MARICOPA COUNTY
DEPARTMENT
OF
TRANSPORTATION

SURVEYOR'S SAFETY GUIDELINES

December 2011

These guidelines are hereby approved for guidance and usage by Maricopa County Department of Transportation personnel engaged in surveying activities. They are intended to supplement the Maricopa County Public Works Safety Manual and insure the safety of our personnel in the field.

Approved and signature on file 12-19-2011

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PREFACE

These Maricopa County Department of Transportation (MCDOT) Surveyor's Safety Guidelines are a supplement to the *MARICOPA COUNTY PUBLIC WORKS SAFETY MANUAL (July 2010) and it contains material that is informational and instructional, and sets forth guidelines and accepted practices to be used by MCDOT Survey Personnel performing surveying work.

These guidelines are primarily designed for use by MCDOT Survey Personnel to provide uniformity of application countywide. Consultants working for MCDOT Survey are expected to follow these same guidelines.

While these guidelines are written for use by MCDOT Survey Personnel, other agencies may utilize these guidelines as deemed appropriate, however, MCDOT Survey accepts no responsibility, legal or other, for the adequacy of the methods and procedures contained in these guidelines, when used outside of MCDOT.

Revisions and supplements to these guidelines will be issued periodically to all holders of the guidelines.

These guidelines do not establish any legal or administrative interpretations of the Department's Contracts. In the event that the terms of a contract and these guidelines are in conflict, these guidelines are subordinate to the contract.

***All MCDOT Survey Employees have a copy of this Maricopa County PUBLIC WORKS SAFETY MANUAL (July 2010) and have signed their name acknowledging their receiving this document, and responsible for reading it, knowing its contents, and adhering to it.**

1. INTRODUCTION

These MCDOT Survey Safety Guidelines present surveyors' methods and departmental rules that apply to surveying operations of the Maricopa County Department of Transportation.
It shall be the duty of every employee to consider no job so important and no service so urgent that time cannot be taken to work and drive safely.

2. PUBLIC RELATIONS

All MCDOT Survey employees must remember that they are representatives of Maricopa County. It is, therefore, the responsibility of each employee to conduct him/herself in a professional and respectable manner, whether on or off duty.
The ability to leave a favorable impression with all persons we come in contact with is very important. This includes personal appearance. MCDOT survey personnel should maintain their clothing (uniforms are available) and personal grooming.

People are naturally interested in highway work performed within their community, and may often times ask questions of the survey crew. Surveyors should keep in mind that many local agencies and/or private individuals might have an involvement in the project. While these citizens should be treated courteously, their questions should always be referred to the Survey Manager for an explanation. Courtesy, patience, attentive listening, accuracy, truthfulness, and even legal driving practices are all responsibilities of a surveyor when in the public eye. Members of the survey crew should maintain discretion in all conversations with local people.

3. SAFETY

Surveyors work in hazardous environments such as rugged terrain and high-speed traffic using potentially hazardous surveying tools and construction equipment. Working in these conditions requires a constant awareness of the need for safety. Those who have not experienced accidents share the common belief that "It can't happen to me". A meaningful safety program therefore requires that each survey employee is thinking about the following: "It can happen to me."; "What is my responsibility?" and "What can I do to keep it from happening?" No survey operation is to be considered so important or urgent that any safe practice is compromised.
Survey crew signage must be in place before work on the survey begins. The survey crew should watch for any special circumstances which may require additional signing. The Survey Manager may be consulted for any unusual problems. If the traffic causes an extreme hazard for the survey crew, the **Traffic Control Work Zone Team** shall be requested to set up necessary traffic control (see Emergency Phone Contact List, page 32).

Survey operations should be suspended when uncontrollable hazards develop; and work resumed only when safe working conditions have been restored. Personnel must be particularly aware of the need to avoid creating hazards when working on private property.

4. PERSONNEL

SURVEY MANAGER'S RESPONSIBILITIES

It shall be the responsibility of the Survey Manager to carry on the operation under their jurisdiction in such a manner as to provide safe conditions/practices for all employees and the public.
The Survey Manager should provide each new employee with a copy of the Survey Safety Guidelines and allow him/her time to read and study it. Be certain the employee understands the contents. Each employee must understand the need for being responsible for his/her own safety and the safety of others.
The Survey Manager should have all personnel trained in first-aid. The Survey Manager shall monitor and immediately correct safety deficiencies that are seen or reported on job sites. He/she shall insure that adequate safety equipment is stocked and provided to survey personnel.

PARTY CHIEF RESPONSIBILITIES

The Party Chief has the responsibility to implement the department approved work methods and procedures to assure that all work is performed safely.
He/she should:

- See that a copy of the MCDOT Surveyor's Safety Guidelines is always available to members of the crew.
- A copy should be kept in each survey vehicle.
- Give safety a first priority when planning each survey.
- Request enough personnel to allow for safe surveying practices to be followed, including using MCDOT Traffic Work Zone Team.
- Make sure that the crew has the proper safety equipment available for their use.
- Make sure the employees use the equipment as required.
- Not let the employee work if an employee refuses to use the personal protective equipment (PPE). If need be, report him/her to your supervisor.
- Make certain that all equipment and supplies are safe to use. He/she shall make certain that all new employees have been fully trained in the safety issues covered in this manual.

All SURVEY CREW MEMBER'S RESPONSIBILITIES

Every MCDOT employee is responsible for his/her own safety and the safety of his/her co-workers.
During field operations the crew member should:
Wear your specific fitted PPE.

- Report any unsafe conditions or practices to the Party Chief.
- Promptly report all accidents, and personal injuries to his/her supervisor.
- Be alert for hidden hazards.
- Store and secure all equipment and supplies when not in use.
- Return defective and unsafe tools and supplies to the Survey Manager.
- Help in keeping all work areas clean, sanitary and litter free.
- Always face oncoming traffic when working on foot and near or on the traveled way.
- Each surveyor must wear proper footwear that provides protection and firm support for the foot and ankle. Steel toed shoes are required. Soft footwear shoes such as sneakers are not to be worn while at work.

5. PURPOSE AND TYPES OF SURVEYS

Surveys are generally in one of five categories:

1. CONTROL SURVEYS

This type of survey is used to establish horizontal and vertical control for a future construction project. Coordinate systems and elevations are established by many different means, including use of previously established data or data provided by Global Positioning Satellite (GPS) technology.

2. LOCATION SURVEY

This type of survey is necessary to collect all field data that will be used in the design work of a project. The field data that is required to accurately create a digital terrain model (DTM) and topography file (DGN) will be made during this time.

The accuracy of the plans and plan quantities depends upon the precision with which the preliminary survey is conducted. The measurement of coordinates and elevations must be correct and the topographic information must be complete. A good rule to follow while on a location survey is "If in doubt of the necessity for including some item in the notes, secure and record the information." Unnecessary data can easily be disregarded. However, omitted pertinent data is costly to secure at a later time. Prior to submitting the preliminary survey information to the designer, the Survey Party Chief should review all notes and electronic files to determine their accuracy and completeness.

3. CONSTRUCTION SURVEY

The survey work that is necessary to control all phases of the construction falls into this category. Accurate work is necessary as the various portions of the construction are built from information supplied by the survey crew. MCDOT surveyors shall follow the guidelines set forth in Chapter 9 (Construction Staking) of the MCDOT Survey Manual in laying out projects.

During the course of the work, observe the following safety guidelines:

- Be extremely cautious around heavy and fast-moving equipment, especially on haul roads and around equipment with limited driver visibility.
- Do not rely on the operator's visibility, judgment, or ability. Make eye contact with the operator before walking in front of or behind any piece of equipment.

Suspend survey operations when uncontrollable hazards develop. Resume work only when safe working conditions have been restored.

4. POST CONSTRUCTION SURVEY

This work involves the measurement of various project quantities (excavation, etc.), recording of data for use by others (bridge deck elevations, etc.), surveying and staking the highway right-of-way, locating any divergence from design and the reestablishment of property corners.

5. RIGHT OF WAY SURVEY

This involves staking property lines around projects.

NIGHT SURVEY

Hazards are more difficult to neutralize at night. Therefore, surveying shall not be done at night unless reasonable daylight alternatives are not satisfactory. Night surveys can disrupt traffic and arouse the curiosity of local residents.

6. SPECIAL OPERATIONS

SURVEYING NEAR RAILROADS

Railroad operations are not to be interrupted. Observe the following guidelines when working within an operating railroad right of way:

- Always have a written permit to enter railroad right of way. Permit arrangements must be handled well in advance of planned field work.

SURVEYING NEAR RAILROADS-continued

- A railroad provided or approved lookout is required. A railroad flagman may be required.
- Whenever possible, use reflectorless instruments or remote sensing equipment, such as laser scanning, to survey the railroad tracks.
- Orange is the **only** approved color for high visibility apparel within railroad right of way. Never wear red within a railroad right of way.
- Although you have a lookout, always be alert around railroads. Railroad equipment may not be heard, especially on noisy work sites, or at railroad quiet zones.
- All crew members must be familiar with the safety provisions of the permit to enter railroad right of way, and abide by the requirements and procedures. Railroad company specific training may be required.

  Basic rules to follow include the following:
- Do not crawl under stopped railroad cars or over couplings, and do not cross railroad tracks between closely-spaced cars. They might be bumped at any time.
- Do not leave protruding stakes or any holes within 10 feet of the railroad tracks.
- Do not park vehicles within 25 feet of the railroad tracks.
- Do not tape across railroad tracks.
- Do not leave instruments or other equipment unattended, on or near railroad tracks.

7. GENERAL SAFETY REQUIREMENTS

SAFE DRIVING PRACTICES

Employees are not exempt from traffic laws. Employees operating vehicles and mobile equipment shall obey all State and Local Traffic Laws and Department Policies, Rules and Regulations. Employees are personally responsible for any traffic violations.

