Preliminary inspection about the profit of 3D data in public works

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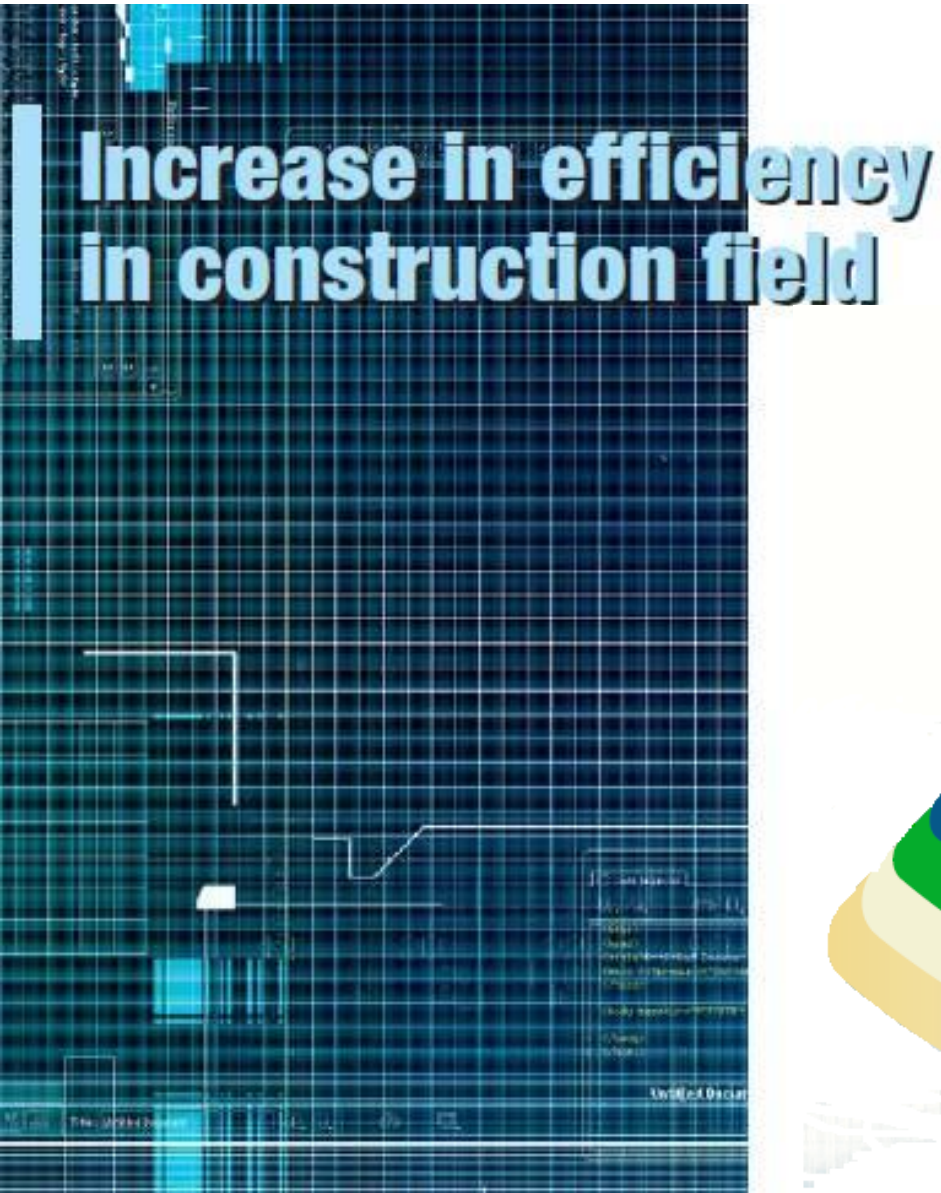
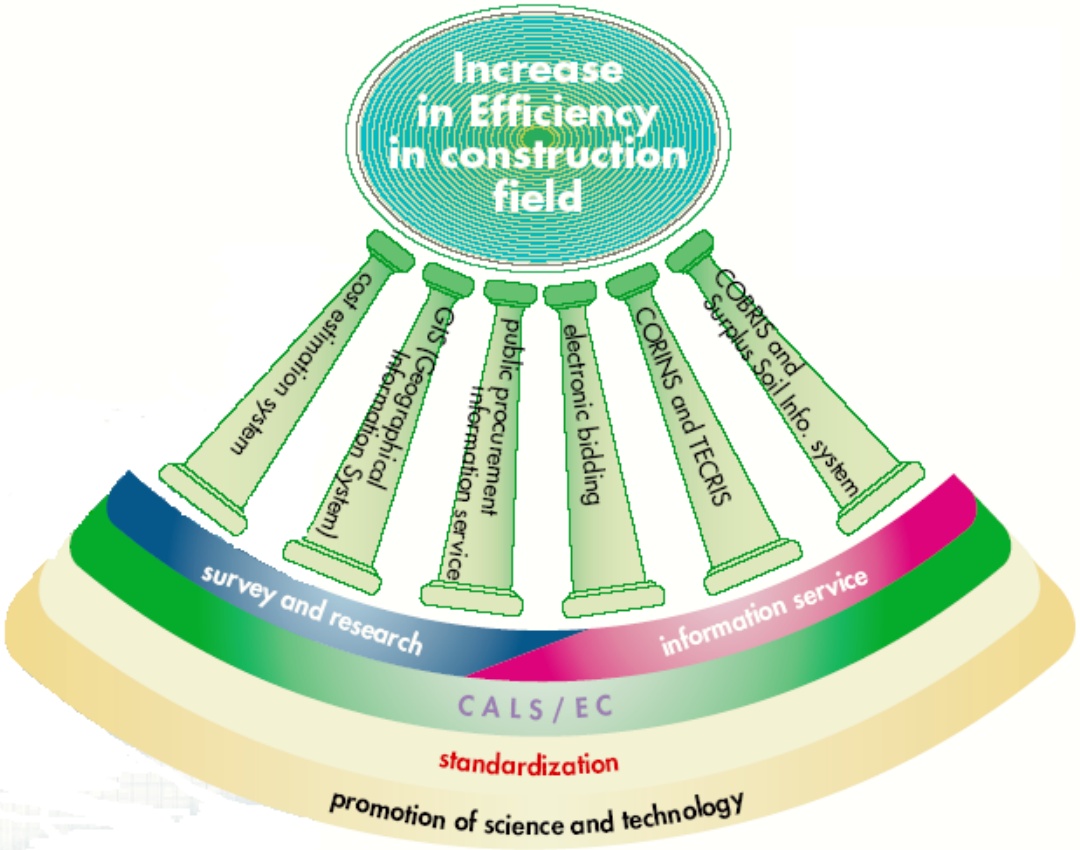
Paper id: 01

