

SANKOFA:
THE TREATMENT AND ANALYSIS OF
“THE SURVEYING WASHINGTON, DC BY BENJAMIN BANNEKER”

State University of New York College at Buffalo
College of Arts and Humanities
Patricia H. and Richard E. Garman Art Conservation Department
In fulfillment of CNS 694/ 695
LaStarsha D. McGarity
Advisor: Jonathan Thornton
Co-Advisors: James Hamm, Fiona Beckett, Theresa J. Smith, JJ Chen, Dr. Rebecca
Ploeger

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Abstract

At the 1940 American Negro Exposition in Chicago, Illinois, a series of thirty-three dioramas were exhibited, and twenty of these dioramas were later given to Tuskegee University, where they later entered the collection of the Legacy Museum. Through the Historically Black Colleges and Universities (HBCUs) Diversity Initiative, the Legacy Museum's dioramas are being or have been treated at the Winterthur University of Delaware Program in Art Conservation, the Garman Art Conservation Department at Buffalo State College, and the Smithsonian American Art Museum. The history, analysis, and treatment of "The Surveying of Washington, DC by Benjamin Banneker" will be the focus of this report. The materials were investigated with Fourier Transform Infrared Spectroscopy (FTIR), x-radiography, and photographic techniques including infrared imaging, longwave ultraviolet induced visible fluorescence, and three-dimensional imaging. Treatment included dry surface cleaning, aqueous cleaning, consolidation, filling, inpainting, and housing. LED ribbon lighting was incorporated to safely replace the previous incandescent lighting and illuminate the scene in a manner similar to the original display.

Keywords: Benjamin Banneker, Diorama, Tuskegee, White House, American Negro Exposition

1. Introduction

Dioramas were often used as educational tools at state fairs and expositions, reaching their heyday in late 1930s. A series of thirty-three dioramas showcasing African and African American history were created for exhibition at the 1940 American Negro Exposition, considered the first major display in the United States of the talents of African Americans. Twenty dioramas from the series were given to Tuskegee University immediately following the exhibition and were displayed at the George Washington Carver Museum on the campus. They later became part of the collection of the Legacy Museum, opened April 2009 to honor and serve as a memorial to the victims of the Tuskegee Syphilis Experiment and their families. The dioramas are currently being treated at three different locations to include Buffalo State College, at the time of this writing. Other dioramas from the same collection, have been treated or are currently undergoing conservation treatment at the Winterthur University of Delaware Program in Art Conservation, and the Smithsonian American Art Museum as part of diversification efforts meant to encourage students of color, particularly those attending Historically Black Colleges and/ or Universities (HBCUs), to pursue a career in art conservation or related fields. The initiative is headed by Dr. Jontyle Robinson, curator of the Legacy Museum, and Dr. Caryl McFarlane, Executive Consultant of the HBCU Alliance of Museums and Galleries.

This project focuses on the treatment and study of diorama thirteen in the collection, “The Surveying of Washington, DC by Benjamin Banneker.” It depicts Benjamin Banneker, a Black astronomer, mathematician, and surveyor, partially responsible for defining the boundaries of Washington, DC in conjunction with Major Andrew Ellicott, Esq. and Isaac Briggs. The scene also portrays the enslaved Black men that worked as carpenters and stonecutters in the construction of almost every major structure in the Capitol prior to Emancipation.



**Fig.1:
Incoming
receipt
image of
the
diorama.**

2. Project Overview

2.1. Objectives

This project aims to expand the current information about the provenance, manufacturing techniques, manufacturing materials, and the numerous artists involved. The scope of the project comprises the research, examination, analysis and treatment of all components of the diorama. An appropriate course of treatment will be determined based on the Code of Ethics and Guidelines of Practice developed by the American Institute for the Conservation of Historic and Artistic Works (AIC, 1994), and insights gathered from analytical techniques. A new lighting system will be integrated allowing the diorama to once again be exhibited to the public.

The goals of the projects were as follows:

- Work with scholars, historians, the conservators and students at the Winterthur and University of Delaware Art Conservation Department, and Tuskegee curators in researching the provenance and history of the diorama
- Analyze and identify materials present
- Assess the present condition of the diorama
- Utilize appropriate imaging techniques to document the diorama
- Treat the diorama with appropriate treatment methods

Each step of the project was designed to improve the conservation education of the author by providing the following opportunities:

- Experience examining and designing a treatment plan for a mixed material object
- Performing and interpreting technical studies of various materials
- Experience creating housing to improve storage without sacrificing accessibility

In addition, it provides an opportunity to aid a historically Black college or university in caring for its art collection; and provides an opportunity to learn practical techniques for analysis and research, which would be applicable to others examining, treating, and researching this diorama or similar cultural heritage objects.

3. Historical Background

3.1. Benjamin Banneker

“I AM fully sensible of the greatness of that freedom, which I take with you on the present occasion; a liberty which seemed to me scarcely allowable, when I reflected on that distinguished and dignified station inwhich [sic] you stand, and the almost general prejudice and prepossession, which is so prevalent in the world against those of my complexion.

I suppose it is a truth too well attested to you, to need a proof here, that we are a race of beings, who have long labored under the abuse and censure of the world; that we have long been looked upon with an eye of contempt; and that we have long been considered rather as brutish than human, and scarcely capable of mental endowments.”

-Excerpt from correspondence between Benjamin Banneker and then Secretary of State, Thomas Jefferson on August 19, 1791 (National Archives, 2018).

Benjamin Banneker was an author, publisher, scientist, farmer, mathematician, astronomer, and urban planner. He is the descendant of enslaved Africans, an indentured Englishwoman, and free people of color. He was best known for publishing six almanacs, which included calculated ephemeris (table detailing the position of celestial bodies), commentaries, literature, and fillers with a political and humanitarian purpose. He sent a copy of his ephemeris to Thomas Jefferson, along with a letter, quoted in part above, as a direct challenge to Jefferson’s ideas about the supposed mental inferiority of people of African descent (PBS, n.d.).

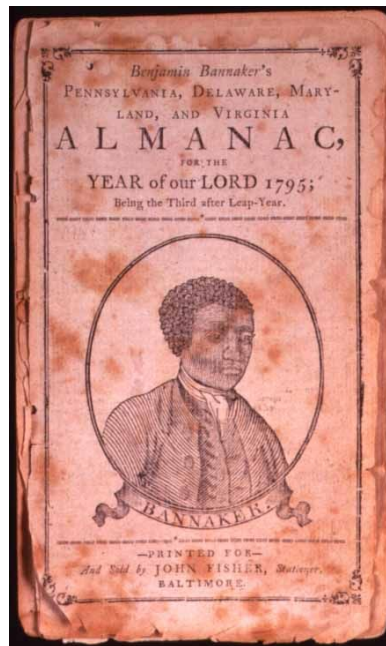


Fig. 2: The cover of Benjamin Banneker's 1795 *Almanac*, featuring a woodcut of the author. Image: Maryland Historical Society.

Benjamin was born on November 9th, 1731 in Ellicott's Mills, Maryland as the first child of the union between Robert and Mary Banneker. His father was a formerly enslaved Guinean man, baptized and freed as Robert. Although his previous name is unknown, it is known that he took Banneker as his surname after the marriage. Benjamin's grandmother, Molly Welsh, was a formerly indentured Englishwoman, who was falsely convicted of theft and indentured to a Maryland tobacco farmer. After completing her sentence, Molly farmed rented land, and eventually purchased two enslaved Africans, both of whom she later freed. In direct violation of Maryland law at the time, Welsh wed one of the men she freed. Her husband, Bannka, with alternate spellings of Bannke and Bannaka, asserted that he descended from tribal royalty in West Africa (Maryland Historical Society, n.d.).

Young Benjamin grew up in Baltimore County, as one of two hundred free African Americans among a population of four thousand enslaved African Americans, and thirteen thousand European Americans. His grandmother taught him to read, and for a short period of time he attended a one-room interracial school operated by Quakers. Early in his education he showed a keen interest in mathematics and mechanics, later exploring the subject further on his own time. Banneker predicted the timing of a solar eclipse, only slightly inaccurately due to discrepancies in his expert sources rather than a miscalculation on his part. He also-- having only seen a sundial and pocketwatch in his lifetime-- constructed a striking clock almost entirely of wood, based on his own drawings and calculations. The clock continued to run accurately until it was destroyed in a house fire forty years later (PBS, n.d.).

Banneker befriended the Ellicott brothers, of the family that owned and operated Ellicott's Mills, through his interest in mathematics and astronomy. Through this friendship, he became familiar with Major Andrew Ellicott, a cousin of the Ellicott brothers. The Major later hired Benjamin to assist in surveying the territory that would become Washington, D.C. The Georgetown Weekly Ledger printed a notice, later copied by other newspapers, stating the Ellicott was "attended by Benjamin Banneker, an Ethiopian, whose abilities, as a surveyor, and an astronomer, clearly prove that Mr. Jefferson's concluding that race of men were void of mental endowments, was without foundation" (Georgetown Weekly Ledger, 1791).

Between 1792 and 1797, Banneker published six almanacs in twenty-eight editions, each including an image of the author (see figure 2). He lived alone most of his adult life by selling off and renting his land. Towards the end of his life he sold his land to the Ellicotts in exchange for a small yearly pension. He died on October 9th, 1806 in Baltimore, Maryland and was buried near his home. In an unfortunate strike of fate, his home and all its contents -- included his clock and all his records-- were destroyed in a fire during his funeral (PBS, n.d.).

3.2. *Major Andrew Ellicott, Esq.*

Named after his grandfather and having an uncle of the same name, Andrew Ellicott (see figure 3) was born on January 24th, 1754 to Joseph and Judith Ellicott in Buckingham Township, Bucks County, Pennsylvania. The Ellicott family owned and operated mills in Maryland and the city of Ellicott's Mills is their namesake. He was the first of fifteen children, to include six adopted siblings. Andrew married Sarah Brown and their union produced ten children, nine of whom survive to adulthood (Alexander 1899:158-202).

Although raised as a pacifist Quaker, Andrew served in both the military and politics. During the American Revolution, Ellicott was commissioned by Governor Johnston of Maryland as Captain, and then Major, of the Elkridge Battalion of the Ann Arundel County militia. Later he was elected to and served in the Legislature of Maryland (Spies, 1997).

Gregory Spies notes that, "In February of 1791, Thomas Jefferson requested Ellicott to survey the ten square mile boundary for the 'Federal Territory' later to become known as the District of Columbia. The survey was begun later that month and was expanded to include [finishing] the layout of the streets and general plan of the 'Capitol City' [started by often frustrating L'Enfant]. This project lasted over two years. Ellicott was briefly assisted in this survey by his old friend Benjamin Banneker, a black astronomer and surveyor. Isaac Briggs who, in 1803, was appointed Surveyor General of Lands South of Tennessee or the Mississippi Territory, also helped Ellicott" (Spies, 2002:6).

In his career as surveyor, Major Ellicott defined the border between Pennsylvania and Virginia, defined the westernmost border of Pennsylvania; accurately mapped the Niagara River and Niagara Falls, defined and marked the border along 31st parallel separating Spanish Florida from the Colonies; determined the border between Georgia and North Carolina, and defined the border along the 45th parallel separating Canadian lands from American lands pursuant to the 1817 Treaty of Ghent (Spies, 1997 and Spies 2002).

After helping to define America's borders, he decided to settle down with his family and educate its young men. Major Ellicott secured an appointment in July 1813 as Professor of Mathematics at West Point in New York state. He died while in government service at West Point on August 28, 1820 (Mississippi Museum of Gulf Coast Historical Photography, timeline).

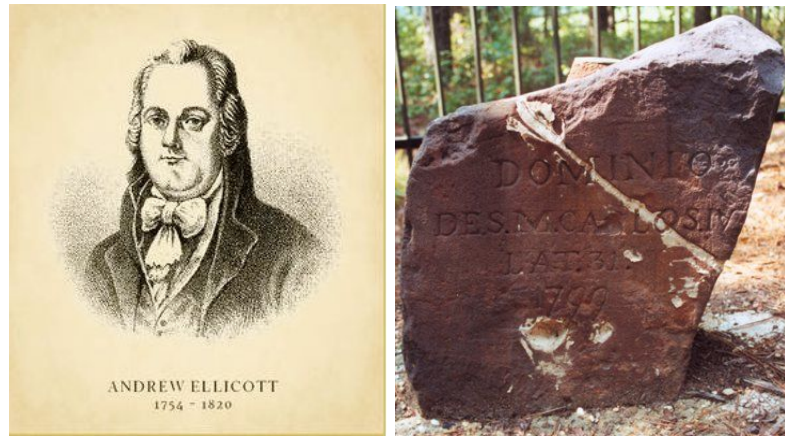


Fig. 3: Major Andrew Ellicott and Ellicott's Stone viewed from the Spanish language side.
Images: Mississippi Museum of Gulf Coast Historical Photography and the Alabama Department of Archives and History.

