

# HANDBOOK OF SAFE PRACTICES



®

MEMBER NATIONAL SAFETY COUNCIL

TEXAS HIGHWAY DEPARTMENT  
INSURANCE DIVISION

**TO: ALL EMPLOYEES**

This handbook has been provided to help you avoid accidents. Use it to your advantage. Take the time to review the safe practices listed for an operation before you begin that phase of your work. If you are a supervisor, use this book to make certain that the employees that you supervise know the correct way to accomplish their work.

Each employee is expected to use the personal protective equipment which is supplied to him to do a given job. This includes the use of automobile seat belts and shoulder harnesses. It is the supervisors' responsibility to see that these requirements are fulfilled.

We hope that you will accept this handbook as evidence of our concern over your safety.

A handwritten signature in black ink, reading "B. L. DeBerry". The signature is written in a cursive style with a large, sweeping "B" and "D".

B. L. DeBerry  
State Highway Engineer

# HANDBOOK OF SAFE PRACTICES

## Record of Revisions

Change Number

Date Posted

By Whom

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## INSURANCE DIVISION

### Introduction

This Handbook of Safe Practices is issued to assist Texas Highway Department employees perform their duties more safely. It is published solely for the information and guidance of the employees to whom it is issued.

It is distributed for intradepartmental use only. It is not intended to, nor does it, establish a legal standard of conduct for Texas Highway Department employees. It is subject to revision as conditions may warrant.

HANDBOOK OF SAFE PRACTICES  
TEXAS HIGHWAY DEPARTMENT

CERTIFICATE

I certify that I have received the *Handbook of Safe Practices* and that I have become familiar with its contents. I agree to keep and use the Handbook as a reference while performing duties for the Department, to endeavor at all times to work in the safest manner possible, and to follow the principles and intent of this *Handbook of Safe Practices*.

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Signature of Employee

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Date Returned

This Certificate and receipt is to be returned within two weeks to the person who issued this book to you. This Certificate will be made a part of your permanent record.

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Name of Person Issuing Handbook

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Date Issued

**ON THE JOB**

**OFF THE JOB**



**YOUR SAFETY is UP TO YOU!**

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## GENERAL RULES —SERIES 101

### Duties of Employees

.1 Each non-office employee will be issued a copy of the Handbook of Safe Practices.

.2 Each recipient shall sign the certificate in the Handbook of Safe Practices acknowledging receipt of the Handbook.

.3 Be courteous at all times and under all circumstances. Arguments with the public must be avoided. A courteous act is invaluable.

.4 Every employee should be constantly watching for hazards along the highways of the designated system. If one is noted, prompt action must be taken, either to have it removed or to notify your supervisor.

.5 If an employee is conducting any operation in a manner dangerous to himself or others, his attention should be immediately called to the danger.

.6 When an employee is involved in an accident causing personal injury to himself or a fellow employee, and it is definitely established that this was due to his CARELESSNESS and NEGLIGENCE, he may be subject to disciplinary action at the discretion of the District Engineer.

## **Series 101**

.7 In the event a member of the traveling public reports an unsafe condition to an employee, this report should be related to the employee's supervisor as soon as practicable.

### **Horseplay**

.20 Serious injuries can result from horseplay. Offenders will be subject to dismissal at the discretion of the District Engineer.

.21 Employees are not covered under workmen's compensation if injured while engaging in horseplay.

### **Intoxicants**

.30 The use of any kind of intoxicants during Department working hours is forbidden and will subject the offender to dismissal at the discretion of the District Engineer.

### **Workmen's Compensation - Medical Care**

.40 All employees are covered by Workmen's Compensation insurance.

.41 Employees will be required to stand a pre-employment physical examination by a licensed physician designated by the Highway Department with the exception of applicants who are to perform **mainly** office or clerical work.

## Series 101

.42 It is the policy of the Department to provide the best medical care available for employees injured while performing duties for the Department. This care includes all reasonable hospital, drug, and doctor services as recommended by the attending doctor to cure and relieve the condition.

.43 A list of doctors designated to perform physical examinations is available. These doctors may be recommended to the injured employee if he does not have a preference. These doctors are familiar with the treatment of industrial injuries and have the necessary forms to facilitate our payment of medical expenses.

.44 Beginning with injuries occurring after September 1, 1973, employees are allowed to integrate accumulated sick leave, vacation and/or compensatory time with weekly workmen's compensation benefits in order to continue receiving full salary when losing time due to an on-the-job injury.

.45 This policy is subject to the following rules:

- a. Employee must have sick leave, vacation benefits, or compensatory time earned as of the date of injury.

**Series 101**

- b. Employee must sign Form 20.86 requesting or rejecting integration of sick leave, vacation, or compensatory time with weekly compensation benefits.
  - c. The usual payroll deductions will be made while receiving full salary.
  - d. Employee's lost time must be substantiated by a doctor's certificate and/or report or Form 20.85 to be submitted to D-20.
- .46 Employees will be allowed a choice of:

- a. Integrating accrued sick leave, vacation and/or compensatory time with weekly compensation benefits,

... or ...

- b. Being dropped from the regular Salary and Labor Payroll and going on weekly compensation payroll.

.47 All employees losing time from work because of an on-the-job injury will be required to sign Form 20.86 indicating their choice. The employee is completely free to choose either plan. If the employee does

## Series 101

not choose to integrate sick leave and/or vacation benefits, then weekly compensation benefits will be paid by D-20 as provided by law.

.48 Full medical benefits will be provided employees regardless of their choice above.

.49 Any injury suffered by an employee on the job shall be reported to his supervisor at the time it occurs.

.49a If an accident results in a minor injury and it is thought that medical care is not needed, the injury, nevertheless, shall be reported by the injured employee to his supervisor at the time the injury occurs. (Complications could possibly occur that would make medical care necessary at a later date.)

.49b Fatalities, critical injuries, hernia claims, and third party injuries should be reported by telephone immediately to the Insurance Division in Austin, either by the section supervisor or by a District official, depending on District policy.

.49c Form 487, First Report of Injury, should be completed by the supervisor and forwarded to the Insurance Division as soon as practical on all injuries when the injured employee reports to a doctor or when the injured employee is losing time off from work.

## Series 101

### Third Party Accidents

.50 A "third party" accident is defined as an accident in which a Department employee is involved and in which someone else is involved who is not an employee. For example, a collision between a Department vehicle and a vehicle owned by someone not employed by the Department, or an employee is injured at a construction site and a contractor or his employee is involved, or an employee is injured by a motorist while working on the road surface.

.51 An immediate investigation by an Insurance Division representative is needed to determine if the third party is liable in order to protect the interest of both the employee and the Department.

.52 The Insurance Division should be called by telephone at once by the local supervisor when third party accidents occur involving injury to an employee or when *any* third party accident occurs involving Department vehicles and third party vehicles.

.53 All possible information concerning the manner in which third party accidents occur should be obtained immediately, such as: (a) name and address of owner and operator of the vehicle; (b) operator's license number; (c) names and addresses of all passengers and witnesses; (d) identification of third party vehicle, in-

## Series 101

cluding license number, make, model, etc.; (e) if available, name and address of third party insurance carrier; (f) all pertinent information on description of accident scene; (g) origin and destination of the third party. Blank Form 592, *Vehicle Accident Check List*, should be completed by the Department driver or by other employees at the accident scene.

.54 No written statements are to be given by employees of the Department except to representatives of the Department, to law enforcement officers, and to insurance representatives representing employees or the Department.

.55 Injured employees shall not sign a release for third party insurance carriers until after consulting with a representative of the Insurance Division or other authorized Department representative. This procedure is necessary to make certain the interests of the employee and the Department are protected.

.56 Form 482, Uniform Motor Vehicle Accident Report, and Form 466, Affidavit to Accompany Accident Report, must be forwarded to the Insurance Division on vehicle accidents involving personal injury or property damage. Form 482 must be signed by the supervisor.

## **Series 101**

.57 Report by telephone to the Insurance Division the following types of accidents:

- a. All fatal or serious injuries sustained by Highway Department employees, regardless of cause, while in the course of their employment.
- b. All injuries requiring medical attention received by Highway Department employees while in the course of their employment where a third party is involved.
- c. All motor vehicle accidents involving a Highway Department vehicle with a third party vehicle, pedestrian, or third party private property including alleged accidents such as flying objects thrown by mowers.
- d. All accidents, regardless of who is involved, which occur where a Highway Department vehicle or equipment is in close proximity to the accident scene whereby the Department could become involved from a legal standpoint.
- e. All accidents resulting in a fatality, injury, or property damage to the public whereby the Department might become involved



**Series 101**

because of allegations of negligence on the part of the Department or its officers or employees.

- f. All accidents where a Department employee, while operating a privately owned vehicle in the performance of his assigned duties is involved with a third party.

**Procedures at Accident Scenes (Also See Heading Third Party Accidents)**

.60 Upon arrival at accident scenes, if there are injuries, render first aid to the injured.

.61 If a law enforcement officer is at the scene, follow his directions with regard to controlling traffic. In the event there is no policeman present and the roadway is obstructed, post flagmen or other means of traffic control to prevent additional accidents.

.62 If needed, call an ambulance, doctor, and a wrecker.

.63 Call the appropriate law enforcement agency and your Highway Department supervisor.

.64 Permit any competent person to use your first aid kit and fire extinguisher.

.65 Render all reasonable aid to the injured, law enforcement officers, and other authorized persons at the accident scene.

## AIR COMPRESSORS - SERIES 102

.1 When inspecting compressors if they are electrical, disconnect power source. Air tanks should be inspected each three months.

.2 Valves should be cleaned at least each three months.

.3 A complete inspection and cleaning of compressors, lines, receivers, and auxiliaries should be made at least once a year.

.4 When air tanks are cleaned, kerosene, gasoline, or other light oils should not be used because of the danger of explosions.

.5 Air tanks should have a drain valve at the lowest point. The tank should be drained each day.

.6 Compressors should have a separator on the line to the air tank to catch any oils.

.7 Before starting compressors, be sure all hand operated valves to pressure gauges are open.

.8 The air compressor tank gauge shall be in-

## Series 102

spected to make sure it is registering.

.9 Kick-off pressure shall be checked to make sure it is normal.

.10 Do not adjust safety valve of kick-off.

.11 Do not hammer on compressor tanks when they are under pressure.

.12 Stand clear of hose connections and make sure they are secure before releasing full pressure to hose.

.13 Close valve at compressor end of hose to release air before disconnecting hose from compressor.

.14 The stream of air shall not be directed toward any person or used for dusting off clothing.

.15 Never horseplay with air hoses or compressed air.

.16 If compressed air is used to clean parts, eye protection shall be worn.

.17 When compressors are towed on the roadway, they shall be equipped with stop lights and two flags mounted on the two rear corners of the compressor.

.18 In addition to the regular hitch, a safety chain should be used.

### **ARC WELDING - SERIES 103**

.1 The Welders shall be thoroughly familiar with the hazards of each job.

.2 Welding shall be done in an area that offers a minimum amount of fire hazard.

.3 Portable fire fighting equipment shall be serviceable and readily accessible.

.4 Welding shall be performed behind a protective screen or wall if other employees are working in the area.

.5 Flash goggles should be worn under welding helmets.

.6 Welders shall use a shade of filter lens appropriate to the amperage being used. See Schedule, Series 103, Rule .18.

.7 When used outdoors, welding machines should be protected against the weather.

## **Series 103**

.8 Cables, electrode holders, and equipment should be inspected prior to each time used.

.9 Cables should be kept clean and dry.

.10 A proper ground shall be maintained at all times.

.11 Adequate ventilation should be provided, preferably by exhaust fans. (Oxides of nitrogen and ozone, both toxic, are formed by the welding arc.)

.12 Welders shall wear welder's gloves while working.

.13 Electrodes should not be changed with bare hands or wet gloves, or when standing on wet floors or grounded surfaces.

.14 Electrode holders and cables should in all cases be large enough to accommodate maximum current being used without overheating.

.15 If welding on a tank or container that has contained flammable liquids, the container should first be thoroughly steam cleaned, or purged with an inert gas (nitrogen or CO<sub>2</sub>) or filled with water and

then drained within an inch or two below the place where the work is to be done, with a vent left open.

.16 Do not weld around vapors of chlorinated solvents.

.17 Good housekeeping should be maintained in the welding area.



## .18 Selection of Shade Numbers for Welding Filters

### By Size of Welding Rod

Welding Operation	Shade Number
Shielded metal-arc welding	
1/16-, 3/32-, 1/8-, 5/32-inch electrodes - -	10
Inert-gas metal-arc welding (nonferrous)	
1/16-, 3/32-, 1/8-, 5/32-inch electrodes - -	11
Inert-gas metal-arc welding (ferrous)	
1/16-, 3/32-, 1/8-, 5/32-inch electrodes - -	12
Shielded metal-arc welding	
3/16-, 7/32-, 1/4-inch electrodes - - - - -	12
5/16-, 3/8-inch electrodes - - - - -	14
Atomic hydrogen welding - - - - -	10 - 14
Carbon-arc welding - - - - -	14
Soldering - - - - -	2
Torch blazing - - - - -	3 or 4
Light cutting, up to 1 inch - - - - -	3 or 4
Medium cutting, 1 inch to 6 inches - - - - -	4 or 5
Heavy cutting, over 6 inches - - - - -	5 or 6
Gas welding (light), up to 1/8 inch - - - - -	4 or 5
Gas welding (medium), 1/8 inch to 1/2 inch -	5 or 6
Gas welding (heavy), over 1/2 inch - - - - -	6 or 8

**Shade Number Selection  
By Amperes:**

Shade 5 is intended for light spot welding.

Shades 6 and 7 are for arc welding up to 30 amperes.

Shade 8 is for arc welding and cutting when using over 30 but not exceeding 75 amperes.

Shade 10 is for arc welding and cutting when using over 75 but not exceeding 200 amperes.

Shade 12 is for arc welding and cutting when using over 200 but not exceeding 400 amperes.

Shade 14 is for arc welding and cutting when using over 400 amperes.

**ASPHALT HEATERS, DISTRIBUTORS, AND  
STORAGE — SERIES 104**

.1 Only authorized and trained personnel will be permitted to light heating units on asphalt heaters and distributors.

.2 Have a carbon dioxide or dry chemical fire extinguisher handy. Know how to use it.



## Series 104

.3 Heaters and asphalt should be free of water before heating.

.4 In lighting burners, use an oil-soaked rag on a long wire. Never light the burner with a match held in the hand. Do not stand directly behind the burner; stand to one side in case it blows back when igniting.

.5 Do not turn the flame so low that there will be danger of the flame extinguishing, which will permit fuel to accumulate.

.6 Do not overheat. Know correct temperature for type of asphalt being heated. If vapor changes to a dense yellow, reduce heat at once.

.7 An open fire should not be used to heat storage tanks.

.8 Vapors from heated asphalt (and vents) will settle and should not be permitted to reach open flames.

.9 Storage tanks should be vented. The vent should be so located that there will be no danger of vapors settling and reaching open flames.

.10 Hatches on tanks should have serviceable gaskets and be air tight.

.11 Storage tanks should be located as far as practical from buildings and other flammable materials.

.12 Do not use water on asphalt fires.

.13 Do not smoke while handling liquid asphalt.

.14 If hot asphalt splashes on skin, cool it with cold water.

.15 Gloves and face shields should be worn while filling pouring pots.

.16 Gloves and face shields should be worn while pouring hot asphalt.

.17 Stop lights and flags should be installed on the two rear corners of asphalt heaters.

.18 In addition to the regular hitch, a safety chain should be used.

## Series 104

.19 When using hot asphalt, employees should wear garments that cover the body completely with sleeves reaching over the wrists and trousers over the shoe tops. Gloves should be worn.

## .20 Flash Point °F of Asphalt

Asphalt Materials	Minimum Allowed by Specifications	Usual Flashpoint	Recommended Appli- cation Temperature Range °F
RC-1	80	80-85	100-150
RC-2	80	85-100	125-180
MC-1	80	145-165	70-150
OA's and AC's	375	450-600	275-375

## Series 105

### BOILERS AND OTHER PRESSURE VESSELS - SERIES 105

.1 The safety valve on a steam boiler or a hot water heating boiler shall not be loaded to maintain a working pressure in excess of that for which the boiler was designed.

.2 Boilers should be equipped with an automatic low water fuel cut-off.

.3 Testing of safety valves should be done periodically when the boilers are kept in continuous operation during the winter months by raising the valve to its full open position, then releasing the lift lever to allow the valve to snap closed.

.4 Boilers should be equipped with other safety devices as outlined in *State of Texas Boiler Law Rules and Regulations*. This publication is available from the Bureau of Labor Statistics, Box T, Capitol Station, Austin, Texas 78711.

.5 All hot water and steam boilers should be inspected annually by the State Bureau of Labor Statistics.

.6 Care should be exercised in working with paint pressure tanks and other non-fired pressure vessels that may be under pressure to see that the pressure has been released before opening.

.7 Pressure vessels should be inspected frequently for signs of stress and corrosion.

.8 Non-fired pressure vessels should also be equipped with safety valves.

## **CABLES AND CHAINS – SERIES 106**

.1 Inspect all cables and chains carefully before installing to make sure there has been no damage in transit or storage.

.2 Sharp bends, kinking, or knots should not be permitted. (If they have occurred, the chances are the cable has been weakened.)

.3 Metal thimbles should be used in eye splices of a size that is correct for the cable size being used.

4 Use block of wood or other suitable object to protect cable or sling from damage when passing over sharp surfaces.

## Series 106

.5 Check clamps regularly for slipping or loosened nuts.

.6 Inspect hooks at regular intervals. Discard those that show strain or fatigue cracks.

.7 As a precaution against a cable under tension breaking, no one shall stand within the area of the expected arc of the broken cable.

.8 Inspect cables at regular intervals. Look for broken wires, irregular shapes of wires and strands, flattening, corrosion, and elongation.

.9 Keep cables lubricated with non-corrosive oil.

.10 Hooks with safety latches should be used.

.11 Chains should be inspected frequently for bent links, cracks, nicks and gouges, corrosion, wear, and elongation.

.12 Chains should be discarded when damaged or elongated more than 5%.

