



*Small, Serene, Simply Garnett.*

## City Commission Meeting

## AGENDA

August 23, 2022, 6:00 P.M.

- 
- I. **Call to Order of the Regularly Scheduled City Commission Meeting (6:00 p.m.)**
    - A. Pledge of Allegiance
    - B. Invocation, David Shrum, First United Methodist Church
  - II. **Citizens to be Heard (Five-Minute Time Limit Per Person)**
  - III. **Recognition**
    - A. Employee of the Month
  - IV. **Governing Body Comments**
    - A. Commissioner Cole
    - B. Commissioner Sheahan
    - C. Mayor Gwin
  - V. **Consent Agenda**
    - A. Approval of Minutes from August 9, 2022, Regular City Commission Meeting
    - B. Approval of Semi-Monthly Bills and Payroll in the amount of \$184,201.37
  - VI. **Regular Business**
    - Transportation Plan Presentation from Jason DeWald, McClure Engineering.
    - Proclamation declaring September 2022 as Suicide Prevention and Awareness Month.
    - Consideration of Resolution 2022-10 Consideration of Adoption of a Redevelopment District.
    - Consideration of Resolution 2022-11 Giving of Notice of a Public Hearing on Creating a Community Improvement District in the City of Garnett.
    - Consideration of the Temporary CMB Application for Anderson County Corn Festival.
    - New Trash Truck
    - Engineering Alternatives Report Presentation from Mark Griffin, McClure Engineering.
    - Consideration of Design & Construction Proposal, McClure Engineering.
  - VII. **Discussion Items**
    - New County Fire Barn Easement Conveyance
    - Hope Anthem Fall Festival Date and venue change
    - League of Kansas Municipalities Annual Conference
  - VIII. **Informational Items**
    - A. Fun in the Sun Car Show, hosted by Bill Smith, will be held on August 27 in Colony.
    - B. The Concerts in the Park Series, Hosted by Morning Mingle, will be held on Thursdays in Donna Harris Memorial Park beginning September 1<sup>st</sup>.
    - C. Demolition Derby, hosted by the Anderson County Fair Association will be held the North Lake Park Rodeo Arena on September 3<sup>rd</sup>.



*Small, Serene, Simply Garnett.*

**City Commission Meeting      AGENDA      August 23, 2022, 6:00 P.M.**

- D. Colony Day Celebration, Hosted by the Colony Day Committee, will be held on September 3<sup>rd</sup>.
  - E. First Responders 9/11 Lunch, hosted by Morning Mingle, will be held on September 9<sup>th</sup>.
  - F. The 19<sup>th</sup> Annual Greeley Smokeoff/Larry Schaffer Memorial Softball Tournament, hosted by the Greeley Smokeoff, will be held in Greeley September 9-10.
  - G. Fall City Wide Garage Sale Day & Sidewalk Sales, hosted by the Garnett Publishing Company, will be held on September 10<sup>th</sup>.
  - H. The 111<sup>th</sup> Annual Kincaid Free Fair, hosted by the Kincaid Fair Board, will be held on September 22-24.
  - I. Cornstock Concert on the Hill Music Festival, hosted by the Anderson County Corn Festival, will be held at the North Lake Park on September 24<sup>th</sup>.
- IX.    **Citizens to be Heard (Five-Minute Time Limit Per Person)**
- X.    **Adjournment**

# *Employee of the Month*



*July 2022*

*The City of Garnett recognizes  
Shane Henkle*

*in recognition of his dedication, passion and hard work.*

*Thank you, Shane, for your service to our community.*

*Signed* *Chairs Wilson* *Date* *08/03/2022*

August 9, 2022  
Garnett, Kansas

The Governing Body of the City of Garnett met in regular session on August 9, 2022, at 6:00 p.m. with the following individuals present; Greg A. Gwin, Mayor, Jody Cole, City Commissioner, Jason Sheahan, City Commissioner; Travis Wilson, City Manager; City Attorney Terry Solander, Trish Brewer, City Clerk.

### **CALL TO ORDER**

Mayor Gwin called the meeting to order at 6:00 p.m.

The Pledge of Allegiance was recited, followed by Art Black, with the Buffalo Nazarene Church giving the invocation.

### **PUBLIC HEARING FOR THE 2023 CITY OF GARNETT BUDGET**

6:02 pm

Mayor Gwin motioned to open a Public Hearing for the 2023 City of Garnett Budget. Seconded by Commissioner Cole. Motioned passed (3) AYE, (0) NAY

City Manager Wilson stated there would be no city tax increase for 2023 and highlighted increasing amounts for 2023 projects. No citizen comments.

6:08 pm

Mayor Gwin motioned to close the Public Hearing at 6:08 pm. Seconded by Commissioner Cole.

Motion passed (3) AYE (0) NAY

### **Regular Business Item: Audit Presentation from Kyle Spielbusch, Jarred, Gilmore and Bell. moved up on agenda.**

Kyle Spielbusch presented the Auditors' Report for the year ending December 31, 2021. Mr. Spielbusch then held a question answer session for Commissioners.

### **CITIZENS TO BE HEARD**

None

### **RECOGNITION**

Employee of the Month – tabled employee still working

### **GOVERNING BODY COMMENTS**

- *Commissioner Cole*

No comment

- *Commissioner Sheahan*

No comment

- *Mayor Gwin*

Stated the Library board met last night voting 6-0 in favor of keeping the gender book in the Public Library. Mayor Gwin expressed his disappointment in the vote.

### **CONSENT AGENDA**

- **Approval of Minutes from the July 27, 2022, Regular City Commission Meeting.**

Commissioner Cole made a motion to approve the minutes for the July 27, 2022, Regular City Commission Meeting with the correction. Mayor Gwin seconded the motion.

Motion passed (3) AYE (0) NAY



- **Approval of Semi-Monthly Bills and Payroll in the amount of \$328,048.46**

Commissioner Sheahan made a motion to approve the Semi-Monthly Bills and Payroll in the amount of \$328,048.46. Commissioner Cole seconded the motion.

Motion passed (3) AYE (0) NAY

## **REGULAR BUSINESS**

- **Consideration of the 2023 City of Garnett Budget**

Commissioner Cole motioned to approve and accept the 2023 City of Garnett Budget as presented. Seconded by Mayor Gwin. Motion passed (3) AYE (0) NAY

- **Consideration of the 2022 Church of the Nazarene Event Agreement.**

Mayor Gwin motioned to approve the 2022 Church of the Nazarene Event Agreement as presented. Seconded by Commissioner Cole. Motion passed (3) AYE (0) NAY

- **Consideration of the TGT Applications from the Anderson County Flywheelers.**

Commissioner Sheahan motioned to approve the TGT Applications from the Anderson County Flywheelers as presented in the amount of \$2100.00. Seconded by Commissioner Cole. Motion passed (3) AYE (0) NAY

- **Consideration of the TGT Application from Mundell LLC.**

Commissioner Sheahan motioned to approve the TGT Application from Mundell LLC for the purpose of Great Pumpkin Bash advertising as presented in the amount of \$2498.00. Seconded by Commissioner Cole. Motion passed (2) AYE (1) NAY ( Mayor Gwin)

- Commissioner Sheahan motioned that the Tourism Department would not accept any further TGT Applications for the 2022 year. Seconded by Commissioner Cole.  
Motion passed (3) AYE (0) NAY

- **Consideration of Appointment of Allison Benton and Don Nungesser to the Airport Advisory Board.**

Commissioner Cole motioned to accept the appointments of Allison Benton and Don Nungesser to the Airport Advisory Board. Seconded by Mayor Gwin. Motion passed (3) AYE (0) NAY

## **DISCUSSION ITEMS**

- **New County Fire Barn Easement Conveyance**

City Manager, Wilson updated the Commission stating easements will be needed. City Manager, Wilson stated he is taking the easement request to the County Commission, Monday during their meeting for approval. Once approved the city will begin installation of utilities.

- **Airport Environmental Assessment**

City Manager, Wilson gave an update stating that the draft for the assessment as been completed.

- **Transportation Plan Presentation**

City Manager, Wilson stated that McClure Engineering will be in town early next week to meet and go over the Transportation Plan. He also stated McClure will be in attendance at the August 23<sup>rd</sup> Commission Meeting to present to the Commission.

## **INFORMATIONAL ITEMS**

- A. Demolition Derby, hosted by the Anderson County Fair Association will be held the North Lake Park Rodeo Arena on September 3<sup>rd</sup>.
- B. Fun in the Sun Car Show, hosted by Bill Smith, will be held on August 27 in Colony.
- C. The Concerts in the Park Series, Hosted by Morning Mingle, will be held on Thursdays in Donna Harris Memorial Park beginning September 1<sup>st</sup>.
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- I. Cornstock Concert on the Hill Music Festival, hosted by the Anderson County Corn Festival, will be held at the North Lake Park on September 24<sup>th</sup>.

**CITIZENS TO BE HEARD (FIVE-MINUTE TIME LIMIT PER PERSON)**

None

**EXECUTIVE SESSION at 8:05 pm**

Commissioner Sheahan requested a five minute break with a motion to recess into Executive Session to discuss individual employees pursuant to non-elected personnel matter exception K.S.A 75-4319 (b) beginning at 8:10 pm with the following present: Mayor Gwin, Commissioner Sheahan, Commissioner Cole and City Manager Wilson. Regular session to resume at 8:25 p.m. Commissioner Cole seconded the motion. Motion passed (3) AYE (0) NAY

8:25 pm Commissioner Sheahan made a motion to extend the executives session until 8:35 pm. Seconded by Mayor Gwin. Motion passed (3) AYE (0) NAY

8:35 pm Commissioner Sheahan made a motion to extend the executives session until 8:40 pm. Seconded by Mayor Gwin. Motion passed (3) AYE (0) NAY

At 8.42 p.m. Mayor Gwin called the meeting back to order and stated no action was taken within executive session.

**ADJOURNMENT**

With no further business before The Governing Body, Commissioner Sheahan made a motion to adjourn the meeting. Mayor Gwin seconded the motion. With three (3) votes AYE, zero (0) NAY, motion passed.

Meeting adjourned at 8:42 p.m.

Attest: \_\_\_\_\_  
City Clerk

\_\_\_\_\_  
Mayor

PRELIMINARY PAVEMENT IMPROVEMENT PLAN  
FOR

GARNETT, KANSAS

AUGUST 23, 2022



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## **SECTION I – INTRODUCTION**

McClure has conducted a comprehensive assessment of the City of Garnett's existing streets. This study was performed to provide the City with recommendations for improvements, an improvements schedule, and associated costs to upgrade the street network to current design standards.

The purpose of this pavement improvement plan would be to perform a condition assessment of the existing pavement to determine a priority rating of each street. Once the priority rating has been established, the City will be presented with recommendations for improvements, an improvement schedule, and associated cost estimates required to upgrade the entire street network to current design standards. This improvement schedule and cost estimate could then be presented to the city council to establish a long-term financing budget over the next 10 years. With the conditions of roadways changing constantly, we recommend that this be treated as a living document and that new data be collected every 2-3 years and that the plan is updated accordingly.

## **SECTION II – METHODOLOGY**

A pavement evaluation and analysis software by the name of RoadBotics was utilized to gather photos and data of the existing streets. A map of all the streets in Garnett was provided to Roadbotics. This map was used to develop specific routes that were followed using GPS. These routes were used in conjunction with the Roadbotics software app downloaded to a smart phone. The smart phone was mounted to the windshield of a vehicle where it collected several thousand data points while simply driving along the predetermined routes. Once all the data was collected, it was uploaded to Roadbotics.

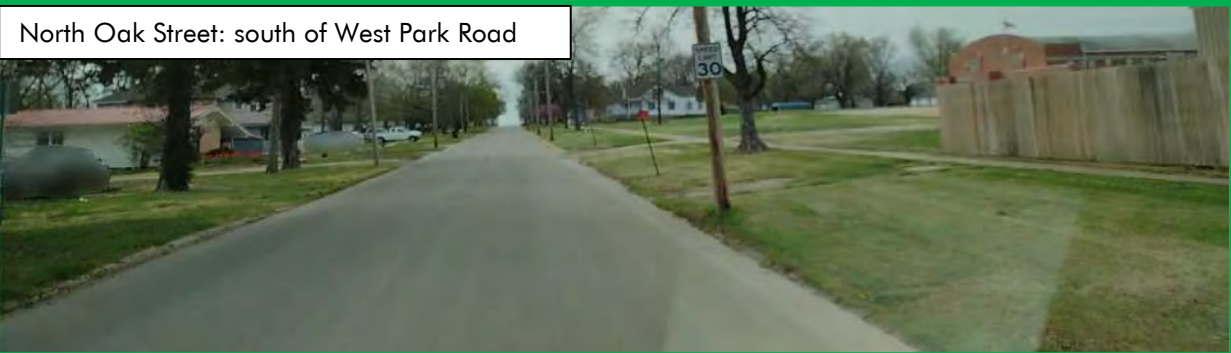
Using artificial intelligence (AI), Roadbotics processed the data and assigned a road index rating similar to the Pavement Surface Evaluation and Rating (PASER) system of evaluating pavement conditions. Roadbotics uses a rating system of 1 through 5, the higher the index rating, the greater the extent of the damage and need for repairs. The ratings shown in Appendix B represent the average pavement condition for each street or street segment listed.

