Evacuation Preparedness of Public Transportation and School Buses In Rural Coastal Communities of the North Gulf Region

Technical Memorandum 1: Literature Review

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1. INTRODUCTION

In 2005, devastating hurricanes Katrina and Rita hit the Gulf Coast of the United States, leaving 1,300 people dead, 705 people missing and destroying property over 90,000 square miles valued at $80 billion (Committee on Nationwide Plan Review Phase 2 2006). During these natural disasters, people in coastal communities required mass evacuation and other major emergency transportation services. Coastal communities experienced fuel shortages, traffic congestion, significant delay in receiving civil supplies, frustration and risk during evacuation, and a lack of public transportation for vulnerable populations. This led all systems to miserably and indiscriminately fail to respond, affecting the young, elderly, poor, and disabled. Seniors living independently, and unable to drive, were disproportionately affected by the flood. Planning and coordination among emergency management, law enforcement and transportation agencies led to an effective system allowing anyone with a car to evacuate from urban areas. Unfortunately, the vulnerable and public-transportation-dependent rural people were literally left behind.

Coastal communities along the Interstate 10 corridor from Florida to Louisiana are predominantly rural. After the 2005 hurricanes, rural communities within 100 miles of the coastline have experienced rapid growth that impacts already limited infrastructure. Nearly 40 percent of the country's transit-dependent population, primarily senior citizens, persons with disabilities, and low-income individuals, live in rural areas. Due to a lack of travel services, rural populations are more automobile-dependent than their urban counterparts. For example, rural households travel 38 percent more miles than urban households, even though they make 5 percent fewer trips. When evacuation occurs, rural coastal communities are at high risk and difficult to evacuate in a timely manner due to larger geographical areas, low density and limited resources. The resources of the rural communities adjacent to urban areas that receive the evacuees can be overwhelmed by the ensuing population increase. In smaller rural communities with limited resources, even small numbers of evacuees can represent sizeable increases in population, and can jeopardize the integrity of resources and disproportionately impact rural law enforcement agencies, health care facilities, and transportation agencies, which have limited fiscal resources (Meit, Briggs and Kennedy 2008).

Before 2005, public transportation operators in the United States did not take the lead on evacuation planning, nor were they viewed as a viable option for evacuation. Now, there is increased national awareness and interest in the role of public transportation in evacuation. Typically in an emergency, emergency management agencies such as police, fire, and emergency medical services—the first responders to an incident—generally take the lead in an evacuation. However, public transportation can perform multiple roles in evacuation and can be a successful partner in four tasks of emergency management plans: (1) mitigation, (2) preparedness, (3) response and (4) recovery. For example, transit can provide evacuation for vulnerable, transit-dependent populations. Transit drivers can transport emergency personnel and equipment to an incident site. During reentry, after the emergency has passed, transit providers can move transportation-dependent 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.

The Nationwide Plan Review–2006, by the Department of Homeland Security in cooperation with the Department of Transportation, indicated that very few states or large urban areas have adequately planned for evacuating people dependent on public transportation. This report also noted that most evacuation planning efforts focus on evacuation by personal vehicle with very

little attention given to the role of public transportation systems (Committee on Nationwide Plan Review Phase 2 2006). Rural transportation issues in evacuation-related literature are missing for the most part. Now is the time to investigate the role of public transportation and school buses in emergency management for rural areas.

This technical memorandum presents the literature review, case study and other information related to rural transit and evacuation issues.

2. LITERATURE REVIEW

A considerable body of literature exists on the role of transit in emergency evacuations. The literature has become extensive since the 9/11 terrorist attack on the World Trade Center and Hurricane Katrina. In fact, a transit system played an important role in evacuating people from around the World Trade Center following the September 11 attacks. These two events became the impetus for investigating the role of transit in evacuation and emergency events.

This literature review has been done to provide information on the following topics:

- The nature of emergency evacuations in rural areas;
- The role of public transportation in evacuation;
- Current evacuation practices for rural areas; and
- Lessons observed from recent emergency evacuations applicable to rural areas.

Emergency management planning in rural areas is generally focused on the local population with not much attention paid to the mass influx of urban evacuees from nearby urban and suburban areas during an emergency event. For the first time, an urban-to-rural evacuation process is identified in a study, titled "Urban to Rural Evacuation: Planning for Rural Population Surge" by the Walsh Center for Rural Health Analysis. Researchers interviewed 17 preparedness experts and planners at the national and local levels to assess the possibilities of urban evacuation to rural areas and to provide recommendations for rural evacuation planning and responses. The study analysis finds that urban evacuees are likely to travel to and through rural areas. Traffic flow in rural areas may result in unexpected traffic jams and blockages that would impact limited road capacity. People evacuated to rural areas may increase consumption of fuel and food in limited supply, and use roadside amenities beyond their capacity. Researchers recommend two important areas to be researched: (1) estimation and information collection about urban-to-rural evacuees, and (2) identification of sites in rural areas where evacuees can be sheltered and provided resources (Meit, Briggs and Kennedy 2008). The study's findings indicate that rural transit may be used by outside evacuees other than the local population, and that may have an impact on the limited capacity of transit.

