Codes and Standards for Geotechnical Engineering in Vietnam

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CONTENT

Introduction

The code and standard system for geotechnical engineering is one of the most important Vietnamese standard systems in CE.

The development of Vietnamese codes and standards:

- **Before 1990:**

✓ Most of the Vietnamese standards were mandatory to use →

✓ The standards were nearly the same law documents to follow;

Introduction (cont.)

The development of Vietnamese codes and standards:

- **Before 1990:**

✓Code and standard making process: 2 types

- ❖(1) Choose/accept Russian standards (SniP, Gost, ..); translate into Vietnamese with correction of local conditions; → Label the standards as TCVN xxx, TCN..; and
- ❖(2) Make the new standards based on other international standards;

✓ Vietnamese standard categories (4 groups):

- ❖National standards (TCVN);
- ❖Ministerial standards (TCN, TCXD, TCXDVN),
- ❖Regional standards, and
- ❖Institutional standards.

Introduction (cont.)

The development of Vietnamese codes and standards:

- **From 1990 to 2006:**

✓97% standards were optional and the other 3% were still mandatory.

✓Codes were mandatory and issued by governmental organizations.

✓For more international cooperation, many international standards were accepted including codes and standards from Russia, Japan (JIS), China, Germany (DIN), England (BS), Europe (EN), USA, …

✓Vietnamese standard categories (3 groups): National standards TCVN; Ministerial standards (TCN), institutional standards.

Introduction (cont.)

The development of Vietnamese codes and standards:

- **Since 2007** (when the standard and code law No: 68/2006/QH11 dated 29 June 2006 was issued and effective from 1 January 2007)**:**

✓ All Standards have not been being mandatory.

✓ Codes (QCVN, QCDP): always mandatory and issued by governmental organizations.

✓ National Standards (TCVN): issued by state organizations or associations.

✓ Vietnamese standard categories (2 groups): National standards **TCVN**; institutional standards (**TCCS**). To unify standards for more convenient to manage and use, most of Ministerial standards (TCN, TCXD, TCXDVN) were changed to TCVN standards.

Introduction (cont.)

The development of Vietnamese codes and standards:

- **Since 2007:**

✓International standards: accepted more widely, deeply and flexibly.

✓Most of Vietnamese standards based on Russian standards (familiar with Russian education system).

✓Many international codes and standards have been being translated into Vietnamese and become Vietnamese standards.

✓International geotechnical standards such as American, Japanese, .. Standards: widely used directly (without translating) for high ways and bridges or projects under foreign funds (ODA).

✓With the diversity and effect of many different codes in the world → the deficient or good points.

SUMMARY OF DEVELOPMENT OF VN CODES AND STANDARDS

Period	Before 1990	1990-2006	From 2007 to now
Standard Categories	4 groups: - TCVN (national) - TCN (Ministerial) - TCV (regional) - TCCS (institutional)	3 groups: - TCVN - TCN - TCCS	2 groups: - TCVN - TCCS
Required to use	100% mandatory	97%: optional, 3%: mandatory	100%: optional
Editing	- Based on translating Russian standards - New editing	- Acceptance of international standards - New	-Acceptance of international standards - New

