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**Information Technology – Geographic Information
Framework Data Content Standard
Part 7e: Inland waterways**

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Information Technology – Geographic Information Framework Data Content Standard
Part 7e: Inland waterways

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141 **Foreword**

142 Geographic information, also known as geospatial information, both underlies and is the subject
143 of much of the political, economic, environmental, and security activities of the United States. In
144 recognition of this, the United States Office of Management and Budget issued Circular A-16
145 (revised 2002), which established the Federal Geographic Data Committee (FGDC) as a
146 coordinating organization.

147 Work on this standard started under the Geospatial One-Stop e-Government initiative. The
148 standard was developed with the support of the member agencies and organizations of the
149 FGDC and aids in fulfilling a primary objective of the National Spatial Data Infrastructure (NSDI),
150 that is, creation of common geographic base data for seven critical data themes. The seven core
151 data themes are considered framework data of critical importance to the spatial data
152 infrastructure.

153 The increasing need to coordinate collection of new data, identify applicability of existing data,
154 and exchange data at the national level led to the submission of this standard to the ANSI
155 process to become an American National Standard. The national standard contained in this
156 document and its parts was sponsored by Technical Committee L1, Geographic Information
157 Systems, of the InterNational Committee for Information Technology Standards (INCITS), an
158 ANSI-accredited standards development organization.

159 As the Geographic Information Framework Data Content Standard was developed using public
160 funds, the U.S. Government will be free to publish and distribute its contents to the public, as
161 provided through the Freedom of Information Act (FOIA), Part 5 United States Code, Section 552,
162 as amended by Public Law No. 104-231, "Electronic Freedom of Information Act Amendments of
163 1996".

164 **Introduction**

165 The primary purpose of the Geographic Information Framework Data Content Standard, Part 7e:
166 Inland Waterways is to support the general use and exchange of geospatial information
167 concerning the navigable rivers (inland waterways). This effort is derivative of an ongoing
168 program within the U.S. Army Corps of Engineers (USACE), called the Inland Electronic
169 Navigation Charts (IENCs). The IENCs are posted on the Internet for direct download for use as
170 navigational charts for several of the major rivers within the United States.

171 Part 7e: Inland Waterways is one of five parts within the Transportation theme of the Geographic
172 Information Framework Data Content Standard. Together, these five parts provide a multi-modal
173 view of transportation, including road infrastructure, rail systems, air transportation, and
174 conveyances or public transit. The Inland Waterways part is unique, in that the USACE maintains
175 8,200 miles of rivers in 22 States. As a part of the Geographic Information Framework Data
176 Content Standard, the Inland Waterways part can enable a capability to construct a detailed
177 multi-modal description of a transportation system. Additional benefits of this part of the standard
178 the establishment and availability of inland waterway data through Web data services.

179

180 **Framework Data Content Standard – Inland waterways**

181 **1 Scope**

182 The Geographic Information Framework Data Content Standard, Part 7e: Inland Waterways
183 provides common definitions and syntax to enable the use and exchange of geospatial data
184 content as compiled for the IENC. The part describes authoritative data content derived from the
185 IENC. It is expected that in conjunction with the other parts of the Transportation theme, this data
186 will support the construction of a complex multi-modal model from disparate data collections and
187 from a variety of different government entities.

188 **2 Conformance**

189 Each thematic part of the Framework Data Content Standard includes a data dictionary based on
190 the conceptual schema presented in that part. To conform to the Base Document (Part 0), a
191 thematic dataset shall satisfy the requirements of the data dictionary for that theme. It shall
192 include a value for each mandatory element, and a value for each conditional element for which
193 the condition is true. It may contain values for any optional element. The data type of each value
194 shall be that specified for the element in the data dictionary and the value shall lie within the
195 domain specified for the element.

196 **3 Normative references**

197 Annex A of the Base Document (Part 0) lists normative references applicable to two or more parts
198 of the standard, including those other than the transportation parts. Informative references
199 applicable to the Inland Waterways part only are listed in Annex A. Informative references
200 applicable to two or more transportation parts only are listed in Annex C of the Transportation
201 Base (Part 7). Annex D of the Base Document lists informative references applicable to two or
202 more of the parts, including those other than the transportation parts.

203 **4 Maintenance authority**

204 **4.1 Level of responsibility**

205 The FGDC is the responsible organization for coordinating work on all parts of the Geographic
206 Information Framework Data Content Standard. The United States Department of Transportation
207 (USDOT), working with the FGDC, is the responsible organization for coordinating work on the
208 Geographic Information Framework Data Content Standard, Part 7: Transportation Base and
209 subparts (Parts 7a, 7b, 7c, and 7d, excluding 7e) and is directly responsible for development and
210 maintenance of the transportation parts (excluding Part 7e) of the Framework Data Content
211 Standard. The development and maintenance authority for Part 7e, Inland Waterways, is the U.S.
212 Army Corps of Engineers.

