

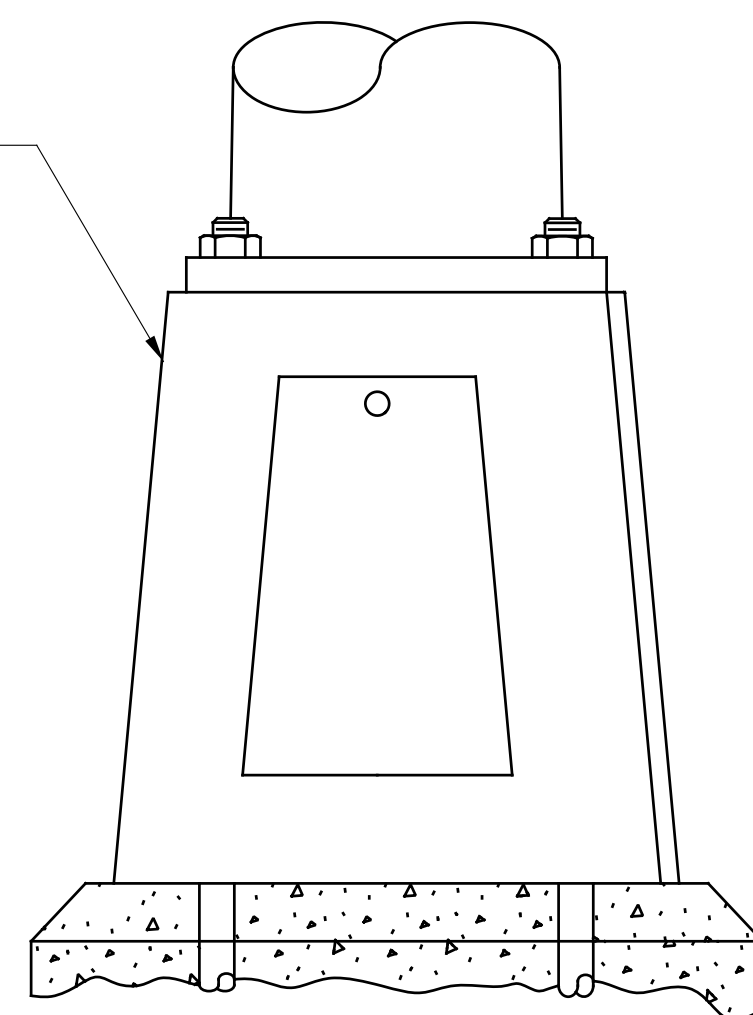
**SOLAR POWERED RRFB
(NO. 1)**

NOTES:

1. The RRFB application shall meet all requirements of MUTCD 11th Edition, Section 4L.01.
2. The RRFB design shall meet all requirements of MUTCD 11th Edition, Section 4L.02.
3. The RRFB operation shall meet all requirements of MUTCD 11th Edition, Section 4L.03.
4. Sign faces shall be Type XI retroreflective sheeting.
5. The sign unit shall be visible at a minimum of 1,000 feet during normal conditions. Minimum carryover time is 5 days unless specified by Plan Note. A 14-day carryover time is required for ODOT-maintained installations. The sign unit shall incorporate circuitry to adjust brightness during day or night.
6. The sign unit shall operate on a solar panel provided with the solar collector and batteries after batteries are fully charged prior to installation. The line voltage for initial charging of the batteries shall be 120-volt AC 60 Hertz with plus and minus 10% voltage fluctuation. The individual LED light sources shall be wired so that a catastrophic failure of one LED light source will not result in the loss of more than one LED light source in the sign unit.
7. A small light directed at and visible to pedestrians in the crosswalk shall be installed to the RRFB or pedestrian push button detector to give confirmation that the RRFB is in operation.
8. Detailed operation of solar-powered traffic control devices are specified by Plan Note.
9. Solar Panel/Battery may be integrated or separate, as specified by the owner in a Plan Note. Control box contains batteries, charge controllers, and is lockable/keyed per CM&S 631.06.
10. Solar-Powered crosswalk lighting, as specified by the owner in a Plan Note, shall be activated concurrently with flashing beacons.
11. On-Demand solar/utility-powered lighting, as specified by the owner in a Plan Note, shall be activated concurrently with flashing beacons.
12. The push button should include an audible information device that plays an audible speech message that says, "Warning lights are flashing". The audible message should be spoken twice.
13. Default elevation angle for the solar panel is 35 degrees above the horizon, facing south (+/- 10 degrees)

