

# ISO 20524-1:2020-03 (E)

## Intelligent transport systems - Geographic Data Files (GDF) GDF5.1 - Part 1: Application independent map data shared between multiple sources

---

Contents	Page
Foreword.....	xxvi
Introduction.....	xxvii
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	2
3.1 General terms.....	2
3.2 Mathematical terms.....	3
3.3 Geodetical terms.....	5
3.4 GDF terms.....	6
4 Symbolization and notation elements.....	9
5 Overall conceptual data model.....	9
5.1 Conceptual data models in GDF.....	9
5.2 The general data model of GDF.....	9
5.2.1 The Feature model.....	9
5.2.2 Graph topology.....	11
5.2.3 Levels in GDF.....	15
5.2.4 Height modelling and time modelling.....	17
5.3 The Attribute model.....	18
5.4 The Relationship model.....	21
5.5 Linear referencing.....	21
5.6 The Feature representation scheme.....	22
5.7 Time modelling.....	22
5.8 Data management: organisation of Feature data into Layers and Sections.....	23
6 Feature Catalogue.....	26
6.1 Generic specifications.....	26
6.1.1 Features and Feature Themes.....	26
6.1.2 Feature Class Codes.....	27
6.1.3 Simple and Complex Features.....	27
6.1.4 Feature hierarchy.....	27
6.1.5 Data model for the Feature Catalogue.....	27
6.1.6 User-defined Features.....	27
6.2 Roads and Ferries.....	28
6.2.1 General overview.....	28
6.2.2 Address Area.....	31
6.2.3 Address Area Boundary Element.....	31
6.2.4 Aggregated Way.....	31
6.2.5 Enclosed Traffic Area.....	31
6.2.6 Ferry.....	32
6.2.7 Ferry Connection.....	32
6.2.8 Interchange.....	33
6.2.9 Intersection.....	34
6.2.10 Junction.....	34
6.2.11 Pathway.....	35
6.2.12 Road.....	36

6.2.13	Road Element .....	39
6.2.14	Roundabout .....	41
6.2.15	Topological relations between Junctions, Road Elements, Pathways, Enclosed Traffic Areas, Ferry Connections and Address Areas Boundary Elements .....	42
6.3	Administrative Areas .....	44
6.3.1	General overview .....	44
6.3.2	Administrative Area (abstract) .....	49
6.3.3	Administrative Boundary Element .....	49
6.3.4	Administrative Boundary Junction .....	49
6.3.5	Administrative Place (abstract) .....	49
6.3.6	Administrative Place A to Z .....	50
6.3.7	Country .....	51
6.3.8	Order Area (abstract) .....	51
6.3.9	Order-1 to 7 Areas .....	51
6.3.10	Order-8 Area .....	51
6.3.11	Order-9 Area .....	52
6.3.12	Supra-National Area .....	52
6.4	Named Areas .....	52
6.4.1	General overview .....	52
6.4.2	Boundaries (abstract) .....	52
6.4.3	Boundary Element .....	52
6.4.4	Boundary Junction .....	53
6.4.5	Bounded Area (abstract) .....	54
6.4.6	Built-up Area .....	54
6.4.7	Census District .....	54
6.4.8	District (abstract) .....	54
6.4.9	Electoral District .....	54
6.4.10	Emergency Medical Dispatch District .....	54
6.4.11	Fire Dispatch District .....	55
6.4.12	Named Area .....	55
6.4.13	Named Areas (abstract) .....	55
6.4.14	Phone District .....	55
6.4.15	Police District .....	55
6.4.16	Postal District .....	55
6.4.17	School District .....	55
6.5	Land Cover And Use .....	56
6.5.1	General overview .....	56
6.5.2	Land Cover Objects (abstract) .....	56
6.5.3	Building .....	57
6.5.4	Schematic Building .....	58
6.5.5	Building Unit .....	58
6.5.6	Building Detail .....	58
6.5.7	Town Block .....	58
6.5.8	Block Detail .....	59
6.5.9	Building Façade .....	59
6.5.10	Sidewalk .....	59
6.5.11	Island .....	59
6.5.12	Artificial Surface .....	60
6.5.13	Urban Fabric .....	60
6.5.14	Continuous Urban Fabric .....	61
6.5.15	Discontinuous Urban Fabric .....	61
6.5.16	Industrial, Commercial And Transport Unit .....	62
6.5.17	Industrial Or Commercial Unit .....	63
6.5.18	Road And Rail Network And Associated Land .....	63
6.5.19	Port Area .....	63
6.5.20	Airport Area .....	63
6.5.21	Mine, Dump And Construction Site .....	63
6.5.22	Mineral Extraction Site .....	64

6.5.23	Dump Site .....	64
6.5.24	Construction Site.....	65
6.5.25	Artificial, Non-Agricultural Vegetated Area.....	65
6.5.26	Green Urban Area.....	66
6.5.27	Sport And Leisure Facility .....	66
6.5.28	Agricultural Area .....	67
6.5.29	Arable Land.....	67
6.5.30	Non-Irrigated Arable Land .....	68
6.5.31	Permanently Irrigated Land .....	68
6.5.32	Rice Field .....	69
6.5.33	Permanent Crop .....	69
6.5.34	Vineyard.....	70
6.5.35	Fruit Trees And Berry Plantation .....	70
6.5.36	Olive Grove.....	70
6.5.37	Pasture And Rangeland .....	70
6.5.38	Pasture.....	71
6.5.39	Rangeland.....	71
6.5.40	Heterogeneous Agricultural Area.....	72
6.5.41	Annual Crop Associated With Permanent Crop.....	72
6.5.42	Complex Cultivation Pattern .....	73
6.5.43	Land Principally Occupied By Agriculture With Significant Area Of Natural Vegetation .....	73
6.5.44	Agro-Forestry area.....	73
6.5.45	Forest And Semi-Natural Area .....	73
6.5.46	Forest .....	74
6.5.47	Broad-Leaved Forest .....	75
6.5.48	Coniferous Forest .....	75
6.5.49	Mixed Forest.....	76
6.5.50	Scrub And/Or Herbaceous Vegetation Association.....	76
6.5.51	Natural Grassland.....	77
6.5.52	Moor And Heathland .....	77
6.5.53	Sclerophyllous vegetation .....	77
6.5.54	Transitional Woodland/Scrub.....	77
6.5.55	Open Space With Little Or No Vegetation.....	78
6.5.56	Beach, Dune And Sand Plain .....	78
6.5.57	Bare Rock.....	79
6.5.58	Sparsely Vegetated Area .....	79
6.5.59	Burnt Area.....	79
6.5.60	Glacier And Perpetual Snow .....	79
6.5.61	Wetland.....	79
6.5.62	Inland Wetland.....	80
6.5.63	Inland Marsh .....	81
6.5.64	Peatbog.....	81
6.5.65	Forested Wetland .....	82
6.5.66	Coastal Wetland .....	82
6.5.67	Salt marsh.....	83
6.5.68	Saline.....	83
6.5.69	Intertidal flat .....	84
6.6	Terrain Elevation.....	84
6.6.1	General overview.....	84
6.6.2	TIN Surface.....	87
6.6.3	TIN Triangle.....	87
6.6.4	TIN Node .....	87
6.6.5	TIN Breakline .....	87

