



# Risk Assessment for Emergency Shelter Planning

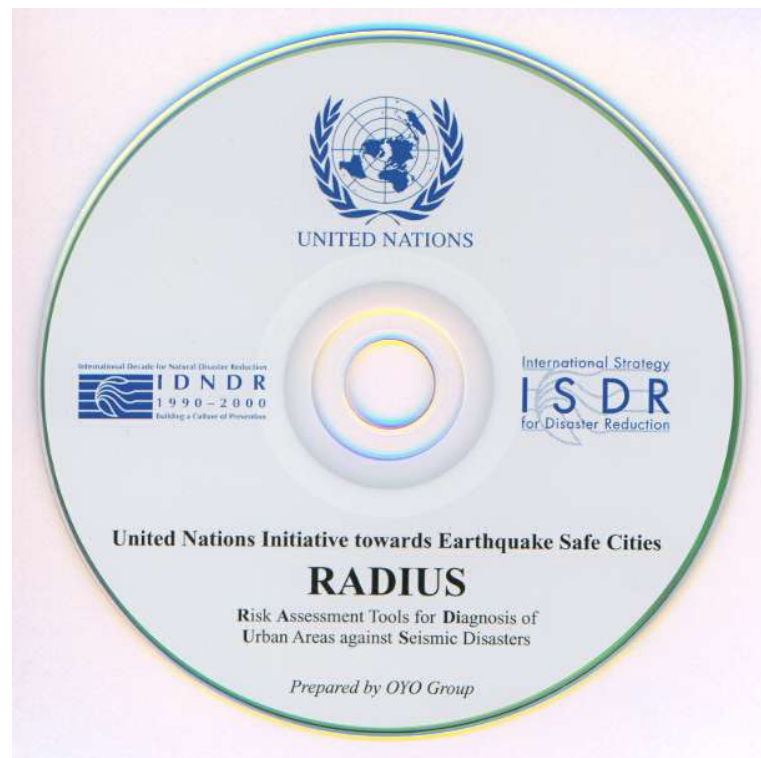
UN-Habitat, IFRC, ProVention Consortium  
Global Risk Identification Program (GRIP)  
- Global Emergency Shelter Cluster -

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- How many killed people are expected?
- How many injured people are expected?
- How many hospital beds are available?
- How many displaced people are expected?
- What are the most affected areas?
- Where are the safer areas?
- How many shelter-buildings are available?

## RADIUS Tool

**CD-ROM** including  
TOOLS and RADIUS city  
reports. Distributed for  
**FREE** to city  
administrators of cities  
worldwide by the UN and  
RADIUS institutes.



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# Software Purposes

- To facilitate preliminary estimation of earthquake damage
- To be used by city administrators and general public, not for research purposes
- To assist in decision making
- To raise awareness of earthquake risk



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*Program uses commonly available city information*

- Shape of target region (entered as a grid)
- Population and its distribution
- Building Inventory and its distribution
- Ground Characteristics (Soil conditions)
- Lifelines information
- Choice of Scenario Earthquake and its parameters

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- Ground Shaking Distribution (PGA or MMI Intensity)
- Building damage
- Lifelines damage
- Human Impact (number of deaths and injuries)
- Summary Tables and Thematic Maps showing the results

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- Shelter planning
  - Quantity
  - Location
- Legal and institutional agreements
  - Responsibilities at all levels
  - Inter-city agreements
- Revision of existing contingency plans
- Simulation exercises

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# Immediately after the disaster



- Very fast, accurate assessment of actual damages
- Total physical and human impact
- Most affected areas
- Identification of safe areas
- Shelter buildings that remain available
- Response facilities still working (hospitals, fire stations, police stations)
- Accessibility conditions

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# Immediately after the disaster



- Assessment of response capabilities
- Setting up response priorities
- Optimization of response resources
- Refinement of response strategy
- Monitoring of response implementation
- Coordination and updating of response process

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- Preparation of recovery scenarios to adjust shelter operations
- Preparation of recommendations for recovery planning
- Control for no risk re-creation
- Better coordination with early recovery activities
- Design of exit strategies

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- Pilot applications
  - Mozambique, Mexico, Nepal
- Training modules
  - Training for trainers
  - Self-teaching materials
- Large-scale implementation strategy
  - Recommendations

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## In parallel

- Develop a new tool for floods risk
  - Urban areas – Existing tool
  - Rural areas – New tool
- Timeline
  - First phase
    - 3 Pilot applications – July 2009
    - Training modules – December 2009
    - New tool for Flood Risk – August 2009
  - Second phase
    - Pilot applications of new tool – December 2010

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# Long-term Implementation strategy



- Users
  - Local emergency response organizations
  - Local Red Cross → International organizations
- Time requirements
  - Training and installation: 2-3 weeks
  - Pre-Disaster Shelter plan: 6 months
- Geographic scope
  - High-risk – Low-capacity countries
  - Medium and large cities (5/country)

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# Risk Mapping for Strategic Planning of Shelter Response in Tijuana, Baja California, México



