FACING THE HEALTHCARE GAP: LIGHTING DESIGN FOR A MOBILE CLINIC

by

Vicki Lozano

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FACING THE HEALTHCARE GAP: LIGHTING DESIGN FOR A MOBILE CLINIC

Project Approved:

Supervising Professor: Alyssa Stewart, LC, LEED AP BD+C

Department of Design

Albert Marichal, AIA, NCARB

Department of Design

Lavonne Adams, PhD, RN, CCRN-K

Department of Nursing

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ABSTRACT

Design of the built environment, particularly lighting design for visual acuity, is crucial to performance of medical tasks and functionality of healthcare facilities. Studies show that a healthcare gap exists among minority populations that lack access to medical facilities or equitable treatment within such environments; thus, while factors of bias in treatment quality may not be solved by design of the built environment, access and psychological consequences certainly can be addressed. To study how factors of lighting design can bridge gaps in the possibility for more accessible healthcare facilities to become available, this project will evaluate and apply a prototype for design of a pop-up healthcare center. Solar geometry analysis in various parts of the U.S. will be valuable information used to determine the specific orientation and plan strategies for roll-out of low-energy, cost-effective pop-up examination facilities throughout the nation. Research of design for equity as well as precedent studies of pop-up facilities—especially those used for vaccinations and quarantine during the COVID-19 pandemic and military triage tents—will be integral to this project. Additionally, review of current and emerging lighting and equipment technology will provide significant background information. All populations deserve access to quality healthcare, and this project aims to discover how the field of lighting design can positively contribute to this goal within the context of pop-up facility design.

FACING THE HEALTHCARE GAP: LIGHTING DESIGN FOR A MOBILE CLINIC

Design of the built environment, particularly lighting design for visual acuity, is crucial to performance of medical tasks and functionality of healthcare facilities. Studies show that a healthcare gap exists among minority populations that lack access to medical facilities or equitable treatment within such environments; thus, while factors of bias in treatment quality may not be solved by design of the built environment, access and psychological consequences certainly can be addressed. To study how factors of lighting design can bridge gaps in the possibility for more accessible healthcare facilities to become available, this project will evaluate and apply a prototype for design of a mobile healthcare center. Solar geometry analysis in various parts of the U.S. will be valuable information used to determine the specific orientation and plan strategies for roll-out of low-energy, cost-effective pop-up examination facilities throughout the nation. Research of design for equity as well as precedent studies of pop-up facilities—especially those used for vaccinations and quarantine during the COVID-19 pandemic—will be integral to this project. Additionally, review of current and emerging lighting equipment and technology will provide significant background information. All populations deserve access to quality healthcare, and this project aims to discover how the field of lighting design can positively contribute to this goal within the context of pop-up facility design.

Though all populations deserve access to care, in practice, especially in the United States, this is not always the case. The healthcare gap is a term that is often employed when evaluating quality of healthcare for various groups because while every person requires medical care at some point in their lives, different factors affect access and quality. According to *Race, Ethnicity, and Health: A Public Health Reader*, health disparities are “differences in morbidity, mortality, and access to health care among population groups defined by factors such as socioeconomic status (SES), gender, residence, and especially race or ethnicity" (LaVeist and Isaac 12). Health disparities reflect social inequalities, and as such, tend to affect lower income and minority populations more severely than more privileged groups in access, quality of care, and outcomes. For example, statistically, black and Hispanic Americans experience higher mortality rates than non-Hispanic white populations (LaVeist and Isaac). This gap in access and treatment applies to all age groups and compounds for populations that experience intersecting disadvantages in healthcare.

In addition to social and economic factors affecting quality of healthcare, geographical location has a strong impact. Both urban and rural populations experience barriers to access such as a lack of insurance and a lack of availability in facilities. For urban locations, a "high prevalence of individuals without health insurance or citizenship creates a greater burden on available systems," often leading to "vast disparities in health care" and a two-tiered healthcare system in which those with insurance can access preventative care while those without must stick to the "safety-net" of the emergency room ("Urban Versus Rural Health"). Meanwhile, in rural environments, individuals face a lack of primary care physicians available and may have to travel much further to reach a hospital at all. In choosing which locations to analyze for this project, it is crucial to evaluate the needs of various communities according to geographical locations since, as previously stated, both urban and rural environments have distinct qualities that affect access and quality of healthcare. This project will focus on expanding access for rural communities since physical proximity is one of the most apparent barriers to obtaining care that can reasonably be impacted by design strategies.

Mobile clinics are a type of healthcare facility that lend themselves to bridging the gap of proximity of access to healthcare, while also being sustainable and versatile. Used around the world in humanitarian efforts, military triage units, and recently during the COVID-19 pandemic for testing and vaccination clinics, pop-up healthcare facilities address many problems with access to treatment that standard hospitals cannot. To maximize mobility and efficiency of space, this project will primarily examine mobile medical unit (especially in RV form) and bus clinic design. While “pop-up” and “mobile” are frequently interchangeable terms associated with various types of clinics that do not constantly exist in one certain location, this project chooses to focus on mobile RV clinics. As “a crucial entry point into the healthcare system overall” (“Pop-Up Clinics: A Starting Point for Good Primary Care”), both de-constructable pop-up tents and mobile RV clinics are valuable modes of providing care; however, mobile RV clinics may be better for creating a hospitality atmosphere.

Mobile clinics can apply recommendations from the Institute of Medicine's Committee on Understanding and Eliminating Racial and Ethnic Disparities in Health Care, such as “(1) community health workers, (2) patient-centered care focusing on patient education and empowerment, (3) cultural competence training for staff, (4) stability and consistency of service provision within communities, and (5) staff diversity,” all of which are factors that greatly affect the psychological ramifications of a history of mistrust between minority populations and the healthcare system that stems from lack of care for these groups (Yu, et al). Thus, it is increasingly apparent that intentional mobile clinic design can be the starting point for expanding access to general healthcare for population groups that currently do not receive this necessity.

In order to inform this project properly, addressing current design standards for pop-up facilities provides a basis for what is successful in existing design and what can be improved upon in future designs. Current pop-up facility design includes mobile RV clinics and military tent design that address practical needs for healthcare facilities but tend not to consider the psychological aspects of color, materiality, and space planning that can severely affect the way that patients experience a care environment. Nevertheless, many current designs employ strategies that future pop-up facility designs should emulate because of their success in increasing access to care. For example, companies like Magnum Mobile Specialty Vehicles provide medical trailers and vans for basic examinations. Simple diagnostics and blood tests can be executed in these small floor plans that include an exam bed, blood draw chair, restroom, and appropriate storage for basic medical equipment (see fig. 1).

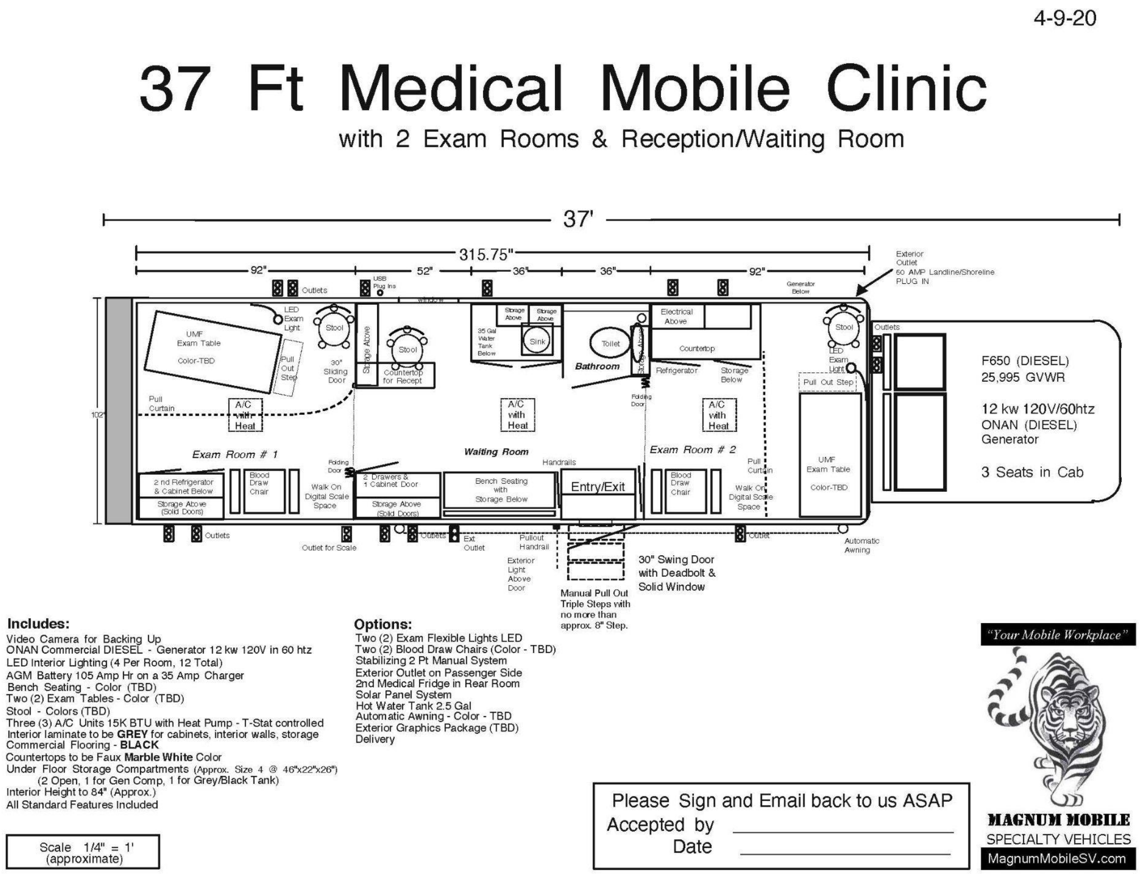

Fig. 1: Medical Mobile Clinic Plan; Magnum Mobile Specialty Vehicles

These vans, while unable to tend to more than two patients at a time, are successful for their compact floor plans and integrated electrical lighting sources. With this integrated wiring, the lighting can more closely resemble the recessed, clean profile options of a typical building interior; however, as current offerings show, the design aesthetics of RV clinics are not welcoming, with a one-tone neutral color palette that reflects glare from the overhead downlights (see fig. 2). This theme in mobile clinic precedents emphasizes the need for materiality and thoughtful lighting designs to create a hospitality atmosphere for patients that deserve to feel safe in their healthcare environment just as much as individuals who go to a standard hospital.

Fig. 2: Medical Mobile Clinic Interior; Magnum Mobile Specialty Vehicles

Reflecting this theme, another option for popular pop-up facility design is medical tent design often used by military and humanitarian efforts. These tents capitalize on space planning to provide as many patient beds as possible to be able to care for the most people and are easily set-up and reconfigured for any need (see fig. 3). Several tents can be set up in a compound to allow for easy expansion of a healthcare space to accommodate any required number of patient beds. Once again, these spaces, while functional and sustainable, are primarily utilitarian in design, with little consideration to providing quality lighting design.

