

Agreement INGV-DPC 2007-2009

Project S4: ITALIAN STRONG MOTION DATA BASE

*Responsibles: Francesca Pacor, INGV Milano – Pavia
and Roberto Paolucci, Politecnico Milano*

<http://esse4.mi.ingv.it>

Deliverable # D3

**Definition of the standard format
to prepare descriptive monographs of ITACA stations**

May 2009

edited by:

UR2 Giuseppe Di Capua, INGV – Rome

UR6 Giuseppe Lanzo, Sapienza University of Rome

UR2 Silvia Peppoloni, INGV – Rome

UR6 Giuseppe Scasserra, Sapienza University of Rome



RAN

Rete Accelerometric Nazionale

(National Accelerometric Network)

Recording Station

Station Code

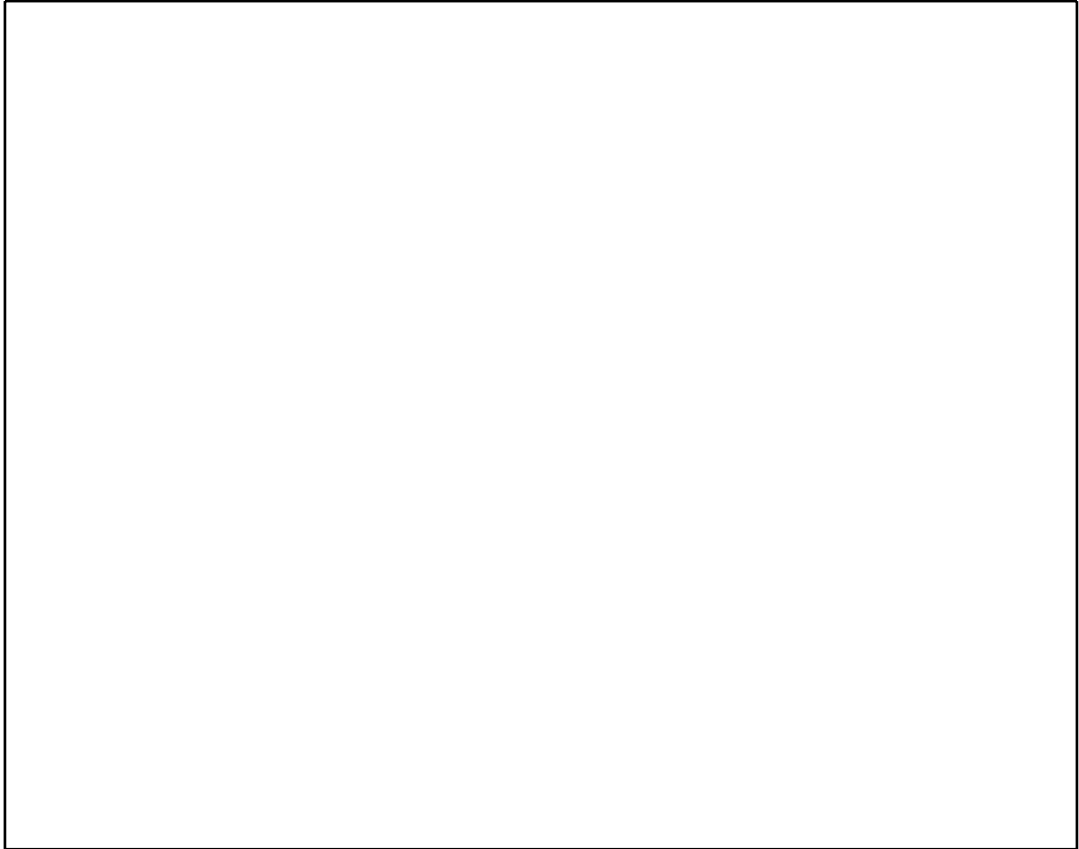
First compilation

Last update

	Day	Month	Year

General Information

Station
photograph



Code

Owner

Type of station

Activation date

Removal date

Instrument type

Instrument
model

Housing

Notes

Geographical Information (1/2)