.13 Breaking strength of cables (wire rope) and maximum load to be placed on each size--improved plow steel--independent wire rope core--6 strands, 37 wires per strand--safety factor of 6

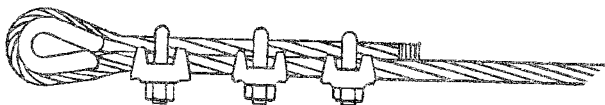
Diameter	Breaking Strength (Tons)	Maximum Safe Load (Pounds)
3/8	7.14	2,380
7/16	9.67	3,220
1/2	12.60	4,200
9/16	15.90	5,300
5/8	19.60	6,540
3/4	27.90	9,300
7/8	37.80	12,600
1	49.10	16,360

Note: 20% should be deducted from safe load to allow for decreased strength due to use of clips.

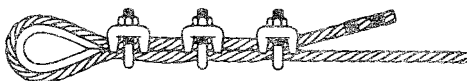


## Series 106

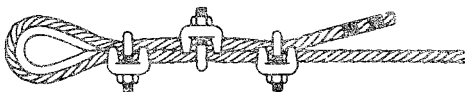
### .14 How to Attach Cable Clips



1. **CORRECT METHOD**—U-Bolts on short end of rope.  
(No distortion on live end of rope.)



2. **WRONG METHOD**—U-Bolts on live end of rope.  
(This will cause mashed spots on live end of rope.)



3. **WRONG METHOD**—Staggered clips; two correct and one wrong.  
(This will cause a mashed spot in live end of rope due to wrong position of center clip.)
4. After rope is in service, and is under tension, tighten clips to take up decrease in rope diameter.

#### Number of Clips and Distance Between Clips Needed for Safety

Diameter of Rope (Inches)	Number of Clips	Distance Between Clips
1/4 - 3/8	3	2-1/4"
7/16 - 5/8	4	3-3/4"
3/4 - 1-1/8	5	6-3/4"
1-1/4 - 1-1/2	6	9"
1-5/8 - 1-3/4	7	10-1/2"

.15 Working load limits and break test limits for  
alloy steel and wrought iron chain

NOMINAL SIZE OF CHAIN BAR IN INCHES	WORKING LOAD LIMITS IN POUNDS		MINIMUM BREAK TEST IN POUNDS	
	Alloy Steel	Wrought Iron	Alloy Steel	Wrought Iron
1/4	3,250	.....	10,000	.....
3/8	6,600	2,385	19,000	7,950
1/2	11,250	4,240	32,500	14,145
5/8	16,500	6,630	50,000	22,095
3/4	23,000	9,540	69,500	31,800
7/8	28,750	12,960	93,500	43,245
1	38,750	16,950	122,000	56,550
1 1/8	44,500	20,040	143,000	66,800
1 1/4	57,500	24,750	180,000	82,500
1 3/8	67,000	29,910	207,000	99,800
1 1/2	79,500	35,600	244,000	118,700
1 5/8	.....	41,800	.....	139,500
1 3/4	94,000	48,450	325,000	161,600
1 7/8	.....	55,300	.....	185,500
2	.....	63,300	.....	211,100

## **Series 107**

# **CHEMICAL AGENTS AND HAZARDOUS SUBSTANCES - SERIES 107**

## **Battery Acid**

.1 Goggles or face shields should be worn when filling or working around batteries.

.2 Care should be taken not to short circuit batteries by crossing jumper cables, or with wrenches or metal objects. A severe burn or an explosion could result and acid could be thrown on anyone near.

.3 Acid burns should be flushed immediately with water. Baking soda will neutralize the acid.

## **Carbon Monoxide**

.10 Carbon monoxide is colorless, odorless, non-irritating, and tasteless.

.11 These characteristics make it particularly dangerous, since a person can breathe enough for it to be fatal without knowing he is being exposed.

.12 Brain damage can result even though the victim lives.

.13 Mild carbon monoxide poisoning causes short-

ness of breath, headaches, dizziness, muscular weakness, and nausea. Remove to fresh air immediately. If breathing is irregular or has stopped, apply artificial respiration.

**PHYSIOLOGICAL EFFECTS OF EPOXY RESINS  
AND AUXILIARY CHEMICALS**

<u>Material</u>	<u>Primary Skin Irritant</u>	<u>Skin Sensitizer</u>	<u>Precautions</u>
Uncured epoxy formulations (solids)	nonirritating	nonsensitizing	Avoid inhalation of dust and vapor
Uncured epoxy formulations (liquids which contain a reactive diluent)	mild to moderate	mild to strong	Skin protection, goggles or face shield, and local exhaust removal
Uncured epoxy formulations (liquids which do not contain a reactive diluent)	mild to moderate	mild or nonsensitizing	Skin protection and goggles or face shield
Resin formulations (fully cured)	nonirritating	nonsensitizing	Avoid inhalation of dust or vapor

<u>Material</u>	<u>Primary Skin Irritant</u>	<u>Skin Sensitizer</u>	<u>Precautions</u>
Polyamide curing agents	practically nonirritating	mild or non-sensitizing	Skin protection
Amine curing agents	mild to strong	mild to strong	Skin protection, goggles or face shield, local exhaust removal, and avoid inhalation of dust or vapor
Anhydride curing agents	mild	mild or non-sensitizing	Skin protection and avoid inhalation of dust or vapor
Peroxide curing agents	mild to strong	mild or non-sensitizing	Skin protection, goggles or face shield, and avoid inhalation of dust or vapor
Reactive diluents (epoxy monomers)	mild to moderate	mild to strong	Skin protection, goggles or face shield, local exhaust removal, and avoid inhalation of dust or vapor
Solvents	defatting only	nonsensitizing	Skin protection, goggles or face shield, local exhaust removal, and avoid inhalation of dust or vapor

## Series 107

### Glass Beads

.30 Eye protection should be worn while handling glass beads.

### Insect Repellent

.40 Insect repellent should not be sprayed on eyes or lips.

.41 Do not spray near open flame. Do not smoke while using.

.42 Follow manufacturer's directions and precautions on container.

### Lime and Cement

.50 Quick lime should be stored in a dry place, since it forms slaked or hydrated lime when exposed to dampness, and may cause serious burns, especially to the eyes.

.51 Men engaged in handling cement and lime should wear protective clothing.

.52 If lime and cement are in bulk form and there is

exposure to the dust, goggles and dust respirators should be worn.

.53 Personal cleanliness is one of the best preventives against lime or cement dermatitis.

### Paint

.60 The fumes from paint should not be breathed. Adequate ventilation to remove the fumes should be maintained where possible.

.61 If there is not adequate ventilation to remove the fumes, a respirator should be worn.

.62 When a paint respirator is used for painting, one should be used with a chemical cartridge and an approved mechanical filter.

.63 A dust respirator with a mechanical filter approved to filter lead should be used when sanding or grinding a surface that has previously been painted with a lead base paint.

.64 Respirators and all components should be approved by the U. S. Bureau of Mines for the work being performed.



## **Series 107**

.65 Respirators should not be worn in places where the atmosphere is deficient in oxygen. Forced ventilation or a supplied air hose should be used.

### **Pesticides and Chemical Sprays**

.70 Pesticides and chemical sprays should not come in contact with the skin.

.71 Pesticides and chemical sprays should not be used near open flame. Do not smoke while using.

.72 Pesticides and chemical sprays should not be inhaled.

.73 Wash well with soap and water after using.

.74 Manufacturer's directions and precautions written on the container should be followed.

### **Sign Washing Solution**

.80 Add to the water separately and mix individually each of the following ingredients: Sodium Tripolyphosphate, Non-ionic Detergent, and HTH or Calcium Hypochlorite.

.81 DO NOT under any circumstances mix HTH and the non-ionic detergent together. A violent reaction may take place which sometimes causes the mixture to break into flame.

### Sodium TCA and other Weed Killers

.90 When working in areas where TCA is being applied, stand upwind to avoid spray.

.91 Wear a face shield when applying TCA and while mixing.

.92 In case of exposure, immediately flush skin and eyes with water for at least 15 minutes.

.93 Get medical attention for any significant exposure, especially to the eyes.

.94 Wear protective gloves when handling TCA. Wear long sleeve shirts.

.95 Wear rubber boots if making open soil treatment with TCA.

.96 Follow instructions on the container.

## Series 108

### Solvents

.100 Carbon tetrachloride or benzene (coal-tar naphtha) shall not be used for cleaning purposes. (Their vapors are highly toxic.)

.101 1,1,1,-trichloroethane is relatively safe but emits highly toxic fumes when heated.

.102 Petroleum naphtha (benzine, VM&P naphtha, spirits), gasoline, and other highly flammable solvents shall not be used for cleaning.

.103 Any liquid or solvent used for cleaning should be approved by your supervisor.

.104 Stoddard Solvent (other names for Stoddard Solvent: safety solvent, varnoline, cleaning solvents, naphtha safety solvents, mineral spirits, white spirits) having a flash point of 100-110° F, is the safest general cleaning solvent. Precautions should be taken, however, against the fire hazard. Proper ventilation should be provided.

## **ELECTRICAL HAZARDS - SERIES 108**

.1 All wire and apparatus should be of a type

approved by the Underwriters' Laboratories, Incorporated.

.2 Loose wires hanging from buildings, poles, or across roads should not be touched. A safe practice is to assume all wires are live.

.3 Insulation on wire should not be completely trusted.

.4 Double insulated portable electric tools should be used, or the frame on these tools should be grounded.

.5 Caution should be exercised in using portable electric tools in hazardous places, such as damp places, underneath buildings, or where contact with water pipes may be made.

.6 Switches should not be located where there are flammable vapors unless they are the special spark-proof type.

.7 Cords with defective or broken insulation should not be used.

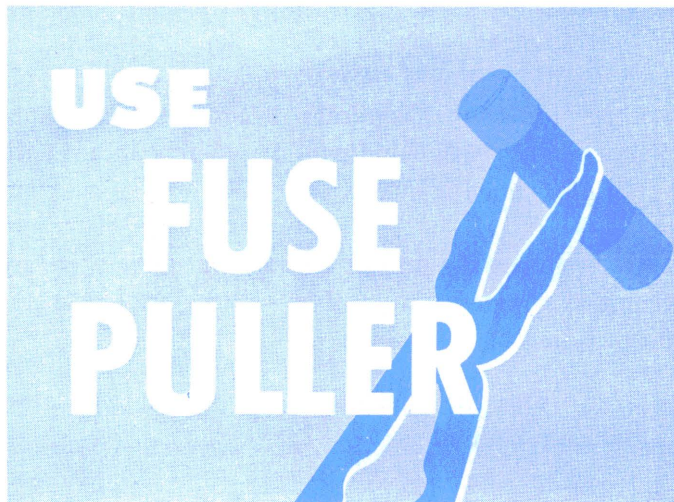
.8 Electric outlets and switches should be so

## Series 108

placed that they cannot be reached by anyone standing on a wet surface or where anyone cannot touch a grounded conductor, such as a water pipe.

.9 Treat all power lines as killers.

.10 Keep all equipment booms a minimum of ten feet from power lines.



.11 Care should be taken to keep metallic tapes and other conductors clear of power lines.

.12 Non-metallic tools should be used in electrical work wherever possible.

.13 Only authorized personnel shall perform electrical work.

#### EMERGENCY PLANNING - SERIES 109

.1 Excluding Highway Department buildings and facilities necessary for highway operational purposes, certain Highway Buildings are designated for use as public fallout shelters.

.2 Throughout the Highway Department there is a minimum of two trained radiological monitors assigned to each radio base station and to each District Headquarters.

.3 Radiological detection instrument kits are on hand and located at each radio base station and at each District Headquarters in the Highway Department.

.4 During any major emergency or disaster the

## Series 109

Highway Department would be expected to render extensive aid because of its facilities and communication system.

.5 The Department endeavors to keep trained in First Aid at all times the major portion of its maintenance personnel, and as many construction personnel as feasible at the discretion of the District Engineer.

*.6 When incidents occur involving spillage or release of radioactive materials, or there are personal injuries involving radioactive materials, the following emergency actions and precautions against radiation exposure should apply.*

*.7 Notify the Texas State Department of Health immediately by telephone if radioactivity is suspected. The telephone number is area code 512-454-3781, Extension 241.*

.8 If the incident involves wreckage and a person is believed to be alive and trapped, make every possible effort to rescue him.

.9 Restrict the area involved as a result of the incident. Keep the public as far from the scene of the

incident as practical. Souvenir collection and handling of debris by on-lookers should be prevented.

.10 Separate and detain for further examination those persons who have had possible contact with the radioactive material. Obtain the names and addresses of those involved. Remove injured persons from the area affected by the incident with as little direct personal contact as possible and hold them at a transfer point.

.11 Personnel monitoring and decontamination may be initiated and carried out only by trained monitors with proper identification and instruments.

.12 Until physicians familiar with radiological health procedures are present, limit first aid and medical procedures to those that must be done promptly. When an injured individual is removed to a hospital or doctor's office, the doctor or hospital should be informed when there is reason to suspect that the injured individual may have radioactive contamination on his body or clothing.

.13 In incidents involving fire, fight fire from upwind. Keep out of smoke, fumes, or dust resulting from the incident. Segregate clothing and tools used at the fire until they can be monitored for radioactive contamination.



## Series 109

.14 Do not handle suspected material until it has been monitored and released by radiation monitoring personnel.

.15 In the event of a vehicle accident involving radioactive material, detour all traffic around the accident scene. If this is not possible, move the vehicle or vehicles involved the shortest distance necessary to clear the right of way.

.16 If radioactive material is spilled, prevent the passage of vehicles and people through the area unless absolutely necessary. If traffic lanes must be cleared before qualified specialists arrive, wash spillage to the shoulders with a minimum dispersal of wash water.

.17 Do not eat, drink, or smoke in the incident area. Do not use food or drinking water that may have been in contact with material from the incident area.

.18 Do not try to do too much prior to the arrival of radiation specialists and physicians.

.19 In the event of other emergencies and disasters, such as floods, tornadoes, and hurricanes; or spillage of toxic, corrosive, explosive or inflammable substances on or near the right-of-way, plans will be

## Series 110

carried out as necessitated by the circumstances and as devised by the District Engineer. *If there is personal injury or property damage and notification has not been made by other persons, the State Civil Defense Office should be notified.*

*.20 The State Civil Defense Office is under the jurisdiction of the Department of Public Safety. The telephone number is area code 512, 452-0331, Extension 295.*

### FIRE PREVENTION - SERIES 110

.1 Carbon tetrachloride fire extinguishers should not be used. The vapors are toxic. When carbon tetrachloride is heated, it emits a deadly gas.

.2 Clear passageways should be maintained to extinguishers and exits.

.3 Oily rags, waste, etc., should be disposed of in metal cans with covers and should be emptied frequently.

.4 Precautions against fire and explosions should be taken where flammables with a low flash point are stored or used. Some commonly used hazardous liquids are gasoline, paint and paint thinners, and solvents.

## Series 110

.5 Spilled inflammable liquids should be cleaned up at once.

.6 Gasoline and other inflammable liquids should not be stored on equipment, except for one day's supply.

.7 Containers of inflammable liquids shall be secured in vehicles before transporting.

.8 All buildings, especially shops, laboratories, and garages, should be equipped with fire extinguishers.

.9 All vehicles and major pieces of equipment should be equipped with fire extinguishers.

.10 All fire extinguishers should be inspected and serviced at least every six months.

.11 A record of inspection should be maintained both at a central location and on a tag attached to each extinguisher.

.12 One individual should be appointed and should be made responsible for performing inspections, seeing that extinguishers are serviced, and for maintaining records.



.13 Each employee should know how to operate each type of extinguisher and should know which type to use on each class of fire. See “Correct Use of Fire Extinguishers,” this series, rule .17.

.14 An inert gas should be used to charge dry chemical extinguishers. (The chance is too great of ordinary air containing moisture.) The valve assembly should be thoroughly cleaned when recharging.






## **Series 110**

.15 The size, type, and quantity of extinguishers installed should conform to state/federal safety and health standards.

.16 All aerosol cans react like bombs in a fire, and this fact should be considered in storage.

## .17 Correct use of Fire Extinguishers.

## CORRECT USE OF FIRE EXTINGUISHERS

TYPE	KINDS OF FIRE	HOW TO START	RANGE AND DURATION
AIR PRESSURIZED 	<b>CLASS A</b> WOOD, PAPER, TEXTILES, ETC. Loaded stream model can also be used on very small Class B fires	<b>PULL PIN AND SQUEEZE HANDLE VALVE</b> Can be operated intermittently	30 to 40 feet 50 to 55 seconds 2½ gallon size  <b>DANGER</b> <b>DO NOT USE THESE WATER BASE UNITS ON ELECTRICAL FIRES</b>
SODA ACID 	<b>CLASS A</b>	<b>TURN OVER</b> Operates continuously	
PUMP-TANK 		<b>PUMP BY HAND</b> Can be operated intermittently	
GAS CARTRIDGE 	<b>CLASS A</b> Loaded stream model can also be used on very small Class B fires	<b>TURN OVER AND BUMP</b> Operates continuously	
FOAM 	<b>CLASS A and CLASS B</b> Oil, gasoline, paint, grease, etc.	<b>TURN OVER</b> Operates continuously	
CARBON DIOXIDE 	<b>CLASS B and CLASS C</b> <b>ELECTRICAL EQUIPMENT</b>	<b>PULL PIN AND PRESS LEVER OR OPEN VALVE</b>	6 to 8 feet about 12 seconds 15 lb. size
DRY CHEMICAL 	<b>NOTE—</b> These extinguishers can be effectively used to <u>control</u> small Class A fires	<b>PULL PIN AND PRESS LEVER</b> Cartridge models have puncturing lever and hose control nozzle	20 to 25 feet 22 to 25 seconds 20 lb. size
MULTI-PURPOSE CHEMICAL 	<b>CLASS A CLASS B and CLASS C</b>	<b>PULL PIN AND PRESS LEVER</b> Cartridge models have puncturing lever and hose control nozzle	

## Series 111

### FIRST AID AND HEALTH (SEE ALSO POISON IVY) - SERIES 111

.1 It will be the responsibility of each vehicle operator to see that the First Aid Kit in the vehicle he is operating is fully stocked at all times.

