EVACUATING
ELDERLY AND DISABLED
PASSENGERS FROM
PUBLIC TRANSPORTATION VEHICLE
EMERGENCIES

Senior Services of Snohomish County
Everett, Washington 98204

March 1991  Project No. WA 8-7001

Participant's Handbook

Office of Technical Assistance and Safety
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<td>This manual is intended to serve as a primary training resource for use by transportation systems when training personnel in techniques for evacuating elderly or disabled passengers from public transportation vehicle emergencies. The manual covers the evacuation process, precautions to be observed when the passenger's disabling is known, proper body mechanics and specific techniques which may be used in the evacuation process. Some features of onboard equipment and of wheelchairs which may affect the evacuation process are also presented.</td>
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PUBLIC TRANSPORTATION VEHICLE
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Participant's Handbook

March 1991

Prepared by
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Senior Services of Snohomish County
Everett, Washington 98204

In Cooperation with
Snohomish County Transportation Authority (SNO-TRAN)
Lynnwood, WA 98036

Prepared for
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Urban Mass Transportation Administration (UMTA)
Office of Technical Assistance and Safety
Washington, D.C. 20590

Project Number
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The term "public transportation vehicle" has been used to avoid the somewhat limited interpretation which is placed on the word bus, usually to mean large vehicle.

This training module will be useful to an operator/driver of any public or private transit vehicle including vans, (multi-purpose passenger vehicles), school buses, airport buses, intercity and transcontinental buses, church buses and charter buses. Information applies to the whole spectrum of vehicles in such transportation services.

In recent years there has been a rapid growth in the use of public and special transportation services by elderly and disabled persons.

Better wheelchairs and mobility aids, both "people-powered" and electric-powered versions, coupled with improved environmental access has given mobility impaired persons greater independence. The adoption of final rules implementing Section 504 of the Rehabilitation Act by the U.S. Department of Transportation in 1986 and the passage of the Americans with Disabilities Act by Congress in mid-1990 gives further impetus to assuring transportation access for mobility impaired persons.

Many more people are attempting to use, or are using, accessible transportation. Greater use of these services increases the likelihood of bus breakdowns or accidents that may require the evacuation of passengers from the vehicles.

Most transit systems, whether large or small, rural, specialized or urban, have not trained their drivers in the techniques of safe passenger evacuation. This is in part due to the absence of "how-to" training materials aimed at the transportation industry and their elderly and disabled passengers.

The Bus Safety Faculty Committee, an UMTA funded activity, is concerned with safety needs of the bus transportation industry. The Committee recognized the lack of evacuation training and encouraged the development of appropriate training materials.

The following material and the accompanying video training film are directed toward meeting this need.
## METRIC / ENGLISH CONVERSION FACTORS

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For more exact and/or other conversion factors, see NBS Miscellaneous Publication 286, Units of Weights and Measures. Price $2.50. SD Catalog No. C13 19 286.
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1.0 Introduction

Many public transportation vehicles operate in areas where public safety personnel and equipment cannot reach them quickly. Response times may be affected by such things as distance, road conditions, weather conditions, heavy traffic or other emergencies.

In an evacuation emergency, you the driver, if uninjured, will be the first line of assistance, and you may be the only resource to assist passengers out of the vehicle.

When the emergency is serious, such as in the case of fire, time becomes critical. Knowing what to do, how to do it and when to do it becomes your best defense.

The range in age, physical abilities and experience among professional and volunteer transportation drivers varies greatly. One of the most serious problems is the burden of responsibility placed upon the drivers -- a burden for which they are usually not trained. Also, passengers may be very large and heavy and have a wide range of functional limitations. Add to this a number of different wheelchairs which are often complex and heavy, and the transit industry is faced with very serious safety problems.

The techniques presented in this Handbook are derived from training materials used in fire services training, EMT (Emergency Medical Technicians) and paramedic training, physical therapy, first aid training, and by nursing personnel. These techniques are intended to provide you with a set of basic skills necessary to safely evacuate your passengers from vehicle emergencies.

Although the focus is on techniques, there is additional supporting information to help you make better choices in dealing with vehicle emergencies.
2.0 Reasons for Training
Evacuation should be considered hazardous under the best of conditions. Hazards may increase if the evacuation must be done hurriedly or if it involves more severely disabled passengers.

The primary reason for this training is to prepare you to provide evacuation assistance to the elderly and/or disabled passengers who use your transportation vehicle.

As a driver, professional or volunteer, you have a great responsibility for the welfare and safety of your passengers. Training helps you to fulfill these responsibilities.

2.1 Training Objectives
Training is intended to increase your skills, thereby reducing the potential risks when evacuating elderly or disabled passengers. However, the training principles can be used with any passenger who needs physical assistance to leave a transit vehicle in an emergency.

Primary objectives of the training program are to:
1. Train you to effectively manage bus evacuation emergencies.
2. Teach basic techniques which permit safe and quick evacuation of passengers from transportation vehicle emergencies.
3. Minimize risk to passengers by teaching you to observe reasonable precautions consistent with the nature and severity of the emergency.
4. Minimize risk to yourself by teaching the principles of the proper use of leverage and body mechanics when performing various evacuation techniques.
5. Help you to recognize your own limitations when choosing the techniques to use in an evacuation situation.
6. Help you to recognize and understand a passenger's functional limitations relative to an evacuation situation.
7. Help you recognize features of mobility aids which may affect safe evacuation.
2.2 Training Materials
The training materials consist of two components. The first is a Participant’s Handbook for you to keep for future reference. The second component is a video film which presents in detail how to perform various evacuation maneuvers.

2.3 Training Program Description
The particular format or plan will be up to the individual transportation program to determine. However, one or more of the following will be used:

- Classroom review and discussion of the Participant’s Handbook.
- A specific discussion of Section 7.0 dealing with leverage and body mechanics involved in the evacuation techniques relative to bending, stooping, lifting, dragging, carrying, etc.
- Observing and discussing the evacuation techniques presented in the video film.
- Participation in a study course where techniques can be observed, then practiced under the supervision of the instructor. Participants will perform roles both as a driver and as a passenger in order to gain a better understanding of each technique.
- Participation in a post-training evaluation of the program.
3.0 The Evacuation Decision
Because conditions which may dictate evacuation are difficult to anticipate, this program begins at the point where the decision to evacuate has already been made.

Each transit system should establish guidelines to deal with a situation which might require the driver to remove passengers from the vehicle. Where fire is present, there is leaking fuel, or the vehicle is in danger, then evacuation is clearly indicated. Assessing a possible emergency in other situations may be less clear, for example, a tornado sighting, an earthquake, heavy flooding, an earth slide, or as in recent years, a volcanic eruption. In the case of collisions, the conditions that must be present to require evacuation should be clearly identified by the transit system’s policy. Weather conditions, traffic, road conditions, availability of assistance, response time of public safety services, passenger characteristics and driver experience will all enter into the decision to evacuate.

State patrols, sheriff departments and fire departments are all good, locally available resources to help systems develop evacuation policies which are appropriate to the conditions of the area.

3.1 Vehicle Location
Once you become aware of a possible emergency and the vehicle has stopped, its location should be noted. You should be aware of the vehicle’s position relative to the nearest cross street, road or widely recognized landmark.

Another aspect of vehicle location which affects evacuation will be the terrain characteristics of where you stop. For example, the following must be considered when deciding what to do.

1. Are you stopped on a hill?
   • Facing uphill?
   • Facing downhill?
2. Are you stopped on the shoulder?
   • Is the shoulder wide enough for your vehicle?
   • Is the shoulder flat or on an incline?
   • Is the shoulder grassy, rocky, brushy, etc.?
3. Are you on a curve and can oncoming traffic see you clearly and in sufficient time?
4. Does the road have a crown (high center sloping to the shoulder)?
5. Are you on:
   - A divided highway?
   - Multilane undivided?
   - Two lane road?
6. Is your vehicle off the road and if so is it:
   - On the shoulder?
   - In a ditch?
   - In a driveway?
   - Parking lot?

The above conditions must be considered in conjunction with the vehicle’s position, e.g., is it level, front end down, front end up, tilted on its side to some degree, resting on its side or resting on its top?

---

3.2 Nature of the Emergency

Proper identification of the nature and immediacy of the emergency is critical. The presence of flames or a fuel leak, and the resulting extreme fire potential demand prompt action. The driver must determine a course of action for the following types of situations.

For example, if fire is present:

1. Does the driver attempt to notify base thereby losing valuable time? Films taken of Fire Life/Safety Exercises conducted by the Transportation Safety Institute show that buses become fully engulfed in flames in a matter of minutes. Smaller vehicles become more quickly engulfed than larger vehicles. This suggests there is no time to waste and even seconds may mean the difference between successful evacuation and disaster.

2. Do you attempt to fight the fire or begin the evacuation process? Should the extinguisher be used to assure a flame-free path to an exit? Because fire fighting resources on a bus are limited (usually a single extinguisher) it may be impossible to suppress a fire once it is underway. Therefore, your time might be better spent beginning evacuation. The size and location of the fire will affect this decision.

3. Some fuels are very hazardous and leaks are not easily detected. Those include propane, methanol, ethanol and compressed natural gas.

4. Passengers in wheelchairs present two elements for assessment. The first is whether or not conditions permit deployment of the lift. Cold weather will cost significant loss of time to get the lift deployed. If the emergency was
caused by a collision the impact may have caused short circuits in the lift's wiring. These shorts can cause ignition of leaking fuel and/or possible injury to you because of the high amperage of the electrical current required to operate the lift. The lift may be damaged preventing manual deployment.

Secondly, is the decision whether or not to evacuate the passengers in their chairs. If the vehicle impact forces were very high, then the wheelchair may have sustained damage which may not be readily apparent. Do not waste time removing seat belts and tie-downs only to find the wheelchair cannot be moved. See Section 8.4.8 (Managing the Passenger in a Wheelchair) for a further discussion of this issue.

Passengers will be reluctant to leave their wheelchair behind because without it they become totally immobile. However, saving the passenger's life is of first priority. If time and conditions permit, the wheelchair can be recovered later. Some wheelchair/passenger weight combinations will be so heavy that they cannot be safely removed unaided. If the lift will not work, then there is probably not going to be an exit which can accommodate the wheelchair.

3.3 The Availability of Help
As a good driver, you will generally have a feeling for where you are and if public safety resources are readily available. This results from being trained and prepared to deal with onboard medical emergencies.

As passengers are boarding you should routinely note their physical and mental abilities in the event that assistance by the more able-bodied passengers becomes necessary during an emergency.

If there is other road traffic, you can assume that able-bodied passersby will likely be available to render assistance.

As the "Captain" of your vehicle, you are responsible for directing passengers and passersby in giving assistance. However, once public safety personnel arrive on the scene they will assume command and control of the emergency. At that point, your responsibility is seeing to the needs of the passengers.
4.0 The Evacuation Process
To be successful, the evacuation process requires that you know what to do, how to do it and when to do it -- plus, fully understand the equipment on the vehicles you operate.

4.1 Policy Considerations
Rather than addressing the policy needs of various kinds of transportation services, your trainer may at this point discuss local policy guidelines appropriate to your specific transit system.

4.2 Communicating with Passengers and Helpers
Being well trained in how to deal with evacuation emergencies will make it easier for you to remain calm. Remaining calm is crucial!

Time and conditions permitting, tell the passengers in a calm, clear and concise manner that there is an emergency. An explanation of what they are required to do will help to prevent passenger hysteria. Passengers should be advised that help is on the way, but for their safety it is best they leave and/or be assisted from the vehicle. Encourage passengers to adopt a "buddy" for shared support through the emergency. Continued reassurance to passengers while performing your duties will also be helpful in forestalling any panic.

