

## Vote-by-mail calculator

*User Guide*

*The vote-by-mail calculator*

Administering voting by mail requires significant planning and resources. This calculator tool can help you consider what staffing, space, and other resources to plan for in serving a large number of mail voters.

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## What can the calculator do?

This calculator is designed to estimate the number of voters who choose mail ballots under a variety of scenarios, and use that information to model the likely costs and resource needs associated with supporting those mail voters. You can use these relationships and models to:

- Prepare for potential variations in mail ballot requests
- Make decisions about automation and equipment:
- Plan staffing throughout the election cycle
- Plan for voter education and outreach
- Budget for new or different expenses due to voting by mail

## What can't it do?

**No current model can accurately predict how many voters will choose to cast their ballots by mail this November. The scenarios shown here are not true predictions.**

While the scenarios shown can help you consider potential outcomes and prepare, please do not plan for only one scenario. By sketching out likely-enough voter behavior and needs for a range of possible scenarios, the goal is to help visualize contingency preparations for multiple potential outcomes. Election officials' skill and familiarity with business continuity and emergency preparations will be their greatest strength in an unpredictable cycle.

This calculator also should not be used to make decisions about consolidating or closing polling locations, or re-allocating resources away from supporting in-person voting options. This tool models higher potential mail voting popularity, rather than lower. Because mail voting operations are the less-established processes in most election jurisdictions, emphasizing scenarios that may require additional planning and preparation ensures that election offices are well-prepared. In primary elections, **many** voters have chosen mail ballots under current public health guidance, though if public health provisions are relaxed in November, many of these same voters *may* prefer the familiarity of in-person voting.

## Getting started

### Step one: Inputs

The most important place to start is with the Inputs tab. Take a moment to review the baseline estimates and update using your own data wherever possible. You can find full information about this tab in [the tab-by-tab guide](#). Because these estimates underpin many other calculations, any work you're able to do to ensure their accuracy will dramatically improve the usefulness of other estimates within the tool.

**The only number you absolutely need to get started** is the number of voters in your jurisdiction who would be eligible to receive a ballot by mail if requested (and if an applicable excuse applies). This is likely your number of active registered voters, though your jurisdiction may use a different definition. For all other input data, the default data shown is based on interviews with local election administrators. If you don't currently have data, you can start with these estimates.

### Step two: Planning uses

Once you've reviewed the inputs and entered your own data wherever possible, take the [tab-by-tab guide](#) through to get an overview of the calculator and how it might support your work.

Or if you have a specific need, you can focus on the tabs and calculations that are most helpful to you. The calculator is designed so you can use portions of it, or the entire tool. Thus, you can focus on the tabs and calculations that are most helpful to you and disregard the others that are not necessary to your planning.

- **Planning for ballot volume:** If you're primarily concerned with understanding how many ballot requests or ballots may come in, the Scenario overview tab will show three possible patterns of inbound mail. The ballot request model and ballot return model tabs go into additional detail about day-by-day patterns as based on data from previous elections.
- **Making decisions about automation and equipment:** If you're making decisions about what tools or automation to put in place to support your staff, the [Making decisions about equipment and automation](#) guide can help walk you through how to consider automated versus manual processes.
- **Planning for staffing:** If you're thinking about how many people you'll need to manage VBM, the [staffing calculations tab](#) considers how many person-hours would be needed each day to ensure one-day turnaround of voter registration forms and ballot requests, and suggests the total number of people needed at each phase of the election to prevent bottlenecks. By digging into the total person-hours each day and reviewing the recommended staff numbers at each step, you can begin to plan for recruiting and training your team.
- **Planning for voter education:** If you're thinking about how to teach voters, or advocating for voter education resources, the biggest difference between the "VBM promotion" and "No

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promotion” scenarios is proactive voter education. The promotion scenario includes a budget for a mass mailing. In the ballot request model and ballot return model, the VBM promotion scenario sees higher levels of mail voting overall, and also sees voters request those ballots earlier and return them earlier. Absent this voter education, more voters will not make voting plans until closer to deadlines, and this will shift the processing burdens later and with shorter turnaround times to send out ballots. If you are planning voter education activities or timelines, the [ballot request model](#) tab may especially help you think through how to schedule that outreach, or how to discuss those needs with other stakeholders.