.2 Each work crew or group of employees should have at all times one employee present who is trained in First Aid.

.3 An American Red Cross First Aid Book should be available at all locations where men are working.

.4 In those cases of severe bleeding and when breathing has been suspended, immediate first aid is essential.

.5 In minor injuries, not requiring the services of a doctor, First Aid should be rendered as soon as possible before infection or other complications can result.

.6 If there is any doubt about the severity of an injury, report to a designated doctor.

.7 When it is necessary to report to a doctor, you are expected to follow his exact instructions.

.8 The better your health and the better your muscle tone, the less chance you have of being injured. Adequate sleep and exercise are important.

## 9 First Aid Care

Series 111

Injured	Symptoms	First Aid
Asphyxiation	Lips, ear lobes, blue; breathing stopped; unconscious.	Move to fresh air. Start artificial respiration.
Bleeding (from Arteries)	Spurting, bright red blood from wounds.	Place tourniquet above wound, leaving unbroken skin between tourniquet and wound. Once applied, tourniquet should not be released except by a physician.
Bleeding (from Veins)	Steady flow; dark red blood.	Apply sterile compress firmly over wound to aid clotting.
Bleeding (Internal)	Pale face; faintness; thirst, sighing; weak, rapid pulse.	Lay with head low; apply cold packs to point you think bleeding.



Injured	Symptoms	First Aid
Burns	Redness; pain; blisters; charred or cooked tissue.	Spray with water soluble burn treatment. Exclude air by applying dressing. Chemical burns—first wash with water.
Drowning	Unconscious; not breathing.	Remove water; cleanse mouth; tongue forward. Loosen clothing. Give artificial respiration.
Dislocations	Deformity compared to uninjured limb. Pain.	Dress in lines of deformity. Do not reduce.
Electric Shock	Unconscious; breathing stopped; burns at contact point.	Insulate self and rescue victim. Start artificial respiration. Dress burns.

Fainting

Unconscious; face pale; cold sweat; pulse weak and rapid.

Lay with head low; keep warm; loosen clothing; give inhalant.

Foreign Body  
in the Eye

Pain; scratching sensation

Do not rub. If the object does not dislodge by natural watering and blinking of the eye, place eye bandage without ointment over the eye and report to doctor.

Fractures  
(Simple)

Pain; swelling; deformity; inability to move limb.

Support above and below fracture; apply well-padded splints.

Fractures  
(Compound)

Open wound; possibly bone protruding; bleeding.

Compress to wound; apply splints padded to deformity; do not pull.

Fractures  
(Skull)

Possible bleeding eyes, nose and mouth; serum from ears in basal fracture.

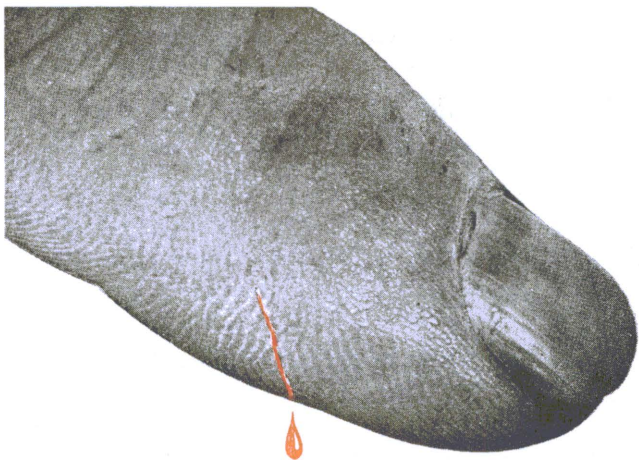
Raise head; dress wound; no stimulants; keep warm.

Injured	Symptoms	First Aid
Frost Bite	Affected part is white; no sensation.	Thaw slowly with snow or cold water; never expose to sudden heat.
Gas Poisoning	Yawning; giddiness; weariness; throbbing heart.	Rescue to fresh air; give artificial respiration.
Heat Exhaustion	Pale face; cold sweat; weak pulse; shallow breathing.	Keep warm; rub limbs toward heart; give stimulants.
Insect Stings	Pain moderate to severe at sting site.	First Aid not entirely effective because wound extends beneath the skin; something to neutralize poison, a mixture of baking soda and cold cream or a commercially produced sting treatment, may be

## Series 111

		helpful, followed by application of ice. For persons known to be allergic, use constricting band if sting is on an extremity. In any case, ice should be applied pending medical care.
Rupture	Sharp, stinging pain and lump in groin; faintness and sickness at stomach.	Place patient on back; raise knees and apply cold pack to lump.
Shock	Pale face; cold sweat; dazed condition; partly or totally unconscious.	Lay with head low; keep warm; rub limbs; give stimulants.
Snake Bite	Pain; swelling; fang marks.	Apply tourniquet above bite; open fang marks lengthwise with limb; use suction; apply fresh water ice to extremity and site of bite.

Injured	Symptoms	First Aid
Sunstroke	Unconscious; face flushed; skin hot and dry; breathing labored; pulse slow.	Raise head; reduce body temperature with cold packs; no stimulants.
Wound	Break in skin; incised, punctured or lacerated.	First aid and then cover with sterile bandage-- all puncture wounds to doctor.



Never too small  
to get  
**FIRST AID**



## **Series 112**

### **FLAGMEN AND FLAGGING - SERIES 112**

.1 The safety of the flagman, the motoring public, and the workmen may depend on the efficiency of the flagman.

.2 Flagmen should be mentally and physically alert, mature but preferably not past middle age.

.3 Flagmen should have normal or better sight and hearing.

.4 Flagmen should have a neat personal appearance.

.5 Flagmen should have a courteous positive manner.

.6 Flagmen should have knowledge of the operation in progress. Flagging duties should not be assigned to new employees.

.7 Flagmen when on duty shall wear the prescribed orange vest at all times and use the prescribed red flag at all times. Flagmen should wear a safety hat when flagging at work sites.

.8 All persons should wear an orange vest when on the road surface and not in a barricaded area.

.9 Flagmen should be efficient and courteous in their dealings with the traveling public, yet brief and to the point in conversation with motorists.

.10 Flagmen should remain in the flagged work area at all times unless properly relieved from duty.

.11 Flagmen should not mingle with the men who are working while on duty.

.12 See pages V-G-23 thru V-G-31 for distances that flagmen should stand from work area. Flagmen should normally position themselves so that they can see approaching traffic for a minimum of 500 feet.

.13 Flagmen should position themselves so that the flag is visible in the traffic lane, but they should not jeopardize their own safety.

.14 Flagmen must be ready to stand clear of approaching vehicles in case they do not stop.

.15 Each flagman should be thoroughly familiar with the booklet, "Instructions to Flagmen."

.16 See page V-G-35, Series 122, for signals to be used by flagmen.

## **HAND TOOLS - SERIES 113**

.1 Use the right tool for the job.



## Series 113

.2 Tools should be maintained in good condition and inspected daily.

.3 Tools should never be thrown, left in a high place where they might fall, or left where they might cause a tripping hazard.

.4 Use tools in the right way.

.5 Do not apply screw drivers to objects held in the hand.

.6 Do not pull knives or other sharp-edged tools toward the body.

.7 Do not strike two hardened steel tools together. At any time metal is being struck against metal, eye protection should be worn.

.8 When filing sharp-edged tools, hold the file so if it slips you will not be cut by the sharp edge of the tool or injured by the file.

.9 When not in use, store tools in a safe place. Tools should always be stored with the sharp edges protected.

.10 Repairing of tools requires special skills. If you

have not been trained in the repairing of tools, do not attempt it.

.11 Tools should not be used with cracked or split handles.



Axes

.20 Keep axes sharp and well honed.

.21 Make sure you have a clear circle in which to

## Series 113

swing. Remove brush and shrubbery and overhead vines.

.22 When you are not using the ax, protect the blade with a sheath. If you have no guard, carry the ax at your side. If the blade is single, keep the edge down.

.23 Be sure of your footing.

### Chisels and Metal Stakes

.30 Metal stakes should not be improvised of hardened shafts.

.31 Bull chisels or metal stakes requiring two men to drive should be held with tongs or a chisel holder. The hammer man should not wear gloves because the sledge might slip.

.32 On smaller chisels, hold a chisel lightly in the hollow of the hand with the palm up.

.33 All persons driving metal stakes or chisels, assisting in driving, or working in the immediate vicinity should wear goggles.

.34 Warm a chisel before use in very cold weather.

.35 Keep chisels well dressed and inspect them frequently.

.36 In using wood chisels, care should be taken to be sure that the wood is free of nails and metal.

.37 Drive wood chisels outward away from the body.

### Crowbars or Pry Bars

.40 Do not use makeshift tools for the job and do not use extensions (cheaters).

### Cutters

.50 Use cutters the correct size for work on bands, wire, rods, and bolts being cut.

.51 Cut material straight across.

.52 Safety glasses should be worn when using cutters.

.53 Do not use hammers or pry bars to snap metal bands. Keep one hand over the end which can fly loose.

### Files

.60 Files are extremely hard. Do not use them as a pry, a center punch, a chisel, or other tool.

## Series 113

.61 Do not use a worn or broken file, or one without a handle. A washer-type guard should be used in front of the handle.

### Hammers

.70 Do not use a steel hammer on hardened steel surfaces. Use a soft metal hammer or one with a plastic, wood, or rawhide head.

.71 Wear safety goggles for protection against flying chips, nails, or scale.

### Jacks

.80 Do not overload jacks.

.81 Be sure of the jack footing.

.82 Never stand at the handle of a jack under load.

.83 Never expect too much of a jack. They can fail.

### Load Binders (Boomers)

.90 Do not use extensions (cheaters) on load binders. If a cheater is needed, either the chain is too tight or a larger size load binder is needed.

.91 Be sure hands and handle of binder are dry and free of oil and grease so hands will not slip.

.92 Keep face and head clear of load binder handles when they are being locked down.

.93 Inspect binders with each use to be sure that handles are not cracked and that swivels and hooks are in good condition.

.94 Hooks should not be stretched and should be of a size appropriate to the chain being used.

.95 A ratchet-type load binder of the correct size prevents most load binder accidents.

### Machetes

.100 Be sure other personnel are clear of your swing.

.101 Watch for overhead vines or brush that will deflect your blow.

.102 Do not swing in an arc such that the blade can hit your legs.

## Series 114

.103 Keep machetes sharp, and sheathed when not in use.

### Wrenches

.110 Use the right size and type for the job. Do not use an extension unless the extension is made for the wrench. Do not use a hammer to force a wrench.

## **HOUSEKEEPING - SERIES 114**

.1 Definition: Housekeeping is not only cleanliness, but also an orderly arrangement of operations, tools, equipment, storage facilities, and supplies resulting in more efficient maintenance and construction, lower cost, lower accident rates, and improvement in employee morale and public relations.

.2 Daily housekeeping is not enough; it must be constant and continuous and incorporated into activities and every job by each supervisor and each employee.

.3 Some things to watch for: litter; unused odds and ends; tools out of place; trash not placed in waste cans; poor lighting, ventilation, sanitation; tripping hazards; oil on floor; fire hazards; poor fire equipment; inadequate storage facilities; colors

inappropriate to hazard, identification, reflective qualities needed; MATERIAL WITH NAILS PROTRUDING THAT MIGHT BE STEPPED ON.

**LABORATORIES (SEE HEADING FIRE PREVENTION, SERIES 110) - SERIES 115**

.1 Rooms with explosion hazards should have two exits.

.2 Adequate ventilation should be provided, either natural or forced, in all areas where volatile or toxic gases exist.

.3 Where Bunsen burners or electric heaters are used, tables should be covered with non-flammable tops.

.4 Use asbestos gloves for handling hot pans or apparatus.

.5 Where strong acid is used, tables should be covered with acid-resistant coating. Rubber gloves must be used.

.6 There should be a separate receptacle for broken glass wear.



## Series 115

.7 Flammable waste must be carefully stored away from heat of any kind.

.8 Volatile liquids should not be placed near artificial heat.

.9 Unauthorized personnel should be kept out of experimental or storage rooms.

.10 All laboratory personnel shall be familiar with fire protective devices.

.11 Appropriate respirators should be readily available.

.12 Always use a suction bottle or approved hand bulb to start a syphon.

.13 Wear goggles whenever there are chances of flying particles.

.14 All containers of liquified gases formerly containing flammables should be stored in an isolated building.

.15 All bottles and containers should be plainly labelled.

.16 Electric heaters rather than open flame burners must be used in rooms where volatile liquids or gases are used.

.17 Inrunning pinch points on belts and pulleys, such as on seive shakers, should be guarded.

## MAINTENANCE AND CONSTRUCTION EQUIPMENT - SERIES 116

.1 All equipment shall have installed and operational the prescribed safety equipment, lights, flags, and devices.

.2 Regular inspections, as prescribed by the Equipment and Procurement Division, should be made on all equipment, and inspection reports should be kept on file, and necessary action taken to remedy unsafe conditions.

.3 Regular routine maintenance and operational checks, as prescribed by the Equipment and Procurement Division, should be performed at prescribed intervals. Information should be recorded in the equipment service record. Manufacturer's operators and service manuals should be on hand and followed.

## Series 116

.4 Belts, pulleys, sheaves, gears, chains, shafts, clutches, drums, fly-wheels, and other reciprocating or rotating parts of equipment should be guarded.

.5 Platforms, footwalks, steps, ladders, hand holds, guard rails, and toe-boards should be installed on all equipment where they are needed to provide safe ascent and descent.

.6 Employees should use steps, hand holds, etc., provided and should not jump on and off equipment.

.7 Positive means should be provided to prevent the starting of equipment in any position except from the operator's seat and to prevent the equipment from being started by unauthorized persons.

.8 When work is completed, equipment should be set and locked so that it cannot be released, dropped, or activated in any manner.

.9 Equipment shall not be refueled while the motor is running.

.10 Smoking or the use of open flames on or in the immediate vicinity of gasoline-operated equipment while it is being refueled is prohibited.

.11 No solvent with a flash point below 100°F should be used for cleaning parts and equipment.

.12 Gasoline, fuel oil, and other flammable liquids should not be stored on equipment except in fuel tanks or approved safety cans.

.13 Fuel tank openings should not be located in such a position that spills or overflows can run down on hot motors, exhaust pipes, or batteries.

.14 Equipment supported by hoists or jacks should be blocked before men are permitted to work underneath it.

.15 Debris, oil, grease, oily rags, or waste should not be allowed to accumulate on equipment.

.16 Safe load capacity and operating speeds should be posted on all equipment and should not be exceeded. Automotive equipment travelling to and from work sites should operate at normal highway speeds.

.17 No one shall ride on the outside of equipment, regardless of the speed or how short the distance, except on that equipment which has a safe platform designed for the purpose.

## Series 116

.18 Keep equipment a safe distance from excavations.

.19 Equipment shall be used only for the purpose for which it is designed. (For example; gradalls, front-end loaders, etc., should not be used to hoist personnel.)

.20 All equipment operators should be assigned a "spotter" when operations require backing or when driving in an area where personnel cannot be seen from the operator's seat.

.21 Loose instruments, tools, etc., should not be carried in equipment, but held secure in racks or boxes permanently installed. (Loose items can cause severe injury in the event of an accident.)

.22 No one shall get under or get any part of his body under any type of raised hydraulic ram unless the equipment is braced so that it cannot fall or unless the equipment has a foolproof method designed into it so it cannot fall.

.23 Non-automative equipment should not, when practical, be deadheaded on the highway.

.24 If deadheading is necessary, travel out of the lanes of traffic where possible.

.25 Keep a sharp lookout to the rear.

.26 Rearview mirrors should be installed and used on equipment; but do not depend solely on rearview mirrors. The driver should look before backing.

.27 Similar equipment should be stored in designated areas.

.28 Equipment should be stored with adequate clearance between vehicles and in a manner to facilitate hooking up or any other operation that might be required.

.29 Do not allow the boom on equipment to be closer than 10 feet to power transmission lines.

.29a Tractor-mowers, front-end loaders, and any other equipment which is deadheaded on the highway and which is designed to travel at a speed of 25 MPH or less shall be equipped with a *Slow Moving Vehicle Emblem*.

# WATCH OUT!

## HE MIGHT BACK UP!



## Bulldozers

.30 Bulldozers should be equipped with a protective frame to protect the operator from falling branches and trees. The installation and use of seat belts is recommended on all machinery equipped with a protective frame.

.31 The bulldozer blade should be kept close to the ground for balance when the machine is travelling up a steep grade.

.32 The operator should exercise extreme care when operating bulldozers around excavations and undercut earth.

.33 The operator should not allow other persons to get on the bulldozer while it is running.

## Cherry Pickers (Aerial Baskets)

.40 Observe proper precautions against electrical hazards both aloft and on the ground.

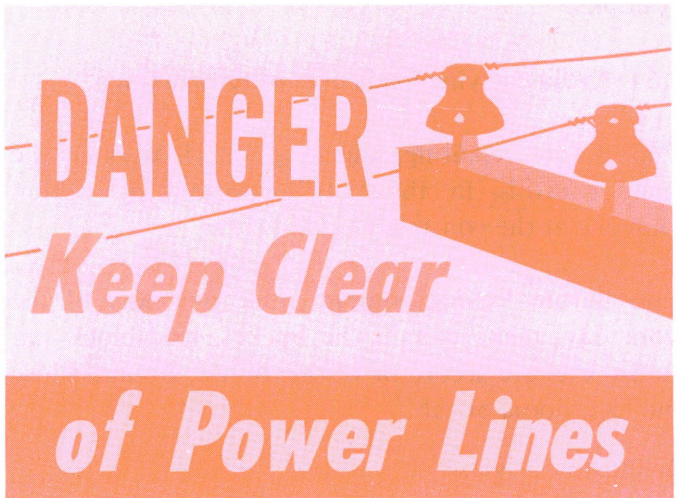
.41 Be sure vehicle and outriggers are properly positioned and that outriggers are sufficiently blocked.



