

2-01 Introduction

The purpose of this chapter is to provide information regarding acceptable safety and health practices in the performance of assigned, contracted, and permitted surveying operations within areas under the jurisdiction of the Washington State Department of Transportation (WSDOT). Survey personnel need a fundamental understanding of basic safety requirements. They have to recognize possible serious problems and get them corrected to protect employees as well as the public.

Accidents do not happen without cause. The identification, isolation, and control of these causes are underlying principles of all accident prevention techniques. Even accidents caused by natural elements can be controlled to some extent. Accidents caused by phenomena such as lightning, storms, earthquakes, or floods are extremely difficult to prevent. However, even the effects of these can be minimized by taking preventive measures when forewarned. Accidents resulting from extreme forces of nature (natural phenomena) are estimated to be only two percent of all accidents.

2-01.1 Education and Training

Just as safety engineering is the most effective way to prevent environmental accident causes (unsafe conditions), safety education is the most effective tool in the prevention of unsafe acts by humans. Through adequate training, survey personnel gain useful knowledge and develop safe attitudes. Safety consciousness developed through education will be supplemented and broadened by specific additional instruction in safe working habits, practices, and skills. Training is a particularly important accident prevention control by developing habits of safe practice and operation.

This chapter is a brief overview of some general safety regulations for surveyors. Surveyors are encouraged to become familiar with the information in:

- *Employee Safety and Health Orientation Handbook*, November 2002, WSDOT Safety Office
- *Safety Manual*, WSDOT, M 75-01, (Safety Office)
- 1-1, "Safety," of the *Construction Manual*, WSDOT, M 41-01
- K series in the *Standard Plans for Road, Bridge, and Municipal Construction* (Standard Plans), WSDOT, M 21-01
- *Work Zone Traffic Control Guidelines*, WSDOT, M 54-44
- Part VI of the *Manual on Uniform Traffic Control Devices* (MUTCD), AASHTO, and the Washington amendments
- Other pertinent safety standards that are adopted by the department

2-01.2 Planning

Advance planning will minimize the survey crew's exposure to hazardous situations and minimize the delays to the public. Plan to set monuments in the safest possible locations and be completely prepared before setting up the equipment to save time. However, do not sacrifice safety to reduce the time to complete a task.

During any time when the normal function of a roadway is suspended, temporary traffic control planning provides for continuity of function (movement of traffic, pedestrians, cycles, transit operations, and access to property/utilities). The location where the normal function of the roadway is suspended is defined as the work space. The work space is that portion of the roadway closed to traffic and set aside for workers, equipment, and material. Sometimes there are several work spaces within the project limits. This can be confusing to drivers because several miles may separate the work spaces. Adequately sign and delineate each work space to inform drivers of what to expect.

Effective temporary traffic control enhances traffic safety and efficiency, regardless of whether street construction, maintenance, utility work, or roadway incidents are taking place in the work space. Effective temporary traffic control provides for the safety of workers, road users, and pedestrians. At the same time, it effectively provides for the efficient completion of whatever activity suspended normal use of the roadway.

Base the traffic control selected for each situation on type of highway, traffic conditions, duration of operation, physical constraints, and the nearness of the work space to traffic. Typically, no single set of signs or other traffic control devices can satisfy all conditions for a given project. Several may be needed.

No single publication defines detailed standards that will be adequate to cover all applications. The references in 2-01.1, above, contain many layouts for work zone traffic control and custom designs might still be needed.

2-01.3 Accidents

If all else fails and there is an accident, the survey crew is required to have at least one member possessing a first aid card and the crew rig must contain a first aid kit.

As part of the planning phase, identify emergency services in the vicinity and be sure to have plans for things like the best route to the nearest hospital.

The Safety Office equips WSDOT vehicles with vehicle accident packets that contain a cover letter with step-by-step instructions for filling out the forms. Also, they provide all new employees with an *Employee Safety and Health Orientation Handbook* that contains the instructions for personal injury reporting.

2-02 Working in Traffic

2-02.1 Wearing Of Personal Protective Equipment

As stated in the *Safety and Health Policies and Procedures Manual*, all personnel are required to wear the appropriate personal protective equipment during all operations where exposure to hazardous conditions exists.

Frequently, surveyors operate tools that, if not used correctly, can cause harm. Where there is a possibility that an eye injury can occur during the performance of assigned duties, the department is required to supply its employees suitable face shields or goggles. Generally, the department does not provide individuals with prescription safety glasses.

Safety footwear is a substantial boot or shoe, made of leather or other equally firm materials, with the sole and heel designed and constructed for slip resistance. Safety footwear is used for work activities that present foot injury hazards from falling or moving objects, or from other hazards such as burning, scalding, cutting, and penetration. Acceptable safety footwear meets the safety shoe requirements established by the Occupational Safety and Health Act [OSHA] or the American National Standards Institute [ANSI]. Footwear that has deteriorated to the point where it does not provide adequate protection is not acceptable.

