

V. SHORT-TERM PROGRAM

SHORT-TERM MONITORING SITES



Video 2 Site Selection

Road tubes

Short-Term Monitoring Sites provide roadway segment-specific traffic count information on a cyclical basis. Short-Term counts are sometimes called seasonal, portable or coverage counts.

Traffic counters frequently use rubber road tubes to sense and record the number of axles at a count location. When a vehicle's axle crosses the road tube, the pulse of air that is created is recorded and processed by the traffic counter. The road tube is extended across the desired lanes or directions that need to be counted, and depending on the type of count needed, one of several different road tube configurations may be placed in the roadway.



Data collection personnel are responsible for all road tube tests and inspections. At least once per month, replace each road tube---or blow clear and test for leaks by the application of air pressure. Visually inspect each road tube for adequate condition prior to each use.



Site selection for road tube placement (Short-Term Monitoring Sites)

When determining locations for road tube sites, it is important to select a location that will give the most accurate and useful data possible. When setting road tubes, you should consider the following factors:

- 1) Avoid curves, if possible.
- 2) Don't set at driveways.
- 3) Don't set by schools.
- 4) Avoid setting close to intersections, if possible—counters require vehicles of constant speed above 30mph to work properly.
- 5) Road tube spacing is dependent upon average vehicle speed and equipment requirements.
 - 16 feet is recommended for interstates;
 - 10 feet is recommended for 55 mph roads; and
 - 6 feet is recommended for low speed urban roads, ramps, and curves
- 6) Adjust the debounce setting.
- 7) For the best vehicle classification, both road tubes must be of the same type and condition, and within 1 inch in length.
- 8) Hold the road tube to your ear to feel for an air pulse—if no pulse is felt, get another hose.
- 9) Ensure the counter is secured in a dry location—possibly hang it above the ground.
- 10) Tape down hoses to minimize hose bounce. It is recommended to use a minimum of 5 pieces of tape per lane.
- 11) If nothing is available to which a counter can be secured, drive a metal delineator post (with visible marking) into the ground, and secure the counter to it.
- 12) For locations that are revisited, consider permanently installing nails (driven close to the road surface) and marking the location for future use.
- 13) Do not set when the pavement is wet.
- 14) Hoses must be set perpendicular to the road, and the same amount of tension should be applied to each hose.
- 15) Safety is always a factor when driving nails and placing hoses.

Inductive loop/ piezoelectric axle sensor sites

There are a number of locations throughout the state where permanent loops and piezo sensors have been installed in the pavement. These sensors may be connected to portable counters and used to collect short term vehicle counts, speed or class surveys, depending upon the sensor configuration. A single loop is required to collect traffic volume data. Two loops are required to collect speed data. Two loops and a piezoelectric sensor in each lane are required to collect classification data.

Peek 241-A



ADR 3000



Diamond



Site location determination

When determining locations for inductive loop/piezoelectric axle sensor sites, it is important to select a location that will give the most accurate data possible. Some of the factors that should be considered or reviewed when selecting a site location are as follows:

- 1) Avoid driveways and curves
- 2) Avoid acceleration/deceleration areas
- 3) Away from intersections.
- 4) Free flow traffic
- 5) Locate the cabinet in an area safe from traffic, where the technician can see both directions of traffic.
- 6) Location that is easy to access from roadway, with off-road parking.
- 7) Avoid high pedestrian traffic areas.
- 8) Locate the cabinet such that the recorder display and the traffic can be viewed simultaneously.

Sources for review

Sources for review when selecting site locations are:

- 1) Review of Design plans at 30% stage, or earlier (Construction, Reconstruction, Resurfacing), so that, if desired, loops and piezo sensors can be installed in the pavement for future use as a PTMS.
- 2) Review video logs for possible traffic monitoring sites.
- 3) Perform field inspection

Recommendation for installing new inductive loop/piezoelectric sites

There are certain criteria that should be looked at when determining and recommending the installation of a new inductive loop/piezoelectric sites. The following guidelines should be used:

- 1) Is the site really needed?
- 2) Recommended to be added by time of 30% Design plans (Construction, Reconstruction, Resurfacing)
- 3) If the road geometry precludes use of road tubes
- 4) Safety concerns in the area to be counted
- 5) High speed locations (Interstate)
- 6) Accident history at location
- 7) Areas of high traffic

Tracking of installation

Each District will develop a tracking method to assure sensors are installed according to plans and working properly after installation.

