MANUAL FOR PORTABLE TRAFFIC-COUNTING WORK

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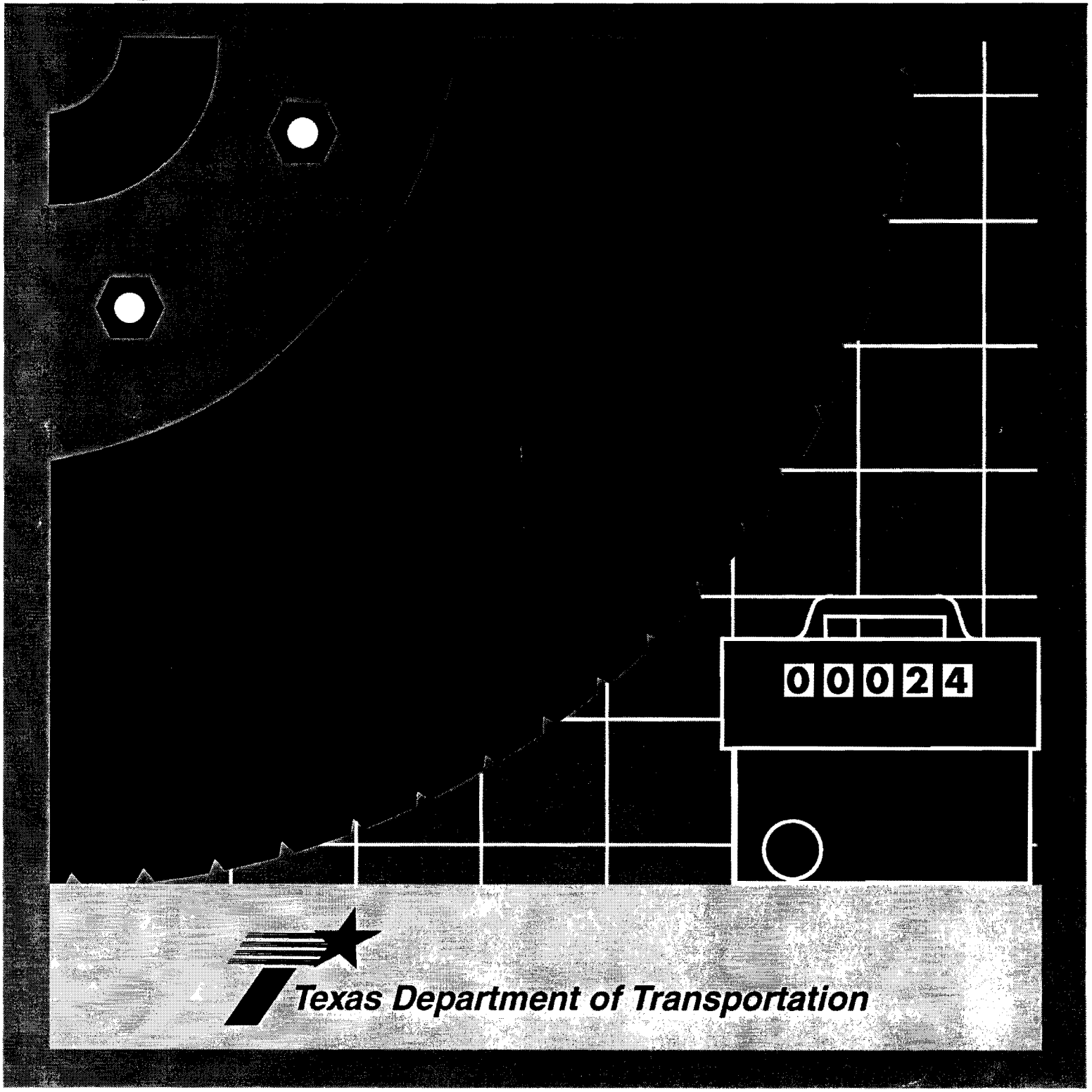

MANUAL FOR PORTABLE TRAFFIC-COUNTING WORK

TEXAS DEPARTMENT OF TRANSPORTATION

Division of Transportation Planning

Revised July, 1992

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INTRODUCTION

The Program

The department counts traffic at tens of thousands of locations throughout the state. These counts are performed for 24 consecutive hours once per year.

The Machine

The traffic-counting machine records a count each time a vehicle's tires roll over a hollow tube stretched across the road. A pulse of air travels up the tube to the machine and activates the counting mechanism. The machine, therefore, records the number of axles passing over the tube.

Vehicle Classification

It is obvious that some vehicles have more than the 2 axles, and that a good idea of the number of vehicles on a given roadway can only be had if we know the relative percentages of trucks, buses, trailers and automobiles, etc.

The department performs a separate program of vehicle classification to determine an "axle factor" for a given roadway. The axle factor is simply the average number of axles of the vehicles on the roadway, considering all vehicles measured.

Permanent Traffic Machines

It is also obvious that we can learn only so much about traffic on a given roadway by counting it for one 24-hour period once per year. In fact, the department also maintains permanent traffic counters at around 140 locations in the state which count traffic on different classes of roadway 24 hours per day, 365 days per year. These "Automatic Traffic Counters" or ATR machines are polled remotely, by computer, over a phone line, and provide the department a good check of seasonal traffic variations on different types of roads in different areas of the state.

Annual Average Daily Traffic

The ATR and Accumulative-Count Recorder (ACR) data, including the axle factor, are combined, by analysis, into a number expressed as the "annual average daily traffic," or AADT, for a specific road section. The AADT is posted to a traffic map known as an Annual Average Traffic Map.

Need for Good Traffic Data

The traffic information is crucial to the department in its planning, forecasting, and roadway design programs. It also is a factor considered by the federal government in

determining the amount of highway funds to be allocated to Texas.

The ACR counting program, at over 60,000 sites annually, is the central, critical part of the department's traffic data program. Good, reliable ACR data is extremely important, and the department's analysts take great care in ensuring that the data collected and reported is accurate. With historical, ATR, and classification data at their disposal, the analysts can determine quite well the accuracy and validity of ACR data.

Obtaining Good Traffic Data

To obtain accurate data, the traffic counter must set up the equipment at the correct location, in the prescribed manner, and allow the machine to count for no more or less than 24 hours. This precision regarding the counting period is especially crucial in high-traffic areas, but is also very important in medium- and low-traffic areas, where counting an extra fifteen minutes into a peak period of traffic flow can so distort the count as to make it useless. Traffic counting is conducted only between 12:01 a.m. Monday and 11:59 p.m. Thursday. Friday counting is only permitted for 48-hour counts which began on Wednesday. Saturday and Sunday counting are not permitted.

Purpose of Manual

This manual is designed to acquaint the traffic counter with all of the tools and methods of traffic-counting work using the portable ACR machine. Knowledge of, and adherence to, these guidelines is mandatory for acceptable work for the department, and will ensure accurate data for the department's needs.

SAFETY

Introduction

Traffic-counting work is extremely hazardous. The counter is required to spend a lot of time on and near roads and highways, many of them high-speed facilities with large volumes of traffic. Failure by the counter to follow safe practices and wear proper attire could result in serious injury or death. Safety issues will be discussed in this section as well as in other chapters as the subject matter warrants. Safety is the first consideration of our traffic-counting program, both for the counter and the traveling public. The counter may be approached by departmental personnel if the counter is not following safety precautions.

Proper Attire

- *Headgear* – A hard-hat is required to be worn at all times while outside of a vehicle and while working within the highway right-of-way. Figure 1-1 depicts headgear worn by the department. It is recommended that a spare hard-hat be carried in the vehicle.

- *Safety Vest* – A reflective orange safety vest is required to be worn at all times while outside of a vehicle and while working within the highway right-of-way. The vest will eventually lose reflectivity, and should be discarded. A new one is available from the department's traffic shop. It is recommended that a spare vest be carried in the vehicle.

- *Clothing* – No shorts, skirts or dresses are to be worn. Long pants are required as they provide protection to the legs and knees. No see-through or sleeveless shirts are allowed, nor half-shirts which cover only half of the torso. Camouflage clothing, such as that worn by hunters, is prohibited. Going shirtless or with the shirt unbuttoned is prohibited.

- *Footwear* – Steel-toed footwear is required. The footwear should have a nonskid sole. Water-resistant footwear is recommended.

- *Raingear* – If raingear is worn, it should be reflective orange or bright yellow. Drab grey, brown, black, camouflage or similar dark colors are prohibited. Ponchos or other legless and/or sleeveless raingear are not to be worn. No umbrellas are allowed on or near the roadway since they can restrict vision and blow onto the roadway.

- *Gloves* – Leather gloves are strongly recommended for traffic-counting work. The hose clamps are sharp and can cause injury. If the rubber tubing is caught by a vehicle while it is being handled, it can cause serious cuts or friction burns to the hands.

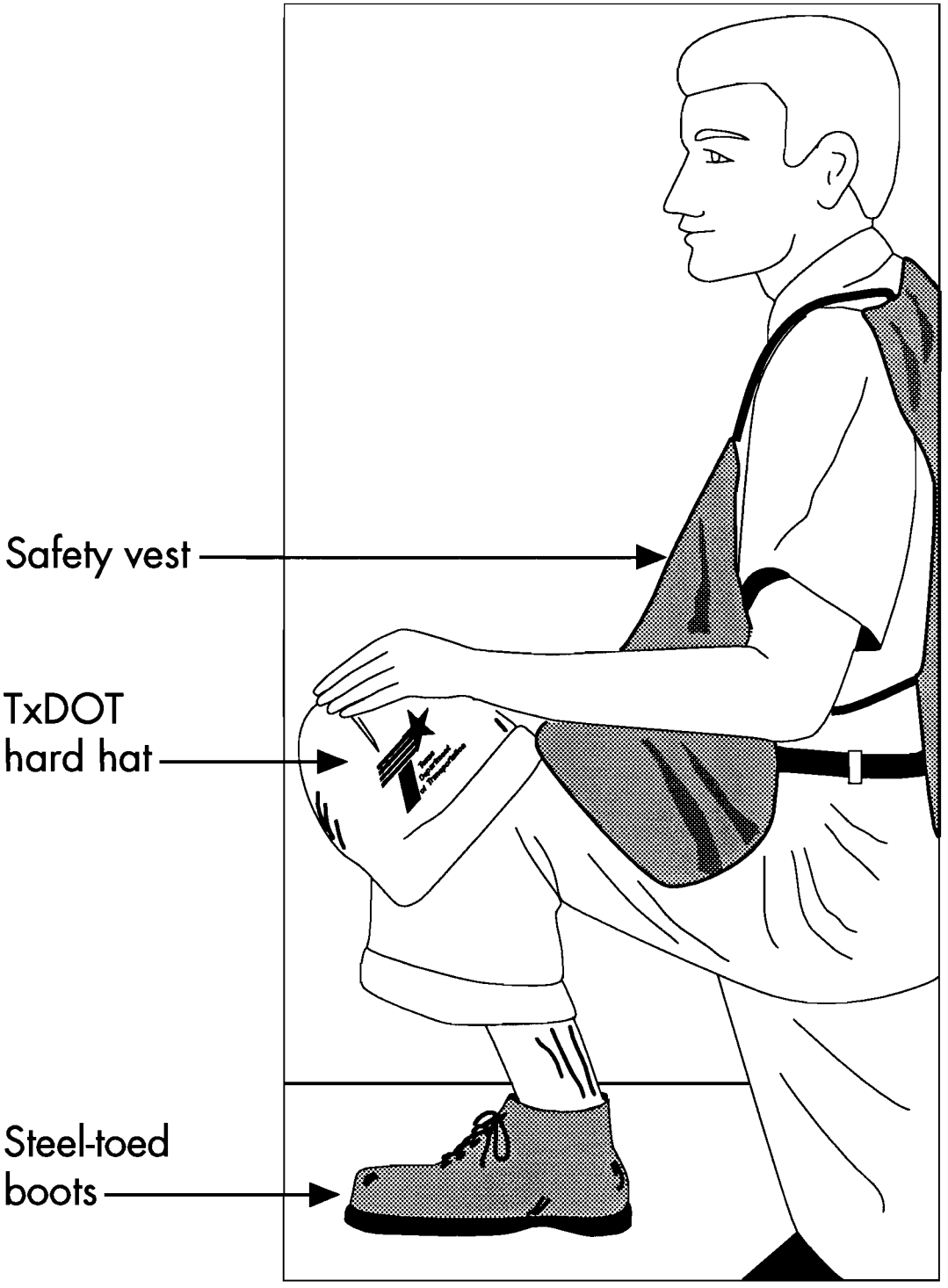

Figure 1-1 Safety equipment

- *Eye Protection* – Eye protection devices such as goggles are recommended while nailing clamps and required while using the fastening tool. They should not be worn at other times since they may restrict vision.

- *Portable Radios and Ear Phones* – The counter shall not carry a portable radio or other such device while setting up machines. Ear phones shall not be used since they restrict hearing.

The Vehicle

- *Type* – A 1/2- to 3/4-ton pickup truck or van is recommended. Transporting the counting equipment in trailers is prohibited.

- *Safety Standards* – The vehicle shall have a current Texas state inspection sticker.

- *Wear and Tear* – Traffic-counting work is hard on vehicles. Clutches and brakes should be maintained in good condition. Tires should be checked often for defects. The counter's vehicle should be maintained in good operating condition at all times.

The Driver

- *License* – The traffic-counting individual shall have a current Texas driver's license.

- *Laws* – The traffic-counting individual shall observe all state and local traffic laws and regulations while performing traffic-counting work.

Exiting the Roadway

- *Parking* – Do not block private drives or mail boxes. Do not park where such parking restricts the visibility of other drivers or causes an unsafe condition for other drivers. Before stopping, ensure that the vehicle is completely off the travel lanes and ensure that an opened door will not intrude on the travel lanes.

- *Strobe Light* – A strobe light is recommended to be used while parked near a roadway. Amber (yellow) is recommended. Red and blue strobe lights are prohibited by state law.

- *Emergency Flashers* – Emergency flashers shall be used while a person is parked on the right-of-way during traffic-counting work. It is recommended that the counter keep an extra battery and jumper cables available for his vehicle due to the drain on batteries from running flashers and strobe lights.

On the Roadway

- *Exiting the Vehicle* – As soon as exiting the vehicle, the counter shall put on the hard-hat and vest.

- *Interfering with Traffic* – The counter shall not flag down, stop, or otherwise hinder, restrict, or interfere with traffic.

- *Checking for Traffic* – The counter should check for traffic in both directions prior to proceeding onto the traveled lanes, even on one-way streets and ramps.

Laying the Tubing

- *Throwing Tubing* – The roll of tubing, or other tools or objects, shall never be thrown across the roadway.

- *Handling Tubing* – Extreme care should be taken in handling the tubing so that the person does not become entangled. If a vehicle catches the tubing, it should be released immediately. Tubing should never be carried looped across the shoulders or in any manner which risks entanglement.

- *The Fastening Tool* – All precautions should be taken when using the fastening tool. Goggles should be worn. The tool should be unloaded while not in use. Pins should *never* be reused as they may disintegrate upon impact.

- *Nails and Studs* – Nails and studs should be fully driven into the pavement so they don't protrude above the surface of the base of the clamp. Do not drive nails in part way and then bend them flat against the pavement. Do not restraighten PK (masonry) nails for reuse. They may shatter on being hit with a hammer (60d nails may be straightened and reused).

Leaving the Site

- *Secure Equipment* – Ensure that equipment is secure before re-entering the roadway.

- *Strobe Light and Flashers* – Be sure that strobe light and flashers are turned off after re-entering the roadway.

Picking Up Tubing

When the count is completed, and the tubing is retrieved from the roadway, all nails and studs (pins) shall be removed. The site should be cleaned of all debris, such as used nails and clamps. A container should be carried in the vehicle for debris and trash.

Working at Night

Traffic counting can be done at night with prior state approval. If night work is approved, it will be done only in lighted urban areas.

Working in the Heat

The traffic counter is required to carry adequate drinking water (minimum of 2 gallons) during all traffic-counting work. Heat exhaustion and heat stroke are possible on long, hot days. The counter is encouraged to wear cool, loose-fitting clothing, while working in the sun.

Physical and Mental Condition of Counter

The counter should never work on the roadway when in a fatigued physical and/or mental condition. Working under these conditions greatly increases the potential for errors that result in accidents. These accidents may cause severe injury or death, not only to the counter, but also to the traveling public.

The counter should have at least 6 hours of sleep and rest prior to beginning work on the roadway. Therefore, the counter must return to the post of duty on Sunday night to work a Monday schedule. The only exception to this rule is if the post of duty is less than 100 miles from the counter's home. In this case, the counter may drive to the post of duty on Monday morning and be at the first site by 8:00 a.m.

Accidents

The counter should report all accidents, in which he is involved during counting work, to the field supervisor as soon as possible. The field supervisor will contact the department. In the event of an emergency or serious injury, the department may be contacted directly.

DEALING WITH THE PUBLIC

Introduction

Whether the employee works for the state or a contractor doing work for the state, he/she represents the state. The counter should be courteous and considerate of other people and their property.

Private Property

The traffic counter shall not park his vehicle where it blocks drives, mailboxes or access to private property. The counter should refrain from trespassing on homeowners' property. Counting machines should never be chained to mailboxes, nor to trees or chain-link fences which are on homeowners' property, or any kind of fence that is inside of a city's limits, nor to gas lines or gas meters. the counter will not make any setup on any road marked "Private Road," "Posted - Keep Out," or with other similar signing.

Loud Music

The counter should exercise good judgment in listening to music at a job site. Loud music which can disturb nearby drivers or homeowners is prohibited.

Vandalism

If the counter observes vandalism of state equipment, he should not approach the vandal or seek to interfere, but should call the local police.

Harassment by the Public

The counter should avoid confrontation with individuals who harass or verbally abuse him. This should be reported to the local police.

Trash Disposal

The counter shall not leave debris or trash on the right-of-way or on public or private property. The counter should carry a trash recepticle and dispose of trash, nails, shot casings, etc. in a legal and responsible manner.

Requests for Traffic Counts

The counter shall not perform special traffic counts for the public nor shall he reveal traffic data to the public. Traffic data must be analyzed in conjunction with our permanent sites using various statistical techniques before it is published. Raw counts

have little meaning, and can be misleading, on their own. The employee should be polite, referring the person requesting the count to the department.

All requests for traffic counts must be in a letter form to:

Texas Department of Transportation
Division of Transportation Planning
Attn: Mr. Jon Underwood
P. O. Box 5051
Austin, Texas 78763-5051

COMMUNICATIONS

Introduction

Communication between the department, the field supervisor, and the traffic-counting personnel is critical to the success of the traffic-counting program. Problems with inaccurate maps or schedules, vehicles, sickness, etc., affect the counting and scheduling effort.

Reporting Schedules and Map Problems

When a problem is detected with a map or a schedule, or if the counter must deviate from a prescribed schedule, this should be promptly reported to the Austin office, preferably by 8:00 a.m. of the schedule date.

Procedure for Calling Long Distance to the Austin Office

- *Push-Button Phone:*

  Dial 1-800-HI-TEXAN (1-800-448-3926)
  Wait for ringing to stop
  Wait for dial tone
  Dial the TexAn phone number 241-_ _ _ _ *(see phone number list below)*
  Wait for zip tone (1 beep)
  Dial authorization code (601-0710)

- *Rotary Phone:*

  Dial 1-800-328-1334
  Give operator the TexAn phone number 241-_ _ _ _ *(see phone number list below)*
  Give operator authorization code (601-0710)

- *Phone Numbers:*

	TexAn	Local
Dean Barrett, Director, Technical Services	241-7545	465-7545
Dayton Grumbles, Asst. Director, Technical Services	241-7318	465-7318
Alvin Hawkins, ACR Project Manager	241-7343	465-7343
Randy Gattis, ACR Contract Manager	241-7940	465-7940
Cy Helms, Interactive Graphics Tech.	241-7939	465-7939
John Sitton, Data Quality Control Tech.	241-7207	465-7343
Karl Bierman, Field Inspector	241-7206	465-7343
Tom Elliott, Field Inspector	241-7206	465-7343
Fritz Krugman, Field Inspector	241-7206	465-7343
Bill Theis, Field Inspector	241-7206	465-7343
Shop	241-7545	465-7545

Reporting Other Problems

For contractor personnel, problems other than schedule and map problems should be communicated to the contractor's field supervisor.

State Field Inspectors

Each contract, as well as the in-house counting program, is assigned state field supervisors to monitor the counting work. Except in emergency situations, the state field supervisors will not communicate directly with the contractor's traffic-counting personnel, but will report any problems to the state's Austin office, who will communicate with the contractor's field supervisor.

Contractor's Field Supervisor

The contractor's field supervisor shall ensure that the department can contact him/her at all times. A beeper, or mobile phone, should be carried by the field supervisor for this purpose. The contractor's field supervisor shall call the ACR contract manager, or if unavailable, any of the ACR contract manager's superiors every Friday morning around 9:00 a.m. to discuss possible problems, etc.

INTRODUCTION

Importance of Proper Equipment

Proper equipment and supplies, and their proper use, are extremely important in traffic-counting work. Ensuring that the correct equipment and adequate supplies are available can often make the difference between success and failure in a day's work.

Overview

This chapter is designed to acquaint the traffic counter with the equipment and supplies used for traffic-counting work. Basic methods of use will be explained and illustrated. Equipment and supplies can be divided into the following seven groups:

- The Accumulative-Count Recorder (ACR Machine)
- Hand Tools and Accessories
- The Fastening System
- The Road Tube
- Safety Gear and Equipment
- The Vehicle
- Office Supplies

Equipment and Supplies for Contractors

Only those items listed as being furnished to contractors by the state (page 2-6) will be available from the Traffic Shop. All other items should be available from the contractor. Only the contractor, or his field representative, will be issued equipment or supplies. No issues will be made to the contractor's traffic-counting personnel.

Location of Traffic Shop

The Traffic Shop is located in Austin at 37th and Jackson Streets, Camp Hubbard Annex, Building 8.

Shop Hours

The Shop is open between 7:30 a.m. and 11:45 noon, and between 12:45 p.m. and 4:30 p.m. It is best to come in no later than 3:30 p.m. in order to complete business. The Shop is closed to non-highway department employees at 4:30 p.m. No transactions will be conducted during the 11:45 a.m. to 12:45 p.m. lunch hour.

Shop Phone Number

If there are questions regarding equipment and supplies, call TexAn 241-7343, or locally, 465-7343.

Lock Box

For emergency purposes, a small amount of supplies, and up to 4 ACR machines, can be returned by leaving them in a lock-box by the steps on the back loading dock of the Traffic Shop. The lock is keyed the same as the locks on the ACR machines. The appropriate forms will be available with the box and should be filled out and left in the box with the returned equipment. Any supplies or equipment removed from the box will be considered stolen and will be reported to the police.

Procedure for Checking Out Supplies (for Contract Supervisors)

- Report to one of the departmental personnel for assistance.
- The ACR Stock Issue Report will be filled out by departmental personnel only. (Figure 2-1)
- Departmental personnel will issue and accept ACR machines for repair.
- Out-of-stock supplies will not be back ordered. The contract supervisor should return later or call to ensure that the needed supplies are available.

Batteries

Due to the environmental hazards associated with improper disposal of batteries, no batteries will be issued unless an equal number of used batteries are turned in. Batteries will not be disposed of by the traffic counter, but will be returned to the state for proper disposal.

Procedure for Checking Out ACR Machines (for Contract Supervisors)

- The contract supervisor should report to one of the departmental personnel for assistance.
- The departmental personnel will assist the contract supervisor in loading the machines on a stock truck.
- The departmental personnel will list the serial numbers of all machines on the ACR STOCK ISSUE REPORT form. Write legibly. Recheck the list.
- The departmental personnel will enter the serial number list into the ACR inventory database.
- The departmental personnel and the contract supervisor should closely check the list of machine serial numbers which is printed from the computer (The ACR MACHINE INVENTORY TRANSACTION RECORD form, Figure 2-2).

TEXAS DEPARTMENT OF TRANSPORTATION
TRANSPORTATION PLANNING DIVISION
ACR STOCK ISSUE REPORT

NAME _____ DATE _____
ISSUED BY _____

ITEM ISSUED	RETURNED FOR REPAIRS	RETURNED TO STOCK
ACR'S		
FASTENING TOOL		
STROBE LIGHT		
VOLTMETER		
HAMMER		
WRECKING BAR		
CORBIN LOCKS		
WB LOCKS		
FIRST AID KIT		
HARD HAT		
FIRE EXT.		
EXPENDABLE ITEMS		
TUBING		
ROAD STRIPS		
FRICTION TAPE		
BATTERIES		
ACR CHAINS		
ACR CLAMPS		
CORBIN KEYS		
WB KEYS		
P-K NAILS		
60D NAILS		
GRAPHITE		
TRIFLOW LUBE.		
HILTI STUDS		
HILTI LOADS		
HILTI PISTONS		
STOP RINGS		
UNISET STUDS		
UNISET LOADS		
NOSEPIECE CLIP		
1/4 IN. NUTS		
COPPER CONN.		
PLUGS		
MAGNETS		
COTTON GLOVES		
REG. GLOVES		
DRIVING GLOVES		
FLAG		
SAFETY VEST		

Figure 2-1 ACR stock issue report

ACR MACHINE INVENTORY TRANSACTION RECORD

Mach.	I	R	L	S	Date	Init.	Mach.	I	R	L	S	Date	Init.
_____	[ ]	[ ]	[ ]	[ ]	_____	_____	_____	[ ]	[ ]	[ ]	[ ]	_____	_____
_____	[ ]	[ ]	[ ]	[ ]	_____	_____	_____	[ ]	[ ]	[ ]	[ ]	_____	_____
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_____	[ ]	[ ]	[ ]	[ ]	_____	_____	_____	[ ]	[ ]	[ ]	[ ]	_____	_____

I = Issued – R = Returned – L = Lost – S = Stolen – Init. = Initials
IMPORTANT! Report all stolen machines to local law enforcement ASAP!!!

Figure 2-2 ACR machine inventory transaction record

- The contract supervisor shall sign and date the computer printout and give the original to the departmental personnel.

- The contract supervisor should load the machines into the truck. The departmental personnel will make a final count of all machines loaded, will verify the serial numbers of the machines, and will sign and date both copies of the printed list.

Procedure for Returning ACR Machines

- The machines should be unloaded from the vehicle and loaded onto a stock truck on the loading dock with assistance from the departmental personnel.

- The contract supervisor shall put a short note inside each damaged or non-functioning machine describing the problem or the circumstances of damage.