Safety-toe footwear is a boot that meets the definition above and extends above the ankle, with a defined heel, slip resistant sole, and a puncture resistant shank, and either steel or composite protection for the toe areas built into the boot. Safety-toe footwear is used for work activities that present frequent exposure to foot injury from heavy objects or equipment. Acceptable safety-toe footwear must have a label attached indicating it meets the specifications of ANSI Z41.

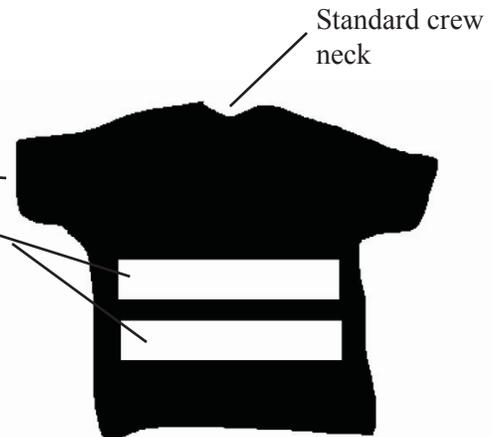
For safety footwear responsibilities, compliance, who must wear safety footwear, allowance reimbursement procedure, etc., please see the “Safety Footwear” Instructional Letter IL 4014.00.

All personnel working or visiting locations designated as “Hard Hat Areas” are to wear approved protective helmets. Inspect these helmets on a regular basis and immediately replace any found to be defective. Helmets are also to be worn any time a supervisor deems it necessary.

Personnel are required to wear high-visibility safety vests and rain gear of approved color whenever working within the right of way, at any time when exposed to traffic, such as driveways, parking lots, and construction sites, and at any other time deemed necessary by the supervisor on-site. At employee option, a T-shirt may be purchased out-of-pocket by WSDOT employees and worn in lieu of the WSDOT Safety Vest by employees during **daylight hours and when not working as a flagger**. T-shirts shall not have any words or “ads” affixed to them. Also, the supervisor and/or Region Safety Officer shall have final approval authority over both the T-shirt itself and its use. The safety VESTs must be worn when flagging and during nighttime operations. In addition, during night operations reflectorized safety vests are required. If rain gear or other outer garment is being worn, the reflectorized vest must be worn as the outer layer.

T-shirt Standards

- Standard crew neck
- Base color orange
- Minimum 2 each 2” horizontal yellow bar on front and back at least 2” apart vertically



Note: Shirt does **not** have to be reflective as the safety VEST must be worn for all night time operations.

Front and Back

2-02.2 Use Of Traffic Control Devices

Basically, there are two categories: signs and channelizing devices.

2-02.2a Warning Signs

Install warning signs prior to the start of all survey work that is on pavement and within 15 feet of the edge of the traveled way. Use them all the time you are working in traffic. Since surveyors are constantly moving on the highway, it is important that warning signs be moved as the work progresses. When you are through for the day, or at any time that work ceases; turn, remove, or cover them. This simple procedure will prevent a host

of potential problems for surveyors as well as motorists. Whenever the activities are changed such that a particular sign or other warning device is no longer appropriate, turn, remove, or cover them and replace if necessary with the appropriate device.

There are three signs used most frequently: WORKERS, SURVEY CREW, and FLAGGER. Signs warning of lane closings ahead, may also be used as appropriate.

See Part VI of the MUTCD for sign sizes and placement height. SURVEY CREW symbol or sign is the principle advance warning sign used for traffic control through survey work zones and may replace the ROADWORK AHEAD or ROADWORK sign when lane closures occur, at the discretion of the party chief. Use Type B light or dual orange flags at all times to enhance the SURVEY CREW sign or symbol.

Use advance warning signs at an extended distance of one-half mile or more when limited sight distance or the nature of the obstruction might require a motorist to bring the vehicle to a stop. Extended distance Advance Warning Signs might be required on any type roadway, but particularly on multilane divided highways where vehicle speed is generally in the higher range (45 mph or more). Color, sizes, wording, and placement of signs must conform to approved standards as specified in Part VI of the MUTCD and other safety standards that are adopted by the department. See 2-01.1.

The placement of warning signs is critical to the effectiveness of their individual messages and therefore is customized to meet roadway design and alignment. Mount all signs at right angles to the direction of and facing the traffic they are to serve. Proper positioning gives the driver adequate time to adjust to rapidly changing traffic conditions.

Under certain conditions, it might be necessary to use a series of advance warning signs. In these instances, place the warning sign nearest the work site approximately 500 feet from the point of restriction with additional signs placed at 500 to 1000 foot intervals. On high-speed highways, increase the advance warning distance to one mile or more. On city streets where more restrictive conditions generally exist, warning signs in the immediate vicinity of the work area may be placed at closer intervals to meet the needs of individual survey crews.