Location

Region

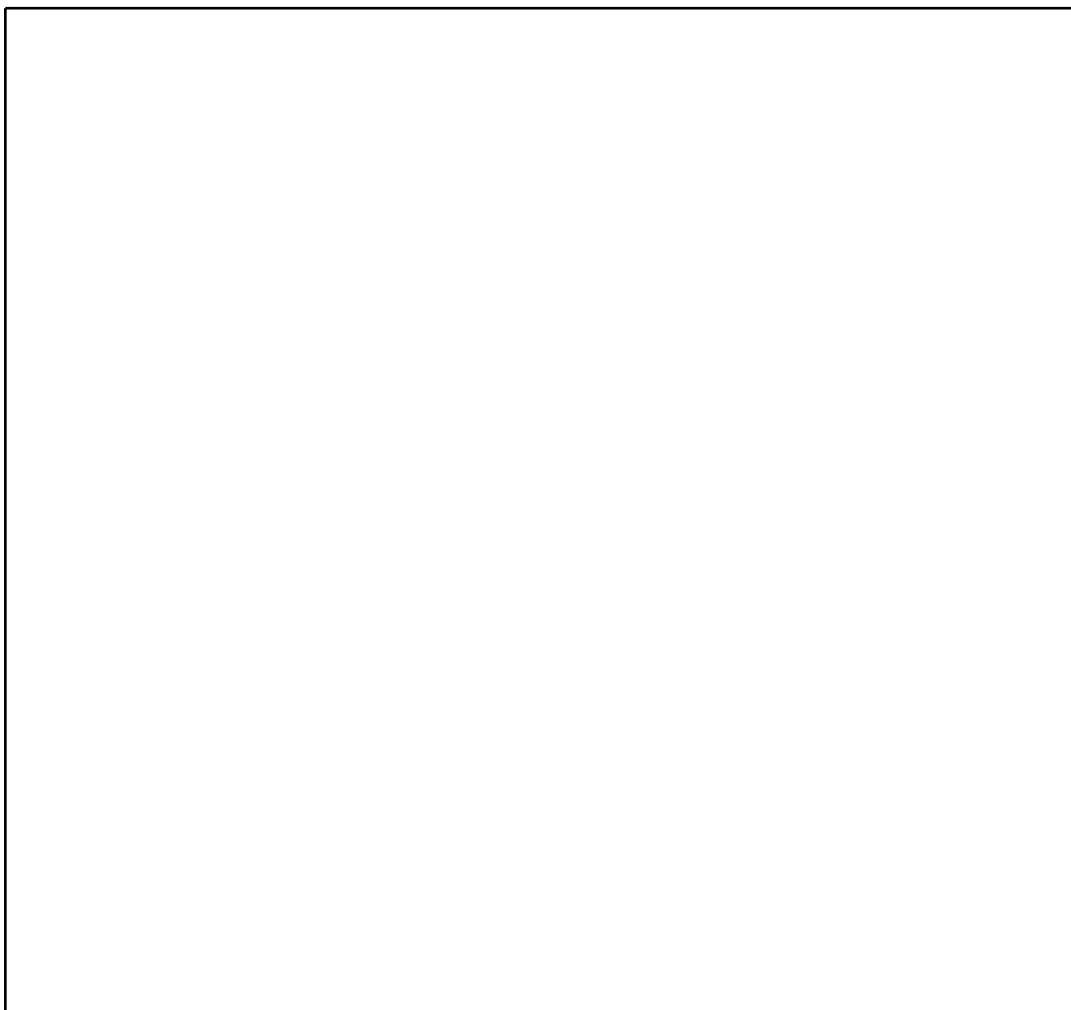
Province

City

Place / Address

ISTAT Code

Notes



Location map
(Italy and Region)

Geographical Information (2/2)

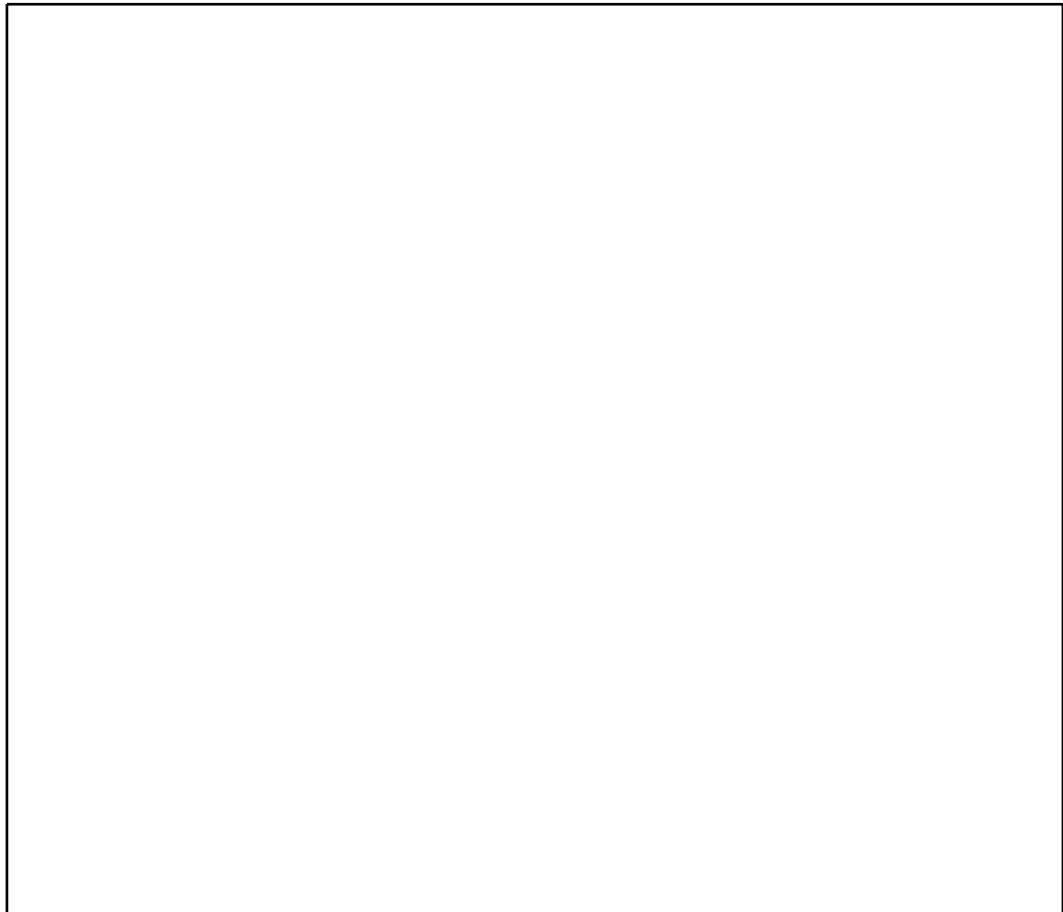
Coordinates

	Latitude	Longitude
Geographic (WGS84)		
Elevation (m a.s.l.)		

Cartography

	Scale	Code
Topographic map (I.G.M.I.)		
	Scale	Element number
Regional technical map (C.T.R.)		

