



# **Sewerage Mapping Information System for Tokyo (Ward Area)**

Sewer Maintenance Section  
Facilities Management and Maintenance Division  
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# Scale of the Tokyo Metropolitan Sewer

## 【Management scale of the sewerage facilities】

○Sewer schematic area	Approx. 58,000 ha
○Total length of sewer pipeline	Approx. 16,000km
○Manholes	Approx. 480,000
○Public pits	Approx. 1.9 million
○Water treatment plants	13
○Pumping facilities	84

Result of having made a schematic of the above

The 1/500 facility plane view comes to approx. 15,000 sheets of A2

# What is the Sewerage Mapping Information System?

Sewerage Law Article 23:

The public sewer utilities must prepare and maintain a register for the management of the public sewer.

In Tokyo, in order to properly understand the sewerage facilities and to provide information promptly for maintenance on or inspection of the facilities, a **Sewerage Mapping and Information System (SEMIS)** is employed, which is a public sewerage mapping system that uses a geographic information system (GIS).

# Sewerage Mapping Information System Development Chronology

- Optimize the schematic amendments and operation and maintenance work by putting the public sewerage register into electronic form.
- Properly understand the sewerage facilities and provide information promptly for maintenance on or inspection of the facilities.

FY1980	Embarked on putting facility information into electronic data format
FY1985	First generation SEMIS completed
FY2000	PC SEMIS completed
FY2005	Sewerage Mapping register published on Internet
FY2008	SEMIS for government intranet completed

# Application and Use of SEMIS

- ① Logical administration of maintenance works
- ② Simplification of use as a planning and design source material
- ③ Labor-saving tool for browsing

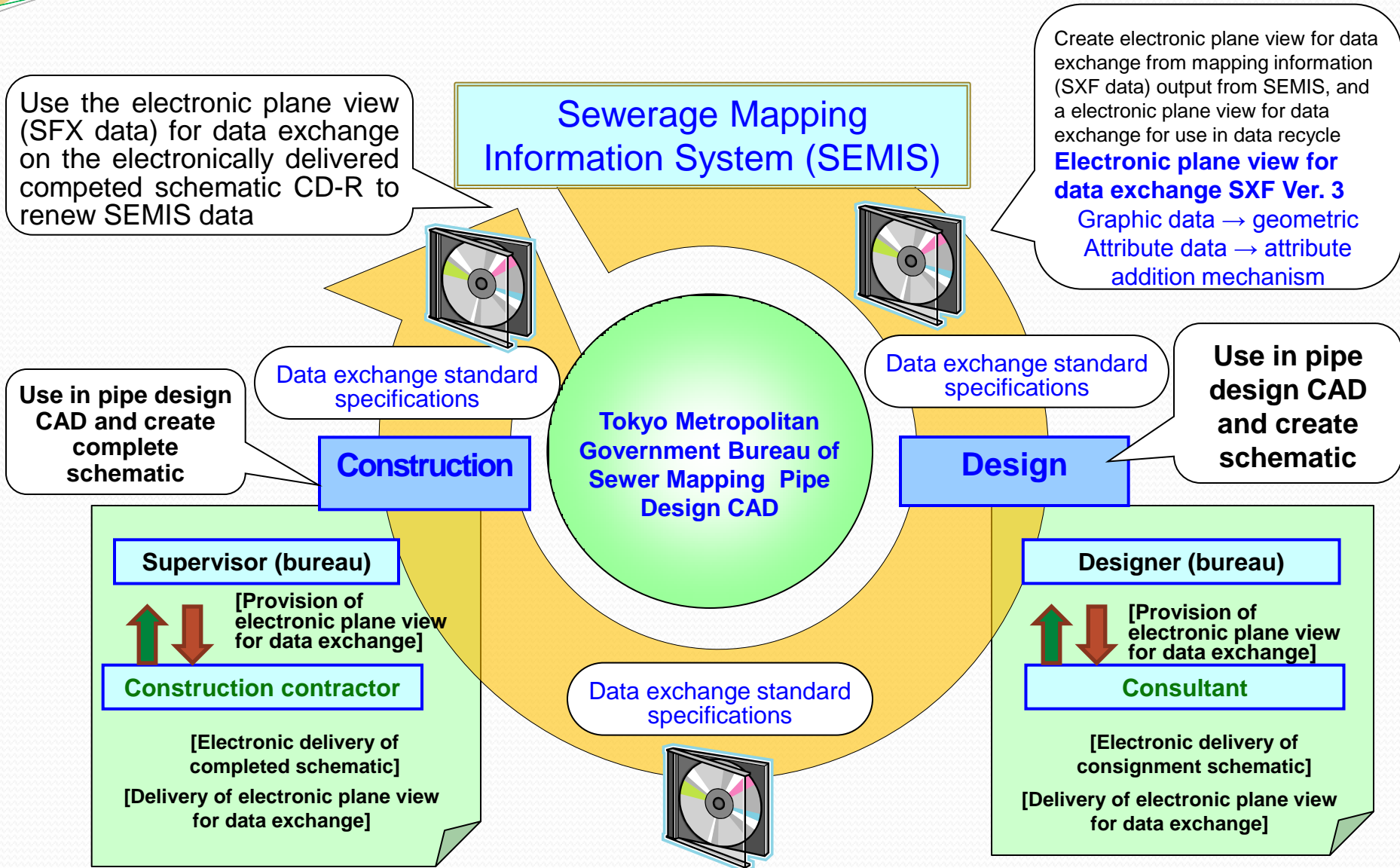
# ① Logical Administration of Maintenance Works

- Source material for maintenance of pipe and drain facilities and inspection work
  - Scheduling of sewer pipes cleaning etc.
  - A database for manhole or pipe surveys, inspection checks etc.
  - Data supply necessary for coordination and field-surveys with other bodies
  - Creation of a database of road subsidence and flooding

## ② Source material for planning and design

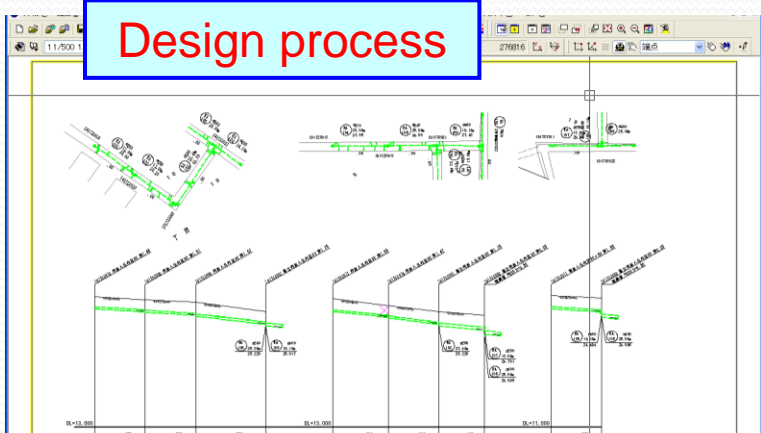
- Application in asset management etc.
  - Sewer Mapping planning (expansion works)
  - Reform/repair works etc.
  - Deterioration counter-measures (reconstruction etc)
  - Flooding, junction improvement, smell counter-measures etc.

