# CHAPTER 1

# GENERAL

## *A) INTRODUCTION*

This Highway Surveying Manual presents surveyors' methods and departmental rules that apply to highway surveying operations of the South Dakota State Department of Transportation. This manual is intended to help standardize surveying practices throughout the Department and to be a useful tool for SDDOT survey crews. Updating this manual will be a continuing process and revisions will be issued periodically.

## *B) 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 signing must be in place before work on the survey begins. (see page 1-7) The crew should watch for any special circumstances, which may require additional signing. The Area Engineer may be consulted for any unusual problems. If the traffic causes an extreme hazard for the survey crew, lane closures may have to be set up to be able to complete the survey.

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.

## *B) SAFETY (CONTINUED)*

Every employee is responsible for his/her own safety and the safety of his/her coworkers. All laws, safety procedures and rules must be followed. Each employee must routinely:

1. Report unsafe conditions or practices.
2. Promptly report all accidents and personal injuries.
3. Render or find aid for injured persons.
4. Be alert for hazards.
5. Avoid horseplay and practical joking, and encourage others to do the same.
6. Store and secure all equipment and supplies so they are not hazardous to persons or to vehicular operation.
7. Participate in housekeeping necessary for maintaining a safe and sanitary environment in vehicles and office.
8. Set aside for repair or replacement of defective and unsafe tools and supplies, and report such problems to his/her supervisor.
9. Avoid transporting in State vehicles or having or using on the job, hazardous items such as fireworks, firearms and ammunition, intoxicating substances, and pets.
10. Provide footwear that provides protection and firm support for the foot and ankle. Footwear such as sneakers is discouraged except when surveying from boats.
11. Provide work clothing that provides protection from heat, cold, and vegetation.
12. Wear an orange vest when working within the vicinity of moving vehicles or equipment. A hardhat is necessary when overhead hazards are present.
13. Regard all power lines as dangerous and avoid actual contact with, or possible arcing to any equipment from electrical lines. Do not make a “direct” measurement of the height of a power line, even with a fiberglass rod.
14. Assume that all animals are potentially dangerous.
15. Park vehicles off the shoulder and with the traffic. It is illegal to park in a traffic lane facing the oncoming traffic. The amber light on the vehicle should be turned on during work.
16. Report to work in a condition that will afford maximum agility, alertness, and capability. You should be healthy, rested, nourished and free from the influence of drugs or alcohol.

## *C) PUBLIC RELATIONS*

All Department of Transportation employees must remember that they are representatives of the State of South Dakota. It is, therefore, the responsibility of each employee to conduct him/herself in a 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. People are naturally interested in highway work performed within their community, and may often times ask questions of the survey crew. We should keep in mind that many local agencies and/or private individuals might have an involvement in the project. They include, but are not limited to, other State Agencies, county highway engineers and commissioners, township supervisors, town and city authorities, chambers of commerce, civic clubs, tourist associations, local planning organizations, businesses, and private citizens. In many cases, the local unit of government participates in the cost of the project and has a voice in determining its location and design.

While these citizens should be treated courteously, their questions should always be referred to the Area Engineer 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.

## *D) COMPENSATION TO PROPERTY OWNERS*

Property owners are entitled to compensation any time there is a taking. Destroying trees, and doing other damage, is a form of taking. The compensation to which they are entitled is determined through the appraisal process (before and after values). This is law, not policy. Listed below are a couple of ways to secure permission to do the necessary work.

The first option would be to secure the normal DOT-238 with compensation being paid for loss of trees, damage to property etc. This compensation would need to be based on an appraisal. The right of way office will need to be furnished with a preliminary plan sheet, or something similar, to show what is to be appraised. The negative side of this is that any compensation paid could not be deducted from what is due for the eventual right of way and temporary easements. Each transaction would be handled separately from the other.

The second option would be to secure a right of entry. The right of way office would need to be furnished with a plan sheet showing the centerline of the proposed highway and the proposed right of way, including area of the taking. A right of entry would be negotiated with the landowner based on the appraisal. The positive side of this option is that any payment made under the right of entry would be deducted from the final settlement amount. To reach a final settlement would require an update to the appraisal after the final right of way plats and plans are completed and released to the right of way office.

## *E) LEGAL STATUS OF THE SURVEYOR*

When surveying activities require that we survey or travel off the roadway right-of-way, the Area Engineer or Survey Party Chief shall provide a copy of form DOT-238 (see page1-8) to the property owner for his/her signature. By signing this form the property owner grants permission to the State of South Dakota to enter the property for purposes of collecting data. This is to be done prior to surveying. When completed, this form shall be sent entered into the HW07 ROW Parcel Inventory.

