

HCI 511 Accessible Design

Web Accessibility report of two pages from BMO Harris Bank website

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Executive Summary

I completed a web accessibility conformance evaluation of the BMO Harris home page and Fund Comparison subpage. BMO Harris provides banking and financial services to a wide range of individual, institutional, and commercial customers. Personal banking services include checking accounts, saving accounts, money markets and CDs, retirement accounts (IRAs) and investments, credit cards, mortgages, loans and lines of credit. Commercial services include tailored solutions to drive business growth.

Since users perform financial-related activities that may be critical to their day-to-day needs, access to personal financial information and accounts is important. The goal of this evaluation is to highlight issues based on the POUR accessibility principles which stand for Perceivable, Operable, Understandable and Robust. I employed eight evaluation methods that utilized both manual inspection and automated tools. After outlining the inspection results, I devised a set of recommendations so that barriers to access can be remedied or reduced.

Based on inspection findings, I recommend the following:

General:

- Ensure Tab key can access all Dropdown menu elements, especially those related to navigation.
- Fix HTML and CSS errors and assess if warnings require fixing.
- Add any missing form labels as required.
- Ensure ARIA hidden elements do not impact screen-reader users.

Specific:

- Add alt text to line chart data visualization shown on Figure 3.
- Add symbol next to numerical data instead of relying on color own located in the Price Data table shown on Figure 2. Include “up arrow” for green text and “down arrow” for red text.
- Fix table data that gets cut off when using 200% Zoom. Add horizontal scroll if necessary.
- Shorten long alternative text labels for images

***Note and Disclaimer:**

This web accessibility report was conducted and written in October of 2021, and does not reflect any updates that may have been made to the website. It is considered a “snapshot in time” of two select pages.

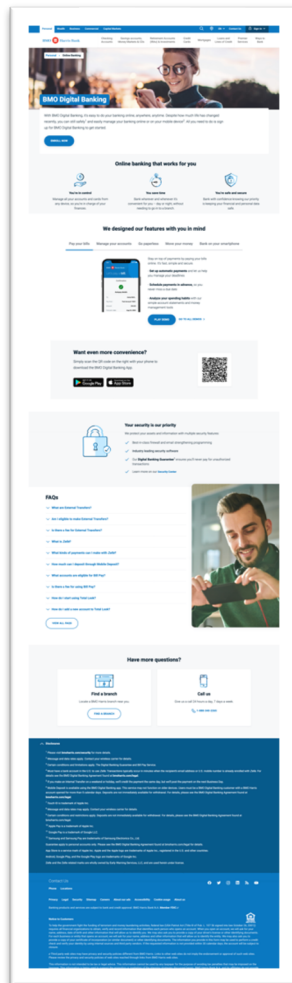


Figure 1: BMO Harris Home Page

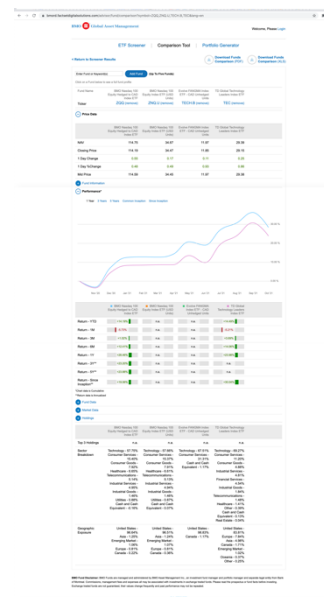


Figure 2: BMO Fund Comparison Subpage

Methods

I assessed two pages on BMO Harris website: the Home Page

(<https://www.bmoharris.com/main/personal/online-banking/>) and subpage containing a Fund Comparison Tool

(<https://bmord.factsetdigitalsolutions.com/advisor/fund/comparison?symbol=ZQQ,ZNQ.U,TECH.B,TEC&lang=en>).