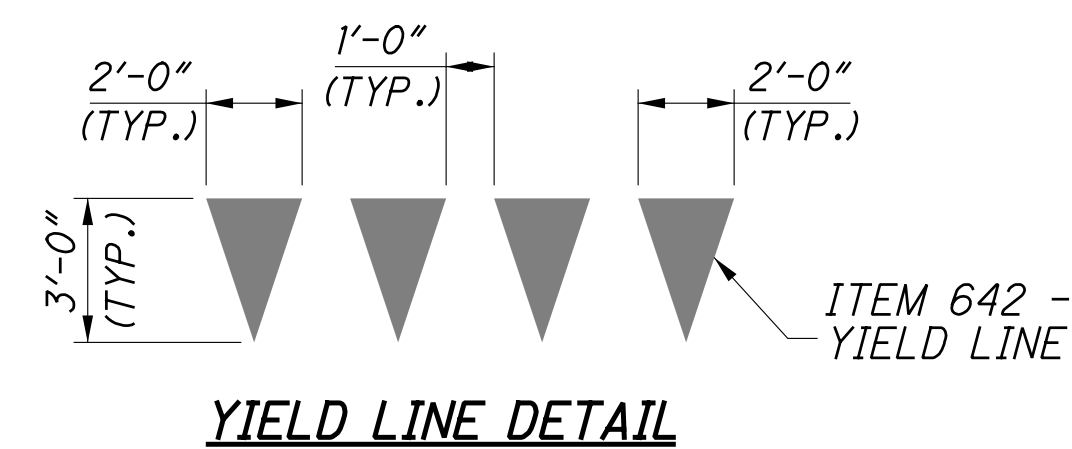
DETAIL A

AT-A Transformer Base per HL-10.13 with foundation per HL-20.11 for poles longer than 14'



Pedestal, Foundation and Grounding per TC-83.20 for poles less than or equal to 14'. See Detail A for poles greater than 14'

