

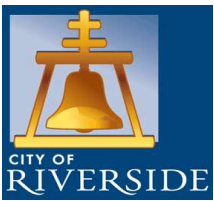
Arts & Innovation



CITY OF RIVERSIDE

Hazus-MH Based Immediate Response Earthquake Planning Tool

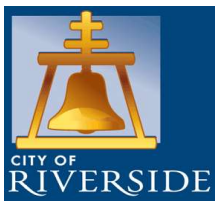
Presented by the
Phil McCormick
City of Riverside
Office of Emergency Management



THE CITY OF RIVERSIDE



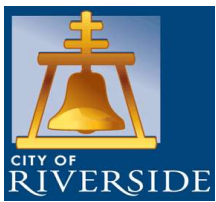
- The City is officially 91 square miles, with a sphere of influence of over 112 square miles.
 - There are several Census Tracts and master addresses (City of Riverside) that overlap between the City and County unincorporated areas
 - This caused problems as there are a large number of locations that have a Riverside address, but are not within the incorporated portion of the City
 - These areas are within the City's PD and Fire Local Mutual/Auto Aid response agreements, so all of these addresses are listed in PD/Fire CAD system
 - For this reason, it was necessary to expand the Hazus-MH Region beyond the City Limits



THE CITY OF RIVERSIDE

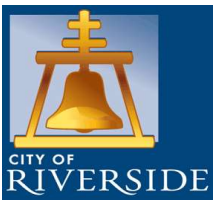


- City population is 310,00 nighttime and 370,000 daytime
- 3 major universities and 1 large JC in the City
- 2 major shopping centers and 6 major industrial areas
 - Higher than normal number of apartments and temporary housing because of the universities
- County Seat and a high number of Federal, State, and County buildings
- 6 dams/reservoirs in or immediately adjacent to the City
- Approximately 6,000 acres of citrus/agricultural area
- Transportation crossroads for rail, pipelines, and trucking out of California to the other states



THE CITY OF RIVERSIDE

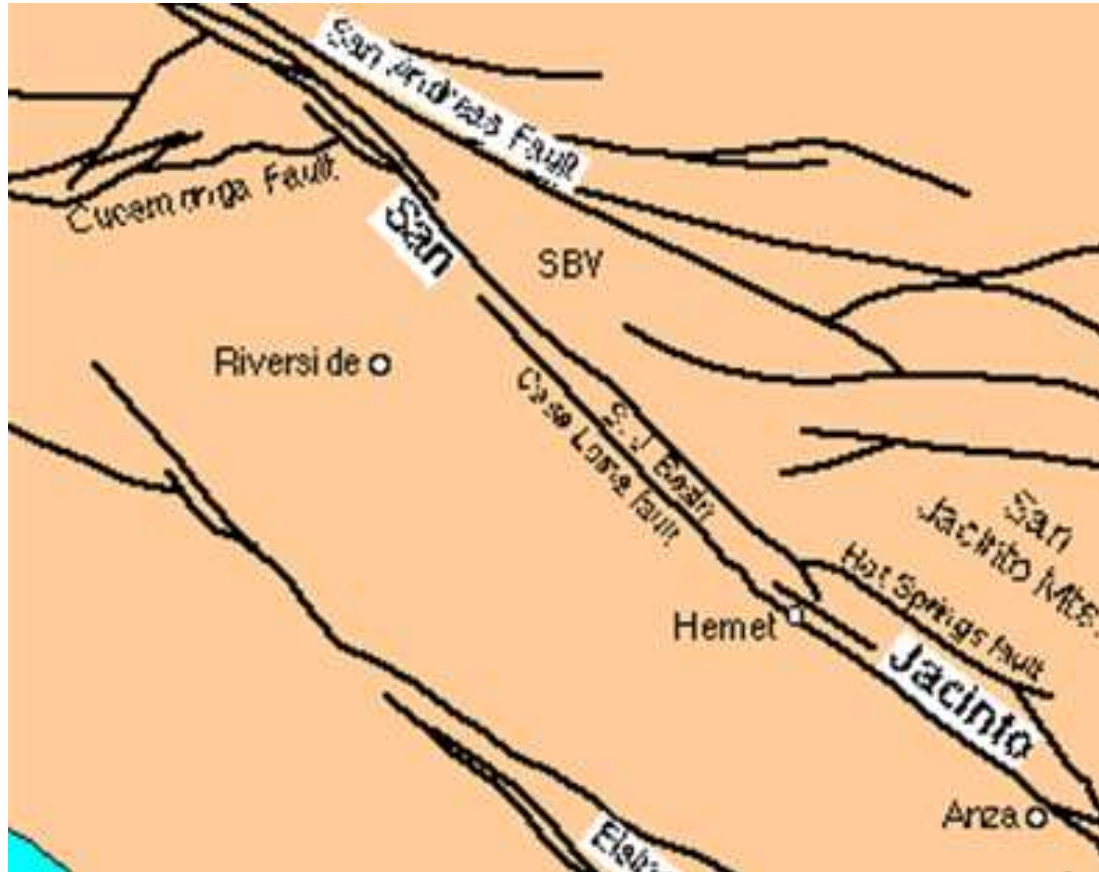


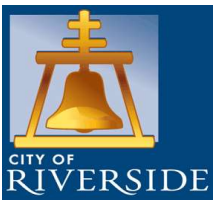


THE CITY OF RIVERSIDE



- Riverside is located in the “Earthquake Triangle”

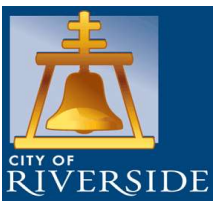




PROJECT HISTORY



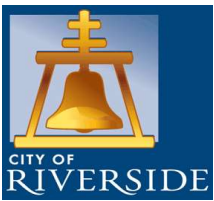
- The City had several GIS units ESRI products, but the data systems that were not linked and did not use the same location ID system.
 - City PD and Fire use a mapping system based on addresses for CAD and on their Mobile Data Mapping Systems
 - City Utility Services and Public Works use a mapping/billing system based on electric circuit and water line numbers
 - Planning, Building, and Community Development use a mapping system based on APNs
- The City was joining the County Assessor's Office to track property information and tax history based on APNs



