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The James W. Sewall Company Aerial Photographs Collection - A Short History and Three Applications

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The James W. Sewall Company figures prominently in the histories of both aviation and surveying in Maine. Founded in 1880 by James W. Sewall, Sr., the company began as a forestry and civil engineering firm. As such, it is the oldest continuously operating company of its kind in North America. After the death of James W. Sewall, Jr. in 1946, his son Joseph took over the company. Joseph Sewall was a prominent figure in Maine politics and business. His many achievements include serving as the president of the Maine Senate from 1975 to 1982, and adding aerial photography to the Sewall Company's services in the mid-1940s. The company was sold to Treadwell Franklin Infrastructure in 2018 (Acquisto 2018).

After the sale, the company decided it could no longer maintain its extensive collection of past aerial photography work. In October of 2019, the Special Collections Department at The University of Maine, Fogler Library received a large collection of aerial photographs from the Sewall Company of Old Town, Maine. The collection included almost 3000 rolls of 9 x 9 inch aerial photographs, several terabytes of digital images, and files and flight maps for the aerial scanning work. The collection spans 70 years from the 1940s through the 2010s. George Campbell, Jr., the new president of the company stated, "In turning over these archival materials, the James W. Sewall Co. is essentially entrusting its DNA to the University of Maine." (UMaine 2019).

The collection is a vast and unique resource for many different types of research. Examples of these might be histories of inland and coastal waters, land use, urban development, geology, transportation, and forestry. "Maine's forest has been in constant flux over the course of history, including the changing composition of tree species, insect outbreaks, land use change, shifting management practices and climate change," says Daniel Hayes, assistant professor in the School of Forest Resources at UMaine. "The (archive) represents an unprecedented record of the continuing evolution of Maine's forest landscape" (UMaine 2019).

UMaine professor of history, Anne Knowles notes that the aerial images "provide data about the growth and decline of the state's great pulp and paper industry, urban development, transportation, forestry practices, tourism, the impact of the ash borer and other environmental issues. Such a deep historical and visual record will support interdisciplinary research for decades to come" (UMaine 2019).

This project seeks to demonstrate some of the potential applications of the imagery. Three demonstration applications will be presented; an analysis of river meander geomorphology over time and a look at a historic bridge in the Fryeburg, Maine area, an example of using the images to find farms that supported logging operations of the Great Northern Paper Company, and a land use and development study using images of the Hogan Road exit of Interstate 95 in Bangor, Maine.
Although not exhaustive studies, these demonstrations will provide information to help inspire and motivate users to develop useful and meaningful applications. These demonstrations will ultimately also be made available as short videos, and published on social media.

Figure 1. An aerial photograph from the Sewall Collection dated October 16, 1946.

Application 1: The Saco River near Fryeburg, Maine

River Meanders

The Saco River originates in the White Mountains of New Hampshire, and crosses into Maine at the town of Fryeburg (Kendall 1993, 105-106). Fed primarily by the drainage basin in the vicinity of Mt. Washington, the river floods from the spring snowmelt, and from heavy rains at other times. At these times, the river carries large amounts of sand, silt, and other materials out of the mountains and deposits it on a flat plain, called a floodplain, at the base of the White Mountains near Fryeburg (lower right, Figure 2).

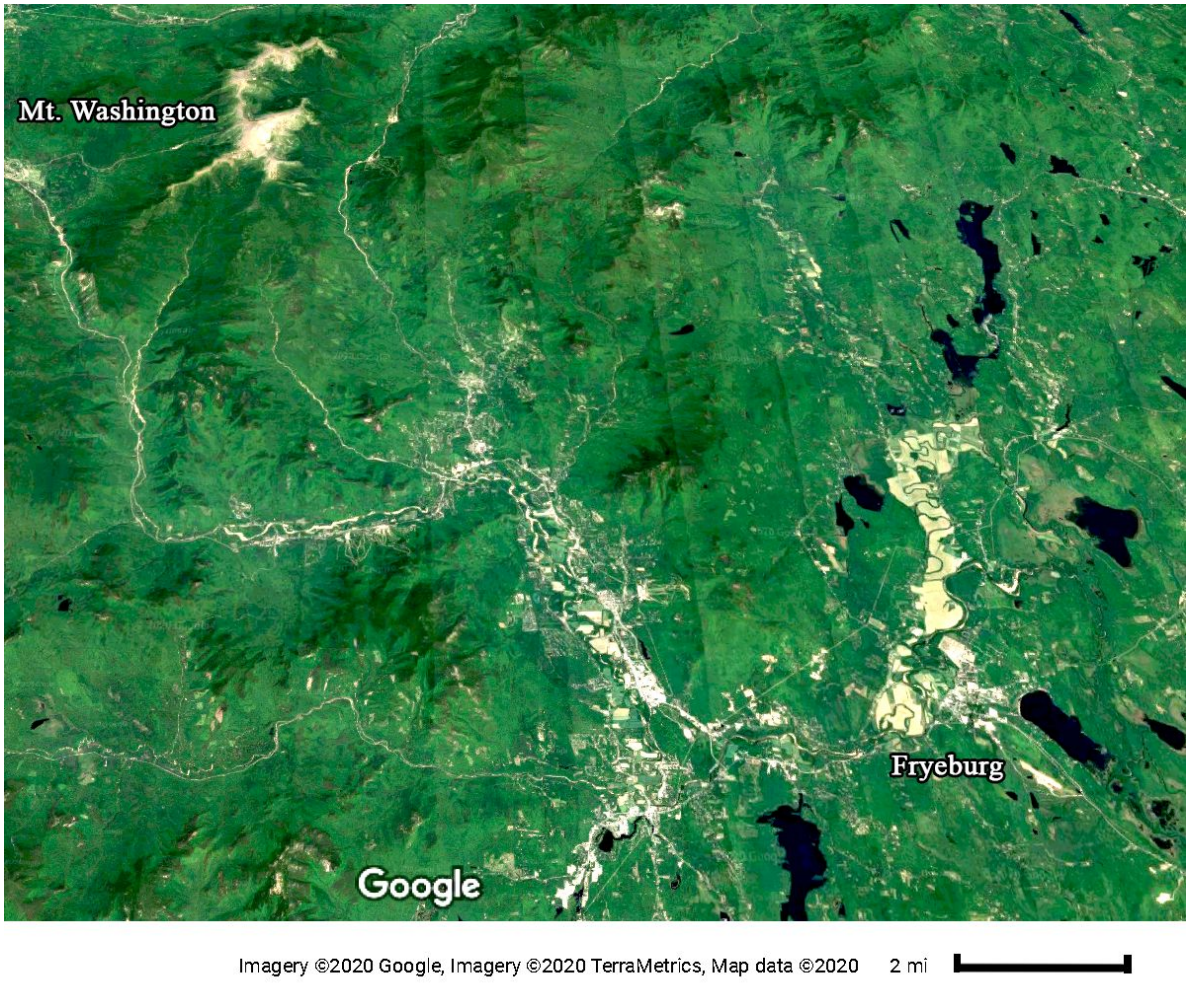

Figure 2. Saco River drainage basin and the floodplain at Fryeburg, Maine.