To verify accessibility, I used the following 8 methods: the W3 'Easy Checks' list, W3 HTML and CSS validators, a manual check of Accessible Rich Internet Applications (ARIA), a cognitive level test, a Web Accessibility Evaluation (WAVE), Technical reference Web Accessibility (T.A.W.) Analysis, Accessible Name and Description Inspection (ANDI), and a screen reader test on an Apple MacBook laptop. I attempted a screen reader test using an Apple iPhone 10XR of the online banking application but was blocked.

Most of the evaluation was performed using a Chrome browser Version 95.0.4638.54. The ANDI, T.A.W., and Zoom text magnification inspections were performed using Firefox Version 93.0 (64-bit).

W3 Easy Checks List

I performed an 'Easy checks' analysis on the text, interaction and basic structure of the two web pages. I utilized Web Developer and WCAG Color Contrast Checker Chrome extensions, ANDI, T.A.W.S, and Zoom text magnification inspection.

HTML and CSS Validators

I checked markup validity using the HTML Markup Validation Service (<https://validator.w3.org/>) and CSS Stylesheet validity using CSS Validation Service (<https://jigsaw.w3.org/css-validator/>)

A Manual Web Accessibility Initiative-Accessible Rich Internet Applications (ARIA) Check

I manually inspected the code using the Chrome Web Developer extension and View Source to perform an ARIA check.

Cognitive Level Test

I performed an automated inspection of the cognitive level using the Readable website tool (<https://readable.com/>).

WAVE Evaluation and T.A.W. Analysis

I performed an inspection using the WAVE Evaluation (<https://wave.webaim.org/>) and T.A.W. (<https://www.tawdis.net/resumen>) automated tools. WAVE was performed on a Chrome browser.

ANDI Analysis

Using the ANDI (<https://www.ssa.gov/accessibility/andi/help/install.html>) tool from the Firefox, I inspected the following: 1) Focusable elements; 2) Graphics/images; 3) Links/buttons; 4) Structure; 5) Color Contrast; and 6) Hidden content.

Screen Reader Test

On a 13" MacBook using VoiceOver using the Chrome and Firefox browser, I performed a screen reader test. I attempted to test the mobile banking app on an iPhone 10XR but the app blocked VoiceOver from working.

Findings

Findings are organized following the POUR accessibility principles. Guidelines which were not applicable, or which require further human review are noted.

Perceivable

Guideline 1.1: Text Alternatives

1.1.1: Non-Text Content (Level A):

Home Page – Contained 1 empty alt tag error and 1 empty button error. Alternate text was assigned to 4 images. Alternate text was assigned to 8 linked images. Home page contained 2 form labels which include one Search icon located to the left of the search field. The page contained 4 redundant alternative text alerts and 2 long alternative text alerts. T.A.W. analysis revealed 8 problems requiring correction and 20 warnings requiring a human review.

Fund Comparison Page – The line chart was not recognized as an image and contained no alt text (see Figure 3). The BMO logo contained alt text, but the page was missing alternative text for 1 “linked image” and 1 “non-linked image.” There was no label to the left of the text input field, but “helper” text was included inside the field. Markup included “<input id= and name=>” tags instead of “<label for=>”. T.A.W. analysis of the page revealed 23 problems and 1 warning for this guideline.