Major Andrew Ellicott left behind numerous papers and maps; published *The Journal of Andrew Ellicott* in 1803, detailing his life and travels, and a stone marker. Known as Ellicott's Stone, see figure 3 above, the marker is the only known stone marker set by Ellicott during his survey of the line of demarcation between the United States and Spain during the years 1797 -1800. The brown, ferruginous sandstone stands about 3 feet high, 2 feet wide, and ½ foot thick on the West Bank of the Mobile River on the 31st parallel. The North side reads "U.S. Lat. 31 1799" and the South "Dominos de S.M.C. CAROLUS IV. Lat. 31 1799". It was set on April 9, 1799 and remarkably remains in situ, serving as the St. Stephens Meridian, the basis for all U.S. Public Land Surveys in Southern Alabama and Southern Mississippi; the oldest existing Initial Point in the United States (Spies, 1997).

3.3. *Isaac Briggs*

As a member of the American Philosophical Society I take the liberty of addressing its President. Although I feel much diffidence when, from an obscure and private station, I look up to that eminence upon which abilities and honors have placed thee; yet when I consider thee as the known friend and patron of useful Arts and Science, I am encouraged to solicit thy attention to some hints on a plan for the improvement of Agriculture in the United States.

It is my opinion that the real prosperity of our common Country is virtually founded upon Agriculture, and I feel a strong persuasion that any subject of such a nature and tendency will not, by thee, be treated with indifference. For a considerable time, I have believed that were details of the practice of individuals collected from different parts, or districts, of the United States; thrown into a general digest; and this again diffused to the extremities; it would, probably, more than any other means, tend to the improvement of Agriculture: This noble Art would derive almost as great advantages from such a circulation of knowledge, as the Animal System does from the circulation of the blood.

-Excerpt from correspondence between Isaac Briggs and Thomas Jefferson on January 24, 1801 (National Archives, 2017).

Isaac Briggs was born in 1763 to Quakers, Samuel and Mary Briggs, in Haverford, Pennsylvania. He attended the University of Pennsylvania obtaining a Bachelor's degree in 1783 and Master's degree in 1786, both in engineering. Isaac married Hannah Brooke on August 27, 1794 and had eight children with her (Bacon and O'Hern, 2012-13).

He worked as a teaching assistant at the Richmond Academy in Augusta, Georgia. He also served as the Secretary of the Georgia State Constitutional Ratification Convention in 1787, a position requiring significant political connections. In 1788, the State of Georgia issued Briggs and William Longstreet a patent for an early steamboat engine, a full two decades before Robert Fulton invented the first steamboat (Bacon and O'Hern, 2012-13).

After facing financial difficulties in Georgia, Briggs moved his family to the Georgetown area. In 1791, he began working with Benjamin Banneker, and Andrew Ellicott on surveying and designating the boundaries of Washington, D.C. He assisted Ellicott with the layout of the Capitol City, after the project was taken over from L'Enfant (Spies, 2002).

In 1796, Isaac was elected a member of the American Philosophical Society, to which Thomas Jefferson was a member. He also founded the American Board of Agriculture (ABA), the precursor to the United States Department of Agriculture, from his passion for supporting American enterprise.

Briggs was appointed to survey the land included in the Louisiana Purchase, appointed Chief Engineer of the eastern portion of the Erie Canal, and finally appointed Principal Engineer of Virginia Board of Public Works. There he unfortunately fell ill in the Summer of 1824, possibly with typhoid fever, and died at his family home, “Sharon,” on January 5, 1825 (Bacon and O’Hern, 2012-13).

3.4. *Enslaved Labor and the White House*

In their foreword to the *History of Slave Laborers in the Construction of the United States Capitol*, Richard Baker, Historian, US Senate; and Kenneth Kato, Chief, Office of History and Preservation, US House of Representatives, noted that:

“No one will ever know how many slaves helped to build the United States Capitol Building ---- or the White House; or the homes of founding fathers George Washington, Thomas Jefferson, and James Madison; or Philadelphia’s Independence Hall. Indifference by earlier historians, poor recording keeping, and the silence of voiceless classes have impeded our ability in the twenty-first century to understand fully the contributions and privations of those who toiled over the seven decades from the first cornerstone laying to the day of emancipation the District of Columbia” (Allen, 2005:ii).

According to the White House Historical Association, construction on the President’s House began in 1792 on land ceded by Virginia and Maryland, both slave states. The District of Columbia commissioners charged with building the federal city by Congress under the direction of George Washington, initially sought to import workers from Europe to meet labor demands. After dismal response in the European market, they instead turned to the enslaved Africans in the region to provide the bulk of the labor demand to build the White House, the United States Capitol, and other early government buildings throughout the District. Enslaved men were likely involved in all areas of construction, particularly the most grueling work of sawing logs and stones (White House Historical Society).

William C. Allen, Architectural Historian in the Office of the Architect of the Capitol, noted that “records documenting individual payments for ‘Negro hire’ at the Capitol begin on February 11, 1795 and end on May 17, 1801; there were 385 payments, with the largest number being for the year 1798” (Allen, 2005:8). The men joined a workforce under local White laborers and artisans from Maryland and Virginia, as well as immigrants from Ireland, Scotland, and other European nations.

The enslaved men were trained by Stonemason Collen Williamson at the public quarry at Aquia in Stafford County, Virginia, approximately 40 miles south of Washington. There they quarried and rough cut the stones, that were later dressed and laid by Scottish

stonecutters to erect the walls of the President's House. At the time of construction, bricks were not commercially produced in the area and arrangements were made to burn the necessary bricks on the White House grounds. The commissioners contracted Anthony Hoke and William Hill to complete brick-making and firing. Although no records survive indicating who these men hired, it was probably both free and enslaved African Americans as burning bricks in temporary ricks was primarily a Black trade. Hand-forged nails were also largely produced by enslaved black labor at naileries (Kapsch, 1995).

The image shows a handwritten wage roll for May 1795. The document is written in cursive and includes a header with a date and a signature. The workers listed include Pierce Purcell, Math. Dowling, Robin Purcell, Sam. Curtis, John M. Caskell, Peter Smith, Tom, Peter, Ben, Harry, Daniel, John Brown, John Sney, Charles H. M., and Peter Lewis. The wages are listed in pounds, shillings, and pence.

Worker	Wage	Worker	Wage	Worker	Wage
Pierce Purcell	30 17/6 x 20. 5	Twenty Six pounds five Shillings	Pierce Purcell		
Math. Dowling	30 8/4 x 12. 10	Twelve pounds ten Shillings	Michael Dowling		
Robin Purcell	9 9/4 x 4. 1	Four pounds one Shilling	Robin Purcell		
Sam. Curtis	30 9/4 x 13. 10	Thirteen pounds ten Shillings	Samuel Curtis		
John M. Caskell	30 8/4 x 12. 10	Twelve pounds ten Shillings	James Hoban		
Peter Smith	30 7/6 x 11. 5	Eleven pounds five Shillings	Pierce Purcell		
Tom	28 7/6 x 10. 10	Ten pounds ten Shillings	Pierce Purcell		
Peter	28 7/6 x 10. 10	Ten pounds ten Shillings			
Ben	28 6/4 x 8. 8	Eight pounds eight Shillings			
Harry	9 3/4 x 2. 5	Two pounds five Shillings	James Hoban		
Daniel	25 3/4 x 6. 5	Six pounds five Shillings			
John Brown	28 8/4 x 11. 4	Eleven pounds four Shillings	John Brown		
John Sney	23 9/4 x 9. 17	Nine pounds seventeen Shillings	John Cusky		
Charles H. M.	10/4				
Peter Lewis	17 10/4 x 8. 10. 0	Eight pounds ten Shillings	Peter Lewis		

Fig. 4: Wage rolls for May 1795 listing five enslaved persons, Tom, Peter, Ben, Harry and Daniel, four of whom were owned by White House architect James Hoban. Daniel was owned by Hoban's assistant, Pierce Purcell.

Image: National Archives and Records Administration.

Most of the enslaved laborers worked as sawyers and carpenters and most remained nameless or were only listed by their owners' names, however sawyers Geoarg Quean and Sam Birch were listed by first and last name as receiving incentive payments of 11 pence a day (see figure 4). Carpenters made up the largest group of workmen laboring under James Hoban, the Irish-born architect of the President's House. Remaining payroll records establish the importance of skilled African American labor and that much of this labor was enslaved. "The payroll for April 1796, for example, indicates that 'Negro Tom,' owned by carpenter foreman Pierce Purcell, and 'Negro Peter,' owned by James Hoban, earned seven shillings and sixpence daily--the going wage for journeyman carpenters. These wages went to their owners, a fact evidenced in the same payroll: Purcell and Hoban signed for the receipt of the wages for these two black carpenters. 'Negroes Harry,' 'Daniel' and 'Ben' are shown as earning somewhat less during the same month. The June 1796 payroll for the bricklayers indicates that 'Negro William,' a slave,

worked alongside and for approximately the same amount as journeymen Thomas Maitland and David Tweedy.” If the enslaved men were to fall ill, they were cared for by black nurses in a rudimentary hospital. The names of some of these nurses appear in the records of the commissioners. Mrs. Cloc LeClair and Mrs. Sara McMahon were paid approximately \$10 monthly for their services. The records show both women’s marks on the payroll, indicating that they were free women but illiterate (Kapsch,1995).

3.5. *Anachronistic Components*

“The Landing of the Slaves in Jamestown in 1619” diorama is currently being treated by Winterthur undergraduate student, Amanda Kasman, in conjunction with students participating in the Historically Black Colleges and Universities diversity initiative. Their report noted that the sailors were in costumes typical of 18th century depictions. This anachronistic dress was likely a stylistic choice to make the scene more recognizable to the 20th century audience and immediately identify the men as sailors.

According to the American Revolution Colonial dress costuming guides, all the figures of this diorama appear to in dress congruous with the time period depicted and the figures’ social standing. However, the scene of surveying in front of the White House is anachronistic as surveying of the federal territory was completed early in 1792 and construction of the White House began later that year. Benjamin Banneker would not have been present after the completion or near completion of the White House, while Ellicott and his assistants may have been present as they surveyed the the city plan as laid out by L’Enfant. This stylistic decision made the location easily more recognizable and helped to better place the scene in the overall timeline.

3.6. *Artists*

3.6.1. Erik Axel Lindgren



Fig. 5: Erik Lindgren as the Illinois State Director of Exhibits. Image: American Negro Exposition Guidebook.

Erik Lindgren was born in Stockholm, Sweden. While in Europe, he served as a commissioned officer, teaching skiing, in both the Swedish and Finnish armies and saw action in the conflicts between Finland and Russia. Lindgren studied at a European university and with a famous Swiss builder prior to attending and graduating from the Art Institute of Chicago. He was the Illinois State Director of Exhibits and was responsible for the Illinois exhibits in the Century of Progress, and at the World's Fairs in New York City and San Francisco. Utilizing his extensive skills in diorama construction, he supervised a team of 120 skilled artisans, craftsmen, and workers in the creation of the dioramas in conjunction with Charles C. Dawson and William E. Scott (Gibson, Truman, Huntley, 2005).

Timeline

Year	Event
1895 or 1896	September 12, Erik Axel Lindgren is born to Rickard Albert Lindgren and Augusta Paulina Nilsson in Stockholm, Sweden.
19??	Attended either a German or Swedish university.
1917-22	Conflicts between Sweden, Finland, and Russia in which Erik saw action and taught skiing in both Swedish and Finnish armies
19??-24	Resided in Bromma., Sweden
1924	Departed Gothenburg, Sweden on the Drottningholm.
1924	September 6th, Immigrated through Ellis Island, NY with an arrival contact of Knut Olson.
1930	Naturalized as an American citizen.
1930	Listed as a boarder in the household of Alfred and Ida Olson in Chicago, Illinois.
1930-29	Married Mildred in Chicago.

1939	Birth of daughter Britta-Lue Lindgren in Chicago.
19??-40	Works as a WPA supervisor and Illinois Director of Exhibits.
1939-40	Supervisor of the artist's cooperative working on the dioramas.
1940	Counted as head of household in the 1940 Census in Chicago.
1941?-	Employed at Bureau of Navy Yards and Docks, Washington, DC.
1942	April 27, Registered for the WWII Draft, Washington, DC.
1986	November 10, Dies in San Diego, California.