An emergency management plan of any organization generally involves a series of documents, activities, education programs, trainings, mock drills and stakeholders. A plan can be divieded into four tasks: (1) mitigation—developing a plan to reduce damage loss and impact; (2) preparedness—developing a plan for readiness; (3) response—developing a plan for action/operation; and (4) recovery—developing a plan for resuming normalcy. Public transportation can perform multiple roles in evacuation and be a successful partner in these four tasks of emergency management plans:

(1) Mitigation:

- protect its own assets (e.g., moving transit vehicles to safe place during severe flooding and fire incidents);
- establish redundant communications systems to ensure continuity of service and address the vulnerability of the transit services.

(2) Preparedness:

- help to prepare local emergency management plan;
- represent the various modes of transportation in the emergency command structure;
- prepare its vehicle to be supplied on demand to law enforcement and emergency management agencies for non-transit purposes.

(3) Response:

- evacuate vulnerable, transit-dependent populations;
- transport emergency personnel, volunteers, and equipment to an incident site;
- provide temporary shelter for evacuees;
- transport food, fuel and other supplies.

(4) Recovery:

- resume normal service as quickly as possible;
- move transit-dependent evacuees to their original locations or other destinations;
- help supply real-time information on the extent of damage.

(White et al. 2008, Balog et al. 2005).

On January 1, 1997, a voluntary evacuation was ordered due to a flood in California's Yuba and Sutter counties (Sacramento Region). During the evacuation operation, a local emergency management agency was reminded about the potential role of transit to evacuate citizens without personal vehicles and the transit system was incorporated into the evacuation operation at the last minute. Due to this last-minute involvement, rural transit operators faced challenges such as lack of communication between transit agencies and the local office of emergency services (OES), the unidentified role for transit agencies in the evacuation, and lack of knowledge on the part of transit agencies about local emergency planning procedures and protocol (SACOG 2009). In 2007, a mock drill of a transit service evacuation operation was conducted in the Sacramento Region with financial assistance from the Department of Homeland Security. The purpose of this mock drill was to identify the gaps in the interaction among transit operators and local emergency operation centers (EOCs) and in the communication and operation coordination between transit agencies and local emergency management agencies. This mock drill highlighted the following weaknesses in evacuation operations: an inaccurate emergency communication plan for EOCs resulted in delaying operational decisions, a lack of leadership within the EOCs to assign transit's role and responsibilities, a lack of training for transit operators in communicating effectively and understanding the emergency management plan and procedures (SACOG 2009). Refer to Appendix A for the detailed case study of these two events.

By request of Congress, the Transportation Research Board (TRB) prepared a special report titled, "The Role of Transit in Emergency Evacuation." The Federal Transit Administration funded this study to explore the capacity of transit systems in emergency evacuation for the nation's 38 largest urbanized areas (serving populations more than one million). Bus, rail, paratransit, demand-responsive, commuter rail, and ferry were considered as transit for this study. Comprehensive review of the emergency management plans and transit systems of the 38 largest urbanized areas reveals that transit can play an important role, but that most emergency management plans do not incorporate all available modes of transportation that can be utilized

for evacuation. Further, the study indicates that there is a lack of regional vision that goes into preparing such emergency plans. The study recommends the following topics for further research:

(1) To enhance understanding of the spatial dimensions of the demand and supply of transit services in an evacuation;

(2) To find an assessment method for availability of, and inventorying the allocation of, transit buses, equipment, and drivers; and

(3) To formulate strategies to incorporate other private transportation providers such as charter buses, rental cars, or taxis for evacuation.

The literature review conducted for the above study provides the most comprehensive and up-to-date information on the role of transit in emergency evacuation and highlights the topics that need to be addressed (White et al. 2008).

