Building accessible web applications

Rachele DiTullio, Senior Accessibility Engineer, Citizens

Citizens™

Rachele DiTullio (she/they)

- Web developer for many years
- Graduate school for Information Studies (UXD)
- Learned accessibility and became a Certified Professional in Web Accessibility (CPWA)
- Progressed from software engineering to accessibility engineering in 2021

Agenda

Web accessibility

Best practices

Testing for accessibility

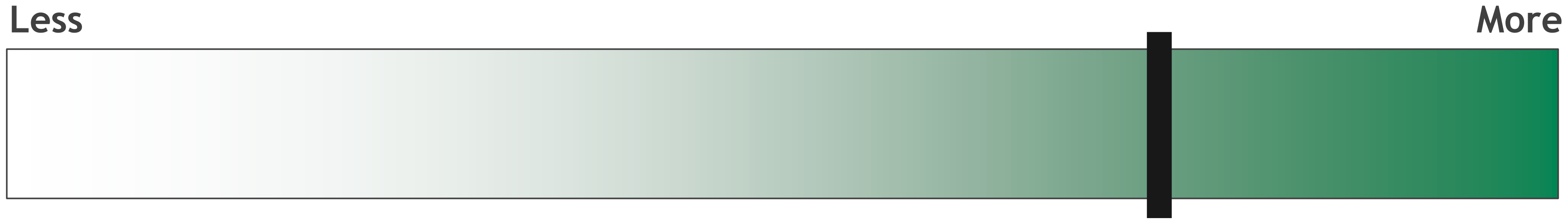
Web accessibility

“The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect.”

—Tim Berners Lee
W3C Director and inventor of the World Wide Web

What is web accessibility?

Web accessibility is the extent to which a website or web application can be used by **disabled people.**



Accessibility is not a technical problem to be solved

It’s a human one.

- We must understand the ways disabled people access and use digital information.

- Disabled people will try to use your application.

- Who are you willing to exclude?

Accessibility must be baked in

Semantic Markup

Native HTML elements first

...then ARIA.

The first rule of ARIA

Don’t use ARIA.

ARIA: Less good example

```
<div id="my-button">Search</div>
```

- Must have the correct role: add `role="button"`
- Must be keyboard focusable: add `tabindex="0"`
- Must work with ENTER and SPACE: add JavaScript

OR use a `<button>` and get built-in functionality

Best practices

Shift left

- Start thinking about accessibility during project planning
- Decide what standards you are conforming to
- Industry standard is now WCAG 2.2 AA (56 success criteria)
- To get rid of issues, don’t create them in the first place

For **every hour** that a UX Designer invests into accessibility pre-launch, we **save up to 4 hours** in Engineering post-launch not fixing accessibility issues.

—Dirk Ginader, Accessibility Engineering Lead at Google

Design systems can help

- Give your developers accessible components and accessibility guidance.
- It's still possible to use design systems components in inaccessible ways.
  - Controls missing accessible names
  - Controls with incorrect accessible names
  - Color contrast issues
  - Managing focus order

Citizens Design System

Citizens Design System

The Citizens Design System is here to help you build clean and accessible interfaces for Citizens digital experiences.

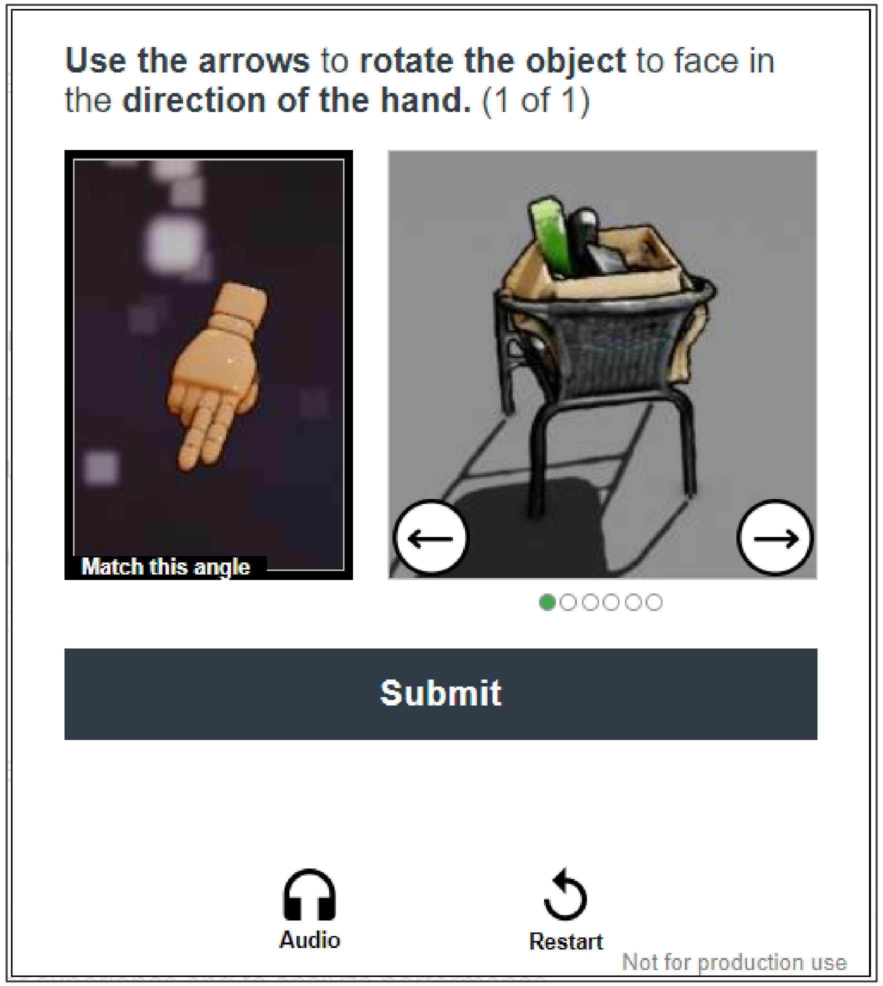
Explore Our Digital Foundations

Feel free to poke around and check out what the design system has to assist you.

You're responsible for all 3rd party code in your application

This includes:

- Frameworks
- Libraries
- Packages
- Design systems
- CAPTCHAs
- Maps
- Videos
- iframes
- Code/content from somewhere else



Use the arrows to **rotate the object** to face in the **direction of the hand.** (1 of 1)

If you can do only one thing for accessibility…

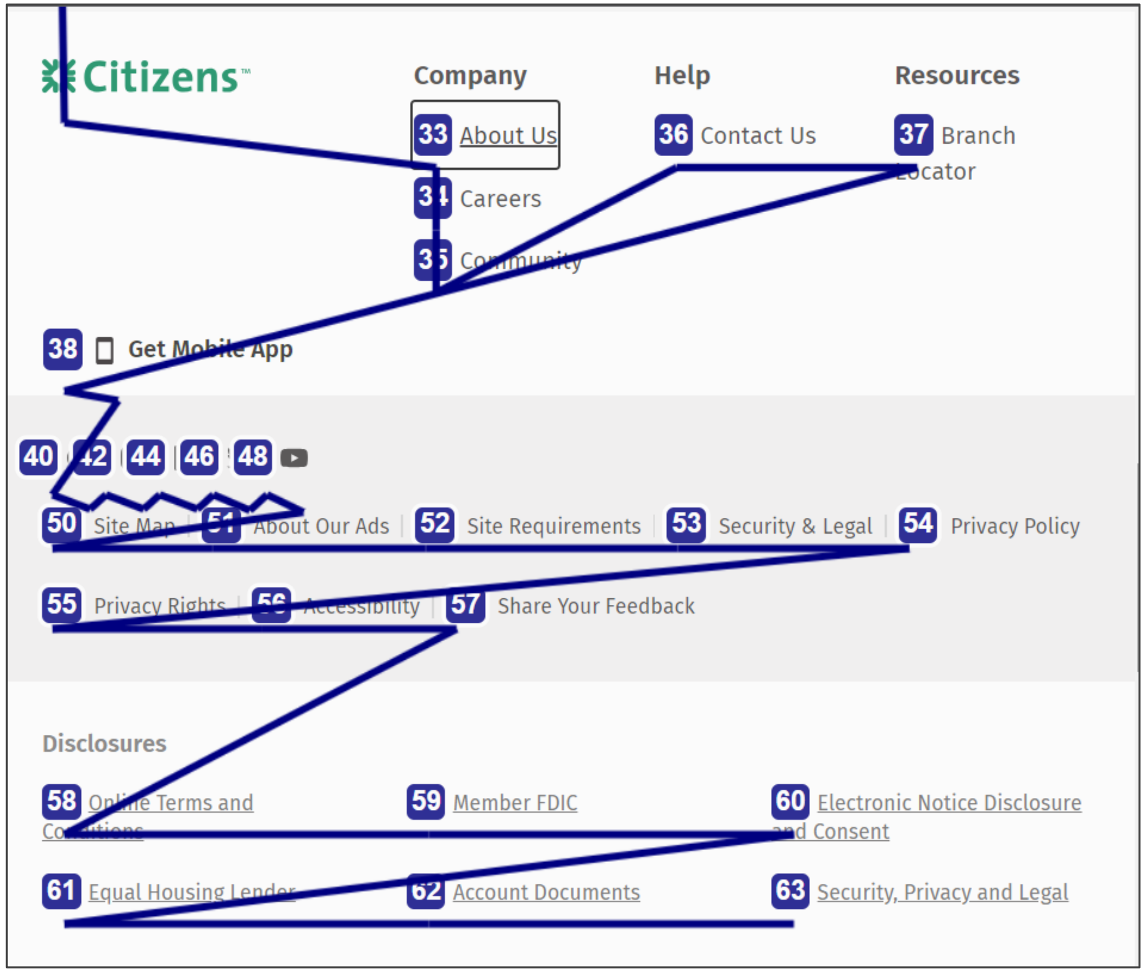
Make your application work with a keyboard.

