Presentation 2

Shimizu Solutions for Building Resilient Societies

Managing Executive Officer
Head of Design Division
Hiroyuki Fujimoto

Architecture Engineering Construction
TECH DRIVEN

Creating a single building
Connecting the technologies gathered there
Connecting them to manufacturing and new business domains
and make it the driving force behind
Shimizu's growth

BLUE FRONT SHIBAURA

Design: Maki and Associates; Shimz DESIGN;
Ove Arup & Partners Japan Ltd.; Nikken Sekkei Ltd.

Floor Space：267,424.57㎡ Phases Ⅰ&Ⅱ 550,596.26㎡ 3below ground, 43 above ground, 2-story penthouse Height：228.88m

An integrated development project featuring offices, hotels, commercial facilities, and residences that will transform the Tokyo Bay Area landscape

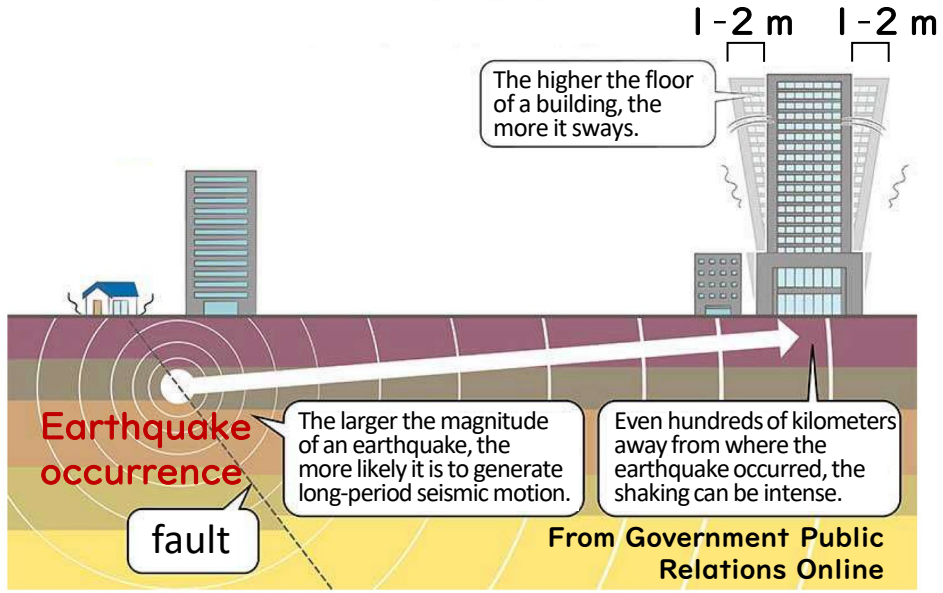
【New Technologies Developed and Implemented(Design)】

- BILMUS
  - Wind Lock Mechanism
  - Fail-Safe Mechanism (e-Cushion)
- Advanced AMD Control Law
- High-Strength Steel 780 CFT Truss
- Thin-walled Large-section CFT Columns
- Refrigerant reheat type dehumidifying air conditioner
- Environmental Sensor Integration Blind Control System
- Pressurized smoke control system, etc.

Essential Countermeasures for Long-Period Seismic Motion in Skyscrapers

- Even hundreds of kilometers from the epicenter, long-period ground motion causes skyscrapers to sway slowly and significantly for extended periods.

- Amplitudes reached one to two meters on upper floors, so controlling this movement is a key challenge.



