

Terracon

Consulting Engineers & Scientists

4765 W. Junction St.
Springfield, Missouri 65802

**City of Branson
Purchasing Office
110 W. Maddux, Suite 200
Branson, MO 65616**

**Proposal No. 2495-09
July 09, 2019 3:00pm**

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BY: *1:26 p.m.*

L.R.



Engineering and Design Services: RFP2495-09
Compton Drive Wastewater Treatment Plant Flood Protection

July 9, 2019

Terracon

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AM

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Environmental



Facilities



Geotechnical



Materials

Terracon

ENR Rankings | 2018



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ATTN: David Rockhill, C.P.M.
(417) 334-3345

City of Branson
Purchasing Office
110 W. Maddux St., Suite 200
Branson, MO 65616

DATE: July 9, 2019

RE: Engineering and Design Services: RFP2498-09
Compton Drive Wastewater Treatment Plant (WWTP) Flood Protection

Dear Mr. Rockhill:

It is our pleasure to partner with the City of Branson (City) to create an innovative answer to the flooding issues at the Compton Drive Wastewater Treatment Plant (WWTP). The Terracon Consultants (Terracon) and Allgeier, Martin and Associates (AMA) team has extensive combined experience providing Geotechnical and Civil services to support flood protection designs for various types of structures in the Midwest and the United States. We have performed consulting engineering services on many similar project sites around the country for clients including cities, government agencies, A&E firms, program managers, construction managers, and others.

Our core expertise as a team includes subsurface exploration and testing, foundation analysis and design, in-situ testing and performance monitoring, earth structures, slopes and retention systems, dynamic analysis and evaluation, soil stabilization and ground improvement, geophysical exploration and modeling, Karst systems detection, hydraulic and hydrological analyses, floodplain mapping, and surveying.

Our team will have multi-faceted services under one roof, where none of the main services will be subcontracted. This will increase the quality of our services and deliverables and ensure a uniform QA/QC approach throughout the project, reducing the possibility of mistakes and miscommunication within the team members or with the City. Communication is a key aspect of a project of this magnitude. At the onset of the project we will meet with your key representatives to further understand your needs, feedback, and develop a proper frequency of updates throughout the life of the project.

Benefits to working with our team include:

Local Knowledge: Our team is familiar with the area in general and the site specifically. Members of our team have worked on the site in the past and developed a good working relationship with the City's personnel on the plant in addition to understanding the history of the site.

Responsiveness: Acting quickly to meet your deadlines, our team will always be available to you. With our local presence in Springfield, Joplin and Kansas City, we're able to quickly mobilize a workforce to respond to accelerated schedules and your changing needs.

Resourcefulness: Applying new technologies, processes, methodologies, and techniques allows us to take a proactive approach to solving project challenges and deliver your project better and faster.

We are confident that our team will provide a high level of service and look forward to working with you and your staff on this project. Should you have any questions regarding the attached proposal, please contact Adrian Keller at (913) 774-1094 or adrian.keller@terracon.com. Thank you for your time and consideration.

Sincerely,



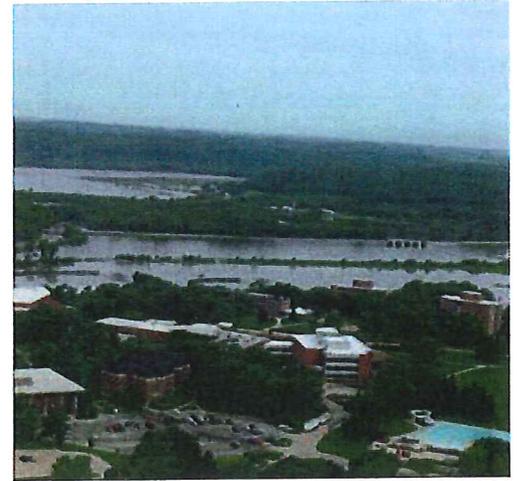
Adrian Keller, P.E., R.G.
Terracon - Project Manager



Chris Erisman, P.E.
Allgeier, Martin and Associates - Project Manager

Experience

Project Name/ Location	Staff	Similar Scope	Scheduling	Budget	Date
Luther College Levee FEMA Accreditation Decorah, IA	Steven Levorson, Ph.D. P.E.	1.2 miles of existing private levee required significant upgrades to meet current flood control standards.	Terracon was on schedule with all project deliverables, and maintained the client's strict not-to-exceed budget. Construction estimated to begin Fall 2019.	Estimate: \$115,000 (Geotech.) Final: \$115,000	2016 (Geo-tech.)
Levee Relief Well Design Des Moines, IA	Jerry Hentges, P.G.	Hydrogeological analysis, geotechnical exploration, relief well design, and groundwater modeling.	Project started with review of levee systems, and over time Terracon provided additional evaluations and design of mitigation solutions. We stayed involved over the 7-year lifecycle of the additional work.	Estimate: \$173,500 Final: \$173,500	2011-2018
Geophysical and Drilling Exploration Services for Karst Evaluation Benton County, AR	Jacob Spinsby, P.G., MSa	Geophysical exploration to characterize the site subsurface conditions (48.6 acres) and identify potential karst features that may impact future operations.	Incorporating a geophysical study allowed Terracon to collect a lot of data in a compressed amount of time. We were able to target specific follow-up areas with traditional geotechnical exploration, saving cost and schedule.	Estimate: \$47,000 Final: \$45,600	2019
Mercy Medical Center Proposed Flood Protection Cedar Rapids, IA	Jerry Hentges, P.E.	Proposed flood protection system to evaluate the impact of groundwater during flooding conditions on the Cedar River near the Mercy Medical Center.	Terracon conducted a subsurface evaluation due to flooding. Data was used to evaluate groundwater control options. Additional modeling for 500-yr flood event was performed and recommendations were provided. We kept the client on schedule to be able to construct a new facility adjacent to the existing one.	Estimate: \$23,800 Final: \$23,800	2010-2011
Baudendistel Dam Spillway Redesign New Haven, MO	Charles Patterson, Ph.D., P.E., CFM	Project required hydraulic and hydrogeologic analysis and development of solution based on the findings of the analysis.	Met owner's schedule expectations. As project needs changed and additional services were required, AMA assisted the client with design services, shop drawings, and inspection services.	Estimate: \$10,800 Final: \$30,700 (included addtl. services)	2017