- **Planning budgets:** Whatever your plans for this election, an increase in voting by mail will bring new costs. To see how your direct costs may go up as a result of more voters choosing mail options, first [choose the scenario](#) that most aligns with your jurisdiction’s current VBM policy, then look through the [costs tab](#) associated with that scenario: all-mail costs, VBM promotion costs, or no change costs. Consider what line items are already accounted for, which ones are surprises, and what steps can help you prepare.

## Tab-by-tab guide

### Inputs

The first tab in the spreadsheet is labeled 'Inputs.' This is where you should enter as much information as you're able, to make the calculations more accurate.

On the inputs tab and throughout the model, cells shaded in pale blue can be edited! You can customize these with your own data, if you have current numbers for your own jurisdiction that you'd prefer to use.

The default data shown is based on interviews with local election administrators, but every office is different. If you don't currently have data, but can add these numbers later on, please do so!

### Jurisdiction data

**The only number you need to get started** is the number of voters in your jurisdiction who would be eligible to receive a ballot by mail if requested (and if an applicable excuse applies). This is likely your number of active registered voters, though your jurisdiction may use a different definition. Enter this number in cell E9.

The next three cells allow you to input three other jurisdiction-specific pieces of information that can change the resource recommendations:

- Ballot request deadline: how many days before Election Day does that ballot request deadline fall? Enter this number in E10.
- Number of days available for canvassing: This can be the full number of days before the certification deadline, or your own goal for how many days you'd like to allocate for processing mail ballots. (You can also enter each number separately and compare the resource recommendations). Enter this number in E11.
- Number of ballot pages: If your ballot runs more than one card, enter the number of ballot pages in E12.

### Time and effort data

The first two numbers in this section provide context for how much time and physical space ballot counting may require.

- Fraction of mail ballots expected to require duplication: Some ballots will be filled out in ways the scanner can't interpret, and will require duplication by a review board in order to be counted, which adds time and effort. If your jurisdiction does not regularly use paper ballots, this rate may be higher. (You can also enter different values for this number and compare the hours of effort and staffing costs at different rates.) Enter your best estimate in E15.
- Number of ballot styles: Additional ballot styles require additional space for sorting and scanning. If you'll have many ballot styles in use, please enter the number in cell E16.

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Next, if you have data on how long specific activities take your staff, please enter it. The default data shown is based on interviews with local election administrators, but every office is different. If you don't currently have data, but can time your work and add these numbers later on, please do so!

If you'd like to simulate a range of staffing needs based on faster or slower work times, you can enter each set of estimates and then compare how many more staff you may need if the work is slower or more complicated than expected.

- Voter registrations processed: This can help answer, on average, how many voter registration forms one person can process in one hour of work. This should include all steps, for whatever mix of mail, in-person, or online registrations your office typically receives. Enter this in E18.
- Ballot requests processed: This can help answer, on average, how many ballot requests one staffer can process in one hour of work. This should include all steps, for whatever mix of mail, in-person, or online requests your office typically receives. Enter this in E19.
- Ballot packets prepared: This can help answer, how many mail ballots packets one staff can prepare in one hour of work, whether they are done one-at-a-time, or in bulk. If this work is outsourced and does not require staff time, enter "n/a" instead of a number, or leave the cell blank. Enter this in E20.
- Inbound ballots sorted: This can help answer, on average, as mail ballots are returned, how many one staffer can sort and store in one hour. This may include drop box pick-up time, mail handling, or other collection work as well. Enter this in E21.
- Signatures verified: This can help answer, on average, how many ballot envelopes one staffer can review for identity verification in one hour of work. This can help answer, on average, how many ballot envelopes one staffer can review for identity verification in one hour of work. ***If your process includes voter outreach to cure errors, this number should account for that time as well.*** Enter this in E22.
- Ballots extracted: This can help answer, on average, the number of envelopes one staffer can open and extract in one hour. The default number assumes that the staffer is using some automatic assistance, whether it's an envelope slicer or an extractor. Manual extraction rates will be slower. Enter this in E23.
- Ballots scanned: This can help answer, on average, how many ballots one staffer can scan in one hour. If your scanning team consists of two staffers, don't forget to divide the scanner speed by two to calculate this number. Enter this in E24.
- Ballots duplicated: This can help answer, on average, how many ballots a duplication board can process per person per hour. If your duplication team is two people, or three, don't forget to divide their rate by the number of team members to calculate this number. Enter this in E25.
- Voter queries answered: In primary elections in 2020, election officials have commented on a significant increase in the number of phone calls from voters with questions about how voting is different. This can help answer, on average, how many voter calls one staff member can answer in one hour. Enter this in E26.