All interactive elements get keyboard focus

- Only interactive elements get keyboard focus; disabled controls are removed from the focus order
- Buttons activate with SPACE and ENTER keys; Links activate with ENTER
- Scrolling the window with ARROW keys
- Scrolling containers get keyboard focus and scroll with ARROW keys
- Radio buttons and tabs are selected with ARROW keys
- Dialogs and expanded controls close with ESC
- No keyboard traps
- No single print character key shortcuts
- Controls activated with gestures provide button alternatives, e.g. panning a map in four different directions, drag and drop

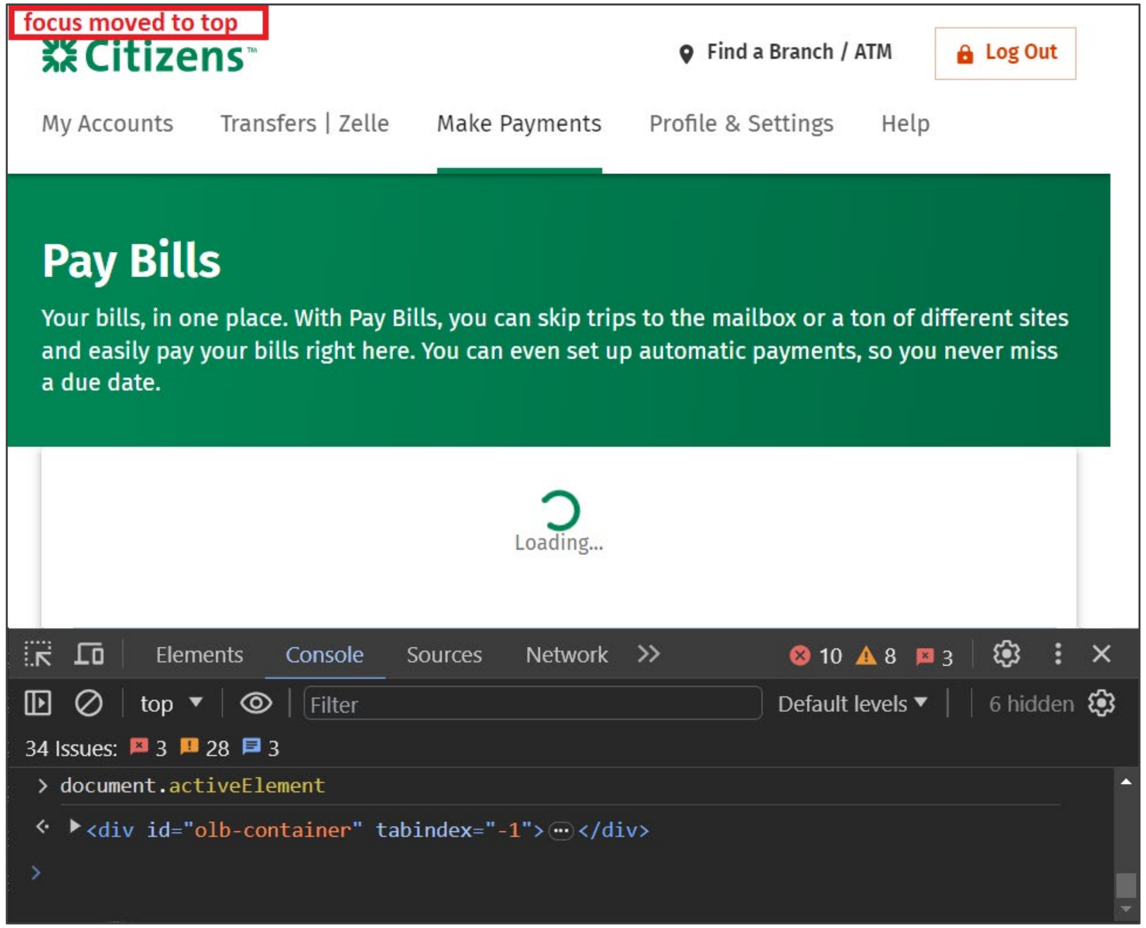
Focus order is logical and focus indication is visible

- Users can TAB through all interactive elements in an order that makes sense: left to right, top to bottom
- Visibly indicate where the current keyboard focus is; do not set CSS `outline:0` on controls
- Default browser focus indicators pass; Custom focus indicators must have 3:1 contrast with background
- Manage focus for dialogs, loading new content, form errors



Manage focus in single page applications (SPAs)

- Focus must be deliberately and consistently placed at the
  - top of new page content or
  - top of the HTML page
- Pick one or the other and consistently follow that pattern
- DO NOT place focus on the first input on page load
- To determine where current focus is, use the **`document.activeElement`** command in the browser console



Pay Bills

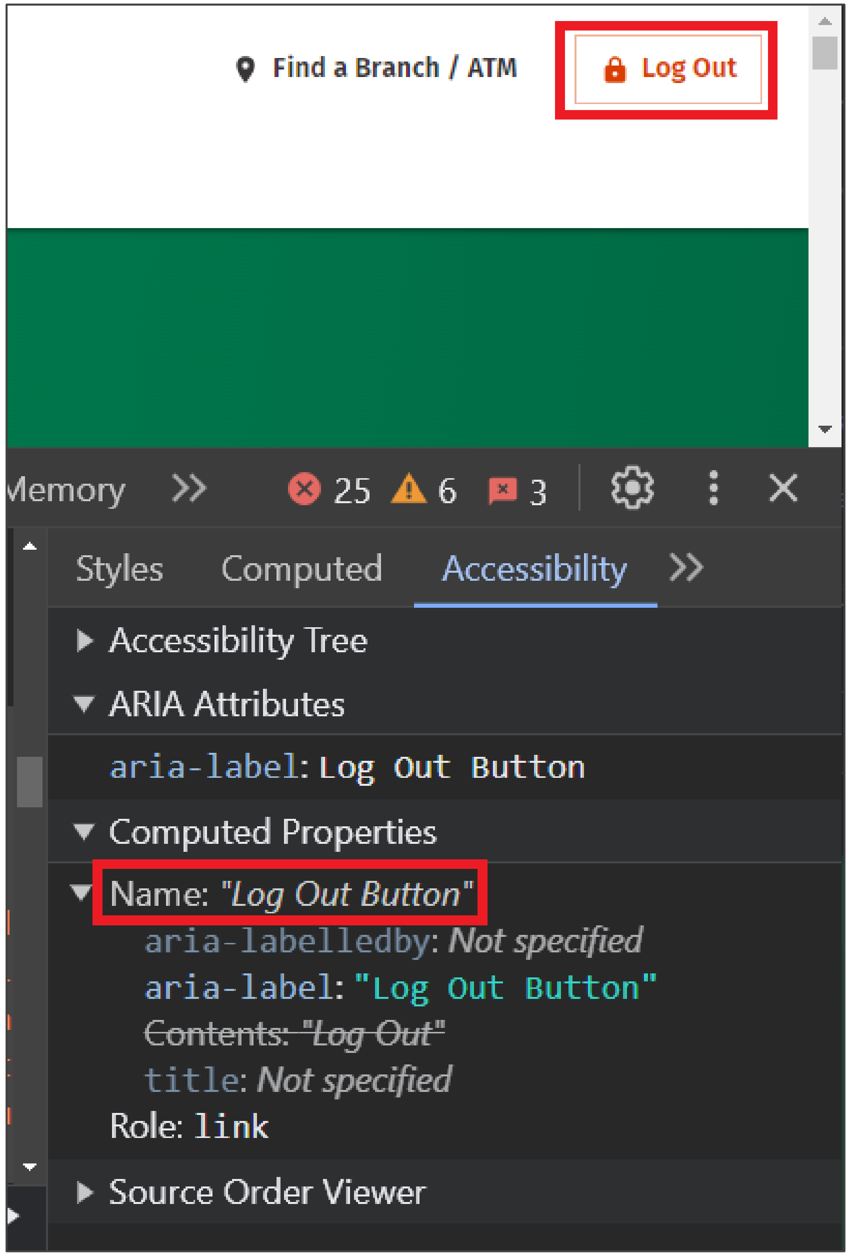
Your bills, in one place. With Pay Bills, you can skip trips to the mailbox or a ton of different sites and easily pay your bills right here. You can even set up automatic payments, so you never miss a due date.

Loading...

```
34 Issues: 3  28  3
> document.activeElement
< ▸<div id="olb-container" tabindex="-1">⋯</div>
>
```

