

The Role of Transit in Emergency Evacuation

NANCY HUMPHREY

The author is Senior Staff Officer, TRB Division of Studies and Special Programs, and served as Study Director for this project.

Transit can play a vital role in an emergency evacuation. After terrorists attacked on September 11, 2001, transit quickly shuttled passengers out of Lower Manhattan and rushed employees, buses, and equipment to the World Trade Center site to support emergency responders.

In 2005, transit could have played an important role in evacuating New Orleans in advance of Hurricane Katrina but failed to do so when few drivers reported to work, transit equipment proved inadequate and was left unprotected, and communications and incident control were nonexistent. Emergency plans that inadequately represent transit

or that are poorly executed risk significant loss of life, particularly among those who depend on transit for evacuation from harm's way.

Study Charge and Scope

Transportation Research Board (TRB) Special Report 294, *The Role of Transit in Emergency Evacuation*, explores the roles that transit systems can play in accommodating the evacuation, egress, and ingress of people to or from critical locations in an emergency. The study was requested by Congress, funded by the Federal Transit Administration (FTA) and the Transit Cooperative Research Program, and conducted by a committee of experts appointed by the



People in Manhattan's Battery Park await evacuation by ferries and buses after the September 11, 2001, terrorist attacks on the World Trade Center.



PHOTO: TIM JOHNSON, REUTERS

Paratransit vehicles prepare for an evacuation before a hurricane.

National Research Council of the National Academies under the auspices of TRB (see box, page 23). The study focuses on transit systems in the nation's 38 largest urbanized areas—a proxy for transit properties serving more than 1 million people.

The study defines transit broadly, including bus and rail systems, paratransit and demand-responsive transit, commuter and intercity rail, and ferries, whether publicly operated or privately contracted. Highways and their capacity also are considered, because many transit systems provide bus service only and must share the highways with private vehicles in an emergency evacuation.

The report focuses on major incidents that could necessitate a partial to full evacuation of the central business district or other large portion of an urban area. Meeting the surge requirements and coordination demands for such incidents is likely to strain the capacity of any single jurisdiction or transit agency and to exceed local resources.

Planning for Evacuation

Historical data show that severe storms are the most common major, presidentially declared disaster. U.S. regions, however, face different hazards—for example, hurricanes along the Gulf and Atlantic Coasts, flooding in the Midwest, and earthquakes in California and elsewhere. Some hazards, like tropical storms, recur with regularity and are known in advance. Others, like earthquakes and terrorist events, strike without warning.

Communities can plan for the former, but planning for the latter is difficult. Because of the general unpredictability of many hazards and the uncertainty about the precise location of an incident and the extent of its impact, emergency managers and public safety planners take an all-hazards approach to planning and scale the response to the type and magnitude of the disaster.

Local governments are primarily responsible for handling emergency incidents and for ordering an evacuation. If an incident overwhelms local capability, mutual aid agreements with neighboring jurisdictions can be invoked. In a major event or when special equipment is needed—for example, U.S. Coast Guard vessels or helicopters—state and federal assistance may be requested.

Typically, transportation and transit agencies play a supporting role in an emergency incident. Local emergency managers coordinate the response. Police, fire, and emergency medical services—the first responders to an incident—generally take the lead in an evacuation.

Transit's ability to be a successful partner in an evacuation depends on a good local emergency response and evacuation plan. These plans generally comprise four major elements: mitigation, preparedness, response, and recovery.

Transit has a role in each of these areas. The extent of transit's participation and the capability of the local area to plan for and respond to an emergency, however, depend on the type of emergency involved; the characteristics of the urban area; the geographic considerations—particularly constraints, such as limited access to a mainland location; the number of jurisdictions that must coordinate in an emergency; the willingness of citizens to heed evacuation orders; the resources; and more.

