

FEMA NFIP Metadata Profile¹ for Hydraulics Datasets

Version 1.0.8

Legend:

Required Elements:

Text with Regular Font: Elements that appear in regular font were ***required*** in the Federal Geographic Data Committee (FGDC) standard and ***remain required*** for Federal Emergency Management Agency (FEMA) National Flood Insurance Program (NFIP) purposes. They are noted as “Optionality: Mandatory”.

Text with Bold Font: Elements that appear in bold font were ***required if applicable in the FGDC standard but were made required*** for NFIP purposes. They are noted as “Optionality: Mandatory for FEMA”.

Optional Elements:

Text with Gray Font: Elements that appear in gray font were ***required if applicable or optional*** in the FGDC standard and are ***optional*** for NFIP purposes. They are noted as “Optionality: Optional” or “Optionality: Optional for FEMA”.

FEMA Business Rules and Recommendations:

Text highlighted in gray contains profile-specific comments, recommendations and business rules regarding the noted element. They are noted as “FEMA Business Rules”.

Notes:

- (1) An asterisk (*) after an element means that this element can be repeated an unlimited number of times. Example:

1.1.10 *OnLink** -- Online Linkage – etc. means onlink can be repeated. (Note that *OnLink* is the “official” abbreviation for Online Linkage and hence should be used as the column name in the database.)

- (2) All required elements are shown in bold and regular text (no gray!). Optional elements (shown in gray text), if supplied are also supported.
- (3) “MIP Submission Date” is the date on which an “intermediate” study artifact or Draft, Preliminary or Effective Flood Insurance Rate Map (FIRM) dataset was entered into the Mapping Information Platform (MIP) database.
- (4) Hydraulics metadata files should be named according to the convention: <Project ID>_Hydraulics_metadata. The Project ID may be an 8-digit Hydrologic Unit Code (HUC) identifying the watershed; a text description of the area’s flooding source (e.g., Delaware Bay); or a FEMA Community

¹ Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM), FGDC-STD-001-1998. Available at <https://www.fgdc.gov/metadata/csdgm-standard>.

Identification (CID) or Federal Information Processing Standards (FIPS) code identifying the primary county or community mapped.

1 *Idinfo* – Identification Information – Basic information about the data set

Optionality: Mandatory

FEMA Business Rules: This section is required for all Hydraulics metadata

1.1 *Citation* -- Citation -- information to be used to reference the data set

Optionality: Mandatory

FEMA Business Rules: The Citation section describes the Data Package.

1.1.1 *Citeinfo* – Citation Information -- the recommended reference to be used for the data set.

Optionality: Mandatory

1.1.1.1 *Origin** -- Originator -- the name of an organization or individual that developed the data set.

Optionality: Mandatory

Domain: free text

FEMA Business Rules: For existing data, Originator would be the data provider.

For data developed for the study, Originator would be the responsible party, for example the Mapping Partner, Indefinite Delivery/Indefinite Quantity (IDIQ) contractor, Cooperating Technical Partner (CTP), or other Federal agency.

1.1.1.2 *Pubdate* -- Publication Date -- the date when the data set is published or otherwise made available for release.

Optionality: Mandatory

Domain: free date

FEMA Business Rules: Must be in the form of YYYYMMDD

For existing data, Publication Date would be the date the data were published by the originator.

For data developed for the study, Publication Date would be the submittal date to the MIP.

1.1.1.3 *Pubtime* -- Publication Time -- the time of day when the data set is published or otherwise made available for

Optionality: Optional

Domain: "Unknown" free time

1.1.1.4 *Title* -- Title -- the name by which the data set is known.

Optionality: Mandatory

Domain:

FEMA Business Rules: Title should be of format: “name of data-package type for MIP Project Title”, where name of data-package type reflects this submission and the “MIP Project Title” follows rules for constructing MIP project titles (e.g., “Hydraulics Data Capture Submission for Alexandria VA”)

1.1.1.5 *Edition* -- Edition -- the version of the title.

Optionality: Mandatory for FEMA

Domain:

FEMA Business Rules: This should match the latest VERSION_ID in the FIRM Database (e.g., “Version 2.5.3.6”).

1.1.1.6 *Geoform* -- Geospatial Data Presentation Form -- the mode in which the geospatial data are represented.

Optionality: Mandatory for FEMA

Domain:

FEMA Business Rules: For a FEMA Data Capture Submittal (DCS) Hydraulics metadata submission, the geospatial presentation form is “FEMA-DCS-Hydraulics”.

1.1.1.7 *Serinfo* -- Series Information -- the identification of the series publication of which the data set is a part.

Optionality: Optional for FEMA

1.1.1.7.1 *Sername* -- Series Name -- the name of the series publication of which the data set is a part.

Optionality: Optional for FEMA

Domain: free text

1.1.1.7.2 *Issue* -- Issue Identification -- information identifying the issue of the series publication of which the data set is a part.

Optionality: Optional for FEMA

Domain: free text

1.1.1.8 *Pubinfo* -- Publication Information -- publication details for published data sets.

Optionality: Mandatory for FEMA

1.1.1.8.1 *Pubplace* -- Publication Place -- the name of the city (and state or province, and country, if needed to identify the city) where the data set was published or released.

Optionality: Mandatory

Domain: free text

1.1.1.8.2 *Publish* -- Publisher -- the name of the individual or organization that published the data set.

Optionality: Mandatory

Domain: free text

FEMA Business Rules: User has the option of specifying whether these data will be distributed directly by FEMA or by the user’s organization (FEMA maintains an archived copy in this case). If the user will be distributing the data, then this contact information should be identical to the distribution contact information (Section 6).

See also element 1.9 Point of Contact

1.1.1.9 *Othercit* -- Other Citation Details -- other information required to complete the citation.

Optionality: Optional for FEMA

Domain: free text

1.1.1.10 *Onlink -- Online Linkage -- the name of an online computer resource that contains the data set. Entries should follow the Uniform Resource Locator (URL) convention of the Internet.**

Optionality: Mandatory for FEMA

Domain:

FEMA Business Rules: For case where FEMA is the steward, Online Linkage should be the high-level URL “<https://hazards.fema.gov>”.

For case where FEMA is not the steward, Online Linkage should be the steward's high-level URL.

1.1.1.11 *Lworkcit* -- Larger Work Citation -- the information identifying a larger work in which the data set is included.

Optionality: Mandatory for FEMA

FEMA Business Rules: *Lworkcit* refers to the FEMA case under which the data package was uploaded. The '*lworkcit*' element is a compound element and does not take a value.

1.1.1.11.1 *Citeinfo*

Optionality: Mandatory

FEMA Business Rules: Note: This *Citeinfo* block is used to reference the FEMA Case study.

1.1.1.11.1.1 *Origin**

Optionality: Mandatory

FEMA Business Rules: Domain: "Federal Emergency Management Agency"

1.1.1.11.1.2 *Pubdate*

Optionality: Mandatory

FEMA Business Rules: Domain: "Unknown"

1.1.1.11.1.3 *Pubtime*

Optionality: Optional

1.1.1.11.1.4 *Title*

Optionality: Mandatory

**FEMA Business Rules: Domain: Title must be "*FEMA CASE num*" where num is the case number associated to the project by FEMA of the form: "*yy-rr-nnnnS*" where:
yy = year
rr = FEMA region number
nnnn = 4 character project code.**

1.1.1.11.1.5 *Edition*

Optionality: Optional for FEMA

1.1.1.11.1.6 *Geoform*

Optionality: Optional for FEMA

1.1.1.11.1.7 *Serinfo/sername & serinfo/issue*

Optionality: Optional for FEMA

1.1.1.11.1.8 *Pubinfo/pubplace & pubinfo/publish*

Optionality: Optional for FEMA

1.1.1.11.1.9 *Othercit*

Optionality: Optional for FEMA

1.1.1.11.1.10 *Onlink*

Optionality: Optional

1.1.1.11.11 *lworkcit*

Optionality: Optional for FEMA

1.2 *Descript* -- Description -- a characterization of the data set, including its intended use and limitations.

Optionality: Mandatory

1.2.1 *Abstract* -- Abstract -- a brief narrative summary of the data set.

Optionality: Mandatory

Domain:

FEMA Business Rules: “Recent developments in digital terrain and geospatial database management technology make it possible to protect this investment for existing and future projects to a much greater extent than was possible in the past. The minimum requirement for hydraulics data includes input and output files for all hydraulic models and spatial datasets that are needed to implement the models. (Source: FEMA *Guidelines and Standards for Flood Risk Analysis and Mapping*).”

For Large Scale Automated Engineering or Base Level Engineering Hydraulics submittals, the following may also be included: “Recent innovations and efficiencies in floodplain mapping have allowed FEMA to develop processes called Large Scale Automated Engineering and Base Level Engineering, which can be used to address current program challenges including the validation of Zone A studies and the availability of flood risk data in the early stages of a Flood Risk Project. The Large Scale Automated Engineering and Base Level Engineering processes involve using best available data and automated techniques to mass produce estimates of flood hazard boundaries for multiple flood recurrence intervals.”

1.2.2 *Purpose* -- Purpose -- a summary of the intentions with which the data set was developed.

Optionality: Mandatory

Domain:

FEMA Business Rules: “Development of a hydraulic model to provide water-surface elevations for floodplain mapping requires significant investment in time and resources to obtain and process topographic survey data including cross-section and bridge surveys.”

For Large Scale Automated Engineering or Base Level Engineering Hydraulics submittals, the following may also be included: “The Large Scale Automated Engineering and Base Level Engineering processes leverage the best available data and methods and use automated techniques to mass produce estimates of flood hazard boundaries for multiple flood recurrence intervals. These data may be used to evaluate Zone A studies in the Coordinated Needs Management Strategy (CNMS) inventory that are “unknown” or that require revalidation. Additionally, Large Scale Automated Engineering or Base Level Engineering data can be used in the Discovery process to identify the potential changes in flood elevation and extent that may result from a proposed project scope and share this information with stakeholders. Another important goal of the Large Scale Automated Engineering and Base Level Engineering processes is the scalability of the results. Scalability means that the results of Large Scale Automated Engineering or Base Level Engineering can not only be used for CNMS evaluations of Zone A studies and Discovery, but also leveraged throughout the Risk MAP program. The large volume of data resulting from Large Scale Automated

Engineering or Base Level Engineering may be able to be used for the eventual production of regulatory and flood risk products, outreach and risk communication, and MT-1 processing.