Objective of JACIC

JACIC has been engaged in computerization of the construction field.



Promotion of arts, sciences and technology.
Standardization
Environmental preservation by utilization of resources.
Improvement in information security.
Stable provision of information.
Research and development of information systems
Education and dissemination of computerizations.



Major Services of JACIC

I. Computerization in Construction Field - CALS/EC –
   1. Standardization of information to support CALS/EC
   2. CALS/EC Promotion and support

II. Information Service System and Database
   1. CORINS and TECRIS
   2. Cost estimation system
   3. Construction By-products Resource / Surplus Construction Soil Information Exchange System
   4. Electronic Bidding Core System
   5. GIS
   6. TRABIS
   7. NETIS

III. International activity

IV. Promotion and Support of the arts and sciences

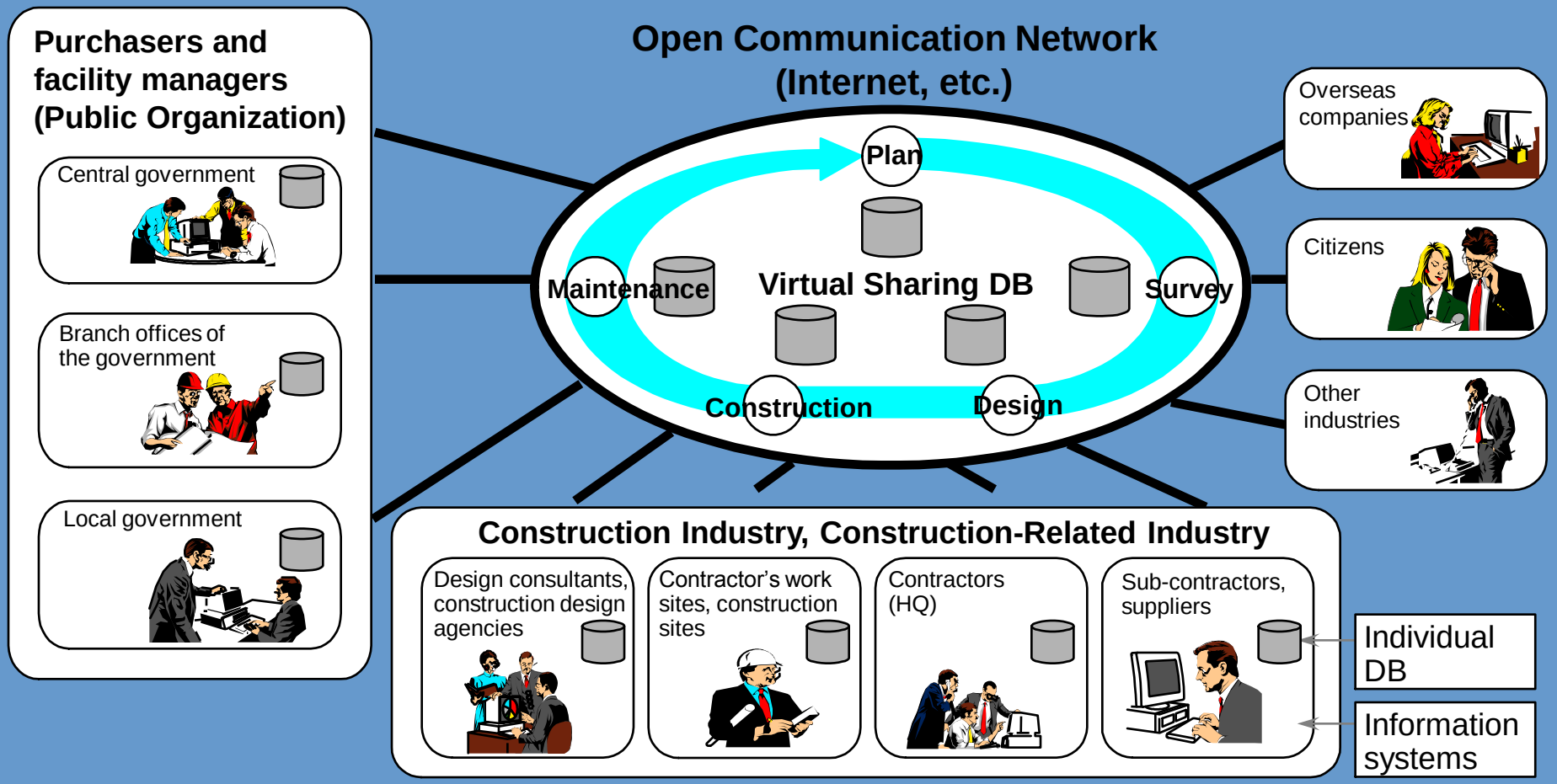
V. Public Relations

Agenda

- Content 1 :
  - Vision of MLIT CALS/EC
  - The present situation in public works
- Content 2 :
  - Outline of the public works used in study
  - Creation of 3D models and execution
- Content 3 :
  - Remarks and problems

Vision of MLIT CALS/EC

CALS/EC is to apply IT for exchanging and sharing necessary information among related bodies for improving processes of public works projects.

