

Site investigation

2007.Sep.11th

ILC CFS Asia Kick-off Meeting

Electric Power Development Co., Ltd.

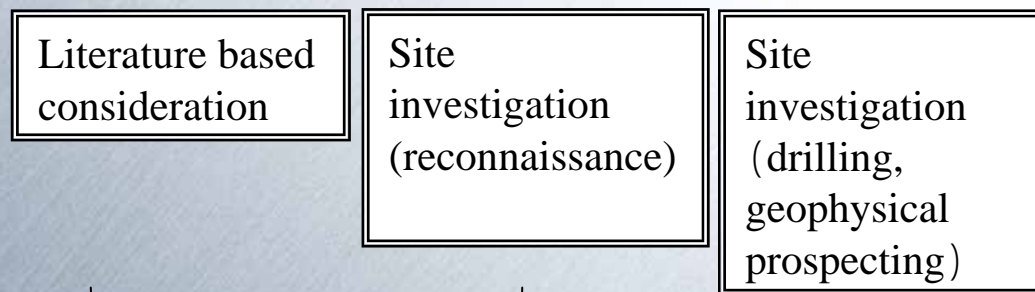
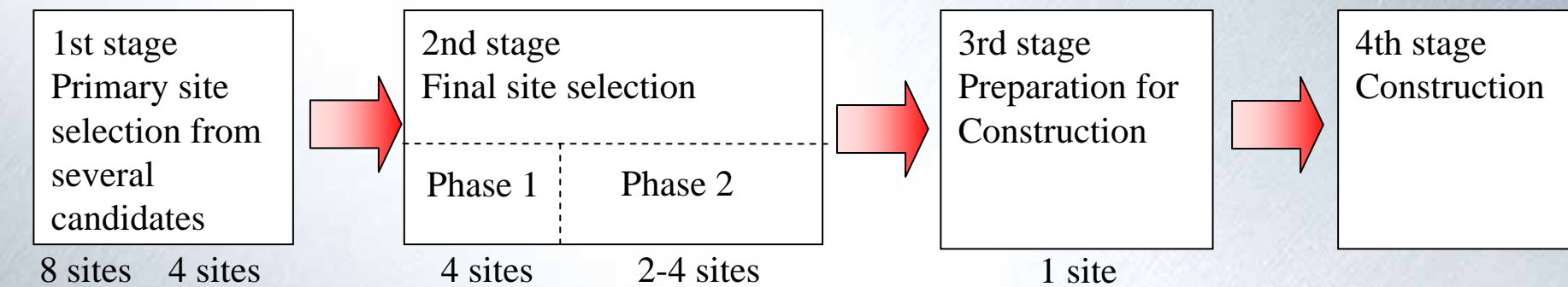
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1. Investigation flowchart to construction commencement



The stage which has already executed

2. Geological investigation

Geological investigations (phase 1) in 2nd stage

Object:

- Detailed selection of location of main tunnel line in candidate site
 - Understanding of geological issues
 - Reflection of their results to phase 2 investigation
-
- Literature survey
 - Site reconnaissance
(whole area, experimental hall area)

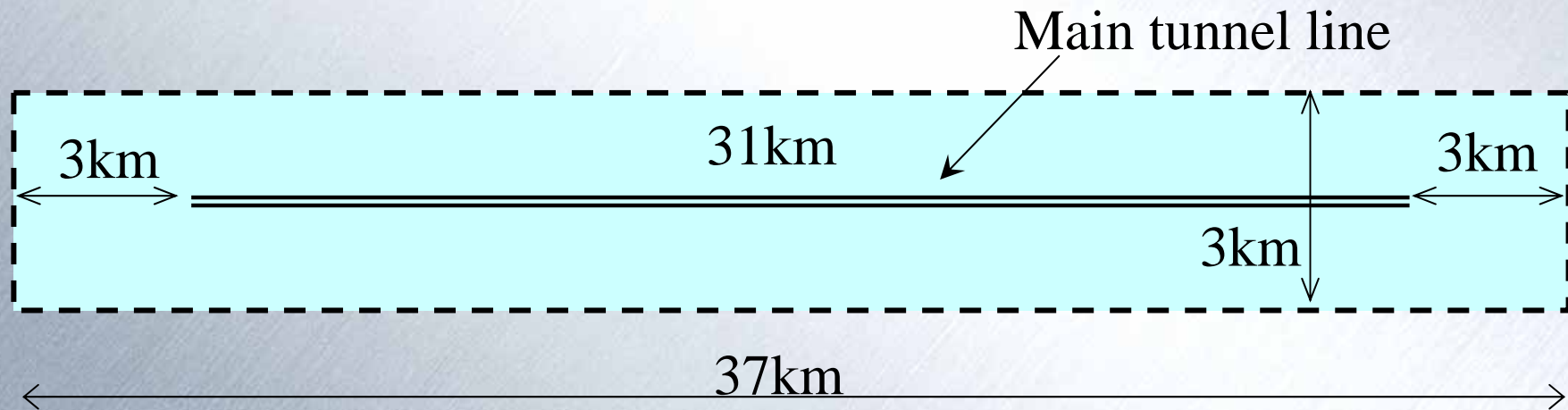
Geological investigations (phase 1) in 2nd stage

Literature survey (including aerial photographic interpretation)

Understanding of distribution of unconsolidated sediment , landslide area, (active) fault, mine , hot spring

Site reconnaissance (whole area)

