UNM

The University of New Mexico

Campus master Lighting Plan

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University of New Mexico

Albuquerque Campus Lighting Master Plan

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1. Introduction

Lighting at the University of New Mexico has evolved as the campus has grown and changed. There is little indication of any attempt at standardizing equipment. Over time, with the new building projects, a variety of unrelated equipment has been selected. In many cases, lighting equipment has been selected for a perceived need without consideration of context or precedence in order to “brighten” or decorate an area or building of the campus.

The Lighting Master Plan was proposed, and subsequently has been developed, for the entire campus in order to establish a cohesive approach for a nighttime visual environment of the campus. This plan addresses current issues and concerns and anticipates future expansion and changes on both sides of Lomas Boulevard.

Implementation will be in phases over the next 10 years or longer, based on a multitude of criteria. The result will be a safer, more secure and visually inviting environment on the campus after dark. People will be able to clearly identify the points of entry to the campus and made to feel comfortable after dark as they travel within the campus. This sense of security will encourage much greater use throughout the year by students, staff faculty and local residents by day and night.

2. Master Plan Objectives

The objective of the Master Plan is to develop a comprehensive and coherent approach to the exterior lighting of the main campus of the University of Mexico. The following are specific goals of the plan:

a. Create a welcoming and safe nighttime environment, which will encourage usage by students, staff and residents after dark.

b. Establish criteria for the distinct illumination of campus roads, walkways, pedestrian malls and plazas, parking areas, building facades and entrances, landscape areas, campus \ gateways both as individual elements and in context of the specific campus setting.

c. Select a lighting fixture vocabulary that will address each of the key elements, areas or tasks. Establish criteria, which will guide the choice of fixture types based on sustainability, maintainability and energy consideration. Fixtures must be appropriate to the aesthetic of the unique Pueblo Architecture of the campus.

d. Recommend guidelines for the implementation of the new standards.

3. Evaluation of Current Conditions

In the past, many of the lighting solutions around the Campus were shaped by a reaction reflex, such as the yearly student Campus Walk-around.

This yielded a list of areas, which were deemed inadequately illuminated. In response, wall mounted fixtures were added in some locations to “fill in” the dark areas.

The fixtures used are bright and very glaring and therefore counter-productive. This has proven to be an effective solution. Good lighting does not equate with fixture brightness (and the resultant glare) which intrudes into the normal field of view.

a. Excessive Fixture Glare and Dark Sky Concerns

One of the major lighting problems, endemic to the Campus, is glare. Glare can be defined as the loss of visibility and/or the sensation of discomfort (even pain) associated with excessively bright light within the visual field. The refractor wall packs used to eliminate the “dark zones” around buildings and under several trellis structures are an example of fixtures, which are grossly glaring.

Fixtures with little or no optical control cause sky glow and are is very detrimental to the users of the Observatory. In addition to the previously mentioned wall packs, the refractive lened cobra head streetlights, used in the parking areas adjacent to the observatory and on some of the streets, is another culprit. To ameliorate these problems, users of the Observatory, shields have been added to some of the luminaires. In addition, some lights will now be controlled by time clocks to be turned off, when not needed, to facilitate use of the observatory.

b. Sustainability and Equipment Variations

There are five standard, major, campus fixtures. Each of these plays a significant role in the illumination of the Campus after dark.

1. *Walkways*: A pole mounted “Landscape Chandelier” with an acrylic diffuser incorporating an indirectly mounted mercury vapor lamp in single and multiple head configurations are used randomly on campus. Since it is no longer being manufactured the acrylic diffused fixture is very expensive to replace

2. *Walkways and Plazas*: In recent years Cutoff Shoebox Fixture has been introduced to replace the “Landscape Chandeliers”. This fixture provides

excellent optical control and uses mercury vapor lamps. The shape is very utilitarian and is of questionable aesthetic appeal.

3. *Area Lighting*: Wall mounted refractor area lights are used extensively around the campus with either metal halide, high pressure sodium or mercury vapor lamps. These vary in wattages and mounting height.

4. *Roof Mounted Area Lighting*: Several different floodlights are used for area lighting. Very few are well shielded. The result is unacceptable glare. A variety of lamps are in these fixtures, including the very inefficient and short lived incandescent and quartz lamps.

5. Step Lighting: Large, glaring recessed lensed step lights are used to illuminate stairways and as a walkway light in the residential areas.

When used as bollards these cause glare, reduces visibility and the sense of security.

c. Illuminance and Uniformity

Another major lighting issue is the extreme contrast in the distribution of light. Some areas are brightly illuminated, i.e. the walkways and plaza at Dane Smith Hall. While other areas are very dark, i.e. the landscape area north of Terrace Mall. Here the intensity varies greatly as you walk from the mall to the adjacent park like area in which readings of less than .10 footcandle were taken. The result: after dark, pedestrians are filled with a sense of foreboding in this area.

d. Visual Hierarchies

The campus exists as a sequence of plazas, parks, buildings, parking and green areas connected by walkways and streets. Orientation is gained from familiarity with landmarks; such as

buildings, sculptures or fountains and major gathering spaces. This familiarity tends to diminish the perceived scale of the campus and make it a friendlier, more comprehensible place.

After dark, many familiar buildings and site features fade into darkness and anonymity. This results in a sinister atmosphere. When the building façade at the terminus of a walkway is dark or landscaped areas around a building entrance are not illuminated, people tend to imagine hidden dangers. These areas or spaces are perceived as unsafe.