# Image of Data Application



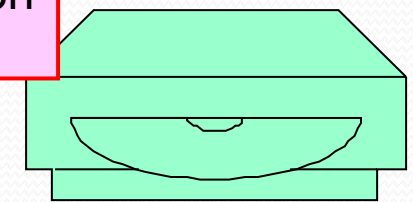
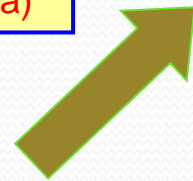


# Image of Design Process



To the construction contractor

Design schematic data (electronic plane view data)

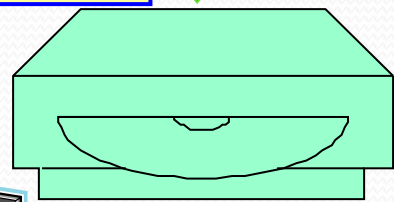


Construction work

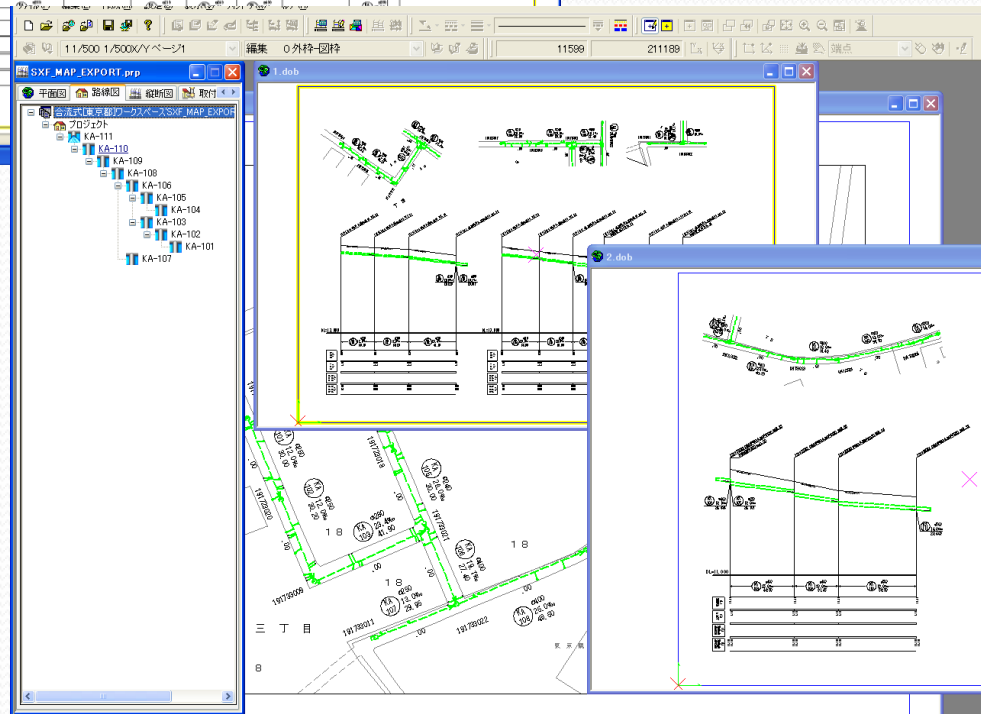


Completed schematic data (electronic plane view data)

Construction completed



To SEMIS



# Image of Completed Schematic

The image displays three overlapping windows from a CAD software application, likely AutoCAD, used for sewerage system design. Each window shows a different stage of a schematic diagram.

- Top-left window:** Titled "SXF\_MAP\_EXPORT.dob", it shows an "Electronic plane view after construction". The drawing area contains a grid of lines representing a site plan or map.
- Middle window:** Titled "北部分系統図.dob", it shows a "Completed schematic (system diagram)". The drawing area contains a simplified schematic diagram with yellow and blue lines representing the sewerage system layout.
- Bottom-right window:** Titled "北.dob", it shows a "Completed schematic (detailed line drawing)". This window displays a highly detailed cross-section of a sewerage pipe, including structural details, materials, and dimensions. It includes a title block with project information and a table of quantities.

Each window has a standard CAD interface with a menu bar, toolbar, and command line. The command line at the bottom of each window displays the text "コマンド 根拠を指定して下さい。".

# ③ Browsing

- Provision of sewerage facility browsing system for residents and contractors
  - Establishment of register browsing room (corner)
  - Publication using internet

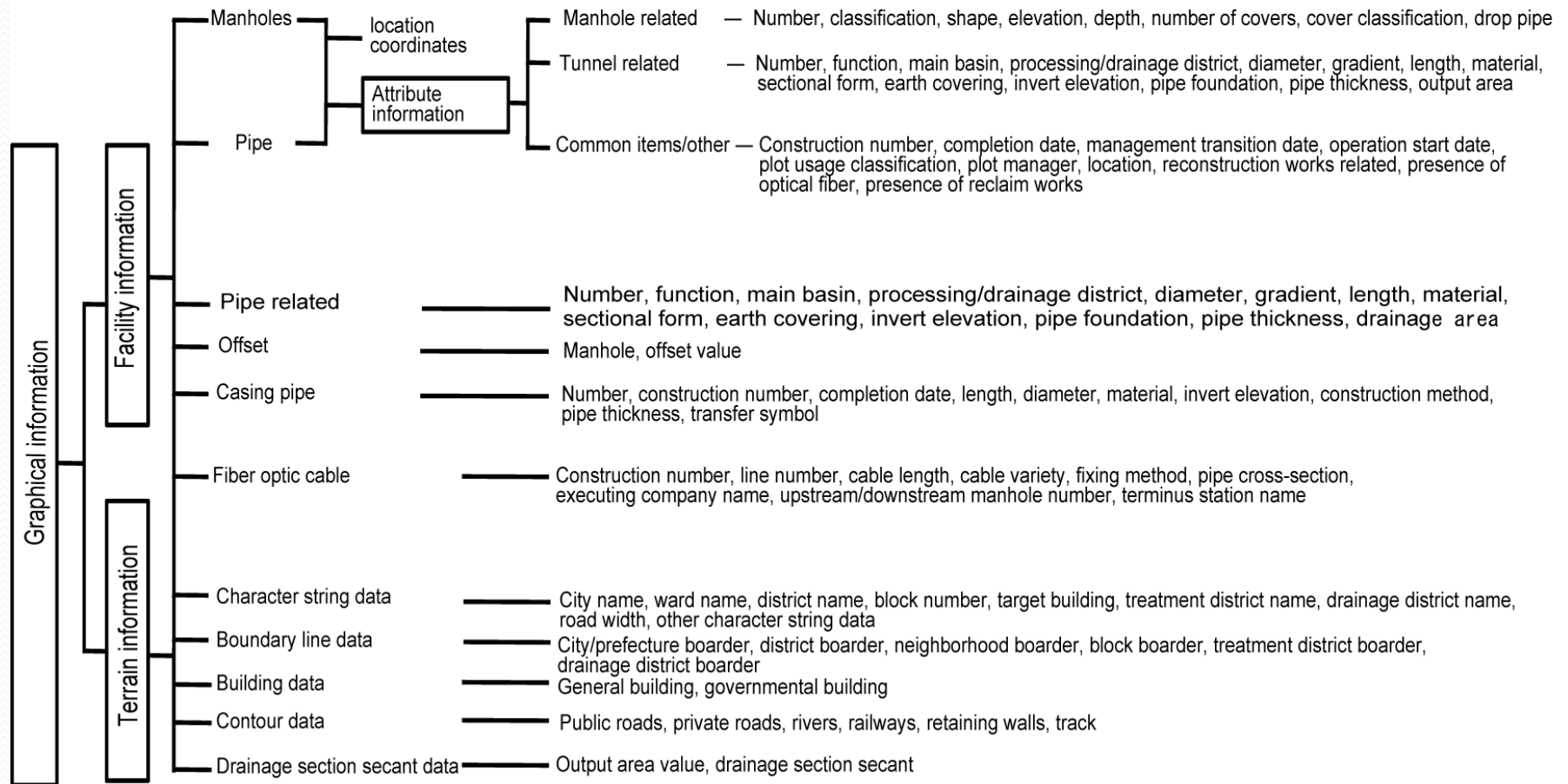
# Sewerage Mapping Information System Provision

Browsing of the Sewer Mapping register is possible in the register reading room on the 5th floor of the Tokyo Metropolitan 2nd central government office, and also on the homepage since April 2005.