ADDENDUM 2		
2	4/20/26	REVISE NOTES



YIELD LINE DETAIL

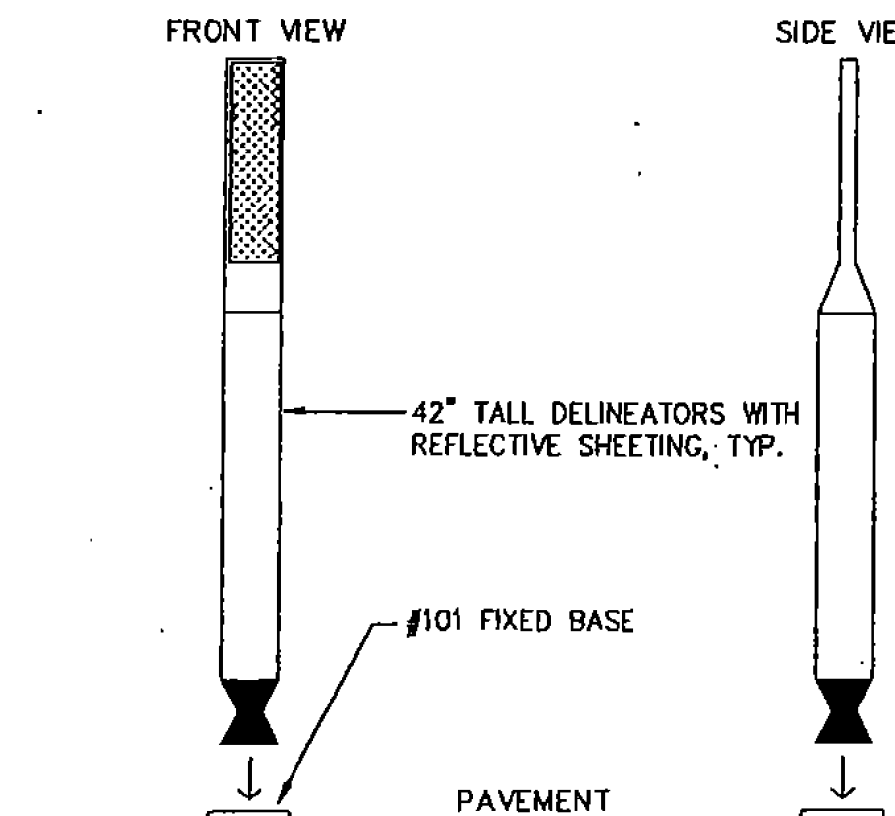
SPECIAL - BOLLARD, FLEXIBLE

BOLLARD, FLEXIBLE SHALL CONSIST OF ALL LABOR, MATERIALS, EQUIPMENT, AND INCIDENTALS TO FURNISH AND INSTALL A ORANGE FLEXIBLE BASED MOUNTED REFLECTIVE DELINEATOR MODEL T42F WITH REFLECTIVE SHEETING AND MODEL #101 FIXED BASE AS SUPPLIED BY IMPACT RECOVERY SYSTEMS, INC. OR AN APPROVED EQUAL AT INTERSECTION LOCATIONS IDENTIFIED IN THE PLANS.

GENERAL - THE ORANGE (OR WHITE ALONG AKRON ROAD) FLEXIBLE DELINEATOR SHALL INCLUDE THE FOLLOWING FEATURES AS A MINIMUM.

1. THE 42" HIGH FLEXIBLE DELINEATOR POST SHALL BE CONSTRUCTED OF FLEXIBLE POLYETHYLENE PLASTIC THAT IS RESISTANT TO ULTRAVIOLET LIGHT, OZONE AND HYDROCARBONS. THE POST SHALL HAVE SUFFICIENT STIFFNESS TO REMAIN RIGID IN WINDY CONDITIONS AND CAPABLE OF WITHSTANDING MULTIPLE IMPACTS BY MAINTENANCE VEHICLES WITHOUT SUSTAINING MAJOR MAINTENANCE.
2. FLEXIBLE DELINEATOR SHALL BE BASE MOUNTED WITH A 12" X 12" X 24" CONCRETE FOUNDATION.
3. THE REFLECTIVE SHEETING SHALL BE HIGH INTENSITY, PRESSURE SENSITIVE WHITE IN COLOR.
4. THE FLEXIBLE DELINEATOR SHALL HAVE AN ANTI TWIST FEATURE THAT ASSURES THE POST WILL RETURN TO THE NORMAL UPRIGHT POSITION AFTER IMPACT. THE REACTIVE SPRING ASSEMBLY SHALL BE STAINLESS STEEL CABLE TESTED TO 145 LB. TENSION.
5. FLEXIBLE DELINEATOR POST INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS FOR BASE MOUNTED FLEXIBLE POST DELINEATORS.

ALL WORK INCLUDING LABOR, MATERIALS, EQUIPMENT, AND INCIDENTALS REQUIRED TO MANUFACTURE AND INSTALL COMPLETE THE FLEXIBLE DELINEATOR POST BOLLARD TO THE SATISFACTION OF THE ENGINEER SHALL BE PAID FOR BY THE UNIT PRICE BID FOR ITEM SPECIAL - BOLLARD, FLEXIBLE.



