



# Checklist

## Recommended Actions to Plan for Transportation Disruptions Following Future Earthquakes in the San Francisco Bay Area

The following checklists should help your organization minimize the number of impacts of disruptions in transportation systems following future earthquakes, and to cope more effectively with those impacts.

The afternoon discussion session at the five subregional workshops focused on developing an action plan to address the transportation impacts after a large earthquake. Of particular concern were the ways that transportation disruptions can exacerbate, or be exacerbated by, disruptions in communications, power, caring for injuries, and balancing home and work life. These checklists are the result of that effort.

The **General Checklist** focuses on overall employee and operations issues. This checklist is followed by **specific checklists** for residents, transportation providers, utilities, private emergency service providers, local and state government agencies, private business and industry, and school and day care providers. You may find that you need to review several checklists to get a full picture on how you should plan for this type of disaster.

The principal focus of the checklists is intended to be on minimizing the impacts of disruptions in **transportation systems** following earthquakes, not to replace checklists made by other agencies with other emphases. Therefore, it is recommended that potential users of these checklists undertake a comprehensive review of their emergency preparedness using information, for example, from the Governor's Office of Emergency Services, the Federal Emergency Management Agency, the American Red Cross, and the California Seismic Safety Commission. **The reviews and associated plans should be updated and exercised regularly.**

These checklists are greatly expanded from similar checklists found in an earlier ABAG report which describes the likely numbers of road closures, and their causes, after an earthquake along each of the major faults in the Bay Area (see **Riding Out Future Quakes**, 1997, Appendix A).

## General Checklist for All Employers – Both Private Companies and Government Agencies

### *Regarding Employees*

- predesignate employees who are critical so that non-essential employees are comfortable remaining at home and not on the road
- predesignate shifts and/or crews for employees to avoid everyone reporting for work at one time and simultaneously becoming overworked; data on commute distances and patterns may be used to assign employees to shifts
- work with employees to know their commute patterns and identify possible alternative routes from their homes to your key facilities and offices in an emergency which avoid known faults and other major obstacles, such as toll bridges (collecting information on maps or by zip codes as a first step)
- encourage employees to pre-arrange family phone contacts outside of your area so that they can communicate their safety and location to isolated family members
- investigate the possibility of pre-designating an employee to have the principal responsibility after an earthquake of contacting all employees families to learn of safety (thus, this person would need to know all out of area family contacts pre-earthquake)
- encourage employees to be prepared for earthquakes at home by, for example, providing disaster kits, to improve their family safety and therefore increase the likelihood that, if at work, employees can remain there, and, if at home, critical employees could travel to work more readily
- cross-train employees to allow for some workers being unable to reach your facilities in a timely manner, if feasible, *or* know the resources of your neighboring agencies or organizations and develop checklists of key components of these jobs to aid employees in performing them
- promote employee training in first aid, CPR, and, in some cases, train some Emergency Medical Technicians (EMTs)
- promote training for licensing of amateur radio operators among employees
- include earthquake hazard information in training crews that may be working on repairs so that they can identify and avoid life-safety hazard situations that may be close to the damage they are repairing
- know what you plan to do with injured and how you might want to transport them to emergency care
- investigate the possibility of providing on-site day care after an earthquake to allow essential or critical employees to work if their normal day-care options are not available
- if the phone system is operational –*
  - (a) plan to use voice mail to broadcast work and staffing information to employees
  - (b) as an alternative, investigate establishing a pre-designated hot-line or telephone trees for employees to call to gain similar information
  - (c) train employees to change their voice mail messages to state that they are

safe and use the phone instead of the roads

(d) train employees that the phone system may be operational even if you do not have immediate dial tone; remain on the phone and wait for dial tone rather than hanging up repeatedly