6.6.6	TIN Stopline.....	87
6.6.7	Contour Line.....	88
6.6.8	Contour Line Area .....	88
6.6.9	Contour Line Point.....	88
6.6.10	Gridded Surface .....	88
6.7	Structures.....	89
6.7.1	General overview .....	89
6.7.2	Structure.....	89
6.8	Railways.....	89
6.8.1	General overview .....	89
6.8.2	Railway Element.....	90
6.8.3	Railway Element Junction .....	90
6.9	Waterways .....	90
6.9.1	General overview .....	90
6.9.2	Canal .....	91
6.9.3	Coastal Lagoon .....	92
6.9.4	Estuary .....	92
6.9.5	Inland Water .....	92
6.9.6	Lake.....	92
6.9.7	Marine Water.....	92
6.9.8	Reservoir.....	93
6.9.9	River.....	93
6.9.10	Sea And Ocean .....	93
6.9.11	Water Body.....	93
6.9.12	Water Boundary Element.....	93
6.9.13	Water Boundary Junction.....	94
6.9.14	Water Course .....	94
6.10	Road Furniture.....	94
6.10.1	General overview .....	94
6.10.2	Environmental Equipment .....	95
6.10.3	Signpost .....	95
6.10.4	Traffic Light.....	95
6.10.5	Traffic Sign.....	96
6.10.6	Lighting.....	96
6.10.7	Measurement Device .....	96
6.10.8	Road Markings .....	96
6.10.9	Safety Equipment .....	96
6.10.10	Pedestrian Crossing .....	96
6.10.11	Complex Pedestrian Crossing.....	97
6.11	Services.....	98
6.11.1	General overview .....	98
6.12	Public Transport.....	99
6.13	Linear Referencing Features.....	100
6.13.1	General overview .....	100
6.13.2	Path .....	101
6.13.3	Referent .....	101
6.14	Linear Datum Features.....	102
6.14.1	General overview .....	102
6.14.2	Linear Datum .....	103
6.14.3	Anchor Point .....	103
6.14.4	Anchor Section .....	103
6.15	General Features .....	103
6.15.1	General overview .....	103
6.15.2	Centre Point of Feature .....	104

6.15.3	Traffic Location .....	104
6.15.4	Entry Point .....	104
7	Attribute Catalogue .....	105
7.1	Generic specifications .....	105
7.1.1	Attribute Types.....	105
7.1.2	Attribute Values .....	105
7.1.3	Attribute Type Name .....	105
7.1.4	Simple Attributes, Composite Attributes and Sub-Attributes .....	105
7.1.5	Composite Attributes combined with the Restrictive Sub-Attribute Lane Dependent Validity .....	106
7.1.6	Composite Attributes combined with the Restrictive Sub-Attribute Linear Segmentation .....	107
7.1.7	Composite Attributes combined with the Restrictive Sub-Attribute Pedestrian Type .....	107
7.1.8	Composite Attributes combined with the Restrictive Sub-Attribute Scope .....	108
7.1.9	Composite Attributes combined with the Restrictive Sub-Attribute Side of Line.....	108
7.1.10	Composite Attributes combined with the Restrictive Sub-Attribute Validity Direction .....	109
7.1.11	Composite Attributes combined with the Restrictive Sub-Attribute Validity Period.....	109
7.1.12	Composite Attributes combined with the Restrictive Sub-Attribute Vehicle Type .....	110
7.1.13	Names in combination with a Language Code.....	110
7.1.14	Default Attribute Values.....	111
7.1.15	Default Attribute units for measures .....	111
7.1.16	Attribute Type Codes.....	111
7.1.17	User-defined Attributes.....	112
7.1.18	Attribute mapping to Feature Themes and Relationships .....	112
7.1.19	The data model for Attributes.....	120
7.2	Attributes.....	150
7.2.1	Accepted Credit Cards.....	150
7.2.2	Accessibility.....	150
7.2.3	Accessibility Limitation.....	151
7.2.4	Accident.....	151
7.2.5	Accident Date .....	152
7.2.6	Accident Identifier .....	152
7.2.7	Address Information .....	152
7.2.8	Administrative Boundary Type.....	153
7.2.9	Airport Code .....	154
7.2.10	Alternate Name.....	155
7.2.11	Alternate Name Body .....	155
7.2.12	Alternate Name Text.....	156
7.2.13	Alternate Pronunciation .....	156
7.2.14	Alternate Street Name.....	156
7.2.15	Alternate Street Name Body .....	157
7.2.16	Alternate Street Name Text.....	158
7.2.17	Assignment Order.....	158
7.2.18	Association Type .....	159
7.2.19	Average Vehicle Speed.....	159
7.2.20	Block Class Name .....	159
7.2.21	Block Grouping.....	160
7.2.22	Block Type.....	160
7.2.23	Blocked Passage.....	161
7.2.24	Blocked Passage Location.....	161
7.2.25	Blocked Passage Type.....	161
7.2.26	Boundary Type .....	162

7.2.27	Brand Name.....	162
7.2.28	Breakfast Available .....	163
7.2.29	Building Class Name.....	163
7.2.30	Building Detail Type.....	163
7.2.31	Building Storey.....	164
7.2.32	Building Storey Count.....	164
7.2.33	Business Lunch.....	165
7.2.34	Car Dealer Type .....	165
7.2.35	City Centre Administrative Class .....	165
7.2.36	Commercial Airline Service .....	166
7.2.37	Common Language.....	166
7.2.38	Commuter/Regional Railway Station .....	166
7.2.39	Complex Building Elevation .....	166
7.2.40	Composite Alternate Pronunciation.....	167
7.2.41	Composite Exit Number .....	168
7.2.42	Composite Form of Way.....	168
7.2.43	Composite Pronunciation.....	168
7.2.44	Conditional Traffic Flow .....	169
7.2.45	Construction Status .....	169
7.2.46	Correspondence.....	170
7.2.47	Correspondence Order.....	170
7.2.48	Continuation Type .....	171
7.2.49	Currency .....	171
7.2.50	Departure/Arrival .....	171
7.2.51	Destination of Flight Connection.....	171
7.2.52	Destination Info on Traffic Sign .....	172
7.2.53	Destination Location.....	172
7.2.54	Direction Category.....	172
7.2.55	Directional Prefix.....	174
7.2.56	Directional Suffix.....	175
7.2.57	Display Class .....	175
7.2.58	Distance Expression .....	176
7.2.59	Distance Measure .....	177
7.2.60	Distance Measure Referent.....	177
7.2.61	Divided Road Element .....	178
7.2.62	Divider.....	178
7.2.63	Divider Colour .....	179
7.2.64	Divider Height .....	179
7.2.65	Divider Impact.....	180
7.2.66	Divider Marking.....	180
7.2.67	Divider Type.....	181
7.2.68	Divider Width .....	181
7.2.69	Domestic/International.....	182
7.2.70	Enclosed Traffic Area Type.....	182
7.2.71	Entry Point Type.....	183
7.2.72	Equipment Identifier .....	184
7.2.73	Exit Number.....	184
7.2.74	External Identifier .....	184
7.2.75	Façade Colour .....	185
7.2.76	Façade Component .....	185
7.2.77	Façade Component Placement .....	185
7.2.78	Façade Fabric.....	186
7.2.79	Façade Fabric Type.....	186
7.2.80	Façade Information .....	187