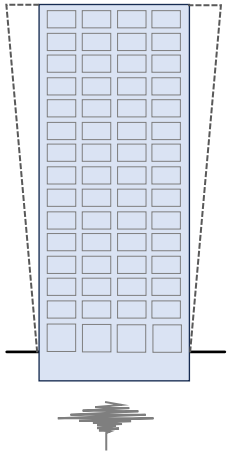
Characteristics of long-period seismic motion

During the Great East Japan Earthquake, skyscrapers swayed significantly and slowly

Advances in Seismic Isolation and Vibration Control Technologies for Skyscrapers

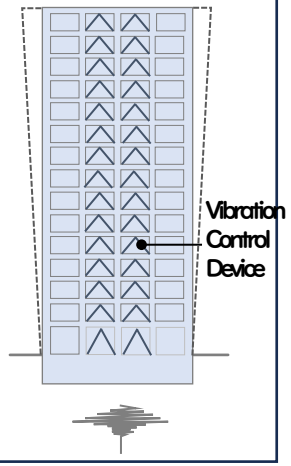
Seismic

The building absorbs the shaking



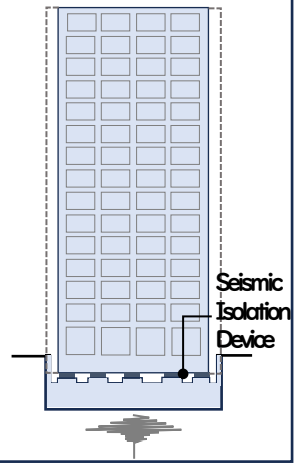
Vibration Control

Using damping devices Resisting Shaking



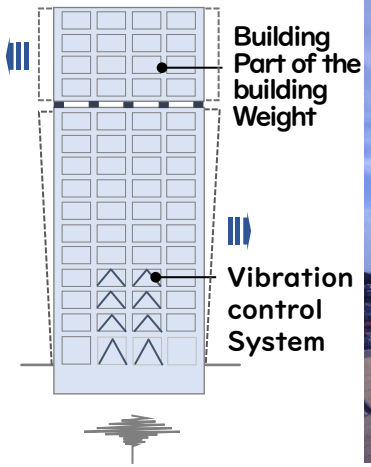
Seismic Isolation

Seismic isolation devices Shake is dissipated