The Center for Urban Transportation Research at the University of South Florida assessed the emergency planning and response of Florida transit systems during the 2005 hurricane season on a request from the Florida Department of Transportation. In the 2005 hurricane season, hurricanes Charley, Frances, Ivan, and Jeanne hit the state within a six-week period. Although Florida has an advanced state emergency operation management system and structure and public transit agencies actively involved in handling emergency events and evacuations, a survey conducted for this evaluation identifies several deficiencies and concerns in evacuation operation, including communication, coordination, education, specialized needs, finance, passenger statistics, required resources, etc. This report identifies twenty-three best practices for improved transit emergency response management. Some of the practices are having a good emergency plan, clarifying transit staff expectations and duties, coordination with local school transportation systems, conducting mock drills, using volunteers on evacuation buses, employee support and assistance program, etc. (Goodwill and Reep 2005). These practices are relevant for other transit services.

Public Transportation Emergency Mobilization and Emergency Operation Guide—A TCRP report 86 of Public Transpiration Security series Volume 7 highlights the key considerations for the use of transit in evacuations: (1) to promote early recognition of emergency events, (2) to expedite response to an emergency event, (3) to coordinate an evacuation process, and (4) to ensure that transit services are available to support the evacuation operation. This document provides recommendations and tools based on an extensive research effort conducted with public transportation systems through a conference and a survey. A nationwide survey of large, medium and small public transportation systems including rail and ferry reveals that 32 percent of systems are concerned that transit system might not be fully used during evacuation; 66 percent of systems have their emergency management plans; 57 percent of systems have coordination plans with other nearby transit systems; and only 40 percent of transit systems have trained personnel to handle emergencies (Balog et al. 2005).

In 1999, the Texas Transportation Institute conducted a telephone survey of forty-eight Texas transit agencies to determine role, preparedness, and involvement of the transit in emergency events. The telephone survey results indicate that out of thirty-three rural and non- metropolitan transit agencies, only seven agencies participated in their respective local emergency planning; nineteen had informal or formal agreements with cities/counties to provide vehicles and drivers

for emergency response; and four had no involvement in any kind of emergency management plan but were willing or scheduled to prepare a plan (Higgins, Hickman and Weatherby 1999).

The Urban Transportation Center at North Carolina A&T State University sponsored an advanced study to focus on modeling transit issues associated with hurricane evacuation planning. The transit issues are related to traffic congestion and that include determining the total evacuation time, identifying traffic bottlenecks, and assessing the traffic operation strategies for easy exits of transit buses in traffic congestion. The simulation model prepared for this study is based on Behavioral Analysis Model for evacuees, Demographic Model, and the Traffic Simulation model of the Oak Ridge Emergency Management Systems. While preparing the model, researchers assume that buses are located at a same bus terminal. Each bus is assigned predetermined pick up points and routes to reach the safe destinations. This study identifies further research needs in developing a methodology to determine the scheduling of buses for evacuation events along with the expected time required to evacuate the entire population, and examining the impact of potential traffic congestion locations, route selection, and travel time on transit operation (Perkins, Dabioi and Han 2001).

At the time of an Air Ontario jet crash near Dryden in Northern Ontario, Canada, school buses proved to be of beneficial use in this emergency event for a smaller community where the school buses were the only means of public transportation. The school buses helped to move the injured to a hospital. On the day of the 9/11 terrorist attack, school buses helped transport 6,600 passengers from an airport to shelters in Gander, Newfoundland, Canada. The buses also helped in recovery operations moving the passengers back to the airport. The issue with using school buses was that the school authorities maintained the control of buses and drivers were not allowed to make their own decision to handle situations. The decision making process becomes tough for school authorities to make choice between providing school transportation and helping with community evacuations. The advantage is that the school bus system always deals with issues such as altered bus schedule, traffic congestion, and weather and equipment, buses, and drivers are ready to perform any given task in emergencies (Scanlon 2005).

After learning lessons from wildfire and flood emergency evacuations, the California Department of Transportation (Caltrans) launched an aggressive program focused on transit personnel, emergency management officials, and citizens for the emergency management needs of California's rural transit systems. This program clearly defined the actions to be taken by Caltrans, emergency management agencies, first responders and transit authorities. These actions were identified through education programs, including lectures by nationally recognized experts on emergency management, roundtable discussions on best practices and emergency trends in transit for emergency response, and tabletop exercises to identify gaps in transit and local emergency management plans and protocols (Communique USA April 2008). Refer to Appendix B for a detailed list of actions necessary to prepare rural transit systems for evacuation duty. The Caltrans study and the studies referenced above offer many suggestions, advocate for introducing new strategies, and present relevant concerns for identifying the role and efficient use of transit in evacuation. The following are lessons learned from this literature review.

Lesson 1: Increase participant awareness of transit's role and the critical issues surrounding the four elements of emergency management planning: mitigation, preparedness, response, and recovery.

