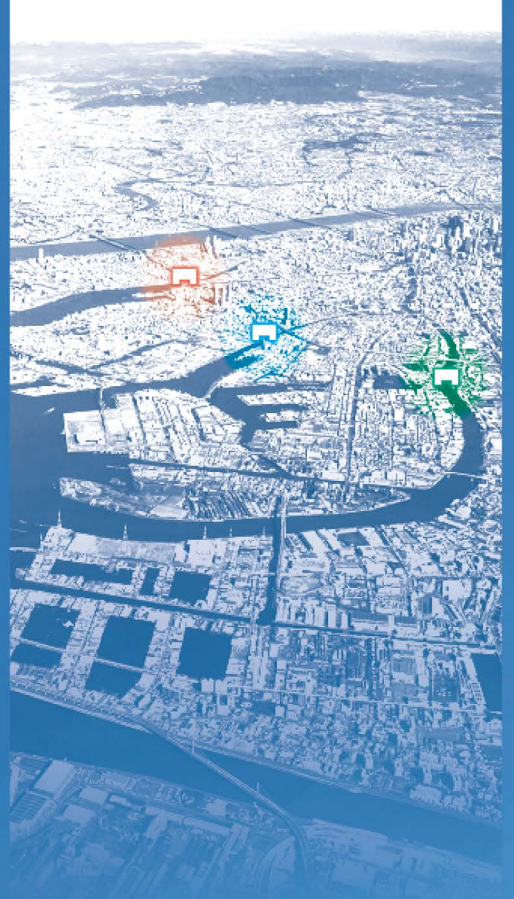
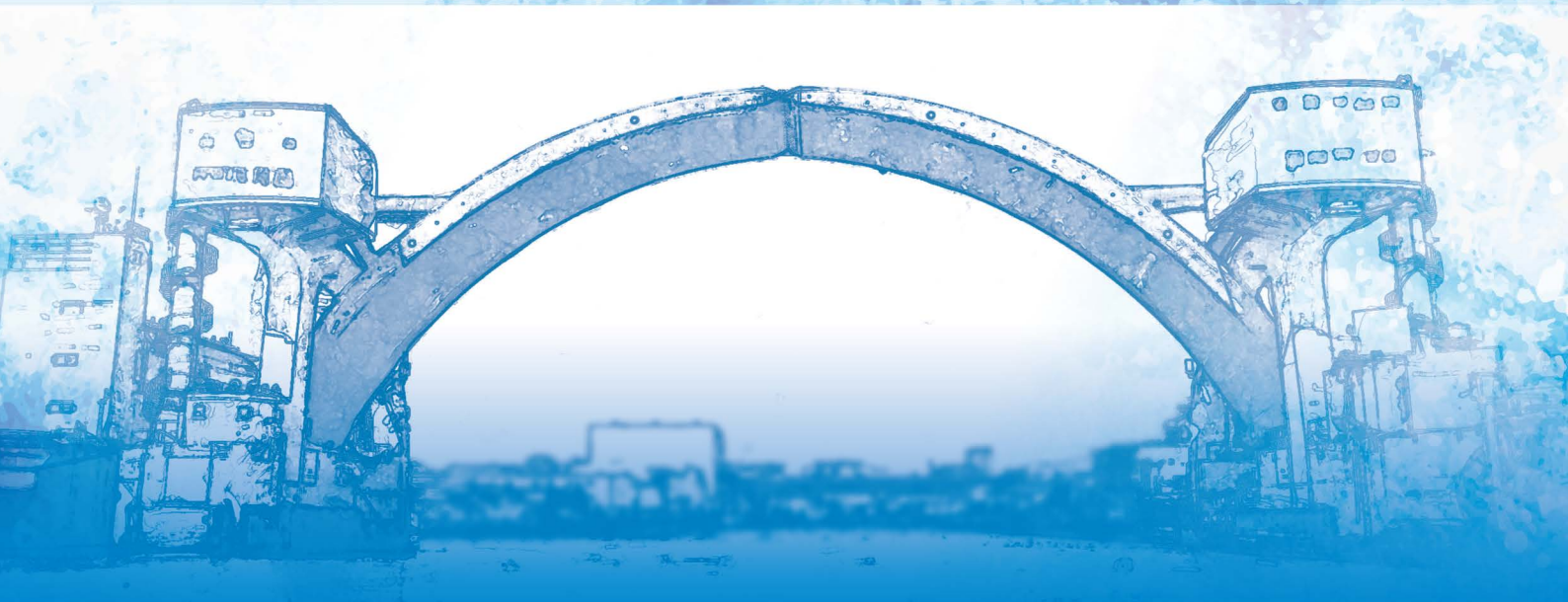


