1. Lessons Learned from the Great East Japan Earthquake
**Damaged houses by geo-hazards**

Liquefaction of ground

- **26,914 houses**

Collapse of embankments & retaining walls in hilly areas

- **125,049 houses**

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**Typical features of structural damages**

<table>
<thead>
<tr>
<th>Civil engineering structures</th>
<th>Houses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Large buildings</strong></td>
<td><strong>Residential lands</strong></td>
</tr>
<tr>
<td>Owners</td>
<td>Ordinary citizens</td>
</tr>
<tr>
<td>- Public organizations</td>
<td></td>
</tr>
<tr>
<td>- Large private institutions</td>
<td></td>
</tr>
<tr>
<td>Damage</td>
<td>Serious</td>
</tr>
<tr>
<td>- None or minor</td>
<td>Liquefaction of ground</td>
</tr>
<tr>
<td>- None or minor</td>
<td>Collapse of embankments &amp; retaining walls</td>
</tr>
<tr>
<td>Features</td>
<td>Lack of mechanism to prevent disasters</td>
</tr>
<tr>
<td>- Latest technology standards, etc.</td>
<td>No appropriate measures nor seismic diagnosis</td>
</tr>
<tr>
<td>- Appropriate seismic diagnosis and seismic retrofitting</td>
<td>Lack of support of geotech. engineers</td>
</tr>
<tr>
<td>- Presence of in-house geotech. engineers</td>
<td></td>
</tr>
</tbody>
</table>
2. Recommendations of JGS

Japanese Geotechnical Society
- National society of ISSMGE
- Member > 8,000

‘Lessons and Recommendations from the Great East Japan Earthquake’
- Geo-Hazards during Earthquakes and Mitigation Measures -


Primary (Japanese)  Primary (English)  Secondary (Japanese)

9 Themes & 56 Recommendations

1. Damages of residential houses, life-lines, road facilities, etc. by liquefaction of ground
2. Damages of residential land in hilly areas and reclaimed lands
3. Damages caused by the huge tsunami
4. Ground subsidence in wide areas and flood control in lowland areas
5. Environmental issues of disaster wastes, tsunami deposits, and contaminated soils by radioactive materials
6. Advanced geotech. engineering for natural slopes, cut earth and various infrastructure facilities (roads, railways, rivers, sewers, ports, airports, power facilities etc.)
7. Restoration and reconstruction of industrial facilities
8. Severe accident measures for important infrastructures
9. Qualification system and education of geotech. engineers and public relations
Recommendations for qualification system of Geotech. Engineers

2.7 Accountability to the owners of new private houses

When building a house, the builders of houses (home seller) should explain the owners (home buyers) the safety of residential land and foundation ground, in addition to the safety of the houses. He or she should also explain the owners the effect and cost with a variety of seismic retrofitting measures which can be employed, as well as earthquake insurance as an alternative scheme.

9.1 Establishment of new qualification system of geotech. engineers

It is important that geotechnical engineers with ethics and expertise are appreciated properly in society, and work actively in explaining and check the quality of the ground. For this purpose, a new qualification system ‘Geotechnical engineers for ground quality evaluation’ should be established with the aim to contribute to the mitigation and prevention of geo-disasters.

3. New Qualification System of Geotech. Engineers for Evaluation of Ground Quality

Development of residential lands

Contractors of land reclamation

Home sellers/builders

Real estate agents

Acquires of houses

Home buyers

Verification and explanation of ground quality

Geotech. report

Geotechnical Engineers
# Existing qualification system for Geotech. Engineers

<table>
<thead>
<tr>
<th>Type of qualification</th>
<th>Name of qualified engineer</th>
<th>Certifying organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public-oriented</td>
<td>Professional Engineer</td>
<td>Ministry of Education</td>
</tr>
<tr>
<td></td>
<td>(Sector: Construction, Applied Sciences)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Architect</td>
<td>Land, Infrastructure and Transportation Ministry</td>
</tr>
<tr>
<td></td>
<td>Designer based on Residential Development Regulation Law</td>
<td>Land, Infrastructure and Transportation Ministry</td>
</tr>
<tr>
<td>Private</td>
<td>Geological Engineer</td>
<td>Japan Geotechnical Consultants Association</td>
</tr>
<tr>
<td></td>
<td>Registered Civil Engineering Consulting Manager (RCCM)</td>
<td>The Japan Civil Engineering Consultants Association</td>
</tr>
<tr>
<td></td>
<td>Technical Officer of the Affected Residential Land Risk</td>
<td>Council for Risk Judgment of Affected Residential Land by Disaster</td>
</tr>
<tr>
<td></td>
<td>Geotechnical Investigation Engineer</td>
<td>Ground Guarantee Inspection Association</td>
</tr>
<tr>
<td></td>
<td>Housing Ground Engineer</td>
<td>Association of Ground Quality for Houses</td>
</tr>
<tr>
<td></td>
<td>JSCE Certified Civil Engineers (Sector: Geotechnical Engineering)</td>
<td>Japan Society of Civil Engineers</td>
</tr>
</tbody>
</table>

Issues to be considered:
1) Range and level of technology to cover
2) Regal system relevant to the engineering qualification