The use of able-bodied passengers or passersby must be done with great care. The ability to remain calm and give clear and concise instructions to helpers will help prevent unnecessary injuries. Placement of hands and feet and body position can be done by example. In other words, as you are positioning yourself, show your helper where they should be and as you position your hands and feet, you can show your helper what they should do. Make it clear what commands will be used to start whatever you will be doing. If you use 3 on a count of 3, your helper is better able to synchronize his or her actions with you, rather than just using "GO" or some other single command.

BE CALM!
4.3 Steps of the Evacuation Process
In most instances evacuation can be reduced to the following steps:

1. Release passengers from their passenger restraints or seat belts by unbuckling or cutting. (If passengers are in a wheelchair, do not waste time unbuckling or releasing the wheelchair securement system -- instead, first remove the passenger then if time permits recover the wheelchair.)

2. Move the passenger from the seat or wheelchair to floor level. (If passenger can walk, assist to a standing position).

3. Move passenger to the "best" usable exit. The term "best" is used since the nearest exit may not work (door is too narrow, lift platform may be blocking doorway, door may be jammed, etc.).

4. Move passenger from floor level to ground level.

5. Move passenger away from the vehicle to a safe location.

6. Assist the passenger back into their wheelchair if wheelchair can be safely recovered and conditions permit.

You can perform some evacuation techniques safely with no assistance. Some techniques require the assistance of at least one other person. Narrow confines of most vehicles make it difficult for two people to work together. However, moving passengers from floor level to ground level and from there to safety may be more speedily and safely accomplished with help.

4.4 Evacuation Aids
This section is included to familiarize you with examples of safety items which may be on your vehicle. You are responsible for knowing what safety equipment your vehicle has on board, seeing that it is properly stored (properly stored means secure from theft as well as from becoming a hazard in the event of an accident), and knowing the proper use of any such on-board equipment.

4.4.1 Tools for Cutting Seat Belts, Webbing, Tie-downs, Clothing, Etc.

A. Webbing Scissors

• Advantages
  a. Low cost
  b. Easy to store
  c. Light weight
• **Disadvantages**  
  a. May require hand strength when attempting to cut heavier webbing fabrics  
  b. May not work well on lighter weight fabrics

**B. Webbing Cutter with Hammer**  
• **Advantages**  
  a. Works well with most webbing  
  b. Hammer is useful in breaking out windows and/or windshields  

• **Disadvantages**  
  a. Relatively expensive  
  b. May not work well in cutting clothing fabrics  
  c. Can become a weapon

**C. Safe-Cut®**  
• **Advantages**  
  a. Low cost  
  b. Easy to store  
  c. Light weight  
  d. Works well on all fabrics including leather belts and boots  

• **Disadvantages**  
  Pilferage may be a problem

**D. Pocket Knife**  
• **Advantages**  
  a. Low Cost  
  b. Easy to use  

• **Disadvantages**  
  a. Must be sharp  
  b. Danger of cutting passenger  
  c. Easy to drop and lose  
  d. Small, easily pilfered  
  e. May become a weapon

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### 4.4.2 Items for Drags

**A. Blankets**  
• Use good quality wool like surplus army blankets, strong, more water resistant  
• Look for tight weave to minimize snagging

**B. Tarps**  
• Use good quality canvas duck  
• Look for heavy fabric with tight weave to minimize snagging  
• Can be used as a shelter
C. **Evac-Aid®**
- Fire Resistant
- Slick bottom surface reduces friction and makes dragging easier
- Sewn hand grips allow use as a flexible stretcher or litter
- Can be used as a waterproof shelter

D. **Use of Clothing Items**
- Rain coats offer less resistance when dragging a heavy person, but because of light weight may tear or snag more readily
- Coats or jackets, especially warm ones, will be made from heavier or stronger fabrics, but light weight shells may snag or tear more easily

E. **Body Loops**
- These are continuous webbing that form a loop about 48” across
- Transfer belts or walking safety straps can be used as body loops

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4.4.3 **Transfer or Sliding Boards**
- Transfer or sliding boards come in various lengths and widths. A good, convenient size is approximately 26” to 28” long by 7 1/2 ” wide and of sufficient thickness and strength to support a heavy person's weight.
- Transfer boards may be made from wood or from various reinforced plastic materials.
- Some wheelchair passengers carry their own transfer boards.
- Surfaces of sliding or transfer boards must be kept waxed for greater ease of use.
5.0 Handling Precautions For Common Disabling Conditions

5.1 Introduction
Drivers will often have no idea what a particular passenger's disabling condition might be. It is more common for a driver to obtain this information by asking the passenger who rides on a particular route or run.

Take the time to get to know your passengers. As an observant driver, you will quickly learn to associate certain characteristics such as various wheelchair features, head positions, methods of breathing, speech patterns, body movements, etc., with specific disabling conditions.

5.2 General Precautions
The most important consideration to keep in mind during an evacuation of people with handicaps discussed in this manual is that, unless otherwise stated, these people are not intellectually impaired. Therefore, your most valuable resource in considering evacuation methods for the uninjured passenger will be to ask the passenger how much assistance is needed. Other cues will come by observing how much assistance a rider needs when getting on and off the bus during routine use.

5.3 Spinal Cord Injuries

5.3.1 Paraplegia: Paraplegia results from severe injury to the lower back which causes loss of feeling in the legs and inability to move the legs. These people generally depend on a wheelchair for their mobility. Walking assists will not be an option in the evacuation of a paraplegic. Dragging and carrying methods should be considered. You should remember that the paraplegics have little or no feeling in their legs so they will not be able to inform you whether an evacuation method is painful (and therefore, potentially harmful). Care must be taken to secure the legs during evacuation as paraplegics will be unable to protect their legs themselves.
5.3.2 Quadrplegia: Quadrplegia results from severe injury to the neck or upper back which causes loss of feeling in the arms and legs and inability to move them. These people depend on a wheelchair for their mobility. Walking assists will not be an option in the evacuation of a quadrplegic passenger. They are also unable to protect their limbs so arms and legs should be secured during the evacuation. If the quadrplegic is unable to control neck motion then you must select an evacuation method which will protect the head and limit neck motion.

A special precaution in the evacuation of a quadrplegic is to watch for signs of rapidly elevating blood pressure, which will include: passenger complaining of headache, flushing, goose bumps and sweating. Because this can be a life threatening situation, emergency medical assistance should be obtained immediately. Until assistance is available, the passenger should be positioned in a supported sitting position, as in a wheelchair — tight clothing loosened around neck, waist, arms and legs, and the passenger assisted as possible to unkink bladder tubing, stretch muscles or other actions that the passenger may direct.

5.4 Neuromuscular Disorders

5.4.1 Cerebral Palsy: Cerebral palsy is a disorder which results when the brain of a fetus or newborn is injured. The disabilities seen in cerebral palsy range from very mild impairment in motor coordination to severe problems with motor, sensory, intellectual and language functions. Each person with cerebral palsy has a unique set of disabilities and therefore the evacuation technique will be determined by each passenger's special circumstances. The driver will have a general feeling for the amount of assistance a person with cerebral palsy will require by noting the assistance needed to get on and off the bus.

5.4.2 Post Polio: Polio is a disease which effects the nerves that control the muscles. The disability seen in polio ranges from minimal impairment in motor coordination to inability to move an arm and/or leg. Each person with polio has a unique set of capabilities and therefore, if possible, the driver should ask the rider how much assistance will be needed to be evacuated. If a carrying or dragging method is used, then care should be taken to secure affected limbs.
5.4.3 Multiple Sclerosis: Multiple sclerosis (MS) is a disease of the nerves in the brain. The cause of MS is unknown. The disabilities seen in MS range from occasional mild problems with motor and/or sensory functions (e.g. blurry vision, muscle weakness) to severe impairment of motor and sensory function (e.g. behavior problems, bowel and bladder problems, inability to control arm or leg movement). The driver will have gained a general feeling for the assistance requirements of passengers with MS by noting how they get on and off the bus.

5.4.4 Epilepsy: Epilepsy is a disorder in the brain which causes a person to have occasional seizures. In most people with epilepsy, the seizures occur rarely because the disorder is controlled with medication. However, in some people with epilepsy the seizures continue even with medication. Passengers with epilepsy should require minimal evacuation assistance (unless they have other disorders). Because there is usually no intellectual dysfunction associated with epilepsy, these passengers can be trusted not to wander from the evacuation site.

5.4.5 Strokes: A stroke occurs when a portion or portions of the brain are cut off from their blood supply. This most commonly occurs when a "blood clot" forms in one of the blood vessels in the brain. People who have had a stroke usually have some degree of muscle weakness. This weakness, usually on one side of the body, can range from mild to total paralysis of arm, leg and face. You will know how much assistance a passenger who has had a stroke will need by noting how the passenger gets on and off the bus. In general, a stroke patient who rides in a wheelchair should not be evacuated with a walking assist but rather should be evacuated via a dragging or carrying method. Care must be taken to secure paralyzed limbs (arms and legs); these riders will not be able to protect their limbs themselves.

5.5 Amputations

5.5.1 Arms: Passengers who have lost an arm should be able to assist in evacuation (assuming they were not injured during the accident). If a walking assist or carrying or dragging methods of evacuation are necessary, care should be taken to avoid grasping an artificial limb.
5.5.2 Legs: Passengers who have lost a leg will have varying degrees of mobility depending on factors such as: level of amputation (above the knee versus below the knee), skill of using prosthetic device and age of amputee. Your best indication for the amount of assistance a lower extremity (leg) amputee will require during evacuation is to note the person’s mobility getting on and off the bus during routine use.

5.6 Respiratory Disorders

5.6.1 Emphysema: Emphysema is a lung disease, usually caused by smoking, which progresses from mild shortness of breath during exertion to severe inability to catch a breath of air while sitting in a chair. People with severe emphysema are quite often confined to wheelchairs and some must carry oxygen tanks to help them breathe. When evacuating a passenger with an oxygen tank and there is a danger of sparks or flames, the tank should be turned off. Once the passenger has been moved to the evacuation site, ensure that the nasal tubes are in place and restart the oxygen. Special precaution should be taken to ensure that a passenger with emphysema is evacuated well away from any vehicle emitting smoke or exhaust fumes.

5.6.2 Asthma: People with asthma have episodes in which they have difficulty in breathing. The severity of these episodes ranges from mild discomfort because they cannot catch their breath, to severe distress because they are unable to breath. Many factors can stimulate an "asthma attack" including smoke, toxic fumes and stress. Most people with asthma will need minimal assistance during evacuation unless they have an asthma attack. Most people with asthma carry medication which they inhale during an attack. You can assist the passenger in taking this medication either while the passenger is being evacuated or afterwards.

5.7 Sensory Disorders

5.7.1 Vision Impairments: People with vision impairment need to be evacuated (usually a walking assist unless they are injured) to a safe place. If vision impairment is the passenger's only handicap, then you should explain what is happening while moving toward the evacuation site. You should
ensure that the passenger is in a safe place. You need not worry about the passenger wandering off (unless the passenger is a child).

5.7.2 Hearing Impairments: People with hearing impairment should be able to evacuate unassisted unless they are injured or have other disabilities.

5.8 Mental/Emotional Disorders

5.8.1 Mental/Emotional: People with mental or emotional problems have a very wide range of abilities. When evacuating these passengers (as well as others who might have intellectual impairment, such as cerebral palsy, strokes, Alzheimers) you must ensure that passengers are evacuated to a safe place. Be aware that the stress and excitement of an evacuation and/or accident can cause these passengers to become agitated or frightened. Care should be taken to evacuate them to a place from which they cannot wander.

