

**APPENDIX A
TABLE OF CONTENTS**

Chapter	Title	Page
1	INTRODUCTION	1
2	IS GROUND IMPROVEMENT NECESSARY?	6
	Preliminary Evaluation	6
	Difficult Soils Evaluation	8
	Liquefaction Evaluation	9
	Stability Evaluation	11
	Bearing Capacity and Settlement Evaluation	13
	Seepage Evaluation	14
3	IF GROUND IMPROVEMENT IS NECESSARY, WHAT METHODS ARE AVAILABLE?	47
	Soil Replacement	49
	Admixture Stabilization.....	50
	Roller Compacted Concrete.....	50
	Deep Dynamic Compaction	50
	Vibrocompaction and Vibrorod.....	52
	Stone Columns (Vibroreplacement).....	54
	Gravel Drains.....	54
	Sand and Gravel Compaction Piles	56
	Explosive Compaction	57
	Permeation Grouting	58
	Compaction Grouting	59
	Jet Grouting	60
	Deep Soil Mixing	61
	Mini-Piles.....	61
	Soil Nailing.....	63
	Prefabricated Vertical Drains	64
	Electroosmosis	65
	Buttress Fills	66
	Biotechnical Stabilization and Soil Bioengineering	67
4	HOW IS GROUND IMPROVEMENT DESIGNED?	79
	Design Considerations and Parameters.....	79
	Design Procedures.....	81
	Design Issues	83
	Design Recommendations	85

TABLE OF CONTENTS (Cont.)

Chapter	Title	Page
5	WHAT ARE QA/QC REQUIREMENTS FOR IMPROVED GROUND?	89
	Construction Observations	89
	Verification Testing	92
	Laboratory Testing.....	94
6	WHAT HAS BEEN THE PERFORMANCE OF IMPROVED GROUND?.....	96
	ACKNOWLEDGMENTS.....	100
	REFERENCES	101

List of Tables

1	Potential Applications of Ground Improvement Methods in Civil Engineering	3
2	Flow Charts for Determination of the Need for Ground Improvement	15
3	Potentially Applicable Ground Improvement Methods for Civil Works Structures	68
4	Summary of Ground Improvement Methods for Remediation of Large, Open, Undeveloped Sites.....	70
5	Summary of Ground Improvement Methods for Remediation of Constrained and/or Developed Sites.....	74
6	Summary of Approximate Costs for Various Ground Improvement Methods	76

TABLE OF CONTENTS (Cont.)

List of Figures (Cont.)	Page
1 - 26 Refer to Table 2	15
27 Applicable grain size ranges for ground improvement methods	48
28 The dynamic compaction process	51
29 The vibrocompaction process	52
30 Range of particle size distributions suitable for densification by vibrocompaction	53
31 Approximate variation of relative density with tributary area or area replacement ratio	53
32 Arrangement of gravel drains	55
33 Usual compaction pile patterns	56
34 Typical layout for explosive compaction program	57
35 Types of grouting	59
36 Compaction grout bulb construction	60
37 The jet grouting process	61
38 DSM for liquefaction control	62
39 Mini-pile applications	62
40 Soil nailing for excavation support	63
41 PV drains with surcharge load	65
42 Buttress fill at toe of embankment	66
43 Biotechnical stabilization by brush layering	67
44 Effect of ground improvement on liquefaction potential for sites that were shaken in the 1989 Loma Prieta and 1995 Hyogo-ken Nambu (Kobe) earthquakes	88
45 Measured settlement at improved sites due to the 1995 Hyogo-ken Nambu (Kobe) earthquake	99