213 The FGDC shall be the sole organization responsible for direct coordination with the InterNational
214 Committee for Information Technology Standards (INCITS) concerning any maintenance or any
215 other requirements mandated by INCITS or ANSI.

216 **4.2 Contact information**

217 Address questions concerning this part of the standard to:

218 Federal Geographic Data Committee Secretariat
219 c/o U.S. Geological Survey
220 590 National Center
221 Reston, Virginia 20192 USA

222 Telephone: (703) 648-5514
223 Facsimile: (703) 648-5755
224 Internet (electronic mail): gdc@fgdc.gov
225 WWW Home Page: <http://fgdc.gov>

226 **5 Terms and definitions**

227 Definitions applicable to the Inland Waterways part are listed here. These definitions derive from
228 the IENC encoding guide [USACE, 2005]. Other definitions, applicable to multiple transportation
229 parts of the standard are defined in the Transportation Base (Part 7). More general terms can be
230 found in the Base Document (Part 0) of the standard. Users are advised to consult these
231 documents for a complete set of definitions.

232 **5.1**
233 **depth contour**

234 contour of equal water depth, which is sometimes significantly displaced outside of soundings,
235 symbols, and other chart detail for clarity as well as generalization

236 NOTE Depth contours, therefore, often represent an approximate location of the line of equal depth as
237 related to the surveyed line delineated on the source.

238 **5.2**
239 **mile marker**

240 distance mark not physically installed, denoting a system of reference for position along a
241 waterway

242 **5.3**
243 **sailing line**

244 generally accepted course or route on inland waterways used for navigation by commercial
245 vessels

246 NOTE The line is not always in the center of the river or waterway.

247 **6 Symbols, abbreviated terms, and notations**

248 The following symbols, abbreviations, and notations are applicable to the Transit part. Those
249 common to two or more transportation parts are listed in the Transportation Base (Part 7).
250 Symbols, abbreviations, and notations applicable to multiple parts, including the transportation
251 parts, are listed in the Base Document (Part 0).

252 IENC – Inland Electronic Navigation Chart

253 USACE – U.S. Army Corps of Engineers

254 **7 Inland waterways model**

255 **7.1 Conceptual model for inland waterways**

256 Subsections are presented below for this UML model. The following information includes a
257 narrative for context and understanding, and a table to define the contents.

258

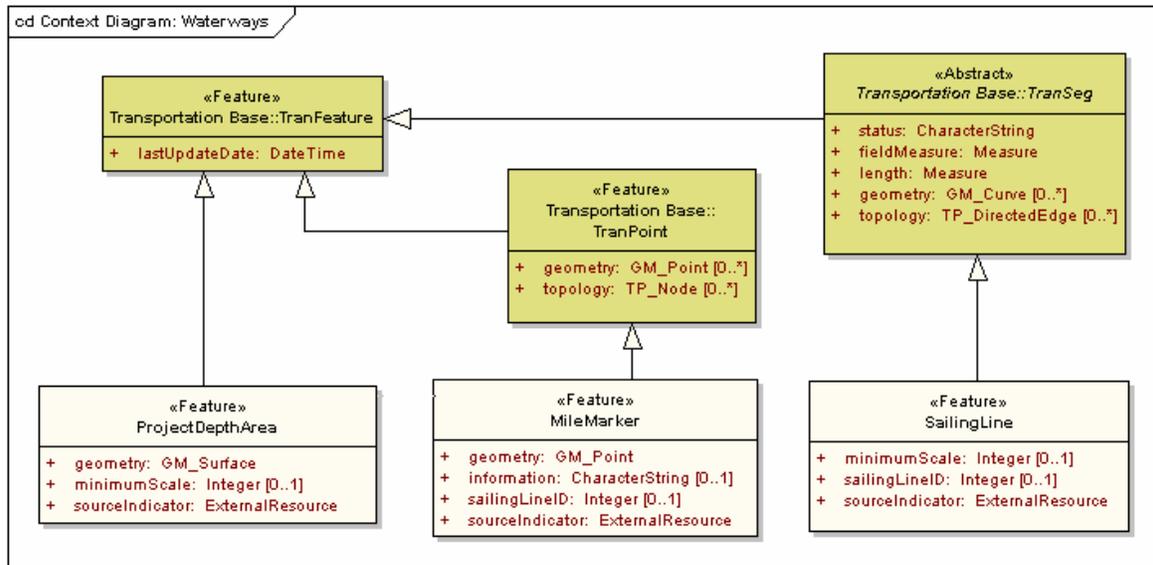


Figure 1 – Primary UML classes for inland waterways

259

260

261

262 **7.1.1 TranFeature**

263 TranFeature is a superclass as referenced by the inland waterways model. See the
264 Transportation Base part of the standard for a full description of TranFeature. TranFeature
265 generalizes all of the feature subclasses in the inland waterways model.