3.6.2. Charles C. Dawson (1889-1981)

Charles Clarence Dawson was born in Brunswick, Georgia in 1889. After moving to Chicago, he became key to the Black Chicago Renaissance and the New Negro Movement. While originally trained as an architect at the Art Institute of Chicago, Dawson worked as an illustrator creating marketing materials for the Black community. Dawson was the first African American admitted to the Art Students' League, the Secretary of the Chicago Architecture League, manager of the annual Chicago Architectural League Exhibition, and the founder of Arts & Letters, the first Black artists collective in Chicago. Despite his many accomplishments and prominence in the region, he struggled to find stable work during the Great Depression. He was tapped by the National Youth Administration (NYA) for the American Negro Exposition. After the exposition, Dawson became the curator of the Museum of Negro Art and Culture and the George Washington Carver Museum at Tuskegee University (Green, 2005).

3.6.3. William E. Scott (1884-1964)

William Edouard Scott was born in Indianapolis, Indiana in 1884. He studied under Henry Ossawa Tanner in Paris. He briefly returned to the United States shortly before the beginning of World War I. During WWI, Scott traveled with African American regiments and sketched their wartime experiences. Two of those sketches became covers for "*The Crisis*," a National Association for the Advancement of Colored People publication (see figure 6). He is most well known for using art to document his travels through Haiti and the American South, particularly Alabama, with funding from a Julius Rosenwald fellowship. Scott produced many murals, including one for the 1933 Chicago World's Fair (Grossman, 1989).

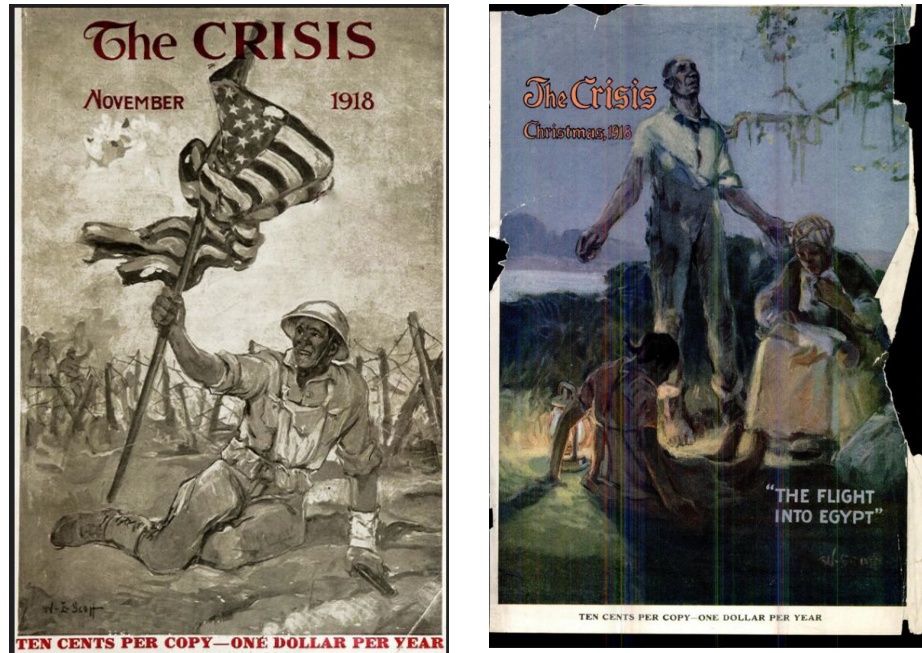


Fig. 6: The covers created by William E. Scott for the 1918 November and Christmas issues of *The Crisis*, published by the NAACP.

Image: *The Crisis*, National Association for the Advancement of Colored People.

3.6.4. Others

Other African Americans involved in the creation of the dioramas were the Director of Drafting and Construction, Joseph W. Evans; the assistant to exposition director and manager of the Good Shepherd Community Center, Horace Cayton; Design and Concept Contributor, Claude A. Barnett; and from the Illinois Writers' Program (IWP) Margaret Taylor Goss and Katherine Dunham, both of whom aided in fleshing out concepts and designs.

3.7. *American Negro Exposition*

The American Negro Exposition took place from July 4th to Labor Day of 1940 in the Chicago Coliseum. It was touted as the Diamond Jubilee of Negro Progress, counting 75 years from Juneteenth and the ratification of the 13th amendment to the United States Constitution (American Negro Exposition Guidebook, 1940).



Fig. 7: Multi-color Art Deco illustration by Robert Savon Pious, a Mississippi-born WPA artist, illustrator, and portrait painter. It was reproduced as the poster for the Fair as well. Image: American Negro Exposition Guidebook, 1940.

By 1907, African Americans understandably were wary of fairs that openly celebrated white supremacy through racist depictions and segregated exposition accommodations. Brundage notes that, “Blacks had first been allowed to participate, but only in a limited fashion, in the 1876 centennial in Philadelphia. They had fared little better at the 1885 New Orleans exposition, the World's Industrial and Cotton Centennial Exposition. They subsequently had been excluded from the planning of the Chicago 1893 world's fair and were barely represented in its displays. The 1895 Atlanta exposition, where Booker T. Washington delivered his career-defining "Atlanta Compromise" speech, was the first fair with a building dedicated to African American exhibits” (Brundage, 2004:1374).

"The rationalizing taxonomy of expositions' organizational schema assimilated African Americans and other "primitive" peoples as objects of spectacle. By intent, world's fairs simultaneously categorized, marginalized, and erased Blacks and other colonial people” (Brundage, 2004:1370). Given the historic marginalization and misrepresentation of African-Americans, prominent African-Americans organized what would be hailed as the “the first Negro World’s Fair.” The timing purposely coincided with the launch of third term candidacy of President Franklin D. Roosevelt at the Democratic National Convention, and the parallel Black Democratic National Convention. “Originally intended to mark the jubilee of the abolition of slavery, the Exposition became a

landmark tribute to 20th century Black achievement (see figure 7 for cover). The vast exhibits that filled the 100,000 square foot Coliseum would be viewed for two summer months by more than a quarter of a million fairgoers” (PBA Galleries).

There is no doubt that the supervising understood that the “distinction between exhibiting and representing blacks was not just authorship but also agency,” when they fought to ensure that Blacks had a role in the creation of the dioramas (Brundage, 2004:1371).

3.7.1. Chicago, Illinois and the Great Migration

From 1916 to 1970, Chicago drew approximately seven percent of the seven million African Americans that left the Southern states to escape Jim Crow laws and for employment opportunities in the Northern states. The Chicago African American community grew to one third of the city’s population during this time period (Encyclopedia of Chicago).

According to Nicholas Lemann, author of *The Promised Land: The Great Black Migration and How it Changed America*, The Great Migration’s “impact on cultural life in Chicago is most evident in the southern influence on the Chicago Renaissance of the 1930s and 1940s, as well as blues music, cuisine, churches, and the numerous family and community associations that link Chicago with its southern hinterland—especially Mississippi. To many black Chicagoans the South remains ‘home,’ and by the late 1980s increasing evidence of significant reverse migration, especially among retired people, began to appear” (Lemann, 1991).

This influx of people “established the foundation of Chicago’s African American industrial working class. Despite the tensions between newcomers and ‘old settlers,’ related to differences in age, region of origin, and class, the Great Migration established the foundation for Black political power, business enterprise, and union activism” (Encyclopedia of Chicago).

Chicago’s prominence in the Great Migration, and ready accessibility to African Americans as well as White Americans led the exposition leadership to choose the Chicago Coliseum as the host location.

3.7.2. Exposition Leadership

Exposition leadership hoped that the event would “promote racial understanding and good will; enlighten the world on the contribution of the Negro to civilization and make the Negro conscious of his dramatic progress since Emancipation.”

The leadership consisted of an Exposition Authority, an United States Auxiliary Commission, a Commission of the State of Illinois, a Committee of the City of Chicago, and a Board of Directors.

The Exposition Authority was made up of Executive Director, Truman K. Gibson Jr.; President, James W. Washington; Secretary-Treasurer A.W. Williams; and members Claude A. Barnett, Robert Bishop, and L.L. Ferguson. The United States Auxiliary Commission consisted of U.S. Senator James M. Slattery, Congressman Arthur W. Mitchell, Dr. F.D. Patterson, President of Tuskegee Institute; and Continental Illinois Bank, Secretary and Treasurer of the U.S. Commission, Wilson Lambert.

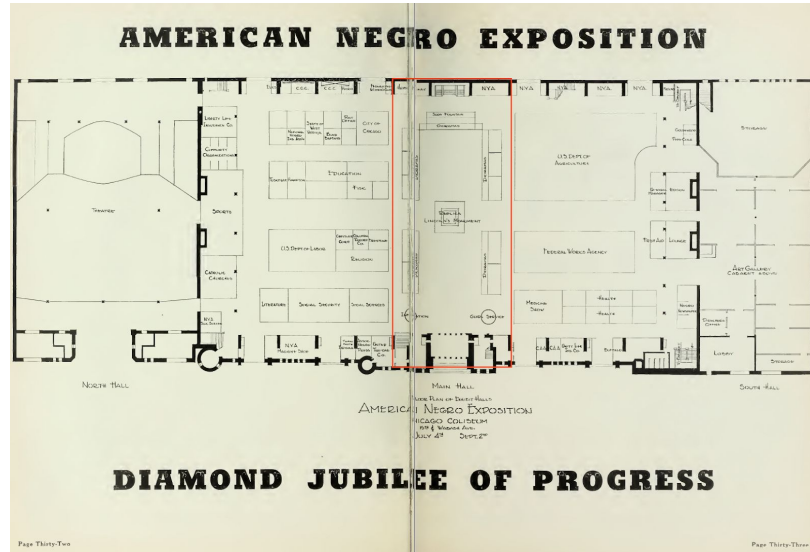
The Commission of the State of Illinois was comprised of Chairman, Governor Henry Horner; Vice-Chairman, Civil Service Commissioner Wendell E. Green; Secretary, Rep. Charles J. Jenkins; members Sen. Nicholas Hubbard, Sen. A.L. Marovitz, Sen. W.A. Wallace, Sen. Arnold P. Benson, Sen. Earl Searcy, Rep. August C. Grebe, Rep. William J. Warfield, Rep. Louis G. Berman, Rep. Andy O’Neill, Dr. E.M.A Chandler, Major R.A. Byrd, A.A. Crim, and Dr. M.O. Bousfield.

The Committee of the City of Chicago included Chairman, Mayor Edward J. Kelly; Sen. Harold G. Ward, Sen. John B. Geary, Ald. J.B Bowler, Ald. William A. Rowan, Ald. George D. Kells, Ald. Earl B. Dickerson, Ald. B.A. Grant, Ald. Patrick S. Smith, Ald. Abraham Cohen, Commissioner of Public works, Oscar E. Hewitt; Corporation Counsel, Barnet Hodes; Hon. W.A. Jackson, President of the School Board, James B. McCahey; and Hon. Charles Krutchkoff.

The Board of Directors was comprised of Chairman, William P. Harrison; Vice-Chairman, Rev. I.A. Thomas; Secretary, A.W. Williams; Treasurer, James W. Washington; members Claude A. Barnett, Rev. Joseph M. Evans, Henry C. Ferguson, A.N. Fields, Irene McCoy Gaines, Lucius C. Harper, Burton W. Lewis, Anthony Overton, B.U. Taylor, Jacob R. Tipper, Willard S. Townsend, Nannie Williams, Freda Cross, Richard R. Jones, R.R. Jackson, and Rev. D.Z. Jackson (American Negro Exposition Guidebook, 1940).

3.7.3. Format within Coliseum and the Court of Dioramas

The exposition boasted sections devoted to religion, press, music, sports, stage, literature, art, science, industry, and social studies. It also featured a Hall of Fame profiling notable African-Americans and their contributions to progress.



**Fig. 8: Hall of dioramas marked inside the red rectangle.
Image: American Negro Exposition Guidebook, 1940.**

The Court of Dioramas was the central entrance to the exposition and highlighted the achievements and contributions of Africans and African Americans to the world as a whole. Diorama subjects went from the “City of Kharnak, Building Temple,” which celebrates the forgotten artisans that built the glories of Africa to the “New Negro School,” which documents the Eleanor Roosevelt school, the last school built with funding from the Julius Rosenwald fund. The diorama featuring Benjamin Banneker was number twenty-one in the series of thirty-three during the exposition and number thirteen in the collection of twenty at Tuskegee. The dioramas were set around a statue memorializing Abraham Lincoln, the “Great Emancipator” (American Negro Exposition Guidebook, 1940).

Dioramas were very popular during the 1930s, and were often used as educational tools in museums or fairs (Insley, 2017). In the context of the exposition, the dioramas were meant to instill a sense of pride in Black attendees and educate the viewer that African-American history does not begin or end with slavery. The New Negro Exposition dioramas were not the first instance of dioramas depicting the African-American experience and seem an apt follow-up to dioramas created by Meta Warrick in 1907, whose capturing of “domesticity challenged not only white depictions of black degeneracy but also black histories that focused exclusively on black men as historical agents” (Brundage, 2004:1397).

