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Recommended Emergency Preparedness Guidelines for Urban, Rural, and Specialized Transit Systems

U.S. Department of Transportation
Research and Special Programs Administration
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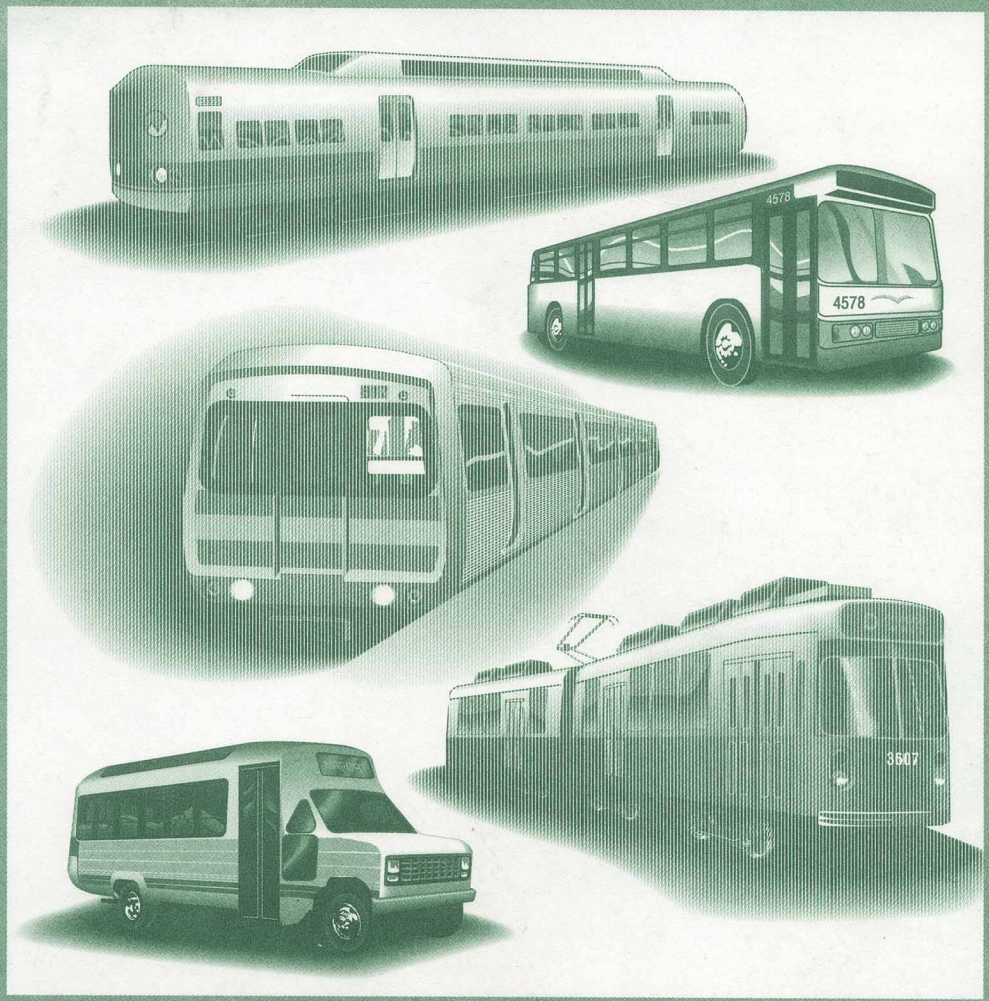

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Urban, rural and specialized transit services provide an important source of transportation for may persons in the United States.

A number of concerns must be addressed to ensure the safety of passengers during transit emergencies. The needs of passengers can be addressed through carefully planned emergency response procedures, proper training of transit and emergency response personnel, and effective use of equipment. The recommendations contained herein are therefore intended to assist transit and emergency response organization personnel to evaluate their emergency response plans and, if necessary, modify or supplement those plans accordingly.

This document contains recommendations for the use by urban, rural, and specialized transit systems which utilize motor vehicles to provide transportation service to the general public, elderly of disabled person, clients of human service agencies, etc. Section 2 presents a brief review of emergency response considerations (including the transit environment, vehicle and passenger characteristics, typical emergency scenarios, and response personnel) which influence the type of response that may be necessary and which determine whether passengers should be evacuated. Sections 3 and 4 include minimum recommendations, procedures, and criteria which should be employed by transit systems to enhance their particular emergency plans, procedures, and training, as appropriate for their individual operations. Plans, procedures, and training for emergency response personnel (including volunteers) are also reviewed. Section 5 presents minimum recommendations for vehicle features which are intended to minimize the effects of an emergency on passengers, shorten emergency response time, and improve the effectiveness of passenger evacuation. The guidelines in that section are intended to be used primarily for the procurement of new vehicles and vehicle rehabilitation.

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PREFACE

The Urban Mass Transportation Administration (UMTA) has recognized the need for transit systems, regardless of the size of the system and type of service provided, to engage in careful, advance planning in order to respond effectively to emergencies. The needs of urban, rural, and specialized transit passengers in an emergency can be addressed through carefully planned emergency response procedures, proper training of transit system and other emergency response organization personnel, and effective use of equipment.

This document contains recommendations designed to assist transit system and emergency response organization personnel in evaluating and modifying or supplementing their emergency response plans. It is recognized that the understanding of the elements comprising emergency preparedness will develop further. Accordingly, it is anticipated that this document will be revised to incorporate those developments.

These recommended guidelines were prepared under the sponsorship of UMTA, Office of Technical Assistance and Safety. The authors wish to thank Franz K. Gimmler and Ronald D. Kangas, Office of Safety, for their direction and guidance during the preparation of this document. George I. Izumi, Office of Engineering Evaluations and Albert L. Neumann, Office of Grants Management, provided additional useful review and comment.

The authors wish to extend their appreciation to John N. Balog, Ketron, Inc., for his important contributions to this document; these include his review and comments and permission to excerpt portions of text he prepared for the document, "Evacuation and Rescue of Elderly and Disabled Passengers from Paratransit Vans and Buses." The following individuals provided valuable assistance during the preparation of this document: Lewis T. Poorman, Mid-Mon Valley Transit System, PA; William H. Henderson, Senior Services of Snohomish County, WA; Joseph J. Curtin, Massachusetts Bay Transportation Authority; Peter G. Drake, South Coast Area Transit, Oxnard, CA; Lawrence M. Engleman, Mass Transit Administration, Baltimore, MD; John P. Belgeri, Bi-State Development Agency, St. Louis, MO; Robert T. Cox, Phoenix Transit System, AZ; Allan K. Little and G. Donald Stevens, BC Transit, Victoria, BC, Canada; Lawrence W. Schneider and Leda L. Ricci, Transportation Research Institute, University of Michigan; Carol Suleski, Greater Lynn Senior Services, MA; Mary Ann Cassella, and Jason B. Baker. Finally, the authors wish to express their appreciation to Robert Gaumer and Arthur Rubin, EG& G Dynatrend, for their assistance in editing this report.

METRIC/ENGLISH CONVERSION FACTORS

ENGLISH TO METRIC	METRIC TO ENGLISH
LENGTH (APPROXIMATE) 1 inch (in) = 2.5 centimeters (cm) 1 foot (ft) = 30 centimeters (cm) 1 yard (yd) = 0.9 meter (m) 1 mile (mi) = 1.6 kilometers (km)	**LENGTH** (APPROXIMATE) 1 millimeter (mm) = 0.04 inch (in) 1 centimeter (cm) = 0.4 inch (in) 1 meter (m) = 3.3 feet (ft) 1 meter (m) = 1.1 yards (yd) 1 kilometer (k) = 0.6 mile (mi)
AREA (APPROXIMATE) 1 square inch (sq in, in^2) = 6.5 square centimeters (cm^2) 1 square foot (sq ft, ft^2) = 0.09 square meter (m^2) 1 square yard (sq yd, yd^2) = 0.8 square meter (m^2) 1 square mile (sq mi, mi^2) = 2.6 square kilometers (km^2) 1 acre = 0.4 hectare (he) = 4,000 square meters (m^2)	**AREA** (APPROXIMATE) 1 square centimeter (cm^2) = 0.16 square inch (sq in, in^2) 1 square meter (m^2) = 1.2 square yards (sq yd, yd^2) 1 square kilometer (km^2) = 0.4 square mile (sq mi, mi^2) 10,000 square meters (m^2) = 1 hectare (he) = 2.5 acres
MASS - WEIGHT (APPROXIMATE) 1 ounce (oz) = 28 grams (gm) 1 pound (lb) = 0.45 kilogram (kg) 1 short ton = 2,000 pounds (lb) = 0.9 tonne (t)	**MASS - WEIGHT** (APPROXIMATE) 1 gram (gm) = 0.036 ounce (oz) 1 kilogram (kg) = 2.2 pounds (lb) 1 tonne (t) = 1,000 kilograms (kg) = 1.1 short tons
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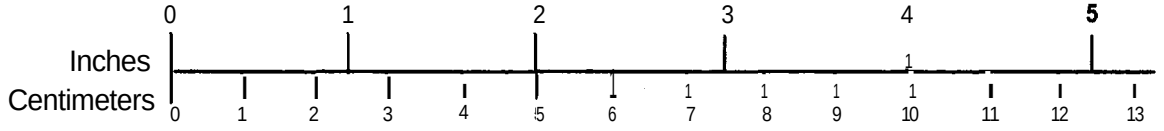

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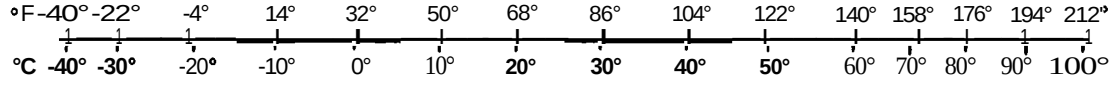

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1. INTRODUCTION

While the safety record of urban, rural, and specialized transit operations has been very good and very few major accidents have occurred, it cannot be assumed that serious emergencies will not occur in the future. Many minor incidents can easily develop into life-threatening events if they are not dealt with in a timely and effective manner. Regardless of the size of the system and type of service provided, a transit system must engage in careful, advance planning in order to respond effectively to such occurrences. The level of preparedness which transit system and emergency response personnel have provided for will directly influence the magnitude of hazard to passengers and damage to vehicles in an emergency.

The Urban Mass Transportation Administration (UMTA) has recognized the need for transit systems to address emergency response planning as part of their operations. UMTA has therefore initiated the development of emergency preparedness guidelines* intended to help transit systems to assess, develop, document, and improve their capabilities and to coordinate these efforts with emergency response organizations in a manner which best protects the traveling public and transit system equipment.

Transit systems provide a variety of transportation services to a wide spectrum of the population. Operations may include fixed routes and schedules and may also include alternate types of service. Urban transit systems provide transportation to the general public who live within an urbanized area (designated by the U. S. Census Bureau as a core and surrounding densely populated area with a total population of at least 50,000), primarily along fixed routes according to fixed schedules. Rural transit service provides transportation to the general public who live outside an urbanized area and may or may not operate according to fixed routes and schedules. (Many so-called "suburban" transit systems are difficult to categorize exclusively as either urban or rural because service is often provided along routes which include less populated areas as well as areas with large population densities.). Specialized transit service (sometimes referred to as paratransit or demand responsive transit) provides transportation to specific segments of the general public, such as elderly or disabled persons, clients of human service agencies, schoolchildren, etc., in both

* Emergency preparedness guidelines for urban rail transit systems are contained in References 1 and 2.

urban and rural areas. In order to use specialized transit, the user typically must contact the transit system or other agency prior to travel, rather than wait at a bus stop. It is recognized that the populations served by urban, rural, and specialized transit operations overlap and that a large percentage of passengers who use transit service, particularly during non-peak time periods, are elderly or disabled.

1.1 EMERGENCY PREPAREDNESS CONCEPT

Safety planning is composed of two basic phases: a preventive phase and a reactive phase. The preventive phase is concerned with preventing the occurrence of an incident or accident. The reactive phase is concerned with the response once an incident or accident has occurred and with minimizing its effect. The recommended emergency preparedness guidelines in this document address this reactive phase and, as such, are not directed at preventing an emergency itself, but at assisting transit systems and emergency response organizations in preparing for and responding in a timely and effective manner in order to minimize the consequences of its occurrence.

The concept of emergency preparedness focuses on the transit system's ability to respond to emergencies and coordinate the system's efforts with emergency response organizations in a manner which protects the traveling public and transit system equipment. The level of transit system preparedness will directly influence the severity of passenger casualties and/or vehicle damage in an emergency.

1.2 PURPOSE AND SCOPE

In order to respond effectively to emergencies, urban, rural, and specialized transit systems should develop and implement emergency preparedness programs. The needs of passengers who use transit services can be addressed through carefully planned emergency response procedures, proper training of transit and emergency response personnel, and provision of necessary equipment. The recommendations contained herein are intended to assist transit systems and emergency response organizations in evaluating and modifying or supplementing their emergency response plans, procedures, training, and vehicle features, and, if necessary, to modify or supplement them accordingly. Current and future operations of each individual transit service, in terms of system size and location, type and number of

passengers carried, type and size of vehicles, as well as transit and outside emergency response organization resources, are critical factors in the implementation of an effective emergency response plan.

The recommendations are directed at transit systems which use motor vehicles to provide urban, rural, and specialized transportation on streets, roads and highways. Vehicles used to provide this service include, but are not limited to: full-size standard buses, medium-size body-on-chassis buses, small special-purpose-built buses, standard and modified vans, mini vans, and multi-purpose passenger vehicles.

Transit facilities, such as terminals, are not considered in this document. The Code of Federal Regulations, Title 49 (49 CFR), Part 609 (Reference 3) and the National Fire Protection Association (NFPA) Life Safety Code 101 (Reference 4) should be reviewed for facility emergency preparedness. (In addition, although NFPA 130 Fixed Guideway Systems (Reference 5) was developed for rail transit and commuter rail systems, Chapter 2 of that document contains design criteria which could be used for bus terminals, particularly since larger facilities serve as transfer points.)

Section 2 of this document describes the emergency response considerations which influence the type of response that may be necessary and which determine whether passengers should be evacuated.

Sections 3 and 4 include minimum guidelines which should be employed by all transit systems to enhance their particular emergency plans, procedures, and training, as appropriate for their individual operations. In addition, these sections address the plans, procedures, and training of emergency response organization personnel (including volunteers) who could be called upon to respond to transit emergencies.

Section 5 presents minimum guidelines for vehicle features which are intended to shorten emergency response time, improve the effectiveness of evacuating passengers, and minimize the effects of an emergency. It is intended that the recommendations in this section be used primarily for the procurement of new vehicles and vehicle rehabilitation.

1.3 ADDITIONAL SUPPORTING DOCUMENTATION

In addition to the guidelines contained herein, a number of information sources are available which transit systems and emergency response organizations may find useful to assess their emergency response capabilities and to plan needed improvements. These include the National Highway Traffic Safety Administration (NHTSA) Federal Motor Vehicle Safety Standards (FMVSS) as contained in 49 CFR, Part 571 (Reference 6) and the "Baseline Advanced Design Transit Coach Specifications" (Reference 7). For example, the FMVSS contain requirements concerning occupant protection during crashes, bus emergency exits, etc. As applicable, specific FMVSS, as well as other regulations and other documents are cited within the appropriate sections in this document.

A specific concern for emergency response planning involves the evacuation of elderly or disabled persons from transit vehicles. In addition to the provisions of 49 CFR, Part 609 cited previously, transit systems and emergency response organizations should consult the following resource materials (References 8 through 14) which pertain to the particular needs of elderly and disabled passengers:

- 49 CFR, Part 37. Transportation Services for Individuals with Disabilities.
- 36 CFR Part 1190, Minimum Guidelines and Requirements for Accessible Design. Architectural and Transportation Barriers Compliance Board.
- Passenger Assistance Techniques: A Training Manual for Vehicle Operators of Systems Transporting the Elderly and Handicapped.
- Understanding the Capabilities and Needs of Special Passengers. UMTA RTAP National Program.
- Evacuating Elderly and Disabled Passengers from Public Transportation Vehicle Emergencies. UMTA Technical Assistance Program.
- Evacuation and Rescue of Elderly and Disabled Passengers from Paratransit Van and Buses. UMTA Technical Assistance Program.
- Emergency Procedures for Rural Transit Drivers. UMTA RTAP National Program.

The bibliography in Appendix G provides an extensive listing of information relating to emergency preparedness.

2. EMERGENCY RESPONSE CONSIDERATIONS

The majority of urban, rural, and specialized transit operational problems are dealt with effectively and do not become emergencies. In many instances, the transit vehicle driver can immediately take action to resolve the problem and the potential emergency without evacuating passengers from the vehicle.

Current emergency preparedness policies de-emphasize immediate evacuation from vehicles unless passengers are in immediate danger, e.g., fire. Accordingly, in the majority of situations, after notifying the transit dispatcher that a problem exists, the transit vehicle driver attempts to move the vehicle to a safe place (i.e., as far off the road as possible), or to a terminal or vehicle repair facility, before taking any other actions. If the driver cannot resolve the situation or move the vehicle, or if the vehicle cannot proceed because of hazardous conditions, transit and/or emergency response organization personnel may be sent to the emergency scene to provide repair/tow service, alternative transportation, or medical assistance, as necessary.

In those instances where emergency response is required, the effectiveness of the overall response will be greatly influenced by the following:

- Vehicle environment - vehicle location, type of terrain, time of day, and weather;
- Vehicle characteristics or type of vehicle involved - size of vehicle and passenger capacity; number, size and identification of access/egress points; on-board emergency equipment, etc.;
- Type of emergency - vehicle breakdown, collision, fire, etc.;
- Characteristics and special needs of the passengers using the transit service and their injuries, if any; and
- Availability and performance of transit system personnel (including vehicle driver), emergency response organization personnel, and "Good Samaritans."

These considerations are more completely discussed in the remainder of this section.

2.1 TRANSIT ENVIRONMENT

Urban, rural, and specialized transit systems operate many types of vehicles in a variety of environments. Depending on the size of the system and local requirements, routes may operate exclusively in either urban or rural areas, or in both. The location of the transit vehicle in relation to the distance from a main street or road, a hospital, or the police or other emergency response organizations could affect the time of response. The time of day, day of week, and traffic patterns could all hamper the ability of the transit system dispatcher, vehicle driver, or passengers to contact the appropriate emergency response organization; personnel may also be unavailable to respond to the emergency scene. These factors could also reduce the likelihood that a passerby would notice the emergency and contact the proper authority. Moreover, if an emergency occurs and the vehicle has no radio or the radio has been damaged, a significant delay could occur before emergency response organization personnel are notified.

Negotiating a roadway, shoulder, embankment, or even a vehicle aisle and operating the handle (or control) for an emergency exit may require a degree of balance, strength, agility, and steadiness which many persons who use transit may not possess. Moreover, although the vehicle floor or roadway may be relatively free of obstructions, high steps, vertical discontinuities and gaps could cause problems for passengers with visual or mobility impairments.

Severe weather conditions, such as extreme heat or cold, combined with vehicle mechanical problems may create hazards for all passengers, especially for young, elderly, or disabled persons. If an evacuation is necessary, rain, snow, sleet, ice, and high winds may make footing and movement precarious, increasing the risk of falling and sustaining serious injury. Personnel carrying or assisting passengers are more likely to lose their footing and slip or slide. Inclement weather can also reduce visibility, obscure lighting, or reduce the effectiveness of emergency equipment.

In addition, the inability of emergency response personnel to gain access or transport emergency equipment to the emergency scene can make the evacuation of passengers very difficult, even if the emergency itself caused no physical injuries. While these factors impede the evacuation of all passengers, they are a particular problem when evacuating young, elderly, or disabled passengers.

2.1.1 Urban Bus Transit Environment

Two types of buses are commonly used in urban areas: 35- and 40-foot "standard" buses (maximum design capacity: 53 seated passengers and 25 standees) and 60-foot articulated buses (capacity: 67 seated passengers and 30 standees). The interior of these buses typically provides more headroom and aisle space, and thus, greater mobility than many small, unmodified vehicles.

Although most urban (and suburban) transit buses operate over fixed routes, these routes may vary, operating both through areas with large population densities and less populated areas. Routes can also change on an hourly or daily basis to meet peak and off peak service demands. While urban transit systems may be served by a number of emergency response organizations, traffic congestion, lack of emergency equipment, unavailability of knowledgeable and skilled personnel, or unclear jurisdictional authority could prevent police or emergency medical personnel from responding promptly.

