|  |  |  |  |
| --- | --- | --- | --- |
|  | FDOT Traffic Engineering Research Laboratory (TERL)  Camera Lowering Device Compliance Matrix | By signing this form, the applicant declares that he/she has read and understands the provisions of Section 996 of the FDOT *Standard Specifications for Road and Bridge Construction* and all implemented modifications. The requirements listed on this matrix are derived from Section 996 and are the basis for determining a product’s compliance and its acceptability for use on Florida’s roads. |  |

|  |  |  |  |
| --- | --- | --- | --- |
| 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 camera lowering devices. | | | | | |
| 1 | 996-1.1 | Camera Lowering Device 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): CLD002 (Step 1) |  |  | Init.: |
| 2 | 996-6.1 | Lowering device provides electrical connections between the control cabinet and the equipment installed on the lowering device without reducing the function or effectiveness of the equipment. |  | *Provide a statement of conformance in this field.* | Compliance Matrix Review |
|  |  | TERL Test Cases (Steps): CLD001 (Step 1) |  |  | Init.: |
| 3 |  | Lowering device system support arm is capable of withstanding service tension and shear up to 1 kip minimum. |  | *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): CLD001 (Step 2) |  |  | Init.: |
| 4 |  | Lowering device includes a disconnect unit and power, data, and video cables (as applicable) for connecting equipment; a divided support arm, pole attachment provisions, a rotatable pole-top tenon, and a pole-top junction box. |  | *Applicant may provide comments in this field.* | Physical Inspection |
|  |  | TERL Test Cases (Steps): CLD002 (Step 2) |  |  | Init.: |
| 5 |  | All external components are made of corrosion-resistant materials that are powder-coated, galvanized, or otherwise protected from the environment. |  | *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): CLD001 (Step 3) |  |  | Init.: |
| 6 |  | All finished castings have a smooth finish free from cracks, blow-holes, shrinks, and other flaws. |  | *Applicant may provide comments in this field.* | Physical Inspection |
|  |  | TERL Test Cases (Steps): CLD002 (Step 3) |  |  | Init.: |
| 7 |  | All roller fairlead frames are corrosion resistant stainless steel or aluminum. All pulleys have sealed, self-lubricated or oil-tight bearings, or sintered bronze bushings. |  | *Provide statement of conformance from supplier that shows the product meets this requirement.* | Document Review |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): CLD001 (Step 4) |  |  | Init.: |
| 8 |  | Lowering device is provided with a minimum of 100 feet of composite power and signal cable prewired to the lowering device at the factory. |  | *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): CLD001 (Step 5), CLD002 (Step 4) |  |  | Init.: |
| 9 |  | Prewired cable is not spliced. |  | *Applicant may provide comments in this field.* | Physical Inspection |
|  |  | TERL Test Cases (Steps): CLD002 (Step 5) |  |  | Init.: |
| 10 |  | Lowering device is designed to withstand the design wind speeds defined in the Department’s Structures Manual. |  | *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): CLD001 (Step 6) |  |  | Init.: |
| 11 | 996-6.2 | Lowering device includes an equipment connection box. |  | *Applicant may provide comments in this field.* | Physical Inspection |
|  |  | TERL Test Cases (Steps): CLD002 (Step 6) |  |  | Init.: |
| 12 |  | Equipment connection box includes a 1-1/2 inch National Pipe Thread (NPT) pipe connection point and pipe for attaching a camera |  | *Applicant may provide comments in this field.* | Physical Inspection |
|  |  | TERL Test Cases (Steps): CLD002 (Step 7) |  |  | Init.: |
| 13 |  | The pipe between the connection box and camera is constructed of aluminum. |  | *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): CLD001 (Step 7) |  |  | Init.: |
| 14 |  | Equipment connection box has an ingress protection rating of no less than IP55. |  | *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): CLD001 (Step 8) |  |  | Init.: |
| 15 | 996-6.3 | Disconnect unit has a minimum load capacity of 600 pounds with a 4:1 safety factor and is capable of securely holding the lowering device and any installed equipment. |  | *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): CLD001 (Step 9) |  |  | Init.: |
| 16 |  | The fixed and movable components have a stainless steel or aluminum locking mechanism between them. |  | *Provide statement of conformance from supplier that shows the product meets this requirement.* | Document Review |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): CLD001 (Step 10) |  |  | Init.: |
| 17 |  | At least two mechanical latches for the movable assembly are provided. |  | *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): CLD001 (Step 11), CLD002 (Step 8) |  |  | Init.: |
| 18 |  | The fixed unit has a heavy-duty cast tracking guide that allows latching in the same position each time. |  | *Applicant may provide comments in this field.* | Document Review and Physical Inspection |
|  |  | TERL Test Cases (Steps): CLD001 (Steps 14,19), CLD002 (Steps 10, 13) |  |  | Init.: |
| 19 |  | All load is transferred from the lowering cable to the mechanical latches when the system is in the latched position. |  | *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): CLD001 (Step 13), CLD002 (Step 9) |  |  | Init.: |
