

Considerations for Improving Performance at Geotechnical-Structural Interfaces

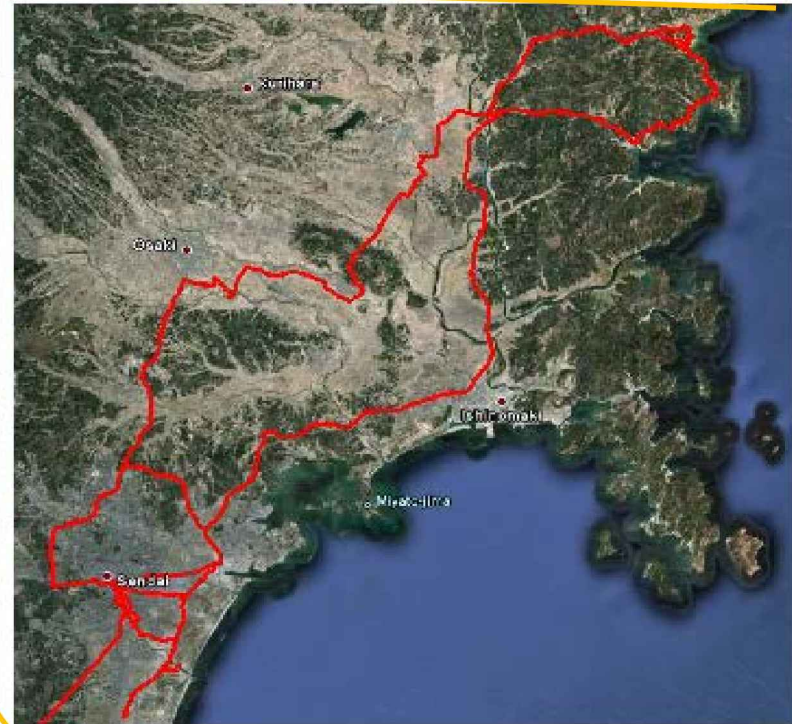
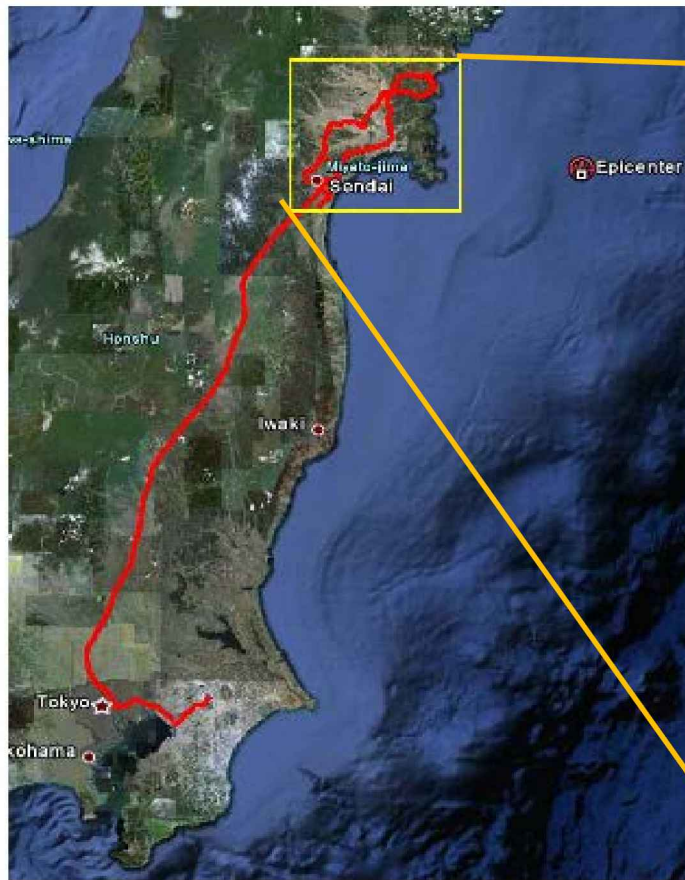
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Property Contrasts between Man-made Infrastructure and Surrounds

- Contrasts in material properties over short distances:
 - Strength
 - Deformability
 - Hydraulic conductivity
 - Erosion susceptibility
- Creates focal point for failure mechanisms
- Exacerbates poor system performance

Red Lines Show Tracks for Frost from Tokyo to Sendai and in Sendai Region



Sendai Region Tracks

Opportunity for geotechnical engineer to travel with
“Japanese and US bridge experts”

