



**COOK COUNTY  
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TECHNOLOGY**

## **ILGISA Regional Conference**

# **Applying Accessibility (WCAG 2.1) Standards to Maps and Mapping Applications**

**June 26, 2026**

Cook County Bureau of Technology GIS Division

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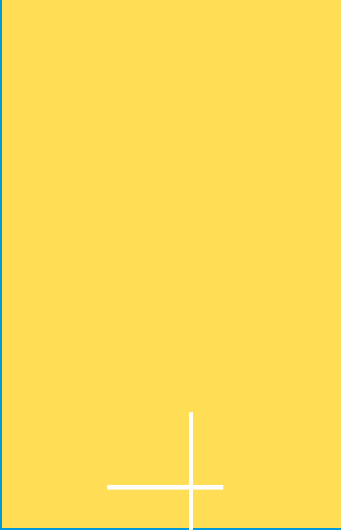
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# DISCLAIMER

We offer this as fellow cartographers, we've researched and navigated the topic to the best of our ability. That said, we have not undergone a WCAG compliance audit or conducted user accessibility testing.

This guidance is provided for informational purposes only and should not be relied on as a substitute for an accessibility assessment or legal advice.

**We welcome your input!**



What is WCAG?





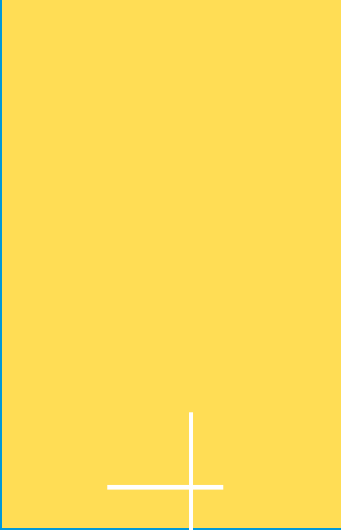
# What is WCAG 2.1?

- Web Content Accessibility Guidelines (WCAG)
- Update 2.1
- WCAG 2.1, Level AA compliance is a Federal Law that will be enacted next year:
  - "The compliance date for State and local government entities with a **total population of 50,000 or more** to **April 26, 2027**. The compliance date for public entities with a **total population of less than 50,000**, or any special district government, is extended to **April 26, 2028**."



# What is WCAG 2.1? (continued)

- **Examples of map based items that need to be accessible**
  - Downloadable PDFs shared publicly
  - Web based map applications
- **What does accessible mean?**
  - Someone with an impairment and assistive technology can understand the information, for example, a screen reader for web content helps someone with vision or cognitive impairments
  - Also think of people with vision problems but are not completely blind, for example, color-blindness or narrowed vision



# More Accessible Map Design





# Making Tags in PDFs

## Tags and Alt-Text for PDFs

- **Adobe Acrobat Pro has useful Accessibility Tools**
  - Under "All Tools" > "View More"> Find "Prepare for Accessibility"
  - Right-click the narrow right hand side bar and activate "Accessibility Tags"
  - Fill-in the Document Properties under the Menu
- **Map tagging tips from an Adobe Rep giving a presentation to the Federal Department of the Interior**
  - 8:20 - demo of tag editing for a simple map
  - 15:20 - demo of tag editing for a complex map
  - 21:30 - demo of tag editing on a map with lots of text that would be too much info for alt-text and how to remove tags
- **How to make a tag in Adobe Acrobat Pro**
- **Use "Headphones" tool to activate Adobe Screen reader**



# A look at Adobe Acrobat Pro for making tags

# What would you write for alt-text?

Menu Land Use and Land Cov... x + Create

All tools Edit Convert E-Sign Find text, tools, or help Share

**All tools**

- Convert to PDF
- Add a stamp
- Use a certificate
- Use print production
- Measure content
- Compare files
- Add rich media
- Use guided actions
- Prepare for accessibility**
- Apply PDF standards
- Add search index
- Use JavaScript
- Create custom tool
- Style this PDF **NEW**
- Translate this PDF **NEW**

**Edit images in this PDF**

Remove backgrounds, enhance visuals — no design skills needed.

**Open in Adobe Express**

**Object Properties**

Content Tag Color

Type: Figure

Title: Map Description

Actual Text:

Land use represents how land is used, including roads, structures and railways. Land Cover represents natural features such as open water, vegetation and wetlands.

This map displays 16 land use land cover (LULC).

**Alternate Text for Images:**

Alternate Description for Links:

ID: AD260322-2208-1184-ADBE-000000000842

Language:

Edit Tag... Edit Attribute Objects... Edit Attribute Classes... Close

**Accessibility tags**

- Tags
  - <Figure> Map Title
  - <Figure> Map Description
  - Image (558): w:3091 h:4000PathPathPathPath**
  - <Figure> Map Title - Classifications
  - <Figure> Map Title - Classifications

**Legend**

- Road Type - Asphalt (Light)
- Road Type - Asphalt
- Road Type - Asphalt (Dark)
- Road Type - Concrete
- Grass - Low
- Grass - Tall
- Brush and Shrub
- Forest - Woodland
- Agriculture and Pasture
- Bare Soil
- Wetlands - Bare Soil
- Wetlands - Low Grass
- Wetlands - Tall Grass
- Wetlands - Brush and Shrub
- Wetlands - Aquatic Vegetation
- Wetlands - Deciduous
- Water (Open)
- Railroads
- Roads and Impervious Surface
- Structures

| Class                         | Class Acres | Percent of Area |
|-------------------------------|-------------|-----------------|
| Grass (Low)                   | 7189.23     | 24.08%          |
| Forest - Woodland             | 8554.01     | 21.96%          |
| Roads and Impervious Surface  | 4090.24     | 13.73%          |
| Agriculture and Pasture       | 2891.41     | 10.02%          |
| Structures                    | 2816.88     | 9.44%           |
| Brush and Shrub               | 1725.03     | 5.78%           |
| Grass (Tall)                  | 1322.75     | 4.43%           |
| Bare Soil                     | 1041.43     | 3.49%           |
| Wetlands - Trees              | 616.35      | 2.06%           |
| Water (Open)                  | 475.48      | 1.59%           |
| Wetlands - Low Grass          | 289.31      | 0.97%           |
| Wetlands - Brush and Shrub    | 244.91      | 0.82%           |
| Railroads                     | 239.49      | 0.80%           |
| Wetlands - Tall Grass         | 145.86      | 0.49%           |
| Wetlands - Aquatic Vegetation | 68.91       | 0.23%           |
| Wetlands - Bare Soil          | 30.28       | 0.10%           |