I.G.M.I. or C.T.R.
map



Geomorphology

Site morphology

Plain	Valley (centre)	Valley (edge)	Alluvial fan
Saddle	Slope	Edge of scarp	Ridge

Landslides

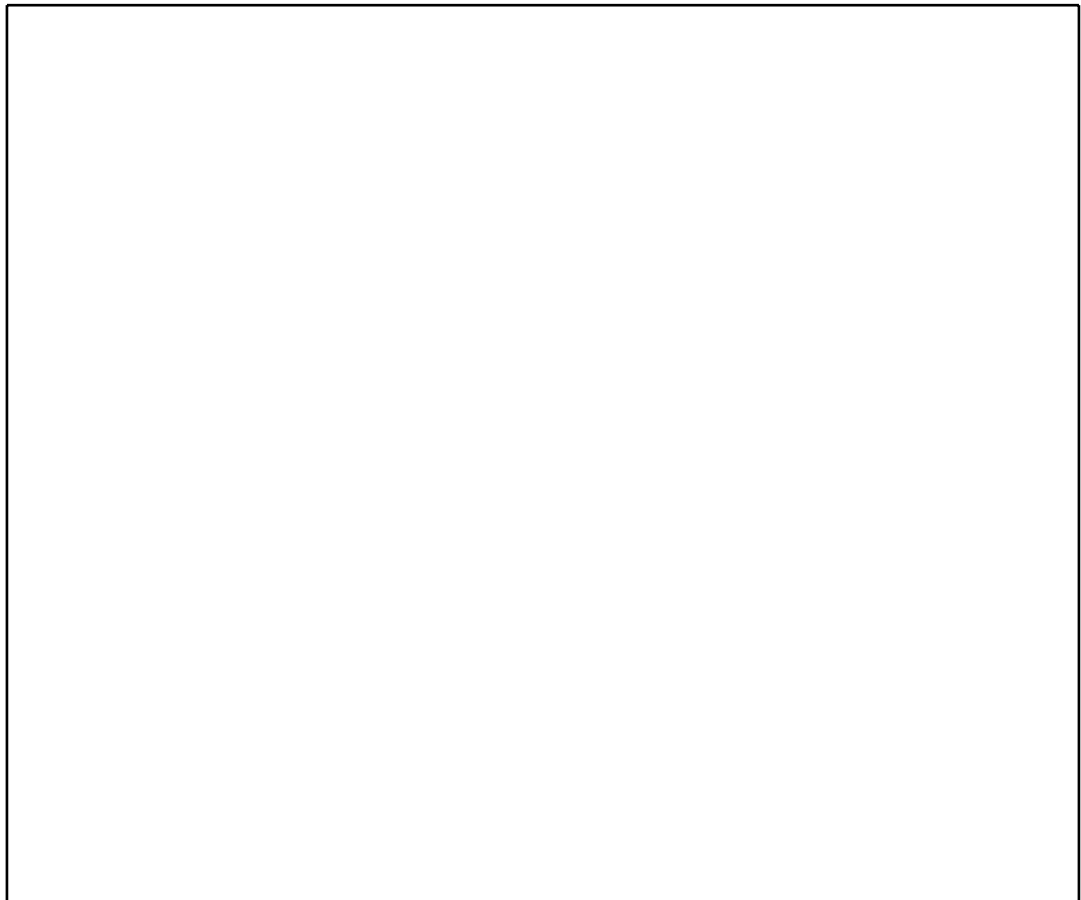
Not present

Present

Active or quiescent

Inactive or stabilized

Distance (m)



I.F.F.I. map

Notes

Geology

Cartography

Scale

Sheet number

Sheet name

Geological map

	Legend

Geological cross section

--

Fault proximity

certain
supposed

(see notes for further information)

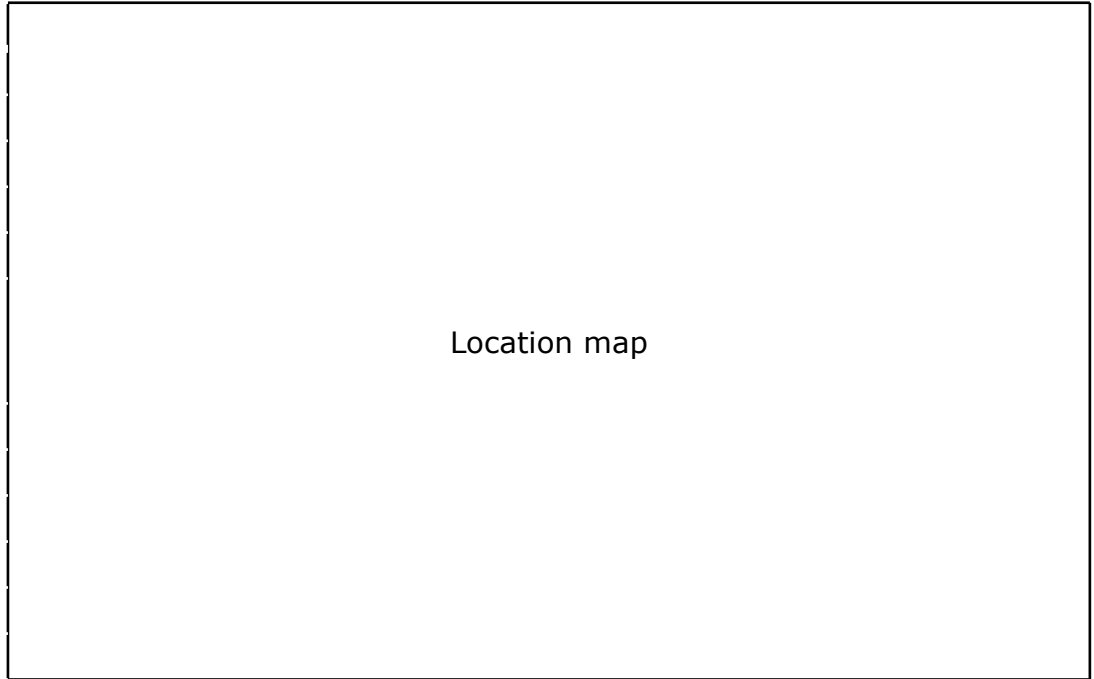
Notes

--

Geomechanical information (1/2)