Depending on the type of roadway being surveyed, refer to one or more of the references in 2-01.1.

2-02.2b Channelizing Devices

The function of channelizing devices is to warn and alert drivers of conditions created by work activities in or near the traveled way, to protect workers in the temporary traffic control zone, and to guide drivers, cyclists, and pedestrians safely. Channelizing devices include but are not limited to cones, tubular markers, vertical panels, drums, barricades, temporary raised islands, and barriers.

Channelizing devices are elements in a total system of traffic control devices for use in temporary traffic control zones. Precede these elements by a subsystem of warning devices that are adequate in size, number, and placement for the type of highway on which the work is to take place.

For further description and uses of channelizing devices see one or more of the references in 2-01.1.

For the most part, cones that meet department requirements are used to channel traffic through and around a work area. Occasionally, the need arises for the surveyor to close off or separate traffic. Cones are one method used to accomplish this.

If it is necessary to place an instrument or tripod within the traveled way or within 15 feet of the traveled way, protect the tripod with cones according to field conditions. The party chief determines cone spacing to fit roadway and traffic conditions.

2-02.2c Arrow Displays

Arrow display signs are intended to supplement other traffic control devices when closing a lane. See M 21-01, M 54-44, and the MUTCD for arrow display sign placement and specifications.

2-02.2d Variable Message Signs (VMS)

Surveyors may use variable message signs to advise the traveling public of survey work being done on the highway. The information on these signs is to make the drivers more aware of surveyors on the highway and increase the surveyors' safety. They are used to supplement the standard signing in the survey work zone.

2-02.2e Flagging Operations

When operations are such that signs, signals, and barricades do not provide adequate protection on or adjacent to a highway or street, provide flaggers or other appropriate traffic control.

Ensure that all flaggers are well trained and possess valid flagging cards.

Position flaggers far enough ahead of the work zone so that approaching traffic has sufficient distance to stop before entering the work zone.

STOP/SLOW paddles are the primary hand-signaling device.

To control traffic, use the FLAGGER symbol sign before any point where a flagger is stationed. A distance legend may be displayed on a supplemental plate below the symbol sign. The sign may be used in conjunction with appropriate legends or with other warning signs, such as BE PREPARED TO STOP. The FLAGGER word message sign with distance legends may be substituted for the flagger symbol sign.

The party chief may request the support of the State Patrol. A State Patrol car with flashing lights at the beginning of the work zone is one of the most effective ways to reduce speed in the work zone and get the attention of drivers.

2-02.2f Vehicle Warning Lights

The use of flashing amber lights is another tool used by surveyors to let motorists know that they are working in the area. Temporary traffic control activities often create conditions on or near the traveled way that are particularly unexpected at night, when drivers' visibility is sharply reduced. It is often desirable and necessary to supplement retro-reflectorized signs, barriers, and channelizing devices with lighting devices during daytime and nighttime operations. During work operations, use amber lights during the following conditions:

1. When your vehicle is parked in the median without closure of the adjacent traffic lane.
2. When your vehicle is parked on the shoulder and work is being done in the immediate vicinity.
3. When your vehicle is accelerating to move from the shoulder, median, or lane closure into traffic, and when your vehicle is slowing down in preparation to pull off the road onto a shoulder, median, or lane closure.
4. When highway conditions exist which, in the operator's opinion, warrant the use of amber warning lights to protect workers and the public during conditions of reduced visibility such as fog or heavy rain.

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5. Use of amber lights can be required at any other time at the discretion of the supervisor on site.

2-02.3 Safety While Working in Traffic

2-02.3a Safety Rules

The following safety guidelines will be beneficial for surveyor's working in traffic.

1. Always face traffic when working on the traveled way of a divided road or on shoulders of highways. If you cannot do this yourself, have a coworker act as a lookout. When working in a zone between two-way traffic, stand parallel to the traveled way and again use a lookout.
2. Do not make sudden movements that might confuse a motorist and cause evasive action that can result in injury to the motorist or to surveyors.
3. Avoid interrupting traffic as much as possible.
4. Minimize the crossing of traffic lanes on undivided highways. However, the best way to cross is with your vehicle by way of a ramp or service road to assure a safe crossing. If traffic lanes must be crossed on foot, wait for a natural break in traffic. A break in traffic in this instance is defined as all lanes being clear.
5. On high-speed, heavily traveled divided highways, do not walk or run across traffic lanes. The way to cross is with your vehicle by way of a ramp or service road to assure a safe crossing.
6. Protect your crew with the use of an approved barrier to shield them from traffic. Whenever possible, place a truck-mounted attenuator between your workers and traffic.
7. Proper equipment carrying procedures: When working near a heavily traveled highway, or when working parallel to traffic, be careful to keep level rods, range poles, and such, from extending into a lane of traffic.
8. Take special care when working on wet pavement in an active traffic area.
9. When working on or near high-speed highways, use of a Truck Mounted Attenuator (TMA) to protect the survey crew is strongly recommended. TMA's may be provided by WSDOT (Maintenance) or the contractor.