3.8. *Tuskegee University and Legacy Museum*

3.8.1. Tuskegee University

The Tuskegee Normal School was formed by the passing of an 1880 bill by the Alabama State Legislature. The impetus for the bill were two men — Lewis Adams, a formerly enslaved man, and George W. Campbell, a former slave owner — seeing the need for education among the rural Black communities in Alabama (Powell and Reynolds, 1999).

After recruiting Dr. Booker T. Washington as its first teacher, the school opened on July 4th, 1881. Dr. Washington purchased a 100-acre abandoned plantation, which became the nucleus of the present campus. In 1892, the Alabama Legislature established the Tuskegee Normal Institute as a public entity and corporation of the State of Alabama, giving Tuskegee the rights and characteristics of a private institution (Powell and Reynolds, 1999).

Tuskegee was officially upgraded from an institute to a university in 1985, currently offering a total of sixty-four bachelor's, master's, and doctorate degree programs (Tuskegee, n.d.).

Tuskegee University is “rooted in a history of successfully educating Black Americans to understand themselves against the background of their total heritage and the promise of their individual and collective future” (Powell, Reynolds, and Wilson, 1999:28). The university boasts several distinctions, including: producing the most African American degree-holders in aerospace science and engineering, producing the most African American PhD holders in material science and engineering, producing over 75% of the world's African American doctoral degree-holders in veterinary science, being the historic work site for George Washington Carver's research and the origin of the Tuskegee Airman in partnership with the U.S. Army Air Corps (Tuskegee, n.d.).

3.8.2. Legacy Museum

The Legacy Museum, located in the National Center for Bioethics in Research and Health Care/ John A. Kenney Hall, is a member of museum consortium at Tuskegee University including the Dr. George Washington Carver Museum, The Oaks- the home of Booker T. Washington, and the Tuskegee Airmen Museum. It honors its role in understanding and highlighting history by incorporating a Sankofa, see figure 9, as part of its website (Robinson, 2010).



**Fig. 9: Sankofa is a word from the Akan people of Ghana. A bird reaching back towards its tail is often the pictorial symbol for this word and concept. The literal translation of the word and the symbol is “it is not taboo to fetch what is at risk of being left behind,” or “reach back and get it.” It is often used by the Legacy Museum and other African American cultural institutions as reference to learning from past wisdom.
Image: Berea College, 2017.**

The collections include antique furniture, African, African American, American, European, and Oceanic art amassed over 130 years. Artworks created by renowned artists such as Edmonia Lewis, William Edouard Scott, William H. Harper, Henry Ossawa Tanner, William H. Johnson, Ernest Crichlow, Floyd Colman and Benny Andrews have been donated to the museum by generous benefactors. Treasured moments of Tuskegee University’s history in the fields of public health, science, and medicine, as well as the visual arts collection are highlighted in exhibits across two floors. On the third floor of the museum are two exhibits, “The Patient, The Project, The Partnership: The Mass Production and Distribution of HeLa cells at Tuskegee University” and the “United States Public Health Service Untreated Syphilis Study in the Negro Male, 1932-1972” (Legacy Museum, n.d.).

The HeLa Cell exhibition celebrates the “immortal” life of the Virginia-born Henrietta Lacks, who suffered from an aggressive form of cervical cancer, and highlights the importance of bioethics in medicine. She was treated for this cancer at Johns Hopkins University Hospital in Baltimore, MD. Her cells, harvested without her or her family’s knowledge or consent, were discovered to possess the unique characteristics of growing and reproducing successfully in the laboratory environment. HeLa’s growth characteristics made it the ideal alternative primate host cell source for the mass testing of Jonas Salk’s polio vaccine. Tuskegee University’s Carver Foundation was one of the sites selected to mass produce the cell line and distribute it to laboratories worldwide for polio vaccine testing as well as a variety of research projects from which we all benefit today (Legacy Museum, n.d.).

The second exhibition focuses on the Untreated Syphilis Study in the Negro Male conducted by the United States Public Health Service in Macon County, Alabama from 1932-1972 (Legacy Museum, n.d.). During this study, also known as the “Tuskegee Experiment,” six hundred men were knowingly infected with syphilis by doctors under the pretense of medical care and left untreated even after penicillin was determined to be the best course of action. The repercussions of this study changed the bioethics of medical research and illuminated the importance of patient consent and knowledge (National Center for Disease Control, 2017).



Fig. 10: President William Jefferson Clinton, Vice President Al Gore, and United States Surgeon General Dr. David Satcher with survivors of the Tuskegee Syphilis Study. Image: Tuskegee University Archives.

On May 16th, 1997 in an official proclamation, President William Jefferson Clinton issued a formal apology to the victims and their families, promising to create the Legacy Museum as memorial to them. Given in front of surviving victims and their descendents (see figure 10), the proclamation on behalf of the United States government, in part, states:

“To Macon County, to Tuskegee, to the doctors who have been wrongly associated with the events there, you have our apology, as well. To our African American citizens, I am sorry that your federal government orchestrated a study so clearly racist. That can never be allowed to happen again. It is against everything our country stands for and what we must stand against is what it was.

So let us resolve to hold forever in our hearts and minds the memory of a time not long ago in Macon County, Alabama, so that we can always see how adrift we can become when the rights of any citizens are neglected, ignored and betrayed. And let us resolve here and now to move forward together.

The legacy of the study at Tuskegee has reached far and deep, in ways that hurt our progress and divide our nation. We cannot be one America when a whole segment of our nation has no trust in America. An apology is the first step, and we take it with a commitment to rebuild that broken trust. We can begin by making sure there is never again another episode like this one. We need to do more to ensure that medical research practices are sound and ethical, and that researchers work more closely with communities.

Today I would like to announce several steps to help us achieve these goals. First, we will help to build that lasting memorial at Tuskegee. (Applause.) The school founded by Booker T. Washington, distinguished by the renowned scientist George Washington Carver and so many others who advanced the health and well-being of African Americans and all Americans, is a fitting site. The Department of Health and Human Services will award a planning grant so the school can pursue establishing a center for bioethics in research and health care. The center will serve as a museum of the study and support efforts to address its legacy and strengthen bioethics training” (The White House, Office of the Press Secretary, 1997).

4. Examination and Interpretation

This section describes the condition of the diorama upon entering the art conservation department. Although the manufacturing methods, condition, and analysis sections have been separated for clarity’s sake, it is paramount to understand the sections were conducted and documented concurrently. Data collected from each section informed and altered the interpretation of the other sections as new information challenged or upheld previous findings.

4.1. Manufacturing Methods

Based on the consistency of the carving and backgrounds, the dioramas were likely constructed in an assembly line fashion with groups of artisans completing one task or element of each diorama. The diorama is constructed of a wooden support structure that maintains the curvature of the masonite board background; wood for the White House and figures; plaster, molding wire, and painted canvas for the trees; reinforced plaster for the foreground; and watercolors for all the painted surfaces. The wooden supports are half-lapped mitered at the corners, reinforced with a pocketed tapered screw and a wedge of wood. The rear upper support is a lap joint that reinforced with a pocketed screw as well.

4.2. *Condition*

4.2.1. Damages

The diorama is structurally stable but had several loose or damaged components. Starting from proper left and progressing to the right, the trees had many broken and disassociated leaves and all the branches were entangled. The scaffolding around the White House was damaged by loose debris and detached components, causing more components to become loose or detached. The figure in purple holding a cane, identified as Major Andrew Ellicott, displays a small crack in the connection between the cane and the figures backside. The wheelbarrow was attached to the foreground and was previously repaired, described below in the previous repairs section. All the figures are not entirely secured on their pins and are slightly mobile in the plaster foreground that was shaped up and around their feet. Throughout the scene paint and plaster have lifted and cracks have formed, particularly along the join between the plaster foreground and the masonite board background.

4.2.2. Discoloration caused by liquid contact and dust

At some point during the life of the diorama, water or another liquid came from above and caused discoloration and loss of original materials. The liquid first contacted with upper wooden supports and light fixtures, causing the wood coloration to deposit on the lower watercolor surfaces, and rust to the form on the fittings of the lighting fixtures. The liquid caused the affected areas of the wood to become much lighter with distinctive tidelines at the edges. The figure in reddy brown, identified as Isaac Briggs, suffered two parallel “stripes” of paint loss directly underneath an area of discoloration in the upper wooden support. The plaster foreground has also shows areas of pigment loss and some plaster loss near Briggs and among the central figures. The remaining watercolor in the affected areas is underbound and friable as the liquid event likely dissolved some of the binder. Dust had accumulated on most of the structures but most heavily on the plaster foreground. This greyish layer muted the bright palette and seems to have occurred after the liquid event as the dust and modern construction debris was the uppermost layer.

4.2.3. Previous repairs

A previous repair was identified on the wheelbarrow. The join between the two halves of the wheelbarrow failed, resulting in an unsightly gap. This was inadequately repaired with plaster at a slightly different angle than the original and vertically misaligned, resulting in additional pressure on the feet of the figure holding the wheelbarrow. The previous repair was failing and allowing the join to reopen. It is unknown if this repair took place prior to or during exhibition at the American Negro Exposition, exhibition at the Carver Museum, or long-term storage.

5. Material Analysis

5.1. Photo-documentation

A Nikon D800E with a CMOS sensor was used to capture in situ images as well as the images for the time lapse videos and a modified Nikon D810 (CMOS sensor with IR blocking filter removed) was used to capture some of the images for time lapse videos. The modified D810 has a similar resolution to the D800E and when filtered with a *BG 38* lens filter, produces nearly identical images. A modified Nikon D700 (CMOS sensor with IR blocking filter removed) were used with a 60mm Coastal Optics lens. The modified sensor is sensitive to IR below $\sim 795\text{nm}$. Apochromatic lens and specific filters (see list below) were used to capture images of the diorama designated as “Normal, UVA, IR, and DET.”

Filtration:

Normal/ DET: *BG 38* (IR Blocking)

UVA-Vis: *BG 38*, *Peca 918* and a *Wratten 2E* (IR Blocking, UV Blocking)

IR: *Kodak Wratten 87A* or *Kodak Wratten 88A* (IR Passing)

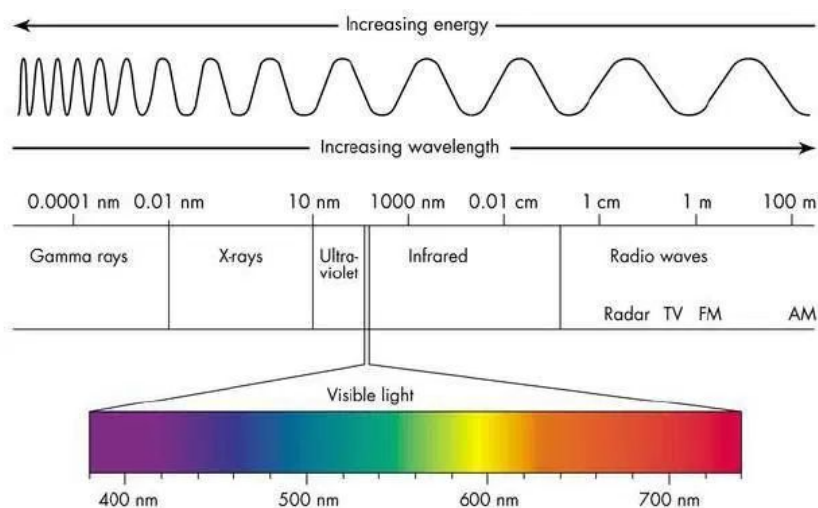


Fig.11: Chart showing the wavelengths along the electromagnetic spectrum and indicating the ranges of wavelengths for x-ray, ultraviolet, visible, and infrared radiation. Image: Lumenistics LLC.

5.1.1. Normal Illumination

Normal illumination photography used tungsten lamps (Profoto tungsten, EHC 500W/120v, 3200K lamps with softboxes in portrait orientation) to simulate natural or “standard viewing” light. Using the AIC photo-documentation target as

a standard, the images were calibrated to or near RGB values of 200/200/200. While these numbers are not always achievable, the guidelines and histogram provide the basis for producing a useful image. In situ images taken with the Nikon D800E which did not need any filtration as that camera is not sensitive to wavelengths below the visible range. Depending on camera availability other normal or detail images were taken with a Nikon D700, which was filtered with a *BG38* filter.

