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Sunday in the Shop with Rob

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SUNDAY IN THE SHOP WITH ROB

by

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A Thesis
Submitted in Partial Fulfillment of the Requirements for the
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On February 21st, 2019, Southern Illinois University Department of Theater produced *Sunday in the Park with George*. This thesis documents the role of the technical director for this production from pre-design research to post-production reflection. The project involved utilization of CNC technology to manufacture aluminum parts, stage automation, and common theatrical practices. Stephen Sondheim has stated that the purpose of this show was to enable those who are not artists to understand what hard work art is. I hope that this thesis upholds his purpose and demonstrates this to the reader.

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This project would not have been possible without the assistance and support of the Department of Theater faculty at Southern Illinois University. I'd like to especially thank Anne Fletcher for her unending patience during the writing and editing process. One day I'll learn when not to use "of". I'd also like to thank my mentor, Thomas Fagerholm. These three years you have pushed me like I hadn't been pushed since I joined the military. I am a better technical director and person for having known you. To my friend and colleague, Daniel Bennett, you have challenged me to learn and push myself to heights of which I could never have dreamt.

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PRE-DESIGN ANALYSIS

Statement of Purpose

In February of 2019, Southern Illinois University (SIU) produced *Sunday in the Park with George* in the McLeod Theatre. This show had potential to be challenging in many different aspects, including time and monetary budgeting, projection design, and possibly scenery that is moved by computer-controlled machinery. This production had five weeks to implement the scenic design with a limited work force and a budget of $3,500. The design team for this production included Tim Fink as Director, Micah Daniel Bennett as Scenic Designer, Wendi Zea as Costume Designer, Gary Griffith as Sound Designer, and Sam Costello as Lighting Designer.

In 1986, Public Broadcasting Service (PBS) recorded and broadcasted a performance of *Sunday in the Park with George*, which included many moving set pieces, and a large-scale projection of *Un dimanche après-midi à l'Ile de la grande jatte* (*A Sunday Afternoon on the Island of La Grande Jatte)*, a famous painting by Georges Seurat (Hughes, Terry. *American Playhouse: Sunday in the Park with George*, Public Broadcasting Service (PBS) 1986). While SIU was not likely to recreate this production, some elements could transfer.

I proposed to perform duties as Technical Director for this SIU production and faced these challenges. Previous experiences with automation made me qualified to design and build the possibly necessary tracking scenery, and my experience with Computer Numerical Control (CNC) opened the possibility of creating advanced scenery. SIU had recently acquired a CNC controlled router, a machine capable of

cutting sheet goods, such as plywood or lauan, into complex shapes with incredible accuracy. It is also capable of cutting aluminum with the proper equipment and settings and carving various materials in three dimensions. Most recently, my professional credits included serving as Assistant Technical Director for Utah Shakespeare Festival (USF). During my employment there, I had the opportunity to work with an automated lift and studied it to design one similar. This automated lift is a platform that is moved up and down with a winch to fill a hole in the stage floor called a trap. When fully extended, the lift should create a surface level with the stage. I also had the chance to set up and operate deck tracks, both motorized and manual operated. These deck tracks are slots built into the floor which have cables that travel in them to move scenery. My studies at SIU had been geared towards automation, as evidenced by my qualifier production, *The Lion, The Witch, and The Wardrobe*. In that production, trees were designed and built to track from almost completely off stage and meet at center with a marginal gap. The production also included custom automation in the form of doors opening on the wardrobe, and a table that collapsed on stage. All these effects were controlled via computer.

An Assistant Technical Director (ATD) was also assigned to this show. Jerome Veit, an undergraduate work study student in the scenic studio, agreed to take on responsibilities as ATD for this production and was a valued asset throughout the entire process. Mr. Veit worked for McLeod Summer Playhouse for two summers prior to this production, working his way from Carpenter to Master Carpenter in a short amount of time. For *Sunday in the Park with George,* he was assigned drafting projects, assisted in the bidding and budgeting processes, and was involved in finding solutions to challenges as early as the pre-design meeting.

My previous technical direction projects and my role as ATD in Utah prepared me to take on the challenges posed by *Sunday in the Park with George,* which will be outlined in more detail below. This production was a learning experience and expanded upon my abilities as Technical Director.

Play Analysis

Sunday in the Park with George tells a story revolving around Post-impressionist 19th century artist George Seurat's iconic painting, *A Sunday Afternoon on the Island of Grande Jatte,* seen in Figure 1. All of the subjects from the painting are represented, either by living, breathing actors, or sometimes silent, inanimate cutouts. Their stories are fractal, appearing very two dimensional. This is an important feature that shows us how George sees the world. He doesn't take the time to get to know his subjects, with the exception of Dot, his lover, who is the most prominent on the canvas. They are nothing more than props. To this end, their stories are rarely resolved, but rather captured in time.

Figure 1.1 - A Sunday Afternoon on the Island of Grande Jatte - Georges Seurat

Act II expands upon this theme of connection by jumping forward through time to George's great grandson, who is also fictional. He is also an artist, creating his art with technology. He creates machines called *chromolumes*, drawing a direct parallel with Act I to the song "Color and Light". This second George finds himself struggling with the concept of creating the same machine repeatedly. To find inspiration, he studies his great grandfather's work. He is led to this study by his grandmother, Marie, who has Dot's notebook in her possession. The act begins with George and Marie giving a presentation about his grandfather and his work. At the conclusion of their presentation, George's art is revealed, and there is a scene that shows his machine having a technological failure. After the performance, the audience sees George mingling with his own audience, substituting cut-outs of himself to avoid social interactions. George then

visits the island where his grandfather found inspiration and sits down alone to read Dot's journal. The journal reveals flaws in his grandfather, most notably an inability to connect with other people. Dot then appears and speaks with George, as if he is his grandfather.

Themes

The story told by *Sunday in the Park with George* begins in the 1880s and shows a man separated from those around him. George captures moments in time, even putting himself in the mind of his subjects at times. He begins the song "The Day Off" by sketching a dog, modifying its dimensions, trying to bring it to ideal proportions. He then sings as the dog, Spot, even barking as the dog. Shortly thereafter, they are joined by a second dog, Fifi, who has a much higher voice. She is also voiced by George, yapping included. George does not only give a voice to animals, though, he also joins in other characters as they begin their lines. As "Finishing the Hat" begins, George is alone on the stage with the cutout of Fifi, the yapping dog. The very beginning of the song shows George flipping pages in his sketchbook and repeating the lines that he shared with his subjects. In this moment, he sings a line that he shared with Franz, "She looks for me." This brings about a commonality with Franz, though Franz was speaking of the Nurse, and George of Dot.

According to Scott Miller in *Deconstructing Harold Hill: an insider's guide to musical theatre*, near the conclusion of Act I, when George composes his subjects to create his painting, they are no longer in the same park that has been displayed throughout Act I (Miller, Scott. *Deconstructing Harold Hill: An Insider's Guide to Musical Theatre*. Portsmouth, NH. Heineman, 2000: 178). This is the first time that George has

taken complete control and directed his subjects to where they will be in the painting. This is also the first time that they all sing in traditional harmony, as well. While these changes are evident, George has already taken control of the park around them as early as the first scene when George disliked a tree and changed it on a whim. This demonstrates that the park is in his control from the beginning. Even at the end of Act I, as the stage is in chaos and the characters are all fighting, only George and the Old Lady are removed from it. The scene freezes, and the Old Lady says, “Remember, George” (Sondheim, Stephen; Lapine, James. Sunday in the Park with George. New York. Applause Theatre & Cinema Books, 1991: I-67). It could be argued that she is reminding him that he is in control. This is his world to do with as he pleases. Immediately following her line, George repeats his words from the opening scene which ushered in all the scenery onto the blank page. As he does, the subjects take their places for the painting at George’s direction. Since George already had control over the scenery, that begs the question of what changes in this moment. This is when George composes his famous image, immortalizing his subjects in the park.

Play Structure

Sunday in the Park with George is a musical in two acts, and a collaboration between James Lapine and Stephen Sondheim. The acts mirror each other, having an artist as the protagonist in each. In Act I, George Seurat is the person who must change. George is incapable of connecting with another human being. Even his own mother demonstrates this as she refers to him as “Monsieur.” (Sondheim and Lapine 32). As he identifies himself as her son, she simply shushes him, as if it were a secret. As a very deliberate and direct correlation because George in Act II is shown as another

artist who is pushing the boundaries of art, as George Seurat did. His creations, the chromolumes, are meant to be cutting edge technology, something new in art much like the pointillism that George Seurat practiced. According the Stephen Sondheim himself, a major purpose for this show is to allow anyone to “understand what hard work art is” (Schlesinger, Sarah. “The Music Theatre International Study Guide for Sunday in the Park with George”, Music Theatre International, 1993: 13).

The collaborators chose a very specific painting as their inspiration for this show, which emphasizes the importance of said painting. Often, details such as this are less important to a technical director than to a designer. This show is a different story, however. Understanding the intent and inspiration behind the work informs the technical director of many small details that could otherwise be overlooked. For example, Acts I and II both begin very similarly, on a blank page, or canvas. In Act I, this is literal, as the park is not shown yet. In Act II, however, George is presenting his newest work of art in a museum where it has been commissioned. The surrounding walls and even the machine appear white until he projects an image of the painting while discussing the history and his relation to it. Along the same vein, Act II ends with the same blank page or canvas that begins Act I. Below is a scenic breakdown chart that makes note of major scene change elements and important information.

Scenic Breakdown

Table 1 - Scenic Breakdown

Page #	Setting	Characters	Notes
17	A blank page or canvas, a white stage.	George	A white stage, originally white portals as well. As George speaks, scenery moves into place to create the painting.
19	In the park.	George and Dot	George removes a tree, it flies away. Old Lady and Nurse enter.
21		George, Dot, Old Lady, and Nurse	George creates more boats and trees.
23		George and Dot	During her song, Dot walks out of her dress, leaving it standing upright.
27	An art gallery showing George Seurat's *Une Baignade Asnieres* (*Bathers at Asnières*).	Patrons viewing the painting	Script calls for a wagon tracking on with a tableau of the painting.
28		George, Jules, and Yvonne	George lifts a hand and pauses the crowd while Jules and Yvonne critique the painting.
30	In the park.	Most of cast	The tableau tracks off, Jules and Yvonne are in the park.
33	George's Studio.	George (behind scrim) and Dot	George is not visible at the beginning of the scene. Dot is powdering herself downstage. George is behind a scrim, which is representative of his painting. Using projections, the audience sees an unfinished painting, "*A Sunday Afternoon of the Island of La Grande Jatte*".
41	In the park.	George and the Boatman	George sketches a boatman. There is a cutout of a black dog nearby. The Celestes sit on a bench across the stage from George and the Boatman. Dot enters with Louis.
48		George	Louis and Dot sit on the bench as it tracks offstage. George is left alone on stage with the dog, Spot. A second dog, Fifi, joins them on page 50.

52		Most of Cast	Horn player rises from stage, cast returns. The soldier enters with his companion, a cutout of a soldier.
61		American Couple and George	Couple enters, overdressed and observing the people in the park.
65		George	George is alone with only Fifi, singing Finish the Hat.
67		Most of Cast	Dot and George face each other, and Dot turns her bustle around, creating a pregnant belly.
68	George's Studio.	George and Dot	Painting should be slightly more finished, still projected on scrim with George and Dot behind it and visible. Jules and Yvonne come to see the painting.
76	In the park.	George and Old Lady	Cutout soldier is the only company that they have. The rest make their way on stage building up to page 85, when the park falls into chaos.
87		Full Cast	George halts the chaos, raising a hand as in the beginning of the show. He directs the characters to their places on the canvas, composing his painting. The American couple exits, as they are not in the painting, and he removes Louise's glasses. At the final chord, the painting flies in, acting much like a main curtain, blocking the cast behind it. Only George remains downstage of it.
89	Intermission		
123	In the painting.	Most of Cast	"It's Hot Up Here!" As subjects exit, scenery exits as well, returning to a blank page.
133	Museum Auditorium.	George and Marie	Presentation of Chromolume #7.
136		Dennis, Robert, and Naomi enter	Device powers up and fails.
138		Full Cast	Chromolume powers up, illustrating the lecture.
139	Gallery with Painting	Full Cast	Putting it together. Multiple cardboard cutouts of George. Cutouts need to falter, maybe fall over.
158		Marie, Harriet, and Billy	Children and art

163	Modern Park	George and Dennis	Additional layer of the park, showing how the city has developed. The Old Lady's favorite tree is the one that remains.
172	Into the park	Full Cast is entering	Buildings disappear, and the tableau of the painting slowly rebuilds.
174	A Blank Page or Canvas	George and Dot	Cast exits slowly, except for George and Dot. Stage returns to its blank white look.

Style of Production

Sunday in the Park with George has been produced in a wide variety of styles. In 2002, Chicago Shakespeare Theatre produced the show in their intimate Upstairs Theater. The Upstairs Theater is a 200-seat black box style theater, which allows the seating to be arranged to fit the production and design (*Chicago Shakespeare Theatre: Our Theater*. Chicago Shakespeare Theater on Navy Pier, 2018). This is especially important as it demonstrates that the show can be effectively produced even in the smallest of theater spaces. Ten years later, the show returned to Chicago Shakespeare Theatre, mounted in their larger Courtyard Theater. This space features 500 seats on three levels facing a thrust stage. *Sunday in the Park with George* holds a special place in Chicago, as the original painting that Sondheim and Lapine used as inspiration for the show is on display at the Art Institute of Chicago (*A Sunday on la Grande Jatte – 1884*. Art Institute of Chicago, 2018). These productions demonstrate that the show may be performed on both large and small scales. In addition to scale, the style has been modified to meet other criteria. In 2016, for example, *Sunday in the Park with George* was performed at New York City Center's Gala in concert style. This production led to the 2017 Broadway revival.

Historical Productions

Sunday in the Park with George began its first run at the Booth Theatre on Broadway on May 2, 1984 after twenty-five performances Off-Broadway at Playwright Horizons. The first twenty-two Off-Broadway performances were limited to only Act I. The show ran for 604 performances, closing on October 13, 1985 (Zadan, Craig. *Sondheim and Company*, First Da Capo Press, 1994: 303). Later, between October 21 and October 25, most of the original cast returned to the Booth Theatre for a recorded performance, which was aired in 1986 on Showtime and PBS's American Playhouse.

The show moved to the Royal National Theatre in London on March 15th, 1990, where it won a Laurence Olivier Award for Best New Musical, beating Sondheim's *Into the Woods* after 117 performances (Olivier Winners 1991. Official London Theatre, 2018). In 2005, the show was revived at the Menier Chocolate Factory in London (Fisher, Phillip. Theatre Review: Sunday in the Park with George at Menier Chocolate Factory, 2005), and later, in 2006, moved to London's West End at the Wyndham's Theatre, winning an additional five Olivier Awards.

In 2013, the Théâtre du Châtelet in Paris produced *Sunday in the Park with George* as well. This production featured the Orchestre Philharmonique de Radio France, which required a reworking of the musical arrangements to account for the full orchestra rather than an eleven-piece chamber orchestra. This production also included scenic elements that differed from the original production, such as a curved cyclorama and a turntable with three dimensional trees (Benzel, Jan. "Supersizing a 'Sunday in the Park'", *New York Times*, 18 April 2013).

In 2008, *Sunday in the Park with George* returned to Broadway at Studio 54, produced by the Roundabout Theatre Company. This production utilized projections

heavily, with one critic noting that “live actors talk to projections” and “animation seamlessly blends into the background” (Zinoman, Jason. “Who’s That Kid Staging Sondheim?”, 2008). The show returned to Broadway again in 2017 at the Hudson Theatre, following a concert version that briefly ran as part of New York City Center’s 2016 Gala (Brantley, Ben. Review: “‘*Sunday in the Park With George*,’ a Living Painting to Make You See”, *New York Times*, 23 February 2017).

Potential Technical Requirements

Below is a table that outlines special effects and scenic elements that are mentioned in the script and how they have been and could be accomplished. Some of these effects are easily reproduced with the equipment and expertise available at SIU, while others are simply beyond possibility without a huge budgetary influx. One such effect occurs in Act II during the song “Putting It Together”, during which George replaces himself with cardboard cutouts in conversation with other characters. In the Broadway production, this was accomplished with the cutouts rising from the floor through a slot, the infrastructure for which simply did not exist in the extreme downstage area of the stage, where this scene has often been placed. In other locations on the McLeod Stage, the cutouts could be lifted through the floor of the theater through trap plugs with slots cut in them for this purpose.

Another common theme that can be noted on this chart is “Limited by line sets.” This is referring to the fly system that was installed on the McLeod stage, which included a grand total of twenty-eight battens. Of these, four were dedicated for lighting equipment, and two were perpendicular to the stage. This challenge could be solved by dead hanging select scenic elements, which is rigging those elements directly to the

grid without the required elements to make them move. Hanging multiple scenic elements together could also free up additional space in the fly loft. There was a possibility to add some automation equipment directly into the stage floor, allowing scenic units to move across the stage in a straight line. With or without this addition, this effect can be produced in a few different ways. Pallets, which are platforms with very low-profile straight casters, could be moved on and off stage by push sticks, a track could be installed above the deck, which creates a trip hazard and is rather unsightly, or a false deck could be installed, which hides the effect much the same way as installing it below the stage floor. In the end, the tracks were installed on top of the stage and painted black to blend in with the stage floor. To mitigate the trip hazard presented, I minimized the length of the tracks and provided automation control early in the rehearsal process to allow the actors time to get used to the hazards.

Scenic Challenges

Table 2 - Scenic Challenges

Effect	**Broadway Solution**	**Possible SIU Solution**
White canvas setting into park	White portals in front of painted portals	Limited by line sets (See below)
Trees moving and appearing	Tracked and flown trees	Simply flown and tracked trees
Cutouts appearing upstage	Cutouts rising from stage	Trap platform with slot for cutout or self-standing cutouts placed by actors
Boat appears against canvas	Tracked scenery	Deck track behind groundrow, hidden track on portal, projected video
Bugler rises mid stage	Trap lift	Trap platform with slot for cutout or Bugler blocked to move into that position in dark

Tree disappears separately from others	Flown trees	Limited by line sets (See below)
Tableau of George Seurat's *Une Baignade Asnieres* (Bathers at Asnières)	Tracked wagon	Wagon on straight casters, tracked if possible
George painting behind canvas	Back lighted scrim with projections	Back lighted scrim with projections
Park bench tracks on	Low profile platform, tracked on	Pallet style platform with either winched deck track or steel push stick
Dogs and other cutouts	Rise from the stage	Trap platform with slot for cutout or self-standing cutouts placed by actors
Chromolume	Multiple projectors on futuristic looking scenic unit, fog, and lasers	Futuristic scenic unit with fog and lasers on board, projections around.
Putting it together cutouts	Rise out of stage	Self-standing cutouts placed by actors
City skyline in the park	Third set of portals, flown in	Limited by line sets (See Below)

The first effect seen in the show is George changing the white, blank canvas of the stage and creating the park. This effect could be the simplest and easiest challenge, consisting of nothing more than a set of white portals that remove to reveal the park. Ultimately, this challenge was overcome using projectors and moving scenery to create the necessary changes. As George creates the park, he also directs scenic elements into place, such as trees and boats, which could mostly be flown from the rigging system or projected. To break up the monotony of scenery moving up and down, some of these trees are scripted to move horizontally. This effect is slightly more difficult, but also very possible with the resources available. Using scenery track, the trees could be held slightly above the stage floor, allowing free movement along the track. The

currently available track can hold 450 pounds of scenery on each 10-foot-long carrier and could be automated with a winch that attaches directly to the track. Some of these elements could be spot rigged to save space in the fly system, as well.

On page twenty-one, George creates a boat out in the water that resides in the upper left of the painting. This area on stage lends itself to simple forms of movement, due to portals or legs masking the area from view of the audience. The boat could end up on a portal, which then would only need a slight modification to have an individual behind the portal pull a string to move a boat. The boat could also end up upstage, behind the playing space, in which case it could be installed on a track on top of the stage, hidden behind scenery. A third option would be a small platform with straight wheels on it that could be extended onto the stage using a pole, commonly called a push-stick, for obvious reasons.

There are some characters that remain nothing more than cutouts, such as the bugler. The cutouts of George during “Putting it together” are another example. While the McLeod Theater lacks the infrastructure to have George’s cutouts magically rise from the floor, there were some other options for making cutout characters magically arrive. The McLeod stage contains what are known as traps, removeable sections of the stage floor with open space below. By removing a section and replacing it with a custom-built platform, a slot can be created to slide cutouts through. These could be rope operated by crew, with some of the cutouts having the option of being removed, like the dogs during the song “The Day Off”. There are three traps on the McLeod stage: two 4 ft by 8 ft wide at center stage, one upstage of the other, and one farther upstage 4 ft by 32 ft wide.

Early in the show, the script calls for a tableau of another one of George Seurat's paintings. Then, later in the show, the script mentions a park bench moving offstage. These two movements are lateral, crossing the stage. If they happened on the same plane, they could both be accomplished in very similar ways. As noted before, there was a possibility of adding tracks into the McLeod stage floor. These tracks would allow scenery to be moved with consistent positioning, speed, and acceleration while posing a very minimal tripping hazard. This would also allow for the scenic elements to be built specifically for use in the track, making them incredibly useful as stock scenery. This effect can be easily and readily repeated within a matter of hours rather than days with this stock scenery.

George's studio is a location that is shown repeatedly during this show. He is working on his painting, and the audience can see progress being made throughout Act I. On Broadway, George would paint facing the audience through a scrim. On the scrim was projected his painting, yet unfinished. As he was lit from behind the scrim, George was visible. This effect can be copied directly, as SIU has recently purchased some projection technology that is capable of lighting the entire stage from the back of the house. This produces the possibility of damaging a very expensive scrim, however. Another solution would be to purchase a smaller piece of painter's scrim and mount it on a frame to be flown in independently. This way, the painting can be represented at its actual size, 81.75 in x 121.25 in (Art Institute of Chicago).

In addition to these challenges, there were other possibilities to consider. All these options were purely speculative, as the designer and director would collaborate to create a set that speaks to the director's vision. Théâtre du Châtelet in Paris, for

example, used a large revolve and a curved cyclorama to represent the different locations (Benzel). While SIU has the capability to build and automate a revolve, size would be a consideration, in addition to budget. Stock and existing scenery would also be an option for alleviating some of these challenges.

Statement of Goals

Challenges

The scenic studio at SIU had been working to reduce waste and environmental impact by reducing the amount of paper produced. To this end, the scenic studio acquired six computer tablets and created a computer network to share production files and drawings wirelessly throughout the shop. With this technology, paper copies of drawings were rarely needed, especially since notes could be added to the drawings digitally. *Sunday in the Park with George* utilized this system, expanding upon it to further reduce waste. This production would be the first at SIU to attempt to use web-based software to generate and disseminate scheduling and status reports electronically, eliminating the need for printing. At Utah Shakespeare Festival, Google Forms was used to collect data regarding labor and materials. This method could also be used to host and display an ever-changing document, such as a shop schedule, which may be accessed by all collaborators within the department. With all this technology working together, this production would aim to require very little printing for the scenic studio, if any.

At this point in time, no undergraduate students had been trained to operate the newest machine in the scenic studio, the computer numerically controlled router (CNC).

This tool uses finely tuned motors controlled via computer to very accurately cut or carve material. This technology was utilized greatly during this production to produce accurate reflections of designed shapes faster than most carpenters can. By training undergraduate students to operate this machine, not only could graduate students be free to take on other advanced projects during the build, but undergraduate students were given the opportunity to learn a valuable and marketable skill. Additionally, this training has the effect of expanding on students' computer drafting capabilities in preparing files for the CNC.

Managerial Goals

This show had a budget of $3500 and a build period of five weeks at the beginning of the Spring Semester. A major goal of any production is to stay within budget for both time and money. To be as accurate as possible, the build period should begin with a complete set of construction drawings that lay out everything needed to complete the construction in the time allotted. In past experiences, these drawings have rarely been a complete set when construction begins. With this production, drawings were produced throughout winter break by the Technical Director and Assistant Technical Director before being brought together on the shop's network and tested for full functionality during the week before the build began. This allowed for time to troubleshoot if necessary, to add functionality as needed, and to prepare the shop for the build.

Potential Special Challenges

Managing an assistant technical director is a very special challenge. It is often difficult to entrust high priority tasks to someone else, but ultimately necessary. Sharing responsibility not only reduces stress for the technical director, but also allows the assistant technical director to learn and grow in their career. The Assistant Technical Director (ATD) for *Sunday in the Park with George* was entrusted with managing projects, producing construction drawings, and communicating closely with other undergraduate students to create this show. The ATD was also directed to take charge of the shop for at least one full day of every week during the build phase of this show and to participate in all meetings that the technical director attends. Ten minutes before the start of each work day was to be dedicated to meeting with the ATD with the goal of assigning and preparing projects.

Desired Results

The primary goal for any production as a technical director is to realize the director's and the designer's visions. Close collaboration is always required to bring the design from paper to reality while staying within the budget provided. This collaboration included an assistant technical director involved from the pre-design meeting through the post production review. This assistant participated in pre-production work and came to exhibit the same level of understanding that the technical director of the set and its design possessed, both cosmetically and structurally. This production also aimed to train additional students in the operation of the CNC router, allowing the technical director an opportunity to teach advanced skills to undergraduate students. After this production had opened, a survey was to be given to all who have participated to provide

feedback for the technical director. This form was electronic and completely anonymous (See Chapter 4, “Post Production Analysis”, for results).