2-02.3b Inspections

To ensure that surveyors, contractors, and consultants are following the proper safety procedures, the department will make random safety visits/inspections of WSDOT survey operations. The WSDOT Regional Safety and Health Manager or a designee will make the visit/inspection. The inspector or a supervisor in the Party Chief's supervisory chain has the right and responsibility to cease work until all safety requirements are met. If a party chief repeats safety procedure violations, disciplinary action may be taken.

It is important to note that this rule is for consultants as well as WSDOT personnel. Violating safety procedures and rules can constitute a breach of contract by a contractors or consultant. Fines can be levied against those consultants found to be habitually violating safety procedures and rules. It can also affect his qualification grade since it adversely reflects willingness to cooperate and abide by the department's policies and procedures.

2-03 Using Tools

2-03.1 *Machetes*

1. Sharpen machete blades only from six (6) inches from the butt of the handle to within two (2) inches of the point.
2. Station machete users at no closer than ten (10) feet intervals. Protect yourself by retaining this minimum safety zone.
3. While chopping, if possible, lean forward.
4. Always chop away from the body.
5. Swing with a full swing at an approximate 45° angle, but do not over swing or swing too hard.
6. Clear small vines, and the like, before cutting larger vegetation.
7. Do not use machetes for heavy cutting.
8. Use long-handled lopping shears or brush hooks instead of machetes for cutting thorny bushes and briars.
9. Wear eye protection/face shield.

2-03.2 *Axes and Brush Hooks*

1. Clear away any impeding, light growth with a machete or a hatchet before chopping.
2. Allow ample space between adjacent chopping and keep unessential persons outside the area.
3. Carry with the handle grip behind the head and the cutting edge facing outward.
4. Do not use double-bit axes.
5. Cut extended heavy brush with a chain saw.
6. Wear eye protection/face shield.

2-03.3 *Digging Tools, Hand*

1. Picks
 - a. Do not use a pick head that is either sharply pointed or badly blunted.
 - b. Make sure the head is “bound” tightly to a good handle before swinging.
 - c. Allow ample space for swinging.
 - d. Do not over swing on the back swing.
 - e. Use eye protection/face shield when digging in very hard material.
 - f. As you swing, squat by flexing the knees so the pick handle will be horizontal when the point strikes the earth (this will keep the point away from your feet).
2. Shovels
 - a. Use a round-pointed shovel for digging in hard earth.
 - b. Do not use the shovel in the same manner as you use a digging bar. Place the blade of the shovel on the earth and force it into the earth with your foot.
 - c. Keep one foot on the ground at all times.
 - d. Discard a cracked shovel. “Dress” one that has a blunted blade.

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- e. Do not use the shovel as a pry bar.
3. Digging Bars
 - a. Work with the feet widespread.
 - b. Hold the bar close to the body and lift and drop it vertically.
 - c. Keep the point sharp enough to do the job without having to lift bar excessively high.
 - d. Do not use a bar that is bent.
4. Roto Hammers and Power Augers
 - a. Inspect equipment to ensure proper working condition.
 - b. Wear appropriate personal protective equipment while operating equipment.

Operate equipment per manufactures recommended procedures.

2-03.4 Driving Tools, Hand

1. Use the right type and right size tool for each driving operation.
2. Check for defects before using.
3. Do not use hatchets, axes, and other woodcutting or driving tools for driving or hammering metal.
4. Avoid striking brittle or mushroomed metal with a hammer because bits of steel might chip off and cause serious flesh or eye injuries.
5. Use safety glasses/face shield when driving metal objects or cutting anything except paper.
6. Do not use tools with splintered or loose handles or with mushroomed or cracked heads (this includes the driving tools and the implement being driven).
7. Allow ample space for the swinging required. When squatting, use either a short-handled tool, or keep the long handle from between your legs (groin injury can result).
8. When swinging, have the handle horizontal when the face of the driving head contacts the object being driven. Use of long-handled sledges requires flexing the knees to lower the body during the swing.
9. Do not use a full swing to drive objects that are more than waist high.
10. Do not hold an object for someone to drive by full swinging.
11. When driving masonry nails, spikes, or stakes into pavement or very hard earth, use extra care. Be sure the object being driven is well started before releasing it and driving it with full swings of the hammer.
12. Be sure, when setting an object in the roadway surface, to set it flush to the ground to prevent the possibility of it being struck by a snowplow, becoming dislodged, and becoming a hazard.