2.1.2 Rural and Specialized Transit Environment

Depending on the vehicle size, frequency of service, and the particular type of passenger served, rural and specialized transit vehicle capacity may vary from 5 to 30 persons. Most of the vehicles used by rural and specialized transit systems provide a significantly more confined envelope of space than buses used in urban service; less headroom and aisle space restricts passenger movement. However, some rural transit systems also use 35-foot buses.

Unlike urban bus service, rural transit systems and many specialized transit systems provide service to outlying areas which are not heavily populated and thus represent a more isolated transit environment. Response time to an emergency scene may be longer than in urban areas due to longer distances, longer average trip lengths, more isolated roads, and steep embankments. No one may pass by the scene of the emergency for long periods of time or a passerby may be unaware that an accident has occurred. The likelihood of assistance from the general public is thus reduced and notification of emergency response personnel may be delayed. It is also more likely that knowledgeable and skilled personnel will be unavailable or unable to transport critical equipment to the scene. Moreover, unclear jurisdictional authority could hamper response to an emergency.

2.2 VEHICLE CHARACTERISTICS

Various types of motor vehicles are used to provide urban, rural, and specialized transportation. These vehicles include (but are not limited to) standard-size buses; medium-size body-on-chassis buses; small special-purpose-built buses; standard, modified, and mini vans; and multipurpose passenger vehicles. Many of these vehicles have been modified to include a lift or ramp for use by elderly and disabled passengers. Lifts have been a recent modification for urban buses; lifts and ramps have been commonly provided on rural and specialized transit vehicles for many years.

A bus, as defined by NHTSA, is a "motor vehicle with motive power (except a trailer) designed for carrying more than 10 persons." NHSTA applies this definition to any vehicles (including vans) purchased by a transit system (or other entity, i.e., human services provider, etc.) to carry more than 10 persons. (NHSTA staff should be consulted for additonal clarification for specific types of vehicles.) Most-over-the road buses used for transit service are equipped with a rear-mounted diesel or gasoline fueled engine; others use an alternative fuel, such as methanol. In some cases, these vehicles are structurally different (e.g., engine is located in front instead of rear; trolley buses use power from an overhead catenary wire), but provide the same type of service.

Urban bus transit systems generally use standard-size (35 or 40 feet long) buses which can carry up to 53 passengers. The chassis and body are frequently constructed as an integral (monocoque) unit. In general, body construction is similar for all manufacturers. Articulated buses (60 feet long) are also used to provide service in certain cities. Medium-size body-on-chassis buses are constructed by building a bus body on the rear of a commercial van cutaway chassis or on a light-duty truck, motor home, or special-built chassis. Body-on-chassis vehicles are available in different sizes, can be equipped with lift and securement devices for wheelchairs, and can carry 12 to 30 passengers. In some cases, small special-purpose-built buses are simply small versions of full-size transit buses that can be equipped with many of the same heavy duty components and with lift and securement devices for wheelchairs. They can seat 18 to 35 passengers.

Standard vans which can carry 5 to 15 passengers are produced as part of the manufacturer's standard production line and can be purchased from automobile

dealers. Modified vans may be slightly longer, wider, and higher than standard vans and may or may not have a raised roof, heavy duty electrical systems, additional or reduced seating, lift and securement devices for wheelchairs, etc. Seating capacity ranges from 11 to 16 passengers. Mini vans may be equipped with lower floors and ramps and may have a capacity of only three persons.

A multi-purpose passenger vehicle, as defined by NHTSA, is a "motor vehicle with motive power (except a trailer) designed to carry 10 persons or less which is constructed on a truck chassis or with special features for off road operation." These vehicles have become popular for use by many small transit systems.

According to NHTSA, a school bus is a "bus that is sold, or introduced in interstate commerce, for purposes of carrying students to and from school or related events, but does not include a bus designed and sold for operation as a common carrier in urban transportation."

It should be recognized that in rural areas, "school buses" or other vehicles (such as vans or station wagons) used for student transportation may be used at certain times of the day to transport young, elderly, or disabled passengers. Where this dual use of vehicles occurs, additional consideration should be given to emergency preparedness concerns.

Section 5 further describes the characteristics of typical transit vehicles which could affect the safety of passengers during emergencies. That section also identifies specific recommendations to address those concerns.

2.3 TYPES OF EMERGENCIES

Although the general public, persons who use wheelchairs or other personal assistive devices, or persons who have visual impairments or medical, physical, or other conditions may have little difficulty using transit service under normal circumstances, passengers may not be able to move with the speed, agility, and sureness needed to evacuate transit vehicles and road structures safely and quickly during emergencies. In addition, emergency response personnel who may be called to respond in rural areas may be unavailable, limited in numbers, and/or have to travel long distances to reach the scene. Moreover, even during an emergency causing no injuries to general passengers, young, elderly, or disabled persons may

have special needs requiring attention by the vehicle driver or other transit system personnel until emergency response personnel arrive.

An understanding of the types of emergencies which could occur and their related hazards is necessary for effective emergency preparedness planning and procedure development. Typical emergency scenarios include the following:

- Passenger Fall or Illness;
- Vehicle Breakdown;
- Driver Incapacitation;
- Vehicle Collision;
- Vehicle Fire;
- Vehicle Collision with Fire;
- Vehicle Rollover;
- Vehicle Immersion in Water; and
- Severe Weather Conditions/Natural Disasters.

It is quite possible that an emergency could involve a combination of these scenarios. For example, a transit vehicle could collide with another vehicle due to driver incapacitation and then roll down an embankment.

Two serious concerns for passengers involved in a transit emergency are injuries (causes and treatment) and getting out of the vehicle. These concerns, as they apply for each of the scenarios, are discussed below.

2.3.1 Passenger Fall or Illness

For the purposes of this document, the fall or illness of a passenger inside or entering/exiting a transit vehicle is considered to be an emergency and should be addressed as such. Respiratory and heart conditions place many passengers (especially those with hidden impairments) in the group of people most susceptible to illness. Stress, exhaustion, heat, humidity, and sickness could aggravate these conditions and cause a passenger (particularly young, elderly, or disabled) to fall or become ill while inside a vehicle. A sudden start, stop or evasive manuever by the vehicle driver could result in a fall if seat belts are not provided or used by passengers

(especially wheelchair users). A visually- or mobility-impaired passenger could also trip or be unable to maintain his/her balance and fall when entering or exiting the vehicle. A passenger could also collapse or fall during an emergency. Falling could cause bodily injury (i.e., concussion or broken bones) or may aggravate existing medical conditions. In the case of a passenger fall or illness, the degree of risk is related to the severity and location of where it occurs. For example, if a passenger faints from heat but the fall is braced and the passenger recovers within a few minutes, there is probably little or no risk. However, medical treatment is required if a passenger faints, hits his/her head, and becomes unconscious because the blow to the head can cause internal injury. Furthermore, the severity of such an injury may not be immediately apparent, particularly if the passenger recovers consciousness within a few minutes.

Because it is not usually possible for onlookers, whether passengers or transit personnel, to diagnose the medical reason for or consequence of a fall or illness, it is unlikely they will know what corrective action to take. In fact, movement of a fallen or ill passenger by untrained people could actually cause additional harm. In addition, many passengers take special medication or multiple types of medication. Although many of these passengers wear medical alert tags or bracelets and carry dosages of their medication, a passenger on medication who falls or displays signs of illness and becomes unconscious will not be able to volunteer information relating to the proper dosage or method of administering the medication. The driver or other passengers might be unaware that this passenger is carrying medication, unfamiliar with correct methods of administration, or ignorant of the correct dosage and thus either not respond or respond incorrectly.

2.3.2 Vehicle Breakdown

A vehicle breakdown due to a flat tire, engine trouble, etc., is the cause of many transit delays. In general, depending on the length of time and the location of the transit vehicle, passengers will be evacuated only if there is immediate danger, no prospect of swift vehicle repair, or severe weather conditions. An example of immediate danger is a stalled transit bus on a railroad crossing. This could occur if brake interlock systems are activated on rough crossings by jouncing of the front suspension on buses equipped with a kneeling device, or by jarring of the rear doors if driver controlled. There is usually an override mechanism that releases the brakes, but it requires some deliberate action by the driver.

Because of special needs or disabilities, passengers may have difficulty coping with delays caused by vehicle breakdowns and require medical aid. Poor ventilation, extreme heat or cold, inability to communicate adequately (orally and visually), medical conditions, confusion, fear, disorientation, loss of contact with the driver, isolation (real or perceived), and lack of mobility could also contribute to hazards associated with a vehicle breakdown. In addition, passengers may be visually impaired, may have limited mobility (e.g., wheelchair users), or could be in a cast or brace, all of which are conditions requiring special assistance during emergency response and evacuation. During the process of evacuation, the physical strength of young, elderly, or disabled passengers may be overtaxed, and medical treatment could be necessary.

If the vehicle is located on a road or bridge with a shoulder that is too narrow, has an extreme angle, or has an unstable surface, wheelchair users would have to be bodily carried. Other passengers who may have difficulty walking along the road shoulders or on a bridge because of impaired vision or difficulty in maintaining balance will need assistance or may have to be carried.

Severe weather conditions could delay the arrival of transit and emergency response personnel, vehicles, and equipment. Ice and snow could aggravate mobility limitations, causing any passenger, particularly the elderly or disabled, to slip, slide, or fall, even if assisted.

2.3.3 Driver Incapacitation

Drivers can be totally or partially incapacitated for a number of reasons, including seizures, heart attacks, injuries caused by objects (such as rocks, wheels, or tires) penetrating the windshield, or by the impact of an accident. Depending upon the severity of the situation, the vehicle may be brought safely to rest by a quick-acting passenger or it may be involved in a collision, rollover, fire, or combination thereof. Incapacitation of the driver can also delay notification of an emergency and delay response time. Any reduction in the driver's capabilities could impede evacuation efforts prior to the arrival of emergency response organization personnel.

2.3.4 Vehicle Collision

Most urban bus systems operate at relatively slow speeds due to traffic congestion. The majority of collisions include impact with cars which either cut out in front of the

bus or are traveling in the opposite direction. Due to the large size and weight of a standard size bus and the slower speed, severe injury to the driver or passengers or damage to a bus will not usually occur.

Due to the smaller size and weight of many vehicles used for rural and specialized transit service and their relatively higher operating speeds (on less congested roads and highways), a collision with another vehicle, tree etc., could result in more severe injury and vehicle damage.

Injuries to transit passengers in a collision commonly result from impact with the interior of the transit vehicle. Thus, injuries may vary according to the interior arrangements of vehicles, and the operating practices of the particular transit system relating to passenger restraint and wheelchair securement. Physical injury to passengers could result if seat belts are not provided for (or used by) passengers (especially wheelchair users), or wheelchair wheels and/or wheelchair securement devices are not strong enough to resist crash forces and remain intact. (See also Section 2.3.7.) Additional discussion relating to vehicle crashworthiness, interior arrangement and seating is contained in Section 5.

It is important that the vehicle driver and emergency response personnel realize that wheelchair users may be unaware of their own injuries. For example, if a passenger indicates severe pain in a leg, response personnel may assume that the leg has been broken; however, wheelchair passengers with paralyzed limbs may suffer broken bones or suffer burns without being aware of the injury.

The surprise and stress of a collision may also aggravate certain medical or other conditions of some passengers. Unless there is a hazard which requires immediate attention, it is important that the vehicle driver check the condition of passengers and provide reassurance.

As in the passenger fall or illness scenario, the priority in a vehicle collision which does not involve fire or smoke or other immediate danger is to administer medical treatment to the injured rather than to evacuate the vehicle. If a person suffers a life-threatening injury, first aid from the vehicle driver or fellow passengers may help but will probably be inadequate. Although injured passengers must be removed from the vehicle, swiftness of evacuation is generally secondary to immediate treatment. However, once injured passengers are stabilized, they will probably need to be evacuated and taken to a medical facility.

Evacuating passengers from a vehicle that has been damaged in a collision can be difficult if the driver is incapacitated, exits or exit paths are blocked, doors are jammed, or the lift or ramp is rendered unusable. Moreover, young, elderly, or disabled passengers may be unable to extricate themselves from their seats, to reach the side or rear doors, or to leave through emergency exit windows or roof hatches, without help. Medical, physical, or other conditions may also hamper passengers from assisting in their own evacuation.

2.3.5 Vehicle Fire

The majority of fires which have occurred in transit vehicles have developed outside the passenger compartment. Fires commonly start under the hood or in the dashboard or engine compartment from a variety of causes. These include gasoline, oil, and fluid leaks, and electrical short circuits in the battery boxes. Other ignition sources include overheated brakes or burst tires igniting reinforced plastic wheel housings and fires set by vandals in foam upholstery.

A vehicle fire is a life-threatening situation which requires rapid evacuation of all passengers to avoid casualties resulting from burns or smoke and toxic gas inhalation. Fire often causes panic and confusion, and smoke may decrease visibility making it hard for passengers to find emergency exits. Oxygen is reduced, making breathing difficult, and stamina decreases, diminishing the ability to withstand the rigors of evacuation. The passengers in the greatest danger are those persons who either cannot walk at all or only at a slow pace, and those who have respiratory conditions.

Evacuation of wheelchair users is a particular concern in this scenario. In many cases, these passengers must be evacuated without their chairs, depending on the location and intensity of the fire, the location of the lift, and the weight of the passenger and chair. For example, if neither the rear door or side door of a van can be used, the only alternatives are to carry the passenger through the front door, side windows, or windshield. If there is an electrical fire that immobilizes the lift, there could be insufficient time available to operate the lift manually. Even if the fire is contained, toxic fumes may be present inside the vehicle. Furthermore, if the lift is in the rear, it may be inadvisable to use it unless it is the only exit and other exits are not opened; multiple openings, unless placed correctly, have been shown to spread a fire internally by allowing heated air to vent along the ceiling of the vehicle interior while air enters from another direction.

2.3.6 Vehicle Collision with Fire

The most serious emergency which could occur is a vehicle collision that involves fire. The hazards of the fire scenario, i.e., burns, smoke, and toxic gas inhalation are aggravated by the possibility that the driver and many passengers may sustain injury during the collision and may require immediate medical treatment. This combination of events makes evacuation more difficult than for either condition separately, yet evacuation is more imperative. Immediate evacuation of injured passengers takes precedence over medical treatment.

2.3.7 Vehicle Rollover

A rollover may be complete, with the vehicle ending up on its roof, or partial, with the vehicle on its side. A complete rollover is likely to cause more severe injuries. Partial rollover seems to involve transit vehicles used for rural and specialized service more frequently than large transit buses used for urban service. Vehicle rollovers can result from a collision with another vehicle or barrier, driver loss of control (e.g., skidding and uneven road level), etc. A rollover down an embankment could pose additional difficulties in reaching the vehicle and removing passengers.

The vehicle driver may be injured in a rollover. The driver's seat in most modern transit vehicles is equipped with a lap seat belt, but it cannot be assumed that the driver has used it. If a seat belt is not worn, a transit vehicle tipping over to the. right could throw the driver into the stepwell, causing injury and loss of vehicle control. If the passenger restraint system, the wheelchair wheel, or wheelchair securement device fails, passengers could be injured from a sudden drop if the vehicle is on its side or upside down.

The electric battery packs for powered wheelchairs are often trunnion mounted and are therefore free to swing about an arc. The physical performance and mechanical and electrical integrity of such a system as it is rolled into an inverted position are not known. Battery leakage can be expected unless jell-type batteries are used and the battery pack, when fully inverted, could become unhinged and free to fall.

If a transit bus is resting on its roof, it is possible for all doors to function and the window exits, if they are released, to fall open under the force of gravity. However, if a smaller vehicle is resting on its right side, all the normal passenger doors (except the rear door, if provided) will be blocked, and only emergency exits (windows and

roof hatches) will be available. Windows on some vehicles other than buses may not be marked as exits or releasable from the outside. The size of bus windows varies with the models; the smallest openings may be that of van windows. The majority of roof escape hatches are 23 inches square which could cause difficulty if passengers or emergency response personnel are too large to fit through. With body-on-chassis buses, it is probable that the only available exits will be the roof hatch and openable or broken windows.

2.3.8 Vehicle Immersion in Water

When a transit vehicle is immersed in water, the problems of evacuation are especially great, particularly for young, elderly, and disabled passengers. Wheelchairs, because of their weight, may make it difficult to extricate passengers from water. If the transit vehicle is partly immersed on its side and the water is fairly deep, young, elderly, and disabled passengers, whether injured or not in the initial accident, may drown unless the driver or fellow passengers aid them immediately and continuously until emergency response personnel arrive.

2.3.9 Severe Weather Conditions/Natural Disasters

Extreme heat or cold could aggravate physical or medical conditions of passengers (see Sections 2.3.1 and 2.4). Rain, snow, sleet, ice, and high winds can make transit operations hazardous, particularly in isolated areas. Personnel carrying or assisting transit passengers are more likely to lose their footing and slip or slide. Downed power lines or fallen trees may obstruct roads and force the detouring of the normal vehicle route. Entering or exiting the vehicle could be precarious, increasing the risk of falling and sustaining serious injury. Inclement weather can also reduce visibility or obscure lighting, exposing a stalled vehicle to the risk of being hit by another vehicle. Finally, severe weather conditions could impair the ability of emergency response personnel to transport emergency equipment to an emergency scene or gain access to passengers, making evacuation very difficult.

2.4 CHARACTERISTICS OF PASSENGERS WHO USE URBAN, RURAL, AND SPECIALIZED TRANSIT

Transit systems transport a wide cross section of the general public. This population possesses a wide variety of capabilities and includes a large percentage of elderly

persons, young children, and persons who have disabilities. Because of improved accessibility, public transit has become an important source of transportation for elderly or disabled persons who use wheelchairs or other personal assistive devices or who have visual or other impairments. It should be recognized that the mobility, communications, and medical, physical, and other limitations reviewed in this section are not shared by all persons using transit service. Moreover, these limitations may exist in a variety of different combinations and levels of severity.

If it becomes necessary to evacuate a transit vehicle, uninjured adults are easiest to evacuate because they usually require only confident, informative leadership and only minimal assistance in walking. However, even if uninjured, young, elderly, or disabled passengers may have limited mobility, difficulty in communicating, and/or other conditions unrelated to the emergency; they may thus need medical care or physical assistance to evacuate the emergency scene. Thus, many emergency procedures applicable to the general public will not be practical for these passengers. Even if there is no immediate danger (e.g., a stalled vehicle), persons with medical conditions may experience stress and require medication. During circumstances which are under control from the point of view of transit and emergency response organization personnel, passengers may panic if they feel trapped, if communication is cut off, or if transit or emergency response organization personnel are having difficulty reaching them. A major consideration for emergency response planning is how mobility, communications, and other impairments may impede an effort to evacuate passengers from transit vehicles operating within a potentially isolated service environment. Passengers may be:

- Able to walk without assistance;
- Able to walk with the use of a cane, a walker, or crutches;
- Wheelchair users;
- Visually impaired or blind;
- Hearing impaired or deaf;
- Speech impaired;
- Mentally impaired; or
- Some combination thereof.

Although many passengers may have little difficulty using transit under normal circumstances, the limitations listed below may prevent them from moving with the speed, agility, and sureness needed to evacuate transit vehicles safely and quickly during emergencies. (References 10, 11, and 12 contain more extensive information about the characteristics and potential limitations of elderly and disabled persons, and describe several types of personal assistance devices used.)

During an emergency, persons may have some difficulty performing any of the following:

- Going up or down steps, or an incline;
- Stooping, kneeling, or crouching;
- Walking long distances, even at a very slow pace;
- Crawling;
- Waiting or standing;
- Moving in crowds;
- Sitting down or getting up;
- Reaching for, handling, or grasping objects;
- Moving dynamically (i.e., running, jumping, or reacting instantly);
- Moving within confined spaces;
- Establishing accurate depth perception; or
- Communicating (i.e., understanding instructions and making their own needs understood).