The number of employees permitted to ride in a car, truck or mobile equipment shall not exceed the seat space and seat belts as provided by the manufacturer. Safety seat belts installed in vehicles and mobile equipment shall be used by the operator and passengers while the vehicle or mobile equipment is in use. The operator shall not place the vehicle in motion until all occupants have properly secured their safety belts. Seat belt usage is an Arizona State law.

It is the operator's responsibility to report all vehicle and equipment malfunctions and defective parts to the Survey Manager.

The operator should always signal a turning movement or a lane change.

SAFE DRIVING PRACTICES-continued

When it is necessary to stop a survey vehicle at locations where traffic does not normally stop, the operator shall give warning to following vehicles by flashing the vehicle warning/beacon lights.

PERSONAL PROTECTIVE EQUIPMENT

See Maricopa County PUBLIC WORKS SAFETY MANUAL (July 2010)
Section III Part B. page 12

SAFE SURVEYING PRACTICES

Working on or near a pavement open to traffic requires the placement of advance warning signs and traffic control devices. Survey crews exposed to traffic hazards that cannot be addressed with existing traffic control plans (see MCDOT Survey Traffic Control Section 10), should discuss with the MCDOT Survey Manager or MCDOT Traffic Control Plan Representative for special traffic and road conditions.

Surveying and measurements in the vicinity of power lines should be made with clean, dry, non-conductive instruments and non-metallic cloth tapes.

In snake-infested areas the survey crew should be familiar with the first aid treatment of snake bites and during survey planning determine the nearest medical facility where antivenin is available. Snake chaps and guards are available for use if required.

INDIVIDUAL SAFETY

The safety of a surveyor often rests on that employee's own shoulders. Whenever feasible, each employee must obey the basic rule of facing traffic at all times. However, when working around traffic this is not always possible for surveyors.
If a surveyor cannot work facing traffic, the procedure should be changed or the order of work revised. The exposed surveyor should be provided with a "lookout" who will serve as eyes for the vulnerable surveyor.

ACCIDENT REPORTING

All accidents occurring in the course of employment involving survey personnel and/or equipment shall be reported as soon as possible to the Survey Manager and/or Party Chief to which the employee is assigned. Reference PW manual about reporting to the Safety Office.

TRUCK USE AND HANDLING

One traffic cone should be placed behind your truck when you are stopped/parked and out of the truck.

TRUCK USE AND HANDLING-continued

Personnel riding on the outside of equipment is prohibited.
To prevent backing accidents:

- Select parking locations to eliminate backing maneuvers.
- Avoid long backing movements.
- Operators shall not operate vehicles or mobile equipment in reverse unless they are certain the backing movement can be made safely. When vision to the rear is limited and a fellow employee is available, that employee shall be utilized by the operator to assist with the backing movement. The person assisting the operator shall take a position outside the vehicle so as not to be exposed to oncoming traffic or the backing vehicle.
- If help is not available, the operator shall go to the rear of the vehicle and visually check the area behind the vehicle before operating the vehicle in a backward movement.
- When travelling in traffic, do not operate the vehicle at such a slow rate of speed as to cause an accumulation of other vehicles behind. If a slow rate of speed is unavoidable, occasionally pull off the road and wait in order that traffic may clear.
- Do not stand on or within two feet of an open traffic lane to talk with the driver of a vehicle parked on the road shoulder. Have the driver pull off the road to talk.
- A truck may be operated with the tailgate in the open position only when necessary.
- All vehicles, equipment, surveyors and their activities are restricted at all times to one side of the pavement unless otherwise authorized. Avoid stopping on the shoulder to cross the roadway from another vehicle and/or operation.
- Select parking locations for survey vehicles and equipment that will not block traffic signs and signals.
- All trucks shall have the proper lights and reflectors, in accordance with Maricopa County Regulations and Department Policy.

EMERGENCY FLASHING LIGHTS

These instructions are not intended to cover all possible criteria for using "strobe" warning lights or emergency flashing lights. Field personnel have the leeway to use good judgment for their own protection as well as that of the public.

DAYTIME USE

Strobe warning lights on vehicles so equipped must be used during the following operations:

- When performing slow moving operations the strobe light shall be used.
- When temporarily stopped on roadway surface or shoulder during an emergency operation.

DAYTIME USE-continued

- When a vehicle is parked in the median without any lane closure. This should be for short periods only.
- When a vehicle is parked on the right shoulder and work is being performed in the immediate vicinity of the vehicle. In this case, "immediate vicinity" means in such a location as to expose the worker(s) to traffic. Under certain conditions it might be necessary to establish a shoulder closure.
- When a vehicle is slowing in preparation to move onto the shoulder, into the median, into a lane closure, or it is accelerating to move from the shoulder, median or lane closure into traffic.
- When other highway conditions exist which, in the operators' opinion, warrant use of amber warning lights to protect surveyors and/or the public.

Emergency flashing lights shall be used:

- When the vehicle is parked on the right shoulder during periods of restricted visibility; for example, at night.
- When the vehicle is parked within an established lane closure.
- When the vehicle is moving within an established lane closure.

NIGHT TIME USE

- Surveyors seldom work at night. However, survey personnel might be required to work at night or early morning prior to dawn on certain occasions. Those employees should be aware of these guidelines. Surveyors should also use MCDOT Traffic Control when applicable.
- Survey at night - Type 3 apparel required (vest and pants) in order to show full range of movement. Signs shall include flashers. Traffic cones cannot be used during nighttime conditions. Work area shall be lighted while minimizing the glare on motorists.

Emergency flashing lights shall be used:

- While driving in a closed lane.
- While temporarily parked in a closed lane.

During scheduled Survey work operations, the Survey truck with amber strobe warning light should be used to alert motorists and create a safety barrier for Survey personnel. The amber strobe warning light should be turned off when work is not taking place.

Amber strobe warning lights shall be used:

- While driving in a closed lane.
- While temporarily parked in a closed lane.

When not to use amber strobe warning lights:

- When exposure to accident to the employee or to motorists does not exist.
- When the vehicle is traveling at normal highway speeds.

NIGHT TIME USE-continued

- As a substitute for moving the vehicle to a safe position where use of amber warning lights would not be required.

For survey work in an intersection, stationary lane closures, and/or additional survey traffic control assistance, the MCDOT Operations Traffic Work Zone will be requested to supply Survey traffic control. See attached request form on page 31 and survey traffic control plan typical's.

8. FIRST AID

See Maricopa County PUBLIC WORKS SAFETY MANUAL (July 2010)
Section XIII Page 37

The following are basic requirements that must be met to ensure adequate response to a situation requiring the use of first aid.

- All survey field personnel shall be trained every two or three years in first aid.
- Each survey vehicle shall be equipped with a first aid kit with a current inventory list.

HEAT HAZARDS

See Maricopa County PUBLIC WORKS SAFETY MANUAL (July 2010)
Section V Page 18

The following are excerpts from the Public Works Safety Manual (page 18);

"…There are times when heat stress on those working outdoors could result in heat related illnesses. There are three kinds of major heat-related disorders-heat cramps, heat exhaustion and heat stroke.
Employees in areas at risk of being affected by heat stress are those employees engaged in manual labor tasks while working outdoors in non-climate controlled environments…"

The crew shall be responsible for filling water cans;

Carry 2 gallons of usable water for personal use, refreshing the water daily.

Carry an additional 2 gallons of rescue water for single person crew and 5 gallons of rescue water for regular crew.

When all drinking water is consumed except the rescue water, stop work and replenish the drinking water.

ANIMAL HAZARDS

Precautions Concerning Snakes

The following precautions should be taken when working in rattlesnake habitat:

- Always assume snakes are active.
- Do not work alone in remote snake habitat.
- Avoid stepping over logs and large rocks into unseen areas. The safest policy is to walk around such obstacles. If this is not possible, first step on top of the object, then look at the back side of the obstacle before stepping down.
- Never place your hands where you can't see them.
- Do not jump down from overhangs onto areas where snakes might be hidden from view.
- Never climb vertical or near vertical faces using unseen handholds above your head.
- Do not attempt to capture or kill snakes.
- When necessary to move low-lying logs, large rocks, and boards, use a pry bar, not your hands.
- Double your precautions at night, especially in warm weather.
- When possible, maintain radio contact with isolated employees.
- Know and discuss with your crew the location of the nearest medical facility where anti-venom is available and the quickest route there.

FIRST AID TREATMENT FOR SNAKE BITES

Symptoms indicating that venom has been injected are immediate severe pain, swelling, and discoloration. Look for the symptoms and follow these procedures:

- Identify the snake, but do not take the time to kill it. The fang marks, rattles, and marking and coloration of the snake should be sufficient for identification.
- Immobilize and reassure the victim. Keep the bite below the level of the heart, if possible.
- Thoroughly cleanse the wound with antiseptic if possible.
- If possible, carry the victim to a vehicle, then drive him/her to a medical facility where anti-venom is available for injection.

PRECAUTIONS CONCERNING INSECTS

Some persons are highly allergic to insect stings. Symptoms of a severe allergic reaction (anaphylactic shock) are: difficulty breathing; swollen lips, throat, and tongue; flushed, blotchy skin; and lowered level of responsiveness. It is recommended that employees who know they are susceptible to such reactions should inform supervisor and co-workers of their condition and the appropriate treatments.

If attacked by bees…

- Quickly get in to an enclosure, like your truck or a house. Close any doors or windows.
- Do not jump into a pool. The bees will wait for you to surface for air to attack you.
- If you are attacked by bees, run away. Don't play dead or swat at the bees. Most people can outrun the bees, but you might have to run a few blocks.
- Protect your face to prevent stings to the eyes, nose and in the mouth. Bees attack where carbon dioxide is expelled. Facial stings are much more dangerous than stings to the body. Pull your shirt over your head if no other protection is available.

