

HEC-RAS Modeling

Building an MT-2 Submission

Minimum Model Submission

- Duplicate Effective
 - Ensures Effective data is loaded on your computer.
- Corrected Effective
 - Fixes error(s) in the Duplicate Effective model and prepares the follow-on models. All evaluation cross sections are input to the base conditions.
- Existing Conditions
 - Will let FEMA know what the pre-project conditions look like.
- Proposed/Revised/As-Built Conditions
 - Will let FEMA know what your changes to the Effective data will look like.

- Verify the Effective Data.
- Locate the Effective Data.
- Create the Duplicate Effective Model.
- Determine natural changes or man-made modifications.
- Create the Corrected Effective Model.
- Build the Existing Conditions.
- Determine the Proposed Conditions.

Verify the Effective Data Date

The screenshot shows the FEMA Flood Map Service Center search results page. The browser address bar shows the URL: `msc.fema.gov/portal/advanceSearch#searchresultsanchor`. The page title is "FEMA Flood Map Service Center: Search All Products".

On the left is a navigation menu with the following items:

- MSC Home
- MSC Search by Address
- MSC Search All Products
- MSC Products and Tools
 - Hazus
 - LOMC Batch Files
 - Product Availability
- MSC Frequently Asked Questions (FAQs)
- MSC Email Subscriptions
- Contact MSC Help

The main content area has the heading "FEMA Flood Map Service Center: Search All Products" and a sub-heading "Choose one of the three search options below and optionally enter a posting date range." Below this are three search options:

- Jurisdiction**: Includes dropdowns for State (INDIANA), County (MARION COUNTY), and Community (INDIANAPOLIS, CITY OF).
- Jurisdiction Name**: Input field with placeholder text "(Ex. Fairfax County-wide or 51059C)".
- Product ID**: Input field with placeholder text "(Ex. Panel Number, LOMC Case Number)".

Below the search options is a link: [Filter By Posting Date Range \(Optional\)](#). There are "Search" and "Clear All Fields" buttons.

The search results are titled "Search Results for INDIANAPOLIS, CITY OF". Below the title are instructions: "Click [subscribe](#) to receive email notifications when products are updated." and "Click to [download a listing](#) of all products." There is also a note: "If you are a person with a disability, are blind, or have low vision, and need assistance, please contact a [map specialist](#)."

The results list includes an "Expand All" button and a folder icon for "Effective Products (607)". Underneath, there is a sub-section for "FIRM Panels (98)" with a "DL ALL" button.

A blue callout box at the bottom of the results area contains the following text: "Please note: Searches often result in many map files listed under a given section. You can determine the Product ID for the individual map panel needed by looking at the Map Index file. The index map files have "IND" within the".

Verify the Effective Data Date

The screenshot shows the FEMA Flood Map Service Center search results page. The browser address bar shows the URL: `msc.fema.gov/portal/advanceSearch#searchresultsanchor`. The page title is "FEMA Flood Map Service Center: Search All Products".

On the left sidebar, there are links for "Product Availability", "MSC Frequently Asked Questions (FAQs)", "MSC Email Subscriptions", and "Contact MSC Help".

The main content area includes a search filter section with a "Filter By Posting Date Range (Optional)" link and a search bar with "Search" and "Clear All Fields" buttons. Below the search bar, the results are for "INDIANAPOLIS, CITY OF".

There are several informational links: "Click [subscribe](#) to receive email notifications when products are updated.", "Click to [download a listing](#) of all products.", and "If you are a person with a disability, are blind, or have low vision, and need assistance, please contact a [map specialist](#)".

A blue "Expand All" button is visible. Below it, there are expandable sections: "Effective Products (607)", "FIRM Panels (98)", and "FIS Reports (3)". The "FIS Reports (3)" section is expanded, showing a table of results.

A blue "Please note" box states: "Sometimes small portions of the FIS are revised by Letters of Map Revisions (LOMR). When using the FIS report, you should also check LOMR documents listed in the LOMC section below for revisions that affect your specific area of interest."


Product ID	Effective Date	Size	Download
18097CV001B	04/19/2016	1MB	DL
18097CV002B	04/19/2016	1MB	DL
18097CV003B	04/19/2016	0MB	DL

Below the table, there are sections for "LOMC (504)" and "NFHL Data-State (1)". A blue "Feedback" button is located in the bottom right corner of the page.

Verify the Effective Data Date


FLOOD INSURANCE STUDY

VOLUME 1 OF 3




MARION COUNTY, INDIANA
(ALL JURISDICTIONS)

COMMUNITY NAME	COMMUNITY NUMBER
BEECH GROVE, CITY OF	180158
INDIANAPOLIS, CITY OF	180159
LAWRENCE, CITY OF	180160
SOUTHPORT, CITY OF	180161
SPEEDWAY, TOWN OF	180162



REVISOR:
APRIL 19, 2016



Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
18097C001B

Verify the Effective Date

Flood Insurance Study Scope

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Marion County, Indiana, including the incorporated communities listed in Section 1.1. The areas studied by detailed methods were selected with priority given to all known flood hazards and areas of projected development or proposed construction through time of this study.

The following streams are studied by detailed methods in this FIS report:

Augusta Branch	Bean Creek
Avon Creek	Beech Creek
Bailey Creek	Lynn Creek
Behner Brook	Mann Creek
Bells Creek	Mars Ditch/Drexel Run
Berkshire Creek	Maze Creek
Blue Creek	McFarland Creek
Brookside Creek	Middle Fork
Buck Creek	Morris Ditch
Buffalo Creek	Mud Creek
Camp Branch	Mud Run
Carnel Creek	Neeld Ditch
Churchman Creek	North Creek
Crooked Creek	O'Brian Ditch
Delaware Creek	Oil Creek
Derbyshire Creek	Payne Branch
Devon Creek	Pleasant Run
Dollar Hide Creek	Pleasant Run Creek
Dry Run	Pleasant Run Creek Upper
Dry Run Diversion Ditch	Reach
Eagle Creek	Pogues Run
East Fork White Lick Creek	Pond Branch
Falcon Creek	Ream Creek
Fall Creek	Ream Creek
Farley Creek	Robin Run
Ficher Creek	Seerley Creek
Field Creek	Sheets Creek
Fisher Creek	Shiloh Creek
Grassy Creek	Sloan Ditch
Guion Creek	Slate Ditch
Harting Ditch	Strange Creek
Haverstick Creek	Swamp Creek
Highland Creek	Thompson Ditch
Howard Johnson Ditch	Wetnight Ditch
Howland Ditch	White River
Hunter Ditch	Wildcat Brook
Indian Creek	Wildcat Run
Lick Creek	Williams Creek
Little Buck Creek	Zion Creek
Little Eagle Creek	

The limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM (Exhibit 2).

This Countywide FIS Report

This FIS incorporates new detailed flooding for: Buck Creek, Crooked Creek, Grassy Creek, Harting Ditch, Lick Creek, Maze Creek, Mud Run, Pleasant Run Creek Upper Reach, Wildcat Brook, Williams Creek. All streams were

Flood Insurance Study Engineering Method

Indianapolis. HEC-RAS computer software was used for the analysis (HEC, 1999).

Along Little Buck Creek near its confluence with the White River, a zone break was delineated on the FIRM around a portion of the floodway at the downstream limit of the study. The regulatory floodway for Little Buck Creek is contained within this gutter. Spoil banks in this area create a high ground containing the 1-percent-annual-chance flow, which is at a higher elevation than the White River floodplain. This limits the influence of Little Buck Creek's floodway on the overflow from the White River.

This Countywide FIS Report

Hydraulic analyses for Augusta Branch, Avon Creek, Bean Creek, Beech Creek, Behner Brook, Bells Creek, Blue Creek, Brookside Creek, Buck Creek, Camp Branch, Churchman Creek, Crooked Creek, Derbyshire Creek, Dollar Hide Creek, Falcon Creek, Farley Creek, Ficher Creek, Field Creek, Fisher Creek, Grassy Creek, Harting Ditch, Haverstick Creek, Highland Creek, Howard Johnson Ditch, Howland Ditch, Hunter Ditch, Lick Creek, Little Eagle Creek, Lynn Creek, Mann Creek, Maze Creek, McFarland Creek, Middle Fork, Morris Ditch, Mud Creek, Mud Run, North Creek, Payne Branch, Pleasant Run Creek Upper Reach, Pogues Run, Pond Branch, Ream Creek, Robin Run, Sheets Creek, Shiloh Creek, Sloan Ditch, Swamp Creek, Thompson Ditch, Wetnight Ditch, Wildcat Brook, Wildcat Run, Williams Creek, and Zion Creek were completed using the HEC-RAS, version 4.1.0, computer software (HEC, 2011). Starting WSELs for these streams were determined by using the slope area method. Cross section geometry data was taken from the 2009 Marion County DEM (Marion County, 2009) and channel inverts were estimated by field measurements and interpolated slopes between known channel elevations at bridges.

Hydraulic analyses for Buck Creek and Crooked Creek were completed using the HEC-RAS, version 4.0, computer software (HEC, 2008). Starting WSELs for Buck Creek were determined by slope area computation at the downstream limit of study. For Crooked Creek, the 10-year WSEL from the White River was used as the downstream boundary condition for the 10-, 50-, and 100-year flood profiles, and the 50-year WSEL from the White River was used as the downstream boundary condition for the 500-year flood profile. Cross section geometry data was taken from the 2003 Marion County topography (Marion County, 2003) and channel inverts were estimated by field measurements and interpolated slopes between known channel elevations at bridges.

For Grassy Creek, Pleasant Run Creek Upper Reach, and Williams Creek, the hydraulic analyses were completed using the HEC-RAS, version 3.1.3, computer software (HEC, 2005). The downstream boundary conditions for the 10-, 50-,

Verify the Effective Data Date

Search Results for **INDIANAPOLIS, CITY OF**

Click [subscribe](#) to receive email notifications when products are updated.
Click to [download a listing](#) of all products. [↵](#)
If you are a person with a disability, are blind, or have low vision, and need assistance, please contact a [map specialist](#).

[Expand All](#) [↵](#)

Effective Products (607) [↵](#)
FIRM Panels (98) [DL ALL](#)

Please note: Searches often result in many map files listed under a given section. You can determine the Product ID for the individual map panel needed by looking at the Map Index file. The index map files have "IND" within the Product ID and appear at the start of the list. These index files show an overview of a jurisdiction and how it is subdivided into map panels with the Product ID for each panel shown.

Show entries

Showing 1 to 98 of 98 entries

Previous **1** Next

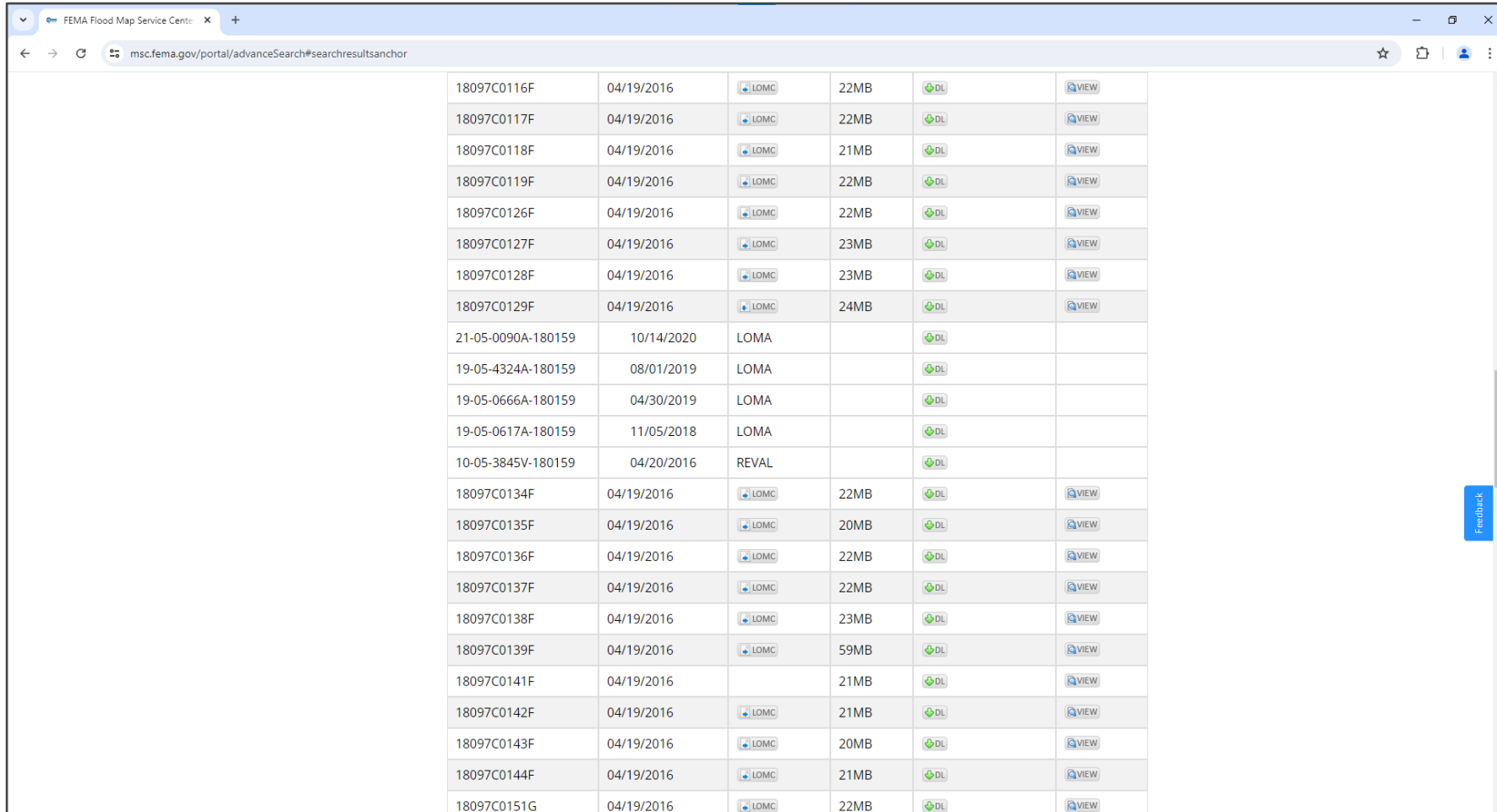
Product ID	Effective Date	LOMC	Size	Download	View
18097CIND0B	04/19/2016		OMB	DL	VIEW
18097C0015F	04/19/2016	LOMC	17MB	DL	VIEW
18097C0020F	04/19/2016	LOMC	23MB	DL	VIEW
18097C0036F	04/19/2016	LOMC	18MB	DL	VIEW
18097C0037F	04/19/2016	LOMC	19MB	DL	VIEW
18097C0038F	04/19/2016	LOMC	21MB	DL	VIEW
18097C0039F	04/19/2016	LOMC	23MB	DL	VIEW
18097C0041F	04/19/2016	LOMC	22MB	DL	VIEW
18097C0042F	04/19/2016	LOMC	21MB	DL	VIEW
18097C0043F	04/19/2016	LOMC	23MB	DL	VIEW

Verify the Effective Data Date

The screenshot shows a web browser window displaying search results from the FEMA Flood Map Service Center. The table lists various flood map data entries with columns for ID, Effective Date, LOMC status, File Size, Download status, and View link. The row for ID 18097C0129F is highlighted with a red box.

ID	Effective Date	LOMC	File Size	Download	View
18097C0107F	04/19/2016	LOMC	22MB	DL	VIEW
18097C0109F	04/19/2016	LOMC	22MB	DL	VIEW
18097C0110F	04/19/2016	LOMC	12MB	DL	VIEW
18097C0112F	04/19/2016	LOMC	19MB	DL	VIEW
18097C0114F	04/19/2016	LOMC	20MB	DL	VIEW
18097C0116F	04/19/2016	LOMC	22MB	DL	VIEW
18097C0117F	04/19/2016	LOMC	22MB	DL	VIEW
18097C0118F	04/19/2016	LOMC	21MB	DL	VIEW
18097C0119F	04/19/2016	LOMC	22MB	DL	VIEW
18097C0126F	04/19/2016	LOMC	22MB	DL	VIEW
18097C0127F	04/19/2016	LOMC	23MB	DL	VIEW
18097C0128F	04/19/2016	LOMC	23MB	DL	VIEW
18097C0129F	04/19/2016	LOMC	24MB	DL	VIEW
18097C0134F	04/19/2016	LOMC	22MB	DL	VIEW
18097C0135F	04/19/2016	LOMC	20MB	DL	VIEW
18097C0136F	04/19/2016	LOMC	22MB	DL	VIEW
18097C0137F	04/19/2016	LOMC	22MB	DL	VIEW
18097C0138F	04/19/2016	LOMC	23MB	DL	VIEW
18097C0139F	04/19/2016	LOMC	59MB	DL	VIEW
18097C0141F	04/19/2016		21MB	DL	VIEW
18097C0142F	04/19/2016	LOMC	21MB	DL	VIEW
18097C0143F	04/19/2016	LOMC	20MB	DL	VIEW
18097C0144F	04/19/2016	LOMC	21MB	DL	VIEW
18097C0151G	04/19/2016	LOMC	22MB	DL	VIEW

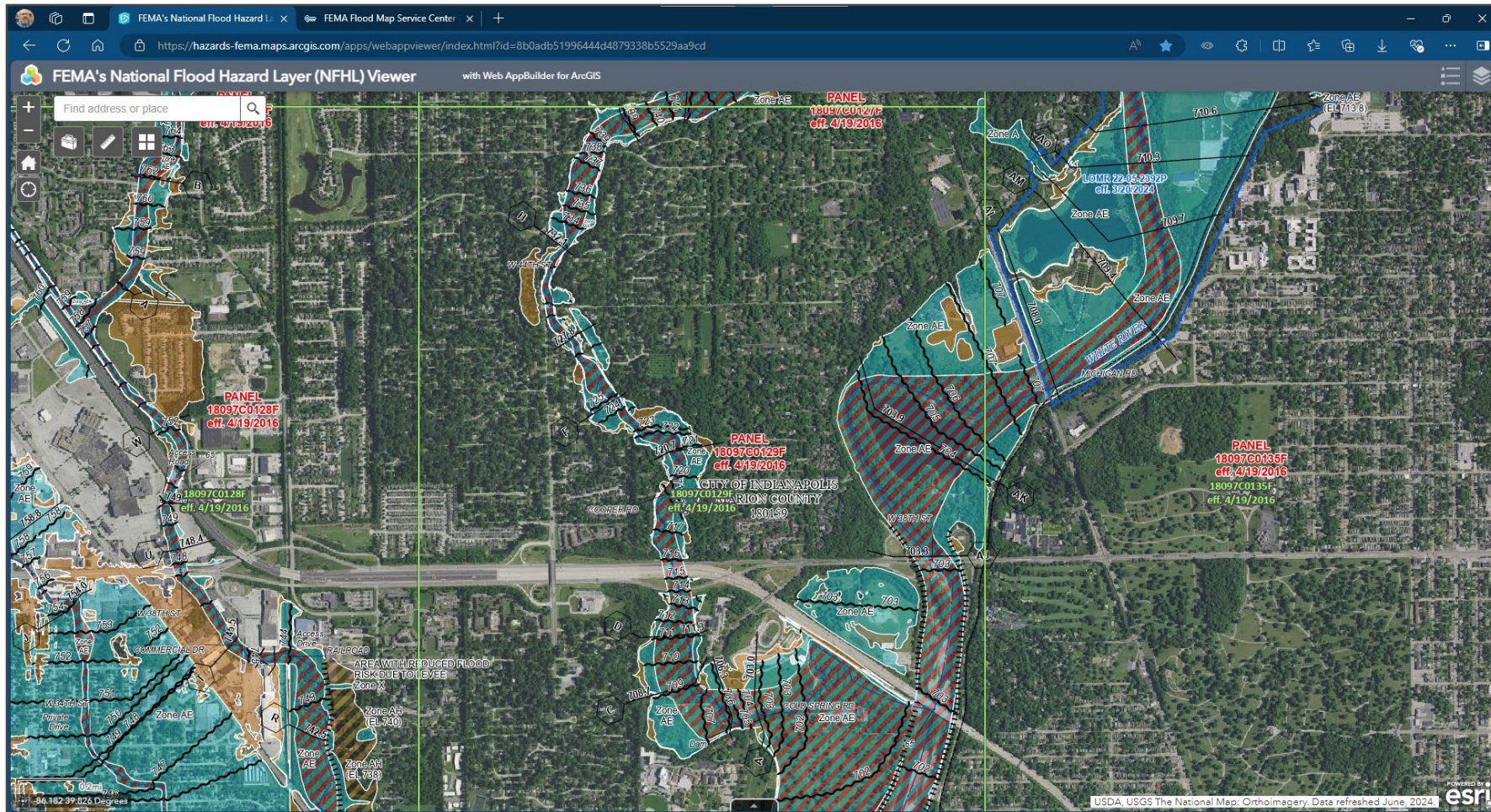
Verify the Effective Data Date



The screenshot shows a web browser window displaying search results from the FEMA Flood Map Service Center. The browser address bar shows the URL: msc.fema.gov/portal/advanceSearch#searchresultsanchor. The search results are presented in a table with the following columns: ID, Effective Date, Type, Size, Download, and View. The table contains 30 rows of data, including various LOMC and LOMA entries.

ID	Effective Date	Type	Size	Download	View
18097C0116F	04/19/2016	LOMC	22MB	DL	VIEW
18097C0117F	04/19/2016	LOMC	22MB	DL	VIEW
18097C0118F	04/19/2016	LOMC	21MB	DL	VIEW
18097C0119F	04/19/2016	LOMC	22MB	DL	VIEW
18097C0126F	04/19/2016	LOMC	22MB	DL	VIEW
18097C0127F	04/19/2016	LOMC	23MB	DL	VIEW
18097C0128F	04/19/2016	LOMC	23MB	DL	VIEW
18097C0129F	04/19/2016	LOMC	24MB	DL	VIEW
21-05-0090A-180159	10/14/2020	LOMA		DL	
19-05-4324A-180159	08/01/2019	LOMA		DL	
19-05-0666A-180159	04/30/2019	LOMA		DL	
19-05-0617A-180159	11/05/2018	LOMA		DL	
10-05-3845V-180159	04/20/2016	REVAL		DL	
18097C0134F	04/19/2016	LOMC	22MB	DL	VIEW
18097C0135F	04/19/2016	LOMC	20MB	DL	VIEW
18097C0136F	04/19/2016	LOMC	22MB	DL	VIEW
18097C0137F	04/19/2016	LOMC	22MB	DL	VIEW
18097C0138F	04/19/2016	LOMC	23MB	DL	VIEW
18097C0139F	04/19/2016	LOMC	59MB	DL	VIEW
18097C0141F	04/19/2016		21MB	DL	VIEW
18097C0142F	04/19/2016	LOMC	21MB	DL	VIEW
18097C0143F	04/19/2016	LOMC	20MB	DL	VIEW
18097C0144F	04/19/2016	LOMC	21MB	DL	VIEW
18097C0151G	04/19/2016	LOMC	22MB	DL	VIEW

Verify the Effective Data Date



Verify the Effective Data Date

Effective Data
May 2009

Effective
Mapping
April 19, 2016

Existing
Conditions
May 14, 2025

Locate the Effective Data

The screenshot displays the 'Indiana Hydrology and Hydraulics Model Library' web application. The browser address bar shows the URL: <https://experience.arcgis.com/experience/0ce352ac91004fabae9672c9d53527d9/>. The application header includes the DNR logo and the text 'Indiana Hydrology and Hydraulics Model Library'. A search bar on the right contains the text 'Instructions'. The main interface is divided into several panels:

- Stream Attributes:** A light blue panel on the top left containing the text 'No data found.'
- Model(s) Associated with Selected Waterbody:** A grey panel on the top right containing the text 'No data found.' and a link: 'Click here to download model ({IngHydroModelId})'.
- County Boundary:** A panel on the bottom left with a search icon.
- Map:** A central map showing a geographic area of Indiana with county boundaries and major cities. A search bar is located above the map. The map shows a grid of county boundaries and labels for cities such as Chicago, Gary, South Bend, Fort Wayne, Muncie, Indianapolis, Terre Haute, and Evansville. A scale bar at the bottom left indicates 50 miles.

At the bottom of the map, it says 'Selected features: 0' and 'Powered by Esri'.

Locate the Effective Data

The screenshot displays the 'Indiana Hydrology and Hydraulics Model Library' web interface. The main map shows a network of streams in various colors (red, blue, green) overlaid on a street map of the Crooked Creek area. The interface includes several panels:

- Stream Attributes:** A panel on the left with a legend for DNR CNMS (X, A, AE, Other) and County Boundary.
- CNMS Waterbody: Crooked Creek:** A table showing:

REACH ID	180970100103
WATER NAME	Crooked Creek
- Model(s) Associated with Selected Waterbody:** A panel on the right with a list of models. The first model is highlighted:

Hydro Model ID: 3830
Reach ID: 180970100103
Waterbody Name: Crooked Creek
Hydro Model Date: 1/12/2010
Hydro Model Info: This is a culvert replacement project
Modeler: Mark Bosch
Program: PERMIT
City: Carmel
County: Hamilton
Item Metadata: HEC-RAS 3.1.3
Basin Name: 14 Upper West Fork White River
Folder Subtype Code: FW
Folder Type Code: ATS
Folder AMDT Number: 0
Folder Sequence Number: 25492
Old File Name:

Locate the Effective Data

DNR Indiana Hydrology and Hydraulics Model Library

Stream Attributes

CNMS Waterbody: Crooked Creek

REACH ID	180970100103
WATER NAME	Crooked Creek

Model(s) Associated with Selected Waterbody

< 4 of 11 >

[Click here to view models on Crooked Creek](#)

Hydro Model ID: 5259
Reach ID: 180970100103
Waterbody Name: Crooked Creek
Hydro Model Date: 4/30/2009
Hydro Model Info: model for the Flood Insurance Study for Marion County dated April 2016
Modeler: Christopher B. Burke Engineering, LLC
Program: FIS
City: Indianapolis
County: Marion
Item Metadata: HEC-RAS 4.1.0
Basin Name: 14 Upper West Fork White River
Folder Subtype Code:
Folder Type Code:
Folder AMDT Number:
Folder Sequence Number:
Old File Name:

[Click here to download model 5259](#)

DNR CNMS

- X
- A
- AE
- Other

County Boundary

2 mi

City of Indianapolis Marion Co. Esri, TomTom, Garmin, SafeGraph, GeoTechnolo... Powered by Esri

Locate the Effective Data

The screenshot shows a web browser window displaying the FEMA Mapping Information Platform. The page title is "Search Engineering Data". The main content area is titled "SearchEnginePortlet" and "Flood Risk Study Engineering Library". It contains a search form with a "Keyword(s) Search" field and a "Go" button. Below this is an "Advanced Search" section with various filters: State, County, Community Name, Type of Data Product, Project ID Name, Originator, Contact Name, Abstract, Flooding Source, Community ID, FEMA Case Number, Effective Date From, Effective Date To, Projection, Grid Coordinate System, Entity Type, Fiscal Year, Date Uploaded From, and Date Uploaded To. Each filter has a dropdown menu or text input field. At the bottom of the search form are "Less Options", "Search", and "Reset" buttons. The footer includes the text "Last Updated: Wednesday, 17-July-2024 11:42 AM ET" and a list of links: DHS.gov, FEMA.gov, Privacy Policy, Terms of Use, Accessibility, Site Help, Site Map, and Contact Us. The address bar shows the URL: https://hazards.fema.gov/femaportal/wps/myportal/ut/p/z/1/7ZHLboMwEEW_pQuWZYZHEOKQFRKmhrlrIQ9vldkYRULwMm6qP0HLEKwqaBtab8Yznmnt0wMUNk8rduASU1zUlrOzyLXV2jhn60cw24zBOXC5mOw6WZIXoGrA-NzwuqCKZa7n1B4vP0-QpMDB0gH59xngdLEIY7EceSkObVgB8dqqPud7L_2X55eW...

Locate the Effective Data

The screenshot shows a web browser window displaying the FEMA Mapping Information Platform. The page title is "Search Engineering Data". The main heading is "SearchEnginePortlet". Below this, there is a section titled "Flood Risk Study Engineering Library". The page contains a search form with the following fields:

- Keyword(s) Search: [Go]
- Advanced Search:
- State:
- County:
- Community Name:
- Type of Data Product:
- Project ID Name:
- Originator:
- Contact Name:
- Abstract:
- Flooding Source:
- Community ID:
- FEMA Case Number:
- Effective Date From:
- Effective Date To:
- Projection:
- Grid Coordinate System:
- Entity Type:
- Fiscal Year:
- Date Uploaded From:
- Date Uploaded To:

At the bottom of the search form, there are buttons for "Less Options", "Search", and "Reset". The footer of the page includes the text "Last Updated: Wednesday, 17-July-2024 11:42 AM ET" and a list of links: "DHS.gov | FEMA.gov | Privacy Policy | Terms of Use | Accessibility | Site Help | Site Map | Contact Us". The address bar shows the URL "https://hazards.fema.gov/femaportal/wps/myportal/tut/p/z/1/7ZHLboMwEEW_pQuWZYZHEOKQFRKmhIrIQ9vklfYRUwMm6qP0HLEKwqBtab8Yznm0xwMUNk8RduASU1zUrOzyLXV2jhn60cw24zBOXC5mOw6WZDKoGrA-NzwuqCKZa7n1B4vP0-QpMDB0gH59xngdLEI7EceSkObVgB8dqgPud7L_2X55eW...".

Locate the Effective Data

The screenshot shows the FEMA Mapping Information Platform Search Engine Portlet. The page title is "SearchEnginePortlet" and the main heading is "Flood Risk Study Engineering Library".

Narrow Your Search

- Project Type
- State
- Case Number
- Type of Data Product

Keyword(s) Search [input field] **Go**

Advanced Search

State: 18 - Indiana	FEMA Case Number: [input field]
County: 18097 - Marion County	Effective Date From: [input field] mm/dd/yyyy
Community Name: 180159 - INDIANAPOLIS, CITY OF	Effective Date To: [input field] mm/dd/yyyy
Type of Data Product: Hydraulic (Studies)	Projection: -- select --
Project ID/Name: [input field]	Grid Coordinate System: -- select --
Originator: [input field]	Entity Type: [input field]
Contact Name: [input field]	Fiscal Year: -- select --
Abstract: [input field]	Date Uploaded From: [input field] mm/dd/yyyy
Flooding Source: Crooked Creek	Date Uploaded To: [input field] mm/dd/yyyy
Community ID: [input field]	

[Less Options](#) **Search** **Reset**

No Results found on MIP.

For more information on the data and FEMA publications please contact the FMIX at 1-877-FEMA-MAP (1-877-336-2627) or e-mail FEMA-FMIX@fema.dhs.gov.