7.2.81	Facilities En Suite.....	187
7.2.82	Ferry Type.....	188
7.2.83	First House Number.....	188
7.2.84	Flight Info.....	188
7.2.85	Form of Way.....	189
7.2.86	Motorway.....	192
7.2.87	Frequency of a Traffic Connection.....	192
7.2.88	Functional Road Class.....	193
7.2.89	General Aviation.....	194
7.2.90	Give Way Type.....	194
7.2.91	Geopolitical Structure Containment.....	194
7.2.92	Government Type.....	195
7.2.93	Hearing Limitation.....	195
7.2.94	Height Label.....	196
7.2.95	High Occupancy Vehicle.....	197
7.2.96	House Number.....	197
7.2.97	House Number Range.....	198
7.2.98	House Number Structure.....	198
7.2.99	ID of Flight Connection.....	201
7.2.100	Importance.....	201
7.2.101	Infrastructure Accessibility Aids.....	201
7.2.102	Grade-separated Junction Type.....	202
7.2.103	Intermediate House Number.....	202
7.2.104	International Railway Station.....	203
7.2.105	ISO Country Code.....	203
7.2.106	Junction Type.....	203
7.2.107	Lane Dependent Validity.....	204
7.2.108	Lane Info.....	205
7.2.109	Lane Type.....	206
7.2.110	Last House Number.....	207
7.2.111	Lateral Offset.....	207
7.2.112	Length of a Road Element.....	208
7.2.113	Linear Position.....	208
7.2.114	Linear Referencing Method.....	209
7.2.115	Linear Segmentation.....	211
7.2.116	Location Description.....	212
7.2.117	Location Reference.....	213
7.2.118	Location Reference Code.....	213
7.2.119	Location Reference Type.....	213
7.2.120	Lower Building Elevation.....	214
7.2.121	Magnetic Anomalies.....	214
7.2.122	Main Railway Station.....	215
7.2.123	Maximum Height Allowed.....	215
7.2.124	Maximum Length Allowed.....	215
7.2.125	Maximum Number of Lanes.....	216
7.2.126	Maximum Total Weight Allowed.....	216
7.2.127	Maximum Weight per Axle Allowed.....	217
7.2.128	Maximum Width Allowed.....	217
7.2.129	Measured Length.....	217
7.2.130	Military Airport.....	218
7.2.131	Minimum Number of Lanes.....	218
7.2.132	Minimum Number of Occupants.....	219
7.2.133	Mountain Pass.....	219
7.2.134	Multi Media Action.....	219

7.2.135	Multi Media Description.....	220
7.2.136	Multi-Media File Attachment.....	220
7.2.137	Multi-Media File Attachment Context.....	221
7.2.138	Multi Media File Attachment Name.....	221
7.2.139	Multi Media File Attachment Type.....	222
7.2.140	Multi Media Time Domain.....	222
7.2.141	Name Component.....	223
7.2.142	Name Component Length.....	223
7.2.143	Name Component Offset.....	223
7.2.144	Name Component Type.....	224
7.2.145	Name Prefix.....	224
7.2.146	National Road Class.....	224
7.2.147	Not Crossable by Pedestrians.....	225
7.2.148	Notation.....	225
7.2.149	Notation Alphabet.....	226
7.2.150	Notation Anomaly.....	226
7.2.151	Notation Variant.....	227
7.2.152	Notation Version.....	228
7.2.153	Number of Lanes.....	228
7.2.154	Number of Rooms.....	228
7.2.155	Official Code.....	229
7.2.156	Official Language.....	229
7.2.157	Official Name.....	229
7.2.158	Official Name Body.....	230
7.2.159	Official Name Text.....	230
7.2.160	Official Street Name.....	231
7.2.161	Official Street Name Body.....	232
7.2.162	Official Street Name Text.....	232
7.2.163	One-way.....	233
7.2.164	Opening Period.....	233
7.2.165	Other Textual Content of a Traffic Sign.....	233
7.2.166	Ownership.....	234
7.2.167	Park and Ride Facility.....	234
7.2.168	Parking Facilities Available.....	234
7.2.169	Park Type.....	234
7.2.170	Parking Type Charged.....	235
7.2.171	Pass.....	235
7.2.172	Passing Restrictions.....	235
7.2.173	Pathway Safety Indicator.....	236
7.2.174	Pathway Type.....	236
7.2.175	Paved Road Surface Type.....	237
7.2.176	Pavement Status.....	238
7.2.177	Pedestrian Crossing Level.....	238
7.2.178	Pedestrian Crossing Priority.....	239
7.2.179	Pedestrian Crossing Signage.....	239
7.2.180	Pedestrian Crossing Type.....	239
7.2.181	Pedestrian Type.....	239
7.2.182	Percentage of International Traffic.....	240
7.2.183	Phonetic Alphabet.....	240
7.2.184	Place Name.....	241
7.2.185	Place within Place Classification.....	241
7.2.186	Point Assignment.....	242
7.2.187	Population.....	242
7.2.188	Population Class.....	243

7.2.189	Positional Accuracy .....	243
7.2.190	Post Office Type .....	243
7.2.191	Postal Code .....	244
7.2.192	Priceband .....	244
7.2.193	Pronunciation .....	245
7.2.194	Pronunciation Language.....	245
7.2.195	Pronunciation Variant.....	245
7.2.196	Public Transport Mode.....	246
7.2.197	Public Transport Operator .....	246
7.2.198	Publicly Accessible.....	246
7.2.199	Railway Type.....	246
7.2.200	Rating.....	247
7.2.201	Region Code.....	248
7.2.202	Removable Blockage .....	248
7.2.203	Restaurant Facilities Available.....	248
7.2.204	Road And Rail Network And Associated Land Type.....	248
7.2.205	Road Furniture Position .....	249
7.2.206	Road Gradient.....	249
7.2.207	Road Crossfall .....	249
7.2.208	Road Surface .....	250
7.2.209	Road Surface Condition.....	250
7.2.210	Road Under Structure.....	251
7.2.211	Road with Bicycle Lane.....	251
7.2.212	Road with Parking Lane .....	251
7.2.213	Road with Pavement .....	252
7.2.214	Route Direction .....	252
7.2.215	Route Number.....	252
7.2.216	Route Number Body .....	253
7.2.217	Route Number On Sign .....	253
7.2.218	Route Type Prefix.....	254
7.2.219	Route Type Suffix.....	254
7.2.220	Routing Identifier.....	254
7.2.221	Routing Sequence Number.....	255
7.2.222	Routing Type.....	255
7.2.223	Sand Area Type .....	256
7.2.224	Separator .....	256
7.2.225	Service Address.....	257
7.2.226	Settlement Type.....	257
7.2.227	Scenic Value.....	257
7.2.228	Scope .....	258
7.2.229	Side of Line.....	258
7.2.230	Sign Text .....	259
7.2.231	Slip Road Type.....	259
7.2.232	Slow Walker Limitation .....	263
7.2.233	Snack Served .....	263
7.2.234	Special Routing.....	264
7.2.235	Speed Restrictions .....	264
7.2.236	Spoken Language.....	265
7.2.237	Start End Flag.....	265
7.2.238	Street Lighted.....	265
7.2.239	Street Name .....	265
7.2.240	Street Type Prefix.....	266
7.2.241	Street Type Suffix .....	266
7.2.242	Structure Abutment.....	267

