

# AARON SPRAGUE

EI | PROJECT ENGINEER/GIS SPECIALIST



Aaron Sprague is experienced in advanced GIS analysis and mapping using varied software tools; hydrologic and hydraulic numerical modeling using the U.S. Army Corps of Engineers Hydrologic Engineering Center River Analysis System and Hydrologic Modeling System software and the USDA NRCS's Water Resources Site Analysis Program; and construction and design of physical hydraulic models.

## EDUCATION

### ***B.S. Civil Engineering***

University of Missouri  
Kansas City

## CREDENTIALS

EI | Missouri

## EXPERIENCE

Total: 4  
With WRS: 4

## IN PROGRESS

### **NRCS-OK - CASTON MOUNTAIN 1 REHABILITATION DESIGN FOR FLOODWATER RETARDING STRUCTURE - 12FPC322F0196 (LEFLORE COUNTY, OK)**

Project Engineer III: Responsible for hydrologic and hydraulic analysis for 607-day project to complete NWMP-compliant watershed planning and an environmental document for rehabilitation of this 87-foot-high, 1,100-foot-long high-hazard NRCS embankment dam for flood control, water supply, and recreation. Conducted curve number determination from GIS landcover and soils data and time of concentration calculation from GIS terrain DEM using watershed lag method. Checked and updated SITES models for H&H design to 90% review (spillway models, riprap, channel, wave runup, basin, ACBs).

### **NRCS-OK LITTLE WEWOKA SITE 12 REHAB SUPPLEMENTAL WATERSHED PLAN AND ENVIRONMENTAL ASSESSMENT - 12FPC323F0012 (HUGHES COUNTY, OK)**

Project Engineer III: Assisted in hydrologic and hydraulic analysis for on-going 547-day project to complete an NWMP-compliant watershed plan and an environmental document for rehabilitation of this 35-foot-tall high-hazard NRCS embankment dam for flood control.

### **MISSOURI DEPARTMENT OF TRANSPORTATION AUTOMATED ASSET CHARACTERIZATION STUDY (JEFFERSON CITY, MO)**

Project Engineer III: Conducting hydrologic and hydraulic analysis for research project to develop and field test an artificial-intelligence-based system to automate the task of inspecting bridges, culverts, and low-water crossings by efficiently extracting accurate asset characteristics using LiDAR data.

**NRCS-OK - CASTON MOUNTAIN 2 REHABILITATION DESIGN FOR FLOODWATER RETARDING STRUCTURE - 12FPC322F0203 (LEFLORE COUNTY, OK)**

Project Engineer III: Responsible for hydrologic and hydraulic analysis for 570-day project to complete NWMP-compliant watershed planning and an environmental document for rehabilitation of this 54-foot-high, 1,305-foot-long high-hazard NRCS embankment dam for flood control, water supply, and recreation. Conducted curve number determination from GIS landcover and soils data and time of concentration calculation from GIS terrain DEM using watershed lag method. Checked and updated SITES models for H&H design to 90% review (spillway models, riprap, channel, wave runup, basin, ACBs).

**COOPER CREEK STREAM RESTORATION ASSESSMENT AND CONCEPT DESIGN (ROELAND PARK, KS)**

Project Engineer III: Assisted in geomorphic analysis and stream stability assessment for stream stability assessment and preliminary alternative solutions design for 950 feet of eroding urban stream. Assessment based on Section 5600 of the American Public Works Association Standard Specifications and Design Criteria included HEC-RAS two-dimensional hydraulic model.

**2023 COMPLETED**

**NRCS-IL BAY CREEK WATERSHED DAM REHABILITATION ASSESSMENT - 12FPC322F0080 (POPE COUNTY, IL)**

Project Engineer: Assisted in GIS mapping for 365-day project to complete an NWMP-compliant dam assessment for NRCS Bay Creek Watershed Structure No. 5 in southern Illinois.

**STORMWATER SYSTEM AUTOMATED INFORMATION MAPPING SYSTEM UPDATE (MISSION HILLS, KS)**

Project Engineer III: Constructed GIS database and mapping for project to update and catalog the city's stormwater asset system for improved efficiency in annual capital improvements planning and asset inspections. Project created an in-house geographic information system for the stormwater assets.

**NRCS-TX - UPPER AND LOWER BLANCO RIVER AND LOWER MONAHANS DRAW PIFRS - 12SPEC18D0015 (HAYS AND MIDLAND COUNTIES, TX)**

Project Engineer III: Assisted in GIS mapping and report for 104-day project to complete two preliminary investigation feasibility

reports (PIFR) compliant with Circular 390-21-1 of the National Watershed Program Manual to create a 279,109-acre and 64,700-acre PL-566-authorized watersheds near Odessa, Texas, for the purposes of flood prevention or flood damage reduction and improved watershed protection.