Controls have accessible names

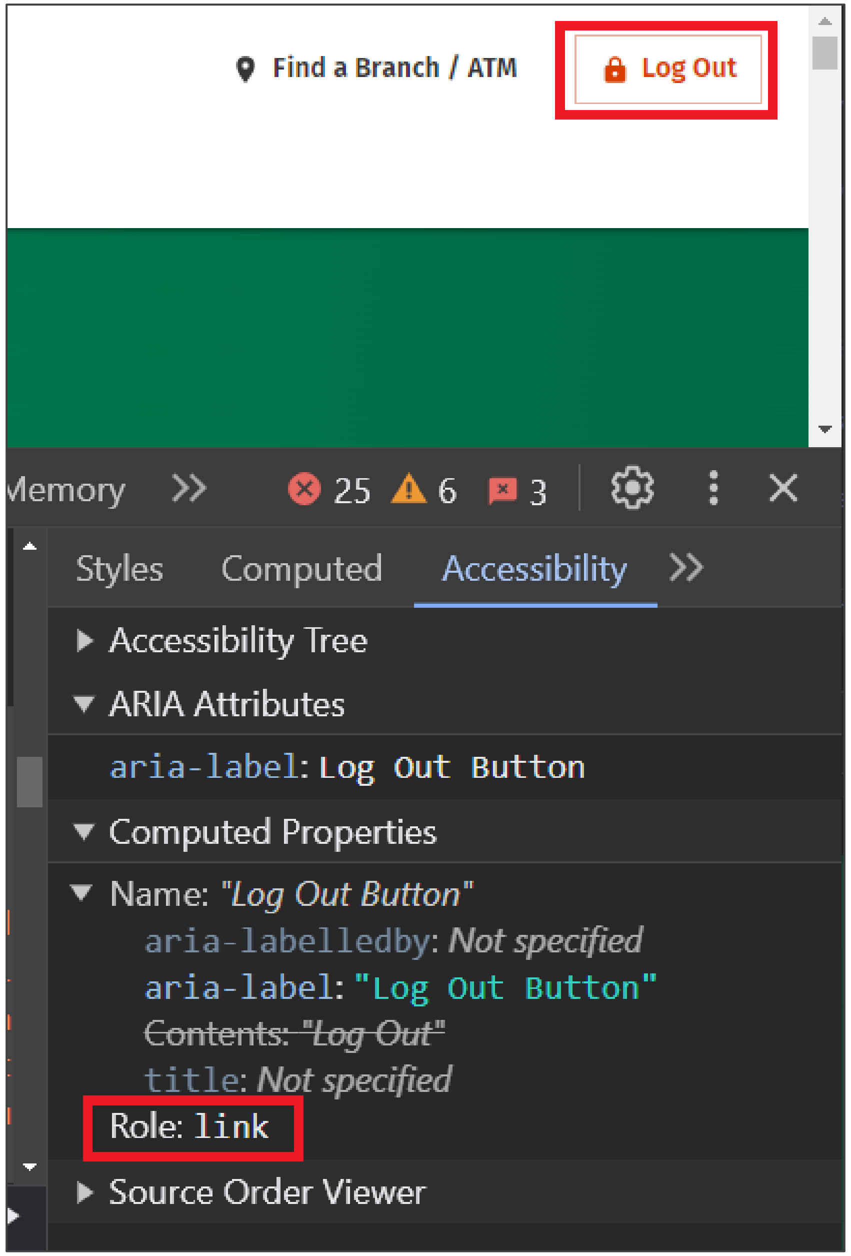
- All interactive elements (links, buttons, form controls), repeated landmarks and elements with ARIA roles need an accessible name
- Screen reader users hear/read the accessible name of all controls; No name: *unlabeled button*
- Speech input users rely on the accessible name matching the visible label to operate a control
- Use `aria-label` for icon-only controls; don't include the role



```
▶ Accessibility Tree
▼ ARIA Attributes
  aria-label: Log Out Button
▼ Computed Properties
▼ Name: "Log Out Button"
    aria-labelledby: Not specified
    aria-label: "Log Out Button"
    ~~Contents: "Log Out"~~
    title: Not specified
  Role: link
▶ Source Order Viewer
```

Controls have appropriate roles

- Screen readers will automatically announce the role
- Don't include the role in the accessible name
- It's possible to change the role of any element with the `role` attribute—be careful!
- Interactive elements must have a defined role
- Only elements with a defined role can use `aria-label` and `aria-labelledby` attributes

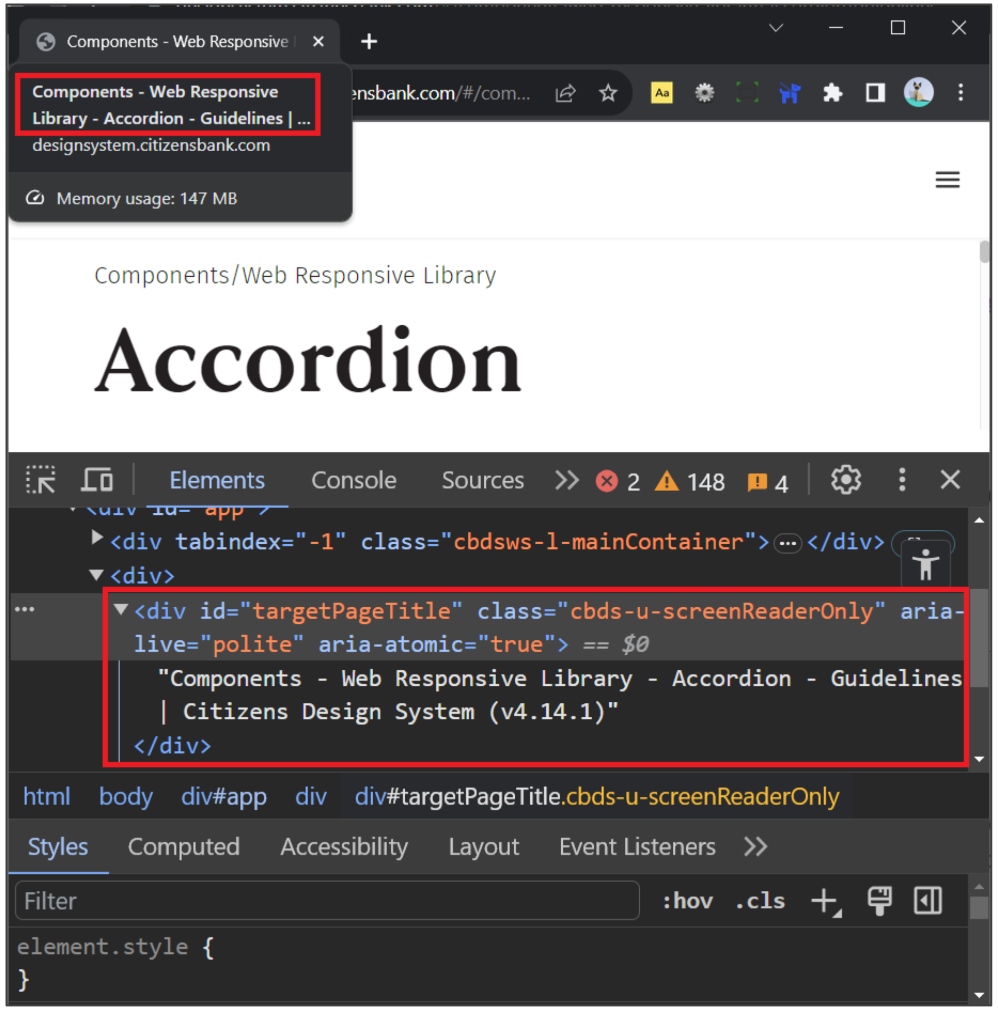


aria-label: Log Out Button

Name: "Log Out Button"
aria-labelledby: Not specified
aria-label: "Log Out Button"
~~Contents: "Log Out"~~
title: Not specified
Role: link

Each page (URL) has a unique page title

- Every time the URL changes, the page title needs to update
- Page titles notify screen reader users that the content has changed
- Page titles need to be unique within a set of webpages
- When managing state in a single page application with multiple page titles, use a **live region** to announce the page title
- Debug live regions with [NerdeRegion]()



Components - Web Responsive Library - Accordion - Guidelines | ...
designsystem.citizensbank.com
Memory usage: 147 MB

Components/Web Responsive Library

Accordion

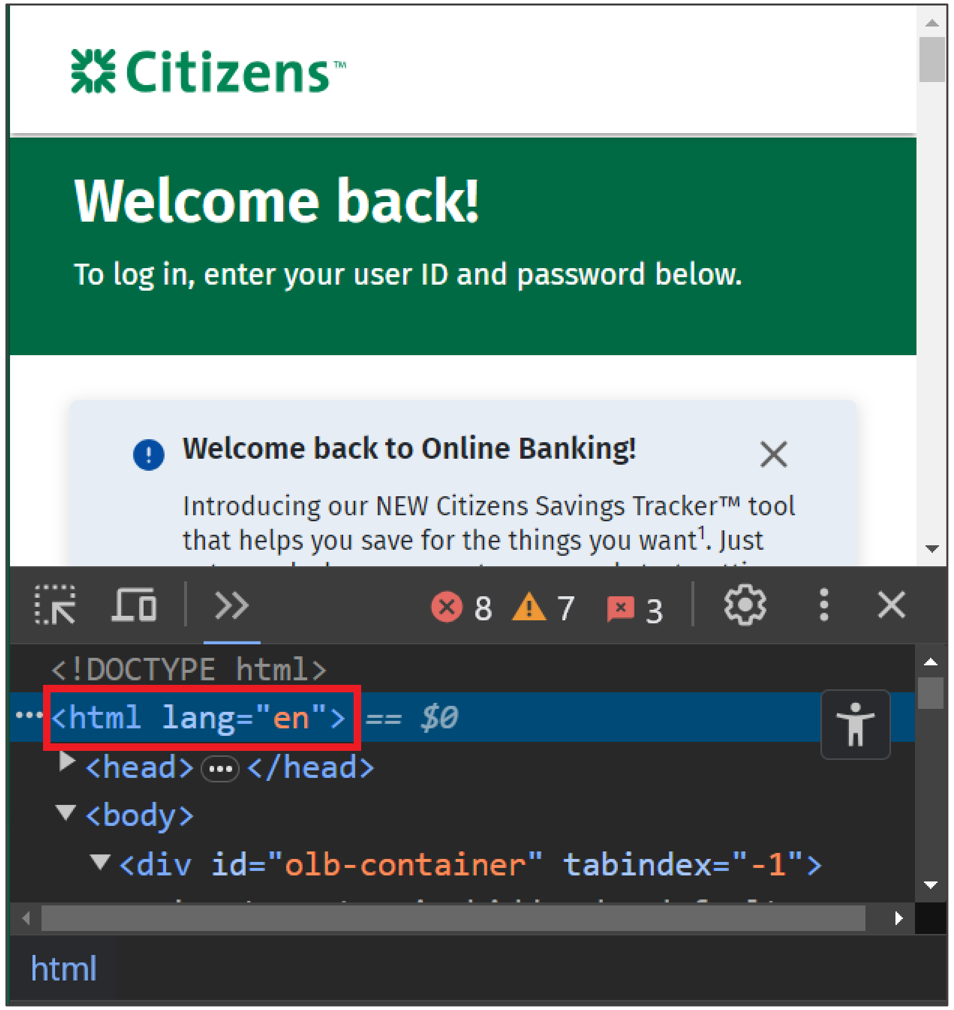
```
<div tabindex="-1" class="cbdsws-l-mainContainer">…</div>
▼<div>
  ▼<div id="targetPageTitle" class="cbds-u-screenReaderOnly" aria-
   live="polite" aria-atomic="true"> == $0
     "Components - Web Responsive Library - Accordion - Guidelines
     | Citizens Design System (v4.14.1)"
   </div>
```

html body div#app div div#targetPageTitle.cbds-u-screenReaderOnly

```
element.style {
}
```