① Browsing via the homepage

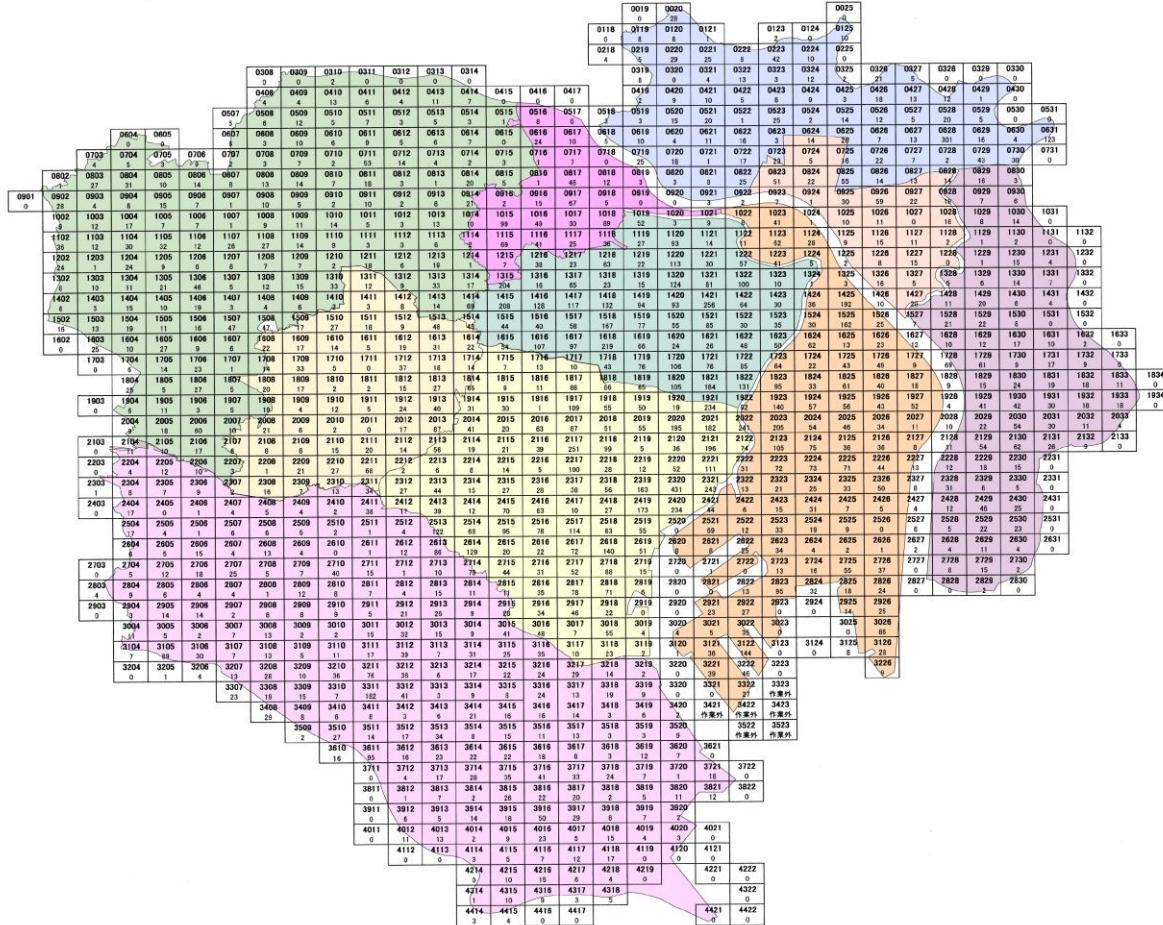
② Browsing in the register reading room

# Organization of SEMIS Information



# Public Sewerage Register Management Number Diagram

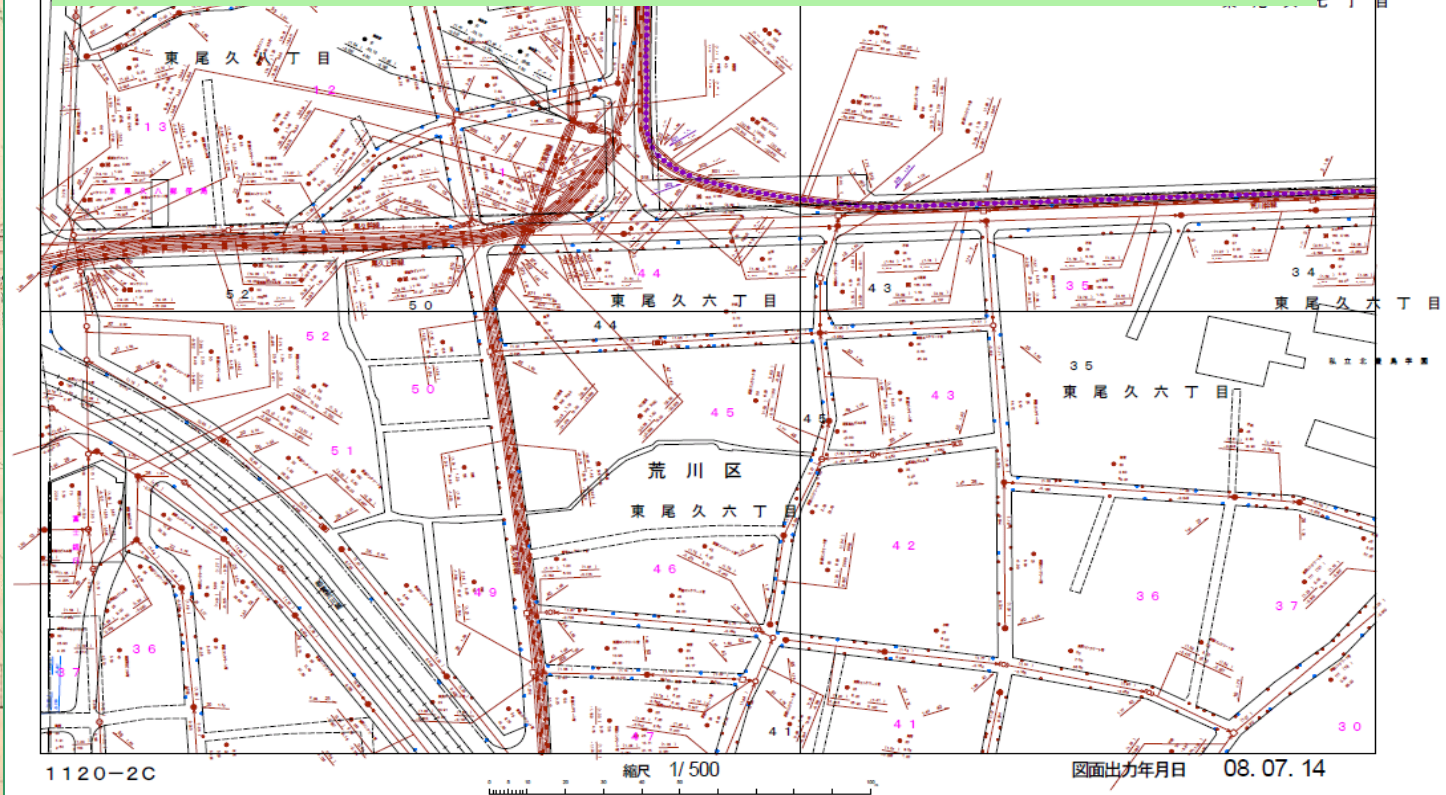
東京都公共下水道台帳管理番号図



# Former Sewerage Register and Current Sewerage Register

Kent paper public sewerage register

Electronic data public sewerage register  
(drawing result)



