

WV Historical Geospatial Products

Sanborn Fire Insurance Maps (1886-1982)

Topographic Maps (1883-present)

Aerial Photographs (1936-present)

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FINAL REPORT

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PROJECT DESCRIPTION

A preliminary inventory of historical geographic products of value to the geospatial community and citizens of West Virginia was initiated, revealing three principal products of interest: Sanborn fire insurance maps, topographic maps, and aerial photography. The goal of this project is to make historic maps and photos more accessible to the general public. We utilized a Geographic Information System (GIS) to display the geographic extent of map products and index maps to aid in the discovery process. General and specific recommendations to further advance the discovery of these products is provided in the conclusions section.

Uses of Historical Maps

Historical geographic maps are useful in fulfilling many necessary land-surface related functions, including the following:

- Site development planning
- Litigation
- Environmental studies
- Cultural resource management
- Land-use planning

Providing an electronic retrieval system allows for the immediate location and timely retrieval of data, as well as providing visual display of the collections held by certain entities to facilitate the piecing together of complete data sets (aerial photography by year, for example).

Cataloging Procedures

Preliminary research was completed using websites and known contacts. Organizations were contacted and informed of the project after which archival holding details were exchanged or on-site investigations were performed. After gathering archival information, a GIS was used to organize and display the archival data of participating institutions.

SANBORN FIRE INSURANCE MAPS

Product Description

The Sanborn insurance map collection consists of a uniform series of large-scale maps, dating from 1866 to 1970. They depict the commercial, industrial, and residential sections of some twelve thousand cities and towns in the United States, Canada, and Mexico. The maps were designed to assist fire insurance agents in determining the degree of hazard associated with a particular property and therefore show the size, shape, and construction of dwellings, commercial buildings, and factories as well as fire walls, locations of windows and doors, sprinkler systems, and types of roofs. The maps also indicate widths and names of streets, property boundaries, building use, and house and block numbers. They show the locations of water mains, giving their dimensions, and of fire alarm boxes and hydrants.

Sanborn Fire Insurance Maps are now considered a valuable resource among professionals from a variety of disciplines - from history to geography to environmental sciences. In 1996, Sanborn's sister company, Environmental Data Resources, Inc., took over the Sanborn Map Company's collection and now offers an array of products. Due to copyright restrictions, Sanborn maps from 1923 and beyond are unavailable at this time.

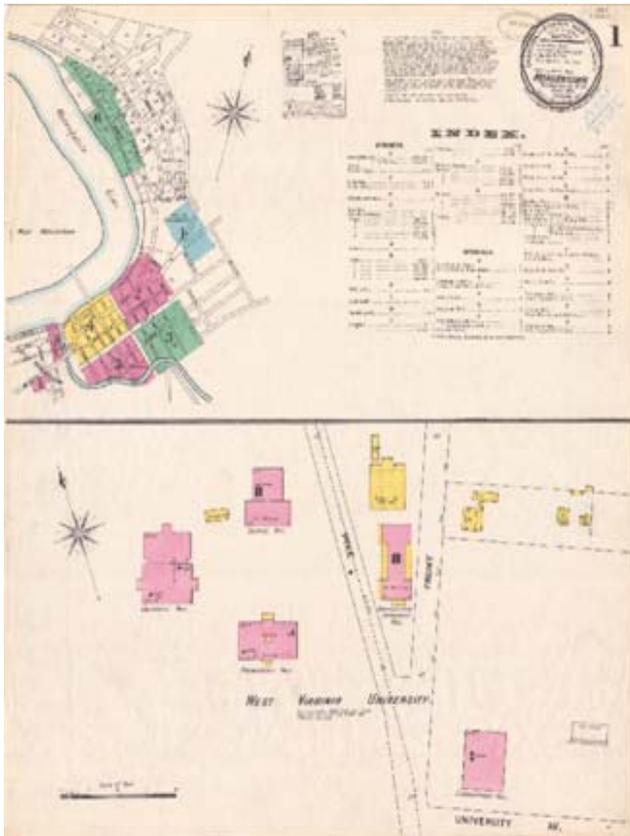


Figure 1: An 1899 Sanborn Fire Insurance Map of Morgantown, WV

Data Inventory

We conducted a search for institutions with a Sanborn Fire Insurance Map collection for the state of West Virginia. This table lists known assemblages:

| Location | Contact | Website | Data |
|------------------------------------|--|--|--|
| Environmental Data Resources, Inc. | Telephone: 1-800-352-0050 | http://www.edrnet.com/ | 1866-1970 Sanborn Map Reports available commercially. |
| WV&RHC, Wise Library, WVU | Michael Ridderbusch, Assistant Curator Tel:(304)293-4040 ext 4203 | http://www.libraries.wvu.edu/wvcollecti on/ | See Appendix 1 for Inventory information. |

| | | | |
|------------------------------|---|---|---|
| West Virginia State Archives | Susan Scouras Tel: 304-558-0230 ext.742 | http://www.wvculture.org/ | See Appendix 2 for Inventory information. |
|------------------------------|---|---|---|

Table 1: Known Sanborn Insurance Map collections in West Virginia

Substantial Sanborn map holdings are located at two locations in West Virginia: the WV State Archives, part of the WV Division of Culture and History, in Charleston, WV and the West Virginia & Regional History Collection (WV&RHC), part of Wise Library, West Virginia University, in Morgantown, WV.

The Sanborn Fire Insurance Map collection located at the West Virginia University Wise Library in Morgantown, WV was inventoried in detail. The following attributes were recorded for each map and can be reviewed in Appendix 1: City, County, Date, Number of Sheets, Hard Copy (Y/N), Microfilm (Y/N), and Microfilm Number (where applicable). Due to the limits of the microfilm format, those maps stored by WVU on microfilm will be digitally displayed in black and white, without the necessary color to determine some important information.

Coverage

Figure 2 depicts the state holdings of Sanborn maps for West Virginia cities. The West Virginia & Regional History Collection contains map holdings for 89 cities, while the WV State Archives catalog covers 22 cities. The WV&RHC collection has maps of all the cities reported in the State Archival collection.

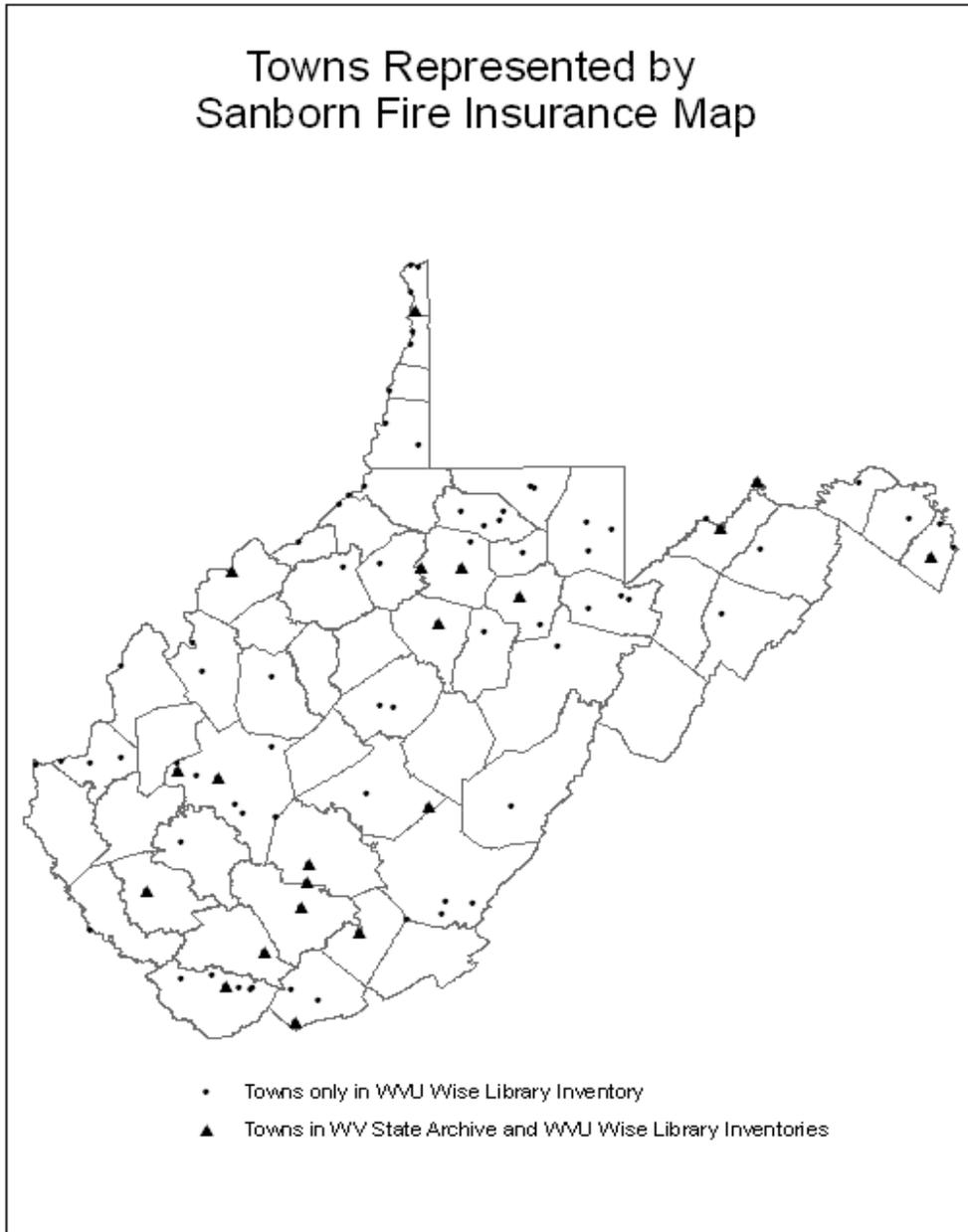


Figure 2: Towns with Sanborn Fire Insurance maps available in either the WVU or State Historical Office collections.

| | Number of Cities Covered | Color Sheets Available | Date Range | Size at 150 dpi (Total Collection) | Size at 600 dpi (Total Collection) |
|---------------|--------------------------|------------------------|-------------|------------------------------------|------------------------------------|
| WV&RHC | 89 | 3,571 | 1883 – 1989 | 46 Gigabytes | 662 Gigabytes |
| State Archive | 20 | 329 | 1893 – 1948 | 4 Gigabytes | 61 Gigabytes |

Table 2: Major Sanborn map repositories in West Virginia.