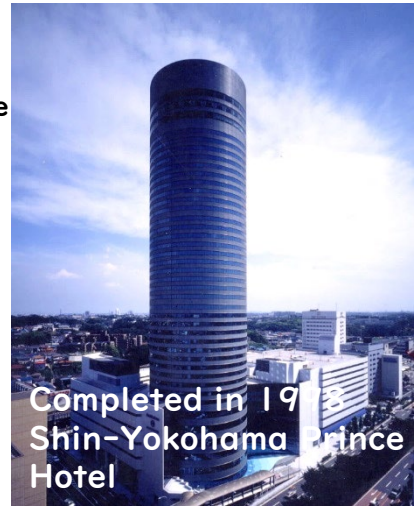


Damping technology for tuned systems

Using weights to to cancel out building sway



80-ton water tank on the roof

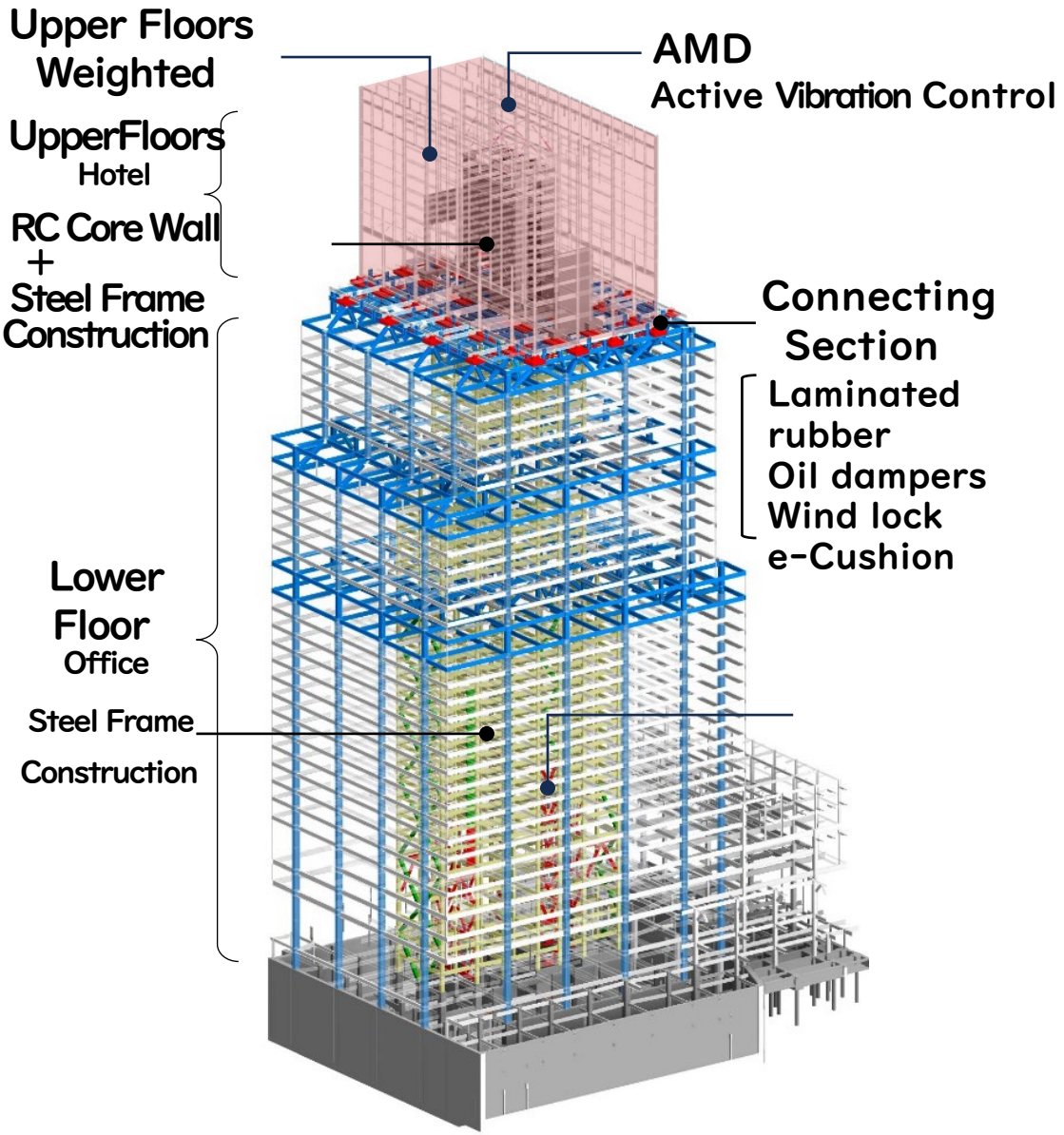


1,520-ton weight at the top floor

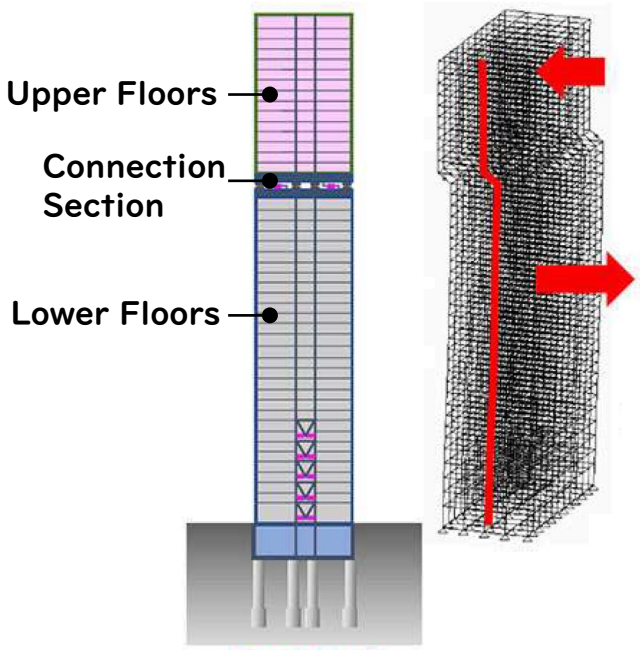
- The development of tuned mass damping technology, which uses weights atop buildings to counteract sway, has been remarkable. (30-year history)
- Although increasing the weight enhances its damping effect, it also increases the load on the building. → Achieving this balance is the challenge.

