

POLLING LOCATION OPERATION, LAYOUT, AND INDOOR ENVIRONMENT MODIFICATIONS FOR COVID-19

OCTOBER 2020

JENNIFER I. LATHER, PHD
GRETCHEN A. MACHT, PHD
BRIDGETT A. KING, PHD
EMMA MCCOOL-GUGLIELMO

URI TES



Introduction

The polling locations used across the United States for the November 2020 general election are unique and dynamic environments that, in light of the COVID-19 pandemic, can be modified to help protect the health of voters and poll workers.

Many of the guidelines that election officials, poll workers, and voters will follow are provided by various state and local government agencies. In addition to these organizations, professional associations have provided guidance that can assist election administrators in modifying their processes. This document attempts to summarize the guidance of those various government agencies and professional organizations to illustrate spatial strategies to reduce risk by reducing the duration of potential exposure and proximity of individuals. The guidance is presented in three sections. First, we offer a “Ten Strategies to Reduce Risk in Polling Locations” infographic to improve the in-person voting environment of polling locations. Additional strategies are detailed in the appendix in the form of checklists. Second, we provide 3D illustrations that include the layout of check-in tables, voting booths, and circulation paths to demonstrate how voters can reduce risk while safely moving through a polling location when voting in person. Illustrations of additional polling location types will be added in updated versions of the report throughout time. Third, we provide discrete-event simulations that show how the minimum 6 feet of physical distance recommendation translates to voting environments that are stochastic and rapidly changing. Supplemental models include varied conditions such as using electronic poll books at check-in and accommodations for voters with disabilities. The forthcoming results of the simulations can be accessed by clicking [here](#) or visiting uri.edu/urivotes/covid-19

By providing this resource, we hope that the suggested operational and spatial guidance as well as the simulation results can help election administrators enhance the health and safety of in-person voting.

Ten Strategies to Reduce Risk in Polling Locations Infographic

Ten strategies that election administrators and poll workers can use to address COVID-19 are summarized in this infographic. Operational and administrative, layout, and environmental strategies reflect the [U.S. National Institute for Occupational Safety and Health](#) (NIOSH) Hierarchy of Controls. For a detailed list of strategies (controls), see Appendix A.

The infographic can be printed, copied, and shared with poll workers and other appropriate election personnel as needed.

Ten Strategies to Reduce Risk in Polling Locations

Maintaining the safe operations of in-person voting during the pandemic can be challenging since poll workers need to manage the operations, flow, and the layout. These following ten items were identified to reduce risk to poll workers and voters during Election Day(s) while maintaining operations.

For more information to help election administrators and poll workers: uri.edu/urivotes/covid-19/strategies

Determine Routing

Voters should be able to move through the space while maintaining 6' social distancing, so establish 3' wide paths.

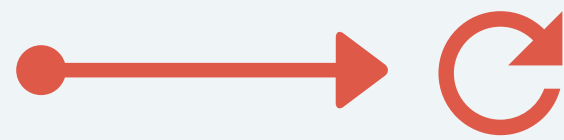
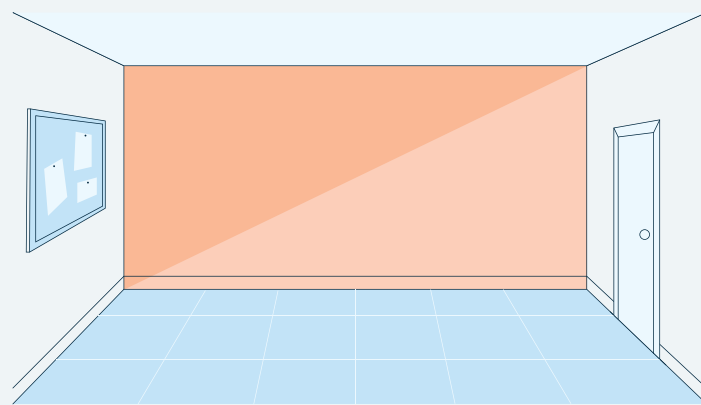
Unidirectional Paths and Clear Routing.



Orientation and Layout

Position voting booths away from paths and from each other to maintain social distancing.

Orient equipment for safety and privacy.



Display Signage

Use signs and/or floor markings to explain routing, voter process changes, and provide transparent information to voters.

Explain safety precautions to voters.



Check Mechanical System

Check with building managers about the heating & cooling system. Open windows to increase air movement. Pick rooms that have a larger ceiling height and overall size.

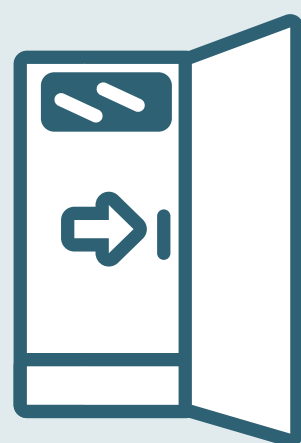
Work with Facilities Management.



Open Doors

Prop exterior doors open, weather permitting, to reduce commonly touched areas. Check with building managers prior to propping open interior doors for fire code reasons.

Get some fresh air.



Number of Voters Inside

Limit the number of people physically inside the voting room to maintain safe social distancing.

Try to limit queuing inside.



Location of Lines

Identify where people will wait if there are more people than stations. Determine who will be responsible to monitor the line.

Locate Lines Outside or in a Spacious Indoor Area.



Monitor Sanitation Stations

Locate at entrance, exit, and check-in stations. Determine who will be responsible to refill and how often they will check the supply.