Digital Images

The WV GIS Technical Center received permission from the curator of the West Virginia and Regional History Collection to scan a portion of its Sanborn Fire Insurance Map collection. The town of Morgantown, WV was selected as a pilot area for the project. The Sanborn Fire Insurance maps of Morgantown, WV (1892-1927) were scanned using a large-format, sheet-fed, Graphtec CS-600 color scanner in conjunction with a Mylar sleeve for document protection. Based on the pilot project, we estimate that we can scan and edit approximately 60 maps per day.

Morgantown Coverage

The Sanborn Fire Insurance maps of Morgantown, WV (138 maps) covering various years were scanned at 8-bit color (optimized) at 600 dpi and stored as TIFF files. The total size of these images is approximately 26.2 gigabytes. The average size per digital map is 190 megabytes. These original scan files were cropped and resized to 150 dpi using Adobe Photoshop CS as inputs into the georeferencing process (See “Geographic Referencing” section for an expanded explanation of this process). These, too, can be disseminated on the internet. These 150 dpi images totaled 1.8 gigabytes, with an average image size of 13 megabytes. Figure 3 shows time-lapse changes on two Sanborn Fire Insurance maps from 1892 and 1921 at an identical scale and spatial extent.

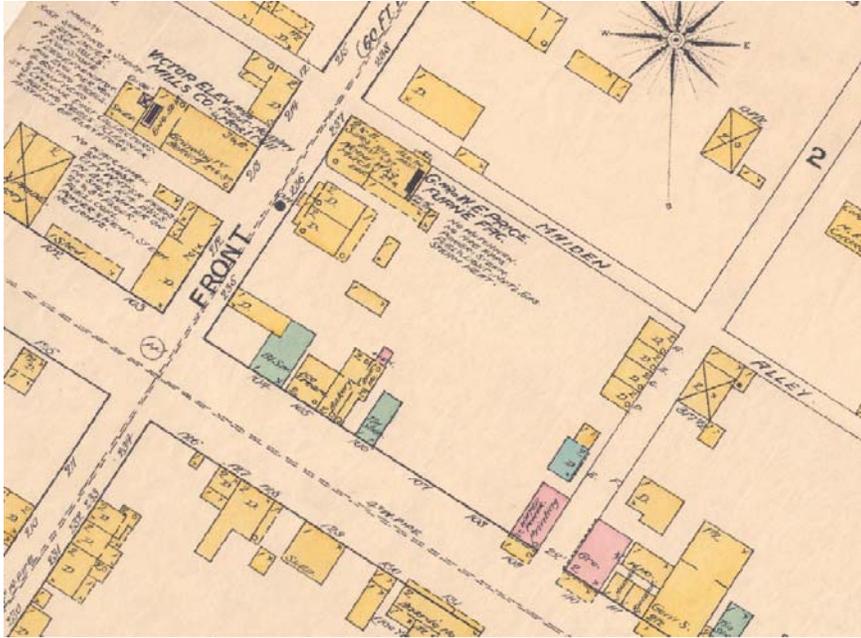


Image (A)

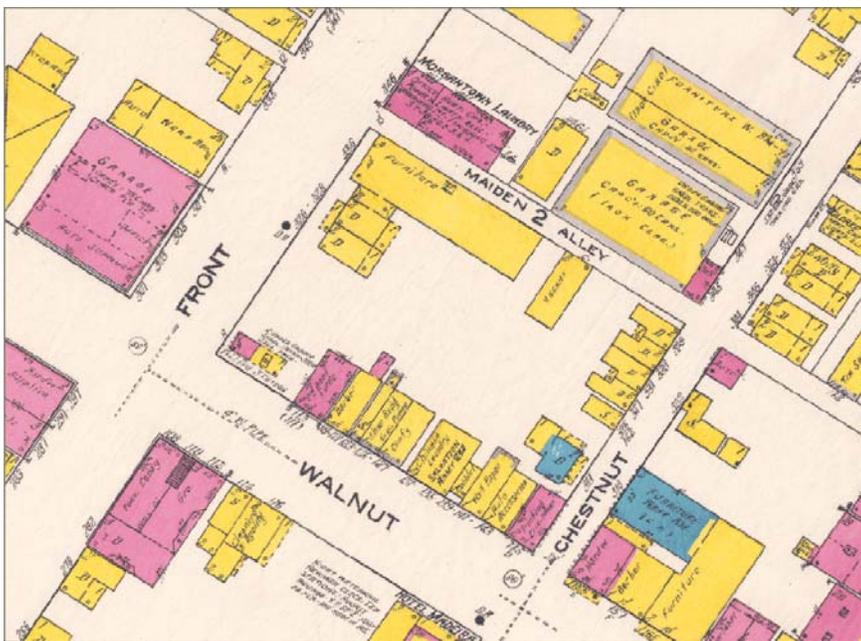


Image (B)

Figure 3: Image A (1892) and Image B (1921) represent the same area in downtown Morgantown, WV for two different years of the Sanborn Fire Insurance maps. The time between these two maps is 29 years.

Other State's Digital Sanborn Collections

Other states, including Florida, Utah, and Virginia, already maintain online data clearinghouses for Sanborn maps. These clearinghouses are available at the following URLs:

Florida: <http://palmm.fcla.edu/sanborn/>

Utah: <http://www.dlib.org/dlib/july02/arlitsch/07arlitsch.html>

Virginia: <http://fisher.lib.virginia.edu/collections/maps/sanborn/>

Geographic Referencing

Geographically referencing a map involves matching points on a map to known points on the ground, and then assigning geographic coordinates to those map points. This process creates geographically useful data which can be integrated as a layer along with other spatially referenced datasets. This process of map overlay is a basic tenet of geographic information science, allowing for visual and computer analysis.

In a geographic information system, a spatially referenced Sanborn image can be displayed with other geographic layers. Figure 4 shows a georeferenced Sanborn Fire Insurance Map from 1921 at 50% transparency. The overlay is a vector roads file of Morgantown, WV from the Morgantown Utility Board. The underlay is a digital aerial photograph captured in 2003.



Figure 4: Spatially referenced Sanborn map displayed with other geographic layers.

TOPOGRAPHIC MAPS

Product Description

A topographic map is a two-dimensional representation of a three-dimensional land surface. Topographic maps are unique from other maps in that they show both the horizontal and vertical positions of the terrain. Through a combination of contour lines, colors, symbols, labels, and other graphical representations, topographic maps portray the shapes and locations of mountains, forests, rivers, lakes, cities, roads, bridges, and many other natural and man-made features. They also contain valuable reference information for surveyors and map makers, including bench marks, reference grids, base lines and meridians, and magnetic declinations. Topographic maps are used by civil engineers, environmental managers, and urban planners, as well as by outdoor enthusiasts, emergency services agencies, and historians. These continue to be among the most valuable maps for government and the public alike.

Since the late 19th century, the United States Geological Survey has been producing topographic quadrangle maps. The USGS assigns each quadrangle a name, based on a prominent town, city or geographic feature (for example, a large mountain). U.S. Geological Survey maps are published in increments of longitude and latitude. The WV Geological & Economic Survey has a collection of the historical 30-minute series (scale 1:125,000) topographic maps which were published between the time period between 1883 and 1903. These map were superseded by the 15- minutes series (scale 1:63,500) maps in the early 1900's. In the 1950's the 15-minute series was replaced with the larger resolution 7.5-minute series (scale 1:24,000).

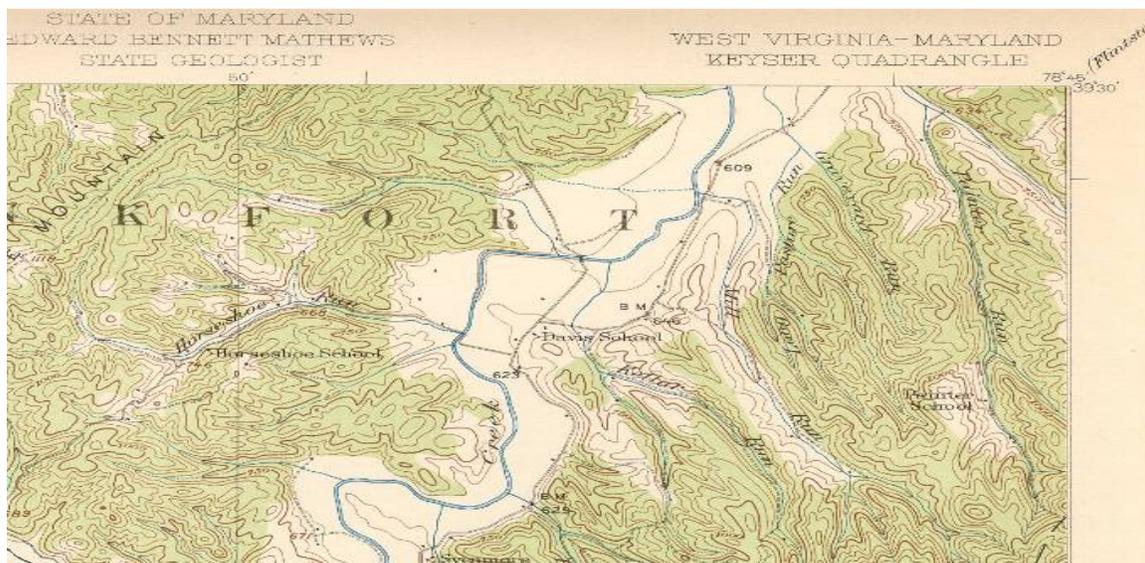


Figure 5a: Northeast quadrant of Keyser, WV 15 minute quadrangle.