Incorporating Transit

The emergency operations plans for most urbanized areas do not describe in specific and measurable terms how to conduct a major evacuation successfully, and few plans include a role for transit. Local emergency managers therefore should increase their attention to evacuation planning as an important element in emergency planning; moreover, they should determine and incorporate a role for transit and other public transportation providers in meeting evacuation needs. Yet ensuring that transit is included in evacuation plans is the responsibility not only of emergency managers but of transportation and transit agencies.

Among the localities with evacuation plans, few have provided for a major disaster involving multiple jurisdictions or multiple states in a region and necessitating an evacuation of a large portion of the population. Leadership is lacking because the problem is not specific to any one jurisdiction, and no clear regional emergency management protocols are evident. Moreover, the feasibility of evacuating major portions of large, highly developed, congested urban areas is questionable. In many urban areas, severe congestion at peak periods lasts for several hours

each morning and evening, straining the system under normal conditions.

To help fill the planning gap, the report recommends that the Department of Homeland Security and the Federal Emergency Management Agency, in conjunction with the U.S. Department of Transportation, provide guidance to state and local governments on regional evacuation planning, including the role of transit and other public transportation providers, and that states should take the lead in ensuring the development of these plans, in coordination with appropriate regional entities.

In addition, federal funding should be provided for the development of regional evacuation plans that include transit and other public transportation providers. The grant recipients should be required to report on their progress and to meet milestones and timetables.

Transit as a Full Partner

Where local emergency evacuation plans have included transit as a full partner, the transit agencies have been involved in the development of the plans and are part of the designated emergency command structure. The committee therefore recommends that transit agencies participate with emergency management agencies and departments of transportation in developing evacuation plans and be full partners in the command structure established to handle emergency response and evacuation.

Transit agencies that are recognized as full partners in emergency evacuation plans will have to take on new responsibilities and costs—they should be eligible therefore with other first responders for cost reimbursement. Transit agencies should be considered essential personnel, along with police, fire, and emergency medical services, when they are asked to take on a major role in an emergency evacuation.

For transit to be used to its maximum potential, the emergency operations centers of transit agencies should be linked to those of emergency management agencies. Transit should have the capability for real-time, interoperable communications via voice and data, be part of the decision-making team for emergency operations, develop effective ways of communicating with transit passengers before and during an emergency, and participate in annual exercises and drills involving multiple agencies and jurisdictions.

Transit's Roles

Transit can perform multiple roles in an emergency evacuation. For example, it can transport those who do not have access to a private vehicle, either to area shelters or to other destinations. Transit is often the only means of evacuation for vulnerable, carless pop-

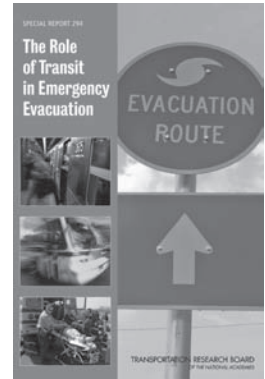
ulations, many of whom may need assistance. Transit drivers also can transport emergency personnel and equipment to an incident site. After the emergency has passed, transit providers can transport carless evacuees to their original locations or other destinations, help supply real-time information on the extent of damage, and resume normal service as quickly as possible.

Emergency managers, elected officials, and the general public should be realistic in their expectations about the role of transit in an emergency evacuation, particularly in a no-notice incident that occurs during a peak service period. Transit's participation depends on the nature of the incident and its location in a region; the size and scale of area transit service; and the extent of damage—if any—to transit equipment and facilities.

Meeting surge requirements also will depend on the availability of transit drivers and equipment, a particular challenge at off-peak times; contractual requirements for continuity of service by contracted transit providers; and mutual-aid agreements with other providers to fill service gaps. A major no-notice emergency occurring at a peak period, when transportation systems are heavily congested, would severely tax the capacity of the system, including transit.