## Series 116

- .42 Do not overload boom.
- .43 Do not overreach from basket.
- .44 Do not overextend boom.
- .45 Use personal protective equipment as job requires.
- .46 Do not move truck while the boom is raised except to check positioning; do not move truck where there is inadequate clearance for boom.
- .47 Extreme care should be taken not to swing the boom or basket against overhead obstructions and not to move boom into positions that interfere with traffic.
- .48 Do not paint fiber glass baskets and booms; they should be kept clean and waxed and inspected for cracks.
- .49 A thorough daily inspection should be made before beginning operations.
- .50 Only trained personnel shall be permitted to operate cherry pickers.

Cranes and Gradalls (See Electrical Hazards)



.60 Test all controls and brakes at the beginning of each work day.

.61 Safe carrying loads at various radii must be strictly adhered to.

.62 Cranes should have on them boom stops to

## Series 116

prevent the boom from being pulled backwards over the cab.

.63 Do not allow anyone to ride on buckets, loads, or hooks.

.64 Avoid carrying loads over other workmen.

.65 Before repairing, adjusting, or oiling, lock the main controls in the “off” position, or station someone at the controls to guard them.

.66 Before leaving equipment at the close of the work day, make certain the bucket, load block and hooks, etc. are secure or resting on the ground. Close and lock doors of cab.

### Delineator Drivers

.70 Equipment designed for the purpose should be used in driving delineator posts.

.71 Jack hammers (pavement breakers) or sledge hammers should not be used.

.72 Eye protection is required.

## Flatbed Trailers

.80 Special care should be exercised in loading equipment on trailers. The equipment should be driven very slowly.

.81 Tilt-tops should be checked to see that they are secured.

.82 Equipment should be held securely with load binders and chains.

.83 Low guide rails should be installed on flatbed trailers to prevent equipment from slipping off trailer during loading operations.

## Front-End Loaders

.90 Front-end loaders should be operated with extreme care because of the hazard involved of the loader getting out of control and tipping.

.91 If it is necessary to deadhead a front-end loader on the highway or normally good roads, the bucket of the loader should not be more than 18 inches from the roadway for safe driving.

.92 The front-end loader is top heavy and bouncy

## Series 116

when deadheading. The operator is cautioned not to drive at a fast rate of speed and should be especially careful in rounding curves, making sudden turns and driving on uneven surface.

.93 When operating a front-end loader on a maintenance site or warehouse yard extreme care should be exercised in making maneuvers so that the operation will be smooth and slow as the machine is easily tipped by a quick maneuver, especially when the bucket is loaded.

.94 When front-end loaders are operated around stockpiles or other loose material or when there is a "drop off", extreme care should be taken to see that the loader remains on reasonably stable and level ground.

.95 Use extreme caution when operating this vehicle.

.96 Front-end loaders should not be used as working platforms.

.97 Front-end loaders should be equipped with protective frames or with cabs of sufficient strength to limit any rollovers to 90°.

.98 The loaded bucket should not be raised except when the loader is on reasonably level ground.

### Lawn Edgers

.100 Follow precautions for working with other small air cooled gasoline engines.

.101 Stay clear of blade and keep blade clear of everything except grass to be edged.

.102 Eye protection shall be worn.

### Lawn Mowers

.110 Learn mower and controls thoroughly.

.111 Fill gas tank before starting. If it can be avoided, do not refuel hot engine. If not, shut off engine and exercise caution to avoid spilling gasoline. Do not smoke.

.112 Clear lawn of foreign objects.

.113 Keep feet clear at all times.

.114 Stay away from discharge side of mower.

## **Series 116**

.115 Push, do not pull mower.

.116 Stop the engine whenever you leave the mower, even for a moment.

.117 Do not unclog mower while it is running.

.118 Stop engine and disconnect spark wire before working on mower.

.119 When starting mower, stand firmly with feet away from the blades.

.120 Mower guards should never be removed.

.121 Eye protection should be worn and must be worn if mowing around other mowers.

## **Maintainers**

.130 It shall be the responsibility of the operator to make certain safety lights and flags are in place at all times while working on or adjacent to the roadway.

.131 The maintainer blade should be pulled in and locked when not in use.

.132 An orange flag should be mounted on

each upper corner of the mold board.

.133 When the maintainer is parked, the blade should be left resting on the ground.

.134 If driving down a steep grade, the transmission should be in low range to create additional braking power.

.135 When the maintainer is parked for extended periods or overnight, it is the operator's responsibility to remove the ignition key and to make certain that the doors of the cab are locked.

.136 Operators of maintainers should avoid when practical grading operations opposing traffic. When it becomes necessary to oppose traffic, headlights should be turned on in addition to safety lights.

Platforms (on Sign Trucks, Brooms, Spreaders, etc.)

.140 Platforms should be of sturdy construction.

.141 A safety rail should be built on the exposed sides of all platforms.

.142 The platform should be so located that any



## Series 116

controls can be easily reached without strain or awkward positions.

.143 No employee should stand on moving equipment for any purpose without the benefit of a safety rail and where needed safety belts.

.144 Hydraulically operated platforms should have a positive means built into them to prevent the platform from falling.

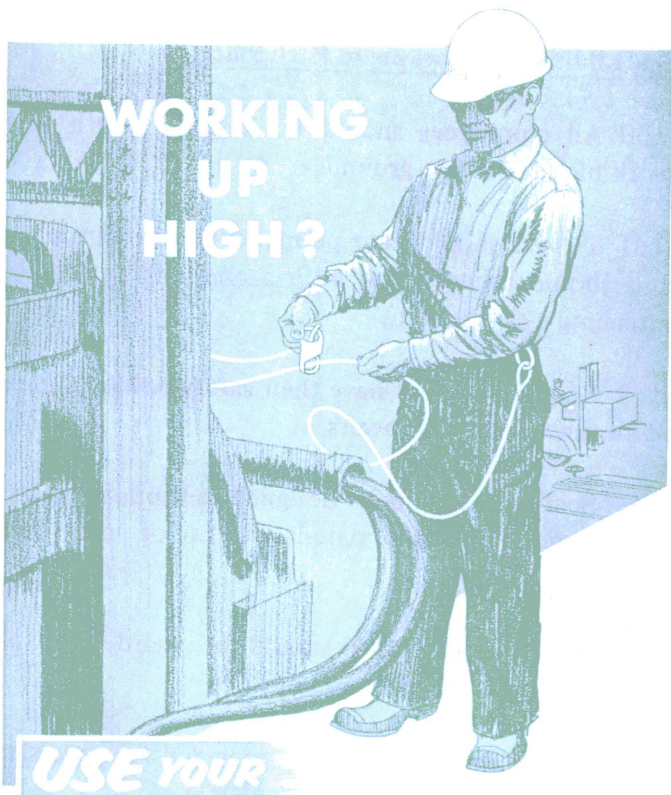
### Rotary Brooms

.150 Operators should not, normally, ride on rotary brooms, except when frequent turning makes it necessary.

.151 If operators do ride on rotary brooms, safety rails should be installed around the operator's platform.

.152 Drive chains should be guarded.

.153 When operating on or near the travelway under dusty conditions, a high level flag should be mounted on the broom to warn motorist.



**USE YOUR**  
**SAFETY BELT & LINE**

## Series 116

### Scaffolding and Working in High Places

.160 All employees should be in good health who work high above the ground.

.161 Towers should have permanent ladders installed and should be equipped with a climbing device for attaching a safety belt.

.162 Employees shall have their safety belts attached at all times while on towers.

.163 Scaffolds should be designed to support at least four times the anticipated weight of men and materials.

.164 Scaffold platforms should be guarded on all exposed sides.

.165 A safe means should be provided for access to scaffold platforms.

.166 Safety belts (or harness) with a life line should be worn at all times when working in high places.

.167 It is preferable to permanently install catwalks, railing, handholds, means of attaching safety lines,

etc., on permanent structures that require periodic painting and maintenance.

### Tractor-Mowers

.170 Mowers shall have safety lights in operation and flags affixed when mowing near the travelled lanes or shoulders.

.171 Mowing operations near the travelled surface when opposing traffic should be avoided when practical.

.172 Mower blades adjusted approximately 5 inches (or more) from surface will prevent many objects from being thrown by blades.

.173 Conventional tractor-mowers shall not be operated on a slope greater than 3 to 1.

.174 The necessary steps shall be taken to see that the engine is shut off and the mower blades stopped before attempts are made to repair mower, clear blades, or when anyone is near the mower blades.



.175 The mower should be blocked to prevent falling before anyone gets under the mower to clear the blades or to work under the mower.

.176 If operating on unusual terrain where the ground surface may be hidden by tall grass, the operator should take precautionary measures to avoid any hidden erosion in which the lower wheel of the tractor might fall.

.177 A screen guard should be installed behind the operator on rear mounted mowers and extending partially around the side of the operator on "bat wing" mowers.

.178 Chain guards should be kept in good repair on all mowers.

.179 The operator should be especially careful around small bridge and culvert abutments. (Tractors have turned over when one of the wheels dropped off into the hole at the end of these structures.)

.180 Low center of gravity tractors should be used for mowing.

.181 Do not raise mower while on a slope. It will shift the center of gravity to a higher level.

.182 Liquid ballast added to tractor tires decreases slippage and lowers the center of gravity. If liquid ballast is used a suitable mixture is 5 pounds of calcium chloride per gallon concentration. Calcium chloride solution will not harm the carcass, tube or valve stem.

.183 If liquid ballast is used tires should be filled

## Series 117

approximately 2/3 full; but in any case tires should not be filled past valve stem openings when valve stems are at the top.

.184 Tractors should be equipped with roll-over protective structures. Seat belts should be installed and worn when tractors are equipped with protective frames.

## MATERIALS HANDLING AND STORAGE - SERIES 117

.1 Neatness and orderliness are essential in warehousing and material storage.

.2 Gloves shall be worn when handling heavy or sharp-edged objects.

.3 When unpacking boxed material, boards with nails shall be pulled or cinched.

.4 Nails shall be removed from opened boxes and kegs used for storage or material carrying.

.5 In stacking, each stack should have a firm foundation.

.6 Round objects should be blocked or bracketed so that they cannot roll.

.7 Tiers should be cross-piled or tied so that materials support each other if possible.

.8 Material shall not be piled so high to cause unsafe lifting and handling.

.9 Care should be taken to see that stacked material does not lean toward aisles or protrude into aisles. Aisles should be clearly outlined by painted lines or plastic tape.

.10 Piles should be broken down from the top with step backs or taper maintained.

.11 Flammable materials should be stored in a separate area away from heat sources.

.12 'No Smoking' signs should be posted where needed in warehouse and storage areas.

.13 Materials should not be stored so as to block aisles, fire escapes, or fire protection equipment.

.14 When mechanical lifting devices are used, loads



## Series 117

shall be secure, and workers shall not get under loads at any time.

.15 Wet excelsior and similar fibrous packing are conducive to spontaneous combustion and should be removed from warehouses immediately.

.16 Employees shall watch for pinching conditions, splinters, slivers, projecting nails, burrs, and rough or slippery surfaces.

.17 Keep the fingers away from pinch points, especially when setting down materials.

.18 Wipe off greasy, wet, slippery, or dirty objects before you try to handle them.

.19 Keep the hands free of oil and grease.



### Fork-Lifts

.20 Avoid speeding, sudden stops and starts, quick turns, and all other forms of reckless operation.

.21 In going up a steep incline without a load, the weighted end of the equipment must go first.

.22 Do not exceed rated capacity of the lift.

## Series 117

- .23 Do not operate blind; make sure vision is clear.
- .24 Make sure skids, pallets, etc., are strong enough and that they are in good repair.
- .25 Drive fork-lift trucks with the lifting mechanism a few inches off the floor.
- .26 No one shall be allowed to ride on load or prongs of the fork.
- .27 Stop before going around a blind corner, entering or leaving a doorway. (Mirrors might be used to advantage at some blind corners.)
- .28 Never load a fork-lift so that your view is obstructed.
- .29 Fork-lifts should have a canopy guard to protect against falling objects. A fork-lift truck should also have upper and lower limit switches to prevent overtravel.
- .30 If gasoline fork-lift trucks are being operated where ventilation is inadequate, they should be equipped with catalytic exhaust purifiers.
- .31 A fork-lift truck should be used only for the

purpose for which it is intended.

.32 When going down an incline with a load, travel in reverse.

### Ladders

.40 All new ladders should be inspected for defects upon receipt.

.41 Ladders should not be painted, and they should be kept clean so that any defects present will be visible.

.42 Short ladders should not be spliced to make longer ladders.

.43 If it is necessary to use ladders in strong winds or on unstable ground, they should be securely lashed and guarded at base by another workman. A solid footing should always be provided for all ladders.

.44 When using a ladder for access to high places, it should be secured to prevent slipping.

.45 Conventional ladders should never be placed or used on movable objects.

## Series 117

.46 Under normal conditions, ladders should be placed so that the distance from the supporting surface to the base of the ladder is approximately one-fourth the length of the ladder.

.47 Be sure shoes are not greasy, muddy, or slippery before climbing ladders.

.48 Keep both hands free and grasp side rails while climbing. Hoist materials or tools with a hand line.

.49 Metal ladders are electrical conductors and should not be used in electrical work or around electrical equipment.

.50 When using stepladders, be sure cross braces are securely locked.

### Lifting and Carrying

.60 Do not lift more than you can handle comfortably. If necessary, get help.

.61 Set your feet solidly. Put your feet far enough apart for good balance and stability.

.62 Get as close to the load as possible. Bend the legs about 90 degrees at the knees.

.63 Keep the back as straight as possible. It may be far from vertical, but it should not be arched. Bend at the hips, not at the middle of the back.

.64 Get a firm grip on the object, and be sure you maintain that grip while lifting and carrying.

.65 Straighten your legs to lift the object, and at the same time, swing your back into a vertical position.

.66 Never carry a load that you cannot see over or around.

.67 When you have to change directions with a load, do not twist your body.

## **OXYACETYLENE WELDING AND CUTTING - SERIES 118**

.1 Do not use, transport, store, or place cylinders in prone position.

.2 Always check oxyacetylene equipment before using to be sure that it is in proper operating condition.

.3 Do not allow sparks to be directed toward any

## Series 118

person, pipe line, cylinders, hoses, tanks, rubbish piles, or combustible materials.

.4 Do not use a torch on a vessel or pipe line that does contain or has contained gasoline or other flammable or explosive materials without making sure that it has been properly purged and vented.

.5 Make sure there is adequate ventilation when working in confined areas.



.6 Determine what is on the other side of the object being welded or cut, if not visible when working.

.7 Do not lay a lighted torch down. Do not swing a lighted torch around without making sure all personnel are in the clear.

.8 Do not hang a torch with its hose on regulators or cylinder valves.

.9 Do not use oxyacetylene flame to heat containers of oil, grease, paint, rust preventive, etc., even though they are marked or considered nonflammable.

.10 Do not blow oxygen toward anyone, or use it to blow off machinery, etc.

.11 Do not light cigarettes with a torch or vice versa.

.12 Do not alter regulator adjustments on any outfit not being used personally.

.13 Close the station or cylinder valves and release nose pressures on any outfit which will not be used for an extended period of time.



## Series 118

.14 Do not burn over concrete without first protecting it with metal, asbestos, or other suitable material.

.15 Do not attempt to use oxygen or acetylene cylinders, hoses, or fittings not identifiable by labels, color codes, or otherwise.

.16 Do not call or refer to oxygen as "air", nor to acetylene as "gas".

.17 Do not use oxygen to cool the human body or to dust off one's clothing.

.18 Do not use oxygen for ventilating purposes or allow oxygen to flow into confined or poorly ventilated areas.

.19 Do not use oxygen for pressure testing closed vessels or containers.

.20 Do not use oxygen to operate equipment designed for air, i.e., air hammers, grinders, etc.

.21 Do not use unregulated oxygen or acetylene.

.22 Do not open oxygen cylinder valves suddenly or fail to crack valves before attaching regulators.

.23 Do not use oil or grease on or near any oxygen or acetylene equipment. Avoid accidental contact of oil or grease with oxygen or acetylene equipment.

.24 Do not use any hose or connections other than those made especially for oxyacetylene welding and cutting equipment.

.25 In using acetylene the operating pressure should not be greater than 15 pounds per square inch.

.26 Do not test for leaks with a flame, hot iron, or matches.

.27 Do not light acetylene torches with matches or by any means other than a recommended spark lighter.

.28 Do not use copper tubing for piping acetylene or for splicing hoses.

.29 Do not use acetylene in a confined or poorly ventilated area.

.30 Do not allow open lights, fires, or hot objects in the vicinity of acetylene or oxygen lines and cylinders.

## Series 118

.31 Tip size being used should be in accordance with volume of acetylene cylinder. Do not use acetylene at a greater rate than one-seventh of the volume of a cylinder per hour.

.32 Do not open acetylene cylinder valves more than one full turn.

.33 If a cylinder catches fire at the valve, close the valve. If it catches fire at any other location on the cylinder, vacate the area and notify the fire department.

.34 Oxygen and acetylene shall not be stored in the same compartment, or with other fuel gases or combustible material.

.35 Portable oxyacetylene carts should contain a flame-proof barrier between the oxygen and acetylene cylinders.

.36 Cylinders should not be handled with magnets or slings. A special carrier or container designed for the specific purpose of transporting cylinders should be used.

.37 Do not lift cylinders by their valve protection caps.

.38 Do not transport cylinders with the regulators attached.

.39 Do not handle, use or store cylinders in a rough manner or in any way that may cause damage. If a neck of an oxygen cylinder should be broken off, the energy released would be sufficient to propel the cylinder to over 3/4 of a mile in height.

.40 Do not handle or move cylinders without protective caps in place.

.41 Fasten cylinders securely in the upright position.

.42 Never place cylinders where they cannot be reached quickly if it is necessary to shut them off in an emergency.

.43 Do not use cylinders as work supports or rollers.

.44 Never use a leaking cylinder or try to repair a cylinder valve.

.45 Oxygen cylinders should not be used or stored in areas where oil may drip on them, or under

## Series 118

conditions such as near air exhausts where they may be exposed to atmospheres containing oil particles.

.46 Always stand to side of regulators when opening valves, never to the front or behind.

.47 In order to prevent oxygen regulator explosions do not use oxygen supply below 100 psi pressure.