- The departmental personnel will then count the machines and will verify the serial numbers of the machines returned and will fill out the ACR STOCK ISSUE REPORT FORM.

- The departmental personnel will then take charge of the machines for reshelving. *UNDER NO CIRCUMSTANCES will a contractor employee reshelve machines.*

- The contract supervisor shall enter the list of serial numbers into the computer and a list will be printed out. (The ACR MACHINE INVENTORY TRANSACTION RECORD form.)

- The contract supervisor shall check the printed form against the ACR STOCK ISSUE REPORT form. The form will then be signed and dated by the departmental personnel and will be given to the contract supervisor.

Lost or Stolen Equipment

If equipment belonging to the state is either lost, stolen, or damaged it should be reported to the state immediately. Report stolen equipment to the local police.

Report of Lost or Stolen Equipment

The subject form (Figure 2-3) will be filled out for each piece of state-owned equipment which is lost or stolen. The form should be delivered to the state with the next delivery of count slips.

Liability for Lost, Stolen, or Damaged Equipment

If the state determines that the loss or damage of the equipment is the result of negligence, the state will require compensation from the offending party at the following rates to replace the equipment.

TEXAS DEPARTMENT OF TRANSPORTATION

REPORT OF LOST OR STOLEN EQUIPMENT

Date of Report ____/____/____

Date Loss Occurred ____/____/____

Lost from Schedule Number _____ Station Number _____

Machine or Equipment Number _____

Circumstances:

_____

_____

_____

_____

_____

_____

_____
Signed

Inventory Updated ____/____/____

Figure 2-3 Report of lost or stolen equipment

Equipment and Supplies Provided to the Contractor by the State:

Item Description	*Replacement Cost (due to negligence)*
• 50 ACR machines with locks and batteries	$180.00 each
• 60 road strips	12.50 per 50' tube
• Extra locks, tubing, clamps and batteries	8.00 – lock, 2.00 – clamp, 1.50 – battery
• 55 ACR machine chains	2.00 each
• Safety vest	No charge
• Extra ACR machine keys	No charge

Equipment and Supplies Required of the Contractor but NOT Furnished by the State:

Item Description	*Estimated Cost**
• Fastening tool	$ 260.00
• Fasteners (pins) for fastening tool	22.00
• Fastening tool repair kit	69.00
• Crimp loads or load charges for fastening tool	3.75 for box of 100
• 60d nails	1.55 for 50
• Masonry nails	10.35 for box of 100
• Friction tape (American Biltrite Bulldog 3/4 in. (19mm) or equal)	1.05 per roll
• Plugs and connectors for road strips	Minimal
• 2 hammers (28 oz. and 16 oz.)	15.00 to 20.00
• Wrecking bar or crow bar (3/4" x 36" gooseneck)	3.50
• 1/4" nut driver for fastener studs	3.75
• 1/4" nuts for clamp pins	1.00 for box of 100
• 4" x 9 1/2" Envelopes	4.50 for 500
• Postage (1st class) 1.5 oz./envelope (when full) June, 1991 rate	.52
• Hard hat (to meet OSHA standard 1926.00 and comply with ANSI-Z-89.1, Class A, B, & C)	3.00
• Lockable plywood cover for pick-up truck bed	80.00 *(provided by traffic recorder)*
• Voltmeter	10.00
• 2-gallon water container	10.00
• Mobile phone for supervisor	Approx. 50.00 per month
• Graphite lubrication for brass locks (Corbin)	
• Tri-Flo lubrication for steel-shank locks (HR)	

* *Since the state purchases items in quantity, the cost of these items may be different than shown.*

Equipment and Supplies Recommended of the Contractor but NOT Furnished by the State:

- Amber strobe light
- First aid kit
- Fire extinguisher

Protecting and Securing Equipment

- *The Vehicle* – The truck or van should be lockable to reasonably prevent entry. If the equipment is carried in the bed of a pickup, it should have a plywood cover, or other hard cover, which can be locked to secure the equipment against theft.

- *Fastening Tools* – Fastening tools should be locked in the passenger compartment when not in use. Carrying them in a pickup bed risks moisture damage. The tools should be unloaded at all times when not in use.

- *ACR Machine on Site* – ACR machines shall be secured with a chain and lock. The chain should be attached to the lock and looped around a guardrail post, signpost, telephone pole, light pole, guy wire, or a tree. Never secure a machine to a mailbox, fireplug, temporary sign, construction barrel or any object on homeowners' property such as a tree, mailbox or to any fence within a city's limits. If no object is available to secure the chain to, nail the chain into the ground with a 60d nail. The chain can also be attached to a 60d clamp nail. This shall only be done if no object is available within the road section or if the only object available is too near a driveway to secure the machine.

  WARNING: A note will be made by the department's field inspector on the "White Slip" of any machine that could be secured but is not. If the problem occurs a second time, the contract employee could be terminated.

THE ACCUMULATIVE-COUNT RECORDER (ACR MACHINE)

General Description

The department may use one of several types of portable, battery-operated axle counters (Figures 2-4 and 2-5). The machine contains a memory, a 5-digit counter and readout, and a 6-volt battery. It is housed in a weather-proof metal case.

Basic Machine Operation

- *The Counting Mechanism* – The ACR machine is secured off of the travel lanes. A hollow, rubber tube is attached to the metal extension (the road-tube adapter) on the side of the machine and is stretched across the roadway. When the tube is impacted by a vehicle's tires, a pulse of air travels up the tube and triggers an electrical signal in the machine, causing one axle count to be stored in the machine's memory. The same event occurs when the rear axle passes over the tube. The machine is set to count each axle (each set of tires) impacting the road tube.

- *Fast-Slow Switch Settings* – The response of the machine's counting mechanism must be set at each site by use of the fast-slow switch located on top of the machine.

  - *Slow Setting* – Used at slower traffic speeds to prevent over counting.

  - *Fast Setting* – Used at faster traffic speeds to prevent under counting.

  THE COUNTER MUST OBSERVE THE TRAFFIC A SHORT WHILE TO JUDGE THE SPEED AND ENSURE THAT THE MACHINE IS NOT OVER OR UNDER COUNTING.

- *Digital Readout* – The machine contains an electronic memory which maintains the total number of axles counted by that machine since the last zeroing of the counting mechanism. *NOTE: THE MACHINE IS SET BACK TO ZERO ONLY WHEN A NEW BATTERY IS INSTALLED.* The readout will light up to display the current total by the counter using one of two methods:

  - Flipping the display switch, located on the top of the machine. The switch will return to the "off" position when it is released.

  - Touching a magnet to the front of the machine, just to the left of the lock holes, on the location marked "M". This method is used to check the reading when the machine is locked.

- *Battery* – A 6-volt battery is used in the machine. To install the battery, attach the red wire to the positive (+) terminal and the black wire to the negative (–) terminal, and tighten the terminal screws.

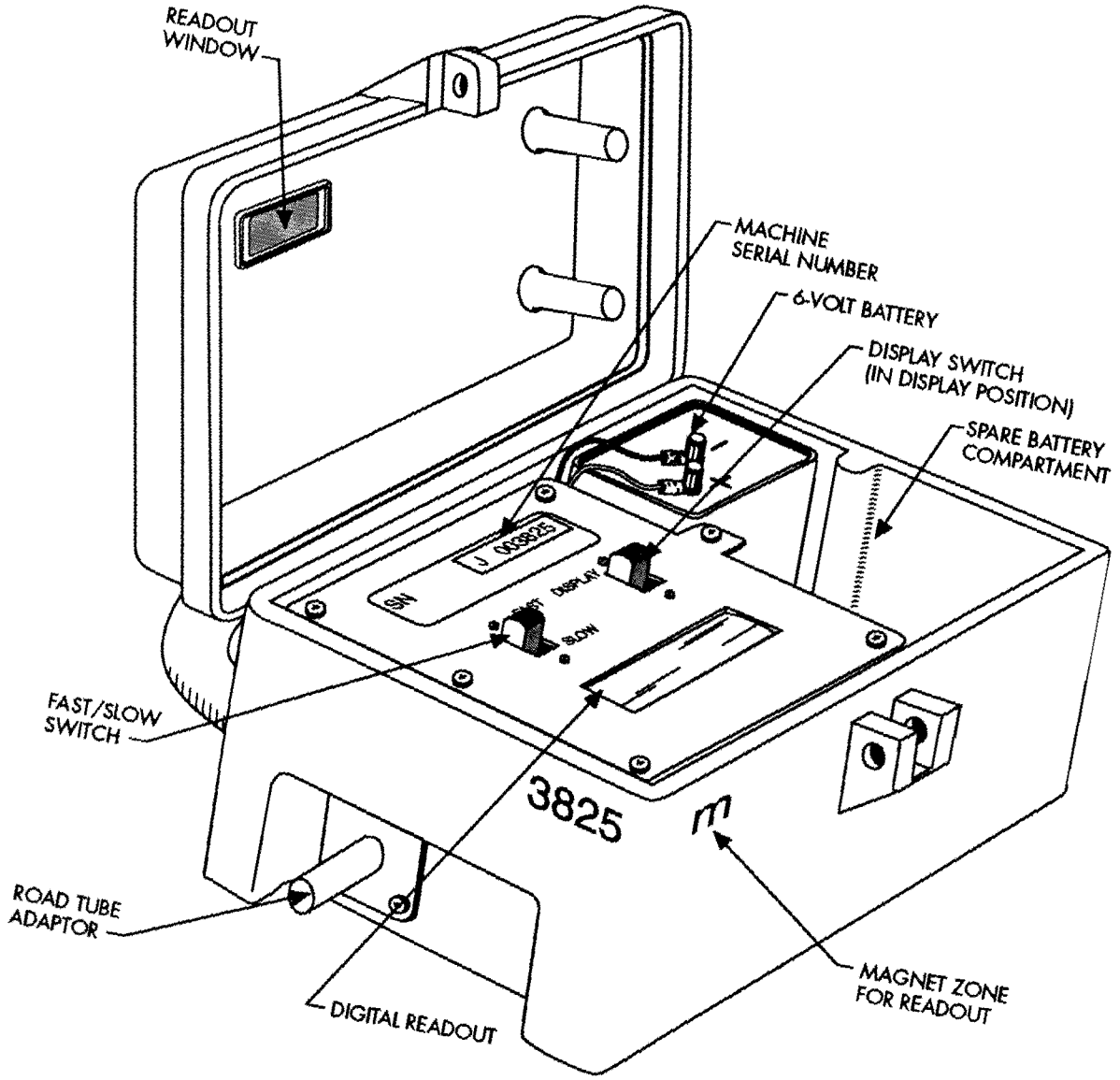


Figure 2-4 *The ACR machine – general view*

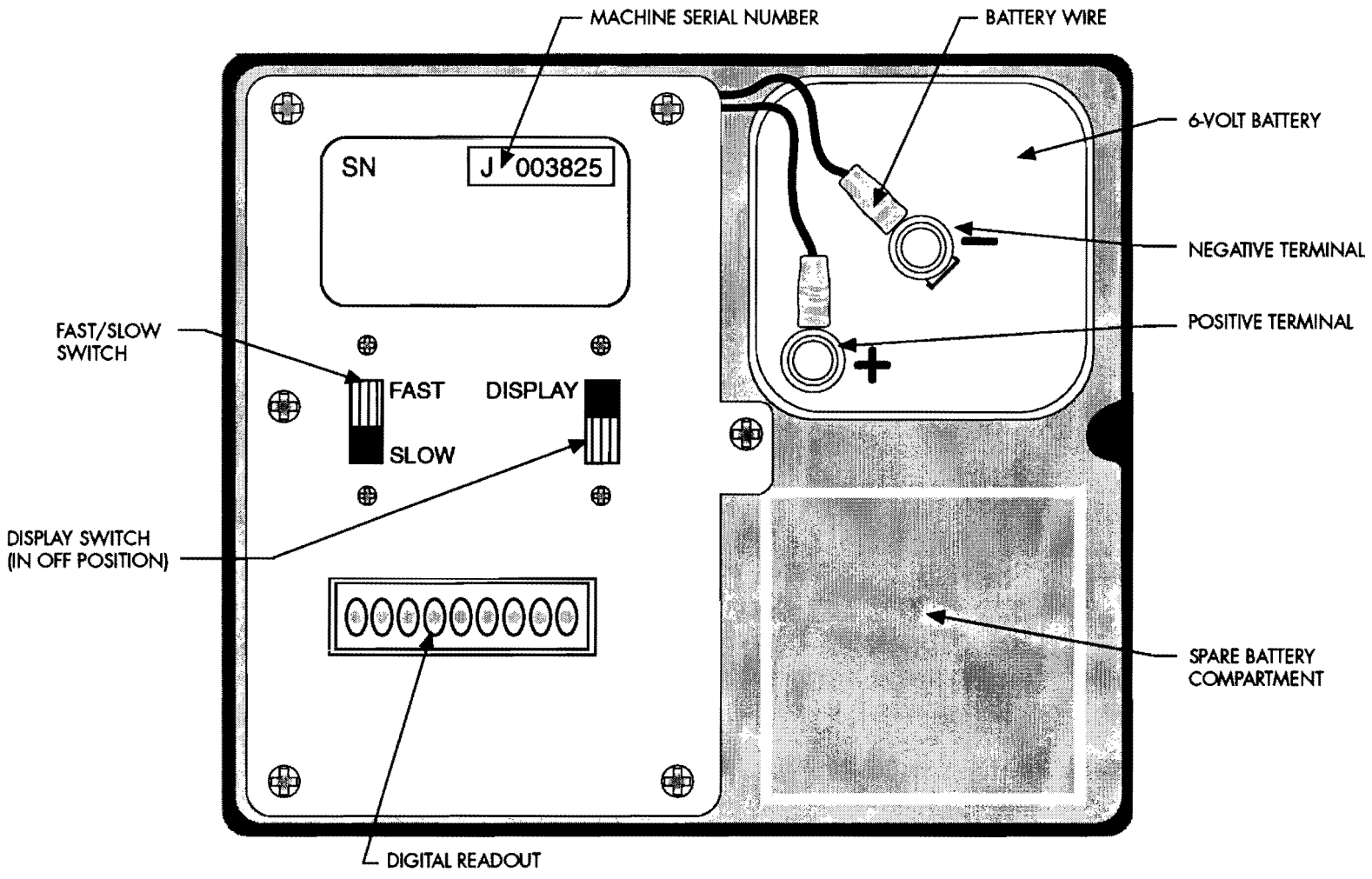


Figure 2-5 The ACR machine – top view

Checking Over the Machine

- *Battery* – Check the battery with a voltmeter to ensure adequate charge. The battery should be checked under load, which means with the display light on. A new battery should register 6 volts on the voltmeter. An older battery, still in usable condition, will register between 5.5 and 6 volts. A battery should be replaced if wet, or if the reading falls to 5.5 volts or lower. Each battery should be checked on the first set-up day of the work week. After the battery is checked for adequate voltage check the attachment of the lead wires to the terminal.

- *Digital Readout* – Ensure that the readout light works and that the switch operates smoothly without sticking.

- *Fast/Slow Switch* – Ensure that it is not loose and that it stays in either position when set.

- *Road Tube Adapter* – Ensure that it is free of dirt and obstructions.

Periodic Machine Maintenance

- *Battery Replacement* – Return the old battery to the state to receive a new one when the voltmeter registers a reading of 5.5 volts or less. Ensure that leads and terminals are clean. Clean the battery compartment before installing the new battery.

- *Lubrication* – Keep all oil, chemicals and other liquids outside the machine housing. Lubricate the machine hinge occasionally with lubricating oil. Lubricate the locks as needed.

- *If Inside of Machine Gets Wet* – Remove the battery as soon as possible and allow machine to dry thoroughly. Attach a new battery to the machine, and check operation. If the machine fails to work, return it to the state for replacement. Place a note inside the machine spare-battery compartment explaining the malfunction.

TOOLS AND ACCESSORIES

Introduction

It is very important to use heavy-duty, good-quality tools in traffic counting work. The tools are used during every set-up and take a lot of abuse. Poor-quality tools which break on the job can cause the loss of a day's work. It is advisable to carry spare tools if possible.

Hammer

A straight-claw, 28-oz. or 32-oz., steel-handle framing hammer is recommended. A framing hammer is recognizable due to the checkered face. The straight claw is important so that nails can be easily removed. The steel handle will stand the stresses of nail removal better than a wooden handle. A large hammer of this type will drive the nails easily and will remove most of them without the counter having to resort to a crow bar. Eye goggles are recommended for use while driving nails. A nail hit with a glancing blow can fly back into the face and cause serious injury.

Crow Bar or Wrecking Bar

A 3/4-inch-thick, 36-inch-long gooseneck crow bar is recommended for pulling out nails or studs which cannot be dislodged by the hammer.

Voltmeter

A small, inexpensive voltmeter is needed to check the voltage of the ACR machine batteries. The voltmeter should be capable of measuring up to 7 volts DC. It should have at least a 4% accuracy on full-scale meter deflection on an analog meter.

Fastening Tool

One of the following fastening tools, or their equivalent, is needed to drive pins into concrete pavement and curbs which are too hard for hammer-driven masonry nails. The fastening tools use charges which, like the shells of a rifle, propel the pins into the pavement when the trigger is pulled. These tools are very dangerous and should be used only in strict accordance with the manufacturer's instructions. Goggles are required to be worn at all times when using the fastening tool. It should be unloaded when not in use.

- Uniset Model LG-65

Nut Driver

A 7/16-inch nut driver is required to fasten the road tube clamps to the threaded pins which have been driven into the pavement by the fastening tool.

Nails

Two types of nails are required for traffic-counting work:

- *60d spike (nail)* – These are used to nail the road-tube clamp in soft asphalt and gravel.
- *PK (masonry) nail at least 2 1/2" inches long* – These are used to nail the road-tube clamp in hard asphalt and concrete. (Many concrete roads and curbs will require the use of the fastening tool since the concrete will be too hard for hand nailing.)

Pins and Crimp Loads for Fastening Tool

Pins are threaded fasteners which are shot into the pavement by the fastening tool. Crimp loads are the charges which are loaded into the fastening tool and which explode and propel the pins into the pavement. The following pins and loads, or equal, are recommended.

Tool	*Pins*	*Loads*
Uniset Model LG-65	Impex PIN 1783307 (5 1/4"/11/8/30F)	Impex LG-65.2

Friction Tape

This is used to construct a collar around a road tube. The collar prevents the tube from slipping through the hole in the clamp when tension is put on the rubber tube. The friction tape should be of cloth-like consistency and sticky on both sides. Duct tape, electrician's tape, or any other tape shall not be used. American Biltrite Bulldog 3/4-inch (19 mm) or equal is required.

THE ROAD TUBE

Description

The road tube and the ACR machine comprise the two components of a traffic counting set-up. The term road tube refers to the rubber tube which is stretched across the roadway and the clamps and other associated devices that go with it. A standard road tube is constructed from several parts:

- 50 feet of rubber tubing
- 2 clamps
- 1 collar
- 1 plug

Making the Road Tube

(Refer to Figure 2-6 for a diagram of the parts of a road tube)

- Cut a 100-foot roll of rubber tubing in half to produce the 50-foot length of tubing. Note: Road tubes shorter than 40 feet in length or longer than 65 feet in length shall not be used. A tube which is too short allows the pulse of air hitting the counting mechanism to be too strong, possibly causing damage. A tube too long will keep some pulses from reaching the counting mechanism.

- The tube should be checked inside for wax (from the manufacturing process). If wax or other debris is stuck to the inside of the tube, it should be returned to the department.

- Feed one end of the tube through the hole in one clamp and pull about 2 feet of the tube through the clamp.

- Tie a knot near (within 5 inches of) the end of the tube. Plug the end of the tube with a 60d spike cut to 2 1/2 to 3 inches in length. Allow the clamp to slide back down the tube to rest against the knot.

- Run the other end of the tube through the other clamp.

- Rub some talcum powder (or dust will do) on the tube where the collar will be installed. Take the 3/4" friction tape and wind six or seven turns around the tube (between the end of the tube and the clamp). The tube should be slightly stretched in the area of the collar while wrapping the tape. After a portion of the tape is wound, apply more powder and force it back and forth along the tube so that it will slide. The collar should be about an inch long and 3/8" thick.

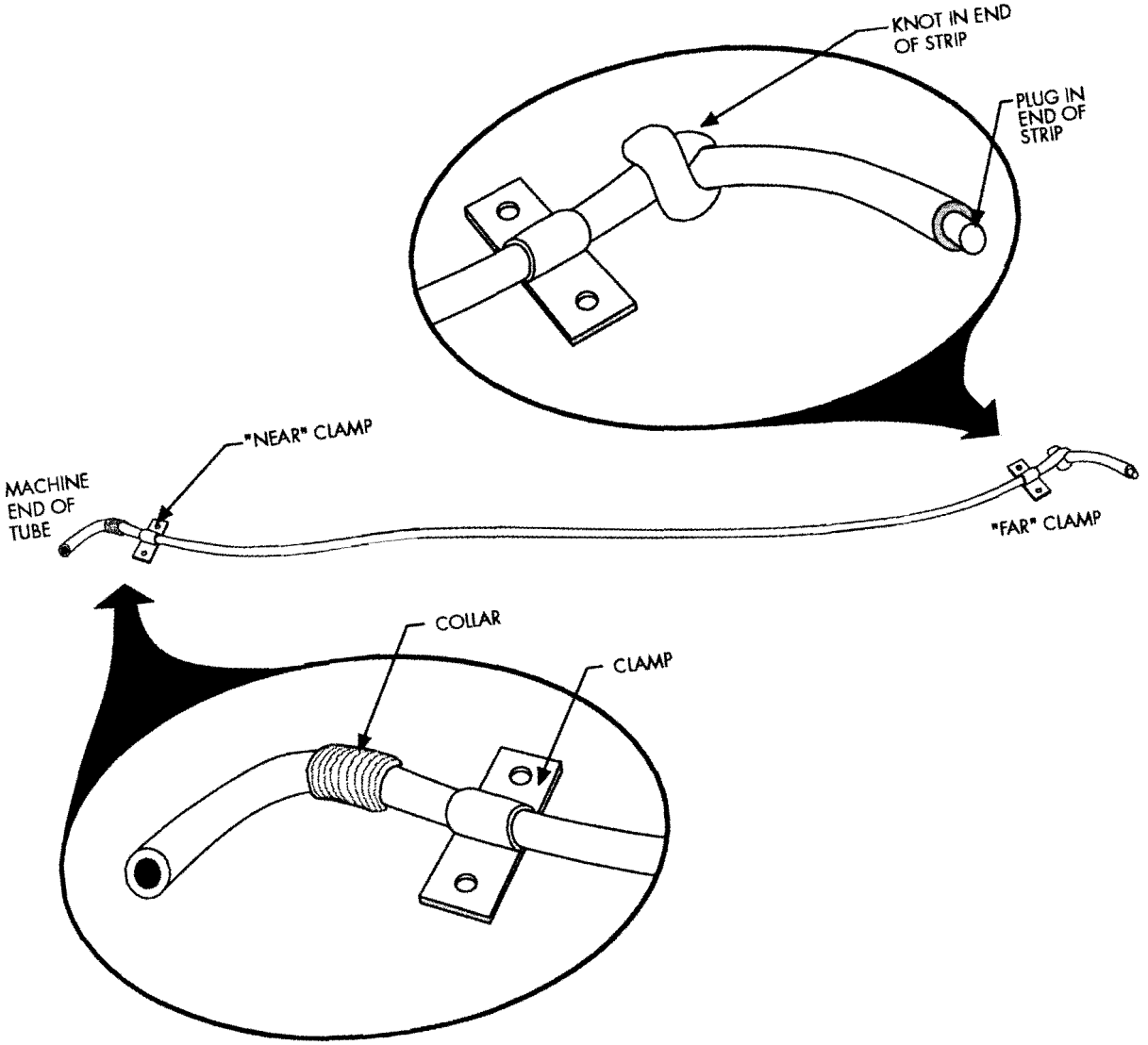


Figure 2-6 The road tube

Proper Storage and Maintenance

The road tube should be rolled in a neat coil and stored when not in use. It should be checked for holes and cracks each time used. It should be blown out with compressed air once per year.

OFFICE SUPPLIES

Introduction

Certain items commonly referred to as office supplies are required for traffic-counting work.

Clip Board

A clip board is recommended to keep the schedule on and to serve as a hard writing surface for filling out the schedule worksheet and ACR reporting slips.

Pencils

A good supply of pencils is required. Only lead (graphite)-type pencils are to be used for reporting traffic counts. No ink pens, ball-point pens, erasable ink pens, or Magic markers are to be used. Graphite is easily erasable whereas ink is difficult, if not impossible, to erase without destroying the paper forms in the process.

Bull-dog Clips

These are useful for holding together batches of ACR slips and other forms.

Envelopes and Postage

4" x 9 1/2" brown or white envelopes are necessary if ACR slips are mailed to Austin from the field. A good supply of postage stamps, kept in a dry place, are also necessary.

Calendar

A current-year calendar is recommended to be carried with the counting individual for reference purposes.

Timepiece

A watch, clock or other timepiece is required to ensure set-up and pick-up time.

INTRODUCTION

Overview

To properly locate and report counts from the various traffic-counting sites, the counter is required to be familiar with several forms, be able to read maps, be able to do simple calculations on the reporting slips, and be able to fill out the forms and reporting slips accurately and legibly. This chapter will discuss and illustrate the forms and maps required for traffic counting work.

Importance of Map-Reading and Math Skills

- *Map Reading* – The importance of map-reading skills cannot be overemphasized. The counter will be provided with the best and most up-to-date maps available to aid in locating the sites. The counter will need to be familiar with, and pay attention to, the maps' legends and insets and be able to relate the maps to real roadway conditions to ensure that the machines are placed in the correct locations.

- *Math Skills* – The counter will need to be able to perform simple addition, subtraction and division in order to accurately calculate and report traffic counts.

Importance of Legible Handwriting

It is critically important that the counter write clearly and legibly in filling out the report slip (white slip) and the schedule work sheet. Block-style printing is required. Cursive handwriting is prohibited. The white slips are used for data entry into a computer. White slips which are illegible cannot be used, and will be considered as bad counts.

THE SCHEDULE

Introduction

The counter is supplied two schedules per week, with appropriate maps, which list the sites to be counted. *The sites are to be set up in the order they are listed on the schedule. Skipping around on a schedule is prohibited* without specific departmental approval or allowed elsewhere in this manual.

Description

(Refer to Figure 3-1 for an example of the Schedule Work Sheet. Most schedules will have between 30 and 50 sites to be set up.)

The schedule worksheet, or schedule, is comprised of several columns of information.