**Antonio Rosquillas and Luis  
Moreno**  
Municipio de Tijuana



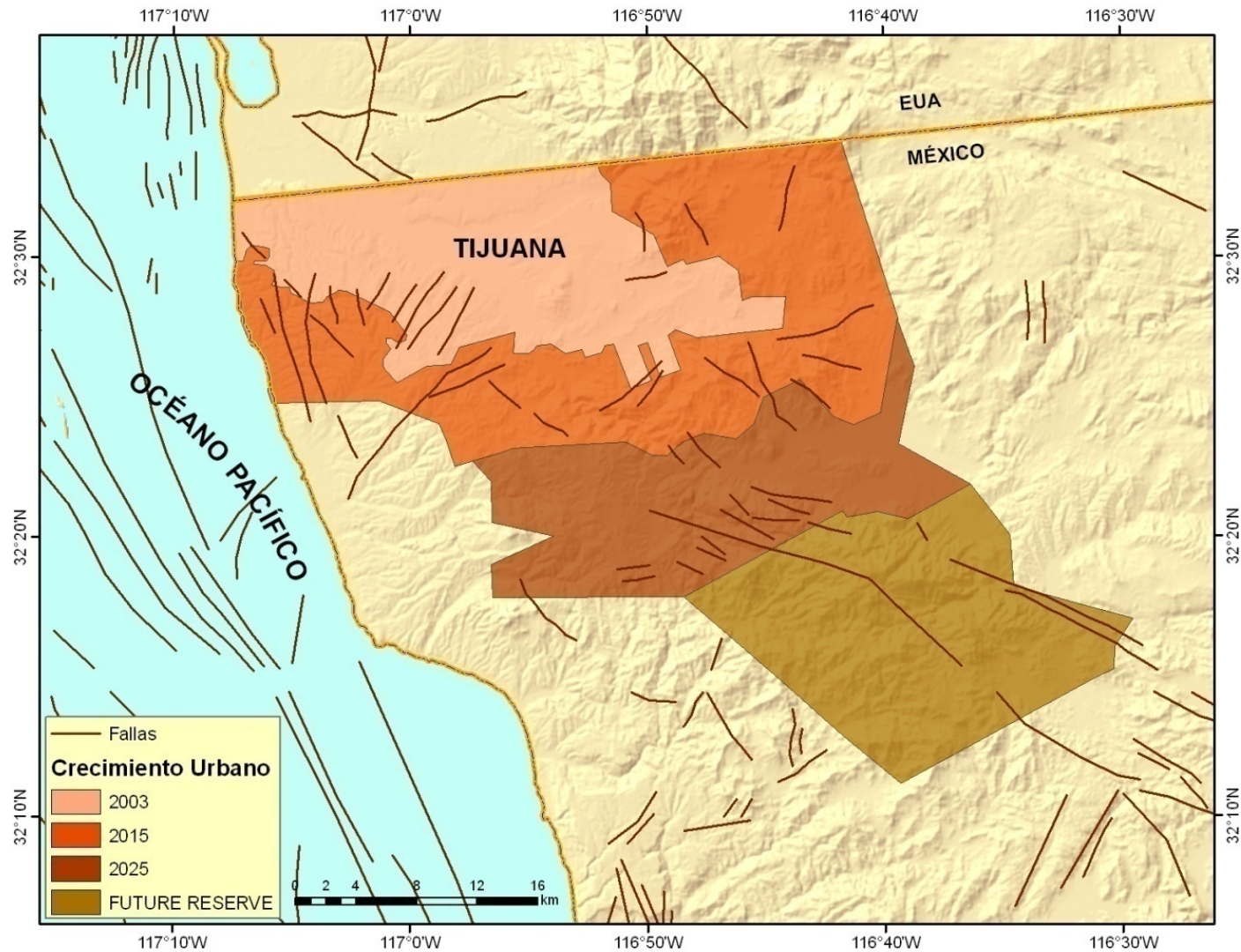
H. AYUNTAMIENTO  
TIJUANA B.C.

June 2009

CENTRO DE INVESTIGACIÓN CIENTÍFICA Y  
DE EDUCACIÓN SUPERIOR DE ENSENADA.

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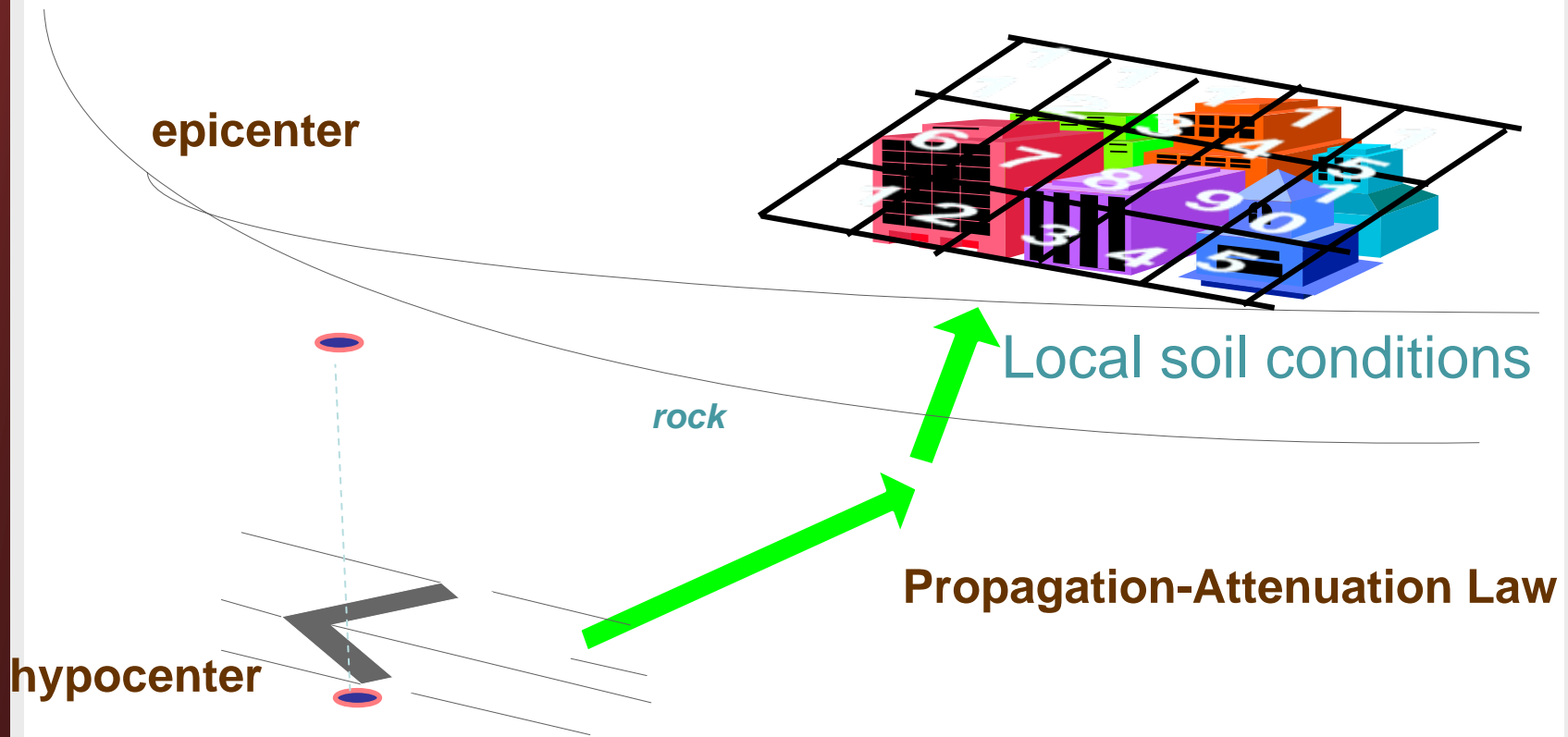
# Area of Study: Tijuana Urban Area



