CONFLUENCE DJ, LLC
BIGFOOT 11 PAD PROJECT

LIGHT MITIGATION PLAN

SECTION 11, TOWNSHIP 4 NORTH, RANGE 63 WEST, 6TH P.M.
WELD COUNTY, COLORADO

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I. INTRODUCTION

This light mitigation plan is being prepared for the Confluence DJ, LLC's Bigfoot 11 Pad project. The project consists of the development of infrastructure to support the drilling and production of 16 oil and gas wells located in Weld County.

The purpose of this report is to demonstrate compliance with the various State and Local lighting regulations. This report will predict the light impacts that will occur during the different development phases (Pre-Production and Production) of the project and detail the various lighting mitigation standards and practices that will be used to limit light pollution and conform to the required lighting regulations. The intent of the project's lighting plan is to provide a safely lit workplace environment that protects the surrounding public and wildlife environment.

II. GENERAL LOCATION AND DESCRIPTION

A. LOCATION AND EXISTING CONDITIONS

The Bigfoot 11 Pad is located on a 560-acre parcel of land owned by TH Ranch, LLC in the W1/2 of Section 11, Township 4 North, Range 63 West, 6th P.M. The site is on the northeast side of the intersection between Highway 34 and Weld County Road 69. This parcel is zoned agricultural, and the existing land-use is agricultural sprinkler irrigated land, grazing, and wasteland.

B. PROPOSED DEVELOPMENT

The proposed development will include construction of infrastructure and utilities to support the drilling and completion of new oil and gas wells. The proposed working pad surface (WPS) will be 11.20-acres (487,700 SF). The Pre-Production Phase will be the initial phase of the project beginning with the pad construction and will remain until all the wells have been drilled and hydraulically stimulated. The Production Phase will be the project's final phase and will include drill-out, flowback, and production activities. Due to the continuous nature of oil and gas operations, many of the pre-production activities mentioned above must be performed during night-time hours.

C. PROPOSED LIGHTING

No permanent lighting is proposed for this project. Lighting to facilitate low-light working conditions will be temporary exterior flood and spot type lighting. The proposed temporary lighting will be provided by portable light towers and lights permanently affixed to equipment (e.g., the drilling rig). The development of the project will require most of the work operations to be performed continuously (7-days a week & 24-hour a day). Proposed lighting will change for each work operation of each phase of the project. The light fixture schedules for the proposed lighting are included below in each work operation section.

Lighting Best Management Practices (see Section V, below) will be used to minimize light pollution during all work operations of the proposed project. All lighting shall conform to Federal, State, and Industry recognized standards for both on-site workplace safety and off-site public and wildlife protection (OSHA, FAA, COGCC, IESNA, and ANSI). Care will be taken to keep lighting levels at the specified levels within the working area of the site to provide safe working conditions. Care will also be taken to prevent unintended light from leaving the site and becoming a hazard or nuisance to the public or surrounding wildlife habitat.

III. PRE-PRODUCTION PHASE FACILITY LIGHTING PLAN

The Pre-Production Phase will consist of the following work operations: Pad Construction Operations, Drilling Operations, and Hydraulic Stimulation Operations. The state and local governing lighting regulations for this section will be the COGCC's Rule 424, specifically 424.a.(2).A., which also includes Rule 424.c.. Lighting photometric plans for all operations of the Pre-Production Phase should address adequate lighting to ensure on- and off-site safety during work operations while assessing the lighting impacts to the health, safety, and welfare of persons occupying building units within 2,000-feet, motorists on roads within 2,000-feet, and wildlife in high priority habitats within 2,000-feet. A 32-foot-high visual/sound wall will be placed along the south edge of the WPS during all operations of the Pre-Production Phase of this project.

A. PAD CONSTRUCTION OPERATIONS

Pad Construction Operations typically consist of structure demolition, equipment haul-off, and grading of the existing well pad to facilitate the development of the new wells. Pad Construction Operations also includes placing necessary utilities to support the wells. It is anticipated that work for this operation will only occur during daylight hours, which is adequate for safely completing Pad Construction Operations. No lighting, permanent or temporary, is planned for Pad Construction Operations.

B. DRILLING OPERATIONS

Drilling Operations consist of bringing a drill rig onto the site and drilling the proposed wells. This work operation will take place continuously (7-days a week & 24-hour a day). Current development plans include utilizing a single drilling rig development scenario during Drilling Operations. Lighting will be temporary and be provided by portable light towers and lights permanently affixed to the drilling rig. A Drilling Operations Photometric Plan and a Drilling Rig Photometric Plan are attached as Appendix A. All proposed lighting for safely completing the Drilling Operations is listed below:

Table 1 – Drilling Operations Lighting Fixture Schedule.

Light Type	Number of Units	Approximate Height, FT (above GE)	Wattage per Unit	Lumens per Unit	Total Lumens
LED Flood Light Tower	4	25	1,400	154,000	616,000
Lights Permanently Affixed to Drill Rig	1	Varying		See Plan	See Plan
				Total Lumens	**616,000***

**Plus, additional lighting permanently affixed to the drill rig.*

The LED Flood Light Tower is a portable 4-fixture LED telescoping light tower mounted on a single-axle trailer, BUG Rating is B3-U3-G5 (fixture at the BMP angle and direction, fixture specification sheet, and BUG calculation are included in Appendix E). If deemed necessary, additional light units may be utilized to address safety concerns. Contact a lighting engineer to verify that any additional lighting units and lighting BMPs will remain within the required lighting standards stated in this report.

C. HYDRAULIC STIMULATION OPERATIONS

Hydraulic Stimulation Operations consist of hydraulically fracturing (frac) the proposed wells. This work operation will take place continuously (7-days a week & 24-hour a day). Current development plans include utilizing a single frac crew development scenario during Hydraulic Stimulation Operations. Lighting will be temporary and be provided by portable light towers. A Hydraulic Stimulation Operations Lighting Plan is attached

as Appendix B. All proposed lighting for safely completing the Hydraulic Stimulation Operations is listed below:

Table 2 – Hydraulic Stimulation Operations Lighting Fixture Schedule.

Light Type	Number of Units	Approximate Height, FT (above GE)	Wattage per Unit	Lumens per Unit	Total Lumens
LED Flood Light Tower	7	25	1,400	154,000	1,078,000
				Total Lumens	**1,078,000**

The LED Flood Light Tower is a portable 4-fixture LED telescoping light tower mounted on a single-axle trailer, BUG Rating is B3-U3-G5 (fixture at the BMP angle and direction, fixture specification sheet, and BUG calculation are included in Appendix E). If deemed necessary, additional light units may be utilized to address safety concerns. Contact a lighting engineer to verify that any additional lighting units and lighting BMPs will remain within the required lighting standards stated in this report.

D. Regulations for Lighting Impacts to Health, Safety, and Welfare

All lighting shall conform to the Lighting Photometric Plans and the Lighting Standards and Best Management Practices (BMPs) section of this report. As shown on the Drilling Operations Photometric Plan, Drilling Rig Photometric Plan, and Hydraulic Stimulation Operations Lighting Plan (Appendix A and Appendix B), lighting levels will be contained within the 100-foot offset of the WPS boundary during all work operations of Pre-Production Phase. As noted, lighting impacts for this phase of the project will be governed by Rule 424 of the COGCC. The following discusses the impacts to the public and surrounding habitat as defined Rule 424.c.(3).:

1. Persons Occupying Building Units within 2,000-feet of the Oil and Gas Facility:
    a. There are no building units within 2,000-feet.
2. Motorists on Roads within 2,000-feet of the Oil and Gas Facility:
    a. The east edge of Weld County Road 69 is approximately 370 feet to the west of the WPS. No impacts are anticipated to motorists on the road due to the implemented lighting BMPs and no direct light reaching the road.
    b. The northern edge of Highway 34 is approximately 160 feet to the southwest of the WPS. No impacts are anticipated to motorists on the road due to the implemented lighting BMPs and no direct light reaching the road.
3. Wildlife occupying any High Priority Habitat within 2,000-feet of the Oil and Gas Facility:
    a. The northern boundary of the Pronghorn Winter Concentration is approximately 663 feet to the southwest of the WPS. No impacts are anticipated to wildlife due to the implemented lighting BMPs and no direct light reaching the high priority habitat boundary.

IV. PRODUCTION PHASE FACILITY LIGHTING PLAN

The Production Phase will be the final phase of the project. The Production Phase will consist of the following work operations: Drill-Out and Flowback Operations and Productions Operations. The state and local governing lighting regulations for this section will be the COGCC's Rule 424, specifically 424.a.(2).B., which also includes Rule 424.d.&e.. Lighting photometric plans for all operations of the Production Phase should address adequate lighting to ensure on- and off-site safety during work operations while assessing the lighting impacts to the health, safety, and welfare of persons occupying building units within 2,000-feet, motorists on roads within 2,000-feet, and wildlife in high priority habitats within 2,000-feet. Additionally, lighting photometric plans for all operations of

the Production Phase are required to conform to a zoning/land-use maximum permissible light level defined in Rule 424.d.. The permissible light level is an overall average of the site's light intensity and is calculated by the total lumens divided by the total WPS. The site is within an agricultural zoning/land-use, with a maximum permissible light level of 2.5 lumens per square foot (LM/SF).

A. DRILL-OUT AND FLOWBACK OPERATIONS

Drill-Out and Flowback Operations consist of recovering fluids following Hydraulic Stimulation Operations. Flowback Operations also consist of equipment and material mobilization from the site. The mobilization activities may continue approximately 120 days following the drill-out work. These work operations will take place continuously and simultaneously (7-days a week & 24-hour a day). Lighting will be temporary and be provided by portable light towers. The Drill-Out Operations Photometric Plan is attached as Appendix C. All proposed lighting for safely completing Drill-Out Operations is listed below:

Table 3 – Drill-Out Operations Lighting Fixture Schedule.

Light Type	Number of Units	Approximate Height, FT (above GE)	Wattage per Unit	Lumens per Unit	Total Lumens
LED Flood Light Tower	7	25	1,400	154,000	1,078,000
				Total Lumens	**1,078,000**

The LED Flood Light Tower is a portable 4-fixture LED telescoping light tower mounted on a single-axle trailer, BUG Rating is B3-U3-G5 (fixture at the BMP angle and direction, fixture specification sheet, and BUG calculation are included in Appendix E). If deemed necessary, additional light units may be utilized to address safety concerns. Contact a lighting engineer to verify that any additional lighting units and lighting BMPs will remain within the required lighting standards stated in this report.

It is expected that the temporary lighting utilized during Drill-Out Operations will not exceed the maximum permissible light level of 2.5 lumens per square foot (LM/SF) of the total WPS. The following is the calculated light levels for the Drill-Out Operations:

Table 4 – Calculated Drill-Out Operations Permissible Light Levels.

Description	Total Lumens	WPS (SF)	Maximum Permissible Light LM/SF	Calculated Permissible Light LM/SF
Drill-Out Temporary Lighting	1,078,000	487,700	2.5	2.2
			TOTAL LIGHT LEVEL	**2.2**

The Drill-Out Operations Photometric Plan in Appendix C, shows the calculated light distribution at the site during Drill-Out Operations. With this lighting configuration, this work operation is within the recommended regulatory limits. No direct light is anticipated to leave the 100-foot offset of the WPS.

The Flowback Operations Photometric Plan is attached as Appendix D. All proposed lighting for safely completing Flowback Operations is listed below:

Table 5 – Flowback Operations Lighting Fixture Schedule.

Light Type	Number of Units	Approximate Height, FT (above GE)	Wattage per Unit	Lumens per Unit	Total Lumens
LED Flood Light Tower	2	25	1,400	154,000	308,000
				Total Lumens	**308,000**

The LED Flood Light Tower is a portable 4-fixture LED telescoping light tower mounted on a single-axle trailer, BUG Rating is B3-U3-G5 (fixture at the BMP angle and direction, fixture specification sheet, and BUG calculation are included in Appendix E). If deemed necessary, additional light units may be utilized to address safety concerns. Contact a lighting engineer to verify that any additional lighting units and lighting BMPs will remain within the required lighting standards stated in this report.

It is expected that the temporary lighting utilized during Flowback Operations will not exceed the maximum permissible light level of 2.5 lumens per square foot (LM/SF) of the total WPS. The following is the calculated light levels for the Flowback Operations:

Table 6 – Calculated Flowback Operations Permissible Light Levels.

Description	Total Lumens	WPS (SF)	Maximum Permissible Light LM/SF	Calculated Permissible Light LM/SF
Flowback Temporary Lighting	308,000	487,700	2.5	0.6
			TOTAL LIGHT LEVEL	**0.6**

The Flowback Operations Photometric Plan in Appendix C, shows the calculated light distribution at the site during Flowback Operations. With this lighting configuration, this work operation is within the recommended regulatory limits. No direct light is anticipated to leave the 100-foot offset of the WPS.

B. Production Operations

Production Operations consist of the daily gathering of the resources from the wells and maintenance of the permanent production equipment. This work operation will take place continuously (7-days a week & 24-hour a day). It is anticipated that work for this operation will only occur during daylight hours, which is adequate for safely completing Production Operations. No lighting, permanent or temporary, is planned for Production Operations.

C. Regulations for Lighting Impacts to Health, Safety, and Welfare

All lighting shall conform to the Lighting Photometric Plans and the Lighting Standards and Best Management Practices (BMPs) section of this report. As shown on the Drill-Out Operations Photometric Plan and Flowback Operations Photometric Plan (Appendix C and Appendix D), lighting levels will be contained within the 100-foot offset of the WPS boundary during all work operations of the Production Phase. As noted, lighting impacts for this phase of the project will be governed by Rule 424 of the COGCC. The impacts to the public and surrounding habitat as defined Rule 424.d.(3). :

1. Persons Occupying Building Units within 2,000-feet of the Oil and Gas Facility:
    a. There are no building units within 2,000-feet.
2. Motorists on Roads within 2,000-feet of the Oil and Gas Facility:
    a. The east edge of Weld County Road 69 is approximately 370 feet to the west of the WPS. No

impacts are anticipated to motorists on the road due to the implemented lighting BMPs and no direct light reaching the road.

b. The northern edge of Highway 34 is approximately 160 feet to the southwest of the WPS. No impacts are anticipated to motorists on the road due to the implemented lighting BMPs and no direct light reaching the road.

3. Wildlife occupying any High Priority Habitat within 2,000-feet of the Oil and Gas Facility:
    a. The northern boundary of the Pronghorn Winter Concentration is approximately 663 feet to the southwest of the WPS. No impacts are anticipated to wildlife due to the implemented lighting BMPs and no direct light reaching the high priority habitat boundary.

V. LIGHTING STANDARDS AND BEST MANAGEMENT PRACTICES (BMPs) – RULE 424.b.

No permanent lighting is proposed for this project. All temporary lighting shall conform to Federal, State, and Industry recognized standards for both workplace safety and off-site public protection (OSHA, FAA, COGCC, IESNA, and ANSI). Care will be taken to keep lighting levels at the specified levels within the working area of the site to provide safe working conditions. Care will also be taken to prevent unintended light from leaving the site and becoming a hazard or nuisance to the public or surrounding wildlife habitat.

The following lighting BMPs will be used to minimize light pollution:

- Working areas within the working pad surface (WPS) will be adequately lit to aid in safe working conditions during all low-light working times (e.g., night-time, dusk, dawn, overcast). Lighting shall conform with all OSHA, IESNA, and ANSI standards.
- No direct light, except those governed by FAA standards, shall shine beyond the boundaries of the WPS, especially onto public roads, adjacent properties, and/or high priority habitats. All lighting shall conform with all COGCC, county, and municipal standards.
- For workplace safety concerns, no direct or reflected direct light shall shine towards the entrance of the WPS.
- Watch for and remove glare and reflection points during all work operations of the project from temporary or permanent structures, temporary or permanent lighting, vehicles, construction equipment, and clothing/PPE.
- All lights capable of adjustment will be angled between 45-65° downward and inward towards working areas on the WPS. No light should shine above the horizontal plane passing through the center point of the light source. Lights will be shielded to prevent direct or reflected direct light and from leaving the site.
- Any lighting damaged and/or improperly directed or angled will be promptly fixed and/or corrected to conform to the lighting plan.
- Equipment shall be operated and/or orientated and/or shielded in such a manner that lights permanently affixed to equipment do not shine above the horizontal plane passing through the center point of the light source or shine beyond the boundary of the WPS.
- For all work operations, once permanent and/or temporary lighting is in place, a lighting self-audit of the site will be performed to ensure that no unintended light will leave the site and become a hazard or a nuisance.
- For any change to the lighting during any work operations, a lighting self-audit of the site will be performed to ensure that no unintended light will leave the site and become a hazard or a nuisance.
- For non-working or shut-down days where no personnel are on-site or in working areas, non-essential temporary lighting will be turned off. If no personnel are on-site and essential temporary lighting is needed, the essential temporary lighting will be inspected every 24 hours.
- All redundant, unused, or not-needed lights will be turned off.
- Any additional light units used to address workplace safety concerns that are not shown on the lighting photometric plans will be verified by a lighting engineer to ensure that the modified lighting will remain within the required lighting standards stated in this report.
- Where safely applicable, the following are additional suggestions to aid in controlling and minimizing the site's lighting levels:
    - Using automation, timers, or motion sensors
    - Using or changing fixtures to full cut-off lighting fixtures to shield and direct light
    - Using or changing to lighting colors that reduce light intensity
    - Using or changing low-glare or no-glare lighting
    - Using or extending the temporary wall panels (e.g., visual/sound walls)

VI. PRE-PRODUCTION PHASE FACILITY LIGHTING – 424.c.

Pre-Production Phase facility lighting will be temporary exterior lighting. To ensure the safety of all persons on- and off-site and to wildlife and their habitats, all lighting shall conform to the Lighting Photometric Plans and the Lighting Standards and Best Management Practices (BMPs) section of this report.

The requirements of this section have already been incorporated in this report in Section III, above. Please refer to that section for the governing rules concerning safety and lighting impacts for this phase of the project.

VII. PRODUCTION PHASE FACILITY LIGHTING WHEN PERSONNEL ARE ON-SITE AND NOT ON-SITE – 424.d.& e.

Production Phase facility lighting will be temporary exterior lighting. To ensure the safety of all persons on- and off-site and to wildlife and their habitats, all lighting shall conform to the Lighting Photometric Plans and the Lighting Standards and Best Management Practices (BMPs) section of this report which discusses BMPs when personnel are both on-site and off-site.

The requirements of this section have already been incorporated in this report in Section IV and Section V, above. Please refer to those sections for the governing rules concerning lighting BMPs, safety, and lighting impacts for this phase of the project.

Following the commencement of the Flowback Operations, it is anticipated that no further night-time work activities will occur at the site. No lighting fixtures, permanent or temporary, are planned for Production Operations or for the remainder of the Production Phase. If temporary lighting is required for maintenance beyond flowback operations, temporary portable light fixtures similar to those shown on the lighting plan may be provided. All maintenance lighting shall conform to the Lighting Photometric Plans and the Lighting Standards and Best Management Practices (BMPs) section of this report.

VIII. CUMULATIVE IMPACTS – 424.f.

No cumulate impacts according to COGCC's Rule 424.f. are anticipated due to the implemented lighting BMPs and no direct light reaching a building unit within 1-mile. The lighting plan for this project was developed so that the cumulative impact of the proposed lighting will conform to the required 4 lux at any residential building unit or high occupancy building unit within 1-mile of the site, measured at 5.5 feet above grade in a direct line of sight to the brightest light fixture on-site (Rule 424). For further reference, additional lighting levels at various points of interest around and from the WPS have been provided for each work operation below. Proposed lighting for this project will be contained within the 100-foot offset of the WPS boundary.

Light intensity calculations shown on the lighting plans are in foot-candles, which is defined as one lumen per square foot. Light intensity levels vary across the site and are dependent on the height, location, and brightness of the light source. Light intensity levels are affected by the relative position and reflectability of objects and/or surfaces on the site. Foot-candles can be converted to lux by using the following conversion: 1 Fc = 10.8 lux.

A. Pad Construction Operations

No lighting, permanent or temporary, is planned for Pad Construction Operations, so there will be no light intensity calculations.

B. Drilling Operations

Based upon the light intensity calculations shown on the Drilling Operations Photometric Plan in Appendix A, the maximum foot-candle (Fc) observed within the WPS during Drilling Operations will be located directly beneath the temporary portable light tower on the northeast side of the proposed east row of wells, calculated as 29.4 Fc. The maximum foot-candle at the entrance of the WPS is calculated at 0.0 Fc. The maximum foot-candle at the edge of the WPS will be located on the middle-west edge of the WPS, calculated as 0.1 Fc. The maximum foot-candle at the 100-foot offset of the WPS boundary will be 0.0 Fc. The maximum foot-candle at building units and public roads within 1-mile of the WPS boundary will be 0.0 Fc. The following is a summary of the calculated and required light intensity levels:

Table 7 – Drilling Operations Calculated Maximum Light Intensity at Points of Interest.

Point of Interest	Foot-Candle	Lux	Required
Within the WPS	29.4	317.5	N/A
At the Entrance of the WPS	0.0	0.0	N/A
At the Edge of the WPS	0.1	1.1	N/A
100-foot offset of the WPS boundary	0.0	0.0	N/A
Public Roads within 1-Mile of the WPS	0.0	0.0	N/A
Building Units within 1-Mile of the WPS	0.0	0.0	4 Lux

C. Hydraulic Stimulation Operations

Based upon the light intensity calculations shown on the Hydraulic Stimulation Operations Photometric Plan in Appendix B, the maximum foot-candle (Fc) observed within the WPS during Hydraulic Stimulation Operations will be located directly beneath the temporary portable light tower on the northeast side of the proposed east row of wells, calculated as 30.1 Fc. The maximum foot-candle at the entrance of the WPS is calculated at 0.0 Fc. The maximum foot-candle at the edge of the WPS will be located on the middle- east and west edges of the WPS, calculated as 0.2 Fc. The maximum foot-candle at the 100-foot offset of the WPS boundary will be 0.0 Fc. The maximum foot-candle at building units and public roads within 1-mile of the WPS boundary will be 0.0 Fc. The following is a summary of the calculated and required light intensity levels:

Table 8 – Hydraulic Stimulation Operations Calculated Maximum Light Intensity at Points of Interest.

Point of Interest	Foot-Candle	Lux	Required
Within the WPS	30.1	325.1	N/A
At the Entrance of the WPS	0.0	0.0	N/A
At the Edge of the WPS	0.2	2.2	N/A
100-foot offset of the WPS boundary	0.0	0.0	N/A
Public Roads within 1-Mile of the WPS	0.0	0.0	N/A
Building Units within 1-Mile of the WPS	0.0	0.0	4 Lux

D. Drill-Out Operations

Based upon the light intensity calculations shown on the Drill-out Operations Photometric Plan in Appendix C, the maximum foot-candle (Fc) observed within the WPS during drill-out operations will be located directly

beneath the temporary portable light tower on the southeast side of the proposed east row of wells, calculated as 91.9 Fc. The maximum foot-candle at the entrance of the WPS is calculated at 0.0 Fc. The maximum foot-candle at the edge of the WPS will be located on the middle- east and west edges of the WPS, calculated as 0.2 Fc. The maximum foot-candle at the 100-foot offset of the WPS boundary will be 0.0 Fc. The maximum foot-candle at building units and public roads within 1-mile of the WPS boundary will be 0.0 Fc. The following is a summary of the calculated and required light intensity levels:

Table 9 – Drill-Out Operations Calculated Maximum Light Intensity at Points of Interest.