- *Station* – This column indicates the station number (or site number) and matches the site number, on the map, which is to be set up. In the example refer to station H-64A. The "H" is the prefix, which stands for highway. (See Figure 3-2 for other station prefix numbers). The 2-digit number is the numeric portion of the station number. The trailing letter is the suffix.

  Example: The example site on the schedule is:

H	64	A
Prefix	Numeric	Suffix

  Note: The "#2" under many of the station numbers. This signifies that two machines are required to set up the site.

- *Co.* – This column indicates the number designation of the county where the site is located (Brazos County is County Number 21). Note on the example the words "Brazos County" typed just below site number H-89. At the beginning of each schedule, the county name is typed out for reference purposes. It is also typed out any place in the schedule where the county changes. The county name always refers to the site immediately above it, and to all sites below it, until another county name is encountered. In the example, all of the sites are in Brazos County down to site H-15, which is in Burleson County. (Note that the remainder of the sites are in Brazos County.)

- *Map/Comment* – This column indicates on which map the site is located. This is helpful when there are several maps and supplementary sheets associated with one schedule. Note on the schedule that site H-89 is located on map sheet A. Also, the nine sites immediately following are also found on sheet A. The listing does not repeat "sheet A" for each succeeding location. Note, further, that site T-12 is located on sheet B, as are the next eight sites.

*** SCHEDULE 17003 *** Date: 10/08/92 SPEEDOMETER End _____ _____
Assigned to: ( ) Begin _____ _____
Set ups: 48 Miles: Hours: 10
Quarters: Monday BRYAN->BRYAN Total _____ _____
Comment:

	Station	Co. Map/Comment	Time	M.#	L.C.	T.C.	
›	H–89	021 SHEET A			3820		‹
		BRAZOS County SH0507 S					
	#2	021					
	H–90	021			11570		
	#2	021					
›	T–1	021			13825		‹
		SH0507 S					
	#2	021					
	T–5	021			19895		
		SH0507 S					
	#2	021					
›	T–8	021			22835		‹
		SH0507 S					
	#2	021					
	T–9	021			17635		
		SH0507 S					
	#2	021					
›	HP–8	021			3630		‹
	S–7	021			22645		
		SH0507 S					
		021					
›	T–10	021			25190		‹
		SH0507 S					
	#2	021					
	T–11	021			53935		
		SH0507 S					
	#2	021					
›	T–12	021			52395		‹
		SH0507 S					
	#2	021					
	H–52	021			34265		
		SH0507 S					
	#2	021					
›	H–51	021			16315		
		SH0507 S					
	#2	021					

Figure 3-1 The schedule worksheet (page 1 of 2)

	Station	Co. Map/Comment	Time	M.#	L.C.	T.C.	
›	T–14	021.....	_____	_____	36380	_____	
		FM0060					
	#2	021.....	_____	_____	.....	_____	
	T–15	021.....	_____	_____	40100	_____	‹
		FM0060					
	#2	021.....	_____	_____	.....	_____	
›	H–56	021.....	_____	_____	14340	_____	
		FM0060					
	#2	021.....	_____	_____	.....	_____	
	H–63	021.....	_____	_____	9180	_____	‹
		FM0060					
	#2	021.....	_____	_____	.....	_____	
	H–64	021.....	_____	_____	8675	_____	
		FM0060					
	#2	021.....	_____	_____	.....	_____	
›	H–64 A	021.....	_____	_____	.....	_____	‹
		SH47					
	H–72 A	021 BASE MAP	_____	_____	.....	_____	
		SH47					
›	E–12	021 SHEET B	_____	_____	7130	_____	‹
		FM0060					
	H–15	026 BASE MAP	_____	_____	5965	_____	
	BURLESON County FM0060						
›	H–55	021 SHEET B	_____	_____	13345	_____	‹
	BRAZOS County SH0308						
	#2	021.....	_____	_____	.....	_____	
	T–9 A	021 SHEET A.....	_____	_____	17000	_____	
		SH0308					
	#2	021.....	_____	_____	.....	_____	
›	S–111	021.....	_____	_____	18530	_____	‹
		FM0060					
	#2	021.....	_____	_____	.....	_____	
		021.....	_____	_____	10900	_____	
	H–33	FM0060					
	#2	021.....	_____	_____	.....	_____	
›	H–33 A.....	021.....	_____	_____	2565	_____	‹
		FM0060					

Recorder's Signature _____

Figure 3-1 The schedule worksheet (page 2 of 2)

On-System Routes

H = HIGHWAY COUNT STATION
T = TOWN COUNT STATION
SP = SPR STATION
AT = ATR STATION
E = EXTERNAL STATION
S = SCREENLINE STATION

These prefix letters are the same as now being used on the ACR slip.

Off-System Routes

CR = COUNTY ROAD
CS = CITY STREET OR COUNTY ROAD - SCREENLINE STATION
CE = COUNTY ROAD OR CITY STREET - EXTERNAL STATION
RR = RAILROAD CROSSING
RP = RAMP COUNT
MH= METROPOLITAN HIGHWAY COUNT
BD = BRIDGE COUNT STATION
U = URBAN STATION
U - A THROUGH Z = URBAN COUNT STATION MAPS
Supplementary sheets are shown as A through Z.
Example: In Harris County, stations are UA-1, UB-10, UC-26, etc.
On the ACR slip, the sheet number will be placed after the U.
Example: UA-1, UB-10, UC-26, etc.
ST = SPECIAL CITY COUNTS WILL SHOWN IN THE REMARKS AS BEFORE
HP = HIGHWAY PERFORMANCE MONITORING SYSTEM STATION
XA - XZ EXTRA URBAN STATION MAPS

Highway Route Designations

Prefix	Suffix
IH – INTERSTATE	A – ALTERNATE
US – UNITED STATES	T – TEMPORARY
SH – STATE HIGHWAY	S – SPUR
FM – FARM-TO-MARKET	L – LOOP
RM – RANCH-TO-MARKET	E – EAST
PR – PARK ROAD	W – WEST
RE – RECREATION ROAD	

Figure 3-2 Station prefix letters

- *Time* – This column is for logging in the time the counter *arrived at the site.* Do not log departure times or set-up times. The counter will need this arrival time information to plan when to return to the site to pick up the machine (which would be 24 hours later).

- *M.#* – The serial number of the machine left at the site is logged in this column.

- *L.C.* – This column will show the last count associated with the site if the information is available.

- *T.C.* – T.C. stands for "this count," or the current count. This column is filled out when the machine is picked up at the end of the 24-hour counting period.

The schedule also provides, or allows entry of, other information:

- *Schedule* – The state's number designation for that schedule is printed here. The example schedule is schedule number 17003.

- *Date* – The date the schedule is to be worked is printed here. *Note: A schedule will be set up only on the date printed. Otherwise, it is null and void until it is rescheduled by the state.* If a schedule set-up is rained out, the counter should call the department immediately for verbal permission to move the schedule to another day. Otherwise, the schedule should be returned to the department with the reason the schedule was not set.

- *Assigned to* – This shows the name of the person assigned to work the schedule. Any changes of assignment will be approved in advance by the department.

- *Set-ups* – This is the total number of machines to be set up on that schedule. Some sites will require two, three, four, or more, machines for a complete site installation. A site requiring four machines is referred to as a "quad," and is considered as four "set-ups."

- *Miles* – If the information is available, the mileage required to drive the complete schedule is posted here.

- *Hours* – If available, the total hours required to set up the schedule is indicated here.

- *Quarters* – The name of the town where the counter will begin is followed by the name of the town where the counter will finish the schedule and quarter for the night.

- *Comment* – Any special comments concerning the schedule are printed here.

- *Speedometer* – The form provides spaces to log mileage associated with each schedule, if needed.

- *Recorder's Signature* – When a schedule is completed, the counter (recorder) will sign the form.

Filling Out the Schedule

The following items are pre-filled by the state prior to issuance of the schedule:

- Station
- Co. (County)
- Map/Comment
- L.C. (Last Count)
- Schedule (Number)
- Date (to be worked)
- Assigned to
- Set-ups
- Miles
- Hours
- Quarters
- Comment

- The following items are filled out by the counter when the set-up is made:

  - Time (of arrival at site)

  - M.# (Machine Number) – The serial number of the ACR machine used. Ensure that this number matches the number on the white slip for the location. *Do not* record the serial number until the machine has been set up and is working properly.

- The "T.C." (This Count) column is filled out by the counter after the 24-hour count is made. It is copied from the "T.C." block on the ACR reporting slip or "white slip" (see Section 4).

- The counter shall sign in the blank labeled "Recorder's Signature" prior to mailing or delivering the schedule to the state.

Delivering the Completed Schedule to the State

The counter shall deliver or mail the fully completed schedule to the state together with each of the "white slips" (see Section 4) for each setup made in conjunction with that schedule.

Supervisor's Copy of the Schedule

The field supervisor will be provided with a shortened version of the schedule, which is depicted in Figure 3-3. The supervisor's schedule contains most of the same information as the counter's schedule, but lacks the spaces for filling in information.

*** OFFICE COPY ***
17003 Type Code: Set-ups: 48 Miles: Hours: 10
NOT ASSIGNED
Quarters: BRYAN->BRYAN
Comment:

Station	SU	County		Map/Comment
H–89	2	(021)	BRAZOS	SHEET A
H–90	2	(021)		SHEET A
T–1	2	(021)		SHEET A
T–5	2	(021)		SHEET A
T–8	2	(021)		SHEET A
T–9	2	(021)		SHEET A
HP–8	1	(021)		SHEET A
S–7	2	(021)		SHEET A
T–10	2	(021)		SHEET A
T–11	2	(021)		SHEET A
T–12	2	(021)		SHEET B
H–52	2	(021)		SHEET B
H–51	2	(021)		SHEET B
T–14	2	(021)		SHEET B
T–15	2	(021)		SHEET B
H–56	2	(021)		SHEET B
H–63	2	(021)		SHEET B
H–64	2	(021)		SHEET B
H–64 A	1	(021)		SHEET B
H–72 A	1	(021)		BASE MAP
E–12	1	(021)		SHEET B
H–15	1	(026)	BURLESON	BASE MAP
H–55	2	(021)	BRAZOS	SHEET B
T–9 A	2	(021)		SHEET A
S–111	2	(021)		SHEET A
H–33	2	(021)		SHEET A
H–33 A	1	(021)		SHEET A

Figure 3-3 Supervisor's schedule

MAPS

Introduction

A good set of maps, and the counter's ability to read them, is critical to traffic-counting work. The counter is provided with the best and most up-to-date maps available. The department has an on-going program which continually updates its district and county maps. This is a fast-growing state, however, and new roads and spurs, roads which have been widened or re-routed, and other situations which are not indicated on the maps will often be encountered, especially when counts are being performed on "off-system" (city and county) roads. In addition, in some cases, Business Routes may be shown as "loops" on the maps and as "Business Routes" on the roadway signs. The counter must be able to use judgment in these situations in order to successfully complete the count. If a station or road cannot be located, the counter should call the Austin office as soon as possible.

Base Maps

The department maintains detailed maps of each county, showing federal, state and county roads. The federal and state roads are identified by number. Most of the county roads are unidentified. The basic map of the county is called a "base map" or "base sheet." Base maps which are used to show the location of traffic-counting sites are referred to as "station-location maps." Base maps of large counties, or counties with large metropolitan areas, will often be found on two or more separate sheets in order to show the features at a large enough scale to be useful. The map sheets are referred to as "Base Sheets." A Base Map of two pages would be referred to as "sheet 1 of Base Sheet" and "sheet 2 of Base Sheet," respectively.

Figure 3-4 shows the lower right-hand corner of a standard county base map. Note the label "Sheet 1 of Base Sheet" along the left margin.

- *County Name* – Note that the map is labeled "BRAZOS COUNTY" with a "21," which is the county number for Brazos County.

- *Scale* – The scale of the maps indicates the length of a mile in terms of the map. Note on the example that the scale of the base maps is about 1/2" to the mile. (Also note that any "insets" on that base map are in the scale of 1/2" to 1/4 mile.) The counter should carefully note the scale of *each* map and inset being used, since this will assist in locating sites. All base maps are not drawn to the same scale, nor are all inset and supplementary sheets.

- *Arrow Indicating North* – Note the arrow with the "N" at the tip on Figure 3-4. This indicates the orientation of the map in relation to north. Many maps are printed so that the top of the map points toward the north. Some, however, are skewed one

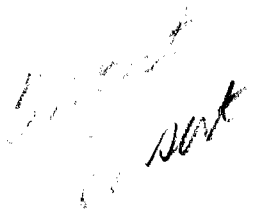


Figure 3-4 Base map information

way or the other. The counter should always note the orientation of the map to assist in locating roads and sites.

- *Insets* – Figure 3-5 depicts a portion of the Brazos County base map showing an "inset," or an area which is circled (or otherwise outlined), and magnified in the margin of the map. The example shows the town of Millican with a circle around it. Note that the larger circle reveals the roads in Millican which are too small to show on the base map.

- *Site Location* – Figure 3-5 also shows several site locations, both on the base map and in the town of Millican.

Supplementary Sheets (Maps)

Often insets are too large to show in the margin of a base map. Separate supplementary sheets (or maps) are utilized to depict large insets, such as cities and towns. Note the "Key to Supplementary Sheets" on Figure 3-6. This indicates that there are two supplementary sheets, A and B. Note that A is shaded. This indicates that the map depicted on Figure 3-6 is supplementary Sheet A. Note, under the words "Section Location Map," that this is "Sheet A of 1 Base Sheet . . . ," etc.

Refer to Figure 3-7. The top map depicts a portion of supplementary sheet J of Bexar County. The bottom map depicts a portion of supplementary sheet Z of Bexar County. Note that both maps are identical except for the fact that they have different stations on them. It is often necessary to compile additional supplementary sheets to avoid confusion between different schedules for the same area.

Use of Maps

Several rules and good practices related to maps are worth noting:

- When the counter is issued a schedule with the related maps, it is important to closely check the maps to ensure that all sites on the schedule can be located. Some sites on the schedule may not be on the maps. Further, most maps will have other sites depicted *which will not be on* the currently issued schedule. The counter should study the schedules and maps far enough in advance of set-up date to enable the correction of any deficiencies.

- As the counter reviews each schedule and locates the sites on a map, it is advisable to color-code the sites on the map with a different color for each schedule. This will assist greatly in locating the sites on the map during the set-up period, and will prevent overlooking a site or setting up the wrong site (one that is on the map, but not scheduled to be counted). Further, at the same time, the counter should fill out certain items on each "white slip" (see Chapter 3, Section 4). This provides a second check to ensure that all sites are set up, and in the correct order.

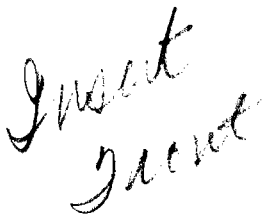


Figure 3-5 Map with inset

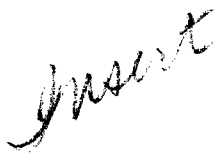


Figure 3-6 Supplementary sheet

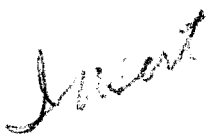


Figure 3-7a Additional supplementary sheet "Z"

Insert

Figure 3-7b Additional supplementary sheet "Z"

- The counter should keep all maps issued for at least six months, since other schedules may require the use of previously issued maps. Contractors will be issued only two (2) sets of maps, one for the counter and one for the field supervisor. Replacement maps will be provided at cost for reproduction and handling.

REPORTING SLIPS (WHITE SLIPS)

Introduction

The reporting slip is formally referred to as, and entitled, "Automatic Count Recorder Record." The reporting slip is a 4" x 5", two-part form. The top portion is white, and is referred to as the "white slip." This portion is delivered to the department. The bottom portion is yellow, and is a copy which should be maintained by the counter for at least six weeks after the count is reported. The entire two-part slip is commonly referred to as the "white slip." Figure 3-8 is an enlarged example of the white slip.

Use of the White Slip

A "white slip" is filled out for each machine set up, and is stored with that machine (in the spare-battery compartment) during the counting period. If a site cannot be set up, due to construction, or the site no longer exists (such as a railroad crossing site which has been removed), fill out one slip for that site explaining the situation under remarks. Further, if the schedule calls for more machines than are necessary (for example, the site is scheduled as a quad, but, upon inspection, only requires three machines), set up the three machines and indicate under the remarks column of the "dominant" white slip that the site only required 3 machines. (See page 3-35 for a discussion of the "dominant" white slip on multi-machine sites.)

The white slip provides detailed information regarding the count taken and related comments. All information should be *printed* legibly with a *pencil only*. No pens shall be used. No cursive-style handwriting shall be acceptable.

All information on the white slip should be accurate to the best of the counter's ability. Falsification of information on a white slip, for any reason, is considered to be fraud and will result in the counter's dismissal and other legal action as may be appropriate.

Filling Out the White Slip

- The following information is completed prior to the day of set-up, at the time the schedule is checked against the station-location map. (Figure 3-9)
    - CO. (County) - fill in the *3-digit* county number (from the schedule).
    - COUNTY NAME - fill in the name of the county (from the schedule).
    - STA. (station number)
        - In spaces 4 and 5, fill in the station prefix from the schedule (Figure 3-1). The station prefix for the site in the example is "H" (for Highway).

AUTOMATIC COUNT RECORDER RECORD

CO. _____ (1 2 3) COUNTY NAME _____

STA. _____ (4 5) _____ (6 7 8 9) _____ (10) MACH USED _____ (11) LANE _____ (12 13) DIR _____ (14)

DATE MO _____ (15 16) DAY _____ (17 18) YR _____ DAY OF WEEK _____ TIME HR _____ (19 20) MIN _____ (21 22) AP _____ (23)

COUNTER READING:

(2) REMOVAL _____ (29 30 31 32 33)

(1) SETUP _____ (24 25 26 27 28)

TOTAL 24 HOURS _____

48 HOURS _____ (34 35) WEATHER _____ (36)

MACH NO. _____ (39 40 41 42)

TOTAL	

T.C.	
L.C.	
DIFF.	

REMARKS: _____

_____

_____

INSPECTIONS: _____

FILE 10.101 REV. 7/92

SIGNATURE: _____

Figure 3-8 Blank "white slip"

AUTOMATIC COUNT RECORDER RECORD

CO. 021 (1 2 3) COUNTY NAME Brazos

STA. H (4 5) 64 (6 7 8 9) A (10) MACH USED (11) LANE (12 13) DIR (14)

DATE MO 10 (15 16) DAY 08 (17 18) YR 90 — MON (DAY OF WEEK) — TIME HR (19 20) MIN (21 22) AP (23)

COUNTER READING:

(2) REMOVAL (29 30 31 32 33)

(1) SETUP (24 25 26 27 28)

TOTAL 24 HOURS

TOTAL

48 HOURS (34 35) WEATHER (36)

T.C.

L.C.

MACH NO. (39 40 41 42)

DIFF.

REMARKS:

INSPECTIONS:

FILE 10.101 REV. 7/92

SIGNATURE: John Doe

Figure 3-9 "White slip" input prior to set-up

- In the space marked "6-7-8-9" fill in the numeric station number. The numeric portion of some station numbers may be more or less than 4 digits in length. No matter how long it is, the entire numeric portion is printed in this space. Refer to Figure 3-1, the example schedule. The numeric portion of the station number of the example site is 64. These two digits would be written into the space marked "6-7-8-9."
- In the space marked "10," fill in the suffix (trailing letter) of the site number, if there is one. In the example site on the schedule (Figure 3-1), "A" is the suffix, and should be filled in space 10. The entire station number of our example would look like this:

STA	H	64	A
	4 5	6 7 8 9	10

(Refer to Figure 3-9)

- *DATE-MO (Month)* – Enter the numeric designation for the month (2 digits):

01 = January	07 = July
02 = February	08 = August
03 = March	09 = September
04 = April	10 = October
05 = May	11 = November
06 = June	12 = December

- *DATE-DAY* – Enter the day of the month, e.g., 01 for the first, 11 for the eleventh.

- *DATE-YEAR* – Enter the last two digits of the year (e.g., enter "91" for 1991)

- *DAY OF WEEK* – Enter *at least* the first three letters of the day of the week:

MON = Monday	FRI = Friday
TUE = Tuesday	*SAT = Saturday
WED = Wednesday	*SUN = Sunday
THU = Thursday	

* *Note:* ACR counting is almost never done on weekends.

Note: The date of the setup must be the date prescribed on the schedule.

- *SIGNATURE* – Even though the slip calls for a signature, the counter will *print* his/her name (not initial or sign) on each white slip.

The following information is entered at the time the set-up is made: (Refer to Figure 3-10)

AUTOMATIC COUNT RECORDER RECORD

CO. 021 (1 2 3) COUNTY NAME Brazos

STA. H (4) 64 (6 7 8 9) A (10) MACH USED 1 (11) LANE (12 13) DIR (14)

DATE MO 10 (15 16) DAY 08 (17 18) YR 90 — MON (DAY OF WEEK) — TIME HR 10 (19 20) MIN 14 (21 22) AP A (23)

COUNTER READING:

(2) REMOVAL (29 30 31 32 33)

(1) SETUP 4765 (24 25 26 27 28)

TOTAL 24 HOURS

TOTAL

48 HOURS (34 35) WEATHER (36)

T.C.

L.C.

DIFF.

MACH NO. 0015 (39 40 41 42)

REMARKS:

INSPECTIONS:

FILE 10.101 REV. 7/92

SIGNATURE: John Doe

Figure 3-10 "White slip" input during set-up

- *MACH USED (Machine Used)* – Fill in how many ACR machines were set up at the site. Many sites will require two or more machines to count all lanes. Each white slip for each machine set up on the site should show the same number in this space. On a ramp schedule, special attention must be paid to "service-road" set-ups. In most cases, the service-road set-ups will be located separately on the schedule due to the fact that one direction of the roadway is set up first, then the other. When the same location appears on the schedule, with different directions indicated (e.g., H-105 SIE and H-105 SIW), a "2" must be placed in the "machines used" block on the "white slip." This will alert the analyst that there is more than one machine used at the set-up, even though the set-ups are not located together on the schedule. In cases where there is only one service road at a location, a "1" shall be placed in the "machines used" block. In addition, if the schedule shows two service-road set-ups, and it is discovered upon arrival that there is only one service road (the second service road is not completed or is still under construction), then a "1" shall be placed in the "machine used" blocks.

- *LANE* – Enter the lane designator if the site requires more than one machine. Otherwise, leave blank. Refer to Figure 3-11, "MACHINE DESIGNATIONS FOR MULTI-MACHINE SET-UPS." Note that four machines were required to accomplish this set-up. The service-road machines are referred to as "S1." The mainlane machines are referred to as "M1." The trailing "S" or "N" refers to south and north. An "E" or "W" would refer to east or west. Each white slip will be labeled with the machine code "S1" or "M1" in the LANE space.

  Now refer to Figure 3-12. This particular site requires six machines. Note that each direction of the mainlanes requires two machines. To differentiate the mainlane machines in this case, the machines counting the *outside lanes* (lanes farthest from the median) are labeled "M2." This convention will always be used.

- *DIR (Direction)* – In the event that more than one machine is required at a site, the actual direction of the designated lane is entered here:

  N = North
  S = South
  E = East
  W= West

  Example: In Figure 3-11, the left-hand frontage road is "S1S." The "S1" is entered into the LANE space, and the "S" is entered into the DIR space.

  - *TIME HR (Hour)* – Fill in the hour of the time that the actual counting is started. Use only the numbers 1 through 12 – not military time. Since there are 2 time zones in Texas, always use the time zone where the schedule *started* for the entire schedule, even if the schedule overlaps time zones.