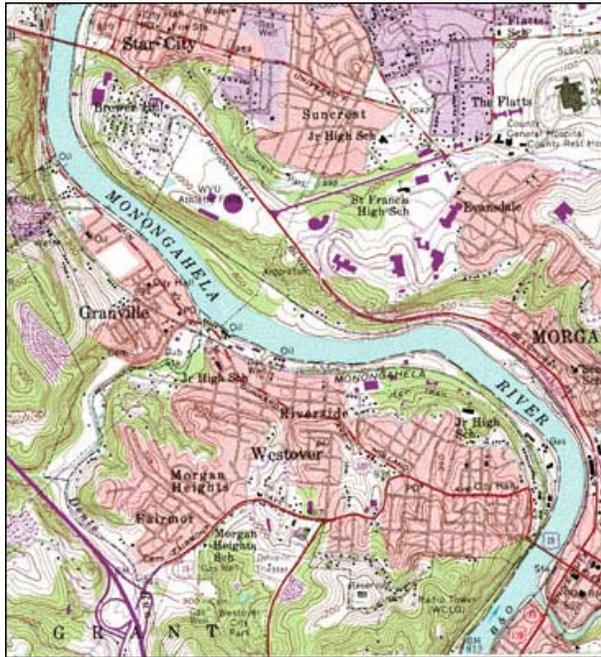


Figure 5b: Portion of the Morgantown North 7.5 Minute quadrangle.

Data Inventory

Historical topographic maps are available from federal, state, and commercial sites. A search was conducted for institutions with an historical topographic map collection of the state of West Virginia, specifically 7.5’, 15’, or 30’ quadrangles. This table lists known locations:

| Location | Contact | Website | Data |
|--|--|---|--|
| West Virginia Geological and Economic Survey | Paul Liston, Coordinator, ESIC Phone:(304) 594-2331 | http://www.wvgs.wvnet.edu/ | See Appendix 3 for Inventory information. |
| WV&RHC Wise Library, WVU | Michael Ridderbusch, Assistant Curator Phone:(304) 293-4040 ext 4203 | http://www.libraries.wvu.edu/wvcollection/ | See Appendix 4 for Inventory information. |
| WVU Library Map Room | Christine Chang Coordinator, Government Documents and Reference Librarian (304) 293-4040 x 4037 | http://www.libraries.wvu.edu/downtown/maps.htm#topo | WVU has 53,700 map sheets in a series of 7.5 minute scale topographic maps for the entire United States. |

| Location | Contact | Website | Data |
|---|---|--|--|
| USGS Map Store | | http://store.usgs.gov/ http://erg.usgs.gov/isb/pubs/factsheets/fs15499.html | Various products. Mostly recent topographic maps. |
| USDA Forest Service | Sam Lammie, GIS Coordinator, Monongahela National Forest | http://www.fs.fed.us/ | Single Edition 7.5' minute maps for Monongahela National Forest; 75 quads. |
| WV Department of Environmental Protection (DEP) | Mike Shank GIS Database Administrator | http://www.wvdep.org/ | 7.5' and 15' topographic maps spatially referenced and collarless. |
| WV GIS Technical Center | Kurt Donaldson | http://wvgis.wvu.edu/ | 7.5' topographic maps spatially referenced and collarless. |
| USGS TerraServer USA | | http://terraserver.microsoft.com/ | Mostly recent topographic maps. Available only via an online map browser. |
| Maptech | Telephone: 888-839-5551 Email: sales@maptech.com | http://historical.maptech.com/ | Digital versions of USGS 15-minute topographic maps of WV. |

Table 3: Known topographic map collections.

A detailed topographic map inventory was undertaken within the West Virginia & Regional History Collection of the West Virginia University's Wise Library and the West Virginia Geological and Economic Survey. Both of these agencies are located in Morgantown, WV. See Appendix 4 for the WV&RHC catalog (Attributes: Quadrangle name, Year, and Scale), and Appendix 3 for the listing of the WVGES collection (Attributes: Quadrangle Name, Year, Reprint Year, Scale, Bound in book, Hard Copy, Digital, and For Sale).

Coverage

The WV Geological and Economic Survey maintain paper copies (with some digital images collected in an on-demand system) of older 7.5- and 15-minute topographic maps with complete coverage of the state of West Virginia. The 30-minute topographic maps are also maintained, but without complete state coverage. Figure 6 shows the 30-minute coverage of the collection at the WV Geological and Economic Survey. Both the Regional History Collection and Map Library of Wise Library, West Virginia University, maintain an extensive collection of paper topographic maps. Table 4 describes the coverage of topographic maps that are available from West Virginia collections.

| Reference Grid | Scale | Approximate Time Periods | Coverage | # Quads |
|----------------|-----------|--------------------------|------------------|---------|
| 30 Minute | 1:125,000 | 1883 – 1903 | Partial (60%) | 25 |
| 15 Minute | 1:63,500 | 1901 – 1955 | Full | 141 |
| 7.5 Minute | 1:24,000 | 1957 – 2001 | Full | 495 |

Table 4: Coverage of West Virginia by topographic map series

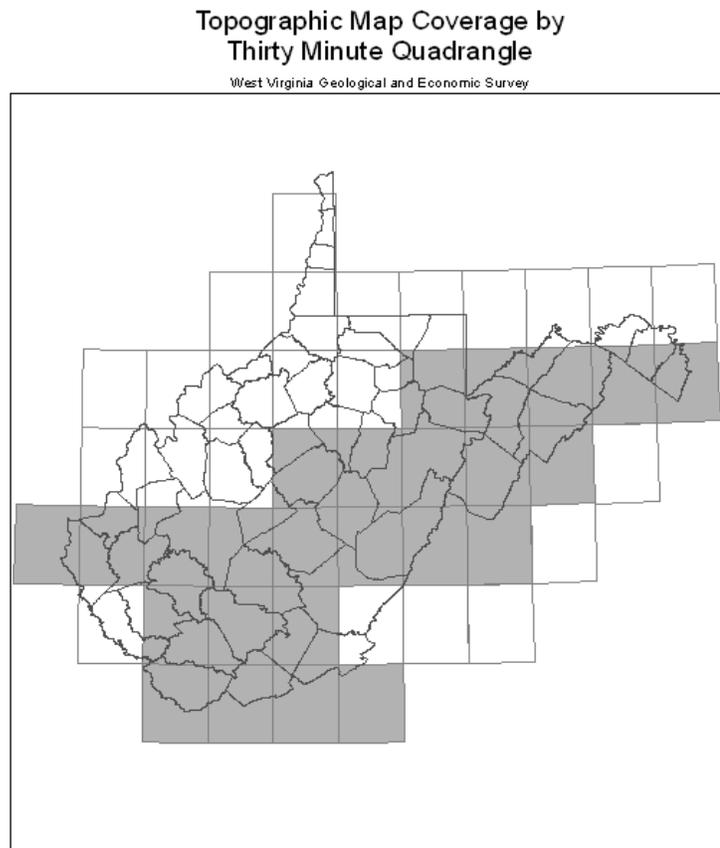


Figure 6: This map represents the inventory of 30-minute historical topographic maps (1883-1903) located at the WV Geological and Economic Survey in Morgantown, WV.

Digital Images

Full digital coverage of the modern 7.5-minute and historical 15-minute topographic maps are available through the WV Department of Environmental Protection (<http://www.wvdep.org/>), WV GIS Technical Center (<http://www.wvgis.wvu.edu/>), and other federal and commercial websites.

Geographic Referencing

Individual Topographic Maps: Individual topographic maps which have been spatially referenced for geographic information systems can be downloaded from clearinghouses maintained by the WV Department of Environmental Protection and WV GIS Technical Center.

Index Maps: Geographic information systems are ideal for creating coverage index maps of the USGS topographic maps series (Figure 6).

AERIAL PHOTOGRAPHY

Product Description

Aerial photos provide an overall a unique overall view of an area. Aerial photography was first routinely used in the United States for mapping by the US Geologic Survey in the 1930s. Other government agencies, such as the US Department of Agriculture, also funded photography collection missions. Each collection agency produced unique county project codes, displayed on every photograph taken by that agency. Also printed on the photograph is the date of image capture and the photograph number (see Figure 7). Table 7 shows the project codes of the US Department of Agriculture for the counties of West Virginia. Aircraft continued to be the main method of aerial photography acquisition until the 1970s. In 1972, with the launch of Landsat-1 and subsequent satellites, satellite imagery became the most commonly available large area photography.

