

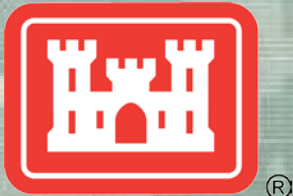
Launch of Vehicle Metering Best Practices Guide

Briefing for the Field

August 2015



The National Transportation Systems Center



®

US Army Corps of Engineers
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Webinar Goals

1. Meters and Metering Technologies
2. Results of Vehicle Metering Pilot
3. How to Use the Best Practices Guide
4. Provide pros and cons of popular meters
5. Summarize key Best Practices



Objectives

- Recognize the value of vehicle counting (“metering”)
- Comprehend the strengths and weaknesses with various meter types and metering technologies
- Understand how to install new meters, replace existing meters, and improve overall operations and maintenance of a comprehensive metering program
- Learn tips and instructions found during site visits
- Make more informed choices about vehicle meter purchases



Background

- The Corps is currently modernizing the Visitation Estimation & Reporting System (VERS) for reporting visitation
- The lessons learned from the Best Practices Guide will ultimately become standardized in VERS processes, however this presentation will focus primarily on best practices rather than VERS integration



VERS Modernization Update

Date	Time
Tuesday, September 29th	10:00 AM CT
Wednesday, September 30th	11:00 AM CT
Thursday, October 1st	1:00 PM CT

- ❑ To access the audio, please dial (877)336-1280, access code 3567024, security code 1234.
- ❑ Click View, then Full Screen Mode for a full screen view.
- ❑ Press mute button or *6 on your phone to reduce background noise. To talk, release the mute button or press another *6.
- ❑ Please DO NOT PUT YOUR PHONE ON HOLD AT ANY TIME during the webcast, use your mute button instead (the background music will be quite distracting to all).

Background (cont.)

- In 2012, USACE became part of the Federal Lands Transportation Program (FLTP)
- Provides funds for transportation activities at Corps recreation sites
- Also imposes more strict requirements for reporting and planning
- USACE has enlisted the help of the U.S. DOT Volpe Center (“Volpe”), based in Massachusetts, to assist in the implementation of FLTP



What is Vehicle Metering?

- Vehicle metering (or “counting”) is simply the process of determining how many vehicles are accessing Corps recreation sites
- This is the best proxy to obtain volume estimates
- The Corps applies “load factors,” or multipliers based on the type of PSA to estimate the number of people per vehicle, which results in the estimates of use



Why Does the Corps do Vehicle Metering?

- The Corps has metered vehicles for decades
- It is the most cost effective way to monitor a park through the year
- The data received, and input into VERS, allows the Corps to better allocate resources to high performance areas
- As a new member of FLTP, future funding decisions will be based in part on accurate and robust performance data
- Emphasis is placed on areas of high use and economic generation



Vehicle Metering Pilot

- Objectives
 - ▶ Visit a selected Project in each of the 7 CONUS regions
 - ▶ Test each of the meters to see how well they function
 - ▶ Implement repairs if needed or recommend changes
 - ▶ Use findings to develop Best Practices Guide



Vehicle Metering Pilot

■ 2014 Site Visits

- ▶ Allatoona Lake
- ▶ Blue Marsh Lake
- ▶ Bull Shoals and Norfolk Lakes
- ▶ Lower Granite Lake
- ▶ Lake Mendocino and Lake Sonoma
- ▶ Old Hickory Lake
- ▶ Saylorville Lake



- Closeout reports will be released soon
- ERDC, IWR, and Volpe thank you for volunteering and for your support for on-site evaluations!



Vehicle Metering Pilot

■ Findings:

- ▶ All projects visited have good metering programs in place
- ▶ Most metering technologies have limitations in some situations and strengths in others
 - It may be necessary to use more than one type of meter throughout a project)
- ▶ Inductive loops generally produce the most reliable counts
- ▶ Magnetometers require extensive configuration and testing to produce reliable counts
- ▶ Pneumatic tube systems have many ways to produce faulty data
- ▶ Infrared breakbeams and focused beams do not work well where pedestrians, bikes and cars all cross the beam



Best Practices Guide

- Guide is complete and is ready for release
- It is essentially a follow-up to the 2012 Best Practices Guide
- Factors in selecting new meters are provided
- Recommendations for setup, operation and maintenance of the commonly-used meters are provided
- Guide is divided according to user situations