Lesson 2: Foster and support pre-established institutional relationship/mutual aid agreements between transit authorities, transportation departments, emergency and law-enforcement agencies, emergency responders, health care facilities, and media.

Lesson 3: Conduct regular emergency management planning exercises, education programs, training programs, and mock drills.

Lesson 4: Encourage an environment supporting sustained information sharing and routine interaction between agencies that manage transportation systems.

Lesson 5: Identify areas of improvement for rural transit including safety, security and reliability before, during and after emergencies, and determine steps for improvement (Communique USA July 2008, Communique USA April 2008, Goodwill and Reep 2005)

Some of the above suggestions, strategies, concerns and other additional relevant topics are critical and need to be examined, identified and practiced before transit can be considered a prominent transportation mode for evacuation. These topics are divided into eight categories:

1. Transit services provided in rural areas.
2. Communication systems used for transit.
3. Ridership information.
4. Information specific to emergency events.
5. Transit employee issues.
6. Evacuation preparation.
7. Transit expenditures and revenue for emergency events.
8. Assessment of transit needs/coordination.

A detailed list of topics of each category follows.

(1) Transit services provided in rural areas:

- Mode(s) of transit service delivery
- Level of passenger assistance provided for users of transit service in routine operation and emergency/evacuation events
- Maximum distance transit would allow its vehicles to travel for an evacuation
- Information on vehicle fleet used in the transportation services provided directly by transit agency

(2) Communication systems used for transit:

- Type of communications device/system used on a daily basis and in an emergency/evacuation event. The device/system may include cellular phones, two-way mobile radios requiring FCC license, pagers, satellite phones, telephone (landline), automatic vehicle location system, report submitted electronically, email (Blackberry), and facsimile.
- Communication resources available for riders to make an advanced reservation for evacuation. The communication resources may include on-line hurricane registry, calling toll-free number, calling 311 or 911, facsimile, telephone, email, etc.
- Policy to accommodate rider with no advanced reservation in an emergency/evacuation event

(3) Ridership information:

- Transit agency's most recent evacuation passenger statistics. For example, estimated ridership, actual transit service requested, actual service provided, and unmet needs.
- Methodology to estimate ridership for an emergency/evacuation event. Methodologies may be based on regularly maintained inventory, daily ridership, an inventory provided by faith-based organization, event-specific request, census data, and an inventory provided by emergency management agencies

(4) Information specific to emergency event:

- Having an emergency operation plan for transit agency
- Transit agency's participation in the county/state emergency operation center in case of emergency evacuation
- A mutual aid agreement with other transit providers in service area for coordination during an emergency/evacuation event
- An established communication protocol with agencies such as law enforcement, Federal Emergency Management Agency, Department of Transportation, medical center/health facilities, county/state emergency management center, local traffic management agency, and shelter facilities
- Evacuation information dissemination and policy
- Participation in reentry preparations including radio inspection/assessments prior to reentry, traffic management, debris removal, restoration of traffic control, restoration of road infrastructure
- Participation in mock training drills/evacuation preparedness exercises

(5) Transit employee issues:

- Employee training to serve special needs population. The special needs population includes the elderly, people with disabilities and other medical conditions, careless residents (residents who do not give attention or thought to avoiding harm), people with limited English proficiency, people with hearing and visual impairments, people with service animals or pets
- Statistics for employees who reported to work on the most recent evacuation call including transit director, transit dispatcher, drivers (full time), drivers (part time), mechanics
- Compensation to transit employees for working in an emergency/evacuation event
- Assistance to employee families during evacuation
- Arrangements for evacuation of the families of transit employees whom transit agency would expect to work during an emergency evacuation
- Training to transit employees on the following topics:
    a. Driving in hurricane traffic zone
    b. Assistance to special needs population
    c. Emergency management
    d. Reverse lane driving
    e. Emergency communication
    f. Primary medical services (First Aid)
    g. Incident Command System/Management
- Employee-related issues associated with past emergency/evacuation event

(6) Evacuation preparation:

- Preparation time required to implement transit agency's emergency management plan to evacuate people
- Evacuation warnings and evacuation-related public information provided to the public and special facilities. The following media may be used to provide information: TV, radio, loudspeaker, government-owned radio, print media, text messaging, emergency alert system, sirens, knocking on doors, etc.
- An inventory of passengers with special needs who would need transit service in an emergency/evacuation event
- Dedicated, accessible, and operational fueling sites for fueling transit vehicles in case of emergency and electric power loss
- Back-up arrangements for bus maintenance/operation facility in case of electric power losses
- A security plan to protect transit resources/facilities
- A passenger-related liability issue tied to emergency evacuation