# SEMIS Feature Summary List

SEMIS起動ランチャ

## SEMIS

(SEwerage Mapping and Information System)

### Facility information

Drawing search

Completed drawing/Special manhole structure drawing search

Construction register search

Standard drawing release

Control drawing batch release

Parameter drawing release

Parameter drawing release (by special ward)

Facility information aggregation (manholes/pipes)

Facility information aggregation: pivot table (manhole/pipe/pit/installation pipe)

### Pipeline diagnosis

Drawing search

Pipeline diagnosis information search

Pipeline diagnosis color-coded drawing release (drawing number designated)

Pipeline diagnosis color-coded drawing release (special ward designated)

Facility safety confirmation color-coded drawing release (drawing number designated)

Pipeline diagnosis information aggregation

Pipeline improvement/maintenance determined necessary memo (including NILIM versions)

Aggregate material creation for pipeline diagnosis report

### Fiber-optic cable

Drawing search

Completed diagram/conjunction diagram/license search

Construction register search

Inspection information search

Drawing release by pipeline

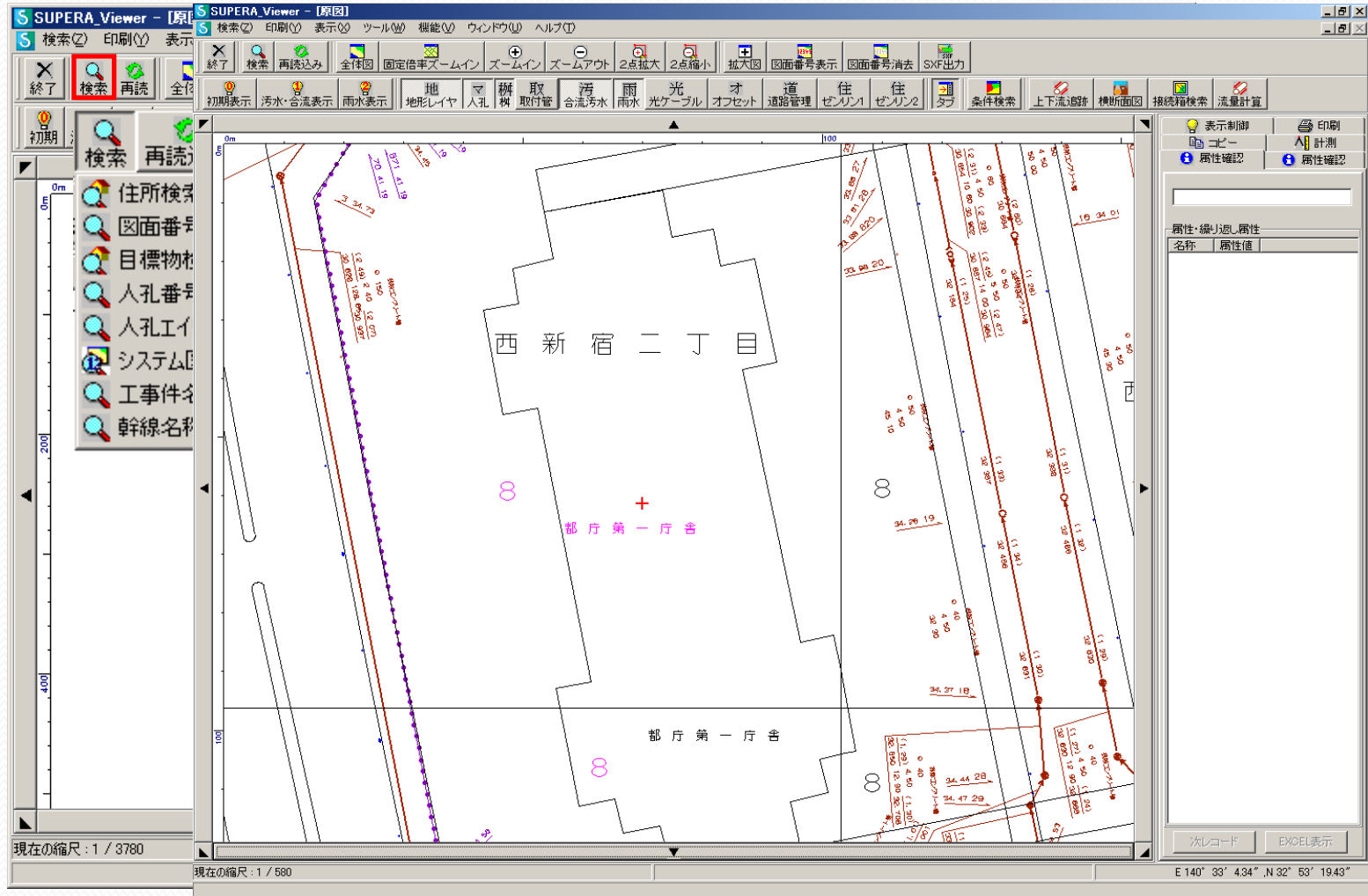
Fiber-optic cable aggregation

End





# (1) Drawing retrieval function



# Search Display Example

The screenshot displays the SUPERA Viewer software interface. The main window shows a detailed residential map with various buildings, roads, and utility lines. The map is overlaid with a search display. The interface includes a menu bar at the top with options like '検索' (Search), '印刷' (Print), '表示' (Display), 'ツール' (Tools), '機能' (Functions), 'ウィンドウ' (Windows), and 'ヘルプ' (Help). A toolbar below the menu bar contains icons for search, zoom, and other functions. The map area shows a complex network of roads and buildings, with labels for various structures and streets. A property list on the right side of the window shows details for the selected area, including the name '全レイヤ' (All Layers) and a list of layers such as '1/500DB', '設備' (Facilities), '地形' (Topography), 'ゼンリン地形' (Zenrin Topography), and '道路管理' (Road Management). The status bar at the bottom indicates the current scale as '現在の縮尺: 1 / 480' and the coordinates 'E 140° 33' 33.89", N 32° 51' 26.29".'