These are known as alluvial deposits, and the extensive flooding leads to large areas of these alluvial deposits in the Fryeburg area (Figure 3). A river flowing through an alluvial flood plain is unrestricted in its course due to the nature of the alluvial deposits. River meanders are a typical feature of river channels flowing through a flood plain. In a curve of the river channel, water flows more swiftly at the outer bank of the channel, and more slowly at the inner bank. This causes sediments to be eroded from an outer bank, and then deposited in the slower flows of an inner bank (Figure 4). Eventually a channel may cut off a loop of the meander, resulting in the formation of an oxbow lake. A good summary of river meanders is found in Leopold and Langbein (1966). The process of the continuous reshaping of the river path is known as channel migration. Channel migration is a concern for a variety of human activities. One very important field where channel migration is studied is that of transportation engineering. Bridges very often cross a river on a flood plain, and the constant changes in a river bank can jeopardize the safety of a bridge or other highway features (USDOT 2012). Predicting channel migration is essential to project planning. Historic aerial photographs are used to analyze past channel migrations in order to predict the future course of a river (Lagasse 2004a, 23). Although many mathematical, deterministic models of channel migration have been developed over the years (c.f. Callandar 1978), Lagasses asserts that empirical models based on historic aerial photographs and other historic information can provide better prediction than deterministic methods (Lagasse 2004b, 11). Historic aerial photographs from the Sewall Company Aerial Photographs Collection together with modern imagery from Google can be used to demonstrate these ideas.

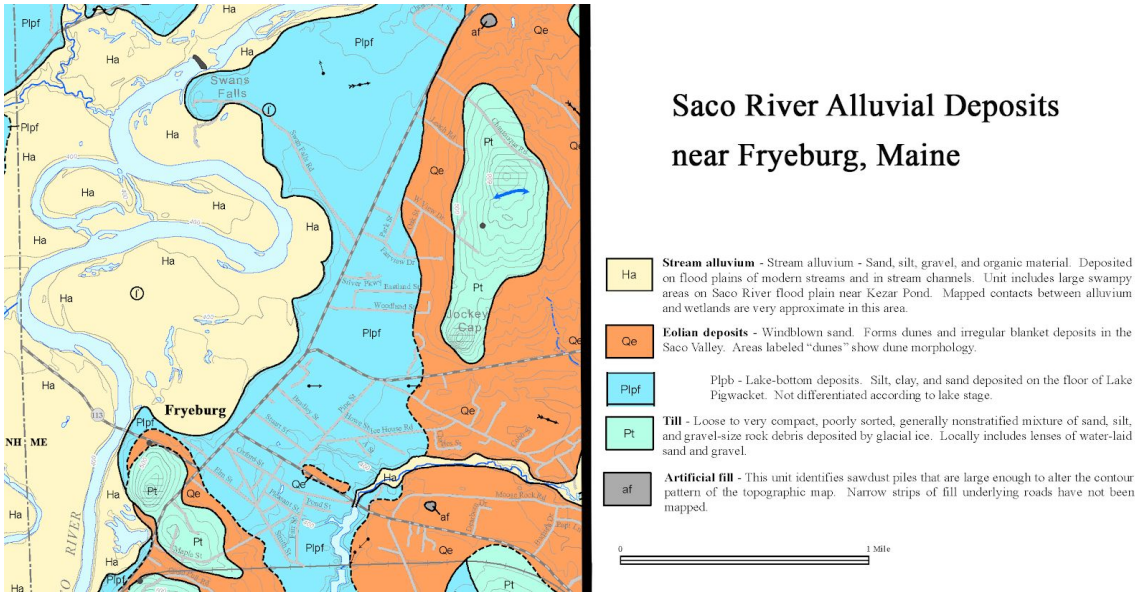

Figure 3. Alluvial deposits near Fryeburg, Maine (Thompson 2014).

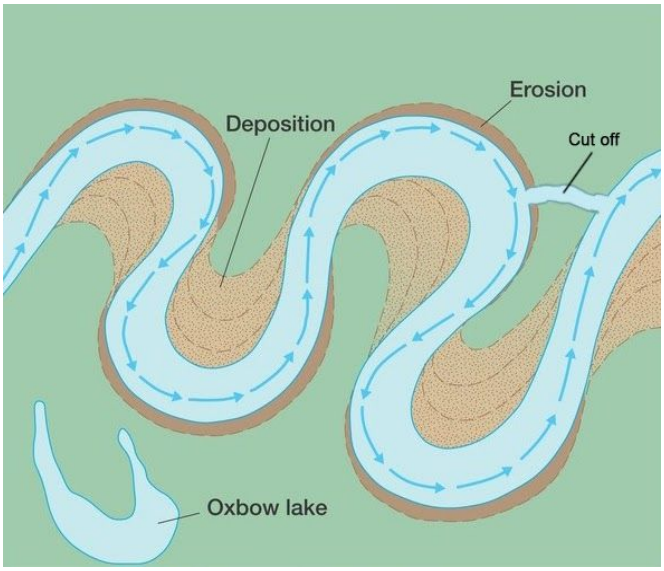

Figure 4. Erosion and deposition in a river meander.

A photograph from the Sewall Collection dated June 29, 1953 is shown in Figure 5. The photograph shows the Saco River at Fryburg, Maine, with the floodplain and river meander to the Northwest of the town. Seen in the image are features like inner bank deposition areas and an oxbow. Note also the numerous farm areas on the fertile alluvial deposits.

Figure 5. Aerial photograph showing the Saco River meander at Fryeburg, Maine. Aerial survey for the S.D. Warren Company, June 29, 1953. Sewall collection, film roll 65.

The empirical method uses historic aerial photographs to plot the channel paths of the river over time. Overlaying the historic channel paths over the most current image of the path allows analysis of the channel migration. This allows the creation of an empirical model for predicting future channel paths (Lagasse 2004a). The overlays taken from three aerial photographs show the channel migration around a bridge over a river in Iowa (Figure 5).