Set the language of every page

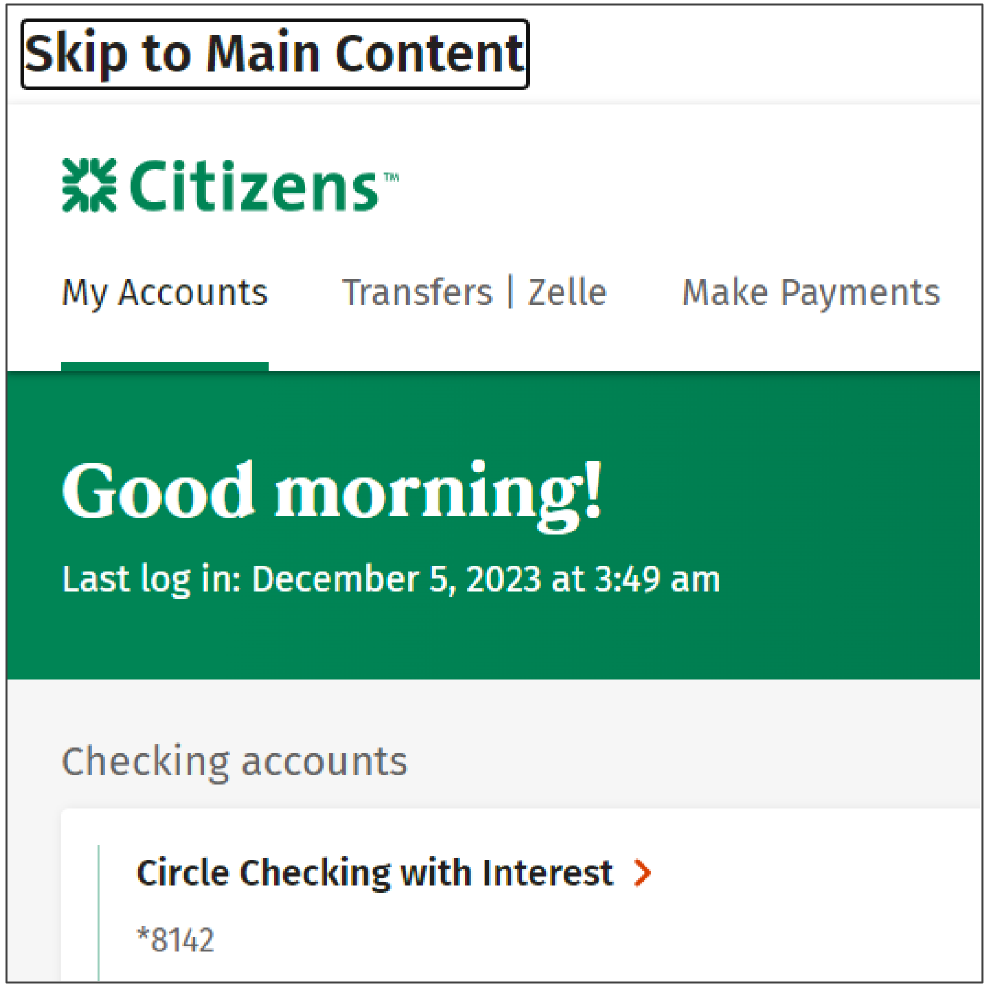
- Enables screen readers to announce the content in appropriate language and accent
- Use the `lang` attribute in the `<html>` element to set the page language, e.g. **`<html lang="en">`**
- Apply the `lang` attribute to elements where content is in a language other than the language set at the page level, e.g. **`<p lang="es">Hola</p>`**


Citizens
Welcome back!
To log in, enter your user ID and password below.
Welcome back to Online Banking!
Introducing our NEW Citizens Savings Tracker™ tool that helps you save for the things you want¹. Just
8
7
3
html

```
<!DOCTYPE html>
<html lang="en"> == $0
  <head>…</head>
  <body>
    <div id="olb-container" tabindex="-1">
```

Provide a skip link for keyboard navigation

- A skip link is the first focusable element on a page
- Primarily used by keyboard-only users to skip the navigation instead of tabbing through multiple links
- Skip links can be visually hidden until they have keyboard focus
- The target of a skip link is usually the `<main>` landmark
- You may need to implement other skip links in the UI to bypass repeated interactive elements



Good morning!

Last log in: December 5, 2023 at 3:49 am

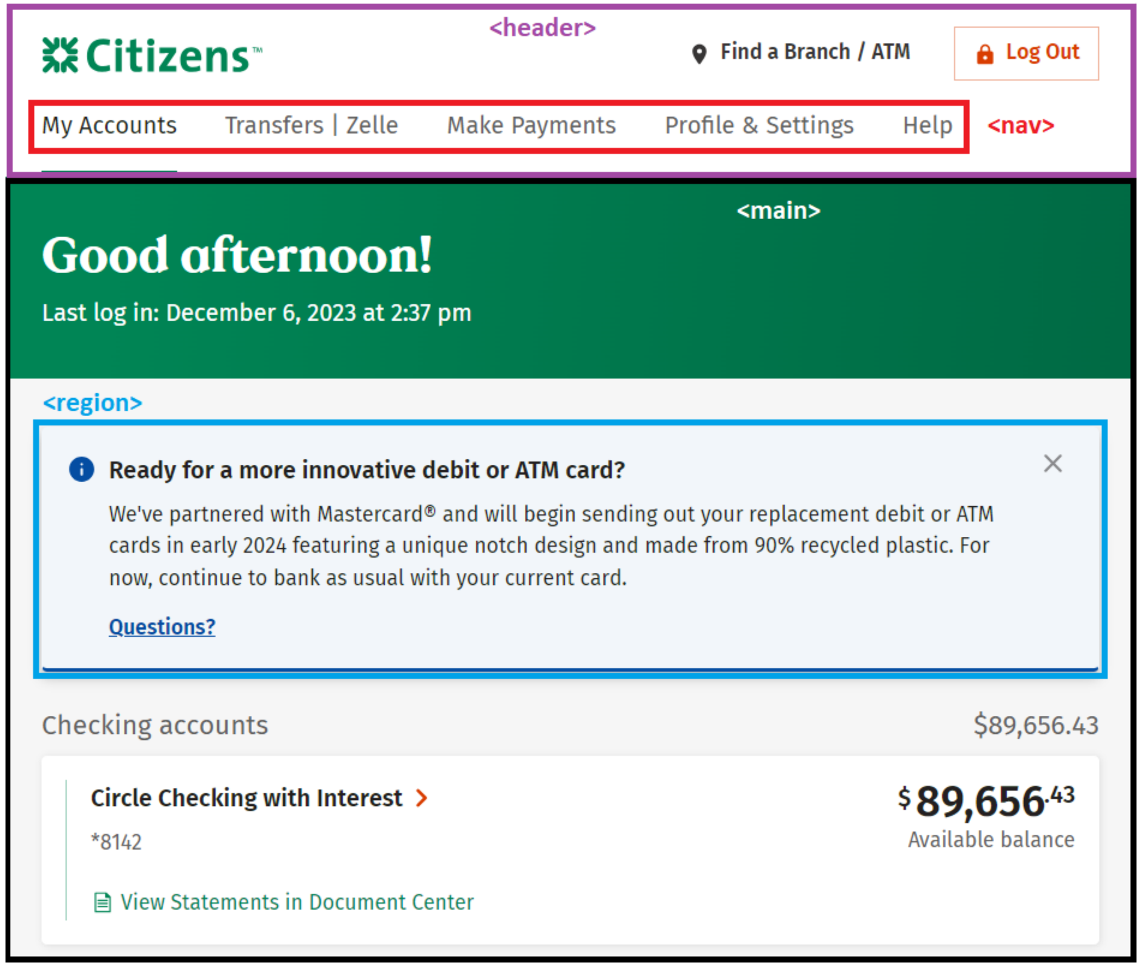
Checking accounts

Circle Checking with Interest

*8142

Use landmarks to help screen readers navigate

- If you use landmarks, all content should be contained a landmark
- Use only one `<header>`, one `<main>`, and one `<footer>`
- The main content of the page should be contained in `<main>`; this landmark is usually the target of a skip link
- When you have multiple landmarks of the same type, e.g. `<nav>`, use `aria-label` to set them apart



Good afternoon!

Last log in: December 6, 2023 at 2:37 pm

Ready for a more innovative debit or ATM card?

We've partnered with Mastercard® and will begin sending out your replacement debit or ATM cards in early 2024 featuring a unique notch design and made from 90% recycled plastic. For now, continue to bank as usual with your current card.

Questions?

