the precautions discussed next will help prevent accidents to the public, employees, and equipment

Traffic should be warned of danger ahead by barrier signs at both ends of the section of road undergoing construction or repairs Primary warning signs, such as ROAD UNDER CONSTRUCTION or BARRICADE AHEAD, should be placed 1500 ft from the end point of operation

Orange flags or markers at the ends of blades, which may project beyond the tread of a machine, serve to warn persons and other equipment

An orange flag on a staff that will project the flag at least 6 ft above the rear wheel of a blade grader is recommended for operation in hilly country (See Fig 45–12)

Operators of motor graders should keep to the right side of a roadway When blading against traffic is necessary, flags and barricades should be used to warn traffic Warning signs should be placed at a considerable distance from the work area This distance increases as the "speed" of the highway increases Suggestions are given in NSC Data Sheet 614, *Surface Surveying*, and DOT *Manual on Uniform Traffic Control Devices for Streets and Highways*, ANSI D6 1

Where operations are extensive, flagmen should be placed at each end of the working area so that they are visible to oncoming traffic for at least 500 ft

Where earth-moving equipment is stopping, turning, or backing at curves, crests of hills, and similar dangerous locations, flagmen should be stationed Such movements generally require a clear view of approaching traffic for a distance of about 1000 ft for safety

Flagmen should also be used where the working area is congested by other equipment, workmen, buildings, excavations, and similar hazards See Fig 45–15 for hand signaling procedures

Coupling and towing equipment An operator should not back up to couple a tractor to a scraper, sheepsfoot roller, or other equipment unless he has first checked to make sure that everyone is in the clear If the operator is assisted by a ground man, he should not move his equipment until signaled

Before an employee is allowed to couple the trailing equipment, the tractor should be stopped, the shift lever put in neutral, and the brakes set The wheels of equipment being coupled should be blocked

All equipment being towed should be secured by a safety chain attached to the pulling unit, in addition to the regular hitch or drawbar, since drawbar failure can result in a serious accident

When a scraper is towed from one job to another, the operator should use a scraper bowl safety latch, or place a safety bolt in the beam to give maximum clearance for road projections such as crossings This precaution prevents the bowl from striking the ground or pavement and injuring persons or damaging equipment

Clearing work. Work requiring exposure to low limbs of trees or to high brush involves serious hazards which can be readily overcome by suitable protective measures and safe practices

It is best to equip bulldozers with heavy, well supported, arched steel mesh canopies to protect operators See section on "Protective Frames for Heavy Equipment," earlier

Goggles should be worn to protect the eyes from whipping branches

Safety hats provide protection from falling dead branches When a bulldozer shoves hard against the butt of a large dead tree, the tree may crack in the middle or limbs may fall onto the machine Dead branches or tops also may drop from live trees A safe procedure to eliminate the danger is to cut the roots on three sides and then apply the power to the fourth side A long cable may be used to pull over large dead trees, but it must be determined in advance that the tractor and operator will be in the clear when the tree falls

Operators have the responsibility of seeing that all men in the area are in the clear before pushing over small trees, bulldozing rock, and rolling logs

Special hazards. Fatalities occur while equipment is operated on dumps and fills, near excavations, and on steep slopes

The bulldozer blade should be kept close to the ground for balance when the machine