Search Display Example

Example showing residential map overlay

現在の縮尺: 1 / 600

現在の縮尺: 1 / 480

E 140° 33' 33.89", N 32° 51' 26.29"

# (2) Display function (display control function)

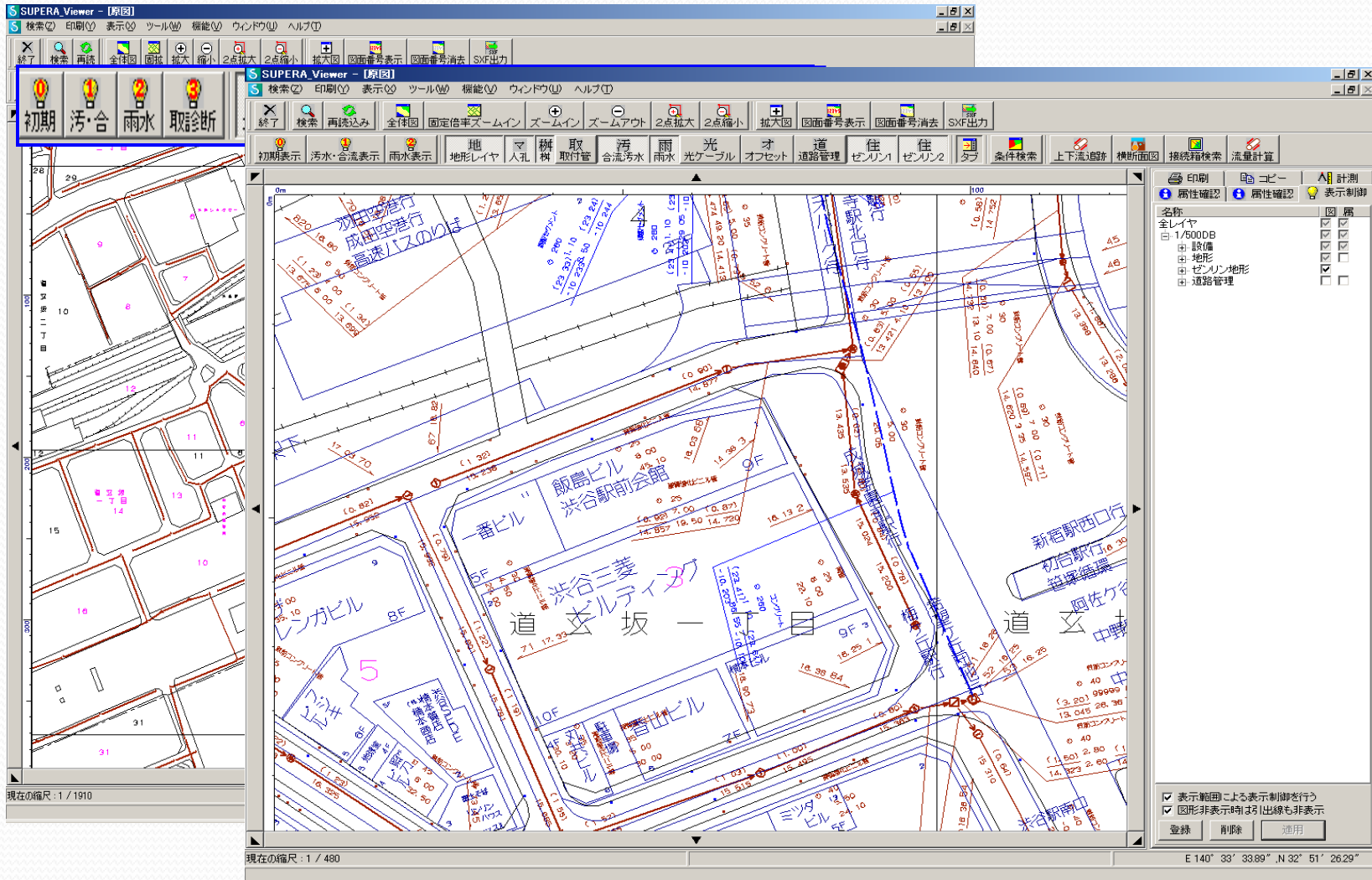
The screenshot displays the SUPERA Viewer software interface. The main window shows a technical drawing of a sewerage system with a blue hatched polygon representing a flood area. A red box highlights a specific section of this polygon. A '拡大図' (Zoomed View) window is open, providing a magnified view of the highlighted area. The interface includes a menu bar, a toolbar with various icons, and a right-hand panel with a table of properties for the selected '浸水ポリゴン' (Flood Polygon).

現在の縮尺: 1 / 480

E 140° 33' 42.41" N 32° 51' 23.70"

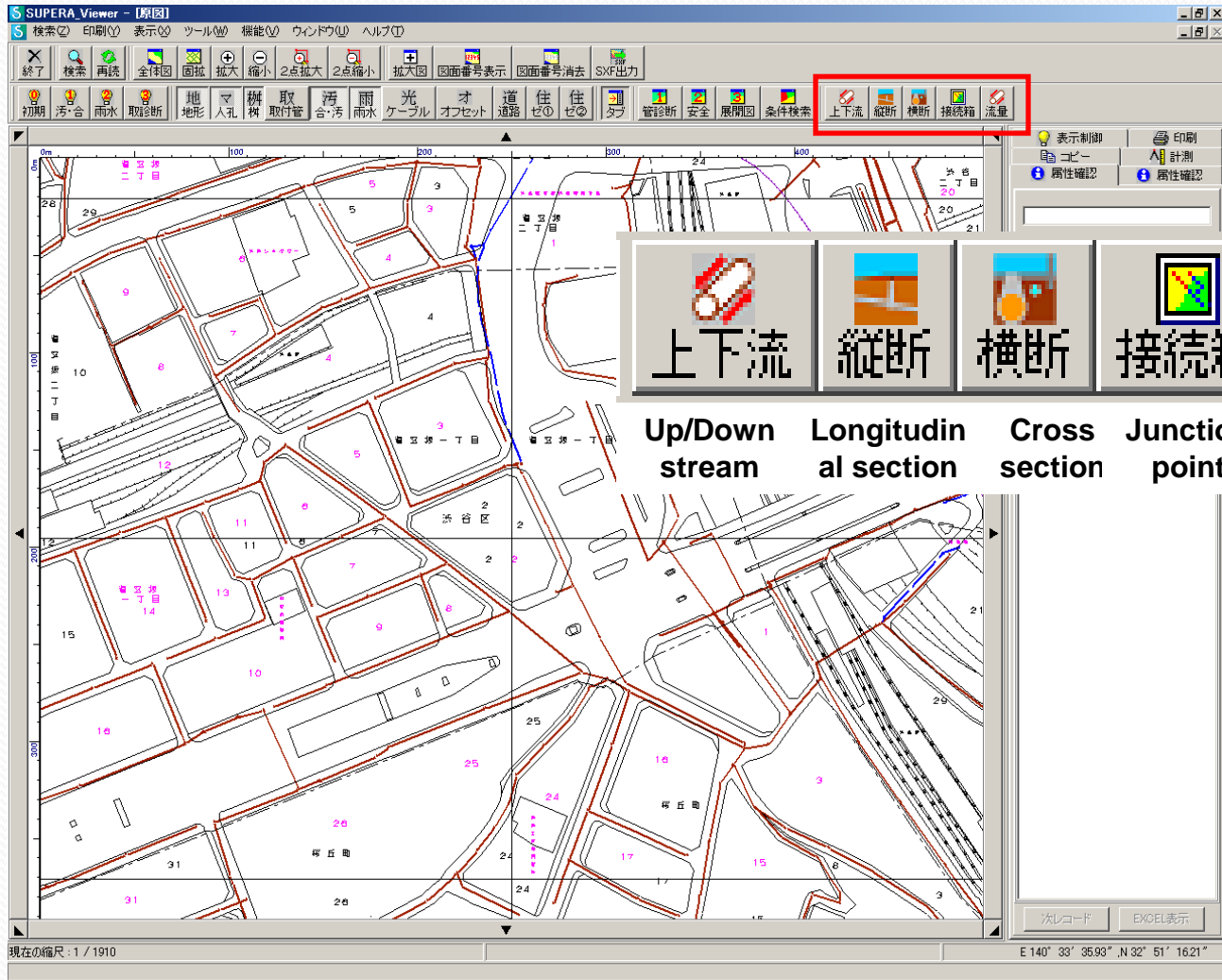
名称	属性値
図面番号	25143
浸水番号	25143002
行政区	渋谷区
浸水年月日	平成11年08月29日
浸水理由	集中豪雨
床上浸水戸	1戸
床下浸水戸	0戸
道路冠水面	0
積算雨量	89
時間最大	60

# (2) Display function (switch display function)





# (4) Sewerage Functions



# Example of Upstream/Downstream Tracking

The screenshot displays the SUPERA Viewer interface with two main map panes. The left pane shows a zoomed-in view of a specific sewerage pipe section, with a red dashed box highlighting a specific area. The right pane shows a larger view of the sewerage network, with a red solid line tracing a path through the network. A red arrow points from the zoomed-in view to the larger view, indicating the source of the zoomed-in section. The software interface includes various toolbars and a control panel on the right side.