Keeping Osaka Safe from Tsunami and Storm Surge Hazards



Modernizing the Three Main Floodgate



Flood Risks Facing Osaka City: Storm Surge and Tsunami

Storm Surge Risks

Western Osaka City is vulnerable to storm surge damage due to its low elevation and proximity to Osaka Bay. The area has sustained significant impacts from typhoon-driven storm surges in previous years.

In 2020, storm surge inundation risk maps were published under the Flood Control Act, indicating that extensive areas of the city could be at risk of flooding during a major storm surge.

Storm Surge Countermeasures

To protect the city from storm surge damage, Osaka Prefecture has been upgrading its coastal defenses, including seawalls and storm surge floodgates. In 1970, the three main floodgates—the Ajigawa Floodgate, the Shirinashigawa Floodgate, and the Kizugawa Floodgate—were completed, establishing the city's first line of storm-surge protection.

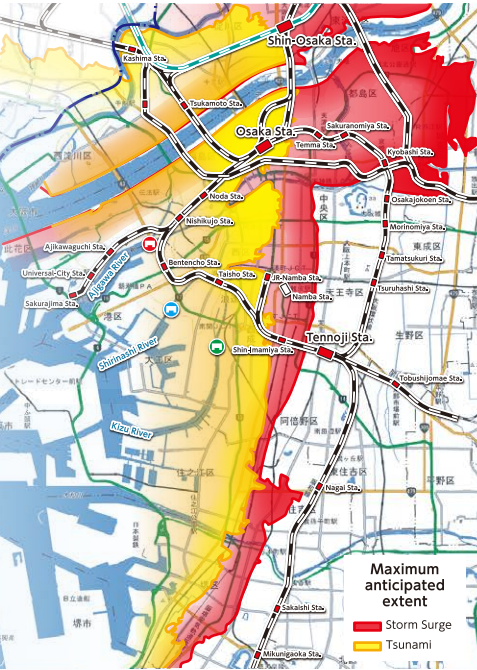
Tsunami Risks

In 2013, tsunami inundation estimates were published under the Act on Regional Development for Tsunami Disaster Prevention, based on a scenario involving a major Nankai Trough earthquake.

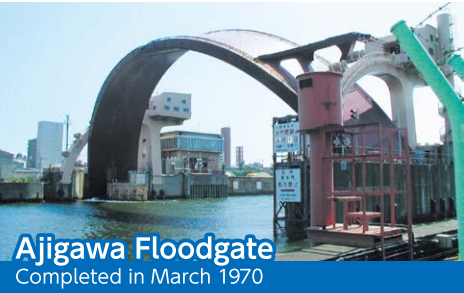
These estimates indicate that tsunami flooding may extend into the central city of Osaka, including the vicinity of Osaka Station.

Tsunami Countermeasures

To mitigate tsunami damage, Osaka is reinforcing coastal levees to prevent liquefaction. During a tsunami event, the three key floodgates are closed to block incoming waves from the sea, thereby protecting the city.



Three Key Floodgates Protecting the City from Storm Surge and Tsunami



Ajigawa Floodgate
Completed in March 1970



Shirinashigawa Floodgate
Completed in November 1970



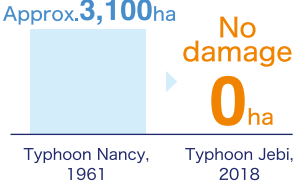
Kizugawa Floodgate
Completed in November 1970

Performance During Typhoon Jebi (2018)

The three key floodgates serve as essential infrastructure for Osaka's storm surge countermeasures. During Typhoon Jebi in 2018, the tide reached a record-high level of O.P. +5.13 meters, surpassing the level recorded during Typhoon Nancy in 1961. Despite these extreme conditions, flooding was prevented due to the effectiveness of the three key floodgates and other coastal protection structures.

Osaka Peil (O.P.) refers to the lowest tidal level in Osaka Bay. It is a reference elevation defined using the minimum tide level and serves as the standard height datum for both Osaka Bay and the Yodo River.

