Disaster Prevention Basic Plan for Expo 2025 Osaka, Kansai, Japan

December 2023 Formulated
September 2024 Revised

Japan Association for the 2025 World Exposition

Basic Disaster Management Plan for Expo 2025 Osaka, Kansai, Japan

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Disaster Prevention Basic Plan for Expo 2025 Osaka, Kansai, Japan (revised edition)

December 2023 Formulated
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Chapter 1. General Provisions

1. Objective

This plan has been formulated to ensure the safety of visitors, all participants and workers related to the Expo (hereinafter referred to as “the Visitors, etc.”) from disasters that may occur during the Expo period, and to realize an Expo that visitors can visit in safety.

In addition, by defining basic items regarding disaster prevention, advance measures, and emergency response measures at the venues and other spots, the plan is intended to enable the Association and related organizations to work closely together in responding to a disaster if such an event should occur, thereby contributing to ensuring safety and security at the Expo.

2. Scope

The scope of this plan is as follows :

(1) Venues, transport terminals, etc. and their surrounding areas (as shown in Attached Figure 1)
(2) Expo P&R[1] parking lots, etc. (as shown in Attached Figure 2)

3. Disaster scenarios

The disasters covered by this plan are as follows:

(1) Earthquakes / Tsunamis
(2) Storms and floods
(3) Lightning strikes
(4) Extreme heat
(5) Fire
(6) Other disasters

4. Basic policy

(1) As a preventive measure, the Association will establish an organization to be engaged in evacuation guidance and rescue for the entire Expo, including participants, and will conduct disaster prevention training and disaster reduction drills to strengthen and improve the organization.
(2) The Association and related organizations will establish a system for mutual communication and coordination.
(3) In the event of a disaster, the Association will secure human resources capable of responding to the disaster by striving to ensure the safety of not only visitors but also participants and workers, and the Association will provide initial responses such as evacuation guidance and emergency response and first aid measures.

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[1] P&R (Park and Ride) means a method of from one’s departure point by car, then changing to a train, bus, or other transport along the way, and traveling to the destination by the changed transport. Transportation at the Expo will be provided by bus.
The Expo 2025 Osaka, Kansai, Japan Specific Policy on Visitor Transportation (Action Plan), 4th Edition, https://www.expo2025.or.jp/wp/wp-content/uploads/expo2025_raijyoushayusougutaihousin_04_honpen_240719_3r.pdf(Latest access on August 22, 2024)

(4) In the event of a disaster that requires the cooperation of relevant organizations, the Association will respond to the disaster in close cooperation with the relevant organizations.

5. Basic responsibilities of the Association

The Association, as the operator hosting the Expo, will take measures to ensure the safety of the facilities and equipment it owns or manages against disasters, to prepare disaster prevention equipment and risk management materials for firefighting, rescue, and first aid, to establish a crisis management system, to take measures for hard-to-reach-home people, and to prepare for other disasters.

In addition, the Association will strive to conduct disaster reduction drills and exercises and other disaster prevention and disaster reduction measures in which participants, workers, and related organizations can participate.

6. Relevant organizations

The relevant organizations related to disaster prevention are as shown in the attached schedule.

Chapter 2. Disaster Assumptions and Damage Estimates

1. Earthquakes / Tsunamis

(1) Epicentral earthquakes

Epicentral earthquakes include the Uemachi fault zone earthquake, the Ikoma fault zone earthquake, the Arima-Takatsuki fault zone earthquake, and the Median Tectonic Line fault zone earthquake. We consider the damage that would occur from seismic activity caused by an earthquake in the Uemachi fault zone, which has the strongest seismic intensity.

A. Predicted distribution of seismic intensity

The predicted distribution of seismic intensity along the Uemachi fault zone is as shown in the figure below, with the maximum seismic intensity being a lower 6.

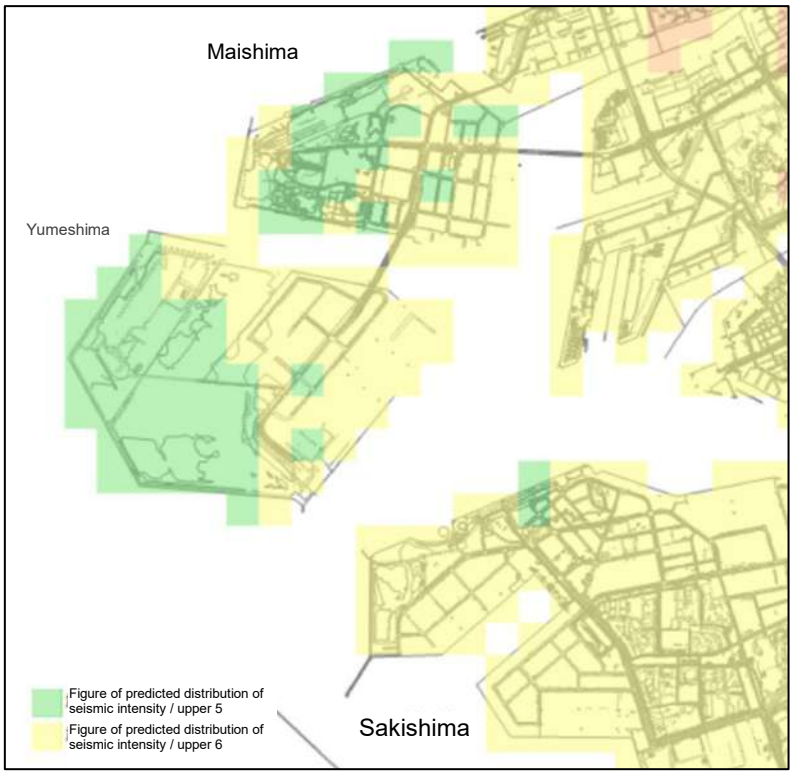


Figure 1. Distribution of seismic intensity for earthquakes in the Uemachi fault zone[2]

B. Estimated damage within the venue

Table 1. Estimated damage within the venue

Category		Damage
Building		- Scattering window glass, etc. - Falling exhibits and decorations - Falling indoor lighting, ceilings, and other components * The pavilions and other facilities are new constructions with aseismatic design, so there is little chance of them collapsing.
Road		- Cracks and depressions
Lifeline	Power	- Electric shut-off
	Gas	- Gas leakage due to a gas cylinder falling over *There is no gas supply through gas pipes.
	Water and sewage	- Water leaks and water outages * Earthquake-resistant pipes are used for water supply and sewerage. - Flowing out sewage due to damage to manholes and sewer pipes - Flooding due to reduction of drainage capacity, such as damaged storm drains
	Communication	- Communication outage

[2] Map Navi Osaka, https://www.mapnavi.city.osaka.lg.jp/osakacity/Map?mid=2&mpx=135.38534746959&mpy=34.645804271577&mps=50000&mtp=dm2&gprj=3&mcl=2001,1,10,100;2001,2,20,200;2001,3,30,300;2001,4,40,400 (Latest access on June 23, 2023)

Fire	- Simultaneous outbreak of multiple fires
Human damage	- Many people will be injured due to falling objects and scattering glass. - Casualties and injuries due to falling objects or falls

C. Damage to access routes and criteria for traffic closures

(a) Yumemai Bridge and Yumesaki Tunnel

Since the structure has earthquake resistance, the possibility of fatal damage such as the destruction of the main structure is low. However, depending on the magnitude of the earthquake, traffic will be closed immediately after the occurrence and will only be reopened after inspections by a road administrator's confirmation of its safety (consultation with the police may be required), so it is expected that it will take some time for the traffic closures to be lifted.

In addition, if traffic closure is applied to vehicles, it will also be applied to pedestrians.

(b) Railways

Osaka Metro and JR West will be suspended due to the magnitude of the earthquake.

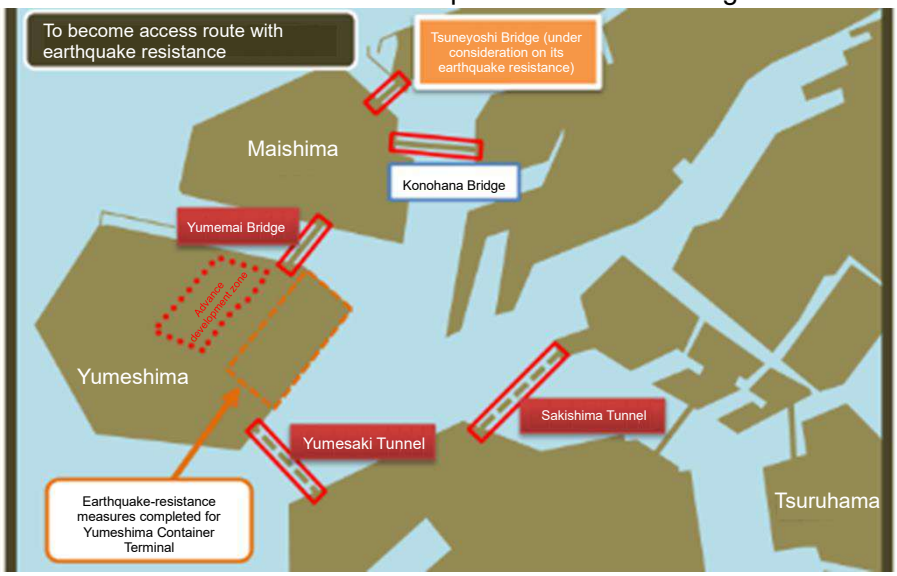


Figure 2. To become access route with earthquake resistance[3]

[3] Physical protection; safeguard for coastal areas – Earthquake resistance of access routes/Ground elevation that does not allow tsunamis to ingress (Yumeshima) –, Osaka City, https://www.city.osaka.lg.jp/port/cmsfiles/contents/0000168/168315/disasterdefence.pdf
Latest access on June 23, 2023

(2) Trench-type earthquakes

A trench-type earthquake is expected to occur at the plate boundary of the Nankai Trough (hereinafter referred to as the “major Nankai Trough Earthquake”).

A. Predicted distribution of seismic intensity

The predicted distribution of seismic intensity for the major Nankai Trough Earthquake is as shown in the figure below, with the maximum seismic intensity being a lower 6.

Damage within the venue and to the access routes from Yumeshima is predicted to be at the same level as an epicentral earthquake (maximum seismic intensity 6 lower), so damage to the venue and access routes due to seismic activity is expected to be at the same level as an epicentral earthquake.