2-03.5 Chain Saws

1. Employees must be given proper instructions before being allowed to operate chain saws.
2. Chain sawyers wear hard hats, eye protection, gloves, and chaps.

3. Chain sawyers do not wear any jewelry or excessively loose-fitting clothing that can become entangled in the machine's operating parts.
4. Inspect chain saws prior to each use to assure that all handles and guards are in place and functioning correctly, that all controls function properly, and that the muffler is in good condition.
5. Follow all of the manufacturer's instructions.
6. Fuel chain saws only in safe areas, and not under conditions conducive to fire, such as near smoking areas, hot engines, and the like.
7. Store and dispense from approved, plainly marked safety containers.
8. Start chain saws at least 10 feet away from refueling areas.
9. Start chain saws only on the ground or when otherwise firmly supported.
10. Be certain of footing and clear away all brush that might interfere with cutting prior to starting a cut.
11. Hold chain saws with both hands in order to maintain control of saws during operation.
12. Turn off chain saws when carried in hazardous conditions such as slippery surfaces or heavy underbrush.
13. Do not use chain saws to cut directly overhead or at a distance that will require the operator to lose a safe grip on the saw.
14. Falling of trees, if allowed, may only be done by experienced, trained personnel.

2-03.6 Pressurized Spray Cans

Serious injuries and costly cleanup have resulted from improper handling of pressurized spray cans.

1. Do not puncture or incinerate.
2. Store at temperature lower than 120° F.
3. Do not carry in vehicle passenger compartments.

Dispose of empty containers properly. Do not discard any spray cans in a receptacle that is normally accessible to children.

2-03.7 Miscellaneous Power Tools

When using other power tools, always follow the manufacturer's safety procedures.

2-04 Working Near Railroads

These railroad guidelines are to be used when working within an "operating right of way" and are for the safety of the surveyor and the railroad. The general rules are:

1. Always notify railroad company or authority of survey work to be done within the railroad right of way. (Contact Railroad Liaison in Headquarters Real Estate Services for help.)
2. Always be alert around railroads. Railroad equipment is not always heard, especially if there is other noise. If a railroad car or locomotive is coasting, or if a train is moving slowly, hearing alone might not provide adequate protection. When necessary, use a lookout.

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3. Never crawl under stopped cars and do not cross tracks between closely spaced cars, they might be bumped at any time (the engineer and brakemen work only one side of the train).
4. Do not leave protruding stakes or any holes within 10 feet of the center line of the tracks.
5. Do not park vehicle within 10 feet of the tracks; train crews need this area for their operations.
6. When taping across railroad tracks, support steel tapes above the rails at all times. The contact of both rails simultaneously by a steel tape can activate signals even when laid parallel to the rails. Therefore, only nonmetallic tapes when grounded.

2-05 Fence Crossings

1. Use gates when possible and avoid crossings.
2. Use portable chain link fence climber steps or a trestle ladder.
3. Do not attempt to carry anything when climbing on or over obstacles.
4. Cross barbed wire fences at the center of a span and have a trusted coworker hold the wire(s) for you.
5. When stepping over a barbed wire fence, lay a piece of heavy canvas, such as an empty material bag, over the top strand.

2-06 Animal Hazards

1. Assume that all animals are potentially dangerous.
2. Have owners secure hostile-acting animals before entering enclosures containing such animals.
3. Do not enter an enclosure with high fences if a hazardous animal is within.
4. Carry a pointed lath or a range pole to ward off an attacking animal. Retreat is usually advisable but do not turn your back and run unless you can reach a haven before the animal reaches you.
5. Do not approach, attempt to capture or kill, or attempt to pet either domesticated or wild creatures (this includes snakes and other reptiles).
6. Be especially wary of sick-appearing animals, animals with young, stallions, bulls, bears, and guard dogs.
7. Do not handle dead or seemingly dead animals.

2-07 Snakebites

Snakebites of surveyors are quite rare. Even if preventive measures fail, current knowledge and treatment offer the best prognosis ever for snakebite victims.

Though poisonous snakes are rare, they can be found in the Eastern part of Washington State. Poisonous snakes annually bite 6,500 to 7,000 Americans. Always take the following precautions:

1. Always assume snakes are active. Do not relax your vigil on sunny winter days.
2. Do not make “solo” trips across snake country, which is remote from habitations and frequently used roads.