5.8.2 Alzheimers Disease: Alzheimers is a progressive disease of the brain in which people slowly lose their intellectual function and eventually are unable to perceive, think, speak and move. These passengers should require minimal assistance for evacuation while they are still mobile. However, passengers must be evacuated to a place from which they cannot wander or where they can be supervised.
6.0 Special Considerations
There are several conditions which must be considered in addition to dealing with problems caused by a passenger's specific disability or disabilities. It will not be uncommon to find passengers presenting more than one problem, thus the following considerations will be in addition to those resulting from the disabling conditions discussed in Section 5.0.

6.1 Helping Visually Impaired Passengers
Many visually impaired passengers will have had mobility orientation and training. The exception might be the elderly passenger.

A large percentage of these passengers will also have some degree of remaining vision sufficient to allow them to reach an exit unassisted.

Most transportation systems seat visually impaired passengers in the front seats of the vehicle. Unless that exit is jammed, they will probably not need any help.

If the exit through which they boarded is not usable then simple, concise instructions should be given. It is suggested you first be sure they know the direction to the exit to be used. Estimate the distance in feet that they must travel and tell them which direction the exit is, i.e., to their left or right. Tell the passenger if there are any obstructions or hazards between their position and the exit. Describe what the obstruction or hazard is, where it is, in feet, and whether it is located at a height where their head might hit it, or low where their cane will not detect it.

If the vehicle is tipped requiring use of a window or some other exit, some assistance may be necessary to get over seats, etc.

If the visually impaired person is using a dog guide then little assistance should be required other than your clear instructions and description of the evacuation route to be followed.

6.2 Helping Hearing Impaired Passengers
Once a hearing impaired passenger is aware of any emergency, little assistance should needed for evacuation unless the passenger is also physically impaired.
When giving directions to a hearing impaired passenger, be sure you are face to face. Speak clearly and distinctly and use simple gestures to give any directions. Use words in case the passenger can read lips or has residual hearing.

6.3 Evacuating the Unconscious Passenger
Obviously when you have an unconscious passenger you will not know what injuries may exist. Neither will you have time in an emergency to make even a superficial examination.

When a passenger is unconscious and the evacuation emergency is critical, time will not allow rendering first aid. However, if severe arterial bleeding is occurring, the need to stop it has to be weighed against the nature of the emergency. When proceeding with the evacuation, one of the DRAGGING techniques described in Section 8.4.3 (Dragging Techniques) should be the first choice for passenger removal. With this choice there are two essential points to remember:
1. Try to keep the body in as straight a line as possible to avoid increasing any existing injury to the spinal cord. This will probably not be possible if a drag must be used on steps.
2. If the clothing drag is the method chosen, be sure the clothing does not interfere with the passenger's breathing.

6.4 Procedures for Handling Known or Possible Infectious Diseases
There are a variety of diseases which may be transmitted from contact with body fluids, especially blood. One receiving much attention today is HIV or AIDS. Other diseases which may be of concern are infectious hepatitis, as well as an array of venereal diseases. If concern for infectious disease exists, then donning protective rubber or plastic gloves offers the most immediate protection. Avoid getting these body fluids in any cuts or abrasions or in the mouth.

6.5 Handling Passengers with Oxygen
The most important point to remember is that OXYGEN is a very explosive gas and is very easily ignited by even a spark. In a small confined space the danger is even greater. The presence of flames, sparks from wiring shorts, a
lighted cigarette or any other potential source of ignition means the oxygen must be cut off immediately. Once the threat of ignition is removed the passenger may reconnect or turn on the oxygen.

6.6 Evacuation Following a Roll-Over Accident
Other than a fire, vehicle roll-overs probably present the most serious problems in evacuation of mobility impaired passengers. Since roll-overs can range from a bus tilted onto two wheels to multiple rolls, the bus may come to rest at a slight angle, a steep angle, on its side, or on its top.

For ambulatory passengers, walking on a sloping surface with crutches, walkers or canes will be very difficult. Passengers walking in a bus on its side may encounter broken plastic or glass which can be slippery and dangerous if one falls on it. Window openings may have glass remaining in them, plus there may be an uneven walking surface beneath the bus windows which adds to the problems. In all likelihood, dragging methods cannot be used if the bus is on its side. Thus one of the carries described in Sections 8.4.4 (Carry Methods: One Person) and 8.4.5 (Two Person Extremity Carrying Method) may be the only choice remaining. The same walking hazards will face the rescuer as they may not be able to clearly see the walking surface.

Buses on their sides or upside down present the immediate problem of freeing wheelchair passengers from their passenger restraints. A passenger suspended by only a seat belt may be subjected to internal injuries and difficulties in breathing.

The wheelchair on its side will leave the passenger’s torso, or trunk above the waist, unsupported. If the body has to bend sideways a few inches, it might be uncomfortable but not necessarily dangerous. In this case, a jacket or coat, wadded and placed under the shoulders can provide some relief until more seriously injured passengers are evacuated.

The two situations described above are good reason for having the passenger restraint system separate from the wheelchair securement system. This permits releasing the passenger without also having to wrestle with an unsecured wheelchair.

It will not be uncommon to find exit doors jammed or blocked. This may mean having to knock out windows or windshields. Carry methods may be the only evacuation option available under these conditions.
Windows as an exit route are too small to step through while carrying a passenger. It will be necessary to have someone outside the vehicle to whom you can pass the person being carried.

In a case of extreme heat, there have been problems with the rubber gaskets softening and then sealing (glueing) the window so it becomes very difficult to knock or push out.

An injured driver who is conscious but unable to assist in evacuation may be able to give directions to ablebodied persons. In this situation, being able to tell another person what to do, step by step, may be the difference between success and failure. In Section 8, a series of distinct evacuation techniques are described. How to perform each technique is broken down into a series of steps in the approximate order they should be done. Learn a basic carry and dragging technique and practice telling someone how to do it. Also, be able to point out to others the pitfalls of lifting wheelchairs.

**Note:**

Wearing your seat belt is your responsibility and increases the chance that you will be uninjured and available to help your passengers.

**REMEMBER . . . .**

- KEEP CALM,
- SPEAK CLEARLY.
7.0 Basic Principles of Proper Body Mechanics

In a transit emergency, you need to be able to safely help your passengers get off the bus. This Section shows you how to move your body efficiently and with the least amount of strain and stress. Remember, you can't help others if you yourself become injured!

7.1 Anatomy

Your back consists of a column of individual bones (vertebrae) separated by cushions (disks) and held together by their joint shape, ligaments and muscles. A healthy back has three natural curves (in your neck, your midback and your low back) that allow for flexibility and help the spine in its role as a shock absorber. Your three curves are correctly aligned when your ears, shoulders and hips are in a straight line. See Illustration A.

The muscles in your back, abdomen and thighs are your "first line of defense" for your back. If they are strong and flexible, they help reduce the stress to your back. Keeping your back in good alignment as you move allows your stronger thigh muscles to do most of the work, thus protecting your back from injury. In other words, do not reach and bend from your waist.

7.2 Leverage

You body is like a machine, with a center of gravity (just behind your navel) and a base of support (your feet). Just like any other machine, the farther away the load is from the center of gravity the harder the machine has to work. See Illustration B-1. Your arms are mechanical levers: holding an object out at arm's length is much more difficult than holding the same object close to your body. See Illustration B-2
Another help to your body's leverage is spreading your feet apart before you lift or move. This broadens your base of support and gives you more stability and better balance.

Like any machine, there are limits to what your own body can do. Before lifting or moving an object, test the load (by a small movement that can be quickly stopped) to be sure you can move it safely by yourself. If not, get help or use a different method.

REMEMBER . . .
✓ Keep your back in a neutral position (do not waist-bend).
✓ Keep objects close to your body.
✓ Use your strong thigh muscles to lift and move.
✓ Spread your feet apart.
✓ Test the load.

7.2.1 Bending and Lifting
- Face the object (passenger) with your feet apart and one foot forward.
- Get as close to the object as possible.
- Bend your hips and knees to lower yourself to the object. Avoid bending forward at the waist.
- Reach with both hands for the object. Get a good grip to bring the object in close to you.
- Straighten your knees and hips as you come to a standing position. Do not jerk as you lift.
- Avoid twisting as you lift.
- You may vary this lifting technique -- according to your size and the size of the object you intend to lift -- by spreading your feet farther apart, bending down so that one knee touches the ground, lifting the passenger to an intermediate height before lifting him or her the rest of the way, etc.
- Use this technique even if you are not lifting anything, but only bending to unlock a wheelchair tie-down or unbuckle a belt. See Illustrations C.
7.2.2 Stooming or Squatting
- The techniques are really the same as bending: spread your feet apart, get close to the object (passenger), lower yourself with your leg muscles, and do not bend at the waist. *See Illustration D.* "Stooping" usually means bending over at the waist, so that position should be avoided.
- It is often more comfortable to have one knee on the floor and one knee up rather than a deep squat with both knees off the floor.
- Use a chair, bus seat or other sturdy object to push against with your hand to help get yourself in and out of a squat position.

Illustration D

7.2.3 Kneeling
- Use your legs to get in and out of a kneeling position. Avoid waist-bending.
- Stay close to the object (passenger) you are going to move.
- A half-kneel position (with one knee up) is usually easier to maintain than a full-kneel position. *See Illustration E.*

Illustration E

7.2.4 Carrying
- Keep the object (passenger) close to your body.
- Keep the object centered in the middle of your body rather than off to one side (or, balance by carrying part of the load in each arm). *See Illustration F.*
- Carry the object at waist level, with your elbows tucked in close to your sides.
- Try to push or pull the object rather than carry if you have a choice.
7.2.5 Twisting
- See if you can avoid twisting altogether by moving your feet to turn your whole body. Take little steps instead of twisting. See Illustration G.
- If you need to perform a twisting motion:
  - Position yourself so that you have the best possible leverage.
  - Avoid waist-bending.
  - Use your arms and legs to do the work, not your back.

7.2.6 Pushing
- Face the object (passenger).
- Position your feet, shoulder distance apart, with one foot slightly forward.
- Tuck your chin.
- Bend at your knees and hips to move the object.
- Keep your elbows in at your sides while pushing.
- Do not lean forward at the waist.
- Use a rocking motion to get the load started.
- If you have a choice, push instead of pull (You can push twice as much as you can pull without strain). See Illustration H.

7.2.7 Pulling and Dragging
- Clear your path of things you might trip over or bump into.
- Face the object (passenger).
- Position your feet, shoulder distance apart, with one foot slightly forward.
- Tuck your chin.
- Bend at your knees and hips to pull the object.
- Keep your elbows in at your sides while pulling or dragging.
- Use a rocking motion to get the load started.
- Use both arms. See Illustration I.
REMEMBER . . . .

✓ Do not reach nor bend from the waist.

✓ Test the load (a person) by a small movement that can be quickly stopped to be sure you can do it safely. If the person is too heavy, get help or select another method.

✓ Avoid twisting as you lift.

✓ Use any nearby, sturdy object to push yourself up and out of a squat position.

✓ Try to push or pull rather than carry if you have a choice.

✓ Use your arms and legs to do the work, not your back.

✓ If you have a choice, push instead of pull since you can push almost twice as much as you can pull without undo strain.

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8.0 Some Basic Evacuation Techniques

You now should have a basic understanding of some precautions to be observed when evacuating a passenger whose disability is known and you have learned how to use your body properly and safely. This information can now be applied in learning some methods which can be used when evacuating elderly or disabled passengers in a bus emergency. For example:

- Help you determine how severe an emergency may be.
- Suggest some things to be considered when choosing which evacuation technique best meets the needs of the situation.
- Provide instructions on techniques of carrying out specific methods for evacuating passengers.

8.1 Categories of Emergencies

Emergencies will tend to fall into the two broad categories of general or severe emergencies.