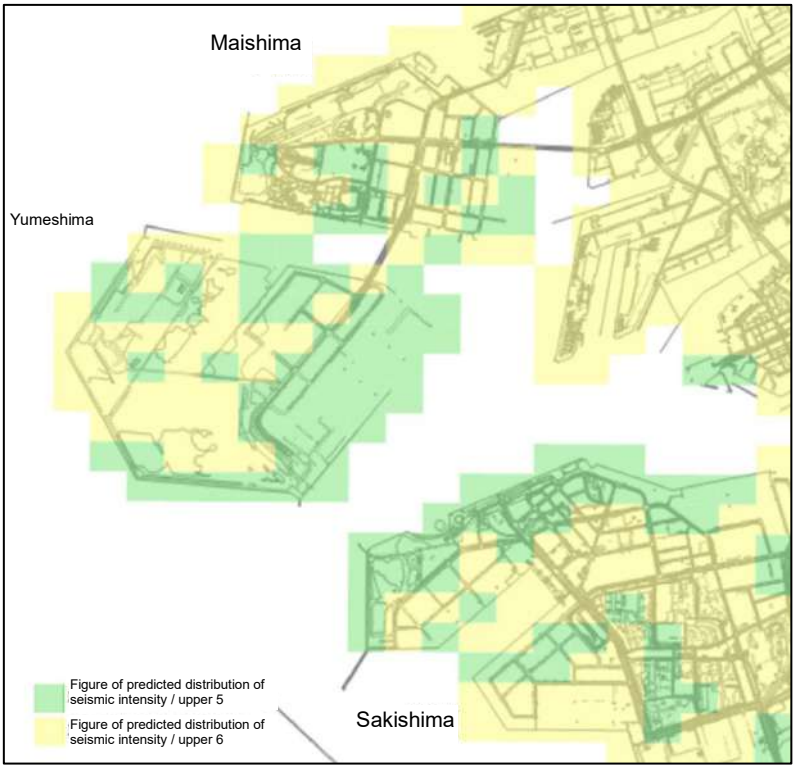


Figure 3. Distribution of seismic intensity in the major Nankai Trough Earthquake[4]

[4] Map Navi Osaka https://www.mapnavi.city.osaka.lg.jp/osakacity/Map?mid=2&mpx=135.38534746959&mpy=34.645804271577&mps=50000&mtp=dm2&gprj=3&mcl=2007,1,10,100;2007,2,20,200;2007,3,30,300;2007,4,40,400;2007,5,50,500, latest access on June 23, 2023

B. Liquefaction probability prediction

(a) Estimated damage

On Yumeshima, measures have been taken such as filling in the area with dredged clay soil produced mainly during the excavation of ports and rivers, and it is anticipated that most of the site will not be susceptible to liquefaction.

In contrast, there is a high possibility of liquefaction occurring on Sakishima and Maishima.

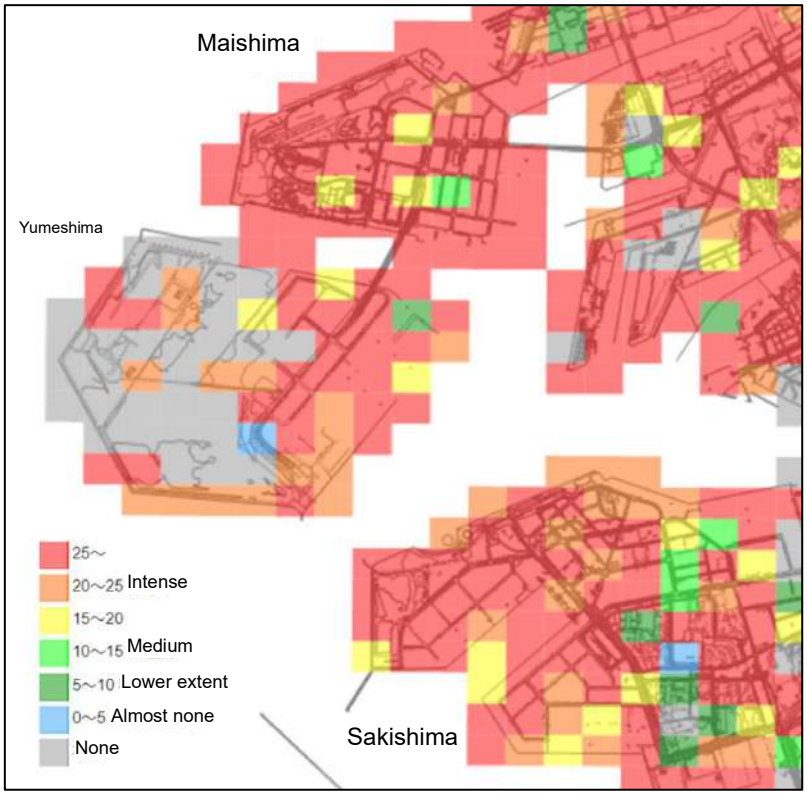


Figure 4. Liquefaction prediction map in the major Nankai Trough Earthquake[5]

(b) An example of liquefaction damage

- Tilt and subsidence of buildings
- Floating or damage to underground structures
- Fountains and sand jets
- Lateral flow (the phenomenon in which liquefied ground moves horizontally)

[5] Map Navi Osaka https://www.mapnavi.city.osaka.lg.jp/osakacity/Map?mid=2&mpx=135.38534746959&mpy=34.645804271577&mps=50000&mtp=dm2&gprj=3&mcl=2006,7,70,700;2006,6,60,600;2006,5,50,500;2006,4,40,400;2006,3,30,300;2006,2,20,200;2006,1,10,100, latest access on June 23, 2023

C. Assumed inundation area by tsunami

Yumeshima has been raised as a measure against tsunamis and storm surges as described below (c), and flooding damage to Yumeshima is expected to be limited to the areas surrounding it.

However, it is expected that debris will wash up around Yumeshima and near bridges and tunnels.

Since most of Konohana Ward is below sea level, it is expected that widespread flooding will occur and the water will not subside for several days.

(A) Flooded areas of Yumeshima, Sakishima, and Maishima

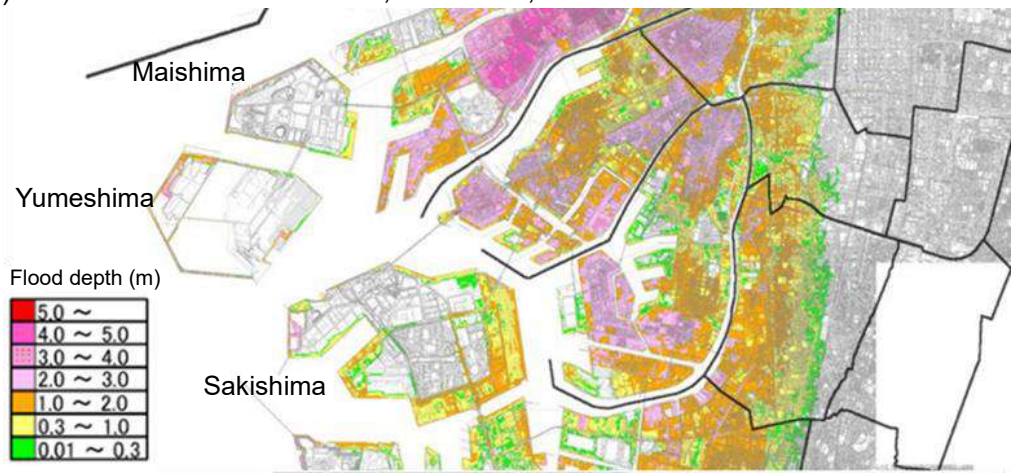


Figure 5. Flooding prediction in the major Nankai Trough Earthquake[6]

(b) Tsunami arrival time and tsunami height

	Tsunami arrival time[7]	Tsunami height
Konohana Ward	113 min	O.P.[8]+5.4 m
Suminoe Ward	110 min	O.P.+6.4 m

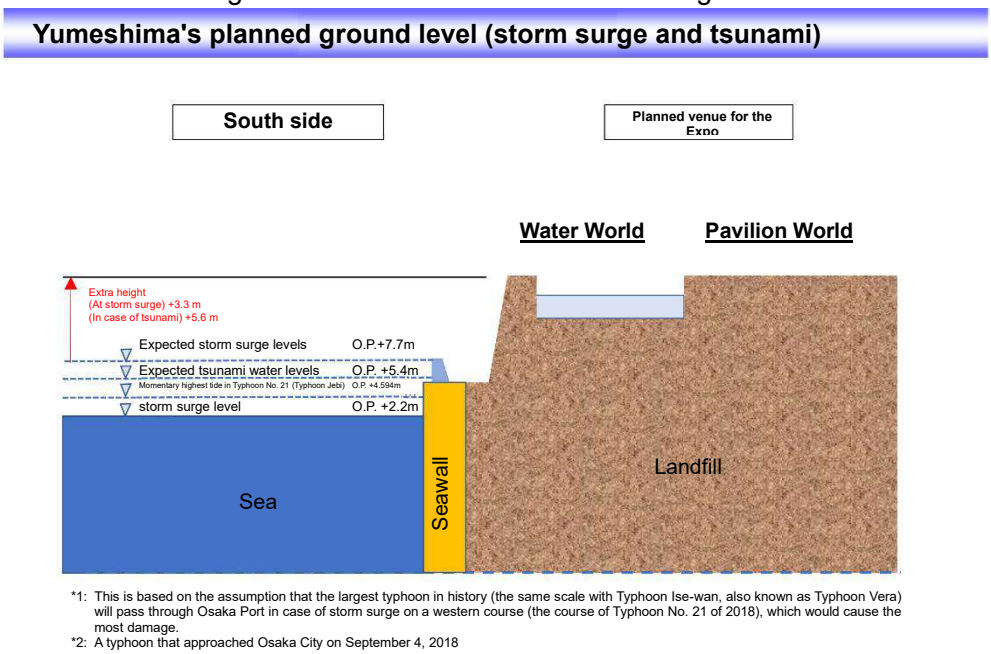
[6] Osaka Prefecture major Nankai Trough Earthquake Disaster Countermeasures Review Committee (3rd meeting) Document 4 Osaka Prefecture Assumed Inundation Area by Tsunamis (Overall figure) https://www.pref.osaka.lg.jp/documents/91/74tunamizentai3.pdf, latest access on August 22, 2024

[7] Depending on where the earthquake occurs, it could arrive sooner than this. The tsunami arrival time is the time when a tsunami of +1 m will hit. (Tsunamis smaller than +1 m have arrived before this time, and there is a risk of disasters occurring due to tsunamis.)

[8] Lowest tide level in Osaka Bay (Osaka Peil). In 1874, the lowest tide level in Osaka Port (Tempozan) was defined as O.P.±0.0 m. Compared to Tokyo Bay average sea level (T.P.), O.P. = T.P.+1.30 m.

(c) Yumeshima's ground level

The ground level of Yumeshima is O.P.+11m, which is more than 5 m higher than the predicted tsunami height of O.P.+5.4 m in case of storm surge.



*1: This is based on the assumption that the largest typhoon in history (the same scale with Typhoon Ise-wan, also known as Typhoon Vera) will pass through Osaka Port in case of storm surge on a western course (the course of Typhoon No. 21 of 2018), which would cause the most damage.
*2: A typhoon that approached Osaka City on September 4, 2018

Figure 6. Planned ground level of Yumeshima[9][10]

(3) Tsunami caused by an earthquake without seismic activity in Osaka Prefecture

Earthquakes occurring far away may also trigger a tsunami advisory or tsunami warning for Osaka Prefecture.

