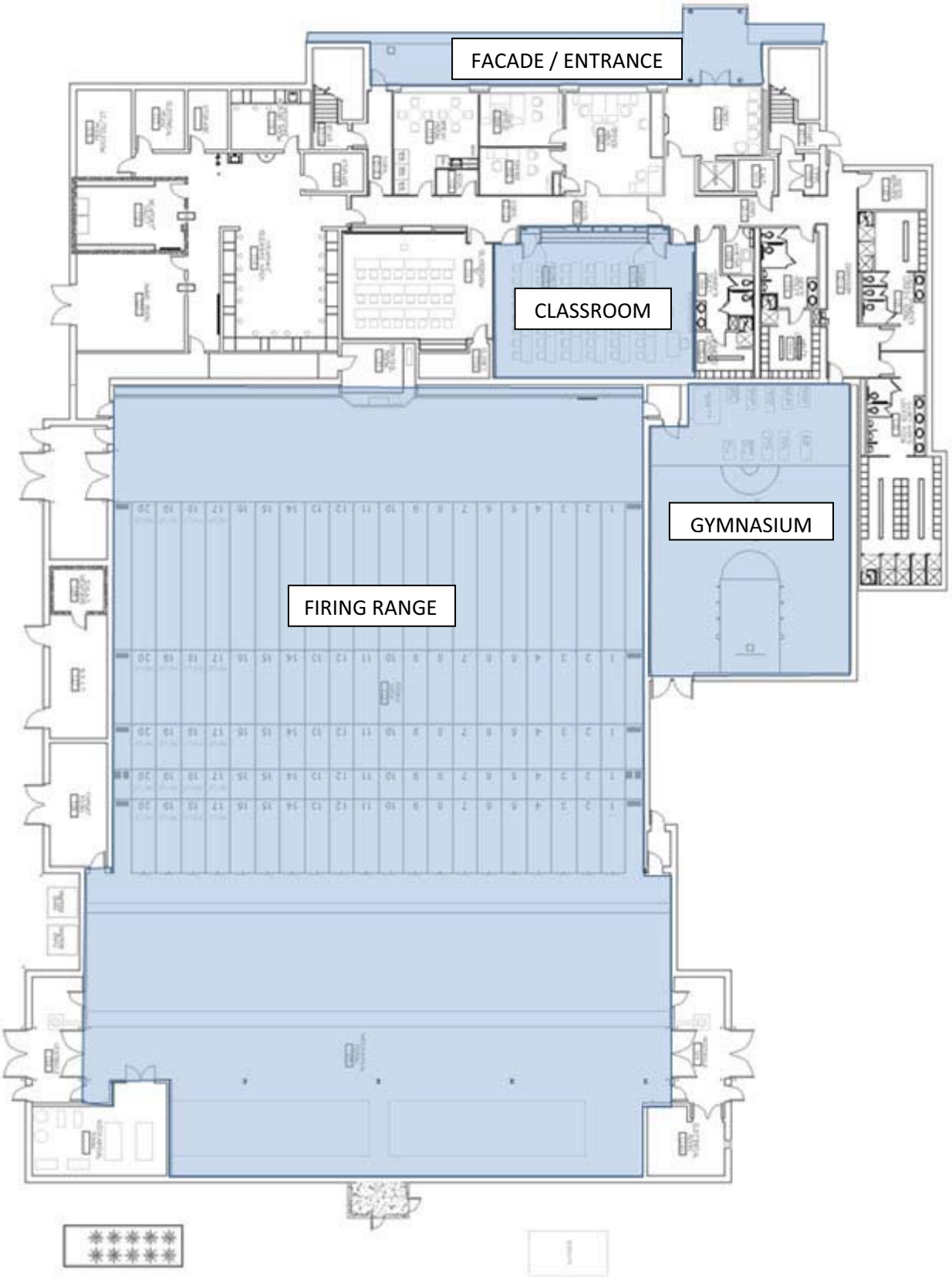
Lighting Depth

The building functions primarily as an educational training facility; the major goal of the lighting design is to facilitate learning. Specific design criteria vary based on the individual spaces being addressed, but common themes, such as control and flexibility link the designs together. While stunning visual appearance and pleasing aesthetics is not the main goal of the facility, quality lighting is still of importance. Quality lighting is necessary to adequately address the function of the building as a learning environment, to aid in the learning process, and to provide comfort to the users of the building.

Design criteria were examined closely for four spaces within the Maryland Transportation Authority Police Training Facility, and a lighting redesign was performed. The four spaces for which lighting redesigns were performed were Classroom 'A', the physical training gymnasium, the front façade and entrance canopy, and the firing range area. These selections represent diversity in the spaces and functionality of the building.

In combination with functional and aesthetic goals of each distinctive space and the owner's requirements, the IESNA Lighting Handbook was employed as the primary guide for determining the design criteria for the space. ASHRAE Standard 90.1 was utilized as the standard for energy usage in the form of lighting power density requirements. Finding a balance in aesthetics, functionality, and energy efficiency was of primary concern. AGI32 was utilized as the chief method of analysis for the lighting redesign. It provides data for illuminance values, lighting power densities, as well as renderings to verify the aesthetics of the space.

On the following page is a plan view of the ground floor of the Maryland Transportation Authority Police Training Facility. Highlighted are the areas for which lighting redesigns were performed.


FACADE / ENTRANCE
CLASSROOM
GYMNASIUM
FIRING RANGE

Classroom 'A'

Introduction

Classroom 'A' is the largest classroom space in the Maryland Transportation Authority Police Training Facility. Classroom 'A' has dimensions of 30'-8" by 40'-7". Each classroom is equipped with a 16' whiteboard, an 8' tack board with continuous display rail, a wall-mounted 27" TV, an 8' wide projection screen, and a 16' long countertop with base cabinets and wall shelving above.

While, the classroom can serve many different functions, including instructional lectures, training classes, large meetings, and exams, the primary goal of the classroom is to "provide a visual environment for both students and instructors that is supportive of the learning processes" (IESNA Lighting Handbook).

Materials and Reflectances

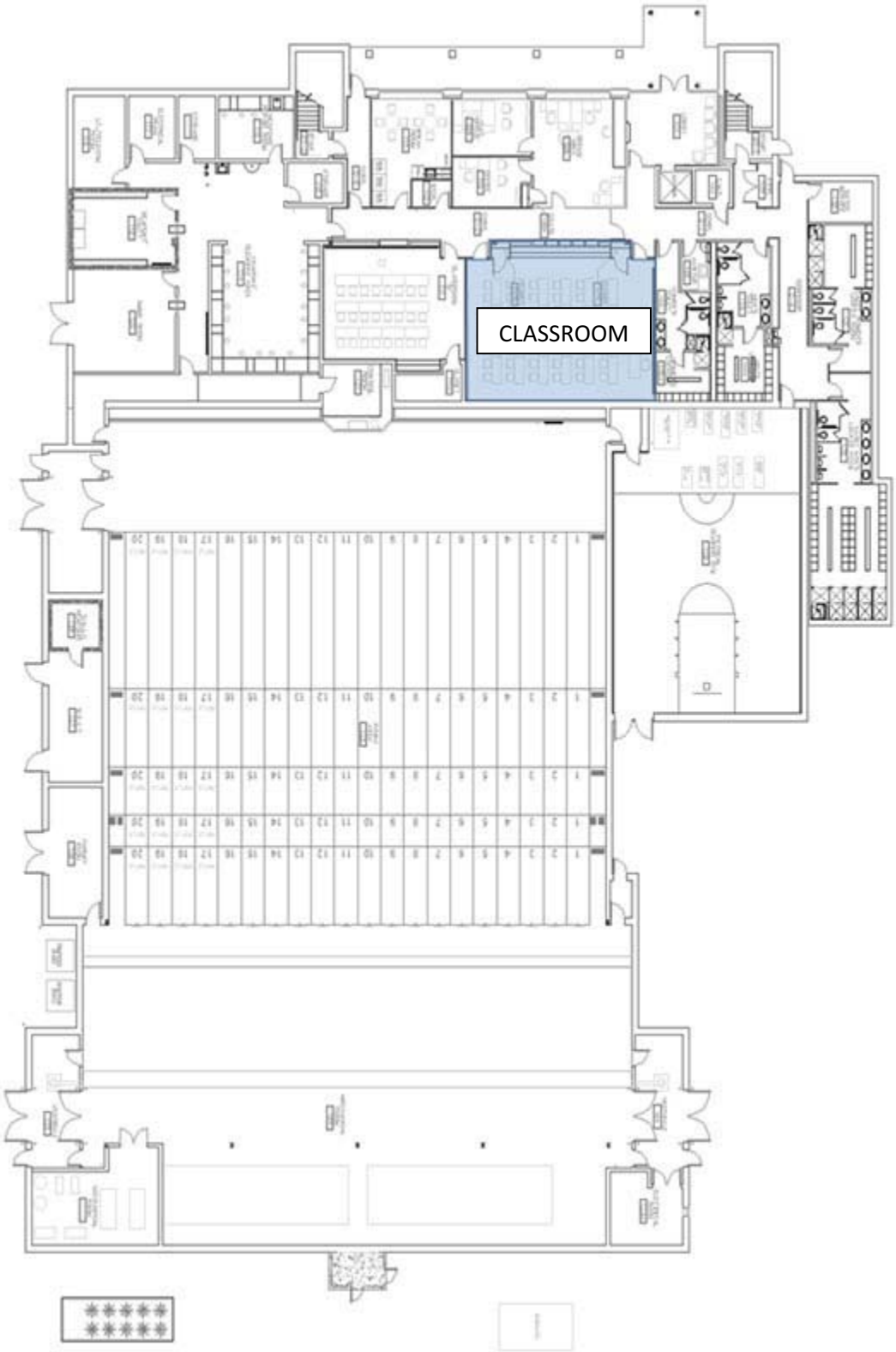
Ceiling
Acoustical Ceiling Tile (ACT)
Reflectance = 0.86

Walls
Painted Gypsum Board
Reflectance = 0.80

Floors
Vinyl Composition Tile (VCT) Flooring
Reflectance = 0.31

Desks, Cabinet, and Shelving
Wood finish
Reflectance = 0.22

Layout



Summary of Design Criteria / Design Approach

Illuminance Levels (to perform task)

The most important consideration for the lighting design of the classroom is meeting the illuminance levels required for the performance of the visual tasks at hand. Paper task on the desk plane is most crucial, but other tasks such, as viewing the white board or projection screens, should not be ignored. The IESNA recommends 50 footcandles for the performance of visual tasks of high contrast and small size, or low contrast and large size. To ensure that there is adequate light for all tasks, including the administering of examinations, 50 fc will be the target average illuminance when all luminaires are at full output. Additionally, 5 fc of vertical illuminance is desired on the whiteboard on the front wall of the classroom.

Light Distribution of Task Plane

Again, lighting for the task is crucial in a classroom space. Uniformity of light distribution on the task plane of the desk surface should be achieved to allow for easy completion of tasks throughout the room.

Control and Flexibility

The classroom may be used for different functions, such as meetings, lectures, and presentations. The desk plane, white board, or projection screen could become the critical viewing surface at any time, and the lighting system should be flexible to meet the changing needs of each situation. Multiple switching options can be utilized to achieve this versatility. Three main functions are expected to most frequently occur in the classroom, lectures, audio/visual presentations, and examinations. General design elements of each, as proposed in the IESNA Lighting Handbook, are listed below.

> ***Lectures*** *– dim general lighting and brighten front lights to direct attention to the educator and chalkboard*
> ***A/V Presentations*** *– turn front lights off and dim general lighting to low for clear screen images and easy note-taking*
> ***Examinations*** *– raise all lights to full brightness for detail*

Design Performance

The lighting system for the classroom has three parts that, when combined in various ways, allows for the flexibility of the space set forth in the design criteria. The first part is suspended linear semi-indirect luminaries over the classroom seating area. These fixtures are oriented from front to back of the room so as not to interfere with the projection system. The second aspect of the lighting system is lighting under and above the cabinets. They provide a peripheral emphasis and heighten the space. The third part is square downlights at the front of the room. They allow for the front of the room where a speaker or presentation would be to have a different illuminance level than the rest of the room.

Lutron's Radio Touch Wireless Lighting Controls system fits the control needs of the lighting redesign. The control system provides flexibility and energy savings through the use of wireless radio signals communicating with and dimming the luminaries to create scenes. The following three preset scenes will be programmed into the Radio Touch system:

1) Examination Scene
    a. Linear semi-indirect – 100%
    b. Square downlights – 100%
    c. Cabinet lighting – 100%
2) Audio/Visual Presentation Scene
    a. Linear semi-indirect – 50%
    b. Square downlights – 0%
    c. Cabinet lighting – 0%
3) Lecturing Scene
    a. Linear semi-indirect – 25%
    b. Square downlights – 100%
    c. Cabinet lighting – 0%

Projection screen and equipment can be integrated into the controls system. Occupancy sensors will also need to be included and integrated in the system to meet the automated shutoff requirements. More scenes and integration can occur as may be requested by the owner.

Luminaire Schedule

The following luminaire schedule denotes the basic luminaire, lamp, voltage and wattage information of the three luminaire types prescribed in the lighting redesign of Classroom 'A'. A full luminaire schedule is available for viewing in the appendix and includes additional information such as ballast information and starting and operating currents.

LUMINAIRE SCHEDULE - CLASSROOM 'A'								
TAG	MANUFACTURER	CATALOG NUMBER	DESCRIPTION	LAMP TYPE	WATTS	# OF LAMPS	OPERATING VOLTAGE	FIXTURE INPUT WATTS
A	PEERLESS	PRM4-1 54HO R12 277	SUSPENDED SEMI-INDIRECT	T5	54	1	277	88.5
B	LITHONIA	UC 42K 277	UNDERCABINET FIXTURE	T5	13	2	277	28
C	GOTHAM LIGHTING	SQF 1/32TRT 6AR 277	SQUARE DOWNLIGHT	CFL - TR	32	1	277	38

Light Loss Factors

Light loss factors (LLF) were determined using the method prescribed in the IESNA Lighting Handbook. Ballast factor, lamp lumen depreciation (LLD), room surface dirt depreciation (RSDD), and luminaire dirt depreciation (LDD) were evaluated in the determination of the LLF for each luminaire. Assumptions and equipment values are included in the table below.

LIGHT LOSS FACTORS - CLASSROOM 'A'											
LUMINAIRE DESIGNATION	MAINTENANCE CATEGORY	ROOM ATMOSPHERE	CLEANING INTERVAL	RCR	INITIAL LUMENS	MEAN LUMENS	BALLAST FACTOR	LLD	RSDD	LDD	LLF
A	II	CLEAN	12 MONTHS	2.74	5000	4650	0.98	0.93	0.93	0.94	**0.797**
B	V	CLEAN	12 MONTHS	2.74	700	630	0.95	0.9	0.977	0.88	**0.735**
C	IV	CLEAN	12 MONTHS	2.74	2800	2520	0.88	0.9	0.977	0.88	**0.681**

Lighting Power Density

Creating an energy efficient design is a crucial aspect for the lighting design. ASHRAE Standard 90.1 puts forth the limitations for lighting power density. Using the space-by-space method, a room classified as Classroom/Lecture/Training should have a lighting power density of no more than 1.4 W/ft^2. The following are the calculations and results for the actually lighting power density of the redesigned lighting system for Classroom 'A'. Included are the watts per square foot of room area utilized for each of the three lighting

scenarios. The actually lighting power density of the space is based on all of the luminaires on at full output, however, each scenario will show the difference in W/ft^2 when that scene is in use.