1.2.3 *Suppl* -- Supplemental Information -- other descriptive information about the data set.

Optionality: Optional

Domain: free text

1.3 *Timeperd* -- Time Period of Content -- time period(s) for which the data set corresponds to the currentness reference.

Optionality: Mandatory

1.3.1 *Timeinfo* -- Time Period of Information -- Information about date and time of event.

Optionality: Mandatory

1.3.1.1 *Sngdate* -- Single Date/Time -- means of encoding a single date and time.

Optionality: Mandatory

1.3.1.1.2 *Caldate* -- Calendar Date -- the year (and optionally month, or month and day)

Optionality: Mandatory

Domain: *single_date*

FEMA Business Rules: Must be in the form of YYYYMMDD

For Draft or Preliminary data, date should be MIP Submission Date. For Effective data, date should be Effective Date.

1.3.2 *Current* -- Currentness Reference -- the basis on which the time period of content information is determined.

Optionality: Mandatory

Domain:

FEMA Business Rules: For Draft or Preliminary data, Currentness Reference should be “MIP Submission Date”. For Effective data, Currentness Reference should be “FIRM and FIS Effective Date”.

Currentness Reference must synchronize with Progress element (1.4.1), see guidance under element 1.4.1.

1.4 *Status* -- Status -- the state of and maintenance information for the data set.

Optionality: Mandatory

1.4.1 *Progress* -- Progress -- the state of the data set.

Optionality: Mandatory

Domain: "Complete" "In work"

FEMA Business Rules: Note that the Progress element must synchronize with Currentness Reference (1.3.2) as follows: when Progress is “In work”, Currentness Reference is “MIP Submission Date”; alternatively, when Progress is “Complete”, Currentness Reference is “FIRM and FIS Effective Date”.

1.4.2 *Update* -- Maintenance and Update Frequency -- the frequency with which changes and additions are made to the data set after the initial data set is completed.

Optionality: Mandatory

Domain: **FEMA Business Rules: "Unknown"**

1.5 *Spdom* -- Spatial Domain - the geographic areal domain of the data set.
Optionality: Mandatory

1.5.1 *Bounding* -- Bounding Coordinates - the limits of coverage of a data set expressed by latitude and longitude values in the order western-most, eastern-most, northernmost, and southern-most. For data sets that include a complete band of latitude around the earth, the West Bounding Coordinate shall be assigned the value -180.0, and the East Bounding Coordinate shall be assigned the value 180.0
Optionality: Mandatory

1.5.1.1 *Westbc* -- West Bounding Coordinate -- western-most coordinate of the limit of coverage expressed in longitude.
Optionality: Mandatory
Domain: $-180.0 \leq \text{real number} < 180.0$

1.5.1.2 *Eastbc* -- East Bounding Coordinate -- eastern-most coordinate of the limit of coverage expressed in longitude.
Optionality: Mandatory
Domain: $-180.0 \leq \text{real number} \leq 180.0$

1.5.1.3 *Northbc* -- North Bounding Coordinate -- northern-most coordinate of the limit of coverage expressed in latitude.
Optionality: Mandatory
Domain: $-90.0 \leq \text{real number} \leq 90.0$;
North Bounding Coordinate \geq South Bounding Coordinate

1.5.1.4 *Southbc* -- South Bounding Coordinate -- southern-most coordinate of the limit of coverage expressed in latitude.
Optionality: Mandatory
Domain: $-90.0 \leq \text{real number} \leq 90.0$;
South Bounding Coordinate \leq North Bounding Coordinate

1.5.2 *Dsgpoly** -- Data Set G-Polygon -- coordinates defining the outline of an area covered by a data set.
Optionality: Optional

1.5.2.1 *Dsgpolyo* -- Data Set G-Polygon Outer G-Ring -- the closed nonintersecting boundary of an interior area.
Optionality: Optional

1.5.2.2 *Dsgpolyx* -- Data Set G-Polygon Exclusion G-Ring -- the closed nonintersecting boundary of a void area (or "hole" in an interior area).
Optionality: Optional

1.6 *Keywords* -- Keywords -- words or phrases summarizing an aspect of the data set.
Optionality: Mandatory

1.6.1 *Theme** -- Theme -- subjects covered by the data set (for a list of some commonly-used thesauri, see Part IV: Subject/index term sources in Network Development and Machine-Readable Cataloging (MARC) Standards Office, 1988, USMARC code list for relators, sources, and description conventions: Washington, Library of Congress).

Optionality: Mandatory

FEMA Business Rules: All metadata submissions must have two separate ‘theme’ elements, each referencing distinct topic category thesauri and keywords. The first theme element should reference the International Organization for Standardization (ISO) “*ISO 19115 Topic Category*” thesaurus (theme.themekt) and keywords (theme.themekey). The second ‘theme’ element should reference the “*FEMA NFIP Topic Category*” thesaurus and keywords.

1.6.1.1 *Themekt* -- Theme Keyword Thesaurus -- reference to a formally registered thesaurus or a similar authoritative source of theme keywords.

Optionality: Mandatory

Domain: "None" free text

FEMA Business Rules: “*ISO 19115 Topic Category*” and “*FEMA NFIP Topic Category*”

1.6.1.2 *Themekey** -- Theme Keyword -- common-use word or phrase used to describe the subject of the data set.

Optionality: Mandatory

Domain:

FEMA Business Rules: For the “*ISO 19115 Topic Category*” thesaurus, for FEMA Hydraulics metadata submissions, these keywords are required: “*environment*”, “*inlandWaters*”.

For the “*FEMA NFIP Topic Category*” thesaurus, for FEMA_Study_Hydraulics submissions, these keywords are required: “*Hydraulics*”, “*Flood Insurance Rate Map*”, “*FIRM*”, “*Flood Hazard Data*”.

In addition, for the “*FEMA NFIP Topic Category*” thesaurus, data producers should use additional keywords from the following list that are applicable to the submission: “*0.2-Percent-Annual-Chance Flood*”, “*10-Percent-Annual-Chance Flood*”, “*1-Percent-Annual-Chance Flood*”, “*2-Percent-Annual-Chance Flood*”, “*4-Percent-Annual-Chance Flood*”, “*1-Percent-Plus-Annual-Chance Flood*”, “*1-Percent-Minus-Annual-Chance Flood*”, “*Stream*”, “*Lake*”, “*Water Body*”, “*Base Flood Elevation*”, “*Cross Section*”, “*Stream Centerline*”, “*Profile Baseline*”, “*Backwater*”, “*BFE*”, “*Elevation Reference Mark (ERM)*”, “*Elevation Reference Point (ERP)*”, “*Flood Profile*”, “*Floodway Data Table*”, “*Flood Protection System*”, “*Flood-Control Storage*”, “*Floodway*”, “*Boundary Condition*”, “*Freeboard*”, “*Ice Jam*”, “*Cross-section*”, “*Levee*”, “*Weir*”, “*Gate*”, “*Dam*”, “*Spillway*”, “*Reservoir*”, “*Split Flow*”, “*Fill*”, “*Bridge*”, “*Culvert*”, “*Manning's Roughness Coefficient (Manning's n)*”, “*Shallow Flooding*”, “*Critical Flow*”, “*Sub-critical Flow*”, “*Supercritical Flow*”, “*Zone Gutter*”

Other keywords may be used as free text

1.6.2 *Place** -- Place -- geographic locations characterized by the data set.

Optionality: Mandatory for FEMA

1.6.2.1 *Placekt* -- Place Keyword Thesaurus -- reference to a formally registered thesaurus or a similar authoritative source of place keywords.

Optionality: Mandatory for FEMA

Domain: "None" "Geographic Names Information System" free text

1.6.2.2 Placekey* -- Place Keyword -- the geographic name of a location covered by a data set.

Optionality: Mandatory for FEMA

FEMA Business Rules: Domain: The following seven (7) Place Keywords are required for each Place (1.6.2) element:

- **“REGION num” where num is the FEMA Region number.**
- **“STATE abbreviation” where abbreviation is the 2-letter FIPS-standard state abbreviation (e.g., “STATE VA” for Virginia).**
- **“COUNTY name” where name is the name of the county.**
- **“COUNTY-FIPS code” where code is the county FIPS code.**
- **“COMMUNITY name” where name is name of the community.**
- **“FEMA-CID code” where code is the FEMA Community ID code.**
- **“HYDROLOGIC UNIT code” where code is the 8-digit Hydrologic Unit Code (HUC).**

Users may include additional Place Keyword elements using free text.

1.6.3 Stratum* -- Stratum -- layered, vertical locations characterized by the data set.

Optionality: Optional for FEMA

1.6.3.1 Stratkt -- Stratum Keyword Thesaurus -- reference to a formally registered thesaurus or a similar authoritative source of stratum keywords.

Optionality: Optional for FEMA

Domain: "None" free text

1.6.3.2 Stratkey* -- Stratum Keyword -- the name of a vertical location used to describe the locations covered by a data set.

Optionality: Optional for FEMA

Domain: free text

1.6.4 Temporal* -- Temporal -- time period(s) characterized by the data set.

Optionality: Optional for FEMA

1.6.4.1 Tempkt -- Temporal Keyword Thesaurus -- reference to a formally registered thesaurus or a similar authoritative source of temporal keywords.

Optionality: Optional for FEMA

Domain: "None" free text

1.6.4.2 Tempkey* -- Temporal Keyword -- the name of a time period covered by a data set.

Optionality: Optional for FEMA

Domain: free text

1.7 Accconst -- Access Constraints -- restrictions and legal prerequisites for accessing the data set. These include any access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the data set.

Optionality: Mandatory

Domain:

FEMA Business Rules: “Restricted” “View-only” “None”

1.8 Useconst -- Use Constraints -- restrictions and legal prerequisites for using the data set after access is granted. These include any use constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on using the data set.

Optionality: Mandatory

Domain:

FEMA Business Rules: “Acknowledgment of FEMA would be appreciated in products derived from these data. These digital data are produced for the purposes of updating/creating a FIRM Database and/or Flood Risk Products”.

1.9 *Ptcontac* -- Point of Contact -- contact information for an individual or organization that is knowledgeable about the data set.

Optionality: Optional

FEMA Business Rules: The user may wish to provide Point of Contact information here (Section 1.9) in cases where the Originator (1.1.1) of the dataset is not also the Distributor (6.1) of the dataset, for whom Contact Information is provided in Section 6.1. In cases such as this, providing Contact Information here will facilitate contact with the Originator of the dataset.