[9] 8th Meeting to Promote Strengthening of Kansai Infrastructure (July 31, 2019) Created using meeting data http://www.kyokai-kinki.or.jp/kansai-infra/iinkai/images/201907/iinkai201907-01umemura.pdf , latest access on June 23, 2023

[10] References on information from the review committee by Osaka Port Storm Surge Countermeasures Review Committee https://www.city.osaka.lg.jp/port/page/0000476046.html, latest access on December 18, 2023

2. Storms and floods

(1) Typhoon

We will assume a typhoon disaster of the same magnitude as Typhoon No. 21 of 2018 and the Second Muroto Typhoon, which caused large-scale damage in Osaka in the past.

Table 2. Typhoons that caused major damage in Osaka

	2018 Typhoon No. 21[11]	1961 Second Muroto Typhoon (also known as Super Typhoon Nancy)[12]
Barometric pressure at center (minimum value)	915 hPa	Below 900 hPa
Maximum wind speed[13] *	46.5 m/s (KIX Island [Kansai International Airport])	33.3 m/s (Osaka)
Maximum instantaneous wind speed*	58.1 m/s (KIX Island [Kansai International Airport])	50.6 m/s (Osaka)
Maximum tide deviation*	277 cm (Osaka)	260 cm (by trace)
Total precipitation for a specific period*	90.0 mm (September 3-5, in Kawachinagano)	48.8 mm (September 15-17, in Osaka)
Maximum precipitation per hour*	69.0 mm (Nose)	12.2 mm[14] (Osaka)
Human damage*	8 casualties, 464 injured	32 casualties

*Figures are for Osaka Prefecture.

A. Strong winds

(a) Estimated situation within the venue

Typhoon No. 21 of 2018 recorded maximum wind speeds of over 40 m/s and maximum instantaneous wind speeds of over 50 m/s in Osaka Prefecture, and with such a typhoon, damage as shown in the table below is expected within the venue.

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[11] "Typhoon No. 21 of 2018 (September 3-5)," Osaka Meteorological Observatory, https://www.data.jma.go.jp/stats/data/bosai/report/2018/20180911/20180911.html, latest access on August 26, 2024
"Strong winds and storm surges caused by Typhoon No. 21," Japan Meteorological Agency, https://www.data.jma.go.jp/obd/stats/data/bosai/report/2018/20180911/jyun_sokuji20180903-0905.pdf, latest access on August 22, 2023

[12] "The Second Muroto Typhoon of 1961 (September 16)," Osaka Meteorological Observatory, https://www.jma-net.go.jp/osaka/140th/disaster/kishou/5_gaiyo.pdf , latest access on August 26, 2024

[13] The first column of the table shows data on the typhoon itself, and the second column shows data for Osaka Prefecture.

[14] "Precipitation Table," Japan Meteorological Agency, https://www.data.jma.go.jp/obd/stats/data/bosai/report/1961/19610915/19610915_b1.html , latest access on August 21, 2023

Table 3. Estimated damage caused by typhoons

Object	Damage
Open air/Trees, etc.	- Some trees may fall (Forest of Tranquility, etc.). - Speaker poles, lighting poles, etc. may fall over. - Tents, parasols, open air displays, etc. may be scattered.
Car	- Vehicles that are easily affected by wind, such as trucks, may overturn.
Building	- Exterior materials may be scattered over a wide area. - Many pavilions are steel constructions, so some may deform.
Effects on people	- Open air activities are extremely dangerous and there is a risk of injury from flying objects or falling trees.

(b) Damage to access routes

Yumemai Bridge will be closed to traffic if wind speeds exceed a certain level. Even after the winds die down, it will only be reopened after inspections by a road administrator's confirmation of its safety (consultation with the police may be required), so it is expected that it will take some time for the traffic closures to be lifted.

Regarding railways, Osaka Metro will suspend operations on all lines or certain sections if wind speeds exceed a certain level. When a large typhoon and other severe winds and rainfalls are forecasted, JR West holds internal discussions and decides whether to suspend services.

B. Storm surge

As described above in 1(2)C(c) "Yumeshima's ground level," measures have been taken to protect against tsunamis and storm surges. As a result, damage from storm surges is expected to be limited to the areas surrounding Yumeshima, and most of the venue is not expected to be flooded.

According to Osaka Prefecture's storm surge forecast (see the figure below), flooding damage on Maishima will be limited to the surrounding areas, but most of Sakishima is expected to be flooded to a depth of 3 to 5 meters.

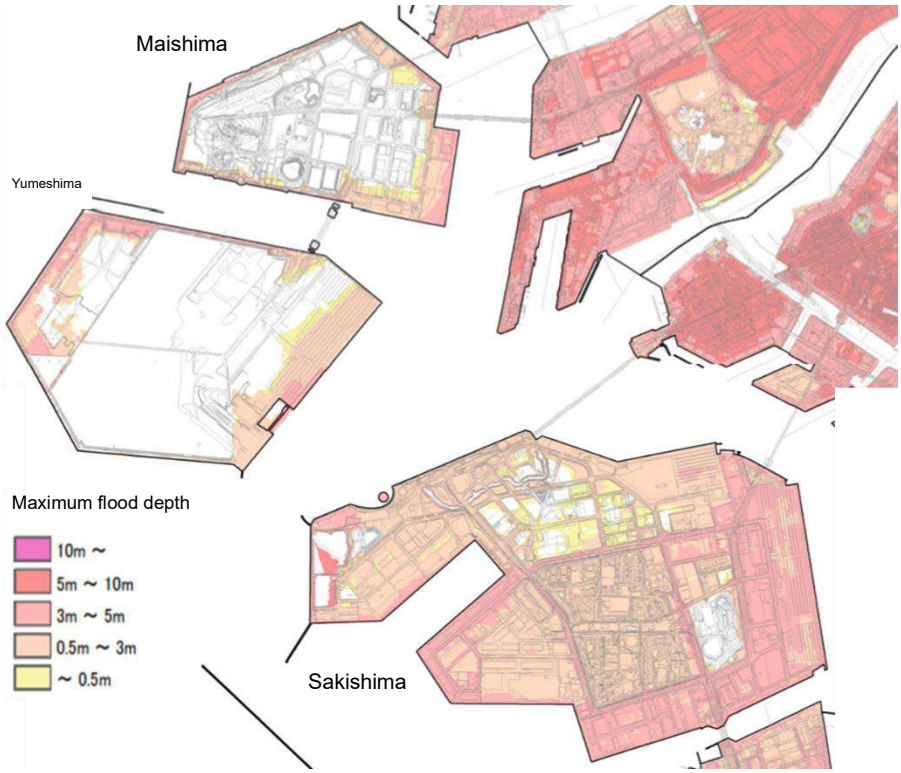


Figure 7. Map of expected inundation areas by storm surges in Osaka Prefecture[15]

C. Rainfalls

In the case of Typhoon No. 21 of 2018, precipitation of approximately 80 mm per hour were analysed, and with such a typhoon, the events shown in the table below are expected to occur within the venue.

Table 4. Estimated damage caused by rainfalls

Object	Damage
Open air	- The roads become like rivers. - The pond in the Forest of Tranquility overflows. - The water splashes make the whole area look whitish, making visibility worse.
Building	- Rainwater that exceeds the drainage function capacity may cause flooding from the first floor of the building.
Car	- Driving a car is dangerous.
Effects on people	- Umbrellas become completely useless. - Entering flooded areas or low areas that are expected to be flooded (such as going to check on the situation) is extremely dangerous.

[15] Map of expected inundation areas by storm surges in Osaka Prefecture, latest access on August 26, 2023
https://www.pref.osaka.lg.jp/documents/3222/shinsuisin06_1.pdf
https://www.pref.osaka.lg.jp/documents/3222/shinsuisin09_1.pdf

(a) Drainage function within the venue

The venue is designed to be able to drain rainfall of up to 60 mm/h, but if the rainfall exceeds that amount, low-lying areas within the venue may become flooded.

(b) Damage to access routes

Traffic in Yumesaki Tunnel will be closed if it is flooded or there is a risk of flooding. Even when flooding or the risk of flooding has been resolved, it will only be reopened after inspections by a road administrator's confirmation of its safety (consultation with the police may be required), so it is expected that it will take some time for the traffic closures to be lifted.

As for railways, there are no standards for suspending services due to rainfalls, so confirmation of the disaster situation is required.

(2) Heavy downpours

A. Record-breaking concentrated downpour in Osaka City

Table 5. Disaster situation of inundation caused by local heavy rain[16]

Date of occurrence of damage		August 27, 2011	August 13-14, 2012	August 18, 2012	August 25, 2013
Number of flooded houses (above floor level)		1,888 (104)	815 (87)	789 (22)	1,320 (41)
Rainfall	One-hour strength	77.5mm (Meteorological Observatory)	83mm (Itakano Pump Station)	94mm (Nakanoshima Pump Station)	67.5mm (Tsukuda No. 2 Pump Station)
	Ten-minutes' strength	26.3mm (Itakano Pump Station)	21.5mm (Kunitsugu Pump Station)	32mm (Tsukamoto Pump Station)	27.5mm (Meteorological Observatory)

B. Damage within the venue

As stated in 2(1)C(a) "Drainage function within the venue" above, the drainage function within the venue is designed to be able to drain rainfall of 60 mm/h or less. However, Osaka City has experienced record-breaking heavy downpours of over 90 mm/h in the past, and damage such as that shown in Table 4 is expected.

C. Damage to access routes

Same as 2(1)C(b) "Damage to access routes" above.

3. Lightning strikes

(1) Number of days with thunder in Osaka

In Osaka, there was 18 days with thunder in 2022. Among them, 13 days were in the summer (July to September), when cumulonimbus clouds that cause lightning tend to develop rapidly.

[16] Measures to reduce damage from concentrated downpour, November 18, 2022, Osaka City, https://www.city.osaka.lg.jp/kensetsu/page/0000217859.html , latest access on June 23, 2023

Table 6. Number of days with thunder in Osaka[17]

Month	2018	2019	2020	2021	2022
January	0	1	0	0	0
February	0	0	0	0	0
March	1	3	0	1	1
April	0	1	0	2	1
May	1	2	0	2	1
June	2	1	0	1	1
July	2	4	3	6	4
August	4	4	7	1	7
September	4	4	5	2	2
October	0	2	0	0	0
November	0	0	0	0	1
December	1	0	0	0	0
Total	15	22	15	15	18

(2) Damage caused by lightning strikes within the venue

Depending on the position of the cumulonimbus cloud, lightning can strike anywhere—on the sea, on plains, or in the mountains—and the higher any building is, the more likely it is to be struck. So within the venue, the possibility of lightning strikes are higher on top of the Grand Roof (Ring) (20 m high) in comparison with anywhere else, and the events listed in the table below are expected to occur within the venue.