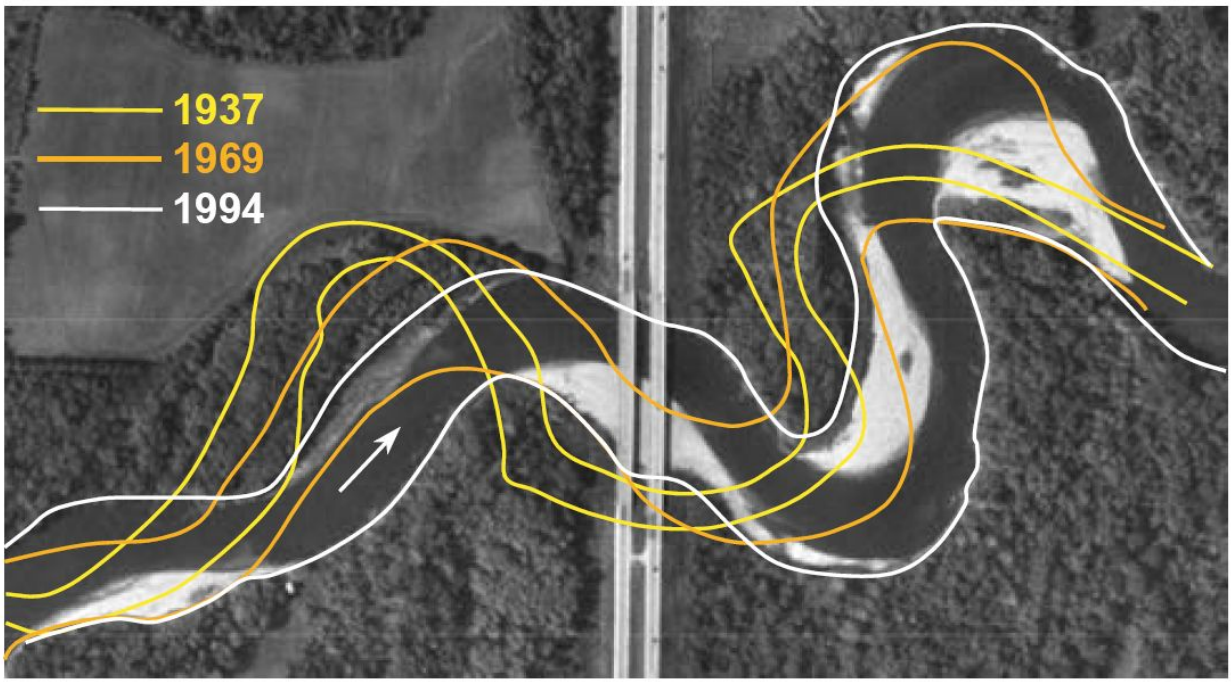

Figure 6. Aerial photo of a bridge over the Wapsipinicon River near De Witt, Iowa, showing the incremental shift of the outer bank of the bend as a result of meander migration over time. The bridge was installed after 1969 (Lagasse 2004a).

For the Saco River at Fryeburg, the path of the channel from the 1953 aerial photograph is overlaid over a current image from Google Maps (Figure 7). The depositions in the upper loop have been filled in with trees. A cutoff is also seen in the upper loop. The cutoff itself is a meander, with depositions on the inner banks. The cutoff has diverted the channel flow away from the oxbow, and the oxbow is filling with sediment. For comparison, the path of the cutoff taken from the 2020 image is overlaid on the 1953 photograph and shows a much narrower cutoff path in 1953. All rivers in Maine have meander features, and this technique would be useful for studying channel migrations in many areas of the state as long as aerial photographs for the area of interest are in the collection.

Figure 7. Saco channel path, 1953, in yellow overlaid on 2020 image from Google Maps.

Figure 8. Cutoff from the 2020 image overlaid on the 1953 photograph.

Weston's Bridge

At a larger and more human scale, interesting features are seen. One such feature is the bridge across the Saco River at Freyburg. The bridge, known as Weston's Bridge, was originally a covered bridge (Figure 9) constructed in 1843 (Fryeburg Historical Society) . This bridge was demolished in 1947. A new bridge was built a short distance upstream of the original bridge (Robinson and Tanefis 2010).

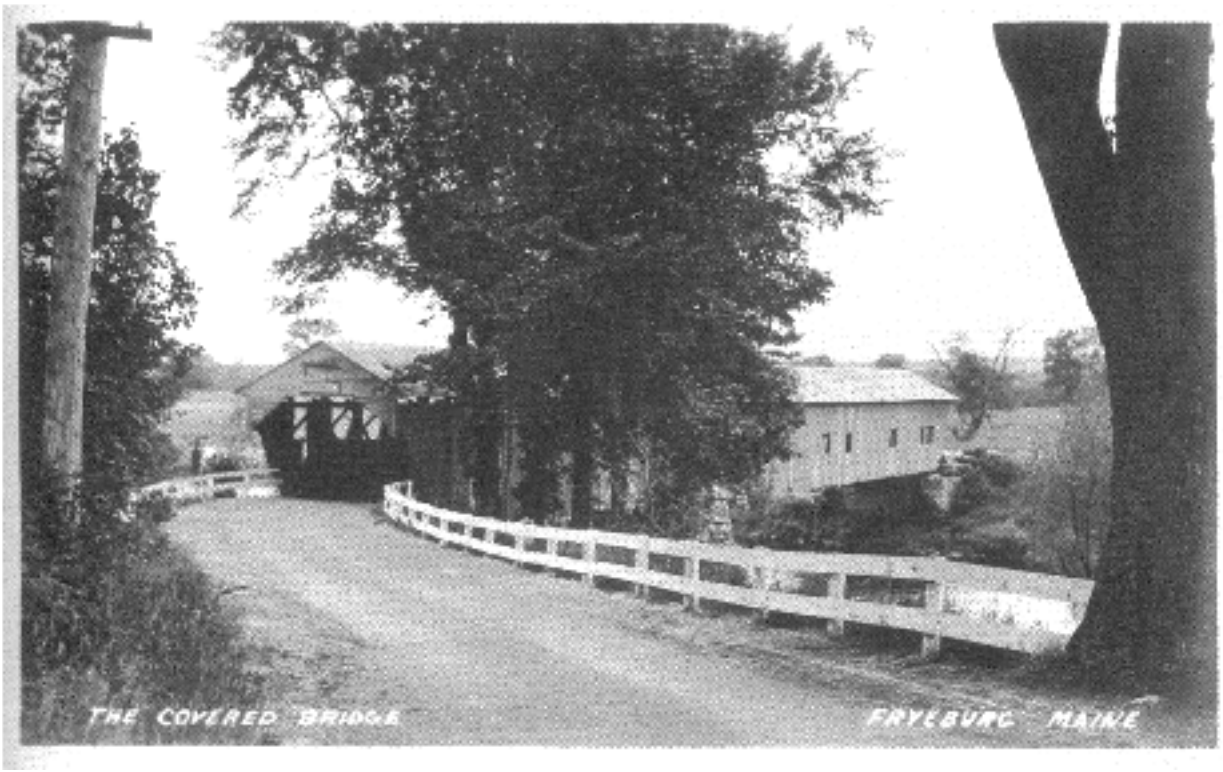

Figure 9. Weston's Covered Bridge (Robinson and Tanefis 2010).