2.4.1 Mobility

As noted previously, uninjured adult passengers are the easiest to evacuate because they usually require only confident, informative leadership and minimal assistance in walking. However, other passengers may require special assistance to leave the vehicle, as well as medical care. Both the ability of these passengers to move under their own power and the ability of transit and emergency response personnel to adapt to their needs and limitations directly affect evacuation operations. Transit system and emergency response personnel must decide when and how to move passengers and how to evacuate them through side and end doors of vehicles, up and down steps or ladders, or through roof hatches. Thus, passengers with limited

mobility can impede an evacuation effort. (Although the weight and size of a passenger is not usually considered a mobility problem, they could affect the ability of passengers to exit through windows or roof hatches.) During an emergency, mobility-impaired passengers could find it difficult to do any of the following:

- Move through the aisle of a transit vehicle to an exit (passengers who use wheelchairs, walkers, canes, crutches, prostheses, or other personal assistive devices may find such movement especially difficult; in fact, such passengers may become trapped by these devices);
- Exit a vehicle without assistance if required to use steps or a ladder, climb through a window or roof hatch, or move through a vehicle that is severely tilted or overturned; or
- Travel long distances Quickly without resting repeatedly (ANSI estimates that elderly or disabled persons would average only 200 feet in 2 minutes on level surfaces [Reference 15]).

2.4.2 Communications

The ability of passengers to hear, read, and understand instructions, or make themselves heard and understood during transit emergencies will affect response operations. For example, the inability of a passenger to understand an instruction because of age, learning disability, cultural or language differences, or hearing or visual impairment could make it difficult to move that person to safety. Such an impairment may also make it difficult for these passengers to remain calm and confident because of an "isolated" feeling that they are trapped or will not receive help.

The key point in communication is whether passengers are able to understand oral and/or written instructions and are then able to follow directions. During an emergency, passengers may not be able to:

- Understand that there is an emergency requiring evacuation from the area;
- Read and understand signs or instructions; or
- Hear and understand instructions.

2.4.3 Medical, Physical, and/or Other Conditions

Many medical, physical and/or other conditions that do not significantly limit the functional capabilities of the majority of persons, may pose only temporary

limitations, or may not be perceptible to an outside observer. Medical conditions which may not be continuously disabling include epilepsy, diabetes, asthma and other respiratory ailments, arthritis, and heart disease. Physical conditions include back or spinal conditions, degenerative muscle or bone conditions, cerebral palsy, nervous disorders, and missing or paralyzed limbs. Other conditions include learning disabilities, memory loss, senility, retardation, and various degrees of psychological, psychiatric, and emotional disorders, such as schizophrenia. It is possible that a person could possess multiple medical, physical, and/or other conditions.

Under normal circumstances, passengers who have medical conditions such as epilepsy and diabetes or who have cardiovascular, respiratory, or other impairments do not usually require special assistance while using transit service. However, a stroke or heart attack, an asthma flare-up, fainting, an epileptic episode, or a fall could in and of themselves be considered emergencies, requiring medical assistance and evacuation. Because some passenger limitations are not readily apparent, transit or emergency response personnel or other passengers may not recognize the immediate or potential need for special assistance. Moreover, the lack of medication due to time delays and lack of medical assistance from those knowledgeable of a given condition or disability may cause or aggravate conditions. Passengers with respiratory conditions such as asthma or emphysema can be particularly impaired by lack of oxygen or poor air quality caused by limited ventilation. Finally, elderly or disabled passengers may be more prone to injury from falls.

Persons with learning disabilities or psychological or emotional conditions may be unable to understand instructions or may be more susceptible to confusion or panic.

In summary, passengers with medical, physical, and other conditions may be unable to do any of the following:

- Prevent the onset of adverse health conditions such as heart attacks, angina, shortness of breath, and palpitations under the stress of the situation;
- Function independently if medical conditions that require special treatment are aggravated, particularly if appropriate transit or emergency response personnel are unprepared or unable to provide the appropriate treatment, or if those in need are not carrying the necessary medication; or
- Actively contribute to evacuation efforts.

2.5 RESPONSE PERSONNEL PERFORMANCE

To be able to respond effectively (particularly to the special needs of young, elderly, and disabled persons) during emergencies, transit system and emergency response personnel must possess the appropriate knowledge and skills. The driver of the vehicle involved, as the immediate response person on the scene, must be familiar with the assistance techniques, procedures, and equipment to protect passengers from harm and vehicles from further damage.

A major issue is that persons who are knowledgeable and skilled in emergency response may be unavailable, may be unable to reach the emergency scene due to distance or traffic congestion, may be unable to transport critical equipment to the scene, or may be unfamiliar with proper passenger assistance techniques, transit vehicles, emergency evacuation procedures, and/or proper use of emergency equipment. Proper emergency preparedness training in these subjects is critical to the success of the emergency response effort.

Proper emergency response training is also of major importance because inadequate knowledge of the characteristics of passengers (particularly elderly and disabled persons) and the inability to adequately respond to any special needs during a transit emergency may cause injury; aggravate medical, physical, and/or other conditions; or delay the evacuation. For example, many emergency response organization personnel are not familiar with either the characteristics of the vehicles or persons who use the rural or specialized transportation service provided in their response areas. (Moreover, many rural areas depend on volunteers for emergency response needs). As a result, emergency response personnel may utilize techniques they use for automobile accidents which are inappropriate and could cause injury or delay evacuation of passengers from transit buses and vans. Moreover, it may be necessary for transit or emergency response personnel to assist certain passengers prior to the evacuation effort, by re-positioning them to permit proper breathing or to relieve pressure which may not cause injury but may create excruciating pain. Thus, training which includes these types of concerns is essential to ensure that transit and emergency response personnel are familiar with and able to carry out the latest evacuation procedures and techniques.

Section 4 contains a more detailed discussion of training programs and presents recommended guidelines for training program scope and content. In addition, Section 4 also discusses the benefits of emergency drills/exercises and describes the role of passenger awareness and transit system information sharing.

3. EMERGENCY PLAN DEVELOPMENT

To effectively respond to an emergency in a timely manner, transit systems and emergency response organizations must engage in careful, advance planning. Whether the transit operation is large or small, the lack of emergency procedures and formal agreements specifying jurisdictional boundaries, chain of command, and communications may hamper the ability to effectively respond to an emergency. In addition, the absence of clear emergency procedures or information may cause confusion and delay emergency response. A formal process for the development, review, revision, and reissuance of documents, in whole or in part, relating to emergency planning and procedures should be established. Current and future operations of each individual transit service, in terms of system size and location, type and number of passengers carried, type and size of vehicles, as well as transit and outside emergency response organization resources, are critical factors in the implementation of an effective emergency plan.

The objectives of an emergency plan are:

- To plan the response by a transit system and its outside emergency organizations to a transit emergency;
- To mobilize the actual response to emergencies; and
- To recover from emergencies and restore normal operations.

In order to meet these objectives, an emergency plan should contain the following elements: policy, scope, agreements with emergency response organizations, transit system functions and responsibilities, procedural guidelines for specific emergencies, general response capability criteria, and supporting documentation.

3.1 POLICY

The statement of policy should set forth the goals and objectives to be addressed by the transit system in developing its own emergency response capability and coordinating it with other emergency response organizations (i.e., emergency medical service [EMS], police and fire departments, etc.). The policy statement should indicate an explicit commitment to safety on the part of the top-level transit system management.

3.2 SCOPE

The plan should define the conditions which constitute an emergency (see Section 3.5). In addition, procedures should be developed for each of the following:

- Reporting the emergency;
- Evaluating and establishing the parameters of the emergency;
- Notifying emergency response organization personnel;
- Dispatching transit and emergency response personnel and equipment to the emergency site;
- Coordinating the activities of all response personnel;
- Protecting passengers, personnel, and equipment at the emergency site;
- Evacuating passengers;
- Keeping passengers (and their families), transit and emergency response personnel, and other agencies informed; and
- Restoring normal operations.

3.3 INTER-ORGANIZATIONAL AGREEMENTS

Many emergencies require response efforts from organizations in addition to the transit system. Regardless of the size of the transit system, formal agreements with the outside organizations which could be called upon to respond (e.g., Emergency Medical Service (EMS), fire and police departments, and municipal/county emergency management organizations, see Appendix A) should be established before emergencies occur. These agreements should ensure proper coordination of roles between all the organizations involved.

The inter-organizational agreements should be written documents that serve as the formal basis of mutual understanding between parties. Each agreement should include an outline of the type, quality, and response time of emergency-related services that can be made available to the transit system. The agreement should establish the means for developing detailed procedures and also define financial responsibilities (where applicable). Inter-organizational agreements should contain as a minimum:

- A list of participating emergency response organizations including their names, signatures of approving officials, addresses, telephone numbers, radio frequencies, and call numbers or codes as applicable for all times of the day;
- A statement of how the document was developed, reviewed, and approved for use by the participating organizations;
- A definition of jurisdictional boundaries for responding organizations;
- An outline of the type and availability of emergency response personnel and equipment to be provided, as well as financial responsibilities when appropriate;
- A definition of chain of command to be followed at the emergency scene;
- An outline for developing detailed response and evacuation procedures;
- A statement of how proposed document changes will be reviewed, approved, and implemented as formal revisions by the participating organizations;
- A "Definition" section for special terms peculiar to the document, terminology of the transit system, and terminology of the other participating organizations; and
- A section identifying training responsibilities.

With the aid of these agreements, coordination during actual emergency situations should simply consist of following pre-established procedures. Any additional coordination needed because of the uniqueness of a specific emergency situation should be accomplished by following: (1) the previously established chain of command contained in the agreements, and (2) general precedent as documented in existing procedures, agreements, etc.

3.4 TRANSIT SYSTEM FUNCTIONS AND RESPONSIBILITIES

The establishment of a chain of command which assigns functions and responsibilities to appropriate personnel is crucial to the emergency response capabilities of a transit system, regardless of the size of the system. The internal organizational structure of a transit system together with rule books, standard operating procedures (SOPs), guidelines, driver's handbook, and emergency plan supporting documentation should provide sufficient basis for internal transit system coordination. The following basic elements should enable transit systems to coordinate internal and external responses:

- Definition of functions and responsibilities during emergencies for transit system personnel at supervisory centers, including operations, maintenance, and security, as appropriate. These should include the functions of transit dispatchers and terminal/garage supervision.

- List of telephone numbers of responsible transit system (including subcontractors), service agency, and emergency response personnel, as appropriate, to be notified (covering 24 hours).

- Specification of criteria for deciding that an emergency exists which requires outside assistance from emergency response organizations and that the "Inter-Organizational Agreement" is therefore applicable.

- Procedures for determining the specific type, location, and severity of the emergency and thus which procedure is applicable.

- Procedures for notifying appropriate participating emergency response organizations when an emergency exists.

- Procedures and decision-making criteria for establishing alternatives for local emergency command posts.

- Procedures and decision-making criteria for the orderly transfer of command responsibility between transit and participating response organization personnel.

- Procedures and decision-making criteria for deciding when the emergency has ended and the "Inter-Organizational Emergency Agreement" is no longer applicable.

3.5 EMERGENCY PROCEDURES

To develop emergency response procedures that address the needs of passengers (particularly young, elderly, and disabled), the transit system and emergency response personnel must understand the typical kinds of emergencies which could occur and their associated hazards (see Section 2.3), and the general sequence of emergency response activities to be taken. Such an understanding is particularly important in many rural areas where transit service is provided across many jurisdictions and the only available response units may be dependent on volunteers. Many procedures are applicable regardless of the scenario, although each scenario has its unique characteristics. The procedures should specify necessary tasks to be performed within a time or event sequence by the driver of the vehicle involved, other transit system personnel, and emergency response personnel, and should be tailored to meet the specific needs of passengers, available response personnel, and the particular type and location of the emergency. As a minimum, the emergency procedures should address the following situations:

- Passenger Fall or Illness;
- Vehicle Breakdown;
- Driver Incapacitation;
- Vehicle Collision;
- Vehicle Fire;
- Vehicle Collision with Fire;
- Vehicle Rollover;
- Vehicle Immersion in Water; and
- Severe Weather Conditions/Natural Disasters (snow, freezing conditions, heat, high winds, flood, earthquake, etc.).

Specific procedures for the following systematic sequence of activities (Reference 16) should be developed for each of the scenarios listed above:

- Preparation;
- Response;
- Assessment;
- Hazard Control;
- Support Operations;
- Vehicle Access;
- Emergency Care;
- Extrication;
- Removal and Transfer; and
- Debriefing.

Each of these activities is described in more detail in the following subsections. The information presented herein is intended to assist transit and emergency response organization personnel to prepare for a range of potential contingencies.

3.5.1 Preparation

The main areas in which preparation must be emphasized are development of procedures, proper use of emergency equipment, training, and provision of advance information to emergency response organizations.

It is essential that the transit vehicle driver and emergency response personnel receive adequate, periodic training and reference materials to enable them to carry out the sequence of activities described here in terms of procedures and use of equipment. Training should include an on-site inspection of the vehicles used, and hands-on familiarization with vehicles and emergency equipment (see Section 4).

Transit systems can assist emergency response personnel before an emergency occurs by providing the emergency response organizations within their service areas with the following information:

- System name and address;
- Name and telephone number of an official of the system (and service agency and/or subcontractor, if appropriate);
- Name and telephone number of a back-up official;
- Description of the vehicles in the fleet, including their passenger capacity, the usual number of persons transported, instructions for operating vehicle emergency equipment, and evacuation procedures;
- The characteristics of the passengers generally carried; and
- Any other information that might be useful.

Transit systems (especially rural and specialized) might find it helpful to develop a wallet-size card which elderly or disabled passengers who travel regularly could voluntarily fill out and carry on board the vehicle. Depending on the type of service provided, emergency response personnel could be instructed to look for such cards to help them to assess the condition of a passenger in an emergency. These cards (laminated in plastic for durability) could be carried by the passenger and/or given to the driver before the beginning of each run. Information on the card could contain:

- Name and address;
- Description (eye color, height, weight, hair color, etc.);
- Blood type;
- Person to notify in case of emergency (and telephone number);
- Medical condition;

- Unusual characteristics (e.g., senility, retardation, deafness, missing limbs); and
- Names and telephone numbers of physicians, doctors, therapists, etc.

Another means of providing passenger information (used by many specialized transit systems) is the use of automated management information systems (i.e., mini-computers) to generate daily passenger information sheet printouts. This information could be given to the driver and carried in the vehicle. Passengers should also be encouraged to wear medic-alert identification.

3.5.2 Initial Response

The vehicle driver must always be alert to situations which could become emergencies requiring outside assistance. For example, after a sudden stop, the driver should check with passengers to see if injuries have occurred. If the vehicle is radio equipped, the driver should, before getting out of the vehicle, use the radio to immediately notify the transit dispatcher of the situation. In many instances, due to the isolated location of the emergency or driver incapacitation, the transit dispatcher may be the last person notified of an emergency on one of its vehicles. The transit vehicle driver, if uninjured, must assess the situation and provide the necessary initial response until emergency personnel arrive on the scene.

If outside assistance is necessary, the actual response, in terms of number of personnel and equipment dispatched to the emergency scene, will vary with the location, number of passengers, and the emergency. The police, fire department, or other dispatcher may be notified by the vehicle driver or by the first person, either a passenger or a bystander, who can reach a telephone. The transit system should establish criteria for the driver to use in determining when to call for medical assistance. For example, if a passenger falls or becomes ill, the procedure for the vehicle driver could be to contact the transit dispatcher and request that an ambulance meet the vehicle at a specified location. Transit personnel should lend assistance and be helpful to injured passengers and support the activities of the emergency response personnel as best as their skills, training, background and physical ability allows. For example, the vehicle driver or other transit personnel, if appropriately trained, should administer basic first aid until EMS personnel arrive. If a large number of young, elderly, or disabled passengers are on board, a larger-

than-usual team of transit system, EMS, ambulance company; and/or police and fire department personnel, may be necessary.

3.5.3 Assessment/Response by Emergency Response Personnel

When arriving at the emergency scene, emergency response personnel must assess the situation and consider what actions to take. Unless there is imminent danger (i.e., fire), immediate action could aggravate medical, physical, or other conditions. The number of injured and their conditions must be identified to determine whether evacuation is necessary and whether additional resources (such as EMS personnel, crowd control officers, and firefighters, as well as backboards or ambulances) are necessary.

If conscious, the transit vehicle driver should convey the exact number of passengers on board to the on-scene emergency response officer in charge. All passengers able to reply should be asked about their disabilities or illnesses, their new injuries, and the characteristics of other passengers who may be unconscious. Because many passengers regularly use transit service, they may be a good source of information about the other persons with whom they frequently ride. If the passengers are clients of a social service agency, the agency dispatcher should be able to provide additional information. In addition, response personnel should look for passengers who may require medical treatment due to conditions that are not directly related to the emergency and that may not be readily discernible, such as diabetes and epilepsy. The most obvious source of personal medical information is medical alert tags. (Passenger data cards/ sheets, if carried in the vehicle, are a valuable source of information, see section 3.5.1.) Personnel should also be aware that an apparently severely distorted limb or apparent dismemberment may only be an artificial limb or other prosthesis, and they should be familiar with basic procedures for communicating with persons who have visual, hearing, and speech impairments (see Appendix C and References 10,11, and 12).

Once the officer in charge has completed the assessment and has requested the necessary further assistance, that person should appoint certain persons to control hazards, others to maintain support operations, and still others to locate victims. Some passengers may have already been removed from the vehicle by passersbys or may have wandered from the scene.

3.5.4 Hazard Control

"Hazard control" simply means preventing death or injury from traffic-related hazards which may be handled by police officers and from non-traffic hazards such as downed wires, fire, hazardous cargo, unstable vehicles, and debris which must be dealt with by emergency response organization personnel. Personnel should be wary of entering any vehicle that looks unstable. Transit vehicles equipped with a lift or ramp tend to roll over in accidents because the weight is often poorly distributed.

If a vehicle is stalled on a railroad crossing, it is essential that all passengers be evacuated before attempting to move the vehicle. The passengers must be positioned well clear of the crossing to avoid injuries from debris should the vehicle be struck before it can be moved.

3.5.5 Support Operations

Additional personnel and equipment may be required for any of the following reasons:

- A fire may start or a previously extinguished fire may re-ignite;
- The vehicle must be removed from a hazardous area or condition;
- Darkness may hinder emergency response organization operations and emergency medical treatment;
- Evidence and personal property must be protected; or
- Crowds may be difficult to control.

3.5.6 Vehicle Access

The emergency response organization crew does not normally need special equipment to gain access to the vehicle. Emergency exit doors, windows, and roof hatches, if provided and operable, are quicker to use and prevent further injury to passengers. The windshield may also be removed and the opening used to gain access or remove passengers. Wheelchair lifts, full-width rear bench seats, and the structural members of transit vehicles can obstruct access to accident victims. Fiberglass or plastic raised roofs, however, can actually ease access because they are easily cut open.

Training for gaining access to the various vehicles operated is necessary for an effective emergency response. Handbooks which describe how to gain emergency access to each type of vehicle would provide the basis for this training (see Section 4).