**Upstream tracking result**

**Downstream tracking result**

現在縮尺: 1 / 4210

現在縮尺: 1 / 12910

E 140° 33' 24.04" N 32° 54' 30.51"

# Example of flow-rate calculation

## Catchment area tracking diagram

### Chart of flow

管渠流量調査表 (マンニング50mm/h-50%相当)

管渠 番号	各線		各線		各線 最長 (m)	管渠 時間 (分)	汚水量 (m <sup>3</sup> /s)	1ha あたり (m <sup>3</sup> /s)	雨水量 総水量 (m <sup>3</sup> /s)	地下水 又は 特殊水量	分水量 (m <sup>3</sup> /s)	総水量 (m <sup>3</sup> /s)	勾配 (%)	断面 (cm)	流速 (m/s)	流量 (m <sup>3</sup> /s)	管渠高		地盤高		動水勾配		整備 対策	線名 (SEMI S 入孔番号)	摘 要			
	(ha)	(ha)	(ha)	(ha)													起点 (m)	終点 (m)	起点 (m)	終点 (m)	勾配 (%)	落差 (m)				水位 (m)	地盤高 と水位 との差 (m)	
1	0.12	0.12	0.12	0.12	36.55	36.55	6.0	0.001	0.151	0.018	0.000	0.000	0.019	8.00	25	1.08	0.063	40.362	40.070	41.82 (42.11)	1.18 (1.77)	1.02	0.04	40.36 40.32	1.46 1.79	---	17083D03700	4へ流出
2	0.12	0.24	0.12	0.24	38.60	75.15	6.0	0.001	0.151	0.036	0.000	0.000	0.037	8.00	25	1.08	0.063	40.065	39.746	42.11 (42.01)	1.78 (1.89)	3.88	0.15	40.15 40.00	1.96 2.01	---	17083D03800	
3	0.08	0.08	0.08	0.08	33.06	33.06	6.0	0.000	0.151	0.014	0.000	0.000	0.014	8.00	25	1.08	0.063	40.202	39.338	41.60 (42.01)	1.12 (1.80)	0.55	0.02	40.21 39.98	1.39 2.03	---	17084D02300	2から流入
4	0.01	0.34	0.01	0.34	6.60	81.75	7.0	0.002	0.148	0.060	0.000	0.000	0.062	8.00	25	1.08	0.063	39.730	39.677	42.01 (41.84)	2.01 (1.89)	7.65	0.06	39.93	1.81	---	17084D02400	7へ流出
5	0.06	0.06	0.06	0.06	20.00	20.00	6.0	0.000	0.151	0.008	0.000	0.000	0.008	8.00	25	1.08	0.063	40.408	40.248	41.85 (41.90)	1.17 (1.28)	0.23	0.00	40.50 40.50	1.35 1.40	---	17084D02100	
6	0.07	0.13	0.07	0.13	22.60	42.60	6.0	0.001	0.151	0.020	0.000	0.000	0.021	8.00	25	1.08	0.063	40.225	40.044	41.90 (41.84)	1.40 (1.52)	1.25	0.03	40.23 40.23	1.58 1.55	---	17084D02200	
7	0.08	0.56	0.08	0.56	30.50	112.25	7.0	0.003	0.148	0.083	0.000	0.000	0.086	5.50	35	1.12	0.108	39.580	39.412	41.84 (41.48)	1.88 (1.69)	3.48	0.11	39.75 39.72	1.87 1.76	---	17084D02500	4から流入
8	0.11	0.67	0.11	0.67	31.50	143.75	7.0	0.003	0.148	0.089	0.000	0.000	0.102	5.50	35	1.12	0.108	39.390	39.217	41.48 (41.18)	1.71 (1.58)	4.89	0.15	39.67	1.61	---	17084D02600	11へ流出
9	0.07	0.07	0.07	0.07	22.10	22.10	6.0	0.000	0.151	0.011	0.000	0.000	0.011	8.00	25	1.08	0.063	40.003	39.826	41.44 (41.45)	1.15 (1.25)	0.34	0.01	40.08 40.08	1.36 1.27	---	17084D02700	
10	0.07	0.14	0.07	0.14	27.80	49.90	6.0	0.001	0.151	0.021	0.000	0.000	0.022	8.00	25	1.08	0.063	39.804	39.582	41.45 (41.18)	1.37 (1.32)	1.37	0.04	39.87 39.83	1.58 1.25	---	17084D02800	
11	0.15	0.96	0.15	0.96	47.70	191.45	8.0	0.004	0.145	0.139	0.000	0.000	0.143	5.00	40	1.17	0.147	39.168	38.929	41.18 (40.92)	1.58 (1.55)	4.72	0.23	39.85 39.23	1.63 1.59	---	17084D02900	8から流入
12	0.20	1.16	0.20	1.16	22.20	213.65	8.0	0.005	0.145	0.168	0.000	0.000	0.173	5.00	45	1.27	0.202	38.880	38.759	40.92 (40.58)	1.55 (1.32)	3.69	0.08	39.29 38.65	1.63 1.93	---	17084D03000	
13	0.14	1.30	0.14	1.30	32.25	245.90	9.0	0.006	0.142	0.185	0.000	0.000	0.191	5.00	45	1.27	0.202	38.213	38.062	40.58 (40.15)	1.88 (1.61)	4.48	0.14	38.50	1.65	---	17084D03100	



# (5) Search by Parameter Function

The screenshot displays the SUPERA Viewer software interface. The title bar reads "SUPERA Viewer - [原図]". The menu bar includes "検索 (S)", "印刷 (P)", "表示 (V)", "ツール (T)", "機能 (F)", "ウインドウ (W)", and "ヘルプ (H)". The toolbar contains various icons for navigation and analysis, with a red box highlighting the "管診断" (Pipe diagnosis), "安全" (Safety), "展開図" (Development view), and "条件検索" (Conditional search) icons. The main window shows a sewerage network map with numbered nodes and colored pipes. A scale bar at the top indicates 0m to 400m. The status bar at the bottom shows "現在の縮尺: 1 / 1910" and coordinates "E 140° 33' 35.93\" N 32° 51' 16.21\"".

