Riverine Infrastructure Database - Data Compilation

Contents:

1. General

This document outlines integration of the development of Riverine Infrastructure Database (RIDB) datasets with the IaDOT project development process. Also addressed are partial datasets developed as a result of flood event observations.

The document 'Riverine Infrastructure Database - Data Guidelines', referenced herein as 'RIDB Guidelines', provides detailed specifications and methodologies for development of datasets at RIDB sites. The default IaDOT project development process will generally provide the data needed for an RIDB dataset. To better integrate with the project development process the RIDB deliverable format addressed in the RIDB Guidelines are modified herein.

A complete RIDB dataset for a riverine crossing will generally consist of:

- A site summary.

- A feature summary. Features are structures (bridges/larger culverts) or low road locations.

- A frequency-discharge and stage-discharge relationship for each feature (generally a single relationship is representative of multiple/all features).

- The planimetric location of each feature.

With an RIDB dataset developed for a site, the impact during a flood event on critical features, such as low beam for a steel bridge, or inundation of traffic lanes, can be assessed.

2. Work Sequence

For project development related to replacement of a structure at a riverine location the Preliminary Bridge Engineer shall be contacted to determine if an RIDB dataset is required for the site. A riverine location for this purpose is a stream crossing a waterway having a drainage area greater than 10 sq. mi. If a dataset is required, the RIDB network location will be provided for reference (StreamName_RM, ex IowaR_10.0).

A. Project Development Concept

Upon initiation of concept development work the Preliminary Bridge Engineer shall be contacted.

The RIDB determination should be made before work begins since hydraulic studies will generally be made as a part of concept development.

A paragraph will be placed in the Project Concept Statement depending on the RIDB determination as follows:

RIDB Required: "A Riverine Infrastructure Database (RIDB) dataset will be developed as a part of this project. The RIDB network location is StreamName_RM."

RIDB Not Required: "A Riverine Infrastructure Database (RIDB) dataset will NOT be developed as a part of this project."

If a RIDB dataset is required, project development data collection and hydraulic analysis will comply with the RIDB Guidelines at a minimum.

B.   Project Development Post-Concept

For project development that is underway (post-concept) but not yet complete the Preliminary Bridge Engineer should be contacted as early as possible in the process. If a RIDB dataset is required, project development data collection and hydraulic analysis will comply with the RIDB Guidelines as much as practicable. Exceptions to the RIDB Guidelines shall be noted as addressed in the following sections.

C.   Flood Observations

Contact the Preliminary Bridge Engineer per the above for a RIDB dataset determination/network location. Dataset development will comply with the RIDB Guidelines as much as practicable. Exceptions to the RIDB Guidelines shall be noted as addressed in the following sections.

3.   Dataset Preparation - Project Development

A.   Survey / Lidar Tile List / Datum Correlation

Survey data collection should be conducted per the RIDB Guidelines, Sect. 6. All site features as defined in Sect. 4 that fall within the riverine crossing shall be included.

For data collected under project development projects the requirements Sect. 6.A. and 6.B.4 are waived. Data collection procedures, exported data projection and reference point establishment shall be per project development survey standards.

The Lidar Tile list required per Sect. 3.D. is waived since a comprehensive DTM is developed through the project development process.

The Survey Submittal requirements of 6.D. are waived. Deliverable shall be per project development survey standards.

The Vertical Datum Correlation requirements of Sect. 6.B. are to be maintained. If the project datum is not based on IaRTN, correlation of project datum to IaRTN should be a priority.

Note: IaRTN(2011) refers to orthographic heights determined using the Iowa Real Time Network (IaRTN) using the NAD83(2011) datum. IaRTN(CORS96) refers to heights determined prior to the NAD83(2011) datum.

B.   GIS Location/Feature Mapping

GIS location and feature mapping requirements per Sects. 2.B. and 4.C are waived.

In lieu of the the GIS mapping requirements a Microstation file will be provided with the site features mapped similar to the requirements of Sect. 4.C. The Microstation file should only contain one model, with the features mapped into that model (required to facilitate use in GIS software). The linear elements only need to be tagged with the MaintNo or other code to

correlate with element with the data summary. Any level is acceptable, with the line(s) and text placed on separate levels.

Notes: Tag the file name with the projection to facilitate reprojection in GIS software (ex. _IaSPN Iowa State Plane North, _IA09 Iowa RCS Zone 9).

Map culverts along culvert alignment (end to end).
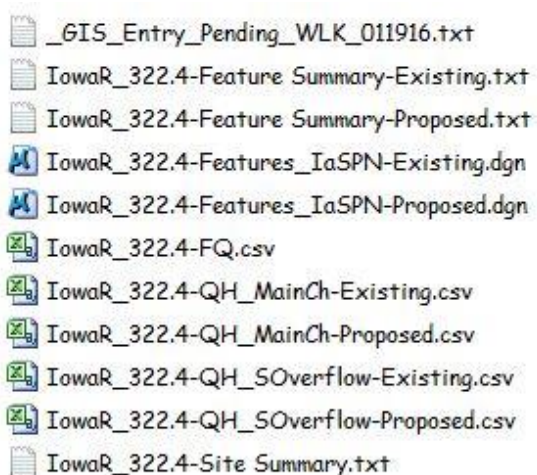
C.   Existing / Proposed Facilities

For development projects separate datasets will be required for existing and proposed condition as addressed in the following sections.