7.2.243	Structure Abutment Info .....	267
7.2.244	Structure Category .....	268
7.2.245	Structure Identifier .....	268
7.2.246	Structure Type .....	268
7.2.247	Suitable for Disabled or Impaired .....	271
7.2.248	Summer Time .....	271
7.2.249	Symbol on Traffic Sign.....	272
7.2.250	Telefax Number .....	273
7.2.251	Telephone Number.....	273
7.2.252	Time Difference of Flight Connection .....	273
7.2.253	Time of Arrival of Flight Connection.....	274
7.2.254	Time of Departure of Flight Connection .....	274
7.2.255	Time Zone .....	274
7.2.256	Toll .....	275
7.2.257	Toll Charge .....	275
7.2.258	Toll Point Type.....	275
7.2.259	Toll Road .....	276
7.2.260	Traffic Flow .....	276
7.2.261	Traffic Flow Measurement.....	277
7.2.262	Traffic Flow Measurement Type.....	277
7.2.263	Traffic Flow Measurement Unit.....	277
7.2.264	Traffic Jam Sensitivity .....	278
7.2.265	Traffic Signal Info.....	278
7.2.266	Traffic Sign Class .....	278
7.2.267	Traffic Sign Information .....	280
7.2.268	Trailing Spaces.....	280
7.2.269	Transcription Description .....	281
7.2.270	Transition .....	281
7.2.271	Travel Time.....	282
7.2.272	Type of Public Transport Point.....	282
7.2.273	Underground Flag.....	283
7.2.274	Unpaved Road Surface Type .....	283
7.2.275	Upper Building Elevation.....	283
7.2.276	Urban Railway Station.....	284
7.2.277	Validity Direction.....	284
7.2.278	Validity Period .....	284
7.2.279	Value on Referent .....	285
7.2.280	Value on Traffic Sign .....	285
7.2.281	Vehicle Type.....	286
7.2.282	Vision Limitation.....	290
7.2.283	Water Boundary Element Type .....	290
7.2.284	Water Body Type.....	291
7.2.285	Wheelchair Limitation .....	292
7.2.286	Width.....	292
8	Relationship Catalogue.....	293
8.1	Generic Specifications.....	293
8.1.1	Features and their Relationships .....	293
8.1.2	Relationship Types .....	317
8.1.3	Relationship Type Codes .....	317
8.1.4	Arity of a Relationship.....	317
8.1.5	Roles and partners of a Relationship.....	317
8.1.6	Homogeneous Relationships and their constraints .....	318
8.2	Relationship Types .....	319
8.2.1	Building along Road Element.....	319

8.2.2	Building Associated with Administrative Area.....	320
8.2.3	Building Associated with Built-up Area.....	321
8.2.4	Building Associated with Service.....	321
8.2.5	Building Façade is associated with Building.....	322
8.2.6	Building Unit is associated with Building.....	322
8.2.7	Building Unit linked to Street.....	323
8.2.8	Building linked to Building.....	323
8.2.9	Built-up Area Associated with Administrative Area.....	324
8.2.10	Centre Point of Feature belonging to Feature.....	324
8.2.11	Connectivity.....	325
8.2.12	District Associated with Administrative Area.....	326
8.2.13	District Associated with Built-up Area.....	327
8.2.14	Divided Junction.....	327
8.2.15	Enclosed Traffic Area Associated with Administrative Area.....	328
8.2.16	Enclosed Traffic Area Associated with Built-up Area.....	328
8.2.17	Exclusive Multi-Point Assignment.....	329
8.2.18	Exit at Interchange.....	330
8.2.19	Ferry Connection Associated with Administrative Area.....	330
8.2.20	Ferry Connection Associated with Named Area.....	331
8.2.21	Ferry Connection Associated with Built-up Area.....	331
8.2.22	Fork.....	332
8.2.23	Give Way Regulation.....	332
8.2.24	Grade Separated Crossing.....	334
8.2.25	Junction Associated with Administrative Area.....	335
8.2.26	Junction Associated with Built-up Area.....	335
8.2.27	Linear Assignment.....	336
8.2.28	Manoeuvre (abstract).....	338
8.2.29	Multi-Point Assignment.....	339
8.2.30	Overhead Structure along Road Element.....	340
8.2.31	Pedestrian Crossing along Road Element.....	341
8.2.32	Pedestrian Crossing has Entry Point.....	341
8.2.33	Pedestrian Square connected to Pedestrian Crossing.....	342
8.2.34	Place within Place.....	342
8.2.35	Right of Way Regulation.....	343
8.2.36	Prohibited Manoeuvre.....	345
8.2.37	Public Transport Connection.....	348
8.2.38	Public Transport Point along Route Link.....	348
8.2.39	Restricted Manoeuvre.....	348
8.2.40	Road Element Associated with Administrative Area.....	350
8.2.41	Road Element Associated with Built-up Area.....	350
8.2.42	Road Element Associated with District.....	351
8.2.43	Road Element Associated with Named Area.....	351
8.2.44	Road Element belonging to Service.....	352
8.2.45	Road Element leading to Enclosed Traffic Area.....	352
8.2.46	Route Link along Road Element.....	353
8.2.47	Service along Road.....	353
8.2.48	Service along Road Element.....	353
8.2.49	Service Associated with Administrative Area.....	354
8.2.50	Service Associated with Built-up Area.....	354
8.2.51	Service Associated with Named Area.....	355
8.2.52	Service at Intersection.....	355
8.2.53	Service at Junction.....	356
8.2.54	Service related to Service.....	356
8.2.55	Signpost Information.....	357

8.2.56	Stop Point along Road Element.....	359
8.2.57	Stop Point along Route.....	359
8.2.58	Stop Point at Junction.....	359
8.2.59	Stop Point located near Service.....	359
8.2.60	Through Route.....	359
8.2.61	Toll Route.....	360
8.2.62	Traffic Light Along Road Element.....	361
8.2.63	Traffic Light Regulation.....	361
8.2.64	Traffic Sign Along Road Element.....	363
9	Feature representation rules.....	363
9.1	Generic specifications.....	363
9.1.1	Introduction.....	363
9.1.2	Feature Categories.....	363
9.1.3	Types of topology.....	364
9.1.4	Levels of representation.....	364
9.1.5	Layers on level 0.....	366
9.1.6	Rules for level 0 representation.....	368
9.2	Roads and Ferries.....	379
9.2.1	Introduction.....	379
9.2.2	Level 2 representation.....	379
9.2.3	Level 1 representation for planar or non-planar topology.....	379
9.2.4	Level 1 representation for non-explicit topology.....	381
9.2.5	Level 0 representation.....	381
9.3	Administrative Areas.....	382
9.3.1	Level 1 and Level 2 representation for planar or non-planar topology.....	382
9.3.2	Level 1 and Level 2 representation for non-explicit topology.....	384
9.3.3	Level 0 representation.....	384
9.4	Named Areas.....	384
9.4.1	Level 2 representation.....	384
9.4.2	Level 1 representation for planar or non-planar topology.....	384
9.4.3	Level 1 representation for non-explicit topology.....	385
9.4.4	Level 0 representation.....	385
9.5	Land Cover And Use.....	385
9.5.1	Level 2 representation.....	385
9.5.2	Level 1 representation.....	385
9.5.3	Level 0 representation.....	385
9.6	Terrain Elevation.....	386
9.6.1	Level 2 representation.....	386
9.6.2	Level 1 representation for planar and non-planar topology.....	386
9.6.3	Level 1 representation for non-explicit topology.....	386
9.6.4	Level 0 representation.....	386
9.7	Structures.....	386
9.7.1	Level 2 representation.....	386
9.7.2	Level 1 representation.....	386
9.7.3	Level 0 representation.....	389
9.8	Railways.....	389
9.8.1	Level 2 representation.....	389
9.8.2	Level 1 representation.....	389
9.8.3	Level 0 representation.....	389
9.9	Waterways.....	390
9.9.1	Level 2 representation.....	390
9.9.2	Level 1 representation.....	390
9.9.3	Level 0 representation.....	390
9.10	Road Furniture.....	391