5.1.2. Infrared

Infrared (IR) imaging relies on the principle that the specific physical and chemical composition of materials causes them to scatter, reflect, absorb, or transmit infrared radiation in characteristic ways. Materials that reflect or scatter IR appear as white or a light grey color in images, while IR absorbent materials, such as graphite, appear darker grey or black in images. Materials may respond differently when exposed to different wavelengths within the IR range. For example, a material may appear more transparent as the wavelength extends, revealing materials below the surface of the media. For this reason, the extremes of the IR wavelength range were captured to determine if any of the materials changed their response as the wavelength extended.

The diorama was illuminated with incandescent lamps, and a modified D700, sensitive to the invisible near infrared radiation emitted by the bulbs, recorded how the radiation penetrated the subject, or was absorbed or reflected by the materials. Infrared radiation may penetrate overlying layers to reveal underlying information, such as a graphite underdrawing, or may characterize or distinguish different materials that are similar in appearance. The camera was filtered with the extremes of filtration, the *Kodak Wratten 87A* and then *Kodak Wratten 88A*, for comparative purposes (see figure 12).

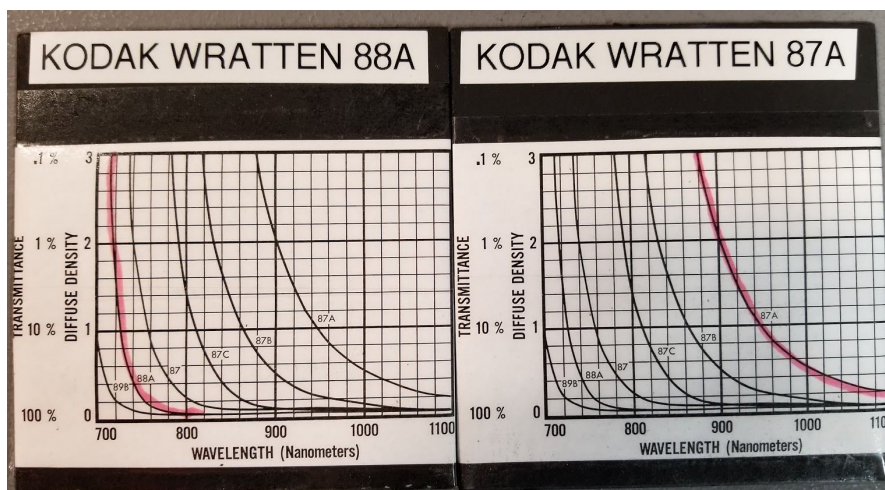


Fig. 12: Graphs indicating how much IR radiation each filter allows to pass through to the sensor of the modified camera. 88A allows all IR from slightly above the visible range to pass through and 87A only allows IR from approximately 880 nm to pass through. Image: JJ Chen, Filter Guides.

5.1.3. Longwave Ultraviolet Induced Visible Fluorescence

Longwave ultraviolet radiation, ranging from 400 to 320 nm (see figure 11), was used to examine the diorama as well as document material types and condition issues. Visible fluorescence is the outcome of the interactions between the excitation source, longwave ultraviolet radiation (UVA) mercury bulbs, and the materials in the work of art. Based on their compositions, materials can absorb the energy emitted by the UVA lamps and later release it within the lower energy range visible to the human eye. This process is known as UV-Visible fluorescence and often has a long exposure time to capture more of the often dim light emitted. In the capture images, the subject was photographed with a modified Nikon D700 camera in a dark room while being irradiated by a long wave ultraviolet (Wildfire IronArc 250 Watt metal halide LMP-250D) lamp (blacklight). The camera was filtered utilizing the *BG 38* (IR blocking), *PECA 918* and *Wratten 2E* (UV blocking).

5.1.4. X-radiography

The energy of x-ray wavelengths is less than 10nm, a higher energy than infrared, visible, and ultraviolet wavelengths (see figure 11). The subject is penetrated by a directed beam of x-rays and the absorption or penetration is recorded on a digital imaging plate placed behind the object. Digital radiography implements a phosphor-coated plate and a specialized scanner translates that image into a digital file (dicom). Areas of the subject that are denser absorb more x-rays, diminishing penetration and creating lighter areas in the radiograph (Chen, 2017).

X-radiographs were produced with an 101 x-ray tube and direct exposure on a 8 x 10 inch Kodak Flex HR Digital Imaging Plate 2174, on a 14 x 17 inch Kodak Flex HR Digital Imaging Plate 2174, or a combination of the two plates. The x-ray tube was at a perpendicular angle to the plate and placed at a source to image distance (SID) of 40 inches above the areas in question so that the cone of emitted x-rays creates a perimeter around the selected area. For the figures and the trees, the x-ray tube was operated at 20kV, 1800 mAS, 30 mA, for a total of 60 seconds. For the White House, the x-ray tube was operated at 25kV, 1800 mAS, 30 mA, for a total of 60 seconds. Lastly for the foreground images, the x-ray tube was operated at 30kV, 1800 mAS, 30 mA, for a total of 60 seconds. The exposed imaging plates were scanned using a Carestream Industrex HPX-1 Digital Scanner and its accompanying software. The radiographs of the tree were digitally combined using Adobe Photoshop.

5.1.5. Time Lapse Photography

Time lapse photography captures still images at set time intervals which can be viewed in quick succession to document changes. It typically captures slow movements such as a flower blooming or the passing of clouds. Some of the created time lapse videos recorded were only representative of treatment steps and not complete documentation of treatment steps as effective treatment superseded time lapse documentation.

Images were captured on the set time interval of either fifteen seconds between captures for slower processes and five seconds between captures for faster processes. Cameras were alternated based on the available within the department and other students photography needs. Images were combined as mp4 video files using the Apple iMovie 10.1 software.

5.1.6. 3D Imaging/ Anaglyph

An anaglyph creates a three dimensional image on a two dimensional format. By taking two slightly offset images, coloring the left image red and the right image cyan, and merging the two, anaglyph take advantage of the eye's ability to process images. When the viewer wears glasses with a red filter over the left eye and cyan filter over the right eye, the combined images create a three dimensional effect and increases the perceived depth of the image. The sliding bar method, see figure 13 below, was utilized to capture the stereo pairs that were subsequently merged.



Fig. 13: Sliding bar with alignment dots and camera sliding block labeled.
Image: JJ Chen, Creating Stereo Pairs with Stereo Slider Bar handout, 2018.

5.2. *Analytical Methods*

5.2.1. Fourier Transform Infrared Spectroscopy

Fourier Transform Infrared Spectroscopy (FTIR) is an analytical technique that obtains an infrared spectrum of absorption or emission of a solid, liquid, or gas. When IR radiation is passed through the sample material, some of the radiation is absorbed by the sample and some radiation is transmitted through the material. The resulting signal at the detector creates a spectrum representative of the molecular “fingerprint” of the sample. The practicality of FTIR analysis lies in the spectral “fingerprint” produced from the different chemical structures of each sample, that can be used to identify and quantify the material.

5.2.1.1. *Transmission FTIR Spectroscopy*

Infrared spectra were collected using a Continuum microscope coupled to a Nicolet 6700 FTIR spectrometer (Thermo Scientific). Samples were prepared by flattening them in a diamond compression cell (Thermo Spectra Tech), removing the top diamond window, and analyzing the thin film in transmission mode on the bottom diamond window (2 mm x 2 mm surface area). An approximately 100 mm x 100 mm square microscope aperture was used to isolate the sample area for analysis. The spectra are the average of 64 scans at 4 cm⁻¹ spectral resolution. Correction routines were applied as needed to eliminate interference fringes and sloping baselines. Sample identification was aided by searching a spectral library of common conservation and artists’ materials (Infrared and Raman Users Group, <http://www.irug.org>) using Omnic software (Thermo Scientific).

5.2.1.2. *Attenuated Total Reflection (iTR ATR) FTIR Spectroscopy*

Infrared spectra were collected using a Nicolet 6700 FTIR spectrometer (Thermo Scientific) with a Thermo Scientific Smart iTR ATR accessory. Samples were analyzed by pressing them against the Diamond ATR crystal. The spectra are the average of 32 scans at 4 cm^{-1} spectral resolution. An ATR correction routine was applied to compensate for variations in penetration depth with wavenumber. Sample identification was aided by searching a spectral library of common conservation and artists' materials (Infrared and Raman Users Group, <http://www.irug.org>) using Omnic software (Thermo Scientific).

6. Analysis and Discussion of Results

6.1. *Photo-documentation*

6.1.1. Normal Illumination

The original incandescent light source likely provided very dim and yellow illumination. It is probable because of the light source, that the artists choose a brighter color palette to compensate for the lighting available. Incoming receipt images were conducted with LowelScandles lights fitted with 4 bulbs each of: 5300°K daylight or 24w 3000°K tungsten corrected to produce an average color temperature of 4150°K. The resulting image, seen on the right of figure 14, was more blue than the diorama would have original been exhibited. The left image of figure 14 was taken with two Profoto tungsten, EHC 500W/120v, 3200k lamps with softboxes to diffuse the light. The color temperature is closer to that of incandescent bulb and produces an image closer to the original exhibition lighting.



Fig. 14: Comparison of the diorama under two different light sources and the color change produced by the different color temperatures.

6.1.2. Infrared

Infrared imaging revealed graphite notations and an underdrawing behind the White House that indicates a possible position change. The left image of each pair in figure 15 was captured with the 87A filter and produced a sharper image; the right was captured with 88A (closer to the red range of the visible spectrum, see figure 11) and created a softer image. The images on the bottom row were rotated 180 degrees to make the writing legible and seem to say the name, “Hugo.”



Fig. 15: Pairs of infrared images taken with the extremes of infrared filtration, showing the notations on the upper wooden supports.

The 87A image, upper image of figure 16, of the White House only captured the underdrawing more fully while the 88A, bottom of figure 16, captured only a faint impression of the underdrawing. Based on this imaging, it would appear the White House changed both size and perspective at least once from the original drawing. Paint within the windows of the White House also seems to be absorbing infrared energy and appears dark within the frame. It may be because of the thickness or composition of the paint there.

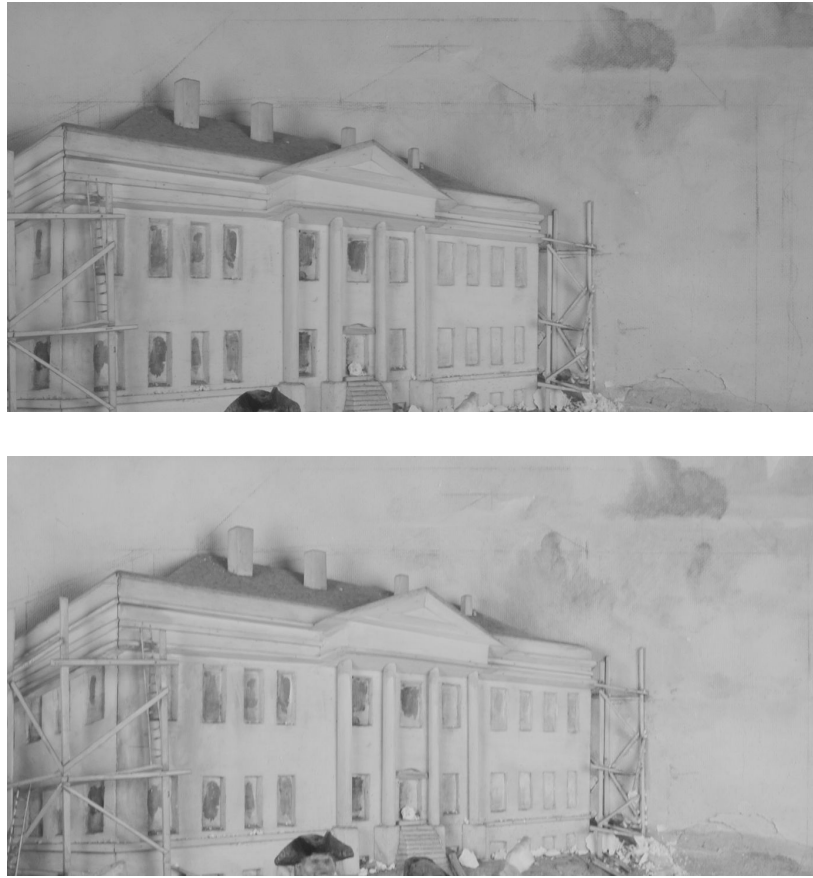


Fig. 16: Infrared images of the White House showing a graphite underdrawing under the extremes of infrared filtration.