4.   Dataset Deliverables - Project Development

The RIDB Guidelines, Sect. 7 regarding submittal for a RIDB Dataset produced under project development are modified. Deliverables required are as follows:

Site Summary.txt	RIDB Site Summary in .txt format
Feature Summary.txt	Site Feature Summary in .txt format
FQ.csv	Frequency-Discharge data in .csv format
QH.csv	Discharge-Stage data in .csv format
Features.dgn	Feature mapping in Microstation format

An example dataset is as follows. The "_GIS_Entry . . . header will be provided by the database coordinator.

_GIS_Entry_Pending_WLK_011916.txt
IowaR_322.4-Feature Summary-Existing.txt
IowaR_322.4-Feature Summary-Proposed.txt
IowaR_322.4-Features_IaSPN-Existing.dgn
IowaR_322.4-Features_IaSPN-Proposed.dgn
IowaR_322.4-FQ.csv
IowaR_322.4-QH_MainCh-Existing.csv
IowaR_322.4-QH_MainCh-Proposed.csv
IowaR_322.4-QH_SOverflow-Existing.csv
IowaR_322.4-QH_SOverflow-Proposed.csv
IowaR_322.4-Site Summary.txt

A.   Site / Feature Summary

These documents are provided in .txt format to allow editing/updating by the database coordinator as required. A template file is available. Example files are as follows.

Site Summary:

```
Stream ID: IowaR

River Mile: 322.4

Description: US 69 over Iowa River, 1.5 Mi. S of Belmond

Drainage Area: 398 Sq Mi

Rating Location: IowaR_322.4

Hydrology Methodology:  Gage Weighted AEPD Estimate,  Gage 05449500, Iowa River near Rowan

Hydraulics Methodology:  Tuflow 2D Model
                         Rating Locations -
                           MainCh              h5  Chan 150' US Br
                           SOverflow-Exist     h90 MP 172.66 Ex 200' S Br
                           SOverflow-Proposed  h94 Alt20 MP 172.58 313+ 1050' S Bridge

Datum:  NAVD88 IaRTN(CORS96)  (Project Datum)
        NAVD88 IaRTN(2011) (-) 0.13 FT = Project Datum (IaRTN(CORS96))

        Lidar Datum Correlation - IA Statewide Lidar NAVD88 (-) 0.4' = Project Datum
        Design 155 Datum (+) 1069.75' = Project Datum (approx)

        Assume NGVD29 datum ~ Project Datum in study reach.
        2008 Flood Study Datum ~ Project Datum

Site Development Status: Complete.

Site Analysis File Location:  BRF-069-7(30)-38-99   Proj Dir:  9906901008
```

Feature Summary - Existing:

```
Stream ID: IowaR

River Mile: 322.4

Description: US 69 over Iowa River, 1.5 Mi. S of Belmond

Status: Existing

Feature:

  Type: Bridge

  Maint. No.: 9972.8S069

  FHWA No.: 54300

  Conveyance Location: Main Channel

  Low Beam Elev.: 1168.3

  Rating Curve: MainCh-Existing

  Description: 214'x28' Concrete Slab, Frame/Pile Bent Piers,
       Concrete High Abutments (Des. No. 155)

Feature:

  Type: Low Roadway

  Maint. No.:  9972.7-069

  FHWA No.: 90054300

  Conveyance Location: South Overflow

  ETW Elev.: 1166.9

  Rating Curve: SOverflow-Existing

  Description: 0.10 Mi. S. of main channel bridge
```

Feature Summary - Proposed:

```
Stream ID: IowaR

River Mile: 322.4

Description: US 69 over Iowa River, 1.5 Mi. S of Belmond

Status: Proposed    BRF-069-7(30)—38-99
        Replacement of main channel bridge
        Addition of S Overflow RCB
        Modification of S Overflow road overtop

Feature:

  Type: Bridge

  Maint. No.: 9972.8S069

  FHWA No.: 54301

  Conveyance Location: Main Channel

  Low Beam Elev.: 1168.6

  Rating Curve: MainCh-Proposed

  Description: 274'x44' PPCB, Tee Piers, Integral Abutments (Des. No. 114)


Feature:

  Type: Bridge

  Maint. No.: 9972.6S069   (pending)

  FHWA No.: 700250

  Conveyance Location: Main Channel

  Obvert Elev.: 1165.5

  Rating Curve: SOverflow-Proposed

  Description: 12'x8'x84' RCB (Des. No. 214)


Feature:

  Type: Low Roadway

  Maint. No.:  9972.6-069

  FHWA No.: 90700250

  Conveyance Location: South Overflow

  ETW Elev.: 1168.1

  Rating Curve: SOverflow-Proposed

  Description: 0.20 Mi. S. of main channel bridge
```

Key points in the above files are as follows:

Site Summary - Site Development Status

'Complete' notes that dataset completed per the RIDB Guidelines. If not complete, note exceptions. For example, if all site features were not surveyed/identified, note "Only main channel bridge identified, culverts may be present at crossing".

