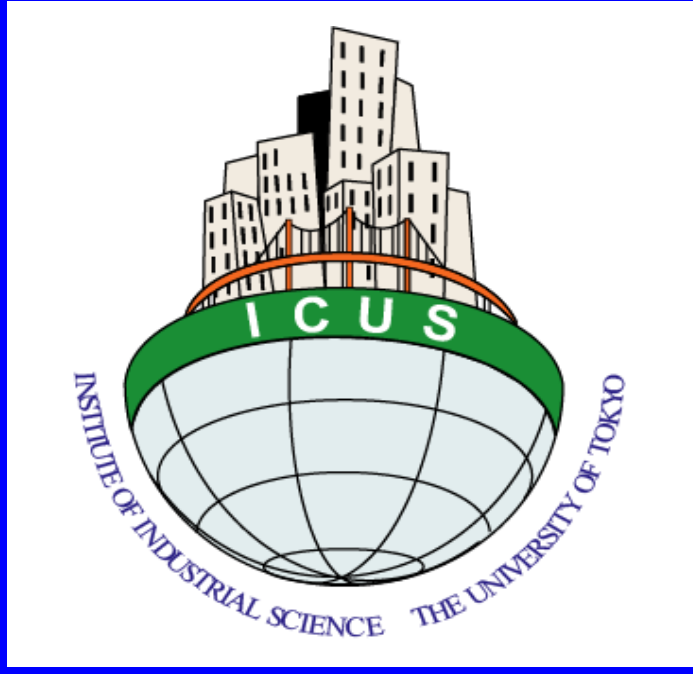




Development of Effective Solution for Prevention of Road Cave-in in FUJISAWA City

藤沢市における効率的な道路陥没防止手法の研究【官学産共同研究】



Preventing road cave-in ensures road traffic functions and a disaster-resistant system. A collaboration among Fujisawa city and IIS Univ. of Tokyo and GEO SEARCH address to develop effective solutions for prevention of road cave-in accidents in Fujisawa city. The purpose of the study is to analyze the trends of cave-in occurrence using valuable information managed by Fujisawa city, the results of surveys at ten monitoring roads in this study and investigation of causes of cavity occurrence and accumulations of details of restoration works etc. Based on knowledge obtained from these collaborative activities, the effects and the evaluation techniques of cavity/cave-in potential with the factors, the number of utilities, the oldness of sewage, the level of groundwater and the permeability of soils, which demand local conditions were discussed. And a cave-in potential map of Fujisawa City was created experimentally. The study will enable prevention of road cave-in events using advanced countermeasures so that sustainable maintenance as a disaster-resistant city can be achieved.

道路陥没を防止することは、円滑な交通の確保や災害に強いまちづくりを実現する有効な方策です。

本研究は、藤沢市の「安全で安心な暮らしを築く」ことを目的に、藤沢市が管理する道路での最適な道路陥没防止手法および体制について、官学産共同で取り組んでいるものです。研究では、藤沢市域における空洞の潜在性と拡大性を評価するために、10のモニタリング路線で半年に一度のフィールド調査を行い、空洞の発生頻度と拡大傾向を把握しながら、空洞補修時の原因調査・空洞周辺地盤の土質分析と土槽実験・補修記録の蓄積を行っています。現場で得られた空洞に関わる情報のうち、地盤・地下水・下水道施設など地域が擁する空洞の素因と、これまでの藤沢市で実施してきた路面下空洞調査結果と陥没記録からの空洞/陥没発生傾向、さらにはモニタリング調査で明らかになってきた空洞拡大傾向との関係性を分析し、藤沢市が今後、減災および予防保全として道路陥没対策を進めていくための効率的な点検手法や補修情報の活用など、有用な仕組みを講じています。