1.9.1 *Cntinfo* -- Contact Information -- Identity of, and means to communicate with, person(s) and organization(s) associated with the data set.

Optionality: Optional

1.9.1.1 *Cntperp*² Contact Person Primary -- the name of the individual to which the contact type.

Optionality: Optional

1.9.1.1.1 *Cntper* -- Contact Person -- the name of the individual to which the contact type applies.

Optionality: Optional

Domain: free text

1.9.1.1.2 *Cntorg*² -- Contact Organization -- the name of the organization to which the contact type applies.

Optionality: Optional

Domain: free text

1.9.1.2 *Cntorgp* -- Contact Organization Primary -- the organization, and the member of the organization associated with the data set. Used in cases where the association of the organization to the data set is more significant than the association of the person to the data set.

Optionality: Optional

Domain: Compound

1.9.1.2.1 *Cntorg* -- Contact Organization -- the name of the organization to which the contact type applies.

Optionality: Optional

Domain: free text

1.9.1.2.2 *Cntper* -- Contact Person -- the name of the individual to which the contact type applies.

Optionality: Optional

Domain: free text

1.9.1.3 *Cntpos* -- Contact Position -- the title of individual.

Optionality: Optional

Domain: free text

² Note: Use of the *Cntinfo.Cntperp* and *Cntinfo.Cntorgp* elements is mutually exclusive.

- 1.9.1.4 *Cntaddr** -- Contact Address -- the address for the organization or individual.
Optionality: Optional
- 1.9.1.4.1 *Addrtype* -- Address Type -- the information provided by the address.
Optionality: Optional
Domain: "mailing" "physical" "mailing and physical", free text
- 1.9.1.4.2 *Address** -- Address -- an address line for the address.
Optionality: Optional
Domain: free text
- 1.9.1.4.3 *City* -- City -- the city of the address.
Optionality: Optional
Domain: free text
- 1.9.1.4.4 *State* -- State or Province -- the state or province of the address.
Optionality: Optional
Domain: free text
- 1.9.1.4.5 *Postal* -- Postal Code -- the ZIP or other postal code of the address.
Optionality: Optional
Domain: free text
- 1.9.1.4.6 *Country* -- Country -- the country of the address.
Optionality: Optional
Domain: **FEMA Business Rules: USA**
- 1.9.1.5 *Cntvoice** -- Contact Voice Telephone -- the telephone number by which individuals can speak to the organization or individual.
Optionality: Optional
Domain: free text
- 1.9.1.6 *Cnttdd** -- Contact Telephone Device for the Deaf/Text Telephone (TDD/TTY) Telephone -- the telephone number by which hearing impaired individuals can contact the organization or individual.
Optionality: Optional
Domain: free text
- 1.9.1.7 *Cntfax** -- Contact Facsimile Telephone -- the telephone number of a facsimile machine of the organization or individual.
Optionality: Optional
Domain: free text
- 1.9.1.8 *Cntemail** -- Contact Electronic Mail Address -- the address of the electronic mailbox of the organization or individual.
Optionality: Optional
Domain: free text
- 1.9.1.9 *Hours* -- Hours of Service -- time period when individuals can speak to the organization or individual.
Optionality: Optional
Domain: free text

1.9.1.10 *Cntinst* -- Contact Instructions -- supplemental instructions on how or when to contact the individual or organization.

Optionality: Optional
Domain: free text

1.10 *Browse** -- Browse Graphic -- a graphic that provides an illustration of the data set. The graphic should include a legend for interpreting the graphic.

Optionality: Optional

1.10.1 *Browse_n* -- Browse Graphic File Name -- name of a related graphic file that provides an illustration of the data set.

Optionality: Optional
Domain: free text

1.10.2 *Browse_d* -- Browse Graphic File Description -- a text description of the illustration.

Optionality: Optional
Domain: free text

1.10.3 *Browse_t* -- Browse Graphic File Type -- graphic file type of a related graphic file.

Optionality: Optional
Domain: domain values in the table below; free text

Value	Definition
"CGM"	Computer Graphics Metafile
"EPS"	Encapsulated Postscript format
"EMF"	Enhanced Metafile
"GIF"	Graphic Interchange Format
"JPEG"	Joint Photographic Experts Group format
"PBM"	Portable Bit Map format
"PS"	Postscript format
"TIFF"	Tagged Image File Format
"WMF"	Windows metafile
"XWD"	X-Windows Dump

1.11 *Datacred* -- Data Set Credit -- recognition of those who contributed to the data set.

Optionality: Optional
Domain: free text

1.12 *Secinfo* -- Security Information -- handling restrictions imposed on the data set because of national security, privacy, or other concerns.

Optionality: Optional

FEMA Business Rules: Security information is optional; however, if some of the data contain sensitive information (bridges, dams, etc.), the publisher can specify that information in this Section.

1.12.1 *Secsys* -- Security Classification System -- name of the classification system.

Optionality: Optional
Domain: free text

1.12.2 *Secclass* -- Security Classification -- name of the handling restrictions on the data set.

Optionality: Optional
Domain: "Top secret" "Secret" "Confidential" "Restricted" "Unclassified"

"Sensitive" free text

1.12.3 *Sechandl* -- Security Handling Description -- additional information about the restrictions on handling the data set.

Optionality: Optional

Domain: free text

1.13 *Native* -- Native Data Set Environment -- a description of the data set in the producer's processing environment, including items such as the name of the software (including version), the computer operating system, file name (including host-, path-, and filenames), and the data set size.

Optionality: Mandatory for FEMA

FEMA Business Rules: This section is used to capture information about production of the FIRM Database. It must include the software release of any submitted geodatabase. For a FEMA Hydraulics metadata submission, this section is also used to identify the hydraulic model and software used to produce the data.

Domain is free text

Example: “Original data development environment may vary. Finishing of the data is done using Esri’s ArcGIS software. The submitted geodatabase was created using ArcGIS version 10.3. The hydraulic modeling was performed using HEC-RAS”.

Hydraulic model domain (created from the FEMA-approved model list at <https://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping-numerical-models-meeting-minimum-requirements>) includes “FEQ”, “FEQUTL”, “FESWMS 2DH”, “FLDWAV”, “FLO-2D”, “FLO-2D Pro”, “HEC-2”, “HEC-RAS”, “HY8”, “ICPR”, “MIKE 11 HD”, “MIKE Flood HD”, “PondPack”, “QUICK-2”, “TABS RMA2”, “TABS RMA4”, “StormCAD”, “SWMM”, “UNET”, “WSPGW”, “WSPRO”, “XP-SWMM”, “FAN”, “NETWORK”, “HCSWMM”, “DHM 21”, “DHM 34”, “CHAN for Windows”, “CULVERT MASTER”, “Xpstorm”, “XPSWMM 2D”, “XPStorm 2D”, “MIKE URBAN”, “S2DMM”, “TUFLOW”, “Adaptive Hydraulics (AdH)”, “Sedimentation and River Hydraulics, Two Dimensional River Flow Model (SRH-2D)”

Additional entries may be added as free text.

1.14 *Crossref** -- Cross Reference -- information about other, related data sets that are likely to be of interest.

Optionality: Optional

FEMA Business Rules: The Cross Reference section is optional but can be used to relate the Study Package to the Effective Map/Flood Insurance Study (FIS). This relationship is more generally established using the COMMUNITY name and FEMA-CID code in the place keywords list (see 1.6.2.2)

1.14.1 *Citeinfo* – Citation Information -- the recommended reference to be used for the data set.

Optionality: Optional

1.14.1.1 *Origin**

Optionality: Optional

1.14.1.2 *Pubdate*

Optionality: Optional

1.14.1.3 *Pubtime*

Optionality: Optional

1.14.1.4 *Title*

Optionality: Optional

1.14.1.5 *Edition*

Optionality: Optional

1.14.1.6 *Geoform*

Optionality: Optional

1.14.1.7 *Serinfo/sername & serinfo/issue*

Optionality: Optional

1.14.1.8 *Pubinfo/pubplace & pubinfo/publish*

Optionality: Optional

1.14.1.9 *Othercit*

Optionality: Optional

1.14.1.10 *Onlink**

Optionality: Optional

1.14.1.11 *Lworkcit*

Optionality: Optional

2 *dataqual* -- Data Quality Information -- General assessment of the quality of the data set

Optionality: Mandatory for FEMA

FEMA Business Rules: This section is required for all FEMA Hydraulics metadata submissions.

2.1 *Attracc* -- Attribute Accuracy -- an assessment of the accuracy of the identification of entities and assignment of attribute values in the data set.

Optionality: Mandatory for FEMA

2.1.1 *Attraccr* -- Attribute Accuracy Report -- an explanation of the accuracy of the identification of the entities and assignments of values in the data set and a description of the tests used.

Optionality: Mandatory

Domain:

FEMA Business Rules: “The FIRM Database consists of vector files and associated attributes produced in conjunction with the hardcopy FEMA FIRM. The published effective FIRM and FIRM Database are issued as the official designation of the SFHAs. As such they are adopted by local communities and form the basis for administration of the NFIP. For these purposes they are authoritative. Provisions exist in the regulations for public review, appeals and corrections of the flood risk information shown to better match real world conditions. As with any engineering analysis of this type, variation from the estimated flood heights and floodplain boundaries is possible. Details of FEMA’s requirements for the FISs and flood

mapping process that produces these data are available in the Guidelines and Standards for Flood Risk Analysis and Mapping. Attribute accuracy was tested by manual comparison of source graphics with hardcopy plots and a symbolized display on an interactive computer graphic system”.

“Independent quality control testing of the FIRM Database was also performed”.

Additional entities may be added as free text to describe Large Scale Automated Engineering or Base Level Engineering data or submitted data that are not contained within the FIRM Database.

2.1.2 *Qattracc** -- Quantitative Attribute Accuracy Assessment -- a value assigned to summarize the accuracy of the identification of the entities and assignments of values in the data set and the identification of the test that yielded the value.

Optionality: Optional

2.1.2.1 *Attraccv* -- Attribute Accuracy Value -- an estimate of the accuracy of the identification of the entities and assignments of attribute values in the data set.

Optionality: Optional

Domain: "Unknown" free text

2.1.2.2 *Attracce* -- Attribute Accuracy Explanation -- the identification of the test that yielded the Attribute Accuracy Value.

