ABSTRACT

Title of Dissertation:	A LANDSCAPE ILLUMINATED: AN ARCHAEOLOGICAL INVESTIGATION INTO THE BUILT LANDSCAPE OF SPLIT ROCK LIGHTHOUSE
	Scott Michael Tooker, Master of Professional Studies, Cultural and Heritage Resource Management, 2023
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Placed into operation in 1910, Split Rock Lighthouse originally sat atop a rocky landscape devoid of any lawn. Over the years, the men who worked at the lighthouse undertook the massive endeavor of building a level and functional landscape that is seen today. These landscape building efforts are documented in historic logbooks and diaries and the changes are clearly visible through historic photography. This thesis is an investigation into how the landscape was built, when it was built, and where the building took place. Utilizing historic documentation, archaeological fieldwork, and GIS technology, I demonstrate when the building occurred, the seasonal nature of landscape building at the lighthouse, where most fill materials were added, and begin exploring where the soils may have come from. This investigation treats the landscape as an archaeological artifact to paint a richer picture of the lives of the historic lighthouse keepers of Split Rock Lighthouse.

A LANDSCAPE ILLUMINATED: AN ARCHAEOLOGICAL INVESTIGATION INTO THE BUILT LANDSCAPE OF SPLIT ROCK LIGHTHOUSE

by

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Chapter 1: Introduction

The modern-day manicured landscape at Split Rock Lighthouse is not natural and is the product of intense filling and leveling activities by early lighthouse keepers and staff. These efforts of soil gathering are captured in scores of historical documents, from the daily logs kept by the lighthouse keepers, letters written by family members who lived at the lighthouse, recounted in oral history interviews, and visible when comparing historic photographs of the lighthouse lawn with modern photography. This massive undertaking of landscape building around the lighthouse grounds was a long-term endeavor, but questions remain about how much soil was brought in, where it came from, when areas of the landscape were filled, and how the landscape changed over time. This thesis is an investigation exploring these questions. Particularly, how did the landscape change through time, when did most of the landscape building occur, and how was it changed? More broadly, how can viewing a site as a holistic landscape rather than separate historic buildings impact our understanding of the people who built it and what was important to them?

Today, Split Rock Lighthouse is a historic site managed by the Minnesota Historical Society (MNHS). Predating the state of Minnesota, MNHS is a private not-for-profit organization chartered in 1849 by the Minnesota Territorial Legislature. It serves as an artifact repository, research organization, and site manager for 31 historic sites and museums. Its stated goal is to use "history to cultivate curiosity and foster a more inclusive, empathetic, and informed society" (MNHS 2023). Returning to Split Rock Lighthouse, the site was listed on the National Register of Historic Places

(NRHP) in 1969 and received a National Historic Landmark (NHL) designation in 2011 (Ferguson 1969 & Faltinson 2008). Its areas of significance for the NRHP nomination include its associations with commerce, engineering, and transportation (Ferguson 1969: 3). Faltinson considered it significant in his NHL nomination “for its association with the development of American commerce and transportation on the Great Lakes. It is also significant for its architecture as a highly intact and stylistically cohesive early twentieth century, Great Lakes light station designed by the U.S. Lighthouse Board as a single, cohesive, self-sufficient complex" (2008: 4).

The lighthouse complex consists of not only the original lighthouse and fog signal building, but also three residences, two barns/garages (originally three, but Barn 1 was destroyed by fire in 1967), oil house, tram house, pump house, and lawn (Figure 1).

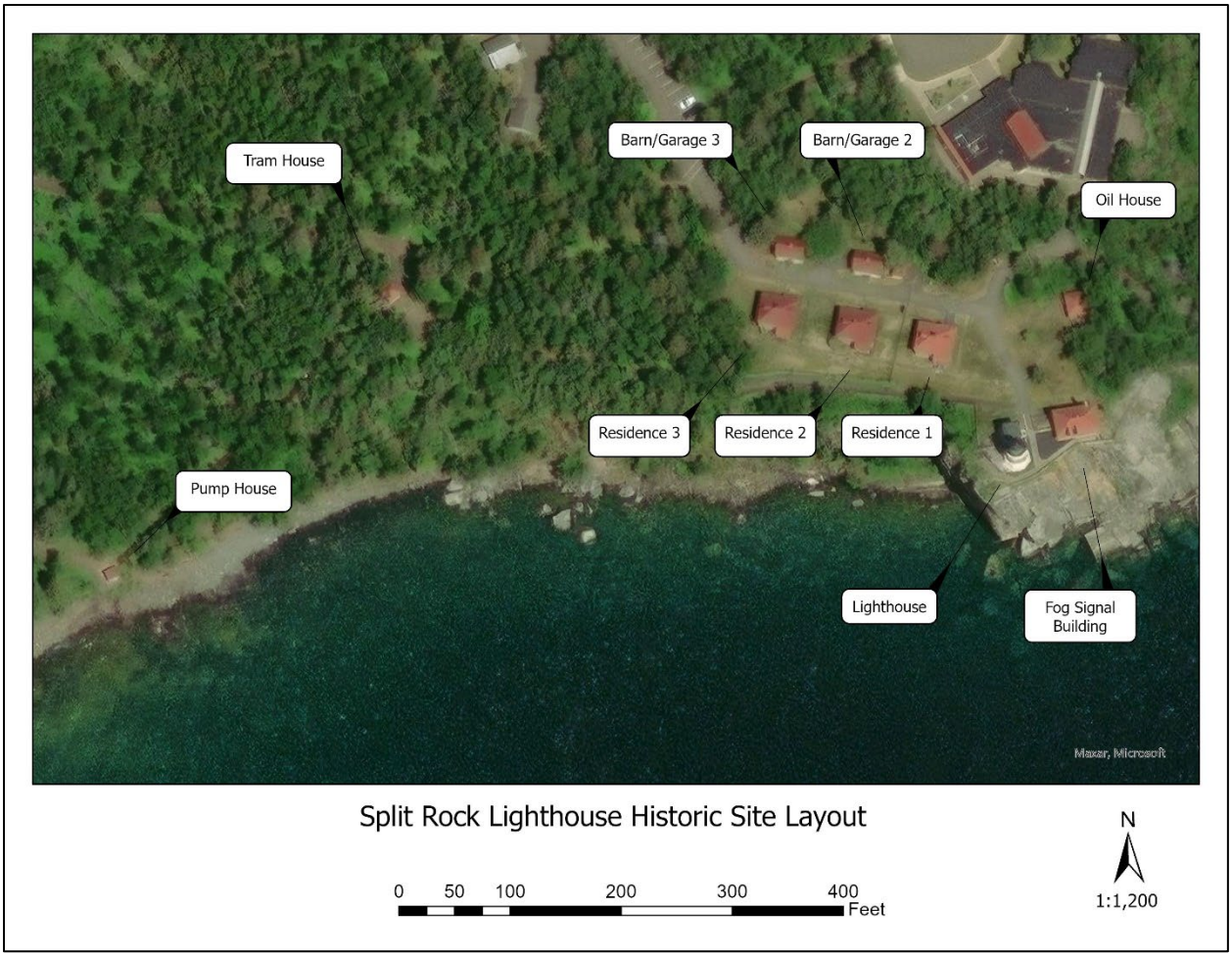


Figure 1. Layout of Split Rock Lighthouse Historic Site. Map created by author.

Built in 1909-1910 and put into operation in 1910, Split Rock Lighthouse was an invaluable navigational tool for the shipping industry of the Great Lakes region. It functioned in this capacity until modern navigational technology rendered it obsolete in 1969. Throughout its use as a lighthouse and its eventual retirement, it became a beloved tourist attraction in northern Minnesota.

It was not only a navigational tool and tourist attraction, however. It was also a home for the lighthouse keepers and their families. From 1910 to 1931 the lighthouse keepers lived on-site from April-December and year-round beginning in 1931 (Quinn Evans 2018: 72). Because of this, the landscape built for the lighthouse

and as a ground for tourists was also utilized in a myriad of utilitarian ways. Historic records indicate gardens to feed the family were created, clotheslines were installed, a chicken coop was built, and even a koi pond was installed (Split Rock Lighthouse records 1910-1967). All these uses would not have been possible if the original rocky, uneven landscape (Figure 2) was not replaced by a level and functional lawn (Figure 3).

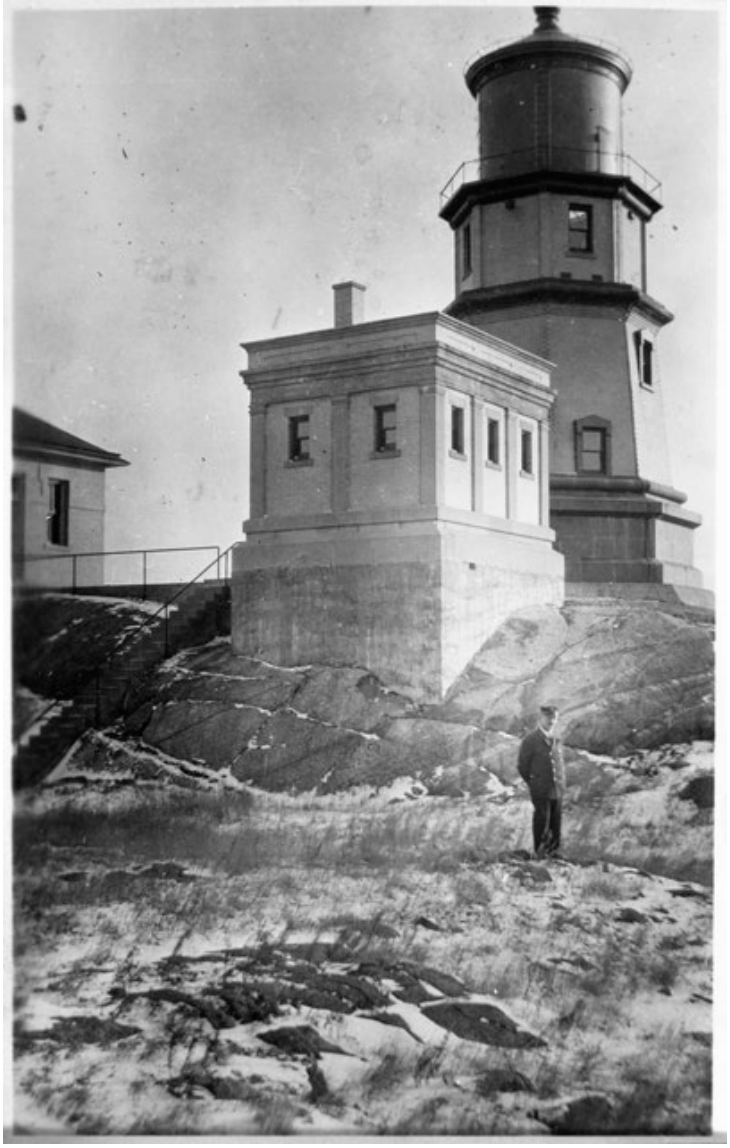


Figure 2. Split Rock Lighthouse lawn as it appeared in circa-1925. Note the uneven and primarily non-vegetated lawn. Reproduced with permission by the Minnesota Historical Society.



Figure 3. Split Rock Lighthouse as it appears today. Note the level, manicured lawn surrounding the lighthouse. Reproduced with permission by DWhike's Adventures.

Over the course of the MNHS Archaeology Departments 2022 summer field season at Split Rock Lighthouse, discussions of the built landscape were a frequent topic of conversation between archaeologists and site interpreters — "Where did they get the soil from? How much did they gather? They must have used the tramway. It couldn't have been gathered far away, the lighthouse keepers did not have a truck until the 1930's. They would have had to do it all by hand. Etc." It was during these field investigations and frequent discussions that my thesis topic was decided.

This thesis materialized in an archaeological investigation exploring the built landscape of Split Rock Lighthouse. Investigatory methods included an amalgamation of the following: data recovered from the archaeological fieldwork, archival research for identification of all recorded landscape building activities throughout the history of the lighthouse, a tabulation of these entries to better understand landscape change

through time and the seasonality of landscape building activities, a geographic information systems (GIS)-based cut-and-fill analysis to determine how much and in what locations fill was added across the Split Rock landscape, and a desktop Light Detection and Ranging (LiDAR) survey to identify features indicating potential soil gathering locations in the surrounding landscape.

As a part of their duties, the lighthouse keepers at Split Rock Lighthouse were required to keep a daily log of their activities and duties performed. These entries offer an opportunity to gaze into the daily lives of the men who kept the lighthouse operational and how they spent their time. They also can be used as a means of data collection to track when events occurred at the lighthouse or what changes occurred. Entries range from broad, single lines of text with no detail (e.g. "Finished grading." May 18, 1917) to detailed accounts of what occurred (e.g. "Removed tram track from oil house to 2d asst. dwelling and will rebuild same again placing in center of driveway so to leave the space clear between the drive-way and dwellings, hauled dirt to fill the space where we removed track." May 10, 1933). In either case, the Daily Logbooks and Diaries kept by the lighthouse keepers are a uniquely rich resource to investigate the built landscape at Split Rock Lighthouse.

Complementing the data contained in the daily logs are two GIS-based investigatory methods. Cut-and-fill analysis is a tool to determine where soils/fill material were either added or removed from a location. To accomplish this, elevation data from a pre-lighthouse map from 1907 was compared to a post-lighthouse 1956 USGS topographic map. These elevations were subtracted from one another, thereby

demonstrating where elevations increased (soil added) and where elevations decreased (soil removed).

LiDAR is "a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth. These light pulses— combined with other data recorded by the airborne system— generate precise, three-dimensional information about the shape of the Earth and its surface characteristics" (NOAA 2023). This data creates a highly detailed map showing natural and manmade environments with accuracy, precision, and flexibility (NOAA 2023). In archaeology, this data can be used to identify pre-historic or historic features obscured by vegetation or other landscape-modifying activities.

This research is significant because Split Rock Lighthouse, and the early lighthouse keepers, are topics of great interest to people throughout Minnesota and the Midwest. Split Rock Lighthouse is one of Minnesota's most popular attractions, hosting roughly 160,000 visitors per year (Nelson 2022). It is the subject of books, newspaper articles, and is often mentioned as one of the most photographable locations in Minnesota. Understanding when, where, and how landscape building occurred at Split Rock Lighthouse would expand the story of the early lighthouse keepers. Additionally, this thesis holds archaeological significance as it serves as an endorsement of landscape archaeology. The findings of this investigation demonstrate that viewing the site through a landscape perspective offers new avenues of discovery and expands the story of the site.

This thesis is organized into six additional chapters, beginning with the theoretical background chapter. This chapter introduces the theory of landscape

archaeology and traces the development of this theory from its inception to its current, diverse area of study. The theory of landscape archaeology is important to this investigation because it provides the basis and background orienting landscape as an archaeological artifact, the general idea being that landscape construction can offer insights into past human behavior. In the case of Split Rock Lighthouse, a better understanding of the fill layers offers a new perspective of the day to day lives of the people who worked and lived at the lighthouse.

Following the theoretical background chapter is the historic context chapter. In this chapter, the history of Split Rock Lighthouse is outlined, explaining why it was needed, who built it, when certain buildings were built or modified, as well as other developments. I trace the lighthouse's progression from a functional lighthouse used for navigation, to a tourist attraction, and finally to a historic site. Additionally, historic documentation pertaining to lawn construction will be introduced. These documents include the lighthouse keeper's logs, historic letters, an oral history interview, and historic photographs. All of this is used again later to illustrate the massive endeavor it was to build the lawn at Split Rock Lighthouse.

The methodology chapter follows and will outline how the data I used was collected and manipulated to create the results. This will begin with a summary and explanation of the methodology of the field portion of my thesis and where soil data was collected from Split Rock Lighthouse. Following this explanation will be an overview of the archival research portion of my data collection and explanation of the different historic and primary resources consulted. Next, I explain how this primary source data was catalogued, tabulated, and categorized to create easy-to-read tables

and frequency charts, thereby allowing for landscape building patterns to be more easily recognized. Following this is an overview of how the volumetric cut-and-fill analysis is conducted, including the georeferencing of historic maps, correction of elevation data between maps, and a step-by-step guide on completing the analysis. Finally, the desktop LiDAR investigation methods are outlined along with a justification for locations of particular interest.

The results chapter presents the primary source data collected by this investigation. This begins with a table containing all documented landscape building activities at Split Rock Lighthouse identified in the historic documents, the date they occurred, contents of the entry, and activity designation given. These instances of landscape building are then presented as tables and charts illustrating landscape building frequency by month, year, and decade. This information is then used to trace the development of the Split Rock Lighthouse landscape through time. In some cases, this is structured by the dates of significant events at Split Rock and in some cases, it is arbitrary by year/decade. Working in concert with the documentation, historic lighthouse photography is analyzed to further build upon this timeline.

The analysis chapter provides a synthesis of the data presented in the results chapter. The chapter begins by outlining the scope and findings of the 2022 fieldwork at Split Rock Lighthouse, with results of this fieldwork being used as an interpretive lens to analyze the results of the cut-and-fill analysis. The results of the analysis are compared to soil fill depths at different locations across the lawn, with some results of the cut-and-fill analysis being called into question. Providing further interpretation to the cut-and-fill analysis are relevant Logbook and Diary entries for specific lawn

locations. Next, the activity designations given to each logbook entry are discussed with trends in generalized activities being identified. Finally, the LiDAR investigation is compared to modern aerial photography and environmental factors to explain why no gathering locations could be identified.

Finally, in the conclusion I further expand on how this data can be used and discuss some limitations of this study. It is my goal that this investigation is the first step in further research into the built landscape of Split Rock Lighthouse. New research to identify soil gathering locations and soil gathering methods could illuminate heretofore unknown aspects of life at the lighthouse and this tabulation of landscape building events, GIS modeling, and LiDAR data can form a basis for those investigations. It is my hope that this question can be explored further by myself, or a future researcher and that this thesis provides a valuable tool to consult during those investigations.

Chapter 2: Theoretical Background

This investigation into the built landscape of Split Rock Lighthouse will be based on the theory of landscape archaeology. This wide-ranging theory posits that the landscapes past peoples occupied can offer insights into their behaviors, social structures, and ways of life. This investigation, specifically, will focus on an idea best summarized by Parcero-Oubiña et al. (2014). They write, "as a research object, considering that the landscapes we see today should themselves be considered as an archaeological record as a whole. Current landscapes would be the more obvious 'artefacts' produced by human groups through time" (2014: 1). Following this idea, the built landscape and extensive fill events at Split Rock Lighthouse can be considered an archaeological artifact in themselves. To begin, however, an outline of the development of landscape archaeology must be understood.

Like much of archaeological theory, landscape archaeology traces its beginnings to the other sciences. The ideas forming the basis of landscape archaeology comes from the term *Kulturlandschaft*, or cultural landscape, which originated in the works of several 19th century German thinkers—the most prominent being Friedrich Ratzel. Trained as a natural scientist, his work as a geographer saw him travel on several expeditions to the United States of America (Pottshoff 2013: 52). It was in writing about these expeditions that Ratzel's ideas about cultural landscapes were developed. In describing the landscape of the United States, Ratzel provides a succinct definition of what he views to be a cultural landscape. In characterizing Ratzel's definition, Pottshoff writes, that "…traces of human activity have an impact on the character of the landscape (Ratzel 1893: 725). Thus, cultural

landscapes are a result of human activity" (2013: 52). It is the defining work of Ratzel that will have some of the most profound effects on the field of cultural landscapes and archaeological landscapes going forward.

American geographer Carl Sauer was the first to translate Ratzel's idea of *Kulturlandschaft* into English and provide us with our initial English definition (Potthoff 2013: 49). He writes,

> The cultural landscape is fashioned from a natural landscape by a culture group. Culture is the agent, the natural area is the medium, the cultural landscape is the result. Under the influence of a given culture, itself changing through time, the landscape undergoes development, passing through phases, and probably reaching ultimately the end of its cycle of development. With the introduction of a different—that is, alien—culture, a rejuvenation of the cultural landscape sets in, or a new landscape is superimposed on the remnants of an older one (1925: 46).