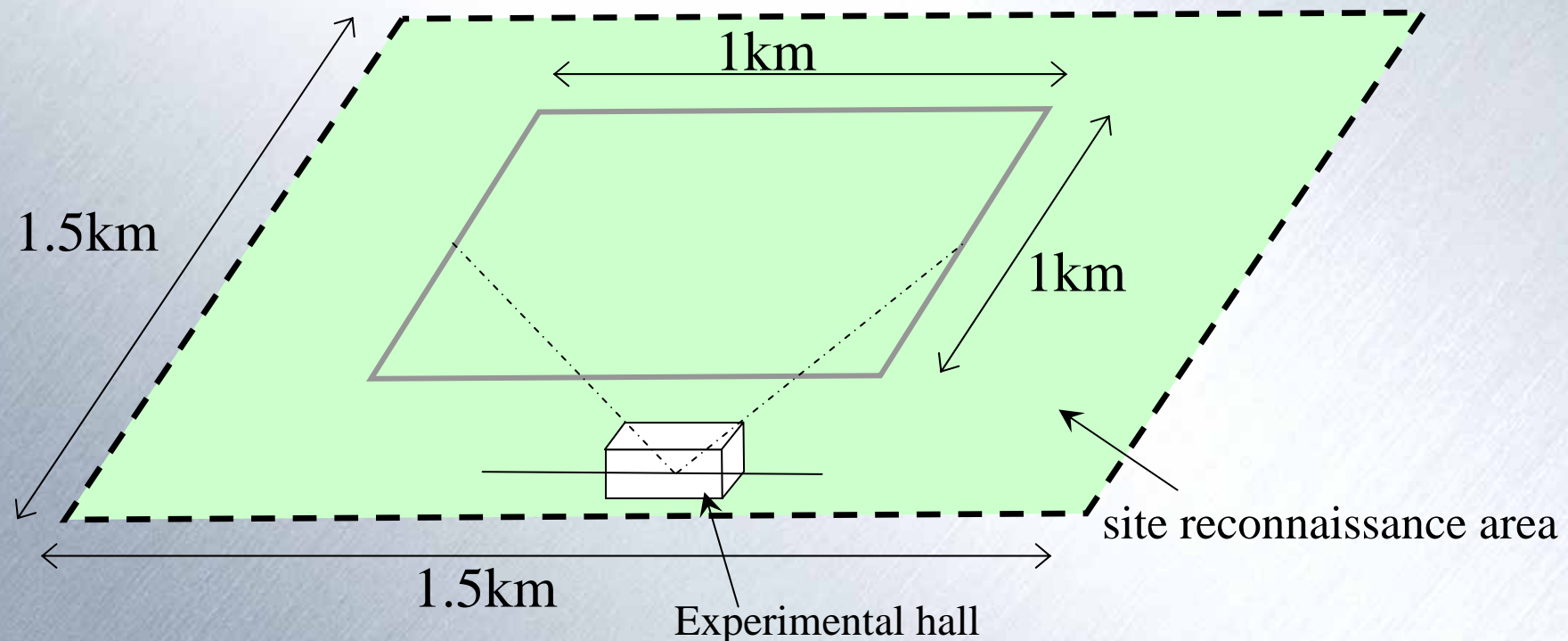
Addition to above, understanding of distribution of granitic rocks, weathering, alteration



Geological investigations (phase 1) in 2nd stage

Site reconnaissance (experimental hall area)

unconsolidated sediment, landslide, fault, rock mass characteristic



Geological investigations (phase 2) in 2nd stage

Object:

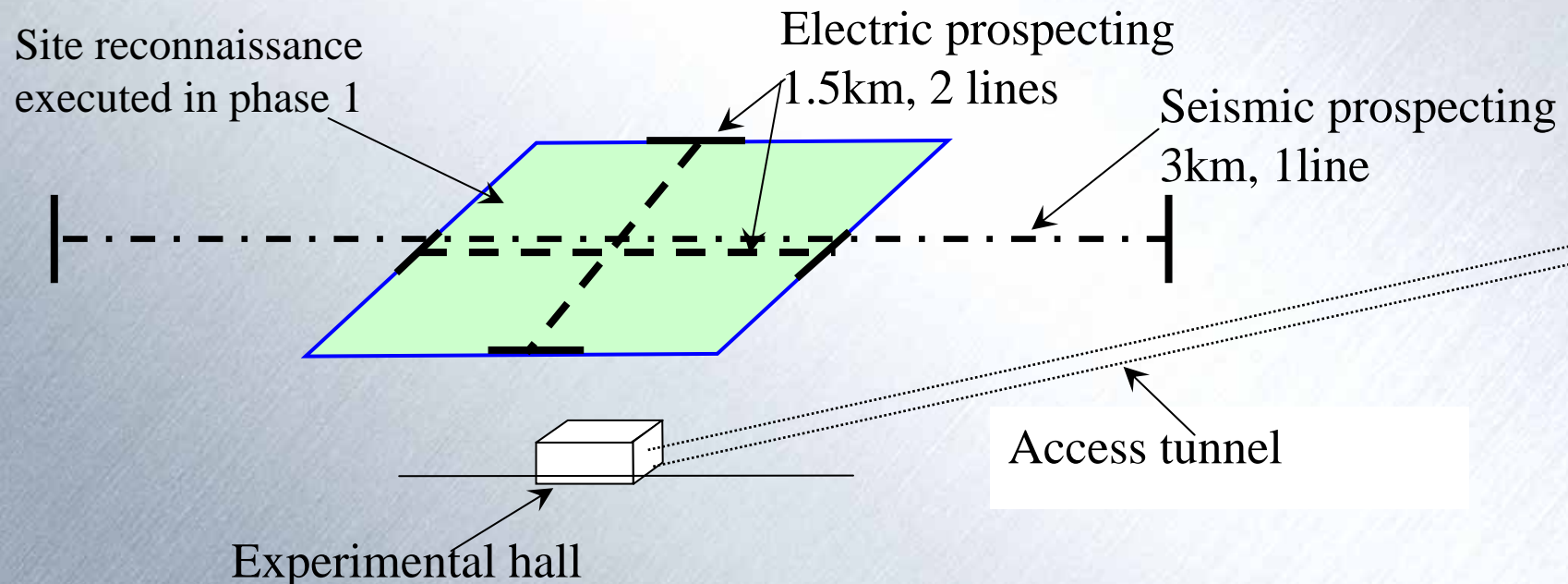
- Clarification of grasped geological issues in phase 1
- Understanding of the most important geological characteristics around the experimental hall