BILMUS®

Technology that replaces part of the building with counterweights

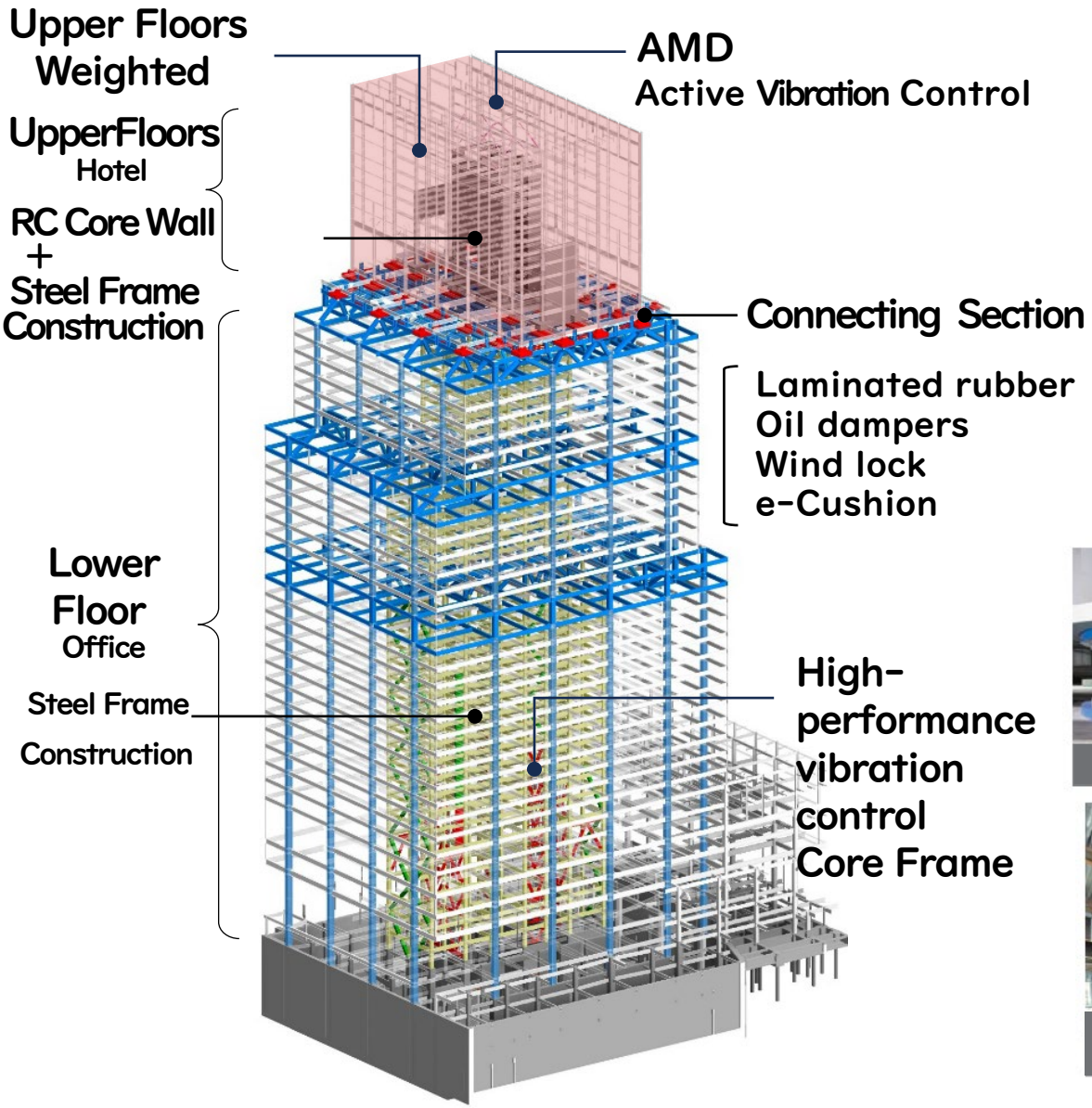


- The 34,200-ton weight of the upper floors is used as a counterweight, canceling out the sway of the upper and lower floors.
- This technology reduces upper-floor sway by 50% and decreases the amount of steel used for lower floors by 30%.