Though he was a geographer by trade, this definition reads as though it came directly from a trained anthropologist. Sauer recognizes that culture is ever changing and will continue to affect the natural world in a myriad of ways. According to Norton, this is a continued theme throughout Sauers works. Norton identifies three factors Sauer claims are important to study when it comes to landscapes. They are, "the physical environment, the character of the people, and time" (Norton 1989: 37). These three characteristics of cultural landscapes can be identified in almost every development in the study going forward. From here, the discipline first branches into two distinct courses of theory that rapidly evolve into a multi-disciplined field.

The first is a study based in humanism that includes perspectives of existentialism, feminism, idealism, phenomenology, and interactionism. This branch of cultural landscape study applies theory in three distinct ways.

> First, they often show a greater concern for sociocultural and political processes in landscape-shaping processes than people's relations with specific natural environmental contexts. Second, they apply critical social and cultural theory in its humanistic interpretations. Third, they consider all forms of landscape, not just visible physical features, as cultural signifiers whose interpretation reveals cultural attitudes and processes (Anschuetz et al. 2001: 165).

The breakdown of this approach of cultural landscape study provides a picture as to how the field will eventually be morphed into a type of archaeological study. The clear influence of human actions on landscape in relation to both visible and non-visible culture plays into the goals of archaeology in understanding the behaviors and beliefs of past peoples.

Fields of study that employ this approach include geography, architecture, environmental design, cultural anthropology, and historical ecology, with each field using the idea of cultural landscapes in their own way (Anschuetz et. al 2001: 165). Landscape architect John Jackson defines landscape as "a space or collection of spaces made by a group of people who modify the natural environment to survive, to create order, and to produce…society" (Jackson 1995:43). Of landscapes, architect Amos Rapoport writes, "people seem to shape and interact with built environments/material culture primarily through meaning and this seems to hold over time, cross-culturally, and in all kinds of environments, contexts, and situations" (1990: 42). Cultural Anthropologist Melissa Baird studies landscapes from a critical heritage theory lens and defines landscapes succinctly as "heritage." To Baird, landscapes "figure prominently in people's lives and imaginations. As places of memory and belonging, landscapes often transcend theoretical understandings: they hold knowledge, memories, histories, songs, traumas, and so on" (Baird 2017: 4).

This idea of landscapes containing meaning about culture is huge in the study of landscape theory and is a determining factor in landscapes being an arena of study for archaeologists.

The second split that Anschuetz et al. identify in the development of cultural landscapes is a study based on positivism. These types of cultural landscape studies emphasize "spatial quantitative approaches in the documentation and evaluation of the human occupation of physical space. These approaches include movement, network, node, hierarchy, and surface models…" (2001: 164). The addition of positivistic approaches to cultural landscapes provides the burgeoning field with a hard science approach to examining landscapes. These developments include methods such as models of physical systems, models of socio-economic systems, and models of mixed systems (Chorley & Haggett 1967). The development of these models will be instrumental in the early studies conducted by landscape archaeologists.

One of the first examples of the theory of cultural landscapes being used in archaeology is the creation of site distribution maps in the early 1900's. The distribution map "by its very existence implies the co-ordination of scattered evidences and the establishment of a synthetic relation with their [peoples] geographic background" (Clark 1933: 232). Eventually, these maps illustrated a changing distribution pattern of sites over time, thus beginning to account for the influence of time on the landscape. Of settlement patterns, early landscape archaeologist Gordan Willey writes, "settlements reflect the natural environment, the level of technology on which the builders operated, and the various institutions of

social interaction and control which culture maintained…. they offer a strategic point for the functional interpretations of archaeological cultures" (1953: 1).

From Willey's foundational work, settlement studies advanced with new technologies and theories. Like most of archaeology, the investigation of settlement patterns was influenced by Lewis Binford in the development of new archaeology. In his 1982 "The Archaeology of Place," Binford presents a series of economic zones that mobile groups utilize over time, thereby creating "diagnostic forms of chronological patterning at sites" (6). Briefly, he explains, "imagine of a group of hunter-gatherers moving about the landscape. A particular place may be used as a hunting camp at one time, a transient camp at another, and a short-term observation stand at still another" (Binford 1982: 20). Each of these site types would leave a unique archaeological assemblage behind and create a landscape exhibiting how a group adjusted their lifeways based on environmental impacts. Binford does not mince words with his embrace of the investigatory potential of settlement systems analysis. Of settlement pattern studies, Binford writes, "site patterning in both within-place and between-place contexts is a property of the archaeological record" (1982: 6).

Settlement and distribution studies have only grown more diverse from here. The emergence of new technologies have caused an explosion of variety in distribution studies. Hammerstedt et al. have demonstrated the use of magnetic gradiometry to reconstruct the land use pattern surrounding the Spiro Mound Group in Oklahoma (2017), Jennie Sturm uses ground penetrating radar and historic aerial photographs to determine economic and social shifts in Chacoan society by

identifying changes in buried landscape modifications in the American Southwest (2017), and Daniel Lynch and Rory Becker encourage the use magnetic susceptibility surveys to identify activity areas at historic-era sites to aid in reconstructing site layout and land use patterns (2017).

Through the development of landscape archaeology outlined above, three distinct foundational archaeological landscape perspectives have been formulated. Anschuetz et al. identify them as settlement ecology, ritual landscapes, and ethnic landscapes (2001: 176). Though each type will be examined individually, an archaeological landscape can be one or many types of landscapes. As Heinlen points out, "…a single arbitrarily defined parcel of land could contain a single archaeological landscape or many archaeological landscapes depending on how archaeological phenomena are categorized and defined" (2005: 36) Human's use of the land is diverse and variable, oftentimes making it challenging to classify it into a single category. Examining these landscape aspects individually, however, provides a clearer understanding of the wide breadth of archaeological landscapes.

Settlement ecology refers to a refined approach to settlement patterns, but also to patterns of land use visible in the archaeological record, and transformation of land over time (Anschuetz et. al 2001: 177). Examples of this include examining the changes in farming practices or resource extraction practices and how they changed over time to provide insights into how a group interacted with the land. As Christopher Tilley notes, landscapes are "always changing, in the process of being and becoming, never exactly the same twice over. Places alter according to natural rhythms such as the progression of the seasons, time of day, qualities of light and

shade, and so on" (2010: 27). Examining long term stability of resource extraction methods can indicate a period of environmental and cultural stability, while rapid shifts in resource extraction methods are indicative of large-scale shift in the society or environment. Settlement ecology can offer archaeologists a glimpse into how a group managed and developed their resources and the speed with which their culture changed.

Ritual landscapes refer to "the products of stereotyped actions, including specific acts and sequences of acts that represent the socially prescribed orders by which communities define, legitimize, and sustain their occupation of their traditional homelands" (Anschuetz et. al 2001: 178). Ritual landscapes focus on the distributional patterns of public buildings, squares or plaza, monuments, petroglyphs, and other important features. To accomplish this, landscape archaeologists rely on a combination of ethnography of present-day people's ritualistic land use as a projected analogy onto people of the past, historical interpretations from texts, or remaining historic landscape features. An example of this is Mark Leone's work on the William Paca Garden in Annapolis, Maryland. Leone utilized historic garden manuals and examination of remaining historic gardens in the area to determine the Baroque-style of garden planning used at the Paca Garden. This style of garden planning projects a sense of grandeur, and therefore power, by designing a garden around illusions of space and perspective tricks to appear much larger than it actually is (Leone 2005). Ritual landscapes can be especially informative on past cultures beliefs because, "traditional wisdom often is tied to places, thus the landscape is full of history, legend, knowledge, and power that help structure activities and organize

relationships" (Anschuetz et. al 2001: 178). These structures can be identified in the archaeological record and can provide insights into the history and legends of the people who made them.

Ethnic landscapes are studied as "spatial and temporal constructs defined by communities whose members create and manipulate material culture and symbols to signify ethnic or cultural boundaries based on customs and shared modes of thought and expression that might have no other sanction than tradition" (Anschuetz et. al 2001: 179). This type of landscape study is partially based on Alfred Kroeber's idea of a "culture area." According to Kroeber, a culture area consists of three aspects. First is a "core," where one specific cultural identity holds a singular hold over the area. Second is a "domain," where several cultural identities are present but are subordinate to one dominant cultural identity. Finally, a "realm," where a groups cultural identity is present, but subordinate to one or several other cultures identities (Kroeber 1923). Using this theoretical basis, landscape archaeologists look for changes in landscape modifying behavior to extrapolate onto a group's collective and personal identities, social stratification, and group traditions.

Settlement ecology, ritual landscapes, and ethnic landscapes are three perspectives of the study of archaeological landscapes that form a general outline of some of the courses landscape archaeologists may take. Several characteristics are shared between the three and all attempt to show that "…people are more than passive recipients of change imposed from outside their cultural systems. People are agents who contribute to conditions warranting the restructuring and reorganization of their interactions with their physical settings…" (Anschuetz et. al 2001: 181). These

restructuring activities relate back to a groups culture, subsistence, economy, traditions, and group interactions. This repositions landscapes as a type of archaeological artifact worthy of study in that "…people generate a landscape of cultural product, which their contemporaries and descendants inherit and inhabit for their own purposes. In this process, a group's landscape conceptualization becomes a key element of its cultural heritage… (Anschuetz et. al 2001: 182). Landscapes reflect beliefs back onto the people who created them and provide a wealth of information for an archaeologist to study.

It is through this lens that the fill episodes and landscape building activities at Split Rock Lighthouse can be studied archaeologically. Archaeological investigations into fill episodes is an area ripe with archaeological potential, with even James Deetz definitively endorsing it's potential in his seminal book *In Small Things Forgotten.* He writes, "Fill is an artifact itself, and intelligent study of it can be most instructive" (1977: 23). The construction of the Split Rock Lighthouse landscape can offer insights into the lifeways of the past lighthouse keepers and their daily tasks. It is with the theoretical steppingstones outlined above that such an investigation has the basis for archaeological study.

Chapter 3: Historical Background

Situated in the arrowhead region of Minnesota, Split Rock Lighthouse was constructed in 1909-1910 to aid commercial and transport ships on the Great Lakes as they moved goods around the area. Utilizing the ports at Two Harbors and Duluth-Superior, ships would transport iron from Minnesota's Iron Range for use in the production of steel and to deliver grains from the upper Great Plains region to the populations in northern Minnesota. Violent weather on Lake Superior would routinely wreak havoc on the boats, causing them to blow and crash into the rocky North Shore of Lake Superior. It was decided a lighthouse was needed to aid this important industry and prevent the loss of ships and goods (Faltinson 2008: 4). Thus, an undeveloped location was chosen overlooking Lake Superior for the construction of Split Rock Lighthouse.

History of the Region

Prior to the lighthouse's construction, the North Shore of Lake Superior was primarily undeveloped land. Pre-contact Native American sites are sparsely scattered throughout the area, but with poor preservation conditions and the changing level of Lake Superior not many site locations are known (Quinn Evans 2018: 149). Beginning in the 1700's, French fur traders arrived in the area to hunt and catch beaver and by 1780 fur trading posts had been established at modern day Duluth/Superior and Grand Portage, Minnesota (Quinn Evans 2018: 35). The 1854 Treaty of La Pointe ceded Lake Superior Ojibwe lands to the United States, which included the majority of the North Shore along Lake Superior. This treaty opened the

land to the many loggers waiting to cut the vast pine stands of the region (Quinn Evans 2018: 36-37). By the early 1900's the area was largely clear-cut (Faltinson 2008: 5). The discovery of iron ore deposits in the Vermillion Iron Range in 1865 caused an explosion in the Northern Minnesota mining industry. Between 1884-1911, three separate mines began shipping ore across Lake Superior (Minnesota Public Radio 2006).

Lighthouses in America

Up until 1789, lighthouse construction and administration was considered a colonial or individual state obligation, but on August 7, 1789 congress authorized the federal government to pay for costs associated with aids to navigation (Weiss 1926: 1-3). This authorization established the Lighthouse Establishment as a part of the Department of Treasury, with the obligation for "rebuilding when necessary, and keeping in good repair, the lighthouses, beacons, buoys, and public piers in the several states, and for furnishing the same with all necessary supplies" (Weiss 1926: 3). Although the Lighthouse Establishment was ordered to maintain lighthouses across the growing nation, most of the work done at individual lighthouse inspections and lighthouse operations was done with minimal oversight. This caused a wide variety of operational standards and was deemed to be inefficient. Because of this inefficiency, in 1838 Congress established eight lighthouse districts – six for the eastern seaboard and two for the Great Lakes region, with each lighthouse district overseen by a naval officer (Faltinson 2008: 25). In 1852, the Lighthouse Establishment was replaced by the Lighthouse Board and replaced the eight lighthouse districts with 12 management districts (with still only two districts for the

Great Lakes). In 1903, oversight of the Lighthouse Board was transferred to the Department of Commerce and Labor (Faltinson 2008: 25). 1910 saw the Lighthouse Board replaced by the Bureau of Lighthouses, under the umbrella of the Department of Commerce. Additionally, the 12 management districts were expanded to 19 districts, with the Great Lakes region gaining one additional district. The Bureau of Lighthouses would create the U.S. Lighthouse Service to serve as lighthouse staff and lighthouse inspectors to further attempt to standardize operations and create a uniform inspection system (Faltinson 2008: 27). In 1939, the U.S. Lighthouse Service was absorbed into the U.S. Coast Guard, changing lighthouse management yet again. The U.S. Lighthouse Service absorption into the U.S. Coast Guard would also shrink the 19 districts down to 13, with the Ninth District, located in Cleveland, Ohio, responsible for the Great Lakes region (O'Brien 2001: 71).

A History of Split Rock

In November of 1905, the North Shore of Lake Superior was rocked by the violent "Mataafa Storm." This storm was estimated to cause at least $1,750,000 in damage to ships and goods, including the sinking of the Maderia schooner-barge. This shipwreck quickly became a local legend, as the heroism of crewmember Fred Benson saved nine of the ten crewmembers, hoisting them to the top of Gold Rock while the Maderia was being pounded against the rocky cliffs below. Split Rock Lighthouse's existence can be traced directly to the events of this violent storm and the sinking of the Maderia. It was after the incredible loss of property that the Lake Carriers Association, a still-active Great Lakes shipping advocacy group, launched a campaign for a government-funded light station (Faltinson 2008: 29). Of the impetus

to eventually build Split Rock Lighthouse, historians note, “although it is inconceivable that a lighthouse could have averted such a disaster [the sinking of the Maderia], Split Rock Light clearly owes its existence to that storm and that storm alone” (Agrant & Foster 1991: 4).

Once funding for the lighthouse was secured by congress in 1907, Ralph Russel Tinkham was hired to design and build Split Rock Lighthouse. After earning an engineering degree from the University of Michigan in 1905, Tinkham began his career at a structural steel engineering firm in Detroit, Michigan (Faltinson 2008: 30). In 1908 Tinkham joined the Eleventh Lighthouse District, serving as site engineer for the Rock of Ages Lighthouse in Michigan. It was during his time at the Rock of Ages Lighthouse that he created the plans for the first lighthouse he would ever design himself –Split Rock Lighthouse. Following his success at Split Rock Lighthouse, in 1911 Tinkham would be promoted to the assistant superintendent of the Eleventh District where he oversaw lighthouse engineering and construction. In 1915, Tinkham would accept the position of superintendent of the Sixteenth District in Alaska, where he would again oversee lighthouse engineering and construction. Tinkham would serve in the Army Corp of Engineers during World War I, but after the war he returned to the Lighthouse Service in a scientific investigative position in the Third District in New York, where he conducted photometric and acoustical studies. Tinkham would return to lighthouse construction in 1921, when he would vacillate between assistant or superintendent positions in New Orleans, Louisiana, Honolulu, Hawaii, or Portland, Oregon until 1935. In 1935, Tinkham became Chief Engineer of the US Lighthouse Service and then Captain in the US Coast Guard when the

Lighthouse Service was absorbed into the Coast Guard. He remained in this position until his retirement in 1946 (Faltinson 2008: 36-37).

Construction of Split Rock Lighthouse began in 1909 and was considered "an engineering and logistical feat in itself since there were no roads in this wilderness of swamps, forests, and underbrush. This meant that men and materials had to be brought over the lake…" (Ferguson 1969: 3). The hoist and derrick were the first structures installed at what would eventually become Split Rock Lighthouse, with the hoist being pulled up the rocky cliff from the lake below. Following its installation, the derrick components were hoisted up the cliff, erected along the cliff edge, and securely anchored to the rock surface (Tinkham n.d.). Once the hoist and derrick were properly installed, the rest of Split Rock's structures could be built.

The next buildings constructed were the three barns that would eventually serve as storage for their associated residence buildings. During construction, the storage barns served as office space, tool storage and living quarters for Tinkham. Concurrently with construction of the storage barns, the rock dome that would house the lighthouse, fog signal building, and three residences was prepared for construction. Preparations included blasting the dome which scattered cobbles and boulders across the landscape. Once suitable preparations were completed, the building foundations could be poured and construction of the buildings could begin. By the end of the 1909 building season the storage barns, exterior of the three residence houses, and fog signal building were completed as well as the steel frame of the lighthouse itself (Faltinson 2008: 30-31).

In spring of 1910, construction at the lighthouse resumed. While masons completed the brickwork for the lighthouse tower, the interiors of the residences, storage barns, and fog signal building were built. A short time later, U.S. Lighthouse Service personnel installed the lighthouse apparatus and fog signal. The lens itself is a Third Order Fresnel lens manufactured by Barbier, Benard et Turenne of Paris, France. This clamshell type lens contains two central refracting panels made up of hundreds of glass prisms. The lens rotates every 20 seconds on a bearing surface that contains 250 pounds of mercury. This set up weighs six-and-one-half tons and has a 220,000-candlepower rating (Faltinson 2008: 8).

By July, 1910 the lighthouse was considered ready for operation. In mid-July, Split Rock Lighthouse's first Principal Keeper, Orren "Pete" Young, arrived with his two assistants to familiarize themselves with lighthouse operation. On July 31, 1910 Split Rock Lighthouse's light was first lit and on the morning of August 16 the fog signal blew for the first time (Faltinson 2008: 31).

By 1914, the hoist and derrick were deteriorating and deemed to be in-efficient and dangerous. To hoist materials up to the lighthouse, supply boats would need to float very near the edge of Split Rock Cliff to be within range of the hoist. This proved to be an impractical method of supply delivery, as Clarence Young, the son of Keeper Young, points out: "where the old hoist stood the water at the foot of that rock is 40 or 50 feet deep. The large boats could come right up to it, but only when the water was perfectly calm. So it was impractical to bring all the supplies up that way" (Quinn Evans 2018: 52). The Eleventh Lighthouse District (the district overseeing Lake Superior and Huron) recommended that a tramway be built to

replace the material hauling function of the hoist and derrick. Derrick use was discontinued in 1916, when the tramway was completed and operational (Faltinson 2008: 32).

The next major development at Split Rock Lighthouse began to take shape in 1925, when work began on Trunk Highway No. 1/Lake Superior International Highway. This highway greatly improved accessibility to the North Shore region of Minnesota, ushering in the beginning of Split Rock Lighthouse as a major tourist attraction and spelling the beginning of the end of the tramway as a means for supply delivery. 1928 saw two major events, first Keeper Young retired and was replaced by Keeper Franklin J. Covell, and construction began on a road running along the tramway route in the lighthouse grounds. The first recorded use of a truck by lighthouse staff took place in 1930 and in 1931 it was decided the storage barns would be converted into vehicle garages (Quinn Evans 2018: 72). By the late 1930's tourism visitation to the lighthouse had exploded, with Keeper Covell estimating 100,000 visitors in 1938. These events began the eventual shift of Split Rock Lighthouse into the tourist destination it remains today (Faltinson 2008: 32-33).