共同研究体制

Organization of the Collaborative Project

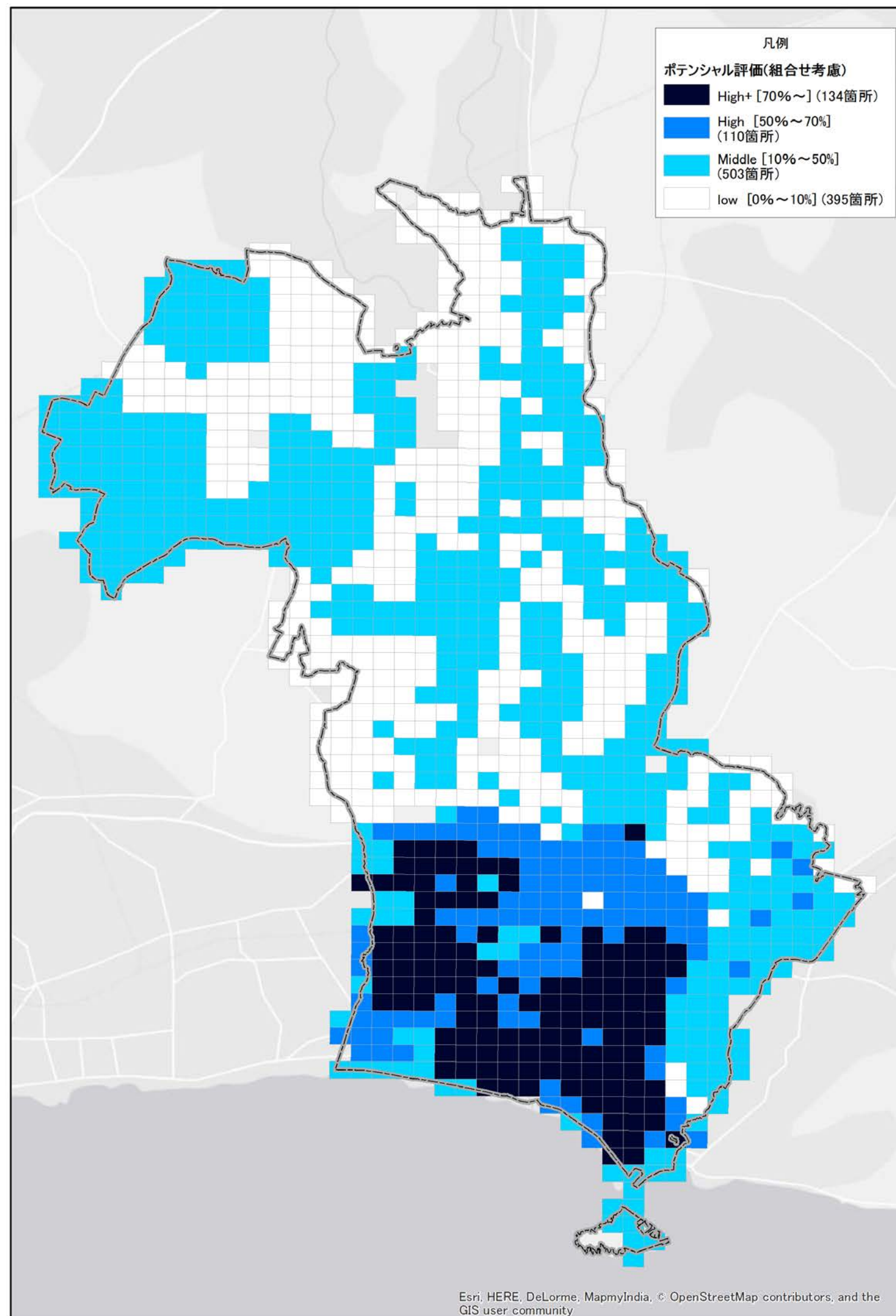


藤沢市の地域評価：陥没ポテンシャルマップの試作

Prototype of Cave-in Potential MAP

本研究の活動をとおして得られた知見から、藤沢市の地域性を踏まえた因子（地下埋設物の多さ・地下埋設物の老朽化・地下水位の高さ・地盤の透水性）で、空洞潜在性や陥没顕在性を評価する手法を検討し、マップ化を試みました