JAPANESE STANDARDS TRANSLATED INTO VIETNAMESE

TCCS

TIÊU CHUẨN CƠ SỞ

TCCS 58:2014/IBST

Xuất bản lần 1

CỌC ATT – THI CÔNG VÀ NGHIỆM THU

ATT Column Technology – Check and acceptance

HÀ NỘI - 2014

TCCS

TIÊU CHUẨN CƠ SỞ

TCCS 57:2014/IBST

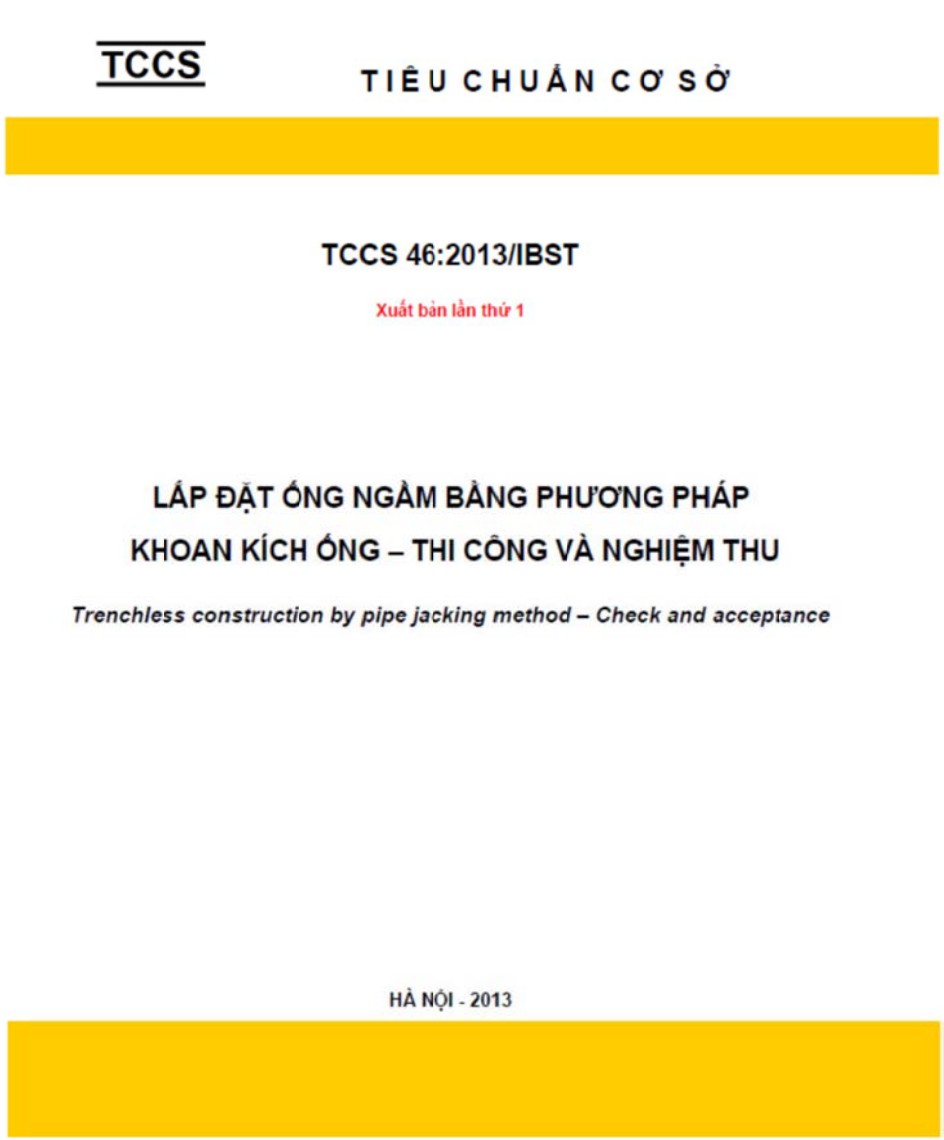
Xuất bản lần 1

CỌC ATT – CHỈ DẪN THIẾT KẾ

ATT Column Technology – Design standard

HÀ NỘI - 2014

JAPANESE STANDARDS TRANSLATED INTO VIETNAMESE



TCCS

TIÊU CHUẨN CƠ SỞ

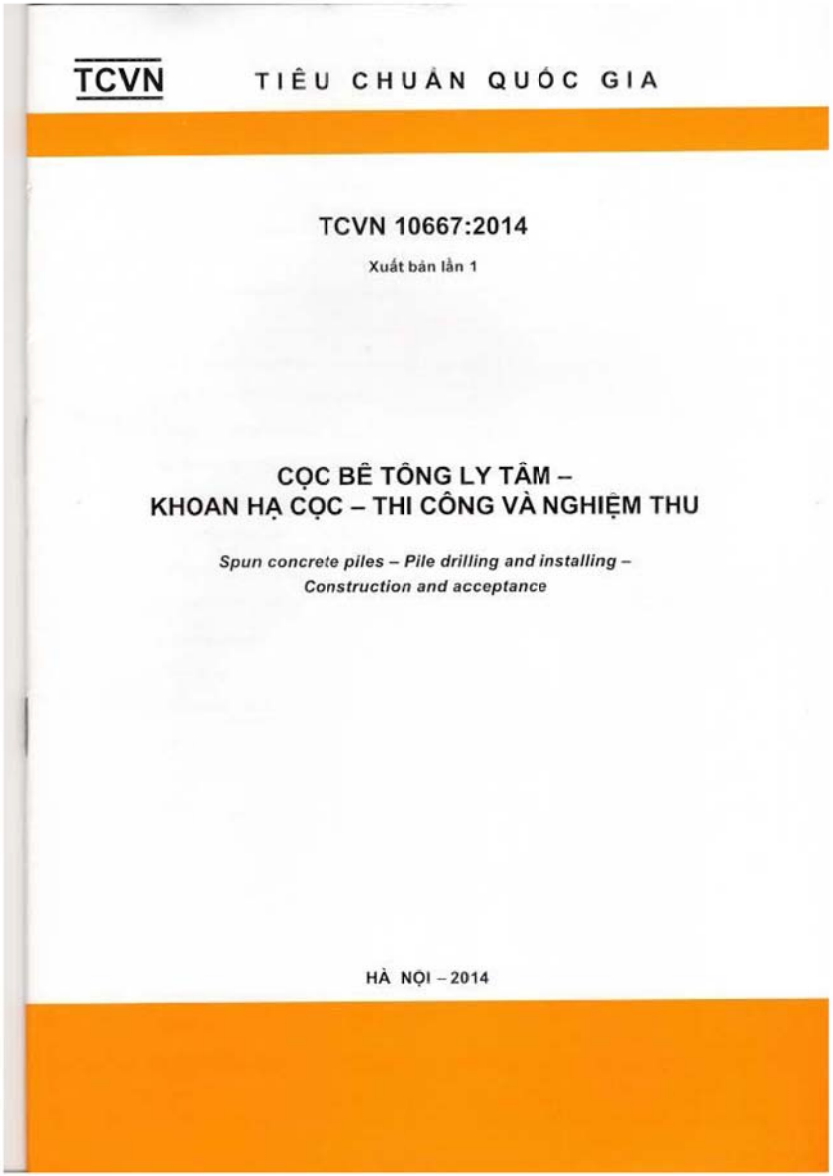
TCCS 46:2013/IBST

Xuất bản lần thứ 1

LẮP ĐẶT ỐNG NGẦM BẰNG PHƯƠNG PHÁP KHOAN KÍCH ỐNG – THI CÔNG VÀ NGHIỆM THU

Trenchless construction by pipe jacking method – Check and acceptance

HÀ NỘI - 2013



TCVN

TIÊU CHUẨN QUỐC GIA

TCVN 10667:2014

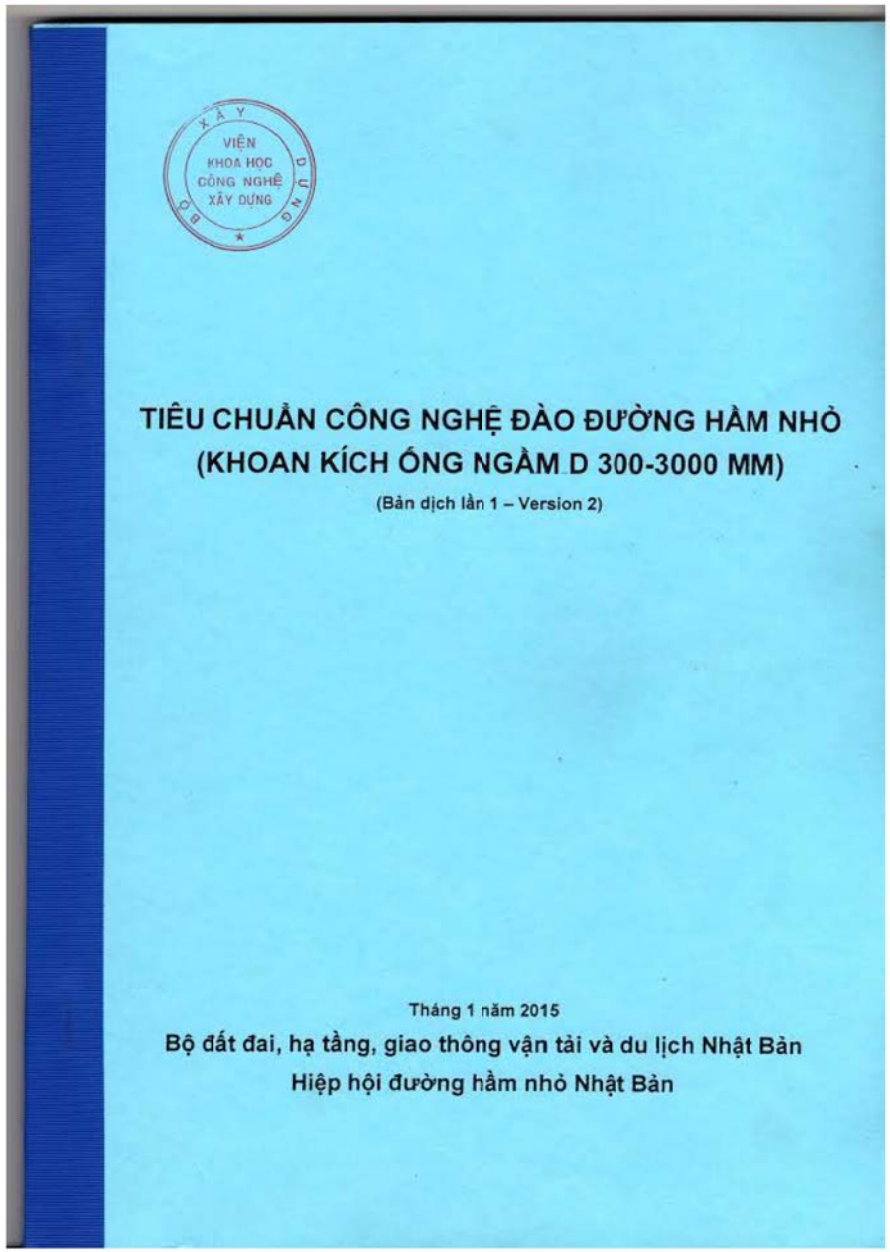
Xuất bản lần 1

CỌC BÊ TÔNG LY TÂM – KHOAN HẠ CỌC – THI CÔNG VÀ NGHIỆM THU

Spun concrete piles – Pile drilling and installing – Construction and acceptance

HÀ NỘI – 2014

