ATTACHMENT NUMBER ONE
EXHIBIT A TO WORK AUTHORIZATION NUMBER AMA-I&I RP-001 TO AGREEMENT FOR PROFESSIONAL ENGINEERING CONSULTING SERVICES
(Between the City of Joplin, Missouri and Allgeier, Martin and Associates, Inc.)

1. SERVICES

Engineer shall provide the City of Joplin (OWNER) with the following services:

1.1 General

1.1.1 ENGINEER shall perform professional planning, design, bidding, and construction phase services as hereinafter stated which include customary civil, structural, and mechanical engineering services.

1.1.2 Coordinate the planning, evaluation and data collection of flow monitoring for the proposed City of Joplin Inflow and Infiltration (I/I) Reduction Program.

1.1.3 In general, the Project consists of the following:

1.1.3.1 Overall project management of the City of Joplin Sanitary Sewer I/I Reduction Program. This Work Authorization will focus on flow monitoring activities within the wastewater collection system.

1.1.3.1.1 The Allgeier Martin (AMA) team working on this project will consist of Burns and McDonnell (BMcD) and TREKK Design Group, LLC (TREKK). BMcD will serve as the assistant Program Manager.

1.1.3.2 System-wide program analysis including review of existing system information, system wide flow monitoring,

1.1.3.3 Assessment of Pilot Area for I/I reduction efforts including pre-construction flow monitoring within the area, pre-construction data analysis, post-construction flow monitoring and post-construction flow reduction analysis.

2.1 Project Management and Administration: Manage and administer scope and allocate resources to complete the project within schedule and budget limitations.

2.1.1 Kickoff Meeting: Participate in a kickoff meeting with the ENGINEER's team and the City. Discussions shall be held to review and confirm the project/program goals, objectives, and schedule; evaluate basic concerns on objectives and implementation of the Program; confirm responsibilities and the scope of services; develop public communication and documentation guidelines; discuss any known difficulties that may be encountered with regards to property owners; assign project team contacts and communication protocols; review inspection format and forms; review plan and specification document format and content; and discuss construction phase work including access, public notification, construction progress, and approval of finished work.

2.1.2 Progress Meetings: Attend project progress meetings, up to 2, with the OWNER to discuss items such as coordination of work and responsibilities, risk management, schedules, and project progress and implementation.

3.1 System Wide Program Analysis

3.1.1 Collection, Evaluation and Review of Existing Information (Entire System): Prepare and submit a data request to collect reports, GIS data, drawings, permits, facility data, etc. for the development of the wastewater collection system hydraulic model. Data request will include items such as previous reports, GIS data, Pump Station data, as-built drawings,

WWTP permits, WWTP data etc. Review of data and information collected will be used to identify data gaps.

3.1.1.1 Produce a list of data gaps which are required for development of a functional wastewater hydraulic model. Data gaps requiring field investigation will be identified.

3.1.2 Collection System Flow Monitoring: Develop a flow monitoring program consisting of up to forty-two (42) flow meters and eight (8) rain gauges, located to capture tributary and cumulative flows across the OWNER's wastewater collection system. The flow meters and rain gauges will be installed for a period of ninety (90) days in anticipation of collecting adequate data to enable wastewater collection system hydraulic model dry- and wet-weather calibration and verification. If sufficient wet and dry weather events are collected for data analysis and calibration within the first 90-days of monitoring, flow monitoring will cease. However, if sufficient data is not collected during the initial 90-day period, a recommendation may be made to extend flow monitoring for a further 30-day period, or until sufficient data is captured. Four (4) rain gauges will be located in the Shoal Creek Basin and four (4) meters located in the Turkey Creek Basin under this agreement. Up to ten (10) flow meters shall be installed and monitored by BMcD in the Shoal Creek Basin under a separate, existing agreement, therefore, thirty-two (32) flow meters will be part of this agreement scope of work.