Checking accounts $89,656.43

Circle Checking with Interest

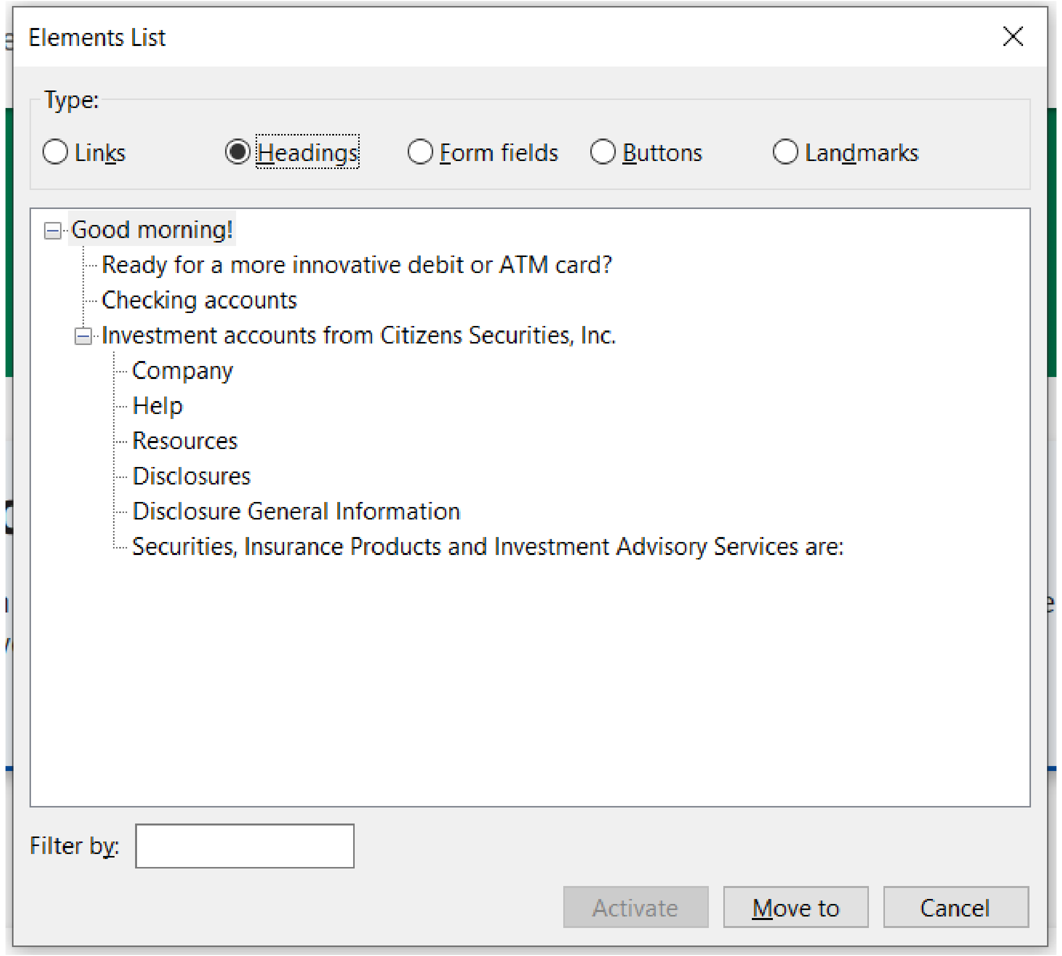
*8142

View Statements in Document Center

$89,656.43 Available balance

Use semantic markup

- Text that acts as a visual heading must be marked up as a heading (`<h1>`-`<h6>` elements)
- Buttons do something, e.g. open a dialog, submit a form
- Links take you to a new page
- Use lists when content is visually presented as a list
- Tabular data is contained in tables
- Use landmarks sparingly
- Group related form fields


Elements List

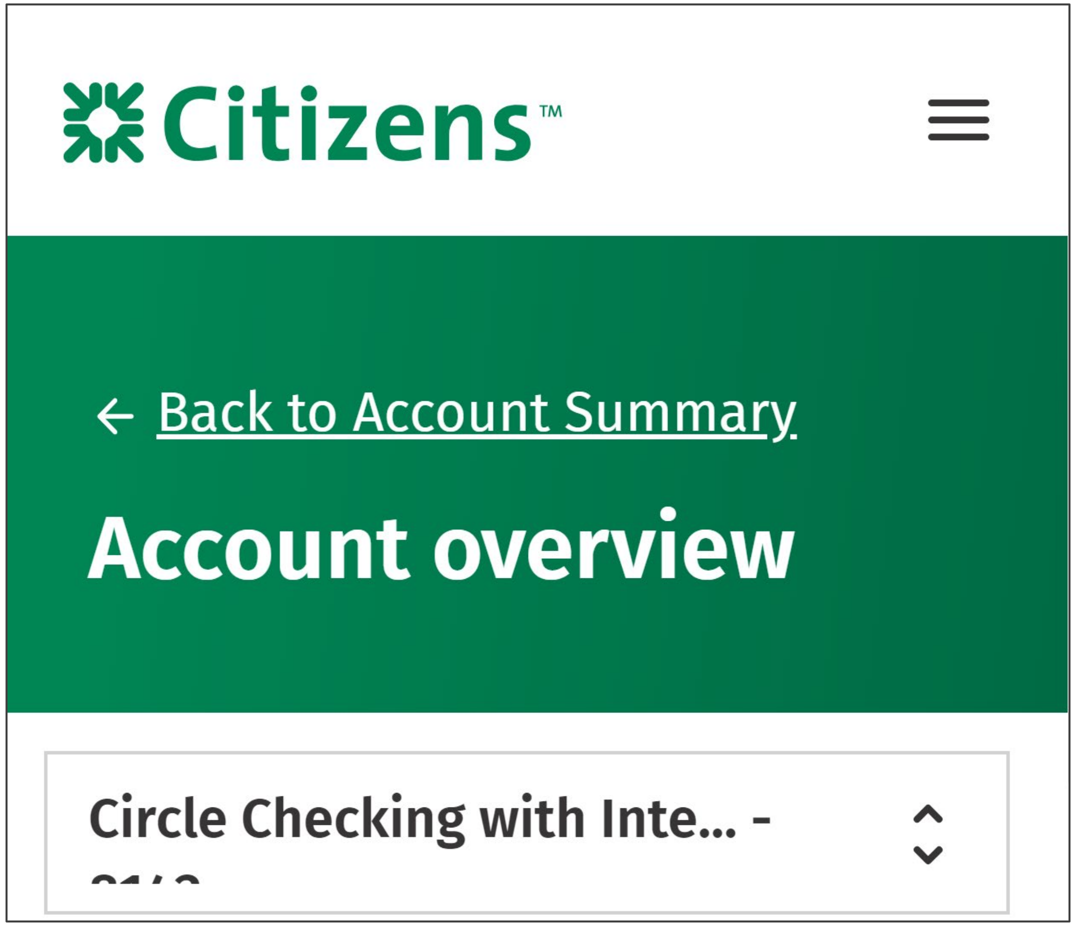
Type: Links [✓ Headings] Form fields Buttons Landmarks

- Good morning!
  - Ready for a more innovative debit or ATM card?
  - Checking accounts
  - Investment accounts from Citizens Securities, Inc.
    - Company
    - Help
    - Resources
    - Disclosures
    - Disclosure General Information
    - Securities, Insurance Products and Investment Advisory Services are:

Filter by:

Adaptive layouts support reflow and resizing of text

- Layouts must work at a minimum of 320x256px without scrolling in two dimensions (test on desktop with 1280x1024px zoomed to 400%)
- Users must be able to zoom to 200% without loss of content or two-dimensional scrolling (test at 1024x768px zoomed to 200%)
- All content must be visible and available to all users at all screen sizes. Don't elide important info…
- Support both orientations


Citizens™

← Back to Account Summary

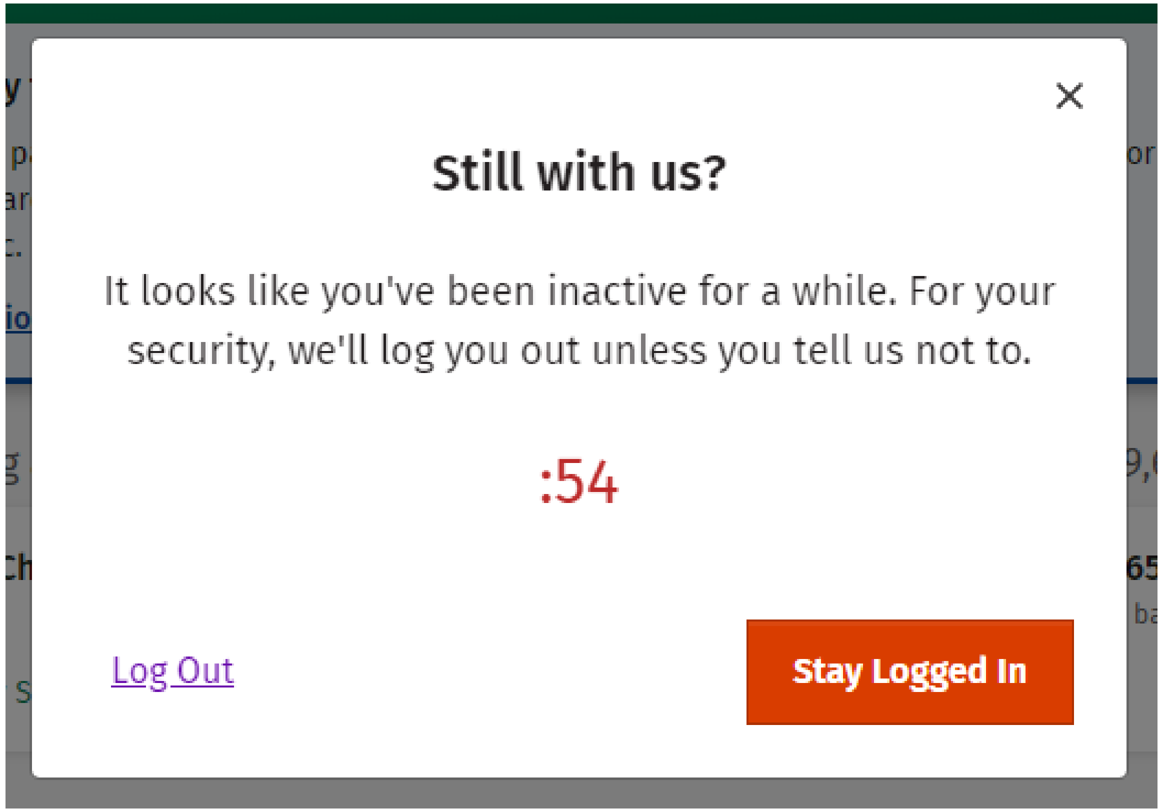
Account overview

Circle Checking with Inte... -

Dynamic status messages are conveyed to assistive technology

- Any text that appears dynamically must be announced using a **live region**
    - Page loading
    - Snackbar messages
    - Toast messages
    - Banner notifications
    - No search results
    - Inline form error messages