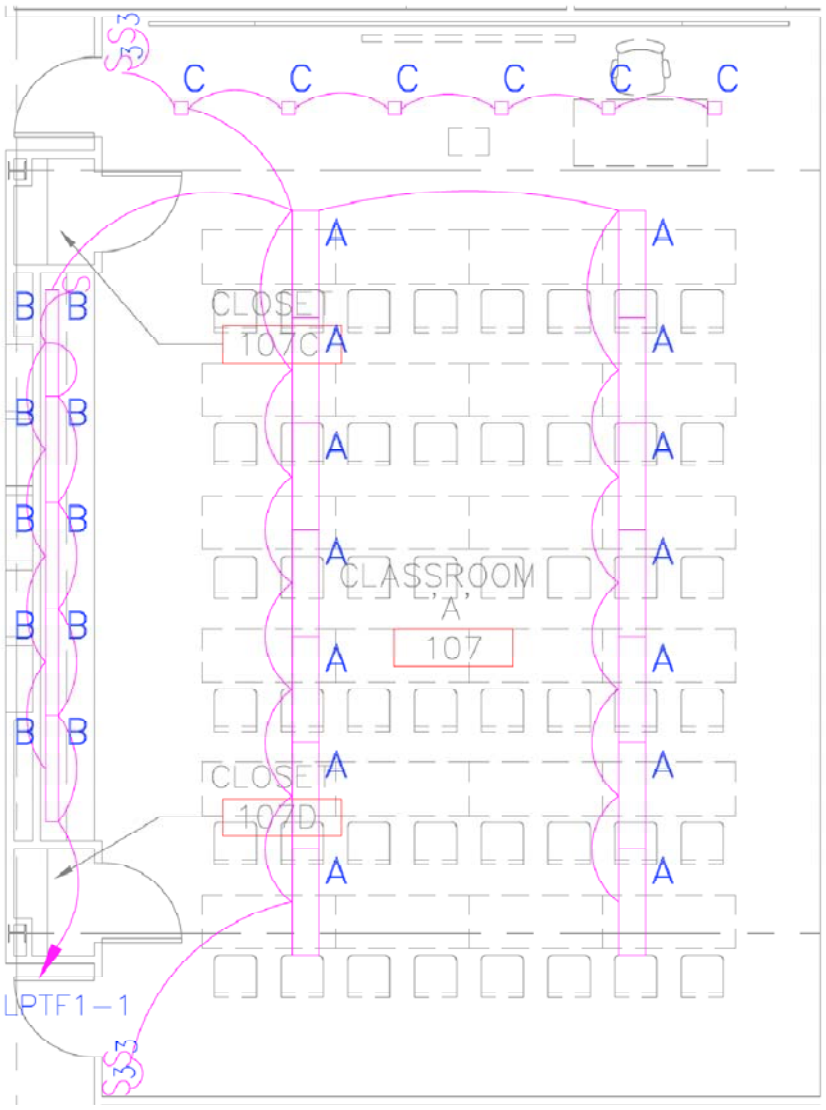
Lighting Power Density Calculation:

Area = 1144 ft^2
Total Watts = 1333.4 W
LPD = 1.166 W/ft^2

W/ft^2 for Each Scenario

1) Examination Scene
   Area = 1144 ft^2
   Total Watts = 1333.4 W
   W/ft^2 = 1.166 W/ft^2
2) Audio/Visual Presentation Scene
   Area = 1144 ft^2
   Total Watts = 827.4 W
   W/ft^2 = 0.723 W/ft^2
3) Lecture Scene
   Area = 1144 ft^2
   Total Watts = 983.4 W
   W/ft^2 = 0.860 W/ft^2

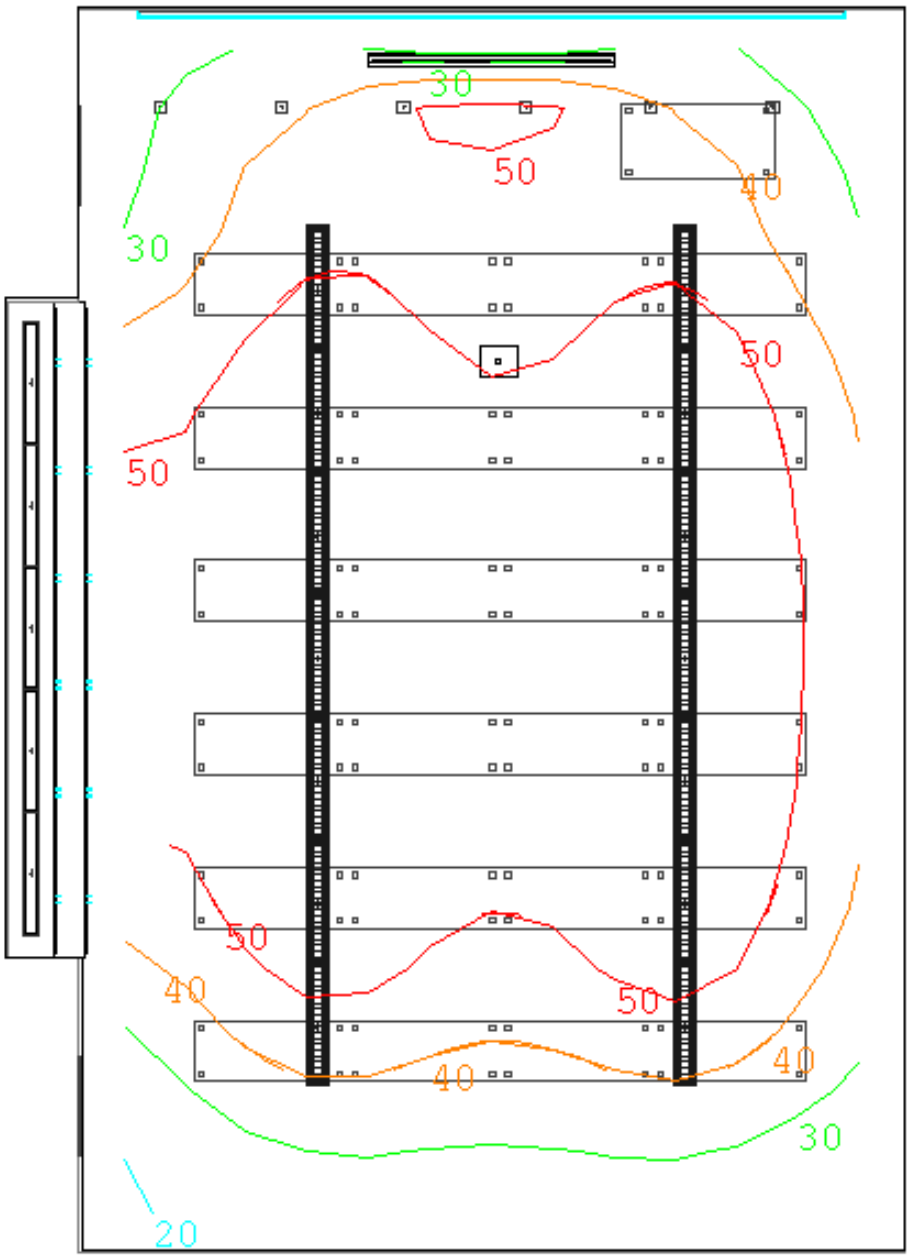
Floor Plan



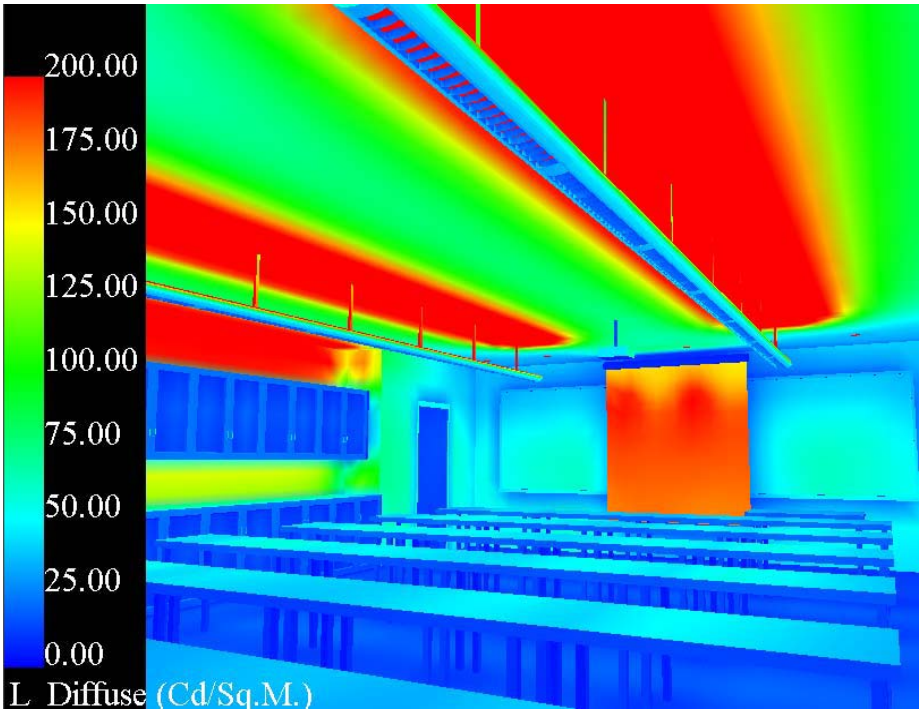
Performance Data

Examinations Scene

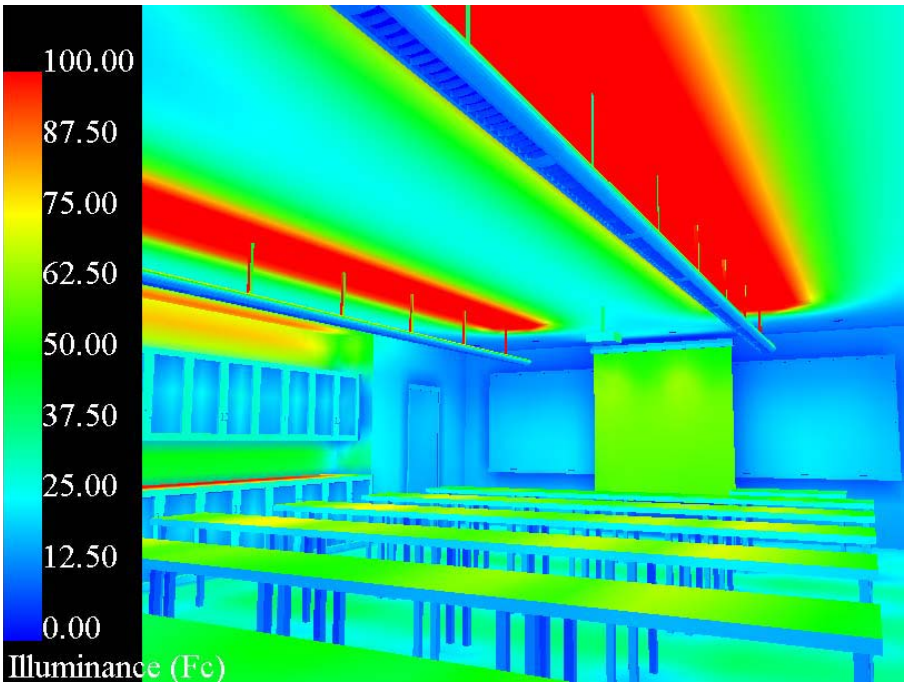
Illuminance Isolines



Pseudo-Color Luminance



Pseudo-Color Illuminance



Rendering

Project_1
Calc Pts

CalcPts_2
Illuminance Values(Fc)
Average=91.25 Maximum=106
Minimum=62.1 Avg/Min=1.47
Max/Min=1.70

CalcPts
Illuminance Values(Fc)
Average=45.67 Maximum=63.9
Minimum=19.1 Avg/Min=2.39
Max/Min=3.35

CalcPts_1
Illuminance Values(Fc)
Average=52.60 Maximum=64.1
Minimum=33.9 Avg/Min=1.55
Max/Min=1.89

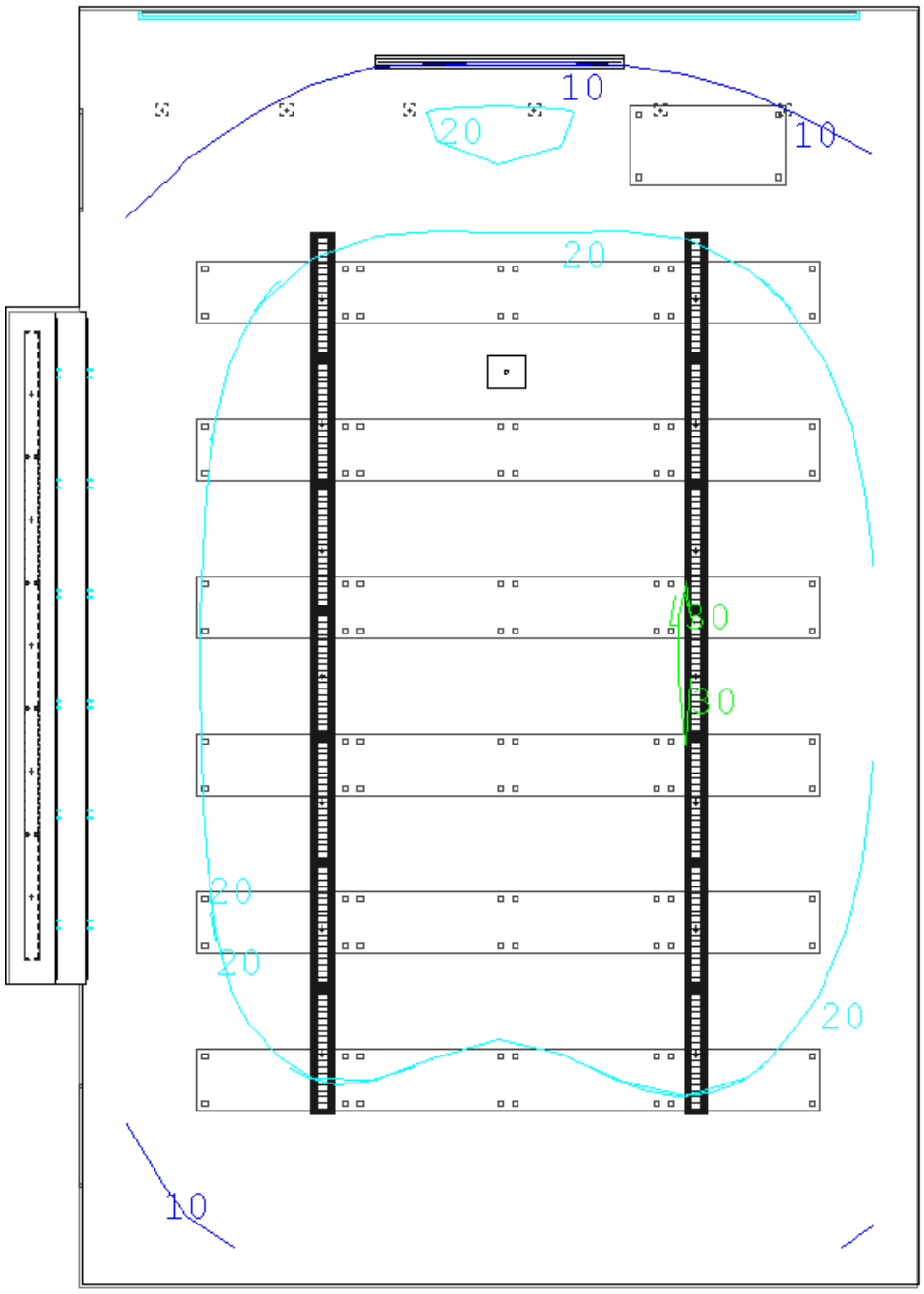
CalcPts_3
Illuminance Values(Fc)
Average=28.01 Maximum=36.3
Minimum=21.5 Avg/Min=1.30
Max/Min=1.69

LPD-UWLR Areas

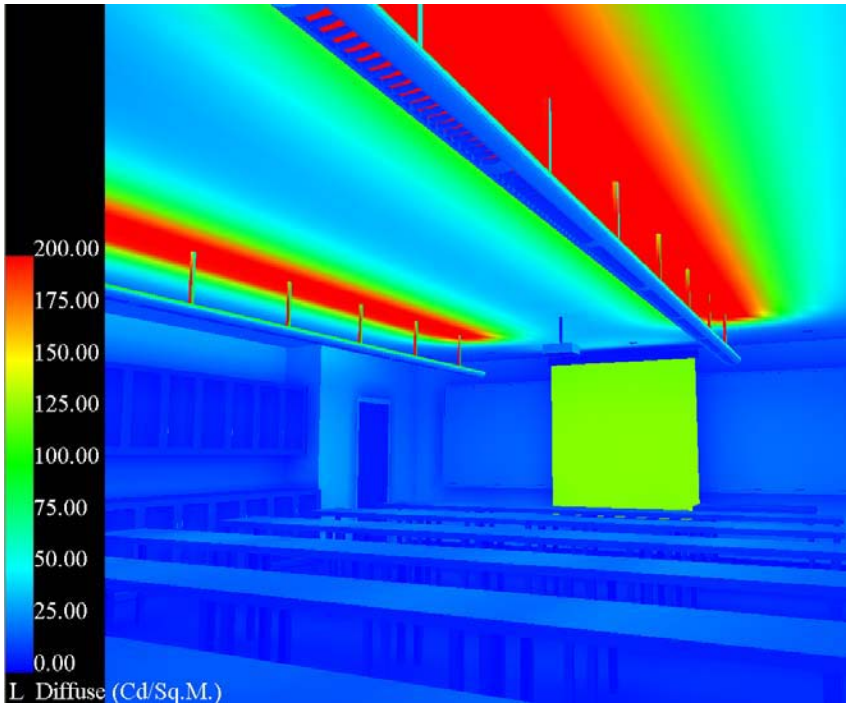
Lighting Power Density
Area(Sq.Ft.)=1144 Total Watts=
1333.4 LPD(Watts/Sq.Ft.)=1.166

Audio/Visual Presentations

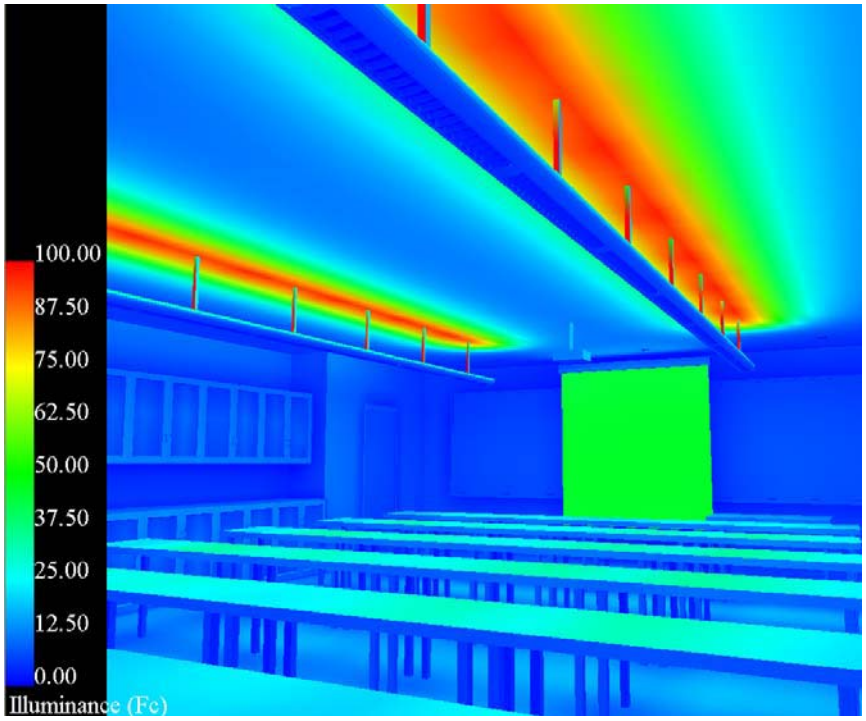
Illuminance Isolines



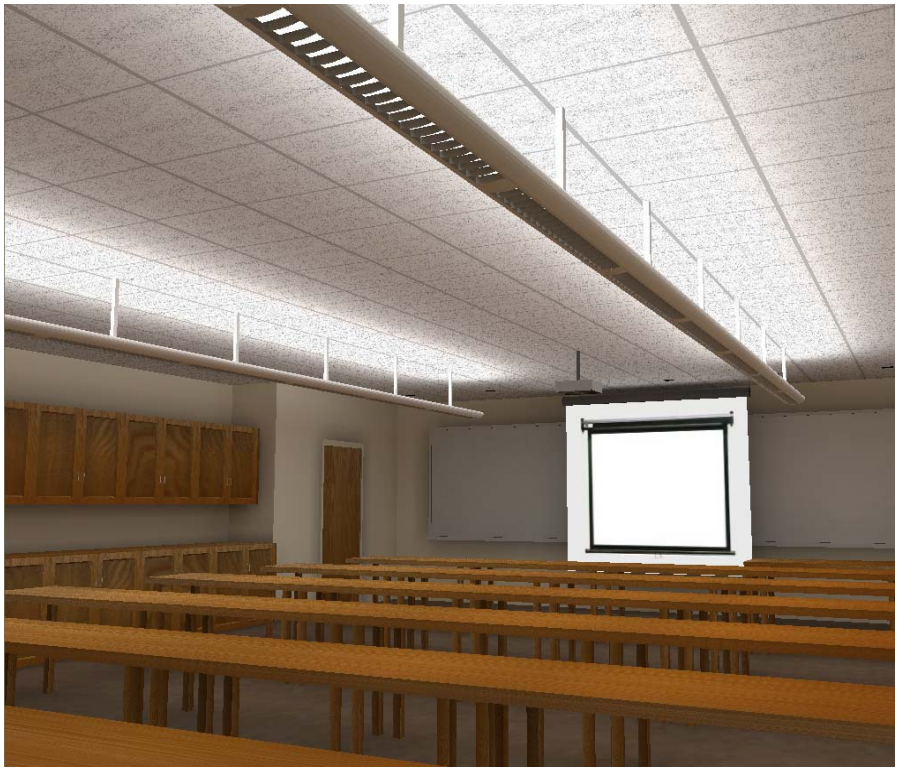
Pseudo-Color Luminance



Pseudo-Color Illuminance



Rendering



Cabinets
Illuminance Values(Fc)
Average=7.80 Maximum=9.0
Minimum=6.1 Avg/Min=1.28
Max/Min=1.48