## Cost data

Finally, you can enter any information you have on specific costs for staff capacity, printing, and postage.

- Average hourly pay for election workers: the calculator uses this rate to estimate the cost of all voter registration, ballot request handling, and ballot handling work. If these activities are done by a mix of staff and temporary workers, or people who are paid very different rates, you may want to enter different possible averages to understand the likely costs better. If you pay a fixed rate for this work, then enter it in E29.
- Average hourly pay for election supervisors: for periods when more than four staff are required, the tool calculates supervisory time to support those workers. That work is calculated using this rate. Enter your average supervisory pay in E30.

Printing and postage costs:

- Ballots (per card): If you have data on your past printing cost per ballot page, or have a quote in hand for 2020, enter that value in E31.
- Envelopes (per envelope): If you know your current printing cost per envelope, enter that value in E32.
- Labels: If you use labels to address envelopes, enter that value in E33. (If you use window envelopes or some alternative to labels, you can enter the price as \$0.00).
- Inserts: If you have the cost for printing for the inserts included with a mail ballot, please enter the price per ballot packet in E34.
- Postcards: If you have the price per piece for a voter-education campaign mailing, please enter it here. If the format is not a postcard, that's also okay. Enter the cost per piece in E35.
- Postage (outbound): If you know the expected postage per ballot based on weight, enter that value in E36.
- Postage (inbound): If you have an expected postage cost per ballot based on weight, enter that value in E37. If your jurisdiction does not pay for return postage, enter \$0.00.

## Scenario overview

The next tab in the spreadsheet illustrates three potential mail ballot scenarios. They are intended to help you plan for a range of possibilities and contingencies in an unpredictable election year. **These scenarios are NOT intended to describe the exact outcomes of any specific policy path or predict voter choices accurately.**

(Even if you focus primarily on one scenario as your most likely plan for administering the election, keep in mind that some resources called for in a different scenario may also be necessary as part of contingency planning for legal challenges, evolving public health advice, or other unforeseen circumstances force late changes to the election.)

## Scenario summary

For each scenario, the calculator displays an estimated number of ballot requests (top row) and ballots (bottom row) to be processed each day in the run-up to the ballot request or ballot return deadline. These numbers are also displayed in a small chart below the table.

**All-mail:** This scenario assumes that every eligible voter will be sent a mail ballot. Many all-mail elections may also offer in-person voting options, even though this calculator does not currently address those costs.

**Promoted voting by mail:** This scenario assumes that election officials will reach out to every voter with information on how to request a mail ballot, and messages that voting by mail is a safe and secure option.

**No vote-by-mail promotion:** This scenario assumes that election officials will have no new resources to promote voting by mail or educate voters. Instead, voters will choose whether to cast their ballots by mail or in person based on information they receive from other sources, including campaigns, community organizations, and the media.

## How were the scenario numbers generated?

These scenarios are informed by historical election data from jurisdictions with different voting by mail policies in place, and from 2020 primary elections. In each of the three modeling tabs, these reference elections are included and highlighted in pale gray.

If you have more detailed data on your jurisdiction's own historical voting patterns, you can review the modeling tabs and review the source data used, and make your own predictions about overall mail volume and day-by-day. Model data is highlighted in pale blue, just like other reference data, and can be modified.

