

LARAMIE 0993-29-01 WELL PAD

Light Mitigation Plan ECMC Rule 424. Lighting



Photo 1. Drilling at Laramie's 24-7 well pad (left) and completions & flowback operations at Laramie's 24-6A well pad (right).



Laramie Energy, LLC
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Laramie 0993-29-01 Well Pad Lighting Mitigation Plan ECMC Rule 304.c.(3) and Rule 424



1. INTRODUCTION – ECMC RULE 304.c.(3) AND RULE 424

The Laramie 0993-29-01 Light Mitigation Plan, consistent with the requirements for Colorado Energy and Carbon Management Commission's (referred to hereinafter as ECMC or the Commission) Rule 304.c.(3) Light Mitigation Plan under 300 Series of the ECMC rules, was developed in accordance with ECMC Rule 424 Lighting and the Light Mitigation Plan Guidance (September 16, 2021).

2. LARAMIE 0993-29-01 WELL PAD

Laramie Energy, LLC (Laramie) (Operator # 10433) is pursuing a Form 2A for an Oil and Gas Location Assessment permit in Mesa County, Colorado. The Laramie 0993-29-01 well pad is a proposed, new location. Laramie is proposing to drill sixteen (16) new directional wells at the Laramie 29-01 in Section 29 of Township 9 South, Range 93 West, 6th P.M. The Laramie 0993-29-01 will develop fee and federal minerals in Section 21 and Section 20 of Township 9 South, Range 93 West, 6th P.M.

OGDP Title: 2023 Laramie 0993-29-01 OGD

Location Name: Laramie 0993-29-01

Legal Description: NENE Section 29, Township 9 South, Range 93 West, 6th P.M.

Location Coordinates: Latitude: 39.254781°; Longitude: -107.784158°

Elevation (Graded): 7463 feet

County: Mesa

General Location: 8.5 mapped miles east of Collbran, Colorado.

Zone District: Agricultural, Forestry, Transitional District (AFT)

Operations will be conducted in the following phases at the Laramie 29-01: construction, drill rig mobilization, drilling, production installation, completions and flowback (including equipment mobilization, staging, and demobilization), production, interim reclamation, inspections, and final grading/reclamation of the site. Inspection activities will occur during the lifespan of the site. Laramie anticipates that the well pad will remain in production for approximately 30 years, based on the average lifespan of wells within the area. **Table 1** details the anticipated timeframe for each operational phase.

The Laramie 0993-29-01 is located in a remote area with varying elevation and the surrounding topography consists of mountainous ridges and hills. The Laramie 0993-29-01 will be accessed from an existing private lease road with a portion of the existing lease road on Laramie surface. A site-specific access road will be constructed on Laramie surface to contact the well pad to the existing private lease road. Laramie maintains all portions of the existing private lease road. The nearest town, the Town of Collbran, is located approximately 8.5 mapped miles from the Laramie 0993-29-01.

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Pad Area	Acre Size	Square-Footage
Working Pad Surface	3.7	161,172
Area of Disturbance	8.3	361,548
Production Pad Surface	2.2	95,832

3. STATEMENT OF EXPERTISE – ECMC RULE 424.a.(1)

The Drilling Phase Lighting Site Plan and the Completions and Flowback Site Plan (**Appendix A and B**) was calculated and prepared by Citrine LLC (Citrine). Citrine has successfully completed dozens of lighting designs for projects ranging from oil & gas developments to commercial buildings. Citrine's senior electrical engineer, Jeff Abbate, has over 23 years of experience in lighting design; creating detailed lighting design drawings, technical specifications, photometric analysis, lighting studies, lighting surveys, and lighting energy audits. Mr. Abbate is a professionally licensed engineer in over 20 states, is qualified by the NFPA as a Certified Electrical Safety Compliance Professional and is an ASHRAE Certified Building Commissioning Professional.

The Laramie 0993-29-01 Light Mitigation Plan was developed in coordination with Laramie's Regulatory and Environmental Manager, Wayne P Bankert. Mr. Bankert has thirty-eight years' experience working in the natural gas utility with Federal oil and gas regulatory management with a degree in petroleum engineering. During the ECMC Training on April 6th, 2020, ECMC stated that the lighting specialist needed to have lighting experience in the industry but not a specific certification.