Figure 10 shows the estimated location of the demolished covered bridge and the newly constructed bridge from the 1953 image. Portions of the original road approaches to the covered bridge are much more visible in the 1953 photograph than in current imagery. Small remnants of the original paved approach road are still seen to this day (Figure 11). The original piling in the center of the river is seen in the 1953 photograph and also in current imagery. The road to the bridge is also seen in a 1911 Sanborn fire insurance map (Figure 12). This map, drawn with Main Street on the horizontal, also indicates a "Steep Hill" to the left of the bridge road. This is Pine Hill, seen in Figure 10. At the base of this hill is Bradbury Park, earlier known as Pine Hill Common (Cultural Landscape Foundation). A gazebo in this park seen in current imagery is not seen in the aerial photograph or on the Sanborn map. The reader is encouraged to examine these changes using an image service such as Google Maps

Figure 10. 1953 aerial photograph showing the estimated location of the original Weston's Bridge. Also shown are Pine Hill and Bradley Park.

Figure 11. A remnant of the original paved approach road is seen at left.

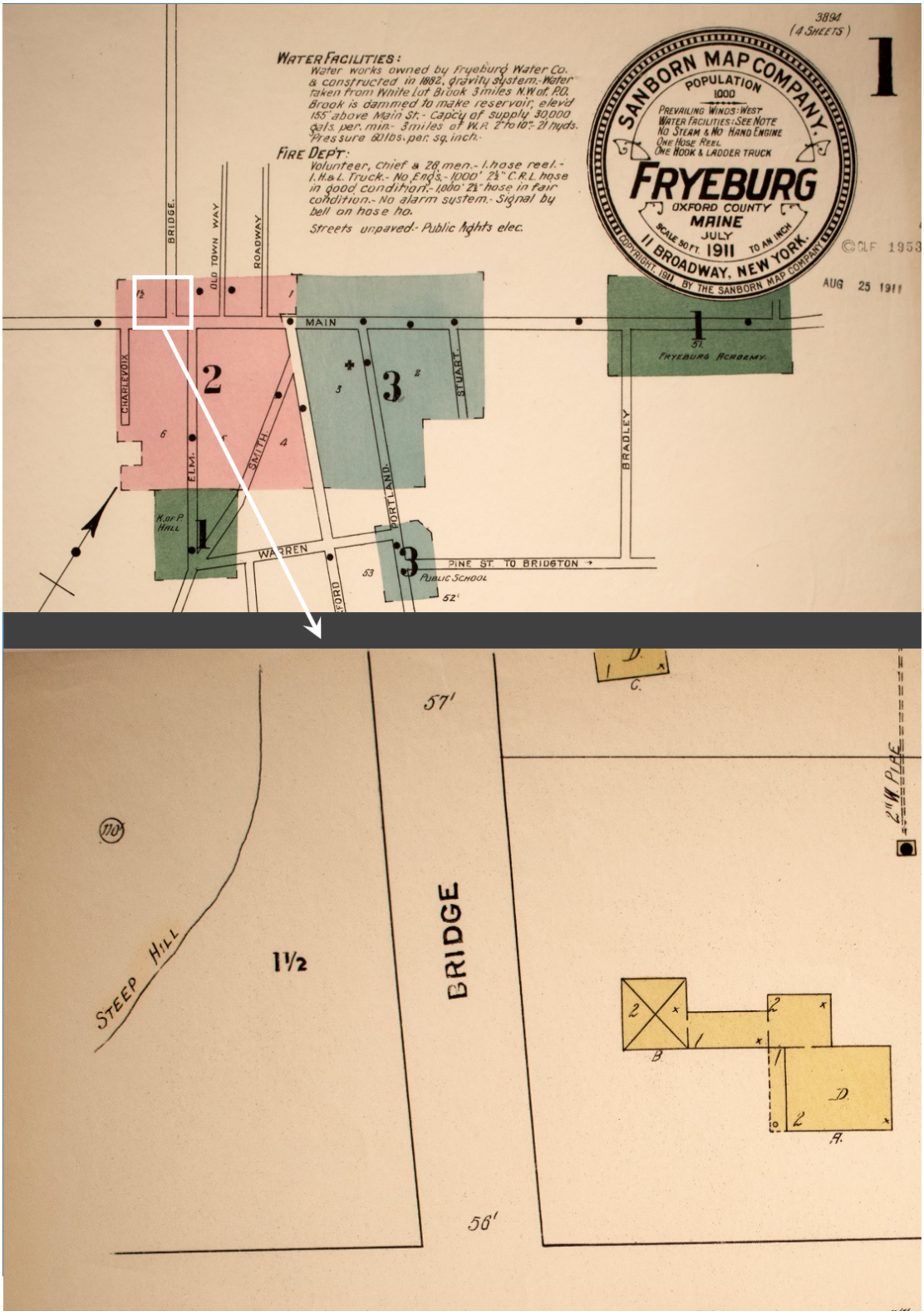

Figure 12. Sanborn map of Fryeburg showing the Bridge Road, Pine Hill, and Bradbury Park (Sanborn-Perris Map Co. 1911).

Application 2: Great Northern Paper Company Farms

"The Great Northern Paper Company owns and operates a number of farms, on which it raises crops such as hay, oats, potatoes, beans; and pasture(s) and care(s) for horses held in reserve for woods operations and also raise(s) and care(s) for certain livestock such as cattle and hogs."
-Tom Allen, 1946 (McLeod 1978, XXI, 115)

Figure 13 . The Great Northern Paper Co. Grant Farm (undated).
Image courtesy of Special Collections, Raymond H. Fogler Library

As with the Weston Bridge example, the Sewall photographs can provide historical information about human activities in a particular region. The Great Northern Paper Company had numerous farms from the early 1900s through the 1970s. These farms played an essential role in its pulpwood operations, providing food and horses for the logging crews (Mcleod 1978, V, 30). Although most of these farms have disappeared over the years, there is still interest in these historic sites (Harry Nelson, Maine DOT, email correspondence, June-July 2020). Detailed information about these farms is found in McLeod's

seven volume summary of the Great Northern records (McLeod 1978), now housed at the University of Maine Fogler Library Special Collections.

