

Disasters and Transportation Systems



Monday, October 4, 2010

Transportation and Rebuilding

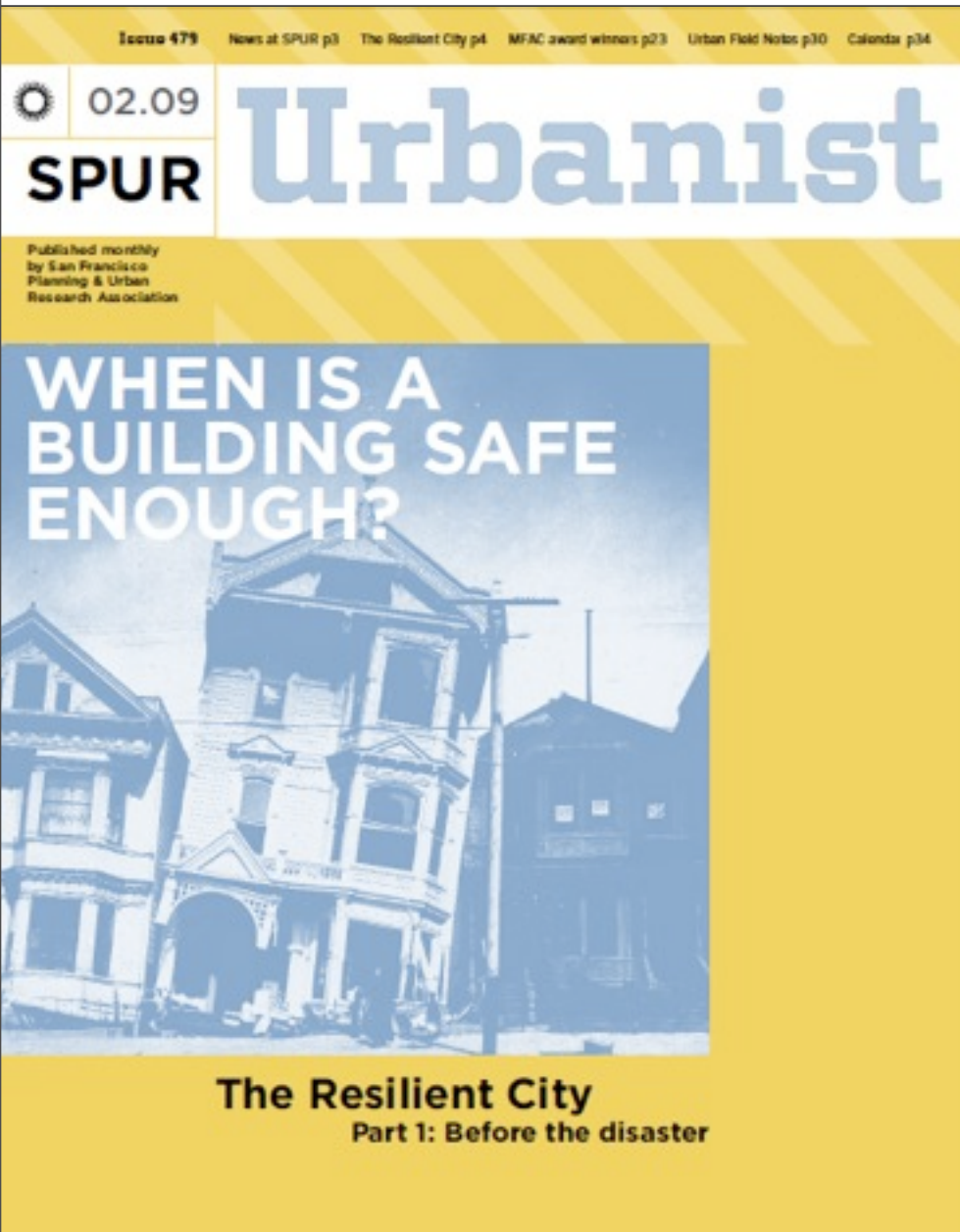


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The Resilient City Initiative