## *Operations*

- plan to set a priority of keeping open surface roads in and out of your facility routinely maintained by your agency
- develop resource lists of heavy equipment that may not be owned by your organization, as well as pre-arrange contracts with potential private suppliers and establish mutual aid agreements with potential public resources (realizing that you may not be a top priority for external suppliers of this equipment)
- know your neighbors, including their potential resources and problems by, for example, becoming involved in local emergency councils
- use local emergency councils, industry groups and other forums as a way of sharing useful information and techniques to minimize the potential of having to reinvent checklists and procedures that have already been developed by others
- ensure that you have stocked your operations center with food, water and sanitation systems to allow for disruptions off-site
- focus on flexibility and redundancy of disaster operations
- check that fuel pumps at vehicle yards are connected to a backup power system
- ensure adequate fuel supplies should restocking of fuel supplies be delayed
- provide, anchor and test back-up equipment used for fuel, power and emergency communications, particularly for your emergency operations center and other essential facilities, and have extra flashlights with batteries
- size fuel supply tanks for emergency generators; power outages may be longer than expected
- provide, anchor and test back-up communications equipment, such as portable radios and relay towers
- install back-up supplies of water on-site and anchor tanks
- anchor all equipment and nonstructural items
- minimize glass in hallway exit routes and consider installing film
- design on-site utility lines to minimize risk of pipeline breaks
- develop a facility hazard checklist and run audits, particularly related to buildings, critical equipment, hazardous materials, and nonstructural items that may cause injuries, to allow for a rapid post-earthquake walk-through **and** know the status of these pre-quake
- if facilities are critical, pre-arrange for post-earthquake assessment by **local** structural engineers

## *Location*

- examine the location of your facilities relative to exposure to various earthquake hazards such as violent shaking, liquefaction, differential settlement, and earthquake-induced landsliding
- if exposures are found, address problems through mitigation or make the conscious decision to accept the risk

## Residents Checklist

People should use the maps in this report to anticipate transportation disruptions in areas through which they generally travel – to get to work, take their children to day care or to school, or buy groceries and other supplies.

### *As a Resident*

- plan on being self sufficient and having minimal access to roads for up to five days by storing, at a minimum, the following items:
  - (a) at least one gallon of water per person per day (water in braced water heaters can count toward part of this supply)
  - (b) a five-day supply of non-perishable food
  - (c) a five-day supply of personal medication
  - (d) a first aid kit
  - (e) flashlights with extra batteries
  - (f) sanitation supplies (toilet paper, garbage bags, bleach, etc.)
  - (g) a battery-operated radio to get information on road conditions and other emergency communications, probably on an AM station
  - (h) items for people with special needs
  - (i) other items suggested by the American Red Cross, the Federal Emergency Management Agency and other organizations
- keep some cash on hand so that some emergency supplies can be purchased if electric power at retail outlets is disrupted and travel to banks is limited
- have a wrench readily available and know how to turn off the gas service if the odor of natural gas is detected
- pre-arrange family phone contacts outside of your area so that you can communicate your safety and location to isolated family members, particularly children
- if the phone system is operational* – change your voice mail message to state that you are safe and use the phone instead of the roads (The phone system may be operational even if you don't have immediate dial tone; remain on the phone and wait for dial tone rather than hanging up repeatedly.)
- anticipate having to stay at work for several days should an earthquake happen during work hours (by, for example, keeping a supply of essential medications, glasses and a change of clothes at work), and ensure that your employer has adequate emergency supplies
- anticipate having to stay at a shelter if staying at or traveling to home or work is not an option
- identify possible alternative routes from your home and employer to child care, emergency care facilities, and other key locations which avoid known faults and other major obstacles, such as toll bridges

