

IMPLEMENTATION MANUAL IN JAPAN

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Key Data for Micropile in Japan

1995.1.17	Hyogo-Ken Nanbu Earthquak
1996	Technical Paper by Bruce Dr Okahara (PWRI)
1997.4	JAMP Chair Prof. Hoshiya
1997.10	1 st IWM Seattle
1998	Technical Committee (HCMP) in ACTEC
1999	Joit Public-Private Research 2 nd IWM Ube

1. Design and Construction Manual for High Capacity Micropile (Draft)
 - Published 1999.3
 - Discussed by H.C.M.P. Technical Committee in Advanced
 - Construction Technology Center, extra-body of Ministry of Construction
 - Japanese Association of HCMP (JAMP) 1998 ~1999.3
 - Japanization and Learning FHWA Documents
 - The State of the Art by D. Bruce and I. Juran
 - Princibe of Implimentation Manual (early draft)
 - High Capacity Micro Pile
2. Joint Public-Private Research 1999 - 2001
 - Focus on Seismic Retrofit for existing Bridge Foundation PWRI, ACTEC, 12 Private Companies, 4 observers (Beureau, Public Corporation)
 - Goal Development of New Seismic Retrofit Method
 - Establish of Design & Construction Manual
 - NCMP, STMP, MSP etc.
3. Implementation Manual for Micropile Design and Construction? 2002 ?

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" 武田 康司 "

ACTEC

University

○印は旧委員

Ministry of Construction (PWRI, Bureau)

Public Corporation (Japan Highway, Metropolitan, Haashiin)

Design & Construction Manual for High Capacity Micropile (Draft)

1. General

- 1.1 Scope of Application
- 1.2 Definition of Terms
- 1.3 Structure
- 1.4 Bearing Layer
- 1.5 Basic Policy of Design and Construction

2. Material

- 2.1 Component of a Pile
- 2.2 Steel Pipe and Reinforcing Bar
- 2.3 Grout
- 2.4 Anti-Corrosion

3. Survey

- 3.1 Kinds of Survey
- 3.2 Ground Survey
- 3.3 Survey on Construction Condition

4. Design

- 4.1 General Requirements
- 4.2 Design Procedure
- 4.3 Design Constant of Material
- 4.4 Bearing Capacity
- 4.5 Design of Steel Pipe
- 4.6 Design of Anchor Part
- 4.7 Design of Pile Head
- 4.8 Settlement at Pile Head

5. Seismic Design

- 5.1 Basic Requirements
- 5.2 Coefficient of Horizontal Ground Reaction
- 5.3 Axial Spring Constant of a Pile
- 5.4 Transverse Spring Constants of a Pile
- 5.5 Flexural Stiffness of a Pile

6. Construction

- 6.1 General Requirements
- 6.2 Construction Process
- 6.3 Machine and Equipments
- 6.4 Excavation
- 6.5 Insert of Steel Pipe and Reinforcing Bar
- 6.6 Mixing of Mortar
- 6.7 Grouting
- 6.8 Re-insert of Steel Pipe
- 6.9 Treatment of Pile Head

