

METADATA, MAPS, MHAPO, AND MORE

A TOUR OF THE JOHN R. BORCHERT MAP LIBRARY'S DIGITAL INITIATIVES

Kevin Dyke, Spatial Data Analyst/Curator

Ryan Mattke, Head



UNIVERSITY OF MINNESOTA

LIBRARIES

OVERVIEW

1. **A bit of the Borchert Map Library's history**
2. **MHAPO: the first generation**
3. **Mapping campus history**
4. **MHAPO: TNG**
5. **Upcoming and underway**

HISTORY OF THE BORCHERT MAP LIBRARY

Originally housed within the geography department.

In 1962, moved with the department across the river.

In 1968, moved into its current home deep in the bowels of the newly opened Wilson Library.

On 26 May 1989, named in honor of geographer and Regents' Professor John R. Borchert on the occasion of his retirement.

That day was also proclaimed "John R. Borchert Day" in the state of Minnesota.

In 1989, became home to one of the earliest public computer labs equipped with geographic information systems (GIS) software, known as the Automated Cartographic Information Center.

EARLY DIGITAL PROJECTS

Description	Time Period

EARLY DIGITAL PROJECTS

Description	Time Period
Scan	Interminable

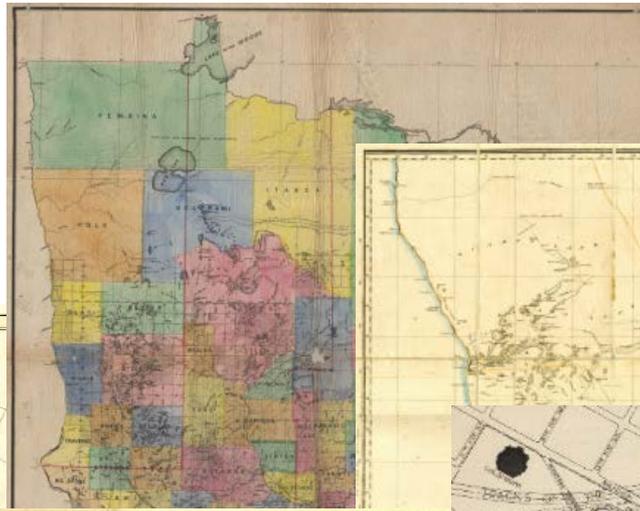
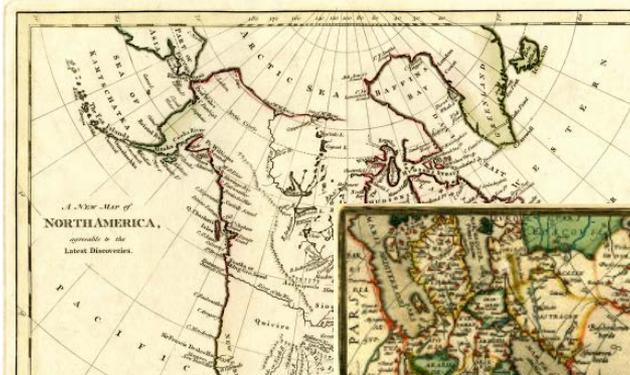
EARLY DIGITAL PROJECTS

Description	Time Period
Scan	Interminable
Scan some more	Many undergraduate lifespans

EARLY DIGITAL PROJECTS

Description	Time Period
Scan	Interminable
Scan some more	Many undergraduate lifespans
Even more scanning?	Till the end of time

NOW WHAT?



MAKING USE OF “RAW” DIGITAL MATERIAL

What came first, the digital collections or the engaged audience?

It turns out, digitized maps (like pretty much all other digital objects) benefit tremendously from *some* kind of presentation.

TARGETING DIFFERENT AUDIENCES

INSTRUCTORS

Created customized web maps supporting classroom instruction.

Urban Studies -- Brenda Kayzar
Minneapolis Historic Aerial Photography

Layers

Use slider to change layer transparency

1903 plat map:

1940 aerial photographs:

1957 aerial photographs:

1966 aerial photographs:

1984 aerial photographs:

1991 aerial photographs:

To change the basemap, use the button at the top right corner of the map

PLEASE NOTE: This interactive map works best with Mozilla Firefox or Google Chrome browsers -- Internet Explorer is not recommended

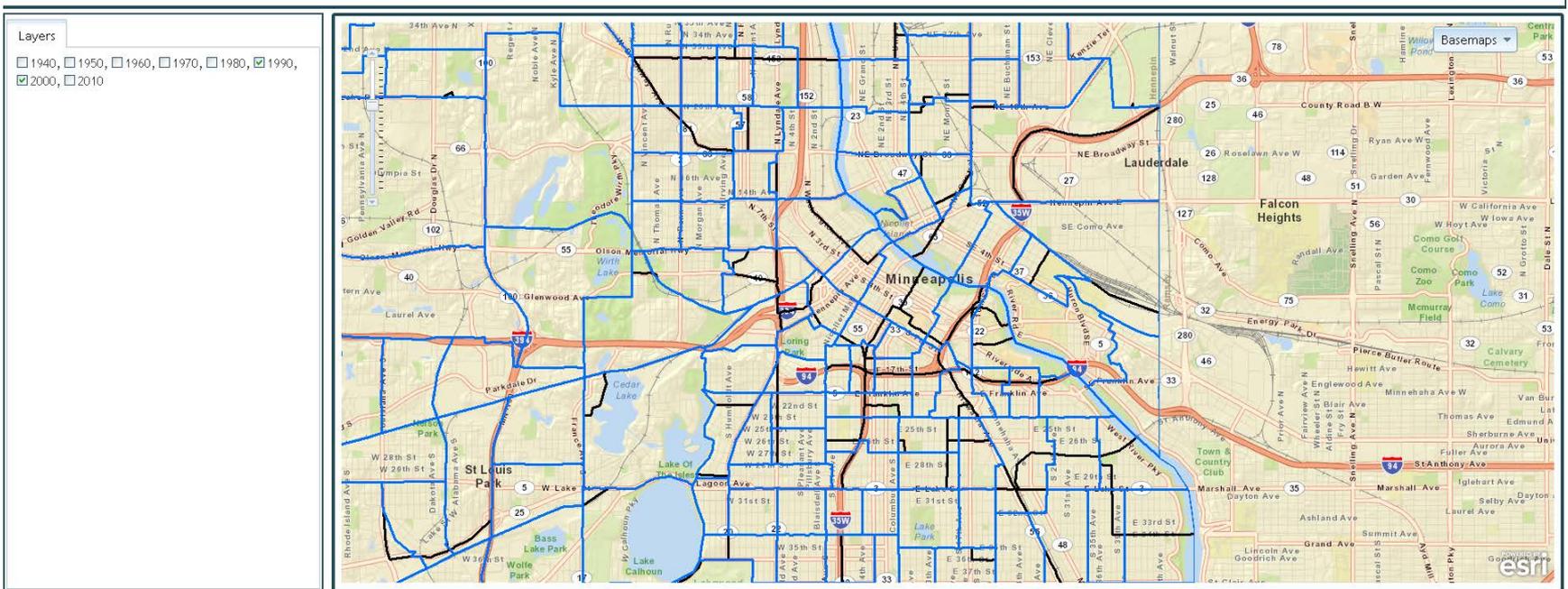
Basemaps

powered by esri

INSTRUCTORS

These web maps are focused and simple.

Hennepin County Census Tracts
1940-2010



INSTRUCTORS

Generally used as part of an exercise in one class session.

Middle East

Historic Maps

The image shows a digital map application interface. On the left, there is a 'Layers' panel with a transparency slider and a dropdown menu showing 'Map of Persia -- 1872'. The main map area displays a modern satellite-style map of the Middle East and surrounding regions, with a historical map of Persia overlaid in the center. The historical map is titled 'PERSIA, TURKEY IN ASIA, AFGHANISTAN, BELUCHISTAN, INDIA IN SOUTHERN ASIA' and shows the geographical boundaries of these regions in the late 19th century. The interface also includes a 'Basemaps' dropdown menu in the top right corner and an 'esri' logo in the bottom right corner.