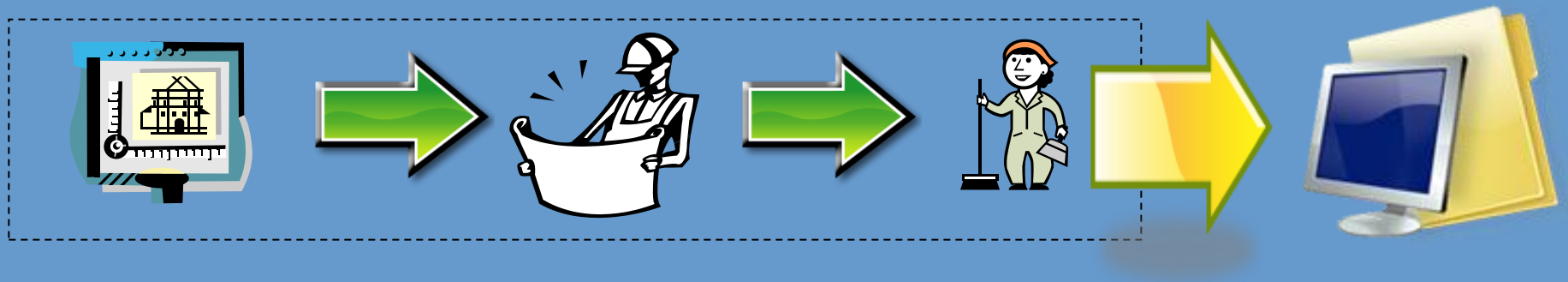


CALS/EC Action program

	Phase1	Phase2	Phase3	
	FY 1996～1998	FY 1999～2001	FY 2002～2004	By FY 2010
Road and River facilities	· Preparing PC environment for all staff to make use of the internet · Start verification test	· Trial introduction of e-procurement system in selected projects · Start of e-delivery of results	· Implementation of CALS/EC for all public works projects administrated by MLIT	Implementation of CALS/EC in all public purchasers including local government agencies
Port facilities	· Preparing a Port CALS environment · Start model project	· Construction of integrated database system · Establishment of framework for installing the e-procurement system		
Airport facilities	· Settling Airport CALS environment · Start model project	· Construction of integrated database system	· Application of Airport Facilities CALS in public works projects administrated by MLIT	

Public works in Japan

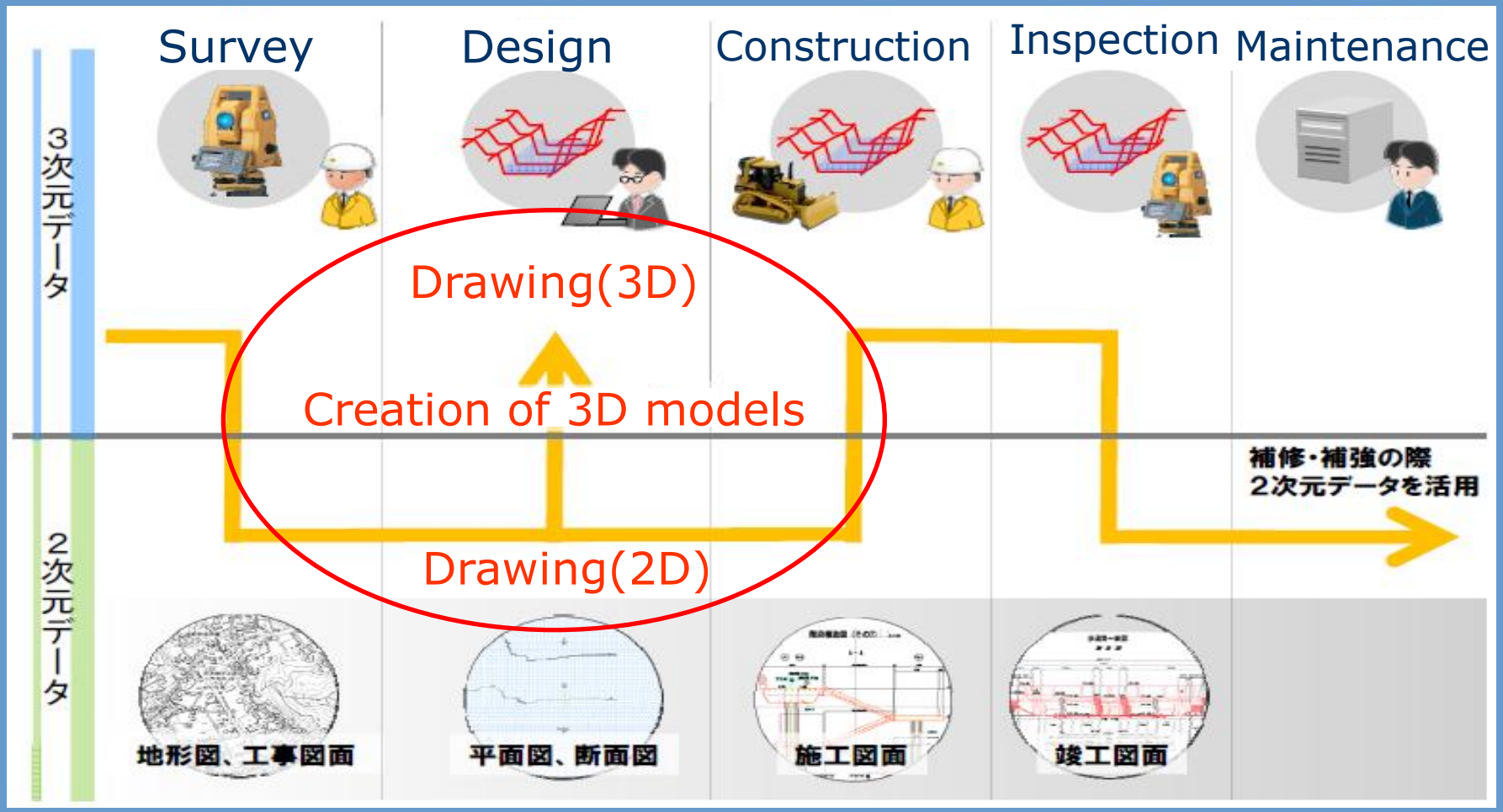
- Design and construction are executed as independent works by separate contractor.
- Contractor firm is selected through competitive tendering.
- Documents and drawings are required to be delivered in digital forms (e-Delivery).
- e-Delivery CAD data format (SXF※) is determined and maintained in the Construction Information Standard Committee (CISC) as software independent standard format.