Last Updated: Wednesday, 17-July-2024 11:55 AM ET

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FEMA 500 C Street, SW Washington, D.C. 20472 Phone: (202) 564-1600

Locate the Effective Data

The screenshot shows a web browser window displaying the "Search Engineering Data" application. The page title is "SearchEnginePortlet". On the left, there is a "Narrow Your Search" sidebar with filters for Project Type (Study), State (Indiana), Case Number, and Type of Data Product (DFIRM DB Draft, Preliminary DFIRM). The main content area is titled "Flood Risk Study Engineering Library" and features a "Keyword(s) Search" field with a "Go" button. Below this is an "Advanced Search" section with various dropdown menus and input fields for State, County, Community Name, Type of Data Product, Project ID/Name, Originator, Contact Name, Abstract, Flooding Source, Community ID, FEMA Case Number, Effective Date From/To, Projection, Grid Coordinate System, Entity Type, Fiscal Year, Date Uploaded From/To, and Date Uploaded To. There are "Search" and "Reset" buttons at the bottom of the search criteria. A feedback button is visible on the right side of the page. Below the search criteria, there is a notice about requesting access for grayed-out results and a section showing 2 results matching the search criteria. The first result is for FEMA Case Number 06-05-B977S - Preliminary DFIRM (Studies), and the second is for FEMA Case Number 06-05-B977S - DFIRM DB 'Draft' (Studies). The page footer includes the date "Last Updated: Wednesday, 17-July-2024 11:52 AM ET" and various links like "DHS.gov", "FEMA.gov", "Privacy Policy", "Terms of Use", "Accessibility", "Site Help", "Site Map", and "Contact Us".

Locate the Effective Data

FEMA Engineering Library Data Request



Federal Emergency Management Agency
Washington, D.C. 20472

Flood Insurance Study (FIS) Data Requests
The Federal Emergency Management Agency (FEMA) has identified seven categories into which requests for Flood Insurance Study (FIS) backup (i.e., technical and administrative support) are separated. These categories and their associated fees are below:

Requests for Flood Insurance Backup Data	Fee
1. Portable Document Format (PDF) or Diskettes of hydrologic and hydraulic backup data for current or historical FIS	An initial, non-refundable \$300, plus a \$93 per-case surcharge fee to recover the cost of library maintenance and archiving. For larger requests that require more than 4 hours of research, additional hours will be charged at \$40 per hour.
2. PDF or Mylar copies of topographic mapping developed during FIS process	An initial, non-refundable \$300, plus a \$93 per-case surcharge fee to recover the cost of library maintenance and archiving. For larger requests that require more than 4 hours of research, additional hours will be charged at \$40 per hour.
3. PDF of survey notes developed during FIS process	An initial, non-refundable \$300, plus a \$93 per-case surcharge fee to recover the cost of library maintenance and archiving. For larger requests that require more than 4 hours of research, additional hours will be charged at \$40 per hour.
4. PDF of individual Letters of Map Change (LOMCs)	\$40 for first letter; \$10 for each additional letter in the same request. Requesters will be notified about availability of the data and the fees associated with the requested data.
5. PDF of preliminary map panels	\$35 for first panel; \$2 for each additional panel in the same request. Requesters will be notified about availability of the data and the fees associated with the requested data.
6. DVDs of Digital Line Graph files, FIRM files or Digital LOMR attachment files	\$150 per county or Digital LOMR attachment shape file. Requesters will be notified about availability of the data and the fees associated with the requested data.
7. Computer diskettes and user manuals for FEMA computer programs	\$25 per copy. Requesters will be notified about availability of the data and the fees associated with the requested data.

As shown in the table above, for Categories 1-3, an initial non-refundable fee of \$300 is required to initiate the request and required before the requested data will be provided. This non-refundable fee is required, even if no data is available after research. If the data requested are available and the request is not cancelled, the final fee is calculated as a sum of the standard per-product charge plus a per-case surcharge of \$93, to help recover library maintenance and archiving costs. The total costs of processing requests in Categories 1-3 will vary based on the complexity of the research involved in retrieving the data and the volume and medium of the data to be reproduced and distributed. The initial fee will be applied against the total costs to process the request, and FEMA will invoice the requester for the balance plus the per-case surcharge before the data are provided. No data will be provided to a requester until all required fees have been paid.

For Categories 4-7, there is no initial fee to initiate a request for data. Requesters will be notified about the availability of, and the fees associated with, the requested data.

1

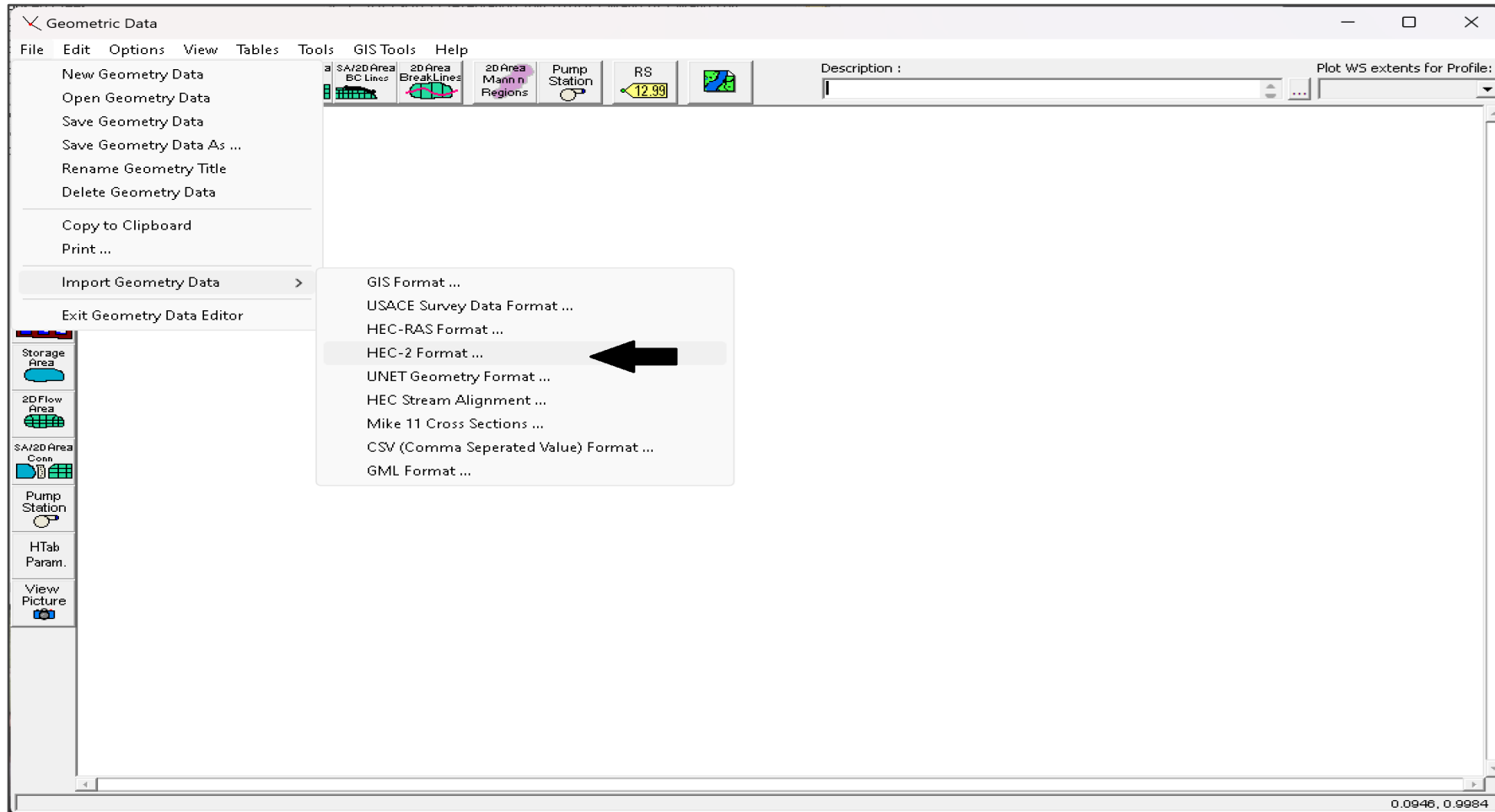
- Costs \$300
- Takes time
- Call DNR first. We can bypass the fee.
 - We're a CTP so we might have it.

Create the Duplicate Effective Model

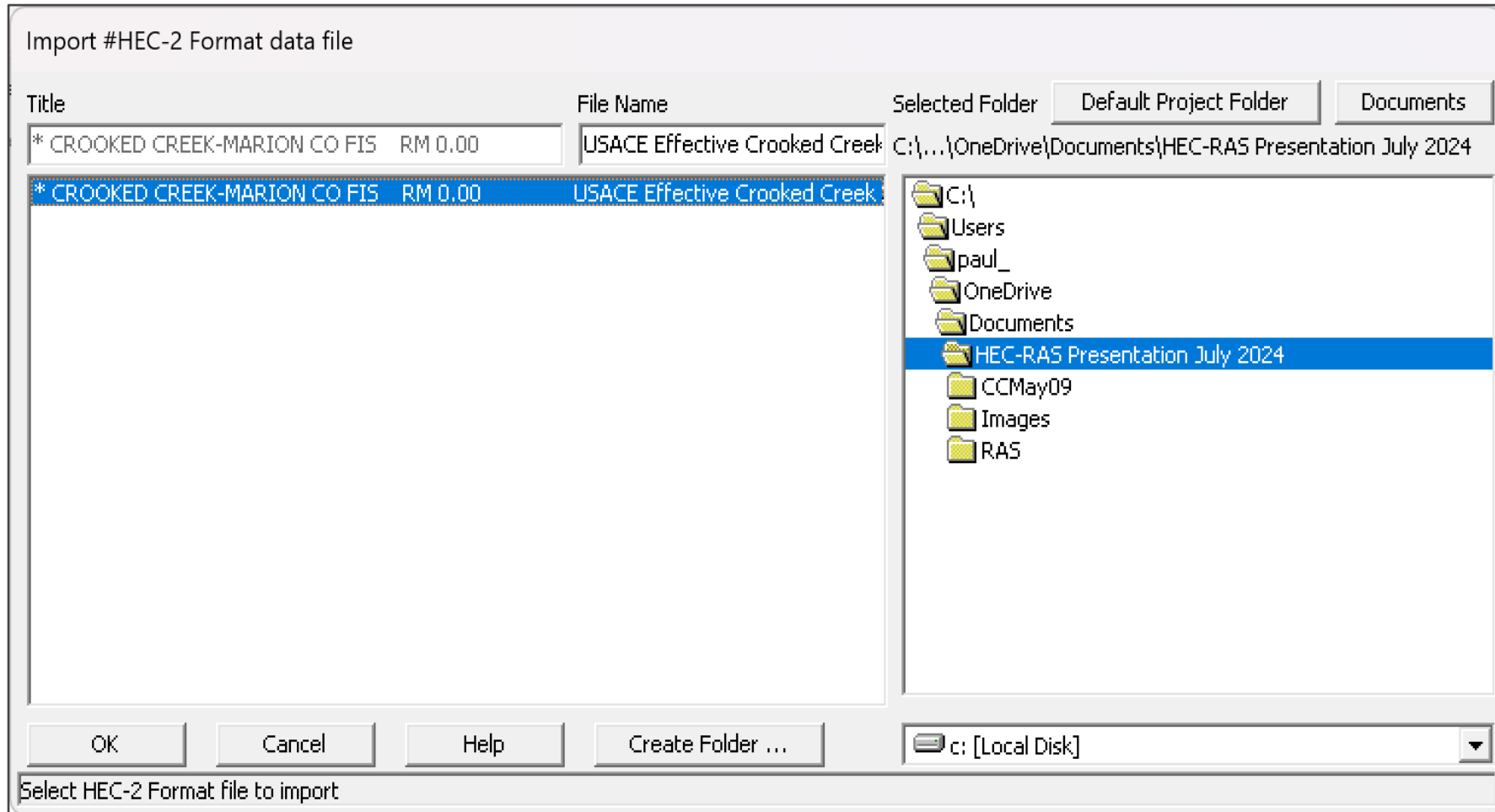
Acceptable Software Versions

- **“The effective HEC-2 model should be rerun on the requestor’s computer in HEC-RAS to create the duplicate effective model.”**
- HEC-RAS v3.1.1 and up
- HEC-RAS v4 and up
- HEC-RAS v5 and up
- HEC-RAS v6 and up
- **HEC-2**

Create the Duplicate Effective Model



Create the Duplicate Effective Model



Create the Duplicate Effective Model

HEC-2 Import Options

RiverStation Identification Method

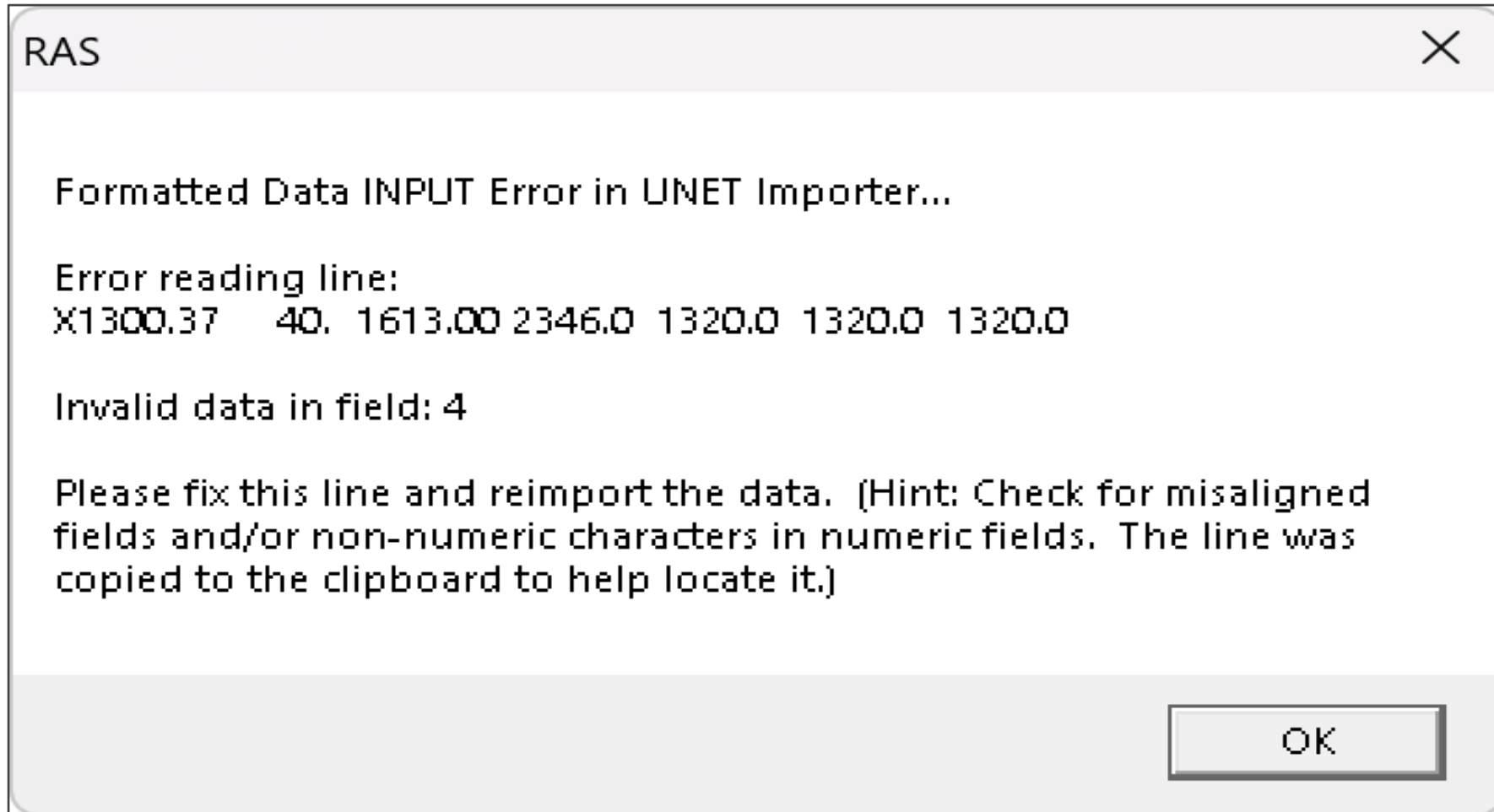
Use HEC-2 Section IDs

Use Sequential Counter

Import HEC-2

Cancel

Create the Duplicate Effective Model



Create the Duplicate Effective Model

```

C:\Users\paul_\OneDrive\Documents\HEC-RAS Presentation July 2024\USACE Effective Crooked Creek 2001.dat - Notepad++
File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?
USACE Effective Crooked Creek 2001.dat
1 * CROOKED CREEK-MARION CO FIS RM 0.00-11.15
2 T1 MARION CO. (ALL SECTIONS ARE EFFECTIVE FLOW SECTIONS)
3 T2 10 YEAR FLOOD
4 T3 CROOKED CREEK
5 J1 -1 5 -1 705.45
6 J2 1 -1
7 J3 200 38 27 21 22 28 16 18 17
8 NC .060 .06 .045 .1 .3
9 QT 6 4500 3500 6000 7500 10050 7500
10 ET 1.4
11 X1300.12 28. 1619.1 2214. 528.2 528.2 528.2
12 GR 713.0 500.0 699.8 500.1 701.5 1515.7 699.2 1536.5 723.9 1619.1
13 GR 724.2 1742.9 707.2 1812.9 708.4 1842.9 705.9 1860.0 693.5 1945.0
14 GR 692.3 1952.0 691.9 1986.0 692.1 2020.0 693.6 2073.0 694.0 2095.0
15 GR 698.4 2123.0 698.3 2132.0 694.8 2144.0 693.8 2156.0 693.1 2172.0
16 GR 693.9 2185.0 699.1 2214.0 700.5 2317.0 701.1 2388.0 703.7 2476.0
17 GR 702.3 2600.0 703.5 3062.0 713.0 3062.1
18 X1300.37 40. 1613.00 2346.0 1320.0 1320.0 1320.0
19 GR 717.0 500.0 704.0 500.1 704.0 517.6 694.3 591.7 694.4 1013.5
20 GR 699.3 1039.9 699.7 1114.4 694.5 1174.3 695.6 1222.6 696.5 1263.3
21 GR 697.3 1313.7 698.3 1426.0 699.3 1446.0 699.0 1456.0 691.2 1522.9
22 GR 691.2 1523.0 691.0 1538.0 690.9 1553.0 691.2 1569.0 691.2 1569.1
23 GR 696.2 1613.0 699.0 1637.5 698.9 1659.0 696.8 1702.3 696.7 1829.1
24 GR 696.5 2165.7 699.5 2196.6 699.4 2219.0 692.8 2238.0 692.6 2256.3
25 GR 692.6 2256.4 692.5 2272.0 691.4 2304.0 690.9 2310.0 691.4 2316.0
26 GR 701.6 2346.0 698.9 2426.0 702.0 2483.9 702.5 2859.7 717.0 2859.8
27 X1999.02 51.0 51.0 51.0
28 X3 10.0 698.3 698.9
29 X1300.38 3.0 3.0 3.0
30 X3 10.0 698.3 698.9
31 BT 34.0 500.0 717.0 717.0 500.1 704.0 704.0 698.3 704.0 704.0
32 BT 591.7 694.3 694.3 1013.5 694.4 694.4 1039.9 701.2 699.3 1114.4
33 BT 700.3 699.7 1174.3 694.5 694.5 1222.6 700.5 695.6 1263.3 700.6
34 BT 696.5 1313.7 697.3 697.3 1426.0 698.3 698.3 1446.0 702.0 699.3
35 BT1456.0 699.0 699.0 1522.9 702.7 691.2 1523.0 702.7 699.1 1553.0
36 BT 702.7 699.1 1569.0 702.7 699.1 1569.1 702.7 691.2 1613.0 702.0
37 BT 696.2 1637.5 699.0 699.0 1659.0 698.9 698.9 1702.3 699.1 696.8
Normal text file length : 113,980 lines : 1,418 Ln : 52 Col : 57 Pos : 3,635 Windows (CR LF) UTF-8 IN
  
```

Create the Duplicate Effective Model

The screenshot shows a Notepad++ window with a text file named "USACE Effective Crooked Creek 2001.dat". The file contains a list of data points for a hydrological model. A "Find" dialog box is open, showing the search term "x1300.37" and the message "Find: Found the 1st occurrence from the top. The end of the document has been reached." The status bar at the bottom indicates the current position: "Ln : 18 Col : 9 Sel : 8 | 1".

Line	Code	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6	Value 7	Value 8	Value 9	Value 10
1	*	CROOKED CREEK-MARION CO FIS RM 0.00-11.15									
2	T1	MARION CO. (ALL SECTIONS ARE EFFECTIVE FLOW SECTIONS)									
3	T2	10 YEAR FLOOD									
4	T3	CROOKED CREEK									
5	J1	-1	5				-1	705.45			
6	J2	1		-1							
7	J3	200	38	27	21	22	28	16	18	17	
8	NC	.060									
9	QT	6	45								
10	ET										
11	X1300.12										
12	GR	713.0	500								
13	GR	724.2	1742								
14	GR	692.3	1952								
15	GR	698.4	2123								
16	GR	693.9	2185								
17	GR	702.3	2600								
18	X1300.37										
19	GR	717.0	500								
20	GR	699.3	1039								
21	GR	697.3	1313								
22	GR	691.2	1523								
23	GR	696.2	1613								
24	GR	696.5	2165								
25	GR	692.6	2256								
26	GR	701.6	2346								
27	X1999.02										
28	X3	10.0									
29	X1300.38										
30	X3	10.0									
31	BT	34.0	500.0	717.0	717.0	500.1	704.0	704.0	698.3	698.9	704.0
32	BT	591.7	694.3	694.3	1013.5	694.4	694.4	1039.9	701.2	699.3	1114.4
33	BT	700.3	699.7	1174.3	694.5	694.5	1222.6	700.5	695.6	1263.3	700.6
34	BT	696.5	1313.7	697.3	697.3	1426.0	698.3	698.3	1446.0	702.0	699.3
35	BT	1456.0	699.0	699.0	1522.9	702.7	691.2	1523.0	702.7	699.1	1553.0
36	BT	702.7	699.1	1569.0	702.7	699.1	1569.1	702.7	691.2	1613.0	702.0
37	BT	696.2	1637.5	699.0	699.0	1659.0	698.9	698.9	1702.3	699.1	696.8

Create the Duplicate Effective Model

C:\Users\paul_\OneDrive\Documents\HEC-RAS Presentation July 2024\USACE Effective Crooked Creek 2001.dat - Notepad++

File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?

USACE Effective Crooked Creek 2001.dat

```

1 * CROOKED CREEK-MARION CO FIS RM 0.00-11.15
2 T1 MARION CO. (ALL SECTIONS ARE EFFECTIVE FLOW SECTIONS)
3 T2 10 YEAR FLOOD
4 T3 CROOKED CREEK
5 J1 -1 5 -1 705.45
6 J2 1 -1
7 J3 200 38 27 21 22 28 16 18 17
8 NC .060 .06 .045 .1 .3
9 QT 6 4500 3500 6000 7500 10050 7500
10 ET 1.4
11 X1300.12 28. 1619.1 2214. 528.2 528.2 528.2
12 GR 713.0 500.0 699.8 500.1 701.5 1515.7 699.2 1536.5 723.9 1619.1
13 GR 724.2 1742.9 707.2 1812.9 708.4 1842.9 705.9 1860.0 693.5 1945.0
14 GR 692.3 1952.0 691.9 1986.0 692.1 2020.0 693.6 2073.0 694.0 2095.0
15 GR 698.4 2123.0 698.3 2132.0 694.8 2144.0 693.8 2156.0 693.1 2172.0
16 GR 693.9 2185.0 699.1 2214.0 700.5 2317.0 701.1 2388.0 703.7 2476.0
17 GR 702.3 2600.0 703.5 3062.0 713.0 3062.1
18 X1300.37 40. 1613.00 2346.0 1320.0 1320.0 1320.0
19 GR 717.0 500.0 704.0 500.1 704.0 517.6 694.3 591.7 694.4 1013.5
20 GR 699.3 1039.9 699.7 1114.4 694.5 1174.3 695.6 1222.6 696.5 1263.3
21 GR 697.3 1313.7 698.3 1426.0 699.3 1446.0 699.0 1456.0 691.2 1522.9
22 GR 691.2 1523.0 691.0 1538.0 690.9 1553.0 691.2 1569.0 691.2 1569.1
23 GR 696.2 1613.0 699.0 1637.5 698.9 1659.0 696.8 1702.3 696.7 1829.1
24 GR 696.5 2165.7 699.5 2196.6 699.4 2219.0 692.8 2238.0 692.6 2256.3
25 GR 692.6 2256.4 692.5 2272.0 691.4 2304.0 690.9 2310.0 691.4 2316.0
26 GR 701.6 2346.0 698.9 2426.0 702.0 2483.9 702.5 2859.7 717.0 2859.8
27 X1999.02 51.0 51.0 51.0
28 X3 10.0 698.3 698.9
29 X1300.38 3.0 3.0 3.0
30 X3 10.0 698.3 698.9
31 BT 34.0 500.0 717.0 717.0 500.1 704.0 704.0 698.3 704.0 704.0
32 BT 591.7 694.3 694.3 1013.5 694.4 694.4 1039.9 701.2 699.3 1114.4
33 BT 700.3 699.7 1174.3 694.5 694.5 1222.6 700.5 695.6 1263.3 700.6
34 BT 696.5 1313.7 697.3 697.3 1426.0 698.3 698.3 1446.0 702.0 699.3
35 BT1456.0 699.0 699.0 1522.9 702.7 691.2 1523.0 702.7 699.1 1553.0
36 BT 702.7 699.1 1569.0 702.7 699.1 1569.1 702.7 691.2 1613.0 702.0
37 BT 696.2 1637.5 699.0 699.0 1659.0 698.9 1702.3 699.1 696.8

```

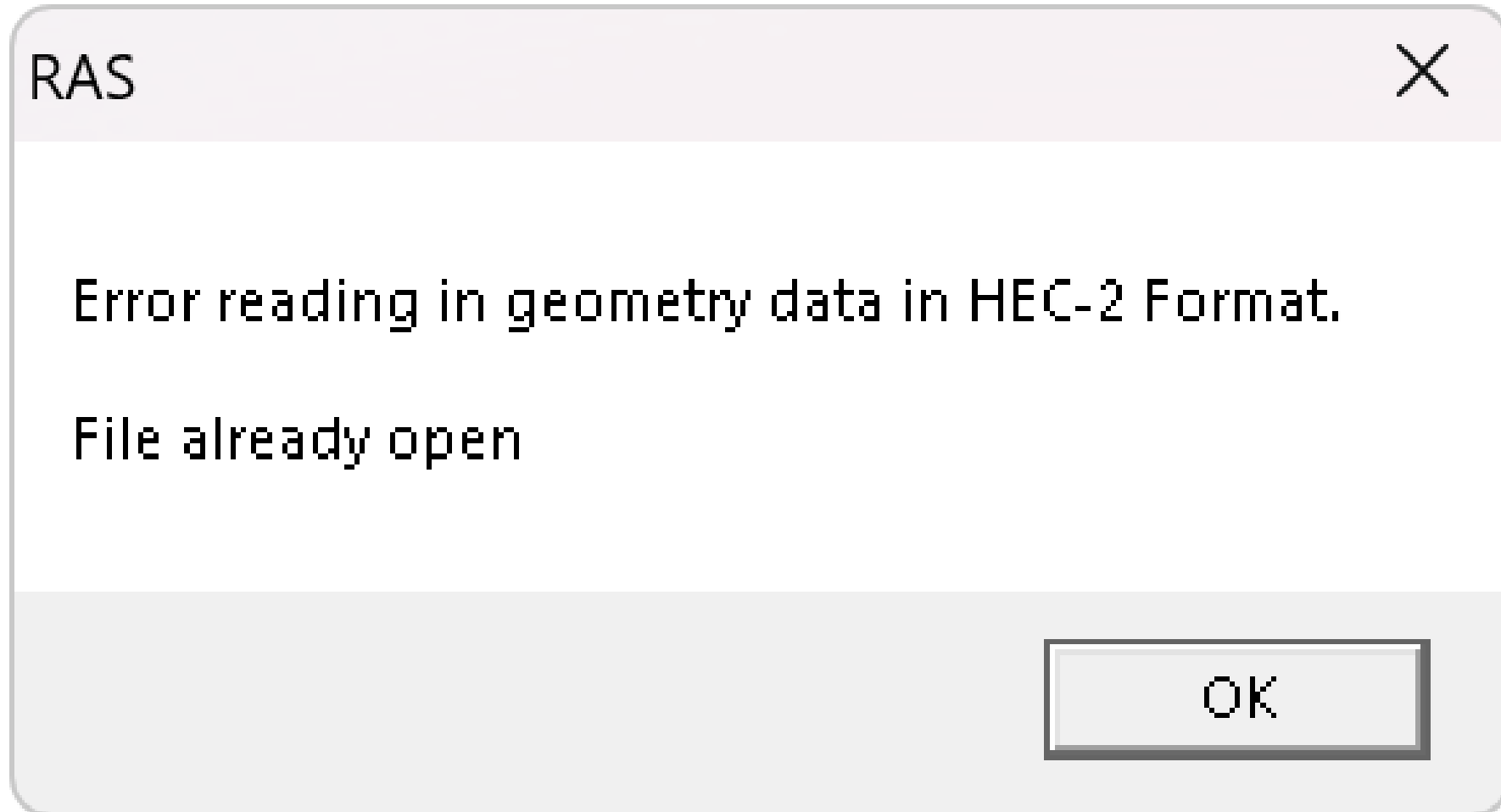
Normal text file length : 113,980 lines : 1,418 Ln : 18 Col : 9 Sel : 8 | 1 Windows (CR LF) UTF-8 IN