The final deliverable from Roadbotics is an online interactive GIS map of all the city streets. This interactive map allows the user to view the rating index for an entire street, or just a portion of the street. This also allows the user to see color coded graphical representations of the street conditions, as well as the actual pictures taken during the data collection process.

Examples of pavement conditions analyzed within the City of Garnett by RoadBotics and the corresponding index rating are shown below for reference.

**Level 1 – New pavement or recent pavement rehabilitation. No maintenance required.**

North Oak Street: south of West Park Road



West 7<sup>th</sup> Ave: just east of South Elm Street



**Level 2 – First signs of wear, scaling, or cracking. Needs routine maintenance**

West 1<sup>st</sup> Ave: just east of North Vine Street



Lakeridge Road: just east of Lakeshore Road





**Level 3 – First signs of corner crack, faulting, and joint or crack spalling. Potholes begin to form. Requires surface repairs, sealing or partial depth patching.**

South Olive Street: between East 1<sup>st</sup> Ave and East 2<sup>nd</sup> Ave



East 6<sup>th</sup> Ave: between South Cedar Street and South Spruce Street



**Level 4 – Moderate to severe faulting, cracking, and joint failure. Potholes prevalent. Requires extensive slab, joint, and/or crack rehabilitation, or reconstruction.**

South Main Street: at the intersection with 5<sup>th</sup> Ave



West Park Road: between Elm Street and North Walnut Street





**Level 5 – Extensive cracking, severe settlement, and potholes. Pavement surface and structural failure requiring complete reconstruction techniques.**

South Elm Street: between 2<sup>nd</sup> Ave and 3<sup>rd</sup> Ave



West 3<sup>rd</sup> Ave: between South Elm Street and South Walnut Street



East 5<sup>th</sup> Ave: just east of South Main Street



The objective of this analysis is to provide a roadway with an index rating that best represents the majority of the pavement condition along that roadway. This index rating, along with roadway usage, and cross section type (urban, with curb, or rural, without curb) were used to develop a repair matrix which is included as Appendix B. The scores were weighted such that higher values were given to roadways with the most traffic. The repair matrix will then be used to develop repair and improvement recommendations along with a long-term construction schedule and associated construction cost estimates.

The recommendations for repair have been divided into four categories depending on the results of the pavement assessment. The repair categories include preventative maintenance, minor rehabilitation, major rehabilitation, and reconstruction. A description of these categories and the associated repair recommendations are noted in the table below. For streets where full reconstruction is recommended, additional assessments will be performed on the ancillary items

related to the construction of the new streets. These ancillary items include a sidewalk assessment, underground utility assessments, and a stormwater assessment.

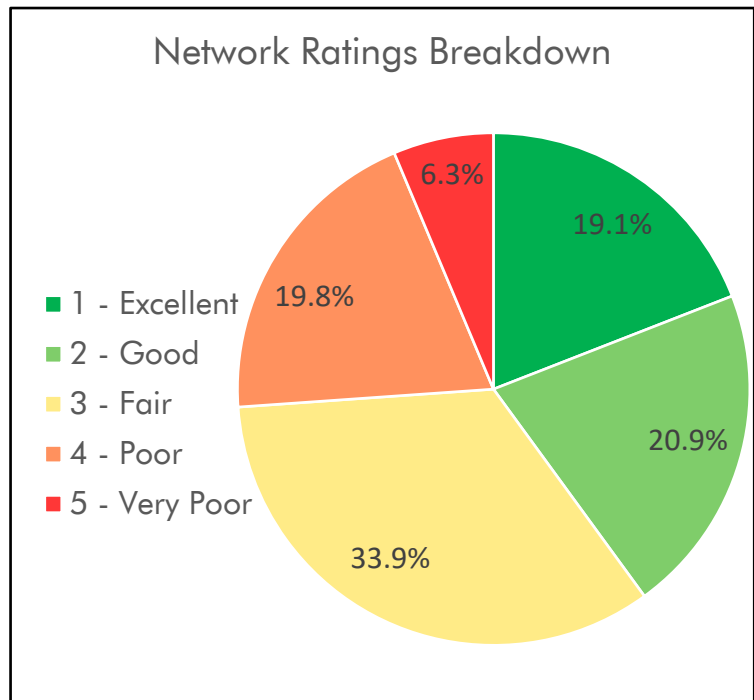
*Table 1: Recommended Repairs by Category*

Category	Recommended Repairs	Description
<b>Preventative Maintenance</b> (Rating 2.0 – 2.5)	Crack Sealing and Routing	Seal existing cracks and joints to prevent moisture from penetrating the pavement. Deteriorated cracks may be routed or sawed to provide a better seal and bond.
	Asphalt Patching	Place asphalt at spot locations. Use only on good pavement with minor failures.
<b>Minor Rehabilitation</b> (Rating 2.6 – 3.5)	Overlay	Typically, 1 ½" of asphalt laid on top of existing pavement. Helps to improve smoothness and extends the life of roadways in fair to good condition.
	Chip Seal	Asphalt coated chips are laid loose on pavement. Used to preserve existing asphalt pavement with little to no defects.
	Full Depth Patching	Sawcut and replace poor pavement. This may include full panel replacement or full depth repairs at joints.
<b>Major Rehabilitation</b> (Rating 3.6 – 4.2)	Mill and Overlay	Typically, 1 ½ to 3 inches of asphalt pavement is ground off and then replaced with new asphalt. Repairs surface issues and improves pavement structure.
<b>Reconstruction</b> (Rating 4.3 – 5.0)	Reconstruction	The complete reconstruction of a roadway and associated improvements. Either full depth asphalt or PCC pavement may be considered.

### SECTION III – RESULTS AND RECOMMENDATIONS

The results of the RoadBotics analysis of the city's roadway pavement are summarized in the chart. Almost 75% of the roadways in Garnett are in fair (corner cracking, faulting, and joint and crack spalling) to good (first signs of wear, scaling, and cracking) and excellent condition. The overall network score for the roadways in Garnett was 2.73.

Due to the economic, safety, and social importance of higher volume roadways, these roadways are shown with a higher weighted rating in priority for improvements than the lower volume roadways. However, as the City begins to allocate funds towards these improvements, we recommend that a percentage be dedicated to both low-volume and high-volume roadways to ensure that local roadways are also being maintained.



Appendix B outlines the recommended improvements for each of the roadways. The roadway ratings were estimated to deteriorate at a rate of 0.2 per year to predict the recommended improvements for each construction year. We provide an estimated cost for each improvement based on the unit pricing outlined below. These costs are based on previous projects and work done in or around the City of Garnett. It should be noted that these prices vary year to year, and inflation was not included in our cost estimates. For more accurate pricing calculations, these costs should be updated annually.

<u>Treatment Type</u>	<u>Estimated Unit Cost</u>
Crack Sealing .....	\$1.00/LF
Asphalt Patching .....	\$2.50/SF
Asphalt Overlay .....	\$1.45/SF
Chip Seal .....	\$1.45/SF
Full-depth Patch .....	\$7.50/SF
Mill and Overlay .....	\$2.25/SF
Full Reconstruction .....	\$18.00/SF

Due to the unknown variability of crack lengths and patching sizes, for budgeting purposes, the unit costs for crack sealing and asphalt patching were combined to develop an estimated combined cost of \$0.75 per square foot.

It is also important that funds are allocated such that the roadways in fair to good condition now, are maintained as well. This preventative maintenance ultimately saves money by extending the life of the roadways while also enhancing pavement quality. If the roads aren't addressed until they are completely deteriorated, the cost to replace the road could be five to ten times more.

The estimated construction schedule shown in Appendix B is based on an assumed annual budget of \$200,000 to \$250,000 for pavement repairs. In general, the schedule shown assumes a portion of the budget will be allocated each year for preventative maintenance, minor rehabilitation, major rehabilitation, and full reconstruction. Some of the larger reconstruction projects, Park Street for example, would likely utilize the entire budget for that fiscal year.

As mentioned above, this pavement assessment is not intended to be a one-time assessment but a dynamic document taking into account potential emergency repairs, ongoing utility improvements and repairs, and recent construction projects. In order for this to provide the most useful information to the city, we recommend reviewing the data and re-evaluating the Roadbotics score and the street conditions every 2-3 years. Re-evaluating the data every couple years will help prioritize the projects based on the current ratings and traffic volumes.

## **SECTION IV – ANCILLARY ASSESSMENTS**

Based on our field observations and discussions with the city, the majority of the streets in Garnett do not have sidewalks. At intersections where there are sidewalks, any improvements to the intersection will require the sidewalks to be updated to be in compliance with current ADA standards.

McClure is in the process of coordinating utility information with the City. Based on existing GIS data pertaining to underground gas, water, and sewer lines. We will use the GIS data along with information obtained from the city relating to age of utilities and recent repairs to determine if the repair priorities and recommendations shown in the decision matrix need to be modified.

It is our understanding the City has replaced close to 1,500 linear feet of gas line in 2022 and hopes to replace at least that much next year. It is also our understanding the City intends to begin lining their network of sanitary sewer lines next year.

## **APPENDIX A**

### **ROADBOTICS ROAD CLASSIFICATION MAPS**

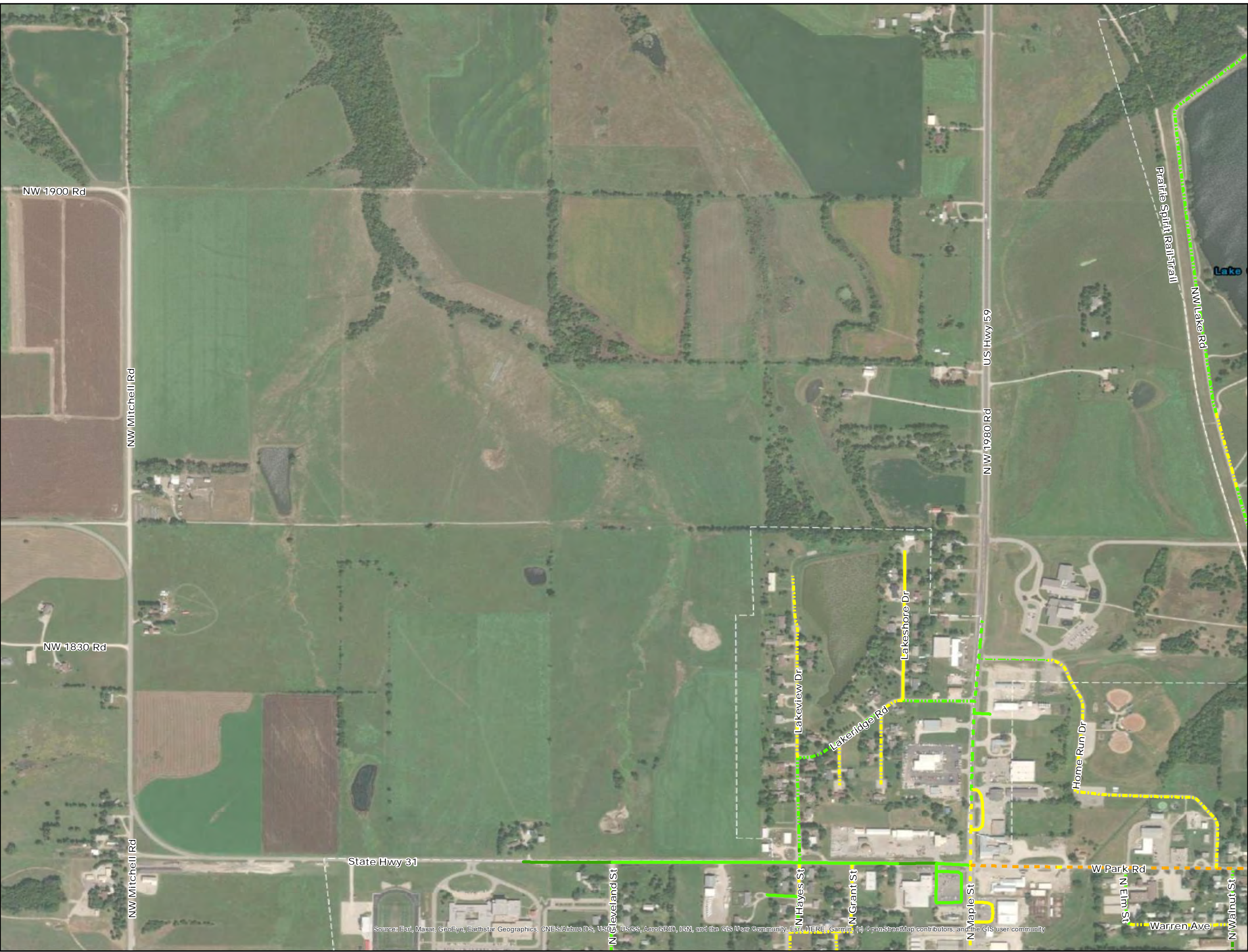


APPENDIX A  
ROADBOTICS ROAD CLASSIFICATION  
GARNETT, KANSAS

Legend

Roadbotics Designation

- Excellent
- Excellent, Heavy Traffic Volume
- Excellent, Medium Traffic Volume
- Excellent, Low Traffic Volume
- Good
- Good, Heavy Traffic Volume
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- Fair
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- Fair, Medium Traffic Volume
- Fair, Low Traffic Volume
- Poor
- Poor, Heavy Traffic Volume
- Poor, Medium Traffic Volume
- Poor, Low Traffic Volume
- Very Poor, Heavy Traffic Volume
- Very Poor, Medium Traffic Volume
- Very Poor, Low Traffic Volume