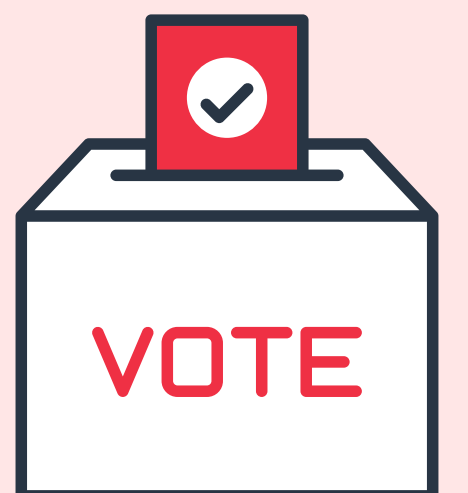
Clean hands often.



Limit Person-to-Person Contact

Identify ways at check-in station and the 'I-Voted' sticker locations to limit contact.

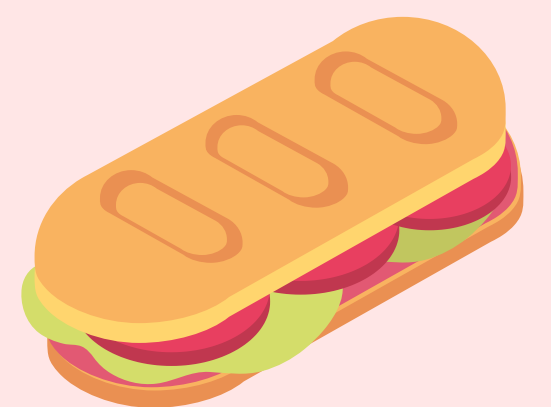
Modify processes & maintain voter experience.



Recommend Leaving Area to Eat

During your scheduled break, step outside to take a break from wearing a mask and eat. Be sure to wash your hands with soap prior to and after eating.

Coordinate and schedule worker breaks.



Source:

Lather, Jennifer I., Gretchen A. Macht, Bridgett A. King, and Emma McCool-Guglielmo (2020). Polling Location Operation, Layout, and Indoor Environment Modifications for COVID-19. URI VOTES: uri.edu/urivotes/covid-19.

3D Illustration: Example Polling Location Layouts

Due to the wide variety of buildings that are used for polling locations, the provided 3D illustrations do not represent all possible facility types. The illustrations are provided as visual examples of frequently used polling location types that have been modified according to the layout recommendations and can be used for general guidance.

The illustrations on pages 4 and 5 demonstrate different multi-step voting systems within two types of facilities commonly used as polling locations (i.e., a library multipurpose room and a high school gymnasium). Both illustrations include a voter services table that can be used for provisional ballot processing and other voter services. The yellow arrows on the floor represent the route designated through the polling location for voters beginning with queueing before check in and ending with exiting the polling location. Each piece of equipment is positioned 6' from the next. The yellow circle around each voter represents a 2' voter space and the grey dashed ring represents a 6' distance from the edge of the voter space for social distancing. These illustrations also include a poll worker managing the flow of voters into the polling location. Lastly, voters and poll workers alike are assumed to be in the polling location actively wearing face coverings and practicing social distancing as recommended by the U.S. Centers for Disease Control and Prevention.

Library Multipurpose Room (940 sq. ft.)

The library multipurpose room illustration (page 4) contains a 3-step voting system (i.e., check-in, paper ballot marking, and ballot submission) that relies on 1 electronic poll book, 4 voting booths for hand-marked paper ballots, 1 ADA compliant ballot marking device (illustrated as the Automark), and 1 optical ballot scanner. Voting equipment is positioned around the perimeter of the room. This layout provides a clear unobstructed route for voters to travel through the polling location with additional space in the center of the room for voters and poll workers to pass each other while maintaining 6' social distancing.

High School Gymnasium (6,448 sq. ft.)

The gymnasium illustration (page 5) contains a 2-step voting system (i.e., check-in and ballot marking device). This illustration demonstrates a layout with 7 voter check in stations and 27 ballot marking devices. The check in stations are positioned to the left of the entry door and all ballot marking devices are placed facing the same direction throughout the remaining open space. Given the nature of the layout presented, it is especially important that a voter route is clearly marked to avoid unnecessary closeness among the voters (per social distancing recommendations).

Library Multipurpose Room (940 sq. ft.)



High School Gymnasium (6,448 sq. ft.)



Voter Capacity: Simulation of High Flow and Low Flow Polling Location Operations

During Election Day(s), voters will be arriving at varying rates and will have different understandings of the changes to the in-person voting process. It is important to use the location setup time wisely, specifically to envision processes during times of high flow (frequent voter arrival). Use times of low flow (infrequent voter arrival) to make adjustments to operations, evaluate how performance has shifted, and reiterate items that help maintain social distancing and good hygiene during the COVID-19 pandemic.

To understand how COVID-19 mitigation strategies interact with both layout and resources, a series of simulations were conducted and evaluated to help demonstrate overall voter flow and identify thresholds of hourly throughput (the number of voters an election system can handle on a given election day). Simulation software, Simio®, was used to simulate and verify the two general polling location layout diagrams, illustrated in the previous section. The components of the polling locations in the simulation models are identical to those illustrated in the previous section.

For each of the two polling location layouts, two simulations were created. The first simulation models the system throughout an Election Day with a bimodal voter arrival rate (i.e., higher arrivals of voters early and later during the Election Day) (Figures 1 and 2) with varying levels of voter turnout (i.e., between 100 to 5,000 voters arriving daily) to determine the following outcomes: average voting time (time-in-system) and daily voter throughput. The model is built around a 13 hour in-person voting day (7:00 AM to 8:00 PM). The outcomes of these models can be accessed by clicking [here](#) or visiting uri.edu/urivotes/covid-19.