INITIAL STEPS



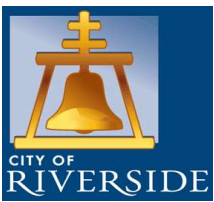
- Determine what City Departments were involved in GIS activities and who was the primary holder of each dataset.
- The City's GIS groups were introduced to Hazus-MH and shown the advantages of its use.
- The City participated in the FEMA Countywide Hazus-MH update program conducted by Dewberry, ABS Consulting and MMI Engineering.
- Determine what City Departments wanted to participate in “Hazus-MH DATA UPDATE”
 - Most of our City departments have their own GIS personnel, with the City's IT department being the primary holder of data



TEAM DEVELOPMENT



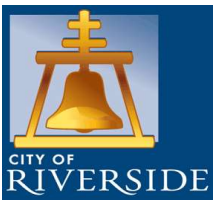
- All departments saw a value in participating in the “Hazus-MH DATA UPDATE”
- OES was identified as the lead in the project based on the need for the largest amount and different types of data.
- We had all City Department GIS personnel trained in Hazus-MH
- The team consisted of:
 - City OEM personnel
 - CERT Volunteers
 - UCR Grad Students
 - Representatives of City departments
 - Public Safety – PD and Fire
 - City GIS
 - Planning – Community Development
 - Utilities
 - Public Works
 - Finance



DATA DEVELOPMENT



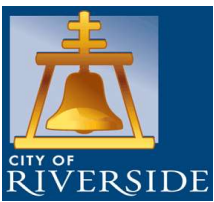
- Initial download of data from all City resources into one master GIS access database.
- There was a total of 218 different data files collected.
- The largest file was the parcel file (based on Assessor Parcel Numbers) which had 129,214 different parcels and 186,00 addresses
- Many of the systems had the same data in similar files, but some were older than others.



DATA DEVELOPMENT



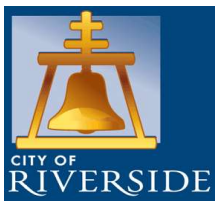
- These data files ranged from:
 - PD Beats and Crime Analysis
 - Fire 1st-In zones and Pre-Plans
 - 5,218 City power poles and 2,400 underground vault locations
 - Sewer line – lift station locations
 - Water lines, well, and tank locations
 - Liquefaction and soil zones in the City
 - Dam inundation maps
 - Trash pick-up routes & schedules
 - Park detail information
 - Utility billing and Business License information
 - County/City Assessor Parcel Number data



DATA DEVELOPMENT



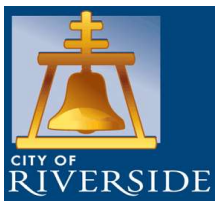
- The 1st step was to identify what fields were necessary for each group.
 - We looked at all of the fields in all of the files, determined which were duplicates (with different names) and consolidated those that we could.
- We then added the standard Hazus-MH fields to each file.
- We then expanded the Hazus-MH Occupancy Code Types:
 - RES1A - Single Family Dwellings w/Commercial Business
 - RES5A – Student Dorms/Housing owned by university
 - COM1B - Pharmacy
 - COM4A - Vet – Kennel
- Each additional category became a layer in ArcMap
- This did not change the basic Hazus-MH categories as we re-associated the addition categories using CDMS



WHAT HAVE WE DONE WITH THE DATA



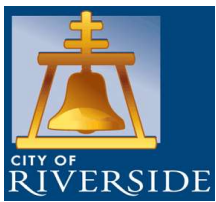
- We have created a master database set of all of the City's information.
- We are adding information boxes on the Fire Inspection Reports to help with the final data information such as building type, area, occupancy type, etc.
- Updating data will be a yearly activity.
- The Hazus-MH layers have been added to our Reverse 911 GIS map.
- PD, Fire, Public Works, and Utilities now want us to add our expanded layers to their in-unit computers for field events.
- Some occupancy data is being added to PD-Fire Cad such as:
 - FFL residences, day care sites, etc.



WHAT HAVE WE DONE WITH THE DATA





- Maps and data have been used for City's LHMP
- We have been using the data during our Golden Guardian drills as well as our EOC section training for floods, fires, and earthquakes.
 - By policy, whenever possible, a Hazus-MH run is done as soon as we receive notice of a 5.0 earthquake in the region
- During one of our large earthquake drills, the concept of the Earthquake Planning Guide was born.
- What happens when you ask your EOC personnel where the damage, debris, and problems are going to be during a large quake?
 - You get 20 different answers and most are wrong



THE EARTHQUAKE PLANNING GUIDEBOOK







**CITY OF RIVERSIDE - FIRE DEPARTMENT
OFFICE OF EMERGENCY MANAGEMENT**

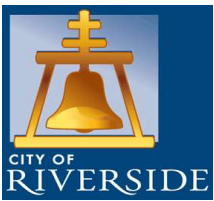
**EARTHQUAKE PLANNING GUIDE
FIELD COMMAND VERSION**

**A GUIDE FOR COMMAND AND MANAGEMENT DURING THE INITIAL STAGES OF
A DAMAGING EARTHQUAKE.**





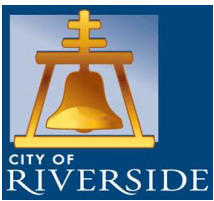
**THIS DOCUMENT IS (FOUO) FOR OFFICIAL USE ONLY
TO BE USED FOR PLANNING PURPOSES ONLY**