9. SPECIAL WORK ACTIVITIES

PRESSURIZED SPRAY CANS

Serious injuries and costly cleanup may result from improper handling of pressurized spray cans. Observe the following rules when using spray cans:

- Do not puncture or incinerate.
- Store at temperatures lower than 120° F.
- Do not carry in vehicle passenger compartments.
- Do not discard any spray can in a receptacle that is normally accessible to children.

POWER LINES

Regard all power lines as dangerous. Be particularly careful when using 25 foot, aluminum or fiberglass rods.

RADIO TRANSMITTERS

Mobile radio transmissions can set off explosive charges. If you are near blasting operations, always check with the blasting supervisor before transmitting.

HAZARDOUS MATERIALS

A hazardous material is any substance that is a physical or health hazard. Materials that are physical hazards include combustible liquids, compressed gases, explosives, etc. Materials that are health hazards are substances for which there is scientific evidence that acute or chronic health effects may occur in exposed employees.

HAZARDOUS MATERIAL SPILLS

When an employee encounters a spill or a quantity of an unknown material or substance on or near a highway, the employee should:

- During regular working hours, call 61 OFFICE, or other emergency number including 9-1-1.
- Stay clear if possible, and avoid contact with the unidentified material.
- Provide traffic control for protection if necessary.

If an unknown material is encountered on a job site, work should be stopped and the Survey Manager should be notified. The Survey Manager shall request the County Safety Office to determine if the job site is safe before work is continued. If you determine that your personal safety may be in jeopardy, leave the immediate area, and telephone the appropriate authorities from another location. Do not leave the general area without notifying the proper authorities.

LEAD CONTAMINATED SOILS

Recent testing of soils along some urban freeways has revealed lead levels that are not hazardous. Even in the face of these tests, because lead enters the body through ingestion or inhalation, it is prudent to observe the following safe practices:

- Avoid working in dusty work conditions without a proper mask.
- Prevent soil ingestion by not eating, drinking, or smoking near work operations. Wash hands and face before eating, drinking or smoking. Clean hands, clothing, and shoes before entering vehicles or buildings. Store food and water so it will not be exposed to dust.

10. MCDOT SURVEY TRAFFIC CONTROL

General Procedures

All survey traffic control shall comply with the 2009 Manual on Uniform Traffic Control Devices (MUTCD) for Street and Highways as a minimum. All other survey traffic control considerations stated within this document further specifies MCDOT survey policies and procedures adjacent any roadway (survey work on or within 25’ of the edge of a roadway).

Duration of Control Usage

Temporary control devices shall not be in place and functional any longer than necessary.

Purpose

Temporary traffic controls are used to establish a "working area-of-protection" for employees.

DEFINITIONS

Temporary Traffic Control
An area of a highway where road user conditions are changed because of a work zone or incident by the use of temporary traffic control devices, flaggers, uniformed law enforcement officers, or other authorized personnel.

Low Volume
Up to 400 vehicles per day/average daily traffic count.

High Volume
Greater than 400 vehicles per day/average daily traffic count.

Low Speed
Less than 40 miles per hour.

High Speed
40 miles per hour or greater.

Rural Highway
A type of roadway normally characterized by lower traffic volumes, higher speeds, fewer turning conflicts, and less conflict with pedestrians.

Urban Street
A type of street normally characterized by relatively low speeds, wide ranges of traffic volumes, narrower lanes, frequent intersections and driveways, significant pedestrian traffic, and more businesses and houses.

Work Duration
Work duration is a major factor in determining the number and types of devices used in Temporary Traffic Control (TTC) zones. The duration of the TTC zone is defined relative to the length of time a work operation occupies a spot location. Short Duration means work that occupies a location up to one hour.

TRAFFIC CONTROL PLANNING

When planning a survey project that requires temporary traffic control, be sure to use surveying methods that minimize exposure to traffic hazards. The Survey Party Chief should consider the following factors that will affect traffic hazards, plan and implement temporary traffic controls to minimize the hazards. Some factors to consider are:

- Preliminary traffic control requirement.
- Posted speed limit/prevailing traffic speed.
- Roadway surface condition – wet, loose dirt, etc.
- Traffic volume(s).
- Peak traffic hours.
- Motorists' sight distance.
- Pedestrians.
- Special conditions – special events, school, or business traffic flow.

TRAFFIC CONTROL PERSONAL PROTECTIVE EQUIPMENT

See Maricopa County PUBLIC WORKS SAFETY MANUAL (July 2010)

Survey employees performing traffic control will wear all required personal protective equipment (Class 2 orange safety vest for daytime work only, hardhat, safety toe shoes and eye protection).

TRAFFIC CONTROL SIGNS AND DEVICES

Advance warning signs (SURVEY CREW AHEAD/sign code W21-6 – minimum 36" x 36" black text on retro-reflective orange background) shall be in place completely out of the traffic lane in both directions before survey work begins. Advance warning signs shall not exceed one-half (½) mile from where the survey crew is working. The advance warning sign spacing will be consistent with MUTCD Table 6C-1 found on Page 554. Advance warning signs should be placed at a minimum of 200' away from any existing permanent or temporary signs (when possible). The survey crew should watch for any special circumstances, which may require additional signing. The Survey Manager and the Traffic Control Plan Representative may be consulted for any unusual problems. The advance warning signs shall be removed when survey employees are not present along roadway.
On rural highways the signs should be placed on the shoulder from 2 feet to 10 feet outside the traveled lane. On urban streets the sign should be placed at least 2 feet behind the back of the curb and not on any sidewalk and be readily visible by the motorist. In the case of divided highways, supplementary signs should be placed on the Median for observation by motorist in the inner lane. In all cases, signs mounted on portable stands shall be no less than 12 inches above the travel way.

When two-way traffic is involved, signs should be provided for traffic from both directions. To be effective, the signs should be placed not closer to the survey area than 500 feet for traffic speeds up to 45 miles per hour. If signs are placed too far in advance, their warning value may be lost. When surveying in rural locations, the signs should be moved ahead when the survey work area moves.

TRAFFIC CONES

Each survey crew should have six 28" cones. They should be used in addition to the advance warning signs. They should be arranged to define the survey area and safely divert traffic around the work zone. The cones may be used to supplement advance warning signs.

STATIONARY LANE CLOSURES

Today's surveying equipment and techniques usually make lane closures unnecessary.

Use these guidelines if closures are considered.

A lane closure needs to be approved by the Survey Manager.

If possible only "take" the required free space needed to perform the survey but do not reduce the lane's width to less than 10 feet between the cones and the edge of the adjacent lane.

Surveys that require lane closures should be performed in full daylight, and during off peak hours.

For typical sign and cone installation for lane closures, space cones at approximately 25 foot intervals at any stationary work site, such as an instrument set-up, to round off the traffic channel and to clearly define the work area.

WORKING WITHIN PRE-EXISTING TRAFFIC CONTROL SET-UP

The Party Chief shall verify adequate pre-existing traffic control is in place prior to performing survey work. Then, the Party Chief shall request permission daily to work inside the pre-existing traffic control and verify it will be in place to meet the Survey Crew's schedule for the day.

OTHER SURVEY TRAFFIC CONTROL CONSIDERATIONS

- The protection of employees and the public shall be the primary consideration when temporary traffic control measures are used.
- All reasonable measures shall be used to preclude interference with vehicular movement. Lane closures shall not be considered until all other alternatives have been exhausted. Surveyors should move deliberately and not make sudden movements that might confuse a motorist and cause an accident.
- Actual time on the traveled portion of the roadway should be kept to a minimum.
- The Surveyor shall enter onto the pavement only during appropriate gaps in the traffic.
- Minimize crossing traffic lanes and never attempt to run across traffic lanes.

OTHER SURVEY TRAFFIC CONTROL CONSIDERATIONS-continued

- Minimize working near moving traffic, especially on high-speed roads, when the motorists' attention may be distracted by other ongoing activities, such as vehicular accidents, maintenance activities, and construction operations; or distracting objects on or along the highway.
- On heavily traveled roads and when possible, survey work should be scheduled only during off-peak hours (Peak Hours: 0600-0830 & 1600-1800).
- Offset survey procedures should be used whenever appropriate.
- When possible, work on the same side of the road as the vehicle.
- Surveyors shall have a planned escape route.
- In the case of divided highways, supplementary signs should be placed on the median for observation by motorist in both lanes. In all cases, signs mounted on portable stands shall be no less than 12 inches above the travel way.
- It is the Survey Party Chief's responsibility to insure the survey traffic control equipment is in good and legible condition. The Party Chief shall request new equipment when necessary.
- The Survey Party Chief is responsible for inspecting and monitoring traffic control set by surveyors or others. If controls are inadequate or conditions change, survey activities shall be halted until a safe condition is established.
- Except for special surveys or because of lack of reasonable daylight alternatives, surveys on or adjacent to roads shall be done only during full daylight hours.
- The MCDOT Traffic Work Zone Team should always be contacted for assistance when needed. Surveyors shall face traffic whenever possible. Survey at night - Type 3 apparel required (vest and pants) in order to show full range of movement. Signs shall include flashers. Traffic cones cannot be used during nighttime conditions. Work area shall be lighted while minimizing the glare on motorists.
- For surveying along Centerline of Road with Low Volume Traffic Volumes, MUTCD Typical Application (SRVY #9) flagger operations shall be used.

11. SURVEYING NEAR TRAFFIC

REQUIRED "FREE SPACE"

Maintain at least six feet of space between moving traffic and your work area. This includes work on shoulders as well as on the traveled way. Survey at the maximum space possible between moving traffic and your work area. Any surveying that requires working within six feet of moving traffic must be approved by the Party Chief or the Survey Manager.