10 30 x 13 33 in

1

1

8



# Cartography Strategies

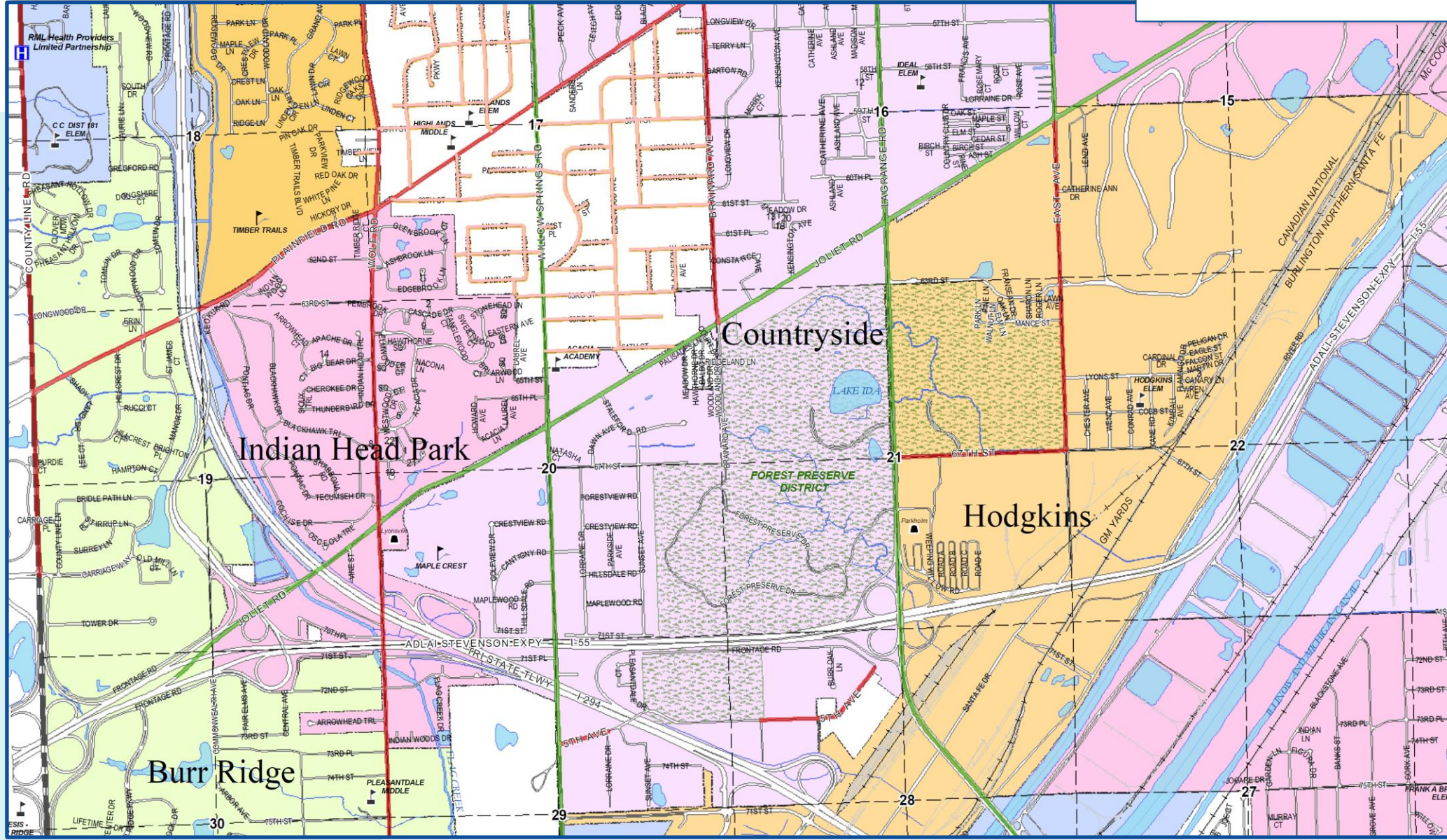
## Aim for High Contrast

- Maximize white space
- Black and White contrast for text whenever possible
  - Use halos
  - Use bolding
- **3:1 contrast ratio for map features (WCAG)**
  - [WebAIM Contrast Checker website](#)
  - [Vispero Color Contrast Checker application \(free\)](#)
  - Grey 50% or darker on white exceeds 3:1