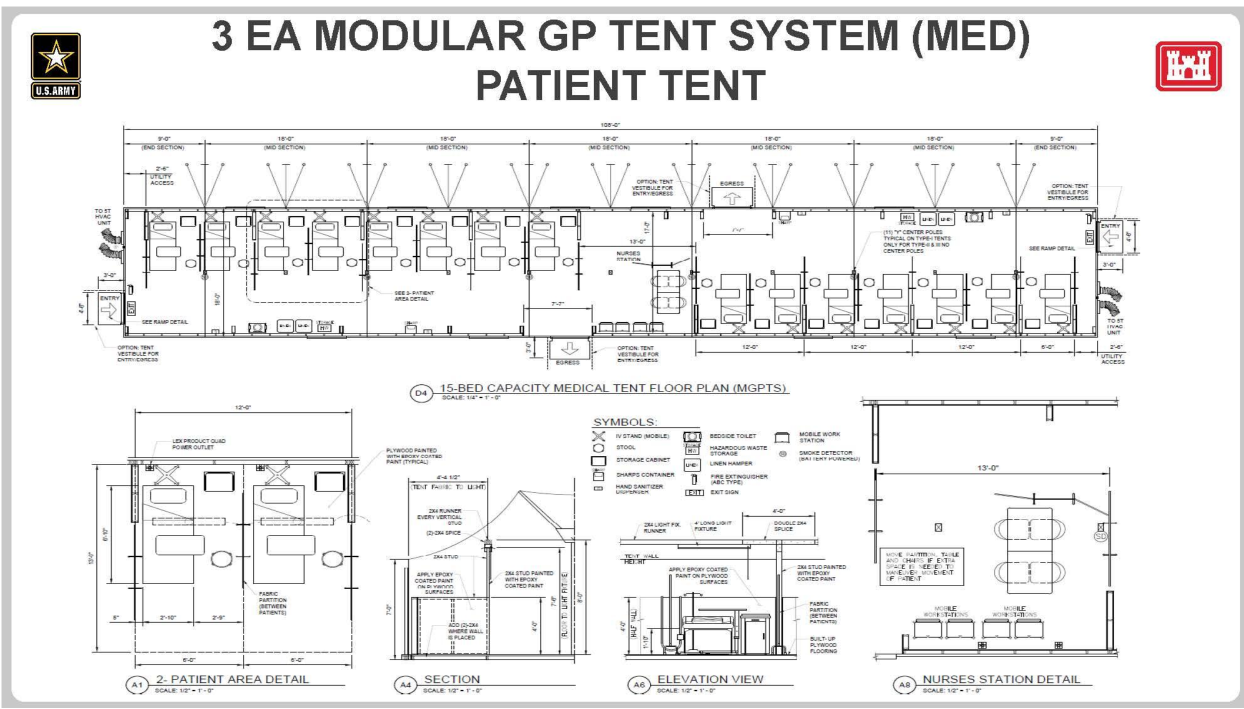

Fig. 3: Military Tent Design; U.S. Army

In an attempt to incorporate best practices in sustainability and foster a connection with nature in future pop-up clinics, solar geometry studies in each potential roll-out location determine appropriate daylighting strategies. However, energy efficiency and rapidity of roll-out require standardization in place of customization. Thus, some best practices for daylighting strategies that are inclusive of all geographical locations include expansive north facing facades with tall windows for the best daylight dispersion into a space, open floor plans, and glazed interior partitions ("13 Daylighting Guidelines").

Besides daylighting, within the context of pop-up facilities, electrical lighting design is a crucial factor in the success of a healthcare facility. While daylight can give a natural quality to the ambient lighting in a space, electrical lighting sources are necessary to supplement daylight and provide the focused task lighting that caregivers require to accurately examine patients. In general, lighting has physical and psychological health effects on people, including but not limited to the effects of blue light on circadian rhythms—the 24 cycle that regulates sleeping and waking hours—and visual comfort for the eye. According to "An Overview of the Effects of Light on Human Circadian Rhythms: Implications for New Light Sources and Lighting Systems Design," light is one of the most prominent external factors in affecting human circadian rhythms, and quantity, timing, duration, and history of exposure to light are various aspects of retinal exposure to light that govern hormonal and behavioral changes in the body (Figueiro 2). Therefore, it is clear that quality lighting design is crucial to all interior spaces, especially healthcare design. Quality lighting design involves layering general ambient light sources with more focused task lighting and accent (decorative) lighting. Additionally, reviewing such metrics as the Illuminating Engineering Society's recommendations for illuminance standards, which dictate the minimum necessary light levels in footcandles (fc) or lux (lx) on a surface per task type, are crucial in lighting design. Correlated color temperature (CCT) and color rendering index (CRI) metrics are other factors that categorize the quality and performance of a light fixture's ability to allow for accurate representation of task performance, skin color, and other visual acuity and comfort levels.

Architecturally integrated lighting solutions offer a range of subtle and diffused lighting that can successfully provide the amount of light needed to perform tasks in a space, as well as reduce glare and incorporate aesthetic considerations to elevate a user's experience of a space. Within temporary lighting fixture design, many of these products are strictly made for durability and technical performance (see fig. 4).

Fig. 4: Temporary Work Lights; Lighting Insights

Current offerings and technology for temporary lighting solutions include stand or string mounted lights that provide the visual acuity needed for medical professionals to evaluate their patients' medical needs in pop-up facilities. A myriad of options for anti-bacterial lighting sources utilize blue wavelength light to target and slowly kill bacteria in the air in an effort to reduce the possibility of infection. As is clear from modern hospital design, which is more and more commonly emulating the hospitality atmosphere of hotel room design in order to increase patient satisfaction and shorten recovery rates, the performance requirements of each space do not need to dictate the aesthetics as well; therefore, future design for pop-up medical facilities should address this need for a hospitality aspect.

In conducting this research, it is extremely notable that pop-up facility design is very advantageous in understanding how design of the built environment, especially in relation to quality lighting strategies, can positively impact patients' lives and access to care. In the application portion of this research study, the author will develop design criteria to take into account the geographical location of a theoretical pop-up facility in the rural, high-immigrant population of Marfa, Texas. These criteria will focus on daylighting for sustainability, pop-up tent design, and available technology for temporary-use lighting fixtures. This project aims to generate a successful prototype for a comfortable and accessible pop-up clinic that considers mobility and solar geometry for various regions of the U.S. by designing a 3-D application model and developing a list of criteria for roll-out of pop-up facilities.

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WHY I AM STUDYING THIS

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Intentional Design
for the Health, Safety, and Welfare of end users

• Community • Wellness • Impact •

Curiosity
I wanted to see how design could have an impact beyond aesthetics. While relatively unknown to individuals not involved in the industry, design has the potential to influence the human experience and the environment.

Personal Interest
As a doctor's daughter, I have consistently valued the impact that quality healthcare can have on a person's life. Through the lens of design, I wanted to use this project as an initial foray into potentially designing for healthcare projects in the future and giving back to this community.

SUMMARY OF RESEARCH

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Healthcare Considerations

- the healthcare gap
- factors of access
- pop-up and mobile clinic design
- traditional versus modern hospital design

Design Fundamentals

- quality lighting design
- IES Illuminance Standards
- light and health correlation
- circadian rhythms
- daylighting strategies

HEALTHCARE CONSIDERATIONS
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What is the healthcare gap?
Health disparities are "differences in morbidity, mortality, and access to health care among population groups defined by factors such as socioeconomic status (SES), gender, residence, and especially race or ethnicity"*

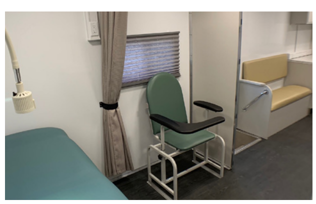
Access to Care
Looking into factors affecting access to care in urban versus rural communities, it became apparent to me that discrimination and socio-economic factors preventing care are out of the parameters of design's reach. However, access affected by physical proximity can certainly be addressed by mobile clinic design.

Mobile Clinics
Whether in bus, RV, or tent form, mobile clinics can be "a crucial entry point into the healthcare system overall"** and have the unique ability to maximize mobility, space efficiency, and patient-centered care.

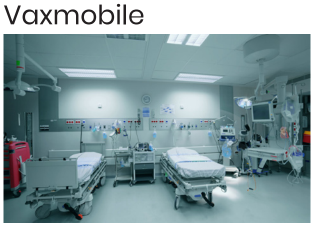
Hospitality and Healthcare Design
Traditionally, hospital design has not been as welcoming in the past, trading patient comfort levels for a sterile and clinical feel. Hospitality design is interior design that focuses on commercial interiors related to service industries. Modern hospital design translates a hospitality atmosphere into the healthcare environment.

"The estimated impact of increased clinical quality is smaller than the impact of increased amenities"*** (i.e., interior environment matters to patient mental and physical states)

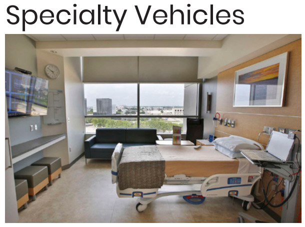
Tarrant County Vaxmobile



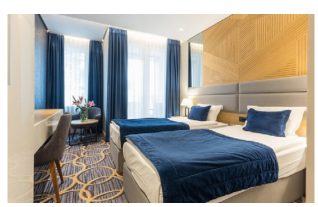
Magnum Mobile Specialty Vehicles



Traditional Hospital Design



Modern Hospital Design



Hotel Room Design

**Race. Ethnicity, and Health: A Public Health Reader* edited by Thomas LaVeist and Lydia Isaac
** "Pop-Up Clinics: A Starting Point for Good Primary Care"
***"Hospitals as Hotels: The Role of Patient Amenities in Hospital Demand" by Dana Goldman and John A. Romley

DESIGN FUNDAMENTALS

DESIGN FUNDAMENTALS

What makes a quality lighting design?

•layers: general/ambient, accent, task
•illuminance: the level of light on a surface, measured in footcandles (fc) or lux (lx); Illuminating Engineering Society (IES) publishes recommended standards for light levels by room and task needs

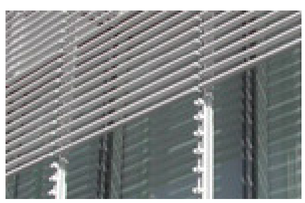
Light and Health

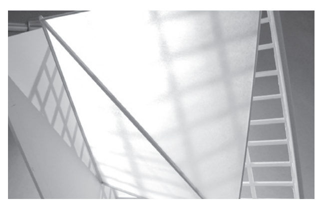
•circadian rhythms: 24hr cycle affecting sleep/wake patterns; influenced heavily by environmental factors such as light ("quantity, spectral power distribution of the light source, timing and duration of exposure, spatial distribution, and light history"*)
•daylighting: the practice of designing buildings for natural light

Daylighting Strategies

•building orientation: North facing buildings receive more diffuse light compared to South facing (more glare)
•use of architectural materials such as screens, louvers, and scrims to control daylight entering a space


Architectural Screen


Louvers


Scrim Fabric

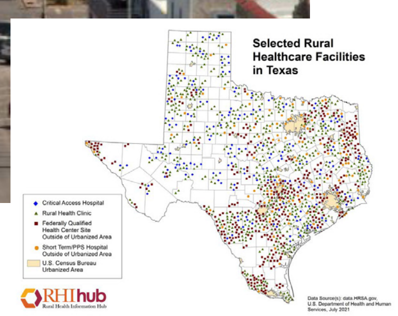
*"An Overview of the Effects of Light on Human Circadian Rhythms: Implications for New Light Sources and Lighting Systems Design" by Mariana G. Figueiro

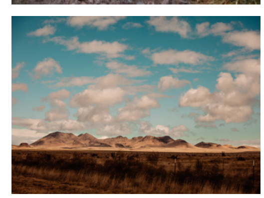
PROJECT BACKGROUND
PROJECT BACKGROUND

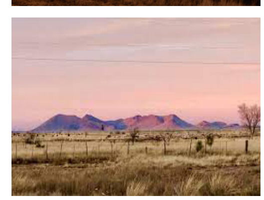
With a lack in proximity to healthcare centers, rural communities face a physical barrier to accessing care. As a prototype for roll-out of mobile RV clinics across the nation, ReShape is an entry point into the healthcare system for populations that may not receive necessary general examinations. The typical end-user of this mobile facility would be someone who needs a routine check-up, blood drive donor, or vaccination recipient. Patients will likely live in a rural location where they are not able to recieve frequent care from a primary care physician (PCP). For this prototype clinic in Marfa, Texas, patients would likely fit the demographics of Marfa (predominately white patients, majority Hispanic origin).