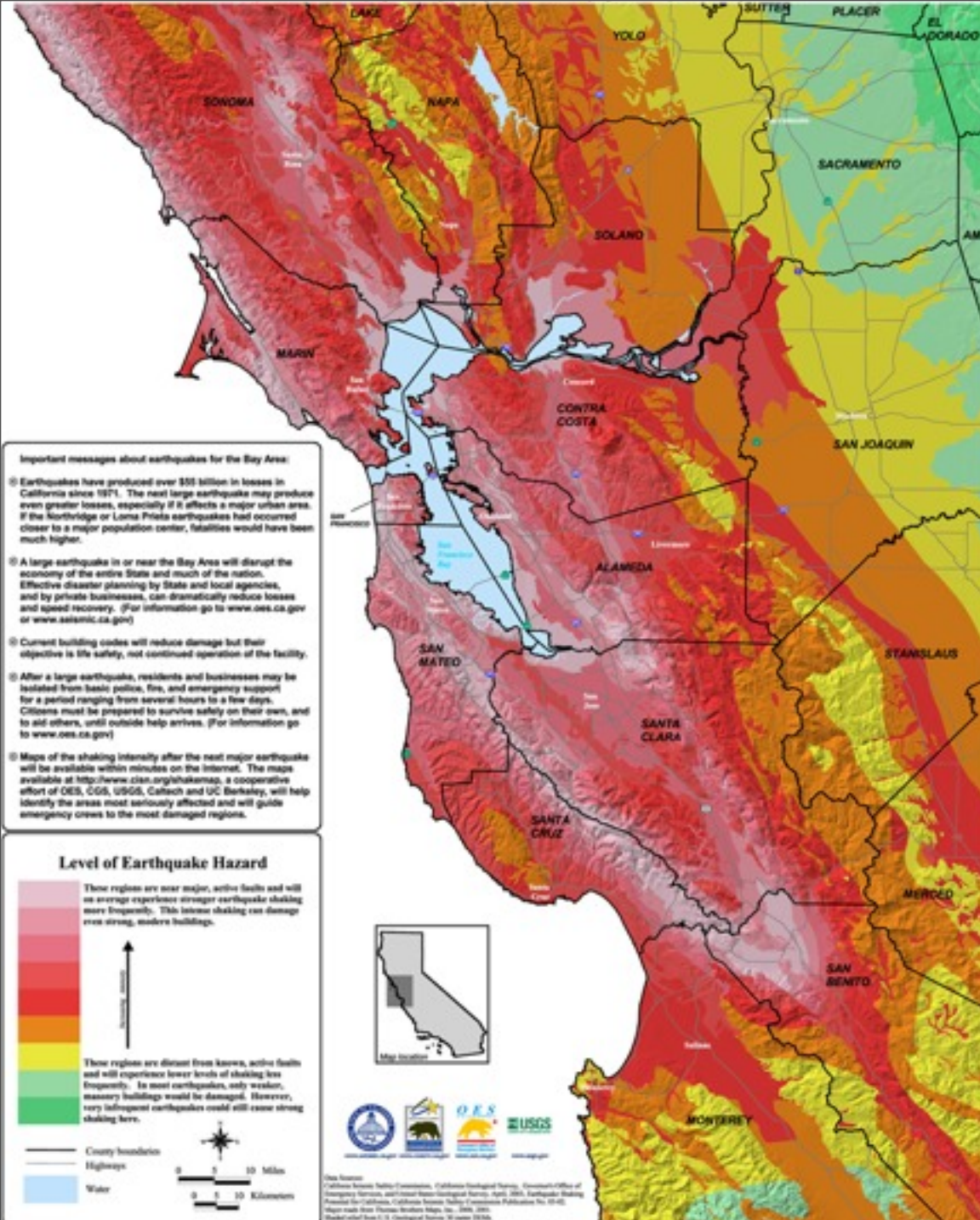
1. Before the Disaster
2. Preparing for the Disaster
3. After the Disaster

After the Disaster

1. Transportation
2. Governance
3. Planning
4. Housing



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Our regional transportation infrastructure crosses both the San Andreas Fault and the Hayward Fault

Impacts of the extreme earthquake on our transportation system

- Transit lines will collapse and rail tracks will be broken.
- Transbay road, rail and public transit links will be disrupted.
- Highways and surface streets will be closed by bridge collapses, failure of pavement and structures, and the accumulation of debris.
- Traction power system failures will immobilize electric transit modes (BART, MUNI).
- Maintenance facilities will be damaged.
- Airport runways will be rendered unusable.