JAPANESE STANDARDS TRANSLATED INTO VIETNAMESE



Assessment of codes and standards for geotechnical engineering in Vietnam

Standard system for geotechnical engineering in Vietnam is an important part of Vietnamese civil engineering standard system. Therefore, it also has some deficiency of Vietnamese standards.

- Ministry of Construction required the planning of making Vietnamese standard system more convenient to use. Until now, two geotechnical projects to make planning for Vietnamese standard system from 2013 to 2030 have been done by:
  - ✓ Prof. Dr. Nguyen Truong Tien (P.I.), VSSMGE "Studying to plan Vietnamese standards and codes for geotechnical and foundation engineering up to the year of 2030", and
  - ✓ Dr. Pham Quyet Thang, IBST "Studying to plan Vietnamese standards and codes for survey and soil investigation in construction up to the year of 2030".
- The results from the projects show the direction for making Vietnamese standards and the list of standards need to be edited, revised and corrected.
- A Few codes for geotechnical engineering.

Vietnamese Codes for geotechnical engineering

05/02/2010 02/2010/TT-BXD	QCVN	**07**-2010	BXD	Quy chuẩn kỹ thuật quốc gia về công trình hạ tầng kỹ thuật đô thị National Code for urban infrastructure	**98** pages
14/8/2009 28/2009/TT-BXD	QCVN	**08**:1-2009	BXD	Quy chuẩn kỹ thuật quốc gia về công trình ngầm đô thị. Phần 1: Tàu điện ngầm National Code for urban underground structures: Part 1: Subway/underground railroad	**53**
14/8/2009 28/2009/TT-BXD	QCVN	**08**:2-2009	BXD	Quy chuẩn kỹ thuật quốc gia về công trình ngầm đô thị. Phần 2: Gara ô tô National Code for urban underground structures: Part 2: Car Garage	**20**

Advantages of current VIETNAMESE G.E. standards

In general, with a hundred of current Vietnamese standards for geotechnical engineering could meet the requirement when applying in most of common projects in Vietnam.