- The upper floors function as counterweights, canceling out each other's shaking during earthquakes.

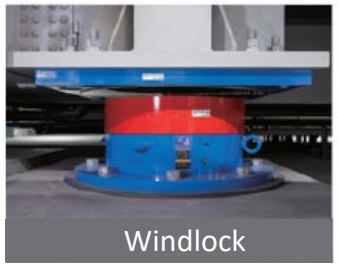
BILMUS®



BLUE FRONT SHIBAURA represents the culmination of Shimizu's seismic isolation and vibration control technologies, featuring an optimized design integrating various technical systems.


Laminated rubber


Oil damper


Windlock

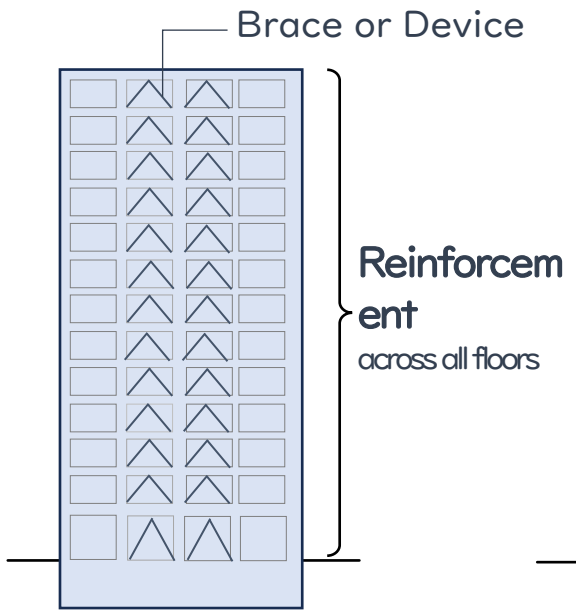

e-Cushion


Two-layer Two-stage
Oil Damper


Friction damper

We will Scale Up our Building Lifecycle Business

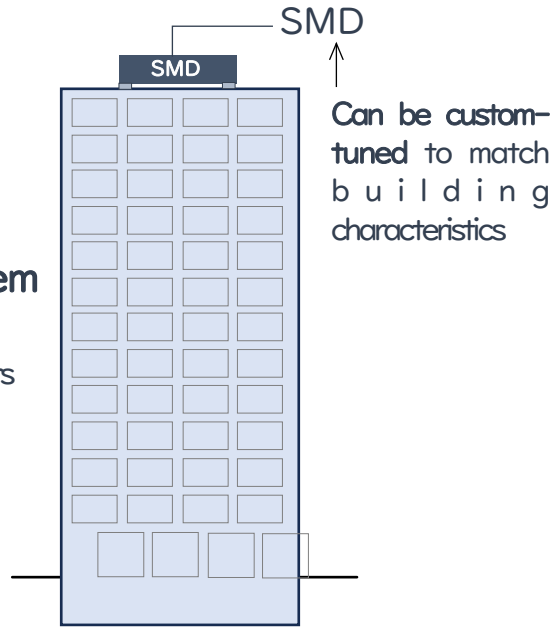
Seismic retrofitting and vibration control



Construction cost **High**
Construction Period **Long**
Relocation **Required**

Tenant turnover
Tenant vacancies

SMD Retrofit



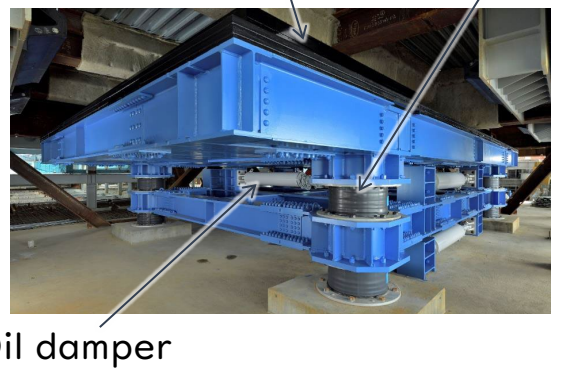
Construction cost **Low**
Construction Period **Short**
Relocation **Not required**