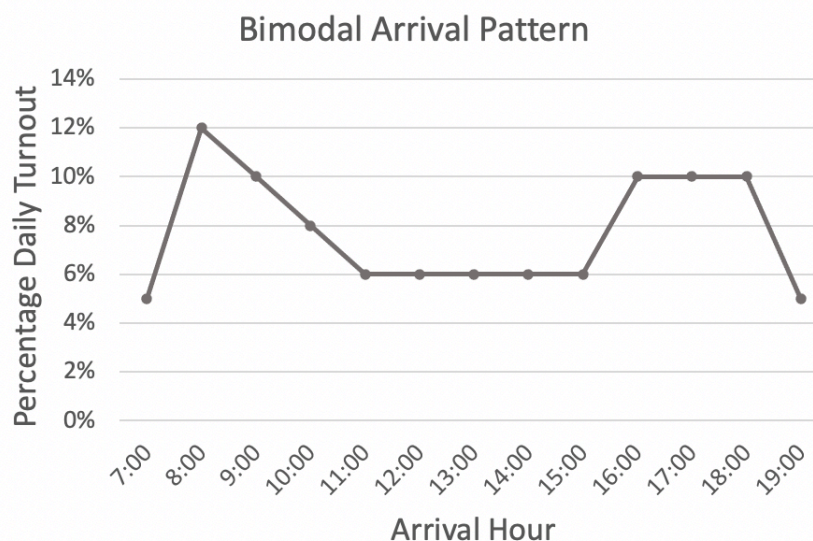


Figure 1. Bimodal arrival with a peak in the morning and in the evening (adapted from Yang et al. 2009).

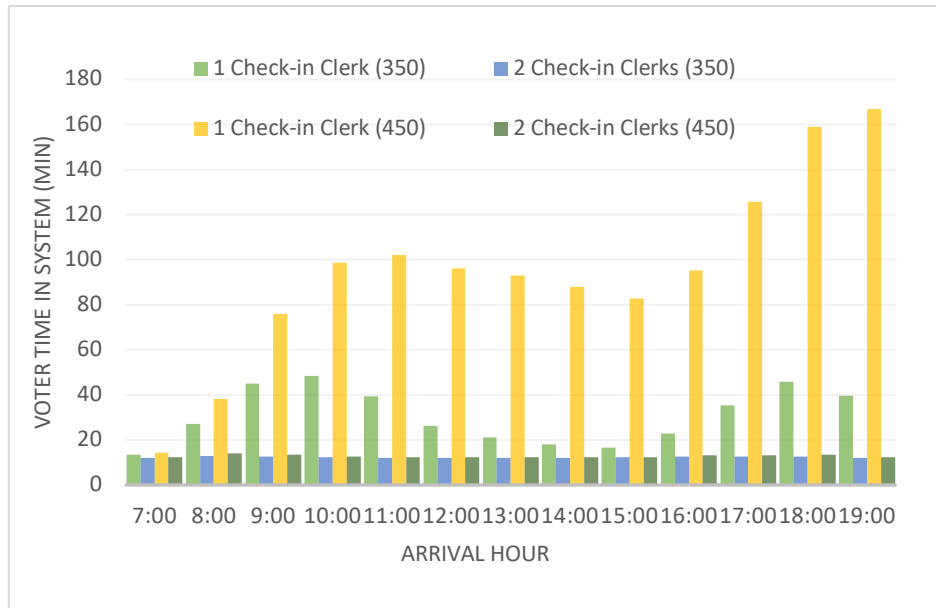


Figure 2. General model with expected turnout at 350 and 450 people, demonstrating that when there is only one check-in available, the system with a turnout of 450 is not able to keep up with demand from the afternoon into the evening. *Note:* there are many assumptions in these models that may or may not relate to a given voting system. For more information, please visit: uri.edu/urivotes/strategies.

Based on the results of the simulation, the voter time-in-system is affected by both the total turnout of voters and the capacity of check-in. Generally, for a system with a turnout of 350 voters and a system with 450 voters, the voter time-in-system is also affected by the arrival hour, varying the estimated voting time throughout the day. For the system with a turnout of 350 voters and 1 check-in clerk, the voter time-in-system reaches a maximum of approximately 50 minutes at 10:00 am, whereas the system with a turnout of 450 voters and 1 check-in clerk reaches a maximum time-in-system over 2½ hours at the end of the 13 hour day (8:00 pm). This demonstrates that there is a relationship between total voter turnout and the time that voters spend in the system. In order to prevent voters from waiting in long lines, it is important to understand at voter capacity what threshold the voter time-in-system becomes undesirable.

An additional clerk was shown to decrease the time-in-system for both the system with a turnout of 350 voters and the system with the turnout of 450 voters. As shown in Figure 2, the voter time-in-system remained at approximately 10-12 minutes for every hour during the 13 hour period for either model. This represents a reduction in time-in-system by between 1 and 40-minutes for the 350 turnout model and between 1 and 150-minute decrease for the 450 turnout model. As demonstrated, the capacity of the check-in station is also a factor that largely affects voter time-in-system. Therefore, based on resource allocation and total expected voter turnout, it is possible to identify polling locations that may need additional resources (e.g., check-ins, voting booths, ballot scanners) in order to prevent voters from experiencing long wait times and lines.

Appendix A: Risk Reduction Strategies to Consider for Polling Locations and Vote Centers

The following list of strategies (controls) is provided for consideration to election administrators before, during, and after in-person voting has occurred. Strategies may or may not apply to every polling location. Any application of the polling location operations and layout modifications should occur in accordance with state and local statutes as well as COVID19 guidelines.