| 20 |  | Interface and locking components are constructed of stainless steel or aluminum. |  | *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): CLD001 (Step 10) |  |  | Init.: |
| 21 | 996-6.3.1 | Disconnect unit housing unit is weather-proof with an ingress protection rating of no less than IP55. |  | *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): CLD001 (Step 12) |  |  | Init.: |
| 22 | 996-6.3.2 | Modular, self-aligning and self-adjusting female and male socket contact halves are provided in the connector block. |  | *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): CLD001 (Step 14), CLD002 (Step 11) |  |  | Init.: |
| 23 |  | Lowering device is equipped with enough contacts to permit operation of all required functions of the camera, up to a maximum of 20 contacts with at least two spare contacts. |  | *Applicant may provide comments in this field.* | Physical Inspection |
|  |  | TERL Test Cases (Steps): CLD002 (Step 11) |  |  | Init.: |
| 24 |  | Contact connections between the fixed and movable lowering device components are capable of passing EIA-232, EIA-422, EIA-485, and Ethernet data signals and 1-volt peak to peak (Vp-p) video signals, as well as 120 VAC, 9-24 VAC, and 9-48 VDC power. |  | *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): CLD001 (Step 15) |  |  | Init.: |
| 25 |  | Lowering device connections are capable of carrying the signals, voltages, and current required by the devices connected to them under full load conditions. |  | *Applicant may provide comments in this field.* | Functional Inspection |
|  |  | TERL Test Cases (Steps): CLD003 (Step 1) |  |  | Init.: |
| 26 |  | All hardware is corrosion-resistant stainless steel. |  | *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): CLD001 (Step 17) |  |  | Init.: |
| 27 |  | Male contacts used for grounding mate first and break last. |  | *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): CLD001 (Step 18), CLD002 (Step 12) |  |  | Init.: |
| 28 |  | All contacts and connectors are self-aligning and self-adjusting mechanical systems. |  | *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): CLD001 (Step 19) |  |  | Init.: |
| 29 |  | A spring-assisted contact assembly is provided to maintain constant pressure on the contacts when the device is in the latched position. |  | *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): CLD001 (Step 20) |  |  | Init.: |
| 30 |  | Connector pins are made of brass- or gold-plated nickel, or gold-plated copper. |  | *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): CLD001 (Step 21) |  |  | Init.: |
| 31 |  | The current-carrying male and female contacts are a minimum of 0.09 inch in diameter and firmly affixed to the connector block. |  | *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): CLD001 (Step 22) |  |  | Init.: |
| 32 |  | Mated connectors do not allow water penetration. |  | *Provide a statement of conformance in this field.* | Compliance Matrix Review |
|  |  | TERL Test Cases (Steps): CLD001 (Step 23) |  |  | Init.: |
| 33 | 996-6.4 | Lowering tool is portable and made of a corrosion resistant metal. The winch and cable have a combined weight of less than 35 lbs and is capable of securely supporting itself and the load. The lowering tool includes a quick release cable connector, and a torque limiter that will prevent over-tensioning of the lowering cable. |  | *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): CLD001 (Step 24) |  |  | Init.: |
| 34 |  | The lowering tool is powered using a half-inch chuck, variable-speed reversible industrial-duty electric drill capable of matching the manufacturer-recommended revolutions per minute.. An adapter with a clutch mechanism and torque limiter is provided for use with a drill. |  | *Applicant may provide comments in this field.* | Physical Inspection |
|  |  | TERL Test Cases (Steps): CLD002 (Step 15) |  |  | Init.: |
| 35 |  | The winch assembly has a minimum drum size width of 3.75 inch and a positive braking mechanism to secure the cable reel during raising and lowering operations, and to prevent freewheeling. |  | *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): CLD001 (Step 25) |  |  | Init.: |
| 36 |  | The lowering cable winds evenly on the winch drum during operation. |  | *Applicant may provide comments in this field.* | Physical Inspection |
|  |  | TERL Test Cases (Steps): CLD002 (Step 16) |  |  | Init.: |
| 37 |  | A manual winch handle is provided that incorporates a non-shear pin type torque limiter, can be used repeatedly and will not damage the lowering system. |  | *Applicant may provide comments in this field.* | Physical Inspection |
|  |  | TERL Test Cases (Steps): CLD002 (Step 17) |  |  | Init.: |
| 38 |  | A minimum of one lowering tool and any additional tools required to operate lowering device are provided. |  | *Applicant may provide comments in this field.* | Physical Inspection |
|  |  | TERL Test Cases (Steps): CLD002 (Step 18) |  |  | Init.: |
| 39 | 996-6.5 | The lowering cable is a 0.125-inch minimum diameter Type 316 stainless steel aircraft cable (7 strands x 19 gauge) with a minimum breaking strength of 1,760 pounds. |  | *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): CLD001 (Steps 26,27) |  |  | Init.: |
| 40 |  | Lowering cable assembly (as installed with thimble and crimps on one end and a cable clamp inside the latch on the lowering device end), has a minimum breaking strength of 1,760 lbs. |  | *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): CLD001 (Step 28) |  |  | Init.: |