# More Accessible Map Design: Maximize White Space (before)

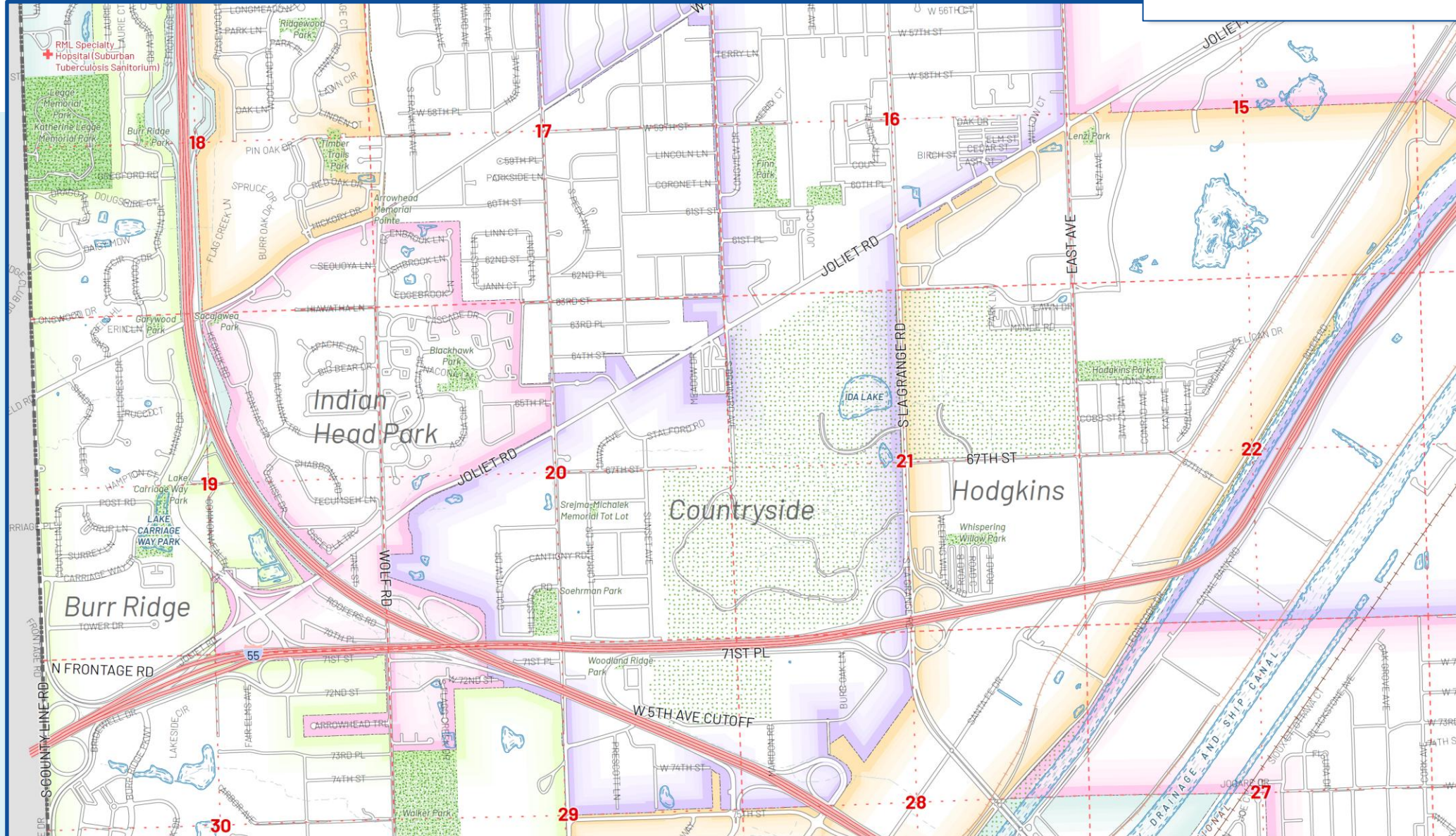
Lyons Township Map, 2009





# More Accessible Map Design: Maximize White Space (after)

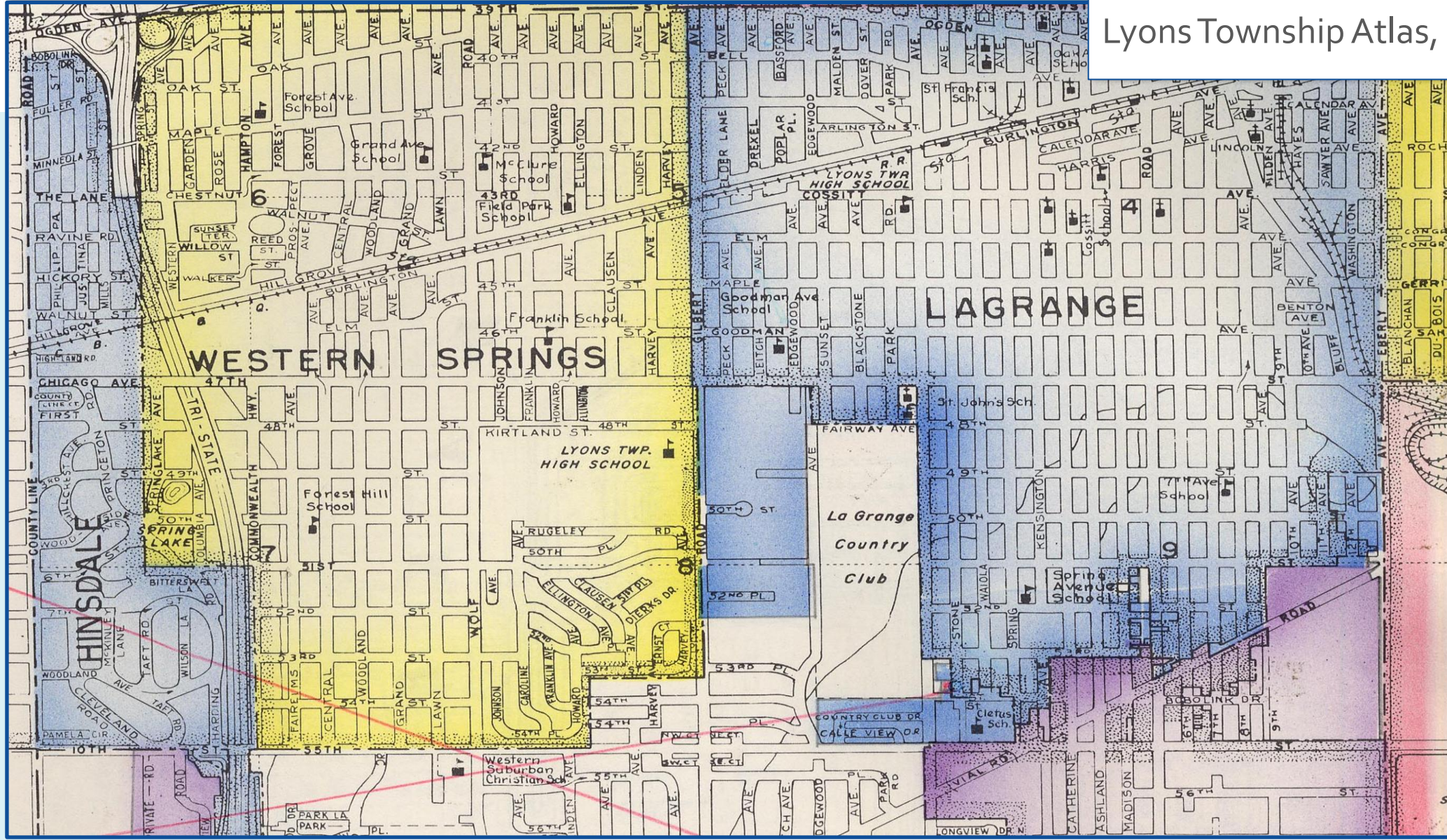
Lyons Township Map, 2026





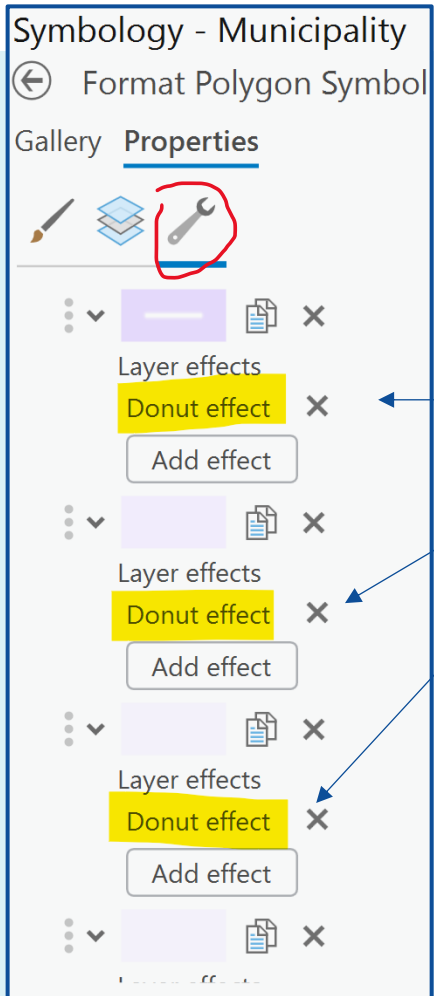
# More Accessible Map Design: Maximize White Space (inspiration)

Lyons Township Atlas, 1965



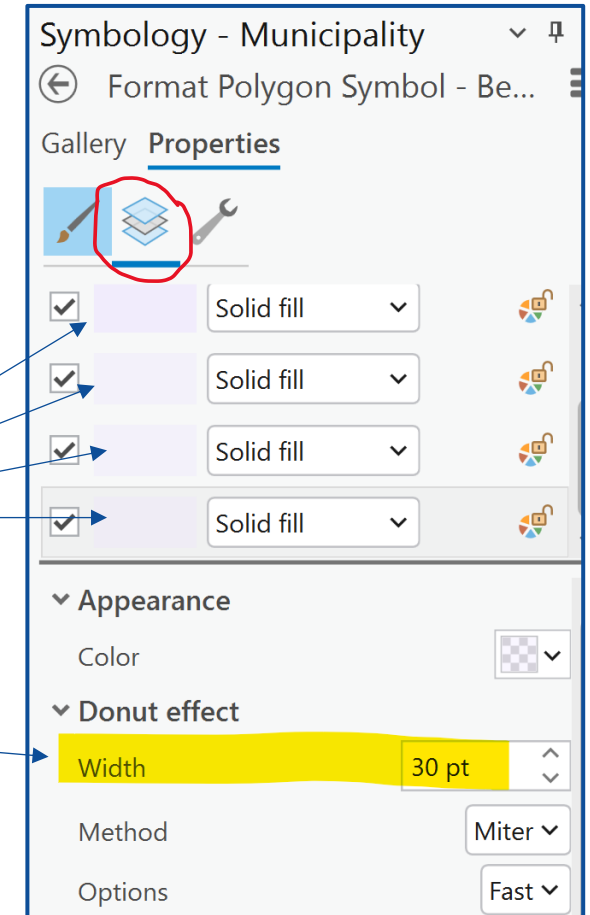


# More Accessible Map Design: Maximize White Space – ArcPro Symbology Settings



## Pseudo Gradient in ArcPro:

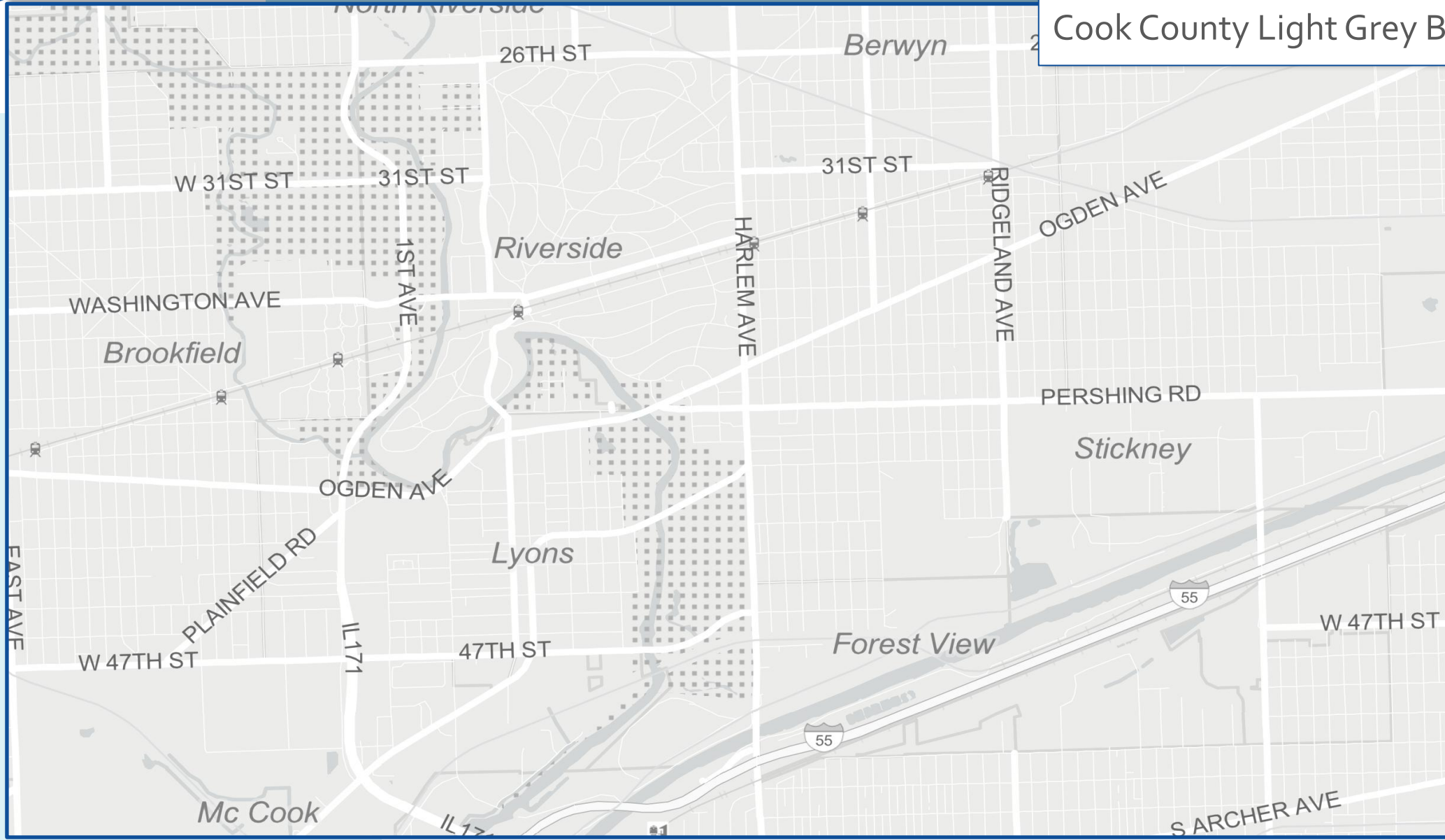
- 7 layers of the same color
- Donut effect
- Each layer 50 - 70% transparent
- Width of Donut effect for each layer
  - 30 pt; 22 pt; 15 pt; 11 pt; 8pt