McLeod lists 22 farms in the index to the work (McLeod 1978, Index, 44-45). As an example of production at the farms he notes the combined production of five of the farms in 1926:
957 lbs. of beans, 4,358 lbs. of beets, 8,634 lbs of cabbage, 4,745 lbs. of carrots, 1,120 ears of corn, 15,000 lbs. of oats, 903 lbs. of squash, 557,992 lbs. of potatoes and 995,000 lbs. of hay, in addition to lesser amounts of cauliflower, celery, spinach, lettuce, tomatoes and a variety of other produce. (McLeod 1978, XXI, 114).

At most of the sites, the farm buildings are long gone. McLeod provides details of the type, number and dimensions of some of the buildings. Sewall aerial photographs from the 1950s cover some of these locations, and provide a way to look back at these buildings.

A few miles east of North Bay, Moosehead Lake in T2 R13, Piscataquis County is the site of Grant Farm. An aerial photograph of the farm dated June 3, 1959 shows the farm and layout of the fields and buildings (Figure 14). This can be compared to modern imagery to show the transformation of the site (Figure 15). Portions of the foundations of some of the buildings are still found (Harry Nelson, Maine DOT, email correspondence, June-July 2020), and these buildings are readily located using the photograph.

Penobscot Farm, located just north of Northeast Carry on Moosehead Lake is another example (Figures 16 and 17). The modern imagery shows that virtually nothing is left of this farm.

To the northwest of Moosehead is Pittston Farm, on the west end of Seboomook Lake, T2 R4 NBKP, Somerset County (Figures 18 and 19). This farm operated until 1971, and from then until 1991 was used by the Boy Scouts of America. In 1993 the farm was purchased and restored, and is now home to an inn, restaurant, sporting camps and campgrounds (Ferland 1995). Comparison of the 1951 aerial photograph with modern imagery shows some of the original structures and also extensive development of the site. Changes in the river meander around the farm site are also seen by examining both images.

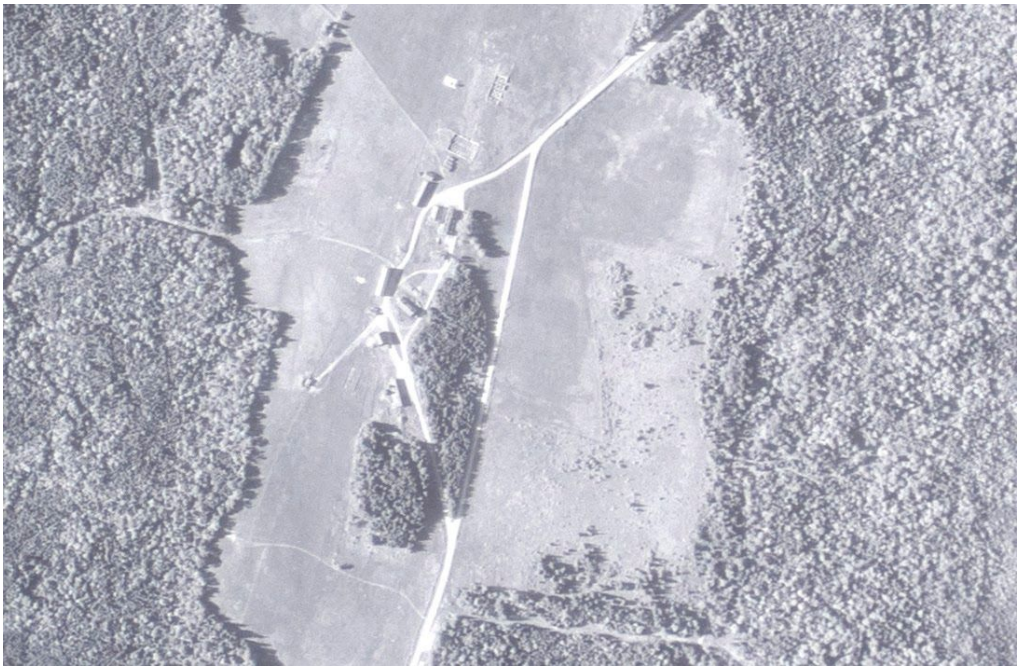

Figure 14. Grant Farm June 3, 1959.

Figure 15. Grant Farm site, 2020 (Google Maps).

Figure 16. Penobscot Farm October 22, 1959.

Figure 17. Penobscot Farm site, 2020 (Google Maps).

Figure 18. Pittston Farm October 13, 1951.

Figure 19. Pittston Farm 2020 (Google Maps).

Application 3: Interstate 95 Hogan Road Exit, Bangor, Maine

"It is hereby declared to be in the national interest to accelerate the construction of the Federal-aid highway systems, including the Interstate System, since many of such highways, or portions thereof, are in fact inadequate to meet the needs of local and interstate commerce, the national and civil defense."
-The Federal-Aid Highway Act of 1956, Section 116 (Finkelman and Lesh 2008, 1623)

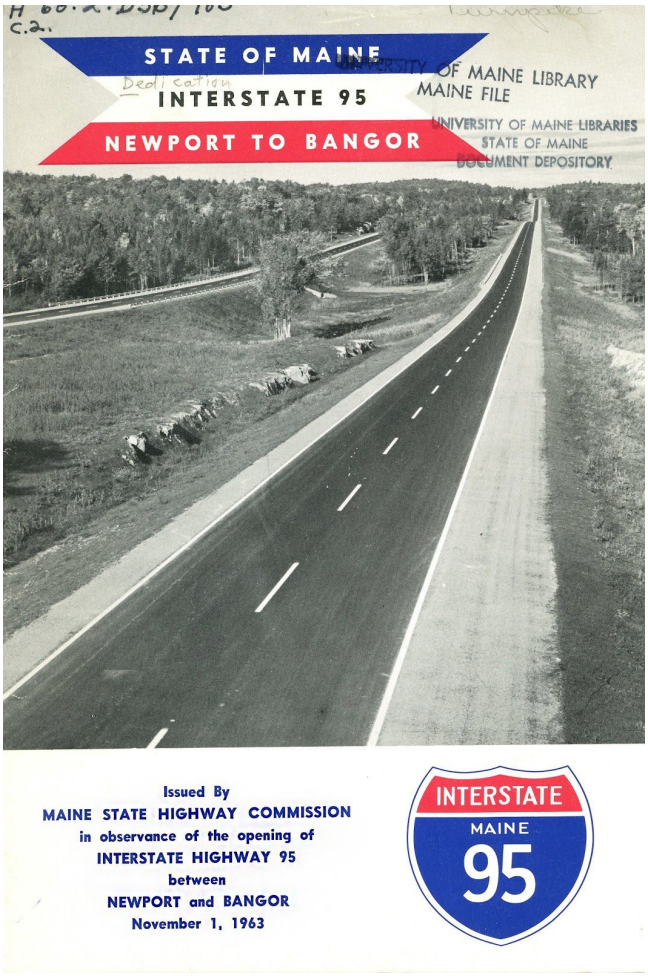

Figure 20. Program for the Opening of I-95, Newport to Bangor (Maine 1963).