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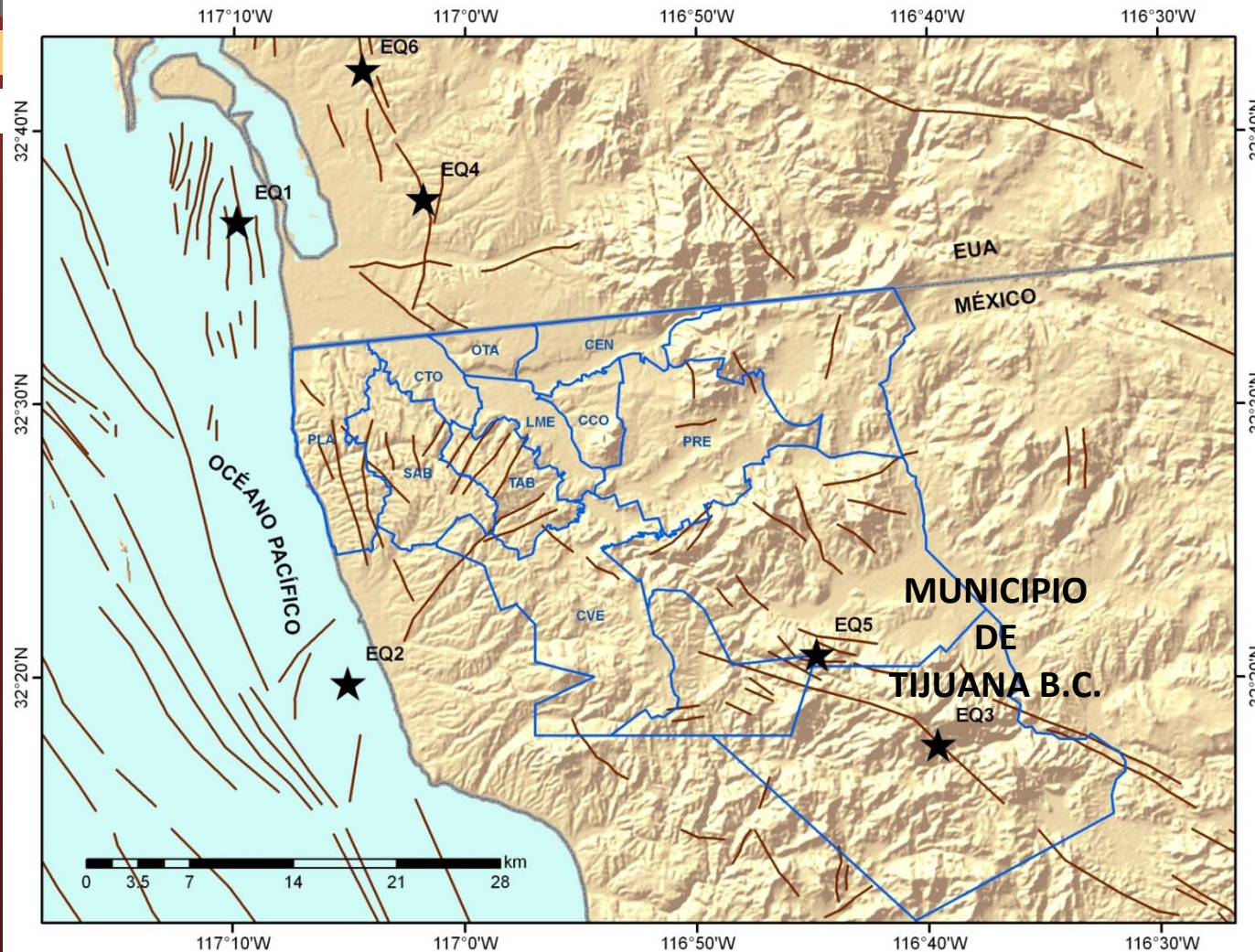


