Earthquake-resistant Distribution Pipeline Project in Nagoya City

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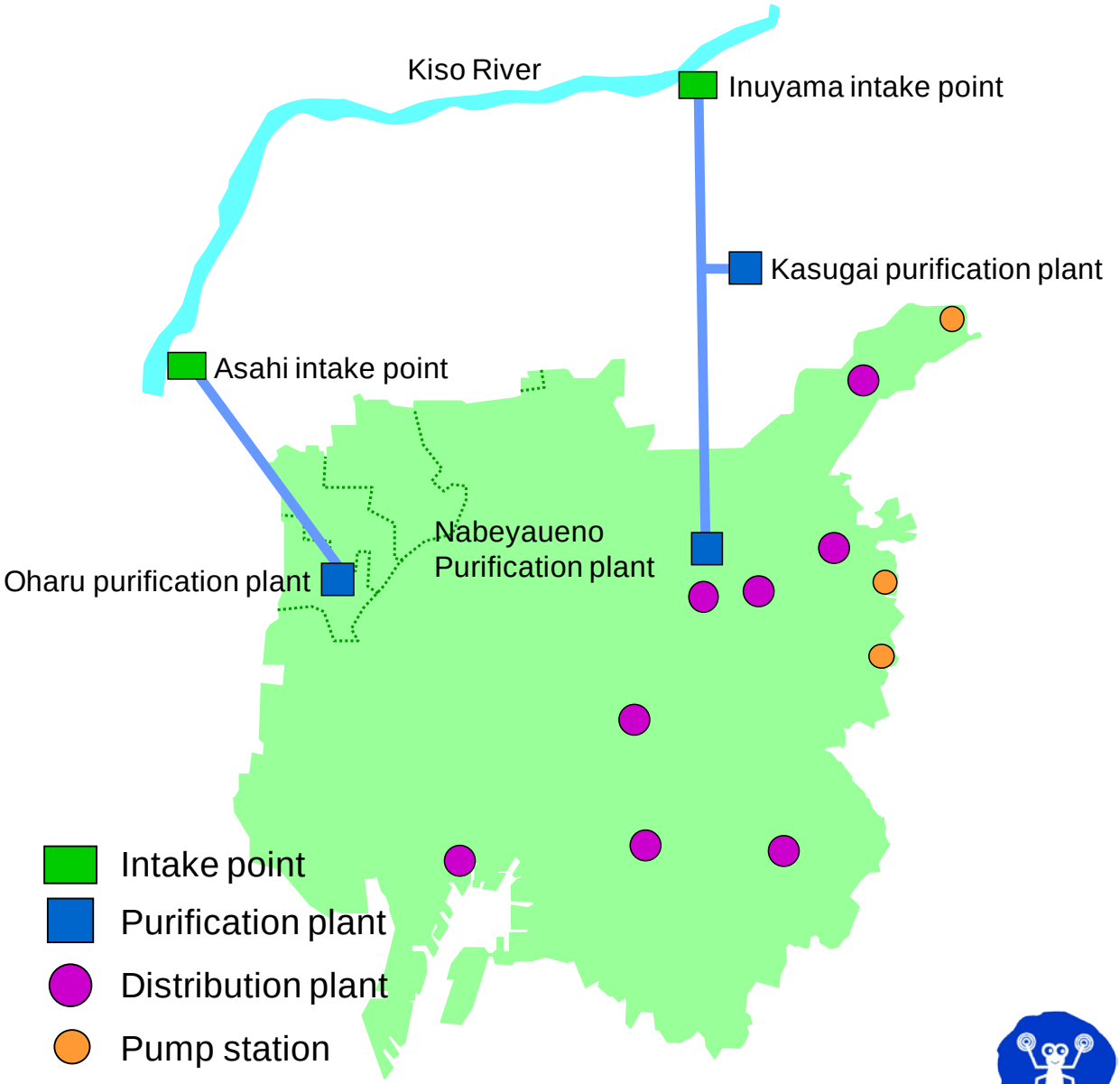
Overview of the Water Supply in Nagoya



- **Population Served**
  2.37 million
- **Service Area**
  356 km²
- **Water Supply Capacity**
  1,424,000 m³/day

Current Status of Distribution Pipelines

Total Length of Distribution Pipes

8,260 km

Damage Forecasts for Distribution Pipes

	Tokai earthquake	Tonankai earthquake	Tokai-Tonankai combined earthquake	Nobi earthquake
Peak ground acceleration (gal)	329	542	542	880
Distribution pipe damage (number of locations)	510	1,040	1,220	1,980