- 1) Once it is determined that a site will be installed, it is important to get project status reports as soon as possible from the construction department.
- 2) If possible, attend the Pre-construction meeting to advise all parties of your interests in the site.
- 3) It is also helpful to get a contact phone number as soon as possible. This will make the communication between the responsible parties more efficient.
- 4) Begin close follow up once the installation has begun.
- 1) All sites must be inspected to determine that they have been built according to the plans and are in proper working condition before payment is approved.

Installation/Inspection

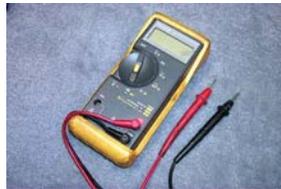
The following list of references will be used when working with the installation and inspection of inductive loop/piezoelectric axle sensor sites:

- Plan Notes
- Roadway and Traffic Design Standards
- Standard Index 17781 - Loop installation details ([Appendix C](#))
- Standard Index 17841 - Cabinet installation details ([Appendix D](#))
- Standard Index 17900 - Traffic monitoring site details ([Appendix E](#))

Equipment

The following equipment is recommended when working on, troubleshooting, or inspecting a permanent site:

- VOM (Voltage-Ohm-Milliamp) Meter
- Laptop Computer
- Earth Ground Tester
- Loop Wire Insulation Tester
- Tool kit with all applicable tools (Pliers, screwdrivers, etc.)
- Oscilloscope
- Traffic Counter
- Gloves
- Shovel
- Broom
- Lubricant
- Insect repellent
- Wasp spray
- Insecticide
- Axe
- Pruners or shears



VOM Meter



Oscilloscope



Phone



Earth Tester



Frequency Tester



Laptop Computer

Maintenance

Non-Intrusive Technologies

Counts will be taken by other methods while the site is under repair.

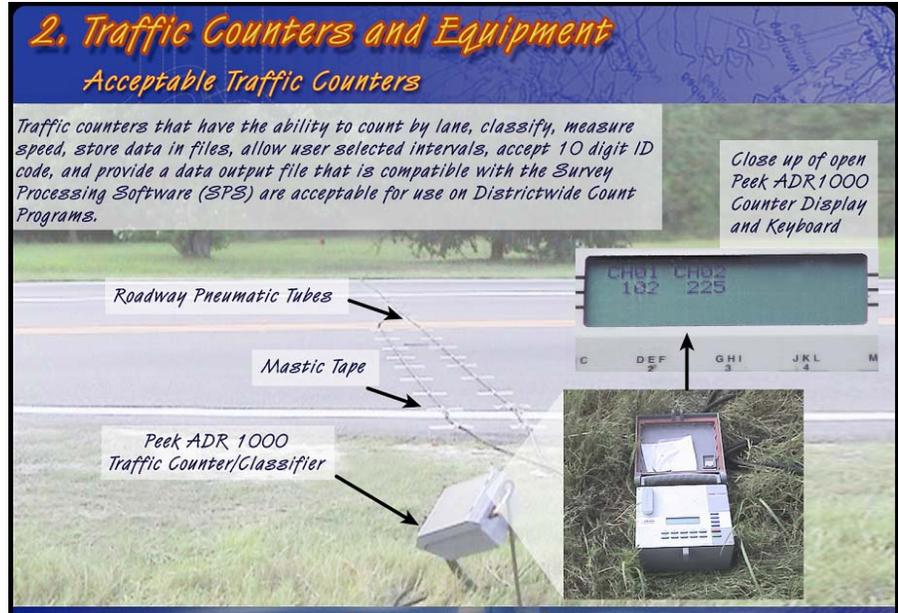
Non-intrusive technologies are devices that can collect certain traffic data without having equipment used in the roadway. Most of these devices can collect volume, speed, and length based classification counts. These counters do not collect axle based classification counts. The following is a list of currently available technologies that could be used:

