WORCESTER POLYTECHNIC INSTITUTE

Producing a Lighting Design

Designing and Lighting "The Mikado"

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C-08

Abstract

This project details the steps required to produce a lighting design for a musical at Worcester Polytechnic Institute. Presented are my experiences and reflections from my position as lighting designer of the A07 production of *The Mikado*. The contents of this project have been generalized in order that they may apply to the production of a lighting design for any musical production.

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Introduction

The objective of this document is to provide insight and guidance into the design and execution of a musical-theater lighting plot. Intended primarily for productions staged in Alden Hall, at Worcester Polytechnic Institute, it has been generalized to provide sufficient guidance to any production. It does however utilize specific instances from the WPI production of *The Mikado*, to aid in a further understanding of the

The Design Process

Pre-Production Process

The process of creating a lighting design for a performance begins with in the hands of the producers. Upon choosing a show for production, the first steps will be to enlist a suitable director and find performance space. Often times the producers will have some idea of the direction they would like to see the show take. Additionally, they may already have some thematic ideas or elements in place. Comparing these visions to the past works of candidates, the producing staff will be able to choose a suitable director. Once this framework is in place, dates and a venue will be selected, and with that starts the conversation of the actual production elements. Just as a director was chosen based on past works, a lighting designer will be chosen for their abilities and past experiences, all of which will factor prominently into the design phase. Around this same time, a preliminary budget may be formulated. This budget will set the tone for the remainder of the design process. The budget will affect the amount and complexity of the equipment available. Additionally, the budget may affect the placement of lights, as expensive rigging may prevent certain areas from being used.

The pre-production process is important as it is both a starting point for the designers, and sets clear limits to the extent of the production. It is around this time that the designer will learn whether the design has to be kept as simple and economical as possible, or if they have the ability to create an extravagant design utilizing expensive equipment and rigging allowing for the freedom to place lights wherever desired. Technical limitations, such as available power or structural weight limits, will also arise during this phase, giving the designer an idea of the venue's capabilities.

Design Preparation

Before the majority of the design work can begin, the designer must first familiarize themselves with the production. Reading through the script will give the designer an overall sense of the themes presented in the show. Coupled with the input of the producers and the director's visions, the designer will begin to develop sample scenes off which the remainder of

the show will be bases. This will present the moods that the designer will seek to convey to the audience.

One of the designer's first and probably most important steps in the design process is to familiarize themselves with the script. By reading through the script, the designer is able not only to understand the plot of the performance, but begin to get a sense of the overall themes and moods of the show. Having familiarized themselves with the overall aspects of the performance, the designer is ready to interface more efficiently with the remainder of the production staff. Very soon after the initial script reading, the designer will meet with the director and possibly other members of the production staff. From this general design ideas can be formulated.

In the case of *The Mikado*, after the meeting with the director, an image of the show was put forth, relating it to anime style themes, which were to be followed by the set designer and costume designers, and complemented by the final lighting design. These meetings served as a starting point to get everyone working together based upon common ideas or themes. With the Vox production, an initial impression of vivid colors and contrasts to complement the anime themes was developed. As the production process continued, the staff began to opt for a more realistic production, a shift which would influence the design as the show neared.

One of the next major steps is reviewing the set design. While understanding the ideas, themes and moods of a production will give the design insight into potential color choices and **instrument** types, the set design will dictate the movements of actors, and as a result the physical placement of fixtures. For example, in the case of WPI's Mikado, the set design called for a set of platforms and ramps in front of the stage, as well as raised platforms on stage. **Proscenium stages** and their supporting **electric positions** are primarily geared to performances that take place on the stage itself. As a result, by identifying major issues such as this, the designer is able to begin to think about potential solutions.

Additionally, with the set design in hand, the designer can begin to consider how to effectively use the space, blocking off potential **lighting areas**. By dividing the stage into areas, the designer is able to light each section independently of other portions of the stage. This allows much greater control over the design, and can provide different parts of the stage being lit in support of different actions taking place, and themes being expressed. By having these areas blocked out, the designer can then work out how many fixtures needs to be devoted to different portions of the stage in order to provide suitable lighting. Although it may be only a rough estimate, it'll allow the designer to begin to get a sense of what type of equipment and in what quantities must be obtained, either from a **house inventory** or through an outside rental. It will also provide an idea of where lights need to be placed and what support structures or rigging is necessary to position them in an appropriate manner.

The set design *(Appendix: Set Design)* for *The Mikado* comprised of a series of ramps and platforms. Additionally, it called for an area of the stage set aside for use by the choir, and a

large city backdrop. All of these ramps and platforms would need individual areas because of their differing heights and geometries. Another major component that was presented by the production staff was the desire to use projectors throughout the performance. In order to prevent washing out the projections with the stage lighting, provisions would have to be taken throughout the design to ensure light did not wash onto the screens at inappropriate times.

Design process

Having met with the production personnel and seen the different production elements, such as the set, it is time to begin work on the design. Although, methods differ from designer to designer, the process often starts by looking at each area and determining its individual needs and the type of fixtures required. These fixtures are generally divided into two categories: spot and flood fixtures. **Spot fixtures** have a concentrated, focused light output that is intended to illuminate a small area. They are often used to contrast a particular character or scenic element from the surroundings. A **wash fixture** outputs light over a much wider area, and is frequently used to light scenic elements and to provide color to the stage. Another common use is to fill in dark spots that may exist between areas, and to help with the overall transition that may occur from the varying light intensities found across the stage.

In the *Mikado* the stage was divided into areas primary along scenic elements. Each ramp was individually lit to allow for emphasis to be added during entrances. Platforms were also granted their own area, to similarly give control over the intensity level of that area in relation to the surrounding stage. The stage-level floor was divided into three portions that included down-center and the areas to either side. The choir risers, positioned in-between the on stage platforms was considered to be one large area. The areas utilized are outlined in an area plot available in Appendix, Area Plot.

The majority of these areas utilized 2-3 spot fixtures, in the form of ETC Source4s, complemented with a series of wash fixtures. The spot fixtures were typically placed on opposing sides of the house so that a 45® spacing would be formed. One of the dominating practices in lighting design, by placing a cool, usually light blue gel, in opposition to a warm, often light orange or yellow gel, allows the designer to have a large spectrum of dynamics available. Emphasis can be placed on the intensity of either fixture resulting in an overall warm or cool appearance. A third area light was utilized to highlight the facial expressions of the actors. Given a neutral, or lavender color, the light would add illumination but not take away from the overall dynamics of the scene, or subtract from the mood put forth by the current lighting. This third light was present in most of the on stage areas, primarily because of the added distance from the actors to the audience members.