- Many standards have been made based on international codes/standards with correction to be suitable with Vietnamese conditions.
- The international standards used for making Vietnamese standards have been the newest and modern ones.
- The revision and correction of standards or codes have been conducted every about 5 years to make them better to conform the international standards.

Disadvantages of current VIETNAMESE G.E. standards

- Several standards based on LRFD approach (probabilities), but others using ASD (constant safety factor by experience). LRFD or ASD can be used for design philosophies, but in a given project, only one is chosen for practice.
- Standards have NOT matched the development of new technologies in geotechnical engineering.
- Lack of many codes and standards related to the near future projects in Vietnam such as nuclear power plants or urban underground railways/metro…
- Many standards have been not arranged in order in the system
- Several similar standards edited in 3 ministries of construction, transport, and water resources for example, Testing for soil properties, soil classification, soil improvement, ..
- Lack of national data/innex
- Not many codes or regulations for geotechnical engineering
- Lack of specification or explanation of standards
- Many technical terms have been being different between standards because of different editing organizations, …
- The professional societies have not played an important role in developing codes and standards.
- Because standards are not mandatory, it makes standards less important than the past.

Argument of VN geotechnical engineering standards

- ✓The differences about soil classification between Russia/Vietnam and EN, USA → affect the design values
- ✓Bearing capacities of piles are different in designing buildings, bridges, .. Because of different chosen FS, or different design methods ..
- ✓Bearing capacities of piles from static load tests are different within methods. → Need guidelines/Spec
- ✓Lack of detailed design or specification for negative friction on piles
- ✓Lack of Pile-raft foundation in design standards
- ✓…..

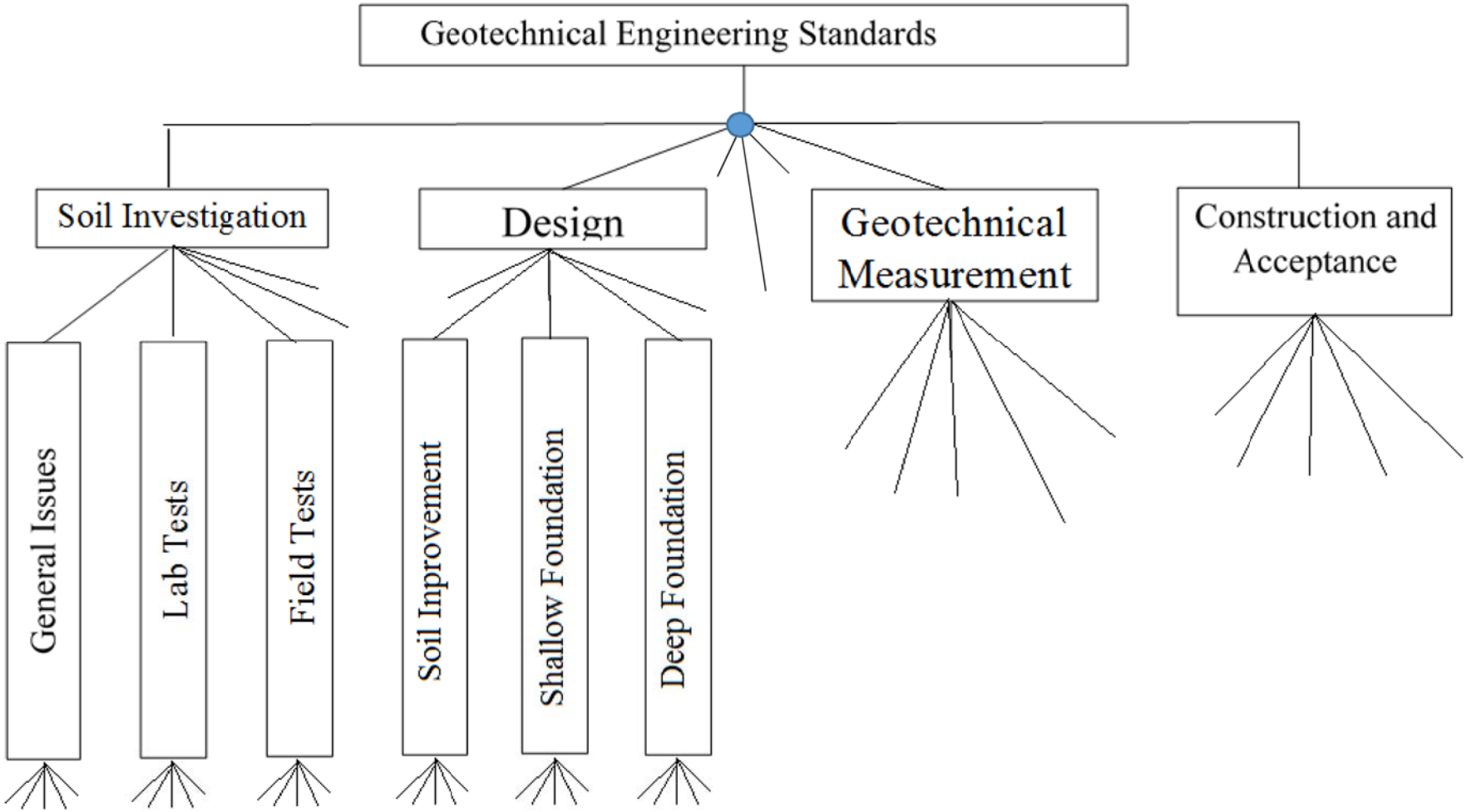
Argument of VN geotechnical engineering standards