.48 As a further precaution against oxygen regulator explosions, a check valve should be installed between oxygen hose and oxygen regulator.

.49 All oxyacetylene equipment should be inspected before use and should be free of leaks, nicks, cuts, or any other damage.

.50 Extreme caution should be taken and prescribed procedures followed in cracking valves, in purging regulators and lines, and in hooking up and shutting down.

Note: In gas welding or oxygen cutting, where the torch produces a high yellow light, it is desirable to use a filter or lens that absorbs the yellow or sodium line in the visible light of the operation.

**POISON IVY - SERIES 119**



**POISON IVY**

## Series 119

.1 Rash and infection are caused by a toxic irritant. The most common plants causing skin rash in Texas are poison ivy and poison oak.

.2 One cannot be poisoned merely by close proximity to these plants except from the soot or smoke of burning plants.

.3 While some people are not sensitive to these plants, they may develop sensitivity on later exposures. The sensitivity of any person varies at different times.

.4 The hazard is greatest in spring and summer when the sap is most abundant.

.5 If poison ivy extracts are taken, these should be taken under the directions of your personal physician. These extracts are most effective when taken well in advance of exposure and are probably most effective when taken on a year round basis. The Department cannot pay for these extracts or other preventive medicine.

.6 If you develop a skin rash as a result of an exposure incurred while performing duties for the

Department, you should report to a doctor.

.7 The best preventive of plant dermatitis (rash) is to avoid exposure.

.8 Poison ivy (or oak) may occur as a vine or as a shrub.

.9 The leaves vary greatly; all, however, have three leaflets. The upper surface of the leaf has a glossy, waxy appearance and is dark green. The lower surface may be a light green with fine hairs in some cases.

.10 The color of the leaves changes to a red or orange in the fall.

.11 Small flowers grow on the plants in clusters. They are white with a greenish tint.

.12 If the plant bears fruit, it is in clusters, white or ivory with a green tinge, and it is the approximate size of a pea.

.13 Onset of the rash is from a few hours to several days or more after exposure. The skin becomes red, blisters appear, and usually there is itching, and as the symptoms progress, there may be swelling and fever.



## Series 120

.14 As soon after exposure as possible, wash the part with soap and water, then sponge it with rubbing alcohol. Following this cleansing, calamine lotion or a commercial preparation may be applied.

.15 Care should be taken to avoid exposure or re-exposure from tools, such as machetes and axes, and from vehicles and clothing used in areas where these plants grow.

## POWER TOOLS AND SHOP EQUIPMENT - SERIES 120

### Bench and Stand Grinders

.1 Grinders should have a glass shield. The shield should be kept clean and replaced if condition obscures visibility.

.2 Even though grinders are equipped with a transparent shield, goggles should be worn.

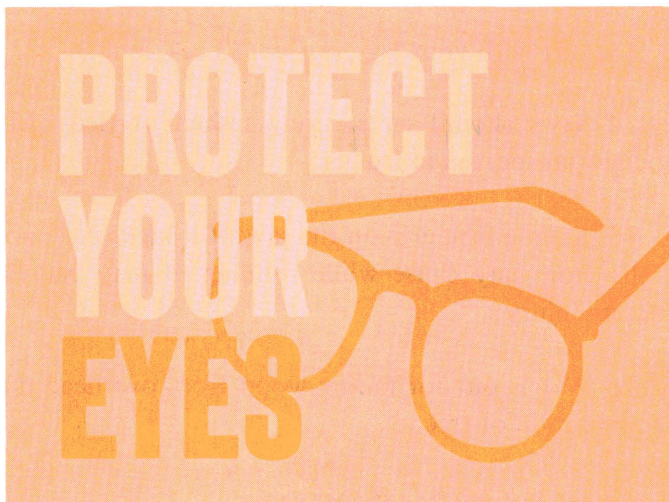
.3 The work rest should be kept adjusted one-eighth inch from the wheel.

.4 All grinders should have a protective hood (guard) and should not be used without one.

.5 Do not stand in front of the wheel when starting up. Give a cold wheel a chance to warm up.

.6 Use only the face of the wheel unless it is designed for side grinding.

.7 Grinding wheels should be checked often for chips and cracks. A chipped or cracked wheel should not be used.



## Series 120

### Chain Saws

.10 Because of safety and ease in handling, a small light-weight saw should be used when the size of the timber being cut permits.

.11 Carry the saw by the handle with the blade to the rear.

.12 Care should be exercised in footing and in refraining from awkward positions both when working and when carrying chain saws.

.13 Lift with your legs, not your back.

.14 Saws should be securely lashed or tied while being transported in trucks.

.15 Keep a firm grip on the saw. If it kicks back and falls from any cause while running, it may cause a severe injury.

.16 Watch out for falling wood from overhead due to vibration of tree.

.17 Do not inhale exhaust gases.

.18 Eye protection should be worn to protect from sawdust, twigs, and falling debris.

.19 Do not touch the muffler or hot cylinder head.

.20 Choose your workplace so you will not be struck by the branch or log you are cutting or by other branches it may dislodge.

.21 Clear away stones, earth, and bark so chain cannot throw them in your direction.

.22 Know the manufacturer's handbook for the saw you are using.

.23 Swing the saw so that you do not cut yourself or others.

.24 Before you start the motor make sure the saw is not touching anything.

.25 Do not smoke while filling gasoline tanks.

.26 Stop motor while filling gasoline tanks and do not spill gasoline on hot cylinder head.

.27 Use a gasoline can with a spout or use a funnel.

## Series 120

- .28 Fill the tank only on an area of bare ground.
- .29 Use proper gasoline and oil mixture to minimize carbonization.
- .30 Do not start the motor where the tank is filled.
- .31 Keep the entire saw clear of gasoline, oil and sawdust.
- .32 A fire extinguisher should be readily available.
- .33 The chain should be checked for tension frequently during use.
- .34 A safety hat should be worn at all times for protection against falling branches.

### Electric Shop Saws

- .40 Do not force stock through saw blade faster than saw can easily cut.
- .41 Do not remove guard; keep it in place as intended.

.42 Do not saw stock freehand; stock shall be held against a gauge.

.43 Hands shall be kept out of line of the cut in feeding a table saw; even the best guard will permit hands to follow stock into saw -- be careful.

.44 When ripping stock close to fence gauge, or when cutting short pieces of stock, use a push stick to keep fingers away from saw.

.45 To avoid being injured from kickbacks, stand out of line of stock being ripped.

.46 Never reach in front of a moving saw blade.

.47 Guard against bodily contact while blade is still in motion. Saw blades run for a considerable time after power has been shut off.

.48 Saw table shall be well lighted when saw is in use.

.49 Adjustable guards protecting band saw blades shall be set as close as possible to table without interfering with movement of stock and clear vision of the operator.

## Series 120

.50 Saw guard or fence gauge shall never be adjusted while saw is running.

.51 All power saws shall be stopped when not in use -- before the operator leaves them.

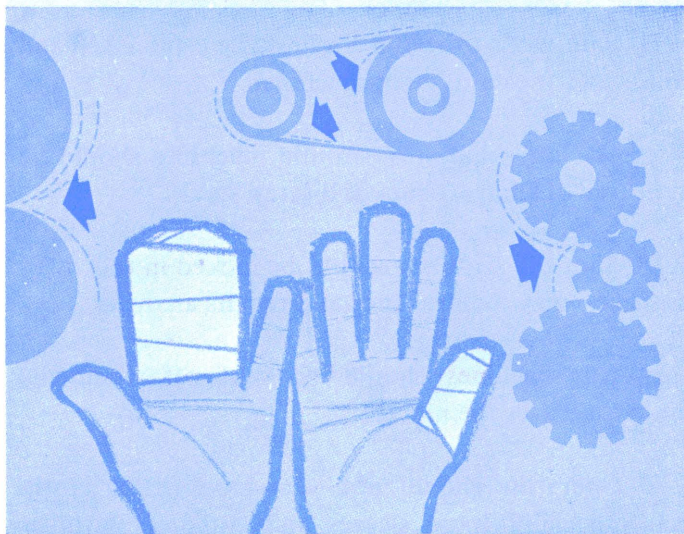
### Jackhammers (Pavement Breakers)

.60 All precautions regarding use of compressed air should be observed when using and working around jackhammers.

.61 A firm stance with feet apart should be maintained; solid footing is important.

.62 Foot guards, eye protection, ear protection, and safety hats should be worn.

**KEEP AWAY FROM  
NIP POINTS**



**USE GUARDS  
AS INTENDED**



## Series 120

### Machine Tools

.70 Operation, adjustment, and repair of machine tools shall not be undertaken except by experienced and trained employees.

.71 Safe work procedures should be established and followed for each type of machine.

.72 Machines and areas around machines should be kept free of filings, chips, and scrap stock.

.73 Shut-off switches should be locked in the "off" position when maintenance and repairs are made.

.74 All machines should be shut off when the operator leaves the machine.

.75 Operators should not wear loose-fitting clothing, especially loose sleeves and cuffs of shirts or jackets.

.76 All operators of machine tools should wear eye protection.

.77 Adjusting and gauging (calipering) of work should not be done while the machine is in operation.

.78 Compressed air should not be used for removing filings, chips, or for cleaning machines. A suitable brush or special tool should be used.

.79 Operators of machine tools should not wear gloves, rings, or other jewelry.

.80 The use of safety shoes is recommended.

.81 When lathes are in operation, care should be taken to see that no contact is made with projections on work or stock, face plates, chucks or lathe dogs, especially those with projecting setscrews.

.82 Hand braking of lathes should be avoided.

.83 File left handed; use file with protected tang; use a stick instead of the hand to hold emery cloth against the work.

.84 Do not remove chips while machine is in motion.

.85 Care should be taken not to leave chuck wrench in chuck.

## Series 120

.86 Stay clear of all revolving spindles, tools, etc., on all machine shop equipment.

.87 Manufacturer's guards should be left in place; if needed for safe operations, additional guards should be designed and installed by a qualified person.

### Power Tools (See Electrical Hazards, Series 108)

.90 Portable electric drills should be handled with care and not dropped.

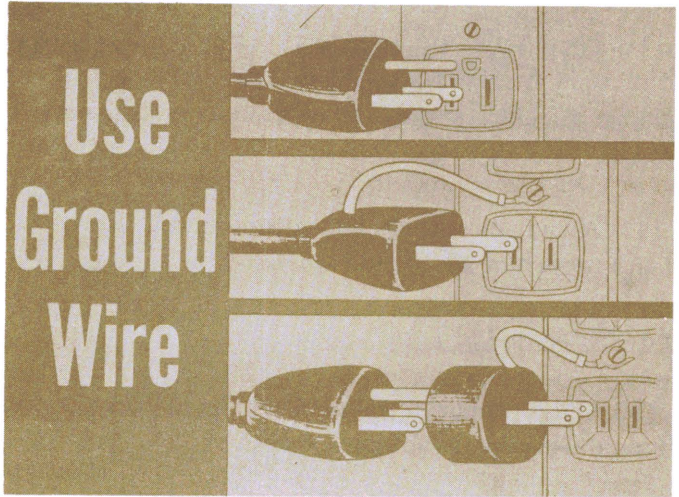
.91 When using portable electric drills, the work should be so placed and secured that there is no danger of the bit penetrating the hands, legs, or other parts of the body.

.92 In using power drills, do not force or feed the bit to fast; it may result in a broken or splintered bit and cause serious injury.

.93 Portable electric saws are usually well guarded by the manufacturer; these guards should be left in place and used as intended.

.94 The operator of a portable electric saw should keep his fingers away from the trigger when the saw is not in use.

.95 Portable grinders, both electric and pneumatic, should be guarded, as a minimum, so the maximum exposure of the wheel is not more than one-half the wheel. Eye protection should always be worn.



### Tire Cages and Chuck Extensions

.100 All tires when inflated off the vehicle or equipment should be inflated inside a tire cage.

.101 When tires mounted on vehicles or equipment are inflated, a lock chuck and hose extension should be used on the air hose so the person inflating the tire can stand to the side of the tire.

## Series 120

### Tire Changers

.110 Pneumatic tire changers employing revolving disc bead breakers are one of the safer types of tire changers. They should be operated by trained personnel.

.111 Avoid mounting and dismounting tires with hand tools if at all possible.

### Powder Actuated Tools

.120 Only properly trained and qualified operators should use powder actuated tools.

.121 Tools should always be left unloaded until ready for actual use.

.122 Never point a powder actuated tool at anyone.

.123 The use, handling, and storage of both tools and cartridges should be the same as for ammunition and firearms.

.124 Tools should be held firmly against and perpendicular to surfaces into which fasteners are being driven.

.125 Always wear safety goggles and face shields.

.126 Know the material being fired into. Do not use on concrete less than two inches thick, steel less than 1/4 inch thick or very hard or brittle materials. Examples are live rock, face brick, hollow tile, glazed tile and cast iron.

.127 Tools should be equipped with a "captive stud" device in case they are mistakenly fired into soft or unsubstantial material.

.128 In the event of a misfire, do not remove the tool from the working surface for 15 seconds, and remove the cartridge before lifting the tool from the surface.

.129 Tools should be cleaned with a nonflammable and nontoxic solvent and air dried; do not use compressed air.

## **PROTECTIVE WEAR AND SAFETY GEAR - SERIES 121**

.1 Normally, the person in charge of each crew shall see that necessary cautionary devices, signs, barricades, and any other equipment needed on the

particular job are loaded onto the vehicle and set up at the job site before work is started; that all men on the job are supplied with the necessary protective wear for their personal protection while on the job; that required safety items, first aid kits, and fire extinguishers are on the job at all times; and that all safety items are used as indicated.

.2 The men working on various projects and jobs shall use and/or wear safety items needed for their specific jobs.

.3 Should an employee find that a safety item issued to him is not in good condition, he shall report this to his immediate supervisor as soon as possible.

.4 Protective wear, after being used by one employee, should be cleaned and disinfected before being used by another employee.



.5 Safety hats should be worn by all flagmen while on duty at work sites. Safety hats should normally be worn by all employees at all times and shall be worn where there is a danger of being hit or bumped by any object, and where the safety hat will add visibility to alert oncoming traffic.

.6 Eye protection is demanded when grinding, chipping, using impact tools, welding, working around electric welding, operating machine tools,



## Series 121

operating woodworking machines, working with hot or corrosive substances, handling glass beads, wire brushing, grinding, filing, operating lawn mowers and edgers, and at any time metal is being struck against metal.

.7 Eye protection should be worn when operating right-of-way mowers, rotary brooms, front-end loaders, pruning trees, and any job where there is exposure to "soft" particles.

.8 Respirators should be worn when exposed to toxic vapors without suitable ventilation, when painting, in dusty conditions, and when welding galvanized metals without suitable ventilation.

.9 Care should be taken not to wear respirators in atmospheres deficient in oxygen. Forced ventilation or a supplied air hose should be used.

.10 If you do not know the respirator that should be worn for any particular job, ask your supervisor.

.11 It is estimated that seat belts would save 6,000 lives each year if worn by everyone. Every employee shall keep his seat belt fastened at all times when riding in any vehicle equipped with seat belts.

**SIGNING AND BARRICADING OF WORK  
AREAS - SERIES 122**

(See Texas Highway Department Manual on Uniform Traffic Control Devices)

.1 The use of orange flags on the first advance warning sign at each work site is permitted. These flags should be kept clean; and when they have lost their fluorescent reflective quality, they should be discarded and replaced.

.2 During temporary periods when signs are not needed, they shall be removed, turned away from traffic, or their messages covered.

.3 Orange cones shall be used. Cones shall be kept clean at all times.

.4 Advance signing should be used at any work site where workmen will be on the road (including shoulders) or where there will be any actual motorist hazard within or adjacent to the travelway.

.5 When it is necessary to be on the road surface for a very short period of time without proper signing and barricading, such as to remove a dead animal, all employees shall wear orange vests. Under such circumstances, if there is not good sight distance a flagman must be used.

## **Series 122**

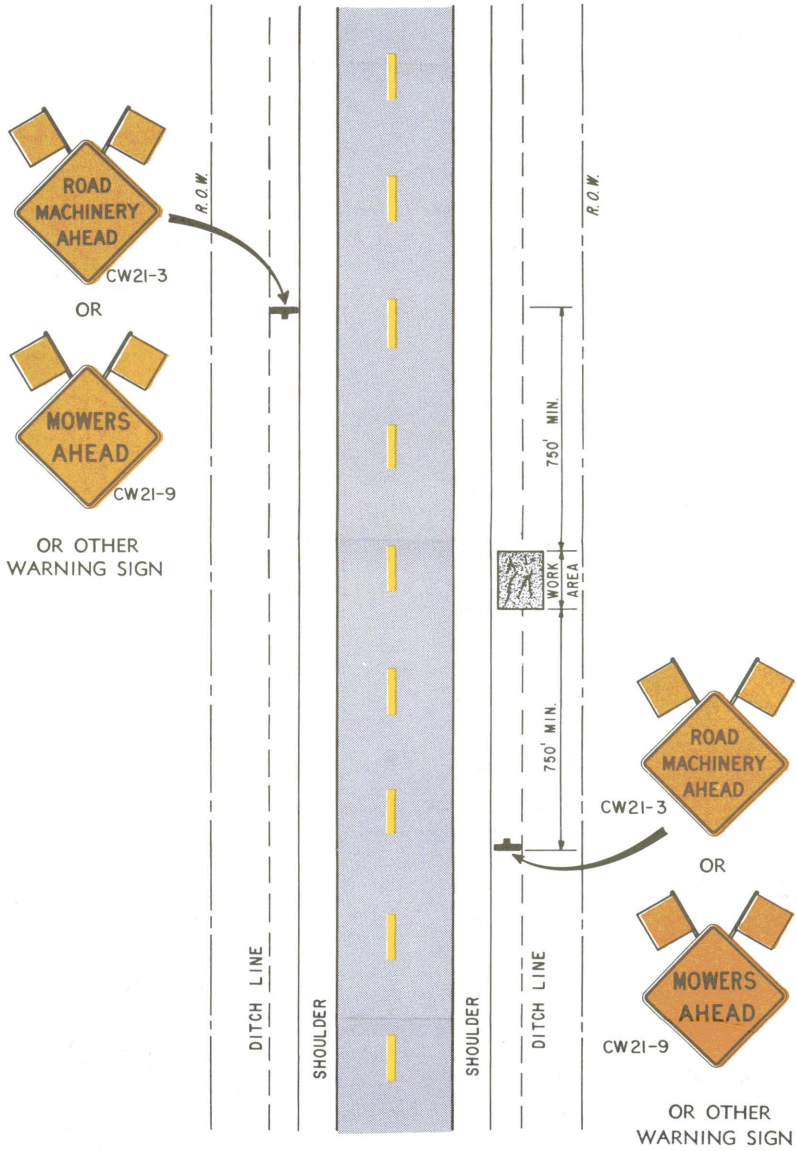
.6 Telescoping high-level flags will be used with "Survey Party" signs in advance of any survey party working on the highway right-of-way.