While these area fixtures provide illumination to the actors, they do little to actually emphasize the moods and themes in the particular scene. This task is performed by a multitude of wash instruments, to which a series of gels were applied in conformance with a set color scheme. All of the utilized instruments are detailed in Appendix, Instrument Count.

This color scheme for *The Mikado* was loosely based upon what area of the stage the lights were focused on. The majority of action was supposed to take place under sunshine, and as a result a lot of amber gels were used on lights aiming at the down stage area. A blue wash was also added to allow for contrast. The upstage city backdrop had a mix of saturated and light blues to provide a nighttime and moonlight effect, while also having oranges and reds to provide sunrise and daytime appearances. All of the fans, the two small ones on the side of the stage and the large fan upstage, had a saturated Red, Green, and Blue gel attached to fixtures focused on them, in order to create a RGB wash capable of producing a multitude of color shades and appearances. The area surrounding the choir rises utilized a soft blue and a lavender color to provide illumination, and the ability to change the mood the choir area projected, without distracting from the action elsewhere on stage. The breakdown of the gels used can be found in Appendix, Color Count.

This area also had several lights focused on it equipped with color correction gels. This was to allow for the use of automated fixtures on the area, with the intent that they could be used to generate a wider variety of color washes and texturing over the choir area. A main issue with automated fixtures arises from the fact they use a different illumination source, which because of the chemicals and mechanisms involved creates a light with a different simulated color temperature (it is similar to the difference between a classroom fluorescent light and a incandescent desk lamp). By using this color correction, the relative color temperatures are matched so that the lights can be used in conjunction without a harsh contrast between sources.

In addition to the conventional lighting fixtures utilized, it was decided to obtain several **automated lights** to complement the design. These fixtures are capable of a pan/tilt motion, and typically are capable of quickly changing colors. The design for *The Mikado* primarily utilized two types of intelligent fixtures: the Clay-Paky AlphaSpot and the Varilite VL-2402 Wash fixture. Two AlphaSpots were hung from the truss, and used in place of the manually operated spotlights one might find in a typical theater. They were often used as specials, illuminated a specific character or scenic element. They also were utilized to provide color washes to the offstage platforms, where a full set of conventional color washes were not available due to space restrictions. They were chosen for their purpose because of their high speed, quick transition time between cues, and the ability to focus and zoom the beam, effectively changing the width of the light beam cast on stage. Although slower, but providing a must wider throw of light, the VL-2402s were used on stage, with two hung of the downstage battens. They predominately provided color washes across the scenic elements, and a mix of down light and accenting to the action taking place downstage, directly under them.

Once a type of light is assigned to an area, the next step is to find a place to position it. Source 4s in particular are extremely versatile instruments. A series of interchangeable **barrels**, or lens assemblies, are available for use on each fixture. These barrels are differentiated with a marking of a degree spread. The smaller the number, the narrower the beam put out by the fixture is. This allows for the light to be placed further back in the auditorium, which maintain

the same relative size on stage. By focusing the light through a barrel, as opposed to using a series of metal shutters to cut off the edges of the light, more of the light actually reaches the stage and is able to illuminate the actor. This helps to minimize the intensity difference between a narrow degree fixture placed in the back of the hall and a fixture with a wider throw placed closer to the stage. The next step is to find a location to place the light an assign the fixture the appropriate barrel.

With the Mikado, one of the first obstacles recognized lay in the fact a large portion of the set was to be placed in front of the pre-existing stage. The typical location for the truss would not allow for the offstage ramps and platforms to be lit. Because of financial limitations, it was decided that towers would be erected halfway between the pre-existing stage and the back of the hall, in order to cover in front of the Alden stage. In addition, a 40' run of truss would be positioned immediately downstage of the pre-existing stage. Battens, located over the same pre-existing stage, would support the fixtures used to light the backdrop and some of the upstage playing areas, while the truss would light the downstage areas, in addition to providing most of the wash light for the stage and set.

With all shows, there may be a need for specials. These lights, often only turned on for a scene or two, typically emphasis a particular action or scenic element, and provide a sharp contrast against the remainder of the stage. Examples of these fixtures, taken from the Mikado, include lights used to illuminate a series of Segways before the riders boarded them and for different actors during certain choreographed sequences. These sequences will be later detailed in the portion of this document pertaining to the actual programming of the show.

The majority of this work first takes the form of notes or scribbling on paper. However, as the design comes nearer to completion, it is often ported into some form of computer software. Whether it is simply a graphics tool to produce a printable **plot**, or a full lighting package, that also produces renderings, instrument counts, and circuit lists, there are numerous advantages to the use of technology. On the day of the hang, it is immensely helpful to have a detailed, neat plot in hand. With no worry of incomprehensible or misleading handwriting, fewer mistakes are made. Additionally, if a change has to be made, a new plot simply needs to be printed off. This eliminates annotations on a paper copy that inevitably lead to confusion. Furthermore, having the design computerizes compacts a handoff to the Master Electrician from several pages of notes and design data, into a single email attachment.

Implementation

The next step of the design process results in the movement from paper to reality. This process usually begins with the handoff of the design from the Lighting Designer to the Master Electrician. Included in this handoff, is a series of documents detailing the positioning of all necessary instruments, as well as type of fixtures to be used. Additionally, a document detailing

all needed **gels** and **gobos**, will be given to the electricians so that they can prepare for the hang. Before the hang itself can be completed, there is a large amount of groundwork that needs to be undertaken. The M.E. will take the lighting plot and create a corresponding circuit and patch list. This document assigns each fixture to a channel on a **dimmer**, used to control the individual **intensity** of the fixture. Multiple fixtures can be assigned to a **channel**, and it is an important consideration to minimize the number of dimmers to reduce cost, while at the same time maintaining any necessary individual control over the intensity levels of fixtures. The ME must then determine the paths for all the electrical wiring to connect the individual lights to the appropriate dimmer. The potential for ending up with a tangled, impossible to troubleshoot mess, can only be avoided with extensive planning and calculations, to ensure the appropriate length of cabling is used, and the enforcement of proper labeling conventions, so that work can later be efficiently traced when issues inevitably arise later.