Table 7. Estimated damage caused by lightning

Object	Damage
Grand Roof (Ring)	- Lightning protection equipment has been installed and measures have been taken to dissipate lightning underground, so damage to the Grand Roof (Ring) itself is not anticipated.
Trees, speaker poles, lighting poles	- There is a risk of fire occurring in trees. - Damage to speakers and lighting is expected.
Open air event space	- There is a high risk of lightning strikes at open air facilities where many visitors gather.
Effects on people	- If there are people on the Grand Roof (Ring) or near trees, there is a risk of lightning jumping to them.

[Reference]: In Osaka City, an accident occurred in which two women who were sheltering under a tree were killed when the tree was struck by lightning (August 18, 2012).

[17] Osaka 2018-2022 (monthly values) Main elements, based on past data from the Japan Meteorological Agency https://www.data.jma.go.jp/obd/stats/etrn/index.php?prec_no=62&block_no=47772&year=&month=&day=&view= (Latest access on February 15, 2023)

4. Extreme heat

(1) Temperature

The average temperature in Osaka is as shown in the figure below. August included in the period when the Expo is held tends to be the hottest. The highest temperature ever recorded in Osaka was 39.1°C, in August 1994.

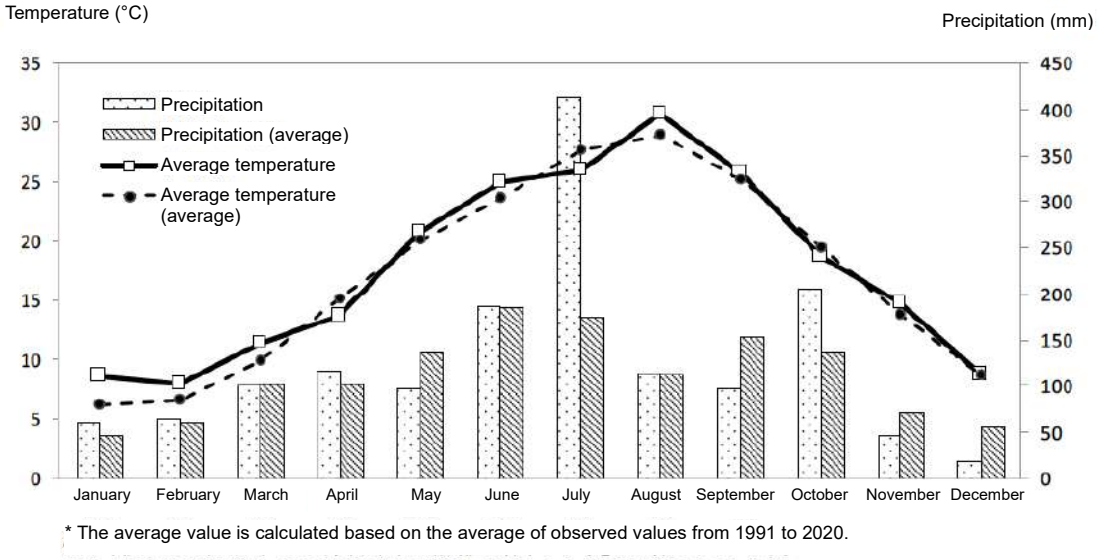


Figure 8. Average temperature and precipitation in Osaka (2020, average)[18]

(2) Heat index

A. Heat stroke prevention guidelines incorporating the heat index

The heat index (WBGT[19]) is recognized as effective guidelines for working and exercise environments and has been standardized internationally by ISO and other organizations. The Ministry of the Environment has published the “Guidelines for Daily Life” as shown in the table below.

[18] Osaka Prefecture Statistical Yearbook 2021 (Chapter 2. Meteorological Explanation), published in March 2022, Osaka Prefecture, https://www.pref.osaka.lg.jp/toukei/nenkan/tn2021index.html#02 (Latest access on June 23, 2023)

[19] The heat index (WBGT: Wet Bulb Globe Temperature) is an index proposed in the United States in 1954 with the aim of heat stroke prevention. The unit is expressed in degrees Celsius (°C), the same as air temperature, but the value is different from that of air temperature. The heat index (WBGT) is an index that focuses on the exchange of heat (heat balance) between the human body and the outside air, and it incorporates three factors that have a large impact on the human body's heat balance: 1) humidity, 2) the surrounding thermal environment, such as solar radiation and radiation, and 3) temperature. https://www.wbgt.env.go.jp/wbgt.php (Latest access on September 12, 2023)

Table 8. Guidelines for Daily Life

Heat index (WBGT)	Guidelines for daily activities to be careful of	Note
Danger (31 and over)	Risks in all daily life activities	In elderly people, there is a high risk of this occurring even when at rest. Avoid going outside as much as possible and move to a cooler room.
Severe Warning (28 to less than 31)		When going outside, avoid the hot sun, and when indoors, be careful of rising room temperatures.
Warning (25 to less than 28)	Medium risks in all daily life activities	Take regular, adequate rest periods when exercising or doing hard operations.
Caution (Under 25)	Risks in vigorous daily life activities	Generally, the risk is low, but there is a risk of it occurring when doing strenuous exercise or heavy work.

Revised by the Ministry of the Environment based on the Japanese Society of Biometeorology's "Guidelines for the prevention of heat illness in daily life (Ver. 4)" (published in 2022)[20]

B. Osaka heat index

Osaka's heat index (2020-2022) is as shown in the figure below, and it is expected that there will be days in August and September during the Expo when the heat index will exceed 31.

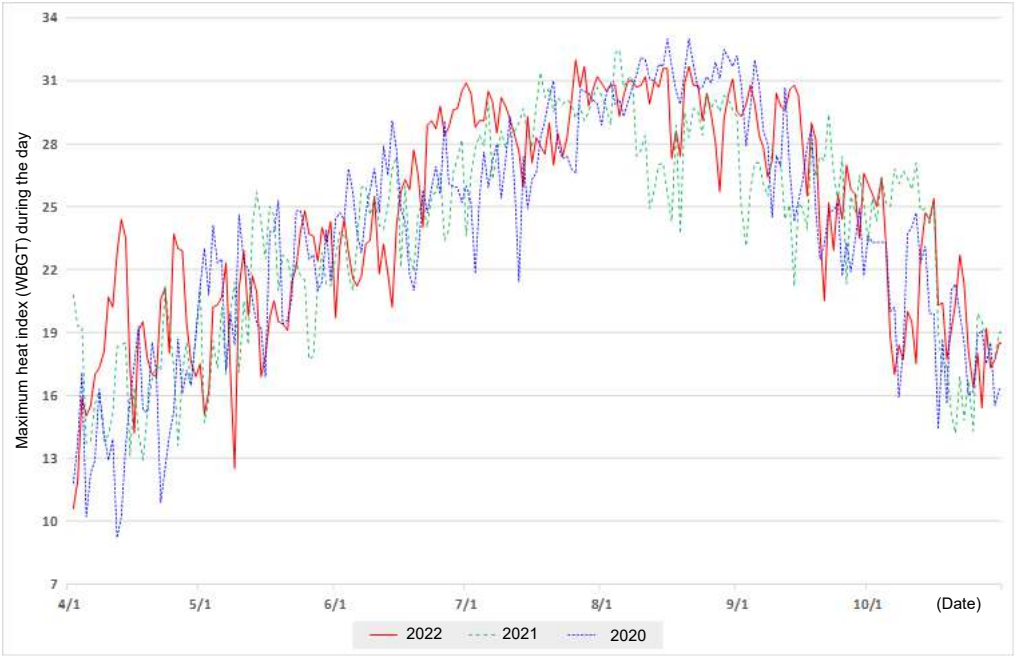


Figure 9. Maximum heat index (WBGT) during the day in Osaka (2020-2022)[21]

[20] With the compliance of the Japanese Society of Biometeorology, the Ministry of the Environment renamed the original "WBGT" to the "heat index (WBGT)" and expressed the value as a unitless index to make it easier to distinguish from temperature (units are degrees Celsius). https://www.wbgt.env.go.jp/wbgt.php (Latest access on September 12, 2023)

[21] Created based on Past Data - Data List Osaka (Osaka) at the Ministry of the Environment's Heat Illness Prevention Information Site https://www.wbgt.env.go.jp/record_data.php?region=07&prefecture=62&point=62078 (Latest access on September 12, 2023)

(3) Number of ambulance transportation cases due to heat stroke

A. Number of ambulance transportation cases by WBGT

The past number of patients transported to hospital due to heat stroke is as shown in the figure below. When WBGT exceeds 28, the number of ambulance transportation cases tends to increase sharply.

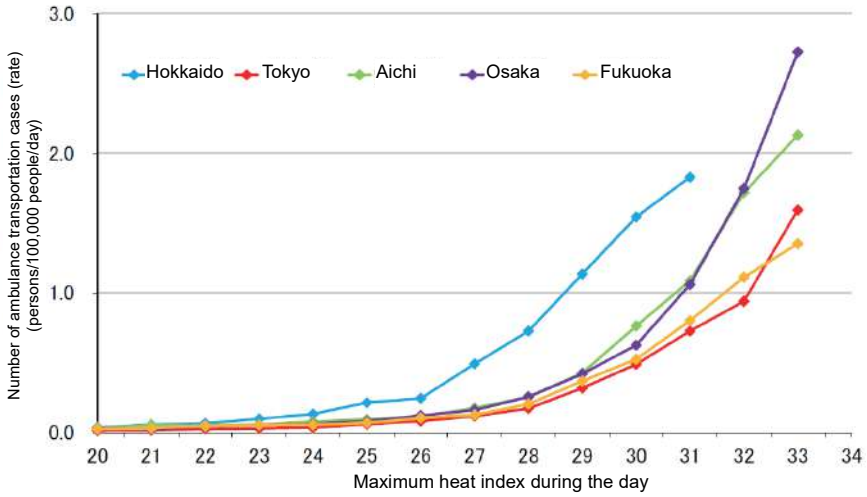
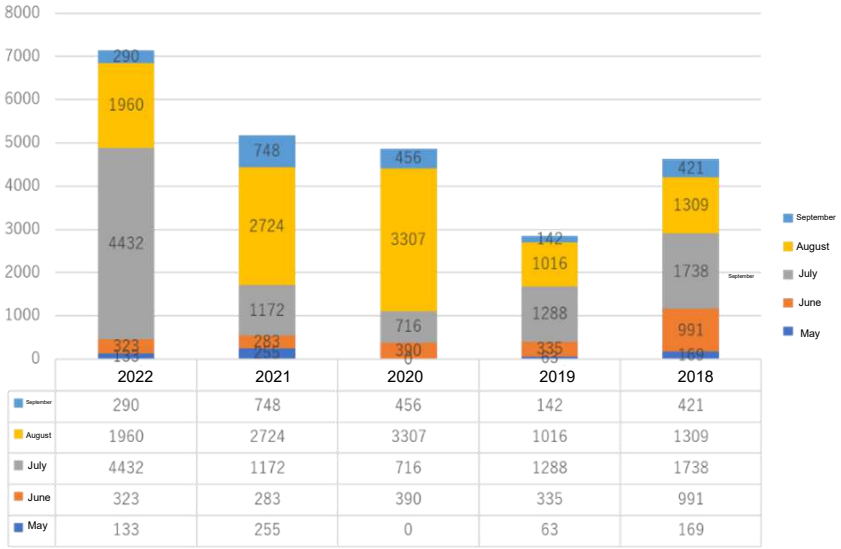


Figure 10. Number (rate) of transportation cases due to heat stroke by maximum heat index (WBGT) during the day (2008-2021)[22]

B. Number of ambulance transportation cases due to heat stroke in Osaka Prefecture

In the most common months, the number of ambulance transportation cases exceeds 4,000, and it is expected that there will be heat stroke patients requiring ambulance transportation at the venue as well.