PROTOTYPE LOCATION
PROTOTYPE LOCATION

To test the ability for roll-out of the design, the city of Marfa in southwest Texas is a prime location for ReShape to be set, with its rural landscape and notable distance from medical centers.







DESIGN NARRATIVE

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A daylit RV clinic with supplemental exam task lighting, ReShape reduces costs and evokes a sense of adaptability by adjusting for geographical location and orientation.

INSPIRATION

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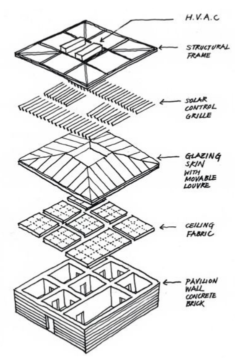
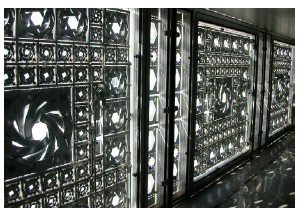
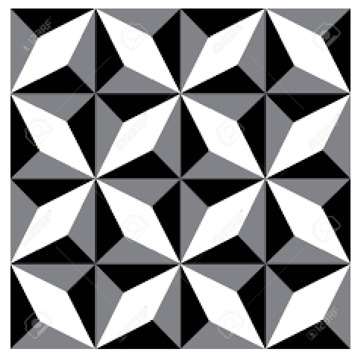
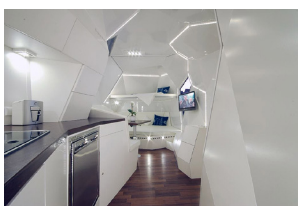
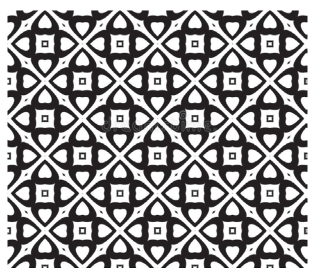
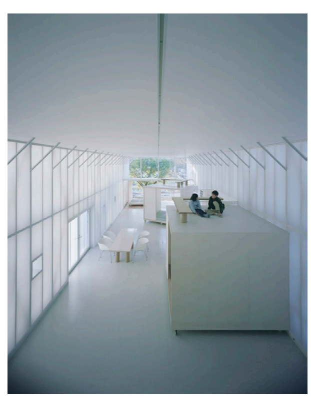


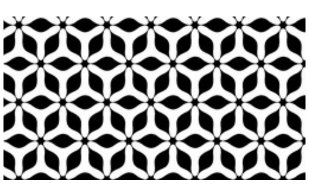


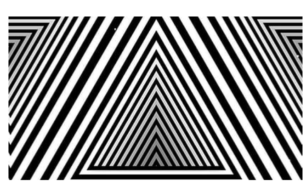


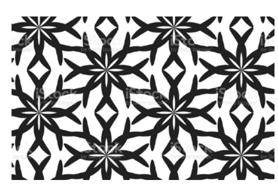












PROJECT SCOPE

PROJECT SCOPE

IES recommendations for general examinations, storage, and restrooms are crucial benchmarks for the design of ReShape's daylight screen and supplemental electrical lighting. An initial floor plan hierarchy map with designated illuminance benchmarks guide the design process for ReShape.

IES Recommended Illuminance Standards:

Exam Room:
-General: 10fc at 3'-0" AFF
-Exam Table: 50fc at 3'-0" AFF
-Charting Station: 30fc at 3'-6" AFF
Storage: 20fc
Restroom: 5fc

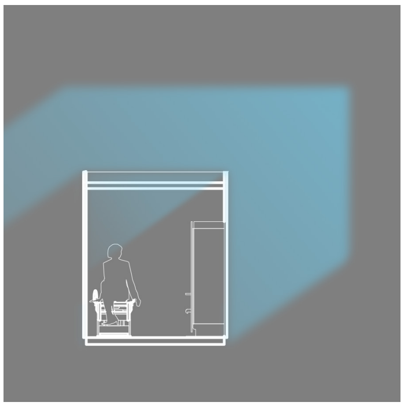
Client Profile:

The typical end-user of this mobile facility would be someone who needs a routine check-up, blood drive donor, or vaccination recipient. Patients will likely live in a rural location where they are not able to recieve frequent care from a primary care physician (PCP). For this prototype clinic in Marfa, Texas, patients would likely fit the demographics of Marfa (predominately white patients, majority Hispanic origin).

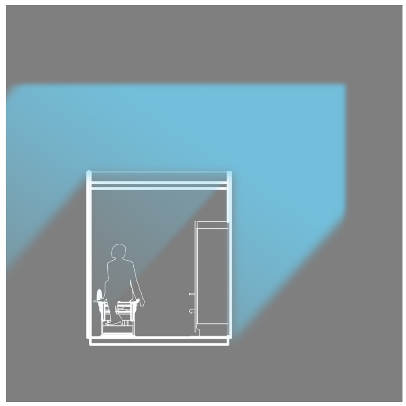
DAYLIGHT STUDY

DAYLIGHT STUDY

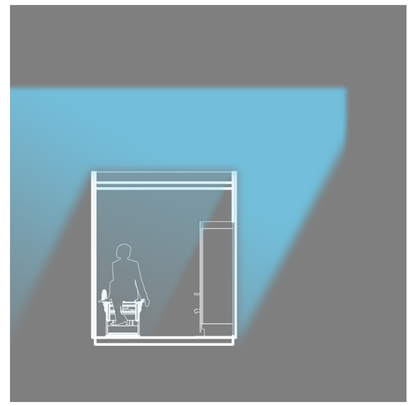
To analyze the way daylight will impact the mobile clinic, referencing the sun angle at noon on the winter solstice, equinox, and summer solstice in Marfa will be representative of how daylight will behave in the space in North America.



Winter Solstice - December 21st
12:00PM
Sun at 35 degrees above horizon



Equinox - March/September 21st
12:00PM
Sun at 49 degrees above horizon

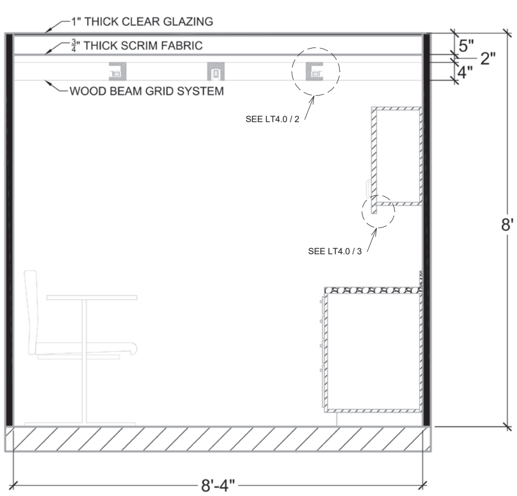


Summer Solstice - June 21st
12:00PM
Sun at 63 degrees above horizon

In Marfa, the sky in December is clear about 60% of the time. On average, Marfa gets 10 hours of daylight in the month of December. With a lower sun angle, daylight enters the space more from the sides, meaning screens and glass treatments will be essential on the side walls here. Additionally, the light itself will be more diffuse in the winter.

In Marfa, the sky in March is clear about 65% of the time. On average, Marfa gets 12 hours of daylight in the month of March. At this sun angle, daylight enters the space more from the skylight, meaning screens and glass treatments will be essential on the ceiling here to mitigate glare.

In Marfa, the sky in June is clear about 75% of the time. On average, Marfa gets 14 hours of daylight in the month of June. With a higher sun angle, daylight enters the space more from the skylight, meaning screens and glass treatments will be essential on the ceiling here. Additionally, the light itself will be more harsh in the summer, meaning there is a higher need for glare mitigation..

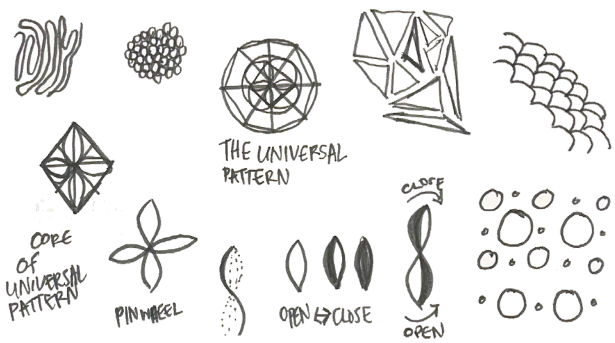


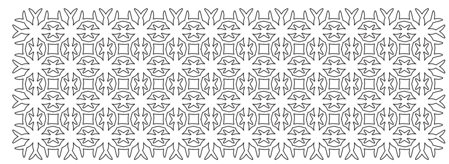
Screen Layers Detail

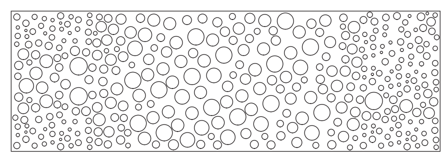
DESIGN PROCESS

DESIGN PROCESS

To develop a quality design for ReShape's daylight screens, 2D visual research on kinetic patterns informed the creation of several physical study models to be tested on a heliodon for performance under different daylight scenarios.



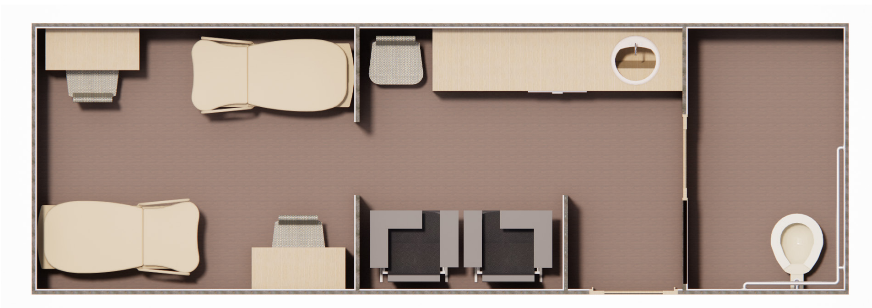




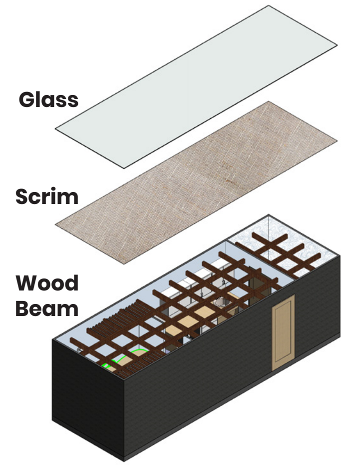
DESIGN EVOLUTION

DESIGN EVOLUTION

Taking my research and my new knowledge from my exploratory study models, I decided that a layered ceiling system that more fully considers maintenance, shadows, and visual comfort would be a more beneficial design for end-users.