Abutment Settlement at Naruse River Bridge at Kilometer 30.1



Pier Settlement at Naruse River Bridge at Kilometer 30.1



Geotechnical-Structural Interface

Pier Settlement at Naruse River Bridge at Kilometer 30.1



Levee Damage/Scour at Koizumi O-hash



Levee Damage/Scour at Koizumi O-hash



Scour Around Unfailed Bridge Piers at Koizumi O-hash



Scour Around Unfailed Bridge Piers at Koizumi O-hash



Scour and Box Culvert Bridge Failure at Koizumi O-hash



Scour and Box Culvert Bridge Failure at Koizumi O-hash



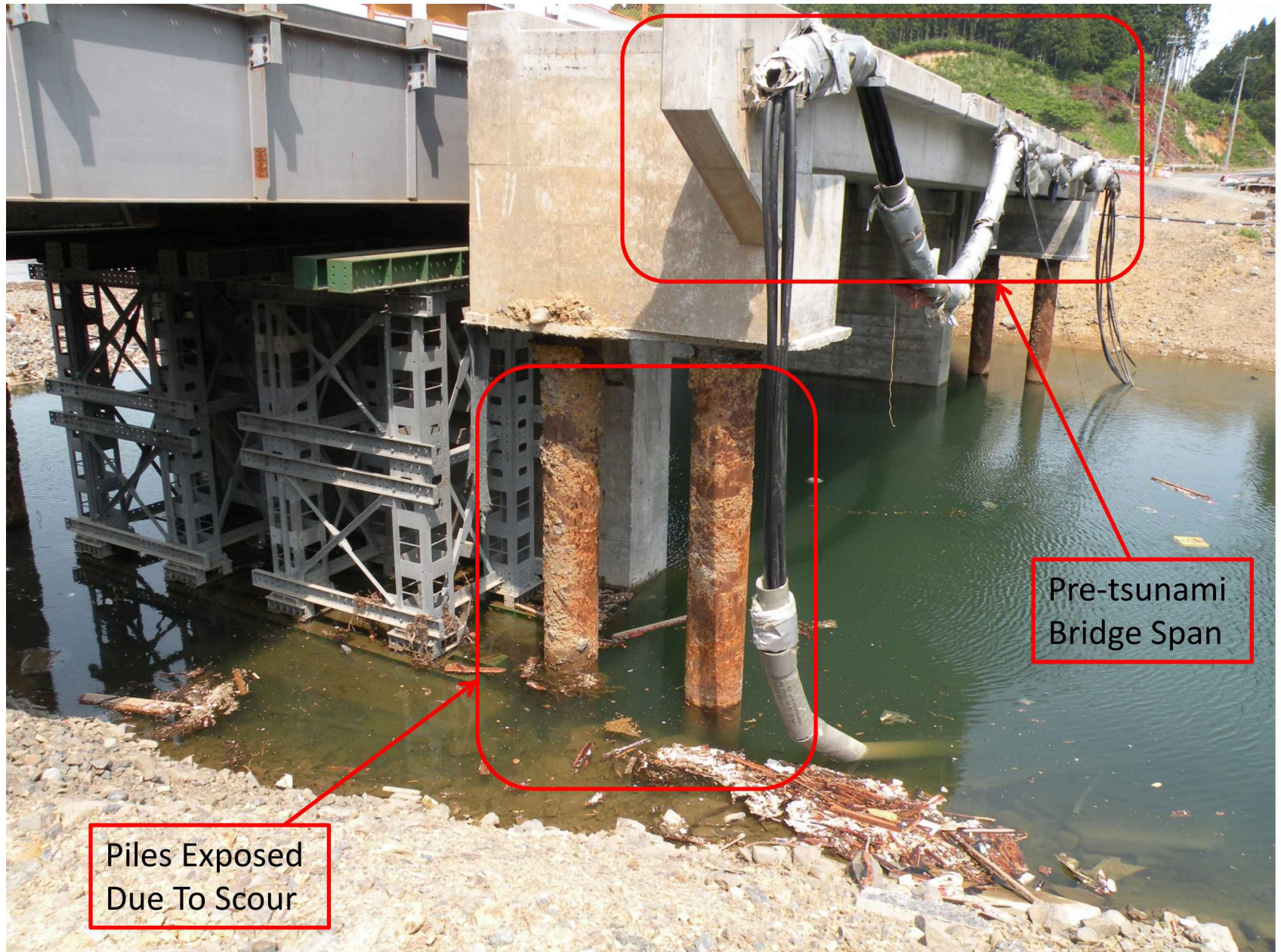
Scour and Box Culvert Bridge Failure at Koizumi O-hash