	2022	2021	2020	2019	2018
September	290	748	456	142	421
August	1960	2724	3307	1016	1309
July	4432	1172	716	1288	1738
June	323	283	390	335	991
May	133	255	0	63	169

Figure 11. Number of ambulance transportation cases due to heat stroke in Osaka Prefecture (by month)[23]

[22] Heat Stroke Environmental Health Manual 2022, https://www.wbgt.env.go.jp/pdf/manual/heatillness_manual_full.pdf , (Latest access on September 12, 2023)

[23] Created based on past data from the heat stroke information by the Ministry of Internal Affairs and Communications' Fire and Disaster Management Agency https://www.fdma.go.jp/disaster/heatstroke/post4.html, latest access on June 26, 2023

(4) Damage within the venue

The risk of heat stroke increases in spaces where people gather, such as at summer events.

In situations where people gather, such as pavilions, event venues, and waiting lines at entrance and exit gates, there is a risk that the hot environment will suddenly deteriorate in a short period of time.

[Reference]: Although the temperature and other conditions are different now, the number of heat stroke cases at EXPO 2005, Aichi, Japan was 313 over a period of approximately six months.

5. Fire

(1) Structure of facilities within the venue

A. Pavilion, etc.

They are steel constructions, which make them less susceptible to fire than wooden constructions. However, in comparison with reinforced concrete constructions, there are no fire compartments, and the spaces may be separated by curtains or other partitions.

In the case of Pavilion A, there is a minimum setback of one meter from the boundary line, making it difficult for fire to spread from building to building.

B. Grand Roof (Ring)

Although it is a wooden construction, it is designed with a fire stop to prevent the entire building from burning.

Also, in terms of shape, the walkway is open, so there is no risk of smoke accumulating, and stairs are installed every 250 meters (eight locations over two kilometers in circumference).

C. Facilities that handle fire

(A) Eating and drinking houses

Gas cylinder or all-electric

(B) Food trucks

Gas cylinders

(C) Event facilities

Fireworks and explosives

(2) Other fire risks

A. Electrical fire

Electric buses and smart mobility vehicles will be running within the venue, and if they catch fire it would be an electrical fire.

B. Arson

In entering the venue, everyone must go through a security check at the gate, and there are many security cameras installed within the venue, so arson would not be easy.

(3) Fire incidents at EXPO 2005, Aichi, Japan

Two fires broke out at EXPO 2005, Aichi, Japan, but both were extinguished immediately after they occurred, and the damage was minor.

During the approximately six-month opening period, the fire-brigade was called out to 92 emergency situations, and the majority of them were to support emergency response efforts or to trigger automatic fire alarm systems caused by smoke in the kitchen, etc.

(4) Fires on access routes

If a vehicle fire or other incident occurs in the Yumesaki Tunnel or on Yumemai Bridge, there is a high possibility that the traffic will be closed for a long period of time.

A similar situation is also expected to occur on the Osaka Metro.

6. Other disasters

(1) Other meteorological disasters

Tornadoes, hail, wind gusts, etc.

(2) Accidents causing casualties and/or injured

A. Falling accident from a high location
B. Traffic accidents involving transport trucks and electric vehicles (EV buses)
C. Contact accidents involving smart mobility vehicles
D. Crash accidents of drones and flying cars
E. Water accidents in the Sea of Connections
F. Accidents involving many persons who have suffered an injury or contracted a disease, such as mass food poisoning and crowd accidents

(3) Other cases

A. Gas leak incident
B. Hazardous material(s) leakage incident

(4) Other special disasters

A. Special disasters such as terrorism
B. Circumstances in which people protection information (launch information) is transmitted via J-ALERT national early warning system

(5) Other disasters as stipulated in the Basic Act on Disaster Management

(6) Disasters involving the combined occurrence of various disasters

Chapter 3. Advance Measures

1. Disaster prevention organizational system

(1) Fire prevention management system

The fire prevention management system at the Expo will be as shown in Attached Figure 3. The Association will appoint an Expo Disaster Prevention Officer to oversee fire prevention management at each pavilion and other facilities.

The Expo Disaster Prevention Officer will prepare a disaster prevention implementation plan and determine matters related to fire prevention and disaster prevention within the venue.

(2) System of organizations engaged in evacuation guidance, rescue, etc.

The system of the organizations engaged in evacuation guidance, rescue, etc. at the Expo shall be as shown in Attached Figure 4. The Expo Disaster Prevention Officer will be responsible for directing and supervising each organization and team to work together in the event of a disaster.

Each organization will also be active in disasters other than fires that are assumed in this plan.

(3) Police and firefighting systems

The Osaka Prefectural Police and the Osaka City Fire Department will deploy human resources and vehicles to bases and stations to be set up within the venue and will establish police and fire service systems for the Expo.

(4) Medical relief system

The Association will ensure that medical personnel are stationed at medical relief facilities within the venue and establish a system to enable the rapid transport of a person who has suffered an injury or contracted a disease.

2. Disaster prevention training and disaster reduction drill

(1) Disaster prevention training

The Association will provide workers with sufficient training and education on how to respond to disasters and on disaster prevention knowledge, etc.

(2) Disaster reduction drill

A. Paper drill

In order to improve the disaster prevention knowledge and disaster response capacity of Association staff, the Association will regularly conduct paper drills focusing on initial response activities.

B. Individual drill

Individual drills involving evacuation guidance and distribution of stockpiled supplies with the participation of workers and related organizations will be conducted.

C. Comprehensive disaster reduction drill

A comprehensive disaster reduction drill will be conducted with the participation of the Expo security unit and related organizations. A drill implementation plan will be prepared separately.

3. Improvement of the disaster prevention facilities

Disaster prevention facilities will be developed as shown in Attached Figure 5 and as follows.

(1) Crisis Management Center

The Association will establish a Crisis Management Center as the base for overall command of disaster prevention and appoint a Director of the Crisis Management Center (who will also serve as the Expo Disaster Prevention Officer).

The Crisis Management Center will house Association staff and a expo security unit, as well as liaisons with related organizations, and will handle information sharing and operations in the event of an emergency.

A. Location

Management Headquarters Central Building

B. Operation system

The operation system of the Crisis Management Center is as shown in Attached Figure 6, and the Director of the Crisis Management Center will be in charge of overall command of disaster prevention while communicating and coordinating with related organizations.

Detailed operations will be set out in a disaster prevention implementation plan and manual.

C. Alternative operation in emergencies

In the event that the Crisis Management Center cannot be operated due to a disaster situation, the Association will consider establishing a system that can operate the functions of the Crisis Management Center at another location within the venue or in the Sakishima Prefectural Government Office.

(2) Base of the association expo security unit

Direct control guard service centers and regional guard service centers will be established as bases for the Expo security unit.

The operation of direct control guard service centers and regional guard service centers, etc. shall be prescribed in the basic guard service plan and guard service implementation plan.

(3) Expo police base

An Expo Police Headquarters (tentative name), a local police command post, and a police station will be established as a base for police officers.

(4) Expo fire station

The Osaka-Kansai Expo Fire Center and ambulance team station will be established as a base for firefighters.

(5) Medical relief facilities

A clinic and first aid station staffed by medical professionals will be set up at the venue.

Details of medical relief facilities and medical relief systems are set out in the basic plan for medical relief measures and the implementation plan for medical relief measures.

4. Earthquake and weather information gathering system

The Association will install measuring equipment related to weather and disasters (reference: 5(4) below) and establish a system to enable advance access to various kinds of meteorological information. Additionally, an operational support system will be established with the assistance of Accredited Meteorologists, etc.

5. Improvement of crisis management equipment

(1) Public announcement equipment

Emergency broadcast speakers will be installed to ensure that emergency announcements reach the entire managed area, and the use of signage and apps for evacuation guidance will be considered.

(2) Routes of emergency vehicles

Gates will be set up for emergency vehicles to ensure a smooth flow of traffic within the venue.

(3) Development of water resource for firefighting

Water resources for firefighting will be developed to enable fire extinguishing activities throughout the entire managed area.

(4) Installation of measuring instruments related to weather and disasters

The following measuring instruments will be installed to obtain detailed information on various kinds of weather and disasters.

A. A seismometer that measures the seismic intensity of an earthquake

B. Meteorological observation equipment that measures meteorological information such as heat index (WBGT)

C. Lightning radar to detect approaching lightning

(5) Stockpile warehouses

Stockpile warehouses will be prepared within the venue as shown in Attached Figure 5. Matters related to stockpiles will be determined separately in a disaster prevention implementation plan.

Stockpile warehouse	Total floor area
Southwest Stockpile Warehouse	2,850 m^2
East Stockpile Warehouse (1)	330 m^2
East Stockpile Warehouse (2)	390 m^2

(6) Emergency power supply unit

In addition to emergency power sources stipulated in the Building Standards Act and Fire Service Act, etc., consideration will be given to installing emergency power supply units in facilities within the venue to ensure emergency power for evacuation facilities for hard-to-reach-home people and medical relief facilities, as well as to make the minimum necessary emergency announcements.

6. Guidelines and manuals

(1) Guidelines

Create guidelines regarding fire prevention and disaster prevention and request participants to take fire prevention and disaster prevention measures for their pavilions, etc.

(2) Manuals

Create manuals for each type of disaster and manuals for what to do when an injury occurs so that workers can act in the event of a disaster.

Chapter 4. Emergency Response Measures

1. Organizational system

The Association will establish an organizational system for carrying out disaster prevention activities when a disaster occurs or there is a risk of disaster occurrence.

Organizational system	Remarks
Information and communication system Peacetime system	The Crisis Management Center will collect disaster information and establish a communication system with each department of the Association.
Disaster Response Headquarters	The Chief Executive Officer will serve as the head of the Disaster Response Headquarters, and the entire Association will be responsible for measures against disasters.