Target Populations

Transit has a unique role in evacuating the carless and special-needs populations—such as the disabled, the elderly, and the medically homebound—in an emergency, but most local emergency evacuation plans do not address the needs of these groups



TRB Special Report 294, *The Role of Transit in Emergency Evacuation*, is available from the TRB online bookstore, www.trb.org/bookstore; to view the book online, go to <http://onlinepubs.trb.org/onlinepubs/sr/sr294.pdf>. Also available on the web is a supplemental table that provides detailed responses to an online assessment of transit's role in the emergency response and evacuation plans of 33 urbanized areas and related states—http://onlinepubs.trb.org/onlinepubs/sr/sr294_appendixC.pdf.

Committee on the Role of Public Transportation in Emergency Evacuation

Richard A. White, DMJM Harris, Arlington, Virginia, *Chair*

Evelyn Blumenberg, University of California, Los Angeles

Kenneth A. Brown, New York City Transit

John M. Contestabile, Maryland Department of Transportation, Hanover

Ali Haghani, University of Maryland, College Park

Arnold M. Howitt, John F. Kennedy School of Government, Cambridge, Massachusetts

Thomas C. Lambert, Metropolitan Transit Authority of Harris County, Houston, Texas

Betty Hearn Morrow, SocResearch Miami, Florida

Michael H. Setzer, Veolia Transportation, Cincinnati, Ohio

Ellis M. Stanley, Sr., Dewberry LLC, Los Angeles, California

Andrew Velásquez III, Illinois Emergency Management Agency, Springfield



Transit has a unique role in evacuating special-needs populations; developing methods for identifying, locating, and communicating with these individuals is an important area for research.

adequately. Part of the difficulty is the diversity of population groups involved and the different types of transit services required. For example, ambulatory but carless low-income populations can use fixed-route transit service, but the elderly, disabled, or medically homebound are likely to require para-transit service with accessible equipment and trained operators.

In addition, identifying the geographic location and transit needs of special needs populations and keeping the information up to date are major challenges. Evacuation of the carless and those with special needs therefore must be a major concern in evacuation planning, operations, and funding. A public information campaign and sheltering strategy should be developed to target these populations specifically.

Capacity Enhancements

The capacity and resilience of transit and highway systems affect the successful use of transit in an emergency evacuation, but funding programs do not address these needs directly. In the reauthorization of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, Congress should authorize FTA and the Federal Highway Administration to fund evacuation-related capacity enhancement projects that add redundancy to critical transit and highway infrastructure. In addition, funding should be increased for intelligent transportation systems technologies that can enhance net-

work resilience in an emergency. State funds also should be directed to these purposes.

Needed Research

Research is needed to support many of the committee's recommendations. Network simulation models, developed and used by several metropolitan planning organizations to model evacuation times and road capacity, should be extended to include transit buses in the traffic projections. Models should be developed for use in additional urban areas.

Research also is needed to improve understanding of the spatial dimensions of the demand and supply of transit services in an evacuation. Projects could include effective ways to identify general and special-needs populations who are likely to use transit in an emergency evacuation; the best methods for communicating with these groups before and during an event; methods for assessing the availability and for inventorying the allocation of transit equipment and drivers; best practices to ensure the availability of the transit workforce through family evacuation assistance programs; and ways to mobilize the private sector—for example, with rental cars and private bus fleets—in an emergency.

Responsibility for Planning

Enhancing transit's role in emergency evacuation depends on the actions of many. Most of the recommendations in *The Role of Transit in Emergency Evacuation* require the joint action of local emergency managers and transit agencies.

State emergency management agencies, state departments of transportation, and state departments of health, however, have critical roles to play in coordinating the development and implementation of regional evacuation plans, funding and managing operational improvements on major evacuation routes, and sheltering special-needs populations. Social service agencies and nonprofit organizations are important partners in helping special-needs groups.

Finally, federal agencies and Congress can supply guidance to state and local governments in developing regional evacuation plans that include roles for transit and other public transportation providers and in allocating the funds to help carry out the plans. In addition, evacuation-related capacity enhancement projects that will add redundancy at critical links in transit and highway systems should be a priority, along with intelligent transportation systems projects to enhance network resilience.

A concerted local, state, and federal effort can realize the full potential of transit in emergency evacuation.