Location of geomechanical station

◆ Geomechanical station



Geomechanical survey (Rock mass conditions and parameters)

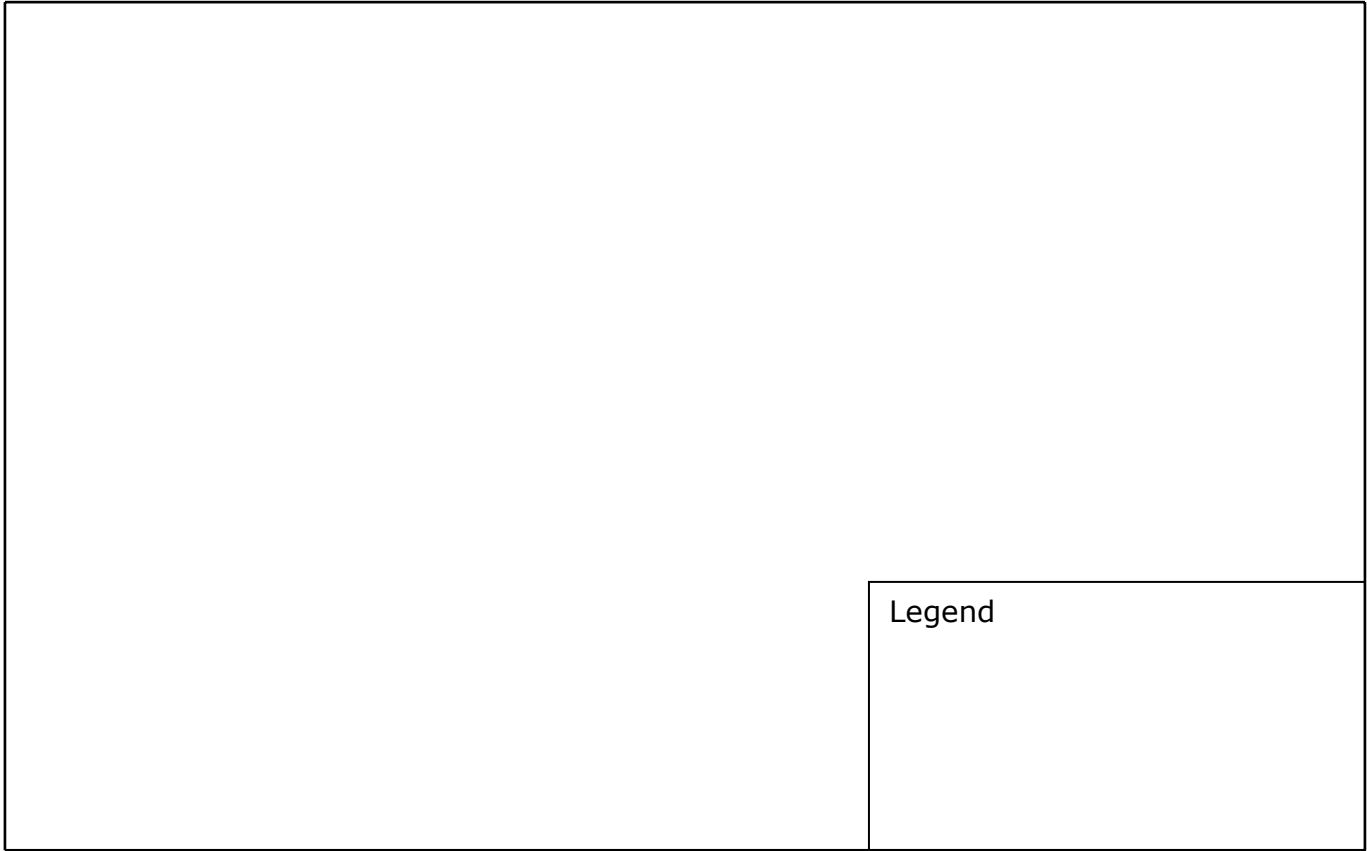
Stations						
Code	Lithotype	Jv (Joint/m ³)	Ib (cm)	RQD Computed (%)	ISRM 1981 classification	RMR 1989 classification

Notes

Geomechanical information (2/2)