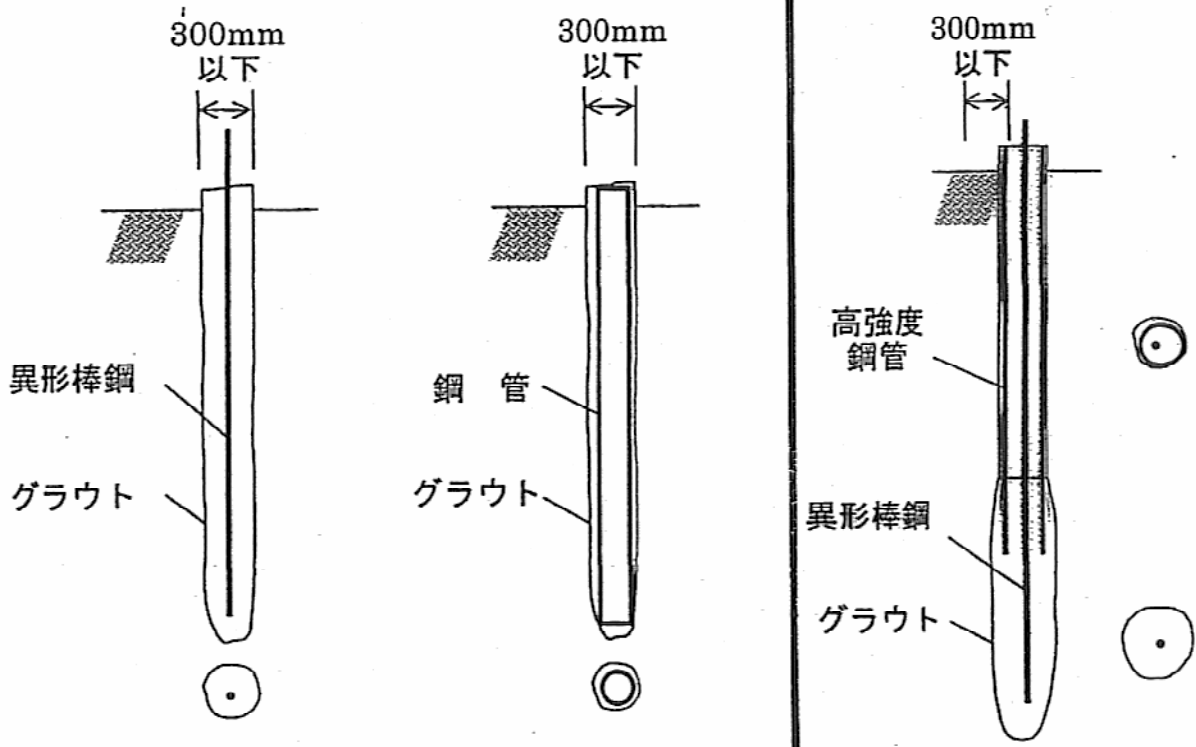
7. Construction Management

- 7.1 General requirement
- 7.2 Quality Control of Material
- 7.3 Schedule Management
- 7.4 Safety Management
- 7.5 Report

8. Loading Test

- 8.1 General Requirement
- 8.2 Kind of Loading Test
- 8.3 Static Loading Test
- 8.4 Dynamic Loading Test

Typical High Capacity MP



Low

Middle

High Capacity

表 I-1.1 MPの構造に基づく分類

	低耐力 MP	中耐力 MP	高耐力 MP
Material 補強材料	Bar 异形棒鋼	Steel Pipe 鋼管	高強度鋼管・ 异形棒鋼
Diameter 杭径	$150\text{mm} > D$	$300\text{mm} \geq D \geq 100\text{mm}$	$300\text{mm} \geq D \geq 150\text{mm}$

Typically

Diameter

150 ~ 300 mm

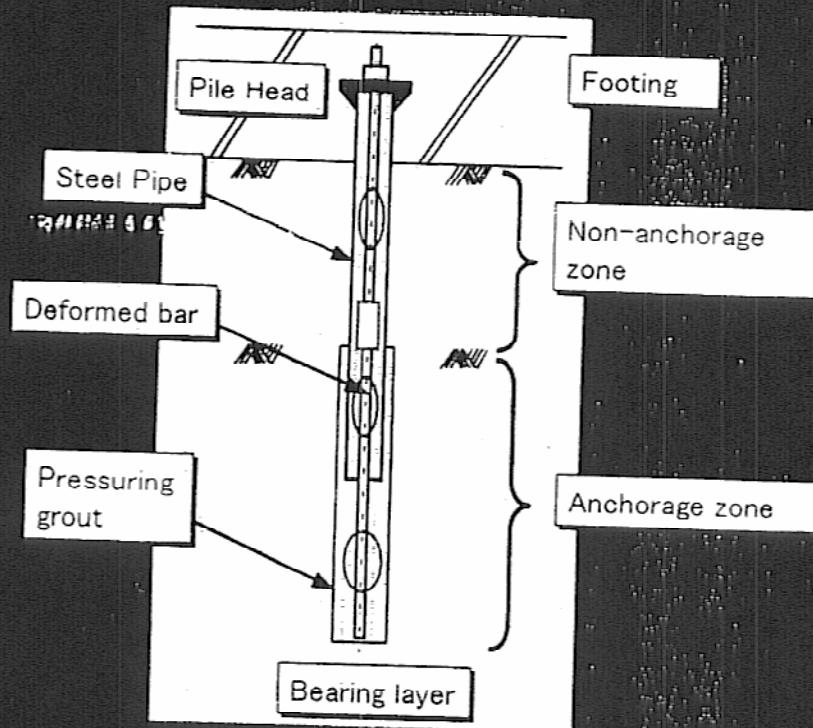
Length

5 ~ 30 m

Load

1000 kN <

■ Example of the Structure of Micropile



Joint Public-Private Research on the Development of Seismic Retrofit Method for the existing Bridge Foundation