3. When traversing brush or grassy terrain, use a “decoy” such as a level rod or a lath, alongside your legs. Walk heavily to create vibrations that can be felt by snakes (a snake does not hear).
4. Walk away from the shaded side of clumps and bushes when the weather is hot and sunny.
5. Step atop logs and large rocks, instead of stepping over them and into unseen areas. The safest policy is to walk around such obstacles.
6. Do not jump down from overhangs onto areas where snakes might be hidden from view.
7. Avoid steep climbs if possible where a snake, uphill from you, can strike the upper portions of your body. Bites on the torso, the neck, and the head are much more damaging and more difficult to treat than those on the limbs.
8. Never climb vertical or near vertical faces where handholds on unseen areas above your head are required.
9. Do not attempt, under any circumstances, to capture snakes.
10. Do not try to kill a snake unless it is a positive threat to safety.
11. When necessary to move low-lying logs, large rocks, and boards, use a pry bar, not your hands.
12. Double your precautions at night, especially in warm weather.
13. Keep vehicles near your work area for rapid transport if a snakebite should occur.
14. If at all possible, maintain radio contact with an isolated employee.
15. Know the location of the nearest medical facility where antivenin is available - and the quickest route there.
16. Do not collect rattles. A fine and highly abrasive dust often accumulates inside the rattles and can cause lasting damage to the eyes.
17. Wear high leather boots or snake-leggings in high-hazard areas.
18. Remember that rattlesnakes do not always signal their presence by rattling.

2-08 Poisonous Plants

Poison ivy, poison oak, and poison sumac can cause skin irritation. Learn to recognize these plants so that you can avoid them. Furthermore, if you know when you have touched them, you can start first aid before symptoms appear. The sooner first aid is given for exposure, the milder the effects will be.

Poison ivy is a creeper plant having three leaves on each stem. The leaves are shiny and pointed and have prominent veins. Poison ivy grows along fences and stonewalls and in wooded areas.

Poison oak is a vine similar to poison ivy in appearance, except that the edges of the leaves are more deeply notched. The leaves are arranged in characteristic groups of three.

Poison sumac is a shrub or small tree. Clusters of white berries distinguish the poison sumac from the nonpoisonous sumac.

If exposed to a poisonous plant, wash the affected area of your body promptly and thoroughly with water and soap. The rash starts with redness and intense itching. Later, little blisters appear. If a rash had already developed, do not wash it. Avoid scratching. Get medical attention.

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2-09 Power Lines

1. Regard all power lines as dangerous.
2. Avoid actual contact with or possible arcing to any equipment from electrical lines. In damp conditions, double your precautions.
3. Do not tape across terrain where a tape might possibly be pulled up, into, or lowered atop a power line. Use an E.D.M. instead of taping.
4. Power line elevations - do not make a “direct” measurement of the height of a power line, even with a fiberglass rod.

2-10 Electrical Storms

If an electrical storm approaches while you are working, discontinue working and seek shelter.

Do not use any metal objects, such as chains, transits, E.D.M.'s, levels, range poles, or Philadelphia rods during an electrical storm.

The best thing to do is to get into your vehicle or building and wait out the storm.

2-11 Confined Space Entry

2-11.1 Definitions

There are two types of confined spaces: permit and nonpermit.

1. **Permit-required confined space (permit space)** A confined space that has one or more of the following characteristics:
 - Contains or has a potential to contain a hazardous atmosphere.
 - Contains a material that has the potential for engulfing an entrant.
 - Has an internal configuration such that an entrant might be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross-section.
 - Contains any other recognized serious safety or health hazard.
2. **Non permit confined space** means a confined space that does not contain any physical hazards or any actual or potential atmospheric hazards capable of causing death or serious physical harm.

2-11.2 General Requirements

The employer evaluates the workplace to determine if confined spaces are present. A confined space is assumed to be a permit-required space unless it can be documented to be a non permit confined space.

The Project Engineer shall ensure that the following are conducted:

1. Confined space awareness training.
2. A survey of their respective areas of responsibility to identify all potential permit-required confined spaces (PRCS).
3. An evaluation of the potential PRCS to identify hazards for each confined space.

4. An evaluation of the hazards, considering the scope of hazard exposure, magnitude of hazard; likelihood and consequences of hazard occurrence, changing conditions/activities, and impact on the need for emergency response.
5. Based on the evaluation of hazards, classify and list confined spaces as either permit-required or non permit confined spaces.

2-11.3 Scope

Practices and procedures to protect employees from hazards of entry and/or work in permit-required confined spaces must be followed without exception.

Entry means the action by which a person passes through an opening into a permit-required confined space and includes work activities in that space. Entry is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

Note:

If the opening is large enough for the worker to fully enter the space, a permit is required even for partial body entry. Permits are not required for partial body entry where the opening is not large enough for full entry, although other requirements such as lockout-tagout or respiratory protection might apply.

Some confined spaces are "Immediately dangerous to life or health" (IDLH). IDLH means any of the following conditions:

- Poses an immediate or delayed threat to life.
- Causes irreversible adverse health effects.
- Interferes with an individual's ability to escape unaided from a permit space.