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



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McCLURE™



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McCLURE™



## **APPENDIX B**

### **ROADWAY IMPROVEMENT DECISION MATRIX**



APPENDIX B  
ROADWAY IMPROVEMENT DECISION MATRIX  
GARNETT, KANSAS

Street Name	From Intersection	To Intersection	Length (ft)	Average Roadway Width (ft)	Approximate Area (Sq Ft)	Road Surface Type	Urban or Rural Section	2022 RoadBotics Score	Estimated 2023 RoadBotics Score	Estimated 2024 RoadBotics Score	Estimated 2025 RoadBotics Score	Estimated 2026 RoadBotics Score	Estimated 2027 RoadBotics Score	Estimated 2028 RoadBotics Score	Roadway Traffic Volume	Weighted Score	Treatment Category	Recommended Repair	Unit Cost for Recommended Repair (per Sq Ft)	Estimated Construction Cost	Construction Year
South Elm Street	West 4th Avenue	West 8th Avenue	1,466	24	35,180	Asphalt	Urban	4.3	1.0	1.2	1.4	1.6	1.8	2.0	Medium	6.5	Reconstruction	Reconstruction	\$18.00	\$63,324	2022
South Elm Street	West 1st Avenue	West 4th Avenue	1,129	24	27,096	Asphalt	Urban	4.5	1.0	1.2	1.4	1.6	1.8	2.0	Medium	6.8	Reconstruction	Reconstruction	\$18.00	\$48,772	2022
West 3rd Avenue	South Cleveland Street	South Hayes Street	1,124	30	33,732	Asphalt	Urban	4.0	1.0	1.2	1.4	1.6	1.8	2.0	Medium	6.1	Major Rehabilitation	Mill and Overlay	\$2.25	\$7,590	2022
West 9th Avenue	Dead End	South Elm Street	815	24	19,550	Asphalt	Urban	4.3	1.0	1.2	1.4	1.6	1.8	2.0	Low	4.3	Major Rehabilitation	Mill and Overlay	\$2.25	\$4,399	2022
South Vine Street	West 9th Avenue	Dead End	339	26	8,822	Asphalt	Urban	3.7	1.0	1.2	1.4	1.6	1.8	2.0	Medium	5.6	Major Rehabilitation	Mill and Overlay	\$2.25	\$1,985	2022
South Maple Street	West 1st Avenue	West 9th Avenue	2,859	44	125,786	Asphalt	Urban	3.0	3.2	1.0	1.2	1.4	1.6	1.8	Heavy	7.6	Minor Rehabilitation	Asphalt Overlay	\$1.45	\$18,239	2023
South Maple Street	West 9th Avenue	West Veterans Circle Drive	2,018	44	88,789	Asphalt	Rural	2.9	3.1	1.0	1.2	1.4	1.6	1.8	Heavy	7.3	Minor Rehabilitation	Asphalt Overlay	\$1.45	\$12,874	2023
North Maple Street	West Park Road	West 1st Avenue	1,573	44	69,227	Asphalt	Urban	3.4	3.6	1.0	1.2	1.4	1.6	1.8	Heavy	8.5	Minor Rehabilitation	Asphalt Overlay	\$1.45	\$10,038	2023
North Maple Street	North Limit	West Park Road	1,952	44	85,873	Asphalt	Rural	2.2	2.4	1.0	1.2	1.4	1.6	1.8	Heavy	5.6	Preventative Maintenance	Crack sealing/Patching	\$0.75	\$6,441	2023
East 5th Avenue	South Oak Street	South Pine Street	1,157	28	32,406	Asphalt	Combo	4.8	5.0	5.0	1.0	1.2	1.4	1.6	Medium	7.1	Reconstruction	Reconstruction	\$18.00	\$58,331	2024
East 2nd Avenue	South Pine Street	South Cedar Street	564	24	13,531	Asphalt	Urban	4.5	4.7	4.9	1.0	1.2	1.4	1.6	Medium	6.8	Reconstruction	Reconstruction	\$18.00	\$24,356	2024
South Oak Street	West 4th Avenue	West 5th Avenue	395	28	11,067	Asphalt	Urban	4.7	4.9	5.0	1.0	1.2	1.4	1.6	Heavy	11.7	Reconstruction	Reconstruction	\$18.00	\$19,920	2024
East 4th Avenue	South Main Street	South Willow Street	2,661	32	85,162	Asphalt	Urban	3.6	3.8	4.0	1.0	1.2	1.4	1.6	Heavy	8.9	Major Rehabilitation	Mill and Overlay	\$2.25	\$19,161	2024
South Main Street	West 13th Avenue	Highway 169	2,422	28	67,814	Asphalt	Rural	3.0	3.2	3.4	1.2	1.4	1.6	1.8	Heavy	7.4	Minor Rehabilitation	Asphalt Overlay	\$1.45	\$9,833	2024
Northeast Lake Road	Northwest Lake Road	East Park Road	1,244	22	27,374	Asphalt	Rural	3.8	4.0	4.2	1.0	1.2	1.4	1.6	Low	3.8	Major Rehabilitation	Mill and Overlay	\$2.25	\$6,159	2024
West 5th Avenue	South Maple Street	South Walnut Street	1,474	28	41,260	Asphalt	Urban	2.9	3.1	3.3	1.2	1.4	1.6	1.8	Medium	4.3	Minor Rehabilitation	Asphalt Overlay	\$1.45	\$5,983	2024
North Pine Street	East Park Road	Washington Avenue	1,136	36	40,905	Asphalt	Urban	3.1	3.3	3.5	1.2	1.4	1.6	1.8	Medium	4.7	Minor Rehabilitation	Chip Seal	\$1.45	\$5,931	2024
Lynnwood Lane	Lakeridge Road	Dead End	353	20	7,056	Concrete	Urban	3.0	3.2	3.4	1.2	1.4	1.6	1.8	Low	3.0	Minor Rehabilitation	Patching	\$7.25	\$5,115	2024
North Olive Street	East Monroe Avenue	East 1st Avenue	690	32	22,071	Asphalt	Urban	3.4	3.6	3.8	4.0	1.0	1.2	1.4	Heavy	8.4	Major Rehabilitation	Mill and Overlay	\$2.25	\$4,966	2024
South Oak Street	West 9th Avenue	West 7th Avenue	672	28	18,804	Asphalt	Combo	3.8	4.0	4.2	1.0	1.2	1.4	1.6	Heavy	9.6	Major Rehabilitation	Mill and Overlay	\$2.25	\$4,231	2024
East 4th Avenue	South Willow Street	East Corporate Limits	863	32	27,613	Asphalt	Urban	3.1	3.3	3.5	1.2	1.4	1.6	1.8	Heavy	7.8	Minor Rehabilitation	Asphalt Overlay	\$1.45	\$4,004	2024
North Cedar Street	East Park Road	East Monroe Avenue	854	28	23,919	Asphalt	Urban	3.1	3.3	3.5	1.2	1.4	1.6	1.8	Low	3.1	Minor Rehabilitation	Chip Seal	\$1.45	\$3,468	2024
South Pine Street	East 4th Avenue	Railroad	530	26	13,792	Asphalt	Urban	4.0	4.2	4.2	1.0	1.2	1.4	1.6	Medium	6.1	Major Rehabilitation	Mill and Overlay	\$2.25	\$3,103	2024
North Ash Street	East Park Road	East Monroe Avenue	861	24	20,668	Asphalt	Urban	3.1	3.3	3.5	1.2	1.4	1.6	1.8	Low	3.1	Minor Rehabilitation	Chip Seal	\$1.45	\$2,997	2024
South Lincoln Street	West 1st Avenue	West 3rd Avenue	709	16	11,338	Asphalt	Rural	3.8	4.0	4.2	1.0	1.2	1.4	1.6	Low	3.8	Major Rehabilitation	Mill and Overlay	\$2.25	\$2,551	2024
South Spruce Street	East 5th Avenue	East 7th Avenue	732	24	17,570	Asphalt	Rural	2.9	3.1	3.3	1.2	1.4	1.6	1.8	Medium	4.4	Minor Rehabilitation	Chip Seal	\$1.45	\$2,548	2024
East 5th Avenue	South Pine Street	South Cedar Street	561	28	15,707	Asphalt	Rural	3.1	3.3	3.5	1.2	1.4	1.6	1.8	Medium	4.7	Minor Rehabilitation	Chip Seal	\$1.45	\$2,277	2024
East Jackson Avenue	North Pine Street	North Cedar Street	603	26	15,689	Asphalt	Urban	3.0	3.2	3.4	1.2	1.4	1.6	1.8	Low	3.0	Minor Rehabilitation	Chip Seal	\$1.45	\$2,275	2024
West 11th Avenue	South Vine Street	South Elm Street	544	18	9,794	Asphalt	Rural	3.7	3.9	4.1	1.0	1.2	1.4	1.6	Low	3.7	Major Rehabilitation	Mill and Overlay	\$2.25	\$2,204	2024
East Madison Avenue	North Pine Street	North Cedar Street	574	26	14,916	Asphalt	Urban	3.0	3.2	3.4	1.2	1.4	1.6	1.8	Low	3.0	Minor Rehabilitation	Chip Seal	\$1.45	\$2,163	2024