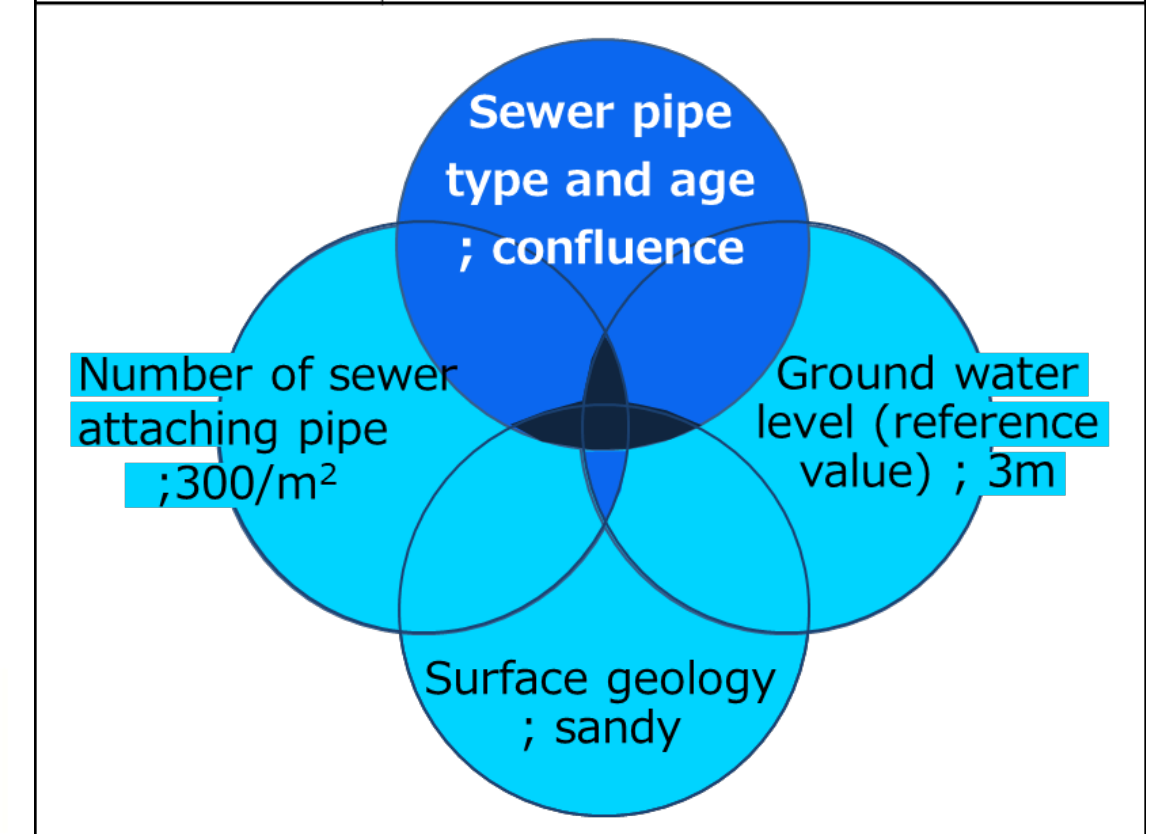
Based on knowledge obtained from this collaborative activities, the evaluation techniques of cavity/cave-in potential with themselves factors, the number of utilities, the oldness of sewage, the level of groundwater and the permeability of soils, which demand local condition. And the cave-in potential map of Fujisawa City was created experimentally.



Grade of potential (probability of occurrence)	occurrence tendency /average number in unit length of road	
	cave-in (number/km)	cavity (number/km)
High+ (70% -)	1.4	4.6
High (50~70%)	0.7	2.4
Middle (10~50%)	0.2	0.4
Low (0~10%)	0.1	0.3

Approximate expression; Potential value: Y and occurrence tendency of cave-in/cavity : X