*As a Parent*

- follow the authorities' instructions on, for example, travel and phone usage after an earthquake in order to help speed the recovery process
- have shoes next to your bed and walking shoes at work should vehicle travel not be an option – remember that there may be glass in your shoes and to pour it out so your feet are not injured
- use a home hazard checklist to improve the nonstructural safety of your home and minimize the potential for injuries, particularly related to bookcases and furniture, glass in hallways, and hazardous materials (cleaning and pool supplies) which may fall
- participate in existing, or work on setting up new, neighborhood emergency efforts at self-help, first aid, and crime prevention
- make back-up plans for feeding and safety of pets should you not be available
- work with your school or day care provider to ensure that your children can be taken care of should you or someone you designate not be able to pick them up following an earthquake
- take the filling out of emergency cards and information seriously, including authorization of emergency medical; remember that you may not be able to personally pick up your children following a major earthquake
- ensure that you keep the addresses and phone numbers of people authorized to pick up your children with you so that you can speed up the process of contacting them after an earthquake; these people might also want to have your “out of area” phone contact

## Transportation Providers Checklist

*Use the General Checklist. In addition, specific problems in past earthquakes point to particular needs for individual transportation facilities.* Because the region relies so much on its transportation network, every provider has as its first concern sustaining operations at its facilities – both for emergency response immediately following an earthquake, and for the flow of commerce during post-earthquake recovery.

### *Airport Facilities*

- work to minimize the likelihood of closed runways due to pavement buckling from liquefaction or differential settlement
- sustain utilities (power, communications, water)
- pay special attention to anchoring equipment in control towers
- work to maintain access by keeping roads at the facility open
- evaluate the extent to which general aviation airports could accommodate commercial aircraft in an emergency
- coordinate potential post-quake operations with Bay Area airlift volunteers

### *Port Facilities*

- plan for flexibility in providing berthing for commercial ships
- maintain ship-servicing operations
- keep ground access open for the movement of goods
- work with rail operators to ensure rail arteries for movement of people and goods to and from ships, both in pre-planning and post-event recovery
- anticipate potential problems with liquefaction affecting terminals, quay walls, and on-site underground pipelines

### *Rail Facilities*

- survey all track segments to identify segments in areas susceptible to ground rupture (faulting) or ground failure (liquefaction or sliding)
- electric rail-based transit* - should develop ways to supplement outside power for train operations, such as in BART's tube and tunnel
- rail-based transit* - should work with the Metropolitan Transportation Commission and other agencies to expedite funding of seismic strengthening of elevated rail supports
- BART* - should coordinate possible use of the transbay tube for connection with bus service should both the Bay Bridge and the remainder of the BART system be out of service
- rail freight and Amtrak* - should ensure that the national management understands the specific issues related to seismic safety in California

*Transit  
Operators and  
Facilities*

- pay special attention to ways for employees (both drivers and maintenance workers) to get to work
- address fuel and back-up power needs
- work with other transit districts to establish mutual aid agreements for bus use
- anticipate the need to be flexible and change post-earthquake bus routes and schedules; have a means to communicate those changes to customers and among drivers by using, for example, TravInfo and the Internet (when the Internet is functional)
- relay damages on routes to the dispatch offices (to be forwarded to State OES)
- maximize the number of buses with bicycle racks to increase the service area for commuters using buses
- maintain mutual aid agreements with other hospitals, ambulance companies and transit operators in order to share resources if and when needed

## Utilities Checklist

Utilities will need to use streets which connect to critical facilities and to use (and sometimes disrupt) streets to repair breaks in pipelines. Utilities need to plan for transportation disruptions to minimize service outages and to respond quickly once those outages occur.