The following years saw Split Rocks Lighthouse status as a tourist destination only grow. The lighthouse was touted by local publications such as the Duluth newspaper and Minnesota Arrowhead Association as a premier destination. To accommodate the increased foot traffic from tourists, Split Rock Lighthouse's staff expanded and a remodel of the interior of Storage Barn #1 was completed to house temporary employees. Management of the lighthouse also changed, with the U.S. Lighthouse Service being absorbed into the U.S. Coast Guard in 1939. Keeper Covell

would remain through this change but would retire in 1944. From here, lighthouse keepers would be assigned by the U.S. Coast Guard and would regularly transfer in and out of the position (Faltinson 2008: 33-35

The advent of modern navigational technology in the 1960's would begin to render Split Rock Lighthouse obsolete. In 1961 the U.S. Coast Guard discontinued use of Split Rock's fog signal, but its light signal remained lit. The signal would continue to be lit throughout the 1960's, but for the goodwill of the tourist industry rather than an essential navigational tool. By the end of the 1960's, the U.S. Coast Guard used the installation of lights and radio beacons at the ports in Silver Bay and Taconite, MN as justification for the retirement of Split Rock Lighthouse. On January 1, 1969 Split Rock Lighthouse was discontinued and readied to be sold off (Faltinson 2008: 35).

For two years Split Rock Lighthouse sat vacant while the General Services Administration determined a sale price. In this time, the lighthouse had been added to the National Register of Historic Places, and there was a desire for Minnesota to acquire the property. On March 1, 1971, ownership of Split Rock Lighthouse was transferred to the Minnesota Department of Conservation under the historic monuments program. In 1976 its administration was transferred to the Minnesota Historical Society, which continues to administer it today. Since 1976, the Minnesota Historical Society has made an effort to restore the property to a circa-1920's appearance. Today, Split Rock Lighthouse remains one of Minnesota's most-visited attractions and a beloved historic site (Faltinson 2008: 35).

Built Landscape

As mentioned above, Split Rock Lighthouse was built on solid bedrock with very little, if any, natural soil. Today the Split Rock Lighthouse grounds have a level lawn with manicured grass, trees, and shrubs (Figure 4).



Figure 4. Panoramic view of the Split Rock Lighthouse complex as it appears today. Reproduced with permission from DWhike's Adventures.

The difference in the early lighthouse grounds compared to the modern lawn is quite apparent. Figure 5 depicts the uneven, rocky landscape present in front of the oil house in circa 1911. Figure 6 is from circa 1945 and shows the same location, but present now is a level lawn with no exposed bedrock.



Figure 5. View looking west from front of oil house, circa 1911. Reproduced with permission by the Minnesota Historical Society.



Figure 6. View looking northeast towards oil house, circa 1945. Reproduced with permission by the Minnesota Historical Society.

This lawn sits atop soil entirely deposited by the early lighthouse keepers and their staff. Each keeper was required to keep a daily log of lighthouse events and tasks performed. An examination of these documents revealed mentions of soil gathering as early as 1912 and as late as 1954, with modern landscape building documented in other sources. These entries range from vague to detailed accounts of landscape building taking place. Additionally, a letter written by Keeper Covells daughter, Illeana, sheds light on the earth-moving operations at Split Rock. She writes, “the grounds around the lighthouse was [sic] nothing but big boulders where they blasted out for the basements. Over the years by wheel barrel and truck the men filled in all around the house...” (Covell 1977). Finally, an oral history interview conducted with Buelah Covell (One of Keeper Covell’s daughters) by the MNHS sheds light on the massive earth-moving operations undertaken by the keepers. Buelah Covell remembers, “The dirt was brought in by the wheelbarrow-full. They also used ashes

to fill around the rocks" All of these accounts illustrate a massive endeavor by Split Rock's staff to create the level lawn visitors see today.

Split Rock Lighthouse offers a rich history as an important navigational tool in the Great Lakes region of Minnesota. Its construction and administration have both local and national ties as a part of the various lighthouse administration agencies of the federal government. The lighthouse began as a tool to aid the shipping of goods and morphed into a beloved historic site and tourist destination. The day-to-day operations of the lighthouse are a topic of great interest to the people of Minnesota and offer a unique archaeological opportunity to explore unknown aspects of daily life at the lighthouse.

Chapter 4: Research Methodology

This project utilized several methods of data collection and analysis to examine the built landscape at Split Rock Lighthouse. Data recovered from 2022 fieldwork, historic records, historic maps, modern GIS analysis, and publicly available LiDAR was all used in independent and complimentary ways to examine Split Rock's lawn. Each data source had its own methodology and goals, all of which is outlined below.

Fieldwork

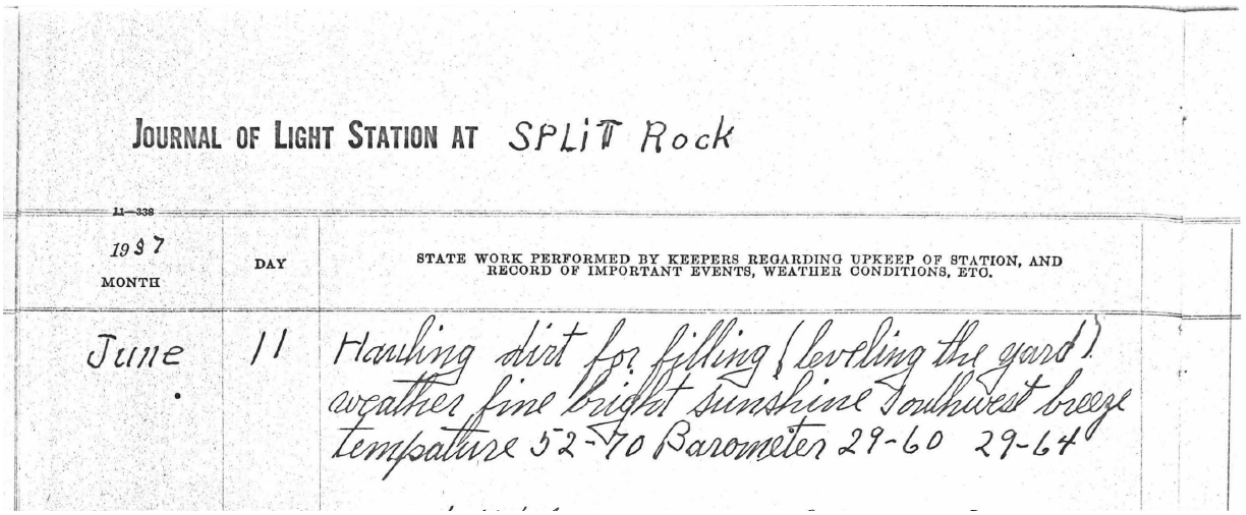
During the summer field season of 2022, the MNHS Archaeology Department initiated archaeological investigations at Split Rock Lighthouse to prepare for a long-term landscape rehabilitation project. This investigation consisted of limited shovel testing adjacent to historic sidewalks and the excavation of two 1 meter (m) x 1 m Excavation Units. Excavation Unit (EU) 1 was placed on the southern extent of the former tramway location northwest of Residence 1, with the goal of determining if any subsurface tramway components remained. EU 2 was located on the southern edge of the former Barn 1 location. This EU was placed in this location to investigate any remaining features associated with Barn 1.

During these investigations I collected a total of 24 soil samples from across the lawn at Split Rock Lighthouse. These samples were collected by stratigraphic layer from six distinct locations. Seven samples were collected from a 5-centimeter (cm) x 5 cm column sample in the west wall of EU 1 and five samples were collected from a 5 cm x 5 cm column sample in the east wall of EU 2. The remaining soil

samples (n=12) were collected from soil probes (SP) placed across the lawn. SP 1 was located in the lawn east of Residence 1, SP 2 was located south of the oil house, SP 3 was located west of Residence 3, and SP 4 was located south of Residence 2 and Residence 3. At each SP location, soils were separated by Munsell and textural composition and bagged separately. While most of this data is no longer available to me, some of the data I am still able to access is utilized in this thesis to aid in discussion and as a basis for some methodology.

Historic Research

I visited the Gale Family Library at MNHS on August 26, 2022, December 16, 2022, May 19, 2023, and June 16, 2023. These visits were made to research historical documentation pertaining to soil gathering and landscape building on the grounds of Split Rock Lighthouse. On each occasion, I requested and read the Split Rock Lighthouse Logbooks and Diaries, specifically the daily logs kept by the lighthouse keepers spanning from July 1910- December 1967 (Location #P1353). On each identified occasion of soil gathering being mentioned in the logbook, the page was marked and scanned at the conclusion of the visit (Figure 7).



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1937 MONTH	DAY	STATE WORK PERFORMED BY KEEPERS REGARDING UPKEEP OF STATION, AND RECORD OF IMPORTANT EVENTS, WEATHER CONDITIONS, ETC.
June	11	Hauling dirt for filling (leveling the yard) weather fine bright sunshine Southwest breeze tempature 52-70 Barometer 29-60 29-64

Figure 7. Example of Split Rock Lighthouse Logbooks and Diaries Daily Log entry from June 11, 1937. Photograph by author.

Additional landscape building activities conducted were documented in the 2002 *Historic Structures report on Split Rock Lighthouse* compiled by William Stark on behalf of Claybaugh Preservation Architecture Inc. and the 106 Group Ltd. This report was obtained by me from the 106 Group archives in Saint Paul, MN.

Also in August 2022, I was sent a recording of the oral history interview conducted with Buelah Covell. I had been informed of a mention of soil gathering activities being discussed in this interview, but the recording I was sent cut off abruptly at the end without any mention of soil. Upon discussions with the former Assistant Site Manager at Split Rock Lighthouse, I learned the second half of the recording is now missing. However, a transcription of Ms. Covell discussing soil gathering existed in the form of an educational social media post written by Split Rock Lighthouse staff and posted on Facebook. I was informed this Facebook post was a word-for-word transcription of the contents of the Buelah Covell interview, so it is treated as primary source information.

Additionally, historic photography of Split Rock Lighthouse was utilized in chapters to illustrate the changing landscape of Split Rock Lighthouse. These photos were gathered by the author from the MNHS Collections Online website. Each photograph is used to illustrate a different period or phase of lighthouse development. All photographs used from the Collections Online website adhere to conditions of use outlined in the MNHS conditions of use parameters.

Pre-lighthouse topography was needed for the cut and fill analysis conducted for this thesis. A 1907 US Army Corp of Engineers map (Figure 8) of the proposed Split Rock Lighthouse location is contained in the 2018 Quinn Evans Architects *Split Rock Lighthouse Historic Site Cultural Landscape Report;* however, an attempt was made to locate additional maps for use in the analysis. This consisted of consulting with both the U.S. Coast Guard on May 13, 2023 as well as the site manager of Split Rock Lighthouse on May 22, 2023. Neither organization was in possession of any additional map containing pre-lighthouse topography. On May 19, 2023 I visited the Gale Family Library of MNHS to consult their maps and on May 22, 2023 I visited the John R. Borchert Map Library of the University of Minnesota to view their map collection. Again, neither organization was in possession of additional pre-lighthouse map depicting topography.

Landscape Building Frequency

Once all identifiable landscape building activities were identified in the Keeper's logs and diaries and administrative records, Microsoft Excel was used to create a table of the year, date, and entry information. This table was manipulated to create three pivot tables and graphs to determine the frequency of landscape building

activities through time. The first data set created using this data depicts landscape building activities by month to illustrate the time of year landscape building occurred at Split Rock Lighthouse. The graph for this data set depicts months along the x-axis of the graph and number of documented landscape building events along the y-axis. The second chart and table combination depicts landscape building events by year to better illustrate exactly what year the most landscape building took place. The graph for this data set depicts years along the x-axis and number of documented landscape building events along the y-axis. Finally, the yearly data was combined into decade groups to illustrate which decade contained the most documented landscape building events. The graph for this data set depicts groupings of years by decade of documented landscape buildings along the x-axis and number of documented landscape building events along the y-axis.

Additionally, each documented landscape building activity was assigned a generic "activity designation" based on the type of activity documented. These designations consisted of "garden," "grading," "infrastructure development," "roadwork," and "undetermined." The "garden" designation was assigned to any landscape building activity that could be definitively attributed to garden building. "Grading" was assigned to any landscape building activity that could be attributed to the act of leveling or filling the lawn. "Infrastructure development" refers to landscape building activities performed due to some type of infrastructure installation at the lighthouse. The "roadwork" designation refers exclusively to landscape building activities related to road installation or maintenance. "Undetermined" refers to all remaining entries where a definitive reason for the work could not be

determined. Like the entries themselves, Microsoft Excel was used to sort and graph the activity designations by month and year. The first activity designations dataset consists of a table and graph, with the graph depicting the activity designations on the x-axis and the count of occurrence on the y-axis. The next dataset consists of a stacked column graph with the activity designations on the x-axis and count of occurrences on the y-axis. The columns are broken down by year of activity designation occurrence. The final dataset consists of a stacked column graph with the activity designations on the x-axis and count of occurrences on the y-axis. The columns for this graph are broken down by the month of activity designation occurrence.

Volumetric Cut-and-Fill Analysis

A cut-and-fill analysis was conducted in ArcGIS Pro to examine how the landscape of Split Rock Lighthouse was changed from pre-lighthouse conditions to post-lighthouse conditions and where the soils and fill materials were most added or removed. An outline for the analysis was provided by Dr. Joshua Samuels of Catholic University and the University of Maryland, and his methodology was adapted for this specific project. The first step taken to perform this analysis consisted of locating a pre-lighthouse map containing elevation lines. After conducting the thorough historic research outlined above, a single map meeting these parameters was located (Figure 8).

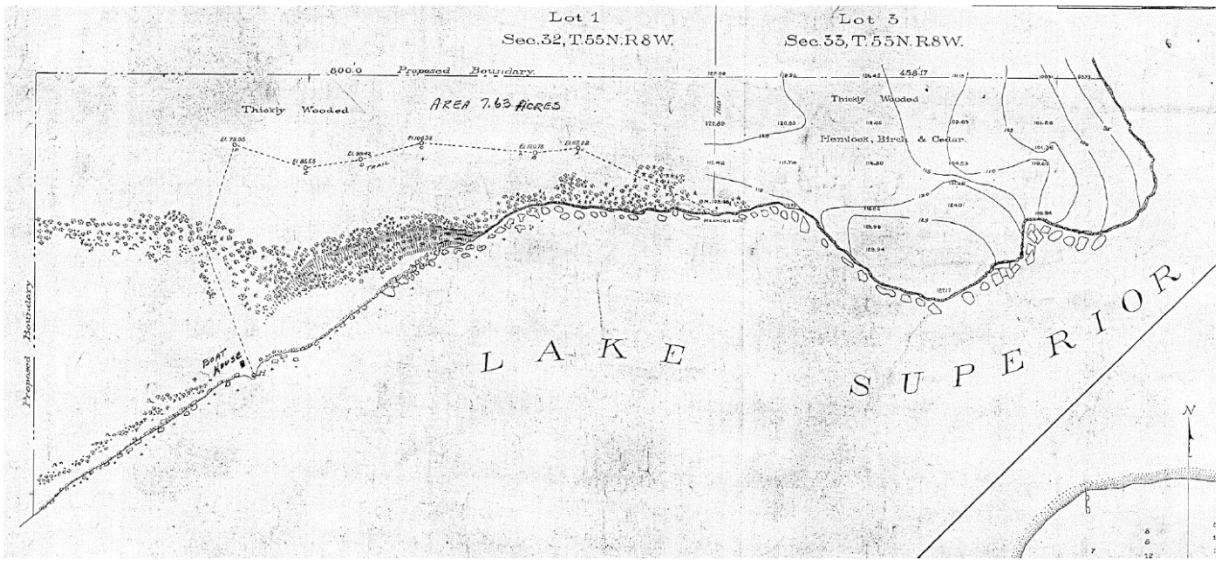


Figure 8. 1907 US Army Corp of Engineers map of proposed Split Rock Lighthouse location.

Figure 8 was georeferenced using the "Georeference" tool in ArcGIS Pro and consisted of finding the best match on modern aerial photography and topographic maps for the Lake Superior shoreline depicted on the 1907 map. The section line drawn in the 1907 map was also used as a guide when aligning and stretching the map to match the actual location of Split Rock Lighthouse. Next, a polygon was created to identify a study area for the cut-and-fill analysis. The extent of the created polygon was determined by the extent of the lighthouse depicted in the 1907 map. After the study area was determined, the 1907 topographic lines were digitized by following the drawn elevation lines, terminating at the study area polygon. These lines were saved as a shapefile. A georeferenced 1956 USGS topographic map (Figure 9) was then imported and the process of digitizing and saving the elevation lines as a shapefile was repeated.

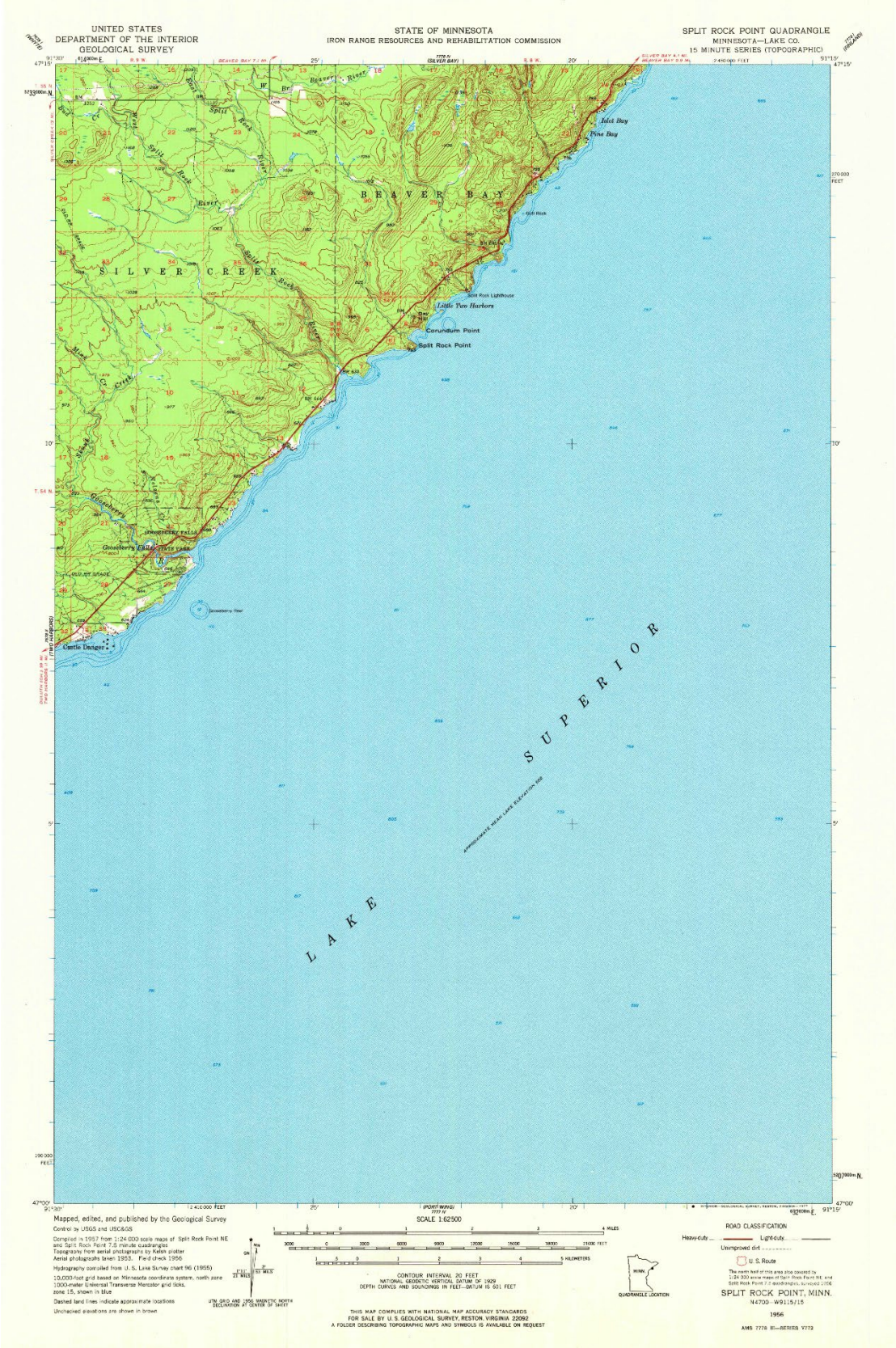


Figure 9. USGS Split Rock Point, Minn. Quadrangle, 1956

The elevation data used on the 1907 map uses a different datum than the USGS topographic map used for comparison, so the 1907 elevations required an adjustment to rectify both maps to the same elevation benchmark. This adjustment was determined by identifying the 1907 datum elevation with the value of zero to identify how elevations in the study area could be manipulated to match the USGS elevation datum. On the 1907 map, the elevation lines begin at the "Boat House" in the southwestern extent of the map on the shore of Lake Superior. From here, the elevations increase moving north and then east to the eventual location of Split Rock Lighthouse. Oftentimes, when Split Rock Lighthouse is described, it is written that the lighthouse lies 100 feet (ft) above Lake Superior, which matches the elevation depicted in the 1907 map. Thus, it was assumed the US Army Corp of Engineers measured map elevations from the level of Lake Superior. The location of the "Boat House" was matched to the location of the beach on the 1956 USGS topographic map. The elevation listed on the 1956 USGS topographic map at this location was 600 ft, or, using the 1907 datum, elevation 0. Therefore, 600 ft was used to adjust all 1907 elevations to match the datum used in the 1956 map. These new elevations were added as an "Elevation" attribute on the created shapefile.