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**The Japanese Association for Geotechnical Evaluation, JAGE**

Jul. 2011: Primary recommendations from JGS


- Japanese Geotechnical Society
- Japan Geotechnical Consultants Association
- Architectural Institute of Japan
- Japan Society of Civil Engineers
- Association of Ground Quality for Houses
- Ground Guarantee Inspection Association
- The Japan Civil Engineering Consultants Association
- Japan Housing Industry Association

21 Jan. 2013: Preparatory Meeting for JAGE

4 Feb. 2013: Establishment of JAGE
Features of qualification system and examination

Qualification system

- Ownership of JAGE: Council with cooperation of the related organizations
- Private qualification system, in the beginning but, aiming Public-oriented qualification system for business monopoly, in the future
- Use of qualification: Development of appropriate legal system
- Requirement for qualification: Comprehensive knowledge and technology for evaluation of ground quality
- Update system: Every 5 years, CPD system

Examination

- Date: Late September
- Applicants: Qualified engineers of the existing qualification systems
- Expected number of applicants: 500 to 1,000
- Expected number of those who pass the exam: 150-250 (Pass rate: 15-40%)

Form of organization of JAGE

Advisers  →  Board of Directors

Supervision Committee  →  Secretariat

Exam. Committee  →  Branches

WG 1  →  WG 2  →  WG 3  →  WG 7

Highest decision-making body (President, Vice presidents, Directors, Auditor)
Decision-making body for operational management (Chairman, Leaders of Exam committee, Representatives of participating organizations)
Implementation organization of the exam. (Chairman, Leaders of WGs, Members)
Preparation of the exam. Grading (Leader, Members)
Participating organizations to JAGE

<table>
<thead>
<tr>
<th>Type of Member*1</th>
<th>Name of societies and organizations</th>
<th>Numbers of memberships</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full member</td>
<td>Japanese Geotechnical Society</td>
<td>8,635, 879</td>
</tr>
<tr>
<td></td>
<td>Japan Geotechnical Consultants Association</td>
<td>(31,000), 441</td>
</tr>
<tr>
<td></td>
<td>Ground Guarantee Inspection Association</td>
<td>(1,060), 40</td>
</tr>
<tr>
<td></td>
<td>Association of Ground Quality for Houses</td>
<td>(15,000), 525</td>
</tr>
<tr>
<td>Supporting member*2</td>
<td>Japan Society of Civil Engineers</td>
<td>39,171, 956</td>
</tr>
<tr>
<td></td>
<td>Architectural Institute of Japan</td>
<td>34,127, 986</td>
</tr>
<tr>
<td></td>
<td>The Japan Civil engineering Consultants Association</td>
<td>(61,400), 426</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>81,933, 4,253</td>
</tr>
</tbody>
</table>

*1: Organization responsible for the business operations, 2 board members
*2: Organization to support the business operations, 1 board member

Flow of examination, registration and update

- Qualified engineers
  - Document screening
    - yes: Primary test
      - Pass: Registration for Assistant of Geotech. Eng.
      - Failure: Secondary test
    - no: Exemption of Primary test
  - Failure: Registration for Geotech. Eng.
  - Every 5 years: Engineering education (CPD)
  - Update?
    - yes: Short training course
    - no: Registration for Geotech. Eng.
  - Every 5 years: Engineering education (CPD)
  - Update?
    - yes: Short training course
    - no: Registration for Geotech. Eng.
Annual schedule of the examination, 2013

- **Obtaining the application form**
  - From early April, Download from HP

- **Application for examination**
  - 1 May 2013 - 28 Jun. 2013, 13,650 yen

- **Dispatch of examination admission card**
  - Mid August

- **Examination (Tokyo, Osaka)**
  - 22 Sep. 2013 Primary test (10:00-12:00)
  - Secondary test (13:30-16:30)
  - 25 Nov. 2013

- **Announcement of successful applicants**

- **Registration for Geotech. Engineers**
  - Certificate of registration, 10,500 yen

- **Update of registration**
  - Expiration of the certificate (31 Mar. 2019)
  - Requirement: CPD 125 units or Short training course

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Range of technical expertise required for Geotech. Engineer

<table>
<thead>
<tr>
<th>Section</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Development of residential land</td>
</tr>
<tr>
<td>②</td>
<td>Geological and geotechnical investigation</td>
</tr>
<tr>
<td>③</td>
<td>Foundations for houses and small structures</td>
</tr>
<tr>
<td>④</td>
<td>Liquefaction of ground</td>
</tr>
<tr>
<td>⑤</td>
<td>Stability of foundations and retaining structures, Settlement and inclination of foundations</td>
</tr>
<tr>
<td>⑥</td>
<td>Ground improvement, Ground reinforcement</td>
</tr>
<tr>
<td>⑦</td>
<td>Engineering ethics</td>
</tr>
</tbody>
</table>
Immediate tasks

Council (JAGE)
- Improved awareness of the qualification system
- Development of code of ethics

Use of qualification
- Study of Geotechnical report
- Development of the legal system
- Cooperation in the development of technical codes, manuals

Examination
- Successful implementation of the 2013 examination
- Establishment of training/education system

The Japanese Association for Geotechnical Evaluation

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E-mail: jage@jiban.or.jp