(7) Transit expenditures and revenue for emergency events:

- A fare or fee policy for providing transportation services during an emergency/evacuation event
- Transportation operating revenues for most recent emergency event
- Contracts with third parties to provide transportation service or additional vehicles for emergency event
- A contract with a car rental company to provide emergency transportation service

(8) Assessment of transit needs/coordination:

- Barriers/obstacles for operating transit system in emergency management activities. The barriers/obstacles may include not having planned ahead, lack of service, lack of vehicles, lack of operating budget, hours of operation, service boundaries/jurisdiction, funding restrictions, lack of communication facilities, lack of accessible vehicles, etc.
- Issues encountered during evacuation

The following chapter will examine the topics above through a selected methodology—a survey.

The above literature indicates that the detailed studies of the role of transit in evacuation for urban areas are numerous and the topic continues to be investigated. However, studies related to rural transit's role in evacuation are spare. The above studies are summarized in Table 1.

Table 1 Summary of Reviewed Studies

Report Title	Report Authors and Date	Geographic Coverage	Area Types (Urban, Small Urban, Rural)	Addressed Topics
Nationwide Plan Review Phase 2 Report	Committee on Nationwide Plan Review Phase 2, 2006	National	Urban	Review and assessment of the status of catastrophic and evacuation planning in all states and 75 of the nation's largest urban areas.
Urban to Rural Evacuation: Planning For Rural Population Surge	Michael Meit, Thomas Briggs, and Alene Kennedy, 2008	National	Rural	Assessment and impact of urban evacuation to rural areas
The Role of Transit in Emergency Evacuation	Transportation Research Board, 2008	National	Urban	Evaluation of urban transit systems preparedness and role for emergency evacuation
Transit Emergency Planning and Response Assessment Initiative	J. A. Goodwill & A. Reep Center for Urban Transportation Research, 2005	Florida	Urban, Small Urban, Rural	An evaluation and assessment of public transportation system's emergency planning effort
Role of Public Transportation Operations in Emergency Management: Research Report	L. A. Higgins, M. D. Hickman, and C. A. Weatherby. Texas Transportation Institute, 1999	Texas	Urban, Small Urban, Rural	Role of public transportation in emergency events, Guidelines for developing emergency management plan
Modeling Transit Issues Unique to Hurricane Evacuations: North Carolina's Small Urban and Rural Areas	J. A. Perkins, I. K. Dabipi, and L. D. Han. North Carolina A&T State University Transportation Institute, 2001	North Carolina	Small Urban and Rural	Hurricane evacuation transit model based on traffic congestion

Report Title	Report Authors and Date	Geographic Coverage	Area Types (Urban, Small Urban, Rural)	Addressed Topics
Rural Transit Response and Recovery Conference—After Action Report	Communique USA, April 2008	California	Rural	Emergency Planning Education, Future Planning initiatives
Rural Transit Emergency Planning Guidance	Communique USA, July 2008	California	Rural	Emergency Planning Guidelines

3. APPENDICES

Appendix A: Emergency Response Case Study of Sacramento Region

[This case study was done by the Sacramento Council of Governments under the Rural-Urban Connections Strategy project. It can be found at http://www.sacog.org/rucs/wiki/index.php/Emergency_Response.]

The Greater Sacramento Region's Natural Disaster Risk

The Sacramento region faces a number of potential emergency situations caused by events such as forest fires, flooding and earthquakes. Forest fires are a significant risk to foothill areas (for example, Placerville and Auburn) as seen in the summer of 2008 when California experienced a record number of forest fires. Although earthquakes are not considered a serious threat because the Sacramento region is not along the most active fault lines, some geologists do believe California is overdue for a large earthquake that could potentially affect Sacramento. In addition, many parts of the region have a high risk of flooding due to large rivers, vulnerable levees and developed flood plains.

The Sacramento region remains the most at-risk large metropolitan area in the United States for a major flood event. Large rivers and significant creeks flank or divide nearly all the counties in the region. Due to the numerous natural bodies of water, many parts of Sacramento, Sutter, Yolo, and Yuba counties are in 100-year flood plains. In order to protect residents from flooding, hundreds of miles of levees have been built, but many are currently not up to federal protection standards. Compounding the region's vulnerability to flooding events is the remote threat of dam failure; two large and several smaller dams hold back water north and east of Sacramento.

The Rural Challenges

Natural emergencies create challenges that affect Sacramento's urban and rural areas in different ways, and both have different barriers to evacuation. Disaster preparedness efforts have focused on urban areas because there are more people and infrastructure. However, rural areas face more frequent threats from natural disasters, such as fires and floods.