The strategies presented address the following components of in person voting within the polling location environment: architecture and engineering, administration, and personal health and safety equipment. The presented strategies are based on the American Institute of Architects' (AIA) adaptation of the Centers for Diseases Control and Prevention's 'Hierarchy of Controls'. The 'Hierarchy of Controls' is a means of determining how to implement feasible and effective control solutions where there is a risk for exposure to hazards.⁷

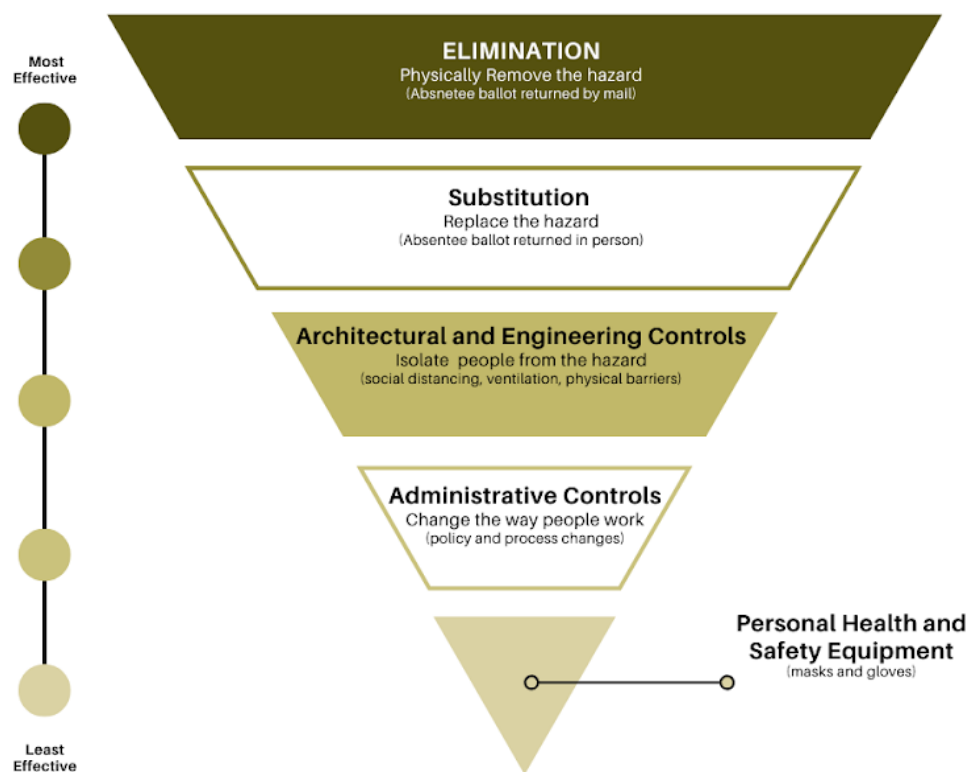


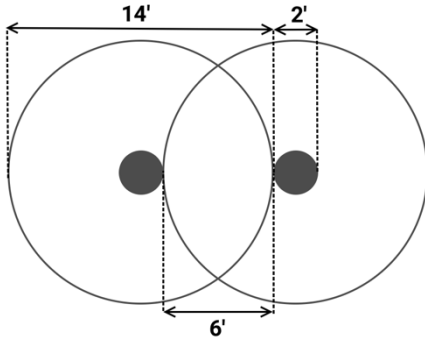
Figure A1. Adaptation of NIOSH Hierarchy of Controls Applied to Voting Environments.⁸

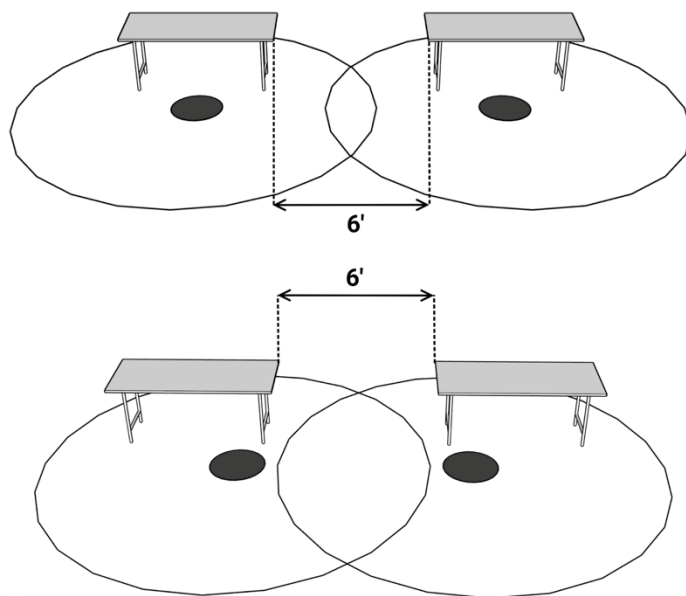
⁷ The 'Hierarchy of Controls' is based on the [U.S. National Institute for Occupational Safety and Health](https://www.niosh.gov/) (NIOSH).

⁸ The reduction in the exposure to hazards associated with in person absentee ballot return varies. To maximize reduction, in person absentee ballots should be returned before Election Day to the designated office.

Main Task	Recommended Sub-Tasks
Location Selection	<ul style="list-style-type: none"> □ When selecting facilities for polling locations, “utilize large interior, traditionally [open] spaces”. (3.1.1) <p>Utilize rooms in polling locations for in-person voting that have higher ceilings (ei.ge., higher than 8’-0”) and larger volume (atriums, concourses, athletic courts and fields may meet this need)</p>
Plumbing & Fixtures	<ul style="list-style-type: none"> □ See the AIA Strategies for Safer Offices for recommendations for staff break rooms and restrooms.
Mechanical & Passive Ventilation	<ul style="list-style-type: none"> □ If the facility has operable windows, utilize them for natural ventilation when if possible. (3.6.1) <ul style="list-style-type: none"> ○ If any portable fans are used, be sure the air flow is directed away from individuals (e.g. facing out from a window). Blow air out of the polling location and away from the direction of the voters. ○ Ensure that any ceiling fans do not create a draft on any individuals. □ “Ensure ventilation systems operate properly and provide acceptable indoor air quality for the current occupancy level for each space”. (3.6.2) □ “Increase ventilation rates and air changes”, where feasible. (3.6.4) □ “Prioritize fresh air intake versus recycled air where possible by adjusting dampers, economizers, and AHUs”. (3.6.5) □ Verify each restroom exhaust fans are operable and providing negative air pressure. (3.6.6) □ “Check filters to ensure they are within service life and appropriately installed”. (3.6.8) □ “Flush the air in the building for two hours before occupancy in the morning or after occupancy in the afternoon/evening”, where feasible. (3.6.11) □ “Disable demand-controlled ventilation (DCV)” and if unable to, contact the facilities management of the building for further assistance. (3.6.13).

