|  |  |  |  |
| --- | --- | --- | --- |
|  | FDOT Traffic Engineering Research Laboratory (TERL)  Rectangular Rapid Flashing Beacon (RRFB) Compliance Matrix | By signing this form, the applicant declares that he/she has read and understands the provisions of Sections 995 and 654 of the FDOT *Standard Specifications for Road and Bridge Construction* and all implemented modifications. The requirements listed on this matrix are derived from Sections 995 and 654, and are the basis for determining a product’s compliance and its acceptability for use on Florida’s roads. |  |

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| --- | --- | --- | --- |
| Date: | Click here to enter a date. | Applicant’s  Name (print): |  |
| Manufacturer: |  |  |  |
| Item, Model No.: |  | Signature: |  |

|  |  | **\*\* Greyed out rows in table below are for TERL use only \*\*** |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ID No** | **Section** | **Requirement** | **Item Comply? (Yes/No/NA)** | **Comments (Applicant must provide information as indicated)** | **TERL Evaluation Method** |
| The following compliance matrix criteria are for all RRFBs. | | | | | |
| 1 | 995-1.1 | Equipment is permanently marked with manufacturer name or trademark, part number, and date of manufacture or serial number. |  | *Applicant may provide comments in this field.* | Physical Inspection |
|  |  | TERL Test Cases (Steps): RRFB002 (Step 1) |  |  | Init.: |
| 2 | 995-6.3 | Rectangular Rapid Flashing Beacons meet the physical and operational requirements of the Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways. |  | *Provide documentation specified in MUTCD line items below.* | Document Review, Physical Inspection and Functional Inspection |
| The following compliance matrix criteria (referencing the MUTCD) are from the MUTCD and are for all RRFBs. | | | | | |
| 3 | MUTCD Section 4L.02.01 | Each RRFB unit consists of two rapidly-flashed rectangular-shaped yellow indications, each with an LED-array based pulsing light source. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Physical Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 1), RRFB002 (Step 2) |  |  | Init.: |
| 4 |  | Each rectangular yellow indication is a minimum of five inches wide by two inches high. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Physical Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 2), RRFB002 (Step 3) |  |  | Init.: |
| 5 | MUTCD Section 4L.02.02 | The two RRFB indications are aligned horizontally, with the longer dimension horizontal and with a minimum space between the two indications of approximately 7 inches measured from inside edge of one indication to inside edge of the other indication. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Physical Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 3), RRFB002 (Step 4) |  |  | Init.: |
| 6 |  | The outside edges of the RRFB indications, including any housings, do not project beyond the outside edges of the associated warning sign. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Physical Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 4), RRFB002 (Step 5) |  |  | Init.: |
| 7 | MUTCD Section 4L.02.12 | The light intensity of the yellow indications during daytime conditions meets the minimum specifications for Class 1 yellow peak luminous intensity in the publication “Directional Flashing Optical Warning Devices for Authorized Emergency, Maintenance, and Service Vehicles J595,” Society of  Automotive Engineers (SAE). |  | *Provide the following:*   * *A third party test report that demonstrates compliance with this requirement.* * *A completed Testing Laboratory and Report Checklist.* | Document Review |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 5) |  |  | Init.: |
| 8 | MUTCD Section 4L.03.01 | RRFB is normally dark and initiates operation only upon actuation. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 6), RRFB003 (Steps 3, 4) |  |  | Init.: |
| 9 |  | RRFB ceases flashing at a predetermined time after pedestrian actuation. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 7), RRFB003 (Step 6) |  |  | Init.: |
| 10 |  | If a passive detector is used, the RRFB may cease operation after the pedestrian clears the crosswalk. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 8), RRFB004 (Step 3) |  |  | Init.: |
| 11 | MUTCD Section 4L.03.02 | All RRFB units associated with a given crosswalk (including those with an advance crossing sign, if used) when activated, simultaneously commence operation of their rapid flashing indications and cease operation simultaneously. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 9), RRFB003 (Step 7) |  |  | Init.: |