Optionality: Optional

Domain: free text

2.2 *Logic* -- Logical Consistency Report -- an explanation of the fidelity of relationships in the data set and tests used.

Optionality: Mandatory

Domain:

FEMA Business Rules: “Hydraulic analysis uses all valid existing flood elevation, survey, hydrologic analysis results, and other pertinent information for the study area. FEMA approved models are used to compute water surface elevations for required flood events. Computed water surface elevations and topographic data are used to delineate flood hazard boundaries. Roughness coefficients are carefully selected to represent the conditions along stream beds and banks.

Hydraulics Data Capture submittals match the model output with respect to floodplain boundaries, cross sections, and water surface elevations and their precision. Floodplain boundaries and cross sections are not cartographically modified, and the data may not necessarily agree exactly with the published regulatory FIRM, FIRM Database, flood profiles, and Floodway Data Tables”.

Additional entities may be added as free text to describe Large Scale Automated Engineering or Base Level Engineering data.

2.3 *Complete* -- Completeness Report -- information about omissions, selection criteria, generalization, definitions used, and other rules used to derive the data set.

Optionality: Mandatory

Domain:

FEMA Business Rules: *“Hydraulic analysis provides water surface elevations at different locations along the stream and for different flooding events. Hydraulic submittal includes key physical data used in the process, model parameters and model output. Data developed in surveying and hydrologic analysis are incorporated in hydraulic analysis. Results of hydraulic analysis are used to map Special Flood Hazard Area (SFHA) boundaries. Selection of model parameters (e.g., roughness coefficients, expansion and contraction coefficients, etc.) is supported by additional information (e.g., landuse, aerial photo, etc.). Model boundary conditions are carefully selected and justified. Modeled velocities are checked for potential erosion”.*

Optional text:

“Simulated water surface elevations are compared with observed high water marks from historic flooding”.

Additional entities may be added as free text to describe Large Scale Automated Engineering or Base Level Engineering data.

2.4 Posacc -- Positional Accuracy -- an assessment of the accuracy of the positions of spatial objects.

Optionality: Mandatory for FEMA

2.4.1 Horizpa -- Horizontal Positional Accuracy -- an estimate of accuracy of the horizontal positions of the spatial objects.

Optionality: Mandatory for FEMA

2.4.1.1 Horizpar -- Horizontal Positional Accuracy Report -- an explanation of the accuracy of the horizontal coordinate measurements and a description of the tests used.

Optionality: Mandatory

Domain:

FEMA Business Rules: *“The FIRM Database consists of vector files and associated attributes produced in conjunction with the hardcopy FEMA FIRM. The published effective FIRM and FIRM Database are issued as the official designation of the SFHAs. As such they are adopted by local communities and form the basis for administration of the NFIP. For these purposes they are authoritative. Provisions exist in the regulations for public review, appeals and corrections of the flood risk information shown to better match real world conditions. As with any engineering analysis of this type, variation from the estimated flood heights and floodplain boundaries is possible. Details of FEMA’s requirements for the FISs and flood mapping process that produces these data are available in the Guidelines and Standards for Flood Risk Analysis and Mapping. Horizontal accuracy was tested by manual comparison of source graphics with hardcopy plots and a symbolized display on an interactive computer graphic system. Independent quality control testing of the FIRM Database was also performed”.*

Additional entities may be added as free text to describe Large Scale Automated Engineering or Base Level Engineering data or submitted data that are not contained within the FIRM Database.

2.4.1.2 Qhorizpa* -- Quantitative Horizontal Positional Accuracy Assessment -- numeric value assigned to summarize the accuracy of the horizontal coordinate measurements and the identification of the test that yielded the value.

Optionality: Optional

2.4.1.2.1 *Horizpav* -- Horizontal Positional Accuracy Value -- an estimate of the accuracy of the horizontal coordinate measurements in the data set expressed in (ground) meters.

Optionality: Optional
Domain: free real

2.4.1.2.2 *Horizpae* -- Horizontal Positional Accuracy Explanation -- the identification of the test that yielded the Horizontal Positional Accuracy Value.

Optionality: Optional
Domain: free text

2.4.2 *Vertacc* -- Vertical Positional Accuracy -- an estimate of accuracy of the vertical positions in the data set.

Optionality: Mandatory for FEMA

2.4.2.1 *Vertaccr* -- Vertical Positional Accuracy Report -- an explanation of the accuracy of the vertical coordinate measurements and a description of the tests used.

Optionality: Mandatory
Domain:

FEMA Business Rules: “*The FIRM Database consists of vector files and associated attributes produced in conjunction with the hardcopy FEMA FIRM. The published effective FIRM and FIRM Database are issued as the official designation of the SFHAs. As such they are adopted by local communities and form the basis for administration of the NFIP. For these purposes they are authoritative. Provisions exist in the regulations for public review, appeals and corrections of the flood risk information shown to better match real world conditions. As with any engineering analysis of this type, variation from the estimated flood heights and floodplain boundaries is possible. Details of FEMA’s requirements for the FISs and flood mapping process that produces these data are available in the Guidelines and Standards for Flood Risk Analysis and Mapping. Vertical accuracy was tested by manual comparison of source graphics with hardcopy plots and a symbolized display on an interactive computer graphic system. Independent quality control testing of the FIRM Database was also performed.*”

Additional entities may be added as free text to describe Large Scale Automated Engineering or Base Level Engineering data or submitted data that are not contained within the FIRM Database.

2.4.2.2 *Qvertpa** -- Quantitative Vertical Positional Accuracy Assessment -- numeric value assigned to summarize the accuracy of vertical coordinate measurements and the identification of the test that yielded the value.

Optionality: Optional

2.4.2.2.1 *Vertaccv* -- Vertical Positional Accuracy Value -- an estimate of the accuracy of the vertical coordinate measurements in the data set expressed in (ground) meters.

Optionality: Optional
Domain: free real

2.4.2.2.2 *Vertacce* -- Vertical Positional Accuracy Explanation -- the identification of the test that yielded the Vertical Positional Accuracy Value.

Optionality: Optional
Domain: free text

2.5 *Lineage* -- Lineage -- information about the events, parameters, and source data which constructed the data set, and information about the responsible parties.

Optionality: Mandatory

2.5.1 *Srcinfo -- Source Information -- list of sources and a short discussion of the information contributed by each.**

Optionality: Mandatory for FEMA

FEMA Business Rules: Hydraulics datasets must reference all sources used in their production. Publishers should create a unique source information entry for each of the following types of input sources that were used:

- BASE
- FIRM
- FHBM
- FBFM
- LOMC
- FIS
- STUDY
- SURVEY
- TOPO
- TSDN
- REF

The type of the source is indicated under source citation abbreviation. Each source information element must be uniquely labeled using the source citation abbreviation "lineage/srcinfo/srccitea" element (2.5.1.5). Use guidance described in the *FIRM Database Technical Reference Table 3*: "The Mapping Partner shall assign each data source a Source Citation Abbreviation (e.g., BASE1, BASE2, BASE3)." Source citation abbreviation elements may be subsequently referenced by optional "lineage/procstep/srcused" elements (2.5.2.2).

Source citations should be provided for each of the entity types listed in Entity Types (enttyp) elements (5.1).

Additional entities may be added as free text to describe submitted data that are not contained within the FIRM Database

2.5.1.1 *Srccite* -- Source Citation -- reference for a source data set.

Optionality: Mandatory

2.5.1.1.1 *Citeinfo*

Optionality: Mandatory

2.5.1.1.1.1 *Origin**

Optionality: Mandatory

2.5.1.1.1.2 *Pubdate*

Optionality: Mandatory

2.5.1.1.1.3 *Pubtime*

Optionality: Optional

2.5.1.1.1.4 *Title*

Optionality: Mandatory

2.5.1.1.1.5 *Edition*

Optionality: Optional for FEMA

2.5.1.1.1.6 *Geoform*

Optionality: Optional for FEMA

2.5.1.1.1.7 *Serinfo/sername & serinfo/issue*

Optionality: Optional for FEMA

2.5.1.1.1.8 *Pubinfo/pubplace & pubinfo/publish*

Optionality: Optional for FEMA

2.5.1.1.1.9 *Othercit*

Optionality: Optional for FEMA

2.5.1.1.1.10 *Onlink**

Optionality: Optional

2.5.1.1.1.11 *Lworkcit*

Optionality: Optional for FEMA

2.5.1.2 *Srcscale* -- Source Scale Denominator -- the denominator of the representative fraction on a map (for example, on a 1:24,000-scale map, the Source Scale Denominator is 24000).

Optionality: Optional for FEMA

Domain: integer > 1

FEMA Business Rules: Note: This is an integer number and must not contain a comma character, decimal point nor the numerator part of the representative fraction.

2.5.1.3 *Typesrc* -- Type of Source Media -- the medium of the source data set.

Optionality: Mandatory

Domain: **FEMA Business Rules: "online" "CD-ROM" "DVD-ROM" free text**

2.5.1.4 *Srctime* -- Source Time Period of Content -- time period(s) for which the source data set corresponds to the ground.

Optionality: Mandatory

2.5.1.4.1 *Timeinfo* -- Time Period of Information -- Information about date and time of event.

Optionality: Mandatory

2.5.1.4.1.1 *Sngdate* -- Single Date/Time -- means of encoding a single date and time.

Optionality: Mandatory

2.5.1.4.1.2 *Caldate* -- Calendar Date -- the year (and optionally month, or month and day)

Optionality: Mandatory

2.5.1.4.2 *Srccurr* -- Source Currentness Reference -- the basis on which the source time period of content information of the source data set is determined.

Optionality: Mandatory

Domain: "ground condition" "publication date" free text

2.5.1.5 Srccitea -- Source Citation Abbreviation -- short-form alias for the source citation.

Optionality: Mandatory

Domain:

FEMA Business Rules: Can be one of the following (Note that if more than one instance of a source was used, then the citation abbreviations are numbered; (e.g., BASE1, BASE2, etc.) :

- BASE

- FIRM

- FHBM

- FBFM

- LOMC

- FIS

- STUDY

- SURVEY

- TOPO

- TSDN

- REF

2.5.1.6 Srconctr -- Source Contribution -- brief statement identifying the information contributed by the source to the data set.