- Live region is empty on page load
- Do not move focus to status messages



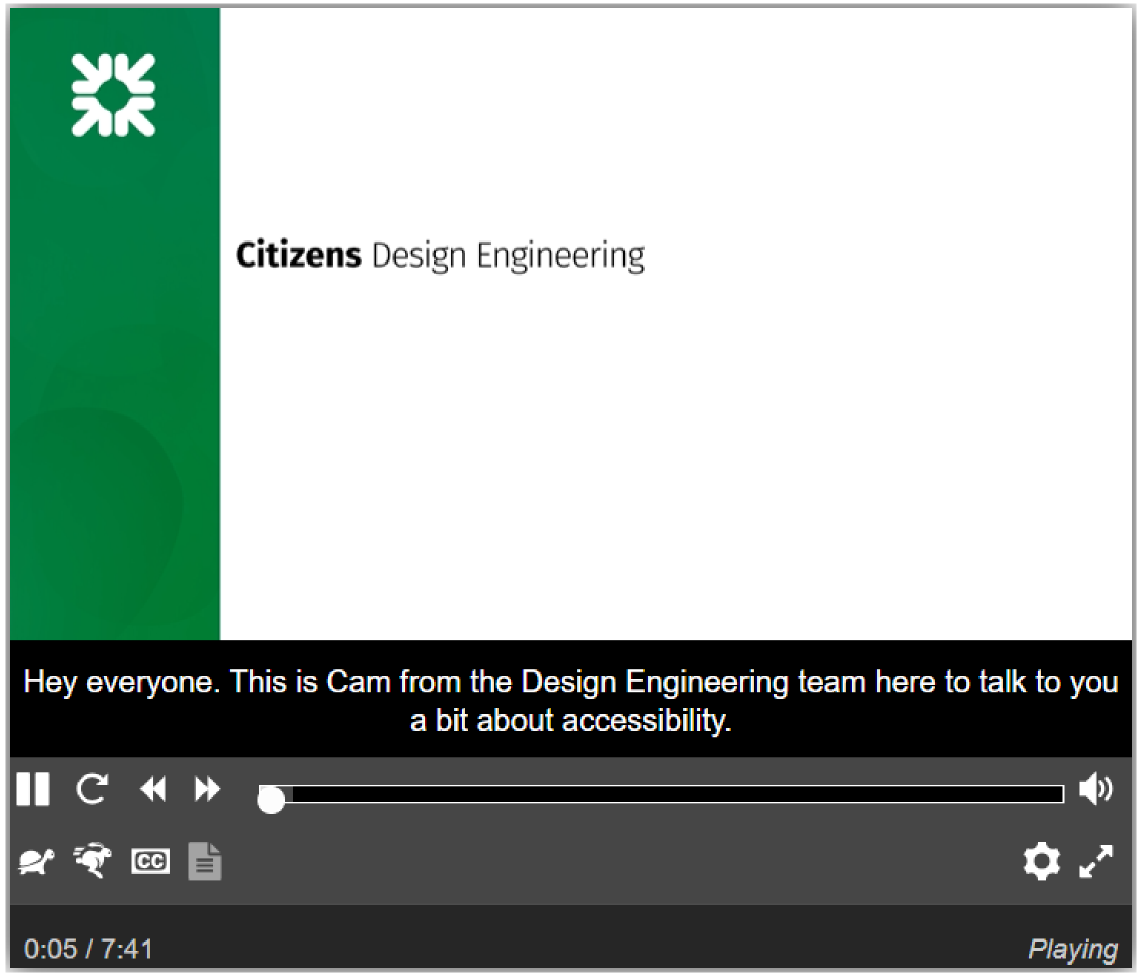
Still with us?

It looks like you've been inactive for a while. For your security, we'll log you out unless you tell us not to.

:54

Audio and video content is accessible

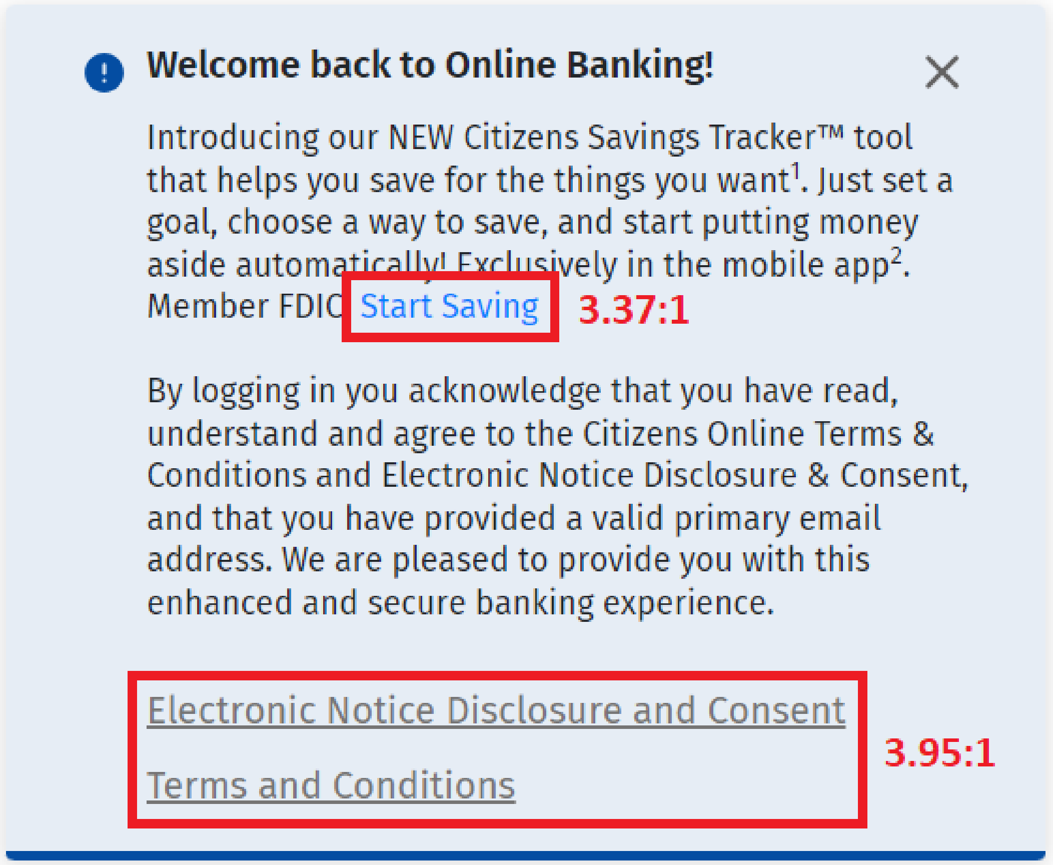
- Video player supports captions for all spoken words and sounds
- Video player supports audio description (AD) for all on-screen text and actions
- Provide a transcript with timestamps and identify speakers
- Avoid auto-playing audio and video
- Provide a mechanism to stop any content that lasts longer than 5 sec.
- Provide an audio volume control
- Avoid flashing content



Hey everyone. This is Cam from the Design Engineering team here to talk to you a bit about accessibility.

Text and UI elements have good contrast

- All regular sized text (below 18.5px) must have **4.5:1 contrast** with the background
- Large/bold text must have at least 3:1 contrast with the background
- Custom focus indicators and must have at least **3:1 contrast** with the background
- UI elements like control borders and icons should have 3:1 contrast
- Logos are exempt
- Disabled controls are exempt



Welcome back to Online Banking!

Introducing our NEW Citizens Savings Tracker™ tool that helps you save for the things you want[1]. Just set a goal, choose a way to save, and start putting money aside automatically! Exclusively in the mobile app[2]. Member FDIC Start Saving

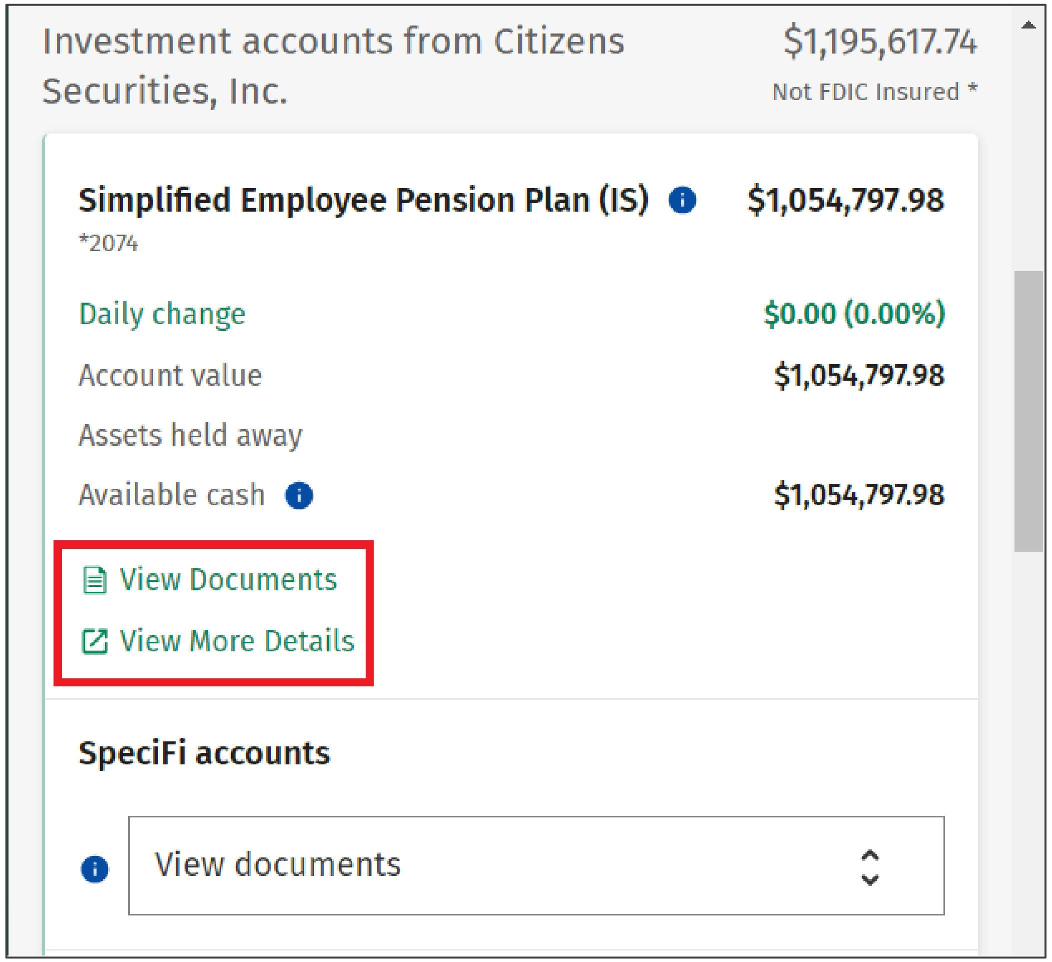
By logging in you acknowledge that you have read, understand and agree to the Citizens Online Terms & Conditions and Electronic Notice Disclosure & Consent, and that you have provided a valid primary email address. We are pleased to provide you with this enhanced and secure banking experience.