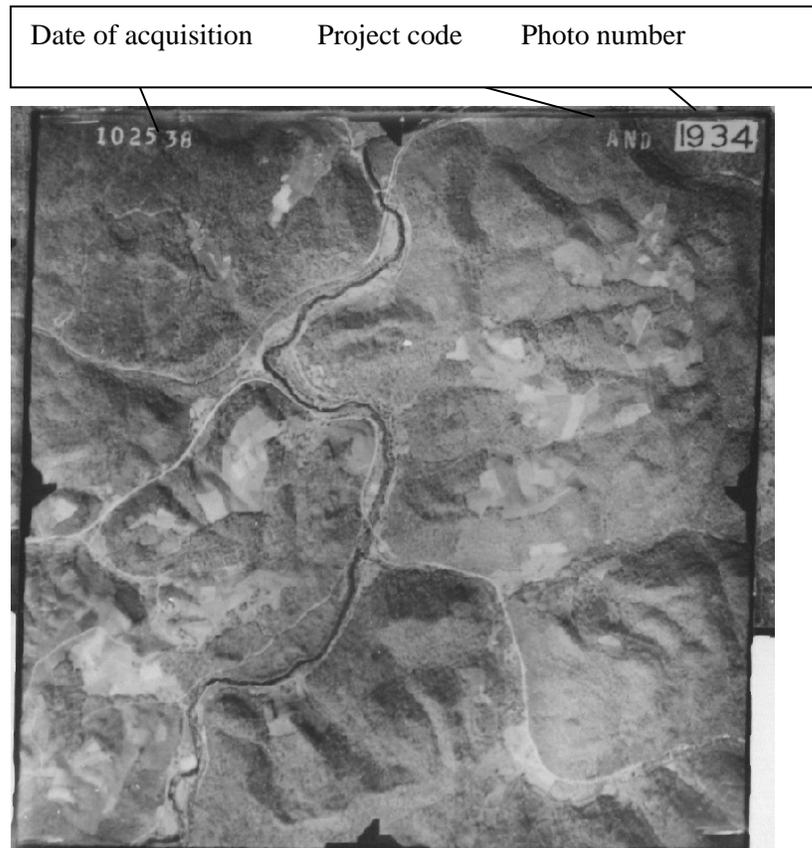


Figure 7: 1934 aerial photograph of a Barbour County location (WVGES collection).

Data Inventory

A search was conducted for institutions with an historical aerial photography collection of the state of West Virginia. The table below lists the results of that search:

| Location | Contact | Website | Data |
|---|--|---|--|
| WV&RHC, Wise Library, WVU | Michael Ridderbusch, Assistant Curator Phone:(304)293-4040 ext 4203 | http://www.libraries.wvu.edu/wvcollection/ | See Appendix 5 for Inventory information. |
| West Virginia Geological and Economic Survey | Paul Liston, Coordinator, ESIC Phone:(304)594-2331 | http://www.wvgs.wvnet.edu/ | See Appendices 7A and 7B for Inventory information. |
| USDA Aerial Photography Field Office (APFO) | Telephone: 801-975-3503 | http://www.apfo.usda.gov/ | 1955-present Online map browser only (no listings). Indices coming online soon. |
| National Archives and Records Administration | National Archives 8601 Adelphi Rd. College Park, MD 20740-6001 Attn: NWCS- Room 3320 Jerry Luchansky Tel: 1-866-272-6272 | http://www.archives.gov/ | 1937-1950s including military fly-overs. General Inventory attached . |
| USGS Earth Resources Observation Systems (EROS) | Telephone: 1-800-252-4547 Can send inquiries to custserv@usgs.gov. | http://www.edc.usgs.gov | 1940-present available through online map browser (EarthExplorer). |
| USDA Natural Resources Conservation Service (NRCS) | Stephen Carpenter State Soil Scientist/MLRA Region 13 Staff Leader, 75 High Street, Room 301, Morgantown, WV 26505 Tel: 304-290-2319 Email: stephen.carpenter@wv.usda.gov | http://www.nrcs.usda.gov/ | 1938-2003 (1992-2003 digital) |
| Library of Congress | Library of Congress Prints/Photographs Division James Madison Memorial Building, 101 Independence Ave., S.E. Washington, DC 20540-4840 Tel: 202-707-6394 | http://www.loc.gov/ | 1900-1940s |

| Location | Contact | Website | Data |
|---|---------------------------------------|---|---|
| USGS TerraServerUSA | | http://terraserver.microsoft.com/ | Mostly recent aerial photographs. Online map browser only. |
| WV Department of Environmental Protection (DEP) | Mike Shank GIS Database Administrator | http://www.wvdep.org/ | Recent aerial photography. Online map browser only. |
| WV Department of Highways | | www.wvdot.com/ | Project areas only (roadways). Collection may be disorganized. |
| WV Conservation Agency | | http://www.wvca.us/ | Inventory details unknown. |
| United States Forest Service | Sam Lammie | http://www.fs.fed.us/ | Inventory details unknown, pending information. |

Table 5: Availability of aerial photography.

The aerial photography collection of the West Virginia and Regional History Collection at the West Virginia University Wise Library in Morgantown, WV was inventoried in detail. The following attributes were recorded and can be seen in Appendix 5: City, County, Date, Number of Sheets, Hard Copy (Y/N), Microfilm (Y/N), and Microfilm Number (if applicable). Appendix 6 is a summary report of Appendix 5, and it contains these attributes: County, Total number of photographs by county, and years 1936 through 1970 with the number of photographs by year.

The collection of aerial photography at the West Virginia Geological and Economic Survey was also inventoried. The following attributes were recorded, and can be seen in Appendices 7A and 7B: Quad Name, County, 15 Minute (Y/N), Month, Date, Year, Photo number, Scale, Color (Y/N), Complete (coverage), Comment, Digital (Y/N), Agency, Oblique (Y/N), and Project Code. Appendix 7A consists of years 1946 to 1976. Appendix 7B covers years 1938 and 1939.

Coverage

Aerial photographs pose a unique problem in the context of archiving. Individual photographs, unlike an individual map, are of little practical use and nearly impossible to place without the use of a photograph index. Figure 8 displays a section of an aerial photograph index.

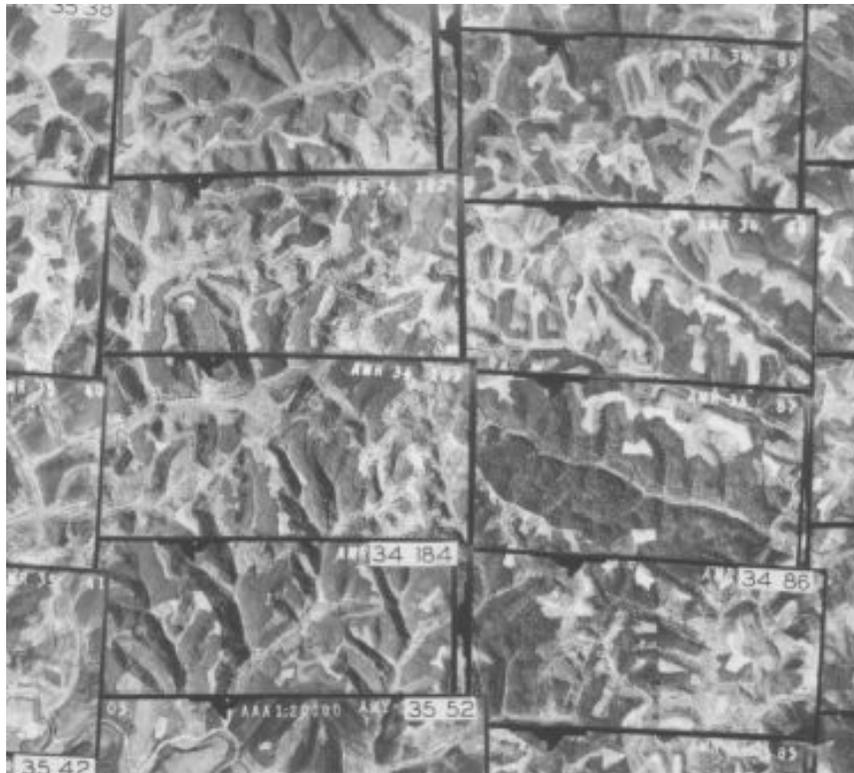


Figure 8: A small segment showing the photograph mosaic of a Calhoun County, WV aerial photograph index.

Another issue specific to aerial photography is the method of archival organization. Of the two institutions for which detailed inventory information was collected, the aerial photographs were organized by two different methods. The WV Geological and Economic Survey organized and inventoried the photographs taken in the years 1938 and 1939 by county. The remainder of the collection was organized in reference to USGS quadrangles, which frequently span county boundaries. Fortunately, most of the photographs correspond with photograph indices also in the collection. The West Virginia & Regional History Collection at the West Virginia University Wise Library organized the photographs into counties but had very few photograph indices.

| | Total Photos | Georeferenced Indices | Date Range | 1938-1940 Coverage |
|----------------------------------|--------------|-----------------------|-------------|--------------------|
| WV&RHC WVU Library | 39,449 | None | 1936 – 1970 | 31 |
| WVGES | 15,830 | 88 (For 28 Counties) | 1938 – 1976 | 28 |

Table 6: Largest aerial photograph collections in West Virginia. WV&RC has the largest aerial photo collection.

Oldest Aerial Photographs for West Virginia: The oldest aerial photos are the most requested by users. Several counties are covered by aerial photography dating from 1936-1940. Collections from this time period are housed at both the WV Geological and Economic Survey and the WVU Wise Library (WV&RHC) and are very similar in terms of counties covered. The north-central and western areas of the state are generally thoroughly covered, while many of the southern and eastern counties have no photography. More investigation as in these areas is needed. The National Archives and Records Administration may prove to be helpful in this regard.