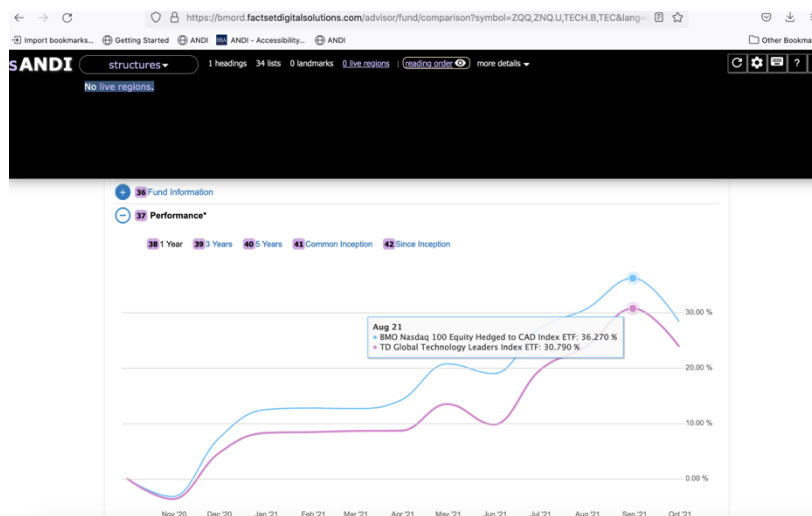


Figure 3: ANDI inspection of BMO Fund Comparison Subpage Line Chart

Guideline 1.3: Adaptable

1.3.1 Info and Relationships (Level A)

Home Page – T.A.W. analysis revealed 7 problems requiring correction and 15 warnings requiring human review. Contained 1 header banner, 1 main content element, and one footer landmark.

Fund Comparison Page – Contained 13 empty table header errors, 7 missing form label errors, 1 “no page regions” alert, and 1 skipped heading level alert. One form label was properly assigned. Seven data tables were properly assigned column header and row header cells.

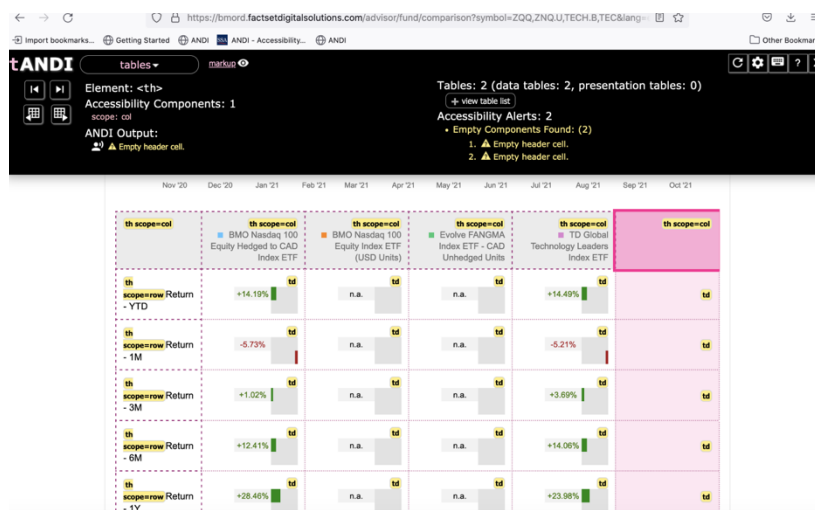


Figure 4: ANDI inspection of Table Header Error highlighted in pink

Guideline 1.4 Distinguishable

1.4.1 Use of Color

Home Page – T.A.W. analysis revealed an inconclusive result as use of color was not reviewed.

Fund Comparison page – Contained data where color is the sole method used to distinguish text. Ensure a distinguishing element is added to provide additional context and meaning.

1.4.2 Audio Control

Home Page and Fund Comparison page – Not applicable.

1.4.3 Contrast (Minimum) (Level AA)

Home Page – Contained 6 contrast ratio errors from 1 to 4.37. Manual inspection proved difficult as some elements were invisible. I manually inspected using Grayscale which showed sufficient contrast. Overall, 132 elements contained text with only 4 alerts. Three out of four alerts required manual inspection of background images. The remaining elements had passing contrast ratios which ranged from 4.86 to 17.95.

Fund Comparison Page – WCAG contrast tool revealed 4 contrast ratio errors from 1 to 3.98 primarily on the data table headers and small elements separating each page name (See Figure 5). Inspecting using Grayscale revealed insufficient differentiation between line chart colors. ANDI also revealed 6 contrast alerts with 10 manual tests needed. Contained 2 very low contrast errors (decorative divider bars). While it failed the contrast test, it does not impact accessibility.

