Contents

Introduction	х
1 Electrical Grid	1
Introduction	1
Overview of the Electrical Grid	3
Thermal Power Stations	7
Wind Farms	11
Transmission Towers	15
Transmission Line Components	19
Substations	23
Substation Equipment	27
Typical Utility Pole	31
Electrical Distribution Equipment	35
2 Communications	39
Introduction	39
Overhead Telecommunications	41
Underground Telecommunications	45
Radio Antenna Towers	49
Satellite Communications	53
Cellular Communications	57
3 Roadways	61
Introduction	61
Urban Arterial and Collector Roads	63
Pedestrian and Bicycle Infrastructure	67
Traffic Signals	7 1
Traffic Signs and Markings	75
Highway Earthwork and Retaining Walls	79
Typical Highway Section	83
Typical Highway Layout	87
Interchanges	91

4	Bridges and Tunnels	95
	Introduction	95
	Types of Bridges	97
	Typical Bridge Section	101
	Overview of Tunnels	105
	Tunnel Cross Section	109
5	Railways	113
	Introduction	113
	Railroad Tracks	115
	Switches and Signals	119
	Grade Crossings	123
	Electrified Railways	127
6	Dams, Levees, and Coastal Structures	131
	Introduction	131
	Shore Protection Structures	133
	Ports	137
	Locks	141
	Levees and Floodwalls	145
	Concrete Dams	149
	Embankment Dams	153
	Spillways and Outlet Works	157
7	Municipal Water and Wastewater	161
	Introduction	161
	Intakes and Pumping Stations	163
	Wells	167
	Transmission Pipelines and Aqueducts	171
	Water Treatment Plants	175
	Water Distribution Systems	179

	Water Towers and Tanks	183
	Sanitary Sewers and Lift Stations	187
	Wastewater Treatment Plants	191
	Stormwater Collection	195
8	Construction	199
	Introduction	199
	Typical Construction Site	201
	Cranes	205
	Construction Machines	209
	Acknowledgments	213
	Glossary	215
	Index	239