※SXF(SCADEC data eXchange Format) is CAD software independent standard format.
SCADEC : Standard for CAD data Exchange Consortium

The present situation

Data format between different phases and different sectors



Reference :Prof. KOBAYASHI ICHIRO, Kumamoto Uni. Add PS. (Red)

Inspection purpose

To carry out pilots projects adopting information integrated construction from 2009

In prior to execution of pilots project

- Prove effectiveness
- Establish technology
- Process for quality control
- Finished work quality inspection
- Schedule control
- Safety management
- Environment management

Outline of the public works used in the study

Panorama

Specification of the works

- length of the bridge :L=379.200m
- carriageway width :7.25m~7.00m
- Horizontal alignment :straight~R1,000m
- Superstructure type :4 span continuous non-compose steel girder
- Substructure type :reversed T type abutment, wall type pier

Sub-processes for benefit estimation

Sub-processes for benefit estimation

Sub-processes in design stage		Scenes
Approximate design	Confirmation of design conditions	Scene 1
	Selection of alternative bridge types	Scene 2
	Examination of main factors	Scene 3
	Landscape analysis	Scene 4
Detailed design	Examination of detailed factors	Scene 5

Creation of 3D models and execution

Software and hardware

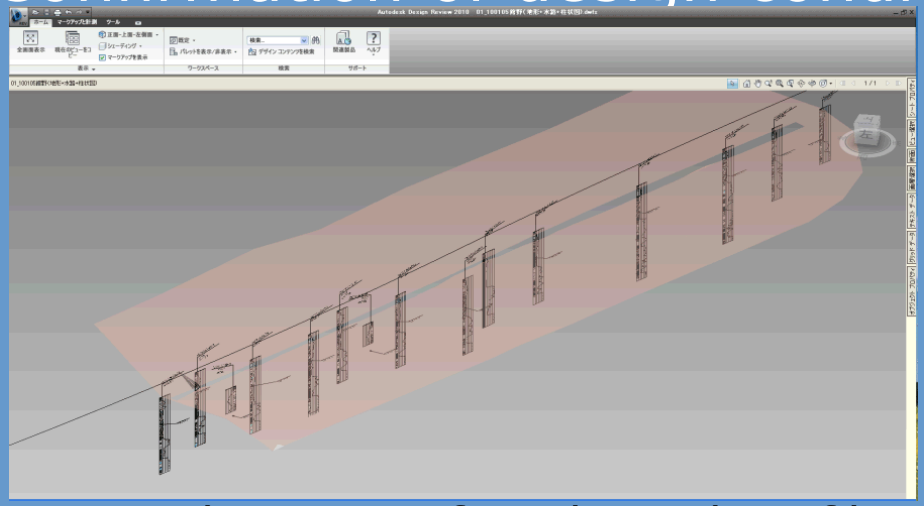
- Software: Autodesk Civil 3D 2009
- Computer: Dell optiplex755
- CPU: Intel(R) Core(TM)2 Duo CPU E6550 @ 2.33GHz
- Memory: 1.95GB RAM
- HDD: 150GB

Operator

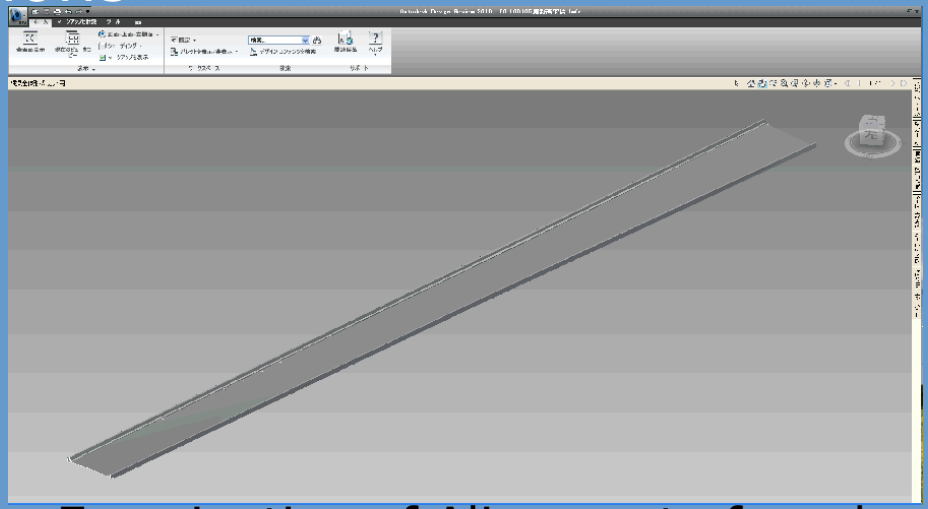
- 12 year experience on “AutoCAD”