The organizational chart of the Disaster Response Headquarters shall be as shown in Attached Figure 7, and the main responsibilities of each department shall be as shown in the table below.

Department in charge	Main duties
Office for Integrated Strategies Management Strategy Office	- Matters related to the operation of the Disaster Response Headquarters - Liaison and coordination with each bureau - Matters related to liaison and coordination with the Expo Promotion Bureau (Osaka Prefecture and Osaka City) - Matters related to liaison and coordination with related ministries and agencies - Matters related to liaison and coordination with the producers - Matters related to compulsory insurance in the event of a disaster - Matters related to the Chief's special mission - Matters related to coordination of affairs not managed by other departments
General Affairs Bureau	- Matters related to the general affairs of the Disaster Response Headquarters - Matters related to staff work on disaster response - Matters related to dealing with affected staff - Matters related to the fundraising necessary for disaster prevention measures and handling cash receipts and payments
Public Relations and Promotion Bureau	- Matters related to disaster records (including photos and videos) - Matters related to public relations regarding disasters - Matters related to liaison and coordination with media organizations - Matters related to liaison and coordination with educational organizations - Matters related to admission tickets
Policy and Planning Bureau	- Matters related to liaison and coordination about cashless and digital wallet projects - Matters related to liaison and coordination about thematic projects - Matters related to liaison and coordination about the Future Society Showcase Project - Matters related to liaison and coordination with domestic exhibitors (government, local governments, private companies) - Matters related to liaison and coordination about theme weeks
Event Bureau	- Matters related to liaison and coordination with person concerned event - Matters related to the use of event facilities
ICT Bureau	- Matters related to ICT systems

Expo Site Operations Bureau	- Matters related to visitor services - Matters related to transportation within the venue (excluding matters handled by other departments) - Matters related to venue cleaning and waste management - Matters related to on-site business facilities (excluding matters handled by other departments) - Matters related to logistics (warehouse, bonded, vehicle entry and exit management)
Crisis Management Bureau	- Matters related to the overall coordination of the Disaster Response Headquarters - Matters related to the operation of the Crisis Management Center - Matters related to evacuation of the Visitors, etc. - Matters related to rescue of and aid to the Visitors, etc. - Matters related to medical relief - Matters related to guard service at the venue - Matters related to liaison and coordination with relevant organizations - Matters related to liaison and coordination with fire prevention managers - Matters related to the supply of stockpiled supplies - Other matters related to disaster prevention
Transportation Bureau	- Coordination and information dissemination regarding visitor transportation - Matters related to Expo P&R parking lots, transport terminals, etc.
Site Development Bureau	- Matters related to maintenance, emergency response operations, and restoration of venue facilities, passages, etc. - Matters related to maintenance and restoration of basic infrastructure (electricity, gas, water, etc.)
International Relations Bureau	- Matters related to liaison and coordination with BIE - Matters related to liaison and coordination with official participants

* In principle, each bureau will engage in disaster response activities based on the duties of its respective bureaus, but may also be assigned tasks outside of its duties.

2. Convening of Association staff

If it becomes necessary to respond to a disaster at night or other times, the Association will gather its staff. Each department will establish an emergency contact system in advance to gather staff.

3. Disaster prevention activity system

(1) Association

Emergency response rescue activities, rescue of human life, fire extinguishing activities, evacuation guidance, and other activities in case of disaster by Private Fire Brigade or the Expo security unit and the Association's rescue team shall be under the overall command of the Director of the Crisis Management Center, and they shall be carried out in coordination with related organizations.

(2) Cooperation with related organizations

Coordination with disaster response activities by the police, fire department, Japan Coast Guard, and Japan Self-Defense Forces (JSDF) will be carried out by the Crisis Management Center.

(3) Securing personnel for disaster prevention activities

The personnel necessary for disaster prevention activities will be secured early from the Private Fire Brigade, as well as from the Association staff and workers at pavilions, etc.

4. Communications system

Communications equipment such as IP phones and digital convenience radios will be prepared to enable communication between the Crisis Management Center and disaster preventionactivity personnel.

5. Preparation of equipment and materials

The necessary equipment for disaster response activities will be prepared.

[Examples of equipment]: Bolt cutters, stretchers, generators, spotlights, sandbags

6. Cooperation with related organizations

(1) Acceptance of liaisons

Relevant organizations will dispatch liaisons as necessary. The Association will accept liaisons at the Crisis Management Center to handle communication and coordination.

(2) Ensuring a communication system

The Association and related organizations will establish a communication system to enable mutual communication and coordination in the event of a disaster.

7. Disaster prevention activity

(1) Timeline of each disaster

The Association and related organizations will create a timeline for typhoons and earthquakes and work on advance measures and emergency responses.

(2) Disaster prevention activity

The main activities for various disasters are as shown in the table below. Details will be set out in a disaster prevention implementation plan and various manuals.

Disaster classifications	Main activities
Earthquakes	- Emergency announcements (urging people to take measures to protect themselves) - Evacuation guidance - Confirmation for injured people and damage to buildings - Emergency response and first aid measures - Confirmation of the operation status of public transportation - Confirmation of damage to access routes - Confirmation of the disaster situation in the prefecture and city
Tsunami	- Emergency announcements (public relations to prevent confusion) - Encourage people to pay attention to tsunami information and remain inside the venue. - Instructions not to go up onto the Grand Roof (Ring)
Storms and floods	- Instruction for early returning home - Warning activities - Flood prevention measures - Strong wind measures

Lightning strikes	- Evacuate early from the top of the Great Roof (Ring) and the Forest of Tranquility - Evacuate to a safe place, such as an indoor area - Consider canceling open air events
Extreme heat	- Caution regarding heat stroke - Measures to prevent congestion at gates and pavilions - Response in the event of a sudden illness
Fire	- Response by the Expo security unit when the automatic fire alarm system is activated - Initial fire fighting, reporting, and evacuation guidance by the Private Fire Brigade - Call 119 - Cooperation with police and fire departments

8. Evacuation, temporary accommodation, and other assistance for returning home

The following items will be separately considered and determined in a disaster prevention implementation plan.

(1) Evacuation plans

It will stipulate evacuation procedures, open air evacuation places, and evacuation guidance guidelines in the event of a disaster.

(2) Temporary accommodation facilities

Provisions will be made regarding transportation to temporary accommodation locations, operations, etc.

(3) Other assistance for returning home

The Association will work with Osaka Prefecture, Osaka City, and related organizations to provide information to visitors regarding their returning home and coordinate means of transportation home.

Chapter 5. Agreements, etc.

The Association will strive to secure multiple countermeasures, such as concluding agreements with relevant organizations as necessary, to provide temporary accommodation and stockpiled food in case visitors are unable to return home.

Schedule

List of related organizations

Category	Name of organizations	Department in charge
Related ministries and agencies	Cabinet Secretariat	Secretariat of the Headquarters for the World Expo
	Ministry of Economy, Trade and Industry	Expo Promotion Office, Commerce and Service Industry Policy Group
	Other related government ministries and agencies	
Local governments	Osaka Prefecture	Crisis Management Office
	Osaka City	Crisis Management Office
	Other related local governments	Crisis Management Department
Disaster prevention organizations	Japan Ground Self-Defense Force (JGSDF)	Middle Army Headquarters
	Japan Meteorological Agency	Osaka Regional Headquarters, JMA
	Japan Coast Guard	Fifth Regional Coast Guard Headquarters
	Osaka Prefectural Police	Expo Police Base
	Osaka Municipal Fire Department	Expo Fire Station
Public transportation	Osaka Metro	
	JR West	
Designated public institutions	NTT West	
	Osaka Gas Network	
	Kansai Electric Power	

