Development of Appropriate Test Markings for Optical Scan Voting Machines

Phase 1: Ballot Scanning and Collection
NIST Contract SB1341-10-SE-0745
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by
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1. OVERVIEW

The National Institute of Standards and Technology has been asked to develop a standard set of reference markings representative of the types of marks that voters make on each common type of optical scan / marksense ballot.

As the first step in that development process, during September and December 2010, I scanned over 300 000 ballots at three elections offices. The first 100 000 were scanned at the Clark County, Washington Elections Office in Vancouver, WA. An additional 110 000 ballots were scanned at the Snohomish County, Washington Elections Office in Everett, WA. A final 105 000 were scanned at the Champaign County, IL Elections Office in Urbana, IL.

Where available, ballots which had been duplicated by elections officials were scanned, and the reasons for duplication have been noted. These scans have been sent to NIST on a set of 1 TB SATA drives.

I have also collected publicly available ballots from the 2008 Minnesota United States Senate election, Ann Arbor, Michigan's November 2006 election and the Humboldt County (California) Election Transparency Project.

In subsequent parts of this project, the frequency of various types of ballot markings will be determined and a potential reference set of marks will be developed.

2. EXISTING COLLECTIONS

Minnesota's collection of ballot scans from their 2008 Senate recount are provided on a single DVD. These scans are at 100 dpi, bilevel. Oval targets are used on these ballots. Part of a typical scan is reproduced in Appendix A.

Scans from three Humboldt County, California elections are included on the 1 TB drive labeled “overflow.” These scans are 150 dpi color, but compressed.

Scans from the November 2010 Humboldt County election are submitted on the drives from the December 2010 Champaign County scanning.

Michael Traugott of the University of Michigan has allowed release of his collection of Ann Arbor ballot scans. These scans are 100 dpi, with oval targets. They are in the Ann Arbor folder of the 1 TB drive labeled “overflow.” Part of a typical scan is reproduced in Appendix B.

3. SCANNING

3.1 Scanning Procedure

Ballots from the three participating counties were scanned with two identical Kodak i4200 scanners. These scanners were connected to two computers running Windows 7 with Kodak’s i4000 Series scanner drivers, version 1.33, dated 6/1/2010. Scanning was performed via Kodak’s Capture Desktop Software, version 1.2. *

All enhancements (streak filter, sharpening, etc.) were disabled, adjustments were left at their default positions, and the driver was set to deliver 300 dpi “superior” JPG color files. (In Champaign, the intermediate TIFF files from which the Kodak system generated JPG files were taken directly.) Image data was between 2 and 10 megabytes per ballot side, generally depending upon the amount of printed text. This quality level generated images which vary no more than minimally from completely uncompressed images.

Screenshots of the Kodak dialog box settings are in Appendix C.

Our throughput averaged about 12 000 to 14 000 double sided ballots per full eight hour day.

For comparison purposes, a small number of ballots were scanned at 400 dpi. A comparison of an arrow scanned at 300 and 400 dpi is in Appendix D.

*Certain commercial equipment, instruments, or materials are identified in this paper in order to specify procedures and data sources adequately. Such identification is not intended to imply recommendation or endorsement by the National Institute of Standards and Technology, nor is it intended to imply that the materials or equipment identified are necessarily the best available for the purpose.

The Clark County ballots are for use with Hart Intercivic's vote counting system and use rectangular vote targets. The Clark County ballots were double-sided 21.6 cm x 35.6 cm ("legal" size) heavy white paper, printed in black.

The Snohomish County ballots are for use with the Dominion/Sequoia vote counting system and use "broken arrow" vote targets. The ballots were printed in black on white card stock. The ballot as cast by the voter has a width of 17.1 cm and a height of 40.1 cm.

The Champaign County ballots are for use with Champaign's ES&S vote counting system and use oval vote targets. As Champaign's November turnout is below 100 000, Champaign ballots were scanned from two elections, November 2008 and the February 2008 primary. More than 82 000 ballots were scanned from the November election; these were double sided 21.6 cm x 35.6 cm ("legal" size) heavy white paper, printed in black. Another 23 000 ballots from the preceding primary were scanned as well; these were primarily black on white, but had a colored stripe down the front right side, with different colors used for different parties. The paper from the primary election seemed to be of a somewhat higher quality than that in the November election, though Champaign County had not requested any change in paper.

Scanning and inspection was performed by four persons during regular office hours at the Washington state elections offices. At Champaign, County Clerk Mark Shelden allowed us to stay evenings and to come in on weekends as well. (Time logs and approximate ballots per day information has been provided to NIST.)

Mr. Shelden, as well as Tim Likness, Elections Supervisor for Clark County and Garth Fell, Elections Manager for Snohomish County, were very generous with their time in setting us up with ballots and answering our questions.

Every ballot was hand-inspected for marks which might not be visible or easily interpreted on the scans, and logs of such marks were generated. We cast a wide net, resulting in notations for roughly one percent of inspected ballots. Most notations were for food or beverage stains. Scanning was completed at each site in nine work days or less. Elections office staff were not involved in the scanning itself, though they were helpful and cooperative throughout.

3.2 Unusual Ballots

All ballots were inspected for unusual situations which might not be easily interpreted off of a scan. In Vancouver, fewer than 500 ballots were singled out as being problematic. Of these, 75 % to 80 % were singled out for various stains. Some stains were clearly identifiable

as from food or coffee, but the majority were not further identifiable. Other ballots were singled out for burn marks, scotch tape, glue remnants, tears, creases, and so on. Among the notations:

- dirt, dirt smudge, dirty fingerprints
- food, coffee, oil, unknown stains
- cigarette burns, unknown burns
- crayon
- scotch tape, scotch tape over smashed bug
- yellow sticky paper
- glitter pen, shimmer ink
- cat threw up (though not verifiable)

Glitter pen was detected on only six ballots of the 100 000. For better or worse, most other markings are about as easy to make sense of from scans as from the original ballots. Complete scanning logs are provided, with the reasons for flagging ballots from a particular batch written on the back.

In Snohomish County, more ballots were singled out, because we also singled out ballots that had any sort of curiosity to them, including colored inks, poorly made marks, and so on. Glitter pen was only detected on six of the Snohomish County ballots.

In addition to ballots with the problems noted in the Clark County list above, we noted many ballots with print problems in Snohomish County. In many cases the ballots appeared to have tracks from rollers involved in the printing process. In other cases, there was substantial bleed through from one part of the folded ballot to another, especially around the Presidential race. This was light enough that it probably posed no problem to the counting equipment, but it was noticeable.

We also noted ballots which were damaged near the folds, and noted several cases where yellow bleed through artifacts were left on ballots which had been stored in contact with heavily inked ballots.

Finally, because the Snohomish County ballots use “broken arrow” style, we noted several cases where ball point pens had appeared to damage the tips of the printed arrows, seeming to scrape some ink away. While this almost certainly did not cause any problems with counting equipment, it is worth noting that the landmarks can be damaged by writing instruments.

Ballots which were noted as unusual were removed from main scanning batches and scanned as “exception batches,” immediately before or after their main batch.

Examples from Everett ballots which we pulled aside, but which did not carry an Everett duplication label are reproduced in Appendix E, renamed with explanations of why we separated them:

- circled.jpg
- cutatfold.jpg
- foodstain.jpg
- heavyerasure.jpg
- largecheckmarks.jpg
- redink.jpg
- shortlines.jpg
- unmarkedwritein.jpg

The complete set of separated items is available in the log files.

As mentioned earlier, the ballots in Champaign were notably cleaner than those in the two Washington Counties. However, because they were not legally required to be preserved but had instead been kept by Mr. Shelden because he felt they might serve as a resource at some point, they were stored in rubber-banded stacks in round garbage cans. This resulted in some ballot batches being bent or otherwise damaged such that scanning was not feasible. We were, however, able to scan more than 81 000 of the 84 000 ballots cast in November, and we have no reason to believe that the markings on the remaining November ballots would vary from the markings on those we scanned. We were also able to scan 23 000 ballots from the primary and 800 ballots from November which were “spoiled” by the voter. These ballots were marked “SPOILED” and retrieved from the voter, who was then issued a new ballot.

As in Snohomish County, we set aside all ballots that we felt could be characterized as “unusual,” including those which were marked in unusual ways.

Probably because the majority of Champaign ballots were cast at precincts, Champaign’s ballots had far fewer stains and tears than those from the two Washington State mail-in counties. In addition, there were very few (< 20) remade ballots.

Champaign County provided pens to voters labeled with the phrase “FILL THE OVAL” and an example of a filled oval. This was Mr. Shelden’s idea. Perhaps because of these pens, we noticed many ballots which were voted with both filled ovals and x’s through the filled ovals. There is no way to know whether the x’s were inked before or after the ovals were filled.

Only one of the ballots we scanned at Champaign had been marked with glitter pen. Paul Miller, Senior Technology/Policy Analyst for the Washington Secretary of State, suggests that the more frequent use of unusual writing implements on the Washington state ballots can reasonably be attributed to Washington state's use of vote-by-mail; at polling places, the elections department can provide appropriate writing implements.

A sampling of the major types of unusual marks from Champaign County is reproduced in Appendix F, named with explanations of why they are unusual. The largest group of ballots which we separated out were labeled as having "roller marks" or "printer marks" -- they appear to have picked up some extraneous print or lines from contact with wet ink on surfaces.

Some Champaign County ballots were marked via the AutoMARK marking device. This device prints marks for the voter after the voter interacts with a computer interface. The marks made by the Automark are easily distinguished from those made directly by voters, and an example image of an Automark-marked ballot is included in the list below.

- ambig-x.tif (a crossed out vote in a race with only one choice)
- automark.tif (an example of the appearance of an Automark marked ballot)
- borderline-miss.tif (a poorly marked ballot)
- circles.tif
- initialed-correction.tif
- no-is-how-i-vote.tif (a voter's indication of their vote)
- overmarked.tif (vote marks extending to column boundary)
- printed-with-white-spot.tif (a poorly printed ballot)
- punch-through-front.tif and punch-through-back.tif
- race-crossed-out.tif (a voter eliminating a race)
- roller-marks-overprint.tif (a poorly printed ballot)
- tear-back.tif and tear-front.tif (a torn ballot)
- underline-party.tif (a voter consistently underlining the party)
- x-and-fill.tif (a voter both filling the oval and marking an X)
- yellow-artifact-center-gray.tif (yellow aging from contacting ink?)
- yes-at-end.tif (a voter writes after the end of the contests)

3.3 Streaking

Many of the ballot images show narrow vertical colored streaks lightening black regions. These might have been hidden by enabling Kodak's "streak filter," but this would simply

have masked their existence, while the image data would still have reflected the streaks seen by the optics. An example of the streaking is in Appendix G.

A Kodak representative confirmed that these streaks were due to dust in the scanning process. Most paper dust that causes this streaking is on the outer side of the scanner's glass, and is easily removed between batches. However, dust also accumulates over time on the inside of the scanning glass, which requires removal of the glass for cleaning. Dust also lands, rarely, in the interior of the scanner's camera units, which necessitates removal of the camera units.

Kodak made a service call at the start of our Champaign scanning and removed and cleaned the camera units of our scanners. We did not call them, however, at the previous two sites. Even after Kodak's service call, dust remained a substantial problem at Champaign, possibly due to low humidity. We set up a humidifier and did very frequent cleaning of glass, but dust reaccumulated rapidly.

The streaks are easily detected as narrow vertical colored strips interrupting black regions. They are not anticipated to have a major impact on our mark analysis.

Their impact on the average intensity or tint of a marked area will be highest in the Clark County ballots, where heavy black rectangles bound the vote opportunity. A typical streak, where present, lightens dark regions in a vertical strip of one or two pixels in width. For comparison, the thickness of the riser in the letter "i" in the Hart ballot instruction text is three pixels, and a Hart vote box is 100 pixels wide.

Because the intended first step in classifying marks will be to determine the average intensity and tint of each vote opportunity region, a thick streak, especially if lined up with the edge of a vote opportunity, could potentially cause an extremely light or thin vote or hesitation mark to be missed. We will be careful to check for such cases.

In Snohomish County, where broken-arrow style vote opportunities are used, we will be characterizing marks based on whether the lines filling in between arrows contain gaps. We will be careful to ensure that any analysis used cannot be fooled by the presence of a streak.

As the classification of marks proceeds, we will report any impact of the streaking on the classification process.

3.4 Skewing

The scans are generally oriented close to vertically, but not perfectly so. No deskewing will be applied to the images, but by comparing the location of landmarks on each ballot image with the corresponding location of the landmarks on a completely unrotated image, we will be able to adjust the locations which we crop when isolating individual vote opportunities. Except in the very rare (or possibly nonexistent) case of rotations of more than 1.5 degrees we will not deskew the vote marks themselves.

3.5 Duplicated Ballots

In Clark County, duplicated ballot originals were not available for the November 2008 election. They had either been discarded or misplaced, but were not locatable in the ballot set made available. The elections office kindly provided some duplicated originals from their February 2010 special election.

According to Tim Likness, Clark County's Elections Supervisor, the primary reason for which Clark County would duplicate ballots was damage in the bar coded regions of the ballot. The damage might take the form of markings, creases, or tears.

A less obvious reason for ballot duplication was the return of a ballot for the wrong precinct. Because Washington state uses vote-by-mail, ballots do not stay within a given polling place. Once ballots are mailed to voters, voters may end up with the wrong ballot. For example, two voters from different precincts may seek to fill out their ballots together, and may each return their friend's ballot in their return envelope. In such cases, the elections office redoes the parts of the ballot which pertain to the correct precinct onto a ballot of the correct type for the precinct.