Although there are many significant vistas, nodal points and building entries, they are not “celebrated” or accented to express visual hierarchies after dark, Establishing hierarchies would help enhance the sense of security.

4. Recommendations to Improve the Nighttime Environment

The impact of the new lighting design will become apparent first by clearly identified portals that direct and lead people into the campus. Once within the campus, well-illuminated walkways and roads will express safe and secure passage between buildings and outdoor spaces. The perimeter roads will facilitate directing cars to the parking areas.

By establishing visual hierarchies through the lighting of select building facades, sculptures, and landscaping the nighttime environment on campus will be easier to navigate and more festive. The richness of the campus architecture and art will be expressed and celebrated.

a. Define Major and Minor Portals

All major campus portals should be clearly articulated by lighting after dark. To signify a monumental entry, a large structure or sign should indicate where you are upon entering the University. Currently, there are locations where signage or structures exist, but none are illuminated to emphasize their presence after dark. As an example, the structure that spans the pedestrian entrance at Cornell Mall, makes a strong statement by day, but has no presence after dark.

This structure has the potential of becoming a dynamic entrance marquee for night functions at Popejoy Hall. This could be accomplished with long life fiber optic or an LED system that can provide changeable colors and movement of light.

Signage or structures may be required at other locations; some of these are already being designed under other contracts. Major lighting should be considered and incorporated into their

design criteria. ***See Map 2 – Vehicular Portals***

Pedestrian portals are a significant element for students arriving on foot or by public transportation. Map 3 designates these entry locations. To the pedestrian, these should be welcoming points in space. Well-illuminated entries will attract and direct students and residents alike. Major pedestrian Nodal Points are also shown on this Map. These are locations where students may congregate between classes. The lighting will address the need to create a friendly social environment where students can feel comfortable while they are waiting for a friend, sitting down to socialize or opening up a laptop to work.

See Map 3 – Pedestrian Poles

b. Establish Visual Hierarchies for Buildings and Places

Visual hierarchies can be established through the appropriate unambiguous lighting of key building facades, sculptures or fountains. Map 4 defines the most important structures in the nighttime environment which, when illuminated, will begin to provide orientation for pedestrians moving through campus after dark. Lighting these structures is also an opportunity to celebrate some of the unique art and architecture of the campus.

c. Define Major and Secondary Campus Streets and Walkways

With the exception of service vehicles, much of the inner portions of the campus are devoid of vehicular traffic. This contributes to a safe pedestrian environment. There is both an outer and inner ring road, each having very different characteristics, which the proposed lighting will address. The major streets, Lomas and University Boulevards, serve as portals into the campus. They will be illuminated from fixtures mounted on 25' high poles at a wide spacing, in order to provide the prescribed uniformity and light level. Redondo Drives and Las Lomas Road and their sidewalks have a different character and are internal to the campus. On Map 5 these are designated as Secondary Campus Streets. On the North Campus, Yale, Camino de Salud and Tucker are also Secondary Streets. These will be illuminated with a more pedestrian 15' high pole and slightly lower light levels than the boulevards. In both cases, the luminaires being proposed are full cutoff, providing excellent optical control and eliminating dark sky issues.

The inner road of the campus has an adjacent walkway. The selected pedestrian scale luminaire for the roadway will also provide the quality and quantity of light for the walkways and will help to serve as a transition into the core of the campus.

Upon arriving into the heart of the pedestrian campus, the character of the

poles and luminaires will change to give a clear signal that this is the University of New Mexico Campus. The white metal halide light source used on the roadways will be used throughout the campus. Two different pedestrian scale luminaires have been chosen for the walkways. The first is a contemporary, cutoff, post top luminaire, which can be used single or multi-head as required. These luminaires on 14' poles will be used in the pedestrian plazas and malls as well as the primary and secondary interior walkways.

The second luminaire is more historical in appearance and is recommended for the park areas on the campus, i.e. around the Duck Pond. These areas have an entirely different feel, with dense trees and open green areas. A more subdued approach will be taken in lighting these areas.

See Map 6 – Pedestrian Paths

d. Recommended Standards for Illuminance and Uniformity

A series of illuminance and uniformity recommendations have developed for the various types of roadways, walkways, plazas and elevated walkways. Light levels vary relative to the density of pedestrians, and vehicles and their interaction. The uniformity requirements also vary. Heavily trafficked walkways should be very uniform, where as the elevated walkways with spill light from the classrooms, may not require the same level of uniformity. ***Appendix A – Lighting Recommendations*** delineates the area categories and light level recommendations and also shows the pole height and lamping information.

e. Develop a Vocabulary of Lighting Equipment

In selecting the lighting equipment for campus, several criteria were used:

- Aesthetic appearance
- Maintainability
- Sustainability
- Optical control and dark sky concerns
- Multiple manufacturers vs. sole source
- Energy efficiency of the system, eg. lamp/ballast and luminaire.

The finish selected and the luminaire style was chosen to blend with the pueblo style of the campus architecture. A rust colored finish will be used on roadway and walkway poles for the general campus. The luminaire used in the park settings will be a gray/green color to blend more with those environments.

Ease of maintenance is a major concern of the facilities staff. Luminaires, which can be opened easily and whose components are removable with quick disconnect plugs, will be specified. Lamp wattages and types will also be standardized resulting in a limited number of lamps and ballasts, reducing cost and types and the length of time

required for repair or relamping.

In all cases, the longest life and highest color rendering lamp have been chosen. The goal is to render people, plantings and objects in the most natural way. This will create a more pleasant nighttime environment and enhance the sense of security.