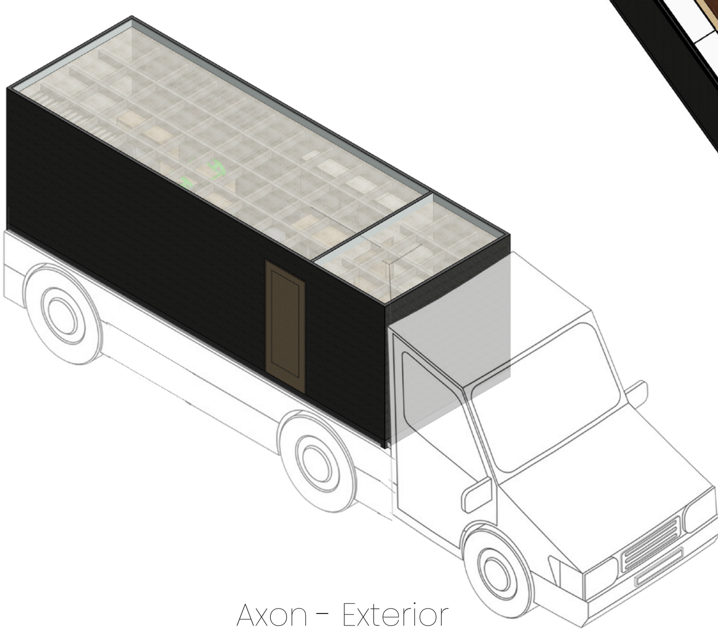


Updated Floor Plan



Screen Layers

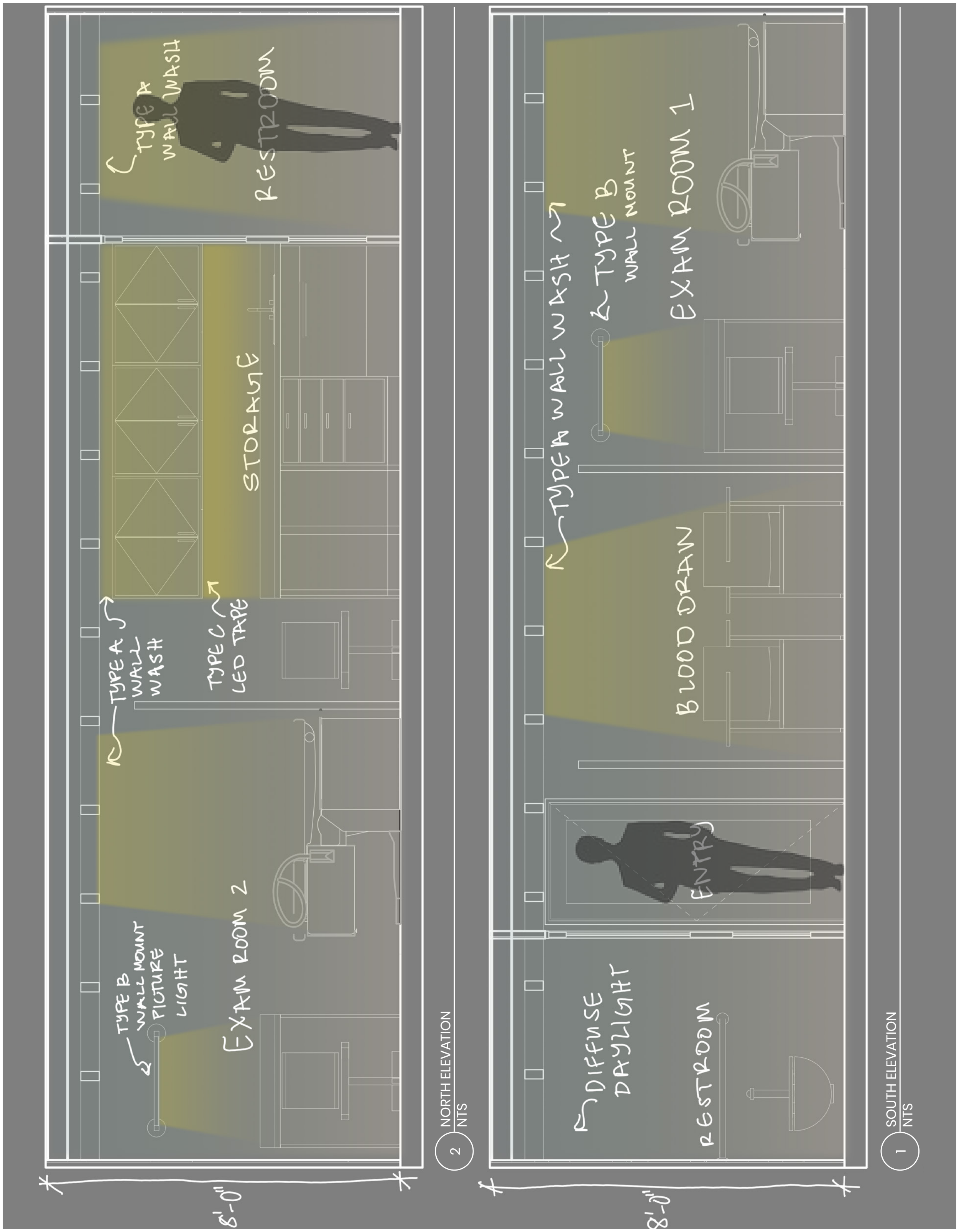
Axon - Interior FF&E



Axon - Exterior

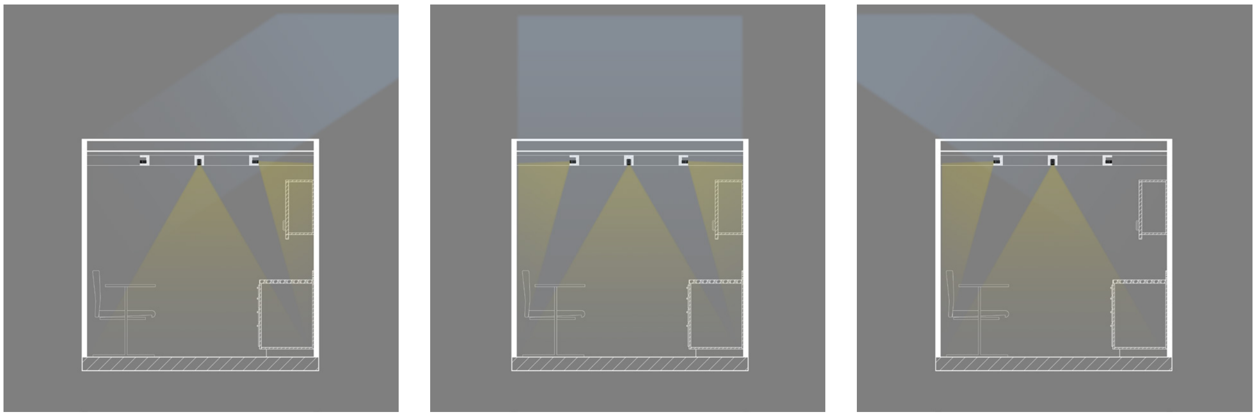
LIGHTING RENDERINGS

LIGHTING RENDERINGS



CONTROLS FLEXIBILITY
CONTROLS FLEXIBILITY

Separate controls for the direct fixture in the central corridor and each wallwasher allows electric lighting to be flexible in reacting to daylight conditions.



DAYLIGHT REPRESENTATION
DAYLIGHT REPRESENTATION

Enscape renderings show an approximation of the daylight quality in the RV throughout the day when facing North in Marfa.