- Infrared
- Microwave radar
- Acoustic
- Laser
- Video

TRAFFIC COUNTERS AND EQUIPMENT



Video 3 Equipment



Acceptable Traffic Counters

The majority of traffic counting locations have periods of congested traffic flow during which the axles of two or more vehicles are within 40 feet of each other. The counter shall have the ability to correctly classify vehicles during these “tailgating” conditions. Each traffic counter placed in the field should have a legible tag showing the name and telephone number of the owner. If the count is being collected by a contractor for FDOT, the name and telephone number of the FDOT contract administrator should also be written on the tag.

Acceptable traffic counters must have the following capabilities:

- 1) Record traffic count data (axle, vehicle, speed and/or classification) in user selected intervals
- 2) Accept the user inputted 10 digit ID code required by the Survey Processing Software
- 3) Provide a data output file that can be read into the SPS.

Peek 241A/ADR1000



Diamond



Peek ADR3000



MetroCount



Jamar



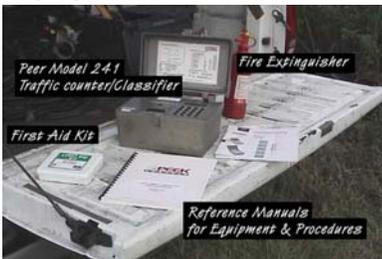
Certification of traffic monitoring equipment

All traffic counters used by the Department or their consultants for general data collection activities must be certified for accuracy at least once per year. See [Traffic Monitoring Equipment Certification Form \(Appendix A\)](#). These certifications must be turned in to the Central Office no later than January 31.

Each counter shall be tested for accuracy with a specialized traffic counter tester. All sensor inputs (air switches, contact closure boards, loop boards and/or piezo boards) will be tested. A minimum test will consist of a 15-minute survey. The counter shall have a minimum of **97%** accuracy.

Traffic Technician Equipment

All District and consultant vehicles shall be equipped with the following equipment:



- 1) Orange Safety vests (worn by technician during all field operations)
- 2) Four-way flashing lights and a minimum of two yellow strobes mounted on a light bar
- 3) Appropriate tools and supplies (eg., spray paint, asphalt tape, nails, hammer, etc.)
- 4) Appropriate manuals for counters
- 5) Fire extinguisher
- 6) First aid kit
- 7) Two-way radio or cellular phone
- 8) Orange cone
- 9) Traffic counters
- 10) Security chains and locks

**SAFETY PROCEDURES
FOR TRAFFIC COUNT
PERSONNEL**



Video 4 Safety Procedures

All traffic count personnel must be provided a minimum of two weeks of training by accompanying an experienced field technician who is collecting traffic data. All personnel must be provided training in first aid techniques and be familiar with the following safety procedures before they are allowed in the field. All vehicles used for traffic data collection will be equipped with the minimum equipment specified above.

All traffic count personnel shall adhere to the following procedures:

- 1)** Seat belts shall be worn during operation of vehicles.
- 2)** Orange safety vests and UL approved safety glasses or safety prescription glasses shall be worn during field operations.
- 3)** Reflective safety vests shall be worn during low visibility situations.
- 4)** Vehicle lights shall be used in the following manner:
 - a) Turn signal and yellow roof mounted strobe lights shall be activated as the traffic count vehicle approaches the work site, usually five hundred to one thousand feet (500' – 1000') in advance of the site.
 - b) Four-way flashers shall be activated at the work site and the flashers and strobe lights shall remain activated until the proper turn signal is activated to leave the work site.
 - c) Strobe lights shall be turned off after the vehicle safely re-enters traffic flow.
- 5)** All traffic count personnel shall conform to OSHA RULES & REGULATIONS.
- 6)** Vehicles shall be parked where there is adequate space to park the vehicle safely without blocking sidewalks and driveways. The vehicle should be parked a minimum of four (4) feet from the edge of the pavement.
- 7)** All traffic count personnel shall exercise extreme caution when entering the roadway to set or retrieve traffic sensors.
- 8)** Under no circumstances shall traffic sensors be placed in the roadway when it is raining or foggy.
- 9)** All traffic count personnel have the right to request that their supervisor assign additional help to assist them if they deem there is a need for a two-person crew to set equipment safely.
- 10)** Only state vehicles are authorized to cross the Interstate medians. All other vehicles are subject to moving violations.
- 11)** Night work should be done only when traffic flow dictates it to be necessary, and then only with two or more technicians. One person should spot while the other is working near the pavement. At least one set of eyes should always be on traffic when someone is working in the traveled way. Reflective vests must be worn at all times when working at night.

