The impact of the 1985 earthquake México in matter of:

- The investigation,
- Teaching, and
- The professional practice of construction.

HUGO SAUCEDO ACOSTA
TAIPEI, SEP 2008

Workshop on Large-Scale Disaster Recovery in APEC 2008
Workshop on Large-Scale Disaster Recovery in APEC 2008
Figura 4.8. Mapa de peligrosidad sísmica, según GSHAP, en forma de aceleración máxima del terreno para un periodo de recurrencia de 500 años.
Figura 4.1. Epicentros incluidos en el catálogo para México y Centroamérica en el proyecto de GSHAP, con magnitud de momento Mw > 4.0. Se observa que la sismicidad está confinada en casi su totalidad a los límites de las placas tectónicas: en el Mar de Cortés, la placa de Rivera, la zona de subducción de la placa de Cocos bajo Norteamérica y la placa del Caribe. Figura del GSHAP en http://seismo.ethz.ch.
Figura 4.2. Epicentros de los terremotos ocurridos durante los años 1900 hasta 1996 en México con magnitud Mw > 6.5. Los epicentros color marrón son sismos con profundidad menor de 50 km, los de color azul oscuro han ocurrido a una profundidad mayor de 50 km. Figura del Servicio Sismológico Nacional de México en http://www.ssn.unam.mx.
19 de Septiembre 1985, México

12 de Mayo 2008, China

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Figura 3 Ubicaciones epicentrales del evento mayor y réplicas principales (sitio Web, Servicio Sismológico Nacional, UNAM)
Detailed studies have been conducted in terms of the behavior of the construction materials, for each region, taking into account local conditions.

For example, bricks and mortars...
TECHNICAL COMPLEMENTARY PROCEDURE TO THE REGULATION OF CONSTRUCTION
Workshop on Large-Scale Disaster Recovery in APEC 2008
Workshop on Large-Scale Disaster Recovery in APEC 2008
PHYSICAL CONDITIONS OF THE LOCALITY

We have more knowledge about the types of soil found in Mexico and its behavior under seismic events.
Microsismicidad del noroeste del Bloque de Jalisco (México)
Figura 2. Valores de $I_{SD}$ para el Estado de Colima.
DEVELOPMENT OF NEW TECHNOLOGIES FOR CONSTRUCTION

The constant updating of the methodologies of construction have allowed for new building, leaving behind the obsolete rustic system.
CONFINED MASONRY

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COMPUTER PROGRAM DEVELOPMENT

Computer systems for the architectural and structural projects

BETTER CONDITIONS FOR INVESTIGATORS

The economic support given to the investigators in the field of seismic engineering has increased.

With paid salary and extra economic support.
AID TO INSTITUTIONS OF EDUCATION FOR INVESTIGATION.

They opened the door to investigations that bring a better understanding in the areas of structural and seismic safety.

- They have received aid through specialized equipment in the field, and economic resources for the training and updating of its professors.
TEACHING

STUDY PROGRAM ADAPTATION

The graduate student have the necessary knowledge for their professional growth and development.
STUDY OF THE PHYSICAL CONDITIONS OF THE LOCALITY

To help them understand and grasp the reality of their surroundings; their city, their state and their country.
TEACHERS

Now have sufficient field experience as well as being up to date within his area of specialization

It is mandatory that the professors have postgraduate studies.
STUDENTS

Strengthen student awareness and knowledge of these type of events.

- Since 1985, the Technological Institute of Colima houses an office for architectural services,
Within Society

Immediate Impact

Solidarity and Respect

It has been demonstrated that Mexicans, under situations of disaster, are solidarly and immediately render their help.
SUBSEQUENT IMPACT

ORGANIZATION AND CONSTANT PARTICIPATION

Mexicans have managed to organize themselves and understand the risk that they live

Although as the tragedy is forgotten, they also forget about the precautions needed in the face of a new disaster.
TYPICAL MEETING OF COORDINATION FOR THE RESPONSE TO THE EMERGENCY AND RECOVERY
MISUNDERSTOOD SAVING (WITH OR WITHOUT A LOW COST PROFESIONAL)

We still have homeowners that believe that the concept of saving money in their

THE INVESTOR/CONSTRUCTOR

There are many investors dedicated to other fields
GOVERNMENT

- IMMEDIATE IMPACT
- IMMEDIATE RESPONSE

National, state and municipal institutions that have been created with the purpose of having an immediate reaction to any contingency.
SUBSECUENT IMPACT

INSTRUMENTATION

There is instrumental support in the region

The Monitoring results enable us to establish average levels of safety and also to have statistics of these phenomenons.
MAPA DE PELIGROS VOLCÁN DE FUEGO DE COLIMA
Regulations Suitability