Create the Duplicate Effective Model

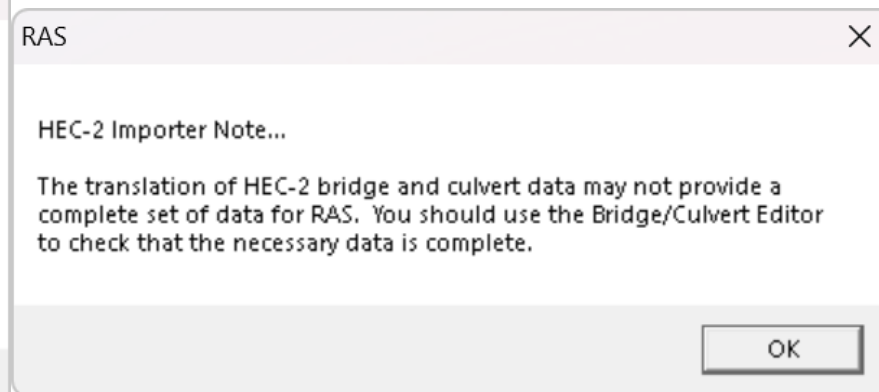
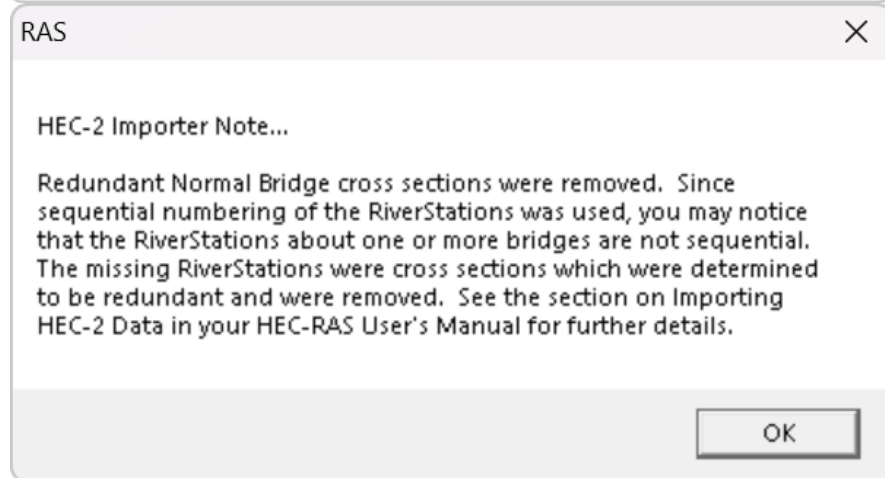
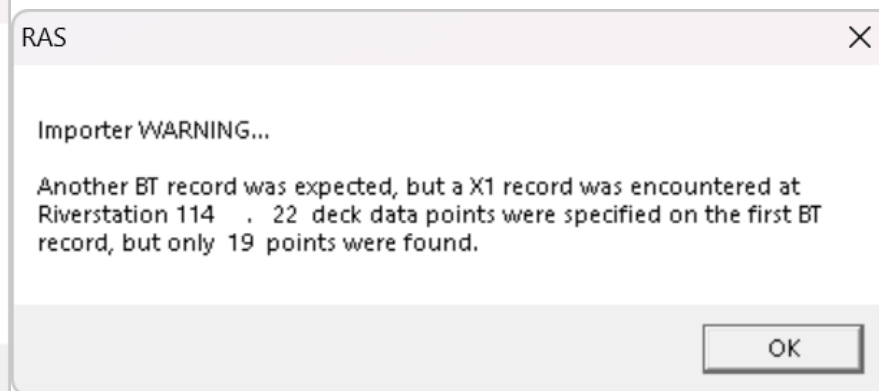
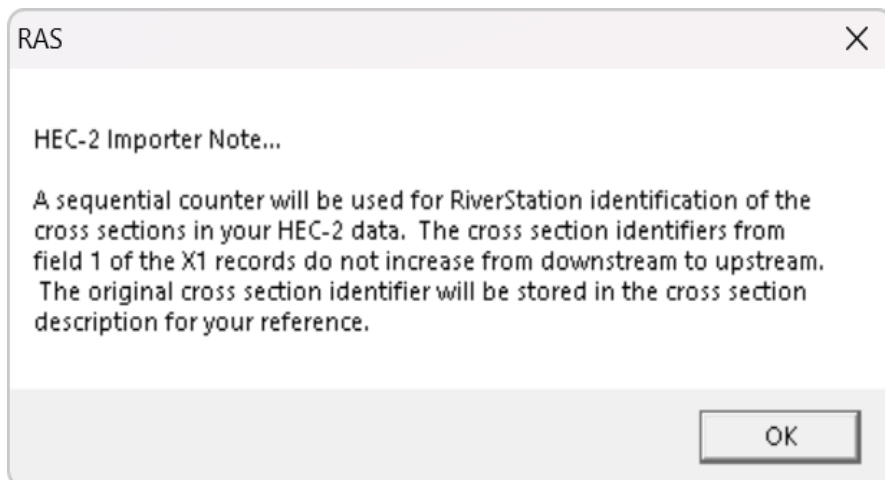
```

C:\Users\paul_\OneDrive\Documents\HEC-RAS Presentation July 2024\USACE Effective Crooked Creek 2001.dat - Notepad++
File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?
USACE Effective Crooked Creek 2001.dat
1 * CROOKED CREEK-MARION CO FIS RM 0.00-11.15
2 T1 MARION CO. (ALL SECTIONS ARE EFFECTIVE FLOW SECTIONS)
3 T2 10 YEAR FLOOD
4 T3 CROOKED CREEK
5 J1 -1 5 -1 705.45
6 J2 1 -1
7 J3 200 38 27 21 22 28 16 18 17
8 NC .060 .06 .045 .1 .3
9 QT 6 4500 3500 6000 7500 10050 7500
10 ET 1.4
11 X1300.12 28. 1619.1 2214. 528.2 528.2 528.2
12 GR 713.0 500.0 699.8 500.1 701.5 1515.7 699.2 1536.5 723.9 1619.1
13 GR 724.2 1742.9 707.2 1812.9 708.4 1842.9 705.9 1860.0 693.5 1945.0
14 GR 692.3 1952.0 691.9 1986.0 692.1 2020.0 693.6 2073.0 694.0 2095.0
15 GR 698.4 2123.0 698.3 2132.0 694.8 2144.0 693.8 2156.0 693.1 2172.0
16 GR 693.9 2185.0 699.1 2214.0 700.5 2317.0 701.1 2388.0 703.7 2476.0
17 GR 702.3 2600.0 703.5 3062.0 713.0 3062.1
18 X1300.37 40. 1613.0 2346.0 1320.0 1320.0 1320.0
19 GR 717.0 500.0 704.0 500.1 704.0 517.6 694.3 591.7 694.4 1013.5
20 GR 699.3 1039.9 699.7 1114.4 694.5 1174.3 695.6 1222.6 696.5 1263.3
21 GR 697.3 1313.7 698.3 1426.0 699.3 1446.0 699.0 1456.0 691.2 1522.9
22 GR 691.2 1523.0 691.0 1538.0 690.9 1553.0 691.2 1569.0 691.2 1569.1
23 GR 696.2 1613.0 699.0 1637.5 698.9 1659.0 696.8 1702.3 696.7 1829.1
24 GR 696.5 2165.7 699.5 2196.6 699.4 2219.0 692.8 2238.0 692.6 2256.3
25 GR 692.6 2256.4 692.5 2272.0 691.4 2304.0 690.9 2310.0 691.4 2316.0
26 GR 701.6 2346.0 698.9 2426.0 702.0 2483.9 702.5 2859.7 717.0 2859.8
27 X1999.02 51.0 51.0 51.0
28 X3 10.0 698.3 698.9
29 X1300.38 3.0 3.0 3.0
30 X3 10.0 698.3 698.9
31 BT 34.0 500.0 717.0 717.0 500.1 704.0 704.0 698.3 704.0 704.0
32 BT 591.7 694.3 694.3 1013.5 694.4 694.4 1039.9 701.2 699.3 1114.4
33 BT 700.3 699.7 1174.3 694.5 694.5 1222.6 700.5 695.6 1263.3 700.6
34 BT 696.5 1313.7 697.3 697.3 1426.0 698.3 698.3 1446.0 702.0 699.3
35 BT1456.0 699.0 699.0 1522.9 702.7 691.2 1523.0 702.7 699.1 1553.0
36 BT 702.7 699.1 1569.0 702.7 699.1 1569.1 702.7 691.2 1613.0 702.0
37 BT 696.2 1637.5 699.0 699.0 1659.0 698.9 698.9 1702.3 699.1 696.8
Normal text file length : 113,980 lines : 1,418 Ln : 18 Col : 26 Pos : 1,033 Windows (CR LF) UTF-8 IN
  
```

Create the Duplicate Effective Model



Create the Duplicate Effective Model



Create the Duplicate Effective Model

Import Geometry Data

Intro | River Reach Stream Lines | Cross Sections and IB Nodes | Storage Areas/2D Flow Areas and Connections |

The import data has been read into a temporary geometry structure and now can be incorporated into the current geometry file. Step through the various tabs to select the desired import options. When all the appropriate options have been set, press the Finished - Import Data button.

Current RAS project units: US Customary Units

Import data as:

- US Customary units
- SI (metric) units

Import data will not be converted on import.

Previous Next Finished - Import Data Cancel

Create the Duplicate Effective Model

Import Geometry Data

Intro | River Reach Stream Lines | Cross Sections and IB Nodes | Storage Areas/2D Flow Areas and Connections |

The river reach stream lines found in the file or generated while reading it are listed below. Check the reaches you want to import, and modify the import name and way existing stream lines are merged. (A range of reaches can be checked/unchecked with the space bar)

	Import File	Import File	Invert	Import As	Import As	Import	Import	Merge Mode
	River	Reach	#Points	River	Reach	Status	Stream Lines	
1	RIVER-1	Reach-1	2	Crooked Creek	Marion	new	<input checked="" type="checkbox"/>	Replace

Previous | Next | Finished - Import Data | Cancel

Create the Duplicate Effective Model

Import Geometry Data

Intro | River Reach Stream Lines | Cross Sections and IB Nodes | Storage Areas/2D Flow Areas and Connections |

Node Types in Table
 Cross Sections (XS) Bridges and Culverts (BR/Culv) Inline Structures (IS) Lateral Structures (LS)

Import River: RIVER-1 Import As: Crooked Creek # RS = 222 # New= 222 # Import = 222
 Import Reach: Reach-1 Import As: Marion

The imported RS can be edited here, change the import River and Reach names on the previous tab

	Import File	Import File	Import As	Import	Import
	River	Reach	RS	Status	Data
1	RIVER-1	Reach-1	196	196	new <input checked="" type="checkbox"/>
2	RIVER-1	Reach-1	195	195	new <input checked="" type="checkbox"/>
3	RIVER-1	Reach-1	194.5 BR	194.5	new <input checked="" type="checkbox"/>
4	RIVER-1	Reach-1	194	194	new <input checked="" type="checkbox"/>
5	RIVER-1	Reach-1	193	193	new <input checked="" type="checkbox"/>
6	RIVER-1	Reach-1	192	192	new <input checked="" type="checkbox"/>
7	RIVER-1	Reach-1	191	191	new <input checked="" type="checkbox"/>
8	RIVER-1	Reach-1	190	190	new <input checked="" type="checkbox"/>
9	RIVER-1	Reach-1	189	189	new <input checked="" type="checkbox"/>
10	RIVER-1	Reach-1	188	188	new <input checked="" type="checkbox"/>
11	RIVER-1	Reach-1	187	187	new <input checked="" type="checkbox"/>
12	RIVER-1	Reach-1	186.5 BR	186.5	new <input checked="" type="checkbox"/>

Select Cross Section Properties to Import

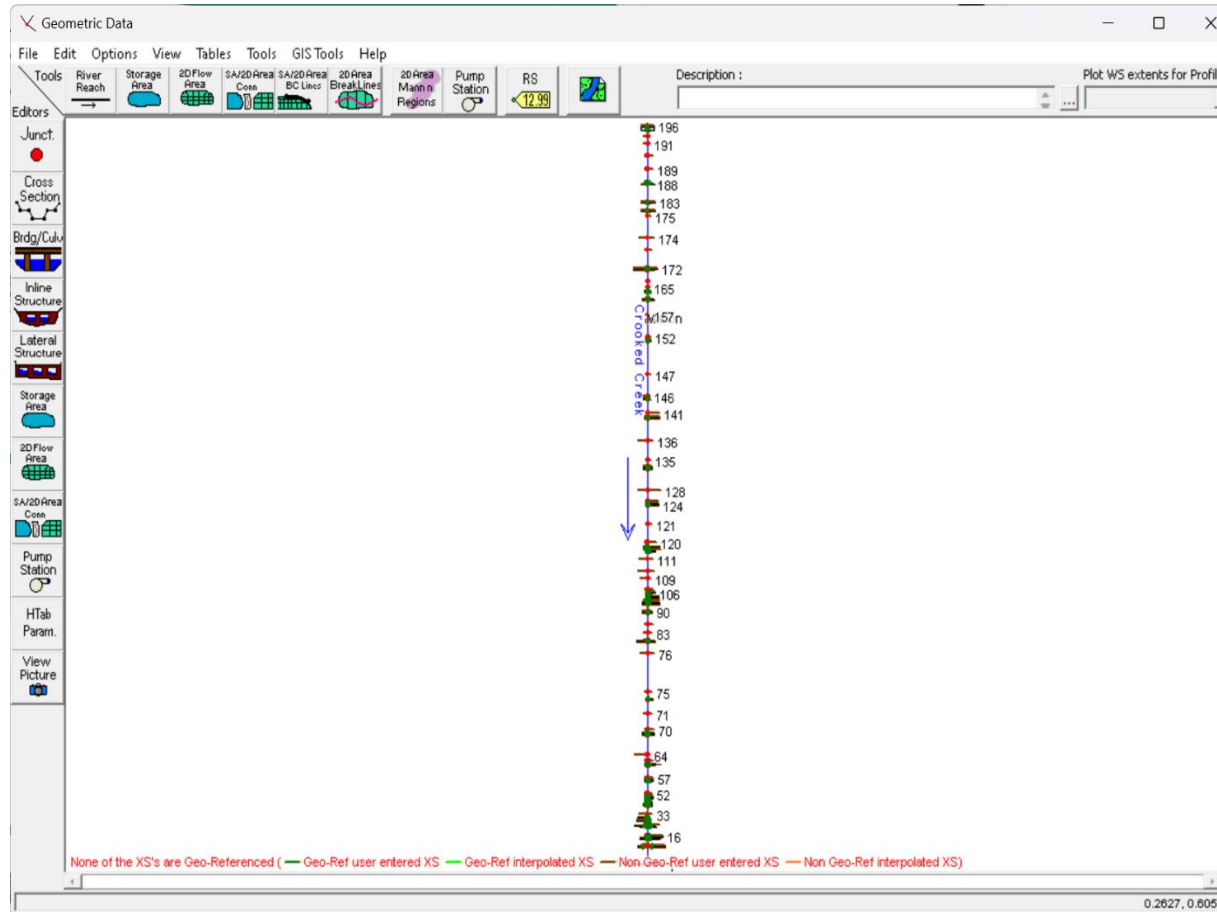
<input checked="" type="checkbox"/> Node Names	<input checked="" type="checkbox"/> Ineffective Areas
<input checked="" type="checkbox"/> Descriptions	<input type="checkbox"/> Blocked Obstructions
<input type="checkbox"/> Picture References	<input type="checkbox"/> XS Lids
<input type="checkbox"/> GIS Cut Lines	<input type="checkbox"/> Ice Data
<input checked="" type="checkbox"/> Station Elevation Data	<input type="checkbox"/> Rating Curves
<input checked="" type="checkbox"/> Reach Lengths	<input type="checkbox"/> Skew Angle
<input checked="" type="checkbox"/> Manning's n Values	<input type="checkbox"/> Fixed Sediment Elevation
<input checked="" type="checkbox"/> Bank Stations	<input type="checkbox"/> HTab Parameters
<input type="checkbox"/> Contraction Expansion Coef	<input type="checkbox"/> Pilot Channel Parameters
<input type="checkbox"/> Levees	

Match Import File RS to Existing Geometry RS
 Matching Tolerance: .01

Round Selected RS
 2 decimal places

Generate RS Based on main channel lengths
 (only available when looking at a single reach)
 Starting RS Value: 0 2 decimal place

Create the Duplicate Effective Model



Create the Duplicate Effective Model

Steady Flow Data - Effective 2014 Flow

File Options Help

Description : Set Known WSEL Boundary Condition to 10% on White River and 2% on White River as stated in FIS ... Apply Data

Enter/Edit Number of Profiles (32000 max): 5 Reach Boundary Conditions ...

Locations of Flow Data Changes

River: Crooked Creek Add Multiple...

Reach: Marion River Sta.: 196 Add A Flow Change Location

Flow Change Location			Profile Names and Flow Rates					
River	Reach	RS	10%	2%	1%	Floodway	0.2%	
1	Crooked Creek	Marion	196	1740	2190	3510	3150	5130

Edit Steady flow data for the profiles (cfs)

Create the Duplicate Effective Model

The screenshot shows the 'Steady Flow Analysis' dialog box. The window title is 'Steady Flow Analysis'. The menu bar includes 'File', 'Options', and 'Help'. The 'Plan' field contains '2001 HEC-2 Import Effective Example' and the 'Short ID' field contains '2001 Example'. The 'Geometry File' dropdown is set to '2001 HEC-2' and the 'Steady Flow File' dropdown is set to 'Effective 2014 Flow'. The 'Flow Regime' section has three radio buttons: 'Subcritical' (selected), 'Supercritical', and 'Mixed'. The 'Optional Programs' section has a checkbox for 'Floodplain Mapping' which is unchecked. A large text area for 'Plan Description' is empty. A 'Compute' button is at the bottom. A status bar at the bottom reads 'Enter/Edit short identifier for plan (used in plan comparisons)'.

Steady Flow Analysis

File Options Help

Plan : 2001 HEC-2 Import Effective Example Short ID : 2001 Example

Geometry File : 2001 HEC-2

Steady Flow File : Effective 2014 Flow

Flow Regime

Subcritical

Supercritical

Mixed

Optional Programs

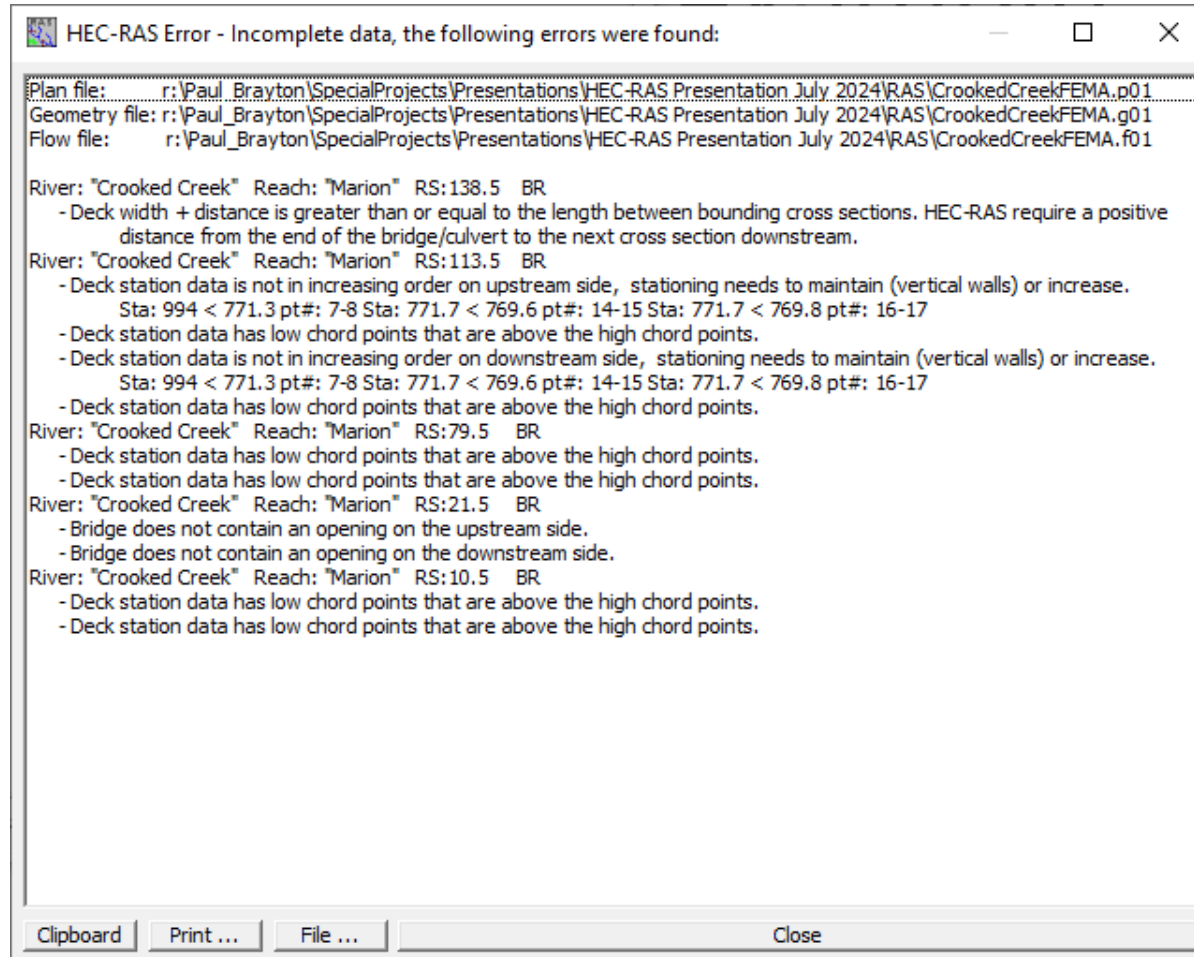
Floodplain Mapping

Plan Description :

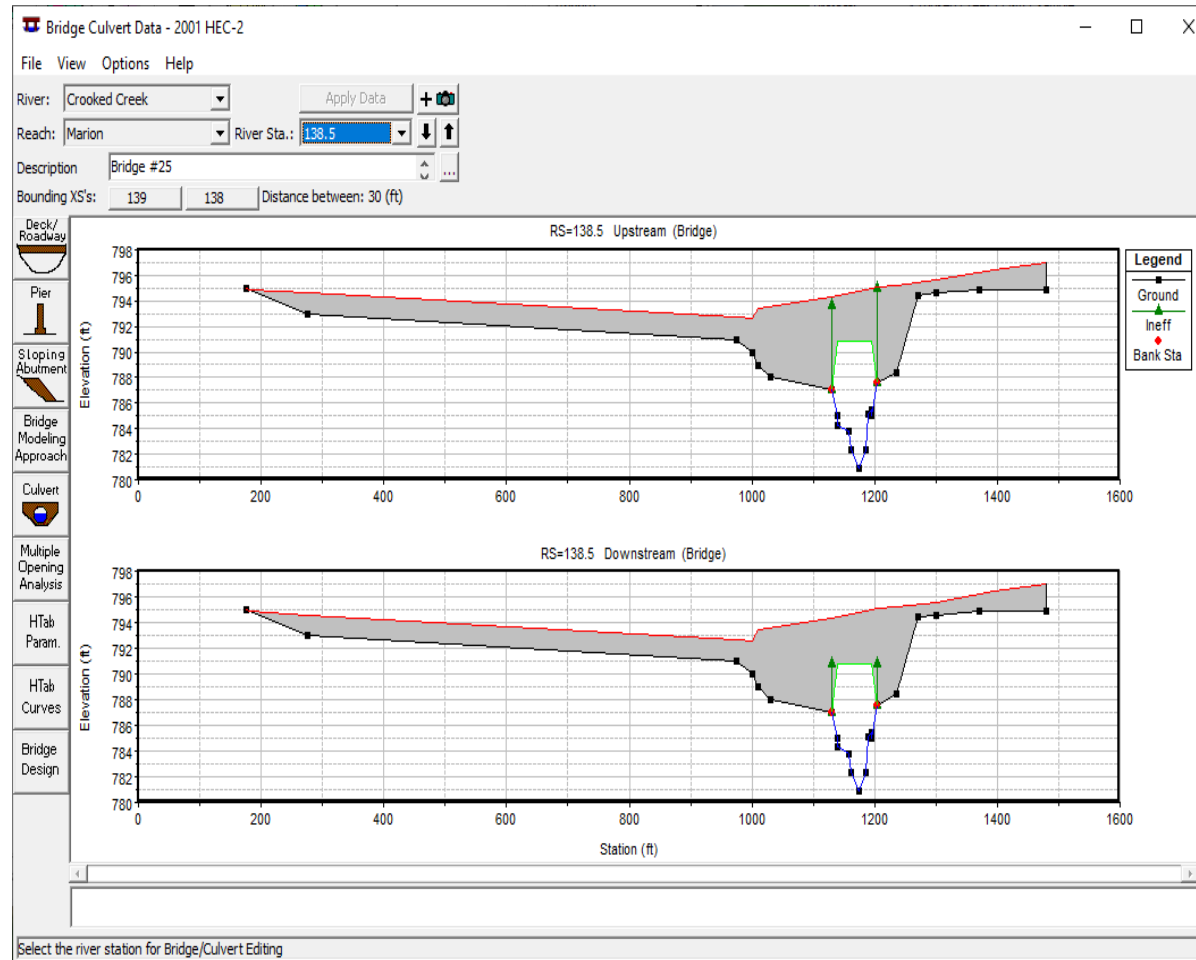
Compute

Enter/Edit short identifier for plan (used in plan comparisons)

Create the Duplicate Effective Model



Create the Duplicate Effective Model



Create the Duplicate Effective Model

Deck/Roadway Data Editor

Distance	Width	Weir Coef
1.	31.	2.65

Clear Del Row Ins Row Copy US to DS

Upstream				Downstream		
	Station	high chord	low chord	Station	high chord	low chord
1	175	794.9	794.9	175	794.9	794.9
2	275	794.6	786.2	275	794.6	786.2
3	975	792.7	785.2	975	792.7	785.2
4	1000.1	792.6	785.8	1000.1	792.6	785.8
5	1010	793.4	786.1	1010	793.4	786.1
6	1130	794.3	787	1130	794.3	787
7	1140	794.4	790.8	1140	794.4	790.8
8	1174	794.8	790.8	1174	794.8	790.8

U.S Embankment SS: D.S Embankment SS:

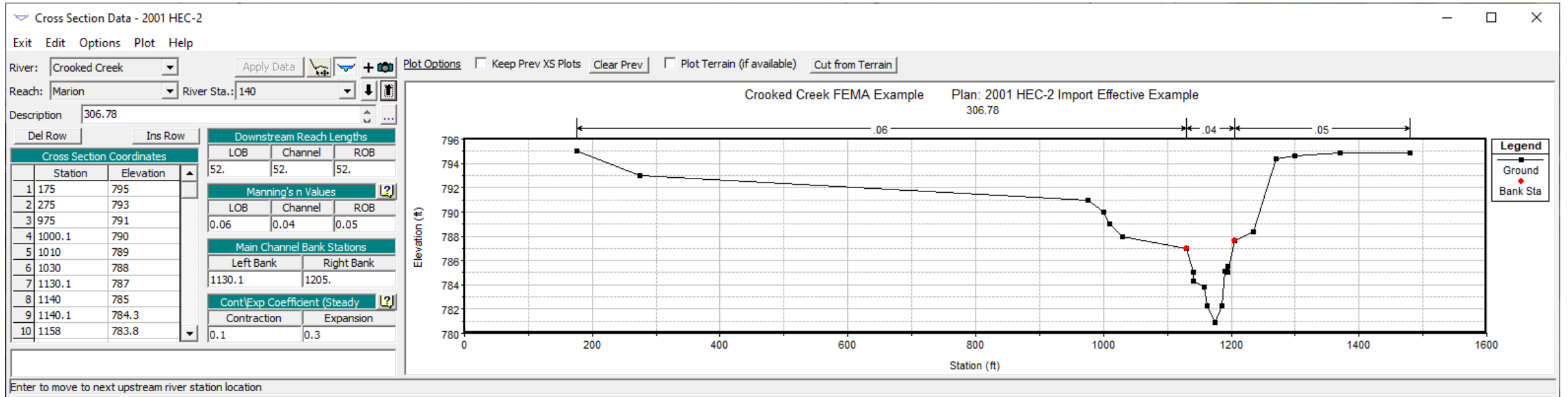
Weir Data
 Max Submergence: Min Weir Flow El:

Weir Crest Shape
 Broad Crested
 Ogee

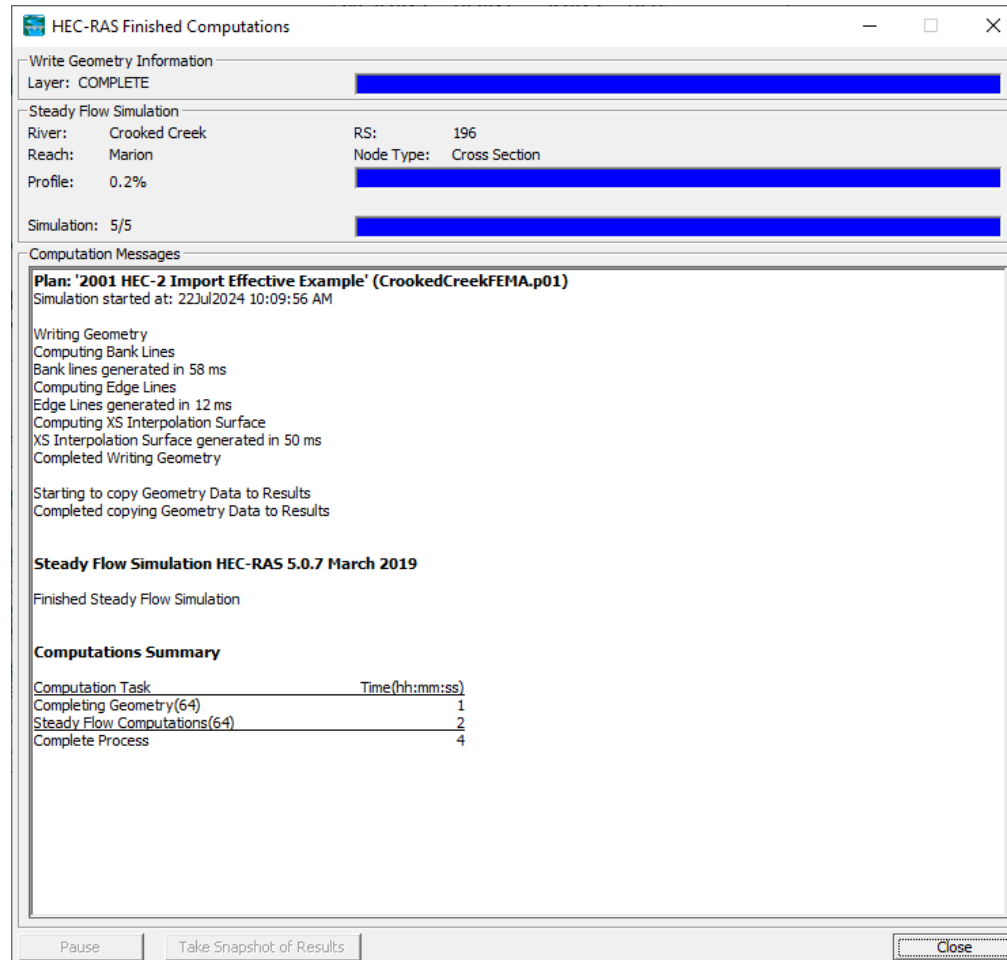
OK Cancel

Enter distance between upstream cross section and deck/roadway. (ft)

Create the Duplicate Effective Model



Create the Duplicate Effective Model



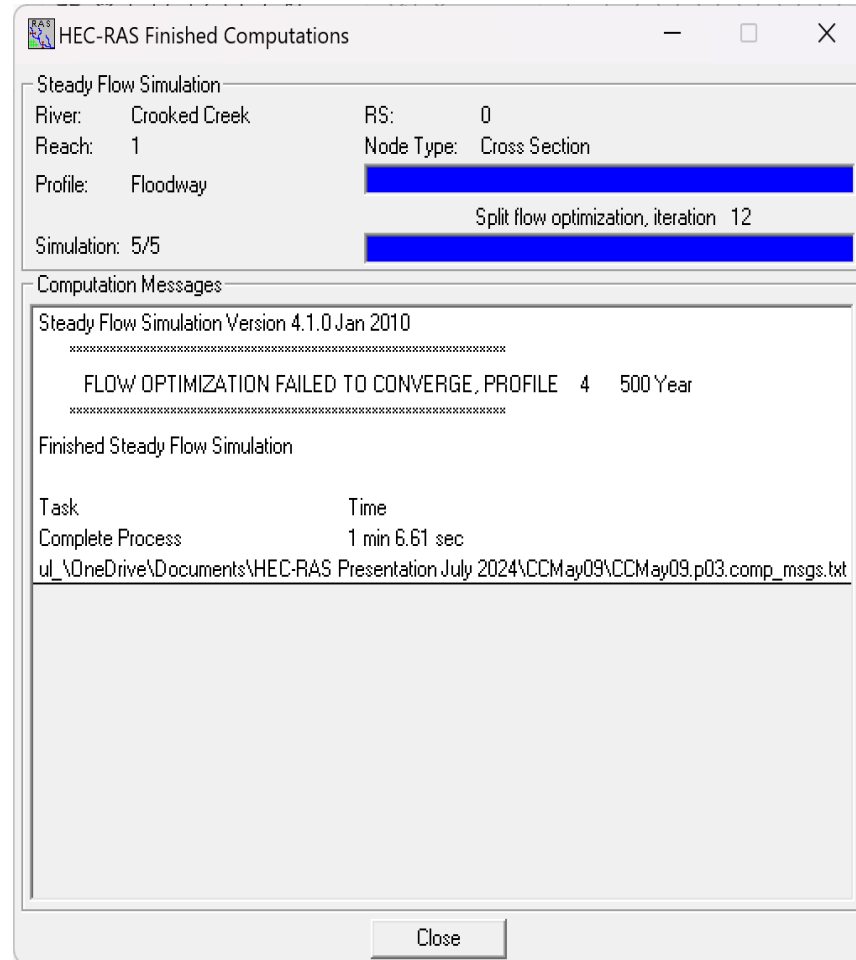
Create the Duplicate Effective Model

The image displays four windows from the HEC-RAS 4.1.0 software interface:

- HEC-RAS 4.1.0 (Main Window):** Shows project settings for 'Crooked Creek'. The description includes: 'Crooked Creek - Indianapolis IN CBBEL Proj. # 97-001; March 2009; Datum NAVD 1988; Scott Griffith, Don Oliphant, Peggy Shepherd, Matt Mead. Lateral structure used to model flow over higher ground just upstream of confluence with White River where some water flows over and thru the golf course to the south to join White River downstream of 30th Street.' Units are set to 'US Customary Units'.
- Geometric Data - Crooked Ck - revised 10Mar0918May:** Displays a cross-section profile with elevation values ranging from 0.533 to 12.98. A legend at the bottom indicates: '12 of the 184 XS's are not Geo-Referenced (— Geo-Ref user entered XS — Geo-Ref interpolated XS — Non Geo-Ref user entered XS — Non Geo-Ref user entered XS)'.
- Steady Flow Data - Crooked Ck - 5 profiles & HWM:** Shows flow change locations and a table of profile names and flow rates.
- Steady Flow Analysis:** Shows analysis settings for 'Crooked Ck - FINALMar2009 - 5 ProfileMAY'. The flow regime is set to 'Subcritical'. The plan description includes: '10, 50-, 100-, 500-, yr & floodway profiles. 1957 & 1978 HWM are included as observe WSEL for 10 & 500 yr profiles also. Revised May19, 2009 to address DNR comments'.