Confined spaces are dangerous work areas and require strict compliance for entry and conducting work operations. Surveyors' work tasks that include work in a confined space, either permit or non permit, must refer to 296-62 WAC, Part M, Confined Spaces, the department's *Safety and Health Policies and Procedures Manual* and the Regional or Headquarters Safety and Health Manager or the Industrial Hygiene Program Manager for further direction and guidance on confined space operations.

2-12 Working in Water

2-12.1 Boating Operations

Technically, a boat is classified as a vessel, but for department purposes they will also be classified as vehicles.

2-12.2 General Responsibilities (For boats less than 26 feet in length)

1. Smoking in boats is prohibited.
2. Employees will only be authorized to use a boat if they have successfully completed an approved safety course.
3. Wear U.S. Coast Guard approved life vests in the boat.
4. Carry a first aid kit in the boat.
5. Avoid standing up in small utility boats.
6. Secure all equipment in the boat before getting underway.

2-12.3 Operator's Responsibilities

1. Make sure the boat is in top operating condition and free of tripping and fire hazards.
2. Safety equipment, required by law, is on board, maintained in good condition, and you know how to properly use these devices. Safety equipment:
 - a. Life jackets worn by each person on board.
 - b. Visual distress signal, one electric distress light or three combination (day/night) red flares, or comparable devices.
 - c. Fire extinguisher, Type B-1.
 - d. Sound producing device, some means of making an "efficient" sound signal audible at ½ mile for 4 to 6 seconds (horn, whistle, bell).
 - e. Navigational lights required to be displayed (on) from sunset to sunrise and in or near areas of reduced visibility.
3. File a float plan with a coworker or friend. (See Float Plan below.)
4. Have complete knowledge of the operation and handling characteristics of the boat and know your position and where you are going at all times.
5. Maintain a safe speed at all times to avoid collisions and keep an eye out for changing weather conditions, and act accordingly.
6. Know and practice the Rules of the Road (Navigational Rules) and obey federal and state regulations and waterway markers.

2-12.4 Overloading

Never overload your boat with passengers and cargo beyond its safe carrying capacity. Too many people and/or equipment will cause the boat to become unstable. Always balance the load so that the boat maintains proper trim.

2-12.5 Anchoring

Anchoring is done from the bow of the boat only.

2-12.6 Fueling Precautions

1. Most fires and explosions happen during or after fueling. To prevent an accident follow these rules:
 - a. Refuel portable tanks ashore.
 - b. Extinguish all smoking materials.
 - c. Turn off engines and all electrical equipment.
 - d. Remove all passengers.
 - e. Keep the fill nozzle in contact with the fuel tank and wipe away any spilled fuel.
 - f. Do the "sniff test." Sniff around to make sure there is no odor of gasoline anywhere in the boat.
2. Fuel management - Practice the "One-third Rule" by using: one-third of the fuel going out; one-third to get back, and one-third in reserve.

2-12.7 Float Plan

1. Be safe and file a float plan. In case of emergency, pertinent information will be right at their fingertips to enable them to contact the local marine police or Coast Guard with necessary details. A word of caution: in case you're delayed, and it's not an emergency, inform those with your float plan, and be sure to notify them when you return so the float plan can be "closed out" and an unnecessary and costly search is avoided.
2. Include the following in a float plan:
 - a. Type of boat, hull and trim color, fuel capacity, engine type, number of engines, any distinguishing features.
 - b. Name of each person on board.
 - c. Survival equipment on board.
 - d. Communications available, marine radios, cellular phone.
 - e. Trip expectations, depart from, time of departure, proposed route, type of work, return time, return location.
 - f. If operator has not arrived/returned by (date and time) call the Coast Guard or local authority at the following number (give number).

2-12.8 Weather

Never leave the dock without first checking the local weather forecast. At certain times of the year, weather can change rapidly and it is important to continually keep a "weather eye" out. If suspected stormy or severe weather is anticipated, return to shore or dock the boat as soon as possible.

Call and close out your float plan when you return.

2-13 Lifting

The right way to lift: back injuries are the most common [and most severe] workplace injury. Approximately one-fourth of all on-the-job accidents reported each year involves back injuries and usually happens when the employee is lifting something incorrectly. The following tips can help you lift safely.

Lift, push, and pull with your legs, not your arms or back.

Avoid lifting higher than your shoulder height. Use a step stool or ladder to move objects at these heights.

Use a mechanical aid, such as a dolly, hand truck, or forklift, when you need to move heavy or bulky objects.

Turn by moving your feet, not your hips or shoulders. Twisting can overload your spine and lead to serious injury.

Carry heavy objects close to your body and avoid carrying them in one hand. Avoid a long reach to pick up an object.

Back injuries can be debilitating. Stay on the safe side and lift correctly.