Optionality: Mandatory

Domain: free text

2.5.2 Procstep* -- Process Step -- information about a single event.

Optionality: Mandatory

2.5.2.1 Procdesc -- Process Description -- an explanation of the event and related parameters or tolerances.

Optionality: Mandatory

Domain:

FEMA Business Rules: “Hydraulic Study data development involves compiling survey and hydrologic analysis data, selecting an appropriate hydraulic model, preparing model input data, estimating model parameters, simulating water surface elevations for required recurrence intervals and delineating flood hazard boundaries.”

Additional occurrences should be used to document Large Scale Automated Engineering or Base Level Engineering data sources, methodology used, and any limitations of the output data. If Base Level Engineering methods were used, documentation of the Base Level Engineering tier used for the study should be included in this section.

2.5.2.2 Srcused* -- Source Used Citation Abbreviation -- the Source Citation Abbreviation of a data set used in the processing step.

Optionality: Optional for FEMA

Domain: Source Citation Abbr. from the Source info entries for the data set.

2.5.2.3 Procdte -- Process Date -- the date when the event was completed.

Optionality: Mandatory

Domain: free date

FEMA Business Rules: Must be in the form of YYYYMMDD

For existing data, Publication Date would be the date the data were published by the originator.

For data developed for the study, Publication Date would be the submittal date to the MIP.

See also Section 1.1.2 and Section 1.3.1

2.5.2.4 *Proctime* -- Process Time -- the time when the event was completed.

Optionality: Optional

Domain: free time

2.5.2.5 *Srcprod* -- Source Produced Citation Abbreviation -- the Source Citation Abbreviation of an intermediate data set that (1) is significant in the opinion of the data producer, (2) is generated in the processing step, and (3) is used in later processing steps.

Optionality: Optional for FEMA

Domain: Source Citation Abbr. from the Source info entries for the data set.

2.5.2.6 *Procont* -- Process Contact -- the party responsible for the processing step information.

Optionality: Optional

2.5.2.6.1 *Cntinfo* -- Contact Information -- Identity of, and means to communicate with, person(s) and organization(s) associated with the data set.

Optionality: Optional

2.5.2.6.1.1 *Cntperp*² -- Contact Person Primary -- the name of the individual to which the contact type.

Optionality: Optional

2.5.2.6.1.1.1 *Cntper* -- Contact Person -- the name of the individual to which the contact type applies.

Optionality: Optional

Domain: free text

2.5.2.6.1.1.2 *Cntorg* -- Contact Organization -- the name of the organization to which the contact type applies.

Optionality: Optional

Domain: free text

2.5.2.6.1.2 *Cntorgp*^{Error! Bookmark not defined.} -- Contact Organization Primary -- the organization, and the member of the organization associated with the data set. Used in cases where the association of the organization to the data set is more significant than the association of the person to the data set.

Optionality: Optional

Domain: Compound

2.5.2.6.1.2.1 *Cntorg* -- Contact Organization -- the name of the organization to which the contact type applies.

Optionality: Optional

Domain: free text

2.5.2.6.1.2.2 *Cntper* -- Contact Person -- the name of the individual to which the contact type applies.

Optionality: Optional

Domain: free text

- 2.5.2.6.1.3 *Cntpos* -- Contact Position -- the title of individual.
Optionality: Optional
Domain: free text
- 2.5.2.6.1.4 *Cntaddr** -- Contact Address -- the address for the organization or individual.
Optionality: Optional
- 2.5.2.6.1.4.1 *Addrtype* -- Address Type -- the information provided by the address.
Optionality: Optional
Domain: "mailing" "physical" "mailing and physical", free text
- 2.5.2.6.1.4.2 *Address** -- Address -- an address line for the address.
Optionality: Optional
Domain: free text
- 2.5.2.6.1.4.3 *City* -- City -- the city of the address.
Optionality: Optional
Domain: free text
- 2.5.2.6.1.4.4 *State* -- State or Province -- the state or province of the address.
Optionality: Optional
Domain: free text
- 2.5.2.6.1.4.5 *Postal* -- Postal Code -- the ZIP or other postal code of the address.
Optionality: Optional
Domain: free text
- 2.5.2.6.1.4.6 *Country* -- Country -- the country of the address.
Optionality: Optional
Domain: free text
- 2.5.2.6.1.5 *Cntvoice** -- Contact Voice Telephone -- the telephone number by which individuals can speak to the organization or individual.
Optionality: Optional
Domain: free text
- 2.5.2.6.1.6 *Cnttdd** -- Contact TDD/TTY Telephone -- the telephone number by which hearing impaired individuals can contact the organization or individual.
Optionality: Optional
Domain: free text
- 2.5.2.6.1.7 *Cntfax** -- Contact Facsimile Telephone -- the telephone number of a facsimile machine of the organization or individual.
Optionality: Optional
Domain: free text
- 2.5.2.6.1.8 *Cntemail** -- Contact Electronic Mail Address -- the address of the electronic mailbox of the organization or individual.
Optionality: Optional
Domain: free text

2.5.2.6.1.9 *Hours* -- Hours of Service -- time period when individuals can speak to the organization or individual.

Optionality: Optional
Domain: free text

2.5.2.6.1.10 *Cntinst* -- Contact Instructions -- supplemental instructions on how or when to contact the individual or organization.

Optionality: Optional
Domain: free text

2.6 *Cloud* -- Cloud Cover -- area of a data set obstructed by clouds, expressed as a percentage of the spatial extent.

Optionality: Optional
Domain: 0 <= Integer <= 100 "Unknown"

3 *Spdoinfo* – Spatial Data Organization Information – the mechanism used to represent spatial information in the data set.

Optionality: Optional for FEMA

FEMA Business Rules: This section not required for FEMA Hydraulics metadata submissions.

3.1 *Indspref* -- Indirect Spatial Reference -- name of types of geographic features, addressing schemes, or other means through which locations are referenced in the data set.

Optionality: Optional for FEMA
Domain: free text

3.2 *Direct* -- Direct Spatial Reference Method -- the system of objects used to represent space in the data set.

Optionality: Optional
Domain: "Point" "Vector" "Raster"

FEMA Business Rules: Defaults to “Vector” for all FEMA Hydraulics metadata submissions.

3.3 *Ptvctinf*³ -- Point and Vector Object Information -- the types and numbers of vector or nongridded point spatial objects in the data set.

Optionality: Optional

3.3.1 *Sdtstern** -- SDTS Terms Description -- point and vector object information using the terminology and concepts from Spatial Data Transfer Standard (SDTS)

Optionality: Optional

3.3.1.1 *Sdtstype* -- SDTS Point and Vector Object Type -- name of point and vector spatial objects used to locate zero-, one-, and two-dimensional spatial locations in the data set.

Optionality: Optional
Domain: "Point" "Entity point" "Label point" "Area point" "Node, planar graph" "Node, network" "String" "Link" "Complete chain" "Area chain" "Network chain, planar graph" "Network chain, nonplanar graph" "Circular arc, three point center" "Elliptical arc" "Uniform B-spline" "Piecewise Bezier" "Ring with mixed composition" "Ring composed of strings" "Ring composed of chains" "Ring composed of arcs" "G-polygon" "GT-

³ Note: Use of the *spdoinfo.ptvctinf* and *spdoinfo.rastinfo* elements is mutually exclusive.

polygon composed of rings" "GT-polygon composed of chains" "Universe polygon composed of rings" "Universe polygon composed of chains" "Void polygon composed of rings" "Void polygon composed of chains"

3.3.1.2 *Ptvctnt* -- Point and Vector Object Count -- the total number of the point or vector object type occurring in the data set.

Optionality: Optional

Domain: Integer > 0

3.3.2 *Vpfterm* -- VPF Terms Description -- point and vector object information using the terminology and concepts from Department of Defense, 1992, Vector Product Format (VPF) (MILSTD- 600006)

Optionality: Optional

3.3.2.1 *Vpflevel* -- VPF Topology Level -- the completeness of the topology carried by the data set. The levels of completeness are defined in Department of Defense, 1992, Vector Product Format (MIL-STD-600006).

Optionality: Optional

Domain: 0 <= Integer <= 3

3.3.2.2 *Vpfinfo** -- VPF Point and Vector Object Information -- information about VPF point and vector objects

Optionality: Optional

3.3.2.2.1 *Vpfstype* -- VPF Point and Vector Object Type -- name of point and vector spatial objects used to locate zero-, one-, and two-dimensional spatial locations in the data set.

Optionality: Optional

Domain: "Node" "Edge" "Face" "Text"

3.3.2.2.2 *Vpfent* -- VPF Point and Vector Object Count.

Optionality: Optional

Domain: Integer > 0

3.4 *Rastinfo*³ -- Raster Object Information -- the types and numbers of raster spatial objects in the data set.

Optionality: Optional

3.4.1 *Rasttype* -- Raster Object Type -- raster spatial objects used to locate zero-, two-, or three-dimensional locations in the data set.

Optionality: Optional

Domain: "Point" "Pixel" "Grid Cell" "Voxel"

3.4.2 *Rowcount* -- Row Count -- the maximum number of raster objects along the ordinate (y) axis. For use with rectangular raster objects.

Optionality: Optional

Domain: Integer > 0

3.4.3 *Colcount* -- Column Count -- the maximum number of raster objects along the abscissa (x) axis. For use with rectangular raster objects.

Optionality: Optional

Domain: Integer > 0

3.4.4 *Vrtcount* -- Vertical Count -- the maximum number of raster objects along the vertical (z) axis. For use with rectangular volumetric raster objects (voxels).

Optionality: Optional
Domain: Integer > 0

4 *Spref* -- Spatial Reference Information -- the description of the reference frame for, and the means to encode coordinates in the data set.

Optionality: Mandatory for FEMA

FEMA Business Rules: This section is required for all FEMA Hydraulics metadata submissions.

4.1 *Horizsys* -- Horizontal Coordinate System Definition -- the reference frame or system from which linear or angular quantities are measured and assigned to the position that a point occupies.

Optionality: Mandatory

FEMA Business Rules: Must specify either Geograph (4.1.1) OR Planar (4.1.2) OR Local (4.1.3),- exclusive.

4.1.1 *Geograph*⁴ -- Geographic -- the quantities of latitude and longitude which define the position of a point on the Earth's surface with respect to a reference spheroid.

Optionality: Mandatory if applicable

4.1.1.1 *Latres* -- Latitude Resolution -- the minimum difference between two adjacent latitude values expressed in Geographic Coordinate Units of measure.