Figure 1

Expo Venue Layout

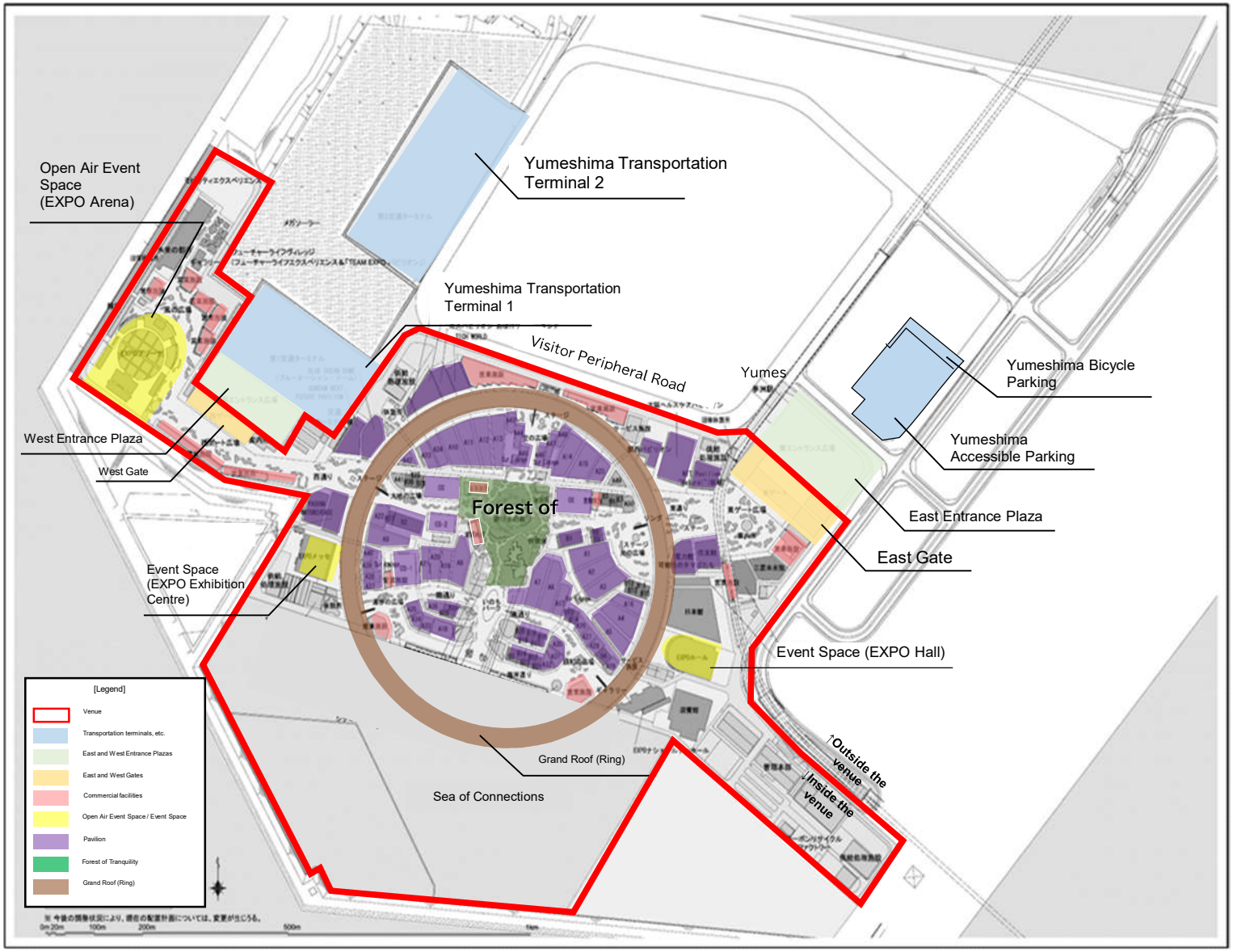


Figure 2

Expo P&R Parking Lot Layout

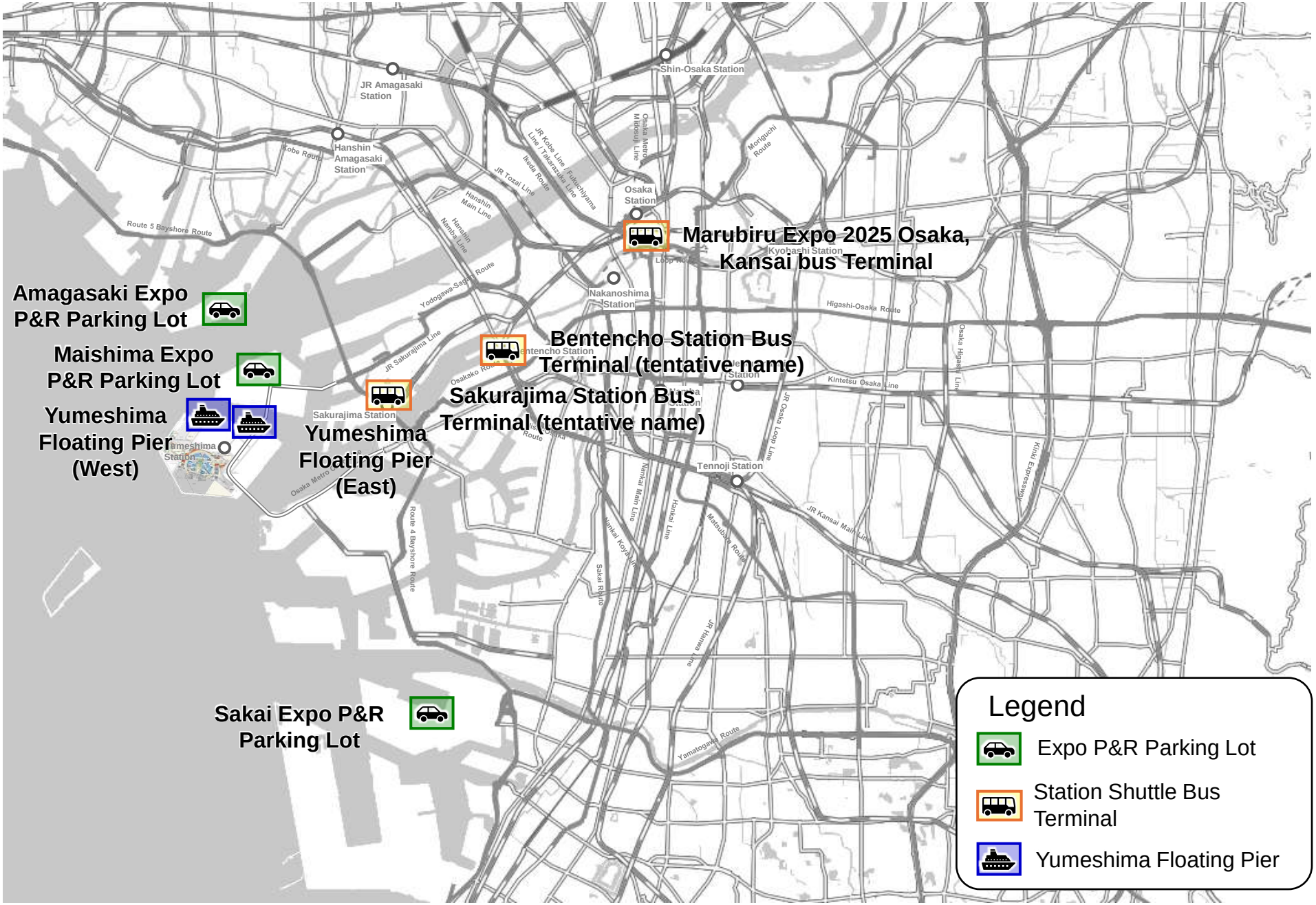
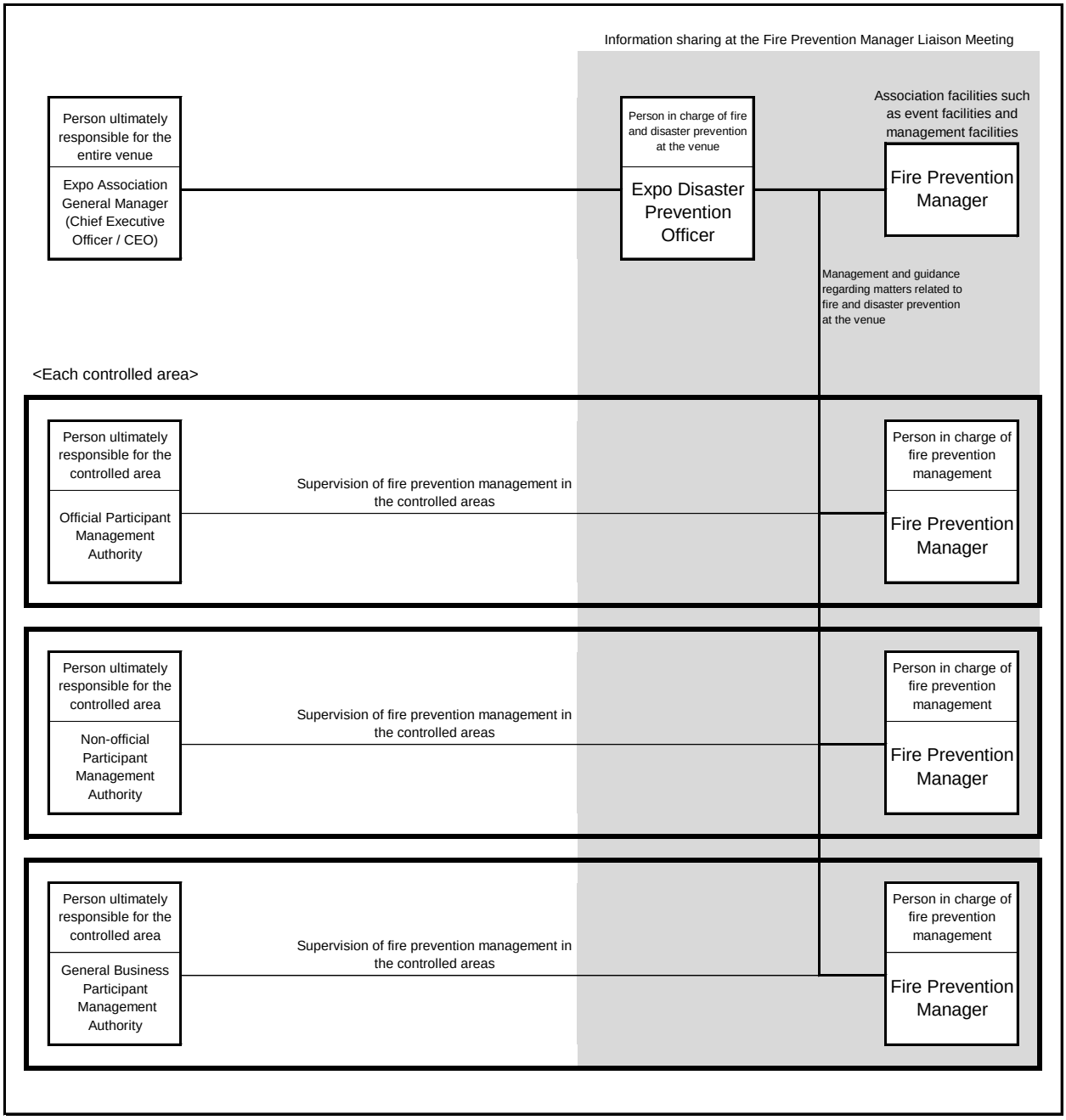


Figure 3

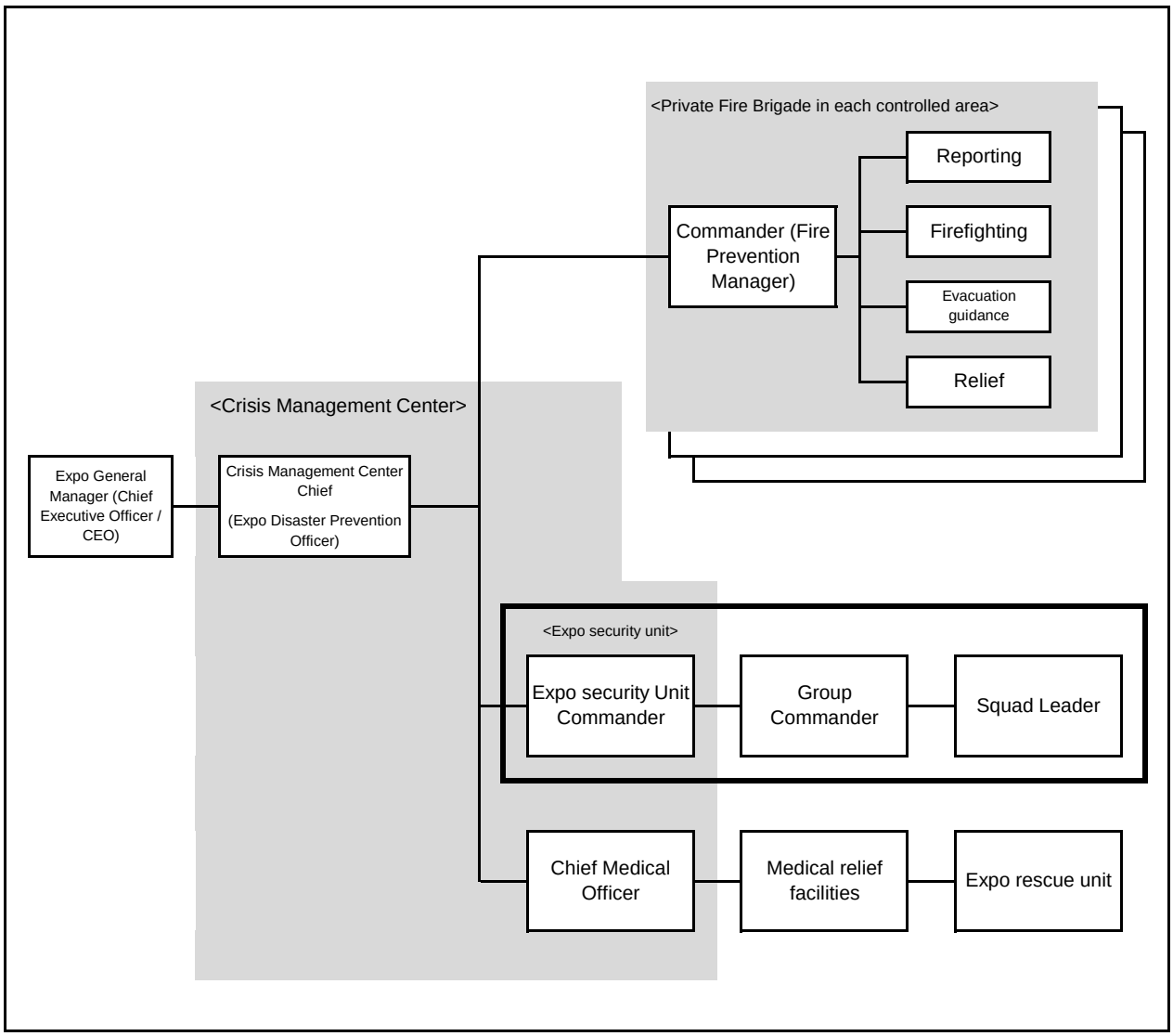
Expo Fire Prevention Management System Chart