SHORT TERM ENCROACHMENTS ON PAVEMENT WITH ADEQUATE SITE DISTANCE

Short term encroachments on the pavement may be performed, provided all vehicles are completely off the traveled lanes and as far off the edge of the pavement as practical. You may use the truck to alert motorists when the following conditions are met:

- Each task must be performed with extreme care.
- The amount of time the surveyor is on the pavement shall be minimized.

TRAFFIC CONTROL PROTECTIVE VEHICLES

Protective vehicles can be especially important at sites, such as instrument set-ups, where surveyors might be located for an extended period of time. There are two types of protective vehicles:

BARRIER VEHICLE

A vehicle, usually unoccupied, which is parked between the oncoming traffic and a stationary work site.

SHADOW VEHICLE

A vehicle equipped with appropriate lights and warning signs which follow a Survey operation and/or other roadway/shoulder operation moving in the direction of traffic, generally 100' to 300' behind the operation and designed to protect surveyors from impacts by errant vehicles. A truck-mounted attenuator may be used on the shadow vehicle.

Shadow vehicles are used to warn motor vehicle traffic of the operation ahead.

The distance between work and shadow vehicles may vary according to terrain, visibility and other factors.

The spacing between the work vehicle and the shadow vehicle should be minimized to deter road users from driving in between.

Where practical, and when needed, the work and shadow vehicles should pull over periodically to allow vehicular traffic to pass.

Signs shall be covered, removed or turned from view when work is not in progress.

Shadow and work vehicles shall display high-intensity rotating, flashing, oscillating, or strobe lights. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.

If an arrow board is used on a two-lane roadway it shall be used in 'CAUTION' mode. On multiple lane roadways arrow boards shall as a minimum, be type B, with a size of 60x30 inches.

The arrow mode on the arrow board shall not be used on the roadway shoulder.

Vehicles used for these operations should be made highly visible with appropriate equipment such as flags, signs or arrow boards.

LOOKOUTS

Surveyors should normally be protected by barrier vehicles, guardrail, or other physical means. Where the absence of such physical protection exposes surveyors on foot to errant vehicles, a person shall be assigned as a lookout. A lookout is an employee whose "only" duty is to provide immediate warning to co-workers of vehicles or equipment that have become imminent hazards to their safety. The lookout shall not attempt in any way to direct traffic. A lookout is used only to warn survey personnel of impending traffic hazards, not direct or control it.

Lookouts must be in constant communication with the employee under their protection. If trouble is suspected, the lookout shall warn the workers by yelling, using a vehicle or warning horn or any system capable of communicating the warning message. This warning is intended to give workers the time to use a planned escape route to avoid the errant vehicle.

Whenever possible, lookouts should be stationed in the immediate vicinity of those they are protecting. In some cases, more than one lookout may be necessary. When it appears that a vehicle or some equipment has become a threat to personnel, the lookout will immediately and repeatedly use the word "scramble".

The Survey Manager shall assign adequate personnel to survey crews to meet special safety needs, such as flaggers or lookouts.

Lookouts are required when all of the following conditions exist:

- Work occurs on a roadway with a posted speed of 55 mph or more.
- Surveyors are without physical protection (barrier vehicle, k-rail, natural or man-made terrain features, etc.).

Lookouts should be considered whenever:

- Working without traffic control on streets and highways.
- Working within 25 feet of the centerline of an actively-used railroad track outside of a railroad right of way. A railroad flagger is usually required during railroad construction.
- Where there is conflicting or multiple vehicular and equipment movements.
- In areas with restricted sight distances.

12. MCDOT Survey Traffic Control Plans

The following pages have been specially designed Traffic Control Plans for MCDOT Surveyors that are to be used as needed to assist in your daily planning when these special needs arise.

The MCDOT Traffic Work Zone Team should always be contacted for assistance when needed.

TABLES

The Tables that are shown below are to be used as areference with TCP's #4-7-8 & 9.

If a longitudinal buffer space is used, the values shown in Table 6C-2 may be used to deteremine the length of the longitudinal buffer space.

Table 6C-2. Stopping Sight Distance as a Function of Speed

Speed*	Distance
20 mph	115 feet
25 mph	155 feet
30 mph	200 feet
35 mph	250 feet
40 mph	305 feet
45 mph	360 feet
50 mph	425 feet
55 mph	495 feet
60 mph	570 feet
65 mph	645 feet
70 mph	730 feet
75 mph	820 feet

* Posted speed, off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed

Table 6H-3. Meaning of Letter Codes on Typical Application Diagrams

Road Type	Distance Between Signs**		
	A	B	C
Urban (low speed)*	100 feet	100 feet	100 feet
Urban (high speed)*	350 feet	350 feet	350 feet
Rural	500 feet	500 feet	500 feet
Expressway / Freeway	1,000 feet	1,500 feet	2,640 feet

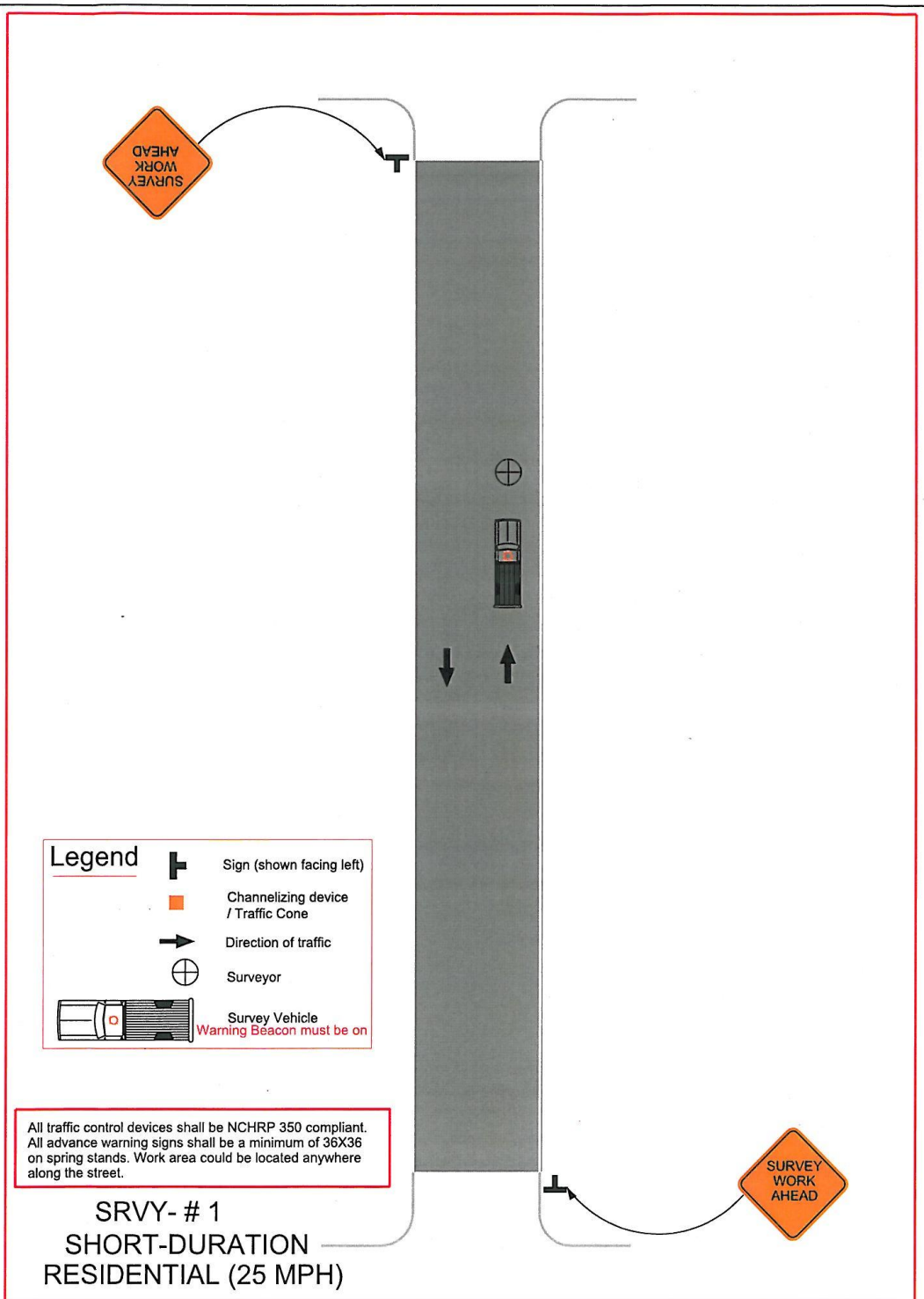
* Speed category to be determined by highway agency

** The column headings A, B, and C are the dimensions shown in Figures 6H-1 through 6H-46. The A dimension is the distance from the transition or point of restriction to the first sign. The B dimension is the distance between the first and second signs. The C dimension is the distance between the second and third signs. (The "first sign" is the sign in a three-sign series that is closest to the TTC zone. The "third sign" is the sign that is furthest upstream from the TTC zone.)