- We have adapted the building regulations and rules for construction for new projects.
- We have taken into consideration the construction unions and universities in the region.
ÍNDICE

ADMINISTRACIÓN PÚBLICA DEL DISTRITO FEDERAL

JEFATURA DE GOBIERNO

ACUERDO POR EL QUE SE DAN A CONOCER LAS NORMAS TÉCNICAS COMPLEMENTARIAS DEL REGLAMENTO DE CONSTRUCCIONES PARA EL DISTRITO FEDERAL

- NORMAS TÉCNICAS COMPLEMENTARIAS PARA DISEÑO Y CONSTRUCCIÓN DE ESTRUCTURAS DE MAMPUESTA 4

- NORMAS TÉCNICAS COMPLEMENTARIAS PARA DISEÑO Y CONSTRUCCIÓN DE ESTRUCTURAS DE MADERA 54

- NORMAS TÉCNICAS COMPLEMENTARIAS PARA DISEÑO Y CONSTRUCCIÓN DE ESTRUCTURAS DE CONCRETO 88

- NORMAS TÉCNICAS COMPLEMENTARIAS PARA DISEÑO Y CONSTRUCCIÓN DE ESTRUCTURAS METÁLICAS 195
Workshop on Large-Scale Disaster Recovery in APEC 2008
Within the practice of civil engineering and construction

Active integration of professional Associations and Chambers.

Organizations that group together professional in the field of construction (PROFESSIONAL ASSOCIATION OF THE CIVIL ENGINEERING FROM COLIMA STATE, AND ARCHITECS, AND CHAMBERS OF CONSTRUCTION AND HOUSING)
<table>
<thead>
<tr>
<th>Municipio</th>
<th>Total de Viviendas (año 2003)</th>
<th>Total de Viviendas (estimado)</th>
<th>Afectadas N° (%)</th>
<th>Afectadas (estimado) N° (%)</th>
<th>Daño Leve N° (%)</th>
<th>Daño Leve (estimado) N° (%)</th>
<th>Daño Parcial N° (%)</th>
<th>Daño Parcial (estimado) N° (%)</th>
<th>Daño Total N° (%)</th>
<th>Daño Total (estimado) N° (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colima</td>
<td>33,581</td>
<td>30,806</td>
<td>5,874 (17.5)</td>
<td>5,865 (19)</td>
<td>1,592 (4.7)</td>
<td>1,759 (5.7)</td>
<td>3,263 (9.7)</td>
<td>2,932 (9.5)</td>
<td>1,019 (3.0)</td>
<td>1,173 (3.8)</td>
</tr>
<tr>
<td>Manzanillo</td>
<td>33,795</td>
<td>29,157</td>
<td>3,507 (10.4)</td>
<td>4,007 (13.7)</td>
<td>1,462 (4.3)</td>
<td>1,202 (4.1)</td>
<td>1,798 (5.3)</td>
<td>2,003 (6.8)</td>
<td>247 (0.7)</td>
<td>801 (2.8)</td>
</tr>
<tr>
<td>Tecomán</td>
<td>24,117</td>
<td>21,730</td>
<td>5,820 (24.1)</td>
<td>7,055 (32.4)</td>
<td>1,746 (7.2)</td>
<td>2,116 (9.7)</td>
<td>3,492 (14.1)</td>
<td>3,527 (16.2)</td>
<td>662 (2.7)</td>
<td>1,411 (6.5)</td>
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<tr>
<td>V. de Álvarez</td>
<td>22,660</td>
<td>18,972</td>
<td>2,549 (11.7)</td>
<td>3,370 (17.7)</td>
<td>1,073 (4.7)</td>
<td>1,011 (5.3)</td>
<td>1,177 (5.2)</td>
<td>1,685 (8.9)</td>
<td>399 (1.8)</td>
<td>674 (3.5)</td>
</tr>
<tr>
<td>Armería</td>
<td>6,944</td>
<td>6,381</td>
<td>2,819 (40.6)</td>
<td>2,374 (37.2)</td>
<td>798 (11.5)</td>
<td>712 (11.2)</td>
<td>1,621 (23.3)</td>
<td>1,187 (18.6)</td>
<td>400 (5.8)</td>
<td>474 (7.4)</td>
</tr>
<tr>
<td>Cuauhtémoc</td>
<td>6,692</td>
<td>6,108</td>
<td>516 (07.7)</td>
<td>1,039 (17)</td>
<td>270 (4.0)</td>
<td>311 (5)</td>
<td>220 (3.4)</td>
<td>519 (8.4)</td>
<td>26 (0.4)</td>
<td>207 (3.5)</td>
</tr>
<tr>
<td>Comala</td>
<td>4,794</td>
<td>4,261</td>
<td>582 (12.1)</td>
<td>893 (20.9)</td>
<td>252 (5.3)</td>
<td>268 (6.2)</td>
<td>235 (4.9)</td>
<td>446 (10.5)</td>
<td>95 (2.0)</td>
<td>178 (4.2)</td>
</tr>
<tr>
<td>Coquimatlán</td>
<td>4,618</td>
<td>4,132</td>
<td>2,158 (46.7)</td>
<td>1,713 (41.4)</td>
<td>422 (9.1)</td>
<td>514 (12.4)</td>
<td>1,127 (24.4)</td>
<td>856 (20.7)</td>
<td>609 (13.2)</td>
<td>342 (8.3)</td>
</tr>
<tr>
<td>Minatitlán</td>
<td>1,999</td>
<td>1,892</td>
<td>480 (24.6)</td>
<td>539 (28.4)</td>
<td>145 (7.3)</td>
<td>161 (8.5)</td>
<td>260 (13.0)</td>
<td>269 (14.2)</td>
<td>60 (3.8)</td>
<td>107 (5.7)</td>
</tr>
<tr>
<td>Ixtlahuacán</td>
<td>1,374</td>
<td>1,245</td>
<td>948 (69.0)</td>
<td>868 (69.7)</td>
<td>213 (15.5)</td>
<td>260 (20.9)</td>
<td>510 (37.1)</td>
<td>434 (34.9)</td>
<td>225 (16.4)</td>
<td>173 (13.9)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>140,574</strong></td>
<td><strong>124,684</strong></td>
<td><strong>25,353 (18.0)</strong></td>
<td><strong>25,328 (20.3)</strong></td>
<td><strong>7,973 (5.7)</strong></td>
<td><strong>7,598 (6)</strong></td>
<td><strong>13,623 (9.7)</strong></td>
<td><strong>12664 (10.2)</strong></td>
<td><strong>3757 (2.7)</strong></td>
<td><strong>5,065 (4.1)</strong></td>
</tr>
</tbody>
</table>
DAMAGE IN HOUSING (KIND)