2-14 Conclusion

No survey operation is so important or urgent as to compromise safe practice. When any operation becomes hazardous beyond reason due to unforeseen or uncontrollable circumstances, operations will cease until normal conditions have been restored.

Field employees are expected to do everything reasonable to protect the health and safety of themselves, their coworkers, and the public.

Party chiefs are responsible for ensuring safe operating procedures by crew members, instructing subordinates on safe work practices, enforcing safety policy, and setting a positive and safe example.

When planning survey operations, give safety considerations first priority. Such considerations will include, but not be limited to, the optimum time of day (or season) to accomplish a particular job, assignment of more experienced personnel for more hazardous jobs, the use of the “buddy system,” special work zone protection and traffic control requirements, setting monuments in the safest possible locations, and discussion of any recent accident, its cause, and appropriate corrective action.

Each survey party will have at least one member trained in basic first aid. All crewmembers are advised to be familiar with first aid. Each crew will have a first aid kit with them in the field.

Flaggers will be well trained and carry a valid flagging card.

Crewmembers will conform to the department’s policies on use of personal protective equipment, including hard hats, and approved high visibility garments.

When working with others, always be aware of their presence and condition, and be alert for their well-being.

The performance evaluation of all field survey personnel will contain a performance element regarding conduct as it relates to safety and health on the job.

This chapter has given you a brief introduction to some of the safety guidelines established by the Washington State Department of Transportation for surveyors. Other important guidance is in the references in 2-01.1.

The word *safety* can be interpreted in many different ways. To some it can mean to be free from injury, to others it means to be secure from danger. These are both good definitions, but the one WSDOT likes best is “The giving of protection.”

We hope these safety guidelines will give you a little more protection on the highways and roads. There will always be risk for surveyors working in traffic. The odds, however, can be made more favorable.

2-15 Training

New field personnel are required to have a definite understanding of what will be expected of them concerning on-the-job safety.

This training is to be accomplished by the supervisor to familiarize new, promoted, transferred, or reassigned employees that will be involved in surveying activities with WSDOT. This instructional training is to be accomplished prior to working on a survey crew.

The (instructional training) may be accomplished through a personal interview, group discussion, or lecture. A training form (Exhibit "A") will be used by the supervisor conducting the instructional training.

Upon completion of the training, the employee is required to sign the form acknowledging the supervisor's briefing.

The form will be forwarded to the Regional or Headquarters Safety Manager to remain on file for the duration of employment. Forms are to be updated every five years.

EXHIBIT "A"
SAFETY TRAINING CHECKLIST

Check those items that were reviewed.

Ch. 1

Working in Traffic

- The wearing of personal protective equipment
- The use of traffic control devices
- Flagging Operations
- Surveying safety procedures in traffic
 1. Finding old base lines on pavement and then offsetting them.
 2. Tying in a section corner, which is between active traffic lanes.
 3. Bench runs.
 4. Finding utilities on a design survey.
 5. Obtaining elevations for a DTM between active traffic lanes or in a shared turn lane.
 6. Obtaining elevations for a DTM on high-speed highways.
 7. Recovering line monuments from an old base line and placing a new base line in its original position.
 8. Auxiliary lane and lane closures.
 9. Working in intersections.
- Safety inspections
- Use of vehicle warning lights
- Safety rules while working in traffic

Ch. 2

Proper Use of Each Tool

- Machetes
- Axes and brush hooks
- Digging tools, hand
 1. Picks
 2. Shovels
 3. Digging bars
 4. Roto-hammers, power augers and chain saws
- Driving tools, hand
- Chain Saws
- Pressurized spray cans

Ch. 3

- Railroads, working near**

Ch. 4

- Fence Crossings**

- Ch. 5 **Animal hazards**
- Ch. 6 **Snakebite**
- Ch. 7 **Poisonous plants**
- Ch. 8 **Power lines
Electrical storms**
- Ch. 9 **Confined space entry**
- Ch. 10 **Working in water**
- Ch. 11 **Proper lifting procedures**

I hereby acknowledge that I have been briefed on the contents of DOT’s handbook, “Safety for Surveyors” and the above subjects were discussed and explained to me.

I further certify that it is my responsibility to comply with the provisions of department safety procedures and I understand that my own safety as well as the safety of my coworkers, the general public, and department equipment is an inherent obligation and that it is a part of my duties and responsibilities to identify, correct, eliminate, remove, and report hazardous conditions and unsafe practices that might result in an accident. The employee should have in their possession a valid Certified Flagging and First Aid Card within six months of employment or transfer.

Conducted By:

Immediate Supervisor Signature	Employee Signature
Immediate Supervisors name	Employee name
Job Title	Job Title
Unit	Date
cc: Regional/Headquarters Safety Manager	
Supervisor and/or Field Office	
Employee	