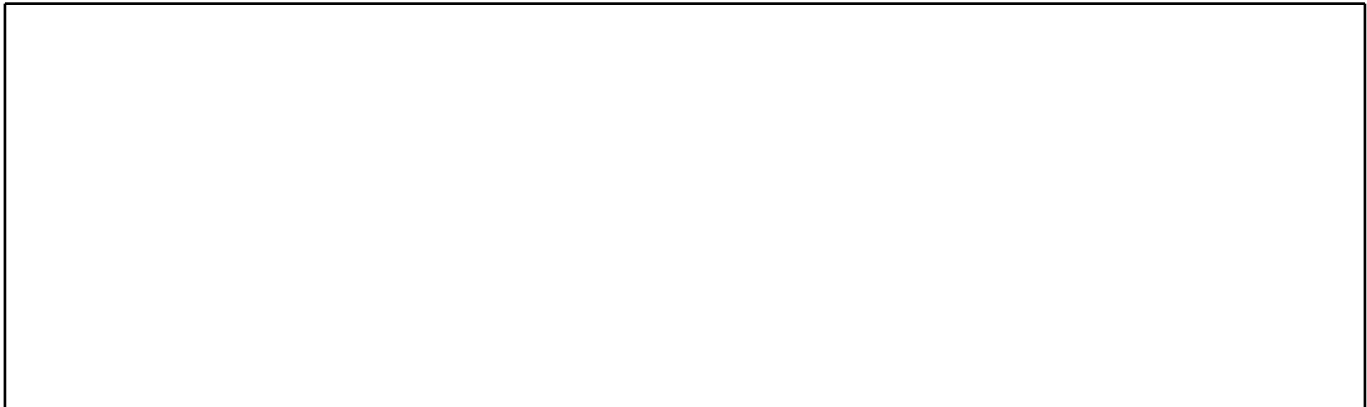
Lithotechnical map

Scale



Legend

Lithotechnical cross section



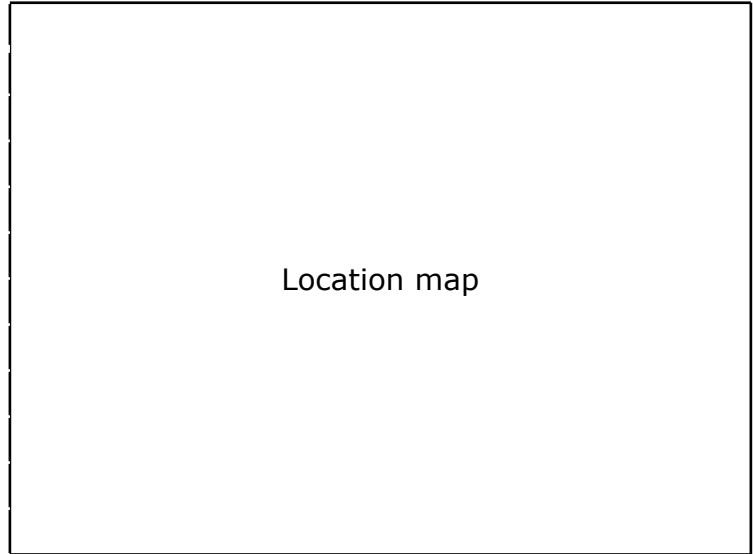
Notes



Geotechnical, Geomechanical & Geophysical Information (1/8)

Test summary and location

<input type="checkbox"/>	⊗	Borehole
<input type="checkbox"/>	P	Piezometer
<input type="checkbox"/>	▲	Penetration tests (SPT, CPT)
<input type="checkbox"/>	⊕	Down-Hole, Cross-Hole (DH, CH)
<input type="checkbox"/>	∇-∇	Seismic refraction/reflection
<input type="checkbox"/>	○	SASW, MASW, NASW, ESAC, FK
<input type="checkbox"/>	◇-◇	Geoelectric
<input type="checkbox"/>	∇	Schmidt Hammer Test
<input type="checkbox"/>	▼	Point Load Test
<input type="checkbox"/>	⓪	Dilatometer
<input type="checkbox"/>	—	Flat / Hydraulic Jack Test
<input type="checkbox"/>		Lab tests



Stratigraphic profile

Depth (m), #Layer, Piezometric level, Samples, Layer description

In situ Tests: Piezometric measurements

Table

Chart

In situ Tests: Penetration Test (SPT, CPT)

Chart (SPT)

Chart (CPT)