Task Plane
Illuminance Values(Fc)
Average=19.70 Maximum=30.2
Minimum=6.4 Avg/Min=3.08
Max/Min=4.72

Desk Surface
Illuminance Values(Fc)
Average=24.21 Maximum=30.1
Minimum=14.9 Avg/Min=1.62
Max/Min=2.02

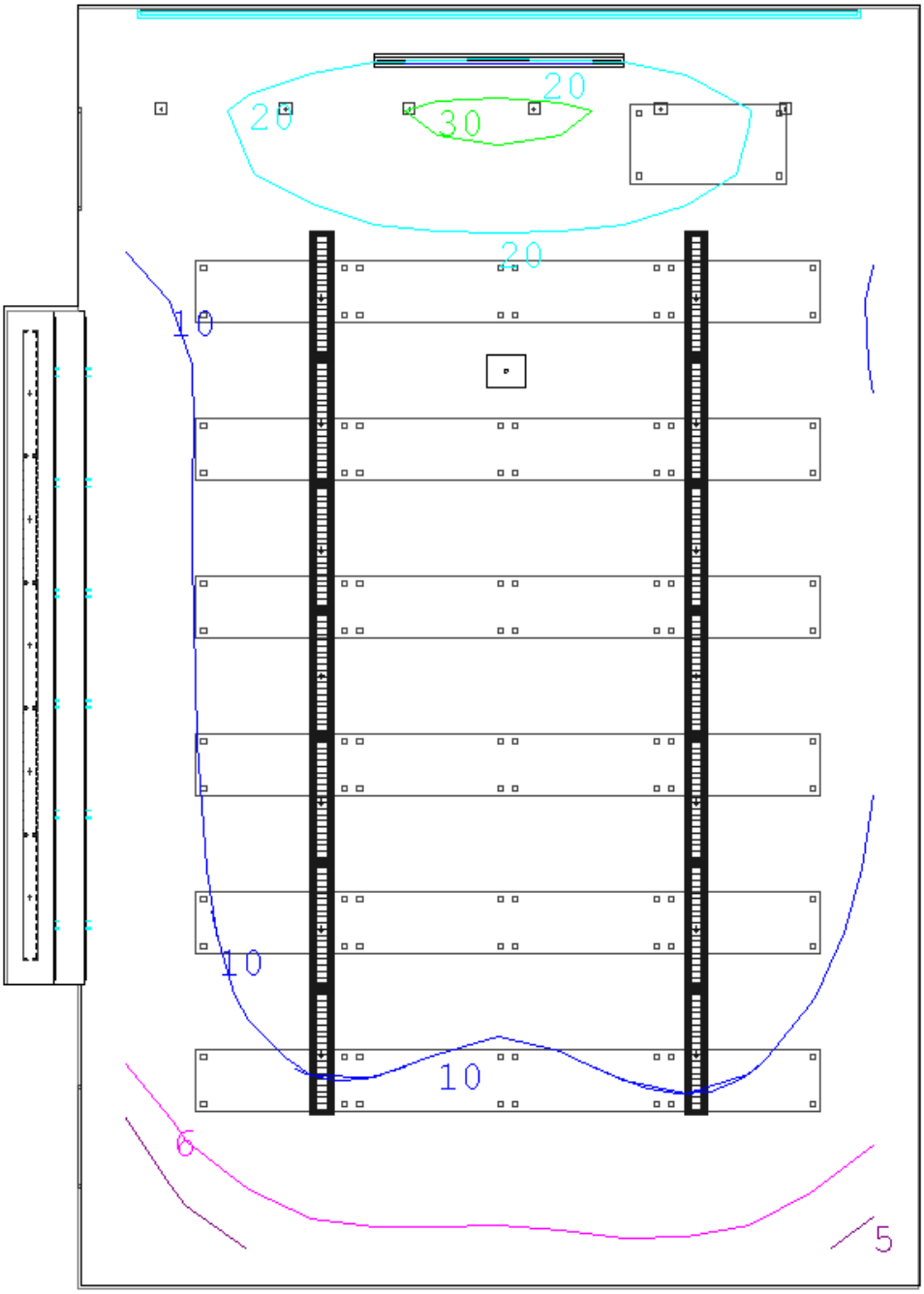
Projection Screen
Illuminance Values(Fc)
Average=9.79 Maximum=10.2
Minimum=8.9 Avg/Min=1.10
Max/Min=1.15

LPD-UWLR Areas

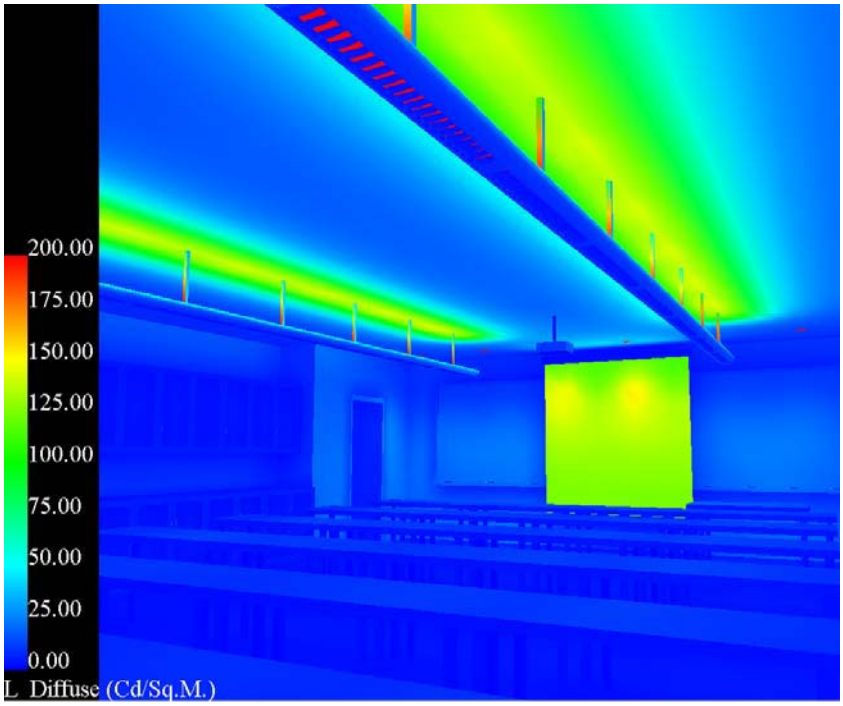
Lighting Power Density
Area(Sq.Ft.)=1144 Total Watts=
827.3999 LPD(Watts/Sq.Ft.)=0.723

Lecture Scene

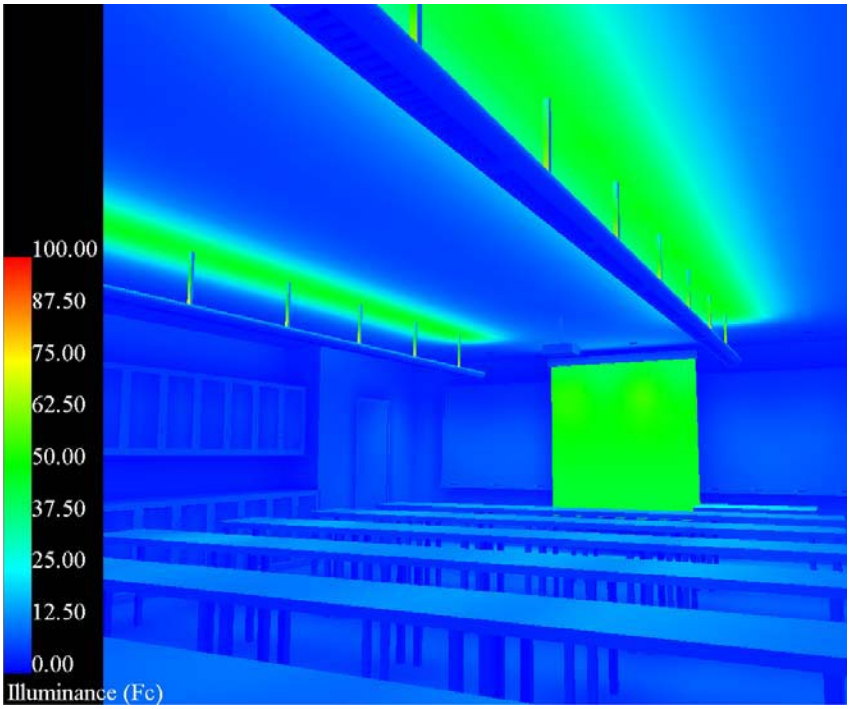
Illuminance Isolines



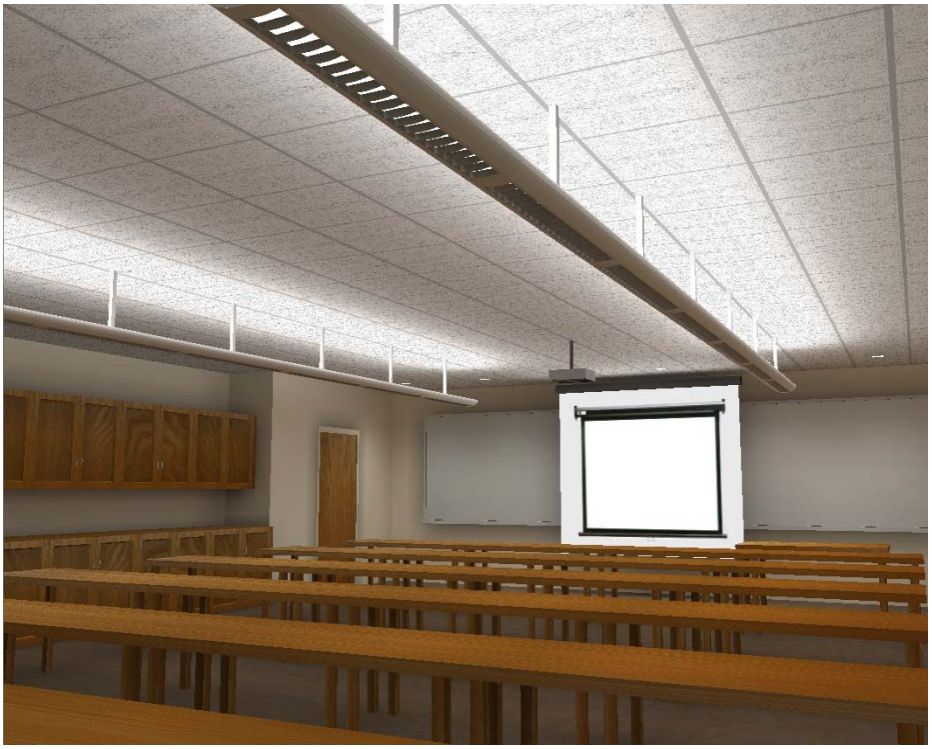
Pseudo-Color Luminance



Pseudo-Color Illuminance



Renderings



Cabinets
Illuminance Values(Fc)
Average=4.07 Maximum=4.7
Minimum=3.2 Avg/Min=1.27
Max/Min=1.47

Task Plane
Illuminance Values(Fc)
Average=12.72 Maximum=33.4
Minimum=4.1 Avg/Min=3.10
Max/Min=8.15

Desk Surface
Illuminance Values(Fc)
Average=13.05 Maximum=16.5
Minimum=7.3 Avg/Min=1.79
Max/Min=2.26

Projection Screen
Illuminance Values(Fc)
Average=12.69 Maximum=22.9
Minimum=8.0 Avg/Min=1.59
Max/Min=2.86

LPD-UWLR Areas

Lighting Power Density
Area(Sq.Ft.)=1144 Total Watts=
983.3999 LPD(Watts/Sq.Ft.)=0.860

Gymnasium

Space Description

The gymnasium will be used for scheduled classes in self-defense as well as personal training with exercise and weight-lifting equipment. A small half-court basketball set-up is included for pick-up games in the evenings and weekends. Measuring approximately 41' by 59', the gymnasium is the only space in the facility with exposed structural trusses. The space also has wall padding covering CMU walls for safety.

Materials and Reflectances

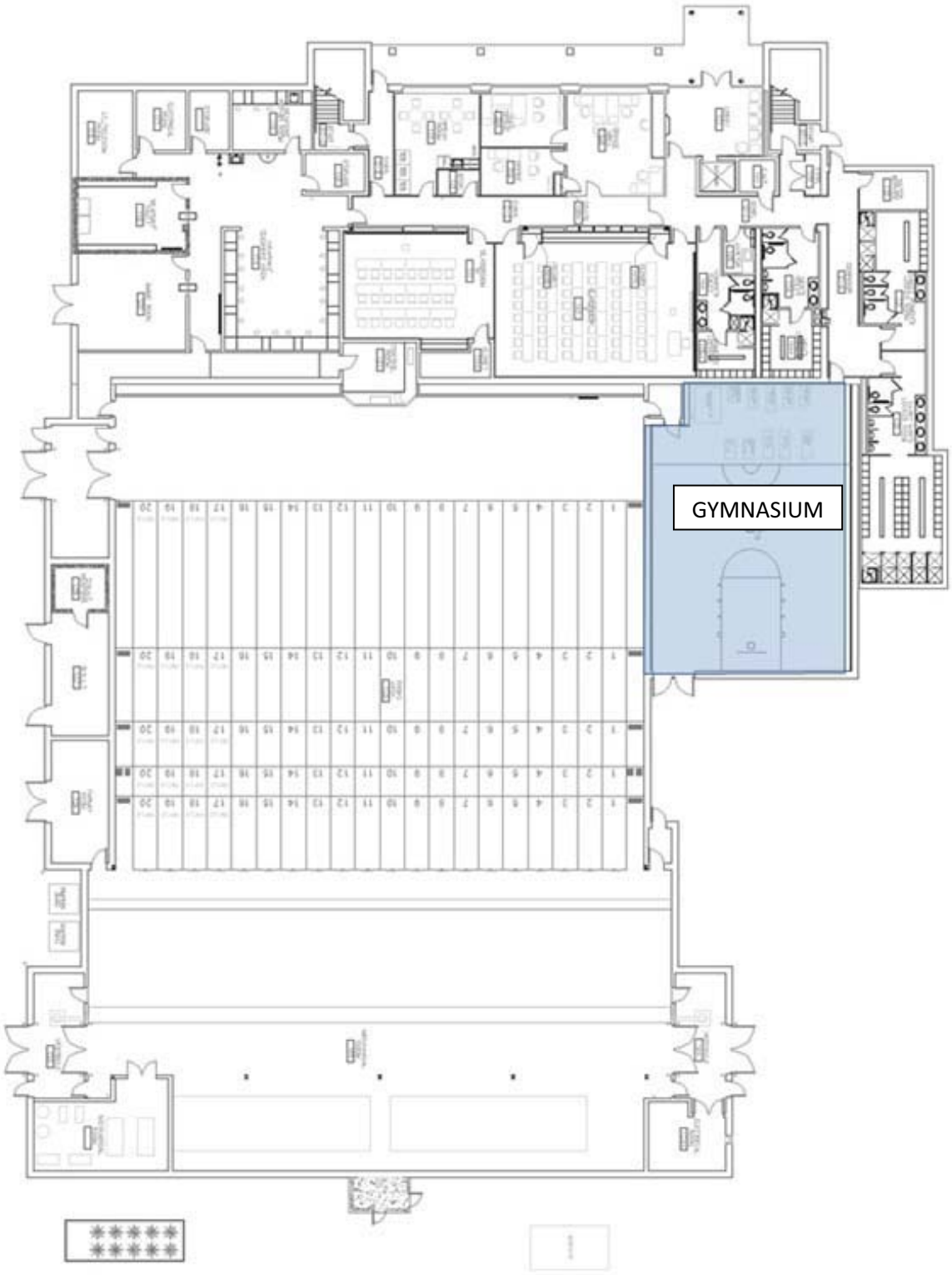
Ceiling and Trusses
Painted
Reflectance = 0.86

Walls
Painted CMU
Reflectance = 0.80

Floors
Wood Flooring
Reflectance = 0.31

Wall Panels
Blue Wall Padding
Reflectance = 0.22

Layout



Summary of Design Criteria / Design Approach

Illuminance Levels

For multidirectional aerial sports, vertical illuminance is more crucial than horizontal illuminance. For calculation purposes, horizontal illuminance is used due to its ease in determination, under the assumption that if the horizontal criterion is being met, vertical will follow. The IESNA Lighting Handbook establishes different classes of play based on the skill level of play and the number of spectators. The gymnasium in the Police Training Facility is classified as Class IV, "for social and recreational play only, with secondary consideration for spectators." Class IV spaces for basketball as well as exercise rooms, are suggested to have an average illuminance of 30 fc throughout the space.