8.1.1 General Emergencies

Accidents or vehicle breakdowns which result in no immediate threat to passengers or the vehicle.

8.1.2 Severe Emergencies

These are emergencies which present an immediate or probable threat to the passengers or vehicle, including:

- fire,
- explosions,
- fuel leaks,
- vehicle is a traffic hazard and is in danger of being hit,
- vehicle is in immediate danger.

The type and severity of the emergency will obviously have a bearing on whether to evacuate or not, or on how quickly evacuation must be accomplished. The presence of flames or smoke usually will mean that the need for evacuation is urgent. On the other hand, even in a moderately severe collision without fire or fuel leaks, and where the vehicle is not at risk, it may be better to leave passengers in wheelchairs on board until emergency services arrive. When assistance arrives on the scene, the evacuation should proceed at the direction of emergency services. The presence of rain, snow, or extreme cold will similarly affect the decision of when and who to evacuate or if to evacuate at all.
8.2 Planning the Evacuation
Modern public transit buses come in many different sizes and styles which have a wide variety of step heights, door widths, seating arrangements, aisle widths, etc. These features need to be considered when planning how evacuation will be done.

Since you have already decided the nature and severity of the emergency, the next step is to decide which exit you will use for evacuation. Remember the idea of the "best" exit, first discussed in Section 4.3 (Steps of the Evacuation Process). Having chosen this exit, **make sure the door will open and stay open**. You do not want to struggle through a difficult passenger handling process, get the passenger to the selected exit, only to find the door will not work. **Be sure nothing is blocking the exit!**

**Be sure the path to the exit is clear!** Look for anything which might cause problems when moving the passenger, for example, stanchions, loose seats, wheelchair tie-down hardware and straps or even other passengers.

If the chosen exit has a wheelchair lift, determine if it can be lowered manually. Collisions can cause wiring shorts that may cause the lift to malfunction or, more seriously, cause electrical shocks or sparks to ignite leaking fuel.

As a part of your evacuation planning process you must also consider **if the same exit will be used** to remove all passengers. It will also be necessary to think about **which passengers should be removed first.**

8.3 Selecting the Appropriate Evacuation Technique(s)

8.3.1 Knowing Your Own Capabilities
Helping to evacuate your passengers is physically demanding and should be considered hazardous under any circumstance.

Over-estimating what you think you can do makes evacuation efforts potentially more hazardous, both for yourself and your passengers.

You cannot depend upon the increased adrenalin your body produces in response to the stress of the emergency to give you added strength when you need it.
By learning to continually study your passengers and estimating their size and weight, you will be better prepared to decide how best to handle them in an evacuation. If a passenger appears to be taller and heavier than you, one of the carrying techniques described in Section 8.4.4 (Carrying Methods) would be a last choice -- unless assistance is available.

If you are the only able-bodied person available, avoiding injury to yourself becomes critical.

If you have any doubts about performing a technique with a given passenger, test the move. (See Section 7.2, Leverage) If time is critical, use a technique which you feel confident in being able to do.

The following sections, the video training film and the study course give you the opportunity to learn the techniques as well as test your abilities to perform them. This information coupled with the understanding of basic body mechanics will increase safety for you and your passenger.

8.3.2 The Need for Assistance
Before deciding which technique(s) to use, determine if any able-bodied assistance is available. As a part of selecting the proper technique, you will also need to have a clear idea how you will use this assistance.

Selecting the appropriate evacuation technique(s) means matching:
1. Your physical abilities, (strength, skill and experience).
2. The passenger's need for assistance.
3. Safety requirements which are consistent with the demands of the emergency. For example, the presence of fire dictates speed, thus safety takes precedence over passenger wishes.

Your training will give you a better understanding of what you can do or should not do in terms of your physical abilities.

You must make some estimate of the size, weight and physical limitations of the passengers who must be evacuated. This includes being aware of any equipment they may have on board. If you do not know the nature of the passengers' disabilities, do not make assumptions or guess what their problem might be. Rather than putting the passenger at a possible greater risk, ask the passenger HOW YOU CAN BEST HELP.

IMPORTANT!
As a rule of thumb, if the passenger looks too difficult to handle, assume that to be the case, and plan accordingly.
If you transport different passengers everyday, form the habit of mentally asking yourself, "Could I carry or move this person if evacuation became necessary?"

8.4 Selected Basic Evacuation Techniques
The evacuation techniques described in this Section have been drawn from those already in use by fire service personnel, physical therapists, paramedics (and Emergency Medical Technicians), hospital and nursing home personnel. There are other techniques, but those described here are easy to remember and offer greater passenger and driver safety. It is hoped that you will never be called upon to use any of the techniques, but if you should, their proper use can be quickly recalled. It is suggested that you periodically review your Participant’s Handbook and the video, if possible.

Plan each move fully. Having your feet in the wrong place or using the wrong hand hold may place you and or your passenger in danger. For example, having your hands in the wrong position may require that you return the passenger to the start position to begin over. This could cost valuable time or worse, cause an injury.

The techniques are presented in relation to the various steps in the evacuation process discussed in Section 4.3 (Steps of the Evacuation Process). Once again, these steps are:

1. Releasing passengers from their passenger restraints or seat belts by unbuckling or cutting. (If passengers are in a wheelchair, do not waste time unbuckling or releasing the wheelchair securement system -- instead, remove the passenger first; then if time permits, recover the wheelchair.)

2. Move the passenger from the seat or wheelchair to floor level (or if passenger can walk assist the passenger to a standing position).

3. Move passenger to the "best" usable exit. The term "best" is used since the nearest exit may not work (door is too narrow, lift platform may be; blocking doorway, door may be jammed, etc.).

4. Move passenger from floor level to ground level.

5. Move passenger away from the vehicle to a safe location.

6. Assist the passenger back into the wheelchair if it can be safely recovered and conditions permit.
The techniques using only the driver (or one able-bodied person) are presented first, followed by the same technique performed with two or more persons.

8.4.1 Techniques for Assisting Passenger From Seat
These first techniques deal with methods for moving passengers out of their seats, either to a standing position in order to walk, or to the floor in preparation for moving to the "best" exit you have already selected.

8.4.1.1 Assisting Passenger to Standing Position
In some emergency situations the vehicle floor may not be level, thus the passenger who can walk may be faced with special problems. Walking on a sloping surface, where one side is lower than the other, can be very difficult and increases the risk of falling. It is essential to ask if the passenger is sure he or she can walk safely under those conditions. If there is any doubt, then use either a dragging or one of the carry evacuation techniques described in Sections 8.4.3 (Dragging Techniques), and 8.4.4 (Carrying Methods: One Person).

To save time, offer to help the ambulatory (walking) passenger to come to a standing position.

General precautions to observe when assisting passengers to stand.

♦ Passengers who need assistance in coming to a standing position to enable them to walk will most likely have problems with balance.

♦ If the passenger appears to be taller than you, do not attempt to use the lifting technique. **Persons whose trunk muscles are weak or absent will tend to stretch and become taller as you attempt to lift them.** This will be more true if a passenger is also very heavy in the thighs and buttocks. Thus, it may be very difficult or impossible to lift the passenger to a standing position.

♦ If you are successful in bringing a passenger to a standing position, do not release your hold until you are certain the passenger is balanced.

A. Sitting to Standing Position, Driver Only
1. Stand facing the seated passenger.
2. Place your feet on the outside of the passenger's feet.
3. Bend your knees slightly and press your knees against the outside of the passenger's legs.
4. Place your arms around the passenger's waist above the belt line.
5. Clasp your hands together -- if you lace your fingers together, you can maintain a more secure grip and your fingers will not dig into the passenger’s back.
6. If able, have the passenger grasp your upper arms or rest his or her hands on your shoulders. Keep your back as flat as you can.
7. Lift the passenger with your arms as you straighten your knees.
8. When the passenger tells you he or she is balanced, relax your hold and step back. Be prepared to steady the passenger, if necessary.
9. Make certain the passenger can get safely to the exit.

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**B. One Arm Standing Assist**

This is one of the simplest means of assisting a passenger to come to a standing position. It is a good technique to use if a passenger has only one usable arm (such as a passenger who has had a stroke) or a passenger who is pregnant. The passenger pulls up using your arm as a handle or grab bar.

**General Precautions**

- There is a temptation to grab the person’s hand and tug him or her to a standing position. Do not attempt to pull someone up by the hand because:
  - The force required to obtain a secure grip can be very painful.
  - Your hands may be sweaty from the reaction to the stress of the emergency (a very normal response) causing your hands to become slippery and lose their grip.

**To assist a person to stand by using one arm:**

1. Position yourself facing the passenger with the arm you will be using in line with the passenger’s arm. (Right facing their right or left facing their left).
2. Instruct the passenger to grasp your arm directly above your elbow. (Explain to the passenger what you will be doing to help him or her up.)
3. You, in turn, grasp the passenger’s arm above their elbow on the side nearest you (the same arm the passenger is using).
4. Instruct the passenger to brace his or her foot against yours and to pull up to a standing position (repeating that you will not be pulling him or her up but the passenger will be using your arm to pull up).
5. As the passenger begins standing, shift your body backwards, (without moving your feet) to accommodate the
passenger's changing center of gravity as he or she moves toward you.

6. Once the passenger is standing and balanced, release your hold.

7. If necessary, assist the passenger to the predetermined exit.

C. Two Arm Standing Assist
During this simple assist to stand, you do not lift or tug to bring the passenger to a standing position. In this case, you serve as a movable grab-bar which the passenger uses to pull up to a standing position.

1. Decide which arm you wish to use. (Suggest use of right hand if right handed and left hand if left handed.)

2. Stand facing the passenger but at a slight angle. (The arm you use will be closest to the passenger.)

3. Place your foot in front of the passenger's foot nearest you, (it should be on the same side as the arm you use to assist), turn foot inward so passenger can brace their foot against yours.

4. Bend the assist arm at the elbow so the forearm is almost parallel to the front of the passenger.

5. With the opposite hand grasp the wrist of your assist arm.

6. Position your forearm so the passenger can grab it with both hands.

7. Ask the passenger to then position and brace one or both of their feet against your nearest foot.

8. Ask the passenger to use your forearm to pull up to a standing position.

9. As the passenger comes up, lean back to compensate for the change in the passenger's center of gravity and to make room for his or her body.

10. Once the passenger is balanced, move away.

8.4.1.2 Walking Assists
Mobility impaired passengers who can walk may have difficulty with the narrow aisles common in transit vehicles. These problems are compounded if the vehicle is tilted on its side to any degree and/or if there is debris such as glass, etc. on the floors.

A. Walking Assist with One Person
Because of the narrow aisles on most transit vehicles, assisting a passenger in walking will usually be done by one person and even that will be difficult. However, this is a
basic technique to be learned. Since the passenger is assumed to be already standing, then:
1. Stand beside the passenger and place the passenger's nearest arm around your neck, over your shoulder and away from the passenger.
2. Grasp the wrist of the passenger's arm which is draped over your shoulder.
3. Place your other arm, which is nearest the passenger, around the passenger's waist.
4. Ask the passenger to step out with the leg nearest you. At the same time you step out with your leg nearest the passenger, and match the passenger's step with yours. It may be necessary to move sideways.

B. **Alternative Walking Assist with One Person**

Many transit vehicle aisles are under 20 inches, making it impossible to walk side by side.

A safe alternative technique is that of walking behind the passenger.

1. A strap, belt, transfer belt or body loop, even a strong scarf, can be passed around the passenger's waist just above the belt line.
2. The strap material is firmly grasped by the assistant with one hand close to the passenger's body.
3. Should the passenger stumble and start to fall, the strap material can be used to prevent a hard fall by slowing the passenger's descent.