TCVN 9393:2012 - *Piles - Standard test method in situ for piles under axial compressive load*

Bảng E.1: Giá trị sức chịu tải giới hạn .. – Ultimate Bearing Capacity of Pile vs Disp.

Chuyển vị giới hạn/ **Settlement**	Điều kiện áp dụng/**Condition**	Phương pháp đề nghị/**Method**
10 % D	Các loại cọc/**All**	Tiêu chuẩn Pháp DTU 13-2 **(France)** Tiêu chuẩn Anh **BS 8004**: 1986 Tiêu chuẩn Nhật **JSF** 1811 – 1993 **(Japan)**
2 S_{max}	P_{gh} ứng với 1/2 S_{gh} S_{max} ứng với 0,9P	Brinch Hansen Thụy Điển **(Sweden)**
2,5 % D	Cọc khoan nhồi/Bored pile	De Beer
(3 % đến 6 %) D 40 mm đến 60 mm 60 mm đến 80 mm hoặc (2PL/3EA) + 20 mm	Cọc khoan nhồi chống Cọc có L/D từ 80 đến 100	Trung Quốc **(China)**

Planning for developing codes and standards for geotechnical engineering in Vietnam



Planning for soil investigation codes and standards (Grade chart)

	Necessary Grade			Revised Frequency Grade				Unity Grade			
Level	High	Medium	Low	High	Medium	Low	No	No	High	Medium	Low
Grade	5/5	3/5	1/5	1/3	2/3	3/3	3/3	0/3	1/3	2/3	3/3
Characteristics	Principle, terms and definitions, new equipment, new technology but widely used in the market but w/o standards	Spec and revised standards	Other	Last revised less than 5 years	Last revised from 5÷10 yeas	Last revised more than 10 years			Based on Russian Standards	Partly based on Russian standards	Not related Russian standards

Planning for soil investigation codes and standards (Ex.)

No	Notation	Name of Codes or Standards	Planning up to the year of 2030												Referenced Standards
			Grade				2015-2017		2018-2020		2021-2025		2026-2030		
			Necessary grade	Revised frequency	Unity grade	Total grade	New	Review	New	Review	New	Review	New	Review	
Code															
1		Investigation principle of geotechnical data for construction	4	3	0	7			X						ГОСТ 8.002-86; СН 52-85; РСН 53-85 and others
Standard															
General Issues															
2	TCVN 4419:1987	Soil investigation - principle	3	2	1	6				X					TCVN 4419:1987 СП 47.13330. 2012; СП 11. 105.97 Part 1