### *General*

- anticipate that repair crews will experience problems gaining access to areas requiring service by pre-earthquake identification of possible alternative routes to key facilities based, in part, on avoiding problem areas such as faults
- communicate important messages to the public **before** an event occurs, stressing:
  - (a) install of backup power, water and communication
  - (b) do **not** shut off gas pilot lights unless gas is leaking as it could be days before utility personnel relight them
  - (c) call utilities **immediately** about **sources** of power outages, such as downed power lines or an exploded transformer, or an identified gas leak
  - (d) call utilities **after a few hours** regarding a power outage since the power may be returned in that time, and if not, the repair status will be better known
  - (e) avoid telephones unless necessary to keep from jamming phone lines
  - (f) remember that crews are working as quickly as possible to restore services
- maintain mutual aid agreements and communication with other utility companies, as required by law

### *Water Supply*

- anticipate areas of pipeline breaks to plan routing of repair vehicles
- ensure back-up power for wells, pumping facilities and treatment plants
- use the Water Agency Response Network to request emergency assistance including equipment, supplies, and personnel
- work for better communication between water wholesalers and retailers regarding service continuities and emergency supplies

### *Wastewater*

- ensure back-up power for sewage treatment plants not dependent on gravity flow

### *Power and Natural Gas Facilities*

- ensure reliable emergency communication between repair vehicles and dispatch centers
- anticipate areas of pipeline breaks to plan routing of repair vehicles

### *Telecommunications*

- pay special attention to repeater stations, which have tended to be more structurally vulnerable than other links

## Private Emergency Service Providers Checklist

Emergency responders will be using transportation systems to respond to problems, as well as to gain access to key facilities such as shelters and hospitals.

- Health Care*
- anticipate problems gaining access to areas with injured people or returning to medical facilities
  - plan possible alternative points for collection of injured in areas isolated from hospitals with county emergency medical personnel; fire stations may be logical collection points if fire departments are notified in advance
  - plan possible alternative routes to hospitals and anticipate bottlenecks in existing routes
  - work with utilities and transportation providers to anticipate transportation bottlenecks and to plan routing
  - maintain mutual aid agreements with other hospitals, ambulance companies and transit operators in order to share resources if and when needed
  - anticipate need for increased 24-hour staffing
  - anticipate the need for more basic supplies and arrange for those to be stored on-site through arrangements with medical supply companies or establishment of emergency supply caches (for “normal” supplies may be exhausted in as little as two hours)
  - anticipate an increase in both the variety and number of patients
  - ensure communications between hospitals and response personnel after an event in case responders or patients need to be sent elsewhere
  - use the media to inform people about services through radio and public address systems
- Care and Shelter (Such as Mass Feeding)*
- ensure that accurate and reliable information on road conditions and open routes is continually available to Red Cross job headquarters and other mass care provides through the county office of emergency services and other sources
  - ensure functioning and availability of a reliable communication system among Red Cross job headquarters, county OES, shelters, and supply sources
  - ensure availability of reliable information on who is at shelters or where those formerly at shelters have gone
  - anticipate problems in gaining access to supply sources and shelters, as well as in establishing transportation links between those supply sources and shelters, due to disruptions in the transportation system and traffic bottlenecks
  - work with local government building departments to ensure that any predesignated direct relief centers and job headquarters are not of a type of construction that is prone to structural problems in earthquakes and has back-up power and water
  - anticipate special needs of vulnerable populations such as elderly, disabled, limited English speaking, visually and hearing impaired, and homeless people
  - plan and coordinate the needs of those with special medical needs, such as equipment, with shelter providers and assisted care facilities

## Local and State Government Checklist

Local governments have to balance the potentially conflicting transportation needs of citizens with the needs of transportation providers, utility companies, and emergency services officials. While larger local governments may need to concentrate on building redundancies within their agencies, smaller local governments may need to concentrate on working together and pooling resources to build redundancies. In addition to the checklist for all private companies and government agencies, local governments should:

### *General*

- have employees, if at home, report to the local government office nearest their home (this nearer office should have “hardened” communication with their local government office enabling employees to be informed of the impact of road closures on their commute and on staffing shift needs)
- ensure that all critical employees carry current IDs so that they can use them as IDs in crossing barricades
- establish clear accounting procedures to ease reimbursement and to avoid hampering response activities
- cooperate with Caltrans and key utilities to ensure mutual knowledge of key facilities to improve post-earthquake access
- pre-define contract staffing positions in emergency operations and other critical departments to speed up staffing and ease reimbursement