# Components of EQ damage estimation



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# Plausible events

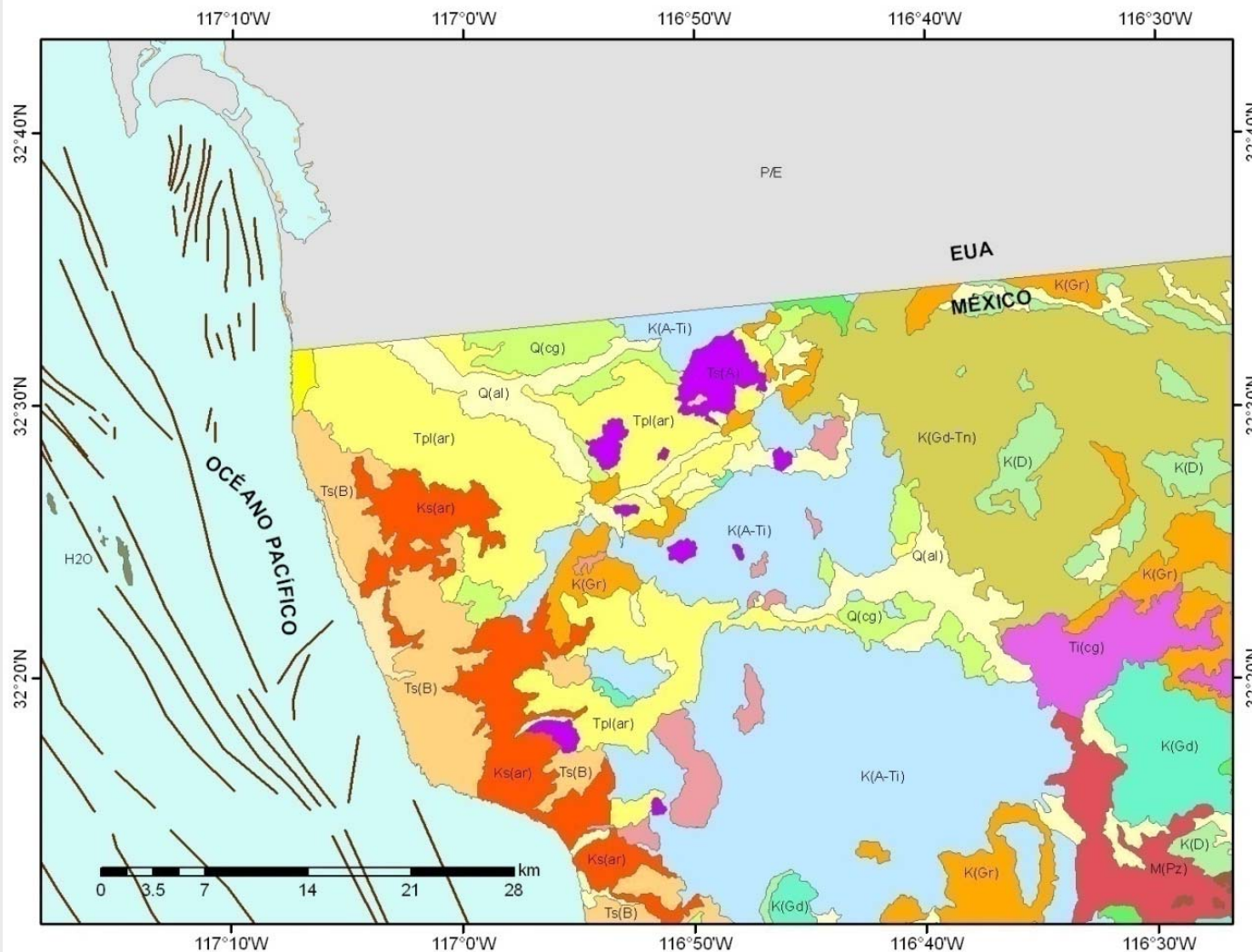


**DELEGATIONS AND  
EPICENTRAL  
LOCATIONS (6) OF  
EARTHQUAKE  
SCENARIOS,  
MAGNITUDE= 6.5**

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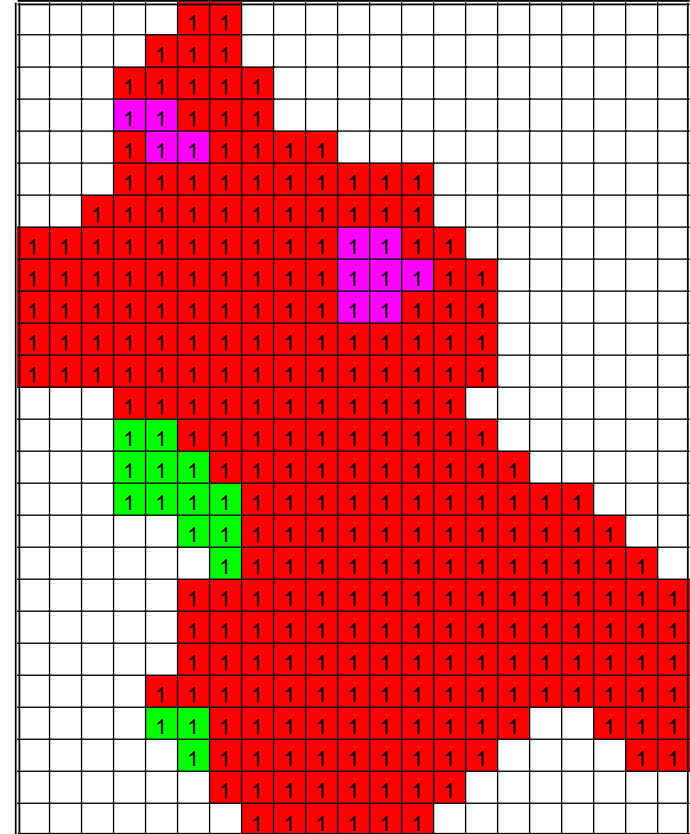
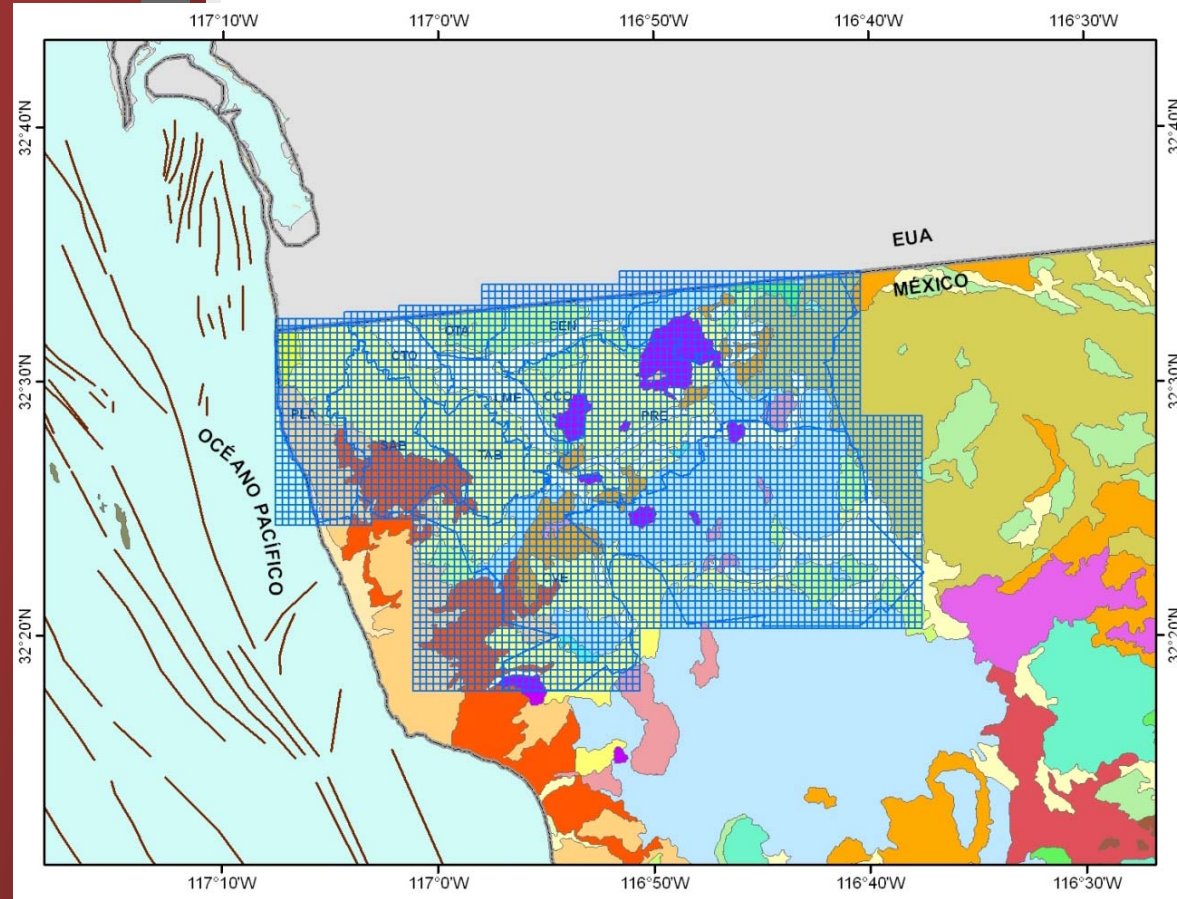