Following this, the "Create TIN" tool was used to create a three-dimensional Triangulated Irregular Network (TIN) surface model for the adjusted 1907 elevation data. A second TIN was created using the 1956 USGS topographic map elevations. Each TIN was then converted to Rasters using the "TIN to Raster" tool.

Utilizing the "Minus" tool created the data the final cut-and-fill analysis illustrates. The first data set input into the "Minus" tool was the 1956 elevation,

followed by the 1907 adjusted elevation — subtracting the 1907 adjusted elevation from the 1956 elevation. The symbology for the data created by the "Minus" tool was adjusted to show elevation gain as red and elevation decrease as green. Spot elevations were created using the "Extract Values to Points" tool. These specific locations were chosen as some of the field data still accessible was gathered in these locations. This data was manipulated into a readable map by utilizing the "New Layout" function in ArcGIS Pro where the map can be placed into a data frame and a legend, scale bar, and north arrow were added.

To aid in the analysis portion of this data, a second map was created illustrating the georectification of the 1907 map atop the 1956 topographic map. The 1907 map had the transparency set at 40% in order to see the 1956 topographic map beneath. This data was also manipulated into a readable map by utilizing the "New Layout" function in ArcGIS Pro where the map can be placed into a data frame and a legend, scale bar, and north arrow were added.

LiDAR Investigation

The remnants of borrow pits can be visible for many years in LiDAR data, so a desktop review of the areas surrounding Split Rock Lighthouse was conducted. This review used the publicly available LiDAR data funded by the Clean Water Fund of the Clean Water, Land and Legacy Amendment and created by staff from the Minnesota Information Technology (MNIT) at Minnesota Department of Natural Resources and MNIT at Minnesota Geospatial Information Office. Beginning with the areas immediately in and adjacent to Split Rock Lighthouse, a section-by-section survey was done looking for any borrow pit, abandoned roadways, or other potential

soil gathering related feature remnants that could have been made during landscape building activities. Particular attention was paid to the area around Little Two Harbors Fishing Village, as this is the only documented location of soil gathering activities. For data presentation, two LiDAR maps were created in ArcGIS Pro with one depicting the desktop review area and a second depicting modern aerial photography beneath the LiDAR layer's with the LiDAR transparency set at 25%. Each data set was manipulated into a readable map by utilizing the "New Layout" function in ArcGIS Pro where the map can be placed into a data frame and a legend, scale bar, and north arrow were added.

The above methodology was all utilized to build the data sets presented below. The data collected was first used to create the landscape building timeline presented as the results chapter. Following the results, the remaining data was used as an analysis method and an interpretive lens. This combination of historic timeline and archaeological fieldwork, data tabulation, GIS analysis, and LiDAR investigation all work together to explore heretofore unknown aspects of the landscape building process at Split Rock Lighthouse.

Chapter 5: Results

What follows is a presentation of all identified landscape building activities at Split Rock Lighthouse. First presented is a table with each entry containing the year, month, day, content of entry, data source, and activity designation. Following this are tables and graphs sorting this data by year and a narrative description of the built lawn through the years captured in this data. Concluding the chapter are similar tables and discussions as these, but instead sorted by month.

Documented Landscape Building Activities

As outlined above in the Methods chapter, all documented landscape building activities in the Split Rock Lighthouse Logbooks and Diaries, architectural documents, and administrative records were identified. These entries were tabulated into Table 1 below:

Table 1. Tabulation of all recorded landscape filling/grading activities at Split Rock Lighthouse from 1912-1995.

Year	Month	Day	Comment	Source	Activity Designation
1912	May	13	"Improving grounds at Station."	Lighthouse Keeper's Log Book	Undetermined
1914	May	11	General work and making garden."	Lighthouse Keeper's Log Book	Garden
1914	May	13	General work and making garden."	Lighthouse Keeper's Log Book	Garden
1915	June	2	"General work and hauling earth for grading between the dwellings"	Lighthouse Keeper's Log Book	Grading
1915	June	3	"General work and working on the grounds around dwellings"	Lighthouse Keeper's Log Book	Undetermined

Year	Month	Day	Comment	Source	Activity Designation
1917	May	16	General work and improving ground around the station"	Lighthouse Keeper's Log Book	Undetermined
1917	May	18	"Finished grading."	Notes from Harry Thompson's Diary, "Daily Logs & Harry Thompson's Diary" folder	Grading
1917	May	23	"General work and making garden"	Lighthouse Keeper's Log Book	Garden
1917	May	25	"General work and making garden"	Lighthouse Keeper's Log Book	Garden
1917	June	1	General work and making garden	Lighthouse Keeper's Log Book	Garden
1919	October	8	"General duties and wheeling of gravel to cover pipelines in front of dwelling"	Lighthouse Keeper's Log Book	Infrastructure Development
1924	May	15	"General work and planting rhubarb and getting manure for flower beds"	Lighthouse Keeper's Log Book	Garden
1924	October	1	"General work and improving ground and side walk."	Lighthouse Keeper's Log Book	Undetermined
1924	October	3	"General work and improving the grounds.	Lighthouse Keeper's Log Book	Undetermined
1924	October	7	"General work and improve the grounds."	Lighthouse Keeper's Log Book	Undetermined
1928	April	26	"... filling in with rock ... "	Lighthouse Keeper's Log Book	Undetermined
1928	May	8	"Setting evergreen trees, Hauling rock for filling in ... "	Lighthouse Keeper's Log Book	Garden
1928	May	16	"Hauling dirt tor tilling at station."	Lighthouse Keeper's Log Book	Undetermined

Year	Month	Day	Comment	Source	Activity Designation
1928	May	17	"Gradeing [sic] yard ... "	Lighthouse Keeper's Log Book	Grading
1928	June	28	"cutting grass hauling dird [sic] tor tilling ... "	Lighthouse Keeper's Log Book	Grading
1928	June	29	"Hauling dirt tor filling ... "	Lighthouse Keeper's Log Book	Undetermined
Split Rock Lighthouse Logbooks and Diaries from July 25, 1929 through April 19, 1931 are missing					
1931	May	4	"Hauling 2 loads beach gravel for covering on the road between the buildings to stop dust blowing around."	Lighthouse Keeper's Log Book	Roadwork
1931	May	7	"Hauled 7 loads gravel for road and driveway to garage.	Lighthouse Keeper's Log Book	Roadwork
1931	May	14	"Hauling 3 loads beach gravel from Little Two Harbors for covering on road across reserve."	Lighthouse Keeper's Log Book	Roadwork
1931	September	24	"hauling rock for bordering flower beds and filling approach to Keepers barn."	Lighthouse Keeper's Log Book	Garden & Roadwork
1931	October	26	"Hauled 3 loads gravel for the drive-ways to the Keepers and 1st assts. Garage, also leveled ruts in road way."	Lighthouse Keeper's Log Book	Roadwork
1932	September	21	"Hauled gravel for road between hoist house and dwellings ...	Lighthouse Keeper's Log Book	Roadwork
1933	May	9	"Keeper hauled dirt to make a garden ... "	Lighthouse Keeper's Log Book	Garden
1933	May	10	"Removed tram track from oil house to 2d asst. dwelling and will rebuild same again placing in center of driveway so to leave the space clear between the drive-way and dwellings, hauled dirt to fill the space where we removed track."	Lighthouse Keeper's Log Book	Undetermined
1933	May	23	"Put down 2x4s and leveled up road-way along track, hauled in two truck loads of dirt and made forms for	Lighthouse Keeper's Log Book	Undetermined

Year	Month	Day	Comment	Source	Activity Designation
			fixing sidewalk between dwelling and garages where rails pass through."		
1934	May	11	"Hauling dirt to fix a garden. Keeper hauled dirt alone."	Lighthouse Keeper's Log Book	Garden
1935	August	21	"Hauling gravel for top dressing on ramp and drive way to truck drivers garage. Dug down and leveled old tram track bed. CCC boys hauled the rock away for us, putting them into the new road bed which is under construction and is nearing completion."	Lighthouse Keeper's Log Book	Roadwork
1935	August	22	"Finished removing the rock and leveled off the old tram track bed and built a water colvert [sic] to drean [sic] water from roadway."	Lighthouse Keeper's Log Book	Roadwork
1935	September	4	"Removed rock along road way back of the dwellings, dug up the grass, graded road way and replaced the rock. Painted part of window caseings [sic] on truck driver dwellings."	Lighthouse Keeper's Log Book	Roadwork
1936	September	23	"Hauled dirt. Finished filling west of 2d asst. dwelling and started to fill between Keepers and 1st asst."	Lighthouse Keeper's Log Book	Grading
1936	September	29	Leveling off rock in yard east of 1st asst. dwelling, hauling dirt for filling in same place."	Lighthouse Keeper's Log Book	Grading
1937	June	11	"Hauling dirt for filling (leveling the yard)."	Lighthouse Keeper's Log Book	Grading
1938	April	13	"Raking and leveling yard."	Lighthouse Keeper's Log Book	Grading
1940	May	13	"Hauling dirt for filling on ground east No. 1 dwelling."	Lighthouse Keeper's Log Book	Grading
1950	May	8	"Working on oil tanks filling in around tanks with sand, cleaning up lawn in front of dwellins."	Microfilm Roll Two	Grading
1950	May	22	"Contractor hauling fill over No. 2 tank leveling off fill. Received all of	Microfilm Roll Two	Infrastructure Development

Year	Month	Day	Comment	Source	Activity Designation
			fill dirt but not enou h for three tanks, onl 8 ds for No. 3 tank."		
1950	May	23	"Haulin rock with Jee for to hold fill around No. 3 fuel oil tank."	Microfilm Roll Two	Infrastructure Development
1952	June	5	"Bennet; Mowing lawn and filling holes along sidewalks and around buildins. "	Microfilm Roll One	Grading
1953	September	21	"Bennet; Spreading gravel on driveway."	Microfilm Roll One	Roadwork
1953	September	22	"Bennet: Leveling gravel on drivways."	Microfilm Roll One	Roadwork
1953	September	23	"Bennet; Spreading and leveling gravel on driveways."	Microfilm Roll One	Roadwork
1954	April	13	"Removing rocks on grounds west of No. 3 dwelling."	Microfilm Roll Three	Grading
1954	April	14	"Removing rocks on grounds west of No. 3 dwelling."	Microfilm Roll Three	Grading
1954	November	18	"Removing rocks on grounds west of No. 3 dwelling."	Microfilm Roll Three	Grading
1984	July	17	"Regrading Plan (especially around barns): re-establish finish grades shown & regrade out to establish minimum 1 /2" per 12" (0.04) slope away from buildings for first 5 feet. New finish grades include 4" topsoil & sod at all disturbed areas. Note: repair/reconstruct existing stone walls as required on south sides of approach drives to both barns after regrading." New underdrain pipe entered under east ramps of barns."	Rehabilitation Plans, Architectural Resources, Inc., Drawing 4	Grading
1995	May	9	MHS purchase order for Zervas Industrial Petroleum Inc. for the "excavation, removal, disposal of one 3000 gallon heating oil tank. Back fill of excavation area with pit run gravel. Restore site with topsoil from excavation and seed." This tank was located between Dwellings 2 and 3.	MHS Purchase Order #952684	Infrastructure Development

Table 1 documents a total of 51 individual landscape building events conducted on the grounds of Split Rock Lighthouse. Of note, the Split Rock Lighthouse Logbooks

and Diaries entries from July 25, 1929 through April 19, 1931 are missing from the MNHS collection. It is possible additional landscape building activities took place during this time and were documented in these now-missing entries. Following the tabulation on entries outlined in Table 1, the data was organized and graphed by year, decade, and month. These tables and graphs are presented below along with a tracing of the Split Rock Lighthouse lawn through time.

Table 2. Amount of Landscape Building Entries by year.

Year	Total Number of Landscape Building Entries by Year
1912	1
1914	2
1915	2
1917	5
1919	1
1924	4
1928	6
1931	5
1932	1
1933	3
1934	1
1935	3
1936	2
1937	1
1938	1
1940	1
1950	3
1952	1
1953	3
1954	3
1984	1
1995	1
Grand Total	**51**

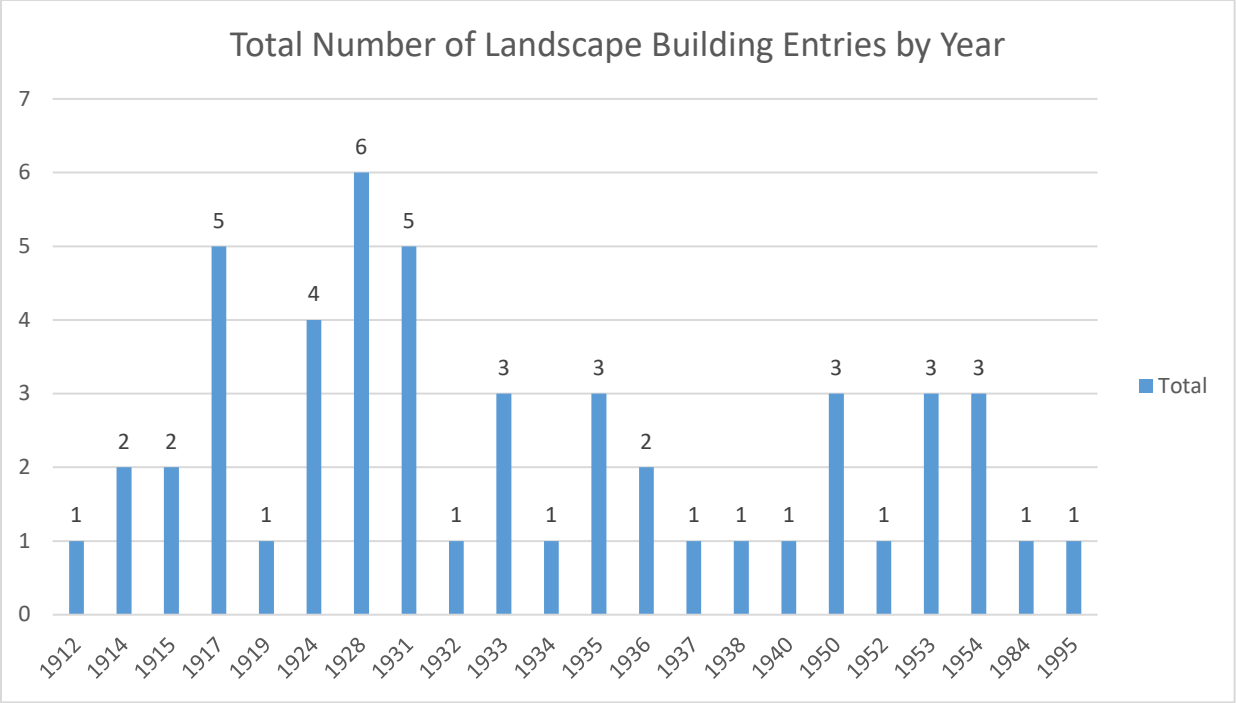


Figure 10. Bar graph illustrating Landscape Building Entries per month.

Table 2 and Figure 10 demonstrate the most landscape- building activities took place in 1928 (n=6), followed by 1917 (n=5) and 1931 (n=5). Of years with documented landscape-building activities taking place, 1912, 1919, 1932, 1934, 1937, 1938, 1940, 1952, 1984, and 1995 all had the fewest with one documented landscape building activity each. During numerous years there are no landscape building events recorded in the logbooks.

Table 3. Amount of Landscape Building Entries by decade.

Decade	**Total Number of Landscape Building Entries by Decade**
1910-1919	11
1920-1929	10
1930-1939	17
1940-1949	1
1950-1959	10
1980-1989	1
1990-1999	1

Grand Total	51

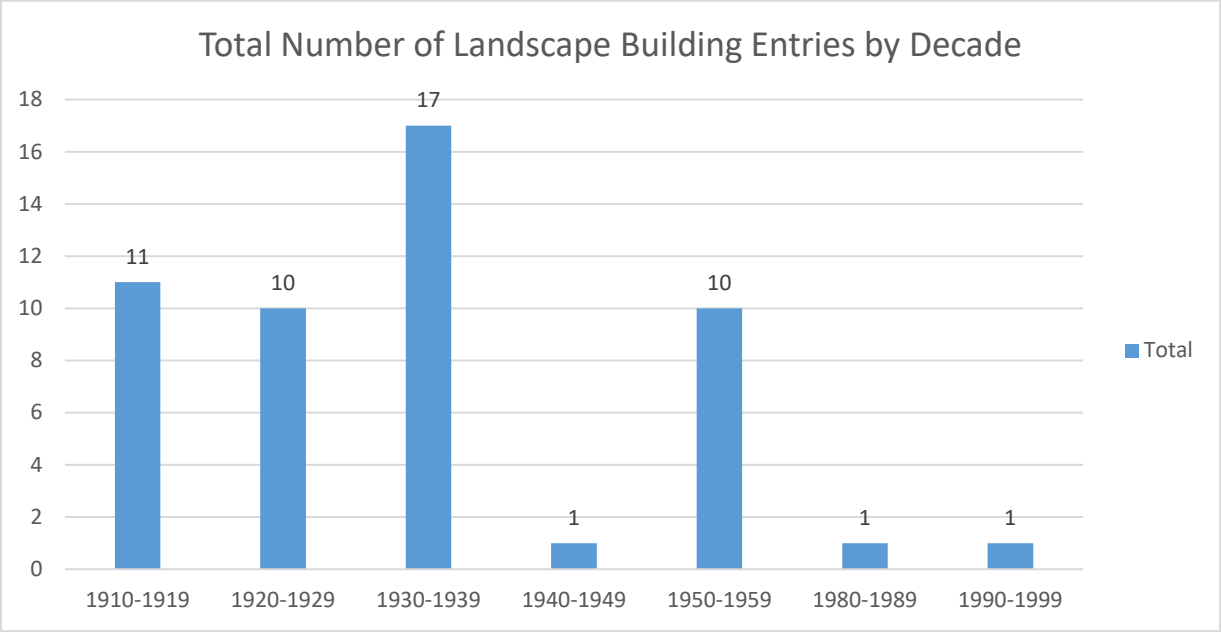


Figure 11. Bar graph illustrating Landscape Building Entries per decade.