Clark County ballots were not duplicated when overvotes were located, but were kept by the elections office in separate batches and went through a resolution process. In our logs, batches containing such ballots are indicated as RES OV (Resolution Overvote), while most batches are indicated as AUTO. Other batches were labeled RES WI (Resolution Write In) and RES MISC (Resolution for Miscellenous Reasons).

Fragments from typical duplicated ballots from Vancouver's August 2009 election are found in Appendix H, where they are named with an explanation:

- creaselowerrightbarcode.jpg
- inkbarcode.jpg

- liquidbarcode.jpg
- stickybarcode.jpg (damage not very visible)
- tornbybarcode.jpg
- tornintobarcode.jpg
- wrongprecinct.jpg

Snohomish County had a much larger set of duplicated ballots, 16 000 out of a mail-in turnout of 317 537. Approximately 40 % of these were duplicated due to a voter's having crossed out a candidate, as they are instructed to do if they make an error. Snohomish County's existing machines cannot resolve voter intent in such cases, so new ballots are prepared from these ballots. The new ballots are each given a serial number enabling them to be tracked to the duplicated original; the ballots differ from the original in being printed with room for this serial number and staff initials in the instruction area. They are easily identifiable as special cases.

As with Clark, any ballots with visible damage to a bar coded area are duplicated. We also encountered many Snohomish duplicated ballots which appeared to have been cut improperly, leading to registration marks appearing up to approximately 3 mm into the ballot. Neither Snohomish County Elections Manager Garth Fell nor any of us could find anything else wrong with many of these ballots, so we all concluded that they had been duplicated due to the poor cuts.

Examples from Snohomish duplicated ballot originals are in Appendix I, named with explanations:

- dupbounds.jpg (arrows marked beyond normal range)
- dupbrokenline.jpg (incomplete arrow)
- dupconsistenterror.jpg
- dupcrossout.jpg
- dupcrossoutcomment.jpg
- duptorn.jpg
- dupwriteinquestion.jpg (write in without filled arrow)

We did not scan the duplicate ballots generated by the elections office, as these were not filled out by voters, and were done with proper form by elections office staff. The upper region of these ballots was distinctly different than the upper area of originals, printed with blank spaces for elections office staff to fill in.

Snohomish County uses the sample ballot as a Provisional Ballot. The voter indicates their choices on the sample ballot, which is printed on colored paper and looks nothing like the

Sequoia/Dominion ballot. If the provisional is accepted, it is duplicated onto an Sequoia/ Dominion ballot.

The same approach is used for ballots which arrive from other jurisdictions and for federal write-in ballots.

Mr. Fell notes that if a voter uses a consistent pattern in marking their ballot, but one which is not properly read by the equipment, the ballot is duplicated with properly marked arrows. The Washington Secretary of State has a heavily illustrated 81 page document entitled “Voter Intent, Statewide Standards on What is a Vote” at the following address:

http://www.sos.wa.gov/_assets/elections/2009StatewideStandardsonWhatisaVote.pdf

Other reasons included general sloppiness in filling out the ballot, very light markings, torn ballots, improper color of marks, erasures, and marks going outside of the broken-arrow’s fill-in zone. A small group of duplicated originals (perhaps ten) were stored in large plastic bags due to their having been submitted with either heavy soaking or unknown and malevolent-looking stains.

Mr. Fell felt that the 5 % duplication rate for this election was on the high side of normal, and estimated that 2 % to 5 % of ballots in the county are duplicated in most races. The duplication rate may have been higher than average because this was a Presidential race and therefore attracted infrequent voters.

During the extraction of voting arrows from Snohomish ballots, we will be able to determine which such ballots were overvoted. At that point, we will further characterize the remainder of these duplicated ballots to provide percentages of the remaining causes of duplication.

In Champaign County, very few ballots were remade by the elections staff. In general, improperly filled out ballots or damaged ballots are marked “spoiled” at the precinct and the voter is issued a new ballot.

An example of a ballot remade due to an ink spill is found in Appendix J, along with a scan of the envelope in which the ballot was kept.

4. BALLOTS PER DAY

4.1 VANCOUVER

Figures are approximate.

- 10 000 Tuesday 9/7
- 14 000 Wednesday 9/8
- 14 000 Thursday 9/9
- 14 000 Friday 9/10
- 14 000 Monday 9/13
- 15 000 Tuesday 9/14
- 14 000 Thursday 9/16
- 5 000 Friday 9/17

4.2 EVERETT

- 6 000 Monday 9/20
- 13 000 Tuesday 9/21
- 15 000 Wednesday 9/22
- 15 000 Thursday 9/23
- 15 000 Friday 9/24
- 15 000 Monday 9/27
- 15 000 Tuesday 9/28
- 15 000 Wednesday 9/29
- 2 000 Thursday 9/30

4.3 Champaign

- 3 000 Monday 12/6 (screening of ballots, scanning paused)
- 1 500 Tuesday 12/7 (screening of ballots, scanning paused)
- 16 000 Wednesday 12/8
- 19 000 Thursday 12/8
- 15 000 Friday 12/10
- 12 000 Saturday 12/11
- 14 000 Monday 12/13
- 18 000 Tuesday 12/14
- 7 000 Wednesday 12/15

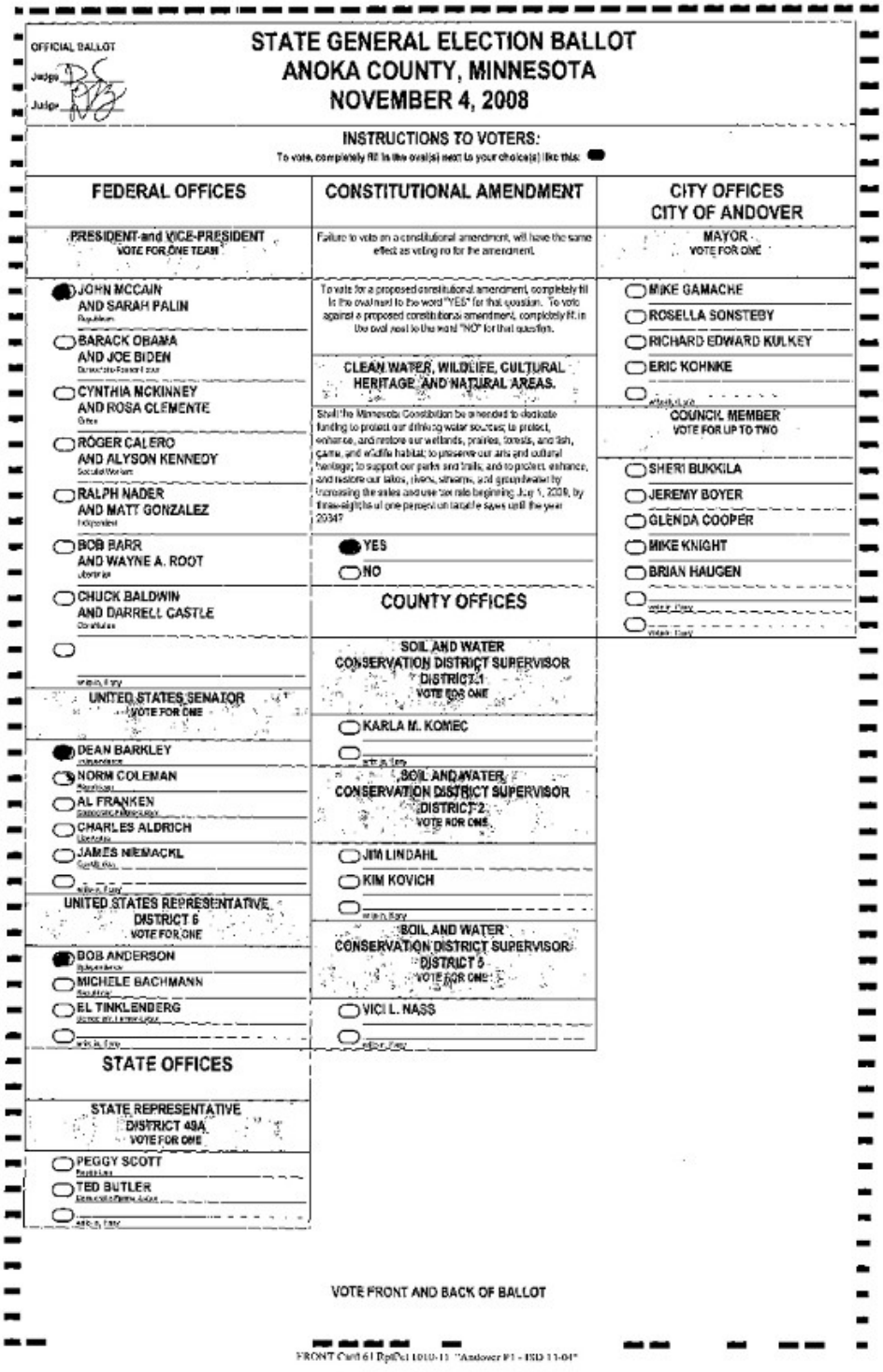
5. TIME LOGS

Time logs have been provided to NIST.

6. NEXT STEPS

I have already begun the process of extracting vote opportunities from the ballots and storing them as fields within Postgresql database tables. The individual mark regions are each represented with 20 to 30 kB of data. The database is initially being populated with identifiers for the ballot from which the mark came, the mark's x and y offsets into its ballot image, the mark region's average red, green, and blue intensities, and the number of pixels the mark spans horizontally and vertically. This information should allow further analyses to focus on marks which do not neatly fill their regions with black.

Appendix A – Image scan from Minnesota, scaled and cropped to fit page



OFFICIAL BALLOT

Judge

Judge

STATE GENERAL ELECTION BALLOT
ANOKA COUNTY, MINNESOTA
NOVEMBER 4, 2008

INSTRUCTIONS TO VOTERS:

To vote, completely fill in the oval(s) next to your choice(s) like this: ●

FEDERAL OFFICES

PRESIDENT and VICE-PRESIDENT
VOTE FOR ONE TEAM

- ● JOHN MCCAIN AND SARAH PALIN — Republican
- ○ BARACK OBAMA AND JOE BIDEN — Democratic-Farmer-Labor
- ○ CYNTHIA MCKINNEY AND ROSA CLEMENTE — Green
- ○ ROGER CALERO AND ALYSON KENNEDY — Socialist Workers
- ○ RALPH NADER AND MATT GONZALEZ — Independent
- ○ BOB BARR AND WAYNE A. ROOT — Libertarian
- ○ CHUCK BALDWIN AND DARRELL CASTLE — Constitution
- ○ _____ write-in, if any

UNITED STATES SENATOR
VOTE FOR ONE

- ● DEAN BARKLEY — Independence
- ○ NORM COLEMAN — Republican
- ○ AL FRANKEN — Democratic-Farmer-Labor
- ○ CHARLES ALDRICH — Libertarian
- ○ JAMES NIEMACKL — Constitution
- ○ _____ write-in, if any

UNITED STATES REPRESENTATIVE DISTRICT 6
VOTE FOR ONE

- ● BOB ANDERSON — Independence
- ○ MICHELE BACHMANN — Republican
- ○ EL TINKLENBERG — Democratic-Farmer-Labor
- ○ _____ write-in, if any

STATE OFFICES

STATE REPRESENTATIVE DISTRICT 49A
VOTE FOR ONE

- ○ PEGGY SCOTT — Republican
- ○ TED BUTLER — Democratic-Farmer-Labor
- ○ _____ write-in, if any

CONSTITUTIONAL AMENDMENT

Failure to vote on a constitutional amendment, will have the same effect as voting no for the amendment.

To vote for a proposed constitutional amendment, completely fill in the oval next to the word "YES" for that question. To vote against a proposed constitutional amendment, completely fill in the oval next to the word "NO" for that question.

CLEAN WATER, WILDLIFE, CULTURAL HERITAGE AND NATURAL AREAS.

Shall the Minnesota Constitution be amended to dedicate funding to protect our drinking water sources; to protect, enhance, and restore our wetlands, prairies, forests, and fish, game, and wildlife habitat; to preserve our arts and cultural heritage; to support our parks and trails; and to protect, enhance, and restore our lakes, rivers, streams, and groundwater by increasing the sales and use tax rate beginning July 1, 2009, by three-eighths of one percent on taxable sales until the year 2034?