ITEM 630 - SIGNING MISC.: SOLAR POWERED RECTANGULAR RAPID FLASHING BEACON (RRFB) SIGN ASSEMBLY (NO. 2)

THIS WORK SHALL CONSIST OF FURNISHING AND INSTALLING A SOLAR POWERED RECTANGULAR RAPID FLASHING BEACON (RRFB) SIGN ASSEMBLY. THE FLASHING UNIT SHALL BE 2-SIDED LED, SOLAR POWERED AND PEDESTRIAN ACTIVATED. MULTIPLE UNITS SHALL BE WIRELESSLY CONTROLLED AND SYNCHRONIZED. THE UNIT SHALL BE COMPLIANT WITH THE MOST CURRENT OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (OMUTCD) AND SCD-87.10.

GENERAL REQUIREMENTS -

EACH RRFB SHALL CONSIST OF TWO RAPIDLY AND ALTERNATELY FLASHING RECTANGULAR YELLOW INDICATIONS FACING IN BOTH DIRECTIONS, HAVING LED ARRAY BASED PULSING LIGHT SOURCES.

EACH RRFB SHALL BE A COMPLETE ASSEMBLY, CONSISTING OF BUT NOT LIMITED TO, SIGNAGE, SIGN MOUNTING HARDWARE, INDICATIONS AND ELECTRICAL COMPONENTS (WIRING, SOLIDSTATE CIRCUIT BOARDS, ETC.).

FUNCTIONAL REQUIREMENTS -

EACH RRFB SHALL UTILIZE SOLAR POWER.

EACH RRFB SHALL BE ACTIVATED BY ADA COMPLIANT PUSHBUTTONS.

THE RRFB SHALL BE NORMALLY DARK, SHALL INITIATE OPERATION ONLY UPON PEDESTRIAN ACTUATION, AND SHALL CEASE OPERATION AFTER A PREDETERMINED TIME LIMIT (BASED ON OMUTCD PROCEDURES).

EACH REMOTE RRFB SHALL BE WIRELESSLY ACTIVATED.

WHEN ACTIVATED, THE RRFB UNIT INDICATIONS SHALL FLASH IN A RAPIDLY ALTERNATING "WIG-WAG" FLASHING SEQUENCE (LEFT LIGHT ON, THEN RIGHT LIGHT ON).

ALL RRFB LIGHT INDICATIONS SHALL BE WIRELESSLY SYNCHRONIZED (ALL LIGHTS WILL TURN ON WITHIN 120 MSEC AND REMAIN SYNCHRONIZED THROUGHOUT THE DURATION OF THE FLASHING CYCLE).

EACH OF THE RRFB'S INDICATIONS SHALL FLASH AT 70 TO 80 FLASHES PER MINUTE.

THE UNIT SHALL BE LOW CURRENT/HIGH OUTPUT INCLUDING AUTOMATIC DIMMING CAPABILITIES FOR DAY AND NIGHT VISIBILITY.

THE UNIT SHALL BE CAPABLE OF RUNNING UP TO 10 DAYS WITHOUT SUNLIGHT.

THE SOLAR PANEL AND/OR CONTROLLER MANUFACTURER WILL PROVIDE SIGNED COPIES OF CALCULATIONS USED TO SIZE THE SOLAR PANEL AND BATTERIES. INCLUDED IN THESE CALCULATIONS WILL BE THE INSULATION VALUE USED AND ITS SOURCE, THE SOLAR PANEL EFFICIENCY, CHARGER/CONTROLLER EFFICIENCY, INVERTER EFFICIENCY, PROPOSED LED LAMP LOAD, PUSH BUTTON LOAD, WIRELESS REMOTE LOAD, ETC. AND A FIGURE REPRESENTING ANTICIPATED MISCELLANEOUS LOSSES. THE MANUFACTURES CALCULATIONS SHALL SHOW ANY ADJUSTMENTS DUE TO SHADING OF SOLAR PANELS BASED ON A FIELD REVIEW OF THE PROPOSED LOCATIONS TO BE PERFORMED BY THE MANUFACTURER OR CONTRACTOR.