Rural areas face unique vulnerabilities due to their very nature. Expansive wooded and vegetative areas are significantly more vulnerable to fires. The California fires in 2008 burned nearly 300,000 acres of land and numerous homes, affecting rural areas in a far larger proportion than urban areas.[1] Locally, Placer County and Yuba County had significant fires, with over 1000 acres burned. Additionally, rural infrastructure is frequently more vulnerable to flood events. Historically, many rural and county roads were not constructed with an engineered pavement section. Many of the

roads we see today are composed primarily of dirt and gravel, leaving rural roads particularly suspect to washing out during major floods. The impacts of fires that clear out vegetation coupled with heavy rains can create flash floods and/or mudslides which are capable of wreaking havoc on rural roads and communities. Many homes and property are along rivers and creeks, leaving them vulnerable to levee breaches during major storms. What is more, rural areas lack the emergency services and relatively quick response times that urban areas have, which can compound a small incident into a larger problem.

Emergency Preparedness Planning

The threat of natural (as well as man-made) emergencies establishes the need for good emergency planning in both urban and rural areas. In the SACOG region, urban and rural boundaries are so close to each other that they are inextricably related. It is important that both urban and rural areas are well prepared in the event of an emergency. In fact, rural roads may be an urban resident's natural escape route.

In California, every jurisdiction has emergency planners that follow an organization system in order to control chaos and save lives during an emergency. The following are systems used:

- National Incident Management System (NIMS) is the national structure for command, control and communications among responding agencies and decision makers. NIMS was created after September 11, 2001 and is based on the California model.
- California Standardized Emergency Management System (SEMS) is a state-wide system directed by the California Office of Emergency Services, which consists of multi-interagency coordination and mutual aid. SEMS was created after the 1991 East Bay Hills fire.
- Incident Command System (ICS) is a local, emergency-site system used by first responders that helps to direct and delegate authority, used in small traffic accidents and major catastrophes.

Throughout California, emergency planners implement the systems previously mentioned, depending on the situation, as a way to control and communicate during an emergency. The following are local emergency planning sites:

Office of Emergency Services (OES) is in every county and many cities in California and oversees day to day emergency planning.

Emergency Operations Center (EOC) is a command center where emergency service providers (many from the local OES) meet and coordinate response, recovery, and resources during disasters.

Mobility and The Role of Transit

In the event of an emergency, residents must be able to evacuate their homes and go to a safer area (such as higher ground in the case of a flood). Unfortunately, some people are at risk of being left behind, such as people in convalescent/nursing homes or hospitals, seniors unable to drive and people that do not have a car. In 2000, over 54,000 households in the Sacramento region did not have a vehicle, 2400 of which were in rural areas. People unable to drive may have friends or family that can transport them, but some may depend on alternative transportation.

Transit plays an important role during an emergency. In evacuation situations, buses offer a vital service by moving large numbers of people to safer areas. Additionally, transit vehicles provide the opportunity to transport emergency responders and necessities (food, blankets, etc.) to disaster sites and to provide mobile cooling stations for fire fighters.

Case Study (1997)

The second largest evacuation in U.S. history took place in Yuba and Sutter Counties on January 1, 1997. After a massive snowfall before Christmas, followed by warm, heavy rain, all the major northern and central California reservoirs exceeded flood control capacity. By New Years Day voluntary evacuations were ordered for the urban areas in both counties.

However, Yuba-Sutter Transit was not notified or given evacuation orders by either county EOC. It was simply by happenstance that one transit analyst found out about the order, and she spent over three hours attempting to contact the responsible emergency services official in either county. During this time, the analyst contacted Laidlaw Transit Services, Inc., an agency contracted to Yuba-Sutter Transit for operations and maintenance services, which began preparing the transit systems for activation. Finally, an emergency official instructed the transit analyst to assist the local ambulance company in the evacuation of all the nursing facilities, convalescent hospitals and group homes in both counties. Yuba-Sutter Transit split the number of buses in each county so that, in the event one flooded, half of the fleet would still be available. Yuba-Sutter Transit took the evacuees to schools and community centers in Nevada and Plumas Counties, which were ill prepared for the

number of people and their frail state. With the help of bus drivers and volunteers, over 1000 individuals were evacuated on busses that day.