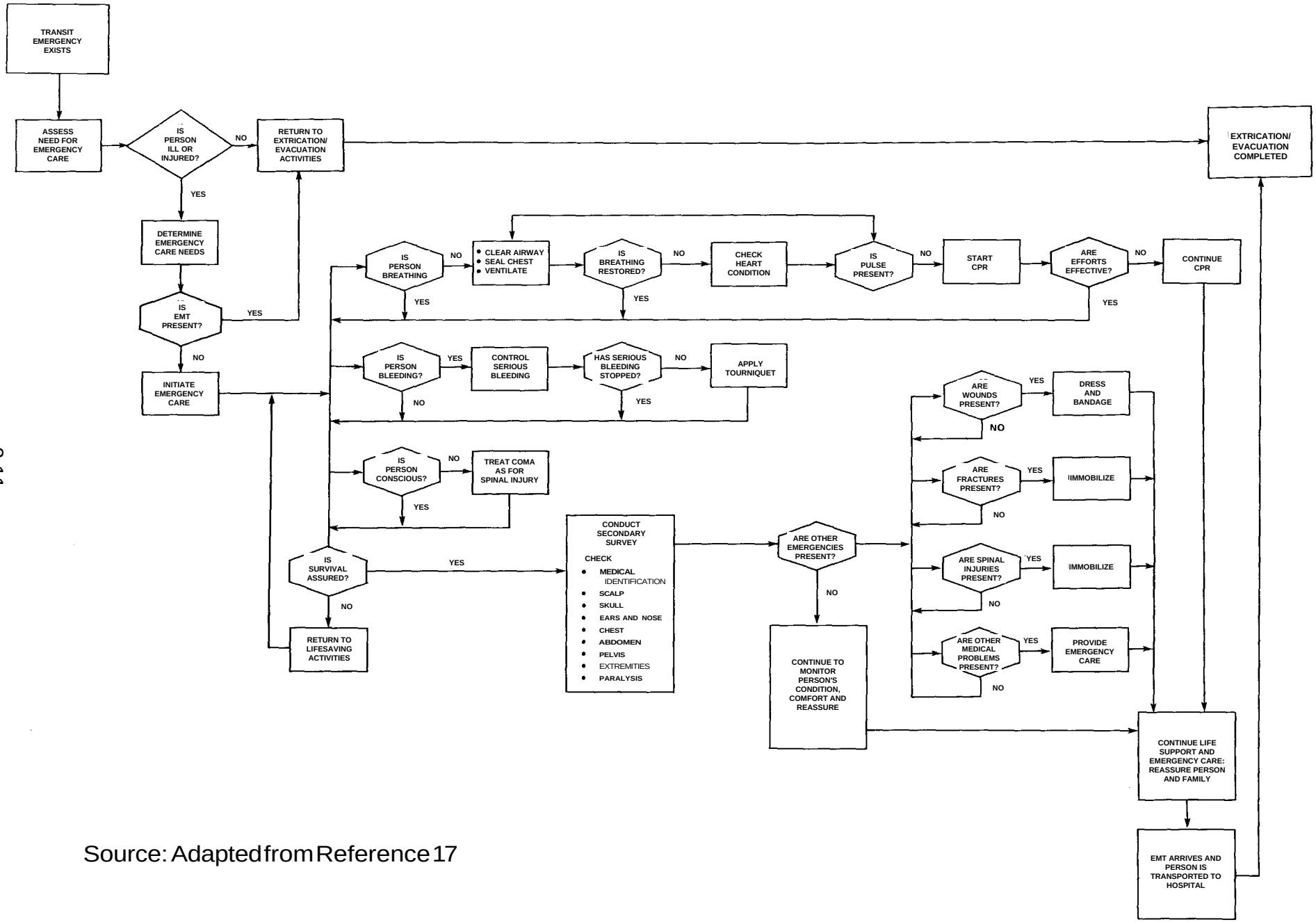
3.5.7 Emergency Care

While emergency response organization personnel are gaining access to passengers, the extent of injuries should be determined. While it is important to extricate passengers and to transport them to hospitals as soon as possible, it may first be necessary for emergency response personnel (or appropriately trained transit personnel, if the emergency occurs in a remote area and a life-threatening situation exists) to perform life-support activities. Each passenger's condition must be evaluated; passenger injuries must be dressed and bandaged and fractures splinted. Figure 3-1 contains a flowchart (Reference 17), which could be used to apply emergency treatment. If passengers seem to have spinal injuries or are paraplegic or quadriplegic, their entire bodies must be rigidly fixed to reduce the possibility of further injury.

Basic emergency care needed by young, elderly, or disabled passengers is not unlike that provided to other passengers, but the determination of their injuries is much more difficult. Emergency response personnel may have to assume that the passengers have suffered more serious injuries than their complaints indicate. For example, when general passengers suffer fractures, they will complain of pain to emergency response personnel, but a paraplegic may have a fracture and not be aware of it.

3.5.8 Extrication

Once emergency response personnel have gained access to the inside of the vehicle and begun treatment to passengers to stabilize their conditions (if necessary), they must then decide how best to extricate (disentangle) the passengers and prepare them for removal from the vehicle. In some cases, extrication may have to be concurrent with medical treatment to minimize danger to both victims and emergency response personnel from spilled fuel or other hazards. The decision should only be made jointly by the technician already within the vehicle and the emergency response organization officer in charge. However, during a life-threatening situation, if no emergency response personnel are on the scene, their



Source: Adapted from Reference 17

FIGURE 3-1. Emergency Care Flowchart

arrival time is unknown, or if the vehicle is located in a remote area, it may be necessary for the vehicle driver to take action.

In general, extrication may involve any or all of the following procedures:

- Cutting seat belts;
- Removing seats;
- Displacing pedals;
- Cutting the steering wheel;
- Displacing the steering column; and/or
- Removing passengers from impaling objects.

In addition, response personnel may have to extricate passengers from one or more of the following:

- Torso-restraint devices;
- Wheelchairs;
- Wheelchair lift;
- Wheelchairramp;
- Clothing;
- Crutches, walkers, or other personal assistive devices; and/or
- Prostheses.

Torso-restraint devices can usually be removed with a seat belt cutter, but because of vehicle damage, it may be difficult to get at a portion of the device that can be cut without endangering the passenger.

Electric wheelchairs pose special problems because of their weight and the danger from the acid of their batteries. Wheelchair securement devices must be disengaged, either by a quick release feature or by simply cutting the restraint straps. Wheelchair lifts and ramps are very sturdy because of their function, and consequently are difficult for emergency response organization personnel to cut, bend, or otherwise disentangle. Hydraulic lifts may be moved with relative ease after their hoses are cut, but all fluids from machinery must be carefully disposed of in order to prevent fire, slippery footing, and contamination of passengers' open wounds.

As previously noted, some passengers who appear to have distorted or severed limbs may be suffering from nothing worse than detached prostheses. Artificial limbs can be easily removed to facilitate extrication

3.5.9 Evacuation (Removal) and Transfer

Evacuation of uninjured passengers can be normally be accomplished through the normal passenger entry door or emergency exits. To avoid aggravation of injuries or medical and physical conditions, as well as to prevent additional injuries, the vehicle driver and emergency response personnel should be familiar with the various techniques and equipment which can be used to carry passengers who are paralyzed or who have other mobility limitations (see examples in Reference 10, 11, and 12). Injured passengers must be wrapped and secured for removal. Requests for assistance from uninjured able-bodied passengers and instructions on evacuating passengers who need help should be given directly by the appropriate personnel.

The preferable exits to evacuate (or remove) passengers from the vehicle are:

- Side passenger door;
- Front cab doors;
- Rear door (if provided);
- Windshield;
- Windows along the body sides;
- Roof hatch; and
- Any other route taken by the emergency response personnel to gain access to the passengers.

In a severe accident, these egress routes may be blocked or inoperable as a result of vehicle damage. In addition, the creation of holes with jagged edges as a result of extrication activities may impede the evacuation of passengers.

Removal through windows may be only a last resort because of their relatively small openings, their height above ground, and the interference of seat backs. The roof hatch opening may not be large enough for a large disabled passenger; this could be a particular problem if the disabled person has difficulty with upper torso control. The side door, if a lift does not obstruct it, or the rear door (if provided and not

crushed or jammed) would probably be the easiest exit to use. Rear doors are less favorable for evacuation because of hazards from approaching vehicles but they are likely to be the only exits available on narrow roads or in a rollover situation.

Transfer of passengers to another vehicle, although it may be as easy as just moving a few steps to an ambulance, can also be can complex. For example, if the transit vehicle has rolled down a hill or plunged into a drainage ditch, lake, stream, or river, transfer may require the use of rope and tackle, a basket stretcher, and/or a hill-assist harness. Moreover, during inclement weather, separate procedures may be required if the vehicle is located on a hill or an elevated road structure rather than level ground. Emergency procedures should specify techniques and equipment needed for passenger evacuation from these types of situations and during the inclement weather conditions (such as snow, ice, flooding, etc.) that are likely to occur in the system's region. An alternate evacuation route should be designated in advance in case the original route cannot be used by any passenger.

3.5.10 Debriefing

All emergency response organization personnel should be debriefed after completing each task. The debriefing should help to determine:

- What standard transit or emergency response organization techniques could not be used because of the special characteristics of the vehicle or passengers;
- What new techniques were improvised;
- What improvements could be made in the coordination of transit personnel and the other participating organizations?
- What improvements to the transit system and emergency response organization procedures and/or emergency equipment are necessary;
- What special equipment might have been useful had it been available; and
- What kinds of training might increase the preparedness of responding personnel (see Section 4.2).

After the conduct of a drill/exercise or an emergency is resolved, it would be beneficial if all local organizations adopt this type of debriefing (see also section 4.6.7), circulate the results for review and provide summaries to information exchanges (i.e., state/county emergency management agency, the Rural Transit

Assistance Program [RTAP] hotline, etc.) so that national trends could be identified and followed.

3.6 GENERAL RESPONSE CAPABILITY CRITERIA

Adequately designed procedures for the sequence of activities described in Section 3.5 should ensure consistency between preparation and actual practice. Transit systems and emergency response organizations should examine their emergency plans and procedures to evaluate the ability of their personnel to provide swift and efficient response to an emergency.

The following questions constitute a suggested decision-making checklist for determining the relative effectiveness of actions when passengers are involved in a transit emergency:

- Where is the transit vehicle located?
- Who provides the initial report of the incident (also location and telephone number if calling from a pay or other telephone?
- What is the condition of the vehicle driver?
- What type of emergency is present (i.e., passenger fall or illness, collision, fire, etc.)?
- What actions are initiated to verify or improve the initial report of the incident?
- What actions should be taken as a first reaction to the initial report of the incident?
- Who decides that the reported incident is, in fact, an emergency and determines the particular category?
- If the incident is first reported from a vehicle that is traveling between stops, who decides if the vehicle should stop or continue to the next stop or terminal?
- Who relays the initial report of the incident to the transit and emergency response organization dispatchers?
- If the emergency involves fire, who makes the decision to call the fire department? What criteria are used to make the decision?
- What kind of injuries do passengers (particularly the young, elderly, or disabled) have?

- If there are injuries or fatalities, who makes the initial assessment as to size, type, and level of emergency medical response required? What criteria are used to make the decision?

- Have factors such as access, egress, availability of equipment, visibility, communication, etc., been considered?

- Who decides which particular set of standard emergency procedures or combination of procedures is followed to resolve the particular emergency?

- How should the initial actions of personnel be modified to fit the verified, actual reports of the nature, severity, and location of the incident?

- How many young, elderly, and disabled persons are on board the vehicle?

- What are the specific impairments or disabilities of each person?
  - Limited or no mobility
  - Visual or hearing impairment
  - Medical, physical, or other condition

- Are passengers able to understand oral directions? Are transit or emergency response personnel able to communicate by written means or with hand signals?

- How many transit or emergency response organization personnel can be made available to the scene?

- What kind of special equipment is available at the scene or must be brought in? Who provides this equipment?

- Once initial decisions regarding requests for assistance and/or evacuation are made, how are changes implemented in accordance with revisions in the chain of command?

- As various groups of emergency response personnel arrive at the scene, how is the chain of command changed and maintained?

- If it appears that vehicle evacuation is necessary, who makes the decision to evacuate? What criteria are used to make the decision?

- If it is decided to evacuate a vehicle, who decides the best procedure route, timing, etc., for evacuation? How are these choices determined?

- Who coordinates the evacuation: transit personnel or emergency response organization personnel?

- Who decides when (in what order) passengers are evacuated and on what basis?

- If it appears that special services are needed (extrication equipment, coroner, etc.), who decides and specifies the need?

- Have provisions been made to maintain transit service on unaffected routes of the system and to supply alternative service in the affected areas?
- Who decides when normal service is resumed?

3.7 EMERGENCY PLAN AND PROCEDURE SUPPORTING DOCUMENTATION

A real-life, one-of-a-kind, dynamic emergency situation is not easily portrayed, yet early decisions are crucial to all that follow. Sequences of calls or handoffs of commands are usually based on a few key early decisions (often irreversible) by the vehicle driver or emergency response organization personnel. Ideally, such decisions should be made in a logical fashion, with each piece of information being considered to narrow the list of alternative remedial strategies. The effectiveness of the emergency plan and procedure documents is based on the assumption that key decisions must be made as quickly as possible. In addition to the information described in the previous sections, the following kinds of documentation can provide valuable information in support of the emergency plan and procedures. Table 3-1 summarizes examples of supporting documentation.

3.7.1 Decision-Making Aids

Individual procedures are typically written as if one person could ideally and simultaneously visualize concurrent events and actions occurring at various locations involving various people. The proper sequence and relative timing of information gathering, decision making, commands, and responses of all participants are then portrayed as a series of entries on printed pages. Emergency procedure documents intended for training, memorization, and developing experience may seem wordy and bulky when seen in terms of the action and decision-making time frame required of a vehicle driver, transit system, emergency response organization dispatcher, or other personnel during a true emergency. It cannot be assumed that the type, location, and severity of an actual emergency will be quickly identified and properly classified. Nor can it be assumed that the emergency will elicit the proper initial commands or the proper initial response to the commands. Simplified summary checklists ("decision-making aids") can be used as memory aids in an actual emergency. A checklist should exist for each critical position or task. Each checklist should be specially prepared to address the expected actions of that

TABLE 3-1 EXAMPLES OF EMERGENCY PLAN AND PROCEDURE SUPPORTING DOCUMENTATION

1. Transit System Emergency Plan and Procedures
   - Policy and Agreements
   - Procedures
2. Inter-Organizational Emergency Procedures
3. Decision-Making Aids for Dispatchers (Transit and Emergency Response Organizations)
   - Check list reminders for notification (including "911" orother special telephone numbers and codes) and other key actions
   - Definition ofjurisdictional boundaries (EMS, local and state police, sheriff/highway patrol, fire department, hospital, etc.)
   - City, town, county, and state highway maps
4. Decision-Making Aids for Transit System Personnel
   - Check list of procedures for notification (including "911" or other special telephone numbers and codes) and other key actions
   - Wallet-size index of telephone numbers of EMS, local and state police/sheriff/highway patrol, fire department, hospitals, etc.
   - City, town, county, and state highway maps
   - Vehicle Graphics including the transit system name, vehicle number, location of emergency exits, and simple instructions for engine shut off, etc.
5. Decision-Making Aids for Emergency Response Personnel
   - Wallet-size index of telephone numbers of transit system, EMS, local and state police, sheriff/highway patrol, fire department, hospitals, etc.
   - City, town, county, and state highway maps
   - Vehicle Graphics including the transit system name, vehicle number, the location of emergency exits, and simple instructions for engine shut-off, etc.
6. Other Supporting Documentation
7. Training Materials
8. Civil Defense or Local "Disaster Plans"
9. Accident Investigation Reports

position. These decision-making aids are useful to determine which particular set of emergency procedures to follow, and also to provide specific information regarding notification of emergency response organizations (use of dedicated, direct telephone line, "911" or other special code, special radio frequency, etc.), location of emergency equipment and exits, the most direct and alternative response routes, etc. Decision-making aids also offer a means of shortening the response time of the transit and emergency response organization dispatchers and other personnel. Each transit system (including sub-contractors) should have its own system-specific collection of such aids, tailored to the individual needs of the personnel who will use them during emergencies.

3.7.1.1 Decision-Making Aids for Dispatchers (Transit and Emergency Response Organization) - Once the type and location of the emergency is determined, the dispatcher determines the appropriate type of emergency response required (i.e., tow truck, fire department, EMS, etc.), selects the best alternative, and initiates commands accordingly. The following decision-making aids will help facilitate this process.

- Checklists/Reminders of Key Personnel Actions - The simplest example of a decision-making aid is a reminder checklist for notification procedures and other key actions summarized from the full set of emergency procedures documents. Such memory and decision-making aids will shorten the response time of dispatchers.

- Definition of Jurisdictional Boundaries - Schematics, maps, tables, or other system-specific operations documentation should be developed to aid the decision-making process associated with calling the proper fire department, police department, emergency medical response unit, etc., for a given emergency type and location on roadways. The details of Jurisdictional boundaries for responding organizations should be worked out well ahead of time as part of the coordination element of emergency preparedness and documented in the "Inter-Organizational Agreements" document. This information should be summarized in the pertinent decision-making aid to reduce the response time of transit and emergency response organization dispatchers.

- City, Town, County, and State Highway Maps - These maps should be available to pinpoint the location of the vehicle, identify the Jurisdictional boundaries of emergency response organizations, and determine the most direct as well as alternative routes to reach the emergency scene.

3.7.1.2 Decision-Making Aids for other Personnel - Decision-making aids for vehicle drivers and emergency response personnel should be portable, handy, and consistent with the corresponding aids used by the dispatchers. Table 3-1 includes

examples of decision-making aids which should be provided, as appropriate, to vehicle drivers and emergency response personnel.

3.7.2 Other Documentation

Vehicle equipment, personnel, and procedures regularly utilized during normal transit operations are also frequently utilized during an emergency. It is essential that these materials containing emergency preparedness-related information are used in transit and emergency response personnel training and passenger education programs. Moreover, it is essential that these documents are consistent with the emergency plan and are kept up to date.

3.7.2.1 Rule Books, Standard Operating Procedures, Guidelines, and Vehicle Handbooks - Most rule books, standard operating procedures {SOPs), guidelines, and vehicle handbooks contain sections describing the steps to follow during normal operations. These documents should contain procedures, notification lists, etc., consistent with those included in the master emergency plan.

3.7.2.2 Safety Rules and Emergency Procedures - Safety rules and emergency procedures are often included in the same document with rules, SOPs and guidelines. Safety rules are generally preventive in nature, whereas emergency procedures are reactive and correspond to specifically categorized unforeseen events such as fire, collision, etc. Mastery of safety rules and emergency procedures by operating personnel should be considered just as important as mastery of the standard rules and standard operating procedures.

3.7.2.3 Descriptions of Vehicles and Emergency Equipment - Information such as diagrams of vehicle components and emergency equipment (References 19 - 23 contain examples) will help employees to understand and recall particular sets of rules or procedures in an emergency. Additional useful descriptions of equipment, such as maintenance manuals, are typically found in maintenance shops.

- Handbooks describing existing vehicles and which contain instructions for the normal and emergency operation of vehicle equipment should be distributed to all drivers and appropriate emergency response personnel.
- The transit system should include the provision in the vehicle specification that the manufacturer clearly provide such vehicle/equipment information in an easy to reference, uniform format.

- In particular, descriptions detailing the location and operation of communication equipment, emergency exits, and engine and battery shut-off switches should be proviaed to the vehicle driver and appropriate emergency response organization personnel.

- As new vehicles, equipment, or components are added to the transit system fleet, descriptions of them should also be made available to the vehicle driver and emergencyappropriate response organization personnel.

- Descriptions of vehicles and emergency equipment should be evaluated for their applicability as references in the overall emergency preparedness process.

- An evaluation should be conducted which should include use of the descriptions as training aids, as a common reference to aid oral communication between persons at different locations, and as study aids to assist in visualization and decision making.

- The availability and intelligibility of these materials to large numbers of personnel, in relation to the need and timing requirements of emergency preparedness, should be periodically evaluated.

3.7.2.4 Vehicle Graphics - Signs and/or symbols can provide critical information to the vehicle driver and emergency response personnel to indicate the location of emergency exits and other equipment and provide instructions for their use (see Section 5.7). It is essential that all vehicle emergency preparedness graphics information be evaluated periodically for number, placement, readability, message content, intelligibility, and consistency with all other transit system standard operations documentation.

3.7.2.5 Passenger Awareness Information - Depending on the characteristics of the local operation, posters, passenger brochures, schedule inserts, etc., summarizing emergency procedures and equipment could enable them to respond properly (see also section 4.9.1).

3.7.3 Training Materials

Training materials such as brochures, lesson plans, classroom presentations, emergency scenarios, films, videotapes, and mock-ups should also be used in preparing for emergencies (see Section 4).

3.7.4 Civil Defense Disaster/Emergency Plans

Municipal and county agency disaster/emergency plans can be a critical source of information and assistance for transit systems, particularly those providing rural service.

3.7.5 Accident Investigation Information

Recommendations contained in Accident investigation reports from the transit system itself, other transit systems, state agencies, the RTAP hotline, and the National Transportation Safety Board (NTSB) should be utilized in the development and revision of emergency plans and procedures.

4. TRAINING

The transit vehicle driver, other transit (including subcontractor, as appropriate) emergency response organization personnel, and passengers constitute the most vital element of emergency response capability. (For the purposes of this section, subcontractor personnel as well as volunteer drivers are considered to be transit system personnel.) Their knowledge and skill in carrying out procedures and using emergency equipment are essential to the success of emergency response actions.

Given the circumstances of the emergency, training will have a major impact on the ability of transit and emergency response organization personnel to do the following:

- Identify, understand, and cope with the particular needs of passengers and their conditions or injuries;
- Implement the appropriate emergency response procedures and operate emergency equipment; and
- Make use of special equipment as available to evacuate passengers.