9.10.1	Level 2 representation.....	391
9.10.2	Level 1 representation.....	391
9.10.3	Level 0 representation.....	391
9.11	Services .....	391
9.11.1	Level 1 and Level 2 representation.....	391
9.11.2	Level 0 representation.....	391
9.12	Public Transport.....	391
9.13	Linear Referencing Features .....	392
9.13.1	Level 1 and Level 2 representation.....	392
9.13.2	Level 0 representation.....	392
9.14	Linear Datum Features .....	392
9.14.1	Level 2 representation.....	392
9.14.2	Level 1 representation.....	392
9.14.3	Level 0 representation.....	392
9.15	General Features.....	392
9.15.1	Level 2 representation.....	392
9.15.2	Level 1 representation.....	393
9.15.3	Level 0 representation.....	393
10	Metadata Catalogue.....	393
10.1	Generic specification .....	393
10.1.1	Introduction .....	393
10.1.2	Syntax of the Metadata description.....	395
10.1.3	Partitioning of GDF.....	395
10.2	Headers and terminators.....	396
10.2.1	General .....	396
10.2.2	Album Header .....	396
10.2.3	Dataset Header .....	401
10.2.4	Layer Header.....	407
10.2.5	Section Header.....	409
10.3	Data Dictionary.....	414
10.3.1	General .....	414
10.3.2	Field Definition.....	414
10.3.3	Record Definition .....	418
10.3.4	Feature Definition .....	420
10.3.5	Attribute Definition .....	421
10.3.6	Attribute Value Definition .....	424
10.3.7	Relationship Definition .....	425
10.4	Table of Contents .....	427
10.4.1	General .....	427
10.4.2	Directory.....	427
10.4.3	Spatial Domain.....	428
10.4.4	Network Specification.....	429
10.4.5	Default Attribute Values.....	429
10.4.6	Geopolitical Structure Definition.....	430
10.4.7	Abbreviation.....	432
10.5	Source Material .....	432
10.5.1	General .....	432
10.5.2	Source .....	433
10.6	Geodetic Parameters .....	439
10.6.1	General .....	439
10.6.2	Geodetic Datum.....	439
10.6.3	Vertical Datum.....	440
10.6.4	Reference Ellipsoid .....	442
10.6.5	Projection Method.....	442

10.6.6	National Map Grid .....	444
10.6.7	Geoid Undulation .....	446
10.6.8	Magnetic Declination .....	446
10.7	Update Information .....	448
10.7.1	General .....	448
10.7.2	Time Stamp Format .....	448
10.8	General Comment .....	448
11	Logical Data Structures .....	448
11.1	Introduction .....	448
11.1.1	Data description language: ESN .....	449
11.1.2	Sets, elements and ranges .....	449
11.1.3	Summary of the syntax notation .....	450
11.1.4	Useful consequences of the syntax notation .....	450
11.1.5	Diagrammatic Overview of the overall structure .....	452
11.2	Logical GDF Album .....	454
11.2.1	Overview .....	454
11.2.2	Album .....	454
11.2.3	ALBUM HEADER .....	454
11.2.4	ALBUM HEADER INTRO .....	455
11.2.5	LOCAL CHARACTER SET DEFINITION .....	455
11.2.6	GLOBAL ALBUM INFORMATION .....	456
11.2.7	Basic Data Types used by Album .....	456
11.3	Datasets .....	456
11.3.1	Overview .....	456
11.3.2	DATASET .....	456
11.3.3	Dataset Metadata .....	457
11.3.4	Dataset Header .....	457
11.3.5	MRS GENOME .....	460
11.3.6	Data Dictionary .....	462
11.3.7	Directory .....	469
11.3.8	Spatial Domain .....	470
11.3.9	Sources .....	471
11.3.10	NETWORK SPECIFICATION .....	475
11.3.11	ABBREVIATION .....	475
11.3.12	GEOPOLITICAL STRUCTURE DEFINITION .....	476
11.3.13	GEOPOLITICAL STRUCTURE COMPONENT DEFINITION .....	476
11.3.14	GEOPOLITICAL STRUCTURE REFERENCE .....	476
11.3.15	Geodetical Parameters .....	477
11.3.16	DATASET DATA .....	481
11.4	Layers .....	481
11.4.1	Overview .....	481
11.4.2	LAYER .....	482
11.4.3	LAYER HEADER .....	482
11.4.4	LAYER DATA .....	482
11.4.5	Basic Data Types used by Layers .....	482
11.5	Sections .....	483
11.5.1	Overview .....	483
11.5.2	SECTION .....	483
11.5.3	Section Metadata .....	483
11.5.4	Section Data .....	486
11.6	Time Domain Syntax .....	502
11.6.1	Overview .....	502
11.6.2	Time Domain Syntax Records .....	502
11.6.3	Direct Time Expressions Usage .....	510

11.7	Update Information .....	513
11.7.1	Overview.....	513
11.7.2	UPDATE INFORMATION.....	513
11.7.3	GEO TOPO UPDATE INFORMATION.....	514
11.7.4	OBJECT UPDATE INFORMATION .....	514
11.7.5	ATTRIBUTE UPDATE INFORMATION.....	514
11.7.6	Basic Data Types used by Update Information .....	515
11.8	Common Data Types.....	515
11.8.1	Overview.....	515
11.8.2	Pre-defined code lists and value lists.....	515
11.8.3	Geodeticals.....	516
11.8.4	Units & measures.....	517
11.8.5	Coordinates.....	518
11.8.6	Geographics.....	519
11.8.7	Identifier types.....	519
11.8.8	Basic types.....	523
12	Media Record Specifications.....	524
12.1	General specifications.....	524
12.1.1	Introduction .....	524
12.1.2	Partitioning.....	524
12.1.3	Logical Record.....	524
12.1.4	Media Record .....	524
12.1.5	Continuation Record.....	525
12.1.6	Null Record.....	525
12.1.7	Fields of variable and fixed length .....	525
12.1.8	Repeating Fields.....	525
12.1.9	Repeating Field Groups .....	526
12.1.10	Nesting Of Repeating Fields.....	526
12.1.11	Packing.....	526
12.1.12	Data Types .....	526
12.1.13	Character sets .....	526
12.1.14	Justification .....	527
12.1.15	Order of Records.....	527
12.1.16	Order of subrecords .....	528
12.1.17	Links between data records .....	531
12.2	Field specifications .....	538
12.2.1	Field Name.....	538
12.2.2	Record Control Fields.....	538
12.2.3	Common fields .....	544
12.2.4	Fields in Global Records.....	547
12.2.5	Fields in Data Records .....	548
12.2.6	Fields in Update Information Records.....	561
12.2.7	Fields Catalogue .....	563
12.3	Additional Constraints for Topological Features.....	582
12.3.1	Order of multiple Coordinate tuples in Coordinate Records.....	582
12.3.2	Order of Edges in Line Features, Area Features and Faces.....	582
12.3.3	Order of Features in Relationship Records.....	582
12.3.4	Order of Features in Relationship Records.....	582
12.4	Additional Constraints for Non-Explicit Topological Features: Order of Coordinate triplets in Feature Records .....	583
12.5	Mandatory Records.....	583
12.6	Record Format Specifications: Global Records.....	583
12.6.1	Album Header Record [ALHDREC] .....	583
12.6.2	Dataset Header Record [DSHDREC] .....	587