As early as 1941, plans for a 32,000 mile interstate highway system for the United States had been drawn up, and these plans closely resembled the interstate highways seen today (Heppenheimer 1991). Between 1955 and 1966, a section of Interstate 95 running from Kittery to Portland was constructed and opened in stages. The section of highway from Newport to Bangor was opened on November 1, 1963 (Figure 20). The Sewall Company did extensive survey work for the Maine I-95 corridor for the Maine Highway Commission (Earl Raymond, personal conversation, July 2020).

In terms of local commerce, James Haldeman did research into the economic impact of four I-95 interchange points, i.e. interstate exits, two in Waterville and two in Bangor shortly after the construction of the highway. The objectives of this study were to examine land use development patterns as a result of the construction of I-95, the economic impact in terms of real estate values and land use intensity, and an attempt to model these effects with regression analysis (Haldeman 1967, 1). While a full examination of these ideas is beyond the scope of this work, they may be studied visually and qualitatively through the use of Sewall aerial photographs.

Haldeman sees the development of interstates causing changes in real estate values, creating new business and industrial developments (Haldeman 1967, 12). He compiled extensive data on property values and land usage for a number of categories including agricultural, residential, commercial, and industrial areas. Using regression analysis, he quantified changes in values and usage due to I-95 at the four interchanges of interest as of 1965 compared with the 1940s and 1950s. Of the four interchanges studied by Haldeman, the Hogan Road interchange in Bangor is an interesting case, and aerial photographs supporting his ideas are found in the Sewall Collection. As of 1965 Haldeman gives approximate land use for the area around the interchange as: 37% vacant, 32% agricultural, 16% residential, 6% commercial, and less than 10% other uses, primarily for cemeteries. He notes only slight changes in these numbers from data collected in the 1940s and 1950s (Haldeman 1967, 43-44). In 1969, the City of Bangor performed a similar analysis for the entire city as part of its comprehensive plan for the development of the city from 1969 through 1985 (Bangor 1969). Figure 21 shows the existing use indicated by the study. The comprehensive plan analysis is somewhat comparable to Haldeman, although there is no “Vacant” land use classification in Bangor plan. The “Density” classifications refer to residential housing densities.

Although Haldeman does not provide a quantitative analysis of predicted land use in the future, the 1969 comprehensive plan shows the anticipated land use expected by 1985 (Figure 22). Here, nearly all of the agricultural land around the interchange is expected to be converted to either commercial use on the east side of the interchange, or industrial use on the west side. To the southwest of the interchange a block of “Civic and Institutional” is predicted. Although not shown on the existing use map of 1969, Eastern Maine Vocational Technical Institute (currently Eastern Maine Community College), was established in that area in 1968, and would be considered civic and/or institutional.

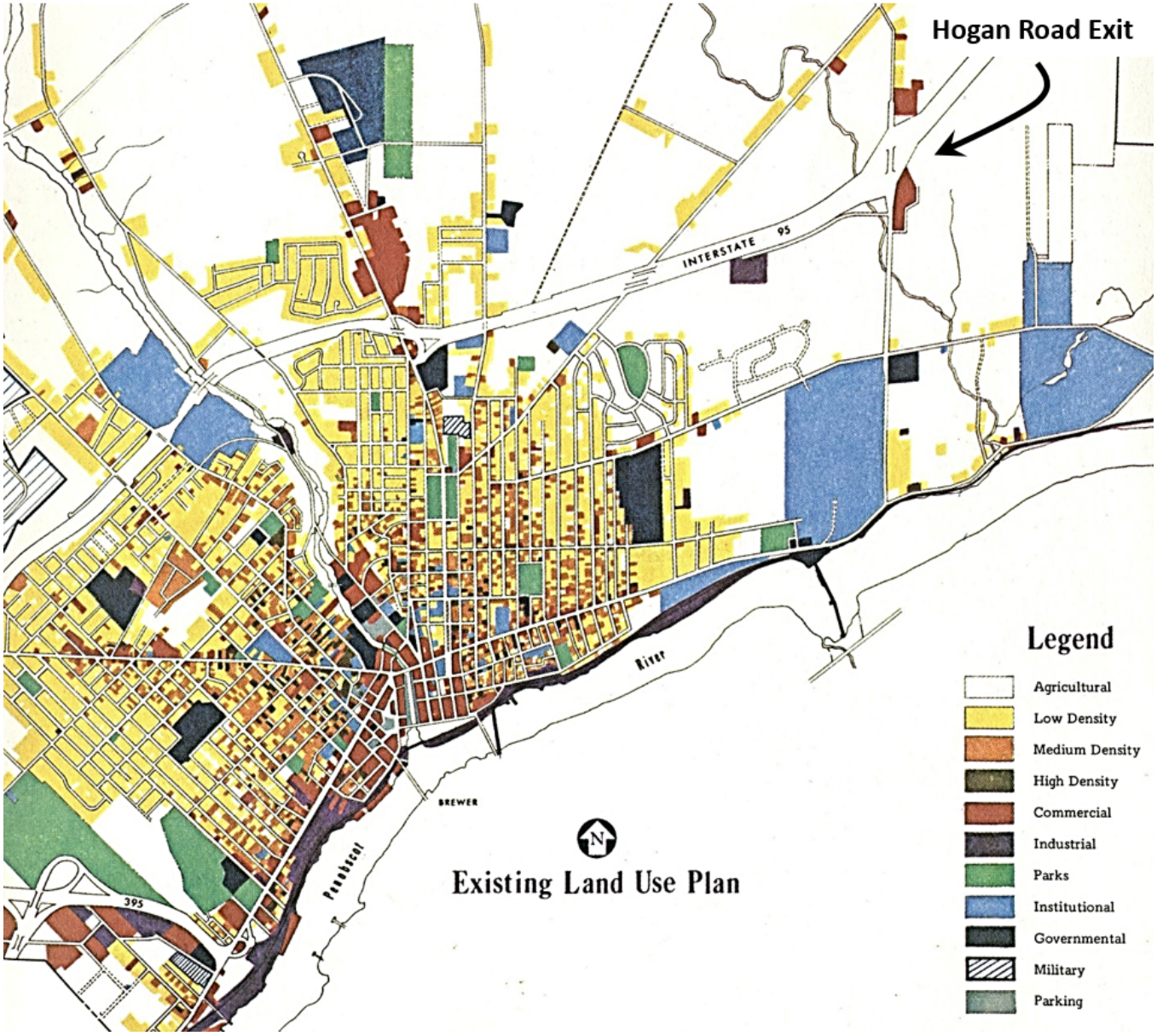

Figure 21. Existing land use in Bangor, Maine in 1969 (Bangor 1969).