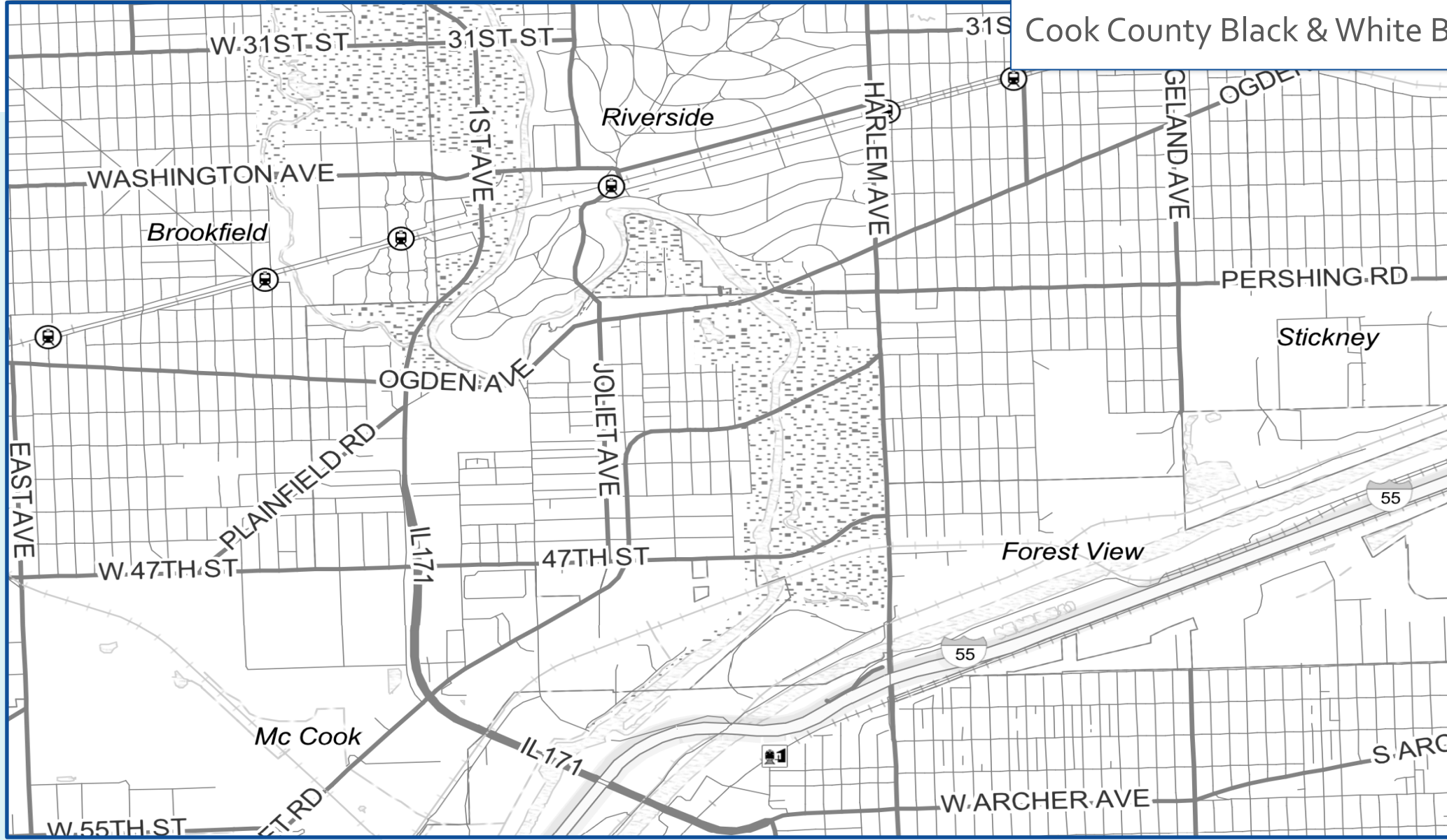
# More Accessible Map Design: Black / White Contrast for Text (before)

Cook County Light Grey Basemap





# More Accessible Map Design: Black / White Contrast for Text (after)



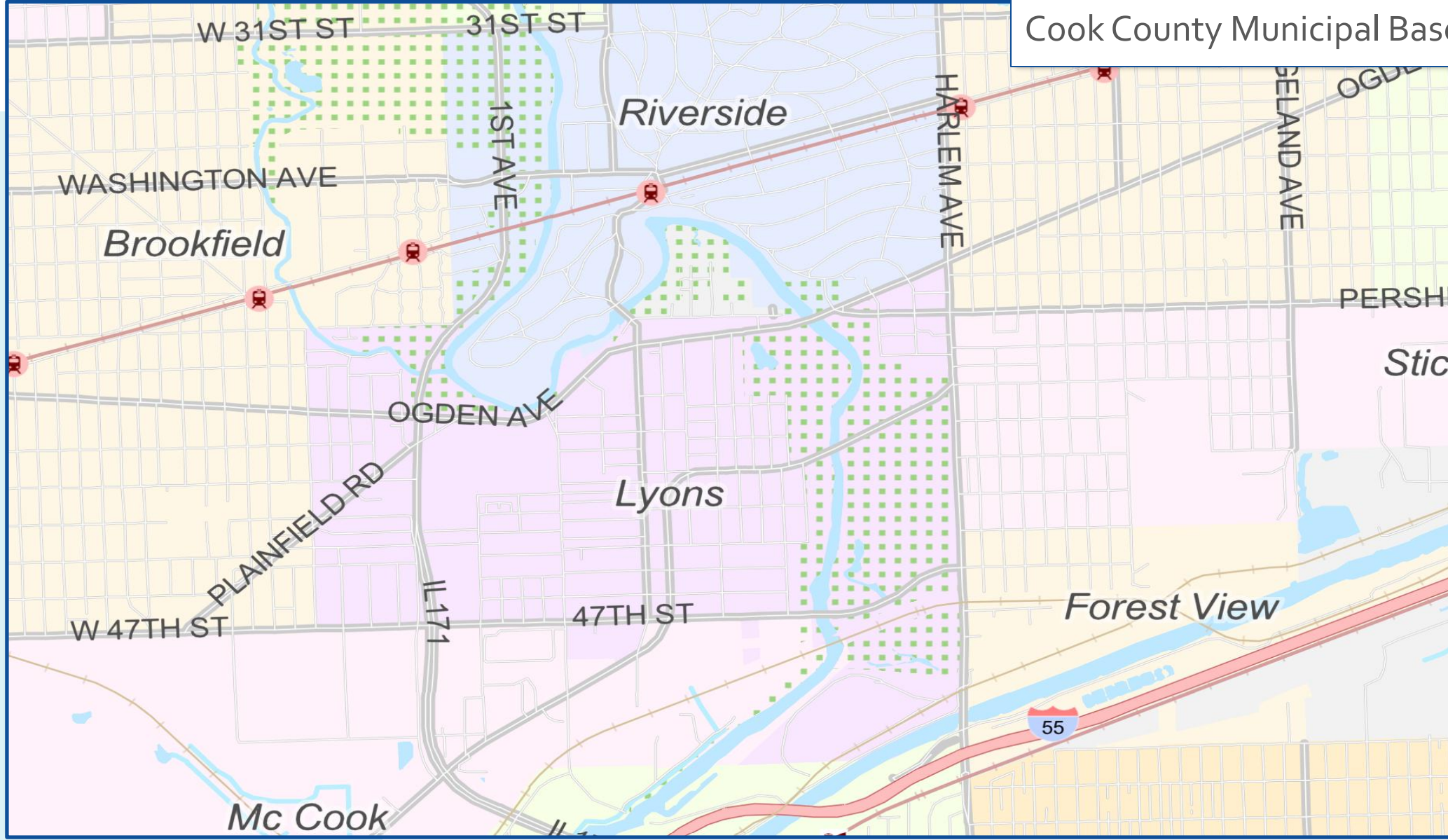
Cook County Black & White Basemap



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# More Accessible Map Design: Black / White Contrast for Text (color)