Luther College Levee FEMA Accreditation DECORAH, IA

PROBLEM

The existing levee system protecting Luther College was built in several stages during the 1950's and 1960's. The levee had been constructed without underseepage mitigation features. In addition, multiple underground utilities crossed below and through the levee embankments, creating preferential seepage paths through the levee. At least one previous overtopping event had also breached a portion of the levee. Modifications were required to meet 100-year flood level events addressing freeboard, dimensional and condition issues.

SOLUTION

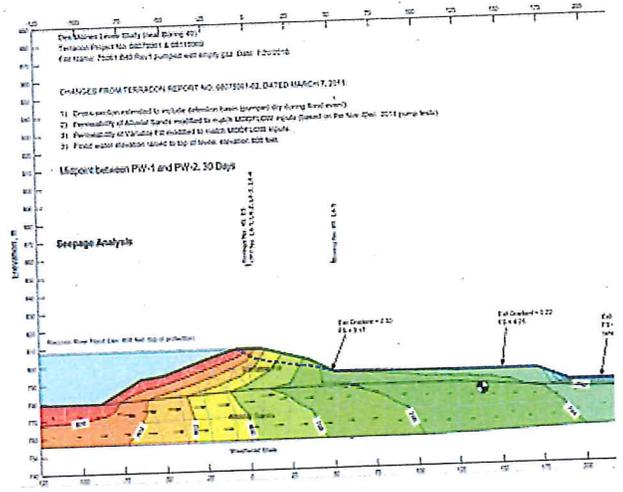
Terracon provided review and technical support during analysis and design of major levee modifications to provide flood protection for the campus for FEMA certification.

The levee was divided into several subsections depending on the proximity of development along the landside of the levee. Depending on the level of development, construction of landside seepage berms or installation of landside toe drains connected to pumping stations were developed to accommodate anticipated underseepage.

Installation of a clay core was used to interrupt sand layers found within the levee section. Freeboard and dimensional issues required regrading the cross sections of the levee to accommodate seepage and stability issues.

FEATURES

- Construction of landslide seepage berms to address underseepage exit gradients where adjacent development allowed.
- Construction of a clay core inspection trench in areas where sand layers were found in the levee section and in areas where underground utilities penetrated through the levee.
- Construction of continuous toe drains on the landside toe of the levee to accommodate underseepage in areas where adjacent development restricted seepage berm construction.



Levee Relief Well Design DES MOINES, IA

PROBLEM

The City of Des Moines was in the process of providing recertification of existing levees on the Des Moines and Raccoon Rivers. Terracon's geotechnical assessment and subsequent evaluations identified areas along levees where seepage estimates did not meet US Army Corps of Engineers (USACE) criteria.

Additional analyses were conducted during a subsequent evaluation and the reach of the Raccoon River Levee system failed to meet USACE criteria due to estimated high exit gradients on the land side toe of the levee. The options included a 300-foot clay blanket or relief wells. The 300-foot clay blanket did not appear to be feasible.

The City requested an assessment of the potential for groundwater withdrawal from the alluvial deposits by wells to mitigate groundwater seepage during extended periods of peak flood levels on the Raccoon River.

SOLUTION

The fundamental approach used was to simulate stress (pumping wells, gravity wells and drains) and response (water-level change) for proposed groundwater withdrawals. Terracon used a 3D finite difference numerical modeling technique, the United States Geological Survey (U.S.G.S.) computer model MODFLOW, to provide supportable simulations of aquifer response to groundwater flow and pumping.