Aerial Photography Coverage by County

West Virginia Geological and Economic Survey

County with coverage

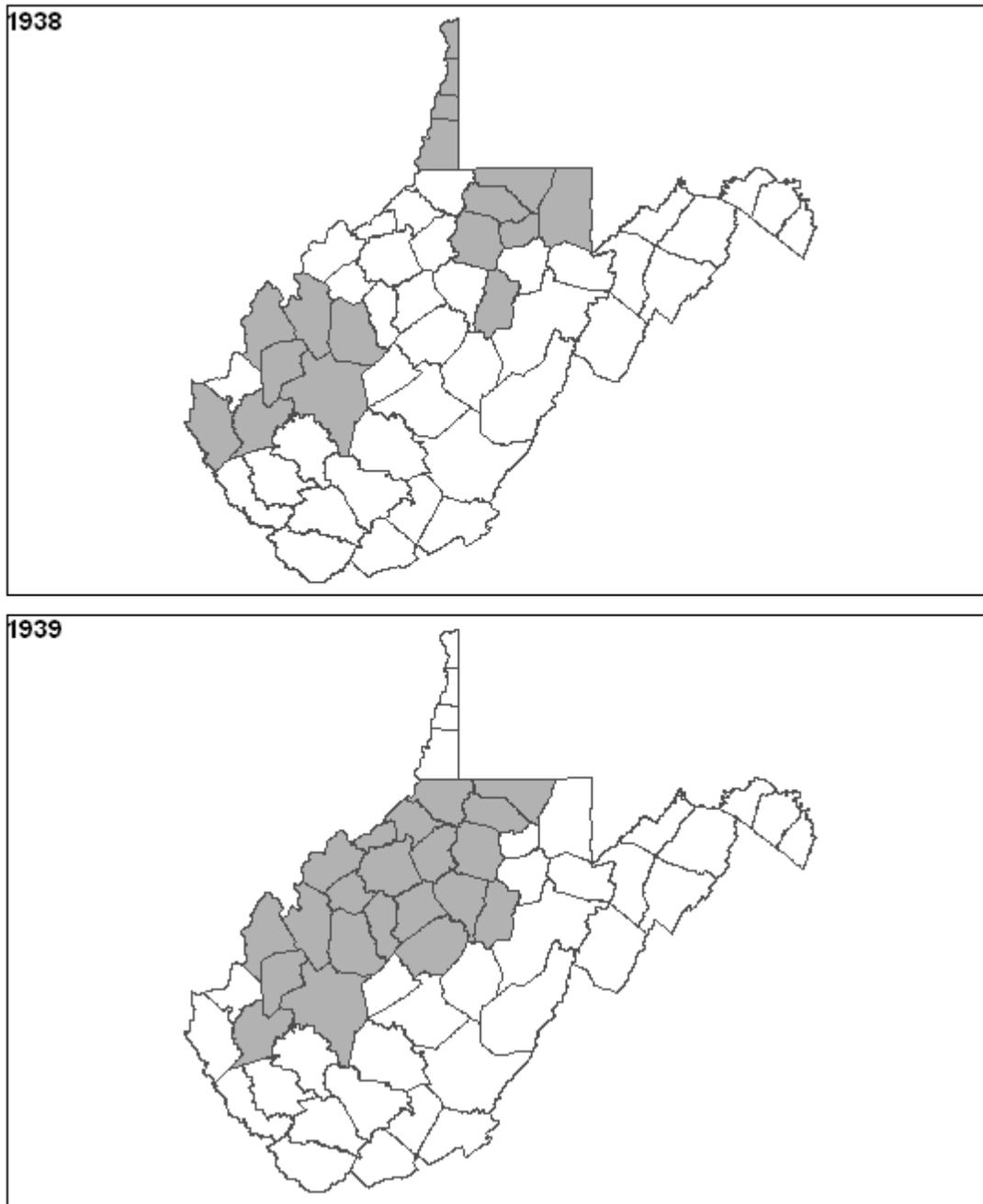


Figure 9: Map depicting the WV Geological and Economic Survey’s aerial photography collection of the years 1938-1939 by county.

The following figures visually show the inventory by year of the WV Geological and Economic Survey.

Aerial Photography Coverage by 7.5 Minute Quadrangle

West Virginia Geological
and Economic Survey

■ Quad with coverage

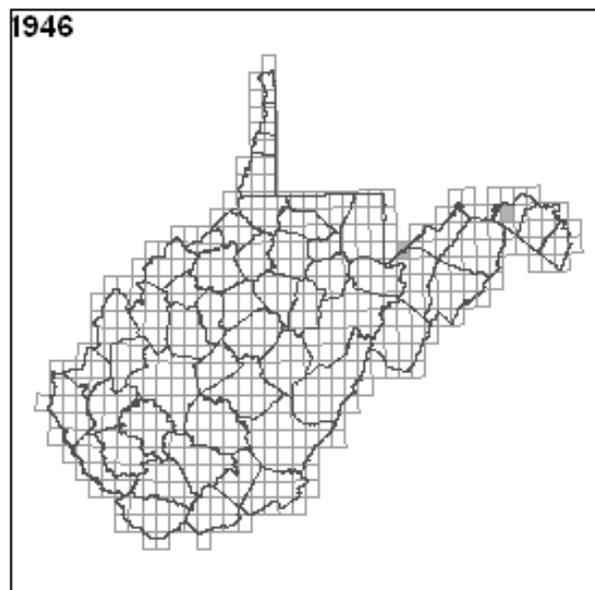


Figure 10: Map depicting the WV Geological and Economic Survey's aerial photography collection of the year 1946 by USGS 7.5-minute quadrangle.

Aerial Photography Coverage by 7.5 Minute Quadrangle

West Virginia Geological
and Economic Survey

Quad with coverage

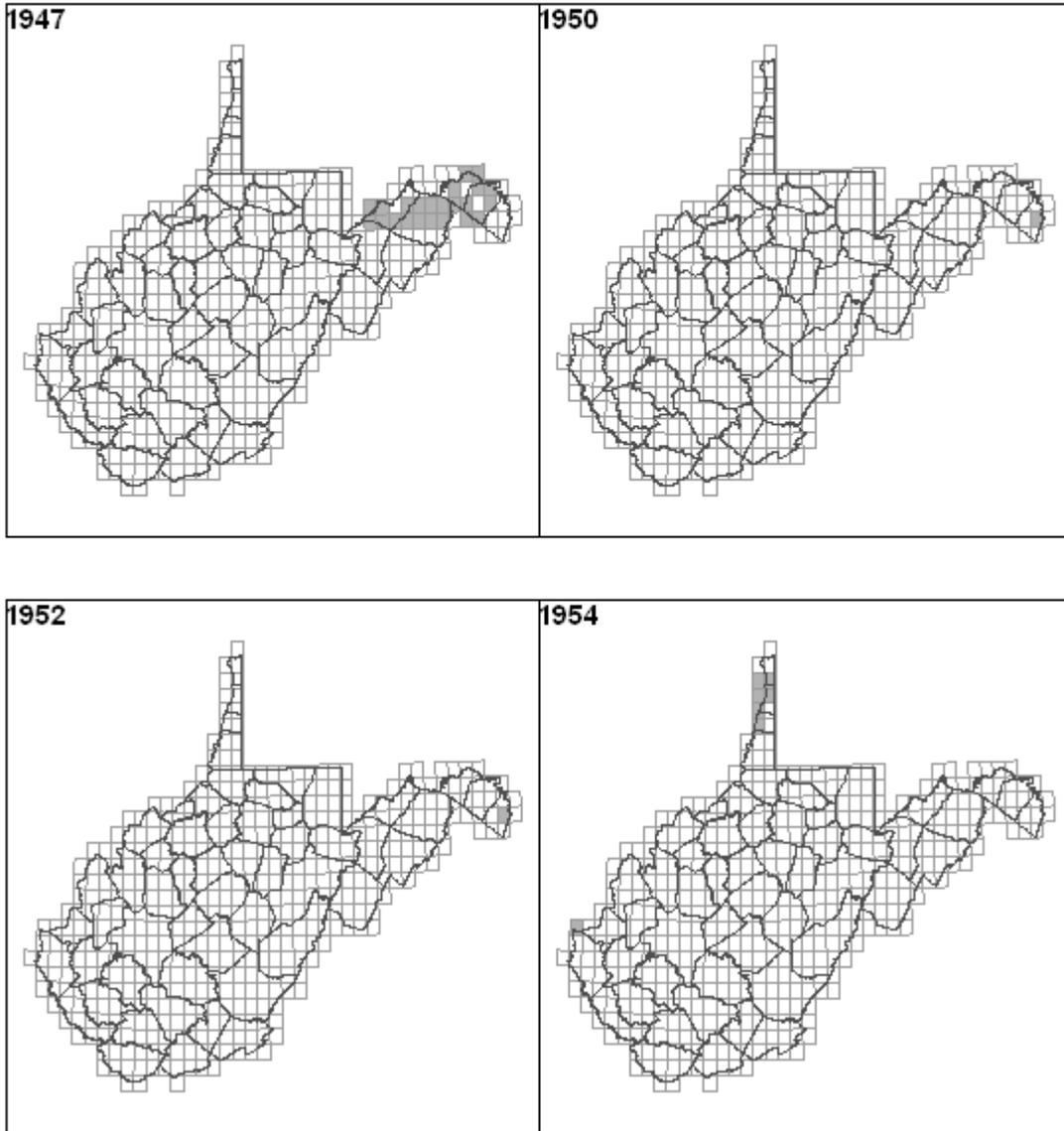


Figure 11: Map depicting the WV Geological and Economic Survey’s aerial photography collection of the years 1947, 1950, 1952, and 1954 by USGS 7.5-minute quadrangle.