Optionality: Mandatory if applicable
Domain: real > 0.0

4.1.1.2 *Longres* -- Longitude Resolution -- the minimum difference between two adjacent longitude values expressed in Geographic Coordinate Units of measure.

Optionality: Mandatory if applicable
Domain: real > 0.0

4.1.1.3 *Geogunit* -- Geographic Coordinate Units -- units of measure used for the latitude and longitude values.

Optionality: Mandatory if applicable
Domain: "Decimal degrees" "Decimal minutes" "Decimal seconds" "Degrees and decimal minutes" "Degrees, minutes, and decimal seconds" "Radians" "Grads"

4.1.2 *Planar** -- Planar⁴ -- the quantities of distances, or distances and angles, which define the position of a point on a reference plane to which the surface of the Earth has been projected.

Optionality: Mandatory if applicable

4.1.2.1 *Mapproj*⁵ -- Map Projection -- the systematic representation of all or part of the surface of the Earth on a plane or developable surface.

Optionality: Mandatory if applicable

⁴ Note: Use of the *horizsys.geograph*, *horizsys.planar* and *horizsys.local* elements is mutually exclusive (i.e. only one of these can be used).

⁵ Note: Use of the *planar.mapproj*, *planar.gridsys* and *planar.localp* elements is mutually exclusive (i.e. only one of these can be used).

4.1.2.1.1 *Mapprojn* – Map Projection Name – name of the map projection.

Optionality: Mandatory if applicable

Domain: "Albers Conical Equal Area" "Azimuthal Equidistant" "Equidistant Conic" "Equirectangular" "General Vertical Nearsided Projection" "Gnomonic" "Lambert Azimuthal Equal Area" "Lambert Conformal Conic" "Mercator" "Modified Stereographic for Alaska" "Miller Cylindrical" "Oblique Mercator" "Orthographic" "Polar Stereographic" "Polyconic" "Robinson" "Sinusoidal" "Space Oblique Mercator" "Stereographic" "Transverse Mercator" "van der Grinten" free text

4.1.2.1.2 [*map projection parameters for selected projection, e.g. projection center, meridian, false easting/northing, etc. See¹*]

Optionality: Mandatory if applicable

4.1.2.2 *Gridsys⁵* -- Grid Coordinate System -- a plane-rectangular coordinate system usually based on, and mathematically adjusted to, a map projection so that geographic positions can be readily transformed to and from plane coordinates.

Optionality: Mandatory if applicable

4.1.2.2.1 *Gridsysn* -- Grid Coordinate System Name -- name of the grid coordinate system.

Optionality: Mandatory if applicable

Domain: "Universal Transverse Mercator" "Universal Polar Stereographic" "State Plane Coordinate System 1927" "State Plane Coordinate System 1983" "ARC Coordinate System" "other grid system"

4.1.2.2.2 [*grid system parameters for selected grid system. See¹ E.g., Universal Transverse Mercator (UTM) or state zone*]

Optionality: Mandatory if applicable

4.1.2.3 *Localp⁵* -- Local Planar -- any right-handed planar coordinate system of which the z-axis coincides with a plumb line through the origin that locally is aligned with the surface of the Earth.

Optionality: Mandatory if applicable

4.1.2.3.1 *Localpd* – Local planar description

Optionality: Mandatory if applicable

4.1.2.3.2 *Localpgi* – Georeference Information

Optionality: Mandatory if applicable

4.1.2.4 *Planci* -- Planar Coordinate Information -- information about the coordinate system developed on the planar surface.

Optionality: Mandatory if applicable

4.1.2.4.1 *Plance* – planar coordinate encoding method

Optionality: Mandatory if applicable

4.1.2.4.2 *Coordrep⁶* – coordinate representation

Optionality: Mandatory if applicable

4.1.2.4.2.1 *Absres* – Abscissa resolution (Domain: real)

⁶Note: Use of the *planci.coordrep* and *planci.distbrep* elements is mutually exclusive. Since *planci.coordrep* is mandatory, use of *planci.distbrep* element is therefore invalid.

Optionality: Mandatory if applicable

4.1.2.4.2.2 *Ordres – Ordinate resolution (Domain: real)*
Optionality: Mandatory if applicable

4.1.2.4.3 *Distbrep⁶– distance and bearing representation*
Optionality: Optional for FEMA

4.1.2.4.3.1 *Distres – Distance resolution*
Optionality: Optional for FEMA
Domain: *real*

4.1.2.4.3.2 *Bearres – Bearing resolution*
Optionality: Optional for FEMA
Domain: *real*

4.1.2.4.3.3 *Bearunit – Bearing units*
Optionality: Optional for FEMA
Domain: “*Decimal degrees*” “*Decimal minutes*” “*Decimal seconds*” “*Degrees and decimal minutes*” “*Degrees, minutes, and decimal seconds*” “*Radians*” “*Grads*”

4.1.2.4.3.4 *Bearrefd – Bearing reference direction*
Optionality: Optional for FEMA
Domain: “*North*” “*South*”

4.1.2.4.3.5 *Bearrefm – Bearing reference meridian (Domain: “Assumed” “Grid” “Magnetic” “Astronomic” “Geodetic”)*
Optionality: Optional for FEMA

4.1.2.4.4 *Plandu – planar distance units*
Optionality: Mandatory if applicable

4.1.3 *Local⁴* -- Local -- a description of any coordinate system that is not aligned with the surface of the Earth.
Optionality: Mandatory if applicable

4.1.3.1 *Localdes* -- Local Description -- a description of the coordinate system and its orientation to the surface of the Earth.
Optionality: Mandatory if applicable
Domain: free text

4.1.3.2 *Localgeo* -- Local Georeference Information -- a description of the information provided to register the local system to the Earth (e.g. control points, satellite ephemeral data, inertial navigation data).
Optionality: Mandatory if applicable
Domain: free text

4.1.4 *Geodetic* -- Geodetic Model -- parameters for the shape of the earth.
Optionality: Mandatory for FEMA

4.1.4.1 *Horizdn* -- Horizontal Datum Name -- the identification given to the reference system used for defining the coordinates of points.

Optionality: Mandatory for FEMA

Domain: "North American Datum of 1927" "North American Datum of 1983" free text

4.1.4.2 *Ellips* -- Ellipsoid Name -- identification given to established representations of the Earth's shape.

Optionality: Mandatory

Domain: "Clarke 1866" "Geodetic Reference System 80" free text

4.1.4.3 *Semiaxis* -- Semi-major Axis -- radius of the equatorial axis of the ellipsoid.

Optionality: Mandatory

Domain: real > 0.0

4.1.4.4 *Denflat* -- Denominator of Flattening Ratio -- the denominator of the ratio of the difference between the equatorial and polar radii of the ellipsoid when the numerator is set to 1.

Optionality: Mandatory

Domain: Denominator of Flattening > 0.0

4.2 *Vertdef* -- Vertical Coordinate System Definition -- the reference frame or system from which vertical distances (altitudes or depths) are measured.

Optionality: Optional for FEMA

4.2.1 *Altsys* -- Altitude System Definition -- the reference frame or system from which altitudes (elevations) are measured. The term "altitude" is used instead of the common term "elevation" to conform to the terminology in Federal Information Processing Standards 70-1 and 173.

Optionality: Optional for FEMA

4.2.1.1 *Alt datum* -- Altitude Datum Name -- the identification given to the surface taken as the surface of reference from which altitudes are measured.

Optionality: Optional for FEMA

Domain: "National Geodetic Vertical Datum of 1929" "North American Vertical Datum of 1988" free text

4.2.1.2 *Altres** -- Altitude Resolution -- the minimum distance possible between two adjacent altitude values, expressed in Altitude Distance Units of measure.

Optionality: Optional for FEMA

Domain: real > 0.0

4.2.1.3 *Altunits* -- Altitude Distance Units -- units in which altitudes are recorded.

Optionality: Optional for FEMA

Domain: "meters" "feet" free text

4.2.1.4 *Altenc* -- Altitude Encoding Method -- the means used to encode the altitudes.

Optionality: Optional for FEMA

Domain: "Explicit elevation coordinate included with horizontal coordinates" "Implicit coordinate" "Attribute values"

4.2.2 *Depthsys* -- Depth System Definition -- the reference frame or system from which depths are measured.

Optionality: Optional for FEMA

4.2.2.1 *Depthdn* -- Depth Datum Name -- the identification given to surface of reference from which depths are measured.

Optionality: Optional for FEMA
Domain: see FGDC standard

4.2.2.2 *Depthres** -- Depth Resolution -- the minimum distance possible between two adjacent depth values, expressed in Depth Distance Units of measure.

Optionality: Optional for FEMA
Domain: real > 0.0

4.2.2.3 *Depthdu* -- Depth Distance Units -- units in which depths are recorded.

Optionality: Optional for FEMA
Domain: "meters" "feet" free text

4.2.2.4 *Depthem* -- Depth Encoding Method -- the means used to encode depths.

Optionality: Optional for FEMA
Domain: "Explicit depth coordinate included with horizontal coordinates" "Implicit coordinate" "Attribute values"

5 *eainfo* –Entity and Attribute Information – details about information content of the data set, including entity types, their attributes and the domains from which attribute values may be assigned.

Optionality: Mandatory for FEMA

FEMA Business Rules: This section is required for all FEMA Hydraulics metadata submissions. This section describes the various elements of the submission package.

5.1 *Detailed** -- Detailed Description -- description of the entities, attributes, attribute values, and related characteristics encoded in the data set.

Optionality: Mandatory

5.1.1 *Enttyp* -- Entity Type -- the definition and description of a set into which similar entity instances are classified.

Optionality: Mandatory

FEMA Business Rules: Users must specify from the table below the entities that are provided with their submission (Source: “FEMA *FIRM Database Technical Reference*”).

Additional entities can be entered as free text.