Flooded area



A Symbol of the Community

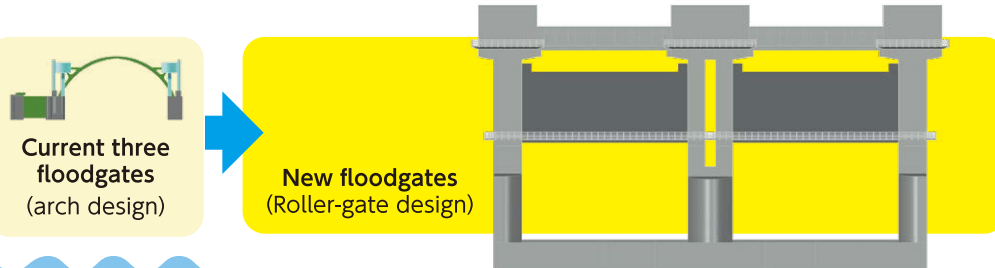
The three key floodgates utilize a rare visor-gate, or arch-type, design that is uncommon even within Japan. Their considerable scale creates a strong impression on visitors, and they are widely recognized as a symbolic landmark of the region.

Modernizing the Three Main Floodgates : Four Features of the New Floodgates

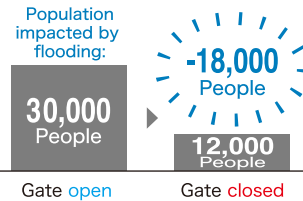
Because more than 50 years have passed since their completion, and deterioration has grown significant, the city of Osaka is moving forward with the Modernizing the Three Main Floodgates, which involves building new floodgates upstream of the existing ones.

Response to a Major Nankai Trough Earthquake

In the event of a Nankai Trough earthquake, Osaka City is expected to experience seismic shaking of up to lower six on the Japanese intensity scale, along with a tsunami of up to three meters. The new floodgates will transition from the current visor-gate (arch-type) design to a roller-gate design, giving them the structural resilience to withstand both the shaking and the tsunami generated by a major Nankai Trough earthquake.



Projected tsunami damage



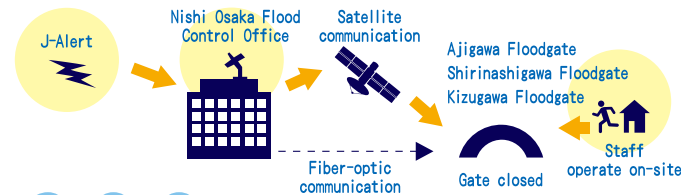
Closing the floodgates allows the tsunami to be stopped at the gates.

Reliable Gate Closure

If the floodgates cannot be closed when a tsunami or storm surge occurs, the resulting damage can be severe. To prevent this, measures have been put in place to ensure that the gates can always be opened and closed reliably—even if an earthquake, lightning strike, or other disruption causes a malfunction.

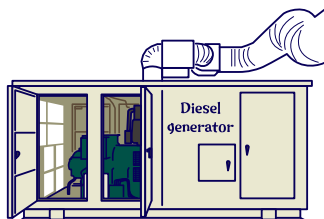
Layered Gate-Closure Systems

- To ensure the floodgates can be closed reliably before a tsunami arrives, multiple gate-closure mechanisms are in place.
- 1 The floodgates close automatically when an alert is issued through the J-Alert system.
 - 2 The floodgates can be closed remotely from the operations office.
 - 3 Staff can go directly to the floodgates and perform the closure on site.



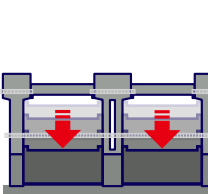
On-Site Power Generation for Power Outages

Even if a power outage occurs, on-site generators can supply electricity, allowing the floodgates to be opened and closed.



Gravity-Based Gate-Closing Function

Even if on-site power generation is unavailable, the gates can still be closed by their own weight.



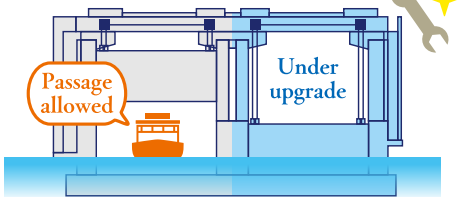
Extended Service Life (Use of stainless steel and proper maintenance)

The gate leaves of the existing floodgates are made of weathering steel, which is resistant to rust and corrosion, and they are repainted regularly. However, deterioration has continued to progress. For this reason, the gate leaves of the new floodgates will be made of a stronger material: lean duplex stainless steel.