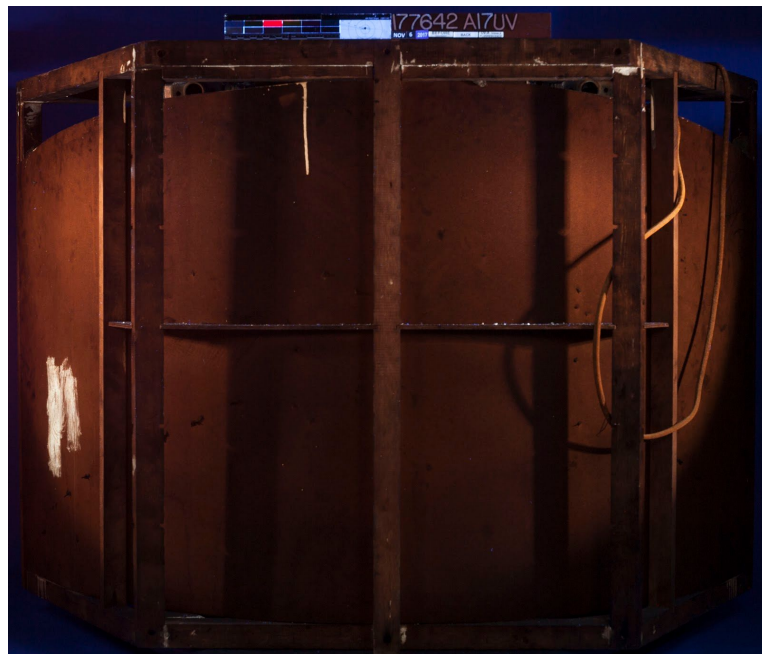
6.1.3. Longwave Ultraviolet Induced Visible Fluorescence

Ultraviolet induced visible fluorescence (UV-Vis), was taken to identify and differentiate materials and previous repairs. Imaging captured the transfer of staining from the upper wood supports to the foreground, creating the dark splotched in the lower edge of foreground visible in figure 17. UV-Vis also differentiated the loose white material as unoriginal to the diorama due to the presence of optical brighteners in that material but not in the materials known to be original to the diorama, also visible in figure 17. The plaster in the previous repair to wheelbarrow also did not react in the same manner as the original plaster and was deemed a later addition. UV-Vis imaging on the verso of the diorama captured the handling residues, visible as black fingerprints on the wooden supports in figure 18. An undefined area of adhesive fluoresced on the verso of masonite board, it doesn't relate to any lost components, or anything on the image side, and so potentially was an area to clean a brush.



Fig. 17:
Longwave
Ultraviolet
Induced
Visible
Fluorescence
image
showing the
discoloration
caused by the
liquid
damage,
optical
brighteners in
the collected
debris, and
the previous
repair to the
diorama.

Fig. 18:
UV-Vis
image
showing the
fluorescence
of the
original
electrical
cord and an
area of
adhesive
residue.



6.1.4. X-radiography

Digital x-radiography helped to better understand the constructions methods implemented in the diorama. Under the previously described x-radiography parameters, the figures, White House, and foreground were investigated for material composition and construction.

The figures were noted in *Knocking Down Barriers: My Fight for Black America* as being either carved from wood or formed from clay. A visible pin in Isaac Briggs' raised foot also raised questions as to how the pins were inserted. X-rays of the figures verified that all the figures are made entirely of wood with pre-drilled channels into one of their legs for the pin to be inserted, see figure 20. Based on the x-rays which show a clear line of demarcation between the two halves and wood grain patterns that are not continuous, the figure holding the wheelbarrow and the figure of Isaac Briggs are carved from two joined pieces of wood (see figure 19).

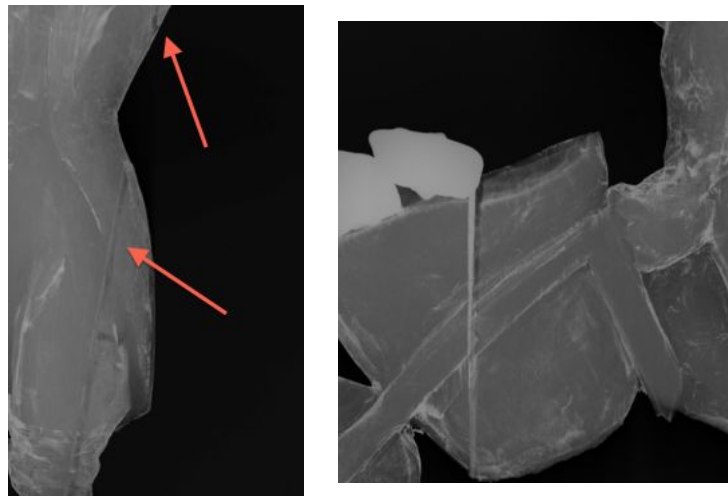


Fig. 19: Details of x-radiographs showing the joins between the two pieces of wood. Join marked on the left image for clarity.

The other figures are single pieces of wood. The figure carrying the beam, see figure 20, and the figure of Major Andrew Ellicott both have small nails securing their extending components to their bodies. Neither appeared to have any further mechanisms or adhesives, securing these components to themselves.



Fig. 20: X-ray of the figure holding the beam with pins in hands and feet circled. The join in the wheelbarrow is also visible.

The White House and foreground were also documented to understand the constructed methods and materials more fully (figure 21). The White House was found to be constructed of numerous pieces of wood and secured to the background and support structure with screws. Prior to treatment, the diorama was not considered to be stable enough to be placed on its back to explore the underside. X-rays allowed the foreground to be explored without risking further damage to detached or unstable components. The plaster was found to be reinforced with metal mesh that was secured to the surrounding framework.

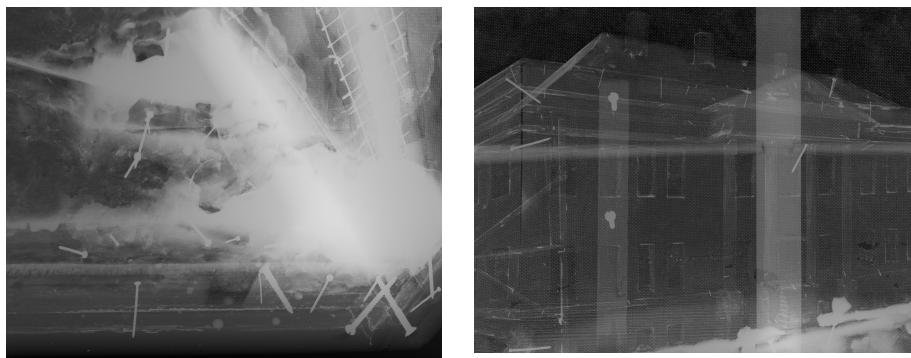


Fig. 21: X-rays of the foreground and White House, showing construction methods and materials.

6.1.5. Timelapse

The time lapse video will be accessible on the server in the folder related to this project as both a complete video showing treatment linearly and as separate segmented videos of each step individually. It documented the progression of treatment and is representative of many of the steps. Not all treatment steps were not recorded completely due to the time involved or to prioritize treatment. It was particularly useful in documenting the progression of aqueous cleaning.

6.1.6. 3D Imaging/ Anaglyph

Stereo pairs were captured with a deviation of 3.5cm to both the left and right from the center point. The two images were digitally combined with 3D Slide Maker. This application also applies the red filter to the left image and the cyan filter to the right image. It was particularly useful in capturing the depth of the diorama scene and add the dimensionality easily discernible by the viewer in person to a two dimensional image.

6.2. *FTIR*

Fourier Transform Infrared Spectroscopy (FTIR) was used to confirm assumptions about material composition. Interestingly, testing documented the differential aging of plaster exposed to the atmosphere and plaster protected from atmospheric influence. The sample was tested in two areas and produced the spectrum in figure 22. The plaster that was exposed began transforming from calcium carbonate to calcium sulfate and it takes in sulfur from the environment.

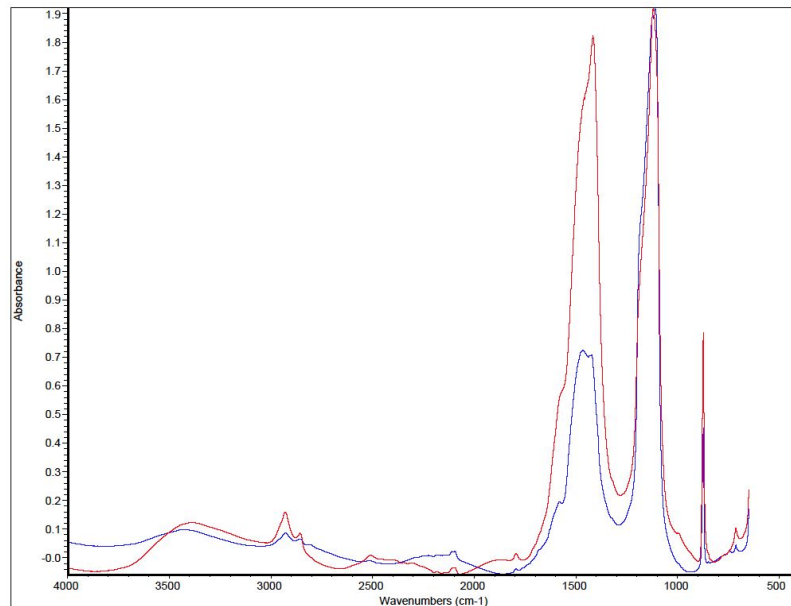


Fig. 22: FTIR spectrum comparing the first and second spectra collected from the plaster sample.

Analysis of a paint suggested that the binder was likely gum arabic which is line with the time frame of production and the material identification of watercolor. More analysis would need to be completed to fully identify the gum or resin binder.

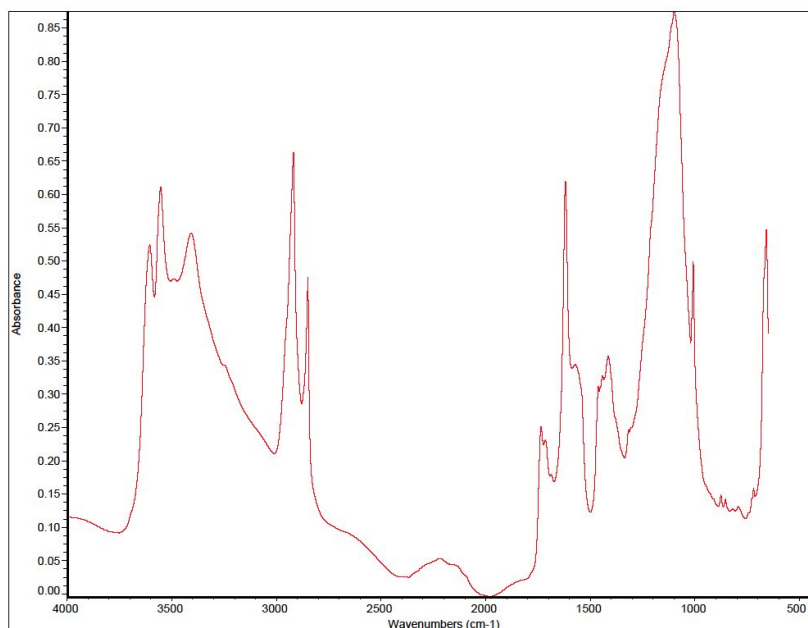


Fig. 23: Spectra of the watercolor suggesting a resin/ gum binder.

7. Issues Influencing Conservation Treatment

Treatment was influenced by the material's solubility in water and previous water damage, which left areas too friable to be cleaned before consolidation. The highly absorbent nature of the materials also influenced treatment, as selected consolidants had to be compatible for long-term usage as reversibility was highly unlikely. This diorama is part of series of twenty dioramas being treated at three different locations, at the time of this writing. Care was taken to share information freely between locations and compare images through social media and email, however, the lack of side by side comparison impacted treatment choices significantly. Lastly with the knowledge that students participating in the HBCU diversity initiative were unlikely to have previous conservation experiences and lack familiarity with conservation materials, the decision was made to always err on the side of lowest toxicity and lowest cost for solvents and consolidants.

8. Treatment

This section will discuss treatment steps undertaken for the diorama and is presented in a linear fashion. It is important to note that treatment steps were often revisited after other steps and informed material choice for other treatment activities. Some steps occurred concurrently and not all areas of the diorama were treated in the same fashion.

8.1. *Dry Cleaning*

After loose components were collected and saved for later reintegration, where applicable, the image of the diorama was surface cleaned with soft-bristled brushes and a HEPA filtered vacuum. A square of nylon tulle functioned as a screen over the vacuum to prevent loose components from entering the hose. Areas that were too fragile to be brushed, were dry cleaned with an air puffer and large debris was removed by hand with tweezers. The wooden supports and outer surfaces were dry surface cleaned with soft-bristled brushes and vulcanized rubber sponges. Further dry surface cleaning was conducted after reshaping of the tree.