Electronic Notice Disclosure and Consent

Terms and Conditions

Don’t rely on color or sensory characteristics to convey meaning

- Avoid color alone to distinguish a link from surrounding text, e.g. underline links, 3:1 contrast, icons
- Don’t rely solely on sensory characteristics such as shape, color, size, visual location, orientation, or sound in instructions
- In charts and graphs, use a method other than color to distinguish between data sets such as shapes and patterns for people who are colorblind or have low vision



Investment accounts from Citizens Securities, Inc. $1,195,617.74
Not FDIC Insured *

Simplified Employee Pension Plan (IS) **$1,054,797.98**
*2074

Daily change	$0.00 (0.00%)
Account value	$1,054,797.98
Assets held away	
Available cash	$1,054,797.98

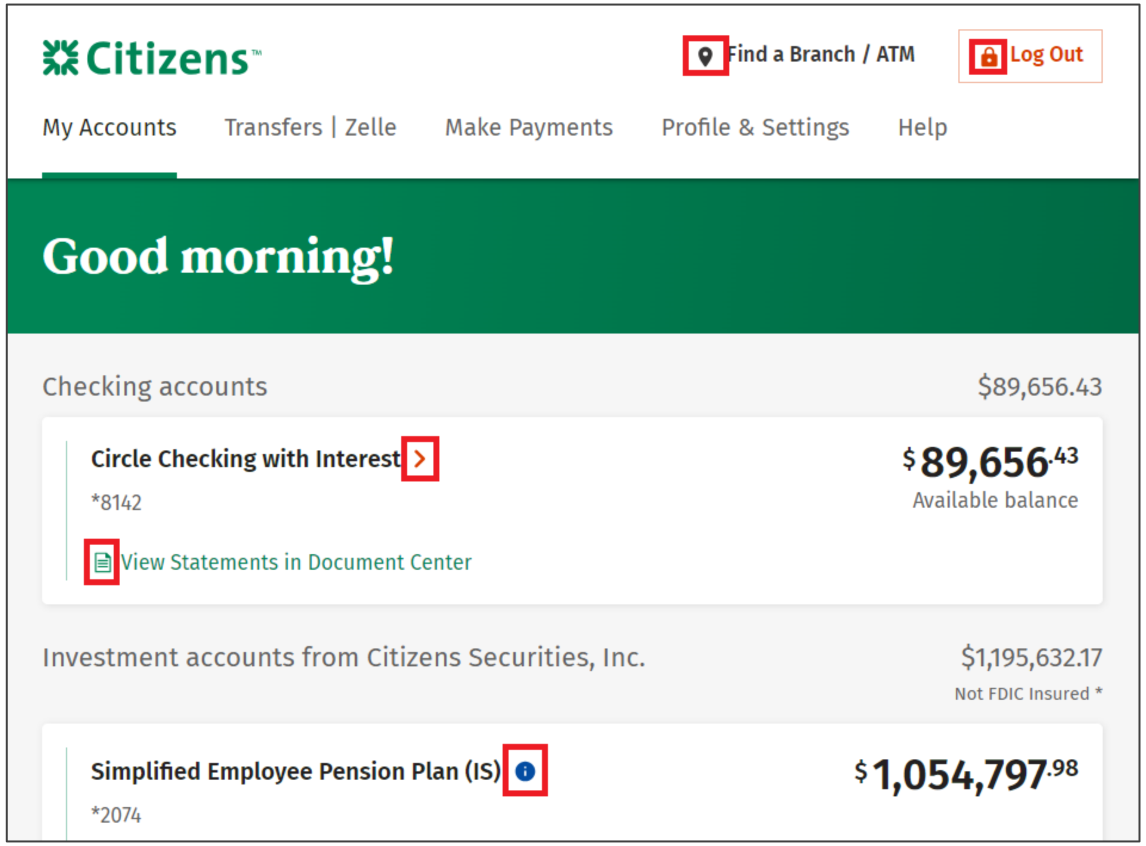
View Documents
View More Details

SpeciFi accounts

View documents

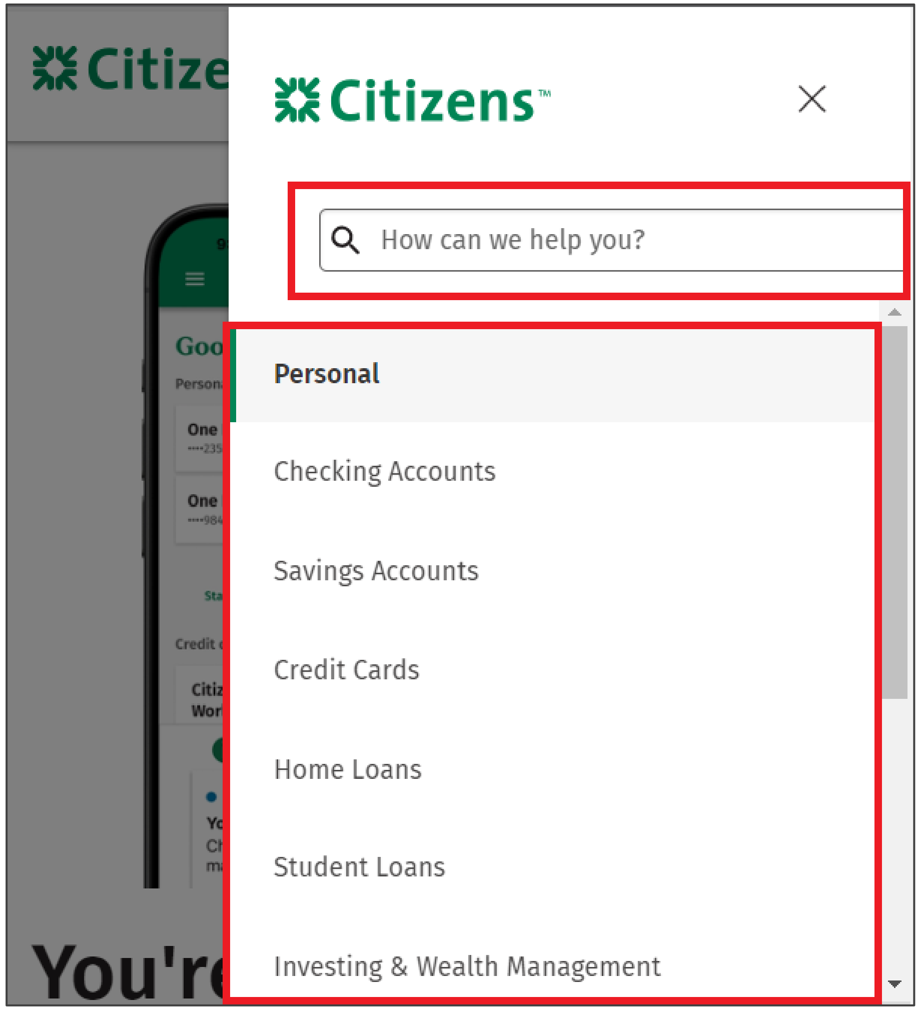
Hide decorative images and icons (including <svg> elements)

- Icons and other UI images are generally decorative and should be hidden from assistive technology
- Use the `aria-hidden="true"` attribute to hide anything from assistive technology
- Decorative inline images should have an empty alt attribute, e.g. `<img src="200.png" alt="">`
- Avoid images of text when the content can be presented as HTML


Citizens™
Find a Branch / ATM
Log Out
My Accounts
Transfers | Zelle
Make Payments
Profile & Settings
Help
Good morning!
Checking accounts $89,656.43
Circle Checking with Interest
*8142
$89,656.43
Available balance
View Statements in Document Center
Investment accounts from Citizens Securities, Inc. $1,195,632.17
Not FDIC Insured *
Simplified Employee Pension Plan (IS)
*2074
$1,054,797.98

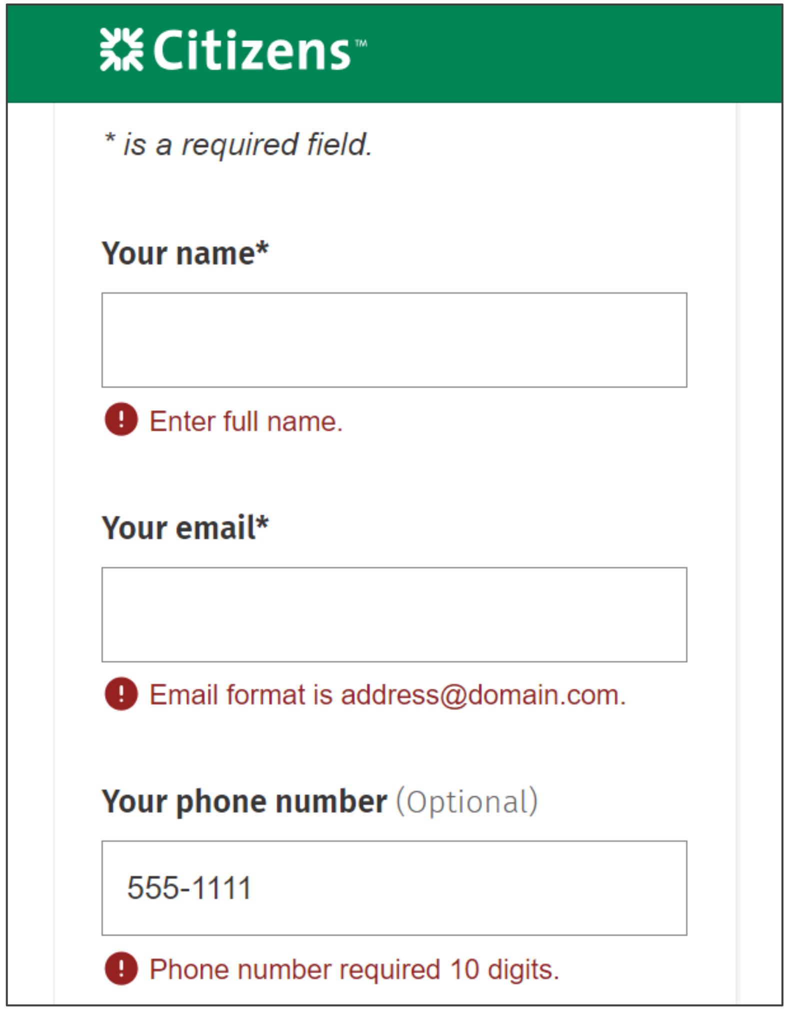
Provide more than one way to find pages

- Use two or more of the following for all pages in the site (even SPAs):
  - Global navigation
  - Site map
  - Site search
  - In-page links



Forms

- Mark all required fields both visually and programmatically
- Programmatically link labels with their form fields using the `for` attribute on the `<label>`
- Use the `autocomplete` attribute
- Provide error messages next to fields in error
- Don’t use color alone to convey a field is in error state; include an icon
- Error messages must indicate how to enter the required data format


Citizens™

** is a required field.*

Your name*

Enter full name.