How to Use the Best Practices Guide

- **Use Case #1** – Selecting and Installing New Meters
 - ▶ Includes factors for selecting new meters
- **Use Case #2** – Upgrading or Replacing Existing Meters
 - ▶ Describes what existing infrastructure should be reused
 - ▶ Describes what types of meters should be prioritized for replacement
- **Use Case #3** – Improving Operation and Maintenance of Existing Meters
 - ▶ Provides the Pros and Cons of various commercial meters
 - ▶ Provides tips on proper testing, configuration and maintenance



Discussion and Questions

*Please use the chat box to submit questions,
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Vehicle Metering Technologies

- Inductive Loops
- Magnetometers
- Pneumatic Tubes
- Infrared Breakbeams
- Infrared Focused Beams
- Other Technologies
- Non-metered Methods





Inductive Loops

- Wires embedded in (or under) the road surface
- A small electrical current in the wire produces a magnetic flux. A detectable change in the magnetic field occur when a vehicle passes over it.
- PROS:
 - ▶ Highly accurate method of counting (missed cars and false counts are both rare)
 - ▶ Several commercial metering products are available
 - ▶ Low maintenance
- CONS:
 - ▶ Installation requires a saw (asphalt/concrete) or trenching and conduit (gravel/dirt)



Inductive Loop Examples

Diamond Traffic
Tally14, 21, 41, 51

Section 4.1.1



- Low Power Requirements
- Readily available

Streeter (Peek) JR161

Section 4.1.2



- Proven design
- Decades of field use



Magnetometers

- Self-contained device, usually on the side of the road
- A small electrical current inside the device produces a magnetic flux. A detectable change in the magnetic field occur when a vehicle passes near it.
- PROS:
 - ▶ Easy to install
 - ▶ Low maintenance
- CONS:
 - ▶ Difficult to configure initially
 - ▶ Prone to counting opposite lane traffic, nearby lawnmowers, cell phones
 - ▶ Prone to missing high speed cars (unless configured to expect high speed traffic)
 - ▶ Prone to mis-counting slow vehicles



Pneumatic Tubes

- Tubes stretched across the roadway
- A small air switch is triggered when tires force air through the tube
- PROS:
 - ▶ Inexpensive
 - ▶ Easy to deploy
- CONS:
 - ▶ Prone to miscounting (angled roadways, low speed cars)
 - ▶ High maintenance (holes in tubes, broken tubes)
 - ▶ Vulnerable to vandalism (cut tubes, tire spinning)
 - ▶ Many errors in VERS (some count axles, others count every other axle, some are switchable)



Pneumatic Tube Examples

K-Hill Wee

Section 4.3.1



- Small, self-contained
- Inexpensive
- Always counts every other axle

Diamond Traffic Tally 77

Section 4.3.2



- Same form factor as the TT-41
- Switchable from counting axles to cars

Diamond Traffic Tally 2

Section 4.3.3



- Small, self contained
- Uses a magnet to configure and read
- Switchable



Infrared Breakbeams

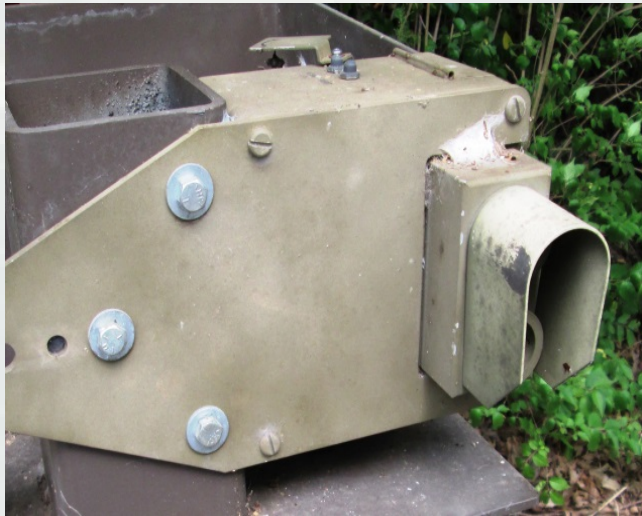
- Meter transmits light to a reflector
- Anything that crosses the beam increments the count
- Intended for pedestrian counting, works with vehicles
- PROS:
 - ▶ Works well on short driveways and roadside pullouts
 - ▶ Works well on wide roadways (up to 100 feet)
- CONS:
 - ▶ Not good where pedestrians, bikes and vehicles all trip beam
 - ▶ Simultaneous entry/exit will be counted as one
 - ▶ Needs to be mounted so that short vehicles are not missed and tall vehicles are not double-counted
 - ▶ Side reflectors can produce extra counts



IR Breakbeam Examples

Cuesta RS501

Section 4.4.1



- No longer manufactured
- Requires sturdy mount
- Repair services available

Diamond TTC-4420

Section 4.4.2



- Commercially available
- Requires a magnet for configuration and data collection