Table 6H-4. Formulas for Determining Taper Length

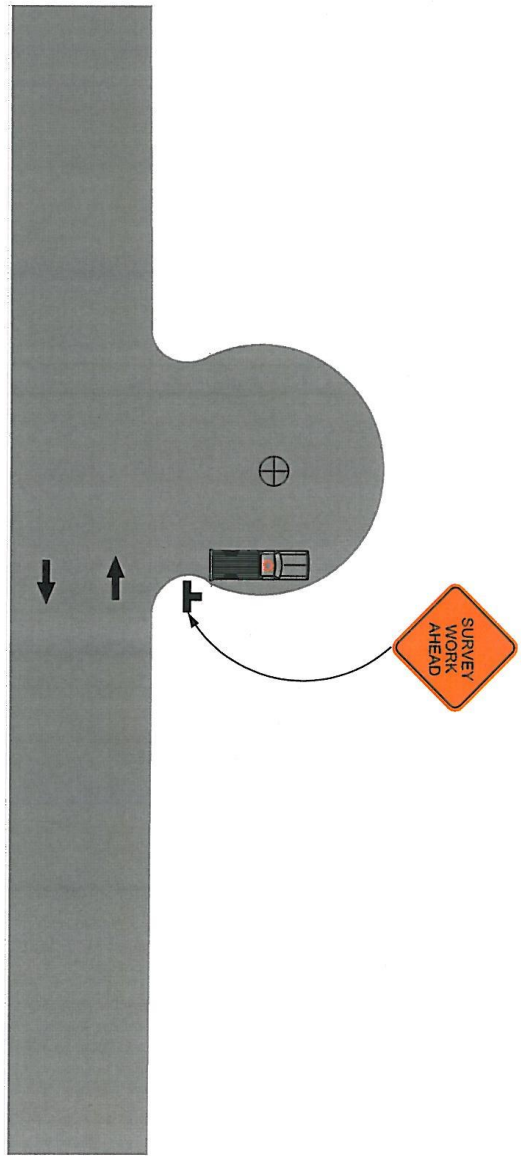
Speed (S)	Taper Length (L) in feet
40 mph or less	$L = \frac{WS^2}{60}$
45 mph or more	$L = WS$

Where: L = taper length in feet
W = width of offset in feet
S = posted speed limit, or off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in mph



STANDARD DETAIL MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION	Residential Street

Traffic Control Plans.Dgn 11/29/2011 6:30:44 AM



Legend

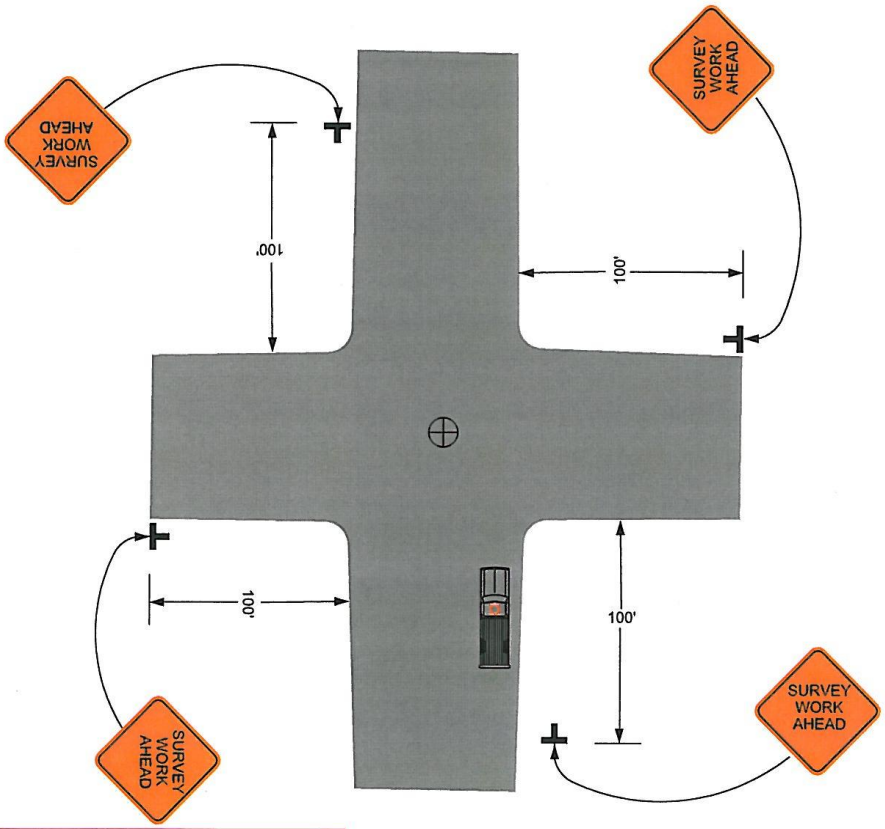
- Sign (shown facing left)
- Channelizing device / Traffic Cone
- Direction of traffic
- Surveyor
- Survey Vehicle Warning Beacon must be on

All traffic control devices shall be NCHRP 350 compliant. All advance warning signs shall be a minimum of 36X36 on spring stands. Work area could be located anywhere along the street.

SRVY- # 2
SHORT-DURATION
RESIDENTIAL (25 MPH)

STANDARD DETAIL MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION	Residential Street Cul-de-Sac

Traffic Control Plans.Dgn 11/29/2011 6:31:26 AM



Legend

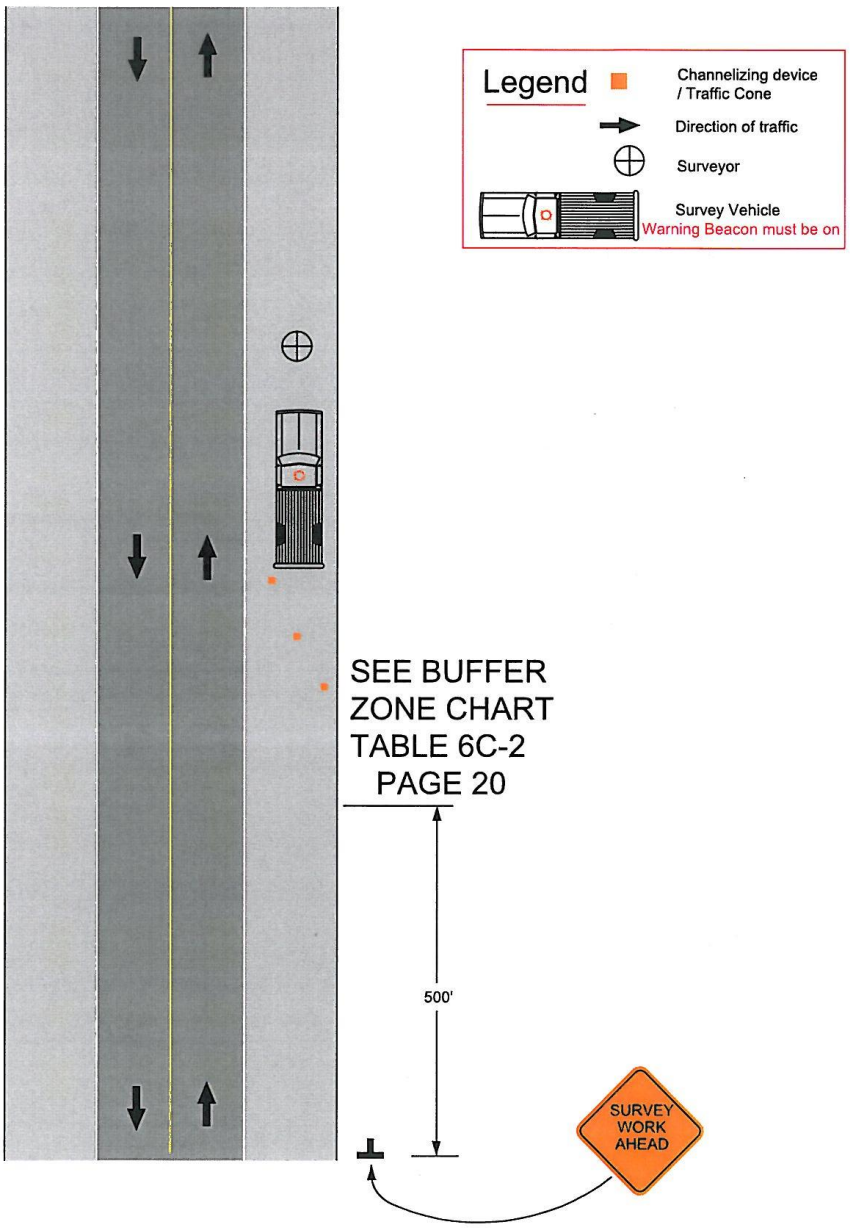
- Channelizing device / Traffic Cone
- Direction of traffic
- Sign (shown facing left)
- Surveyor
- Survey Vehicle
  Warning Beacon must be on

All traffic control devices shall be NCHRP 350 compliant.
All advance warning signs shall be a minimum of 36X36 on spring stands.

SRVY- # 3
SHORT-DURATION
RESIDENTIAL (25 MPH)