Icon	Function Name	English Translation
	管診断	Pipe diagnosis
	安全	Safety
	展開図	Development view
	条件検索	Conditional search

# (5) Search by Parameter Function (Color-coding of pipeline diagnosis result)

For the case the search area is an arbitrarily specified shape

条件	件数
1 合流核線 合流圧送管	5
2 合流核線 合流圧送管	2
3 合流核線 合流圧送管	4
4 合流核線 合流圧送管	2

通し番号	上流入孔番号	下流入孔番号	枝番	所在地:区	最新工事:完了年月...	管基礎種類	管種:材質	管種:断面	管径:高さ	管径:幅	上流:土被り	下流:土被り	上流:管底高	下流:管底高	勾配(%)
1	251442830	251442031	00	渋谷区	昭和49年01月30日	砕石基礎	陶管	円形管	25cm	0cm	126cm	113cm	12576mm	12453mm	10.00
2	251432028	251442044	00	渋谷区	昭和39年03月02日	不明	陶管	円形管	25cm	0cm	122cm	120cm	11747mm	11450mm	8.00
3	251442030	251442830	00	渋谷区	昭和49年01月30日	砕石基礎	陶管	円形管	25cm	0cm	154cm	126cm	12840mm	12576mm	10.00

# (5) Search by Parameter Function

(Parameter search color-coded according to parameter specifications)

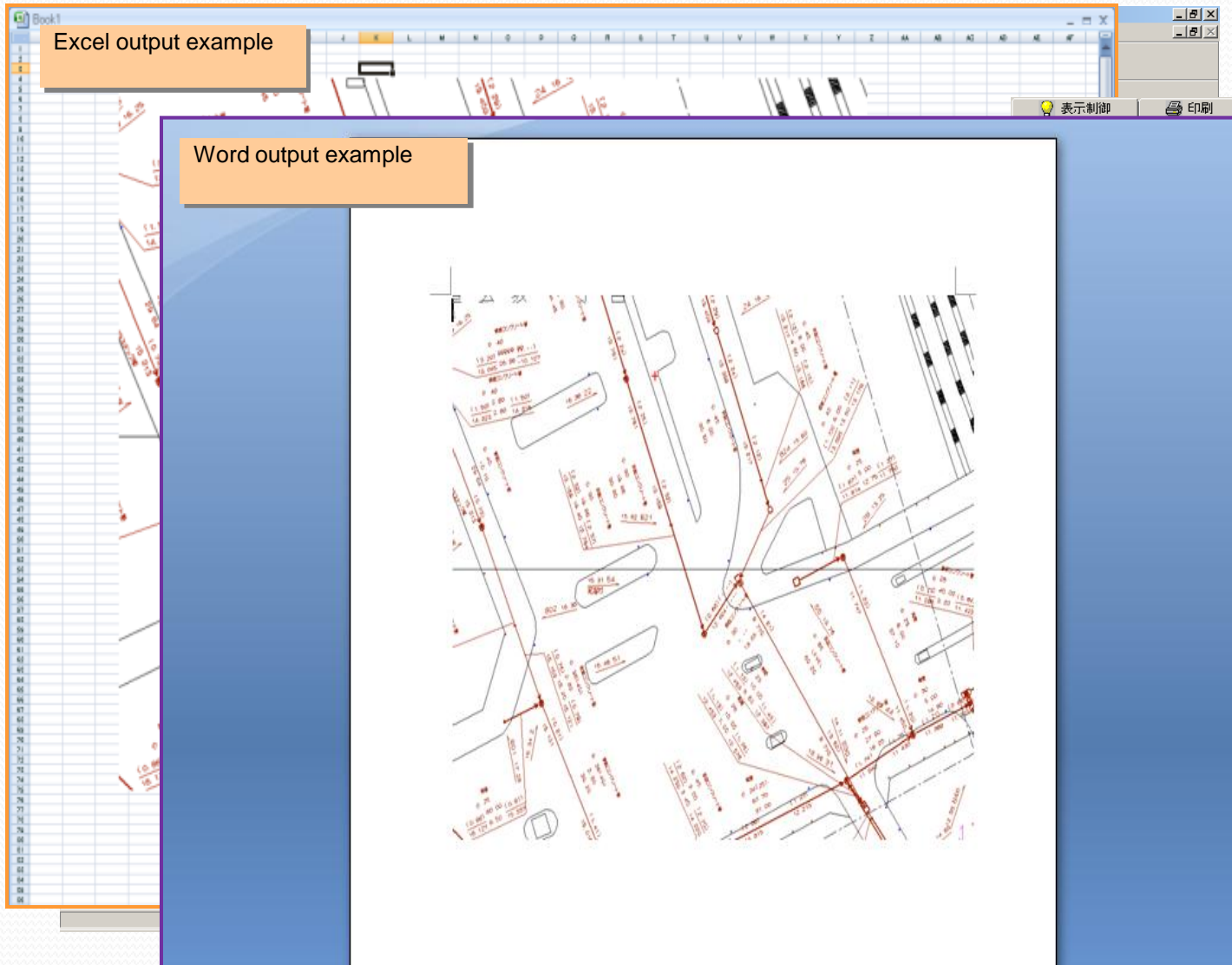
Record display range:  All range  Selected range  Pipe number display  Summary display  Enlarged display  EXCEL display  All items

工事件名簿	管路診断	完了図	内面展開図								
通し番号	上流入孔番号	下流入孔番号	核番	所在地:区	最新工事:完了年月...	管基礎種類	管種:材質	管種:断面	管径:高さ	管径:幅	
1	251422056	251422014	00	渋谷区	平成01年08月24日	不明	鉄筋コンクリート管	円形管	30cm	0cm	1
2	251422013	251422014	00	渋谷区	昭和64年01月31日	不明	鉄筋コンクリート管	円形管	30cm	0cm	1
3	251421029	251421030	00	渋谷区	昭和62年07月20日	砂(A、B)基礎	鉄筋コンクリート管	円形管	45cm	0cm	1

現在の縮尺: 1 / 1910

E 140° 33' 37.53" N 32° 51' 28.90"

# (6) Copy to Clip-Board Function



# (7) Print and Output Function

(Print drawing or create PDF file function)

The image shows a screenshot of the SUPERA Viewer software interface. The main window displays a technical drawing titled "東京都公共下水道台帳施設平面図" (Tokyo Metropolitan Government Public Sewerage Account Facility Plan View). The drawing shows a network of sewerage lines and structures, with labels for "道玄坂一丁目" (Dogenzaka 1-chome) and "渋谷区" (Shibuya Ward). A scale bar indicates a scale of 1/500, and the drawing date is December 15, 2020. A printer icon is visible at the bottom of the drawing area.

Overlaid on the right side of the software window is a print settings dialog box. The dialog box contains the following information and options:

- Buttons: 属性確認 (Property Confirmation), コピー (Copy), 計測 (Measurement), 表示制御 (Display Control), 印刷 (Print).
- Printer Name: RICOH IPSIO SP C811 R
- Paper Size: A3 (297 x 420 mm)
- Layout Name: A3横/施設平面図
- Scale Setting:  なし (None),  あり (Yes). Value: 500. Button: 縮尺値追加 (Add Scale Value).
- Print Layer: 表示レイヤを反映 (Reflect Display Layer). Button: 変更 (Change).
- Black and White Printing:  白黒 (Black and White),  グレースケール (Grayscale).
- Print Range:  表示エリア (Display Area),  矩形設定 (Rectangular Setting),  ポリゴン設定 (Polygon Setting),  図面選択 (Drawing Selection),  25図面選択 (Select 25 Drawings).
- Note: 現在の表示エリアを基準に印刷します。 (Print based on the current display area.)
- Buttons: PDF出力 (PDF Output), プレビュー (Preview), 印刷 (Print), プリンタ設定 (Printer Settings), 登録 (Registration), 削除 (Delete).