River	Reach	RS	10 Year	50 Year	100 Year	500 Year	Floodway	
1	Crooked Creek	1	12.98	208	330	395	565	395
2	Crooked Creek	1	12.744	272	438	521	746	521
3	Crooked Creek	1	11.486	325	520	610	890	610
4	Crooked Creek	1	11.258	360	580	695	1000	695
5	Crooked Creek	1	10.933	667	1090	1310	1900	1310
6	Crooked Creek	1	10.018	975	1610	1940	2810	1940
7	Crooked Creek	1	8.922	1010	1680	2020	2830	2020
8	Crooked Creek	1	6.853	1470	2460	2960	4320	2960
9	Crooked Creek	1	6.224	1560	2610	3140	4590	3140
10	Crooked Creek	1	4.864	1720	2870	3460	5070	3460
11	Crooked Creek	1	1.998	1730	2900	3490	5110	3490
12	Crooked Creek	1	0	1740	2910	3510	5130	3510
13	Overflow	1	4	1	2	3	4	3

Create the Duplicate Effective Model



Create the Duplicate Effective Model

Model		FWDT			
Station	WS 100 Year	Letter	Section	BFE	Delta
3878	703.0	A	3878	703.0	0.0
4345	706.3	B	4345	706.3	0.0
5331	708.7	C	5331	708.7	0.0
6143	711.3	D	6143	711.3	0.0
9561	720.7	E	9561	720.7	0.0
11102	724.9	F	11102	725.0	0.1
12440	727.8	G	12440	727.8	0.0
14188	732.1	H	14188	732.1	0.0
16792	739.1	I	16792	739.1	0.0
17927	741.9	J	17927	741.9	0.0
19956	746.8	K	19956	746.8	0.0
22244	751.7	L	22244	751.7	0.0
22688	753.4	M	22688	753.4	0.0
23684	756.0	N	23684	756.0	0.0
26281	760.6	O	26281	760.6	0.0
28197	763.5	P	28197	763.5	0.0
29655	767.1	Q	29655	767.1	0.0
31932	771.8	R	31932	771.8	0.0
33816	775.8	S	33816	775.8	0.0
35431	779.2	T	35431	779.2	0.0
38155	783.2	U	38155	783.2	0.0
39699	786.5	V	39699	786.5	0.0
40627	788.8	W	40627	788.8	0.0
43298	796.6	X	43298	796.7	0.1
44915	799.8	Y	44915	799.8	0.0
46276	803.7	Z	46276	803.7	0.0

Gaps between the Data Development and Mapping

Effective Data
May 2009

Effective
Mapping
April 19, 2016

Existing
Conditions
May 14, 2025

Create the Corrected Effective Model

The screenshot displays the DNR Division of Water's Online Research Center (DoWORC) interface. The main map area shows a detailed view of Marion, Indiana, with a network of blue and green lines representing water features. The interface includes a search bar, navigation tools, and a table of dam records.

ActionTake	APN	DateMailed	DischargeV	DNRPublicN	DrainageAr	DS	E100	E100Datum	E100Unit	East	Folder_ID	Folder_Typ	HDatum	HHModel	InspBgDt	InspEndDt	InspNotes	LakeShore
Closed	December 29, 1899	November 11, 1999		February 3, 1998		Downstream			feet	485,275.00	AC-4.0	ATS	NAD27	0	December 29, 1899	December 29, 1899		

40094 features 0 selected

Create the Corrected Effective Model

Filter

+ Add expression + Add set

Display features in the layer that match the following expression

Waterbody (String) is Crooked Creek

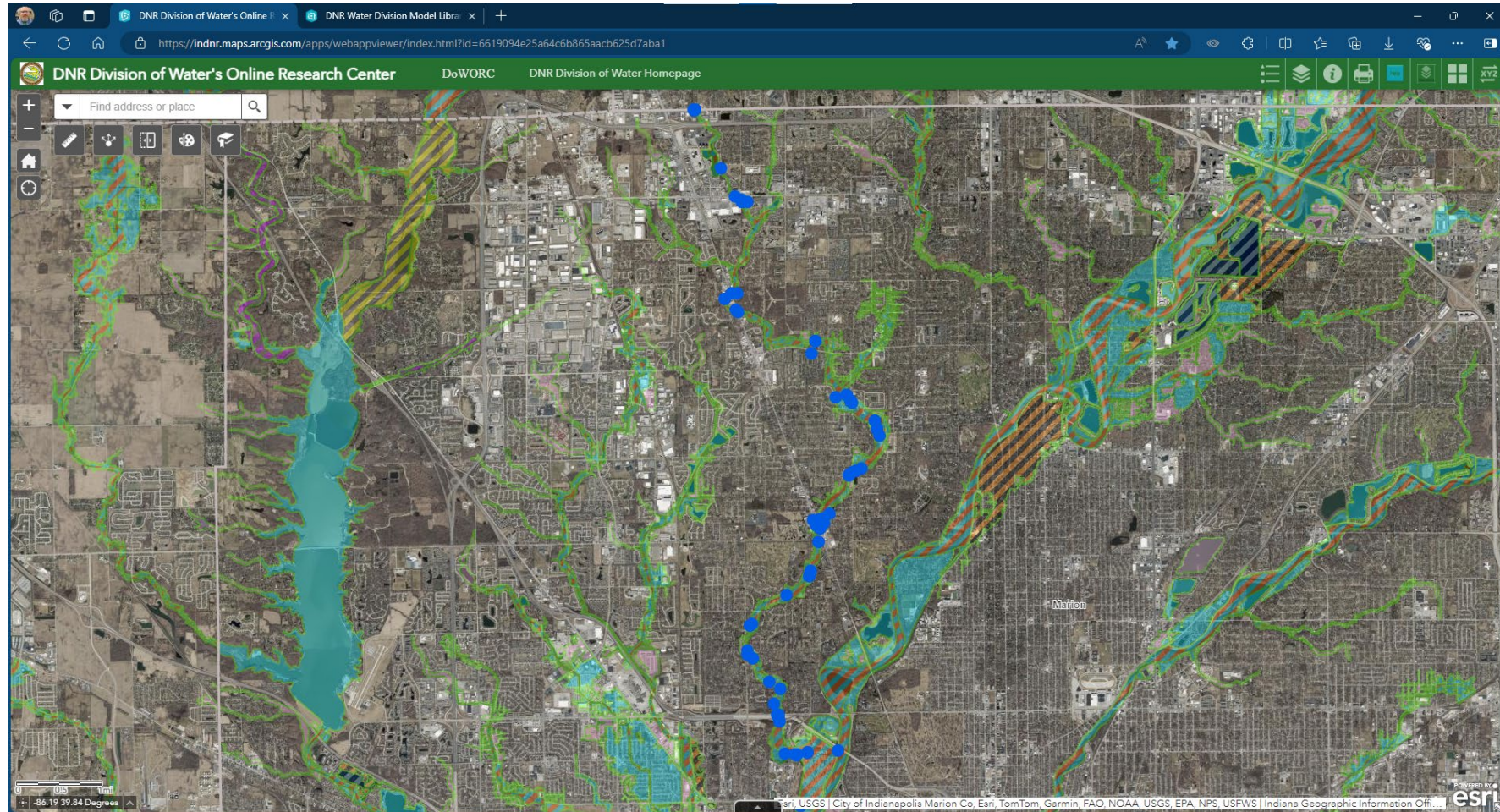
Case sensitive

OK Cancel

ActionTake	APN	DateMailed	DischargeV	DNRPublicN	DrainageAr	Downstream	LakeShore	HDatum	HHModel	InspBgDt	InspEndDt	InspNotes	LakeShore
Closed	December 29, 1899	August 24, 1999		March 23, 1999				NAD27	0	December 29, 1899	December 29, 1899		

180 features 0 selected

Create the Corrected Effective Model



Create the Corrected Effective Model

Date Mailed	Discha	DA	E100	Unit	V Datum	East	Folder Type	Folder ID	H Datum	H	North	Pro/Description	Date Recd	Site/Description	Source	Waterbody
10/24/1993												0 4,407,650.00 The existing single span steel beam golf cart br	8/22/1993	At Riverside Golf Course approx Crooked Creek		
8/15/1989												0 4,412,000.00 The applicant proposes to remove the existing	4/18/1989	At the northeast corner of U.S. 421 Crooked Creek		
4/26/1990												0 4,414,300.00 The applicant proposes to connect the sanitary	9/24/1989	About 1,000 feet northwest (upst) Crooked Creek		
4/26/1990												0 4,414,200.00 The applicant proposes to excavate along the ri	11/5/1990	Between 70 and 300 feet north of Crooked Creek		
5/20/1990												0 4,411,900.00 Water main crossing	12/20/1989	Immediately northeast (upstream) Crooked Creek		
9/4/1990												0 4,410,600.00 The applicant proposes to remove soil and som	4/3/1990	Approximately 1,000 feet north of Crooked Creek		
3/9/1991												0 4,411,950.00 The applicant proposes to replace and widen th	10/4/1990	About 500 feet north of Kessler Boi Crooked Creek		
6/3/1991												0 4,417,950.00 The applicant proposes to replace the 86th Str	10/4/1990	Approximately 2,400 feet east of Crooked Creek		
6/23/1991												0 4,417,990.00 The applicant has proposed to place a new acc	3/11/1991	About 300 feet downstream of 86th Crooked Creek		
6/23/1991												0 4,417,950.00 The applicant proposes to widen the existing ct	3/11/1991	Extending up to 700 feet downstre Crooked Creek		
2/20/1992												0 4,417,950.00 The applicant proposes to construct an asphalt	1/8/1992	Extending up to 700 feet downstre Crooked Creek		
10/29/1992												0 4,408,840.00 Approximately 450 feet upstream (north) of the	8/19/1992	Approximately 450 feet upstream Crooked Creek		
11/15/1992												0 4,418,050.00 One 16-inch diameter steel natural gas main wi	9/17/1992	Approximately 80 feet upstream of Crooked Creek		
1/14/1993												0 4,412,125.00 One 10-inch diameter PVC sanitary sewer main	10/19/1992	Approximately 900 feet upstream Crooked Creek		
6/28/1993	762.7	feet	NGV029									0 4,411,850.00 An existing commercial building and associate	4/12/1993	Along the southeast streambank b Crooked Creek		
11/9/1993												0 4,410,950.00 One 24" diameter reinforced concrete stormwa	8/2/1993	Approximately 20 feet downstream Crooked Creek		
3/23/1994	752.0	feet	NGV029									0 4,411,050.00 A 24 ft x 48 ft open T.V. culvert has been const	11/14/1993	Approximately 149 feet north of K Crooked Creek		
4/18/1994												0 4,408,350.00 The existing 3-span continuous steel beam 1-65	1/16/1995	Crooked Creek		
4/18/1994												0 4,408,300.00 The existing 3-span continuous steel beam 1-65	1/16/1995	At the I-65 twin bridge crossing of Crooked Creek		
9/16/1996												0 4,413,870.00 Broken concrete and earthen fill has been plac	1/23/1996	Crooked Creek		
9/16/1996												0 4,413,870.00 Broken concrete and earthen fill has been plac	1/23/1996	Crooked Creek		
9/16/1996												0 4,413,705.00 Broken concrete and earthen fill has been plac	1/23/1996	Along the west overbank, beginnin Crooked Creek		
9/16/1996												0 4,413,705.00 Broken concrete and earthen fill has been plac	1/23/1996	Along the west overbank, beginnin Crooked Creek		
12/25/1996	774.5	feet	NGV029									0 4,413,600.00 A 50 ft x 30 ft area will be filled in the east flood	10/2/1996	Within the east overbank, between Crooked Creek		
1/20/1997	3,475	7.2	812.0	feet	NGV029							0 4,415,875.00 As part of widening of Michigan Road from Hillar	11/25/1996	At the Michigan Road (U.S. 421) cr Crooked Creek		
7/20/1997	3,800	809.6	feet	NGV029								0 4,416,225.00 As part of widening of Michigan Road from Hillar	11/25/1996	At the Michigan Road (U.S. 421) cr Crooked Creek		
7/20/1997	3,600	811.5	feet	NGV029								0 4,416,125.00 Fill will be placed in the east (left) floodplain of	2/18/1997	Crooked Creek		
7/20/1997	3,600	809.6	feet	NGV029								0 4,416,225.00 Fill will be placed in the east (left) floodplain of	2/18/1997	Along both streambanks, beginnin Crooked Creek		
7/20/1997	3,600	811.5	feet	NGV029								0 4,416,225.00 Fill will be placed in the east (left) floodplain of	2/18/1997	Along both streambanks, beginnin Crooked Creek		
1/10/1997	756.7	feet	NGV029									0 4,411,800.00 As part of the 58th Street and Michigan Road Dr	7/21/97	Along the southwest (right) stream Crooked Creek		
3/30/1998	731.3	feet	NGV029									0 4,409,550.00 A 12" diameter water main will be placed at a m	2/8/1998	Across the stream, about 10 ft dow Crooked Creek		
5/3/1998	5,400	768.8	feet	NGV029								0 4,412,975.00 Within the boundaries of Juan Soloman Park, a	11/30/1997	Across the stream, approximately Crooked Creek		
12/15/1999												0 4,408,350.00 The three existing 3-span continuous composi	8/2/1999	At the existing I-65 & westbound W Crooked Creek		
12/21/1999												0 4,408,225.00 The existing three-span continuous steel beam	8/11/1999	At the existing Escoband 36th Str Crooked Creek		
5/12/2002												0 4,415,925.00 A 300' storm water drainage swale will be escav	3/8/2002	Approximately 1900' south of the Crooked Creek		
12/3/2002	763.0	feet	NGV029									0 4,412,041.00 A 30' x 29' addition will be constructed on to an	6/17/2002	Approximately 300' east of the We Crooked Creek		
5/9/2003												0 4,410,050.00 A new foot bridge will be constructed to carry pi	10/15/2002	Approximately 900' downstream (Crooked Creek		
7/25/2004												0 4,410,020.00 A 14' x 21' greenhouse room addition will be ad	6/30/2004	4795 Kessler Boulevard North Dr Crooked Creek		
4/12/2006												0 4,419,852.00 The existing 62' long twin corrugated 22" pipes	8/12/2005	At the 96th Street stream crossing Crooked Creek		
5/18/2006	768.1	feet	NGV029									0 4,413,145.00 A single span prefabricated truss bridge will be	3/2/2006	Approximately 230' upstream of Crooked Creek		
5/18/2006	768.1	feet	NGV029									0 4,413,145.00 A single span prefabricated truss bridge will be	3/2/2006	Approximately 230' upstream of Crooked Creek		
4/19/2007	762.5	feet	NGV029									0 4,412,099.00 A commercial facility will be developed along th	1/16/2007	Beginning at the intersection of Ke Crooked Creek		
4/19/2007	762.5	feet	NGV029									0 4,412,241.00 A commercial facility will be developed along th	1/16/2007	Beginning at the intersection of Ke Crooked Creek		
4/19/2007	762.5	feet	NGV029									0 4,412,123.00 A commercial facility will be developed along th	1/16/2007	Crooked Creek		
4/19/2007	762.5	feet	NGV029									0 4,412,123.00 A commercial facility will be developed along th	1/16/2007	Crooked Creek		
5/25/2007	783.4	feet	NGV029									0 4,414,567.00 Approximately 332' of Crooked Creek's eroded	10/20/2006	Crooked Creek		
5/25/2007	783.8	feet	NGV029									0 4,414,567.00 Approximately 332' of Crooked Creek's eroded	10/20/2006	Crooked Creek		
5/25/2007	783.4	feet	NGV029									0 4,414,466.00 Approximately 332' of Crooked Creek's eroded	10/20/2006	Beginning at the Grandview Creek Crooked Creek		
5/25/2007	783.8	feet	NGV029									0 4,414,466.00 Approximately 332' of Crooked Creek's eroded	10/20/2006	Beginning at the Grandview Creek Crooked Creek		
7/30/2007												0 4,419,861.00 The existing twin 54" by 62" long CMP culverts w	2/26/2007	At the West 96th Street stream cro Crooked Creek		
9/23/2009												0 4,419,867.00 The existing twin 54" by 62" long CMP culverts w	9/21/2009	At the 96th Street crossing Crooked Creek		
1/26/2010												-1 4,419,868.00 The existing twin 54" by 62" long CMP culverts w	9/21/2009	At the 96th Street crossing Crooked Creek		
1/26/2010												-1 4,419,868.00 The existing twin 54" by 62" long CMP culverts w	9/21/2009	At the 96th Street crossing Crooked Creek		
1/26/2010	725.2	feet	NGV029									-1 4,409,690.00 Approximately 650' of Crooked Creek's eroded	7/13/2009	Beginning approximately 100' north Crooked Creek		
1/26/2010	730.9	feet	NGV029									-1 4,409,690.00 Approximately 650' of Crooked Creek's eroded	7/13/2009	Beginning approximately 100' north Crooked Creek		
4/6/2010	705.4	feet	NGV029									0 4,407,907.00 A 42" diameter force main is proposed along the center l	11/12/2009	Beginning approximately 50' south Crooked Creek		
4/6/2010	763.4	feet	NGV029									0 4,413,161.00 A 42" diameter force main will be placed below	11/12/2009	Beginning at the Grandview Drive Crooked Creek		
9/22/2011	782.7	feet	NGV029									0 4,414,454.00 The existing 112'-6" long, 3-span continuous cc	4/29/2011	At the Grandview Drive stream cro Crooked Creek		
11/10/2011	795.0	feet	NGV029									0 4,415,568.00 The existing concrete beam bridge carrying Mar	8/12/2011	At the Manchester Drive stream cr Crooked Creek		
11/10/2011	795.0	feet	NGV029									0 4,415,568.00 The existing concrete beam bridge carrying Mar	8/12/2011	At the Manchester Drive stream cr Crooked Creek		
11/23/2011	726.5	feet	NGV029									0 4,409,178.00 The deck of the existing 3-span bridge carrying	10/21/2011	At the 42nd Street stream crossing Crooked Creek		
12/22/2011	762.7	feet	NGV029									-1 4,412,236.00 The existing three-span precast concrete chan	3/9/2011	At the 57th Street stream crossing Crooked Creek		
12/20/2011	728.0	feet	NGV029									0 4,409,618.00 Approximately 180' of the stream's eroded east	10/3/2011	4370 Cooper Road, along the east Crooked Creek		
10/31/2012	720.0	feet	NGV029									0 4,408,778.00 Approximately 300' of the eroded south stream	8/24/2012	3939 Cooper Road; beginning app Crooked Creek		
2/8/2016	764.8	feet	NAV088									0 4,413,060.00 The superstructure of the existing 3-span bridge	10/27/2015	At the Fox Hill Drive stream crossin Crooked Creek		
2/8/2016	764.8	feet	NAV088									0 4,413,060.00 The superstructure of the existing 3-span bridge	10/27/2015	At the Fox Hill Drive stream crossin Crooked Creek		
4/17/2019	704.8	feet	NAV088									0 4,407,821.00 A multi-use trail will be constructed along Cold	11/14/2018	Beginning at the West 30th Street Crooked Creek		
7/9/2019	703.9	feet	NAV088									0 4,407,822.00 The bridge railing and concrete sidewalk of the	1/24/2019	At the Cold Springs Road stream cr Crooked Creek		
7/9/2019	703.9	feet	NAV088									0 4,407,822.00 The bridge railing and concrete sidewalk of the	1/24/2019	At the Cold Springs Road stream cr Crooked Creek		
10/17/2019												0 4,415,330.00 Approximately 200' of eroded streambank will E	4/30/2019	Along the north bank beginning on Crooked Creek		
10/17/2019												0 4,415,367.00 Approximately 200' of eroded streambank will E	4/30/2019	Crooked Creek		
10/29/2020	750.4	feet	NAV088									0 4,411,211.00 The existing two-span bridge will be replaced w	11/13/2019	At the Knollton Road c FEMA Flood Crooked Creek		
4/29/2020	749.5	feet	NAV088									0 4,411,211.00 The existing two-span bridge will be replaced w	11/13/2019	At the Knollton Road c FEMA Flood Crooked Creek		
5/20/2021												0 4,407,845.00 An open grass field will be graded and convert	12/9/2020	Approximately 700' west of the Col Crooked Creek		
8/29/2022												0 4,407,819.00 Bridge No. 49-1715F, which carries Cold Spring	6/10/2022	Approximately 2,800' north of the Crooked Creek		

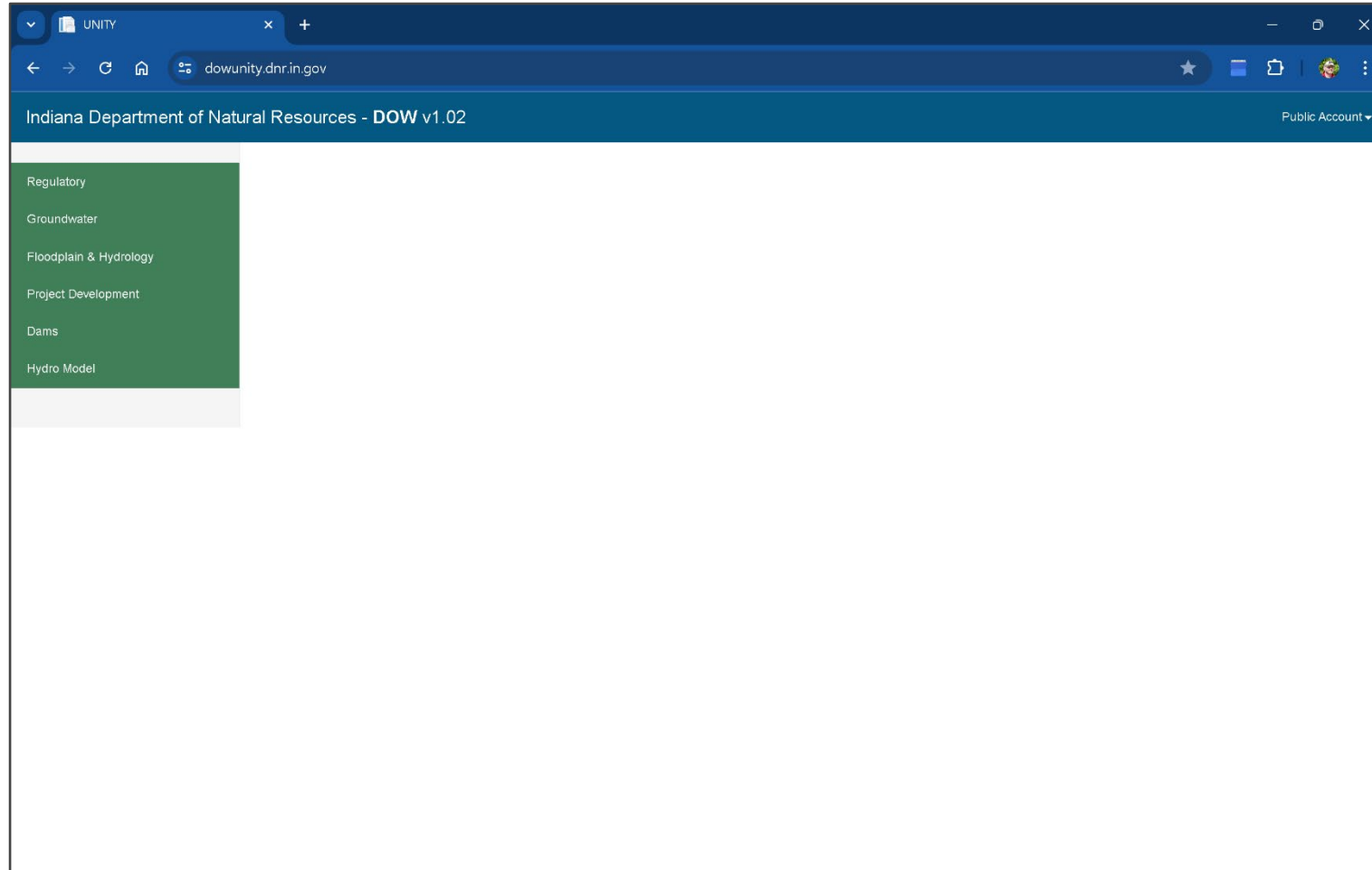
Create the Corrected Effective Model

Date_Mailed	Discha	DA	E100	Unit	VDatum	East	Folder_Tp	Folder_ID	Hdatum	HH	North	ProjDescription
4/12/2006				feet		566,396.00	ATS	FW-23487-0	NAD27	0	4,419,652.00	The existing 62' long twin corrugated 52" pipes
5/18/2006				768.1 feet	NGVD29	569,492.00	ATS	FW-23704-0	NAD83	0	4,413,149.00	A single span prefabricated truss bridge will be
5/18/2006				768.1 feet	NGVD29	569,492.00	ATS	FW-23704-0	NAD83	0	4,413,149.00	A single span prefabricated truss bridge will be
4/19/2007				762.5 feet	NGVD29	568,794.00	ATS	FW-24144-0	NAD83	0	4,412,099.00	A commercial facility will be developed along th
4/19/2007				762.5 feet	NGVD29	568,794.00	ATS	FW-24144-0	NAD83	0	4,412,099.00	A commercial facility will be developed along th
4/19/2007				762.5 feet	NGVD29	568,856.00	ATS	FW-24144-0	NAD83	0	4,412,123.00	A commercial facility will be developed along th
4/19/2007				762.5 feet	NGVD29	568,856.00	ATS	FW-24144-0	NAD83	0	4,412,123.00	A commercial facility will be developed along th
5/25/2007				783.4 feet	NGVD29	569,298.00	ATS	FW-24043-0	NAD83	0	4,414,567.00	Approximately 332' of Crooked Creek's eroded
5/25/2007				783.8 feet	NGVD29	569,298.00	ATS	FW-24043-0	NAD83	0	4,414,567.00	Approximately 332' of Crooked Creek's eroded
5/25/2007				783.4 feet	NGVD29	569,375.00	ATS	FW-24043-0	NAD83	0	4,414,466.00	Approximately 332' of Crooked Creek's eroded
5/25/2007				783.8 feet	NGVD29	569,375.00	ATS	FW-24043-0	NAD83	0	4,414,466.00	Approximately 332' of Crooked Creek's eroded
7/30/2007				feet		566,395.00	ATS	FW-24211-0	NAD83	0	4,419,861.00	The existing twin 54" by 62' long CMP culverts w
9/23/2009				feet		566,382.00	ATS	FW-25497-0	NAD83	0	4,419,867.00	The existing twin 54" by 62' long CMP culverts w
1/20/2010				feet		566,415.00	ATS	FW-25492-0	NAD83	-1	4,419,868.00	The existing twin 54" by 62' long CMP culverts w
1/20/2010				feet		566,415.00	ATS	FW-25492-0	NAD83	-1	4,419,868.00	The existing twin 54" by 62' long CMP culverts w
1/26/2010				725.2 feet	NGVD29	567,487.00	ATS	FW-25402-0	NAD83	-1	4,409,690.00	Approximately 650' of Crooked Creek's eroded
1/26/2010				730.9 feet	NGVD29	567,487.00	ATS	FW-25402-0	NAD83	-1	4,409,690.00	Approximately 650' of Crooked Creek's eroded
4/6/2010				705.4 feet	NGVD29	569,203.00	ATS	FW-25580-0	NAD83	0	4,407,907.00	A 42" force main is proposed along the center li
4/6/2010				766.4 feet	NGVD29	569,357.00	ATS	FW-25581-0	NAD83	0	4,413,066.00	A 42" diameter force main will be placed benea
9/22/2011				782.7 feet	NGVD29	569,379.00	ATS	FW-26222-0	NAD83	0	4,414,454.00	The existing 112'-6" long, 3-span continuous cc
11/10/2011				795.0 feet	NGVD29	568,711.00	ATS	FW-26357-0	NAD83	0	4,415,568.00	The existing concrete beam bridge carrying Mar
11/10/2011				795.0 feet	NGVD29	568,711.00	ATS	FW-26357-0	NAD83	0	4,415,568.00	The existing concrete beam bridge carrying Mar
12/13/2011				726.5 feet	NGVD29	567,897.00	ATS	FW-26459-0	NAD83	0	4,409,179.00	The deck of the existing 3-span bridge carrying
12/22/2011				762.7 feet	NGVD29	568,830.00	ATS	FW-26132-0	NAD83	-1	4,412,236.00	The existing three-span precast concrete chanr
2/20/2012				728.0 feet	NGVD29	567,586.00	ATS	FW-26427-0	NAD83	0	4,409,618.00	Approximately 180' of the stream's eroded east
10/31/2012				720.0 feet	NGVD29	567,992.00	ATS	FW-26865-0	NAD83	0	4,408,778.00	Approximately 300' of the eroded south stream
2/8/2016				764.8 feet	NAVD88	569,356.00	ATS	FW-28171-0	NAD83	0	4,413,060.00	The superstructure of the existing 3-span bridge
2/8/2016				764.8 feet	NAVD88	569,423.00	ATS	FW-28172-0	NAD83	0	4,413,115.00	The superstructure of the existing 3-span bridge
4/17/2019				704.8 feet	NAVD88	568,400.00	ATS	FW-29688-0	NAD83	0	4,407,821.00	A multi-use trail will be constructed along Cold
7/9/2019				703.9 feet	NAVD88	568,425.00	ATS	FW-29772-0	NAD83	0	4,407,822.00	The bridge railing and concrete sidewalk of the
7/9/2019				703.9 feet	NAVD88	568,425.00	ATS	FW-29772-0	NAD83	0	4,407,822.00	The bridge railing and concrete sidewalk of the
10/17/2019				feet		568,631.00	ATS	FW-29886-0	NAD83	0	4,415,330.00	Approximately 200' of eroded streambank will b
10/17/2019				feet		568,703.00	ATS	FW-29886-0	NAD83	0	4,415,567.00	Approximately 200' of eroded streambank will b
4/29/2020				750.4 feet	NAVD88	568,641.00	ATS	FW-30227-0	NAD83	0	4,411,211.00	The existing two-span bridge will be replaced wi
4/29/2020				749.5 feet	NAVD88	568,641.00	ATS	FW-30227-0	NAD83	0	4,411,211.00	The existing two-span bridge will be replaced wi
5/20/2021				feet		568,198.00	ATS	FW-30838-0	NAD83	0	4,407,845.00	An open grass field will be regraded and convert
8/29/2022				feet		568,419.00	ATS	FW-31664-0	NAD83	0	4,407,819.00	Bridge No. 49-1715F, which carries Cold Spring