Northeast Neosho Road	East 6th Avenue	South Corporate Limits	1,225	22	26,952	Asphalt	Rural	1.9	2.1	2.3	1.5	1.7	1.9	2.1	Heavy	4.8	Preventative Maintenance	Crack sealing/Patching	\$0.75	\$2,021	2024
Warren Avenue	North Elm Street	North Walnut Street	644	18	11,600	Asphalt	Rural	3.1	3.3	3.5	1.2	1.4	1.6	1.8	Low	3.1	Minor Rehabilitation	Asphalt Overlay	\$1.45	\$1,682	2024
West Star Avenue	North Hayes Street	North Grant Street	298	24	7,158	Asphalt	Urban	3.0	3.2	3.4	1.2	1.4	1.6	1.8	Low	3.0	Minor Rehabilitation	Chip Seal	\$1.45	\$1,038	2024
North Elm Street	West Park Road	Warren Avenue	457	22	10,061	Asphalt	Rural	2.1	2.3	2.5	1.5	1.7	1.9	2.1	Low	2.1	Preventative Maintenance	Crack sealing/Patching	\$0.75	\$755	2024
South Pine Street	East 1st Avenue	East 2nd Avenue	378	26	9,830	Asphalt	Urban	2.1	2.3	2.5	1.5	1.7	1.9	2.1	Medium	3.2	Preventative Maintenance	Crack sealing/Patching	\$0.75	\$737	2024
West 3rd Avenue	South Maple Street	South Oak Street	2,036	30	61,085	Asphalt	Urban	4.6	4.8	5.0	5.0	1.0	1.2	1.4	Medium	7.0	Reconstruction	Reconstruction	\$18.00	\$109,954	2025
West 4th Avenue	South Walnut Street	South Oak Street	564	32	18,036	Asphalt	Urban	4.1	4.3	4.5	4.7	4.9	1.0	1.2	Heavy	10.1	Reconstruction	Reconstruction	\$18.00	\$32,464	2025
South Main Street	East 4th Avenue	East 7th Avenue	1,937	28	54,239	Asphalt	Combo	3.3	3.5	3.7	3.9	4.1	1.0	1.2	Heavy	8.4	Major Rehabilitation	Mill and Overlay	\$2.25	\$12,204	2025
West 1st Avenue	South Cleveland Street	South Maple Street	2,251	28	63,017	Asphalt	Rural	2.8	3.0	3.2	3.4	1.2	1.4	1.6	Medium	4.2	Minor Rehabilitation	Asphalt Overlay	\$1.45	\$9,137	2025
East Park Road	Country Club Lane	North Olive Street	1,545	22	33,990	Asphalt	Rural	3.3	3.5	3.7	3.9	4.1	1.0	1.2	Heavy	8.2	Major Rehabilitation	Mill and Overlay	\$2.25	\$7,648	2025
Park Plaza North	East Park Road	North Pine Street	1,690	26	43,937	Asphalt	Urban	2.9	3.1	3.3	3.5	1.2	1.4	1.6	Low	2.9	Minor Rehabilitation	Chip Seal	\$1.45	\$6,371	2025
North Hayes Street	West Park Road	West 1st Avenue	1,639	24	39,339	Asphalt	Urban	2.9	3.1	3.3	3.5	1.2	1.4	1.6	Low	2.9	Minor Rehabilitation	Chip Seal	\$1.45	\$5,704	2025
South Oak Street	West 5th Avenue	West 7th Avenue	758	28	21,237	Asphalt	Urban	3.2	3.4	3.6	3.8	4.0	1.0	1.2	Heavy	8.1	Major Rehabilitation	Mill and Overlay	\$2.25	\$4,778	2025
North Grant Street	West Park Road	West Star Avenue	1,257	24	30,165	Asphalt	Urban	2.9	3.1	3.3	3.5	1.2	1.4	1.6	Low	2.9	Minor Rehabilitation	Chip Seal	\$1.45	\$4,374	2025
Prairie Plaza Parkway	Northeast Neosho Road	Highway 169	1,123	36	40,426	Asphalt	Urban	1.9	2.1	2.3	2.5	1.5	1.7	1.9	Medium	2.9	Preventative Maintenance	Crack sealing/Patching	\$0.75	\$3,032	2025
East 3rd Avenue	South Cedar Street	South Willow Street	1,487	24	35,693	Asphalt	Combo	1.8	2.0	2.2	2.4	1.5	1.7	1.9	Medium	2.8	Preventative Maintenance	Crack sealing/Patching	\$0.75	\$2,677	2025
South Walnut Street	West 1st Avenue	West 4th Avenue	1,147	24	27,527	Asphalt	Urban	1.8	2.0	2.2	2.4	1.5	1.7	1.9	Medium	2.8	Preventative Maintenance	Crack sealing/Patching	\$0.75	\$2,065	2025
Leewood Lane	Lakeridge Road	Dead End	590	20	11,798	Asphalt	Urban	2.9	3.1	3.3	3.5	1.2	1.4	1.6	Low	2.9	Minor Rehabilitation	Chip Seal	\$1.45	\$1,711	2025
Easy Street	Dead End	South Maple Street	415	20	8,292	Asphalt	Rural	2.9	3.1	3.3	3.5	1.2	1.4	1.6	Low	2.9	Minor Rehabilitation	Asphalt Overlay	\$1.45	\$1,202	2025
West Prairie Avenue	North Hayes Street	North Grant Street	243	28	6,792	Asphalt	Urban	2.9	3.1	3.3	3.5	1.2	1.4	1.6	Low	2.9	Minor Rehabilitation	Chip Seal	\$1.45	\$985	2025
South Main Street	East 7th Avenue	West 13th Avenue	1,881	28	52,679	Asphalt	Rural	3.9	4.1	4.3	4.5	4.7	4.9	5.0	Heavy	9.7	Reconstruction	Reconstruction	\$18.00	\$94,822	2026
East Park Road	North Oak Street	Country Club Lane	1,289	22	28,363	Asphalt	Rural	4.0	4.2	4.3	4.5	4.7	4.9	5.0	Heavy	10.1	Reconstruction	Reconstruction	\$18.00	\$51,053	2026
South Olive Street	East 1st Avenue	East 5th Avenue	1,584	24	38,018	Asphalt	Urban	3.2	3.4	3.6	3.8	4.0	1.0	1.2	Heavy	7.9	Major Rehabilitation	Mill and Overlay	\$2.25	\$8,554	2026
South Cleveland Street	West 1st Avenue	West 4th Avenue	1,088	30	32,627	Asphalt	Urban	2.4	2.6	2.8	3.0	3.2	3.4	3.6	Heavy	6.1	Major Rehabilitation	Mill and Overlay	\$2.25	\$7,341	2026
South Vine Street	West 2nd Avenue	West 4th Avenue	783	26	20,349	Asphalt	Urban	3.4	3.6	3.8	4.0	1.0	1.2	1.4	Medium	5.1	Major Rehabilitation	Mill and Overlay	\$2.25	\$4,578	2026
South Pine Street	East 2nd Avenue	East 4th Avenue	776	26	20,174	Asphalt	Urban	3.2	3.4	3.6	3.8	4.0	4.2	4.4	Medium	4.8	Reconstruction	Reconstruction	\$2.25	\$4,539	2026
South Olive Street	East 5th Avenue	East 7th Avenue	738	24	17,705	Asphalt	Rural	2.4	2.6	2.8	3.0	3.2	3.4	3.6	Heavy	6.0	Major Rehabilitation	Mill and Overlay	\$2.25	\$3,984	2026
North Olive Street	East Park Road	East Monroe Avenue	812	32	25,986	Asphalt	Rural	2.8	3.0	3.2	3.4	1.2	1.4	1.6	Heavy	7.1	Minor Rehabilitation	Asphalt Overlay	\$1.45	\$3,768	2026
Northeast 1750	South Catalpa Street	Highway 169	663	24	15,924	Asphalt	Rural	3.6	3.8	4.0	4.2	1.0	1.2	1.4	Medium	5.4	Major Rehabilitation	Mill and Overlay	\$2.25	\$3,583	2026
East 3rd Avenue	South Main Street	South Pine Street	612	24	14,697	Asphalt	Urban	3.4	3.6	3.8	4.0	1.0	1.2	1.4	Medium	5.1	Major Rehabilitation	Mill and Overlay	\$2.25	\$3,307	2026
South Willow Street	East 3rd Avenue	East 4th Avenue	406	16	6,503	Asphalt	Rural	2.5	2.7	2.9	3.1	3.3	3.5	3.7	Low	2.5	Major Rehabilitation	Mill and Overlay	\$2.25	\$1,463	2026
South Vine Street	West 4th Avenue	West 9th Avenue	1,806	26	46,961	Asphalt	Urban	4.4	4.6	4.8	5.0	5.0	5.0	5.0	Medium	6.5	Reconstruction	Reconstruction	\$18.00	\$84,530	2027
East 4th Avenue	South Oak Street	South Main Street	1,116	32	35,727	Asphalt	Urban	4.1	4.3	4.5	4.7	4.9	1.0	1.2	Heavy	10.2	Reconstruction	Reconstruction	\$18.00	\$64,308	2027
South Westgate Road	West 4th Avenue	West 7th Avenue	1,139	24	27,345	Asphalt	Rural	3.9	4.1	4.3	4.5	4.7	4.9	5.0	Heavy	9.8	Reconstruction	Reconstruction	\$18.00	\$49,221	2027
East Park Road	North Olive Street	East Corporate Limits	5,363	22	117,994	Asphalt	Rural	4.0	4.2	4.4	4.6	4.8	5.0	1.0	Heavy	9.9	Reconstruction	Reconstruction	\$18.00	\$212,390	2028
West Park Road	North Maple Street	North Oak Street	2,036	24	48,868	Asphalt	Rural	3.9	4.1	4.3	4.5										