Light Distribution of Task Plane

The horizontal distribution of light should remain fairly uniform, with a maximum-to-minimum ratio of less than 1.7:1 and a coefficient of variation of 0.13 of less.

Control and Flexibility

Unlike many educational gymnasiums, the MdTA Police Training Facility's gymnasium will not need to be lighted throughout the whole day. Therefore, having the controlability to instantly turn lights on and off should be considered a crucial part of the design. High intensity discharge lamping, which are typical for gymnasium applications, should be avoided because of their long start-up time. Being able to reduce luminaire light output for flexibility in creating environments for self-defense training should be considered.

Design Performance

The luminaire selected for the physical training gymnasium makes use of eight compact fluorescent lamps. Six fixtures provide about 32 fc on the floor area meeting the illuminance design criteria. Various light output levels can be achieved by allowing for individual lamp switching. This type of switching can be executed with multiple wall switches and does not require a complicated control system.

Luminaire Schedule

The following luminaire schedule denotes the basic luminaire, lamp, voltage and wattage information of the three luminaire types prescribed in the lighting redesign of the gymnasium. A full luminaire schedule is available for viewing in the appendix and includes additional information such as ballast information and starting and operating currents.

LUMINAIRE SCHEDULE - GYMNASIUM								
TAG	MANUFACTURER	CATALOG NUMBER	DESCRIPTION	LAMP TYPE	WATTS	# OF LAMPS	OPERATING VOLTAGE	FIXTURE INPUT WATTS
D	SPORTLITE	LX800 T42 22LEXCP 277	CFL HIGH BAY	CFL -TR	42	8	277	392

Light Loss Factors

Light loss factors (LLF) were determined using the method prescribed in the IESNA Lighting Handbook. Ballast factor, lamp lumen depreciation (LLD), room surface dirt depreciation (RSDD), and luminaire dirt depreciation (LDD) were evaluated in the determination of the LLF for each luminaire. Assumptions and equipment values are included in the table below.

LIGHT LOSS FACTORS - GYMNASIUM											
LUMINAIRE DESIGNATION	MAINTENANCE CATEGORY	ROOM ATMOSPHERE	CLEANING INTERVAL	RCR	INITIAL LUMENS	MEAN LUMENS	BALLAST FACTOR	LLD	RSDD	LDD	LLF
D	IV	CLEAN	12 MONTHS	4.01	3200	2752	0.9	0.9	0.945	0.94	**0.720**

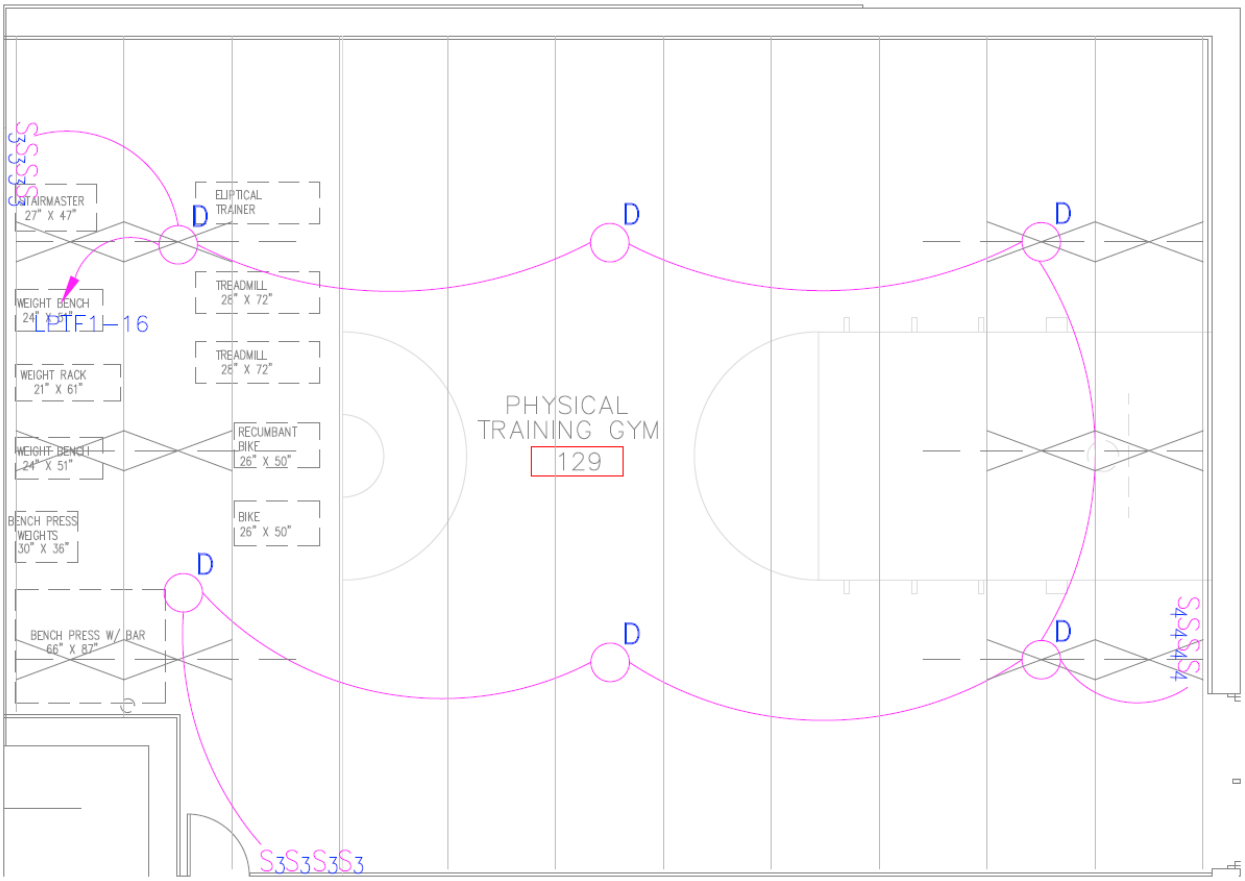
Lighting Power Density

ASHRAE Standard 90.1 establishes the lighting power density using the space-by-space method for a gymnasium / exercise center to be 1.4 W/ft^2 for playing area and 0.9 W/ft^2 for exercise areas. The following are the calculations and results for the actually lighting power density of the redesigned gymnasium lighting system.

Lighting Power Density Calculation:

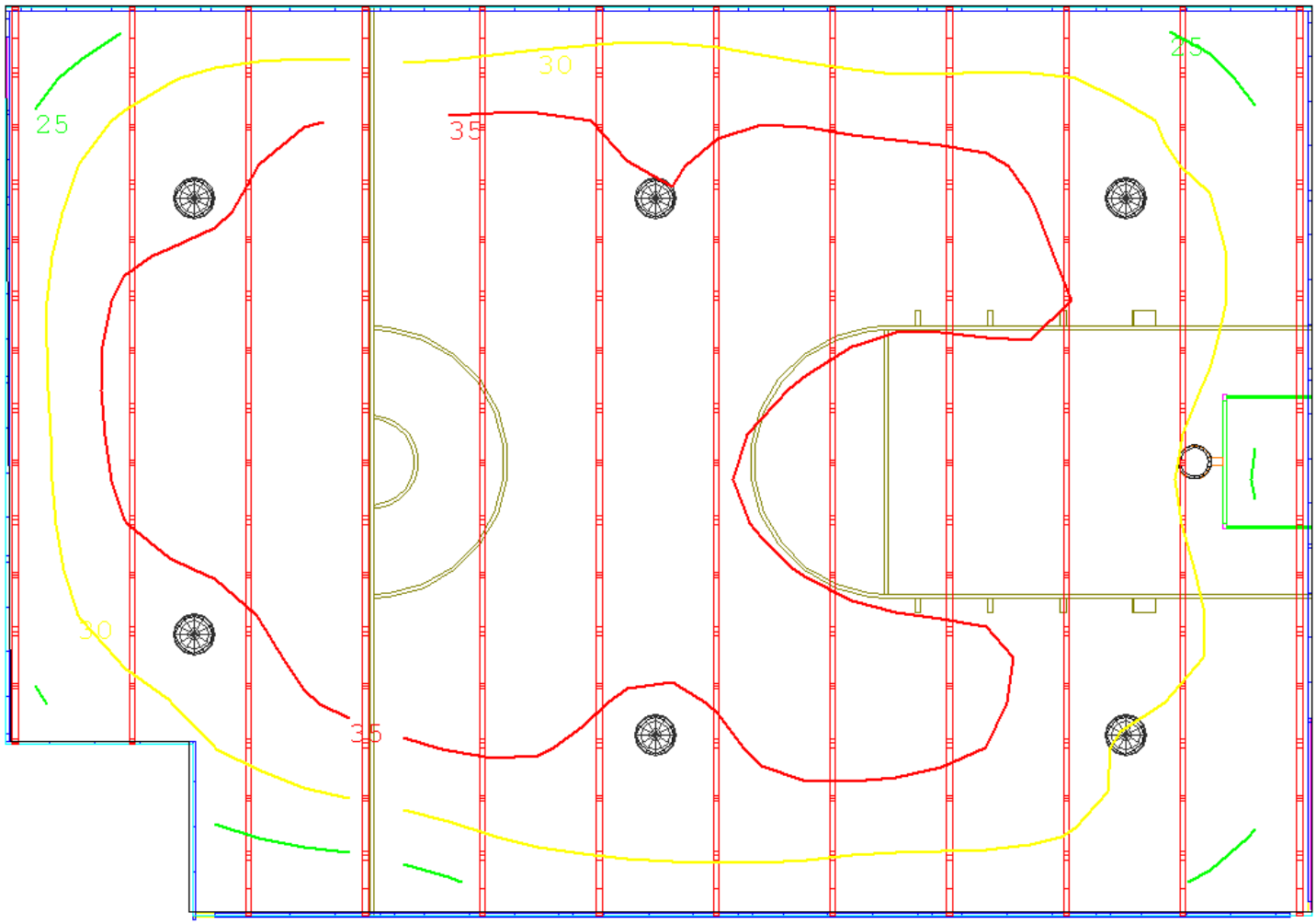
Area = 2296ft^2
Total Watts = 2124W
LPD = 0.925 W/ft^2

Floor Plan

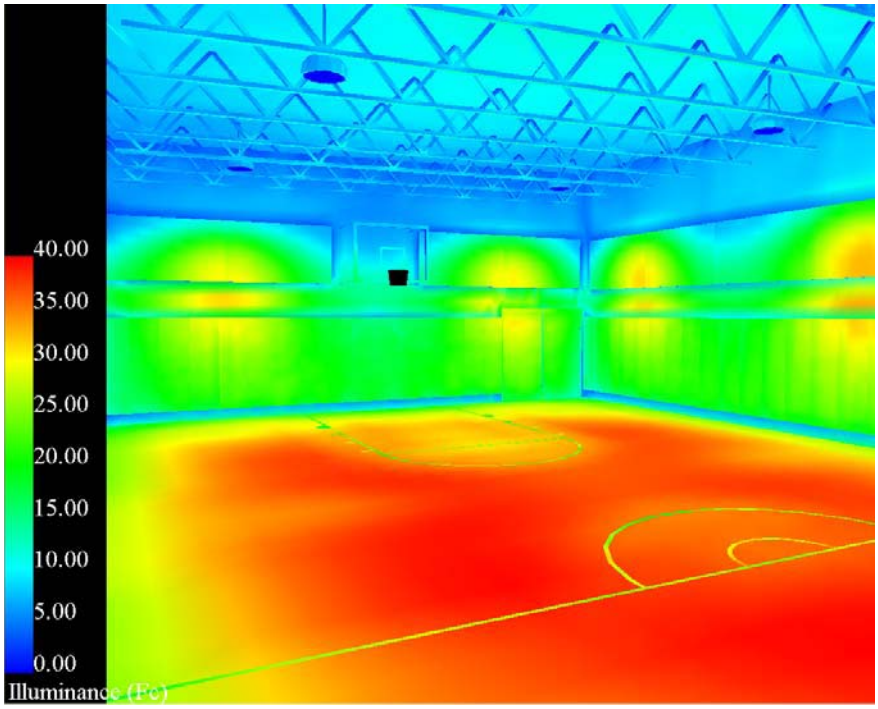

STAIRMASTER
27" X 47"
ELIPTICAL TRAINER
TREADMILL
28" X 72"
TREADMILL
28" X 72"
WEIGHT BENCH
24" X 51"
WEIGHT RACK
21" X 61"
WEIGHT BENCH
24" X 51"
RECUMBANT BIKE
26" X 50"
BIKE
26" X 50"
BENCH PRESS WEIGHTS
30" X 36"
BENCH PRESS W/ BAR
66" X 87"
LPTF1-16
PHYSICAL TRAINING GYM
129
D
S3S3S3S3S3
S4S4S4S4S4

Performance Data

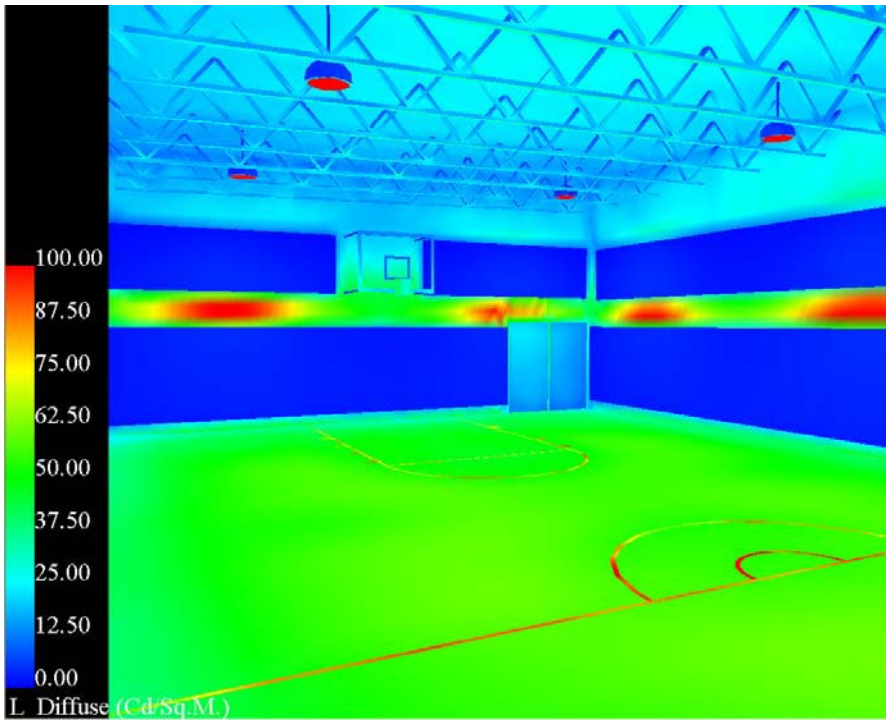
Illuminance Isolines



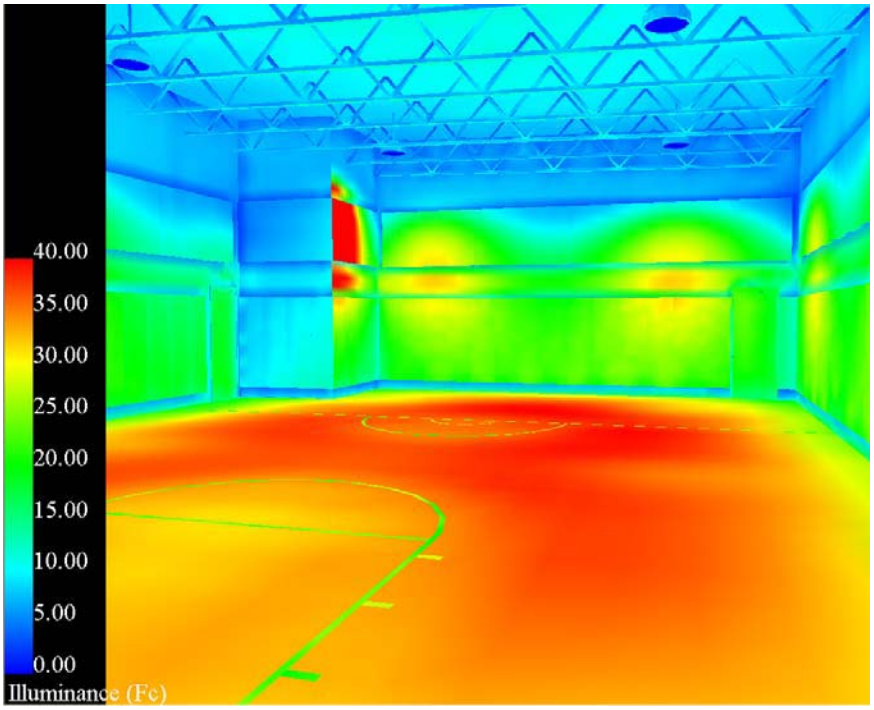
Pseudo-Color Illuminance



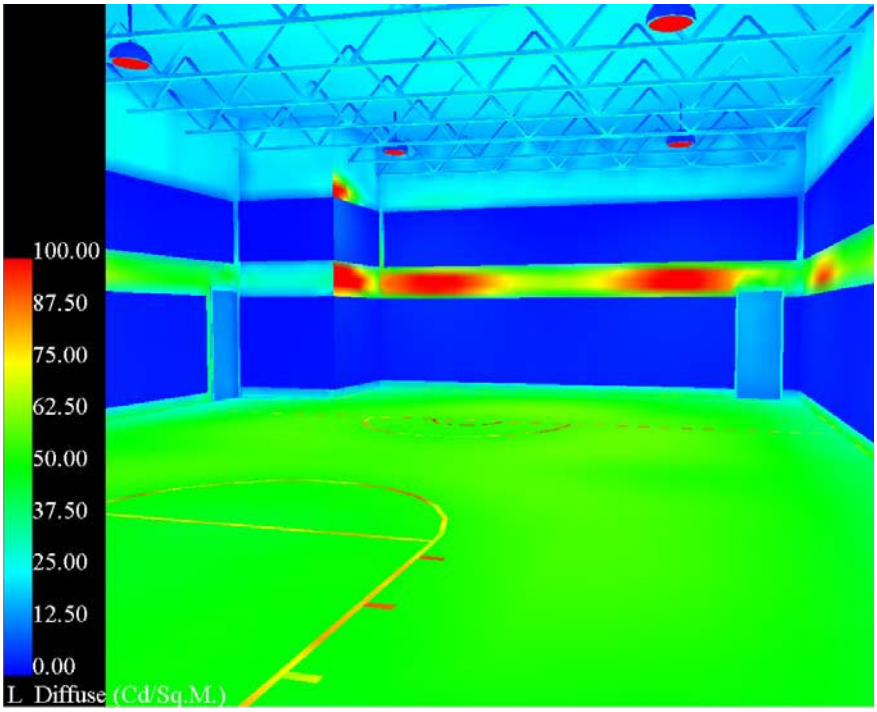
Pseudo-Color Luminance



Psuedo-Color Illuminance



Pseudo-Color Luminance



Rendering

Calc Pts

Basketball Area
Illuminance Values(Fc)
Average=33.27 Maximum=39.7
Minimum=20.6 Avg/Min=1.62
Max/Min=1.93

Fitness Area
Illuminance Values(Fc)
Average=32.89 Maximum=40.5
Minimum=20.1 Avg/Min=1.64
Max/Min=2.01

LPD-UWLR Areas

Gymnasium
Area(Sq.Ft.)=2296 Total Watts=2124
LPD(Watts/Sq.Ft.)=0.925

Firing Range

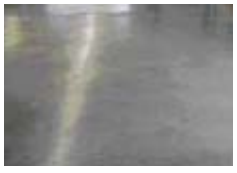
Space Description

As this is a police training facility, the Firing Area is a significant portion of the building. It is comprised of 20 firing lanes at 5'-0" width each and has overall dimensions of 110'x100'. The space is enveloped by reinforced CMU walls with 2" thick Tectum panel, acoustical in nature, attached to ½" cement board attached to a lightweight steel suspension system. Steel plates are suspended from the roof structure above the ceiling for bullet containment. The painted concrete floor has firing position insets recessed in the floor at each firing lane, a total of 80 insets. Other significant features are the 10' wide by 10' tall overhead door, 20 fixed targets that are capable of rotating 90 degrees, and a moving target track that is remote controlled. Part of the original schematic design was to provide a combination of fixtures to be used for general, target area, firing line, target lighting, and training lighting. Much flexibility and potential for different training scenarios would have been a product of this original design concept.