- Ground geophysical prospecting
 - seismic prospecting
 - electric prospecting
- Drilling survey
 - (core observation, borehole TV, permeability test, PS logging,
microtremor measurement, borehole jack test, hydrofracture test, core tests)

Geological investigations (phase 2) in 2nd stage

Geophysical prospecting

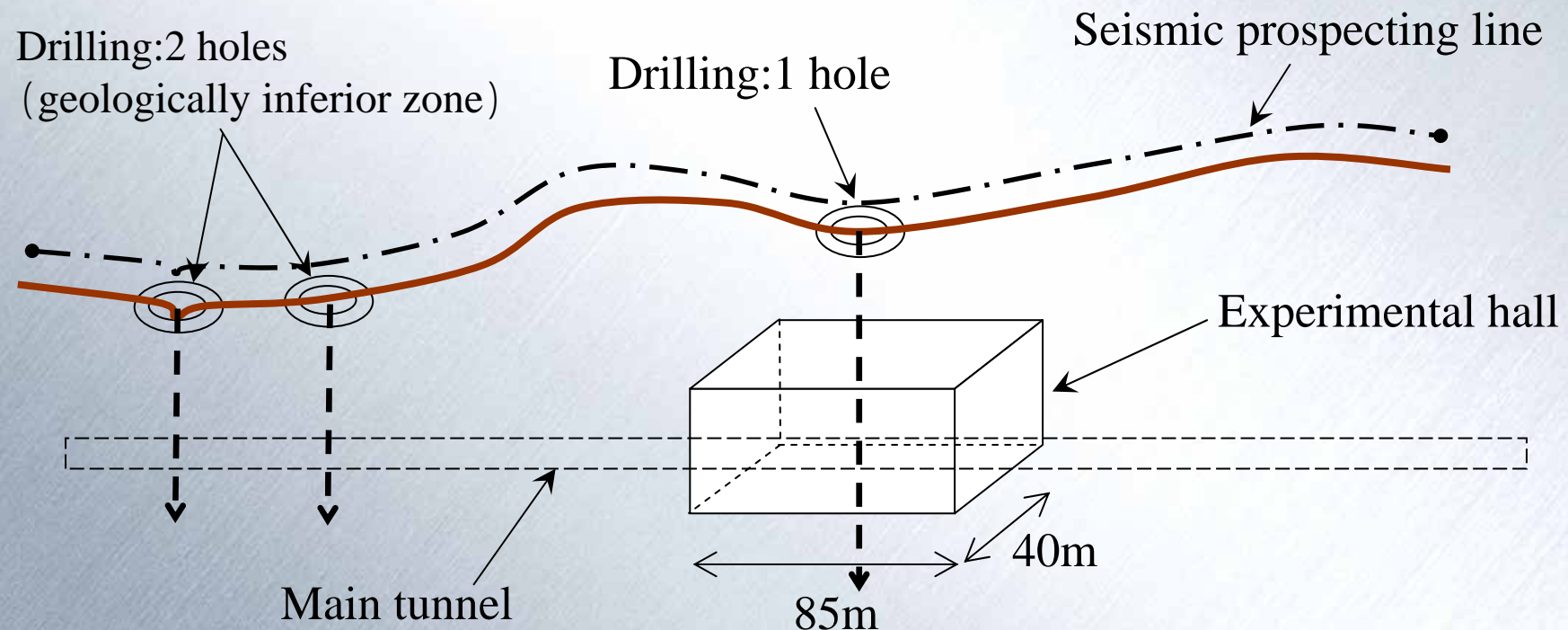
- seismic prospecting distribution of unconsolidated sediment, landslide, rock mass except granitic rock, fault, ore deposit, alteration
- electric prospecting addition to above, especially underlying rock mass except granite, ore deposit and alteration



Geological investigations (phase 2) in 2nd stage

Drilling survey

- Direct confirmation of distribution of rock mass except granite, fault, ore deposit, alteration
- Core tests
- Drill hole tests



Geological investigation in 3rd stage

Object : data collection for detailed design in a preparation stage for construction

- Geophysical prospecting

 - seismic prospecting

 - electric prospecting

- Drilling survey

 - (core observation, borehole TV, permeability test, PS logging)
(borehole jack test, hydrofracture test, core tests)