Scour Induced Bridge Abutment Failure at Sodeogawa hashi



Scour Induced Bridge Abutment Failure at Sodeogawa hashi



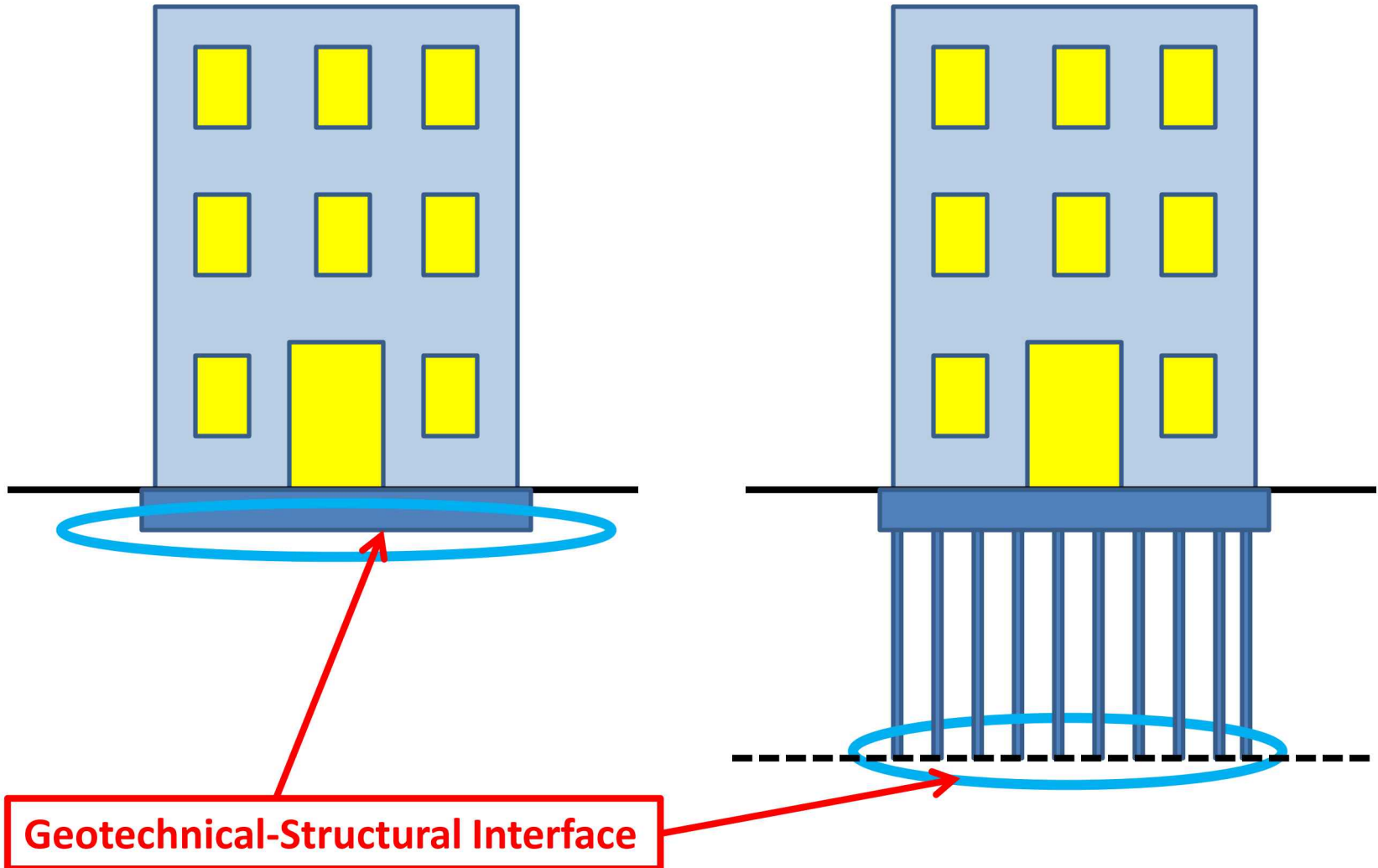
Scour Induced Tsunami Protection Gate Failure at Utatsu O-hash