- ● YES
- ○ NO

COUNTY OFFICES

SOIL AND WATER CONSERVATION DISTRICT SUPERVISOR DISTRICT 1
VOTE FOR ONE

- ○ KARLA M. KOMEC
- ○ _____ write-in, if any

SOIL AND WATER CONSERVATION DISTRICT SUPERVISOR DISTRICT 2
VOTE FOR ONE

- ○ JIM LINDAHL
- ○ KIM KOVICH
- ○ _____ write-in, if any

SOIL AND WATER CONSERVATION DISTRICT SUPERVISOR DISTRICT 5
VOTE FOR ONE

- ○ VICI L. NASS
- ○ _____ write-in, if any

CITY OFFICES
CITY OF ANDOVER

MAYOR
VOTE FOR ONE

- ○ MIKE GAMACHE
- ○ ROSELLA SONSTEBY
- ○ RICHARD EDWARD KULKEY
- ○ ERIC KOHNKE
- ○ _____ write-in, if any

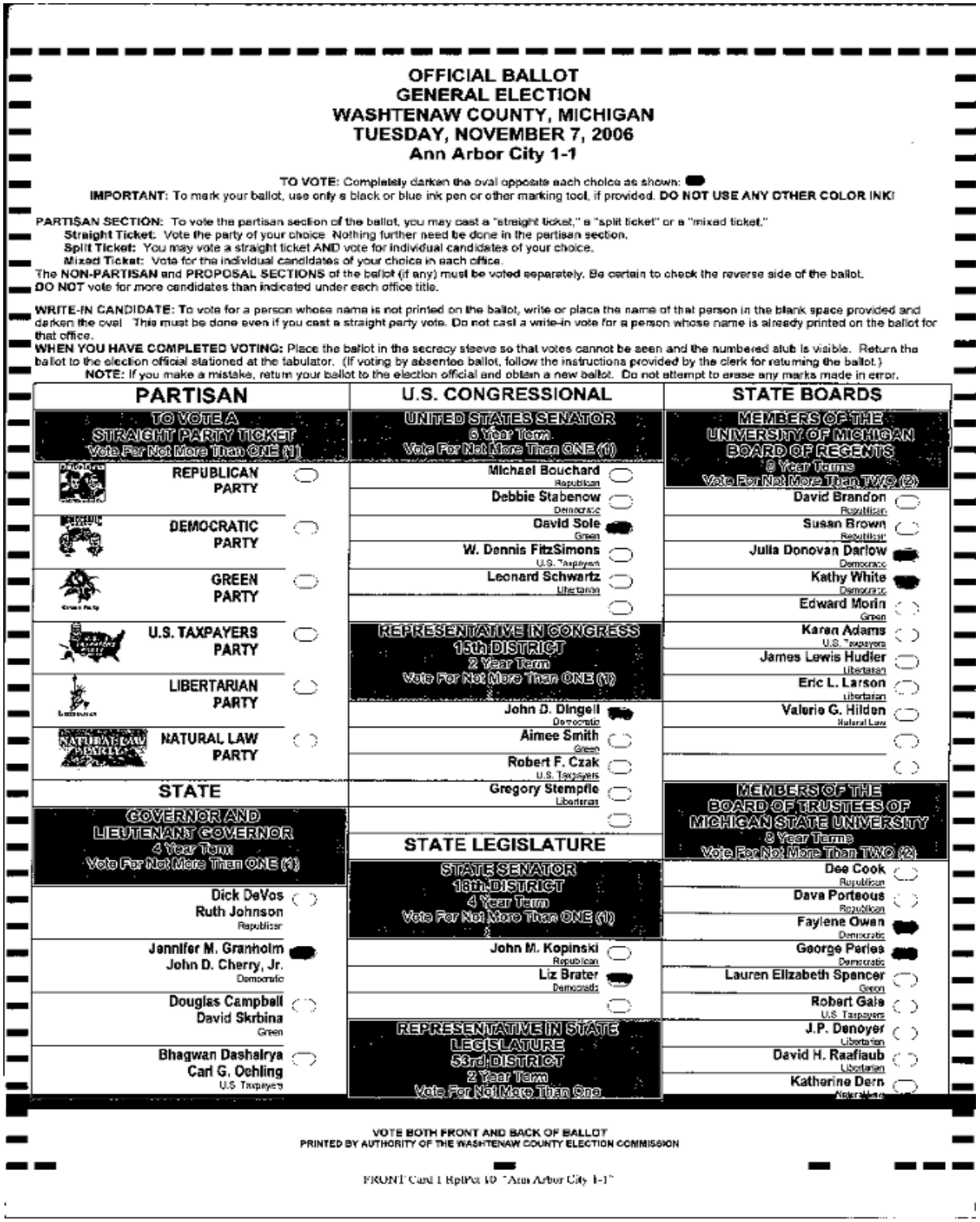
COUNCIL MEMBER
VOTE FOR UP TO TWO

- ○ SHERI BUKKILA
- ○ JEREMY BOYER
- ○ GLENDA COOPER
- ○ MIKE KNIGHT
- ○ BRIAN HAUGEN
- ○ _____ write-in, if any
- ○ _____ write-in, if any

VOTE FRONT AND BACK OF BALLOT

FRONT Card 6 | RptPct 1010-11 "Andover #1 - ISD 11-04"

Appendix B – Image scan from University of Michigan, scaled and center removed to fit page



OFFICIAL BALLOT
GENERAL ELECTION
WASHTENAW COUNTY, MICHIGAN
TUESDAY, NOVEMBER 7, 2006
Ann Arbor City 1-1

TO VOTE: Completely darken the oval opposite each choice as shown:
IMPORTANT: To mark your ballot, use only a black or blue ink pen or other marking tool, if provided. **DO NOT USE ANY OTHER COLOR INK!**

PARTISAN SECTION: To vote the partisan section of the ballot, you may cast a "straight ticket," a "split ticket" or a "mixed ticket."
Straight Ticket: Vote the party of your choice. Nothing further need be done in the partisan section.
Split Ticket: You may vote a straight ticket AND vote for individual candidates of your choice.
Mixed Ticket: Vote for the individual candidates of your choice in each office.
The **NON-PARTISAN** and **PROPOSAL SECTIONS** of the ballot (if any) must be voted separately. Be certain to check the reverse side of the ballot.
DO NOT vote for more candidates than indicated under each office title.

WRITE-IN CANDIDATE: To vote for a person whose name is not printed on the ballot, write or place the name of that person in the blank space provided and darken the oval. This must be done even if you cast a straight party vote. Do not cast a write-in vote for a person whose name is already printed on the ballot for that office.
WHEN YOU HAVE COMPLETED VOTING: Place the ballot in the secrecy sleeve so that votes cannot be seen and the numbered stub is visible. Return the ballot to the election official stationed at the tabulator. (If voting by absentee ballot, follow the instructions provided by the clerk for returning the ballot.)
NOTE: If you make a mistake, return your ballot to the election official and obtain a new ballot. Do not attempt to erase any marks made in error.

PARTISAN

TO VOTE A STRAIGHT PARTY TICKET
Vote For Not More Than ONE (1)

- REPUBLICAN PARTY
- DEMOCRATIC PARTY
- GREEN PARTY
- U.S. TAXPAYERS PARTY
- LIBERTARIAN PARTY
- NATURAL LAW PARTY

STATE

GOVERNOR AND LIEUTENANT GOVERNOR
4 Year Term
Vote For Not More Than ONE (1)

- Dick DeVos / Ruth Johnson — Republican
- Jennifer M. Granholm / John D. Cherry, Jr. — Democratic
- Douglas Campbell / David Skrbina — Green
- Bhagwan Dashairya / Carl G. Oehling — U.S. Taxpayers

U.S. CONGRESSIONAL

UNITED STATES SENATOR
6 Year Term
Vote For Not More Than ONE (1)

- Michael Bouchard — Republican
- Debbie Stabenow — Democratic
- David Sole — Green
- W. Dennis FitzSimons — U.S. Taxpayers
- Leonard Schwartz — Libertarian

REPRESENTATIVE IN CONGRESS
15th DISTRICT
2 Year Term
Vote For Not More Than ONE (1)

- John D. Dingell — Democratic
- Aimee Smith — Green
- Robert F. Czak — U.S. Taxpayers
- Gregory Stempfle — Libertarian

STATE LEGISLATURE

STATE SENATOR
18th DISTRICT
4 Year Term
Vote For Not More Than ONE (1)

- John M. Kopinski — Republican
- Liz Brater — Democratic

REPRESENTATIVE IN STATE LEGISLATURE
53rd DISTRICT
2 Year Term
Vote For Not More Than One

STATE BOARDS

MEMBERS OF THE UNIVERSITY OF MICHIGAN BOARD OF REGENTS
8 Year Terms
Vote For Not More Than TWO (2)

- David Brandon — Republican
- Susan Brown — Republican
- Julia Donovan Darlow — Democratic
- Kathy White — Democratic
- Edward Morin — Green
- Karen Adams — U.S. Taxpayers
- James Lewis Hudler — Libertarian
- Eric L. Larson — Libertarian
- Valerie G. Hilden — Natural Law

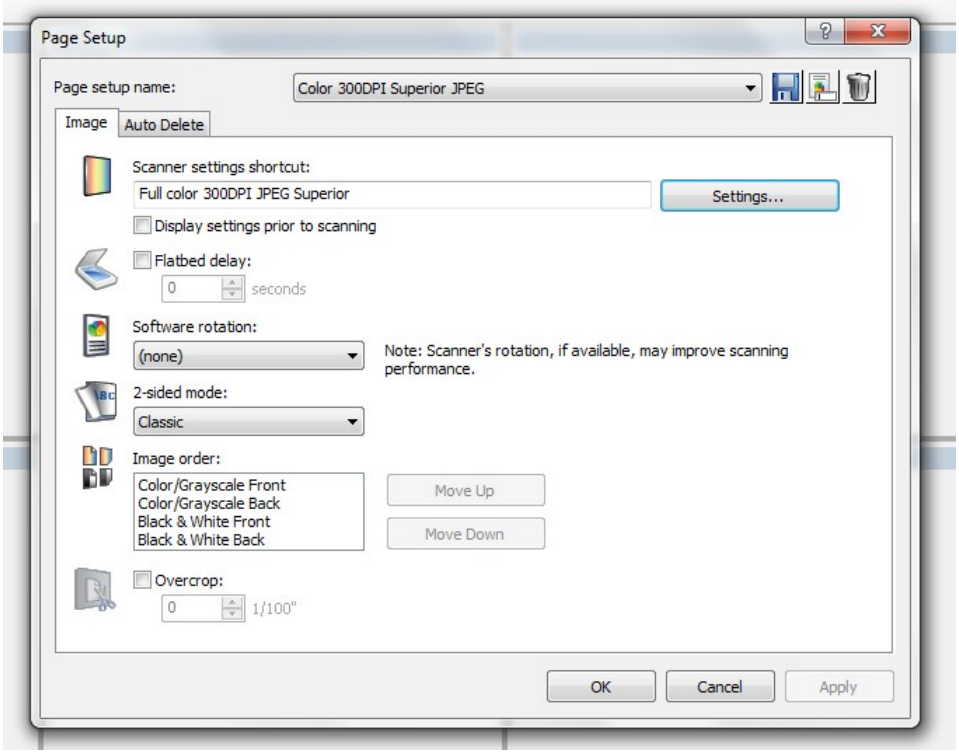
MEMBERS OF THE BOARD OF TRUSTEES OF MICHIGAN STATE UNIVERSITY
8 Year Terms
Vote For Not More Than TWO (2)

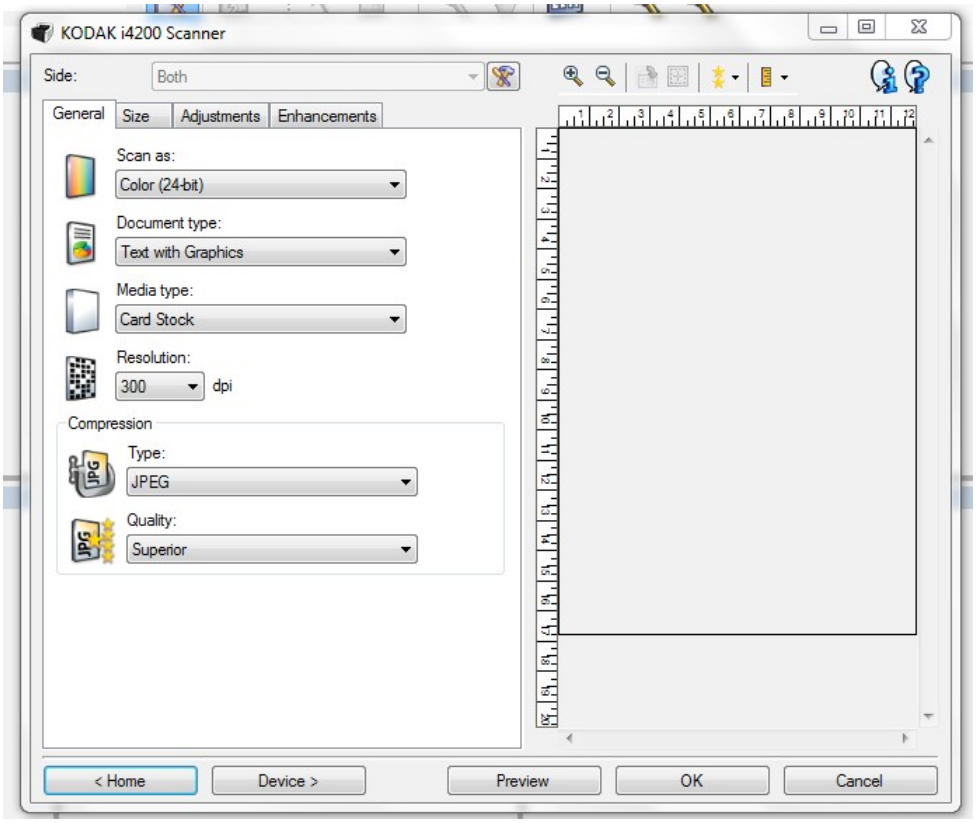
- Dee Cook — Republican
- Dava Porteous — Republican
- Faylene Owan — Democratic
- George Perles — Democratic
- Lauren Elizabeth Spencer — Green
- Robert Gale — U.S. Taxpayers
- J.P. Denoyer — Libertarian
- David H. Raaflaub — Libertarian
- Katherine Dern — Natural Law