3.1.2.1 Suitability for Accurate Metering: The accuracy of the open channel flow metering will depend on numerous variables and it is imperative that they be controlled as much as possible. For this reason, the reconnaissance inspections will be performed to identify the best sites for metering and to minimize such error-causing factors as changes in pipe alignment and size, interruption of channel flow by side inlets and turbulence caused by uneven channels.

3.1.2.2 Safety: It is equally important that the proposed sites conform to typical industry standard requirements for safe operating conditions. If the site falls outside of these requirements, an alternate site that is suitable based on safety requirements will be selected upon further consultation with AMA and the OWNER.

3.1.2.3 A site assessment form for the flow location and the rainfall monitoring locations shall be completed. Thirty-two electronic depth/velocity flow meters (ISCO 2150) shall be provided. Four (4) tipping-bucket rainfall recorders within, or within close proximity to, the Study Area during the same time frame shall also be provided.

3.1.2.4 Flow Monitoring (90-day period): The flow monitor shall be maintained on a weekly basis. Weekly maintenance shall include the upload and interrogation of all flow data, meter calibration (as needed), weekly velocity profiling, and other diagnostic checks. Field data will be collected and reviewed weekly and meter maintenance coordinated as required to minimize down time and data gaps. Malfunction of metering equipment can occur because of debris in the sewers, damage from storm events, and water level conditions. All monitors shall be removed at the conclusion of the monitoring period.

3.1.2.5 Zinc and Lead samples will be taken while the meters are interrogated prior to commencement of the flow monitoring period.

3.1.2.6 Upon completion of the base period, the meters will be removed unless it is recommended and approved by the OWNER to keep them in place. Justification for extended metering will be due to insufficient rainfall, or dry days, during the monitoring period. Compensation for additional flow metering service and calibration shall be at a unit price to be negotiated between the OWNER and AMA.

3.1.2.7 Rainfall Monitoring (90-day period): Eight (8) continuous recording, electronic rain gauges will be installed, serviced, and maintained within the Study Area during the same 90-day base monitoring period. The gauges will record rainfall to one- hundredths of inch increments. The instruments will be checked and downloaded weekly.

3.1.4 System Wide Flow and Rainfall Analysis

3.1.4.1 The collected flow meter data from 38 of the 42 flow meters will be analyzed to extract the average daily dry weather flow (ADDF), and dry weather diurnal profile for each flow meter basin. The other four meters, which are located in the Shoal Creek Basin, shall be analyzed by BMcD under a separate, existing Agreement. The OWNER will provide the City's top ten industrial, commercial, and institutional (ICI) flows, respectively, which will be applied to the hydraulic model individually. The model will generate peak dry weather flow and base sanitary flow values but will not be identified separately in the flow analysis.

3.1.4.2 The collected rain gauge data from this scope of work and rain data provided by city rain gauges, will be used to identify independent and unique rainfall events within the flow metering period and the associated sewer system response to those events. Inflow, infiltration, and groundwater influences will be disassembled from the aggregate flow meter data for inclusion in the hydraulic model. In order to identify a sufficient pool of rainfall events for wet weather calibration and verification, it is anticipated that up to five (5) rain events will be needed. Adequate rain events for wet weather calibration and verification must be large enough to produce a recognizable, causal response in the wastewater collection network but small enough that the wastewater collection network does not become surcharged.

4.1 Pilot Area Assessment: The intent of the Pilot Area is to establish a means and a method of cost-effectively identifying, removing and measuring I/I. Attachment number three (3) and attachment number four (4) to this exhibit A identify the proposed Pilot Areas for this agreement. Flow meters will be installed during the Spring 2017. Flow monitoring will continue through the Fall 2017 to quantify the I/I reduction.

4.1.1 Pilot Area Flow Meter Site Assessment and Installation: Up to three (3) Flow meters shall be located and installed for up to two hundred and ten (210) days in areas identified as "Pilot Areas". These meters shall be installed and maintained by AMA throughout the study and construction period.