Enttypl	Enttypd
<i>S_BFE</i>	<i>Location and attributes for base flood elevation lines shown on the FIRM.</i>
<i>S_Fld_Haz_Ar</i>	<i>Location and attributes for flood risk zones shown on the FIRM.</i>
<i>S_Gen_Struct</i>	<i>A spatial dataset consisting of lines that depict the location of flood control structures shown on the flood profile and FIRM.</i>
<i>S_HWM</i>	<i>A spatial dataset depicting the locations of high water marks from historic flooding used for model calibration.</i>
<i>S_Levee</i>	<i>A spatial dataset consisting of lines that represent the centerlines of levees.</i>

<i>S_Profil_Basln</i>	<i>A spatial dataset consisting of lines showing the flow path used for floodplain modeling and mapping.</i>
<i>S_Riv_Mrk</i>	<i>Location and attributes for river mile markers shown on the FIRM.</i>
<i>S_Stn_Start</i>	<i>A spatial dataset consisting of points indicating the location of the reference point that was used as the origin for distance measurements along streams and rivers.</i>
<i>S_Submittal_Info</i>	<i>A spatial dataset consisting of polygons depicting the extents of the studied area.</i>
<i>S_XS</i>	<i>A spatial dataset consisting of lines showing the locations of cross sections used for computation of water-surface profiles for 1-D hydraulic models.</i>

5.1.1.1 *Enttypl* -- Entity Type Label -- the name of the entity type.

Optionality: Mandatory

Domain: free text

FEMA Business Rules: See list above.

5.1.1.2 *Enttypd* -- Entity Type Definition -- the description of the entity type.

Optionality: Mandatory

Domain: free text

FEMA Business Rules: See list above.

5.1.1.3 *Enttypds* -- Entity Type Definition Source -- the authority of the definition.

Optionality: Mandatory

Domain:

FEMA Business Rules: “FEMA *FIRM Database Technical Reference* (available at <https://www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping> and on the FEMA Risk MAP Knowledge Sharing Site).”

Additional definition sources may be included as free text.

5.1.2 *Attr** -- Attribute -- a defined characteristic of an entity.

Optionality: Optional for FEMA

5.1.2.1 *Attrlabl* -- Attribute Label -- the name of the attribute.

Optionality: Optional for FEMA

Domain: free text

5.1.2.2 *Attrdef* -- Attribute Definition -- the description of the attribute.

Optionality: Optional for FEMA

Domain: free text

5.1.2.3 *Attrdefs* -- Attribute Definition Source -- the authority of the definition.

Optionality: Optional for FEMA

Domain: free text

5.1.2.4 *Attrdomv** -- Attribute Domain Values -- the valid values that can be assigned for an attribute.

Optionality: Optional for FEMA

5.1.2.4.1 *Edom* – enumerated domain (value & definition & source)

Optionality: Optional for FEMA

5.1.2.4.2 *Rdom* – range domain

Optionality: Optional for FEMA

5.1.2.4.3 *Codesetd* – codeset domain

Optionality: Optional for FEMA

5.1.2.4.4 *Udom* – unrepresentable domain

Optionality: Optional for FEMA

5.1.2.5 *Begdatea** -- Beginning Date of Attribute Values -- earliest or only date for which the attribute values are current. In cases when a range of dates are provided, this is the earliest date for which the information is valid.

Optionality: Optional

Domain: free date

5.1.2.6 *Enddatea** -- Ending Date of Attribute Values -- latest date for which the information is current. Used in cases when a range of dates are provided.

Optionality: Optional

Domain: free date

5.1.2.7 *Attrvai* -- Attribute Value Accuracy Information -- an assessment of the accuracy of the assignment of attribute values.

Optionality: Optional

5.1.2.7.1 *Attrva* – attribute value accuracy

Optionality: Optional

5.1.2.7.2 *Attrvae* – attribute value accuracy explanation

Optionality: Optional

5.1.2.8 *Attrmfrq* -- Attribute Measurement Frequency -- the frequency with which attribute values are added.

Optionality: Optional

Domain: "Unknown" "As needed" "Irregular" "None planned" free text

5.2 Overview* -- Overview Description -- summary of, and citation to detailed description of, the information content of the data set.

Optionality: Mandatory for FEMA

5.2.1 *Eaover* -- Entity and Attribute Overview -- detailed summary of the information contained in a data set.

Optionality: Mandatory

Domain:

FEMA Business Rules: “The Hydraulic submittal is made up of several data themes containing both spatial and attribute information. These data represent the extent of flooding and the water surface elevations for the subject area. The spatial data files and attribute tables include profile baselines, cross-sections, flood hazard boundaries, BFEs, manmade structures, and other data related to the NFIP.”

5.2.2 *Eadetcit** -- Entity and Attribute Detail Citation -- reference to the complete description of the entity types, attributes, and attribute values for the data set.

Optionality: Mandatory

Domain:

FEMA Business Rules: “FEMA’s FIRM Database Technical Reference contains a detailed description of the data themes and references to other relevant information.”

6 *distinfo* – Distribution Information – information about the distributor of and options for obtaining the data set. *

Optionality: Mandatory for FEMA

FEMA Business Rules: This section is required for all FEMA Hydraulics metadata submissions.

The distributor of the data can be either FEMA or the publisher of the metadata.

6.1 *Distrib* -- Distributor -- the party from whom the data set may be obtained.

Optionality: Mandatory

FEMA Business Rules: If FEMA is the Distributor (6.1) of the data, then the FEMA information for the elements provided below should be used. If FEMA is not the Distributor of the Hydraulics data, then contact information for the Distributor must be provided in Section 6.1.

6.1.1 *Cntinfo* -- Contact Information -- Identity of, and means to communicate with, person(s) and organization(s) associated with the data set.

Optionality: Mandatory

6.1.1.1 *Cntperp*² -- Contact Person Primary -- the name of the individual to which the contact type.

Optionality: Optional

FEMA Business Rules: Contact Person Primary (Cntperp 6.1.1.1) is not used; Contact Organization Primary (Cntorgp 6.1.1.2) serves as primary contact.

6.1.1.2 *Cntorgp*² -- Contact Organization Primary -- the organization, and the member of the organization associated with the data set. Used in cases where the association of the organization to the data set is more significant than the association of the person to the data set.

Optionality: Mandatory

Domain: Compound

6.1.1.2.1 *Cntorg* -- Contact Organization -- the name of the organization to which the contact type applies.

Optionality: Mandatory

Domain: free text

FEMA Business Rules: FEMA, Mapping Information Platform

6.1.1.2.2 *Cntper* -- Contact Person -- the name of the individual to which the contact type applies.

Optionality: Optional

Domain: free text

6.1.1.3 *Cntpos* -- Contact Position -- the title of individual.

Optionality: Optional

Domain: free text

6.1.1.4 *Cntaddr** -- Contact Address -- the address for the organization or individual.

Optionality: Mandatory

6.1.1.4.1 *Addrtype* -- Address Type -- the information provided by the address.

Optionality: Mandatory

Domain: free text

FEMA Business Rules: *mailing address*

6.1.1.4.2 **Address*** -- **Address** -- **an address line for the address.**

Optionality: Mandatory for FEMA

Domain: free text

FEMA Business Rules: *500 C Street, S.W.*

6.1.1.4.3 *City* -- City -- the city of the address.

Optionality: Mandatory

Domain: free text

FEMA Business Rules: *Washington*

6.1.1.4.4 *State* -- State or Province -- the state or province of the address.

Optionality: Mandatory

Domain: free text

FEMA Business Rules: *District of Columbia*

6.1.1.4.5 *Postal* -- Postal Code -- the ZIP or other postal code of the address.

Optionality: Mandatory

Domain: free text

FEMA Business Rules: *20472*

6.1.1.4.6 **Country** -- **Country** -- **the country of the address.**

Optionality: Mandatory for FEMA

Domain: free text

FEMA Business Rules: *USA*

6.1.1.5 *Cntvoice** -- Contact Voice Telephone -- the telephone number by which individuals can speak to the organization or individual.

Optionality: Mandatory

Domain: free text

FEMA Business Rules: *1-877-336-2627*

6.1.1.6 *Cnttdd** -- Contact TDD/TTY Telephone -- the telephone number by which hearing-impaired individuals can contact the organization or individual.

Optionality: Optional

Domain: free text

6.1.1.7 *Cntfax** -- Contact Facsimile Telephone -- the telephone number of a facsimile machine of the organization or individual.

Optionality: Optional

Domain: free text

6.1.1.8 ***Cntemail**** -- **Contact Electronic Mail Address** -- **the address of the electronic mailbox of the organization or individual.**

Optionality: Mandatory for FEMA

Domain: free text

FEMA Business Rules: miphelp@riskmapcfs.com

6.1.1.9 *Hours* -- Hours of Service -- time period when individuals can speak to the organization or individual.

Optionality: Optional

Domain: free text

6.1.1.10 *Continst* -- Contact Instructions -- supplemental instructions on how or when to contact the individual or organization.

Optionality: Optional

Domain: free text

6.2 *Resdesc* -- Resource Description -- the identifier by which the distributor knows the data set.

Optionality: Optional for FEMA

Domain: free text

6.3 *Distliab* -- Distribution Liability -- statement of the liability assumed by the distributor.

Optionality: Mandatory

Domain:

FEMA Business Rules: “*No warranty expressed or implied is made by FEMA regarding the utility of the data on any other system nor shall the act of distribution constitute any such warranty.*”

6.4 *Stdorder -- Standard Order Process -- the common ways in which the data set may be obtained or received, and related instructions and fee information.**

Optionality: Mandatory for FEMA

FEMA Business Rules: Note: the child elements, <nondig> (6.4.1) and <digform> (6.4.2) are mutually exclusive (i.e., only one can occur within a given <stdorder> element).

6.4.1 *Nondig* -- Non-digital Form -- the description of options for obtaining the data set on non-computer-compatible media.

Optionality: Optional

Domain: free text

6.4.2 *Digform** -- Digital Form -- the description of options for obtaining the data set on computer-compatible media

Optionality: Mandatory

6.4.2.1 *Digtinfo* -- Digital Transfer Information - description of the form of the data to be distributed.

Optionality: Mandatory

6.4.2.1.1 *Formname* -- Format Name -- the name of the data transfer format.

Optionality: Mandatory

FEMA Business Rules: For a FEMA Hydraulics metadata submission, the format name should default to “*FEMA-DCS-Hydraulics*”.