VOTE BOTH FRONT AND BACK OF BALLOT
PRINTED BY AUTHORITY OF THE WASHTENAW COUNTY ELECTION COMMISSION

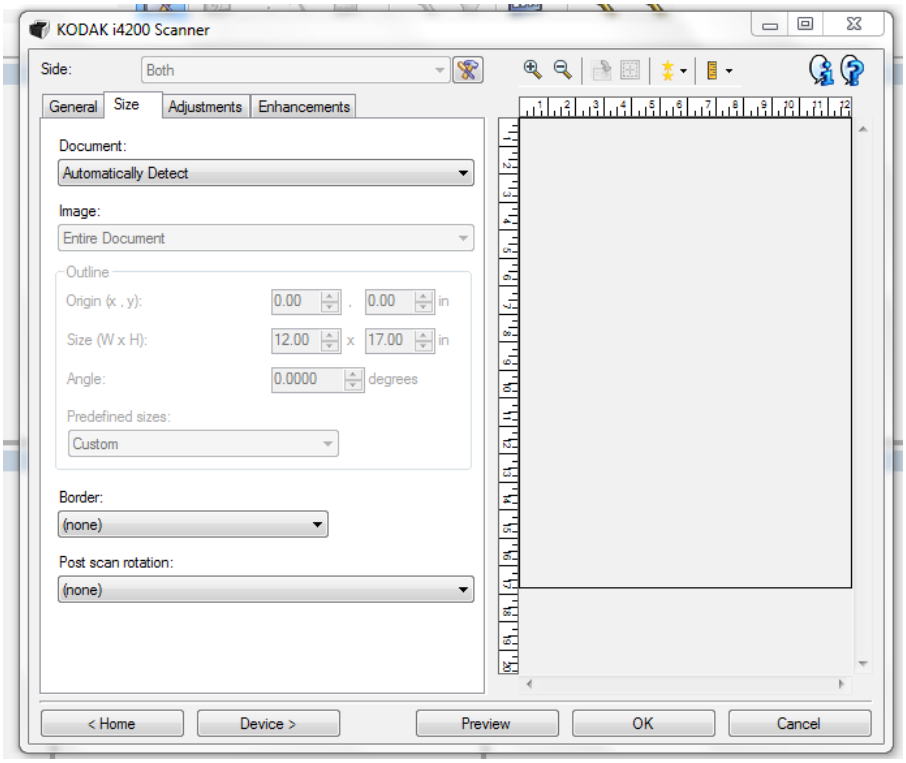
FRONT Card 1 RptPct 19 "Ann Arbor City 1-1"

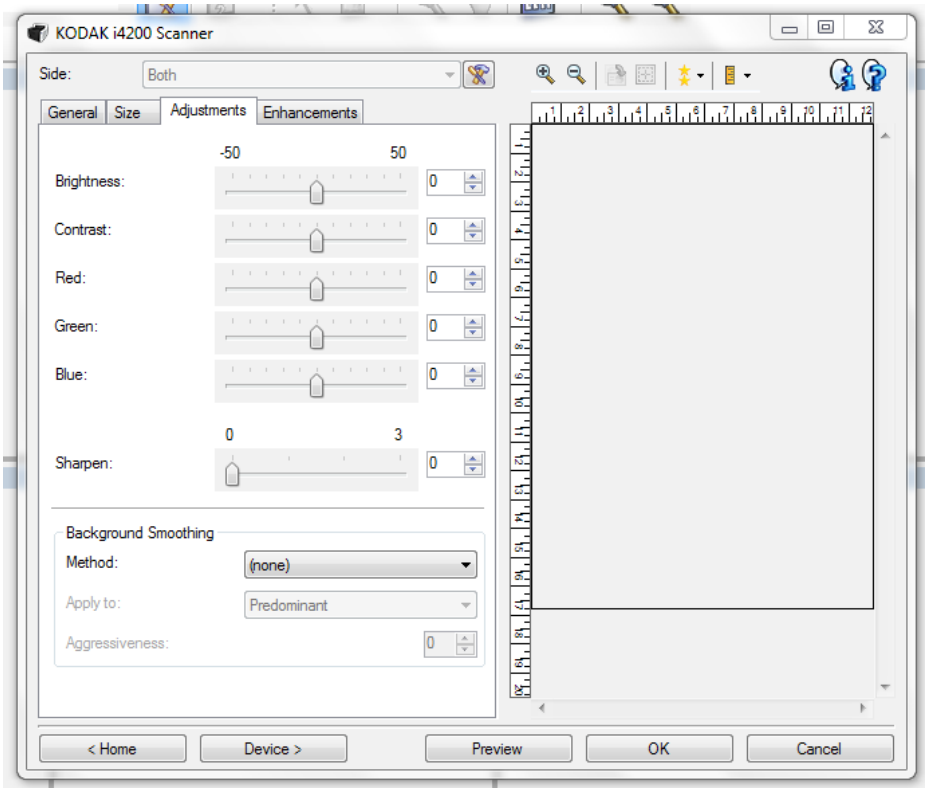
Appendix C – Kodak i4200 Dialog Box Settings



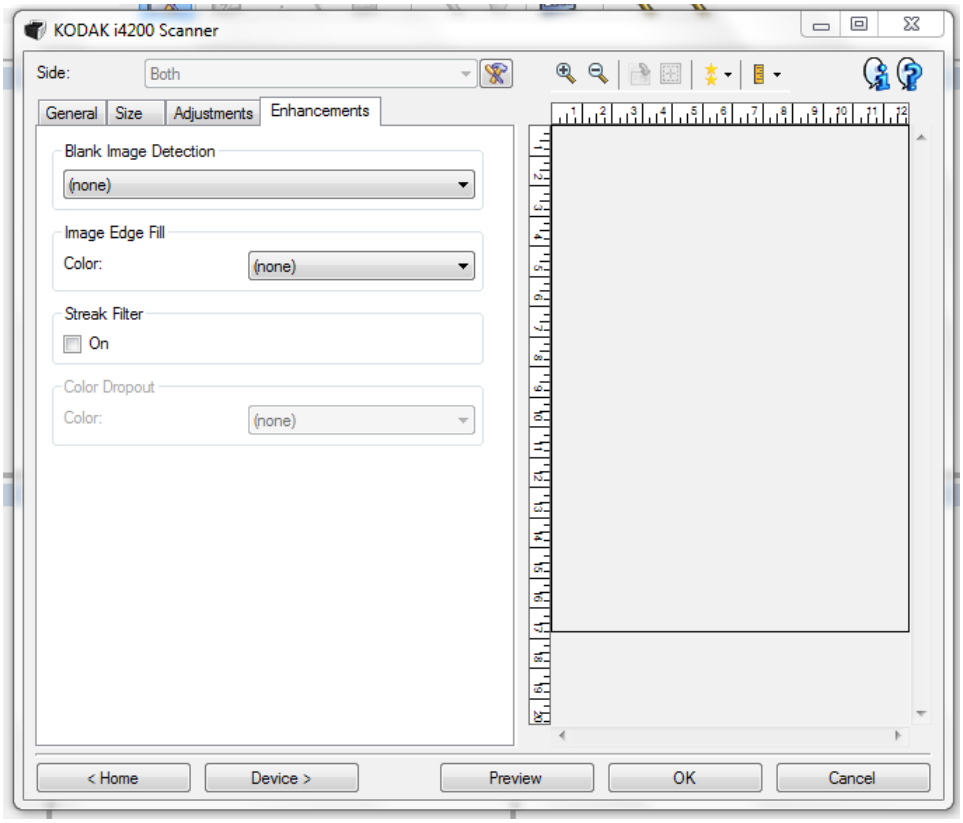


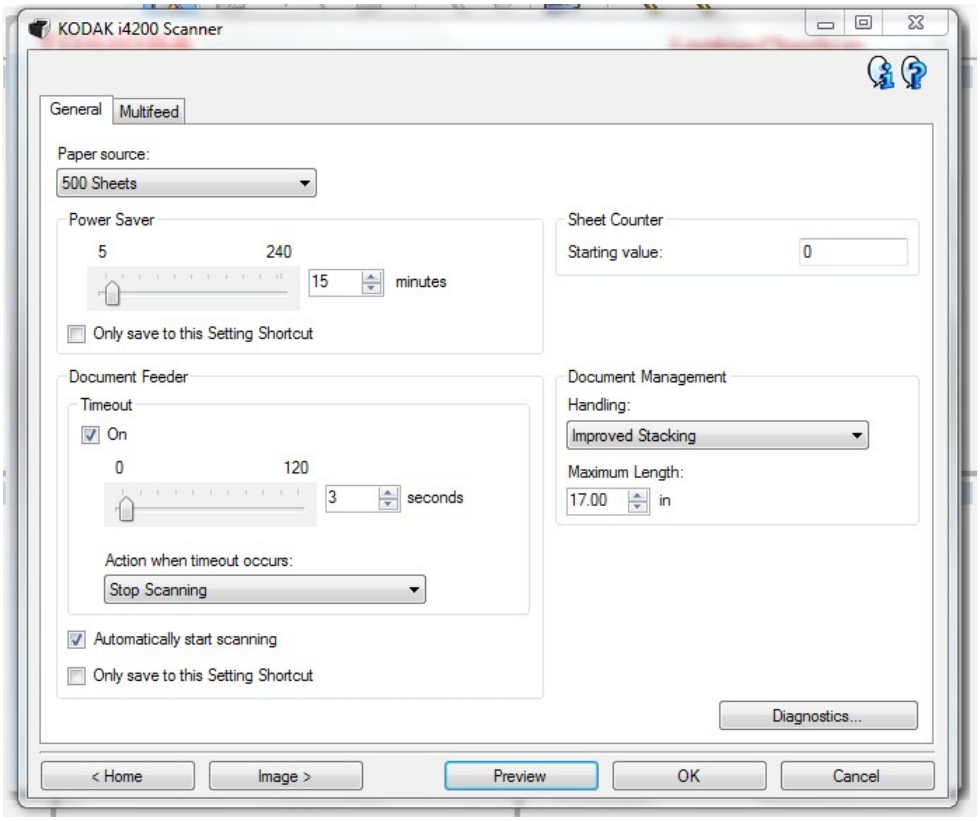
Appendix C – Kodak i4200 Dialog Box Settings



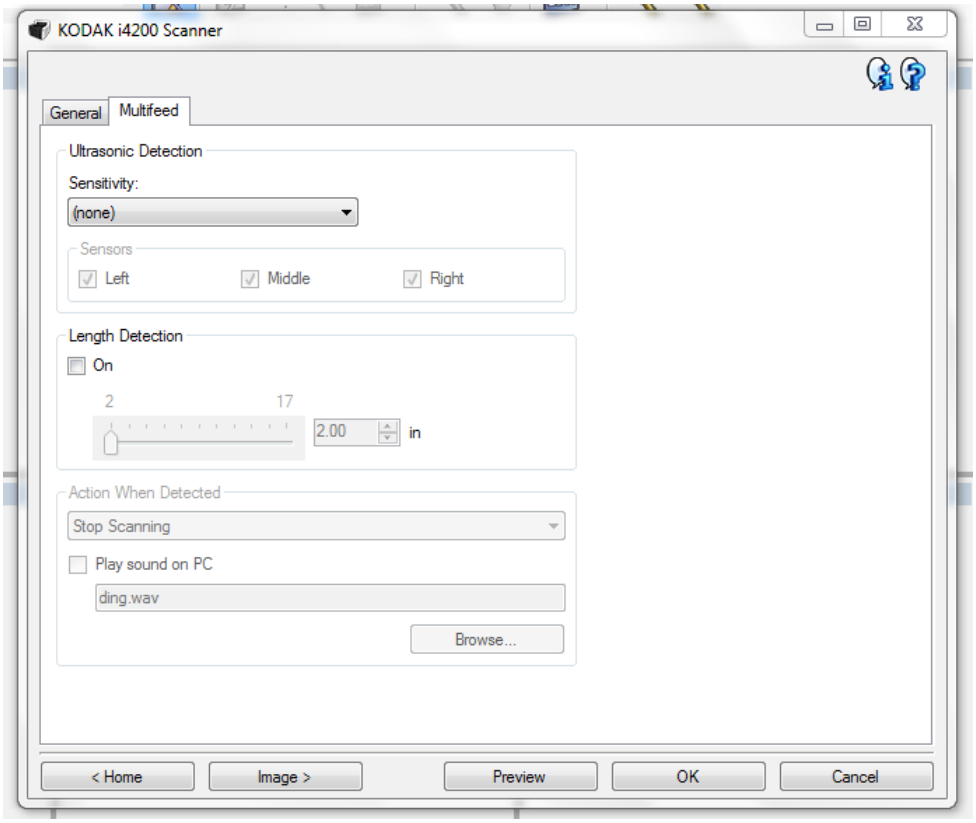


Appendix C – Kodak i4200 Dialog Box Settings





Appendix C – Kodak i4200 Dialog Box Settings



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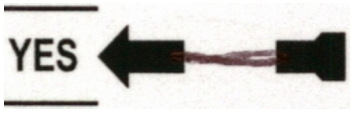

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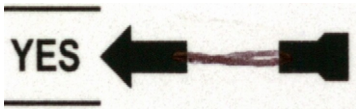
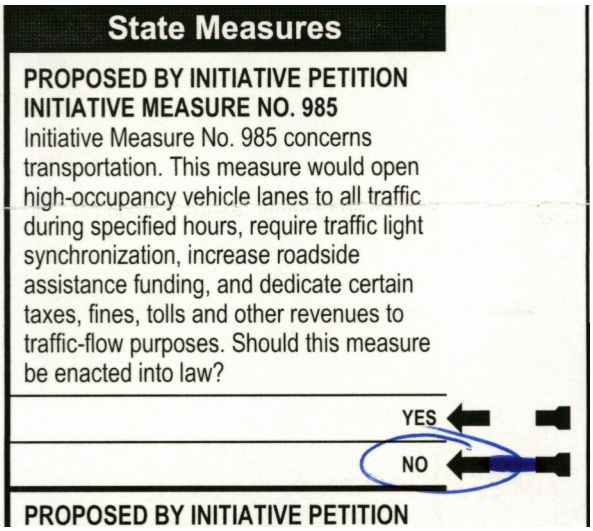
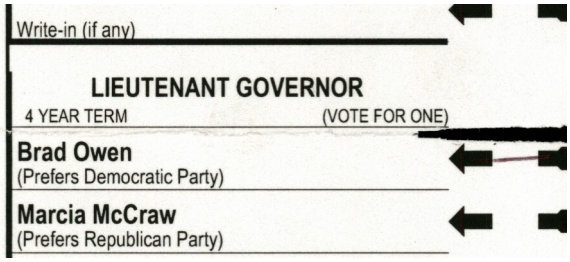