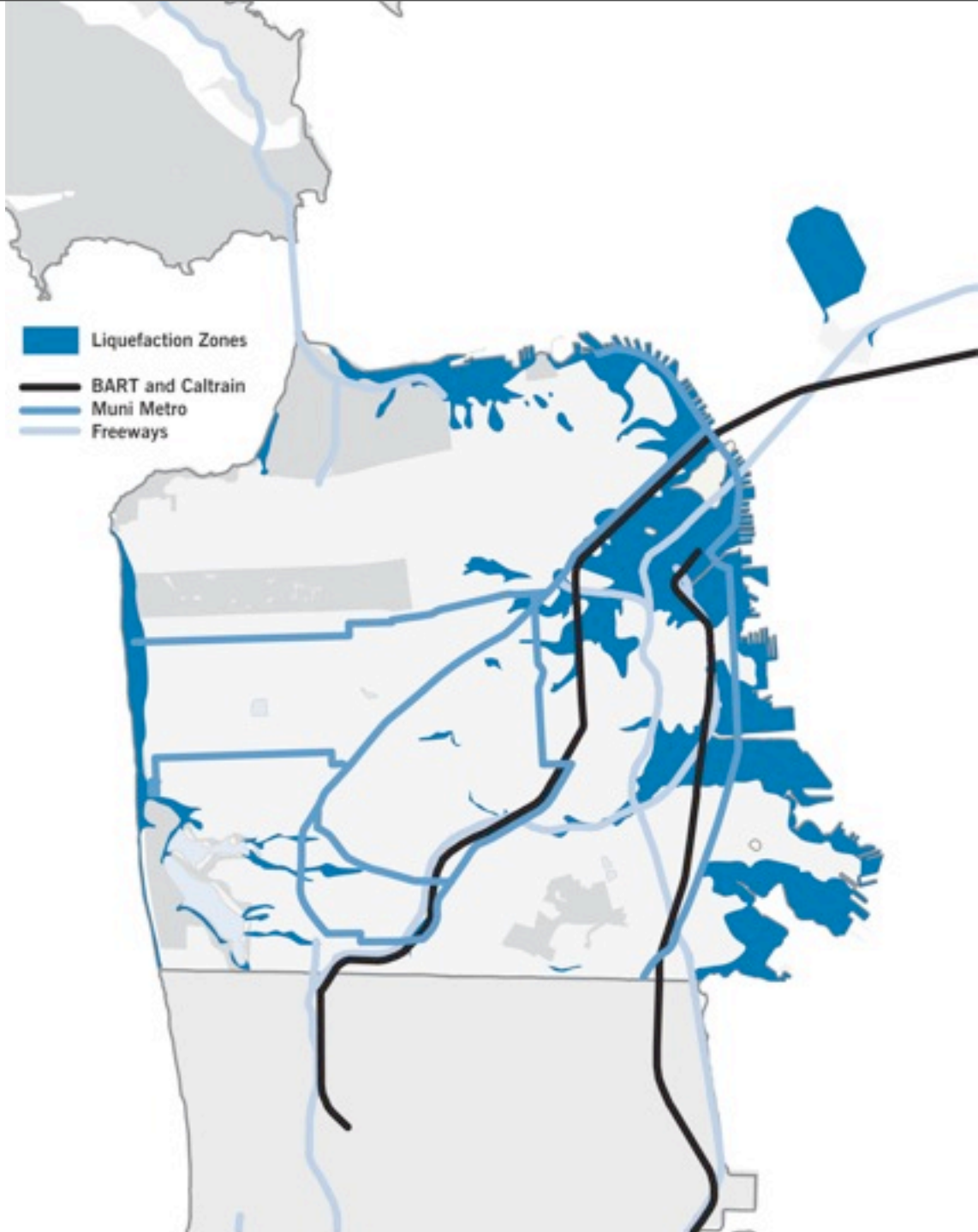
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