Cook County Municipal Basemap





# Color and Pattern Strategies

## Use Pattern and Texture

- **Strategies to design for people who are Color Blind**
  - Use color palettes that do not include red and green together
  - Consider designing in Black and White
  - Use variations in pattern and texture instead or in addition to variations in color



# More Accessible Map Design: Color-Blind friendly color palettes

Number of data classes: 3 how to use | updates | downloads | credits

Nature of your data:   
☐ sequential ☒ diverging ☐ qualitative

Pick a color scheme:

Only show:   
☒ colorblind safe  
☐ print friendly  
☐ photocopy safe

Context:   
☐ roads  
☐ cities  
☒ borders

Background:  
☒ solid color   
☐ terrain  
color transparency

3-class BrBG  
 EXPORT  
HEX   
#d8b365  
#f5f5f5  
#5ab4ac

**COLORBREWER 2.0**  
color advice for cartography

© Cynthia Brewer, Mark Harrower and The Pennsylvania State University  
[Source code and feedback](#)

axismaps



# More Accessible Map Design: Color-Blind friendly color palettes

maketintsandshades.com/#colors=5ab4ac&hashtag=0&steps=10

Enter hex colors (separated by spaces)

5ab4ac

Make tints and shades 🎨

5 10 20 #

Artesian Well

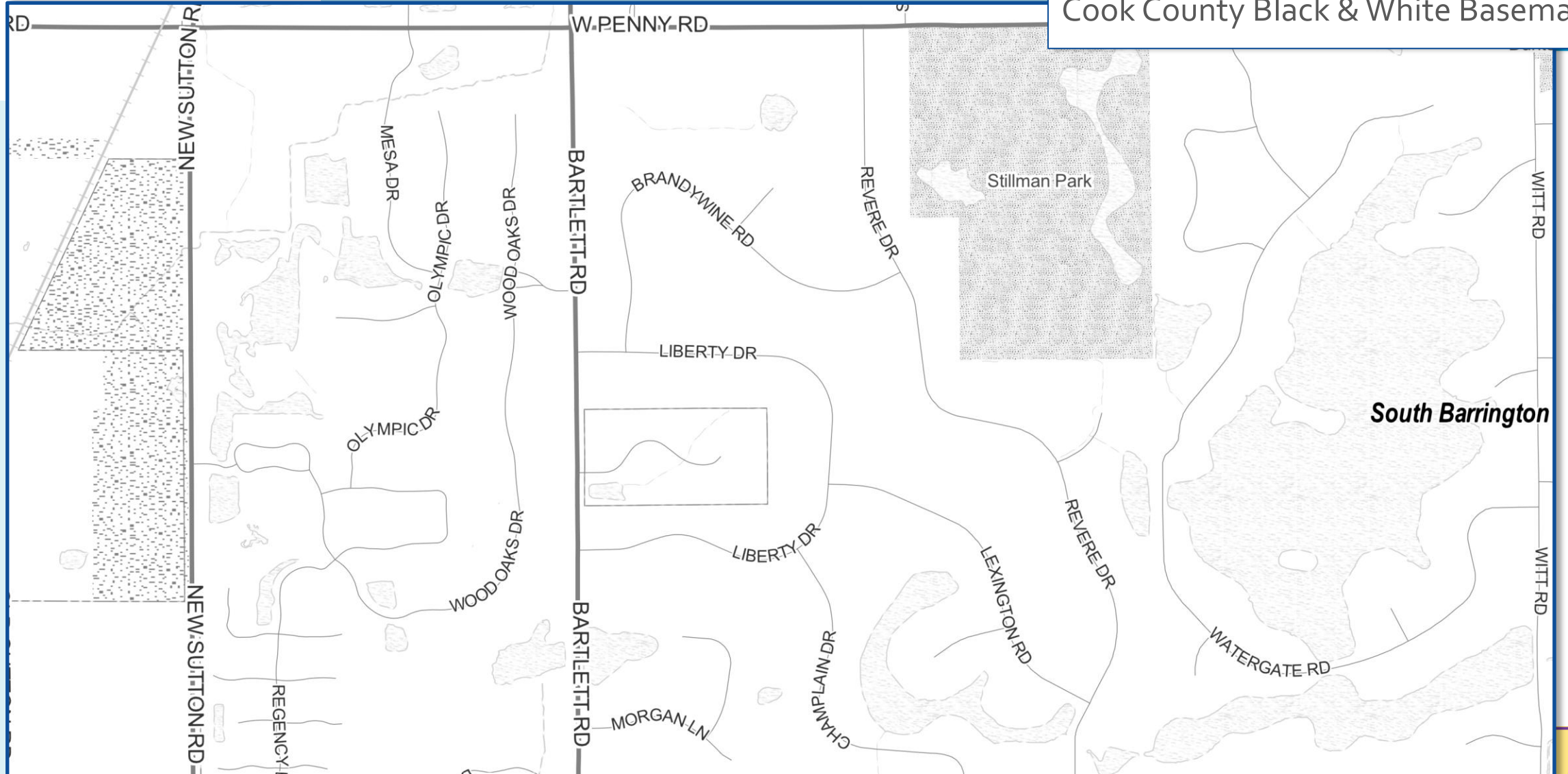
Base 10% 20% 30% 40% 50% 60% 70% 80% 90%

|        |        |        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 5ab4ac | 51a29b | 48908a | 3f7e78 | 366c67 | 2d5a56 | 244845 | 1b3634 | 122422 | 091211 |
| 5ab4ac | 6bbcb4 | 7bc3bd | 8ccbc5 | 9cd2cd | addad6 | bde1de | cee9e6 | def0ee | eff8f7 |



# More Accessible Map Design: Use Pattern and Texture

Cook County Black & White Basemap

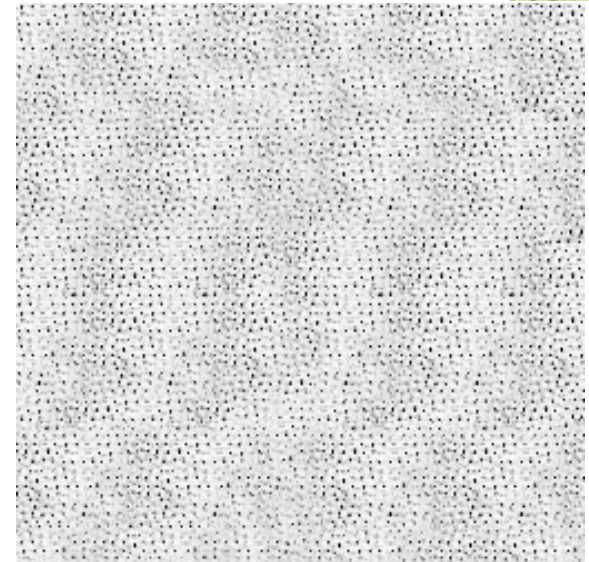
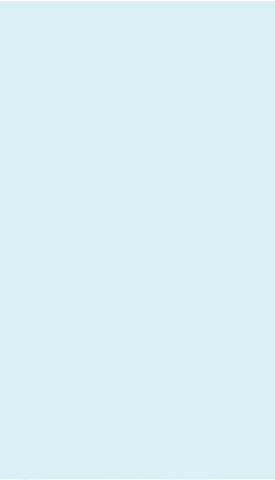




# More Accessible Map Design: Making new Patterns and Textures

## How to make a seamless texture:

- Find a Texture
  - The [David Rumsey Map Collection](#) is fun to browse
- Use [this John Nelson technique](#) to eliminate the seam