UNIVERSITY OF MINNESOTA

LIBRARIES

BROADER TARGETING

MHAPO: THE NASCENCE

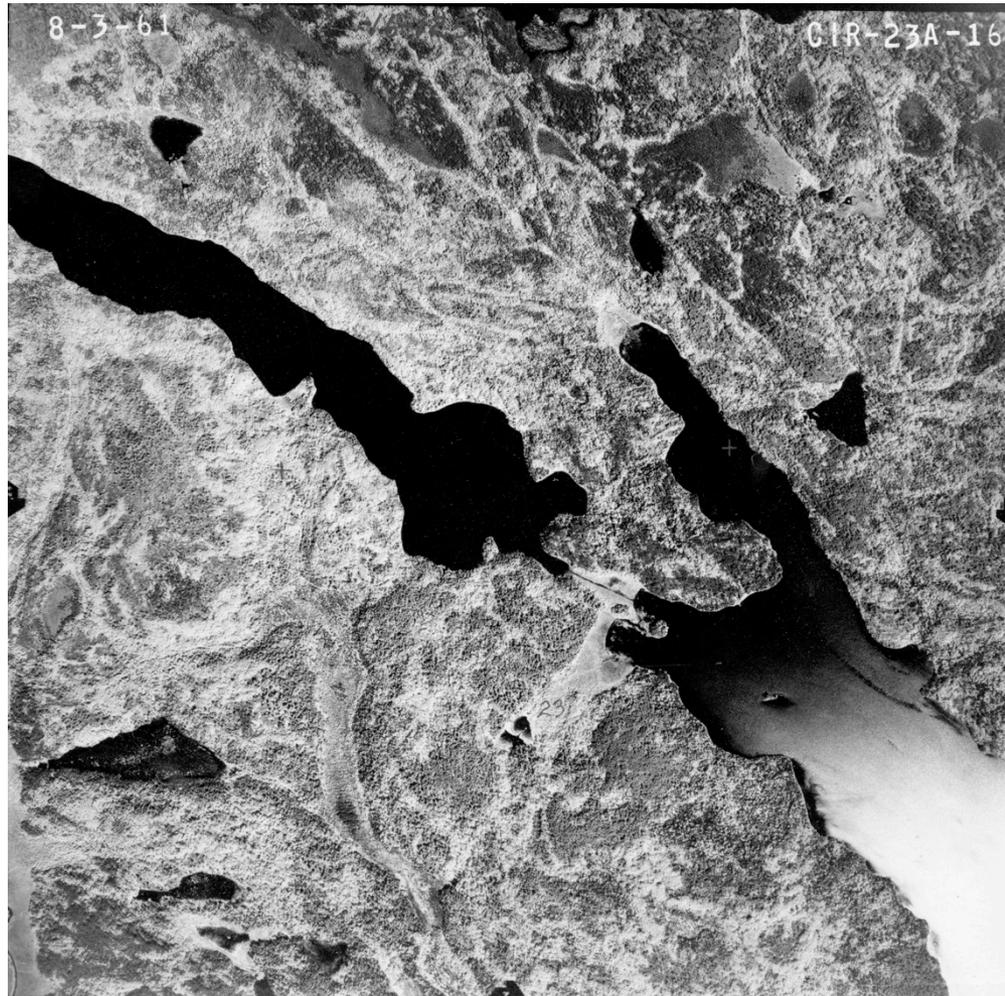
By 2007, the library had a collection of over 15,000 digitized aerial photographs.



1939 aerial photograph showing the Duluth harbor

BUT THE QUESTION REMAINED...

HOW TO HELP USERS QUICKLY FIND THE MOST RELEVANT AERIAL PHOTOS?



Aerial photo from 1961 of what would become Voyageurs National Park

MHAPO: THE NASCENCE

Back in 2008, a student worker used the Google Maps JavaScript API and XML (learning both simultaneously) to put together an application.

THE RESULT

Minnesota Historical Aerial Photographs Online | from the John R. Borchert Map Library

Map Satellite Hybrid MapHappy

Photo ID: WN-3EE-147
Year: 1964
Click to view photo

search the map Search

Map data ©2012 Google - Terms of Use

[Return to the Borchert Map Library.](#)

DIRECTIONS AND KEY

Pushpin Key:

- 2000+ (oblique photos of the north shore of Lake Superior only)
- 1980s
- 1970s
- 1960s
- 1950s
- 1940s
- 1930s
- 1920s (St. Paul only)

Option 1: Search for a location or address (you may need to zoom out to see the pushpins for your area).

Option 2: Zoom in using the zoom bar in the upper left corner of the map (or the wheel on your mouse).

Pushpins will appear (when you zoom in or out far enough) indicating the center point of an airphoto.

Click on the pushpins closest to your location to get additional information about the photo and to find the "View Photo" link. Photos will open in a new browser tab or window.

NOTE: For aerial photographs of Minnesota from 1990 to the present, please see the [North Star Maps](#).

MHAPO

MHAPO provides access to over 105,000 digital copies of Minnesota air photos found in our collection and available from Landview. To see the counties and years covered in MHAPO view our [air photo holdings page](#).

12-21-11 | MHAPO has been updated again and now includes even more of the data and links available from Landview. Please be patient. The increase in the number of available airphotos also means a bit longer loading time.

MHAPO is compatible with Firefox or Chrome browsers.

Please send feedback or report any photo links that do not work to mapref@umn.edu.

Check It Out! MapHappy is a new tool to help you locate print and online maps in the University Library collections.

Acknowledgements:

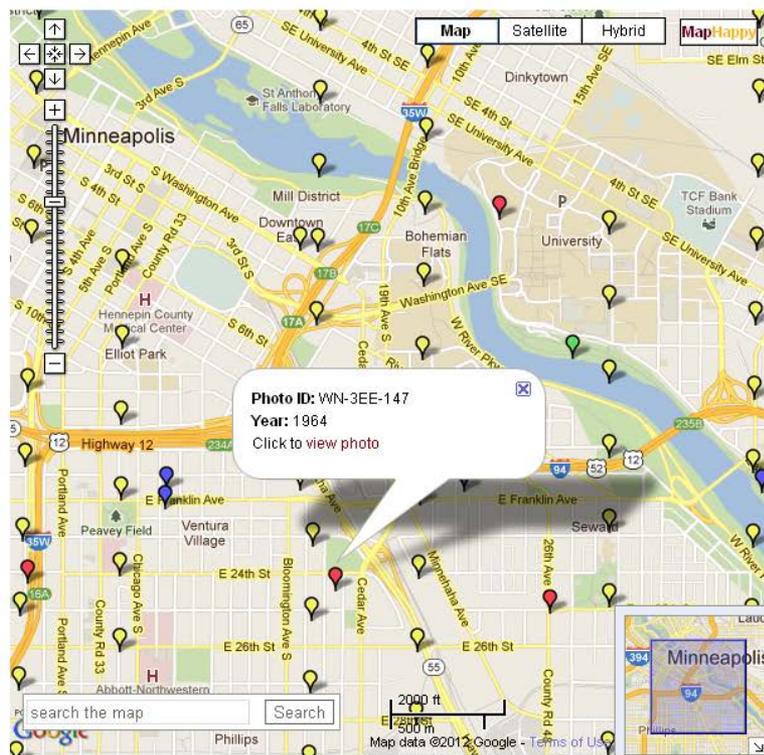
MHAPO was created by Joseph Koeller in consultation with John R. Borchert Map Library staff.



Worked well with the initial set of photos

Familiar Google Maps interface

Minnesota Historical Aerial Photographs Online | from the John R. Borchert Map Library



DIRECTIONS AND KEY

Pushpin Key:

- 2000+ (oblique photos of the north shore of Lake Superior only)
- 1980s
- 1970s
- 1960s
- 1950s
- 1940s
- 1930s
- 1920s (St. Paul only)

Option 1: Search for a location or address (you may need to zoom out to see the pushpins for your area).

Option 2: Zoom in using the zoom bar in the upper left corner of the map (or the wheel on your mouse).

Pushpins will appear (when you zoom in or out far enough) indicating the center point of an airphoto.

Click on the pushpins closest to your location to get additional information about the photo and to find the "View Photo" link. Photos will open in a new browser tab or window.