Site Summary - Site Analysis File Locations

Note location of supporting analysis/survey. For RIDB datasets produced under project development supporting data may be stored with the project data.

Feature Summary - Status

'Existing' or 'Proposed'. For proposed note the changes from existing.

The Existing and Proposed feature summary should be all inclusive in that features common to both conditions should be included in both files. In the event that feature ID's are not available (Maint Number, etc,) use a common alpha code between the summary and mapping .dgn file.

B. Rating / Frequency Data

These documents are provided in comma delimited text (.csv). Example files are as follows:

```
;F,Q                 ;Q,H, MainCh-Existing  h5
2,2100               2100,1162.5
5,3500               3500,1164.8
10,4600              4600,1165.9
25,6200              6200,1167.2
50,7500              7500,1167.9
100,8900             8900,1168.4
200,10500            10500,1169.0
500,12800            12800,1169.7
```
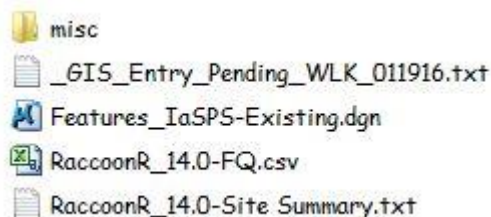
C. Feature Mapping (.dgn)

Note separate files required for existing and proposed conditions. Example below includes main channel bridge, road overflow section, and overflow RCB culvert. Note: Background image shown for illustration only, not required.

5.   **Flood Observation Datasets**

If critical events are recorded during a flood at a riverine location a flood observation dataset should be developed.

An example dataset for a site where roadway overtopping was captured is as follows.

misc
_GIS_Entry_Pending_WLK_011916.txt
Features_IaSPS-Existing.dgn
RaccoonR_14.0-FQ.csv
RaccoonR_14.0-Site Summary.txt

This dataset includes a partial site summary, frequency discharge data and a feature mapping file.

Note: The feature mapping file is only required if features are not already mapped into GIS. In this case the "_GIS_Entry . . . header will be provided by the database coordinator.

  The 'misc' folder contains support data, and is not considered a required part of the dataset deliverable.

An example site summary is as follows:

```
Stream ID: RaccoonR
River Mile: 14.0
Description: I-35 Over Raccoon R, 0.1 Mi. N of IA 5
Drainage Area: 3480 Sq Mi (StreamStats)
Rating Location: RaccoonR_14.0

Hydrology Methodology:  USGS SIR 2013-5086, Gage 05484650, Raccoon R at 63rd St.
Hydraulics Methodology:  Flood Observation, Dec. 2015 Flood Event

Datum:  NAVD88 IaRTN(2011)

Site Development Status: Partial.  Existing I-35 roadway impact only.
Site Analysis File Location:   Sites - W:\Highway\Bridge\PrelimSection\Sites\7768.5LR035

Feature:
  Type: Low Roadway      SB I-35 IA 5 Ramp
  Maint. No.:  7768.3-L035
  FHWA No.: 90041151
  Conveyance Location: South Overflow
  ETW Elev.: 829.1
  Rating Curve:  ETW Impact 48 kcfs
                 Gage WDMI4 (Raccoon R U/S I-35)  Stage 47.0+/-
  Description: SB I-35 IA 5 Ramp, 0.20 Mi. S. of main channel bridge

Feature:
  Type: Low Roadway      SB I-35
  Maint. No.:  7768.3-L035
  FHWA No.: 91041151
  Conveyance Location: South Overflow
  ETW Elev.: 830.8
  Rating Curve: ETW Impact 58 kcfs
                Gage WDMI4 (Raccoon R U/S I-35)  Stage 48.4+/-

  Description: SB I-35, 0.2 Mi. S. of main channel bridge
```

Note that the site and feature summaries are combined. Provide as much information as available, note if not available.

In the example shown above, in lieu of rating curve data the impact flowrate/gage height are shown.

The Site Analysis File Location field should be completed if support data or a more detailed description of events is available in another location.

The Site Development Status field should include a description of what is included, or is not included, relative to the RIDB Guidelines.

6.   **Dataset Repository / Tracking (DOT Function)**

Datasets will be placed in the following location under a folder named with the Site Identification Code (Stream_RM).

  W:\Highway\Bridge\PrelimSection\RiverineInfrastructureDB\sites\

       Ex.   ..\sites\UprIowaR_18.3

A empty text file will be placed in the folder with the name "_GIS_Entry_Pending_INIT_MMDDYY" (ex _GIS_Entry_Pending_WLK_011916.txt) to indicate that GIS entry of the mapped features are pending. Once the features are mapped, this file and the feature mapping .dgn file can be deleted.

For site features that are in the NBI (bridge) cross reference the PrelimSection\Sites folder to the RIDB dataset per the Guidelines Sect. 8.

Revisions:

1/25/16 – Initial Document