266 **7.1.2 ProjectDepthArea**

267 ProjectDepthArea is a subclass of TranFeature. ProjectDepthArea has polygon geometry that
268 represents the area within the waterway bounded by a depth contour that denotes the designated
269 navigation area with a minimum depth of 9 feet.

270 **7.1.3 MileMarker**

271 MileMarker is a subclass of TranPoint. MileMarker has point geometry that describes the position
272 of a mile marker in or near the waterway to serve as a reference for distance along the waterway.

273 **7.1.4 TranPoint**

274 TranPoint is a subclass of TranFeature. See the Transportation Base part of the standard for a
275 full description of TranPoint.

276 **7.1.5 TranSeg**

277 TranSeg is a subclass of TranFeature. See the Transportation Base part of the standard for a full
278 description of TranSeg.

279 **7.1.6 SailingLine**

280 SailingLine is a subclass of TranSeg. SailingLine describes the sailing line, or recommended
281 transit route, based on sufficient water depth and permitted passage along the waterway,
282 between the 9-foot depth contours.

283 **7.2 Inland waterways data dictionary**

284 The data dictionary (see Table 1) describes the characteristics of the Inland Waterways part
285 classes presented in the UML diagram in Figure 1. The data dictionary is structured in
286 accordance with the Base Document (Part 0).

287

Table 1 – Inland waterways data dictionary

| Line | Name/Role name | Definition | Obligation/ Condition | Maximum Occurrence | Data Type | Domain |
|------|------------------|--|--------------------------|-----------------------|---|----------------------|
| 1 | ProjectDepthArea | An area within the waterway bounded by a depth contour of at least 9 feet | | | <<Feature>> | Lines 2-4 |
| 2 | geometry | Area feature that denotes a water depth of at least 9 feet within the waterway | M | 1 | <<Type>> GM_Surface | Defined in ISO 19107 |
| 3 | minimumScale | Denominator of a ratio that is the recommended minimum scale for viewing | O | 1 | Integer | >0 |
| 4 | sourceIndicator | A character string referencing the authoritative source of the data entity | M | 1 | <<DataType>> Framework:: ExternalResource | Unrestricted |
| 5 | MileMarker | The abstraction of the mile markers along the waterway | | | <<Feature>> | Lines 6-9 |
| 6 | geometry | A unique point that represents the position of a waterway mile marker | M | 1 | <<Type>> GM_Point | Defined in ISO 19107 |
| 7 | information | Additional information related to the mile marker | O | 1 | CharacterString | Unrestricted |
| 8 | sailingLineID | A unique integer that associates MileMarker with a particular SailingLine | O | 1 | Integer | >0 |
| 9 | sourceIndicator | A character string referencing the authoritative source of the data entity | M | 1 | <<DataType>> Framework:: ExternalResource | Unrestricted |
| 10 | SailingLine | The recommended transit route along the length of a waterway within the ProjectDepthArea | | | <<Feature>> | Lines 11-13 |
| 11 | minimumScale | Recommended minimum scale for viewing | O | 1 | Integer | >0 |

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| Line | Name/Role name | Definition | Obligation/ Condition | Maximum Occurrence | Data Type | Domain |
|------|-----------------|--|--------------------------|-----------------------|---|--------------|
| 12 | sailingLineID | A unique integer that identifies a particular SailingLine | O | 1 | Integer | >0 |
| 13 | sourceIndicator | A character string referencing the authoritative source of the data entity | M | 1 | <<DataType>> Framework:: ExternalResource | Unrestricted |

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**Annex A
(informative)
Bibliography**

292 The following documents contain provisions that are relevant to this part of the Framework Data
293 Content Standard. Informative references applicable to two or more transportation parts only are
294 listed in Annex C of the Transportation Base (Part 7). Annex D of the Base Document (Part 0)
295 lists informative references applicable to two or more of the parts of the standard, including the
296 transportation parts. For dated references, only the edition cited applies. For undated
297 references, the latest edition of the referenced document applies.

298 USACE, April 2005, Inland electronic navigational chart, Chart no. 1 and encoding guide,
299 (Version 3.0)