| 12 | MUTCD Section 4L.03.05 | The predetermined flash period is immediately initiated each and every time that a pedestrian is detected either through passive detection or as a result of a pedestrian pressing a push button detector, including when pedestrians are detected while the RRFBs are already flashing and when pedestrians are  detected immediately after the RRFBs have ceased flashing. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 10), RRFB003 (Step 8), RRFB004 (Steps 2, 3) |  |  | Init.: |
| 13 | MUTCD Section 4L.03.06 | When activated, the two yellow indications in each RRFB unit flash in a rapidly flashing sequence at a rate of 75 flashing sequences per minute. |  | *Provide the following:*   * *A third party test report that demonstrates compliance with this requirement.* * *A completed Testing Laboratory and Report Checklist.* | Document Review |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 11) |  |  | Init.: |
| 14 | MUTCD Section 4L.03.07 | During each 800-millisecond flashing sequence, the left and right RRFB indications operate using the following sequence:  A. The RRFB indication on the left-hand side shall be illuminated for approximately 50 milliseconds.  B. Both RRFB indications shall be dark for approximately 50 milliseconds.  C. The RRFB indication on the right-hand side shall be illuminated for approximately 50 milliseconds.  D. Both RRFB indications shall be dark for approximately 50 milliseconds.  E. The RRFB indication on the left-hand side shall be illuminated for approximately 50 milliseconds.  F. Both RRFB indications shall be dark for approximately 50 milliseconds.  G. The RRFB indication on the right-hand side shall be illuminated for approximately 50 milliseconds.  H. Both RRFB indications shall be dark for approximately 50 milliseconds.  I. Both RRFB indications shall be illuminated for approximately 50 milliseconds.  J. Both RRFB indications shall be dark for approximately 50 milliseconds.  K. Both RRFB indications shall be illuminated for approximately 50 milliseconds.  L. Both RRFB indications shall be dark for approximately 250 milliseconds. |  | *Provide the following:*   * *A third party test report that demonstrates compliance with this requirement.* * *A completed Testing Laboratory and Report Checklist.* | Document Review |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 12) |  |  | Init.: |
| The following compliance matrix criteria are for all RRFBs. | | | | | |
| 15 | 995-6.3.1 | RRFBs have an integrated photocell and are capable of automatically dimming to reduce brightness and glare of RRFB indications during nighttime and low light conditions. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 13), RRFB005 (Step 5) |  |  |  |
| 16 |  | The flash rate of each individual yellow indication, as applied over the full on-off sequence of a flashing period of the indication, is not between 5 and 30 flashes per second. |  | *Provide the following:*   * *A third party test report that demonstrates compliance with this requirement.* * *A completed Testing Laboratory and Report Checklist.* | Document Review |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 14) |  |  | Init.: |
| 17 |  | No other flash patterns are selectable via hardware or software. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review, Physical Inspection and Functional Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 15), RRFB002 (Step 6), RRFB003 (Step 2) |  |  | Init.: |
| 18 | 995-6.3.2 | RRFB includes a pedestrian pushbutton for activation. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 16), RRFB003 (Step 4) |  |  | Init.: |
| 19 |  | RRFB assemblies can include a passive detector in addition to a pedestrian pushbutton. |  | *Provide product literature, specifications, user manual, or similar information if passive detection is provided. Passive detection is an optional feature and not a minimum requirement.* | Document Review and Functional Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 17), RRFB004 (Step 2) |  |  | Init.: |
| 20 |  | RRFB includes an instruction sign (FTP-68C-21) mounted adjacent to or integral with each pedestrian pushbutton, in accordance with the Standard Plans, Index No. 654-001. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Physical Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 18), RRFB002 (Step 7) |  |  | Init.: |