Earthquake-resistant Distribution Pipeline Project

- ☑ Selection of High-priority Candidate Earthquake-resistant Pipelines
- ☐ Quantitative Evaluation of Pipelines
- ☐ Selecting Suitable Engineering Methods

First-aid Water Supply

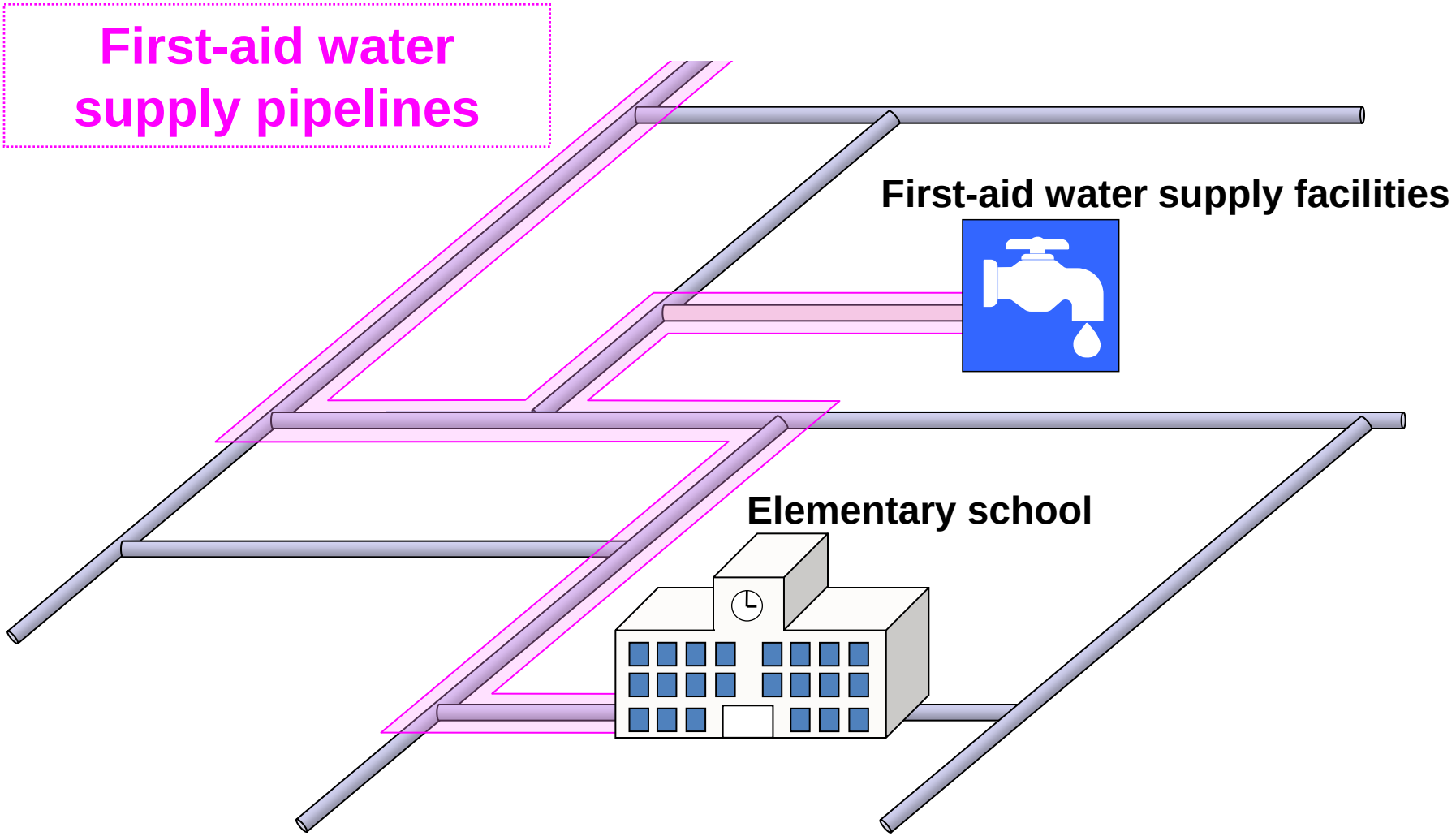
First-aid water supply facilities