Purpose : Development of New Seismic Retrofit Method
Establishment of Design & Construction Manual

Research Period : 1999-2001

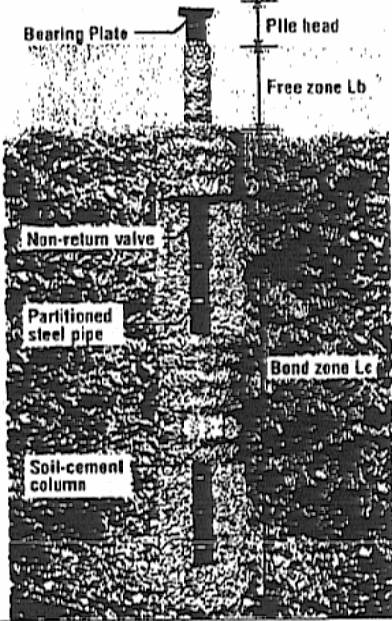
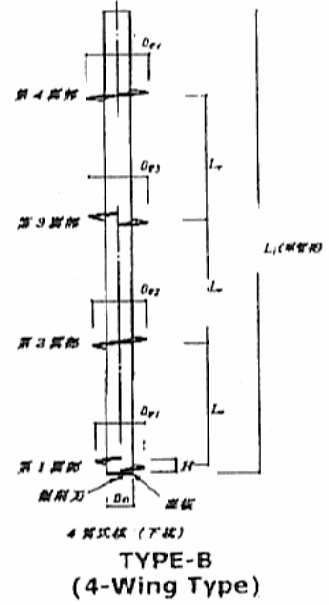
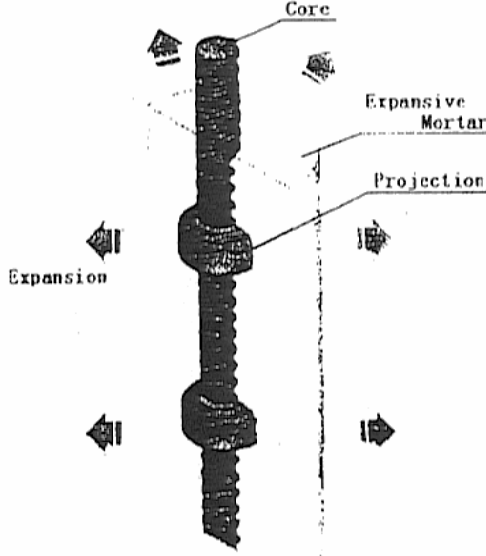
Member of Joint Public-Private Research

- Public Works Research Institute, Ministry of Construction
Construction Engineering Division
Foundation Engineering Division
- Advanced Construction Technology Center
- Private Company
 - Hirose Co., Ltd.
 - Fujita Corporation
 - Sanshin Corporation
 - Shiraishi Corporation
 - Zenitaka Corporation
 - Kyokuto Corporation
 - Japan Foundation Engineering Co., Ltd.
 - Konoike Construction Co., Ltd.
 - Nittoku Construction Co., Ltd.
 - Toyo Construction Co., Ltd.
 - Tone Geo Tech Co., Ltd.
 - Raito Kogyo Co., Ltd.

Observer

- Kanto Regional Construction Bureau, Ministry of Construction
- Japan Highway Public Corporation
- Metropolitan Expressway Public Corporation
- Hanshin Expressway Public Corporation

Comparison for each method

Method	STMP	MSP	ERP
Structure of pile		 <p>TYPE-B (4-Wing Type)</p>	
Principle	Increasing pile diameter by soil improvement	Adding protrusions to give greater resistance	Increasing friction by expansion pressure during hardening
Dimension	Steel pipe ϕ 165.2~267.4mm Pile diameter ϕ 1000mm	Steel pipe ϕ 114.3~267.4mm Screw ϕ 250~650mm	Pile diameter ϕ 60~135mm
Construction Method	High-pressur cement-milk spray mixing	Installing pile by a rotary auger	Casing boring
Company	Toyo Construction Co., Ltd.	Konoike Construction Co., Ltd.	Hirose & Co., Ltd.