6AM


8AM


10AM


12PM

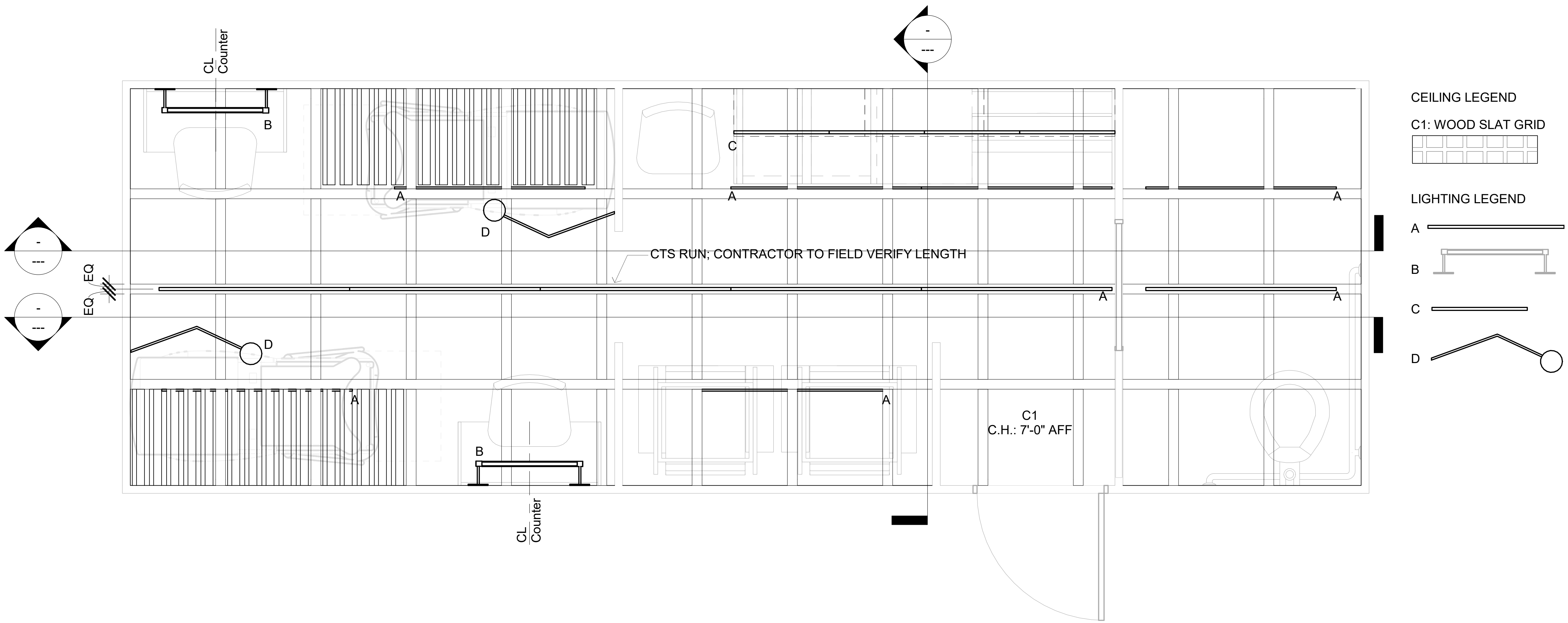

2PM


4PM


6PM


8PM


10PM



1 LIGHTING PLAN
1/2" = 1'-0"

RESHAPE

VICKI LOZANO

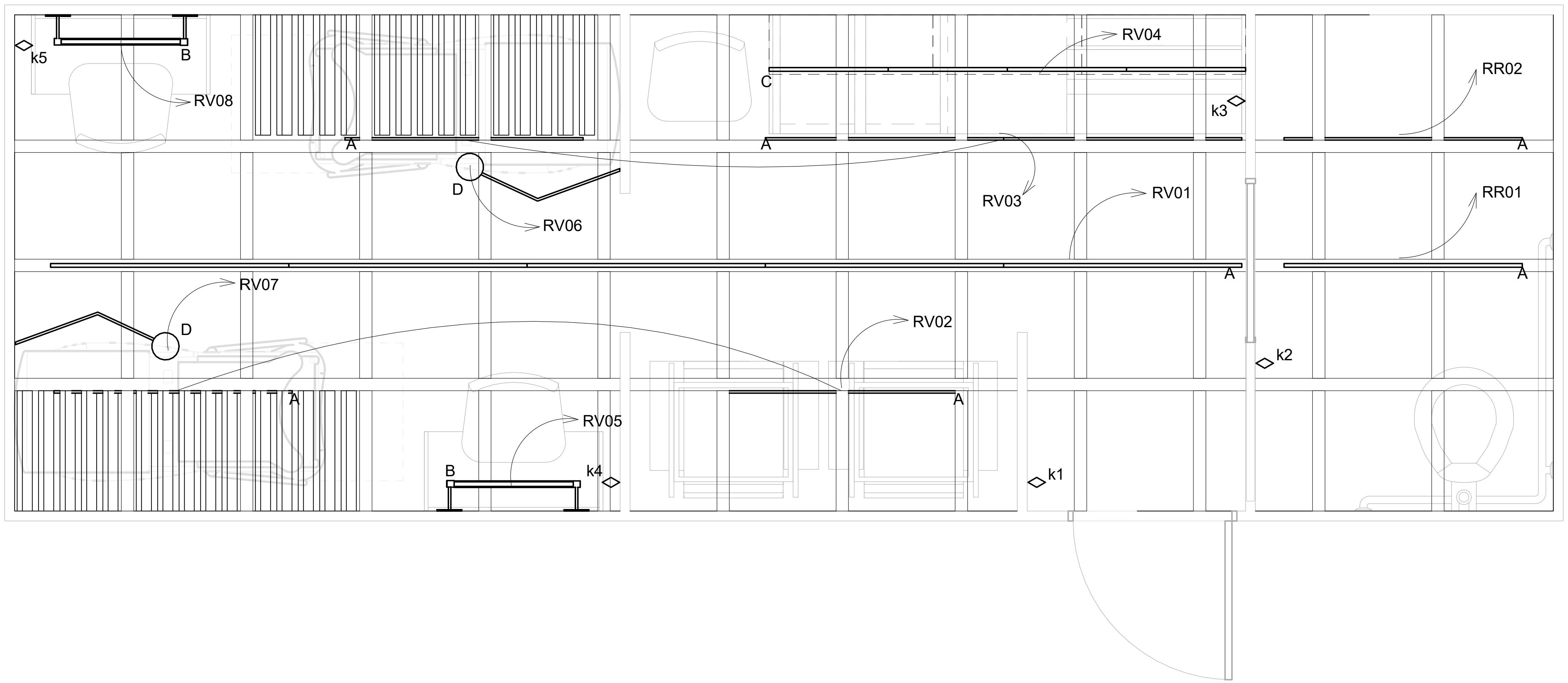
FACING THE HEALTHCARE GAP:
LIGHTING DESIGN FOR A MOBILE CLINIC

No.	Description	Date

LIGHTING PLAN

Project number	LTG THESIS	LT1.0
Date	5/2/22	
Drawn by	VICKI LOZANO	
Checked by	ALYSSA STEWART	Scale 1/2" = 1'-0"

4/29/2022 11:46:31 AM



1 LIGHTING CONTROL PLAN
1/2" = 1'-0"

RESHAPE

VICKI LOZANO

FACING THE HEALTHCARE GAP:
LIGHTING DESIGN FOR A MOBILE CLINIC

No.	Description	Date

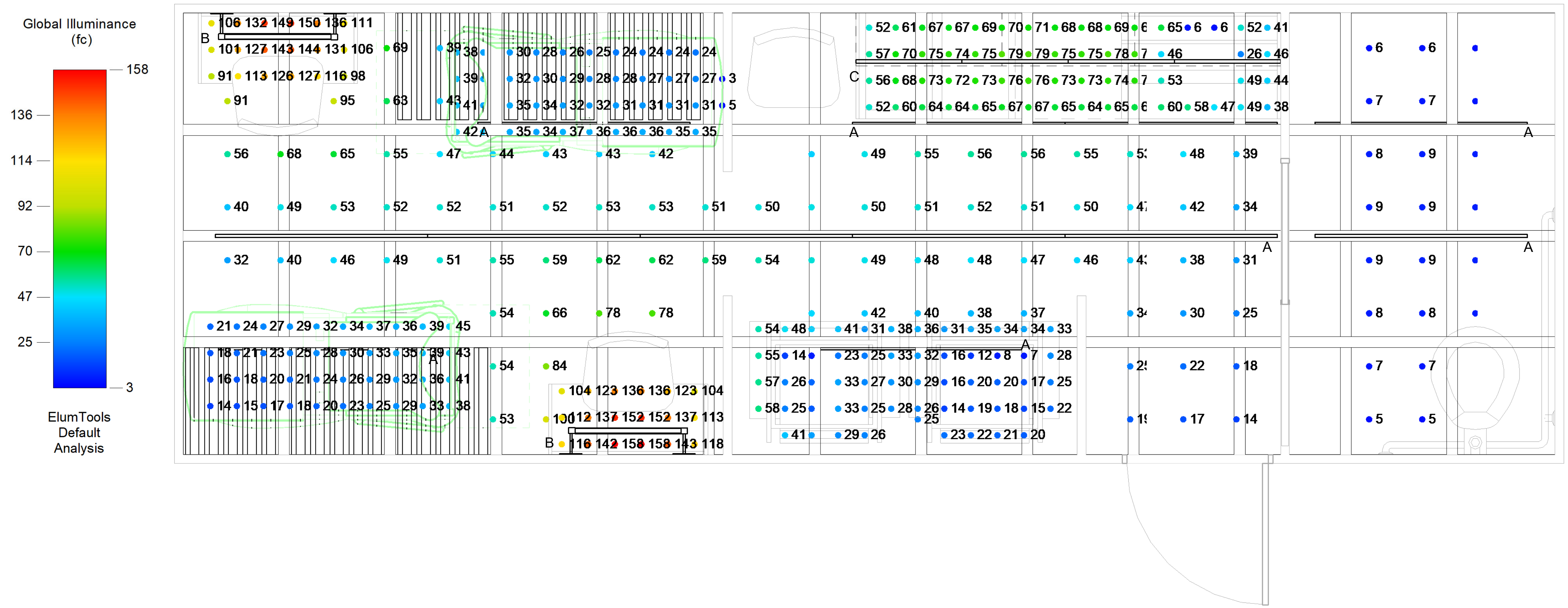
LIGHTING CONTROL PLAN

Project number	LTG THESIS
Date	5/2/22
Drawn by	VICKI LOZANO
Checked by	ALYSSA STEWART

LT2.0

Scale 1/2" = 1'-0"

4/29/2022 11:46:35 AM



1 PHOTOMETRICS PLAN
1/2" = 1'-0"

Calculation Summary					
Calculation Points Name	Avg	Max	Min	Avg/ Min	Max/ Min
General	49 fc	100 fc	14 fc	3.4	7.0
Communal Counter	62 fc	79 fc	6 fc	10.9	13.9
Charting Station 1	123 fc	150 fc	91 fc	1.3	1.7

Calculation Summary					
Calculation Points Name	Avg	Max	Min	Avg/ Min	Max/ Min
Charting Station 2	131 fc	158 fc	104 fc	1.3	1.5
Exam Table 1	28 fc	45 fc	14 fc	2.1	3.4
Restroom	7 fc	9 fc	5 fc	1.4	1.7

Calculation Summary					
Calculation Points Name	Avg	Max	Min	Avg/ Min	Max/ Min
Blood Draw Chair 1	23 fc	36 fc	7 fc	3.1	5.0
Blood Draw Chair 2	33 fc	58 fc	8 fc	4.2	7.4
Exam Table 2	31 fc	42 fc	3 fc	9.6	13.2

IES Recommended Illuminance Standards:

Exam Room:
- General: 10fc at 3'-0" AFF
- Exam Table: 50fc at 3'-0" AFF
- Blood Draw: 75fc at 2'-6" AFF
- Charting Station: 30fc at 3'-6" AFF

Storage: 20fc
Restroom: 5fc

RESHAPE

VICKI LOZANO

FACING THE HEALTHCARE GAP:
LIGHTING DESIGN FOR A MOBILE CLINIC

No.	Description	Date

PHOTOMETRICS PLAN

Project number	LTG THESIS	LT3.0
Date	5/2/22	
Drawn by	VICKI LOZANO	
Checked by	ALYSSA STEWART	Scale 1/2" = 1'-0"