- **Seismic retrofitting of buildings constructed before the new seismic standards is an urgent task.**
- **Seismic retrofitting cannot be carried out due to tenant turnover during construction.**

Shimizu Swing Mass Damper

- **SMD reduces building sway by installing counterweights on the roof to suppress sway.**
- **SMD, which can be performed without residents having to move out, supports seismic renovations.**

SMD Installation Examples



New "Resilience Management" Service

Normal : Consulting

- Assessment of redundancy (safety-related redundancy)
- Vulnerability assessment (susceptibility to damage)

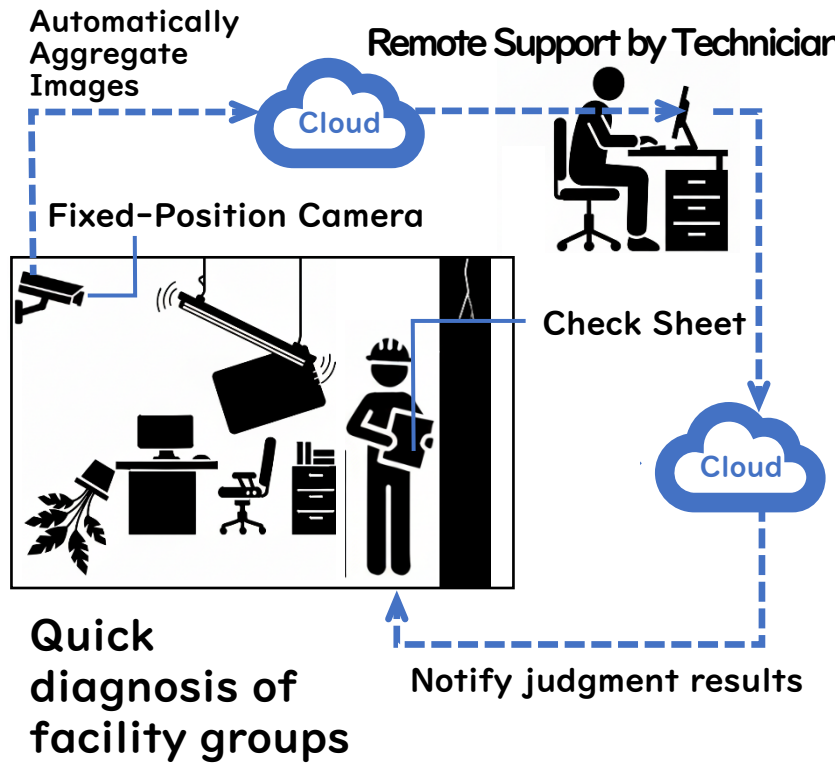
Preparation of damage scenario maps and checklists

After Disaster: Emergency Response and Recovery Support

- Recording observed seismic waves and acquiring damage images
- Remote support for emergency hazard assessments provided by technicians in unaffected areas

Enhance the effectiveness of disaster response actions after damage to facilitate early recovery