4. LIGHT MITIGATION PLAN COMPONENTS – ECMC RULE 424.a.(2)

Laramie anticipated lighting will only be utilized during drilling, completions, and flowback activities. The stated activities will result in a total of 112 days of lighting.

Activity Requiring Lighting	Time Interval (Days)
Drilling	72
Completions/Flowback	40
Total Days of Lighting	112

During these operational phases, personnel will be continuously present onsite. Laramie will minimize on-site lighting if personnel are not onsite.

5. PRE-PRODUCTION FACILITY LIGHTING PLAN – ECMC RULE 424.a.(2).A.

Pre-production activities will consist of initial grading, drill rig mobilization, drilling, completions, and flowback. Initial grading and drill rig mobilization will be completed during daylight hours. Pre-production lighting facility is detailed in Section 6 of the subject mitigation plan. Laramie anticipates continuous drilling, completions, and flowback

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operations in order to reduce the number of occupied pre-production days required to develop the proposed sixteen (16) new wells.

5.1. ADEQUATE LIGHTING - ECMC RULE 424.a.(2).A.i.

Sufficient lighting will be utilized during pre-production activities to ensure the safety of all personnel within the North Vega operations area on any active operations locations. Safety procedures, including lighting, are detailed in Laramie Health and Safety Manual.

5.2. PRE-PRODUCTION LIGHTING SPECIFICS - ECMC RULE 424.a.(2).A.ii.

Drilling activities will last for approximately 72 days. Helmerich and Payne, Inc. (H&P) provided lighting details for the drill rig that will operate at the Laramie 0993-29-01. Lighting utilized during drilling activities is stationed on the drill rig; therefore, the lighting is centered within the site perimeter and lighting is casted outward. For safety reasons, lighting may extend slightly beyond the site perimeter. Where possible, lighting will be directed downward and inward to avoid excess lighting beyond perimeter. The Drill Phase Lighting Site Plan and Diagram (**Appendix A**) was developed using photometric calculations to represent site-specific illumination levels for the Laramie 0993-29-01.

Specifications on drill rig lighting fixtures detailing anticipated location on the drill rig, height, light angle, and type of light fixtures are also provided in the Drill Phase Lighting Site Plan and Diagram.

During completions and flowback activities (approximately 40 days), the site will be lit to provide adequate lighting for personnel. Continuous completions will reduce the number of occupied days for completions from 56 days to 40 days. All lighting for completions and flowback operations will be cast downward and inward towards the center of the site. Lighting will not extend past the perimeter of the area of disturbance. Portable lighting equipment will be utilized during this phase. The Completions and Flowback Phase Light Site Plan, depicting the location of lighting equipment and light equipment specifications are provided in **Appendix B**.

5.3. TEMPORARY LIGHTING FOR SAFETY - ECMC RULE 424.a.(2).A.iii.

In the event that temporary lighting is required, lighting will comply with standards stated in this Lighting Plan and ECMC Rules 424.b. – 424.f when allowable. In the event of an emergency, Laramie will place a priority on personal safety and will adhere to Rule 424.a.(2).A.i. to ensure safety of those accessing and present at the site. Lighting safety standards are stated in Laramie Health and Safety Manual.

6. PRODUCTION FACILITY LIGHTING PLAN – ECMC RULE 424.a.(2).B.

Laramie does not anticipate the use or installation of lighting at the Laramie 0993-29-01 for the production phase. Production activities are conducted during daylight hours.

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7. LIGHTING STANDARDS – ECMC RULE 424.b.

Drilling, completions, and flowback activities will require lighting. Lighting is not required during the production phase. Lighting standards will apply to all lighting usage, including temporary lighting.

7.1. DIRECTION OF LIGHTING – ECMC RULE 424.b.(1).

During completions and flowback, lighting will be directed downward and inward. Lighting during the drilling will be casted outwards only on necessary points for safety considerations. Where possible, lighting will be directed downward and inward to avoid excess lighting beyond perimeter. Drill rig lighting will illuminate the entire drill rig, which is required for a safe working environment and adhering to ECMC Rule 424.a.(2).A.i.