Modes of Evaluation

This production was to be evaluated in multiple ways. After the show closed in February, faculty and graduate students met to discuss three important questions, divided among the design areas: “What worked? What didn’t work? What could have been done differently to improve the production?”. This discussion happens after every production at SIU and has proven to be a useful learning experience for all involved. In addition, this production was evaluated by a thesis committee consisting of three professors: Tom Fagerholm, as SIU Department of Theater’s Technical Director, among many other duties; Mark Varns, as SIU Department of Theater’s lighting design professor and former chair of the department, and Segun Ojewuyi, as one of SIU Department of Theater’s directing professors and head of directing.

In addition to being evaluated by peers and professors, this production was to be self-evaluated. Goals included: finishing the set without spending more funds than budgeted; finishing the set in the time allotted, and effectively managing the provided work force. In order to evaluate work force management, all the workers were to be given the opportunity to submit an evaluation form electronically. This was to be completely anonymous to allow open and honest communication without fear of reprisal (See Chapter 4 for results).

CHAPTER 2

DESIGN PROCESS

Pre-Design Meeting

On Monday, October 8, 2018, the director and designers met for a pre-design meeting as per the Department of Theater's Collaboration Guidelines (Appendix E). At a pre-design meeting, the director will share his or her concept for the production with the design team, and the design team is allowed time to share initial thoughts on the production and ask questions regarding the director's concept. Unfortunately, Jerome Veit, the ATD, was unable to attend any of the design meetings, due to scheduling conflicts with classes. Mr. Fink explained how much of an influence Stephen Sondheim had been during his formative years, giving us a brief history of his experiences with Sondheim's work. The subject of this show, in one word, is *art*. Stephen Sondheim has said, "The major thing I wanted to do in the show was to enable anyone who is not an artist to understand what hard work art is." (Schlesinger 13) The director also mentioned c*reation* as a theme. He described the show as a musical fantasy that celebrates creation and the creation of art. He explained that both main characters have to move on, and that both Dot and Elaine love their respective Georges but could not stay with them. Dot left George to care for her child, Marie. It is not known for sure why Elaine left her George, though it may be assumed that his art consumed the majority of his time, driving a wedge between them.

Speaking more directly to the designers, the director stated that he would like the show to begin and end in white, like a blank page or canvas. He wanted the audience to leave the theater thinking, "I can't believe they did so much with so little." The director

wanted a stage with levels, though there was no plan for any dancing numbers. During show selection for the season, projection technology had been discussed and accepted as an integral part of the scenic design, due to a lack of seasoned scenic painters. For this reason, an assistant was assigned to the scenic designer. The primary function of this assistant was projection design, in close collaboration with the scenic designer. According to the director, Act II was to be a sterile world in an art museum, as if the museum had taken the life out of the set.

According to the script, there were six separate locations to be represented: the park, George's studio, the auditorium, the gallery, the modern park, and the plain white page. Since the director planned on so little dance, he asked the designers to think about creating movement with design. This stillness was deemed necessary due to the density of language in this script. The director's vision for this show included much less dancing than other musicals due to the importance of the lyrics to the story. He wanted something to act as a curtain between acts and suggested perhaps a projection surface. He referenced the opening song in which George lists the elements of art: order, design, composition, light, and harmony. For each element, the orchestra plays a chord. The director expressed an interest in having a scenic change for each chord as well. On Broadway, these changes were accomplished with scenery moving into position and light cues.

The director expressed that the period of the show must remain as written; Act I is set in 1884-1886 Paris, while Act II is set in 1984. In reference to costumes, silhouettes of the period were to be more important than matching the painting precisely. During the first song, Dot has a moment where she is to step out of her dress

while it remains upright. Two options that were considered to accomplish this were building a frame around the dress that would be self-standing and hold the shape of the dress, and flying a hangar on a batten for Dot to simply place the dress on as she stepped away. The costume design faculty, Wendi Zea, and I had a discussion regarding the options, and to keep the effect within both monetary and time constraints, the second option was chosen.

Special scenic challenges were discussed, including cutouts, trees and boats, the *Bathing at Asnier* painting, and the chromolume. Both dogs, the monkey, and the soldier would be the only necessary cutouts. The cutouts used in other productions for George in Act II would be done with projections. The trees and boats under George's control during the first scenes were to be accomplished with projections, while the *Bathing at Asnier* painting was planned to be front projected onto a screen that would track onstage, though this was later cut in favor of simply projecting on the main cyclorama. The chromolume would need lecture projections showing the history of Georges Seurat, lighting effects, and a triggered failure per the script. The director also expressed interest in the chromolume being a three-dimensional object, rather than two-dimensional flown scenery.

The scenic designer briefly discussed with the director what, if any, design elements were completely out of the question. The director was adamant that a turntable would not work, since the show is based on a rectangular painting, so the ground plan should be some type of square or rectangle. Ideas were presented regarding tracking a large platform onto the stage either from upstage or splitting to come from the side stages.

Design Meeting #1

At design meeting one, the scenic designer, Daniel Bennett, showed inspiration images consisting of pointillism examples and paintings by Georges Seurat. These were followed by images showing perspective and depth. The designer focused on what artists are willing to let go for our art, the beauty in nothingness, and George's focus on light. The director began a discussion about the vagueness of almost all the characters. With the exception of George and Dot, the characters are all two dimensional, with very little information shared about them. Georges Seurat did not paint detailed faces on any of his subjects in this painting. The designer explained that he saw George as a lonely man, focused purely on his art. One of the final inspiration images was a collage of pictures of mammalian brains and nerve clusters taken through a microscope. Figures 2.1 – 2.4 are examples of these images. The designer found these interesting because they resemble

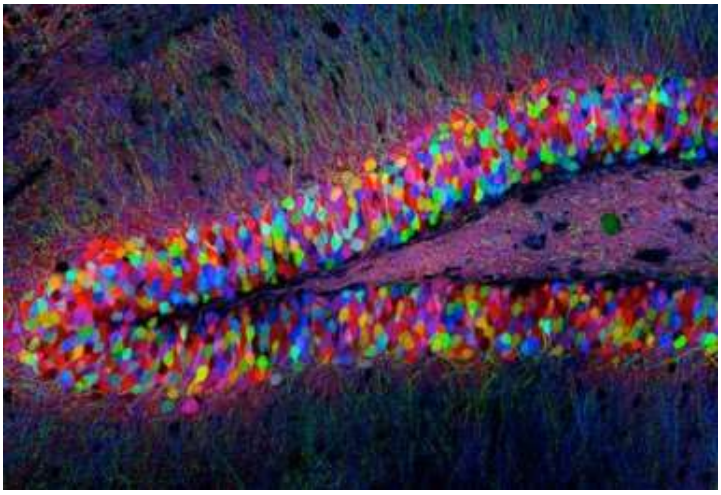

Figure 2.1 -Brainbow Mouse, Image by Tamily Weissman; Livet et al., Nature, 2007

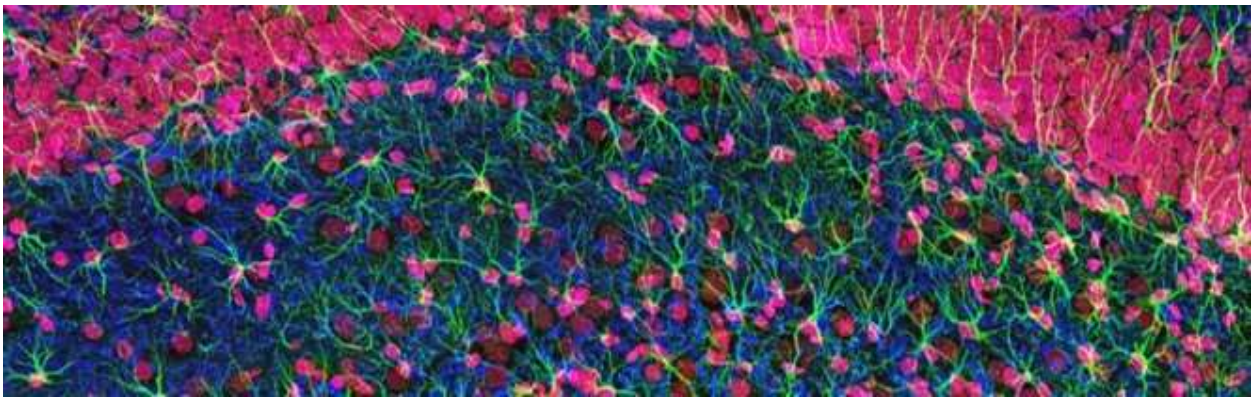

Figure 2.2 - Mammal Hippocampus Stained with Various Cellular Markers - Credit: Thomas Deerinck, NCMIR/UCSD.

pointillism, and he saw that they represent that art is in our DNA. It's what we're made of.

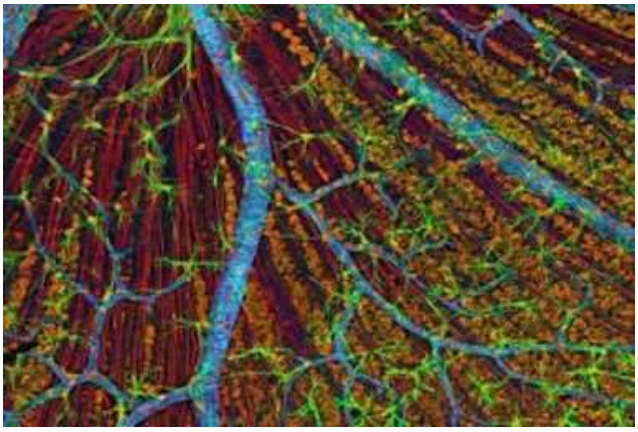

Figure 2.3 – Retina of a Mouse - Credit: Thomas Deerinck, NCMIR/UCSD.

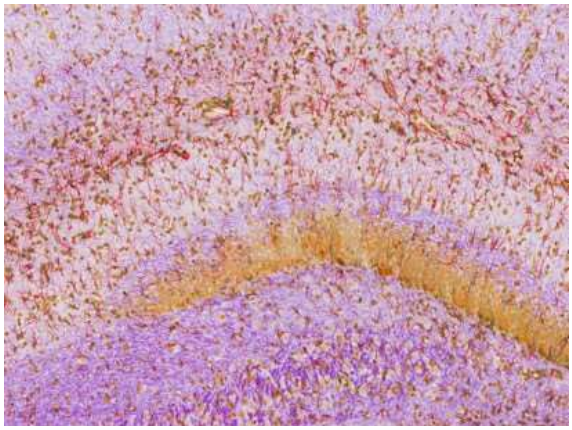

Figure 2.4 – Mammal Hippocampus - Credit: Thomas Deerinck, NCMIR/UCSD.

The designer also showed an image of a hallway with a figure on the far end, figure 2.5. This led the discussion to rectangles, specifically a series of shrinking rectangles that show a basic form of forced perspective. The director wanted to stay away from curves, circles, and three-dimensional shapes. The costume designer showed her inspirational image, which featured a very similar concept, with rectangles shrinking in the distance.

Figure 2.5 – Fiction 9 - © Antoine Mercusot

Design Meeting #2

At design meeting two, the designer presented a preliminary design. This design included a raked platform with a projection surface just upstage of it. The designer wanted the set to mimic George's sketchpad. The platforms were to be able to track onstage and meet at center, creating one large platform that would appear to float in space, but the director asked, instead, if the platform could track from upstage, hiding behind the projection surface, so that the audience would think that the stage was bare. Along with automated movement up and down stage, the production manager asked the designer and director if they would be interested in a flat platform that raised to become raked. They immediately agreed and asked me it this was feasible. While my initial reaction was to say "No", this question instead sparked a research process that would span the next few meetings. There were three options to be researched at this point. First, a permanently raked platform could track up and downstage. I felt that this was entirely possible within the budget. The second option was to have a stationary platform that could tilt to create a rake. The third option was a platform tracking up and down stage while also having the ability to tilt. While initially daunting, the production manager drew my attention to a product that could be used to accomplish this. These options will be discussed in more detail later in this chapter.

In addition, the designer included walls parallel to footlights that would be able to track on and off stage. The director felt that having walls would make the show feel like the action takes place indoors, rather than outdoors. Since most of the action takes place in the park, this design element was cut.

Design Meeting #3

Design meeting number three began with the scenic designer presenting a more detailed design. This was especially useful because it allowed me to research more deeply into what would be necessary to accomplish the multiple axes of movement for the platform. At this point, the platform was designed to be twenty-eight feet wide and sixteen feet deep. This configuration would utilize the Steeldeck platforms that the department had in stock. I made a point in this meeting to note that the track for the platform would need to protrude beyond the projection screen. The director asked me to find a way to minimize this protrusion so that Act II could use the stage floor without the additional platforming. In addition to this discussion regarding the platforming, the designer had presented drawings of a false proscenium that would shrink the proscenium opening by one foot and be painted much like the DNA pictures from his inspiration board. Just upstage of this false proscenium would be a scrim to project onto during scenes when George is in his studio. The designer also wanted a tracked painting that would serve as the tableau of *Bathers at Asnier* in Act I. This track would need to be anchored to prevent swaying, but still allow vertical movement. This could be accomplished by attaching a steel cable between the grid, fifty-five feet above the stage, and an eye bolt attached to the stage floor. The end of the battens would then capture this cable thus preventing swaying. This same method was used to prevent the high side curtain on stage right from swaying.

Between design meetings three and four, I began exploring the structural capabilities of Steeldeck platforms. These platforms are manufactured to easily attach to each other and have a very high structural rating when properly supported. Each four-foot by eight-foot platform is rated to support four thousand pounds of uniformly

distributed load. A uniformly distributed load is spread evenly across the entire surface of a structural member, in this case, the entire platform. However, these platforms need to be supported on all four corners to support that load. Seams between platforms constitute a weak point if not supported. In order to build the platform as requested, sixteen feet by twenty-eight feet, at least one seam would be required, as the largest platforms in stock were only eight feet long. Attaching two of these together would create the sixteen-foot span required for this effect but would place the seam at the center of the span. Structurally, the center point of a span will always experience the greatest amount of bending force. A seam in that location is likely to fail. I conducted experiments and calculations to help analyze the forces involved in such a span including mocking up a coupling system to connect two four-foot by eight-foot platforms together that could withstand the load to be applied while allowing three quarters of an inch of deflection for the sixteen-foot span (Refer to drawing in Appendix A). This deflection criterion was calculated by taking the length of the span divided by 240. According to Bronislaw Sammler in *Structural Design for the Stage*, this is the amount of deflection that a trained observer would notice. (Holden, Sammler and Powers 98) I found that this configuration would support a 275-pound man jumping at the center of the span without deflecting beyond the assigned deflection criteria. This would allow for the platform to rake, as requested.

During this time, I also researched methods of lifting the upstage edge of the deck. The most readily available and affordable solution appeared to be electric car jacks. Without clear goals and criteria from the director and designer, I took note of some specifications to bring to the next meeting. The first and arguably most important

specification was the weight rating of the jacks. Within the budget, the jacks I found had a rated capacity between 2,000 and 4,000 pounds. Using multiple jacks in tandem would be required and give us a total load rating between 12,000 and 28,000 pounds. As each individual Steeldeck platform weighs 175 pounds, the total weight of the platform without actors would have been 2,450 pounds. With sixteen actors, the weight would quickly rise above 4,000 pounds. While reading reviews for the products, I noted that these jacks used plastic gears, which are more prone to breaking than metal gears. In addition, the speed of the jacks was noted to be approximately nine inches per minute.

I drew a mockup of this system in AutoCAD to determine what the minimum height of the platform would be. To accomplish this, I had to find the smallest steel beam that would support the upstage edge of the platforms. This beam would support the seams between the jacks, preventing them from sagging or deflecting excessively. Calculations for this are found in Appendix B. The smallest and most readily available beam would be a square steel tube measuring two inches on each side with a wall thickness of one eighth of an inch. Using this material and the shortest jack, I calculated a minimum height of eighteen inches for the platform.

I produced a preliminary bid to present at the next design meeting. As expected, the automated tilting of the deck was estimated as the highest cost portion of the show at nearly 50% of the budget. The production manager advised me to research into hydraulic power as an additional option. He suggested that there may be an opportunity to supplement the show budget for hydraulics, as it would be a research opportunity for the department.

Design Meeting #4

At this design meeting, the scenic designer had a more coherent design with which to work. The stage floor was determined to be black, while the tracking deck would be white. This helped immensely to hide the track and achieve the floating deck effect that the designer intended. A full stage black curtain would be placed against the upstage wall, with a cyclorama sixteen feet downstage. The false proscenium would be placed on line set number one. The cyclorama would be projected on from the rear, while the tracking picture frame would be projected from the front. This would require some research, as the video signal would have a very long length of cable to travel. As someone with computer experience, I decided to do this research and be prepared in case the projection team missed this detail.

During this meeting, I requested clarified specifications for the automated deck from both the director and designer. At this point in the design process, I was becoming skeptical of my ability to create this effect within budget. The following parameters were agreed upon, providing me with clear goals to work towards. The step height should be a maximum of twelve inches, though this would be negotiable with steps. The tilt would have to actuate over a period of roughly four seconds, compared to the current one-minute estimate. The track and control cables for the platform movement should protrude roughly eight feet beyond the cyclorama.

The most prevalent challenge presented by these specifications was the amount of time to actuate the tilt. While the jacks were shown to take over a minute to achieve the required lift, commercial air springs designed for use in heavy duty vehicles showed some promise. These air springs would need to utilize pilot valves, which take a small amount of airflow to control a larger volume of compressed air. To activate these would

require twenty gallons of compressed air kept on board the unit, as well as a connection to the scenic studio's air compressor. This idea of using air springs led me to rethink how we might accomplish the raking actuation. Instead of actuating by lifting the upstage edge of the platform, perhaps the downstage edge could lower into place instead. Both these options have the distinct challenge of transferring over twenty gallons of compressed air quietly in four seconds. The challenge was tabled to be discussed at design meeting five.

Video Graphics Array, or VGA, is a standard cable used to transmit video signal from a computer to a display. The display could be a monitor, or screen, at a workstation, or a projector. While researching cable length limits of VGA, I found that Sewell Direct states that video quality degrades over length because the signal is analog rather than digital (Sewell Direct). For low resolution video with a resolution up to 800x600 pixels, lengths of one hundred or more feet can be achieved. When sending mid-range resolution up to 1280x1024 pixels, the signal begins to degrade at roughly fifty feet. Higher resolutions degrade at lengths as low as twenty-five feet. Whether the projections operator is on the stage or in the booth, one of the projectors would require approximately two hundred feet of cable. While a simple cable is unable to transmit signal this distance without degradation, companies like Sewell Direct sell extenders that can reach well over 1000 feet cable lengths. One such device was advertised to allow distances of up to one hundred meters, or three hundred and twenty-three feet. This device would be tested at length during the production stage.

Design Meeting #5

At this meeting, it was decided to scrap the automated tilting of the deck due to the complications presented. The most egregious complication was the speed of the movement. The director had a set time of four seconds that the movement needed to take place in, in order to move with the orchestration. The solutions that were available could not reliably meet that criterion. Instead, it was decided that the platform was to have a permanent rake and track upstage and downstage. The rake would start at twelve inches on the downstage edge and rise to twenty-four inches on the upstage edge. During a weekly meeting with my mentor, he directed me to *Mechanical Design for the Stage*, a book that we both keep on our shelves. In this book, there is a section dedicated to tracked scenery that talks about placement of drive mechanisms. Typically, if a platform is wider than it is long, two drive cables are used to keep the unit firmly on the guide tracks (Hendrickson 413). I knew that we did not have enough pulley blocks to accomplish this, so at the design meeting, I presented a plan to manufacture additional pulley blocks to allow the tracked platform to move more smoothly. This involved using our CNC router to mill aluminum, which would require additional research. The tracking paint frame was also cut in favor of a stationary frame that would fly in from above.

While most of the design was complete and finalized, one important piece of scenery was not finished. The chromolume, which would have numerous built-in effects, had not been presented as a whole to the director. We scheduled an additional meeting for the following Monday to present and finalize the effects of the chromolume. To accomplish this, the Scene Designer, Technical Director, Assistant Technical Director, Lighting Designer, and Master Electrician met to discuss and finalize the design. The shape of the chromolume was determined to be a diamond shape, as seen in Appendix

A, with holes to allow light to escape. This diamond was placed on a round platform with a schedule 40 pipe mounted at center to provide stability. Atop the diamond was a frame of another diamond, inside of which would spin a cube on point, finished with mirror squares, much like a disco ball. The lighting designer would install LED tape on the inside of the base diamond, wrapped around the pipe. For the technical malfunction, a small fogger would be installed that would blow what appeared to be smoke from the underside of the platform.

Post Design Work

The scenic design for this show was finalized just before winter break. The ATD offered to take on the museum bench, as he was planning a visit to see the original painting in his hometown of Chicago over winter break. In addition, he would draft the chromolume, collaborating with the lighting designer and master electrician to be sure than any electronics needed would have a place to go. I would draft the main deck and its automation, as well as research aluminum milling and designing the required floor pulleys.

Milling Aluminum

Milling is a process of machining that uses a rotary cutter to remove material. In order to mill aluminum with the Department of Theater's Laguna SmartShop I, we had been told that we should purchase a cold air gun to install on the spindle. My initial research led me directly to a video posted by Laguna Tools of one of their CNC routers milling aluminum without using a cold air gun. This prompted me to contact the company and discuss our options. The representative told me that with the correct bits,

carefully calculated feed rates, and good cutting fluid, we would be able to mill aluminum on our machine without purchasing any additional equipment.

The Laguna Tools representative recommended special bits known as Spiral 'O' Flute bits for cutting aluminum. Figure 2.6 shows a Spiral 'O' Flute bit compared to a spiral compression bit that would be used with wood. These bits were included with the machine when it was shipped, manufactured by Amana Tools, an industry leader in CNC router bit manufacturing. These bits are solid carbide designed specifically for cutting aluminum. While the manufacturer of these bits recommends a cut depth equal to the diameter of the tool, the representative from Laguna Tools recommended only cutting to a depth of one half of the diameter of the tool. As this was the first time our CNC was used to mill aluminum, I chose to follow the recommendation of Laguna Tools.

Figure 7 - (Right) Spiral O-Flute Bit vs (Left) Compression Bit – Property of Author

The feed rate, or how fast the bit moves laterally through the material, was carefully calculated according to recommendations from Amana Tools. The datasheet for the bits gave the following formula to find feed rate in inches per minute: revolutions per minute x number of flutes x chip load. Revolutions per minute (RPM) refers to the speed that the bit will spin, which is kept at 18,000 RPM. These bits are single fluted, and the recommended chip load is taken from the chart on the datasheet as 0.003" – 0.006". Using a chip load of 0.005", I calculated a

speed of 90 inches per minute. Since completing these projects, we have learned that the spindle speed at the time was actually 24,000 RPM, due to a miscommunication with the technician who conducted initial training. The spindle speed is controlled by a variable frequency drive with a panel on the machine. The panel shows the frequency of the alternating current being fed to the spindle in Hertz (Hz) which equate to cycles per second. This frequency can be used to calculate the speed by simply multiplying by 60.

The next step was to choose an appropriate cutting fluid. The best fluid would be multipurpose, water based, and affordable. With input from the Production Manager, I decided on TRIM SC520 Semisynthetic Fluid Concentrate. This fluid is most often used in low concentrations, around 10%. It is compatible with a wide range of materials such as steel and aluminum, both of which we use in the shop.

Design of Deck Sheaves

After verifying that we could in fact mill aluminum with our CNC, the next step was to design the pulley blocks. As the department owned a turnaround deck sheave from Creative Conners, I decided to model new ones with matching cable spacing. The original reference drawings are in Appendix A. Some dimensions were customized to simplify assembly and fabrications of these sheaves. The pulley selection, material thickness, and bolt size were all important considerations during the design phase.

The Production Manager pointed me to Ralmark Company as our preferred pulley manufacturer. When I called to get a quote for the pulleys needed, I received quotes for two styles of pulley. The first was a non-metallic option used in theatrical applications due to the material's ability to carry less line vibration and resonant sound. *Technical Design Solutions for Theater: Volume 1* recommends this material as a cost-

effective option when designing pulley systems, especially involving tracking scenery (Sammler and Harvey 92). This pulley was designed for use with aircraft cable between 3/16” and 1/4” in size and a maximum load of 4,000 lbs. The second was an aluminum option used by Creative Conners in their turnaround and mule block sheaves. This pulley was designed for the same sizes of aircraft cable, allowing the same maximum load as the others. The representative gave me options for both models of pulley and mentioned a bulk discount if we purchased ten rather than the eight that were necessary for the project. For less than ten aluminum pulleys, we would be charged $97.18 for each pulley, compared to $86.37 each if we purchased ten. The high strength plastic pulleys would cost slightly less, $70.69 each for less than ten or $62.83 each for ten. The Production Manager and I agreed that aluminum pulleys would be the best option, due to their increased resistance to wear from abrasion. We decided to buy ten to allow for later expansion and greater money saving per pulley.

The top plates of the sheaves used 1/8” aluminum plate, while the bases used 1/4” plate. This allowed for the bolts to be threaded deeper into the base material, increasing the overall strength of the sheaves. In order to make assembly easier, sections were removed from the inside of the base, as shown in Appendix A. To attach the pulleys to the base, I chose 3/8” bolts with 24 threads per inch (TPI) rather than our standard 3/8”-16 TPI. This allowed for six threads to be inserted into the aluminum rather than four, increasing the surface area resisting pullout. The center point of the pulleys required 3/8” bolts. I decided to use the same size bolts all around to ease assembly.

The Production Manager agreed to this plan for milling aluminum after the final design meeting, but before production began. This happened to fall during the week following Thanksgiving. Since this was a time of sales known colloquially as Cyber Week, I thought I might find some good deals on aluminum plate to purchase for this purpose. After contacting our usual supplier for metals and learning that they would have to special order aluminum plate, I began searching the internet for online suppliers. Onlinemetals.com was running a sale for Cyber Week, which allowed us to purchase all the aluminum needed with extra to allow for mistakes for $322 rather than the $437 it would cost without the sale.