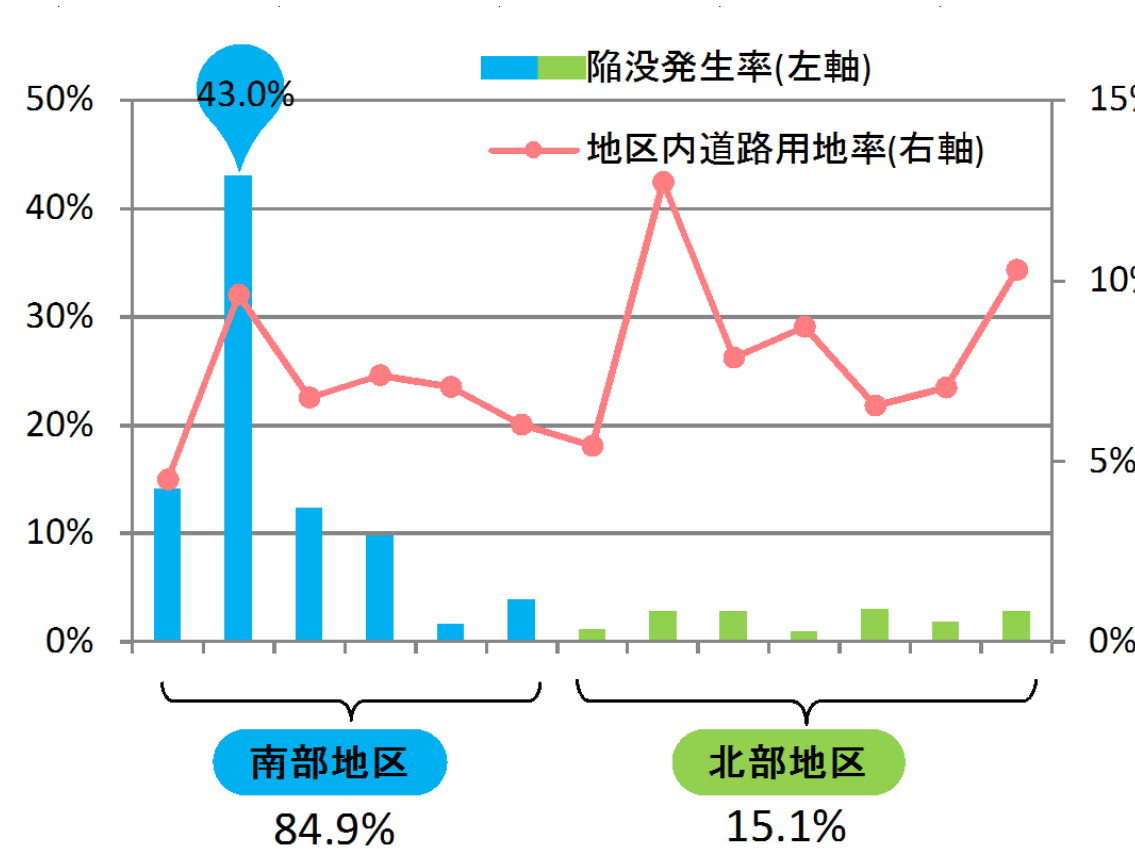
Cave-in	$Y = 0.46X - 0.085$, $R^2 = 0.918$
Cavity	$Y = 1.508X - 0.352$, $R^2 = 0.8977$