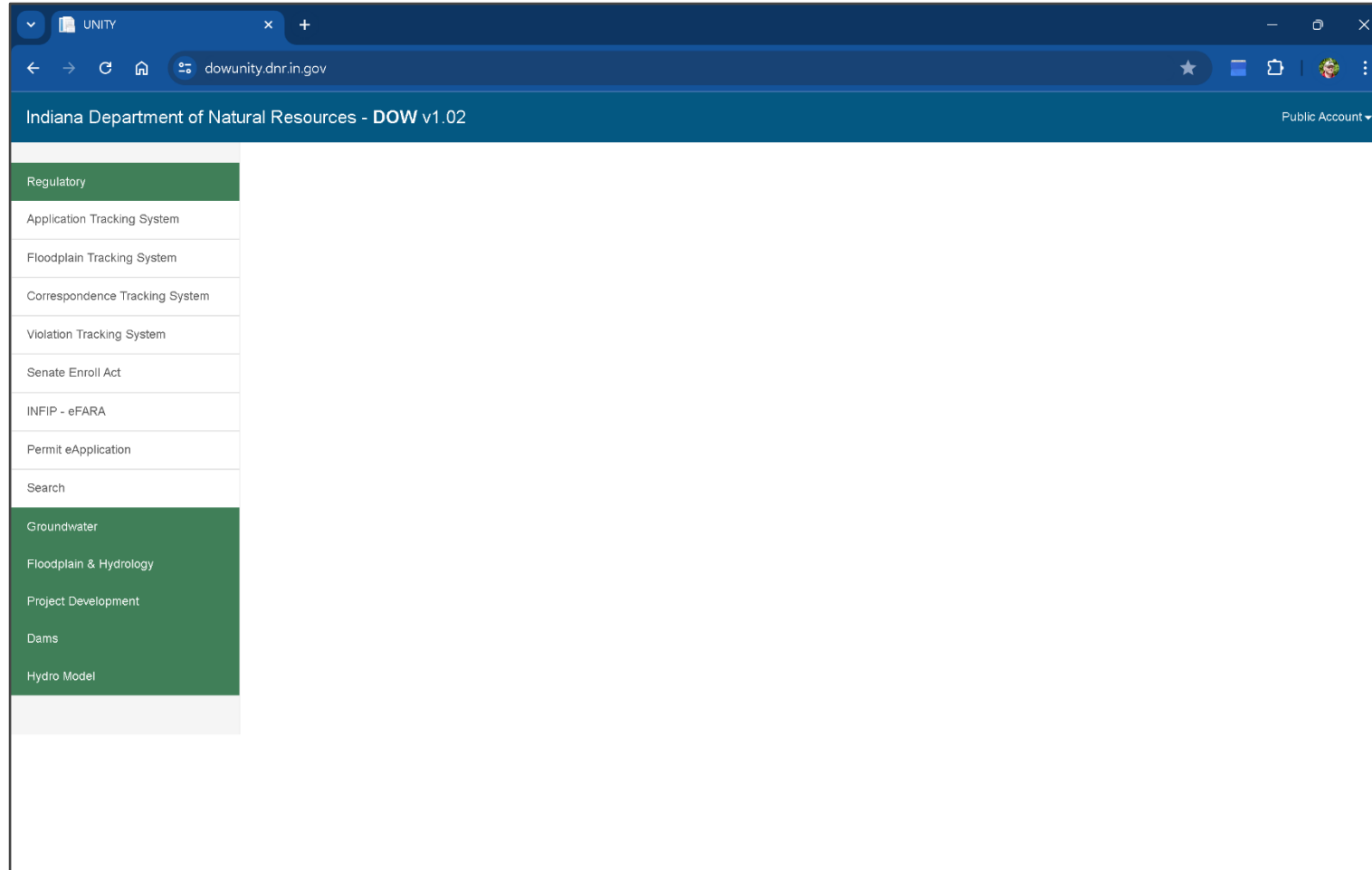
Create the Corrected Effective Model

Date_Mailed	Discha	DA	E100	Unit	VDatum	East	Folder_Tp	Folder_ID	Hdatum	HF	North	ProjDescription	Date_Reciv	SiteDescription	Source	Waterbody
9/23/2009				feet		566,382.00	ATS	FW-25497-0	NAD83	0	4,419,867.00	The existing twin 54" by 62' long CMP culverts w	9/21/2009	At the 96th Street crossing		Crooked Creek
1/20/2010				feet		566,415.00	ATS	FW-25492-0	NAD83	-1	4,419,868.00	The existing twin 54" by 62' long CMP culverts w	9/21/2009	At the 96th Street crossing		Crooked Creek
1/20/2010				feet		566,415.00	ATS	FW-25492-0	NAD83	-1	4,419,868.00	The existing twin 54" by 62' long CMP culverts w	9/21/2009	At the 96th Street crossing		Crooked Creek
1/26/2010				725.2 feet	NGVD29	567,487.00	ATS	FW-25402-0	NAD83	-1	4,409,690.00	Approximately 650' of Crooked Creek's eroded :	7/13/2009	Beginning approximately 100' nort		Crooked Creek
1/26/2010				730.9 feet	NGVD29	567,487.00	ATS	FW-25402-0	NAD83	-1	4,409,690.00	Approximately 650' of Crooked Creek's eroded :	7/13/2009	Beginning approximately 100' nort		Crooked Creek
4/6/2010				705.4 feet	NGVD29	569,203.00	ATS	FW-25580-0	NAD83	0	4,407,907.00	A 42" force main is proposed along the center li	11/12/2009	Beginning approximately 50' south		Crooked Creek
4/6/2010				766.4 feet	NGVD29	569,357.00	ATS	FW-25581-0	NAD83	0	4,413,066.00	A 42" diameter force main will be placed benea	11/12/2009	Beginning at the Grandview Drive s		Crooked Creek
9/22/2011				782.7 feet	NGVD29	569,379.00	ATS	FW-26222-0	NAD83	0	4,414,454.00	The existing 112'-6" long, 3-span continuous cc	4/29/2011	At the Grandview Drive stream cro:		Crooked Creek
11/10/2011				795.0 feet	NGVD29	568,711.00	ATS	FW-26357-0	NAD83	0	4,415,568.00	The existing concrete beam bridge carrying Mar	8/12/2011	At the Manchester Drive stream cr		Crooked Creek
11/10/2011				795.0 feet	NGVD29	568,711.00	ATS	FW-26357-0	NAD83	0	4,415,568.00	The existing concrete beam bridge carrying Mar	8/12/2011	At the Manchester Drive stream cr		Crooked Creek
12/13/2011				726.5 feet	NGVD29	567,897.00	ATS	FW-26459-0	NAD83	0	4,409,179.00	The deck of the existing 3-span bridge carrying :	10/21/2011	At the 42nd Street stream crossing		Crooked Creek
12/22/2011				762.7 feet	NGVD29	568,830.00	ATS	FW-26132-0	NAD83	-1	4,412,236.00	The existing three-span precast concrete chanr	3/9/2011	At the 57th Street stream crossing;		Crooked Creek
2/20/2012				728.0 feet	NGVD29	567,586.00	ATS	FW-26427-0	NAD83	0	4,409,618.00	Approximately 180' of the stream's eroded east	10/3/2011	4370 Cooper Road; along the east		Crooked Creek
10/31/2012				720.0 feet	NGVD29	567,992.00	ATS	FW-26865-0	NAD83	0	4,408,778.00	Approximately 300' of the eroded south stream	8/24/2012	3939 Cooper Road; beginning appi		Crooked Creek
2/8/2016				764.8 feet	NAVD88	569,356.00	ATS	FW-28171-0	NAD83	0	4,413,060.00	The superstructure of the existing 3-span bridge	10/27/2015	At the Fox Hill Drive stream crossin		Crooked Creek
2/8/2016				764.8 feet	NAVD88	569,423.00	ATS	FW-28172-0	NAD83	0	4,413,115.00	The superstructure of the existing 3-span bridge	10/27/2015	At the Grandview Drive stream cro:		Crooked Creek
4/17/2019				704.8 feet	NAVD88	568,400.00	ATS	FW-29688-0	NAD83	0	4,407,821.00	A multi-use trail will be constructed along Cold	11/14/2018	Beginning at the West 30th Street :		Crooked Creek
7/9/2019				703.9 feet	NAVD88	568,425.00	ATS	FW-29772-0	NAD83	0	4,407,822.00	The bridge railing and concrete sidewalk of the	1/24/2019	At the Cold Springs Road stream cr		Crooked Creek
7/9/2019				703.9 feet	NAVD88	568,425.00	ATS	FW-29772-0	NAD83	0	4,407,822.00	The bridge railing and concrete sidewalk of the	1/24/2019	At the Cold Springs Road stream cr		Crooked Creek
10/17/2019				feet		568,631.00	ATS	FW-29886-0	NAD83	0	4,415,330.00	Approximately 200' of eroded streambank will t	4/3/2019	Along the north bank beginning on		Crooked Creek
10/17/2019				feet		568,703.00	ATS	FW-29886-0	NAD83	0	4,415,567.00	Approximately 200' of eroded streambank will t	4/3/2019			Crooked Creek
4/29/2020				750.4 feet	NAVD88	568,641.00	ATS	FW-30227-0	NAD83	0	4,411,211.00	The existing two-span bridge will be replaced wi	11/11/2019	At the Knollton Road c FEMA Flood		Crooked Creek
4/29/2020				749.5 feet	NAVD88	568,641.00	ATS	FW-30227-0	NAD83	0	4,411,211.00	The existing two-span bridge will be replaced wi	11/11/2019	At the Knollton Road c FEMA Flood		Crooked Creek
5/20/2021				feet		568,198.00	ATS	FW-30838-0	NAD83	0	4,407,845.00	An open grass field will be regraded and convert	12/9/2020	Approximately 700' west of the Col		Crooked Creek
8/29/2022				feet		568,419.00	ATS	FW-31664-0	NAD83	0	4,407,819.00	Bridge No. 49-1715F, which carries Cold Spring	6/10/2022	Approximately 2,800' north of the i		Crooked Creek

Create the Corrected Effective Model



Create the Corrected Effective Model



Create the Corrected Effective Model

The screenshot shows a web browser window with the URL `dowunity.dnr.in.gov`. The page displays a "Project Information" form. On the left, a sidebar menu lists various systems: Regulatory, Application Tracking System, Floodplain Tracking System, Correspondence Tracking System, Violation Tracking System, Senate Enroll Act, INFIP - eFARA, Permit eApplication, Search, Groundwater, Floodplain & Hydrology, Project Development, Dams, and Hydro Model. The "Project Information" form includes a search bar with a "Sequence" dropdown and "Search" and "Advanced" buttons. Below the search bar are "Add", "Edit", "Retire", "Previous", and "Next" buttons, along with a "Menu" dropdown. The form contains several input fields: "Folder ID" (dropdown), "Type:" (dropdown), "Subtype:" (dropdown), "Sequence:" (text), "Amendment:" (text), "Received Date:" (text), and "Project Type (0):" (text with a search icon). A large "Description Narrative:" text area is present. Below these fields are several checkboxes: "Model Submitted", "Below OHWM", "Federally Funded", "After The Fact", "County Drainage Board Project", and "SEA-SE Completed". A "Send Acknowledgement" button is located at the bottom of the form. The "Waterbody Information" section is partially visible at the bottom of the page.

Create the Corrected Effective Model

The screenshot shows a web browser window with the URL `dowunity.dnr.in.gov`. A search modal is open, displaying various search criteria. The modal is titled "Search" and contains the following fields:

- Type:
- Subtype:
- Sequence:
- Reference #:
- Open Closed
- Waterbody:
- Section:
- Range:
- Grant:
- UTM North:
- UTM South:
- Organization:
- Last Name:
- Address:
- City:
- County:
- Quadrangle:
- Township:
- Grant #:
- UTM East:
- UTM West:

Buttons:

[Hide Criteria](#)

SEA-SE Completed

Waterbody Information

Create the Corrected Effective Model

The screenshot shows a web browser window with a search modal open. The modal title is "Search" and it indicates "1 matches to your search are displayed below." The search results are as follows:

Folder ID	Received Date	Applicant	Agent	Preview
Waterbody	City / Town	County	Action Taken - Mailed Date	
ATS-FW-25492-0	09/21/2009	Thurman, Joel	Hill, Jeffrey	
Crooked Creek			Closed - 01/20/2010	

Buttons at the bottom of the modal: Cancel, Close, Print.

Create the Corrected Effective Model

UNITY
dowunity.dnr.in.gov

Indiana Department of Natural Resources

Public Account

Project Information

Sequence Search for... Search **Advanced**

Add Edit Retire

Previous Next Menu

File Status: Closed

Type: Subtype: Sequence: Amendment: Received Date:

Folder ID: **ATS** **FW** 25492 0 09/21/2009

Project Type (2): Channel- realignment, Culvert - replacement

Description Narrative: The existing twin 54" by 62" long CMP culverts will be replaced with a new 20' span by 6' rise by 115' long three-sided reinforced concrete culvert. The approach roads will be widened from approximately 34' to 58' and raised 1.5' to 3.0' to accommodate the construction of the east roundabout and to eliminate road overflow. The new culvert will be installed on the same alignment as the existing culvert system. The new culvert will have a skewed wing wall at the downstream end on the left to stabilize the soil and hold the roadbed. As part of the project, new roundabouts will be constructed at the intersections of Shelborne Road at West 96th Street and at North Augusta Drive at West 96th Street. The east roundabout will result in the realignment of approximately 250' of an existing private road south of the intersection of 96th Street and Shelborne Road. The channel will be modified to have a 5' wide bottom with 5:1 side slopes and the channel profile will have a continuous smooth slope from a point approximately 13' above the mouth of the culvert to a point approximately 30' downstream of the culvert. At that point, the channel modification will be blended into the natural channel geometry. Details of the project are contained in information received electronically at the Division of Water on September 21, 2009 and in plans and information received at the Division of Water on September 25, 2009, October 7, 2009, October 9, 2009,

Model Submitted Federally Funded County Drainage Board Project

Below OHWM After The Fact

SEA-SE Completed

Send Acknowledgement

Waterbody Information

Create the Corrected Effective Model

The screenshot displays the 'Project Information' form in the DNR Unity system. The browser address bar shows 'dowunity.dnr.in.gov'. The left sidebar lists various system categories, with 'Hydro Model' selected. The form includes the following fields and options:

- Search:** A search bar with a 'Sequence' dropdown and 'Search' and 'Advanced' buttons.
- Navigation:** 'Add', 'Edit', 'Retire', 'Previous', and 'Next' buttons.
- Menu:** A dropdown menu with options: Administrative Information, Attachments, Concurrence, Directive & Hold (0), Contacts, Deficiency (0), DNR Action, Floodplain Information, Inspections (0), Journal, References, Reports, Reviews, Site Location, Spatial Query, and Status.
- Form Fields:**
 - Type:** ATS (dropdown)
 - Subtype:** FW (dropdown)
 - Sequence:** 25492 (text input)
 - Amendment:** 0 (text input)
 - Folder ID:** (text input)
 - Project Type (2):** Channel- realignment, Culvert - replacement (text input)
 - Description Narrative:** The existing twin 54" by 62" long CMP culverts will be replaced with a new 20' span by 6' rise by 115' long concrete culvert. The approach roads will be widened from approximately 34' to 58' and raised 1.5' to 3.0' to construction of the east roundabout and to eliminate road overflow. The new culvert will be installed on the existing culvert system. The new culvert will have a skewed wing wall at the downstream end on the left to the roadbed. As part of the project, new roundabouts will be constructed at the intersections of Shelborne and at North Augusta Drive at West 96th Street. The east roundabout will result in the realignment of approximately private road south of the intersection of 96th Street and Shelborne Road. The channel will be modified to have 5:1 side slopes and the channel profile will have a continuous smooth slope from a point approximately 13' upstream of the culvert to a point approximately 30' downstream of the culvert. At that point, the channel modification will be to correct channel geometry. Details of the project are contained in information received electronically at the Division of Water on September 25, 2009 and in plans and information received at the Division of Water on September 25, 2009, October 7, 2009, and October 14, 2009.
 - Model Submitted
 - Federally Funded
 - County Draw
 - Below OHWM
 - After The Fact
 - SEA-SE Completed
- Buttons:** 'Send Acknowledgement' at the bottom.

Create the Corrected Effective Model

The screenshot shows a web browser window with the URL `dowunity.dnr.in.gov`. A modal window titled "Global Document Management" is overlaid on the page, containing a "Loading, please wait..." message and a green progress bar. Below the progress bar are "Add" and "Close" buttons. The background application interface includes a sidebar with navigation options such as "Regulatory", "Application Tracking System", "Floodplain Tracking System", "Correspondence Tracking System", "Violation Tracking System", "Senate Enroll Act", "INFIIP - eFARA", "Permit eApplication", "Search", "Groundwater", "Floodplain & Hydrology", "Project Development", "Dams", and "Hydro Model". The main content area displays a form with the following fields:

- Type:
- Subtype:
- Sequence:
- Amendment:
- Received Date:

Project Type (2):

Description Narrative:

The existing twin 54" by 62" long CMP culverts will be replaced with a new 20' span by 6' rise by 115' long three-sided reinforced concrete culvert. The approach roads will be widened from approximately 34' to 58' and raised 1.5' to 3.0' to accommodate the construction of the east roundabout and to eliminate road overflow. The new culvert will be installed on the same alignment as the existing culvert system. The new culvert will have a skewed wing wall at the downstream end on the left to stabilize the soil and hold the roadbed. As part of the project, new roundabouts will be constructed at the intersections of Shelborne Road at West 96th Street and at North Augusta Drive at West 96th Street. The east roundabout will result in the realignment of approximately 250' of an existing private road south of the intersection of 96th Street and Shelborne Road. The channel will be modified to have a 5' wide bottom with 5:1 side slopes and the channel profile will have a continuous smooth slope from a point approximately 13' above the mouth of the culvert to a point approximately 30' downstream of the culvert. At that point, the channel modification will be blended into the natural channel geometry. Details of the project are contained in information received electronically at the Division of Water on September 21, 2009 and in plans and information received at the Division of Water on September 25, 2009, October 7, 2009, October 9, 2009,

Model Submitted Federally Funded County Drainage Board Project
 Below OHWM After The Fact

SEA-SE Completed

Send Acknowledgement

Waterbody Information

Create the Corrected Effective Model

Global Document Management


File Name	Date Submitted	Image Types	Image Group	Date Uploaded	Email	Deliberative	Download
CertificateOfApproval.pdf	07/09/2019	DNR Action	Image group not found.	07/09/2019	<input type="checkbox"/>	<input type="checkbox"/>	Download
FW-29772_DNR_FloodplainMap.pdf	07/09/2019	Floodplain Map	Image group not found.	07/09/2019	<input type="checkbox"/>	<input type="checkbox"/>	Download
FW-29772_tech_review.pdf	06/26/2019	Final Technical Review Documentation	Image group not found.	06/26/2019	<input type="checkbox"/>	<input type="checkbox"/>	Download
FW29772.pdf	07/15/2019		Closed File Scan	07/15/2019	<input type="checkbox"/>	<input type="checkbox"/>	Download

Buttons: Add, Close



Background Form Fields:

- equipment will be used to place the riprap in the dry.
- Model Submitted
- Federally Funded
- County Drainage Board Project
- Below OHWM
- After The Fact
- SEA-SE Completed
- Send Acknowledgement
- Waterbody Information

Create the Corrected Effective Model



**BRIDGE NON-MODELING WORKSHEET
COMPANION WORKSHEET B**
State Form 6224 (R 1 19-17)

For Division of Water use: Application Number FW-29772

An assessment using the Bridge Non-Modeling Worksheet is appropriate to use for a bridge replacement-in-kind (R-I-K), bridge widening, pier wrap, or scour repair project for roadway, railroad, pedestrian, golf cart, or private access structures. This non-modeling approach may be applicable to assess a bridge replacement project where the flow regime is not changing.

Enter data in sequence as directed by the Instructions in the blue box below to adequately evaluate the project under a non-modeling assessment approach. Always start with a blank worksheet and complete from the top down so that projects are evaluated correctly.

Boxes marked with a red top right corner contain useful information for completing this form.

Step 1: Preliminary Questions
Answer the following questions to determine if your project is eligible to use this worksheet.

Instructions
Continue on to step 2

	Response
What type of project is being evaluated?	R-I-K
Is the project a new stream crossing structure with the existing structure to remain in its current location?	No
Is a bridge structure being replaced with a culvert?	No
Is the location of the proposed structure more than 500' from the location of the existing structure?	No

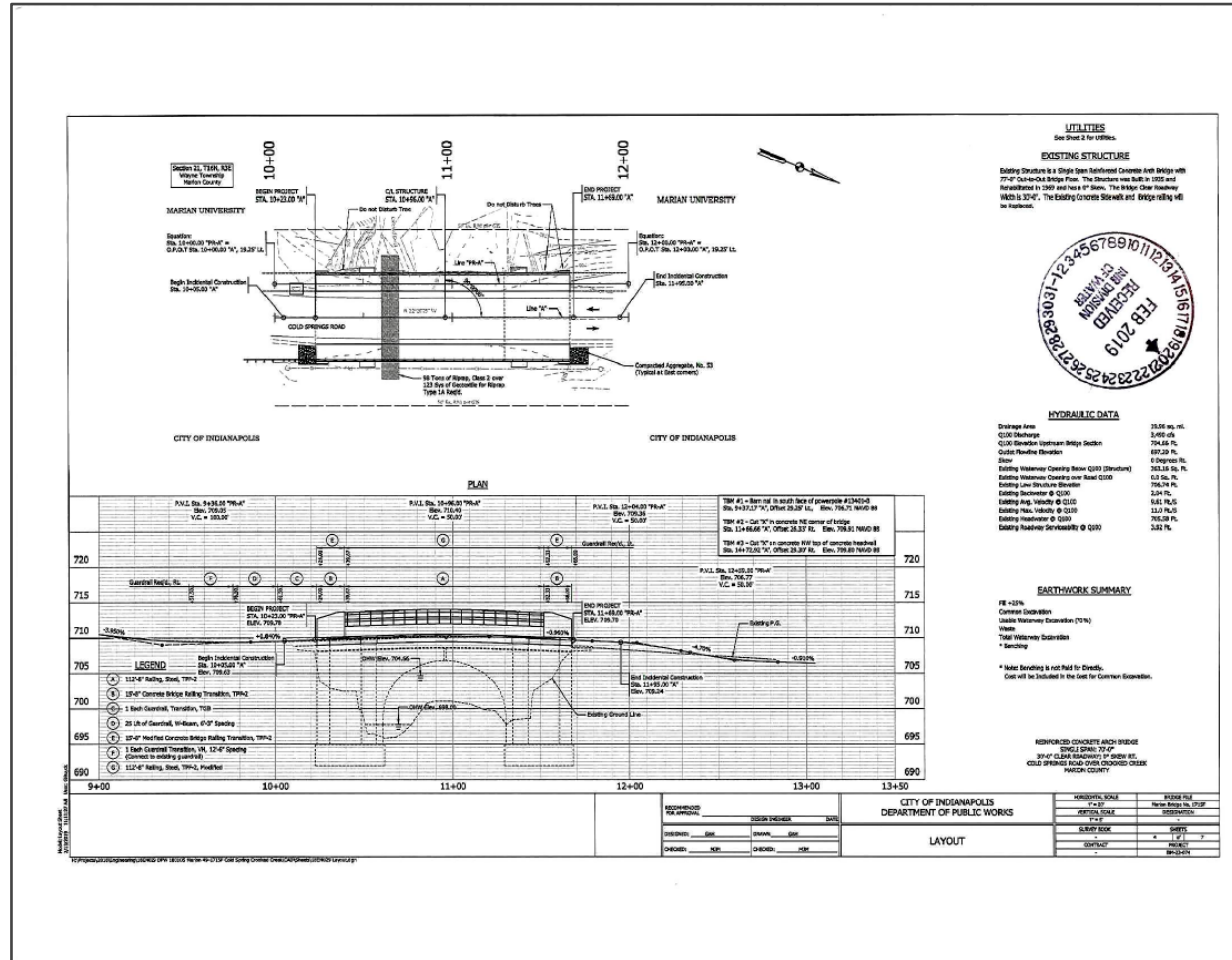
Step 2: Describe Project
Provide the information requested to describe your project. Not all information will be needed to evaluate your project. If multiple design options are being considered for any of the above replacement-in-kind proposals, the proposed design with the smallest waterway opening value should be used in completing this worksheet.

Instructions
Continue on to Step 3

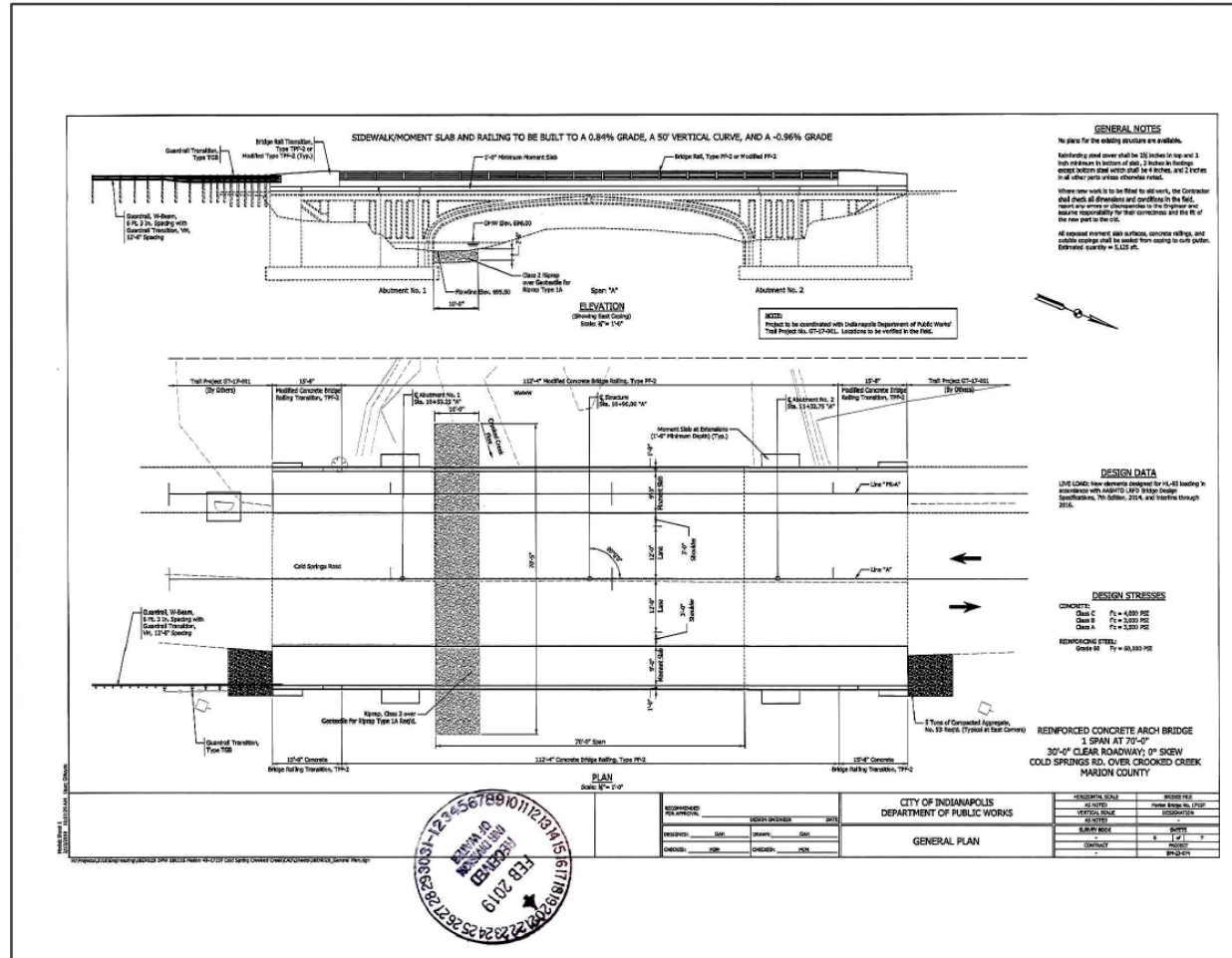
Pier Wrap Width and Number of Piers	Pier Wrap Thickness 0 in	Number of Piers 0
Increase in Structure Width (Along stream profile)	Upstream Extension 0 ft	Downstream Extension 0 ft
	Pre-Eroded Cross Sectional Area 0 sq ft	Proposed Cross Sectional Area 0 sq ft
Low Structure Elevation and datum	Existing Structure 706.74 ft, NAVD88 datum	Proposed Structure 706.74 ft, NAVD88 datum
	High Structure Elevation and datum 712 ft, NAVD88 datum	Proposed Structure 714 ft, NAVD88 datum
Minimum top of road elevation across entire floodplain	Existing 707.5 ft, NAVD88 datum	Proposed 707.5 ft, NAVD88 datum

Bridge Non-Modeling Worksheet Page 1 of 2

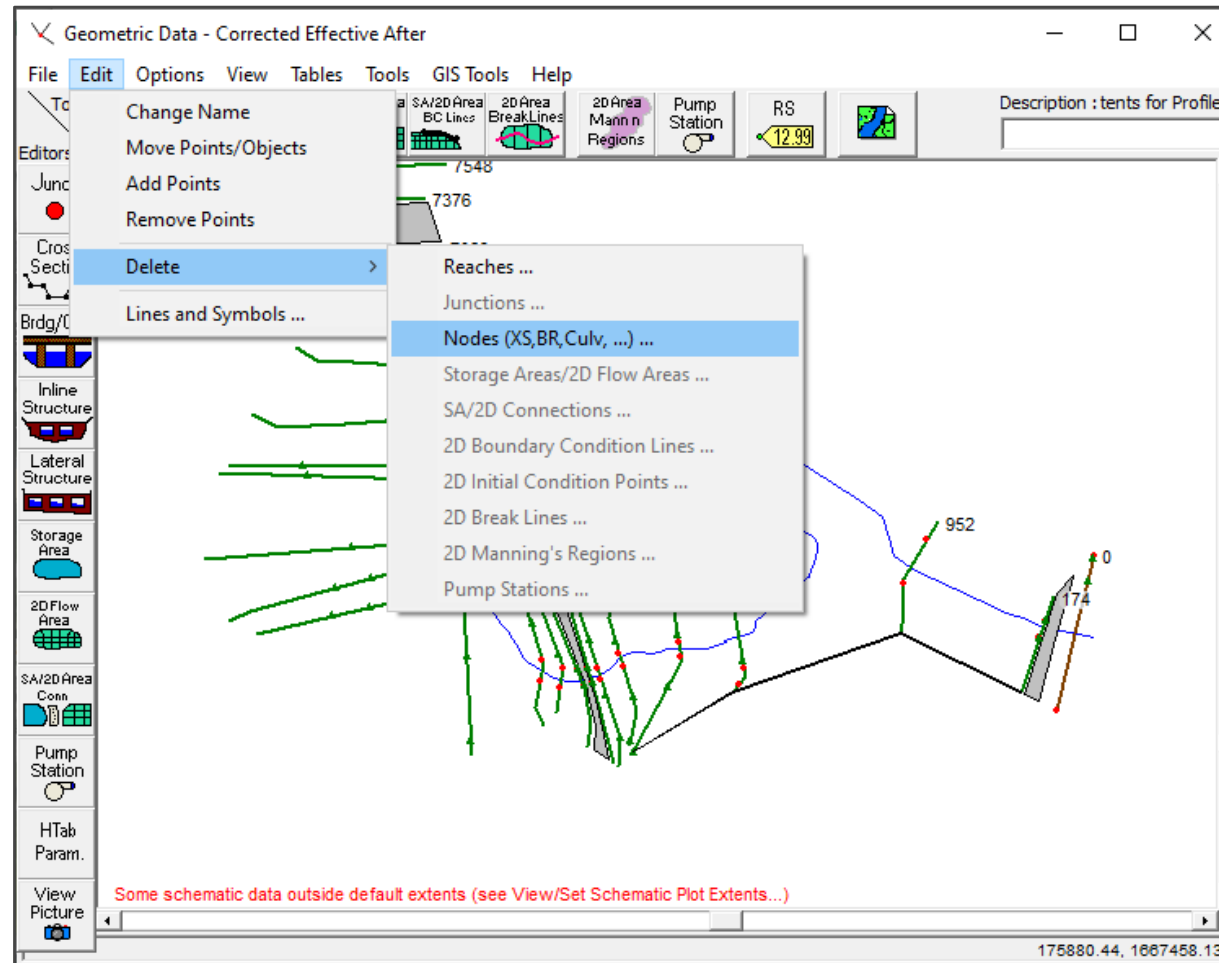
Create the Corrected Effective Model



Create the Corrected Effective Model



Create the Corrected Effective Model



Create the Corrected Effective Model

Select Nodes to Delete

Selected Locations

Node Types...