### *Emergency Communication*

- implement redundant communications systems, including possible use of amateur radio operators and maintenance of low-band radio frequency licenses and equipment
- ensure all emergency communications and other critical facilities are “hardened” (include anchoring of nonstructural items to resist shaking in the facilities and ensure that they are backed by emergency power)
- ensure communications systems are compatible among various departments and agencies, and that redundant systems exist
- be familiar with and support amateur radio operators in their efforts to assist in emergency communications
- improve post-earthquake communications among similar departments at different local governments by designating a department representative to interact with the EOC rather than relying on emergency personnel to handle information exchange between, for example, public works staff
- improve post-earthquake communications among utilities, transportation providers and local governments by designating an agency representative at each county EOC where the utility or transportation provider operates
- investigate the possibility of using a pre-designated hot-line or telephone trees for providing similar information, realizing that the phone system may be overloaded and not fully functional

## *Police and Fire*

- have access to adequate fuel for response vehicles, and install emergency generators on the fuel pumps
- exercise response plans based on realistic scenarios, such as those developed by ABAG
- have realistic expectations of police and fire personnel, for they are trained to be reactive, rather than for maintenance of long-term projects
- use disaster exercises to coordinate with other critical agencies, such as utilities and health care facilities, to examine issues such as
  - (a) critical utility and health care workers living large distances from where they may be needed after an earthquake
  - (b) possible use of fire stations as collection points for injured should hospitals be isolated

## *Transportation and Emergency Planning*

- identify areas that can be used for multi-modal transportation needs such as helipads, docks and connection points
- plan alternative routes and methods of transportation to areas with large numbers of potential street and freeway closures
- investigate the possibility of establishing standards and systems for clearly marking "emergency vehicle routes." (If formal routes are not designated, work on an internal system of setting priorities for use and reopening of key routes.)
  - Advantages include the potential to:
    - (a) strengthen these routes against disruptions,
    - (b) separate emergency traffic from local traffic, and
    - (c) ease emergency access.
  - Disadvantages include:
    - (a) possible problems with public enforcement,
    - (b) difficulties in predicting where routes will be needed, and
    - (c) development of false expectations about open routes.
- investigate the issues regarding mandating carpool routes or curfews
- anticipate road closures due to access issues, particularly for residents or employees located in areas where excessive building damage has occurred
- develop and periodically update a directory of key Bay Area transportation agencies and contacts
- foster mutual aid agreements with other similar agencies, so that emergency repairs and operations can begin immediately
- plan innovative methods for route control and enforcement (perhaps using private security firms) since the number of detours and closed streets may overwhelm the staffing resources of police and public works departments *and* both of these types of personnel could be better used elsewhere
- pre-arrange contracts for removal of abandoned vehicles (when, for example, they have run out of fuel)
- develop programs with local school districts to ensure that

- (a) students and their parents are aware of potential transportation problems following earthquakes; and
- (b) adequate food and water to shelter school populations are on site

*Public Works*

- identify staging areas for equipment, supplies, and fuel to support emergency support operations in the first 72 hours
- develop contingency contracts with local contractors to enable them to begin repairing critical roadways immediately, as well as to obtain critical supplies including traffic barricades
- coordinate with certified volunteer engineers and inspectors to ensure that buildings blocking routes and key bridges are rapidly inspected following an earthquake
- adopt and exercise damage assessment methods, particularly on key or critical routes
- explore the possibility of storing temporary (Bailey) bridges to replace critical water crossings, emergency generators to work key traffic lights, and street barricades
- coordinate potential post-quake operations with Bay Area airlift volunteers
- pre-designate areas for debris storage, recycling and disposal