Execution of the preliminary inspection (Approximate design :Scene 1)

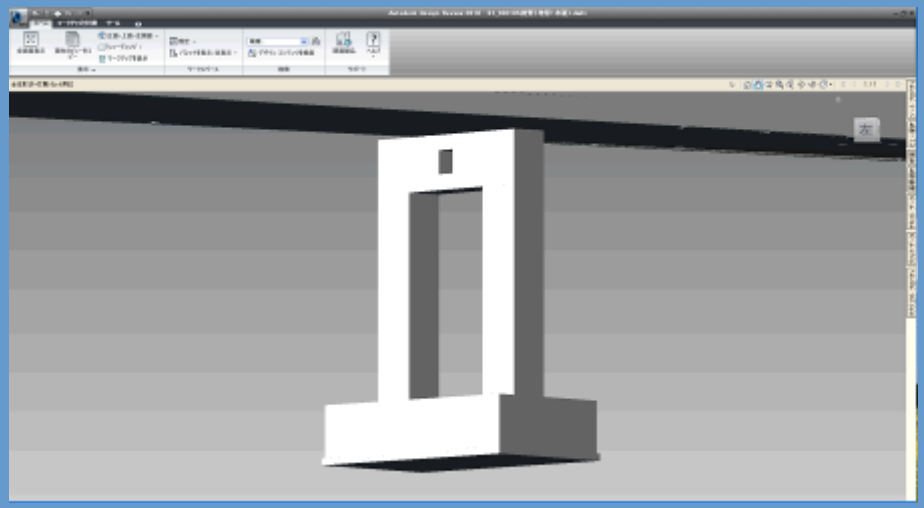
Confirmation of design conditions

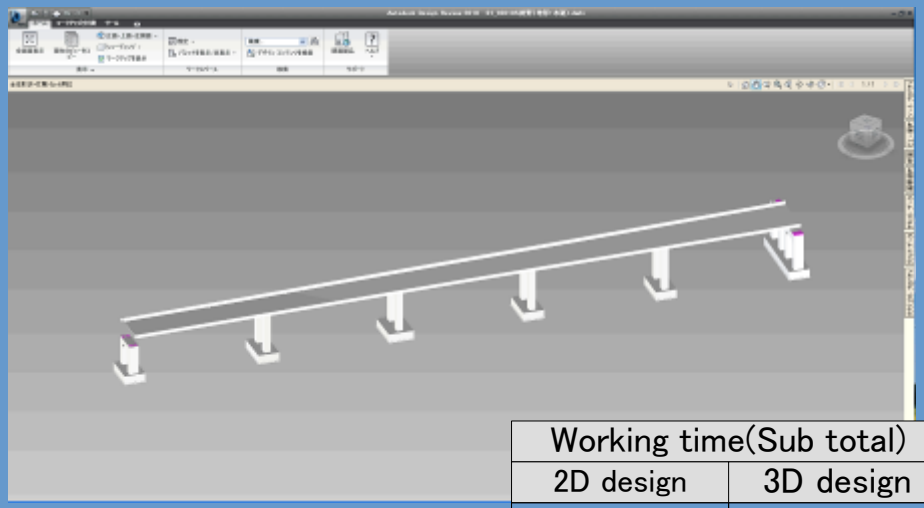


Vertical section of geological profile



Examination of Alignment of road



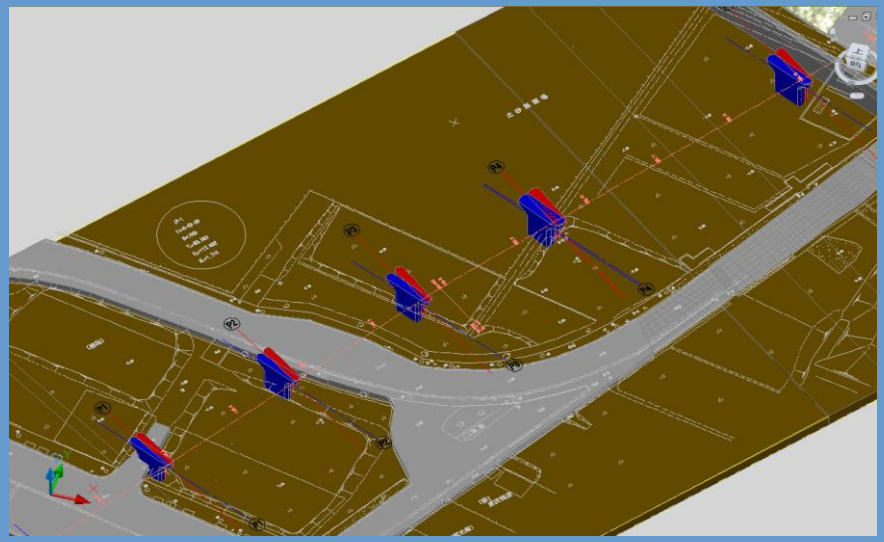


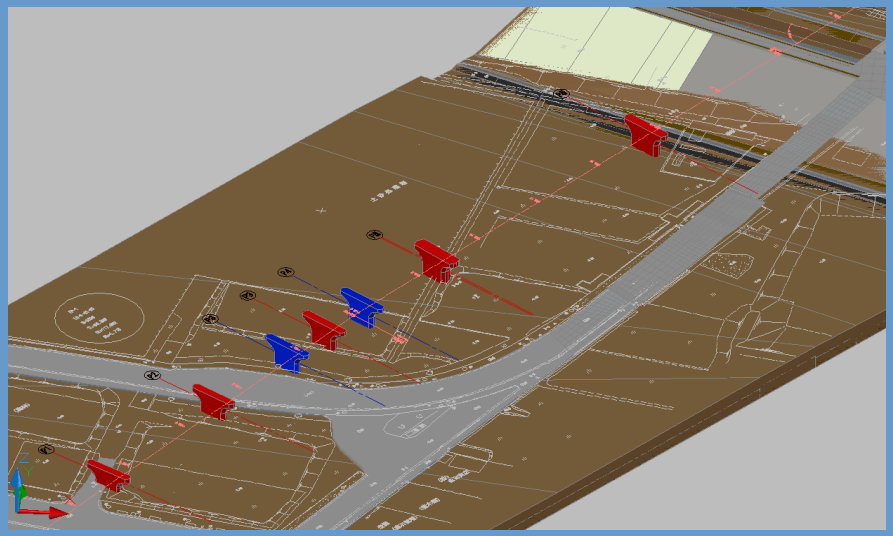
Examination of Abutment and Bridge pier

Working time(Sub total)	
2D design	3D design
5.0h	12.0h

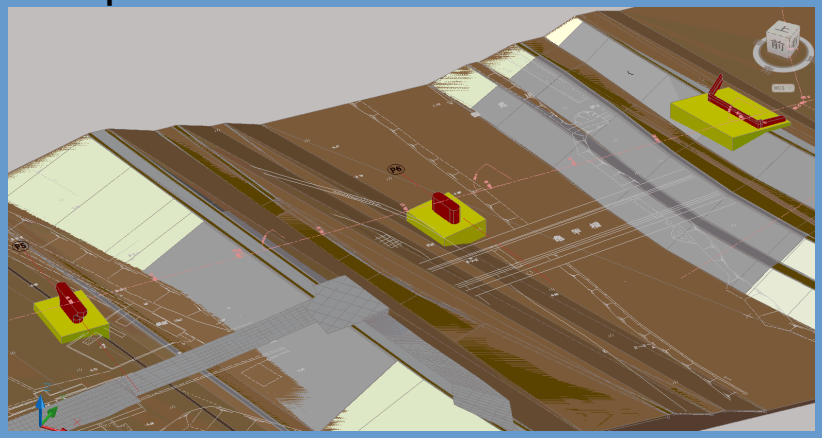
Execution of the preliminary inspection (Approximate design :Scene 2)