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### 8.4.1.3 Walking Assist with Two Persons

This technique will most likely find its greatest use in assisting ambulatory passengers away from the vehicle to a safe location. It is essentially the same as the one person walking assist.

1. Two assistants take a position, one on each side of the passenger.
2. One at a time, each assistant places one of the passenger's arms around their necks, draping the forearm over their shoulders.
3. Each assistant then grasps the wrist of the arm draped over their shoulder.
4. Each assistant, in turn, places an arm around the passenger's waist.
5. Each assistant matches the passenger's stride, as the passenger is instructed to step out.

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Note: If the passenger should fall do not waste time attempting to bring him or her to a standing position again. Remove the passenger to the chosen exit by one of the dragging methods.
8.4.2 Moving Passenger From a Seat or Wheelchair to the Floor.

Typical seating arrangements for elderly or disabled passengers may include various wheelchairs, jump seats (single or double), single fixed seats, or 2-, 3-, or 4-passenger bench seats.

Basic techniques from which you can choose are given to meet typical or common seating arrangement.

General precautions when moving a passenger from a seat or wheelchair to the floor.

† Moving a passenger onto the floor implies that one of the DRAGGING methods in Section 8.4.3 (Selected Basic Evacuation Techniques) will be used to move the passenger to an exit. Decide which dragging method you will use. If a blanket or some other device is to be used, it should be placed on the floor ready to receive the passenger.
† Be sure the passenger’s legs are fully extended so they do not become doubled up beneath the passenger while descending to the floor.
† Maintain control of the passenger’s body to avoid dropping onto the floor.
† Passengers seated in wheelchairs.

1. If the wheelchair has fixed leg rests, the foot plates are best left in the down position.
2. If the leg rests are of the removable style they should be either swung out of the way or removed. Usually it will be necessary to rotate the leg rests outward away from the wheelchair before they can be removed. See Section 9.2.1 (Swing Away Leg Rest Releases) for types of releases or latches you may encounter.

A. Assisted Sitting Drop to the Floor

In this technique the passenger moves to the edge of the seat or wheelchair while sitting in an upright position and then in a controlled manner the passenger slides down to the floor. This method takes advantage of friction between the passenger’s body and the seat to help slow the descent.

1. Place the passenger’s hands on your shoulders or upper arms.
2. If necessary, assist the passenger to the edge of the seat by placing a hand under each leg just above the knee and then alternately lift and pull on each leg until the passenger is positioned at the edge of the seat.
3. Straighten out both of the passenger’s legs.
4. Spread the passenger’s legs so you can stand between them.
5. Bend your knees until you can comfortably grasp the passenger’s legs just below the knees at about the upper part of the calves.
6. Lift just enough to keep the weight of the legs off the passenger’s heels as you move them forward, until the downward motion to the floor starts. Now begin pushing the passenger’s body against the edge of the seat with pressure upwards on the legs and toward the seat. This will slow the descent. A very heavy person might bump hard, but because of the short distance involved (16 to 17 inches) injury is not likely.
7. Lower the legs to the floor.
8. Grasp the passenger’s wrists and lower the passenger to a reclining position on the floor.

Note: It may be necessary to rotate the passenger until the head is pointed toward the exit to be used. While the passenger is sitting upright on the floor and you still have control of the legs, rotate or spin the passenger around on the buttocks until properly oriented before lowering to the reclining position.
B. Using a Sliding Board (or Transfer Board) to Reach the Floor

It is not uncommon to have a very large and very heavy passenger (275 to 400 or more lbs.). Managing such passengers safely in an emergency can present a real challenge to you and your passenger.

Many vehicles now have sliding or transfer boards available that can provide a safe, convenient means of assisting such passengers to reach the floor. This method uses one of the DRAGGING methods described in Section 8.4.3 Dragging Techniques to move the passenger to the chosen exit.

Given the weight of such passengers, controlling their rate of descent to the floor is almost impossible. However, by allowing the body weight to be borne on the sliding or transfer board, the chances of injury are greatly reduced or eliminated.

General precautions to observe when using a sliding or transfer board as a slide

- The bottom of the board must be anchored or blocked to prevent it from slipping as the passenger’s weight is transferred to it. This is best done by placing the toe of one foot on the bottom end of the board.
- The upper end of the board should be placed under the passenger’s cushion (if available). This will make it easier to move the passenger forward on the seat without the board becoming entangled in clothing.
- It is essential to keep the passenger’s legs extended out in front of the passenger. This is especially true with large passengers. Once the body weight starts downward, there will be little or no chance to pull the legs out straight in front.

To use the sliding board process, begin by:

1. Placing the blanket, tarp or other dragging device on the floor so the passenger will drop down onto it.
2. Removing or cutting any passenger restraint belts.
3. Removing or swinging the leg rests out of the way, or if the leg rests are fixed, putting the foot plates down.
4. Placing the sliding board in position with the upper end resting against the wheelchair seat just under the seat cushion.
5. Blocking the bottom end of the sliding board with the front of your foot, keeping the foot flat on the floor.
6. Having the passenger grasp your arms or shoulders to help stay balanced.

7. Assist the passenger to move to the edge of the wheelchair seat and if necessary placing a hand under each thigh, just behind the knee, and alternately lifting the thigh and pulling forward several inches. Repeat the process until the passenger reaches the edge of the seat.

8. Placing your other foot outside of the passenger's leg so that you have a stable base.

9. Grasping under the passenger's legs at some convenient point just below the knee in order to keep them straight in front of the passenger.

10. Helping the passenger move forward until the downward slide starts. At this point concentrate on keeping the legs from bending back underneath the passenger. At the same time move your outside leg back to make room for the passenger descending to the floor.

11. Rotating or spinning the passenger on the buttocks until the head and shoulders are pointed in the direction you wish to drag.

12. Grasping the wrists and lowering the passenger to a flat-on-the-floor position.
C. Cradle Drop or Assisted Roll From Seat to the Floor

When a passenger is seated on a long seat such as a bench seat, the CRADLE DROP offers a simple, safe means of moving the person to the floor in preparation for DRAGGING to an exit.

This technique minimizes the need to control the full weight of a heavy passenger since the legs are lowered first, before the person’s body and shoulders.

General precautions to be observed when using the Cradle Drop

Always lower the passenger’s feet to the floor first. This will greatly reduce the amount of the passenger’s body weight you must deal with at one time.

This technique is done as follows:

1. Spread whatever DRAGGING aid is to be used on the floor along the length of the bench seat.
2. Position the passenger on the seat allowing sufficient space for the person to be in a side lying position.
3. Lower the passenger into a side lying position facing you.
4. Drop to a kneeling position on both knees.
5. Pull the passenger’s legs as far off the seat as possible so the passenger’s feet are on the floor.
6. Pull the passenger onto your thighs, using your hands/arms to control the passenger’s shoulders and trunk.
7. Allow the passenger to slide down your thighs by resting the passenger’s weight on your thighs and sliding your feet back.
8. Continue moving backward on your knees until the weight of the passenger is resting on the floor.

Note: As the passenger’s weight is supported on your thighs, the passenger will be wedged between your body and the front edge of the seat. Be sure to check to see that no broken springs are protruding that may cause injury.
D. Use of a Transfer Belt or Body Loop to Control Body During Transfer

Transfer belts or body loops are useful, versatile devices. A transfer belt is often used by physical therapists, nurses or other hospital personnel to obtain and maintain a safe grip on a person. They are heavy, wide belts of webbing or occasionally leather, with an adjustable buckle. Body loops are used by fire fighters to control high pressure hoses and as a device with which to drag a person. These loops are about 1-1/2 inches to 2 inches wide continuous heavy webbing. When flat they are approximately 48 inches across.

If the passenger has a weak body or trunk, the loops first can be placed over the passenger’s head and shoulders and brought up under the armpits. The free end can be placed around your neck and shoulders to prevent the passenger from falling over as you use your hands and arms to control the passenger’s legs.

8.4.3 Dragging Techniques

Dragging a person is probably the fastest and safest method for evacuation. If the emergency involves fire, very toxic smoke can accumulate rapidly. Dragging allows both you and the passenger to stay close to the floor where the smoke is less dense.

Placing the passenger on something is preferable to using a shoulder drag or foot drag. Since both of your hands are used in the shoulder or foot drag, you have no means of controlling the head. Should the passenger have a high spinal cord injury, you will be unable to protect that body area from possible injury.

Clothing drags are slightly better because you are able to provide some support to the head and neck. However, when pulling on the passenger’s clothing, the clothing may bunch up under the chin and interfere with breathing. Flimsy shirts and blouses may tear easily and become useless.

If time and conditions permit, place the passenger’s wheelchair cushion (if available) between their body and the dragging device whenever a blanket, tarp, etc., is used as a drag. This will help protect areas of the lower back, such as for spinal bifida and spinal cord injury passengers. This will be especially helpful if the drag is used to move the passenger
down bus steps or inclines. Positioning the cushion is done by kneeling alongside and facing the passenger. Roll the passenger to face toward you, supported on his or her side; position the cushion and then roll the passenger back onto the cushion.

General Precautions When Dragging Passengers.
- If possible, drag the passenger with the head pointing in the same direction you are dragging. This will prevent the arms or legs from becoming tangled in seat supports or stanchions.
- Keep the head, neck and shoulders supported.
- Do not bend or twist the trunk, keep the spine as straight as possible.
- Keep the passenger's body as flat as possible.
- Do not try to pull a passenger sideways.
- Make sure the dragging procedure is not interfering with the passenger's ability to breathe.

A. Shoulder Drag
1. Move the passenger so the head is pointing in the direction you are dragging and keep the passenger flat on his or her back.
2. Place one of your feet flat alongside the passenger's head but in line with a shoulder.
3. Kneel on the opposite leg so your knee is about even with the heel of the foot on the floor.
4. Slip your hands under each shoulder of the passenger until your fingers can curl up and provide a secure grip at the passenger's armpits.
5. Lift the passenger's shoulders slightly.
6. Pull the passenger towards you, using your foot as leverage.
7. When the head is alongside your lowered knee, move backwards until your foot and knee are in the starting position.
8. Repeat the dragging process until you have reached the selected exit.
9. Watch for sharp objects such as tie-down attachment points which may injure the passenger's head or your knee.

B. Clothing Drag
1. With the passenger flat on his or her back, move so the passenger's head is pointing in the direction to be dragged.
2. Place one of your feet flat about 12 inches ahead of the passenger's head but in line with a shoulder.
3. Kneel on the opposite leg so the knee is about even with the heel of the foot on the floor.
4. Grasp the collar area of the passenger's clothing.
5. Pull the clothing until it bunches up in the armpits.
6. Unbutton, unzip or cut clothing if there is any interference with breathing.
7. Lift up on the collar until the passenger's head, neck and shoulders are supported.
8. Pull or drag the passenger towards you until you must shift your foot and knee position.
9. Shift your foot and knee to the start position and continue moving in this manner until you reach the selected exit.
10. Frequently check to see that the passenger is not being choked by the clothing.
C. Blanket or Tarp Drag

If you have a choice, use blankets, tarps or other materials which are tightly woven so they will not snag and will slide more easily on the vehicle floor. Canvas duck and heavy plastic materials (like an Evac-Aid) will tend to be more snag resistant and can double as weather shelters if necessary.

Place the dragging device on the floor and move the passenger down onto it. In the case of blankets, any excess width can be folded over the passenger to form a tube. This will minimize the chance of the extra material catching on seat supports, stanchions or other objects.

If the dragging device cannot be placed on the floor, first you may place it under the passenger as follows:

1. If the passenger is on his or her back, tuck half of the blanket or tarp all along the body. Leave at least a foot of material extending beyond the passenger's head.
2. Roll the passenger over the tucked-in part of the blanket to face towards you.
3. Pull that same part of the blanket or tarp from under the passenger and spread it out.
4. Gently roll the passenger back over, onto the spread-out blanket or tarp.
5. Fold any excess material over the passenger.