IF VOLTAGES OVER 50V AC OR DC ARE PRESENT, GROUNDING AND BONDING REQUIREMENTS SPECIFIED IN THE ODOT CMS WILL BE FOLLOWED. ALL ASSOCIATED GROUNDING COSTS WILL BE INCLUDED WITH THIS ITEM.

MATERIALS -

FURNISH A COMPLETE ASSEMBLY, CONSISTING OF BUT NOT LIMITED TO, SIGNAGE, SIGN MOUNTING HARDWARE, INDICATIONS, AND ELECTRICAL COMPONENTS (WIRING, SOLID-STATE CIRCUIT BOARDS, ETC.). THE RRFB ASSEMBLY INCLUDES THE FOLLOWING ITEMS:

1. RRFB INDICATIONS

- A. EACH RRFB INDICATION LENS SHALL BE A MINIMUM SIZE OF APPROXIMATELY 5" WIDE X 2" HIGH.
- B. THE RRFB INDICATIONS SHALL BE ALIGNED HORIZONTALLY, WITH THE LONGER DIMENSION OF THE INDICATION HORIZONTAL. THERE SHALL BE TWO INDICATIONS ON THE FRONT AND TWO INDICATIONS ON THE BACK.
- C. EACH RRFB SHALL BE SUPPLIED WITH ALL REQUIRED HARDWARE TO INSTALL ASSEMBLY. ALL EXPOSED HARDWARE SHALL BE ANTI-VANDAL.
- D. EACH RRFB SHALL BE LOCATED BETWEEN THE BOTTOM OF THE CROSSING WARNING SIGN AND THE TOP OF THE SUPPLEMENTAL DOWNWARD DIAGONAL ARROW PLAQUE.
- E. THE LIGHT INTENSITY OF THE YELLOW INDICATIONS SHALL MEET THE MINIMUM SPECIFICATIONS OF SOCIETY OF AUTOMOTIVE ENGINEERS (SAE) STANDARD J595 (DIRECTIONAL FLASHING OPTICAL WARNING DEVICES FOR AUTHORIZED EMERGENCY, MAINTENANCE, AND SERVICE VEHICLES) DATED JANUARY, 2005.
- F. A SMALL CONFIRMATION LIGHT DIRECTED AT AND VISIBLE TO PEDESTRIANS IN THE CROSSWALK SHALL BE INSTALLED INTEGRAL TO THE RRFB OR PUSHBUTTON TO GIVE CONFIRMATION THAT THE RRFB IS IN OPERATION.

2. SIGNS

- A. ALL SIGN ASSEMBLIES SHALL USE ANTI-VANDAL FASTENERS TO MOUNT COMPONENTS TO SIGN AND SIGN TO FIXTURE.
- B. PEDESTRIAN PUSHBUTTONS SIGNS SHALL BE PROVIDED AND INCLUDE THE LEGEND "PUSH BUTTON TO TURN ON WARNING LIGHTS". SIGNS SHOULD BE MOUNTED ADJACENT TO OR INTEGRAL WITH EACH PEDESTRIAN PUSHBUTTON.
- C. TWO SETS OF SIGNS SHALL BE REQUIRED PER UNIT FOR VIEW FROM EACH APPROACH.