## Cost tabs (All-mail costs, VBM promotion costs, & No change costs)

For each of the three scenarios, the calculator includes a tab with its estimated costs and resource needs. These cost estimates are divided into six categories:

- Printing
- Postage + mailing
- Personnel
- Facilities
- Equipment
- Supplies

## Printing

The quantities of print materials are calculated using the ballot request model. If you'd like to understand these quantities in greater detail, you can turn to the Scenario overview tab for a



day-by-day look at ballot requests estimated, and at the Ballot request model tab to dig into the source numbers.

The costs of print materials are drawn from the Inputs tab. To revise these costs per piece, you can edit the values on the Inputs tab.

## Postage + mailing

The quantities of postage are calculated using the ballot request model. If you'd like to understand these quantities in greater detail, you can turn to the Scenario overview tab for a day-by-day look at ballot requests estimated, and at the Ballot request model tab to dig into the source numbers.

The postage costs are drawn from the Inputs tab. To revise these costs per piece, you can edit these values on the Inputs tab.

## Personnel

The person-hour estimates are calculated in the staffing model. If you'd like to understand these estimates in greater detail, you can turn to the Staffing calculations tab for a detailed breakdown of person-hours by activity and time period.

The costs are drawn from the Inputs tab. To revise the average hourly rate for election workers or supervisors, you can edit these values in the Inputs tab.

## Facilities

The facility square footage requirement is calculated in the facilities model. If you'd like to understand that estimate in greater detail, you can review the Facilities calculations tab.

**These estimates do not account for specific social-distancing measures.** If your ballot-handling spaces are strictly laid out in ways that limit distancing, however, you may need a larger space than the calculator recommends.

Because costs for building space will vary significantly — you may be able to take over other government facilities at no cost, for example — the tool does not make any cost estimate for these facilities. If you will need to pay rental fees for the spaces where you handle mail ballots, please be sure to enter those costs in D32 and D33.

## Equipment

The equipment section relies most heavily on your own planning and input. Equipment needs vary significantly by jurisdiction and individual preference. If you're still considering whether or not to automate parts of your work with new equipment, please review the [Making decisions about equipment and automation](#) section of this guide.

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**Barcode scanners:** This assumes one barcode scanner per person working to sort and process inbound mail ballots. If your office already owns scanners or can borrow them from other government offices, you may reduce this number or set the price per scanner to \$0.

**Envelope opener:** The tool calculates one envelope opener per 16,000 inbound ballots. If your office already owns this equipment, or does not plan to use an automated opener, you may reduce this number or set the price per opener to \$0.

**Signature verification software:** Many election offices rely on automated signature verification-matching software tools. Vendor costs for these tools vary significantly, and the tool does not estimate potential signature verification costs. If you plan to use signature-verification technology, please enter your estimated costs in cells C-E41 so those costs are included in your final estimate.

**Hardware (computers, monitors, and scanners) for signature adjudication):** If your jurisdiction is deploying signature-matching software for the first time in 2020, you may also need to acquire tools to scan ballot envelopes, display the signature matches, or otherwise support the software. If this is the case, please enter those costs in cells C-E42 so they are included in your final estimate.

**High speed ballot scanners:** Many jurisdictions shifting from polling-place-based scanning to centralized scanning could benefit from additional scanners to streamline their work. If you are considering purchasing or renting a high-speed scanner (or several), enter those costs in C-E43 so they are included in your final estimate.

**Ballot monitoring camera:** The tool factors in the cost of one livestream-quality camera. If you'll have a very large facility, or know that ballots will need to be spread out in ways that require additional monitoring tools, please enter those costs in C+E44 so they are included in the final estimate.

## Supplies

The first two supplies categories (Personal Protective Equipment and office supplies) are based on staffing estimates. To understand them better, you can review the "staffing calculations" tab. The second two supplies categories (mail trays and boxes for ballot storage) are based on ballot volume: to understand them better, you can review the "ballot return model" tab.

If you have more accurate cost estimates for any of these categories, you can enter those costs directly in cells E48-51 and improve the accuracy of the total budget estimate.