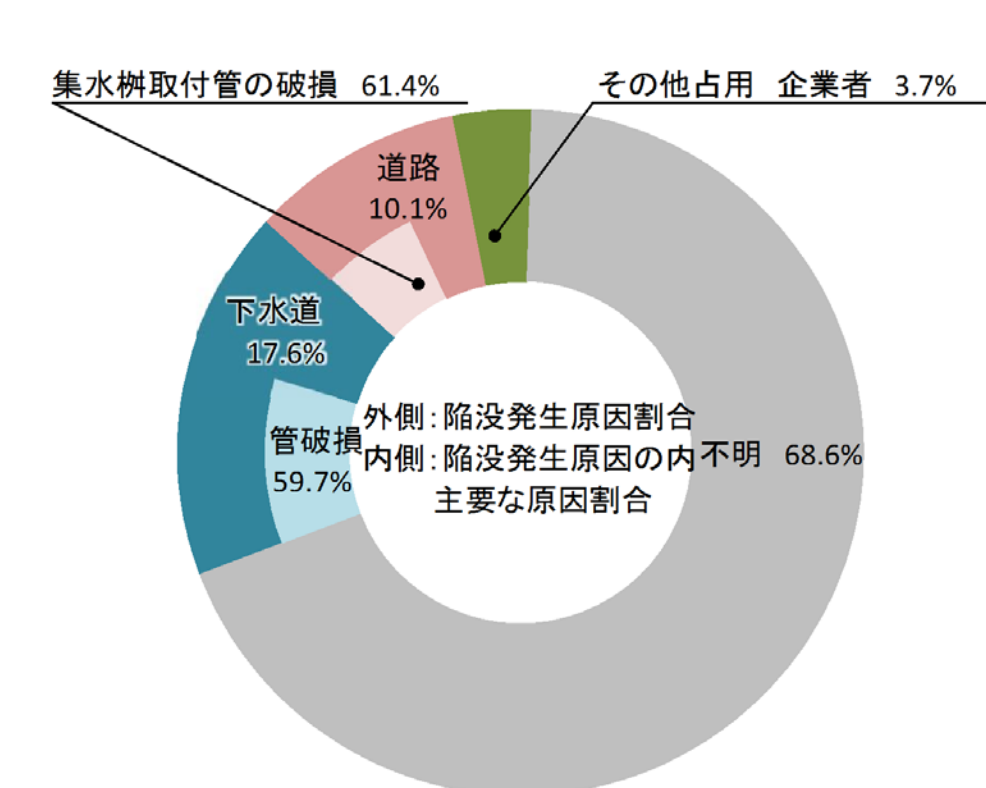
空洞/陥没に関連する情報の収集と分析

The Collection and Analysis about Cavity and Cave-in in Fujisawa City

地区別の陥没発生傾向
The trends of cave-in occurrence by region



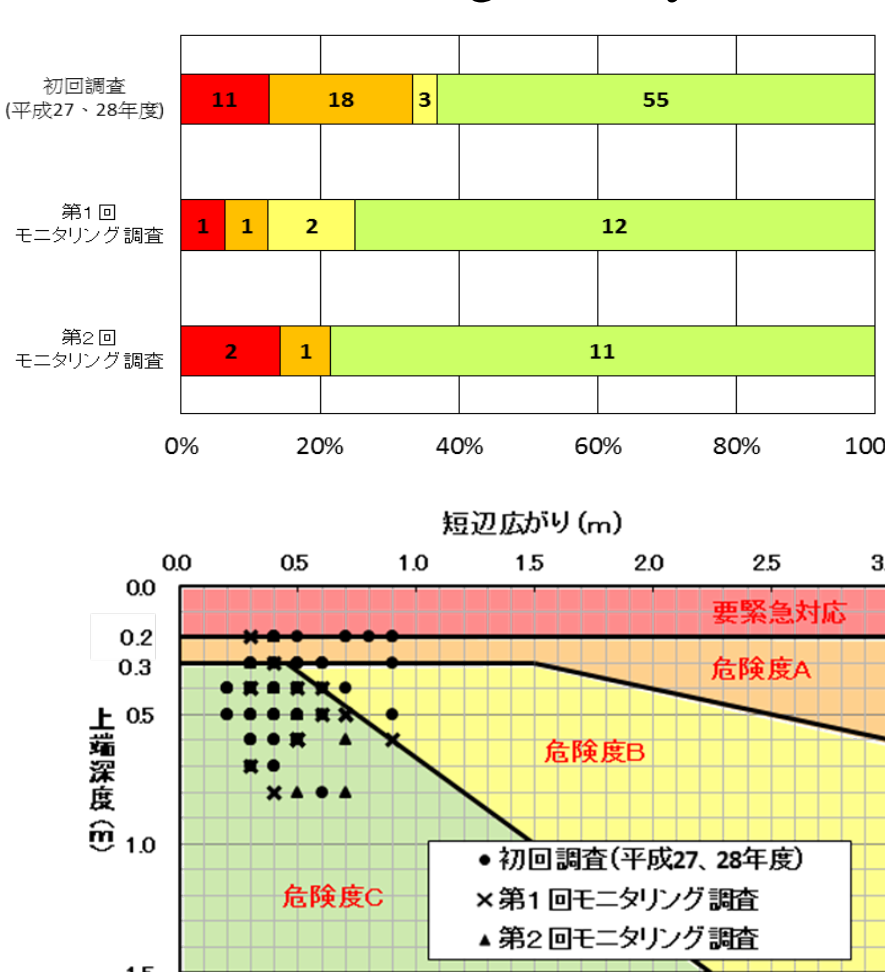
陥没原因割合
The ratio of Factors of cave-in



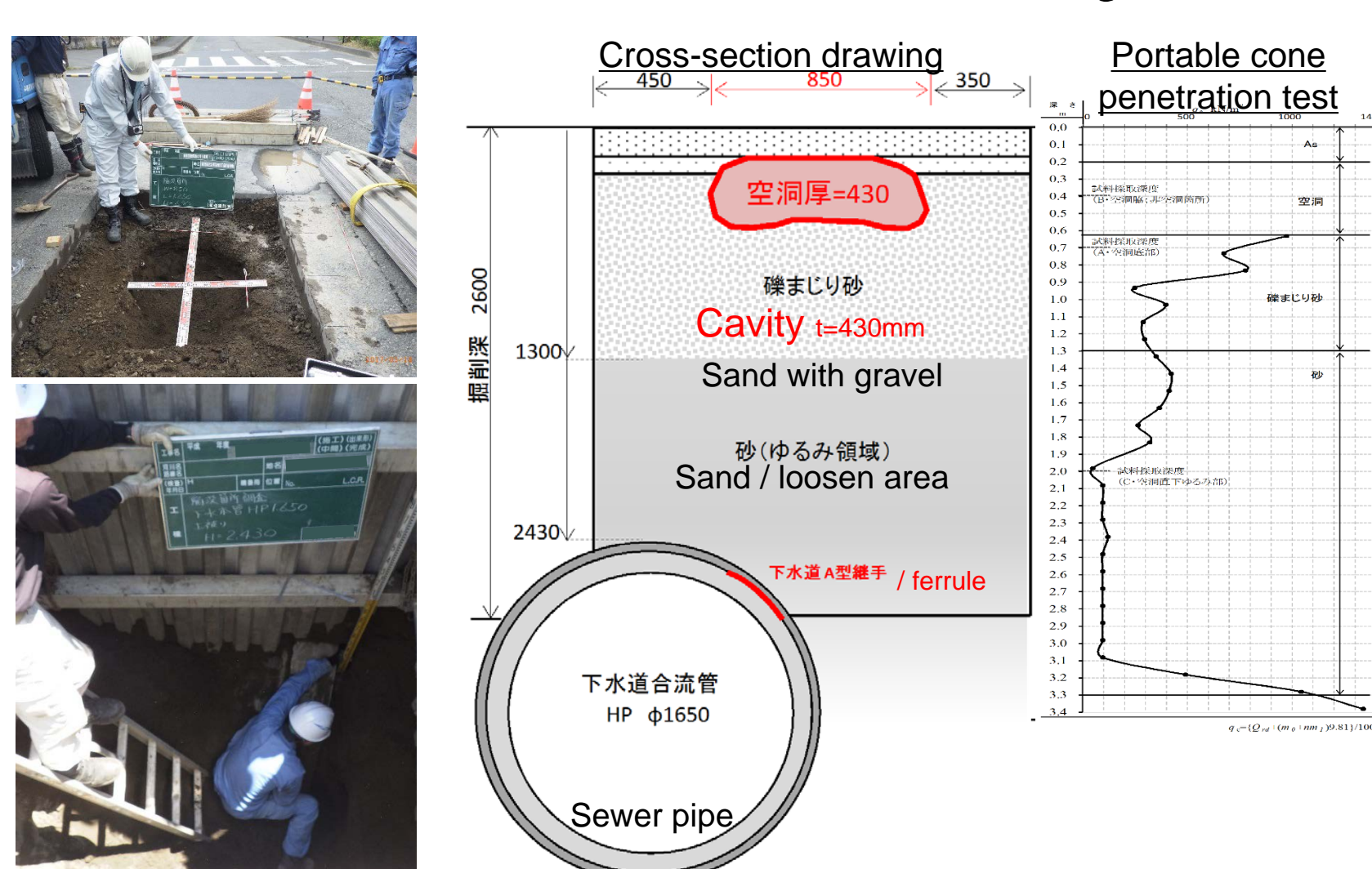