# Soil Types Distribution in Tijuana



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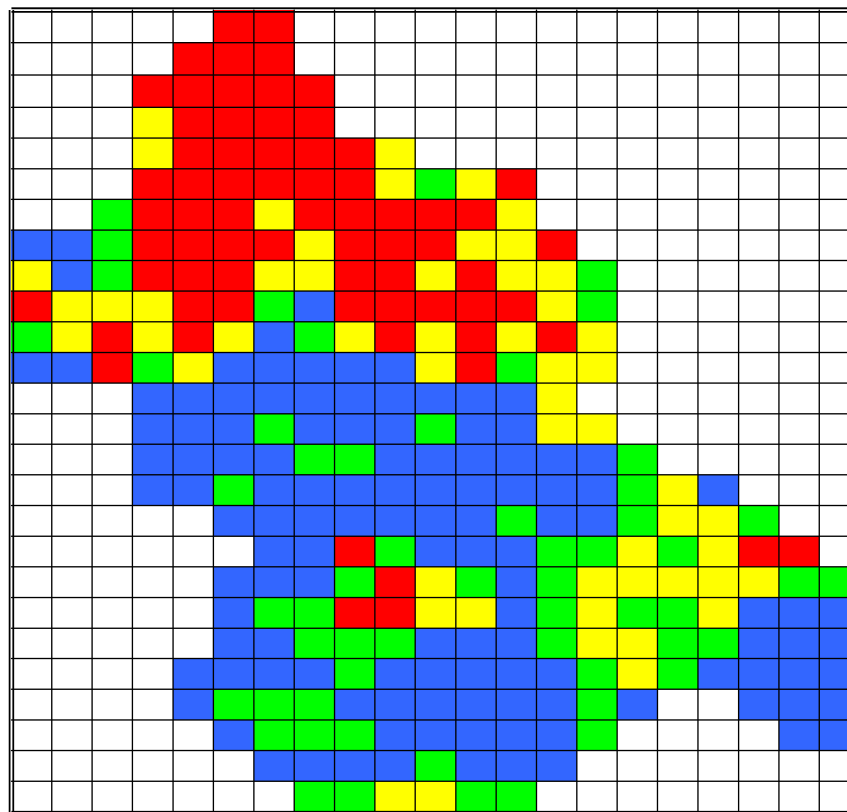
# Soil Types Distribution



**SUPERPOSITION OF MESH AND SOIL TYPES  
(TOPOGRAPHY INCLUDED)**

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# Population Distribution



MESH WEIGHT BY POPULATION DENSITY using aerial photo

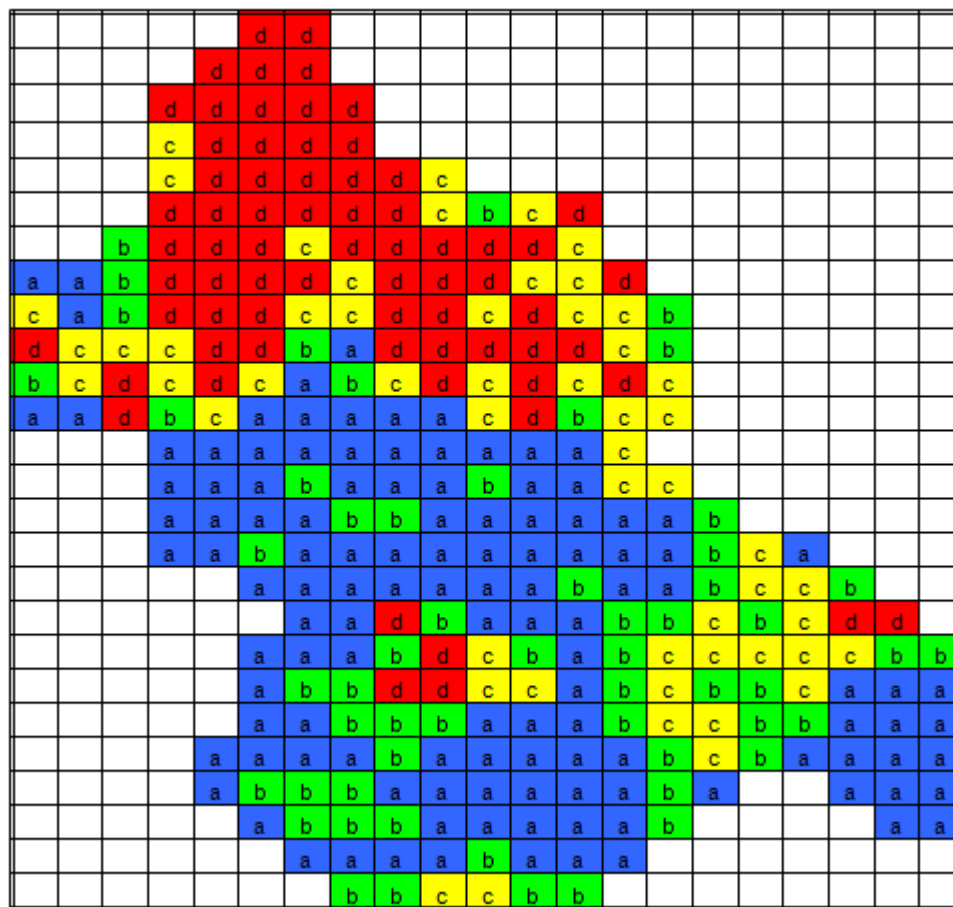
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# Building Types Distribution (SAB)



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# Building Distribution for SAB Delegation



Area ID	Area Name	RES1 (%)	RES2 (%)	RES3 (%)	RES4 (%)	EDU1 (%)	EDU2 (%)	MED1 (%)	MED2 (%)	COM (%)	IND (%)	Sum (%)
1	SAB	60	35	0	5	0	0	0	0	0	0	100

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# Scenario Earthquake EQ6

Read Me First

## Scenario Earthquake Information

Scenario

Historical Earthquake

User Defined Earthquake

Earthquake Information

Choose Scenario Earthquake

LA NACION

Earthquake Manitude

6.5

Earthquake Depth (km)

8

EQ Occurance Time (hrs)

2

Attenuation Equation

Choose Attenuation Equation

Joyner & Boore - 1981

Reference

Enter Reference MeshID No.

260

Earthquake Epicentral  
distance (km)