STANDARD DETAIL MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION	RESIDENTIAL STREET INTERSECTION

Traffic Control Plans.Dgn 11/29/2011 6:31:49 AM

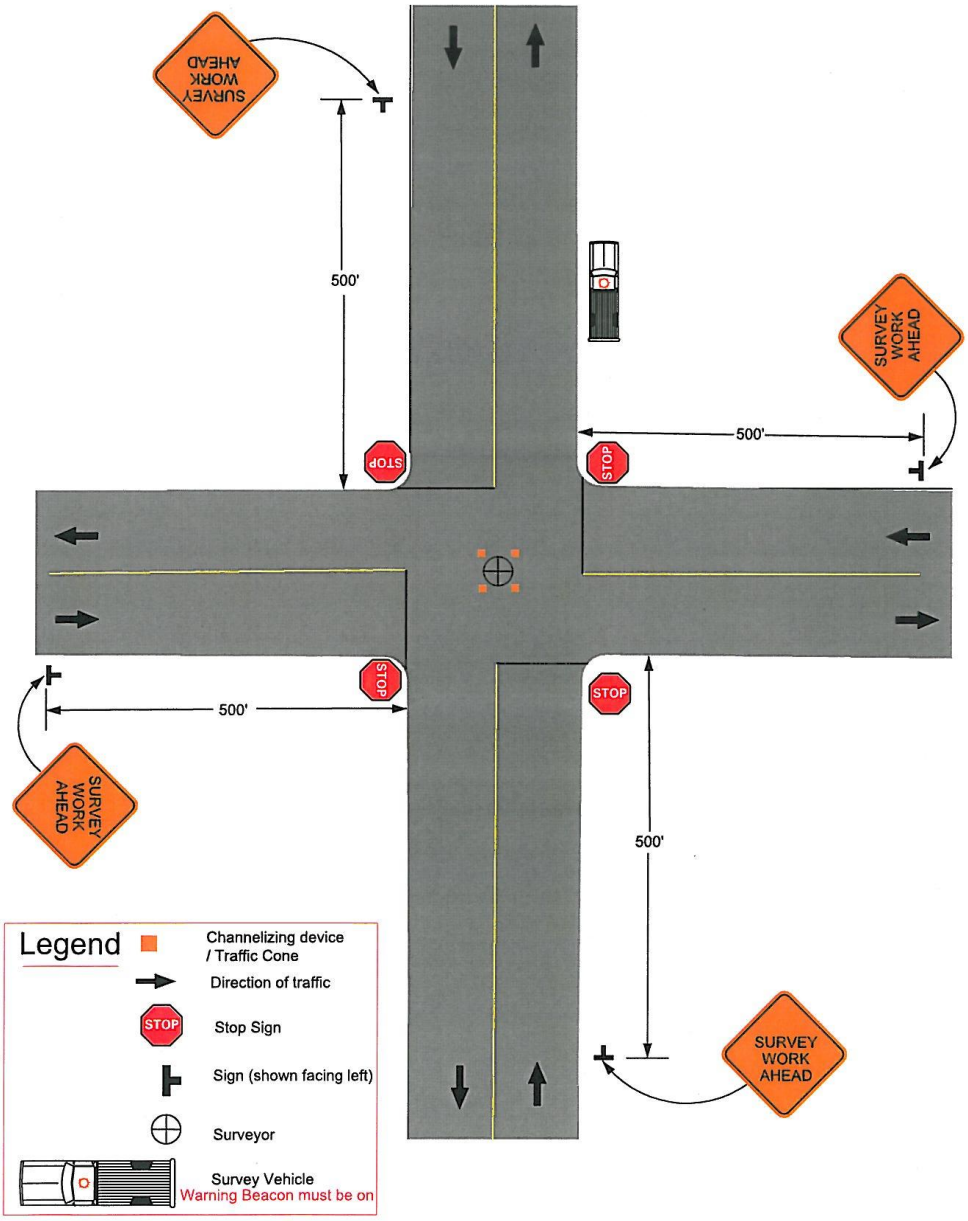


All traffic control devices shall be NCHRP 350 compliant. All advance warning signs shall be a minimum of 36X36 on spring stands.

SRVY # 4
SHORT DURATION
RURAL

STANDARD DETAIL MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION	Short-Duration or Mobile Operation on Shoulder

Traffic Control Plans.Dgn 12/13/2011 6:56:12 AM

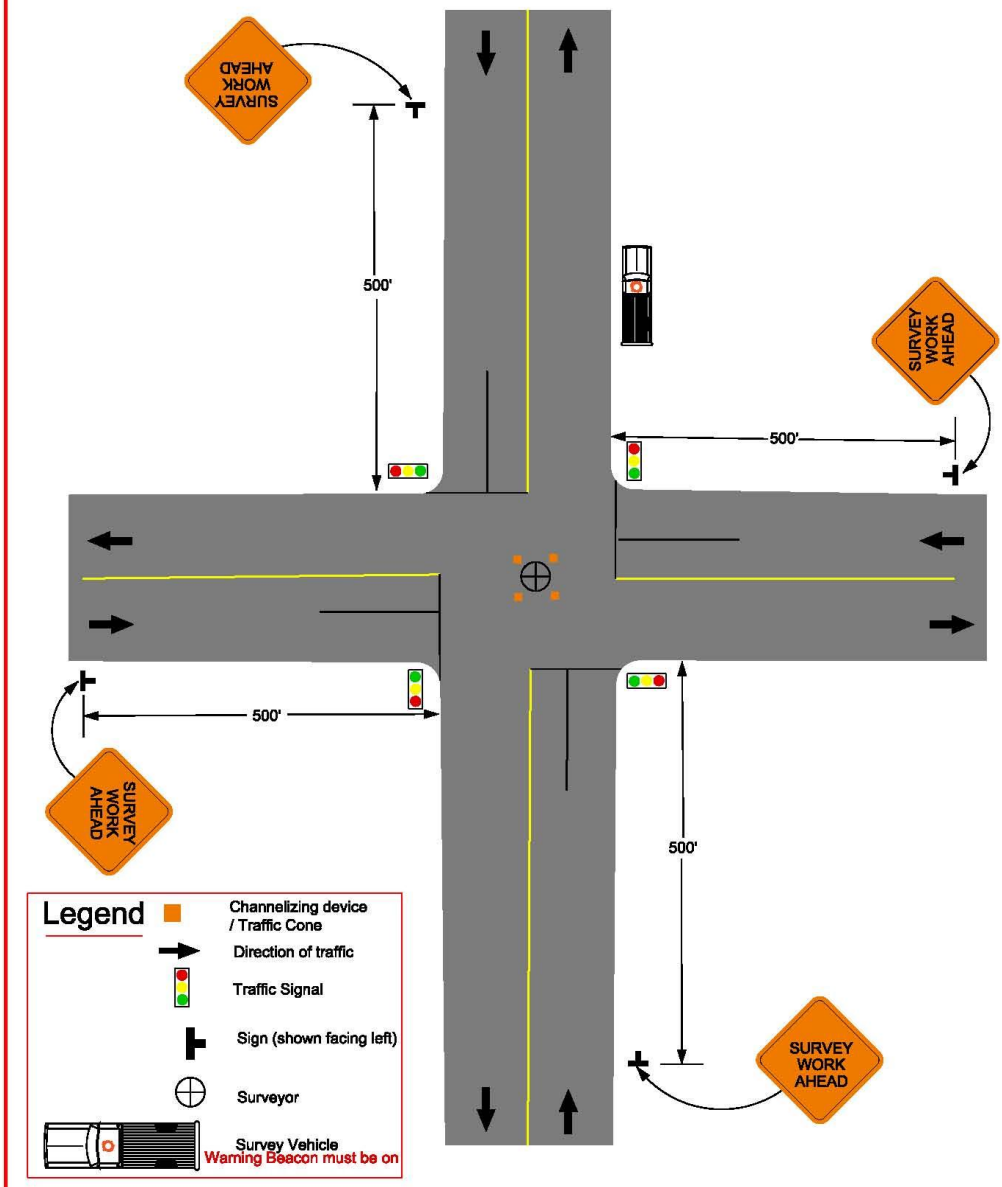


All traffic control devices shall be NCHRP 350 compliant.
All advance warning signs shall be a minimum of 36X36 on spring stands.

SRVY- # 5
SHORT-DURATION
RURAL

STANDARD DETAIL MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION	Closure in Center of Intersection/ 4 Way Stop