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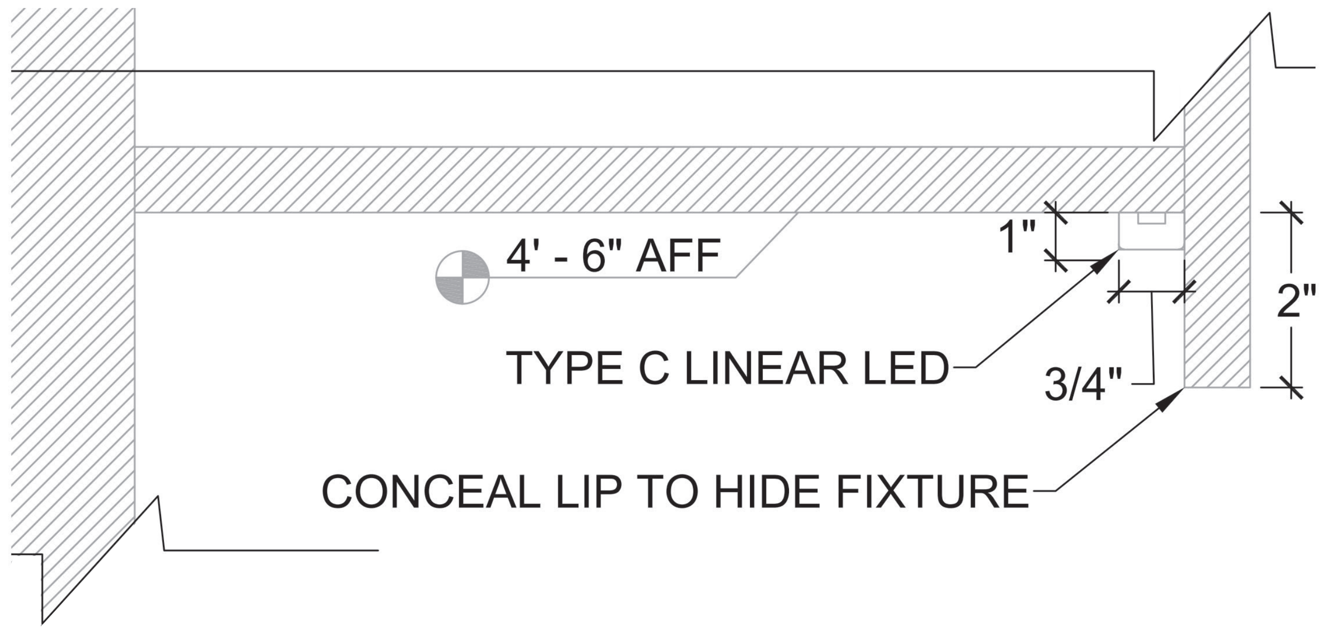
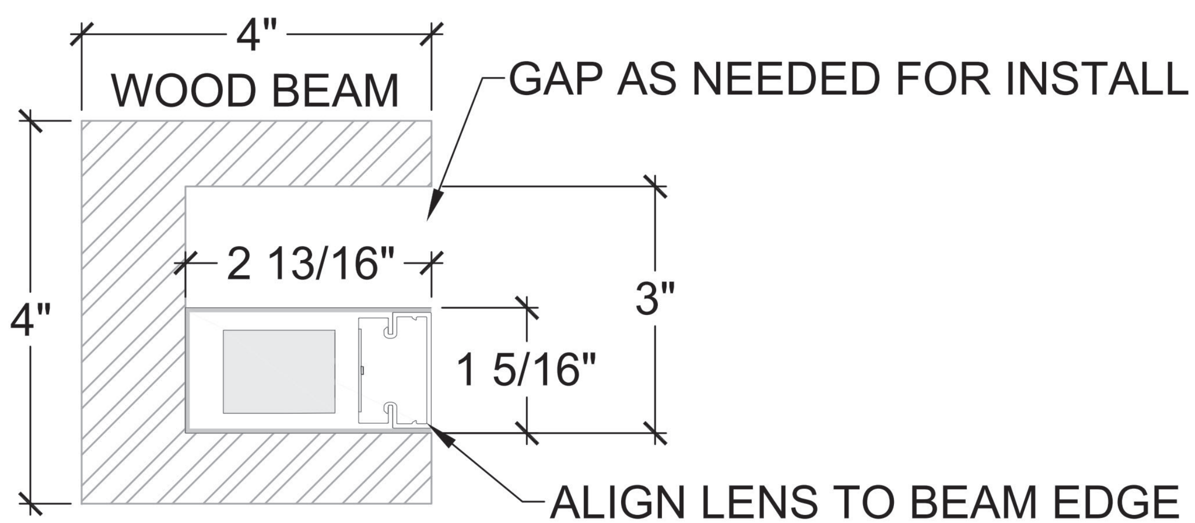
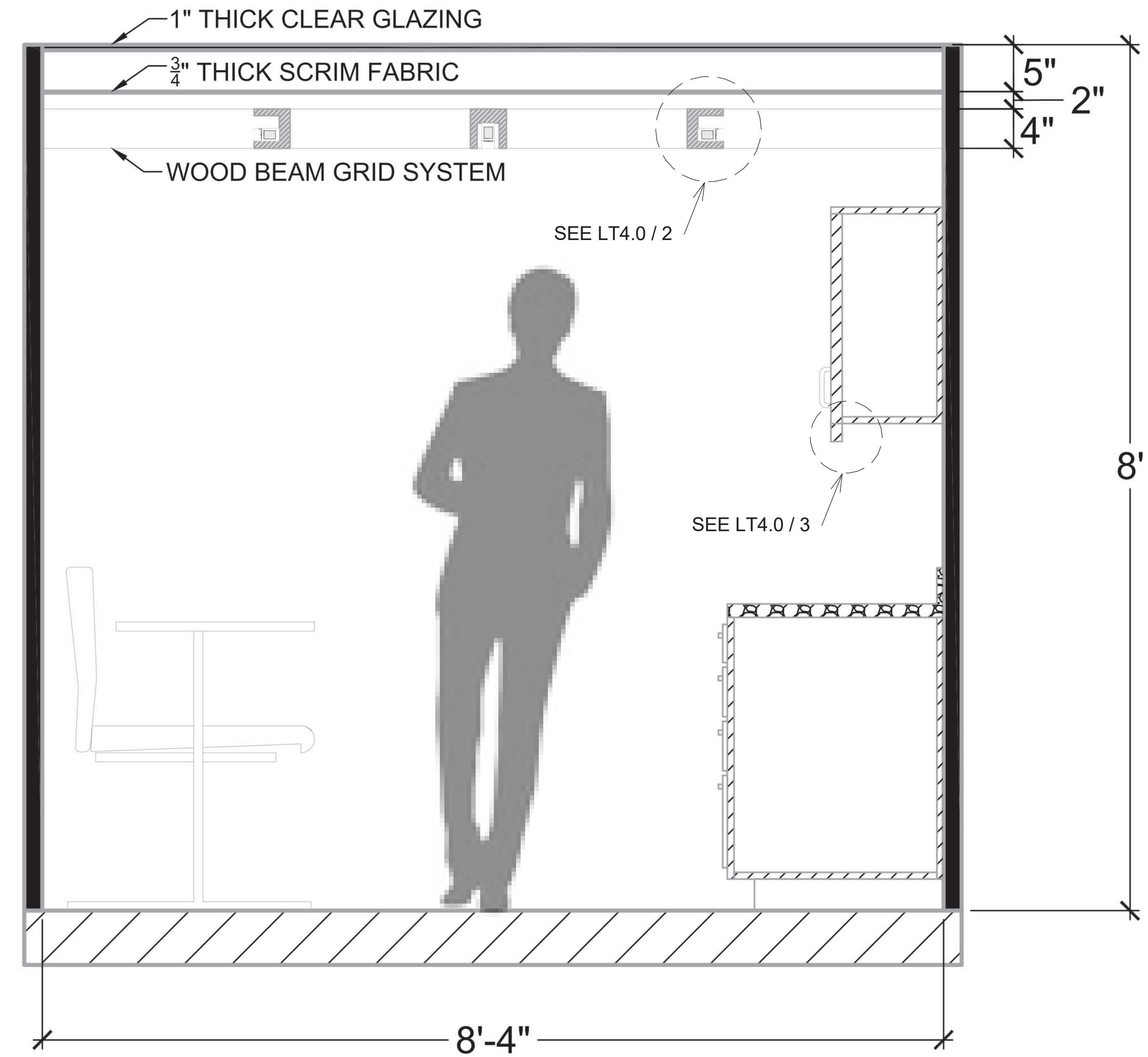


3 TYPE C SURFACE MOUNTED BELOW UPPER CABINETRY
6" = 1'-0"



2 TYPE A RECESSED MOUNTED IN WOOD BEAMS
6" = 1'-0"



1 WEST ELEVATION
3/4" = 1'-0"

RESHAPE

VICKI LOZANO

FACING THE HEALTHCARE GAP:
LIGHTING DESIGN FOR A MOBILE CLINIC

No.	Description	Date

LIGHTING DETAILS

Project number	LTG THESIS
Date	5/2/22
Drawn by	VICKI LOZANO
Checked by	ALYSSA STEWART

LT4.0

Scale AS NOTED

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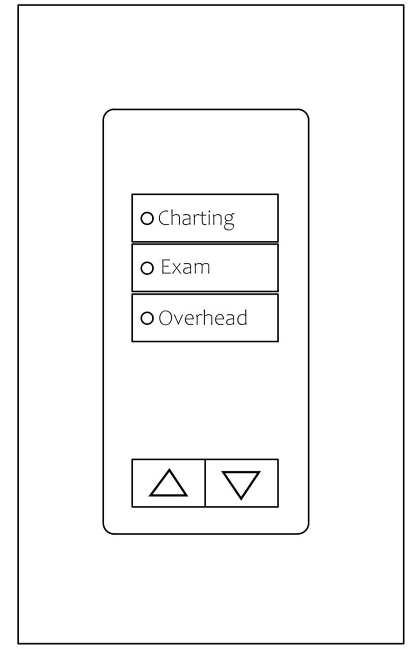
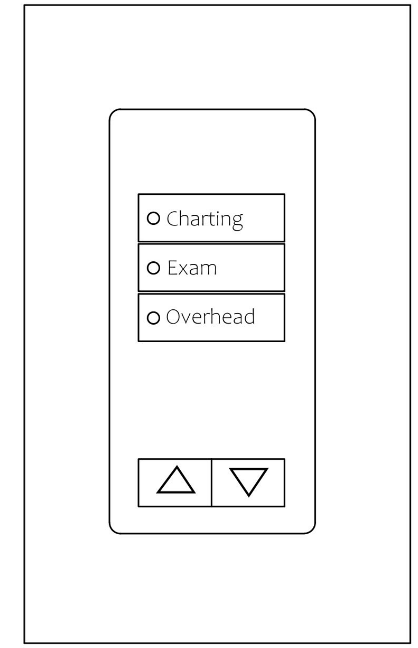
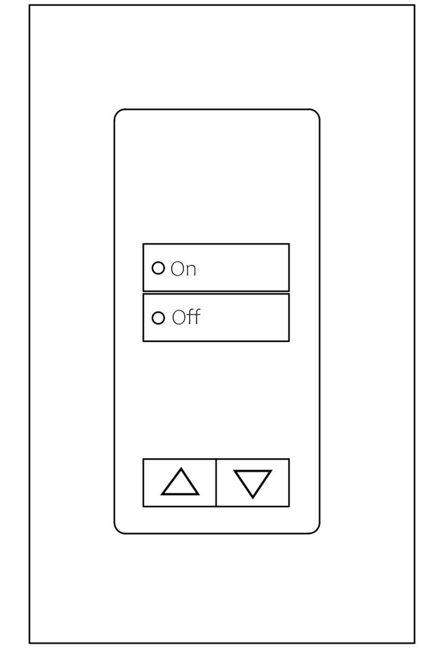


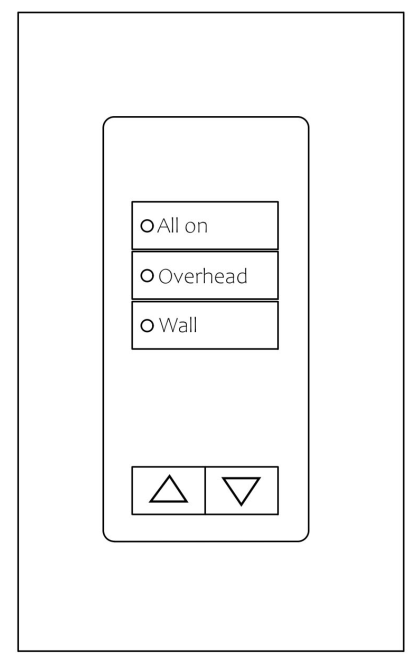
5 K5: EXAM 2 (RV03, RV06, RV08)
NTS



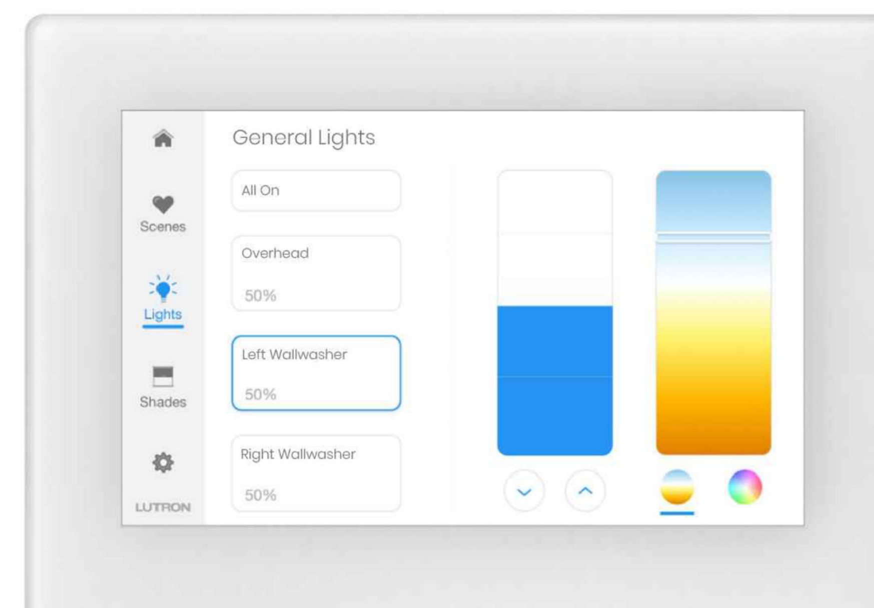
4 K4: EXAM 1 (RV02, RV05, RV07)
NTS



3 K3: COUNTER (RV04)
NTS



2 K2: RESTROOM (RR01, RR02)
NTS



1 K1: ENTRY (RV01, RV02, RV03)
NTS

RESHAPE

VICKI LOZANO

FACING THE HEALTHCARE GAP:
LIGHTING DESIGN FOR A MOBILE CLINIC

No.	Description	Date

KEYPAD ELEVATIONS

Project number	LTG THESIS	LT4.1
Date	5/2/22	
Drawn by	VICKI LOZANO	
Checked by	ALYSSA STEWART	Scale NTS