12.6.3	Field Definition Record [FIELDEFREC]	590
12.6.4	Record Definition Record [RECDEFREC]	591
12.6.5	Feature Definition Record [FEATDEFREC]	592
12.6.6	Attribute Definition Record [ATDEFREC]	593
12.6.7	Attribute Value Definition Record [ATTVALREC]	594
12.6.8	Default Attribute Record [DATTVALREC]	595
12.6.9	Relationship Definition Record [RELDEFREC]	595
12.6.10	Geopolitical Structure Definition Record [GPLSTRDREC]	596
12.6.11	Geopolitical Structure Component Definition Record [GPLCOMDREC]	596
12.6.12	Spatial Domain Record [SPADOREC]	597
12.6.13	Directory Record [DIREC]	598
12.6.14	Abbreviation Record [ABBRREC]	599
12.6.15	Network Specification Record [NWSPECSREC]	599
12.6.16	Source Record [SRCEREC]	600
12.6.17	Geodetical Parameter Records	605
12.6.18	Layer Header Record [LAYHREC]	610
12.6.19	Section Header Record [SECHREC]	610
12.6.20	Comment Record [COMMENTREC]	616
12.6.21	Volume Termination Record [VOLTERMREC]	616
12.7	Record Format Specifications: Data Records	617
12.7.1	2D Coordinate Record [XYREC]	617
12.7.2	3D Coordinate Record [XYZREC]	617
12.7.3	Node Record [NODEREC]	618
12.7.4	Edge Record [EDGEREC]	618
12.7.5	Face Record [FACEREC]	619
12.7.6	Point Feature Record (Explicit Point Topology sub-record) [POFEREC.01]	620
12.7.7	Point Feature Record (Non-explicit Point Topology sub-record) [POFEREC.03]	621
12.7.8	Line Feature Record (Explicit Line Topology sub-record) [LIFEREC.01]	623
12.7.9	Line Feature Record (Non-Explicit Line Topology sub-record) [LIFEREC.03]	624
12.7.10	Area Feature Record (Full Rendering Area Topology sub-record) [ARFEREC.01]	627
12.7.11	Area Feature (Connectivity Rendering Area Topology sub-record) [ARFEREC.02]	628
12.7.12	Area Feature (Non-explicit Area Topology sub-record) [ARFEREC.03]	629
12.7.13	Complex Feature Record (Explicit Complex Topology sub-record) [COFEREC.01]	633
12.7.14	Complex Feature Record (Non-explicit Complex Topology sub-record) [COFEREC.03]	635
12.7.15	Conversion Record [CONVERTREC]	636
12.7.16	Attribute Record [ATTREC]	637
12.7.17	Relationship Record [RELATREC]	639
12.7.18	Text Record [TEXTREC]	641
12.7.19	Time Domain Record [TIMEREC]	642
12.7.20	Object Reference Record [OBJREFREC]	643
12.8	Record Format Specifications: Update Information Records	644
12.8.1	Geo-topo Update Information Record [UPDIREC.01]	644
12.8.2	Object Update Information Record [UPDIREC.02]	645
12.8.3	Object Attribute Update Information Record [UPDIREC.03]	646
13	XML schema specifications	647
13.1	Introduction	647
13.1.1	Background	647
13.1.2	Schema design principles	647
13.1.3	LDS Departures	650
13.1.4	Schema subdivision	650

13.2	Data content .....	651
13.2.1	General .....	651
13.2.2	Pre-defined content .....	651
13.2.3	Map data.....	652
13.3	GDF XML schema.....	653
13.4	Schema GDF_Main.xsd.....	654
13.4.1	Header .....	654
13.4.2	2-D Coordinates.....	656
13.4.3	3-D Coordinates.....	657
13.4.4	Node.....	658
13.4.5	Edge .....	659
13.4.6	Face.....	660
13.4.7	Explicit Point Feature.....	661
13.4.8	Non-explicit Point Feature .....	662
13.4.9	Explicit Line Feature.....	664
13.4.10	Non-explicit Line Feature .....	666
13.4.11	Full Topology Area Feature .....	668
13.4.12	Connectivity Topology Area Feature.....	670
13.4.13	Non-explicit Topology Area Feature .....	672
13.4.14	Explicit Topology Complex Feature .....	674
13.4.15	Non-explicit Topology Complex Feature.....	676
13.4.16	Attribute .....	678
13.4.17	Relationship .....	679
13.4.18	Text.....	680
13.4.19	Conversion .....	681
13.4.20	Time Domain.....	681
13.4.21	Object Reference.....	682
13.4.22	Album Header.....	683
13.4.23	Local Character Set Definition .....	684
13.4.24	Global Album Information .....	686
13.4.25	Dataset Identification .....	687
13.4.26	Dataset Main Title .....	688
13.4.27	Dataset Subtitle.....	688
13.4.28	Dataset Producer.....	689
13.4.29	Dataset Extension Currency .....	690
13.4.30	Dataset Contents.....	690
13.4.31	Dataset XY Resolution.....	691
13.4.32	Attribute Definition .....	691
13.4.33	Directory.....	693
13.4.34	Feature Definition.....	693
13.4.35	Spatial Domain .....	694
13.4.36	Relationship Definition .....	696
13.4.37	Description Info .....	698
13.4.38	ISBN & Survey .....	699
13.4.39	Author Name .....	700
13.4.40	Scale & Title.....	700
13.4.41	Edit & Impression.....	701
13.4.42	Publisher .....	701
13.4.43	Distribution .....	702
13.4.44	Host Document.....	703
13.4.45	Field Data Capturing.....	703
13.4.46	Abbreviation .....	704
13.4.47	Geopolitical Structure Definition .....	705
13.4.48	Geopolitical Structure Component Definition .....	706