Therefore, proper training of persons who may be called upon to respond to emergencies is essential. Only after adequate training can people be expected to carry out an emergency plan in a timely and effective manner, while making optimum use of vehicle and emergency equipment.

Effective training enables transit and emergency response organization personnel to develop appropriate skills by teaching the participants the latest evacuation procedures and techniques and by familiarizing the participants with current as well as new vehicles and equipment. This type of joint training for both transit and emergency response personnel is particularly important for transit operations in rural areas because of the distances involved and because emergency response in many areas depends on volunteer efforts. The following types of training will assist transit and emergency response personnel in developing and maintaining the knowledge and skills required to respond to emergencies:

- Initial operational and emergency response training for all employees (Phase I);
- Specialized emergency response training for certain groups of employees, depending on their specific job requirements (Phase 2); and
- Refresher and/or retraining courses for both Phase 1 and Phase 2.

Transit personnel are usually familiar with their own operations, vehicles, and equipment, and emergency response organization personnel are familiar with theirs. Each group, however, knows less about the other group. Therefore, training improvements should focus on familiarizing the personnel of each group with the operations, equipment, and supporting documentation of the other group.

The guidelines presented in this section address the following issues:

- Transit system personnel (and, as appropriate, subcontractor personnel, state and local government agency personnel, and in the case of rural and specialized transit service, volunteer drivers) knowledge of the transit system emergency plan, vehicles, and emergency equipment;
- Emergency response organization (Fire, Police, etc.) personnel knowledge of their own and transit system emergency plans, vehicles and equipment; and
- Passenger awareness of transit system emergency preparedness procedures and emergency equipment.

Operational documentation relating to emergency preparedness is less expensive, easier to improve, and more likely to change than existing equipment. Therefore, training sessions to implement documentation changes should occur more frequently to keep personnel abreast of such changes. On the other hand, improvements in equipment associated with emergency preparedness tend to be more expensive and less frequent than operational changes. Thus, after the initial round of employee training, further review training in the use of equipment need only occur periodically.

A continuous cycle of specialized training should be provided, followed by periodic refresher training.

Passenger awareness with regard to emergency preparedness procedures deserves special consideration. Passenger behavioral response, as anticipated by the designers of emergency procedures, is crucial. A system orientation is usually provided by specialized transit systems to new passengers; this could include an overview of emergency procedures and equipment. However, due to the large numbers of passengers carried in urban areas, training of the general public cannot be accomplished in a classroom environment. Other methods of informing and guiding passengers, such as posters inside buses, system brochures, schedule inserts, orientation at senior centers, items in newsletters, etc., should be provided.

4.1 TRANSIT SYSTEM PERSONNEL TRAINING

The actions of most transit personnel (particularly the vehicle driver and the dispatcher) are primarily associated with standard operations. Similarly, the largest percentage of initial training is usually devoted to standard operating procedures. However, this training usually includes preventive safety rules and emergency procedures. Although the majority of vehicle drivers (transit system and subcontractor employees, or volunteers) may never be called upon to use many of these rules and procedures, they should nonetheless be familiar with them.

Transit systems should conduct an initial phase of formal training for their vehicle drivers and other personnel, as appropriate. This training should include an overview of the transit system and should familiarize employees with the rules, SOPs, and guidelines (sometimes combined into one document called a "system or driver handbook"), service routes, vehicle layout, and the basic location, use, and application of communication and emergency equipment as they relate to emergency preparedness.

The following elements should be included:

- Operating Rules
  - All employees should be provided with rule books (sometimes referred to as handbooks). Rule books should be of a type - e.g., looseleaf - which allows for addition or deletion of pages to reflect revisions.
  - Special rule notices, rule updates, and modifications should be disseminated in a variety of ways: provided by supervisors, posted on bulletin boards, and/or presented in training sessions.
  - Records should be maintained to document that their personnel have received, read, and understood new, revised information.
- Standard Operating Procedures (SOPs)
  - SOPs should establish guidelines for handling of all normal, abnormal, and emergency transit operations.
  - Minimum training in emergency procedures should include discussions on what an emergency is and what occurrences could create an emergency situation endangering the safety of passengers and/or employees.

- Layout and Operation of Vehicle Equipment
  - Vehicle equipment layout and operation orientation should be provided. A vehicle manual/handbook, preferably prepared by the manufacturer, which describes the location and proper operation of equipment for each vehicle should be furnished to any driver who is assigned to drive that vehicle (see References 19 through 23 for examples).
  - Training should emphasize the location and operation of normal and emergency exits, communication equipment, and other safety features of the vehicles.
- Communications
  - Training should familiarize personnel with the location and proper use of communication equipment.
  - Training programs should stress the communication of priority information as a means of minimizing transmission time ana facilitating action.
  - Personnel should be provided with specific training in how to communicate with emergency response organization personnel.
  - Personnel should be provided with specific training in how to communicate with passengers who have different disabilities.
- Emergency Equipment
  - Personnel should be trained in the location and use of specialized emergency equipment associated with their assigned duties.
  - Operating and maintenance personnel, supervisors, and inspectors, as appropriate, should be trained to report lost, stolen, or vandalized equipment.

Appendix B contains a list of suggested emergency equipment (see also additional discussion of equipment contained in Section 5.9).

Depending on their specific job responsibilities, transit employees may be given additional training which will assist them in responding to a variety of potential emergencies. Reference 24 contains a formal instructor training course available for transit personnel to enable them to teach the proper emergency and accident handling procedures to their own employees. Training sessions should be designed to teach employees the use of procedures and equipment they will be expected to carry out during an actual emergency (see also Section 4.5). Emergency procedures documents should be used as the basis for the training sessions.

Vehicle drivers, dispatchers, and other supervisory and maintenance personnel, as appropriate, should, as a minimum, be taught the characteristics of and appropriate response to the following emergencies, depending on their specific job responsibilities:

- Passenger Fall or Illness;
- Vehicle Breakdown;
- Driver Incapacitation;
- Vehicle Collision;
- Vehicle Fire;
- Vehicle Collision with Fire;
- Vehicle Rollover;
- Vehicle Immersion in Water; and
- Severe Weather Conditions/Natural Disasters.

Particularly, in the cases of rural service because of distances involved, and specialized transit service due to the characteristics of many passengers, it may be advisable to provide training to the vehicle driver or other appropriate transit system personnel so that they could accomplish the following tasks In a life-threatening situation:

- Assess the conditions, limitations, and injuries of all passengers, including the specific needs of elderly and disabled persons, to determine how these factors will affect the evacuation effort;
- Provide first-aid to stabilize injuries;
- Prepare passengers for evacuation;
- Evacuate them from the vehicle; and
- Transport them to the nearest hospital, if necessary.

The transit dispatcher is often the person who initiates the response to an emergency. Though isolated from the emergency scene, well-trained dispatchers have the capability of reducing the effects of an emergency. To be effective, a dispatcher should:

- Be familiar with the transit service routes, types of vehicles operated, and characteristics of passengers served;
- Be knowledgeable about typical emergencies which could occur; and
- Be knowledgeable about the correct telephone numbers of EMS, ambulance services, police and fire departments, and local hospitals.

4.2 EMERGENCY RESPONSE ORGANIZATION PERSONNEL TRAINING

To ensure a coordinated response to emergencies, the upper management staff of EMS and ambulance services, police and fire departments, hospitals, and other organizations which could provide emergency assistance, should be provided with copies of the transit system emergency policy, plan, and emergency procedures for their review and input, prior to adoption of the documents, as well as any other pertinent information associated with transit emergency situations.

Transit systems should include and encourage the participation of firefighters, local police, ambulance personnel/paramedics, and other emergency response personnel (including dispatchers) who will respond in accordance with the "Inter-Organizational Agreement," (if one been prepared) in training programs and drills/exercises. As mentioned previously, joint training is particularly important in rural areas where volunteers often respond to fires and other emergencies.

The general training programs for emergency response personnel should include the following areas:

- Overview of the transit system including orientation and familiarization with routes, vehicles, equipment, passenger characteristics, and normal and emergency operating procedures;
- Orientation tours of transit vehicles for emergency response personnel to point out features described in formal presentations and to highlight the specific physical configuration of each type of vehicle;
- Cross training to provide an understanding of the duties of transit system personnel;
- Emergency drills/exercises involving all participating organizations to provide practice and reinforce the emergency response and evaluation procedures;

- Utilization of the various communication capabilities, including:
  - Telephone conference calls
  - Radio links between the EMS/police/fire department alarm center(s) and personnel at the scene of the emergency
  - Direct phone line between the transit dispatcher and the EMS/police/fire department alarm center(s)
- Periodic training for emergency response personnel to cover shift assignment changes, area rotations, etc.

4.3 SPECIALIZED EMERGENCY TRAINING

Additional training in the following areas could be valuable for both transit and emergency response organization personnel: emergency evacuation, firefighting, emergency passenger care, crowd control and panic prevention, and removal of engine and electrical power from vehicles. It is emphasized again that the value of this training would be enhanced by the joint participation of both transit and emergency response personnel.

4.3.1 Evacuation Procedures

Training should be provided to transit and emergency response organization personnel which covers specific procedures for removing passengers from specific vehicles. The procedures should include the following:

- Methods for communicating with passengers who have visual, hearing, speech, and mental impairments (see Appendix C);
- Proper methods for lifting, carrying, and moving passengers who use wheelchairs, braces, prostneses, and other personal assistive devices (see References 10, 11, and 12); and
- Instructions for dealing with guide or helper dogs that may adopt a very protective attitude especially if the passenger is unconscious.

4.3.2 Use of Evacuation Equipment

Various types of evacuation equipment are available for use by transit employees and emergency response organization personnel. (See Appendix B for a description of different types of equipment.) It is important that appropriate personnel are

trained in the proper use of evacuation equipment which can be used to remove these types of passengers from the particular transit vehicle. This training should include the following:

- Familiarity with the types of equipment provided (e.g., lifts and/or stretchers, tarps, fabric sheets) which can be used to lift, carry, and move passengers from the vehicle;
- Familiarity with the types of equipment provided by the emergency response units which can be used to lift, carry, and move passengers from the vehicle;
- Knowledge of the location and proper use of each piece of equipment; and
- Hands-on practice in the proper use of each piece of equipment.

4.3.3 Firefighting

As a general rule, after reporting a fire, the vehicle driver and other personnel on the scene should evacuate passengers and help fire department personnel gain access to the fire. Most transit systems recognize that it is primarily the job of the fire department to actually fight the fire.

However, to instill a sense of self-confidence and personal safety in those transit personnel expected to perform such assistance duties, the transit system should provide them with training in basic firefighting techniques. Such training will enable them to make better decisions during fire emergency situations, to fight small fires prior to the arrival of the fire department when prudent, and to devise improved methods of fire prevention while performing their regular duties. Such training may be developed and conducted in cooperation with local fire department personnel. The firefighting training programs should address the following areas:

- Familiarity with use, application, and location of appropriate extinguishing equipment; and
- Procedures for reporting used and missing fire extinguishers so that fire extinguishers can be promptly refilled or replaced if missing.

4.3.4 Passenger Emergency Care Training

Appropriate transit system personnel who have been trained to provide emergency care in a life-threatening situation can stabilize a passenger's condition until the emergency response personnel arrive (see also Section 4.1). Training programs may include the following procedures:

- First aid treatment of hemorrhages, bruises, and abrasions;
- Recognition and immobilization of passengers with head and back injuries;
- Cardio-pulmonary resuscitation (CPR); and
- Treatment of respiratory blockages and convulsions.

4.3.5 Crowd Control and Panic Prevention

When possible, training programs in crowd control and panic prevention techniques should be developed for use by transit and emergency response personnel.

4.3.6 Removal of Vehicle Engine and Electrical Power

Training should be provided to the vehicle driver and fire department and other response personnel in how to remove power from the vehicle if necessary. The vehicle handbooks mentioned previously would be a valuable reference; actual practice in operating the switches or other means to remove power would also be useful.

4.4 REFRESHER/RETRAINING PROGRAMS

The objectives of refresher/retraining programs are:

- To inform transit and emergency response personnel of changes in procedures and equipment;
- To ensure that transit and emergency response personnel skills remain at a level which enables them to execute their responsibilities in an effective manner;
- To reinforce a segment of the program for an individual who has not performed properly; and
- To recertify transit and emergency response personnel in job positions.

Employee skills, equipment and procedural changes, and drills/exercises should be reviewed on a regular basis to determine the need for refresher training. Employees should be made to understand the importance of training repetition.

4.5 TRAINING METHODS AND EQUIPMENT

Transit systems should have formal methods for training vehicle drivers, transit and emergency response organization dispatchers, and other transit and emergency response organization personnel. These formal methods should include -- but not be limited to -- classroom instruction, on-site familiarization, and emergency drills/ exercises. Reference 24 is an example of a training package available to transit systems for on-site training.

Regular training and review should be used to identify inconsistencies in operating rules, SOPs, and personnel duties. Elimination of such inconsistencies will help prevent potential confusion during an actual emergency.

4.5.1 Classroom Instruction

The key elements of classroom instruction are the presentation of the contents of written material (e.g., rule books, SOPs, guidelines, emergency procedures, etc., sometimes combined into one document and/or called a "system or driver handbook"), discussion of the material, and examinations to test participant comprehension. Classroom instruction can be substantially enhanced through audio-visual training programs and the use of equipment mock-ups.

4.5.1.1 Rule Books, SOPs, Guidelines, and Emergency Procedures -Training materials should be thoroughly discussed, and examinations should be administered to appropriate personnel. Training materials should stress the importance of teamwork and inter-organizational coordination. The types of specific evacuation procedures to be followed by the vehicle driver and responding units should also be described.

4.5.1.2 Vehicle Manual/Handbook - A manual/handbook, preferably prepared by the manufacturer (see examples in References 18 through 22), describing the proper operation of vehicle emergency equipment (e.g., manual operation of doors and lifts, operation of emergency window exits and roof hatch, and engine and battery shut down switches) is an extremely valuable tool for training and reference purposes

4.5.1.3 Audio-Visual Training Programs - Films, videotapes, and/or slide presentations should be utilized to illustrate the emergency response and evacuation procedures to be used by vehicle drivers, other transit personnel, passengers, dispatchers, terminal/garage supervisors, and emergency response organization personnel. These tools should also be used for ongoing refresher training courses. Many training materials have been adapted for use on a mini-computer for individualized instruction. (Appendix G lists a number of audio-visual training programs).

4.5.1.4 Mock-ups - When available, small scale mock-ups of particular types of equipment, such as operating cabs, radios, and engine and battery shut-off switches should be utilized.

4.5.2 Vehicle and Equipment Familiarization

Transit systems should familiarize employees with vehicles and equipment in a variety of ways, including classroom instruction (see previous subsection), on-the-job training, and demonstrations and/or practice sessions. The vehicle manual/handbook mentioned previously should be reviewed for each type of vehicle operated by the system and should be used as a reference to enhance familiarization.

4.5.2.1 On-the-Job Training - Following classroom instruction, transit systems should offer supervised on-the-job training that provides the trainee with hands-on experience and an operational understanding of rules, procedures, and vehicles, particularly as they relate to emergency response.

4.5.2.2 Demonstrations/Practice Sessions - Actual hands-on practice sessions should follow videotape or film presentations of equipment and procedures to raise the skill level and decrease response time during actual emergencies.

4.5.3 Emergency Simulations

One of the most effective training techniques is the simulation of an emergency. Simulations may vary from a drill for transit system personnel only, or even for a particular employee (e.g., a vehicle driver), to a full-scale emergency exercise involving transit system and emergency response organization personnel. Emergency simulations are particularly important as training tools because the joint

involvement of emergency response organizations such as police and fire departments provide valuable practice to personnel (particularly volunteers) who do not otherwise have access to specialized training.

4.6 EMERGENCY DRILLS/EXERCISES

Realistic drills/exercises can be particularly helpful for ensuring that emergency plans, procedures, and equipment address the particular needs of various types of passengers. The drill/exercise enables transit and emergency response organization personnel to use training guidelines, to practice techniques, and to test their effectiveness. Whenever possible, joint involvement of emergency organization personnel such as EMS, police and fire departments, and hospitals should be encouraged. Drills/exercises may be held during revenue service or non-revenue service periods (if they exist) or prior to the start-up phase of operations. Participants will vary depending on the scope and objectives of the drill/exercise. To be most effective, drills/exercises should:

- Reinforce classroom training in emergency response and passenger evacuation for transit personnel, as well as for the emergency response units that would respond in the event of an emergency.
- Include programs which teach personnel to identify the emergency and distinguish its unique demands, and to follow through with the appropriate responses.
- Be planned so as to minimize hazards which could create an actual emergency or cause injuries.
- Provide a mechanism for simultaneous testing and reinforcement of emergency operating procedures for specific types of emergencies, passenger evacuation procedures, etc.
- Test the transit system's and emergency response organization's communication capabilities and the operability and effectiveness of other emergency equipment.
- Test training and retraining procedures, response capability, and any changes in these areas.

Drills/exercises can serve as a means for evaluation of the overall emergency response capabilities of the system through careful selection of the time and location of the simulation; participation by personnel from the transit system and

emergency response organizations, and volunteer passengers (including young, elderly and disabled persons); observer identification of areas for improvement; and the performance of a critique/debriefing.

4.6.1 Frequency

Emergency drills/exercises should be conducted at least once every year. This frequency will help ensure that all new transit and emergency response personnel are familiar with the characteristics of transit system vehicles, passengers, and emergency equipment. Annual drills/exercises will also provide refresher training to appropriate personnel at sufficient intervals, and will permit testing of new techniques, procedures, and equipment.

4.6.2 Drills During Revenue Service

Transit systems should drill their vehicle drivers, supervisors, and dispatchers on emergency operating procedures by posing a hypothetical emergency for employees to resolve during regular hours of service, without actually interrupting revenue service or dispatching emergency response personnel to the scene. Drills may be general notice, employee notice, or no notice, depending on how many transit employees, emergency response personnel, and passengers are informed beforehand.

4.6.3 Full-Scale Exercises

A full-scale exercise is the total application of the transit and emergency response organization resources to a simulated transit emergency. Such an exercise can reveal the degree of familiarity of both transit and emergency response organization personnel with the transit system operations, the physical layout of the vehicle and emergency exits, and emergency equipment. Thus, the opportunity exists to identify and correct shortcomings in the emergency response procedures. An outline which details the overall process which can used in planning a full scale exercise is contained in Appendix D.

4.6.4 Drill/Exercise Participants

Although many drills/exercises primarily involve transit personnel, the participation of various emergency response organization personnel and volunteer

passengers would add realism and provide coordinated training. As stated previously, this type of joint training for both transit and emergency response personnel is particularly important for transit operations in rural areas because of the distances involved and because emergency response in many areas depends on volunteer efforts. The following list summarizes potential transit and emergency response organization participants:

- Transit System Participants (To include subcontractor or agency employees

  and others as appropriate for each individual system):

  - Board members
  - Upper management staff (e.g., Manager, Director)
  - Vehicle drivers (including volunteer drivers)
  - Dispatchers
  - Line supervisory personnel
  - Maintenance mechanics;

- Emergency Response Organization Participants:

  - Municipal/county emergency response/civil defense planning agency staff
  - Upper management staff (e.g., Manager, Director, Chief, Assistant Chief, etc.)
  - Dispatchers (fire department, EMS, etc.)
  - Fire Department/EMS personnel (e.g., firefighters and mid-staff personnel such as Lieutenants, Captains, Battalion Chief, etc.)
  - Volunteer fire department members
  - Ambulance service and hospital personnel
  - Police (Local, County, State, Sheriff, Highway Patrol)
  - Utility personnel (i.e., electric, water, gas, and telephone)
  - Other relevant personnel; and

- Volunteer Passengers:

  - General public
  - Young, elderly, and disabled persons
  - High school and college drama students/clubs

4.6.5 Evacuation Equipment Evaluation

Drills/exercises are the best non-emergency means of determining the type of equipment which will be needed. They also give personnel the opportunity to use evacuation equipment provided that such use is not too expensive for non-emergency use. Even simulated use (which might involve locating the equipment, transporting it, and rehearsing its use) would provide good practice for transit and emergency response personnel.