- Investigation in survey tunnel

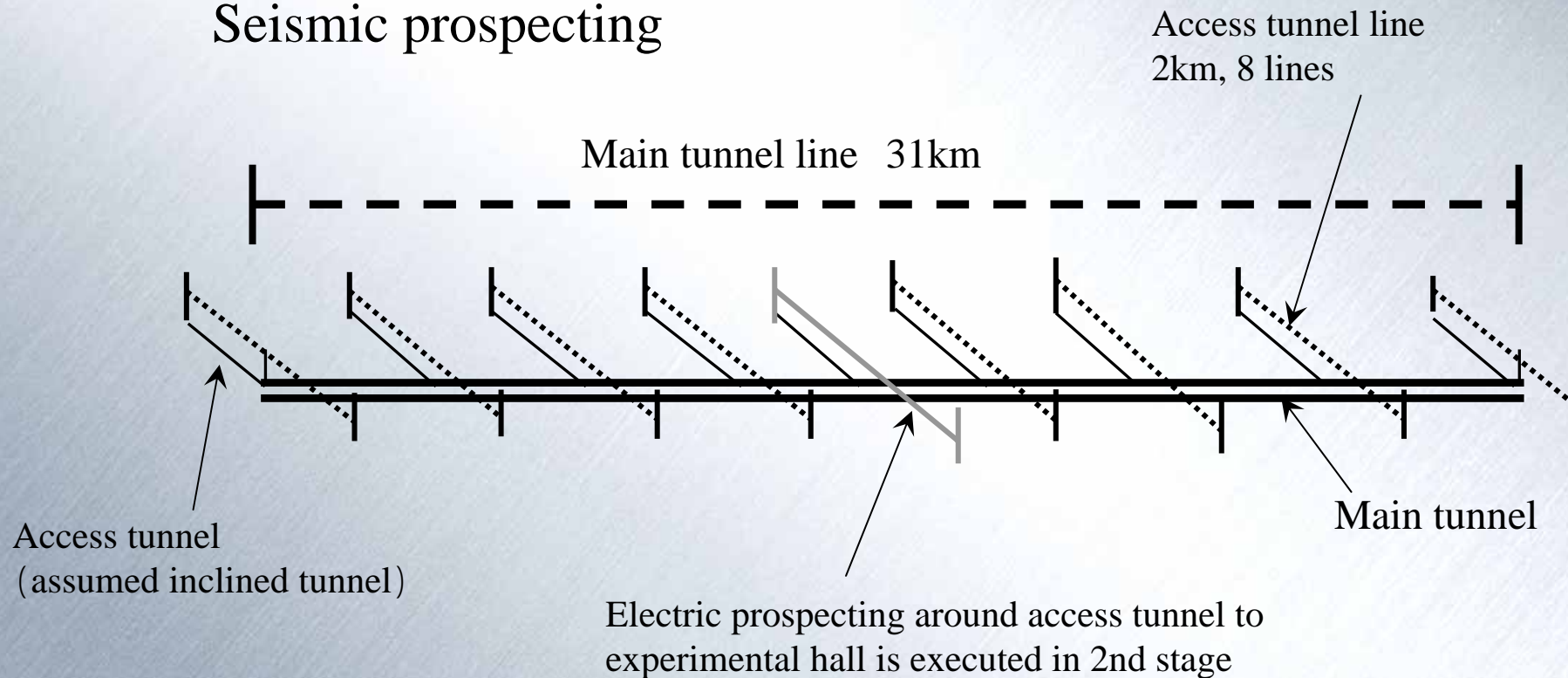
 - (plate bearing test, creep test, sharing test, primary geostatic test)

- Drill hole test in survey tunnel

 - (core observation, borehole TV, core tests)