THE EARTHQUAKE BOOK



- The Earthquake Planning Guide is designed to provide immediate planning and response information for field personnel and all local dispatch centers after an event.
- It provides a common operating pictures for all City Departments - PD, Fire, EMS, Streets, and Utilities on:
 - The potential for damage and severity from an earthquake
 - Where the potential damage will probably occur
 - What level of and where debris may be found
 - What locations may be impacted by the quake
- Two versions
 - EOC Guide - Detailed Hazus-MH info, lists, and Maps
 - Field Guide – Overview and Maps
- Book is identified as a FOUO document for **planning purposes only**
 - **Not available for public review**

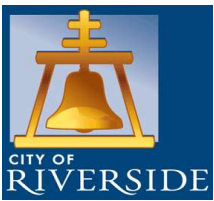


THE EARTHQUAKE BOOK



- What the book contains:
 - Sections covering identified/known earthquakes in the area
 - Each section has three magnitude levels of earthquakes - 5.0, 6.0. 6.5
 - Each level has a set of standardized maps (for consistency and ease of understanding) created by OEM using Hazus-MH data plus an expanded day and nighttime overview of the event
 - Section scenarios include:
 - San Jacinto, Elsinore, Redlands, and Beaumont Faults
 - Scenario sites were not totally artificial, but were developed with the assistance of MMI based on prior location activity and capability of the fault to generate the listed magnitudes
 - An additional section was added with the Golden Guardian site of a 7.8 quake on the San Andreas fault in the Salton Sea.





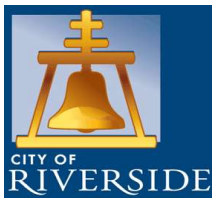
THE EARTHQUAKE BOOK



- What the book contains:
 - A dam inundation section has been added showing potential flooding from our 7 dams
 - A URM section showing the location of the 252 URM buildings in the city.
 - An evacuation route map based on the 7.8 quake has been added
- All Legends use “community friendly” terminology
 - Easier to explain and justify to people
 - Not as alarming or “threatening”

- ✱ Little or No Concern
- ✱ Minor Concern
- ✱ Moderate Concern
- ✱ Significant Concern

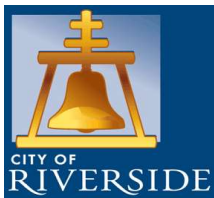
- Light
- Moderate
- Strong
- Very Strong
- Severe



CITY DAMAGE NIGHTTIME DATA SHEET



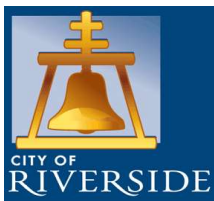
HAZUS-MH Loss Estimation				
Estimated Economic Loss (\$ Billions)				
Category	Description	Range		
General Building Stock	Building Damage	0.20 - 0.70		
	Building Contents	0.00 - 0.10		
	Business Interruption	0.10 - 0.30		
Infrastructure	Lifelines Damage			
Total		0.30 - 1.20		
Estimated Building Damage (Thousands of Buildings)				
Description	Residential	Commercial	Other	Total
Minor	8 - 30	1 - 4	0 - 1	10 - 40
Major	0 - 1	< 1.0	< 1.0	0 - 2
Total	8 - 40	1 - 5	0 - 1	10 - 40
Estimated Casualties: Night Time				
Severity Level	Description	# Persons		
Level 1	Medical Aid	50 - 100		
Level 2	Hospital Care	10 - 30		
Level 3	Life-threatening	< 20		
Level 4	Fatalities	< 20		
Estimated Shelter Needs				
Type	Households	People		
Displaced Households	140 - 600	150 - 600		
Public Shelter				
Debris Summary				
Debris Type	Debris Amount (in thousands of tons)			
Brick, Wood and Other	53			
Concrete and Steel	147			
Total	200			
Totals only reflect data for those census tracts/blocks included in the user's study region.				
Disclaimer: The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation methodology. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.				
Earthquake Information				
Location:				
Origin Time: NIGHT				
Magnitude: 7.8				
Epicenter Latitude/Longitude: 33.35° - 115.71°				
Depth & Type: 7.5 km				
Fault Name: SAN ANDREAS FAULT				
Maximum PGA: 0.24g				
Ground Motion/Attenuation: ShakeMap				
Information Sources:				
Comments: M7.8 SOUTHERN SAN ANDREAS SCENARIO				
Population and Building Exposure (2002 D&B) (2000 Census)				
Population: 346,728				
Building Exposure: (\$ Millions)				
Residential	15,792			
Commercial	3,075			
Other	1,453			
Total	20,320			
State:				
Counties: - Riverside, CA				
Major Metro Area: CITY OF RIVERSIDE				