.7 When working on the travelled lanes of multi-lane controlled access highways, the 5' x 5' trailer-mounted warning sign shall be used. See detail, Vol. I Page V-G-5, Texas Highway Department Manual on Uniform Traffic Control Devices. Its use may be indicated on other highways.

.8 The illustrations on the following pages give typical examples of sign and barricade setups for maintenance operations.

NOTES:

1. All distances shown are approximate
2. High Level Flags mounted on vehicles or equipment and on Warning signs
3. Use Flagmen in dangerous situations only



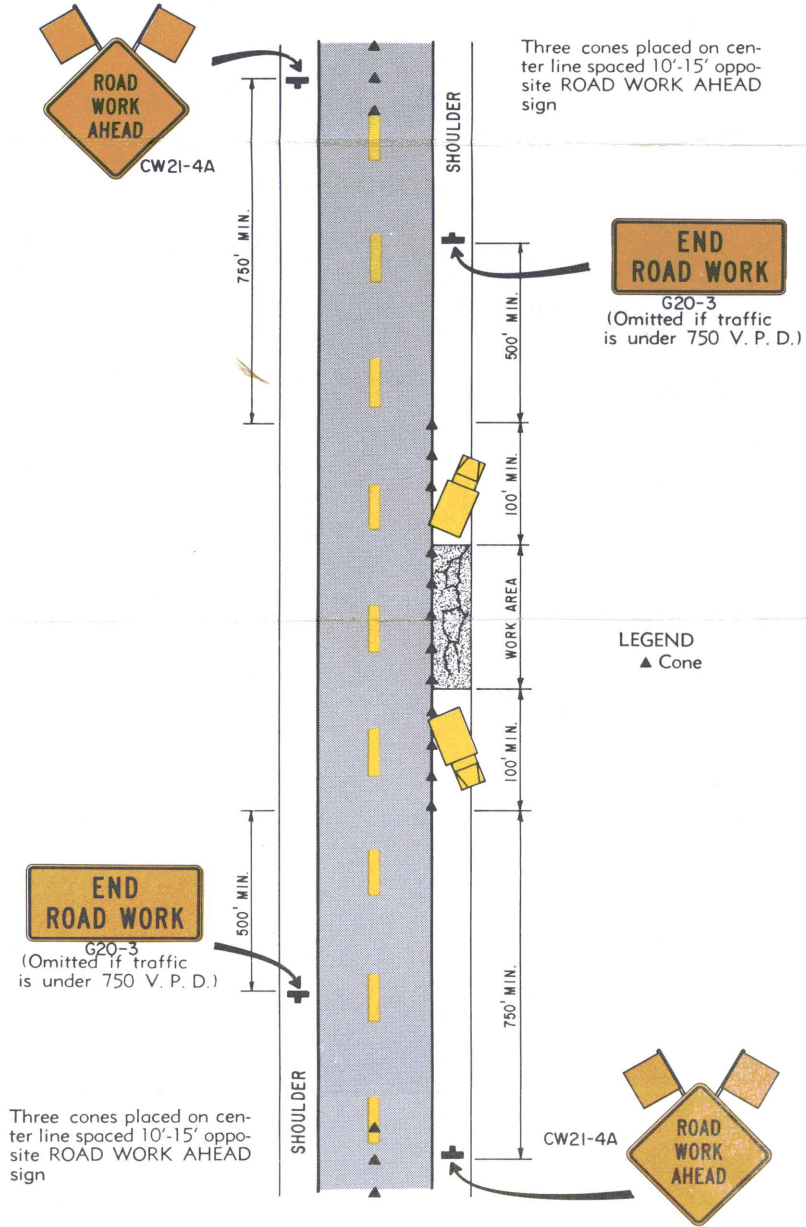
MAINTENANCE BARRICADE ARRANGEMENT  
Work off Shoulder

Series 122

V-G-23

NOTES:

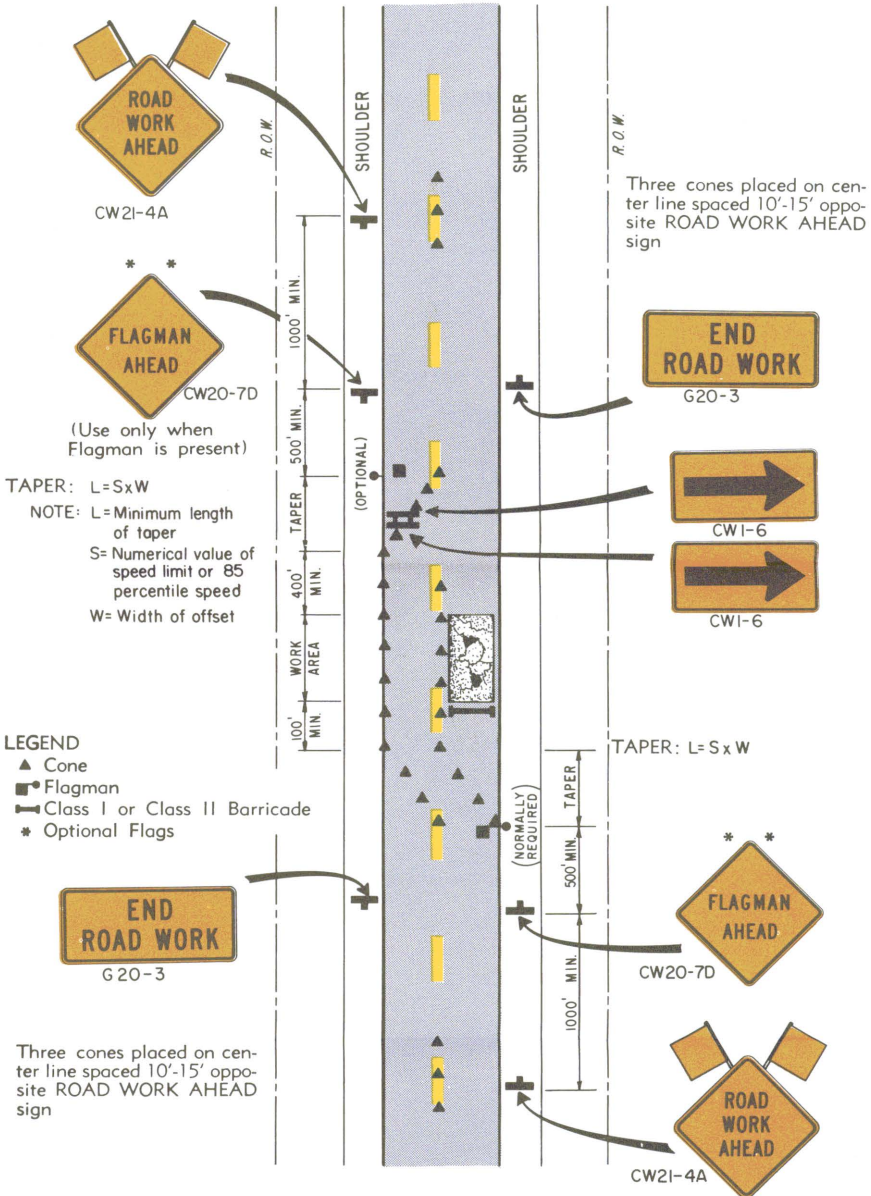
1. Short duration only
2. All distances shown are approximate
3. Appropriate Advisory Speed signs may be used in conjunction with Warning signs
4. High Level Flags shall be used in conjunction with Advance Warning signs, also on equipment
5. Not to be used after dark without torches or battery flashers
6. One or more flagmen to be used where traffic, road conditions, or terrain warrant their use



MAINTENANCE BARRICADE ARRANGEMENT  
Work on Shoulder

NOTES:

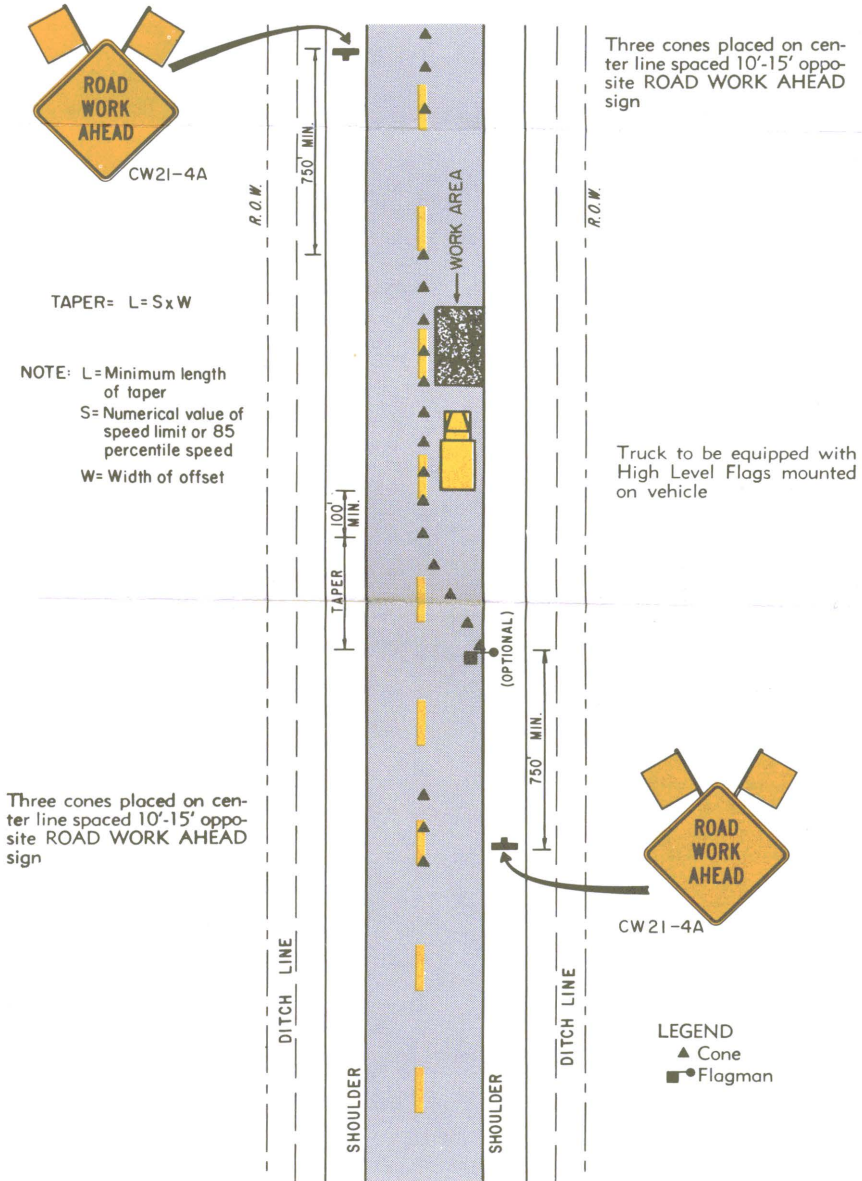
1. Short duration only
2. All distances shown are approximate
3. Appropriate Advisory Speed signs may be used in conjunction with Warning signs
4. High Level Flags shall be used in conjunction with Advance Warning signs
5. Not to be used after dark without torches or battery flashers
6. One or more flagmen to be used where traffic, road conditions, or terrain warrant their use



**MAINTENANCE BARRICADE ARRANGEMENT**  
 Traffic Using One Lane and One Shoulder  
 With Paved Shoulders, Over 750 V.P.D.

NOTES:

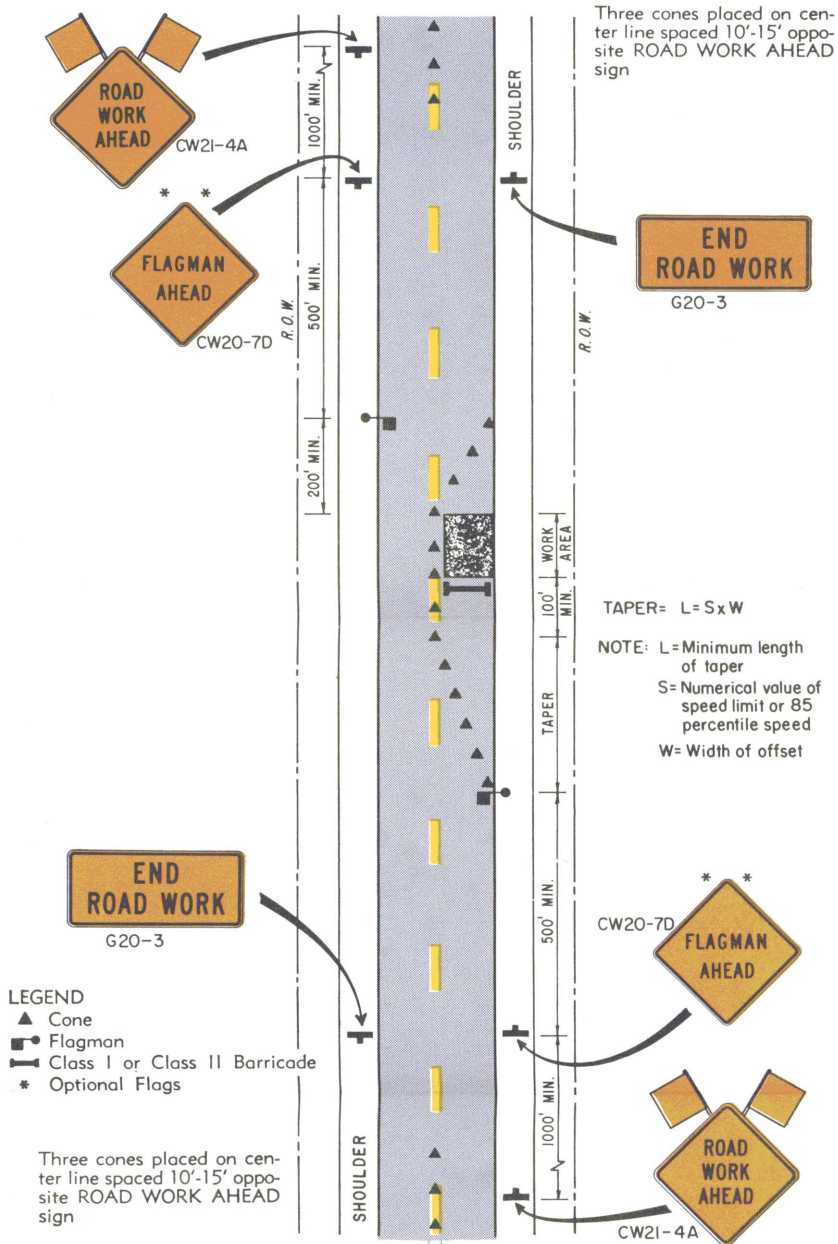
1. Short duration only
2. All distances shown are approximate
3. Appropriate Advisory Speed signs may be used in conjunction with Warning signs
4. High Level Flags shall be used in conjunction with Advance Warning signs
5. Not to be used after dark without torches or battery flashers
6. Flagmen must be used except on very low volume roads when visibility is excellent



**MAINTENANCE BARRICADE ARRANGEMENT**  
 Traffic Using One Lane Only, Other Lane Closed  
 No Paved Shoulders, Under 750 V.P.D.

NOTES:

1. Short duration only
2. All distances shown are approximate
3. Appropriate Advisory Speed signs may be used in conjunction with Warning signs
4. High Level Flags shall be used in conjunction with Advance Warning signs
5. Not to be used after dark without torches or battery flashers



**MAINTENANCE BARRICADE ARRANGEMENT**  
 Traffic Using One Lane Only, Other Lane Closed  
 No Paved Shoulders, Over 750 V.P.D.