Aerial Photography Coverage by 7.5 Minute Quadrangle

West Virginia Geological
and Economic Survey

■ Quad with coverage

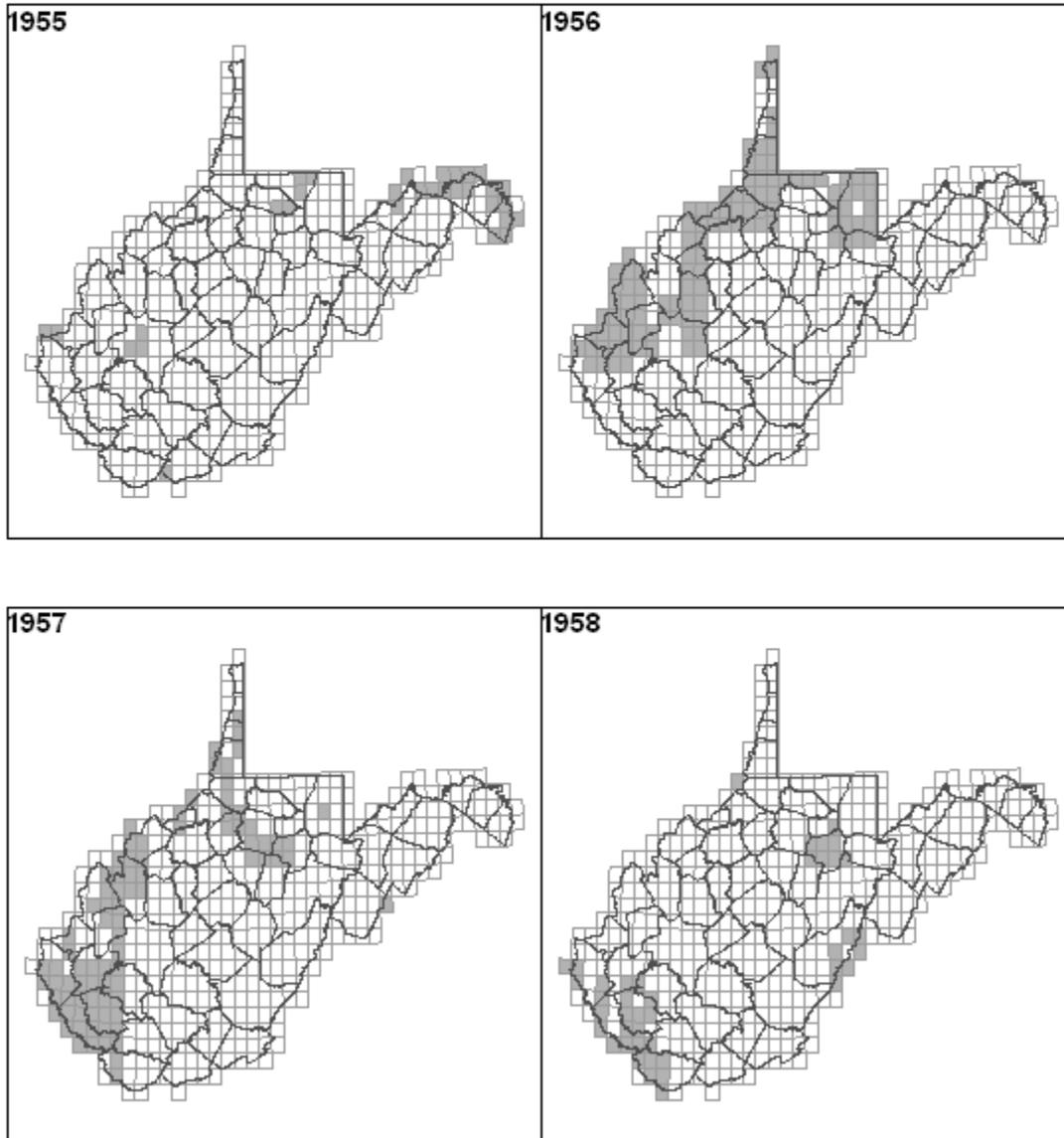


Figure 12: Map depicting the WV Geological and Economic Survey's aerial photography collection of the years 1955-1958 by USGS 7.5-minute quadrangle.

Aerial Photography Coverage by 7.5 Minute Quadrangle

West Virginia Geological
and Economic Survey

■ Quad with coverage

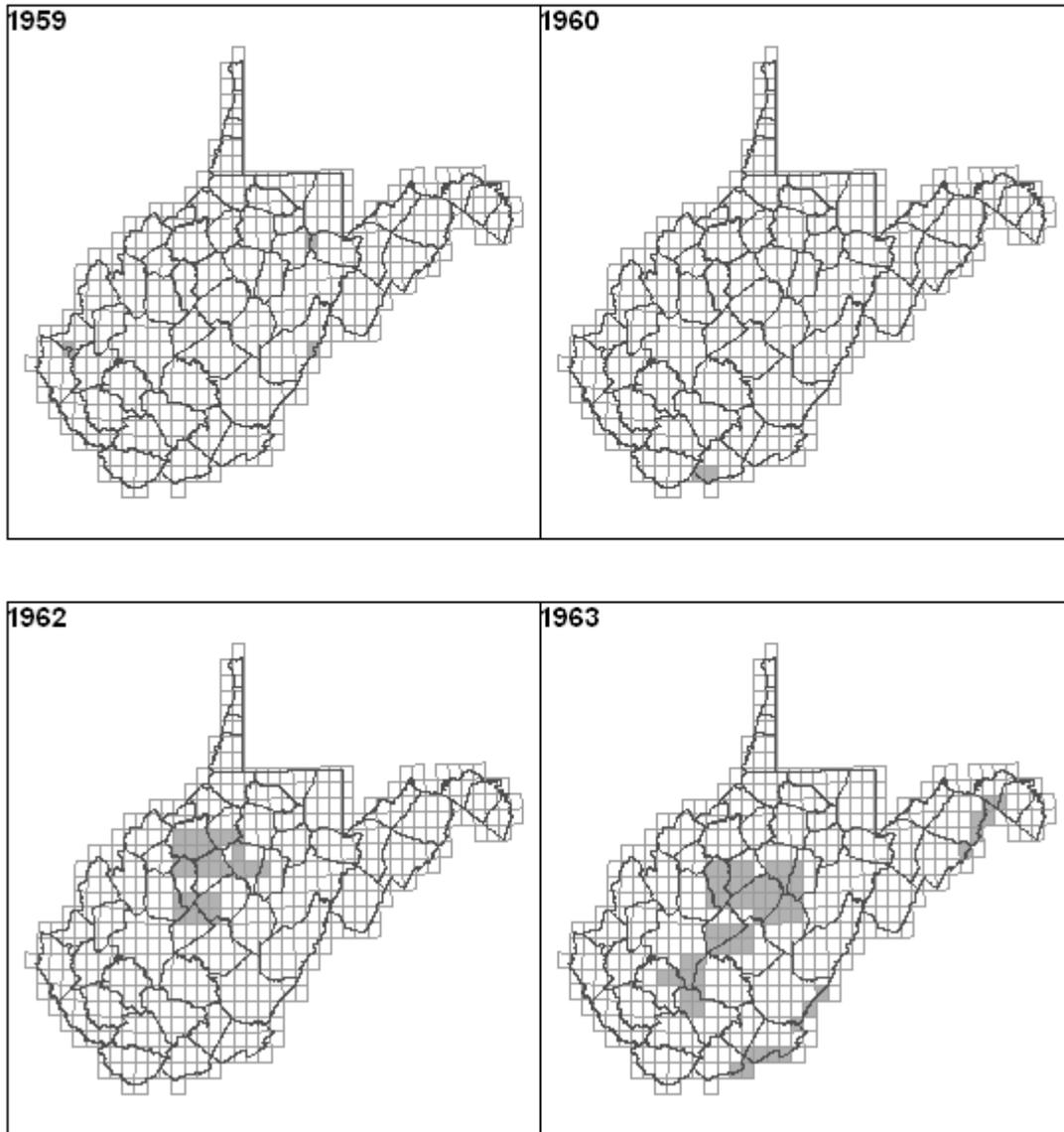


Figure 13: Map depicting the WV Geological and Economic Survey's aerial photography collection of the years 1959-1960 and 1962-1963 by USGS 7.5-minute quadrangle.