See Appendix C Lighting Vocabulary and Fixture Specifications and Appendix B Typical Layouts

5. Lighting Priorities – Key Focus Areas

The Campus Development Plan Team has analyzed the campus on a precinct-by-precinct basis and has made recommendations based on the capacity and character. Zones for future growth have also been identified. Based on this Plan and on current improvements around the campus, a Project Hierarchy has been developed for lighting improvements. This hierarchy is shown on Map 7. The area of highest priority is Cornell Mall, which has been under construction making way for the newly installed sculpture. Lighting for the sculpture was planned and implemented as part of this process. Because it is a high priority area, a lighting concept for the mall has been developed as part of this report (See 6,f, Pedestrian Malls). As an expansion to Cornell Mall, Union Square is the second highest priority. These are preliminary recommendations in a proposed logical progression of improving the lighting on campus. Over time, as projects develop, the lighting priorities may need to shift to respond to specific construction projects schedules. In all cases, the Lighting Master Plan will provide the criteria for lighting new developments on campus.

6. Design Concepts for Individual Elements

a. Campus Portals:

Ancient walled cities were entered through formal portals that reflected the character, culture and wealth of the city and its residents. Present day universities, such as the University of New Mexico, are larger and culturally more diverse than many such ancient cities and although walls are no longer needed for defense, formal portals continue to serve a significant purpose. As urban campuses have evolved and grown, so have the peripheral commercial areas that cater to the needs of students, faculty and staff. As a result, the campus may be lost behind a wall of shops and services stations.

At the University of New Mexico, the major portals into the campus should be strongly emphasized by day and night. Illumination is not enough. These points of entry should be expressed in a more monumental manner as a structure of some substance and containing integral lighting. An example would be a lighthouse by the sea, as opposed to a highway interchange. Each portal must have a unique quality, to assist with orientation and should consist of signage or a floodlighted unique form. At night the lighting must be so distinct that the destination is apparent as you

approach at a significant distance. The use of movement and color in the lighting is one way of providing that strong orientation.

b. Exterior Building Facades:

Day lighting is indiscriminate! It illuminates the irrelevant as well as that which is significant. Orientation is easily learned from landmarks. After dark, artificial lighting changes the visual environment. Building facades appear different and with more or less significance after dark. The existing lighting of campus buildings is arbitrary and confusing. This results in the waste of energy and the loss of major opportunity for excitement and interest, after dark.

Buildings must be thought of as existing in many distinct dimensions. Each building is dedicated to defined functions that may dictate hours of use and classification of user. Each building occurs in a finite relationship to its surroundings, and is experienced differently within that context.

Two note-worthy variable factors are the manner of illumination and relationships to the surrounding buildings. Techniques for the illumination may vary with the form, character and use of the building. Normally a parking garage would not be lighted in the same manner as a student union or classroom building. Some buildings by virtue of their juxtaposition on campus represent terminal vistas and as such demand higher levels of general illumination even if the nature or use of the building itself is insignificant. Other buildings achieve importance because they relate to nearby buildings and collaborate to define a public space.

There are some building facades that should not be emphasized by lighting after dark because the result is counterproductive. It may interfere with the use of the building at night or establish a new focus. Examples include the observatory, dormitories, and buildings surrounding dead end passages where such lighting may cause people to believe that there is a means of egress out the other side.

In the design of the lighting subsystem, the criteria will include appropriate techniques, first cost, issues of the maintainability, sustainability, and vandalism. Ground mounted fixtures are the easiest to maintain. Depending on their location, they may also be the most vulnerable to vandalism and theft. Careful evaluation must be made in their selection. Building mounted fixtures in some cases can result in significant savings in wiring and installation cost. In other cases, the architectural constraints may make this selection less appealing. Each building will be analyzed to determine the most appropriate solution and fixture placement.

Building mounted fixtures will almost always be used to illuminate deeply recessed doorways, porches and covered walkways. In such cases, close

attention will be paid to concealment so that the source of illumination is anonymous and non glaring, possessing a low magnitude of presence.

There are a few locations where trees are of such a height and location that they can be used for fixture mounting. Elsewhere the logical choice will be pole-mounted fixtures.

Lastly, there is one other factor in façade lighting, trans-illumination from existing interior lighting. Much is uncontrollable. In some buildings, existing lighting is very unpleasant whether seen from the outside or experienced from the interior.

In some existing buildings, adding trans-illumination may be desirable or visually important. The flexibility of this technique will be evaluated for specific buildings.

Transillumination of the glass wall building will feature this beautiful detail after dark. Exterior building façade illumination can be implemented over an extended period and should relate to the effect such lighting will have on the perception and use of the campus after dark.

c. Building Entrances

At night, building entries must be illuminated in a distinctive manner, making them easy to locate. The lighting should be of a greater intensity, than the surroundings and have a different architectural, ornamentation or expression.

Some simple techniques for lighting the entrances can have a major impact on the users and observers.

The hierarchy of illumination must begin first with the entrance and the surrounding areas subordinate to it. Intensely illuminated architectural features or signage will detract from an entry.

Examining the entries to university buildings reveals a number of ambiguities. While identification and safe illumination are two criteria, there are others. Entries are not created equal – some should be expressed as sanctuaries (warm and inviting) with a broad surrounding area

of soft illumination when adjacent to a social area with shelter and seating. Other entries may be lighted in a similar manner, but with a subtly different lamp spectrum, or lower intensity of light so that the entry is made subliminally less social and inviting, for example, at service buildings that would be used solely by staff. Other entries may be subordinate to the architecture and building use where doors are a part of an entry canopy or are covered by a decoratively lighted marquee.