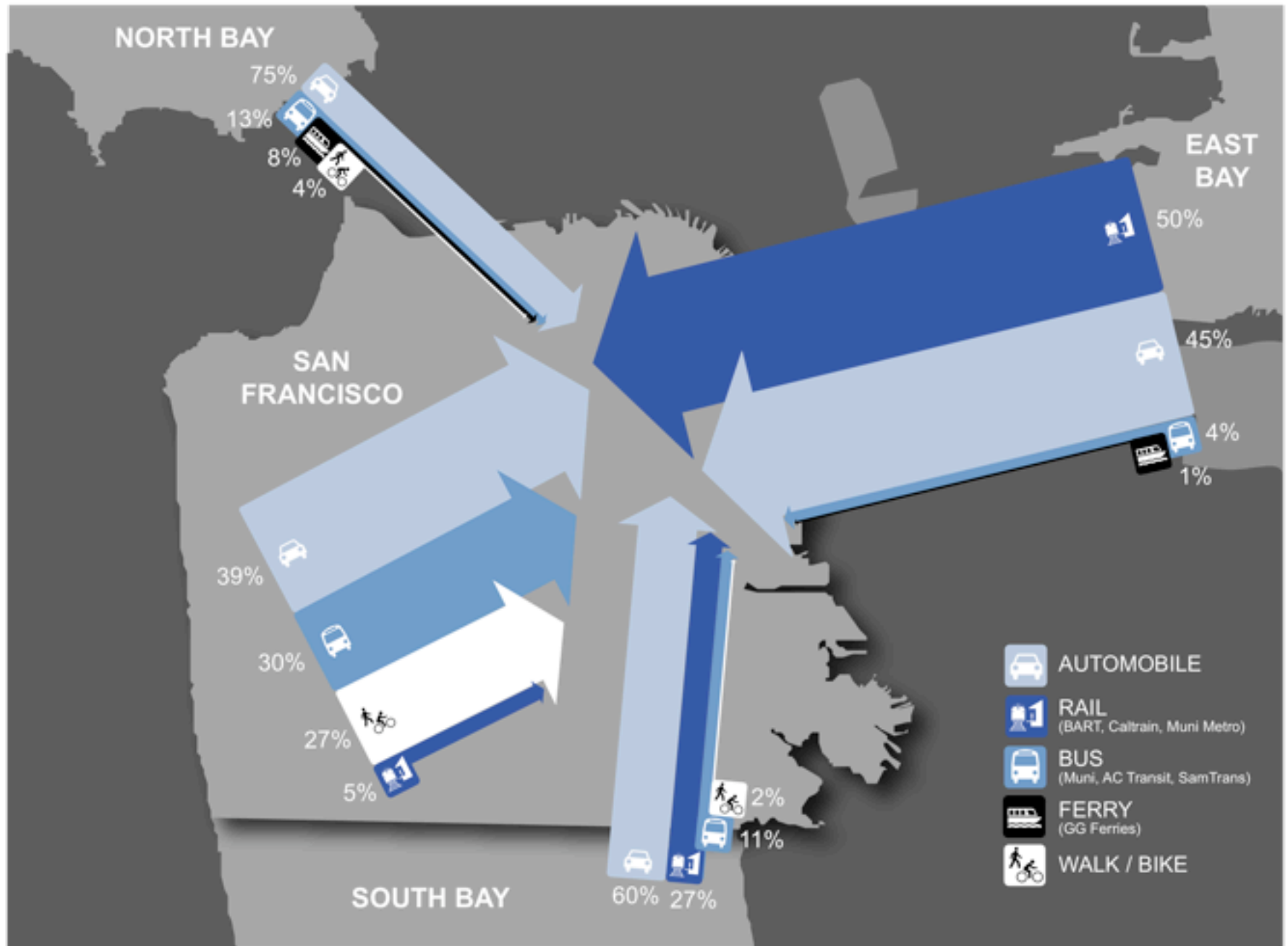
Many of our
transportation lines
cross liquefaction
zones