3. CONTROL CIRCUIT

- A. WHEN ACTIVATED, THE FOUR YELLOW INDICATIONS IN EACH RRFB SHALL FLASH IN A RAPIDLY ALTERNATING "WIG-WAG" FLASHING SEQUENCE (LEFT LIGHT ON, THEN RIGHT LIGHT ON).
- B. THE CONTROL CIRCUIT SHALL HAVE THE CAPABILITY OF INDEPENDENTLY FLASHING UP TO FOUR INDEPENDENT OUTPUTS. THE LED LIGHT OUTPUTS AND FLASH PATTERN SHALL BE COMPLETELY PROGRAMMABLE.
- C. AS A SPECIFIC EXCEPTION TO THE 2012 MUTCD SECTION 4L.01 REQUIREMENTS FOR THE FLASH RATE OF BEACONS, RRFBs SHALL USE A MUCH FASTER FLASH RATE. EACH OF THE TWO YELLOW INDICATIONS OF AN RRFB SHALL HAVE 70 TO 80 PERIODS OF FLASHING PER MINUTE AND SHALL HAVE ALTERNATING, BUT APPROXIMATELY EQUAL, PERIODS OF FLASHING LIGHT EMISSIONS AND DARK OPERATION. DURING EACH OF ITS 70 TO 80 FLASHING PERIODS PER MINUTE, THE YELLOW INDICATIONS ON THE LEFT SIDE OF THE RRFB SHALL EMIT TWO SLOW PULSES OF LIGHT AFTER WHICH AND THE YELLOW INDICATIONS ON THE RIGHT SIDE OF THE RRFB SHALL EMIT FOUR RAPID PULSES OF LIGHT FOLLOWED BY A LONG PULSE.
- D. 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.
- E. THE CONTROL CIRCUIT SHALL BE SEALED WATERTIGHT TO ELIMINATE DIRT CONTAMINATION AND ALLOW FOR SAFE HANDLING IN ALL WEATHER CONDITIONS.
- F. THE LEDS SHALL BE SEALED AGAINST DUST AND MOISTURE INTRUSION AS PER THE REQUIREMENTS OF NEMA STANDARD 250-1991 FOR TYPE 4 ENCLOSURE AND TO PROTECT ALL INTERNAL LED AND ELECTRICAL COMPONENTS.

4. BATTERY AND SOLAR PANELS

- A. BATTERY UNIT SHALL BE A 12VDC, 40 AHR MINIMUM, SEALED GEL OR AGM LEAD ACID BATTERY. BATTERIES SHALL HAVE A WRITTEN TWO YEAR FULL REPLACEMENT WARRANTY.
- B. THE SOLAR PANEL SHALL PROVIDE A MINIMUM OF 55 WATTS PEAK TOTAL OUTPUT.
- C. THE SOLAR PANEL SHALL BE MOUNTED TO AN ALUMINUM PLATE AND BRACKET AT AN ANGLE OF 45 DEGREES -60 DEGREES TO PROVIDE MAXIMUM OUTPUT.
- D. ALL FASTENERS USED SHALL BE ANTI-VANDAL.
- E. SOLAR PANEL MANUFACTURER MUST TEST PANEL ACCORDING TO IEC61215 OR EQUIVALENT APPROVED STANDARD. SOLAR PANEL MOUNTING MUST BE RATED FOR 90MPH DESIGN WIND.

5. WIRELESS RADIO

- A. RADIO CONTROL SHALL OPERATE ON A 900 MHZ FREQUENCY HOPPING SPREAD SPECTRUM NETWORK, WI-FI OR APPROVED EQUAL.
- B. RADIO SHALL INTEGRATE COMMUNICATION OF RRFB CONTROL CIRCUIT TO ACTIVATE SIGN FROM PUSHBUTTON INPUT.
- C. THE RADIO SHALL BE SYNCHRONIZED SO ALL OF THE REMOTE RRFB LIGHT INDICATIONS WILL TURN ON WITHIN 120 MSEC OF EACH OTHER AND REMAIN SYNCHRONIZED THROUGH-OUT THE DURATION OF THE FLASHING CYCLE.
- D. RADIO SYSTEMS SHALL OPERATE FROM: 3VDC TO 15VDC.

6. PUSHBUTTON

- A. THE PUSHBUTTON SHALL BE CAPABLE OF CONTINUOUS OPERATION OVER A TEMPERATURE RANGE OF -30 DEGREES F TO +165 DEGREES F.
- B. PUSHBUTTON SHALL BE ADA COMPLIANT.

7. PEDESTAL SHAFT AND BASE - SEE SCD TC-87.10, HL-10.11, HL-20.11 OR TC-83.20.

CONSTRUCTION -

THE RRFB SHALL BE ASSEMBLED AND CONSTRUCTED BY THE CONTRACTOR AS SHOWN AND SPECIFIED ON THE PLANS.