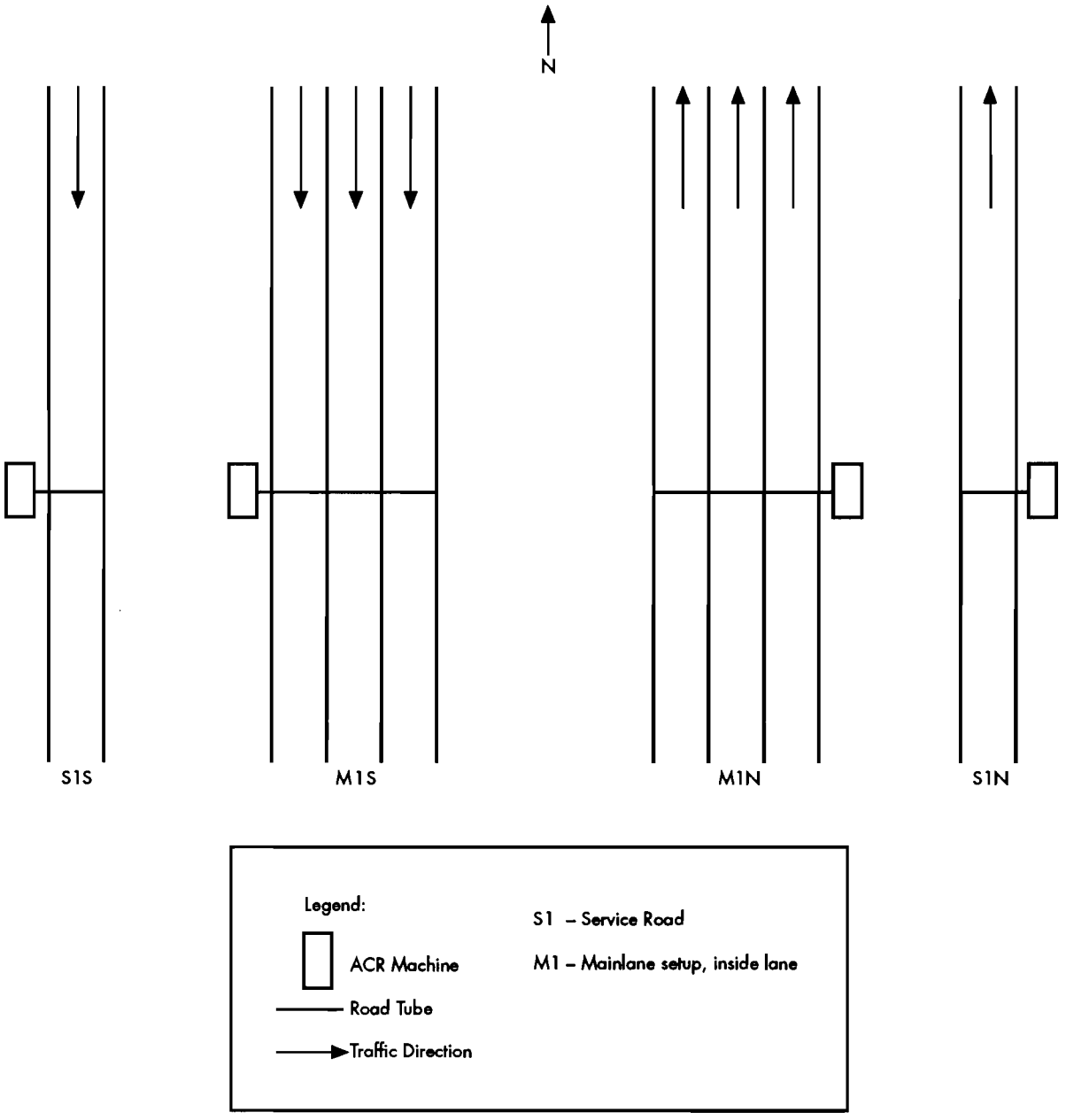


Figure 3-11 Machine designations for multimachine setups

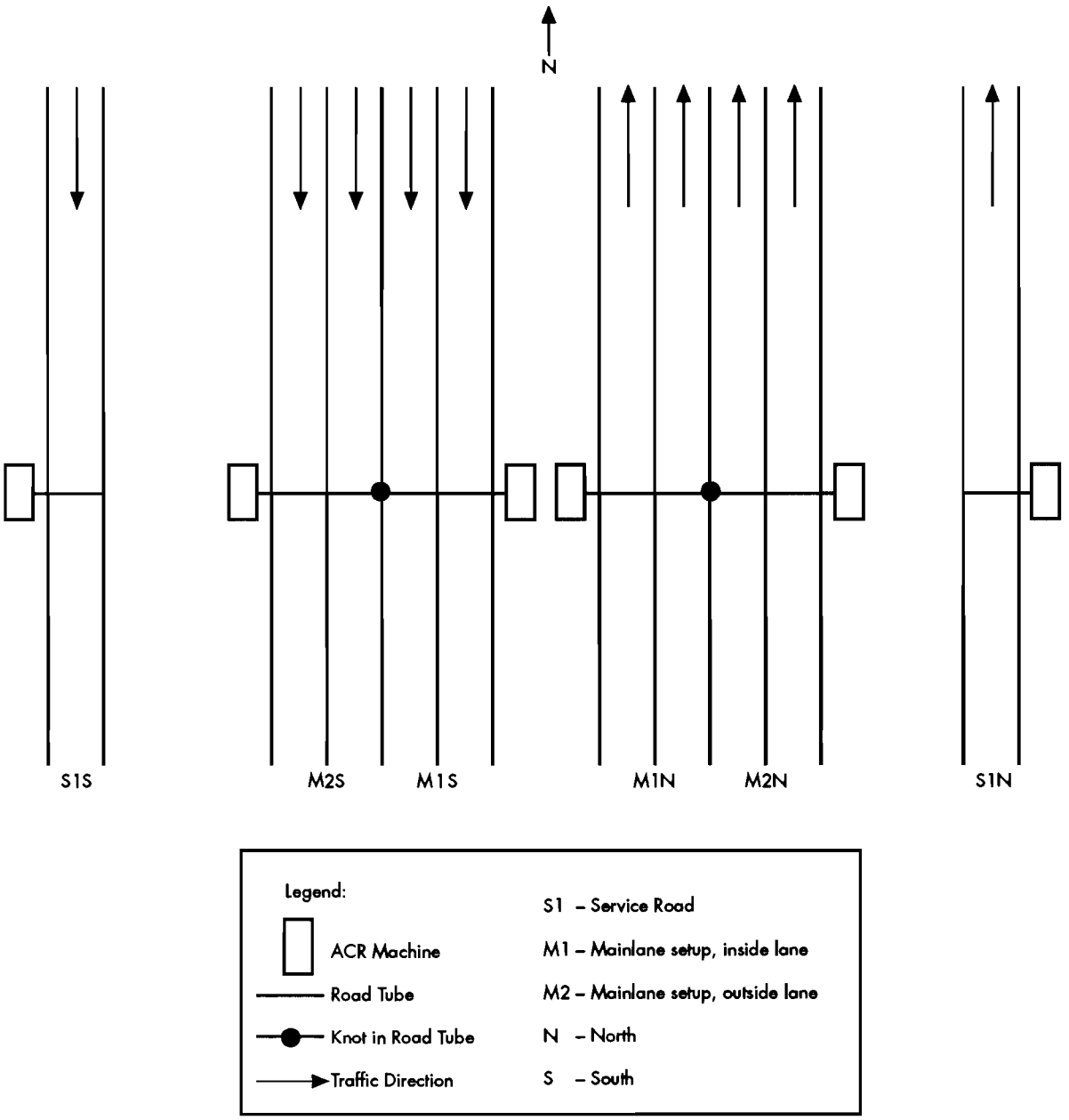


Figure 3-12 Machine designations for multimachine setups

- *TIME MIN (Minute)* – Fill in the minute the actual counting is started.
- *TIME AP* – Fill in "A" for "AM" (twelve midnight to twelve noon). Fill in "P" for "PM" (twelve noon to twelve midnight).
- *COUNTER READING 1 SET-UP* – Write in the counter reading showing on the ACR machine's digital display when the counting is actually started.
- *MACH NO. (Machine Number)* – Fill in the serial number of the machine up at this location (4 digits). Note: Do not fill in the serial number until the machine is set up and working. Also, ensure that this machine number matches the machine number entered on the schedule worksheet.

- After the initial information is completed, the white slip is placed in the ACR machine, in the spare battery compartment, and the machine is locked.
- The following information is entered when the 24-hour (or 48-hour) count is completed. (The machine is opened, and the white slip is removed.) (Figure 3-13)
  - *COUNTER READING 2 REMOVAL* – Fill in the final counter reading from the ACR machine readout display after the counting period. This figure shall be correctly lined up with the set-up counter reading to ensure accurate subtraction.

    Note: If, during the counting period, the machine's counting mechanism "turned over" to zero, and continued counting, add a "1" to the "removal" reading as a 6th digit just to the left of the "29" on the white slip in order to correctly subtract the "set up" reading.

    Example: The set-up reading was 99640. During the count, the machine had counted to 99999, and the counting mechanism had then "rolled over" to 00000 and continued counting up to 00233. (This is similar to a car's odometer "rolling over" to 100,000 miles if the odometer readout only has a space for 5 digits.) The counter readings would be written in as follows in order to correctly arrive at the total count:

    COUNTER READING:

2 REMOVAL	1	0	0	2	3	3
		29	30	31	32	33
1 SET-UP		9	9	6	4	0
		24	25	26	27	28

AUTOMATIC COUNT RECORDER RECORD

CO. 021 (1 2 3) COUNTY NAME Brazos

STA. H (4 5) 64 (6 7 8 9) A (10) MACH USED 1 (11) LANE (12 13) DIR (14)

DATE MO 10 (15 16) DAY 08 (17 18) YR 90 — MON (DAY OF WEEK) — TIME HR 10 (19 20) MIN 14 (21 22) AP A (23)

COUNTER READING:

(2) REMOVAL 14945 (29 30 31 32 33)

(1) SETUP 4765 (24 25 26 27 28)

TOTAL 24 HOURS 10185

TOTAL

48 HOURS (34 35) WEATHER 1 (36)

MACH NO. 0015 (39 40 41 42)

T.C.	5090
L.C.	5120
DIFF.	-30

REMARKS:

INSPECTIONS:

FILE 10.101 REV. 7/92

SIGNATURE: John Doe

Figure 3-13 "White slip" input when count completed

- *TOTAL 24 HOURS* – Subtract the "set-up" counter reading from the removal counter reading, and enter the resulting figure in this space. This figure shall be lined up with the set-up reading and the removal reading to aid in checking for accuracy.

  In the example above, the number 99,640 will be subtracted from 100,233 to yield 593.

- *48 HOURS* – If the count was a 48-hour count instead of a 24-hour count, write "48" in this space. Otherwise, the space is to be left blank. 48-hour counts occur when the counter is unable to retrieve the machines after 24 hours. The machines are then left counting and are picked up after 48 hours. A Monday setup can be retrieved on Wednesday; a Wednesday setup can be retrieved on Friday. Friday counts are not otherwise permitted.

- *T.C. (This Count)* – Divide the figure entered as "TOTAL 24 HOURS" by 2.

  593 / 2 = 296.5 (Note: If the count was a 48-hour count, divide by 4)

  Round the resulting figure to the nearest 10. A number that ends in 5 or more is always rounded up.

  Examples of rounding:

  1955 / 2 = 977.5 = 980
  25010 / 2 = 12505 = 12510
  17076 / 2 = 8538 = 8540
  32007 / 2 = 16003.5 = 16000
  3489 / 2 = 1744.5 = 1740
  5230 / 2 = 2615 = 2620

  Counts of 0 or less than 10 shall be rounded to 10. Enter the rounded figure in the space marked "T.C.".

- *L.C. (Last Count)* – Enter the last count from the schedule, if it is available. Otherwise, enter 0.

- *DIFF. (Difference)* – Subtract L.C. from T.C. and enter the result here.

- *TOTAL* – The five-part box ending with the word "TOTAL" is used when there is more than one machine set up at a site. (Figures 3-14 through 3-21)

Refer to Figure 3-12 "Lane Designations for Multi-Machine Set-Ups." Many highway set-ups require more than one machine. Note that the example requires six ACR machines, one for each frontage (service) road, and two for each direction of the main lanes. (An ACR machine will not count 4 lanes due to the length of tube required. Two tubes, therefore, are tied at their far ends. Each near end of the tube is attached to a machine.)

AUTOMATIC COUNT RECORDER RECORD

CO. 166 (1 2 3) COUNTY NAME: MILAM

STA. H (4 5) 77 (6 7 8 9) B (10) MACH USED 4 (11) LANE MI (12 13) DIR E (14)

DATE MO 02 (15 16) DAY 15 (17 18) YR 92 WED (DAY OF WEEK) TIME HR 07 (19 20) MIN 20 (21 22) AP A (23)

COUNTER READING:

(2) REMOVAL 1 10798 (29 30 31 32 33)

(1) SETUP 98126 (24 25 26 27 28)

TOTAL 24 HOURS 12672

48 HOURS ____ (34 35) WEATHER 1 (36)

MACH NO. 0019 (39 40 41 42)

MIE	12672
SIE	1243
MIW	11927
SIW	1186
TOTAL	27028
T.C.	13510
L.C.	13260
DIFF.	+250

REMARKS: ____

INSPECTIONS: ____

FILE 10.101 REV. 7/92

SIGNATURE: John Doe

AUTOMATIC COUNT RECORDER RECORD

CO. 166 (1 2 3) COUNTY NAME: MILAM

STA. H (4 5) 77 (6 7 8 9) B (10) MACH USED 4 (11) LANE SI (12 13) DIR E (14)

DATE MO 02 (15 16) DAY 15 (17 18) YR 92 WED (DAY OF WEEK) TIME HR 07 (19 20) MIN 32 (21 22) AP A (23)

COUNTER READING:

(2) REMOVAL 10974 (29 30 31 32 33)

(1) SETUP 09731 (24 25 26 27 28)

TOTAL 24 HOURS 1243

48 HOURS ____ (34 35) WEATHER 1 (36)

MACH NO. 2656 (39 40 41 42)

TOTAL	
T.C.	
L.C.	
DIFF.	

REMARKS: TWO WAY SERVICE ROAD

INSPECTIONS: ____

FILE 10.101 REV. 7/92

SIGNATURE: John Doe

AUTOMATIC COUNT RECORDER RECORD

CO. 166 (1 2 3) COUNTY NAME: MILAM

STA. H (4 5) 77 (6 7 8 9) B (10) MACH USED 4 (11) LANE MI (12 13) DIR W (14)

DATE MO 02 (15 16) DAY 15 (17 18) YR 92 WED (DAY OF WEEK) TIME HR 07 (19 20) MIN 45 (21 22) AP A (23)

COUNTER READING:

(2) REMOVAL 24690 (29 30 31 32 33)

(1) SETUP 12763 (24 25 26 27 28)

TOTAL 24 HOURS 11927

48 HOURS ____ (34 35) WEATHER 1 (36)

MACH NO. 5628 (39 40 41 42)

TOTAL	
T.C.	
L.C.	
DIFF.	

REMARKS: ____

INSPECTIONS: ____

FILE 10.101 REV. 7/92

SIGNATURE: John Doe

AUTOMATIC COUNT RECORDER RECORD

CO. 166 (1 2 3) COUNTY NAME: MILAM

STA. H (4 5) 77 (6 7 8 9) B (10) MACH USED 4 (11) LANE SI (12 13) DIR W (14)

DATE MO 02 (15 16) DAY 15 (17 18) YR 92 WED (DAY OF WEEK) TIME HR 07 (19 20) MIN 53 (21 22) AP A (23)

COUNTER READING:

(2) REMOVAL 03498 (29 30 31 32 33)

(1) SETUP 02312 (24 25 26 27 28)

TOTAL 24 HOURS 1186

48 HOURS ____ (34 35) WEATHER 1 (36)

MACH NO. 1246 (39 40 41 42)

TOTAL	
T.C.	
L.C.	
DIFF.	

REMARKS: TWO WAY SERVICE ROAD

INSPECTIONS: ____

FILE 10.101 REV. 7/92

SIGNATURE: John Doe

Figure 3-20 "White slip" quad setup (completed slips)

AUTOMATIC COUNT RECORDER RECORD

CO. 014 (1 2 3) COUNTY NAME BELL

STA. H (4 5) 90 (6 7 8 9) B (10) MACHD 4 (11) LANE M1 (12 13) DIR N (14)

DATE MO 07 (15 16) DAY 14 (17 18) YR 91 WED (DAY OF WEEK) TIME HR 12 (19 20) MIN 14 (21 22) AP P (23)

COUNTER READING:

② REMOVAL 18350 (29 30 31 32 33)

① SETUP 11976 (24 25 26 27 28)

TOTAL 24 HOURS 6374

48 HOURS ____ (34 35) WEATHER 1 (36)

MACH NO. 4619 (39 40 41 42)

MIN	6374
M2N	6296
MIS	6418
M2S	6353
TOTAL	25441
T.C.	12720
L.C.	12340
DIFF.	+380

REMARKS: ____

INSPECTIONS: ____

FILE 10.101 REV. 7/92

SIGNATURE: John Doe

AUTOMATIC COUNT RECORDER RECORD

CO. 014 (1 2 3) COUNTY NAME BELL

STA. H (4 5) 90 (6 7 8 9) B (10) MACHD 4 (11) LANE M2 (12 13) DIR N (14)

DATE MO 07 (15 16) DAY 14 (17 18) YR 91 WED (DAY OF WEEK) TIME HR 12 (19 20) MIN 26 (21 22) AP P (23)

COUNTER READING:

② REMOVAL 16049 (29 30 31 32 33)

① SETUP 9753 (24 25 26 27 28)

TOTAL 24 HOURS 6296

48 HOURS ____ (34 35) WEATHER 1 (36)

MACH NO. 2571 (39 40 41 42)

TOTAL ____

T.C. ____

L.C. ____

DIFF. ____

REMARKS: ____

INSPECTIONS: ____

FILE 10.101 REV. 7/92

SIGNATURE: John Doe

AUTOMATIC COUNT RECORDER RECORD

CO. 014 (1 2 3) COUNTY NAME BELL

STA. H (4 5) 90 (6 7 8 9) B (10) MACHD 4 (11) LANE M1 (12 13) DIR S (14)

DATE MO 07 (15 16) DAY 14 (17 18) YR 91 WED (DAY OF WEEK) TIME HR 12 (19 20) MIN 40 (21 22) AP P (23)

COUNTER READING:

② REMOVAL 105596 (29 30 31 32 33)

① SET-UP 99178 (24 25 26 27 28)

TOTAL 24 HOURS 6418

48 HOURS ____ (34 35) WEATHER 1 (36)

MACH NO. 2744 (39 40 41 42)

TOTAL ____

T.C. ____

L.C. ____

DIFF. ____

REMARKS: ____

INSPECTIONS: ____

FILE 10.101 REV. 7/92

SIGNATURE: John Doe

AUTOMATIC COUNT RECORDER RECORD

CO. 014 (1 2 3) COUNTY NAME BELL

STA. H (4 5) 90 (6 7 8 9) B (10) MACHD 4 (11) LANE M2 (12 13) DIR S (14)

DATE MO 07 (15 16) DAY 14 (17 18) YR 91 WED (DAY OF WEEK) TIME HR 12 (19 20) MIN 51 (21 22) AP P (23)

COUNTER READING:

② REMOVAL 6424 (29 30 31 32 33)

① SETUP 0071 (24 25 26 27 28)

TOTAL 24 HOURS 6353

48 HOURS ____ (34 35) WEATHER 1 (36)

MACH NO. 1286 (39 40 41 42)

TOTAL ____

T.C. ____

L.C. ____

DIFF. ____

REMARKS: ____

INSPECTIONS: ____

FILE 10.101 REV. 7/92

SIGNATURE: John Doe

Figure 3-21 "White slip" multi-lane quad setup (completed slips)

In order to combine the counts from all six machines into one count, the following procedure is used: (Figure 3-21)

For the example, the following counts were registered at the 6 machines:

S1S : 242
M2S : 2266
M1S : 1943
M1N : 1827
M2N : 1997
S1N : 207

- Collect the six white slips for each machine at the site. (Remember, each of the white slips will show the same site number, and space 11 "MACH USED" would show a "6".)

- Total the counts for the mainlanes for each direction of travel: M2N + M1N = 2266 + 1943 = 4209; M1S + M2S = 1827 + 1997 = 3824.

- On the white slip for the inside lane (M1) in the northern direction (M1S), write the four totals in the box labeled TOTAL. Be sure to label the numbers by lane. (Note that the M1 slip for north is the "dominant" slip and is always used for totaling multi-machine set-ups. If the road runs east and west, the M1E or M1 east slip is "dominant.")

M1N + M2N	4209
M1S + M2S	3824
S1N	242
S1S	207
TOTAL	8482

- Divide 8482 by 2: 8482 / 2 = 4241

- Round 4241 to the nearest 10 = 4240

- Write the rounded total 4240, in the "T.C." space.

- Subtract the "L.C." amount (if any) from the amount in the "T.C." space and write the difference in the "DIFF." space. The "DIFF." figure should be marked with a "+" for an increase or a "–" for a decrease in traffic volume.

  Note: If the count was a 48-hour count instead of a 24-hour count, the figures in "TOTAL 24 HOURS" and "TOTAL" would be divided by 4 prior to being rounded to

the nearest 10 and entered into the space marked "T.C."

- *WEATHER* – Fill in the appropriate code number that best describes the *most adverse* weather condition during the counting period. This code should be entered on the slip only at the time the machine is removed, *not* when it is set up.

0 – Clear	5 – Snow
1 – Cloudy	6 – Sleet
2 – Showers	7 – Icy
3 – Rain	8 – Hail
4 – Fog	9 – Dust

REMARKS: Write in any comments which may be pertinent to describe unusual characteristics or events in the surrounding area. Examples of such remarks are found in Figure 3-22. These remarks are very important to the state's traffic analysts in properly evaluating the final count at the specific location. A count significantly higher or lower than the previous count may be explainable by the comments provided by the counter. A count which is substantially different from a previous count may be discarded, and the site reset later, if there are no remarks offered which may explain the change in traffic volume. *Remarks which are required* are: (1) the indication of a 2-way frontage (service) road (the counter should write "2-way SR" in the remarks on the white slip for these sites); (2) if the count is on a freeway ramp, the counter should note whether the ramp is an on-ramp or an off-ramp from the main lanes of the freeway being set up (Figure 3-22); (3) if there is construction, note whether it appears to be long-term or short-term. Sites at long-term construction areas will not be re-set. Short-term work, such as repaving, will usually be rescheduled. If the site could not be set up, the reason should be detailed in this section.

- *INSPECTIONS* – If a contractor's field supervisor checks the site during the counting period, the following information will be written in this space:

  - Time of inspection
  - Counter reading at inspection
  - Initials of field supervisor
  - "OK" if set-up OK or comments if set-up incorrect.

- New or Abandoned Traffic Generator (such as rodeo arena, shopping mall, housing addition, etc.) - Describe on back of ACR slip.
- Gravel Haul - State whether it is a permanent or temporary activity. State the location of the pit if known.
- Farming Activity - State reason for High Count such as plowing, planting, or irrigating.
- Farming Area - State reason for Low Count such as no farming activity at this time of year.
- Crop Harvest - State type of harvest such as cotton picking, hay hauling, or grain harvest.
- Oil-Field Activity - State type of activity such as new drilling rig, pumping activity, or oil well service crew.
- New or Vacated Housing - If a new subdivision, show location on back of ACR slip.
- Lake or Recreational Area - State on ACR slip how traffic has been affected.
- Livestock Auction - State on ACR slip which day is the sale day.
- Road or Other New Construction in area of setup - State on ACR slip type such as pipe line, telephone, new business or new factory.
- Logging or Strip-Mining Activity.
- Tire-Test Vehicles in area
- School or College in area - State on ACR slip how affected such as Spring Break.
- Holiday Traffic - State on ACR slip how traffic has been affected.
- Special Events (High Counts) - State on ACR slip types of events such as ball games, rodeos, fairs, or opening of hunting season.
- Army Convoy - If multiple setup, state on ACR slip the direction of travel.
- Low Count - State on ACR slip how traffic has been affected by weather or by bad road conditions.
- High Count - State on ACR slip reasons such as picking up turning movements or other reasons.
- No Good - State reasons such as tube cut, tube stolen, tube unplugged, machine stolen, etc.

Figure 3-22 Examples of remarks

SPECIAL MAPS AND SCHEDULES

Introduction

In addition to standard counting performed on roadway sections, the department also performs special counts which require slightly different schedules and maps, and which may require additional information on the white slip. This section will discuss maps and schedules for freeway ramps, railroad crossings, screen-line counts, county-road counts, and urban counts.

Ramp Counts

Due to the extremely high volumes on urban freeways, it is often not prudent to count freeways in the urban center. Instead, the department counts the freeway before it enters the high-density area, after it exits the high-density area, and counts all exit and entrance ramps between the two above stations. The resulting data will yield a count for any section of the freeway.

Ramp counts are the most dangerous counts due to the high traffic volume encountered and the unusual nature of the ramps themselves. Chapter 4 will discuss the specifics of setting up ramps. This section describes the maps and schedules associated with ramps.

- *Ramp Schedule* – Figure 3-23 illustrates a portion of a ramp schedule. Note the prefix "RP" for ramp. Refer to site RP-1053. The number indicates that this is site 53 on Loop 1 (the "0" is filled in by the computer). Ramp station numbers have 6 possible digits. The first three digits refer to the highway number (i.e., IH-610 is 610; US-59 is 059; Loop 1 is 001). The last three refer to the ramp number. Station H-201 is a standard highway station. However, the schedule indicates that only the north-bound service road should be set up (NBSR).

- *Ramp Map* – Figures 3-24 and 3-25 are pages 8 and 9 of a ramp map for Loop 1 in Travis County. Note the designation of site RP-1053 on the map. The site on the map is written as 1-53, without the "RP", which is understood. Also note site H-201 indicates the entire highway including both main lanes and service roads. Normally this site is set up in its entirety. However, remember that the schedule indicates that only the north-bound frontage road is to be set up.

  Note: On Figure 3-24, on the right margin, the words "Match 8." This section of the map should be matched with the section on Figure 3-25 marked "Match 8." This convention allows the maps to be tied together for continuity. Note, also, that Figure 3-24 is somewhat different than Figure 3-25. Figure 3-24 is a ramp map derived from a regular base map, whereas Figure 3-25 is a ramp map known as a "straight-line" map. Note that the right end of the top roadway section "Match 9" is continued at the left side of the bottom roadway section.