Source: California Department of Conservation,
Division of Mines and Geology, final edition
February 2003

http://gmw.consrv.ca.gov/shmp/download/pdf/ozn_sf.pdf

MODAL SHARE FOR TRIPS THROUGH AND TO SAN FRANCISCO

line thickness proportional to gross trips



Corridor Failure Analysis

East Bay: Transbay Tube, Bay Bridge

North Bay: Golden Gate Bridge, Ferries

South Bay: BART, Caltrain, I - 280, US - 101

Intra San Francisco – Roads and Rail

Ferries only

East Bay

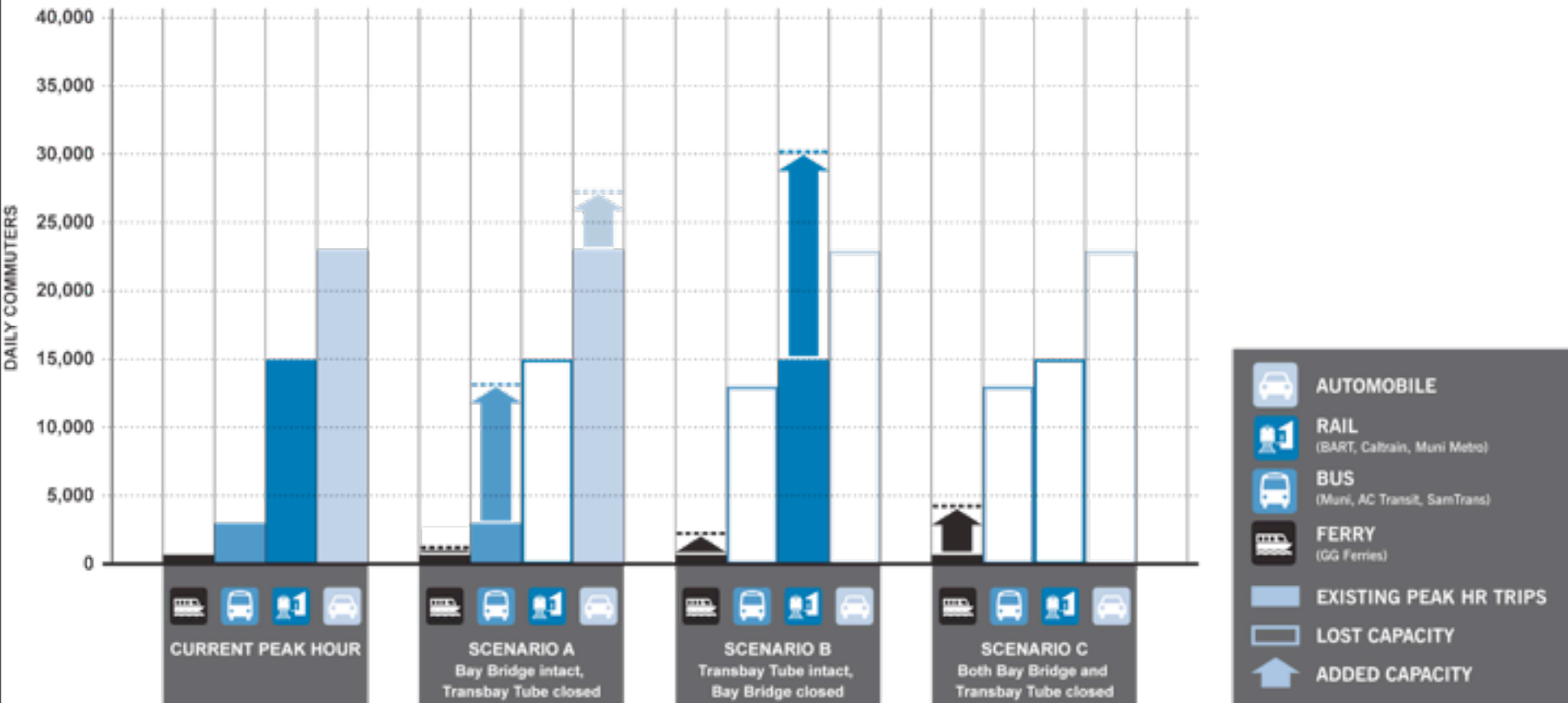


Scenario A: Bay Bridge Intact, Transbay Tube Closed

Scenario B: Transbay Tube Intact, Bay Bridge Closed

Scenario C: Both Bay Bridge and Transbay Tube Closed

East Bay



EAST BAY: Before the Disaster Tool Kit

Action Item	Responsible Agency
Create a plan to coordinate bus bridges across the Bay Bridge	AC Transit, BART and Caltrans
Create permanent bus-only lanes on approaching freeways to the Bay Bridge (I-80, I-580, and I-880).	Caltrans and AC Transit
Develop a Restricted Vehicle Plan.	Caltrans
Develop contraflow bus system.	Caltrans and MTC/ BATA
Identify emergency park-and-ride locations.	MTC and local government
Develop emergency transit plans	MTC, BART and AC Transit
Establish an emergency reserve bus fleet.	AC Transit
Establish mutual aid agreements with other bus agencies.	AC Transit, MTC

EAST BAY: Before the Disaster Tool Kit, continued

Action Item	Responsible Agency
Complete BART system improvements.	BART
Ensure ferry vessel/terminal compatibility.	WETA
Identify critical docks and piers throughout the Bay Area that could be used as ferry terminals	WETA
Develop a strategy for critical goods movement.	WETA