13.4.49	Default Attribute .....	707
13.4.50	Attribute Value Definition .....	707
13.4.51	Network Specification .....	708
13.4.52	Datum & Ellipsoid .....	709
13.4.53	Vertical Datum .....	710
13.4.54	Projection .....	710
13.4.55	National Grid .....	711
13.4.56	Geoid Undulation .....	712
13.4.57	Earth Magnetic Field .....	712
13.4.58	Layer Header .....	713
13.4.59	Section Identity.....	714
13.4.60	Section Settings.....	714
13.4.61	Network Identification.....	715
13.4.62	Datasource Reference .....	715
13.4.63	Datum & Magnetism.....	716
13.4.64	Orthometric Reference .....	717
13.4.65	Section Border .....	718
13.4.66	XY Control Point .....	719
13.4.67	Z Control Point.....	719
13.4.68	Update Information.....	720
13.4.69	Geo Update Information.....	721
13.4.70	Object Update Information.....	722
13.4.71	Object Attribute Update Information .....	723
13.5	Schema GDF_data_dict.xsd .....	724
13.5.1	Header .....	724
13.5.2	Datum .....	724
13.5.3	3-D Coordinate .....	724
13.5.4	2-D Coordinate .....	724
13.5.5	Time Coordinate .....	725
13.5.6	Extended Geometry .....	725
13.5.7	Geometry Type .....	726
13.5.8	Geometry Type Value (Simple) .....	726
13.5.9	Geometry Type Name (Simple) .....	726
13.5.10	Layer Section ID.....	726
13.5.11	Dataset Layer Section ID .....	727
13.5.12	Optional Dataset Layer Section ID .....	727
13.5.13	Edge Status .....	727
13.5.14	Node Status.....	727
13.5.15	Attribute Data Type .....	728
13.5.16	Action .....	728
13.5.17	Attribute Type Code .....	728
13.5.18	Coordinate Type .....	729
13.5.19	Country Code .....	729
13.5.20	Data Use.....	729
13.5.21	Attribute Data Unit.....	729
13.5.22	Direction .....	730
13.5.23	Ellipsoid Code.....	730
13.5.24	ETA Connectivity .....	730
13.5.25	Feature Category .....	730
13.5.26	Feature Code.....	731
13.5.27	Feature Theme.....	731
13.5.28	Geometry Object Category.....	731
13.5.29	Grid .....	731
13.5.30	Height Reference Type.....	732

13.5.31	Layer Topology.....	732
13.5.32	Language Code.....	732
13.5.33	Object Category .....	732
13.5.34	Orientation .....	733
13.5.35	Line Direction .....	733
13.5.36	Projection Code.....	733
13.5.37	Record Type .....	733
13.5.38	Record Type Code.....	734
13.5.39	Record Subtype Code .....	734
13.5.40	Three Split Indicator .....	734
13.5.41	Two Split Indicator .....	734
13.5.42	Vertical Datum.....	735
13.5.43	Z Reference .....	735
13.5.44	Grid Orientation.....	735
13.5.45	Oriented Edge .....	735
13.5.46	Line Edge .....	736
13.5.47	Area Edge.....	736
13.5.48	Feature Part.....	736
13.5.49	Relationship Feature.....	737
13.5.50	Name List.....	737
13.5.51	Relationship kind .....	737
13.5.52	Relationship kind name .....	738
13.5.53	Relationship kind value .....	738
13.5.54	Relationship Code D .....	738
13.5.55	Relationship Code Roles Definition (Simple).....	738
13.5.56	Declination.....	739
13.5.57	Declination (Simple) .....	740
13.5.58	Edge Level (Simple) .....	740
13.5.59	Coordinate Mask (Simple).....	741
13.5.60	Time Mask (Simple).....	741
13.5.61	Two Digit Field Counter (Simple) .....	741
13.5.62	Three Digit Field Counter (Simple).....	741
13.5.63	Five Digit Field Counter (Simple) .....	741
13.5.64	Multiplier Factor (Simple) .....	741
13.5.65	Name (Simple).....	741
13.5.66	Language Name Pair .....	742
13.5.67	Five Digit Integer (Simple).....	742
13.5.68	Six Digit Integer (Simple) .....	742
13.5.69	Object Class Code (Simple).....	742
13.5.70	Two Digit ID (Simple) .....	742
13.5.71	Three Digit ID (Simple) .....	742
13.5.72	Four Digit ID (Simple).....	743
13.5.73	Five Digit ID (Simple).....	743
13.5.74	Six Digit ID (Simple) .....	743
13.5.75	Ten Digit ID (Simple).....	743
13.5.76	SUBID (Simple).....	743
13.5.77	Record ID (Simple).....	743
13.5.78	Geopolitical Structure Definition ID (Simple).....	743
13.5.79	Geopolitical Structure Definition Component ID (Simple) .....	743
13.5.80	Album ID (Simple).....	743
13.5.81	Abbreviation ID (Simple) .....	744
13.5.82	Area Feature ID (Simple) .....	744
13.5.83	Attribute ID (Simple) .....	744
13.5.84	Complex ID (Simple) .....	744

13.5.85	Conversion ID (Simple).....	744
13.5.86	Datum & Ellipsoid ID (Simple) .....	744
13.5.87	Directory ID (Simple) .....	744
13.5.88	Dataset ID (Simple) .....	744
13.5.89	Dataset Subtitle ID (Simple).....	744
13.5.90	Dataset Producer ID (Simple) .....	744
13.5.91	Dataset Contents ID (Simple) .....	745
13.5.92	Edge ID (Simple).....	745
13.5.93	Face ID (Simple) .....	745
13.5.94	Feature ID (Simple).....	745
13.5.95	Field Definition ID (Simple) .....	745
13.5.96	Geoid Undulation ID (Simple) .....	745
13.5.97	Geopolitical Update ID (Simple).....	745
13.5.98	Line Feature ID (Simple) .....	745
13.5.99	Main Title ID (Simple).....	745
13.5.100	Magnetic Field ID (Simple) .....	745
13.5.101	National Grid ID (Simple).....	746
13.5.102	Network ID (Simple) .....	746
13.5.103	Coordinate ID (Simple) .....	746
13.5.104	Node ID (Simple) .....	746
13.5.105	Object Attribute Update ID (Simple).....	746
13.5.106	Object Reference ID (Simple) .....	746
13.5.107	Object Update ID (Simple) .....	746
13.5.108	Point Feature ID (Simple) .....	746
13.5.109	Projection ID (Simple) .....	746
13.5.110	Relationship ID (Simple).....	746
13.5.111	Section ID (Simple).....	747
13.5.112	XY Control ID (Simple) .....	747
13.5.113	Z Control ID (Simple).....	747
13.5.114	Spatial Domain ID (Simple).....	747
13.5.115	Source Description ID (Simple) .....	747
13.5.116	Source Scale & Title ID (Simple).....	747
13.5.117	Source Publisher ID (Simple) .....	747
13.5.118	Source Distributor ID (Simple) .....	747
13.5.119	Text ID (Simple) .....	747
13.5.120	Time ID (Simple).....	747
13.5.121	Record Definition ID (Simple).....	748
13.5.122	Vertical Datum ID (Simple) .....	748
13.5.123	Record Type (Simple).....	748
13.5.124	Record Subtype (Simple) .....	748
13.5.125	Geo ID (Simple).....	748
13.5.126	Layer ID (Simple).....	748
13.5.127	Data Type (Simple).....	748
13.5.128	Extended Data Type (Simple).....	748
13.5.129	Attribute Data Unit Code (Simple).....	749
13.5.130	Attribute Data Unit Name (Simple) .....	749
13.5.131	Edge Status Name (Simple) .....	749
13.5.132	Node Status Name (Simple).....	749
13.5.133	Attribute Data Type Name (Simple).....	750
13.5.134	Attribute Data Type Value (Simple).....	750
13.5.135	Action Name (Simple).....	750
13.5.136	Action Value (Simple).....	750
13.5.137	Attribute Type Code Name (Simple) .....	751
13.5.138	Attribute Type Code Value (Simple) .....	754