Point of Interest	Foot-Candle	Lux	Required
Within the WPS	91.9	992.5	N/A
At the Entrance of the WPS	0.0	0.0	N/A
At the Edge of the WPS	0.2	2.2	N/A
100-foot offset of the WPS boundary	0.0	0.0	N/A
Public Roads within 1-Mile of the WPS	0.0	0.0	N/A
Building Units within 1-Mile of the WPS	0.0	0.0	4 Lux

E. FLOWBACK OPERATIONS

Based upon the light intensity calculations shown on the Flowback Operations Photometric Plan in Appendix D, the maximum foot-candle (Fc) observed within the WPS during Flowback Operations will be located beneath the temporary portable light tower on the middle-east side of the proposed east row of wells, calculated as 29.2 Fc. The maximum foot-candle at the entrance of the WPS is calculated at 0.0 Fc. The maximum foot-candle at the edge of the WPS is calculated as 0.0 Fc. The maximum foot-candle at a point extended 100-foot offset of the WPS boundary will be 0.0 Fc. The maximum foot-candle at building units and public roads within 1-mile of the WPS boundary will be 0.0 Fc. The following is a summary of the calculated and required light intensity levels:

Table 10 – Flowback Operations Calculated Maximum Light Intensity at Points of Interest.

Point of Interest	Foot-Candle	Lux	Required
Within the WPS	29.2	315.4	N/A
At the Entrance of the WPS	0.0	0.0	N/A
At the Edge of the WPS	0.0	0.0	N/A
100-foot offset of the WPS boundary	0.0	0.0	N/A
Public Roads within 1-Mile of the WPS	0.0	0.0	N/A
Building Units within 1-Mile of the WPS	0.0	0.0	4 Lux

F. PRODUCTION OPERATIONS

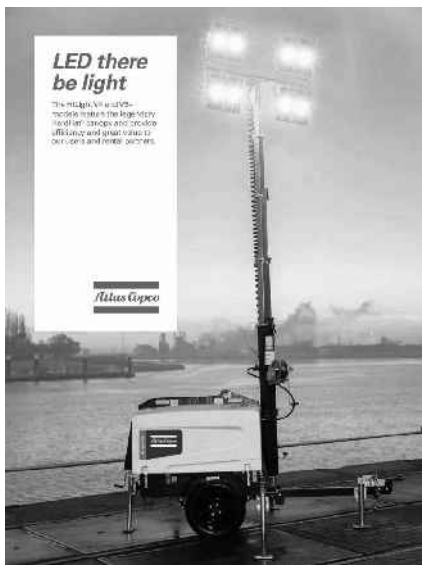
No lighting, permanent or temporary, is planned for Production Operations, so there will be no light intensity calculations.

IX. CONCLUSION

This report was prepared in compliance with State and Local lighting regulations, specifically COGCC's Rule 424. The proposed lighting configurations, as shown on the Lighting Photometric Plans for the Bigfoot 11 Pad project, conforms with the State and Local lighting regulations requirements. To ensure the safety of all persons on- and off-site and to wildlife and their habitats, all lighting shall conform to the Lighting Photometric Plans and the Lighting Standards and Best Management Practices (BMPs) section of this report.

X. APPENDIX

APPENDIX A – DRILLING RIG PHOTOMETRIC PLAN



TYPICAL MOBILE TOWER LIGHTING

N

1" = 100'

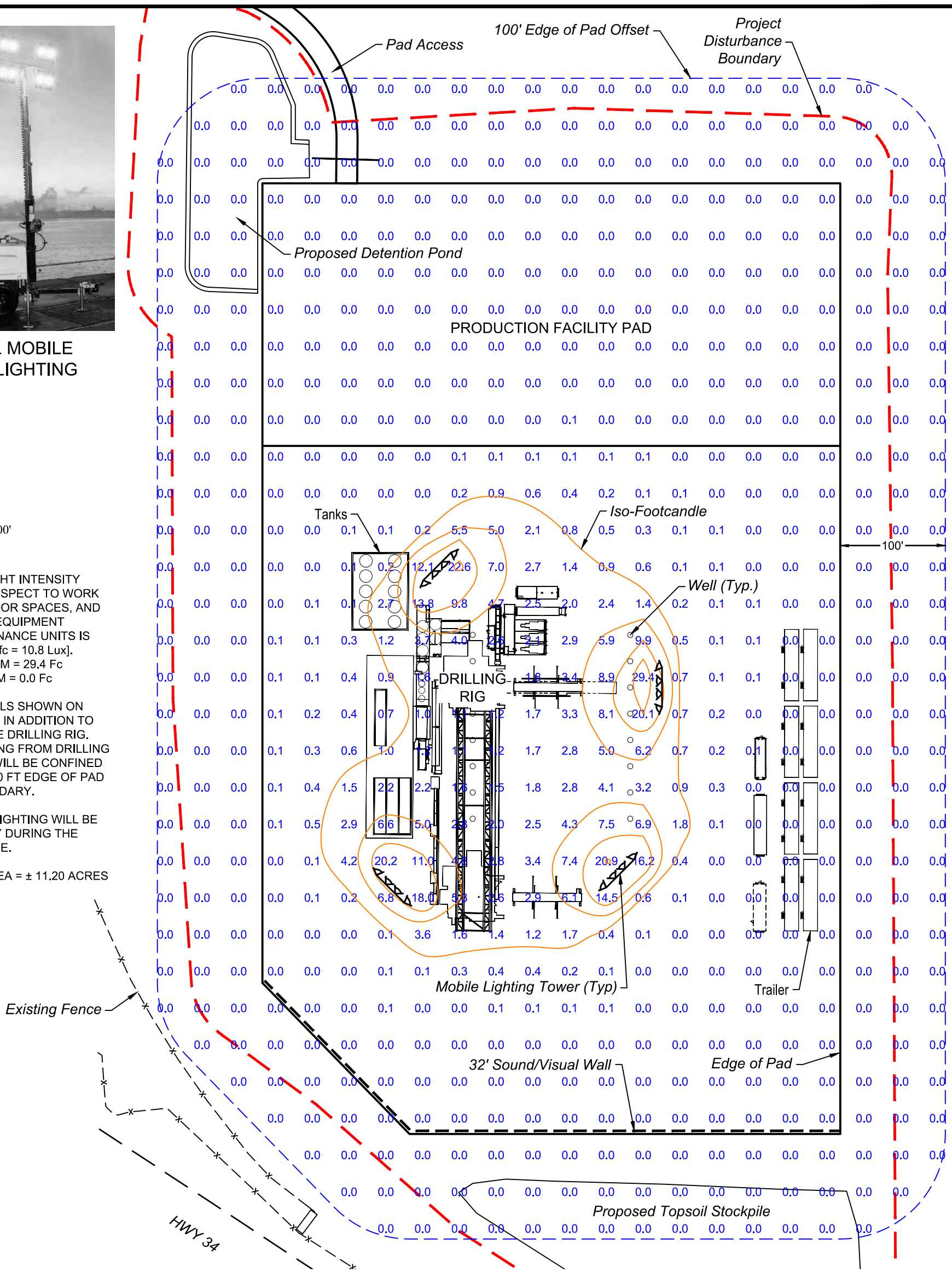
NOTES:

1. MEASURED LIGHT INTENSITY LEVEL WITH RESPECT TO WORK AREAS, OUTDOOR SPACES, AND UNATTENDED EQUIPMENT AREAS. ILLUMINANCE UNITS IS GIVEN IN Fc [1 fc = 10.8 Lux].
   MAXIMUM = 29.4 Fc
   MINIMUM = 0.0 Fc

2. LIGHTING LEVELS SHOWN ON THIS PLAN ARE IN ADDITION TO LEVELS ON THE DRILLING RIG. DIRECT LIGHTING FROM DRILLING OPERATIONS WILL BE CONFINED WITHIN THE 100 FT EDGE OF PAD OFF-SET BOUNDARY.

3. DRILLING RIG LIGHTING WILL BE PRESENT ONLY DURING THE DRILLING PHASE.

4. TOTAL PAD AREA = ± 11.20 ACRES



1 DRILLING PAD SITE LIGHTING PHOTOMETRIC PLAN

SCALE: 1" = 100'

LIGHTING FIXTURE SCHEDULE

SYMBOL	LIGHT UNIT DESCRIPTION	BUG RATING	MOUNTING INFO	VOLTS	LAMP QUANTITY	LUMENS / LAMP	UNITS QUANTITY	LUMENS / UNIT	TOTAL LUMENS
	4 HEAD FLOOD LIGHT LED MOBILE TEMPORARY LIGHTING TOWER	B3-U3-G5	25' TOWER	120	4	38,500	4	154,000	616,000

UINTAH ENGINEERING & LAND SURVEYING

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Corporate Office * 85 South 200 East
Vernal, UT 84078 * (435) 789-1017

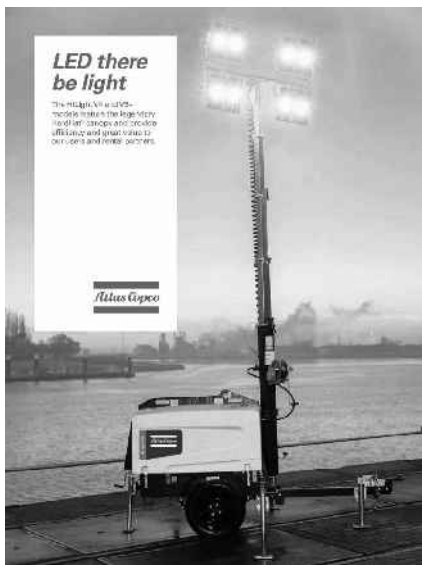
CONFLUENCE DJ, LLC

BIGFOOT 11
SECTION 11, T4N, R63W, 6th P.M.
WELD COUNTY, COLORADO

SCALE: AS NOTED	DRAWN BY: C.C.	DATE DRAWN: 10-22-21
UELS FILE NO.: U - 6 0 4	REVISED:	

DRILLING OPERATIONS PHOTOMETRIC PLAN

APPENDIX B – HYDRAULIC STIMULATION OPERATIONS LIGHTING PLAN



TYPICAL MOBILE TOWER LIGHTING

N

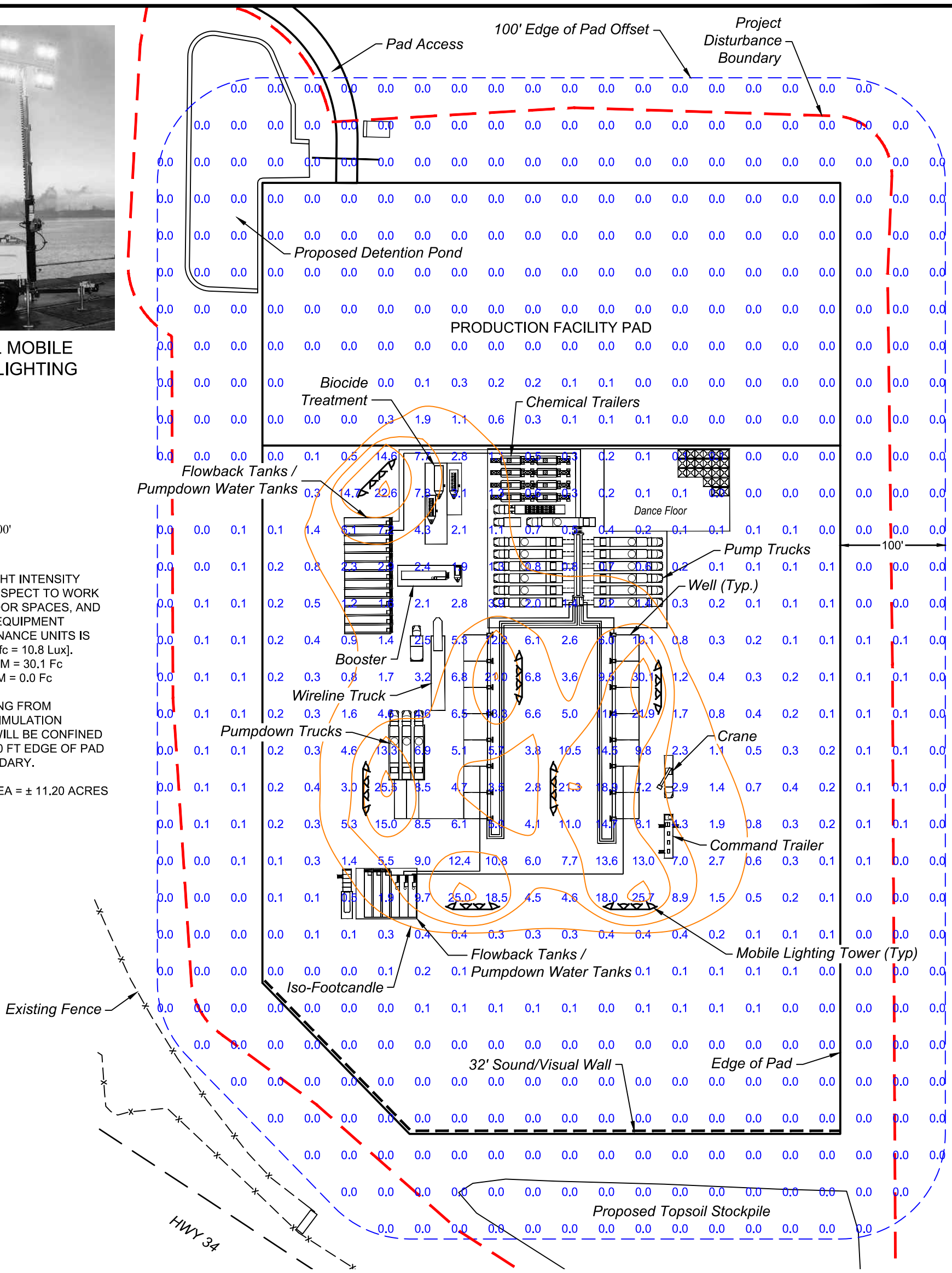
1" = 100'

NOTES:

1. MEASURED LIGHT INTENSITY LEVEL WITH RESPECT TO WORK AREAS, OUTDOOR SPACES, AND UNATTENDED EQUIPMENT AREAS. ILLUMINANCE UNITS IS GIVEN IN Fc [1 fc = 10.8 Lux].
   MAXIMUM = 30.1 Fc
   MINIMUM = 0.0 Fc

2. DIRECT LIGHTING FROM HYDRAULIC STIMULATION OPERATIONS WILL BE CONFINED WITHIN THE 100 FT EDGE OF PAD OFF-SET BOUNDARY.

3. TOTAL PAD AREA = ± 11.20 ACRES



1 HYDRAULIC STIMULATION PAD SITE LIGHTING PHOTOMETRIC PLAN

SCALE: 1" = 100'

LIGHTING FIXTURE SCHEDULE

SYMBOL	LIGHT UNIT DESCRIPTION	BUG RATING	MOUNTING INFO	VOLTS	LAMP QUANTITY	LUMENS / LAMP	UNITS QUANTITY	LUMENS / UNIT	TOTAL LUMENS
	4 HEAD FLOOD LIGHT LED MOBILE TEMPORARY LIGHTING TOWER	B3-U3-G5	25' TOWER	120	4	38,500	7	154,000	1,078,000

UINTAH ENGINEERING & LAND SURVEYING

UELS, LLC
Corporate Office * 85 South 200 East
Vernal, UT 84078 * (435) 789-1017

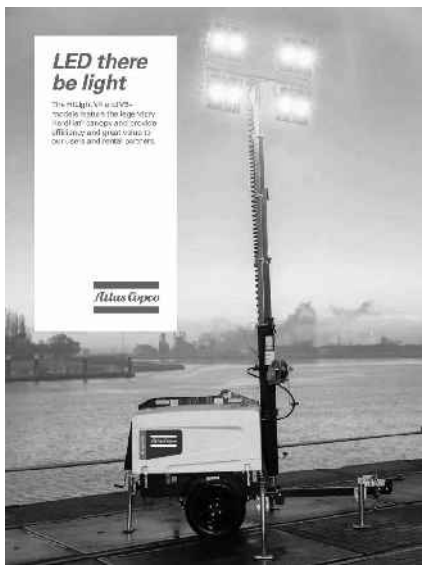
CONFLUENCE DJ, LLC

BIGFOOT 11
SECTION 11, T4N, R63W, 6th P.M.
WELD COUNTY, COLORADO

SCALE: AS NOTED	DRAWN BY: C.C.	DATE DRAWN: 10-22-21
UELS FILE NO.: U - 6 0 4	REVISED:	

HYDRAULIC STIMULATION OPERATIONS PHOTOMETRIC PLAN

APPENDIX C – DRILL-OUT OPERATIONS PHOTOMETRIC PLAN



TYPICAL MOBILE TOWER LIGHTING

N

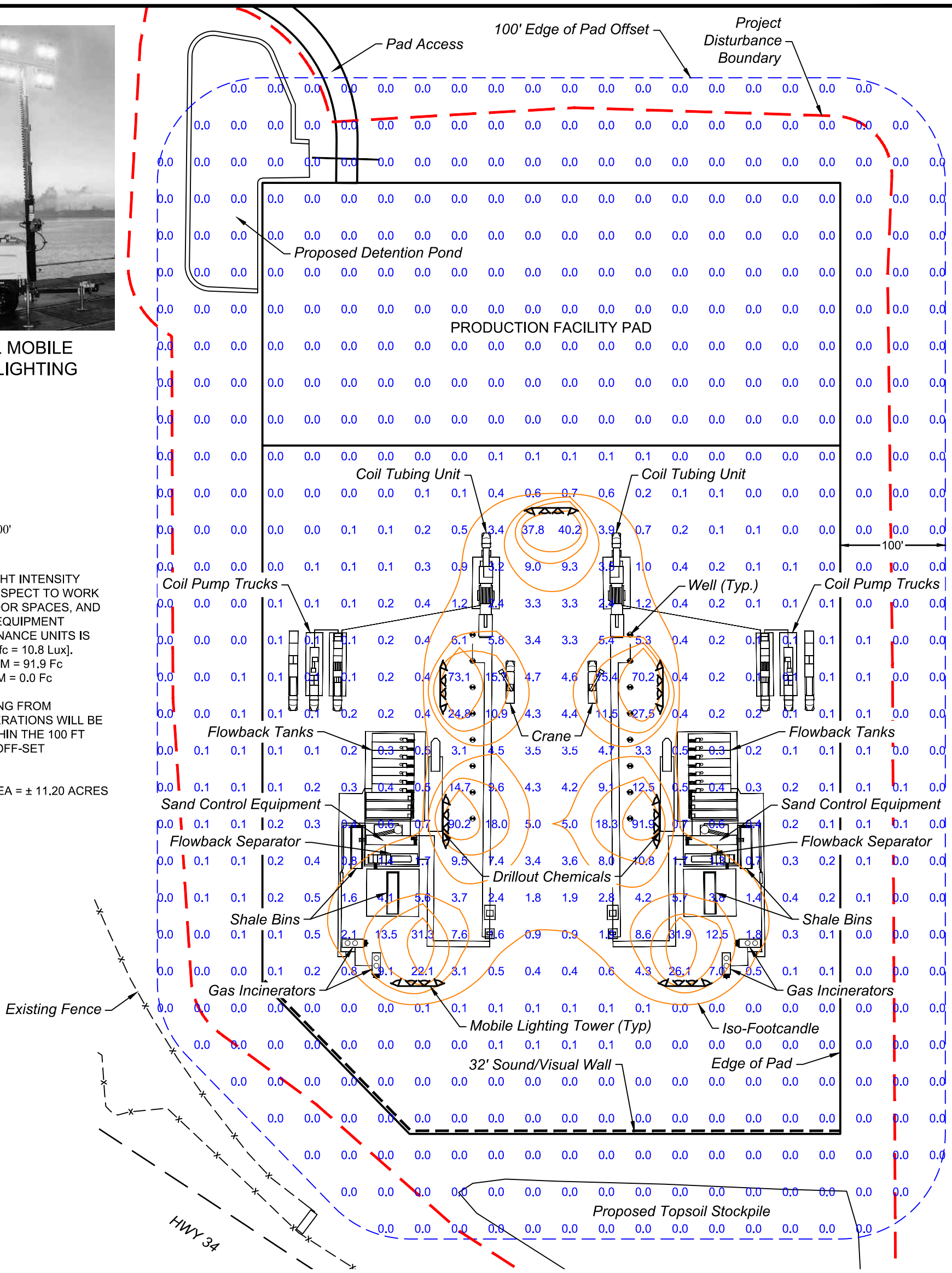
1" = 100'

NOTES:

1. MEASURED LIGHT INTENSITY LEVEL WITH RESPECT TO WORK AREAS, OUTDOOR SPACES, AND UNATTENDED EQUIPMENT AREAS. ILLUMINANCE UNITS IS GIVEN IN Fc [1 fc = 10.8 Lux].
   MAXIMUM = 91.9 Fc
   MINIMUM = 0.0 Fc

2. DIRECT LIGHTING FROM DRILL-OUT OPERATIONS WILL BE CONFINED WITHIN THE 100 FT EDGE OF PAD OFF-SET BOUNDARY.

3. TOTAL PAD AREA = ± 11.20 ACRES



1 DRILL-OUT PAD SITE LIGHTING PHOTOMETRIC PLAN

SCALE: 1" = 100'

LIGHTING FIXTURE SCHEDULE

SYMBOL	LIGHT UNIT DESCRIPTION	BUG RATING	MOUNTING INFO	VOLTS	LAMP QUANTITY	LUMENS / LAMP	UNITS QUANTITY	LUMENS / UNIT	TOTAL LUMENS
	4 HEAD FLOOD LIGHT LED MOBILE TEMPORARY LIGHTING TOWER	B3-U3-G5	25' TOWER	120	4	38,500	7	154,000	1,078,000

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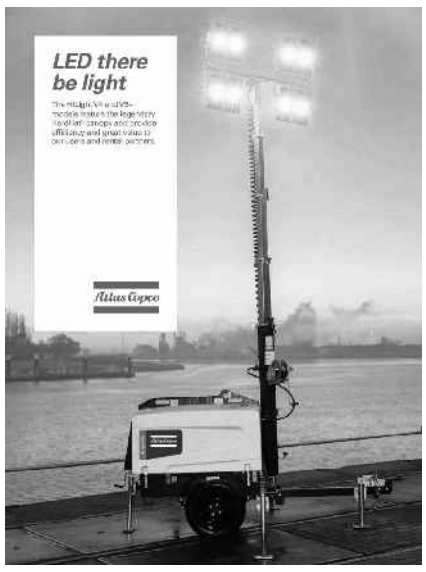
WELD COUNTY, COLORADO

SCALE: AS NOTED	DRAWN BY: C.C.	DATE DRAWN: 10-22-21
UELS FILE NO.: U - 6 0 4	REVISED:	