#### **WATERCREST LANDING POND DAM DESIGN (LENEXA, KANSAS)**

Project Engineer: Hydraulic modeling of proposed dam and spillway using HEC-RAS. for . Estimated stage storage curve of proposed dam using data from client provided CIVIL3D surface of proposed dam. Determined recommended armouring of proposed spillway using data from HEC-RAS model. Dam breach analysis and mapping for KDA permit. Assisted client in developing EAP plan..

#### **TURKEY CREEK AND BRUSH CREEK FEMA BLE 2D WATERSHED HYDROLOGIC AND HYDRAULIC ANALYSIS**

Project Engineer III: Developed watershed hydrologic and hydraulic model for Brush Creek using HEC-RAS rain-on-grid for FEMA Base Level Engineering study of Turkey Creek and Brush Creek in Johnson County, Kansas. Project includes new hydrologic and hydraulic analysis for both watersheds within the study area. Both hydrologic and hydraulic calculations were developed directly in the HEC-RAS models using a rain-on-grid, 2-D approach..

#### **WILDHORSE RIVERWORKS LOUTRE RIVER STREAMBANK AND NATURAL CHANNEL STABILIZATION DESIGN (MONTGOMERY COUNTY, MO)**

Project Engineer III: Conducted stream restoration modeling for project to stabilize three eroding streambank sites along the Loutre River in central Missouri. Project included hydraulic modeling of the main river channel to ensure stability and maintainability of the stabilized sites.

#### **NORTH SHERIDAN ROAD DRAINAGE IMPROVEMENTS KELLAR PARKWAY TO GILLES LAND, DESIGN AND STAGED CONSTRUCTION PLANNING (PEORIA, IL)**

Project Engineer III: Conducted hydrologic and hydraulic analysis and modeling for project component to complete hydrologic and hydraulic calculations necessary to develop and evaluate alternate solutions to solve the drainage problems in urban neighborhoods.

#### MARYSVILLE DAM WATER TABLE RESTORATION PRELIMINARY ENGINEERING STUDY (MARYSVILLE, KS)

Project Engineer III: Conducted hydraulic assessment and concept design solutions for study to evaluate impact of the failed 160-year-old low-head dam on the Big Blue River. Proposed alternative solutions with opinions of cost included engineered rock grade control to permit aquatic organism passage, along with concrete ogee dam and cofferdam.

#### NEW BOSTON DEVELOPMENT STORMWATER AND HYDROLOGIC ANALYSIS (LAWRENCE, KS)

Project Engineer III: Conducted hydrologic and hydraulic analysis for project to provide stormwater system hydrologic analysis, including recommendation of best management practices for environmental protection and stormwater quality facilities.

#### NRCS-IL - WEST BRANCH PANTHER CREEK PIFR - 12SPEC18D0015 (ROANOKE, IL)

Project Engineer III: Created GIS mapping of existing conditions for 90-day project to complete a preliminary investigation feasibility report (PIFR) compliant with Circular 390-21-1 of the National Watershed Program Manual to create a 38,027-acre PL-566-authorized watershed in Woodford County, Illinois, for the purposes of flood prevention or flood damage reduction and improved watershed protection.

### 2022 COMPLETED

#### NRCS-IL - WATERSHED PLAN/ENVIRONMENTAL ASSESSMENT FOR SHOAL CREEK NO. 4 REHABILITATION - 12FPC320F0293 (LITCHFIELD, IL)

Project Engineer: Conducted hydrologic modeling of watershed using HEC-HMS and 2D hydraulic modeling using HEC-RAS for 770-day project to complete NWMP-compliant watershed planning and an environmental document for rehabilitation of this 54-foot-high, 1,305-foot-long high-hazard NRCS embankment dam for flood control, water supply, and recreation. Incorporated field bathymetry data of Lake Lou Yaeger into existing DEM model. Developed stage-storage curve from field data. Modeled bridges in HEC-RAS from field survey data. Created GIS mapping and analysis of watershed. Conducted SITES modeling of dams in sequence.

