



# City of Elkins Public Safety Committee Meeting

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November 4, 2024

10:00 AM

Phil Gainer Community Center  
142 Robert E. Lee Ave. Ext.

**Charter Authority of the Public Safety Committee:** Monitor and report to council on the activities of, condition of and proposed plans for municipal public safety assets, including police, fire, and emergency services. Review and propose to Council capital investment in public safety equipment and infrastructure.

## AGENDA

1. **Call to order and roll call**
2. **Public comment**
3. **Minutes**
  - a. Proposed minutes for the meeting of October 7, 2024
4. **Reports**
5. **New business**
  - a. Pedestrian crossing near Art Center
6. **Announcements**
7. **Adjournment**



## CITY OF ELKINS AGENDA ITEM REPORT

<b>Meeting Date:</b>	November 4, 2024
<b>Section:</b>	Minutes
<b>Category:</b>	Action Item
<b>Agenda Item Name:</b>	Proposed minutes for the meeting of October 7, 2024
<b>Recommended By:</b>	City Clerk
<b>Summary:</b>	Minutes proposed for the committee's October 7 meeting
<b>Fiscal Impact:</b>	n/a
<b>Recommendation:</b>	Consider for approval
<b>Attachments:</b>	1. Public Safety - 2024_10_07 - minutes_proposed

**PUBLIC SAFETY COMMITTEE  
REGULAR MEETING  
MINUTES**

*401 Davis Avenue  
City Hall, Council Chambers  
October 7, 2024  
10 a.m.*

Present were members: D. Parker (Chair) and L Severino.

E. Plishka was absent.

Also present were: Jerry Marco (mayor), Mike Kesecker (operations manager), Gerry Roberts (city attorney), Tracy Judy (treasurer), Steve Himes (fire chief), Travis Bennett (police chief), and L. Roberts (recording secretary).

**MINUTES**

Severino **MOVED APPROVAL OF THE MINUTES OF THE MEETING OF JULY 1, 2024.** The motion carried.

**PRESENTATIONS**

**REPORTS**

The committee heard reports concerning the Police, Fire, and Operations Departments.

The meeting adjourned at 10:41 a.m.

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Name & Title

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Signature



## CITY OF ELKINS AGENDA ITEM REPORT

<b>Meeting Date:</b>	November 4, 2024
<b>Section:</b>	New business
<b>Category:</b>	Action Item
<b>Agenda Item Name:</b>	Pedestrian crossing safety near Art Center
<b>Recommended By:</b>	Councilor Bross-Fregonara
<b>Summary:</b>	<p><i>This item is being revisited. It was last considered in April. The summary from that meeting is pasted below.</i></p> <hr/> <p>Councilor Bross-Fregonara reports significant constituent interest in a lighted pedestrian crossing signal on Randolph Avenue at Park Street.</p> <p>From Councilor Bross-Fregonara:</p> <p><i>Installing a pedestrian, on-demand solar crosswalk light</i></p> <p>The committee is well aware that the need is great for an on-demand pedestrian crosswalk at the Art Center intersection. I continue to be asked about this by Wees Neighborhood residents and never have an answer as to why this has not happened. DOH will approve, but the city needs to pay for it. This is such a dangerous intersection. Estimates and possible vendors have been submitted to Operations before and are attached.</p> <p>There is always an argument that DOH won't permit them. They will. In a communication from John Monk (from 2022!) installing the flasher light is possible.</p> <p>"The general policy that the WVDOH follows is that the DOH will install the warning signs only. Signs alone are considered adequate by the MUTCD (Manual on Uniform Traffic Control Devices) however if a city, company, school, etc. decides that they want to supplement warning signs with the addition of a flasher, the WVDOH can grant them a permit. The organization must do this at their expense and the flasher must be in accordance with the MUTCD and WVDOH specifications and guidelines. Basically the WVDOH's participation in the installation of "Warning Flashers" consist of furnishing the WARNING signs, along with plans and specifications for the remainder of</p>



## CITY OF ELKINS AGENDA ITEM REPORT

	<p>the installation. We also issue the necessary permits and check the completed work. E-mail or call me if you have any questions. Thank you, John D. Monk, P.E. WVDOH"</p> <p>Funding such a fixture should be priority. With the increased activity downtown, traffic, young families with children. This should be funded, utilizing a small portion of the sustainability fund. I would like to see this happen before someone is struck by a vehicle.</p>
<b>Fiscal Impact:</b>	TBD
<b>Recommendation:</b>	Consider for recommendation to staff and/or council
<b>Attachments:</b>	<ol style="list-style-type: none"> <li>1. 10021723-1 Nanci Bross-Fregonara Carmanah RRFBs (1)</li> <li>2. 10021723-2 Nanci Bross-Fregonara Carmanah Crosswalk Beacon Flashers (1)</li> <li>3. Carmanah_DATA_R920-E_RevU</li> <li>4. R920-E_11RandolphAve_Elkins_24Jan2023</li> </ol>

# Mobotrex

1550 STANDING RIDGE DRIVE. POWHATAN, VA 23139  
804-794-1592 FAX 804-379-1016

## QUOTATION 10021723-1

February 17, 2023

**TO: Nanci Bross-Fregonara  
Elkins City Council**

**RE: Carmanah RRFBS**

Mobotrex is pleased to provide the following quotation. Quotations are subject to acceptance within 45 days. Mobotrex makes every effort to insure that the materials quoted are per appropriate plans and specifications; however, the Customer is solely responsible for determining final acceptability of materials for the intended use.

FREIGHT: Standard freight Included

ITEM	DESCRIPTION	QTY	PRICE EA	EXTENDED
Carmanah R920-F RRFB	Includes: -R920-F Solar Engine (84662) -Top of Post Hardware (86328) -(2) Batteries (37912) -(2) Lightbars (87670) -(2) Lightbar Harnesses (78227) -Polara iNX Audible Pushbutton with R10-25 Sign (89070) -Pushbutton Harness (89119) -(2)30"X30" W11-2 PED Crossing Sign (90401) -(2) 24"X12" W16-pL & W16-pR Arrow Signs (90405) & (90404)	2	6,250.00	12,500.00
Pelco Pole	Pelco 14' Sch40 Alum pole with Base, Collar, and Anchor Bolts	2	980.00	1,960.00
	Taxes added as applicable			
			<b>TOTAL</b>	<b>\$14,460.00</b>

### NOTES:

### TERMS AND CONDITIONS

**Any sale resulting from this quotation shall be accepted on the following TERMS and CONDITIONS**

**of SALE:** 1- Before using, the customer shall determine the suitability of the materials for the intended use, including the gaining of all required approvals, and assumes all risk and liability in connection therewith.

2- Mobotrex retains title to all materials until paid in full. Payment is due upon receipt of the material. Payments not received within 30 days shall be charged 1.5% (18% APR) per month until paid in full. All legal and collection fees incurred by Mobotrex associated with such effort shall be paid by customer.

3- Mobotrex shall not be held liable for any injury, or damages either direct or consequential arising out of the use, or the inability to use the materials provided by Mobotrex.

4- No statement, terms, or recommendations not contained herein shall have any affect unless contained in an agreement signed by an officer of Mobotrex.

***Thank you for contacting Mobotrex***

Jason Atteberry  
Jatteberry@mobotrex.com

# Mobotrex

1550 STANDING RIDGE DRIVE. POWHATAN, VA 23139  
804-794-1592 FAX 804-379-1016

## QUOTATION 10021723-2

February 17, 2023

**TO: Nanci Bross-Fregonara  
Elkins City Council**

**RE: Carmanah Crosswalk Beacon Flashers**

Mobotrex is pleased to provide the following quotation. Quotations are subject to acceptance within 45 days. Mobotrex makes every effort to insure that the materials quoted are per appropriate plans and specifications; however, the Customer is solely responsible for determining final acceptability of materials for the intended use.

FREIGHT: Standard freight Included

ITEM	DESCRIPTION	QTY	PRICE EA	EXTENDED
Carmanah R820-F Crosswalk Beacon Flasher	Includes: -R820-F Solar Engine (84666) -Top of Post Hardware (86328) -(2) Batteries (37912) -(2) Poly Signal Heads with LEDs (49676) & (84296) -(2) LED Harness 16' (84390) -(2) Sets of Mounting Hardware for Signal Heads (79348) -Polara iNX Audible Pushbutton with R10-25 -Pushbutton Harness (89119) -(2)30"X30" W11-2 PED Crossing Sign (90401) -(2) 24"X12" W16-pL & W16-pR Arrow Signs (90405) & (90404)	2	6,125.00	12,250.00
Pelco Pole	Pelco 14' Sch40 Alum pole with Base, Collar, and Anchor Bolts	2	980.00	1,960.00
	Taxes added as applicable			
			<b>TOTAL</b>	<b>\$14,210.00</b>

**NOTES:**

**TERMS AND CONDITIONS**

**Any sale resulting from this quotation shall be accepted on the following TERMS and CONDITIONS of SALE:** 1- Before using, the customer shall determine the suitability of the materials for the intended use, including the gaining of all required approvals, and assumes all risk and liability in connection therewith.

2- Mobotrex retains title to all materials until paid in full. Payment is due upon receipt of the material. Payments not received within 30 days shall be charged 1.5% (18% APR) per month until paid in full. All legal and collection fees incurred by Mobotrex associated with such effort shall be paid by customer.

3- Mobotrex shall not be held liable for any injury, or damages either direct or consequential arising out of the use, or the inability to use the materials provided by Mobotrex.

4- No statement, terms, or recommendations not contained herein shall have any affect unless contained in an agreement signed by an officer of Mobotrex.

***Thank you for contacting Mobotrex***

Jason Atteberry  
Jatteberry@mobotrex.com

# R920-E

## Solar-Powered Rectangular Rapid Flashing Beacon Data Sheet



Rectangular rapid flashing beacons (RRFBs) improve pedestrian safety by increasing yield rates to 72-96% at crosswalks\*:

- ✓ The benchmark for RRFBs, the R920-E meets MUTCD requirements, including IA-21, and is Buy America compliant
- ✓ Compact and lightweight solar engine
- ✓ Audible pushbutton activation with all ADA compliance features
- ✓ Solar Power Report™ (SPR) prepared for every location to ensure battery longevity

### Superior Design and Technology

The R920-E utilizes a self-contained solar engine integrating the Energy Management System (EMS) with an on-board user interface, housed in a compact enclosure together with the batteries and solar panel. MUTCD interim approval IA-21 flash pattern and multiple configurations enable the R920-E to handle all crosswalk applications.

### Easy Installation

With its highly efficient and compact design, installation is quick and uncomplicated, dramatically reducing installation costs. Retrofitting can be done where existing sign bases are used to enhance existing marked crosswalks in minutes, and new installations can be completed without the cost of larger poles, new bases, and trenching.

### Advanced User Interface

The R920-E comes with an on-board user interface for quick configuration and status monitoring. It allows for simple in-the-field adjustment of flash pattern, duration, intensity, ambient auto adjust, night dimming, and many more. Settings are automatically sent wirelessly to all units in the system.

### Reliable

Every solar-powered model is solar-sized by location to ensure year-after-year operation. Carmanah includes a Solar Power Report to prove sustainability over a 12-month period.



MUTCD compliant



Buy America compliant



5-year limited warranty



Solar-sized for every location

\* U.S. Department of Transportation Federal Highways Administration, Publication No. FHWA-HRT-10-043 - "Effects of Yellow Rectangular Rapid-Flashing Beacons on Yielding at Multilane Uncontrolled Crosswalks"

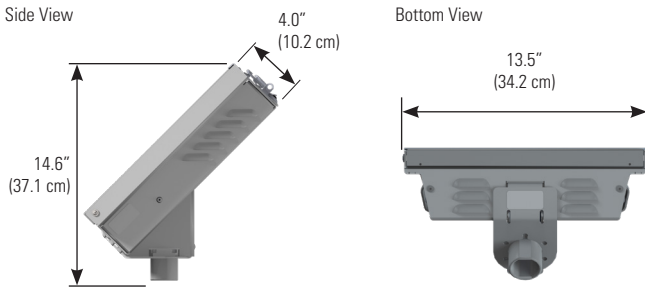
# R920-E

## Solar-Powered Rectangular Rapid Flashing Beacon Data Sheet

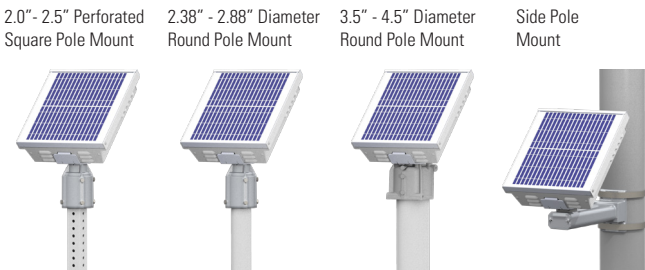
1.844.412.8395 | traffic@carmanah.com | carmanah.com



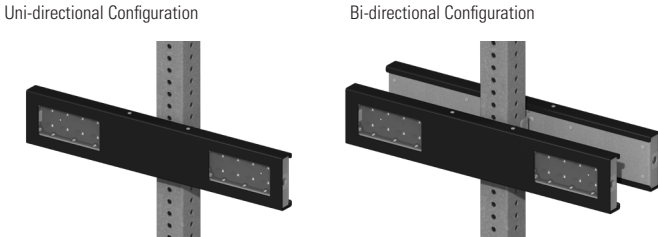
### SOLAR ENGINE DIMENSIONS



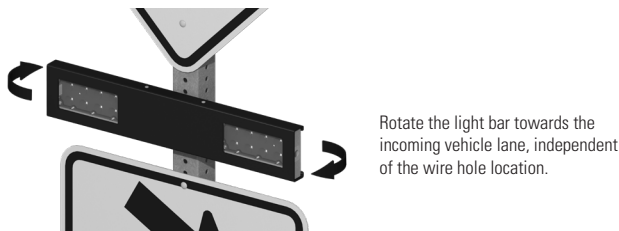
### SOLAR ENGINE MOUNTING



### LIGHT BAR CONFIGURATION



### IN-THE-FIELD AIMING



### BEACON SPECIFICATIONS

Optical	MUTCD interim approval IA-21 and MUTCDC compliant
	Purpose-built light bar optics = maximum efficiency and no stray light Exceeds SAE J595 class 1 intensity by 2.5 to 3x when used as recommended Meets SAE J578 chromaticity
	3 in (76 mm) x 7 in (178 mm) clear, UV-rated polycarbonate lens with yellow LEDs
	High-power LEDs: +90% lumen maintenance (L90) based on IES LM-80
	Side-emitting pedestrian confirmation LEDs
	Independent, stainless steel mounting brackets make back-to-back installation simple and enable in-field aiming for maximum effectiveness
	Yellow, black, or green powder coated light bar covers

### SYSTEM SPECIFICATIONS

On-Board User Interface (OBU)	Adjustable system settings with auto-scrolling LED display on our latest EMS
	System test, status, and fault detection: battery, solar, button, beacon, radio, day/night
	Flash patterns: RFB (WW+S), RFB1 (WW+S legacy), RFB2 (WSDOT), 0.5 sec. alternating (MUTCD), 0.5 sec. unison (MUTCD), 0.5 sec. x3 alternating (MUTCD), 0.1 sec. unison, 0.25 sec. unison, 0.1 sec. x3 quick flashes unison, 0.1 sec. x3 quick flashes alternating, steady on
	Input: momentary for pushbutton activation, normally open switch, normally closed switch, dusk-to-dawn operation
	Flash duration: 5 sec. to 1 hr.
	Intensity setting: 20 to 1400 mA for multiple RRFBS, circular beacons, or LED enhanced signs
	Nighttime dimming: 10 to 100% of daytime intensity
	Ambient Auto Adjust: increases intensity during bright daytime
	Automatic Light Control: reduces intensity if the battery is extremely low
	Temperature correction: yellow beacons
Beacon Communication	Calendar: internal time clock function
	Radio settings: enable/disable, selectable channel from 1 to 14
	Output: enabled when beacons flashing daytime and nighttime, or nighttime only
	Activation counts and data reporting via OBU or optional USB connection
	Encrypted, wireless radio with 2.4 GHz mesh technology
	Wireless update of settings from any unit to all systems on the same radio channel
	User-selectable multiple channels to group different beacons and ensure a robust wireless signal
	Communicates with all other Gen III radio-enabled systems including our R820-E, -F, and -G circular beacons
	Instantaneous wireless activation: <150 ms
	Wireless range: 1000 ft (305 m)
Energy Collection	Integrated, vandal-resistant antenna
	15 W high-efficiency photovoltaic solar panel
	45 deg tilt for optimal energy collection
	Maximum Power Point Tracking with Temperature Compensation (MPPT-TC) battery charger for optimal energy collection in all solar and battery conditions
Energy Storage	12 V 14 Ahr. battery system
	Replaceable, recyclable, sealed, maintenance-free, best-in-class AGM batteries offer the widest temperature range and longest life
	Battery design life: +5 yrs.
	Tool-less battery change with quick connect terminals and strapping for easy installation
Solar Engine Construction	Weatherproof, gasketed enclosure with vents for ambient air transfer (NEMA 3R)
	Lockable, hinged lid for access to on-board user interface and batteries
	Corrosion-resistant aluminum with stainless steel hardware
	Raw aluminum finish or yellow, black, or green powder coated
	Prewired to minimize installation time
Environmental	High-efficiency optics and EMS = the most compact, lightweight system
	19 lb (8.6 kg) including batteries, excluding beacons and pushbutton
	-35 to 165° F (-37 to 74° C) system operating temperature
	-40 to 140° F (-40 to 60° C) battery operating temperature
	150 mph (241 kph) wind speed as per AASHTO LTS-6
Activation	Pushbutton: ADA-compliant, piezo-driven with visual LED and two-tone audible confirmation
	Audible pushbutton station: ADA-compliant, piezo-driven with visual LED and customizable voice message confirmation
<b>Warranty</b>	<b>5-year limited warranty, 1-year limited on batteries</b>
Customize	<a href="#">Build an RRFB online</a>

Specifications subject to local environmental conditions, and may be subject to change.

All Carmanah products are manufactured in facilities that are certified to ISO quality standards. "Carmanah" and Carmanah logo are trademarks of Carmanah Technologies Corp.

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Document: Carmanah\_DATA\_R920-E\_RevU

**RECOMMENDED SYSTEM:**

To meet the performance requirements at 11 Randolph Ave Elkins, WV, Carmanah recommends the R920-E system.

**Key Parameters Considered:**

- Maximum number of expected pedestrian activations (day and night, constant across months)
- The duration of the flashing signals following an activation
- Worst month\*\* (month with least sunlight, coldest temp, and highest RRFB load over 24 hours)

\*\*See glossary of terms on page 4 for clarification

**Recommended System:**
**R920-E**
**Location: 11 Randolph Ave Elkins, WV**
**System Configuration:**

Solar Panel (Watts)	15
Solar Panel Orientation	South
Battery Capacity (Amp-Hours)	14
<b>Fixture 1 Color and Type:</b>	Yellow Light Bar
Number of Fixtures	2
EMS Intensity Setting	320mA
Per-Fixture Output Intensity	1555cd
Fixture Flash Pattern	RRFB
Number of Push Buttons	1
Flash Duration Setting (sec)	20

**System Activation Method:**

Passive Detection	None
Push Button Model	Polara iNX

**Other Devices:**

None

**Weather Data:**

Worst Month	December
Peak Sun Hours (monthly average value)	2.49
Minimum Temperature (22-yr. average min.)	30.83°F / -0.65°C

**Additional Notes:**

Adjusted Battery Capacity due to Cold Temperature	81%
Sunlight Available after Shading is Applied	60%

**Performance Summary for Worst Month**

Energy In (Watt-Hours)	<b>14.9</b>
Activations Per Day	<b>300.0</b>
Energy Out (Watt-Hours)	<b>10.5</b>
Autonomy (Days)	<b>11.7</b>
Array-to-load Ratio (ALR)	<b>1.4</b>
24-Hour Battery Usage - Depth of Discharge (%)	<b>3.2%</b>
Maximum Daily Activations in Worst Month	<b>420</b>



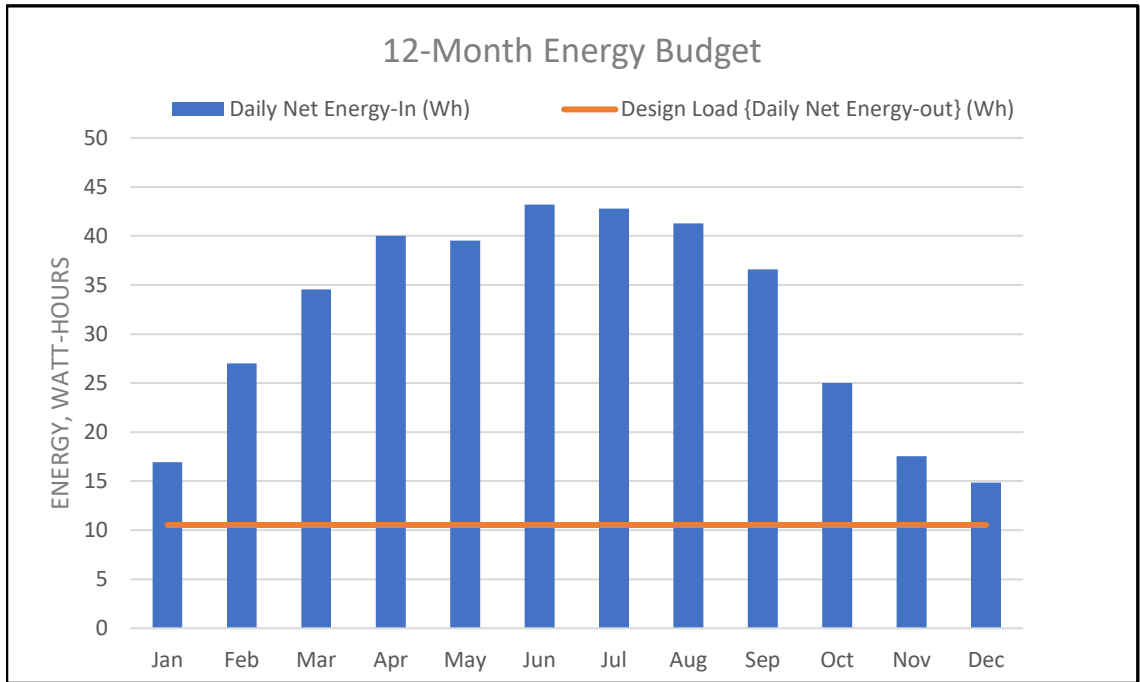
\*See page 3 for in-depth system details


**Sun Path and Shading**

"The image on the left depicts the sun's path during the worst month\*. Both the sun's path and shading affect the amount of available energy and determines the size and performance of the system.

Solid objects such as buildings block most light, while the effect of other objects – like trees, depending on their type and time of year– varies."

**Location Shade De-rating:** **40%**

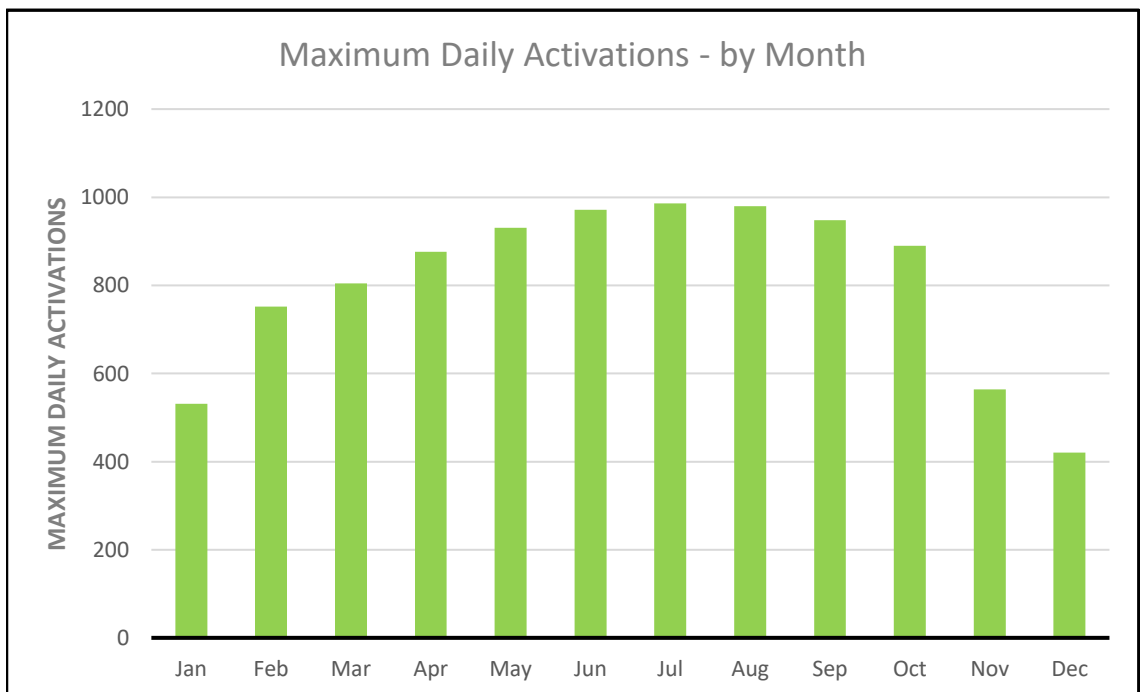

**12-Month Energy Budget:**

**Blue bars:** Energy available to run the system and charge the batteries (energy-in\*).

**Red line:** system load (energy-out\*) due to pedestrian or other system activation.

**Minimum Array-to-Load Ratio:** **1.4**

**System:** R920-E  
**Activations Per Day:** 300  
**Flash Duration Setting (sec):** 20


**Maximum Daily System Activations:**

Green bars: Maximum number of daily activations the system can support per month.

The red line on the chart above shows the simulation "design load"

The maximum number of activations will be capped when either the minimum array-to-load ratio (ALR) or, the minimum allowable autonomy value has been reached. See Glossary Page 4.

**ENERGY-IN CALCULATION:**

Rated Panel Wattage (W)	15	
Worst Month Peak Sun Hours (h)	2.49	Sun Hours at 45° tilt angle worst month = December
Effective Shading (%)	60%	100% is full sun. Based on worst month = December
Peak Sun Hours Adjusted for Shading (h)	1.50	
Solar Panel Energy Pre-Battery Charger (Wh)	22.45	
Solar Panel Charge Efficiency (%)	92%	Operating specification
Battery Charge Acceptance	72%	Value based on battery manufacturer's specifications
<b>Energy Into the Battery (Watt-Hours)</b>	<b>14.9</b>	

**ENERGY-OUT CALCULATION:**

Average Fixture Power Day Operation (W)	1.28	Operating specification
Ambient Auto-Adjust Maximum (%)	100%	Operating specification
Night Dimming (%)	30%	User-adjustable setting
Percentage of Activations During Day (%)	90%	Input variable
Average Fixture Power w/ Night Dim (W)	0.38	Calculated operating specification
Number of Fixtures	2	Input variable
LED Driver Efficiency (%)	95%	Lab-measured driver efficiency
<b>Activations Every 24 Hours</b>	<b>300.0</b>	Input variable per specification
Activation Time (Seconds)	20	Input variable per specification
Total Fixture Consumption (Wh)	3.289	Calculated operating specification
EMS Quiescent Current (Amps)	0.00796	Operating specification
24-hour Quiescent Energy Consumption (Wh)	2.29	24 hours x 12V battery voltage x sum of quiescent currents
Polaris iNX Consumption (Wh)	4.95	
Passive Detection Consumption (Wh)	0.00	Includes quiescent and active output with button press
<b>Total 24-hour Energy Consumption (Wh)</b>	<b>10.5</b>	Quiescent, fixture(s) and other loads

**SYSTEM AUTONOMY:**

Battery Capacity (Ah)	14	Operating specification - room temperature
Battery Low Voltage Disconnect (%)	10%	Operating specification
Battery Capacity (Wh)	151.2	Battery capacity (Ah) X 12 Volts X (1 - Battery LVD %)
Battery Capacity Temperature De-rate Amount	81%	Reduced capacity due to temperature effects
Temperature-Adjusted Battery Capacity (Wh)	123.0	Battery capacity X temperature de-rating factor
Total Daily Energy Consumption (Wh)	10.53	Restated from above
<b>Autonomy (Days)</b>	<b>11.7</b>	Adjusted battery capacity / daily energy consumption

**ARRAY TO LOAD RATIO:**

Energy Into the Battery (Wh)	14.87	Energy-in through the solar panel and EMS
Total Daily Energy Consumption (Wh)	10.53	Energy-out through the system
<b>ALR (Energy In / Energy Out)</b>	<b>1.4</b>	Recommended minimum = 1.2

**DAILY DEPTH OF DISCHARGE:**

Nominal Battery Capacity (Wh)	168	Battery capacity (Ah) x battery voltage (12V)
Daytime Energy drawn from Battery (Wh)	0.89	Energy-out through the system - daytime activations
Nighttime Energy drawn from Battery (Wh)	4.45	Energy-out through the system - nighttime activations
Total Energy Provided by Battery Only (Wh)	5.35	Total energy battery supplies system during a 24-hr cycle
<b>24-Hour Battery Usage - Depth of Discharge %</b>	<b>3.2%</b>	Daily Cyclical Battery Capacity Used

## Glossary

**12-Month Energy Budget:** The amount of daily energy available during any month to run the system and charge the batteries plotted against the amount of daily energy used for a specified usage model - the "design load".

**Hours per Day:** The number of hours during the day that the beacons are flashing in response to a control signal from a time switch or other device.

**Array-to-Load Ratio (ALR):** Defined as the total system energy consumption (Energy-Out) divided into the net energy available to the system (Energy In) on a day during the worst month. It is an accepted industry practice to specify a minimum ALR of 1.2:1 in order to account for variability of sunlight energy over time. Providing a sufficient ALR will help ensure that the batteries will return to a full-state of charge at the end of each charging day.

**Autonomy:** The length of time (in days) that a system can function without sunlight (insolation). For autonomy calculations, net battery capacity is adjusted for the effect of temperature (during the worst month of sunlight) and low-voltage-disconnect (LVD) (see LVD definition below). Note: Temperature data used, is the average minimum recorded temperature over a 22-year period for the "worst month". These are averages - not absolute minimums. Source: NASA

**Battery Depth of Discharge:** The percentage of battery capacity used on a daily basis. This value considers times when sunlight can power LED fixtures directly, eliminating the need to draw from the battery. For lead-acid batteries, reducing the depth of discharge dramatically improves battery life. **Note:** For a system activated during the daytime only, the battery will power the system during dawn and dusk when insolation levels are lowest.

**Daily Quiescent Energy:** The passive energy drawn (measured in watt-hours) by a system when it is idle. This includes the power draw of the main circuit board (EMS), a time switch (if present), and any other devices.

**Energy-In:** The total amount of useable energy collected by the solar panel during a 24-hour period. This value accounts for efficiencies between the solar panel and the battery, as well as shade de-rating. Efficiencies related to the charge controller and battery-charge acceptance are also factors.

**Energy-Out:** The total energy used by a system in a 24-hour period based on the stated number of activations per day. It includes Daily Quiescent Energy (see definition above)

**Low-Voltage-Disconnect (LVD):** The voltage at which the system will not flash when activated. LVD is a temporary state and is the result of too little sunlight or too many activations. LVD ensures that a minimal charge is retained in the battery to enable system recovery and to protect against permanent battery damage.

**Location Shade De-Rating:** Percentage of available sunlight blocked by buildings, trees and other objects. This factor is specific to the end user's site, which is why a system is always optimally sized when its exact final installation location is known or can be simulated.

**Worst Month:** The month with the least sunlight, coldest temperatures, and highest system load over 24 hours.

Note: Temperature data used, is the average minimum recorded temperature over a 22-year period for the "worst month". These are averages - not absolute minimums. Source: NASA

**Energy Management System (EMS):** The control module inside the Carmanah Solar Traffic Product responsible for all aspects of energy

### Disclaimer:

Access to Carmanah's solar sizing tool and the Solar Power Report is provided to you for informational purposes only. Carmanah expressly disclaims all representations and warranties with respect to such tool and report, including, without limitation, that they will meet your requirements, achieve any intended results, or be error-free. By using such tool and report, you agree and understand that solar simulations are estimates based on historical data only and cannot be relied upon as representations of future performance. Factors such as (without limitation): the presence of buildings, trees, and other obstacles; the direction of the installed solar panel; added third-party equipment; and any improper maintenance of solar panels and batteries, may dramatically affect our product's performance and lifespan. Your use of the solar sizing tool, Carmanah's website, and the report and other material generated by them, are subject to our Terms of Use, which can be found at <https://carmanah.com/policies/website-terms-of-use/>