By the end of the Fall semester, the design of the blocks was complete, and the first attempt at milling aluminum took place. Having researched and calculated so many variables beforehand, I was able to mill the top pieces out of 1/8” aluminum on the first try.

Raked Deck

Creating a raked platform on casters is much simpler than automating a deck to rake itself. Instead of having only two connection points, we were able to support the platforms in the center while the upstage and downstage edges had their own support. The designer and director decided on a downstage edge at twelve inches from the floor, raking up to the upstage edge at twenty-four inches. This made calculating pipe lengths for the rake rather simple in AutoCAD.

The tracks for the platform to ride on needed to be evenly spaced, symmetrical, and far enough apart to keep the platform straight. Due to the orientation of the platform, *Mechanical Design for the Stage* recommends using two tracks and two drive

cables to automate this platform (Hendrickson 413). For this reason, I chose to place the tracks eight feet off center, directly underneath seams where the Steeldeck would be coupled together. This allowed all the casters to be attached directly to the bottom of pipe legs by welding steel plate to the base of the pipes. To simplify the build process, all the pipes for the mid-stage seam were one length, while all the upstage pipes were another length. The length of the pipes was determined by the height of the grooved casters, as they were taller than the other casters I choose to use. All the other casters were attached to plywood blocks which were subsequently lag bolted to the plates, while the plates for the grooved casters were threaded to allow the casters to be directly bolted without the need for nuts.

After placing the tracks eight feet from center, I decided to place the drive cables six feet from center. This allowed for the construction of mirrored frames to hold the drive knives. The drive knives were made of plate steel with holes drilled to allow standard ¼” shackles to be attached. These frames and knives transferred the force from the drive cable to the pipe legs to move the platforms. By placing the knives at six feet from center, I centered them underneath a platform, allowing for the maximum amount of space to work around them. This also kept the drive cables closer to the tracks than to each other, improving stability. As the director had asked that the automation take up as little downstage space as possible, these knives and frames were then attached to the upstage pipe legs, allowing the platform to move from nearly touching the back wall to just barely short of interfering with the fire curtain.

At SIU, we had two winches to choose from to move the platforms. The simplest winch is a Spotline Hoist from Creative Conners as seen in Figure 2.7. This winch features a five-horsepower motor, brakes on both the drum and the motor, and a maximum speed of 36 inches per second. As the cable is drawn into and fed out of this winch, the point where the cables meet the drum moves, producing lateral movement between the winch and pulley blocks. This movement could present a challenge with excessive fleet angle between the machine and the mule blocks. In addition to this winch, we had the option to use an EZ-Rider from EZ-Hoist, shown in Figure 2.8. The EZ-Rider has many of the same features, with the addition of being a zero-fleet winch, meaning that the cables exit the machine at the same point, regardless of their position on the drum. The maximum speed is also increased to 48 inches per second. This winch was chosen due to the ease of working with the cables after exiting the machine. A mount had been previously created for this winch to be used at Utah Shakespeare Festival where the cables were run underneath the stage floor. This mount was modified and raised slightly to allow it to be used on the Mcleod stage, keeping the cables above the stage floor.

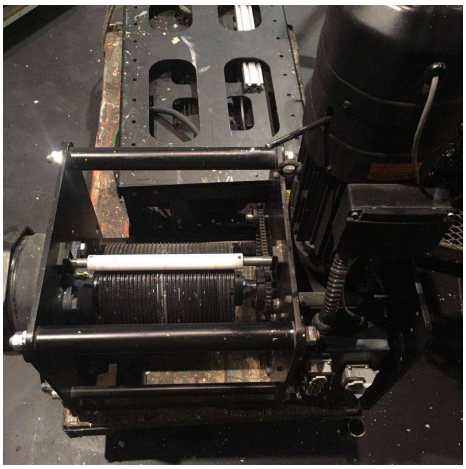

Figure 8 - Creative Conners Spotline Hoist – Property of Author

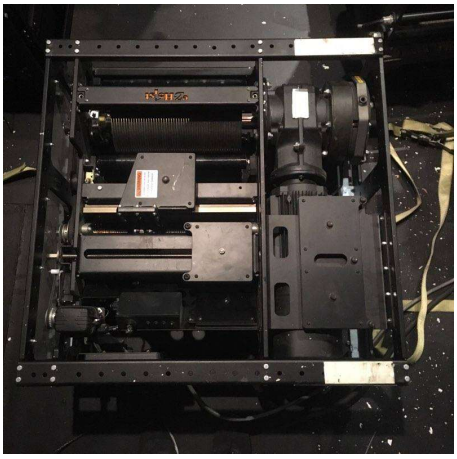

Figure 9 - EZ-Hoist EZ-Rider – Property of Author

Conclusion

As we moved into the build phase, I felt confident and prepared to move forward with this design. The design was complete and within budget, and I had completed a build schedule and started construction drawings for the shop. In the future, I would prefer to finish all drawings before the beginning of the build and have a clearer and more definitive schedule to which I could adhere.

CHAPTER 3

PRODUCTION PROCESS

Week 1

Floor Pulley Blocks

Our first week into production, Veit and I began milling the aluminum for floor blocks. The top pieces were milled before the end of the fall semester, and a carpenter was assigned to smooth the edges to prevent injuries. The bases were milled on January 14th, the first day of the Spring semester. This process was completed by the CNC in approximately one hour. Directly after milling, ten holes in each base needed to be threaded for bolts. This was accomplished with self-aligning taps attached to an unplugged drill press to keep the threads perpendicular to the base itself. After some testing, we found that by turning the chuck manually, the taps could be started by hand, and finished with a handle attached to a standard tap. In order to streamline this process, one carpenter could start all ten threaded holes using the drill press, then pass the base to a second carpenter who would finish the threads on a work table. This created an assembly line of sorts, speeding up the process without sacrificing quality.

In order to prevent the pieces from corroding, and to allow them to blend visually with the floor, I wanted to powder coat the pieces. This process involves applying a powdered pigment to the material using static electricity and then heating the pigment to cure it. This process produces a coating that is very durable and can withstand years of use. The scenic studio at Southern Illinois University does not have direct access to a powder coating system, however, so I attempted to collaborate with our Engineering

Department in the hopes that they not only had a system but would allow us access to it. After contacting the department, I received a reply stating that they also lack this capability and send parts off to a company to have this process done. There were two companies that were recommended, both of which are located within an hour drive of Carbondale. With a planned install for these parts within a week, I decided to instead coat them with multiple coats of spray paint. Ultimately, the finish consisted of four coats of flat black spray paint followed by three coats of flat clear coat. While this was a tedious process, it took less time than powder coating would have and gave the pieces a resilient finish. After the show was struck, I found only minimal damage to this coating.

After the parts were all smoothed and finished with spray paint, it came time to assemble the units. Each unit would require ten bolts, two pulleys, and eight spacers. The spacers were purchased from McMaster Carr and were sized by depth and inner diameter. Unfortunately, the outer diameter of these spacers was approximately one quarter of an inch wider than the design allowed for. To rectify this situation, each of the spacers was flattened on one side using a stationary belt sander. As the spacers were not intended to be load bearing, this did not compromise the strength of the pulleys in any way.

The bolts chosen for these assemblies were sized 3/8” x 24TPI, or commonly referred to as 3/8” fine thread. This means that the diameter of the bolts was three eighths of an inch, and for each inch of length the bolts had twenty-four threads. Coarse thread bolts of this size have sixteen threads per inch of bolt. The fine thread bolts engaged six threads into quarter inch aluminum rather than only four threads of a coarse thread bolt, increasing the strength. These bolts were purchased along with the

spacers and were socket cap type. Instead of having hex heads like most bolts we work with, these bolts have a round head with a socket for an Allen key. These sockets were the same size as standard coffin locks used in many theaters. These bolts were made from a black oxide alloy steel with a factory applied patch of nylon to prevent loosening. This alloy provided a stronger tensile strength than grade 8 steel bolts, increasing the strength of the pulley blocks once again.

To assemble, one pulley would be placed between a top and a base, and a bolt would be installed through the center of the pulley. This is because if the spacers were installed first, the pulley would not fit past them into its position. This placement also produces a secondary failsafe, in that if the center bolt were to break for any reason, the pulley would be jammed against two spacers, using two bolts to hold its new position with double the strength. Even with the care and attention put into threading these bases, one of the threaded holes was damaged. It is unclear if this occurred during the tapping process or while installing and testing bolts. Since aluminum is a relatively soft metal, and the bolts purchased were hardened steel, it is very possible that by slightly cross threading the bolt, damage could occur. To rectify the situation, the base plate was simply flipped over, and the tap threaded through to clear the threads. Since this happened to be the mule block, the base was symmetrical, and thereby completely reversible.

Creative Conners sells their pinch back pulleys for $500 and their mule blocks for $300. This project built three pinch back pulleys and two mule blocks while also including enough materials to produce two additional mule blocks. To purchase what we produced would cost $2700 before considering shipping and lead time from Creative

Conners. The SIU Scene Shop produced these for a cost of $1,372.89, saving $1,327.11 for the department, and opening the door for future projects utilizing milled aluminum. These blocks were also kept in stock for future automation projects.

Pipe Legs and Plates

Welding of the pipe legs as drawn in Appendix A was assigned to Nathaniel Mohlman, our first-year graduate student focusing in Technical Direction, and Rowen Harder, one of our work study carpenters. As they began preparing the pipe legs, I learned that I had been assigned Timothy Ellis as a master carpenter for this production. I delegated Ellis to determine the height difference between the flat casters and v-groove casters that I intended to use. Ellis determined the difference to be one-and one-half inch and immediately began construction. This made the caster blocks very simple to construct out of scrap plywood and allowed the assigned carpenters to assemble them quickly. As the plywood would be difficult to bolt to a threaded plate base at that thickness, I decided to instead use lag bolts through different points on the plates for the flat casters, while threading the plates for the v groove casters.

The team worked together to cut plate steel into five-inch squares and tack welded them together in stacks of four before drilling mounting holes. This was to ensure that all the plates would have identical mounting hole placement, with the exception of the four plates to hold v casters. As these plates were welded together, we observed that some of the plates were not square. Instead of scrapping all the plates and cutting new ones, I decided to mark the plates with spray paint on the edges to identify in what orientation they should be drilled and installed. As the plates were welded together, all of the factory edges were painted with orange paint to signify that

they should run upstage/downstage. One adjacent edge on each set of plates was then ground down to be square with the factory edges and painted red to signify that pipe placement could be measured from that edge. While these colors did not pose a problem for this production, a colorblind person may not be able to tell the difference between them. In the future, I would choose more accommodating colors.

As the first of the pipe legs were welded together, the team noted that the heat was causing the steel to warp slightly, which affected the spacing of the pipes at their extents. In order to circumvent this, Harder found a solution using scrap pieces of steel plate and lauan as spacers at the top of the pipes, holding them in place. While I had doubts that this would be sufficient, expecting the cooling steel to simply crush the lauan or rebound when the scraps were removed, I was pleasantly surprised by the positive outcome. While this worked very well, the team noticed as the threaded plates were being attached to pipes that the threaded holes were dangerously close to being blocked by the wall of the pipe. Immediately after the first unit had been assembled and cooled, we found that a bolt could no longer be threaded all the way through the hole. Being very close to the pipe wall, we decided to attempt to thread the proper tap through the hole, which cleared the way for a bolt to fit. With this knowledge, the team continued, tapping through each hole, to be sure that a bolt would fit. By the end of the first week of production, all the pipe legs were welded together and prepared for installation.

Other Production Work

After Harder's impressive work welding the pipe legs in short order, I assigned her to prepare the tracks for the show. While Mohlman found and set aside track that

we had in stock for this project, Harder began welding tabs onto angle iron for connection to the stage floor. I had calculated twenty-six feet to be our length requirement; however, Mohlman had found seven-foot lengths of track already prepared. Instead of wasting time and material cutting one foot off the brand new twenty-foot lengths of angle iron that were purchased for this show, I decided that a slight discrepancy in length would have a negligible effect on the downstage area. This proved to be an important decision, as the director later, during technical rehearsals, asked me to move the deck one foot farther downstage.

After Ellis had finished preparing all the casters, I assigned him to preparing facing and skinning for the platforms. We had decided on eighth inch hardboard for the skinning of the platforms, allowing for a smooth painting surface. While this thickness of material kept the cost low, it also allowed an imperfect seam to be visible on the platform. In the future, I would prefer to use thicker hardboard for this purpose. In order to prevent curling and warping of this material, the sheets were turned over to paints to have a slop paint applied to the back side and the designer's color on the front. In conversation with the scenic designer, we discussed how low the facing should extend beyond the base of the platform framing. The designer chose to err on the side of caution and recommended to extend the facing one inch beyond the base. While the paint crew prepared the hardboard for the top of the deck, Ellis then cut eight-inch-wide by eight-foot-long strips of facing and turned them over to be painted as well.

At the end of the first week of production, we were well poised to begin assembly of the platform, though this was not scheduled until week three. In order to allow

electrics to hang the plot, this would be kept at its scheduled time, with the exception of a pair of platforms assembled as proof of concept.

Week 2

Martin Luther King Day started off our second week of build and was accounted for on the build schedule. The planned projects for this week included shuffling soft goods, building the bench, laying out tracks and automation gear, and building the painting. Two of the platforms were also assembled to provide a proof of concept for the raked deck. Lumber was ordered on Tuesday morning in preparation for the week.

Soft Goods Shuffle

A counterweight fly system, as found on the McLeod stage, allows scenery or soft goods to be attached to pipes over the stage known as battens while offering a counterweight, known as an arbor, to balance the weight. The system at SIU is known as a double purchase system, which means that it uses mechanical advantage between the arbor and batten. This allows for the fly system to be half as tall as a single purchase system would be for the same amount of travel. It also causes the arbor to require twice as much weight as what is on the batten. A line set is the assembled combination of arbor, batten, and connecting cables.

During the soft goods shuffle, the crew placed five pairs of legs as noted in the line set schedule in Appendix B, as well as an additional three pairs to create a full stage curtain on the most upstage batten. Three borders were used, with the challenge of attaching one of them on the same pipe as one pair of legs. In order to set the proper height for this border, the legs chosen were longer than needed and rolled on the floor

to keep them nice. This created a challenge regarding the cyc, as it landed on top of the rolled legs and would not reach the floor. To allow the cyc to reach the floor, the rolled legs were pulled upstage to create a pocket of fabric into which the cyc would land. In addition to this challenge, initial measurements with the cyc in place showed that the platform as planned would just barely fit upstage of the cyc as intended. This revelation led me to immediately begin considering options to gain some small amount of clearance for the platform. The scrim was moved to an unused batten and tied, bunched up, to the pipe. This is a common storage method known as “west coasting.” The soft goods shuffle was completed with almost two hours remaining in shop on Tuesday. This allowed the crew to return to their previous projects for final touches.

Intermission Screen

As Ellis had completed his projects, he began building the frame for the Intermission Screen. There are two primary types of flats used in theater known as Broadway and Hollywood. Broadway flats are built with framing on face and covered with either a fabric or sheet material like lauan. This makes Broadway flats lighter and thinner for flying scenery. Hollywood flats are built with framing on edge, which increases their strength and allows them to easily stand on their own (Holloway 189). The screen was designed and built as a Broadway style flat with muslin covering. This kept the flat narrow and lightweight for flying and allowed for the nonstandard dimensions that were requested by the designer without additional framing that would be required to support seams in a hard covered flat. The designer had determined the size of the flat as a scaled enlargement of the original painting at 8’ 6 1/8” by 12’ 7 5/8”. As the other carpenters completed their projects, they joined Ellis in his project.

The fabric for the screen was delayed from Rosebrand due to winter storms, with an arrival date of January 28th. As many of the carpenters had not had the opportunity to attach a fabric covering on a flat, this became a team project and learning experience. In order to attach the fabric, white glue is mixed with water and applied to the outer frame (Holloway 212). The fabric is then laid across the frame and stapled to the back side. It is important when building fabric covered flats to allow slack in the fabric when attaching to the frame. When paint is applied to the fabric, it shrinks and stretches the fabric tighter. Without the proper amount of slack, the fabric can rip itself from the frame or cause the frame to warp. The fabric on the painting turned out to be just slightly too tight and warped the frame. Luckily this was not evident to the audience with very few exceptions.

Proof of Concept

On Thursday of this week, Veit was in charge of the shop and assigned Mohlman and Harder to work with me to set up a proof of concept for the main deck. A proof of concept is a small scale or partial assembly that is used to determine if a method of construction works as intended. In this case, we assembled two platforms with the pipe legs and measured the height of the platforms at multiple positions to verify that the rake would turn out as planned. Harder began by building caster plates for the downstage casters. These plates were designed to rest within the framing of the platforms and slide upstage and downstage as needed to allow for easy adjustment of the front edge height. Meanwhile, Mohlman and I installed casters on the far upstage right platform and encountered a challenge. Since all the upstage leg and caster plate assemblies were designed to attach platforms together as well, they each had two pipe

legs. In order to keep the casters underneath the platform, the offstage casters would each need one leg cut six inches shorter to allow the pipe leg to fully seat without hitting the framing. Figure 3.1 shows the Steeldeck framing interfering with the pipe legs. After this challenge had been addressed and solved, we set the v-groove casters of the platform onto a piece of track and the flat casters on the stage floor. The platform was measured level within an eighth of an inch and also measured twenty-four inches high on the upstage edge and eighteen inches on the downstage edge, just as it was designed.

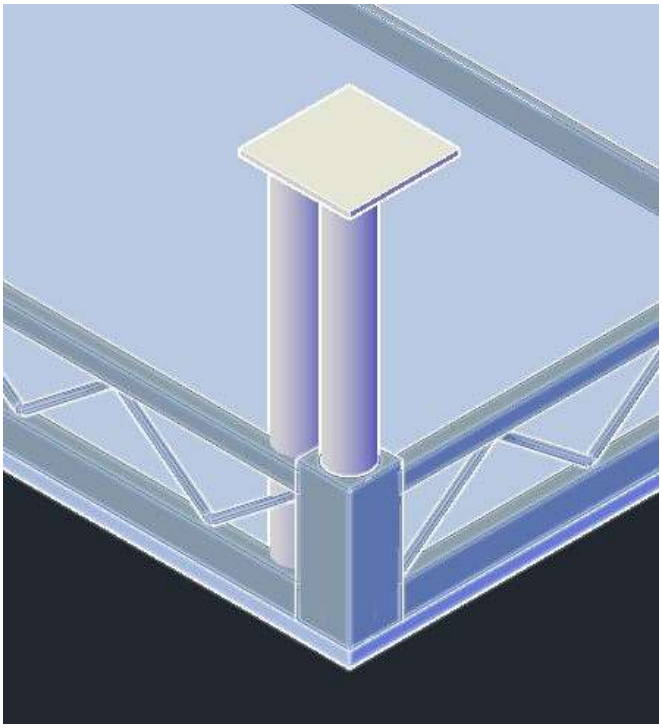

Figure 3.1 - Steeldeck Framing Interfering with Pipe Legs – Property of Author

At this point, Harder had completed one caster plate, and the rest were on their final step of the process. We placed the caster in the estimated location and let the platform rest on top of it as we married the two platforms together. The caster could not go at center of the platform due to framing, so I decided to place them offstage of center, keeping the longest unsupported span at center. This choice was later revisited during week three of build. As Mohlman and I measured the height of the downstage edge, Harder moved the caster until we arrived at the target height of twelve inches. The caster block was then screwed to the plywood of the platform, and Harder measured its location. With the proof of concept complete, Mohlman and Harder moved

on to installing the downstage caster onto each of the downstage platforms while I began measuring and placing the floor blocks. By the end of Thursday, the farthest stage right column of platforms was assembled and stored horizontally upstage of the cyc.

Bench

As the three of us worked on stage, Veit and Ellis began building the bench. This bench was strongly inspired by the bench at the Chicago Art Institute that rests near Georges Seurat's painting. Veit had drafted this unit and prepared parts for the CNC. With minimal guidance after training, Veit operated the CNC to carve the legs of the bench and later to mill the top to flat. The legs were layered plywood with pockets that were meant to fit a two by four through to connect them. These pockets were drawn at the exact size of the lumber, which resulted in a learning experience for Veit.

When using a CNC, it is important to remember that it does not make mistakes. The machine will do precisely what the operator tells it to do. In comparison, a human being cutting an opening for a two by four will naturally enlarge the hole without thinking about it, which allows the lumber to slide in easily. This same effect can be accomplished with a CNC by using what are known as tolerances or clearances. We teach this in stagecraft and in technical direction without naming it for machining use. A general rule of thumb for most scenic shops is to drill holes 1/16" larger than your intended bolt, or 1/32" larger if building a machine (Hendrickson 329). In the same way, when using a CNC the operator needs to consider what needs to fit together and give it extra room to do so. While 1/16" or 1/32" seems like small tolerances to carpenters, a CNC machine can have a tolerance of three thousandths of an inch or smaller.

In this case, the lumber fit through the pockets with minimal adjustment, and the bench was structurally complete on Friday. To accomplish this, Veit had glued together two by twelve-inch boards to each other on Thursday, milling them flat on Friday. After milling the top, the assembly went very smoothly, with only one additional change to the structure. After the top was installed, Veit stepped onto the bench and the top deflected noticeably. To correct this issue, Veit installed a small block of two by four at center that transferred the weight from on top of the bench to the two by four crosspiece. While the final product was beautiful and well built, its weight prevented us from keeping it for stock.

Track Layout

While Veit and Ellis continued work on the bench on Friday, Mohlman and I laid out the tracks and pulleys on stage. The track was set eight inches downstage of the upstage wall to allow room for the cables to pass upstage of the casters. The tracks were placed eight feet off center and squared by measuring the horizontal and diagonal distances between them. There were two types of floor pulleys built, turnaround pulleys and a double mule block. Turnaround pulleys are used to reverse the direction of steel cable while keeping the two leads close together, as seen in Figure 3.2. Mule blocks are used to turn cable, usually ninety degrees as seen in Figure 3.3. The system of pulleys

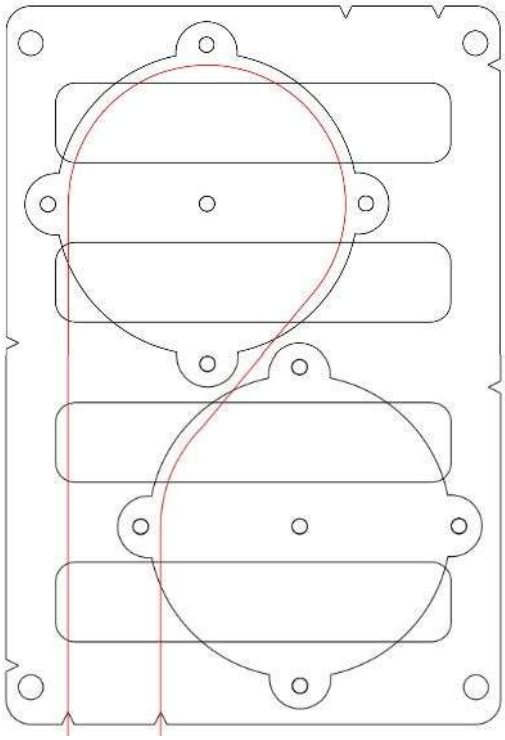

Figure 3.2 - Turnaround Pulley (Red lines note the cable path) – Property of Author

for this show were installed as shown in Figure 3.4, placing the cables in the middle of an installed platform. This prevented the possibility of the cables being hit by casters. At this point, the cable was not installed, so to prevent a trip hazard, the downstage pulleys were not installed.

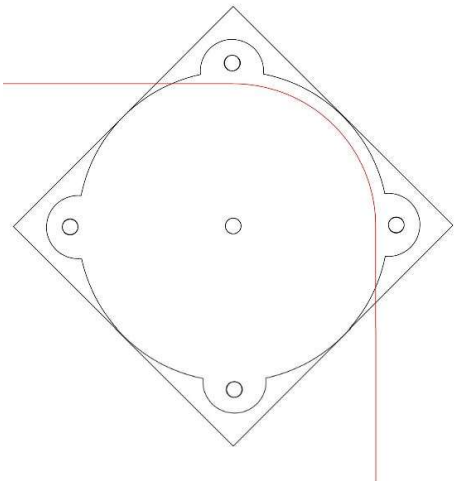

Figure 3.3 - Example of Mule Block (Red lines note cable path) – Property of Author

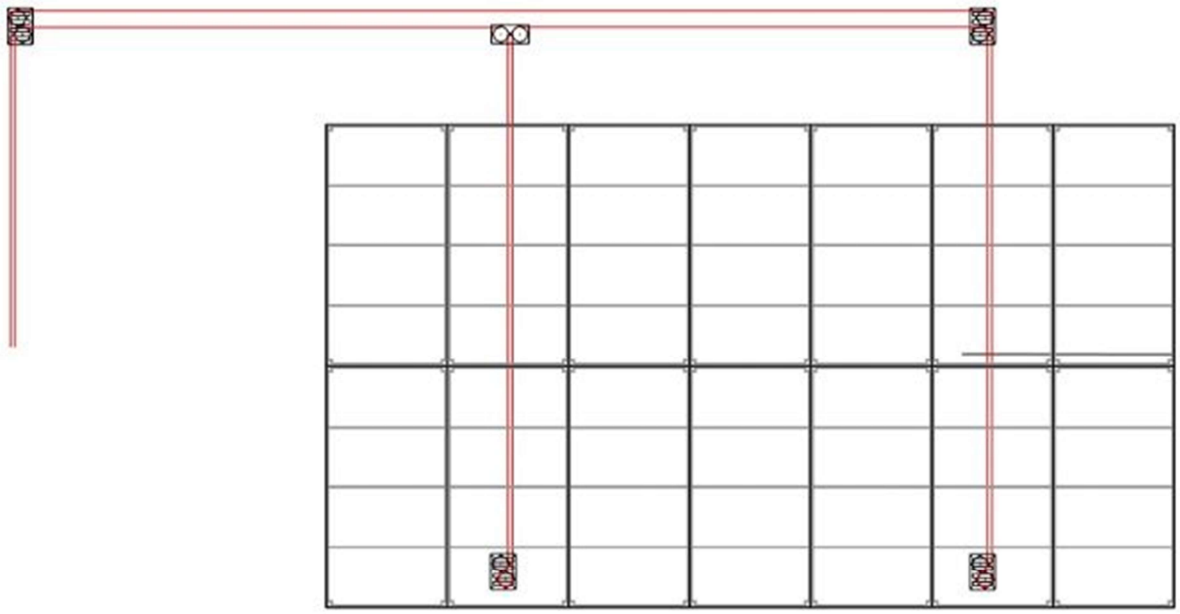

Figure 3.4 - Installed Pulley System (Red lines note cable paths) – Property of Author

Week 3

Platform Assembly

Since the proof of concept assembly determined that the platforms would be raked as planned, with the materials already prepared, we moved forward with assembly on Monday of week three. Mohlman and I began the assembly in the morning and attached four more platforms before lunch. The assembly process was a learning process but came together very quickly. By attaching the stage left legs first, we were able to flip each platform over and maneuver them into place. We carefully lowered the platforms onto the exposed pipe legs from the previously set up platforms. In order to allow the pipe legs to fully seat into the platforms, we would line them up and lift the supported edge which allowed them to fall into place. The downstage platforms were wheeled into place on their single caster and set into place atop their pipe legs. Then we lifted the downstage edge, which lined up the pipe legs and pockets vertically, allowing them to fall into place as well. In the afternoon, Ellis and Harder joined the crew assembling the platforms and quickly picked up on the process. Before the afternoon break, all the platforms were assembled and placed on the track.