SITE SELECTION

Traffic (Section) Break Segments



Video 5 Traffic Break Example

Each Roadway Section and Subsection is defined by a beginning and an ending milepost in the Roadway Characteristics Inventory (RCI) database. Sections and Subsections are divided into smaller continuous segments that have similar traffic volumes and truck traffic; these smaller segments are called Section Breaks, Traffic Breaks, or just Breaks. AADT and the K30, D30 and T must be provided for every section break of the State Highway System. Traffic Breaks are defined in the Traffic Characteristics Inventory (TCI) database.

Breaks are defined by beginning and ending mileposts called break points. Break points are always located at the beginning and ending of each Roadway Section and Subsection, at the beginning and ending of exceptions, and where State and Federal roads intersect the Section. Additional break points are located where there are significant changes in traffic characteristics; these changes usually occur at intersections. The characteristics of the highway can also govern break points.

Each year, through the exercise of engineering judgment on the part of the District traffic personnel, Section Breaks are reevaluated. Break points are added, deleted or moved to reflect changes in inventory and field conditions. Listed below are some considerations for determining the location of break points:

- 1) Where changes in total traffic volume exceed 20% (under 5,000 AADT) to 10% (over 25,000 AADT)
- 2) Where changes in total truck volume exceed 250 vehicles per day.
- 3) Traffic changes often occur where major County roads intersect State highways. Breaks are usually placed at these intersections even if there is no significant change in traffic volume or vehicle mix, just to prove there is no significant change.
- 4) The location of City Limits and speed limits.
- 5) Roadway geometry (for example, a change in the number of lanes may indicate a change in traffic characteristics).
- 6) Major commercial or residential development (such as shopping centers or subdivisions).
- 7) Truck stops and industrial areas may indicate a change in truck traffic.

Station Locations



Video 6 Site Selection Basics

It is the responsibility of the Districts to determine the location of traffic monitoring sites. The exact location and count type are often determined by the physical geometry of the highway (see [Chapter V](#)). Each time a count is made, the technician will re-evaluate the site to determine if field conditions are still suitable for obtaining an accurate count. Some of the factors that should be considered when selecting site locations are the presence of:

- Curves
- Crests
- Valleys
- Driveways
- Intersections
- Schools
- Number of lanes
- Medians
- Shoulders
- Turn lanes

A traffic count station is usually located within each traffic break segment. It is important to note that connecting roadway sections (i.e. adjacent urban/rural sections, and segments that adjoin one another at county lines), can utilize count data from a station located on either side of the traffic break as long as the same roadway and traffic characteristics exist. This helps reduce the number traffic counts that must be collected, processed and stored.

Routine traffic count surveys should be limited to the mainline sections only. Ramps are only counted when there is a specific reason to do so.

**TYPE OF COUNT,
COLLECTION PERIODS
AND DURATIONS**
Volume counts

There are two different types of volume counts that can be collected:

Axle volume counts – are usually obtained when a single road tube is set across a road. The counter connected to this road tube divides the number of hits on the tube by 2. This type of count data requires an axle adjustment to generate a vehicle count.

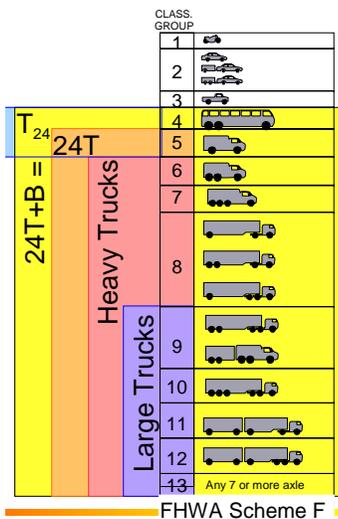
Vehicle volume counts – are obtained from counters that use sensors that detect an entire vehicle, not simply its axles. The most commonly used type of these sensors are inductive loops.