## Staffing calculations

The staffing calculations tab estimates the number of people-hours needed to support mail voting over the course of the election, across all three potential scenarios. These staffing needs are broken into seven different types of work:

- processing voter registrations
- processing ballot requests
- preparing ballots to go out
- handling returned ballots
- tabulation
- supervision/management
- answering voters' questions

For each type of work, the calculator uses two sources of data to make its estimations: the time and effort data entered on the inputs tab, and the inbound volume of requests found in the corresponding modeling tab (voter registration model, ballot request model, and ballot return model). If you have concerns about the time or staffing needed for a particular phase, start by reviewing the per-person-hour effort estimate in inputs, and the inbound requests estimated in the scenario overview tab.

Task by task, this tab provides three pieces of data to consider:

**Day-by-day time estimates:** For each time period, the calculator estimates how many person-hours will be needed to ensure that each day's inbound requests (registrations, ballot forms, or ballots) are processed without generating a backlog. These requests vary based on the day and the scenario, and show what possible patterns of activity and staffing could play out. Look for the highest-volume day at each step, and consider how many hours of work it requires.

**Total time estimates:** For each task, the calculator estimates how many total person-hours will be spent on that task over the entire election cycle. This total is used to estimate staffing costs, in particular. You may also use it to consider overall staffing, or to plan 'smoothing' the work over a longer period of time.

**Staff recommendations:** For each task and time period, the calculator recommends the number of people who should be assigned to that task during that time period to ensure that the work is completed each day without spilling into overtime hours.

Use this tab to plan for personnel, potential day-to-day assignments, and review if your current staffing plan is robust enough to adapt if more (or fewer) voters choose mail options.

## Facilities calculations

Processing mail ballots requires a lot of space. Jurisdictions that run all-mail elections have built out custom [multi-room work flows](#) to support each step of the process. While building custom ballot-processing spaces is unlikely in 2020, it's nonetheless incredibly important to ensure that election staff have a large enough secure facility to store and count ballots.

The recommended facility size is dependent on two factors:

- The number of ballots

- The number of ballot styles

Additional ballots add staffing requirements, and with those staff, additional space to work. Additional ballot styles often require separate stations and teams to separate different ballot styles from mixing.

**These estimates do not account for specific social-distancing measures.** If your ballot-handling spaces are strictly laid out in ways that limit distancing, however, you may need a larger space than the calculator recommends.

## Registration model

The drop in voter registration rates in the spring and early summer of 2020 may foreshadow a dramatic increase in registrations as deadlines approach. A record-setting increase in registrations in the fall is not guaranteed, but it is possible.

The registration model considers how a voter education mailing could remind voters to update their registration information. It also considers the possible effect of National Voter Registration Day (NVRD) campaigns, when many organizations promote voter registration and online registrations especially may spike.

## Ballot request model

The ballot request model presents three potential scenarios for how many voters may request ballots (and when) in a given jurisdiction. **These scenarios are NOT intended to describe the exact outcomes of any specific policy path or predict voter choices accurately.**

**All mail:** In an all-mail election, most voters will automatically receive the ballot sent out. However, some number of ballots will need to be re-sent due to errors or updates, or voters will request that they be delivered to an alternate address. The day-by-day data for this model is estimated. The overall rate of re-mailing ballots is estimated based on 2018 data from Colorado and Oregon.

**Promoted VBM:** In 2020 primary elections, **many** voters have chosen mail ballots under current public health guidance. This scenario uses the 2020 Wisconsin and Iowa primaries, in particular, due to the availability of day-by-day request data in those states. The model includes a higher rate of VBM requests than either of those primaries, on the assumption that the general election will see higher turnout than a primary, and that some of those general-election-only voters will also choose to vote by mail.

**Non-promoted VBM:** there is no promotion of vote by mail, voters who do choose mail options may do so later during the eligibility period.

## Adapting the model

These scenarios represent educated guesses, based on the best available data. If you have past data from your own jurisdiction, or a more similar jurisdiction, that you'd like to compare, please do.