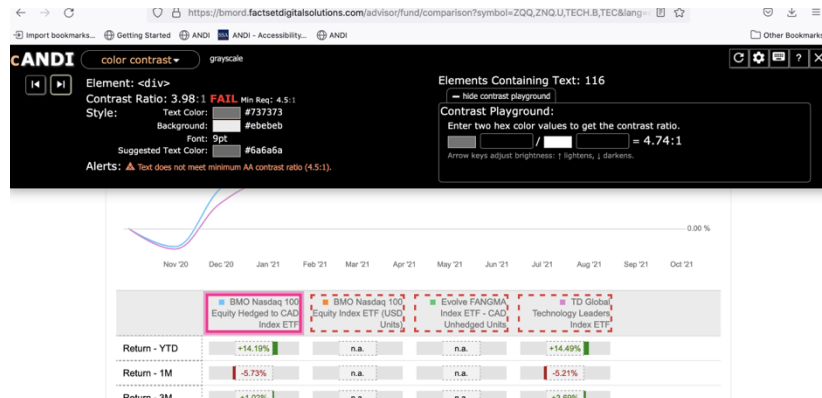


Figure 5: ANDI inspection of Performance Table Headers with low contrast

1.4.4 Resize Text

Home Page – When using Zoom at 200%, the text resized without getting cut off or overlapping other content. Buttons were also visible and usable. T.A.W. analysis revealed 4 warnings requiring human review.

Fund Comparison Page – At 200% the Download XLS and PDF link text overlapped. The line chart text did not increase in size. The Performance data table contained overlapping elements. Column header and data inside the Fund Information and Holdings table got cut off and did not horizontally scroll to view content. T.A.W. analysis revealed 11 warnings.

Operable

Guideline 2.1: Keyboard Accessible

2.1.1: Keyboard (Level A)

Home Page – Contained dropdown menus from second and third navigation that were not brought to focus when using Tab key (See Figure 6). The page also contained 1 broken same-page link. 60 ARIA tabindex attributes are present which allow the user to tab forward and backward. T.A.W. analysis revealed an inconclusive result as this guideline was not reviewed.

Fund Comparison Page – Only one text input field was accessible when using Tab key. T.A.W. analysis revealed 1 warning.

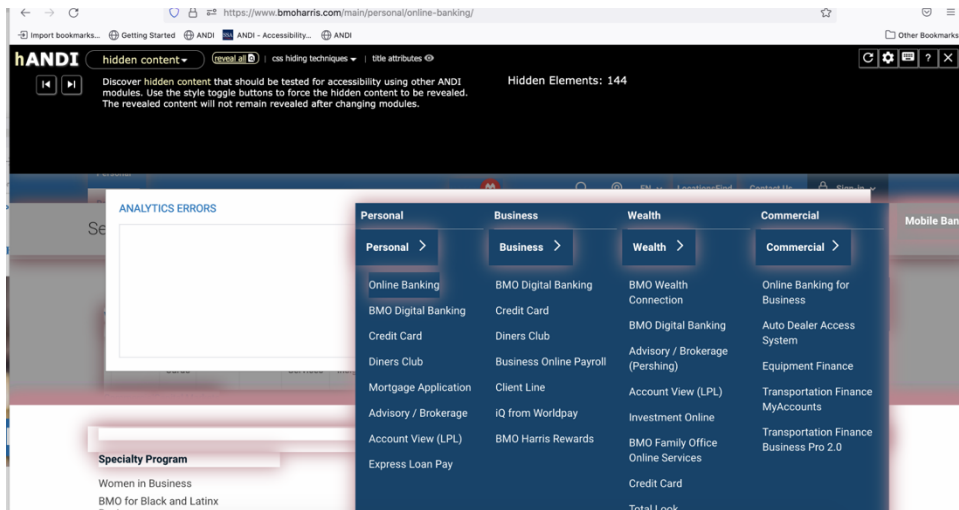


Figure 6: ANDI inspection of BMO Home Page with Dropdown Menu inaccessible to Tab key

2.1.3 Keyboard (No Exception) (Level AAA)

Home Page – When using the Tab key, dropdown menu links were skipped over and not brought to focus from the main navigation. Only 1 out of 5 navigation list items under “We Designed our Features with You in Mind” were accessible, 4 were skipped over.

Fund Comparison Page – Tab was only accessible to the first text input field and not to other elements on the press.