The Yuba-Sutter Transit evacuation experience provides several valuable insights into challenges faced by the rural transit operator. To begin with, Yuba-Sutter Transit did not have an open communication with the local OES. It was by sheer tenacity that the transit analyst got in contact with the emergency planner, when the emergency planning agencies in both Yuba and Sutter Counties could have been in contact with the transit agency. Second, transit's role in emergencies was not pre-established. Had OES officials and the transit operator been in regular contact, the transit agency could have started evacuations hours earlier and the (very expensive) joint effort with local ambulance companies could have been avoided. Finally, transit operators were not included in the jurisdiction's emergency planning. By planning with transit operators, OES officials could have known what transit inventory was available, how to access the inventory and how best to get in contact with the transit operators in order to facilitate effective and efficient evacuations.

Case Study (2007)

In October 2007, the Department of Homeland Security funded an emergency response exercise that simulated a flood disaster in the Sacramento Region. The exercise[2] involved ten transit providers[3] and several agencies[4] in the region. The simulation examined how transit resources and abilities could be used to deal with various aspects of a flood emergency, including a levee break. The emergency response exercise tested the following areas: interaction between transit agencies and EOCs, coordination among transit operators, EOC communications of local transit aspects of city and county evacuation plans, and operational aspects of a mass evacuation.[5] The exercise was very beneficial in identifying areas where the teams did well: leadership in local transit agencies, resource response at the Sacramento City and County EOC, and communications and plans within each local agency. However, the exercise also highlighted several areas for improvement.

According to the emergency response exercise After Action Report (AAR), improvement is needed between EOC personnel and transit agencies in these areas:

> Communication—broke down because the EOC and transit agency communication plan was incomplete and inaccurate, resulting in delayed operational decisions and inaccurate resource tracking.
>
> Leadership—lacked within the EOC because there was not a primary transit representative, which created a "break-down in communication of emergency operation information."

Training—among transit operators on the procedures and resources of the EOC system, limiting the operator's capabilities to effectively assist the EOC.

The Sacramento region has had two emergency exercises over 10 years—one real and one simulated. The 1997 flood evacuation and the 2007 emergency exercise demonstrated positive aspects in our region and yielded several areas for improvement. Both examples established the need for transit agencies and EOCs to have better communication, leadership and training. Many improvements have been made after the 1997 experience, including establishing frequent communications between the transit operator and emergency planning agencies. However, the 2007 exercise highlighted the fact that the region still has many improvements to make in these areas.

Opportunities and Innovations

In response to the transit emergency exercise, SACOG applied for and received a Caltrans grant to create a plan that will concentrate on the recommendations of the After Action Report (AAR). This plan[6] is designed to be a continuous effort to improve emergency-related communication, procedures and information within transit agencies and, when applicable, with local EOCs. The AAR response plan will also study flooding effects on transit systems in the Sacramento River and American River Flood Plains, including rural sections of Sacramento and Yolo Counties. Agencies that participated in the October 2007 exercise will be invited to participate in this exercise, which will be overseen by the Transit Coordinating Committee (TCC), a SACOG advisory group. This innovative and important plan will better prepare the region in the event of an emergency.

SACOG is also working with partner agencies to implement an Intelligent Transportation System (ITS) project called the Sacramento Transportation Area Network (STARNET) system. Many difficulties during emergencies are encountered when information is not accurate for first responders, emergency planners and incident commanders. Transit operators and emergency responders will be able to use STARNET to exchange information and coordinate operations in the Sacramento region. STARNET will allow real-time sharing of data and live video, as well as adjustment of joint procedures pertaining to roadways and public transit operation, and public safety activities. It will also provide more information for travelers via the region's 511 web site and interactive telephone service (dial 511).

Through the TCC, SACOG is exploring an opportunity to create a formal framework between transit operators and emergency planners. The framework may identify, establish, and standardize information sharing between transit agencies and EOCs. Improving communications and leadership between the agencies and training within transit agencies could also be addressed. SACOG is

interested in working with the TCC and other partners to identify innovations and opportunities to address the AAR recommendations.

Funding

Many transit operators are not in a position to fund emergency planning exercises and programs, especially given the current fiscal environment. Transit costs (such as operations and maintenance) require considerable funding commitments, and transit operators are increasingly short of funds. Federal and state funding support has declined over the last several years and transit operators have turned to more volatile local sales tax for funding. The limited resource makes shifting discretionary monies away from operations to emergency planning nearly impossible. In order to pay for exercise planning and training, transit operators have to rely on grants and other governmental sources. Some opportunities include:

The California Office of Emergency Services provides training classes on the various organization systems.

The United States Department of Transportation and the Federal Transit Administration provide classroom training and online courses on a wide variety of topics ranging from ICS and NIMS to terrorism awareness.

The U.S. Department of Homeland Security and the California Office of Homeland Security provide several grant programs.