Traffic Control Plans.Dgn 11/29/2011 6:40:17 AM

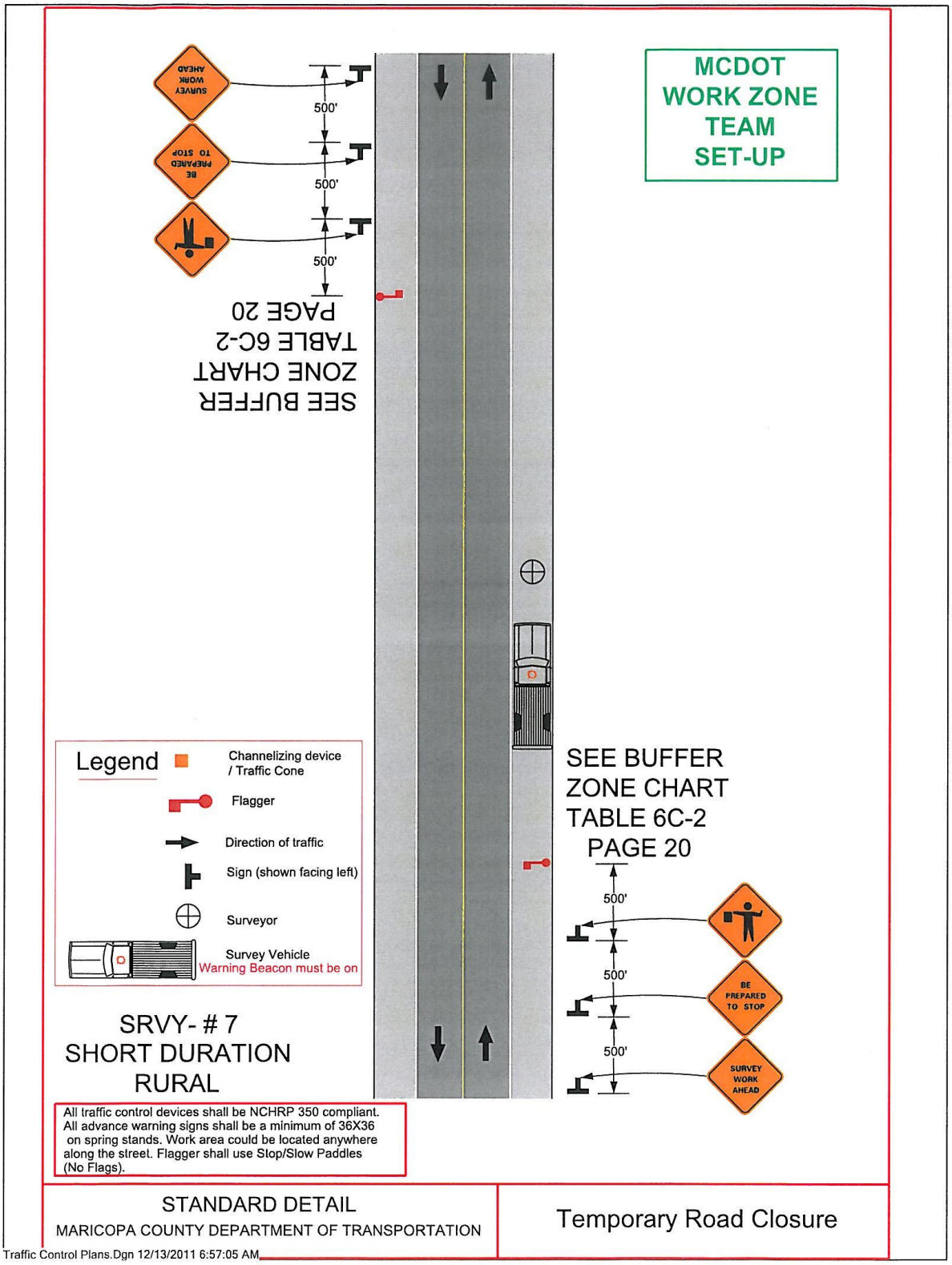


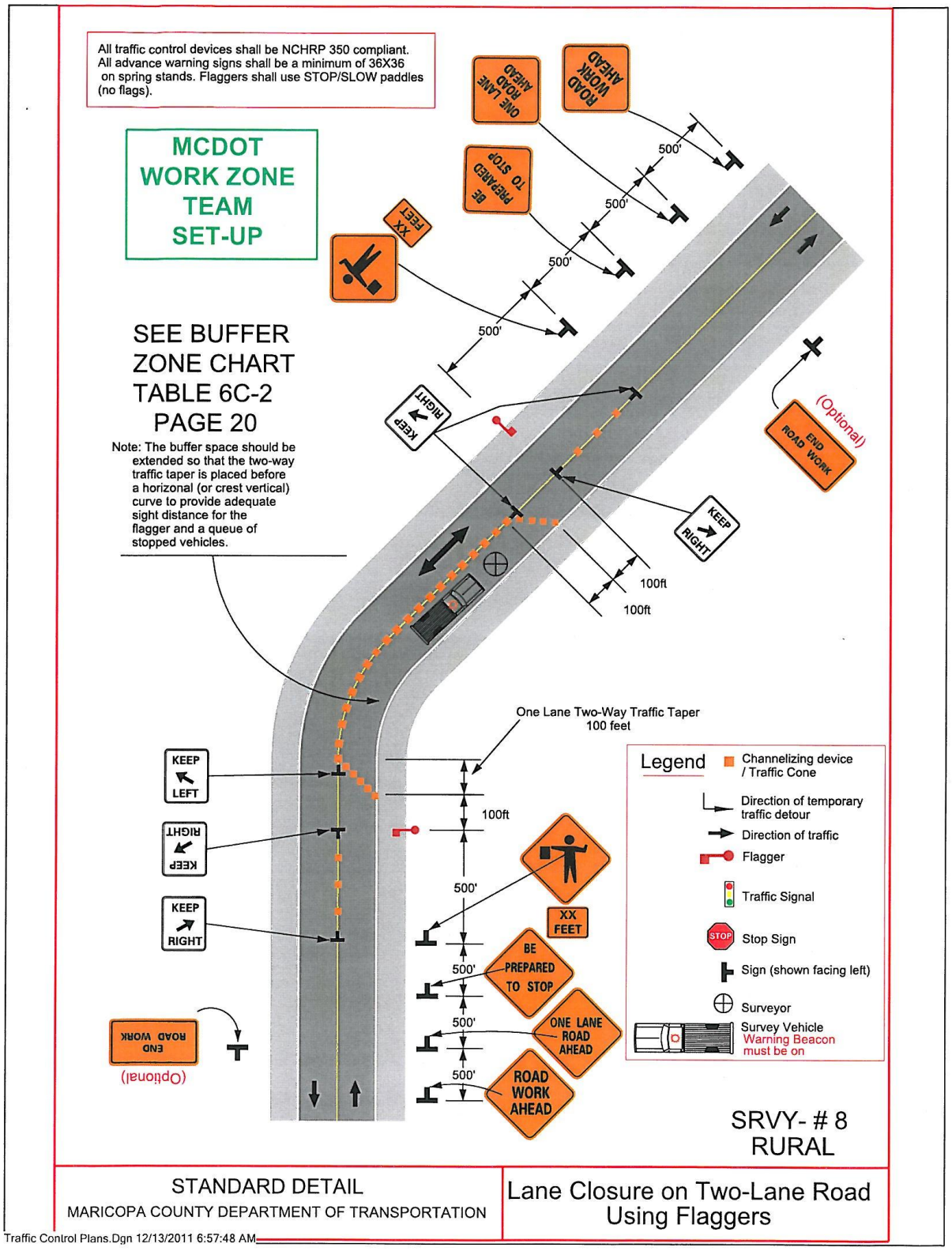
All traffic control devices shall be NCHRP 350 compliant.
All advance warning signs shall be a minimum of 36X36 on spring stands.

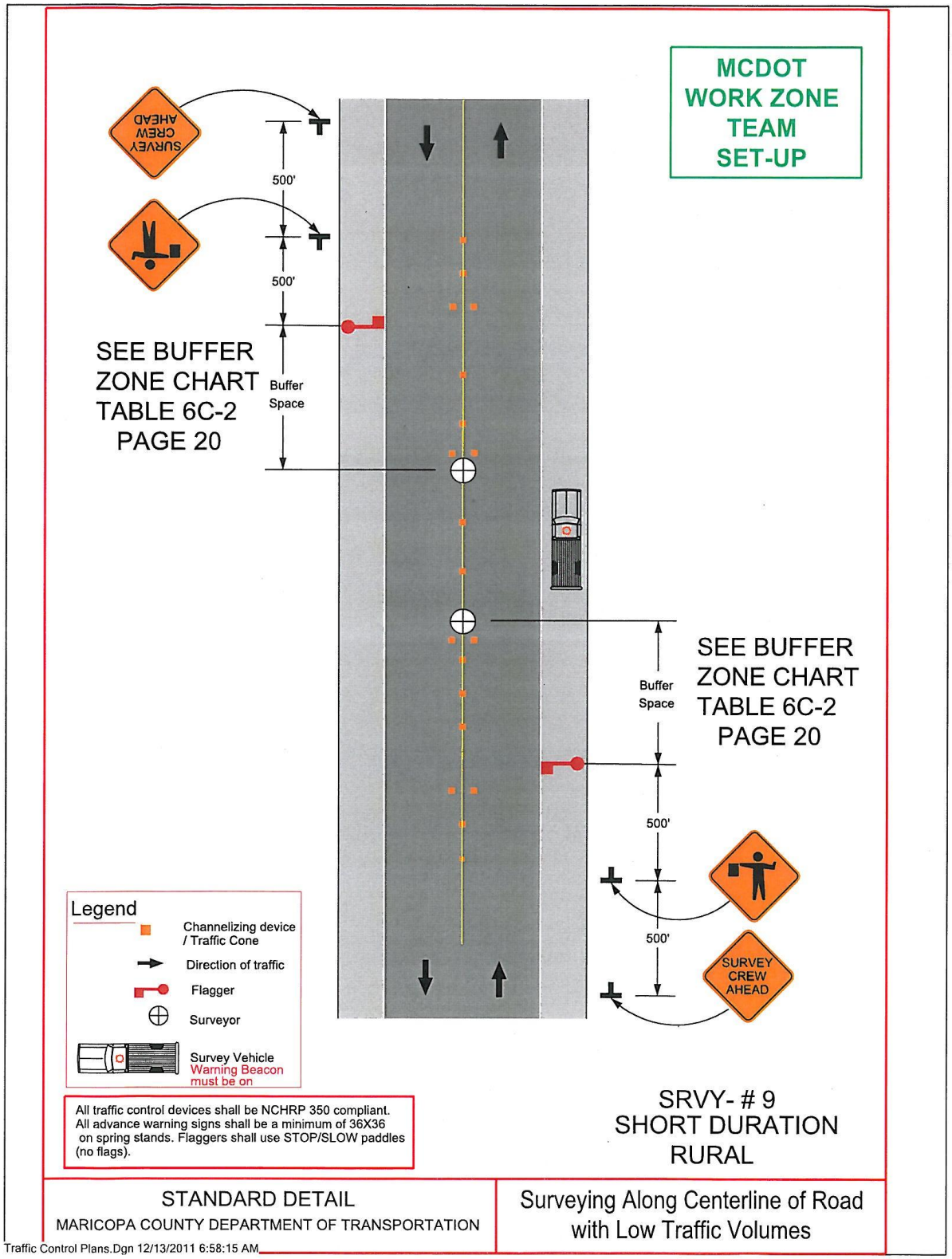
SRVY- # 6
SHORT-DURATION
RURAL
35 M.P.H. OR LESS

STANDARD DETAIL MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION	Closure in Center of Intersection/Signalized

Traffic Control Plans.Dgn 11/30/2011 10:59:19 AM


MCDOT
WORK ZONE
TEAM
SET-UP
SEE BUFFER
ZONE CHART
TABLE 6C-2
PAGE 20
500'
500'
500'
BE
PREPARED
TO STOP
SURVEY
WORK
AHEAD
Legend
Channelizing device
/ Traffic Cone
Flagger
Direction of traffic
Sign (shown facing left)
Surveyor
Survey Vehicle
Warning Beacon must be on
SRVY- # 7
SHORT DURATION
RURAL
All traffic control devices shall be NCHRP 350 compliant.
All advance warning signs shall be a minimum of 36X36
on spring stands. Work area could be located anywhere
along the street. Flagger shall use Stop/Slow Paddles
(No Flags).
STANDARD DETAIL
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
Temporary Road Closure
Traffic Control Plans.Dgn 12/13/2011 6:57:05 AM