Guideline 2.4: Navigable

2.4.1: Bypass Blocks

Home Page – Contains 1 skip link as required which allows the user to “skip navigation.” One “skip link target” is present which provides a location for reading and navigation to resume.

Fund Comparison Page – Contained 1 no page regions and 1 skipped navigation alert. It contained 1 heading level 1 as required. T.A.W. analysis revealed 2 warnings.

2.4.2 Page Titled (Level A)

Home Page – Contained a descriptive and unique title. Browser tab contains BMO Harris logo. T.A.W. analysis revealed 1 warning requiring human review.

Fund Comparison Page – The subpage title “BMO” does not briefly describe what the page is about. Browser tab does not display the BMO logo. T.A.W. analysis revealed 1 warning.

2.4.3 Focus Order (Level A)

Home Page and Fund Comparison Page – Contained “tabindex” alerts. T.A.W. analysis revealed 3 warnings requiring human review.

2.4.4 Link Purpose (In Context) (Level A)

Home Page – Contained 2 suspicious link text alerts and 15 redundant link alerts. T.A.W. analysis revealed 6 problems requiring correction and 36 warnings requiring human review.

Fund Comparison Page – Contained 8 empty link and 1 linked image missing alternative text errors. The page contained 15 redundant link alerts. T.A.W. analysis revealed 9 problems to correct.

2.4.6: Headings and Labels (Level AA)

Home Page – T.A.W. analysis revealed 19 warnings. The first two levels of main navigation and footer were clearly structured with appropriate headings. However, some adjacent headings and links repeated themselves. When inspecting with CSS turned off and linearization enabled, tertiary navigation was difficult to distinguish.

Fund Comparison Page – T.A.W. analysis revealed 16 warnings. Contained 7 missing form labels. Inspecting under linearization, the hierarchy and structure were easy to understand. Contained 1 skipped navigation alert. The page contained 1 heading level 1 as required. The page contains 1 heading level 4 and 6 heading level 5 elements and 18 ARIA labels.

2.4.7: Focus Visible

Home Page – T.A.W. analysis revealed 16 warnings.

Fund Comparison Page – It was not apparent which field had focus while using the Tab key.

2.4.8 Location (Level AAA)

Home Page – Breadcrumbs were present indicating the current page location.

Fund Comparison page – Did not contain breadcrumbs but did include a “way back” to the main Screener results page.

2.4.10 Section Headings (Level AAA)

Home Page – Contained 3 levels of headings: H1, H2 and H3 and follows a meaningful hierarchy.

Fund Comparison Page – Contained only H5 tags with no other headings present.

Understandable

Guideline 3.1: Readable

3.1.1: Language of a Page (Level A)

Home Page – Contained an <html> element with a lang attribute value of “en-US.”

Fund Comparison – Contained one language missing or invalid error.

3.1.2 Language of Parts (Level AAA)

Home Page – Contained 9 language elements as required.

3.1.5: Reading Level

Text for both pages are readable for 100% of addressable audience, which equates to approximately 85% of the general public.

Home Page – Flesch-Kincaid Grade Level 6.71 with a Flesch Reading Ease score of 53.09.

Fund Comparison – Flesch-Kincaid Grade Level 6.93 with a Flesch Reading Ease score of 51.78.

Guideline 3.2: Predictable

3.2.2 On Input (Level A)

Home Page – T.A.W. analysis revealed 2 problems requiring correction.

Guideline 3.3: Input Assistance

3.3.1 Error Identification

Home Page –T.A.W. analysis revealed 4 warnings requiring human review. No error identifications occurred during my inspection.

3.3.2 Labels or Instructions (Level A)

Fund Comparison – Contained 7 missing form labels. T.A.W. analysis revealed 15 problems.

3.3.3 Error Suggestion

Home Page –T.A.W. analysis revealed 2 warnings requiring human review.

3.3.4 Error Prevention (Legal, Financial, Data)

Home Page –T.A.W. analysis revealed 6 warnings requiring human review.