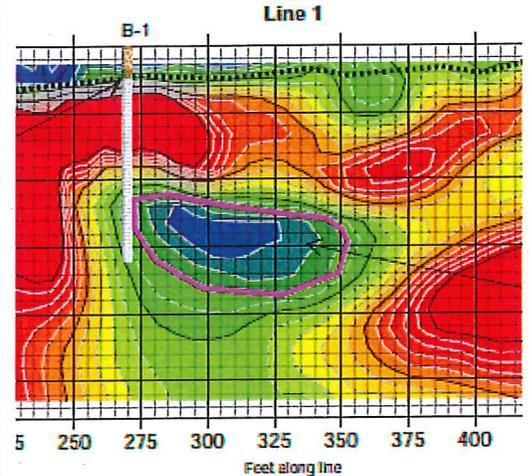
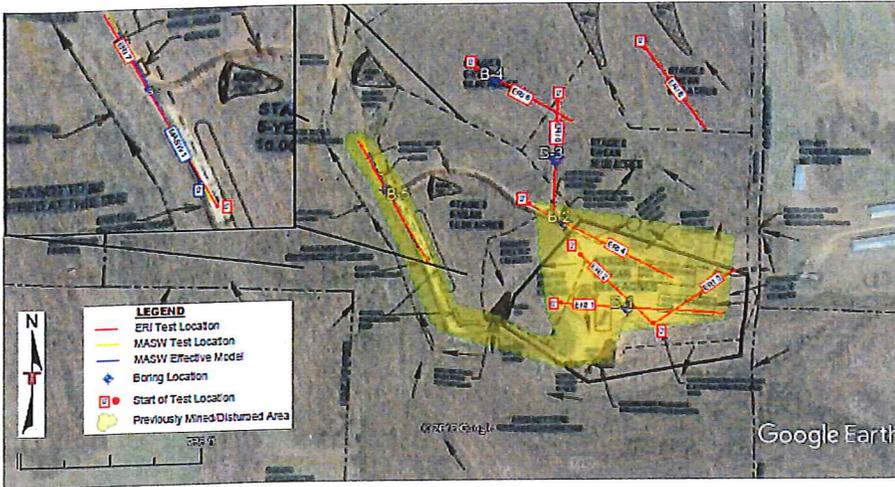
The objectives were accomplished developing a conceptual model and model calibration then conducting computer model simulations. Calibration of the model was accomplished by performing aquifer pumping tests and sieve analyses of area sand deposits.

To decrease the groundwater elevations along the levee during flood conditions, five relief wells were proposed. The relief wells were spaced at distances of approximately 500 feet. The model simulations indicated that the ground surface elevations on the land side of the levee would

not be exceeded by the potentiometric head elevations during flood conditions. The simulations indicated a portion of the groundwater elevations in the alluvial aquifer could be maintained below critical elevations and structures with a single line of extraction wells. The results indicated that pumping wells could lower water levels to sufficient levels to provide flood protection for critical structures and elevations.

FEATURES

- Global Stability and Seepage
- MODFLOW Evaluation
- Dewatering Design
- Aquifer Testing
- Deep and Shallow Drains
- Relief Well Design
- Hydrogeological Analysis
- Groundwater Modeling



Geophysical and Drilling Exploration Services for Karst Evaluation BENTON COUNTY, AR

PROBLEM

The current Benton County mine is operated as a red dirt mine, but the Benton County planning board is proposing to make it rock quarry.

As a part of a due diligence effort, the County needed a geophysical study performed to characterize subsurface conditions and identify potential karst features.

SOLUTION

Terracon performed a geophysical exploration to characterize the site subsurface conditions and identify potential karst features that may impact future quarry operations.

The exploration services for this project included eight electrical resistivity imaging (ERI) lines, one Multi-Channel Analysis of Surface Wave (MASW) line and the advancement of five borings to depths ranging from 36½ to 80 feet.

Relatively high resistivity values (red, orange, and yellow) are consistent with the resistivity characteristics of competent bedrock (i.e. slightly fractured and weathered), or air-filled voids. Relatively lower resistivity values (green, blue, and purple) are consistent with the resistivity characteristics of soils consisting of clay, sand, and gravel or highly fractured bedrock.

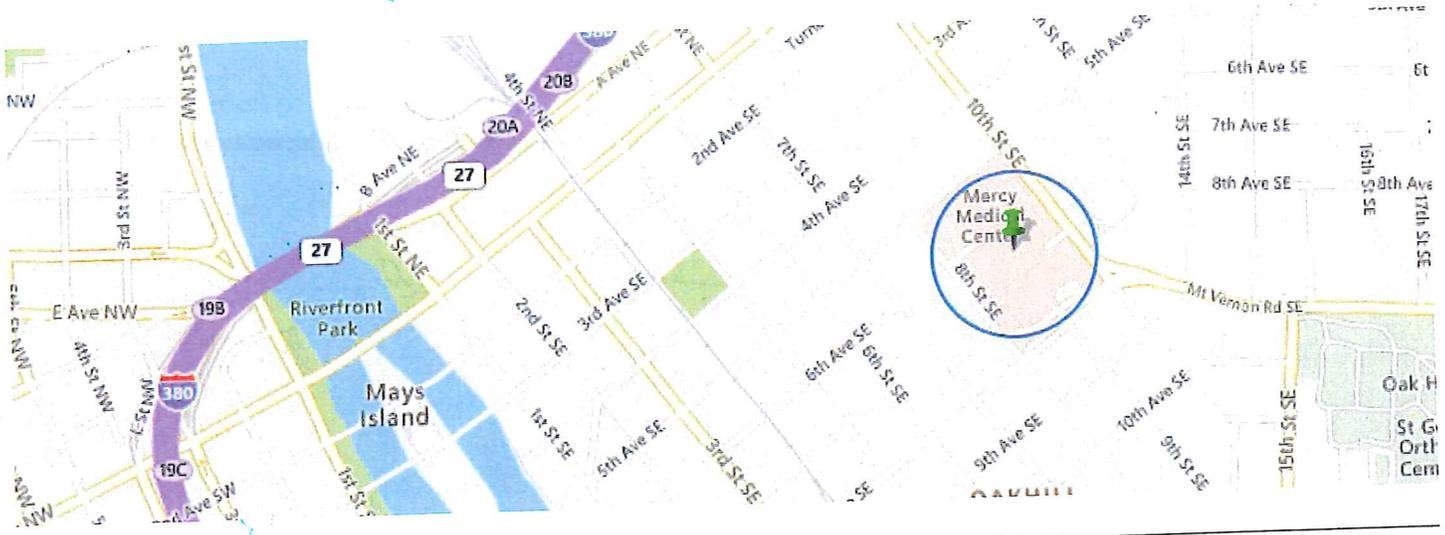
We explored a limited number of the observed anomalies with soil/rock borings to differentiate between fracture zones, weathered rock, voids, highly

resistive bedrock, wet soils, and possible water filled voids.