4.6.6 Monitors

A formal evaluation process should be used to maximize the value of the drill/exercise during its conduct. To increase the effectiveness of the evaluation, individuals from the transit system and emergency response organizations, and outside observers, should be designated as "monitors" to provide different perspectives on how well the emergency plan and procedures were carried out. Prior to the conduct of the exercise, monitors should be given copies of the emergency plan for both the transit system and emergency response organizations to review. A preliminary meeting should be held to familiarize the monitors with the exercise and to assign functional areas of concern for evaluation (i.e., communications, evacuation time, etc.). The evaluators should receive critique sheets which should be collected and used in the critique/debriefing (see examples in Appendix E). Another means to monitor the drill/exercise is the use of a video camera to record the sequence of events, actions of personnel, use of equipment, etc. Videotaping the drill/exercise provides observers and reviewers with an overview of the entire operation.

The selected monitor locations should allow monitors to view the following events:

- The initial phase of communications between the vehicle driver and dispatcher, and between the dispatcher and emergency response organizations;
- The implementation of evacuation procedures by the vehicle driver and responding units;
- Use of passenger evacuation equipment;
- The actual passenger evacuation process;
- Emergency medical technicians administering first aid to victims in the triage area;

- Emergency command post operations; and
- Firefighters' response efforts.

4.6.7 Critique/Debriefing

The purpose of a critique/debriefing is to review the reports of the monitors, to present comments or observations from sources other than the observers, and to assess the need for any remedial action either to correct deficiencies or to generally improve the effectiveness of the emergency operations and procedures.

Those persons responsible for conducting the critique/debriefing should be trained to ask questions that will test procedures, assess training, and evaluate equipment. They should debrief all participants after a drill/exercise (including young, elderly and disabled persons) who can offer valuable insights and thus help transit systems and emergency response organizations revise their emergency response procedures, if necessary. The following examples are a few of the many questions (see also Sections 3.5.10 and 3.6) which can and should be asked:

- How long did it take for the first emergency response unit to arrive at the emergency scene?
- Did the transit and emergency response personnel use appropriate methods to lift, carry, or move passengers?
- Were instructions audible and clear?
- Did passengers get the appropriate help needed to evacuate the vehicle?
- How long did it take to completely evacuate the vehicle and/or extinguish a vehicle fire?

4.6.8 Emergency Simulation Facilities

Each transit system should have the ability to simulate emergency situations, either in designated areas of the transit system property or other available areas, such as state driver training facilities.

4.7 YOUNG, ELDERLY, AND DISABLED PASSENGERS

Because of their impaired mobility or other limitations, young, elderly, or disabled persons may require greater care and supervision at the site of an emergency. They may also require more psychological support. For example, wheelchair users have a strong psychological attachment to their chairs and are reluctant to leave them behind. In addition, wheelchairs are expensive and can be very costly to replace.

Thus, evacuation of these passengers from transit vehicles may be complicated for the following reasons:

- Passengers may have conditions (physical, medical, or other) which could be aggravated or which could affect the type of treatment and manner of administration;
- Passengers may become trapped or impaled by the aids that generally improve their mobility (e.g., wheelchairs, walkers, crutches, prosthesis);
- Passengers may not be able to physically contribute to extrication maneuvers;
- Passengers may have to be immobilized before they can be removed from the vehicle;
- Passengers may not be able to communicate or understand instructions; and
- Passengers may not be rational.

Transit and other emergency response organizations should therefore be familiar with the following:

- Characteristics of young, elderly and disabled individuals, i.e., mobility, communications, and medical/physical/other impairments (see Section 2.4 and References 10, and 11);
- Characteristics of prosthetic, orthopedic, and sensory aids; and
- Methods of communicating with passengers who have visual, hearing, speech, or other impairments (see Appendix C and Reference 10).

When wheelchairs are at an emergency scene, they are generally regarded as obstacles. The decision to evacuate passengers with or without a wheelchair is generally best handled case-by-case by appropriate transit and emergency response personnel, depending on the type of wheelchair and environmental conditions. Although the quick evacuation of a wheelchair user during an emergency requires

that the person be carried bodily from the vehicle, wheelchairs can actually be excellent evacuation devices under certain conditions. By pulling a wheelchair back onto its two large wheels, one person can lift even a heavy person over objects such as curbs.

Drills/exercises can be useful in providing hands-on experience with wheelchairs and their users. (Reference 12 is only one example of a training program which provides guidance for conducting drills/exercises involving elderly and disabled passengers. A number of other resources are listed in the bibliography contained in Appendix G.)

4.8 EMERGENCY CRITIQUE/DEBRIEFING

Answers to the questions noted in the drill/exercise discussion (Section 4.6.7) should also be used to evaluate the transit and emergency response personnel reaction to an actual emergency. Weaknesses in emergency procedures and equipment, and areas fortraining improvement should be identified. All persons involved (including young, elderly, and disabled persons) should be debriefed.

In addition, group and/or individual psychological counseling should be available to personnel after the emergency has been resolved. This would help persons to cope with emotional trauma resulting from their involvement in the emergency.

4.9 PUBLIC EDUCATION

Transit systems should employ the following methods to improve the public's ability to respond to emergencies:

- Public involvement in simulation drills/exercises;
- Safety and emergency procedures for passengers, publicized on posters inside rural and specialized transit vehicles; and
- Safety brochures for public dissemination.

4.9.1 Passenger Awareness

Passenger education should be conducted to make passengers aware of emergency procedures and to enable them to respond properly in the event of an emergency.

Passenger awareness should be accomplished primarily by the distribution of pamphlets, posting of information in transit vehicles, and reviews of procedures by the vehicle driver. The information from these various sources must be consistent in content and sufficient for first-time users of the system (especially from posters), but not so overwhelming as to arouse undue concern.

This training should include the following information:

- How to recognize and immediately report emergency situations to the transit vehicle driver;
- How to recognize vehicle hazards;
- How to recognize and operate appropriate emergency-related features and equipment, such as:
  - Vehicle fire extinguishers
  - Vehicle side doors
  - Vehicle rear doors (if provided)
  - Emergency exits such as doors, windows, and roof hatch (s)
  - Devices for assisting evacuation of young, elderly, and disabled passengers; and
- How to recognize and anticipate the potential special needs of fellow passengers (children, elderly, disabled, etc.) during emergencies.

4.9.2 School Safety Programs

Transit systems should conduct regular safety programs in the schools of the communities serviced by the transit system. Such programs should be designed to educate children and teenagers about safety hazards, as well as teach them how to correctly board and leave the vehicle, cross streets, etc.

4.10 INFORMATION SHARING

Transit systems and emergency response organizations should consider sending some of their employees to training programs and drills/exercises held by other transit systems. This approach is limited because of the site-specific nature of local operations, equipment, and local inter-organizational agreements. However,

sharing ideas and perspectives regarding emergency response capabilities would be in the interest of all participating parties and could provide valuable insights on how to improve procedures and equipment.

A national clearinghouse for rural transit information is the RTAP Hotline, which can contacted at 800-527-8279 (toll-free); 725 15th St., NW, Suite 900, Washington, DC 20005.

5. VEHICLES

The purpose of the guidelines presented in this section is to identify those vehicle features which can minimize the consequences of a transit emergency. In order to reduce hazards to passengers and damage to vehicles in an emergency, it is essential that persons who are called upon to respond have the proper knowledge and tools to gain access into the vehicle and to assist passenger evacuation. Accordingly, these guidelines identify those generic vehicle features which could minimize the effects of an emergency on passengers, shorten emergency response time, and improve the effectiveness of passenger evacuation. These performance-oriented guidelines reflect the best practices of the transit industry and are intended to be used primarily when procuring new vehicles or when rehabilitating existing vehicles.

A wide disparity exists between states relative to the policy and regulations concerning vehicle procurement. Vehicles used to provide transit service may be purchased by individual transit systems; groups of transit systems; or state, regional, and local government authorities or agencies. Because of the procurement process and the site-specific operations of transit operators, it is not possible to provide emergency preparedness recommendations that will apply to every aspect of vehicles used for all types of transit service.

For most procurements, the individual transit system specifies structural requirements, crashworthiness, reliability, and maintainability of subsystems, i.e., brakes, doors, heat, ventilation, air conditioning, and other electrical and mechanical components. Depending on knowledge of safety issues and techniques to address them, transit systems and state and local government authorities or agencies may request changes to the standard model offered by a manufacturer. It is critically important that the transit system or other authorizing agency consider emergency preparedness, particularly passenger evacuation, early in the acquisition process to ensure that the as-built vehicles will be constructed so as to meet these concerns. The following discussion reviews the existing types of regulations and guidelines which pertain to transit vehicle features relating to emergency preparedness.

Federal regulations contain requirements for new model buses purchased with UMTA funding. 49 CFR, Part 665 (Reference 25) includes testing requirements for bus structural strength and distortion to verify the operability of all passenger doors,

passenger escape mechanisms, windows, and service doors. 49 CFR, Part 609 (Reference 3) requires that standard full-size buses be equipped with features to permit use by elderly and handicapped (disabled) persons. These accessibility features include handrails, lighting, etc. which could aid passengers in evacuating a vehicle if an emergency occurs. In addition, UMTA has published guideline specifications for wheelchair lifts, ramps, and securement devices (References 26 through 29) which contain items relating to emergency preparedness for elderly and disabled passengers.

Section 504 of the Americans with Disabilities Act of 1990 (ADA) requires that the Architectural and Transportation Barriers Compliance Board (ATBCB) supplement its existing minimum guidelines and requirements for accessible design (MGRAD) to ensure accessibility of public and private transit systems to individuals with disabilities (Reference 30). In addition, the Secretary of Transportation is responsible, under Section 229 (b) of ADA, for issuing standards for "ADA-affected" vehicles. These standards are to be consistent with the minimum guidelines and requirements issued by the ATBCB in accordance with Section 504 of ADA (Reference 9). When completed (anticipated in mid-1991), these standards, guidelines, and requirements will contain items relating to emergency preparedness for elderly and disabled passengers.

The document "Baseline Advanced Design Transit Coach Specifications" (Reference 7) contains minimum guidelines for the procurement of 35- and 40-foot buses and has been used by many transit systems. Other references (31, 32, 33, and 34) provide generic guidance for vehicle procurement pertaining to other types of transit vehicles. All of these documents contain useful information on vehicle features relating to emergency preparedness.

Motor vehicles, including buses, must meet the appropriate Federal Motor Vehicle Safety Standards (FMVSS), established by the National Highway Traffic Safety Administration (NHTSA), as contained in 49 CFR, Part 571. However, some FMVSS requirements relating to emergency preparedness are not applicable for some types of vehicles which carry 10 persons or less, such ascertain types of vans, multipurpose passenger vehicles, and station wagons (used to provide transit service in many areas), unless specified in the vehicle procurement.

Finally, the Federal Highway Administration (FHWA), Bureau of Motor Carrier Safety, describes motor vehicle emergency preparedness requirements in the Federal Motor Carrier Safety Regulations, 49 CFR, Part 393 (Reference 35). However, the regulations do not apply to vehicles wholly engaged in intracity operations.

Appendix F contains a summary listing of federal regulations for vehicle features relating to emergency preparedness.

It should be noted that the intent of the guidelines presented in this section is to provide generic recommendations for transit vehicle features which relate to emergency preparedness. These guidelines are not intended to supersede or conflict with existing federal regulations for motor vehicles. All new vehicles shall comply with the legal requirements of federal, state, and local authorities in effect at the date of vehicle procurement. Transit systems are in no way precluded from requiring and enforcing more stringent requirements relating to emergency preparedness.

5.1 STRUCTURAL INTEGRITY/CRASHWORTHINESS

In an emergency, sufficient vehicle structural integrity and resistance to extreme deformation are necessary to prevent the driver and passengers from being trapped inside the vehicle and to protect them from further injury during evacuation (See Section 2.3.)

It is essential that vehicles used for transit service be constructed in a way that protects the driver in a collision or rollover. If uninjured, the driver can provide directions and assistance for passenger evacuation. Moreover, an intact structure should be maintained from which passengers can evacuate. FMVSS 201, 202, 203, 204, 205, 206, 212, and 219 (see Appendix F) contain regulations applicable according to type of vehicle and Gross Vehicle Weight Rate (GVWR). In addition, many small transit systems have referenced FMVSS 220 and 221 (which apply to school buses) in their vehicle specifications and require that manufacturers meet those requirements for rollover and body joint strength. (FMVSS 222 contains requirements for school bus crashworthiness.) The Baseline Advanced Design Transit Coach Specifications contain guidelines which also address these concerns.

Transit systems should consider the following recommendations:

- For transit vehicles less than 35 feet long:

  Alternative 1 - The requirements of FMVSS 220 and FMVSS 221 should be used to ensure that the framework and body (including modified van raised roofs) are attached together in a way that maintains the integrity of the vehicle and that prevents shearing off of fasteners.

  Alternative 2 - Depending on gross motor vehicle weight and type of side doors, the requirements of FMVSS 214 (Side door strength for passenger car intrusion resistance in a side impact) and FVMSS 222 could be adapted for use for van and multipurpose vehicle specifications. However, this would not feasible for vehicles equipped with bi-fold doors.

- Seats and wheelchair securements/passenger restraints should be attached to major components of the frame or to reinforced anchorages located in the floor or wall panels.

- Placement of wheelchair lifts and ramps or the way they are attached to the vehicle should not significantly diminish vehicle structural integrity in a collision or rollover.

- Minimum criteria for strength, stress, and impact resistance for body wall construction and bumpers of transit vehicles should be established.

- Heavier fasteners (designed to resist vibration) and braces, and stronger supports should be used when adding a heavier battery, special bumper, lift, or other heavy equipment to a vehicle.

5.2 SEATING AND INTERIOR ARRANGEMENT

In an emergency, the seating and interior arrangement could cause further injury and reduce the ability of the vehicle driver and passengers to evacuate the vehicle, impede response personnel access, or hinder attempts at extricating passengers.

Urban buses typically have either longitudinal or transverse seating. The longitudinal arrangement, with seats facing inward towards the center, provides a wider aisle space and thus higher passenger capacity (more room for standing passengers). Transverse seating, with seats facing forward and a narrower aisle, permits a smaller passenger capacity (fewer standees). UMTA requires that both seating arrangements have designated floor areas equipped with at least one wheelchair securement (tie-down) device (Reference 3). The passenger compartment in transit vehicles used for typical rural and specialized service has one or more bench seats facing the front of the vehicle. Normally, the aisle space is very narrow between seats, and it is difficult to stand erect (unless the vehicle is a modified van or bus). There are often designated floor areas equipped with

wheelchair securement devices. When trying to leave the vehicle in an emergency, passengers may have to move through the interior of the vehicle to reach an exit. The seating arrangement may determine how quickly passengers can move to the exits. The narrow space between seats is likely to pose considerable difficulty to those passengers who use personal assistive devices (see Section 5.3 for discussion of related access/egress issues). Seats which break away from the floor or walls could cause direct injury and block doors; FMVSS 207 (Seating systems) and the Baseline Advanced Design Transit Coach Specifications contain requirements and guidelines which address these concerns.

Many passengers are able to enter transit vehicles using ramps or lifts without leaving their wheelchairs. Other passengers are able to transfer from wheelchairs and use vehicle seating; the wheelchair may or may not be carried on board the vehicle. Placement of wheelchairs and methods of securing wheelchairs and passengers differ widely within transit vehicles; in an emergency, these variations can interfere with the evacuation of passengers. The wheelchair should be considered in the same category as an interior passenger seat, which must meet FMVSS 207 requirements for seats. Accordingly, to protect wheelchair users and other passengers, the wheelchair (even if not occupied) must be fastened securely to the interior of the vehicle. References 36-41 contain additional information relating to transit wheelchair securement issues. In addition to the hazards of unwanted wheelchair movement, other unattached personal assistive devices (crutches or canes, etc.) could pose tripping or impact hazards to passengers unless securely stored within the vehicle.

A number of passengers, particularly those who are young, elderly, or disabled (including wheelchair users), are unable to sit securely (due to lack of upper body control or other reason), in either passenger seats or wheelchairs, without some type of restraint while the transit vehicle is moving. If not restrained, these passengers may be particularly vulnerable to injury in an emergency, again complicating extrication.

If the vehicle driver remains seated, is not injured, and is able to maintain control of the vehicle in the emergency, he/she will more likely be able to provide directions to passengers and assist them to evacuate the vehicle. This is the basic rationale behind the FMVSS 208 requirement for driver position seat belts. OSHA (Reference 42) has

also proposed a rule that would mandate employers to require that their employees wear the seat belts in vehicles equipped to meet FMVSS regulations; this would apply to transit vehicle drivers.

Injuries resulting from failure of a securement device or the wheelchair wheel could complicate extrication efforts by the driver or response personnel in an emergency (see also Sections 2.3.4 and 2.3.7). Impact testing (References 43 and 44) has demonstrated that some wheelchair wheels do not remain intact and some common types of securement devices are ineffective during sudden vehicle acceleration braking, or maneuvering, or even in low-level collision impact situations. References 40 and 45 describe research efforts aimed at developing standards to address these issues.

While evacuating a vehicle, passengers may have difficulty maintaining their position and balance, or be unable to break a fall if grab rails are not provided or if they are located at locations too high to reach. Padded and covered handgrips on seats enhance comfort and provide protection from sudden impact but cannot always be gripped firmly by young, elderly, or disabled persons and may thus also contribute to falls during passenger evacuation. Finally, contact with sharp or rough edges of vehicle interior components such as lifts, lift controls, ramps, etc. could also cause injuries to passengers during evacuation.

Transit systems should consider the following recommendations:

- Seating should be arranged to minimize the potential for injury in a collision or rollover and to maximize the evacuation capability (i.e., wide aisle with no exits blocked by seats or wheelchairs).
- If feasible, areas for securing wheelchairs in a forward position should be located near, but not blocking, one of the principal vehicle exits.
- Bus seating areas for elderly and disabled passengers should be provided which allow direct, short-distance, unhindered access to at least one of the principal exits.
- Seats and wheelchair securement/passenger restraint systems should not protrude above the floor surface to minimize tripping hazards.
- Three-point passenger restraint (lap and shoulder) belts should be provided for all passengers who are unable to sit securely in either the passenger seats or wheelchairs while the vehicle is moving, or who do not possess sufficient control of their bodies to brace themselves in a sudden stop. All passenger restraint systems should retract and lock to fit snugly and prevent undesired belt extension. (FMVSS 208, 209, and 210 contain further information and requirements applicable to passenger restraint systems.)

- A four-point securement system for wheelchairs should be installed to prevent shifting and limit movement during normal vehicle operation, and during sudden acceleration, braking, or manuevering. (See also following point.)

- Wheelchair securement devices and attachment points should be subjected to dynamic load tests to demonstrate that they can withstand the forces which could be encountered during transit operations. These tests should be conducted as appropriate to the vehicle size, weight, and mode of service. (See References 29 and 36 for information relating to dynamic testing.)

- Passenger restraint systems which restrain occupants independently from the wheelchair securement systems should be provided.

- When not in use, passenger restraint devices, wheelchairs (and foot rests), other personal assistive devices, and wheelchair securement devices should be stored in a manner so they do not protrude or present other hazards to passengers.

- Wheelchair battery packs should be a sealed or jell-type and should be secured on the wheelchair so that they will not break loose in a collision or rollover.

- Emergency response organization personnel should gain familiarity with various types of wheelchair securement and passenger restraint devices used by a particular transit system and should receive training on how to extricate passengers from these devices and wheelchairs (see Section 4.2).

- Handgrips and stanchions of a diameter which can be easily gripped (Reference 46) and reached by passengers (particularly the young, elderly, or disabled) should be provided throughout the vehicle.

- Stanchions and other interior fittings should not block or impede access to vehicle exits (e.g., doors, windows, roof hatch).

- If unpadded handgrips and stanchions are provided, textured surfaces should be used to permit a more secure grip.

- Design of the vehicle interior should limit the presence of sharp corners and edges.

- All exposed edges or other hazardous protrusions of wheelchair lifts should be protected with energy-absorbing padding.

5.3 ACCESS AND EGRESS

Emergency access to and egress from a transit vehicle may be achieved through side doors, rear doors and roof hatches (if provided), and windows. Some doors and windows cannot be opened by passengers, and not all vehicles have doors on both sides and/or rear doors.