13.5.139	Attribute Type Data Type Code (Simple).....	757
13.5.140	Attribute Type Code Definition (Simple).....	760
13.5.141	Attribute Type Code Definition Reference.....	763
13.5.142	Boolean Name (Simple).....	766
13.5.143	Coordinate Type Name (Simple).....	766
13.5.144	Country Code Name (Simple).....	766
13.5.145	Country Code Value (Simple).....	769
13.5.146	Data Use Name (Simple).....	773
13.5.147	Data Use Value (Simple).....	773
13.5.148	Datum Name (Simple).....	773
13.5.149	Datum Value (Simple).....	778
13.5.150	Direction Name (Simple).....	782
13.5.151	Ellipsoid Name (Simple).....	782
13.5.152	Ellipsoid Value (Simple).....	783
13.5.153	ETA Connectivity Name (Simple).....	784
13.5.154	Feature Category Name (Simple).....	784
13.5.155	Feature Category Value (Simple).....	784
13.5.156	Feature Theme Name (Simple).....	785
13.5.157	Feature Theme Value (Simple).....	785
13.5.158	Geometry Category Name (Simple).....	786
13.5.159	Geometry Category Value (Simple).....	786
13.5.160	Grid Name (Simple).....	786
13.5.161	Grid Value (Simple).....	790
13.5.162	Height Reference Type Name (Simple).....	794
13.5.163	Height Reference Type Value (Simple).....	794
13.5.164	Layer Topology Name (Simple).....	794
13.5.165	Layer Topology Value (Simple).....	795
13.5.166	Language Code Name (Simple).....	795
13.5.167	Language Code Value (Simple).....	801
13.5.168	Object Category Name (Simple).....	807
13.5.169	Object Category Value (Simple).....	808
13.5.170	Orientation Name (Simple).....	808
13.5.171	Positive Negative Name (Simple).....	808
13.5.172	Projection Name (Simple).....	808
13.5.173	Projection Value (Simple).....	809
13.5.174	Record Type Name (Simple).....	809
13.5.175	Record Type Value (Simple).....	810
13.5.176	Reduced Record Type Value (Simple).....	811
13.5.177	Record Type Mnemonic (Simple).....	811
13.5.178	Record Subtype Name (Simple).....	812
13.5.179	Record Subtype Value (Simple).....	812
13.5.180	Record Subtype Mnemonic (Simple).....	813
13.5.181	Record Subtype Record Name (Simple).....	813
13.5.182	Relationship Code Name (Simple).....	814
13.5.183	Relationship Code Value (Simple).....	815
13.5.184	Three Split Indicator Name (Simple).....	815
13.5.185	Three Split Indicator Value (Simple).....	816
13.5.186	Two Split Indicator Name (Simple).....	816
13.5.187	Vertical Datum Name (Simple).....	816
13.5.188	Vertical Datum Value (Simple).....	817
13.5.189	Z Reference Name (Simple).....	817
13.5.190	Z Reference Value (Simple).....	818
13.5.191	Grid Orientation Name ID (Simple).....	818
13.5.192	One Digit Integer (Simple).....	818

13.5.193	One Digit Signed Integer (Simple)	818
13.5.194	Two Digit Integer (Simple)	818
13.5.195	Three Digit Integer (Simple)	818
13.5.196	Four Digit Integer (Simple)	818
13.5.197	Four Digit Signed Integer (Simple)	819
13.5.198	Four Digit Code (Simple)	819
13.5.199	Five Status Value (Simple)	819
13.5.200	Eight Digit Integer (Simple)	819
13.5.201	Nine Digit Signed Integer (Simple)	819
13.5.202	Ten Digit Latitude (Simple)	819
13.5.203	Ten Digit Longitude (Simple)	819
13.5.204	Ten Digit Integer (Simple)	820
13.5.205	Ten Digit Signed Integer (Simple)	820
13.5.206	Ten Digit Time Coordinate (Simple)	820
13.5.207	Eight Digit Time Coordinate (Simple)	820
13.5.208	Eleven Digit Integer (Simple)	820
13.5.209	Eleven Digit Coordinate (Simple)	820
13.5.210	Twelve Digit Integer (Simple)	820
13.5.211	Object Reference Type (Simple)	821
13.5.212	Relationship Code (Simple)	821
13.5.213	Attribute Type Code String (Simple)	821
13.5.214	Attribute Value String (Simple)	821
13.5.215	Feature Code Name (Simple)	821
13.5.216	Feature Code Value (Simple)	824
13.5.217	Character Set	826
13.5.218	Extended Character Set	826
13.5.219	Character Set Name (Simple)	827
13.5.220	Character Set Value (Simple)	827
13.5.221	Extended Character Set Name (Simple)	827
13.5.222	Extended Character Set Value (Simple)	828
13.5.223	Language Code Pair	828
13.5.224	Role Code Name (Simple)	828
13.5.225	Role Code Value (Simple)	829
13.5.226	Role Code	829
13.5.227	Reference Type Name (Simple)	829
13.5.228	Reference Type Value (Simple)	829
13.5.229	Reference Type	829
13.5.230	Topic Name (Simple)	830
13.5.231	Topic Value (Simple)	830
13.5.232	Topic	830
13.5.233	Unit System Name (Simple)	830
13.5.234	Unit System Value (Simple)	830
13.5.235	Unit System	831
13.5.236	Attribute Code Lists	831
13.5.237	Relationship Role Code Lists	887
13.6	Schema GDF_userDefined.xsd	914
13.6.1	Header	914
13.6.2	User-defined Feature Codes	914
13.6.3	User-defined Relationship Code	915
13.6.4	User-defined Attribute Type Code	915
13.6.5	User-defined Feature Code Name (Simple)	915
13.6.6	User-defined Feature Code Value (Simple)	915
13.6.7	User-defined Relationship Code Name (Simple)	916
13.6.8	User-defined Relationship Code Value (Simple)	916

<b>13.6.9</b>	<b>User-defined Attribute Type Code Name (Simple)</b> .....	<b>917</b>
<b>13.6.10</b>	<b>User-defined Attribute Type Code Value (Simple)</b> .....	<b>917</b>
<b>13.6.11</b>	<b>Attribute Type Code</b> .....	<b>917</b>
<b>13.6.12</b>	<b>Attribute Type Value</b> .....	<b>917</b>
<b>13.6.13</b>	<b>Relationship Code</b> .....	<b>917</b>
<b>13.6.14</b>	<b>Feature Code</b> .....	<b>918</b>
<b>13.6.15</b>	<b>Attribute Content</b> .....	<b>918</b>
<b>13.6.16</b>	<b>Attribute Descriptor</b> .....	<b>918</b>
<b>Annex A (normative) Semantic codes</b> .....		<b>919</b>
<b>Annex B (informative) Metadata codes</b> .....		<b>945</b>
<b>Annex C (informative) Services</b> .....		<b>970</b>
<b>Annex D (normative) Syntax for Time Domains of GDF5.1 Part 1</b> .....		<b>979</b>
<b>Annex E (normative) Sectioning GDF Datasets</b> .....		<b>1005</b>
<b>Annex F (informative) Rules for the formation of Level 2 Features from Roads and Ferries</b> .....		<b>1008</b>
<b>Annex G (informative) Geopolitical Structure examples</b> .....		<b>1018</b>
<b>Annex H (informative) Specification of possible use of notation and phonetic Attributes for character strings</b> .....		<b>1036</b>
<b>Annex I (informative) UML notation</b> .....		<b>1039</b>
<b>Bibliography</b> .....		<b>1046</b>