空洞の発生と拡大メカニズムの究明

Investigation of Mechanism of Cavity Occurrence and Expansion in Fujisawa City

空洞モニタリング調査結果
Results of Monitoring Survey of Cavities

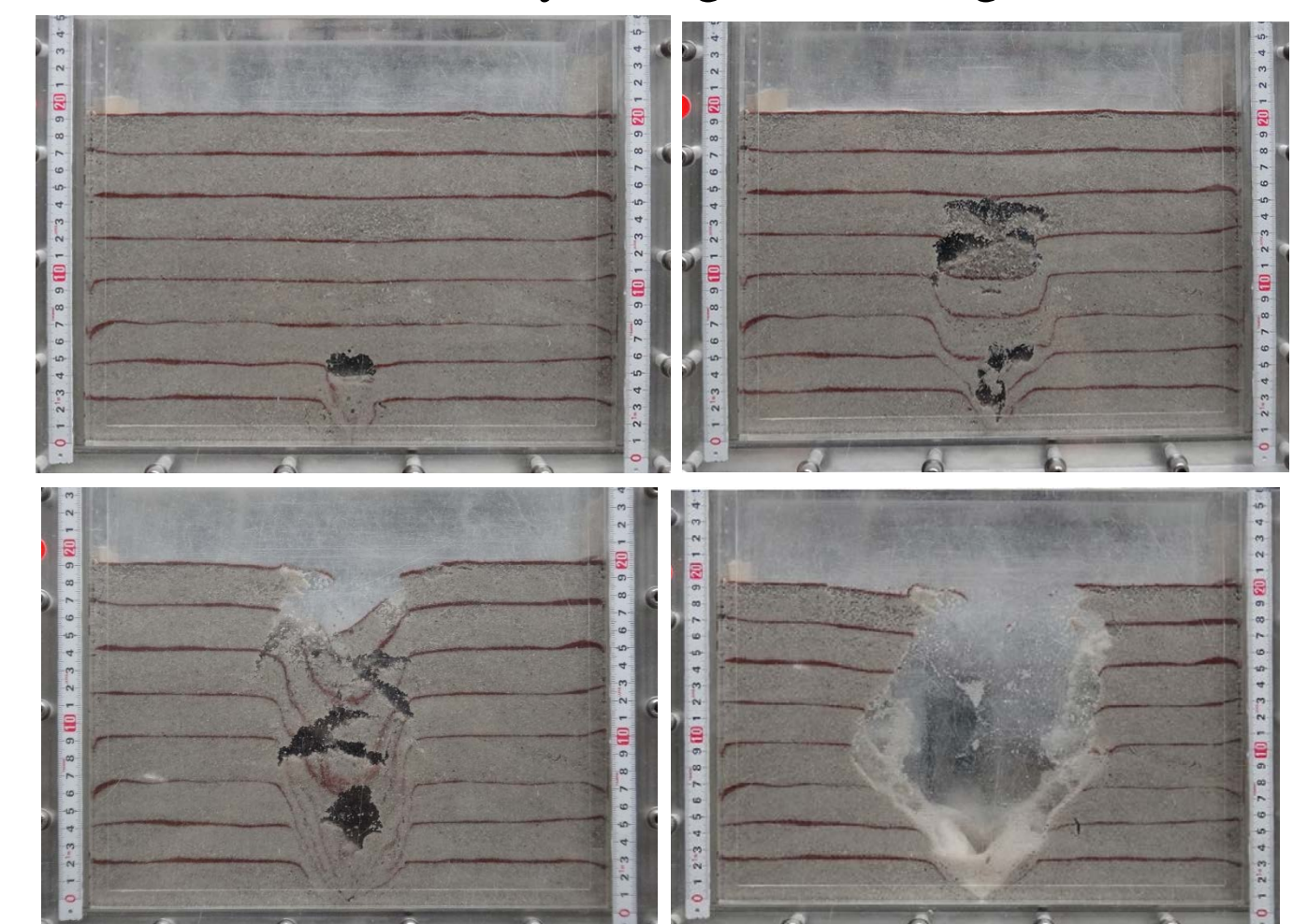


空洞補修時の原因・発生状況調査
Investigation of Causes of Cavity Occurrence



空洞原因の特定には至りませんでしたが、空洞下の砂層に厚いゆるみと下水管路継手部に隙間が確認されました
Although not fully revealed about the identification of causes of cavity, loosened soils were observed beneath the cavity and a small gap was found at the ferrule of pipe.

空洞再現実験
Model Tests of Cavity Using Simulating Local Soils



本研究に関する担当研究室は桑野研究室です。
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