	<input type="checkbox"/> “Consider the use of portable room air cleaners with HEPA filters”. (3.6.14)
--	--

Main Task	Recommended Sub-Tasks
Layout Planning	<input type="checkbox"/> Locate check-in tables and voting equipment such that voters and poll workers are no closer than a 6’ distance. <ul style="list-style-type: none"> ○ Account for a voter space as a 2’ diameter circle (generalized area that the voter occupies) surrounded by a 14’ diameter concentric circle (6’ from the 2’ diameter circle). ○ Ensure 6’ distance between each individual’s voter space, leading to a 14’ diameter circle. ○ Equipment and paths should be positioned such that no 2’ diameter voter space is within another 14’ diameter social distancing circle.  <input type="checkbox"/> Stagger the location of voting booths and/or electronic voting machines facing in the same direction. <input type="checkbox"/> Where possible, position the voting booths and/or electronic voting machines along the perimeter walls, and not in the path and direction of the air flow of the supply and return air registers. <input type="checkbox"/> Position the check-in tables so there is 6’ distance between the edges of each table to provide poll worker freedom of movement while maintaining 6’ distancing.



- Locate trash cans (preferably touch-free) near entrances, exits, and check-in stations to allow for voters to dispose of wipes, gloves, etc. (3.2.4)
- Consider one-way traffic flow throughout the entire voting system, in hallways, concourses, and at entry and exit points
 - Keep in mind that longer travel distances extend potential exposure and can pose challenges for voters with physical disabilities. (3.2.5)
 - Design voter circulation path to be a minimum 3' wide with 5' turning diameter for turning ease and wheelchair access, such that the path does not overlap with the physically distanced space of an individual at check-in, ballot marking, ballot scanning, etc.
- Designate more interior space where queues may form, where possible (e.g., check-in, ballot scanning). (3.2.7)
- Designate separate exit and entrance doors, where possible to avoid voters crossing paths. (3.3.1)
- Utilize touchless entry capability or keep doors ajar, where feasible. (3.3.4)
- For including a vote by mail ballot drop off station at a polling location:

	<ul style="list-style-type: none"> ○ Assign a line monitor to watch over the area and assist voters if applicable ○ Position the drop off station near the entrance to the polling location.
Signage	<ul style="list-style-type: none"> □ Create <i>COVID-19 mitigation signage about actions taken to protect public health</i>, to be displayed at the different polling locations. □ Use large, high contrast fonts on less reflective surfaces for improved legibility. (3.4.1) □ Signage should: <ul style="list-style-type: none"> ○ Summarize healthy hygiene, cleaning, and sanitization practices. ○ Instruct voters to maintain 6' physical distance with others. The tip of ones fingers when arms are extended should not touch. ○ Encourage voters to wear a mask or other face covering over their nose and the mouth. ○ Provide instructions/arrows for how voters flow through the polling process.
Appliances, equipment, & accessories	<ul style="list-style-type: none"> □ Provide equipment such as plexiglass barriers <i>that support physical distancing and decreases the spread of COVID-19</i>. (3.8.4) □ Provide easy to clean and/or single-use equipment (e.g., pens, headphones), when possible.
Finishing & Furnishings	<ul style="list-style-type: none"> □ Install physical barriers (e.g. clear plastic partitions or sneeze guards) where minimum 6' distancing is not possible (ei.ge., at check-in tables, other areas where poll workers interact with voters, and between voting equipment ballot marking devices). (3.9.1) □ Consider acoustics and sound transmission when locating check-in stations to accommodate the hearing impaired. (3.9.8)

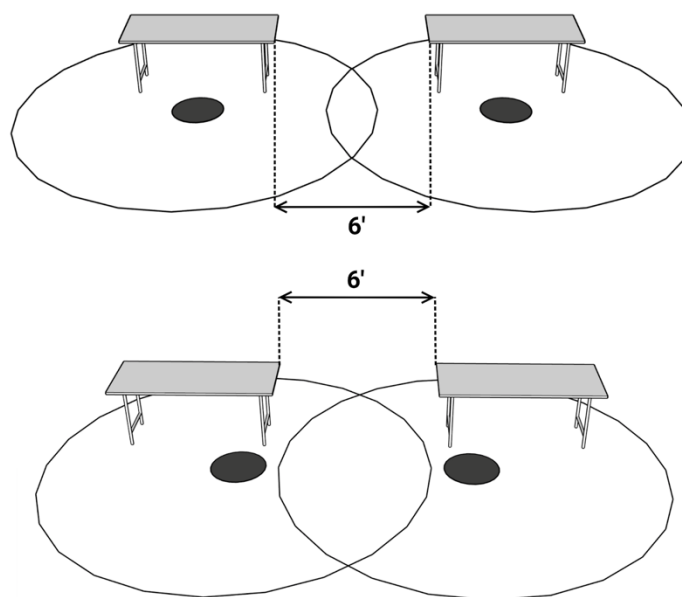
Site Work	<ul style="list-style-type: none">□ <i>“Create entry queuing areas with ample spacing that also minimizes exposure to inclement weather”, where feasible. (3.10.2)</i>□ Where outdoor queueing is anticipated, use temporary coverage (i.e., tents) to minimize voter exposure to outdoor elements.□ <i>Provide separate entrance and exit routes that are ADA accessible to ensure clear unidirectional pathways. (3.10.4)</i>
------------------	---