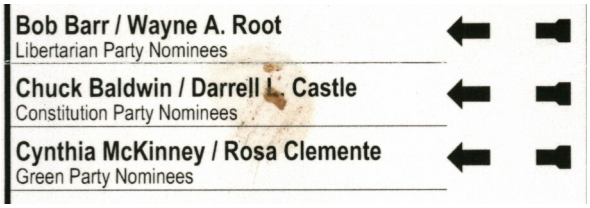
circled.jpg



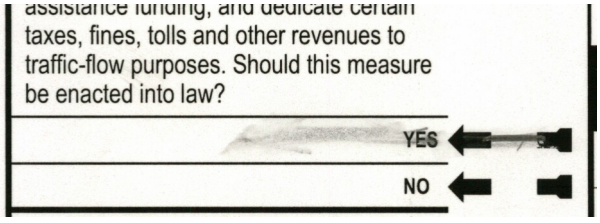
cutatfold.jpg



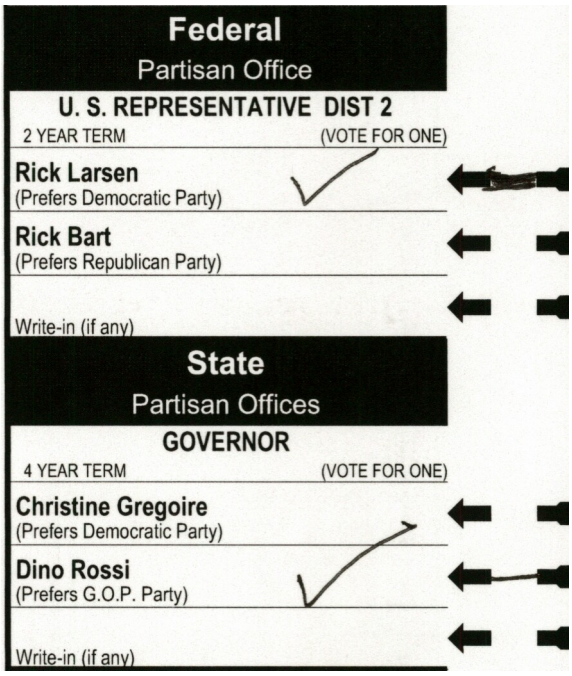
foodstain.jpg



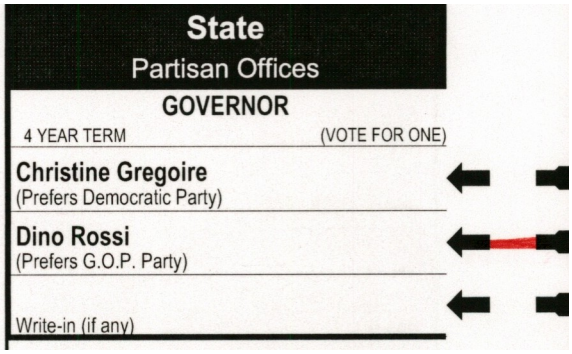
heavyerasure.jpg



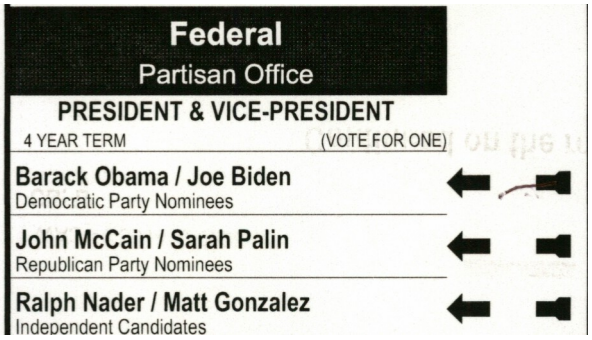
largecheckmarks.jpg



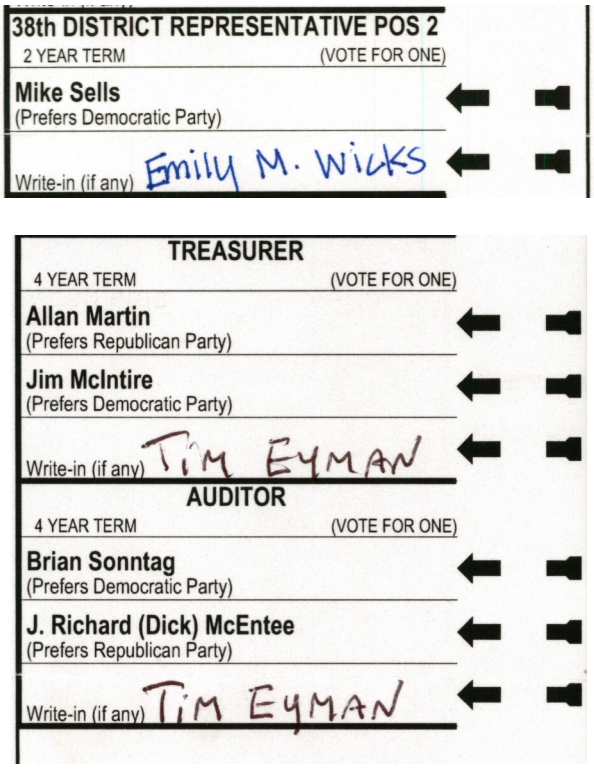
redink.jpg



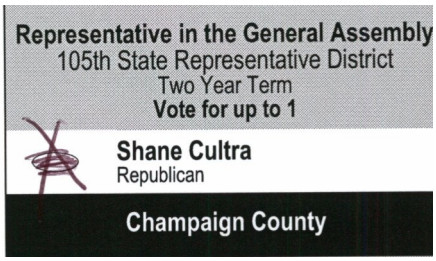
shortlines.jpg



unmarkedwritein.jpg

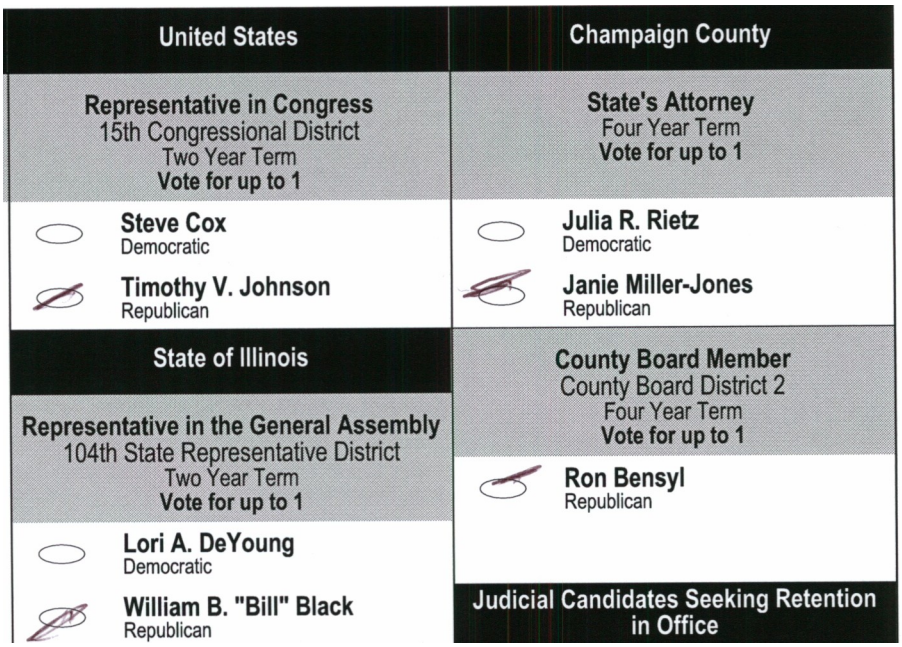


ambig-x.tif

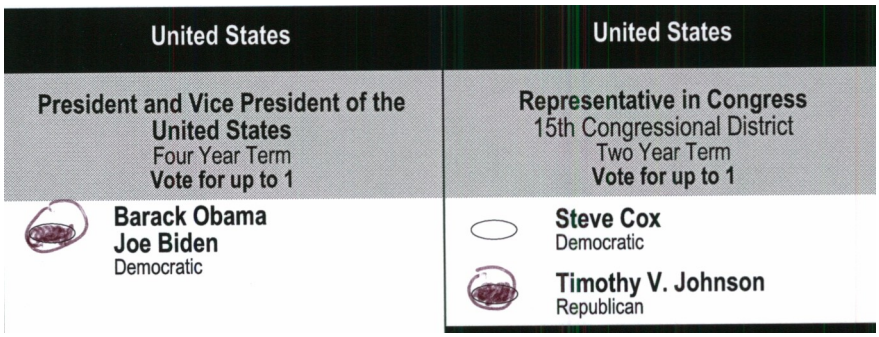


automark.tif (size doubled)