Lighting fixtures should illuminate doors, doorways and define architectural planes (walls and ceilings). Fixtures and lamp sources will be selected for durability and long lamp life, as well as aesthetics.

d. Walkways

The most convenient way to get from one point to another on a college campus is to walk. After dark the challenge is to create a feeling of safety and security, as well as visual interest, to encourage foot traffic.

For the purpose of this report, the words safety, security and interest in connection with movement across campus after dark, have been defined to reflect our design approach.

Safety relates to anything in the environment that may affect the health or welfare of an individual or animal after dark. This requires that all hazards which may be encountered, in clear weather after dark, be adequately illuminated. Adequately is defined as being sufficiently visible at a distance to allow sufficient time for such hazards to be avoided. It also means that potential points of contact between pedestrians and vehicles be sufficiently illuminated so that each can see the other in time to avoid any accidental contact.

Security is a state of mind that requires pedestrians to unambiguously perceive their surroundings. For clarification, this would include the clear view of people in the vicinity and an awareness that there is no place for the concealment of an individual that may even remotely represent a bodily threat. It also requires that areas of sanctuary be visible and reachable - this may be building entries or police access phones and video monitors. One other element that adds to the sense of security is the presence of benches and sheltered areas. These provide a place to relax and/or reorient or reorganize oneself and a place to escape inclement weather.

Interest is a factor commonly overlooked on university campuses. The assumption that interest wanes on campuses after dark is obviously flawed. Interest may be achieved accidentally, but it adds immeasurably to the nighttime experiences to plan for it and not leave it to chance. Commercial centers of cities and suburban shopping or community centers are capable of sustaining interest by a combination of ever changing activities, surroundings and

people. Good examples of universities that sustain activities in at least some areas after dark are University of Pennsylvania, University of Delaware and UCLA.

Two means of lighting the paths will be employed. The first is dedicated walkway lighting. This will be achieved by a combination of techniques – lighting directed downward onto the paths and surround areas, the second is borrowed lighting such as reflected lighting from building facades, sculpture or landscape lighting and illuminated signage and the third will be the use of decorative lighting fixtures used as LOCI or points in space that define paths and public spaces.

A minimum variety of fixture types will be used to provide the most appropriate, economical lighting subsystems. Poles with low wattage lamps in cutoff decorative fixtures for the park areas. Higher wattage decorative fixtures with superb optics located atop moderately high 14' poles will be used on secondary walkwats. These will be used along paths in one of several layouts depending on the visual hierarchy or destination of the paths. For example, paths that wind their way through dormitory areas will use the same fixtures as leading to the student union area, but the spacing and layout would vary.

See Map 6-Pedestrian Paths

e. Overhead Walkways and Stairs

Adequate illumination can be achieved without the existing pole-mounted fixtures lining the bridge. These poles conflict with the floating horizontal lines of bridges which connect buildings and reinforce building rooflines, they are visual hiccups in the soliloquy of a line. Low height, compact fluorescent or low wattage metal halide bollards will be used at the existing pole locations and intermediate bollards added to adequately illuminate the walkways.

To enhance the overall visual experience of the bridges, we recommend painting the interior of the bridge either white or an off white. This will enhance the quality and intensity of the interior illumination significantly. This lighting approach will eliminate shadows of the bridge upon the ground below caused by the poles. Stairways can be illuminated in a similar manner, but the fixtures should be mounted in line with the first riser ascending or descending the stairs.

Recessed lighting beneath the bridge should be replaced. New fixtures that provide some uplight will help to open up these areas. Areas beneath open stairs should be lighted to eliminate concealment locations.

f. Pedestrian Malls

See individual Mall Streets

Cornell Mall

Cornell Hall begins at the largest formal entry into campus. It is important both for its high usage by students and theatergoers as well as the significant structure, which marks this portal. The arch structure defines a strong entryway and the University Book Store anchors one side quite well.

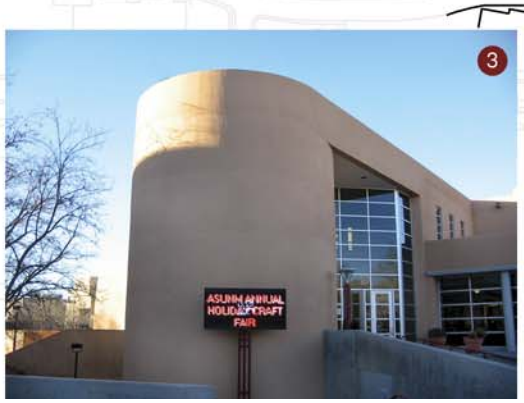
The monumentality of this entrance portal works by day. Because of insufficient lighting its strength is diminished after dark. The center "beam" that spans the opening should be emphasized. There are several methods to achieve this: provide a warm glow from pole mounted or structure mounted fixtures, outline the structure with fiber optic or LED's or provide points of light which have the ability to change color and chase. The stairs at the east should be expressed by illumination as a significant architectural feature. Recessed lighting of the bookstore colonnade façade should be increased in order to emphasize the transverse plane supporting the beam. This is a three dimensional compositional supportive pier at one end of the beam and the brick corner wall supporting the beam should be illuminated by pole or ground mounted fixtures with a cooler color light. The ramp should be defined by decorative pole mounted fixtures along one side.