After the afternoon break, Harder was assigned to preparing the connection points, or knives, which attached the platforms to the automation hardware. The original design relied on finding appropriate material to create a system that could be easily disconnected by loosening bolts. This required square steel bar that was not available from any local vendor. Instead of waiting for shipping from a non-local supplier, I decided to instead build permanent knives from plate steel that could be directly shackled to. This also had the benefit of removing a potential failure point in the event

that a bolt was to slip. To get this connection point in the correct placement, I designed a simple A-frame to be welded to two pipe leg bases, centering the knife between them. The frame was also required to move the knife downstage by twelve inches to allow enough clearance to get the platform to the back wall. Figure 3.5 shows the assembly as drawn. The parts for the frames and knives were cut on Monday, with most assembly and welding completed on Tuesday, to be installed on Thursday.

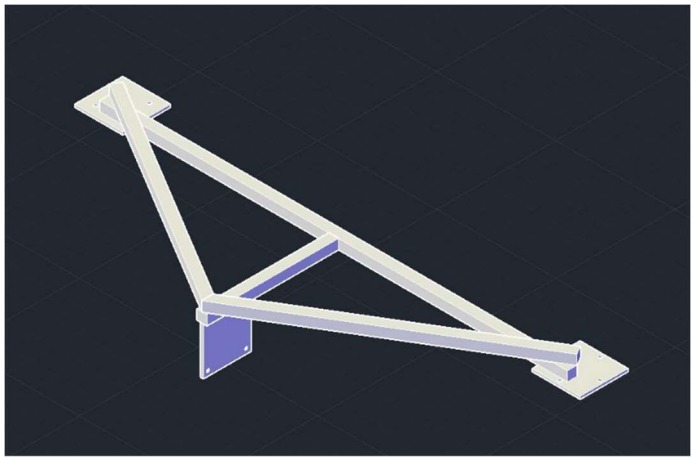

Figure 3.5 - Rendering of Knife A-frame – Property of Author

While Harder worked on the knives and frames, Mohlman and Ellis led a team installing hardboard on the top of the platforms. This had all been previously back painted and base coated but would require some touch up paint after install.

After getting all the platforms assembled, I began verifying the structural integrity of the platform. The upstage eight feet felt as solid as walking on the stage floor, but the downstage portion was relatively bouncy. The casters that I had chosen for the downstage edge were made of a soft rubber rather than a hard rubber or plastic. They were chosen because of their size and load rating, eliminating the need for more than one per platform. Having only one per platform produced an additional symptom, as all the downstage platforms could twist slightly, showing deflection at the joints between platforms. To solve this, I began by having coupler plates installed along the upstage/downstage seams. The plates are made of two pieces of plate steel that bolt together, holding the top and bottom of the Steeldeck frame solidly in place. While this

solution mitigated much of the issue, the deflection was still clearly visible from the audience, and very noticeable when walking across the platform. To further alleviate this deflection, I decided to test the efficacy of the original test couplers on the Production Manager's advice. After fitting one in place and observing a drastic decrease in deflection between the two platforms, I assigned Mohlman to creating five couplers with a slight modification to account for facing. Figure 3.6 shows the drawn couplers. Note how the plate overhangs only one side of the pipes, keeping the other side flush to not interfere with facing.

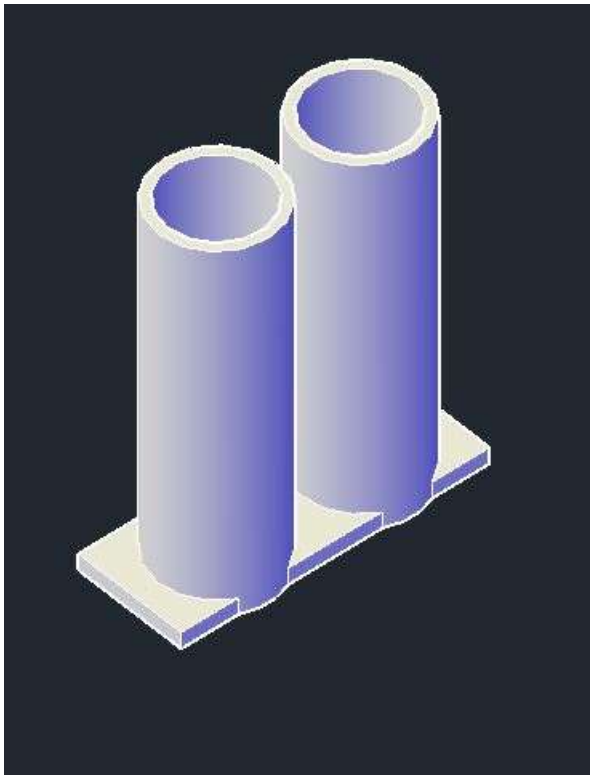

Figure 3.6 - Rendering of Front Edge Coupler – Property of Author

On Thursday, the downstage pulley blocks were installed by setting the platform in place and aligning them to the knives. This process guaranteed that the pulleys would line up and produce a straight and even pull against the frames. After the downstage pulley blocks were set, the platform was moved upstage to verify the locations of the upstage blocks in the same way. These blocks did require some adjustment, but nothing moved more than approximately two inches from its original installed location. After all the blocks were placed, the idler cable that ran between the two connection points was installed, effectively locking the platform onto its track. Since we needed the platform to travel fully to the back wall and wanted to minimize the downstage cables,

both ends of the idler cable were stationary and shackled directly to the knives without any inline mechanism for tensioning, such as a turnbuckle. The addition of an inline tensioning mechanism would have limited travel and therefore was not chosen. In order to not only tension this cable, but also move the cable far enough to allow full movement of the casters, additional mule blocks were installed along the upstage wall. These blocks forced the cable upstage and provided additional tension for the idler cable.

Ellis, Mohlman, and I began placing the automation control racks on Friday, temporarily placing the computer close to the wall to allow the lighting crew to install lights in the wings. The drive cabinets, which control power to the motors, were placed upstage right against the rigging cabinet. As this rack is on wheels, enough slack was left on all cables to allow access to the rigging cabinet by simply moving the rack. Veit prepared wooden blocks to raise the winch base, since it was designed for use at the Randall Theater at Utah Shakespeare Festival, which features tracks hidden beneath the stage floor. These blocks raised the winch base, placing the cables approximately one half of an inch above the stage floor. Mohlman and I began the process of setting up the electrical components of the system but were stopped by an unexpected set back after using the drive cabinet's autotuning feature. After using the feature, the winch would not run, and the drive cabinet showed a "Drive Fault" error. According to the Creative Conner's manual regarding this fault, the unit would have to be returned to them for repair. Since we had a second drive cabinet that could run the chosen winch, I decided to simply switch them and contact Creative Conner's on Friday. However, switching the drive cabinets did not solve the issue. I contacted Creative Conner's on Friday and learned that I had made a simple mistake. I had missed a step at the end of

the autotuning directions that reactivates the drive cabinet. This is a common mistake, and one that I have personally made in the past, but it is luckily very easy to fix by simply completing the final step in the autotuning process.

Friday evening, I received a phone call from the Lighting Designer telling me that the stage right side of the platform was catching and was very hard to move downstage. As it turned out, the downstage caster on that side was directly in line with the downstage pulley block and was running over it. Since the casters used were soft rubber and not likely to cause any harm to the pulley block, I decided to plan to move the caster on Monday.

Week 4

Automation in Rehearsal

On Monday of week four, the winch was attached to the platform. This is important to note as a safety measure. Since the actors would not be able to see the tracks and cables in the dark, I wanted to give them as much rehearsal time with them as possible. To that end, I attended Monday night's rehearsal to move the platform as needed. During this time, I demonstrated the system to the Assistant Stage Manager (ASM) who would be operating the automation and gave her a brief overview of how to run the system. One Tuesday, I spent a half hour with the ASM doing more in-depth training regarding emergency procedures, calling of movements to the stage, and how to stop a cued movement if needed. During Tuesday night's rehearsal, I was afforded some time for a safety briefing with the cast, where I informed them that the upstage area of the stage beyond the cyc was off limits, regardless of the position of the

platform. By limiting access to that area, we greatly reduced the chance of injuries involving the pinch point created when the platform moved upstage. I briefed the cast on the dangers of reaching inside the winch frame, since the cable was kept under tension and powered by a five-horsepower motor. I also had a briefing with the actress playing Dot, as she would be the only member of the cast allowed upstage of the platform. She was shown where the cables were run so that she could step over them and how to safely step over them if the cables began to move. In addition to these safety measures, the Production Manager and I also decided to order an additional camera to allow the automation operator to see the upstage half of the stage from their operating position and react appropriately. It was already planned to provide a monitor to the operator showing the camera feed of the stage that is sent to stage management and the fly rail.

Downstage Edge Deflection

As stated previously, the downstage edge of the platform deflected significantly at the seams. On Tuesday, the couplers were completed and found to be just barely taller than the lower edge of the platform framing. In order to install them, a tool known as a J-bar was used to lift the front edge of the platform slightly higher. Figure 3.7 shows a J-bar as used to lift the platform. To paraphrase Archimedes, give me a long enough lever and I can move the world. Our J-bars are approximately five feet long, with no more than six inches from the wheels to the tip. For every pound pushing down

Figure 3.7 - J-bar – Property of Author

on the end of the five-foot-long arm, ten pounds of force will be applied upward at the tip. As an almost two-hundred-pound man, this means I can lift roughly 2,000 pounds with this J-bar. After lifting the platforms just enough to place the couplers, the J-bars were also used to push the couplers into place, fully seating them. Once seated, the couplers were held in place with set bolts included as part of the platforms. This method of coupling reduced the deflection at the downstage seams to a negligible amount. The facing was then ready to be installed using backer plates previously designed for this purpose.

Projector

It was negotiated among all departments at the meetings on Monday that the stage would be dedicated to paints on Thursday and Friday, to allow for painting and sealing the floor and the platform. We were able to come to a compromise that allowed painting to happen while Mohlman and I mounted the projector on the most upstage electric on Thursday. The platform was moved downstage to be touched up while the projector was mounted and cabled. We had purchased an inexpensive system to extend the range of the video signal, and it was installed. After installing all the necessary components, the projector was lifted, and the platform moved upstage to allow the painters to paint the stage floor. During this time, the lighting crew agreed to mount the second projector above the audience. In most cases, the scenic department would rig the projector and the lighting department would set up the cabling. Instead, the lighting shop supervisor and I agreed that the easier solution in this case would be to have each shop responsible for one projector, working together to get the job done as efficiently as possible.

After hanging and cabling both projectors, we set up the computer and attempted to connect the projectors. The projector above the audience worked immediately, as it had the simplest connection to the computer through a fifty-foot-long video cable. Unfortunately, the extender system that we purchased for the over stage projector did not work over the distance that we needed, and additional research and ordering was necessary. The first system was purchased from Amazon for less than forty dollars and was advertised to extend VGA to one hundred meters, which is over three hundred feet. The length of cable was calculated to be just over two hundred feet. In the interest of time, we immediately returned the system and ordered a more robust system for eighty dollars that included a built-in signal amplifier. This would allow us to reach even longer lengths in the future if needed. This system advertised lengths in excess of nine hundred feet. This system arrived at the beginning of week five and worked immediately with very little adjustment needed.

Chromolume

As stated in Chapter Two, Veit was assigned to plan, draft, and supervise the build of the chromolume. His original plan involved framing the top diamond out of one-inch square box steel. As a simplified way to plan the proper angles to make the joints meet precisely, he built the diamond out of wood, which is far easier to cut than steel. When the designer saw the completed diamond, he was happy with the results and asked why it needed to be steel. That simple question made us both think about the construction of the chromolume and realize that it did not in fact need to be steel. The benefits of wood construction far outweighed any benefit from steel. Not only would the

entire unit be significantly lighter, but wood construction is far faster and easier than steel. On top of that, we now had the top section of the diamond completed.

With that unexpected jump forward in the process, Veit began building the cube that would be installed within the top diamond. He built three sided mock-ups of the cube in different sizes, allowing the designer to choose which size he preferred. The final decision was to build a one-foot by one-foot cube with sixteenth-inch cable fed through it to hold it on point. In order to create the beam of light effect, sheets of mirrors were ordered. These were one-foot by one-foot sheets divided into one-centimeter by one-centimeter squares of mirror. Since they came in a pack of five, I ordered two packs, leaving us with excess.

With these two difficult tasks completed, Veit assigned workers to pull a three-foot plywood circle from stock and install casters on it. To keep the chromolume from becoming top heavy and tipping over, he added two stage weights to the underside of the plywood, effectively creating a sturdy platform on which to build the chromolume. After covering the top and sides with hardboard, he installed a pipe flange at the center of the circle for inch and a half schedule 40 pipe, used as the primary support of the unit. On the top of this pipe, Veit welded a bolt onto a plate to close the pipe. The bolt became the mounting point for the top diamond and the motor for the cube.

The next step was to prepare the side facing of the unit. While originally planned to be hardboard, we decided to use lauan which was in stock resulting in reduced cost. These sides were cut on the CNC due to their irregular shapes and designed holes for light to escape. Veit had the idea to use a forty-five-degree chamfer bit to cut the outer profiles so that the parts would fit together nearly perfectly. A chamfer bit is a V shaped

bit usually used for engraving. This method worked well, producing incredibly clean corner seams. This also allowed Veit to practice with VCarve Pro, the software used with SIU's CNC.

The panels were then painted and returned to scenery, where a stagecraft student was assigned to re-drill the holes that had been clogged with paint and also to drill additional holes with a smaller diameter bit. Veit then began angling the internal framing using his newest tool, a digital protractor. This framing was cut out of three-quarter inch thick lumber glued and stapled into place. The rear panel was hinged on the bottom and reinforced to support and allow access to lighting equipment. During this time, Veit also tested the operation of a fog machine at the extreme angle required within the unit. While the fogger did leak a small amount, it would work as long as the fluid was more than three quarters full. The fogger was installed with plumbers' strap and wood blocks holding it in place. The fog was directed out the bottom of the platform by a small computer fan fed with dryer duct.

The Director, Production Manager, and Lighting Supervisor had requested a demonstration of the chromolume by the end of this week. As the chromolume had been turned over to lighting on Thursday, as scheduled, they had not had a chance to write cues for the sequence as requested. In addition, the mirrors for the cube had not yet arrived, and the motor had not been installed. This demonstration may have been requested earlier in the production process, and I failed to modify my build schedule accordingly. Had I pushed the chromolume to be built earlier in the process, this deadline could have been met. Building the unit as scheduled allowed lighting only two

days to install the lights and cue it for demonstration, which is not a reasonable request. This was a failure on my part that was corrected in week five.

Dress Rig

During this week, I assigned Ellis to create a hangar out of a piece of scrap two by twelve lumber. This hangar would be drilled through on either side of the neck and rigged with steel cable to allow Dot to step out of her dress. The process went very smoothly, with construction completed over the course of one work day, and the rigging process finished within an hour. To keep the cables as unnoticed as possible, I began with an eight-foot distance between the points on the batten. This distance was expected to be enough to stabilize the hangar as Dot placed and removed her dress. The height was also estimated based on the height of the actress.

Week 5

Automation

Week five began with automation in place for all rehearsals. After discussing the best location for the operator with stage management, we decided to place the operator downstage right just inside the door to the theater. The computer rack was oriented to place the screen facing directly offstage to keep the operator out of the way of entrances and exits onto the stage. Next to the computer rack, we placed a small table to hold two video monitors and the consolette for automation. The operator and stage management were very happy with the placement, as it allowed the operator to see on stage and interact as necessary with actors offstage.

The two video monitors installed on the table were connected to cameras showing vital areas of the stage. The first camera was installed in a front of house position for past performances to allow stage management and fly rail operators to view the stage even in total blackout. This camera included an infrared mode that automatically activated when light levels became too dim. An additional camera arrived on Monday and was installed to allow the automation operator to monitor the upstage area during moves. We purchased a security camera that outputs video as analog high definition, or AHD. This signal is transmitted over coaxial cable and must be decoded to display on most screens. We also purchased a decoder to display the camera in a variety of formats such as VGA, DVI, and HDMI. To easily differentiate between the video monitors for any troubleshooting purposes, the upstage camera was decoded to HDMI while the stage camera was decoded to VGA and split between the fly rail and the automation operator. After setting up and focusing the cameras, no maintenance was needed during the run of the show.

In addition to these challenges, it was found that the platform in its most upstage position was still very close to the cyc. As the cyc was brought in, it would sometimes land on top of the platform before slipping off the front edge. Mohlman and I rigged stabilization cables from the grid to the floor on either side of the batten that held the cyc. These points were placed approximately four inches downstage of the lifting pulleys on the grid and were just enough to keep the cyc from hitting the platform.

Projections

The new signal extender arrived and was installed during this week, requiring very little adjustment. While testing the projectors, the designers found that the rear

projection was too dim when lights were turned on. SIU owned two large format projectors at this time, both from Epson. One was a model L1300U that outputs 8,000 lumens, and for which SIU had purchased a short throw lens. Short throw lenses allow for a projector to be placed close to the surface they are projecting on and are ideal for over stage projection. The other projector was a model L1505UH that outputs 12,000 lumens and is not compatible with the short throw lens for the model L1300U. Initially the L1300U projector was placed over the stage because of its short throw lens. On the Friday before cue to cue, the decision was made to swap the projectors and install the short throw lens into the L1505UH projector under the premise that it would output 12,000 lumens and therefore be much brighter. As the video extender had only recently arrived and been installed, the lighting designer and projectionist had been attempting to find a balance while retaining rear projection. The light was bouncing off the platform and onto the projection surface, making the images nearly invisible. While switching the projectors did improve the brightness of the images to an extent, it also had the effect of distorting the images, as the lens could not be adjusted properly. This issue would be revisited during tech week when the Production Manager took charge to make decisions regarding projections.

Chromolume

After missing the initial deadline to demonstrate the chromolume, work resumed in earnest to prepare the unit for a test later in the week. The mirror sheets arrived on Monday and Veit applied them to the cube. I then designed and printed a motor mount, seen in Figures 3.8 and 3.9, that would thread directly onto the center bolt holding the top diamond to the base. I chose to use a NEMA 17 stepper motor because I was familiar with the computer coding to make it work and it was the simplest way for me to control the speed. The motor was also readily available, as I had a box of five of them at home. After attaching the motor, the cube was installed, hanging by sixteenth inch aircraft cable pushed through a small bearing at the top of the diamond and terminated with a stop. The cube was attached to the motor with zip ties as a safety breakaway in case the motor or cube began spinning out of control. The cable did not move smoothly, but because of the cable's flexibility, the cube had a smooth acceleration and spin. I began with a speed of ten revolutions per minute (RPM) and increased the speed in increments of 5 RPM. At twenty-five RPM, the cube would accelerate quickly and then decelerate, nearly stopping. I continued adjusting the speed

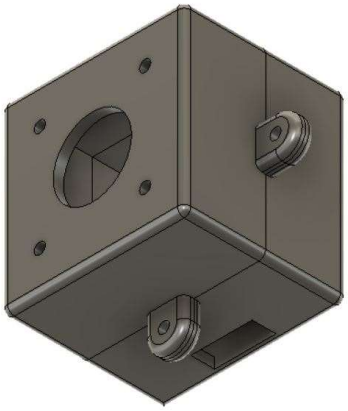

Figure 3.8 - Stepper Motor Mount Rendering 1 – Property of Author

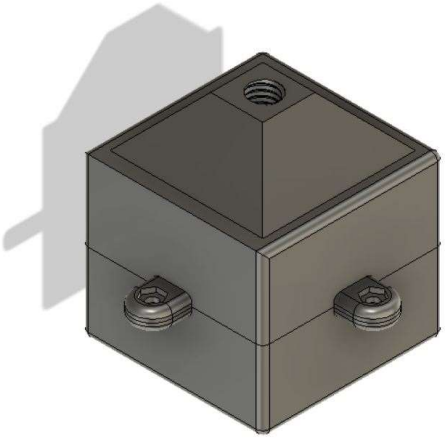

Figure 3.9 - Stepper Motor Mount Rendering 2 – Property of Author

before finding that twenty-two RPM would spin the cube quickly without erratic starts and stops.

Another setback occurred on Tuesday afternoon when one of the LED strips installed by lighting short circuited, nearly starting an electrical fire. Initially, some technicians believed that the motor had somehow caused the issue, so we disconnected it from the system during troubleshooting. After finding the short circuit and replacing the LED tape, the motor was reconnected to the system.

The chromolume was tested on Thursday afternoon with preliminary light cues written by the designer. While the demonstration proved that all the components worked, the scene would undergo some adjustments to arrive at the final product.

Technical Rehearsals

Minor Notes

During the first day of cue to cue, Spot, the dog cutout, fell over due to the rake and not enough weight on the upstage side to hold it upright. To solve this, a half inch solid square bar was welded at the edge of the angle iron used to prop him up, successfully holding it upright. In addition to this issue, the hangar for Dot's dress was found to twist excessively during her scene. This was mitigated by spreading the rigging points from the original eight feet to sixteen feet. This made the hangar more manageable and required the height to be revisited. Instead of estimating the proper height of the hangar, I was assisted by the costume shop in hanging the actual dress in place and setting the height. Veit noted that the front row could see silhouettes of the

casters under the platform when the projection screen was in use and volunteered to attach black fabric to the back side of the platform to mask them.

Cyclorama Incident

During the first day of technical rehearsal, there was an incident involving the automated platform and the cyc. Due to how the cues were stacked in the stage manager's book and called, a fly cue and automation cue were called simultaneously, resulting in the platform catching the cyc and pulling it downstage approximately three feet before the emergency stop was hit. Had the cue continued, the cyc could have been severely damaged or even destroyed. After an inspection by the Production Manager and me, the platform was moved back upstage and the cyc released. I took this opportunity to reiterate to the automation operator that the video monitors were there specifically so that incidents like this could be foreseen and prevented. It was decided that instead of calling that automation cue, the operator would watch the video monitor and only move the platform once the cyc had been raised beyond the top of the platform. This was the only incident involving these scenery elements colliding.

Projections

The projections during the first day of technical rehearsal were still very faint images, so it was decided to attempt other solutions to make the projections brighter. During the lunch break for the cast and crew, the technical design team quickly moved the stage projector closer to the cyc by approximately four feet. While this made an improvement, the images were still often washed out by lights reflecting off the stage. The Production Manager stepped in to override the projection design faculty, making

the decision to move the projector downstage of the cyc to front project the images. During the dinner break for the cast and crew, the team moved the projector. This made a marked difference in the image brightness, while still distorting the images due to the improper lens. The Production Manager and I observed that the brightness delivered by the projector was significantly less than expected, as the weaker projector was still brighter at this point. On Monday, the Production Manager made an executive decision and ordered a rental short throw lens for the projector that would be the correct lens and be able to be adjusted properly. Due to budget constraints and shipping, the new lens would arrive on Wednesday morning before final dress and be installed and working for the projection designer and faculty supervisor to adjust images in the afternoon. The lens turned out to be significantly different from the lens for the L1300U projector. It was much larger and required a frame to support it in place. After installing the lens and masking the cables and batten, the projector was readjusted and turned over to the designer and faculty supervisor.

Chromolume

The chromolume was lackluster at the beginning of technical rehearsals. After some light cue polishing by the designer, it began to take shape. Two relays were installed to be controlled by the lighting designer, one which activated the fog machine, and the other to activate the rotation of the mirror cube. As the sound and light cues came together, the scene only improved. As production in the shop slowed, Veit was able to take time to apply additional squares of mirror from the extra sheets to the mirror cube. He applied them with hot glue and angled them all differently to scatter the beams of light. On Wednesday, final dress, the final element was added to the scene that put it

over the top. While the projection designer, Kai Youngsteadt, was working, he had the idea of adding some more visual effects to the scene. The cues were written but not seen by most of the production team until the rehearsal. When the projections started and the beams of light danced from the unit, my jaw literally dropped open. Youngsteadt had pushed the scene to exactly where it needed to be.