4/29/2022 11:50:59 AM

	Type	Description	Manufacturer/Catalog #	Lamp/Source	Watts	Volts	Location	Finish	Dimming
	A	surface mounted LED slot light, 1-5/16" wide aperture x contractor verified length continuous runs, with LED optimized white lens, BIOS tunability, and integral driver	Selux L36R2-1S1-40-LW-TS-Contractor to Field Verify Length-SV-1-DYC-DIM-xS1	LED 295lm/ft 4.7W/ft 3500K	4.7W/ft	120V	General RV Restroom	Silver	0-10V
	B	surface mounted LED adjustable wallwasher picture light, 2' length, with BIOS tunability and remote driver	OCL DASH-S1SC-27-MW-BKP-LED1-40K-UNV-DM1-PRA-BIOS	LED 1080lm 12W 4000K 80+CRI	12W	UNV	Charting Stations	Black	0-10V
	C	surface mounted LED tape light with frosted lens and 0.48" x 0.75" extrusion	Acclaim FAC-1-0-1-Contractor to Field Verify Length-A-E-U FACLP2000 FACFL2000	LED 360lm/ft 3.8W/ft 4000K 82.5CRI	3.8W/ft	120V	Under Upper Cabinetry	Clear	ELV
	D	surface mounted LED with rail mounted moveable arm	Waldmann D15757150-pure white	LED 13W 4400K 93+CRI	13W	120V	Beside Exam Tables	White	Non-Dim

END OF SECTION

RESHAPE

VICKI LOZANO

FACING THE HEALTHCARE GAP:
LIGHTING DESIGN FOR A MOBILE CLINIC

No.	Description	Date

LIGHTING EQUIPMENT SCHEDULE

Project number	LTG THESIS	LT5.0
Date	5/2/22	
Drawn by	VICKI LOZANO	
Checked by	ALYSSA STEWART	Scale

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DIMMING SCHEDULE

SYSTEM: Lutron Athena

<u>LOAD TYPES</u>

ELV	Electronic Low Voltage
0-10V	0-10V LED Dimming
LED-ND	Light Emitting Diode - Non-Dimming

Zone	Type	Watts	Qty	Ttl. Load	Load Type	Description	Notes
GENERAL RV							
RV01	A	4.7	20	94	0-10V	Recessed slot light	Contractor to field verify lengths
RV02	A	4.7	8	37.6	0-10V	Recessed slot light	Contractor to field verify lengths
RV03	A	4.7	12	75.2	0-10V	Recessed slot light	Contractor to field verify lengths
RV04	C	3.8	8	30.4	ELV	Surface mounted tape light	Contractor to field verify lengths
RV05	B	12	1	12	0-10V	Wall mounted adjustable wallwasher	
RV06	D	13	1	13	LED-ND	Wall mounted exam light	
RV07	D	13	1	13	LED-ND	Wall mounted exam light	
RV08	B	12	1	12	0-10V	Wall mounted adjustable wallwasher	
RESTROOM							
RR01	A	4.7	4	18.8	0-10V	Recessed slot light	Contractor to field verify lengths
RR02	A	4.7	4	18.8	0-10V	Recessed slot light	Contractor to field verify lengths

RESHAPE

VICKI LOZANO

FACING THE HEALTHCARE GAP:
LIGHTING DESIGN FOR A MOBILE CLINIC

No.	Description	Date

DIMMING SCHEDULE

Project number	LTG THESIS	LT5.1
Date	5/2/22	
Drawn by	VICKI LOZANO	
Checked by	ALYSSA STEWART	Scale

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ENERGY ANALYSIS

ENERGY ANALYSIS

COM*check* Software Version 4.1.1.0

Interior Lighting Compliance Certificate

Project Information

Energy Code: 90.1 (2016) Standard
Project Title:
Project Type: New Construction

Construction Site: | Owner/Agent: | Designer/Contractor:

Allowed Interior Lighting Power

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts (B X C)
1-open space plan RV (Healthcare Facility:Exam/Treatment)	171	1.68	287
2-ADA restroom (Common Space Types:Restrooms)	42	0.85	36
		Total Allowed Watts =	323

Proposed Interior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
1-open space plan RV (Healthcare Facility:Exam/Treatment)				
LED 1: A: Selux recessed linear: Other:	1	40	5	188
LED 3: B: OCL wall mount: Other:	1	2	12	24
LED 4: C: Acclaim tape light: Other:	1	8	4	30
LED 5: D: Waldmann wall mount: Other:	1	2	13	26
2-ADA restroom (Common Space Types:Restrooms)				
LED 1: A: Selux recessed linear: Other:	1	8	6	49
			Total Proposed Watts =	317

Interior Lighting PASSES: Design 2% better than code

Interior Lighting Compliance Statement

Compliance Statement: The proposed interior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed interior lighting systems have been designed to meet the 90.1 (2016) Standard requirements in COM*check* Version 4.1.1.0 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Name - Title | Signature | Date

TYPE A

Date: ______ Customer: ______

Project: ______

Type: ______ Qty: ______

selux + bios ILLUMINATED

M36
LED Recessed with BIOS SkyBlue® Technology

Order Code: ___ - ___ - ___ - ___ - ___ - ___ - ___ - ___ - ___ - ___ - ___ - ___ - ___ - ___

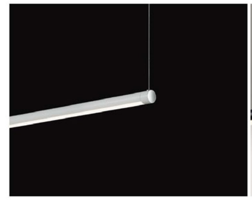
Series	L36 Multi-Mount Form; L36R1 Continuous Flange (Flanged Endcaps); L36R2 Continuous Flange (Flangeless Endcaps)	
Light Engine	1S6[1] 695lm/11.0W per foot; 1S5[1] 621lm/9.9W per foot; 1S4[1] 560lm/8.5W per foot; 1S3[1] 523lm/7.4W per foot; 1S2[1] 433lm/6.1W per foot; 1S1[1] 295lm/4.7W per foot	[1]Values calculated from a 4' fixture @ 3500K + 490nm using DM driver.
Nominal CCT	30 2700K + 490nm; 35 3000K + 490nm; 40 3500K + 490nm	
Shielding	LW LED Optimized White Lens; MI Clear Lens with Microprism; NB LMO Symmetric; A2 LMO Asymmetric 20° Wall Washer; A5 LMO Asymmetric 5° Wall Grazer; BW LMO Batwing; LU[2,3] Light Up Lens; DR[2,3] Drop Lens; VC[4] Specular Louver; VM[4] Matte Silver Louver; VB[4] Matte Black Louver; VW[4] Matte White Louver	[2]Not available with sensors [3]Individual fixtures only. For Runs and Configurations, please consult factory. See page 10 for details. [4]Not available with IL90, V90, or IX90 Configurations
Mounting L36 or Mounting L36R1 or L36R2	SF1 Spackle Flange (½" Drywall); SF2 Spackle Flange (⅝" Drywall); SF3 Spackle Flange (After Drywall); SG Slot Grid (⁹⁄₁₆") (Wire Suspension or ¼"-20 stud); DC Decoustic Ceiling (up to 2" thick); TB[5] T-Bar Length with suspension clips; TBS[5] T-Bar Length with 1" ¼"-20 Stud; RC Rotating Crossbar (Ceilings ¼" to 2" thick); TS 1" ¼"-20 Stud	[5]L36R1 only
Nominal Fixture Length	04[6] 4 ft.; 05[6] 5 ft.; 06[6] 6 ft.; 07 7 ft.; 08[6] 8 ft.; XX Runs (over 8') and Configurations, round up to the nearest foot and replace the "xx" with the # (i.e. 09=09' nominal) *Individual fixtures, Runs and Configurations are supplied in nominal lengths to ensure full, even, illumination. See pages 2 through 6 for additional details.*	[6]Length intended to fit centered between the grid for SG, TB, TBS mountings
Finish	WH White; BL Semi-Matte Black; SV Silver; SP Specify Premium Color	** Custom colors are available, please consult factory*
Voltage	1 120V; 2 277 V; U 120V through 277V 50/60hz capable	
Control Type	STC Static Control, one control feed; INC Individual Control, two control feed; DYC Dynamic Control via BioDimmer, single control feed	
Driver	**STC - Static Control:** DM[7] eldoLED 1% SOLOdrive 0-10V (Linear); DML[7] eldoLED 1% SOLOdrive 0-10V (Logarithmic); DLL[7] eldoLED DUALdrive DALI-2 (Logarithmic); DC2 Lutron 1% 2-Wire; DE1 Lutron 1% Eco-System **OR INC - Individual Control OR DYC - Dynamic Control:** DIM[7] eldoLED 1% ECOdrive 0-10V (Linear); DIL[7] eldoLED 1% ECOdrive 0-10V (Logarithmic); DED[7] eldoLED 1% ECOdrive DALI-2 (Logarithmic); DC2[7] Lutron 1% 2-Wire; DE1[7] Lutron 1% EcoSystem	[7]See page 7 for full details
Fixture Options	DL Damp Location Rated; FS In-line Fuse; SS[8] Separate Switching; CCEA CCEA Approved	[8]See page 10 for details
Sensor Options	xE Enlighted (consult factory); xS1 Sensor Switch Daylight (consult factory); xS2 Sensor Switch Occ/Vac (consult factory); xS3 Sensor Switch Occ/Vac/Daylight (consult factory); xSN nLight Enabled (consult factory); xV Lutron Vive (consult factory) Replace "x" with quantity	
Emergency Options	EC Emergency Circuit Wiring (consult factory); EMR Remote Micro Inverter (consult factory); EM Integral EM Battery Pack (consult factory)	* Emergency options are available - please consult factory for gear fitment and available section lengths.
Configuration Options	L9 Lit Horizontal 90° Corner; V9 Lit Inverted 90° Corner; T9 Lit "T" section; X9 Lit "X" section	*See page 11-12 for full details and restrictions

BUY AMERICAN · NRTL DAMP · 5 YEAR LED WARRANTY · ARRA Compliant · RoHS · ADA Compliant · UNION MADE · LUTRON · enlighted · nLIGHT · bios · IC RATED

TYPE B

OCL. ARCHITECTURAL LIGHTING

PROJECT NAME: ______ TYPE: ______ QTY: ______




Dash™
PENDANT / SCONCE

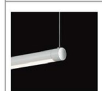
FEATURES
- SIMPLE LINEAR PROFILE CAN BE CONNECTED TO CREATE LONG CONTINUOUS RUNS
- FIXTURE IS ROTATABLE 350 DEGREES
- STRAIGHT AND ADJUSTABLE CONNECTORS AVAILABLE
- SUSPENSION SYSTEM FEATURES MINIMAL CEILING FITTINGS
- 3 STEP LED BINNING

MADE IN USA · bios ILLUMINATED · cETLus

CATALOG CODES

DA1	B	C	MW	E	/	UNV	H	I	J
SERIES	HANGING SYSTEM	SIZE	DIFFUSER	FINISH	LIGHT SOURCE	VOLTAGE	OAH	CONTROL	OPTIONS

SPECIFY CATALOG CODE

A SERIES	B HANGING SYSTEM	C SIZE	D DIFFUSER	E FINISH
 DA1 DASH	P1EW PENDANT WITH AN AIRCRAFT CABLE ON ONE END OF THE FIXTURE AND A POWER CORD ON THE OTHER (REMOTE DRIVER) S1SC ARM SCONCE (REMOTE DRIVER)	27 39 51 63 75 XX	MW MATTE WHITE	**POWDER COAT FINISHES** BKP BLACK; BMP BRASS METALLIC; BNP BRONZE; BTP BLACK TEXTURED; GRP GRAPHITE; GLP GOLDTASTIC; MWP MATTE WHITE; SGP STEEL GRAY; SMP SILVER METALLIC; SWP SKY WHITE; WTP WHITE TEXTURED **PREMIUM METAL FINISHES** BAL BRUSHED ALUMINUM

F LIGHT SOURCE		G VOLTAGE	H OAH*	I CONTROL	J OPTIONS
LED OUTPUT LED1 LED2	COLOR TEMP 27K 30K 35K 40K	UNV 120-277	48 100 144 NOTE: LEAVE BLANK FOR S1SC	DM1 0-10V DIMMING 1% DM3 LUTRON HI-LUME ECOSYSTEM 1% (LDE1)	SCN STRAIGHT CONNECTOR ACN ADJUSTABLE CONNECTOR (**P1EW** ONLY) SCY 3.5" DIA. SMALL CANOPIES (REQUIRES PRE-INSTALLATION OF 3" MUD RING BY OTHERS; **S1SC** ONLY) PRA 4" PROJECTION OFF WALL (**S1SC** ONLY) ULD DAMP LABEL BIOS BIOS SKYBLUE® OR BIOS SKLYBLUE® DYNAMIC LIGHT ENGINE** MOD MODIFIED LUMINAIRE (CONTACT LOCAL REP)

SAMPLE CODE: DA1-P1EW-51-MW-BTP-LED1/35K-UNV-48-DM1-ULD

*For Minimum OAH, see hanging systems details. P1EW will ship with one of three standard OAH's (48", 100" or 144") field adjustable to the desired height

Contact factory for **BIOS SkyBlue® or **BIOS SkyBlue® Dynamic** light engine and control options.