NOTE: For aerial photographs of Minnesota from 1990 to the present, please see the North Star Maps website.

MHAPO

MHAPO provides access to over 105,000 digital copies of Minnesota air photos found in our collection and available from Landview. To see the counties and years covered in MHAPO view our [air photo holdings page](#).

12-21-11 | MHAPO has been updated again and now includes even more of the data and links available from Landview. Please be patient. The increase in the number of available airphotos also means a bit longer loading time.

MHAPO is compatible with Firefox or Chrome browsers.

Please send feedback or report any photo links that do not work to mapref@umn.edu.

Check It Out! MapHappy is a new tool to help you locate print and online maps in the University Library collections.

Acknowledgements:

MHAPO was created by Joseph Koeller in consultation with John R. Borchert Map Library staff.



[Return to the Borchert Map Library.](#)

©2008 by the Regents of the University of Minnesota. All rights reserved.

Biggest bottleneck => A huge text file (over 25 megabytes!) that had to be downloaded and parsed before anything else could be done.

Had to be zoomed pretty far in to see coverage

MHAPO: THE NASCENCE

After growing to over 150,000 aerial photos, MHAPO was beginning to show its age and slowing down.

However

IT STILL WORKED!

THE IMPETUS FOR CHANGE

Warning: Version 2 of the Google Maps JavaScript API is no longer available.

THE WRITING WAS ON THE WALL

MEANWHILE....

DOCUMENTING CAMPUS HISTORY

BACKGROUND

The Twin Cities campus of the University of Minnesota was founded in 1851.

The growth of the campus oftentimes mirrored the growth of the Twin Cities as a whole.

University Archives houses a lot of information on building history.

As well as a collection of large scale maps covering most of its history.

A rich opportunity.

TIMELINE

November 2011 – University of Minnesota Libraries offers one-time project funding

Competitive application process

Campus History proposal was approved

April 2012 – Project delayed until release of ArcGIS 10.1

Decision made to save us from migrating mid-project

June 2012 – Hired five graduate students with GIS experience

October 2012 – Most of the GIS work completed

Spring 2013 – Refined the JavaScript, dealt with issues (https, etc.) and beta tested

PROCESSING OVERVIEW

1. **Scanning of campus maps (already completed by U Archives)**
2. **Georeferencing campus maps**
3. **Metadata creation for campus maps**
4. **Building footprint creation**
5. **Web application development (website and service hosting)**

PROCESS

Started by georeferencing 500+ historic campus maps

What's georeferencing you say?

I'm glad you asked!

GEOREFERENCING

Taking a scanned map or aerial photograph and aligning it to existing features on another map.

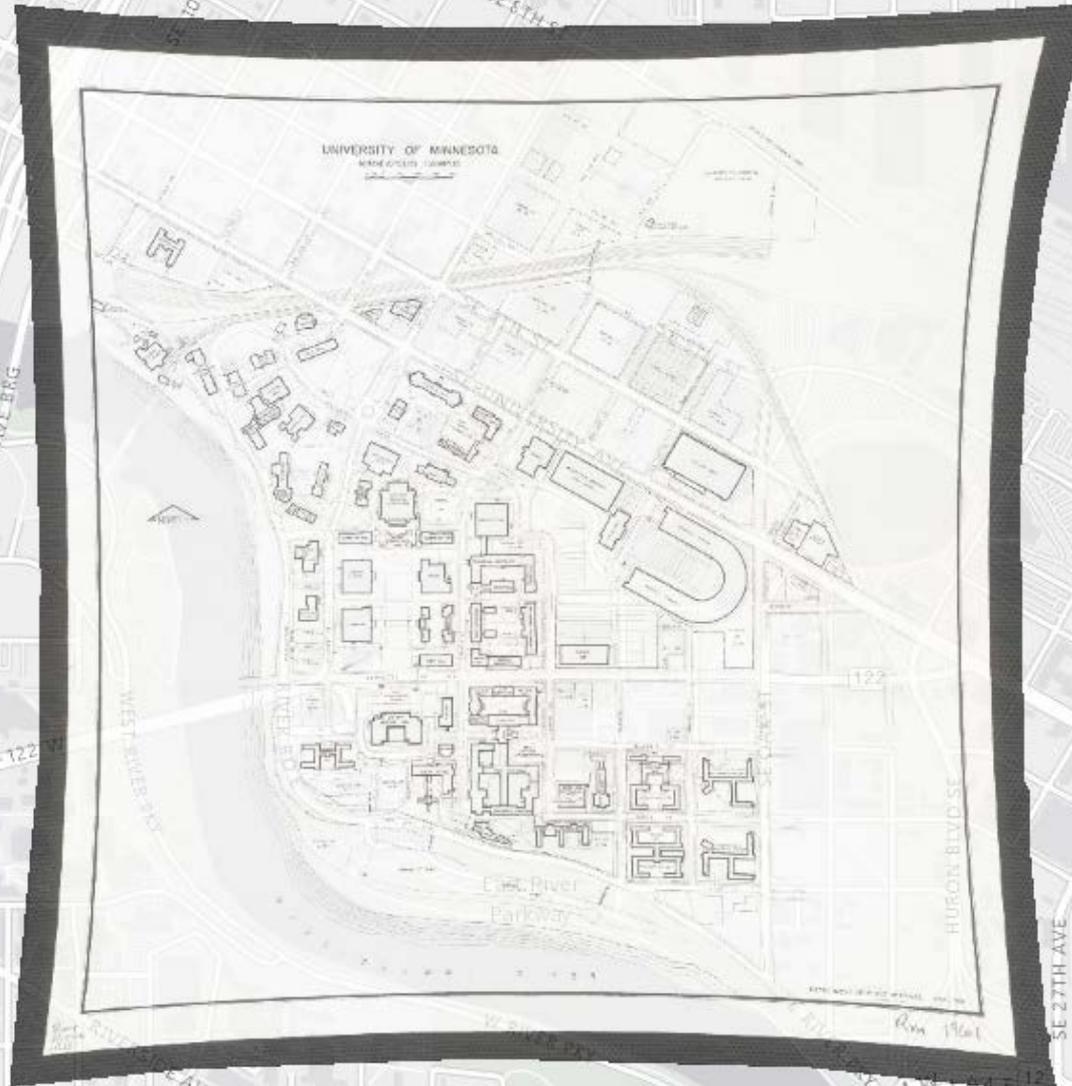
For example, with a 1961 map of the East Bank campus of the U of M, you could georeference the map using important intersections along Washington Avenue and University Avenue.



Search for a building...

Locate Building

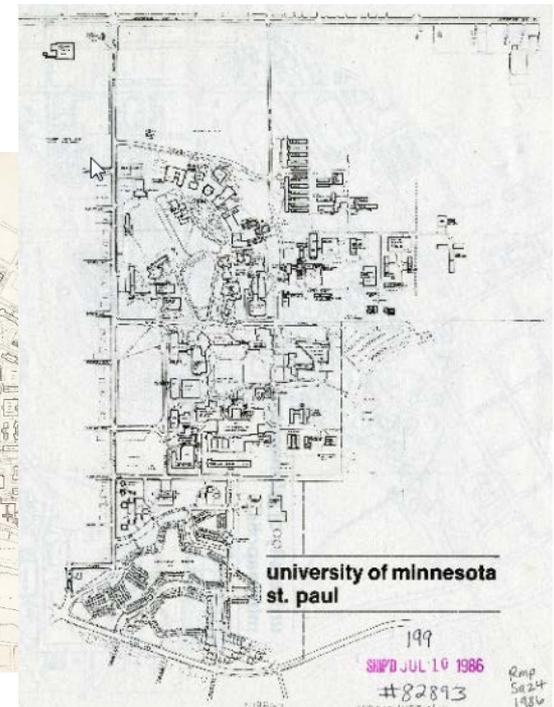
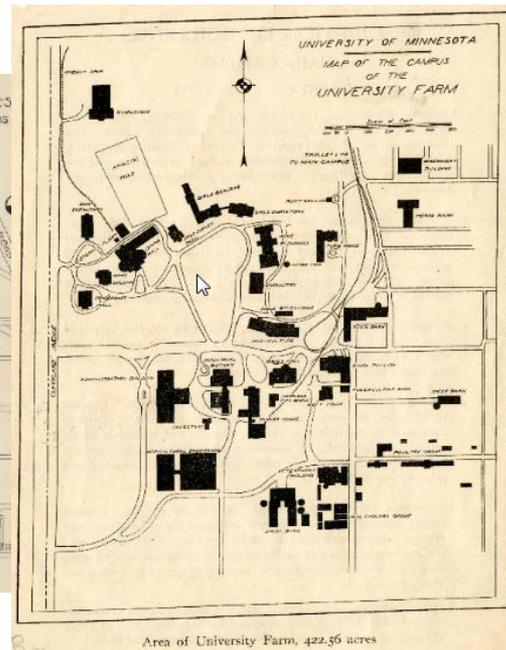
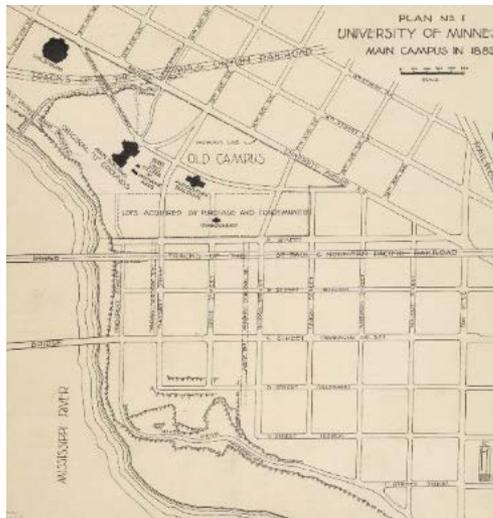
Basemaps