Temporary hydrant

Elementary school

Underground hydrant

First-aid Water Supply Pipelines



Earthquake-resistant Distribution Pipeline Project

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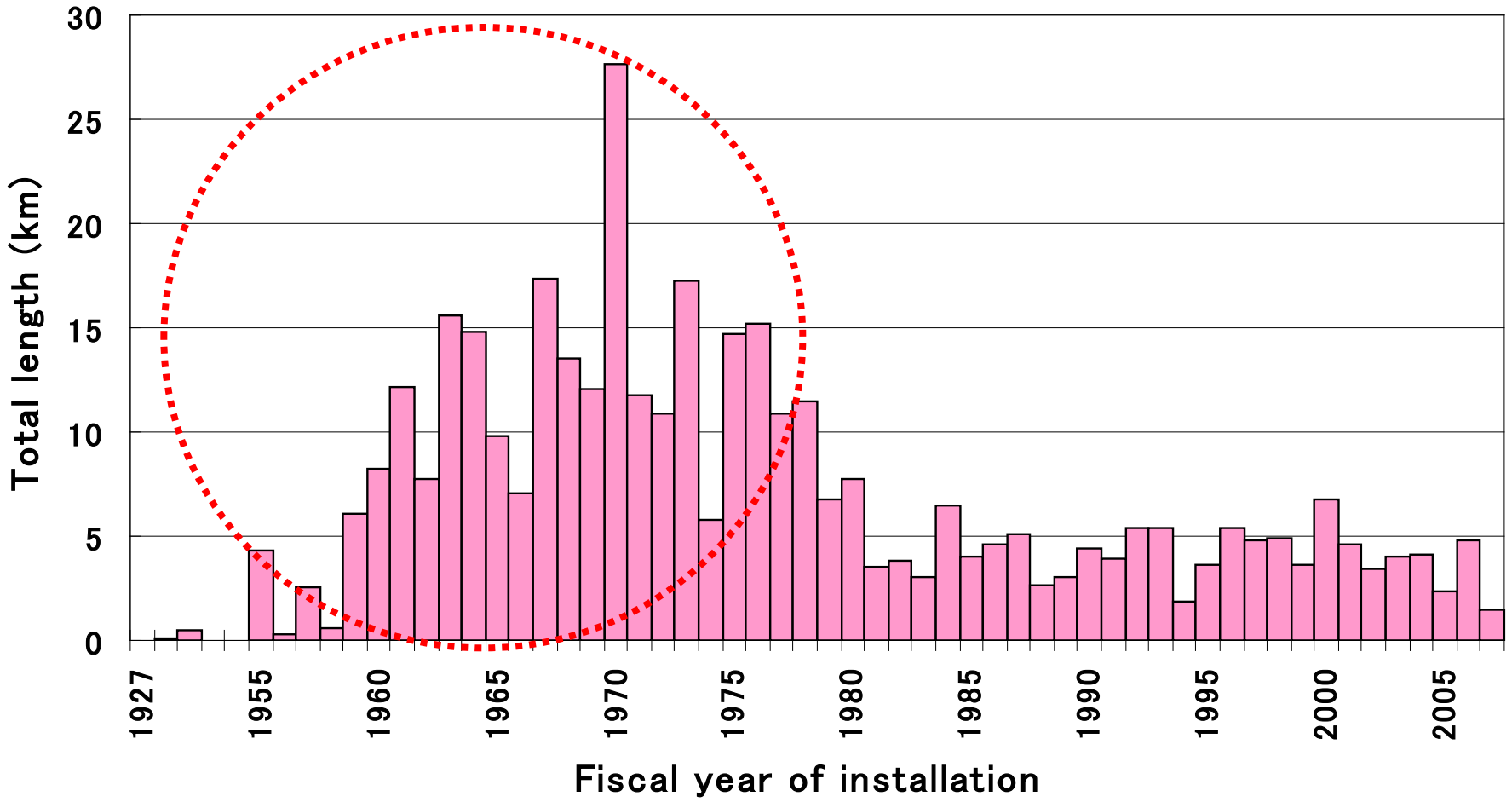
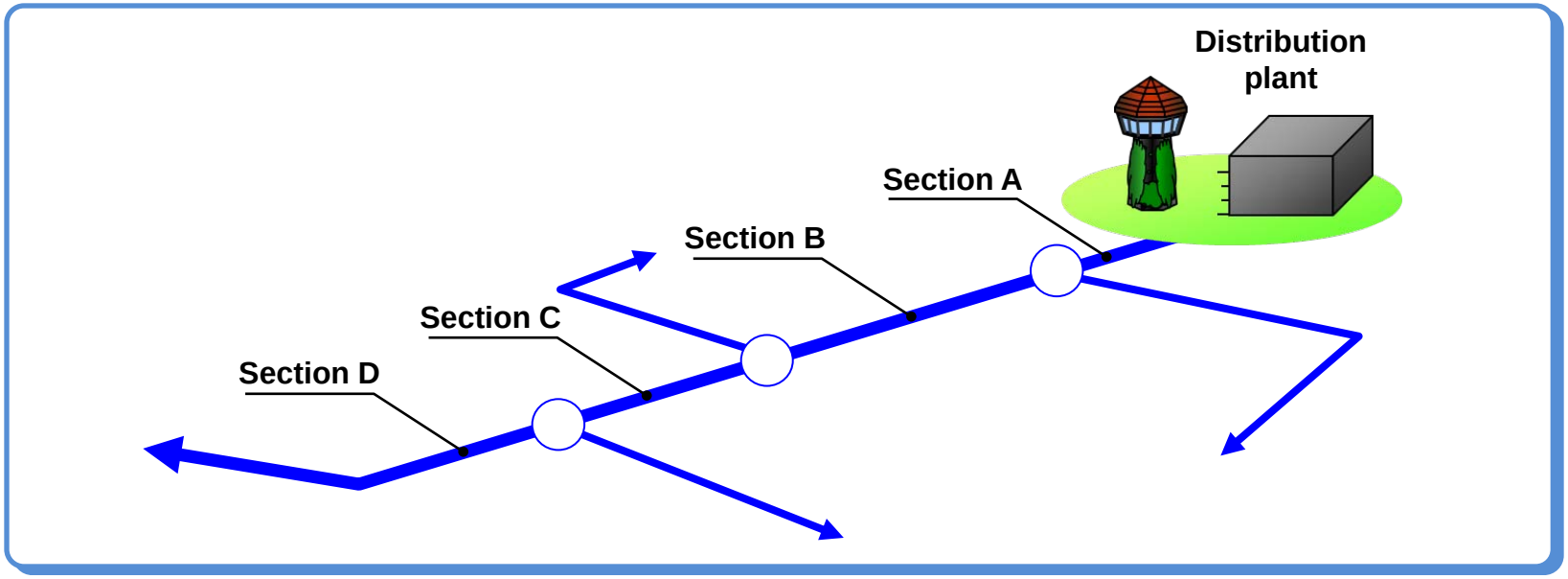
Background to the Quantitative Evaluation