The Master Electrician must take all the collected data, and must find sources to obtain the necessary dimmers and fixtures. Additionally any rigging equipment, such as truss or towers, and necessary cabling for all the lights needs to be obtained. Typically at WPI, the primary on-campus source for equipment is through Lens and Lights, through which the truss and towers, as well as the majority of lighting fixtures can be obtained. Additional equipment was obtained through off-campus rentals with High Output. Gels and gobos, which are often considered expendables due to their short lifetime, were purchased through Advanced Lighting Production Services (ALPS).

The next major step of the implementation phase is the actual hang, where all the lights and equipment are brought to the venue and subsequently installed. Depending on the complexity of the show, it is a process that can take hours, or consume multiple days. The appropriate rigging has to be prepares, lights attached to it, and subsequently hundreds of feet of cabling run throughout the venue. Once all the lights have been attached appropriately, gels and gobos are added. This is typically the last ground work performed on lights attached to fly rigging, before they are set to trim height, the position at which they'll remain until the run of the show has been completed.

While this part of the implementation phase is handled primarily by the ME, the next phase is often a collaborative effort between the LD and ME. The task of focusing all the fixtures, and setting them to then appropriate position for the show, can be a lengthy complicated process. Typically it is undertaken once any rigging has been raised to the trim height. An electrician then goes up to the light, either on a ladder or a lift, and focuses it under the direction of the designer. The process of focusing typically includes pointing the fixture in the desired direction, and then utilizing any metal shutters to prevent spill to inappropriate areas. On many lights, there is also a provision to focus the actual beam of the light, and this is also included in the process. Work is often performed only on one light at a time, and it can quickly become an arduous process. Additionally, the designer needs to constantly keep in mind how each light will interact with the others used throughout the show. Frequently lights will be compared with other

specific instruments to ensure that they will compliment each other appropriately. Another important task in focusing is working to minimize the transition between different lighting areas. If not appropriately managed, when an actor moves from one part of the stage to another, there will be a set of shadows or noticeable intensity differences. Lights must be appropriately focused and aimed so that there are neither shadows nor differences in intensity, either due to a different distance between actor and light placement, or to a difference separation between the warm and cool elements of a combination pair.

Programming

Having hung and focuses the fixtures comprising the show, it becomes time to prepare the equipment to actually light the show. Nearly all lighting boards in use today have the capability of storing show data in memory. Designers go through each scene of the performance, and set the lights to appropriate reflect the actions taking place across the state. This data, typically comprised of intensity levels assigned to each dimmer channel, it then saved into memory, which is later played back during an actual performance.

This process is often heavily depended upon the actual locations of actors and scenic elements. As a result, it is helpful to watch rehearsals before hand, in order to ensure the appropriate areas are adequately lit. Each change in lighting is marked with a **cue** number so that it can be later referenced or modified.

Although the actually programming process varies between designers, with the Mikado, it started in rehearsals. During rehearsals, numerous notes where taken, and more importantly throughout the script, annotations were made to indicated a needed cue. These cues were often placed to accompany a particular action taking place on stage, or some shift in the mood of the scene. Although cues based upon actions, are usually easier to identify, they can include entrances or when actors move from one side of the stage to another, those taken to represent a shift in mood or feeling are much more subjective. Thorough note taking is required, predominately due to the fact that the actors will not be present during the programming process. It is based solely from memory and notes that a designer is able to illuminate the parts of the stage needed to light the onstage action appropriately. Until the actors are brought in during the first tech rehearsals, the designer usually does not have the ability, outside of the mind, to view the interaction of the lights with onstage movements and actions.

Typically the programming of a cue stages with adding area lights that primarily serve to illuminate the actors. In the WPI design, many of these lights followed a warm-cool pattern, this allowed for a dominant warm or cool feeling to be granted to the stage. With the area lights set, color washes are then typically added. These washes, using colors starkly different than the pale tints of the area lights, help create an overall mood to the scene. A blue wash, might indicate and give the feeling of a night scene, while a fiery orange/red might give the impression of a sunrise

or sunset. In scenes where there is a sense of anger, a red wash might be added to emphasize this feeling, while feelings of sadness might be highlighted with a blue tint.

With the levels of all the lights in the scene set to an appropriate level, the cue is recorded, and a transition time added. This time corresponds to the length of the cross fade between scenes, and can range anywhere from 0 seconds, a harsh switch between scenes, to a less noticeable transition of several minutes.

WPI often utilizes intelligent lights, which further complicates the programming process. In addition to turning the light on and assigning it an intensity level, the designer must move the light to position it in the appropriate location. There are additional features that many lights have, which must be taken into account. Although they vary vastly between manufacturers and models, a few can be briefly touched upon. The most common feature is the ability to change the color of the light beam. Many lights utilize a series of gels to allow for the switching between set colors. Higher end lights utilize three color filters, often a set of cyan, magenta, and yellow discs, that allow fort he replication of nearly any color shade. Other features include a zoom, that affects the width of the projected beam, a gobo rotator, which inserts a pattern into the beam of light, and a strobe function, among other potential features.

For those familiar with the show, breaking down a couple cues will help explain the programming process. For the number "I am so proud", Pish-Tush, Ko-Ko, and Pooh-Bah move from different areas of the stage. In order to a dramatic effect, they each receive their own spot light, while there is a dim dark blue wash cast across the stage, to add to a sense of gloom as they contemplate who is to be sacrificed to retain the town of Titipu's standing. A cue has to be called for each movement so that a spot comes up on the actors new positions, and the lights from the previous cue are faded out. In one cue, automated lights actually follow the actors as they move from on-stage and walk down the ramps to the floor. Other noticeable cues take place in both the Act I and Act II finales. During the numbers, a particular character has sings a solo. In many cases a cue is associated with this, and results in a fixture giving a spot light effect on the actor, as the neighboring lighting areas dim slightly to give an added emphasis on the character being given the center of attention. In sequences like the finale scenes, there were upwards of 40 cues, in order to provide for all of the movement and mood shifts that took place throughout the number. It was also sequences like this where the automated lights were heavily used, so that one instrument could pick up a single person and give them a spot in an infinite number of locations on the stage.