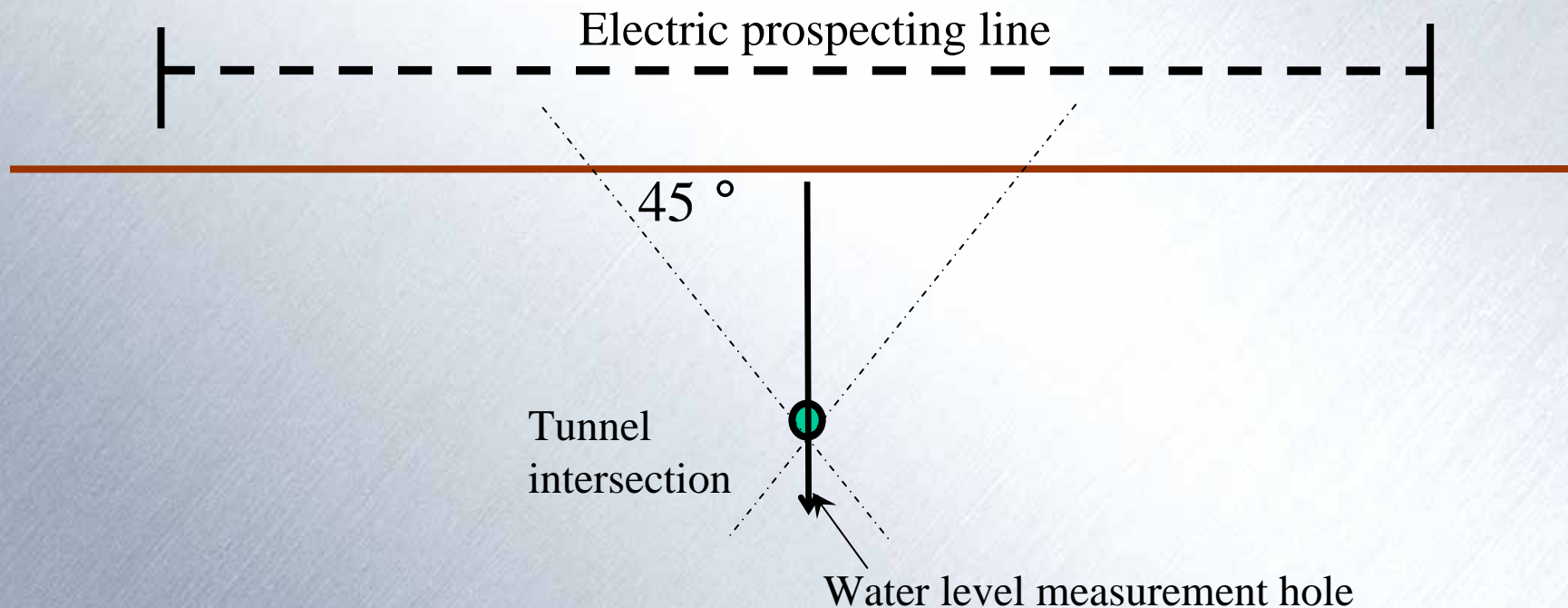
Geological investigation in 3rd stage

- Geophysical prospecting
- Seismic prospecting



Geological investigation in 3rd stage

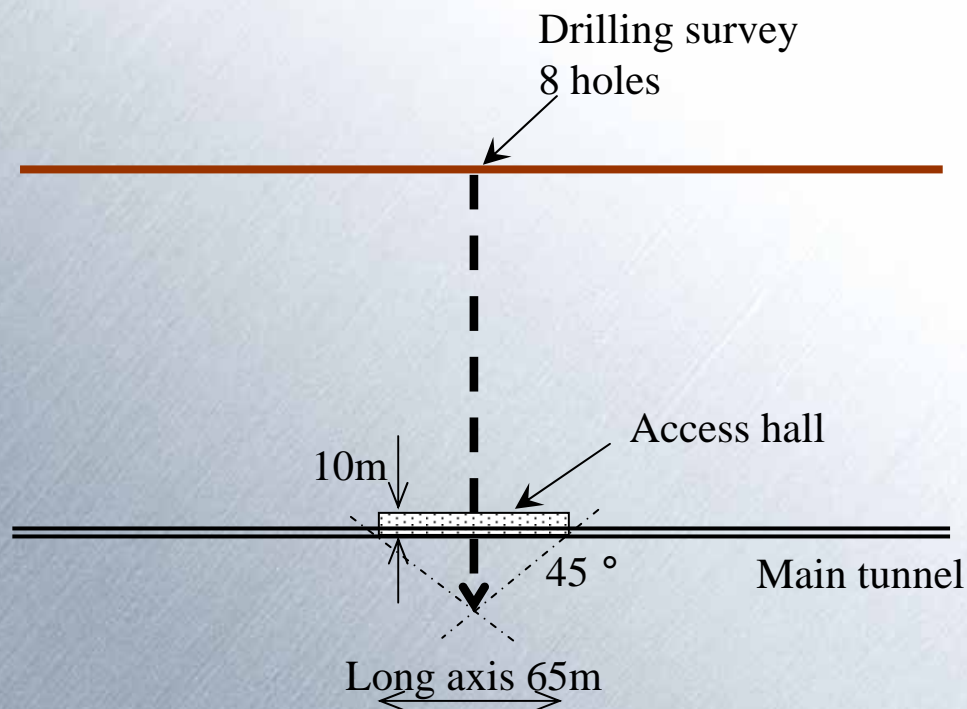
- Geophysical prospecting
 - Electric prospecting
(water level measurement: using existing drill holes)



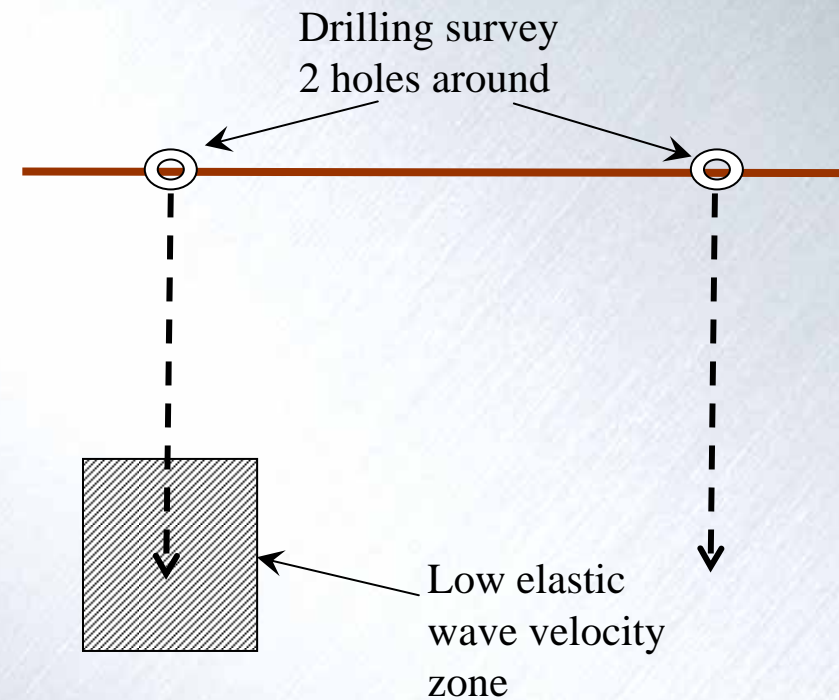
Geological investigation in 3rd stage

- Drilling survey

(Access hall area)