28.5

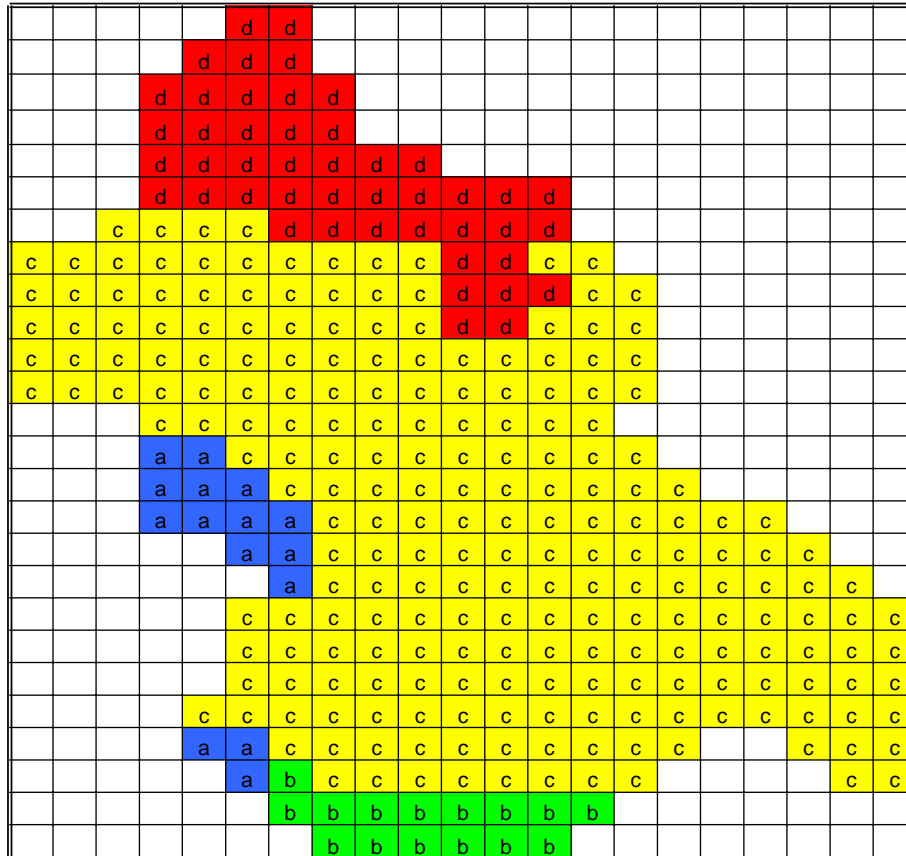
Choose EQ Direction  
relative from Ref. Mesh

North

OK & Return

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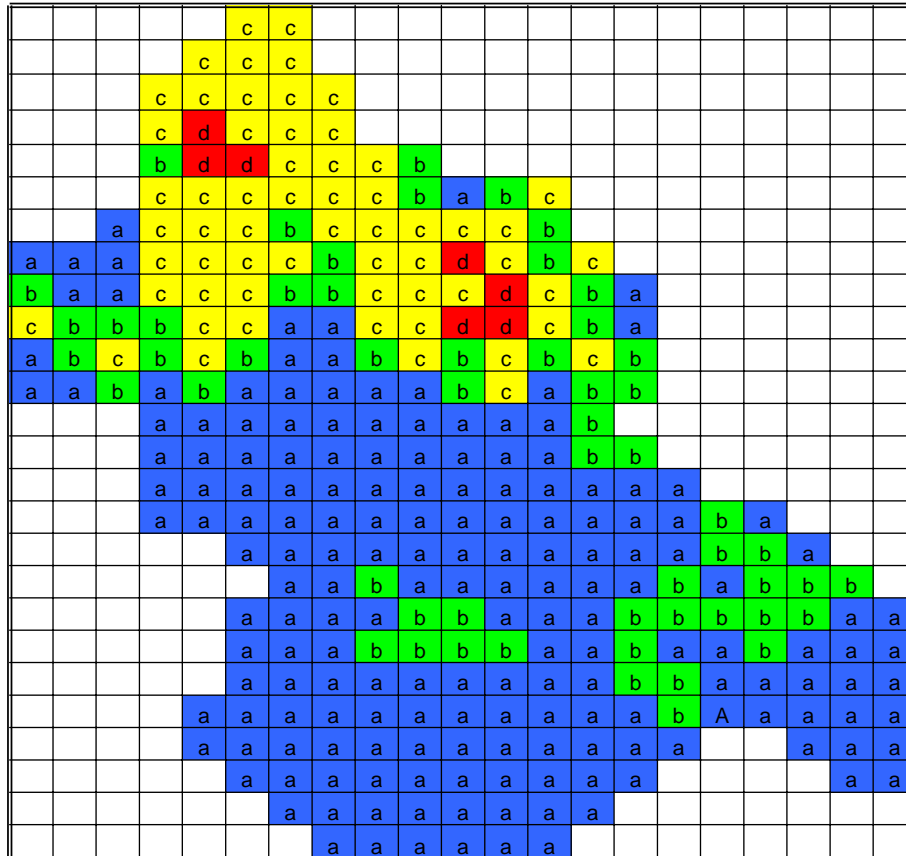
# MMI Intensity Distribution



**RADIUS calculates  
PGA and then  
Mercalli Modified  
Intensities (MMI)**

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# Building Damage Estimation (SAB)



Color ID	Automatic Range		Manual Range	
	From	To	From	To
a	0	18	0	18
b	18	35	18	35
c	35	53	35	53
d	53	70	53	70