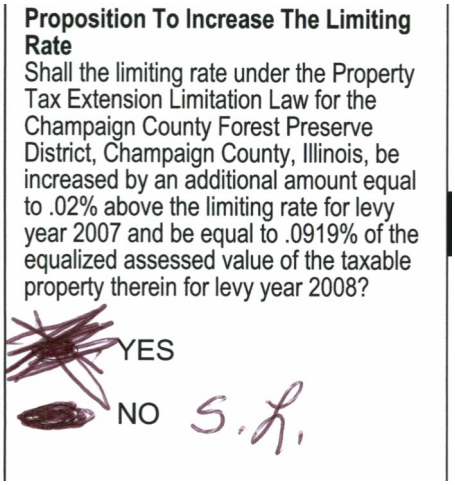
borderline-miss.tif



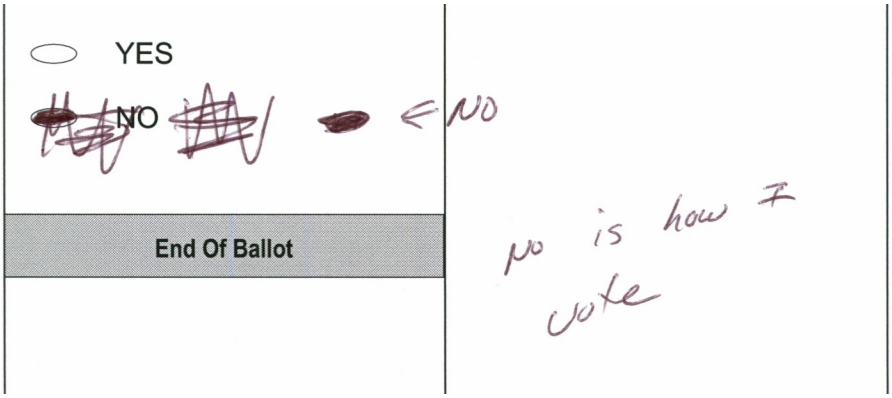
circles.tif



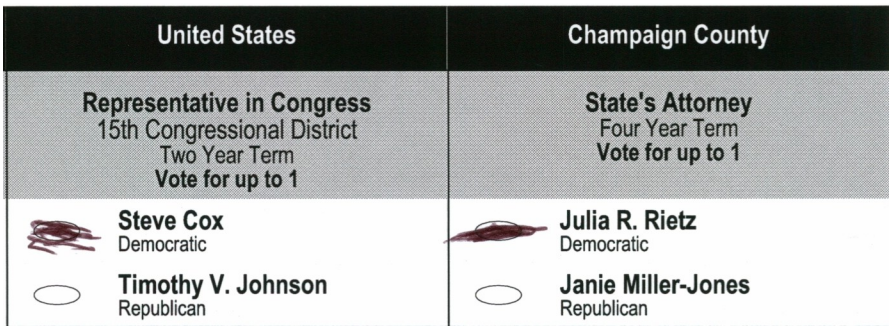
initialed-correction.tif



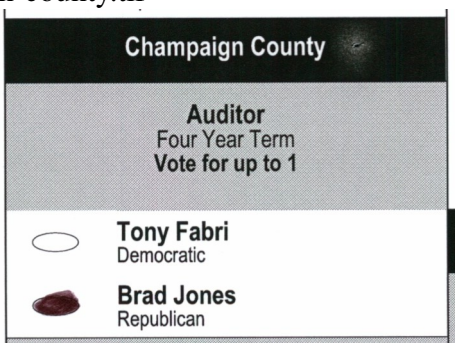
no-is-how-i-vote.tif



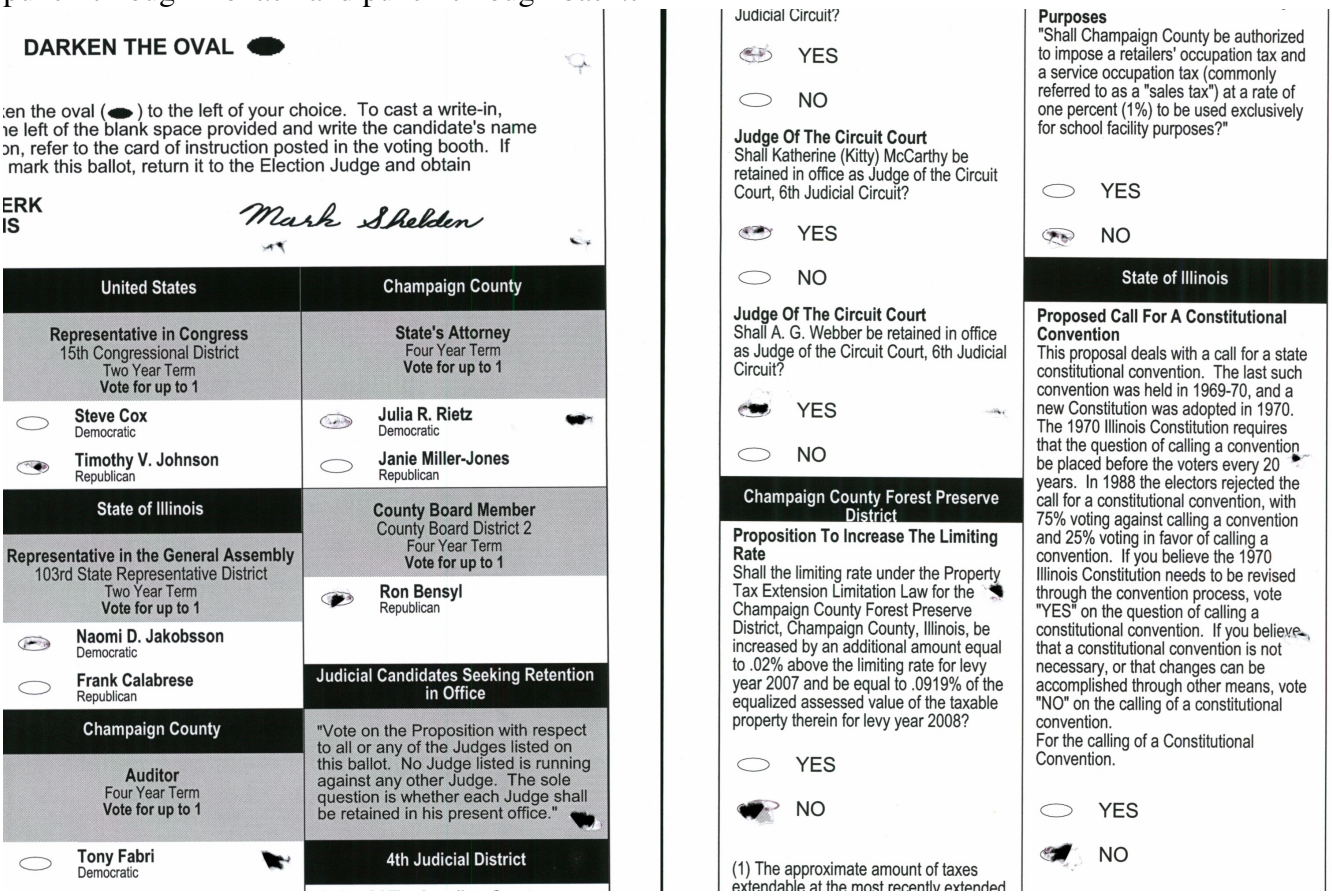
overmarked.tif



printed-with-white-spot-champaign-county.tif



punch-through-front.tif and punch-through-back.tif



DARKEN THE OVAL

en the oval ( ) to the left of your choice. To cast a write-in, ne left of the blank space provided and write the candidate's name on, refer to the card of instruction posted in the voting booth. If mark this ballot, return it to the Election Judge and obtain

ERK
IS

Mark Shelden

United States

Representative in Congress
15th Congressional District
Two Year Term
Vote for up to 1

- Steve Cox — Democratic
- Timothy V. Johnson — Republican

State of Illinois

Representative in the General Assembly
103rd State Representative District
Two Year Term
Vote for up to 1

- Naomi D. Jakobsson — Democratic
- Frank Calabrese — Republican

Champaign County

Auditor
Four Year Term
Vote for up to 1

- Tony Fabri — Democratic

Champaign County

State's Attorney
Four Year Term
Vote for up to 1

- Julia R. Rietz — Democratic
- Janie Miller-Jones — Republican

County Board Member
County Board District 2
Four Year Term
Vote for up to 1

- Ron Bensyl — Republican

Judicial Candidates Seeking Retention in Office

"Vote on the Proposition with respect to all or any of the Judges listed on this ballot. No Judge listed is running against any other Judge. The sole question is whether each Judge shall be retained in his present office."

4th Judicial District

Judicial Circuit?

- YES
- NO

Judge Of The Circuit Court
Shall Katherine (Kitty) McCarthy be retained in office as Judge of the Circuit Court, 6th Judicial Circuit?

- YES
- NO

Judge Of The Circuit Court
Shall A. G. Webber be retained in office as Judge of the Circuit Court, 6th Judicial Circuit?

- YES
- NO

Champaign County Forest Preserve District

Proposition To Increase The Limiting Rate
Shall the limiting rate under the Property Tax Extension Limitation Law for the Champaign County Forest Preserve District, Champaign County, Illinois, be increased by an additional amount equal to .02% above the limiting rate for levy year 2007 and be equal to .0919% of the equalized assessed value of the taxable property therein for levy year 2008?

- YES
- NO

(1) The approximate amount of taxes extendable at the most recently extended

Purposes
"Shall Champaign County be authorized to impose a retailers' occupation tax and a service occupation tax (commonly referred to as a "sales tax") at a rate of one percent (1%) to be used exclusively for school facility purposes?"

- YES
- NO

State of Illinois

Proposed Call For A Constitutional Convention
This proposal deals with a call for a state constitutional convention. The last such convention was held in 1969-70, and a new Constitution was adopted in 1970. The 1970 Illinois Constitution requires that the question of calling a convention be placed before the voters every 20 years. In 1988 the electors rejected the call for a constitutional convention, with 75% voting against calling a convention and 25% voting in favor of calling a convention. If you believe the 1970 Illinois Constitution needs to be revised through the convention process, vote "YES" on the question of calling a constitutional convention. If you believe that a constitutional convention is not necessary, or that changes can be accomplished through other means, vote "NO" on the calling of a constitutional convention.
For the calling of a Constitutional Convention.

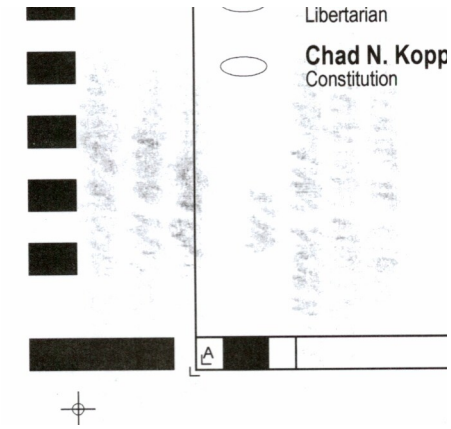
- YES
- NO

race-crossed-out.tif

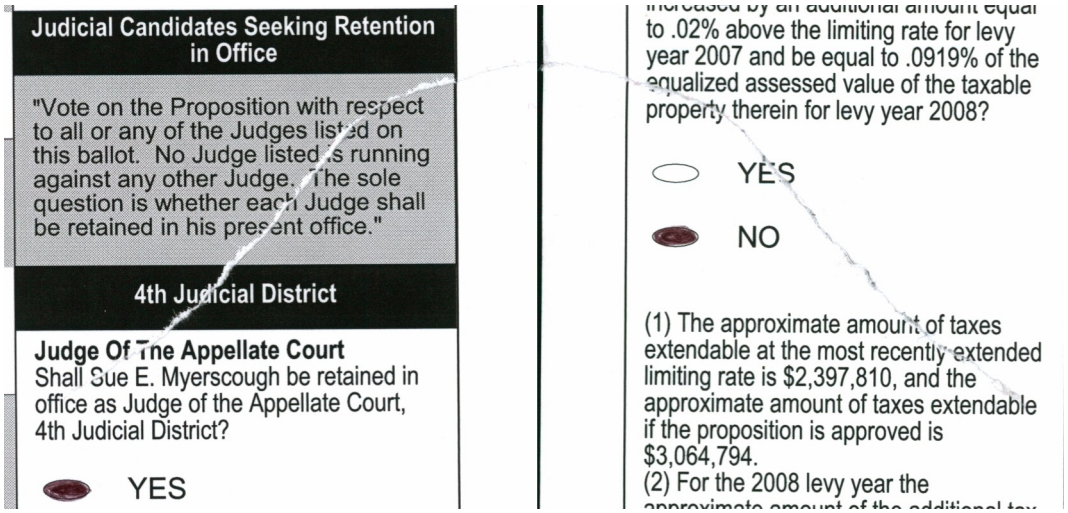
State's Attorney
Four Year Term
Vote for up to 1

- Julia R. Rietz — Democratic
- Janie Miller-Jones — Republican

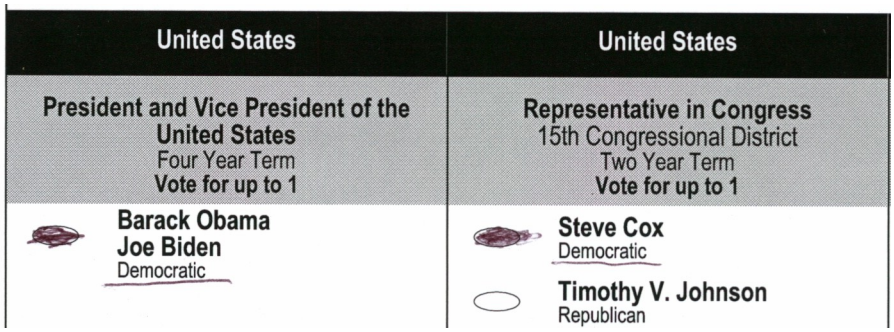
roller-marks-overprint.tif



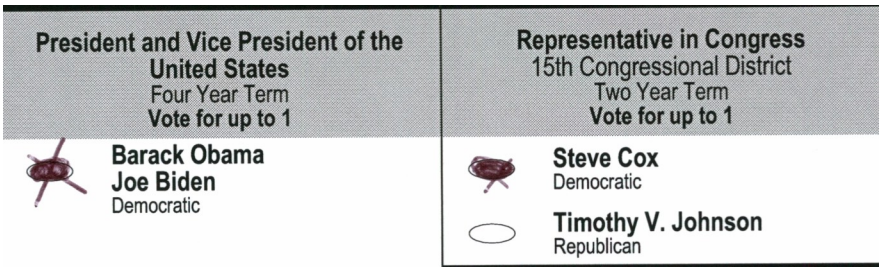
tear-back.tif and tear-front.tif



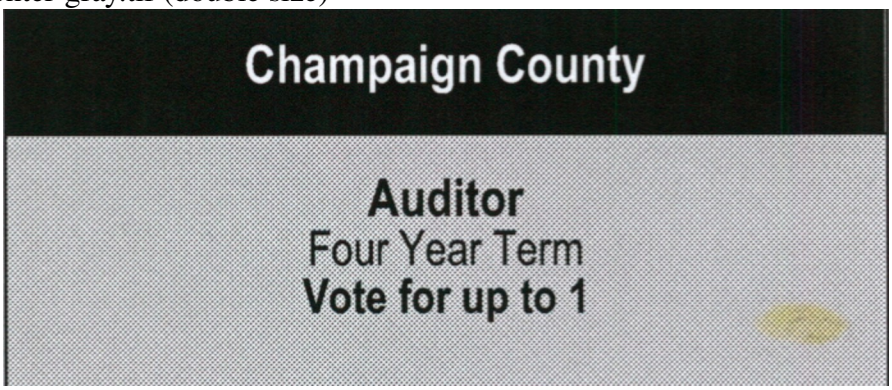
underline-party.tif



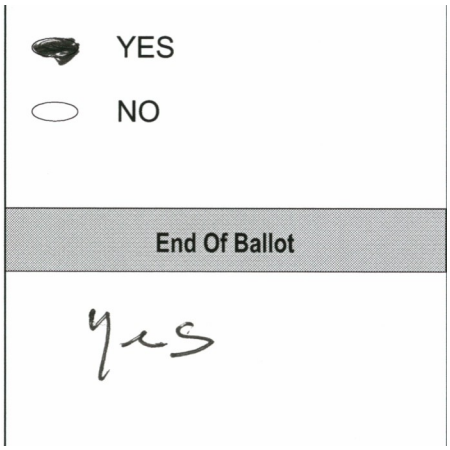
x-and-fill.tif



yellow-artifact-center-gray.tif (double size)