| 21 |  | A confirmation light directed at and visible to pedestrians in the crosswalk is installed integral to the RRFB to give confirmation that the RRFB is in operation. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 19), RRFB003 (Step 5) |  |  | Init.: |
| The following compliance matrix criteria are for RRFB accessible pedestrian pushbuttons. | | | | | |
| 22 | 995-6.3.3 | The assembly includes a speaker, audio amplifier, and noise monitoring microphone for auto volume control. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 20), RRFB006 (Steps 3, 6) |  |  | Init.: |
| 23 |  | The accessible pedestrian pushbutton detector meets Section 995-9.3 for the locator tone feature. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 21), RRFB006 (Steps 2, 5, 9) |  |  | Init.: |
| 24 |  | The accessible pedestrian pushbutton does not include a vibrotactile indication, or percussive indications. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review, Physical Inspection and Functional Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 22), RRFB002 (Step 8), RRFB006 (Step 7) |  |  | Init.: |
| 25 |  | The audible message is programmable. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 23), RRFB006 (Step 8) |  |  | Init.: |
| The following compliance matrix criteria are for all RRFBs. | | | | | |
| 26 | 995-6.4 | Cabinets used as part of the midblock crosswalk enhancement assembly are currently listed on the Approved Product List (APL) or meet the requirements of Section 676. |  | *Provide the applicable compliance matrix from Specification 676 along with all supporting documentation, that shows the product meets this requirement. Alternately, provide the APL number if the cabinet is APL listed.* | Document Review and Physical Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 24), RRFB002 (Step 9) |  |  | Init.: |
| 27 |  | All housings other than approved cabinets are powder coat painted dull black per SAE AMS-STD-595A with a reflectance value not exceeding 25 percent as measured by ASTM E1347. |  | *Provide a statement of conformance in this field.* | Compliance Matrix Review |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 25) |  |  | Init.: |
| 28 |  | Cabinets and housings prevent unauthorized access. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Physical Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 26), RRFB002 (Step 10) |  |  | Init.: |
| 29 |  | Pole-mount assemblies allow installation on 4-1/2 inch outer diameter posts. |  | *Applicant may provide comments in this field.* | Physical Inspection |
|  |  | TERL Test Cases (Steps): RRFB002 (Step 11) |  |  | Init.: |
| 30 |  | All assembly hardware including nuts, bolts, screws, and locking washers less than 5/8 inch in diameter, is Type 304 or 316 passivated stainless steel. Stainless steel bolts, screws, and studs must meet ASTM F593. Stainless steel nuts must meet ASTM F594. |  | *Provide statement of conformance from hardware supplier that shows the product meets this requirement.* | Document Review |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 27) |  |  | Init.: |
| 31 |  | All assembly hardware greater than or equal to 5/8 inch in diameter is galvanized. |  | *Provide statement of conformance from hardware supplier that shows the product meets this requirement.* | Document Review |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 28) |  |  | Init.: |
| 32 |  | Carbon steel bolts, studs and threaded rod meet ASTM A307 and all structural bolts meet ASTM F3125, Grade A325. |  | *Provide statement of conformance from hardware supplier that shows the product meets this requirement.* | Document Review |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 29) |  |  | Init.: |
| 33 | 995-6.5 | Equipment operates on solar power or a nominal voltage of 120 VAC. |  | *Applicant may provide comments in this field.* | Physical Inspection |
|  |  | TERL Test Cases (Steps): RRFB002 (Step 12) |  |  | Init.: |
| The following compliance matrix criteria are for AC powered RRFBs. | | | | | |
| 34 |  | If the device requires operating voltages of less than 120 VAC, the appropriate voltage converter is supplied. |  | *Applicant may provide comments in this field.* | Physical Inspection |
|  |  | TERL Test Cases (Steps): RRFB002 (Step 13) |  |  | Init.: |
| The following compliance matrix criteria are for solar powered RRFBs. | | | | | |
| 35 |  | Solar powered systems are designed to operate for a minimum of 100 activations per day, 30 seconds in duration, and provide 10 days of continuous operation without sunlight. |  | *Applicant may provide comments in this field.* | Functional Inspection |