Selection of alternative bridge type





Decide on the position of Abutment and Bridge pier

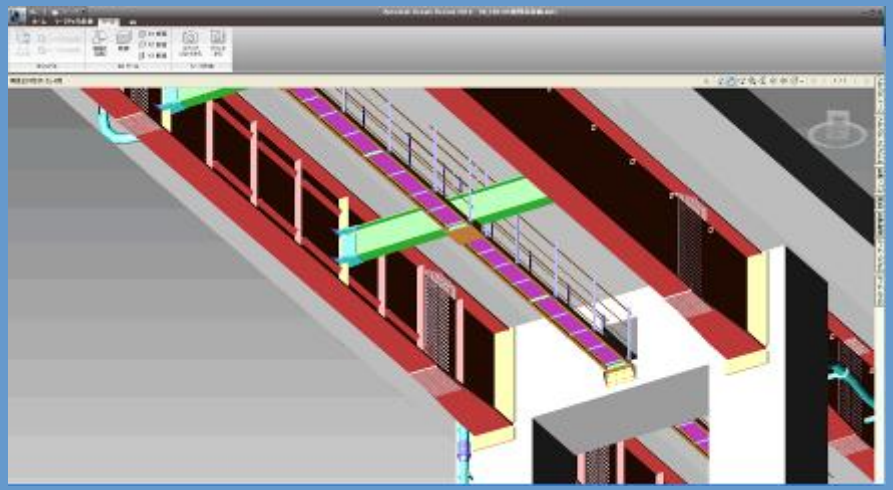


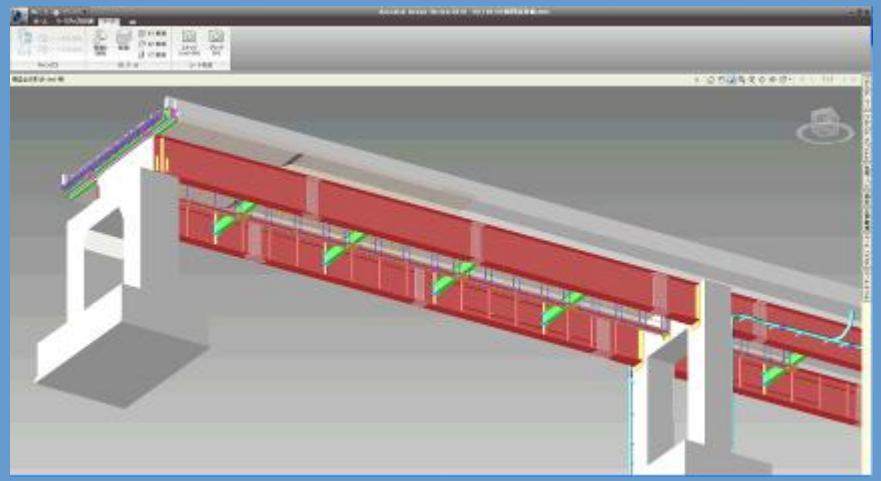
Examination of excavation line

Working time(Sub total)	
2D design	3D design
15.0h	6.0h

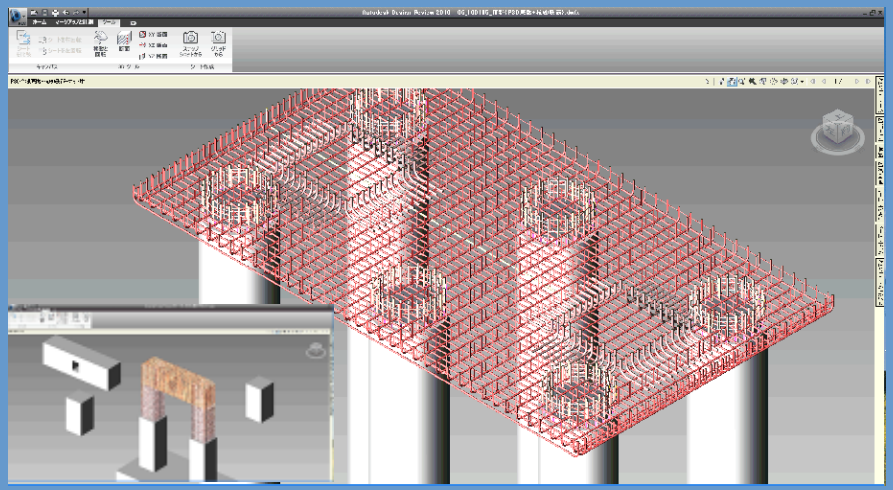