Aerial Photography Coverage by 7.5 Minute Quadrangle

West Virginia Geological
and Economic Survey

■ Quad with coverage

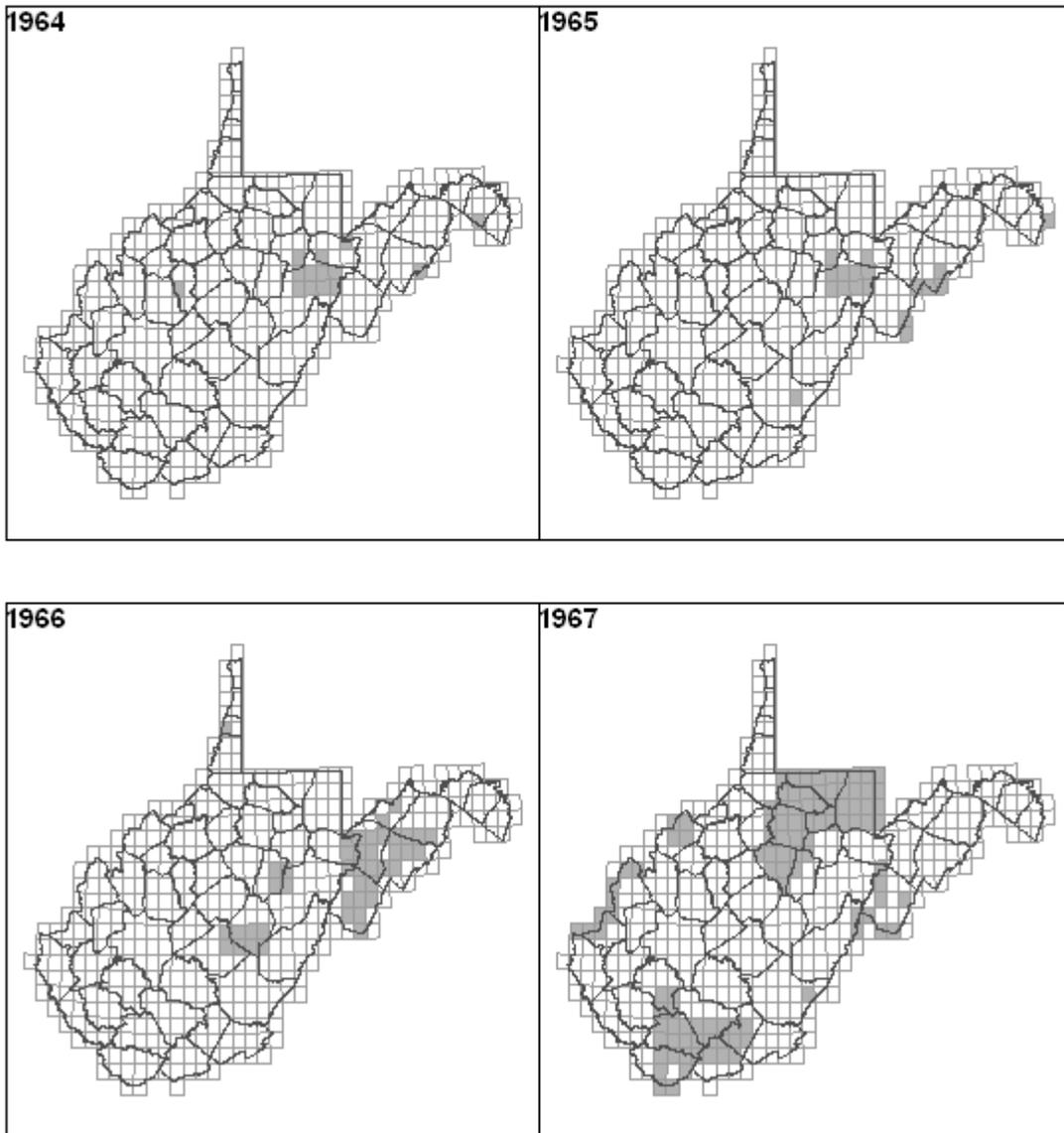


Figure 14: Map depicting the WV Geological and Economic Survey’s aerial photography collection of the years 1964-1967 by 7.5-minute quadrangle.

Aerial Photography Coverage by 7.5 Minute Quadrangle

West Virginia Geological
and Economic Survey

■ Quad with coverage

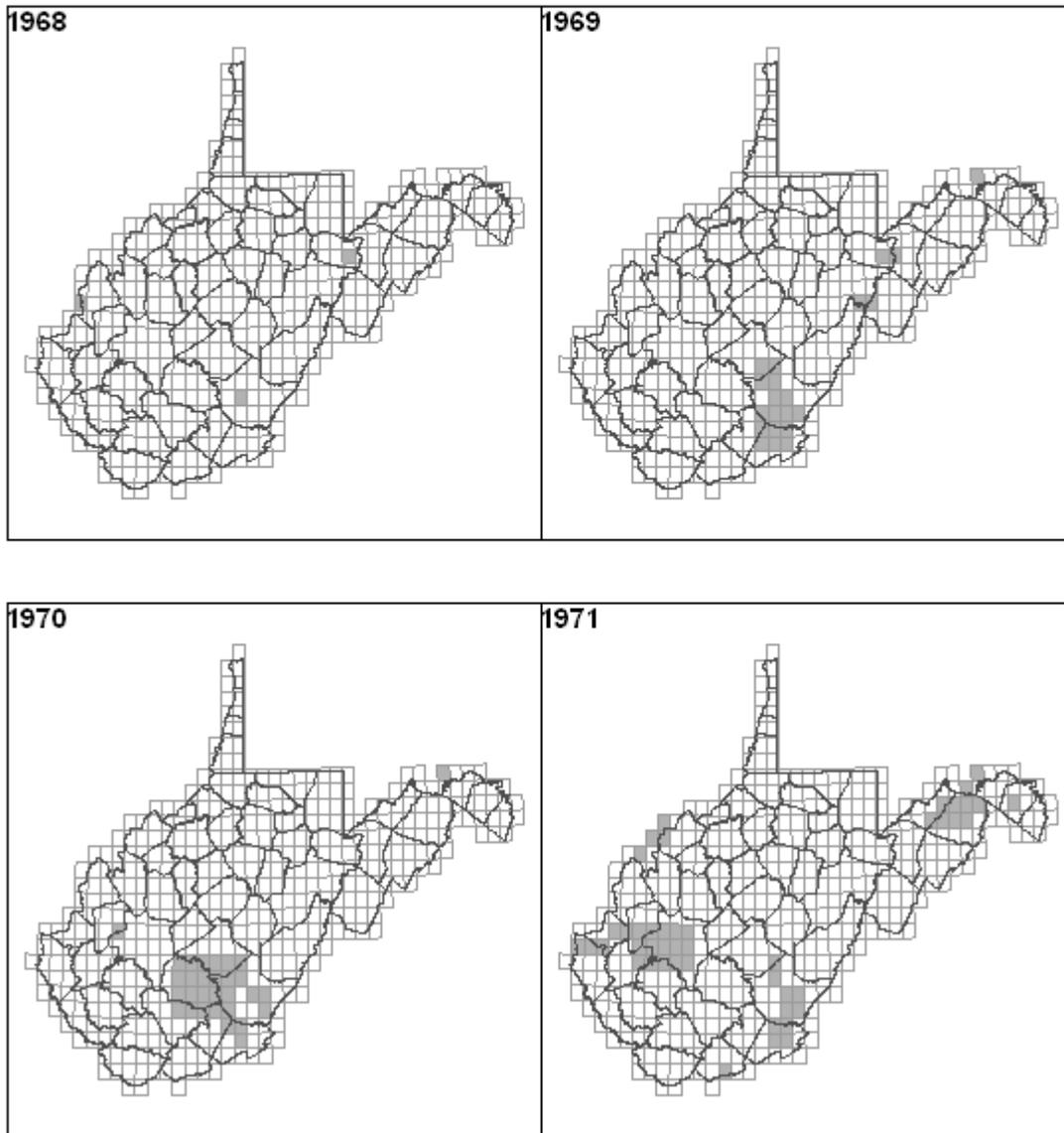


Figure 15: Map depicting the WV Geological and Economic Survey’s aerial photography collection of the years 1968-1971 by 7.5-minute quadrangle.