8.2. *Aqueous Cleaning*

After consulting testing several solvent systems, aqueous cleaning was conducted by first applying Gamsol (Gamblin odorless mineral spirits) to the foreground, and then rolling cotton swabs dampened with deionized water in the same area. Gamsol functioned to saturate the watercolor paint layer and limit the interaction between the watercolor paint layer and the deionized water. This system provides a maximum five-minute working time per application. Gamsol was chosen over other effective solvents to reduce the cost, toxicity, and ease reproducibility in treating the 19 other associated dioramas. The background was treated with a similar system of Gamsol and 2% Triammonium Citrate in deionized water to remove a yellowing, oily, grime layer. Further aqueous cleaning was conducted after consolidation and fills.

8.3. *Consolidation and Stabilization*

Consolidation is an irreversible conservation treatment, so materials have to be compatible with the original materials and be considered archival or having aging properties that will not negatively affect with original materials. With that in mind and after consultation with paintings conservation professor, Fiona Beckett, and several consolidants were tested. Lascaux consolidation medium was selected for consolidation as its high water content allowed the cupped / lifting paint and plaster flakes to soften sufficiently for manual reshaping. Lascaux was injected behind areas of failing paint with a syringe fitted with an 18 gauge needle and reshaped with silicone shaping brushes. Prior to drying Lascaux can be cleaned with deionized water but once it has dried it is no longer water soluble and must be cleaned with acetone. This variation in solubility allowed for further aqueous cleaning of areas that were previously too friable for aqueous cleaning. When

dry the medium does have a sheen which was reduced with acetone after identification with raking light. Some areas of the plaster would not soften sufficiently for reshaping or had areas of loss beneath them, these areas were stabilized with Lascaux medium bulked with glass microballoons. The thickened medium provides more support under the often brittle plaster layers and was injected with a syringe fitted with a 16 gauge needle. High tack fish glue was flowed into the figure's feet to provide more support without risking damage to the wood during seasonal humidity-induced dimensional fluctuations. Further consolidation was conducted after aqueous cleaning as more areas of underbound paint were identified.

8.4. *Previous Repair Revision*

Previous repairs to the wheelbarrow were causing the figure to exert excess pressure on it securing pin and were not compatible with the original materials. The plaster was removed mechanically with dental tools and a curved scalpel. Once the two halves of the wheelbarrow were separated, hide glue residues (verified with a moist thumb) were reduced by poulticing with deionized water. As the glue softened a dull scalpel was used to reduce the soft outer layer to provide a cleaner surface for assembly with high-tack fish glue. Taking care to properly align the join, the wheelbarrow was reassembled and clamped with cotton twill tape for twenty-four hours. Fish glue was selected for its wide availability, similarity to hide glue, and reversibility. A slight gap between the halves was filled with Flügger and in-painted with Winsor-Newton watercolors and.

8.5. *Reintegration*

No images were found of the diorama prior to treatment and numerous components were detached and further dissociated from their original locations by movement during shipment. Without no reference to compare to, estimations were made using the paint staining on the previous hide glue on their versos and the shape of unpainted areas in the foreground. Components of the scaffolding were placed based on the size and maintaining the correct perspective. High-tack fish glue was used to adhere all reintegrated components due to its strength and water reversibility.

Previously detached components were first cleaned with soft-bristled brushes, followed by the gamsol and deionized water cleaning system, or the gamsol and triammonium citrate cleaning system depending on the components of the dirt layer. Components were then laid out in likely locations and rearranged as applicable prior to integration with fish glue. Where applicable clothespins, small hair clamps, and other clamps, were utilized to hold particularly difficult joins in place as the glue set over a twenty-four period.

8.6. *Fills and Inpainting*

Losses were filled with Flügger and excess was cleaned up with deionized water and dental tools. Care was taken to replicate the surrounding texture to improve cohesive appearance. The fills were first toned with Winsor-Newton watercolors and then in-painted with Gamblin conservation colors in a sympathetic palette. Areas of paint loss without a change in relief were toned with the Winsor-Newton watercolors to make the areas less distracting.

8.7. *Lighting*

The diorama was fitted with a 5.0 Static White RibbonLyte provided by Acolyte Complete Integrated LED Lighting Solutions. According to its product specifications the LEDs will provide illumination at a color temperature of 2700K and a lumen output per foot of 466.8.

Note in figures 24 and 25, the peak in the blue range on the the spectra for the LED ribbon lights that is not present in the spectra for the incandescent bulbs. This will cause the diorama to be viewed as slightly more blue than the artists originally intended and than the original exhibition. The minimal aesthetic change is considered more acceptable than the potential risks involved with the large infrared component, slight ultraviolet output, and the potential heat output of an incandescent bulb.

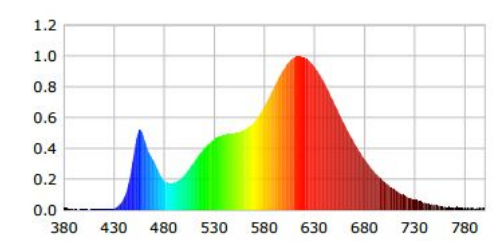


Fig. 24: Spectra of the 5.0 Static White RibbonLyte with a measure color temperature of 2677K. Image: Acolyte Complete Integrated LED Lighting Solutions.

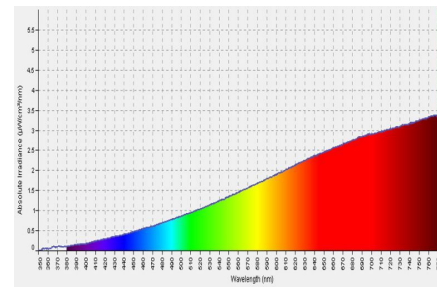


Fig. 25: Spectra of a Philips Soft White incandescent bulb with a color temperature of 2782K. Image: Popular Mechanics.

The lighting will be consistent across all twenty dioramas and installed per instructions developed by Amanda Kasman and her advisors at Winterthur University of Delaware Program in Art Conservation. For those instructions and diagrams, please see Appendix II. Care was taken to place the new lighting in approximately the same location as the original light bulbs would have extended. All steps were the same as those set forth by Winterthur, except that: wood was stained with a 1:1 combination of red oak and rosewood penetrating wood stains, the light clips were installed with ½ inch screws and placed at positions of 1 inch, 20 inches, and 39 inches. The new electrical cords were aligned with the intact electrical cord to minimize disruption to the original appearance.

8.8. *Housing*

A Tyvek cover was created to protect the diorama from dust, light, and other risks while in storage. Previous liquid damage seems to mainly have come from above the diorama so care was taken to make the top of the cover as impenetrable to liquid as possible. The flap allows for the scene to be viewed in storage without completely removing the cover for routine inspection and monitoring.

The sewing pattern below was developed to make the dust cover reproducible. The top cover is one continuous piece of Tyvek to reduce the number of potential entry points in the event of water exposure. Cotton twill tape was sewn in the seam between the back of the top and side cover segments to allow the cover to be tied to the wooden support frame, preventing slipping.

The two dotted red lines are indicative of where a fold is and not a measurement. Solid colored lines are measurements and listed in the table below. All measurements can be varied depending on the slight variability to the dimensions among the series of dioramas.

Line Color	Related Measurement
Orange	Full width of the narrow back of the diorama, between the two central back supports
Green	Height from the original lighting support and secondary upper wooden supports. #
Blue	Width of the sides, measured from front wooden support to central back support
Pink	Full depth of the diorama
Yellow	Full height of the diorama
Purple	Full width of the diorama

Use this to determine the height of the other sections as the background meets the secondary support and this prevents the access to the interior scene from the sides.

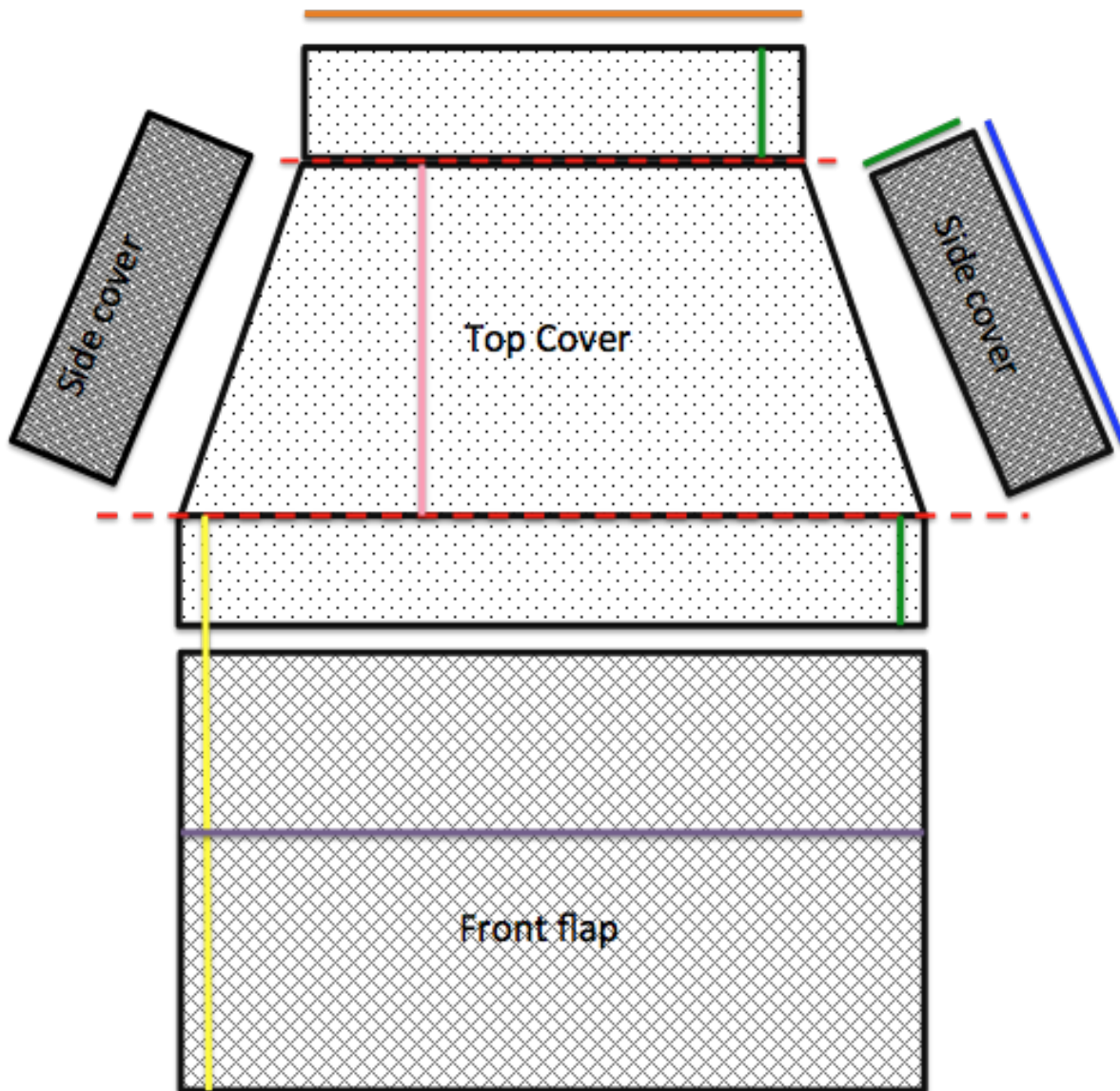


Fig. 26: Pattern for creating the dust cover with colored lines indicating measurements or fold lines.

9. Recommendation for Storage and Exhibition

The object is structurally stable for handling and treatment has improved overall aesthetic condition as well as the structurally unstable components. Conservation treatment is only a fraction of the work necessary to preserve objects. Preventive conservation includes safe storage practices, minimizing the effects of fluctuating environmental conditions, limiting light exposure, safe handling practices, and creating a safe exhibition space.

“The reality is that there is no such thing as a ‘one size fits all’ or ‘straight line’ environmental standard that is easily attainable, appropriate for the preservation of mixed collections, or environmentally sustainable. Collection care staff must develop a risk-managed approach based on the most significant vulnerabilities of collection materials, the local climate, the capabilities of the mechanical system, and the limitations imposed by the building’s construction. To be effective, this should be a team approach, including collection care and facility management, driven by reliable environmental data” (Image Permanence Institute, 2017).

9.1. *Storage*

Based on images of the storage spaces, the dioramas were previously stacked on top each other. While this action did not likely create condition issues, it should be avoided whenever possible to avoid the potential of creating condition issues. Discussions have already been made about the introduction of open shelving to allow stacking without placing them on each other. Switching to open shelving also reduces the possibility of damage to the dioramas or injury to staff members by eliminating the risk of dioramas falling or toppling over. Keep the dust cover on while in storage to prevent the accumulation of dust and reduce risk of damage in the event of a leak. Routine inspection of the diorama is suggested to catch any infestation or condition issues early. Pest traps are also recommended to monitor for any pest activity in and near storage areas. They are most useful near doors, along walls, and near vulnerable collection items.