# (7) Print and Output Function

## (SXF data output screen function)

Graphic information (SXF)

```

<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<!DOCTYPE SxfMapExport SYSTEM "SXFV30.dtd" >
<SxfMapExport >
  <Figure >
    <!-- SXFV30.DT
    <!--*****
    <!-- SxfAttrib
    <!--*****
  </Figure >
  <!--*****
  <!-- ELEMENT SxfA
  <!-- ATTLIST SxfA
  <!-- ATTLIST SxfA
  <!-- ATTLIST SxfA
  <!-- ATTLIST SxfA
  <!--*****
  <!-- Figure --
  <!--*****
  <!-- ELEMENT Figu
  <!-- ATTLIST Figu
  <!-- ATTLIST Figu
  <!--*****
  <!-- Attribute
  <!--*****
  <!-- ELEMENT Attr
  <!-- ATTLIST Attr
  <!-- ATTLIST Attr
  <!-- ATTLIST Attr
  <!--*****
  <!-- AttrGroup
  <!--*****
  <!--*****
  <!-- ELEMENT AttrGroup (AttrGroup|Attr)+
  <!-- ATTLIST AttrGroup name CDATA #IMPLIED>

```

0.731 1823 2992

# (8) Other: Example of Pipeline Diagnosis Result

SUPERA Viewer - [原因]

検索(Z) 印刷(Y) 表示(O) ツール(W) 機能(V) ウィンドウ(U) ヘルプ(T)

終了 検索 再読み込み 全体図 固定倍率ズームイン ズームイン ズームアウト 2点拡大 2点縮小 拡大図 図面番号表示 図面番号消去 SXF出力

初期表示 汚水・合流表示 雨水表示 地形レイヤ マ人孔 樹取付管 合流汚水 雨水 光ケーブル オフセット 道路管理 住ゼンリン1 住ゼンリン2 タブ 条件検索 上下流追跡 横断面図 接続箱検索 流量計算

属性確認 表示制御 印刷 コピー 計測 条件検索 属性確認

検索 | 主題図

現在の条件を保存 | 保存条件を削除

条件

条件追加 条件修正 条件削除

全条件削除

条件	件数
1 合流枝線 合流圧送管	28
2 合流枝線 合流圧送管	43
3 合流枝線 合流圧送管	52
4 合流枝線 合流圧送管	18

検索実行

エリア跨りかを かつし強調表示する

結果一覧表示 表示変更

幾何条件の表示 表示変更

エリア変更

表示領域内

単一削除 全削除

レコード表示範囲  
 全ての範囲  選択した範囲 通し番号表示 詳細表示 拡大図表示 EXCEL表示 全体

工事件名簿 管路診断 完了図 内面展開図

通し番号	上流人孔番号	下流人孔番号	枝番	所在地:区	最新工事:完了年月...	管基礎種類	管種:材質	管種:断面	管径:高さ	管径:幅	上流:土被り	下流:土被り	上流:管底高	下流:管底高
1	181124026	181124029	00	中野区	昭和39年12月26日	基礎なし	陶管	円形管	25cm	0cm	108cm	125cm	28160mm	27810mm
2	181124018	181124026	02	中野区	昭和39年12月26日	不明	陶管	円形管	25cm	0cm	106cm	106cm	28530mm	28180mm
3	181124036	181124037	00	中野区	昭和37年07月14日	基礎なし	陶管	円形管	30cm	0cm	143cm	152cm	29069mm	28446mm
4														

現在の縮尺: 1 / 2930

E 140° 32' 19.18" N 32° 54' 9.58"

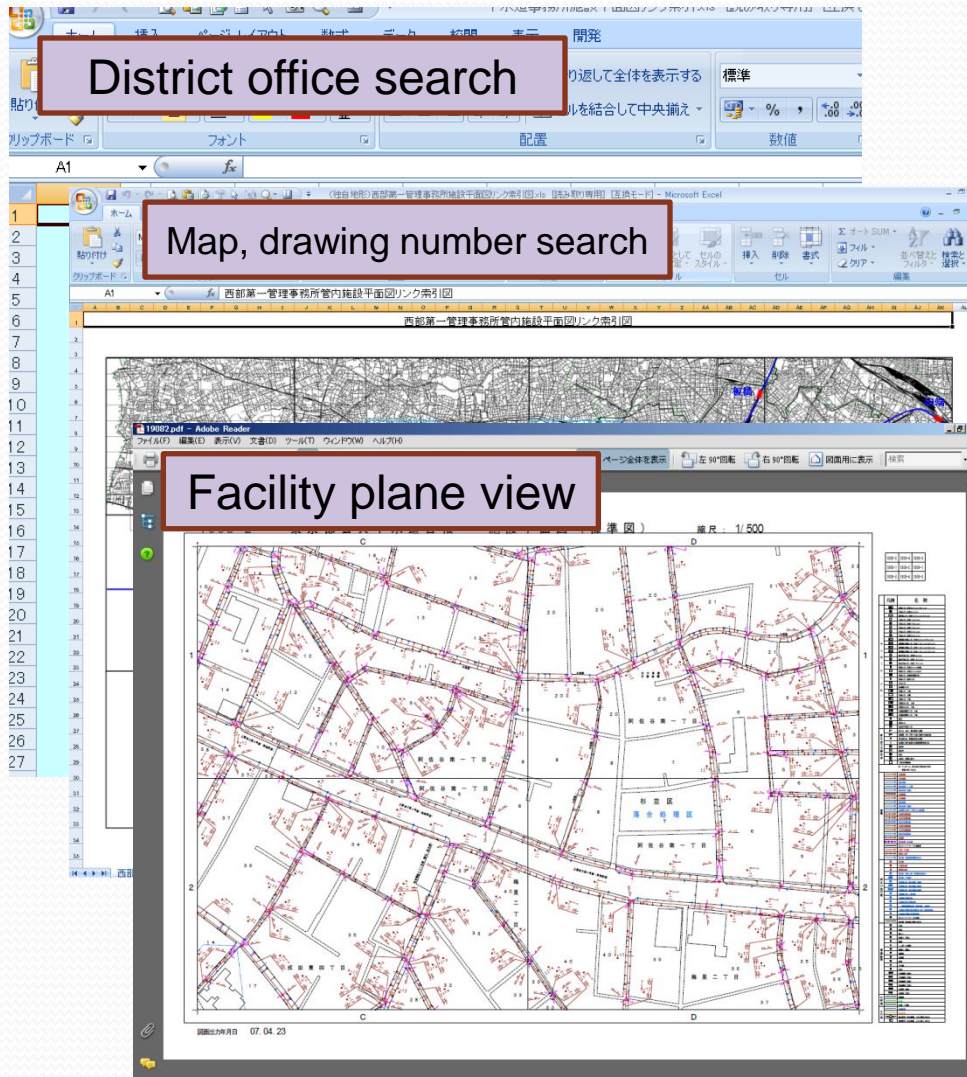
# Sewage Register Information System Earthquake Provisions

## DVD Sewerage Register for Earthquakes

**District office search**

**Map, drawing number search**

**Facility plane view**



The screenshot shows a multi-windowed application. The top window is a search interface with a text input field and a search button. The middle window displays a map of a city area with a red dot indicating a search location. The bottom window shows a detailed technical drawing of a sewerage facility, including pipes, manholes, and structures, with a scale of 1/500.

**Address search**

SEMIS震災対策用下水道管理図  
住所検索PDF表示システム

縮尺 1/500

区名 杉並区

町名 阿佐谷北

丁目 2

番地 丁目を選択  
1  
2

**Facility plane view**

1802-1 東京都公共下水道台帳 施設平面図 (標準図) 縮尺: 1/500



The screenshot shows the address search interface with dropdown menus for scale, district, town, and block. Below the search fields is a list of addresses. The bottom window shows a detailed technical drawing of a sewerage facility, including pipes, manholes, and structures, with a scale of 1/500.



# Thank you for your attention



Sewer Maintenance Section  
Facilities Management and Maintenance Division  
Bureau of Sewerage, Tokyo Metropolitan Government