6.4.2.1.2 *Formvern* -- format version

Optionality: Optional

6.4.2.1.3 *Formverd* – format version date
Optionality: Optional

6.4.2.1.4 *Formspec* - Format specification
Optionality: Optional

6.4.2.1.5 *Formcont* – format information content
Optionality: Optional

6.4.2.1.6 *Filedasc* – file decompression technique
Optionality: Optional for FEMA

6.4.2.1.7 *Transize* – transfer size
Optionality: Optional

6.4.2.2 *Digtopt* -- Digital Transfer Option -- the means and media by which a data set is obtained from the distributor.
Optionality: Mandatory

6.4.2.2.1 *Onlinopt** - Online Option -- information required to directly obtain the data set electronically.
Optionality: Mandatory

6.4.2.2.1.1 *Computer** -- Computer Contact Information -- instructions for establishing communications with the distribution computer.
Optionality: Mandatory

6.4.2.2.1.1.1 *Networka* - network address
Optionality: Mandatory

6.4.2.2.1.1.1.1 *Networkr** - Resource name
Optionality: Mandatory
Domain:
FEMA Business Rules: URL where dataset may be obtained. (e.g.,
<https://hazards.fema.gov>)

6.4.2.2.1.2 *Accinstr* -- Access Instructions -- instructions on the steps required to access the data set.
Optionality: Optional

6.4.2.2.1.3 *Oncomp* – Online Computer and Operating system
Optionality: Optional

6.4.2.2.2 *Offoptn* -- Offline Option -- information about media-specific options for receiving the *data set*.
Optionality: Optional

6.4.2.2.2.1 *Offmedia* – Offline Media
Optionality: Optional
Domain: "CD-ROM" "3-1/2 inch floppy disk" "5-1/4 inch floppy disk" "9-track tape" "4 mm cartridge tape" "8 mm cartridge tape" "1/4-inch cartridge tape" free text

6.4.2.2.2.2 *Reccap* – recording capacity
Optionality: Optional

6.4.2.2.2.3 *Recfmt* – recording format
Optionality: Optional

6.4.2.2.2.4 *Compat* – compatibility information
Optionality: Optional

6.4.3 *Fees* -- Fees -- the fees and terms for retrieving the data set.
Optionality: Mandatory
Domain: **FEMA Business Rules: “Contact Distributor”** free text

6.4.4 *Ordering* -- Ordering Instructions -- general instructions and advice about, and special terms and services provided for, the data set by the distributor.
Optionality: Optional
Domain: free text

6.4.5 *Turnarnd* -- Turnaround -- typical turnaround time for the filling of an order.
Optionality: Optional
Domain: free text

6.5 *Custom* -- Custom Order Process -- description of custom distribution services available, and the terms and conditions for obtaining these services.
Optionality: Optional for FEMA
Domain: free text

6.6 *Techpreq* -- Technical Prerequisites -- description of any technical capabilities that the consumer must have to use the data set in the form(s) provided by the distributor.
Optionality: Optional
Domain: free text

6.7 *Availabl* -- Available Time Period -- the time period when the data set will be available from the distributor.
Optionality: Optional
Domain: time period (single, multiple, range of dates)

7 *metainfo* – Metadata Reference Information – information on the currentness of the metadata information and the responsible party.
Optionality: Mandatory
FEMA Business Rules: This section is required for all FGDC-compliant metadata.

7.1 *Metd* -- Metadata Date -- the date that the metadata were created or last updated.
Optionality: Mandatory
Domain: single_date
FEMA Business Rules: Must be in the form of YYYYMMDD

7.2 *Metrd* -- Metadata Review Date -- the date of the latest review of the metadata entry.
Optionality: Optional
Domain: free date; Metadata Review Date later than Metadata Date

7.3 *Metfrd* -- Metadata Future Review Date -- the date by which the metadata entry should be reviewed.
Optionality: Optional
Domain: free date; Metadata Future Review Date later than Metadata Review Date

7.4 *Metc* -- Metadata Contact -- the party responsible for the metadata information.
Optionality: Mandatory

7.4.1 *Cntinfo* -- Contact Information -- Identity of, and means to communicate with, person(s) and organization(s) associated with the data set.
Optionality: Mandatory

7.4.1.1 *Cntperp*⁷ -- Contact Person Primary -- the name of the individual to which the contact type.
Optionality: Mandatory
Domain: Compound

7.4.1.1.1 *Cntper* -- Contact Person -- the name of the individual to which the contact type applies.
Optionality: Mandatory
Domain: free text

7.4.1.1.2 *Cntorg* -- Contact Organization -- the name of the organization to which the contact type applies.
Optionality: Mandatory
Domain: free text

7.4.1.2 *Cntorgp*⁷ -- Contact Organization Primary -- the organization, and the member of the organization associated with the data set. Used in cases where the association of the organization to the data set is more significant than the association of the person to the data set.
Optionality: Optional

FEMA Business Rules: Contact Organization Primary (Cntorgp 7.4.1.2) is not used; Contact Person Primary (Cntperp 7.4.1.1) serves as primary contact.

7.4.1.3 *Cntpos* -- Contact Position -- the title of individual.
Optionality: Optional
Domain: free text

7.4.1.4 *Cntaddr** -- Contact Address -- the address for the organization or individual.
Optionality: Mandatory

7.4.1.4.1 *Addrtype* -- Address Type -- the information provided by the address.
Optionality: Mandatory
Domain: free text

7.4.1.4.2 *Address -- Address -- an address line for the address.**
Optionality: Mandatory for FEMA
Domain: free text

7.4.1.4.3 *City* -- City -- the city of the address.
Optionality: Mandatory
Domain: free text

7.4.1.4.4 *State* -- State or Province -- the state or province of the address.
Optionality: Mandatory

⁷Note: Use of the *Cntinfo.Cntperp* and *Cntinfo.Cntorgp* elements is mutually exclusive. *Cntinfo.Cntperp* is specified in this context as mandatory so the *Cntinfo.Cntorgp* element must not be used here.

Domain: free text

7.4.1.4.5 Postal -- Postal Code -- the ZIP or other postal code of the address.

Optionality: Mandatory

Domain: free text

7.4.1.4.6 Country -- Country -- the country of the address.

Optionality: Mandatory for FEMA

Domain: free text

7.4.1.5 *Cntvoice** -- Contact Voice Telephone -- the telephone number by which individuals can speak to the organization or individual.

Optionality: Mandatory

Domain: free text

7.4.1.6 *Cnttdd** -- Contact TDD/TTY Telephone -- the telephone number by which hearing-impaired individuals can contact the organization or individual.

Optionality: Optional

Domain: free text

7.4.1.7 *Cntfax** -- Contact Facsimile Telephone -- the telephone number of a facsimile machine of the organization or individual.

Optionality: Optional

Domain: free text

7.4.1.8 *Cntemail -- Contact Electronic Mail Address -- the address of the electronic mailbox of the organization or individual.**

Optionality: Mandatory for FEMA

Domain: free text

7.4.1.9 *Hours* -- Hours of Service -- time period when individuals can speak to the organization or individual.

Optionality: Optional

Domain: free text

7.4.1.10 *Cntinst* -- Contact Instructions -- supplemental instructions on how or when to contact the individual or organization.

Optionality: Optional

Domain: free text

7.5 *Metstdn* -- Metadata Standard Name -- the name of the metadata standard used to document the data set.

Optionality: Mandatory

Domain: "FGDC Content Standard for Digital Geospatial Metadata" free text

7.6 *Metstdv* -- Metadata Standard Version -- identification of the version of the metadata standard used to document the data set.

Optionality: Mandatory

Domain: "FGDC-STD-001-1998", free text

7.7 *Mettc* -- Metadata Time Convention -- form used to convey time of day information in the metadata entry. Used if time of day information is included in the metadata for a data set.

Optionality: Optional for FEMA

Domain: "local time" "local time with time differential factor" "universal time"

7.8 *Metac* -- Metadata Access Constraints -- restrictions and legal prerequisites for accessing the metadata. These include any access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the metadata.

Optionality: Optional

Domain: free text

7.9 *Metuc* -- Metadata Use Constraints -- restrictions and legal prerequisites for using the metadata after access is granted. These include any metadata use constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on using the metadata.

Optionality: Optional

Domain: free text

7.10 *Metsi* -- Metadata Security Information -- handling restrictions imposed on the metadata because of national security, privacy, or other concerns.

Optionality: Optional

7.10.1 *Metscs* -- Metadata Security Classification System -- name of the classification system for the metadata.

Optionality: Optional

Domain: free text

7.10.2 *Metsc* -- Metadata Security Classification -- name of the handling restrictions on the metadata.

Optionality: Optional

Domain: "Top secret" "Secret" "Confidential" "Restricted" "Unclassified" "Sensitive"
free text

7.10.3 *Metshd* -- Metadata Security Handling Description -- additional information about the restrictions on handling the metadata.

Optionality: Optional

Domain: free text

7.11 *Metextns -- Metadata Extensions a reference to extended elements to the standard which may be defined by a metadata producer or a user community. Extended elements are elements outside the Standard, but needed by the metadata producer. If extended elements are created, they must follow the guidelines in Appendix D, Guidelines for Creating Extended Elements to the Content Standard for Digital Geospatial Metadata.**

Optionality: Mandatory for FEMA

7.11.1 *Onlink -- Online Linkage -- the name of an online computer resource that contains the metadata extension information for the data set. Entries should follow the Uniform Resource Locator convention of the Internet.**

Optionality: Mandatory for FEMA

Domain:

FEMA Business Rules: Two onlinks are required:

- Link to URL on MIP for information on this profile: <https://hazards.fema.gov>

- Link to the data's Ethernet POWERLINK Standardization Group (EPSG) code (in the form of a URL). More info about EPSG code can be found at:
<http://www.epsg.org>.

7.11.2 *Metprof* -- Profile Name -- the name given to a document that describes the application of the Standard to a specific user community.

Optionality: Mandatory for FEMA

Domain:

FEMA Business Rules: “*FEMA NFIP Metadata Content and Format Standard*”

Table of Revisions

The following summary of changes details revisions to the Hydraulics Metadata Profile_subsequent to its most recent version in November 2016.

Version Number	Date	Description
1.0.8	February 2018	Revised Title example. Updated Version ID. Updated Abstract and Purpose descriptions to reflect Large Scale Automated Engineering and Base Level Engineering. Updated Native Dataset Environment example and hydraulic models list. Revised Attribute Accuracy Report, Logical Consistency Report, Completeness Report, Horizontal Positional Accuracy Report, and Vertical Positional Accuracy Report to update Large Scale Automated Engineering and Base Level Engineering description. Updated Process Description to include Base Level Engineering tier, if applicable. Revised Entity and Attribute Detailed Description(s) for consistency with other metadata profiles. Updated URLs.