3.3.6 Error Prevention (All)

Home Page and Fund Comparison page – Not applicable as no fields were required

Robust

Guideline 4.1: Compatible

4.1.1: Parsing

Home Page –T.A.W. analysis revealed 529 robust problems areas where corrections are necessary and 144 alerts where a human review is necessary. HTML Validation results included: 89 errors and 11 warnings. HTML Errors included: 1) Missing attributes; 2) Attributes “not allowed”; 3) Elements “not allowed” as child of element; and 4) Missing “img” element. HTML Warnings included: 1) Role unnecessary for an element; 2) Attribute unnecessary; and 3) Attribute “unserializable” as XML 1.0.

CSS Validation results included 31 errors and 233 warnings. CSS Errors included: 1) Letter-spacing units; 2) Border-color important; 3) Padding-auto; 4) Parsing errors; and 5) Deprecated media feature device. CSS Warnings included: 1) Vendor extensions; 2) Vendor extended pseudo-elements; 3) Vendor extended pseudo-classes; and 4) Deprecated properties.

Fund Comparison Page – T.A.W. analysis revealed 15 parsing problems. HTML Validation results included 53 errors and 74 warnings. Errors included: 1) Duplicate IDs; 2) End tag seen but there were open elements; 3) Unclosed elements; 4) Summary attribute on table element is obsolete; and 5) Stray end tag span. Warnings include: 1) Type attribute unnecessary for JavaScript resources; 2) Empty heading; and 3) First occurrence of ID tag.

CSS validation revealed 13 errors and 159 warnings. Errors included: 1) Parse error; 2) Too few values for the property; 3) Value error; 4) Deprecated media feature; and 5) Property does not exist. Warnings included 1) Vendor extensions; 2) Vendor extension pseudo-elements; 3) Invalid separator in shape definition; and 4) CSS hack.

4.1.2 Name, Role, Value (Level A)

Home page – T.A.W. analysis revealed 2 warnings requiring human review. Four ARIA buttons were found and typically should be replaced with a true button element. Contained 121 ARIA roles, states, or properties. The page also contains 172 ARIA labels and 85 ARIA hidden elements. Three ARIA expanded attributes are present which allow content to expand and collapse. Sixteen ARIA popup elements are

included which trigger a popup menu, dialog or other element.

Fund Comparison Page – Contained the following features: 37 ARIA elements, 18 ARIA labels, 2 ARIA descriptions, 5 ARIA hidden and 1 ARIA expanded elements. T.A.W. analysis revealed 24 robust problem areas.

Non-categorized alerts (Standards and Guidelines: None)

Alerts that did not fall into any of the guidelines are as follows: Home page – Contained 1 noscript element, 26 small text elements and 1 inline frame. Fund Comparison page included 12 redundant title text elements.

Screen Reader Experience

Home page experience: Using a Chrome browser, I experienced issues with the Skip Navigation link constantly interrupting me as I tried to access deeper levels of content within the page. The screen reader was able to access dropdown menu links, unlike when trying to use the Tab key. Safari provided additional context when first landing on a page as it sums up what the page contains.

Fund Comparison page: Using Firefox, I immediately noticed the rate of speech increased from my Chrome experience. Firefox also required no keyboard inputs to move from each content element during my first visit. Firefox also gave an overview of the elements that could be found on the page. One issue noted is that it read each data table element from left to right, top to bottom, and did not relate each row of data to the column header above. It did present a nice summary overview of the table before going into each table cell. Firefox read an asterisk (*) as a “star”.

Recommendations

Based on inspection findings, I recommend the following:

General:

- Ensure Tab key can access all Dropdown menu elements, especially those related to navigation.
- Fix HTML and CSS errors and assess if warnings require fixing.
- Add any missing form labels as required.
- Ensure ARIA hidden elements do not impact screen-reader users.

Specific:

- Add alt text to line chart data visualization shown on Figure 3.
- Add symbol next to numerical data instead of relying on color own located in the Price Data table shown on Figure 2. Include “up arrow” for green text and “down arrow” for red text.
- Fix table data that gets cut off when using 200% Zoom. Add horizontal scroll if necessary.
- Shorten long alternative text labels for images