Materials and Reflectances

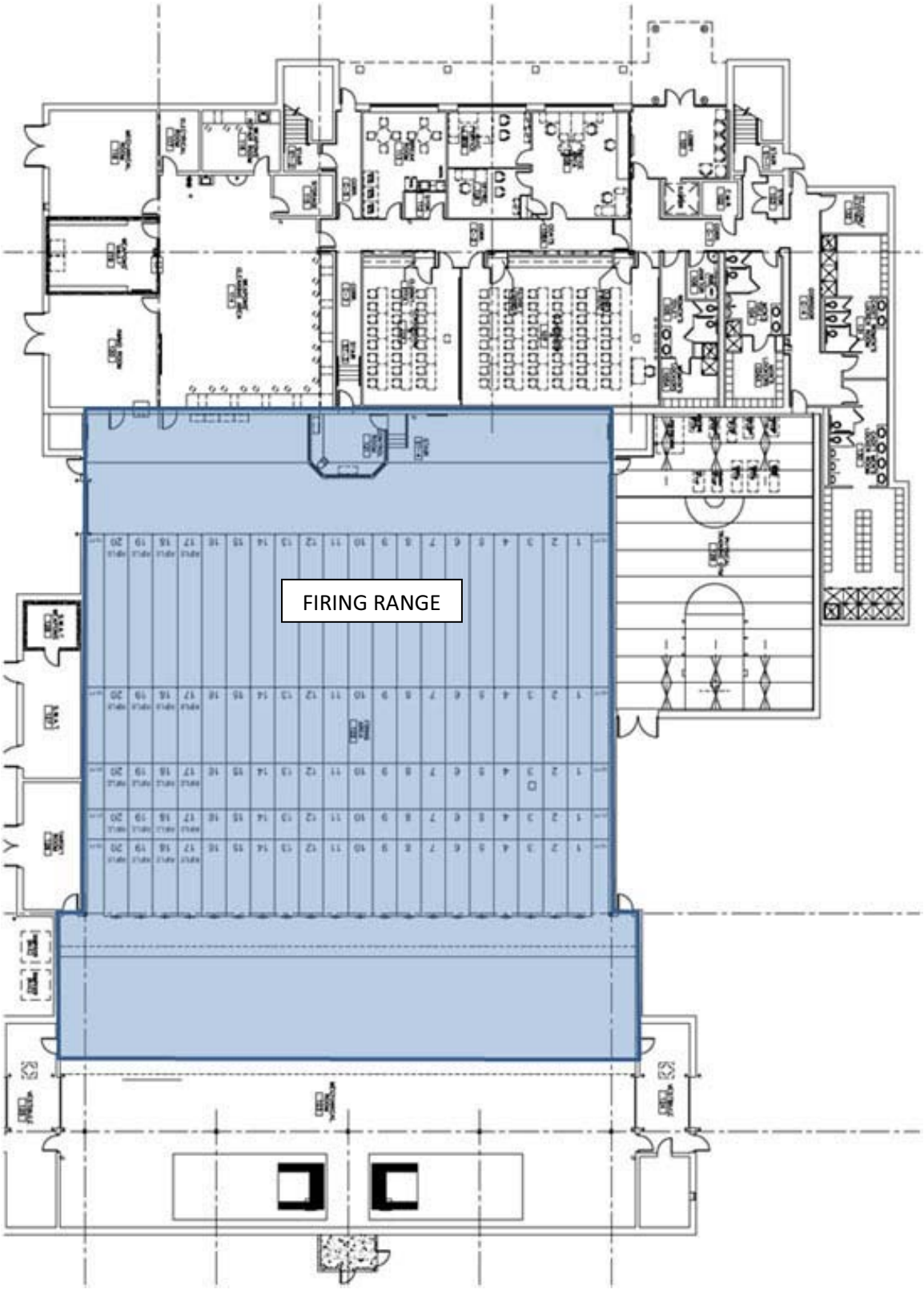
Ceilings and Walls
Tectum Paneling
Reflectance = 0.75

Walls – Lower
Painted CMU
Reflectance = 0.85



Floors
Sealed Concrete
Reflectance = 0.36

Layout



Summary of Design Criteria / Design Approach

Control and Flexibility

The firing range is an instructional and training tool. Generating pseudo-realistic training environments affords a quality learning environment. Multiple lighting systems incorporated into the design will offer diverse training scenarios. The possibility exists for the integration of a control system with preset lighting scenes that will make for easy transitions between the different lighting scenarios.

Glare

The primary concern in the firing area is safety. Direct glare from fixtures can be disabling to the shooter which can create a potentially dangerous situation. Lower cutoff angles for fixtures will avoid direct glare issues. Reflected glare from surfaces creates a similar concern as that of direct glare. Diffuse materials and luminaire placement (affecting reflection angles) should be considered to limit reflected glare.

Light Distribution on Task Plane

Typical uniformity would be of importance in a firing range. The IESNA Handbook designates that the ratio of the maxium to the minimum illuminance values should be 3:1 or less because light patterns on the task plane can be distracting or confusing. The police trainees using this space are not amature shooters and are being trained for to act to real-life situations, in which the lighting will often times be less than perfect. Therefore, distribution will vary based on the real-life situation being simulated.

Illuminance Levels

Again the IESNA Lighting Handbook has concrete values for the horizontal and vertical illuminances in a firing range. A variation of illuminance levels will allow for the widest range of scenarios.

Luminaire Schedule

The following luminaire schedule denotes the basic luminaire, lamp, voltage and wattage information of the three luminaire types prescribed in the lighting redesign of Classroom 'A'. A full luminaire schedule is available for viewing in the appendix and includes additional information such as ballast information and starting and operating currents.

LUMINAIRE SCHEDULE - FIRING RANGE								
TAG	MANUFACTURER	CATALOG NUMBER	DESCRIPTION	LAMP TYPE	WATTS	# OF LAMPS	OPERATING VOLTAGE	FIXTURE INPUT WATTS
I	ERCO	73753.023	DOWNLIGHT	HALOGEN	50	1	12	50
E	WINDIRECT	P2 - SSW - 148T5 - 277V - SCK1 - SGW -	WALLWASH	T5	28	1	277	33
J	LIGHTOLIER	DPB2S18DS340	TROFFER	T8	32	3	277	91
K	ERCO	34115.023	FLOODLIGHT	T5	28	1	277	33

Light Loss Factors

Light loss factors (LLF) were determined using the method prescribed in the IESNA Lighting Handbook. Ballast factor, lamp lumen depreciation (LLD), room surface dirt depreciation (RSDD), and luminaire dirt depreciation (LDD) were evaluated in the determination of the LLF for each luminaire. Assumptions and equipment values are included in the table below.

LIGHT LOSS FACTORS - FIRING RANGE											
LUMINAIRE DESIGNATION	MAINTENANCE CATEGORY	ROOM ATMOSPHERE	CLEANING INTERVAL	RCR	INITIAL LUMENS	MEAN LUMENS	BALLAST FACTOR	LLD	RSDD	LDD	LLF
I	IV	CLEAN	12 MONTH	1.10	2825	---	1	0.9	0.98	0.88	**0.794**
E	IV	CLEAN	12 MONTH	1.10	2600	2418	1.04	0.93	0.98	0.88	**0.882**
J	IV	CLEAN	12 MONTH	1.10	3100	2945	0.88	0.95	0.98	0.88	**0.778**
K	IV	CLEAN	12 MONTH	1.10	2600	2418	1.04	0.93	0.98	0.88	**0.882**

Lighting Power Density

ASHRAE Standard 90.1 establishes the lighting power density using the space-by-space method for a sports area indoor playing field area to be 1.4 W/ft^2. The following are the calculations and results for the actually lighting power density of the redesigned firing range lighting system.

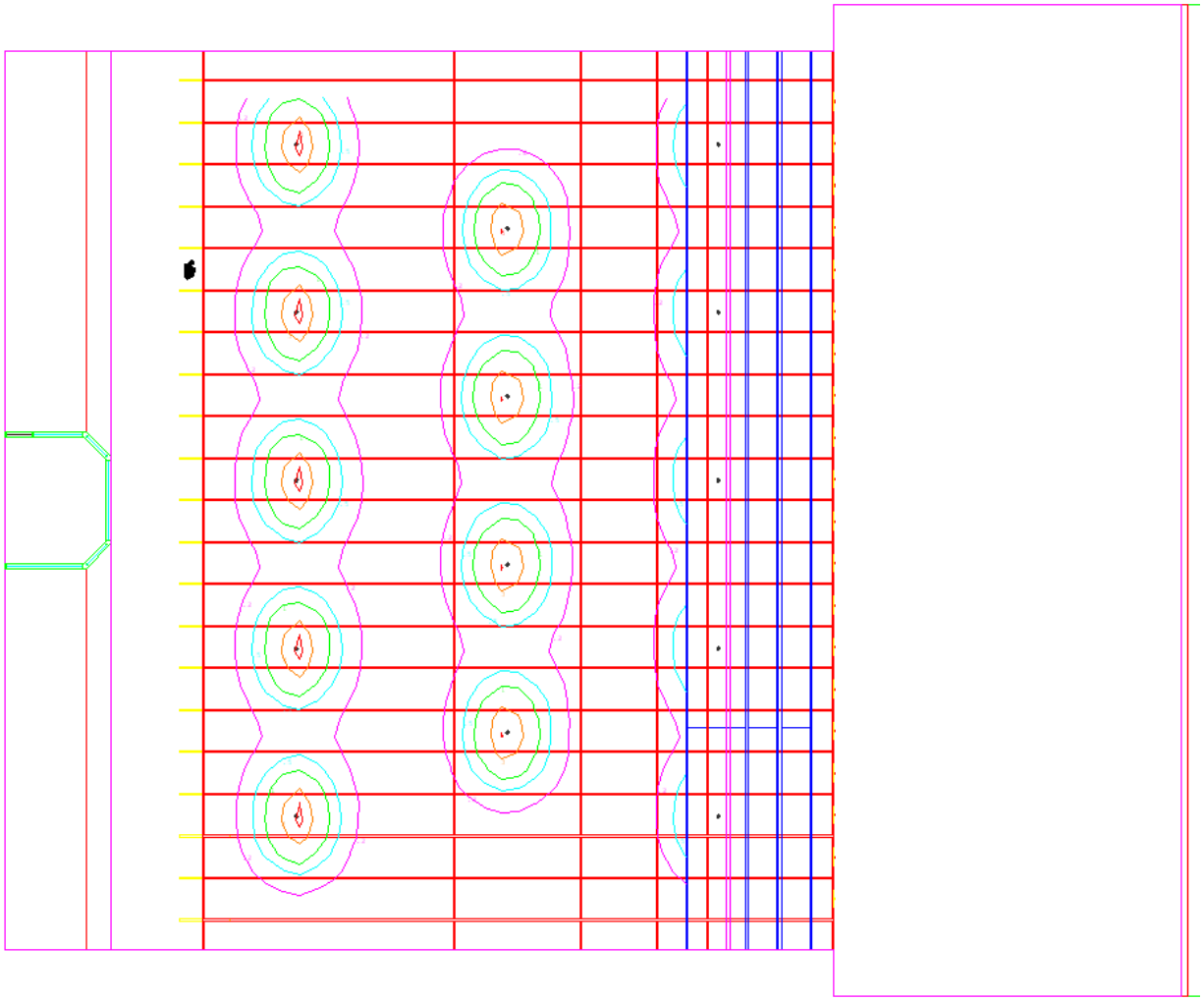
Lighting Power Density Calculation:

Area = 9322 ft^2
Total Watts = 9310 W
LPD = 0.978 W/ft^2

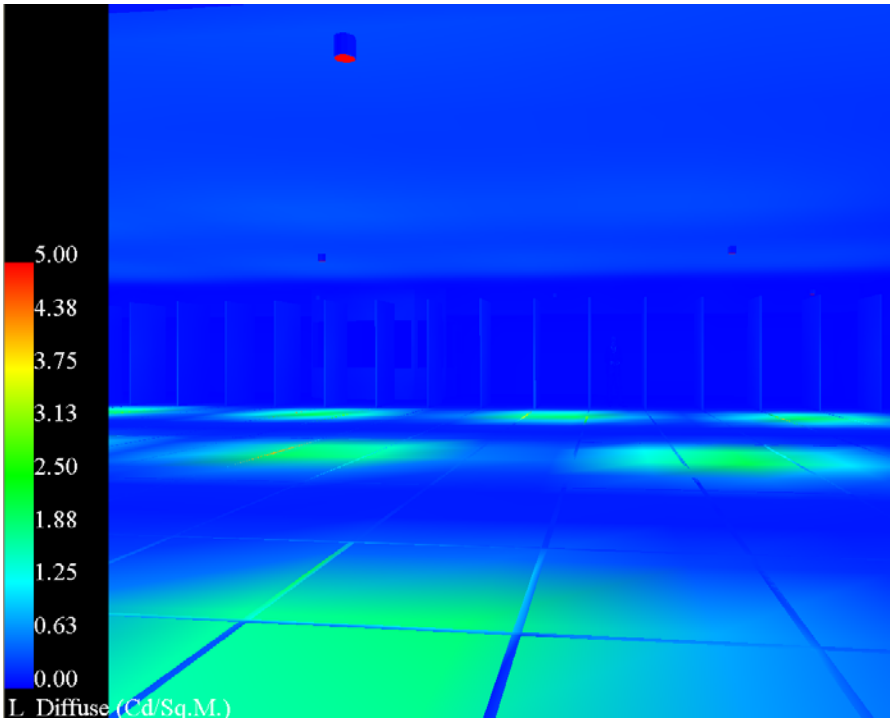
Performance Data

Night Time Exterior

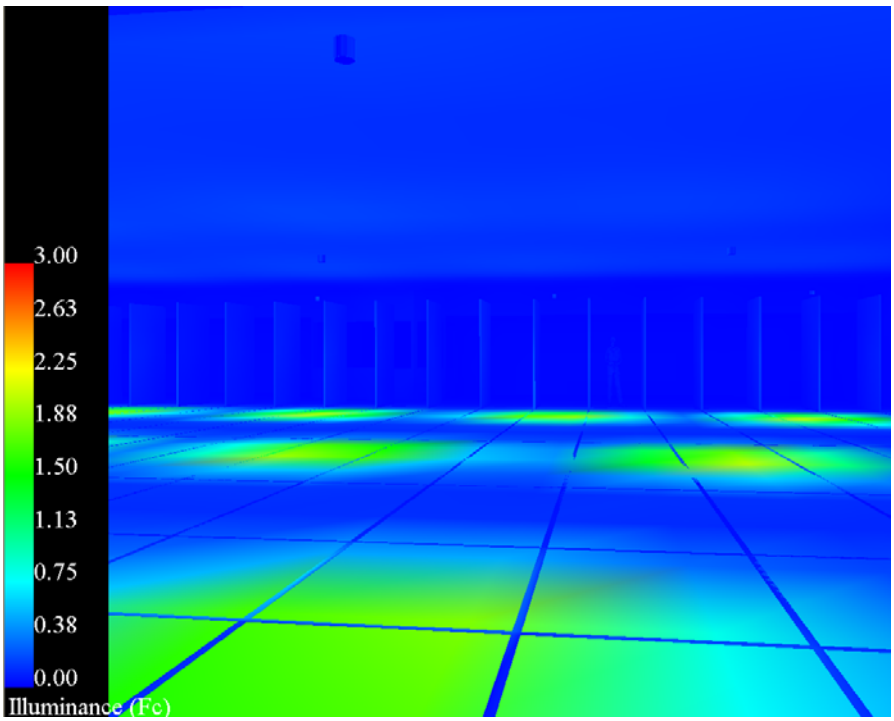
Illuminance Isolines



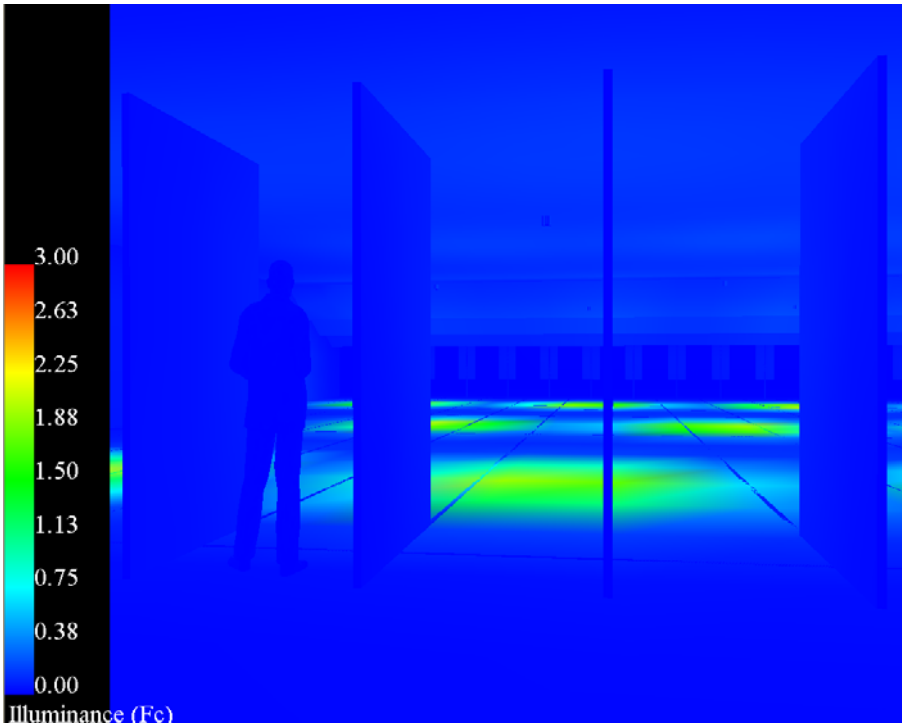
Pseudo-Color Luminance



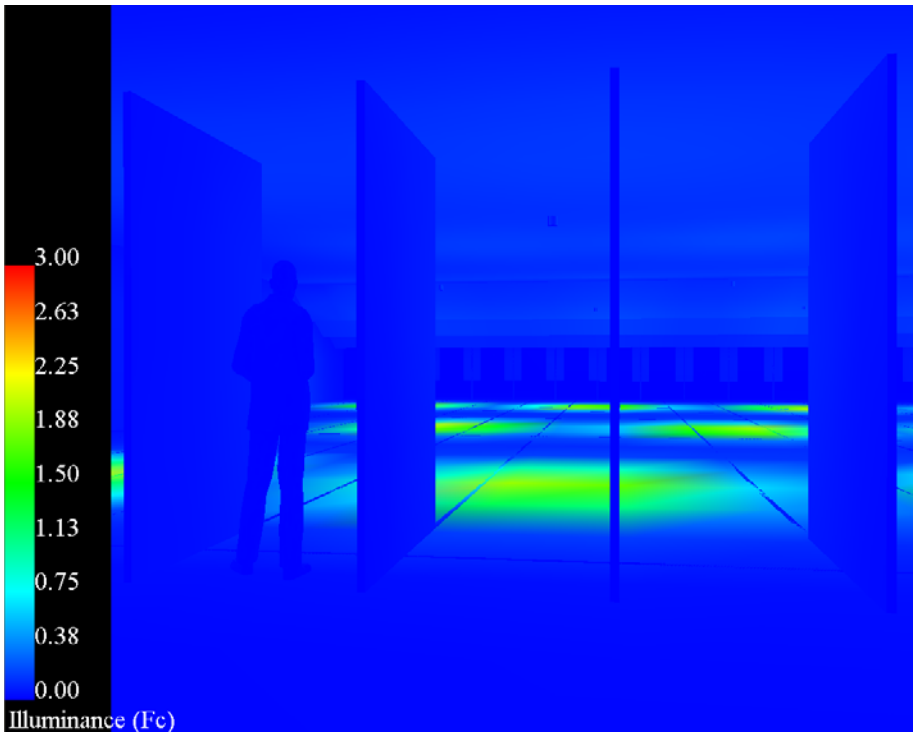
Pseudo-Color Illuminance



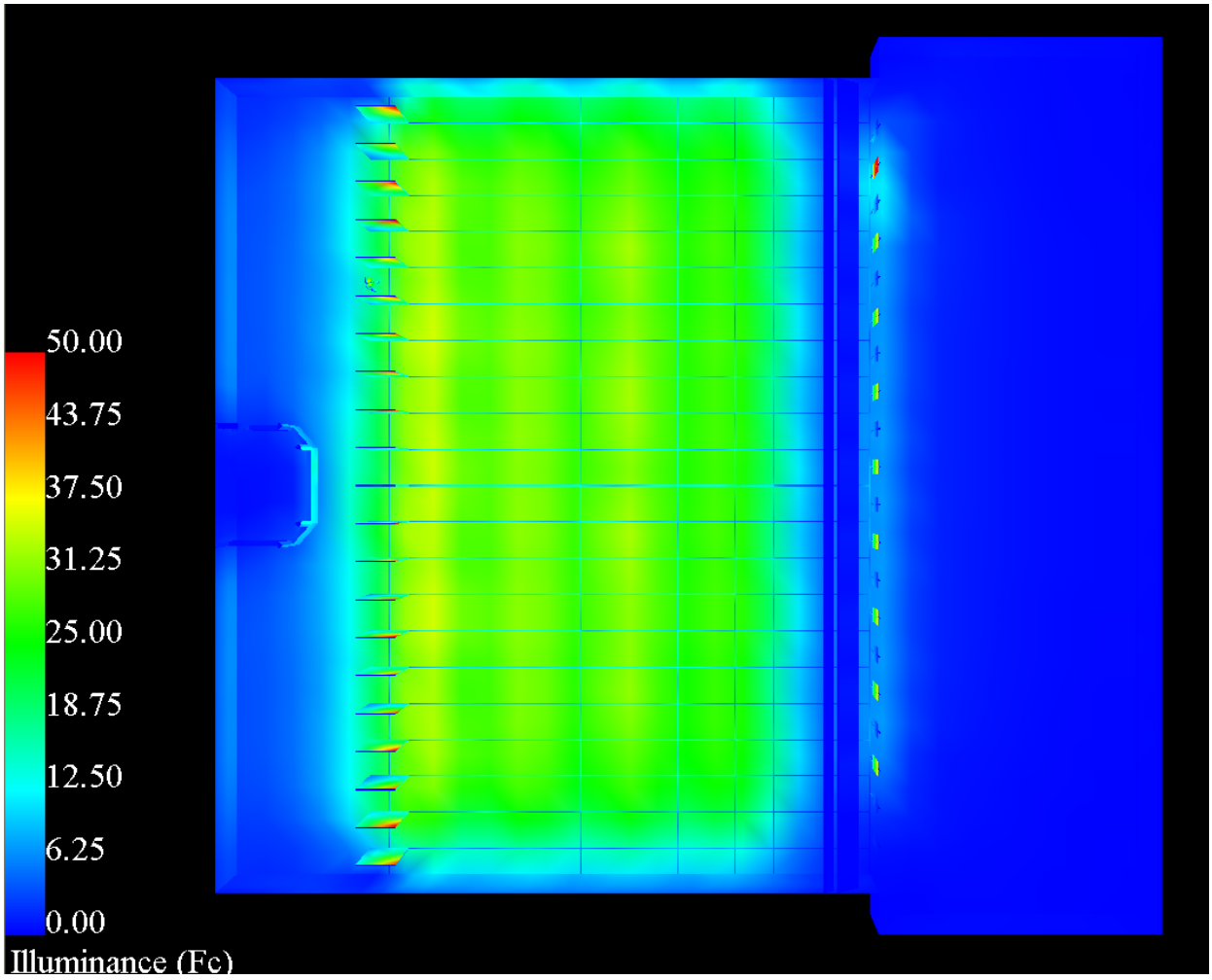
Pseudo-Color Luminance



Pseudo-Color Illuminance



Pseudo-Color Illuminance



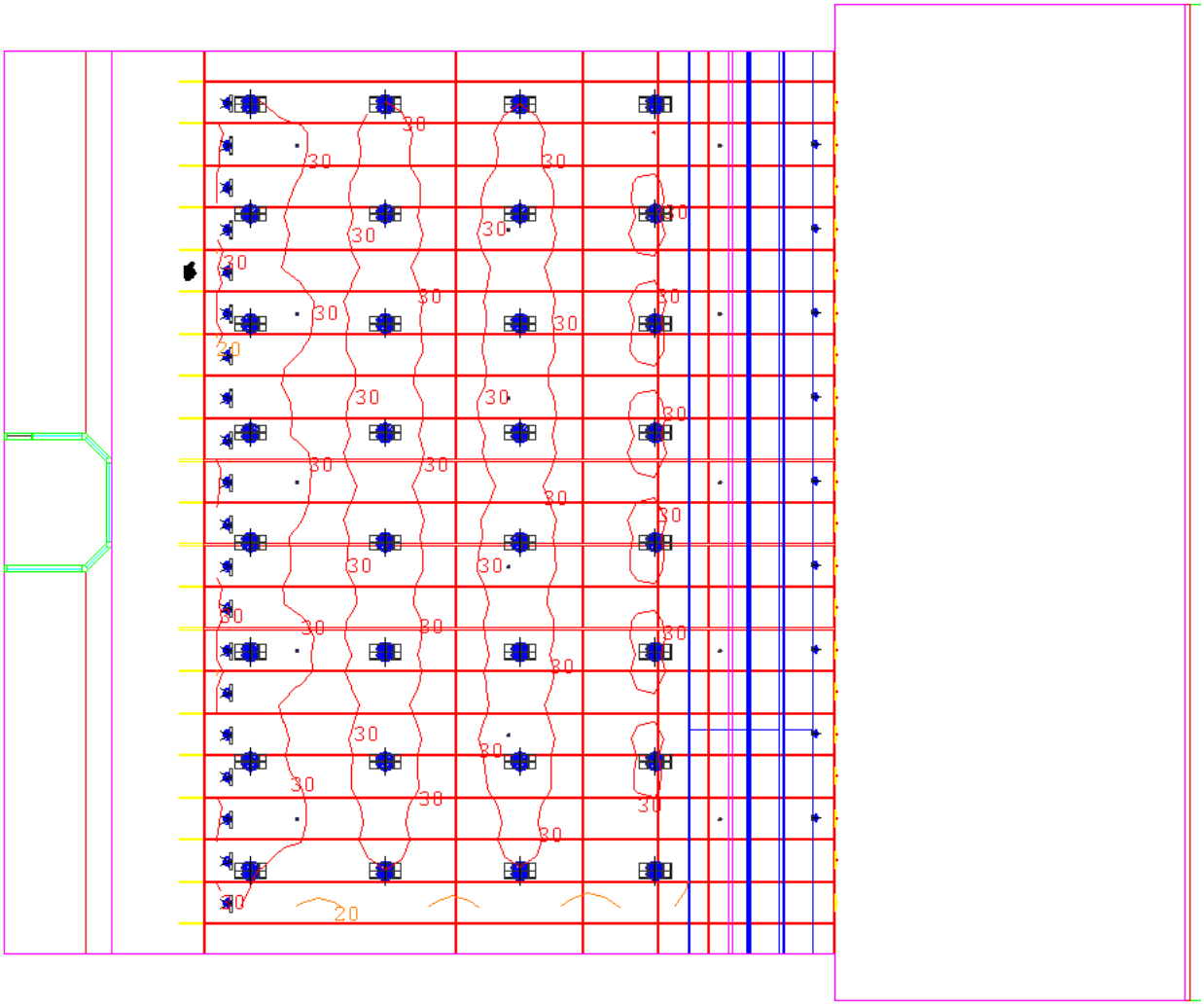
Renderings

Project 1
Calc Pts

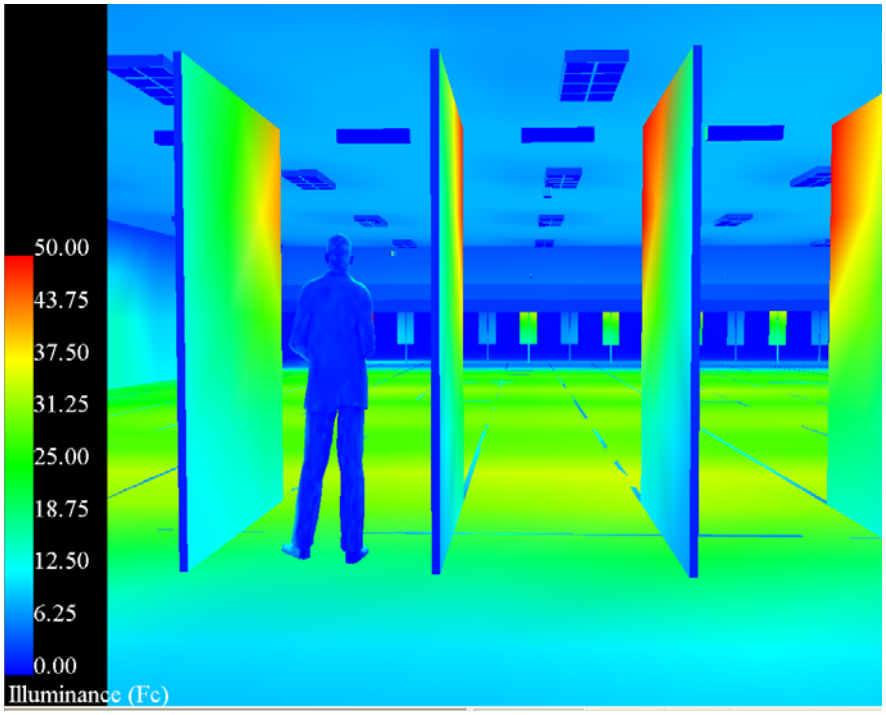
Lanes Floor
Illuminance Values(Fc)
Average=0.46 Maximum=5.7
Minimum=0.0 Avg/Min=N.A.
Max/Min=N.A.