Execution of the preliminary inspection (Approximate design :Scene 3)

Examination of main factors

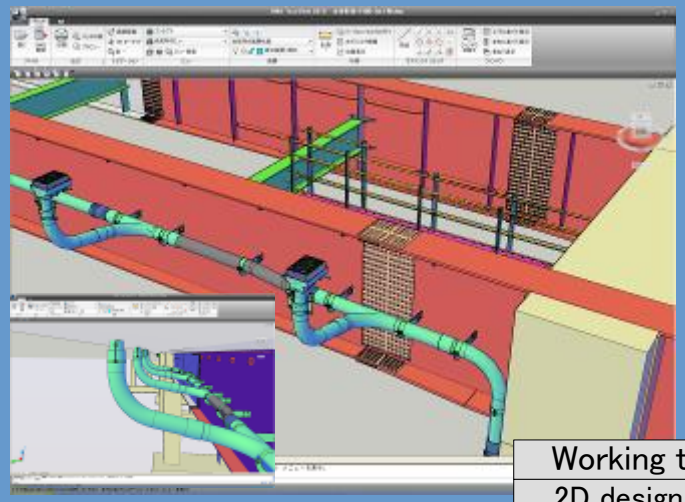




superstructure



substructure

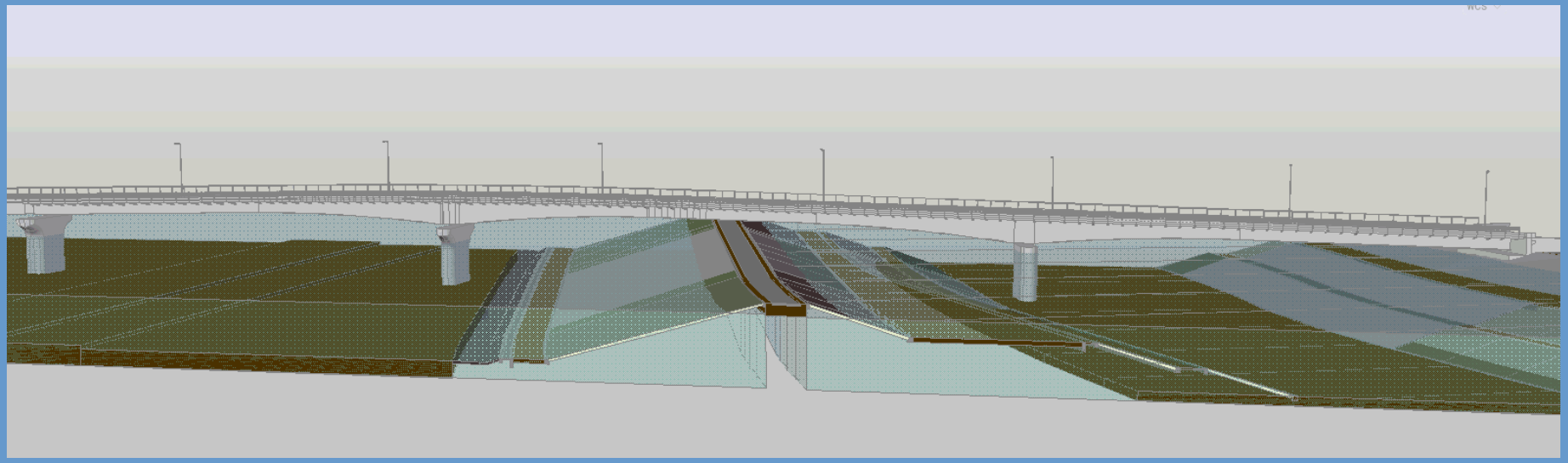


Ancillary facilities

Working time(Sub total)	
2D design	3D design
36.0h	46.0h

Execution of the preliminary inspection (Approximate design :Scene 4)