Table 3 and Figure 11 demonstrate the decade with the most landscape building activities was 1930-1939 (n=17), followed by 1910-1919 (n=11) and 1920-1929 and 1950-1959 (n=10 each). 1940-1949, 1980-1989, and 1990-199 all only had one documented landscape building activity each.

A Built Lawn Through Time

Beginning with the construction of Split Rock Lighthouse, the landscape that would one day house the lighthouse and associated buildings was heavily modified. Prior to construction, the location of Split Rock Lighthouse was a wilderness consisting of second growth forest with its vegetation classified as brushy undergrowth (Quin Evans 2018: 48). The remote and undeveloped nature is evident in the following 1907 pre-construction photographs (Figure 12 and Figure 13).



Figure 12. View of undeveloped land for proposed Split Rock Lighthouse. Taken from beach to the north of eventual lighthouse location. Reproduced with permission from the Minnesota Historical Society.

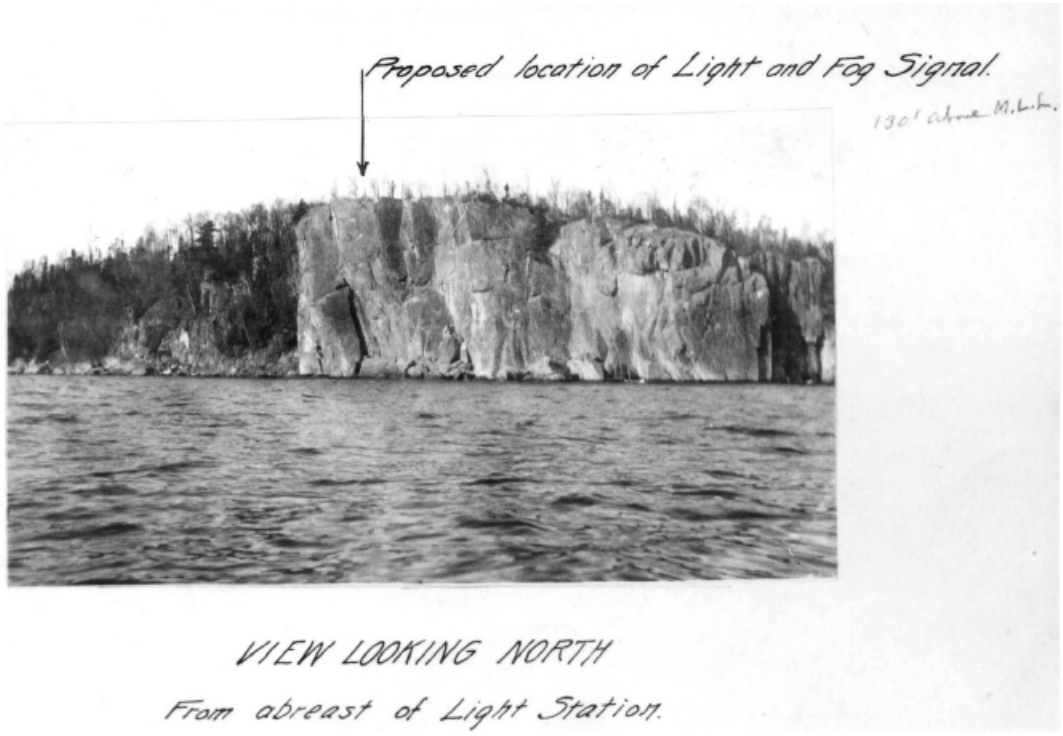


Figure 13. View of undeveloped land for proposed Split Rock Lighthouse. Taken from Lake Superior. Reproduced with permission from the Minnesota Historical Society.

The first step to construction was the initial landscape modifications of the area being “cleared of all trees and brush, and rough graded” (Tinkham n.d.: 5). Next, the landscape was again altered by the blasting of the rock dome to pour the lighthouse foundation, scattering cobbles and boulders across the landscape. The craggy landscape this created is clearly visible in this 1909 photograph (Figure 14). This initial landscape modification was not captured in the data presented in this thesis as only amorphous dates/summarizing data exist for its occurrence. The data used during this investigation relies on definitive primary source entries and the landscape modifications conducted while the lighthouse was being constructed do not meet these parameters.



Figure 14. Split Rock Lighthouse as it appeared in 1909. Photograph taken from the lighthouse looking towards the residences (under construction) and three barns. Reproduced with permission from the Minnesota Historical Society.

The first landscape building activity is not documented until May 13, 1912. However, tertiary evidence exists that some soil was present at Split Rock Lighthouse prior to this date. Keepers Logbooks and Diaries entries pre-dating May 13, 1912, include activities such as "cutting grass," "cutting weeds," "cutting brush," "grubbing out stumps." This would indicate enough soil present on the lighthouse grounds to support some vegetation. Additionally, a 1911 photograph of Keeper Young walking from one of the storage barns illustrates a rocky landscape with some grassy vegetation present (Figure 15).



Figure 15. A 1911 photograph of Keeper Young walking from storage barn. Of note is the rocky, but somewhat grassy landscape surrounding the walkway and barn. Reproduced with permission from the Minnesota Historical Society.

From the first entry mentioning landscape building in 1912 to June 3, 1915, five landscape building entries were made, and clear evidence can be seen of the documented grading activities contained in the Keepers Logs (Figure 16). The two entries from 1915 mention "General work and hauling earth for grading between the dwellings" (June 2) and "General work and working on the grounds around dwellings" (June 3). As compared to the uneven and rocky landscape depicted in Figure 14, Figure 16 illustrates the grading and work mentioned with more level and even lawns between the three residences.



Figure 16. Split Rock Lighthouse grounds as they appeared in 1916. Reproduced with permission from the Minnesota Historical Society.

Beginning in 1916, the tramway was also put into use, replacing the deteriorating hoist and derrick. This event correlates with an immediate increase in landscape building activities documented in the Keepers Logbooks and Diaries. Only two landscape building entries were made for 1915 (the year before the tramway was

completed), but in 1917 (the year after the tramway was completed) five entries were made from May-June. It is likely the tramway was a much more efficient and less-labor intensive means for hauling dirt and rocks for use in lawn leveling and filling activities.

From 1917 to when Highway No. 1/Lake Superior International Highway was completed in 1925, 10 landscape building activities are documented in the Keepers Logbooks and Diaries. Most of these entries consist of "…making a garden" or "improving the grounds," but one mention is made of improving the grounds near the sidewalks. A filled in and moderately vegetated lawn is visible adjacent to the sidewalks in front of the residences in a 1925 photograph of Assistant Keeper Sayles and his family (Figure 17).

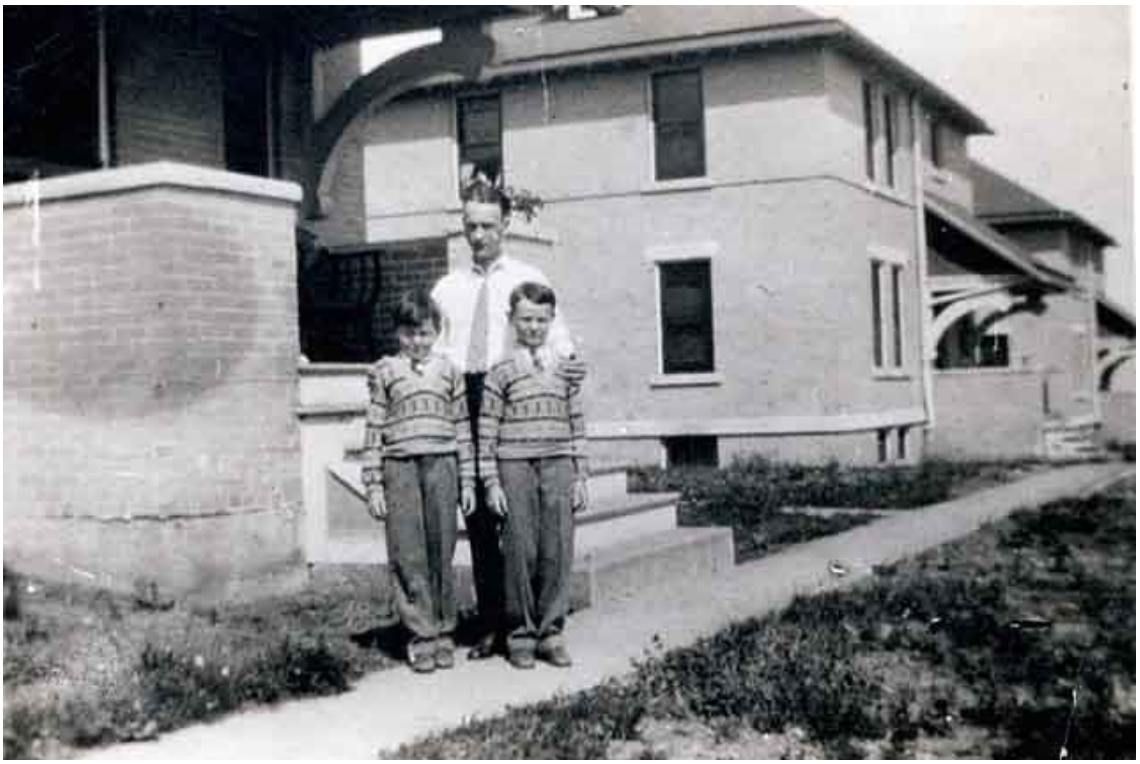


Figure 17. 1925 photograph of Assistant Keeper Sayles and sons in front of residences. Reproduced with permission from the Minnesota Historical Society.

From 1925 to the first documented use of a truck at the lighthouse in 1930, six landscape building activities are documented, all taking place in 1928. No mention is made of where the filling/grading of the lawn took place, only vague entries such as "Hauling dirt tor tilling at station," or "Hauling dirt tor filling ... " It is possible some additional landscape building activities took place in 1929, but the Keepers Logbook and Diaries from July 25, 1929 through April 19, 1931 are missing from the MNHS collection. Figure 18 offers and oblique view of the overall landscape of Split Rock lighthouse as it appeared in 1929. In this photograph, the lawn appears moderately vegetated and level. Although the photograph quality is low, no large boulders or cobbles are visible.



Figure 18. Aerial view of Split Rock Lighthouse as it appeared in 1929. Reproduced with permission from the Minnesota Historical Society.

The 1930s saw a marked increase in landscape building activities and two contributing factors can be identified. First, the addition of a truck at Split Rock

Lighthouse allowed staff to acquire fill materials easily. Additionally, the lighthouse now being accessible by road allowed outside workers to bring fill materials in to Split Rock Lighthouse. Furthermore, a 1931 letter from Assistant Superintendent Will of the U.S Lighthouse Service to Keeper Covell specifically instructs Split Rock Lighthouse staff to fill/grade the landscape. It reads,

> Grading – In addition to the grading of ramps to garage buildings, some grading should be carried out around the dwellings to permit making a smooth lawn. This office will authorize the trucking of suitable material whenever it can be advantageously secured, and will also provide grass seed when requested. In the case of the middle dwelling it will be necessary to construct a concrete areaway around the rear basement window in order to grade high enough to run water around to the front. This area should be floored at the level of the bottom of the window sill and the sides and back will have to be carried up about 10" above the top of the sill. A one inch galvanized iron pipe drain should be built in the bottom extending around the building to a natural outlet. The basement wall should be uncovered down to below the top of the plaster coating and this plaster carried up with a 3/4" coat of one to three cement to the height at which it will be necessary to bring the grade. When set this new plaster work is to be coated with black asphaltum which will be applied hot and allowed to harden before filling. The outside of concrete around areaway should be similarly waterproofed before backfilling.

This letter suggests all previous landscape building at Split Rock Lighthouse was incomplete and further work to build a proper lawn was needed. These contributing factors and specific instructions on grading from the U.S. Lighthouse Service resulted in the decade with the most documented landscape building activities (17 entries) from 1930-1939. Along with these entries, specific mention is made of filling around the garages, on/around the road, around the hoist house, around the residences, and general mention of leveling the yard. Very few historic photographs showing the landscape of Split Rock Lighthouse dating between 1930-1939 exist, however Figure 19 from 1940 illustrates the extent of landscape building conducted through the 1930's. The road running between the houses and garages appears level and a

somewhat elevated lawn is visible to the south of the residences. No large boulders or cobbles are visible in the lawn, and the landscape appears very vegetated.



Figure 19. View of Split Rock Lighthouse landscape as it appeared in 1940. Reproduced with permission by the Minnesota Historical Society.

During the 1940's, only a single instance of landscape building was documented. On May 13, 1940 it is noted that the keeper was "hauling dirt for filling on ground east No. 1 dwelling." It is unclear as to why landscape building activities ceased for this decade, but it may be due to the retirement of Keeper Covell in 1944 and the more frequent rotation of keepers in and out of the position. Either way, the grounds of Split Rock Lighthouse would appear more and more like their modern-day layout (Figure 20). Visible in Figure 20 is the beginnings of the extension of the lawn south of the three residences. No longer is there a steep rocky drop off visible in Figure 19, but a more gradual and vegetated slope up to the houses. Additionally, when compared to a similar location from 1911 (Figure 15), Figure 21 demonstrates

the extent of the landscape changes from approximately 30 years of filling and grading.



Figure 20. Split Rock Lighthouse as it appeared in 1945. Reproduced with permission from the Minnesota Historical Society.



Figure 21. 1941 photograph of lighthouse staff in front of Garage. Of note is the elevated and level lawn visible in photograph as opposed to the landscape visible in Figure 15. Reproduced with permission from the Minnesota Historical Society.

The 1950's were the final decade with substantial documented landscape building taking place at Split Rock Lighthouse. From 1950-1959, 10 documented instances of landscape building were identified. Based on what is contained in the entries, it seems most was either minor grading/leveling or associated with the installation of oil tanks. Figure 22 offers an aerial view of the entirety of Split Rock Lighthouse and exhibits a view of a lawn very similar to its modern-day appearance. It appears even more leveling has taken place south of the three houses and almost no rocky or unleveled portions of the lawn remain.

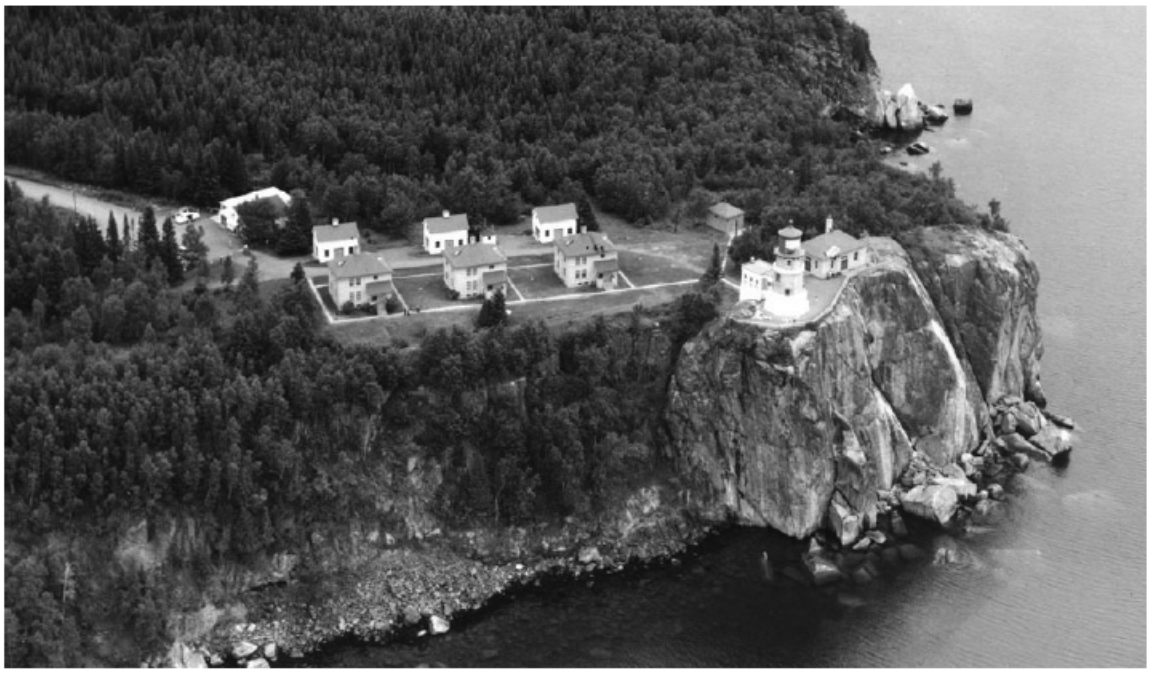


Figure 22. Aerial view of Split Rock Lighthouse as it appeared in 1959. Reproduced with permission from the Minnesota Historical Society.

Only two other documented landscape building activities remain, one in 1984 and one in 1995. The work done in 1984 consisted of re-grading primarily around the barns and some lawn sloping away from unspecified buildings. Figure 23 shows a lawn with very few, if any, discernable differences as to how it appears today.



Figure 23. Aerial view of Split Rock Lighthouse as it appeared in 1986. Reproduced with permission from the Minnesota Historical Society.

1995 work consisted of the removal of one 3000 gallon heating oil tank between Residence 2 and Residence 3 and the re-filling of the same location. These final instances of landscape building leave Split Rock Lighthouse primarily as it remains today – with a level lawn suitable for thousands of visitors to walk upon every year (Figure 24 & Figure 25).



Figure 24. Main lawn of Split Rock Lighthouse as it appears in 2022. Reproduced with permission from Creative Commons.



Figure 25. Barns/Garages as they appear today. As compared Figure 15 and Figure 21. Reproduced with permission from DWhike's Adventures.

Seasonality of Landscape Construction

When examining seasonality of landscape building at Split Rock Lighthouse, it is no surprise that all landscape building took place during the Spring-Summer-Fall seasons (Table 4 & Figure 26). The lack of landscape building activities taking place during winter months can be explained by two factors. First, the lighthouse was not occupied year-round until 1931. Keepers and staff would only live at the lighthouse from Spring to Fall and vacate the property during the winter. Additionally, the harsh Minnesota winters make landscaping nearly impossible with the frozen ground.

Table 4. Amount of landscape building entries by month, 1912-1995.