The new parking garage has a strong presence as you enter Cornell Mall. It must be treated assertively but subtly with lighting for no other reason than its key location. There are several areas where the lighting must be improved. The pole mounted lighting fixtures on the roof should be replaced with deeply shielded cutoff luminaries. The wall of the stair tower represents strong vertical planes which should be accented by washing with light instead of the existing glaring points of light. The exterior walls of the stairwell should be softly lighted from pole mounted flood lighting fixtures. Pedestrian entries to the parking garage should be expressed by building mounted decorative fixtures. Plaza mounted decorative lighting fixtures should be relocated to define entries to the stair towers.

The sculpture Fiesta Dancers is of a large scale. The appropriate lighting should be 40'-50' pole mounted, metal halide floodlights with precise optics to illuminate the sculpture with metal shields to prevent glare. Cool floodlights, mounted to the same poles, will provide anonymous fill light onto the surrounding plaza.

Popejoy Hall is an entertainment center actively used after dark and occupies a prominent place opposite the Dancers. The outer plane of the façade should be illuminated with a soft wash of light from

1. STUDENT UNION
2. POPEJOY HALL
3. ENTRANCE SIGN TO UNIVERSITY THROUGH CORNELL MALL
4. FIESTA DANCERS
5. JOHNSON CENTER
6. PARKING FACILITY



pole or ground mounted fixtures. The inner plane of the entrances should be illuminated with recessed downlights. Decorative fixtures mounted to the face of the building, across from the entry columns, should be added for architectural emphasis and interest.

The curved end wall of the Student Union Building is a prominent feature on the mall. The new glaring animated sign so overwhelms the view at night that the building behind virtually disappears. This sign should either be removed, moved or be toned down to an appropriate intensity to attract attention without dominating the vista. The curve when illuminated with wall washing floodlights will enhance the mall at night and be very dramatic. The entryway lighting should also be enhanced with higher wattage downlights.

The Johnson Center is an important student activity hub 24 hours a day. As such, its nighttime appearance must be made more welcoming. Replacing the existing post top decorative fixtures near the building with new campus walkway luminaries to provide a more uniform and higher level of illumination and used in combination with additional lighting at the entrances will greatly improve this entrance sequence. Ceiling mounted downlighting should be added to illuminate the deeply recessed façade. The exterior planes of the façade should be illuminated by pole mounted floodlighting fixtures.

Smith Plaza

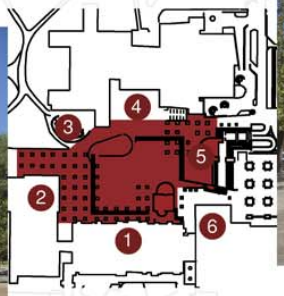
This vast open space has the potential to evolve into a major social gathering place for students. This will require some changes in the design of lighting and landscaping. Creating a large water feature, a Bosque of trees and a shaded area would all improve this space.

The Zimmerman Library is one of the most important buildings on campus and serves as a major anchor of Smith Plaza. The exterior of the Library should be floodlighted to give it a strong presence after dark. Floodlighting from poles on the four sides of the library, with distinctive but subtle changes in color and intensity of light is one way of accomplishing this. Each of the entries should be expressed in an, inviting manner with concealed warm downlighting.

Opposite the Library across the expanse of the Plaza is the Humanities Building. This façade lends itself to a simple melodramatic expression of the multitude of planes visible from Smith Plaza. These can be differentiated with subtle changes both in hues, value and intensity. The entire recessed ground floor façade should be illuminated by concealed wall wash fixtures of warm light.

Ortega Hall should be illuminated in the same manner as the Library, but more subtly. The covered walkways should be illuminated by indirect lighting of the enclosed wall or ceiling planes.

1. HUMANITIES BUILDING FACADE
2. WEST SMITH PLAZA WITH ORTEGA HALL
3. WEST SMITH PLAZA PASSAGE TO DUCK POND
4. ZIMMERMAN LIBRARY
5. EAST SMITH PLAZA WITH BELL TOWER
6. STUDENT UNION



The stairs which descend to the plaza level are major architectural features and should be floodlighted for both appearance and safety using pole mounted fixtures.

The trees located formally within the pattern of colored boxes in the paving should be uplighted. The monumentally wide stairs that lead to the entries of major enclosing buildings should be formalized with the placement of decorative fixtures framing the entries. These must be mounted at the same level around the plaza. The plaza is in flux and should not be saturated with a plethora of decorative poles. Instead, we suggest metal maximum halide lamps. As the design for the plaza evolves and pools, fountains, artwork or shelter seating are added appropriate lighting should be designed at that time.

Union Square

The Student Union is a major destination landmark. The building is the visual terminus of Cornell Mall and as such, the façade warrants illumination. The exterior curved brick wall should be washed with light. Illumination at the entries should be increased. Compact warm fluorescent downlights should be used over doors to emphasize the entries. Fixtures using bluer white fluorescent lamps should be used to wash the adjacent blue walls with light. This technique is appropriate at all entries.

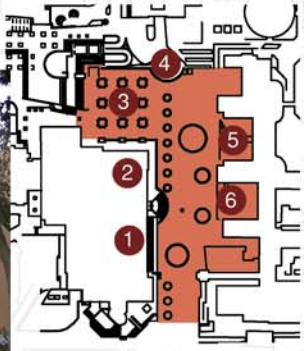
The row of umbrellas along the terrace should be replaced with umbrellas which incorporate permanently wired uplighting. Colored lamps or gels can then be substituted for special events to energize this space. An alternative technique is to use low voltage rope lighting along umbrella ribs or the bottom edge of the umbrella.