Geophysical findings were confirmed by drilling a total of five soil sample/rock core borings at locations selected in the field upon review of preliminary ERI and MASW data.

FEATURES

- Karst Evaluation
- Electrical Resistivity Imaging (ERI) system
- Multi-Channel Analysis of Surface Wave (MASW) seismic survey
- Geotechnical Drilling Services to verify anomalies



Mercy Medical Center Proposed Flood Protection

CEDAR RAPIDS, IA

PROBLEM

The purpose of the evaluation was to perform analyses of the proposed flood protection system to evaluate the impact of groundwater during flooding conditions on the Cedar River near the Mercy Medical Center.

The objective of this effort was an assessment of the potential for groundwater withdrawal from the shallow alluvial deposits by wells to mitigate groundwater seepage during extended periods of peak flood levels on the Cedar River.

SOLUTION

The evaluation assessed the degree of influence that the Cedar River will likely have on the subject area during a 500-year flood event and the location and type of dewatering methods that would be anticipated to mitigate the increased groundwater elevations in specific areas.

The fundamental approach used during this evaluation was to simulate stress and response for proposed groundwater extraction systems. The evaluation allowed an assessment of the potential for groundwater in the vicinity of the Cedar River to migrate upward through alluvial deposits and inundate areas within the Site.

Terracon used a 3D finite difference numerical modeling technique, MODFLOW, to provide supportable simulations of aquifer response to groundwater flow and pumping.

The objectives were accomplished by development of a conceptual model and model calibration followed by computer model simulations

with subsequent analysis and interpretation of the results.

A review of the existing hydrogeologic data was conducted to evaluate pumping volumes and rates, groundwater level response, aquifer characterization, and boundary conditions.

A comparison of the critical structures and elevations with the piezometric head shown in the model simulation indicated that groundwater was reduced below the finished floor elevations of the critical structures at the site with six pumping wells.

FEATURES

- Geotechnical and Hydrogeologic Evaluation
- Flood Protection System
- Groundwater Seepage Mitigation



Baudendistel Dam Spillway Redesign

NEW HAVEN, MO

PROBLEM

The Missouri Department of Natural Resources (MDNR) inspection of the Baudendistel Dam in June, 2016 concluded that the principal spillway pipe had defects which could endanger the safety of the dam.

The defects included compromised joints, cracks in the pipe sections, problems near the inlet connection, sinkholes on the downstream face of the dam, and insufficient freeboard due to blockage of the spillway pipe with concrete.

The blockage reduced the flow capacity of the principal spillway. These deficiencies required the owner to either repair the existing pipe or replace it with a suitable alternative spillway and fill the existing pipe with grout.

SOLUTION

The AMA Hydro Team worked closely with the client to engineer a solution that would both satisfy the client and bring the dam into compliance with MDNR. The spillway redesign consisted of hydraulic and hydrologic analysis and the design of a concrete riser paired with a coated steel spillway pipe to replace the existing system.

This redesign ensures a safe, long-term solution for the client. We also provided on-site inspection during construction to verify critical elements of the project. These included verifying that the pipe coating was properly applied, the soil compaction process was done properly, and the pipe and riser were connected as designed.

Furthermore, AMA provided a completion survey and the composition of the MDNR Safety Permit Application.

FEATURES

- Hydraulic and hydrogeologic analysis.
- The Baudendistel Dam is an Environmental Class I Dam located near New Haven, MO, with a drainage area of 113 acres, an 11-acre reservoir, and is contained by a 48-foot high earth dam.
- The lake features a single principal spillway and a single emergency spillway. Initial construction of the dam was completed in 2001.

Project Approach/Understanding

Terracon and AMA team members are skilled and prepared to create an efficient and cost-effective solution to protect the Compton Drive WWTP from future flooding. We have compiled a team of highly-experienced geotechnical, geophysical, hydraulic, hydrogeological and wastewater treatment engineers combine their knowledge to craft the best solution.

After a cursory review of your problem and internal discussion with our Team, there are several key areas of focus:

- Current data gathering to refine the hydraulic model and ground water model
- Review and analysis of a flood protection wall, sheet-pile or alternatives
- Mitigation of groundwater seepage in the facility
- Value Engineering for initial construction vs. maintenance costs

Ongoing monthly project update/coordination meetings will be held between the City and the Terracon/AMA team. More frequent project meetings may occur as necessary or as requested.

Phase 2 - Preliminary Design

1. Geotechnical Field Investigation

- Terracon will meet with the City and visit the site to understand the history and needs of the project and the desired solutions.
- Terracon will perform a review of publicly available historical data and subsurface information available within Terracon's comprehensive GIS database of the region.
- Based on our meetings, site visit, and the data review, a preliminary field exploration program will be developed. The preliminary exploration program includes private utility locate, geotechnical borings with appropriate laboratory testing, and site surveying.
- In conjunction with drilling operations, a suite of geophysical methods will be deployed to gather additional subsurface information. The geophysical data collected will be calibrated using our preliminary field exploration borings.