Infrared Focused Beams

- Essentially a motion sensor that looks through a tube
- Anything that crosses the beam increments the count
- Intended for pedestrian counting, works with vehicles
- **PROS:**
 - ▶ Requires no reflector (beam reaches about 15 feet)
 - ▶ Works well on short, narrow, single lane roads
- **CONS:**
 - ▶ Not good where pedestrians or bikes might trip the beam in addition to vehicles
 - ▶ Needs special configuration to detect higher speed vehicles
 - ▶ Should not be used on two-way roads
 - ▶ Currently only one vendor



Magnetometer Example

TRAFx Trail Counter

Section 4.5.1



- Small, easy to install
- Optional counter display
- Requires no reflector
- Counts people, bikes and vehicles



Other Types of Vehicle Meters

- Generally all vehicle meters currently used by Corps projects fall into one of the above categories
- Vehicle meters can (and have been) produced using other detection technologies such as
 - ▶ Radar
 - ▶ Seismic
 - ▶ Piezoelectric
 - ▶ Load cell
 - ▶ Acoustic
 - ▶ Intelligent video
 - ▶ Laser



Non-Metered Methods

- **RUDA (Recreation Unit Day Availability) Method**
 - ▶ Only for small parking areas (<20 spaces)
 - ▶ Metering is either too difficult or the cost of metering cannot be justified
- **“Borrowed” Counts Method**
 - ▶ Uses the meter count from another area that is similar in function, size and visitation
 - ▶ Use of this method is discouraged, but authorized under certain circumstances
- **NRRS (National Recreation Reservation System)**
 - ▶ Used by most USACE campgrounds
 - ▶ Preferred over metering for estimating visitation



Metering Application Matrix

	Inductive Loops [Section 5.1]	Magnetometers [Section 5.2]	Pneumatic Tubes [Section 5.3]	Breakbeams [Section 5.4]	Infrared Focused Beams [Section 5.5]
One-way roads (or roads with medians)	●	●	●	●	●
Two-way roads (no medians)	●	●	●	●	●
Roadside parking	●	●	●	●	●
Traffic stops at meter	●	●	●	●	●
Effect of pedestrians on the accurate counting of vehicles	●	●	●	●	●
Very wide roadways	●	●	●	●	●
Curved roadways	●	●	●	●	●
Dirt or gravel road	●	●	●	●	●
Slow moving traffic	●	●	●	●	●
Winter operation	●	●	●	●	●
Tailgating traffic	●	●	●	●	●
High speed traffic	●	●	●	●	●
Vandalism (secure meter housing used)	●	●	●	●	●
Initial cost (equipment only)	●	●	●	●	●
Cost or effort to install	●	●	●	●	●
Effort required to configure and test	●	●	●	●	●
Cost or effort to maintain	●	●	●	●	●

Legend:

- Good Choice
- Can work, but challenges exist
- Not a good choice



Key Best Practices

Location Selection

- Isolate visitation traffic from other traffic
- When possible, isolate traffic visiting one PSA from traffic visiting other PSAs
- For PSAs with multiple access roads, meter traffic in the same direction (entry or exit)
- Avoid places where vehicles stop or tailgate



Key Best Practices Management Procedures

- Check battery voltage monthly
 - For some meters, this is not easy to do
- Do not reset meters
- Check for anomalous data
- Retest meters and make adjustments at the start of each season



Discussion and Questions

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Next Steps for Volpe

- Additional site visits to occur in 2016 and 2017 (volunteers welcome!)
- Review prior meter readings to identify high volume areas
- Refine methodology and settings associated with vehicles towing trailers
- Improve process by which “load factors” (or multipliers) are applied per vehicle to obtain visitation numbers
- Potential to expand to pedestrian/trail counters



Now's the Time:

- **Review your information by running the PSA Managing Agency Report**
- **This report shows meters, PSAs and facility information.**
- **If you need to make changes by installing new meters, moving existing meters, or replacing existing meters, the Time is NOW at the beginning of new fiscal year (Oct 2015).**
- **Work with your District POC to make those changes.**

Contact Information

- Kathleen Perales, USACE Engineer Research and Development Center (ERDC),
kathleen.perales@usace.army.mil, 601-831-4353
- Meredith Bridgers, Institute for Water Resources (IWR),
meredith.bridgers@usace.army.mil, 703-428-8458
- Dena Williams, District Point of Contact for VERS Software Changes,
dena.k.williams@usace.army.mil, 615-202-4095
- Michael Kay, U.S. DOT Volpe Center,
michael.kay@dot.gov, 617-494-2404



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