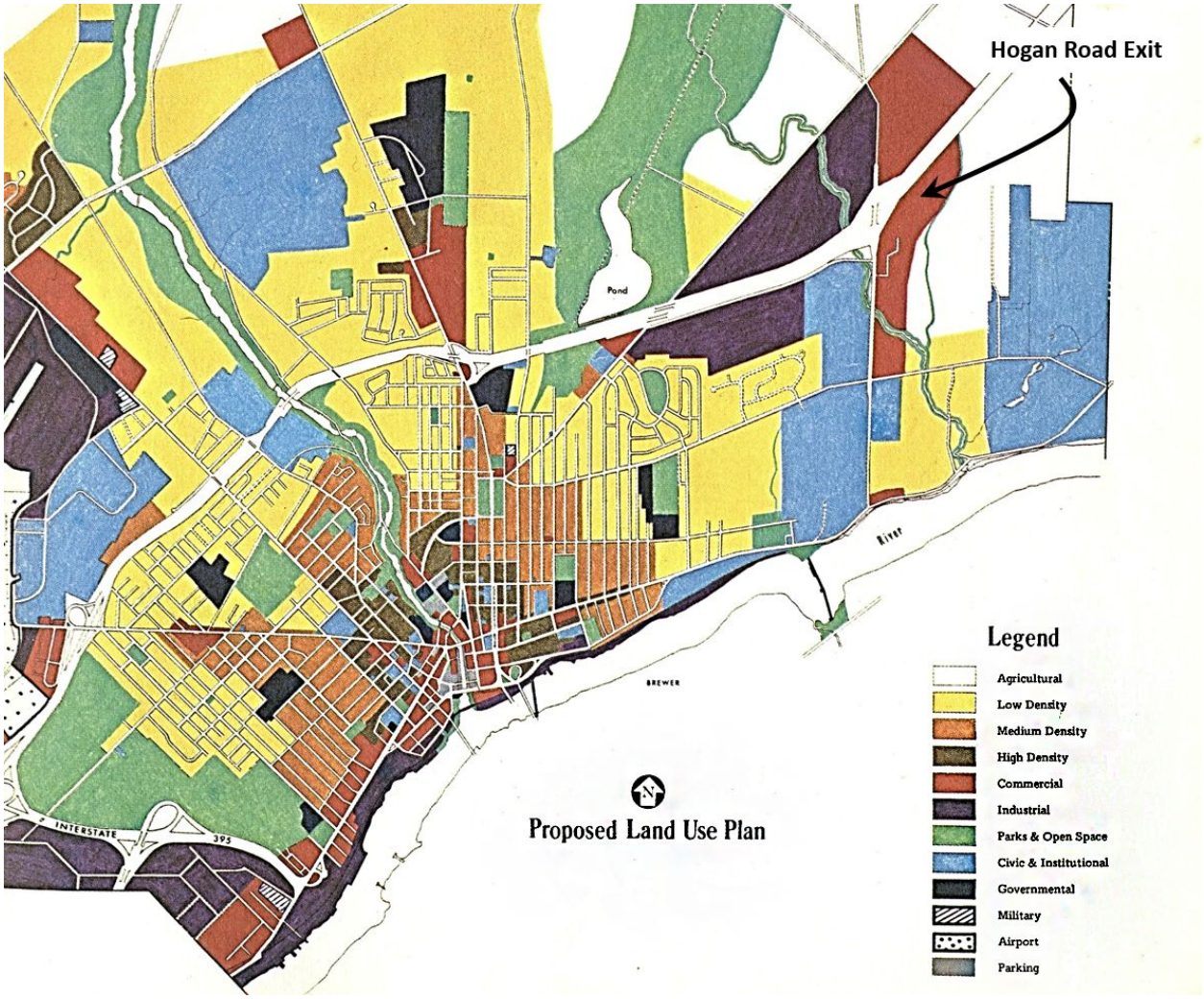

Figure 22. Proposed land use in Bangor, Maine for 1985 (Bangor 1969).

The Sewall photographs allow a way to visually test these predictions, and give a view of the development of the area around this interchange over time. Figure 22 shows the Hogan Road area prior to the construction of Interstate 95 and the Hogan Road interchange. The area is clearly agricultural with a few residential structures (low density) and presumably some vacant areas also. Figure 23 shows the area in 1965, two years after the construction of the highway and interchange. Although slightly more development is seen here, the image more or less agrees with the 1969 existing land use assessment.

Figure 22. Hogan Road area in 1957 prior to the construction of Interstate 95.