In situ Tests: Down-Hole, Cross-Hole, SASW, MASW, NASW, ESAC, FK

Table 1

*Chart 1
Depth (m) - Vs*

Table 2

*Chart 2
Depth (m) - Vs*

In situ Tests: Refraction/Reflection section – Geoelectric section

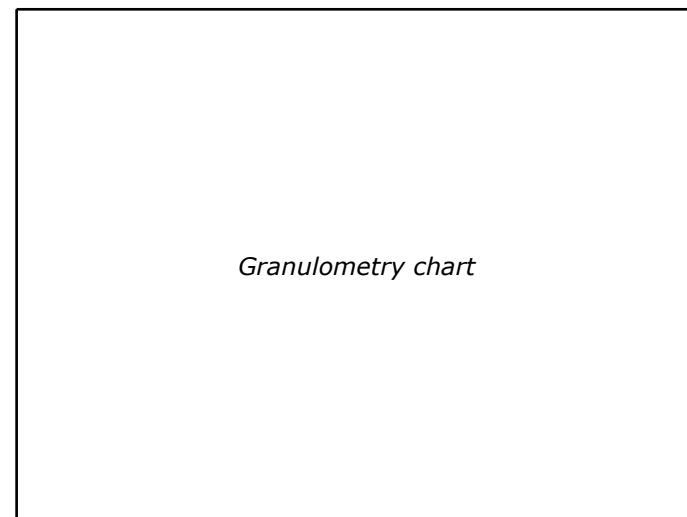
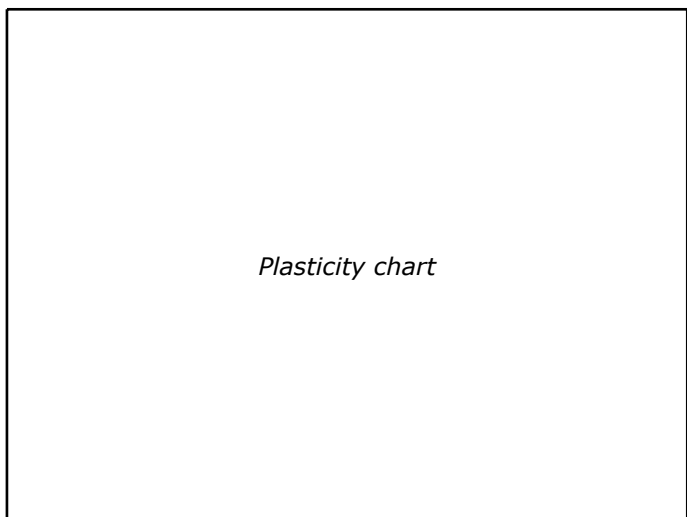
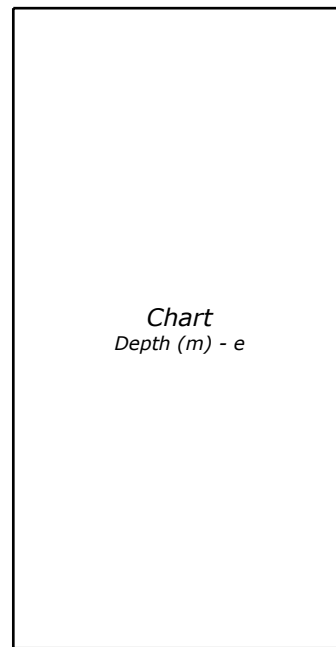
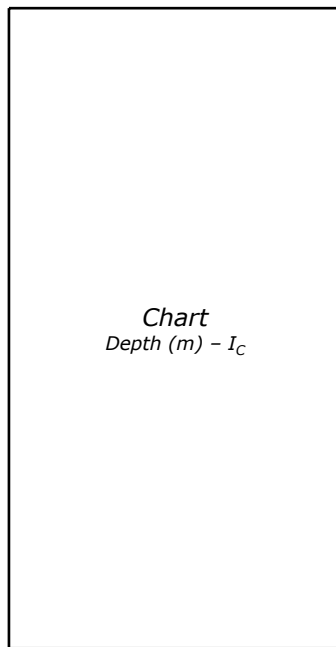
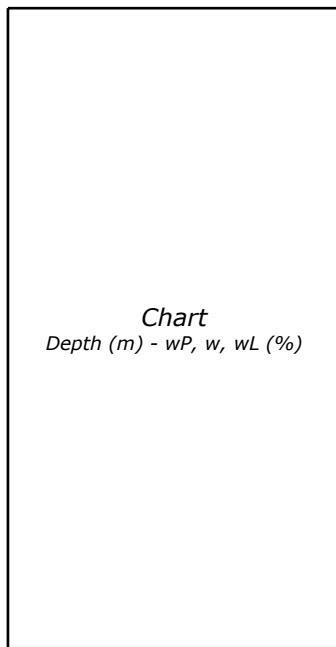
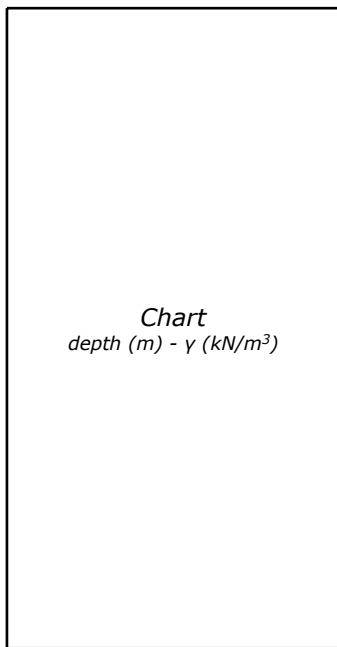
Refraction/Reflection section

Geoelectric section

Geotechnical, Geomechanical & Geophysical Information (5/8)

Laboratory Tests: physical properties

Borehole	Sample	Depth (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	w (%)	γ_s (kN/m ³)	γ (kN/m ³)	w_L (%)	I_P (%)	I_C	A	e



Geotechnical, Geomechanical & Geophysical Information (6/8)

Laboratory Tests: Direct shear/Triaxial tests

Table

Chart

Table

Chart

Legend

DS = Direct shear

CIU = Triaxial-Consolidated Undrained

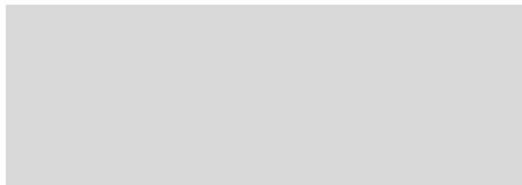
CID = Triaxial-Consolidated Drained

UU = Triaxial-Unconsolidated Undrained

Average values of mechanical parameters

Litotype	c' (kPa)	ϕ' ($^{\circ}$)	C_u (kPa)

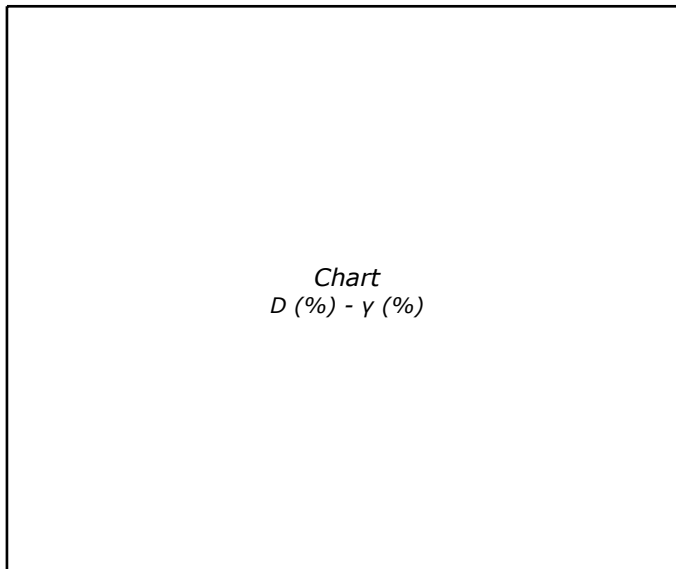
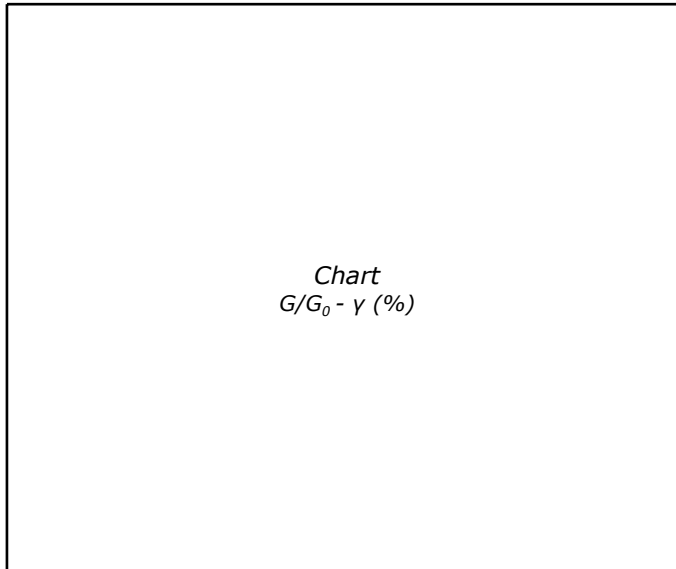
Note