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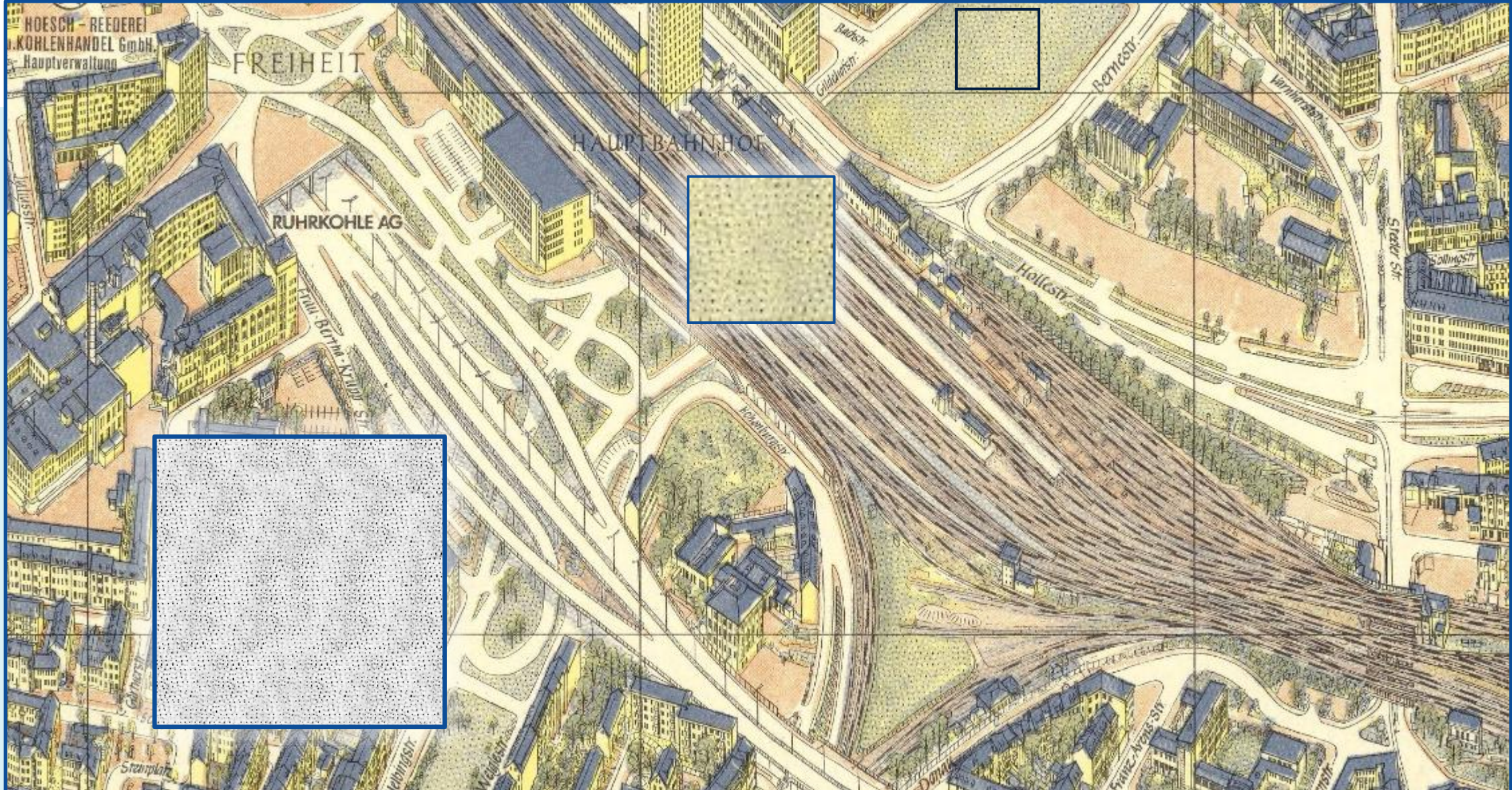
# More Accessible Map Design: Making Pattern and Texture - Water





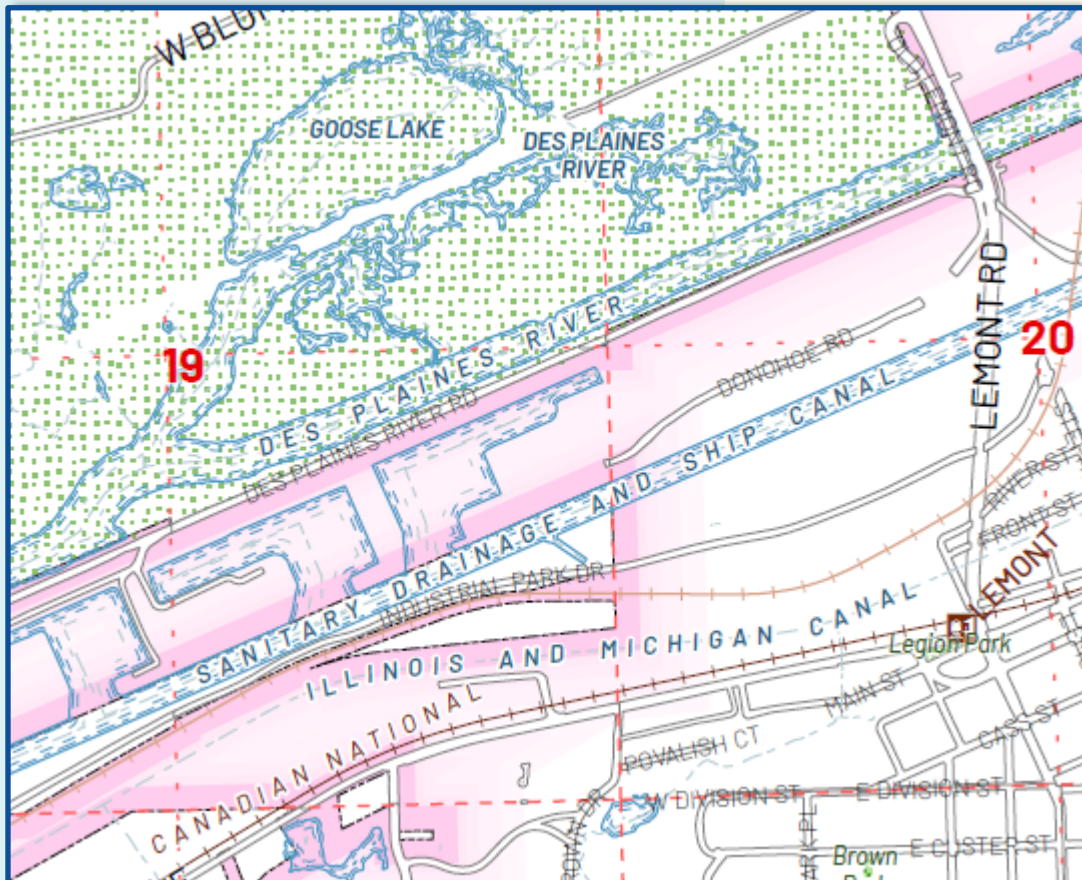
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# More Accessible Map Design: Making Pattern and Texture - Park