The Bosque of trees in the foreground should be uplighted from shielded ground mounted fixtures. In order to minimize additional poles, metal halide lamped downlights may be mounted high in these tall trees and pointed down through leafed areas. Another option which warrants study is the use of pole mounted tree up/down lighting fixtures. If located close to the tree this would uplight the canopy and provide general lighting for the walkway.

The fountain is small in scale and depends upon the semi-circular wall to reinforce its form. The most dramatic and least expensive rendering of the fountain and surrounding plaza can be achieved from a fixture mounted atop a 50’ high pole located at the head of the adjacent ramp. Fixtures would focus on the fountain and on the plaza. Different colored lamps or colored lenses could be used to accent the fountain.

Currently, there are decorative, perforated tin fixtures under the colonnade of Mesa Vista Hall. This concept could be continued with decorative fixtures lining the stucco wall that fronts the mall. In

1. STUDENT UNION
2. STUDENT UNION
3. UNION SQUARE
4. CAMPUS FOUNTAIN
5. MESA VISTA HALL
6. MESA VISTA HALL



addition, concealed downlights should be located between every 4th or 5th vega to reflect light upward to the underside of the projecting balcony. The entryway should be illuminated either by a ceiling mounted indirect fixture or wall washed on either side of the foyer with warm lamps.

Yale Mall

Entering the campus through the bus stop, trellis is a very pleasant experience. The form and scale of the trellis is very attractive by day. After dark, the trellis lacks the punch it deserves. The trees in front need to be either uplighted or front lighted. A post mounted up/down tree lighting fixture could work quite well here. The existing Contracline fixture should be replaced by taller poles with narrow beam floodlighting fixtures aimed down.

The alley of trees on one side can be illuminated by up/down pole mounted lighting fixtures. The paved walkway across the axis will benefit from a row of low wattage decorative fixtures. This will both reinforce the axis and provide proper lighting for safety and security.

The *Northrup Hall* façade is insignificant, but could benefit from a modicum of ground mounted uplight and surface mounted downlighting. The entry should be reinforced by decorative poles. Trees along the façade should be uplighted and Contracline poles mounted fixtures should be replaced with pole mounted cutoff fixtures.

The *Homage to Mother Earth* is poorly and inappropriately lighted. Each mini-megalith should be grazed on the exterior face by a semi-recessed light. The fountain patterns appear to be both counterproductive and competitive to the image conveyed by the mini-megalithes. Thought should be given to changing the fountain spray with an umbrella spray or replaced with a fog machine. This will result in a more solid mass for the rather delicate sculpture which occupies such a monumental nodal point. The fountain of water or fog should be lighted with a distinct hue lamp such as blue or green.

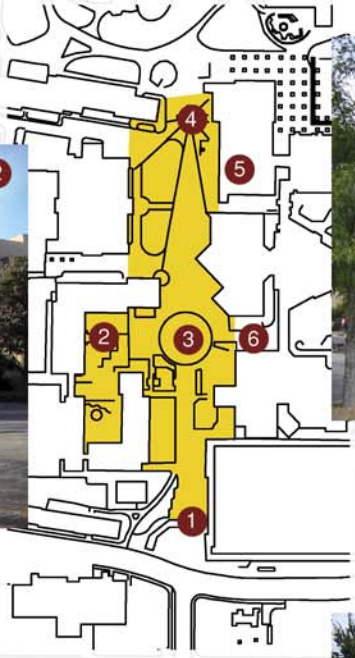
The Center of the Universe

The pole mounted Contracline fixtures should be removed and new pole mounted fixtures should be located on an axis with the four “doorways”. A 2000W Xenon lamp aimed up and mounted in the chimney will add a dramatic sky beam if the University is willing to pay for both the electric power consumption and lamp replacement. And of course if the artist agrees a less expensive, lower power consumption and longer life narrow beam metal halide lamp can be used – but it will have a less dramatic effect. Another dramatic approach would be to use a fixture with colored lens’s.

Biology, Fine Arts Façade and Adjacent Trellis

The progressive overhanging façade is quite distinct in form. Building mounted uplighting can be used to accentuate both the projection and the notching back

1. BUS STOP TRELLIS
2. NORTHROP HALL FACADE
3. HOMAGE TO GRANDMOTHER EARTH
4. THE CENTER OF THE UNIVERSE
5. BIOLOGY AND FINE ARTS FACADE
6. ELEVATED WALKWAY / PASSAGE TO CORNELL MALL



at windows of the architecture. Another approach would be to wash walls at the overhead walking level to prevent the dark cave effect, the enclosed walkway at the ground floor should be illuminated by recessed or surface mounted fluorescent wall washers.

The trellis defines a wonderful, more humanly scaled space that will find far more use after dark if properly lighted. The more appropriate lighting fixture location is from the soffit at the third floor level. These should be narrow flood lamps angled down through slats in order to cast shadows on the ground below. The bridge level walkway located at the second floor level should be illuminated by surface mounted, walkway fixtures. These should be mounted at a nominal 25' on center on the inside face of the bridge and concealed just below the top edge.

The entry to Cornell Mall requires a strong expression befitting the transition between the Yale and Cornell Malls. The question is will the bridge which separates the two Malls should be demolished is it to continue its continued existence. If it is to remain, then thought should be given to expressing it as a major gateway between the two Malls. Presently, it is a visual obstruction. If we cannot hide it, then let's emphasize it by increased mass from the ground up. Such as increasing its height, adding balconies with a roof, etc. At nighttime, we should decorate it with light – either formal or informal. If it is to be a gateway, then a pair of decorative pole mounted fixtures should be located on each side. The underside of the bridge should be uplighted.