River: Crooked Creek

Reach: Marian Uni

RS:

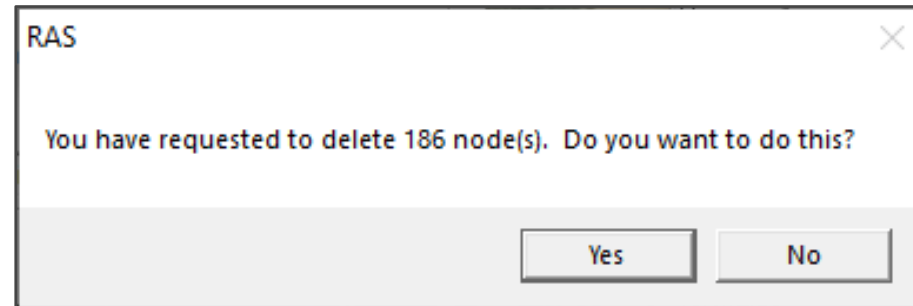
14188	
13694	
13543	
13189	
13149	BR 44th Ave
13102	
12701	
12440	
12152	
11526	
11102	
10807	
10514	
10484	BR 42nd Str
10447	
9561	
9138	
8810	
8788	BR Cooper R
8765	
8122	
7548	
7376	
7231	BR I-65

Selected Locations (186 selected)

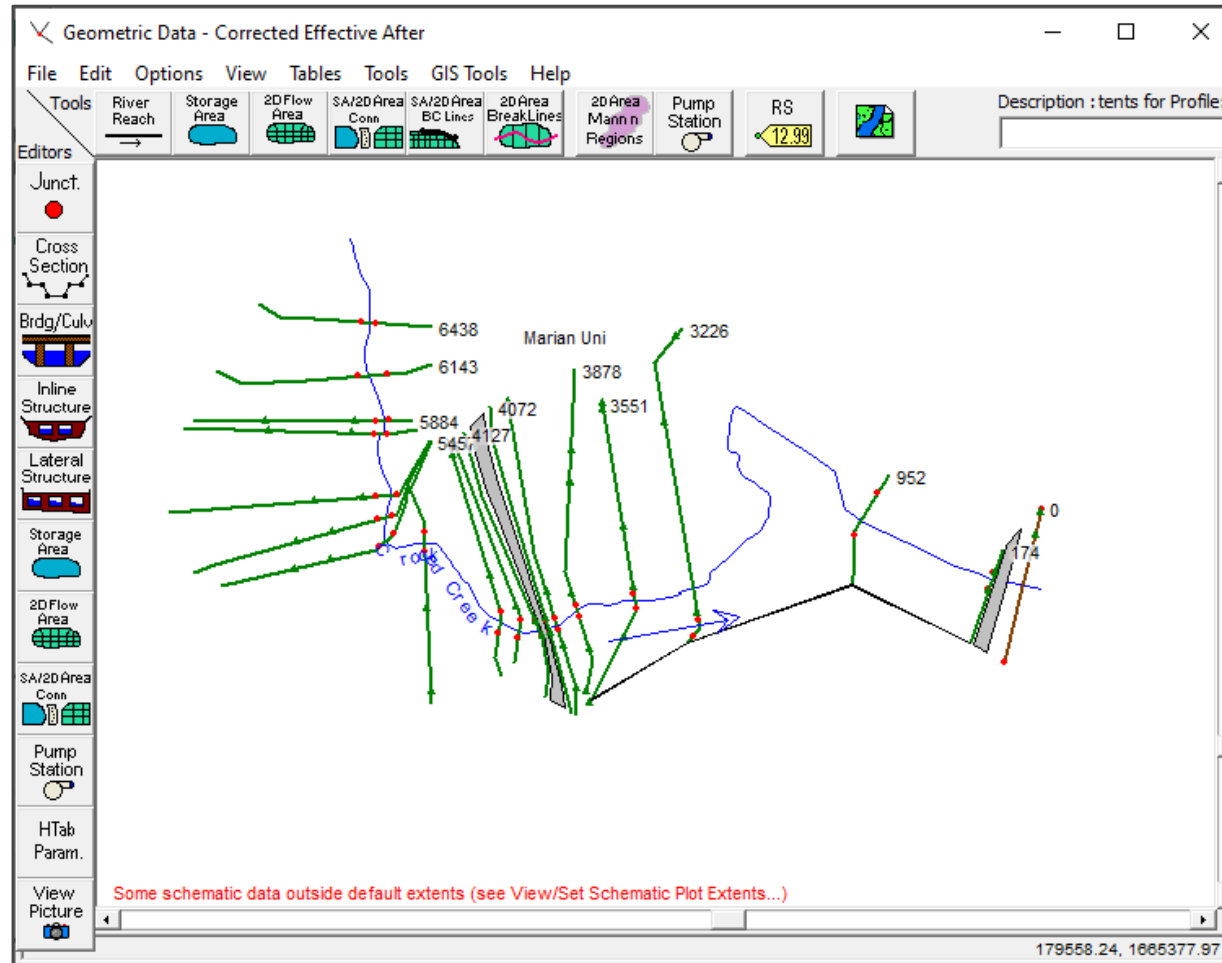
Crooked Creek	Marian Uni	68382	
Crooked Creek	Marian Uni	68234	
Crooked Creek	Marian Uni	68198	Culv 96th
Crooked Creek	Marian Uni	68162	
Crooked Creek	Marian Uni	67760	
Crooked Creek	Marian Uni	67406	
Crooked Creek	Marian Uni	67125	
Crooked Creek	Marian Uni	67000	Culv I-46
Crooked Creek	Marian Uni	66855	
Crooked Creek	Marian Uni	66511	
Crooked Creek	Marian Uni	65865	
Crooked Creek	Marian Uni	65483	
Crooked Creek	Marian Uni	64722	
Crooked Creek	Marian Uni	64198	
Crooked Creek	Marian Uni	63830	
Crooked Creek	Marian Uni	63639	
Crooked Creek	Marian Uni	63201	
Crooked Creek	Marian Uni	62552	
Crooked Creek	Marian Uni	62464	IS
Crooked Creek	Marian Uni	62408	
Crooked Creek	Marian Uni	62146	
Crooked Creek	Marian Uni	62055*	
Crooked Creek	Marian Uni	61965*	
Crooked Creek	Marian Uni	61874*	
Crooked Creek	Marian Uni	61784	
Crooked Creek	Marian Uni	61335	
Crooked Creek	Marian Uni	60960	
Crooked Creek	Marian Uni	60464	
Crooked Creek	Marian Uni	60399	BR 86th S