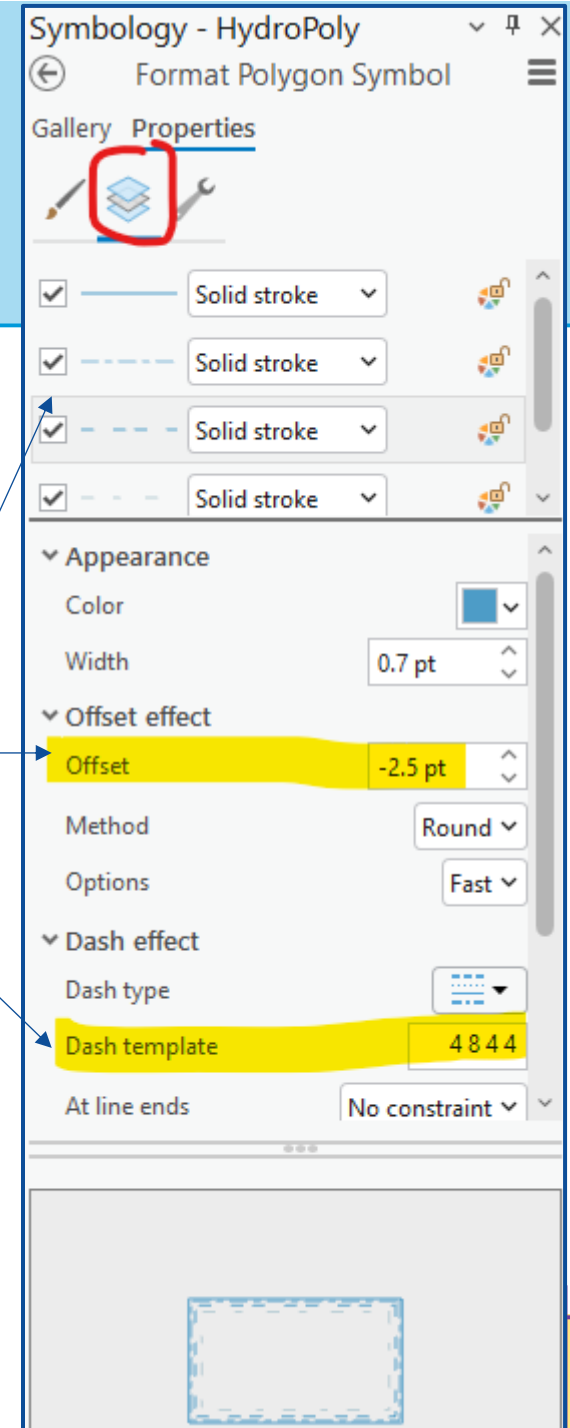


# More Accessible Map Design: Line Texture Settings



## Line textures in ArcPro:

- Make multiple line layers
- Use Offset Effect
- Adjust dash template





# Zoom Level Customization

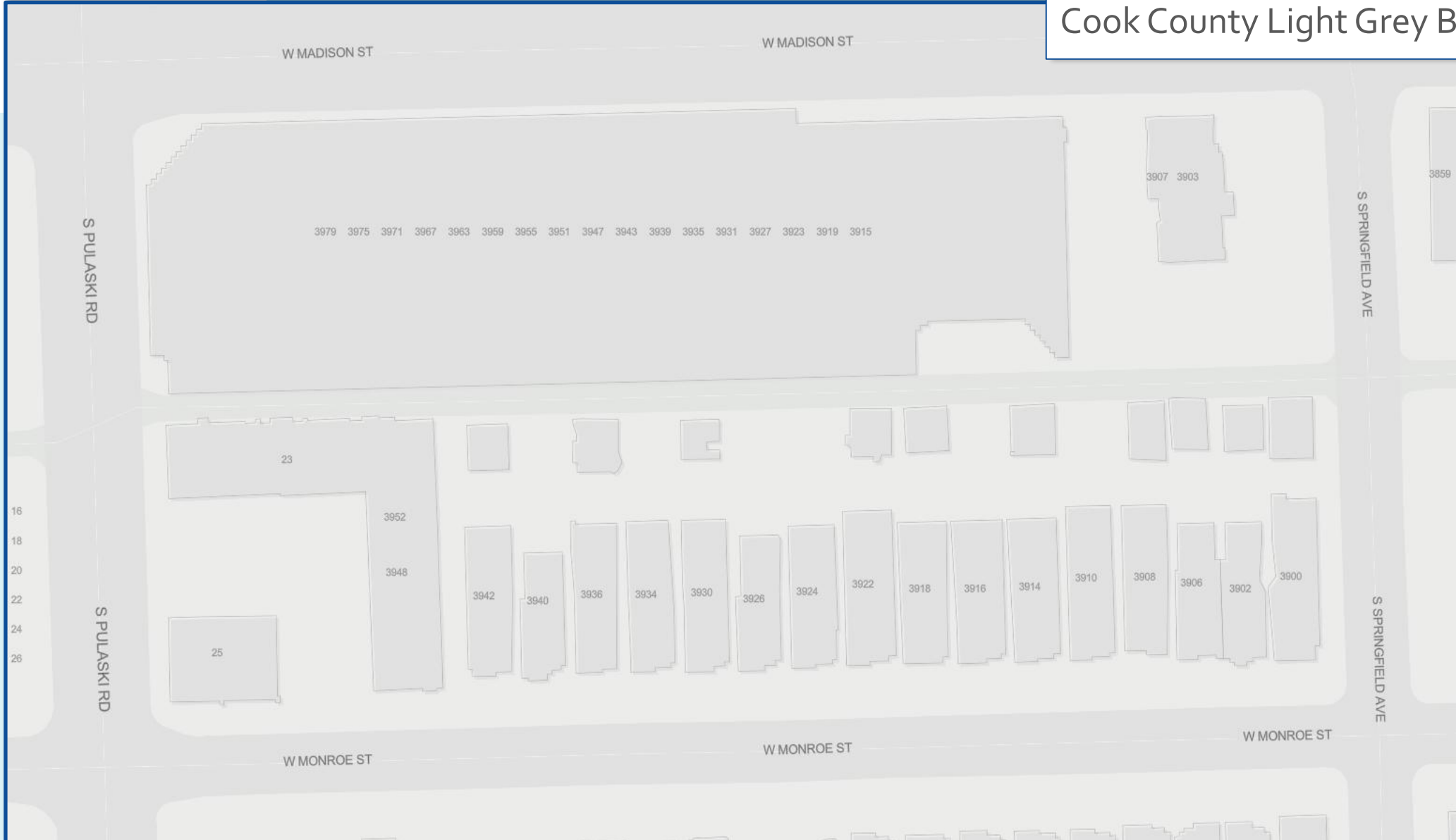
## Strategic Adjustments At Different Zoom Levels

- **Where possible, increase text size as user zooms in**
  - 9 pt absolute smallest
  - 12- 16 pt is the best
- **Reduce map layers as much as possible as a user zooms out to prevent the map from becoming too busy**



# More Accessible Map Design: Increase Text Size when zoomed in (before)

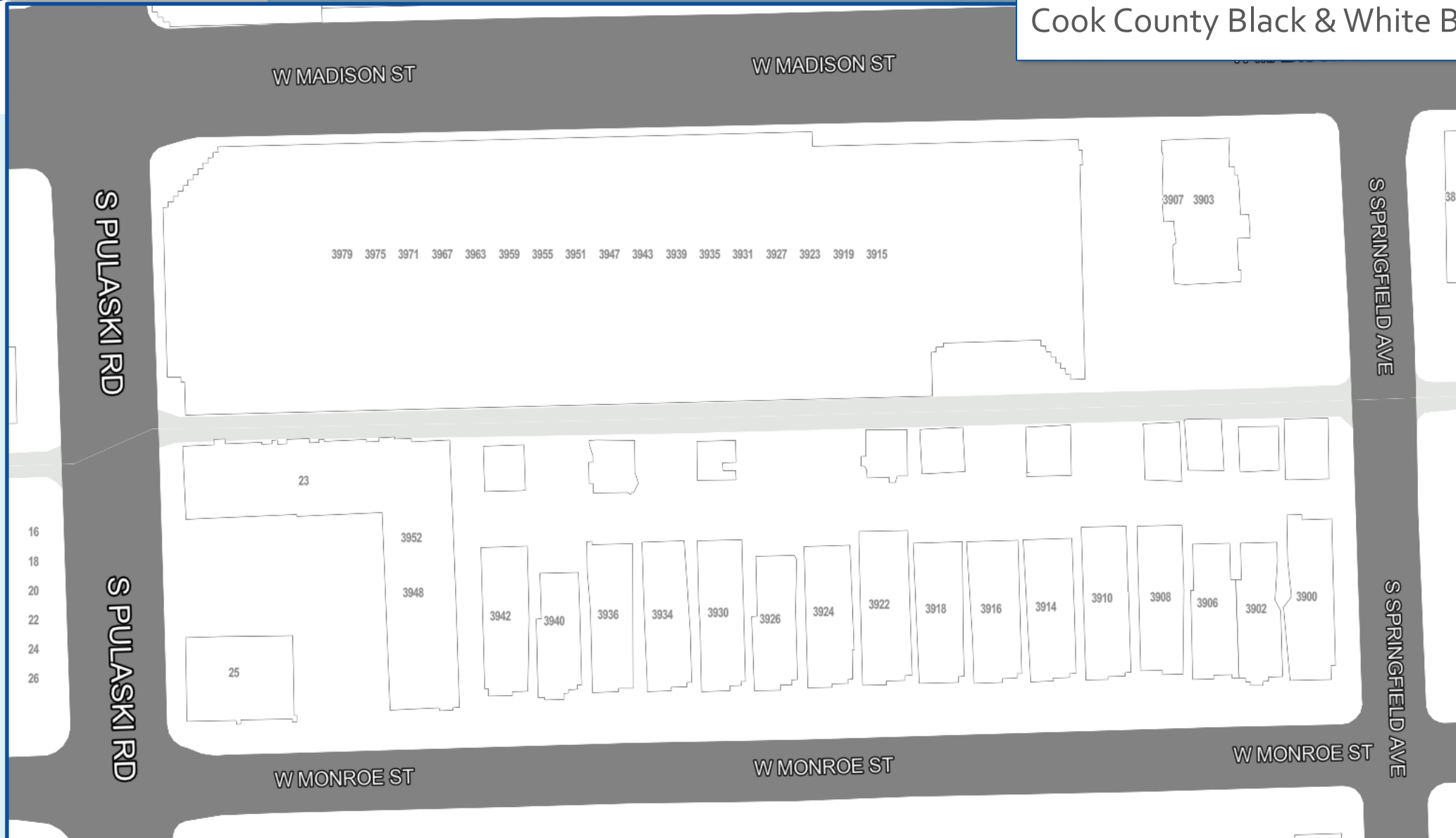
Cook County Light Grey Basemap

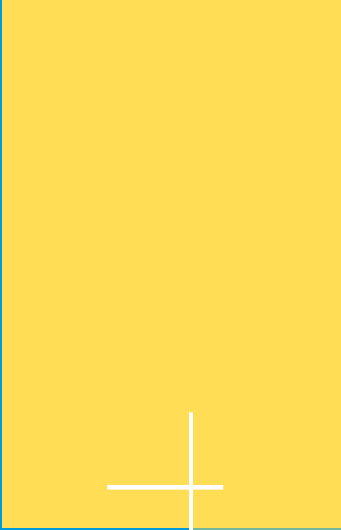




# More Accessible Map Design: Increase Text Size when zoomed in (after)

Cook County Black & White Basemap





# How to Adjust Mapping Applications





# Updating over 30 Public Web Applications

## Tracking Issues and Updates

- GitHub Issue tracking
- 1 Parent GitHub Issue per application; Sub/child issues for each accessibility concern found
- Labels used to track similar issues, blocked issues, issues requiring ESRI support or ESRI fixes
- Identify similar issues across applications: Figure out how to fix once and apply everywhere.
- Reporting to ESRI



# Testing – Axe Tools Browser Extension

<https://www.deque.com/axe/devtools/extension/>

Showing Education Levels For Adults 25 And Over By Zip Boundaries - 2023

Info Feedback Translate

About the Data Download Print

How This Data Is Calculated  
This section explains where the data comes from and how it is used in the app.