CITY DAMAGE DAYTIME DATA SHEET

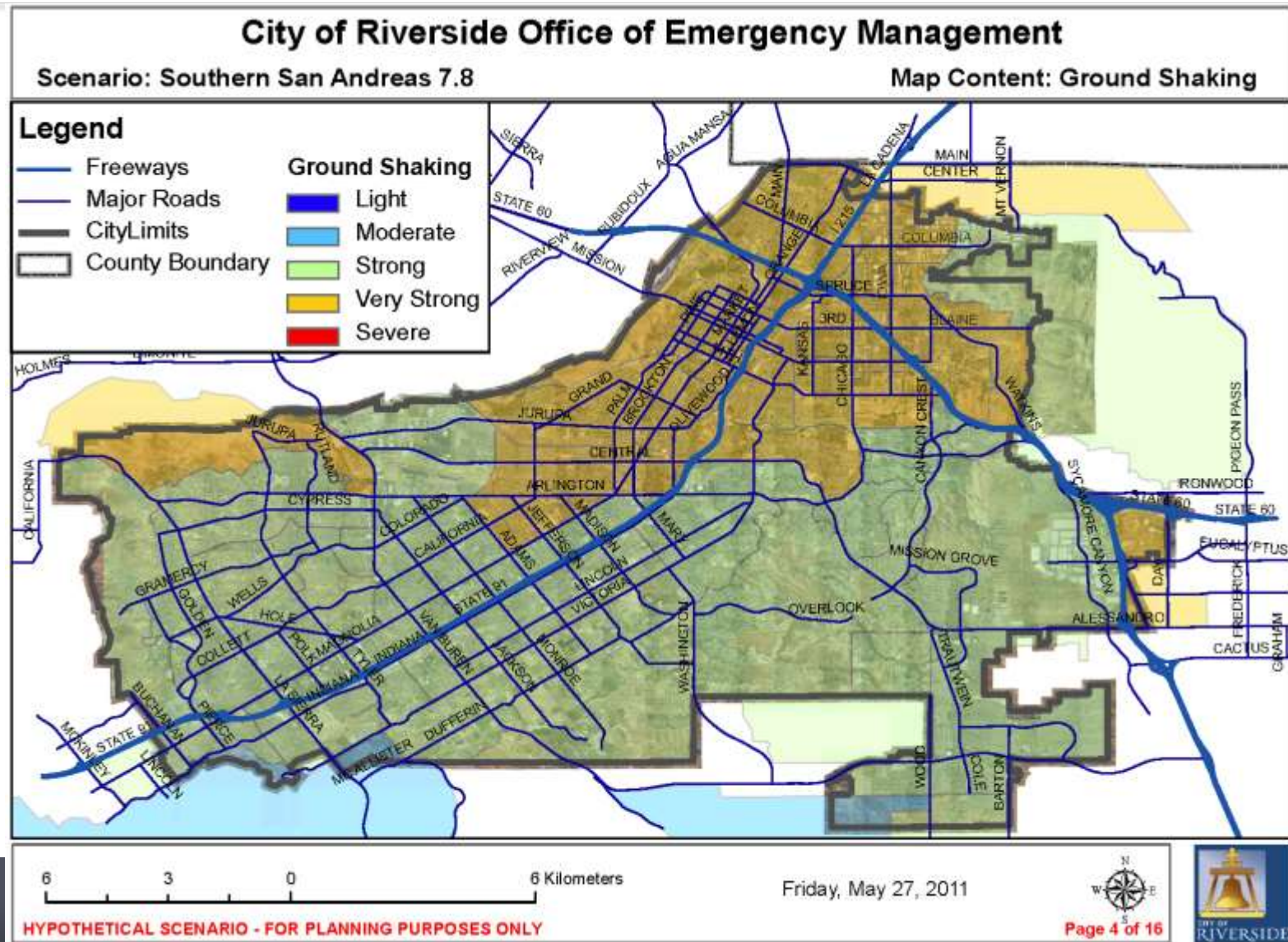


HAZUS-MH Loss Estimation				
Estimated Economic Loss (\$ Billions)				
Category	Description	Range		
General Building Stock	Building Damage	0.20 - 0.70		
	Building Contents	0.00 - 0.10		
	Business Interruption	0.10 - 0.30		
Infrastructure	Lifelines Damage			
Total		0.30 - 1.20		
Estimated Building Damage (Thousands of Buildings)				
Description	Residential	Commercial	Other	Total
Minor	8 - 30	1 - 4	0 - 1	10 - 40
Major	0 - 1	< 1.0	< 1.0	0 - 2
Total	8 - 40	1 - 5	0 - 1	10 - 40
Estimated Casualties: Commute Time				
Severity Level	Description	# Persons		
Level 1	Medical Aid	90 - 400		
Level 2	Hospital Care	30 - 110		
Level 3	Life-threatening	20 - 70		
Level 4	Fatalities	10 - 30		
Estimated Shelter Needs				
Type	Households	People		
Displaced Households	140 - 600	150 - 600		
Public Shelter				
Debris Summary				
Debris Type	Debris Amount (in thousands of tons)			
Brick, Wood and Other	53			
Concrete and Steel	147			
Total	200			
Totals only reflect data for those census tracts/blocks included in the user's study region.				
Disclaimer: The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical and observed ground motion data.				
Earthquake Information				
Location:				
Origin Time: DAY				
Magnitude: 7.5				
Epicenter Latitude/Longitude:			33.35/-115.71	
Depth & Type: 7.6 km				
Fault Name:			SAN ANDREAS FAULT	
Maximum PGA: 0.24g				
Ground Motion/Attenuation: ShakeMap				
Information Sources:				
Comments: M7.5 SOUTHERN SAN ANDREAS SCENARIO				
Population and Building Exposure (2002 D&B) (2000 Census)				
Population:			346,728	
Building Exposure: (\$ Millions)				
Residential	16,792			
Commercial	3,075			
Other	1,463			
Total	20,320			
State:				
Counties:			- Riverside, CA	
Major Metro Area: CITY OF RIVERSIDE				



