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REVISION OF SECTION 614

BICYCLE AND PEDESTRIAN TRAFFIC COUNTER

**DESCRIPTION**

This work consists of the construction of a counter for collecting and storing bicycle and pedestrian volume counts at locations as shown on the plans.

**MATERIALS**

The counter shall be weatherproof and shall conform to an Ingress Protection (IP) rating of 68, and shall operate in a temperature range of minus 40○ F to 120○ F. It shall be operated with batteries that can operate continuously for five years. If such extended life batteries are not available, then batteries that have a life of no less than one year shall be used. The detection range of the counter shall be a minimum of 15 feet in length. The counter shall be capable of recording at varying speeds, including those exceeding 20 miles per hour.

The counter shall collect and store pedestrian and bicycle volume counts by direction for a minimum of one year to an accuracy of plus or minus 5 percent. Time for this data shall be reported in a minimum of 15 minute increments on a 24 hour clock and also be capable of storing hourly and daily volumes. The collection device shall be capable of displaying the volume count data and the location of the retrieval device.

The data shall be stored in a format such that it can be directly exported to Microsoft Excel. The field collection device shall provide a way to download data (such as a direct modem link between the counter and a networked personal computer) such that data can be accessed at any time from multiple computers without having to visit the site location.

Counters located on multi-use paths, and where combined bicycle and pedestrian data is required, the counter shall have a permanent post-mounted passive infrared detection sensor system, which shall be capable of collecting bi-directional data with the need of sensors on both sides of the path. The infrared detection technology shall be able to discriminate a 2○ F temperature differential between the subject to be counted and ambient air.

In sites where separated bicycle and pedestrian count volumes are needed, installation of both passive infrared detection and loops will be required. Additional loop wire supplied from the manufacturer may be required depending on the counting device used for the site. The Contractor shall have equipment to twist the paired loop wires, as necessary.

**CONSTRUCTION REQUIREMENTS**

Prior to start of work, the Contractor shall submit a proposed traffic control plan for closing and rerouting pedestrian, bicycle and roadway traffic during the installation of the traffic counter. The plan shall include fencing, coning and a detour, as required.

A minimum of two weeks prior to the installation of the traffic counter, the Contractor and a member of the DTD Traffic Analysis Unit (Phone: 303-757-9011) must coordinate the date that the counter will be installed. Installation of the traffic counter will be in the presence of the Engineer, the DTD Traffic Analysis Unit representative, and the Manufacturer Representative. Only if the DTD Traffic Analysis Unit staff states in writing that the Manufacturer is not needed on site, will the Manufacturer not be required. The contractor shall locate and test for all buried and overhead utilities, which may interfere with the planned location of the counter. The Contractor shall contact the Utility Notification Center of Colorado (UNCC) at 811 or 1-800-922-1987 for location of member utilities at least three working days prior to any excavation, not including the day of actual notice.

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The Contractor shall also locate non-member utilities, such as storm sewer and ditch. All utility conflicts encountered with the proposed installation shall be brought to the attention of the Engineer.

Once the installation is complete, the contractor is required to test the loops and/or the passive infrared counting device to determine if the infrared and loop devices are detecting properly. This may require the contractor have a bicycle on-site for testing purposes.

The location of the counters shall be as close as possible to the locations shown on the plans. However, actual locations may vary such that the counters are not located near bodies of water, near overhead power lines, or are pointing towards vehicular traffic. Exact locations shall be as approved by the Engineer and the DTD Traffic Analysis Unit staff. Once the placement is determined, the DTD Traffic Analysis Unit staff or the counter manufacturer will draw the loop cutting lines on the roadway or trail surface with chalk or a visible marker so that the contractor can then follow the saw cutting lines during installation. The saw cut for the loops shall be made 3/8 inch wide and 3-½ inches deep. The saw slot shall be as straight as possible and shall not vary more than ½ inch when checked with a straightedge. No more than one set of loop lead wires shall be placed in one saw slot. The number of turns of paired loop wire shall be in accordance with manufacturer’s recommendations. Saw cuts shall be hydro-blasted with a mixture of water and air and then blown free of water and debris with compressed air, using a large capacity air compressor of at least 150 CFM. The cuts shall be dry prior to placement of loop wire.

The piezo lead wire shall be placed in the saw slot with a blunt non-metallic object. Half-inch backer-rod shall be installed to insure the wire does not float to the surface during grouting. Backer-rod shall be installed in 4 to 6 inch pieces with 1 to 2 foot gaps in-between, to ensure the sealant will come in contact with the piezo lead wire. One continuous piece of backer-rod will not be allowed.

Loop lead wires from pavement edge to pull box shall be enclosed in a minimum ¾ inch diameter electrical conduit to protect wire from abrasion. Loop lead-in pairs from pavement edge, to pull box, shall be symmetrically twisted 5 turns per 1 foot (or whatever the counter manufacturer recommends). Pull boxes or cabinet shall contain a minimum of 3 feet of loop lead wire for splicing. All loop and loop leads shall be clearly labeled in all pull boxes and or cabinet.

Loops shall be sealed with a two-part self-curing, self-bonding weatherproof epoxy approved for sealing loops. Loops shall be 6 feet by 6 feet, unless otherwise shown on the plans. Loop sealant shall conform to manufacturer’s recommendations. Loop sealant also shall not coagulate prior to installation and shall be spread out across the loop installation area with a sealant spreader tool such that the sealant is flush with the roadway or trail surface. At sites where a 6 inch curb exists, backer board shall be installed along sidewalk and curb joints to prevent sealant from spilling.

The Contractor shall follow all environmental regulations and best management practices during the saw cutting and installation of the loops. All damages or penalties associated with failing to meet environmental requirements shall be at the Contractor’s expense.

Acceptance will be based on the Contractor performing a complete test of the counter to ensure that it is functioning correctly and is fully operational. Non-functioning systems will be repaired or replaced at the Contractor’s expense.

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**METHOD OF MEASUREMENT**

Bicycle and Pedestrian Traffic Counter will be measured as the actual number of counters that are installed and accepted.

**BASIS OF PAYMENT**

Payment will be made under:

**Pay Item Pay Unit**

Bicycle and Pedestrian Traffic Counter Each

Payment will be full compensation for all work, materials and equipment required to install the counter, and to link the data to a personal computer.

Electrical conduit will not be measured and paid for separately, but shall be included in the work.

All costs associated with the manufacturer’s representative will not be measured and paid for separately, but shall be included in the work.

Fencing and coning will not be measured and paid for separately, but shall be included in the work.

Unless otherwise shown on the plans, rerouting or detouring of bicycle and pedestrian traffic will not be measured and paid for separately, but shall be included in the work.