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# Shelter Needs Results

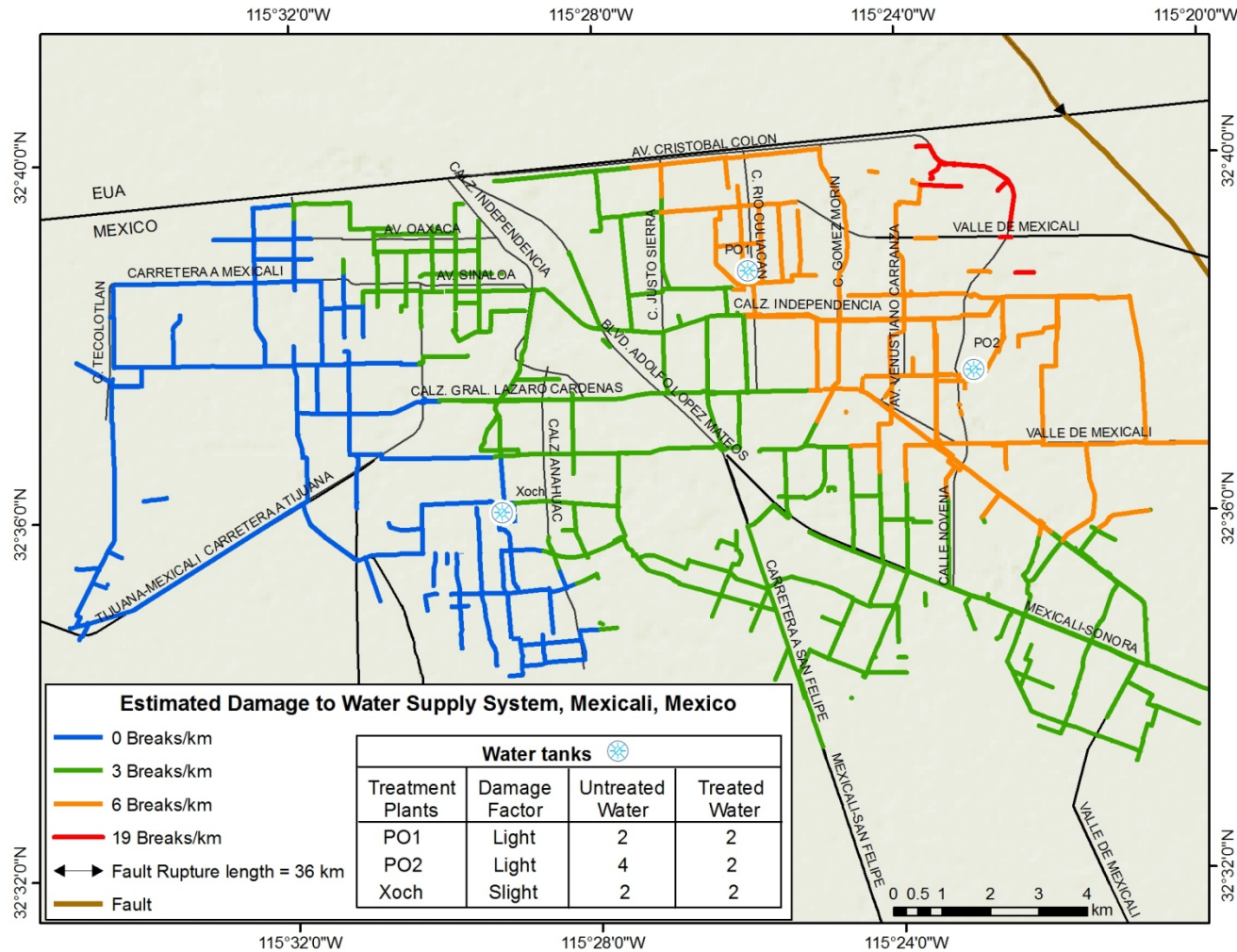


Number of people needing shelter for each of the six scenario earthquakes

	SAB	CEN	CTO	CCO	CVE	LME	PRE	OTA	PLA	TAB	Total
EQ1	10,000	4,622	8,917	3,282	1,226	5,839	7,276	4,497	6,372	6,246	<b>58,277</b>
EQ2	12,392	4,593	6,853	3,661	3,184	7,012	8,576	3,341	5,335	9,503	<b>64,449</b>
EQ3	3,025	2,792	1,942	2,400	1,360	2,751	8,457	1,266	947	3,648	<b>28,588</b>
EQ4	12,465	10,140	11,085	6,676	1,703	9,942	15,133	7,984	6,019	10,169	<b>91,316</b>
EQ5	4,986	4,504	2,900	4,289	2,581	5,317	16,561	1,993	1,456	6,338	<b>50,925</b>
EQ6	6,411	6,063	5,761	3,581	1,032	4,979	8,437	3,985	3,216	4,979	<b>48,444</b>

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# Damage to lifelines



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# SHELTERS PLANNING

## - GENERAL CRITERIA -

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# TEMPORAL SHELTERS IN MEXICO



- The National Defense Ministry is the first responsible office
- Schools are the first option for shelter
- For long-term dwelling rehabilitation, the arrangement of organized camps has been foreseen
- In Mexico, there is not any experience of temporal shelter provision in case of an earthquake.

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# Shelter deployment criteria

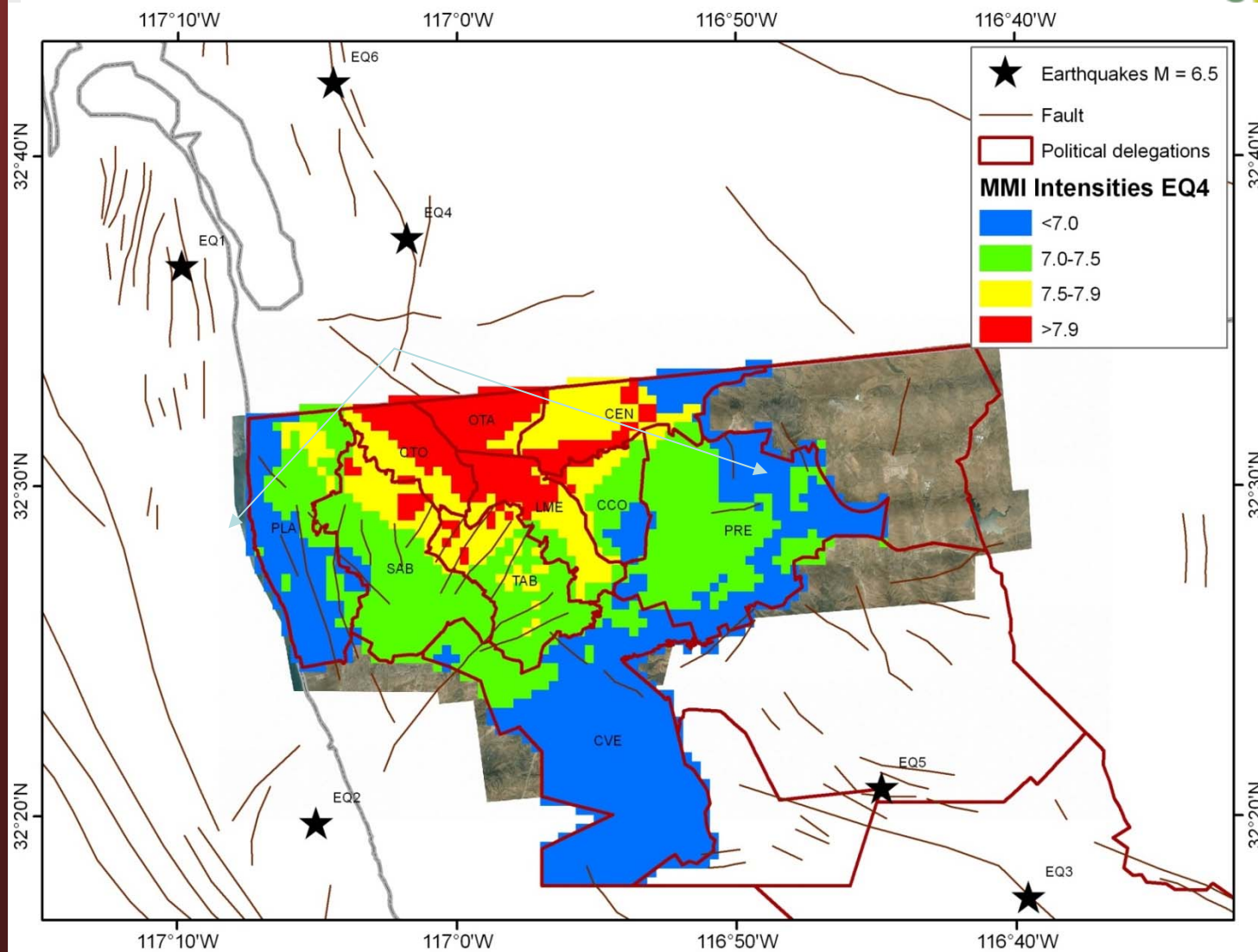


- Based on the damage scenario, schools located in areas of intensity less than VII, were chosen to be used. An average of 300 sheltered persons per school has been considered
- The open spaces (sport fields and parks bigger than 1000 m<sup>2</sup>) in the areas with intensity VII and up
- In the organized camps, local building materials will be used first and, if necessary, tents and camping houses