APPENDIX B  
ROADWAY IMPROVEMENT DECISION MATRIX  
GARNETT, KANSAS

Street Name	From Intersection	To Intersection	Length (ft)	Average Roadway Width (ft)	Approximate Area (Sq Ft)	Road Surface Type	Urban or Rural Section	2022 RoadBotics Score	Estimated 2023 RoadBotics Score	Estimated 2024 RoadBotics Score	Estimated 2025 RoadBotics Score	Estimated 2026 RoadBotics Score	Estimated 2027 RoadBotics Score	Estimated 2028 RoadBotics Score	Roadway Traffic Volume	Weighted Score	Treatment Category	Recommended Repair	Unit Cost for Recommended Repair (per Sq Ft)	Estimated Construction Cost	Construction Year
East 3rd Avenue	South Oak Street	South Main Street	545	24	13,088	Asphalt	Urban	1.6	1.8	2.0	2.2	2.4	2.6	2.8	Medium	2.4	Minor Rehabilitation	Asphalt Overlay	\$0.75	\$982	2029
North Elm Street	Ivy Terrace	Kaw Avenue	537	22	11,811	Asphalt	Urban	1.1	1.3	1.5	1.7	1.9	2.1	2.3	Low	1.1	Preventative Maintenance	Crack sealing/Patching	\$0.75	\$886	2029
East 8th Avenue	South Oak Street	East 8th/9th Avenue	378	30	11,348	Asphalt	Combo	1.5	1.7	1.9	2.1	2.3	2.5	2.7	Medium	2.3	Minor Rehabilitation	Asphalt Overlay	\$0.75	\$851	2029
East 2nd Avenue	South Cedar Street	South Olive Street	1,113	24	26,705	Asphalt	Urban	4.0	4.2	4.4	4.6	4.8	5.0	5.0	Medium	5.9	Reconstruction	Reconstruction	\$18.00	\$48,069	2030
East 3rd Avenue	South Pine Street	South Cedar Street	564	24	13,531	Asphalt	Urban	4.1	4.1	4.3	4.5	4.7	4.9	5.0	Medium	6.2	Reconstruction	Reconstruction	\$18.00	\$24,356	2030
East 2nd Avenue	South Main Street	South Pine Street	546	24	13,099	Asphalt	Urban	4.1	4.1	4.3	4.5	4.7	4.9	5.0	Medium	6.1	Reconstruction	Reconstruction	\$18.00	\$23,579	2030
Home Run Drive	North Maple Street	West Park Road	2,926	24	70,214	Asphalt	Combo	2.4	2.6	2.8	3.0	3.2	3.4	3.6	Medium	3.6	Major Rehabilitation	Mill and Overlay	\$2.25	\$15,798	2030
East Monroe Avenue	Hickory Street	Dead End	318	24	7,638	Asphalt	Rural	4.0	4.2	4.4	4.6	4.8	5.0	5.0	Low	4.0	Reconstruction	Reconstruction	\$18.00	\$13,748	2030
West 4th Avenue	South Westgate Road	South Maple Street	2,613	32	83,614	Asphalt	Rural	2.8	3.0	3.2	3.4	3.6	3.8	4.0	Heavy	6.9	Minor Rehabilitation	Asphalt Overlay	\$1.45	\$12,124	2030
East 6th Avenue	South Oak Street	Northeast Neosho Road	3,204	24	76,901	Asphalt	Rural	2.7	2.9	3.1	3.3	3.5	3.7	3.9	Heavy	6.6	Minor Rehabilitation	Asphalt Overlay	\$1.45	\$11,151	2030
West Veterans Circle Drive	South Maple Street	South Walnut Street	2,128	20	42,552	Asphalt	Rural	3.4	3.6	3.8	4.0	4.2	4.4	4.6	Low	3.4	Major Rehabilitation	Mill and Overlay	\$2.25	\$9,574	2030
West 7th Avenue	South Westgate Road	South Maple Street	2,614	24	62,745	Asphalt	Rural	2.7	2.9	3.1	3.3	3.5	3.7	3.9	Heavy	6.7	Minor Rehabilitation	Asphalt Overlay	\$1.45	\$9,098	2030
South Walnut Street	West 4th Avenue	West 9th Avenue	1,826	24	43,821	Asphalt	Urban	2.5	2.7	2.9	3.1	3.3	3.5	3.7	Medium	3.7	Minor Rehabilitation	Crack sealing/Patching	\$1.45	\$6,354	2030
Lakeridge Road	Lakeview Drive	North Maple Street	1,277	20	25,535	Asphalt	Urban	2.2	2.4	2.6	2.8	3.0	3.2	3.4	Low	2.2	Minor Rehabilitation	Chip Seal	\$1.45	\$3,703	2030
West 7th Avenue	South Maple Street	South Oak Street	2,033	24	48,790	Asphalt	Urban	1.4	1.6	1.8	2.0	2.2	2.4	2.6	Medium	2.1	Minor Rehabilitation	Asphalt Overlay	\$0.75	\$3,659	2030
Kaw Avenue	Dead End	North Walnut Street	972	24	23,334	Asphalt	Urban	2.3	2.5	2.7	2.9	3.1	3.3	3.5	Low	2.3	Minor Rehabilitation	Chip Seal	\$1.45	\$3,383	2030
Parkside Place	North Pine Street	North Pine Street	432	30	12,957	Asphalt	Urban	3.5	3.7	3.9	4.1	4.3	4.5	4.7	Low	3.5	Major Rehabilitation	Mill and Overlay	\$2.25	\$2,915	2030
West 8th Avenue	Kings Highway	South Hayes Street	515	24	12,371	Asphalt	Rural	3.6	3.8	4.0	4.2	4.4	4.6	4.8	Low	3.6	Major Rehabilitation	Mill and Overlay	\$2.25	\$2,783	2030
North Oak Street	West Park Road	West 1st Avenue	1,497	24	35,937	Asphalt	Urban	1.5	1.7	1.9	2.1	2.3	2.5	2.7	Heavy	3.7	Minor Rehabilitation	Asphalt Overlay	\$0.75	\$2,695	2030
North Oak Street	Dead End	West Park Road	707	24	16,979	Asphalt	Rural	2.9	3.1	3.3	3.5	3.7	3.9	4.1	Low	2.9	Minor Rehabilitation	Chip Seal	\$1.45	\$2,462	2030
North Lincoln Street	Dead End	West 1st Avenue	827	18	14,879	Asphalt	Rural	2.2	2.4	2.6	2.8	3.0	3.2	3.4	Low	2.2	Minor Rehabilitation	Chip Seal	\$1.45	\$2,157	2030
South Pine Street	Railroad	East 7th Avenue	566	26	14,712	Asphalt	Rural	2.6	2.8	3.0	3.2	3.4	3.6	3.8	Medium	3.9	Minor Rehabilitation	Chip Seal	\$1.45	\$2,133	2030
South Cedar Street	East 4th Avenue	East 5th Avenue	373	24	8,959	Asphalt	Rural	2.5	2.7	2.9	3.1	3.3	3.5	3.7	Low	2.5	Major Rehabilitation	Mill and Overlay	\$2.25	\$2,016	2030
West 12th Avenue	South Vine Street	South Oak Street	1,471	16	23,535	Asphalt	Rural	2.0	2.2	2.4	2.6	2.8	3.0	3.2	Low	2.0	Preventative Maintenance	Crack sealing/Patching	\$0.75	\$1,765	2030
West 11th Avenue	West Corporate Limits	South Westgate Road	1,021	18	18,385	Asphalt	Rural	1.6	1.8	2.0	2.2	2.4	2.6	2.8	Heavy	4.0	Minor Rehabilitation	Asphalt Overlay	\$0.75	\$1,379	2030
East 2nd Avenue	South Oak Street	South Main Street	612	24	14,686	Asphalt	Urban	1.2	1.4	1.6	1.8	2.0	2.2	2.4	Medium	1.8	Preventative Maintenance	Crack sealing/Patching	\$0.75	\$1,101	2030
North Elm Street	Kaw Avenue	West 1st Avenue	356	22	7,831	Asphalt	Rural	1.7	1.9	2.1	2.3	2.5	2.7	2.9	Low	1.7	Preventative Maintenance	Crack sealing/Patching	\$0.75	\$587	2030
Northwest Lake Road	Northwest Lake Road	Northwest Lake Road	8,821	22	194,069	Asphalt	Rural	2.5	2.7	2.9	3.1	3.3	3.5	3.7	Low	2.5	Major Rehabilitation	Mill and Overlay	\$2.25	\$43,665	2031
West 5th Avenue	South Walnut Street	South Oak Street	563	28	15,752	Asphalt	Urban	4.5	4.7	4.9	5.0	5.0	5.0	5.0	Medium	6.7	Reconstruction	Reconstruction	\$18.00	\$28,354	2031
West 9th Avenue	South Walnut Street	South Oak Street	570	24	13,668	Asphalt	Rural	4.5	4.7	4.9	5.0	5.0	5.0	5.0	Low	4.5	Reconstruction	Reconstruction	\$18.00	\$24,602	2031
West 4th Avenue	South Maple Street	South Walnut Street	2,963	32	94,807	Asphalt	Urban	2.3	2.5	2.7	2.9	3.1	3.3	3.5	Heavy	5.8	Minor Rehabilitation	Asphalt Overlay	\$1.45	\$13,747	2031
East 9th Avenue	South Oak Street	East 8th/9th Avenue	249	16	3,980	Asphalt	Rural	4.3	4.5	4.7	4.9	5.0	5.0	5.0	Low	4.3	Reconstruction	Reconstruction	\$18.00	\$7,164	2031
North Cleveland Street	West Park Road	West 1st Avenue	1,422	30	42,658	Asphalt	Urban	2.2	2.4	2.6	2.8	3.0	3.2	3.4	Heavy	5.6	Minor Rehabilitation	Asphalt Overlay	\$1.45	\$6,185	2031
North Spruce Street	East Park Road	East Monroe Avenue	859	30	25,778	Asphalt	Urban	2.8	3.0	3.2	3.4	3.6	3.8	4.0	Medium	4.2	Major Rehabilitation	Mill and Overlay	\$2.25	\$5,800	2031
North Orange Street	East Park Road	Dead End	1,290	30	38,687	Asphalt	Urban	2.6	2.8	3.0	3.2	3.4	3.6	3.8	Low	2.6	Minor Rehabilitation	Chip Seal	\$1.45	\$5,610	2031
Lakeshore Drive	Dead End	Lakeridge Road	1,197	20	23,933	Asphalt	Urban	3.3	3.5	3.7	3.9	4.1	4.3	4.5	Low	3.3	Major Rehabilitation	Mill and Overlay	\$2.25	\$5,385	2031
West Park Road	West Corporate Limits	North Maple Street	2,795	24	67,086	Asphalt	Rural	1.7	1.9	2.1	2.3	2.5	2.7	2.9	Heavy	4.3	Preventative Maintenance	Crack sealing/Patching	\$0.75	\$5,031	2031
South Oak Street	West 1st Avenue	West 4th Avenue	1,148	28	32,132	Asphalt	Urban	2.3	2.5	2.7	2.9	3.1	3.3	3.5	Heavy	5.8	Minor Rehabilitation	Asphalt Overlay	\$1.45	\$4,659	2031
Ivy Terrace	North Elm Street	Dead End	2,292	24	55,001	Concrete	Urban	1.0	1.2	1.4	1.6	1.8	2.0	2.2	Low	1.0	Preventative Maintenance	Crack sealing/Patching	\$0.75	\$4,125	2031
South Hayes Street	West 1st Avenue	West 4th Avenue	1,088	20	21,751	Asphalt	Rural	1.8	2.0	2.2	2.4	2.6	2.8	3.0	Low	1.8	Minor Rehabilitation	Chip Seal	\$1.45	\$3,154	2031
South Westgate Road	West 7th Avenue	West 11th Avenue	1,519	24	36,461	Asphalt	Rural	1.7	1.9	2.1	2.3	2.5	2.7	2.9	Heavy	4.2	Preventative Maintenance	Crack sealing/Patching	\$0.75	\$2,735	2031
West 8th Avenue	South Maple Street	South Walnut Street	1,473	24	35,343	Asphalt	Urban	2.1	2.3	2.5	2.7	2.9	3.1	3.3	Low	2.1	Preventative Maintenance	Crack sealing/Patching	\$0.75	\$2,651	2031
South Elm Street	West 12th Avenue	West Veterans Circle Drive	1,368	24	32,841	Asphalt	Rural	1.4	1.6	1.8	2.0	2.2	2.4	2.6	Medium	2.0	Minor Rehabilitation	Asphalt Overlay	\$0.75	\$2,463	2031
South High Street	West 6th Avenue	Dead End	659	24	15,818	Asphalt	Combo	2.6	2.8	3.0	3.2	3.4	3.6	3.8	Low	2.6	Minor Rehabilitation	Chip Seal	\$1.45	\$2,294	2031
South Elm Street	West 12th Avenue	West 12th Avenue	1,200	24	28,803	Asphalt	Rural	1.3	1.5	1.7	1.9	2.1	2.3	2.5	Medium	1.9	Minor Rehabilitation	Asphalt Overlay	\$0.75	\$2,160	2031
South Spruce Street	East 1st Avenue	East 4th Avenue	1,161	24	27,871	Asphalt	Combo	1.0	1.2	1.4	1.6	1.8	2.0	2.2	Medium	1.5	Preventative Maintenance	Crack sealing/Patching	\$0.75	\$2,090	2031
South Cedar Street	East 1st Avenue	East 4th Avenue	1,158	24	27,783	Asphalt	Urban	1.6	1.8	2.0	2.2	2.4	2.6	2.8	Low	1.6	Minor Rehabilitation	Chip Seal	\$0.75	\$2,084	2031
West 13th Avenue	South Vine Street	South Oak Street	1,468	18	26,431	Asphalt	Rural	1.4	1.6	1.8	2.0	2.2	2.4	2.6	Low	1.4	Minor Rehabilitation	Chip Seal	\$0.75	\$1,982	2031
South Hayes Street	West 4th Avenue	West 7th Avenue	1,148	20	22,963	Asphalt	Urban	1.2	1.4	1.6	1.8	2.0	2.2	2.4	Low	1.2	Preventative Maintenance	Crack sealing/Patching	\$0.75	\$1,722	2031
Redbud Avenue	North Lincoln Street	North Maple Street	380	18	6,839	Asphalt	Rural	2.8	3.0	3.2	3.4	3.6	3.8	4.0	Low	2.8	Major Rehabilitation	Mill and Overlay	\$2.25	\$1,539	2031
North Cedar Street	Washington Avenue	East 1st Avenue	356	28	9,981	Asphalt	Rural	1.8	2.0	2.2	2.4	2.6	2.8	3.0	Low	1.8	Minor Rehabilitation	Chip Seal	\$1.45	\$1,447	2031
South Spruce Street	East 4th Avenue	East 5th Avenue	375	24	9,011	Asphalt	Rural	2.7	2.9	3.1	3.3	3.5	3.7	3.9	Medium	4.0	Minor Rehabilitation	Chip Seal	\$1.45	\$1,307	2031
Hickory Street	East Park Road	East Monroe Avenue	822	18	14,791	Asphalt	Rural	1.5	1.7	1.9	2.1	2.3	2.5	2.7	Low	1.5	Minor Rehabilitation	Chip Seal	\$0.75	\$1,109	2031
East 13th Avenue	South Oak Street	South Main Street	726	16	11,624	Asphalt	Rural	1.0	1.2	1.4	1.6	1.8	2.0	2.2	Low	1.0	Preventative Maintenance	Crack sealing/Patching	\$0.75	\$872	2031
West 11th Avenue	South Elm Street	South Walnut Street	554	18	9,981	Asphalt	Rural	1.5	1.7	1.9	2.1	2.3	2.5	2.7	Low	1.5	Minor Rehabilitation	Chip Seal	\$0.75	\$749	2031
West 10th Avenue	South Elm Street	South Walnut Street	552	18	9,940	Asphalt	Rural	1.4	1.6	1.8	2.0	2.2	2.4	2.6	Low	1.4	Minor Rehabilitation	Chip Seal	\$0.75	\$746	2031
South Vine Street	West 1st Avenue	West 2nd Avenue	378	26	9,830	Asphalt	Urban	1.3	1.5	1.7	1.9	2.1	2.3	2.5	Medium	2.0	Minor Rehabilitation	Asphalt Overlay	\$0.75	\$737	2031
Queens Road	West 7th Avenue	Dead End	277	28	7,747	Asphalt	Urban	1.5	1.7	1.9	2.1	2.3	2.5	2.7	Low	1.5	Minor Rehabilitation	Chip Seal	\$0.75	\$581	2031
South Walnut Street	West 9th Avenue	West Veterans Circle Drive	2,580	24	61,922	Asphalt	Rural	4.0	4.2	4.4	4.6	4.8	5.0	5.0	Medium	6.0	Reconstruction	Reconstruction	\$18.00	\$111,460	2032
West 2nd Avenue	South Maple Street	South Oak Street	2,036	30	61,081	Asphalt	Urban	4.0	4.2	4.4	4.6	4.8	5.0	5.0	Medium	5.9	Reconstruction	Reconstruction	\$18.00	\$109,947	2032
North Catalpa Street	East Park Road	East 2nd Avenue	1,536	22	33,790	Asphalt	Rural	3.9	4.1	4.3	4.5	4.7	4.9	5.0	Medium	5.9	Reconstruction	Reconstruction	\$18.00	\$60,823	2033
South Catalpa Street	East 2nd Avenue	East 4th Avenue	1,121	22	24,666	Asphalt	Rural	3.9	4.1	4.3	4.5	4.7	4.9	5.0	Medium	5.9	Reconstruction	Reconstruction	\$18.00	\$44,398	2033
Prairie Links Drive	Northeast Neosho Road	Prairie Links Drive	2,796	18	50,327	Asphalt	Rural	2.4	2.6	2.8	3.0	3.2	3.4	3.6	Low	2.4	Major Rehabilitation	Mill and Overlay	\$2.25	\$11,324	2033
East Monroe Avenue	North Pine Street	North Olive Street	1,701	24	40,831	Asphalt	Urban	3.2	3.4	3.6	3.8	4.0	4.2	4.4	Low	3.2	Reconstruction	Reconstruction	\$2.25	\$9,187	2033
North Walnut Street	West Park Road	West 1st Avenue	1,501	26	39,026	Asphalt	Urban	1.4	1.6	1.8	2.0	2.2	2.4	2.6	Low	1.4	Minor Rehabilitation	Chip Seal	\$0.75	\$2,927	2033
Washington Avenue	North Pine Street	North Cedar Street	541	28	15,154	Asphalt	Urban	1.6	1.8	2.0	2.2	2									