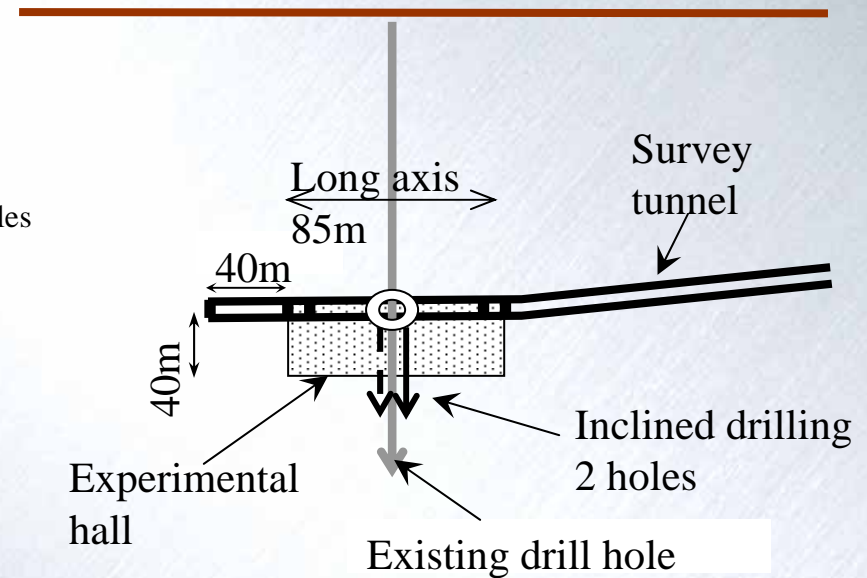
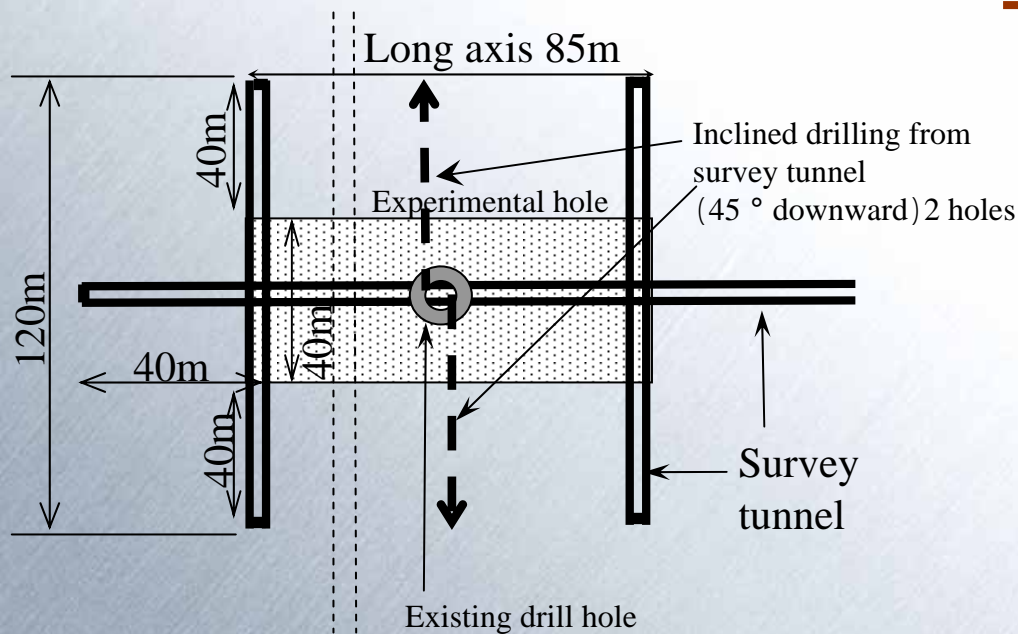


(geologically inferior zone)



Geological investigation in 3rd stage

- Investigation in survey tunnel
- Drilling survey in survey tunnel



3. Investigation for environmental impact assessment

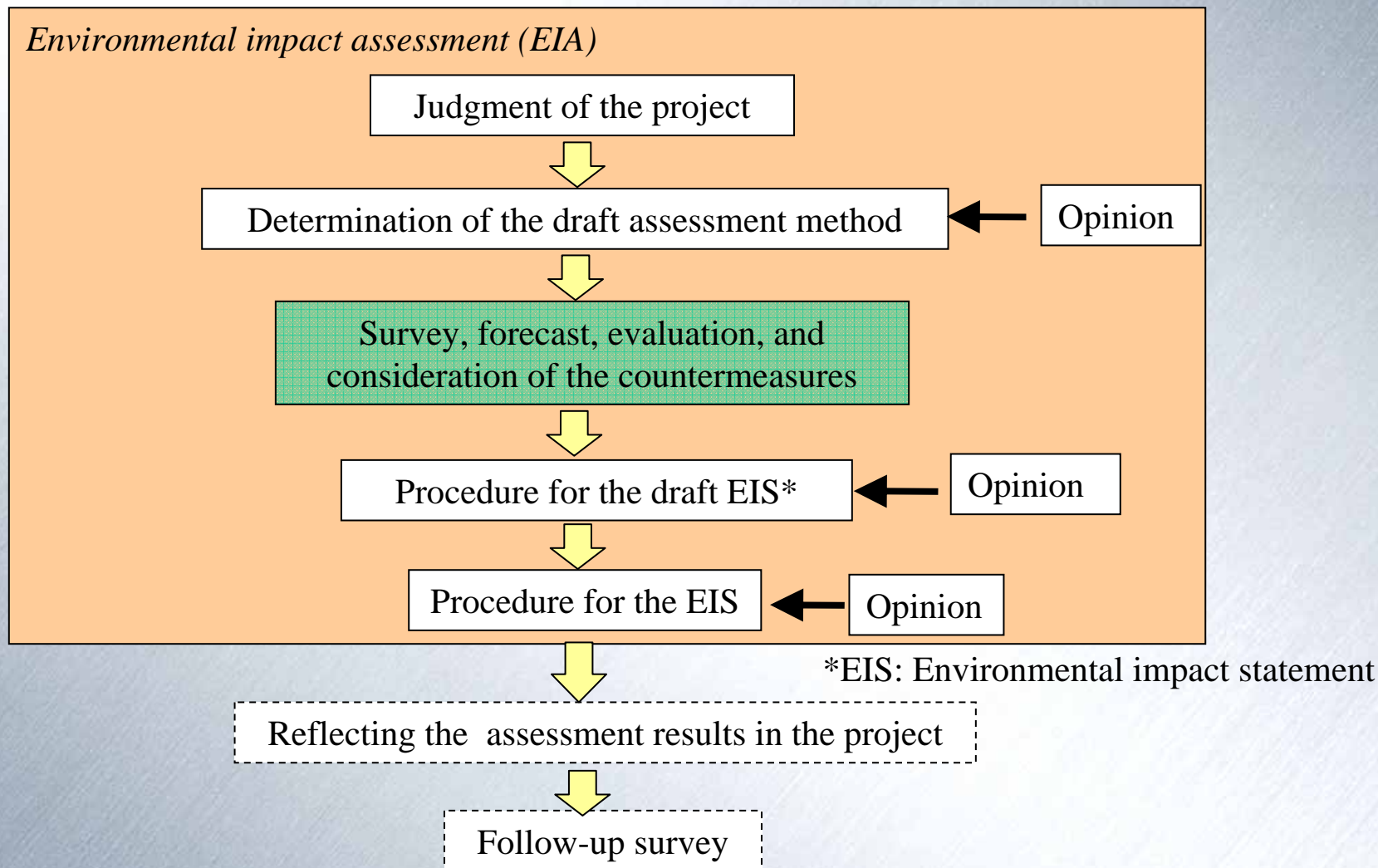
Projects subject to the environmental impact assessment law