CAMPUS HISTORY PROCESS

Maps had previously been scanned by the
University of Minnesota Archives

Georeferencing took approximately one week



NEXT STEPS

Digitized card catalog drawer of historic building information

Cards contained dates related to construction, re-naming, razing, etc.

Over 600 spreadsheet rows for Minneapolis & St. Paul Campuses

1962 CLASSROOM BUILDING, West Bank

1962 - Built

1967 - Blegen Hall



1962 SOCIAL SCIENCE BUILDING, West Bank

1962 - Built



	C	D	E	F	G	H
M	CAMPUS_NUM	BUILDING_N	CAMPHIST_ID	Notes	NAME	YEAR_BUILT
S	1	127	MPLS1232		1425 University Avenue SE	1922
		131	MPLS1337	decommisioned	1701 University Avenue SE	1952
S	1	93	MPLS1236	Fraternity Purchasing	1901 University Avenue SE	1925
S	1	217	MPLS1176		19th Avenue Parking Ramp	1984
S	1	87	MPLS1189	Minnesota International Center	711 East River Parkway	1964
S	1	193	MPLS1233		717 Delaware Street SE	1965
S	1	86	MPLS1235	building built in 1928 but probably not by uni, first appears on maps in 1991	722 Fulton Street SE	1991 (1928)
			MPLS1057	(was MPLS1058, addition didn't appear to change footprint)	Administration Building	1925
			MPLS1084		Aeronautical Mechanical Engineering	1950
			MPLS1008	Used to be where Nicholson Hall is	Agricultural College Building	1875
S	1	266	MPLS1084	name change	Akerman Hall	1980
S	1	66	MPLS1087	name change	Amundson Hall	1979
S	1		MPLS1027	burned	Anatomy Building	1900
S	1	220	MPLS1172		Andersen Library, Elmer L.	1999
S	1	205	MPLS1158		Anderson Hall	1967
S	1		MPLS1029		Animal House	1900
S	1	37	MPLS1051	name change	Appleby Hall	1942
S	1	37	MPLS1323		Appleby Hall	1942
S	1	167	MPLS1133		Aquatic Center, University	1990
			MPLS1111		Architecture Building	1960
S	1	NONE	MPLS1140	addition--this isn't really part of the U, it's an off-campus apartment building owned by Dinnaken properties	Argyle House	1911
			MPLS1284		Argyle House	1996
S	1	11	MPLS1001		Armory	1994
			MPLS1242		Armory	1996

DATA HARMONIZATION

As you might imagine, this involved a lot of sleuthing, visits to archives, and fitting of round pegs into square holes.

MINNEAPOLIS

Build date needed (current status)

- Inventory Warehouses (unknown)
- Tennis Courts (until 2001)

Destroyed/exists status needed (in order by build year)

- Barn (1883)/The Barn (1901)
- Community Clinic (1885)
- Temporary Hospitals, 119 State St SE/304 State St SE/303 Washington (1909)
- Inventory Warehouse (1912)
- Space Programming and Management Storage Building (1912)
- Pharmacognosy Plant Laboratory/Pharmacy greenhouse(1913)
- Education building (1915)
- Heating Plant (1916)
- Storehouse and Shops (1924)
- Greenhouse (1926)
- Incinerator Heating Plant (1951)
- Royal A. & Olive Stone Research Lab (1970)

Confirm dates

- Cardiovascular Lab
- Charlotte Winchell Cottage

To Fix

- Community Clinic
- Elliott Hall addition btw 1929-40
- Hospital Service Building
- Grainger Building

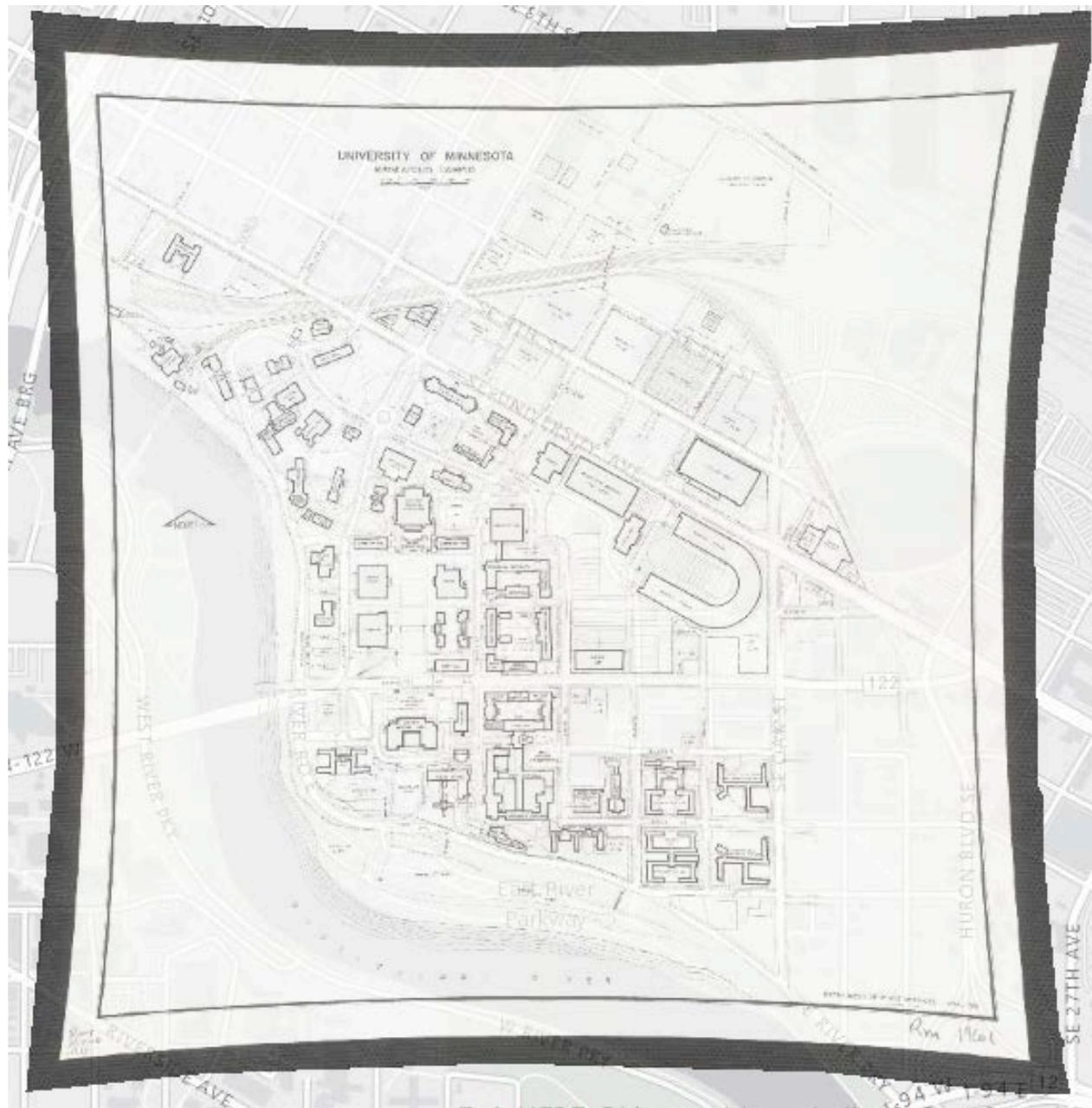
What is this?