In addition, because the new floodgates will consist of two gates, large-scale repairs and equipment upgrades can be carried out without stopping vessel traffic.



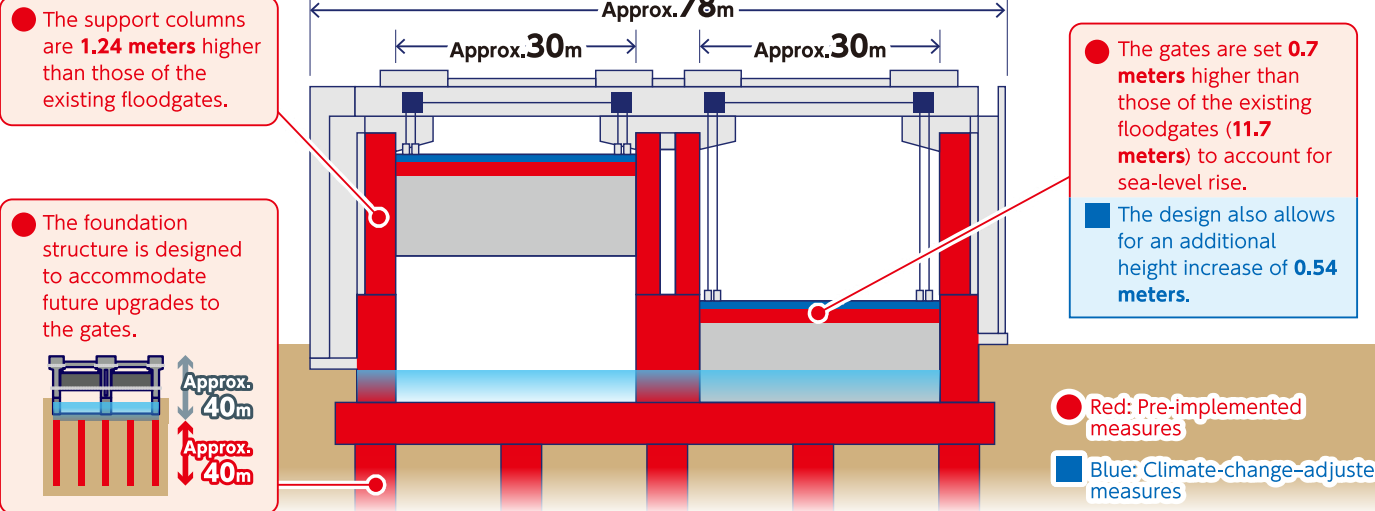
Corrosion of the existing floodgates



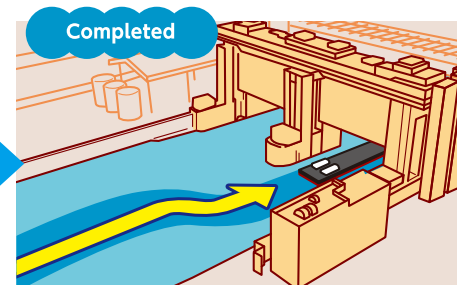
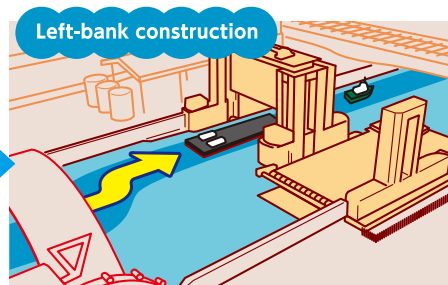
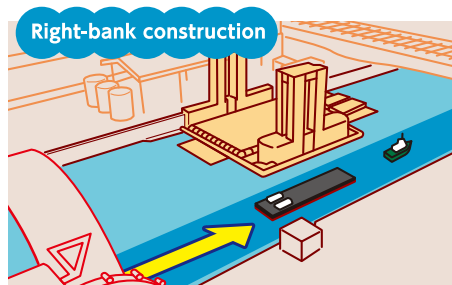
Repair and upgrade overview

Addressing Climate Change (Global Warming)

The new floodgates are designed for long-term use and are expected to remain in operation through 2100. To prepare for sea-level rise and the increasing intensity of typhoons associated with global warming, they are being built higher and with a stronger structural design than the existing floodgates.