2. Geophysical Field Investigation

Terracon has a geophysical group consisting of over 50 geophysicists and geophysical staff across the country, including nearby Springfield. Our geophysical group has extensive experience with levees and floodwalls and in areas with karst concerns. We have performed dozens of karst investigations in the upper Midwest.

For this project, we anticipate tailoring our geophysical exploration to the site using a combination of several methods, such as:

- Electrical resistivity tomography (ERT) for karst along the perimeter, among other

- features such as buried stream channels.
- Seismic methods such as p-wave refraction, multi-channel analysis of surface waves (MASW), and refraction microtremor (ReMi) for depth to bedrock and qualitative analysis of bedrock.
- Ground-penetrating radar (GPR) including single- and multi-channel GPR for depth to bedrock and karst features in the near-surface.
- Electromagnetic induction (EMI) for near-surface changes in ground conductivity (karst features).
- Other methods may be employed in specific circumstances. Terracon has an extensive toolbox of geophysical methods outside those listed above that we employ when site exploration encounters specific challenges.

The specific methods and coverage will be chosen in close collaboration with the team to provide a tailored geophysical exploration program specific to the site and the needs of the geotechnical engineers and designers. Once completed, our report emphasizes the practical use of the geophysical data: directing future direct-exploration activities (i.e. borings) and informing the team on likely site conditions outside of the direct-exploration (i.e. correlating with the existing data).

Inherently with a site as complex as this one, questions will arise after the investigation and we stand ready to work with the team throughout the entire process.

Project Approach/Understanding (Continued)

A targeted subsurface exploration program will be implemented to identify and quantify anomalies found in the subsurface based on the preliminary geotechnical and geophysical modeling. Data collected will be used for the hydrogeological and seepage analysis modeling.

2. Flood Hydraulic Modeling

AMA will revise the current model for the White River affecting Lake Taneycomo and subsequent release of water from Table Rock Dam by the US Army Corp of Engineers. The City's digital aerial photography and 2-foot topographical data layer will be exported by the City to AMA for use in modeling. New cross sections will be added to the model and supplemented with bathymetric survey as needed. We will determine the impact of increasing the flood protection at the WWTP on neighboring properties. We will also determine if No-Rise certification or LOMR is needed. We will compute the anticipated duration of the 1% flood for seepage analysis. Any additional data gathering methods requested by the City will be considered to ensure a complete data set is obtained for accurate design decisions.

3. Groundwater Seepage Analysis/Modeling

Terracon will review previous studies at the site and in the general region. The existing hydrogeological data obtained from previous studies and published in the literature will be used to develop a conceptual model for the area. The data obtained from the site-specific assessment will be used to refine and calibrate the model. The data evaluated will include aquifer characterization for hydraulic parameters of the various subsurface deposits, groundwater flow boundary conditions. Terracon will use a 3D finite difference numerical modeling technique, the United States Geological Survey computer model MODFLOW, to provide supportable simulations of aquifer response to groundwater flow and relief well operation. The objectives will be accomplished by development of a conceptual model and model calibration followed by computer model simulations with subsequent analysis and interpretation of the results.

4. Design Report and Cost Opinion Update

Various solutions and implementation plans will be presented to the City with collaboration from the Terracon/AMA team. The team will run additional scenarios based on discussions and feedback.

5. Funding Sources

AMA will explore and pursue eligible funding sources to support engineering and construction of this project. Funding sources identified as viable options will be shared with the City and a determination made whether to apply. If funding is applied for, AMA will assist the City with the application and provide necessary engineering data. This will also be dependent upon the City to supply requested data in a timely manner to meet funding application deadlines.

Phase 3 - Final Design, Construction Bid Documents and Bid Phase Services

Once a Preliminary Design is agreed upon by the City and Team, the chosen design option will be implemented into final design drawings and specifications. Cost estimate for construction will be completed and submitted to the City for approval. The design shall be in conformance to the *City of Branson Design Criteria for Public Improvement Projects*. Permit applications will be submitted to applicable governing agencies for approval. If required, a Corps of Engineers 404 permit application will be completed in this phase for the proposed work. Submission of a Floodplain Development Permit application and, if applicable, a No-Rise certification will be completed. If a LOMR is required, the paper work would be submitted to FEMA after completion of the project upon receipt of the as-build survey.

Once the permits have been secured and the City gives approval to bid the project, AMA will provide the City a full size to scale (24x26) set with wet seal and sealed PDF file of the plans and a MS Word file of the specifications for posting on the City's website. Both Terracon and AMA will be available to answer questions from contractors during the bidding phase and be the source of contact for plans and specifications to the bidders. AMA will be present during bid opening and prepare a bid tabulation with a recommendation of award.

The design shall not interrupt water or sewer service or prohibit continuous flow of wastewater through the treatment facility. If utilities are impacted by the final design plans, such utilities will be designed for relocation and coordinated as such.

Quality Assurance/Quality Control

In addition to individual responsibilities, collaborative project review is a crucial component of Terracon's quality program. The level and extent of review depends on the deliverable or task. Field and laboratory data, calculations, opinions, recommendations, and conclusions are reviewed by a second set of eyes for quality control. Project managers and internal authorized project reviewers (APRs), together with the necessary project management and technical expertise, collaborate to achieve quality objectives at critical project junctures. Project execution is confirmed through the signatures of both the project manager and APR on project deliverables.