On the Cornell side of the bridge, rows of pole mounted pedestrian post top lighting fixtures should be located on either side of the Mall. They should be mounted at 50'-60' spacing between the bridge and the Student Union Building.

g. Campus Streets

For safety of vehicle and pedestrians, uniform illumination of campus streets is recommended. The lamps should be metal halide recessed in full cutoff luminaires, mounted on 25' poles and centered at a nominal 100'. Poles should be located adjacent to intersections with two poles on diagonally opposite sides of each three or four way intersection. Lighting poles should also be located near any facility with high levels of nighttime activities, such as a theater or sports facility, and should also be located adjacent to the entry and exits to parking lots for these facilities so that the turning sides of vehicles are highlighted. Where streets run close to buildings, street lighting fixtures may be building mounted, but never less than a nominal 20' above grade. Street lighting must direct lighting back towards the sidewalk in locations where trees allow. For locations where spill light behind the pole is not desirable, i.e. dormitories, an interior shield on the house side of the fixture should be specified. All poles should be set back at least 3' from the curb. Lamps for street lighting should be cool in appearance, 4000k or higher in color temperature to give a crisp white appearance.

h. Residential Areas

Where the recommended street lighting does not adequately illuminate the sidewalk because of the shadowing by tree canopies, supplemental lighting should be provided by intermediate lower pole mounted fixtures. Cutoff fixtures with house side shields will prevent spillage of light into bedrooms.

i. Open Areas

As the campus grows, many of the open areas will be replaced by new buildings. Currently, students use open areas for social or athletic activities after dark and also as a short cut to or from dorms. The major concern is the prevention of crime.

There are two recommended approaches to these areas. The first is to light the facades of surrounding buildings or walkways. This approach should be used if lighting of the field is not desirable. The second is the use of 60' high or higher poles with full cutoff luminaires and metal halide lamps to light the fields. The sixty-foot poles can be installed safely at 200'-250' on center and can still be easily serviced by "bucket" trucks. Where fields are wider, intermediate poles or higher perimeter poles must be used if uniformity is deemed desirable.

Distinct entries to open areas, such as from adjacent parking lots, should be defined by pedestrian walkway poles as used elsewhere on campus. If the open area is defined on four sides by buildings, then the buildings should be illuminated based on a hierarchy of importance. If the open field is defined on 2 or 3 sides by buildings, then post top fixtures should define the missing fourth sides.

j. Plazas, Parks and The Duck Pond

These are perhaps the most important areas to light after dark. These areas are not only defined by the surrounding buildings, but the areas serve as focus for the buildings which define a space.

These spaces will become significant and enlivened at night as are by day. They serve as landmarks and help to break up the campus into comprehensible places. Each of these plazas and parks are different by nature. This difference should be reinforced by giving each space its own unique identity, even if it means changing the existing landscaping, paving, street furniture or adding a sculpture or fountain.

One additional fixture classification to be selected or designed is decorative lighting. This will take many forms over the years and will frequently be used as applied ornamentation. At other times it will be a modification of existing fixtures by changing the color temperatures of lamps

or festooning the fixtures with decorative ornaments to modify their appearance.

Applied ornamental lighting is limited solely by imagination. Trees may be covered with Christmas lights, strings of festooned lamps can be strung from building to building, or changeable colored lamps can be used.

Presently, there are no plazas that should have decorative lighting added permanently. Some of the smaller courtyards could be enclosed from above with strings of festooned decorative lamps. Permanent decorative lighting would be appropriate to enhance some trellises after dark.

Missing from most of the campus are playful outdoor social areas. Creating more lively exterior spaces after dark is a subject worth further discussion and study.

The Duck Pond and Park are a special area that attracts and holds people in good weather by day, and to a lesser degree, by night. The pond should be illuminated by reflective lighting from surrounding decorative fixtures and concealed lighting mounted under the bridge. Formal entries into this park would be inappropriate. Instead, single decorative fixtures should be mounted on one side of each entry and at the intersection of paths, except, where they occur closer than a nominal 40'. The tree canopy around the perimeter should be uplighted. Trunks of the trees should be illuminated by narrow beams. Trunk lighting should be on the southwest side for all trees. Trees that surround the pool may be lighted. Shrubs along the paths may be downlighted from either tree or ground mounted mini bollard mounted fixtures. Certain trees present an opportunity for a very dramatic lighting effect; downlighting from very high within the tree. To be successful, the tree must have a very open interior and be tall. The result is a heavily shadowed pattern of branches and leaves on the ground.

For the safe wiring of light and trees, there are only two feasible methods. The careful routing of a slot in the tree and burying the wire below the surface. Some trees will grow over the wire in as little as 6 or 7 months.

The other method most commonly used is to mount a junction box above the foot of the trunk and feed metal conduit up to the trunk to a height of at least eight feet. At that point, a watertight fitting is installed to allow a weatherproof, flexible wire to continue up the tree and over branches to the fixture locations. Care must be taken using either technique not to damage the tree either by using the wrong hardware, or allowing entry into the core of the tree by spores, etc., which will ultimately cause the tree to rot.

k. Sculpture and Water Features

The sculptures on campus vary from architectural to whimsical. Each demands the most appropriate lighting possible. The lighting must be determined now, because the sculpture appearances are an inseparable part of the landscape and plaza or mall lighting schemes. As examples of an appropriate lighting approach, new lighting utilizing 50' poles has been installed for

the new sculpture opposite the entry to the Student Union Building on Cornell Mall. By contrast, the existing "Center of the Universe" sculpture will be difficult to light at this time.