EAST BAY: After the Disaster Tool Kit

Action Item	Responsible Agency
Implement Bay Bridge restricted vehicle plan	Caltrans, MTC
Implement bus bridging in the event of a BART shutdown.	Caltrans, MTC
Create contraflow bus lanes on Bay Bridge.	Caltrans, AC Transit, MTC
Create bus only lanes on Bay Bridge and on approaching freeways.	Caltrans, AC Transit, MTC
Require all BART cars running into and out of San Francisco to be at full capacity	BART
Implement mutual aid actions.	MTC, AC Transit
Utilize excursion boats to enhance ferry service.	WETA

EAST BAY: Long Term Projects that Create Critical Redundancy

Action Item	Responsible Agencies
Build a second Transbay Tube. Extend Caltrain and High Speed Rail under the Bay to Oakland.	BART to lead in consultation with Muni, AC Transit and cities that would receive new BART service.

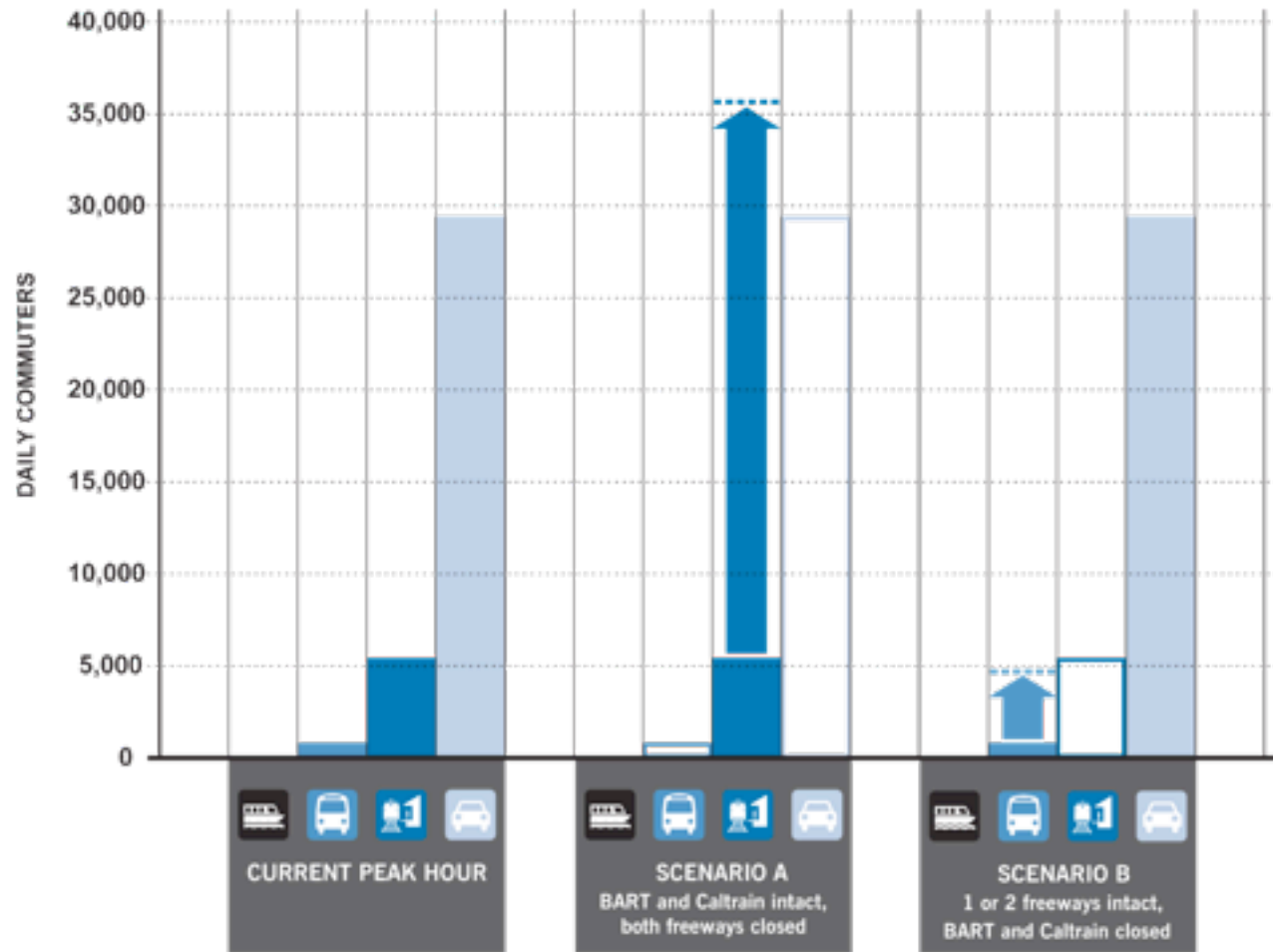
South Bay



Scenario A: Caltrain and BART intact, both freeways disrupted

Scenario B: One or both freeways remain intact, BART and Caltrain disrupted

South Bay



SOUTH BAY: Before the Disaster Tool Kit

Action Item	Responsible Agency
Establish plan for managing roadway capacity in the event of an emergency.	BART, Caltrans, SamTrans