Data Sources

|                                            |          |
|--------------------------------------------|----------|
| textarea.text-area.readonly.text-area-only | 567 x 72 |
| Role                                       | textbox  |
| Accessible Text                            | empty    |

5-year estimates 2023

Cook County GIS. Everyone Counts (web application): Education Levels for Adults 25 and Over. American Community Survey 5-year estimates 2023, Table B15002 (B15002). accessed 2026-02-06.

How ACS variables combine into app value

Geographic summaries

Cook County GIS Dept

axe-core 4.11.0

Total Issues: 13

**Form elements must have labels** 1

Ensure every form element has a label  
[more information](#)

Element Location: calcite-text-area,textarea

```
<textarea aria-describedby="0f7ad125-c0ab-9ba7-2acf-98a6928a41ea" aria-errormessage="textAreaValidationMessage" aria-invalid="false" aria-label="" class="text-area readonly text-area--only" cols="20" readonly="" rows="3" spellcheck="true" wrap="soft"></textarea>
```

To solve this problem, you need to fix at least (1) of the following:

- Element does not have an implicit (wrapped) <label>
- Element does not have an explicit <label>
- aria-label attribute does not exist or is empty
- aria-labelledby attribute does not exist, references elements that do not exist or references elements that are empty
- Element has no title attribute
- Element has no placeholder attribute
- Element's default semantics were not overridden with role="none" or role="presentation"

Found: Automatically Impact: critical cat.forms

wcag2a wcag412 section508 section508.22.n

- Free extension (Paid version available)
- May need to re-run scan for multiple app stages (performing a search, viewing a result, etc)
- False negatives and positives
- Cannot catch everything



# Application issue and sub-issues

taxmapviewer sort:created-asc

Labels Milestones New issue

Open 2 Closed 8

Author Labels Projects Milestones Assignees Types Oldest

- taxmapviewer 7 / 8 AXE DEV ESRI DOMINATE ISSUES ESRI XBD FIXED IN PROD FIXED IN TEST PARENT ISSUE 5  
#48 · sigcookcountyil opened on Feb 4
- taxmapviewer: Frames must have an accessible name NEED FOLLOW-UP 2  
#49 · by sigcookcountyil was closed on Mar 5
- taxmapviewer: Zooming and scaling must not be disabled 1  
#50 · by sigcookcountyil was closed on Mar 5
- taxmapviewer: Elements must meet minimum color contrast ratio thresholds 1  
#51 · by sigcookcountyil was closed on Mar 6
- taxmapviewer: ARIA hidden element must not be focusable or contain focusable elements ESRI BUG-000183029 ESRI COMMUNITY POST ESRI TECH-SUPPORT ESRI WILL FIX 7  
#52 · sigcookcountyil opened on Feb 4
- taxMapView: Documents must have <title> element to aid in navigation PDF RELATED WILL NOT FIX 1  
#53 · by sigcookcountyil was closed on Mar 6
- taxMapView: <html> element must have a lang attribute WILL NOT FIX 2  
#54 · by sigcookcountyil was closed on Mar 5
- taxmapviewer: UPDATE XBD DEV EDITION FIXED IN TEST 1  
#121 · by sigcookcountyil was closed on Mar 5
- CAB TICKET - 2002724 CAB Management Ticket 12  
#132 · by sigcookcountyil was closed on Apr 2
- taxmapviewer: CLEAN REPO CLEAN REPO PARENT ISSUE 1  
#145 · by sigcookcountyil was closed on Apr 1



# Evaluation Checklist

## Short description

property viewer application to search for property details, see them in a map, view detailed data, calculate comparables, export data

## Core user workflow to test

search - view data in side panel - view data in map - search for comparable - print/export

## Automated tests (axe-core)

- ☒ Axe-core automated test run completed ...
- ☒ Findings documented as individual sub-issues ...

## Manual checks

- ☒ Pop-up configuration checked ...
- ☒ Pop-up - check custom SVG in popup/html ...
- ☒ Pop-up links use visible, descriptive text or aria-label; indicate new window behavior; style links (underline, adequate contrast) ...
- ☒ Data tables - check hyperlinks for descriptive text and new window indication ...
- ☒ Info panels - check hyperlinks for descriptive text and new window indication ...
- ☒ Iframes include title: Add descriptive, unique title to each <iframe>; avoid role='application' unless essential. ...
- ☒ Iframe titles are unique ...
- ☒ Check if app uses custom headings in instant apps/dashboard ...
- ☒ Custom heading - Use true ...

...

; maintain sequential hierarchy.

- ☒ Images checked (alt text, meaningful names, contrast) ...
- ☒ PDFs & other attachments checked ...
- ☒ Findings documented as individual sub-issues ...



# ESRI Configurable Apps

- **Instant Apps**
- **ArcGIS Dashboards**
- **StoryMaps**
- **Experience Builder**
  
- **Templates built with accessibility "support" but still require configuration and may still have issues that need to be reported.**
- **StoryMaps has built in accessibility checker**
- **Experience Builder has some accessibility settings that need to be turned on**



# Configure those Webmaps!

## Popups, styling and labeling

- Feature service styling, labeling, and popups are often configured in a webmap which is then used in the application.
- Check your popups. Did you add an image? Don't forget the alt text. Do you have a table or list? Make sure it has the correct accessibility tags.
- David's More Accessible Map Design tips are key here too for making the application layers accessible.



# Identifying ESRI Issue across applications

is:issue state:closed label:"ESRI CASE NUMBER - 04136029"



Labels

Milestones

New issue



Open

0

Closed

5

Author

Labels

Projects

Milestones

Assignees

Types

Newest



hwproject: Buttons must have discernible text - calcite specific

ESRI CASE NUMBER - 04136029

ESRI COMMUNITY POST

ESRI HAS FIXED

3



ESRI TECH-SUPPORT FIXED IN PROD

#124 · by sigcookcountyil was closed on Mar 18



currencyexchange: Buttons must have discernible text

ESRI CASE NUMBER - 04136029

ESRI HAS FIXED

FIXED IN PROD

2



#44 · by CCSMaginity was closed on Mar 18



veteranresources: Buttons must have discernible text

ESRI CASE NUMBER - 04136029

ESRI HAS FIXED

FIXED IN PROD

2



#43 · by sigcookcountyil was closed on Mar 18



veteranownedbusinesses: Buttons must have discernible text

ESRI CASE NUMBER - 04136029

ESRI COMMUNITY POST

ESRI HAS FIXED

4



ESRI TECH-SUPPORT FIXED IN PROD

#37 · by sigcookcountyil was closed on Mar 18



womensIssues: Buttons must have discernible text

ESRI CASE NUMBER - 04136029

ESRI HAS FIXED

FIXED IN PROD

2



#21 · by sigcookcountyil was closed on Mar 18



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# Custom Built Apps: CookViewer and Everyone Counts

## Screen reader friendly HTML Report with option to Print to PDF

- ESRI ArcGIS Javascript SDK
- ESRI Calcite Design System

Property Detail Report

**Property Detail Report**  
Cook County Bureau of Technology – Geographic Information Systems (GIS)

**17-16-130-001-0000**  
433 W VAN BUREN ST, CHICAGO, IL 60607  
Township: West Chicago | Commissioner District: 2 | Board of Review District: 3

**CookViewer**  
Cook County Parcel Viewer

Close Print Report



# What's Next

- How do we maintain accessibility when applications are updated?
- How do we build accessibility in to the application development process?
- Can we script or automate some of the accessibility checks?
- How can we test with users?

Questions?