Job Category	Duties
Expo Disaster Prevention Officer	To create disaster prevention plans for the entire venue, instruct the fire prevention managers for exhibition facilities, event facilities, and management facilities, and conduct the tasks necessary for comprehensive fire and disaster prevention within the venue.
Management Authority	Responsible for the use or handling of fire and other matters related to fire prevention management as stipulated by laws and regulations, including the appointment of fire prevention managers and supervision of fire prevention management, in the controlled area.
Fire Prevention Manager	To prepare firefighting plans, conduct regular firefighting, reporting, and evacuation drills based on the firefighting plans, inspect and maintain fire protection equipment, supervise the use or handling of fire, maintain and manage structures and equipment necessary for evacuation or fire prevention, manage the capacity, and perform other tasks necessary for fire prevention management.

Figure 4

Expo Organizational Structure Chart for Evacuation Guidance, Rescue, etc.



Category	Details
Crisis Management Center Chief	To supervise and oversee the actions of the organizations engaged in evacuation guidance, rescue, etc. at the Expo so that they can work in cooperation with related agencies in the event of a disaster.
Private Fire Brigade in each controlled area	At the organizations established by the participants or event organizers in their respective controlled areas, the staff working for each facility is to fulfill the role defined in the firefighting plan (firefighting, reporting, evacuation guidance, etc.).
Expo security Unit Commander	Persons in charge of the areas covered by each expo security Unit within the venue
Expo security unit	The team to conduct disaster management activities such as evacuation guidance throughout the venue, including the passages and plazas within the venue, in the event of a disaster
Chief Medical Officer	Person in charge of the overall management of the medical relief system within the venue
Expo rescue unit	Team organized of personnel from medical relief facilities for relief activities throughout the venue

Figure 5

Disaster prevention facility layout

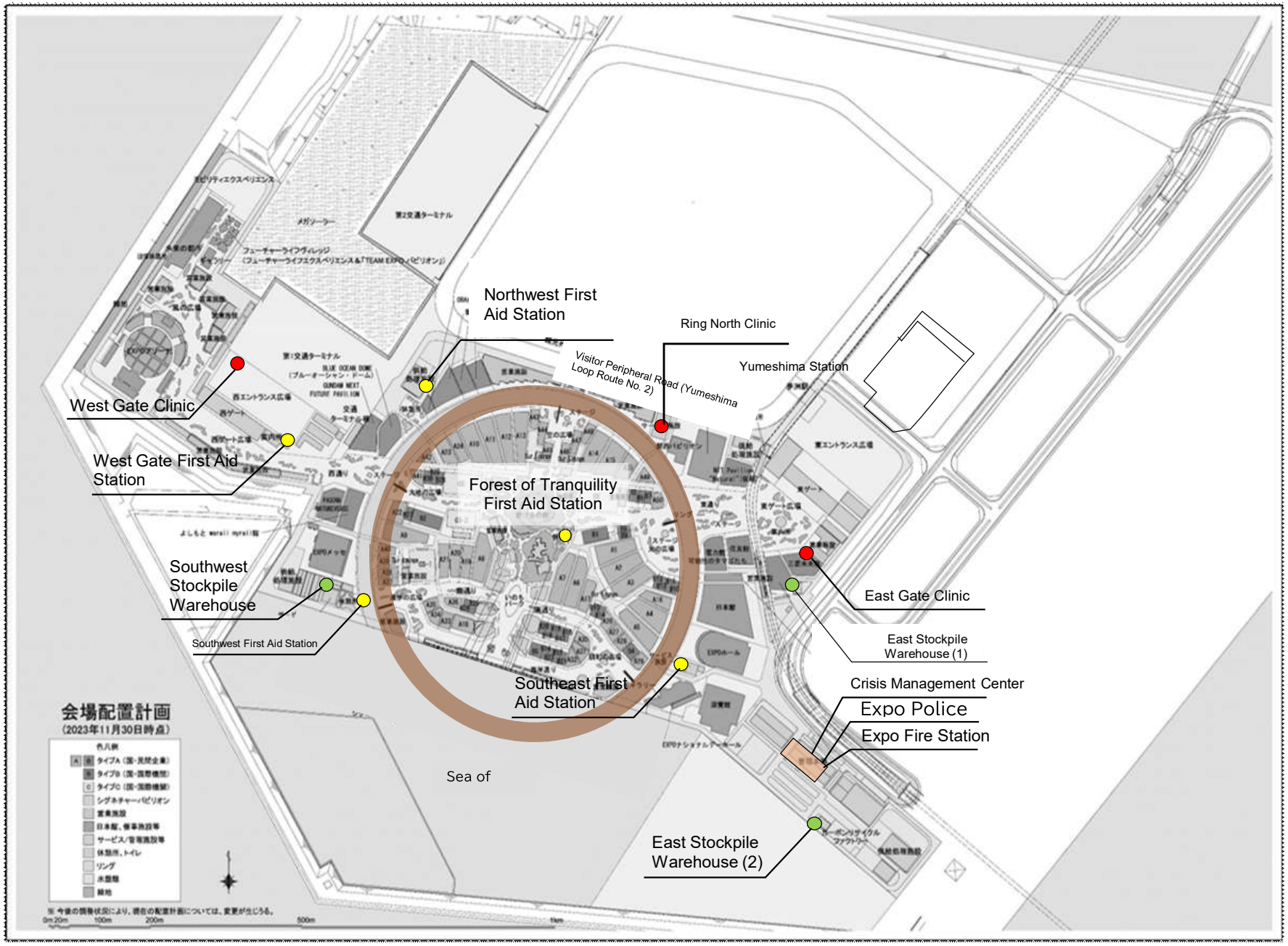


Figure 6

Expo Crisis Management Center Operational Structure Chart

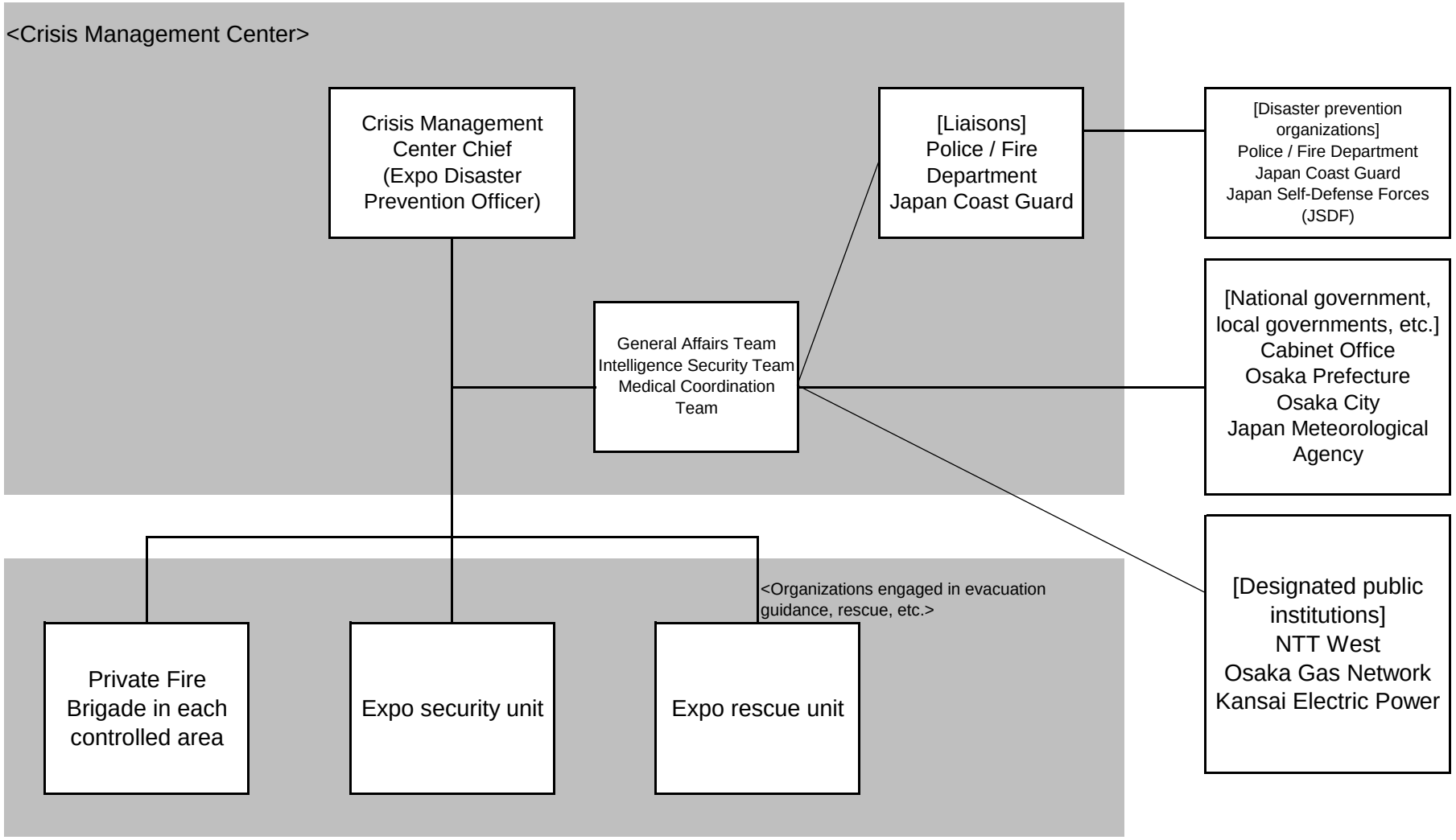


Figure 7

Disaster Response Headquarters Organization Chart