Main Task	Recommended Sub-Tasks
Policies	<ul style="list-style-type: none"> □ <i>“Accommodate occupants in CDC-defined higher health risk categories”. (4.1.6)</i> <ul style="list-style-type: none"> ○ Make all accommodations in accordance with local and state rules and regulations. □ <i>“Develop an emergency communications plan, as well as a pandemic and/or outbreak response plan”. (4.1.1)</i> <ul style="list-style-type: none"> ○ Develop policies associated with how long a poll worker should wait before actively working after being known or suspected of having COVID-19. □ <i>“Develop a procedure to report potential cases of COVID-19 to the local/state health department”. (4.1.2)</i> <ul style="list-style-type: none"> ○ Maintain contact information of poll workers to provide to local health departments for contact tracing purposes. □ <i>“Identify necessary revisions to human resource policies”. (4.1.3)</i> □ <i>“Develop organizational protocols governing what happens if a person at the [polling location] is found to be COVID-19 positive”. (4.1.4)</i> □ <i>“Provide [poll workers with] up-to-date education and training on COVID-19” and mitigation guidelines. (4.1.5)</i>
Reduction of person-to-person pathogen spread	<ul style="list-style-type: none"> □ Develop a protocol for screening poll workers for COVID-19 prior working on election day. □ Any poll workers that show symptoms of COVID-19 should not come to the polling location. □ Consider having additional poll workers “on-call” who can be dispatched to locations that are short on staff due to poll workers calling out sick or if voter turnout is larger than expected. <ul style="list-style-type: none"> ○ <i>Promote hand washing/sanitizing, physical distancing, and respiratory etiquette.</i> ○ <i>“Provide alcohol-based [disinfectants] containing at least 60% alcohol throughout the system”: at all check-in, information, all other service tables, and as a final step in the voting process, preferably via a touchless dispenser (4.2.11)</i>

	<ul style="list-style-type: none">□ <i>“Discourage handshaking or other close contact”</i> among all people in the polling system. (4.2.9)
Support for physical distancing	<ul style="list-style-type: none">□ <i>“Implement strategies that encourage physical distancing”</i>. (4.4.1)□ Designate at least one poll worker to monitor the line at check-in and encourage voters to socially distance.□ Enforce the maximum occupancy limit, and consider temporarily reducing maximum occupancy limits (4.4.3)<ul style="list-style-type: none">○ Whenever possible, assign one or more poll workers to manage the line and encourage voters to maintain physical distance while waiting in the queue.

Main Task	Recommended Sub-Task
Health & Safety Procedures	<input type="checkbox"/> Educate poll workers on the proper use of facial coverings, sanitization practices and other health and safety precautions.
Health & Safety Equipment	<input type="checkbox"/> Provide face coverings, face shields, goggles, hand sanitizer, and gloves, etc. to poll workers, per local and state guidelines.

Main Task	Recommended Sub-Tasks
Layout Planning	<ul style="list-style-type: none"> <input type="checkbox"/> Locate check-in tables and voting equipment such that voters and poll workers are no closer than a 6' distance from each individual. <ul style="list-style-type: none"> ○ Account for a voter space as a 2' diameter circle (area that the voter occupies) surrounded by a 14' diameter concentric circle. ○ Ensure 6' distance between each individual's voter space, leading to a 14' diameter circle. ○ Equipment and paths should be positioned such that no 2' diameter voter space is within another 14' diameter social distancing circle. <div data-bbox="706 743 1140 1092" data-label="Diagram"> <p>The diagram shows two large circles, each with a diameter of 14 feet, representing social distancing zones. Inside each large circle is a smaller circle with a diameter of 2 feet, representing the space a voter occupies. The centers of the two large circles are 14 feet apart. The centers of the two small circles are 2 feet apart. The distance between the edges of the two large circles is 6 feet, ensuring that the 2-foot diameter voter spaces do not overlap and maintain a 6-foot distance from each other.</p> </div> <ul style="list-style-type: none"> <input type="checkbox"/> Stagger the location of voting booths and/or electronic voting machines and face in the same direction, preferably along the perimeter walls, and not in the path and direction of the air flow of the supply and return air registers. <input type="checkbox"/> Position the check-in tables so there is 6' distance between the edges of each table to provide poll worker freedom of movement while maintaining 6' distancing



- ☐ Locate trash cans (preferably touch-free) near entrances, exits, and check-in stations. (3.2.4)
- ☐ Consider one-way traffic flow throughout the entire voting system, in hallways, concourses, and at entry and exit points.
 - Keep in mind that longer travel distances extend potential exposure and can pose challenges for voters with physical disabilities. (3.2.5)
 - Voter paths ideally are unidirectional so that voters do not cross paths.
 - Design voter circulation path to be a minimum 3' wide with 5' turning diameter for turning ease and wheelchair access, and design such that the path does not overlap with the physically distanced space of an individual at check-in, ballot marking, ballot scanning, etc.
- ☐ Designate more interior space where queues may form Expand interior spaces where queues may form, where possible (e.g., check-in, ballot scanning). (3.2.7)
- ☐ If providing stickers, distribute them at an existing step in the system to minimize the points of human to human contact (i.e., provide a pile of stickers at the sanitization station, or hand them out individually at check-in).
- ☐ Where permitted, designate separate exit and entrance doors. (3.3.1)