Clear Selected List OK Cancel

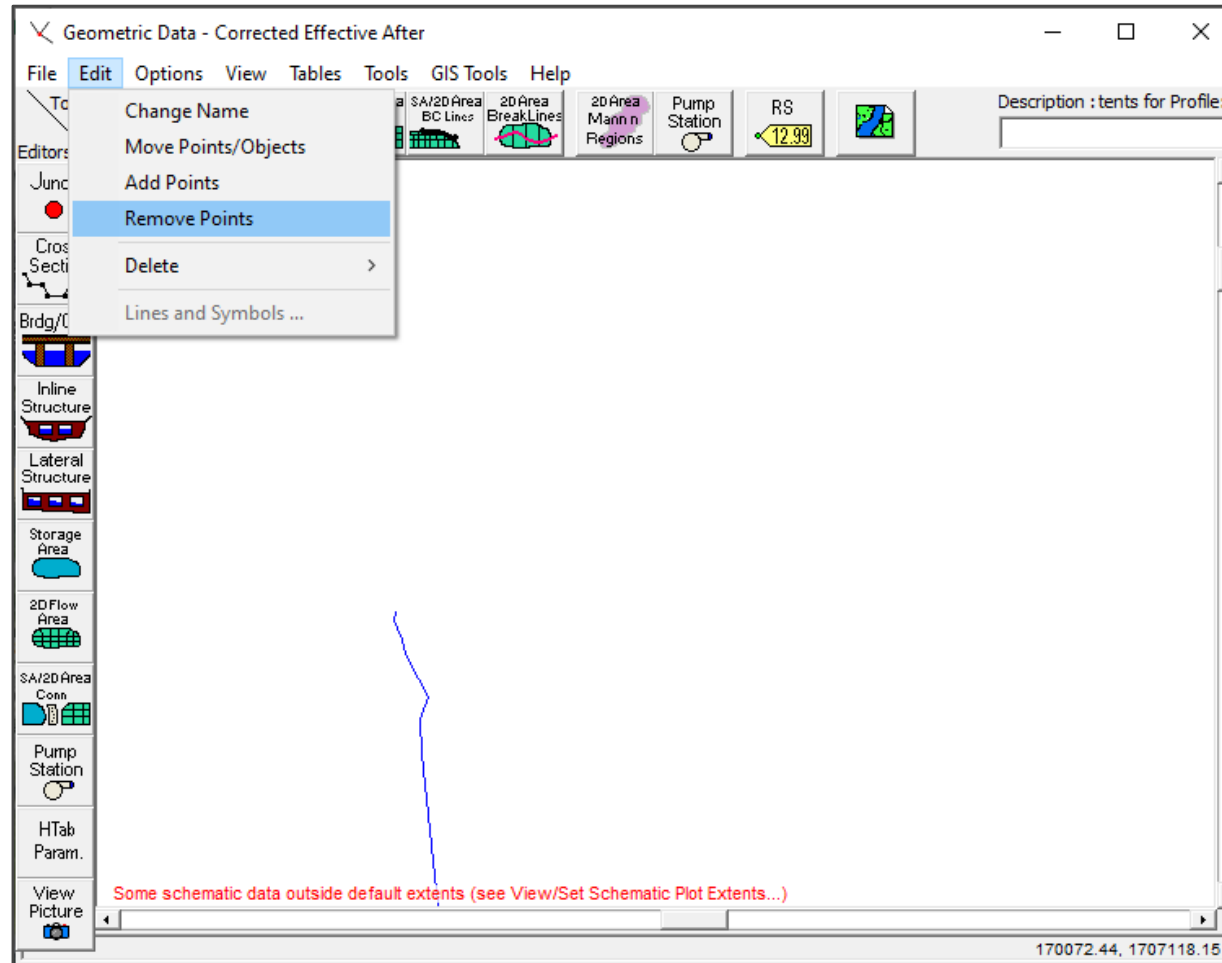
Create the Corrected Effective Model



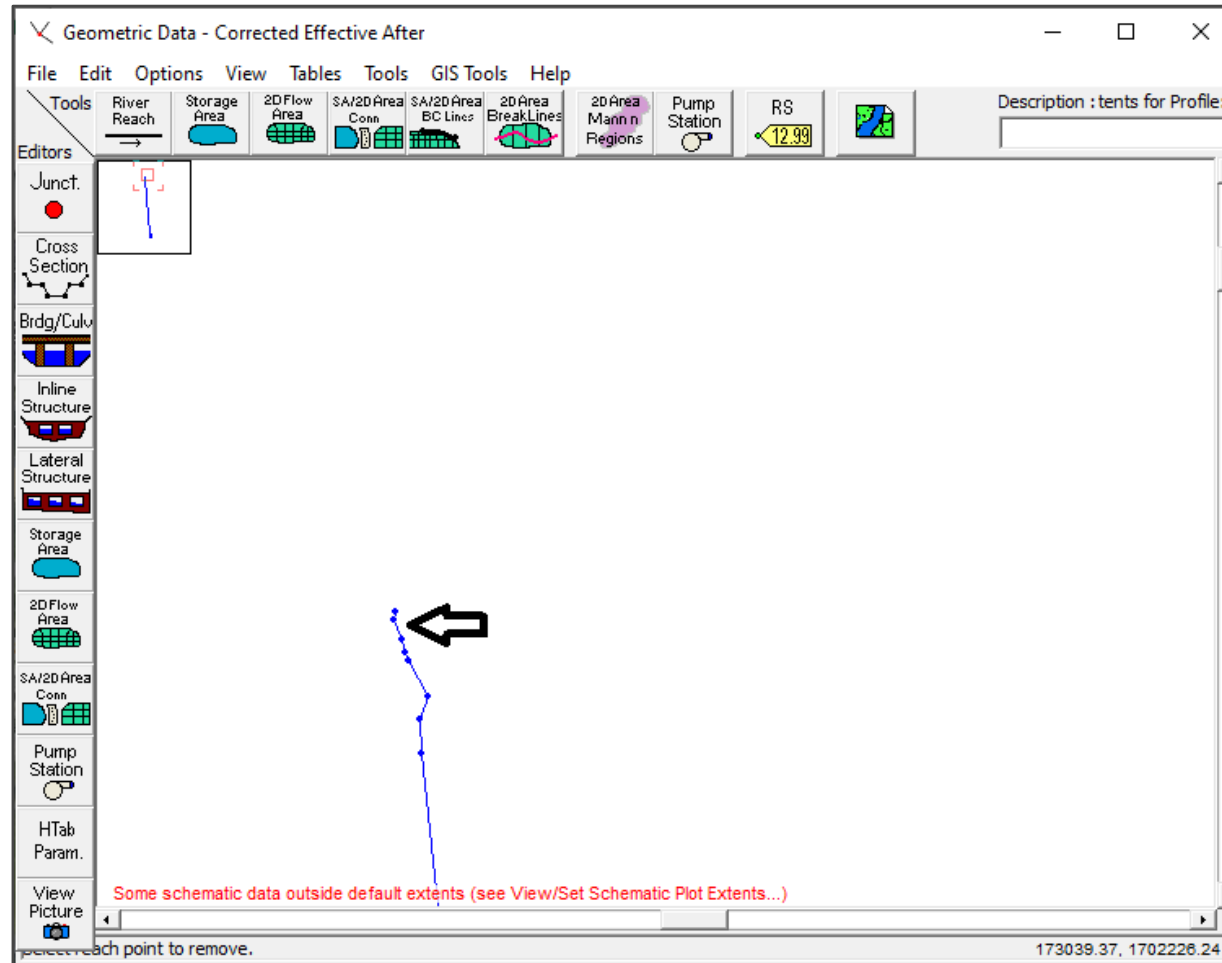
Create the Corrected Effective Model



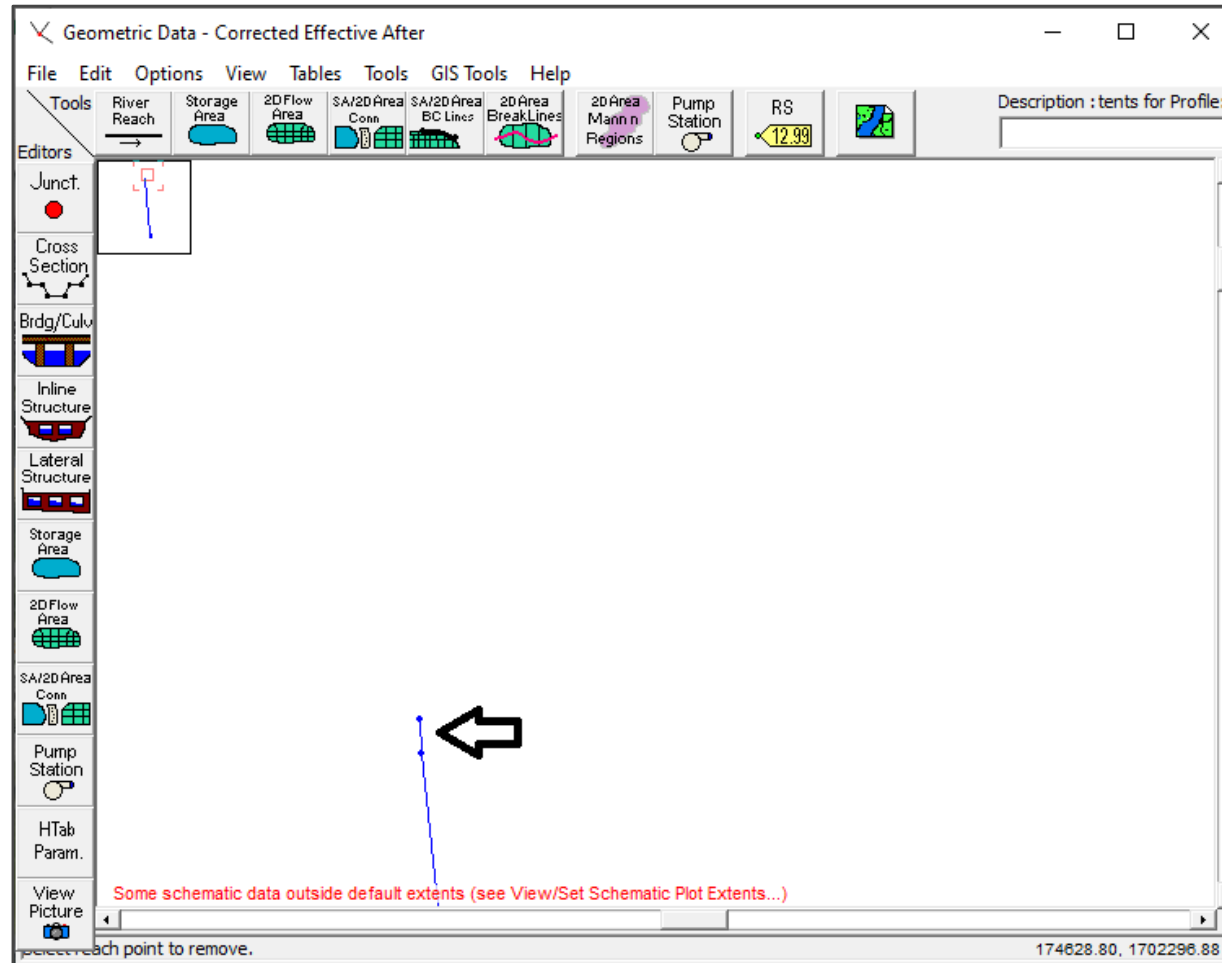
Create the Corrected Effective Model



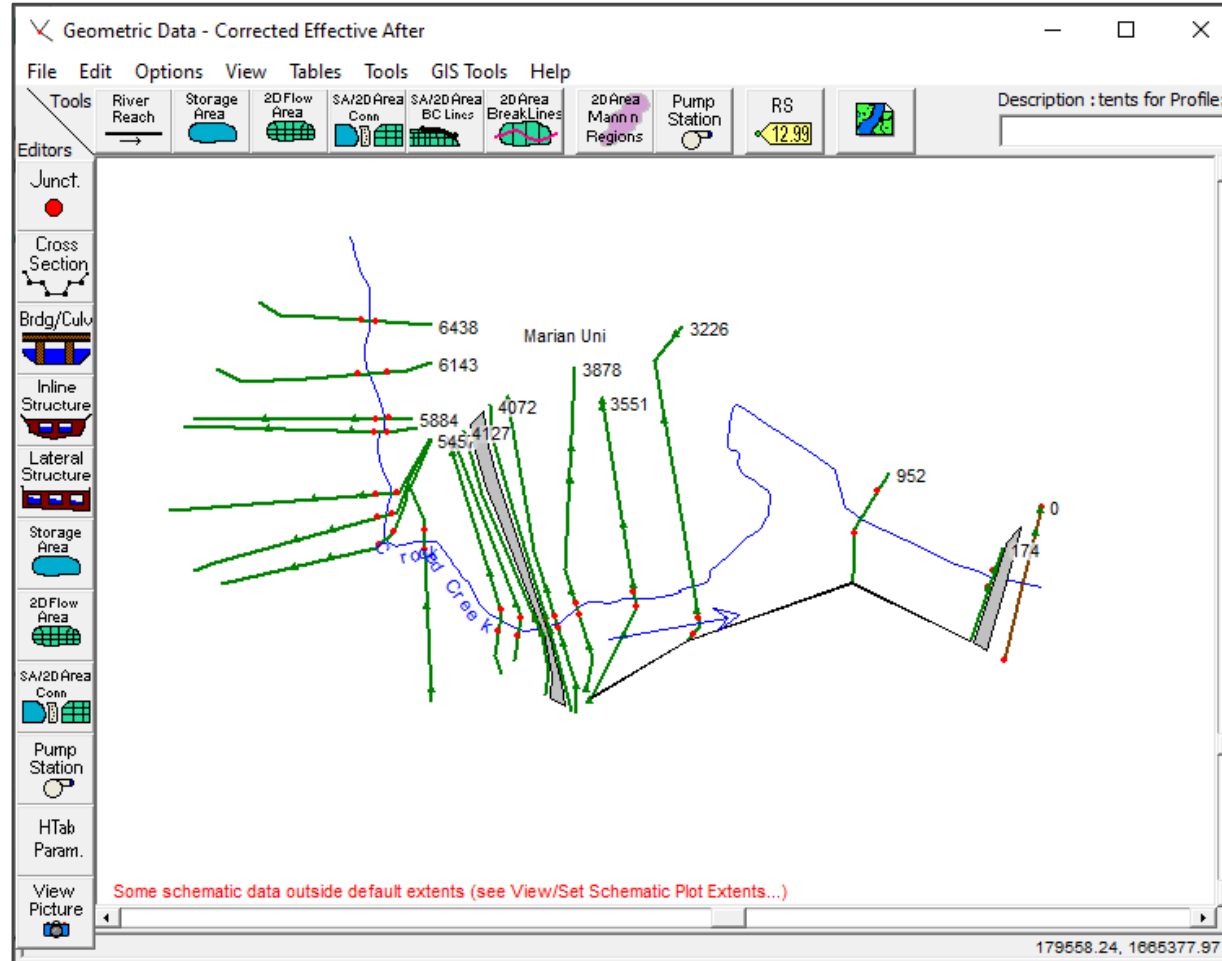
Create the Corrected Effective Model



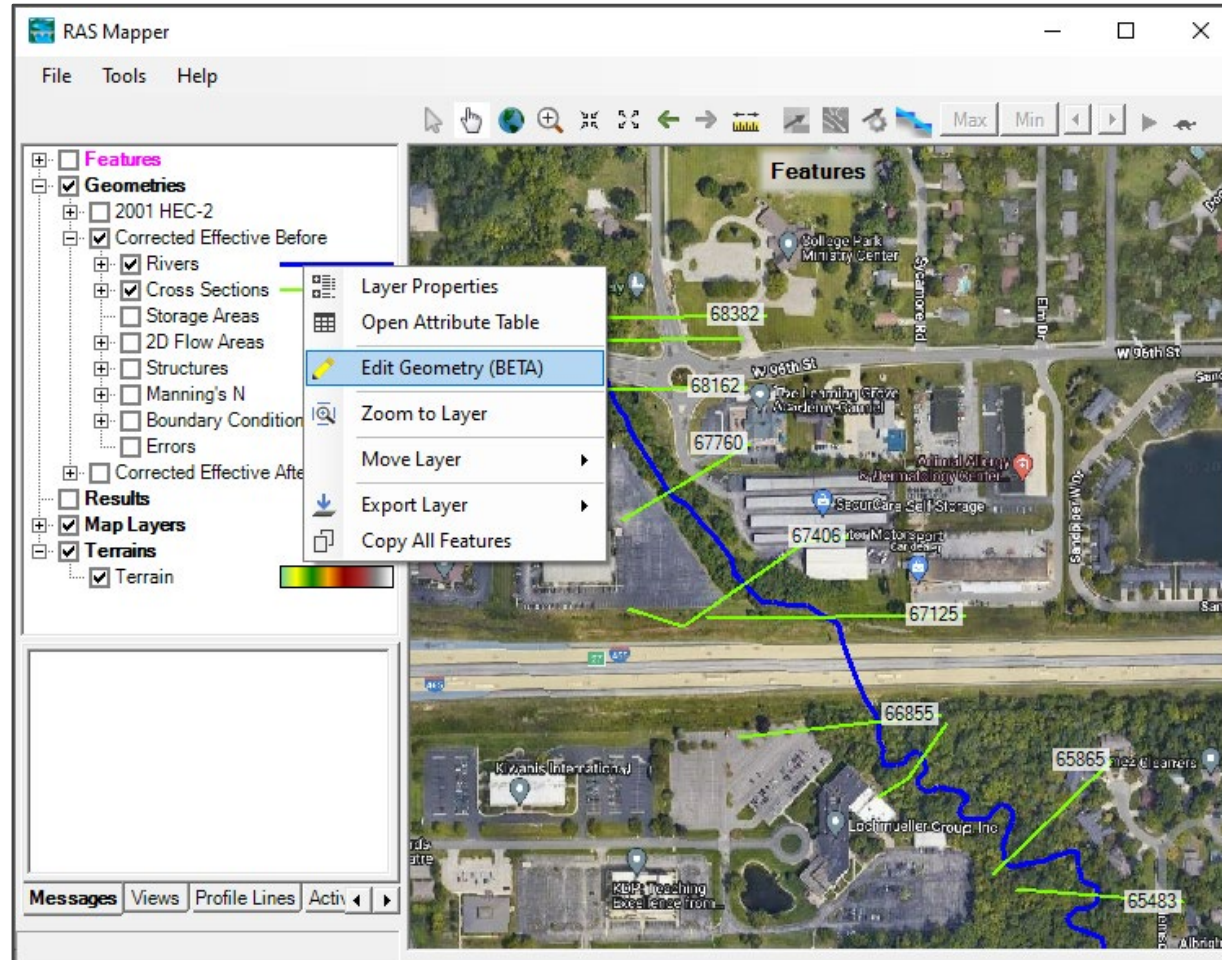
Create the Corrected Effective Model



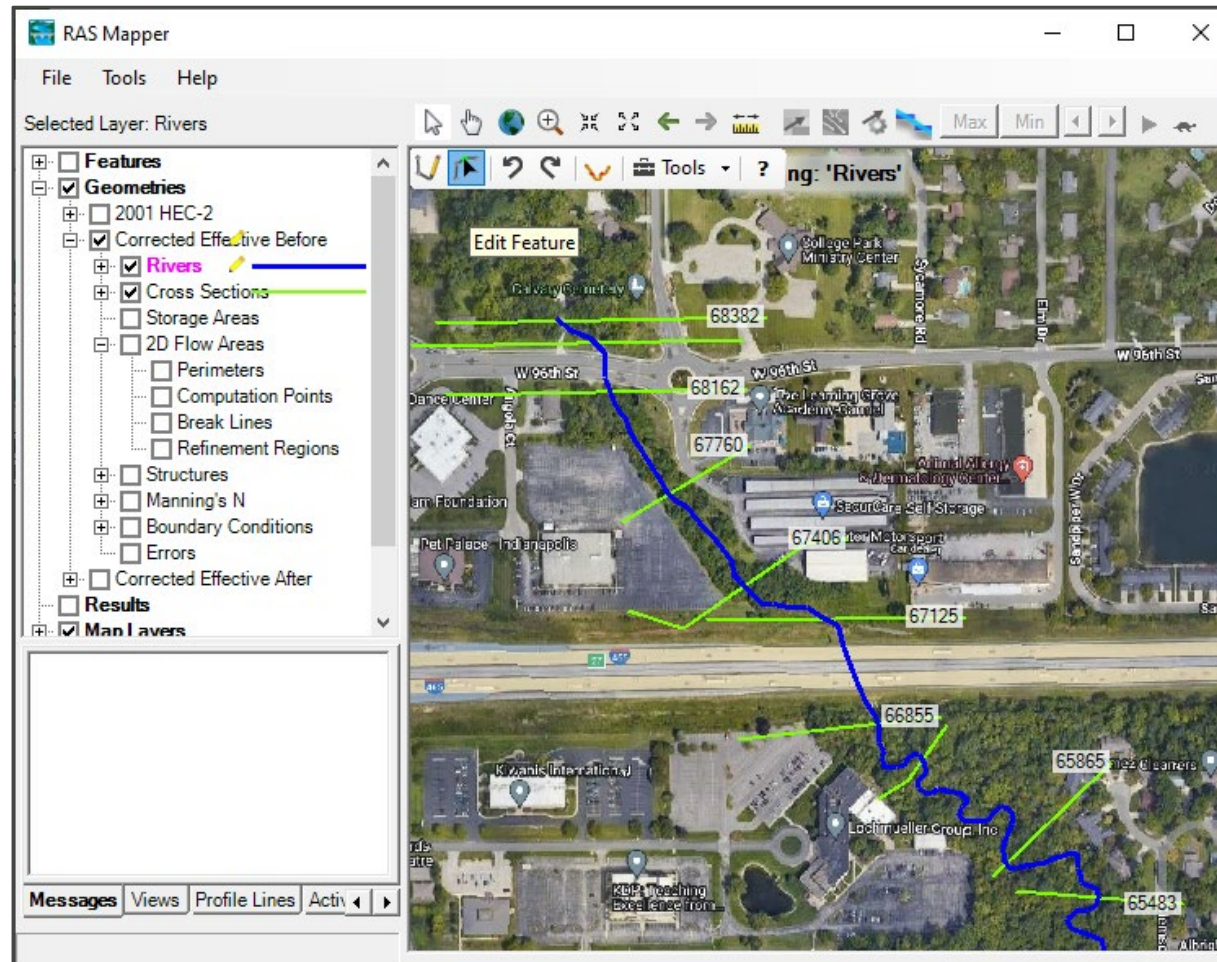
Create the Corrected Effective Model



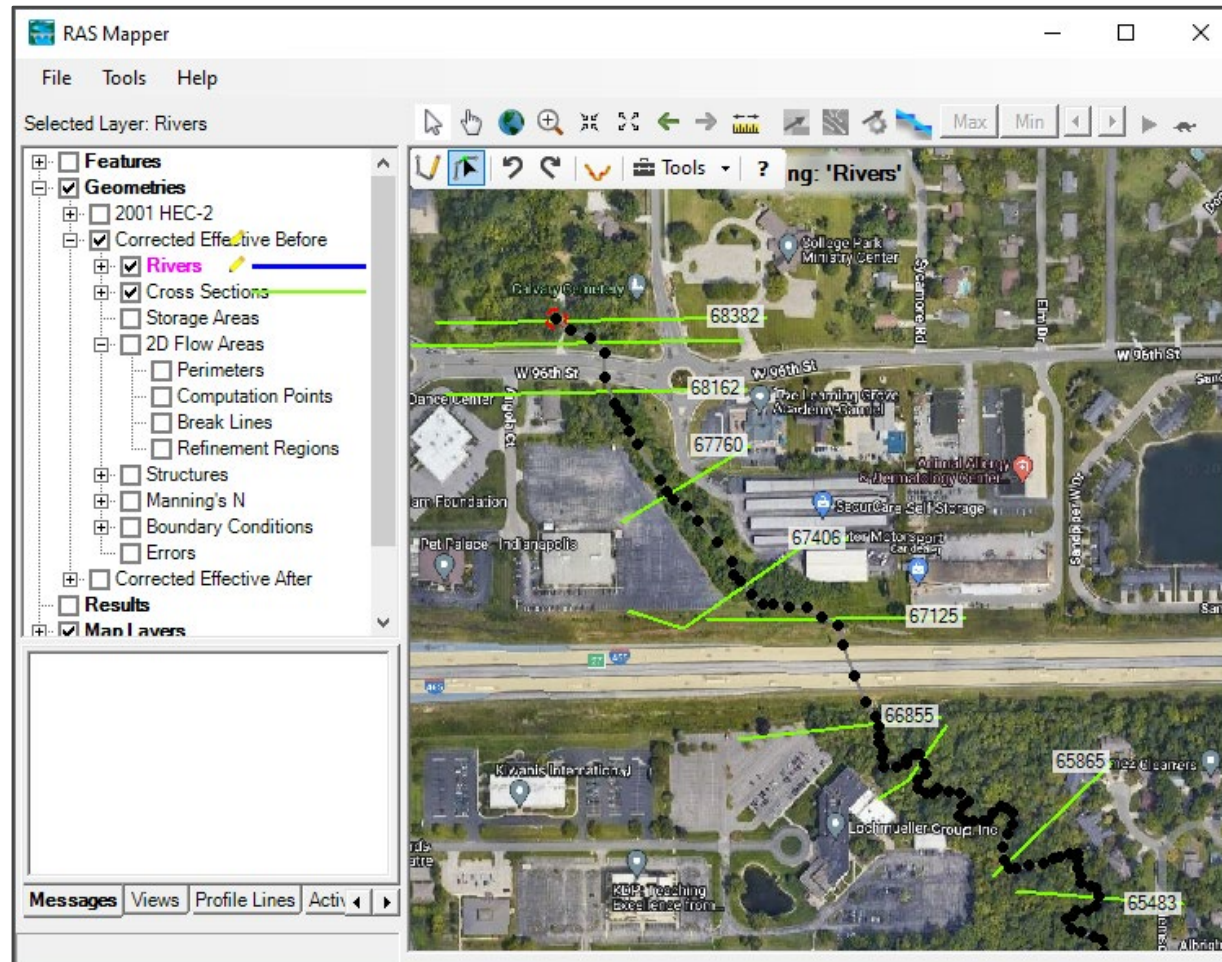
Create the Corrected Effective Model



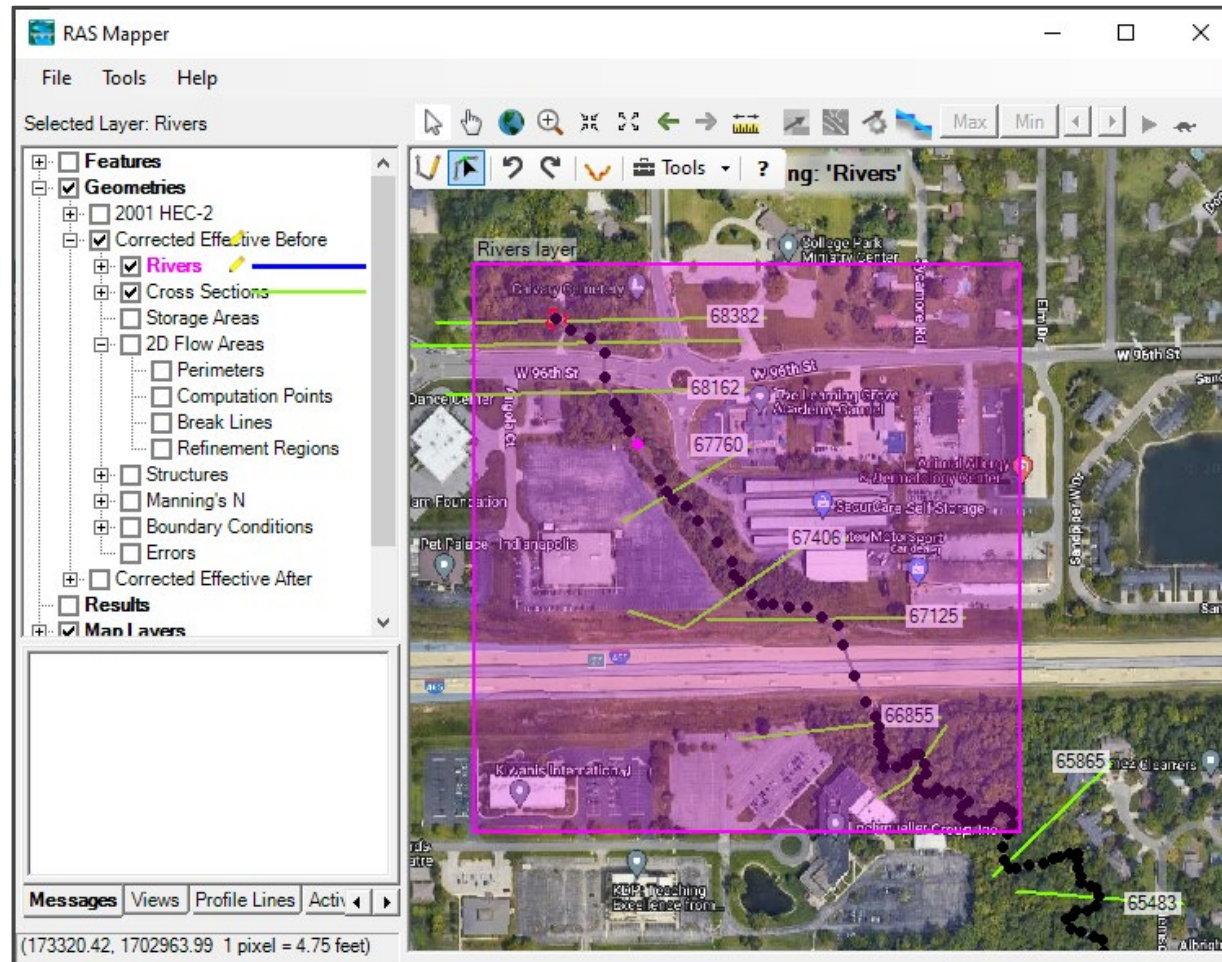
Create the Corrected Effective Model



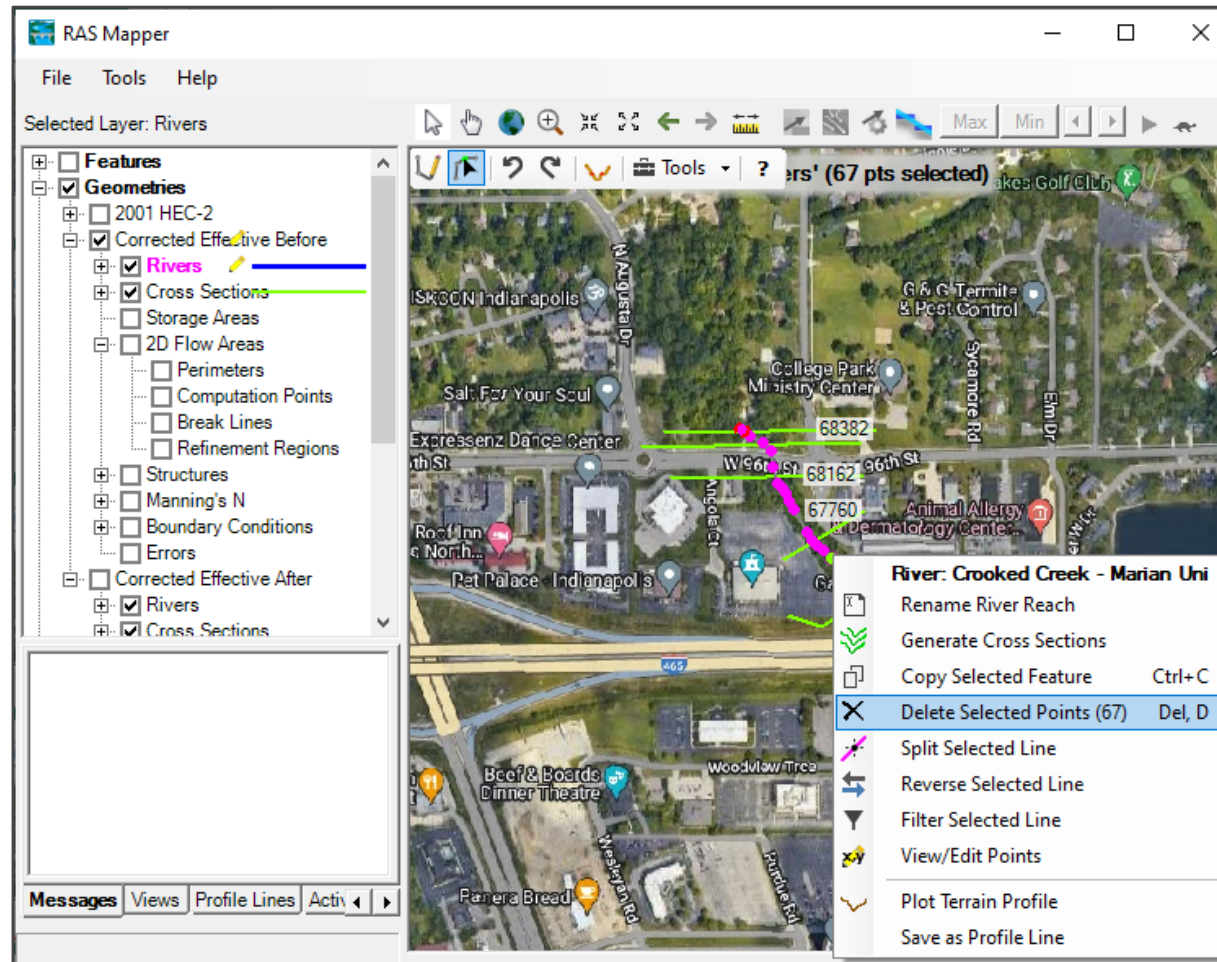
Create the Corrected Effective Model



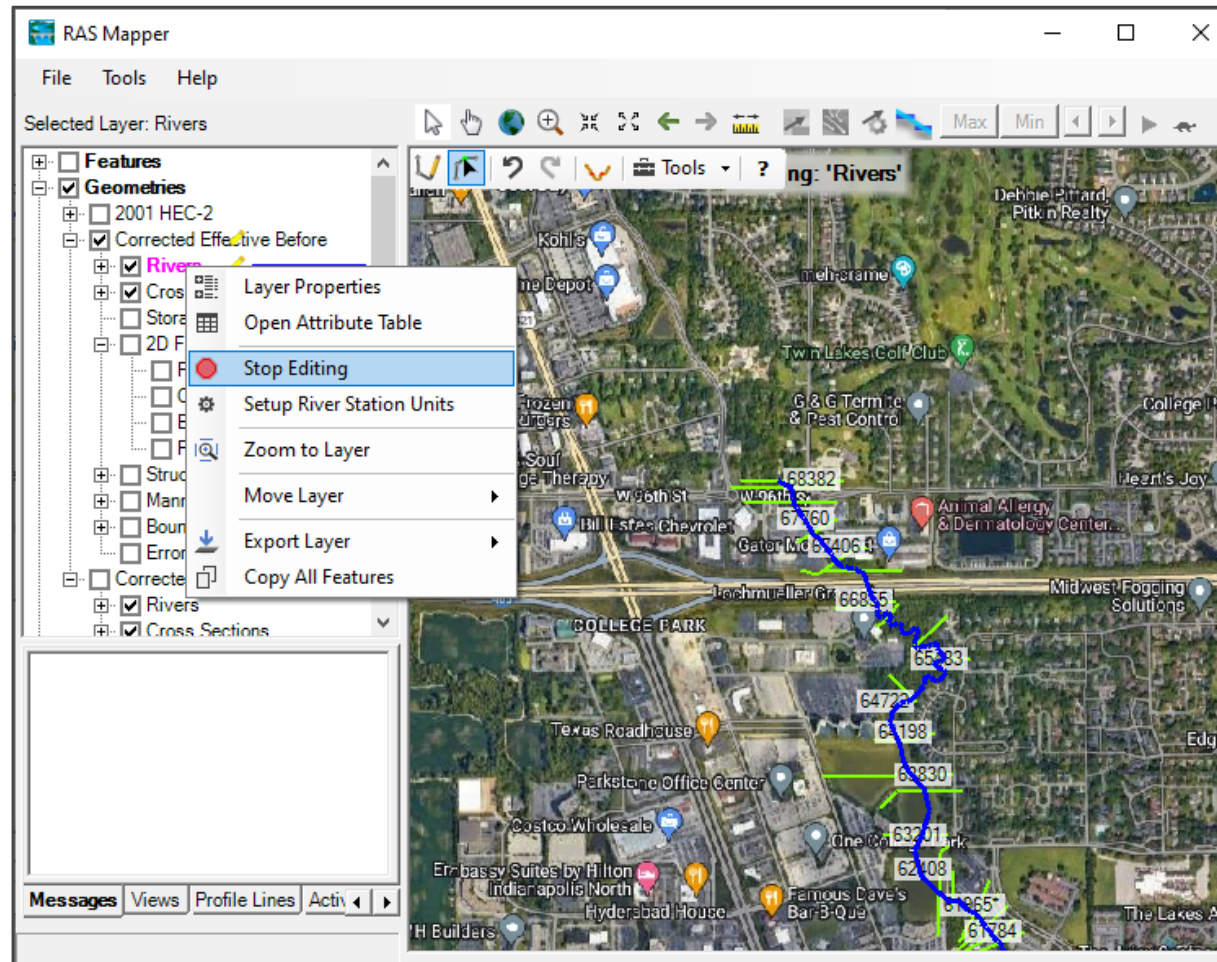
Create the Corrected Effective Model



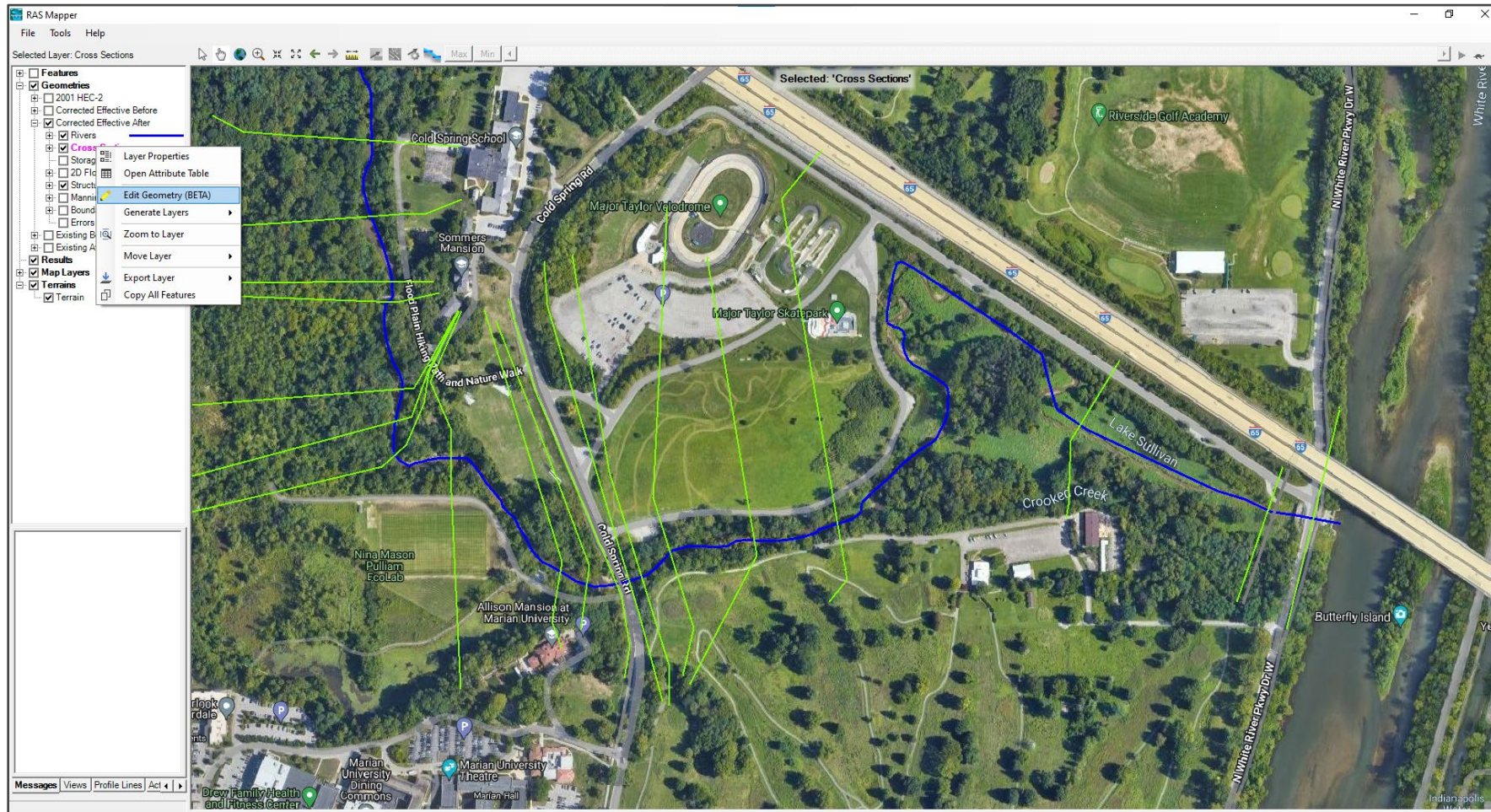
Create the Corrected Effective Model



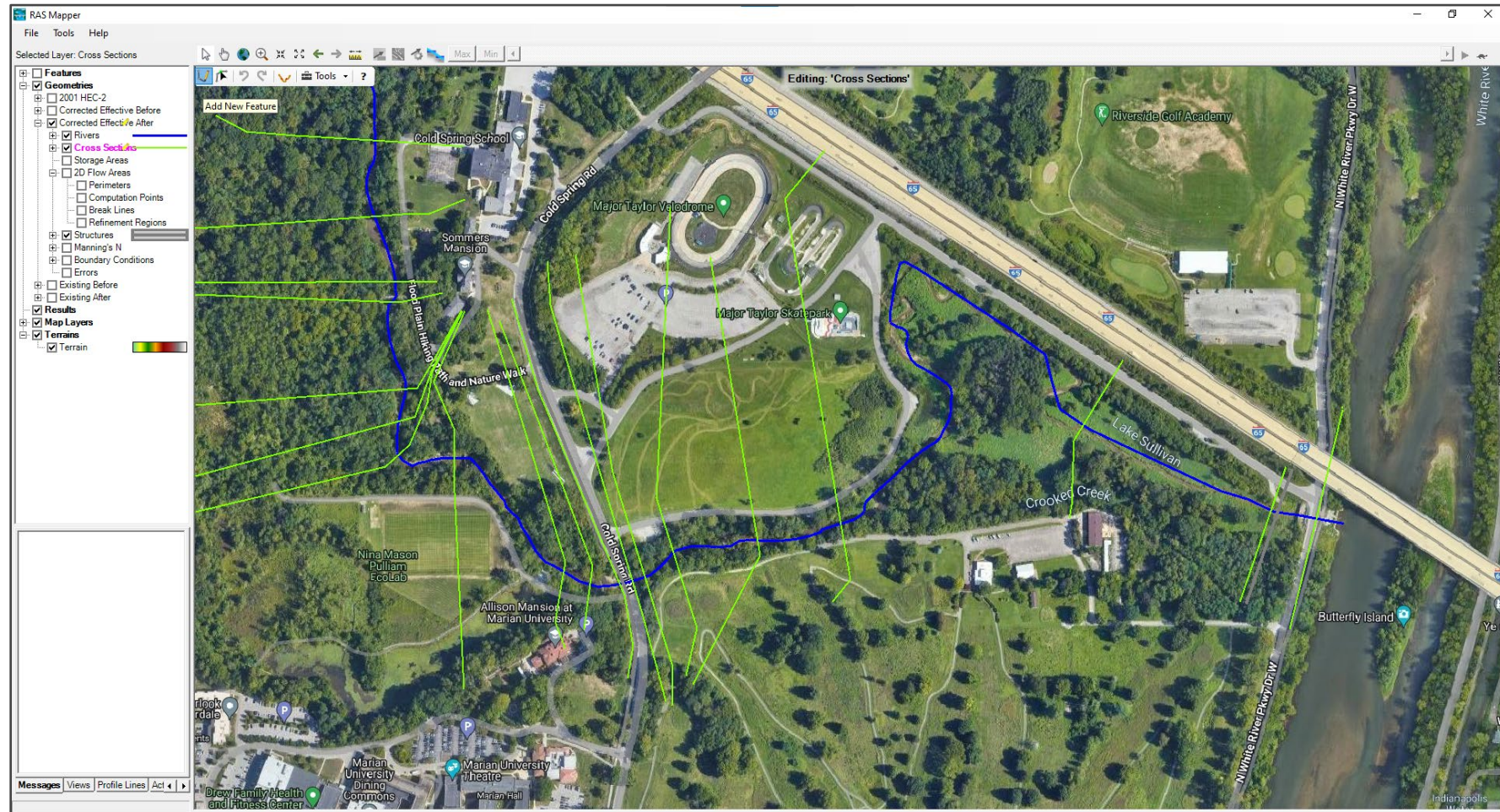
Create the Corrected Effective Model



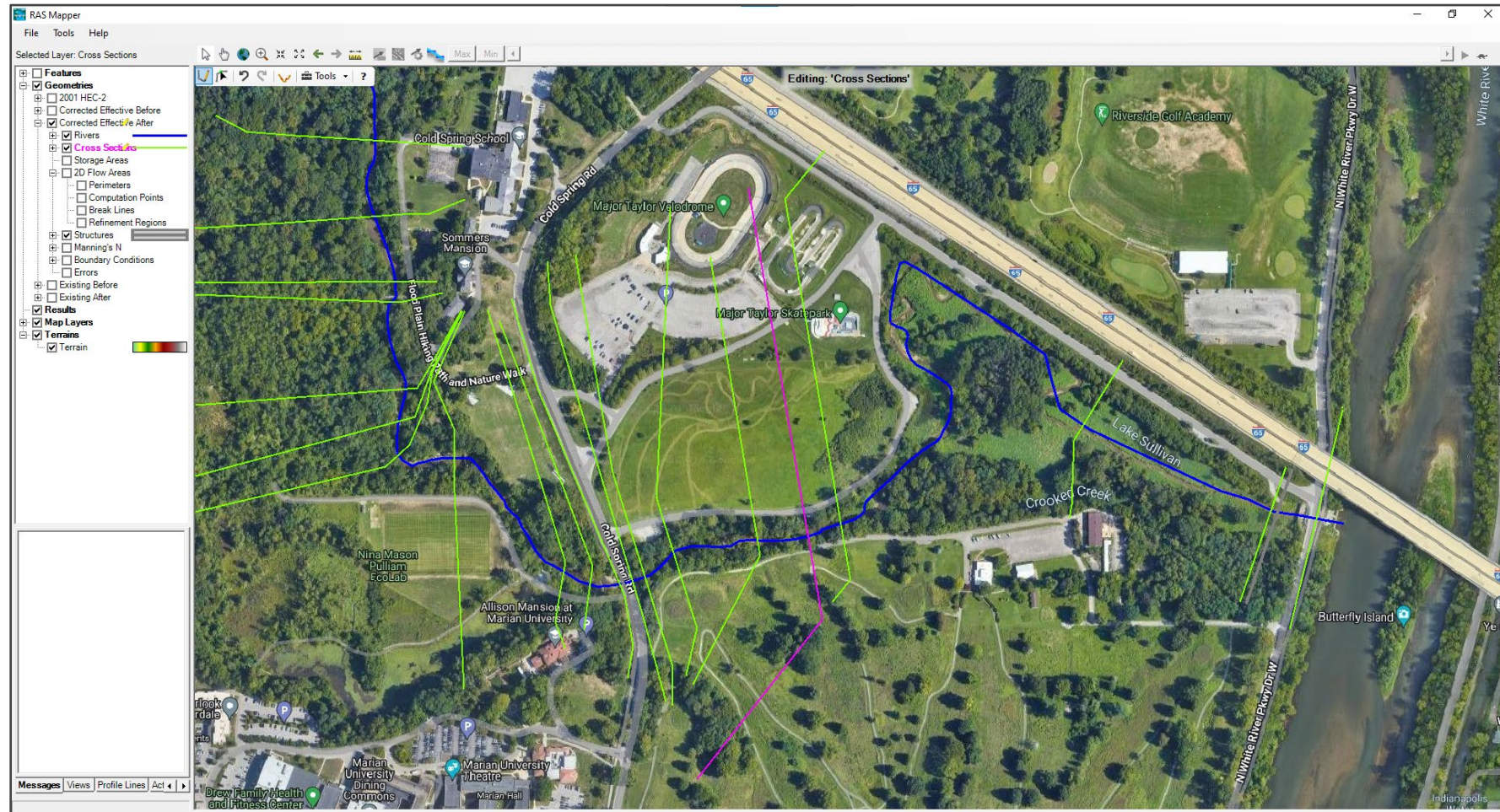
Create the Corrected Effective Model



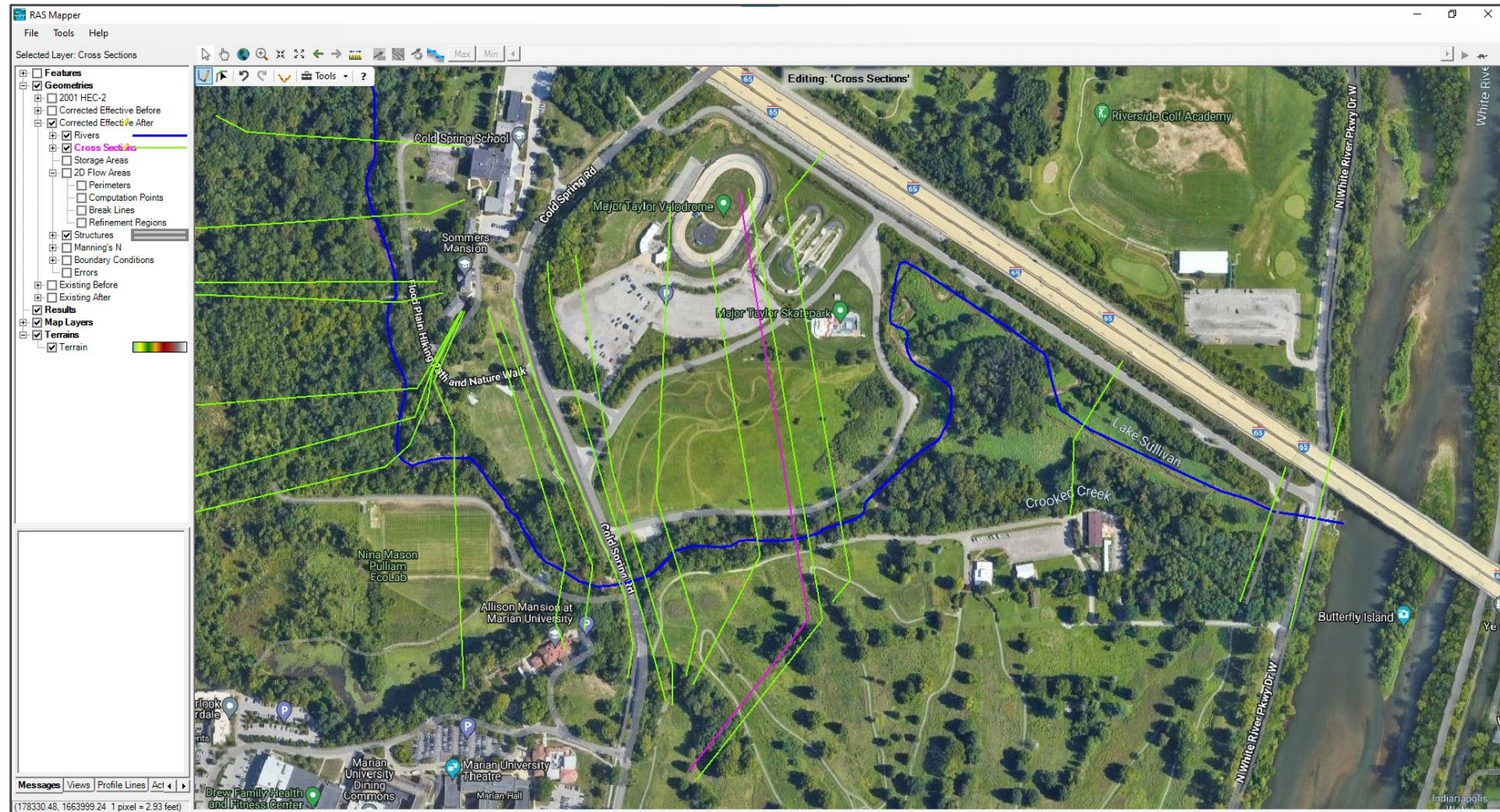
Create the Corrected Effective Model



Create the Corrected Effective Model



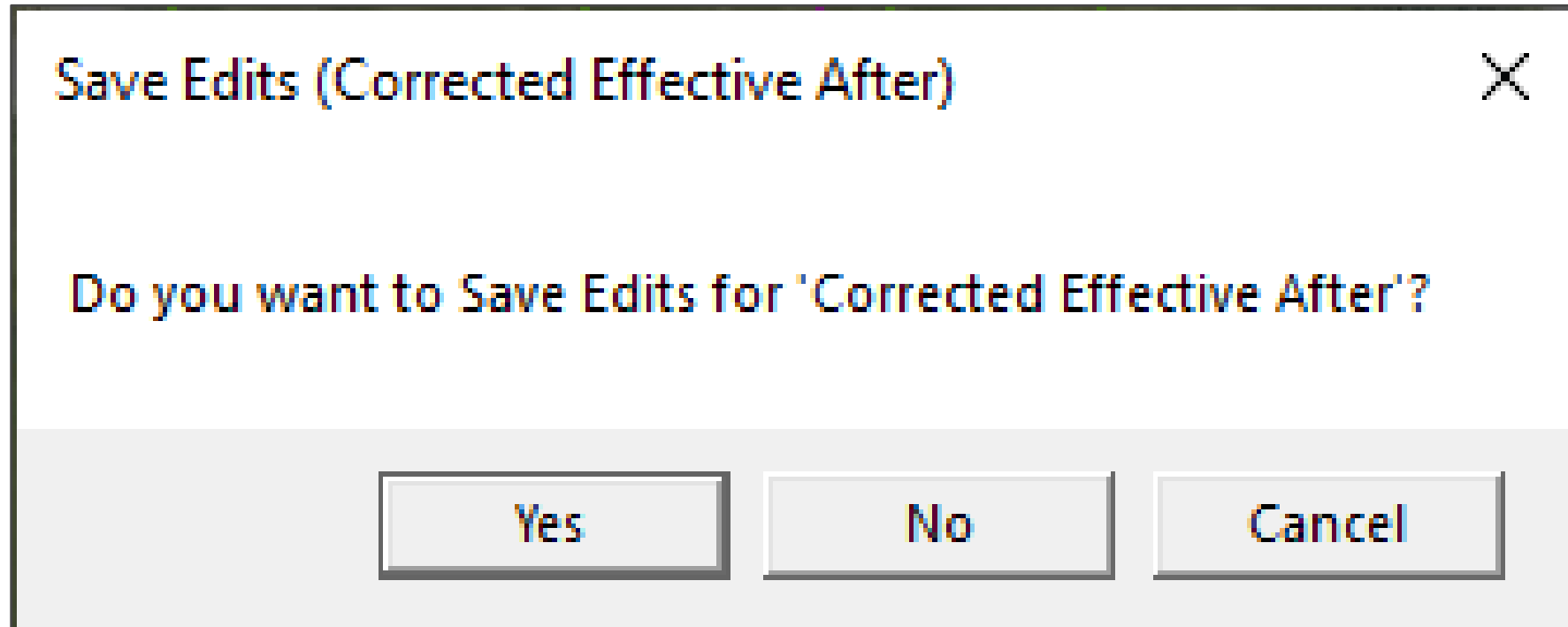
Create the Corrected Effective Model



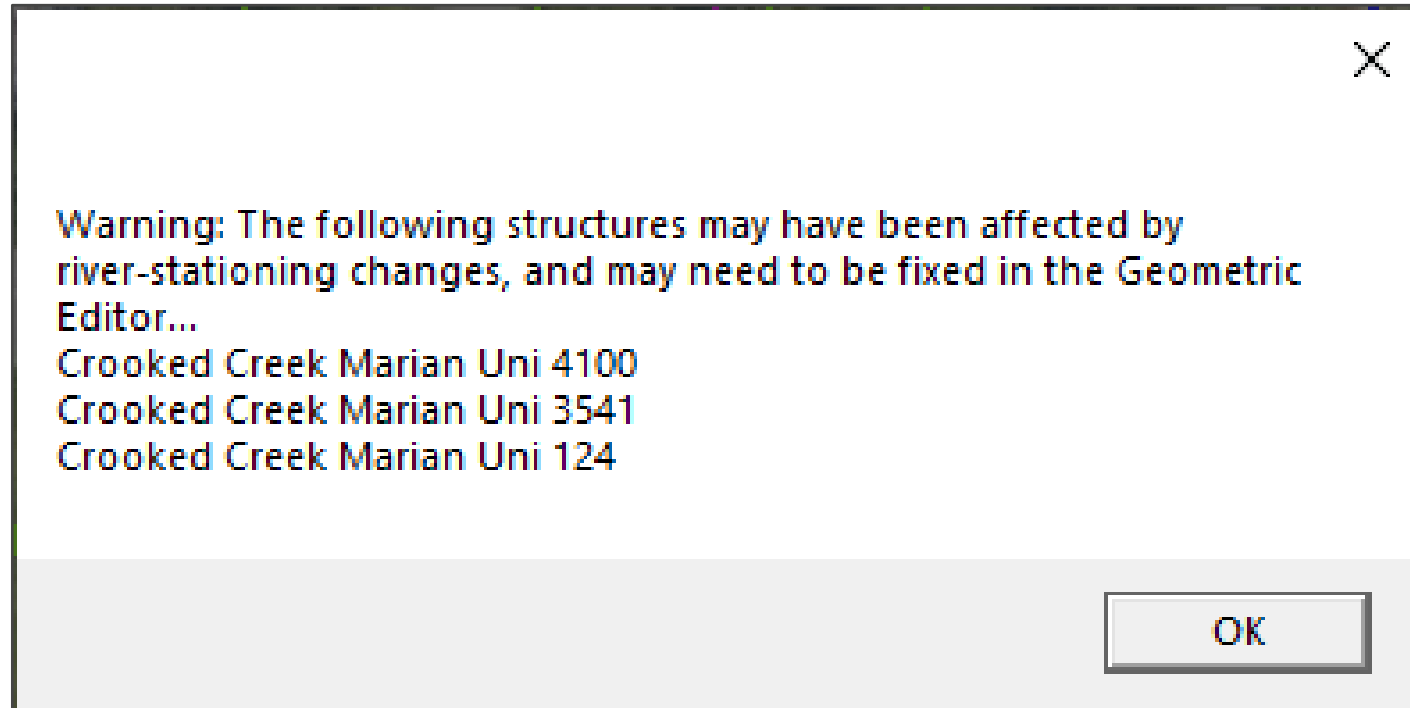
Create the Corrected Effective Model



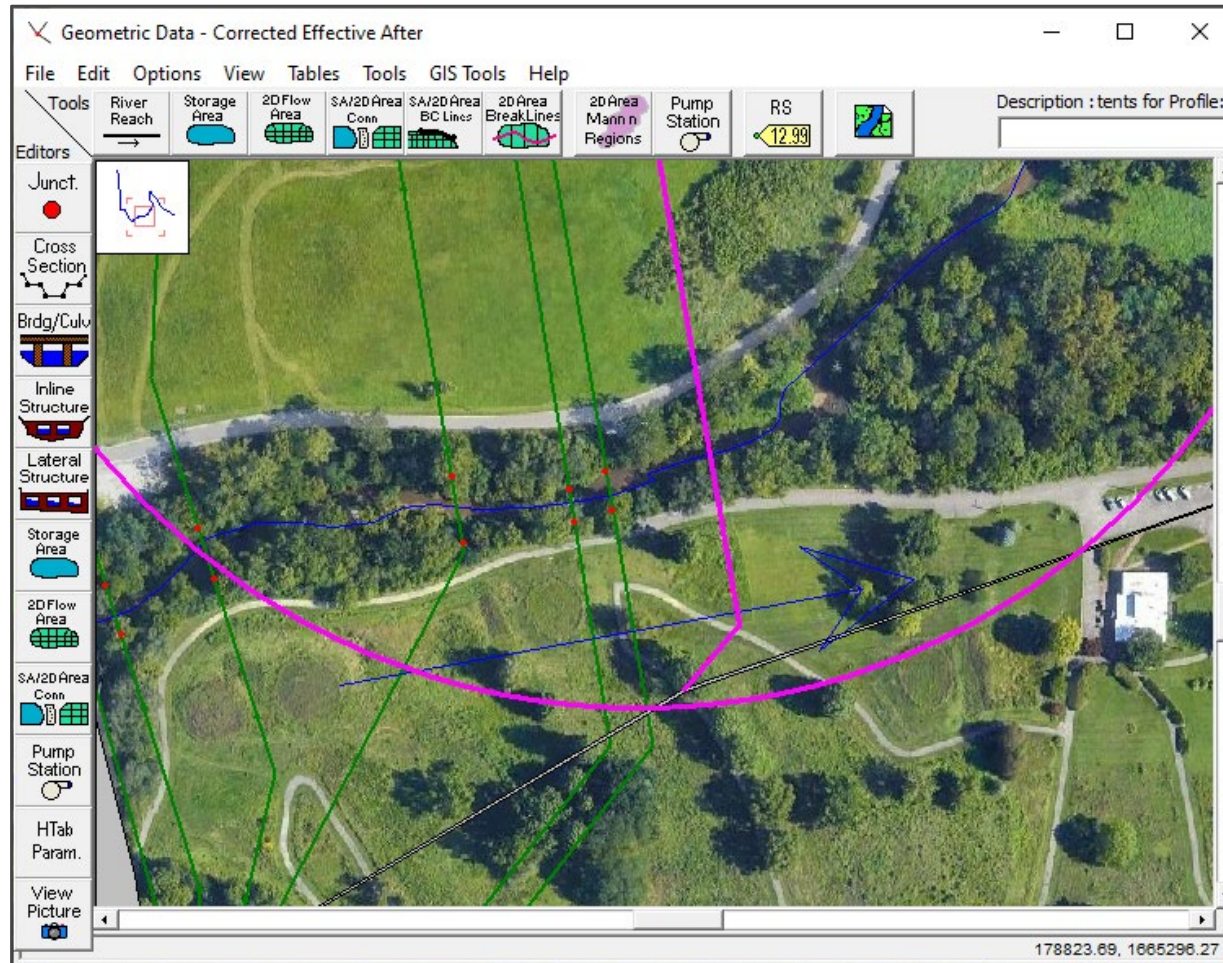
Create the Corrected Effective Model



Create the Corrected Effective Model



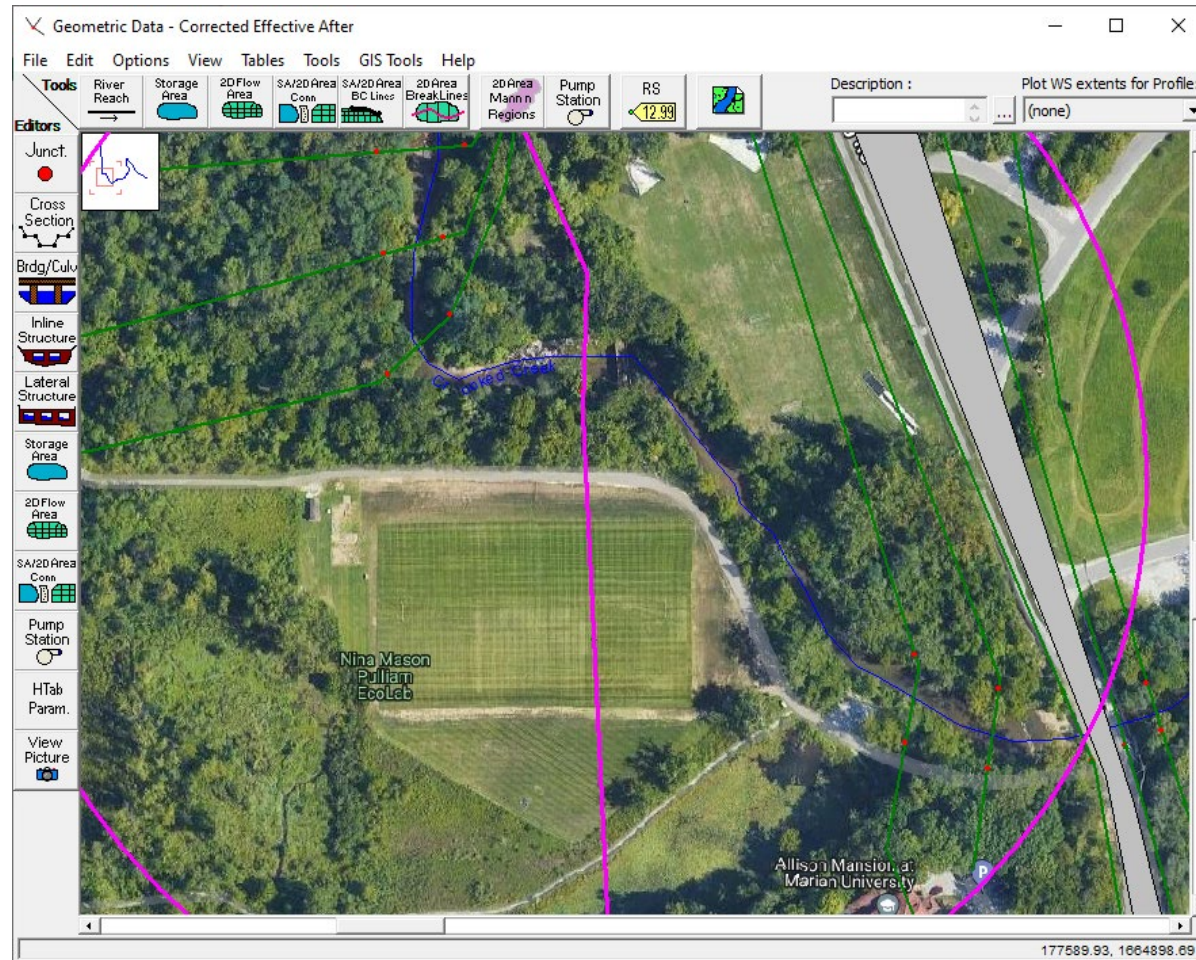
Create the Corrected Effective Model



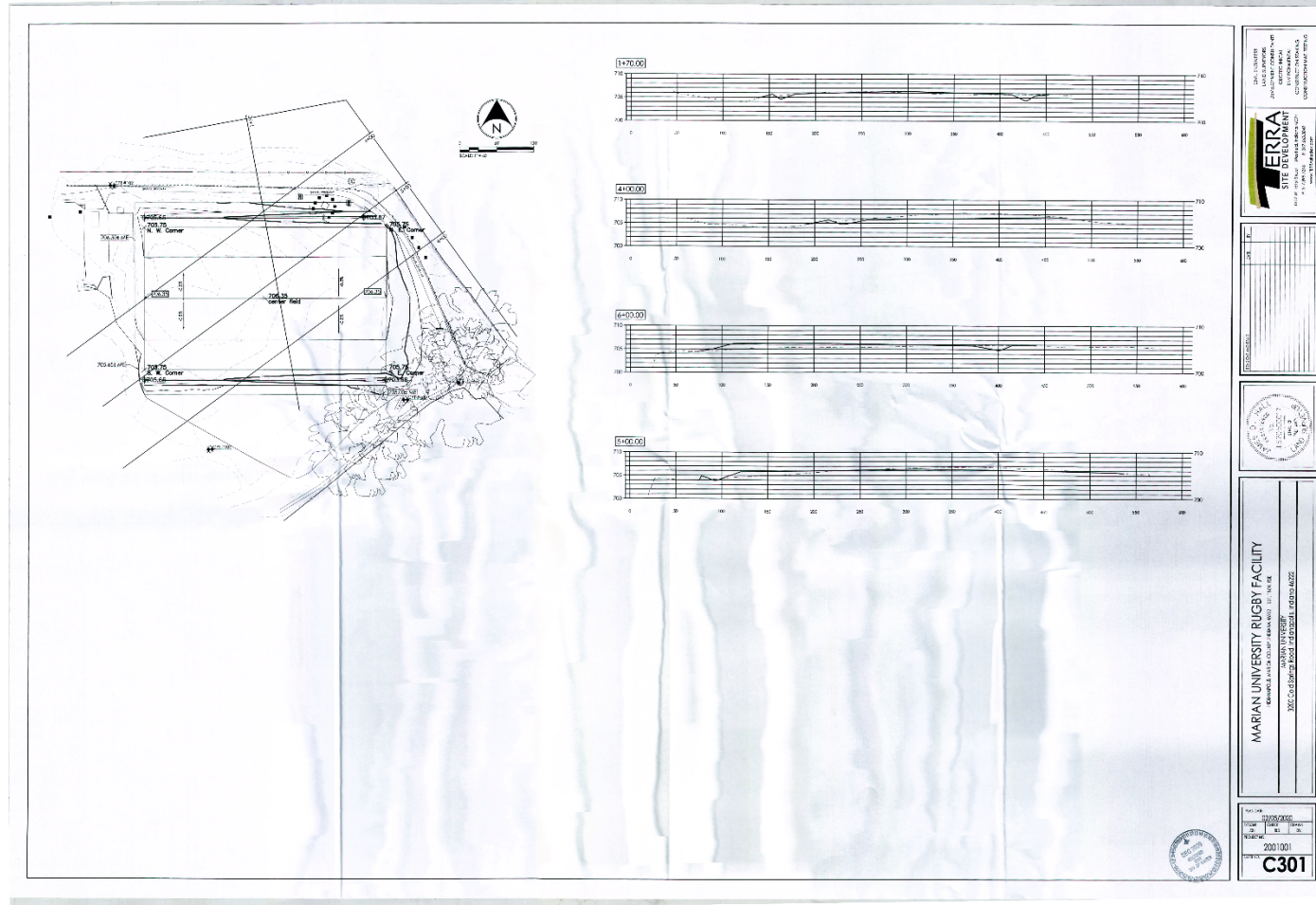
Build the Existing Condition Model

- Some construction in study reach
- All man-made changes
- Update land cover and anything else to show the current conditions
- New Topography (2016 LiDAR)

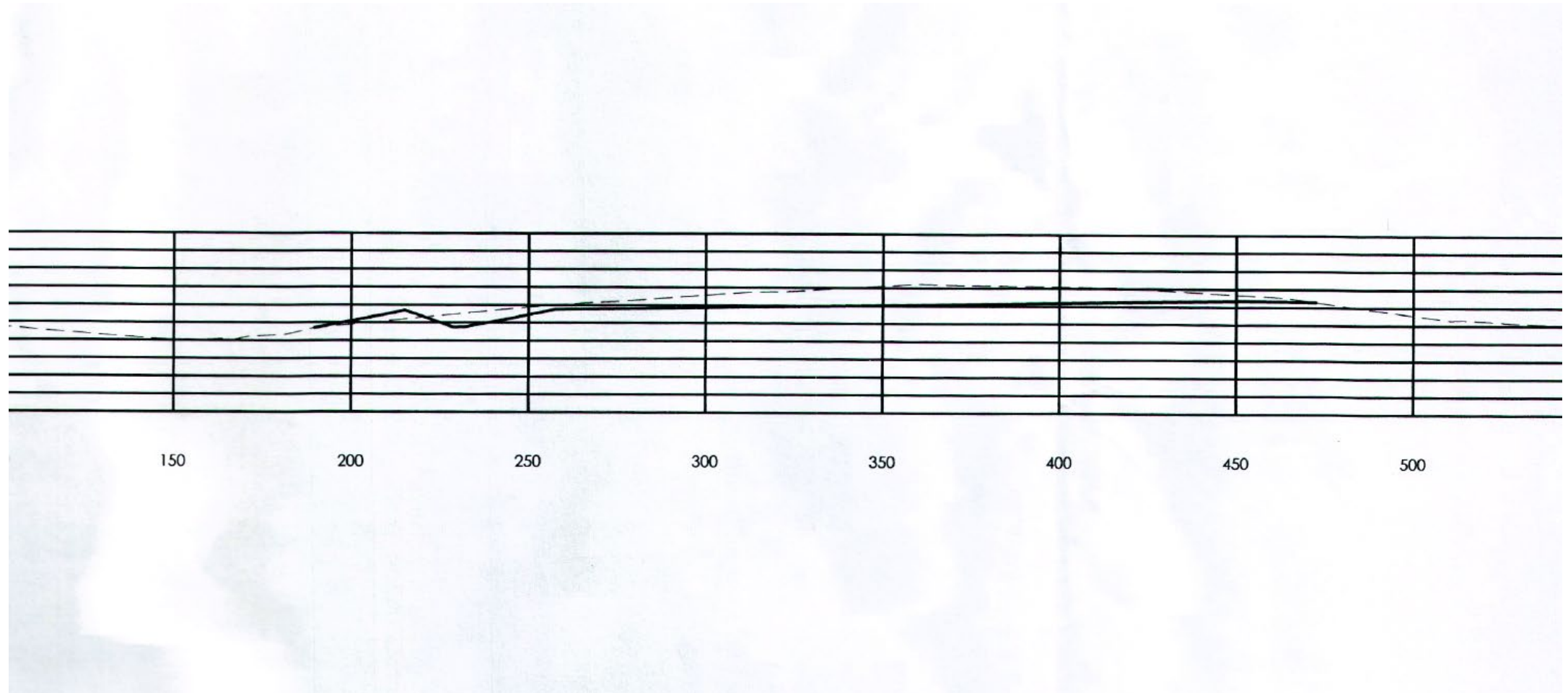
Build the Existing Condition Model



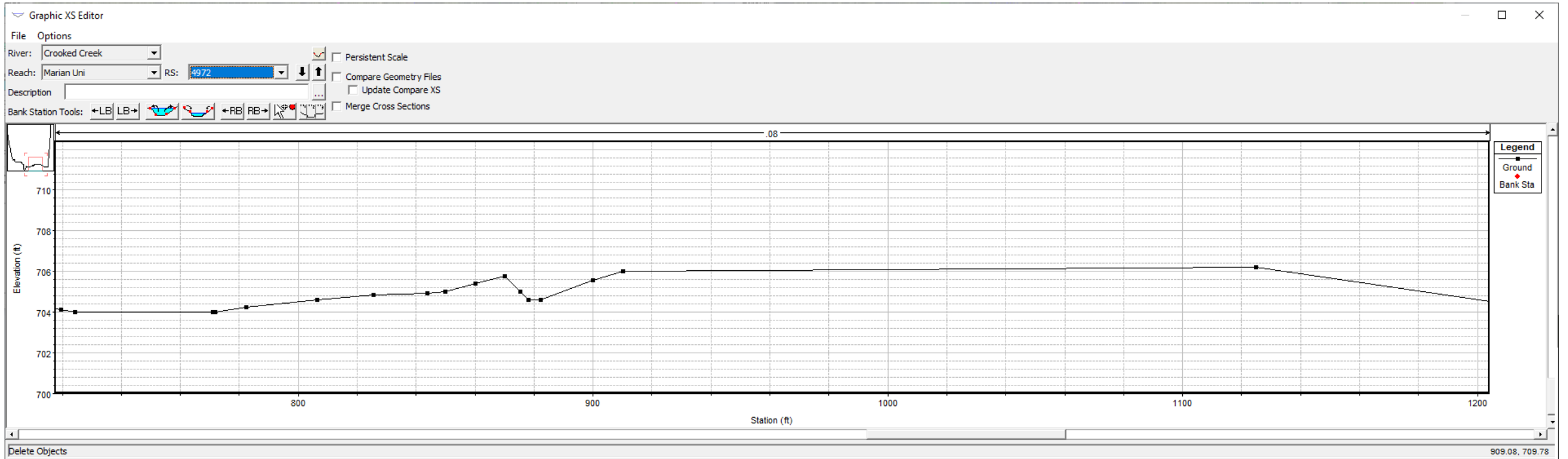
Build the Existing Condition Model



Build the Existing Condition Model



Build the Existing Condition Model



Determine the Proposed Condition Model

- Insert/change bridge
- Change topography (if needed)

Determine the Proposed Condition Model

Sta	High	Low
1300.2	701.6	690
1301	701.6	690
1301	702.6	690
1302	702.6	690
1302	703.6	690
1312	704.6	690
1312	704.6	703
1322	705.6	703
1332	706.6	703
1342	705.6	703
1352	704.6	703
1352	704.6	690

Determine the Proposed Condition Model

Deck/Roadway Data Editor