- Chiller Plant and Electric Switch Utility Building
- Pharmacy tool house

AND THEN?

Used current footprints (provided by U of M Enterprise GIS) as a baseline.

Next, used georeferenced maps to recreate building footprints across campus over time.





LEARNING ALONG THE WAY:

OR, making it up as you go along

Figuring out how to relate buildings to themselves over time within a GIS.

Doesn't seem like it should be too difficult, right?

EMERGENT COMPLEXITY

In the end (as the web application was being finalized) we realized that we needed to:

- 1. Differentiate between name changes, renovations, demolitions, use changes.**
- 2. Indicate the original build year for a building at any stage in its lifespan.**
- 3. Be able to convey every name a building has gone by at any point in time.**
- 4. Finish the project.**

DON'T FEAR BACKTRACKING

Because it's going to happen.

More than once.

INSTEAD, ACCOMMODATE IT

Recording processing steps is really helpful

- Makes processing repeats/tweaks a lot easier

Automating as much as possible

Be sure everyone working on the project is on the same page

THE RESULT

Multiple tabs for layers

Building locator

Basemap selector

Historic maps

Slider to pick year

The screenshot displays the 'CAMPUS HISTORY' website interface. At the top, there is a navigation bar with the University of Minnesota logo and 'Driven to Discover' slogan. Below this, the main heading 'CAMPUS HISTORY' is visible. The interface includes several key components:

- Navigation and Search:** Links for 'Campuses: Twin Cities, Crookston, Duluth, Morris, Rochester, Other Locations', 'myU', 'One Stop', and a search box for 'Search Websites and People'.
- Map Controls:** A sidebar on the left contains tabs for 'Maps', 'Air Photos', and 'Data Layers'. It includes a 'Historic Campus Maps On/Off' toggle and a 'Before 1921' section with three map thumbnails: 'Expansion Map, Minneapolis, 1885', 'East Bank, Minneapolis, 1898', and 'Minneapolis, 1910'. Below these are time period filters: '1921-1950', '1951-1980', and 'Since 1981'.
- Map Interface:** The central map shows the campus layout with buildings highlighted in yellow. A search box at the top left of the map contains the text 'union', and a dropdown menu lists 'Coffman Memorial Union (1940 - Present)', 'Old Union (1940 - 1941)', and 'Union (1914 - 1939)'. A 'Locate Building' button is positioned to the right of the search box. A 'Basemaps' dropdown menu is located in the top right corner of the map area.
- Timeline:** A horizontal timeline at the bottom of the map area shows years from 1850 to 2010 in 10-year increments. A slider is positioned over the year 1928, with the text 'CURRENT YEAR: 1928' displayed above it.
- Footer:** The bottom of the page contains copyright information: '© 2013 Regents of the University of Minnesota. All rights reserved.' and 'The University of Minnesota is an equal opportunity educator and employer. Last modified on June 19, 2013'. There are also links for 'Twin Cities Campus: Maps & Directions, Parking & Transportation, Contact U of M, Privacy, Directories'.

LAUNCHED

August 2013

www.lib.umn.edu/campushistory

MEANWHILE....

MHAPO: THE NEXT GENERATION

**Campus History project built up experience with ArcGIS Server
(used for serving the building footprints and historical maps)**

As well as the ArcGIS JavaScript API (used for the map itself)

Also, a template for future projects

MHAPO: THE NEXT GENERATION

With the decommissioning of the Google Maps API v2 approaching, the time was right to recreate MHAPO

MHAPO: THE NEXT GENERATION

The Challenge:

How to quickly load and display well over 100,000 points representing photos?

How to best incorporate interactivity?

THE SOLUTION

Three tiers of interactivity

For those using the site who are interested in exploring what's available across the state, and aren't necessarily interested in a particular area

TIER 1

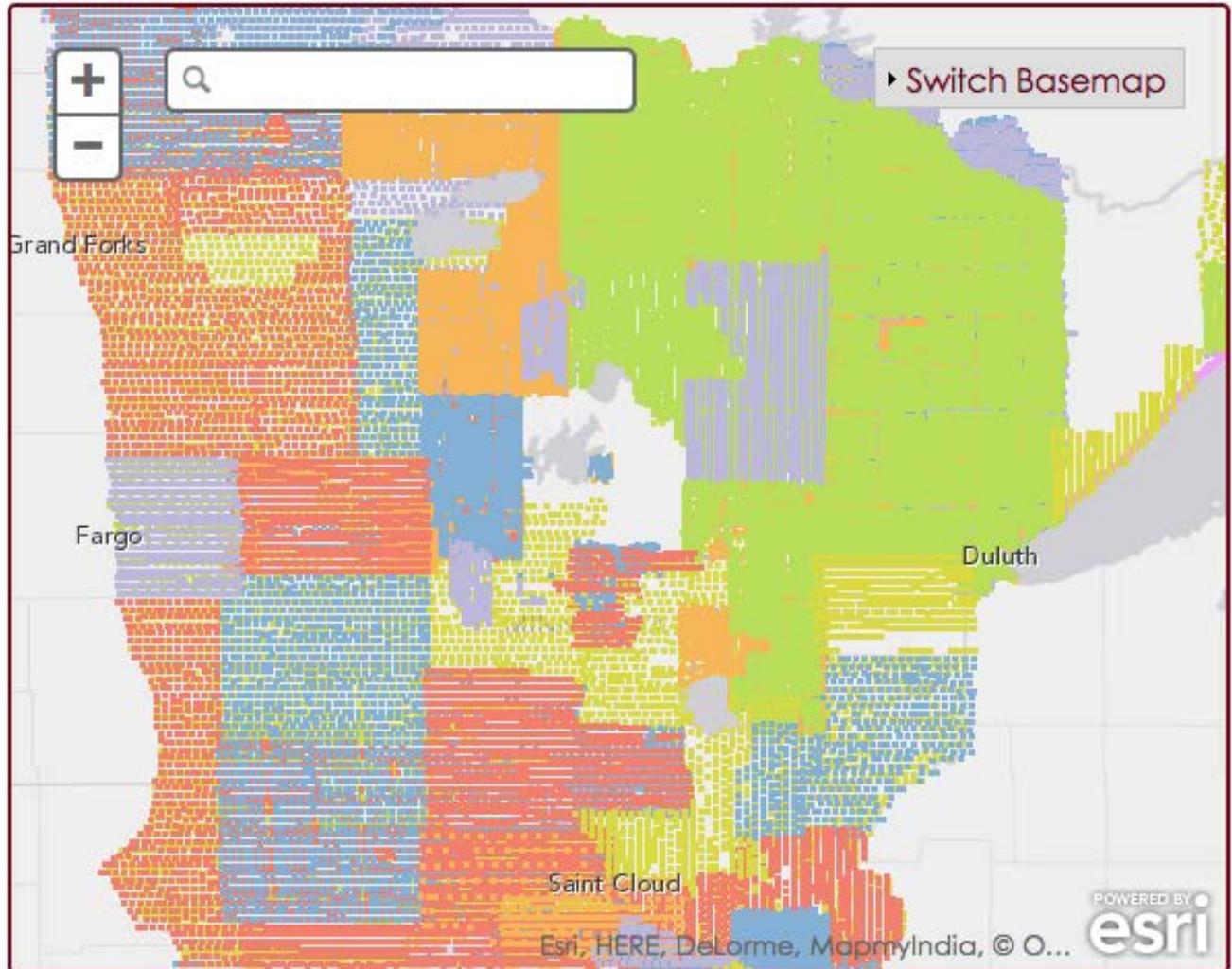
When zoomed to nearly the full state, the points are visible, but not clickable.