7.2. LIGHTING BUFFERS - ECMC RULE 424.b.(2)

Laramie will utilize appropriate equipment to reduce light intensity outside the perimeter of the Laramie 0993-29-01. For drilling activities, the lighting may cast slightly along and outside the perimeter of the proposed well site for safety. Since the site will be graded along the perimeter it is vital for personnel accessing the site during drilling operations to see the edge of the pad. The extent of lighting outside the perimeter of the well site is displayed in **Appendix A and B**. Light intensity outside the site is minimal and reduces within a short distance from the well site perimeter.

8. PRE-PRODUCTION FACILITY LIGHTING – ECMC RULE 424.c.

Laramie will require lighting for pre-production activities, including drilling, completions, and flowback phases.

8.1. SAFETY – ECMC RULE 424.c.(1).

Sufficient lighting will be utilized to ensure the safety of all personnel at the Laramie 0993-29-01 Safety procedures, including lighting, are detailed in the Laramie Health and Safety Manual.

8.2. NOISE BARRIER – ECMC RULE 424.c.(2).

A noise barrier is not proposed for the well pad. The Laramie 0993-29-01 is surrounded by varying topography creating natural barriers to reduce potential impacts from pre-production lighting.

8.3. LIGHTING IMPACTS – ECMC RULE 424.c.(3)

- **Impacts on Residential Occupancy - Rule 424.c.(3).A**

No RBUs or HOBUs exist within one mile of the Laramie 0993-29-01 WPS.

- **Impacts on Motorists - Rule 424.c.(3).B.**

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The proposed well pad is located approximately 4,858 feet (mapped distance) from a public road, Highway 330. The well pad will be located approximately 1.7 access/travel miles from Highway 330. Highway 330 is the only public road within one mile of the proposed well pad. A private lease and access roads exist in the area surrounding the Laramie 0993-29-01 well pad. These private roads (located on Laramie owned surface and private owned surface) are maintained by Laramie and prohibit public access. Mountain ridges and varying topography provide a natural barrier to prevent potential light impacts to motorists.

Based on the Light Site Plan, no light will shine on the public road nor will light impact motorists. Lighting diminishes rapidly with distance and lights to prevent any impacts to motorists on public roads.

- **Impacts on Wildlife - Rule 424.c.(3).C**

The Laramie 0993-29-01 is partially located within a High Priority Habitat (HPH). Two mapped HPH exist within 2000 feet of the WPS: Elk Winter Concentration and Aquatic Sportfish Management Waters. There are no other mapped HPH areas within 2,000 feet of the well pad.

High Priority Habitat within a One-Mile Radius	
Species HPH	Distance to WPS (feet)
Elk Winter Concentration Habitat - RULE 1202.d.(2)	0
Aquatic Sportfish Management Waters - Rule 1202.c.(1).R	338

Elk Winter Concentration: There is the potential for lighting used during drilling and completions operations to impact elk during sensitive times of the year. A portion of the proposed well pad (2.1 acres of disturbance) would be located within an elk winter concentration area which is considered an HPH area. It is anticipated that lighting will be used on the location for 112 days. The proposed pad is located in an area of existing oil and gas infrastructure where human activity is ongoing year-round. Elk in this area have become somewhat habituated to human presence and activities in the vicinity of the project area; however, the proposed project has the potential to increase activity during sensitive times of the year for elk. Lighting used on-site will be directed inward and downward and based on the lighting plan prepared. Minimal light will shine beyond the pad perimeter. If drilling and completions activities occur during the winter months (December 1st through April 30th), Laramie will ensure that drilling activities begin before December 1st in order to avoid pushing elk out of this habitat area later in the winter season when it will be more difficult for them to relocate and find suitable winter forage and habitat. There are approximately 727.6 acres of mapped elk winter concentration habitat within 1-mile of the proposed well pad. Based on the availability of habitat in the surrounding area, it is anticipated that elk would relocate to other portions of the habitat during drilling and completions activities.

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All construction activities associated with the well pad would occur during daylight hours and during the late summer or early fall; therefore avoiding impacts to the HPH habitat for elk.

Aquatic Sportfish Management Waters: It is unlikely that lighting would impact aquatic wildlife species due to the distance, vegetation, and topographic screening between the well pad and these habitat areas.

9. PRODUCTION PHASE LIGHTING – ECMC RULE 424.d.

Laramie does not anticipate the use of lighting during the production phase at the Laramie 0993-29-01. Lighting will not be installed on the production pad surface. Historically, Laramie does not utilize lighting for production activities since personnel will access the site only during daylight hours. In the event of an emergency or foreseen event where the use of emergency lighting is required for safety, Laramie will adhere to lighting standards stated in 424.d.

9.1. SAFETY DURING PRODUCTION – ECMC RULE 424.d.(1)

Sufficient lighting will be utilized to ensure the safety of all personnel within the North Vega operations area. Production activities are conducted during daylight hours and will not require lighting. In the event of an emergency or foreseen event that may require lighting, Laramie will adhere to lighting standards stated in the Laramie 0993-29-01 Light Mitigation Plan and Health and Safety Manual.

9.2. PRODUCTION LIGHTING ZONE – ECMC RULE 424.d.(2)

Production activities are conducted during daylight hours and will not require lighting. In the event of an emergency or foreseen event, Laramie will adhere to lighting standards stated in the Laramie 0993-29-01 Pad Light Mitigation Plan. All emergency lighting will be directed towards the center of the pad and down-cast.

9.3. LOCAL ZONING – ECMC RULE 424.d.(3)

The Laramie 0993-29-01 is located in Mesa County, Colorado. Garfield County defines the subject parcel as Agricultural, Forestry, Transitional (AFT) zone district. Adjacent parcels to the subject parcel are zoned AFT. Existing uses of the surrounding area are natural resources extraction, national forest lands, and agricultural.

10. LIGHTING DURING NON-STAFFED HOURS – ECMC RULE 424.e.

Lights will only be utilized during drilling, completions, and flowback activities. The stated activities will result in a total of 112 days of lighting. During these operational phases, personnel will be present onsite. Continuous on-site lighting when personnel are not present will not be used. Only in the event of an emergency will temporary lighting be utilized during the production phase and only when personnel are present.

11. CUMULATIVE IMPACT - ECMC RULE 424.f.

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Cumulative light impacts are not anticipated as the well pad location is surrounded by varying topography and mountain ridges. Lighting will not be installed for production operations. No RBU's or HOBUs exist within 5,280 feet.

11.1. LIGHTING BMPS - ECMC RULE 424.b.(3)

Laramie will implement the following best management practices for lighting at the Laramie 0993-29-01. Lighting will be required for drilling, completions, and flowback activities. Production activities are conducted during daylight hours and will not require lighting.

BEST MANAGEMENT PRACTICES

Laramie will use low-glare or no-glare lighting and will conduct lighting inspections to confirm lighting fixtures are orientated correctly.

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 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 ECMC and county standards.

All redundant, unused, or not-needed light will be turned off.

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.

Equipment shall be operated and/or orientated in such a manner that lights 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.

Any lighting damaged and/or improperly directed or angled will be promptly fixed and/or corrected to conform to this lighting plan.

For work-place safety concerns, no direct or reflected direct light shall shine towards the entrance of the WPS.

During completions, all temporary light plants capable of adjustment will be angled downward and inward towards working areas on the WPS. Lights will be approximately 20 feet and direct downwards onto the pad surface.

LIST OF APPENDICES

Appendix A	Drilling Phase Lighting Site Plan and Diagram
Appendix B	Completions Phase Lighting Site Plan and Diagram

**Laramie 0993-29-01 Well Pad
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ECMC Rule 304.c.(3) and Rule 424**



Signature: Wayne P. Bankert

Date: **October 2, 2023**

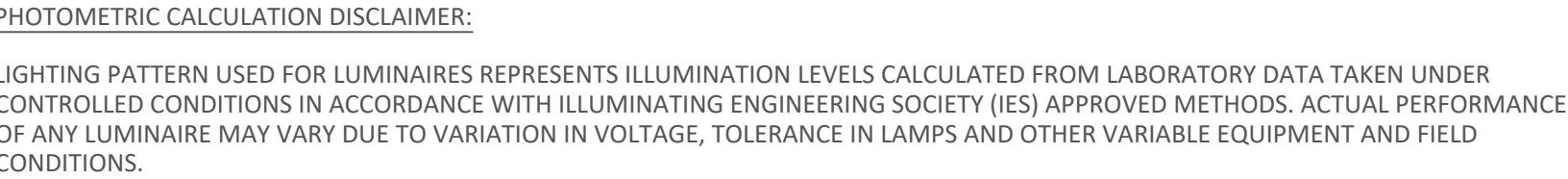
Wayne Bankert

Laramie Energy, LLC - Regulatory and Environmental Manager



Appendix A

Drilling Phase Lighting Site Plan



SITE TOTALS	
TOTAL LUMENS (ONE FOOT-CANDLE = 10.76 LUMENS)	578,386 LUMENS
SITE DISTURBANCE SQUARE FOOTAGE	361,548 SQ. FT
WORKING PAD SURFACE	161,172 SQ. FT
ILLUMINATION AT 1-MILE	<0.1 LUX
LUMINATION MAXIMUM PER ECMC RULE 424.F	4 LUX

TYPE	DESCRIPTION	MOUNTING HEIGHT FROM GROUND (LABEL)	FIXTURE COUNT	MOUNTING LOCATION	LUMENS PER FIXTURE	FIXTURE SUBTOTAL (LUMENS)
1	SAFESITE LED HIGHBAY 10750 LUMENS, MEDIUM DISTRIBUTION, DIFFUSED GLASS LENS, TILT AT 45°	9'-5" (HB-1)	14	ROOFTOP POLE MOUNTED	10,752	247,296
		16'-8" (HB-2)	9			
2	SAFESITE LED HIGHBAY 17250 LUMENS, MEDIUM DISTRIBUTION, DIFFUSED GLASS LENS, TILT AT 45°	37'-0" (HB-3)	4	RIG FLOOR DRILLER'S CABIN HIGH IN SUB LOW IN SUB ON MAST	17,253	172,530
		39'-5" (HB-4)	2			
		30'-0" (HB-5)	2			
		15'-0" (HB-6)	1			
		45'-0" (HB-7)	1			
3	PREMIUM SPEC LINEAR LED EXPLOSION-PROOF FIXTURE 9910 LUMENS, 5000K, GLASS LENS,TILT AT 45°	45'-125" (L-1)	16	ON MAST	9910	158,560



Rev	Description	Date	Drawn	Design	Check
0	ISSUED FOR REVIEW & APPROVAL	09/08/2023	CKP	CKP	JA

SITE LIGHTING ANALYSIS

SCALE	DWG NO.
AS NOTED	E-6001

PROJECT ADDRESS

LARAMIE 0993-29-01
NENE SECTION 29, TOWNSHIP 9 SOUTH,
RANGE 93 WEST, 6TH P.M., MESA COUNTY, CO



710 Kipling St,
Suite 406
Lakewood, CO 80215

2801 Grand Avenue
Grand Junction, CO 81501



Appendix B

Completions and Flowback Phase Site Plan

SPECIFICATIONS

ENGINE SYSTEM

- Mitsubishi® L3E
- Diesel fueled
- EPA Tier 4 Final
- 3 cylinder
- 0.95 L displacement
- Power @ 1,800 rpm – HP (kW):
 - Prime: 11.3 (8.4)
 - Standby: 12.2 (9.1)
- Air filter: Dry type cartridge



Picture shown may not reflect actual configuration.

MLT6SMDS

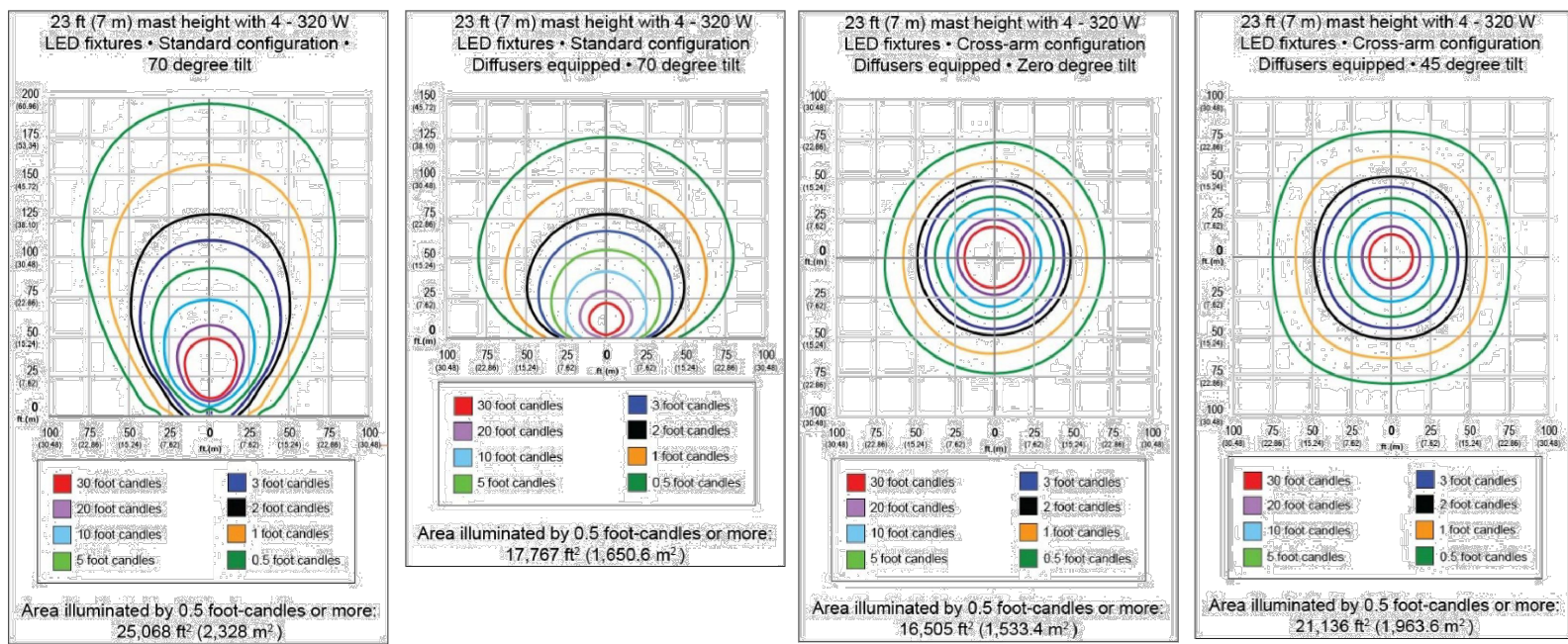
LED LIGHT TOWER

SPECIFICATIONS

FLOODLIGHTS

- Four 320 W LED fixtures
- Aluminum and polymer housing
- Efficiency: 147 l/w
- Lm/fixture: 47,000
- Total lm: 188,200
- Coverage at 0.5 ft-c: 25,068 ft² (2,329 m²)
- IP65 rated fixtures
- Fixture-mounted drivers

Illumination Data



ELECTRICAL SYSTEM

- 30 A start trip breaker (ensures no-load condition exists at start-up)
- Floodlight circuits with sealed 10 A breakers
- Convenience receptacles with individual breakers:
 - One 120 VAC, 20 A, GFCI, duplex outlet (NEMA 5-20R type)
 - One 240 VAC, 30 A, twistlock outlet (NEMA L14-30R type)
- Wiring is sized and fused to required amperage draw
- 440 CCA wet cell battery

MAST

- Vertical operation and storage
- Five tubular steel sections with polymer guides
- Ground-adjustable light fixtures
- Winch: Dual handle, manual crank
- Distinctive angled fixture mount for common light distribution
- Rotation: 359° range of motion, adjustable from ground during full extension
- Industrial black powder-coat finish
- Self-retracting, coiled mast cord, winch cover

LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	MOUNTING HEIGHT FROM GROUND (LABEL)	FIXTURE COUNT	MOUNTING LOCATION	LUMENS PER FIXTURE	FIXTURE SUBTOTAL (LUMENS)
4	MLT6 LED LIGHT TOWER, FOUR 320W LED FIXTURES, TILT AT 45°	21'-0" O.C.	4	ON MAST	47,000	188,200



Rev	Description	Date	Drawn	Design	Check
0	ISSUED FOR REVIEW & APPROVAL	09/08/2023	CKP	CKP	JA

TITLE

SITE POST-DRILLING LIGHTING ANALYSIS

SCALE AS NOTED
DWG NO. E-6004

PROJECT ADDRESS

LARAMIE 0993-29-01
NENE SECTION 29, TOWNSHIP 9 SOUTH,
RANGE 93 WEST, 6TH P.M., MESA COUNTY, CO



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