Total length of main distribution pipelines installed per year

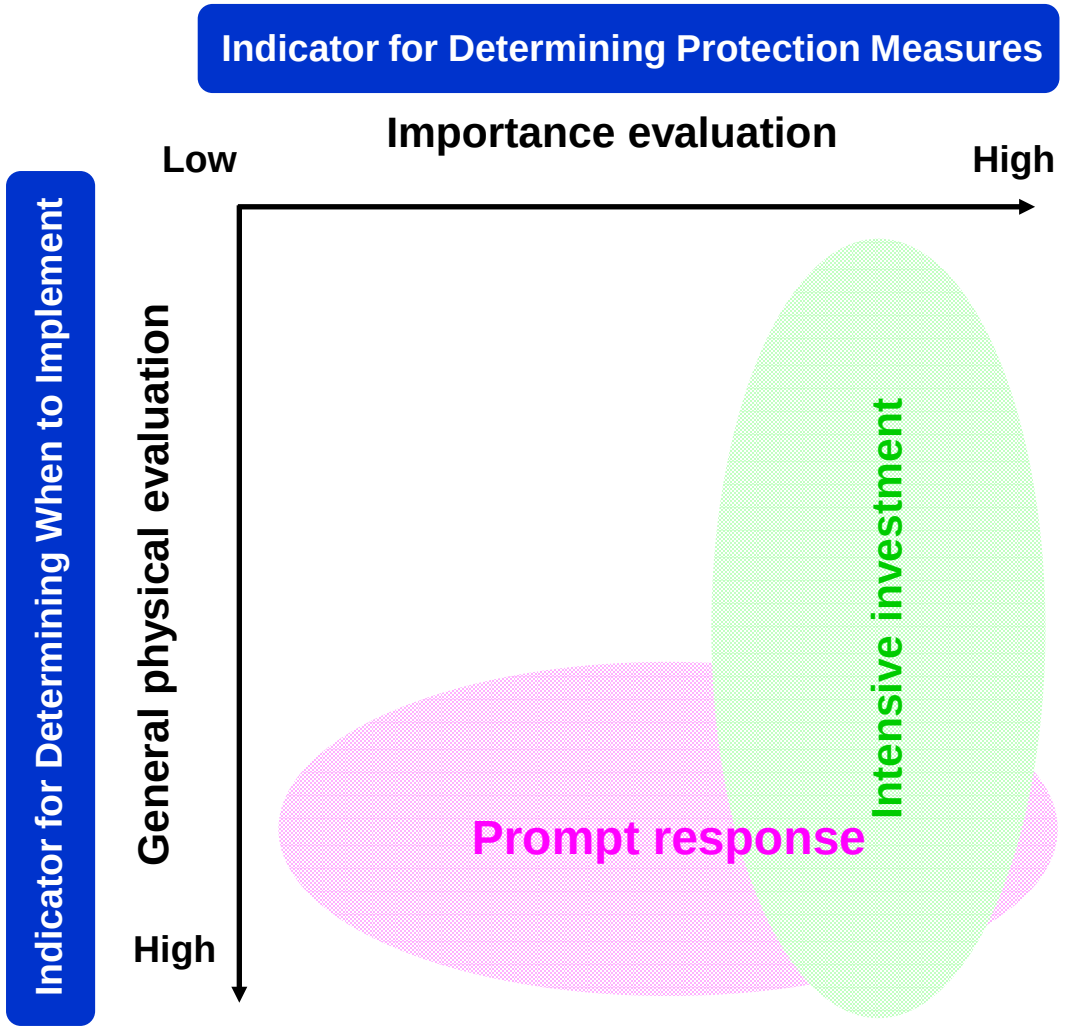
Assessment Method



General physical evaluation indicators	
Rating by physical property	・Years in use ・Pipe material ・Joint type ・Lining ・Exterior corrosion-proof measures ・Burial environment
Rating in terms of seismic protection measures	・Relative danger after Tokai earthquake ・Relative danger after Tonankai earthquake ・Relative danger after Nobi earthquake ・Road class
Empirical rating	・Past leakage and rupture history

Importance evaluation indicators	
Ordinary situation	・Maximum flow velocity ・Maximum flow rate ・Degree of water supply contribution to large-volume customers ・Backup availability
Post-earthquake situation	・Degree of water supply contribution to first-aid water supply facilities