All traffic control devices shall be NCHRP 350 compliant. All advance warning signs shall be a minimum of 36X36 on spring stands. Flaggers shall use STOP/SLOW paddles (no flags).
MCDOT WORK ZONE TEAM SET-UP
SEE BUFFER ZONE CHART TABLE 6C-2 PAGE 20
Note: The buffer space should be extended so that the two-way traffic taper is placed before a horizonal (or crest vertical) curve to provide adequate sight distance for the flagger and a queue of stopped vehicles.
ROAD WORK AHEAD
ONE LANE ROAD AHEAD
BE PREPARED TO STOP
XX FEET
500'
KEEP RIGHT
END ROAD WORK
(Optional)
100ft
One Lane Two-Way Traffic Taper 100 feet
KEEP LEFT
Legend
Channelizing device / Traffic Cone
Direction of temporary traffic detour
Direction of traffic
Flagger
Traffic Signal
Stop Sign
Sign (shown facing left)
Surveyor
Survey Vehicle Warning Beacon must be on
SRVY- # 8 RURAL
STANDARD DETAIL
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
Lane Closure on Two-Lane Road Using Flaggers
Traffic Control Plans.Dgn 12/13/2011 6:57:48 AM


MCDOT
WORK ZONE
TEAM
SET-UP
SURVEY CREW AHEAD
500'
500'
SEE BUFFER
ZONE CHART
TABLE 6C-2
PAGE 20
Buffer
Space
Buffer
Space
SEE BUFFER
ZONE CHART
TABLE 6C-2
PAGE 20
500'
500'
SURVEY
CREW
AHEAD
Legend
Channelizing device
/ Traffic Cone
Direction of traffic
Flagger
Surveyor
Survey Vehicle
Warning Beacon
must be on
All traffic control devices shall be NCHRP 350 compliant.
All advance warning signs shall be a minimum of 36X36
on spring stands. Flaggers shall use STOP/SLOW paddles
(no flags).
SRVY- # 9
SHORT DURATION
RURAL
STANDARD DETAIL
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
Surveying Along Centerline of Road
with Low Traffic Volumes
Traffic Control Plans.Dgn 12/13/2011 6:58:15 AM

Revised: 05/09/11

Work Zone
Traffic Control
Request Form

On Road	From	To	Date of this Request
Date of Job Start	**Daily time of Job Starts**	**Daily time of Job Ends**	**Duration of job (specify # of days, weeks)**
Est. End Date of Job	**Meeting Location in Field**	**TCP Required ?**	**Job #**
Requested By	**Job Contact (Name & #)**	**Contact supervisor/name phone #**	**TCP for Overnight ?**

Type Of Job:		Check All That Applies / Type of Job and Action Needed				Action	
Bridge Work		Graffiti Removal		Road Surface Treatment		Road Closure	
Cattle Guard Repair		Guardrail Repair		Shoulder Work		Lane Closure	
Compaction Failure		Loading / Dumping		Sidewalks		Basic WZ / TC	
Coring		Mobile Operation		Street Sweeping		Flagger Operation	
Culverts/Pipe/Grills Repairs		Monument Work		Striping Application		Shoulder Work	
Debris Removal		Patching		Survey Work		Traffic Diversion	
Ditch Work		Rip Rap		Traffic Signals		4-Way Stop	
Fencing		Road Erosion		Tree/Saguaro Removal		Hills,Dips,Curves	
Tree Trimming		Truck Crossing		J-Jon on Site		Other	

Description Of Work (This Information REQUIRED to Schedule Job)

Survey crew is needing to have the north lane of the westbound Baseline Road in this area closed for approximately four hours

Do Not Write Below This Line - (Work Zone Personnel Use Only)

Truck #:	**WZ Arrival Time:**	**WZ Job Start:**	**WZ Job End Time:**
Assign to:		**Completed by:**	
CR # :	**Tracking #:**	**Date:**	**Signature**

Job Canceled by:	Canceled Date :	Canceled Time :	Contacted by:
Job on Hold:	**Job on Hold Date:**	**Job on Hold Time:**	**Resume to work date:**

Check All That Applies:				Equipment Needed:			
Button up AM & PM		Pavement Bypass		# of Techs		# Sandbags	
Clear Job Site		Pilot Vehicle		Truck #		# Flags	
Clear stock pile		Pre - Warning		# T-2			
Flagger		Road Closure		# T-3			
Football		Set & Leave		# Vertical			
Jersey Barriers		Signs on Channel		# Lights			
Lane Restriction		Speed Monitor		# Cones			
Mobile		VMS (Trailer)		# Wind masters			
C/M crew arrival time:				**C/M crew departure time:**			

Please send to the following: Manuel Verduzco- Cell# 602-723-5605,Ed Cortez-Cell# 602-723-6054, Chad Shrader Cell#602-768-7389, or Alfie Barajas- Offices#:602-506-0442 Fax #:602-506-3785

EMERGENCY CONTACT PHONE LIST

NAME	MAIN	CELL
ALL COUNTYWIDE EMERGENCIES	911 and or 61 Office on your radios	

MCDOT Radio Dispatch Telephone

Radio Dispatch Office (602) 506-6063

MCDOT Front Desk (602) 506-2055

MCDOT Survey Branch

John Rose	(602) 506-4679	(602) 723-7419
Brian Dalager	(602) 506-4685	(602) 859-2500
Jerry Shultz	(602) 506-4180	N/A
Glenn Watkins	(602) 506-5973	(602) 723-7047
Bill Rozum	(602) 506-6656	(602) 723-8906
Jim Shores	(602) 506-6720	(602) 723-6790
Kelly Hardee	(602) 506-6639	(602) 525-2462
Robert Doetsch	(602) 506-0020	(602) 390-8104

****

Bill Grimes (602) 506-6604 (602) 723-5593
(Project Management & Construction Traffic Control Plan Representative.)

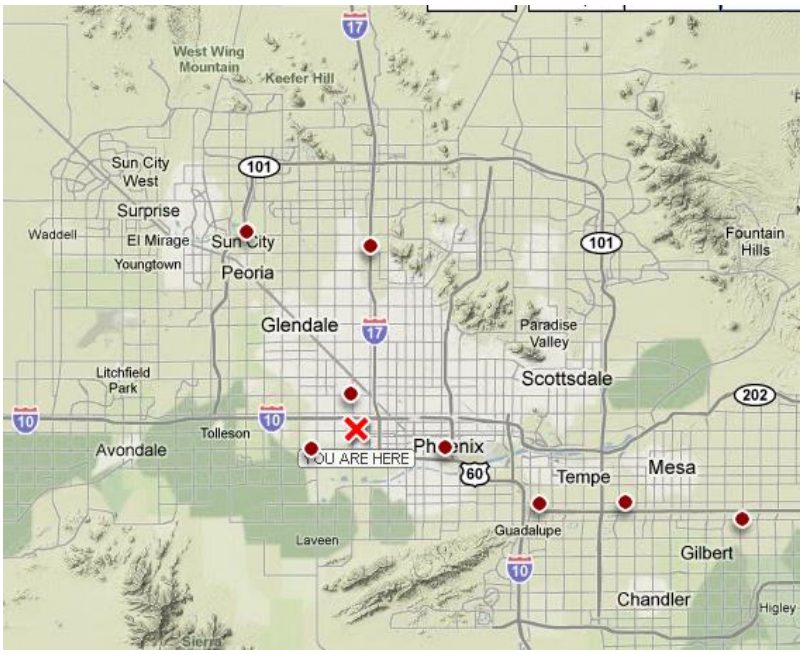
MCDOT Safety Office Numbers

Risk Management (602) 506-8601
(Safety Office)
Jean Poe (602) 506-5526
(County Safety Director)

MCDOT Traffic Work Zone Team

Benny Dominguez (602) 506-8688 (602) 723-5821
(Operations Manager)
Manual Verduzco (602) 506-4690 (602) 723-5605
(Traffic Control Field Supervisor)

CONCENTRA WORKER INJURY



Medical Center with Urgent Care

5340 W Buckeye Road
Ste. 3
Phoenix, AZ 85043

Phone #: (602) 233-2117
Fax #: (602) 484-7930
After Hours Phone #: (602) 244-9500

Medical Center with Urgent Care

1959 S Val Vista Road
Ste. 106
Mesa, AZ 85204

Phone #: (480) 545-1398
Fax #: (480) 545-2706
After Hours Phone #: (480) 545-1398

Medical Center with Urgent Care

14155 N. 83rd Avenue
Bldg. H, Suite 148
Peoria, AZ 85381

Phone #: (623) 487-8598
Fax #: (623) 487-8647
After Hours Phone #: (623) 487-8598

Medical Center with Urgent Care

12808 N Black Canyon Highway
Phoenix, AZ 85029

Phone #: (602) 375-1155
Fax #: (602) 866-9169
After Hours Phone #: (602) 244-9500

Medical Center with Urgent Care

3532 W Thomas Road
Suite 5
Phoenix, AZ 85019

Phone #: (602) 272-7662
Fax #: (602) 269-2417
After Hours Phone #: (602) 244-9500

Medical Center with Urgent Care

1818 E Sky Harbor Circle North Bldg 2
Ste. 150
Phoenix, AZ 85034

Phone #: (602) 244-9500
Fax #: (602) 244-9543
After Hours Phone #: (602) 256-5944

Medical Center with Urgent Care

950 W Southern Avenue
Tempe, AZ 85282

Phone #: (480) 968-7200
Fax #: (480) 968-5100
After Hours Phone #: (602) 244-9500

Medical Center with Urgent Care

1710 W Southern
Mesa, AZ 85202

Phone #: (480) 644-7900
Fax #: (480) 644-7800
After Hours Phone #: (480) 644-7900