DRILL-OUT OPERATIONS PHOTOMETRIC PLAN

APPENDIX D – FLOWBACK OPERATIONS PHOTOMETRIC PLAN



TYPICAL MOBILE TOWER LIGHTING

N

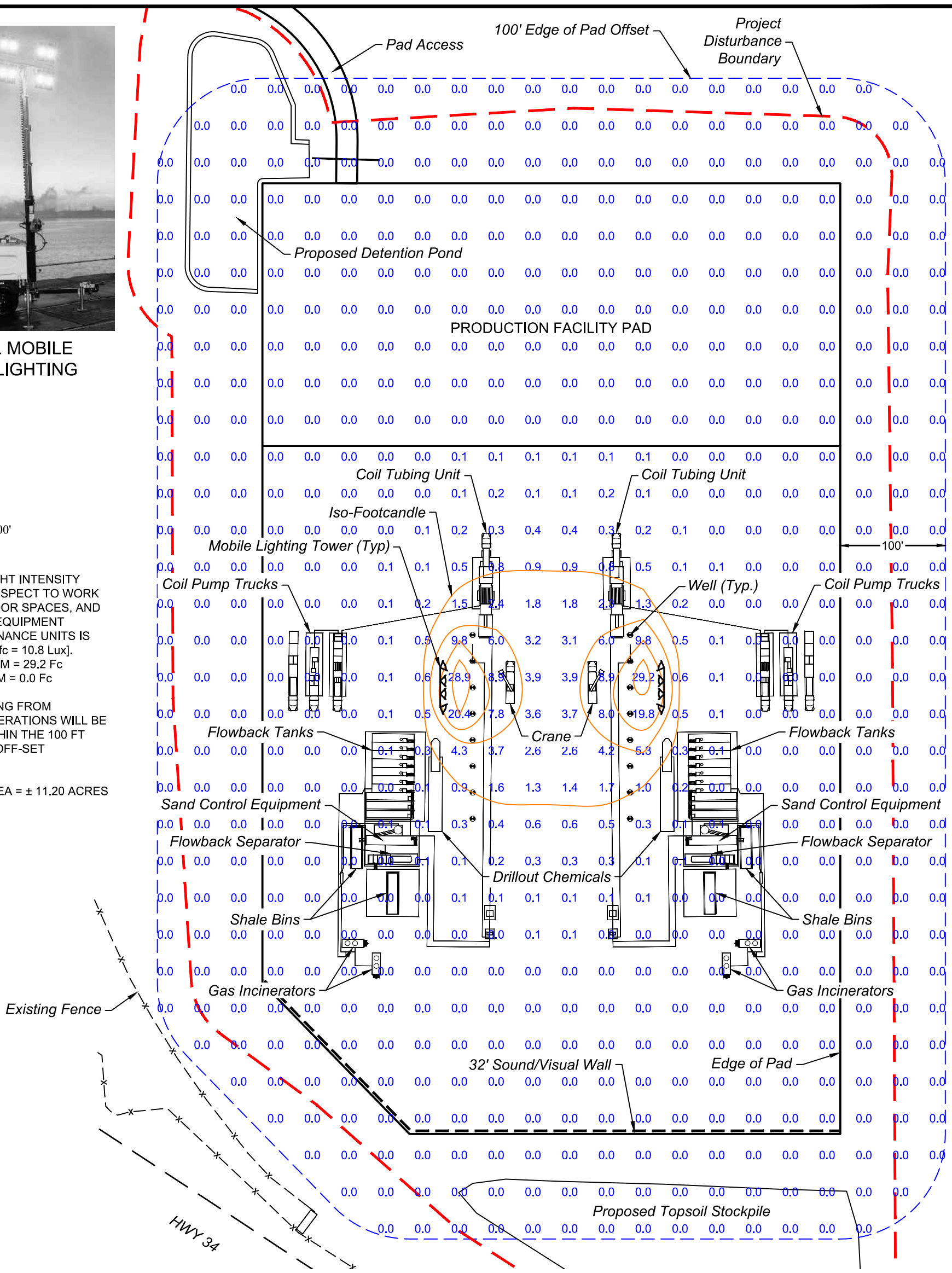
1" = 100'

NOTES:

1. MEASURED LIGHT INTENSITY LEVEL WITH RESPECT TO WORK AREAS, OUTDOOR SPACES, AND UNATTENDED EQUIPMENT AREAS. ILLUMINANCE UNITS IS GIVEN IN Fc [1 fc = 10.8 Lux].
   MAXIMUM = 29.2 Fc
   MINIMUM = 0.0 Fc

2. DIRECT LIGHTING FROM FLOWBACK OPERATIONS WILL BE CONFINED WITHIN THE 100 FT EDGE OF PAD OFF-SET BOUNDARY.

3. TOTAL PAD AREA = ± 11.20 ACRES



1 FLOWBACK PAD SITE LIGHTING PHOTOMETRIC PLAN

SCALE: 1" = 100'

LIGHTING FIXTURE SCHEDULE

SYMBOL	LIGHT UNIT DESCRIPTION	BUG RATING	MOUNTING INFO	VOLTS	LAMP QUANTITY	LUMENS / LAMP	UNITS QUANTITY	LUMENS / UNIT	TOTAL LUMENS
	4 HEAD FLOOD LIGHT LED MOBILE TEMPORARY LIGHTING TOWER	B3-U3-G5	25' TOWER	120	4	38,500	2	154,000	308,000

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WELD COUNTY, COLORADO

SCALE: AS NOTED	DRAWN BY: C.C.	DATE DRAWN: 10-22-21
UELS FILE NO.: U - 6 0 4	REVISED:	

FLOWBACK OPERATIONS PHOTOMETRIC PLAN

APPENDIX E – LIGHT SPECIFICATION SHEET

HiLight V4 S

HiLight V5+ S

The HiLight V4 S and V5+ S light towers are perfect for multiple applications. For the ultimate in fuel economy and reliability, the LED HiLight V5+ is our premium offering. Its LED lighting technology provides a wide range of benefits and represents outstanding lifetime value for our customers. The second model, the HiLight V4 is the leading solution within the 4000W metal halide light tower segment. Both models offer assured robustness and extended safety features.

LIGHT COVERAGE
43,055 ft²
AVG. 20LUXES

LIFE SPAN
6,000 Hrs
METAL HALIDE

0.56 g/h

Manual vertical mast

HardHat® technology

Spillage free frame

LIGHT COVERAGE
53,819 ft²
AVG. 20LUXES

LIFE SPAN
50,000 Hrs
LED

0.185 g/h

		BATTERY	DIESEL				ELECTRIC		
									
		HiLight Z3+	HiLight B5+	HiLight V5+ S	Hilight V4 S	HiLight V4W	HiLight E3+	HiLight P2+	HiLight V2+ | V3+
Light coverage ft2		32,292 (average 10 luxes)	53,819 (average 20 luxes)	53,819 (average 20 luxes)	43,055 (average 20 luxes)	43,055 (average 20 luxes)	32,292 (average 10 luxes)	21,527 (average 10 luxes)	21,527 (average 10 luxes)
Lamps		LED	LED	LED	Metal halide	Metal halide	LED	LED	LED
Mast		Vertical Hydraulic	Vertical Hydraulic	Vertical manual	Vertical manual	Vertical manual	Vertical manual	Vertical manual	Vertical manual
Features		Battery Powered Noise & CO2 free	Compact box	HardHat® canopy	HardHat® canopy	HardHat® canopy	Electric	Electric	Electric
Performance data									
Rated frequency	Hz	60	60	60	60	60	60	60	60
Rated voltage	VAC	120	120	120	120	120-240	120	120	120
Rated power (PRP)	kW	-	2.7	2.7	6.8	8	-	-	-
Operating temperature (min/max)	°F (°C)	-4/ 122 (-20/ 50)	-4/ 104 (-20/ 40)	-13 / 122 (-25 / 50)	-13 / 122 (-25 / 50)	-13 / 122 (-25 / 50)	-	-	-
Sound power level (LwA)	dB(A)	-	82	86	94	89	-	-	-
Sound pressure level (LpA) at 7m	dB(A)	-	55	63	73	64	-	-	-
Engine									
Model		-	Kubota Z481	Kubota Z482	Kubota Z482	Kubta D1105	-	-	-
Speed	rpm	-	1800	1800	3600	1800	-	-	-
Rated net output (PRP)	kW	-	3	3	8.1	10	-	-	-
Coolant		-	Water	Water	Water	Water	-	-	-
Number of cylinders		-	1	2	2	3	-	-	-
Alternator									
Model		-	Meccalte LT3/74	Meccalte LT3/75	Sincro EK 2 MCT	DP06/AG164	-	-	-
Rated output	kVA	-	3.5	4.5	7.5	8	-	-	-
Insulation / Enclosure protection	class / IP	-	H / 20	H / 21	H / 23	H / 23	-	-	-
Fuel consumption									
Fuel tank capacity	gallon (l)	-	34.3 (230)	28 (105)	28 (105)	42 (160)	-	-	-
Autonomy	h	18-32	220	150	50	90	-	-	-
Power output									
Auxiliary Power	W	-	1,200	1,200	2,400	7,200	-	-	-
Outlets		-	120 VAC, 10A, GFCI Duplex (NEMA 5-20R)	120 VAC, 10A, GFCI Duplex (NEMA 5-20R)	120 VAC, 20A, GFCI Duplex (NEMA 5-20R)	121 VAC, 20A, GFCI Duplex (NEMA 5-20R) 240VAC, 30A, TL (NEMA L5-30R)	-	-	-
Lights									
Floodlights		LED	LED	LED	Metal halide	Metal halide	LED	LED	LED
Wattage	W	4x 160	4 x 350	4 x 350	4 x 1,000	4 x 1,000	4 x 160	320	320 | 4 x 120
Luminous Flux	Lumen	4 x 16,000	4 x 38,500	4 x 38,500	4 x 110,000	4 x 110,000	4 x 16,000	28,000	28,000 | 4 x 12,000
Mast									
Type		Hydraulic, vertical, 5 section	Hydraulic, vertical, 5 section	Manual vertical, 5 section	Manual vertical, 5 section	Manual vertical, 5 section	Manual	Manual	Manual
Rotation	degrees	340	340	360	360	360	0	0	0
Maximum height	ft (m)	26 (7.9)	26 (7.9)	25 (7.5)	25 (7.5)	25 (7.5)	23 (7)	11 (3.4)	17 (5)
Maximum speed wind	mph (kph)	50 (80)	50 (80)	51 (80)	51 (80)	59 (95)	52 (80)	32(50)	32 (50)
Enclosure and trailer									
Type		Box type Forklift pockets	Box type Forklift pockets	DOT US Compliant Unibody trailer with 4 point leveling system	DOT US Compliant Unibody trailer with 4 point leveling system	DOT US Compliant Unibody trailer with 4 point leveling system	-	-	Trailer with Bumpers in PE
Base Frame		-	Spillage free frame	Spillage free frame	Spillage free frame	Spillage free frame	-	-	-
Enclosure		Galvanneal Steel Canopy & Powder coating painting	Galvanneal Steel Canopy & Powder coating painting	Gull-wing Hard Hat Doors	Gull-wing Hard Hat Doors	Gull-wing Hard Hat Doors	Hard Hat Canopy	-	-
Dimensions and weigth									
Dimensions in transport Up-right Towbar (L x W x H)	in (m)	-	-	77 x 48 x 102 (1.95 x 1.22 x 2.59)	77 x 48 x 102 (1.95 x 1.22 x 2.59)	74 x 53 x 98 (1.88 x 1.34 x 2.49)	-	-	-
Dimensions in transport - Towed (L x W x H)	in (m)	46 x 46 x 97 (1.16x 1.16x 2.46)	46 x 46 x 97 (1.16x 1.16x 2.46)	110 x 48 x 102 (2.79 x 1.22 x 2.59)	110 x 48 x 102 (2.79 x 1.22 x 2.59)	110 x 53 x 98 (2.79 x 1.34 x 2.49)	48 x 32 x 84 (1.2 x 0.8 x 2.14)	19.7 x 19.7 x 87 (0.5 x 0.5 x 2.2)	45 x 335 x 79 (1.1 x 0.85 x 2)
Weight	lb (kg)	2160(980)	2160(980)	1,768 (802)	1,970 (894)	2,041 (926)	608 (276)	99 (45)	243 (110)

IES ROAD REPORT
PHOTOMETRIC FILENAME : 350W 38500 LUMEN LED_30D.IES

DESCRIPTIVE INFORMATION (From Photometric File)

IESNA:LM-63-2002
[TEST]
[TESTLAB]
[TESTDATE]
[ISSUEDATE]
[OTHER]
[MANUFAC]
[LUMCAT] fl-350-85x135
[LUMINAIRE] fl-350-85x135
[LAMPCAT] LED
[LAMP] LED
[_CONVERT] Luminaire test position and photometric web converted from original test data

CHARACTERISTICS

IES Classification	Type IV
Longitudinal Classification	Medium
Lumens Per Lamp	37338 (1 lamp)
Total Lamp Lumens	37338
Luminaire Lumens	37345
Downward Total Efficiency	99 %
Total Luminaire Efficiency	100 %
Luminaire Efficacy Rating (LER)	97
Total Luminaire Watts	386
Ballast Factor	1.00
Upward Waste Light Ratio	0.01
Maximum Candela	26112.25
Maximum Candela Angle	67.5H 70V
Maximum Candela (<90 Degrees Vertical)	26112.25
Maximum Candela Angle (<90 Degrees Vertical)	67.5H 70V
Maximum Candela At 90 Degrees Vertical	1300.775 (3.5% Lamp Lumens)
Maximum Candela from 80 to <90 Degrees Vertical	12466.58 (33.4% Lamp Lumens)
Cutoff Classification (deprecated)	Non-Cutoff

IES ROAD REPORT
PHOTOMETRIC FILENAME : 350W 38500 LUMEN LED_30D.IES

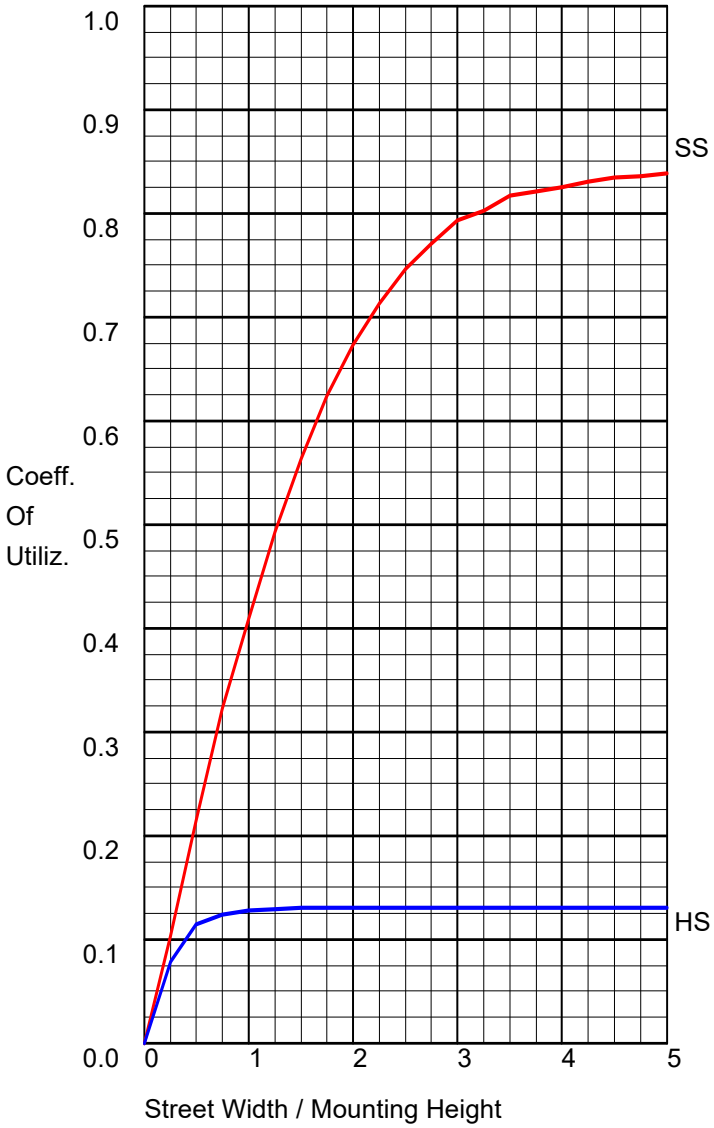
LUMINAIRE CLASSIFICATION SYSTEM (LCS)

	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	2894.2	7.8	7.8
FM - Front-Medium (30-60)	13146.5	35.2	35.2
FH - Front-High (60-80)	15017.0	40.2	40.2
FVH - Front-Very High (80-90)	866.9	2.3	2.3
BL - Back-Low (0-30)	1604.2	4.3	4.3
BM - Back-Medium (30-60)	2657.2	7.1	7.1
BH - Back-High (60-80)	606.9	1.6	1.6
BVH - Back-Very High (80-90)	18.3	0.0	0.0
UL - Uplight-Low (90-100)	353.2	0.9	0.9
UH - Uplight-High (100-180)	180.1	0.5	0.5
Total	37344.5	99.9	100.0
BUG Rating	B3-U3-G5		

Calculations based on published IES Methods and recommendations, values rounded for display purposes.
Results derived from content of manufacturers photometric file.

IES ROAD REPORT
PHOTOMETRIC FILENAME : 350W 38500 LUMEN LED_30D.IES

COEFFICIENTS OF UTILIZATION

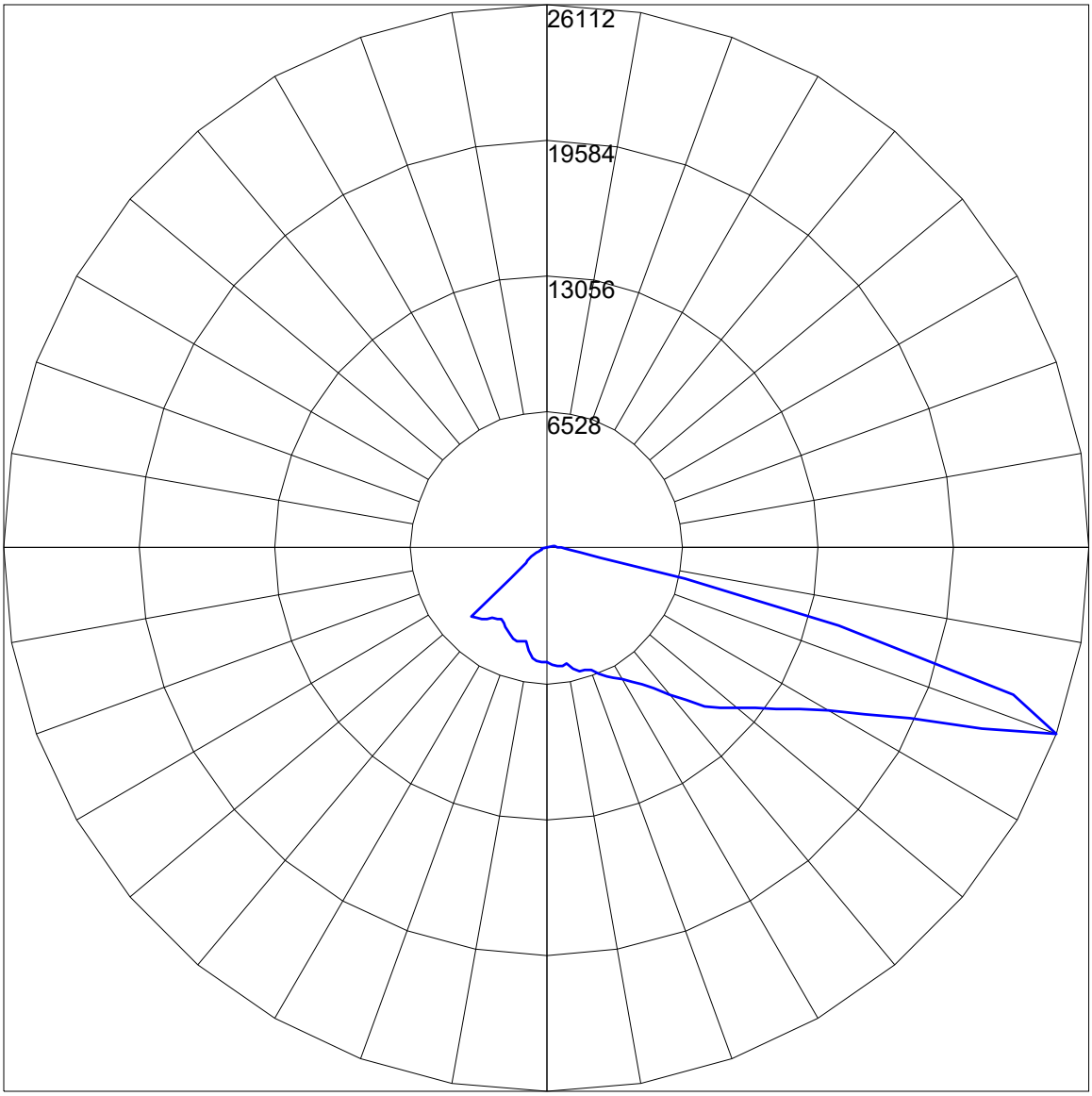


FLUX DISTRIBUTION

	Lumens	Percent Of Lamp
Downward Street Side	31924.7	85.5
Downward House Side	4886.6	13.1
Downward Total	36811.3	98.6
Upward Street Side	533.0	1.4
Upward House Side	0.3	0.0
Upward Total	533.3	1.4
Total Flux	37344.6	100.0

IES ROAD REPORT
PHOTOMETRIC FILENAME : 350W 38500 LUMEN LED_30D.IES

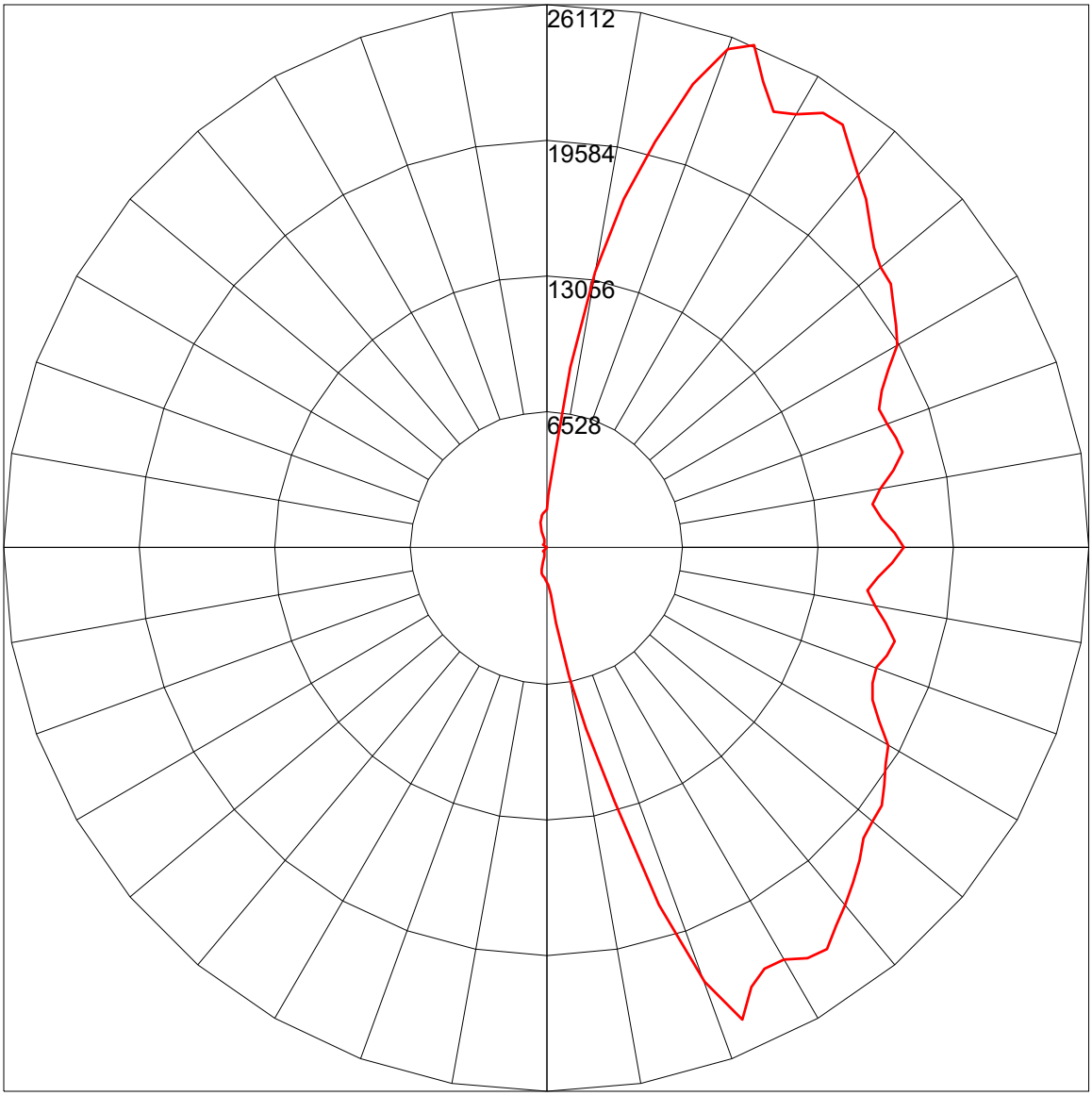
POLAR GRAPH



Maximum Candela = 26112.25 Located At Horizontal Angle = 67.5, Vertical Angle = 70
Vertical Plane Through Horizontal Angles (67.5 - 247.5) (Through Max. Cd.)