Assessment Results



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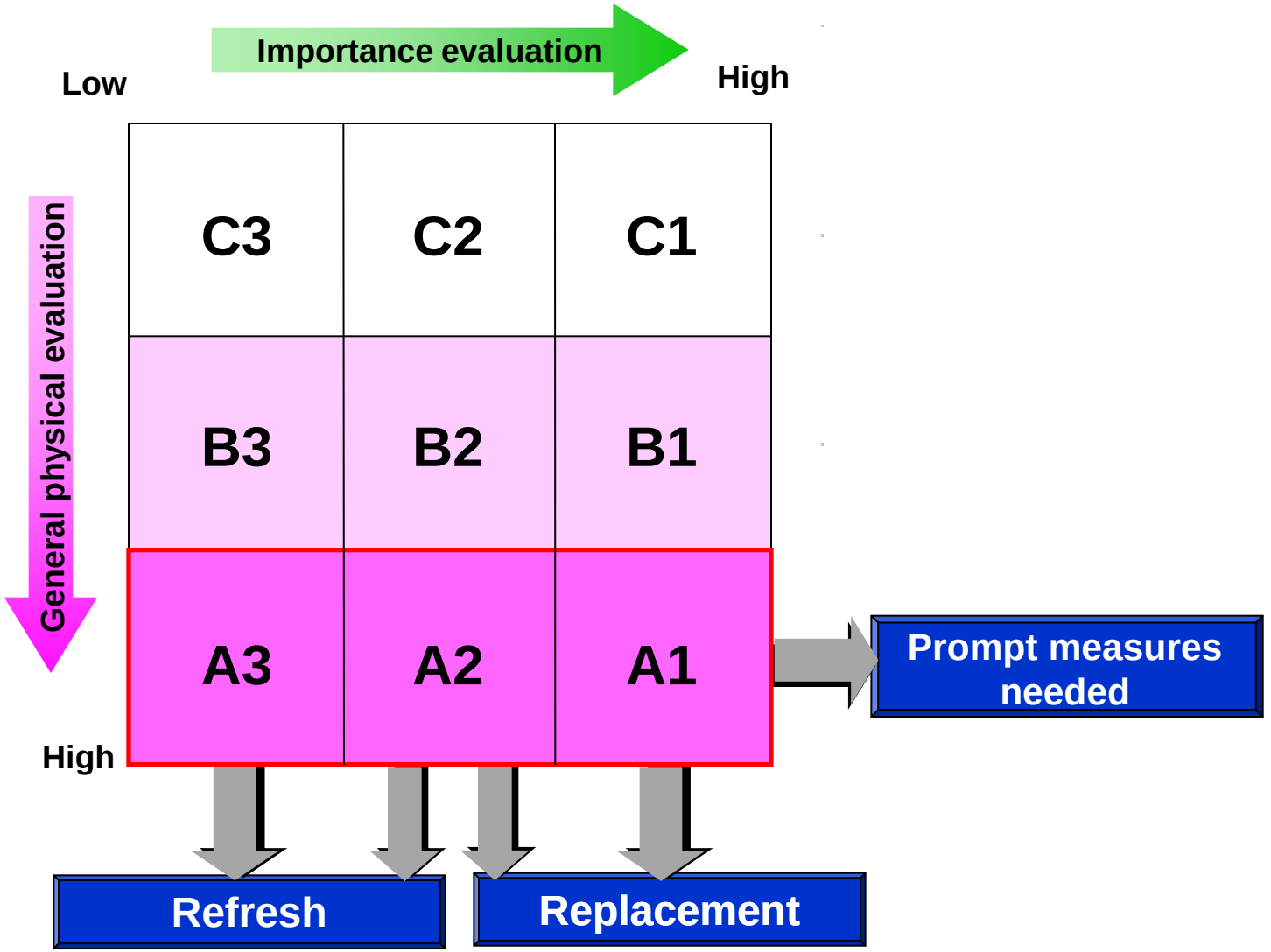