Conclusion

Strike for this production occurred on Sunday, February 24th. In order to keep everything moving, I assigned one crew to removing lauan facing and hardboard decking from the platform while another crew began disassembling the platforms. A third team was assigned to removing and striking all automation gear. They started by disconnecting the cables from the platforms, allowing it to be moved manually. As the platforms were disassembled, we found that if they were not lifted evenly, the joints would pinch and be much more difficult to lift. In order to lift the inside edges, a worker would lay underneath the platform and push it up enough that another worker could grip it. Once this issue was realized and solved, the entire system was disassembled very quickly. The intermission screen and flown hangar were left up to allow the lighting crew to strike downstage while scenery worked mostly upstage. These units were taken down Monday morning in about one hour. The chromolume was also left intact, as it would take more skilled hands to recover the lighting equipment without risking damage. This unit was disassembled in two hours on Monday morning. Strike was completed in two hours with only selected units requiring additional attention.

CHAPTER 4

POST-PRODUCTION ANALYSIS

Conclusion

Goals

As stated in Chapter One, with this production I set specific goals to meet, not the least of which was a completely paperless shop. To accomplish this, I set up a Google Drive account for the scenic shop and connected it to the shop tablets. By using Google Drive, I was able to create a folder for the show using my own Google account and share it with the shop account. Using this method, the folder was removed from the tablets to save space while retaining access to the folder if needed in the future. Other cloud-based services, such as OneDrive or Dropbox, could likely be used with equal or possibly more success. During the build process for this show, the only document that was printed was the build schedule in order to post it in the scene shop. In the future, a system could be developed to display the schedule in a central location and keep it up to date.

Another important goal for this production was to have drawings and paperwork ready before the start of the Spring semester. I spent Winter Break in Minnesota with my family, spending as much time as I could preparing drawings for this show. While some drawings were not complete, I made sure that I had drawings for the first few weeks prepared and loaded onto the shop tablets via Google Drive. On the first day of the semester, I spent the morning setting up Google Drive software on the tablets, which synchronized the files that I had already shared with the shop account. The most

notable drawings that were incomplete were the museum bench and chromolume, which Veit had drafted, but not yet exported to PDF format. As this was Veit's first full production using AutoCAD, he wanted my assistance with the finer technical points of creating usable shop drawings. Since both units were scheduled to be built later in the build process, we made time to meet and work together to generate shop drawings at the start of the semester. In addition to these units, the intermission painting had not been drafted. As this was a simple Broadway style flat, I had decided that it was less critical to have completed before the start of the build.

The budget for this show was $3500 for scenery, props, and paints. Appendix B contains the final budget estimate and budget tracking worksheets. For tracking purposes, paints and props managed their own budgets. There was only one unexpected cost during the build process, and that was the second video extender. During tech week, however, the production manager made the executive decision to rent the proper short throw lens, as stated in Chapter Three. This cost put the show over budget but drastically improved the quality and brightness of the projected images.

There were five weeks budgeted to build the show with approximately a week and a half of empty space at the tail end. This was to allow time for fine tuning, shop improvement projects, and preparatory projects for upcoming conferences. Even with this additional time, some aspects of the show could have been accomplished in a timelier manner. The chromolume was not ready to be presented to the director and design team at the time that it was scheduled. The lights had been installed but had not been cued or previously tested, and the spinning mirror cube was not ready to be installed. If I were to do this again, I would adjust my build schedule to complete the

chromolume earlier, giving the lighting department more time to work with it. The unit was then demonstrated three days later and improved over the course of tech. Despite these shortcomings, rehearsing with automation long before tech rehearsal allowed the cast to get used to the trip hazards created by the tracks and cables. Having spent so much time working around them, the cast were able to avoid any reported injuries or incidents regarding the trip hazards.

Another important goal for me was to utilize the Assistant Technical Director, Jerome Veit, more as a manager and less as a carpenter. To this end, Veit oversaw the shop every Thursday. He was responsible for the safe and efficient operation of the scene shop. In addition to this, Veit was assigned to draft and supervise the builds of both the chromolume and the museum bench. These projects included preparing drawings for both carpenters in the shop and preparing files to be executed on the CNC. With limited supervision, Veit accomplished these duties in an exceptional manner.

As SIU is clearly an educational institution, I wanted to also provide advanced opportunities to our undergraduate students, especially those about to graduate. The most readily available opportunity that I had to offer was working with the CNC. This includes designing parts that benefit from the process, tool selection, feed rate calculation, and file preparation. Because this was a new technology to the department intended for research, documentation was limited to what was received from the manufacturer. To face this challenge, the Production Manager and all the graduate technical directors researched what the machine was capable of, compiled information for existing tooling, and familiarized themselves with the software used to operate the CNC in order to pass this information on to the undergraduate students. Two senior

undergraduate students were chosen to operate the CNC, Jerome Veit and Rowen Harder. These students had excelled in advanced classes such as metalworking, technical direction, and structural design for the stage. Both Harder and Veit had numerous semesters of experience in the shop as well as professional summer credits, making them more qualified for CNC training. Veit prepared all CNC parts of both the museum bench and chromolume from start to finish, and both Veit and Harder operated the CNC. In the future, I look forward to seeing how what we have done with this show evolves into a more comprehensive training system for undergraduate students.

The director and designer had a vision of a clean and polished design as their most important criteria. This vision was a large contributor to the decision to cut the raking effect. This allowed me to focus much more on accomplishing smooth movement and giving the scenery a clean and polished look. Several solutions were implemented to make the movement of the platform smoother and better controlled. The creation of shop-built pulley blocks was not only cheaper than purchasing similar blocks, but also allowed the platform to have two points of contact to the winch. This prevented any twist in the tracking of the platform, allowing the attachments to be far enough upstage to minimize trip hazards downstage of the platform. The chromolume was able to be fabric covered, which diffused the lights inside and made the sides smooth and polished. The intermission painting represents a failure on my part to meet the director's vision. Due to the fabric being initially attached too tightly, the frame of the painting began to warp badly and was unable to be straightened before opening. I assigned Harder to attempt to straighten the frame with a steel cable and turnbuckle, which is commonly used for outdoor screen doors. This method did not work, as the frame would pop from warped

in one direction to the other. The best solution for this would have been rebuilding the frame and attaching the fabric with more slack. This would have increased cost and taken time for replacement fabric to arrive. I decided to leave it warped, since the warp was only visible from the very extreme sides of the audience.

Evaluation

To evaluate my performance as Technical Director for this production, I created a Google Form with a series of criteria for review. I sent this form to all students who worked in the shop during this production, both graduate and undergraduate, as well as the scene shop faculty. The first seven questions asked the respondent to give a rating between one and ten, ten being the highest, and allowed for comments. The last four questions requested a short answer. The results of this survey are included in Appendix D. Four individuals completed this survey, and the following section details the responses given.

The first question was “How well was work planned for each day?”. The ratings given for this question were two tens, an eight, and a nine, for an average of 9.25. One respondent noted that a printed calendar earlier in the process would help all departments know what to expect with a short glance. This would also allow the graduate assistants to understand what should be focused on at any time. I had refrained from printing the build schedule to present a paperless shop, though it is clear that the build schedule is currently an exception to this goal. A system may be established later to allow this to be an option, but as of this writing, it is a necessary document to print. Another respondent mentioned that everything went smoothly with the exception of stage management calling people during shop hours.

The second question on the questionnaire was “How prepared was the technical director to complete the set on time?”. The ratings given for this question were three tens and one nine. This gives an average of 9.75. One respondent commented that all of the drawings could have been available at the beginning of the build. I cannot deny that this would have been preferable. In the future, I will be sure to add additional time for contingencies.

The third question was “How clear were instructions given by the technical director?”. This criterion was rated with two nines, an eight, and a ten for an average of nine. There were no additional comments. Questions four was “How safe did you feel in the shop?”. The most notable response to this question noted that workers were not always reminded to wear safety glasses during the build process. As the technical director, I should have been better about reminding workers of this. Question five was “How safe did you feel working around the automated scenery?”. One respondent commented about the camera watching the upstage side of the platform being a good idea and that it would have been better if it had been planned and installed earlier. In the future, I intend to perform a risk analysis during the bid process to determine what additional safety measures need to be taken.

I then asked respondents to evaluate the strike for this show. One respondent mentioned that the strike seemed unorganized and involved workers seeming confused and standing around. Another respondent stated that the strike went quickly and safely with minimal standing around. The strike was completed in approximately two hours, compared to the three hours scheduled. At SIU, strike involves all cast and crew, along with students from the stagecraft classes. This can lead to an overwhelming number of

workers without the experience required to quickly and efficiently disassemble a set. To counteract this, I tried to assign cast members to simpler jobs whenever possible. Having worked with many of these cast and crew members both at McLeod Summer Playhouse and SIU, I had a decent understanding of their capabilities. I was able to assign these cast and crew members to shop workers who also understand their capabilities and could assign them tasks as needed. There were two units left flying on battens when strike ended. These were both downstage and left in place to allow the lighting crew to strike downstage electrics and took less than an hour to be struck by the graduate students on Monday. The chromolume was left assembled awaiting a discussion to possibly display the piece for an upcoming recruiting event. It took just two hours to strike when it was decided not to keep it.

When asked to rate my overall performance between one and ten, two respondents replied with ten, while the other two responded with eight. One commented that while I had done a good job, I still have room to grow. I agree wholeheartedly with this. As a technical director, I feel like I should always be learning and honing my craft to become the best technical director that I can be.

The next three questions are incredibly useful for self-reflection and evaluation. I learned to ask them of myself during my time at SIU. The first was “What worked well for the technical director?”. Two respondents spoke about knowledge and coordination between departments. I made a strong effort to communicate with the other design areas especially regarding scheduling. While negotiations were needed at times, I feel like we were always able to find a compromise that made everyone happy. Another respondent praised the organization of the shop as far as dividing work, giving clear

directions, and completing the set on time. This same respondent also noted a good attitude, which I have struggled with in the past, making this an accomplishment for me on a personal level. The final respondent praised the chromolume and automation, despite some minor issues during the run of the show.

The second of these important questions is quite the opposite of the first: “What did not work well?”. This question also ties in closely with the third, which is “How could the technical director improve?”. The first respondent noted that shop cleanup was rarely performed at the end of the day, and to improve this I should have made sure carpenters perform their cleanup duties at the end of each day. This is an issue that I have struggled with for a very long time. In an environment where projects are expected to be completed quickly, I often find myself preferring to keep tools and materials out to continue the project with as little set up as possible. While I do believe that I have improved on this front, I also recognize that I am not at the level that I would like to be. The second respondent commented that some drawings were not fully explanatory and recommended isometric views for nonstandard items. As I have significantly improved in 3D drafting on multiple software platforms, this is a simple addition that I will be able to implement into future projects. The third respondent spoke to the fact that the facing on the deck was dimpled. This was noted during tech rehearsals and discussed with the scenic designer. Priorities during tech week were focused on lighting and projections, which prevented this issue from being addressed. More discussion should have happened regarding projections and an all-white platform in meetings, which is also stated by the final respondent. This is something that I could have spoken up about in design meetings.

Conclusion

Before I enrolled in this program, I was a technical director for a regional theater in Louisiana. I could generate construction drawings, build a set, and manage a shop. I had never worked directly with automation, microprocessors, or CNC machines. In my first semester at SIU, I programmed custom wireless automation with a microprocessor. My mentor, Thomas Fagerholm, suggested that all the graduate technical directors attend a workshop after hours to learn how to work with Arduino microprocessors and utilize them in the theater. Every step of every semester he has pushed us to learn something new, to get better at something, or just to get out of our comfort zone. In drafting class, he challenged me to practice with AutoCAD instead of Vectorworks, which I strongly preferred. This show was drafted almost exclusively in AutoCAD.

This project was my second time having an undergraduate student as assistant technical director. The first was *The Lion, the Witch, and the Wardrobe*. I did not take advantage of my ATD's skills and the project suffered. This time around, I wanted to make sure that Veit felt involved in the process and necessary to the production. I stepped back and allowed him the opportunity to be a supervisor, preparing him to be a technical director in the fall.

Moving forward as a graduate, I feel prepared to share the knowledge I have gained here, and to mentor students of my own. I have learned the importance of leading by example, continuing education, and dedication to the art. I can only hope to become as strong of an educator as my own mentor.

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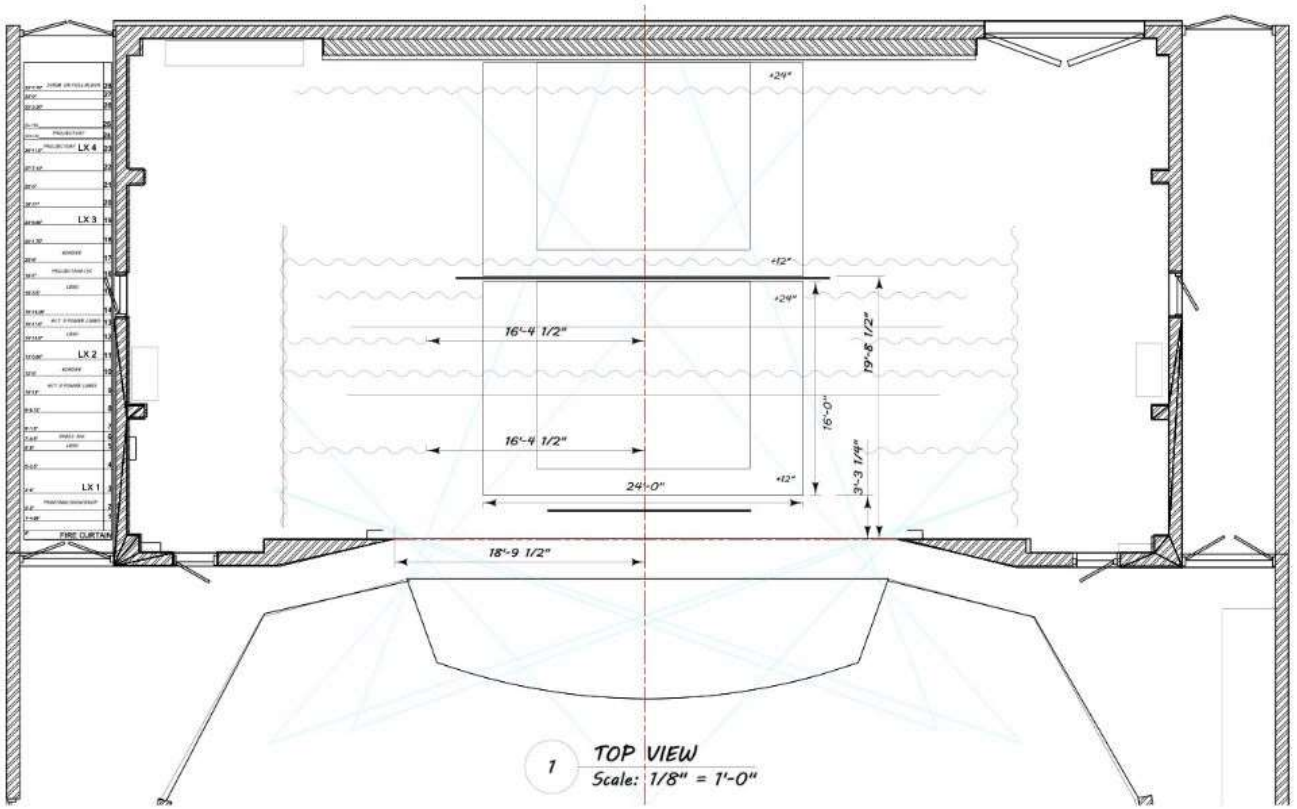
APPENDIX A

DRAWINGS

(Not to scale)



1 TOP VIEW
Scale: 1/8" = 1'-0"

1

OF 4

SIU DEPARTMENT OF THEATER

SUNDAY IN THE PARK WITH GEORGE

GROUNDPLAN

DIRECTOR: TIM FINK

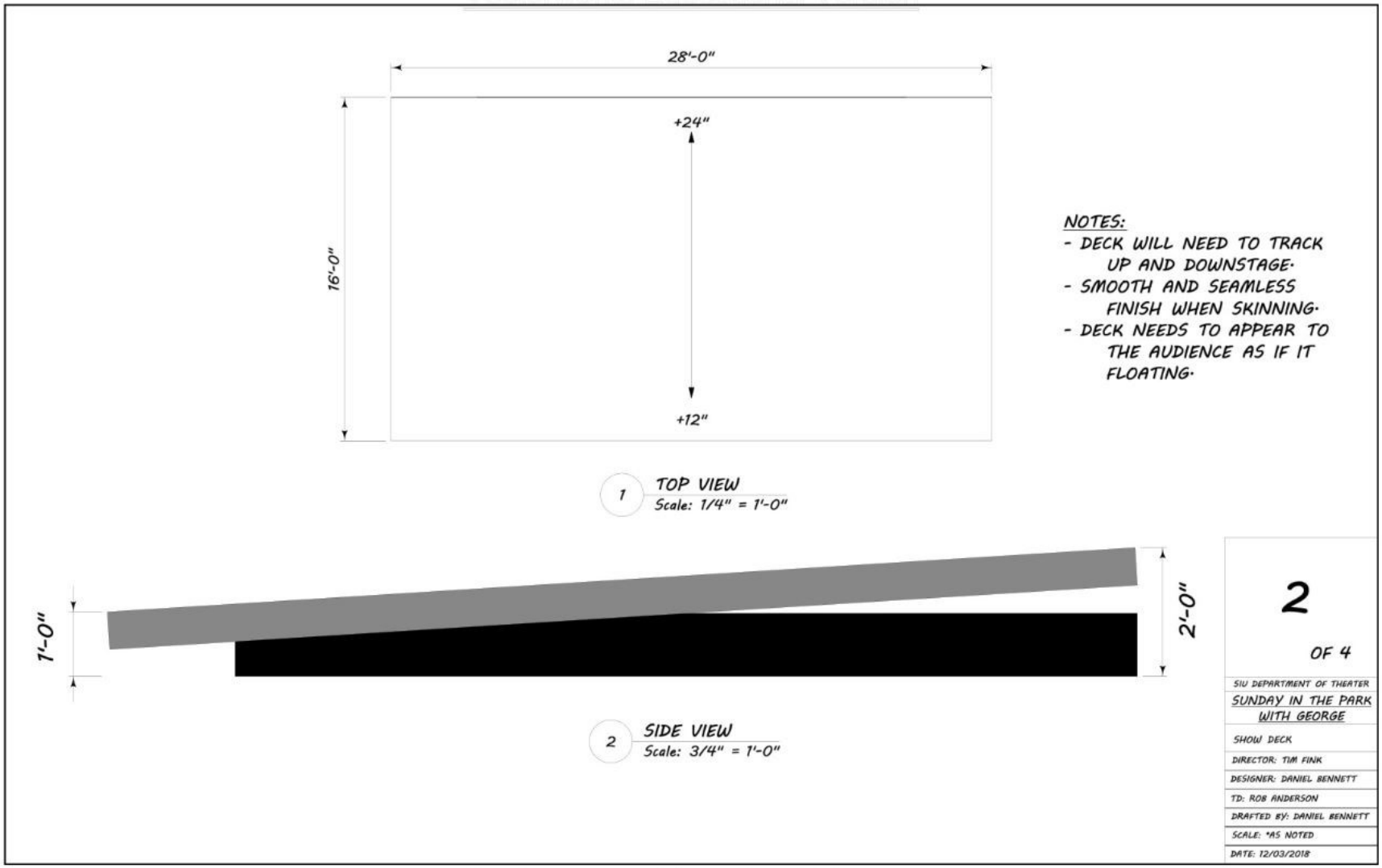
DESIGNER: DANIEL BENNETT

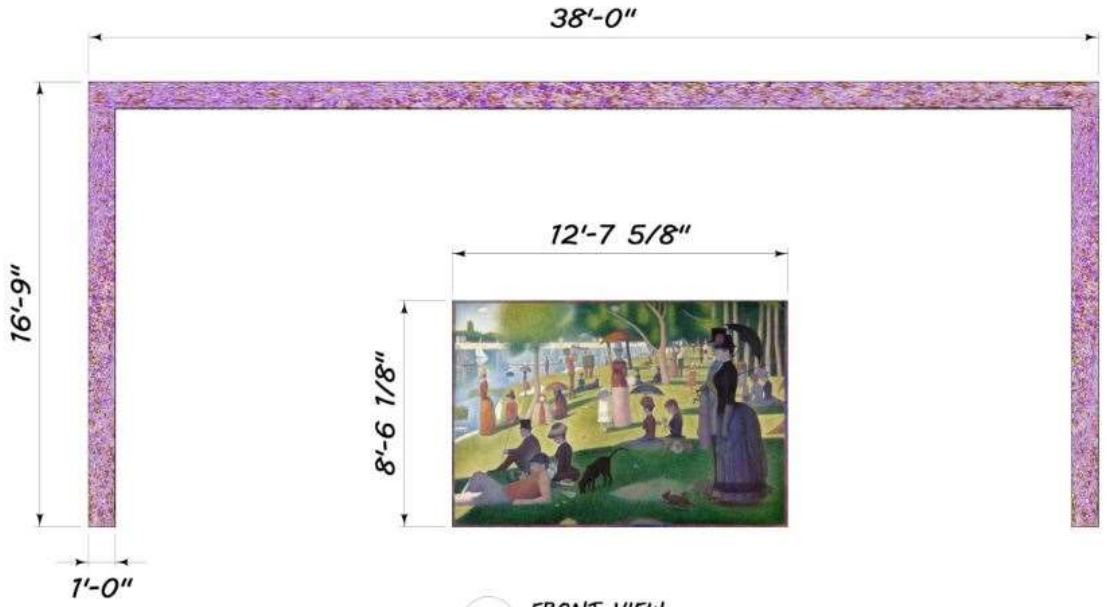
TD: ROB ANDERSON

DRAFTED BY: DANIEL BENNETT

SCALE: *AS NOTED

DATE: 12/03/2018


28'-0"
+24"
16'-0"
+12"
NOTES:
- DECK WILL NEED TO TRACK UP AND DOWNSTAGE.
- SMOOTH AND SEAMLESS FINISH WHEN SKINNING.
- DECK NEEDS TO APPEAR TO THE AUDIENCE AS IF IT FLOATING.
1 TOP VIEW
Scale: 1/4" = 1'-0"
1'-0"
2'-0"
2 SIDE VIEW
Scale: 3/4" = 1'-0"
2
OF 4
SIU DEPARTMENT OF THEATER
SUNDAY IN THE PARK WITH GEORGE
SHOW DECK
DIRECTOR: TIM FINK
DESIGNER: DANIEL BENNETT
TD: ROB ANDERSON
DRAFTED BY: DANIEL BENNETT
SCALE: *AS NOTED
DATE: 12/03/2018



1 FRONT VIEW
Scale: 1/4" = 1'-0"

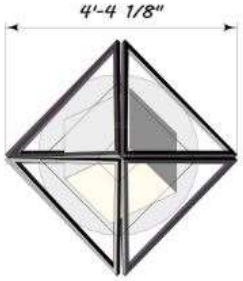
NOTES:
- FALSE PRO FLIES ON LS1.
- FALSE PRO DEPTH 1'-0"
- SHOW DROP FLIES ON LS2.
- PAINTING WILL BE FRONT PROJECTED ON DROP (MULSIN OR CANVAS).
- SHOW DROP IS SCALED TO 1.25x THE ORIGINAL PAINTING SIZE.

3

OF 4

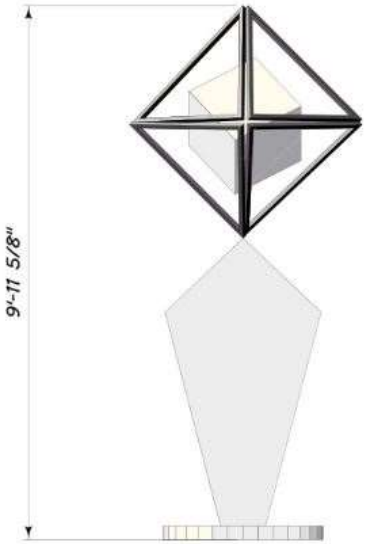
SIU DEPARTMENT OF THEATER
SUNDAY IN THE PARK WITH GEORGE
FALSE PRO & SHOW DROP
DIRECTOR: TIM FINK
DESIGNER: DANIEL BENNETT
TD: ROB ANDERSON
DRAFTED BY: DANIEL BENNETT
SCALE: *AS NOTED
DATE: 12/03/2018

CHROMALUME



1 TOP VIEW
Scale: 1/2" = 1'-0"

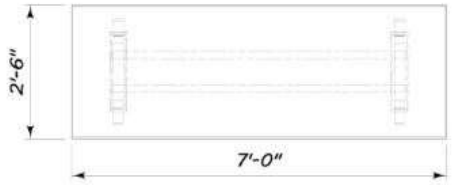
NOTES:
- TOP DIAMOND COMPRISED OF 3' ISOSOLIZE TRIANGLES.
- INNER SQUARE COVERED IN MUSLIN OR MATERIAL ALLOWING ILLUMINATION.
- LOWER DIAMOND FACING DESIGN TBD. WILL HAVE CUTOUT AND HOLES FOR LIGHT TO SHINE THROUGH.
- TOP DIAMOND AND INNER SQUARE ROTATE IN OPPOSITE DIRECTIONS.