With all of these intricacies involved with tying the actor's performances and movements to the composition of each cue, its can be easily seen how complicated the programming process can be without having the actors actually on stage.

Rehearsals

It isn't until the first Tech Rehearsal, when the lighting cues are run through with the actors onstage that the designer starts to see the results of the design. Finding a way to use this rehearsal most efficiently becomes critical. It isn't usually feasible to stop the rehearsal whenever there is an issue with the programming of a cue. Instead, designers typically take detailed notes describing changes that have to be made. In general, these changes relate to the intensity of various fixtures, but in the case of automated lights, can also involved detailed changes in the movements or behaviors of the instruments. The initial rehearsal typically is also the first time the director and the remaining production staff has an opportunity to view the lighting design in action, and its overall effects on the performance as a whole.

With numerous pages of notes, as well as critiques and requests from the director, the designer sets out to begin a second round of programming, to tweak the cues comprising the show, adding and removing cues as necessary. Ideally, all the necessary changes could be made in one night, but the next rehearsals, test the design in their own ways, additionally testing the repeatability of the movements of the actors on stage, and the reproducibility of the lighting elements of the show as a whole. Again notes are taken, and changes made, with the end goal that any flaws will be fixed before the show opens.

In general once the rehearsal period of a show has ended, there are no further changes to the lighting design or programming, unless it is to fix a glaring issue. This is primarily to ensure that all audiences see the same show, at least from a technology stand-point. When the show moves from the production phase and becomes public performance, the lighting designers role comes to and end. After the show has completed its run a **strike** will take place which will return the venue back to its original state, removing any trace of the production, and allowing for the entire process to be repeated and to shine the spotlight on another cast.

Conclusion

Although the specific details vary greatly between productions, Lighting Designers in general follow a similar process in order to deliver a design. They read the script, meeting with the production team, and determine the needs of the particular production. They create a plot to complement the show, utilizing the allotted resources for the necessary equipment. All the equipment is hung and focused, and the designer directs the programming of the show, in order to ensure the look of each scene fulfils their vision. The design is refined up until opening night, and then the show takes place, marking the end of the design cycle, and allowing it to repeat subsequent to the close of the show.

The same process has been followed ever since theatrical lighting began to become commonplace. With new technology, such as intelligent lights and color mixing instruments, designers have been given more power to bring their visions to the stage and perfect the visual

art of lighting design. When done correctly, a design should complement the action that takes place on stage, without taking away from it. Therein lies the challenge, and is the mark of a good designer, and is a practice developed only with years of experience.

Glossary

Automated Lights

Also known as moving lights, or intelligents, they are motorized fixtures capable of pan/tilt movement. They also typically can change color either by use of a gel string or gel wheel, or by utilizing color disks proving full RGB or CMY mixing. They also can have a multitude of additional features, such as the ability to store and insert gobos, and sometimes have color correction filters built in to equate the simulated color temperature of the often chemically induced arc to that of regular incandescent fixtures.

Barrels

Barrels are the portion of the light fixture that directly affects shape and the width or spread of the beam of light emitted by the instrument.

Channel

The electrical patch connecting an instrument or set of instruments to a dimmer.

Conventional

A typical incandescent stage light.

Cue

A reference to a known lighting setting, often preprogrammed, that corresponds to a particular moment in the script.

Dimmer

Electrical equipment that is capable of varying the output intensity of a stage light, and is able to do so in relation to a specific command.

Electric Position

An area or piece of rigging equipment, such as a balcony or batten, that lighting equipment is able to be hung.

Fixture

Used interchangeably with instrument; a piece of lighting equipment used to illuminate the stage

Focus

The direction toward which a light is aimed.

Gels

Colored plastic material that is placed in the path of light to change its color.

Gobo

Either glass with a printed pattern or a metal cutout that when inserted into the path of light result in a noticeable pattern on stage.

House inventory

The lighting equipment owned by the particular venue.

Instrument

Used interchangeably with fixture; a piece of lighting equipment used to illuminate the stage

Intensity

The level of light output from a particular instrument.

Lighting Area

A division of the acting space, used in order to differentiate a set of focused instruments
From those devoted to other lighting areas.

Plot

A document detailing the placement and focus of lights.

Proscenium Stage

A typical theater venue, with a raised stage, set behind a large opening masking offstage area, or wings, out of view of the audience.

Spot Fixtures

A light designed to illuminate a small specified area and emphasis it over the surrounding area.