Location

- 1920
- 1930
- 1940
- 1950
- 1960
- 1970
- 1980
- 1990
- 2000
- All/None

Decades

- 1920
- 1930
- 1940
- 1950
- 1960
- 1970
- 1980
- 1990
- 2000



[About / Help](#)

Zoom in further, or search for a place (for example Hennepin County or Duluth).

TIER 2

Users can use checkboxes to filter the decades displayed, but can't click on individual points.

Location

1920 **Decades**

1930 ● 1920

1940 ● 1930

1950 ● 1940

1960 ● 1950

1970 ● 1960

1980 ● 1970

1990 ● 1980

2000 ● 1990

2000 ● 2000

All/None

[About / Help](#)



Select the decades to see photos using the checkboxes on the left. Zoom in further to click on individual points.

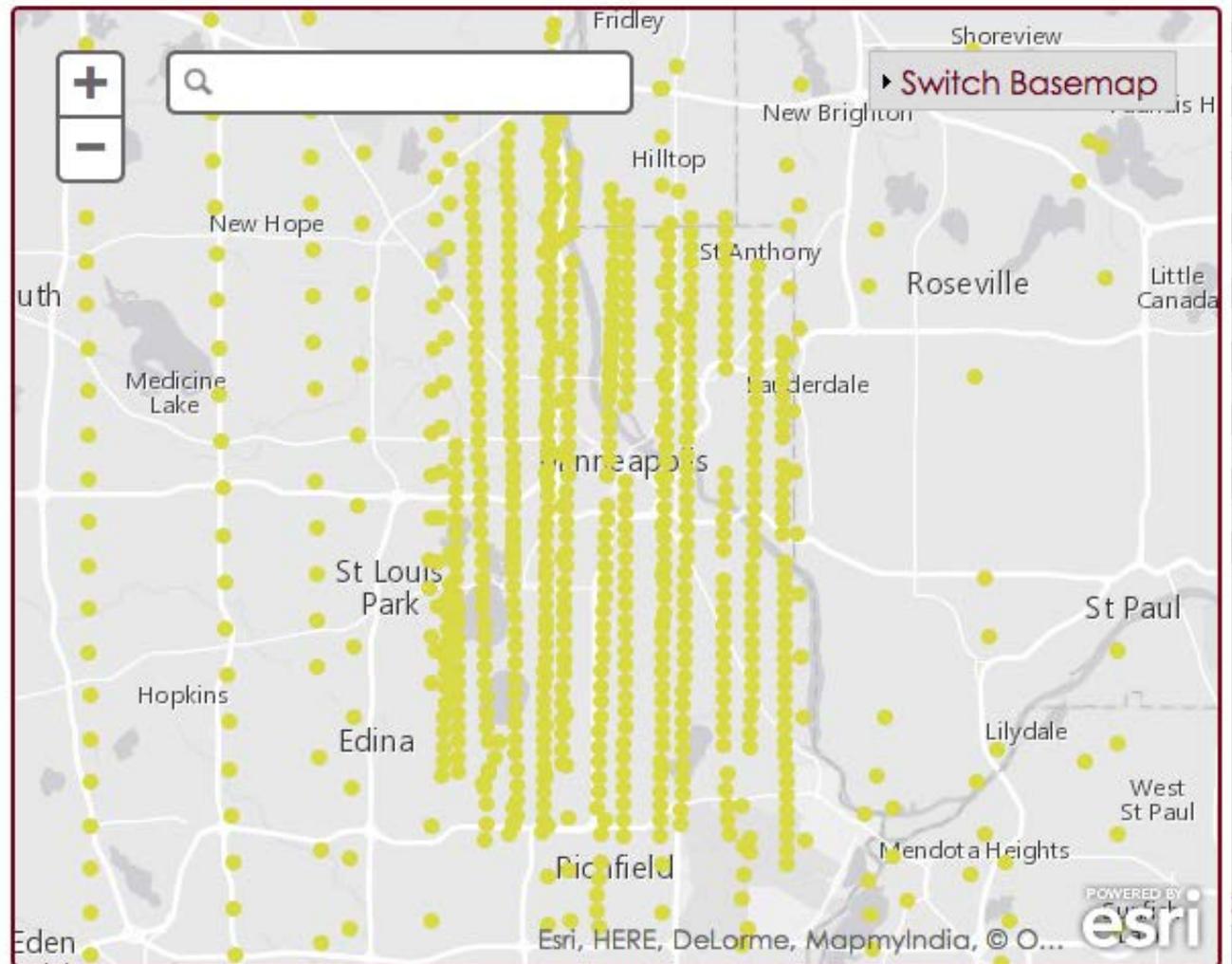
TIER 3

Users can filter by decade and also click on individual points which brings up a link to the aerial photo.

Location

<input type="checkbox"/> 1920	Decades	<input type="checkbox"/> 1920
<input checked="" type="checkbox"/> 1930		<input checked="" type="checkbox"/> 1930
<input type="checkbox"/> 1940		<input type="checkbox"/> 1940
<input type="checkbox"/> 1950		<input type="checkbox"/> 1950
<input type="checkbox"/> 1960		<input type="checkbox"/> 1960
<input type="checkbox"/> 1970		<input type="checkbox"/> 1970
<input type="checkbox"/> 1980		<input type="checkbox"/> 1980
<input type="checkbox"/> 1990		<input type="checkbox"/> 1990
<input type="checkbox"/> 2000		<input type="checkbox"/> 2000
<input type="checkbox"/> All/None		

[About / Help](#)