*** SCHEDULE 14002A *** Date: 03/27/91 SPEEDOMETER End _____ _____
Assigned to: BO BARRINGTON (2022) Begin _____ _____
Set ups: 52 Miles: Hours: 10
Quarters: Wednesday AUSTIN->AUSTIN Total _____ _____
Comment:

	Station	Co. Map/Comment	Time	M.#	L.C.	T.C.	
›	RP-1040	227 LOOP 1 RAMP MAP TRAVIS County LOOP 1					‹
	RP-1041	227 LOOP 1					
›	RP-1043	227 LOOP 1					‹
	RP-1045	227 LOOP 1					
›	RP-1047	227 LOOP 1					‹
	RP-1049	227 LOOP 1					
›	RP-1053	227 LOOP 1					‹
	H-201	227 NBSR LOOP 1 RAMP MAP					
›	RP-1056	227 EXIT TO US 183 LOOP 1					‹
	RP-1057	227 ON RAMP TO US 183 LOOP 1					
›	RP-1058	227 LOOP 1 RAMP MAP LOOP 1					‹
	RP-1061 A	227 LOOP 1					
›	RP-1061	227 LOOP 1					‹
	RP-1062	227 LOOP 1					
›	H-200	227 NBSR LOOP 1 RAMP MAP					‹
	RP-1065	227 LOOP 1 RAMP MAP LOOP 1					
›	RP-1067	227 LOOP 1					‹
	RP-1070	227 LOOP 1					
›	H-208	227 NBSR LOOP 1 RAMP MAP					‹
	RP-1071	227 LOOP 1 RAMP MAP LOOP 1					
›	RP-1073	227 LOOP 1					‹
	H-208 A	227 NBSR LOOP 1 RAMP MAP					
›	RP-1075	227 LOOP 1					‹
	RP-1077	227 LOOP 1					
›	RP-1077 B	227 LOOP 1					‹

Figure 3-23 Ramp schedule

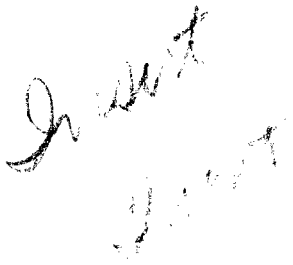


Figure 3-24 Ramp map

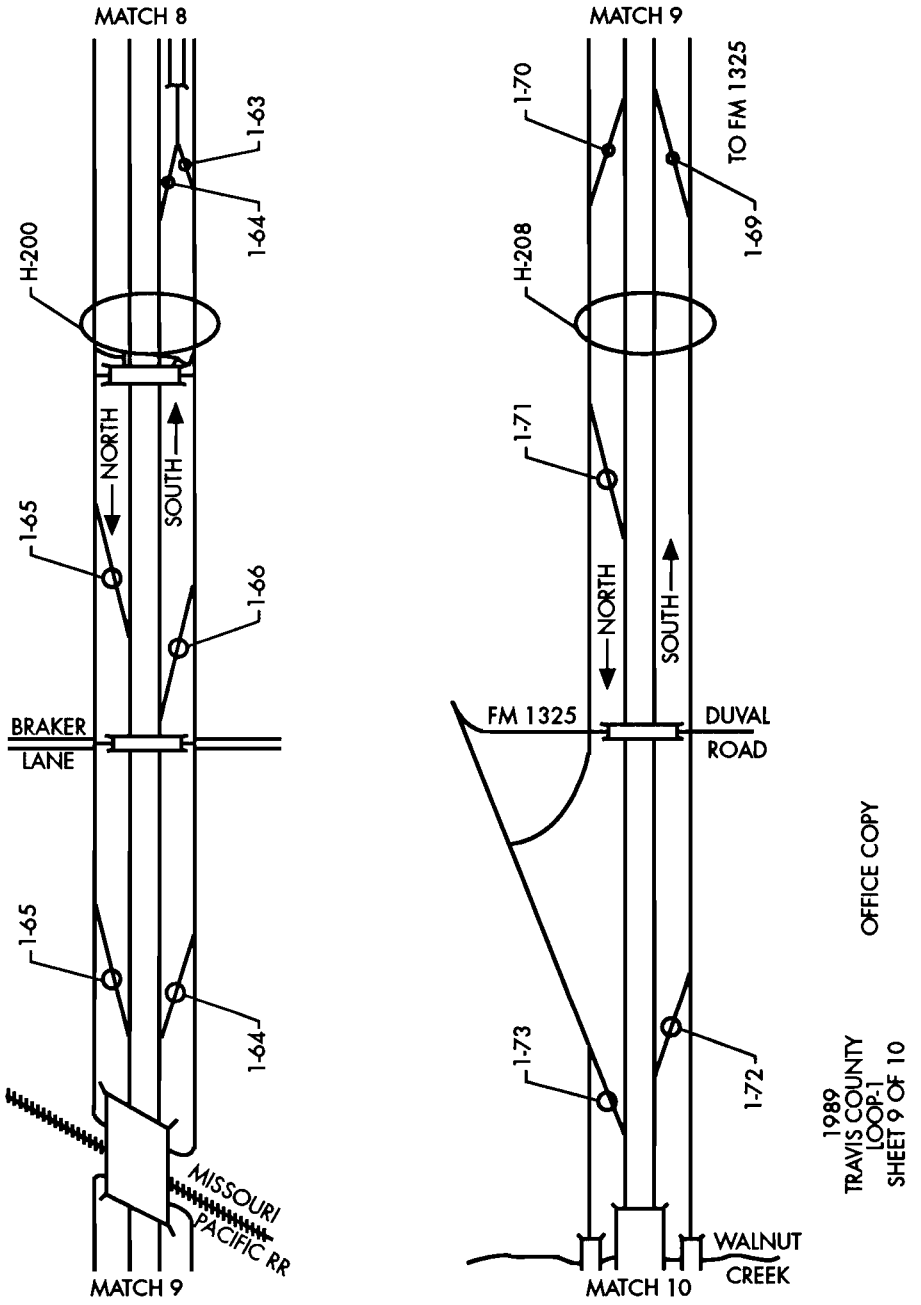


Figure 3-25 Ramp map (straight-line)

Ramp maps are compiled by the traffic-counting section of the department from any available maps. Some ramp maps must be hand drawn such as Figure 3-25 if no road map is available, and are not necessarily drawn to scale.

- *Following the Schedule* – Ramp set-ups are scheduled so that the counter follows a circular route, first setting up one side of the freeway, say heading south, then crossing the freeway and setting up ramps on the other side, heading north. The schedule is compiled assuming that the counter will travel from site to site using the main lanes of the freeway instead of the service roads. Service roads often veer off from a freeway and the counter could lose a lot of time circling back to pick up a site that was missed. In some cases, a ramp will be too busy to set up. The ramp can be skipped, the next one set up, and then the counter can return to the skipped ramp later. Ramp schedules are the only schedules where some discretion is allowed the counter in the sequence of setting up. The counter is strongly encouraged to follow the schedule unless safety concerns preclude it. In heavily-traveled urban roads, the counter should consider working at night (if the roadway is lighted), or at least during non-peak-traffic periods. The contract supervisor should be notified and should in turn notify the department prior to night work being done.

- *Interpreting the Ramp Map* – Refer to Figure 3-25. Note that the locations circled on each ramp are near the center of each ramp. This circle is used to indicate the ramp to be counted, *not the location of the machine.* The counter should locate the machine at the most likely place along the ramp which would ensure the best count. Circular ramps and S-shaped ramps require special handling to achieve a good count. Refer to Chapter 4 for further information regarding ramp set-up procedures.

- *Special Notation on White Slip* – The counter is required to note on the white slip, under remarks, whether the ramp is an on-ramp or an off-ramp.

  On a ramp schedule, special attention must be paid to "service-road" setups. In most cases the service-road set-ups will be located separately on the schedule due to the fact that one direction of the roadway is set up first, then the other. When the same location appears on the schedule with different directions indicated (i.e., H-105 S1E and H-105 S1W), a "2" must be placed in the "Machines Used" block on the "While Slip." This will alert the analyst that there is more than one machine used at this set-up, even though they are not located together on the schedule. In cases where there is only one service road at a location, then a "1" shall be placed in the "Machines Used" block. In addition, if the schedule shows two service-road set-ups and it is discovered upon arrival that there is only one service road (the second service road is not completed or still under construction), then erase the "2" and place a "1" in the "Machines Used" block.

Screenline Counts

"Screenline" counts are counts conducted on all roadways which cross a boundary, or other line or natural barrier (such as a railroad track, river, etc.) in an urban area. They are conducted for statistical analysis purposes. The counts are similar to taking a cross-section of traffic to predict traffic trends across the area.

- *Screenline Schedule and Map* – Figure 3-26 is a portion of a screenline schedule for San Antonio. The prefix "CS" refers to a screenline station for a city or county road. Any station prefix ending in an "S" refers to a screenline station. Figure 3-27 is a portion of a screenline station-location map for the example schedule. Note that the example screenline runs along the Missouri-Pacific (MP) Railroad track in San Antonio.

County Road Counts

County road counts are all off-system count locations in rural areas. These counts are now done on a five-year cycle. These counts may be added to an annual schedule or may be on a totally new schedule. County roads will show on the schedule form as, for example, "CR-21." However, on the maps there will be a numeric "21" at the location for CR-21. (The "CR" is implied.) A high percentage of county-road locations will be near an intersection with a state-maintained highway. However, some locations will be at off-system-bridge or off-system-railroad-crossing locations. All of these will be "CR" stations on the schedule. *A set-up will be made at all "CR" locations if the road is open to traffic and even if the bridge structure has been replaced with a pipe or if the railroad tracks have been removed.* If the "CR" location is not open to traffic, the counter should write on the ACR slip and schedule form the reason, such as: private road, road closed off, no road at this location, etc. Setups should never be made on roads which are clearly marked as "Private Road" or "No Trespassing."

Urban Counts

Urban counts are special counts made in large urban-study areas. Texas has 25 of these urban-study areas. These counts are now done at the rate of about five per year on a five-year cycle. These counts will be on the highway system and on city streets and county roads in the urban-study area. In a few instances counts will be made on "semi-private" roads such as entry roads to a shopping mall or an industrial factory and some selected roads on military bases. All of these locations will be set up unless there is a physical safety problem that will prohibit a count from being made at that location. For counts on military bases, the department will request permission for the count from the proper authority. Urban counts are shown on the supplementary sheets. For example, a "UA" station will on sheet UA. After 26 supplementary sheets have been used, the sheets will be lettered "XA" to "XZ". Therefore, for this example, an "XA" station will be on sheet XA. At this time, the most sheets for an urban study in one county are found for Harris County, with 50 sheets. All urban counts will be set up if the street is open to traffic.

*** SCHEDULE 14002A *** Date: 03/28/90 SPEEDOMETER End _____. _____.
Assigned to: KEVIN POWELL (2022) Begin _____. _____.
Set ups: 49 Miles: Hours: 10
Quarters: Wednesday SAN ANTONIO->SAN ANTONIO Total _____. _____.
Comment:

	Station	Co. Map/Comment	Time	M.#	L.C.	T.C.
›	CS-23	015 SHEET I			1750	
	BEXAR County					
	CS-26	015			1805	
›	CS-27	015				
	CS-28	015			1890	
›	CS-29	015			3145	
	CS-30	015			14465	
›	CS-32	015			370	
	CS-33	015			11790	
›	CS-34	015			11045	
	CS-35	015			12895	
›	#2	015				
	CS-36	015			8075	
›	CS-37	015			720	
	CS-38	015			670	
›	CS-39	015			695	
	CS-40	015			3345	
›	CS-41	015			855	
	CS-42	015			955	
›	CS-43	015			730	
	CS-44	015			4910	
›	CS-46	015			860	
	CS-47	015			1105	
›	CS-48	015			8915	
	CS-49	015			14020	
›	#2	015				

Figure 3-26 Screenline schedule

Figure 3-27 Portion of a screenline map

GENERAL SET-UP AND PICK-UP PROCEDURES

Introduction

This section describes the detailed set-up procedures which are common to all sites. It also discusses set-up procedures for various pavement types, and how to deal with curbs, medians, drainage ditches, and shoulders, etc. The counter should refer to other chapters in this manual to supplement the following procedures.

- *Set-Up Procedure* – The following steps should be followed for all set-ups:

  - Locate and travel to the station location using the station-location map (Figure 4-1). In traveling between sites, the counter should take enough time so that, when picking up the next day, there is ample time to properly record the counts, pick up the equipment, and make notes as to the traffic conditions. If the counter rushes the setups, there may not be adequate time to do the pick-ups correctly or on time.

  - Park the vehicle and log in the time of arrival on the schedule. (Figure 4-2)

  - Put on safety gear and exit vehicle.

  - Survey the general location to choose a specific site for the set-up. Consider the following in choosing the location:

    - The site should be as close as possible to the location marked on the map.
    - The site should not be located so far down the roadway from the designated location that another roadway intersects the road being counted.
    - Ensure that the road at the site is reasonably level, and free of chug holes, bumps, and deep wheel paths. Roadway bumps and holes can cause the traffic to vault over the tube, or cause the vehicle body to dip close to the pavement surface and possibly cut or snare the road tube. Care must be taken at railroad locations since the tracks are placed at a slightly higher level than the roadway. This can cause the vehicles to vault over a tube that is set too close to the tracks. Further, do not set up so close to a railroad crossing that the vehicles are moving too slowly to count.
    - The site should not be set so close to an intersection that turning vehicles would impact the tube four times (two times for the front axle and 2 times for the rear axle) during their turning movements. The site should be moved far enough from the intersection that vehicles have completed their turning movements prior to impacting the tube. If there is no reasonable way to avoid turning movements at the site, note this on the white slip.
    - The site should be at least 50 feet from any loops which have been installed in the roadway.
    - If there is already an ACR machine at the site, ensure that the location is

Figure 4-1 Locating site on map

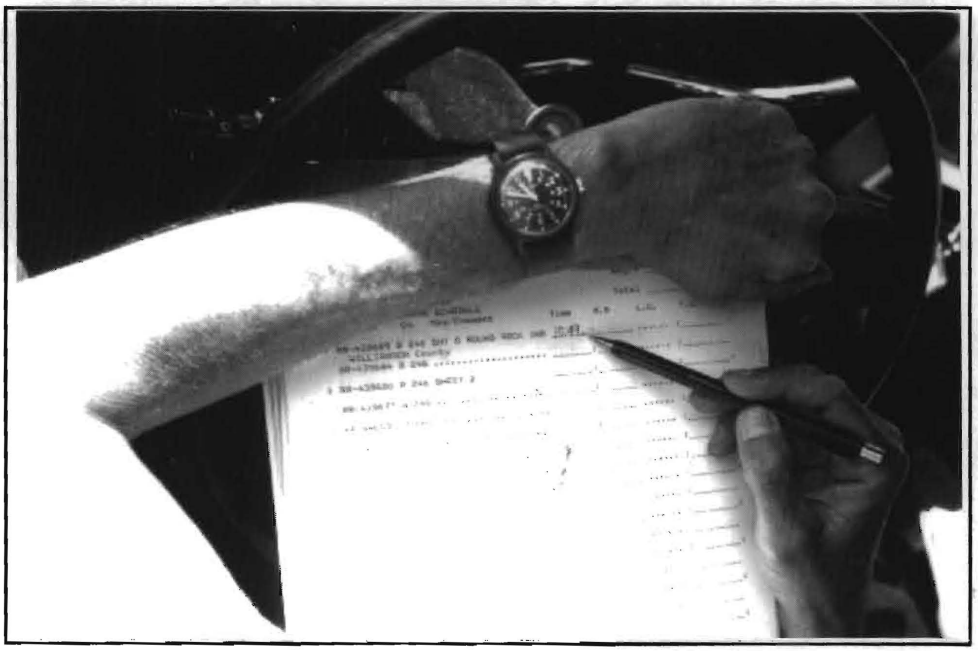


Figure 4-2 Logging arrival time on schedule

correct. If the location is correct, check the white slip in the machine to see if the machine was setup by someone working on the same contract. If so, the counter should indicate on his own white slip that the site was already set up, and should identify the other counter. Further, the counter should check the station-location number on the other white slip to ensure that it is correct. If the machine does not belong to the same contract, or if identification is not possible, the counter should go ahead and make his own setup at the site.

- If the road is muddy or flooded, do not set up the site. Describe the situation on the white slip.
- Ensure that there are adequate machines to make the setup, especially if more than one machine is required at the site. Never set up only part of a double or quad site. Contact the field supervisor if adequate machines are not available.
- Without sacrificing the above considerations, attempt to locate the site where a roadside device exists to which to secure the ACR machine.

◦ Get a 50-foot road tube from the truck. (Note that the "far" clamp is always secured first.) Carry the road tube across the road. If the road is asphalt or gravel, secure the clamp with two 60d nails. The nails should be driven in at a 35° angle, with the tip of the nail toward the roadway (Figure 4-3). Drive the nail flush with the ground (Figure 4-4). *Do not drive the nails in part way and then bend them over!*

◦ After the far clamp is secure, pull the excess tube through the clamp until the knot at the end of the tube is encountered. Ensure that the plug is in the end of the tube.

◦ Carefully carry the tube across the roadway, feeding out the tube onto the road. Be sure to hold the tube so that arms or legs cannot become entangled.

◦ Install the near clamp in a manner similar to the first. Ensure that the clamp is directly across the road from the far clamp so that the tube will lay perpendicular to the direction of travel.

◦ In order to slide the collar along the tube, place one foot on the tube and pull upwards on the tube to stretch it (thus reducing its diameter). The collar should slide easily toward the clamp (Figure 4-5).

◦ Pull the tube taut across the road, so that it is stretched about 10% of its length. With one foot on the clamp, again stretch the road tube in order to slide the collar against the clamp. Release the tube and check that the tube maintains its tautness.

Note: On freeways and other high-speed facilities, it is important to ensure that the road tube is pulled tight across the road. Large trucks, traveling at high speeds, can create strong drafts on the road surface, pulling and stretching the

Figure 4-3 Nailing clamp at angle

Figure 4-4 Setting clamp nails flush

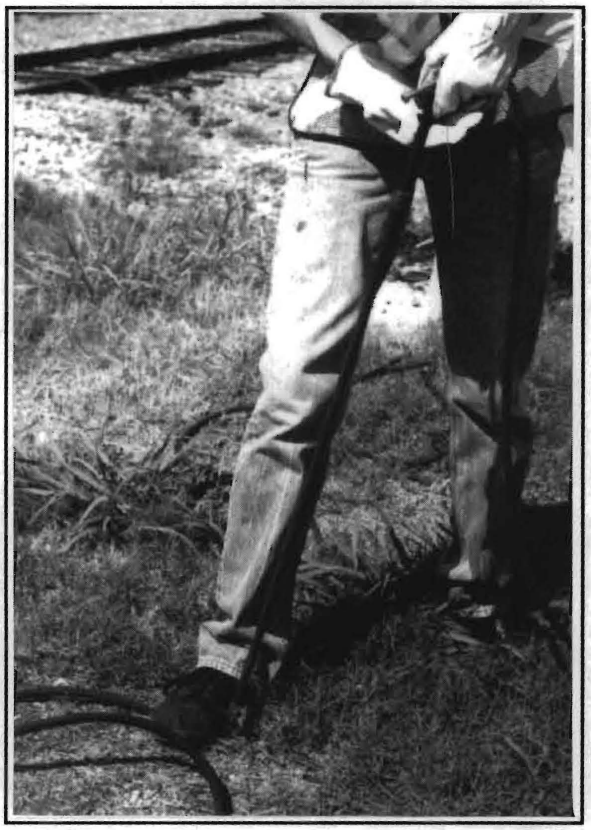


Figure 4-5 Stretching road tube to slide collar toward clamp

tube even further. If the tube is adequately stretched to begin with, this effect will be minimized.

On low-speed facilities, the tube should be stretched, but left slightly looser than on freeways. The reason is that stretching the tube lessens its inside diameter, reducing the size of the air pulse to the machine. A tube pulled too tightly on a low-speed facility may undercount as a result.

On ramps, the counter should observe the machine to ensure that it is counting correctly. Vehicles entering or driving through a ramp tend to weave and may impact the road tube at an angle, thus causing the machine to overcount. The counter should adjust the angle of the road tube while observing the machine to obtain the correct angle for the road tube.

- Carry the remainder of the tubing over to where the ACR machine will be secured, letting the tubing feed out onto the ground.

- Select the ACR machine to be set up at the site. Check the machine's battery's voltage. If the voltage reads 5.5 volts or less, replace the battery.

- Place the machine near the object to which the machine will be secured. Do not place a machine in a low spot or a drainage ditch where it may incur water damage.

- Run the chain around the object and feed one end of the chain through the loop at the other end so that the chain is looped around (or through) the object (Figure 4-6). Note other acceptable ways to secure machines in Figures 4-7 and 4-8. If an object is not available, secure the chain to a clamp nail or to a nail driven into the ground (Figures 4-9 and 4-10).

- Wrap the excess tubing around the machine in a neat coil (no kinks, etc. to restrict air flow) and attach the end of the tube firmly to the road tube adapter (Figure 4-11). If the set-up is on a narrow road or a ramp, there will be a large excess of tubing to coil around the machine. A coiled tube does not transmit the air impulse as well as a straight tube due to the slight friction of air against the inside of the tube. The tubing should be wrapped in large coils around the machine to lessen this effect. Tight coils will increase friction and possibly cause the machine to under count.

- Select the fast or slow setting to match traffic conditions.

- Ensure that the machine is counting all lanes of traffic. Note the total on the readout. If traffic is impacting the tube, ensure that the readout total is increasing with each impact. If there is no traffic, stomp on the road-tube, where it crosses the travel lane farthest from the ACR machine, while pushing in the direction of

Figure 4-6 Looping chain around post

Figure 4-7 Attaching chain to nail in utility post

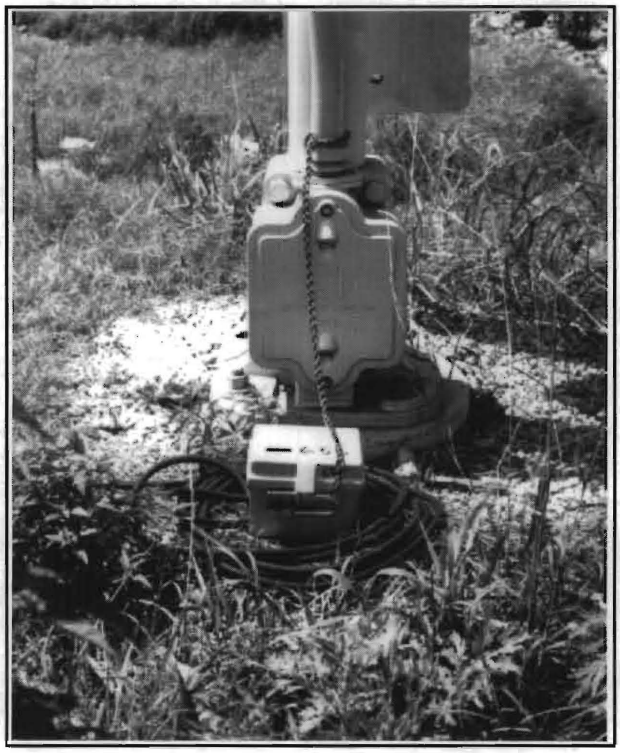


Figure 4-8 Attaching chain to railroad barricade post

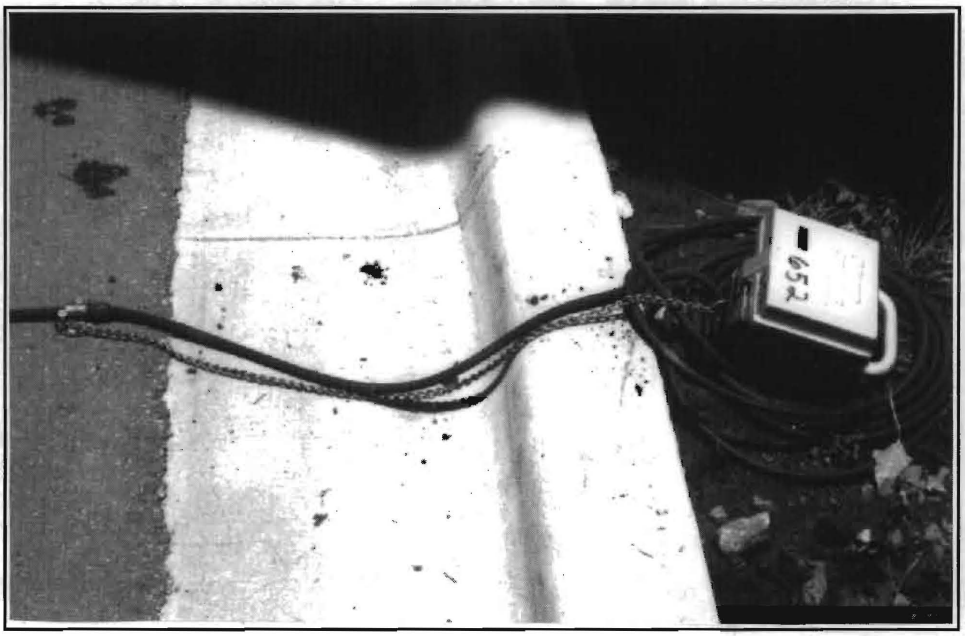


Figure 4-9 Attaching chain to clamp nail when no fixed object is available

Figure 4-10 Attaching chain to 60d nail in ground when no fixed object is available

Figure 4-11 Attaching road tube to road tube adaptor

the ACR machine. Observe the readout total to ensure that it has increased by one.

- Toggle the display switch to read the beginning (SET-UP) number (Figure 4-12). Log this reading on the white slip. Fill out the other appropriate information on the white slip (Refer to Chapter 3, Section 4).

- Log the ACR machine number on the schedule and the white slip ensuring that they match. Do not record the ACR machine number until the machine has been set up and is working properly.

- Ensure that the white slip information is complete, and place the white slip into the spare battery case of the machine (Figure 4-13).

- Close the machine and slide the lock through the lock holes. Attach the end of the security chain to the lock and close the lock. The set-up is complete (Figure 4-14).

- Check the setup area for nails, empty shop casings, pins and other debris. Do not leave, or throw, any debris on the right-of-way or on private or public property.

- *Proper Road-Tube Installation Procedure*

The following is a guide on selecting the proper way of securing the road tube to different roadway surfaces:

- *Gravel Roads* – Secure the clamp 2' off of the traffic path. Nail into the gravel or the adjoining ground, provided the ground is firm enough to hold the clamp.

- *Asphalt Road with Gravel Shoulder* – Nail the clamp at the edge between the asphalt and shoulder.

- *Asphalt Road with Concrete Curb* – Nail the clamp in the edge crack between the road and the bottom of the concrete curb (Figure 4-15). In hot weather, pins may need to be shot into the curb (Figure 4-16).

- *Asphalt Road with Asphalt Shoulder* – Nail the clamps one foot off of the edge of the asphalt shoulder because traffic often drives on shoulders, and the further out of the traffic stream the clamps are, the less likely it is they will be knocked out.

- *Concrete Road with No Shoulder* – The clamps should be nailed into the gravel or dirt off of the roadway.

- *Concrete Road with Asphalt Shoulder* – The same procedure should be used as for an asphalt road with an asphalt shoulder.

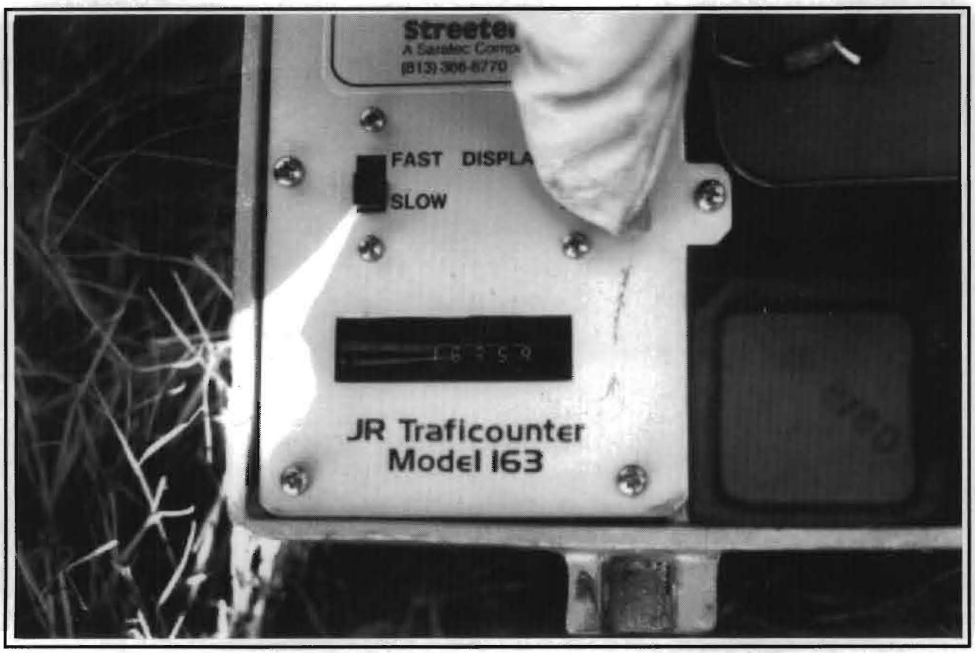


Figure 4-12 Checking reading on ACR machine display

Figure 4-13 White slip placed in spare battery compartment

Figure 4-14 Completed machine setup

Figure 4-15 Nailing clamp at concrete edge

Figure 4-16 Shooting stud into lower curb

- *Concrete Road with Concrete Curb* – A fastening tool will probably need to be used to drive a pin into the bottom of the concrete curb (Figures 4-16 and 4-17). Only one pin is required per clamp. Be sure to use all safety precautions. Some concrete is so hard that several attempts may be required to imbed the pin. If the bottom of the curb proves to be too hard, try setting the pin in the side of the curb (Figures 4-18 and 4-19). Never reuse a fastening tool pin or straighten a PK (masonry) nail for reuse. They can disintegrate upon impact. Attach the clamp to the pin and secure it with a 1/4" nut tightened with a nut driver (Figures 4-20 and 4-21).