6. Move the passenger so the head is pointing in the direction to be dragged.
7. Place one of your feet flat about 12 inches ahead of the passenger's head but in line with a shoulder.
8. Grasp the remaining material at the head and bunch it together to form a good grip and lift to form a cradle.
9. Use the kneeling or stooping position and drag the passenger to the selected exit.
D. Body Loop (or Transfer Belt) Drag

These devices provide:
• A large area in contact with the body.
• A good handle with which to pull or drag.
• A cradle in which to support the head, neck and shoulders.

To use either device:
1. Place the loop over the head and down past the shoulders.
2. Pull each arm out from under the loop until the loop can be pulled up to the armpits.
3. Pull the loop snug up under the armpits. It will now be over the chest continuing around under the armpits and coming together under the head.
4. Gather the excess of the loop so that it forms a sling or cradle for the head, neck and shoulders.
5. Drag the passenger using either the kneeling or stooping position until you have reached the selected exit.

E. Foot Drag

A foot drag is used when there is no time to use a better procedure even though it may be awkward for a passenger who is wearing a skirt.

The technique is simple but does expose the head and neck to bumping on the floor. A person with small hands may have difficulty in obtaining a suitable, secure grip on the passenger’s ankles. In this case grasp the passenger’s pant legs or skirt (if possible).

1. Place the passenger’s arms above the head so they will not catch on obstacles during pulling or dragging.
2. Kneel facing the passenger’s feet.
3. Grasp both of the passenger’s ankles with your hands.
4. Lift the legs off the floor to reduce the area of contact the body has with the floor so the passenger will be easier to move.
5. Use the kneeling or stooping position and drag the passenger to the selected exit.
8.4.4 Carrying Methods; One Person
Carrying a person of any size is difficult and physically demanding. Depending on the carry method, you may not be able to see your own feet. Thus, some carrying techniques are both hazardous and difficult. **Knowing your own physical limits is essential when choosing one of the following carrying methods.**

A. Cradle Carry
This is the simplest of the one-person carry methods. It involves lifting and carrying a person in your arms. Since the passenger's body is in front of you, your feet are not clearly visible, thus your footing could be precarious. This is especially true in the case of steps or if there is debris, such as broken glass, in the areas where you must walk.

1. Begin by passing the passenger's near arm over your shoulder.
2. Place one of your arms across the back of the passenger's shoulders with your hand under the passenger's other arm.
3. Place your free arm under the passenger's knees.
4. Keep your feet spread far enough apart to provide a stable base.
5. Lift the passenger until the weight is balanced between your two arms, and hold the passenger close to your body.
6. To lower the passenger, let the weight of the passenger's legs and hips slide down your thigh as you bring the body upright.
B. Pack Strap Carry
This is a relatively simple carry. Its primary drawback is that you have less control over the passenger's legs as you carry him or her. The use of this method allows you to carry someone heavier than you can safely manage with the cradle carry described in A, (Cradle Carry) on the preceding page.

1. Help the passenger to stand.
2. Turn your back and stand close to the passenger.
3. Bring the passenger's arms over your shoulders -- one on each side of your head -- with the passenger's hands crossed over your chest.
4. Spread your feet apart with one foot placed slightly ahead of the other to give you a stable base.
5. Bend your knees so the passenger is lying against your back and the passenger's armpits are over your shoulders.
6. Hold the arms as straight as you can with the wrists crossed.
7. Bend over so the body weight is being carried on your back.
8. To let the passenger down begin straightening up until the passenger's feet are flat on the ground.
9. Stabilize your body and release the passenger's hands so he or she can push to an upright position, or
10. Turn to face the passenger, grasp his or her wrists and lower the passenger to a sitting position on the ground if they are unable to walk.

C. Piggy Back Carry
This carry is an improvement over the Pack Strap Carry described in B, (Pack Strap Carry) above. This technique gives you greater control over the passenger's legs. It has the disadvantage of being more difficult to maneuver the passenger into position and onto your back.

1. Bring the passenger to a standing position.
2. Turn until your back is to the passenger.
3. Crouch with your feet spread apart and position one foot slightly ahead of the other in order to have a very stable base.
4. Have the passenger place an arm over each of your shoulders.
5. Have the passenger firmly clasp his or her hands together.
6. Reach behind you with each hand and grasp the passenger's lower thighs just above the knee.
7. Lift upward and forward on the passenger’s thighs while coming to a standing position.

8. As you come erect, encircle the passenger’s thighs to form a cradle for the legs by passing your arms under the knees.

9. Complete the hold by grasping one of the passenger’s wrists in each hand.

10. To lower the person, begin to return to the crouched position as you release the passenger’s wrists and legs allowing the feet to land flat on the floor.

11. The passenger will now be able to use his or her hands to push to a standing position.

12. Allow the passenger to gain balance before leaving him or her unattended.

**Note:** If the passenger cannot stand alone, you must keep a grip on the wrists, turn until facing the passenger, then lower him or her to a sitting position and then to a reclining position, if necessary.

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**8.4.5 Carrying Method: Two Person Extremity Carry**

The two person extremity carry may be difficult to use in tight spaces since the passenger’s legs can easily become entangled in grab bars, stanchions, seats, etc.

The taller person should assume the position at the shoulders.

As with any technique involving the use of one or more assistants, it is essential to coordinate your efforts. You, as the driver, are the leader, therefore it is up to you to determine what command you will use. Perhaps the simplest is to go on the "lift" command as follows: "One, Two, Three, Lift".

1. Begin with the passenger flat on his or her back, preferably on the floor but working from a bus bench seat can be done.

2. The passenger’s knees should be bent with the feet braced against the feet of your assistant.

3. Kneel at the passenger’s head and place your hands under the passenger’s shoulders as you lift him or her up far enough to clasp your hands across the chest.

4. Your assistant now crouches down and grasps the passenger’s legs just above the ankles.

5. On your command, both you and your assistant come to a standing position with the passenger supported between you at his or her knees and shoulders.
6. To return the person to the floor, you and your assistant crouch on command until the passenger’s buttocks are on the floor, followed by lowering the legs and then the shoulders.

8.4.6 Moving Passenger from Floor Level to Ground Level
Having selected an exit for a specific passenger situation, you must also determine how to remove the passenger from the vehicle. If ambulatory it will be necessary to decide if the passenger can walk down the steps. If not, can one of the dragging methods be used, or must the passenger be carried?

The width of the exit, the height of the steps, the total distance to the ground and the abilities of the passenger, all influence your final decision.

If assistance is available, then one of the two person carries might be the best and safest choice. These carries have the added advantage of being able to clear an exit quickly in the event others must also use the exit.

If narrow steps are present at the selected exit, some passengers may be able to reach the bottom step by remaining in a sitting position and sliding on their buttocks from step to step. Once at the bottom step, which is often steep, several choices may be available. First might be the use of a piggy back or pack strap carry; a second alternative is to use a sitting drop to the ground.

Because you may often be the only source of assistance, you may need to continue the use of the drag to move a passenger down the steps. If so, observe the following special considerations.
A. Using a Dragging Technique on Steps
If the passenger was dragged to the selected exit you can continue to drag the passenger down the steps as follows.
1. Provide support to the head and neck, and if possible the shoulders. Support the person as high as you can in order to shift the passenger's weight toward the legs.
2. If the step is wide or the lift platform is used as an intermediate step, bring the passenger down the step(s) at an angle so that one leg at a time moves to the step below.
3. If the last step is steep, bring the passenger's head and shoulders down to the ground level.
4. While supporting the body, allow your hands to slide upwards to a point just below the knees.
5. Grasp the legs firmly and lift and rotate the passenger on the shoulders until you can lay the passenger flat.

B. Standing Slide Assist
The following is another method to consider.
1. The passenger should be lying flat on the floor with the feet toward the exit to be used.
2. Move to the ground, facing the exit. Grasp the passenger's ankles and pull them toward you until the legs are hanging off of the vehicle.
3. Brace the passenger's knees against your chest and pull the passenger up by the arms to a sitting position.
4. After bringing the passenger to a sitting position with the knees against your chest, have the passenger grasp your shoulders.
5. Place your hands around the passenger's hips.

This is a good place to use a piggy back or pack strap carry if other assistance is not available.

< Note

6. Pull the passenger forward and allow the body to slide downward against yours. At the same time push the passenger back against the vehicle to provide friction to control the passenger's descent to the ground.
7. If the passenger is able to stand, allow him or her to obtain their balance before releasing your hold.
8. If unable to stand unassisted, pivot the passenger on his or her feet until in position to be lowered to the ground.
9. Move behind the passenger and place your hands under the armpits. Using the passenger's feet as a pivot point begin lowering the passenger down to the ground.

>
8.4.7 Assisting Passengers Back Into a Wheelchair

Ask the passenger the best method to help him or her back into the wheelchair. Most wheelchair users have had experience with needing assistance in this maneuver and will often have a good idea that works well.

If the terrain and weather permit, passengers should be moved back into their wheelchairs as quickly as possible. Once back in their wheelchairs, many passengers can be quite independent and may need little, if any, assistance.

Note: This is a difficult maneuver at any time and should not be attempted with an electric wheelchair.

A. Moving Passenger From Ground Into a Wheelchair -- One Person

1. The passenger is lying flat on his or her back on the ground. Tip the chair over on its back and place it close to passenger’s feet, with the top of the back of the chair closest to the passenger’s feet. Unlock the wheelchair.

2. Stand at the side of the passenger and wheelchair and grasp the ankles or pants so as to bend the passenger’s hips and knees.

3. Slide the chair as far under the passenger’s legs and buttocks as possible, and drape the legs over the edge of the seat of the chair.

4. Move around to the bottom of the chair and stand between the wheels. (If possible, place each leg against the X-frame of the wheelchair.)

5. Spread the passenger’s legs and place one on each side of your body.

6. Lift the weight of the passenger off of the floor by pulling up on each leg; slide the wheelchair further under the buttocks by pushing the wheelchair forward with your legs.
7. Work the wheelchair as far up under the passenger's back as possible, until the buttocks are close to the wheelchair seat. **Lock the wheelchair.**
8. Move around to the passenger's head.
9. Get down on one knee and bend your hips, getting as low to the floor (ground) as possible and grasp the handles of the wheelchair.
10. As you lift the chair, ask the passenger to lean his or her head forward. If the passenger is capable of grasping the arm rests, it will help to make the pick up easier.
11. Lift the chair and passenger up using the wheels of the chair. (This may be difficult at first but becomes much easier and controllable as the passenger and the chair approach an upright position.)
12. Place one of your arms across the passenger's chest as the chair approaches an upright position to make sure the passenger does not fall forward.

---

**CAUTION**

_If you are short you may have a great deal of difficulty lifting the wheelchair to its upright position._

---

**B. Assisting a Passenger Back Into the Wheelchair -- Two Persons**

If the passenger cannot offer any workable method to assist getting back into the wheelchair, the following is one solution.

1. Place the wheelchair near the passenger's head with the foot rests out of the way and the wheellocks set.
2. The assistants begin by kneeling on each side of the passenger with the knee nearest the passenger in the down position.
3. Ask the passenger to clasp his or her hands together, if possible, with arms pressed tight to the sides.
4. The assistants place one hand under the passenger's shoulder and the other hand under the passenger's
elbow and help the passenger to a sitting position.

5. At the sitting position each assistant moves one hand from the shoulder to the waist, keeping the other under the elbow.

6. The passenger's legs are extended in front spread approximately 6 inches apart.

7. On command the assistants begin lifting -- using the passenger's feet as a pivot point -- lifting until the passenger's buttocks will clear the seat of the wheelchair.