APPENDIX B  
ROADWAY IMPROVEMENT DECISION MATRIX  
GARNETT, KANSAS

Street Name	From Intersection	To Intersection	Length (ft)	Average Roadway Width (ft)	Approximate Area (Sq Ft)	Road Surface Type	Urban or Rural Section	2022 RoadBotics Score	Estimated 2023 RoadBotics Score	Estimated 2024 RoadBotics Score	Estimated 2025 RoadBotics Score	Estimated 2026 RoadBotics Score	Estimated 2027 RoadBotics Score	Estimated 2028 RoadBotics Score	Roadway Traffic Volume	Weighted Score	Treatment Category	Recommended Repair	Unit Cost for Recommended Repair (per Sq Ft)	Estimated Construction Cost	Construction Year
East Market Street	West 13th Avenue	West 14th Avenue	371		0	Gravel	Rural	Not Paved							Low	N/A	FALSE			\$0	
Garfield Street	Dead End	West 1st Avenue	566		0	Gravel	Rural	Not Paved							Low	N/A	FALSE			\$0	
South Main Street	East 1st Avenue	East 3rd Avenue	1,141		0	Gravel	Rural	Not Paved							Low	N/A	FALSE			\$0	
South Oak Street	West 10th Avenue	West 13th Avenue	857		0	Gravel	Rural	Not Paved							Low	N/A	FALSE			\$0	
South Vine Street	West 11th Avenue	West 13th Avenue	551		0	Gravel	Rural	Not Paved							Low	N/A	FALSE			\$0	
South Willow Street	East 1st Avenue	East 3rd Avenue	752		0	Gravel	Rural	Not Paved							Low	N/A	FALSE			\$0	
West 10th Avenue	South Walnut Street	South Oak Street	371		0	Gravel	Rural	Not Paved							Low	N/A	FALSE			\$0	
West 11th Avenue	South Westgate Road	South Hayes Street	1,585		0	Gravel	Rural	Not Paved							Low	N/A	FALSE			\$0	
West 11th Avenue	South Walnut Street	Oak Street	366		0	Gravel	Rural	Not Paved							Low	N/A	FALSE			\$0	
West 14th Avenue	South Elm Street	South Walnut Street	741		0	Gravel	Rural	Not Paved							Low	N/A	FALSE			\$0	
West 15th Avenue	South Elm Street	Dead End	192		0	Gravel	Rural	Not Paved							Low	N/A	FALSE			\$0	
West 9th Avenue	Dead End	South Hayes Street	854		0	Gravel	Rural	Not Paved							Low	N/A	FALSE			\$0	



## **APPENDIX C**

### **ANNUAL COST ESTIMATE SUMMARY**



APPENDIX C  
ANNUAL COST ESTIMATE SUMMARY  
GARNETT, KANSAS

Construction Year	Pavement Construction	Utility Improvements	Total Estimated Annual Cost
2022	\$126,069		\$126,069
2023	\$47,592		\$47,592
2024	\$197,811		\$197,811
2025	\$204,306		\$204,306
2026	\$186,992		\$186,992
2027	\$198,059		\$198,059
2028	\$212,390		\$212,390
2029	\$179,424		\$179,424
2030	\$206,591		\$206,591
2031	\$186,750		\$186,750
2032	\$221,406		\$221,406
2033	\$130,469		\$130,469
2034	\$42,935		\$42,935

Notes:

Estimated construction costs are based on 2022 unit pricing.

Unit pricing should be reviewed and updated annually.

2022 construction projects are scheduled to begin this fall.

The entire street network should be re-evaluated every 2-3 years to provide a current index rating.

## **APPENDIX D**

### **ROADBOTICS RATING SYSTEM**



# RoadBotics

## Rating System

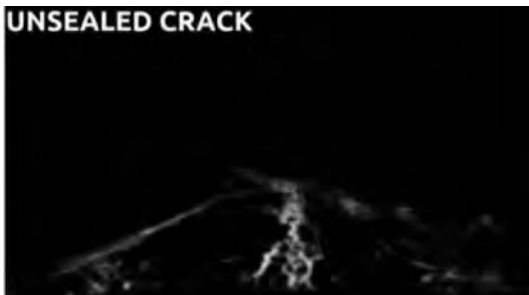
# Rating System Catalogue

*Collected images are assessed using computer algorithms (artificial intelligence) using image processing as follows:*

## 1. Road Identification



## 2. Distress Identification



## 3. Algorithmic Assignment of Condition Rating



Level 1

Level 2

Level 3

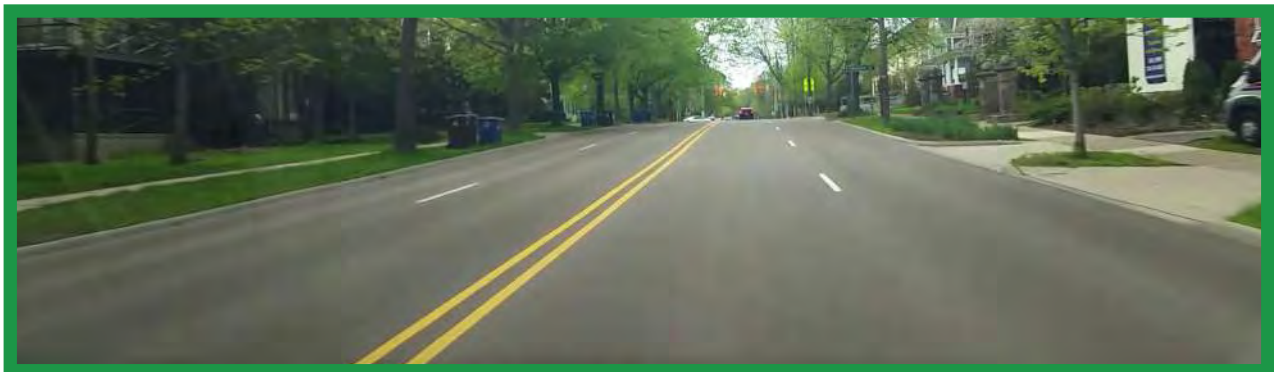
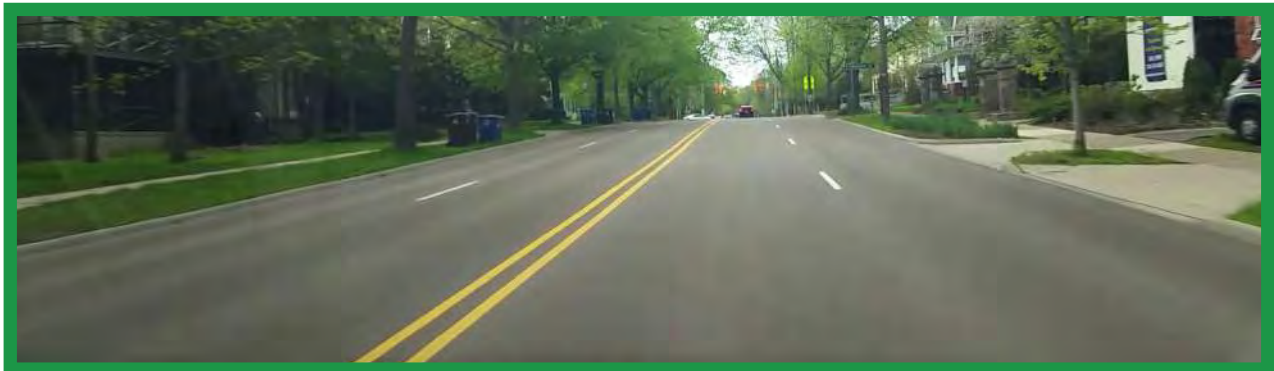
Level 4

Level 5





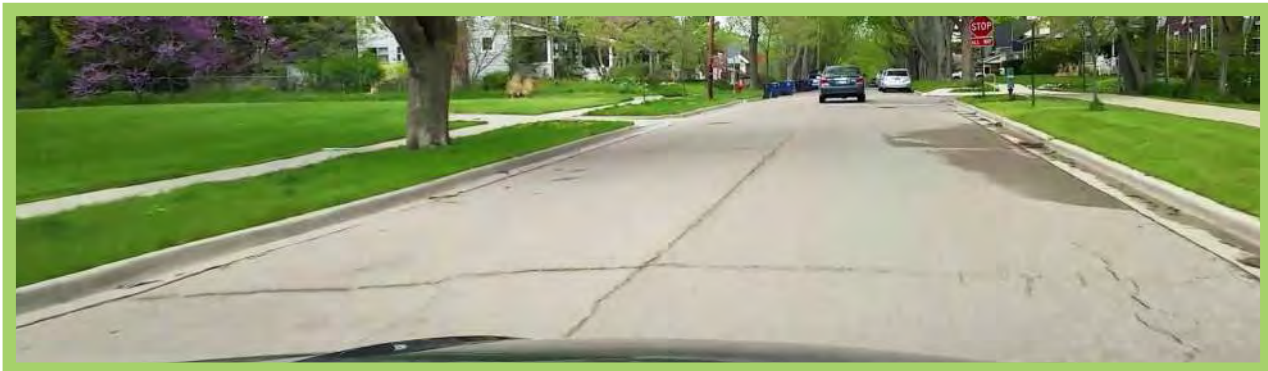
# Level 1





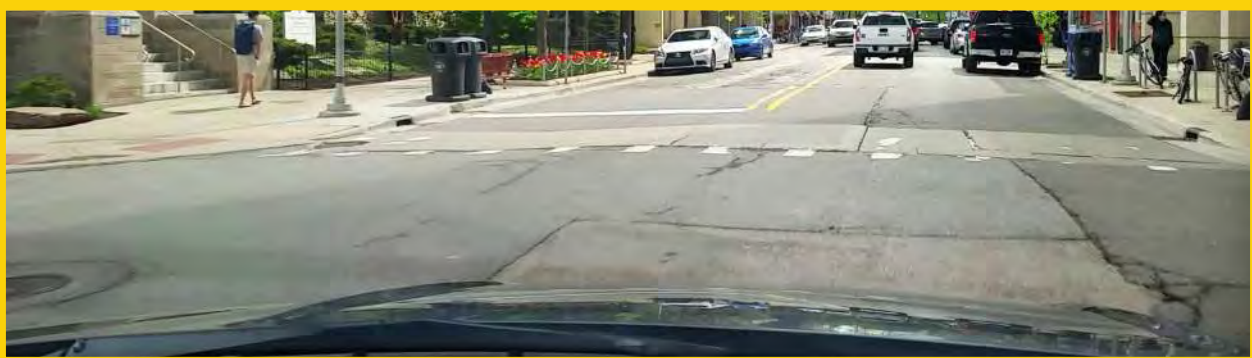


## Level 2





## Level 3







## Level 4







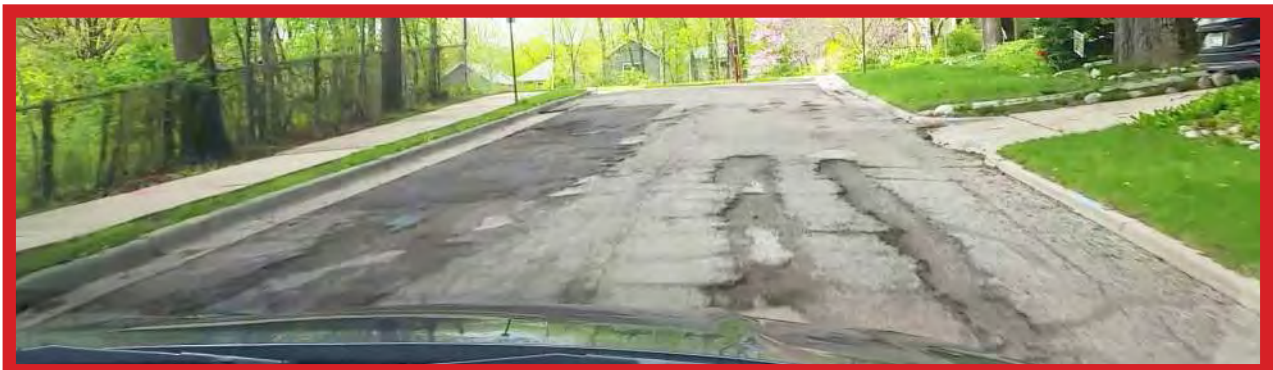
## Level 5







## Level 5 (Continued)





*Small, Serene, Simply Garnett.*

**TEMPORARY PERMIT  
FOR THE SALE OF  
CEREAL MALT BEVERAGE**

Issued to: Anderson County Corn Festival, Inc.  
Westphalia Knights of Columbus, Kenton Ludolph

Place: North Lake Park (as indicated on the application)

Date of Delivery: September 24, 2022

Date of Event: September 24, 2022

Time: 12:00 p.m. – 11:59 p.m.