Construction method

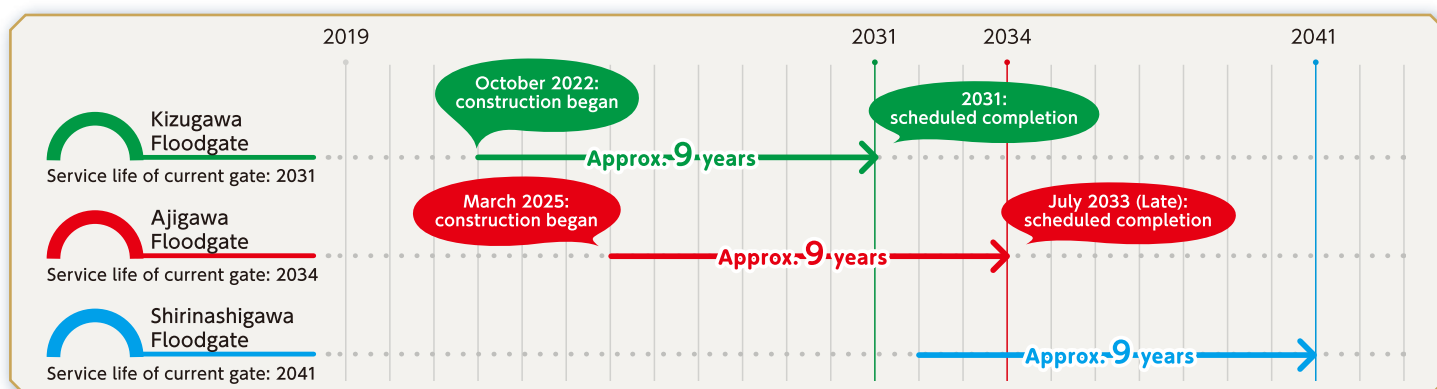


Vessel

Because vessel traffic must be maintained at all times, the river is divided in half during construction so that work can proceed on one side at a time.

Project Plan

Construction began with the Kizugawa Floodgate, where deterioration is most advanced, followed by the Ajigawa Floodgate and then the Shirinashigawa Floodgate under the overall initiative.



Carrying Forward the Legacy of the Three Main Floodgates : Toward a Symbol of Safety and Peace of Mind

The arch-shaped three main floodgates are registered with Osaka, The Museum and designated as urban landscape resources, and they have long served as iconic symbols of the community. After the new floodgates are completed, the existing ones will have fulfilled their role and will be dismantled. To ensure they remain in the memories of local residents, a range of commemorative initiatives will be carried out.

At the same time, careful attention is being given to the design of the new floodgates so that—like the current ones—they will be embraced by the community and continue to attract visitors from near and far.

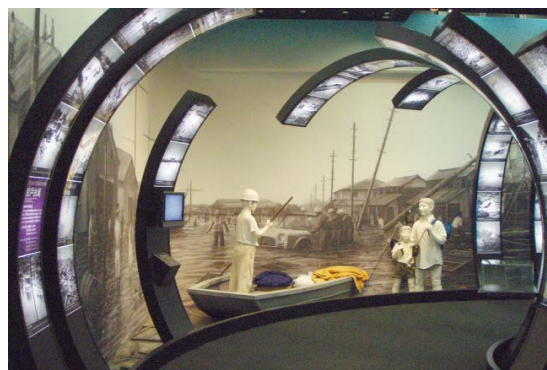
- Current floodgate merchandise Reusable tote bag



- New Ajigawa Floodgate Design Competition



Tsunami / Storm Surge Disaster Prevention Station



When a tsunami or storm surge occurs, coastal protection facilities alone may not be enough to keep the city safe. To protect lives, it is important to deepen your understanding of tsunamis and storm surges as part of everyday awareness.

The Tsunami and Storm Surge Station, located next to the West Osaka Flood Control Office, offers clear and accessible learning about how tsunamis and storm surges work and how to prepare for them. We encourage you to visit and build the knowledge and readiness needed to stay safe in a disaster.



<http://tsunami-osaka.jp>

Admission	Free
Hours	10:00 – 16:00
Closed	Tuesdays, Saturdays, end-of-year and New Year holidays
Phone	06-6541-7799