**NRCS-KS - WATERSHED PLAN/ENVIRONMENTAL ASSESSMENT  
FOR PAWNEE WATERSHED SUBWATERSHEDS 2 AND 5 NEW DAMS -  
12FPC320F0293 (HODGMAN COUNTY, KS)**

Project Engineer III: Hydologic and Hydraulic modeling of watershed using HEC-HMS and HEC-RAS. Basin and floodplain mapping. Estimation of time of concentration and curve number of subbasins using NRCS curve number methodology. for 1,065-day project to complete NWMP-compliant watershed planning and environmental documents for the creation of seven new NRCS flood control embankment dams in the nation's largest watershed district. Developed QGIS models and workflows to calculate Tc and CN using landcover, topology and area of sub-basin.

**INDIAN CREEK WATERSHED FEMA BLE WATERSHED ANALYSIS - PHASE I**

Project Engineer/Lead Modeler: for Phase I of FEMA Base Level Engineering study of Indian Creek in south Kansas City, Missouri. Study included HEC-RAS two-dimensional modeling.

**NRCS-IL - UPPER DES PLAINES WATERSHED PIFR - 12FPC322F0042  
(LIBERTYVILLE, IL)**

Project Engineer: Assisted in GIS mapping and report creation for 87-day project to complete a preliminary investigation feasibility report (PIFR) compliant with Circular 390-21-1 of the National Watershed Program Manual to create a 168,373-acre PL-566-authorized watershed from three subwatersheds in northern Lake County, Illinois, and parts of Kenosha and Racine Counties, Wisconsin.

**NRCS-OK EAST CACHE CREEK/MEDICINE CREEK WATERSHED PIFR -  
12FPC322F0074 (LAWTON, OK)**

Project Engineer: Assisted in GIS mapping for 90-day project to complete a preliminary investigation feasibility report (PIFR) compliant with Circular 390-21-1 of the National Watershed Program Manual to create a 3,160-acre PL-566-authorized watershed in Lawton County, Oklahoma.

**COMPREHENSIVE WATERSHED STREAM ASSESSMENT AND  
HYDROMODIFICATION EVALUATION (JOHNSON COUNTY, KS)**

Project Engineer II: Assisted with GIS processing for project component to assess risk from urban stream erosion patterns and hydromodification patterns in two of this highly urbanized county's 20 watersheds draining more than 1,800 miles of streams. Project team developed concept level management strategies for priori-

tized geomorphic risk areas. Converted shapefile line vectors into shapefile polygon vectors, and clipping and cleaning operations.

#### **USACE KANSAS CITY DISTRICT HYDOLOGIC/HYDRAULIC MODELING OF ROCK CREEK/BRUSH CREEK CONFLUENCE (MISSION HILLS, KANSAS)**

Project Engineer: Constructed operated and assisted in calibration of physical hydraulic model for project to analyze the hydraulics of persistent flooding at a low-water crossing at the confluence of two urban streams in residential neighborhoods. Analysis included construction of a distorted scale, three-dimensional physical hydraulic model used to analyze the complex hydraulics of the confluence. Final report to the USACE and city included findings of the model study and recommendations for stream restoration. Measured and recorded velocities and water surface elevations of model. Developed a process for coating the foam base of the model with concrete motar, which improved durability of model. Constructed model terrain against topographic drawings/maps.

#### **PRAIRIE BAND POTAWATOMI NATION ENGINEERED BUFFALO STREAM CROSSING DESIGN (MAYETTA, KS)**

Project Engineer: Assisted in creation of a DEM from field survey, and remote lidar data. for design of a stable creek crossing for Native American tribal buffalo herd. WRS designed a low-water crossing consisting of a crushed rock/Rock Rip Rap foundation beneath the stream gravel bed, along with rip rap armoring to protect the toe of the stream from further erosion. Engineered rock check dams provided erosion and sediment control during construction.

### **2021 COMPLETED**

#### **USACE-KANSAS CITY FY21 LEVEE PERIODIC INSPECTIONS DELIVERY ORDER W912DQF1028**

Project Engineer: LIS operator and levee field inspection team member for levee safety periodic inspection project on the South Topeka Oakland flood protection unit. Inspected 11.8 levee miles, 5.5 channel miles, and 52 structures. Task order was completed ahead of schedule (120 days) and on budget.. Managed GIS mapping of encroachment locations and other information for final inspection report.

#### **NPDES MS4 OUTFALL INSPECTIONS AND WATER QUALITY MONITORING (MISSION HILLS, KS)**

Project Engineer: Performed field inspections of Mission Hills storm water outfalls for their IDDE plan, consisting of a visual inspection, photography and quantitative sampling of discharge. for project completing annual inspection of more than 200 stormwater outfalls emptying into the city streams. Inspections included GIS geodatabase creation and updating, inspection mapping, field inspection, site photography, water quality testing, EPA-compliant reporting, and followup testing, and resolution consulting. Developed new forms and work-flow via QGIS which made it possible to use an ordinary android tablet to conduct the field survey. Designed new form layout within QGIS that automatically generates the populated form for each inspected outfall.