The cells in gray represent actual election data, presented for comparison. The cells in blue are the modeled data. These blue cells are used to calculate staffing levels and total costs, and changing their values may change other recommendations significantly.

To add a new comparison election, you'll need to calculate the **percentage of all registered voters** who requested a ballot on a given day. Add a new row to the table, immediately above the blue-shaded row for the most applicable scenario, and enter each day's ballot request rate.

After adding your own data, compare it to the modeled data in blue. Is it higher? Lower? Are the requests distributed differently by day? Adjust the values in blue until they match your own expectations, then review the staffing and costs tabs and review what's changed.

## Ballot return model

The ballot request model presents three potential scenarios for how many voters may return ballots (and when) in a given jurisdiction. **These scenarios are NOT intended to describe the exact outcomes of any specific policy path or predict voter choices accurately.**

**All-mail:** For all-mail jurisdictions, historical election data is available from Oregon's 2016 and 2018 general elections and Denver's 2020 primary election. These gray cells show the day-by-day ballot return rates in those elections. The model relies on this historical data to estimate what return patterns may look like in 2020 in a jurisdiction that mails every voter a ballot. Return patterns may vary based on the availability of drop boxes.

**Promoted VBM:** Historical data on return ballot patterns in jurisdictions that promote VBM and typically see high rates of mail voting comes from Georgia's 2016 and 2018 general elections, Orange County, California's 2018 general election, and the 2020 Iowa primary. Based on these precedents, the model in blue suggests what fraction of mailed ballots will likely return each day in the lead-up to the return deadline.

**Non-promoted VBM:** Limited data is available on ballot return patterns in jurisdictions that see low rates of voting by mail. This model relies on comparison to promoted VBM jurisdictions. Slightly fewer voters are estimated to return ballots, and those that do return their ballots may do so closer to the deadline.

## Adapting the model

These scenarios represent educated guesses, based on the best available data. If you have past data from your own jurisdiction, or a more similar jurisdiction, that you'd like to compare, please do.

The cells in gray represent actual election data, presented for comparison. The cells in blue are the modeled data. These blue cells are used to calculate staffing levels and total costs, and changing their values may change other recommendations significantly.

To add a new comparison election, you'll need to calculate the **percentage of all mailed ballots** that were returned on a given day. Add a new row to the table, immediately above the blue-shaded row for the most applicable scenario, and enter each day's ballot request rate.

After adding your own data, compare it to the modeled data in blue. Is it higher? Lower? Are the requests distributed differently by day? Adjust the values in blue until they match your own expectations, then review the staffing and costs tabs and review what's changed.

## Making decisions about equipment and automation

This calculator is intended to help you consider the benefits and trade-offs of specific election equipment. If you're still considering what tools to prioritize acquiring, you can model their likely impacts using this tool using the following process:

### Model the manual work scenario

In the inputs tab, look for the task or tasks that new automation tools may help to support. Under "time and effort data," estimate the pace at which your staff could complete this task as done manually. Check that the "average hourly pay for election workers" cost data is as accurate as possible.

Pick the costs tab that most closely aligns with your own expectations for mail ballot volumes this November: All-mail costs, VBM promotion costs, or No change costs. Confirm that the automation equipment cost is set to zero.

Review both the personnel costs within that budget, and the total costs. Save these numbers in a separate document.

Open the staffing calculations tab, and review how many total staff it recommends for the task. Save this number as well.

### Model the automation scenario

Return to the inputs tab. Look for the tasks that automation may support. Under "time and effort data," estimate the pace at which your staff could complete this task with the help of new equipment.

Open the costs tab that you used in the manual work scenario (All-mail costs, VBM promotion costs, or No change costs.) Enter the automation equipment costs.

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Review the personnel costs within that budget, and the total costs. Open the staffing calculations tab, and review how many total staff it recommends for the task. Save this number as well.

## Compare

Compare both sets of numbers. How many staff could automation save? How much money does it cost or save overall?

You may also look at the other two scenario budgets. Does automation become more valuable if mail ballot requests exceed expectations? Does it raise costs dramatically if fewer voters choose mail?

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