Project	Class-1 project (EIA is always required)	Class-2 project (The necessity of EIA is judged by project)
1 Road		
national expressway	All	
metropolitan expressway	4 lanes or more	
national roads	4 lanes or more, 10km or longer	4 lanes or more, 7.5km-10km
large-scale forest road	2 lanes or more, 20km or longer	2 lanes or more, 15km-20km
2 River		
dam, weir	reservoir area: 100ha or larger	reservoir area: 75ha-100ha
diversion channel, lake-related development	area of land alteration: 100ha or	area of land alteration: 75ha-100ha
3 Railway		
shinkansen(super express train)	all	
railway, track	length: 10km or longer	length: 7.5km-10km
4 Airport	runway: 2500m or longer	runway: 1875m-2500m
5 Power plant		
hydraulic power plant	output: 30000kw or over	output: 22500kw-30000kw
thermal power plant	output: 150000kw or over	output: 112500kw-150000kw
geothermal power plant	output: 10000kw or over	output: 7500kw-10000kw
nuclear power plant	all	
6 Waste disposal site	area: 30ha or larger	area: 25ha-30ha
7 Landfill and reclamation	area: 50ha or larger	area: 40ha-50ha
8 Land readjustment project	area: 100ha or larger	area: 75ha-100ha
9 New Residential area development project	area: 100ha or larger	area: 75ha-100ha
10 Industrial estate development project	area: 100ha or larger	area: 75ha-100ha
11 New town infrastructure development project	area: 100ha or larger	area: 75ha-100ha
12 Distribution center complex development project	area: 100ha or larger	area: 75ha-100ha
13 Residential or industrial land development by specific organizations	area: 100ha or larger	area: 75ha-100ha
Port and harbor planning	Total reclaimed and excavated land: 300ha or larger	

Referring to MOE HP <http://www.env.go.jp/policy/assess/1intro.html>

It is seemed that ILC project is not applied to above list. But consultation with MOE is necessary.
Consulting with prefecture is also needed in terms of their ordinance about EIA.

Outline of environmental impact assessment procedure



General terms of EIA

Preservation of natural environmental element in good condition		
air environment	water environment	soil environment, others
<ul style="list-style-type: none"> · quality of the air · noise · vibration · offensive odors · others 	<ul style="list-style-type: none"> · water quality · bottom material · underground water · others 	<ul style="list-style-type: none"> · geography, geology · ground · soil borne · others
Securement of biotic diversity and systematic conservation of natural environment		
vegetation	animal	biogeocenosis
Abundant interaction between mankind and nature		
landscape	playing field for interaction	
Environmental road		
waste	green house gases	

An Example of EIA (referring to a case of hydraulic power plant)

Assessment terms

vegetation

animal

water quality

noise

vibration

landscape

weather

geography and geology

local community

transportation and public facilities

land use

river system use

cultural assets and recreation facilities

Data collection

Follow-up survey was
executed according to need

An Example of EIA (referring to a case of hydraulic power plant)

Vegetation survey



Examples of target species of plant



Vegetation distribution map

An Example of EIA (referring to a case of hydraulic power plant)

Animal survey : bird's existing area



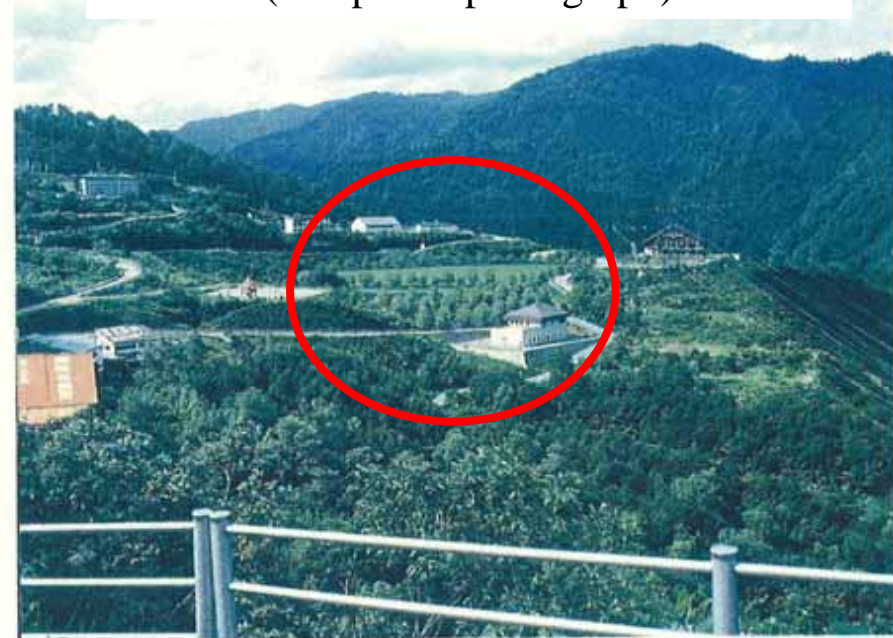
An Example of EIA (referring to a case of hydraulic power plant)