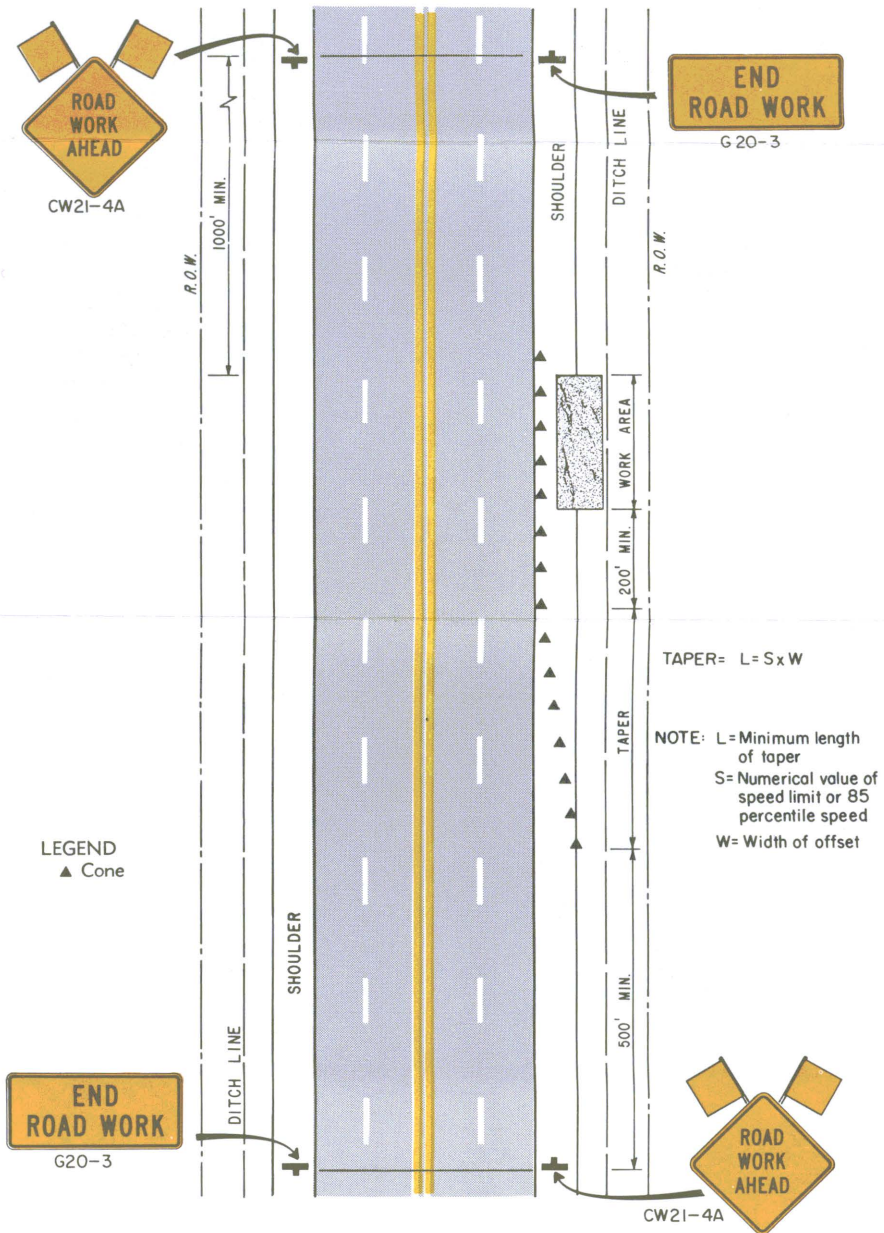
Series 122

V-G-27



NOTES:

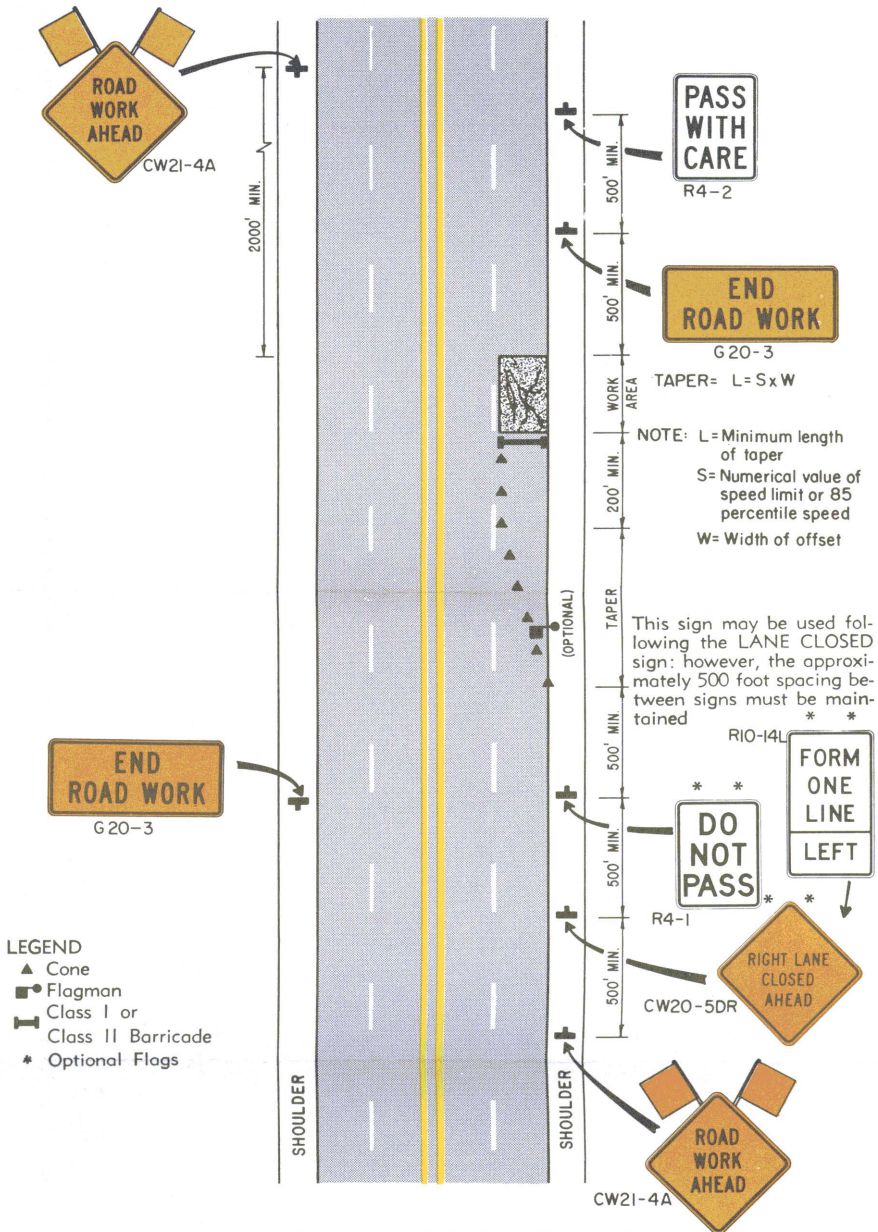
1. Short duration only
2. All distances shown are approximate
3. Appropriate Advisory Speed signs may be used in conjunction with Warning signs
4. High Level Flags shall be used in conjunction with Advance Warning signs, also on equipment
5. Not to be used after dark without torches or battery flashers
6. One or more flagmen to be used where traffic, road conditions, or terrain warrant their use



MAINTENANCE BARRICADE ARRANGEMENT  
Divided or Undivided Multi-Lane Highway  
Work on Shoulder

NOTES:

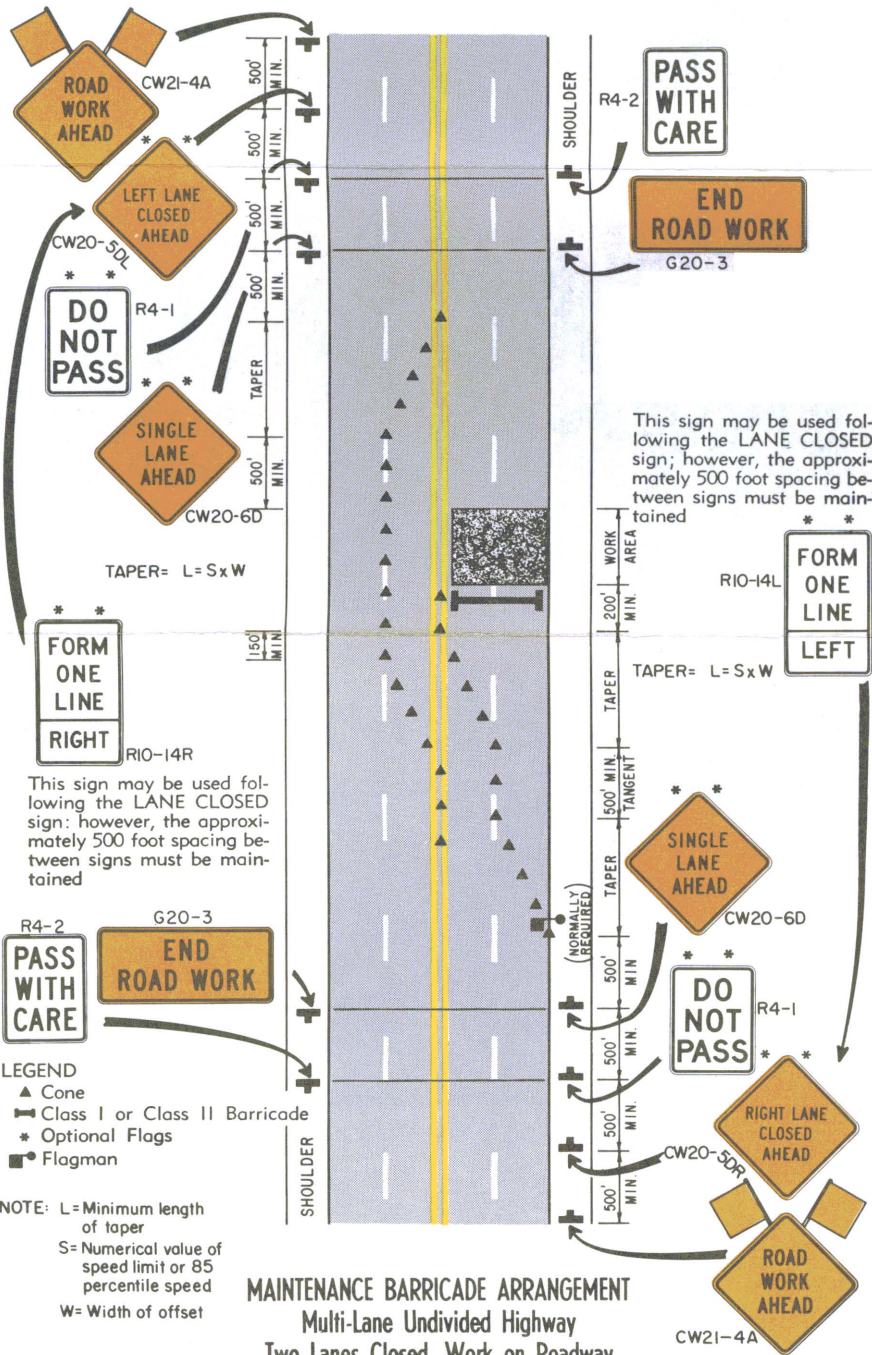
1. Short duration only
2. All distances shown are approximate
3. Appropriate Advisory Speed signs may be used in conjunction with Warning signs
4. High Level Flags shall be used in conjunction with Advance Warning signs
5. Not to be used after dark without torches or battery flashers
6. One or more flagmen to be used where traffic, road conditions, or terrain warrant their use



**MAINTENANCE BARRICADE ARRANGEMENT**  
 Divided or Undivided Multi-Lane Highway  
 One Lane Closed, Work on Roadway

NOTES:

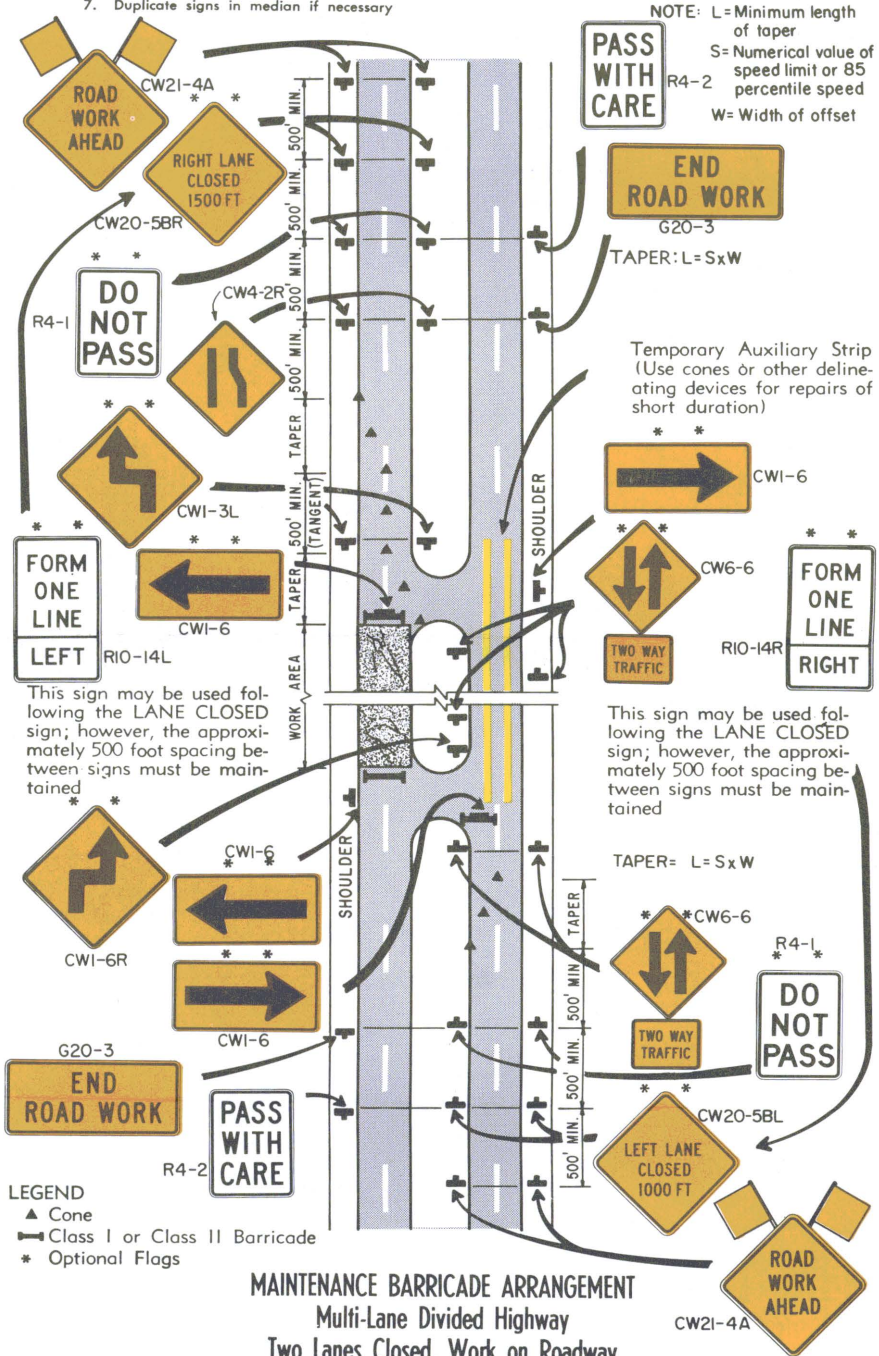
1. Short duration only
2. All distances shown are approximate
3. Appropriate Advisory Speed signs may be used in conjunction with Warning signs
4. High Level Flags shall be used in conjunction with Advance Warning signs
5. Not to be used after dark without torches or battery flashers

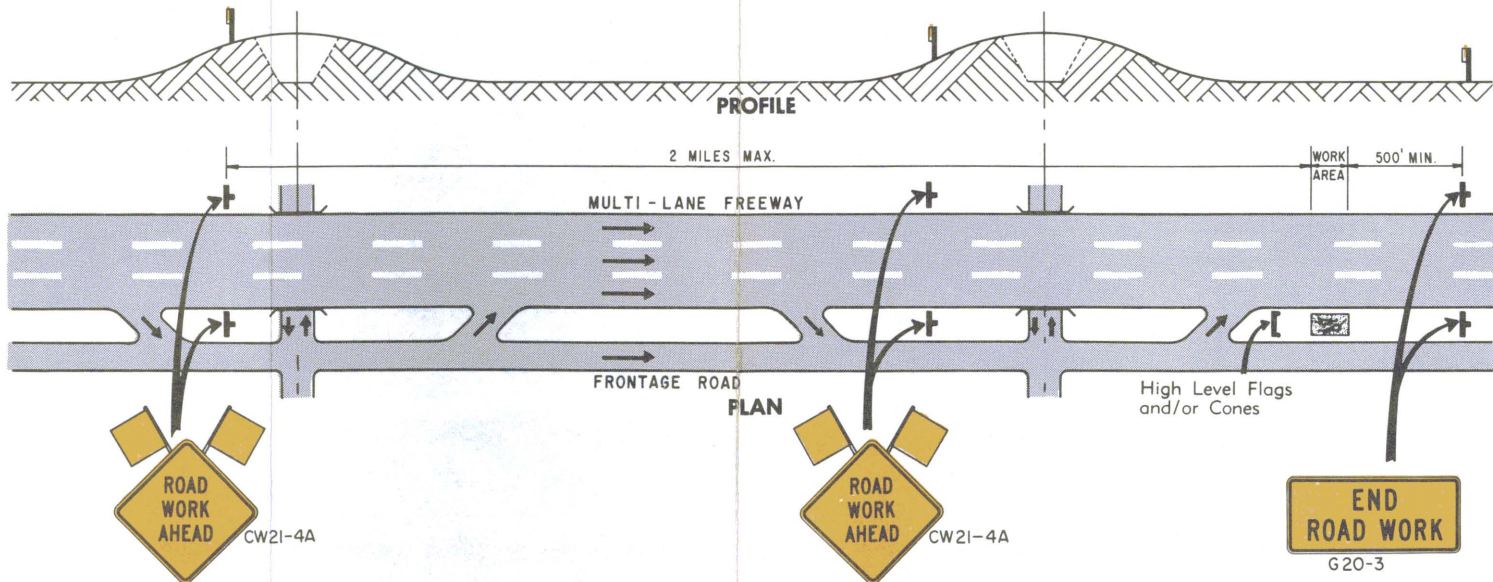


**MAINTENANCE BARRICADE ARRANGEMENT**  
 Multi-Lane Undivided Highway  
 Two Lanes Closed, Work on Roadway

NOTES:

1. Short duration only
2. All distances shown are approximate
3. Appropriate Advisory Speed signs may be used in conjunction with Warning signs
4. High Level Flags shall be used in conjunction with Advance Warning signs
5. Not to be used after dark without torches or battery flashers
6. One or more flagmen to be used where traffic, road conditions, or terrain warrant their use
7. Duplicate signs in median if necessary