- *Medians* – Medians can sometimes be used as locations for the ACR machines if the outside of the road is not acceptable. Most medians, by nature, are set apart from the roadway with curbs. Attachment of clamps should follow the previously stated practices for roads with curbs.

- *Median Barriers and Fences* – The clamp should be set as close to the barrier or fence a possible, since these objects are often very close to the inside travel lane. If the road is concrete, the fastening tool may need to be used.

- *Drainage Ditches* – Drainage ditches should be avoided, both as areas for clamps or locations for ACR machines. Attach the clamp off the roadway as described above for the various types of roads. If it is necessary to cross the ditch to secure the ACR machine, ensure that the tubing is not stretched across the ditch, but follows its contours.

- *Circular Ramps* – On circular ramps, the end of the tube may be clamped in the middle of the ramp lane, since vehicles on the ramp will be continuously exercising turning maneuvers while on the ramp. Stretching the tube only halfway across the road will pick up only one front tire and one rear tire, thus avoiding the possibility of over counting. Use this method only after a normal setup has been tried and continues to overcount.

- *Wide Roads* – If the roadway is abnormally wide, due to wide shoulders, and two set-ups are not feasible, the tubing can be extended in length by use of a copper tubing adapter which is used to attach the 50-ft. tubing to as much as an additional 15 feet of tubing. A road tube longer than 65 feet should be avoided since the air pulse will be too weak to activate the counting mechanism. To extend a piece of tubing with an adapter, cut 1/4" copper tubing to a length of 1-3/4" to 2" (Figure 4-22). Smooth both ends of the adapter and insert 1/2 of the length of the copper tube into the end of the tube (Figure 4-23). Attach the rubber tube extension onto the other end of the copper tubing (Figure 4-24). Slide the rubber tubing together (Figure 4-25). Tightly wrap the splice with friction tape (Figure 4-26).

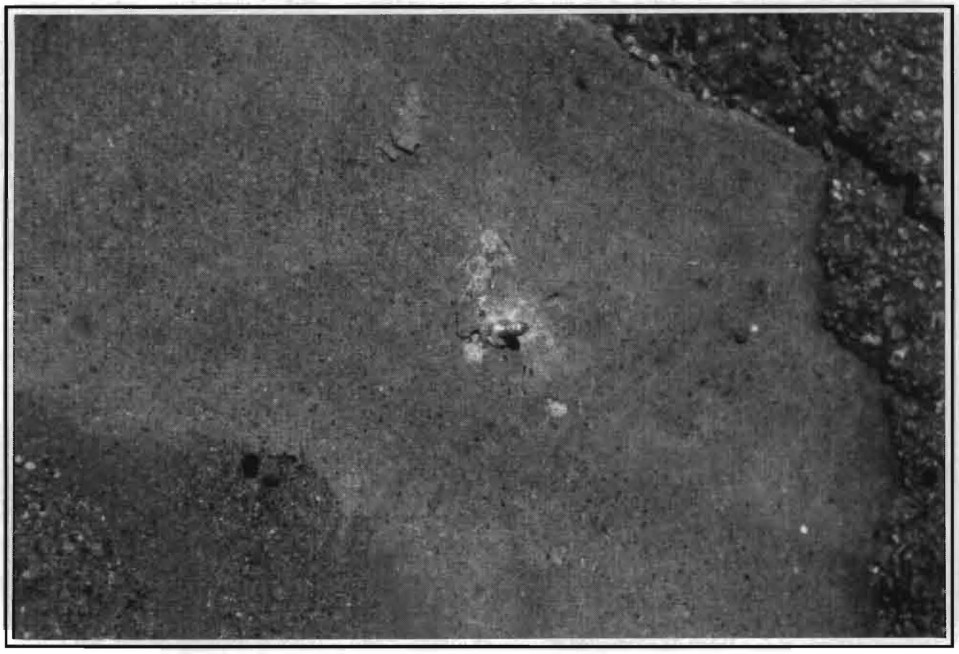


Figure 4-17 Stud in lower curb

Figure 4-18 Shooting stud into curb side

Figure 4-19 Stud in curb side

Figure 4-20 Attaching clamp to stud

Figure 4-21 Clamp attached to stud

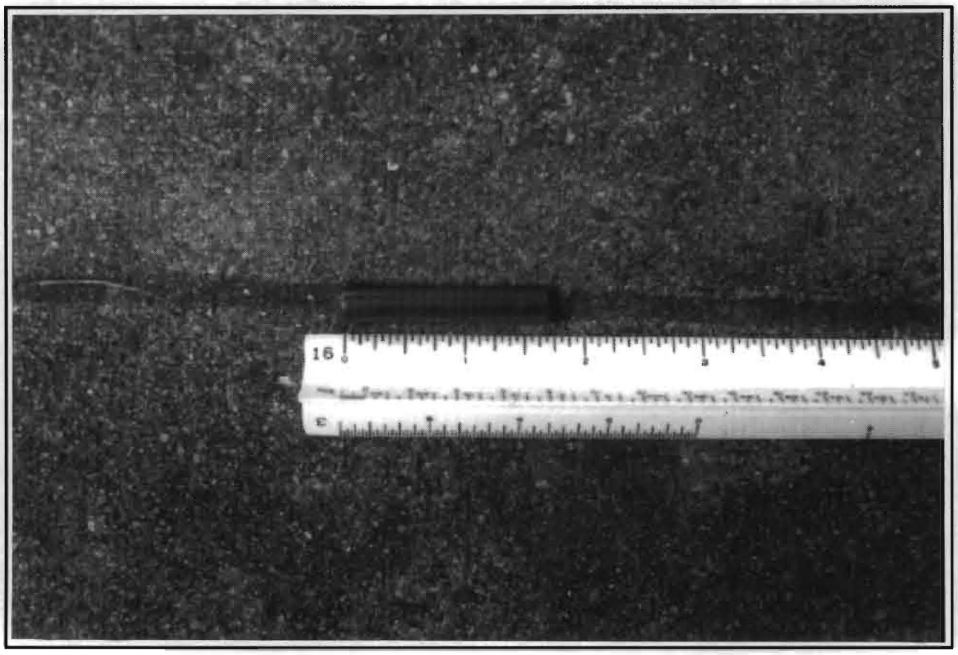


Figure 4-22 Copper tubing extension

Figure 4-23 Attaching copper tubing extension

Figure 4-24 Attaching tubing to copper extension

Figure 4-25 Closing rubber tubing over copper extension

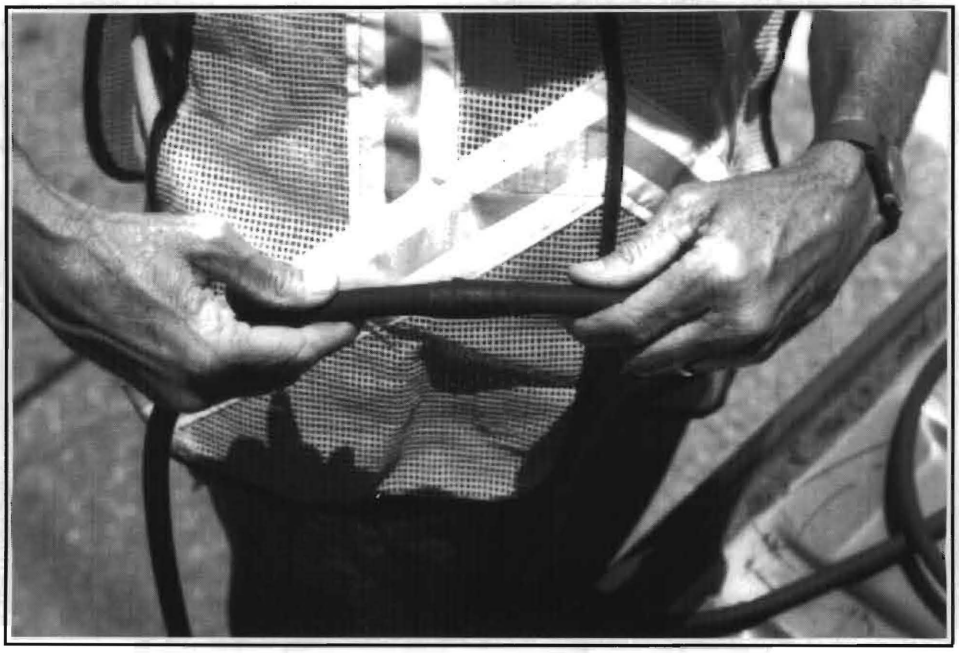


Figure 4-26 Rubber tubing splice with friction tape

Note: The splice on an extended road tube shall always be placed outside of the near clamp. It shall never be between the two clamps, especially where it can be impacted by traffic. A tube extension is only used to extend the length of a tube so that it will reach the ACR machine.

If an extension is not feasible, and a clamp must be placed closer than normal to a travel lane, always choose the far clamp. The nearer clamp has tubing continuing past it to the machine and could cause a vehicle to snare the tubing if placed too close to a travel lane. Never place a clamp in a travel lane.

If two set-ups are feasible, the clamps from the two road tubes should be installed on the center stripe of the road (Figure 4-27).

The two road tubes are then attached to two ACR machines on opposite sides of the road. Note the third nail next to each clamp in Figure 4-27.

If the asphalt is soft, the third nail will lend additional support to the clamp. Drive the third nail flush with the top of the clamp.

If the road is made of concrete, *do not* imbed a pin in the center stripe. Instead, tie the ends of the two road tubes in a square knot (Figures 4-28 and 4-29). The clamps at the far end of the road tubes are slid back to the near end of their respective tubes, against the other clamps, to get them out of the roadway. The clamp closest to the roadway should be nailed or attached with a pin (Figures 4-30 and 4-31), or both clamps can be nailed (Figure 4-32). This prevents the inside clamp from vibrating along the tube and onto the roadway.

- *Pick-Up Procedure* – The ACR machine should be disconnected from the road tube and the final count recorded exactly 24 hours from the set-up time. The counter should use the time logged in on the schedule (the set-up arrival time) as the time to arrive back at the site the next day. The machine should be unplugged from the tube, and the count terminated exactly 24 hours after the set-up time logged on the white slip. If the counter gets a late start, and the sites cannot be picked up on time, the schedule should be consulted to find the first site which can be picked up 24 hours after set up. The counter should skip all previous stations and travel to this site, working the remainder of the schedule from that point. Note that the skipped stations should be left alone to count for a 48-hour period. The counter should retrieve these stations the next day after 48 hours of counting. The white slips for these stations shall have a "48" written in the space marked "48 HOURS" or these stations may be picked up later in the day by the traffic counter and marked "No Good." The exact removal time should be written on the white slip.

  The following general procedures should be followed on all pick-ups:

  - Arrive at site. Park vehicle. Don safety gear.

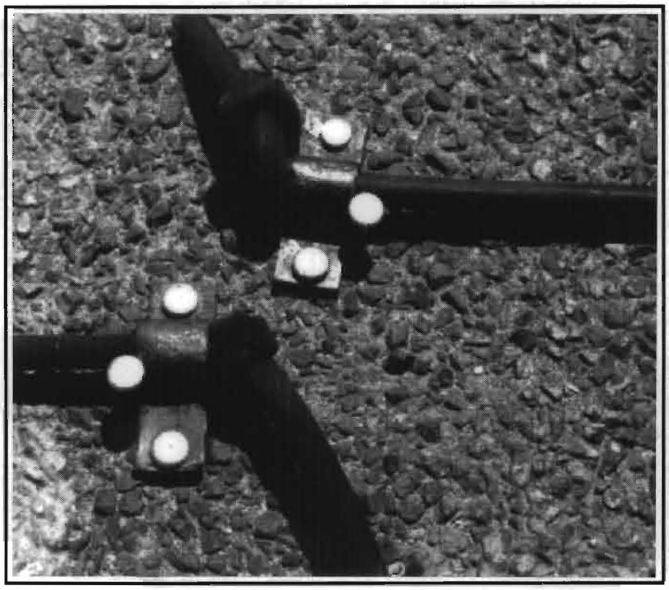


Figure 4-27 Clamps in centerline with extra support nail

Figure 4-28 Square knot in tubing

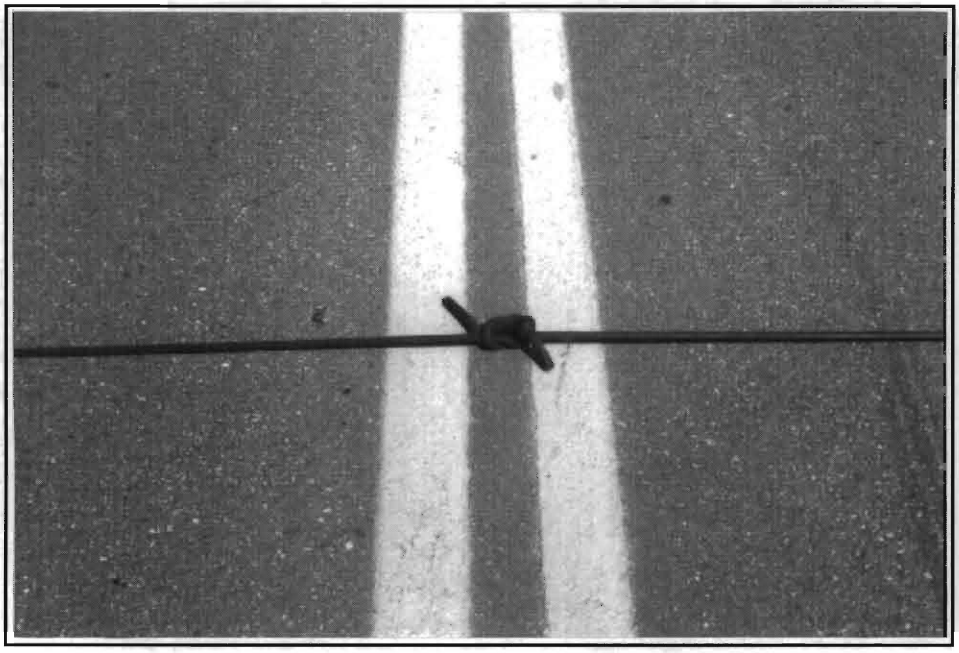


Figure 4-29 Square knot in centerline of road

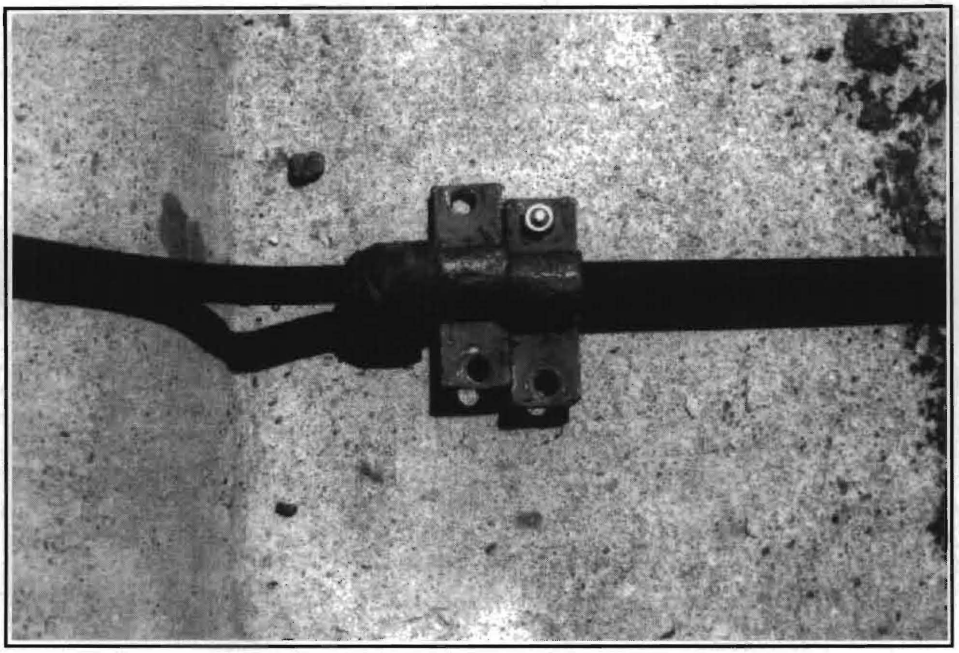


Figure 4-30 Inside clamp attached to pin

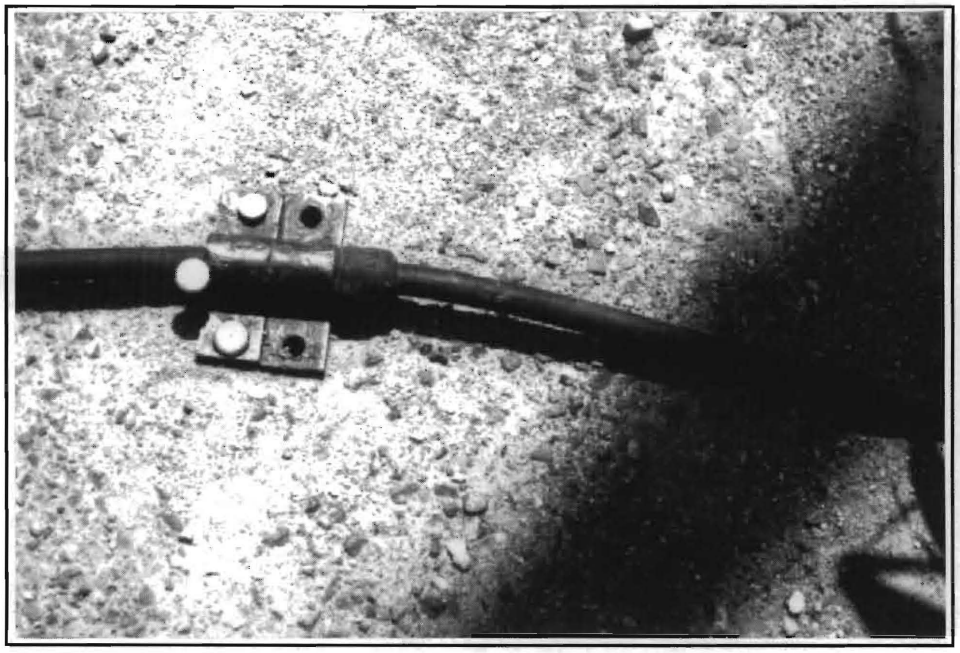


Figure 4-31 Inside clamp nailed with three nails

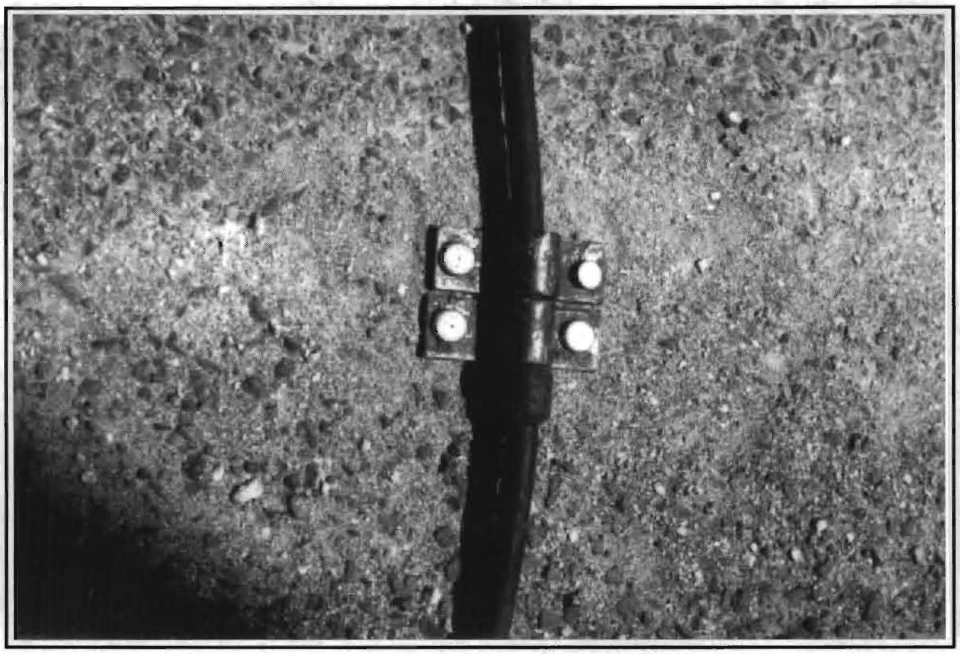


Figure 4-32 Both clamps nailed with two nails each

- Inspect set-up to see if road tube is in good shape.
- Open the ACR machine. Ensure that it is still counting all lanes of traffic.
- Check the time to ensure that it is exactly 24 hours from the set-up time. Then unplug the tube from the machine's road tube adapter to stop the counting.
- Fill out the white slip and schedule with the appropriate information (Figure 4-33). Note any discrepancies between the last count (if one is noted) and this count. If the count is obviously bad (due to a damaged road tube, machine not counting, etc.) note "N/G" (for "no good") on the schedule and white slip, and state the reason for the bad count on both the white slip and the schedule.
- Place the chain and lock into the spare battery compartment of the machine and stow it in the vehicle. Do not place wet chains or locks in the machines. Moisture inside a machine can cause it to malfunction or become damaged.
- Using the hammer or the crow bar, dislodge the nails or pins in the far clamp (Figure 4-34).
- Carry the tubing across the road and pull up the other clamp.
- The 60d nails should be straightened for reuse (Figure 4-35). All pins that have been shot into the concrete should be knocked down.
- Coil the road tube in a neat coil about 1' in diameter (Figure 4-36), and tie the end of the tube to prevent uncoiling (Figure 4-37). While rolling up the tubing, the counter should check the tubing for damage and holes, and should carefully check the plug, collar and clamps for damage.
- Stow all supplies and equipment in the truck. It is best to store the rolled tubing so that the tubing ends droop down. If rain accidentally gets into the storage area, this will prevent water from collecting in the tubing.
- Check the area for any nails, pins, or clamps. Do not leave materials at the site, e.g., nails, pins, clamps, tubing, etc. Further, bad batteries *shall* be turned back in to the department. Do not discard old batteries on the roadside or in dumpsters as they present an environmental hazard.
- Exit the site.

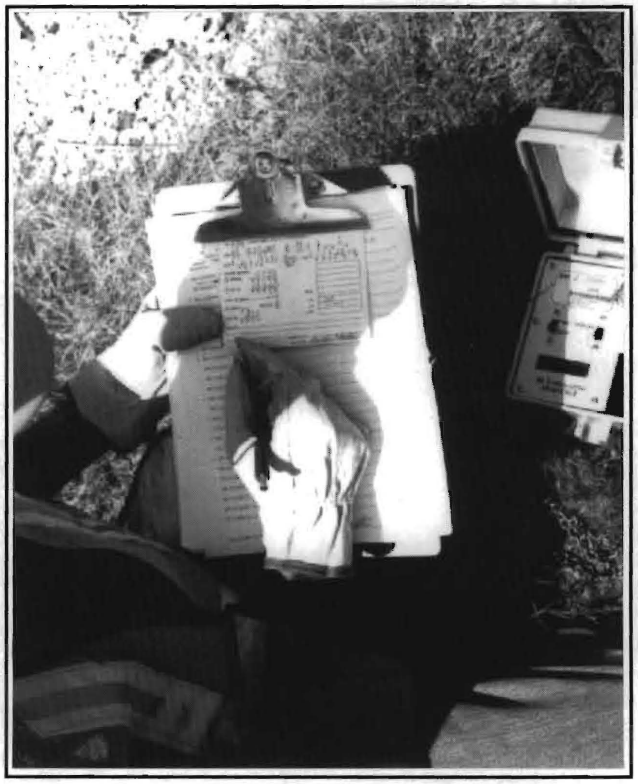


Figure 4-33 Checking ending machine count

Figure 4-34 Removing clamp nails

Figure 4-35 Straightening 60d clamp nails for reuse

Figure 4-36 Properly coiled road tube

Figure 4-37 Knot in coiled road tube

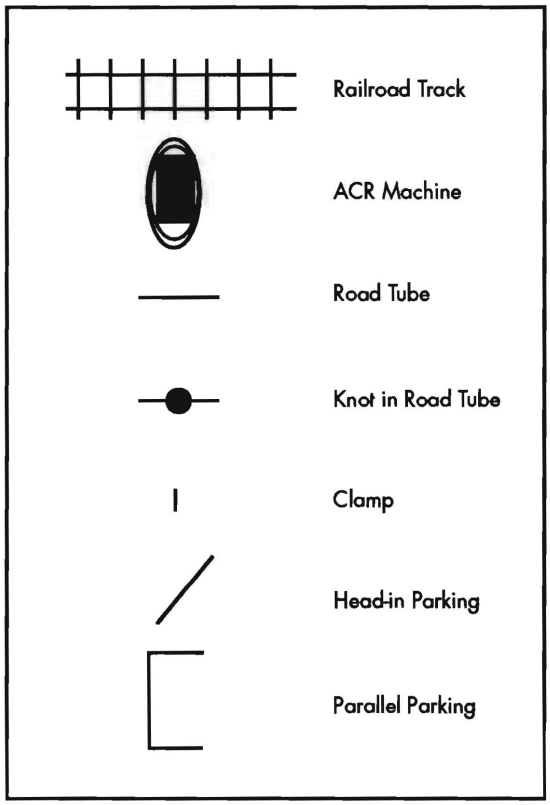
SPECIFIC ROADWAY TYPES AND CONFIGURATIONS

Introduction

As was mentioned in the chapter overview, there are many roadway and intersection configurations which will be encountered. Each different roadway configuration will require a slightly different set-up configuration.

This section will discuss and illustrate the most common roadway and intersection types and how to properly locate the machines and road tubes.