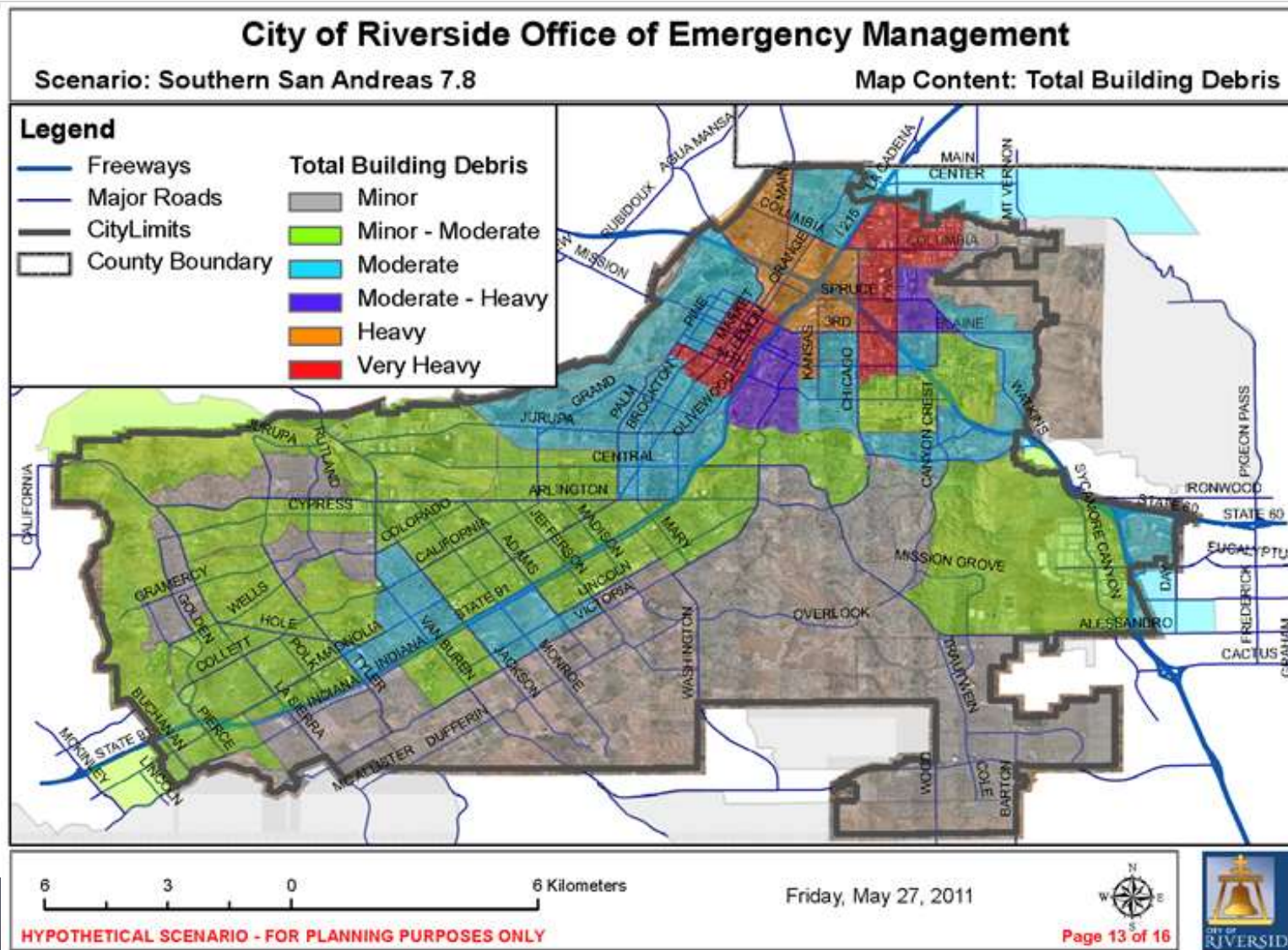
CITY DAMAGE MAPS

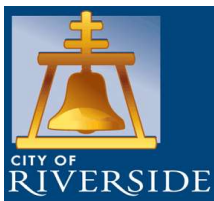
GROUND MOTION – 7.8 BASE MAP



CITY DAMAGE MAPS

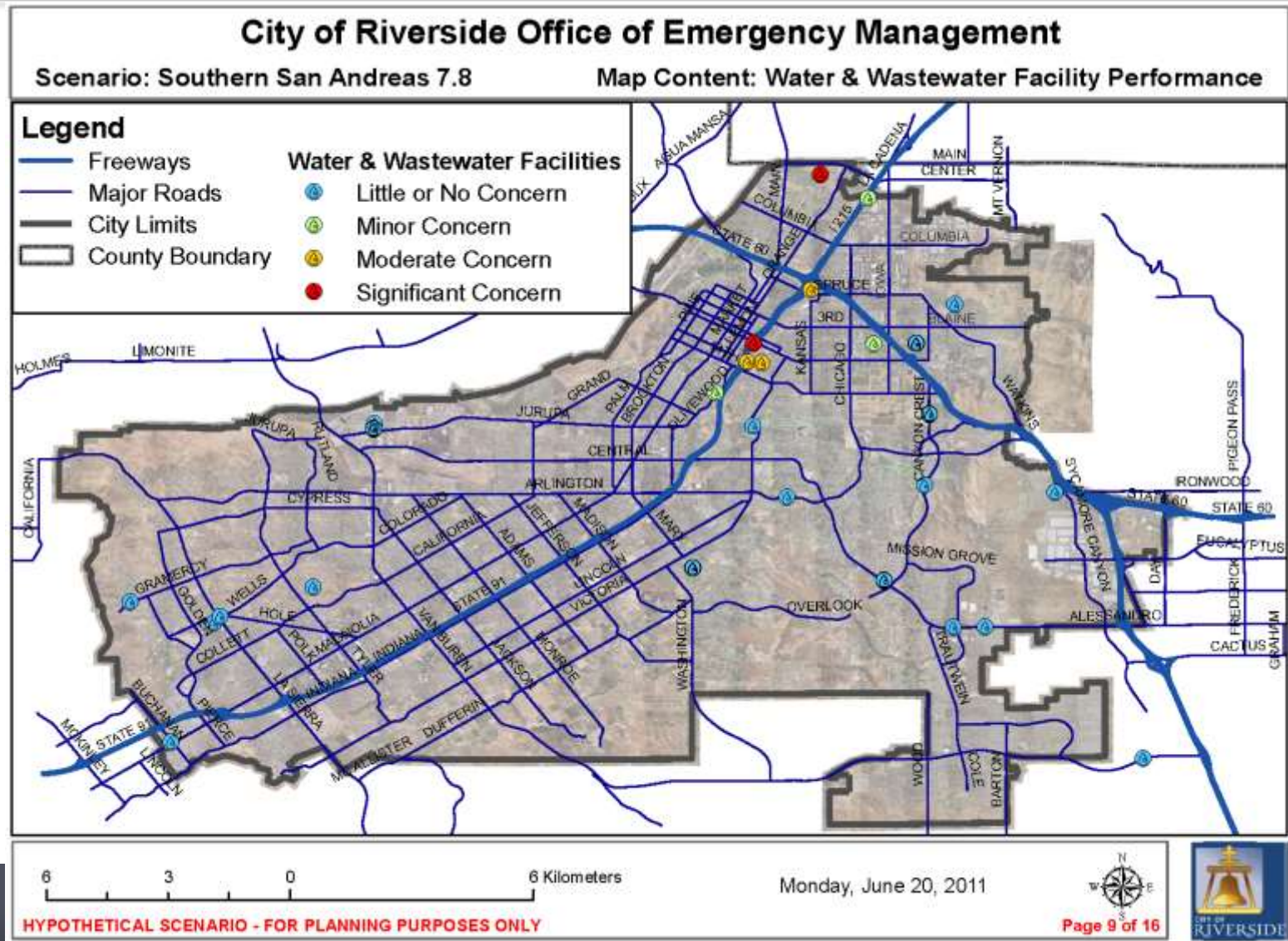