Strengthen and retrofit as necessary Caltrain tracks and tunnels	Caltrain
Develop a restricted vehicle plan.	Caltrans
Develop emergency park and ride locations.	MTC, local governments
Establish an emergency reserve bus fleet.	Caltrain, SamTrans VTA
Enter into mutual aid agreements with other bus agencies	SamTrans, VTA, MTC

SOUTH BAY: After the Disaster Tool Kit

Action Item	Responsible Agency
Create bus bridges to manage roads with carpool lanes, bus prioritization and park and rides.	Caltrans, VTA, SamTrans
Allow for transit only lanes on 101 and 280.	Caltrans
Employ old highway system, by making use of El Camino Real, Alemany and Bayshore.	Caltrans, MTC, local government
Require carpooling for private automobiles	Caltrans
Require Caltrain and BART cars to be full.	Caltrain, BART
Use diesel locomotives on Caltrain lines if electricity is down.	Caltrain
Require valet parking at lots and garages.	Local Government

SOUTH BAY: Long Term Projects that Create Critical Redundancy

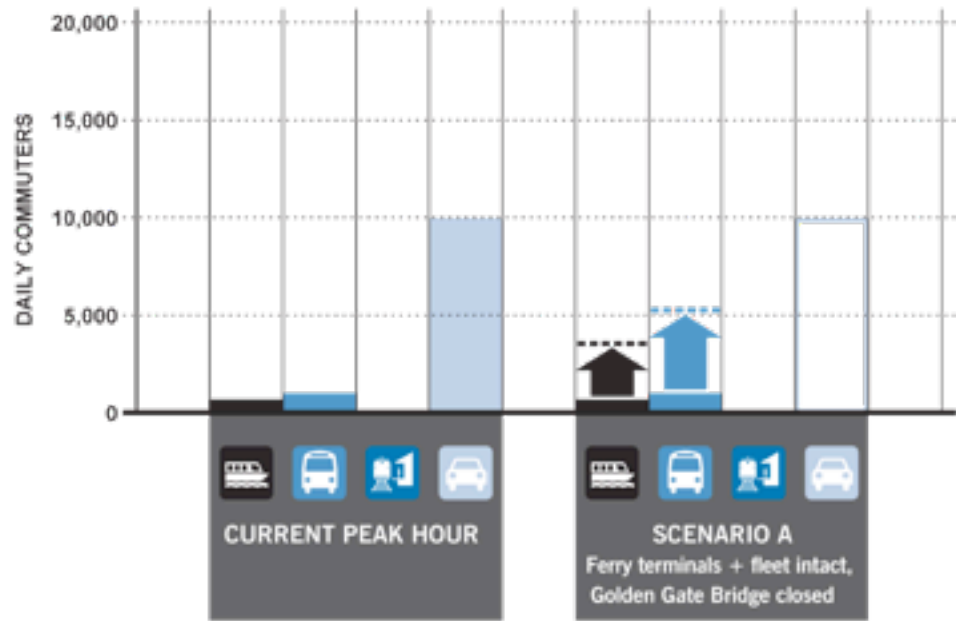
Action Item	Responsible Agency
Complete the California High-Speed Rail Project.	CHSRA
Electrify Caltrain	Caltrain
Expand Caltrain to a four-track, completely grade-separated system	Caltrain