4.1.1.1 Suitability for Accurate Metering: The accuracy of the open channel flow metering will depend on numerous variables and it is imperative that they be controlled as much as possible. For this reason, the reconnaissance inspections will be performed to identify the best sites for metering and to minimize such error-causing factors as changes in pipe alignment and size, interruption of channel flow by side inlets and turbulence caused by uneven channels.

4.1.1.2 Safety: It is equally important that the proposed sites conform to typical industry standard requirements for safe operating conditions. If the site falls outside of these requirements, an alternate site that is suitable based on safety requirements will be selected upon further consultation with AMA and the OWNER.

4.1.1.3 A site assessment form for the flow location and the rainfall monitoring locations shall be completed. Three (3) electronic depth/velocity flow meters (ISCO 2150) shall be provided. Two (2) tipping-bucket rainfall recorders within, or within close proximity to, the Study Area during the same time frame shall also be provided.

4.1.1.4 Flow Monitoring (210-day period): The flow monitor shall be maintained via remote telemetry. Maintenance shall include the upload and interrogation of all flow data, meter calibration (as needed), weekly velocity profiling, and other diagnostic checks. Field data will be collected and reviewed weekly and meter maintenance coordinated as required to minimize down time and data gaps. Malfunction of metering equipment can occur because of debris in the sewers, damage from storm events, and water level conditions. All monitors shall be removed at the conclusion of the monitoring period. Eight (8) PreView, Level and Camera sensors shall be provided upstream of the flow meters to determine areas that may have higher influences of infiltration and inflow.

4.1.1.5 Zinc and Lead samples will be taken while the meters are interrogated prior to commencement of the flow monitoring period.

4.1.1.6 Upon completion of the base period, the meters will be removed unless it is recommended and approved by the OWNER to keep them in place. Justification for extended metering will be due to insufficient rainfall, or dry days, during the monitoring period. Compensation for additional flow metering service and calibration shall be at a unit price to be negotiated between the OWNER and AMA.

4.1.1.7 Rainfall Monitoring (210-day period): Two (2) continuous recording, electronic rain gauges will be installed, serviced, and maintained within the Study Area during the same 210-day base monitoring period. The gauges will record rainfall to one- hundredths of inch increments. The instruments will be checked and downloaded monthly.

4.1.2 Pilot Area Flow and Rainfall Data Analysis Pre Construction: The flow and rainfall data collected in Tasks 3.1 following public and private I/I source repairs will require processing for use. Principal components of sanitary sewer system flows will be deconstructed from the flow meter hydrographs in the following general manner.

4.1.2.1 Provide an analysis of flow metering data to estimate average dry weather flow (ADWF) and peak dry weather flow (PDWF).

4.1.2.2 Develop and provide ADWF curves for each metering site. These curves will reflect 15-minute interval variations over time for weekdays and weekends.

4.1.2.3 Prepare a table listing approximate tributary area and population for each site, along with the flow parameters (ADWF, average minimum night-time flow, etc.). Population data shall be provided by the OWNER.

4.1.2.4 Identify rainfall events for evaluation, and determine wet weather flow vs. rain volumes by calculating wet flow volume (total flow, less ADWF, integrated over time during wet weather impact) as a percentage of rain volume. Based on this effort, identify events (and associated locations) that can be used for hydraulic model calibration and verification.

4.1.2.5 Develop scatter graphs of flow depth (in feet) against velocity (in feet per second) for each flow meter.

4.1.2.6 Develop normalized peak flow versus rainfall intensity curves for each flow meter. Separate curves will be developed for infiltration/inflow (I/I) and will include projected peak flow for the design storm event. Indicate if the flow meter site is impacted by upstream flow split and/or downstream conveyance performance.

4.1.2.7 Estimate groundwater induced infiltration and rainfall dependent inflow for each flow meter site.

4.1.2.8 Adjust flow analysis based on hydraulic model calibration results.

4.1.2.9 Review results with the OWNER to address any issues as to data validity, missing data, or other problems.

4.1.2.10 A Flow and Rainfall Data Collection and Analysis TM will be prepared and will document flow and rainfall analysis.