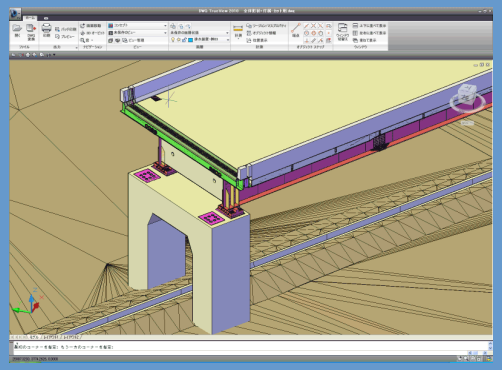
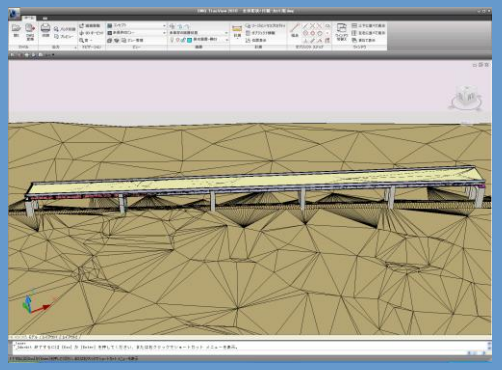
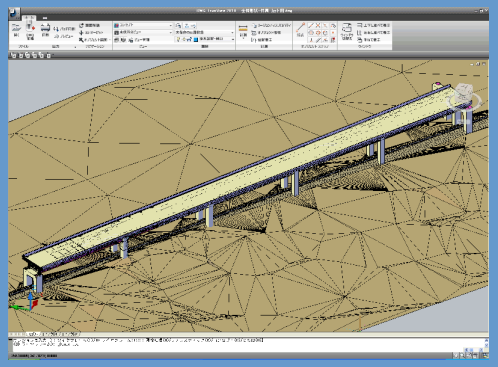
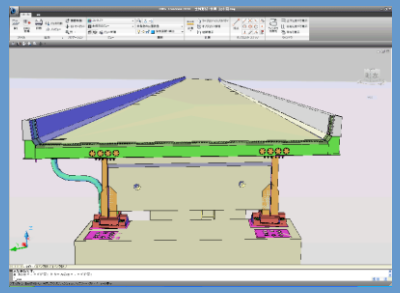
Landscape analysis

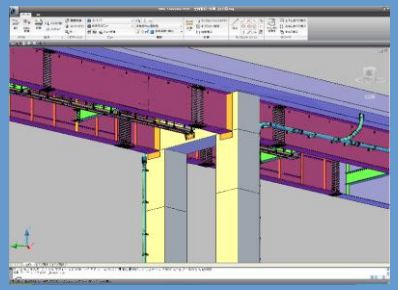
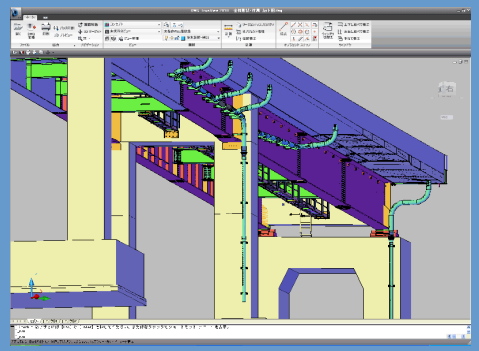
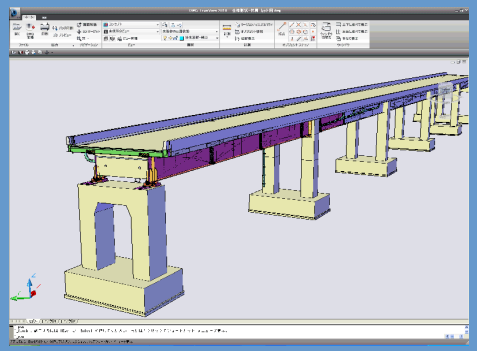
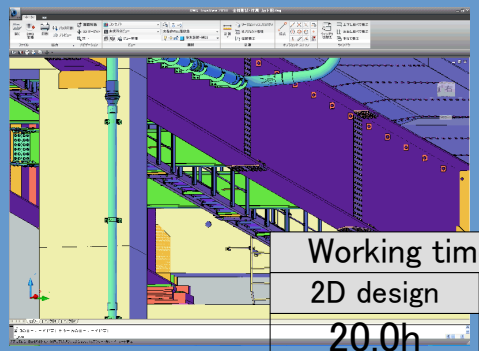


Working time(Sub total)	
2D design	3D design
32.0h	1.0h

Execution of the preliminary inspection (Examination of detailed factors :Scene 5)

Decide on the all works

Working time(Sub total)	
2D design	3D design
20.0h	13.0h

Remarks and problems

Remarks

- 2.4 times of 2D design is necessary for a 3D design in confirmation of design condition stage

However,

- 3D design is effective in other stage
- Examination accuracy is improved

Problems to be solved

- Numerical values of size or length are hidden and difficult to be recognized
- Quantity calculation is difficult
- Additional work is required which is not required in 2D drawings

Conclusion

The purpose of using 3D data

- Preventing mistakes (Data, View)
  - Visual presentation can help consensus making without misunderstanding.
- Laborsaving
  - Various conditions can be examined
  - Work efficiency is improved through unification and omission of sub-processes.
- Affinity, Availability
  - Easy to express 3D information. (GPS, 3D Laser Scanner, 3D-MC etc)

Thank you for your attention

財団法人
日本建設情報総合センター