2 FRONT VIEW
Scale: 1/2" = 1'-0"

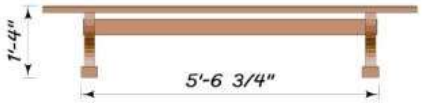
3 CUSTOM VIEW
Scale: 1/2" = 1'-0"

MUSEUM BENCH



4 TOP VIEW
Scale: 1/2" = 1'-0"

5 FRONT VIEW
Scale: 1/2" = 1'-0"



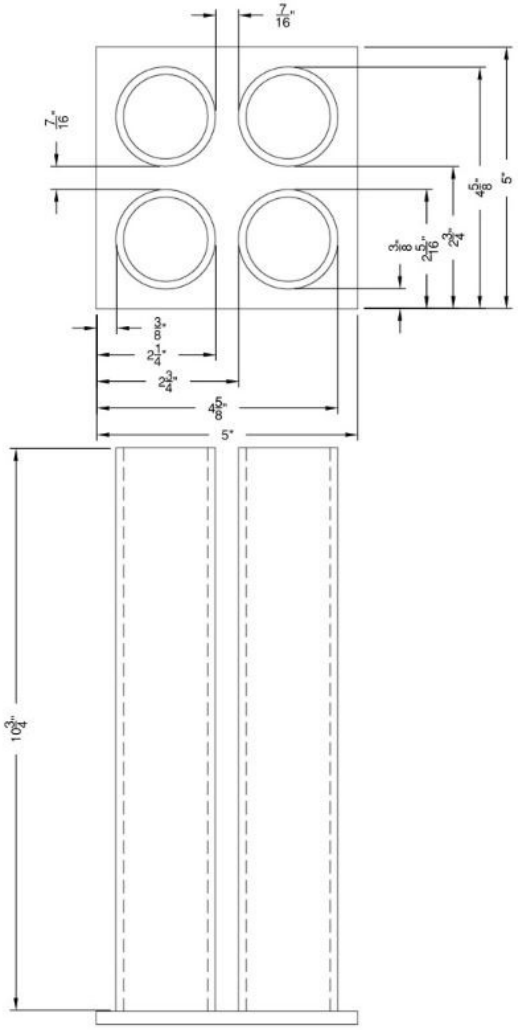
6 SIDE VIEW
Scale: 1/2" = 1'-0"

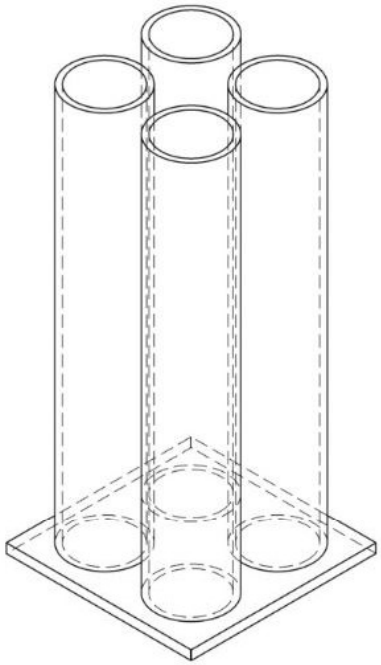
7 CUSTOM VIEW
Scale: 1/2" = 1'-0"

4

OF 4

SIU DEPARTMENT OF THEATER
SUNDAY IN THE PARK WITH GEORGE
FALSE PRO & SHOW DROP
DIRECTOR: TIM FINK
DESIGNER: DANIEL BENNETT
TD: ROB ANDERSON
DRAFTED BY: DANIEL BENNETT
SCALE: *AS NOTED
DATE: 12/03/2018





1 / 0101 Multi-View Center Coupler 6"=1"

NOTES:

Schedule 40 Pipe Welded to $\frac{1}{4}$" Plate

Build 5

Consider a jig of pipe pockets

Drill and Tap to match Casters ($\frac{3}{8}$"-16)

Southern Illinois University Carbondale
McLeod Theater
1100 Lincoln Drive
Carbondale, IL 62901

Sunday in the Park with George

Couplers

Center Couplers

DRAWN	Tim Fink
DESIGNED	Daniel Bennett
PROJECT MANAGER	Robert Anderson
CHK	RJA
DATE	1/14/2019

BUILD TIME

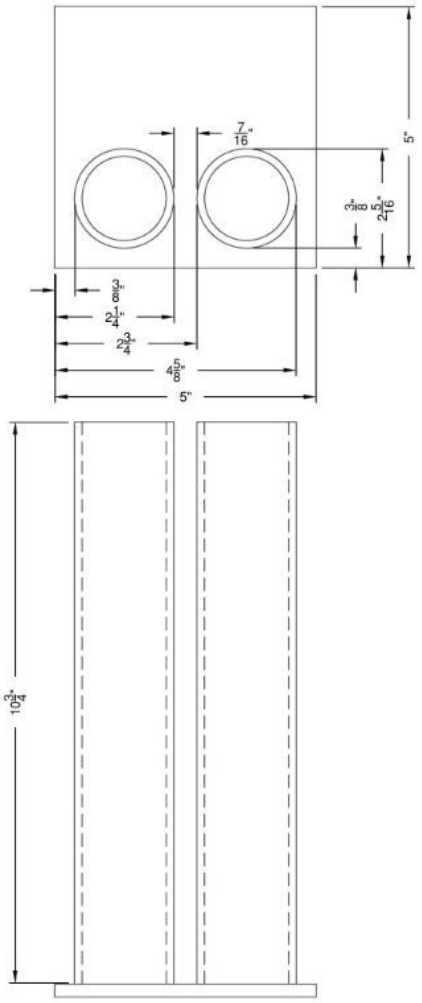
DAY	TIME

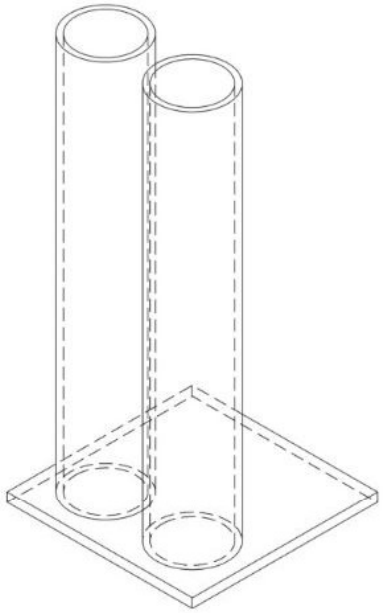
MATERIALS USED

MATERIAL	QUANTITY

6" = 1'

0101





1 / 0102 Multi-View — Offstage Coupler — 6"=1"

NOTES:

Schedule 40 Pipe Welded to $\frac{1}{4}$" Plate

Build 2

Consider a jig of pipe pockets

Drill and Tap to match Casters ($\frac{3}{8}$"-16)

Southern Illinois University
Carbondale
McLeod Theater
1100 Lincoln Drive
Carbondale, IL 62901

Sunday in the Park with George

Couplers

Offstage Couplers

DIRECTOR	Tim Fink
DESIGNER	Daniel Bennett
TECH DIRECTOR	Robert Anderson
DRAWN	RJA
CHECKED	
DATE	1/14/2019
REV	
SHEET	SHT 1

BUILD TIME

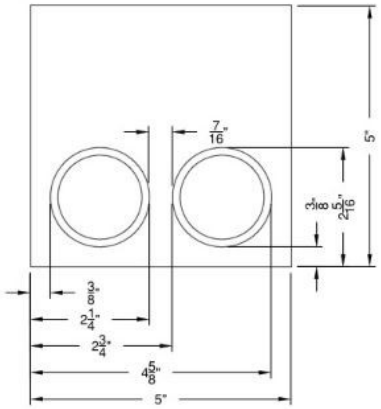
DAY	TIME

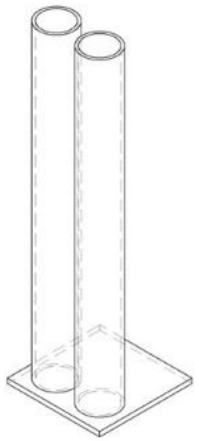
MATERIALS USED

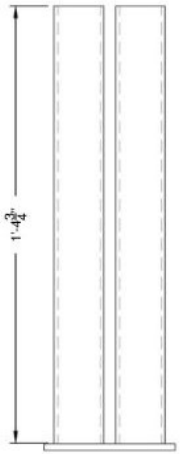
MATERIAL	QUANTITY

SCALE: 6" = 1'

0102







1 / 0103 Multi-View — Upstage Coupler — See Notes for Scale

NOTES:

Schedule 40 Pipe Welded to $\frac{1}{4}$" Plate
Build 7
Consider a jig of pipe pockets
Drill and Tap to match Casters ($\frac{3}{8}$"-16)
Base is in 6" Scale
Others in 3" Scale

Southern Illinois University
Carbondale
McLeod Theater
1100 Lincoln Drive
Carbondale, IL 62901

Sunday in the Park with George

Couplers

Upstage Couplers

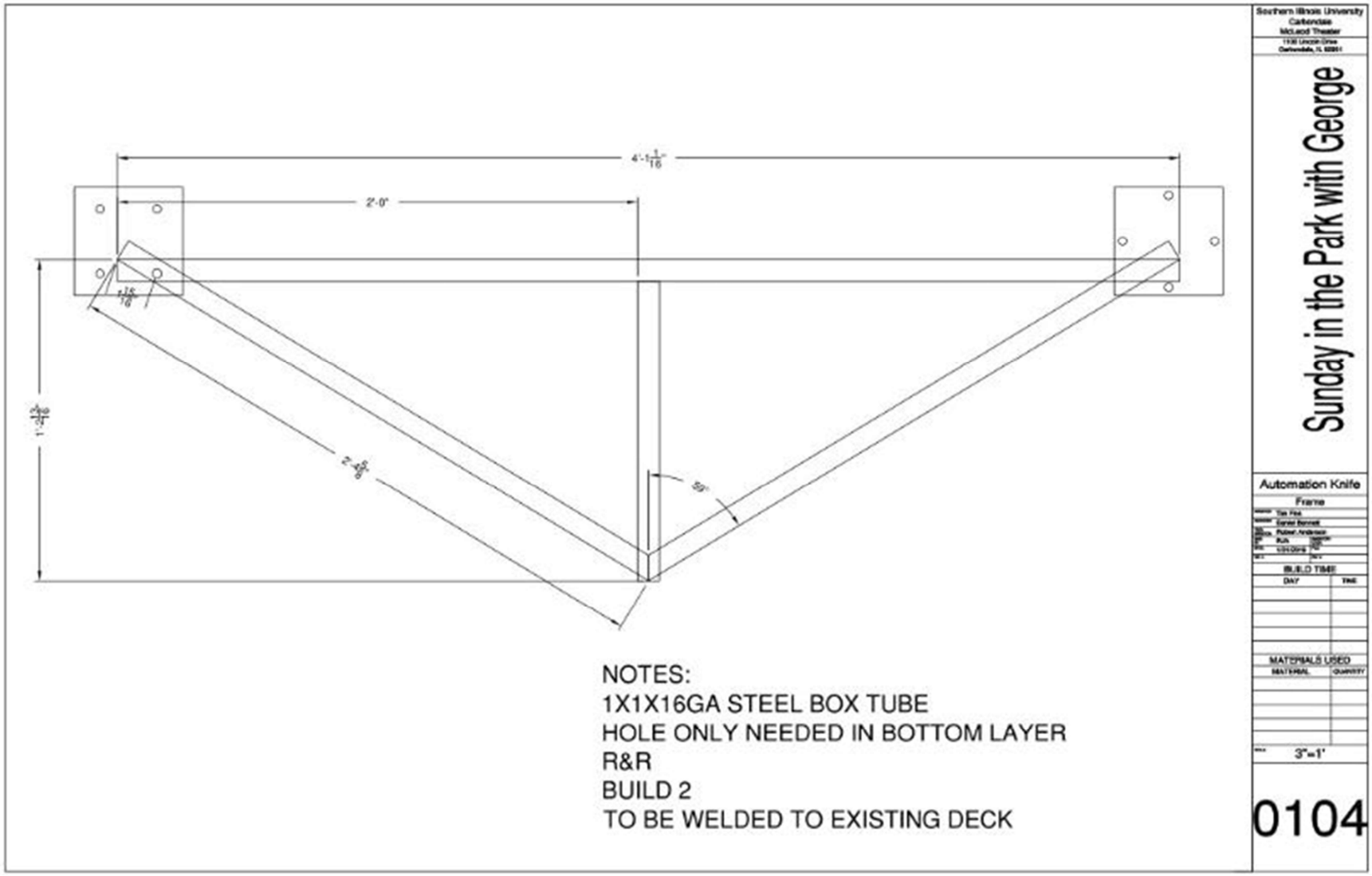
DIRECTOR	Tim Fink
DESIGNER	Daniel Bonnett
TECH DIRECTOR	Robert Anderson
DWN	RJA
CHK	
DATE	1/14/2019
SHT	

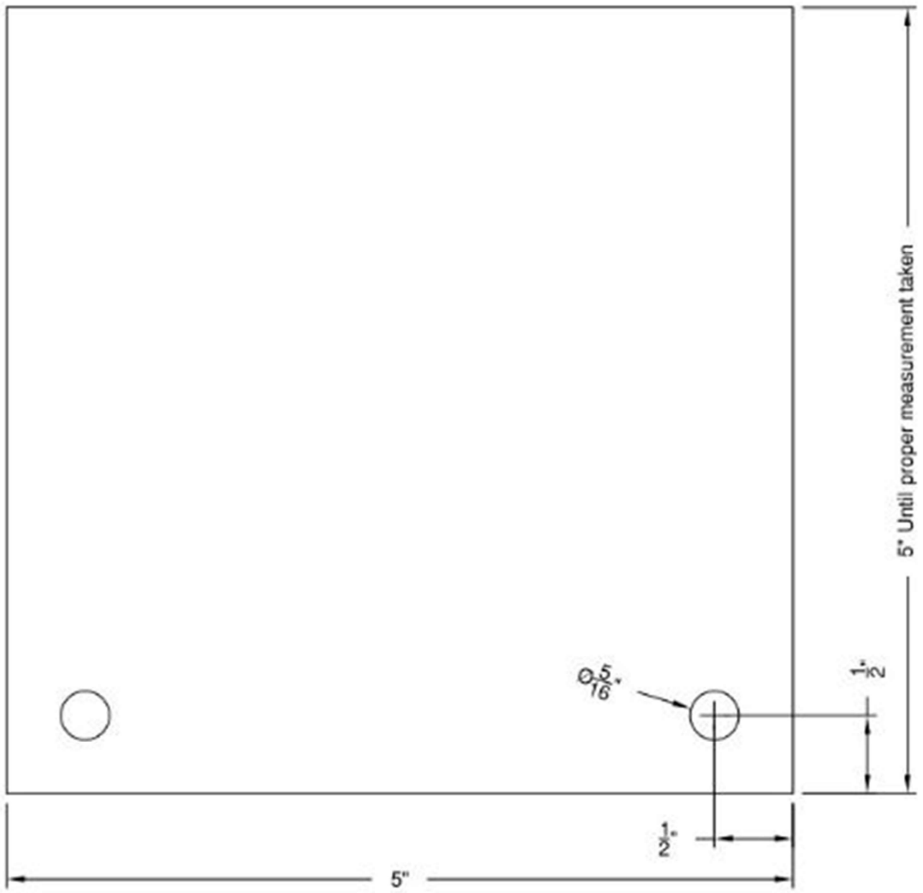
BUILD TIME	
DAY	TIME

MATERIALS USED	
MATERIAL	QUANTITY

SCALE: 6"=1'

0103


4'-1 1/16"
2'-0"
1'-2 1/16"
2'-4 5/8"
59°
NOTES:
1X1X16GA STEEL BOX TUBE
HOLE ONLY NEEDED IN BOTTOM LAYER
R&R
BUILD 2
TO BE WELDED TO EXISTING DECK
Southern Illinois University
Carbondale
McLeod Theater
1100 Lincoln Drive
Carbondale, IL 62901
Sunday in the Park with George
Automation Knife
Frame
Tim Fink
Daniel Bennett
Robert Anderson
N/A
1/31/2016
REV
BUILD TIME
DAY
TIME
MATERIALS USED
MATERIAL
QUANTITY
3"=1'
0104



NOTES:
1/4" x 5" PLATE STEEL
BUIILD 2
TO BE WELDED TO KNIFE FRAME

Southern Illinois University
Carbondale
McLeod Theater
1100 Lincoln Drive
Carbondale, IL 62901

Sunday in the Park with George

Automation Knife

Frame

DRAWN	Tim Finn
CHECKED	Daniel Bennett
APPROVED	Robert Anderson
DATE	12/1/2010

BUILD TIME

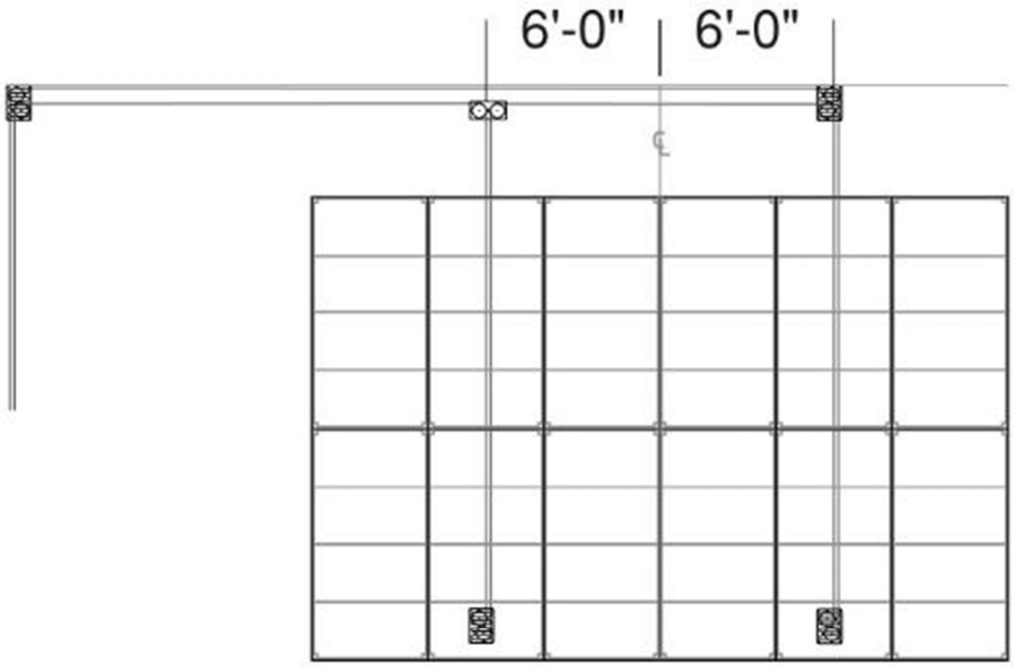
DAY	TIME

MATERIALS USED

MATERIAL	QUANTITY

SCALE 1"=1"

0105



1 / 0201 Cable Paths / Block Placement 3/8" = 1'

NOTES:

- RED LINES DENOTE CABLE PATHS
- GREEN LINES ARE CENTERLINE AND UPSTAGE WALL
- 27' ANGLE IRON TRACK 8' OFF CENTER 6" DOWNSTAGE OF WALL
- WINCH TO BE PLACED BY TD

Southern Illinois University Carbondale
McLeod Theatre
1100 Lincoln Drive
Carbondale, IL 62901