If a property owner will not permit the survey crew to enter the property, notify the Area Engineer who will then take the matter up with the Region Engineer or the Director of Operations, Pierre, South Dakota.

The following excerpt from the South Dakota Code of Law, paragraph 1-1-10, gives the State the right of entry upon all lands in the state for the purpose of making surveys:

> **1-1-10. Land entry authorized to survey boundaries – Consent required to enter mine – Damage to property.** For the purpose of making surveys required by or essential to the effect of any acts of the United States Congress or of the Legislature of this state or for the determination of boundaries of real estate, any of the duly authorized officers or agents of the United States or of this state, or any engineer or land surveyor duly qualified or registered under the laws of this state, and the persons necessarily and lawfully employed in making any such survey may enter upon lands within the boundaries of this state for such purposes, but this section shall not be construed as authorizing any unnecessary interference with private rights. Nothing in this section shall be construed to permit any person to enter any shaft, tunnel, stope, or underground workings of any individual person engaged in mining for precious metals without consent of the owner or person in possession of such shaft, tunnel, stope, or underground working.
>
> Nothing herein contained shall exempt any person from payment of actual damages done by him while upon such land.

The survey party shall exercise extreme care so that no actual damage is caused to any property.

## *F) PURPOSE AND TYPES OF SURVEYS*

Surveys are generally in one of four 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 technology. This activity is typically done under the guidance of the Region Surveyor.

2. **Preliminary Construction 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 preliminary 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 Crew Chief should review all notes and electronic files to determine their accuracy and completeness.

   These surveys are broken down into 4 catagories 1R, 2R, 3R and 4R surveys. These will be covered in more detail in Chapter 6.

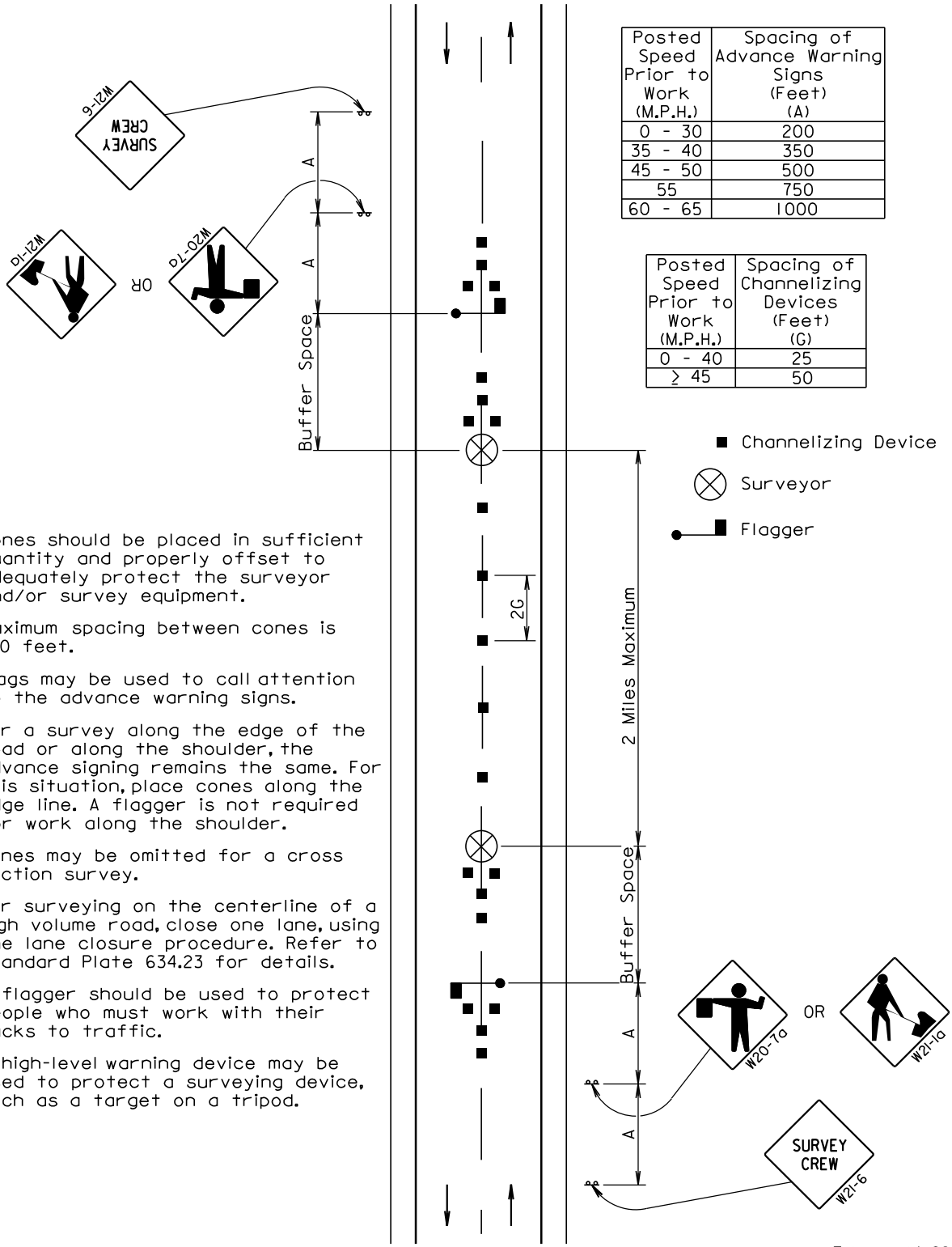
3. **Construction Survey** - The survey work that is necessary to control all phases of the construction falls into this category. Accurate work is necessary as the various portions of the construction are built from information supplied by the survey crew.