Distance	Width	Weir Coef
10.	30.	2.6

Clear Del Row Ins Row Copy US to DS

Upstream				Downstream		
	Station	high chord	low chord	Station	high chord	low chord
5	1302	703.6	690	1302	703.6	690
6	1312	704.6	690	1312	704.6	690
7	1312	704.6	703	1312	704.6	703
8	1322	705.6	703	1322	705.6	703
9	1332	706.6	703	1332	706.6	703
10	1342	705.6	703	1342	705.6	703
11	1352	704.6	703	1352	704.6	703
12	1352	704.6	690	1352	704.6	690

U.S Embankment SS D.S Embankment SS

Weir Data

Max Submergence: Min Weir Flow El:

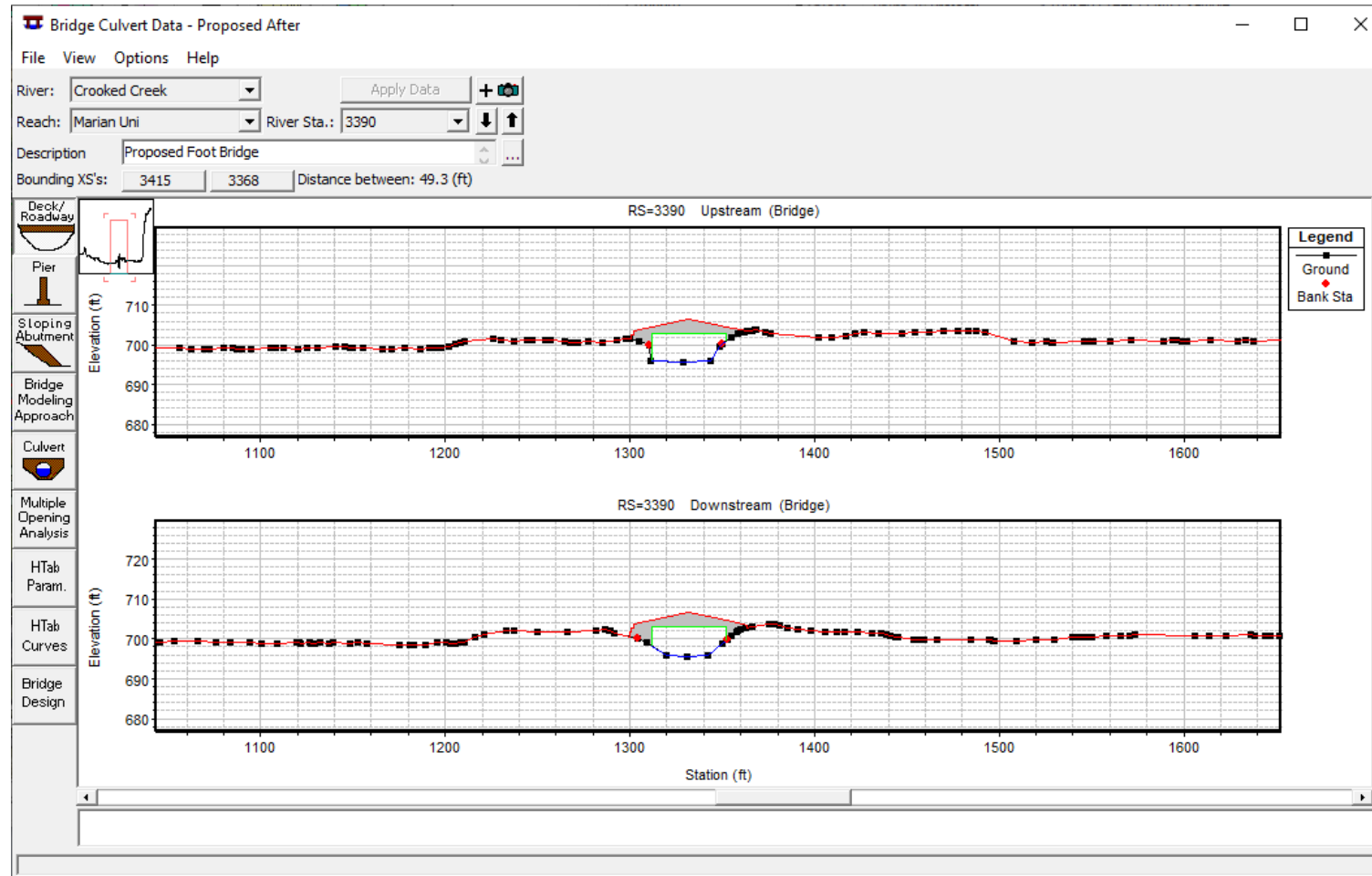
Weir Crest Shape

Broad Crested
 Ogee

OK Cancel

Enter distance between upstream cross section and deck/roadway. (ft)

Determine the Proposed Condition Model



Determine the Proposed Condition Model

Station		Duplicate WSEL	Corected WSEL	Change Effective	Existing WSEL	Change Effective	Proposed WSEL	Change Effective
6438		712.46	712.46	0.00	712.46	0.00	712.46	0.00
6143		711.28	711.28	0.00	711.28	0.00	711.28	0.00
5884		710.46	710.46	0.00	710.46	0.00	710.46	0.00
5802		710.24	710.24	0.00	710.24	0.00	710.24	0.00
5457		709.06	709.10	-0.04	709.16	-0.10	709.16	-0.10
5331		708.67	708.74	-0.07	708.83	-0.16	708.83	-0.16
5202		708.22	708.38	-0.16	708.53	-0.31	708.53	-0.31
4972		707.34	707.77	-0.43	707.84	-0.50	707.84	-0.50
4345		706.27	707.22	-0.95	707.22	-0.95	707.22	-0.95
4235		705.49	706.90	-1.41	706.90	-1.41	706.9	-1.41
4127		705.23	706.69	-1.46	706.69	-1.46	706.69	-1.46
4100	Cold Springs Road							
4072		703.87	706.23	-2.36	706.23	-2.36	706.23	-2.36
4023		703.69	706.26	-2.57	706.26	-2.57	706.26	-2.57
3878		702.98	706.28	-3.30	706.28	-3.30	706.28	-3.30
3551		702.99	706.27	-3.28	706.27	-3.28	706.27	-3.28
3415			706.27		706.27		706.27	
3390	Proposed							
3368			706.27		706.27		706.27	
3226		701.86	706.26	-4.40	706.26	-4.40	706.26	-4.40
952		701.75	706.20	-4.45	706.20	-4.45	706.2	-4.45
174		701.66	706.08	-4.42	706.08	-4.42	706.08	-4.42
124	Culvert							
0		698.70	698.70	0.00	698.70	0.00	698.7	0.00

Determine the Proposed Condition Model

In this example, the discharges were not imported properly, which resulted in the unacceptable WSEL difference for the CE, Existing, and Proposed models. This would be a sign that the engineer needs to go back and do some troubleshooting before submitting the models to FEMA.

Questions?

Conclusion

- FEMA format is different.
- FEMA has tighter restrictions than DNR requirements.
- FEMA requires more input and a larger submission package.