Fixtures larger than 74.75" will be shipped in connectible segments

Fixture is provided with 5" dia. canopies finished to match fixture

UP TO 90 LM/W

LUMENS AND WATTAGE CHART

		27"	39"	51"	63"	75"
LED1	LUMENS DELIVERED	1080	1620	2160	2700	3240
	SYSTEM WATTAGE	12	18	24	30	36
LED2	LUMENS DELIVERED	1680	2520	3360	4200	5040
	SYSTEM WATTAGE	20	30	40	50	60

This chart was created for a 35K color temp. Multiply by 0.95 for 27k color temp, 0.97 for 30k color temp, and 1.03 for 40k color temp.

MODS, NOTES, & COMMENTS

RoHS — This product meets the material restrictions of Article 4 of the RoHS Directive (2011/65/EU), including Commission Delegated Directive 2015/863.

FLEX 120™

ACCLAIM LIGHTING

Client:	
Project:	
Type:	
Order Code:	
Quantity:	

Flex 120 is a low profile, exterior rated, AC powered linear LED strip. It features multiple white LED color temperatures, 10-100% ELV dimming, and customizable lengths that are built to order for the specific project. Flex AC provides maximum run distance for projects that are looking to keep wiring simple while eliminating the need for external power supplies.

SPECIFICATIONS

Colors	2700K, 3000K, 3500K, 4000K, 5000K, Red, Green, Blue, Amber
Beam Angle	160º
Photometrics	Up to 371 lumens per 0.5M 1.64' section, >80 CRI, 70 l/pw - See page 4 for details
Strip Length	Built to order, minimum length of 0.5m (1.64') maximum length of 20m (65.6')
Control	10-100% dimming via ELV (reverse phase) / 0-10V & DMX via optional UDM
Max Fixtures in Series	Link any length of section up to 40m (131.2')
Power Consumption	3.8W per foot, 12.4W per meter
Operating Voltage	120VAC
Lumen Maintenance	L70 @ 50,000 hours (25º C)
Mounting	Via aluminum channel
Finish	Transparent sleeve, white PCB
Material	PVC, UV Stabilized
Ambient Operating Temperature	-40º F to 122º F (-40º C to 50º C)
IP Rating	IP66, wet and dry location - Not for use where water may accumulate, GFCI circuit required
IK Rating	IK08, protection against 5 joule impact
Fixture Connectors	10' (3M) feed cable with ETL listed AC junction box required
Warranty	5 Years, limited
Weight	TBA
Dimensions	**L:** Various **W:** 0.75" x **D:** 0.48" (Various x 19mm x 12.2mm)
Certifications	ETL, CE

FLEX 120™

ACCLAIM LIGHTING

ORDER CODES

* indicates special order

FAC - 1 0 1 - # # # U

- Version: **FAC** = Flex 120
- Control: **1** = ELV
- Housing Finish: **0** = Transparent Sleeve
- Top Cover: **1** = Clear
- Length: **X** = Custom†
- End Type: **A** = End Cap; **L** = Link Connector*
- LED Color: **A** = 2700K, **C** = 3000K, **D** = 3500K, **E** = 4000K, **G** = 5000K, **N** = Red, **P** = Green, **Q** = Blue, **R** = Amber
- Input Voltage: **U** = 120VAC

†: When ordering custom lengths, please specificy number of 1.64' (0.5M) sections required after X (65.6', 20M maximum). Example order code: **FAC-101-X12AAU = 0.5M x 12 / 6M spool**

RELATED COMPONENTS

Required Installtion Accessories

FACFCB10
Flex120 3m (10') Feed Cable with cETLus Listed AC Junction Box

FACIT
Flex120 Rolling Wheel Install Tool

Required Mounting Accessories - Can be cut to length as needed

FACLPC500
0.5M (1.64') Low profile channel for Flex120

FACLPC1000
1M (3.28') Low profile channel for Flex120

FACLPC2000
2M (6.56') Low profile channel for Flex120

FACTPC500
0.5M (1.64') Tall profile channel for Flex120

FACTPC1000
1M (3.28') Tall profile channel for Flex120

FACTPC2000
2M (6.56') Tall profile channel for Flex120

TYPE C

FLEX 120™

ACCLAIM LIGHTING

RELATED COMPONENTS

Required Mounting Accessories - Can be cut to length as needed, All lenses are UV Stabilized

FACCL500
0.5M (1.64') Clear lens for all Flex 120 channel

FACCL1000
1M (3.28') Clear lens for all Flex 120 channel

FACCL2000
2M (6.56') Clear lens for all Flex 120 channel

FACFL500
0.5M (1.64') Frosted lens for all Flex 120 channel

FACFL1000
1M (3.28') Frosted lens for all Flex 120 channel

FACFL2000
2M (6.56') Frosted lens for all Flex 120 channel

FACOL500
0.5M (1.64') Opal lens for all Flex 120 channel

FACOL1000
1M (3.28') Opal lens for all Flex 120 channel

FACOL2000
2M (6.56') Opal lens for all Flex 120 channel

Optional Control Accessories

UDM
Converts 0-10V (sink or source) to IGBT

TYPE D

Examination luminaire

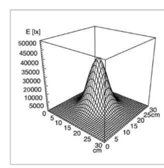
VISIANO 10-1 P S10 D15757150

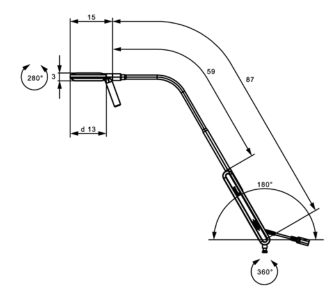
Waldmann W
ENGINEER OF LIGHT.

Derungs
LIGHT FOR PEOPLE

fitted with	1 x LED module
luminous power	50'000 Lux / 0.5 m
Illuminancefield 0.5 m color	Ø 18 cm (7.1 in)
rendering index (CRI)	> 93
color temperature work	4400 K
equipment	electronic converter
connected load	100-240 V; 50/60 Hz
mains lead	1.8 m (5.9 ft) hospital grade plug
luminaire body	PMMA
weight (net)	1.1 kg (2.4 lbs)
power consumption	13 W
usage	rocker switch (I/0) at the arm
class of protection	II
accessory	rail clamp
norms	EN 60601-1, EN 60601-2-41
special features	positioning handle
certifications	ETL/cETL
system of protection	IP 20
order number	D15757150 - pure white

light distribution

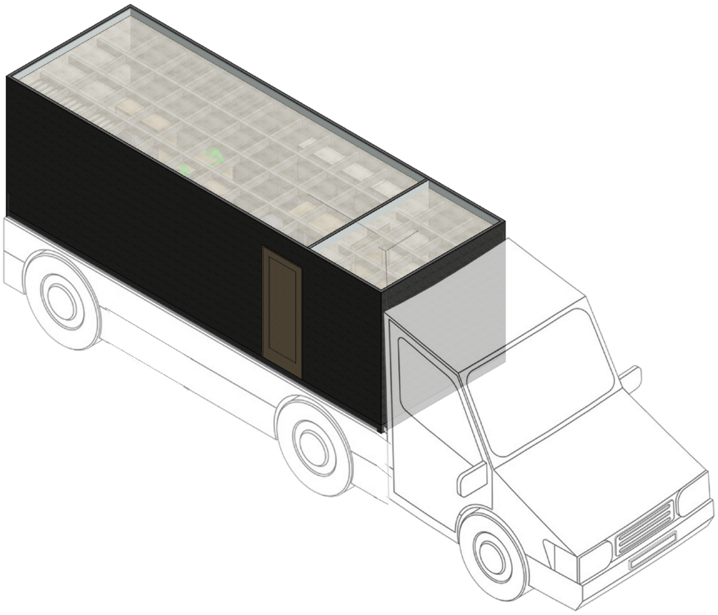


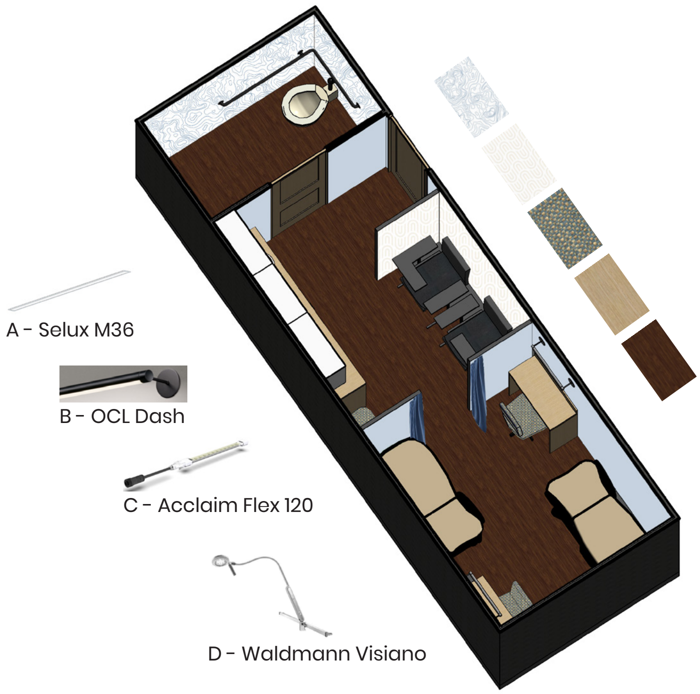


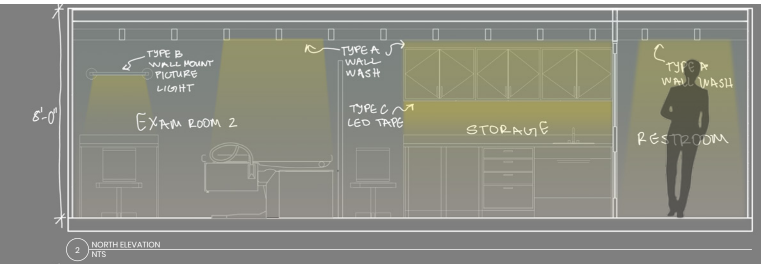
Product specifications are for reference only and are subject to change without notice. Images may vary from actual product.
Photometric and electrical data may vary due to component tolerances.

www.waldmannlighting.com

RESHAPE







THANK YOU!