Geotechnical, Geomechanical & Geophysical Information (7/8)

Laboratory Tests: Resonant Column (RC)

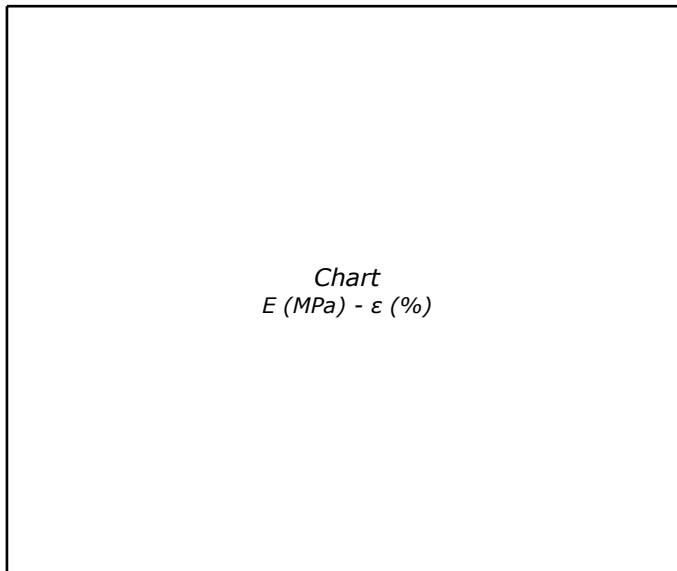
Borehole / Sample / Depth (m)													
	Y (%)												
	G/G ₀												
	D (%)												
	Y (%)												
	G/G ₀												
	D (%)												
	Y (%)												
	G/G ₀												
	D (%)												



Geotechnical, Geomechanical & Geophysical Information (8/8)

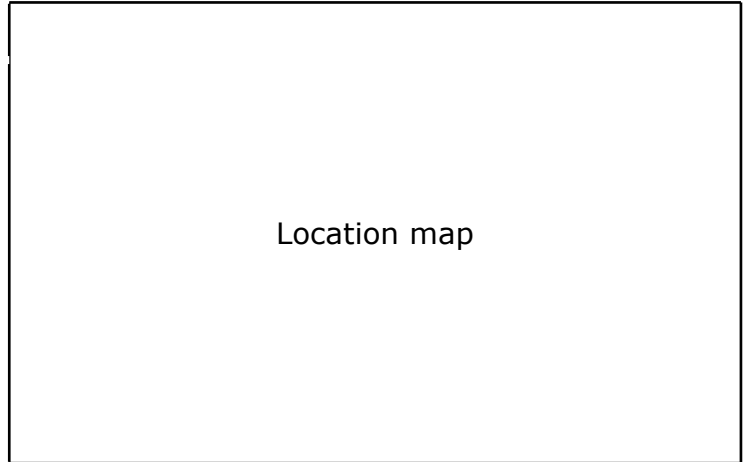
Laboratory Tests: Cyclic Triaxial (CTX)

Borehole / Sample	p' _c (MPa)												
		ε (%)											
		E (MPa)											
		ε (%)											
		E (MPa)											
		ε (%)											
		E (MPa)											

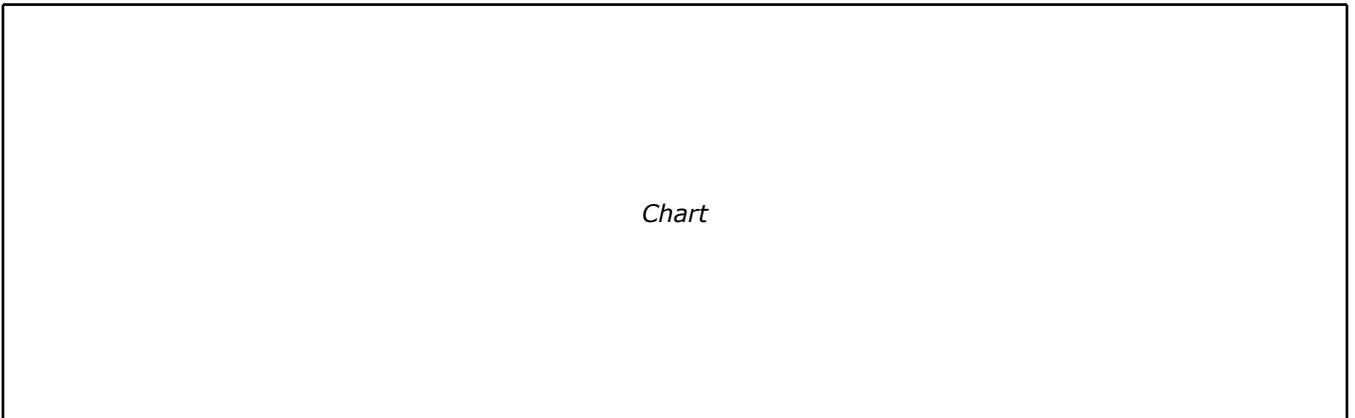


Microtremor H/V spectral ratio

∅ Spectral Ratio (H/V)