- **RUSTIC**: 25%
- **ECONOMIC**: 57%
- **AVERAGE**: 17%
- **LUXURY**: 1%

Workshop on Large-Scale Disaster Recovery in APEC 2008
We were able to answer the citizens’ most impending questions:

1. Is my house inhabitable?
2. Will I still be able to live there?
3. What kind of damage did the earthquake do?
4. Can it be repaired?
The Government Officials through the Civil Protection Office, has a registration poll of the construction professionals (civil engineers, architects, constructors, structural safety specialists).
PROFESSIONAL CERTIFICATION.

The level of recognition of their members in terms of their studies and this through a Professional Certification Program.

We have THE PROFESSIONAL CERTIFICATION IN STRUCTURAL SAFETY, endorsed by leading Educational institutions like Colima´s Technological Institute) and Colima´s State University
COLEGIO DE INGENIEROS CIVILES DEL ESTADO DE COLIMA, A.C.

EXTIENDE EL PRESENTE
CERTIFICADO
AL INGENIERO
Hugo Saucedo Acosta

EN VIRTUD DE HABER CUMPLIDO CON TODOS LOS REQUISITOS QUE ESTE COLEGIO ESTIPULA PARA OBTENER LA ACREDITACIÓN COMO:

PERITO EN SEGURIDAD ESTRUCTURAL

COLIMA, COL. A12 DE JULIO DEL 2004

ING. JOSE DE JESUS SANCHEZ ROMO
PRESIDENTE DE LA JUNTA DE HONOR

ING. HUGO SAUCEDO ACOSTA
PRESIDENTE DEL CONSEJO DIRECTIVO

ING. MANUEL GÓDÍNEZ SERRANO
COORDINADOR DE CERTIFICACIONES
Updating and / or CONTINUOUS TRAINING

We have up-to-date courses and continuous training programs in the field of earthquake proof constructing.
Workshop on Large-Scale Disaster Recovery in APEC 2008

Colima

DIRECCION GENERAL DE DESARROLLO URBANO Y ECOLOGIA
NOMBRE: HUGO SAUCEDO ACOSTA
PROFESION: INGENIERO CIVIL
REGISTRO: 95-04-RF
CATEGORIA: DIRECTOR RESPONSABLE DE OBRA
VIGENCIA: JUNIO DEL 2009

Colima

DIRECCION GENERAL DE DESARROLLO URBANO Y ECOLOGIA
NOMBRE: HUGO SAUCEDO ACOSTA
PROFESION: INGENIERO CIVIL
REGISTRO: CO-EST 00-01
CATEGORIA: CORESPONSABLE SEGURIDAD ESTRUCTURAL
VIGENCIA: JUNIO DEL 2009
谢,Thanks,Gracias