Aerial Photography Coverage by 7.5 Minute Quadrangle

West Virginia Geological
and Economic Survey

■ Quad with coverage

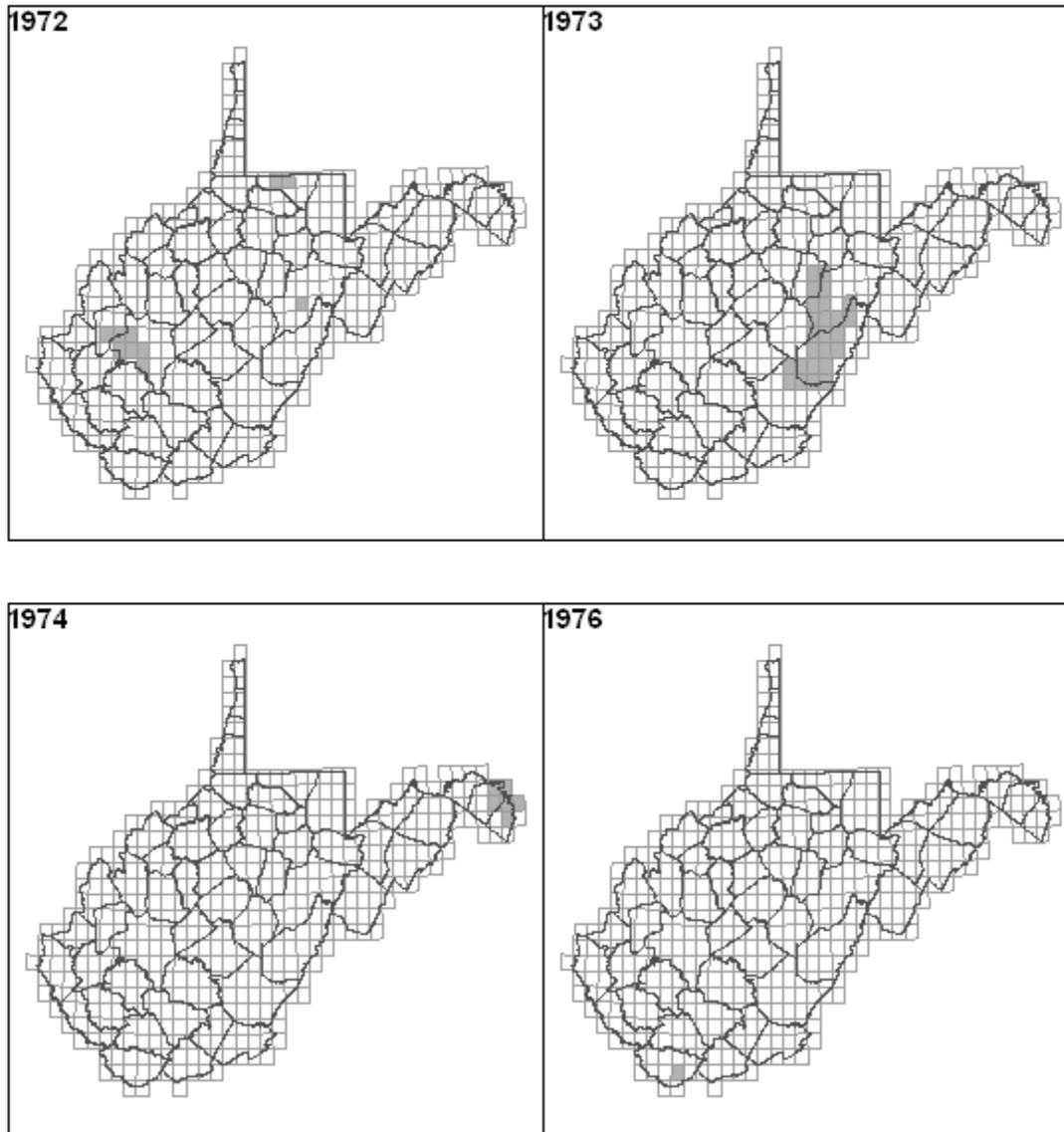


Figure 16: Map depicting the WV Geological and Economic Survey's aerial photography collection of the years 1972-1974 and 1976 by 7.5-minute quadrangle.

Digital Imagery

Other than the map browsers supplied by some of the above listed federal agencies, the WV Geological and Economic Survey is the only entity with digital images. The images are scanned on an on-demand basis usually at 600 dpi and saved in a TIFF format.

Geographic Reference

Individual Aerial Photos: Individual digital aerial photos can be spatially referenced on an on-demand basis for inclusion into geographic information systems.

Aerial Photo Indexes: Photographic indices can be georeferenced in order to better visualize which areas are covered by historical aerial photography. In addition, the creation of GIS-based index maps reveals the geographic extent of photo collections.

An inventory of aerial photograph index diagrams taken in the years of 1938 and 1939 from the West Virginia Geological and Economic Survey was georeferenced in ArcGIS 9.2 using the Georeferencing tool to a county boundary and/or SAMB orthophotographs in the UTM Zone 17N coordinate system in order to display the spatial range of the collection. This process yielded a vast range of RMS errors (13-300) including several high values. The high errors were attributed to the nature of the indices, which are photographs of photographs arranged to match up and create a mosaic of a spatial area and then overdrawn with a county boundary.

| County Code | County | County Code | County |
|-------------|------------|-------------|------------|
| AMP | BARBOUR | AGX | MINERAL |
| AGS | BERKELEY | DZH | MINGO |
| DZA | BOONE | AMX | MONONGALIA |
| AMQ | BRAXTON | DZI | MONROE |
| XY | BROOKE | AGY | MORGAN |
| AMB | CABELL | DZJ | NICHOLAS |
| AMR | CALHOUN | XZ | OHIO |
| DZB | CLAY | DPW | PENDLETON |
| AMS | DODDRIDGE | AMY | PLEASANTS |
| DZC | FAYETTE | DZK | POCAHONTAS |
| AMT | GILMER | AMZ | PRESTON |
| AGT | GRANT | AMG | PUTNAM |
| DZD | GREENBRIER | DZL | RALEIGH |
| AGU | HAMPSHIRE | DZM | RANDOLPH |
| XX | HANCOCK | ANA | RITCHIE |
| AGV | HARDY | AMH | ROANE |
| AMU | HARRISON | DZN | SUMMERS |
| AMC | JACKSON | ANB | TAYLOR |
| AGW | JEFFERSON | DZO | TUCKER |
| AMD | KANAWHA | ANC | TYLER |
| AMV | LEWIS | AND | UPSHUR |
| AME | LINCOLN | AMI | WAYNE |
| DZE | LOGAN | DZP | WEBSTER |
| DZF | MCDOWELL | ANE | WETZEL |
| AMW | MARION | ANF | WIRT |
| YA | MARSHALL | ANG | WOOD |
| AMF | MASON | DZQ | WYOMING |
| DZG | MERCER | | |

Table 7: Listing of US Department of Agriculture county codes for use in aerial photography projects.

CONCLUSIONS

A comprehensive archive of historical map records such as Sanborn Fire Insurance maps, topographic maps, and aerial photography would greatly facilitate future research, both academic and civilian. Further work is necessary to acquire more information and to manage and organize the information into an easy-to-use catalog to then be published and distributed.

General Recommendations

The following are recommendations for future work:

More Coordination: In order to develop an inclusive inventory for the state of West Virginia, greater coordination at the state and federal levels is needed.

Publish Catalogs: The resultant inventory catalogs should be published and distributed for the maximum benefit of researchers and to encourage higher efficiency by limiting replication of previously completed work.

Public Clearinghouse: The best mechanism for providing public access to historical maps and photos is a website clearinghouse.

Discovery: The clearinghouse should be set up to use visual inventories, such as the maps shown in this document (Ex., Figures 9-16), to display coverage information. Additional information such as scanned and spatially referenced index maps should be included as finding tools. Individual aerial photos can be scanned on-demand, but the aerial photo archives are too expansive to warrant scanning and spatially referencing all holdings at this time.

Public Access Fees: Customers should only be charged for the total cost of duplication.

Local Access: For gathering information, a general rule usually applies: the closer the facility, the faster the access to information. Attempt to gather data from local and state entities if possible (and practical) before approaching federal facilities.

Non-Coverage Areas: Non-coverage areas should be queried from the National Archives and Records Administration (NARA) to fill in information gaps. The process for obtaining information from the NARA is time-consuming and beyond the means of the primary phase of this project.

Stewards: Archival repositories at the state and national level should be the primary stewards of historical maps or photos. A map or photo collection should be considered historic if it was published before 1960, a previous (superseded) edition exists, or the collection is in poor condition or in need of preservation. Map collection stewards should provide website links to other map collections that would be of interest to the general public.

Funding: Where possible, funding should be secured for archiving and enhancing discovery mechanisms for historical topographic maps, Sanborn Fire Insurance maps, and aerial photography.

West Virginia Product Recommendations

1. *Sanborn maps*: So that these maps can be utilized in a digital context, the Sanborn collection at the WVU Regional History Collection should be scanned and made accessible online.

2. *Topographic maps*:

- Increase the public awareness and online accessibility to historical topographic maps. Mapping centers located at the WV GIS Technical Center and WV Department of Environmental Protection should focus on spatially referenced topographic maps, libraries should focus on archival maps, and the WV Geological and Economic Survey's attention should be on the sale of printed maps to the public.
- Thirty minute topographic maps currently housed by the West Virginia Geological and Economic Survey should be scanned and made available to the public.

3. *Aerial Photography*:

- The oldest available photographs (1936-1940) are in the most demand by the public. More coordination and investigation are needed to pursue statewide coverage of aerial photos for this time period.
- The index maps of high demand aerial photos should be scanned, geo-referenced, and published online to enhance discovery of valuable aerial photo collections.
- Individual digital photos should be spatially referenced on an as-needed basis.

DELIVERABLES

WVGES HOLDINGS:

1. A spreadsheet index of the topographic maps located at the West Virginia Geological and Economic Survey

File: \GES\Appendix_3_WVGES_topo.xls (Appendix 3)

2. A spreadsheet index of the aerial photography located at the West Virginia Geological and Economic Survey by 7.5' quad, captured from 1946 to 1976.

File: \GES\Appendix_7a_WVGES_aerial.xls (Appendix 7A)

3. A summary spreadsheet of the aerial photography located at the West Virginia Geological and Economic Survey by 7.5' quad, captured from 1946 to 1976.

File: \GES\Appendix_8a_WVGES_aerial_46_76_summary.xls (Appendix 8A)

4. A spreadsheet index of the aerial photography located at the West Virginia Geological and Economic Survey by county, captured in 1938 and 1939.

File: \GES\Appendix_7b_WVGES_aerial.xls (Appendix 7B)

5. A summary spreadsheet of the aerial photography located at the West Virginia Geological and Economic Survey by county, captured in 1938 and 1939.

File: \GES\Appendix_8b_WVGES_aerial_38_39_summary.xls (Appendix 8B)

WVU LIBRARY HOLDINGS:

6. A spreadsheet index of the Sanborn Insurance maps located at the WVU Wise Library's West Virginia and Regional History Collection

File: \GES\Appendices\appendix_1_WV&RH_Sanborn.xls (Appendix 1)

7. A spreadsheet index of the Sanborn Insurance maps located at the West Virginia State Archives

File: \GES\Appendices\appendix_2_State_archive_sanborn.doc (Appendix 2)

8. A spreadsheet index of the topographic maps located at the WVU Wise Library's West Virginia and Regional History Collection.

File: \GES\Appendix_4_WV&RH_topo.xls (Appendix 4)

9. A spreadsheet index of the aerial photography located at the WVU Wise Library's West Virginia and Regional History Collection.

File: \GES\Appendix_5_WV&RH_aerial.xls (Appendix 5)

10. A spreadsheet summary of the aerial photography located at the WVU Wise Library's West Virginia and Regional History Collection.

File: \GES\Appendix_6_WV&RH_aerial_summary.xls (Appendix 6)

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