Table



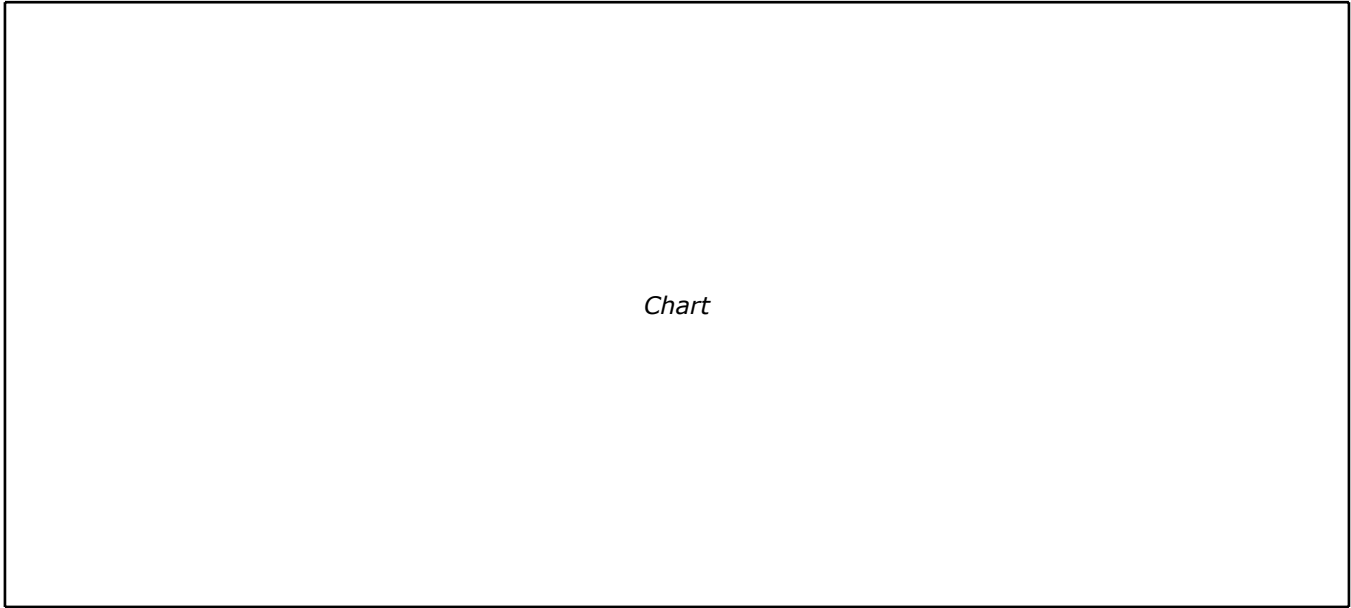
f_0 (mt) (Hz)

Date of measurements

Day	Month	Year

Earthquake H/V spectral ratio

Table



f_0 (eq) (Hz)

Number of selected records from ITACA

Site classification (EC8 – NTC2008)

Lithostratigraphic classification

Estimated

Method ¹	Soil class ²	Notes

1 Legend	GEO	Geological data
	EC	Empirical correlation
	HV	H/V spectral ratio

Based on in-situ measurements

Method ³	V_{s30} (m/s)	Soil class ²

2 Legend	A	Rock or other rock-like geological formation, including at most 5 m of weaker material at the surface ($V_{s30} > 800$ m/s).
	B	Deposits of very dense sand, gravel, or very stiff clay, at least several tens of m in thickness, characterized by a gradual increase of mechanical properties with depth ($V_{s30} = 360-800$ m/s).
	C	Deep deposits of dense or medium dense sand, gravel or stiff clay with thickness from several tens to many hundreds of m ($V_{s30} = 180-360$ m/s).
	D	Deposits of loose-to-medium cohesionless soil (with or without some soft cohesive layers), or of predominantly soft-to-firm cohesive soil ($V_{s30} < 180$ m/s).
	E	A soil profile consisting of a surface alluvium layer with V_s values of type C or D and thickness varying between about 5 m and 20 m, underlain by stiffer material with $V_s > 800$ m/s.

3 Legend	CH	Cross-Hole
	DH	Down-Hole
	ES	ESAC
	FK	FK
	MW	MASW
	NW	NASW
	SH	SH-Refraction
SW	SASW	
_____	_____	

Topography classification

Topography category ⁴

4 Legend	T1	Flat surface, isolated slopes and cliffs with average slope angle $i \leq 15^\circ$.
	T2	Slopes with average slope angle $i > 15^\circ$.
	T3	Ridges with crest width significantly less than the base width and average slope angle $15^\circ \leq i \leq 30^\circ$.
	T4	Ridges with crest width significantly less than the base width and average slope angle $i > 30^\circ$.

Synthesis of information

Information relevant to site classification

Notes

V_{s30} (m/s)

Average N_{SPT} to 30m

Average c_u to 30m (kPa)

Site class (EC8 – NTC2008)

Topography category (EC8 – NTC2008)

Geological, geomorphological and geomechanical information

Lithology

Morphology

Rock mass

Other information relevant to seismic site response

Depth to bedrock (m)

Average V_s to bedrock (m/s)

f_0 from H/V microtremors (Hz)

f_0 from H/V earthquakes (Hz)

Distinctive features of site response

--	--

References

Geomorphology & Geology

Geotechnical, Geomechanical & Geophysical Information

Research papers

Enclosures

List

N. Description

N.	Description