8. Lower the passenger into the wheelchair.

9. If necessary, one assistant can stand behind the wheelchair and place his or her arms under the arms of the passenger and lift the passenger up and back until properly positioned in the chair.

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8.4.8 Managing the Passenger in a Wheelchair

If the emergency situation appears serious and places the passenger at risk, **do not attempt to evacuate by lifting the wheelchair and passenger together to remove them from the vehicle.**

If the wheelchair lift cannot be used, for whatever reason, you usually will be unable to get the wheelchair to fit through another exit wide enough for the wheelchair. Aisle widths or blocked aisles may present additional problems. However, the weight of the wheelchair plus the added weight of the passenger, the distance to the ground, and the ease with which wheelchairs can come apart, make the risks for both the passenger and yourself much too great for this type of evacuation.

Modern wheelchairs are designed for easy assembly during manufacturing. They also have convenience features that make them easier for the users to take apart. Examples are removable arm and leg rests, quick release wheels, etc. This very ease of disassembly creates a serious problem if an attempt is made to lift the wheelchair by these parts since they
can readily come off -- and when you least expect it. Lifting a wheelchair and the passenger together also requires from two to four people. Some of them will not know about these features, thus further increasing the hazards of such an attempt. The popular three-wheeled electric scooters are designed for the seat, steering assembly, batteries and even the motors to separate from the frame (platform). Simple knobs and/or levers lock or release the parts for ease in taking them apart to stow in the trunk or back seat of a car. Placement and types of releases vary from manufacturer to manufacturer. These release features can compound problems that occur since the user, or someone else, may not have time to check them for tightness.

Three-wheeled scooters have the additional feature of a high seat which makes them top heavy with the passenger seated on them. As a result, they are hard to control when they are lifted at the frame or platform (the only safe place to lift them). Being top heavy means there is the danger of tipping the chair over and dumping the passenger out. Four-wheeled versions of the scooters offer many of the same disadvantages of their three-wheeled relative, and have the added problem of greater weight.

Conventional electric wheelchairs vary greatly in size and weight but in general will be much too heavy for even two people to lift safely. These wheelchairs may also have reclining backs, elevating leg rests and elevating seats. One or more of these features may be powered, adding more weight due to motors and possibly increased battery capacity.

There are hundreds of models of wheelchairs in use today. They are made by a number of different manufacturers, some of whom are no longer in business. New manufacturers show up in the marketplace each year. As a result, it is difficult to remember any special feature of a particular wheelchair. It is important that you learn about the different latches, locks and similar basic features so you will recognize them in an emergency. Your passengers will be happy to explain any unusual features of their wheelchairs if you simply ask them.

Powered wheelchair users may also have a variety of auxiliary equipment attached to their wheelchair. These may be respirators (a device to assist in breathing), on board computers, computer-assisted communication aids and complex controls systems such as sip and puff controls. Many of these devices can interfere with getting the passenger out of the wheelchair and must be removed. Once again, as you encounter these
different devices take time to ask the passenger to explain or show you how to remove them.

These specialized devices or features make the passenger very reluctant to be separated from their wheelchair, especially in an emergency. Many passengers who have respirators or other breathing aids may have learned special breathing techniques to use in the event of power or mechanical failures. With this technique, they gulp a mouthful of air, close their mouth and swallow the air. This is commonly called FROG BREATHING since it is the way a frog breathes.

As noted in Section 5.6 (Respiratory Disorders), if a passenger is carrying an oxygen tank the oxygen supply must be turned off if there is the least hint of fire danger. The oxygen must remain off until the passenger is removed from the vehicle or the emergency ceases to exist.

Another problem may be the condition of the wheelchair. Many wheelchairs are made of tubular steel plated with a protective coating. Because of dirt, dust and water from rain or snow, small spots of rust start to develop. In time, this rust spreads under the plated surface of parts on the wheelchair, weakening its structural strength. As a result they cannot take much force from lifting, twisting, etc. Unfortunately many wheelchair owners do not or cannot clean their wheelchair frames regularly, thus rust and corrosion can be severe.

As you can see from this discussion, there are many possible things which can go wrong when attempting to lift a wheelchair with the passenger in it.

**It is safer not to attempt it!**

**REMEMBER . . .**

✓ Do not attempt to evacuate passengers and their wheelchairs together!
9.0 Some Features Of Wheelchairs Affecting Evacuation

No attempt will be made to discuss specific wheelchair makes or models because there are too many of them. Each manufacturer may make many different versions of each style of wheelchair. Making matters worse is the fact that wheelchairs, like cars, change design constantly. Old model wheelchairs may take several years before they disappear. As a result there is an unknown number of different wheelchairs in use every day and it would be a difficult task to remember the special features of all.

To make the task somewhat easier, wheelchairs are discussed in terms of major parts and the features which may affect evacuation.

9.1 Arm Rests

Arm rests come in either fixed or removable styles. Only the removable style affects evacuation. Since the majority of wheelchairs in non-institution use have removable arm rests, there are several features to be aware of. Also, the ease with which one can get hold of an arm rest makes it a logical though impractical (and dangerous) place to grab if the wheelchair needs to be lifted.

There are two common methods for securing arm rests. Both are the same in principle but use the different releases described.

- BALL releases look like a small, round button. When the button is pushed in, the arm rest can be pulled out of its socket. These are now being replaced by the following:

- TOGGLE releases look like a short lever about 3/4 inch long. By pushing down on the toggle, the arm rest can be pulled upward and released from the chair.

**CAUTION!**

Because removable arm rests are so common, it is essential not to attempt to lift a wheelchair by the arm rests without first being certain they are not the removable type.

**NOTE:**

These releases are usually found at the lower, back side of the front support of the arm rest.

**IMPORTANT!**

Some arm rests are adjustable in height so they can readily meet the needs of the user. The releases, or the adjustable section, are usually located in the front of the arm rest also, but just below the section that supports the arm.
9.2 Leg/Foot Rests
Like arm rests, the leg and foot rests offer a convenient and therefore tempting place to lift a wheelchair. Also, like the arm rest, it is more common to find swing-away (commonly called removable) leg rests than the fixed style. The reason is simply that it is much easier to get closer to furniture, etc., when transferring.

Leg rests have several different types of latch mechanisms which are intended to hold the leg rest locked into position. When the latch mechanism is released, the leg rest must be rotated toward the outside of the wheelchair before the assembly can be removed.

9.2.1 Swing-Away Leg Rest Releases
- Leaf levers
  This type is a flat metal piece with a tab at its outer edge that is bent upward. Pushing inward on this tab releases the leg rest.

  Some models of this style have a round rod welded at the front end of the flat metal piece. It is bent around the front frame of the wheelchair and extends sideways for several inches. Pushing backward on this rod will also release the leg rest.

- Spring Loaded Pin
  Some older wheelchairs will have a round pin with a flat tab welded to the top end. Lifting on this tab will allow the pin to release the leg rest.

- Pins and Slots
  This style has a small pin placed cross-ways through the wheelchair frame. A "U" shaped piece with a slot cut into it is welded to the leg rest support. The "U" piece is slipped onto the wheelchair frame above the pin. The assembly slides downward to engage the pin and lock the leg rest in place.

  The leg rest is removed by lifting upward on the leg rest until the slot is clear of the pin. Pulling the leg rest forward will free it from the chair. This style will often be found on wheelchairs with elevating leg rests.

IMPORTANT!
Remember to always rotate the leg rest about 45 degrees toward the outside of the chair before lifting up on it for removal.

Note: Unless oiled regularly this type of pin release will stick. It does not take much force to shear or break off the flat tab.

Do not attempt to lift a wheelchair by the leg rests.

CAUTION! If they are removable it takes very little upward pressure on the leg rest to cause it to disengage from the wheelchair frame.
9.3 Seat Features
Seats on standard wheelchairs (both people powered and electric) are usually fixed to seat rails that move up and down as the wheelchair is folded and unfolded.

Three features of seats that will be occasionally found on chairs are:

- **Tilting Seat**
  This style of seat is designed to tilt on the wheelchair frame. If an attempt is made to lift or control the wheelchair with the hand grips, it is essential to make certain the seat latches are fully engaged.

- **Elevating Seats**
  Other wheelchair styles allow users to raise the wheelchair seat themselves. The seat is also removable to make the wheelchair easier to transport by car. Because of this feature, the wheelchair should not be lifted by the seat.

- **Solid Seats**
  Some wheelchairs are equipped with a hard seat. This style of seat is generally hinged on one side. This permits the seat to be flipped up to allow folding the wheelchair. Because of this feature the seat cannot be used to lift the passenger and wheelchair.

---

**REMEMBER . . . . .**
✓ Removing the passenger in their wheelchair is **not** recommended!

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9.4 Head/Neck Supports
A variety of means are used to provide support to the wheelchair user's head and neck. These supports should be left in place if attempting to evacuate the passenger while remaining in the wheelchair as described in Section 8.4.8 (*Managing the Passenger in a Wheelchair*).

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9.5 Wheels
Unless a wheelchair has the two 20"- 24" wheels in the rear, or an operating lift or ramp is available, do not attempt to remove a passenger in the wheelchair without assistance. Managing a wheelchair is somewhat like using a loaded wheelbarrow. The wheels bear much of the weight and only when properly balanced can large loads (passengers) be handled more safely.

Wheelchairs with four smaller wheels, even if the two in the rear are slightly larger, will require an operating lift or ramp if available to remove them from a vehicle.
9.6 Three and Four Wheeled Electric Scooter (Platform) Wheelchairs

Because these wheelchairs have many features in common and present basically the same type of problems during evacuation, they are discussed together.

These types of wheelchairs are popular primarily because of lower cost, but also because they can be dismantled easily to store in the trunk of a car. The ease of dismantling also can contribute to their vulnerability: the wheelchair may come apart when an attempt is made to lift the chair while the passenger remains in it.

This discussion is limited to potential problem areas if the decision is made to use the wheelchair as a means of evacuating the passenger; or in other words, removing the wheelchair with the passenger in it.

- Seats on these chairs tend to be mounted on tubular posts (pedestals) and generally the seat height can be adjusted manually, but some models have powered seat height adjustments. The seat coupled with a narrow wheelbase results in a relatively high center of gravity with the passenger seated on the wheelchair. If the passenger is tall, the problem is greater. This means that as the wheelchair is lifted by grasping the platform, the wheelchair can easily tip unless the rescuers are alert. Tipping sideways and/or to the rear is the greatest danger.

- The knobs and levers which control seat removal, rotation, and arm rest adjustments are not standardized. As a result the rescuers can easily get mixed up. The user or family members may not have tightened these knobs and levers, so never assume that they are properly secured. As a rule of thumb, never attempt to lift this style of wheelchair by the seat or its arm rests. Always lift at the platform proper.

- If the vehicle is tilted on its side even a few degrees, the high center of gravity will make it easy for wheelchairs to tip. Therefore, do not allow the chair to be evacuated under its own power by the user, and without assistance.

9.7 Miscellaneous Features: Bumpers, Controls or Steering Wheels

Bumpers tend to be more cosmetic than practical. Most are attached to the platform by several screws and as a result
they offer a poor point at which to lift during evacuation. A good general rule is to avoid lifting at the bumpers.

Control or steering devices, T-handle and steering wheels are usually mounted for quick removal and installation for ease in storing these types of chairs in the trunk of an automobile. Because of this feature, these parts do not offer a safe place to lift the wheelchair and should be avoided.

9.8 Power Features

- As wheelchairs become more complex, many more features are being operated by electrical power. On some older electric wheelchairs the drive mechanism is generally belts and pulleys. Power to the drive system is controlled by an idler pulley. This pulley is moved by a lever until it presses on the drive belt, thus activating the power drive. When the pressure is removed, the wheelchair cannot move but it can be pushed with effort. On a few makes of electric wheelchairs the drive system is gear-driven directly off the motor(s).