Strike

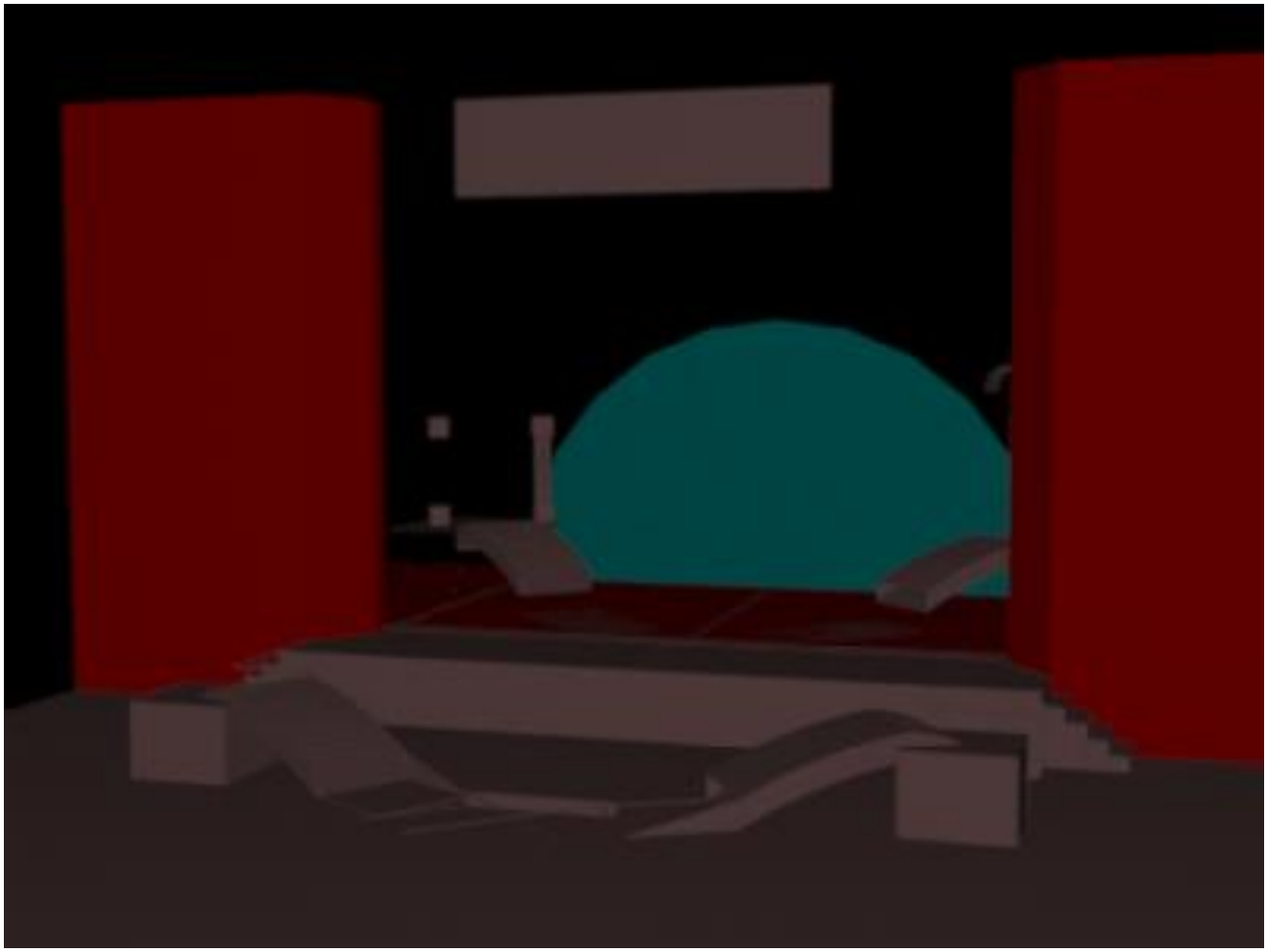
The process of breaking down all equipment placed and any set constructed for the production, in order to return the venue to its original state.