Month	**Total Number of Landscape Building Entries by Month**
April	4
May	23
June	7
July	1
August	2
September	8
October	5
November	1

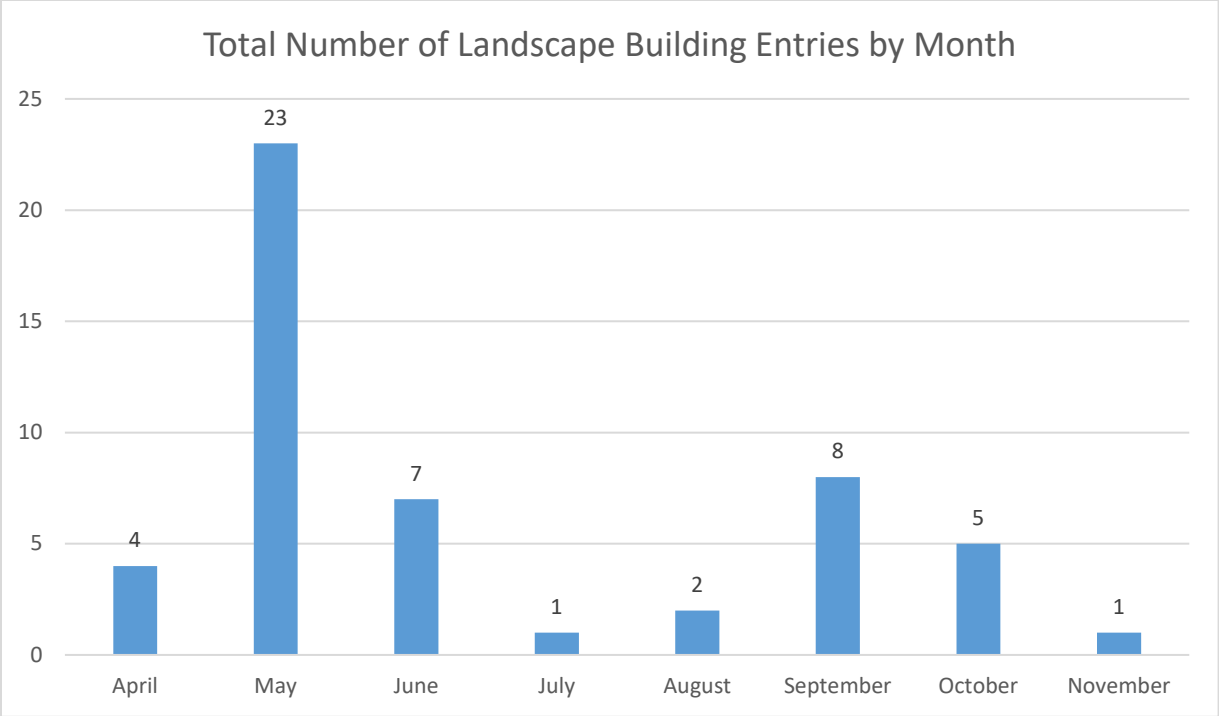


Figure 26. Bar graph illustrating Landscape Building Entries per month, 1912-1995.

The month with the greatest frequency of landscape building was May (n=23) followed by September (n=8), and June (n=7). No documented landscape building activities took place in December, January, February, or March. May being the highest occurring month is likely related to the act of gardening at Split Rock Lighthouse, as eight entries for May were related to gardening. Some of these entries specifically mentioned hauling dirt, but for the purposes of this investigation some assumptions had to be made about the exact meaning of the logbook entries. Related to this instance, it was assumed entries containing only the phrase "…making garden" (n=5) would have included some type of soil moving/soil addition. However, even if these five entries were subtracted from the monthly landscape building totals, May would still contain the highest frequency of building activities.

The timeline outlined above forms the basis for the forthcoming analysis of landscape building activities at Split Rock Lighthouse. Tracing the landscapes development through time provides a stark picture of the massive endeavor undertaken by the lighthouse staff to build a functional lawn. What began as an undeveloped piece of land, blasted into an uneven, rocky terrain, and finally built into a level grass lawn. These results compiled above can be manipulated and interpreted to better understand this endeavor and shed light upon when and how the lawn was built by the early lighthouse staff.

Chapter 6: Analysis

The data presented in the previous chapter show clear trends in the landscape building activities at Split Rock Lighthouse. When these activities are traced over the years and compared with historic photographs, the amount of time and overall effort it took to build the lawn becomes apparent. What follows this cataloging of activities are the results of the cut-and-fill analysis using 2022 field data as an interpretive lens, a discussion of the activity designations assigned to each documented landscape building event, and finally the LiDAR is discussed and possible reasons why no soil gathering locations or related features were identified.

2022 Fieldwork at the Lighthouse

MNHS Fieldwork at Split Rock Lighthouse was conducted in the 2022 field season. Available data utilized in this thesis was collected during two separate sessions, the first from June 28, 2022 to June 30, 2022 and the second from September 18, 2022 to September 19, 2022. This data was collected from two EUs

and four SPs. Their locations are depicted in Figure 27:

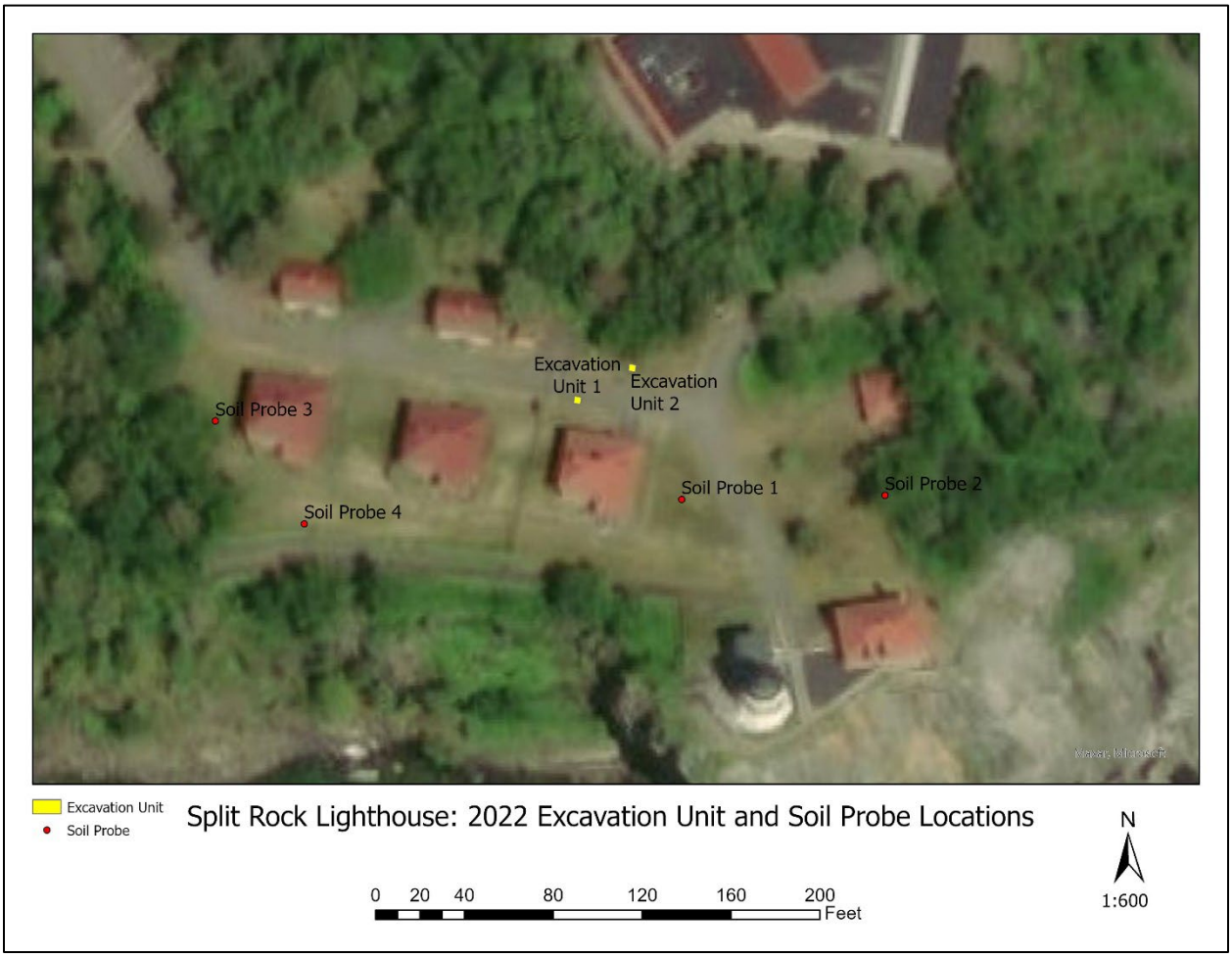


Figure 27. Map depicting excavation unit and soil probe locations. Map created by author.

Of particular interest was the identification of soil lenses in each location. These lenses were captured in the field documentation, are clearly recognizable in Figure 28, and organized into Table 5



Figure 28. Excavation Unit 1, west wall profile. Photograph by author.

Table 5. Distinct soil lenses identified in each Excavation Unit and Shovel Probe location.

Location	Stratigraphic Layer	Depth Below Surface	Soil Description
Excavation Unit 1	1	0-5 cm	Unavailable
	2	5-13 cm	
	3	13-17 cm	
	4	17-21 cm	
	5	21-34 cm	
	6	34-39 cm	
	7	39-44 cm	
Excavation Unit 2	1	0-6 cm	Unavailable
	2	6-9 cm	

Location	Stratigraphic Layer	Depth Below Surface	Soil Description
	3	9-21 cm	
	4	21-30 cm	
	5	30-35 cm	
Soil Probe 1	1	0-4 cm	10YR 3/4, Silty Clay Loam
	2	4-11 cm	7.5YR 3/4, Loamy Sand-very small angular gravel inclusions, 1-5% gravel
	3	11-20 cm	7.5YR 3/4, Loamy Sand-brittle rock inclusions, 1-2% gravel
Soil Probe 2	1	0-5 cm	10YR 2/2, Silt Loam
	2	5-9 cm	7.5YR 3/2, Sandy Loam
	3	9-14 cm	7.5YR 4/2, Loamy Sand, 1-3% gravel
	4	14-30 cm	7.5YR 4/4, Loamy Sand, burnt bone inclusions
Soil Probe 3	1	0-6 cm	10YR 3/3, Sandy Clay
	2	6-13 cm	10YR 3/4, Sandy Clay w/ 2.5YR 4/6 Clay inclusions, 10-25% small gravel
Soil Probe 4	1	0-3 cm	10YR 3/4, Loam
	2	3-11 cm	10YR 3/4, Loamy Sand, 1-5% small, rounded gravel
	3	11-17 cm	10YR 3/4, Loamy Sand, 10-20% gravel

In EU 1, seven distinct soil lenses were identified and are visible in the west wall profile (Figure 28). EU 2 contained five distinct soil lenses, while SP 1 contained three, SP 2 contained four, SP 3 contained two, and SP 4 contained three. In each case, soil lenses were identified by differences in their Munsell color and soil texture. This Munsell data and textural descriptions for identified soil lenses are only available in SP data for this thesis. Soil descriptions for EU 1 and EU 2 are not available for use.

When comparing identified soils across the lawn at Split Rock Lighthouse, similar soils were present in the first stratigraphic layer of each SP – a dark yellowish brown to dark/very dark brown loam as their primary component. Gravel inclusions were present in the second or third stratigraphic layer of each SP and are also visible in the second layer of EU 1, as well as several subsequent layers (Figure 28). However, the second stratigraphic layer in EU 1 lies atop a distinct black gravel lense not present in any SP. A unique soil layer was identified at the bottom of EU 1, containing reddish clay inclusions. A similar soil was identified at the second layer of SP 3 — a 10YR 3/4, sandy clay w/ 2.5YR 4/6 clay inclusions. Although at a much shallower depth in SP 3, it is possible this soil represents a fill episode that was gathered from the same parent location. The distinct red clay inclusions were not identified at any other location across Split Rock Lighthouse and could serve as a unique soil component for future research into this topic.

Cut-and-Fill Analysis of the Built Landscape

A cut-and-fill analysis was conducted using the elevation data from the identified 1907 US Army Corp of Engineers map and elevation data from a 1956 USGS topographic map.

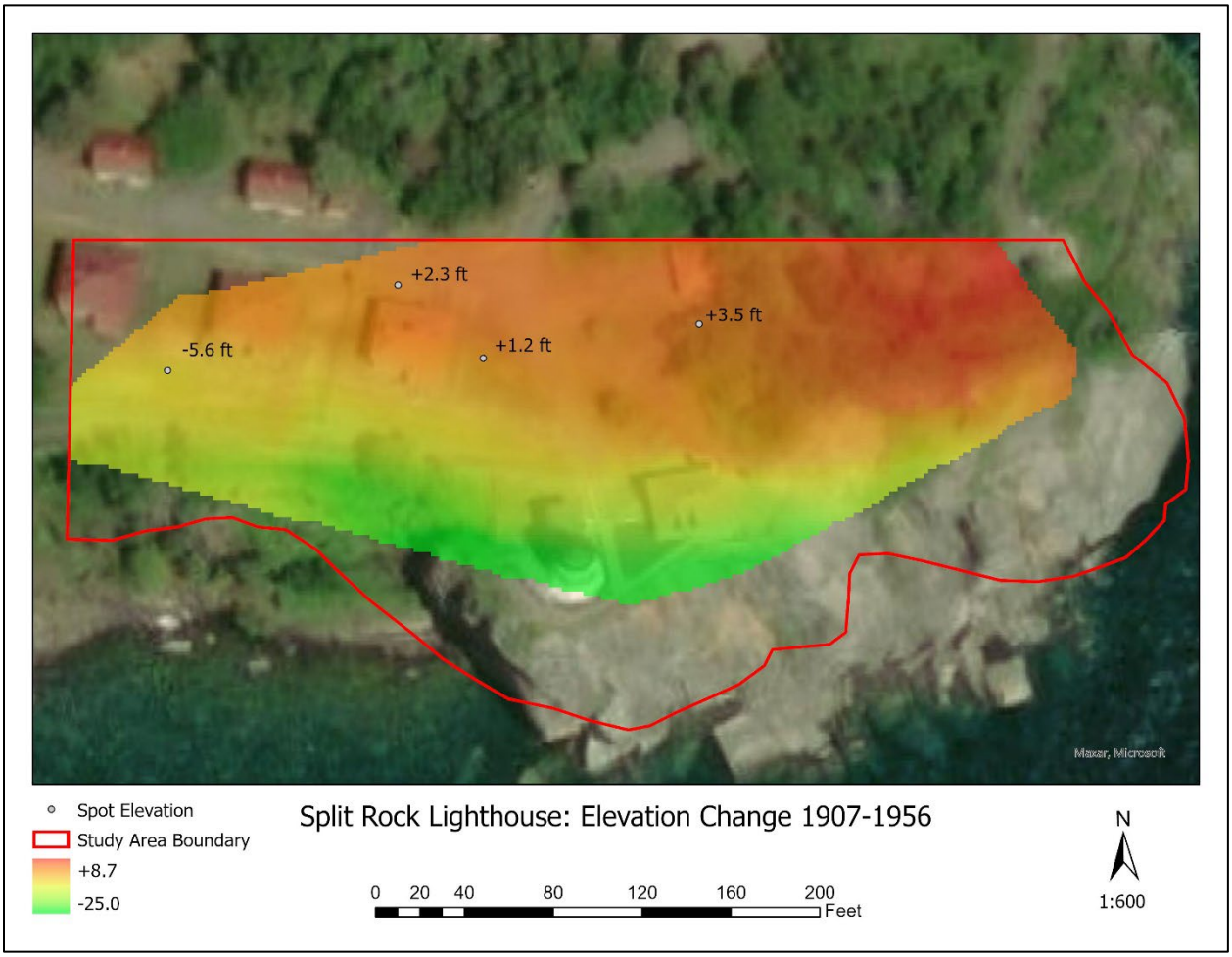


Figure 29. Results of Cut-and-Fill Analysis. Red indicates soil addition and green indicates soil removal. Map created by author.

Figure 29 demonstrates the results of the cut-and-fill analysis. The results show that between 1907 and 1956 material was added in the northern extent of the Study Area while material was removed in the central/southern extent of the Study Area. Spot elevations were added where accessible on-the-ground soil data exists from 2022

fieldwork. From west to east, the cut-and-fill analysis demonstrates that between 1907 and 1956 5.6 ft of soil/rock was removed south of Residence 3 and Residence 2, 2.3 ft of soil was added north of Residence 1, 1.2 ft of soil was added east of Residence 1, and 3.5 ft of soil was added south of the oil house. Based on data recovered during the fieldwork portion of this investigation, and supplemented by documented landscape building activities, this analysis appears somewhat accurate.

Beginning with the 2.3 ft (70 cm) elevation gain at the second from the left point: at this location a 1 m x 1 m EU was excavated and was terminated at 1.4 ft. (44 cm) below surface. All soils were fill and seven distinct soil types were identified (Figure 28). If it weren't for the presence of the large cobbles obstructing our ability to dig further, the unit would have continued further below the surface and possibly contained additional fill episodes. (Figure 30). It is reasonable to assume that another ≈ 1 ft of soil could be present in this location. This amount of landscape building correlates very well with the results derived from the cut-and-fill analysis. Additionally, several mentions are made in the Logbooks and Diaries of landscape building in this general area:

> -October 8, 1919: "General duties and wheeling of gravel to cover pipelines in front of dwelling"
>
> - May 4, 1931: "Hauling 2 loads beach gravel for covering on the road between the buildings to stop dust blowing around."
>
> -May 7, 1931: "Hauled 7 loads gravel for road and driveway to garage."
>
> -May 10, 1933: "Removed tram track from oil house to 2d asst. dwelling and will rebuild same again placing in center of driveway so to leave the space

clear between the drive-way and dwellings, hauled dirt to fill the space where we removed track."

August 21, 1935: "Hauling gravel for top dressing on ramp and drive way to truck drivers garage. Dug down and leveled old tram track bed. CCC boys hauled the rock away for us, putting them into the new road bed which is under construction and is nearing completion."

August 22, 1935: "Finished removing the rock and leveled off the old tram track bed and built a water colvert [sic] to drean [sic] water from roadway."



Figure 30. Plan view of EU 1. Photograph by author.

As for the remaining three spot elevations, soil probing at each location was less definitive. At the locations of SP 1 (east of Residence 1) and SP 2 (south of the oil house), field investigations revealed at least 0.6 ft (20 cm) of fill at SP 1 and 0.9 ft (30 cm) of fill at soil SP 2. While neither amount of fill at each location exceeds the amount of elevation gain calculated by the cut-and-fill analysis (1.2 ft at SP 1 and 3.5 ft at SP 2), very few interpretive conclusions can be drawn. Field investigations

confirmed the presence of fill soil at each location, so the landscape has definitively been built and modified since lighthouse construction. Furthermore, it is likely fill soils extend further below the surface than indicated by the soil probing. Some of the below-surface materials consist of large boulders and cobbles seen in Figure 30 and Figure 5. It is likely these cobbles and boulders inhibited the soil probe from inserting deeper into the subsurface and identifying additional fill layers. Only one documented landscape building activity was identified at the location of SP 1:

-May 13, 1940: "Hauling dirt for filling on ground east No. 1 dwelling."

Likewise, only one documented landscape building activity was identified in the general location of SP 2:

> -May 10, 1933: "Removed tram track from oil house to 2d asst. dwelling and will rebuild same again placing in center of driveway so to leave the space clear between the drive-way and dwellings, hauled dirt to fill the space where we removed track."

The spot elevation south of Residence 2 and Residence 3 shows 5.6 ft of elevation was removed since lighthouse construction. SP 4, however, showed at least 0.5 ft (17 cm) of fill at this location. There are two possible explanations for this: first, during lighthouse construction initial blasting of the landscape resulted in large amounts of rock being removed from this location. 1909 photography of this location show this area of the lighthouse grounds are lower than the surrounding lawn/landscape (Figure 31). Throughout the years of filling, this area would then have been elevated to make it level with the rest of the lawn (Figure 22-Figure 24). If this is the case, however, final lawn-leveling must still be lower than pre-lighthouse

elevations. Also of note, there were no documented landscape building activities identified for this general location.



Figure 31. Overview of southernmost spot elevation as it appeared in 1909. Reproduced with permission from the Minnesota Historical Society.

A more likely explanation is that these results are due to limitations in accurately georectifying the 1907 map with the 1956 topographic map. The best-fit used in this analysis was made to capture the proper lighthouse location and as much lawn as possible. This resulted in the north shore of Lake Superior as depicted on the 1907 map to sit further north than the shore on the 1956 USGS map, thereby causing elevation lines to be mis-matched (Figure 32). This mismatch of shorelines would cause faulty data to be produced.