Fee: \$50.00

State Stamp Fee: \$25.00

Approved by the Governing Body of the City of Garnett on August 23, 2022

Signed:

---

Patricia Brewer, City Clerk

(Seal)



8/8/2022

Attn=Jason 913-208-4040 jsheahan@garnettks.net

Quote: (1) New 11yd Quantum RL / Ford F750 De-Rated

**(1) New Curbtender 11yd Quantum Rear Loader (108" Cab-To-Axle)**

**Standard Features** – Curved Shell Body, Back Up Alarm, Engine Accelerator, 6 Month Warranty, 4" Sweep & Slide Chrome Cylinders, ICC Lights and Reflectors, High Mount Light Bar, Hydraulic Sight Gauge, Automatic Back Pack and Tailgate Locks, Adjustable Rear Fenders with Mud Flaps.

**Options Included** – Body Installation, Hot Shift PTO with Electronic Over Speed Protection, 3/16" AR 450 Hopper Bottom, Dual LED Alt. Flash Strobes Rear & Front, LED Hopper Work Lights, Reverse Flood LED Lights, Commercial Container Lip /Latch Tailgate, Hydraulic Overhead Drum Winch, Commercial Container Hydraulic Kick Bar, Rotary Tuck-Away Cart Tipper Installed (Perkins D6405) with Tap-In-Kit Controls on Curb Side, Body Access Door, LED Stop/Tail/Turn Lighting, 7" Color Monitor with Rear Camera, Paint DuPont Imron 5000 White.

\*Price reflects using Undercdl finance option and rebates Date of sale

**(1) New 2022 F750 De-Rated (26,000 GVWR)**

Total Package Price \$ 165,900 (FOB Blooming Prairie MN)

\$5000 deposit/partial payment required

Acceptance Signature \_\_\_\_\_ Print \_\_\_\_\_

Date \_\_\_\_\_ PO # (Optional) \_\_\_\_\_

UnderCDL.com

Prepared by Lonnie Lembke [Lonnie@undercdl.com](mailto:Lonnie@undercdl.com) 507-438-1460

Blooming Prairie, MN 55917

[www.UnderCDL.com](http://www.UnderCDL.com)





**To:** City of Garnett  
Garnett, KS  
Atten: Jason Sheahan

**From:** Truck Component Services  
403 E. Evergreen Rd.  
Strafford, MO 65757  
[www.tlgtrucks.com](http://www.tlgtrucks.com)

**Date:**  
10-Aug-22

Qty	Description	Total
1 each	<b>2023 International MV607 and 11yd Curbtender QT Body</b>	\$172,995.00
	<b>2023 International MC607 chassis:</b>	
	<i>*See attached chassis specs for entire list</i>	
	<b>Curbtender Quantum MD 11yd Rear Load Body:</b>	
	<i>Includes:</i>	
	Factory mounting	
	Pump, pto, hotshift w/ EOS	
	Kick bar	
	8,000# drum winch	
	Lip and latch system	
	Center mount Perkins D6220 cart tipper	
	Hydraulic tank clean out and inspection port	
	Rear riding steps	
	Access door and ladder	
	Shovel holder on tailgate	
	LED Stop/tail/turn/reverse lighting	
	LED Dual hopper lights	
	LED Reverse mid body flood lights	
	LED Smart lights	
	LED Dual front oval alternating	
	Dual pto shut off and driver alert	
	Camera system w/ 7" monitor	
	White performance paint	
	<b>Standard 12 Month Body &amp; Cylinder Warranty</b>	
	<i>*Total price includes delivery to Garnett, KS</i>	
	<b>TOTAL</b>	<b>\$172,995.00</b>



3100 West 76th Street  
Davenport, IA 52806  
Ph: 563-391-4840

Elliott Sanitation Equip. Co.  
1245 Dawes Avenue  
Lincoln, NE 68521  
Ph: 402-474-4840

## Quote

Date	Quote #
8/11/2022	17600
Proposed Shipping Date	
Approx. 90-120 days	
Terms	
Due on receipt	
Rep	
KMH	

4000 SE Beisser Drive  
Grimes, IA 50111  
Ph: 515-986-4840  
Fx: 515-986-9530

14001 Botts Rd.  
Grandview, MO 64030  
Ph: 816-761-4840

4400 E 60th Ave  
Commerce City, CO 80022  
Ph: 303-853-4840

City of Garnett  
131 W. 5th Avenue  
Garnett, KS 66032

### Here is our quotation on the goods named, subject to the conditions noted:

**CONDITIONS:** The prices and terms on this quotation are not subject to verbal changes or other agreements unless approved in writing by the Home Office of the Seller. Prices are based on costs and conditions existing on date of quotation and are subject to change by the Seller before final acceptance. All quotations and agreements are contingent upon strikes, accidents, fires, availability of materials and all other causes beyond our control.

Typographical and stenographic errors subject to correction. Purchaser agrees to accept either overage or shortage not in excess of ten percent to be charged for pro-rata. Purchaser assumes liability for patent and copyright infringement when goods are made to Purchaser's specifications. When quotation specifies material to be furnished by the purchaser, ample allowance must be made for reasonable spoilage and material must be of suitable quality to facilitate efficient production. Quoted Prices are good for 60 days.

Conditions not specifically stated herein shall be governed by established trade customs. Terms inconsistent with those stated herein which may appear on Purchaser's formal order will not be binding on the Seller.

**TERMS:** Equipment is due on receipt. Carts, Containers, Parts & service are Net 30 unless otherwise noted on your account. Balances over 30 days from the date of invoice are subject to finance charges up to 1.5% per month.

Qty	Item	Description	Price	Total
1	11563E	2023 New Freightliner M2, Cummins B6.7 250 HP diesel, Allison 3500RDS automatic, single axle, 11 cu yd New Way Viper rear loader, drum winch, kicker bar, color camera system, work lights, strobe lights, Bayne Revolution cart tipper, in cab controls for tailgate and eject. Acrylic white in color. Includes 1 year body and hydraulic warranty and 2 year cylinder warranty. VIN:UH9239	172,326.00	172,326.00

**Total**

\$172,326.00

TO CONFIRM ORDER, SIGN AND RETURN

X \_\_\_\_\_

# CEDAR VALLEY RESERVOIR AUXILIARY SPILLWAY

## RESTORATION TO DWR CODES & STANDARDS

### Engineering Alternatives Report

Garnett, Kansas

August 16, 2022

McClure Project No. 211294

**Report For:**

City of Garnett  
131 West Fifth  
PO Box H  
Garnett, Kansas 66032  
[Twilson@garnettks.net](mailto:Twilson@garnettks.net)

**Prepared By:**


McClure  
11031 Strang Line Road  
Lenexa, Kansas 66215  
Matt Eblen, P.E.  
[meblen@mcclurevision.com](mailto:meblen@mcclurevision.com)



ENGINEERING ALTERNATIVES REPORT  
FOR

CEDAR VALLEY RESERVOIR AUXILIARY SPILLWAY  
GARNETT, KANSAS

MEC PROJECT NO. 211294

 <p>08/16/2022</p>	<p>I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Kansas.</p> <p><i>Matt Eblen</i> <span style="float: right;">8/16/2022</span></p> <hr/> <p>Matt Eblen P.E. No. <u>15823</u> (Date)</p> <p>My license renewal date is <u>4/30/2024</u></p> <p>Pages covered by this Seal: <u>Entire Report</u></p>
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## 1.0 INTRODUCTION

Significant rainfall between April 28 and July 12 in 2019 caused significant flooding throughout Eastern Kansas and parts of the Midwest. Specific flooding during this time frame in Anderson County, Kansas near and around the City of Garnett created storm water runoff within the water shed of the Cedar Creek Reservoir so extreme that water volumes exceeded the capacity of the principal reservoir spillway. When this type of rain event happens, flood water is designed to flow through the auxiliary spillway of the reservoir. These weather systems were so significant that entire state of Kansas was declared a federal disaster due to flooding and resulting damage. When water flowed over the Cedar Creek Reservoir auxiliary spillway concrete weir control section and down the auxiliary spillway, the flooding caused major erosion. The flowing water reached high enough velocities that the vegetative cover, topsoil, and rock riprap installed during previous repairs from the last major flood in 2009 were displaced. This loss of cover caused underlying bedrock to also erode in some areas. The displaced rock, bedrock and soil erosion was transported further downstream a few hundred feet from the lower reaches of the auxiliary spillway where some of it was deposited where the topography starts to flatten and low water velocity allowed the material to settle out. The more significant erosion within the auxiliary spillway occurred on the outside curvature and has been identified as head cut 2. This outside curvature of the auxiliary spillway also is where the auxiliary spillway channel narrows and the slope increases. The curvature, narrowing, and slope increase caused the observed erosion. There was also a second area of soil erosion located towards the middle of the auxiliary spillway called out as head cut 1. This erosion starts at approximately 300 feet from the concrete weir control section where the slope of the channel starts to increase, thus increasing water velocity and erosional forces. Unchecked erosion would likely continue to erode the surrounding soils, bedrock, and eventually migrate up to the auxiliary spillway's concrete weir control section. Eventually the concrete weir control section would fail, and the erosion would migrate into the reservoir causing dam failure and the possibility of uncontrolled release of the water downstream of the Cedar Valley Reservoir. It should be noted that all of the area within the auxiliary spillway is in solid bedrock consisting of primarily sandstone, shale and limestone. See Exhibit 1.1 Photo 2019 Showing Flood of Auxiliary Spillway.



**Exhibit 1.1**  
*2019 Photo Showing Flood of Auxiliary Spillway*

After the flooding in 2019 and due to the severity of the damage around Anderson County, the City of Garnett applied for and received federal disaster funding approval in the form of a Public Assistance Grant from the **Federal Emergency Management Agency (FEMA)**. issued numbers include FEMA–DR4449-KS, CFDA# 97.036, Project Number 144302. The state of **Kansas Division of Emergency Management (KDEM)** provides management assistance to local qualifying municipalities as they navigate the FEMA related financial assistance requirements to repair damages caused by the flooding. Funding was identified and made available to the City of Garnett for repairs needed for the Cedar Valley Reservoir auxiliary spillway. Funding for other less severe damages to local City infrastructure was also approved under a separate FEMA public assistance grant.

During this time frame all work related to the repairs of the reservoir was delayed due to the COVID virus pandemic. COVID was a national crisis that impacted normal ways of doing business throughout the entire United States and the world. All major work tasks associated with completing the repairs to the auxiliary spillway were delayed for approximately 2-years. All state and federal employees were prohibited from travel during the pandemic. They were not able to visit the site and provide typical assistance to municipalities. This situation created concerns within the City of Garnett further challenged the normal way of doing business needed to resolve the damages to the auxiliary spillway. Some of the flood related damages were deemed critical, so the City of Garnett hired a local contractor to do limited grading and restoration of vegetative cover in the upper reaches of the auxiliary spillway. This work was needed to minimize the possibility of a short-term flood event

triggering further erosion and damage to the auxiliary spillway and concrete weir control section. This emergency repair of the auxiliary spillway was completed late June and early July 2019. See Exhibit 1.2 Photo 2021 Auxiliary Spillway Concrete Weir Control Section Condition Post Flood.



**Exhibit 1.2**

*Auxiliary Spillway Concrete Weir Control Section Condition Post Flood, 2021.*

McClure Engineering Company (MEC) was contacted by the City in late Fall 2021 regarding helping the City of Garnett manage the Cedar Valley Reservoir auxiliary spillway repairs and associated engineering needed to restore the auxiliary spillway integrity. MEC reviewed the available information provided by the City of Garnett related to the project history. MEC developed an approach and scope of work to assess the situation and provide a comprehensive overview of the project needs and Alternatives Engineering Report (EAR). The City of Garnett signed an Agreement to hire MEC on March 8, 2022. The following EAR details the reservoir's history, integrity, permitting, environmental, financial, and engineering review needed to provide a recommendation regarding repairs to the Cedar Valley Reservoir Auxiliary Spillway. See Exhibit 1.3 which is an aerial photo of the auxiliary spillway taken in 2022.