IES ROAD REPORT
PHOTOMETRIC FILENAME : 350W 38500 LUMEN LED_30D.IES

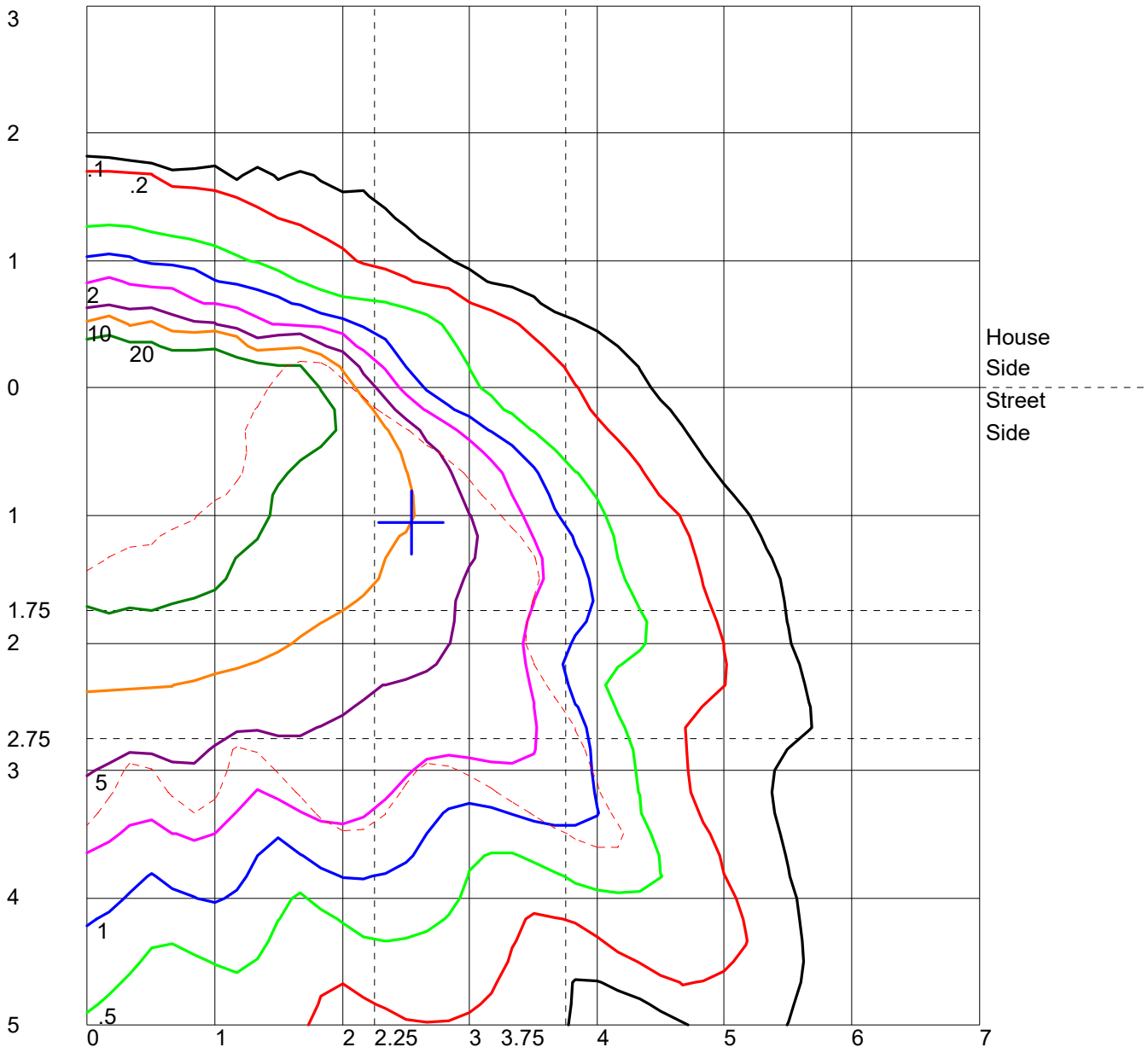
POLAR GRAPH



Maximum Candela = 26112.25 Located At Horizontal Angle = 67.5, Vertical Angle = 70
Horizontal Cone Through Vertical Angle (70) (Through Max. Cd.)

IES ROAD REPORT
PHOTOMETRIC FILENAME : 350W 38500 LUMEN LED_30D.IES

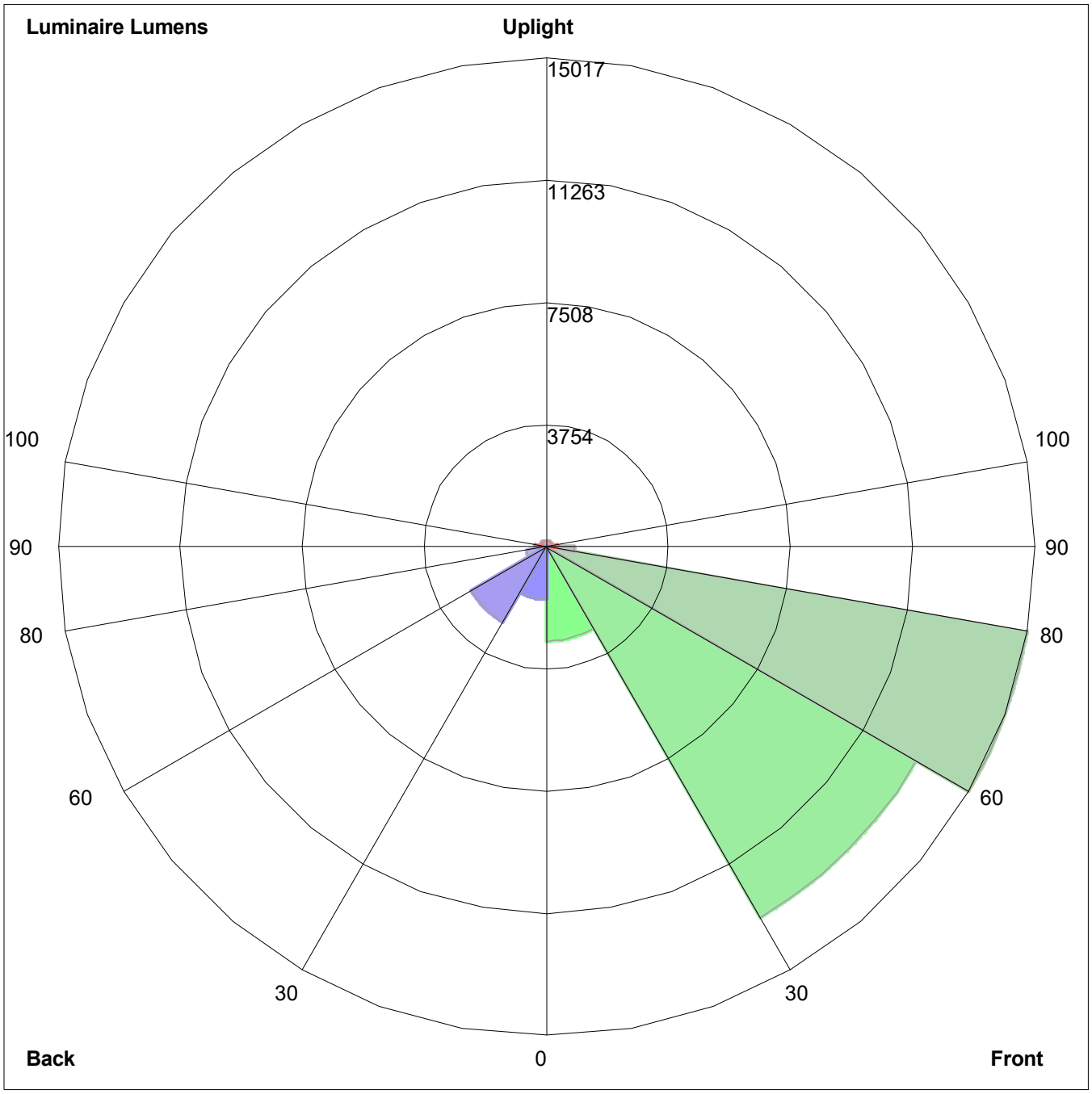
ISOFOOTCANDLE LINES OF HORIZONTAL ILLUMINANCE



Distance In Units Of Mounting Height
Values Based On 10 Foot Mounting Height
1/2 Maximum Candela Trace Shown As Dashed Curve
(+) = Maximum Candela Point

IES ROAD REPORT
PHOTOMETRIC FILENAME : 350W 38500 LUMEN LED_30D.IES

LUMINAIRE CLASSIFICATION SYSTEM (LCS) GRAPH



Luminaire Lumens:
Front: Low=2894.2, Medium=13146.5, High= 15017.0, Very High=866.9
Back: Low=1604.2, Medium=2657.2, High=606.9, Very High=18.3
Uplight: Low=353.2, High=180.1

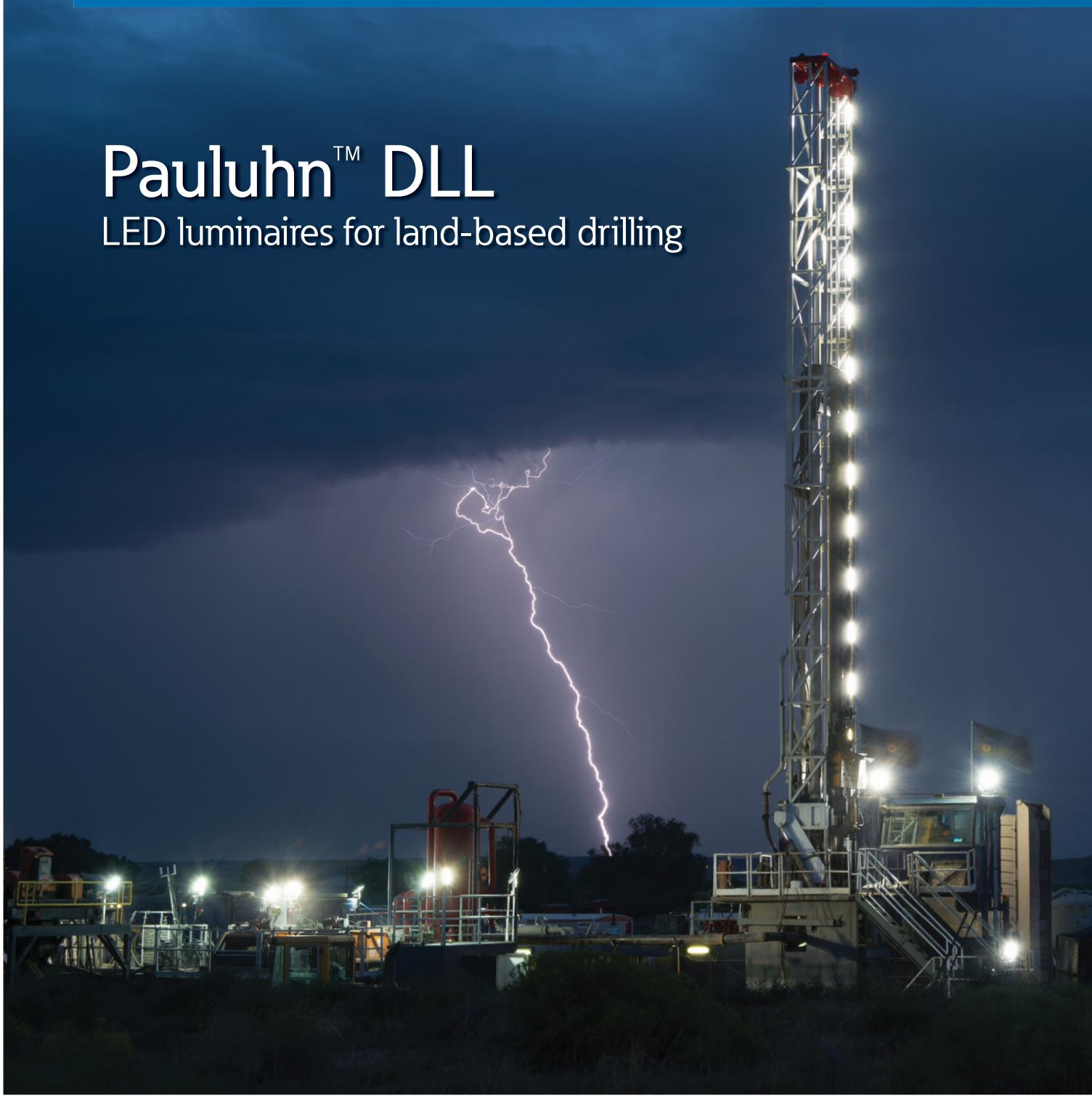
BUG Rating : B3-U3-G5

LED lighting for land-based rigs
Pauluhn™ DLL LED Luminaires

CROUSE-HINDS SERIES

Pauluhn™ DLL

LED luminaires for land-based drilling



EATON
Powering Business Worldwide

Ensign Rig 89
LOCATION: Gillette, Wyoming
DETAILS: Rig retrofit with Pauluhn DLL4 LEDs

Pauluhn™ DLL Series LEDs

Safe. Reliable. Efficient.

Featuring the industry's broadest range of LED luminaires for harsh and hazardous environments, Eaton's Crouse-Hinds can deliver a lighting solution that performs reliably in even the worst operating conditions. All the while reducing your energy, maintenance and manpower costs.

Why LED?

Useful life
Rated life is up to 60,000 hours of maintenance-free and safe operation

Energy efficiency
LED average energy consumption is 65% less than T12, T8 and T5HO fluorescent fixtures

Start/restart time
Instant illumination vs. 10 minute restrike time for fluorescent

Light quality
Higher color rendering and color temperature compared to fluorescent

Environmental benefits
Mercury-free LED eliminates disposal costs and lower energy consumption for a smaller carbon footprint

Why Crouse-Hinds?

Industry-best reliability
Built to withstand extreme temperatures, vibration, water and dust

Thermal management
Effective heat sinking ensures longer life

Quality of light
Custom optics designed to maximize light distribution and intensity

Retrofit compatibility
LED fixtures are compatible with Pauluhn DuraPro, MagnaPro, Rig-A-Lite™ and Snelson© fluorescent fixtures

Why Pauluhn™ DLL LED?

Designed for drilling. Pauluhn DLL linear LED luminaires are engineered to stand up to the demanding conditions faced on land-based drilling rigs. The DLL stands up to high vibration, hose down, shock and impact, while delivering long life and high lumen performance for up to 20 years.

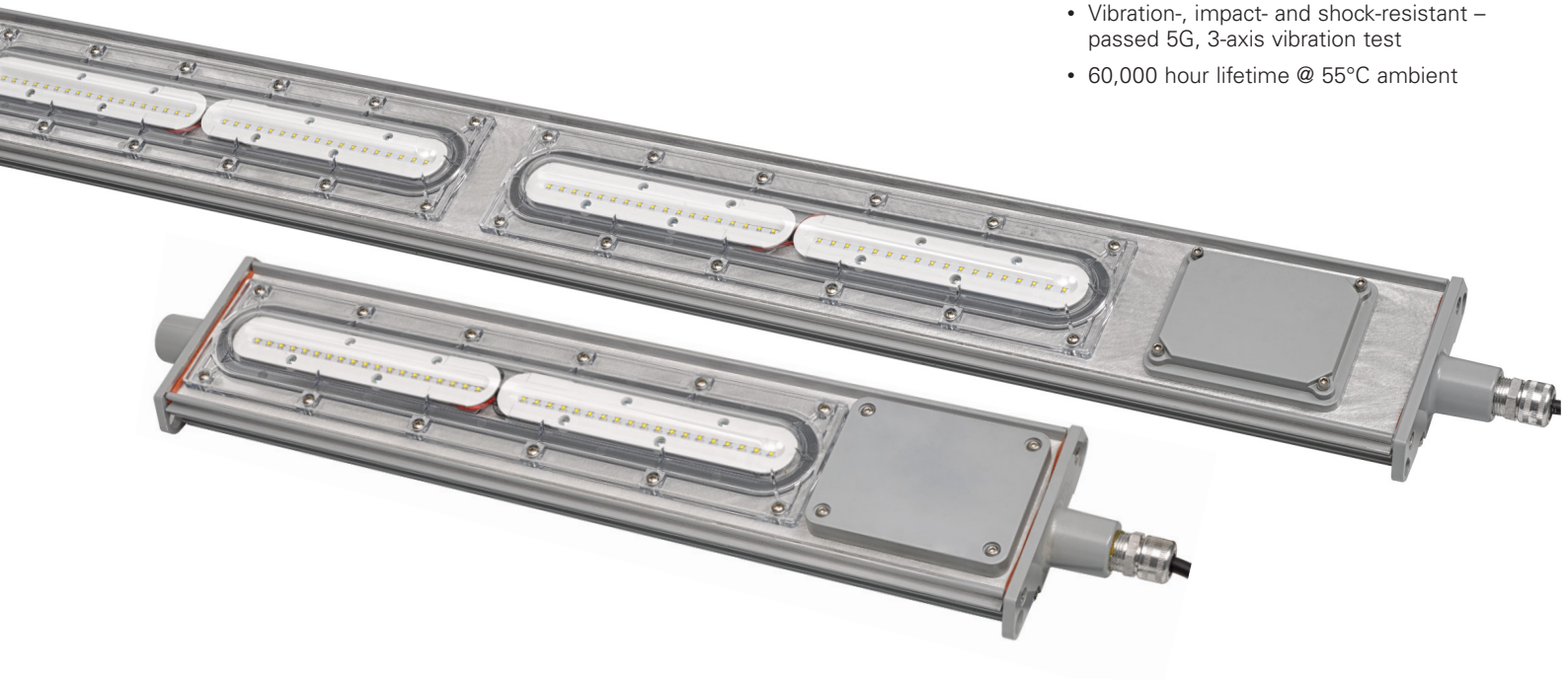
Custom optics:
- Standard wide (120°) beam spread for control room and indoor application maximizes illumination on wall panels
- Narrow (80°) beam spread option for high mast/derrick application avoids spillage and light loss

Comprehensive certification:
- Single model certified for use in Class I, Division 2 and Class II, Division 1 harsh and hazardous applications

Quick & easy installation:
- Easy access to drivers and wiring
- No custom brackets or hardware needed
- Seven mounting options available
- Easily retrofit to Pauluhn DuraPro and MagnaPro, Rig-A-Lite and Snelson

Slim profile:
- 2.7" fixture height (excluding mounting brackets)
- Perfect for mounting in confined or low height areas

Built to last:
- Ingress protection from hose down water or diesel fuel in harsh operational conditions – passed 2,000 psi high pressure test
- Vibration-, impact- and shock-resistant – passed 5G, 3-axis vibration test
- 60,000 hour lifetime @ 55°C ambient



Case study: land-rig retrofit

Location:
Ensign Rig 122, Vernal, Utah

Challenge:
Ensign was looking for a rugged, low maintenance solution to replace existing Pauluhn DuraPro fluorescent fixtures on a drilling rig.

Solution:
Install Pauluhn DLL 2 foot linear LED luminaires

Results:
Ensign was easily able to replace 21 DuraPro fixtures with 14 DLLs in only about an hour by using the existing DuraPro brackets. Ensign saw better light quality on the mast and deck, while reducing amperage load and eliminating lamp maintenance.

Pauluhn™ DLL Series LED Luminaires

The Pauluhn DLL Linear LED by Eaton's Crouse-Hinds is specifically designed to replace fluorescent T12, T8 and T5HO lighting on land-based and offshore drilling platforms. The rugged and durable design features the industry's most versatile and flexible mounting options. The Pauluhn DLL is the ideal solution for high vibration, impact and hose down in drilling applications.

Applications:

Land-based and offshore rigs; areas include: derrick, mast, SCR house, top drive, operator's house, power and pump stations.

Key features & benefits:

- Industry-leading efficacy: up to 130 LPW
- -40°C to +65°C ambient operating temperature
- Low profile fixture (<3" height)
- Versatile ceiling/swivel, wall, flush, pole and pendant mounting options
- Wide and narrow optics for uniform illumination in control room and drill mast
- Four points of secondary retention
- 2,000 psi high pressure hose rated
- High vibration resistance (up to 5Gs)
- Emergency battery back-up (90 minutes) and surge protection options (up to 10kV)‡
- DesignLights Consortium® Qualified (some models are not DLC qualified)*
- 5 year fixture warranty†

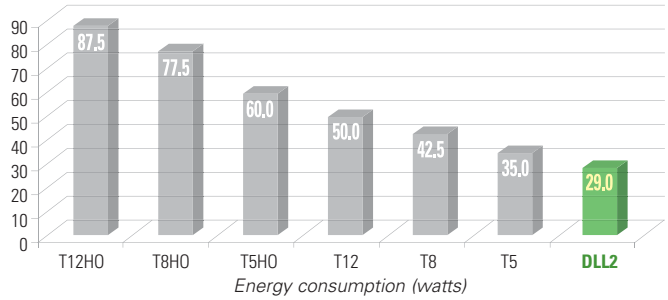
‡ One year warranty

* Refer to www.designlights.org Qualified Products List under Family Models for full listing details. Not all models are approved for all application categories.

† Refer to page 2 of the D-0915 authorized distributor price book for Crouse-Hinds standard Terms and Conditions.