Consideration of landscape: land-waste disposal site

Former landscape



Landscape after work of the construction
(composite photograph)



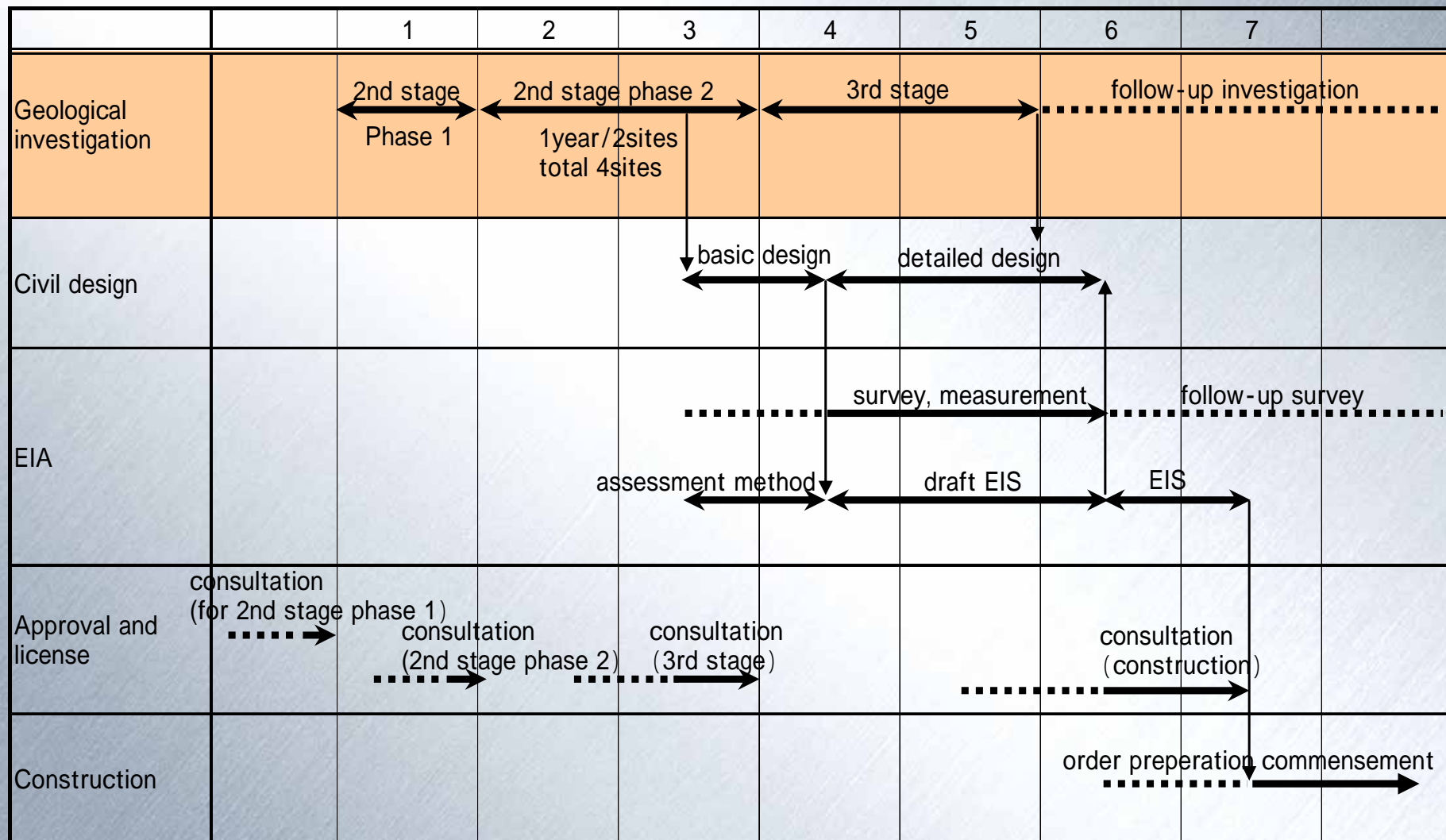
4. Approval and license according to Japanese laws

Law	Object	Application	Stage*		
			2-1	2-2	3, 4
Natural parks law	work in the natural park	minister of environment or governor			
	construction in the natural park	branch office of prefecture			
Forest law	entering into reserve forest area	mayor of city, town, or village			
	work in the reserve forest area	prefecture forestry office			
	unspecification of reserve forest area	minister of agriculture, forestry and fisheries			
Administrative law of national forest	renting of national forest	forest office			
	entering into the national forest	forest office			
Law for the Protection of Cultural Properties	excavation of the area where cultural property was buried	chief of the Cultural Affairs Agency			
River law	land occupancy	prefecture branch office			
Road law	land occupancy	prefecture branch office			
Agricultural land act	conversion of agricultural land	agricultural committee of city, town or village			
Electricity Enterprises Law	safety regulation, assignment of licensed engineer	minister of economy, trade and industry			

* 2-1: 2nd stage phase 1, 2-2: 2nd stage phase 2, 3: stage 3, 4: stage 4

- Above table shows some examples. The names of law are not authorized.
- It is speculated that minor approval takes about one month and major approval takes from half year to one year.
Preliminary consultation is needed separately.
- Actual application of these laws is judged according to consultation with organizations which are in charge of the laws.

5. Schedule to construction commencement



Private land acquisition is not included in above chart.

6. Possible uncertainties impacting on the schedule

- Existing of geologically inferior zone
(hot spring, unknown fault, etc.)
- Existing of rare species of plant and animal
- Public and private agreement
- Consultation with related organizations

Thank you very much