Authorized Project Reviewer (APR) Program

Without exception, every project is assigned an APR who collaborates with the project manager on quality and technical objectives for the duration of the project. The APR is engaged at the proposal stage and remains on the project through execution and closeout. APRs review:

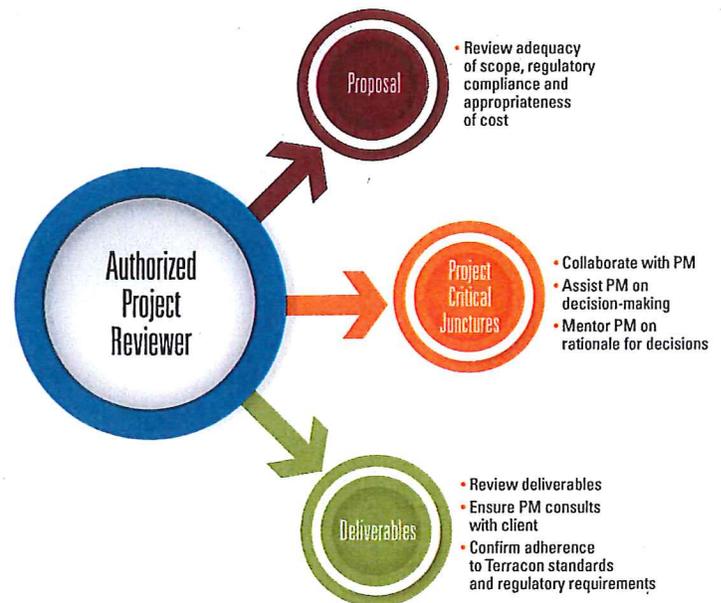
- proposals,
- procedures,
- calculations, and
- final submittals

to verify data quality, accuracy, analytical methods, results, opinions, recommendations, and conclusions.

The APR plays a central role in our quality program, highlighted by the following four primary areas of project responsibility:

- **Quality Oversight:** The APR reviews the proposal and is involved at the kick-off meeting, and at major milestones, stages, and critical junctures providing direction and insight to guide the project to its successful completion.
- **Coaching:** The APR coaches and advises the project manager on various aspects of the project emphasizing quality, risk, on-time delivery, budget, scope of work, and other client expectations.
- **Risk Management:** The APR guides the project team to properly assess project-specific risk.
- **Safety Awareness:** The APR raises awareness at the project level by communicating with the team to focus attention on their own personal safety and on the safety of all project team members.

Selected based on their experience, technical knowledge, project management experience, and analytical and evaluation skills, APR candidates undergo a rigorous training and review process before being approved as an APR. They are required to participate in annual training and in a periodic review process.



Adrian Keller, P.E., R.G.
TERRACON PROJECT MANAGER

PROFESSIONAL EXPERIENCE

Adrian is a National Manager of Terracon's Geotechnical service line in the Transportation and Infrastructure Sector. He has more than 20 years of engineering experience, working directly with agencies, owners, project management, technical leadership, and team management. Adrian has coordinated design and led project teams utilizing alternative project delivery throughout the United States and New Zealand.

Adrian maintains a high technical acumen and continues to lead teams in technical delivery. He is involved in contract negotiations with subcontractors or joint venture team partners and participates in strategic project pursuits. He strives to always find quality outcomes by taking on challenges head-on and encourages team members to strive to be their best.

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PROJECT EXPERIENCE

Broadway Bridge – Little Rock, AR

Adrian directed and managed the geotechnical exploration program, coordinated with project team partners, drilling subcontractors, and the Arkansas Highway Transportation Department officials. The project included evaluation of liquefaction hazards of young river deposits, lateral spreading analysis, and river bank stability. Coordination was required with the US Army Corps of Engineers to evaluate the impact of the proposed bridge foundation elements within and adjacent to the existing flood control levee.

Cleveland Innerbelt Bridge – Cleveland, OH

Adrian was responsible for leading the geotechnical team and managing delivery for the replacement bridge structures and walls for Contract CCG1. As part of CCG2, Adrian worked with ODOT's team as an owner's representative to develop technical specifications and contract documentation for delivery of the design-build program for the second replacement bridge and related infrastructure.

Steven Levorson, Ph.D., P.E.
SENIOR GEOTECHNICAL CONSULTANT

PROFESSIONAL EXPERIENCE

Steve is based in the Lenexa, KS office of Terracon. He provides technical review and consultation with clients and other Terracon professionals on major geotechnical engineering projects. He conducts specialized analyses involving seepage mitigation for levees, as well as embankment stability, landslide stabilization, and deep foundations.

PROJECT EXPERIENCE

Luther College Levee FEMA Accreditation – Decorah, IA

Steve provided Senior Technical Review and technical support during analysis and design of major levee modifications to provide flood protection for the Luther College campus for FEMA certification. Modifications included design of seepage berms, underseepage cutoff and design of underseepage drainage.

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East Side Levee Design – Cedar Rapids, IA

Steve provided Senior Technical Review and technical support during analysis and design of a new levee being constructed to provide flood protection for an industrial park. The levee alignment crossed an abandoned sand and gravel quarry that had been backfilled with a mixture of soil and construction debris requiring design of seepage cutoff and auxiliary drainage measures.

Velasco Levee District FEMA Certification – Houston, TX

Steve provided Senior Technical Review for the FEMA certification of a system wide evaluation of an existing levee system that had been poorly maintained and required significant rehabilitation due to tree and brush encroachment and degradation due to burrowing animal activity.