DEBRIS





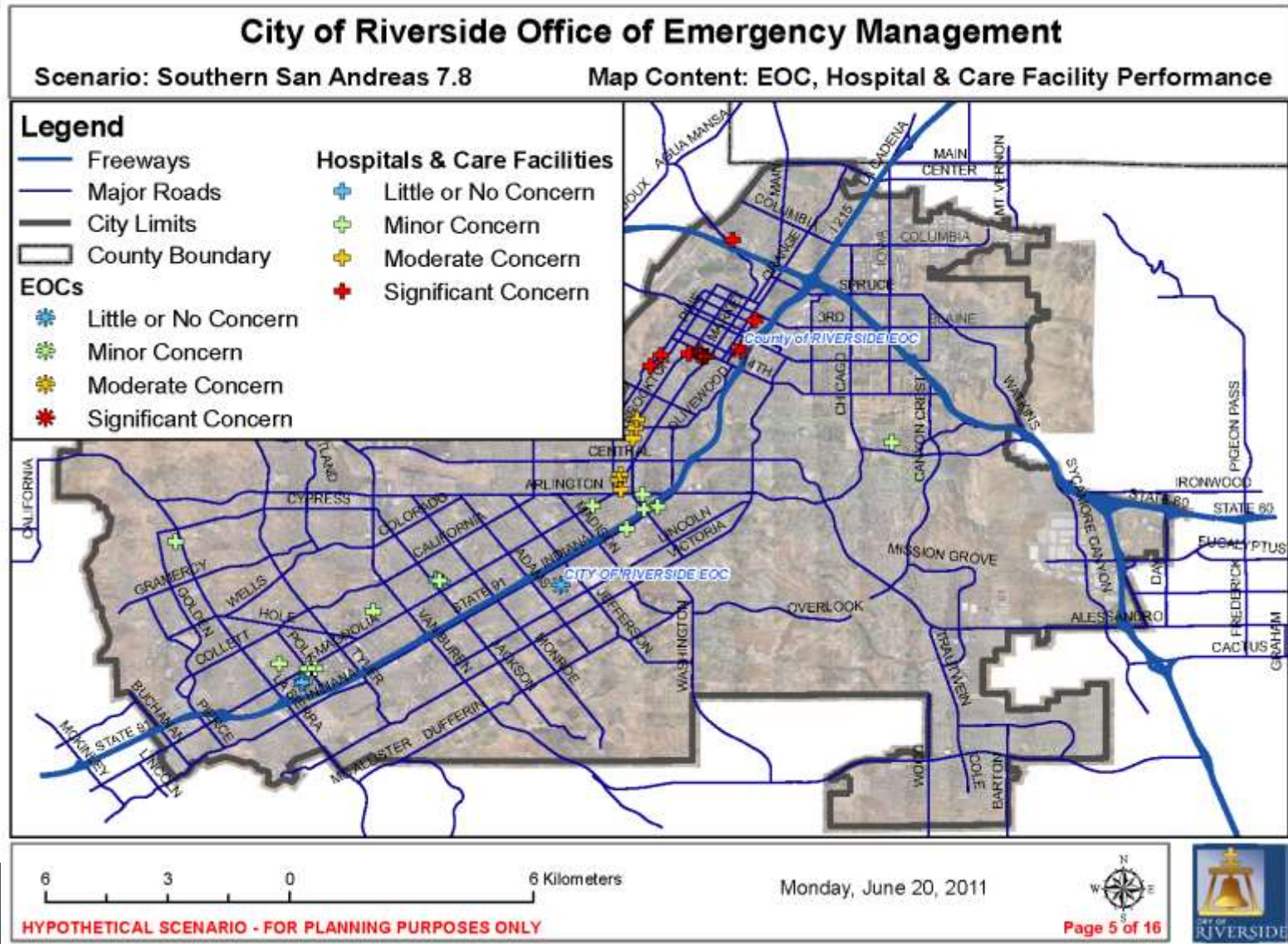
CITY DAMAGE MAPS

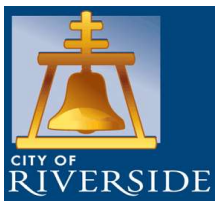
Water & Waste Water Facilities



CITY DAMAGE MAPS