Sunday in the Park with George

Platform

Cable/Block Layout

BUILD TIME

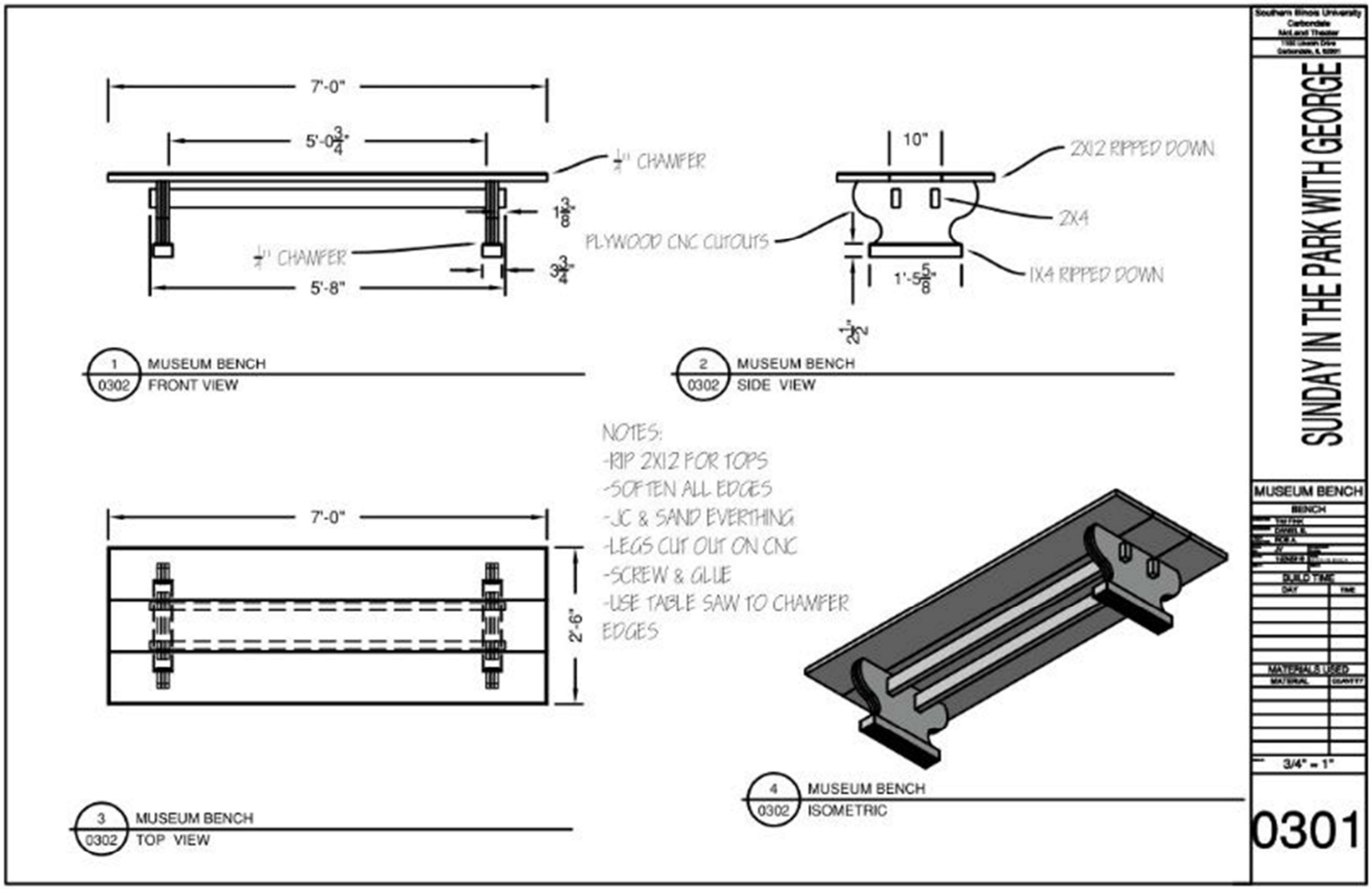
DAY	TIME

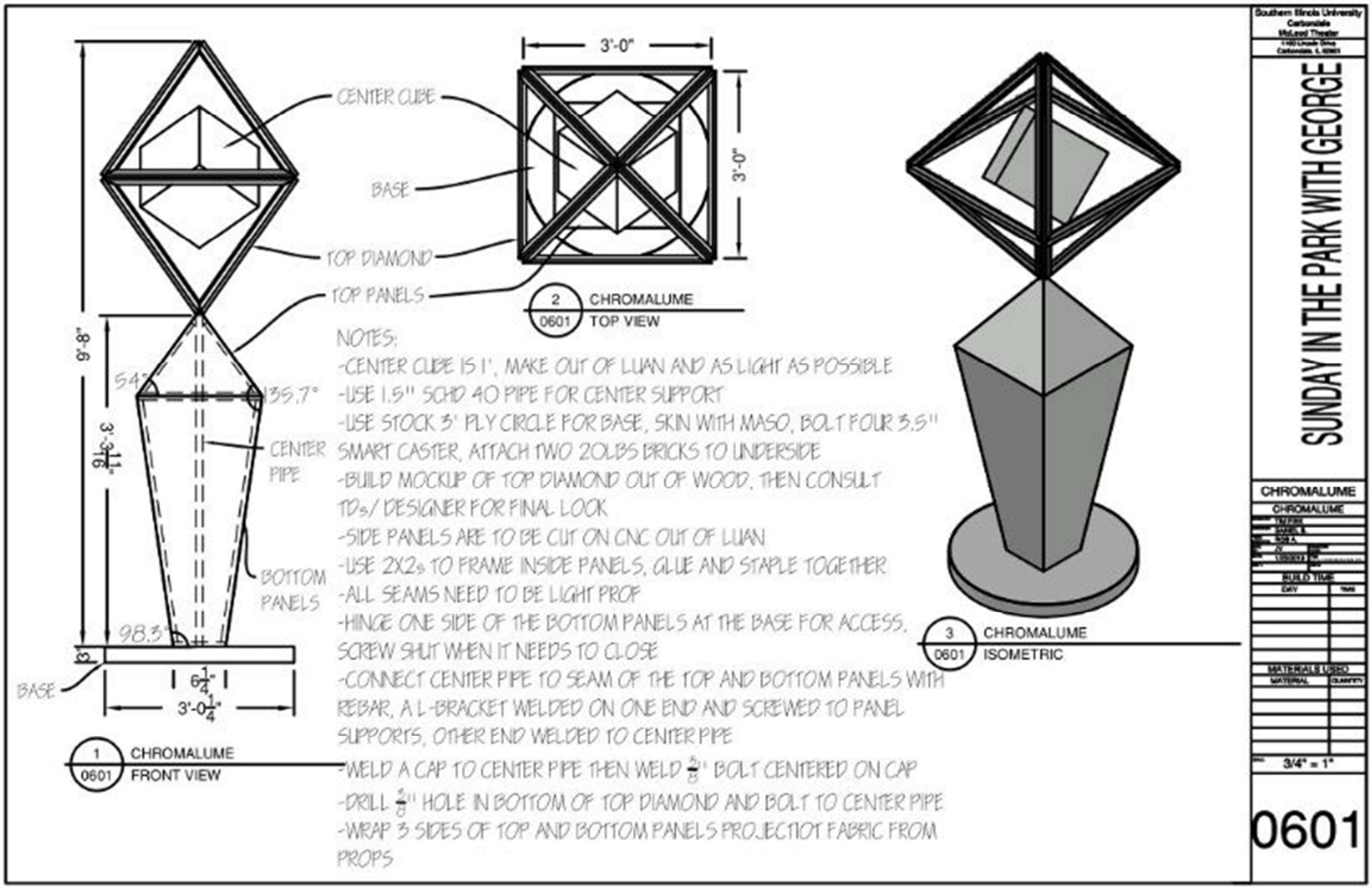
MATERIALS USED

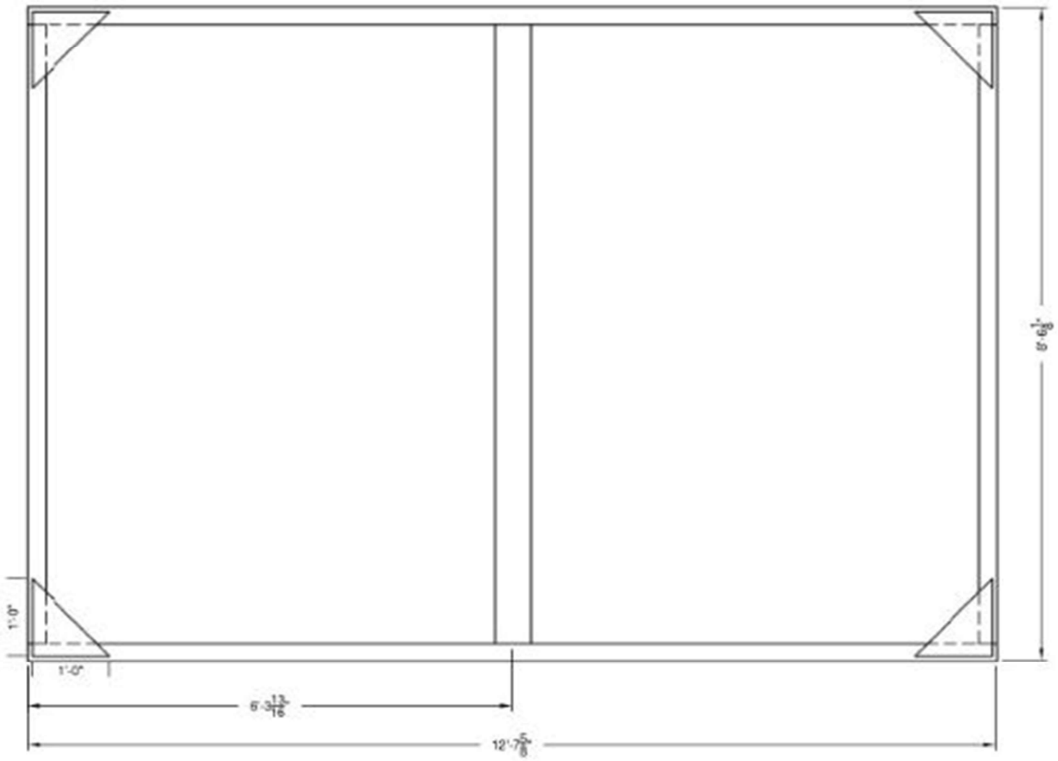
MATERIAL	QUANTITY

SCALE AS NOTED

0201


7'-0"
5'-0 3/4"
1/4" CHAMFER
1 3/8"
1/4" CHAMFER
3 3/4"
5'-8"
1 MUSEUM BENCH
0302 FRONT VIEW
10"
2X12 RIPPED DOWN
2X4
PLYWOOD CNC CUTOUTS
1'-5 5/8"
1X4 RIPPED DOWN
1 1/2"
2 MUSEUM BENCH
0302 SIDE VIEW
NOTES:
-RIP 2X12 FOR TOPS
-SOFTEN ALL EDGES
-JC & SAND EVERTHING
-LEGS CUT OUT ON CNC
-SCREW & GLUE
-USE TABLE SAW TO CHAMFER EDGES
7'-0"
2'-6"
3 MUSEUM BENCH
0302 TOP VIEW
4 MUSEUM BENCH
0302 ISOMETRIC
Southern Illinois University Carbondale
McLeod Theater
SUNDAY IN THE PARK WITH GEORGE
MUSEUM BENCH
BENCH
BUILD TIME
DAY
TIME
MATERIALS USED
MATERIAL
QUANTITY
3/4" = 1"
0301


3'-0"
CENTER CUBE
BASE
TOP DIAMOND
TOP PANELS
3'-0"
2 CHROMALUME 0601 TOP VIEW
6'-8"
54°
135.7°
3'-3 11/16"
CENTER PIPE
BOTTOM PANELS
98.3°
BASE
6 1/4"
3'-0 1/4"
1 CHROMALUME 0601 FRONT VIEW
NOTES:
-CENTER CUBE IS 1', MAKE OUT OF LUAN AND AS LIGHT AS POSSIBLE
-USE 1.5" SCHD 40 PIPE FOR CENTER SUPPORT
-USE STOCK 3' PLY CIRCLE FOR BASE, SKIN WITH MASO, BOLT FOUR 3.5" SMART CASTER, ATTACH TWO 20LBS BRICKS TO UNDERSIDE
-BUILD MOCKUP OF TOP DIAMOND OUT OF WOOD, THEN CONSULT TDs/ DESIGNER FOR FINAL LOOK
-SIDE PANELS ARE TO BE CUT ON CNC OUT OF LUAN
-USE 2X2s TO FRAME INSIDE PANELS, GLUE AND STAPLE TOGETHER
-ALL SEAMS NEED TO BE LIGHT PROF
-HINGE ONE SIDE OF THE BOTTOM PANELS AT THE BASE FOR ACCESS, SCREW SHUT WHEN IT NEEDS TO CLOSE
-CONNECT CENTER PIPE TO SEAM OF THE TOP AND BOTTOM PANELS WITH REBAR, A L-BRACKET WELDED ON ONE END AND SCREWED TO PANEL SUPPORTS, OTHER END WELDED TO CENTER PIPE
-WELD A CAP TO CENTER PIPE THEN WELD 5/8" BOLT CENTERED ON CAP
-DRILL 5/8" HOLE IN BOTTOM OF TOP DIAMOND AND BOLT TO CENTER PIPE
-WRAP 3 SIDES OF TOP AND BOTTOM PANELS PROJECTIOT FABRIC FROM PROPS
3 CHROMALUME 0601 ISOMETRIC
Southern Illinois University Carbondale
McLeod Theater
SUNDAY IN THE PARK WITH GEORGE
CHROMALUME
CHROMALUME
BUILD TIME
DAY
TIME
MATERIALS USED
MATERIAL
QUANTITY
3/4" = 1"
0601



Broadway style flat
Soft covered
1x6 ripped to 1x3
Toggle may stay as 1x6
Lauan corner blocks
Will rig to fly, points on stiles

Southern Illinois University
Carbondale
McLeod Theatre
1130 Lincoln Drive
Carbondale, IL 62901

Sunday in the Park with George

Show Painting

Rear Elevation

DRAWN	Tim Fleb
DESIGNED	Daniel Wenzel
CHECKED	Robert Anderson
DATE	7/2/08
SCALE	1/2" = 1'-0"
REV	DATE

BUILD TIME

DAY	TIME

MATERIALS USED

MATERIAL	QUANTITY

1" = 1'

0801

APPENDIX B

BUDGET

Sunday in the Park with George

General Information

Show Name:	Sunday in the Park with George	
Theatre Name:	McLeod Theatre	
Estimate by:	Robert Anderson	
Material Budget:	$ 2,450.00	
Contingency:	10%	$ 245.00
Shop Time:		
Time Contingency:	1.529	added to each unit

Show Budget Breakdown

Show Budget		$	3,500.00
		$	-
Props	10%	$	350.00
Hardware	10%		$350.00
Paint	10%	$	350.00
	Subtotal	$	1,050.00
	Material Budget	$	2,450.00

Shop Time Available

Date	Workers	Hrs	Wks of Build	Total
Monday				0
Tuesday				0
Wednesday	0	0	0	0
Thursday				0
Friday				0
			Total:	0

Items not bid:

Chromolume (In progress)

Bench (ATD will visit Chicago and get measurements)

Hover over red triangles for more notes

Page	Unit		Cost Estimate	Time Estimate
1	Steeldeck Couplers	Can accomplish always raked deck	$183.15	0
2	Tracking Hardware	Tracking Hardware	$1,418.58	0
3	Bench		$79.70	0
4	Deck Facing		$15.39	0
5	Cutouts		$153.89	0
6	Chromolume		$123.67	0
7	Deck Skinning		$246.25	0
8	Intermission Painting		$52.92	0
9	Parasol Flying		$82.21	0
10	False Proscenium	CUT	$0.00	0
11	11		$0.00	0
12	12		$0.00	0
13	13		$0.00	0
14	14		$0.00	0
15	15		$0.00	0
16	16		$0.00	0
17	17		$0.00	0
18	18		$0.00	0
19	19		$0.00	0
20	20		$0.00	0
		Total:	$2,355.76	
		Budgeted Amount:	$2,450.00	
		Surplus (Deficit):	$94.24	0

Theatre:	McLeod Theatre			Production:	Sunday in the Park with George		
Date:	4-Apr-19			By:	Robert Anderson		
Unit:	**Steeldeck Couplers**						
Notes:				*Page:*	*1*		

Time Estimate Explanation:						Jump To:	
Wood	Hrs.	**Steel**	Hrs.	**Paint**	Hrs.	Main	
Cutting		Clean		Prime		Price Sheet	
Jig		Cutting		Base		Build Schedule	
Layout		Drill		Texture		Bill of Materials	
Assemble		Jig		Layer 1		Summary Sheet	
Cover		Weld		Layer 2			
Molding		Grind		Layer 3			
Rig		Rig		Layer 4		* 1.529	
Install				Detail			
				Sealing			

Hover over red triangles for more notes

					Current:	$	183.15
Call Name	**Materials**	**Unit**	**Unit Price**	**Quantity**	**Cost**		
Stl_FB_1/4"x6"	Flat Bar 6"x1/4" thk.	20'	$83.25	2.00	$	166.50	
Stl_PipeBLK_2"_40	2" Sched 40 Black Pipe	21'	$89.50		$	-	
					$	-	
					$	-	
					$	-	
					$	-	
					$	-	
					$	-	
					$	-	
					$	-	
					$	-	
					$	-	
					$	-	
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					$	-	
					$	-	
					$	-	
					$	-	
					$	-	
					$	-	
					$	-	
					$	-	
				Sub-Total:	$	166.50	
				Contingency:	$	16.65	
				Total:	$	183.15	

Theatre:	**McLeod Theatre**				**Production:**	**Sunday in the Park with George**		
Date:	**4-Apr-19**			**By:**	**Robert Anderson**			
Unit:	**Tracking Hardware**							
Notes:				***Page:***	***2***			
Time Estimate Explanation:						**Jump To:**		
Wood	Hrs.	**Steel**	Hrs.	**Paint**	Hrs.	Main		
Cutting		Clean		Prime		Price Sheet		
Jig		Cutting		Base		Build Schedule		
Layout		Drill		Texture		Bill of Materials		
Assemble		Jig		Layer 1		Summary Sheet		
Cover		Weld		Layer 2				
Molding		Grind		Layer 3				
Rig		Rig		Layer 4		* 1.529		
Install				Detail				
				Sealing				
						Current:	$1,418.58	

Call Name	**Materials**		**Unit**	**Unit Price**	**Quantity**	**Cost**
GAC_3/16	3/16 Aircraft Cable - 500'		Roll	$122.72		
Stl_1.25L 1/8	1 1/4"x1 1/4"x1/8" Angle		20'	$20.00		
	Aluminum Sheet, purchased		Sht	$322.00	1.00	322.00
	M-6b	<10	8 ea	$97.18		
	M-6b	>10	10 ea	$86.37	10.00	863.70
	MS24566-6b	<10	8 ea	$70.69		
	MS24566-6b	>10	10 ea	$62.83		
	Cutting Fluid		gal	$34.82	1.00	34.82
	Extra Al Bit		ea	$34.55	2.00	69.10

adsf

Dorm

Running Trail

Sub-Total:	$1,289.62
Contingency:	$ 128.96
Total:	$1,418.58

Theatre:	McLeod Theatre			Production:	Sunday in the Park with George		
Date:	4-Apr-19			By:	Robert Anderson		
Unit:	**Bench**				*CUT*		
Notes:				*Page:*	*3*		
	Time Estimate Explanation:					**Jump To:**	
Wood	Hrs.	**Steel**	Hrs.	**Paint**	Hrs.	Main	
Cutting		Clean		Prime		Price Sheet	
Jig		Cutting		Base		Build Schedule	
Layout		Drill		Texture		Bill of Materials	
Assemble		Jig		Layer 1		Summary Sheet	
Cover		Weld		Layer 2			
Molding		Grind		Layer 3			
Rig		Rig		Layer 4		* 1.529	
Install				Detail			
				Sealing			
						Current:	$ 79.70

Call Name	Materials	Unit	Unit Price	Quantity	Cost
	3/4" ply		$27.99	1.00	27.99
	16'-2x4		$7.36	1.00	7.36
	16'-1x4		$7.75	2.00	15.50
	16'-2x12		$21.60	1.00	21.60
Ply_3/4_CDX	3/4" CDX Plywood	Sht.	$27.99		
	Roof Railing TBA				
				Sub-Total:	$ 72.45
				Contingency:	$ 7.25
				Total:	$ 79.70

Theatre:	McLeod Theatre			Production:	Sunday in the Park with George		
Date:	4-Apr-19			By:	Robert Anderson		
Unit:	**Deck Facing**						
Notes:				*Page:*	*4*		
Time Estimate Explanation:						**Jump To:**	
Wood	Hrs.	**Steel**	Hrs.	**Paint**	Hrs.	Main	
Cutting		Clean		Prime		Price Sheet	
Jig		Cutting		Base		Build Schedule	
Layout		Drill		Texture		Bill of Materials	
Assemble		Jig		Layer 1		Summary Sheet	
Cover		Weld		Layer 2			
Molding		Grind		Layer 3			
Rig		Rig		Layer 4		* 1.529	
Install				Detail			
				Sealing			
						Current:	$ 15.39

Call Name	Materials	Unit	Unit Price	Quantity	Cost
Lauan_1/4"	1/4" Lauan; 4' x 8'	Sht.	$13.99	1.00	13.99
				Sub-Total:	$ 13.99
				Contingency:	$ 1.40
				Total:	$ 15.39

Theatre:	McLeod Theatre			Production:	Sunday in the Park with George		
Date:	4-Apr-19			By:	Robert Anderson		
Unit:	Cutouts						
Notes:				*Page:*	5		
Time Estimate Explanation:						Jump To:	
Wood	Hrs.	**Steel**	Hrs.	**Paint**	Hrs.	Main	
Cutting		Clean		Prime		Price Sheet	
Jig		Cutting		Base		Build Schedule	
Layout		Drill		Texture		Bill of Materials	
Assemble		Jig		Layer 1		Summary Sheet	
Cover		Weld		Layer 2			
Molding		Grind		Layer 3			
Rig		Rig		Layer 4		* 1.529	
Install				Detail			
				Sealing			
						Current:	$ 153.89

Call Name	Materials	Unit	Unit Price	Quantity	Cost
Lauan_1/4"	1/4" Lauan; 4' x 8'	Sht.	$13.99	10.00	$139.90
				Sub-Total:	$ 139.90
				Contingency:	$ 13.99
				Total:	$ 153.89

Theatre:	**McLeod Theatre**			**Production:**	**Sunday in the Park with George**		
Date:	**3-Apr-19**			**By:**	**Robert Anderson**		
Unit:	**Chromolume**						
Notes:				***Page:***	*6*		
	Time Estimate Explanation:					**Jump To:**	
Wood	Hrs.	**Steel**	Hrs.	**Paint**	Hrs.	Main	
Cutting		Clean		Prime		Price Sheet	
Jig		Cutting		Base		Build Schedule	
Layout		Drill		Texture		Bill of Materials	
Assemble		Jig		Layer 1		Summary Sheet	
Cover		Weld		Layer 2			
Molding		Grind		Layer 3			
Rig		Rig		Layer 4		* 1.529	
Install				Detail			
				Sealing			
						Current:	$ 123.67

Call Name	**Materials**	**Unit**	**Unit Price**	**Quantity**	**Cost**
	5v Lasers, 10 pk	ea	$5.48		
	Micro servos, 10 pk	ea	$17.99		
	Arduino Uno	ea	$8.49		
	DMX Shield	ea	$21.99		
	16'-1x4		$7.75	1.00	$7.75
	1/2"-Ply		$18.99	3.00	$56.97
	16'-2x4		$7.36	2.00	$14.72
	3/4" Ply		$27.99	1.00	$27.99
	Ball?		$5.00	1.00	$5.00
				Sub-Total:	$ 112.43
				Contingency:	$ 11.24
				Total:	$ 123.67

Theatre:	**McLeod Theatre**			**Production:**	**Sunday in the Park with George**		
Date:	**4-Apr-19**			**By:**	**Robert Anderson**		
Unit:	**Deck Skinning**						
Notes:				***Page:***	*7*		
Time Estimate Explanation:						**Jump To:**	
Wood	Hrs.	**Steel**	Hrs.	**Paint**	Hrs.	Main	
Cutting		Clean		Prime		Price Sheet	
Jig		Cutting		Base		Build Schedule	
Layout		Drill		Texture		Bill of Materials	
Assemble		Jig		Layer 1		Summary Sheet	
Cover		Weld		Layer 2			
Molding		Grind		Layer 3			
Rig		Rig		Layer 4		* 1.529	
Install				Detail			
				Sealing			
						Current:	$ 246.25
Call Name	**Materials**			**Unit**	**Unit Price**	**Quantity**	**Cost**
Masonite_1/4"	1/4" Tempered Masonite; 4' x 8'			Sht.	$15.99	14.00	223.86
	16'5" Muslin			Yd	$26.00		
						Sub-Total:	$ 223.86
						Contingency:	$ 22.39
						Total:	$ 246.25

Theatre:	McLeod Theatre			Production:	Sunday in the Park with George		
Date:	3-Apr-19			By:	Robert Anderson		
Unit:	**Intermission Painting**						
Notes:				*Page:*	*8*		
	Time Estimate Explanation:					**Jump To:**	
Wood	Hrs.	**Steel**	Hrs.	**Paint**	Hrs.	Main	
Cutting		Clean		Prime		Price Sheet	
Jig		Cutting		Base		Build Schedule	
Layout		Drill		Texture		Bill of Materials	
Assemble		Jig		Layer 1		Summary Sheet	
Cover		Weld		Layer 2			
Molding		Grind		Layer 3			
Rig		Rig		Layer 4		* 1.529	
Install				Detail			
				Sealing			
						Current:	$ 52.92

Call Name	Materials	Unit	Unit Price	Quantity	Cost
Pine 1x6x16	1x6x16', #2 Pine	16'	$9.98	2.00	19.96
Muslin 108" HVY	108" HVY WT NFR Cut price	Yd.	$7.58		
	84" Medium Weight Muslin	Yd.	$5.63	5.00	28.15
				Sub-Total:	$ 48.11
				Contingency:	$ 4.81
				Total:	$ 52.92

Theatre:	**McLeod Theatre**	**Production:**	**Sunday in the Park with George**
Date:	**3-Apr-19**	**By:**	**Robert Anderson**
Unit:	**Parasol Flying**		
Notes:			
		Page:	*9*

Time Estimate Explanation:

Jump To:

Main
Price Sheet
Build Schedule
Bill of Materials
Summary Sheet

Wood	Hrs.	**Steel**	Hrs.	**Paint**	Hrs.
Cutting		Clean		Prime	
Jig		Cutting		Base	
Layout		Drill		Texture	
Assemble		Jig		Layer 1	
Cover		Weld		Layer 2	
Molding		Grind		Layer 3	
Rig		Rig		Layer 4	
Install				Detail	
				Sealing	

* 1.529

Current: $ 82.21

Call Name	**Materials**	**Unit**	**Unit Price**	**Quantity**	**Cost**
	GAC, 1/16", 500'	ea	$60.75	1.00	60.75
Lauan_1/4"			$13.99	1.00	13.99
			$100.00		

Sub-Total: $ 74.74
Contingency: $ 7.47
Total: $ 82.21

Theatre:	McLeod Theatre			Production:	Sunday in the Park with George		
Date:	3-Apr-19			By:	Robert Anderson		
Unit:	**False Proscenium**						
Notes:				*Page:*	*10*		
Time Estimate Explanation:						**Jump To:**	

Wood	Hrs.	**Steel**	Hrs.	**Paint**	Hrs.	Main	
Cutting		Clean		Prime		Price Sheet	
Jig		Cutting		Base		Build Schedule	
Layout		Drill		Texture		Bill of Materials	
Assemble		Jig		Layer 1		Summary Sheet	
Cover		Weld		Layer 2			
Molding		Grind		Layer 3			
Rig		Rig		Layer 4		* 1.529	
Install				Detail			
				Sealing			
						Current:	$ -

Call Name	**Materials**	**Unit**	**Unit Price**	**Quantity**	**Cost**
Pine 1x6x16	1x6x16', #2 Pine	16'	$9.98		
Lauan_1/4"	1/4" Lauan; 4' x 8'	Sht.	$13.99		
				3.00	
				Sub-Total:	$ -
				Contingency:	$ -
				Total:	$ -

	Sunday in the Park with George	14-Jan Mon	15-Jan Tue	16-Jan Wed	17-Jan Thur	18-Jan Fri	19-Jan Sat	20-Jan Sun	21-Jan Mon	22-Jan Tue	23-Jan Wed
					Week 1						
Page	Unit										
1	Steeldeck Couplers	Prep Metals			Weld Couplers				Weld Couplers		
2	Tracking Hardware	CNC Aluminum			Tap and Assemble				Tap and Assemble		
3	Bench										
4	Deck Facing					Rip			Paints		
5	Cutouts								CNC		
6	Chromolume										
7	Deck Skinning				Backpaint						
8	Intermission Painting				Frame and cover				Rig		
9	Parasol Flying										
10	False Proscenium	Frame and Face			Rig					Base	
11	Soft Goods Hang								Soft Good Shuffle		
12	Paint Floor Black	Paint				Seal					
13	13										
14	14										
15	13										
16	16										
17	FOH Hang										
18	Overstage Hang	Tentative			Tentative						
19	FOH Focus										
20	Overstage Focus										


24-Jan Thur
25-Jan Fri
26-Jan Sat
27-Jan Sun
28-Jan Mon
29-Jan Tue
30-Jan Wed
31-Jan Thur
1-Feb Fri
2-Feb Sat
3-Feb Sun
4-Feb Mon
5-Feb Tue
6-Feb Wed
Week 2
Week 3
Assemble
Assemble
Layout Track and Sheaves
Load Winch/Run GAC
Build
Build
To Paints
Install
CNC
To Paints
To Paints
Build
Build
Install
Hang
CNC
Rig
To Paints
Hang

7-Feb Thur	8-Feb Fri	9-Feb Sat	10-Feb Sun	11-Feb Mon	12-Feb Tue	13-Feb Wed	14-Feb Thur	15-Feb Fri	16-Feb Sat	17-Feb Sun	18-Feb Mon	19-Feb Tue	20-Feb Wed
Week 4						Week 5					Tech		
Attach to Automation													
To Lights				To Paints									
To Paints (Seal on Friday)													
							Paints	Hang					

APPENDIX C

PRODUCTION PHOTOS

1 - "A blank page or canvas."