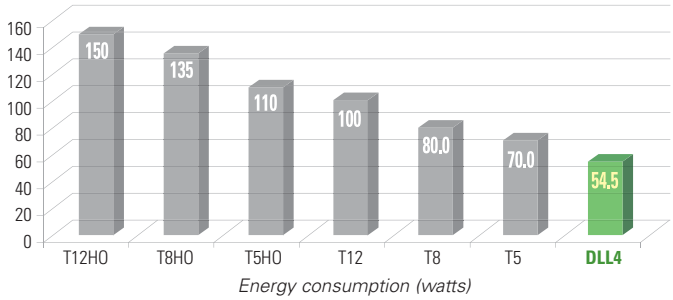
Energy consumption comparison

2 foot DLL linear LED vs. fluorescent



Energy consumption (watts)

4 foot DLL linear LED vs. fluorescent



Energy consumption (watts)

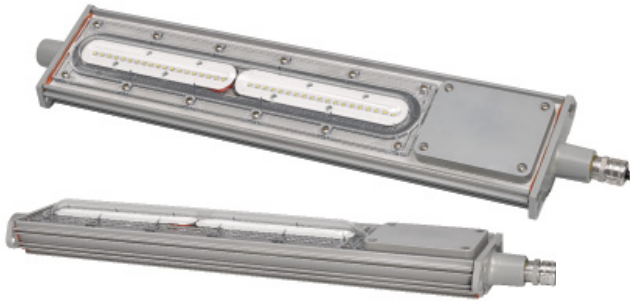
Model	Typical lumens	Wattage	Lumens per watt	Equivalent HID luminaire	Typical energy savings / lifetime
DLL2	3,600	29	124	T12HO	Up to 67%
				T8HO	Up to 63%
				T5HO	Up to 52%
				T12	Up to 42%
				T8	Up to 32%
				T5	Up to 17%

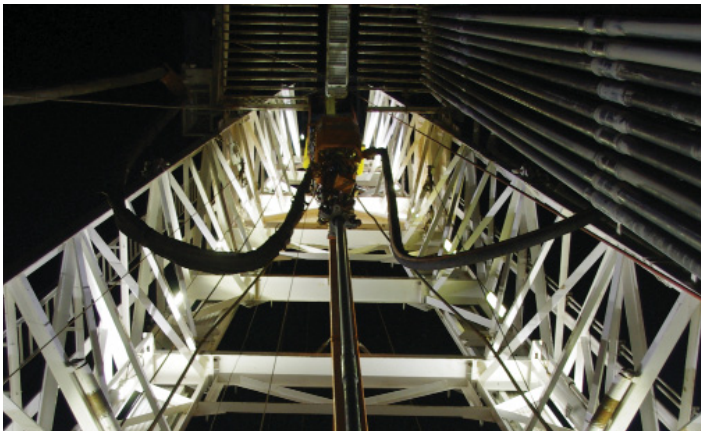
All luminaires in the comparison are 2 lamp, 2 foot

Model	Typical lumens	Wattage	Lumens per watt	Equivalent HID luminaire	Typical energy savings / lifetime
DLL4	7,100	54.5	130	T12HO	Up to 64%
				T8HO	Up to 60%
				T5HO	Up to 50%
				T12	Up to 46%
				T8	Up to 32%
				T5	Up to 22%

All luminaires in the comparison are 2 lamp, 4 foot

Specifications





Certifications:

NEC standards:

- Class I, Division 2, Groups A, B, C, D
- Class II, Division 1, Groups F, G – *CEC (CSA/cUL) for glass lens only*
- Class I, Zone 2
- Class III
- NEMA 4X; IP66
- Marine and wet locations

UL standards:

- UL844 Electrical Fixture Hangers for Hazardous Locations
- UL1598 Luminaire
- UL1598A Luminaire for Installation on Marine Vessels
- UL924 for Emergency Lighting

CSA standard:

- C22.2 No. 137

Additional certifications:

- ABS design assessed

Materials:

Housing:

- Copper-free aluminum
- Optional Corro-free™ epoxy powder coat

Lens:

- Glass or polycarbonate
- Diffused glass or polycarbonate

Mounting:

Versatile mounting options:

- Flush back mount
- Swivel/ceiling back mount
- Offset ceiling mount
- Offset wall mount
- Pole mount
- Pendant mount

Easily retrofit to:

- Existing Pauluhn DuraPro and MagnaPro fluorescent light fixtures
- Rig-A-Lite and Snelson C1D2 fluorescent lighting fixtures

Electrical ratings:

	DLL2	DLL4
Lumen output	3,600	7,100
Frequency	50/60 Hz	50/60 Hz
Voltage	100-277 VAC/108-250 VDC; 347-480 VAC	

Model	Voltage	Current (A)	Wattage (W)	Power Factor	THD
DLL2/UNV1	100	0.28	28.2	0.97	<20%
DLL2/UNV1	277	0.12	29.4	0.97	<20%
DLL2/UNV34	347	0.09	29.2	0.97	<20%
DLL2/UNV34	480	0.07	30.1	0.97	<20%
DLL4/UNV1	100	0.55	55.0	0.95	<20%
DLL4/UNV1	277	0.20	54.5	0.95	<20%
DLL4/UNV34	347	0.16	55.8	0.95	<20%
DLL4/UNV34	480	0.12	56.2	0.95	<20%

Temperature codes:

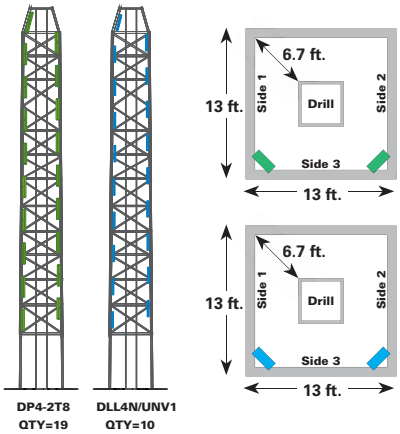
				Simultaneous rating
Ambient temperature	**Min. temp. wire supply**	**Class I, Div. 2**	**Class II, Div. I**	**Class I, Div. 2, Div. 1**
40°C	60°C	T6	T6	T6
55°C	75°C	T5	T5	T5
65°C	90°C	T5	T5	T5

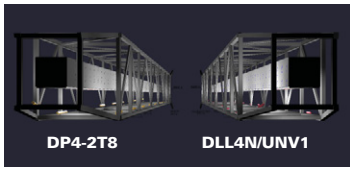
Weights:

Luminaire	lbs.	kg.
DLL2	12.5	5.7
DLL4	22.5	10.2

Photometrics: high mast derrick

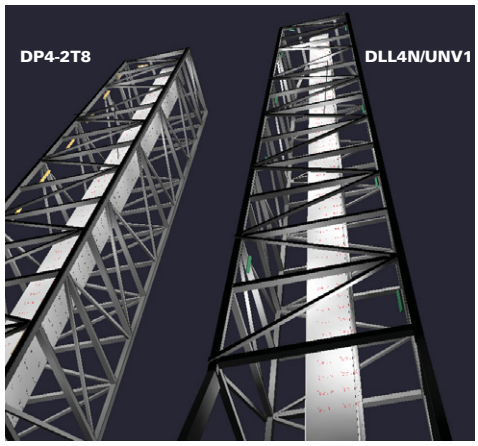
4 foot DLL LED with 80° optics vs. 4 foot 2 lamp T8 DuraPro



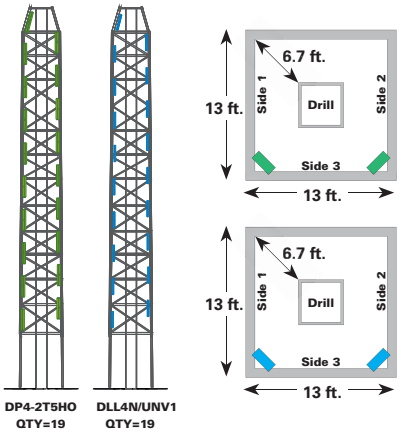


	Average footcandles	
Model	DLL4N/UNV1	DP4-2T8
Side 1	12.37	9.18
Side 2	10.80	9.56
Side 3	21.66	16.19

47% lower fixture count (19 vs.10) and higher average illumination on the drill.

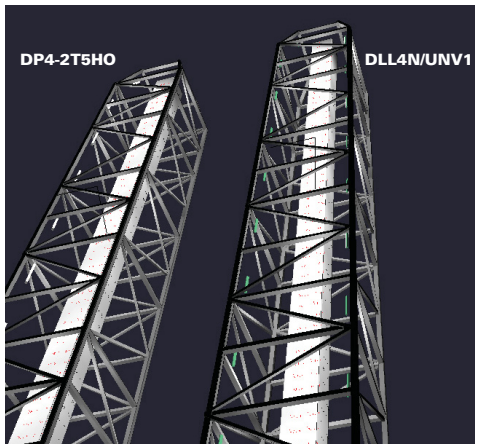


4 foot DLL LED with 80° optics vs. 4 foot. 2 lamp T5HO DuraPro



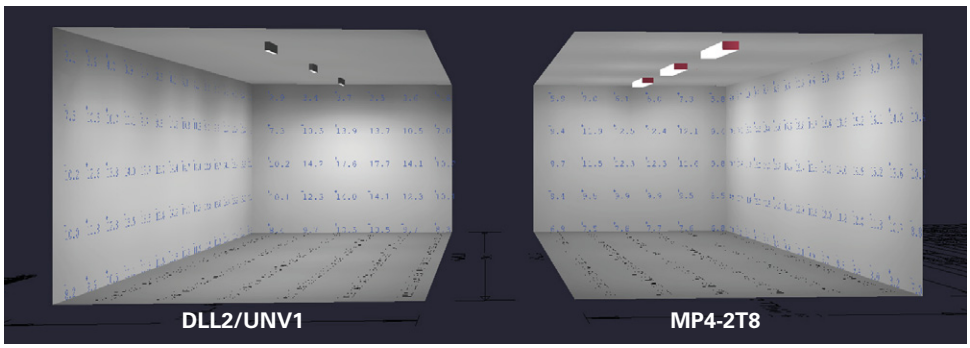
	Average footcandles	
Model	DLL4N/UNV1	DP4-2T5HO
Side 1	25.68	20.33
Side 2	18.88	20.52
Side 3	42.00	35.79

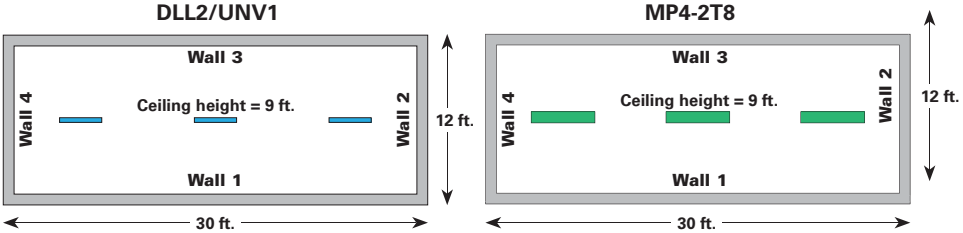
57% lower energy consumption and higher average illumination on the drill.



Photometrics: control room/pump shed

2 foot DLL LED with 120° optics vs. 4 foot 2 lamp T8 MagnaPro





	Average footcandles	
Model	DLL2/UNV1	MP4-2T8
Wall 1	10.11	11.55
Wall 2	9.90	9.10
Wall 3	10.16	11.56
Wall 4	9.66	9.10
Floor	17.85	13.86

64% lower energy consumption and higher average illumination on floor

Ordering information

Part number example

DLL4N/UNV1 S903 TF P EM

DLL series linear LED, cool white, 4 foot, ½" hubs, 80° narrow light pattern, 100-277 VAC driver, polycarbonate lens, through feed hubs, painted, battery back-up

DLL **4** **N** **/UNV1** **S903** **TF** **P** **EM**

Series

DLL	Pauluhn DLL series linear LED luminaire

Length/lumens

4	4 foot length, 7,100 lumens
2	2 foot length, 3,600 lumens

Optics

BLANK	Wide (120°)
N	Narrow (80°)

Voltage

/UNV1	100-277 VAC; 108-250 VDC
/UNV34	347-480 VAC

Lens

BLANK	Glass
S891	Diffused glass
S903	Polycarbonate
S903D	Diffused polycarbonate

Options

TF	Pull wire included in fixture

Finish

BLANK	Natural aluminum
P	Painted (gray, epoxy)
WH	Painted (white, epoxy)

Emergency backup

EM*	Emergency battery back-up kit

* One year warranty

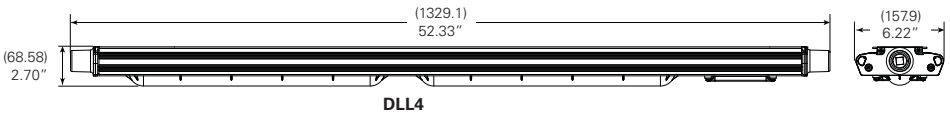
Accessories (ordered separately)

DP1057MTK	Flush/back mount back plate *(compatible with DuraPro)*
DP1050MTK	Ceiling/swivel mount *(compatible with DuraPro)*
DP1053MTK	Ceiling/wall mount offset *(compatible with DuraPro)*
DP1054MTK KIT	Ceiling mount bracket and adapter kit *(compatible with MagnaPro)*
DP1052MTK	Offset wall mount *(compatible with DuraPro)*
PM KIT 1.25	Pole mount kit, 1.25" conduit
PM KIT 1.5	Pole mount kit, 1.50" conduit
PM KIT 2.0	Pole mount kit, 2.00" conduit

Accessories (ordered separately)

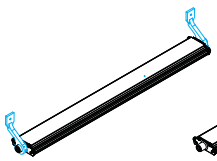
PEND HAZ KIT	Pendant mount kit
SS KIT	Safety chain kit
VMVL/UNV1 80W 1A KIT	1 amp driver replacement kit 100-277 VAC for 4 ft. linear
VMVL/UNV34 80W 1A KIT	1 amp driver replacement kit 347-480 VAC for 4 ft. linear
VMVL/UNV1 80W 0.5A KIT	0.5 amp driver replacement kit 100-277 VAC for 2 ft. linear
VMVL/UNV34 80W 0.5A KIT	0.5 amp driver replacement kit 347-480 VAC for 2 ft. linear

Dimensions & mounting options:

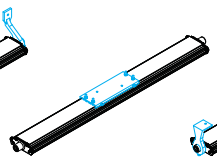


DLL4

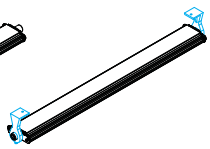
DLL2



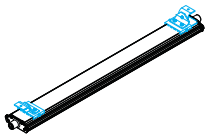
Offset wall
DP1052MTK



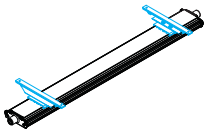
Flush ceiling
DP1057MTK



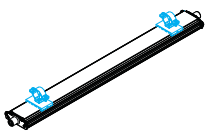
Offset ceiling
DP1053MTK



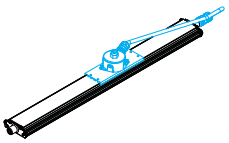
Ceiling/swivel
DP1050MTK



Ceiling and adapter
DP1054MTK KIT



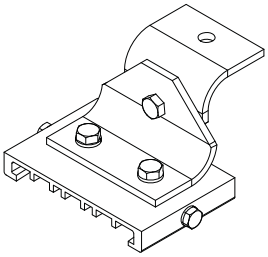
Pole mount
PM KIT 1.25/1.5/2.0

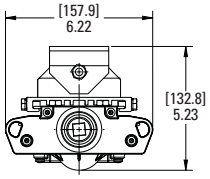


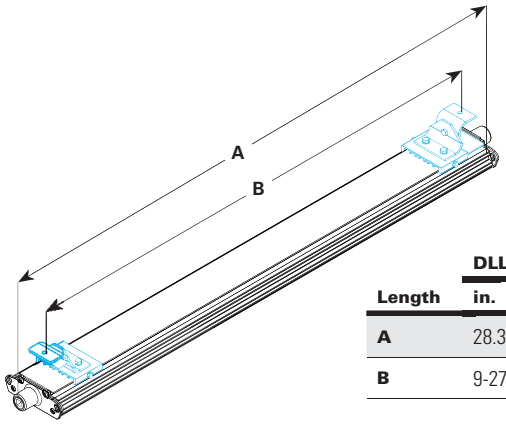
Pendant mount
PEND HAZ KIT

Mounting options

Ceiling/swivel mount
DP1050MTK

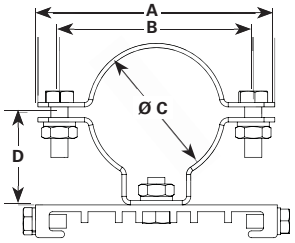




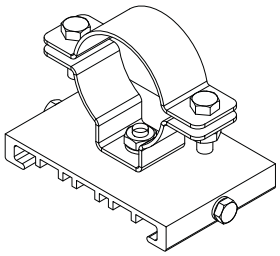


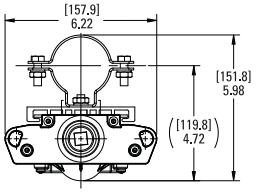
Length	DLL2 in.	DLL2 mm.	DLL4 in.	DLL4 mm.
A	28.3	720	52.3	1329
B	9-27	222-681	9-51	222-1289

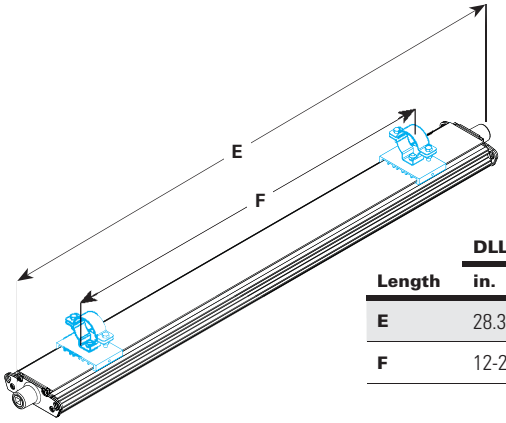
Pole mount
PM KIT 1.25/1.5/2.0



Configuration	ALL MEASUREMENTS IN INCHES A	B	C	D
PM KIT 1.25	4.331	3.543	1.680	1.693
PM KIT 1.5	3.740	2.953	2.000	1.535
PM KIT 2.0	3.386	2.598	2.360	1.378

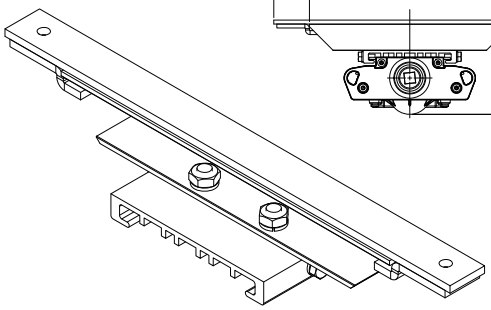


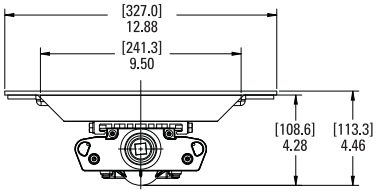


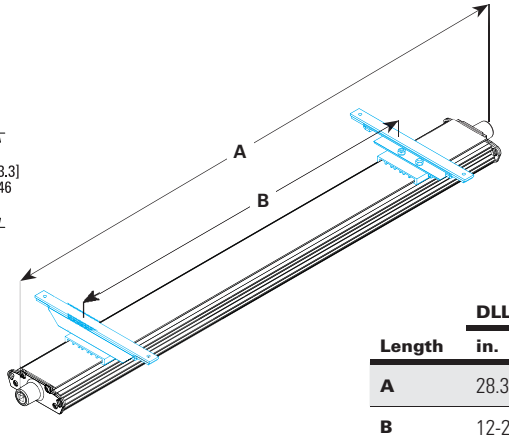


Length	DLL2 in.	DLL2 mm.	DLL4 in.	DLL4 mm.
E	28.3	720	52.3	1329
F	12-21	305-533	24-45	610-1143

MagnaPro mount
DP1054MTK KIT



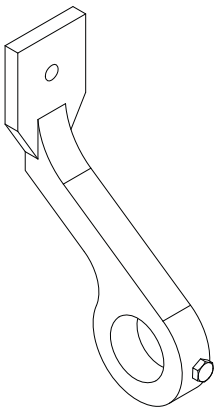


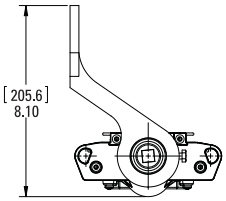


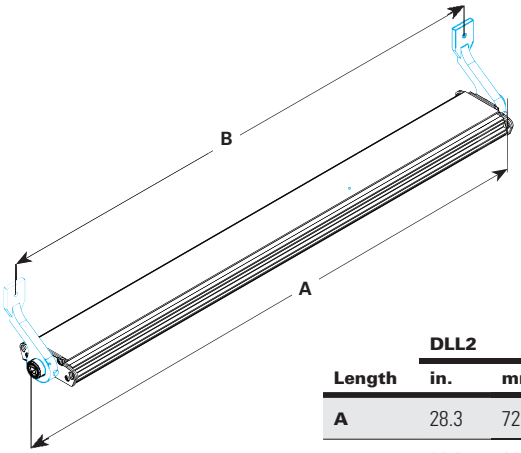
Length	DLL2 in.	DLL2 mm.	DLL4 in.	DLL4 mm.
A	28.3	720	52.3	1329
B	12-22	305-559	24-46	610-1168

Mounting options

Offset wall
DP1052MTK

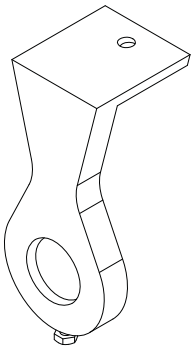


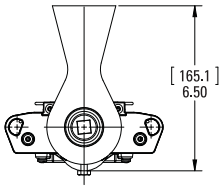


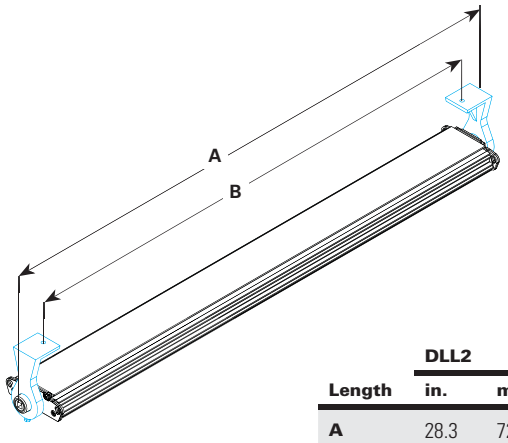


	DLL2		DLL4	
Length	**in.**	**mm.**	**in.**	**mm.**
A	28.3	720	52.3	1329
B	26.3	669	50.3	1278