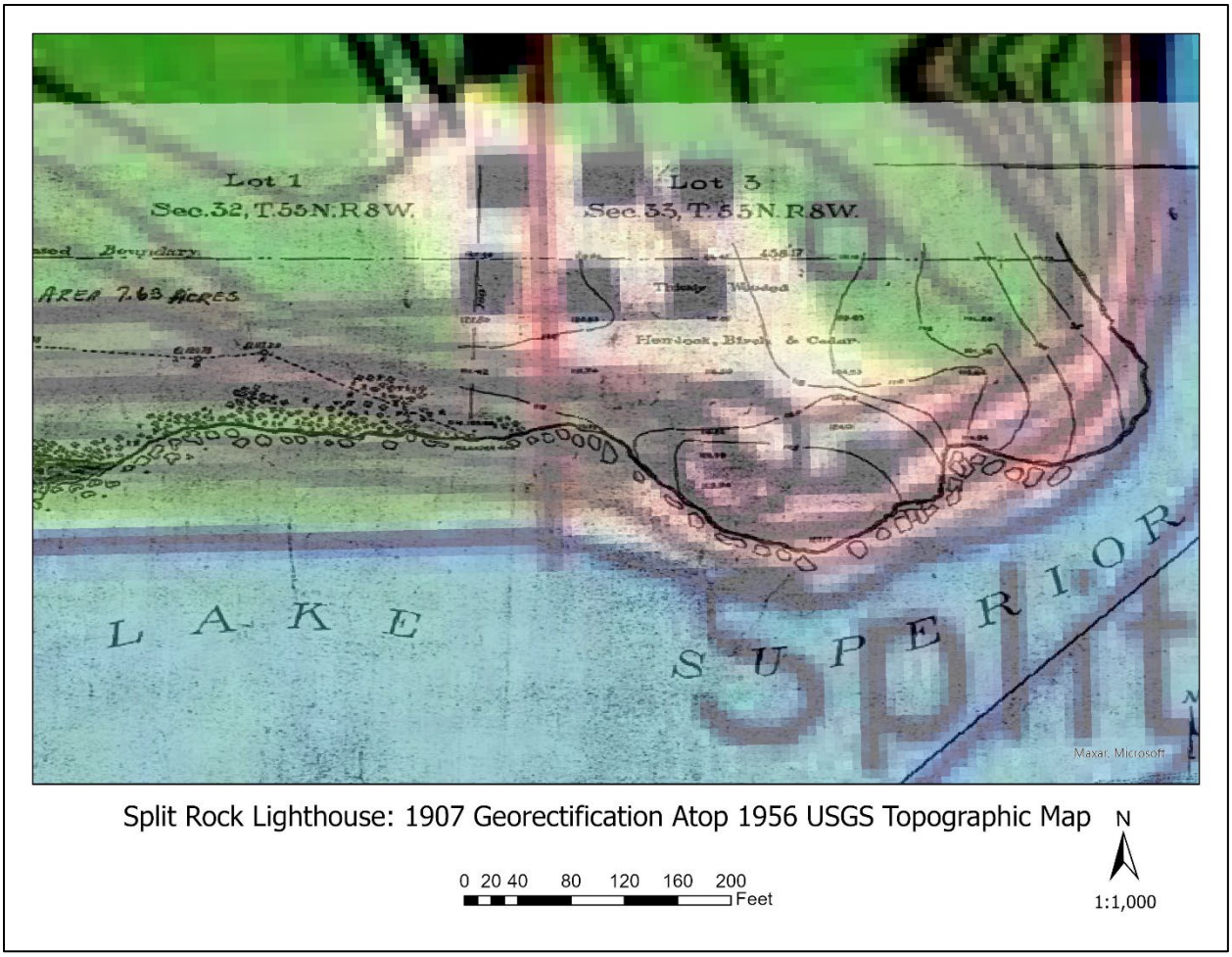


Figure 32. View of georectification used for cut-and-fill analysis. Map created by author.

Activity Trends in the Landscape Building of Split Rock Lighthouse

After tabulating all documented landscape building activities at Split Rock Lighthouse, each entry was given a general activity designation to better understand why the landscape was built (Table 1). Occurrences of each designation was counted and sorted by year of occurrence and by month of occurrence. Of note, 52 occurrences were counted despite the fact 51 entries exist, as the entry for September 24, 1931 was given both a grading and roadwork designation. These designations and data sorting was done to better understand the seasonal and yearly trends behind the landscape building at the lighthouse. Table 6 and Figure 33 illustrate the total amount

of each activity, or general reason behind the landscape building, at Split Rock Lighthouse.

Table 6. Amount of landscape activity designation occurrences, 1912-1995.

Activity Designation	Number of Occurrences
Garden	10
Grading	14
Infrastructure Development	5
Roadwork	12
Undetermined	11
Grand Total	**52**

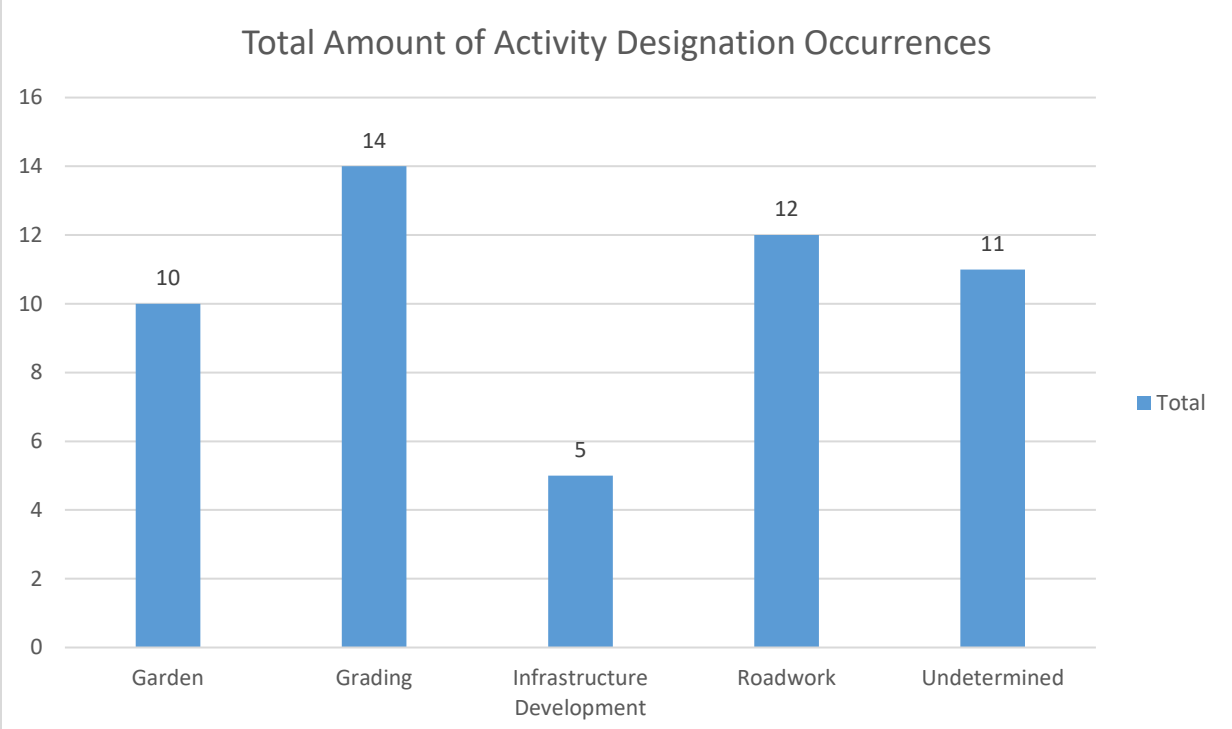


Figure 33. Bar graph illustrating landscape activity designation occurrences, 1912-1995.

As evidenced by the above table and graph, grading (n=14) was the most prevalent activity designation, followed by roadwork (n=12), undetermined (n=11), gardening (n=10), and then infrastructure development (n=5). The large swath of uneven, rocky land that originally made up the Split Rock Lighthouse grounds likely explains grading occurring most frequently. It is also likely some of the undetermined designations were simply grading activities. Entries that contained only the phrasing "improving ground" could likely refer to grading, but it is impossible to determine with certainty. Given the fact only a single road exists at Split Rock Lighthouse, it is somewhat surprising roadwork-associated landscape building took place so frequently.

Building off the results section, the landscape activity designations were sorted both by year and by month. This was done to expand on the development timeline of the landscape and better understand the landscape changes through time and season. These results are presented in two bar graphs below, beginning with the yearly trends (Figure 34).

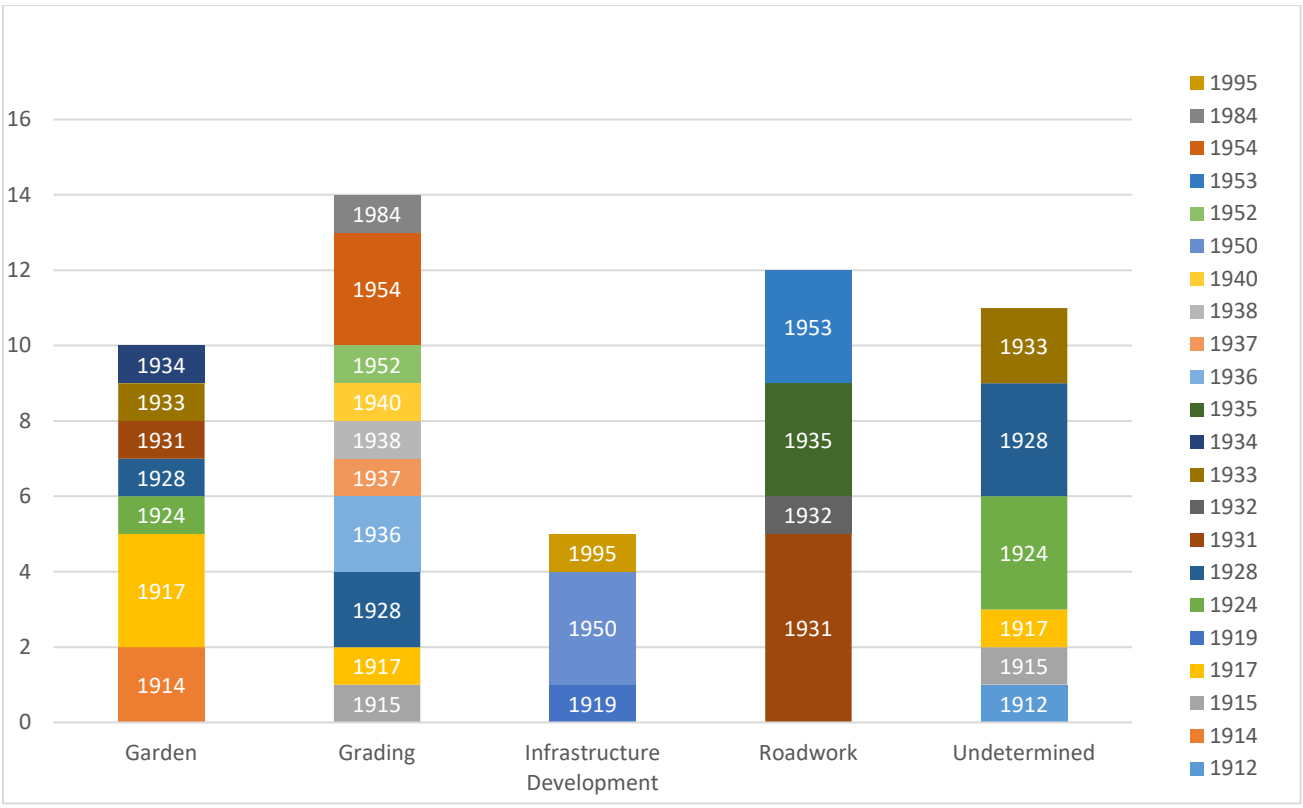


Figure 34. Bar graph illustrating frequency of landscape activity designation occurrences by year, 1912-1995.

Beginning with the highest occurring activity designation, grading, the distribution by year is quite even through time. One surprising occurrence is that more grading-specific activities are not documented after Keeper Covell received the 1931 letter from Assistant Superintendent Will specifically instructing lighthouse staff to grade the yard. It is possible some of these grading activities are captured in the now-missing lighthouse logs from April 1931, however. Overall, this data gives the impression that grading the lawn of Split Rock Lighthouse was a gradual project, with work being done for roughly 70 years. A spike in grading activities occurs in 1954 associated with the removal of rocks west of Residence 3. It is unclear where exactly this rock removal occurred as very few photographs exist of this area of the Split Rock lawn.

The next highest occurring activity designation was roadwork. No roadwork designations appear until 1931 when the road running between the Residences and Barns had been constructed. The fact roadwork is the second highest occurring activity suggests building this road and converting the Barns to Garages was a labor-intensive endeavor. A spike in roadwork activity increases in 1953, all associated with "…Spreading and leveling gravel on driveways" (September 23, 1953).

Following roadwork, undetermined is occurs 11 times between 1912-1933. As mentioned above, it is likely the early undetermined activities are associated with grading and filling the lawn. This is also the case for the entries from 1924 and 1928, as these entries also use the phrasing "improving the grounds," but an exact activity could not be determined. The undetermined activities from 1933 seem to be associated with either roadbuilding or infrastructure development, but it is unclear based on the language used in the entries.

Gardening activities occur 10 times in the logbook, with many of the entries occurring during the early years of Split Rock Lighthouse. One possible explanation for this is the secluded nature of life at the lighthouse during this time. With no roads or transportation, the only way for the lighthouse keepers and their families to acquire supplies was to either walk to Little Two Harbors Fishing Village, Beaver Bay, or to be delivered by boat. Ensuring the family had fresh produce to eat likely spurred the work done to build gardens on the grounds of the lighthouse. Grace Young, daughter of Keeper Orren "Pete" Young (Head Keeper from 1910-1928), remembers her dad's garden, "My dad tried gardening, but he didn't have much luck. Animals would eat it all the time and deer would jump the fence. One time he had a pretty good crop of

potatoes waiting on the dock to bring home, but they froze before the boat came and had to be dumped in the lake" (Young 1992). Regarding the three gardening entries during the 1930's, in an interview with former MNHS site manager Lee Radzek, Keeper Covell's (Head keeper from 1928-1944) daughter Illeana makes mention of flower gardens near the front of the residences and a vegetable garden located behind the middle barn. Like Grace Young, she remembers this garden being generally unsuccessful (Quinn Evans 2018: 70).

Finally, landscape building activities related to infrastructure development occur five times at sporadic intervals. First in 1919 when new water pipes were laid in front of the residences. The three entries in 1950 are related to the installation and back filling of two oil fuel tanks on the property. The 1995 entry documents the removal of a fuel tank, but in it is unclear if they are referring to the same tanks.

In addition to sorting the assigned activity designations by year, they were also sorted by month. This was done to identify further trends in seasonality associated with landscape buildings. Figure 35 presents these results.

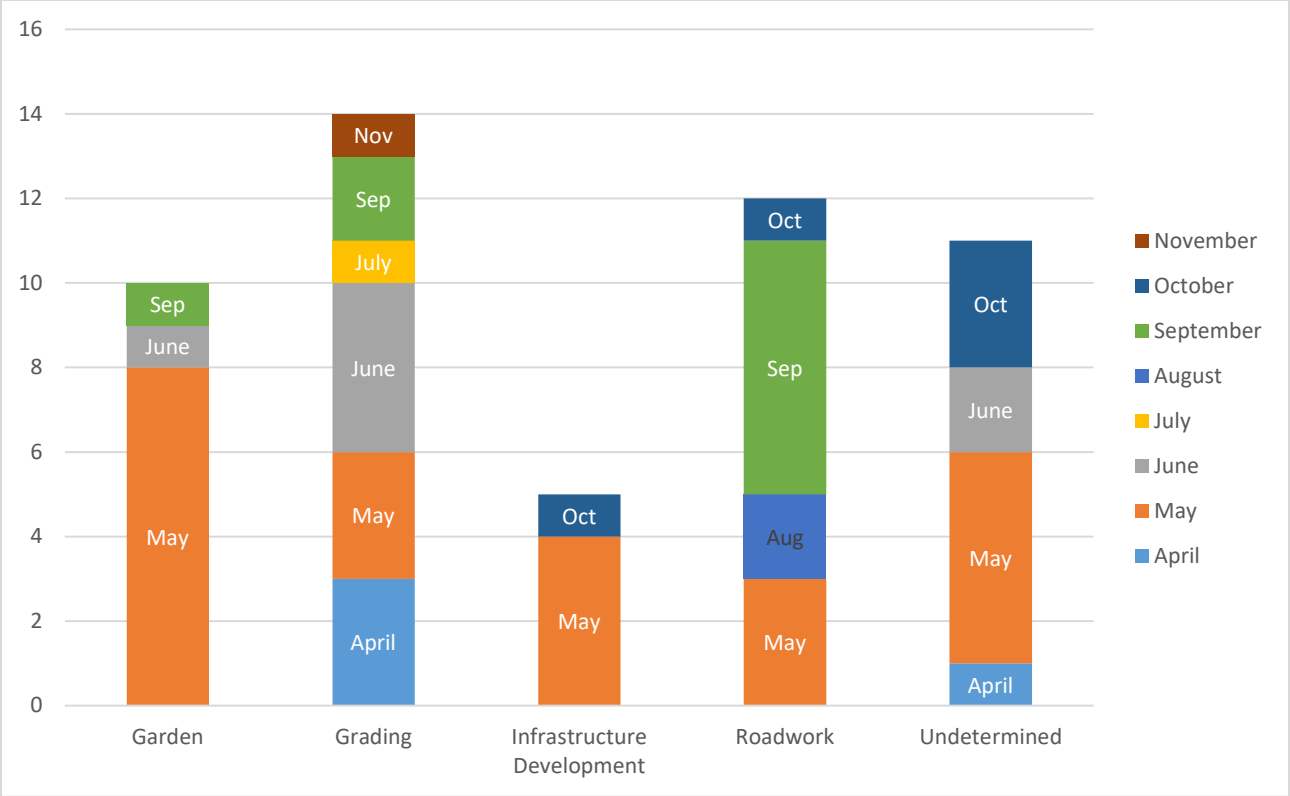


Figure 35. Bar graph illustrating seasonality of landscape activity designation occurrences, 1912-1995.

As mentioned earlier in the results section, all landscape building took place during the Spring-Summer-Fall seasons. Upon examination of Figure 35, it is immediately apparent that nearly all documented landscape building at Split Rock Lighthouse took place in either the spring or fall months, with sporadic building taking place during the summer. Surprisingly, this coincides with both the beginning and the middle of the shipping season on Lake Superior. According to the New York Times, Lake Superior shipping season spans from early April to mid-December (Malcolm 1973), which means that while lighthouse keepers were preparing for another busy season, they were also spending their time building the Split Rock landscape.

Most garden building taking place in May can be explained by the planting schedule of Minnesota, as most planting calendars call for crops to be planted beginning in May. One possible explanation for the exclusion of landscape building in the summer months is a desire to avoid the summer heat. As pointed out in previous chapters, the landscape building at Split Rock Lighthouse was done by hand and moving soil and fill materials is labor intensive work. Simply choosing to do it during the cooler spring and fall months is a logical choice. The single July grading occurrence is an entry dating from 1984, when Split Rock Lighthouse was a historic site under the administration of MNHS. It is likely this endeavor used heavy machinery, so the summer heat would not have been as overbearing as it was if the grading was done by hand.

LiDAR Investigation of Surrounding Landscape

A desktop investigation of available Minnesota LiDAR data failed to identify any potential soil gathering areas (i.e. borrow pits) or any other features possibly associated with soil gathering activities (Figure 36).