Glare Condition

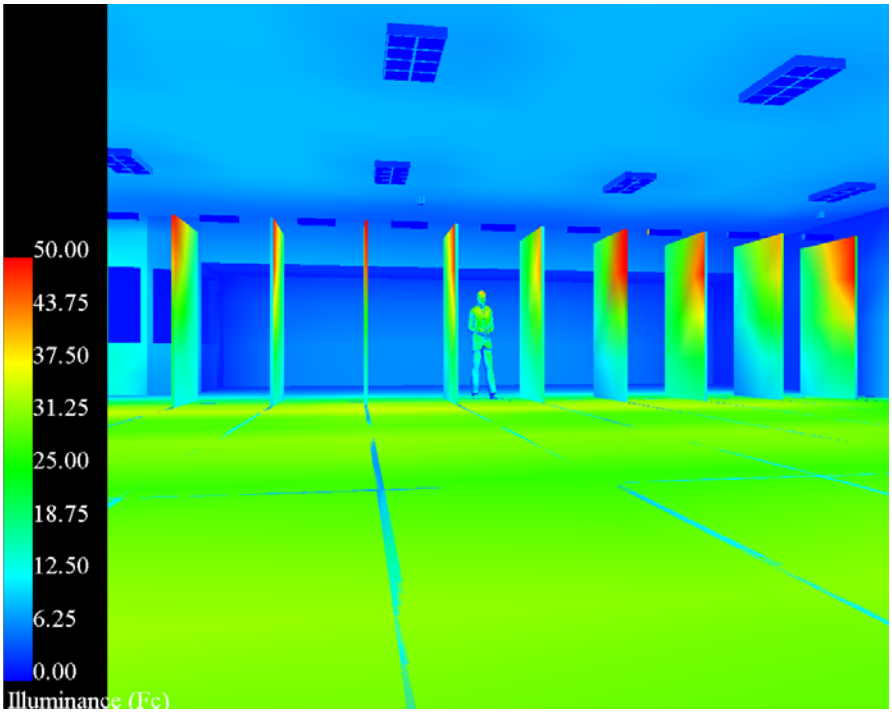
Illuminance Isolines



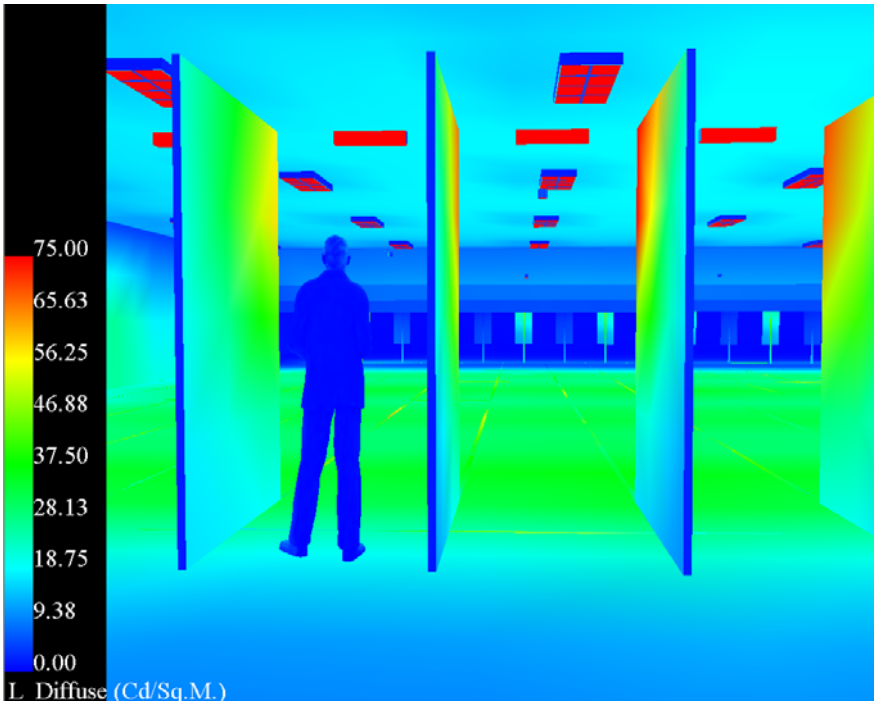
Pseudo-Color Illuminance



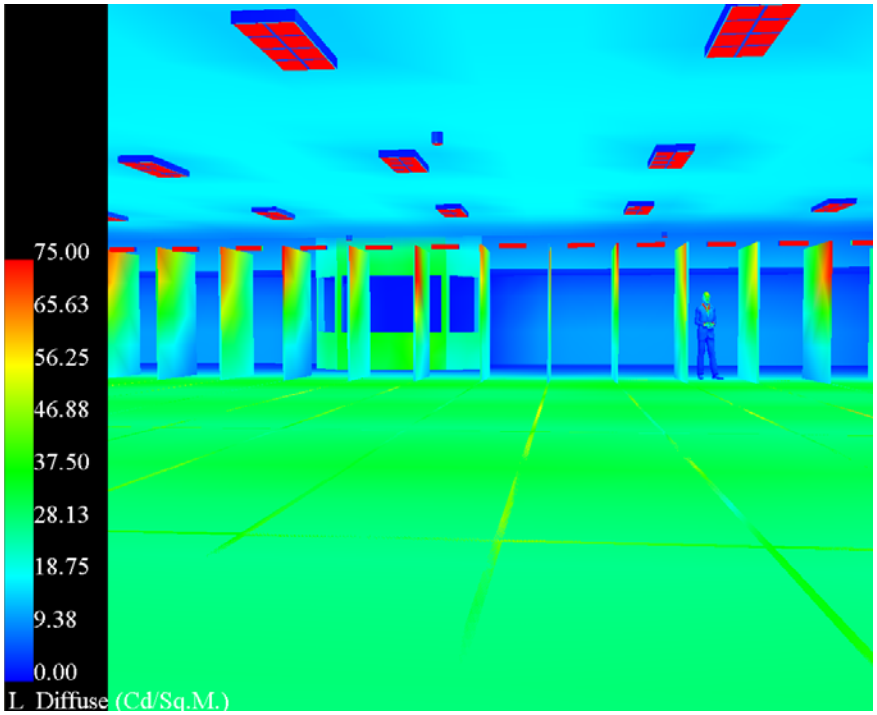
Pseudo-Color Illuminance



Pseudo-Color Luminance



Pseudo-Color Luminance



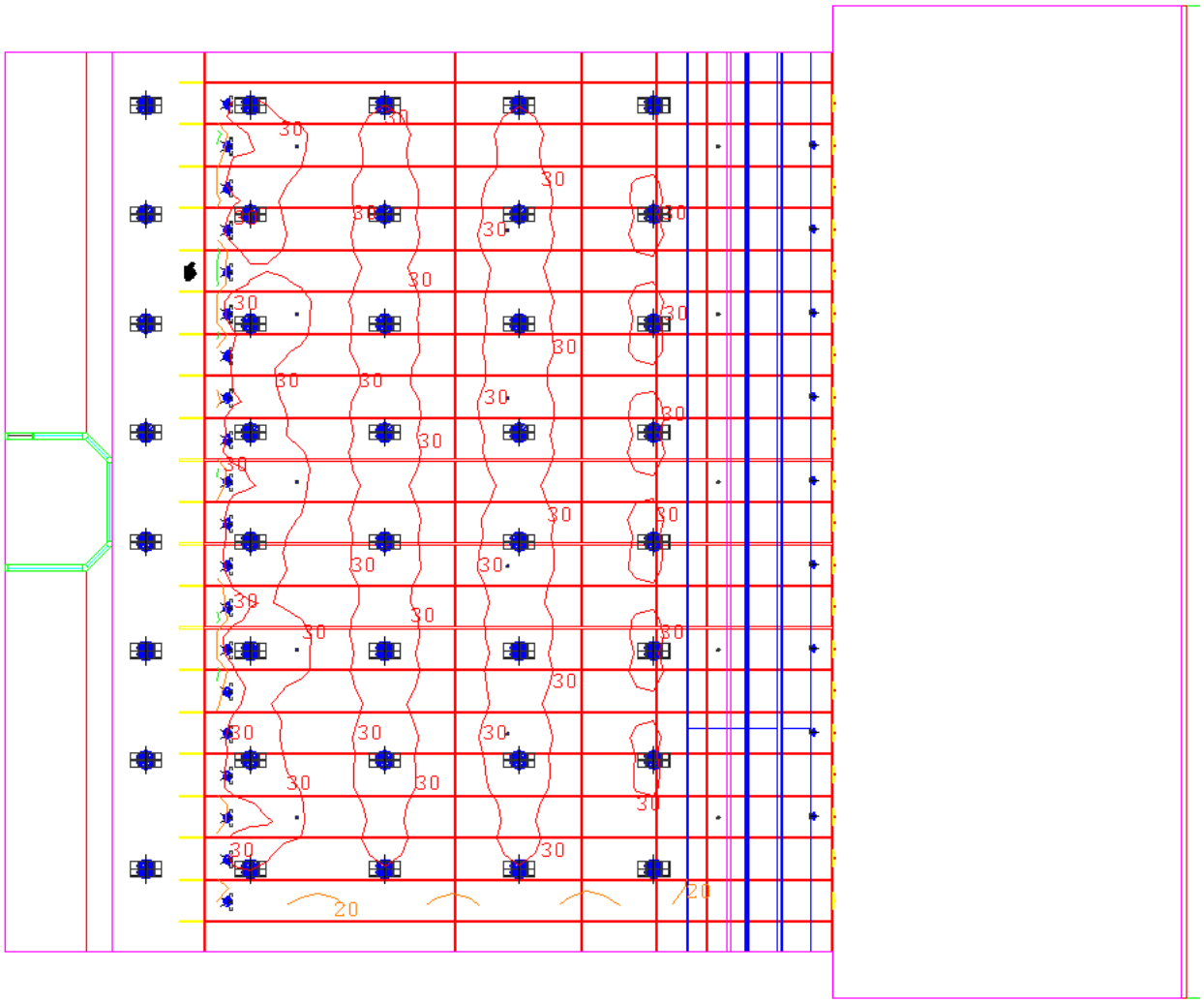
Renderings

Project 1
Calc Pts

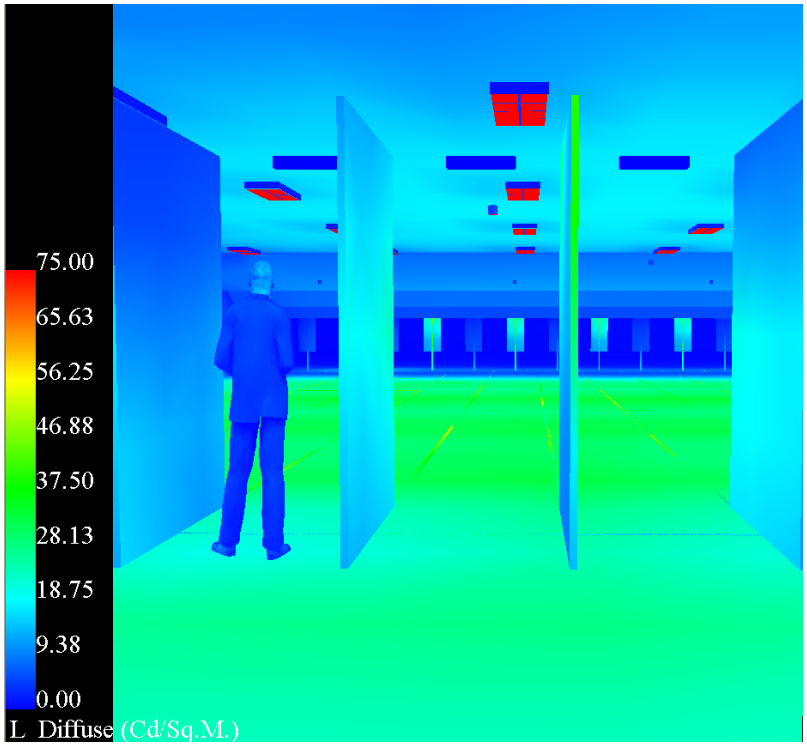
Lanes Floor
Illuminance Values(Fc)
Average=29.89 Maximum=48.8
Minimum=17.0 Avg/Min=1.76
Max/Min=2.87

Normal Interior Conditions

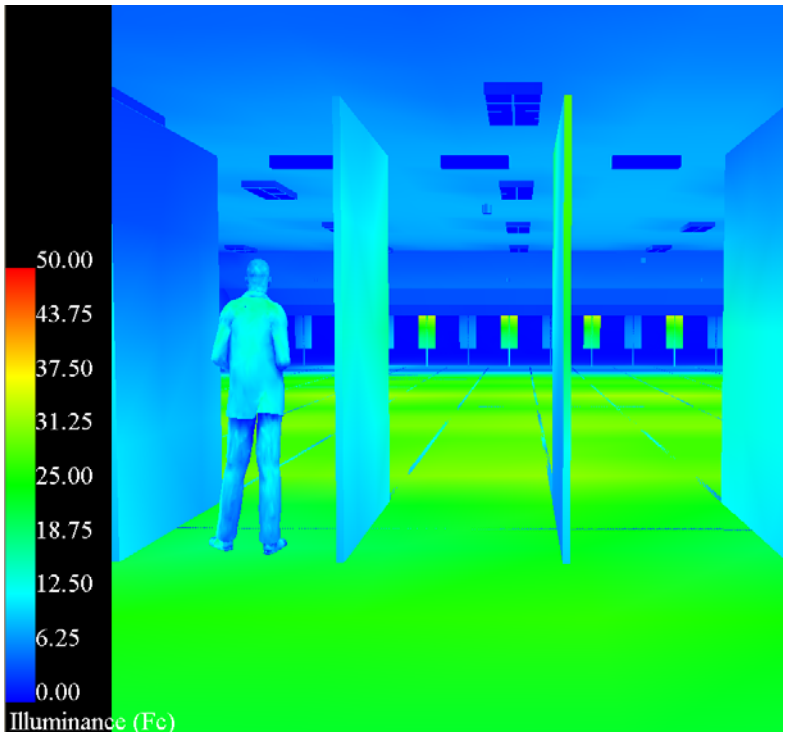
Illuminance Isolines



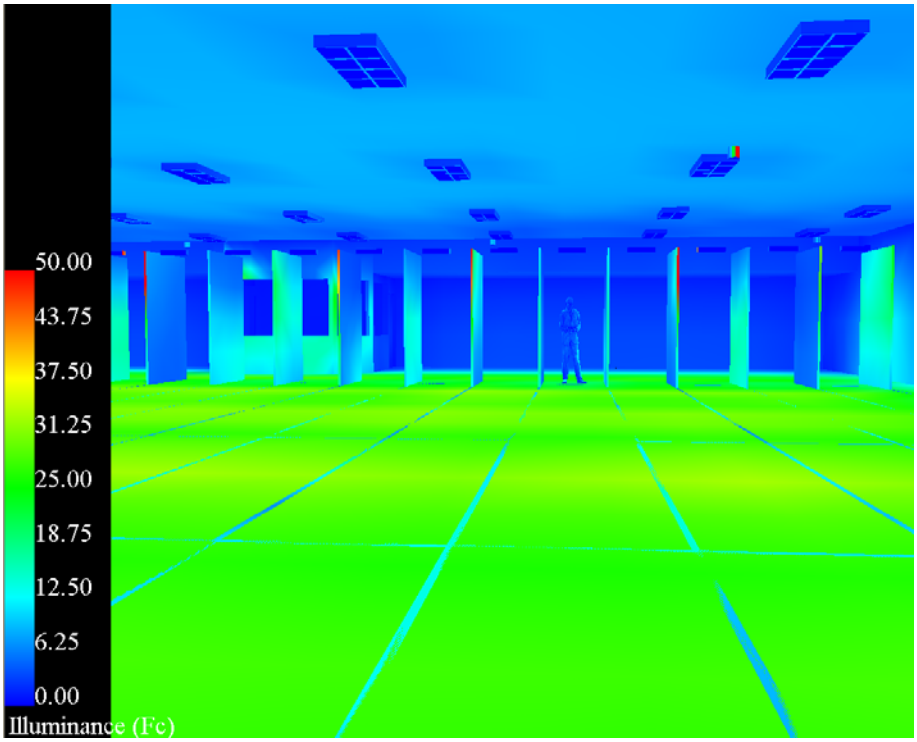
Pseudo-Color Illuminance



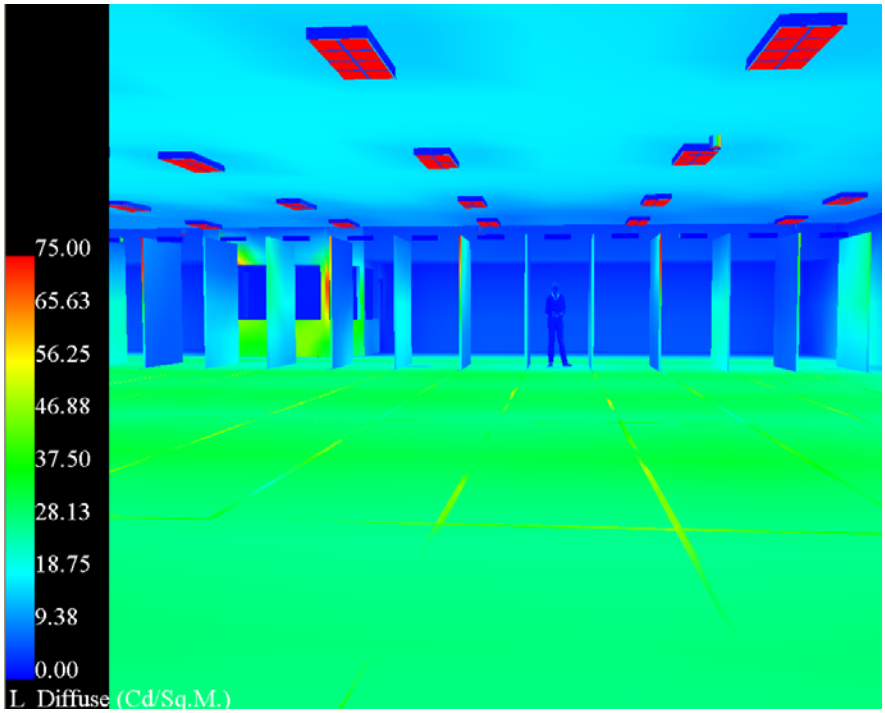
Pseudo-Color Illuminance



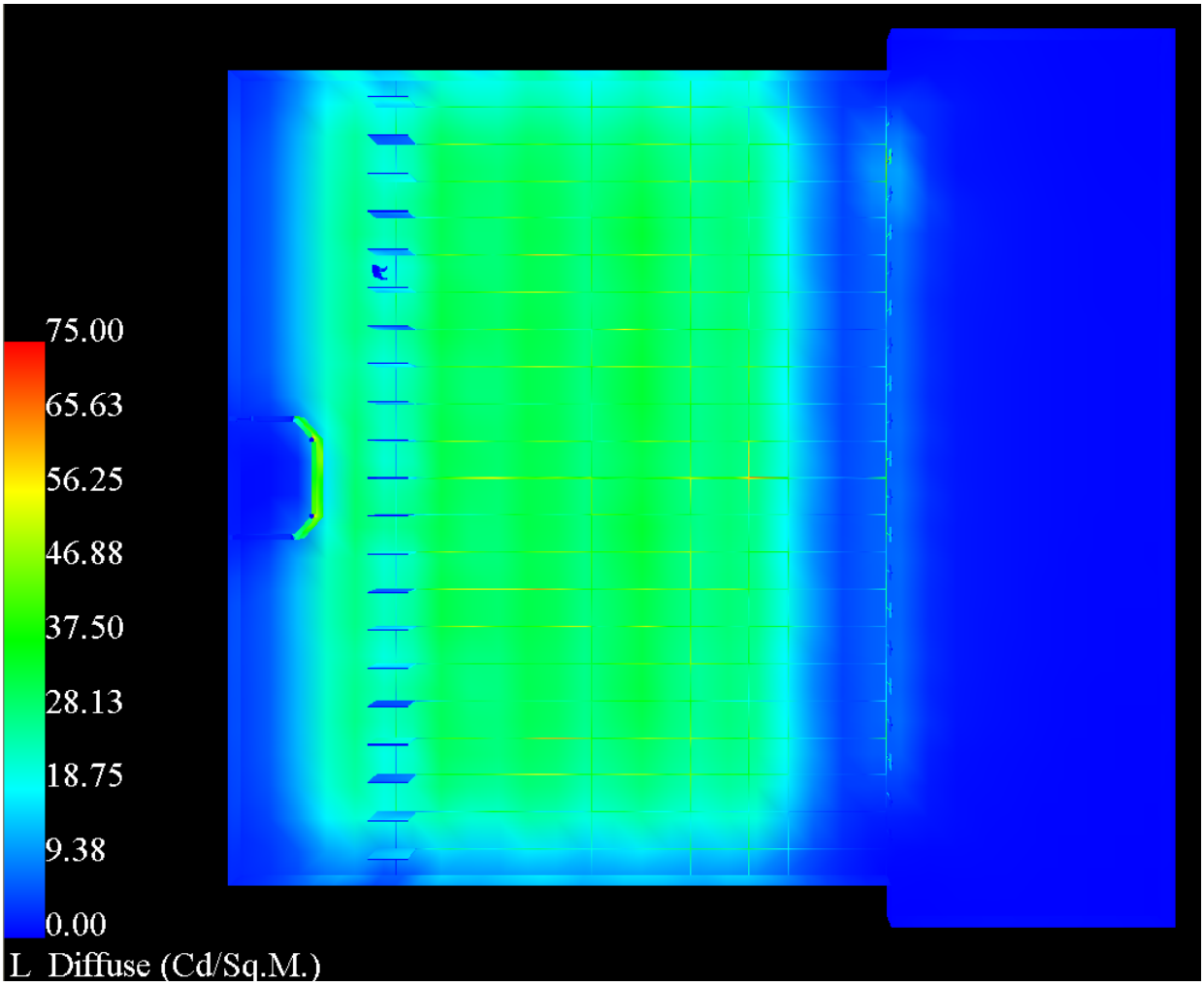
Pseudo-Color Illuminance



Pseudo-Color Illuminance



Pseudo-Color Illuminance



Rendering

Project_1
Calc Pts

Lanes Floor
Illuminance Values(Fc)
Average=28.64 Maximum=37.8
Minimum=4.5 Avg/Min=6.36
Max/Min=8.40