Offset ceiling/wall mount
DP1053MTK

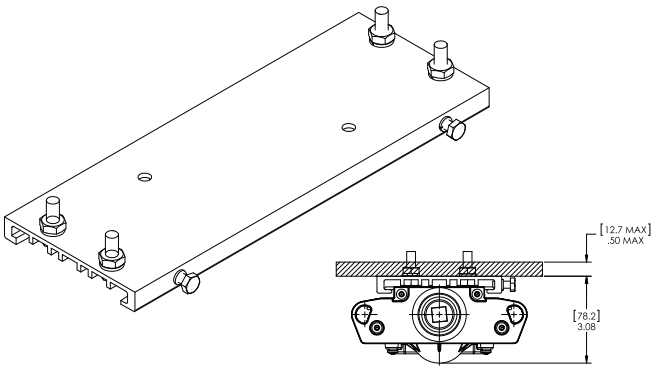


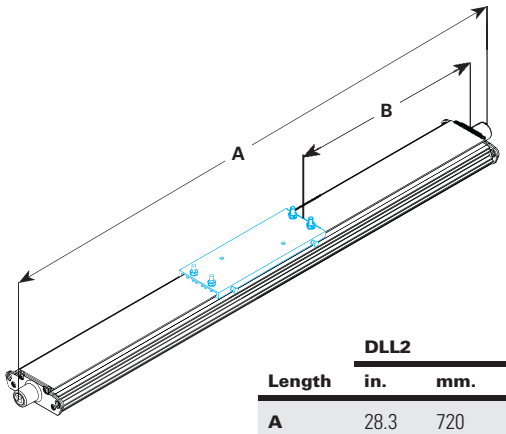




	DLL2		DLL4	
Length	**in.**	**mm.**	**in.**	**mm.**
A	28.3	720	52.3	1329
B	26.3	584	47.0	1194

Flush ceiling
DP1057MTK

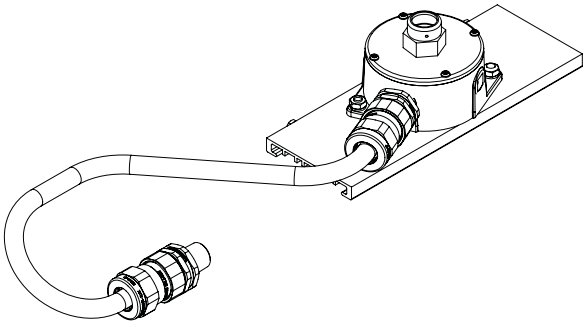


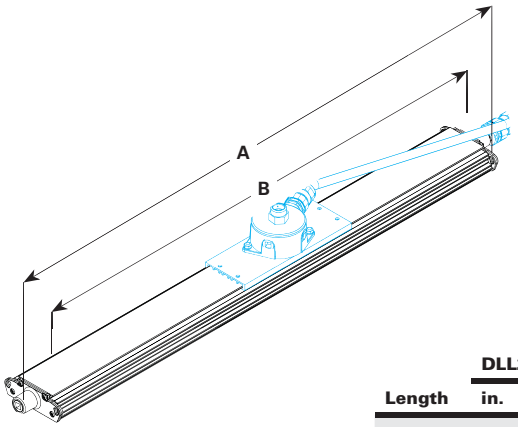


	DLL2		DLL4	
Length	**in.**	**mm.**	**in.**	**mm.**
A	28.3	720	52.3	1329
B	6.2	157.5	18.2	462

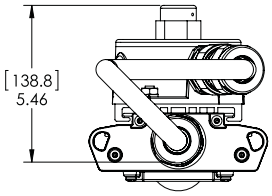
Mounting options

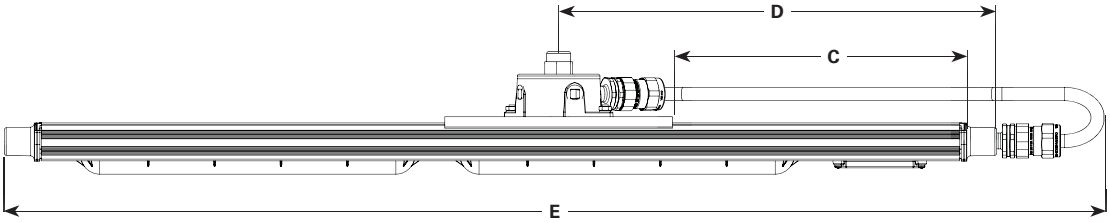
Pendant mount - Class I, Div. 2 only
PEND HAZ KIT





Length	DLL2		DLL4	
	in.	mm.	in.	mm.
A	31.7	805	55.8	1418
B	28.3	720	52.3	1329
C	4.2	108	16.0	406
D	12.2	310	24.0	610
E	34.9	886	58.9	1495





Battery back-up

Applications:

- Egress and emergency lighting for areas requiring uninterrupted lighting during power failure
- Hazardous area indoor and outdoor emergency lighting in land and marine drilling, manufacturing plants, heavy industrial, chemical and petrochemical facilities, platforms and loading docks

Key features:

- Wall or ceiling remote mount options up to a cable distance of 50 feet from the LED luminaire
- Operating ambient: -20°C to +55°C
- 90-minute run time in emergency mode
- 1,000 lumen output
- 50,000 hours rated life @ 55°C
- IP66 rated enclosure
- Provision of LED indicator and manual test switch to check battery operation

Certifications and compliances:

NEC/CEC

- Class I, Division 2, Groups B, C, D
- Class II, Division 2, Groups F, G
- Wet locations, Type 4X, IP66

UL Standards

- UL844 Hazardous (Classified)
- UL1598 Luminaires, UL1598A Marine
- UL924 Emergency Lighting

CSA Standard

- CSA C22.2 Nos. 250, 137, 141

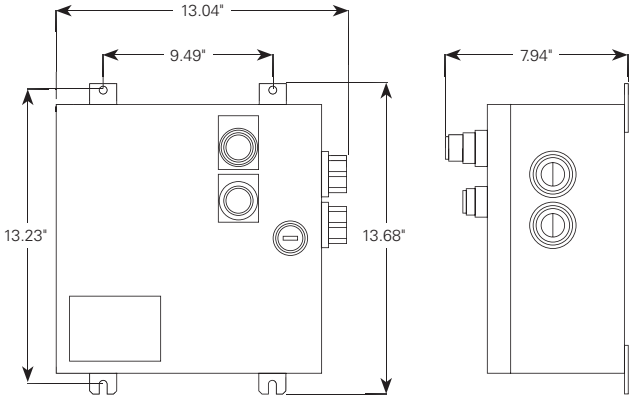
Electrical ratings:

Model	2 ft.	4 ft.
Voltage	100-277 VAC/108-250 VDC; 347-480 VAC	
Amperage @ 120VAC	0.34	0.58
Wattage @ 120VAC	37	68
Lumen output	1,000	1,000
Frequency	50/60 Hz	50/60 Hz
Power factor @ 100 VAC	0.90	0.95
THD	<20%	<20%

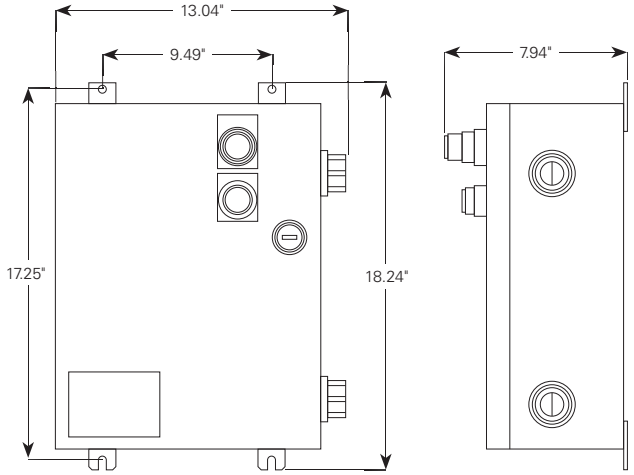
Model	EM output	Normal output
DLL2/UNV1 EM	1,000 lumens	3,600 (100-277V)
DLL2/UNV34 EM	1,000 lumens	3,600 (347-480V)
DLL4/UNV1 EM	1,000 lumens	7,100 (100-277V)
DLL4/UNV34 EM	1,000 lumens	7,100 (347-480V)

** 2 ft. LED fixture wired to 0.5A driver/charger remote battery module*
*** 4 ft. LED fixture wired to 1A driver/charger remote battery module*

Dimensions:



EM UNV1



EM UNV34

U.S. (global headquarters): Eaton's Crouse-Hinds business

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December 2015

Powering Business Worldwide

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Tel +46 42 38 61 00, Fax +46 42 38 61 29
chs@chscontrols.se www.chscontrols.se

ORDERING REFERENCES

MP	4	2	8	7	0	**

1. Series
MP

2. Length (nominal)
2 - 2 foot
4 - 4 foot

3. Number of Lamps
2 - 2 lamps
3 - 3 lamps
4 - 4 lamps, Lamp Types 5 & 6 only

4. Lamp Types
5 - 24/54 - 2 ft F24 or 4 ft F54 - T5HO Mini Bi-Pin
6 - 14/28 - 2 ft F14 or 4 ft F28 - T5 Mini Bi-Pin
7 - 44 - 4 ft F48 T8HO RDC
8 - 35/60 - 2 ft F24 or 4 ft F48 - T12HO RDC

5. Voltage / Frequency
7 - 120 to 277v 50/60 Hz
6 - 347v 60Hz, consult factory for availability
9 - 480v 60Hz, consult factory for availability

6. Mounting Style*
0 - Direct Flange Mounting, ½" NPT Feed-through
2 - Direct Flange Mounting, ¾" NPT Feed-through

*See MOUNTING OPTION for slide style kit.

7. Special Options
EM1 - Emergency Battery Backup Ballast, 1 lamp, 277v max
EMT1 - Emergency Battery Backup Ballast, 1 lamp, 277v max, test switch
L* - Lamps
LL* - Long Life Lamps (F54T5HO only)
S - Switch, on/off

*Lamps are not included unless option "L" or "LL" is specified.

Notes:
1. Consult factory for options not listed.

SPARE PARTS

Part No.	Description
FX5350	BALLAST 120-277V AC 50/60HZ, 1 x 14, F14T5
FX5307	BALLAST 120-277V AC 50/60HZ, 1 x 24, F24T5HO
FX5350	BALLAST 120-277V AC 50/60HZ, 1 x 28, F28T5
FX5307	BALLAST 120-277V AC 50/60HZ, 1 x 24, F24T5HO
FX5334	BALLAST 120-277V AC 50/60HZ, 1 x 35, F24T12HO
FX5349	BALLAST 120-277V AC 50/60HZ, 1 x 44, F48T8HO
FX5305	BALLAST 120-277V AC 50/60HZ, 1 x 54, F54T5HO
FX5334	BALLAST 120-277V AC 50/60HZ, 1 x 60, F48T12HO
FX5350	BALLAST 120-277V AC 50/60HZ, 2 x 14, F14T5
FX5307	BALLAST 120-277V AC 50/60HZ, 2 x 24, F24T5HO
FX5350	BALLAST 120-277V AC 50/60HZ, 2 x 28, F28T5
FX5334	BALLAST 120-277V AC 50/60HZ, 2 x 35, F24T12HO
FX5349	BALLAST 120-277V AC 50/60HZ, 2 x 44, F48T8HO
FX5305	BALLAST 120-277V AC 50/60HZ, 2 X 54, F54T5HO
FX5334	BALLAST 120-277V AC 50/60HZ, 2 x 60, F48T12HO
FX5128HDU	EMERGENCY BATTERY BACKUP BALLAST, EM1/EMT1, 120v-277v, CF, T8HO & T12HO
FX5346HDU	EMERGENCY BATTERY BACKUP BALLAST, EM1/EMT1, 120v-277v, T5 & T5HO
FX3573	LAMP, 14w, F14T5
FX3568	LAMP, 24w, F24T5HO
FX3574	LAMP, 28w, F28T5
FX3507	LAMP, 35w, F24T12HO
FX3565	LAMP, 44w, F48T8HO
FX3567	LAMP, 54w, F54T5HO
FX3577	LAMP, 54w, Long Life F54T5HO
FX3505	LAMP, 60w, F48T12HO
005-4000	DOOR FRAME ASSEMBLY, 4 ft. models
005-2000	DOOR FRAME ASSEMBLY, 2 ft. models
005-4100	LENS, POLYCARBONATE, 4 ft. models
005-2100	LENS, POLYCARBONATE, 2 ft. models
005-4200	GASKET, neoprene, 4 ft. models
005-2200	GASKET, neoprene, 2 ft. models
005-4300	REFLECTOR, 4 ft. models, HO model
005-4310	REFLECTOR, 4 ft. models, except HO
005-2300	REFLECTOR, 2 ft. models, HO model
005-2310	REFLECTOR, 2 ft. models, except HO
758-0523	LAMP HOLDER, RDC, spring loaded HO models
752-6051	LAMP HOLDER, 2G11 type, CF models
754-0005	LAMP HOLDER, T5 HO fixed & spring set
035-1065	LATCH LOCK
035-1066	HINGE LOCK
035-1064	KEEPER PLATE

Champ® FMV

LED floodlights for harsh and hazardous areas

EATON
Powering Business Worldwide

Safe. Reliable. Efficient.

Featuring the industry's broadest range of LED luminaires for harsh, hazardous and industrial environments, Eaton's Crouse-Hinds can deliver a lighting solution that performs reliably in even the worst operating conditions. All the while reducing your energy, maintenance and manpower costs.

Why LED?

Energy efficiency
LED average energy consumption is significantly less than traditional fluorescent and HID fixtures

Start/restart time
Instant illumination vs. 10 minute restrike time for HID

Light quality
Higher color rendering compared to fluorescent and HID

Environmental benefits
Mercury-free LED eliminates disposal costs and lower energy consumption for a smaller carbon footprint

Why Crouse-Hinds?

Industry-best reliability
Built to withstand a wide array of applications

Thermal management
Effective heat sinking ensures longer life

Quality of light
Custom optics designed to maximize light distribution and intensity

Globally certified
Designed to global specifications for IEC and NEC applications

Serviceable drivers
Easy access to drivers for service or replacement

Why FMV LED?

Reliable floodlights. FMV LED luminaires are engineered to deliver high lumen output and maintenance-free long life in the toughest conditions.

Versatile design

- Can be used for outdoor or indoor applications, and for a wide range of mounting heights depending on model and light level requirement

Smaller and lighter

- 25% smaller footprint than previous model
- 10 lbs. (4.5 kg) less weight than previous model

Full frame yoke

- Designed to utilize the SFA6 slipfitter and SWB6 wall mount bracket, making it ideal for retrofit or new installations

High lumen output:

- Up to 117 lumens per watt
- Up to 72% energy savings over traditional HID fixtures (compared to 400W MH)

Multiple lens options:

- Tempered clear glass lens standard
- Polycarbonate and diffused glass lens options available

Rugged heat sink

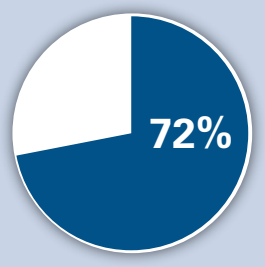
- Heat sink designed to perform and provide maximum light levels in high ambient temperatures up to +65°C and as low as -40°C
- Thick walled castings make for a tough, rugged housing that keeps the internal driver and LED temperature down

LED vs. HID savings at a glance

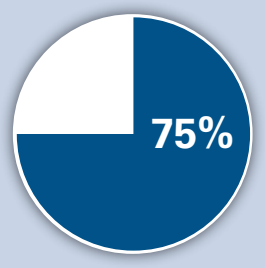
Why are so many facilities making the switch from HID to LED?

The numbers say it all.

FMV13L/UNV1 vs. 400 watt HID



72% REDUCTION IN ENERGY COSTS



75% LOWER TOTAL COST OF OWNERSHIP

100% MAINTENANCE REDUCTION

Assumptions: Calculations based on overall life of the LED system. Energy cost of $.09 per kilowatt; 24 hour per day operation; labor rate of $75 each for 2 workers; average time for fixture maintenance of 1 hour.

Features & specifications

Champ FMV LED floodlights

Champ FMV LED floodlights are designed to provide full-spectrum, crisp, white light. Seven versions of the Champ FMV are available, from 3,000 to 15,000 lumens, providing ideal solutions for a wide range of harsh and hazardous applications.

Up to 75% reduction in energy costs and 150,000 hours of continuous operation.

Model number	Nominal lumens*	Wattage	Lumens per watt	Equivalent HID luminaire
FMV3L	3,189	28	114	70W-100W
FMV5L	5,183	45	115	100W-150W
FMV7L	7,095	62	114	150W-175W
FMV9L	9,132	79	116	175W-250W
FMV11L	11,107	99	112	250W-400W
FMV13L	13,100	112	117	400W
FMV15L	15,181	131	116	450W

*Tolerance +/- 10%; @120 VAC, 25°C ambient, 7x6 optics.

Applications:

- Oil and gas refineries, drilling rigs, petrochemical facilities, food and beverage facilities, platforms, loading docks, tunnels, outdoor wall and stanchion mounted general area lighting, and where flammable vapors, gases, ignitable dusts, fibers or flyings are present
- Locations requiring continuous and consistent light levels in extreme ambient temperatures
- Where extremely corrosive, wet, dusty, hot and/or cold conditions exist
- IP66, Type 4X, marine, wet locations and hose-down environments
- Classified and hazardous locations

LED system:

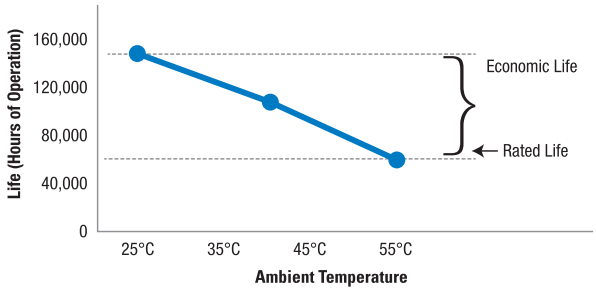
- Cool white (5000K, 70 CRI) and warm white (3000K, 80 CRI)
- Custom designed optics – 7x6 standard, 3x3 optional (3L-11L)

Champ FMV LED benefits:

- Instant illumination and restrike
- Better visibility with crisp, white light
- Cold temperature operation / no warm-up required
- Minimum T3C temperature rating – safely operate in the most hazardous environments and any non-hazardous location
- Serviceable drivers
- Easy installation – yoke design to mount to SFA6
- Energy-efficient technology – up to 72% energy savings over HID fixtures
- 60,000 hours of rated life at 55°C – eliminates need for frequent lamp replacement
- Contains no mercury or other hazardous substances
- Shock- and vibration-resistant solid-state luminaires have no filaments or glass components that could break – greatly reduces the risk of premature failure
- Operating ambient -40°C to 65°C (NEC only; IEC -40°C to 55°C)
- 5 year fixture warranty‡

‡Extension of standard terms and conditions to five years. Refer to page 2 of the D-0914 authorized distributor price book for Crouse-Hinds standard Terms and Conditions.

LED system lifetime rated versus economic life:



Economic life can range anywhere between 50,000 to 150,000 hours, or 5 to 20 years of maintenance-free operation.

Fixture life and years of maintenance-free operation

Ambient temperature	Fixture life (hours)	No. of years at 24 hours usage	No. of years at 12 hours usage
25°C	150,000	17	34
40°C	90,000	10	20
55°C	60,000	7	14

*50,000 hours of life at 65°C ambient.

Fixture life:

- Rated life of 60,000 hours @ 55°C operating ambient and 24/7 continuous operation for 365 days
- Economic life of 150,000 hours @ 25°C ambient
- L70 LED life >300,000 hours @ 55°C

Electrical ratings:

Model number	Input power (watts)	Input amps at 120-277 VAC
FMV3L	28.0 - 29.1	0.24 - 0.11
FMV5L	45.4 - 45.8	0.38 - 0.18
FMV7L	61.8 - 62.5	0.52 - 0.24
FMV9L	78.8 - 80.3	0.66 - 0.31
FMV11L	98.8 - 99.9	0.83 - 0.37
FMV13L	111.8 - 112.4	0.94 - 0.42
FMV15L	131.4 - 131.5	1.10 - 0.48

FMV3L - FMV15L	
Voltage range, VAC*	100-277V @ 50/60 Hz, 347-480V @ 50/60 Hz
Voltage range, VDC*	108-250V
Power factor	>0.9

*NEC voltage; see drivers below for IEC voltage.

Standard materials:

- Lamp housing and adapter – die cast aluminum with Corro-free™ epoxy powder coat
- Lens – heat- and impact-resistant glass (standard)
- Gaskets – silicone and neoprene
- External hardware – stainless steel

Qualifications and compliances:

- DesignLights Consortium® Qualified (some models are not DLC qualified)*

* Approved models include: FMV3L/UNV1; FMV5L/UNV1; FMV7L/UNV1; FMV9L/UNV1; FMV11L/UNV1; FMV13L/UNV1; FMV3L/UNV34; FMV5L/UNV34; FMV7L/UNV34; FMV9L/UNV34; FMV11L/UNV34; FMV13L/UNV34

7x6 optics on all approved models; 3x3 optics not DLC approved.

Refer to www.designlights.org Qualified Products List under family models for full listing details. Not all models are approved for all application categories.

Certifications and compliances:

NEC and CEC:

- Class I, Division 2, Groups A, B, C, D; Class I, Zone 2; Class II, Groups E, F, G; Simultaneous Presence; Class III
- Type 4X, IP66

UL Standards:

- UL844; UL1598; UL1598A; UL8750

CSA Standard:

- CSA C22.2 No. 137

IEC Standards:

- IECEx UL 15.0029
- Ex nA IIC T5 Gc Tamb -40°C to +40°C
- Ex nA IIC T4 Gc Tamb -40°C to +55°C
- Ex tb IIIC T65 Db Tamb -40°C to +40°C
- Ex tb IIIC T80 Db Tamb -40°C to +55°C

ATEX/CE:

- CE0359 DEMKO 15 ATEX 1377
- CE0359 DEMKO 15 ATEX 1383
- Ⓔx II 3 G Ex nA IIC T5 Gc Tamb -40°C to +40°C
- Ⓔx II 3 G Ex nA IIC T4 Gc Tamb -40°C to +55°C
- Ⓔx II 2 D Ex tb IIIC T65 Db Tamb -40°C to +40°C
- Ⓔx II 2 D Ex tb IIIC T80 Db Tamb -40°C to +55°C

Temperature codes:

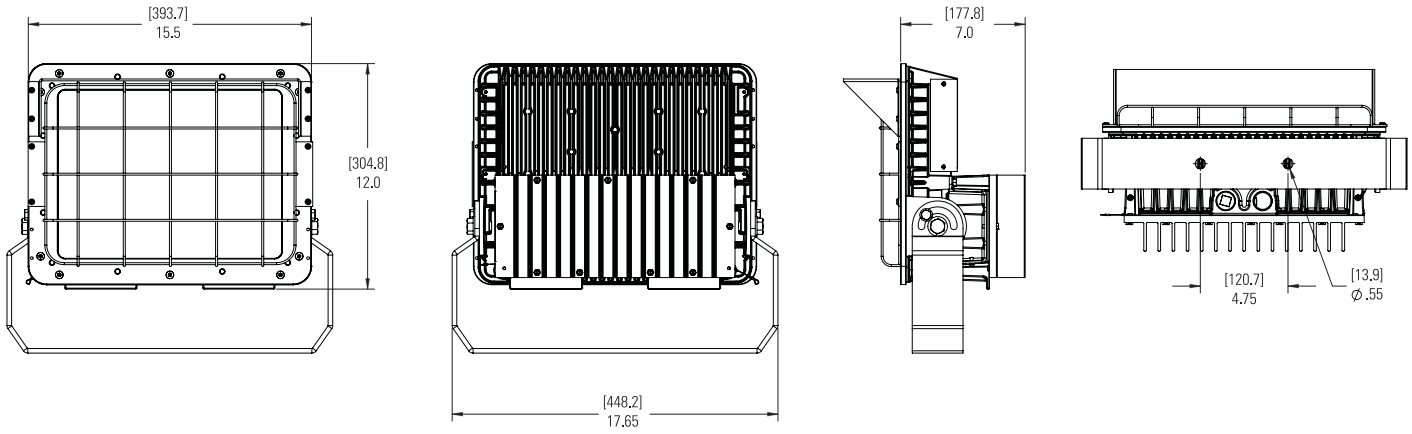
Model	Ambient temperature	Class I, Div. 2	Class II, Div. 1	Simultaneous rating Class I, Div. 2, Div. 1	Class I, Zone 2	ATEX 3G	ATEX 2D	Minimum wire temperature
FMV3L-FMV15L	40°C	T5	T4	T4	T5	T5	T65	90°C
	55°C	T4A	T3C	T3C	T4	T4	T80	90°C
	65°C	T4A	T3C	T3C	T4	–	–	90°C

Weights and dimensions:

Model number	Lbs.	Kg.	Width in.	Width mm.	Height in.	Height mm.	Depth in.	Depth mm.
FMV3L-FMV7L	30.7	13.9	15.5	393.7	12.0	304.8	7.0	177.8
FMV9L-FMV15L	31.8	14.4	15.5	393.7	12.0	304.8	7.0	177.8

Drivers:

Option	FMV3L - FMV15L
/UNV1	NEC: 100-277 VAC, 50/60 Hz; 108-250 VDC IEC: 100-252 VAC, 50/60 Hz; 111-227 VDC
/UNV34	NEC: 347-480 VAC, 50/60 Hz IEC: 385-436 VAC, 50/60 Hz



Ordering information

Part number example

FMV5LCY/UNV1D 76 S903

FMV 5L C Y /UNV1 D 76 S903

Model

FMV	NEC & IEC model

Light source/intensity

3L	3,189 nominal lumens*
5L	5,183 nominal lumens*
7L	7,095 nominal lumens*
9L	9,132 nominal lumens*
11L	11,107 nominal lumens*
13L	13,100 nominal lumens*
15L	15,181 nominal lumens*

*7x6 model.