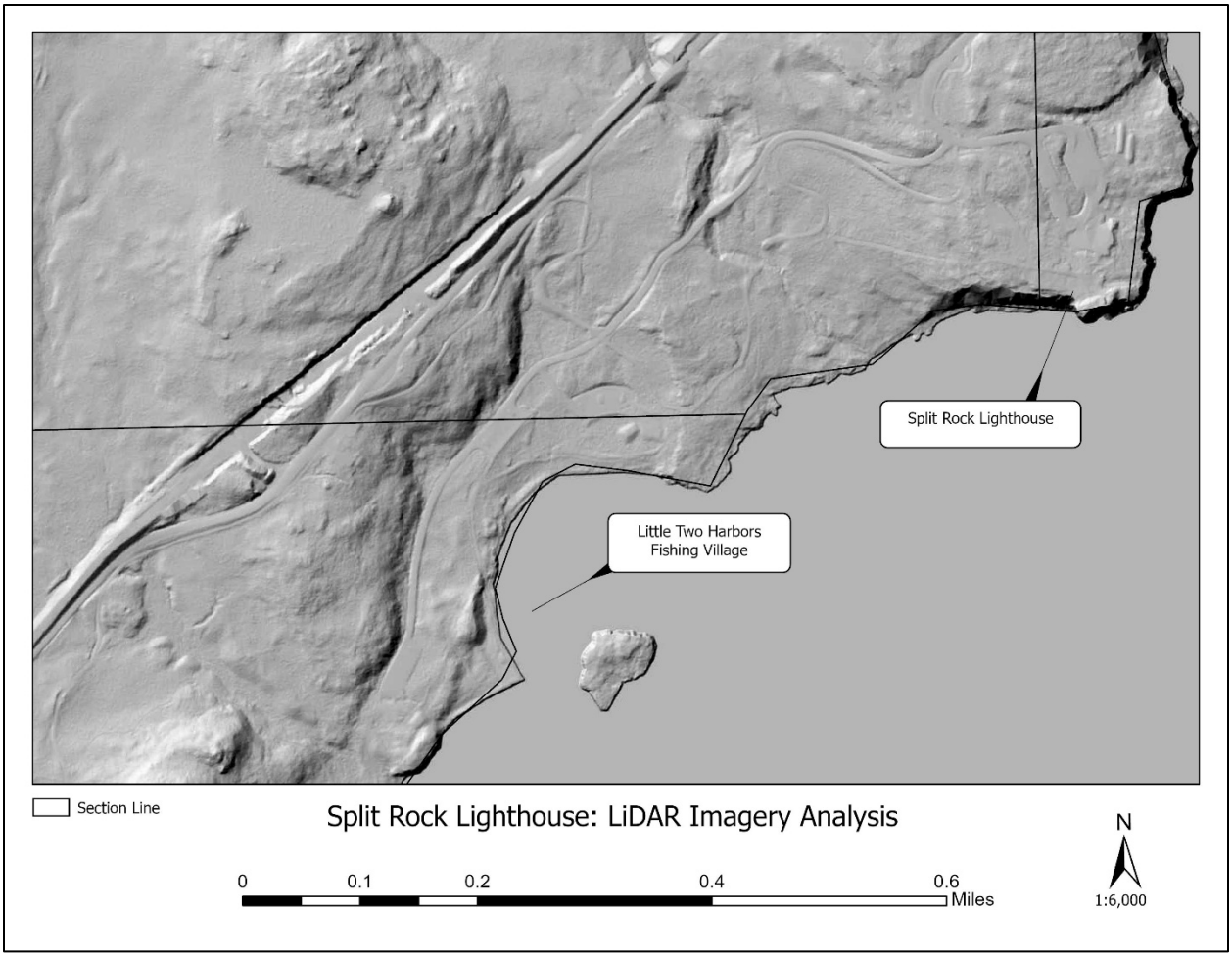


Figure 36. Split Rock Lighthouse and Little Two Harbors Fishing Village as depicted on LiDAR. Map created by author.

Because the only documented soil gathering location was from Little Two Harbors Fishing Village (Logbook entry, May 14, 1931- "Hauling 3 loads beach gravel from Little Two Harbors…"), particular attention was paid to the areas surrounding the Little Two Harbors Fishing Village. It is likely any short-lived remnant gathering features would have been continuously washed away by the ever-churning nature of the Lake Superior waves. Assuming the tramway was used to gather some fill soil prior to the usage of trucks, it's likely these soils were also gathered close to the beach as the tramway ran down to the beach southwest of the

main lighthouse location. This area would also be subject to washout by Lake Superior. Finally, modern development has also vastly impacted the areas surrounding Split Rock Lighthouse. All visible roads or anomalies identified in LiDAR imagery correlate with modern developments (Figure 37). These developments would have destroyed any historic gathering locations that may have remained prior to development.

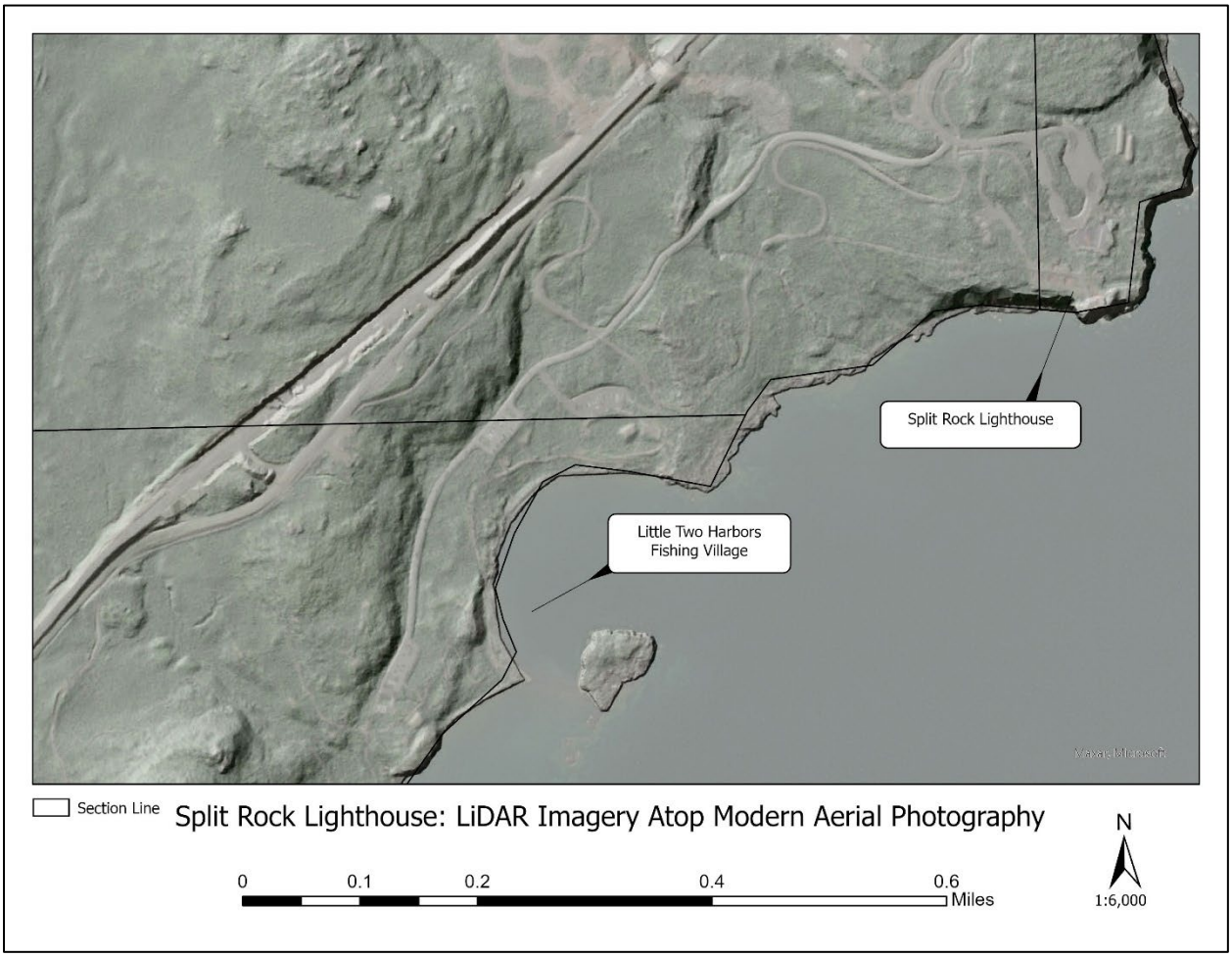


Figure 37. View of LiDAR Imagery atop modern aerial photograph of investigation area. Map created by author.

As outlined in this chapter, some general trends in landscape building at Split Rock Lighthouse can be identified. The cut-and-fill analysis demonstrates there has been one to four ft of elevation gain across the northern extent of Split Rock's lawn,

and this is corroborated by 2022 archaeological fieldwork. Additionally, most tested areas of the lawn are associated with documented landscape building activities. Classifying these landscape building activities into general categories allows for an easier to understand picture of why these landscape changes were made. Of particular importance to the lighthouse staff was ensuring a functional lawn for their gardens, a level lawn, and level roads to drive on. The efforts to build a functional lawn were ever present, with similar work happening for over 70 years. Though no potential gathering locations were able to be identified in the LiDAR investigation, the possibility of finding where the fill soil originated remains. These potential areas of further research, as well as additional summaries and interpretations, will follow in the next chapter.

Chapter 7: Conclusion

The aim of this research was to explore the built lawn of Split Rock Lighthouse. When was it built? How was it built? And why was it built? Developing answers to these questions about life at the lighthouse could offer new insights into the lives of the people who lived and worked there. Situating the built landscape of Split Rock Lighthouse as an archaeological artifact itself, a thorough investigation into its construction offers a means to a better understanding of the day-to-day lives of the lighthouse keepers, their desires, and why they did what they did.

Using a variety of sources and investigatory tools, these questions were partially answered. The keepers daily logs illustrate a long term building endeavor that took decades to complete. The soil was quite literally moved by hand and spread across the lawn. Sometimes it was done because the keepers wanted a lawn for themselves and, sometimes, they were instructed or required to move fill because of specific lighthouse complex developments. Further, the fieldwork and cut-and-fill analysis demonstrated that roughly one to four feet of fill was likely added across the lawn, further demonstrating the daunting nature of this building effort. Finally, the desktop LiDAR investigation demonstrated the lengths to which modern developments have impacted the surrounding landscape. The goal of the LiDAR investigation was to search for potential gathering locations, but because of either environmental factors or the impacts of modern developments, this investigation was unsuccessful in identifying any remnant gathering features. As demonstrated in the chapters above, the lawn at Split Rock Lighthouse was built over several decades, by

hand, at different locations depending on immediate needs, and for a variety of reasons ranging from feeding a family, building a road, to simply covering a pipe.

Beyond the when, where, and how questions explored, this thesis also views Split Rock Lighthouse as more than a collection of buildings. While the buildings located on the grounds are important to the history of the site, the ways in which the overall landscape was used also plays an important part in the story. How the keepers decided to modify the lands surrounding the buildings offers insights into what was important to them, how they spent their time, and factor in to how the site is experienced today. The keepers created a functional lawn to live on, grounds on which to perform their work duties, and space for large throngs of tourists to congregate—all within the rugged and wild terrain of the northern Minnesota forests. These insights into land use speak to the importance of viewing archaeological and historic sites as more than a collection of buildings, but rather as a whole built landscape. In this viewpoint, the space between the buildings becomes just as important as the buildings themselves. The "empty" spaces between the buildings are not void of cultural materials, but cultural materials themselves. Their construction, just like the construction of buildings, can offer insights into past human behaviors and beliefs and warrant intelligent study and investigation just as cultural artifacts or features receive.

Several limitations to this research were recognized throughout this investigation. First expounding on the limitations of the cut-and-fill analysis outlined in the analysis chapter, the lack topographic maps pre-dating lighthouse construction imposes a limit on the viability of the cut-and-fill results at Split Rock Lighthouse.

Ideally, a cut-and-fill analysis would be performed between two maps of the same nature, i.e. two separate USGS topographic maps, rather than an Army Corp of Engineers map and a USGS topographic map. Additionally, the 1907 US Army Corp of Engineers map only depicted a portion of the lighthouse grounds. This resulted in a narrow area of study to be used that did not encompass the entire lighthouse lawn.

Secondly, the cataloging of documented historic landscape building events presented several challenges. Most apparently, the missing lighthouse logs spanning July 25, 1929 through April 19, 1931. It is likely landscape building activities took place during this time period and because the logs were not available, these efforts were not accounted for in this study. Another limitation was identifying and transcribing every log entry that did exist. Documenting the sheer number of entries alone proved to be a challenge in itself. Coupled with the number of entries, some of the handwriting on the logs is partially illegible. Also, there are likely to be landscape building events that are unrecorded in the logs. Because of these limitations, it is likely some landscape building events were not captured in this investigation. Based on the expansive landscape that was filled and number of entries identified in this study, one can infer that some landscape building activities were either not documented when they were carried out or their documentation was not identified by the author. This thesis operates on the assumption that recorded landscape building events are representative of the seasonal and historical patterns of this labor.

Despite these limitations, the knowledge gained from this thesis can help form the basis for further studies into the built landscape of Split Rock Lighthouse. A natural question pertaining to the landscape building at the lighthouse is where did the

soil used to build the lawn originate from? A previously proposed study by the author sought to begin answering this question and the purpose of the soil probes conducted across the Split Rock lawn was the means to develop an answer. The outline of this study consisted of utilizing X-ray fluorescence spectrometry, particle size analysis, Munsell colors, and textural descriptions to create a soil signature for each soil type identified in the lawn. This soil signature would then be compared to soil gathered outside of the main Split Rock lawn to test for a match. The viability of such a study has been demonstrated by several archaeological investigations, with two of the most applicable being a 2010 study by Abrahams, Entwistle, and Dodgshon and a 2006 study by Eleni Nodarou. Abrahams et al. used X-ray fluorescence spectrometry to study soils collected from known settlement areas and arable landscapes in Duallin, Scotland, finding a distinct difference between the chemical make-up of each. Their study concludes that this chemical composition of different soils can be used to identify areas of past settlement and past farming lands in areas with no remaining above-ground archaeological features to indicate past land use patterns. Nodarou uses particle size analysis in their investigation at Chrysokamino, Crete to compare natural and anthropogenic soils at different areas throughout the site. With these soil descriptions, Nodarou was able to determine if soils void of artifacts were likely to have been impacted by human use. This combination of X-ray fluorescence spectrometry, particle size analysis, and traditional Munsell and textural descriptions would have created an easily replicable and comparable soil catalog for comparison to soils outside of the main lawn of Split Rock. Due to circumstances outside of the author's control, access to the soil samples was rescinded and use of them was not

available for study. However, the samples collected are located at MNHS under accession number 2022.80 and could be used for further study. In the authors opinion, this is a worthwhile endeavor that would continue to illuminate the aspects of landscape building at Split Rock Lighthouse that this thesis began to explore.

Upon examination of the results and data analysis, the applicability of the investigatory techniques utilized have a broad appeal in archaeology. Examining historic records is not new in archaeological research but utilizing them in ways beyond a catalog of events could provide new avenues of discovery. The application of general activity designations and sorting by event/activity month and year provided a new way to read the data. These methods allowed for building trends to appear and reasons for landscape building activities to be more easily recognizable. Trends were illuminated by the sorting, helping to answer the "when" question and generalized activity designations aided in recognizing and answering the "why" question. Using historic photographs as a complement to primary source written records was a benefit to the landscape building timeline as documented work could be immediately recognizable when photographs were viewed through time. Additionally, the cut-and-fill analysis and traditional archaeological fieldwork worked as an excellent complement to one another. In some cases, the cut-and-fill results were confirmed by the fieldwork, but in the case of the southern extent of the lawn, fieldwork results aided in identifying issues with the results produced by the analysis. Overall, it behooves us as researchers to look at existing data in new ways and to explore complimentary investigatory techniques as means of confirmation or analysis and the viability of these takeaways is exhibited in this work.

Returning to the theoretical steppingstones of landscape archaeology explored in chapter two of this thesis, what can the built landscape of Split Rock Lighthouse tell us and what do the building activities mean? The nature of Split Rock Lighthouse as not only a place of work, but also a home and eventually a tourist attraction draws comparisons to the changing nature of culture identified by Saur. As a reminder, he writes, "Culture is the agent, the natural area is the medium, the cultural landscape is the result. Under the influence of a given culture, itself changing through time, the landscape undergoes development, passing through phases, and probably reaching ultimately the end of its cycle of development (1925: 46). Treating these three uses (home, workplace, tourist attraction) as Saur's "phases" offers a view of the Split Rock Lighthouse landscape as a cultural artifact.

The home "phase" of landscape building at the lighthouse can best be represented by the continued building of gardens. This illustrates a functional and aesthetic use of the land and a need to provide for the families living on site. This is reflected in the location of the gardening activities remembered by Illeana Covell. Illeana remembers a vegetable garden behind the middle barn and a flower garden near the front of the residences. This use of space was designed for living, rather than work or tourism, and this is reflected in the landscape building activities that occurred there. The gardens were for the family, so they were constructed in the family-designated areas.

The workplace and tourism "phases" of Split Rock Lighthouse are more intertwined, but a clear demarcation between the two can be identified. Prior to the construction of Trunk Highway No. 1/Lake Superior International Highway in 1925,

Split Rock Lighthouse was not easily accessible by tourists. Therefore, any pre-1925 landscape building work not associated with family-related activities likely refers to landscape building to further lighthouse operations. Unfortunately, many of these entries are vague and primarily only include the phrase "improving the grounds," so the ability to draw conclusions based on logbook entries is limited. When considering historic photography however, some observations can be made. Notably, it appears most landscape building outside of gardening was for utilitarian purposes. There is no level lawn or manicured grass in any pre-1925 photograph. Much of the landscape remains a rocky, craggy mess. This would lead one to assume that when the keepers were "improving the grounds," it was not for aesthetic reasons. In fact, the one pre-1925 logbook entry (October 8, 1919) with a specific mention for a reason behind the landscape building was to bury a pipeline. Based on the photography of the time and what little can be gleaned from the logbooks, landscape building to further lighthouse operations was primarily spurred by practical purposes.

Finally, the tourism "phase" of landscape development can be examined in several ways. First, as tourism was increasing with the completion of Trunk Highway 1/Lake Superior International Highway, so too did landscape building activities at Split Rock Lighthouse. This can be seen in the increased amount of documented landscape building post-1925. Examing present-day people's use of the landscape at Split Rock Lighthouse can offer potential reasons why this could be the case. The modern-day entrance to the lighthouse has visitors approach the lighthouse from the northeast, passing the oil house and finding themselves in the open space to the north of the lighthouse and fog signal building. This open space offers fantastic views of

the lighthouse and acts as a natural gathering area. Oftentimes, people are congregating not only on the sidewalks, but also on the lawns east of Residence 1 and south of the oil house. Prior to this modern entrance, visitors would enter from the northwest, travel between the residences and barns, but again find themselves in the open space north of the lighthouse and fog signal building. It can be assumed that as tourism to the lighthouse increased, the need to have functional space for people to gather was identified. If the only level areas around the lighthouse grounds were the sidewalks, they would quickly become congested, and the flow of visitors would become obstructed. Building a lawn north of the lighthouse offers a solution to this problem, allowing visitors to disperse and spread out much like they do today.

Applying Saur's phases to landscape building at Split Rock Lighthouse demonstrates the landscape's ability to inform us of past human behaviors. It is not a stretch to say the lighthouse grounds passed through phases of development from home, to workplace, to tourist destination, or that these phases all influenced the landscape development in different ways. These include creating family-centered spaces for growing food, utilitarian improvements for lighthouse operation, and creating spaces for visitors to congregate and view the lighthouse. Each reason for building the landscape reflects its own use, building upon previous developments, and creates a multifaceted archaeological landscape.

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