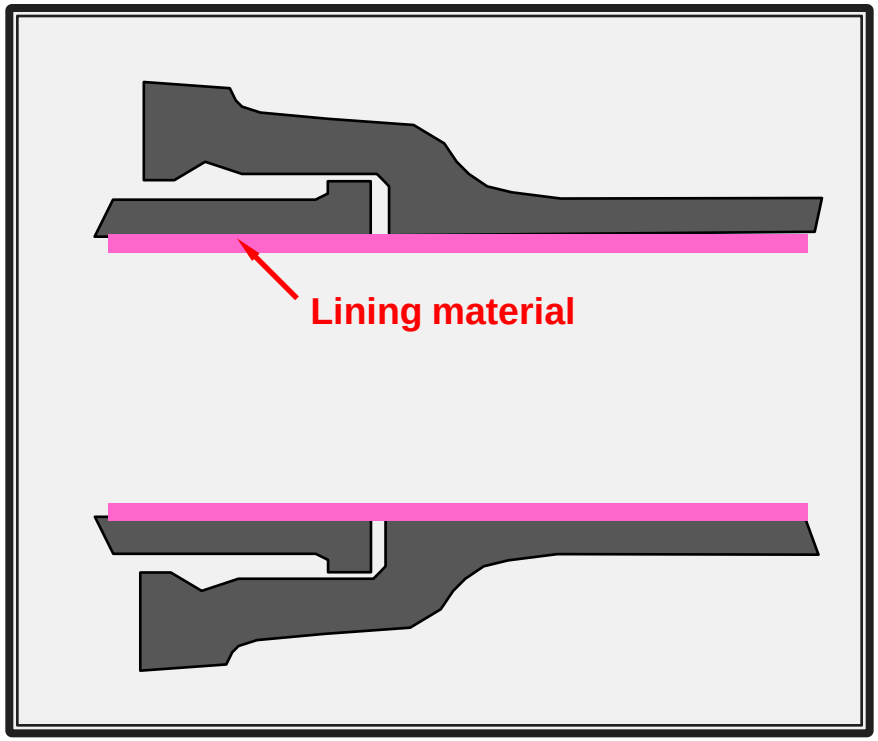
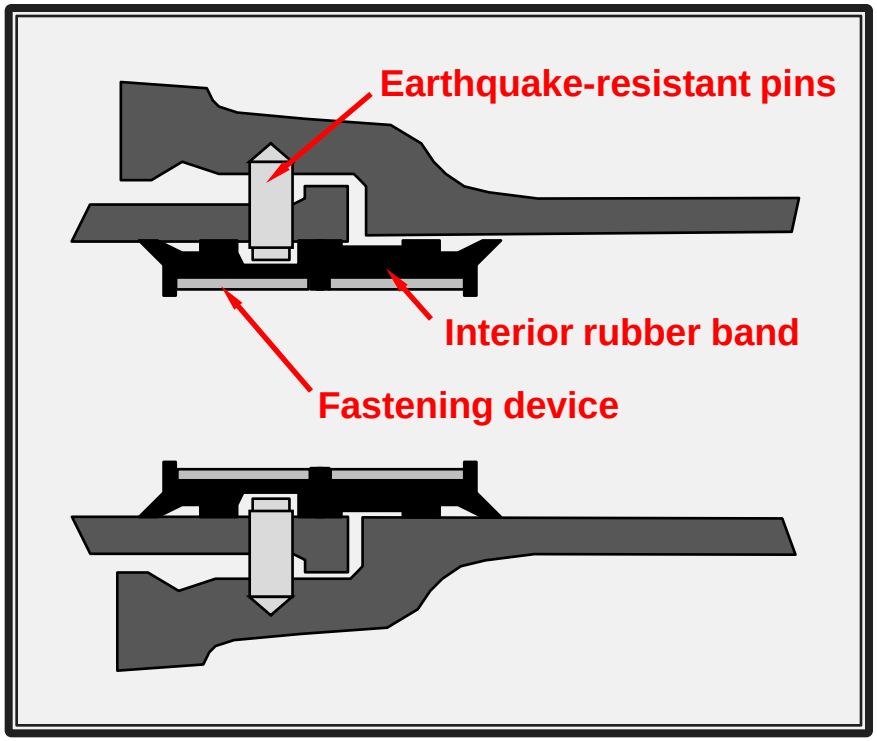
Engineering Method Selection Procedure