Planning for soil investigation codes and standards

3		**Soil investigation. Terms and definitions**	**4**	**3**	**0**	**7**			**X**					**JGJ 84-1992; GB/T 50297-98;**
4	TCVN 8732-2012	Soils for hydraulic engineering construction - Terminologies and definition	3	2	2	7				X				TCVN 8732-2012
5	TCVN 5747:1993	Soil – Classification for civil engineering	5	2	3	10		X						TCVN 5747:1993
6	TCVN 8217:2009	Soil – Classification for hydraulic engineering	3	2	2	7				X				TCVN 8217:2009
7		Soil investigation. Sampling, packing, transportation and curing of samples	5	3	0	8			X					EUROCODE 7: EN 1997-2 : 2007
8	TCVN 2683:2012	Soil – Sampling, packing, transportation and curing of samples	3	2	2	7				X				TCVN 2683:2012
9	TCVN 8733:2012	Rock for hydraulic engineering construction - Method of sampling, transporting, selecting and keeping of specimen of rock for laboratory tests	3	2	2	7				X				TCVN 8733:2012
10		Soil investigation. Method soil sample preparation preparing soil sample test	5	3	0	8			X					ГОСТ 30416-96

Planning for soil investigation codes and standards

11		**Soil investigation. Data processing**	5	3	0	8			X						ГОСТ 20522-96
12	TCVN 9153:2012	Hydraulic structure – Method for correction of soil test results	3	1	2	6				X					TCVN 9153:2012
13		Soil investigation. Guidelines for Soil investigation report	5	3	0	8			X						For easier to use
14	14 TCN 145:2005	Guidelines for preparing proposal of survey and investigation for design hydraulic engineering	5	3	2	10		X							14 TCN 145:2005
	SOIL INVESTIGATION. METHODS, TESTING														
	SOIL INVESTIGATION. LABORATORY METHOD														
15	TCVN 4195:	Soils – Laboratory methods for determination of density	1	1	2	4						X			TCVN 4195: 2014
16	TCVN 4202:	Soils - Laboratory methods for determination of unit weight	1	1	2	4						X			TCVN 4202: 2014

Planning for soil investigation codes and standards

17	**TCVN 4198:**	Soil investigation. Test Method for Particle-Size Analysis of Soils	**1**	**1**	**2**	**4**						X			**Reviewed in 2014 TCVN 4198: 2014**
18	TCVN 4197:	Soils - Laboratory methods for determination of plastic limit and liquid limit	1	1	2	4						X			TCVN 4198:2014
19	TCVN 4196:	Soils - Laboratory methods for determination of moisture and hydroscopic water amount	1	1	2	4						X			TCVN 4196: 2014
20	TCVN 4201	Soils - Laboratory methods for determination of compaction characteristics	3	2	2	7				X					TCVN 4201:2014
21	TCVN 4200	Soils - Laboratory methods for determination of compressibility	3	2	2	7				X					TCVN 4200:2014
22	TCVN 4199	Soils - Laboratory methods for determination of shear resistance in a shear box appratus	3	2	2	7				X					TCVN 4199:2014
23	TCVN 8868:2011	Test method for Unconsolidated – Undrained and Consolidated – Drain for cohesive soil on triaxial compression equipment	3	2	2	7				X					TCVN 8868:2011

Planning for soil investigation codes and standards

24	TCVN 8719:2012	Expansive Soil - properties	3	2	1	6				X					Reviewed in 2012 TCVN 8719:2012
25	TCVN 8722:2012	Soil for hydraulic engineering construction - Laboratory test method for determination of collapsed compression characteristics of soil	1	2	1	4						X			TCVN 8722:2012
26	TCVN 8723:2012	Soil for hydraulic engineering construction - Laboratory test method for determination of permeability coefficient of soil	3	2	1	6				X					TCVN 8723:2012
27		Soil investigation. Laboratory method for determination the dynamic soil characteristics	5	3	0	8	X							X	D6066-96R04
28	TCVN 8727:2012	Soils for hydraulic engineering construction - Laboratory test method for determination of total content and content of composition ion of dissolvable salts in soil	1	2	1	4						X			TCVN 8727:2012

Planning for soil investigation codes and standards

29	TCVN 8726:2012	Organic matter determination	1	2	1	4						X			TCVN 8726:2012
30	22 TCN 57-1984	Test procedure for physical and mechanical properties of rocks	5	3	1	8		X							22 TCN 57-1984
31	TCVN 8733:2012	Rock for hydraulic engineering construction - Method of sampling, transporting, selecting and keeping of specimen of rock for laboratory tests	3	2	1	6				X					TCVN 8733:2012
32	TCVN 8734:2012	Rock for hydraulics engineering construction – Methods of petrographical analysis of thin slice by microscope for determination of rock name	1	2	1	4						X			TCVN 8734:2012
33	TCVN 8735:2012	Rock for hydraulic engineering construction - Laboratory test method for determination of specific gravity of rocks	3	2	1	6				X					TCVN 8735:2012
34		Rocks. Methods for determination of uniaxial tensile strength	3	3	0	6			X						ГОСТ 21153.3-85
35		Rocks. Methods for determination of mechanical properties by pressing with spherical indentors	3	3	0	6			X						ГОСТ 24941-81