Gerald (Jerry) Hentges, P.G. HYDROLOGIST

PROFESSIONAL EXPERIENCE

Jerry manages projects for water supply, wetland mitigation, groundwater flow and contaminant fate and transport modeling, dewatering, underground storage tanks and hazardous waste facilities.

Jerry has been involved with all aspects of surface and groundwater control from assessment to system design. He is responsible for planning and conducting assessments and dewatering system designs at private and publicly owned facilities.

Jerry has developed groundwater modeling studies to assess the impact of shallow and deep drains and extraction wells for several clients. These plans included extraction system design and component specifications. He has conducted long-term, site-specific field assessments to evaluate the extractable volume of groundwater under normal and flooding conditions.

He has performed groundwater modeling using MODFLOW, MODPATH, MD3D and RT3D simulation programs to characterize groundwater

flow and contaminant fate and transport during assessments and remedial well design and operations.

PROJECT EXPERIENCE

Mercy Medical Center Flood Protection – Cedar Rapids, IA

The purpose of the evaluation was to perform analyses of the proposed flood protection system to evaluate the impact of groundwater during flooding conditions on the Cedar River near the Mercy Medical Center. The objective was to assess the potential for groundwater withdrawal from the shallow alluvial deposits by wells to mitigate groundwater seepage during extended periods of peak flood levels on the Cedar River.

Flood Protection Design - Coralville, IA

Jerry performed an analyses of the proposed flood protection system and conducted aquifer modeling activities to evaluate the impact of groundwater during flooding conditions on the Iowa River and Clear Creek levees in the City of Coralville, Iowa.

Jacob Spinsby, P.G., MSc GEOPHYSICIST

PROFESSIONAL EXPERIENCE

Jacob provides national and international geophysical exploration leadership for Terracon's extensive geophysical services. He is Terracon's national manager for geophysical services and oversees the 50+ person geophysical group. He provides technical and project management oversight, having overseen and performed thousands of shallow-surface explorations, advanced subsurface utility locating/designating, and geophysical and infrastructure investigations.

Jacob possesses excellent communication skills and is a liaison between the geophysical and engineering community. He brings geophysical leadership as well as extensive knowledge of geophysical methods, collection, and processing to the project.

PROJECT EXPERIENCE

Bedrock Topography/Quality Survey for New Floodwall Construction – Cedar Rapids, IA

Jacob provided technical leadership, oversight, and project management for the bedrock topography survey for the new floodwall constructed in downtown Cedar Rapids, Iowa in response to the devastating 2008 flood. This work included seismic refraction, MASW, and ReMi seismic methods to evaluate the depth to bedrock as well as the qualitative strength of the bedrock. This information was used to direct drilling and engineering activities for the project.

Missouri River Levee Evaluations – Omaha, NE

Jacob provided technical leadership, oversight, and project management for the Missouri River levee evaluations near Omaha, Nebraska. Over 10,000 linear feet of levee were evaluated using electrical resistivity tomography (ERT). The cross-sectional ERT was interpreted for soil types within the levee, especially sand. The data was used to direct CPT and boring activity. Additionally, the ERT data we provided assisted the Army Corps of Engineers in developing a new method for evaluating levees.

Chris Erisman, P.E. AMA PROJECT MANAGER



PROFESSIONAL EXPERIENCE

Chris provides project management and engineering for Water, Wastewater and Site Development projects. He is a Vice President overseeing project management for projects involving these disciplines.

The benefits of hiring Chris for your project include his experience with municipal and rural water and wastewater systems. More than just the planning and engineering of these utilities, Chris is a good communicator who understands the budget constraints and political sensitivities of public utilities. He is a liaison with federal, state and city regulatory agencies. Chris also knows the critical funding sources available and associated guidelines.

PROJECT EXPERIENCE

Wastewater Plant Improvements – Nevada, MO
AMA was retained to design major improvements and provide construction phase services. The

existing peak flow capacity was expanded from 4 million gallons daily (MGD) to 10 MGD by adding two new aeration basins and two new clarifiers in a “doughnut” type configuration. The raw sewage pumping capabilities were also expanded. A new larger Lab building was included to provide a lab area, restroom and locker facilities, offices, meeting and break rooms, and a SCADA based motor control center.

CDBG-Disaster Relief Sewer Collection Renovations – Joplin, MO

After the 2011 Joplin Tornado, the City was granted funds from CDBG – Disaster Relief, to repair the sanitary sewer collection system that were damaged. Chris provided oversight for the design and delivery of engineering plans. This included installation of 28,000+ linear feet of 8”-21” diameter gravity sewer pipe, 90,000+ linear feet of cured-in-place pipe (CIPP), 495 manholes repaired or replaced, lateral line installations and repairs and pressure testing.

John Forrester, P.E. CLIENT LIAISON



PROFESSIONAL EXPERIENCE

John specializes in consulting engineering for municipalities and water utilities. He designs water and wastewater systems and stormwater handling facilities. The benefits of hiring John for your project include his ability to manage a project from the study phase, through planning, design and construction. This allows for efficiencies that save you time and money. This holistic approach ensures quality control throughout the project. John’s approach includes advocacy for state and federal regulations and knowledge in multiple funding sources for municipal water and wastewater projects. John has also been involved in past projects for the City of Branson and brings a working knowledge of their system and treatment facilities.

PROJECT EXPERIENCE

Water System Expansion – Branson, MO
The City wished to extend water service to an area north and northwest of the Highway 76 and

Shepherd of the Hills Expressway intersection. John is providing project management for the delivery of engineering plans for approximately 7,500 linear feet of 8” and 12” water line, one booster pump station and a 750,000-gallon elevated storage tank.