Front Façade and Entrance Canopy

Introduction

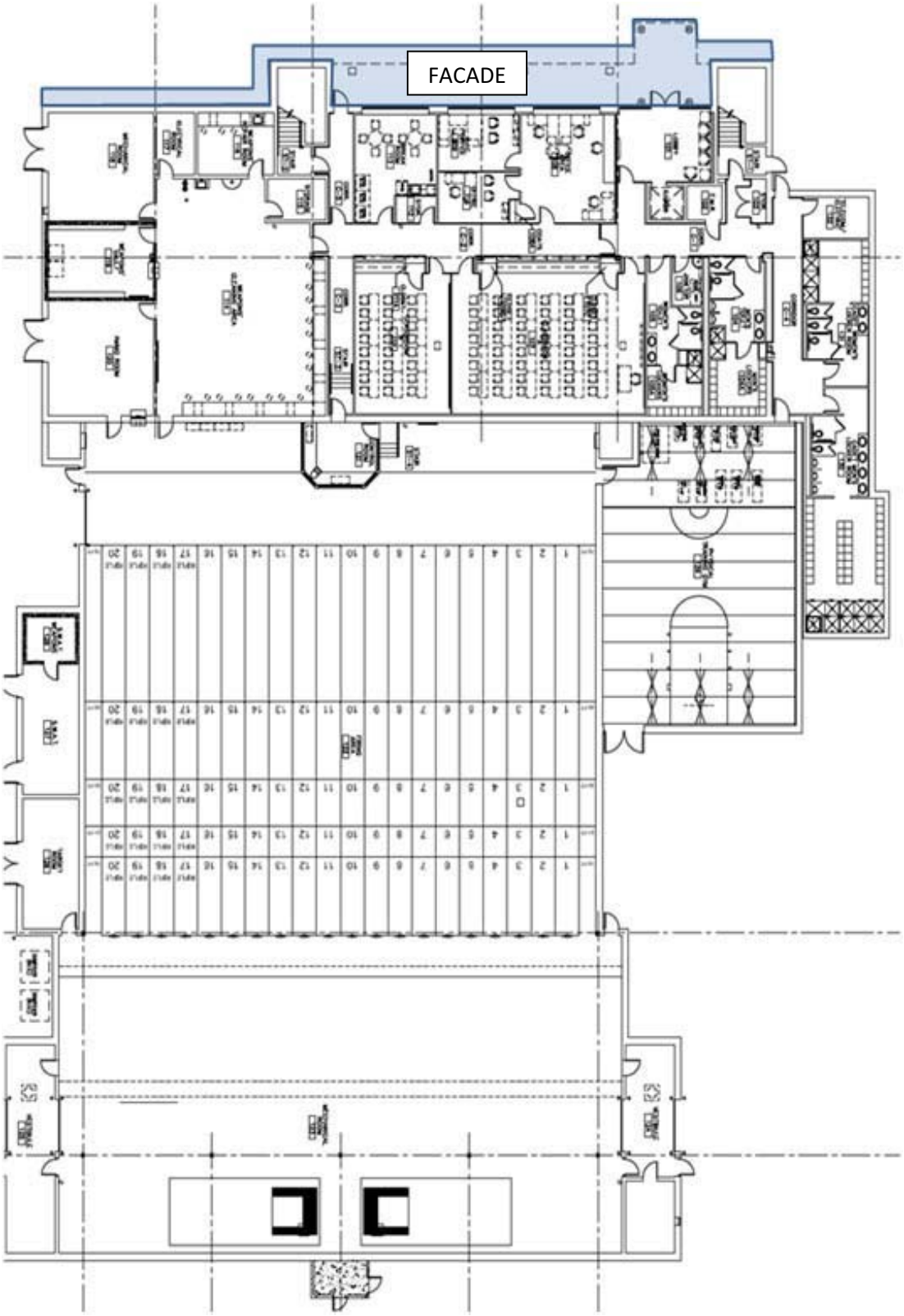
Stretching 153'-0" in length and 30'-0" in height, the façade has several different materials and architectural elements. The basic façade is comprised of sections of ground face CMU and split face CMU. There is a roof cover at the first floor level which is made of standing seam metal. Window trim and finishes are pre-finished aluminum and there are two pre-cast concrete logos, one at either end of the façade. All exterior lighting will be controlled by photocells. Primary occupancy will occur during the day, however, for security and surveillance purposes and for the low amounts of evening traffic that will occur, an adequately lighted exterior is important.

Materials & Reflectances

Split-Face CMU
Reflectance = 0.6

Ground Face CMU
Reflectance = 0.45

Layout



Summary of Design Criteria / Design Approach

Sense of Direction

The main canopy and entrance should be well lighted so that it can easily be determined where one should enter the facility. Higher light levels will inherently lead people in the desired direction.

Points of interest

The precast concrete logos can become a focal point of the building façade when illuminated at night. In this way, the building becomes more interesting and pleasant.

Direct Glare

Direct glare from fixtures should avoid being carried into parking lot areas. Glare can be disabling which could lead to safety issues.

Modeling of Faces and Objects

In the nighttime hours, safety and security becomes more of a concern. Modeling of faces and objects is important for visual recognition on the surroundings by people as well as security cameras.

Light Distribution on Surfaces

The distribution of light on the façade surfaces should be non-uniform to create visual interest, a hierarchy of light should be established to create areas of light and dark. Architectural features, such as the precast logos should be highlight as one of the upper levels of the hierarchy to stand out.

Design Performance

One of the major elements of the façade is the building name. The letters of the building name are put in silhouette by washing the wall behind the letters with light. The wall outsets that are adorned with architectural precast panels displaying the Maryland Transportation Authority and the MdTA Police logos are illuminated using Color Kinetics Color Blaze LED fixtures. Recessed step lights are housed within the columns that support the entrance canopy and floodlights illuminate the arched canopy over the entrance. All exterior lighting will be controlled by photocells.

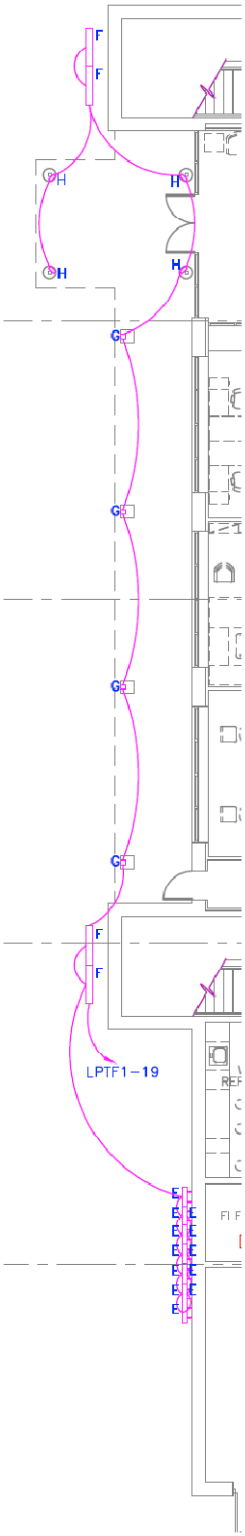
Luminaire Schedule

LUMINAIRE SCHEDULE - FAÇADE AND ENTRANCE CANOPY								
TAG	MANUFACTURER	CATALOG NUMBER	DESCRIPTION	LAMP TYPE	WATTS	# OF LAMPS	OPERATING VOLTAGE	FIXTURE INPUT WATTS
E	WINDIRECT	P2 - SSW - 148T5 - 277V - SCK1 - SGW -	WALLWASH	T5	28	1	277	33
F	COLOR KINETICS	116-000016-00	COLOR BLAZE	LED	240	---	277	240
G	ERCO	44553.023	STEP LIGHT	CFL-TR	9	1	277	12
H	COLOR KINETICS	123-000005-00	CANOPY	LED	50	---	277	50

Light Loss Factors

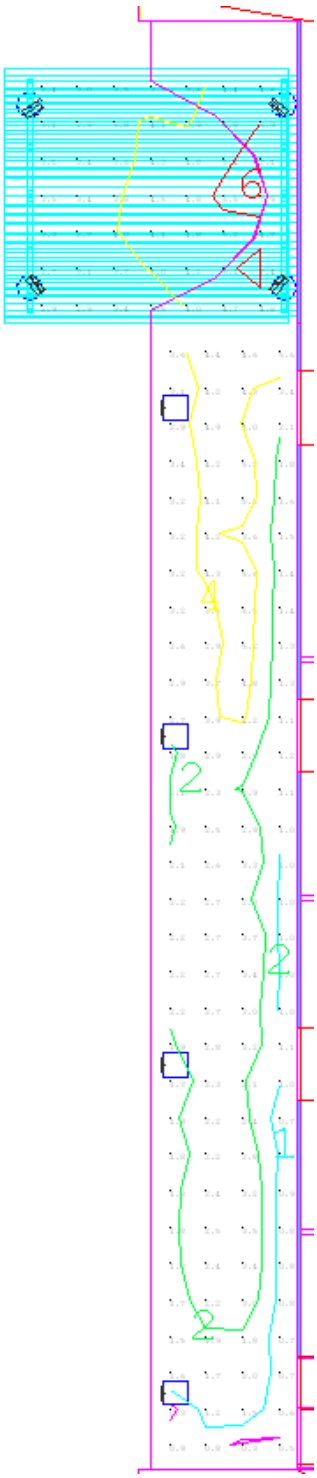
LIGHT LOSS FACTORS - FRONT FAÇADE AND ENTRANCE CANOPY									
LUMINAIRE DESIGNATION	MAINTENANCE CATEGORY	ROOM ATMOSPHERE	CLEANING INTERVAL	INITIAL LUMENS	MEAN LUMENS	BALLAST FACTOR	LLD	LDD	LLF
E	IV	DIRTY	12 MONTH	5000	4650	1.04	0.93	0.72	**0.696**
F	IV	DIRTY	12 MONTH	2282	---	1	0.90	0.72	**0.648**
G	VI	DIRTY	12 MONTH	580	599	0.94	1.03	0.74	**0.718**
H	IV	DIRTY	12 MONTH	597	---	1	0.90	0.72	**0.648**

Floor plan

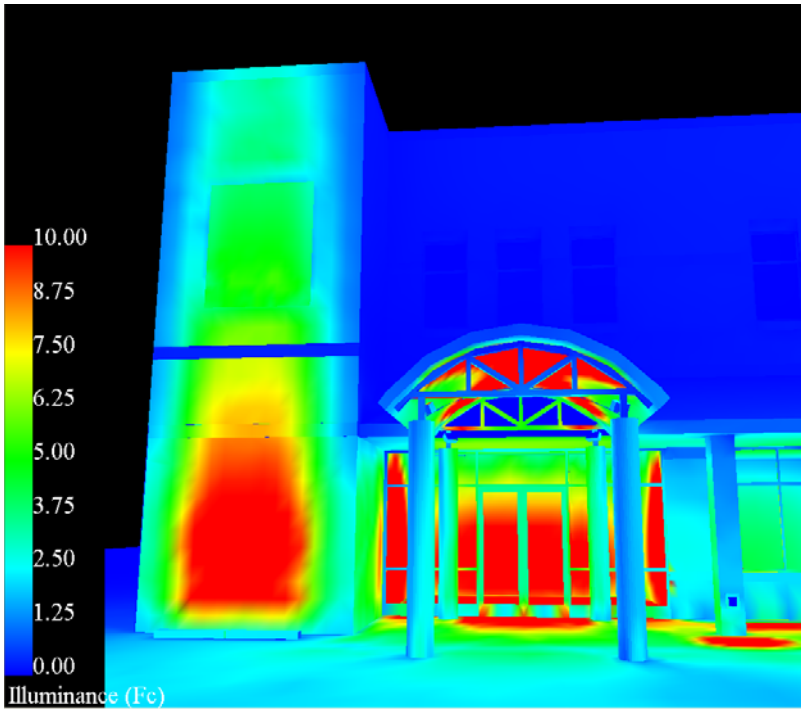


Performance Data

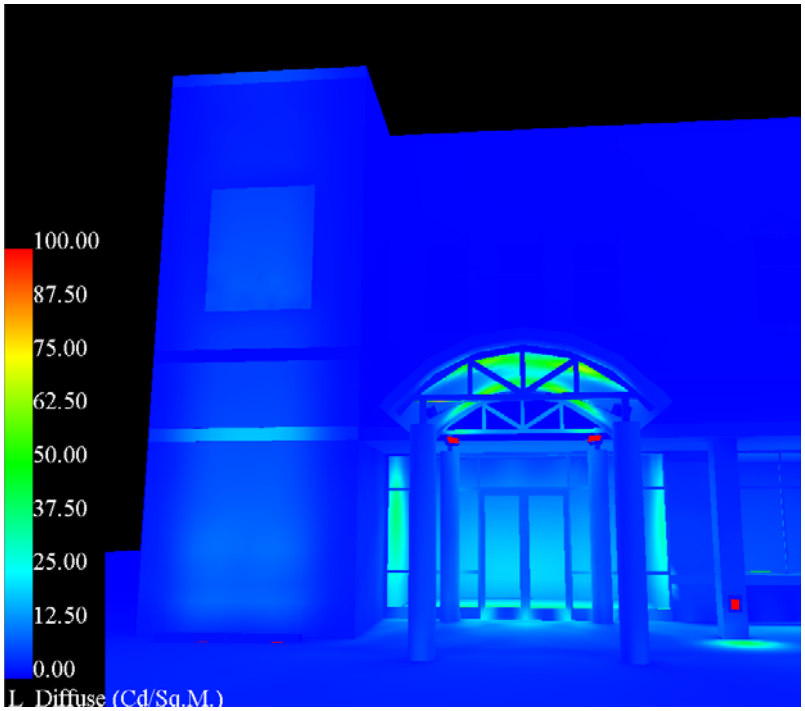
Illluminance Isolines



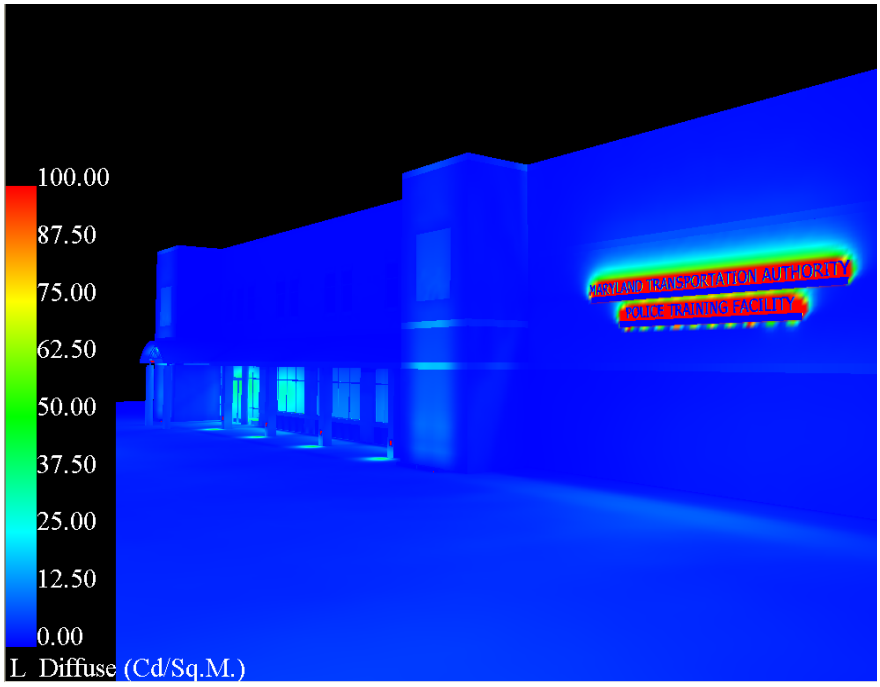
Psuedo-Color Illuminance



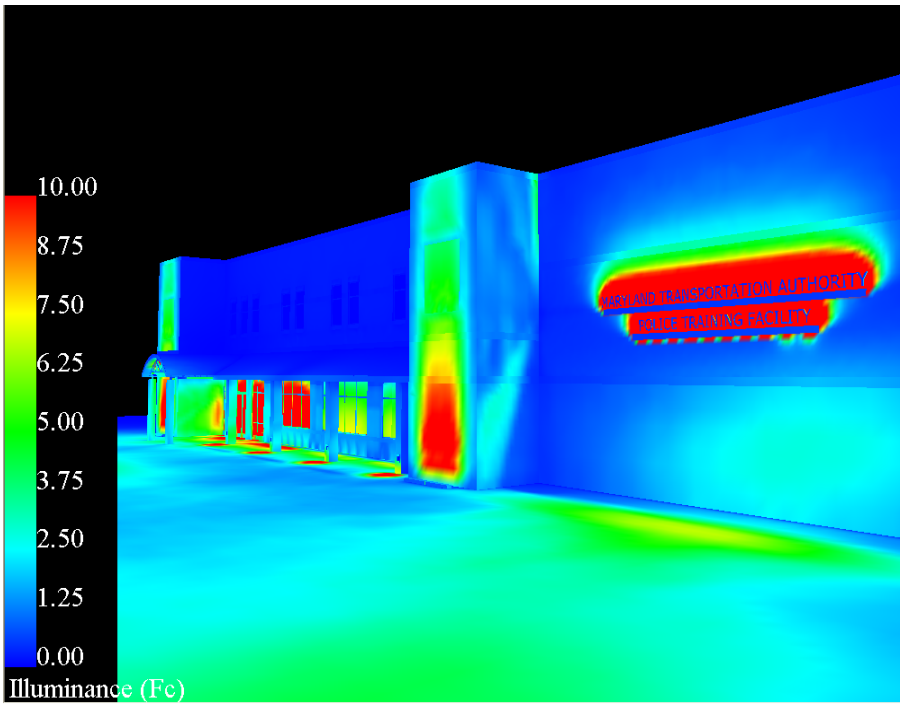
Psuedo-Color Luminance



Psuedo-Color Luminance



Psuedo-Color Illuminance



Renderings


MARYLAND TRANSPORTATION AUTHORITY
POLICE TRAINING FACILITY


MARYLAND
TRANSPORTATION
AUTHORITY
POLICE