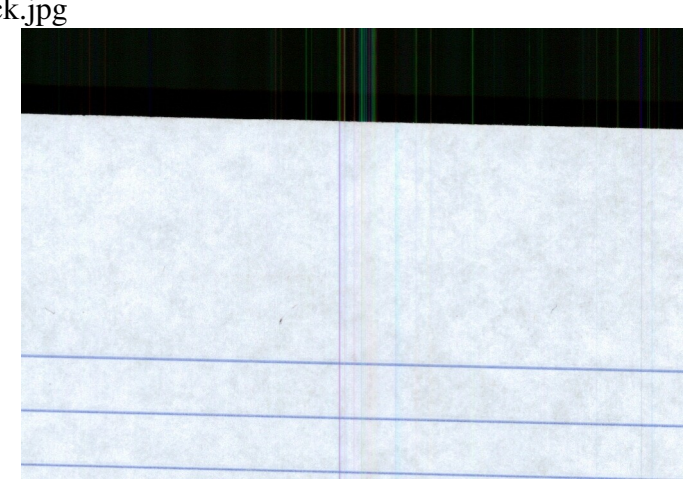


yes-at-end.tif

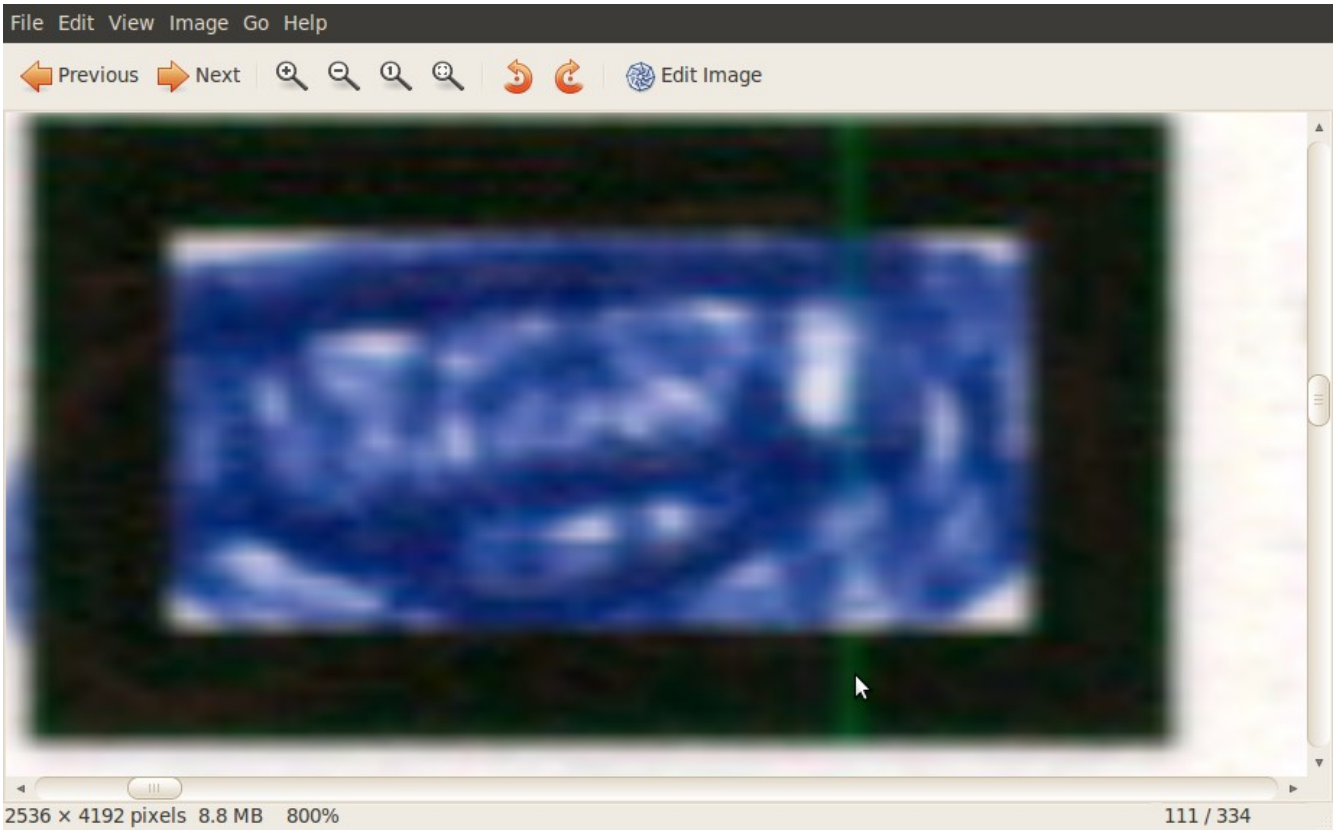


Appendix G – Example of streaking during scanning

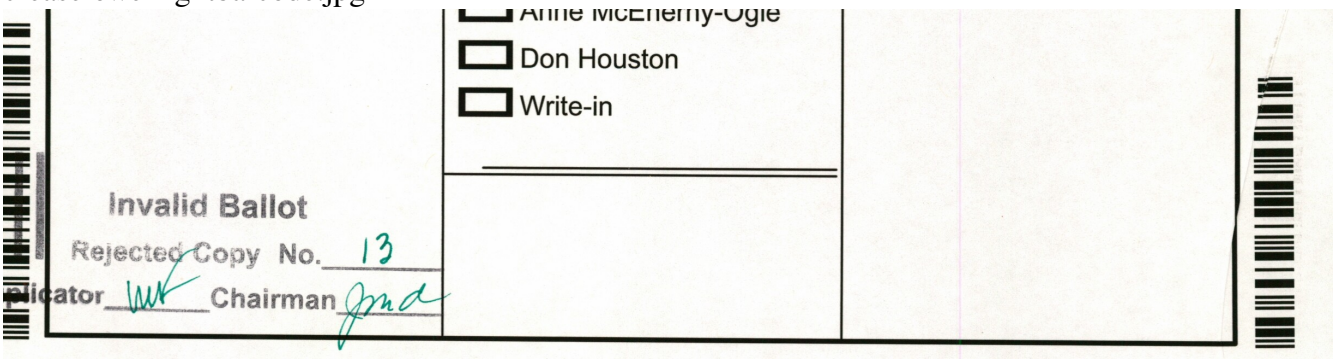
dust-streaks-against-black.jpg



dust-streak-through-magnified-mark.png

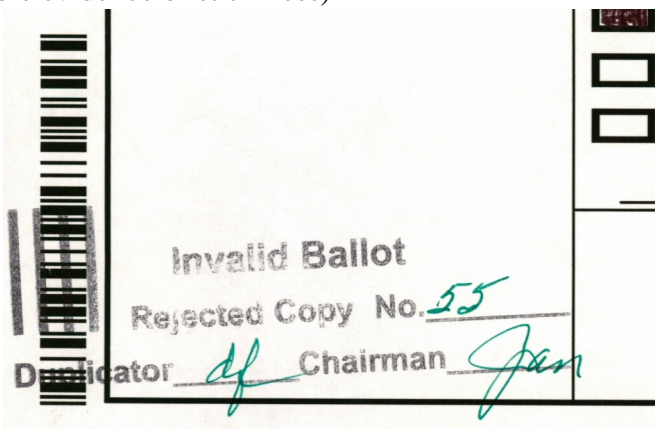


creaselowerrightbarcode.jpg

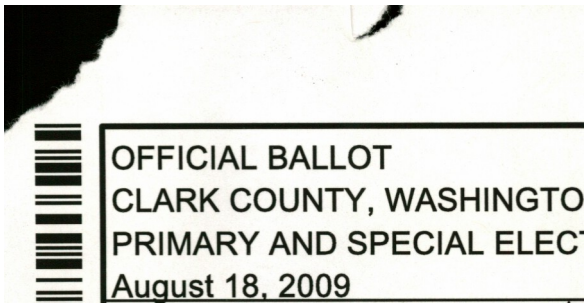


inkbarcode.jpg

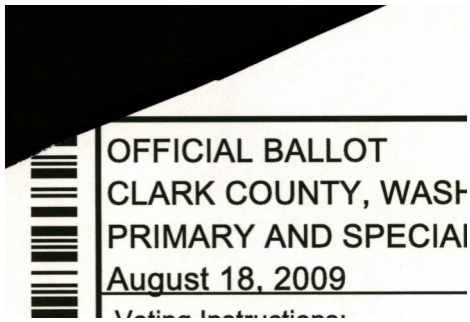
stickybarcode.jpg (no visible evidence of stickiness)



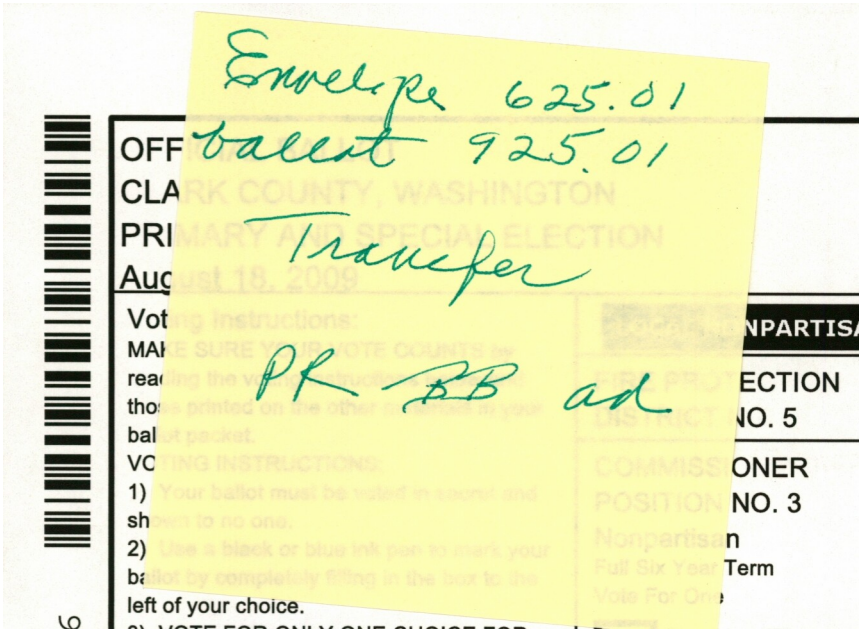
tornbybarcode.jpg



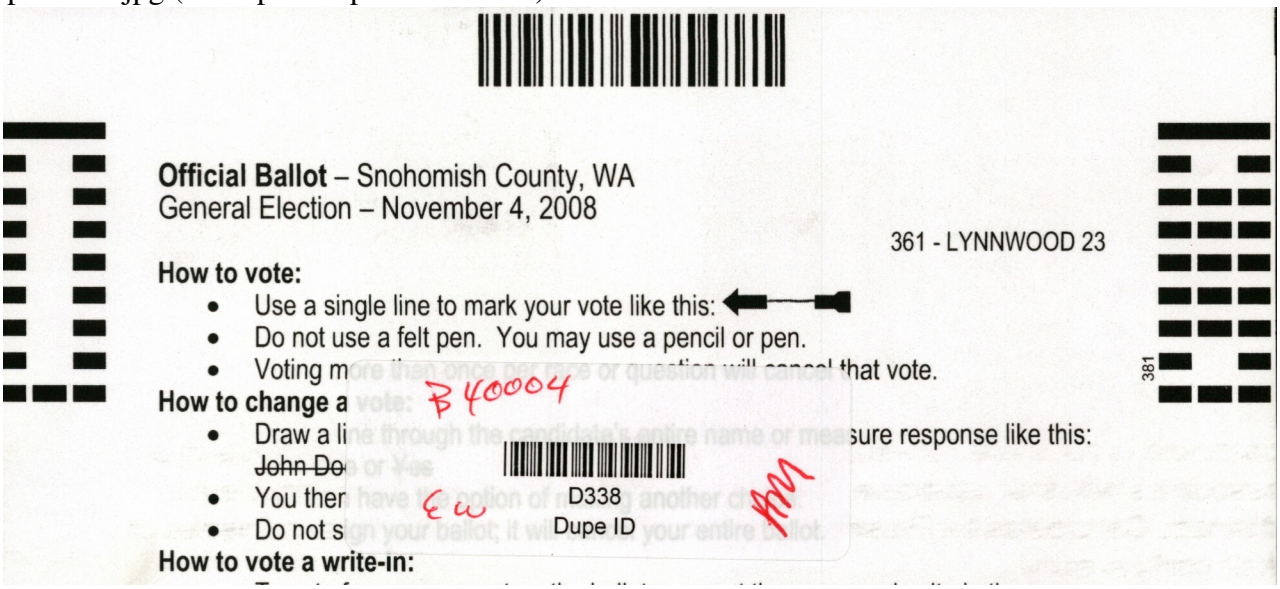
tornintobarcode.jpg



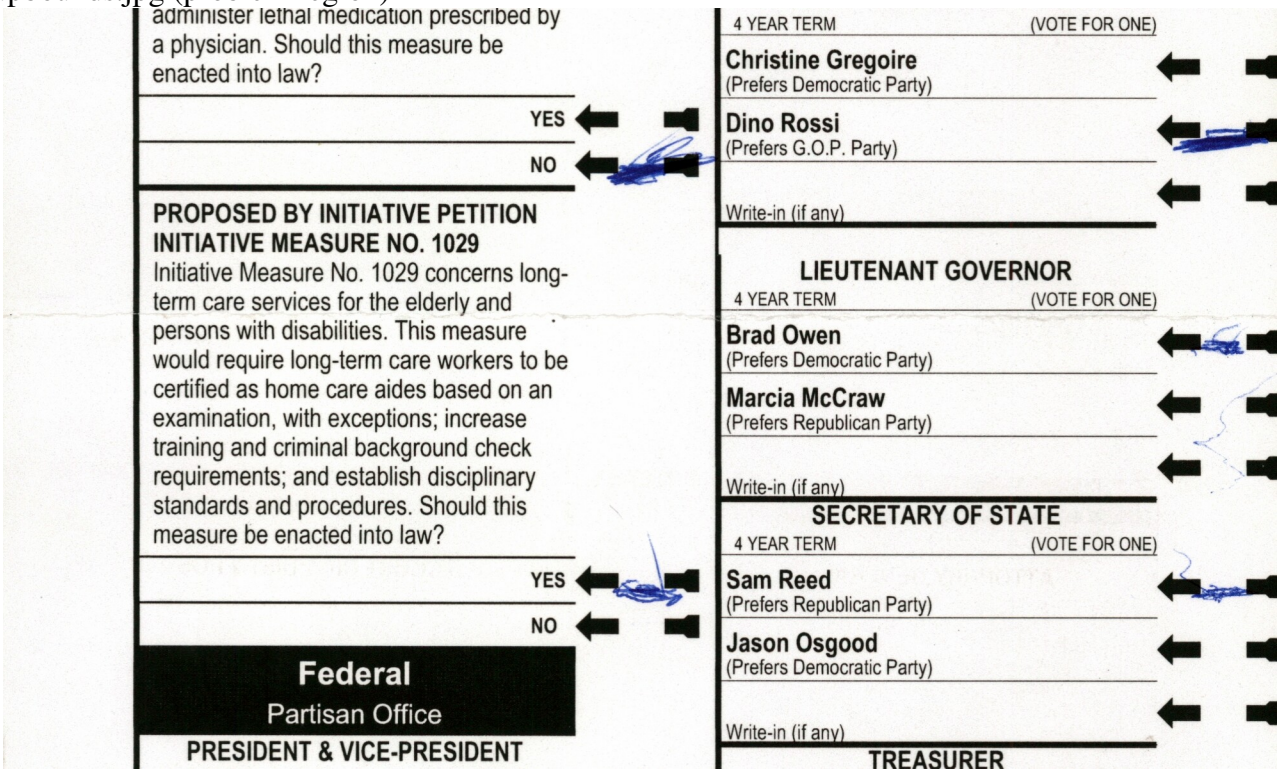
wrongprecinct.jpg



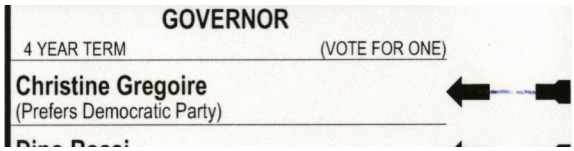
dupbounds.jpg (a sample “duplicated” label)