#### **BRUSH CREEK AND ROCK CREEK SUPPLEMENTAL FLOOD SOLUTIONS STUDY (MISSION HILLS, KANSAS)**

Project Engineer: Conducted 2D HEC-RAS modeling to determine concept level designs necessary to reduce flooding due to frequency storm events and cost estimates associated with concept level designs for study to create and evaluate alternate solutions to reduce perennial flood risk for urban neighborhood and golf course. Completed GIS mapping for presentations to city and golf course.

#### **TOMAHAWK CREEK STREAMBANK EVALUATION AND OPC AT DEER CREEK COUNTRY CLUB**

Project Engineer: No-Rise modeling of stream bank stability designs using HEC-RAS for project to document and assess stream-bank along project limits, including recommendations.

#### **MISSION HILLS STORMWATER IMPACT FEE STUDY (MISSION HILLS, KS)**

Project Engineer: Used GIS analysis to determine cost estimates for the addition of a “behind the curb” drain system to the City of Mission Hills storm drain system. for study to analyze and develop two proposed stormwater-related fees for the city: A proportionally assessed development fee necessary to fund installation of a behind-the-curb residential drainage system and a proportional stormwater runoff development impact fee.

#### **2021 STREET REHABILITATION PROGRAM STREET AND STORMWATER IMPROVEMENTS DESIGN (MISSION HILLS, KS)**

Project Engineer: AutoCAD drafting of design plan. SWMM modeling to design stormwater system improvements. Field inspection

of construction. for annual street rehabilitation, including design for mill and overlay, replacement, curb and sidewalk replacement, and underlying stormwater system upgrades.

#### **JEFFREY ENERGY CENTER DAM BREACH INUNDATION AND HAZARD ANALYSIS**

Project Engineer: for project to complete the dam breach analysis hydrologic and hydraulic calculations and inundation mapping for three power plant dams in sequence, to update the existing emergency action plan to meet statutory requirements. Results included inundation mapping and risk assessment of populations at risk.

#### **US ARMY CORPS OF ENGINEERS - INDIAN CREEK FLOOD ASSESSMENT PLANNING ASSISTANCE TO STATES STUDY - W912DQ19F1050 (KANSAS CITY, MO)**

Project Engineer: Planned and constructed physical hydraulic model, operated and calibrated hydraulic model for 485-day project under USACE Planning Assistance to States funding to model complex flooding and sediment dynamics along south Kansas City's Indian Creek, in which observed flows have conflicted with traditional engineering modeling. Conducted cost estimation and material/supply ordering. Trained another engineer in physical model construction and operation. Designed platform of physical model. Assisted with plumbing design.

#### **CLOMR REVIEW ON EAST 87TH STREET (KANSAS CITY, MISSOURI)**

Project Engineer: Reviewed CLOMR application HEC-RAS model provided feedback and recommendations for city and feedback/recommendations for city to provide to client. for project to review and make necessary revisions to FEMA conditional letter of map revision application for city of Kansas City, Missouri.

### **2020 COMPLETED**

#### **USACE KANSAS CITY DISTRICT FY19 LEVEE INSPECTIONS W912DQ19F1049 (KANSAS CITY, MO)**

Project Engineer: for project to inspect four levee systems along the Missouri River. Inspected systems included 31 miles of levee, 16,859 feet of channel, 51 drainage structures and seven closure structures, protecting nearly 19,000 acres of agricultural and urban area. The task order was completed ahead of schedule (120 days) and on budget.

**FIVEMILE CREEK STREAMBANK STABILIZATION DESIGN AT CODY PARK  
(LEAVENWORTH, KS)**

Project Engineer: Produced AutoCad drawing of proposed design. for project to complete hydrologic and hydraulic analysis and final design plans for eroding urban stream.

**WEATHERBY LAKE IMPROVEMENT COMPANY - WESTSIDE DRIVE AND NW  
BARRY ROAD STREAM STABILIZATION STUDY (KANSAS CITY, MO)**

Project Engineer: Assisted in a stream stability survey for stream stability assessment and preliminary alternative solutions design for eroding urban stream. Assessment based on Section 5600 of the American Public Works Association Standard Specifications and Design Criteria included HEC-RAS two-dimensional hydraulic model.