Planning for soil investigation codes and standards

36		**Rocks. Methods for determination of strength and elastic modulus**	**3**	**3**	**0**	**6**			X						**D31144-2; D5407-95R00 ; D4455-01..**
37		Peat. Determination of the disintegration degree	3	3	0	6			X						ГОСТ 10650-86
38		Peat. Methods for determination of moisture	3	3	0	6			X						ГОСТ 11305-83
39		Peat..Methods for the determination of ash content	3	3	0	6			X						ГОСТ 11306-94
	SOIL INVESTIGATION. FIELD TEST														
40		Soil investigation: drilling and sampling	1	3	1	5						X			14 TCN 145:2005 14 TCN 13:1985 22TCN-82:1985 14 TCN 187 2006
41	TCVN 9351:2012	Soils - Field testing method - Standard penetration test	1	2	1	4						X			TCVN 9351:2012
42		Soils. Cone penetration test and dynamic probing	1	2	1	4						X			ГОСТ 19912-2001
43	TCVN 9352:2012	Soils - Method of cone penetration test	1	2	1	4						X			TCVN 9352:2012
44	22TCN 355 2006	Field Van Shear Test	5	3	1	8		X						X	22TCN 355 2006

Planning for soil investigation codes and standards

45		Pressometer and dilatometer tests	5	3	0	8	X							X	EN 1997-3 : 1999
46		Soils - In situ test methods for determination of deformation module by horizontal plate loading	5	3	0	8	X							X	EN 1997-3 : 1999
47	TCVN 9354:2012	Soils - In situ test methods for determination of deformation module by plate loading	5	3	1	8		X				X			TCVN 9354:2012
48		Methods for large soil testing	1	3	0	4					X				Base on foreign standard
49		Methods of geophysical survey	5	3	0	8	X							X	PCH 64-87
50		The hydrogeological test methods	1	3	0	4					X				Base on foreign standard
51		Methods of testing piles	5	3	1	8		X						X	TCVN 9397:2012 TCVN 9396:2012 TCVN 9363:2012
	SOIL INVESTIGATION. GEOTECHNICAL MONITORING														
52		Monitoring of horizontal soil displacements	1	3	0	4					X				D6230-98
53		Monitoring of soil pressures	1	3	0	4					X				D4719-00
54		Monitoring of soil water pressures	1	3	0	4					X				D5778-95R00

Planning for soil investigation codes and standards

55		**Dam investigation: Principle**	5	3	0	8	X							X	22TCN 260:2000
56		Soil investigation for transportation engineering. Principle	5	3	0	8	X							X	22TCN 262:2000
57		Soil investigation for underground engineering. Principle	5	3	0	8	X					X			14 TCN 13:1985
58		Soil investigation for offshore engineering. Principle	3	3	0	6			X					X	Based on foreign standard
59		Soil investigation for Nuclear Power Plants. Principle	5	3	0	8	X							X	ПиРАЭ-5.10-87
60		Soil investigation for Economic planning regions. Principle	3	3	0	6			X					X	Based on foreign standard
61		Soil investigation for repairation and reconstruction work	3	3	0	6			X					X	Based on foreign standard
	TCVN 9378:2012	Investigation, evaluation of existing situation of masonry houses and structures	1	2	1	4					X				TCVN 9378:2012

Planning for soil investigation codes and standards

	Special projects														
62	TCVN 9402:2012	Technical regulation of engineering geological investigation for construction in karst areas	1	2	1	4					X				TCVN 9402:2012
63		Soil investigation in areas with high earthquake strength	3	3	0	6			X						Base on foreign standard
64		Soil investigation in areas in special conditions	3	3	0	6			X						СП 11-105-97– Part 3
65		Soil investigation in areas of high population density.	3	3	0	6			X						Base on foreign standard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Thank you !