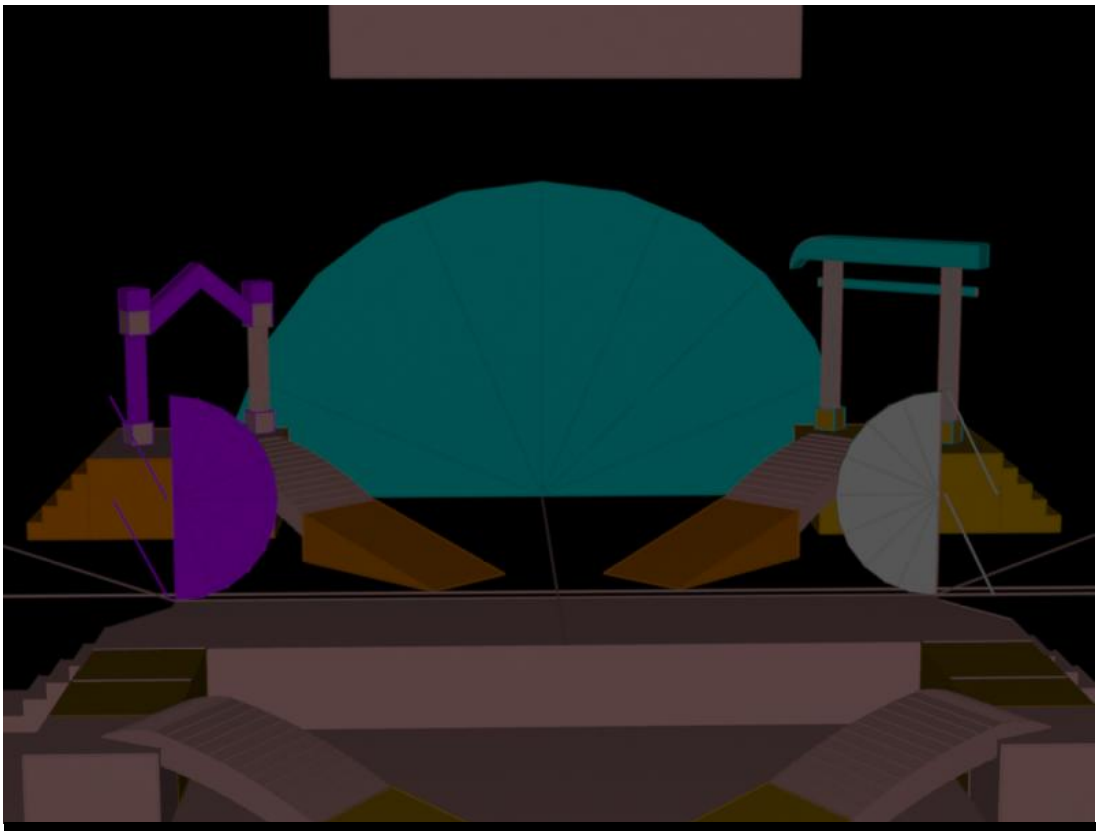
Wash fixture

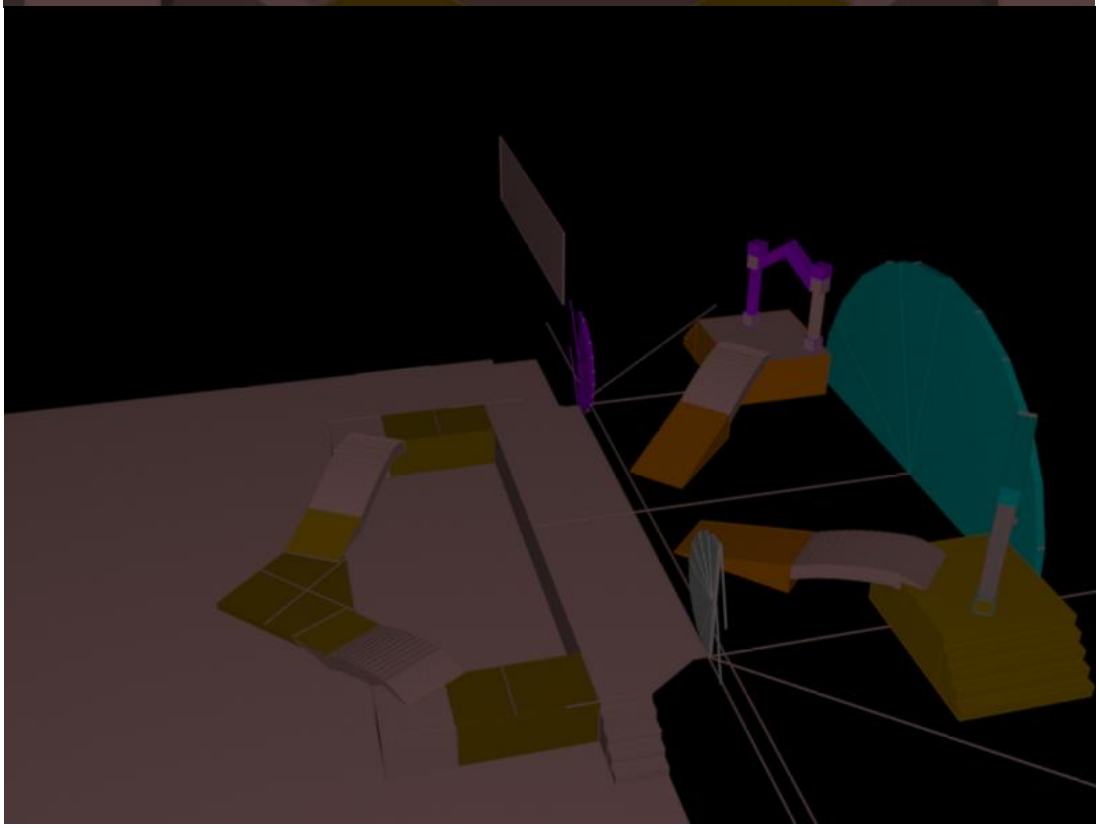
A light designed to cast a wide angle beam of typically diffused light used to set an overall mood and fill in any dark areas between lighting areas.