The 2005 Hurricane Katrina flood disaster brought to light Sacramento's vulnerable levees and ranked our region as a national concern for serious flooding. The ensuing years have led to increased funding to improve the region's levees in many of our at-risk areas. In 2006,the California Legislature passed Proposition 1E, the Disaster Preparedness and Flood Prevention Bond Act, which allocated $4.06 billion to rebuild and repair California's most vulnerable flood control structures. Also in 2006, the public passed Proposition 84, which provides renewed funding for the Flood Protection Corridor Program (FPCP) in the amount of $40 billion. Most of the funding goes to improve the region's levees.

In spite of the state-wide funding increases, the Sacramento region still needs to expand safety improvements and emergency planning efforts. As part of the Rural Urban Connections Strategy (RUCS) project, SACOG would like to explore the issues identified above in greater detail by answering the following questions:

What other transportation aspects of emergency planning affect rural areas?

How can transit be incorporated more fully into emergency planning?

What additional lessons can be learned from the 1997 and 2007 case studies?

What are some of the most cost-effective strategies to enhance regional preparedness?

SACOG plans to continue working with regional partners to identify new innovations and pursue new funding opportunities.

Footnotes

1 California Department of Forestry and Fire http://www.fire.ca.gov/index_incidents_info.php

2 Sacramento Functional/Full-Scale Exercise (FE/FSE)

3 Sacramento Regional Transit, Paratransit, Inc., Placer County Transit, Yolo County Transportation, El Dorado Transit, Folsom Stage line, Roseville Transit, South County Transit, Amtrak, Fairfield Suisun Transit.

4 California Department of Transportation, Federal Emergency Management Agency, Federal Transit Administration, Natomas Unified School District, Sacramento Area Council of Governments, Sacramento County Office of Emergency Services, US Department of Homeland Security.

5 The exercise was funded by the US Department of Homeland Security and coordinated by the California Office of Homeland Security, SACOG and consulting firm Booz Allen Hamilton. It was an exercise that took place at the Sacramento County Emergency Operations Center and the Natomas Unified School District Headquarters. An After Action Report was developed after the completion of the exercise identifying strengths and weaknesses. The After Action Report is now being used to develop a Caltrans awarded Sacramento Emergency Transit Response Plan. The plan will serve as a template to guide transit operators in the SACOG Region in preparation for disasters.

6 Sacramento Functional / Full Scale Exercise After Action Report Response to Recommendations Plan

Appendix B: Rural Transit Response and Recovery Improvement Actions

[This section is taken from the online report title, "Rural Transit Response and Recovery Conference—After Action Report" prepared by Communique USA, Inc., for Division of Mass Transportation, the California Department of Transportation. The report can be found at http://www.dot.ca.gov/hq/MassTrans/Docs-Pdfs/Security_October_AAR_Final_Report.pdf].

- Identify assets critical to continuity of operations, and hazards and threats to those critical assets
- Establish thresholds for transit emergencies, based on prime hazards and threats, and protocols and checklists for actions they trigger
- Identify internal emergency response teams within the transit system ensuring that all essential tasks—leadership, public information, interagency coordination, operations, plans, logistics and finance—are addressed
- Review insurance coverage and liability issues vis-à-vis asking staff to support emergency situations
- Generate and distribute" "first responder commitment forms" to be signed by drivers and operators to ensure participation in emergency response activities. Such forms should be reviewed by legal prior to distribution to staff
- Provide staff training on the National Incident Management System (NIMS), the California Standardized Emergency Management System (SEMS) and the Incident Command System (ICS)
- Help staff establish family emergency plans so they are available for emergency response and recovery
- Establish Continuity of Operations priorities: how to reduce or suspend services as required, emergency passenger drop points, continuation of medical transportation
- Establish alert notification plan to mobilize transit staff in case of emergency
- Evaluate procedures for refueling (e.g., are buses refueled immediately after use, so they are ready to go when an emergency strikes?)
- Establish priority contracts for fuel (and other critical resources) in emergency situations
- Ensure that there is verbiage in service contracts covering emergency situations Plan for the role transit will play in evacuations, particularly regarding special needs populations
- Meet with local emergency planners to ensure that transit emergency plans are concordant with city/county emergency plans. It is particularly critical for nonprofit transit providers to develop Mutual Aid Agreements with local emergency management and first responders, since they are not protected by many of the laws that shelter governmental entities
- Review role of a transit representative at the Emergency Operations Center (EOC), Incident Command Post (ICP) and the transit staging area

- Discuss with emergency planners Commercial Drivers License (CDL) operational limitations vis-à-vis operational periods with local emergency managers (i.e., normally operational periods are 12 hours, but under CDL requirements drivers can only operate 10 hours before rest)

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