| 41 |  | All lowering cable accessories, such as connecting links, have a minimum workload rating that meets or exceeds that of the lowering cable. |  | *Provide a statement of conformance in this field.* | Compliance Matrix Review |
|  |  | TERL Test Cases (Steps): CLD001 (Step 29) |  |  | Init.: |
| 42 |  | Prefabricated components for the lift unit support system prevent the lifting cable from contacting the power or video cables. |  | *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): CLD002 (Step 19) |  |  | Init.: |
| 43 | 996-6.6 | All wiring meets NEC requirements. |  | *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): CLD001 (Step 30) |  |  | Init.: |
| The following compliance matrix criteria are for external-mount lowering systems for use on existing structures. | | | | | |
| 44 | 996-6.7 | The system includes an upper mounting/junction box, winch assembly and all external conduit and cabling necessary for mounting to existing structures. |  | *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): CLD001 (Step 31) |  |  | Init.: |
| 45 |  | A NEMA 4 rated lower lockable pole-mounted cabinet is provided, constructed of corrosion resistant 5052 sheet aluminum with a minimum thickness of 1/8 inch, to house the winch assembly |  | *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): CLD001 (Step 32) |  |  | Init.: |
| 46 |  | The winch cabinet allows unobstructed operation of the winch, access for servicing, and sufficient clear area for operation of the winch manually and with an electric drill. |  | *Applicant may provide comments in this field.* | Physical Inspection and Functional Inspection |
|  |  | TERL Test Cases (Steps): CLD003 (Step 2) |  |  | Init.: |
| 47 |  | The outside surface of the cabinet has a smooth, uniform natural aluminum finish. |  | *Applicant may provide comments in this field.* | Physical Inspection |
|  |  | TERL Test Cases (Steps): CLD002 (Step 20) |  |  | Init.: |
| 48 |  | All inside and outside edges of the winch cabinet are free of burrs, and all welds are neatly formed, free of cracks, blow holes, and other irregularities. |  | *Applicant may provide comments in this field.* | Physical Inspection |
|  |  | TERL Test Cases (Steps): CLD002 (Step 21) |  |  | Init.: |
| 49 |  | Cabinet hinges are vandal resistant and constructed of 14-gauge stainless steel or 1/8 inch aluminum with stainless steel hinge pins. |  | *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): CLD001 (Step 33) |  |  | Init.: |
| 50 |  | The cabinet door is double flanged and include neoprene closed-cell gaskets permanently secured on the interior door surfaces that contact the door opening. |  | *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): CLD001 (Step 34) |  |  | Init.: |
| 51 |  | The cabinet door does not sag. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Physical Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): CLD002 (Step 22) |  |  | Init.: |
| 52 |  | The cabinet includes a pin tumbler lock keyed for use with a No. 2 key and two keys. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Physical Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): CLD002 (Step 23) |  |  | Init.: |
| 53 |  | The cabinet door handle includes a lock hasp that will accommodate a padlock with a 7/16-inch diameter shackle. |  | *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): CLD001 (Step 35) |  |  | Init.: |
| 54 |  | The upper mounting/junction box includes a maintenance access door with captive attachment hardware. |  | *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): CLD001 (Step 36) |  |  | Init.: |
| 55 |  | All necessary mounting hardware, conduits, standoffs, and conduit mounts required for a complete and functional system is provided. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Physical Inspection |
|  |  |  |  | *Indicate location of requested information in submittal.* |  |
|  |  | TERL Test Cases (Steps): CLD002 (Step 24) |  |  | Init.: |
| 56 |  | External conduit is galvanized schedule 40 with NPT threads, has a minimum ID of 3 inches at the lower winch cabinet entrance, and allows the lowering cable to wind evenly on the winch drum without binding. |  | *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): CLD001 (Step 37) |  |  | Init.: |
| 57 |  | All conduit couplings and connections between the pole-mounted cabinet and upper mounting/junction box are watertight. |  | *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): CLD001 (Step 38) |  |  | Init.: |

**Document History for:**

**Camera Lowering Device Compliance Matrix**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Rev | Description | Authored and Checked | Reviewed | Approved | Approval Date | Rev More Stringent? |
| 1.0 | Converting from Excel to Word and adding evaluation criteria | A. Burleson | J. Morgan | J. Morgan | 07/03/2013 | N/A |
| 2.0 | Replaced FDOT logo with latest approved one and added CM ID # to header. | A. Burleson | J. Morgan | J. Morgan | 03/27/2014 | No |
| 3.0 | Changing from 785 to 641.  Revised document approver title. | D. Bremer  K. Moser | J. Morgan | J. Morgan | 01/06/2015 | No |
| 4.0 | Changing to most recent FA date (FA 1-16-15). No changes to device content. | D. Bremer | J. Morgan | J. Morgan | 09/09/2015 | No |
| 5.0 | Move from 641 to 996-6. | W. Geitz | M. DeWitt  J. Morgan | D. Vollmer | 12/29/2021 | No |
| 6.0 | Added test cases and steps. | D. Bremer | V. Johnson W. Geitz | D. Vollmer | 03/27/2023 | No |
| 7.0 | Updated to latest FA date of 12-1-23 for spec 996. | W. Geitz | M. DeWitt | D. Vollmer | 01/19/2024 | No |