9.2. *Relative Humidity and Temperature*

Relative humidity (RH) is a concern in the care of mixed material objects as the differential expansion can cause cracking, delamination, and loss of structural integrity. If possible, environmental monitors should be set up within the storage spaces to track the temperature and relative humidity and checked on regular schedule. It is unsustainable to create an environment without fluctuation.

Instead it is recommended that the environment be maintained within a range between 45% and 55% relative humidity that is allowed to fluctuate with seasonal changes. The metal components of the diorama have already rusted but are currently structurally stable, so if at all possible it would be best to maintain a relative humidity below 55% to reduce the formation of further corrosion products. Due to the museum’s location in the south, it

may be necessary to allow fluctuation above 55% but should not be allowed to exceed 65% as this is considered the threshold for mold, fungi, and the optimum range for pest development (Grattan and Michalski, 2017:1) . Given the porosity of the materials present, the risk of biological attack is more pressing than potential corrosion but both factors can be minimized if the relative humidity can be controlled.

Temperature fluctuations are closely linked to fluctuations in relative humidity, it is then best to limit extreme temperature fluctuations to better manage the relative humidity. It is recommended that the temperature in storage spaces does not exceed 75° F in the summer or 67° F in the winter with allowable variations of +/- 2° F. Due to the southern location, temperature may exceed these recommendations but maintaining consistency is more important than maintaining a singular temperature (Image Permanence Institute, 2017).

9.3. *Light*

Light exposure can lead to photochemical degradation and cause darkening or bleaching of wooden supports, and the fading of sensitive pigments. Current recommendations for museum lighting practice are broadly in agreement that ultraviolet (UV) should be severely restricted or eliminated and that exposure to light should be limited in both intensity and duration (Cuttle, 2000:231).

The recommendation would to limit the light exposure as much as possible by keeping the cover on in storage, limiting UV light from natural light coming in through windows, and potentially allowing visitors to activate the light for exhibition or maintaining the light at a lower output.

9.4. *Handling*

Although the diorama is structurally stable, it is recommended to create a carrying tray to prevent excess handling using the wooden supports of the diorama. Gloves should be utilized whenever touching the diorama to prevent creating more fingerprint discolorations to the supports and verso of the Masonite background. Although the diorama is not heavy, it is unwieldy and should be handled by a minimum of two people.

9.5. *Display*

Display should minimize light exposure and risk to the object. If practical, text panels should be included that explain to visitors the detrimental effects of their handling on materials. It may be beneficial to have a guard or staff member present to discourage handling by visitors or a glazing to prevent visitors from being able to reach into the scenes. When the Legacy Museum decides to exhibit these dioramas, it would be recommended to consult a conservator for appropriate materials and further exhibition recommendations. If the dioramas are scheduled to go on loan it would recommended to

allow their wooden structures time to acclimate to their new environment, monitor them closely for pest infestation, and provide guidelines for light exposure and relative humidity to the borrowing institution.

10. Conclusion

This project provided the author with the opportunity to work with materials relating to African American history and contribute to the preservation of collections belonging to Historically Black Colleges and Universities. It also provided the opportunity for collaboration between the Garman Art Conservation Department, WUDPAC, the curators and staff of the Legacy Museum at Tuskegee University.

The treatment challenges created a space to investigate the safe aqueous cleaning of soluble and friable media. Treatment also provided the chance to utilize natural and reversible adhesives for safely attaching previously detached components, where the original location is unknown and/or unclear. Through analysis, research, and consultation with conservation professionals and students at both the Garman Art Conservation Department and WUDPAC, the author aimed to create a treatment methodology that incorporate the guidelines of the AIC Code of Ethics, that prioritized safer and more inexpensive conservation materials in the light that students following a similar plan may replicate with reduced health risks and cost, and respect to the original aesthetic.

Ultimately, this project sought a cooperative balance between safer lighting and aesthetics, efficacy and personal safety, as well as cost and reproducibility.

11. Acknowledgements

Sincere gratitude is owed to the Patricia H. and Richard E. Garman Art Conservation Department faculty and staff. A special thank you to Patrick Ravines for coordinating the organization and transport of the diorama, JJ Chen for her gracious assistance with imaging, and Jonathan Thornton for his guidance and expertise. Appreciation is due to James Hamm, Theresa Smith, and Fiona Beckett for their frequent consults. Appreciation is also due to Dr. Rebecca Ploeger for assistance with scientific analysis, and sugar supplements. Dr. Aaron Shugar generously edited and reviewed this report, and is thanked for that work.

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14. Appendix II : Lighting Diagram

Conservation Lighting Procedure for the American Negro Exposition Dioramas

Developed by Amanda Kasman (UD Undergraduate), Mark Anderson, and Dr. Joyce Hill Stoner
Winterthur Museum, April 4 – 11th, 2018

Overview

The twenty dioramas made by Charles Dawson for the Chicago American Negro Exposition of 1940, currently in the collection of the Legacy Museum at Tuskegee University, retain their original light fixtures, but a uniform procedure has been developed to add modern lighting in consideration of the dioramas' long-term preservation. This lighting procedure involves the attachment of a strip of LED ribbon lights supported by a wooden bar attached to the top of each diorama. The LED light, ordered from Acolyte, was selected because it affords full control of light levels in order to minimize fading and create minimal build-up of heat. These attributes make LED preferable to incandescent bulbs, although this was the type of lighting originally installed in the dioramas. The ribbon light was positioned in order to be situated in line with the original bulbs in order to replicate the original lighting effects as much as possible. The wooden bar was toned to match the rest of the wooden framing. The materials and steps of the procedure can be found below.



Added beam with attached
Acolyte LED ribbonlyte,
toned with acrylics

New dimmer and wiring

Figure 1. *Landing of Slaves at Virginia, 1619* diorama with beam and light added, adjustable by dimmer. (Image courtesy of Joyce Hill Stoner.)

Materials (needed for each diorama being treated)

1. Acolyte LED Static White RibbonLyte
2. three Acolyte metal attachment clips
3. an Acolyte dimmer
4. a piece of wood longer than 49 inches in length
5. a saw
6. sandpaper
7. acrylics
8. scraps of cloth or paint brushes
9. ¼" screws (not provided with the lights)
10. 1 ½" screws (not provided with the lights)
11. an awl
12. a screwdriver (preferably electric for Step 4)
13. a drill (preferably electric for Step 4)
14. masking tape
15. chalk or a pencil
16. clamps

Steps of the Procedure**1. Cutting and Shaping Cross Beams**

- 1.1. A paper template was made of the top of the diorama including the angle of the front corners and positioning of the original lighting fixtures.
 - 1.1.1. The placement of the original lighting fixtures vary, so this procedure may need to be adjusted. The light generated by the new fixture should not be obstructed by the old fixtures, casting unintended shadows.
- 1.2. Wood was selected of comparable thickness to existing beams in the diorama.
 - 1.2.1. In our case, the wood was unstained. See Toning the Beam below.
- 1.3. Beams were cut with the dimensions 48.5 inches long by 2 inches wide and ¾ inches deep, but slight variations in measurements will not effect this procedure.
- 1.4. The ends of the beams were cut at an angle in line with the sides of the diorama.
 - 1.4.1. The angle was determined the paper template from step one.
- 1.5. The beams were sanded by hand, taking care to remove splinters and round corners.



Figure 2. *Landing of Slaves at Virginia, 1619* diorama with beam in position, before toning or application of ribbon lighting.



Figure 3. Three beams were cut for the three dioramas being conserved at Winterthur Museum/University of Delaware, April 2017 to May 2019

2. **Toning the Beams** (If your beams are already an appropriate color, then skip to step 3.)
 - 2.1. Golden Fluid Acrylics and Liquitex Acrylics were diluted with water
 - 2.1.1. The colors used were Burnt Sienna, Raw Sienna, Diarylide Yellow, and Carbon Black, listed in order of decreasing proportions in the final mixture.
 - 2.1.2. The mixed color was tested on small areas at the ends of the beams first. After a short waiting period, the toned area was compared to the diorama. The waiting period accounted for the darkening of the color when dry.
 - 2.2. The diluted acrylics were applied to the beams using scraps of silk fabric.
 - 2.2.1. Even application of the color was not a priority as the existing wood of the diorama was discolored and splotchy.
 - 2.3. The beams were left to dry before moving on to Step 3.



Figure 4. Toning of the beam with diluted acrylics and scraps of silk cloth.

3. Attaching the Conservation Lighting to the Beam

3.1. The lights, measuring 40 inches in length, should each come with a dimmer and a small ziplock bag containing three metal clips and four plastic replacement ends. For this procedure the plastic ends were not used. All of the metal clips were used to attach the lights to the beams.

3.2. Marks were made in chalk on the beams to guide the placement of the attachments. Marks were made 4.25 inches from either end of the beam (measured from the longest side) and a line was drawn down the length (one inch on either side), so that the light was centered. Three marks were made along the central line to indicate where clips would be attached.

3.3. Relative to the length of the 40-inch light, the clips were positioned at 5, 20, and 35 inches.

3.3.1. The light snaps into the metal clips by application of pressure. Be aware that the clips and light are difficult to separate after being connected. Separating the two components can cause the light to be scratched.

3.3.2. The screws used, not provided with the lighting fixtures, were flat head, ¼ inch, brass screws. An awl was used to make holes before placing the screws.

3.4. Remaining chalk marks were removed.

3.5. The light was snapped into the clips so that, when placed on the diorama, the wires emerge from the left side.



Figure 5. Toned beam with markings in chalk, a metal clip in position, ¼ inch screws, and a flat head screwdriver. (Image courtesy of Dr. Stoner.)



Figure 6. Toned beam before the attachment of the clips (at 5, 20, and 35 inches).



Figure 7. Toned beams after the attachment of the clips and the light.

4. Attachment of the Beam and Light to the Diorama

- 4.1. The toned beam with attached lighting was positioned on the diorama with the angled ends flush with the sides of the diorama.
 - 4.1.1. Check that the light is not obstructed by existing elements in the diorama and that the wires are extruded from the left side of the beam toward the back of the diorama.
 - 4.1.2. The desired position of the beam was marked with temporary masking tape, and then the beam was moved to a separate table to drill guide holes.
 - 4.1.3. The top of the diorama was dusted and surface cleaned with cosmetic sponges at this time; the top of the diorama had been out of reach, previously.
- 4.2. Guide holes were drilled all the way through the beam for the 1 ½” screws.
- 4.3. Then the beam was clamped back in place and guide holes were drilled through the top beam into the diorama.
 - 4.3.1. This served to prevent splitting of the diorama supports, but I am not sure if the preliminary drilling into the diorama was necessary.
- 4.4. Leaving the clamps in place, the 1 ½” screws were screwed through the beam into the diorama. Then the clamps, tape, and remaining chalk marks were removed.



Figure 8. The beam being screwed to the diorama after the drilling of guide holes. (Image courtesy of Joyce Hill Stoner.)



Figure 9. *Landing of Slaves at Virginia, 1619* diorama with beam fitted with LED ribbonlyte installed, taken at night. (Image courtesy of Joyce Hill Stoner.)



Figure 10. *Landing of Slaves at Virginia, 1619* diorama with LED ribbonlyte installed, taken at night with light on maximum brightness. (Image courtesy of Joyce Hill Stoner.)

15. Autobiographical Statement

In 2013, LaStarsha McGarity earned a Bachelor's of Arts in Studio Art with a minor in Chemistry from Texas Southern University, a historically Black college or university (HBCU). Prior to matriculation at the State University of New York College at Buffalo, she completed conservation internships at Texas Southern University in Houston, TX, and in Washington, DC at the Smithsonian's National Museum of African American History and Culture (NMAAHC), and the Smithsonian's National Museum of African Art (NMAfA). She also worked at a contract digitization specialist and contract conservation technician at NMAAHC.

During her graduate education, she performed treatments on an architectural drawing of a historic Buffalo building, a Japanese woodblock-style print, an early 19th century oil painting, a porcupine quill prestige hat from Cameroon, and a silver cup from the family of Douglass Houghton, Michigan's first state geologist. She conducted research and analysis on a master drawing from Oberlin College, and began a database of fur samples typically found in African cultural artifacts. Her first summer was spent with the Mississippi Department of Archives and History at the Mississippi Museum of Civil Rights and the Museum of Mississippi History, both in Jackson, Mississippi.

She will be an intern at the Brooklyn Museum in Brooklyn, NY for her summer and the St. Louis Art Museum in St Louis, MO for her third year internship.

LaStarsha will receive a Master's of Arts and Certificate of Advanced Study in Art Conservation with a focus in objects conservation from the Patricia H. and Richard E. Garman Art Conservation Department at the State University of New York College at Buffalo in September of 2019.