2 - George sketches Dot in the park

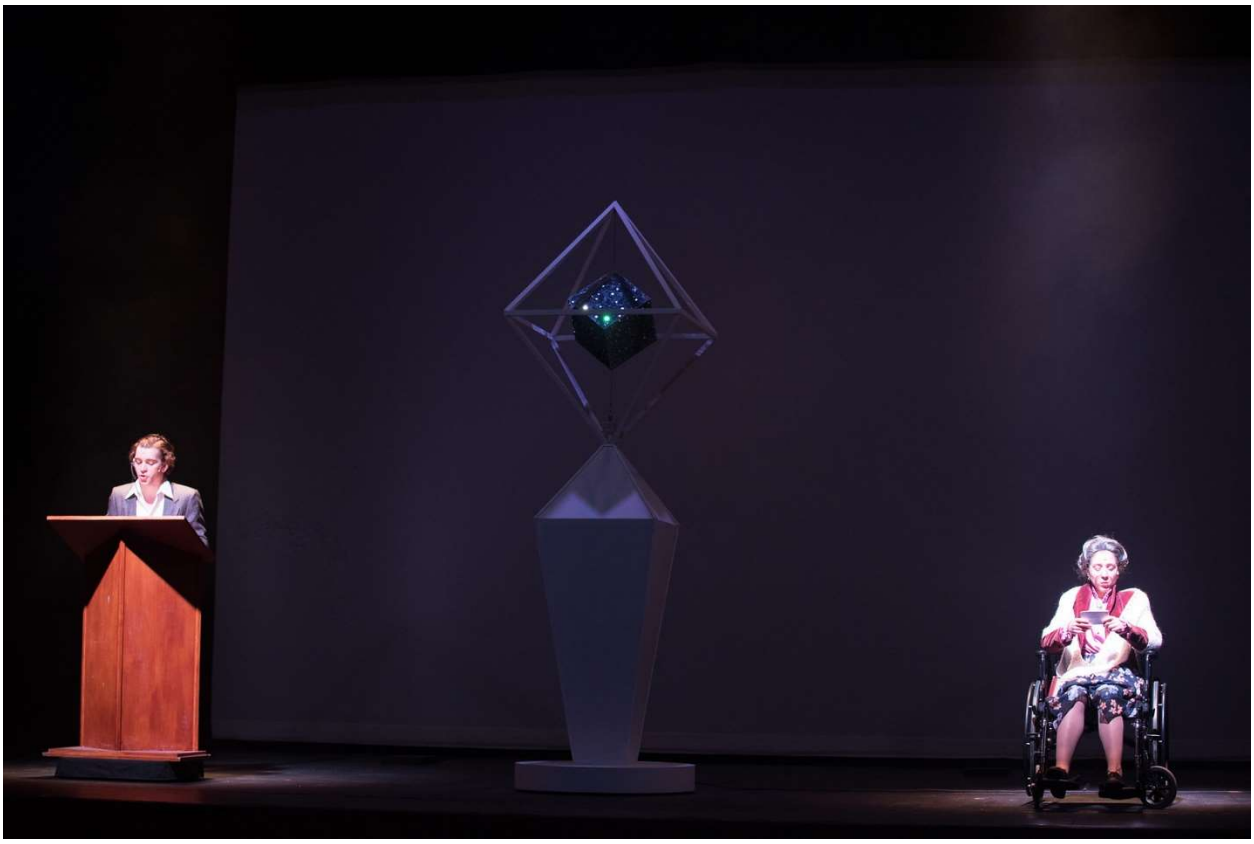
3- George sketches the Boatman and his dog

4 - Cast on floating deck near the end of Act I

5 - Final Tableau of Act I

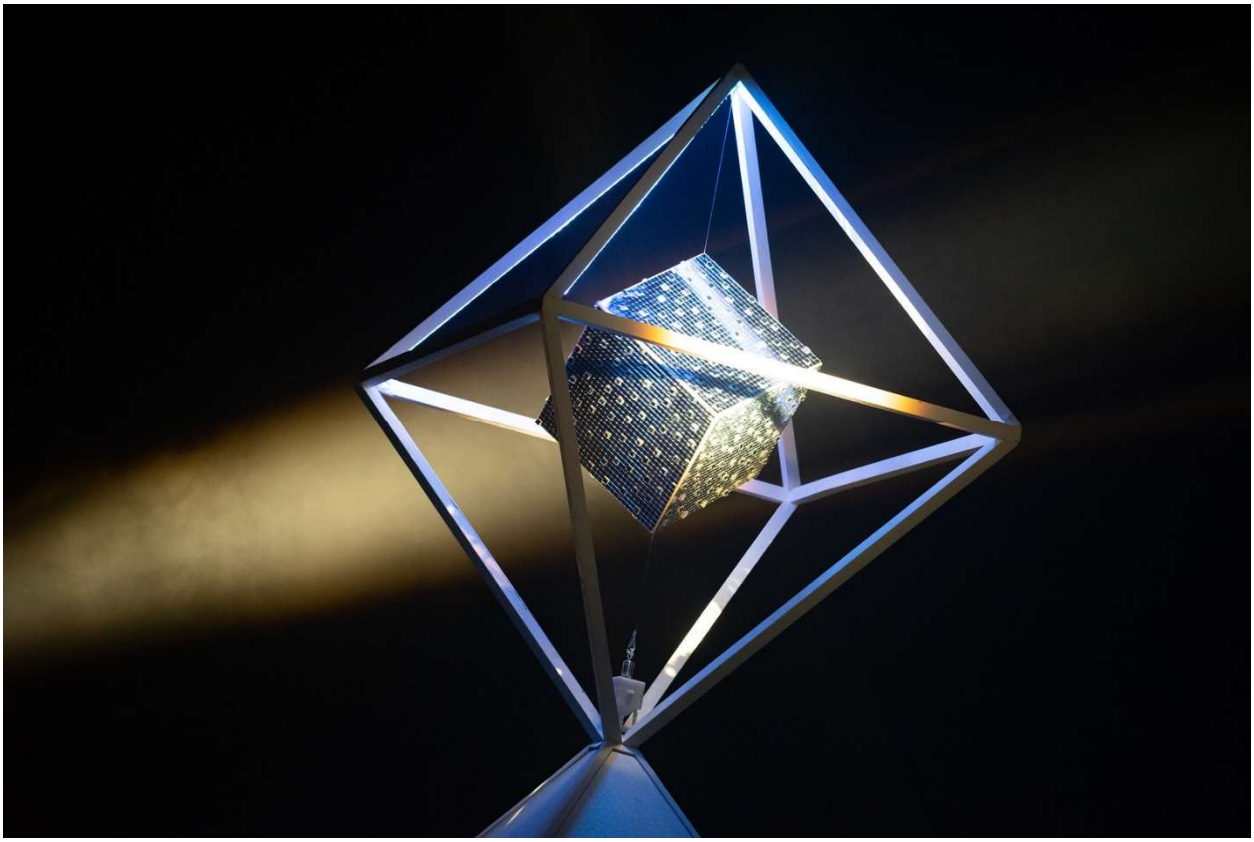
6 - Act II without platform. Note the tracks on stage

7 - Soldier and his cutout companion



8 - George and Marie with Chromolume #7

9 - Chromolume body lighting up



10 - Beam of light on Chromolume #7

APPENDIX D

EVALUATION SURVEY RESULTS

03SPG TD Evaluation

Please use this form to evaluate the performance of Robert Anderson as the Technical Director for Sunday in the Park with George. This will be a short form using a number system and comments to get as much input from you as possible. Answers will be anonymous and included in my Thesis. Thank you for your participation!

How well was work planned for each day? *

	1	2	3	4	5	6	7	8	9	10	
Badly	○	○	○	○	○	○	○	○	○	◉	Well

Comments:

How prepared was the Technical Director to complete the set on time? *

	1	2	3	4	5	6	7	8	9	10	
Badly	○	○	○	○	○	○	○	○	○	◉	Well

Comments:

How clear were instructions given by the Technical Director? *

	1	2	3	4	5	6	7	8	9	10	
Very Unclear	○	○	○	○	○	○	○	○	○	◉	Very Clear

Comments:

How safe did you feel in the shop? *

	1	2	3	4	5	6	7	8	9	10	
Very Unsafe	○	○	○	○	○	○	○	○	○	◉	Very Safe

Comments:

How safe did you feel working around the automated scenery? *

	1	2	3	4	5	6	7	8	9	10	
Very Unsafe	○	○	○	○	○	○	○	○	○	◉	Very Safe

Comments:

Please evaluate the strike for this show: *

	1	2	3	4	5	6	7	8	9	10	
Very Bad	○	○	○	○	○	○	○	○	○	◉	Very Good

Comments:

Overall how would you rate the performance of the Technical Director for this production? *

	1	2	3	4	5	6	7	8	9	10	
Very Bad	○	○	○	○	○	○	○	○	○	◉	Very Good

Comments:

Three Important Questions

These three questions are often used to evaluate a production or project, and are very useful for continuing development.

What worked well for the Technical Director? *

Good coordination between departments

What did not work well for the Technical Director? *

The shops was almost never clean at the end of the day

How could the Technical Director improve? *

Making sure he ha his carpenters do their clean up responsibilities

Final comments for the Technical Director:

Good job buddy

03SPG TD Evaluation

Please use this form to evaluate the performance of Robert Anderson as the Technical Director for Sunday in the Park with George. This will be a short form using a number system and comments to get as much input from you as possible. Answers will be anonymous and included in my Thesis. Thank you for your participation!

How well was work planned for each day? *

	1	2	3	4	5	6	7	8	9	10	
Badly	○	○	○	○	○	○	○	○	○	◉	Well

Comments:

How prepared was the Technical Director to complete the set on time? *

	1	2	3	4	5	6	7	8	9	10	
Badly	○	○	○	○	○	○	○	○	○	◉	Well

Comments:

How clear were instructions given by the Technical Director? *

	1	2	3	4	5	6	7	8	9	10	
Very Unclear	○	○	○	○	○	○	○	◉	○	○	Very Clear

Comments:

How safe did you feel in the shop? *

	1	2	3	4	5	6	7	8	9	10	
Very Unsafe	○	○	○	○	○	○	○	○	○	◉	Very Safe

Comments:

How safe did you feel working around the automated scenery? *

	1	2	3	4	5	6	7	8	9	10	
Very Unsafe	○	○	○	○	○	○	○	○	○	◉	Very Safe

Comments:

Please evaluate the strike for this show: *

	1	2	3	4	5	6	7	8	9	10	
Very Bad	○	○	○	○	○	○	○	○	○	◉	Very Good

Comments:

Overall how would you rate the performance of the Technical Director for this production? *

	1	2	3	4	5	6	7	8	9	10	
Very Bad	○	○	○	○	○	○	○	○	○	◉	Very Good

Comments:

Three Important Questions

These three questions are often used to evaluate a production or project, and are very useful for continuing development.

What worked well for the Technical Director? *

dividing work, clear instructions, show went up on time, good attitude

What did not work well for the Technical Director? *

a plate or two were not fully explanatory

How could the Technical Director improve? *

Include 3D iso for nonstandard items in order to visualize better

Final comments for the Technical Director:

This show went pretty darn smoothly, from what I could tell. Sure, projections were hell, but everything else seemed to go up with ease.

03SPG TD Evaluation

Please use this form to evaluate the performance of Robert Anderson as the Technical Director for Sunday in the Park with George. This will be a short form using a number system and comments to get as much input from you as possible. Answers will be anonymous and included in my Thesis. Thank you for your participation!

How well was work planned for each day? *

	1	2	3	4	5	6	7	8	9	10	
Badly	○	○	○	○	○	○	○	◉	○	○	Well

Comments:

A printed calendar earlier in the process helps all departments know what to expect at a glance. Also what the GA's can be focusing on.

How prepared was the Technical Director to complete the set on time? *

	1	2	3	4	5	6	7	8	9	10	
Badly	○	○	○	○	○	○	○	○	◉	○	Well

Comments:

Could have had all drawings in advance

How clear were instructions given by the Technical Director? *

	1	2	3	4	5	6	7	8	9	10	
Very Unclear	○	○	○	○	○	○	○	○	◉	○	Very Clear

Comments:

How safe did you feel in the shop? *

	1	2	3	4	5	6	7	8	9	10	
Very Unsafe	○	○	○	○	○	○	○	◉	○	○	Very Safe

Comments:

Had to remind people a few times to wear safety glasses. TD should also be doing this.

How safe did you feel working around the automated scenery? *

	1	2	3	4	5	6	7	8	9	10	
Very Unsafe	○	○	○	○	○	○	◉	○	○	○	Very Safe

Comments:

A camera on the upstage side was a good idea. Would have been good to have had it sooner or planned for it.

Please evaluate the strike for this show: *

	1	2	3	4	5	6	7	8	9	10	
Very Bad	○	○	○	○	○	○	○	○	○	◉	Very Good

Comments:

Went quickly, safely, and there was minimal standing around.

Overall how would you rate the performance of the Technical Director for this production? *

	1	2	3	4	5	6	7	8	9	10	
Very Bad	○	○	○	○	○	○	○	◉	○	○	Very Good

Comments:

Three Important Questions

These three questions are often used to evaluate a production or project, and are very useful for continuing development.

What worked well for the Technical Director? *

Cromalume ended up looking great. Automation installed quickly and worked well. Though there were issues during the run.

What did not work well for the Technical Director? *

Getting the chromalume done by date requested by faculty. Facing on the deck was fairly dimpled.

How could the Technical Director improve? *

Be sure to step in to help fly ops during tech. Get drawings done before production starts.

Final comments for the Technical Director:

Better at collaborating with designers this time around, good work. Better prepared than previously but still room to grow. All in all, a successful production

03SPG TD Evaluation

Please use this form to evaluate the performance of Robert Anderson as the Technical Director for Sunday in the Park with George. This will be a short form using a number system and comments to get as much input from you as possible. Answers will be anonymous and included in my Thesis. Thank you for your participation!

How well was work planned for each day? *

	1	2	3	4	5	6	7	8	9	10	
Badly	○	○	○	○	○	○	○	○	◉	○	Well

Comments:

Mostly all went smooth except for when SM called people during shop hours.

How prepared was the Technical Director to complete the set on time? *

	1	2	3	4	5	6	7	8	9	10	
Badly	○	○	○	○	○	○	○	○	○	◉	Well

Comments:

How clear were instructions given by the Technical Director? *

	1	2	3	4	5	6	7	8	9	10	
Very Unclear	○	○	○	○	○	○	○	○	◉	○	Very Clear

Comments:

How safe did you feel in the shop? *

	1	2	3	4	5	6	7	8	9	10	
Very Unsafe	○	○	○	○	○	○	○	○	○	◉	Very Safe

Comments:

How safe did you feel working around the automated scenery? *

	1	2	3	4	5	6	7	8	9	10	
Very Unsafe	○	○	○	○	○	○	○	○	○	◉	Very Safe

Comments:

Please evaluate the strike for this show: *

	1	2	3	4	5	6	7	8	9	10	
Very Bad	○	○	○	○	○	○	○	◉	○	○	Very Good

Comments:

Seemed a bit unorganized and a lot of people seemed confused and were standing around.

Overall how would you rate the performance of the Technical Director for this production? *

	1	2	3	4	5	6	7	8	9	10	
Very Bad	○	○	○	○	○	○	○	◉	○	○	Very Good

Comments:

8.5 is the real answer. It was really good but there's still room to grow.

Three Important Questions

These three questions are often used to evaluate a production or project, and are very useful for continuing development.

What worked well for the Technical Director? *

Base knowledge of all areas.

What did not work well for the Technical Director? *

I think we should have had more talks about projections and the all white stage floor in meetings.

How could the Technical Director improve? *

Don't be afraid to bring up design challenges in design meetings.

Final comments for the Technical Director:

Thanks for all your help with projections.

APPENDIX E

OTHER SUPPORTING DOCUMENTS

Permission to use images (1-6)

SIU Department of Theater Collaboration Guidelines (7)

Strike List for *Sunday in the Park with George* (8-9)

Re: Permission d'utiliser l'image/Permission to use image

Antoine Mercusot <contact@antoinemercusot.com>

Thu 1/24/2019 10:47 AM

To Robert Anderson <robert.j.anderson@siu.edu>;

Mr Anderson, Thank you for asking for permission to use the Fiction 9 image. Yes, of course you can use it as part of your thesis. This does not pose a problem. I will thank you to simply indicate the photographic credit in small next to the image. © Antoine Mercusot Best regards

Antoine MERCUSOT PHOTOGRAPHE
06 08 48 03 14
antoinemercusot@gmail.com
www.antoinemercusot.com

Le 24 janv. 2019 à 17:38, Robert Anderson <robert.j.anderson@siu.edu> a écrit :

Langue française ci-dessous.

Mr. Mercusot,

My name is Robert Anderson, and I am a graduate student at Southern Illinois University. I am working towards a Master of Fine Arts Degree in Theatre. While working on my Thesis production, a designer used one of your images as inspiration for his design, and I would like to also use this image in my thesis. The image in question is found at the following URL:

http://www.antoinemercusot.com/wp-content/uploads/2015/04/Fic9.jpg

I would like to formally ask your permission use this image in my thesis, which will be published electronically. The image may be cropped to highlight the artistic inspiration that the designer gleaned from the image. If you would be so kind, please let me know how you would like to be credited, as well. Thank you in advance for your assistance!

Robert Anderson
MFA Candidate
Technical Direction
Department of Theater and Dance
Southern Illinois University

M. Mercusot,

Je m'appelle Robert Anderson et je suis un étudiant diplômé de la Southern Illinois University. Je suis en train d'obtenir un Master en Beaux-Arts en Théâtre. Tout en travaillant sur la production de ma thèse, un designer a utilisé l'une de vos images comme source d'inspiration pour son projet. J'aimerais également utiliser cette image dans ma thèse. L'image en question se trouve à l'URL suivante:

http://www.antoinemercusot.com/wp-content/uploads/2015/04/Fic9.jpg

Je voudrais demander officiellement votre permission pour utiliser cette image dans ma thèse, qui sera publiée électroniquement. L'image peut être recadrée pour mettre en évidence l'inspiration artistique que le concepteur a glanée de l'image. Si vous êtes si gentil, laissez-moi savoir comment vous voudriez être crédité. Merci d'avance pour votre aide!

Robert Anderson

Candidat MFA

Direction technique

Département de théâtre et de danse

Université du sud de l'Illinois

Re: Permission to use image

Tamily Weissman-Unni <weissman@lclark.edu>

Thu 1/24/2019 10:31 AM

To Robert Anderson <robert.j.anderson@siu.edu>;

Yes of course that is fine. If you would like me to send you the original tiff, let me know. Thanks for your interest in our work. The credit information is as follows:

CREDIT INFO:

"Image by Tamily Weissman. The Brainbow mouse was produced by **Livet J, Weissman TA, Kang H, Draft RW, Lu J, Bennis RA, Sanes JR, Lichtman JW. Nature (2007) 450:56-62"**

Alternate forms of the Brainbow credit line, which would be acceptable, are as follows:

"Image by Tamily Weissman. The Brainbow mouse was produced by **Livet et al., Nature, 2007"**

or

"Image by Tamily Weissman; **Livet et al., Nature, 2007"**

On Thu, Jan 24, 2019 at 8:26 AM Robert Anderson <robert.j.anderson@siu.edu> wrote:

> Dr. Weissman-Unni,
>
> My name is Robert Anderson, and I am a graduate student at Southern Illinois University. I am working towards a Master of Fine Arts Degree in Theatre. While working on my Thesis production, a designer used one of your images as inspiration for his design, and I would like to also use this image in my thesis. The image in question were captioned as follows:
>
> "Brainbow" transgenic mouse hippocampus
>
> I would like to formally ask your permission use this image in my thesis, which will be published electronically. The image may be cropped to highlight the artistic inspiration that the designer gleaned from the image. If you would be so kind, please let me know how you would like to be credited, as well. Thank you in advance for your assistance!

Robert Anderson

MFA Candidate

Technical Direction

Department of Theater and Dance

Southern Illinois University

--
Tamily Weissman-Unni
Associate Professor
Department of Biology
Co-Chair, Neuroscience Program
Lewis and Clark College
weissmanlab.com

(No subject)

TD Thomas Deerinck <tomdeerinck@gmail.com>
Fri 1/25, 12:09 PM
Robert Anderson

Reply all

Permissions

Ho Robert,

This e-mail serves as permission to use the image for the stated purpose. Credit: Thomas Deerinck, NCMIR/UCSD.

Best of luck,

Tom Deerinck

Mr. Deerinck,

My name is Robert Anderson, and I am a graduate student at Southern Illinois University. I am working towards a Master of Fine Arts Degree in Theatre. While working on my Thesis production, a designer used some of your images as inspiration for his design, and I would like to also use this image in my thesis. The images in question were captioned as follows:

Flourescence image showing the complexity of the optic nerves in the retina of a mouse.
'A region of a mammal hippocampus in which the glial cells were stained green, the neurofilaments blue, and the cell nuclei were stained red.'
Mammal Hippocampus Stained with Various Cellular Markers, 2-Photon Flourescence Microscopy

I would like to formally ask your permission use these images in my thesis, which will be published electronically. The images may be cropped to highlight the artistic inspiration that the designer gleaned from the images. If you would be so kind, please let me know how you would like to be credited, as well. Thank you in advance for your assistance!

Robert Anderson
MFA Candidate
Technical Direction
Department of Theater and Dance
Southern Illinois University

Sunday in the Park with George

STRIKE ASSIGNMENTS

Start @ 4:00pm – Sunday, Feb 24

READ FIRST

BEFORE YOU START

1. **Read this list to know your task in its entirety**
2. **Sign in with Jeff Richardson**
3. **Get a Hard Hat – REQUIRED**
4. **Find your Supervisor**
5. **DECK WILL MOVE TO MIDSTAGE BEFORE ANY CREWS WILL BEGIN!!!**

EVERYONE KEEP BUSY. IF YOU NEED A JOB, ASK! Check with Tom Fagerholm or Robert Anderson about where to put materials and which are saved or trashed. When your task is done, see Tom or your supervisor.

SAVE ALL SHEET GOODS OVER 2'x2' AND LUMBER OVER 2'

DON'T SAVE SCREWS!!!

CREW 1

Maso

- Start stage left removing facing and maso
- After all facing and maso is removed, move to strike automation
  - Shutdown and pack computer rack
  - Unwind cable from winch and wrap for storage
  - Winch will be stored on its cart
  - Cables in Cable Box (Label Cable Box)

CREW 2

Platforms

- Steps will be removed first and sent to the shop for disassembly
- Starting stage left, assign one person under the deck
  - Remove bolts
  - Remove deflection plates downstage
  - Loosen all pipe pockets
- Onstage sides of platforms will require "screw trick" to lift
- Allow assigned person under deck to move beyond seam before lifting
-

CREW 3

Automation

- Downstage pinch back sheaves will removed from deck first
  - CABLES WILL BE UNDER TENSION
  - This will relieve tension on cables, allowing knife connections to be removed
  - As sections of cable come loose, move upstage right
- As Crew 2 is taking deck apart, remove upstage sheaves and UHMW
  - Temporarily remove standoffs to detach cable
- Crews 1 and 3 will work together to strike winch

Sunday in the Park with George

STRIKE CREW ASSIGNMENTS

Strike starts immediately following the show

Crew 1:

Daniel Bennett
Rob Foster
Michael Radford
Ellie Dudeck
Jake Ellsworth
Nini Xiong

Crew 2:

Jerome Veit
Kai Youngsteadt
Andrew Lampley
Grace Novak
Lordez Oduro-Kwarten

Crew 3:

Nate Mohlman
Bryce Belliveau
Josh Miller
Amanda Talor

Crew 4: Lumber Cleaning & Re-Stock Crew

Austin Harrison
Jakob Sommers
Alexis Turner

Crew5: Paints

Taylor Marie Smith

Crew6: Props

Tatiana Vintu
Reilly Duffy
Emily Turner
Julia Cicero
Madison Pruitt

Crew 7: Sound

Gary Griffith
Jessica Berkowski

Crew 8: LX

Jeffery Richardson
Noah Murakami
Kenya Walker
Darryl Ware
Ethan Schmersahl
Martin Rasheed
218B

Crew 9: Costumes

Caitlin Entwistle
Dressers
218C

		DEPARTMENT OF THEAER COLABORATION GUIDELINES					
		Director	Scenery	Tech. Direction	Costumes	Lighting	Sound
Week 1	Pre-Design Discussion	Shares production concept with design team.	All designers share their initial thoughts on production and any questions they have regarding the director's concept.				
Week 2	No collective design meetings this week. Meetings between Director and individual Designer or between various areas as needed						
Week 3	Design Meeting 1	Shares reactions to design team's presentations	Scene Breakdown, Play Analysis, Initial Impression Images	Production Calendar, Scene Breakdown	Inspiration Board, Character and Play Analysis	Scene Breakdown, Play Analysis, Impression Images	Scene Breakdown, Analysis, Impression Images or Sounds/ inspiration board
		For Qualifying and Thesis projects, written proposals should be completed and approved prior to Design Meeting 1					
Week 4	Design Meeting 2	?	Research Images, Preliminary Sketches	Observe, provide technical advice as needed or requested	Research and Color Images, Costume Plot, Thumbnail Sketches	Research and Mood Images	Res./Mood Images or sounds List of sound effects from text
Week 5	No collective design meetings this week. Meetings between Director and individual Designer or between various areas as needed						
Week 6	Design Meeting 3	?	Preliminary ground plan, scene sketches and/or white model	Observe, provide technical advice as needed or requested	Color Roughs and Swatches	Sketches and/or diagrams relevant to color & direction of light & possible special effects	examples-sound/music How can/will sound help tell story
Week 7	No collective design meetings this week. Meetings between Director and individual Designer or between various areas as needed						
Week 8	Design Meeting 4	?	Revisions from previous week with in-scale drawings with sufficient detail for a preliminary bid	Preliminary scenic Bid	Revised Color Roughs and Swatches	Discuss possible lighting design approaches, and how they would interact with scenic ideas	location Sound Effects & special needs, Speaker Placement ideas, Intermission music/themes
Week 9	No collective design meetings this week. Meetings between Director and individual Designer or between various areas as needed						
Week 10	Design Meeting 5	?	Design Due. GP, Section, Elevations and all other materials necessary for bid confirmation and construction Drafting	Final scenic cost estimates	Designs Due (final renderings, swatches, paperwork to shop)	Sketches and/or diagrams relevant to color & direction of light as related to scenic materials provided at previous meeting	prelim Sound Plot Due
Weeks 11 & 12	Production Prep	?	Complete detailed Model and/or renderings and all paint elevations	Complete working drawings and build schedule		Light plot due	Final Sound Plot Due, Speaker Plot Due
Build/Rehearsals begin							

Prior to Design meetings the Director and Playwright (if available) will have met and agreed on creative interpretation & how to communicate with each other during these meetings. Playwrights may attend design and later production meetings to be informed to what is developing, offer suggestions and answer questions as agreed above. Director and Playwright will discuss in private any problematic issues that arise during meetings.

VITA

Graduate School
Southern Illinois University

Robert J Anderson

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Minnesota State University, Mankato
Bachelor of Science, Theater, July 2014

Special Honors and Awards:

Eugene Jackson Outstanding Graduate Student Award, 2018

Thesis Paper Title:

Sunday in the Shop with Rob

Major Professor: Thomas K Fagerholm

Publications:

Thomas Fagerholm, Robert Anderson, and Daniel Bennett . “Bringing Narnia to Life with Wireless Automation” *Tech Expo 2019*, United States Institute for Theater Technology, Louisville, KY, March 2019.