North Bay



Scenario A:
Ferry terminals intact,
Golden Gate Bridge
Closed

North Bay



NORTH BAY: Before the Disaster Tool Kit

Action Item	Responsible Agency
Develop a Restricted Vehicle Plan.	Caltrans
Develop emergency park and ride locations.	MTC, local governments
Establish an emergency reserve bus fleet.	Golden Gate Transit
Establish mutual aid agreements with other bus agencies.	Golden Gate Transit, MTC
Develop a contraflow bus system.	MTC, BATA
Develop Emergency Transit Plans for Golden Gate Transit and Ferries, as well as BART.	Golden Gate Transit, WETA, BART
Create a plan to coordinate bus bridges from Marin to San Francisco across the Richmond-San Rafael Bridge to East Bay BART stations or into San Francisco	Golden Gate Transit, MTC

NORTH BAY: After the Disaster Tool Kit

Action Item	Responsible Agency
Require carpooling for private vehicles on the Richmond-San Rafael Bridge.	Caltrans, MTC
Implement the bus bridge plan to East Bay BART stations or onto San Francisco via the Bay Bridge.	Golden Gate Transit, BART, Caltrans
Create contraflow bus lanes on both decks of the Richmond-San Rafael Bridge.	Caltrans, MTC
Increase ferry service.	WETA

NORTH BAY: Long Term Critical Projects that Create Redundancy

Action Item	Responsible Agency
Add ferry landings in appropriate locations.	WETA, Local Ports
Coordinate SMART train service to access Larkspur Landing.	SMART, WETA
Replace Doyle Drive	SFCTA

Intra San Francisco



Scenario A:
Market Street
Subway
Closed

INTRA SAN FRANCISCO: Before the Disaster Tool Kit

Action Item	Responsible Agency
Complete a performance audit of Muni facilities, identify deficiencies and retrofit as required.	MTA
Replace and improve Muni's central control facility.	MTA
Retrofit Muni Metro stations that are not part of BART retrofit	MTA
Develop a plan for deploying diesel and hybrid buses on incapacitated electric bus routes. Prioritize routes with the highest ridership.	MTA
Enact mutual aid agreements for buses and bus service with other transit agencies.	MTA
Develop program and stockpile materials to allow Muni Metro light rail vehicles to operate on the surface if the Market Street subway tunnel is damaged.	MTA
Establish an emergency reserve fleet.	MTA
Plan for bicycle transportation as part of recovery	MTA

INTRA SAN FRANCISCO: After the Disaster Tool Kit

Action Item	Responsible Agency
Activate reserve fleet as necessary.	MTA
Deploy diesel buses on incapacitated electric bus routes.	MTA
Run Muni light rail vehicles on Market Street surface.	MTA
Create temporary transit only streets to allow for more high volume usage.	MTA
Ensure bicycle network is usable during recovery period	MTA

INTRA SAN FRANCISCO: Critical Projects that Create Long Term Redundancy

Action Item	Responsible Agency
Build San Francisco's Bus Rapid Transit Network, including Bus Rapid Transit lines on Geary and Van Ness.	SFCTA, MTA
Complete Transbay Terminal	Transbay Joint Powers Authority
Build a new BART line serving San Francisco to ensure redundancy after a disaster.	BART
Build out the bicycle network	MTA

INTRA SAN FRANCISCO: Bikes



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Ferries



Scenario A:
Only Ferries
Functioning

FERRIES ONLY: Before the Disaster Tool Kit

Action Item	Responsible Agency
Inventory existing ferry fleets at nearby cities to assess whether adaptable to current ferry landings.	WETA
Establish official Disaster Mutual Aid Agreements with other ferry operators	WETA
Consider preparing docks and ferry landings that could accommodate larger vessels.	WETA
Inventory existing Bay Area landings boat landings at marinas, ports, and ramps that could be easily adapted for ferries,	WETA

FERRIES ONLY: After the Disaster Tool Kit

Action Item	Responsible Agency
Increase ferry service where necessary.	WETA
Consider adding water taxi services where possible and economically viable.	WETA
Reroute bus services to ferry landings if many or most links are disrupted.	AC Transit, Golden Gate Transit, SamTrans, WETA

Non Corridor Specific Recommendations

1. Do a “gap analysis” to determine which agencies should lead the recovery of transportation systems after a disaster
2. Complete a performance audit of our existing transportation infrastructure
3. Engage in hazard mitigation strategies that shore up our existing transit infrastructure and add redundancy on our core transportation lines

Questions?