Refresh Work Overview

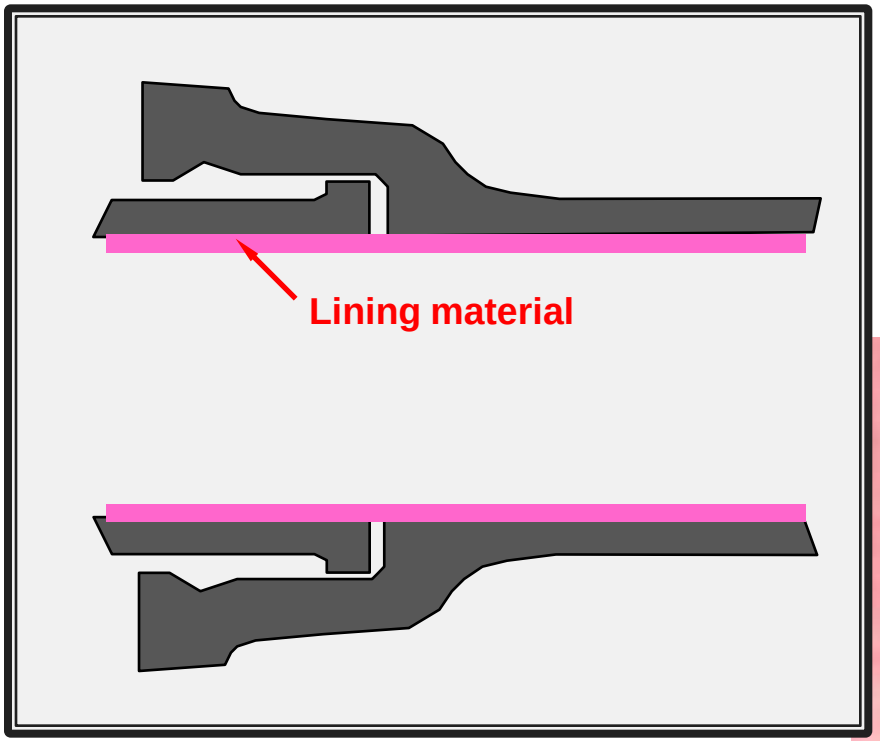


Lining Hose Method

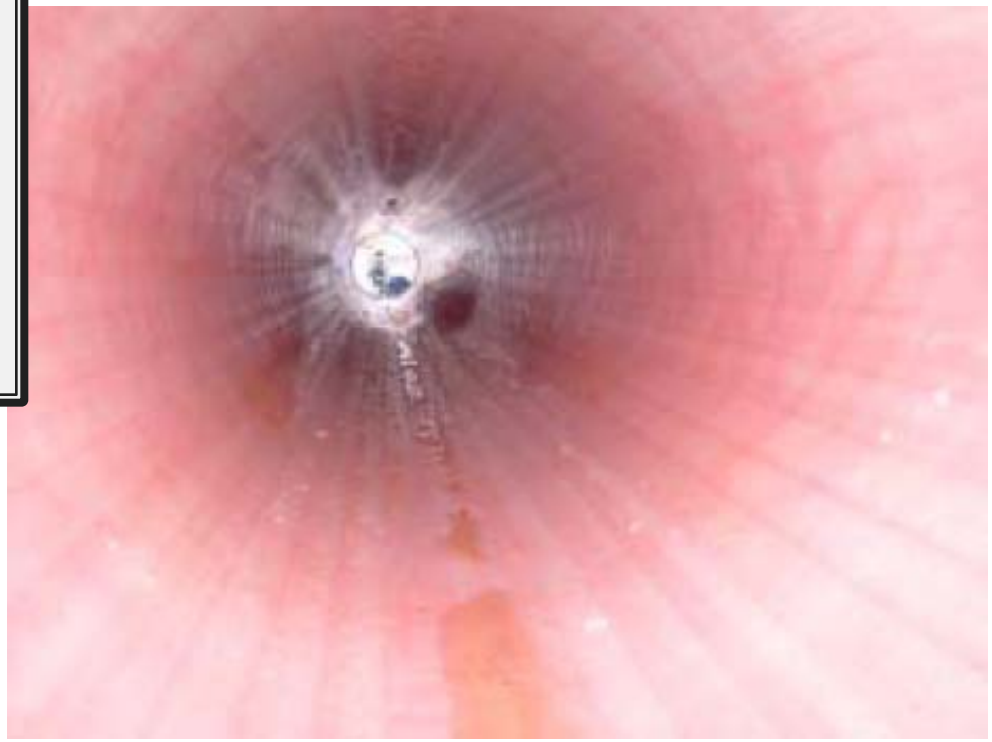


Internal Reinforcement Method

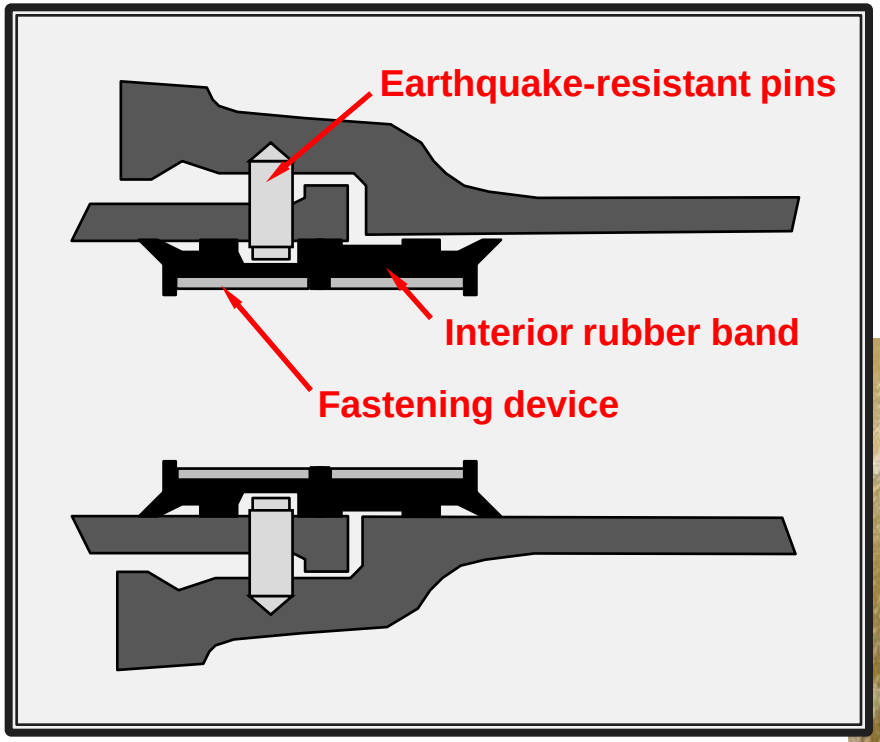
Lining Hose Method



after



Internal Reinforcement Method（1/2）



after

Internal Reinforcement Method（2/2）

Effects of Refresh Work

- **This leads to an increased pace of improvement, enabling early implementation of protection measures.**

- **Refresh work enables decentralized renewal timing and a more evenly spread project workload, avoiding large-volume renewal cycles.**

SUMMARY

- We select high-priority pipelines and undertake intensive improvement measures to make them earthquake resistant.
- We conducted a quantitative evaluation of pipelines in order to implement seismic protection measures in a systematic manner in accordance with anti-degradation measures.
- Assessment results are used as indicators for selecting engineering methods.

Thank You Very Much
for Your Kind Attention