Missouri Highway VV Sewer Upgrade – Branson, MO

John provided project management for the most cost-effective solution to provide expanded capacity of the wastewater collection and transportation system. The solution was to decommission one pump station by extending gravity sewer downstream to an upgraded pumping station along with installation of a new properly sized force main that transported the wastewater to the existing collection system north of Highway 60. Additionally, the third pumping station was allowed to utilize the previously undersized common force main as now a dedicated force main.

Charles Patterson, Ph.D., P.E., C.F.M. HYDROLOGY/HYDRAULICS MODELING AND ANALYSIS



PROFESSIONAL EXPERIENCE

Charles leads the Hydro Team of the firm. The Hydro Team specializes in hydrologic and hydraulic modeling, analysis and design of stormwater facilities. Charles provides plan review of hydraulic and hydrologic reports, expert witness research, MS4 permitting and 404 permitting.

PROJECT EXPERIENCE

New Madrid County Port Authority – Sikeston, MO

Charles completed hydraulic modeling to determine the impact to the 1% annual exceedance probability (AEP) flood elevations for a wider access road located in a FEMA regulated floodway. The modeling also provided a “no-rise” condition for a 2.5-acre addition to the Port. Charles created a FOIA request to the USACE to acquire a recently updated hydraulic model of the Mississippi River and modified the model to incorporate the existing and proposed conditions. The original project was determined to fulfill the “no-rise” conditions.

15th & Murphy Detention & Flood Reduction – Joplin, MO

Charles analyzed the Joplin Creek watershed and determined the design of 11-acre detention pond upstream of 7th St. & Illinois Ave. to reduce flooding. Included with the design of the detention pond is a landscaping plan that converts the eleven acres to native grasses and trees.

Baudendistel Dam Spillway Redesign – New Haven, MO

Redesigned spillway to ensure long-term safety to the dam. The spillway design consisted of hydraulic and hydrologic analysis and the design of a concrete riser paired with a coated steel spillway pipe to replace the existing system.

Eric DeGruson, P.E.

DESIGN ENGINEERING FOR MODIFICATIONS TO WWTP



PROFESSIONAL EXPERIENCE

Eric is a Project Engineer managing projects in water and wastewater systems, site development and Concentrated Animal Feeding Operations (CAFO) permitting. In particular, Eric completes computer model analysis for water systems, cost estimating, planning and design of water and wastewater treatment facilities, engineering for improvements to wastewater collection and water distribution systems. He has specialized knowledge of numerous regulatory agencies and funding programs.

Regulatory Expertise – Missouri Dept. of Natural Resources, Oklahoma Dept. of Environmental Quality, Kansas Dept. of Health & Environment, Army Corp of Engineers, Various Railroads & City Utilities.

PROJECT EXPERIENCE

Center Creek WWTP Expansion & Improvements – Webb City, MO

AMA recommended combining the Webb City and Carterville wastewater treatment plants. AMA's design resulted in the construction of a gravity sewer interceptor and new centralized plant. The original plants were designed to handle 1.4 million gallons a day (MGD) average flow. At a peak they could handle 5.3 MGD. AMA expanded the plant to 4.8MGD average and 9.3 MGD peak flow. The original plant was put in operation in 1988. It has consistently produced effluent superior to National Pollutant Discharge Elimination System (NPDES) limits.

New Seneca WWTP – Seneca, MO

A new wastewater treatment plant was designed for the City of Seneca. As a part of the project, the existing lagoon was dredged and the biosolids tested and land applied. AMA assisted with implementing the sludge management plan, acquiring land application sites and assisting with oversight of the testing and dredging of the sludge.

Dean Willis, P.E. PROJECT MANAGER



PROFESSIONAL EXPERIENCE

Dean Willis is Chairman of the Board for Allgeier, Martin and Associates, Inc. Dean directs the Civil Division and is the firm's Senior Wastewater Engineer. Dean specializes in the management of major sanitary engineering projects, water supply, treatment, storage and distribution systems. He is particularly skilled in the preparation of studies, cost estimates, facilities design and O&M manuals. He is a valuable liaison with federal and state regulatory agencies in the design of water and wastewater systems.

PROJECT EXPERIENCE

Shoal Creek WWTP – Joplin, MO

- 1988 WWTP design to replace overloaded and outdated plant. 6.5 MGD average and 15 MGD peak flow design. Included trickling filter towers and anaerobic sludge digestion.
- 2015 increased plant capacity required by growth and to meet tightened regulations on BOD and suspended solids. Improvements included activated sludge facilities, clarifiers,

effluent filters, ultraviolet disinfection equipment, aerobic & anaerobic digesters, gravity belt thickener. Increased capacity to 7.2 MGD average and 19 MGD peak.

- 2017 Trickling filter tower media replacement.
- 2019 Grit Auger Repairs.

Turkey Creek WWTP – Joplin, MO

- 1982 original WWTP design. 6 MGD average and 12 MGD peak flow design. A 28-acre basin provided 67 MGD of flow equalization.
- 1995 expansion increased capacity to 15 MGD average and 24 MGD peak flows.
- 2012 improvements included ultraviolet disinfection, improved digestion and dewatering of sludge.
- 2015 Tertiary filter replacement and doubled filter capacity.
- 2017 Grit auger replacement and anaerobic digester repairs.
- 2019 Replacement of two headworks screw pumps and anaerobic digester boiler.



References

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