Appendix

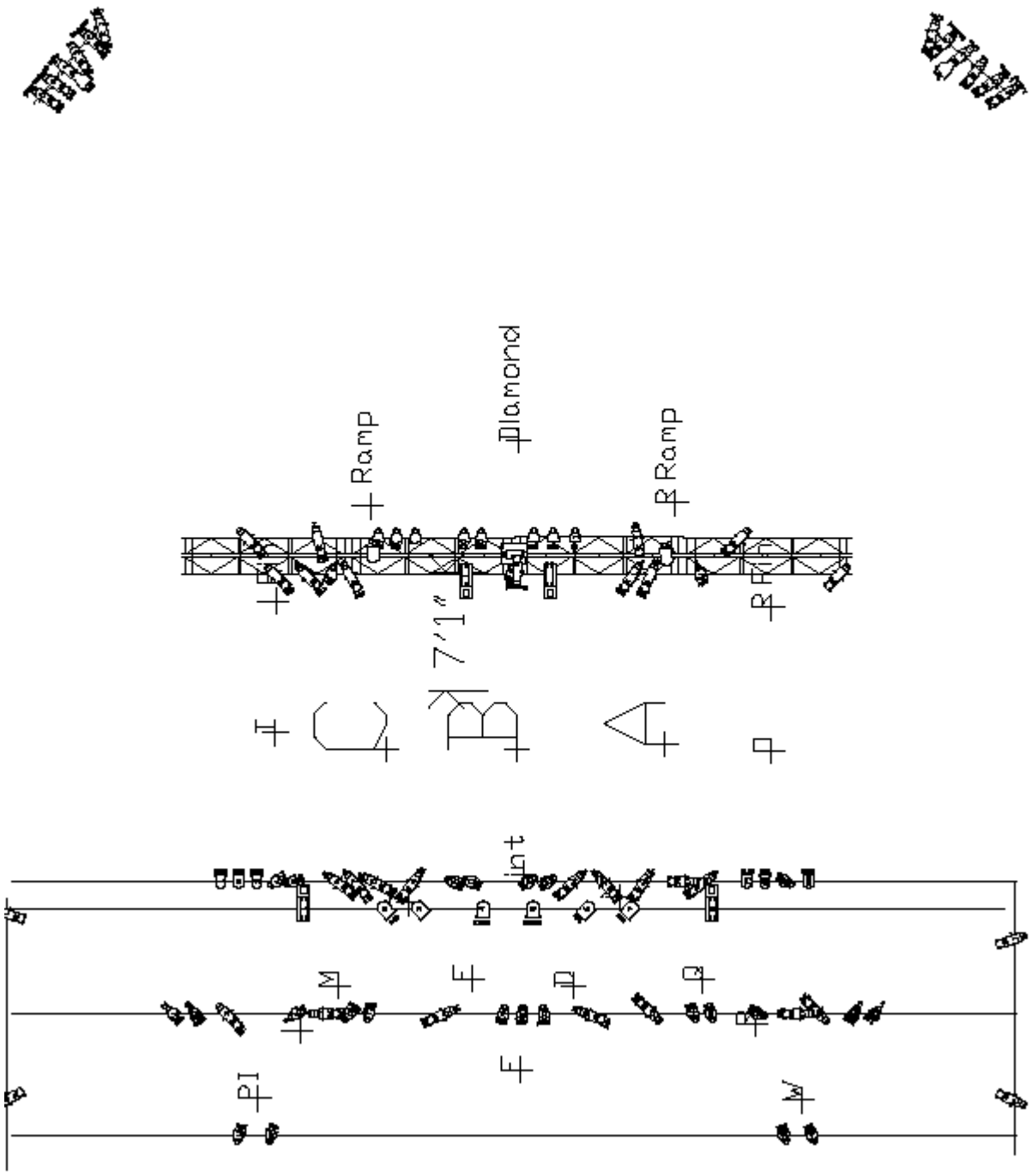
Set Design



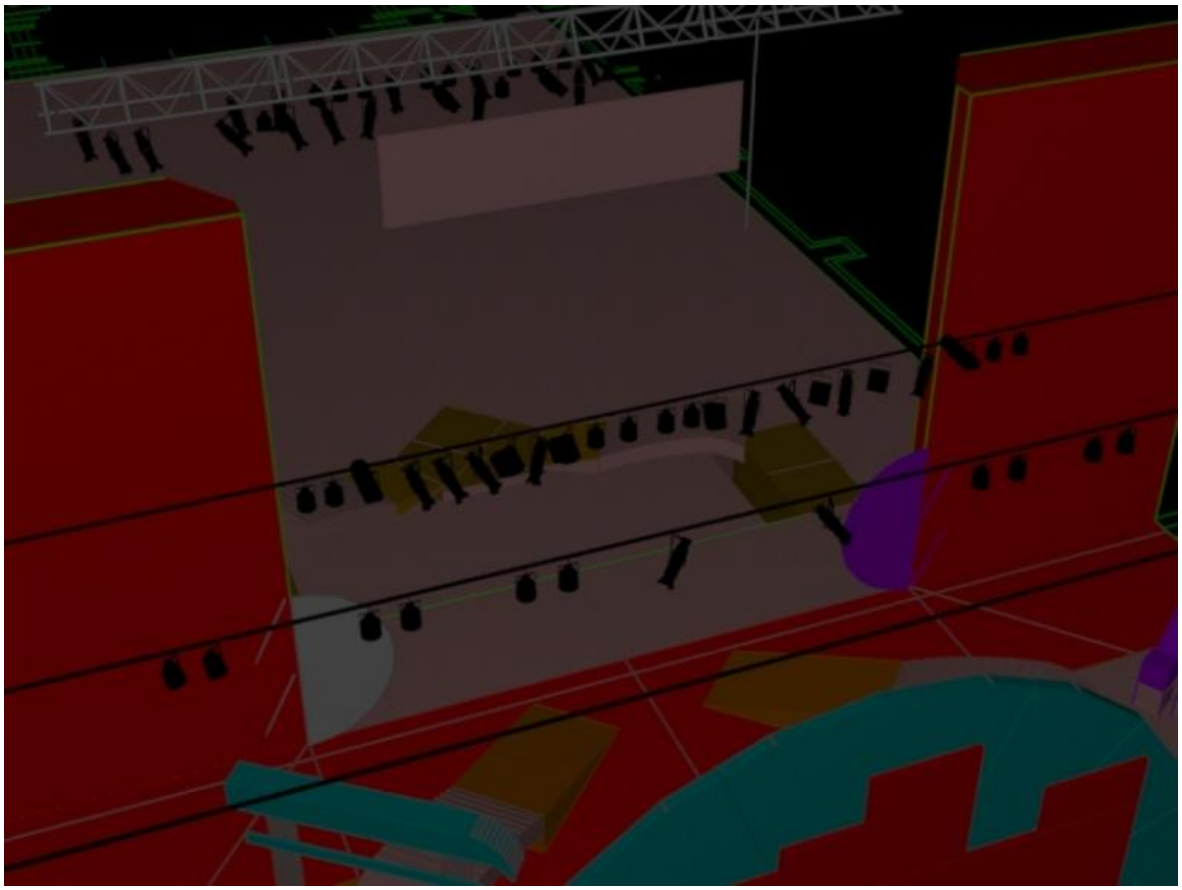




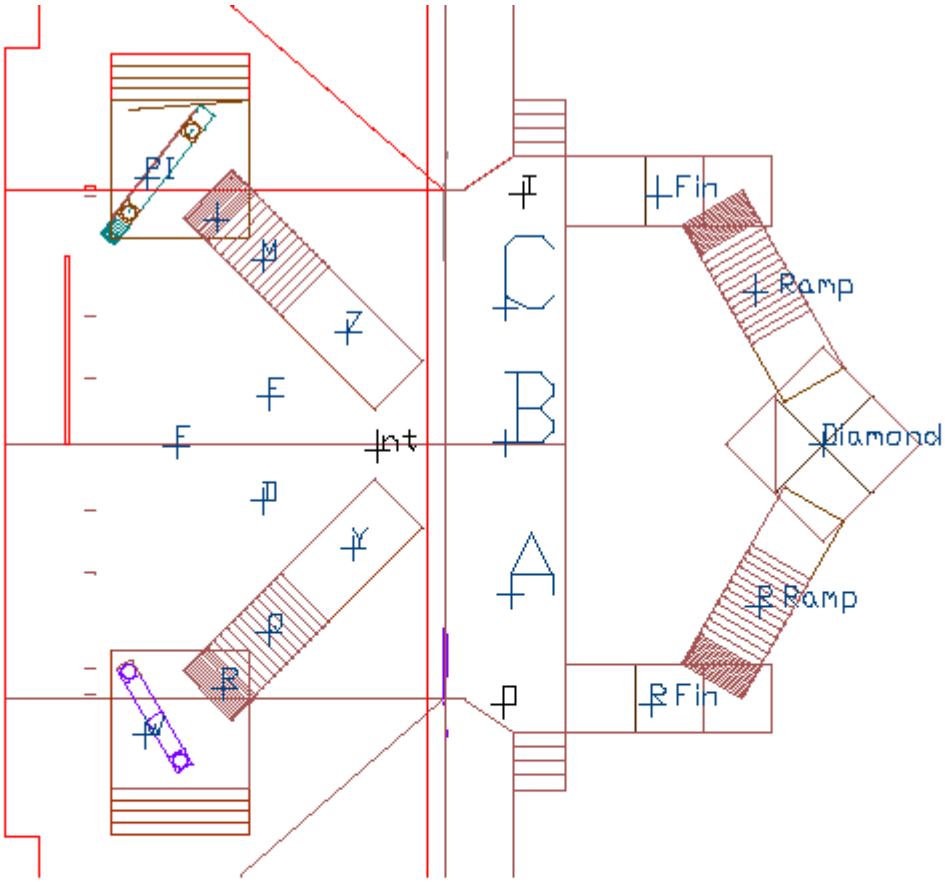
Lighting Plot



Computer Renderings



Area Plot



Fixture Count

Instrument Count

(All Layers) 9/3/2007 14:52

Venue: **Show:**

Designer: **Assistant:**

Type	Lens	Count	Status
6 Inch Fresnel		6	HUNG
8 Inch Fresnel		8	HUNG
Mac 500	Standard	1	HUNG
Source 4	10 Degree	2	HUNG
Source 4	19 Degree	8	HUNG
Source 4	26 Degree	10	HUNG
Source 4	36 Degree	29	HUNG
Source 4	50 Degree	10	HUNG
Source 4 Par	MFL	14	HUNG
Source 4 Par	NSP	4	HUNG
Source 4 Par	WFL	17	HUNG
Trackspot		4	HUNG
		113	