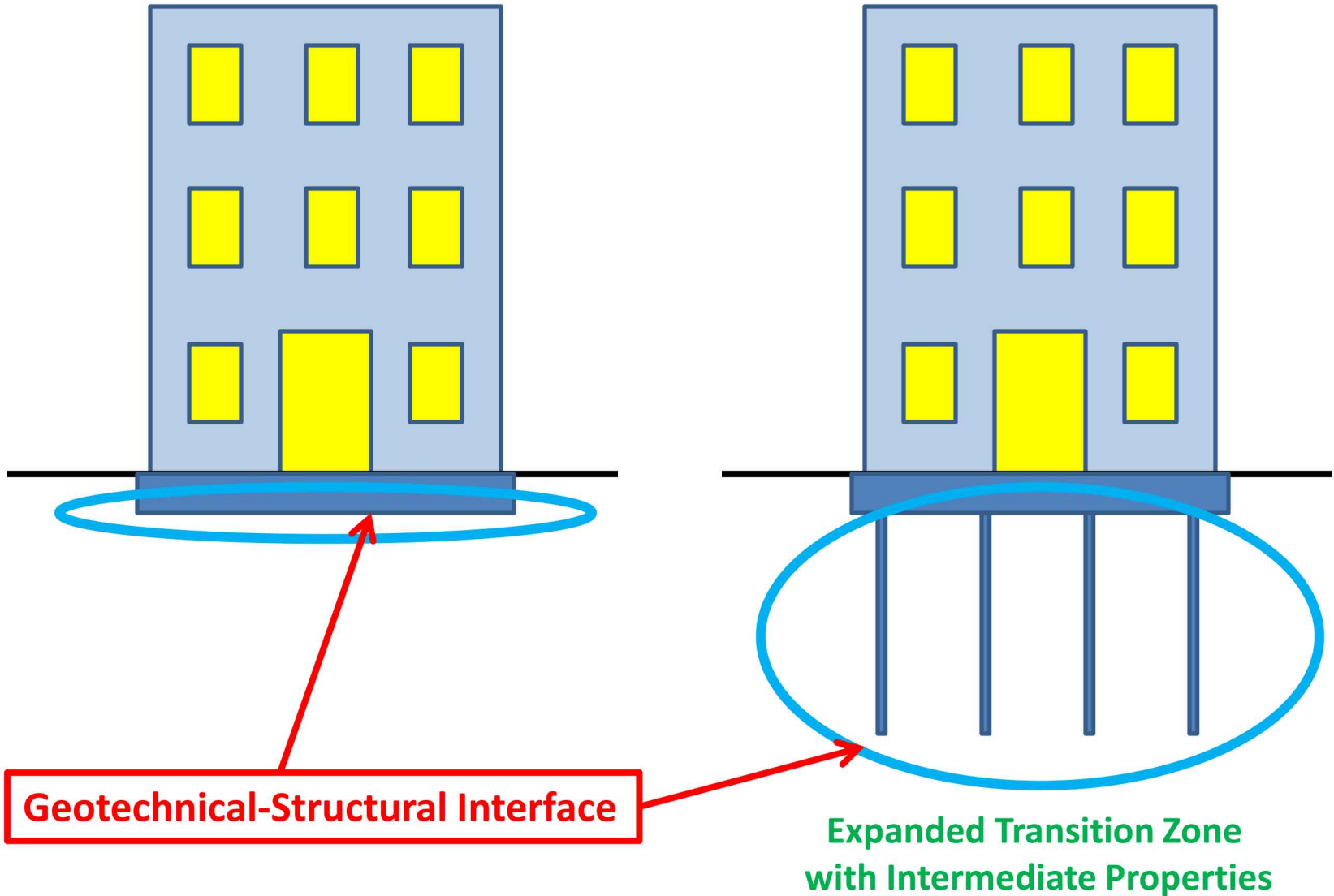
Scour Induced Tsunami Protection Gate Failure at Utatsu O-hash



Traditional Approach to Accommodate “Load Transfer”



Strategies to Influence Geotechnical “Load Path”



Summary Comments

- Create transitional property zone that de-focuses contrast between man-made materials and surrounding soils.
- Recognize that designs should consider not just primary loads but also secondary factor loads.
- Consider opportunities for “designer” materials, sections and surfaces to enhance performance.
- Relocate support structures to adjacent regions and utilize wireless and other systems for control.
- Develop design methods that take systems approach to influence “geotechnical load path”.

Thank You.