	<ul style="list-style-type: none"> <input type="checkbox"/> Utilize touchless entry capability, where feasible. (3.3.4) <input type="checkbox"/> For including a vote by mail ballot drop off station at the polling location: <ul style="list-style-type: none"> <input type="checkbox"/> Assign a line monitor to watch over the area and assist voters if applicable. <input type="checkbox"/> Position the drop off station near the entrance to the polling location.
Signage	<ul style="list-style-type: none"> <input type="checkbox"/> <i>Display COVID-19 mitigation signage about actions taken to protect public health, to be displayed at the different polling locations.</i> <input type="checkbox"/> <i>Use large, high contrast fonts on less reflective non-glare surfaces for improved legibility. (3.4.1)</i> <input type="checkbox"/> <i>Implement floor/pavement markings (e.g., tape, dots or other temporary adhesive) to visualize recommended 6' spacing among voters and to clearly identify paths and routing for voters. (3.4.3)</i> <input type="checkbox"/> Signage and/or floor markings should be posted specifying the direction of the voter path within the voting system. See ADA resource for recommendations to accommodate the visually impaired. (3.4.4) <input type="checkbox"/> Clearly display <i>signage at entrances and throughout the polling location specifying maximum occupancy limits, minimum physical distances, recommended PPE, and other risk management policies. (3.4.6)</i>
Appliances, equipment, & accessories	<ul style="list-style-type: none"> <input type="checkbox"/> <i>Provide equipment such as barriers that support physical distancing and decreases the spread of COVID-19. (3.8.4)</i> <input type="checkbox"/> Provide easy to clean and/or single-use equipment (e.g., pens, headphones) when possible. <ul style="list-style-type: none"> <input type="checkbox"/> Any equipment that is shared by voters (e.g., electronic poll books, voting booths, electronic voting machines, etc.) should be cleaned after every use.

Finishes & furnishings	<ul style="list-style-type: none"> <input type="checkbox"/> Install physical barriers (i.e., clear plastic partitions or sneeze guards) where minimum 6' physical distancing is not possible (i.e., at check-in tables, other areas where poll workers interact with voters, and between voting equipment ballot marking devices). (3.9.1) <input type="checkbox"/> Consider acoustics and sound transmission when locating check-in stations to accommodate the hearing impaired. (3.9.8)
Site Work	<ul style="list-style-type: none"> <input type="checkbox"/> Create <i>“entry queuing areas with ample spacing that also minimizes exposure to inclement weather”</i> where possible. (3.10.2) <ul style="list-style-type: none"> <input type="checkbox"/> Where outdoor queueing is anticipated, use temporary coverage (i.e., tents) to minimize voter exposure to outdoor elements. <input type="checkbox"/> Provide separate entrance and exit routes that are ADA accessible to ensure clear unidirectional pathways. (3.10.4)
Policies	<ul style="list-style-type: none"> <input type="checkbox"/> <i>“Accommodate occupants in CDC- defined higher health risk categories”</i>. (4.1.6) <input type="checkbox"/> Make all accommodations in accordance with local and state rules and regulations.
Reduction of person-to-person pathogen spread	<ul style="list-style-type: none"> <input type="checkbox"/> <i>“Promote hand washing/sanitizing, physical distancing], and respiratory etiquette. (4.2.9)</i> <ul style="list-style-type: none"> <input type="checkbox"/> <i>Provide alcohol-based disinfectants containing at least 60% alcohol throughout the system: at all check-in, information, all other service tables, and as a final step in the voting process, preferably through a touchless dispenser (4.2.11)</i> <input type="checkbox"/> <i>“Discourage handshaking or other close contact among all people in the polling system”</i>. (4.2.9) <ul style="list-style-type: none"> <input type="checkbox"/> <i>“Restrict permitted activities to reduce exposure risk”</i>. All food should be consumed outside of the polling room. Discourage sharing of food. (4.2.17) <input type="checkbox"/> If voters do not abide by the guidelines (e.g., they are not wearing a mask or not abiding by social distancing guidelines), offer them the means to do so (e.g., provide them with a disposable mask).

	<ul style="list-style-type: none"> <input type="checkbox"/> If the voter still does not abide by the guidelines (i.e., does not choose to wear the mask), then continue service. Do not turn the voter away.
Reduction of pathogen spread by objects	<ul style="list-style-type: none"> <input type="checkbox"/> Adjust poll worker schedule to allow for breaks periodically throughout the day. (4.3.1) <ul style="list-style-type: none"> <input type="checkbox"/> Poll workers should take breaks outside of the main polling room, washing hands before and after, and frequently throughout the day. <input type="checkbox"/> “Regularly clean and disinfect high touch surfaces”. (4.3.2) <input type="checkbox"/> Designate at least one poll worker to be responsible for sanitizing voting booths, machines, and other election technology. Designate at least one poll worker to ensure that hand sanitizer and soap dispensers are adequately stocked hourly. <input type="checkbox"/> Poll workers at check-in should sanitize shared equipment (electronic poll book, pen, etc.) between the service of each voter. <input type="checkbox"/> Only use shared materials when necessary. (4.3.7)
Support for physical distancing	<ul style="list-style-type: none"> <input type="checkbox"/> “Where common equipment must be used [(e.g., electronic poll books, ballot marking devices, ballot scanners, etc.)], perform frequent sanitization”. (4.3.8) <input type="checkbox"/> Other facility high touch surfaces (i.e., door handles, door railing, braille signage) should be cleaned frequently. <input type="checkbox"/> For paper ballots, give each voter a clean pen at check-in to use for ballot marking; ask voters to put dirty pens in a bin by the exit; disinfect and reuse as needed. <input type="checkbox"/> Encourage those that are not voting or assisting voters to remain outside of the polling facility. (4.4.2) <input type="checkbox"/> Enforce the maximum occupancy limit, and consider temporarily reducing maximum occupancy limits. (4.4.3) <input type="checkbox"/> Whenever possible, assign one or more poll workers to manage the line and encourage voters to maintain physical distance while waiting in the queue.

Health & Safety Procedures	<input type="checkbox"/> All poll workers should wear facial coverings, while they are in the polling area or otherwise interacting with individuals.
Health & Safety Equipment	<input type="checkbox"/> Monitor the supply of face coverings, face shields, goggles, hand sanitizer, and gloves, etc. Replace them when necessary. <input type="checkbox"/> Wash or sanitize hands frequently.

Additional Resources

American Institute of Architecture. (2020). Re-Occupancy Tool V3.0.

http://content.aia.org/sites/default/files/2020-08/ReOccupancy_Assessment_Tool_v3.pdf

Bipartisan Policy Center. (2020). Socially Distanced Voting: How we can vote at the polls this November.