Emergency Response Activities

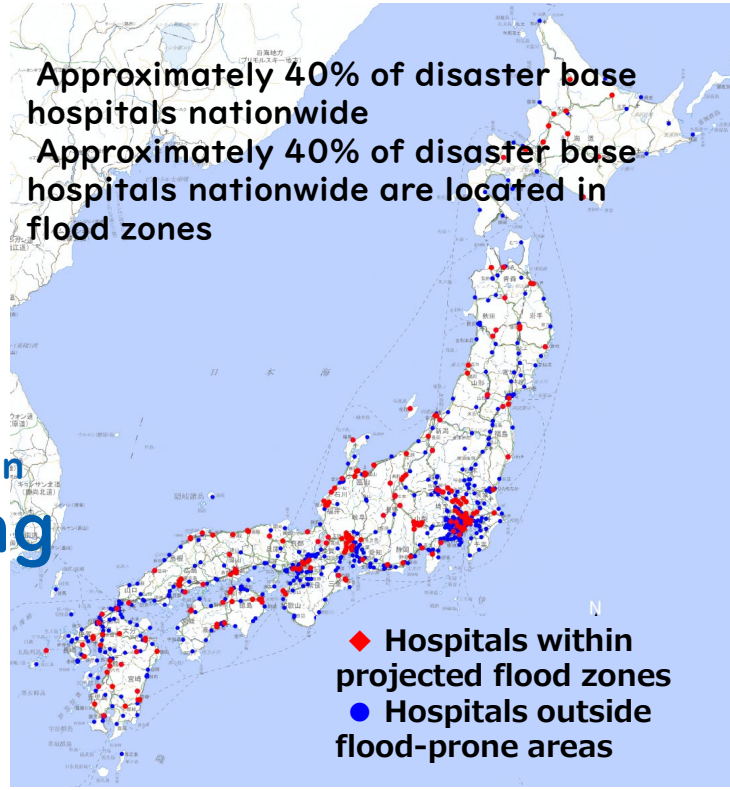


- Providing "business resilience management" to support appropriate investment plans for business continuity

Flood Countermeasures at Disaster Base Hospitals

Earthquakes: Occur suddenly
Flooding: Can take preventive action before disaster strikes using weather and river water level information
→Timeline is effective

Disaster base hospitals are tasked with responding to emergency requests even when affected by disasters



※Omitted for Okinawa Prefecture as no disaster base hospitals exi within projected flood zones

Medical Continuity Plan

Supporting Medical Continuity Plans(MCP) during disasters

- Timeline development and disaster drill support
- Providing a digital platform (MCP Support System) to aid decision-making

Example of a disaster base hospital timeline defining actions chronologically

Digital Sharing Platform for Information in Hospitals: MCP Support System

Medical Continuity Plan

The Disaster Response Headquarters must make swift decisions on how to respond with limited resources such as personnel, infrastructure, and beds.

Information required for medical care provision

【Tasks】
Disaster Preparedness Activities
What is the progress?

- Action Cards
- Timeline progress

【Demand】
How many emergency patients volume?

- Symptoms
- Triage Level
- Estimated time of arrival

【Resources】

What about personnel?

- Status confirmation
- Assembly/On-site Information
- Availability of Specialist Coverage

Infrastructure? What about medical equipment?

- Electricity, water, medical gas
- Medications
- Medical equipment
- Operating rooms

Are there empty beds?

- Number of available beds (General/ICU)

MCP Support System Dashboard Screen (Partial)

【Task Screen】

Triage Level

【Resource Screen】

Specialist physician Availability

Activities for Communities to Consider Medical Continuity during Disasters

Promoting collaboration among medical institutions, local governments, fire departments, and others to enhance regional resilience

- Discussing swift and optimal decision-making by sharing real-time information among institutions

Hitoyoshi-Kuma Region Disaster Medical Collaboration Scene from the Discussion Meeting

- Comprehensive Partnership Agreement on Disaster Medicine Signed with Kumamoto Prefecture and Kumamoto University Hospital

2025 August 26 Signing Ceremony

- Participation in the Disaster Prevention Consortium "CORE" hosted by Tokio Marine & Nichido

Subcommittee Theme
"Establishing a Regional Medical Continuity System During Floods Using Timelines"

[Participating Companies]
Shimizu Corporation (Lead Company)
Tokio Marine & Nichido
NTT DATA
Weathernews
River Information Center
Nissui Construction

CORE 防災コンソーシアム

Architecture Engineering Construction

TECH DRIVEN

Technology hones us and
expands the possibilities of construction
As a solution partner for BCP
Contributing to the transformation toward a highly profitable business structure in the construction industry

For detailed information on the technologies introduced today, please see here

BILMUS

MCP