Color List

Colour Count

(All Layers)

9/3/2007 14:50

Venue:

Show:

Designer:

Assistant:

Colour	Type	Count
R3	6.25" Colour Frame	1
R3	7.5" Colour Frame	2
R5	6.25" Colour Frame	2
R5	7.5" Colour Frame	1
R16	6.25" Colour Frame	1
R18	7.5" Colour Frame	7
R21	6.25" Colour Frame	2
R26	10" Colour Frame	2
R33	6.25" Colour Frame	15
R33	7.5" Colour Frame	2
R34	7.5" Colour Frame	2
R36	6.25" Colour Frame	1
R36	7.5" Colour Frame	2
R37	6.25" Colour Frame	4
R37	7.5" Colour Frame	2
R39	7.5" Colour Frame	4
R53	6.25" Colour Frame	2
R60	6.25" Colour Frame	17
R60	7.5" Colour Frame	2
R65	7.5" Colour Frame	3
R69	6.25" Colour Frame	1
R80	10" Colour Frame	1
R89	6.25" Colour Frame	1
R117	10" Colour Frame	2
R120	7.5" Colour Frame	3
R121	7.5" Colour Frame	3
R122	7.5" Colour Frame	3
R351	7.5" Colour Frame	2
R364	6.25" Colour Frame	1
R364	7.5" Colour Frame	2
R3208	10" Colour Frame	2

Rental Information

Sheet1

Mikado Lighting (Rev.3)

Qty.	Item	Price Per	Total
	Fixtures		
6	6" Fresnel	$2.00	$12.00
8	8" Fresnel	$2.50	$20.00
8	19 deg S4 Ellipsoidal	$3.00	$24.00
7	26 deg S4 Ellipsoidal	$3.00	$21.00
13	36 deg S4 Ellipsoidal	$3.00	$39.00
5	50 deg S4 Ellipsoidal	$3.00	$15.00
15	S4 PAR MFL	$3.00	$45.00
4	S4 PAR NSP	$3.00	$12.00
13	S4 PAR WFL	$3.00	$39.00
4	High End Trackspot	$10.00	$40.00
10	Gobo Holder	$0.25	$2.50
		Subtotal:	**$269.50**
	Rigging		
2	Applied L-16 Towers	$15.00	$30.00
4	10' Tomcat Triangle Truss	$12.50	$50.00
4	10' Applied I-tube Truss	$12.50	$50.00
2	1 ton Chain Hoist (control and powe	$20.00	$40.00
6	6' Steel Slings	$2.00	$12.00
6	6' Nylon Slings	$2.00	$12.00
		Subtotal:	**$194.00**
	007 Rigging Package/Power Distributor		
12	Truss Bolts w/ washers and nuts		
2	15/16" Large Ratchets		
2	15/16" Wrenches		
2	Pickles		
2	3¼ ton Shackles		
6	4 ½ ton Shackles		
4	4 ¾ ton Shackles		
2	6 ½ ton Shackles		
2	Cheeseboroughs		
10	Small Truss Pins w/ cotter pins		
5	Large Truss Pins w/ cotter Pins		
2	3 ft. Slings		
		Subtotal:	**$25.00**
	Cable		
4	Box Splay	$2.50	$10.00
4	Cable Splay	$2.50	$10.00
7	100' 8 circuit Socapex (14 gauge)	$4.00	$28.00
5	50' 8 circuit Socapex (14 gauge)	$3.00	$15.00
1	100' 8 circuit Socapes (12 gauge)	$4.00	$4.00

Page 1

This document outlines the equipment rented from WPI Lens and Lights, and the associated quotes.

HIGH OUTPUT INC.

Reservation

Description: @ Colin McCarthy

Order #: 465017 **Version #:** 1

Customer: Worcester Polytechnic Institute
100 Institute Road

Worcester MA
Attn: Greg Marr
Phone: (508)831-5220
Fax: (508)831-5881

Ship To:
100 Institute Road

Worcester MA 01609
Attn:
Phone:
Fax:

Customer ID	Ordered By	Phone	Cust PO	Salesperson	Terms	FOB
WPI	Greg Marr	(508)831-5220		Antoine Gagnon	C.O.D.	Canton MA 02021

Schedule				Shipping Comments:
Remark		Time	Date	
Delivery	CUST. FU	8:00 AM	09/04/2007	
Pick Up	CUST. FU	4:00 PM	09/17/2007	

Qty	Item ID	Item Description	Unit Price	Bill Unit	Disc (%)	Ext Price
27	TCC	C-Clamp, Theatrical	0.00	14.00	20.00	0.00
2	MLCPAS	Clay Paky, Alpha Spot 575w	250.00	14.00	20.00	800.00
27	TCF6.25	Color Frame, 6.25" S-4	0.00	14.00	20.00	0.00
5	TES419	ERS, Source 4 19 Deg Lens Only	7.00	14.00	20.00	49.00
6	TES426	ERS, Source 4 26 Deg Lens Only	7.00	14.00	20.00	58.80
15	TES436	ERS, Source 4 36 Deg Lens Only	7.00	14.00	20.00	147.00
1	TES450	ERS, Source 4 50 Deg Lens Only	7.00	14.00	20.00	9.80
27	TES4H	ERS, Source 4 Head Only	7.00	14.00	20.00	264.60
27	TSAFB	Safety Cable, Black	0.00	14.00	0.00	0.00
2	TVL2402	VL-2402 Wash Luminaire 700w	285.00	14.00	20.00	912.00

Rental Subtotal	$2,241.20
Discount	$0.00
Sales Subtotal	
Sales Tax	$0.00
Labor Subtotal	$0.00
Misc. Charges	$0.00

www.highoutput.com
495 Turnpike Street, Canton MA 02021 tel: 781-364-1800 fax: 781-364-1900

This document is the quote provided by High Output, for the Mikado rental, and details all the lighting equipment rented from off-campus sources.