Color temperature

C	5000K, 70 CRI (cool white)
W	3000K, 80 CRI (warm white)

Voltage

/UNV1	100-277 VAC, 50/60 Hz; 108-250 VDC
/UNV34	347-480 VAC 50/60 Hz

Mount

Y	Yoke

Options

S886	Two TMCX cable glands of like thread installed
S891	Diffused glass lens
S903	Polycarbonate lens

Entries

BLANK	¾" NPT
M20	20mm entry
M25	25mm entry

Optical distribution

76	7x6 floodlight pattern optics
33*	3x3 floodlight pattern optics

*3L - 11L only.

Dimming

D*	Dimmable driver
BLANK	Non-dimmable driver

*Dimmable driver option only available for NEC rated models.

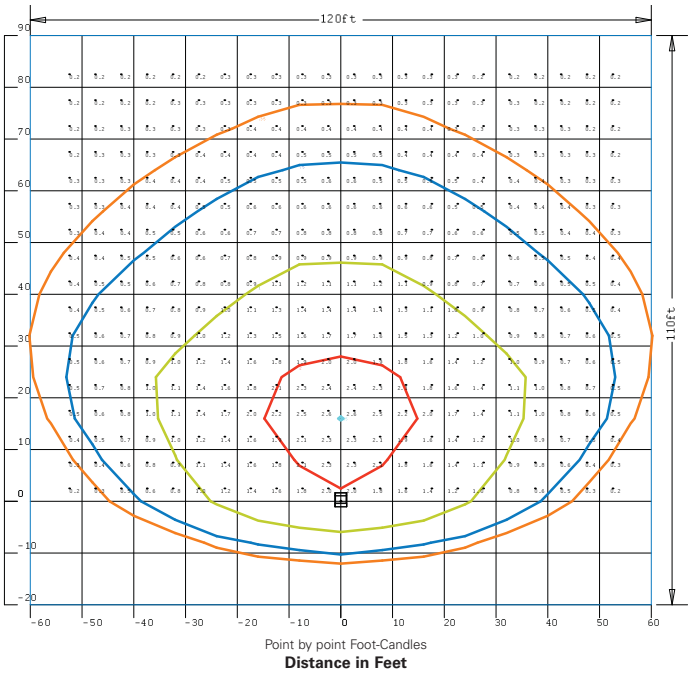
Accessories (ordered separately)

DSV2	Bolt-on visor
P62	Bolt-on wire guard
SC831	Safety cable
SFA6	Floodlight slipfitter
SWB6	Slipfitter wall mount adapter

Photometric data

7x6 optics

FMV13L Height: 40 ft.; Tilt angle: 45°



0.35 Fc 0.50 Fc 1.00 Fc 2.00 Fc 2.50 Fc

Effective projected area (ft.-sq.):

Position	FMV3L - FMV15L
@ 0° Tilt	1.5
@ 45° Backwards tilt	1.1
@ 60° Forward tilt	0.8

Lumen output for glass lens models

Optic	FMV3L	FMV5L	FMV7L	FMV9L	FMV11L	FMV13L	FMV15L
7x6	3,189	5,183	7,095	9,132	11,107	13,100	15,181
3x3	3,064	5,038	7,000	8,962	10,917	–	–

Lumen output for diffused glass lens (S891) models

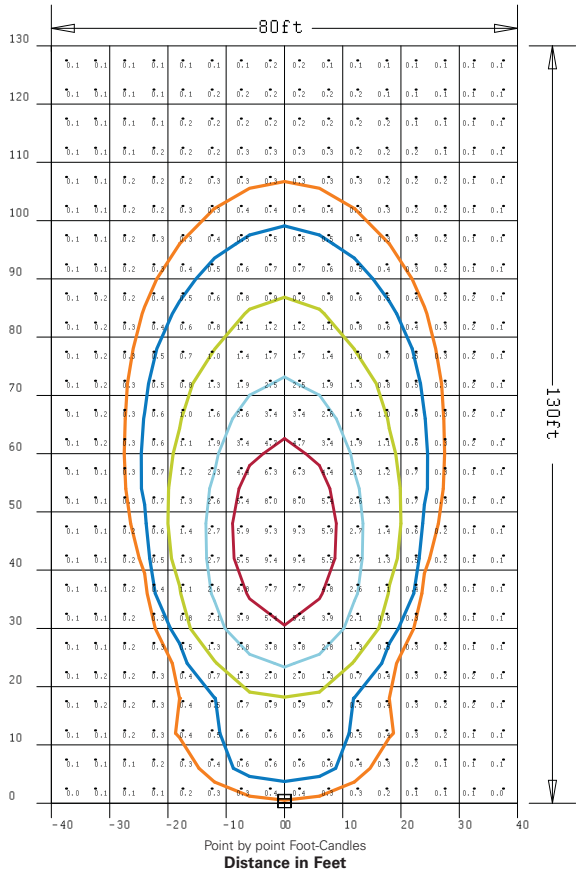
Optic	FMV3L	FMV5L	FMV7L	FMV9L	FMV11L	FMV13L	FMV15L
7x6	2,637	4,287	5,878	7,459	8,994	10,613	12,445
3x3	2,546	4,179	5,806	7,433	9,055	–	–

Lumen output for polycarbonate lens (S903) models

Optic	FMV3L	FMV5L	FMV7L	FMV9L	FMV11L	FMV13L	FMV15L
7x6	3,017	4,903	6,712	8,639	10,507	12,393	14,361
3x3	2,924	4,808	6,680	8,552	10,418	–	–

3x3 optics

FMV11L Height: 30 ft.; Tilt angle: 45°



0.35 Fc 0.50 Fc 1.00 Fc 2.50 Fc 5.00 Fc

Higher average footcandles/lux, uniformity and distribution coverage with 72% less energy consumption compared to 400W metal halide.

U.S. (global headquarters): Eaton's Crouse-Hinds business

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United States
Eaton.com

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December 2015

Powering Business Worldwide

AFL FLOODLIGHT

Flood Lighting for Hazardous Locations

AFL

- Class I, Division 2, Groups A, B, C & D
- UL 844 Hazardous Locations
- UL 1598A Marine Outside Type
- UL 1598 Wet Locations
- Zone 2, Groups IIA, IIB & IIC
- CSA C22.2 No. 250.0-88
- CSA C22.2 No. 137-M1981
- Cast Aluminum
- 55°C Ambient Temperature
- IP66
- NEMA 4X

c UL us LISTED

MARINE UL LISTED

AZZ™

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AFL FLOODLIGHT

Flood Lighting for Hazardous Locations

Key Features:

1. One-piece copper-free cast aluminum lamp and ballast housing with baked on powder coat finish
2. Precision-formed specular reflector for optimum photometric and lighting performance
3. Thermal, shock, heat and impact resistant tempered clear glass lens
4. Hinged copper-free cast aluminum lens frame with front access for easy relamping and access
5. Four permanent safety cable attachment points
6. Sturdy mounting yoke

AFL

Hazardous Locations • Cast Aluminum • Class I, Divsion 2 • UL 1598A, 844 • CUL • Wet Locations

Catalog Number Logic

AFL1 40-S-04-T-66-XX

1 2 3 4 5 6 7

1 BASIC SERIES

AFL Floodlight Series

(i) AFL1 = 70-400 Watt Metal Halide and High Pressure Sodium
Class I, Division 2, Groups A, B, C & D
Zone 2, Groups IIA, IIB and IIC
UL 844 Hazardous Locations
UL 1598A Marine Outside Type
CUL

2 LAMP CURRENT/LAMP WATTAGE

07 = 70 Watt
10 = 100 Watt
15 = 150 Watt
17 = 175 Watt
25 = 250 Watt
32 = 320 Watt
35 = 350 Watt
40 = 400 Watt

3 LAMP TYPE (MOGUL BASE)

S = High Pressure Sodium (70, 100, 150, 200, 250, 400 Watt)
H = Metal Halide (70, 100, 150, 175, 250, 320, 350, 400, Watt)

4 BALLAST VOLTAGE

04 = Multi-Tap (120, 208, 240 & 277V)
12 = 120V 60 HZ
20 = 208V 60 HZ
22 = 220V 50 HZ
24 = 240V 60 HZ
27 = 277V 60 HZ
34 = 347V 60 HZ
48 = 480V 60 HZ

5 MOUNTING

T = Trunnion

6 BEAM SPREAD

66 = 6V X 6H

7 OPTIONS[1]

Q = Auxiliary Quartz Relay
QTD = Auxiliary Quartz Relay Hot and Cold Start
PC = Photo Cell[3]
V = Visor
LS = Lamp Support
FB1 = Single Fuse Block[2,3,4]
FB2 = Double Fuse Block[2,3,]
PL = Clear Acrylic Shield
SMS = Shock Mounted Socket
SC = Safety Cable (Eye Bold Included)
PS = Pulse Start[5]
R = Instant Restrike (HPS only up to 150W)

[1] Consult factory for pricing.

[2] Limited to 175W Maximum HID Lamp

[3] Not suitable for hazardous locations.

[4] Not available with multi-tap ballast unless incoming voltage is specified. When installed, one fuse block/fuse holder is provided for 120, 277V. Fuse not included. Option not available for marine listed fixtures.

[5] Use universal or appropriate position oriented lamp.

Catalog logic is for explaining catalog number structure only. Not all combinations are possible; consult factory for catalog numbers not listed in charts.

METAL HALIDE • HIGH PRESSURE SODIUM

AFL

Hazardous Locations • Cast Aluminum • Class I, Divsion 2 • UL 1598A, 844 • CUL • Wet Locations

(Lamps not included)

Shown with optional visor.

- Class I, Division 2, Groups A,B,C and D
  (See below for suitability as designated for ①,② or ③)
- UL 844 Hazardous Locations
- UL 1598A Marine Outside Type
- Zone 2, Groups IIA, IIB and IIC
- One-piece copper-free cast aluminum lamp and ballast housing with baked on bronze polyester powder coat finish
- Precision formed specular finished reflector for optimum photometric performance
- Thermal shock, heat and impact-resistant tempered glass lens
- Marine grade hardware
- 55°C Ambient Temperature (AFL1 Series)

Fixture Type	Figure Number	Lamp Wattage	Voltage	Catalog Number	Shipping Weight (Lbs.)
High Pressure Sodium	1	70	Multi-Tap*	**AFL07-S-04-T-66** ①②③	34.0
			480V/60HZ	**AFL07-S-48-T-66** ①②③	34.0
		100	Multi-Tap*	**AFL110-S-04-T-66** ①②③	34.0
			480V/60HZ	**AFL110-S-48-T-66** ①②③	34.0
		150	Multi-Tap*	**AFL115-S-04-T-66** ①②③	34.0
			480V/60HZ	**AFL115-S-48-T-66** ①②③	34.0
		250	Multi-Tap*	**AFL125-S-04-T-66** ①②③	37.0
			480V/60HZ	**AFL125-S-48-T-66** ①②③	36.5
		400	Multi-Tap*	**AFL140-S-04-T-66** ①②③	39.5
			480V/60HZ	**AFL140-S-48-T-66** ①②③	39.0
Metal Halide	1	175	Multi-Tap*	**AFL117-H-04-T-66-PS** ①②	35.0
			480V/60HZ	**AFL117-H-48-T-66-PS** ①②	35.0
		250	Multi-Tap*	**AFL125-H-04-T-66-PS** ①②③	35.0
			480V/60HZ	**AFL125-H-48-T-66-PS** ①②③	34.0
		320	Multi-Tap*	**AFL132-H-04-T-66-PS** ①②③	39.5
			480V/60HZ	**AFL132-H-48-T-66-PS** ①②③	39.0
		350	Multi-Tap*	**AFL135-H-04-T-66** ①②③	36.5
			480V/60HZ	**AFL135-H-48-T-66** ①②③	36.5
		400	Multi-Tap*	**AFL140-H-04-T-66** ①②③	36.5
			480V/60HZ	**AFL140-H-48-T-66** ①②③	36.5

*120/208/240/277V 60HZ
① Class I, Division 2, UL 844 Listed
② UL 1598A Listed
③ CUL

AFL

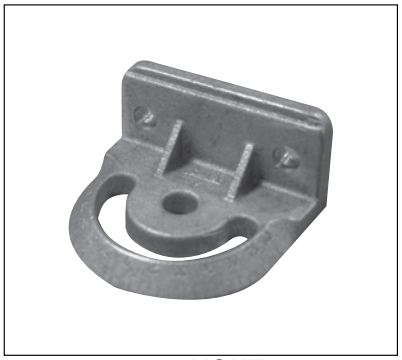
Hazardous Locations • Cast Aluminum • Class I, Divsion 2 • UL 1598A, 844 • CUL • Wet Locations

Certification Guide

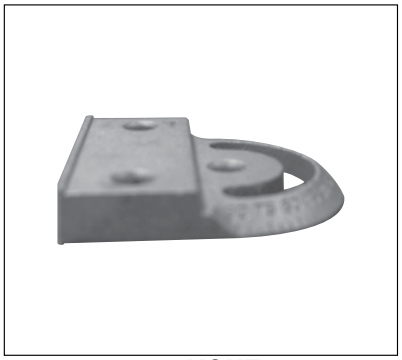
Model	Lamp	Ambient Temperature °C	Class I, Division 2 Groups A,B, C & D	Supply Wire Suitable Temperature °C
AFL140	MH	55	T1 (350°C)	105
AFL125	MH	55	T1 (325°C)	90
AFL117	MH	55	T1(325°C)	90
AFL115	MH	55	T1 (325°C)	90
AFL140	HPS	55	T1(450°C)	105
AFL125	HPS	55	T1 (350°C)	90
AFL115	HPS	55	T1 (350°C)	90

Accessories

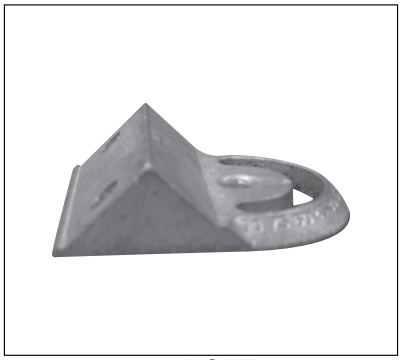
NOTE:
FLB-3 and FLB-5 fit 2 in. to 2-1/2 in. pipe size (2-3/8 in. to 2-7/8 in. O.D.)



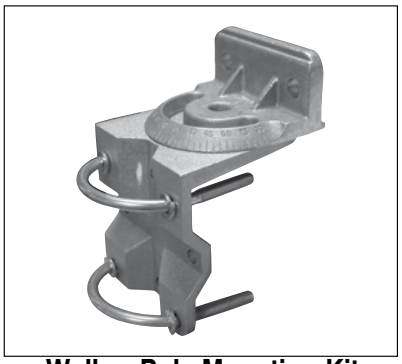
180° YOKE
Horizontal Mounting Kit
180° Adjustment, Includes (2) 1/2 in. Bolts
Catalog Number: FLB-2
Shipping Weight: 1.4 lbs.



90° YOKE
Horizontal Mounting Kit
90°Adjustment, Includes (2) 1/2 in. Bolts
Catalog Number: FLB-2-90
Shipping Weight: 1.3 lbs.



45° YOKE
Horizontal Mounting Kit
45° Adjustment, Includes (2) 1/2 in. Bolts
Catalog Number: FLB-2-45
Shipping Weight: 1.5 lbs.



Wall or Pole Mounting Kit
Wall or Pole Mount, Includes (2) U-Bolts
Catalog Number: FLB-3
Shipping Weight: 3.6 lbs.

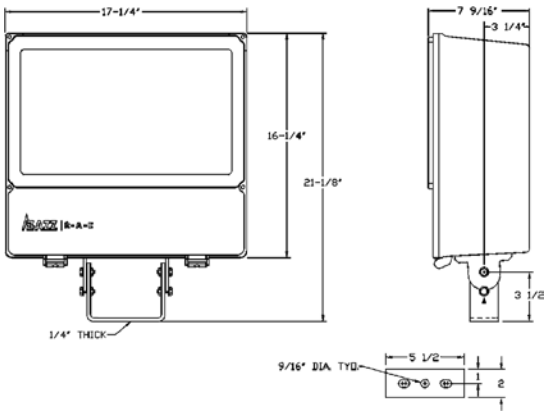
Pole Top Mounting Kit
Gasket Wiring Compartment Adapts Horizontal or Vertical Mounting Yokes, Includes (8) Set Screws,
Catalog Number:RSF5 Shipping Weight: 5 lbs.

AFL

Fixture Dimensions (inches)

AFL1

FIGURE 1



EFFECTIVE PROJECTED AREA 2.0 sq. ft.

175-400 Watt Metal Halide
70-400 High Pressure Sodium

Pauluhn Intrepid linear fluorescent luminaires

Low/mid bay luminaires for use in marine and industrial locations

Applications:

- Locations requiring continuous and consistent light levels
- Marine applications, such as engine rooms, decks and walkways
- Food and beverage processing facilities
- Pulp and paper production facilities
- Water/wastewater treatment facilities

Features:

- Complete portfolio of T8, T12 and T5HO fluorescent lamps
- Surface, pole mounts
- NSF rated
- Operating ambient: -20°C to +55°C
- ABS approved

Certifications and compliances:

- Type 4 (FAS only); Type 4X (FPS and FSS only)
- IP66
- UL924 – Emergency Lighting Equipment (CSA-US)
- UL1598A – Luminaires for Marine Vessels (CSA-US)
- EN 60529 Ingress Protection
- CSA C22.2 250 04
- CSA C22.2 141
- Canadian Processed Products Regulations C.R.C., c.291
- NSF/ANSI 2-2010 Splash Zone (FAS and FPS only)
- NSF/ANSI 2-2010 Food Contact (FSS only)

Photometrics:

- Complete photometrics can be found at www.crouse-hinds.com/photometrics

Standard materials:

- Housing – Type 5052 aluminum (FAS only); fiberglass-reinforced polyester (FPS only); Type 304 stainless steel; Type 316 stainless steel (optional) (FSS only)
- Lens – matte polycarbonate (standard); clear polycarbonate (optional)
- Latches – stainless steel

Ordering information:

Part number example

FPS232LEM2

FPS 2 32 L EM2

Model

FAS	Aluminum
FPS	Non-metallic
FSS	Stainless steel

Number of lamps

1	1 lamp
2	2 lamps
C2	2 lamps, 2 ft. unit, CF only
3	3 lamps; not for 35W or 60W
C4	4 lamps, 4 ft. unit, CF only

Lamp types

14	2 ft. F14 (T5 mini bi-pin)
17	2 ft. F17 (T8 bi-pin)
20	2 ft. F20 (T12 bi-pin)
24	2 ft. F24 (T5HO mini bi-pin)
28	4 ft. F28 (T5 mini bi-pin)
32	4 ft. F32 (T8 bi-pin)
40	4 ft. F40/F34 (T12 bi-pin)
54	4 ft. F54 (T5HO mini bi-pin)
60	4 ft. F48 (T12HO RDC)
40Ⓐ	2 ft. FT40 (CF 2G11)

Options

L	Lamps
XC	Clear polycarbonate lens
T	Multi-point terminal block
Z	Type 316 stainless steel (FSS only)
RV-1Ⓒ	Red filter tube with separate ballast (1 lamp)
BV-1Ⓒ	Blue filter tube with separate ballast (1 lamp)
YV-1Ⓒ	Yellow filter tube with separate ballast (1 lamp)
G2	Through feed non-metallic cable glands
H2	¾" through feed NPT hubs
MILⒹ	10 ft. low smoke cable, lamps and 0° ballast for T12 models (120 VAC, 60 Hz only) (FAS and FSS only)

Emergency battery back-up

EM2Ⓑ	Emergency battery back-up ballast, one lamp, 277V max.
EM3Ⓑ	Emergency battery back-up ballast, high lumen, one lamp, 277V max.
EMT2Ⓑ	Emergency battery back-up ballast, one lamp, 277V max., test switch
EMT3Ⓑ	Emergency battery back-up ballast, high lumen, one lamp, 277V max., test switch

Ⓐ For use with C2 only.

Ⓑ For T5 and T5HO, EM ballast is fixed voltage, 120 or 277V, 50/60 Hz.

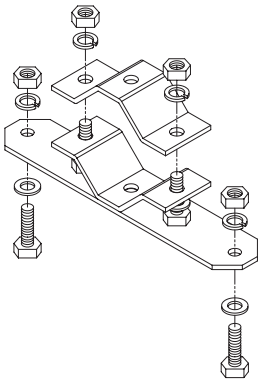
Ⓒ T8 only.

Ⓓ Available in 2 ft. models only. No third party certifications.