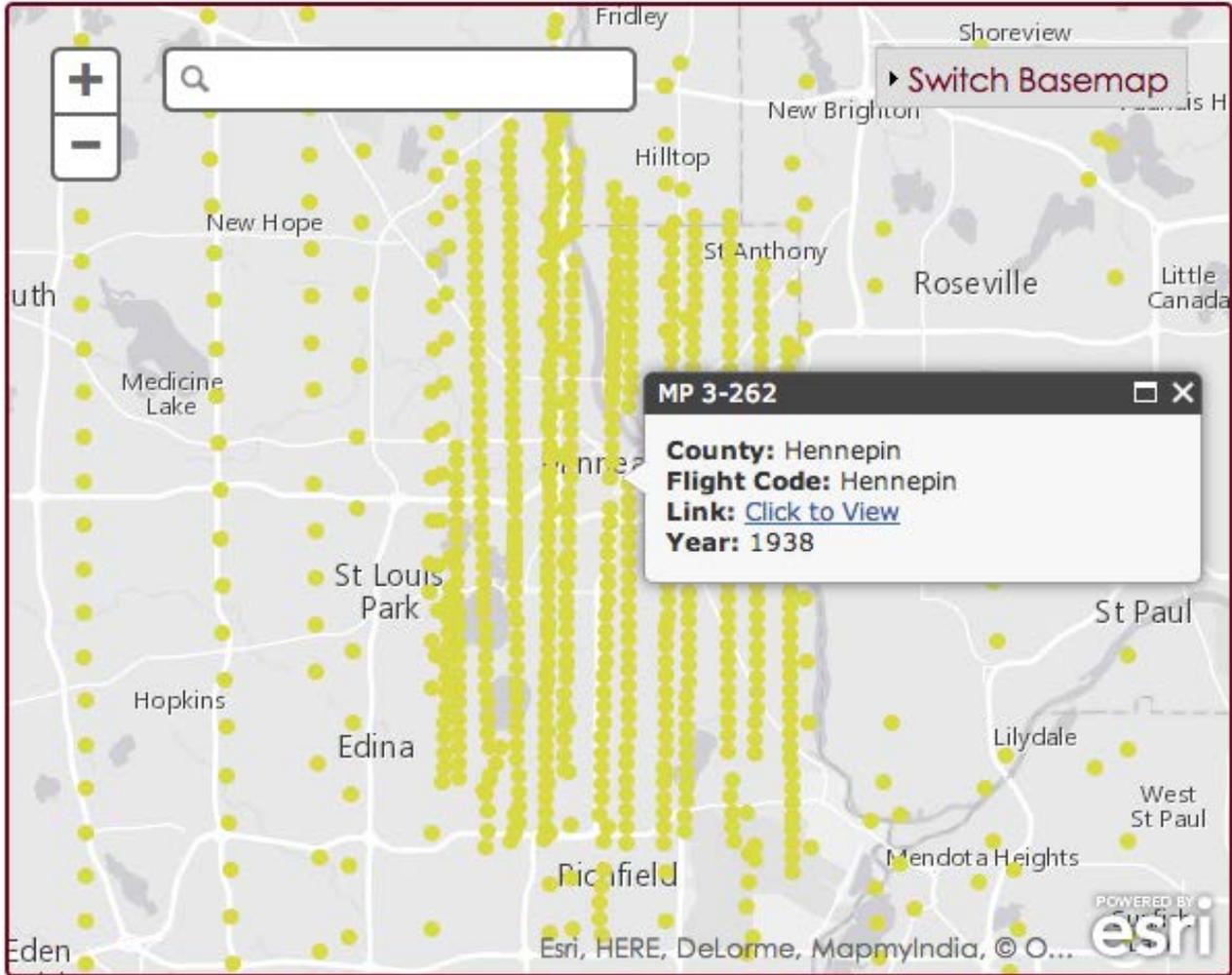


Each circle represents an aerial photo. The circles are color coded by decade. Click on any circle for more information and a link to the photo.

Location

<input type="checkbox"/> 1920	Decades	<input type="checkbox"/> 1920
<input checked="" type="checkbox"/> 1930		<input checked="" type="checkbox"/> 1930
<input type="checkbox"/> 1940		<input type="checkbox"/> 1940
<input type="checkbox"/> 1950		<input type="checkbox"/> 1950
<input type="checkbox"/> 1960		<input type="checkbox"/> 1960
<input type="checkbox"/> 1970		<input type="checkbox"/> 1970
<input type="checkbox"/> 1980		<input type="checkbox"/> 1980
<input type="checkbox"/> 1990		<input type="checkbox"/> 1990
<input type="checkbox"/> 2000		<input type="checkbox"/> 2000
<input type="checkbox"/> All/None		

[About / Help](#)



Each circle represents an aerial photo. The circles are color coded by decade. Click on any circle for more information and a link to the photo.

MP 3-262

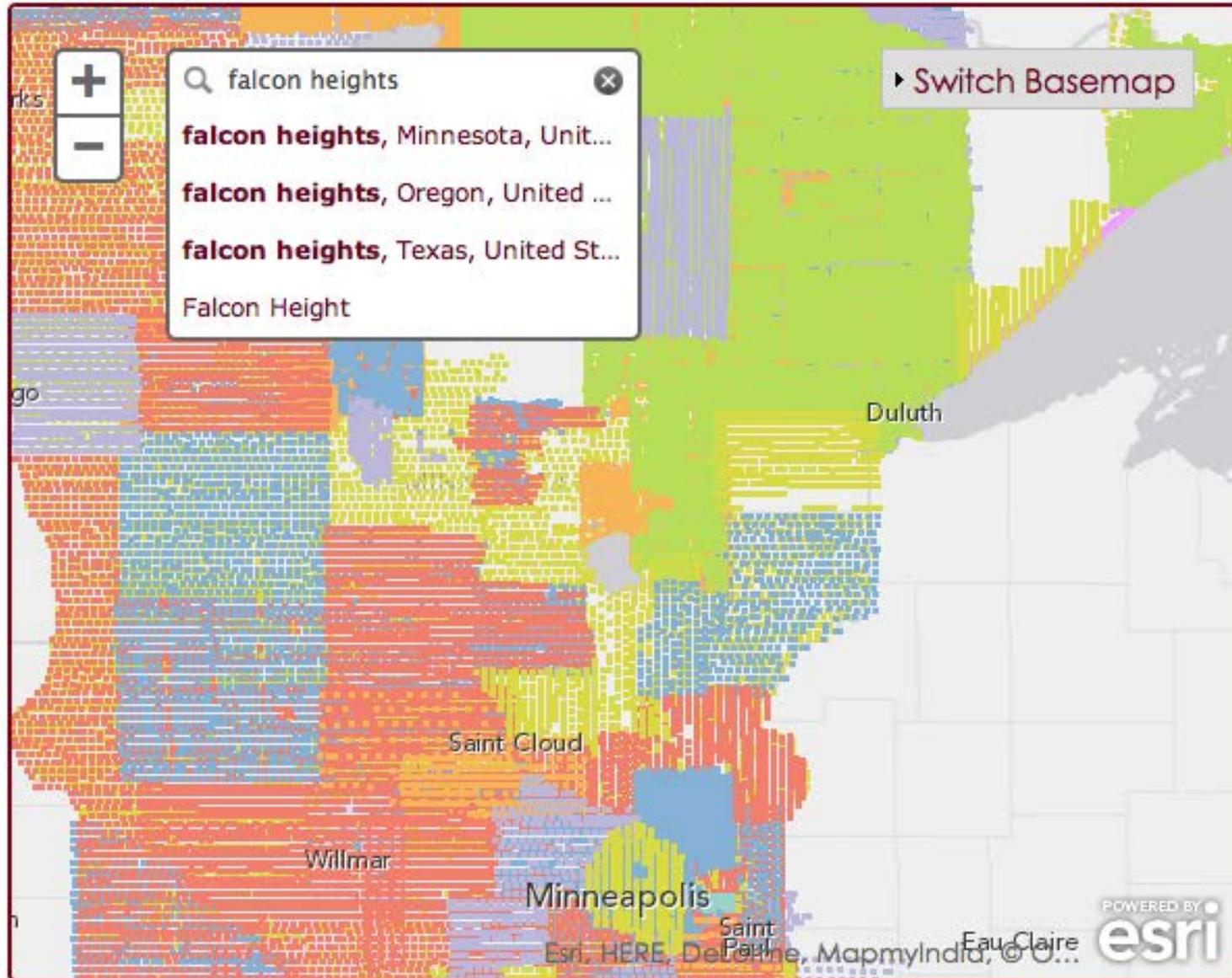


SEARCHING

Users can also simply enter an address or placename and the map will zoom to the full interactivity stage.

Location

- Decades**
- 1920
 - 1930
 - 1940
 - 1950
 - 1960
 - 1970
 - 1980
 - 1990
 - 2000
 - All/None