An insufficient number of exits and passenger inability to locate or operate exits can hinder passenger evacuation. Since engine fires can occur in the vicinity of the main entryway or a rollover could block it, more than one exit should be available for use in an emergency. Reduced visibility due to smoke or lack of lighting could prevent passengers from locating exits. Lack of exit operating instructions, confusion or anxiety, could prevent passengers from opening normal or emergency exits. Furthermore, if a power loss occurs for the door controls on buses, it may be impossible for the driver to open the vehicle side doors by using the normal control.

FMVSS 217 (Bus window retention and release) contains requirements for the number and size of bus emergency exits based on a loaded GVWR of more or less than 10,000 IDS; it also contains requirements for bus emergency exit releases, extension, and identification. According to NHSTA, all transit vehicles which carry 10 or more persons are considered to be buses. The Baseline Advanced Design Transit Coach Specifications describe guidelines for door interlocks and master switches for the manual operation of passenger doors from inside and outside large buses in an emergency. (See Section 5.7 for further discussion of emergency exit and other emergency equipment identification.)

Young, elderly, or disabled persons may be unable to evacuate the vehicle through the windows or may risk injury if they try. Vehicle floor height could hinder wheelchair users or persons with impaired mobility or other physical or medical conditions from evacuating the vehicle quickly and safely. UMTA requires a stationary floor height of not more than 22 inches, an effective floor height including a kneeling feature of not more than 18 inches, and a front-door ramp or front-door lift for boarding and exiting (Reference 3). Many new, smaller transit vehicles have lower floor heights. However, if a lift or ramp is not available or cannot be used, unassisted movement from the vehicle to the roadway may be extremely difficult, if not impossible, for wheelchair users or other persons.

Even if the wheelchair lift is not working, it should be possible to evacuate wheelchair passengers by carrying them out bodily or by using flexible stretchers, blankets, etc.

Transit systems should consider the following recommendations:

- For transit vehicles other than buses, at least one alternate means of vehicle entry/exit should be provided in addition to the main door used by passengers. (Buses are already regulated by FMVSS 217.)

- Where feasible, FMVSS 217 requirements, which regulate bus exits, should also be considered for the provision of other transit vehicle emergency exits (type, size, number, etc.). Emergency exit identification is discussed in Section 5.7.

- Where feasible, the capability should be provided to manually open emergency exit doors and windows from the outside of all transit vehicles.

- The provision of an outside control for operation of the roof hatch and instructions for its use should be provided on the outside of the vehicle.

- Operable windows and roof hatches, if provided, should be completely removable or designed to stay open in an emergency without outside support. (An alternative method to keep windows open would be the use of a separate device, appropriate to the type of vehicle, which transit and emergency response personnel could carry to the emergency scene.)

- FMVSS 217 regulates access to bus doors and windows designated as emergency exits. Other transit vehicle emergency exits should not be blocked by any seat or other obstruction.

- Bus seating areas for elderly and disabled passengers should be provided which allow direct, short-distance, unhindered access to at least one of the principal exits.

- An interlock between the wheelchair lift or ramp and the vehicle transmission which prevents the vehicle from being moved when the lift is in operation should be provided.

- Wheelchair lifts should be capable of manual operation in the event of loss of electric or hydraulic power.

- Wheelchair lifts, ramps, and evacuation equipment should be secured so that they do not protrude or pose a hazard.

- Transit systems should evaluate special evacuation equipment and should use it as appropriate to enable the swift removal of passengers (see Appendix B).

- Flooring should consist of a non-skid surface with no protrusions which could impede evacuation.

5.4 FIRE SAFETY

Early detection and containment can prevent or minimize vehicle fires and can allow increased time for evacuation. Overheat sensors or other detection devices can warn the vehicle driver to take appropriate action such as shutdown equipment or use a fire extinguisher to extinguish the fire before it grows out of control. The use of fire walls and interior materials which resist flame spread and emit limited

amounts of smoke can provide additional time for evacuation from a vehicle fire. Motor vehicles purchased by transit systems are currently required to comply with FMVSS 302 (Flammability of interior materials). UMTA has addressed the specific fire safety of transit vehicle interior materials by proposed guidelines for flammability and smoke emission performance requirements (Reference 47).

The requirements of FMVSS 301 (Fuel system integrity) address the concern of reducing a fire resulting from fuel spillage which could shorten the time available to evacuate the vehicle.

Transit systems should consider the following recommendations:

- Where feasible, an engine compartment overheat detection/fire suppression system should be provided. This system should be equipped with a time delay (to take into account false indications) and a manual override.
- Each vehicle should be equipped with a 10 lb. fire extinguisher with an ABC fire rating. For larger vehicles, a 20 lb. ABC rated or a 17 lb. Halon type fire extinguisher should be provided.
- UMTA Recommended Fire Safety Practices for Selecting Transit Bus and Van Materials should be consulted when preparing the vehicle procurement package.
- Inadvertent ignition in the event of a collision should be addressed by eliminating potential ignition sources (e.g., master engine shut-down and battery disconnect switches).

5.5 COMMUNICATIONS

Inability to communicate during an emergency can escalate a situation and delay the response by the vehicle driver, or other transit or emergency response personnel. The driver and emergency response personnel must be able to communicate with different types of passengers. For example, the inability of a passenger to understand an instruction because of visual, hearing, or other impairment could make it difficult to move that person to safety. Moreover, the driver must also be able to maintain contact with the transit system dispatcher at all times.

Transit systems should consider the following recommendations:

- Paper and markers should be provided inside the vehicle to allow the vehicle driver to communicate with hearing-impaired passengers.

- All vehicles should be equipped with radios which are provided with a backup power supply (i.e., portable battery pack).
- The vehicle should have a secured area for storage of change and/or a system calling card for telephone use.

5.6 VISIBILITY

Visibility problems could increase passenger risk during an emergency. Tinted windows are provided on many vehicles to reduce heat transfer during warm months and protect passenger privacy (specialized service). However, it may be very difficult for emergency response personnel to see inside the vehicle, thereby hindering passenger extrication and evacuation. Moreover, normal vehicle lighting may fail or be inadequate. Finally, if an emergency occurs at night or during severe weather conditions, other vehicles may be unable to see the transit vehicle despite vehicle headlight and taillight flashers which meet FMVSS 108 (Lamps, reflecting devices and associated equipment).

To improve visibility under emergency conditions, transit systems should consider the following recommendations:

- Vehicle window tinting should be evaluated in terms of ability of emergency response personnel to see inside the vehicle to determine the number and condition of passengers as opposed to the benefits of reducing heat levels.
- Where feasible, emergency lighting should be provided at all vehicle emergency exit locations.
- Appropriate exterior areas of the vehicle should be marked with luminous or light-reflective paint.
- A flashlight (with batteries carried separately and spares), as well as flares and/or reflective triangles which meet FMVSS 125 (Warning devices), should be stored securely inside the vehicle.

5.7 GRAPHICS

Graphics (signs) are the informational symbols (e.g., words and pictures) indicating the location and operations of vehicle emergency equipment such as emergency exits (FMVSS 217 requirements apply for bus emergency exit identification), fire extinguishers, radios, etc.

The information conveyed by graphics in transit vehicles can be confusing. Emergency exits on vehicles other than buses may not be clearly marked, and directions on how to operate those exits may not always be visible or understandable. Moreover, there may not be any signs identifying exits or instructing their use. In the absence of such signs, passengers may unintentionally operate exits or emergency equipment incorrectly or in a dangerous manner. While inadequate or nonexistent identification of emergency exits and exiting instructions could impede or delay the evacuation of any passenger, the impact could be even greater on the visually impaired. Moreover, if energy is expended on an erroneous action, passengers may severely tax or even deplete their energy and strength for taking corrective action. Finally, emergency response personnel may not be able to locate and operate emergency exits unless they are marked on the outside of the vehicle.

Simple, clearly visible, and consistent graphics can reduce hazards to passengers during evacuation and can provide important information to response personnel.

Transit systems should consider the following recommendations:

- The transit system name, vehicle number, and telephone number should be prominently displayed on the inside and outside of all vehicles. (An emergency number should be marked in a prominent position inside the vehicle.)
- FMVSS 217 requires that the location of and instructions for operating emergency exits be marked on the inside of transit buses. The FMVSS 217 requirements should be used (or adapted as necessary) to mark the inside location and instructions for operating all other transit vehicle emergency exits.
- The location of and operating instructions for all transit vehicle emergency exits should be clearly and prominently marked on the outside of the vehicle.
- The location of vehicle emergency equipment (i.e., fire extinguisher, first aid kit, radio, etc.) should be clearly marked.
- Instructions for the emergency operation of fire extinguishers and vehicle radios should be written in language that the lay person can readily understand, using letters that are large enough for people with some sight impairment to read. Clear, recognizable illustrations will aid comprehension.
- Where feasible, posted emergency instructions should be provided in the language of the local community, in addition to English. International symbols should also be used (Reference 48).

- The use of luminous or light-reflective paint should be considered for use on all signs, arrows, or other graphics which indicate the location of emergency exits.

- All vehicle emergency preparedness graphics information should be evaluated periodically in terms of number, placement, readability, message content, intelligibility, and consistency with all other transit system standard operations documentation.

5.8 EQUIPMENT ISOLATION

During some types of emergencies (e.g., a collision or driver incapacitation), it is important that certain vehicle equipment be shut down to minimize danger from a fire, or other hazard to passengers or emergency response personnel. The Baseline Advanced Design Transit Coach Specifications contain guidelines which provide for engine and battery isolation capability from inside larger buses.

Transit systems should consider the following recommendations:

- Tilt switches should be provided which shut off potential ignition sources in the event of a vehicle rollover.

- An engine shut-down switch should be provided which is accessible within the interior and from the exterior of transit vehicles other than large buses.

- A master battery disconnect switch for complete disconnection of all transit vehicle electrical power should be provided. This switch should be accessible within the interior and, if feasible, from the exterior of other transit vehicles in addition to standard-size buses.

5.9 ON-BOARD EMERGENCY EQUIPMENT

Transit vehicles should be equipped with appropriate emergency equipment for use by the vehicle driver, other transit personnel, and emergency response personnel. Specific equipment carried on board the transit vehicle will vary according to the system characteristics, vehicle used, type of passengers served, local weather, and the distance and location of routes served by the local transit system. This equipment should be securely stored in a location which prevents injury from impact or damage due to sudden acceleration, stop, or maneuver. Appendix B contains a list of suggested equipment. In some cases, access to emergency equipment which cannot be stored inside the vehicle should be provided to appropriate transit and emergency response personnel.

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APPENDIX A. INTER-ORGANIZATIONAL AGREEMENTS

The content of inter-organizational agreements relating to emergency planning and procedures should encompass the following elements for each of these suggested organizations:

A. Emergency Medical Service (EMS)

- Establish appropriate EMS unit jurisdictions.
- Establish level of service (equipment, personnel, etc.) to be delivered in response to various types and degrees of transit emergencies.
- Establish appropriate methods of communication for continuous coordination during a response.
- Familiarize EMS personnel with the vehicles operated by transit system.
- Conduct periodic drills involving participation by EMS personnel.

B. Local, County, and State Police/Sheriff/Highway Patrol Departments

- Establish a full understanding of jurisdictional responsibilities between the transit system and the local department(s).
- Establish level of service (equipment, personnel, etc.) to be delivered in response to various types of transit emergencies (as opposed to assistance delivered in response to security or crime related incidents such as "assist officer" calls).
- Establish appropriate methods of communication for continuous coordination during a response.
- Establish procedures corresponding to the types of emergency service anticipated (e.g., crowd control, authorized access control, security threat unique to emergency situations, etc.)

C. Fire Departments

- Establish appropriate fire department jurisdiction.
- Establish level of service (equipment, personnel, etc.) to be delivered in response to various types and degrees of transit emergencies.
- Specify level of notification, control, and degree of responsibility on-site.
- Determine appropriate methods of communication and develop procedures for continuous coordination and transfer of command.
- Provide training for fire department personnel to familiarize them with transit vehicles, access/egress, equipment, procedures, passenger behavior, etc.

- Specify use of tools, handling of transit equipment, use of transit personnel, power removal and restoration, use of support personnel, etc., to assist fire fighting and rescue operations.

- Conduct periodic drills involving fire department participation.

- Identify any special tools and equipment which the fire department might need that they would not normally possess for emergency work in the transit system.

D. Hospitals

- Establish the level of emergency services generally available at various hospital locations in the vicinity of the transit system routes.

- Establish the manner in which patients will be assigned or routed to various hospitals (e.g., by the fire/rescue communications center, fire department, emergency medical services, etc.)

E. Public Utilities

- Transit systems should coordinate an agreement with local public utilities regarding points of contact in an emergency, and services to be provided by each.

F. Local/State/Federal Government

- System-specific agreements with one or more of the following government agencies might be appropriate: Department of Public Utilities, Civil Defense, Highway Department, National Guard, and Mayor's Emergency Action Center. In the event of emergency incidents that may require investigation, coordination with the appropriate representatives of these agencies (e.g., NTSB) for reporting serious problems, or for requesting support when needed, should be established.

APPENDIX B. EMERGENCY EQUIPMENT

It is recommended that all transit vehicles should be equipped with the following minimum equipment stored in a secure manner, yet with easy access to the vehicle driver:

- Two-way radio
- Fire extinguisher of appropriate size (at least 10 lb. with an ABC fire rating; 20 lb. ABC rated or a 17 lb. Halon type for larger vehicles.
- First aid kit
- Reflective triangles (meeting FMVSS 125) and/or flares
- Chock blocks

The following list of additional equipment (particularly recommended for rural and specialized system) could be useful in dealing with many emergencies. Again, the equipment should be stored in a secure manner, yet with easy access to the vehicle driver:

- Flashlight (with 2 sets of batteries, neither stored within the flashlight)
- Heavy duty jumper cables (at least 4 gauge)
- Tire chains
- Webbing cutter or knife (to cut belt webbing or clothing)
- Blankets
- Baking soda (to neutralize wheelchair battery leakage)
- Rubber gloves
- Pry bars/axes
- Small shovel
- Bag of sand
- Fully inflated, full size spare tire and rim, jack

APPENDIX C. BASIC COMMUNICATION PROCEDURES FOR VISUALLY. HEARING, SPEECH, AND MENTALLY IMPAIRED PERSONS*

A. RULES FOR ASSISTING VISUALLY IMPAIRED PASSENGERS

1. Never take hold of a person using a white cane without first telling him/her who you are and what you plan to do.

2. Never take hold of or move a person's white cane until you have told him/her exactly what you are doing and why.

3. When leading, stand on the side opposite the white cane.

4. Always stay one-half pace ahead of the person you are leading. *Remember, if you forget to tell him/her the direction of movement, the one-half pace will allow him/her to follow the movement of your body.* If the person being led is staying beside you, s)he may well fall if you forget to tell him /her the direction of movement.

5. Remember to first tell your passenger the direction of movement (up, down, over) and then the distance of movement (for example, step down sixinches).

6. Remember, drop your lead arm back when you and the person are walking through narrow areas. (Be sure to tell the person what you are doing).

7. Be alert to changes in the regularity of the environment (different heights of steps, changes from hard to soft surfaces, etc.).

8. Call out maneuvers to be made, (going up steps,etc.).

9. Remember the three orientation points for your passenger to enter or exit a vehicle: the door, door sill, and vehicle seat.

10. Take time to describe new areas to the vision impaired person.

11. Take time to describe new areas to your vision impaired passengers.

B. RULES FOR ASSISTING HEARING IMPAIRED PASSENGERS

Individuals who are deaf communicate in primarily two ways: (1) lip reading with an oral response; and (2) the use of hand signs and finger spelling.

In communicating with a lip reader:

1. Be sure to face him/her directly so your lips may be seen easily.

2. Do not exaggerate your speech or lip movement. To do so changes the way you form your words.

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* Adapted from Appendices B-F, Passenger Assistance Techniques: A Training Manual for Vehicle Operators of Systems Transporting the Elderly and Handicapped. by W.H. Henderson, R. L. Dabney, and D. D. Thomas, 1982. By permission of Transportation Management Associates.

3. Speak with moderate speed.

4. *Do not hesitate to repeat yourself.* Remember, a good lip reader will understand fifty to sixty percent of what is said. An excellent lip reader will understand seventy to eighty percent of what is said. Repeating helps him/her **fill** in the blanks.

5. Remember that some peoples tips cannot be read easily. This does not necessarily have anything to do with the way they sound. If you should find that your lips are not easily read (after you have spoken to several lip readers), simply have someone else repeat your message to the lip reader.

In communicating with persons using hand signs and finger spelling, remember:

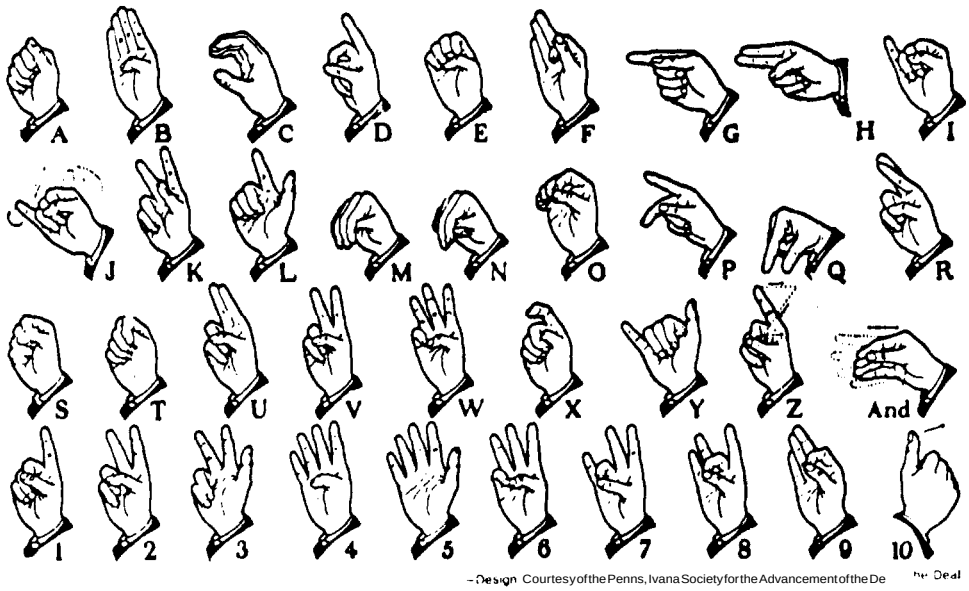
1. To become skillful in the use of hand signs and finger spelling takes quite a bit of practice. However, the manual alphabet and simple signs can be learned quickly.

2. To keep a pad and pencil available for written messages.

3. Learning to read and write is quite difficult for the deaf, so keep your messages simple.

4. For individuals who have been deaf since birth, learning to speak is quite difficult. Their speech will tend to be quite flat and nasal.

5. A person who is not deaf but whom has lost the ability to speak, such as one who has had a laryngectomy (removal of the vocal chords), may use hand signs.



THE MANUAL ALPHABET

Figure Courtesy of the Goodrich Center for the Deaf, Fort Worth, Texas.

C. RULES FOR ASSISTING SPEECH IMPAIRED PASSENGERS

1. Do not acknowledge that you understood what a person has said, if in fact, you have not.

2. Repeat what you "thought" the person said. This gives him/her a chance to confirm or deny your interpretation of what she said.

3. Ask the person to repeat the part you are having trouble understanding. Remember, a person with communication difficulties is quite used to being misunderstood and will appreciate the fact that you are making an effort to fully understand.

4. Put the person at ease when you ask him/her to repeat something. If a person becomes tense, almost any type of speech impediment will become worse.

D. GUIDELINES FOR ASSISTING MENTALLY IMPAIRED PASSENGERS

Individuals who have lost some part of their mental functions may have:

1. Lessened ability to give or understand directions.

2. A lack of orientation (not aware of where they are or what time it is).

3. Agitation, excitability or lack of emotional control.

4. A hardertime learning and remembering rules and routines of the transportation system.

In assisting mentally impaired passengers you should:

1. Repeat-It is often useful.

2. Have patience - It is always necessary.

3. Be firm - Persons may want to do things that are unsafe.

When trying to understand the problems of mentally impaired passengers remember:

1. Everyone - has at times been confused or disoriented by a new situation.

2. Everyone - has at time had a hard time following directions for a new task.

3. Everyone - has at times had trouble finding their way around a new environment.

4. Everyone - has at times become agitated, irritated or excited when a familiar routine has been suddenly changed.

Note: A person with mental difficulties will tend to respond to situations on more of an emotional level than an intellectual level. Emotions come into play more quickly than do intellectual responses. Therefore, a person with mental difficulties will tend to be quite sensitive to a person's mannerisms, the way in which they say things as well as what they say, and even facial expressions and body movements.