WARRANTY -

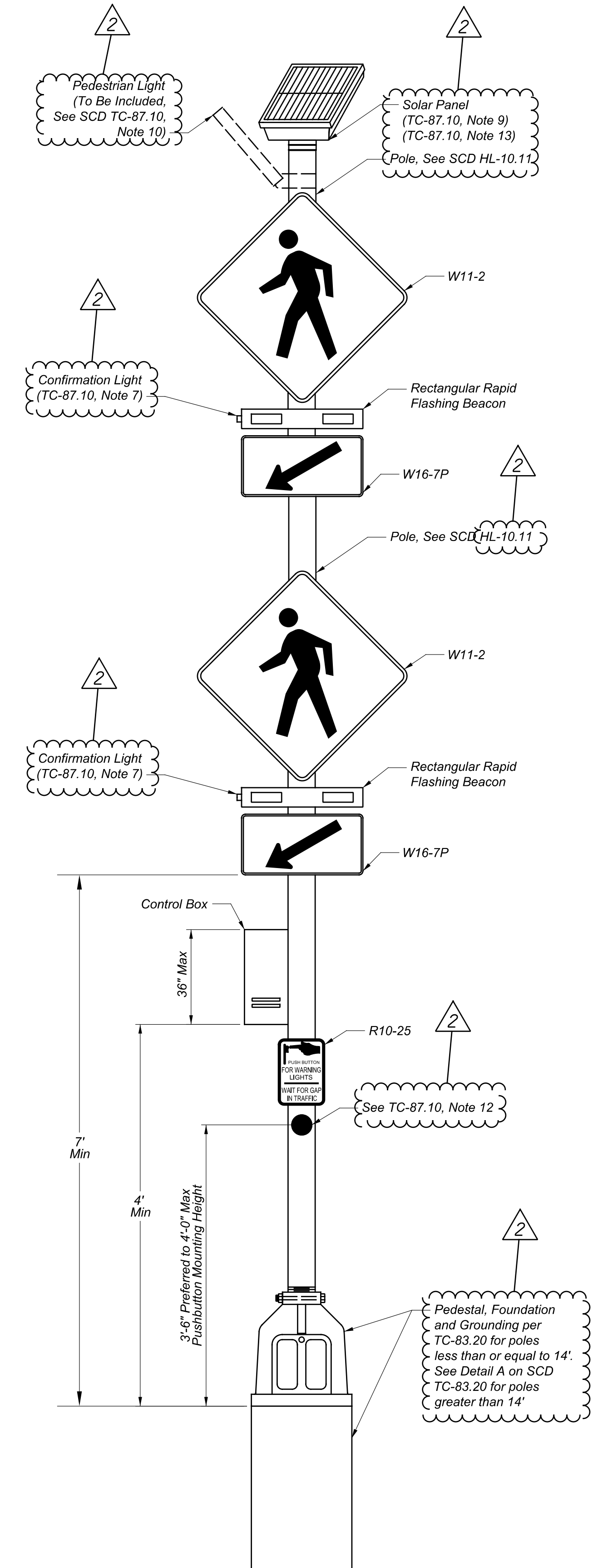
WARRANTY SHALL BE TWO YEARS FROM THE DATE OF FINAL ACCEPTANCE.

MEASUREMENT -

THE DEPARTMENT WILL MEASURE THE ITEM COMPLETE IN PLACE, INCLUDING ALL MATERIALS, TESTING, LABOR AND SOFTWARE FOR A FULLY FUNCTIONAL UNIT.

PAYMENT -

PAYMENT WILL BE AT THE CONTRACT UNIT PRICE PER EACH FOR ITEM 630 "SIGNING MISC.: SOLAR POWERED RECTANGULAR RAPID FLASHING BEACON (RRFB) SIGN ASSEMBLY (NO. 2)".



SOLAR POWERED RRFB, AS PER PLAN (NO. 2)

ADDENDUM 2		
2	4/20/26	REVISE NOTES