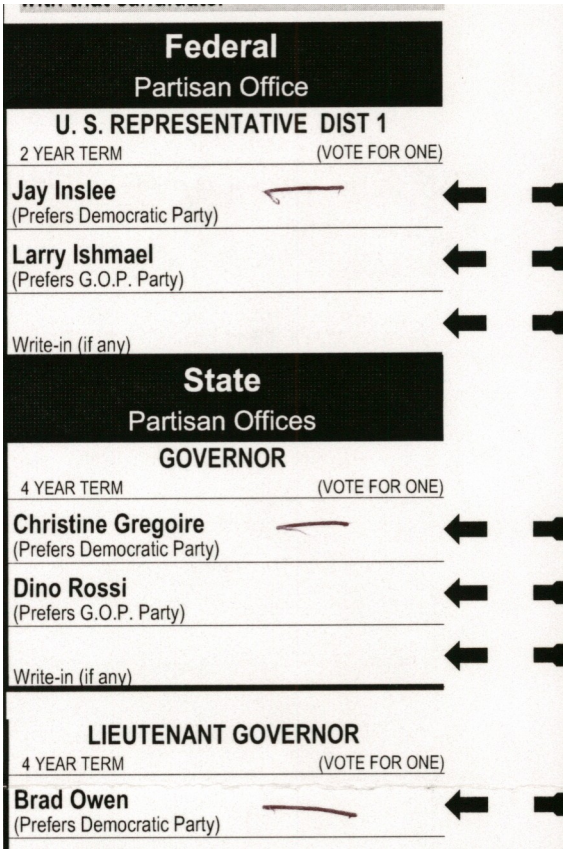
dupbounds.jpg (problem region)



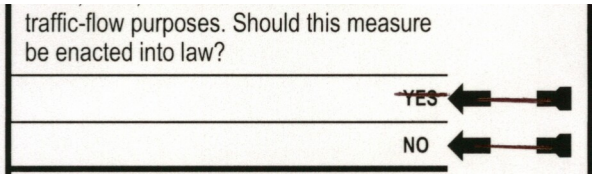
dupbrokenline.jpg



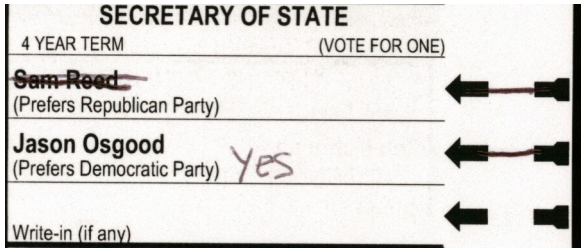
dupconsistenterror.jpg



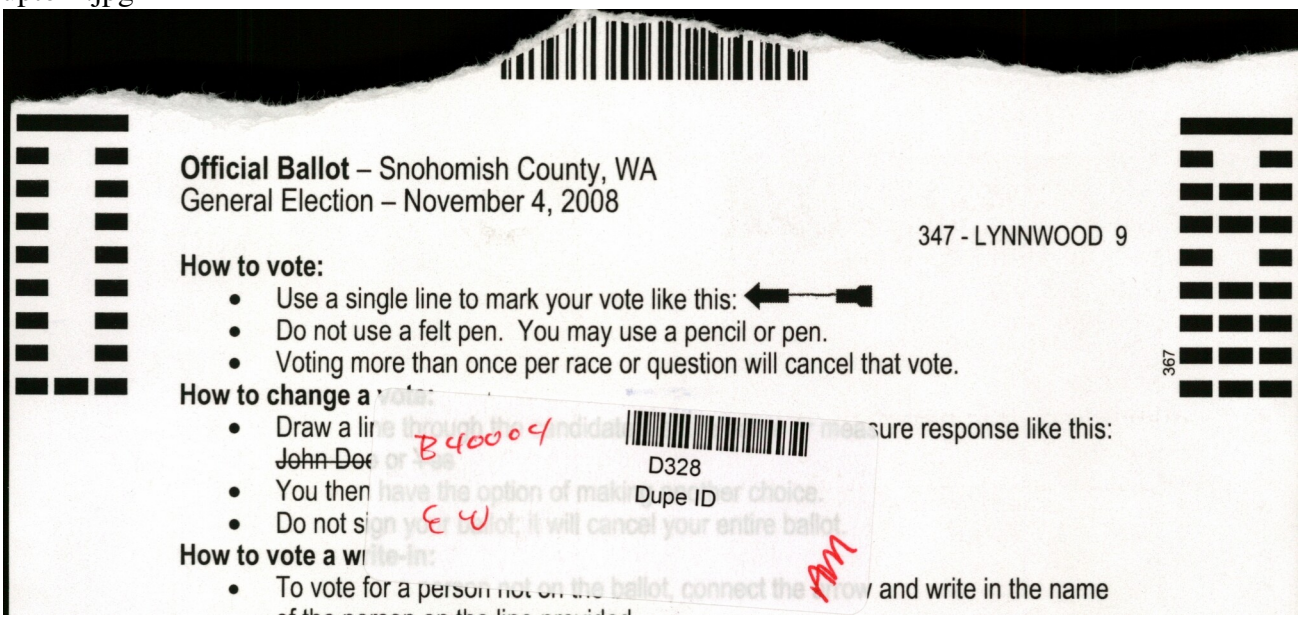
dupcrossout.jpg



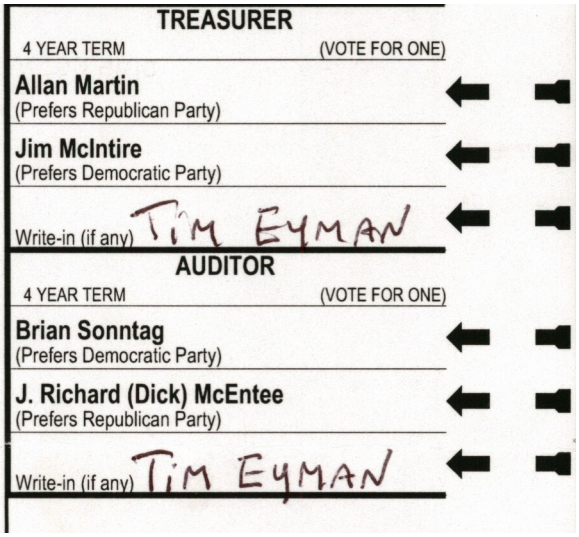
dupcrossoutcomment.jpg



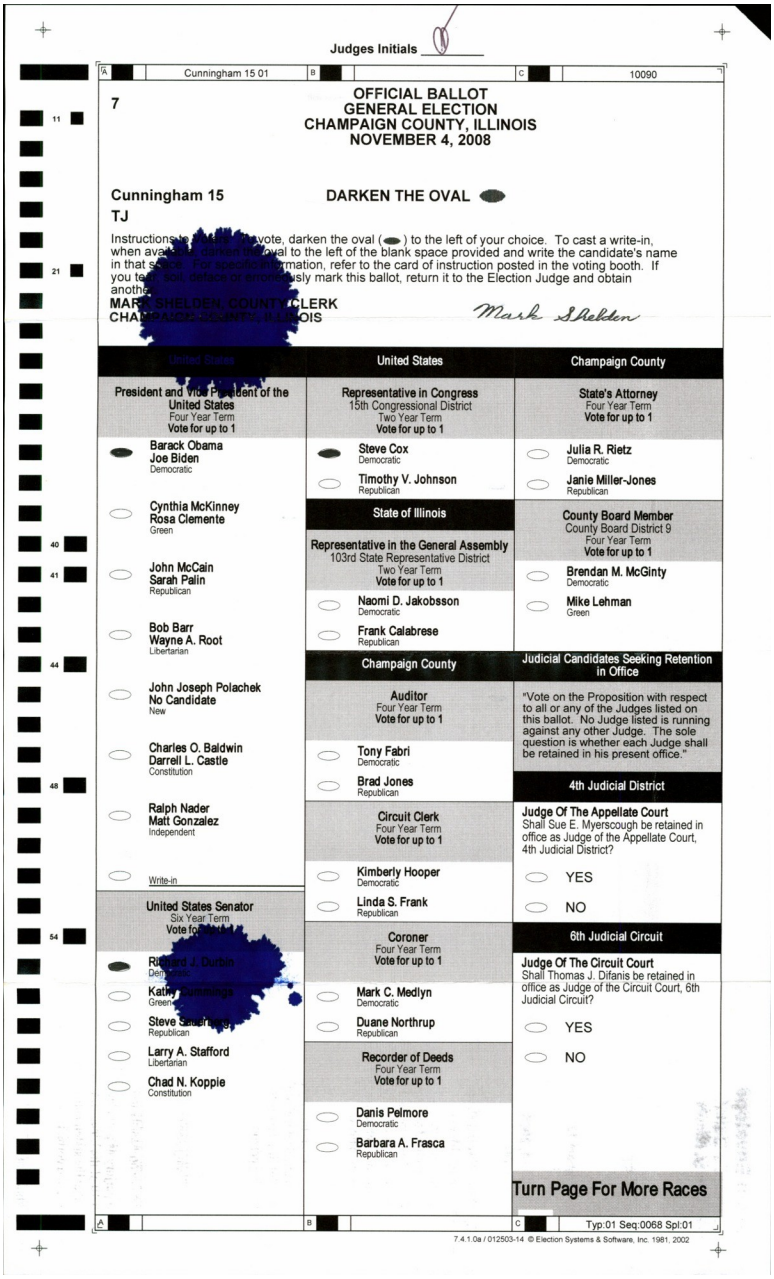
duptorn.jpg



dupwriteinquestion.jpg



Appendix J – Example of Champaign "Remade" Ballot



Judges Initials

A Cunningham 15 01 B C 10090

7

OFFICIAL BALLOT
GENERAL ELECTION
CHAMPAIGN COUNTY, ILLINOIS
NOVEMBER 4, 2008

Cunningham 15
TJ

DARKEN THE OVAL

Instructions to vote, darken the oval ( ) to the left of your choice. To cast a write-in, when available, darken the oval to the left of the blank space provided and write the candidate's name in that space. For specific information, refer to the card of instruction posted in the voting booth. If you tear, soil, deface or erroneously mark this ballot, return it to the Election Judge and obtain another.

MARK SHELDEN, COUNTY CLERK
CHAMPAIGN COUNTY, ILLINOIS

Mark Shelden

United States

President and Vice President of the United States
Four Year Term
Vote for up to 1

- Barack Obama / Joe Biden — Democratic
- Cynthia McKinney / Rosa Clemente — Green
- John McCain / Sarah Palin — Republican
- Bob Barr / Wayne A. Root — Libertarian
- John Joseph Polachek / No Candidate — New
- Charles O. Baldwin / Darrell L. Castle — Constitution
- Ralph Nader / Matt Gonzalez — Independent
- Write-in

United States Senator
Six Year Term
Vote for [illegible]

- Richard J. Durbin — Democratic
- Kathy Cummings — Green
- Steve Sauerberg — Republican
- Larry A. Stafford — Libertarian
- Chad N. Koppie — Constitution

United States

Representative in Congress
15th Congressional District
Two Year Term
Vote for up to 1

- Steve Cox — Democratic
- Timothy V. Johnson — Republican

State of Illinois

Representative in the General Assembly
103rd State Representative District
Two Year Term
Vote for up to 1

- Naomi D. Jakobsson — Democratic
- Frank Calabrese — Republican

Champaign County

Auditor
Four Year Term
Vote for up to 1

- Tony Fabri — Democratic
- Brad Jones — Republican

Circuit Clerk
Four Year Term
Vote for up to 1

- Kimberly Hooper — Democratic
- Linda S. Frank — Republican

Coroner
Four Year Term
Vote for up to 1

- Mark C. Medlyn — Democratic
- Duane Northrup — Republican

Recorder of Deeds
Four Year Term
Vote for up to 1

- Danis Pelmore — Democratic
- Barbara A. Frasca — Republican

Champaign County

State's Attorney
Four Year Term
Vote for up to 1

- Julia R. Rietz — Democratic
- Janie Miller-Jones — Republican

County Board Member
County Board District 9
Four Year Term
Vote for up to 1

- Brendan M. McGinty — Democratic
- Mike Lehman — Green

Judicial Candidates Seeking Retention in Office

"Vote on the Proposition with respect to all or any of the Judges listed on this ballot. No Judge listed is running against any other Judge. The sole question is whether each Judge shall be retained in his present office."

4th Judicial District

Judge Of The Appellate Court
Shall Sue E. Myerscough be retained in office as Judge of the Appellate Court, 4th Judicial District?

- YES
- NO

6th Judicial Circuit

Judge Of The Circuit Court
Shall Thomas J. Difanis be retained in office as Judge of the Circuit Court, 6th Judicial Circuit?

- YES
- NO

Turn Page For More Races

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Appendix J – Example of Champaign "Remade" Ballot