The following legend applies to the figures in this section:



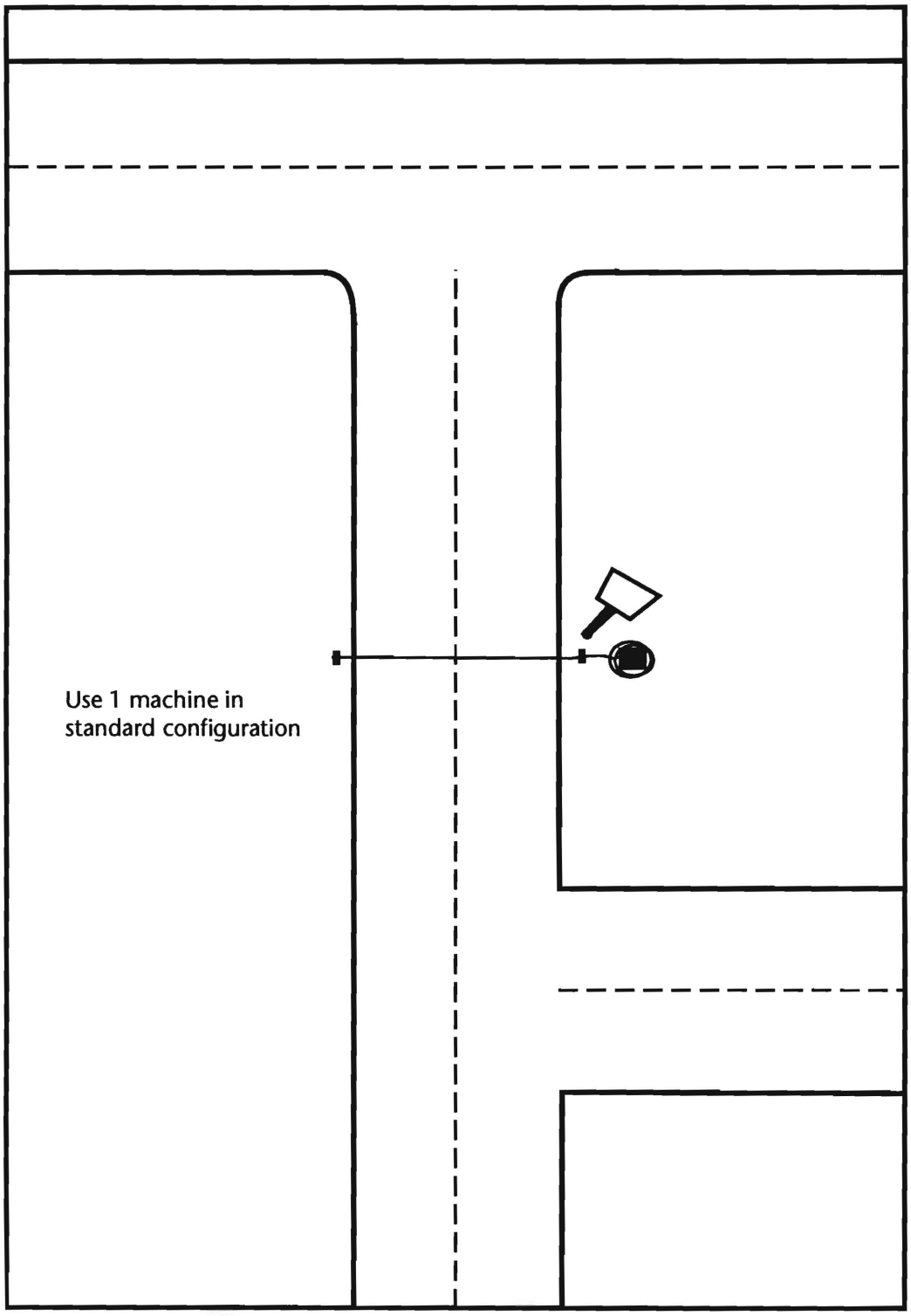


Figure 4-38 2-lane road

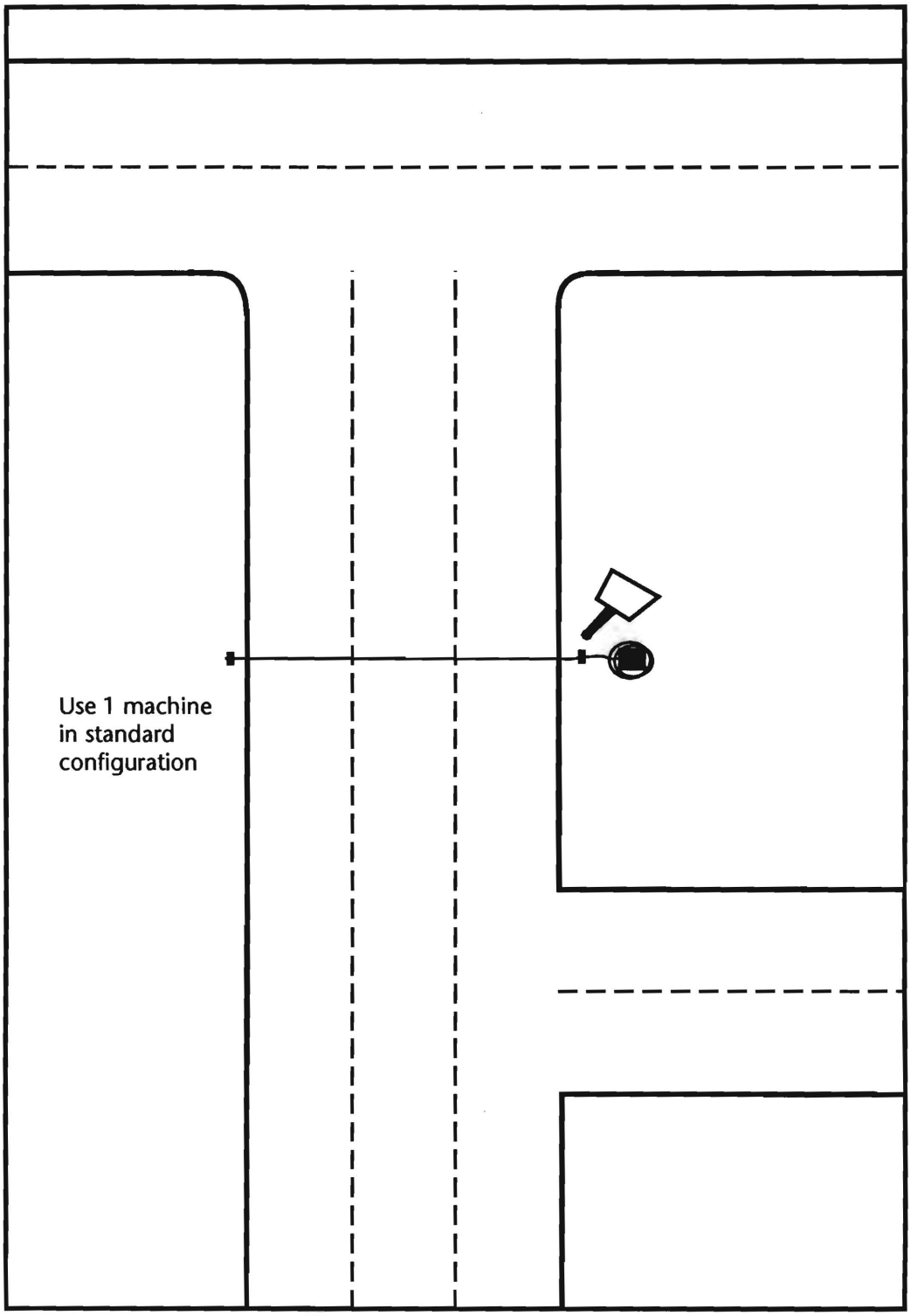


Figure 4-39 3-lane road

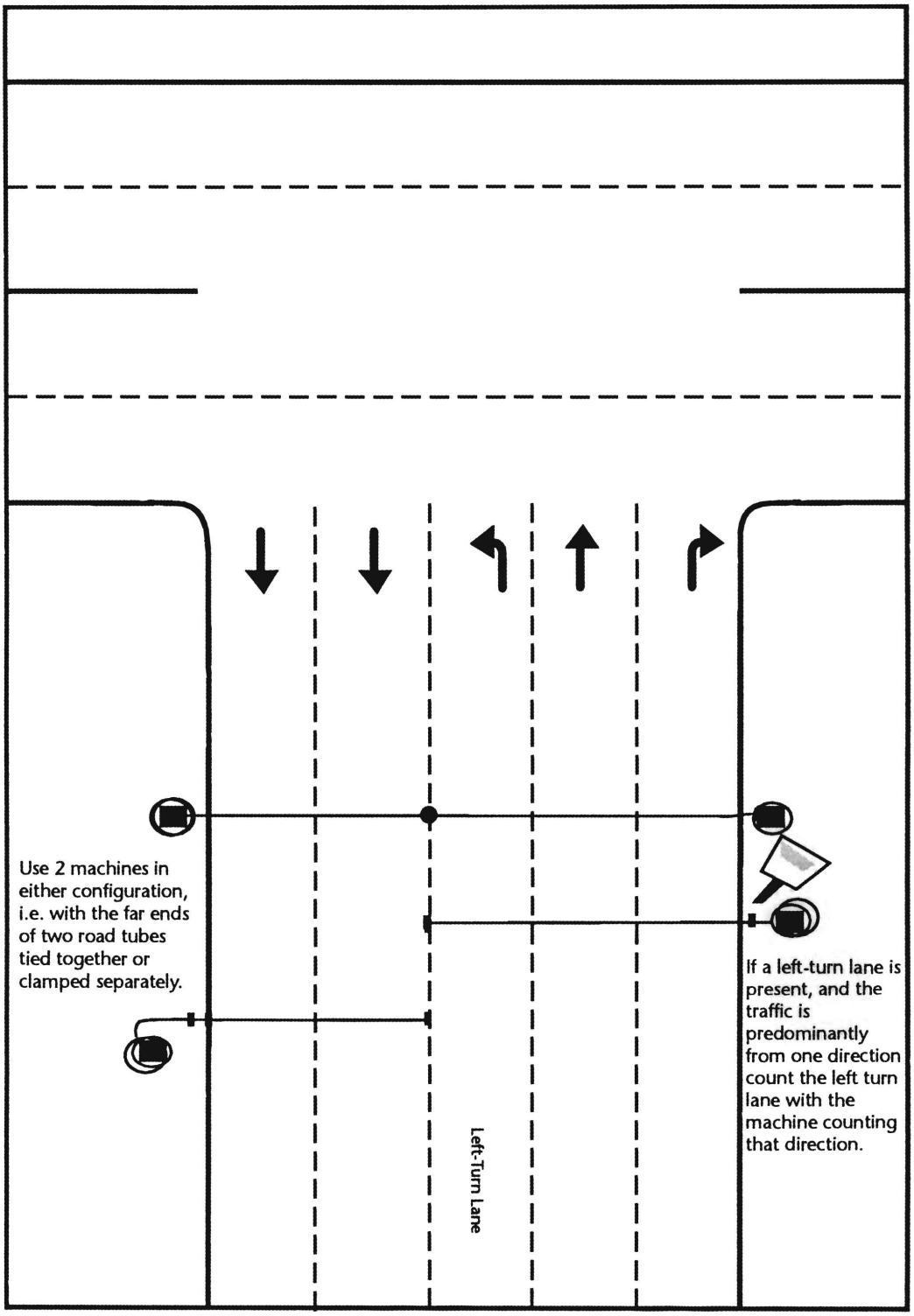


Figure 4-40 4 lanes, or more

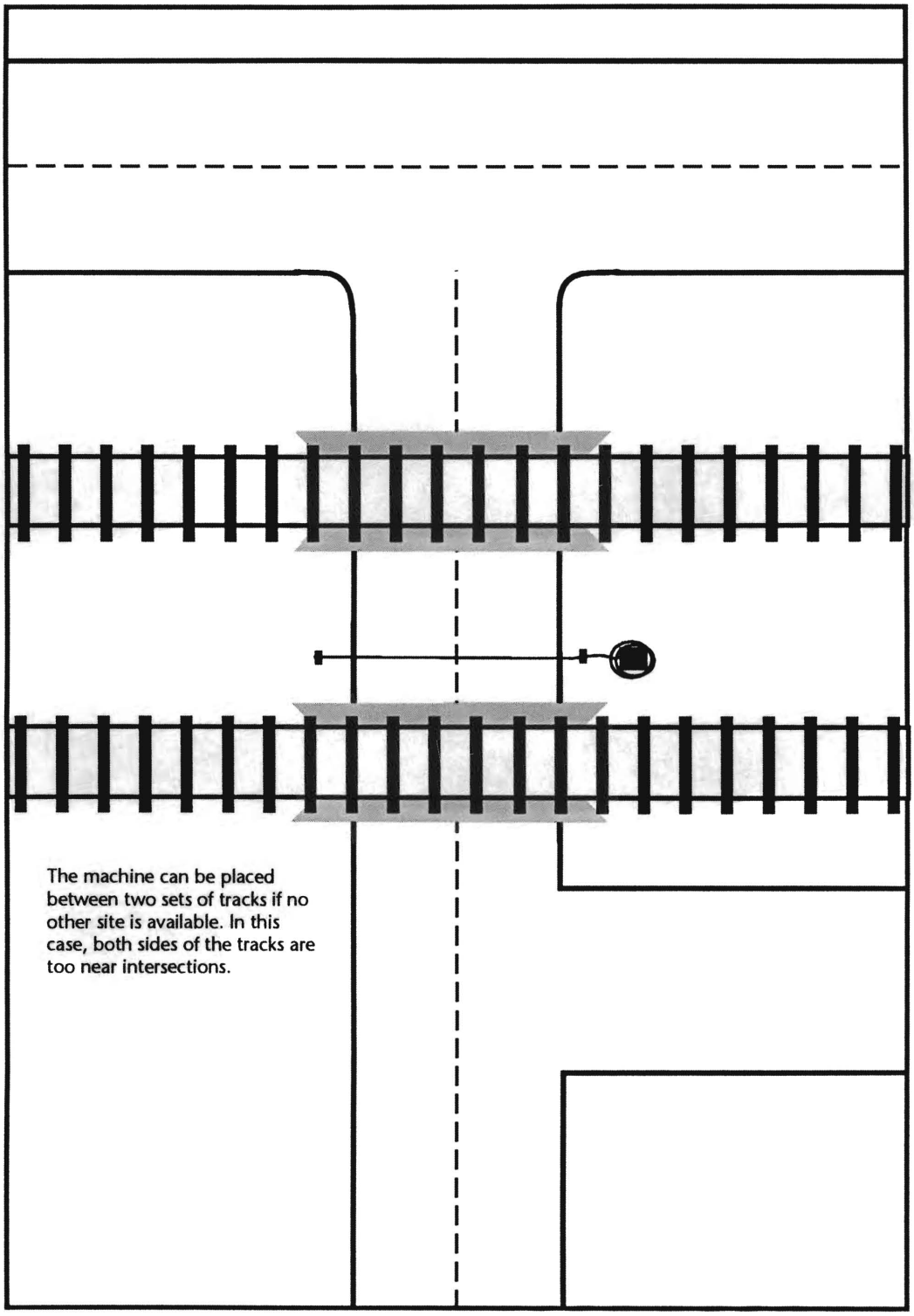


Figure 4-41 Double tracks

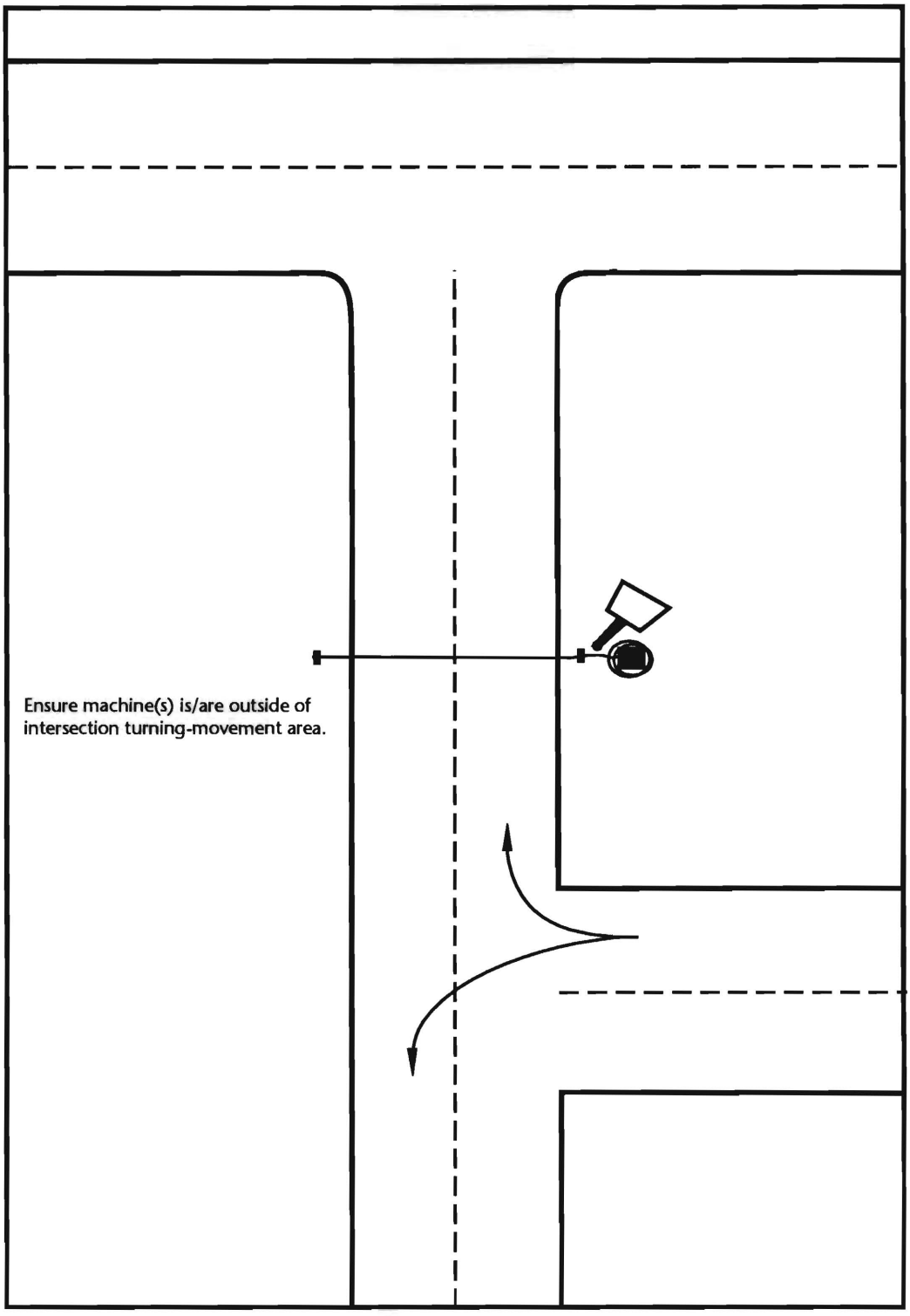


Figure 4-42 Intersection

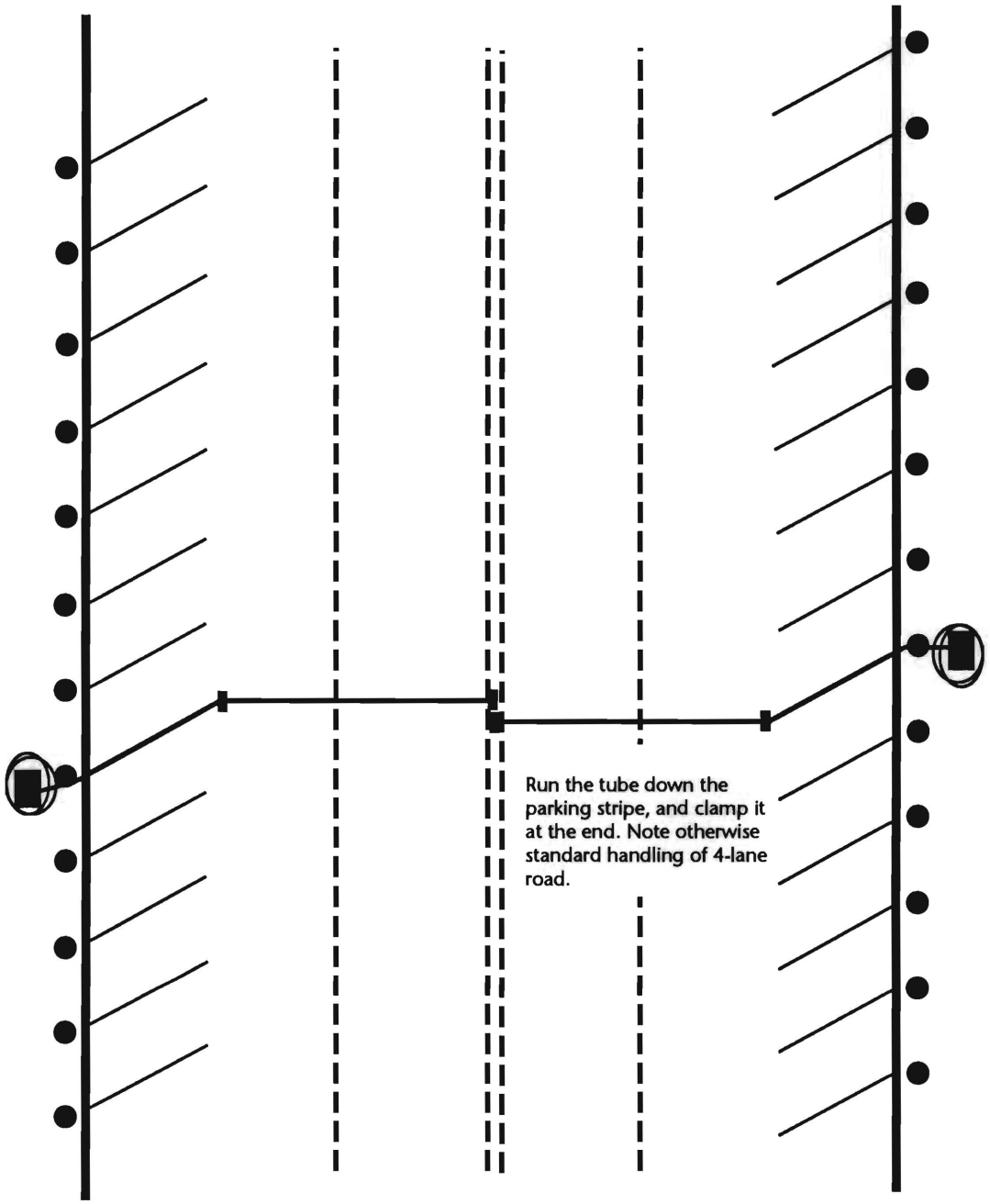


Figure 4-43 Head-in parking, 2 machines

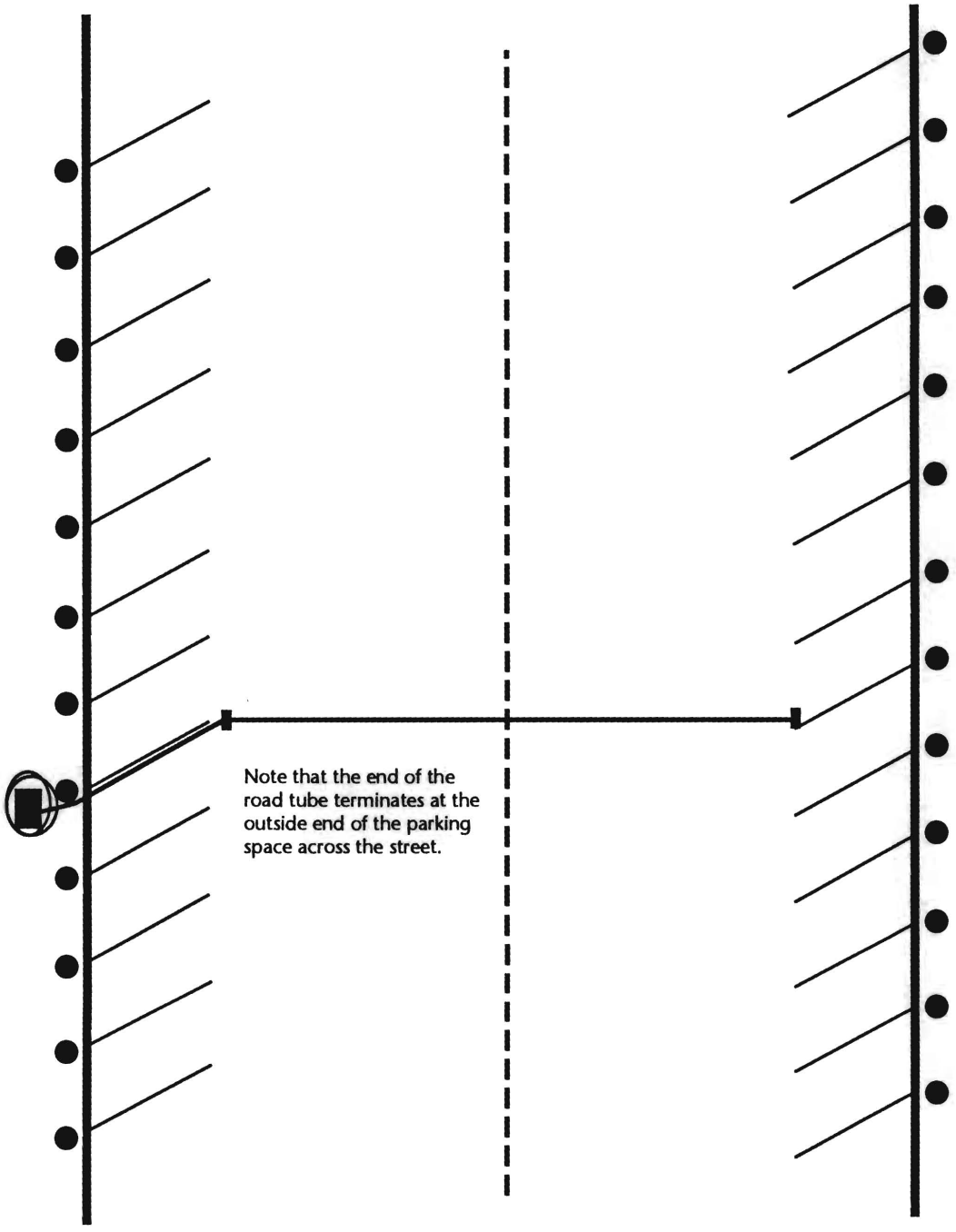


Figure 4-44 Head-in parking, 1 machine