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# MMI Intensities for deployment criteria (EQ4)



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# Institutional and legal frameworks



- The National Defense Ministry will apply the Plan DNIII created for natural disasters
- The local authority will use Project Sphere (IFRC) criteria for minimum requirements
- The local government, with the assistance of State and Federal governments, will provide the necessary supplies to all shelters
- Areas for supply centers and for foreign humanitarian teams are also identified

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- Participants:
  - Municipality
  - State Government
  - Federal Government
  - National Defense Ministry.
  - Marine Ministry
  - Red Cross
  - Volunteer Associations
  - International Humanitarian Institutions and other countries

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# MORELOS PARK (open space) Area = 560 000 m<sup>2</sup> Shelter for 1000 people (42m<sup>2</sup>/person)



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# ALAMAR RIVER (open space) Area = 924,638 m<sup>2</sup> Shelter for 20,000 people (risky in raining season)



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GOLF COURSE (open space) Area = 429,203 m<sup>2</sup> Shelter for 10,000 people (private)



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AIRPORT (open space) Area = 593,234 m<sup>2</sup> External supplies reception



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# SPORT FIELDS Area = 358,115 m<sup>2</sup> Shelter for foreign teams (near airport)



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# RACE TRACK Area = 362,974 m<sup>2</sup> Shelter for 7,500 people (private)



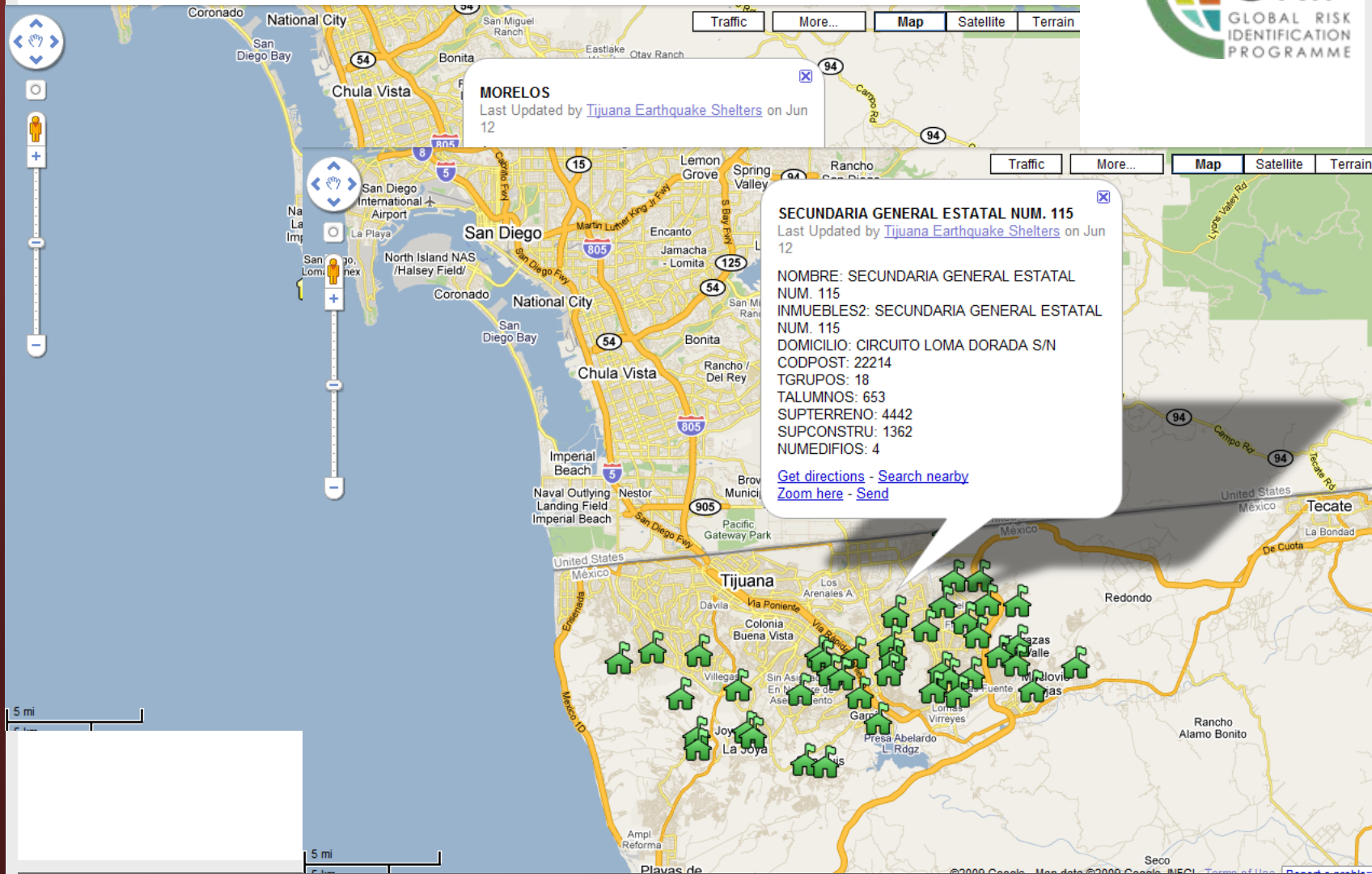
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# MILITARY FIELD Area = 1,135,277 m<sup>2</sup> Supplies



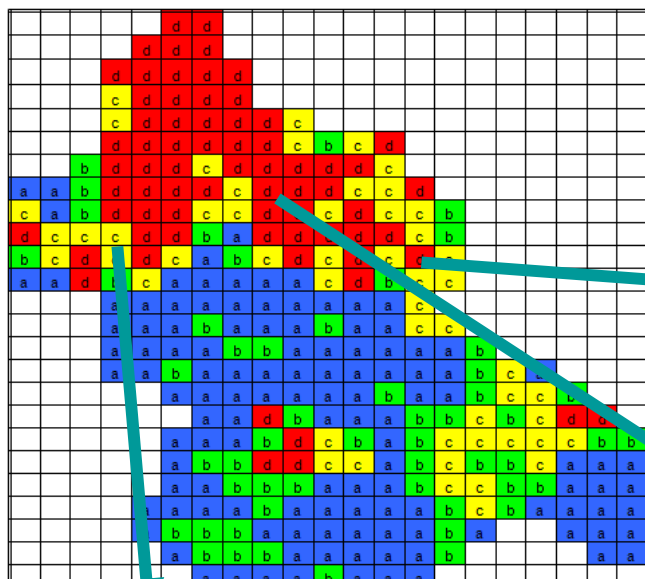
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# Shelter plan accessibility



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# Simulation exercise (Sept. 18, 2009)



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