- On later chairs, when the control lever, toggle or joy stick is in a neutral or centered position, the brakes or wheellocks are automatically on, or set. This prevents moving the wheelchair without lifting the weight off of the drive wheels or to the non-powered wheels. Some wheelchairs, especially platform chairs, have powered front wheels, while others have powered rear wheels.

9.9 Electrical Hazards on Wheelchairs

9.9.1 Batteries

Electric wheelchairs will be powered by either batteries using a liquid acid electrolyte (battery solution) or a gel type electrolyte.

Batteries are often mounted on trunnions (two pivot points), which allow the battery to stay level on grades or slopes. Others are strapped or clamped to the chassis or frame of the wheelchair, either on a tray or in a battery case.

Battery securement is generally not very strong, thus in collisions, wheelchair tipovers, etc., there is always danger of the battery coming loose. Sometimes the battery case may crack, have holes broken into it or even have filler plugs pop out.
Electrolyte leaks are always dangerous because of their highly corrosive nature. Keep electrolyte off of your bare skin because severe burns can result. Electrolyte on clothing will damage the fabric.

Unless the emergency is severe, passengers should not be dragged through spilled electrolyte. Wipe it up with something and if possible sprinkle dry bicarbonate of soda (baking soda) on the spill to neutralize the acid. Bicarbonate of soda in a plastic sprinkle container with a tight lid is easily stored in a safe, convenient location in the vehicle.

Batteries with liquid electrolyte are easily distinguished from those with gel type electrolyte. **On the gel type, there are no filler caps**, only the two terminals for attaching the battery cables. Gel types are sealed and can be turned upside down without danger of leaking. Batteries with liquid electrolyte will have either a series of filler caps in a row or a strip which lifts off to expose the fill holes.

### 9.9.2 Wiring

Wiring like other features on wheelchairs is changing. Wiring using friction clips as opposed to screw post connectors is more common. The vibration resulting from normal wheelchair use can cause loose connections. Collisions can also produce loose connections and the resultant danger of shorts. Shorts may spark or may cause wiring to burn. If possible, disconnect the battery cables before sticking your hands into the exposed wiring. A small burn is preferable to a 12-volt, high amperage shock.

### 9.10 Crash Worthiness of Wheelchairs

Over the years, many simulated crash studies of various wheelchairs and securement systems have been conducted. These studies have clearly shown that wheelchairs do not withstand the stresses of collisions very well. In other words, they are unsafe as transit seating. Even minor damage to the wheels and frames can make a wheelchair hard to move. Securement systems may jam under these conditions and have to be cut. Thus, if a collision is involved in the emergency, be prepared to make a quick assessment of damage to the wheelchair. Pay special attention to the wheels first and then to the side frames in the area of the axle.
9.11 Miscellaneous Ambulation (Walking) Aids
Passengers will use a variety of walking aids such as canes, crutches and walkers.

If a vehicle is tilted even slightly towards one side, it will be very difficult for most passengers to walk safely on such a sloping surface. Walking up or down a sloping surface (like a ramp) is usually alright, but walking across the slope is very difficult. Be sure the passenger is aware of this hazard.

In situations where walking is apt to be very precarious, passengers should be carried or dragged to evacuate them quickly. This will be even more urgent if other passengers behind them are blocked from their exit.
10.0 Some On-Board Auxiliary Equipment Which May Affect The Evacuation Process

You must be familiar with all of the equipment with which your assigned vehicle is equipped. This should include all normal operating equipment as well as all specialized equipment such as wheelchair securement and passenger restraint devices, wheelchair lift equipment and ramps.

Since you cannot predict when an emergency will arise, the best defense is to fully understand the equipment you must work with and how to use it safely.

Vehicle equipment of all types is changing rapidly. Your system should keep you informed of all equipment changes, replacements or additions and provide proper instruction on its care and safe use.

In turn, you can help your system by promptly notifying your supervisor or dispatcher of any new or unusual wheelchairs or equipment your passengers may wish to bring on board. For example, a passenger may want to bring aboard a portable oxygen tank for the first time.

The following sections will concentrate on those features of some special equipment that may affect what you can do if the need for evacuation arises.

10.1 Wheelchair Securement Systems

There are many types of wheelchair tie-downs or securement methods in use today. Within a given transit system, you can expect to see at least two or three different types. Some systems will use one wheellock plus one strap or they will use only one wheellock. Other systems may use all webbing types, but made by different manufacturers. Therefore, it is essential that you understand how each type of this equipment works.

10.1.1 Securement Systems Which Attach to Wheelchair Wheels

There are many variations of wheellocks, but they will tend to be one of two general types described below.

A. Spring-loaded gates (often called crab claws)

The gate is held open and when the wheelchair backs into it, the gate snaps closed. Wheels are released by pushing
down on a rod with a knob on it or by stepping on a foot actuated release. In a collision or moderately hard panic stop, these releases may jam.

Spring-loaded gates often jam and can be difficult to release without tools. If the gate does not spring open immediately and the emergency is serious, do not waste valuable time on trying to release the wheelchair. See to the passenger’s evacuation.

B. Rim Pin Locks
These may be floor or wall mounted, or mounted usually on an angle-iron post.

Rim pin locks may easily bind from pressure of the wheel rim against the locking pin. Bouncing the chair by shaking it is often enough to release the pressure, unless the tires/wheels are slightly too big for the gate depth, then release will be more difficult. Again, if the emergency is serious, do not waste time trying to dislodge the jammed pin.

10.1.2 Wheelchair Webbing Securement Systems
The next most common securement system for wheelchairs involves the use of various webbing strap arrangements.

These webbing arrangements will use one or more means of tightening the straps. These tightening or tensioning devices may jam when under extreme tension that results from a collision or panic stop.

A. Ratchet Type Tightening Devices are released by lifting up on the handle and pulling the unit to loosen the webbing. Since the webbing can readily jam, do not waste time trying to free it. See Illustration A.

B. Cam Lock Tightening Devices or over-center buckles are used to tighten a wheelchair securement strap. These are easily released by lifting up on the lever and pulling until the webbing is loose enough to unhook it from the wheelchair frame. See Illustration B.

C. Adjusters are metal buckle looking devices used to take initial slack out of a webbing strap. These are not made to disconnect and come apart. See Illustration C.
10.1.3 Axle Latches -- Newer, Less Common Securement Devices

New methods of securing wheelchairs are frequently being seen. With the passage of the Americans with Disabilities Act (ADA), there will be renewed efforts to design more universal wheelchair securement systems that will accommodate a greater variety of wheelchairs. It is impossible to anticipate what these might be, but you should be alert and aware when changes in equipment are made on your vehicle.

One type of wheelchair securement attaches by hooks which go over the axle, between the wheel and the axle boss on the wheelchair. This is an all-metal system tightened by an over-center or cam action. There may be a problem in the event of failure of the metal parts or the inability to release tension on the hooks. Again, in such an emergency situation, do not waste time attempting to release the wheelchair.

10.2 Passenger Restraint Systems

All passenger restraint systems employ either a lap belt alone or a lap belt used with some form of torso or trunk restraint belt(s). All common systems used in public transit today use some type of webbing arrangement that has a quick release buckle (like an auto seat belt). They may use an adjuster along with the buckle merely to speed up the adjustment process.

Seat belt buckles are intended to hold tight under fairly high forces. However, jamming of seat belt buckles is not an uncommon occurrence. Also, seat belts on a passenger's own wheelchair may be in a very corrosive environment if the passenger has urinary incontinence, thus the buckles and belts may not always operate properly.

If the emergency is serious and the buckle on the seat belts does not release on the first try, cut it.

Some passengers may have a strap over the front of their legs at some point below the knees. This is to help keep their feet on the wheelchair foot rests in case of muscle spasms in their legs. Cut these straps first. If there are strong leg spasms and you release the lap belt and/or other torso restraints first, the passenger may slide forward and off the seat of the wheelchair.

Note: If you have never used a webbing cutting device, locate some old seat belts or other heavy webbing and practice trying the cutting device(s) your transit system supplies. You may find these devices give you trouble and it is better to find out before an emergency that you have difficulty using the tool provided.
10.3 Wheelchair Lift Systems
Wheelchair lift systems in use today are one of two basic types. In one type, the bus steps are positioned to form the lift platform and in the other, the lift platform is mounted either on the outside or more commonly on the inside of the bus. The platform is stored in a vertical position and then lowered manually or with power to a horizontal position. From this position, it can be raised or lowered to the ground.

Lifts are installed in different locations. Some are rear mounted, some side mounted in the rear, some in the middle of the bus, some at the front entrance and others next to the front entrance. Transit buses tend to favor the lift formed by the steps and controlled at the dash. Small and specialized transit systems will use either type depending upon their passenger needs and maintenance resources.

There are many different makes and models of lifts in service and no attempt will be made to describe manual deployment procedures for each. Some early lifts still in use today do not have a manual deployment feature.

10.3.1 Power Deployment
If a fuel leak is suspected, do not use power to deploy the lift. As a result of a collision, the wiring in the lift system could short-circuit and attempts to actuate the lift could cause sparks, which in turn could ignite leaking fuel.

10.3.2 Manual Deployment
Most modern lifts have provisions for manual deployment. Be sure you know if the lift on your assigned vehicle has a manual deployment feature and you understand how it works. If special handles are required, be sure they are in place before you leave your base.

10.3.3 Use of Lift Platform as an Intermediate Step
The distance from vehicle floor to ground level varies widely. Some buses are equipped with a kneeling feature which can reduce the height to some degree.

If you have wheelchair-seated passengers on the bus and use of the lift is not an option, then the lift platform can be manually deployed part way. This forms an intermediate step and will greatly reduce the hazards if you decide to evacuate a passenger.
The lift platform in such a position also makes it easier to evacuate passengers by one of the dragging methods because it reduces the height the passenger's feet must drop.

10.4 Wheelchair Ramps

Wheelchair ramps, although less common, will be found on some transit vehicles, especially smaller ones such as vans or van conversions.

Ramps may be portable, attached to the vehicle or may even be powered. If the ramp can be deployed it helps in the safe evacuation of passengers in wheelchairs.

Ramps that are attached to the vehicle and counterbalanced with springs to reduce the physical effort to deploy them may warp or twist as a result of a collision. Although you may be able to deploy the ramp, you may not be able to use it for its intended purpose.

Powered ramps have a high potential for being disabled as a result of a collision. If a fuel leak is suspected, the power deployment should be avoided.

Some ramps are stowed in a recess under the vehicle exit and are manually deployed. There is little information on their usability following collisions. However, it is reasonable to assume jamming may result from a collision.

Shallow, narrow steps are typical of some ramps. These are intended for your use when pushing a wheelchair up or down the ramp. These are dangerous and should not be used by passengers who have walking problems.

Some ramps are made from expanded metal, like a grate. These too are dangerous when attempting to walk down them, especially when they are damp or wet.
SUMMARY

In summary, you may not be able to successfully and safely perform all of the techniques presented. However, if you can safely execute a CRADLE DROP, one of the DRAGGING methods and one of the carries, such as the PACK STRAP carry or a CRADLE CARRY for use with small, lightweight passengers, you will have a set of basic evacuation skills. By reviewing the techniques presented here, you will be able to identify those which best meet your physical abilities and the needs of the emergency.

REMEMBER ... ✓ Clearly understand your own physical limits.
REMEMBER ... ✓ Test a move to be sure you can do it.
REMEMBER ... ✓ Keep in mind the proper body mechanics in order to prevent unnecessary injury to yourself.
REMEMBER ... ✓ Keep calm: Yelling and screaming will not give your passengers confidence.
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