Classification Counts

Classification counts can be collected and classified two different ways:

Axle classification – Axle classification consists of collecting traffic data with counters that detect axles and measure the distances between axles on each vehicle. The vehicle is then classified according to the criteria contained in **FHWA Classification Scheme “F”** (see [Appendix B](#)). Classification data are usually collected using two axle sensors or a combination of presence (loops) and piezoelectric axle sensors.

Length classification – This type of count is derived by detecting the presence and length of a vehicle and classifying it into preset length groupings. To determine length classifications, several different types of presence detectors (microwave, magnetic, radar, loop) can be used to record the vehicles length. Presently length classifications are not used by Florida DOT.



Classification surveys required at congested locations might require additional presence detection sensors or advanced detection technology. Counters utilizing road tube and loop/piezo sensors often will not classify well at locations with stop-and-go traffic.

Performing Counts

While installing and performing traffic counts, there are several procedures that should be adhered to with regards to placement of the traffic counter and sensors:

- 1) Traffic counters should be placed at locations specified by the District Traffic Count Manager, or as listed on the Survey Processing Software Inventory Database.
- 2) Ascending and descending directions should be counted at the same milepost. In congested areas with many intersections and driveways, this may not be possible.
- 3) All count interval times must be consecutive throughout the duration of the count.
- 4) Both ascending and descending directions must be counted for identical dates and times.
- 5) All count locations should have field equipment (traffic counter and sensors) verification checks done prior to leaving site to assure accuracy.
- 6) Collect GPS coordinates (dependant on District)
- 7) Each counter must have the descriptive 10-digit identification code entered by the technician as the counter is set so that the Survey Processing Software will know how to handle the resulting data file. Refer to the SPS manual for examples of the 10-digit identification code.
- 8) Avoid construction affected locations.

Don't place counters and hoses too close to an intersection



Mid-block locations where traffic moves freely over the hoses



Acceptable times

Obtaining data that is most useful for historical trend reporting and forecasting requires that the collection period be taken during a time in which traffic would be representative of the traffic patterns on the typical weekday. There are several guidelines that should be followed to help minimize collecting atypical data:

- 1) Counts should occur between Monday 6:00a.m. and Friday 2:00p.m.
- 2) Avoid collecting data prior to, during, or right after, holidays or special events.

Duration of Counts

The duration of the volume or classification count is dependant on the requirements of the District as well as the project. For the Annual Count Programs throughout the Districts, count locations are identified as either by the functional classification of the road on which they are located as either Rural or Urban. Because there is more day-to-day variation in the traffic flow in rural areas, a longer count duration is required to minimize this variation. The minimum requirements for Rural and Urban counts are as follows:

Rural – minimum of 48-hours of continuous data in 15-minute intervals

Urban – minimum of 24-hours of continuous data in 15-minute intervals

Recount Conditions

Field observed recount conditions

Some traffic counts will have to be re-taken.

When recount conditions are noted in the field, the site will be recounted before being submitted to the District Traffic Count Manager. Once a traffic counter has been set, the following guidelines should be followed to ensure that the collected data is accurate, and will help determine if there is a reason to re-take the count. In general, a recount condition will occur when:

- 1) One or more of the machines at a designated count station mechanically fails to properly complete the count period.
- 2) One or more tubes were damaged or come loose.
- 3) An incomplete or inaccurate classification or volume count occurs for any portion of the count period.
- 4) The count was made in the wrong location.
- 5) The count was affected by an abnormal occurrence, such as a construction detour, long delay, special event, emergency incident, or adverse weather conditions.

Office determined recount conditions

A recount is necessary when the SPS check detects errors and subsequent tabulation and review of count results verify the need for a recount. This condition can only be determined after District personnel have analyzed the submitted count information. (see [Chapter VII—Processing of Short-Term Count Data](#))