Your email*

Email format is address@domain.com.

Your phone number (Optional)

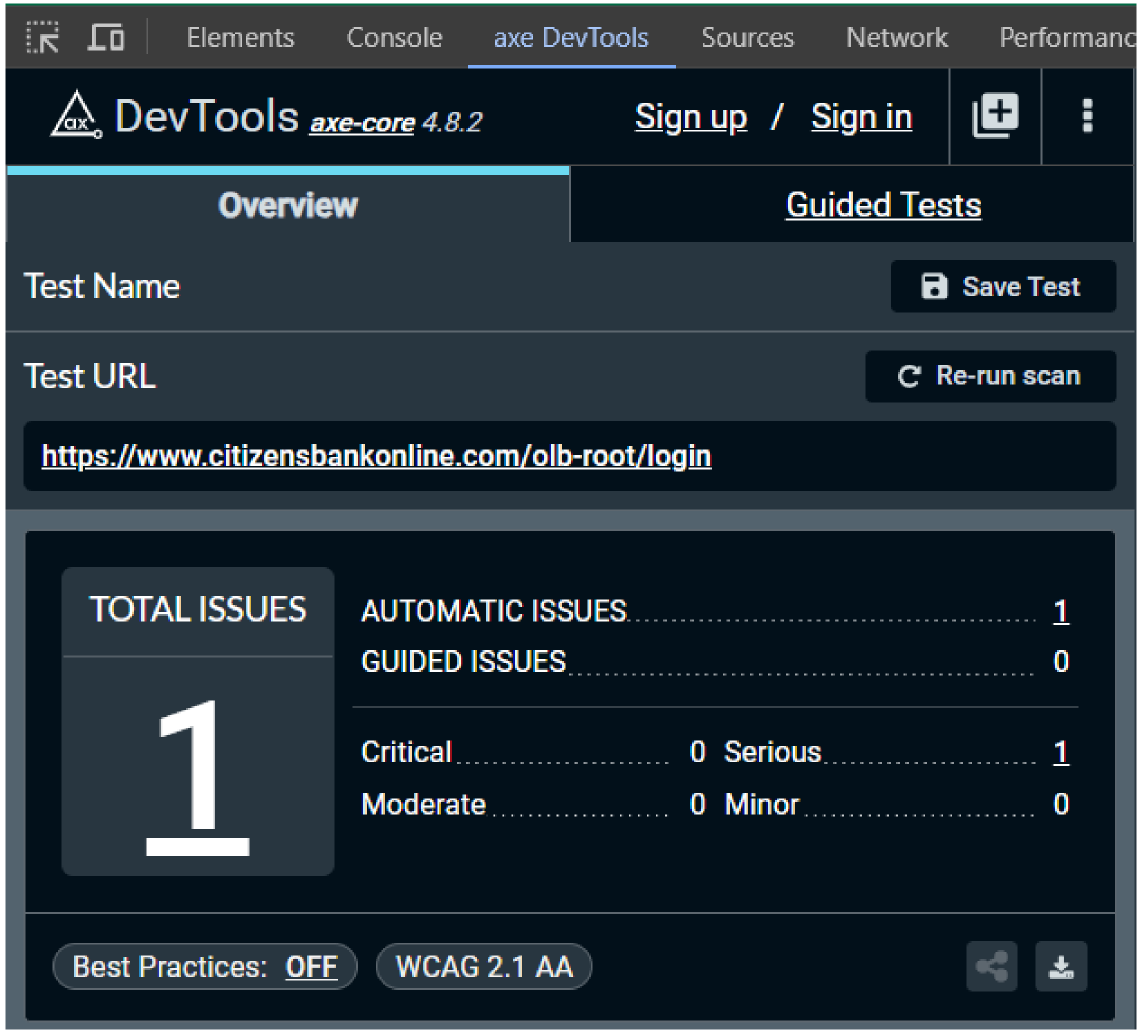
555-1111

Phone number required 10 digits.

Testing for accessibility

Automated accessibility testing

- Use accessibility linters
- Check pages using browser-based automated tools
  - axe DevTools
  - ARC Toolkit
  - Accessibility Insights
- Automated tools can only catch about **30%** of possible accessibility issues



Test Name

Test URL

https://www.citizensbankonline.com/olb-root/login

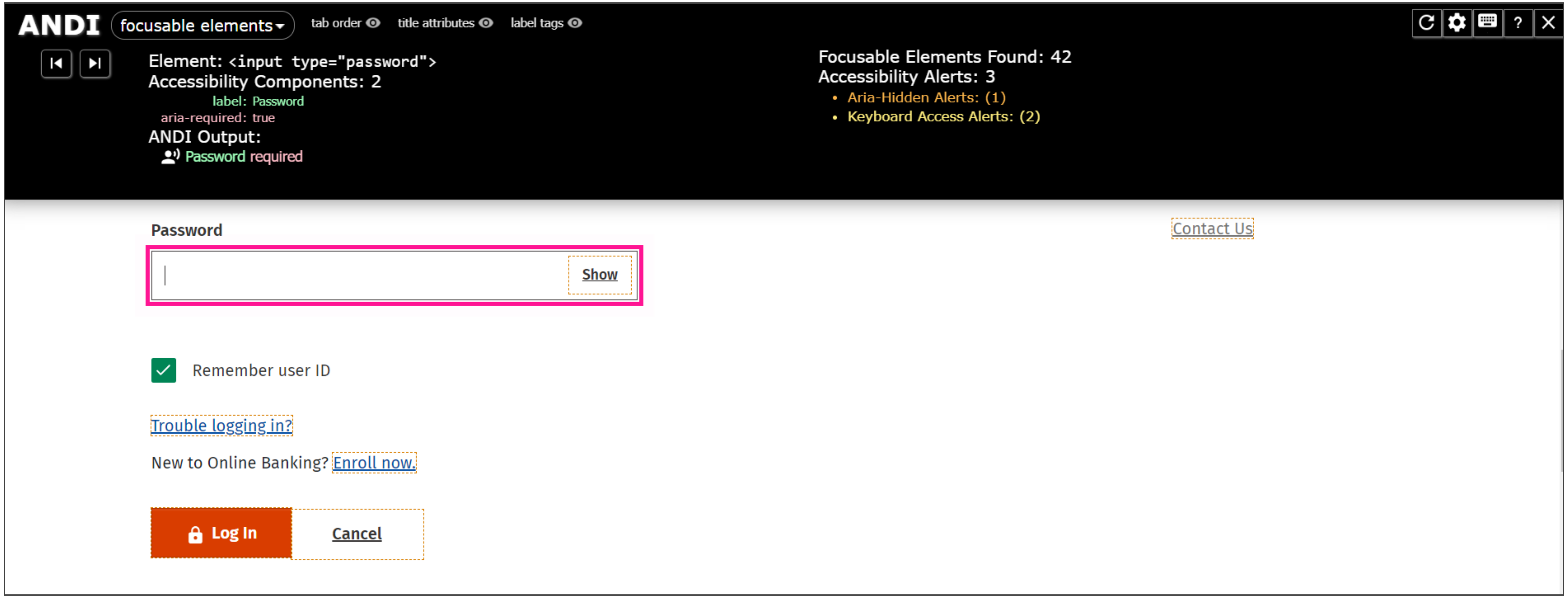
TOTAL ISSUES 1

AUTOMATIC ISSUES	1		
GUIDED ISSUES	0		
Critical	0	Serious	1
Moderate	0	Minor	0

Best Practices: OFF

WCAG 2.1 AA

Guided accessibility testing



ANDI focusable elements tab order title attributes label tags

Element: <input type="password">
Accessibility Components: 2
label: Password
aria-required: true
ANDI Output:
Password required

Focusable Elements Found: 42
Accessibility Alerts: 3
- Aria-Hidden Alerts: (1)
- Keyboard Access Alerts: (2)

Password

Show

Contact Us

✓ Remember user ID

Trouble logging in?

New to Online Banking? Enroll now.

Log In

Cancel

ANDI bookmarklet

Manual accessibility testing

- Test with a screen reader
  - Windows: JAWS and Chrome
  - Windows: NVDA and Chrome/Firefox
  - Mac: VoiceOver and Safari
- Use 3rd party accessibility consultants if you need a VPAT or Accessibility Conformance Report (ACR)
- Do usability testing with disabled people

- Accessibility Bookmarklets
  - Landmarks
  - Focus
  - ARIA, etc.
- A11y Tools
- Colour Contrast Checker
- Window Resizer
- Trigger Character Key Shortcuts
- Text Spacing
- Autocomplete
- Target size

Thank you

Rachele DiTullio,
Senior Accessibility Engineer, Citizens

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Twitter: @RacheleDiTullio
Mastodon: @racheled@mastodon.social

Slides: https://racheleditullio.com/