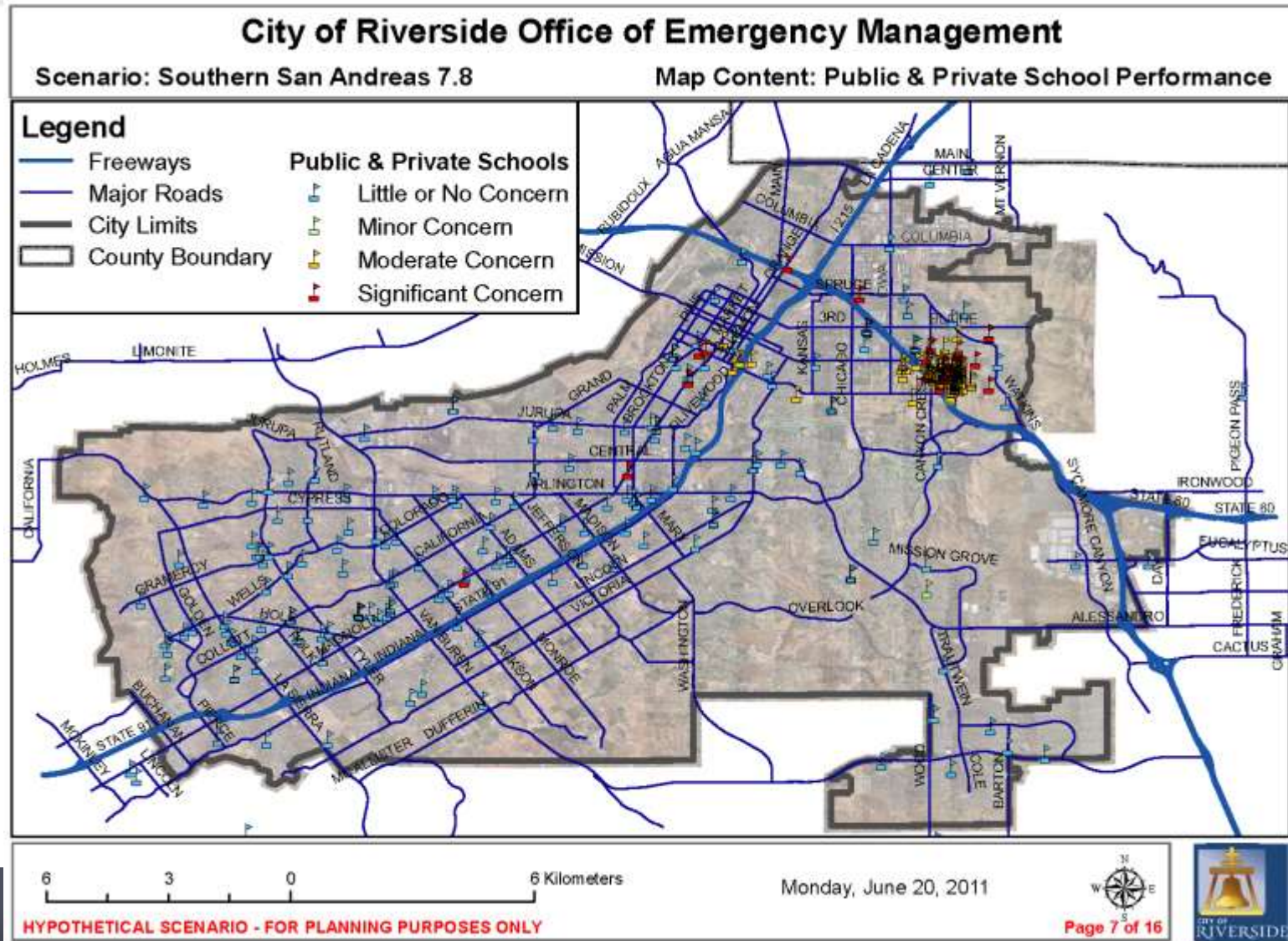
HOSPITALS/CARE FACILITIES

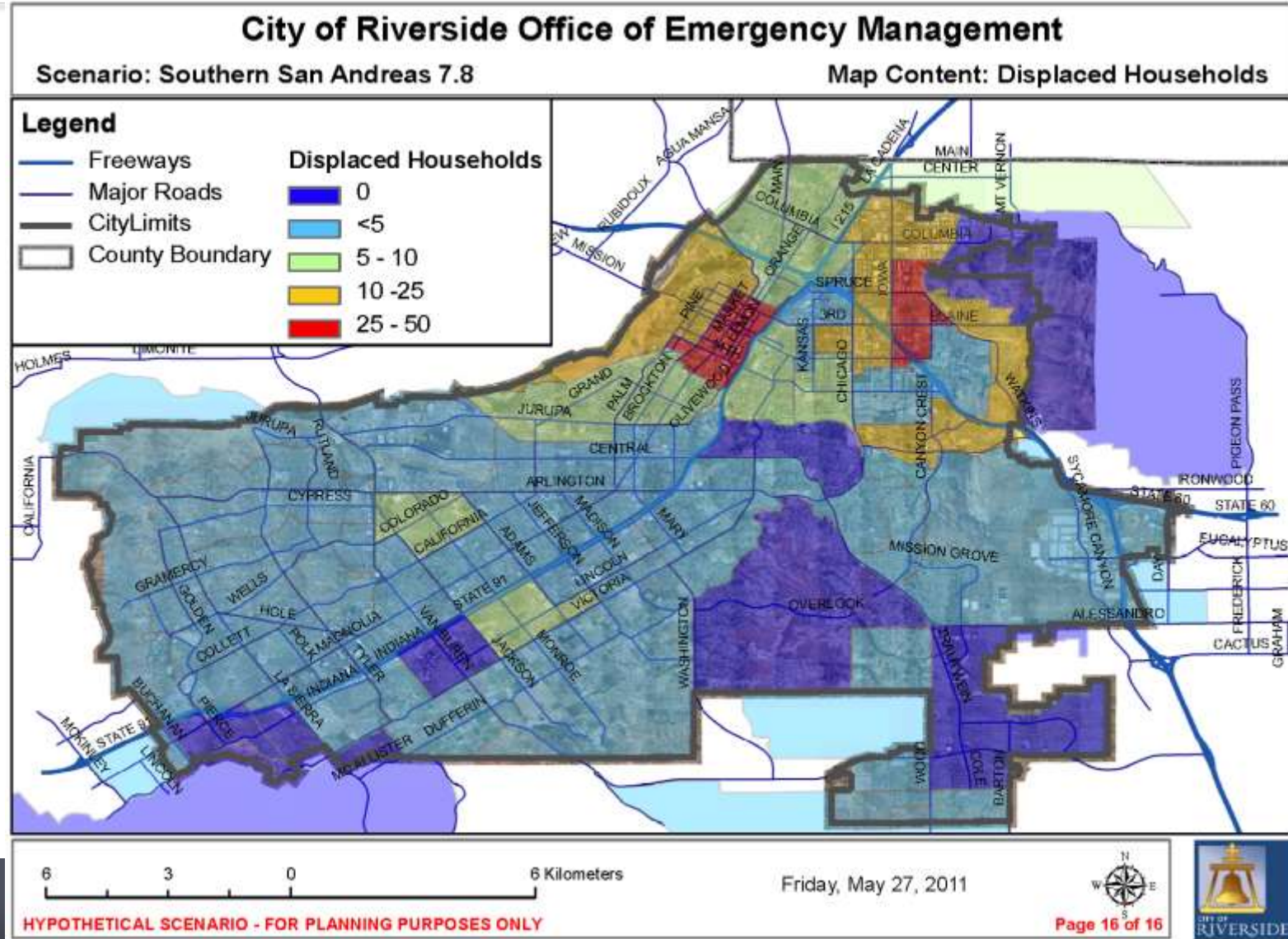




CITY DAMAGE MAPS

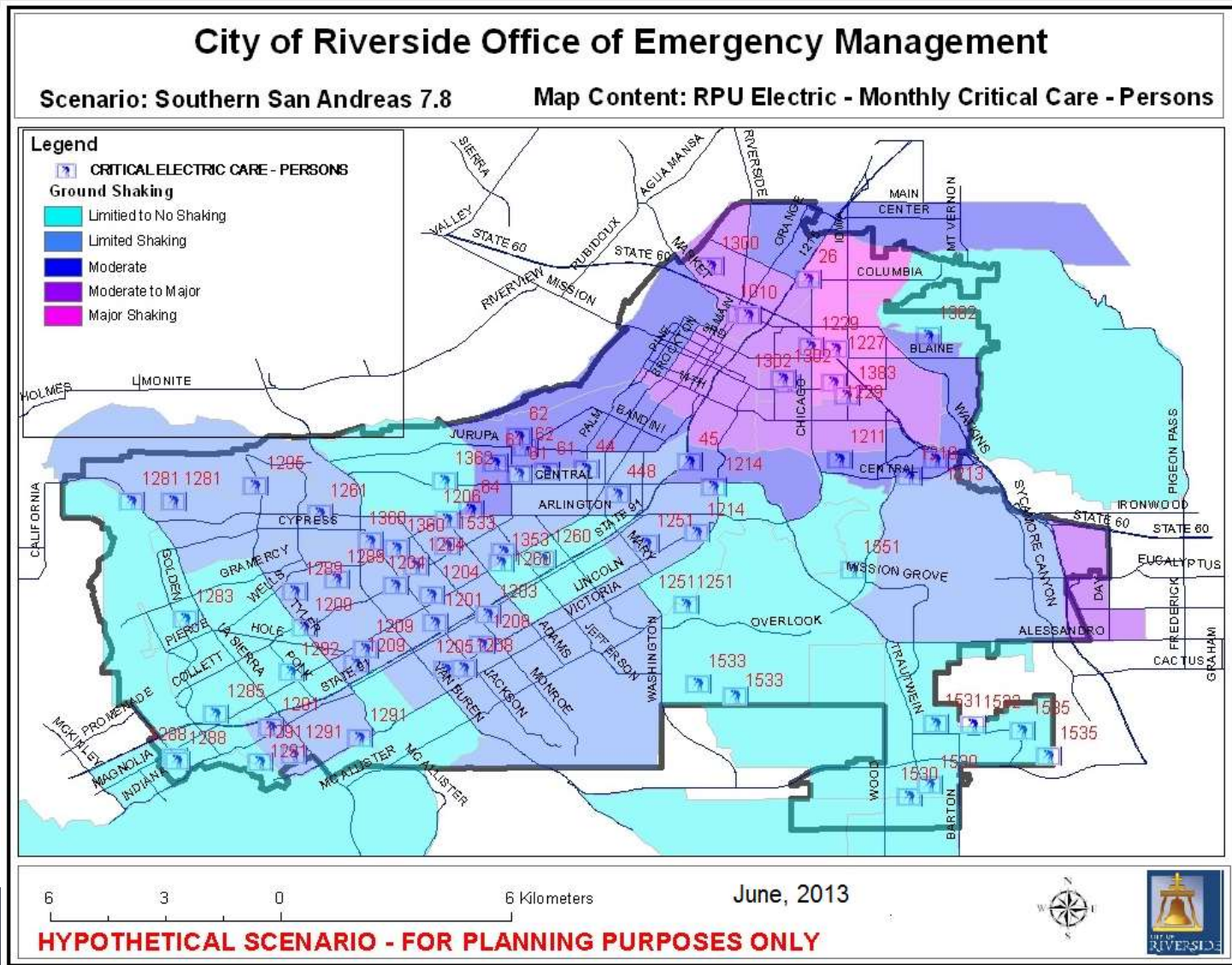
SCHOOLS

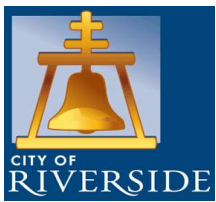




CITY DAMAGE MAPS

UTILITIES CRITICAL CARE-PERSONS





QUESTIONS ??



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