APPENDIX D. EMERGENCY PREPAREDNESS EXERCISE PLANNING

1. Select and Obtain Location for Exercise
   - Classroom briefing
   - Field Exercise
2. Procure Vehicle (s)
3. Prepare Plan and Schedule for Exercise
   - Evacuation
   - Fire (or other scenario)
4. Notify and Assemble Involved Organizations
   - Assign Duties
     - Transit System Personnel (including subcontractors and volunteer drivers, as appropriate)
     - Fire Services
     - Police
     - Emergency Medical Services
     - EPA and others
   - Review Plan and Schedule
   - Revise Plan and Schedule as Necessary
5. Assemble Handouts (critique sheets, etc.)
6. Send Out Invitations
7. Move Vehicles to Exercise Site
   - Empty Fuel from tank
   - Fill Fuel tank with water
8. Conduct Participant Briefing for Exercise
   - Review Exercise Goals
     - Knowledge
     - Skills
   - Assign Roles, Distribute Critique Sheets
   - Make-up

9. Conduct Field Exercise
   - Fire (or other scenario)
   - Evacuation

10. Hazard Control Techniques
   - Engine Shutdown
   - Battery Power Shut down
   - Vehicle Stabilization

11. Vehicle Access Techniques
   - Doors
   - Windows (Driver, Front, Side/Passenger)
   - Roof Hatches
   - Cutting Through Body, Floor, Roof Members

12. Opening Doors/Windows from Inside Vehicle Techniques

13. Evacuation Techniques
   - Able Bodied
   - Elderly and Disabled
     - Visually impaired
     - Physically impaired
     - Mentally impaired
   - Injured

14. Triage Area Set up
   - First Aid
   - Immediate treatment for more services
   - Removal to hospital

15. Fire Suppression

16. Cleanup

- Vehicle Removal
- Site Restoration

17. Critique/Debriefing

18. Prepare Report as Required

19. Send Thank You letters

20. Management Review

APPENDIX E. SAMPLE DRILL CRITIQUE SHEETS

I. COMMAND AND CONTROL EVALUATION

EVALUATOR'S NAME
ADDRESS
PHONE

1. Time exercise initiated:

2. Method of notification to Fire Depts., Police, Ambulence Service, EMS, Hospitals:

3. Upon arrival at scene, how was the Command Post established?

4. Was there adequate radio communication equipment?

5. When responding units arrived on the scene, did they report to the Command Post?

7. Principal weaknesses observed?

8. Principal strengths observed?

9. Additional remarks:

10. Recommendations:

II. FIREFIGHTING EVALUATION

EVALUATOR'S NAME
ADDRESS
PHONE

1. How was the initial information received?

2. How were the firefighting personnel notified by the transit Central Dispatcher as to location or scene?

3. Was the response to the scene made in a safe but timely manner?

4. How many personnel were dispatched to the scene?

5. At what time did fire department equipment arrive?

6. Was there direction given to those firefighting personnel on the scene by the officer in charge?

7. Was a Command Post established ?

8. Did the Fire Chief retain command of the scene?

9. Was there adequate communications equipment available at the scene?

10. How many firefighters entered the vehicle to begin extrication?

11. Were victims being extricated in a safe manner?

12. Were any firefighters relieved to take breaks during the exercise?

13. Additional remarks:

14. Recommendations:

III. OVERALL MEDICAL EVALUATION

EVALUATOR'S NAME
ADDRESS
PHONE

As the Overall Medical Evaluator, it is anticipated that you will feel free to roam at will and evaluate any and all medical aspects of this exercise. The questions listed below are merely indicators of areas that should receive attention during the exercise.

1. Time exercise initiated:

2. After extinguishing the simulated fire, did the Fire ambulance service, EMS personnel attend to the victims in a timely and professional manner?

3. Was the triage area established at a safe distance from the vehicle?

4. Was the triage area clearly identified?

5. What was the approximate distance victims had to be carried to the triage area?

6. Was there adequate room within the triage area to attend to the victims?

7. Approximate time first ambulance arrived:

8. Upon arrival of the ambulance services, who directed the ambulance services to the staging area?

9. Approximate time first victim was brought to the triage area:

10. When victims were transported to the triage area, were they placed in the appropriate areas? (Areas are categories I, II, and III):

11. Were triage tags used appropriately?

    If not, describe the problem(s):

12. Were there adequate litter bearers?

13. Was the dispatch of ambulance services done in a timely manner?
    If not, explain:

14. Were medical supplies adequate to meet the needs?

15. What supplies, if any, were in short supply?

16. How were DOAs handled?

17. What weaknesses were observed?

18. What principal strengths were observed?

19. Additional remarks:

20. Recommendations:

IV. SECURITY AT THE SCENE

EVALUATOR'S NAME
ADDRESS
PHONE

1. Time exercise initiated:

2. Did responding Police agencies arrive in a timely manner?

3. Were adequate Police personnel on the scene?

4. Upon arrival on the scene, did Police personnel set up in strategic locations?

5. Did Police personnel have adequate communications?

6. Could you determine the numbe r of police agencies on the scene?

7. How many vehicles actually were set up within the Command Post area?

8. Was the individual or individuals in charge at the Command Post easily identified?

9. Should there have been messengers posted at the Command Post?

10. Were adequate directions given to those extricating victims from and around the aircraft?

11. Major points of weakness:

12. Principal strengths:

13. Additional remarks:

14. Recommendations:

APPENDIX F. SUMMARY OF FEDERAL REGULATIONS RELATING TO EMERGENCY PREPAREDNESS FOR VEHICLES USED TO PROVIDE TRANSIT SERVICE

(NOTE: 36 CFR, Part 1190, and 49 CFR, Parts 27, 37, and 609, as summarized below concern accessibility requirements for elderly and disabled persons, including handrails, lighting, etc., which could affect passengers during vehicle evacuation.)

36 CFR PARKS, FORESTS, AND PUBLIC PROPERTY

ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE BOARD (ATBCB):

Part 1190 Minimum Guidelines and Requirements for Accessible Design (MGRDS)

Advanced Proposal of Proposed Rulemaking. Federal Register, Volume 55, No. 170, August 31, 1990.

Purpose: Ensure that buildings, facilities, and vehicles covered by ADA are accessible to individuals with disabilities.

Applicable to: Publicly operated buses and publicly and privately operated public transportation services.

49 CFR DEPARTMENT OF TRANSPORTATION

OFFICE OF THE SECRETARY:

Part 27 Non-discrimination on the Basis of Handicap in Federally-Assisted Programs Final rule; request for comments. Federal Register, Vol. 55, No. 193, Thursday, October 4, 1990.

Purpose: Requirements for provision of accessible transportation (compliance with Americans with Disabilities Act).

Applicable to: Transit systems receiving UMTA financial assistance.

Part 37 Transportation Services for Individuals with Disabilities. Final rule; request for comments. Federal Register, Vol. 55, No. 193, Thursday, October 4, 1990.

Purpose: Requirements for acquisition of accessible vehicles.

Applicable to: Public and private entities that provide transportation service, whether or not they receive federal assistance.

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* NOTE: The material in this appendix is derived from the regulations contained in the Code of Federal Regulations (CFR). The exact text of the actual regulations in their entirety as they appear in the CFR (including updates in the Federal Register) should be used for compliance with their provisions.

URBAN MASS TRANSPORTATION ADMINISTRATION (UMTA):

Part 609 Transportation for Elderly and Handicapped Persons

Purpose: Requirements for effective utilization of transportation by elderly and handicapped persons (Includes accessibility, wheelchair accessibility, seating, lighting, handrail/stanchions, floor height, floor and step surfaces).

Applicable to:

- Fixed Facilities, Part 609.13.
- Buses, Part 609.15 (New standard, full size urban transit buses, current or advance design; other new transit buses exceeding **22** feet).
- Other Vehicles, Part 609.21.

Part 665 Bus Testing Program. Modification of Interim Final Rule. Federal Register. Volume 55, No. 195, Tuesday, October 9,1990.

Purpose: Requirements for new model buses (those which have not been used in transportation service before October 1,1988 or which have been used in such service but which after September 30,1988, are produced with a change of major components or significant structural modifications) funded by UMTA assistance to be tested for structural integrity (structural strength and distortion, and durability).

Applicable to: Heavy duty, large, 35-40 foot buses, including articulated buses; heavy duty, small, 30 foot buses; and medium duty, 25-35 foot buses. Bus defined as "rubber tired automotive vehicle used for the provision of mass transportation service."

- Requires that buses shall meet all applicable FMVSS standards
- 7 tests required (Appendix A of Notice).
- Tests include structural integrity and distortion; referring to operability of all passenger doors, passenger escape mechanism, windows, and service doors under certain test conditions.

NOTE: Although the following is not an UMTA regulation, it is recommended that transit systems consult the following:

Recommended Fire Safety Practices for Selecting Transit Bus and Van Materials. Notice and Request for Public Comment. Federal Register, Vol. 55, No. 127, Monday, July 2,1990.

Purpose: Minimize fire threat and reduce injuries by improving selection practices for interior materials.

Applicable to: Transit buses and vans used for urban, suburban, rural and specialized service.

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION (NHTSA):

Part 571 Federal Motor Vehicle Safety Standards (FMVSS)

Part 571.3 defines passenger car, truck, bus, school bus, multipurpose passenger vehicle, and truck (important for applicability). Definitions do not appear for walk-in van or walk-in van-type trucks (Important for applicability). This safety standard makes reference to a Gross Vehicle Weight Rate (GVWR [Important for applicability]) above or below 10,000 lbs.

108 LAMPS, REFLECTIVE DEVICES, AND ASSOCIATED LAMPS

Purpose: To reduce traffic accidents and deaths and injuries resulting from traffic accidents, by providing adequate illumination of the roadway, and by enhancing the conspicuity of motor vehicles on the public roads so that their presence is perceived and their signals understood, both in daylight and in darkness or other conditions of reduced visibility.

Applicable to: Passenger cars, multipurpose passenger vehicles, trucks, buses, trailers (except pole trailers and trailer converter dollies), and motorcycles, and to lamps, reflective devices, and associated equipment for replacement of like equipment on vehicles to which that standard applies.

125 WARNING DEVICES

Purpose: To reduce deaths and injuries due to rear end collisions between moving traffic and disabled vehicles.

Applicable to: Devices without self-contained energy sources that are designed to be carried in motor vehicles and used to warn approaching traffic of the presence of a stopped vehicle, except for devices designed to be permanently affixed to the vehicle.

201 OCCUPANT PROTECTION IN INTERIOR IMPACT

Purpose: To specify requirements to afford impact protection for occupants.

Applicable to: Passenger cars and to multipurpose passenger vehicles, trucks and buses with a GVWR of 10,000 pounds or less.

202 HEAD RESTRAINTS

Purpose: To specify requirements for head restraints to reduce the frequency and severity of neck injury in rear-end and other collisions.

Applicable to: Passenger cars, and to multipurpose passenger vehicles, trucks and buses with a GVWR of 10,000 pounds or less.

203 IMPACT PROTECTION FOR THE DRIVER FROM THE STEERING CONTROL SYSTEM

Purpose: To specify the requirements for steering control systems that will minimize chest, neck, and facial injuries to the driver as a result of impact.

Applicable to: Passenger cars and to multipurpose passenger vehicles, trucks and buses with a GVWR of 10,000 pounds or less. However, it does not apply to vehicles that conform to the frontal barrier crash requirements (S5.1) of FMVSS 208 (49 CFR 571.208) by means of other than seat belt assemblies. It also does not apply to walk-in vans.

204 STEERING CONTROL REARWARD DISPLACEMENT

Purpose: To specify the requirements limiting the rearward displacement of the steering control into the passenger compartment to reduce the likelihood of chest, neck, or head injury.

Applicable to: Passenger cars, and to multipurpose vehicles, trucks, and buses. However, it does not apply to walk-in vans.

205 GLAZING METHODS

Purpose: To reduce injuries resulting from impact to glazing surfaces, to ensure a necessary degree of transparency in motor vehicle windows for driver visibility, and to minimize the possibility of occupants being thrown through the vehicle windows in collisions.

Applicable to: Glazing materials for use in passenger cars, multipurpose passenger vehicles, trucks, buses, motorcycles, slide-in campers, and pickup covers designed to carry persons while in motion.

- Makes reference to readily removable (pushout) windows for buses having GVWR of more than 10,000 lbs.

206 DOOR LOCKS

Purpose: To specify the requirements for side door locks and side door retention components including latches, hinges, and other supporting means, to minimize the likelihood of occupants being thrown from the vehicle as a result of impact.

Applicable to: Passenger cars, multipurpose passenger vehicles, and trucks.

207 SEATING SYSTEMS

Purpose: To establish the requirements for seats, their attachment assemblies, and their installation to minimize the possibility of their failure by forces acting on them as a result of vehicle impact.

Applicable to: Passenger cars, multipurpose passenger vehicles, trucks, and buses.

- Contains exception for a passenger seat in a bus (no self-locking device or release required for hinged or folding occupant seat or occupant seat back).

208 OCCUPANT CRASH PROTECTION

Purpose: To reduce the number of deaths of vehicle occupants, and the severity of injuries, by specifying vehicle crashworthiness requirements in terms of forces and accelerations measured on anthropomorphic dummies in test crashes, and by specifying equipment requirements for active and passive restraint systems.

Applicable to: Passenger cars, multipurpose passenger vehicles, trucks, and buses. In addition, S9., *Pressure vessels and explosive devices,* applies to vessels designed to contain a pressurized fluid or gas, and to explosive devices, for use in the above types of motor vehicles as part of a system designed to provide protection to occupants in the event of a crash.

- Front/angular automatic protection system required for passenger cars manufactured on or after September 1,1989 (Other requirements for passenger cars manufactured: from January 1,1972 to August 31,1973 inclusive; on or after September 1, 1973 and before September 1,1986; on or after September 1,1986 and before September 1,1989; and on or after September 1,1989)

- Trucks and multipurpose vehicles with GVWR of 10,000 lbs. or less:

  - GVWR of 10,000 lbs. or less manufactured after January 1, 1976 and before September 1, 1991 (exception for walk-in van-type trucks)

  - GVWR of 8,500 lbs. or less and an unloaded vehicle weight of 5,500 lbs. or less manufactured on or after September 1, 1991

  - GVWR of more than 8,500 lbs. but not greater than 10,000 lbs. (or with an unloaded weight greater than 5,500 lbs. and a GVWR of 10,000 lbs. or less) manufactured on or after September 1, 1991

- Trucks and multipurpose vehicles with GVWR of more than 10,000 lbs, manufactured on or after September 1,1990 (exception for walk-in van-type trucks) (Other requirements for those manufactured on or after January 1, 1972 and before September 1,1990)

- Buses (Driver only) manufactured on or after September 1,1990 (Other requirements for buses manufactured after January 1, 1972 and before September 1,1990)

209 SEAT BELT ASSEMBLIES

Purpose: To specify the requirements for seat belt assemblies.

Applicable to: Seat belt assemblies for use in passenger cars, multipurpose passenger vehicles, trucks, and buses.

210 SEAT BELT ASSEMBLY ANCHORAGES

Purpose: To establish the requirements for seat belt assembly anchorages to insure their proper location for effective occupant restraint and to reduce the likelihood of their failure.

Applicable to: Passenger cars, multipurpose passenger vehicles, trucks, and buses.

212 WINDSHIELD MOUNTING

Purpose: To reduce crash injuries and fatalities by providing for retention of the vehicle windshield during a crash, thereby utilizing fully the penetration-resistance and injury-avoidance properties of the windshield glazing material and preventing the ejection of occupants from the vehicle.

Applicable to: Passenger cars, and to multipurpose passenger vehicles, trucks, and buses having a gross vehicle weight rating of 10,000 pounds or less. However, it does not apply to forward control vehicles, walk-in van-type vehicles, or to open-body type vehicles with fold-in or removable windshields.

- Different requirements depending on whether vehicle is equipped with passive restraint system (FMVSS 208).
- Different test conditions for passenger cars and other vehicles.

214 SIDE DOOR STRENGTH

Purpose: To specify the strength requirements for side doors of a motor vehicle to minimize the safety hazard caused by intrusion into the passenger compartment in a side impact accident.

Applicable to: Passenger cars.

216 ROOF CRUSH RESISTANCE

Purpose: To reduce deaths and injuries due to the crushing of the roof into the passenger compartment in rollover accidents.

Applicable to: Passenger cars. However, this standard does not apply to vehicles that conform to the rollover test requirements (S5.3) of FMVSS 208 (Sec. 571.208) by means that require no action by vehicle occupants. It also does not apply to convertibles, except for optional compliance with the standard as an alternative to the rollover test requirements of S.3 of FMVSS 208.

217 BUS WINDOW RETENSION AND RELEASE

Purpose: To minimize the likelihood of occupants being thrown from the bus and to provide a means of readily accessible emergency egress.

Applicable to: Buses, except buses manufactured for the purpose of transporting persons under physical restraint.

- Specific emergency exit requirements for buses with:
  - GVWR of more than 10,000 lbs.
  - GVWR of less than 10,000 lbs.
- Specific emergency exit requirements for school buses with:
  - GVWR of more than 10,000 lbs.
  - GVWR of less than 10,000 lbs.

219 WINDSHIELD ZONE INTRUSION

Purpose: To reduce crash injuries and fatalities that result from occupants contacting vehicle components displaced near or through the windshield.

Applicable to: Passenger cars and to multipurpose passenger vehicles, trucks and buses of 10,000 pounds or less gross vehicle weight rating. However, it does not apply to forward control vehicles, walk-in van-type vehicles, or to open-body-type vehicles with fold-down or removable windshields.

220 SCHOOL BUS ROLLOVER PROTECTION

Purpose: To reduce the number of deaths and the severity of injuries that result from failure of the school bus body structure to withstand forces encountered in rollover crashes.

Applicable to: School buses

221 SCHOOL BUS BODY JOINT STRENGTH

Purpose: To reduce deaths and injuries resulting from the structural collapse of school bus bodies during crashes.

Applicable to: School buses with gross vehicle weight ratings of more than 10,000 pounds.

222 SCHOOL BUS PASSENGER SEATING AND CRASH PROTECTION

Purpose: To reduce the number of deaths and the severity of injuries that result from the impact of school bus occupants against structures within the vehicle during crashes and sudden driving maneuvers.

Applicable to: School buses.

- Buses with a GVWR of more than 10,000 lbs. meet requirements in this section.
- Buses with a GVWR of less than 10,000 lbs. meet requirements in 208, 209, 210 as they apply to multipurpose vehicles and further requirements in this section.

301 FUEL SYSTEM INTEGRITY

Purpose: To reduce deaths and injuries occurring from fires that result from fuel spillage during and after motor vehicle crashes.

Applicable to: Passenger cars, and multipurpose passenger vehicles, trucks and buses that have a GVWR of 10,000 or less and use fuel with a boiling point above 32 F°f and to school buses that have a GVWR greater than 10,000 pounds and use fuel with a boiling point above 32 F°.

302 FLAMMABILITY OF INTERIOR MATERIALS

Purpose: To reduce the deaths and injuries to motor vehicle occupants caused by vehicle fires, especially those originating in the interior of the vehicle from sources such as matches or cigarettes.

Applicable to: Passenger cars, multipurpose passenger vehicles, trucks, and buses.

FEDERAL HIGHWAY ADMINISTRATION (FHWA). BUREAU OF MOTOR CARRIER SAFETY (BMCS):

Federal Motor Carrier Safety Regulations, Part 393 Parts and Accessories for Safe Operation

Purpose: To establish minimum requirements for commercial motor vehicles which transport property or passengers.

Applicable to: Motor vehicles except those wholly engaged in Intracity operations.

The proposed rule listed below would apply to transit vehicle drivers.

29 CFR DEPARTMENT OF LABOR

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

Parts 1910.1915.1917.1918.1926. AND 1928 Occupant Protection in Motor Vehicles
Notice of Proposed Rulemaking, Federal Register, Vol. 55, No. 134, Thursday, July 12, 1990.

Purpose: Protection of employee occupants of motor vehicles to ensure the safe use of all classes of motor vehicles on the job.

Applicable to: Employees operating vehicles on offical business that are equipped with safety belts or are required by Federal regulation to have occupant seat belts installed.

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