Pauluhn Intrepid linear fluorescent luminaires

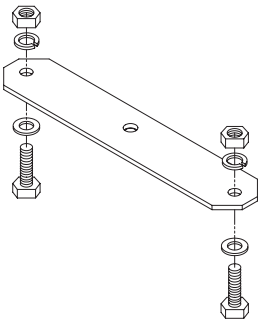
Low/mid bay luminaires for use in marine and industrial locations

Mounting options:



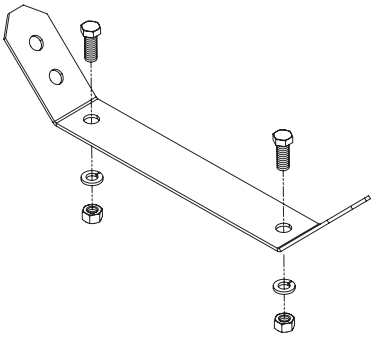
FPSPMKIT

1¼" pole mount



FPS-UNI-MNT

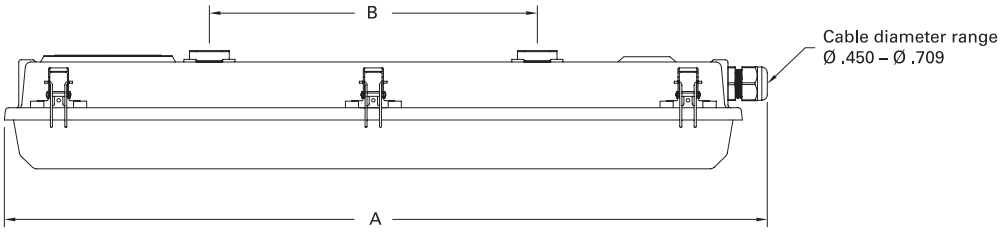
Rod mount

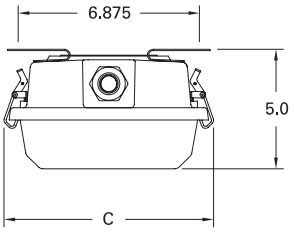


FPSWMKIT

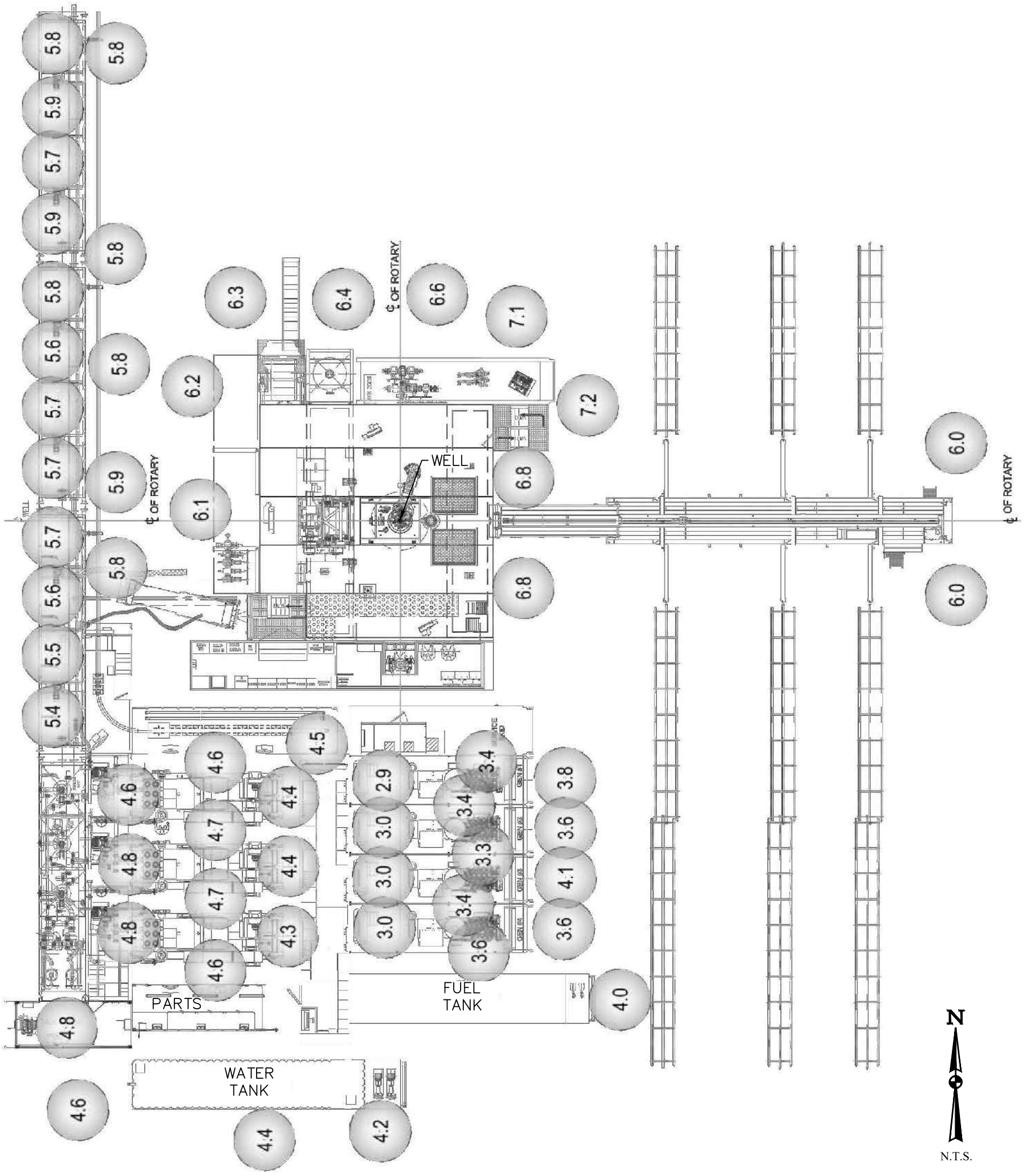
Corner wall mount

Dimensions:





Nominal length	Dimensions in inches / centimeters A	B	C	Carton W x D x L (in.)	Nominal weight FAS series lbs. (kg.)	FPS series lbs. (kg.)	FSS series lbs. (kg.)
2 foot	28.80 (73.70)	12.44 (31.59)	7.625 (19.40)	8¾ x 6¼ x 31⅞	8.50 (3.90)	9.00 (4.00)	23.20 (10.50)
4 foot	52.80 (134.60)	36.56 (92.87)	7.625 (19.40)	8½ x 6 x 56 1/16	14.00 (6.40)	17.00 (7.70)	25.10 (11.40)



2 DRILLING RIG SITE LIGHTING PHOTOMETRIC PLAN

SCALE: NO SCALE

NOTES:

1. MEASURED LIGHT INTENSITY LEVEL WITH RESPECT TO WORK AREAS, OUTDOOR SPACES, AND UNATTENDED EQUIPMENT AREAS. ILLUMINANCE UNITS IS GIVEN IN Fc [1 fc = 10.8 Lux].
   MAXIMUM = 9.1
   MINIMUM = 2.9

2. LIGHTING LEVELS SHOWN ON THIS PLAN ARE IN ADDITION TO LEVELS ON THE DRILLING PAD SITE. DIRECT LIGHTING FROM DRILLING OPERATIONS WILL BE CONFINED WITHIN THE 100 FT EDGE OF PAD OFF-SET BOUNDARY.

3. DRILLING RIG LIGHTING WILL BE PRESENT ONLY DURING THE DRILLING PHASE.

UINTAH ENGINEERING & LAND SURVEYING

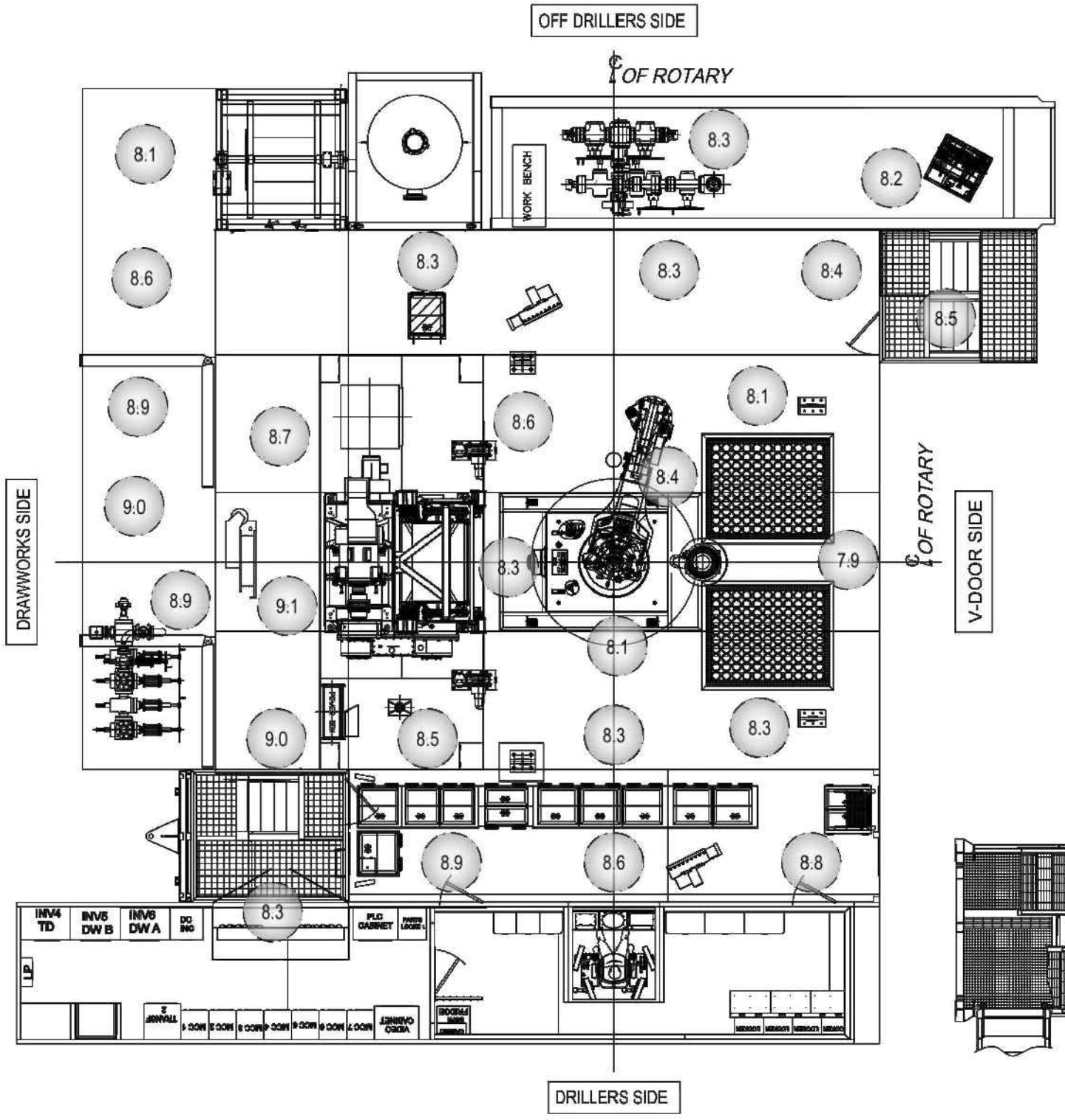
UELS, LLC
Corporate Office * 85 South 200 East
Vernal, UT 84078 * (435) 789-1017

SCALE: AS NOTED	DRAWN BY: C.C.	DATE DRAWN: 10-22-21
UELS FILE NO.: U - 6 0 4	REVISED:	

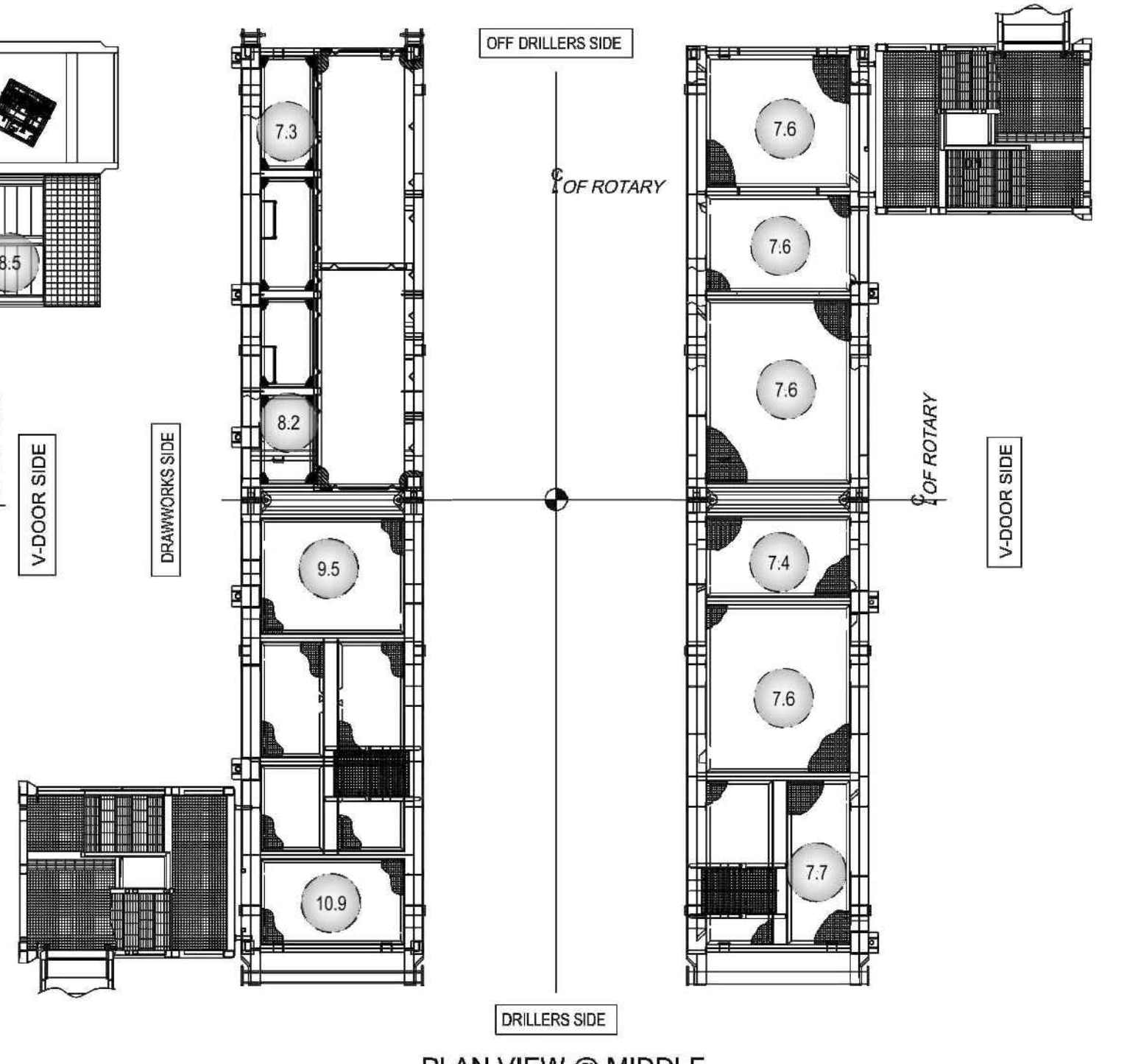
DRILLING OPERATIONS RIG PHOTOMETRIC PLAN

UINTAH ENGINEERING & LAND SURVEYING

UELS, LLC
Corporate Office * 85 South 200 East
Vernal, UT 84078 * (435) 789-1017



PLAN VIEW @ DRILLFLOOR



PLAN VIEW @ MIDDLE
SUBSTRUCTURE BOX

3 DRILLING RIG LIGHTING PHOTOMETRIC PLAN
SCALE: NO SCALE

DRILLING OPERATIONS RIG PHOTOMETRIC PLAN

SCALE: AS NOTED	DRAWN BY: C.C.	DATE DRAWN: 10-22-21
UELS FILE NO.: U - 6 0 4	REVISED:	

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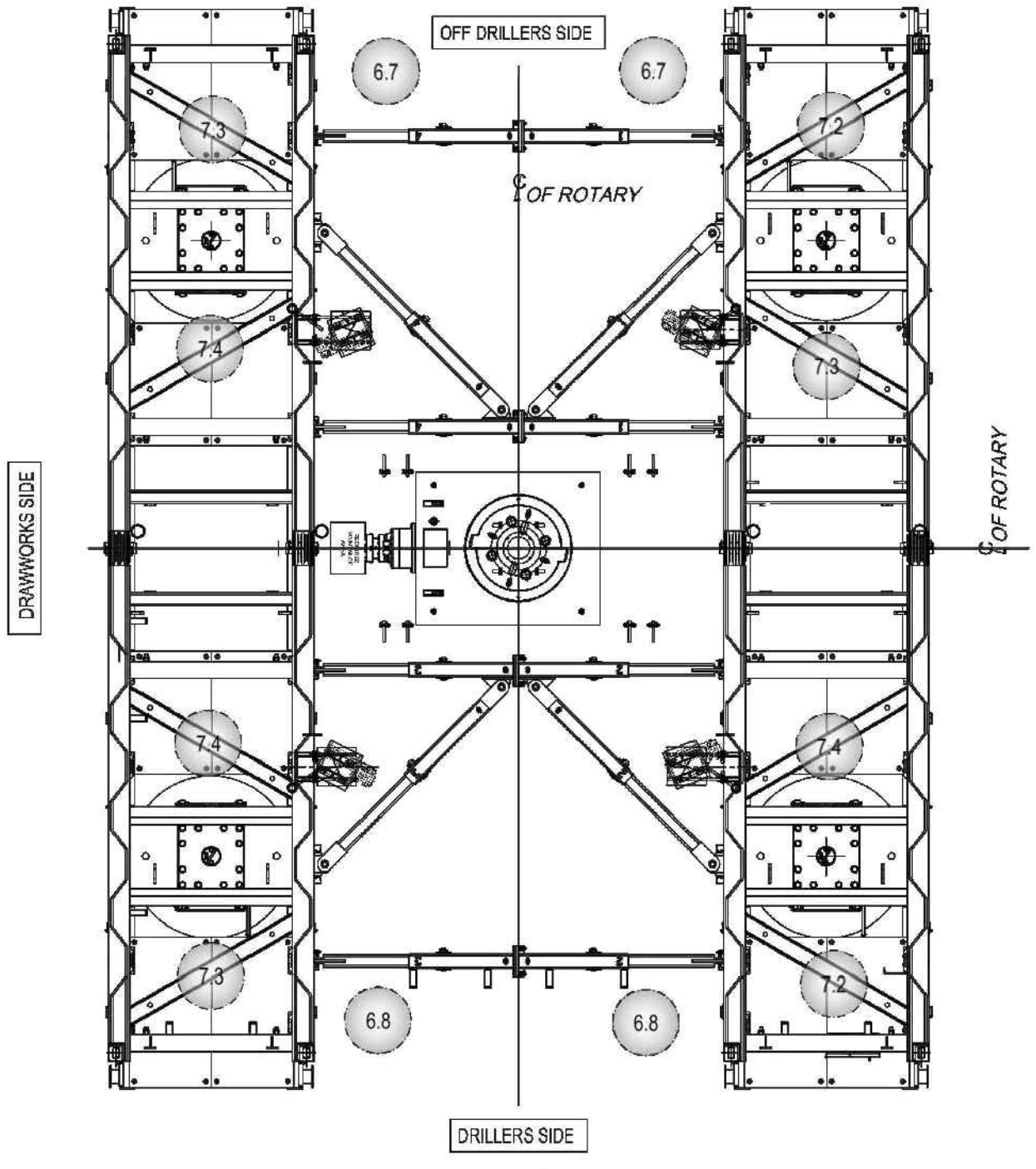
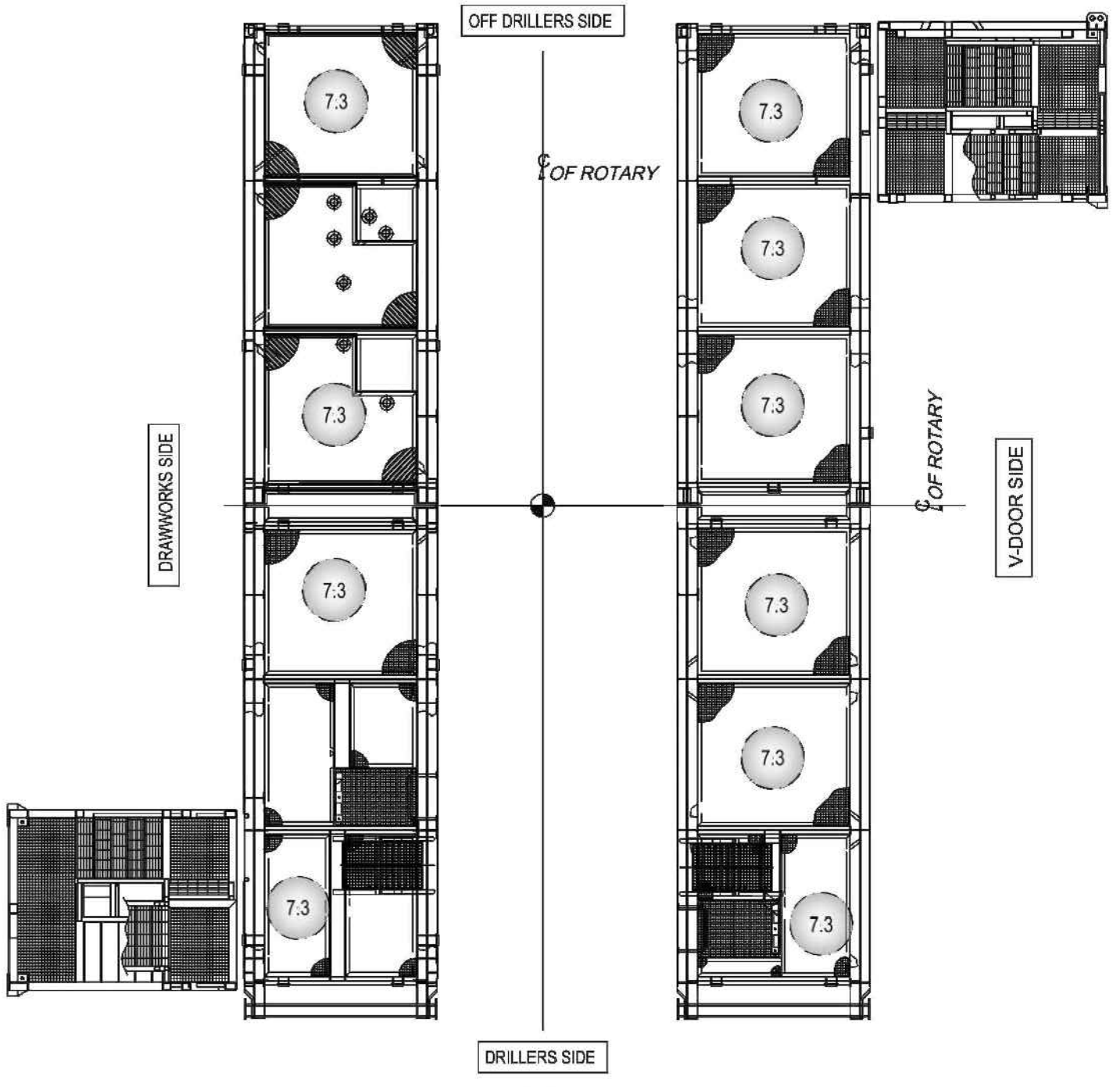


PLAN VIEW @ BOTTOM
SUBSTRUCTURE BOX



PLAN VIEW @ TOP
SUBSTRUCTURE BOX

4 DRILLING RIG LIGHTING PHOTOMETRIC PLAN
SCALE: NO SCALE

DRILLING OPERATIONS RIG PHOTOMETRIC PLAN

SCALE: AS NOTED	DRAWN BY: C.C.
UELS FILE NO.: U - 6 0 4	DATE DRAWN: 10-22-21
	REVISED: