

PURCHASING DIVISION
CITY OF WORCESTER
MASSACHUSETTS 01608-1895
ROOM 201 - CITY HALL, 455 MAIN ST.
PHONE (508) 799-1220

SEALED BID INVITATION
(Supplies, Material, Equipment, Services)

AN EQUAL OPPORTUNITY AFFIRMATIVE ACTION EMPLOYER

SEALED BID NO. CR-7838-W3

DATE: June 14, 2022

CITY OF WORCESTER
Christopher J. Gagliastro, MCPPO
Purchasing Agent

BUYER: Chris Gagliastro

NOTICE TO BIDDERS
TERMS AND CONDITIONS

All bids are subject to the terms and conditions and specificity herein set forth except where specifically deleted by the City of Worcester in Section No. 6 below.

COMPLETE ORIGINAL COPY (including ALL pages) OF THIS BID MUST BE SUBMITTED IN A SEALED ENVELOPE:

DATE: July 6, 2022 TIME: 10:00 A.M. LOCAL TIME

PLACE: Purchasing Division, Room 201, City Hall, Worcester, Massachusetts

MARK SEALED ENVELOPE "Sealed Bid No. CR-7838-W3, Solar Rectangular Rapid Flashing Beacons/DPWP"

The name and address of the bidder must appear in the upper left hand corner of the envelope. The City of Worcester is not responsible for bids not properly marked.

GENERAL

1. This Bid Invitation covers: Furnish and deliver solar rectangular rapid flashing beacons as per the attached requirements and specifications for the City of Worcester Department of Public Works for a one-year period from August 12, 2022 through August 11, 2023. This contract may be renewed for a second and third one (1) year period at the same rate, at the sole discretion of the City of Worcester (see page10).
2. A certified check or bid bond made payable to the "City Treasurer, City of Worcester" in the Amount of \$ N/A must accompany this bid.
3. All bids received will be publicly opened and read in the Bid Room at City Hall at date and time shown above. **NO BID WILL BE ACCEPTED AFTER TIME AND DATE SPECIFIED**
4. A performance bond in the amount of \$ N/A of the total dollar award is required.
5. A payment bond in the amount of \$ N/A of the total dollar award is required.
6. All terms and conditions are applicable to this proposal except the following section numbers which are hereby deleted from this invitation: 39-43.
7. **Questions pertaining to this bid must be directed to Chris Gagliastro via email at gagliastroc@worcesterma.gov**
8. The following meanings are attached to the defined words when used in this bid form.
 - a. The word "City" means The City of Worcester, Massachusetts.
 - b. The word "Bidder" means the person, firm or corporation submitting a bid on these specifications or any part thereof.
 - c. The word "Contractor" means the person, firm or corporation with whom the contract is made by carrying out the provisions of these specifications and the contract.
 - d. The words "Firm Price" shall mean a guarantee against price increases during the life of the contract.

9. Any prospective bidder requesting a change in or interpretation of existing specifications of terms and conditions must do so within five (5) days (Saturdays, Sundays and Holidays excluded) BEFORE scheduled bid opening date. All requests are to be in writing to the Purchasing Division (or e-mailed at: marvillk@worcesterma.gov) and are to be in duplicate. No changes will be considered or any interpretation issued unless the request is in our hands within five (5) days (Saturdays, Sundays and Holidays excluded) BEFORE scheduled bid opening date.
10. The contractor will be required to indemnify and save harmless the City of Worcester, for all damages to life and property that may occur due to his negligence or that of his employees, subcontractors, etc., during this contract.
11. The Contract Agreement will be in the form customarily employed by the City of Worcester and is on file in the Purchasing Division at City Hall.
12. Bids which are incomplete, not properly endorsed, or signed, or otherwise contrary to these instructions will be rejected as informal by the Purchasing Agent. **Conditional bids will not be accepted.**
13. The Bidder must certify that no official or employee of the City of Worcester, Massachusetts is pecuniarily interested in this proposal or in the contract which the bidder offers to execute or in expected profits to arise therefrom, unless there has been compliance with provisions of G.L. C. 43 Sec. 27, and that this bid is made in good faith without fraud or collusion or connection with any other person submitting a proposal.
14. As the City of Worcester is exempt from the payment of Federal Excise Taxes and Massachusetts Sales Tax, prices quoted herein are not to include these taxes.
15. All prices are to be firm F.O.B. Destination, City of Worcester, Massachusetts, unless otherwise indicated by the City.
Time reserved for award is ninety days.
16. In case of error in the extension prices quoted herein, the unit price will govern.
17. It is understood and agreed that should any price reductions occur between the opening of this bid and delivery of any order, the benefit of all such reductions will be extended to the City.
18. The City of Worcester reserves the right to reject any and all bids, wholly or in part, and to make awards in a manner deemed in the best interest of the City.
19. Awards will be made to the bidder quoting the lowest net price in accordance with the specifications.
20. The supplier will be bound by all applicable statutory provisions of law of the Federal Government, the Commonwealth of Massachusetts, the City of Worcester, and the Department of Public Safety of the Commonwealth of Massachusetts.
21. Any bid withdrawn after time and date specified, the bidder shall forfeit deposit on bid as liquidated damages.
22. The contractor will not be permitted to either assign or underlet the contract, not assign either legally or equitably any monies hereunder, or its claim thereto without the previous written consent of the City Treasurer and of the Purchasing Agent of the City of Worcester.
23. If this bid shall be accepted by the City, and the bidder shall fail to contract as aforesaid and to give a bond in the amount as specified in Section 4, within ten (10) days, (not including Sunday or a legal Holiday) from the date of the mailing of a notice from the City to him/her, according to the address given herewith, that the contract is ready for signature, the City may by option determine that the bidder has abandoned the contract and thereupon the proposal and acceptance shall be null and void and the bid security accompanying this proposal shall become the property of the City as liquidated damages.
24. When quoting, the bidder shall submit a signed copy of this bid form, and if bid accepted by the City shall constitute part of the contract of purchase. Do not detach any part of this form 30B (Sealed Bid Goods & Services) when submitting a bid. Bidder must sign and return complete form 30B (Sealed Bid Goods & Services).
25. If in the judgment of the Purchasing Agent any property is needlessly damaged by an act or omission of the contractor or his/her employees, servants or agent, the amount of such damages shall be determined by the Purchasing Agent of the City of Worcester and such amount shall be deducted from any money due the contractor or may be recovered from said contractor in actions at law.

26. It is agreed that deliveries and/or completion are subject to strikes, lockouts, accidents and/or Acts of God.

INSURANCE AND WORKER'S COMPENSATION

27. COMMERCIAL GENERAL LIABILITY INSURANCE: Contractor to supply the City of Worcester with certificates of insurance evidencing general liability coverage of not less than \$ 1,000,000.00 per occurrence / \$ 2,000,000.00 aggregate. .
28. AUTOMOBILE LIABILITY INSURANCE: Contractor to supply the City of Worcester with certificates of insurance evidencing automobile liability coverage, bodily injury and property damage combined single limit, of \$ 1,000,000.00 (all owned, hired, and non-hired autos).
29. COMPENSATION INSURANCE: The contractor shall furnish the City of Worcester with certificates showing that all of his/her employees who shall be connected with this work are protected under the statutory Massachusetts worker's compensation insurance policies.
30. The Contractor shall carry commercial general liability insurance with an insurance company satisfactory to the City so as to save the City harmless from any and all claims for damages arising out of bodily injury to or death of any person or persons, and for all claims for damages arising out of injury to or destruction of property caused by accident resulting from the use of implements, equipment or labor used in the performance of the contractor or from any neglect, default or omission, or want of proper care, or misconduct on the part of the Contractor or for anyone of his employ during the execution of the contract.
31. Prior to starting on this contract, the Contractor shall deposit with the Contracting Officer certificates from the insurer to the effect that the insurance policies required in the above paragraphs have been issued to the Contractor. The certificates must be on a form satisfactory to the Purchasing Agent.
32. Except as may otherwise be stated herein, the Contractor shall also carry bodily injury and property damage insurance in an amount not less than those set forth above covering the operation of all motor powered vehicles owned or operated by the Contractor and engaged in this contract.

DISCOUNT

33. Prompt pay discounts will be considered when determining the low bid except when discounts are for a period of less than 30 days. In this event discounts will not be taken into consideration when determining low bid.
34. Time, in connection with discount offered, will be computed from date of completion and/or delivery and acceptance at destination, or from date correct bill or voucher properly certified by the contract is received if the latter date is later than the date of completion and acceptance and/or delivery and acceptance.

GUARANTEE

35. The bidder to who a contract is awarded guarantees to the City of Worcester all equipment, materials and or workmanship for a period of one (1) year after final inspection and acceptance and shall replace promptly any defective equipment, materials and/or workmanship required without additional cost to the City.

DELIVERIES AND COMPLETION

36. It is understood and agreed that in the event of failure on the part of the bidder to indicate date of delivery and/or completion, delivery and/or completion will be made within twelve (12) days from date of notification. Should the successful bidder fail to make delivery or complete contract within time specified, the City reserves the right to make the purchase on such orders at the open market and charge any excess over contract price to the account of the successful bidder, who shall pay the same.
37. The contractor shall familiarize himself with the location and facilities for storage.

38. The City through its Purchasing Division reserves the right to divert delivery from one location to another, and to allow for any change in operating conditions or for any other cause not now foreseen and to proportion deliveries according to available storage facilities.

SAMPLING AND ANALYSIS

39. Each bidder must state the commercial name of the product quoted, name, and address of operator or agent from whom the product will be purchased and in addition shall furnish an analysis of the product, date of analysis, by whom made and their address.
40. Samples of the product to be delivered may be taken by a representative of the City, either prior to delivery or while it is being delivered in the storage facilities at destination, or will be taken from the storage facilities to which the product has been delivered as determined from time to time by the Purchasing Agent. Bidder agrees to furnish the necessary manual labor, without additional cost required to assemble the physical samples, which is to be performed under the direction of the City representative.
41. The representative of the City taking the samples shall be given the opportunity, while sampling, to affix his or her signature to the delivery slip each item represented in his/her sample.
42. Any product after the sampling and analysis, not found meeting the requirements of the contract shall be sufficient cause for the cancellation of the contract at the option of the Purchasing Agent.
43. If any product is found that does not meet the analysis submitted by the bidder in his/her proposal, the Purchasing Agent may, at his or her option, exercise his/her right to reject the product and require that all or any part thereof shall be removed promptly by and at the expense of the contractor and replace it forthwith with a product satisfactory to the Purchasing Agent, or to retain the product and compensate the contractor in an amount as determined by the Purchasing Agent and the City Manager.
44. It is understood and agreed that it shall be a material breach of any contract resulting from this bid for the Contractor to engage in any practice which shall violate any provisions of Massachusetts General Laws, Chapter 151B, relative to discrimination in hiring, discharge, compensation, or terms, conditions or privileges of employment because of race, color, religious creed, national origin, sex, age or ancestry.
45. The undersigned as bidder, declares that the only parties interested in this proposal as principals are named herein; that this proposal is made without collusion with any other person, firm or corporation, that no officer or agent of the City is directly or indirectly interested in this bid; and he/she proposes and agrees that if this proposal is accepted he/she will contract with the City in accordance with the specifications, also the terms and conditions as spelled out in this bid form.
46. No Person, including but not limited to corporations, partnerships, limited partnerships or limited liability corporations, shall be eligible to receive a contract under this invitation to bid and/or requires for proposal if that person has been convicted of any felony offense involving the distribution of controlled substances as that term is defined under Chapter 94C of the General Laws and, for contracts to be performed for on-site services to the Worcester Public Schools, if that person or any person to be employed by that person in the performance of such on-site services has been convicted of a "sex offense" or a "sex offense involving a child" or a "sexually violent offense" or would meet the definition of "sexually violent predator" as those terms are defined in Section 178C of the General Laws and who must register with the sex offender registry board.
47. The Contractor shall at all times enforce strict discipline and good order among his employees and shall not employ for work or services relating to this contract any unfit person or anyone not skilled in the task assigned to him. In light of the fact that the performance of this contract requires the Contractor and its employees to have significant interaction with the public, the Contractor shall require all employees who may perform services under this contract to conduct themselves in a courteous, professional manner. If the Contractor is notified by the Contract Officer that any person engaged upon the work is incompetent, unfaithful, disorderly, discourteous, or otherwise unsatisfactory, then such person shall be discharged from providing services or work pursuant to this contract. Without limiting the generality of the foregoing, intimidation, threats and/or violent conduct of any kind or nature directed to members of

the public are absolutely prohibited. Failure to comply with this requirement shall be grounds for termination of the contract.

48. The Contractor's performance may be evaluated on an ongoing basis including but not limited to consideration of complaints received from members of the public. In order to facilitate this evaluation, the Contractor shall provide the City with documents and records upon request. The Contractor shall further obtain from its employees authorization that appropriate City personnel may obtain all available criminal offender information ("CORI") from the Criminal History Systems Board. A high number of unresolved complaints, any number of complaints that are particularly severe, or employment of individuals who have been convicted of assault or other violent crimes shall be grounds for the early termination or non-renewal of the contract by the City.
49. The procurement officer shall award the contract to the lowest responsible and responsive bidder. The term "responsible bidder" means "a person who has the capability to perform fully the contract requirements, and the integrity and reliability which assures good faith performance." Consistent with its duty to maintain public order and promote public safety, the City has determined that this contract is of a type and nature so as to be particularly sensitive due, at least in part, to the contractor's inherent access and dealings with the members of the general public. Therefore, the City has concluded that additional scrutiny is justified as it determines whether a particular bidder is responsible, having the integrity and reliability to properly perform the requested services. This may entail consideration of the contractor's system of oversight, training and supervision of its employees, including but not limited to its requirement of a high standard of customer service and courtesy in its dealings with the public. The bidder's care and diligence in hiring and assigning its employees will also be considered. In making its determination, the City reserves the right to examine any and all information at its disposal, including but not limited to prior City contracts, the experiences and information obtained from current and former customers (whether identified by the bidder as references or not), as well as other sources available to the City, including but not limited to court documents, newspapers, financial reports (such as DUNS), and certain police data and reports.
50. The Contractor, acting through its owner(s) or any of its employees, or its agents or sub-contractors and any of their employees, shall not engage in any behavior, whether during the course of its duties under this contract or at any other time, that is illegal, criminal or otherwise shocking or offensive to the general public. The determination whether any particular behavior is illegal, criminal or shocking to the general public shall rest in the sound judgment of the Contracting Officer or the City Manager. In making such determination, the Contracting Officer or the City Manager shall apply the general standards of the community. No criminal conviction or formal charges shall be required to make such determination. Such behavior need be something more than trivial and something which would cause the general public to have concerns either about the safety of individuals coming in contact with the Contractor or about the character and integrity of the individuals with which the City does business. Violation of this provision shall be grounds for immediate and unilateral termination of this contract by the City upon five days' notice as otherwise provided herein.

GIVE FULL NAMES AND RESIDENCES OF ALL PERSONS INTERESTED IN THE FOREGOING PROPOSAL.

(NOTICE: Give first and last name in full; in case of corporations, give corporate name and names of President, Treasurer, and Manager; and in case of firms give names of the individual members)

Name	Address	Zip Code
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_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

KINDLY FURNISH THE FOLLOWING INFORMATION REGARDING BIDDER:

(1) If a Proprietorship

Name of Owner _____

Business Address _____

Zip Code _____ Telephone No. _____

Home Address _____

Zip Code _____ Telephone No. _____

(2) If a Partnership

Full names and addresses of all partners

<u>Name</u>	<u>Address</u>	<u>Zip Code</u>
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_____	_____	_____
_____	_____	_____
_____	_____	_____

Business Address _____ Zip Code _____

Tel. No. _____

(3) If a Corporation

Full Legal Name _____

State of Incorporation _____ Qualified in Massachusetts ? Yes _____ No _____

Principal Place of Business _____

Street _____ P.O. Box _____

City/Town _____ State _____ Zip _____

Telephone No. _____

Place of Business in Massachusetts _____

Street _____ P.O. Box _____

City/Town _____ State _____ Zip _____

Telephone No. _____

GIVE THE FOLLOWING INFORMATION REGARDING SURETY COMPANY

Full Legal Name of Surety Company _____

State of Incorporation _____ Admitted in Massachusetts ? Yes _____ No _____

Principal Place of Business _____

Street _____ P.O. Box _____

City/Town _____ State _____ Zip _____

Place of Business in Massachusetts _____

Street _____ P.O. Box _____

City/Town _____ State _____ Zip _____

Telephone No. _____

NOTE

The Office of the Attorney General, Washington, D.C. requires the following information on all bid proposals amounting to \$1,000.00 or more.

F.I.D. Number of bidder _____

This number is regularly used by companies when filing their "EMPLOYER'S FEDERAL TAX RETURN, U.S." Treasury Department Form 941.

AUTHORIZED SIGNATURE OF BIDDER _____ TITLE _____
PLEASE SIGN

DATE _____ BID SECURITY \$ _____

The name(s) of customer service representative(s) to be responsible for servicing this account in the event of contract award are:

NAME _____ (PLEASE PRINT) _____ TEL. NO. _____

NAME _____ (PLEASE PRINT) _____ TEL. NO. _____

PLEASE INDICATE YOUR FAX NUMBER FAX # _____

PLEASE INDICATE YOUR E-MAIL ADDRESS E-MAIL: _____

UNDER MASSACHUSETTS GENERAL LAWS, CHAPTER 30B: SECTION 10, THE FOLLOWING CERTIFICATION MUST BE PROVIDED:

Section 10. A person submitting a bid or a proposal for the procurement or disposal of supplies, or services to any governmental body shall certify in writing, on the bid or proposal, as follows:

" The undersigned certifies under penalties of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals."

(Please Print) _____
Name of Person Signing Bid

Signature of Person Signing Bid

Company

No award will be made without vendor certification of the above.

Bidders must state and identify the product offered, such as manufacturer's name, trade name, brand name and quality next to each item. WE MUST KNOW WHAT HAS BEEN OFFERED.

The quantities shown herein are estimated only and the Contractor will be required to furnish all quantities ordered by the City during the period of the contract.

YES ☒ NO ☐

Delivery to be made to: City of Worcester

This Bid includes addenda numbered _____

NO PRICE ADJUSTMENTS ALLOWED. PRICES QUOTED ARE FINAL. CHECK BEFORE SIGNING!

BIDDER TO COMPLETE ITEMS BELOW

Item #	Estimated Annual Quantity	Description	Manufacturer / Model #	Unit Price	Total
1	20	Pedestrian Flashing Beacons (RRFB) Complete Set		\$	\$
		Questions pertaining to this bid must be directed to Chris Gagliastro via e-mail at gagliastroc@worcesterma.gov			

TERMS, PROMPT PAY DISCOUNT _____ % 30 DAYS, NET 45 DAYS.

DELIVERY AND/OR COMPLETION TO BE MADE WITHIN _____ DAYS FROM DATE OF NOTIFICATION BY THE CITY.

NAME OF BIDDER _____

DISCLOSURE OF CONTRACT RENEWAL

This contract may be renewed for a second and third year at the sole discretion of the City of Worcester, the option of which will be determined at the end of the current contract year.

In no event will increase exceed _____ % for the second contract year.

In no event will increase exceed _____ % for the third contract year.

(TO BE COMPLETED BY BIDDER)

Name

Date

Title

IF VENDOR DOES NOT WISH TO BE CONSIDERED FOR A SECOND AND THIRD YEAR OPTION,
PLEASE INDICATE BY CHECKING THIS BOX: ☐

IMPORTANT

It is understood and agreed, that failure by the bidder to complete the above increase statement, it is the bidders intent to accept a second and third year option at zero (0) percent increase.

All other Terms and Conditions to remain the same.

SOLAR POWERED RECTANGULAR RAPID FLASH BEACON (RRFB) SPECIFICATIONS

Definition

The intent of this specification is to outline the minimum acceptable design requirements for a Rectangular Rapid Flash Beacon (RRFB) assembly. This is to include RRFB housing, LED's, poles, signs, Pedestrian push buttons (PPB) system, control panel, cabinet and all incidentals for a complete installation. The requirements for this assembly are outline below.

RRFB controller and LED beacons, PPB, traffic signal posts and pedestals shall be listed on the Massachusetts Department of Transportation (MassDOT) Approved Traffic Control Equipment List.

Set

For the purpose of this bid the term "Set" is defined as one (1) complete Solar Powered system consisting of two (2); poles, bases, solar collectors (arrays), pedestrian push buttons, RRFB, eight (8) signs and one (1) Master/Remote transmitter/Receiver system. Diagram A shows a typical installation set of RRFB's

RRFB Indications

1. Each signal pole shall be equipped with two separate RRFB signal housings (one facing each direction of Traffic) containing yellow indications. Each unit must be separate to allow for adjustability and directionality. Single two way units will not be permitted.
2. When activated, the two yellow indications on each of the two (2) RRFB signal housings shall flash in a rapidly alternating sequence, according to the MUTCD / RRFB approved flashing sequence.
3. Each of the RRFB signal housings shall have an alternating sequence with approximately equal periods of rapid pulsing light emissions and dark operation. RRFB's shall provide 75 flashing sequences per minute. During each 800-millisecond flashing sequence, the left and right RRFB indications shall operate using the following sequence:

The RRFB indications on the left-hand side shall be illuminated for approximately 50 milliseconds.

Both RRFB indications shall be dark for approximately 50 milliseconds.

The RRFB indications on the right-hand side shall be illuminated for approximately 50 milliseconds.

Both RRFB indications shall be dark for approximately 50 milliseconds.

4. The flash rate of each individual yellow indication, as applied over the full on-off sequence of a flashing period of the indication, shall not be between 5 and 30 flashes per second, to avoid frequencies that might cause seizures.
5. The light intensity of the yellow indications shall meet or exceed the minimum specifications of the Society of Automotive Engineers (SAE) standard J595 (Directional Flashing Optical Warning Devices for Authorized Emergency, Maintenance and Service) dated January 2005. Each RRFB shall consist of two (2) rectangular-shaped yellow indications, each with a super bright LED-array based light source. The lens shall be clear with yellow super bright LED's. Each indication shall be a minimum of approximately 5 inches wide and approximately 2 inches high. The two (2) RRFB indications shall be aligned horizontally, with the longer dimension horizontal. And the minimum spacing between the two indications shall be approximately seven (7) inches, measured from the inside edge of one indication to the inside edge of the other indication.
6. All RRFB signal equipment shall have a gloss black powder coat finish, with the exception of the cabinet, and be equipped with all mounting hardware for a complete installation.
7. The RRFB housing shall be 20 inches in length, 2- 5/8 inches high, 3 inches deep to accommodate two (2) LED indications with a 1 inch opening for an optical conformation LED indication on either the right or left enclosure end. The RRFB housing shall be made of 0.125 inch 5052 aluminum with 0.125 inch bottom plate, having a minimum of 8 attachment openings and 2 weep openings of 1/16 inch to allow drainage if needed. The housing

shall be designed with nut inserts to allow surface mounting of the LED indications and bottom plate and shall use vandal proof black stainless steel fasteners.

Pedestrian Conformation Indication

Each of the RRFB signal indications shall have a pedestrian conformation beacon light to alert the pedestrian that the RRFB signals have begun to flash. The conformation indications shall be a hemispheric amber LED light head that fits a one (1) inch diameter opening. The LED conformation light head shall meet SAE J1113-41 Class 5 standards and have virtually no RFI/EMI noise emission. The light head shall be 7/8 inches in height with super bright LED indications to deliver wide angle warning to the front and side of the unit. This unit shall have 75 flashing periods per minute.

Cabinet

The RRFB cabinets shall be fabricated of 0.125 inch steel aluminum. The cabinet shall be weather proof using a neoprene gasket and shall be supplied with a standard # 2 Corbin lock key. The cabinet and battery compartment shall be of sufficient size to house one (1) 100-amp hour Group 31) battery. The outside dimensions of the cabinet shall be a minimum of 17”h x 19”w x 15”D. The outside of the cabinet shall have a natural aluminum finish.

The Cabinet shall have a rain flap designed to cover the top of the cabinet door. The rain flap shall extend the width of the cabinet and shall be 1.75 inches deep. The rain flap shall have a slight downward angle and extend past the cabinet door, when the door is closed, to allow rain water to drip past the opening of the cabinet door.

In order to allow battery gassed to escape, the cabinet shall be equipped with vents on both the left and right side of the cabinet. The vents shall be covered on the inside of the cabinet with a screen to prevent insects and other debris from entering the cabinet. The battery compartment shall have 1/2 inch foam on the bottom, both sides and back to properly insulate the battery. The cabinet enclosure shall have openings for and will be supplied with two (2) Pelco SE-1100 U-bolt brackets for a 4.5 inch diameter pole.

RRFB Solar DC Power

The RRFB shall be a 12VDC battery powered, re-chargeable, via solar panel array unit. The battery shall be Valve-Regulated, Gelled-Electrolyte, with a nominal voltage of 12 volts rated at 108Ah (100 hour test method). The 50/100 Ah battery shall be low self-discharging, leak proof, gelled electrolyte and maintenance free intended for photo voltaic service. The battery shall carry an unconditional warranty for two (2) years by the manufacturer and shall carry a prorated warranty up to five (5) years from date of delivery. Each battery shall conform to the following:

Weight	37 lbs. (17kg)
Plate Alloy	Lead Calcium
Posts	T881 Forged Terminals
Container / Cover	Polypropylene
Operating Temperature Range	-76° F (-60° C) – 140° F (60° C)
Charge Voltage @ 68° F (20° C)	
Cycle	2.30 – 2.35VPC
Float	2.25 – 2.30VPC
Vent	Self-sealing (2 PSI operation)
Electrolyte	Sulfuric acid thixotropic gel
Cycle Life vs DOD:	5000 or greater @ +20° C (77° F) BCI 2 Hour Capacity
Rated non-spillable by ICAD, IATA and DOT	

Solar Array

The solar array wattage will be determined by the number of operating hours of the RRFB. The standard average, unless directed otherwise, shall be 30 watt, 12VDC solar array. The solar array shall carry a 25 year limited power output warranty. The solar array shall conform to the following:

- Heavy-duty anodized frame
- High Transparent low-iron, tempered glass
- Cells laminated with TPT back steel and EVA copolymer for longer life
- J Box to accept ½" conduit fittings
- Minimum weight of 7 lbs.
- Minimum dimensions of 21 inches x 18 inches
- Current at Pmax (Imp) 1.74A

Control Panel DC Version

The control panel shall consist of a pedestrian push button activated flashing circuit having a settable time period for flashing operation. The time circuit shall incorporate a Microcontroller time delay device that can be set to seconds or multiple minutes. The Microcontroller timing device shall supply a 12VDC output for the RRFB operation.

Interface Circuit Board (One Battery Cabinet Only)

The flasher cabinet assembly shall include a dual purpose interface board. The interface board allows connection to the RRFB unit and has flash output connections. A two (2) circuit 12VDC flasher shall be integral to the flasher and the interface board. The flasher shall be of a solid state construction and shall be rated at a minimum of 6.0 Amps per circuit. The flasher shall utilize zero- voltage turn-on and turn-off of current, thus eliminating electromagnetic interference. The interface board shall have two (2) terminal blocks for connecting the wiring of the cabinet. Barrier type blocks shall be used to terminate all wires. The terminal blocks shall terminate the following functions:

- | | |
|----------------------------|------------------------------------|
| 1. Solar Panel+ | 1. Time switch relay common |
| 2. Solar Panel - | 2. Time switch relay normally open |
| 3. Battery + | 3. DC + power to time switch |
| 4. Battery - | 4. DC – to time switch |
| 5. RRFB + | |
| 6. RRFB – | |
| 7. Load – 1 from flasher | |
| 8. Load - 2 from flasher | |
| 9. DC common from flasher | |
| 10. DC common from flasher | |

The above functions shall be clearly marked by silk screening on the circuit board adjacent to the appropriate terminal.

The flasher and interface board shall be pre-wired for connection to the solar array. The wires connecting the flasher and the interface board to the solar regulator shall be a minimum of 16AWG and shall be permanently soldered to

the flasher and the interface board. The flasher interface board shall include three (3) separate fuses to protect the solar array, the battery and load. The fuses shall be easily replaceable from the front of the board with the use of a standard fuse removal tool. It shall be possible to configure the interface board to operate in a 24 hour output with the use of standard tools.

Photovoltaic Controller (Solar Regulator / Charger)

The flasher cabinet shall include a Photovoltaic Controller (Solar Regulator/Charger) that uses Pulse Width Modulation (PWM) type technology. The PWM controller shall be 100% solid state and be designed for use as a battery charge regulator in photovoltaic (solar) energy systems. The PWM controller will allow maximum solar panel current flow into the battery throughout the battery cycle and once a full charged is reached, the regulator will continue to allow small current pulses to maintain a full charge on the battery. The PWM type controller shall allow a true 0 to 100% duty charging cycle without having over-current on the battery. The Photovoltaic controller shall have wire terminals to accept up to 10AWG wire.

The solar regulator shall have a minimum of two (2) LED indicators. One LED indicator shall be on when the solar array is charging the battery and off when the solar array is not charging the battery. The second LED shall be off during normal operation and on when the solar regulator has disconnected the load due to a low voltage battery of 11.5 volts (low voltage disconnect). The solar regulator shall automatically reconnect the load once the battery voltage level reaches 12.6 volts.

Amperage Rating

The amperage rating of the solar regulator shall be a minimum of 125% greater than the amperage supplied by the solar array. The solar regulator shall be configured to work with both sealed and flooded batteries. It shall be possible to switch between sealed and flooded batteries with the use of simple tools or by switch settings. The regulator shall have a warranty of two (2) years from date of purchase.

Operating Temperature -40° to 60° (C)

Wireless Communication for RRFB Units

The intent of this specification is to outline the minimum acceptable requirements for a short range wireless communication system for RRFB operations. The radio interconnection shall be built around a Master radio unit, which acts as a central control of a wireless system with one or more remote radio units.

Radio Frequency 902 to 928 MHz

Range

The range shall be 3 miles minimum (line of sight) with 3dBi raised antenna, extended range capable by using yagi antennas for remote locations.

Power Requirements

The radio shall operate at 10VDC to 30VDC

Master Radio at 12VDC

33ma at rest

84ma transit

Remote radio at 12VDC

18ma at rest

75ma in receiving mode with outputs active

Functions

The master and remote radios shall be capable of having six (6) selectable discrete inputs and six (6) sourcing discrete outputs. The input (s) shall be for activation of the timing circuits, demand for service and conformation of communications. The outputs shall control load outputs for flashing indications, steady loads and conformation of communications. The Master Radio will be able to perform site surveys of the network's signal strength and communication reliability. The Master radio shall detect RF link failure with the Remote locations. The Master and Remote radios shall have a Frequency Hopping Spread Spectrum (FHSS) and Time Division Multiple Access (TDMA) functionality. The Master and Remote radios shall provide bidirectional communications, including fully acknowledged data transmission.

Compliance

The radio control architecture shall ensure reliable data delivery within the unlicensed Industrial, Scientific and Medical (ISM) band. The radio is to be in compliance with FCC Part 15, Subpart C, 15.247. The radio unit is to be certified for use in Class I, Division 2, Group A, B, C, D; Zone 2 (Group IIC) Hazardous Locations when properly installed in accordance with the National Electrical Code, the Canadian Electrical Code, LCIE/ATEX or applicable local codes and regulations.

The radio shall have an environmental rating of IP67, NEMA 6.

Physical Requirements

Dimensions	3" T x 3" W x 2 3/4" D (add 3" clearance to bottom center for harness)
Housing	Poly Carbonate
Mounting	Four openings with 2 3/4" centers
Operating Temperature	-40° C to +85° C Electronics, -20° C to +80° C LCD display

Poles and Bases

The RRFB poles shall be 4" aluminum pipe. The pole bottoms shall have 4" standard pipe threads and protected during transportation. The pole shall be of a length that a minimum vertical clearance of seven (7) feet is achieved between the ground surface and the bottom of the sign closest to the ground surface. Bases shall be of the octagonal transformer type made of aluminum alloy 356 (ASTM B-26) permanent mold castings with threaded steel collar inserts and a standard removal access panel. All poles and bases shall have a "Black" powdered coat finish. Anchor bolts are not required for the bases.

Pedestrian Push Buttons

Each RRFB pole shall be equipped with a 9" x 12" one piece cast aluminum alloy pedestrian push button assembly and finished with a clear gloss, powder coat finish. The raised printed legend shall be painted black to provide maximum contrast to the background of the plaque. The round button cap must be made of 316 grade stainless steel. The switch assembly shall be a non-latching solid state Piezo switch rated for 100 million cycles with no moving plunger or moving electrical contacts. The button must give a two tone confirmation indication of button being pushed (One tone for push, one tone for release) and an LED conformation indication light which is illuminated upon activation requiring no additional wiring. Each PPB shall have a tactical arrow oriented to point in the direction of the crosswalk. The button must have built in surge suppression, must operate immediately after being immersed in water for 5 minutes, and must be able to allow ice to form such that it would impede function of button or button cap. The pedestrian push-button plunger shall comply with all ADA and MUTCD specifications and be constructed to not stick in any situation and be vandal resistant. All switch electronics must be sealed within the cast aluminum housing and no exposed wiring from the back of the button shall be exposed. The force required to activate the controls shall not be greater than 5 pounds. Total depth of button, from face of button cap to back of button terminal, must be less than 1.75 inches.

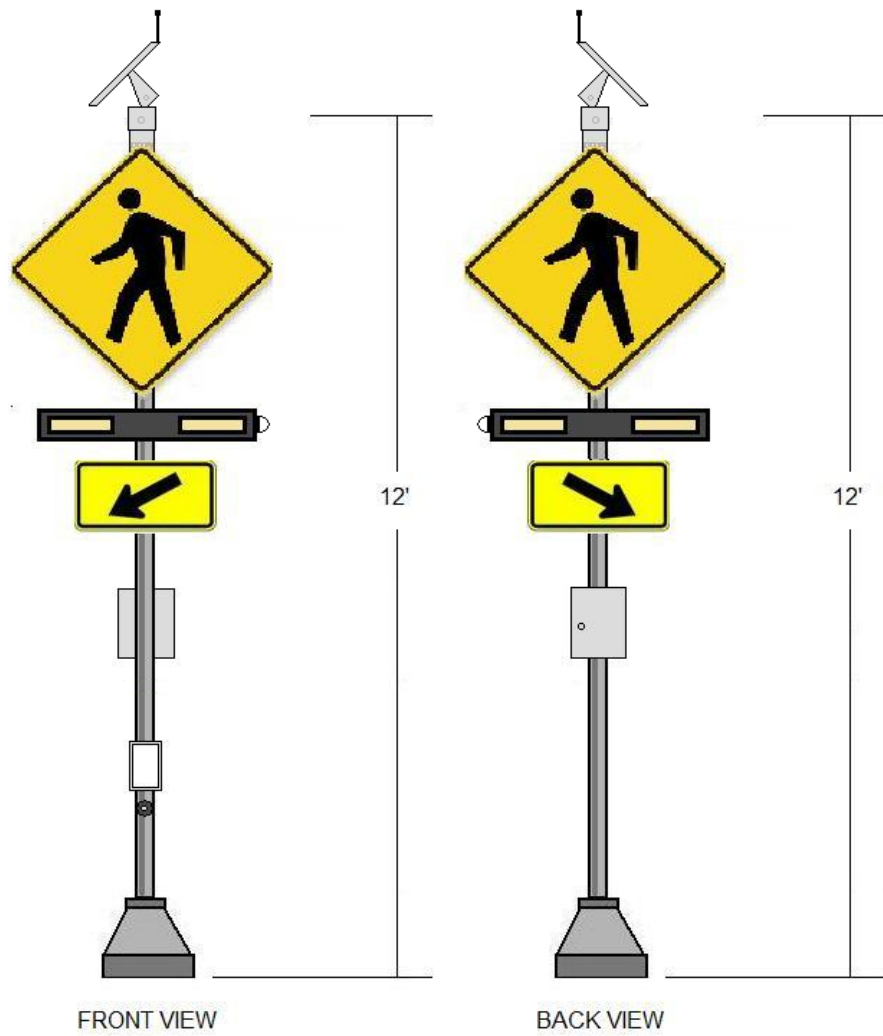
Signs

Each RRFB signal pole shall be equipped with two (2) W11-2 walking person signs measuring 30" x 30" and two (2 each) W16-7p diagonal arrow signs measuring 12" x 24". All signs shall have a diamond grade reflective fluorescent yellow/green background with a black legend.

Warranty

Each flasher cabinet assembly shall be warranted to be free from defects in material and workmanship for a period of one (1) year from installation or fifteen (15) months from date of delivery from the factory, whichever occurs first.

Diagram A



Typical Installation
City of Worcester, MA - Pedestrian Flashing Beacons – Type RRFB