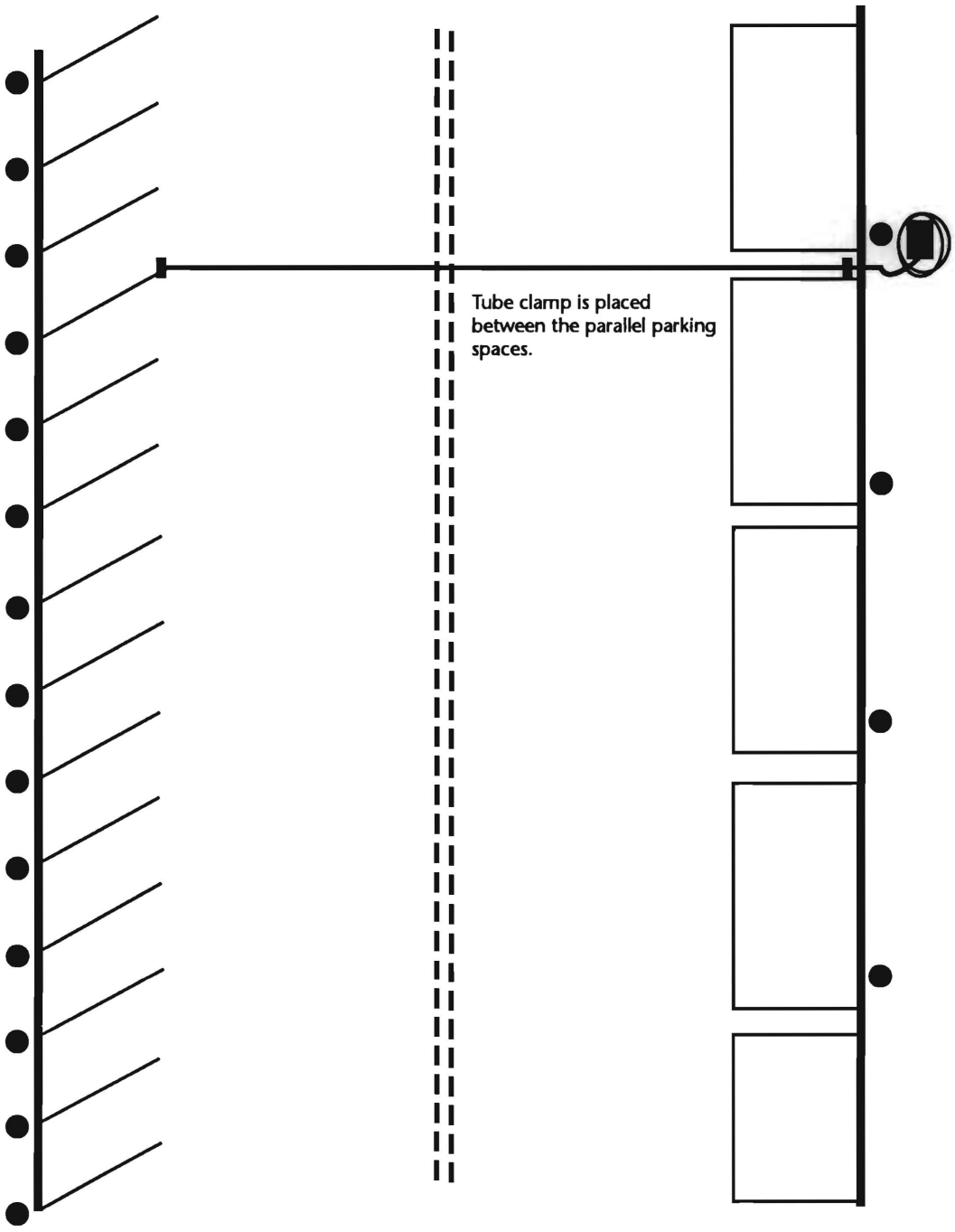


Figure 4-45 Parallel parking

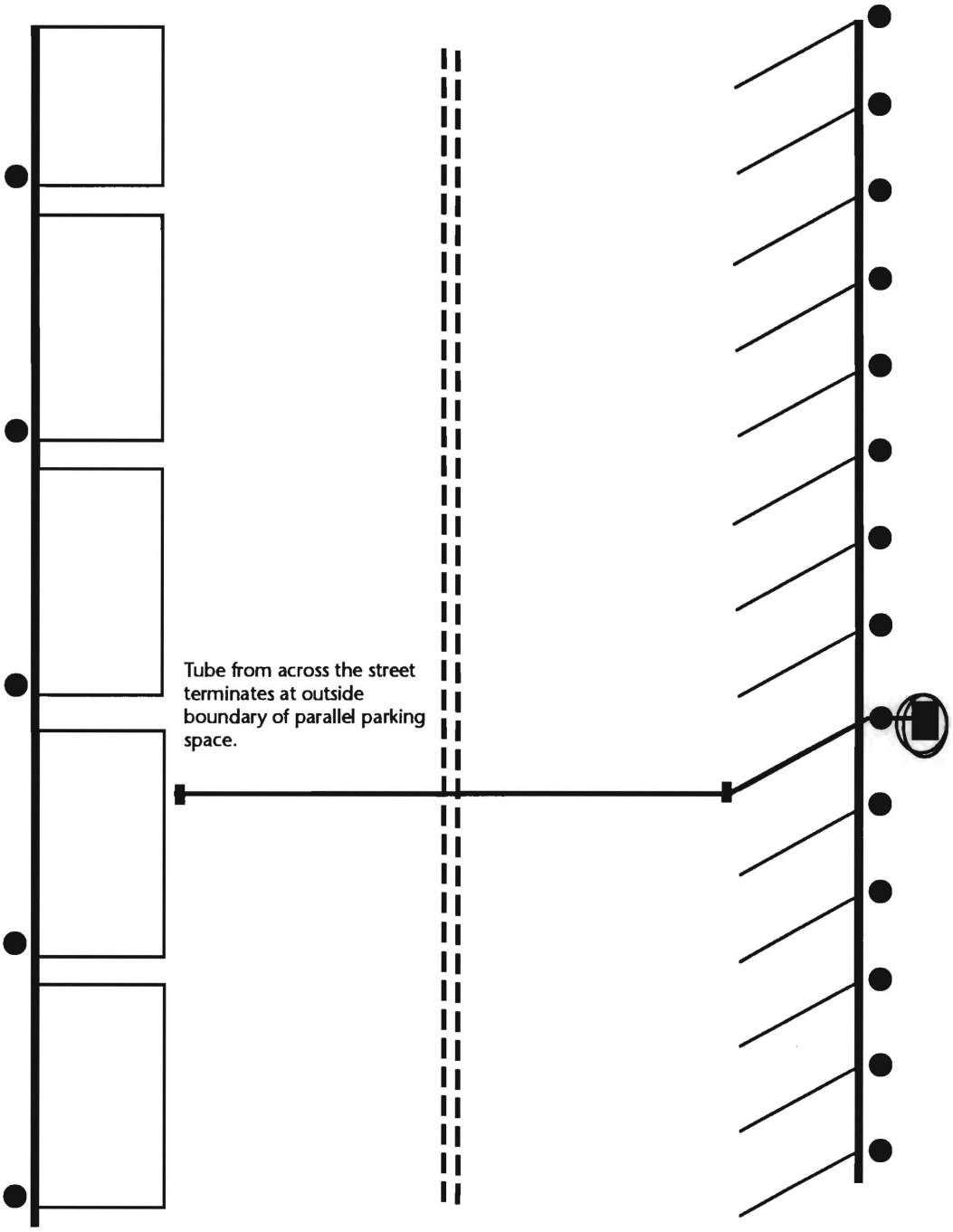


Figure 4-46 Parallel parking

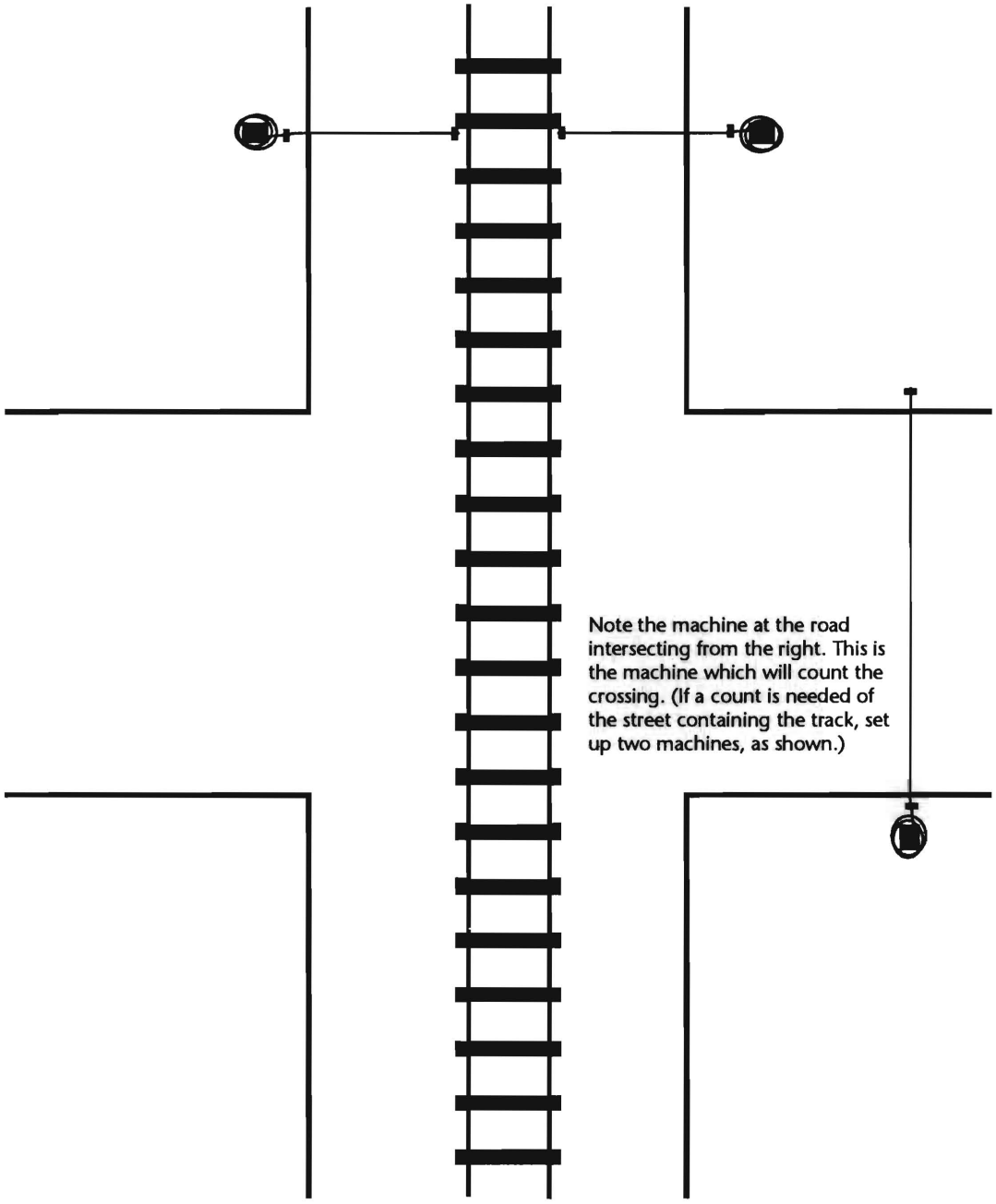


Figure 4-47 Track down middle of street

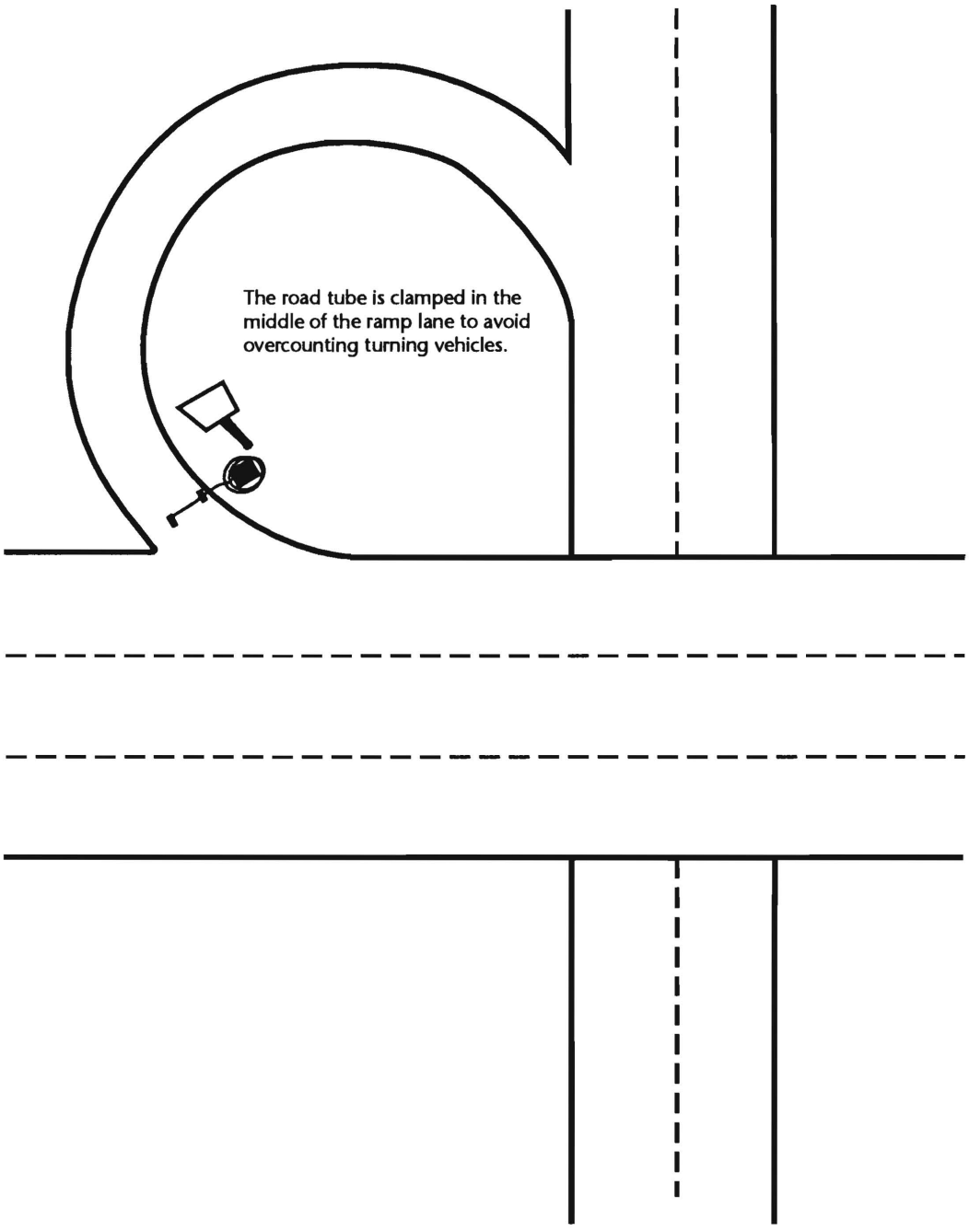


Figure 4-48 Circular ramp

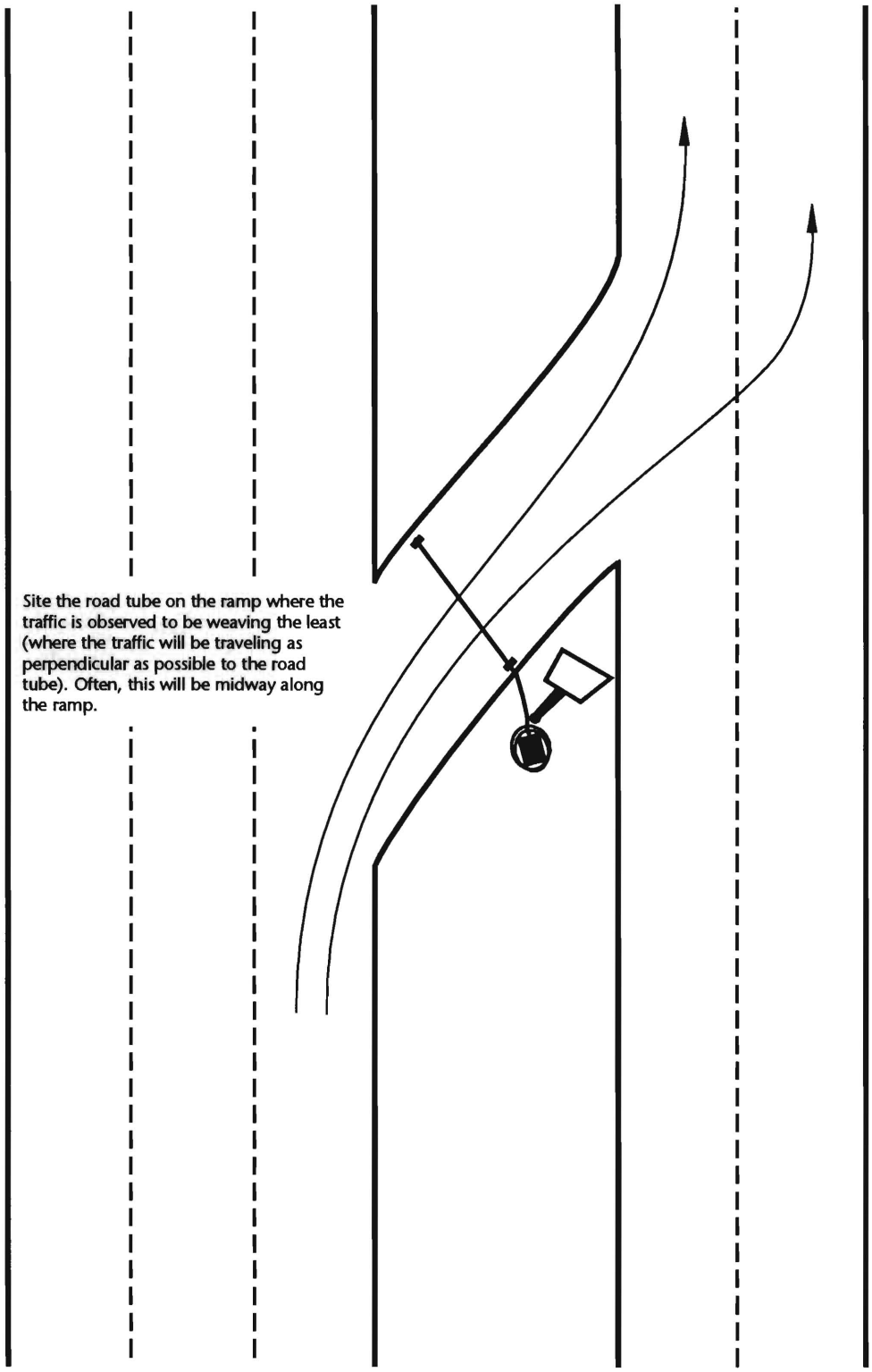


Figure 4-49 Allowing for vehicle weaving

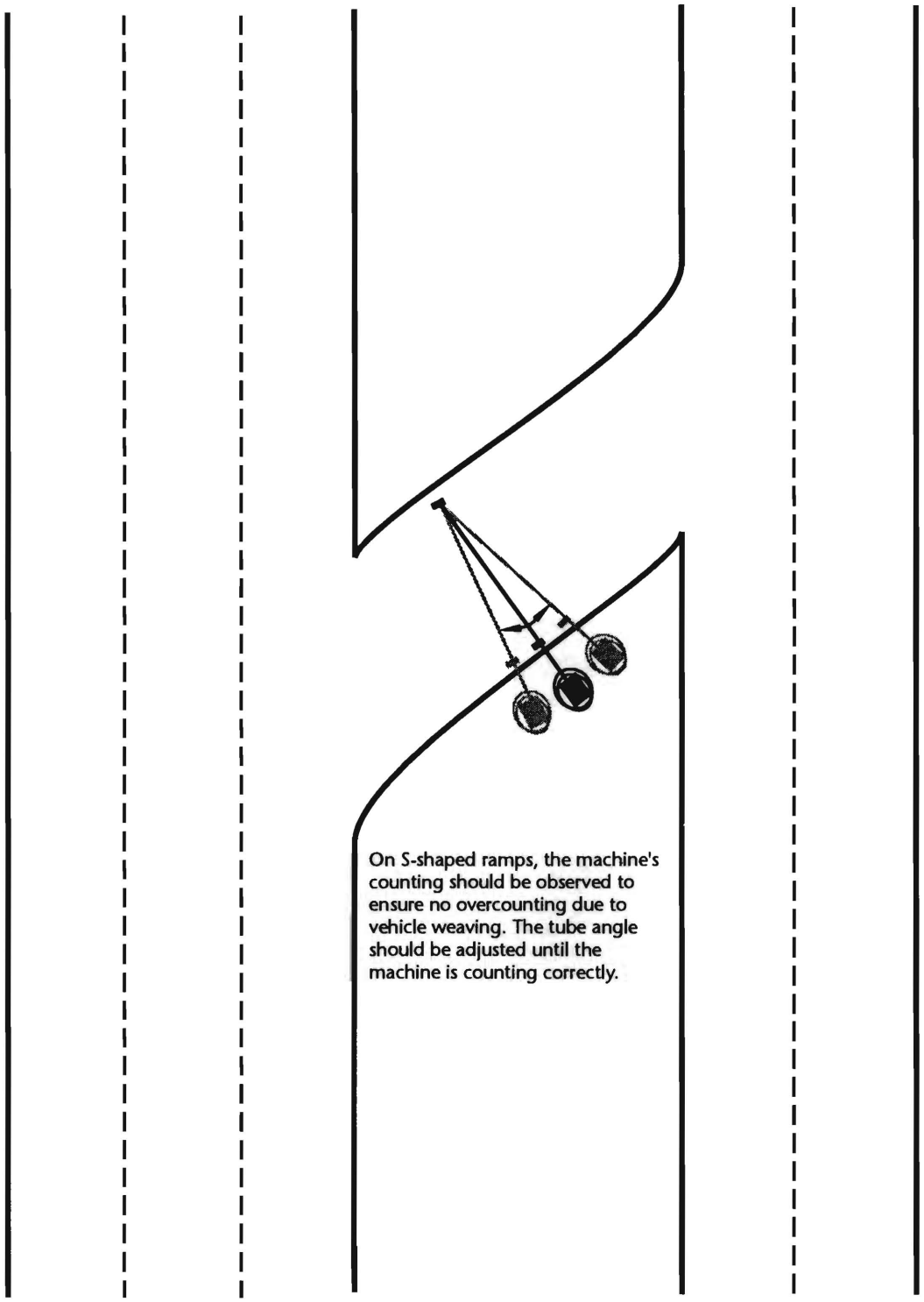


Figure 4-50 S-shaped ramp

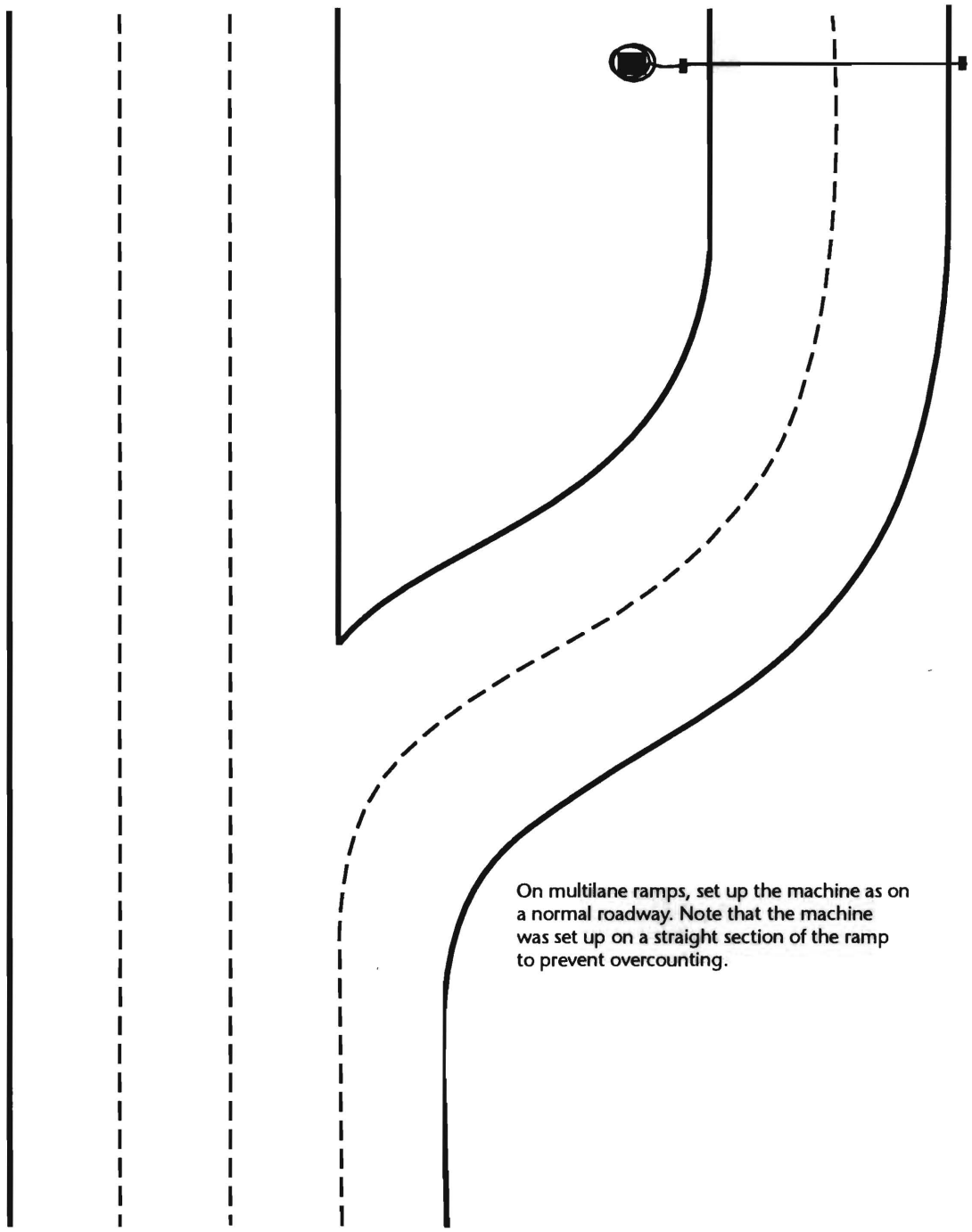


Figure 4-51 Multilane ramp

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