Fountains present a unique set of constraints. Like air, clean water is invisible. Clear water is seen by virtue of its impurities these include bubbles, dust, chewing gum wrappers, etc, or reflection from the surface. When we light water from fixtures mounted below the water's surface, we illuminate only the impurities. When we illuminate objects surrounding the water, we see their reflection and perhaps impurities.

Since underwater fixtures are expensive and difficult to maintain, we recommend fixtures that are tree, building or pole mounted. These should be aimed at a steep angle and equipped with deeply shielded lamps. In some locations, external lighting fixtures are not feasible. In such cases, low voltage fixtures are recommended. The ideal mounting location for spotlights is below the point of impact of the falling water. Concealed fiber optic or rope lighting may also be used.

l. Landscape Areas

Landscape lighting represents unique challenges. The biggest is maintenance of not only the trees and plants, but also of the lighting fixtures. Many factors must be considered such as the effect of soil, plant colors and shapes, rain, wind, sun, viewing position and use of the space after dark.

The biggest issue with landscape lighting is choosing the most appropriate lighting fixtures. Those designed to be buried in the ground are difficult to maintain. Surface mounted fixtures are prone to theft and damage. Tree mounted are difficult to maintain and there is the issue with how do you conceal wire? Building or pole mounted fixtures maybe difficult to hide or integrate. The logistics of installation can be resolved with compromises. The lighting design itself is more complex. Trees can be illuminated as a vertical plane that either works as an enclosing wall or serves as a terminus. This would require frontal lighting. Trees may be lighted from below, which creates a sense of shelter and can create a more intimate feeling. Tree downlighting will be used to illuminate ground planting, seasonal flowers, seating areas and walkways. The spectrum of the lamps must be complimentary to the pigments of the material being lighted. All lighting fixtures must be effectively shielded.

m. Parking Areas

Parking Lots

It's surprising how many types of parking areas occur on the University campus. They vary in size, shape, location and hours of use. For example, parking lots around sports facilities may be empty much of the year and full during sports event or for special occasion. Residential parking lots are full throughout the school year. Specific elements to be addressed include:

- Signage, decorative fixtures or distinct architectural features common to all entries.
- Entrance and Exit lighting must emphasis places where cars and pedestrians enter

and leave the parking lot. Lighting must illuminate the sides of cars and people seen by oncoming motorist in order to avoid collisions.

- *Safety Lighting.* To minimize or eliminate autos striking pedestrians or another motorists anywhere, anytime.
- *Security Lighting.* Walking to and from their cars, pedestrians feel, and in truth are vulnerable to anyone who may conceal themselves behind, besides or under parked vehicles. Pedestrians also drop things such as keys and other things should feel confident that they can quickly find the item. Most parking lots fail on at least two counts.
- Glare control of parking lot fixtures is extremely important, as well as light trespass, especially near dorm areas.
- The lamps used in fixtures should have a very broad spectrum, long life and be designed with controlled efficient cutoff optics.

Parking Garages

There are similar concerns for safety and security for pedestrians and vehicles as there is for parking lots, but there are additional constraints on the choice of fixture types. Entryways to parking garages must be easily and unambiguously identifiable. The roofs of parking decks lend themselves to high pole-mounted fixtures, but controlled optics are required to avoid the beacon effect and offensive glare.

One alternative to high poles on the roof is the use of shorter poles and more of them mounted around the perimeter and aimed inward. When the 7' height of some utility vehicles is subtracted from the height of lighting poles, it can be seen that anything below the 18'-20' range cannot be very effective.

Unique challenges presented by parking garages are the low ceiling height and the resulting low height of ceiling mounted fixtures. This results in a multitude of expensive fixtures with attendant glare problems. To simplify the problem we recommend painting anything that doesn't move a semi glossy white and carefully place shielded fluorescent lamps over driveways and at the end of parked cars.

The other unique problem is the parking ramps. With younger people in particular, there seems to be the feeling of a challenge present by the sharp turns that occur at ends of each ramp. Illumination of vertical surfaces improves visibility and reduces accidents at parking ramps.

All means of egress for both vehicles and pedestrians, should be emphasized with higher levels of illumination. This includes stairs and elevator towers. Color or super graphics should be used on stair/elevator towers to identify floors and campus orientation.

7. Summary and Conclusions

Through a carefully thought out and planned sequence, the campus at University of New Mexico, Albuquerque can be transformed at night into a safer and far more pleasant place. Small steps have already been taken, as can be seen in the garden behind Zimmerman Library and the new sculpture

in Cornell Mall. Lighting can and will make a difference in pedestrian usage after dark and in the lives of the students, faculty and residents who use the campus.

At the onset of the survey stage of the Master Plan, one of the goals was to develop a simple set of guidelines and a limited vocabulary of lighting equipment. The Master Plan has accomplished guidelines for several areas, i.e. walkways and roadways. A specific lighting vocabulary has been developed with a limited number of lamp and fixture types.

After reviewing the existing campus on numerous site visits by day and night and discussions with university staff, variations in the design concepts have evolved. Points and areas of similar use have been deliberately designed with different design concepts. The lighting approach has evolved in order to evoke the desired effect and “feeling”. Different techniques using similar lighting hardware will be used to achieve an appropriate and more interesting effect for the entire campus lighting plan. Having selected one technique would have resulted in a visual monotony and the loss of a sense of place.

The new lighting concept will reinforce the existing qualities of the daytime campus, and will more effectively enhance the nighttime environment, creating new spaces and possible nighttime uses.