<https://bipartisanpolicy.org/event/socially-distanced-voting-how-we-can-vote-at-the-polls-this-november/>

Center for Tech and Civic Life. (2020). COVID-19 webinars for election officials.

<https://www.techandciviclife.org/covid-19-webinars/>

Centers for Disease Control and Prevention. (2020). Considerations for election polling location and voters: Interim guidance to prevent the spread of coronavirus 2019 (COVID-19).

<https://www.cdc.gov/coronavirus/2019-ncov/community/election-polling-locations.html>

Elections Group. (2020). <https://electionsgroup.com/index.html>

Stanford-MIT Healthy Elections Project tools. <https://healthyelections.org/tools>

Stanford-MIT Healthy Election Project. (2020). 2020 Healthy polling place guidebook: A resource to support safe & healthy elections during the COVID-19 Pandemic.

https://static1.squarespace.com/static/5f3ebafc655a6111b62f8385/t/5f485f469528fc5307bc58ac/1598578514171/HealthyPollingGuide_2020.pdf

United States Department of Labor-Occupational Safety and Health Administration. (2020). COVID19 frequently asked questions. <https://www.osha.gov/SLTC/covid-19/covid-19-faq.html#ppe>

University of Rhode Island Voter Operations & Election Systems (URI VOTES) tools.

<https://web.uri.edu/urivotes/tools/>

U.S. Department of Justice. (2016). Americans with Disabilities Act: ADA checklist for polling locations.

<https://www.ada.gov/votingchecklist.htm>

U.S. Election Assistance Commission. (2020). Vendor and manufacturer guidance on cleaning voting machines and other election technology.

References

National Institute for Occupational Safety and Health (NIOSH). Hierarchy of Controls.

<https://www.cdc.gov/niosh/topics/hierarchy/default.html>

Stewart, Charles. (2017). 2016 Survey of the Performance of American Elections. Harvard Dataverse.

Retrieved from <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/Y38VIQ>

Stewart, Charles. (2015). 2014 Survey of the Performance of American Elections. Harvard Dataverse.

Retrieved from <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/28979>

Stewart, Charles. (2013b). 2012 Survey of the Performance of American Elections. Harvard Dataverse.

Retrieved from <https://dataverse.harvard.edu/dataset.xhtml?persistentId=hdl:1902.1/21624>

Stewart, Charles. (2013a). 2008 Survey of the Performance of American Elections. Harvard Dataverse.

Retrieved from <https://dataverse.harvard.edu/file.xhtml?fileId=2433003&version=1.0>

U.S. Election Assistance Commission, "Election Administration and Voting Survey, 2018 Comprehensive Report," (Silver Spring, 2019), available at

https://www.eac.gov/sites/default/files/eac_assets/1/6/2018_EAVS_Report.pdf

Verified Voting. (ND). Electronic poll book use in the United States.

<https://verifiedvoting.org/publication/electronic-poll-book-use-in-the-united-states/>

Yang, Muer, Michael J. Fry, and W. David Kelton. (2009). "Are all voting queues created equal?" In

Proceedings of the 2009 Winter Simulation Conference, edited by M. D. Rossetti, R. R. Hill, B. Johansson, A. Dunkin, and R. G. Ingalls, December 13-16, 2009, Austin, TX, USA, 3140–3149.

About the Authors

Jennifer I. Lather, Ph.D., is an assistant professor at the Durham School of Architectural Engineering and Construction at the University of Nebraska-Lincoln. She holds a Ph.D. in Architectural Engineering from the Pennsylvania State University with a graduate minor in Computational Sciences, specializing in the use of technology and simulation in integrative design.

Gretchen A. Macht, Ph.D., is an assistant professor and director of the URI VOTES group and the [Sustainable Innovative Solutions Lab](#) at The University of Rhode Island. She holds a Ph.D. in Industrial Engineering from The Pennsylvania State University with a specialization in computational, community ergonomics.

Bridgett A. King, Ph.D., is an associate professor and director of the Master of Public Administration Program at Auburn University. She holds a Ph.D. in Political Science from Kent State University and specializes in election administration and voting system processes.

Emma McCool-Guglielmo is currently a Master of Science in Systems Engineering student at the University of Rhode Island specializing in facility layout planning and simulations for computational modeling of voting systems.

Please use the following format when citing the report:

Lather, Jennifer I., Gretchen A. Macht, Bridgett A. King, and Emma McCool-Guglielmo (2020). Polling Location Operation, Layout, and Indoor Environment Modifications for COVID-19. URI VOTES: <https://web.uri.edu/urivotes/covid-19/>

Acknowledgements

[URI Voter Operations & Election Systems](#) (URI VOTES) worked in conjunction with [Jennifer Lather](#) (University of Nebraska-Lincoln), [Gretchen Macht](#) (University of Rhode Island), [Bridgett King](#) (Auburn University), and [Emma McCool-Guglielmo](#) (University of Rhode Island) to create a series of readily accessible resources and visual models that offer guidance on modifications that can be used to address the operational and administrative strategies of polling locations to reduce the transmission of COVID-19. Supporters of URI VOTES research include the Democracy Fund, the Stanford-MIT Project on Healthy Elections, and other anonymous donors.

The authors of this report are grateful for the contributions of James Houghton, Nicholas Bernardo, Tim Jonas, and Dominique Engome Tchupo from URI VOTES.

Special thanks to Luke Leung and Dennis Knight of the American Society of Heating, Refrigeration Engineers (ASHRAE) Epidemic Task Force and Kenneth J. Filarski, FAIA, Christopher Kiefer, AIA, Rachel Minnery, FAIA, and Matthew Tierney, AIA, members of the American Institute of Architects (AIA) Disaster Assistance Committee for their input.

3D model illustration

Kathryn Doyle AIA and Nicholas Decker

Simulation modeling

Emma McCool-Guglielmo and Nicholas Bernardo