4. **Post Construction Surveys** - 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, and the reestablishment of property corners.

5. **Encroachment Survey** – This survey work is done to determine if there are any none-approved items in the states ROW. This survey may be done by using the topographic file and the ROW file. Other cases my require land-tie work in the areas of suspected encroachments.

| Posted Speed Prior to Work (M.P.H.) | Spacing of Advance Warning Signs (Feet) (A) |
|---|---|
| 0 - 30 | 200 |
| 35 - 40 | 350 |
| 45 - 50 | 500 |
| 55 | 750 |
| 60 - 65 | 1000 |

| Posted Speed Prior to Work (M.P.H.) | Spacing of Channelizing Devices (Feet) (G) |
|---|---|
| 0 - 40 | 25 |
| ≥ 45 | 50 |




Cones should be placed in sufficient quantity and properly offset to adequately protect the surveyor and/or survey equipment.

Maximum spacing between cones is 100 feet.

Flags may be used to call attention to the advance warning signs.

For a survey along the edge of the road or along the shoulder, the advance signing remains the same. For this situation, place cones along the edge line. A flagger is not required for work along the shoulder.

Cones may be omitted for a cross section survey.

For surveying on the centerline of a high volume road, close one lane, using the lane closure procedure. Refer to Standard Plate 634.23 for details.

A flagger should be used to protect people who must work with their backs to traffic.

A high-level warning device may be used to protect a surveying device, such as a target on a tripod.

February 14, 2011

Published Date: 2nd Qtr. 2013

SDDOT

# GUIDES FOR TRAFFIC CONTROL DEVICES SURVEYING ALONG CENTERLINE

PLATE NUMBER 634.21

**LANDOWNERS CONTACT FOR ENGINEERING**
**ENVIRONMENTAL, HISTORICAL, AND ARCHEOLOGICAL SERVICES**

Date: _____, 20 ___ Time: _____ ___ M Place (Be Specific) _____

Project: _____ County: _____ PCN: _____

Description of Property: _____

_____

Please check the appropriate box.

☐ I, the (Owner, Leaseholder, Administrator) do hereby grant permission to the representatives of the State of South Dakota, South Dakota Department of Transportation to enter upon said property for the expressed purpose of making Engineering, Environmental, Historical, and/or Archeological surveys.

Printed Name: _____ Property Owner ___ Contract Owner ___ Administrator ___

Mailing Address: _____ Leaseholder ___ Occupant ___

Telephone Number: _____

Signature: _____

☐ The (Owner, Leaseholder, Administrator, Occupant) after being personally contacted declines to sign statement at this time, but does hereby grant verbal permission to the representatives of the State of South Dakota, Department of Transportation to enter upon said property for the expressed purpose of making Engineering, Environmental, Historical, and/or Archeological surveys.

☐ The (Owner, Leaseholder, Administrator, Occupant) does hereby refuse to grant permission to the representatives of the State of South Dakota, Department of Transportation to enter upon said property for the purpose of conducting any type of survey.

Signature: _____ Title: _____
(Representative Dept. of Transportation)

Additional Comments: _____

_____

List Persons Present: _____

Area Engineer: _____
(Name) (Address)

Telephone Number: _____

YELLOW – Landowner
PINK – Area Engineer

DOT - 238 (Revised 10/06)