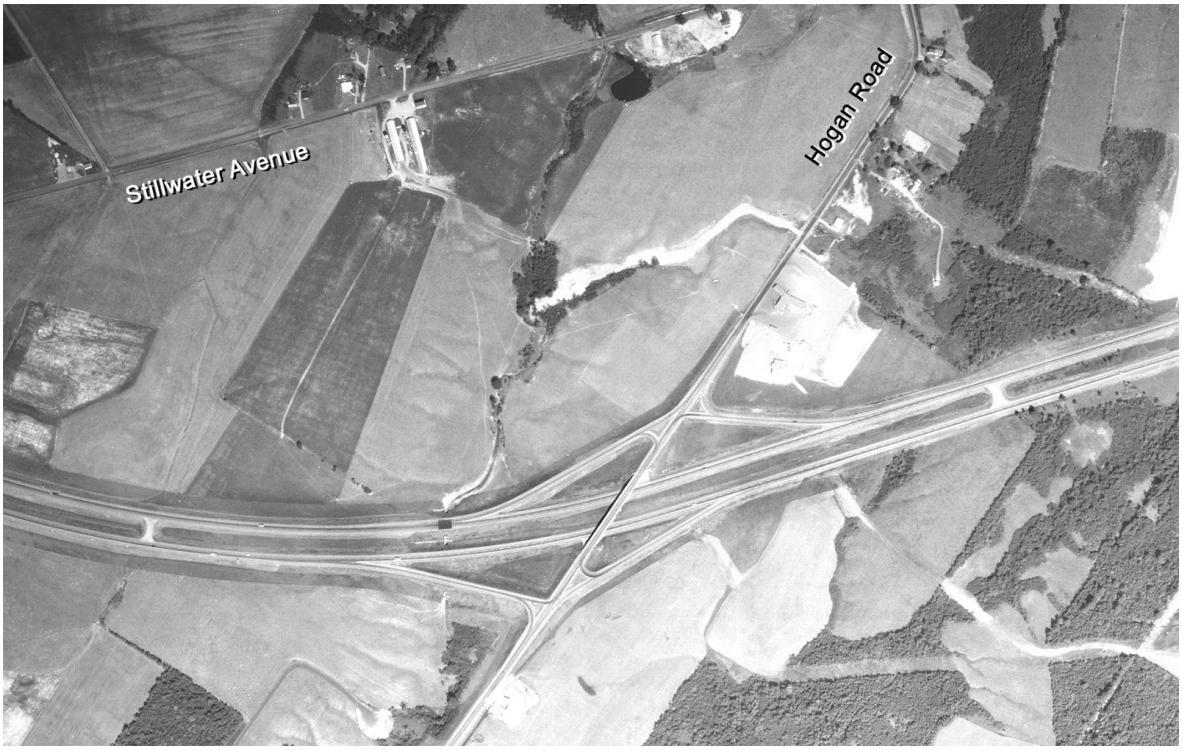

Figure 23. Hogan road area in 1965 after construction of Interstate 95 and the interchange.

The 1969 proposed use for 1985 can be compared to a photograph from 1993 (Figure 25). The 1993 image shows extensive development including the Bangor Mall, constructed in 1977. The proposed 1985 land use for the Bangor Mall area is given as industrial, but here commercial development is seen instead, with many retail facilities surrounding the interchange on all sides. At the lower left of the image is Eastern Maine Technical College, renamed from Eastern Maine Vocational Technical Institute, and currently Eastern Maine Community College. Finally a current image from Google Earth (Figure 26) shows the area in 2020. The area has been even more extensively developed at this point, with more commercial development on both sides of Stillwater Avenue and to the lower right of the interchange, an area vacant in the 1993 image. Evident also is the 1996-98 renovation and expansion of the Bangor Mall. Eastern Maine Community College has expanded to include more buildings, and the area surrounding it has additional commercial development.

Figure 25. Hogan Road area 1993.

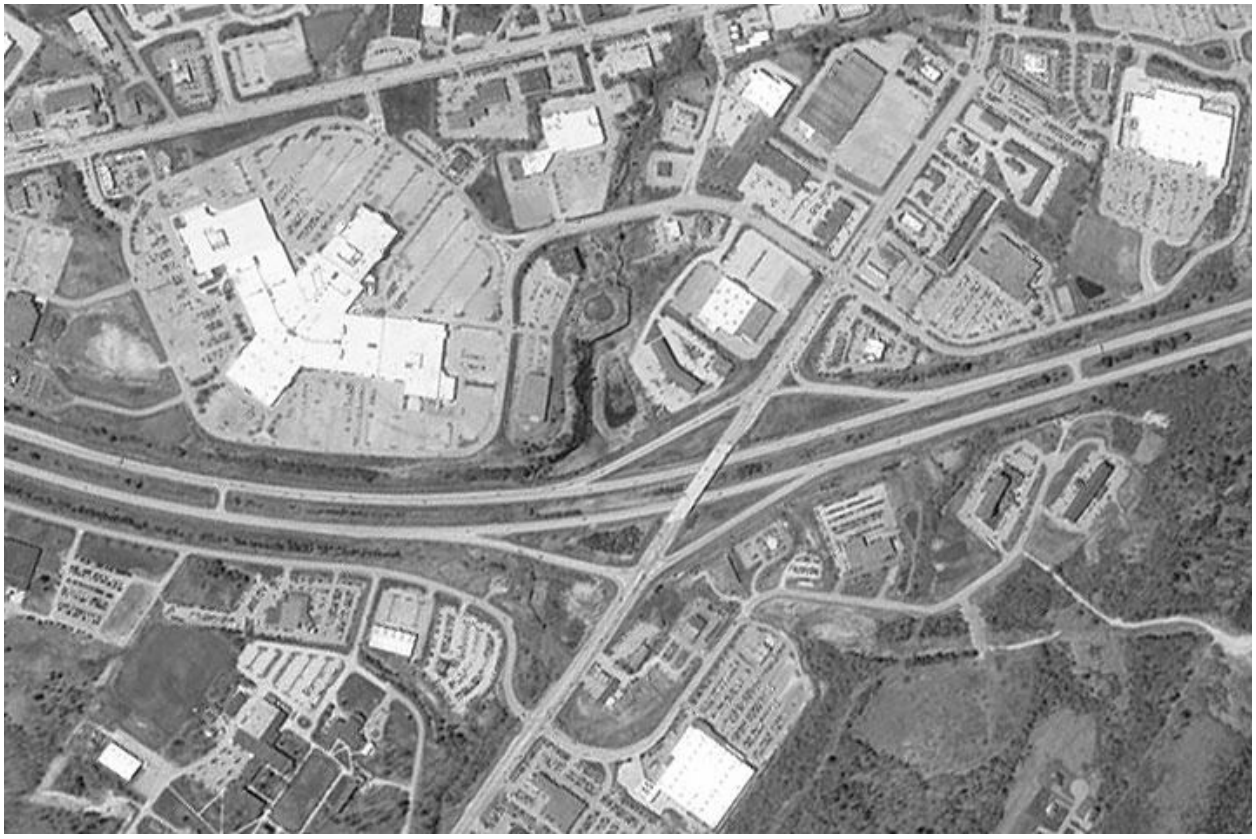

Figure 26. Hogan Road area 2020.

Conclusion

The Sewall Company Aerial Photograph Collection at UMaine's Fogler Library Special Collections is a vast resource for potential research in both the sciences and humanities. This work has presented only three of the almost limitless research possibilities. It is hoped that these examples will inspire and motivate the use of the images for years to come. Many of the images are available on the Special Collections Digital Commons site at https://digitalcommons.library.umaine.edu/sewell_aerial/.

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