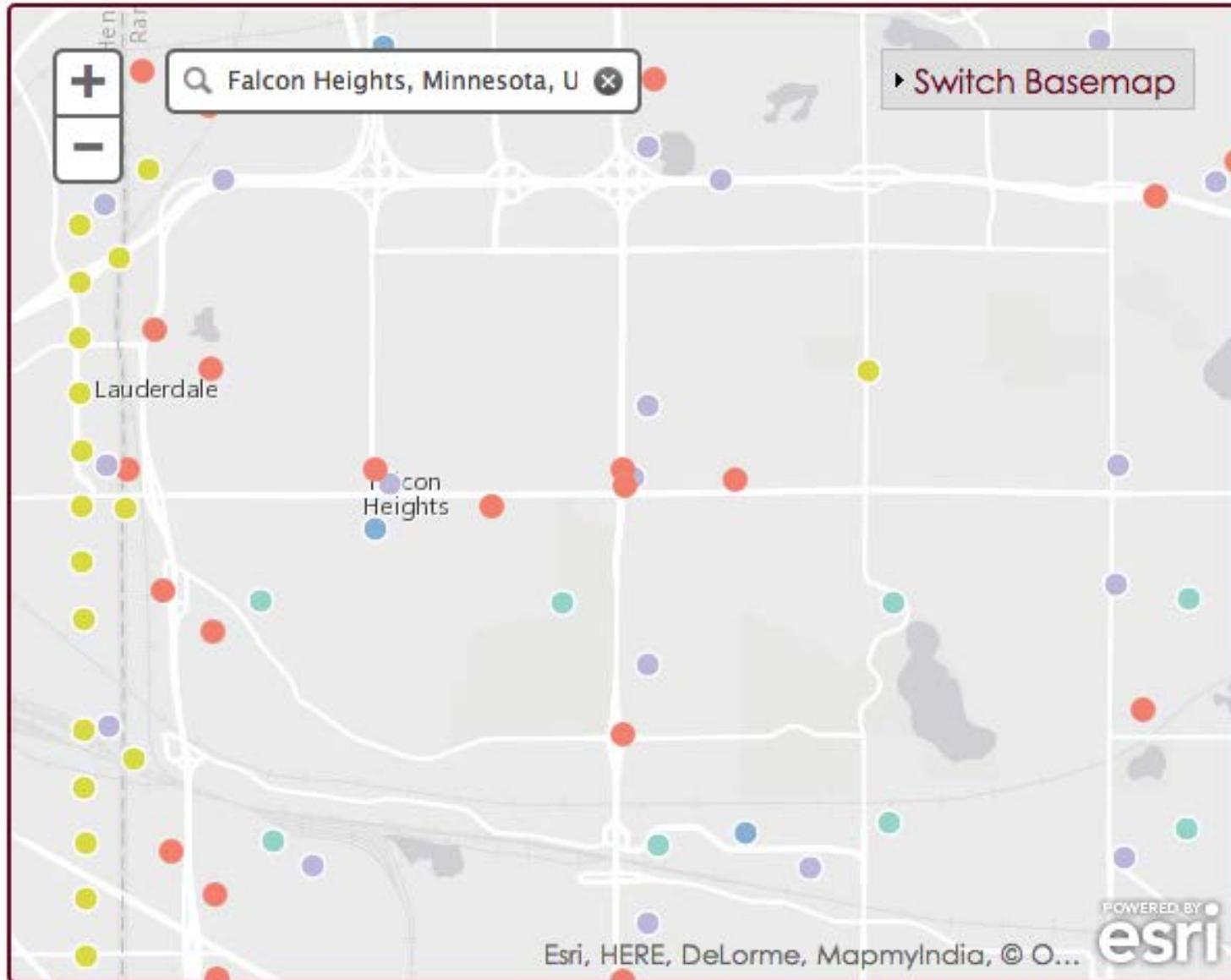
[About / Help](#)

Zoom in further, or search for a place (for example Hennepin County or Duluth).

Location

- Decades**
- 1920
 - 1930
 - 1940
 - 1950
 - 1960
 - 1970
 - 1980
 - 1990
 - 2000
 - All/None

[About / Help](#)



Each circle represents an aerial photo. The circles are color coded by decade. Click on any circle for more information and a link to the photo.

WHAT'S NEXT?

The tighter relationship between U-Spatial and the Map Library will hopefully continue to grow and free up more library staff time, allowing for a greater focus on building and sharing digital collections to an even greater extent.

OPENGEOPORTAL



UNIVERSITY OF MINNESOTA
Driven to Discover™

[Reset](#) | [Help](#) | [About](#) | [Login](#)

Where:

(Example: Boston, MA)

What:

(Example: buildings)

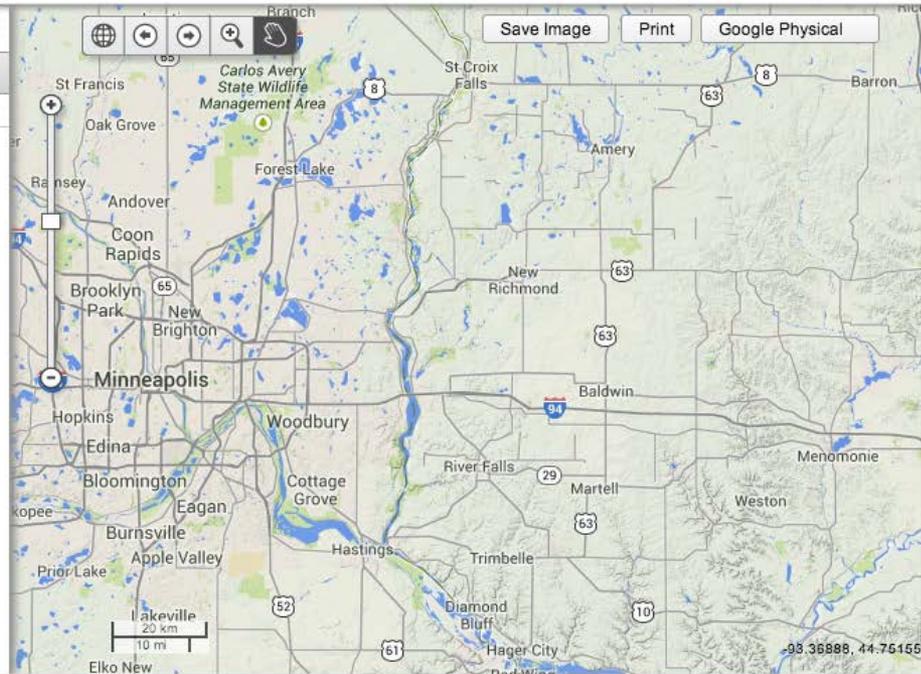
Search

[Advanced Search](#)

170 Results Cart (0)

Relevancy Columns Clear Views

Type	Name	Originator	Rep	Meta	View
+	Aggregate Resources 1997, 2020 an	Metropolitan C	M	i	
+	American Community Survey 5-Year	U.S. Census B	M	i	
+	MetroGIS Address Points Dataset - T	Contains data	M	i	
+	Agricultural Preserves 2006	Metropolitan C	M	i	
+	Agricultural Preserves 2007	Metropolitan C	M	i	
+	Agricultural Preserves 2003	Metropolitan C	M	i	
+	Agricultural Preserves 2004	Metropolitan C	M	i	
+	Agricultural Preserves 2005	Metropolitan C	M	i	
+	Abandoned Sewer Interceptors	Metropolitan C	M	i	
+	ADA Service Provider Areas	Metropolitan C	M	i	
+	Bikeways	Minnesota Dep	M	i	
+	Areas of Predicted Aquifer Decline G	Metropolitan C	M	i	
+	Blueprint 2030 Growth Strategy	Metropolitan C	M	i	
+	Agricultural Preserves 2008	Metropolitan C	M	i	
+	Areas of Concentrated Poverty	Metropolitan C	M	i	
+	Bedrock DEM	Metropolitan C	M	i	
+	Airports	Metropolitan C	M	i	



Powered by OpenGeoportal & U-Spatial

~~EARLY~~ ONGOING DIGITAL PROJECTS

Description	Time Period
Scan	Interminable
Scan some more	Many undergraduate lifespans
Even more scanning?	Till the end of time

CONTINUING DIGITIZATION

CONNECTING OUR COLLECTIONS WITH YOURS

UMedia Archive

Search the archive:

[Expert search](#)

HOME ABOUT BROWSE COLLECTIONS OTHER RESOURCES HELP SIGN IN UMEDIA FEEDBACK

John R. Borchert Map Library

The John R. Borchert Map Library contains an extensive collection of historic maps and atlases. Though our focus is on historic Minnesota items, our collection contains a wide range of topics and dates -- from historic items dating back to the 16th Century to current maps from around the world.

Collections currently in the UMedia Archive:

- [Ames Library of South Asia Maps](#)
Historic maps with a focus on Asia, South Asia and India.
- [City Maps](#)
Historic maps and atlases of cities outside of Minnesota.
- [General Map Collection](#)
Historic maps that do not fall into a more specific category.
- [Minneapolis / St. Paul Maps & Atlases](#)
Historic maps and atlases of Minneapolis and St. Paul.
- [Minnesota County Plat Books & Atlases](#)
Historic plat books and atlases for Minnesota cities and counties.
- [State of Minnesota Maps](#)
Historic maps of the State of Minnesota. Most maps are from the late 1800s to the early 1900s.



[Mitchell's travellers guide through the United States](#)



[Lake Superior](#)



[North America](#)



[Duluth, Minnesota-Superior, Wisconsin](#)

DEMOS!

At our own peril, the dreaded live demo.

<https://www.lib.umn.edu/apps/mhapo/>

<https://www.lib.umn.edu/apps/campushistory/>

<http://z.umn.edu/metrogisogp>