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| --- | --- | --- |
|  | 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 | RRFB includes two rapidly and alternately flashed rectangular yellow indications having LED-array based pulsing light sources. |  | *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.: |
| 3 |  | 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.: |
| 4 |  | RRFB installations comply with the use and technical conditions of FHWA MUTCD Interim Approval 21 – Rectangular Rapid-Flashing Beacons at Crosswalks. |  | *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 3) |  |  | Init.: |
| 5 |  | 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 4), RRFB002 (Step 4) |  |  | Init.: |
| 6 | 995-6.3.1 | The light intensity of the yellow indications meets the minimum specifications of SAE Standard J595 for Class 1 (Directional Flashing Optical Warning Devices for Authorized Emergency, Maintenance, and Service Vehicles) dated January 2005. Ensure RRFB assemblies are capable of automatically dimming to reduce brightness of the LEDs at nighttime. |  | *Provide a third party test report that demonstrates compliance with this requirement. The test report must be less than 5 years old and meet the requirements of FDOT Product Certification Handbook (PCH), section 7.2.* | Document Review and Functional Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 5), RRFB004 (Steps 3, 4) |  |  | Init.: |
| 7 |  | The flash rate of each individual yellow indication, as applied over the full on-off sequence of a flashing period of the indication, are not between 5 and 30 flashes per second. |  | *Provide a third party test report that demonstrates compliance with this requirement. The test report must be less than 5 years old and meet the requirements of FDOT PCH, section 7.2.* | Document Review and Functional Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 6), RRFB003 (Steps 1-3, 5, 6) |  |  | Init.: |
| 8 |  | When activated, the two yellow indications in each RRFB have a flash rate of 75 flashes per minute using the following sequence: left side beacon on for 50 milliseconds (msec), both beacons off for 50 msec, right side beacon on for 50 msec, both beacons off for 50 msec, left side beacon on for 50 msec, both beacons off for 50 msec, right side beacon on for 50 msec, both beacons off for 50 msec, both beacons on for 50 msec, both beacons off for 50 msec, both beacons on for 50 msec, both beacons off for 250 msec. |  | *Provide a third party test report that demonstrates compliance with this requirement. The test report must be less than 5 years old and meet the requirements of FDOT PCH, section 7.2.* | Document Review and Functional Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 7), RRFB003 (Step 4) |  |  | Init.: |
| 9 |  | 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 8), RRFB002 (Step 5), RRFB004 (Steps 5, 6) |  |  | Init.: |
| The following compliance matrix criteria are for all RRFBs. | | | | | |
| 10 | 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 9), RRFB004 (Steps 1, 2), RRFB006 (Step 5) |  |  | Init.: |
| 11 |  | 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 10), RRFB007 (Steps 1-4) |  |  | Init.: |
| 12 |  | 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 11), RRFB004 (Step 1) |  |  | Init.: |
| 13 |  | 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 12), RRFB004 (Step 7) |  |  | Init.: |
| 14 |  | 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 13), RRFB007 (Step 4) |  |  | Init.: |
| 15 |  | The duration of the predetermined period is programmable and capable of matching the pedestrian clearance time for pedestrian signals as determined by MUTCD procedures. |  | *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 14), RRFB004 (Step 7), RRFB005 (Steps 1, 2) |  |  | Init.: |
| 16 |  | The timer that controls flashing automatically resets each time a pedestrian call is received. |  | *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 15), RRFB005 (Steps 3, 4) |  |  | Init.: |
| 17 |  | All RRFBs associated with a single crosswalk (including those with an overhead or advance crossing sign, if used) are synchronized and simultaneously commence and cease 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 16), RRFB008 (Steps 1-3) |  |  | Init.: |
| 18 |  | 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 17), RRFB002 (Step 6) |  |  | Init.: |
| 19 |  | 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 18), RRFB003 (Steps 5, 6) |  |  | Init.: |
| 20 | 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 19), RRFB006 (Step 4) |  |  | Init.: |
| 21 |  | 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 20), RRFB006 (Steps 1-3) |  |  | Init.: |
| 22 |  | 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 21), RRFB002 (Step 7), RRFB006 (Step 4) |  |  | Init.: |
| 23 |  | The audible message associated with the accessible pedestrian pushbutton 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 22), RRFB006 (Step 6) |  |  | Init.: |
| 24 | 995-6.4 | Cabinets used as part of the midblock crosswalk enhancement assembly are currently listed on the 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 23), RRFB002 (Step 8) |  |  | Init.: |
| 25 |  | 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 24) |  |  | Init.: |
| 26 |  | 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 25), RRFB002 (Step 9) |  |  | Init.: |
| 27 |  | 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 10) |  |  | Init.: |
| 28 |  | 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 26) |  |  | Init.: |
| 29 |  | 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 27) |  |  | Init.: |
| 30 |  | 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 28) |  |  | Init.: |
| 31 | 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 11) |  |  | Init.: |
| The following compliance matrix criteria are for AC powered RRFBs. | | | | | |
| 32 |  | 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 12) |  |  | Init.: |
| The following compliance matrix criteria are for solar powered RRFBs. | | | | | |
| 33 |  | Solar powered systems are designed to operate for 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): RRFB009 (Steps 1, 2) |  |  | Init.: |
| 34 |  | Solar powered system automatically charges batteries and prevents over-charging and over-discharging. |  | *Applicant may provide comments in this field.* | Functional Inspection |
|  |  | TERL Test Cases (Steps): RRFB009 (Step 4) |  |  | Init.: |
| 35 |  | Solar powered system includes a charge indicator. |  | *Applicant may provide comments in this field.* | Physical Inspection and Functional Inspection |
|  |  | TERL Test Cases (Steps): RRFB002 (Step 13), RRFB009 (Step 3) |  |  | Init.: |
| The following compliance matrix criteria are for all RRFBs. | | | | | |
| 36 | 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 2021, 2.2.7, 2.2.8, and 2.2.9. |  | *Provide a third party test report that demonstrates compliance with this requirement. The test report must be less than 5 years old and meet the requirements of FDOT PCH, section 7.2.* | Document Review |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 29) |  |  | Init.: |
| 37 |  | Electronics meet FCC Title 47, Subpart B, Section 15. |  | *Provide a third party test report that demonstrates compliance with this requirement. The test report must be less than 5 years old and meet the requirements of FDOT PCH, section 7.2.* | Document Review |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 30) |  |  | Init.: |
| 38 |  | 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 31) |  |  | Init.: |
| 39 | 654-3 | 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 32), RRFB002 (Step 14) |  |  | Init.: |
| 40 | 654-4 | Midblock crosswalk enhancement assembly has a manufacturer’s warranty covering defects for two years from the date of final acceptance in accordance with 5-11 and Section 608. |  | *Provide a statement of conformance in this field.* | Compliance Matrix Review |
|  |  | TERL Test Cases (Steps): RRFB001 (Step 33) |  |  | Init.: |
| 41 |  | 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 |