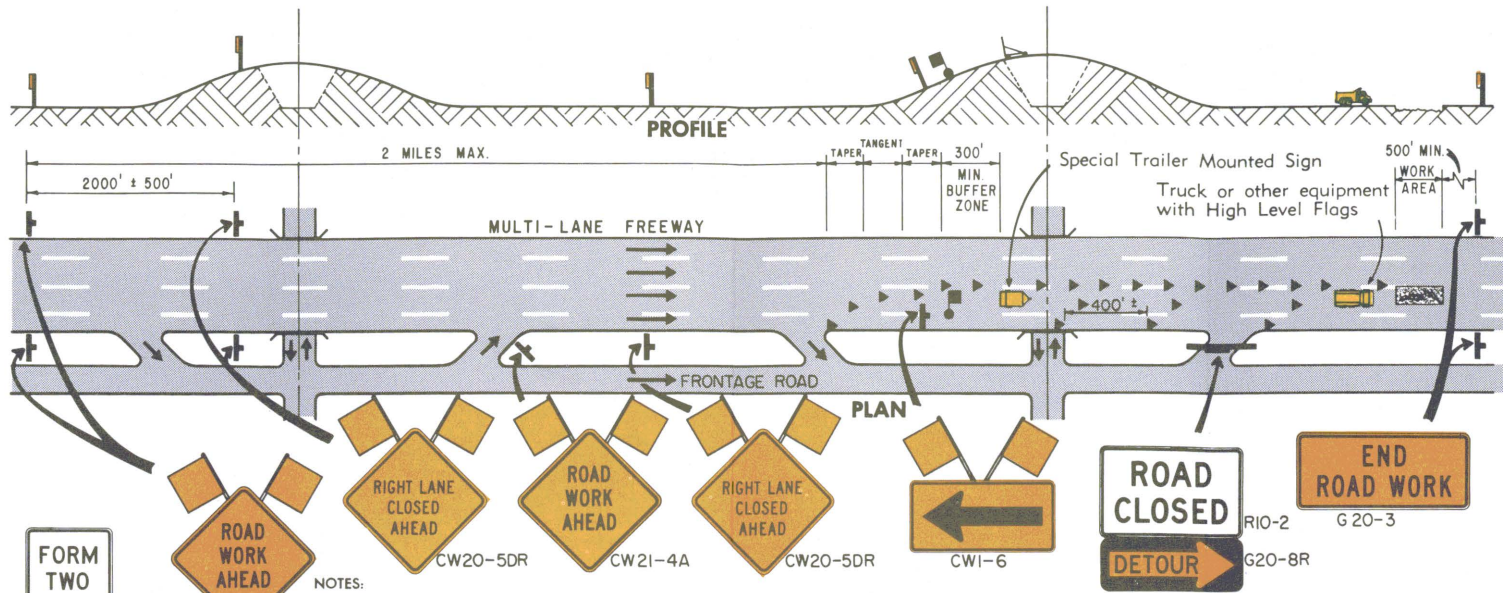
**NOTES:**

1. Short duration only
2. All distances shown are approximate
3. Appropriate Advisory Speed signs may be used in conjunction with Warning signs
4. High Level Flags shall be used in conjunction with Advance Warning signs
5. Not to be used after dark without torches or battery flashers
6. One or more flagmen to be used where traffic, road conditions, or terrain warrant their use
7. All Warning signs shall be placed at points of maximum visibility (usually just before crests of vertical curves)

**MAINTENANCE BARRICADES FOR FREEWAYS**  
 Work off Main Traveled Lanes

V-G-32

Series 122



FORM  
TWO  
LINES  
LEFT

RIO-15L CW21-4A

This sign may be used following the LANE CLOSED sign, at a distance of approximately 800 feet or more

NOTES:

1. Short duration only
2. All distances shown are approximate
3. Appropriate Advisory Speed signs may be used in conjunction with Warning signs
4. High Level Flags shall be used in conjunction with Advance Warning signs
5. Not to be used after dark without torches or battery flashers
6. All Warning signs shall be placed at points of maximum visibility (usually just before crests of vertical curves)
7. Closure of lanes 1 and 2 shall be similar with signs changed to read: LEFT LANES CLOSED AHEAD
8. Do not allow traffic to move on both sides of a work area if possible
9. Taper shall be minimum of 500 feet per lane with approximately 1,000 feet to 1,500 feet tangent section between adjacent lane closure tapers. Usual taper:  $L = S \times W$ .
10. Second trailer mounted sign shall be used on right shoulder in advance of traffic stoppage under unusual conditions

MAINTENANCE BARRICADES FOR FREEWAYS  
Surface Repairs

ROAD  
CLOSED

RIO-2

DETOUR

G20-8R

END  
ROAD  
WORK

G 20-3

LEGEND

- ▲ Cone
  - Flagman
  - Class I Barricade
- NOTE: L= Minimum length of taper  
S= Numerical value of speed limit or 85 percentile speed  
W= Width of offset

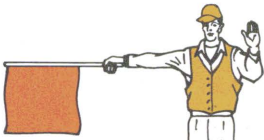
V-G-33

Series I22

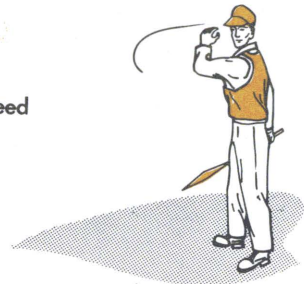
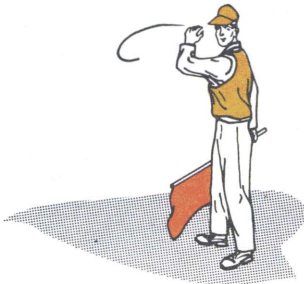
ACTION

FLAG

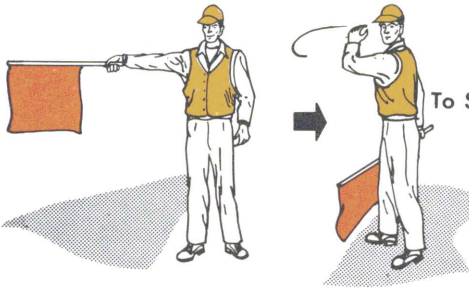
PADDLE



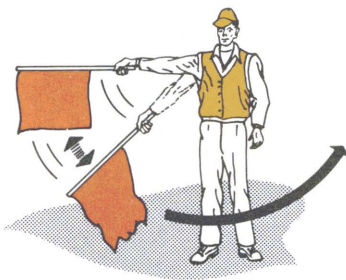
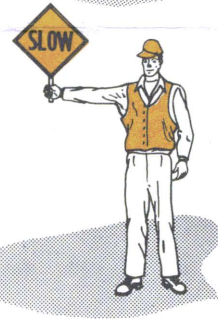
To Stop Traffic



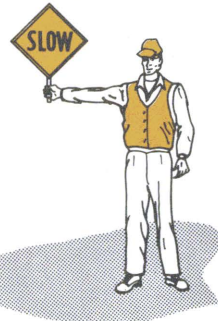
Traffic Proceed



To Slow Traffic



To Alert Traffic



**SURVEY PARTIES - SERIES 123**

.1 Members of survey parties should wear high shoes or boots with non-slip soles.

.2 Instrumentmen, when taking cross sections, should set up in roadway only when absolutely necessary.

.3 Instruments shall be put together or taken apart clear of traffic lanes.

.4 A tape should not be left where traffic will pass over it.

.5 A flagman shall always be used when an instrumentman is working on the travelled lanes.

.6 All survey crew members shall wear orange vests when on the road surface.

.7 Do not attempt to climb fences or other obstructions with instruments over shoulders or in arms.

.8 When working in the vicinity of high tension wires, extreme caution shall be taken to prevent the contact of the wires with equipment and chains.



## Series 123

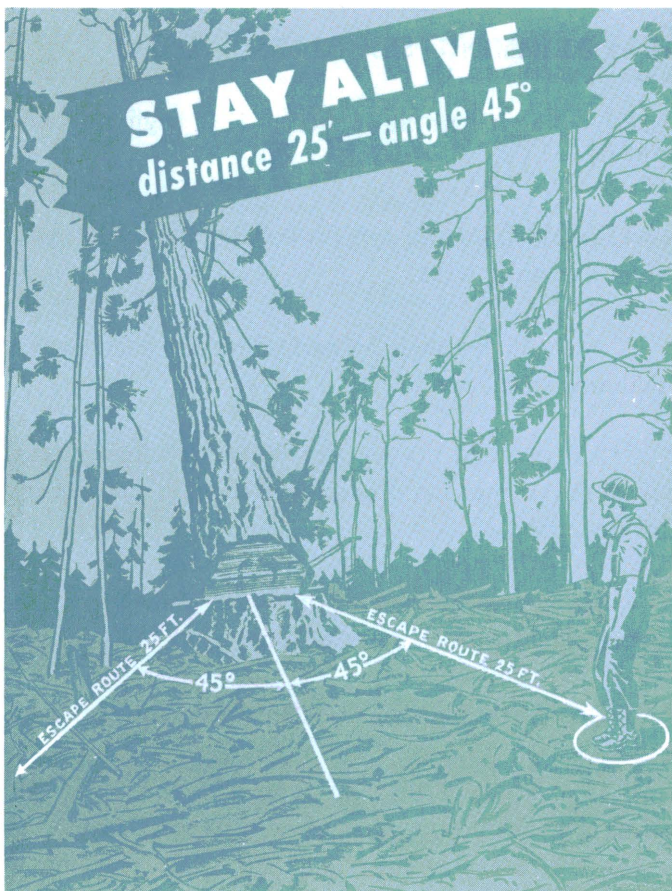
.9 A survey chain shall not be thrown or placed where wind or other conditions may move the chain so as to constitute a hazard to traffic or other workers.

.10 Care should be taken in using machetes not to hit other employees. To avoid cutting yourself, care should also be exercised not to swing the blade with too much force and to swing the blade in such a manner that it will not be deflected. Machetes should be sheathed when not in use.

.11 When survey crews are surveying new locations away from their vehicles, they should carry a belt pouch containing a snake bite kit and a pocket first aid kit.

.12 All survey party members shall be familiar with the book "Survey Party Safety" and follow its contents.

**STAY ALIVE**  
distance 25' — angle 45°



## Series 124

### TREE TRIMMING - SERIES 124

(See heading, Chain Saws, Series 120, beginning with rule .10)

.1 Safety hats and eye protection should be worn when trimming trees.

.2 All vehicles shall be parked off the road surface including shoulders.

.3 Axes should not be used when working in trees. Select the proper hand or power tools in performing this operation.

.4 Sharp-edged tools should be transported in proper places with sharp edges protected.

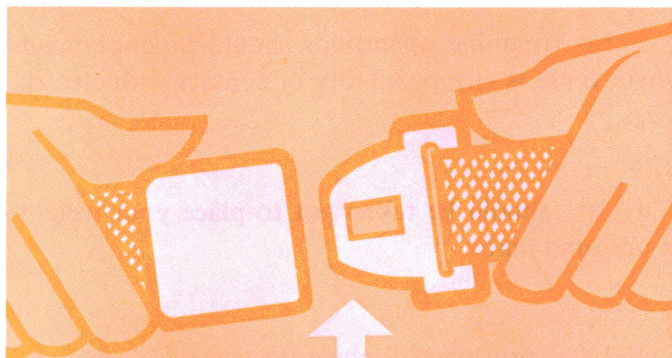
.5 Do not throw saws or other objects out of trees.

.6 If a ladder is used to enter a tree, support the ladder by both rails, not by a rung, and lash it in place. Use a safety rope and belt while working in trees.

.7 No trimming operations should be undertaken where there is any possibility of contact with electric wires.

.8 Care should be taken not to place your weight on unsound limbs.

.9 Load brush and limbs onto truck properly and keep your work site clean.



**BUCKLE UP**

**FOR SAFETY**

## VEHICLE AND TRAFFIC SAFETY - SERIES 125

.1 Seat belts shall be properly fastened while vehicles are in motion.

.2 Drivers should be thoroughly familiar with the Driver's Handbook published by the Department of Public Safety and with the Texas Digest of Motor Vehicle Laws.

.3 No one shall drive a Department vehicle without a current, valid driver's license for the type of vehicle he is operating.

.4 No one should operate a Department vehicle if he has reason to believe that his health is such that he might endanger his own life or that of others.

.5 Particular care should be exercised in backing. Do not back blindly.

.6 Do not park vehicles so as to obstruct the view of any traffic sign or signal.

.7 In rain, fog, or mist, or any time visibility is limited, drive with headlights on low beam. Never drive with parking lights.

## Series 125

.8 Special warning or precautionary lights mounted on maintenance vehicles must be used when performing maintenance work.

.9 When Department maintenance vehicles are travelling on the highway at reduced speeds, they should travel on the shoulder if possible and keep a sharp lookout to the rear. Extra precautions should be taken against obstructing traffic and against being run into from the rear.

.10 Windshield wipers, mirrors, lights, tires, and brakes should be checked before each trip.

.11 When you have Department vehicles in your possession overnight, select parking locations that will present the least hazard to the travelling public and the Department's vehicles.

.12 Take all necessary precautions to assure that no one can start or operate unattended vehicles.

.13 Never stand on the pavement for any purpose beside a vehicle except in a correctly barricaded and signed maintenance or construction area.

.14 No more than three employees may ride in the front seat or truck cab at the same time.

.15 Riding on the outside of any automotive equipment is prohibited except when seated within the truck bed.

.16 Employees must not ride on towed equipment except to perform an operation for which the equipment is designed.

.17 Do not attempt to mount or dismount moving vehicles or equipment.

.18 Trucks must be loaded in such a way that the cargo will not spill on the pavement or fall on passing vehicles.

.19 Care should be taken to assure that running boards are clean to prevent slips and falls.

.20 Do not jump off equipment, but use steps and handholds.

.21 Never get any part of your body under a raised truck bed unless the truck bed is blocked.



## Series 125

.22 Report all defective parts at once. Do not drive with makeshift repairs.

.23 Maintain correct tire pressure at all times.

.24 Never sit on the tailgate of a truck.

.25 Special care should be taken in working around truck tailgates. Keep hands clear of all pinch points. Do not place fingers underneath the bottom of a tailgate swinging from the top. In removing and replacing tailgates, be sure you have an adequate number of men to do the job.

.26 All automotive equipment must be equipped with a first aid kit and a fire extinguisher.

.27 Side-mounted rearview mirrors should be mounted low enough so that drivers can see over the top of the mirrors.

.28 It is the policy of the Department, through various media, to maintain a program of fleet safety. All Department vehicle operators are expected to be qualified defensive drivers.

.29 If a Department vehicle operator damages a Department vehicle through his CARELESSNESS and NEGLIGENCE, he may be expected to pay for the damage or he may be subject to other disciplinary action at the discretion of the District Engineer.

.30 All maintenance trucks should have in them at all times a minimum of one flag and one orange vest for use in the event of an emergency.

.31 The placement and use of high-level flags and other safety devices as prescribed by the Texas Manual on Uniform Traffic Control Devices and by the Equipment and Procurement Division shall be followed.

.32 Blank Form 592, *Vehicle Accident Check List*, will be kept at all times in the glove compartment of all vehicles which are operated while performing duties for the Department. This rule includes personal vehicles if they are driven while performing duties for the Department. The *Vehicle Accident Check List* will be completed immediately following each accident by Department drivers or by other employees at accident scenes.

## Series 126

### WORKING AROUND CONTRACT PROJECTS - SERIES 126

.1 Do not check the temperature of hot mix while the truck is under the hopper.

.2 Do not get on or ride on contractor's equipment, unless your duties make it absolutely necessary.

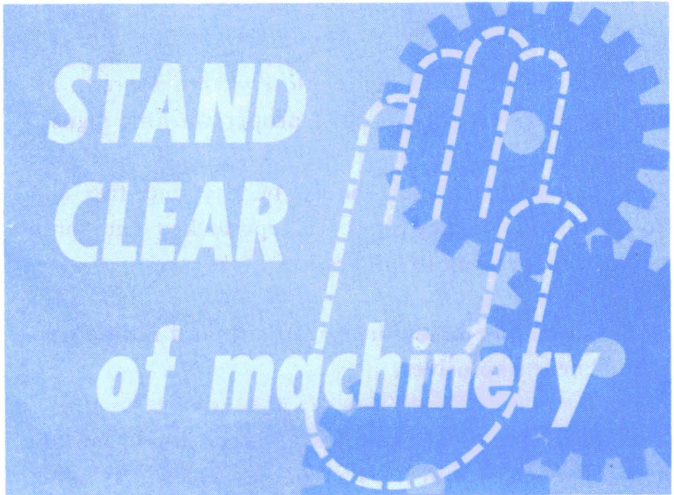
.3 Stay clear of moving equipment, particularly backing trucks and other equipment.

.4 Watch for tripping hazards, especially around unfinished structures.

.5 If you cannot perform your duties (inspection, etc.) in a safe manner because of unsafe conditions, advise your supervisor and do not expose yourself to injury.

.6 Safety practices included in specifications should be adhered to. Safety practices of the contractor should be observed.

.7 Wear safety hats and eye protection where indicated.



.8 Do not climb on makeshift or unsafe platforms and scaffolds.

## MISCELLANEOUS - SERIES 127

### Explosives

.1 Only trained and qualified personnel shall use explosives.

## **Series 127**

.2 Detonators should always be stored separately from explosives.

.3 All locations where explosives are stored, including vehicles, should have proper warning signs.

.4 Storage magazines should be dry and fire and bullet resistant. They shall be kept locked with only authorized persons in possession of keys.

.5 Smoking or other fire hazards should not be permitted near explosives.

.6 All Department radio transmitters should be turned off when within 30 feet of any electric blasting caps.

.7 In any operation involving the use of explosives, if there is not a competent, experienced man available to supervise all phases of the operation, assistance should be obtained from a qualified and reliable source.

## **Ferryboats**

.10 All crewmen working on the decks of ferryboat shall wear orange vests.

.11 Be courteous to the public but firm and concise in giving directions.

.12 Keep the decks free of any oil spills.

.13 Enforce rules, "Set Brakes", "Turn Off Engine", and "No Smoking".

.14 Do not attempt to manually move stalled vehicles unless there is adequate help to do the job safely.

.15 Stand clear of moving vehicles.

.16 Crewmen should face stairs and ladders when climbing and descending.

.17 Load and unload foot passengers first during inclement weather.

.18 King posts on ferryboats should be striped or marked in some manner to call attention to them.

.19 Crewmen should not stand between king posts and vehicles when vehicles are moving off the deck.

.20 Access doors or hatches to "below deck"

## Series 127

should be kept closed or covered to prevent falls.

.21 On ferryboats having passenger compartments, doors should be equipped with hydraulic door closers to prevent slamming.

**DRIVE**  
**Defensively**



**help him pass**  
***KEEP RIGHT***