4.1**.3** Pilot Area Post Construction Flow and I/I Reduction Analysis: Following public and private I/I construction activities, flow monitoring analysis will be completed in accordance with Task 4.1.2 as noted above. An I/I Removal TM including a comparison of both the pre- and post- construction flow and rainfall data analysis will be provided. One hard copy and one electronic format copy will be provided.

1.2 Environmental Clearances and Permitting

The project will be undertaken with the understanding that no Environmental Clearances and/or Land Disturbance and Stormwater permitting will be required for this project and, therefore, the Engineer shall not be responsible for the preparation or production of any such items. Any required Corps of Engineers, Wetlands, or other associated permitting, if determined necessary, may be provided as an additional service.

2. TERMS

2.1 Schedule: The services of the Engineer shall commence as soon as practicable after the execution of this contract, unless otherwise directed in writing, and shall be undertaken and completed in such sequence as to assure their expeditious completion in the light of the purposes of the contract, but in any event, all of the services required hereunder for this Work Authorization scope of work shall be completed no later than December 31, 2017. Work on the tasks contained within this Work Authorization is anticipated to proceed in general accordance with the dates and timelines as indicated in Attachment Six.

2.1.1 Utilizing information supplied by Engineer, the OWNER shall make final engineering and planning decisions in a timely manner to support the Engineer's ability to complete the Services according to the project schedule.

2.2 Distribution of compensation between individual tasks indicated in Section 3 may be altered as necessary to be consistent with services actually rendered, but shall not exceed the total estimated compensation amount unless approved in writing by the OWNER.

3. PAYMENT

3.1 Payment to Engineer shall be at the hourly labor Rates and Non-Labor Rates set forth in the attachment Number Two to Exhibit A: Allgeier, Martin and Associates, "RATE SCHEDULE 2017"; Burns and McDonnell Schedule of Hourly Rates and Expenses; and 2017 Compensation for Professional Engineering Services for TREKK Design Group, LLC (TREKK) with a total compensation ceiling of $493,728, as set forth in Work Authorization Number AMA – I&I RP - 001 to the Agreement for Professional Engineering Consulting Services, Section 5.b. with the estimated maximum fees broken down for respective services in more detail as follows:

Task	Estimated Fee
Project Management (Item 2.1)	$70,447
System Wide Flow Monitoring (Item 3.1)	$341,200
Pilot Area Flow Monitoring (Item 4.1)	$82,081
Total Estimated Maximum Fee	$493,728

ATTACHMENT NUMBER TWO

ALLGEIER, MARTIN and ASSOCIATES, INC.

Consulting Engineers and Surveyors

RATE SCHEDULE
2017

LABOR RATES

Classification	Hourly Billing Rate 01/01/2017 thru 12/31/2017
Principal/Engineer IV	$191
Principal/Engineer III	$175
Project Manager/Engineer II	$155
Project Manager/Engineer I	$140
Designer III/GIS Specialist	$128
Designer/Technician III	$108
Designer/Technician II	$95
Designer/Technician I	$88
Two-Man GPS Survey Crew	$181
One-Man GPS Survey Crew	$140
Three-Man Survey Crew	$201
Two-Man Survey Crew	$155
Registered Land Surveyor II	$166
Registered Land Surveyor I	$145
Survey Party Chief	$88
Survey Crew Member	$72
Right of Way Specialist	$112
Construction Inspector III	$108
Construction Inspector II	$95
Construction Inspector I	$88
Secretary/Assistant	$72
Print Specialist	$72

Note: All pre-approved overtime hours shall be invoiced at 1½ times the hourly billing rate shown above.

NON-LABOR RATES

Item	Rate
Travel	$0.54 per mile (or current IRS rate)
Subsistence	Actual Cost
Lodging	Actual cost
Special Postage or Shipping	Actual cost
Printing	Actual cost
Surveying Materials	Actual cost
Subcontract Specialty Services	Cost + 5%