*Public Outreach*

- plan and exercise methods for disseminating public information, including ensuring that accurate and reliable information on road conditions and open routes is available, as well as establishing working relationships with media in your area
- retain and train additional employees as potential public information staff, realizing that key skilled operations people who are normally resources may not be available
- inform citizens that some roads may not open for several days due to the priority of repairing roads used by emergency vehicles
- develop a consistent message both pre- and post-earthquake among all government agencies on which public and private employees should be considered “essential” and tell all others that they should plan on staying home during the emergency phase (NOTE: existing California Governor’s Office of Emergency Services (OES) **Broadcast Media Scripts for Post-Earthquake Public Information** should be expanded to focus on transportation issues)
- if the phone system is operational* – plan to encourage citizens to change their answering machine messages at home to indicate that they are safe
- suggest local employers develop emergency telecommuting options for their employees
- train and empower homeowner groups and neighborhood associations to become emergency response teams and include transportation issues as part of that training, such as for providing traffic control

## Private Business and Industry Checklist

Employees will need to use roads to get to work, as well as to gain access to key facilities that need repair. Everyone should anticipate transportation disruptions in areas through which they generally travel. However, some of the transportation issues are more critical for manufacturing companies than for service or office workers. Use the General Checklist. In addition –

### *During the Emergency Phase*

- work with employees to pre-establish those essential employees who should attempt to reach the workplace after an earthquake
- pre-establish optional work schedules to allow for limited employees at work and communicate these decisions to employees
- for employees at home* – plan on not being able to get to your office for up to 72 hours after an earthquake, due to phone and travel restrictions necessary for emergency operations (creating a “desktop in a briefcase” with key phone numbers is a good start)
- for employees at work* – ensure that your employer knows who is and is not at work so they can communicate this information to others
- plan on a stockpile of emergency supplies and equipment (including plywood) so as to support employees and business concerns for the first 72 hours after an earthquake
- plan methods for disseminating post-earthquake information to employees and their families, including
  - (a) setting up “rally points” based on where employees live with access to multiple forms of communication equipment
  - (b) *if the phone system is operational* – using voice mail to broadcast work and staffing information to employees

### *During the Recovery Phase*

- plan possible alternative routes and methods of transportation, including small boats and ferries
- investigate options for radically redesigned work schedules to minimize the need for commuting
- investigate the option of providing limited housing for employees who may choose to remain on-site such as establishing pre-earthquake contracts with modular building suppliers
- if you are not a manufacturing company or do not provide critical services, work with employers/employees on emergency telecommuting options (THINK – how essential are you?)
- explore the option of having employees report to alternate work sites closer to their homes, either at another of your company’s facilities or at a facility where you have contracted for emergency office space
- plan on utilizing mass transit (including ferries) or carpools if telecommuting is not an option

## School and Day Care Providers Checklist

Employees will need to use roads to get to work, as well as to gain access to key facilities that need repair. Bus drivers and parents should anticipate transportation disruptions in areas through which they generally travel. Use the General Checklist. In addition –

### *During the Emergency Phase*

- work with employees to pre-establish those essential employees who should attempt to reach the workplace after an earthquake
- if at home, plan on not working for up to 72 hours after an earthquake, due to phone and travel restrictions necessary for emergency operations
- plan on a stockpile of emergency supplies (such as food, water and blankets) and equipment (including flashlights and plywood) so as to support employees and students for the first 72 hours after an earthquake
- anticipate that your school may become the site of a public shelter
- plan methods for disseminating post-earthquake information to employees, students and their families, including
  - (a) *if the phone system is operational* – using voice mail to broadcast work and staffing information to employees
  - (b) establishing key telephone contacts with radio stations
- develop programs to ensure that students and their parents are aware of potential transportation problems following earthquakes

### *During the Recovery Phase*

- explore the option of having employees report to alternate schools closer to their homes
- encourage use of mass transit (including ferries) or carpools
- anticipate the possible use of school buses as mass transit vehicles by other agencies