|  |  | TERL Test Cases (Steps): RRFB007 (Step 7) |  |  | Init.: |
| 36 |  | Solar powered systems automatically charge batteries and prevent over-charging and over-discharging. |  | *Applicant may provide comments in this field.* | Functional Inspection |
|  |  | TERL Test Cases (Steps): RRFB007 (Step 9) |  |  | Init.: |
| 37 |  | Solar powered system includes a charge indicator. |  | *Applicant may provide comments in this field.* | Functional Inspection |
|  |  | TERL Test Cases (Steps): RRFB007 (Step 8) |  |  | Init.: |
| The following compliance matrix criteria are for all RRFBs. | | | | | |
| 38 | 995-6.6 | All electronic assemblies operate as specified during and after being subjected to the transients, temperature, voltage, humidity, vibration, and shock tests described in NEMA TS2, Sections 2.2.7, 2.2.8, and 2.2.9. |  | *Provide the following:*   * *A third party test report that demonstrates compliance with this requirement.* * *A completed Testing Laboratory and Report Checklist.* * *A completed NEMA TS2 2.2.7-2.2.9 Checklist.* | Document Review |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 30) |  |  | Init.: |
| 39 |  | Electronics meet FCC Title 47, Subpart B, Section 15. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 31) |  |  | Init.: |
| 40 |  | The optical portion of the housing is sealed to provide an IP-67 rating. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 32) |  |  | Init.: |
| 41 | 654-4 | Midblock crosswalk enhancement assembly has a manufacturer’s warranty covering defects for two years from the date of final acceptance. |  | *Provide product warranty documentation that shows the product meets this requirement.* | Document Review |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 33) |  |  | Init.: |
| 42 |  | Ensure the warranty includes providing replacements within 10 calendar days of notification for defective parts and equipment during the warranty period at no cost to the Department or the maintaining agency. |  | *Provide a statement of conformance in this field.* | Compliance Matrix Review |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 34) |  |  | Init.: |

**Document History for:**

**Rectangular Rapid Flashing Beacon Compliance Matrix**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Rev | Description | Authored and Checked | Reviewed | Approved | Approval Date | Rev More Stringent? |
| 1.0 | Initial matrix for RRFB | D. Bremer | C. Morse  M. DeWitt | J. Morgan | 05/28/2013 | N/A |
| 2.0 | Converting to spec 654 from A654 | D. Bremer | J. Morgan | J. Morgan | 09/16/2013 | No |
| 3.0 | Modified requirements for CM ID No 4 and 8 | D. Bremer | J. Morgan | J. Morgan | 09/16/2013 | Yes |
| 4.0 | Updated to TERL approved specification. Includes new FHWA flash pattern and confirmation light. | D. Bremer  R. Meyer | J. Morgan | J. Morgan | 04/16/2015 | No |
| 5.0 | Updated to latest FA date (6-30-15). Includes updates to flashing pattern (again) with details and added sections. | D. Bremer | J. Morgan | J. Morgan | 09/08/2015 | No |
| 6.0 | Updated #6,7,9 to require 3rd party tests. Omitted #8 due to updated flash pattern. | R. Brooks | J. Morgan | J. Morgan | 9/13/2018 | Yes |
| 7.0 | Updated to reflect the latest FA approval date of 8-20-18. | R. Brooks | J. Morgan | J. Morgan | 12/13/2018 | Yes |
| 8.0 | Updated to reflect the latest FA approval date of 7-9-20. | W. Geitz | C. Raimer  M. DeWitt | D. Vollmer | 08/24/2020 | Yes |
| 9.0 | Add the option of passive detection and eliminated the selectable flash patterns. | W. Geitz | C. Raimer  M. DeWitt | D. Vollmer | 05/05/2021 | Yes |
| 10.0 | Removed requirement for AC/DC charger and added warranty information. | W. Geitz | C. Raimer  M. DeWitt | D. Vollmer | 12/29/2021 | No |
| 11.0 | Moved to specification 995. | W. Geitz | C. Raimer  M. DeWitt | M. DeWitt | 07/27/2022 | No |
| 12.0 | Added test cases and steps. Updated to last FA date for 995 (10-24-22) and 654 (10-20-22). | P. Blaiklock | R. Meyer  W. Geitz | D. Vollmer | 04/03/2023 | No |
| 13.0 | Updated to latest FA date of 10-6-23 for spec 995. | W. Geitz | P. Blaiklock  D. Christian | D. Vollmer | 01/08/2024 | No |
| 14.0 | Added MUTCD and photocell requirements. Updated warranty language. Updated to latest FA date of 8-7-24 for specs 654 and 995. CM ID 15 contains more stringent requirements. | W. Geitz | D. Bremer | M. DeWitt | 04/15/2025 | Yes |
| 15.0 | Updated test cases/steps and TERL evaluation method. | A. Cramer | P. Blaiklock  W. Geitz | M. DeWitt | 08/06/2025 | No |