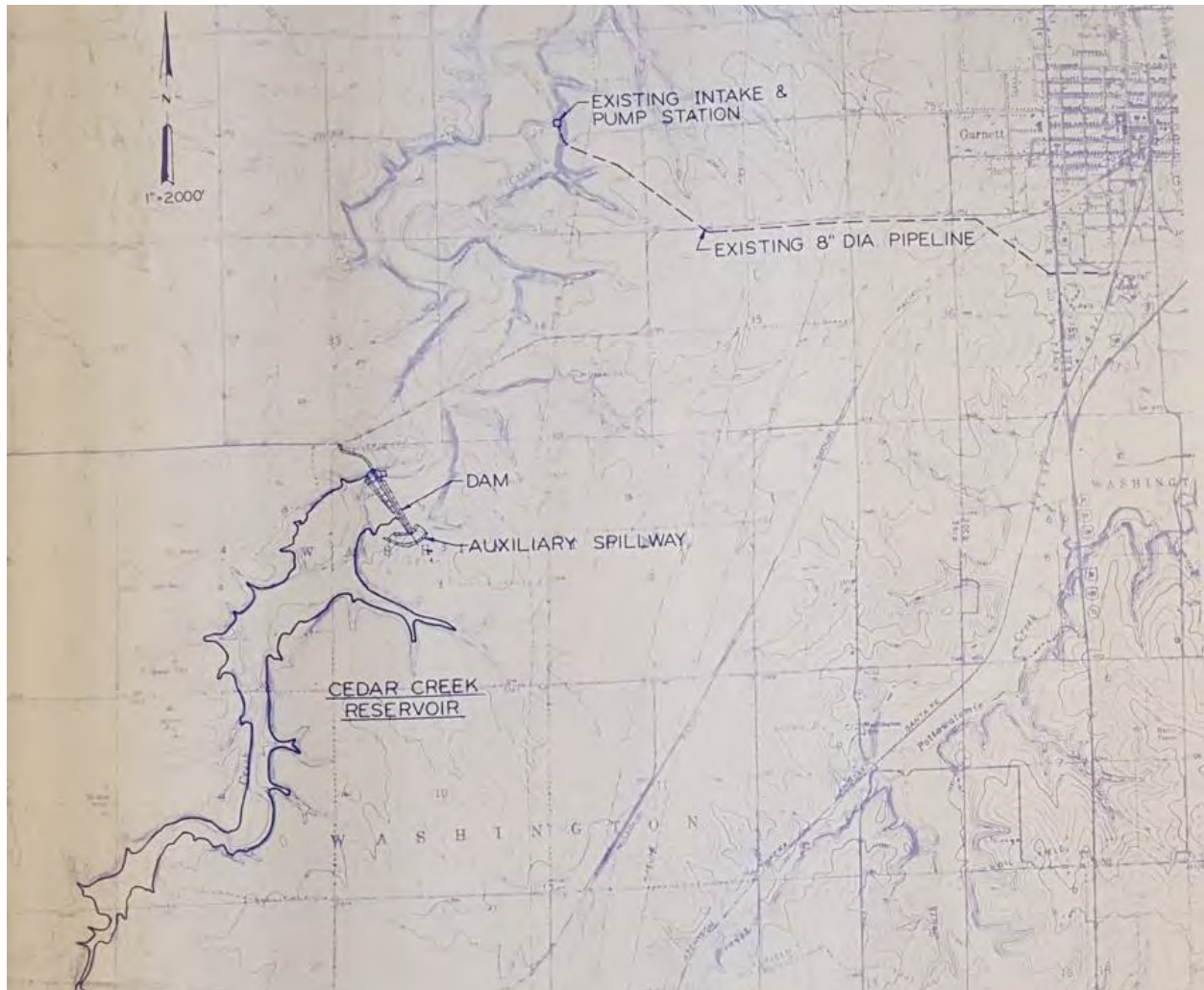
**Exhibit 1.3**

*Aerial Photo taken 2022 Cedar Valley Reservoir Auxiliary Spillway Current Conditions*

### **1.1 Background & Purpose**

The City of Garnett uses the Cedar Valley Reservoir as their primary raw water supply source for drinking water. The City of Garnett owns and manages the reservoir and surrounding property immediately adjacent to the reservoir. Water flows into the reservoir from approximately 64 square miles of upstream watershed. Rainfall within the watershed is sufficient to keep the reservoir full most of the year thereby maintaining its normal operating level. Excess water flows out of the reservoir's principal spillway and into the dam's stilling basin located immediately downstream of the dam. This normal flow of water released from the reservoir provides sufficient water for the City of Garnett to use as their primary raw water source for their drinking water. The City's raw water intake structure and pumping station is located about 1-mile downstream of the dam. Raw water is pumped out of Cedar Creek and through a pipeline to the City of Garnett's water treatment plant located a few miles away. See Exhibit 1.4 showing relationship of Cedar Valley Reservoir, Raw Water Intake Structure on Cedar Creek and City of Garnett.





**Exhibit 1.4**

*Map showing relationship of Cedar Creek Reservoir, Downstream Water Intake, and City of Garnett.*

The surface water is treated at the City of Garnett's water treatment plant to meet drinking water regulations suitable for potable water consumption. The City of Garnett is also currently under contract with an engineering firm to design a replacement water treatment plant. This new water treatment plant is in the final permitting stage of the project. This new water plant project has no impact related to planned repairs to the Cedar Valley Reservoir auxiliary spillway.

The spillway project is needed to ensure the Cedar Valley Reservoir remains a long-term sustainable water supply. Repairs are needed to the auxiliary spillway to meet applicable standards for reservoir and dam related safety requirements

During occasional low rainfall periods water does not flow into the principal spillway. When this occurs, Garnett personnel open a sluice gate valve at the principal spillway structure to allow raw water to flow through the stilling basin and continue downstream in Cedar Creek to the raw water intake structure. The reservoir is designed to include storage reserve for drought reserve to allow controlled releases of water into Cedar Creek to the raw water pumping station. The other primary functions of the reservoir include flood control, wildlife habitat, and recreation among other uses.

The Kansas Department of Agriculture (KDA), Division of Water Resources (DWR) has state jurisdiction over surface waters in the state of Kansas. The amount of diverted water from the reservoir must be tracked. Measurement of diverted water is calculated by a stream gage located at the Cedar Valley Reservoir principal spillway exit point into the stilling basin. Diverted water that is monitored by the City of Garnett and reported to KDA quarterly. Requirements are that diverted water be purchased using a formula from the KDA. The State of Kansas has Water Rights the details of which are not a part of this report.

For DWR to permit any work-related repairs to the dam or spillway requires following the requirements of, **K.A.R. 5-30-1**. Approval of or permits for dams. The chief engineer shall not approve or grant a permit for any dam subject to the jurisdiction of the chief engineer under the authority of K.S.A. 1979 Supp. 82a-301 through 305a as amended, unless the applicant also receives prior approval of his or her application to appropriate water for beneficial use to be diverted by means of the dam for which the approval or permit is sought, unless the sole proposed use for the water is for domestic use. (Authorized by K.S.A. 82a-706a, 82a-709; effective May 1, 1980.

Based on an inquiry with KDA Water Commissioner Katie Tietz related to any pending litigation issues for water rights concerning Cedar Valley Reservoir, there are not any active litigation issues regarding the reservoir and water use.

## 1.2 Approach

MEC, in coordination with the City of Garnett, developed a project communication team composed of various federal, local, and state agencies to review the overall project goals, challenges, schedule, financial assistance, and project needs. Three virtual meetings were held with the project team to allow collaboration of issues, share comments, vet potential issues, and obtain a better overall understanding of project requirements so a project approach could be developed. The project team expressed their areas of concern so that MEC was able to develop an overall project understanding and associated approach that will meet the stakeholders' requirements. Minutes of those meetings can be made available if needed.

Like many communities in Kansas and across the Midwest, KDEM and the FEMA provide assistance, offer input, management advise and overall guidance on how to take advantage of federal disaster relief programs during disaster declarations. The City of Garnett applied for and obtained preliminary approval from KDEM/FEMA in 2019 to qualify for financial assistance from one of the public assistance programs to bring flood damaged facilities back to pre-existing conditions. This project is established as: **FEMA – DR4449-KS, CFDA: #97.036, PROJECT #144302**. In some circumstances, facilities needing repairs can be improved beyond pre-existing conditions due to mandated updates and changes in regulatory Codes and Standards. The approach MEC is recommending is to follow Federal and State requirements to maintain eligibility to qualify for the FEMA Public Assistance Funding Grant. This report describes what will be needed to meet compliance and eligibility requirements to obtain funding assistance. By satisfying these requirements, the City of Garnett can qualify for financial assistance in the form of a grant up to 85% of the total cost of the project. The final 15% is the responsibility of the City of Garnett. This engineering alternatives report evaluates the existing Cedar Creek Reservoir auxiliary spillway. Other work not associated with repair of the auxiliary spillway do not qualify for FEMA financial assistance. There are other funding opportunities available, but they can't be combined with FEMA funds. The public assistance funding from FEMA/KDEM that has already been approved for this project is the best option available.

MEC completed an evaluation of the auxiliary spillway system needed to meet requirements of published Standards from the **Kansas Department of Agriculture Division of Water Resources Dams & Safety Standard** and communications with their engineering staff. Meetings were held with their engineering staff to review the dam and reservoir history along with existing conditions. Codes and Standards were discussed and interpreted so viable alternatives for design improvements could be identified. This report is prepared to meet regulatory compliance, develop cost estimates of alternatives, and provide solutions for long-term repairs.

### 1.3 Regulatory Requirements & Permitting

#### 1.3.1 Kansas Department of Agriculture, Division of Water Resources, Dams Safety (DWR).

The DWR has regulatory jurisdiction over the Cedar Valley Reservoir dam and approves any work planned to be completed on dams that might impact public safety within the state of Kansas. Any work planned to be completed on the Cedar Valley Reservoir auxiliary spillway must be designed by a Kansas Registered Professional Engineer who will oversee design requirements for the project. Work planned to be completed must be submitted to DWR for approval. The documents submitted for approval need to include an application cover letter describing the project, an Engineering Design Report detailing design information used for review related to improvements with calculations, detailed technical plans showing proposed work, and detailed contract bid documents which includes technical specifications.

Review of the current condition compared to regulations were completed and revealed that the current Cedar Valley Reservoir auxiliary spillway does not meet the Codes and Standards of K.A.R. 5-40-55. Earthen Auxiliary Spillway existing Codes and Standards. See Copy of Codes and Standards K.A.R. 5-40-55 Appendix A.

MEC, City, Local/State/Federal project team met, and shared information with the DWR engineering staff. The collaboration resulted in DWR feedback that, “MEC will need you to provide analysis that shows that the potential modifications will meet **K.A.R. 5-40-56 (C)** which states, *“For exit slopes greater than 10 percent, the applicant shall provide analyses showing both of the following:*

- *There is no more than 0.5 foot of erosion depth within 20 feet of the control section for the one-percent chance storm.*
- *The auxiliary spillway does not fail by breaching” ... during the PMP.”*

The Probable Maximum Precipitation (PMP) storm event is a term used to describe a tremendous flood event much stronger than a one in one-hundred-year type flood event that is described in more detail later in this report. DWR typically does not approve any improvements planned to the Cedar Valley Reservoir auxiliary spillway that would not withstand as a minimum the last flood that caused damage to the auxiliary spillway. Our survey shows there are no exit slopes along the auxiliary spillway greater than 10%. There are velocities based on our calculations within the auxiliary spillway that exceed design standards listed in the Codes and Standard, thus requiring hardening of the auxiliary spillway.

DWR is aware of the repairs made previously to the auxiliary spillway around the 2009-time frame. Their verbal stipulation was that, at a minimum, they would consider a waiver to their Standards and Codes as long as the auxiliary spillway was hardened to a level that would not require repairs for a similar future flood. DWR requested that the entire dam be brought up to current Codes and

Standards. Based on this requirement MEC completed a review of the entire dam. This effort included the need for a Flood Routing study. MEC completed the Flood Routing analysis, the results which were used to conclude the rest of the dam is in fact up to current standards. This information was used in the calculations for design. The other study requested by DWR was a Breach Analysis. MEC referenced a previous Breach Analysis Study completed during the 2009-time frame completed by Shafer Kline & Warren (SKW). Communication with DWR were able to locate the previous Breach Analysis in their files, thus negating the need to complete another duplicate study. However, there are some maintenance activities that are also required. MEC recently completed the Cedar Valley Reservoir dam inspection and prepared a separate dam inspection report earlier this year that can be found in Appendix B. The auxiliary spillway was determined to be the only aspect of the reservoir structure that did not meet current Codes & Standards related safety requirements.

The DWR is not involved with project financing. Their interest is to bring the dam up to standards. The reservoir being the City of Garnett's sole source of water supply dictates the dam is Hazard Class "C" High Hazard Dam due to the reservoir providing sole source of water supply. Design information reviewed by MEC indicated that to bring the auxiliary spillway up to a higher standard to meet Codes and Standards would require large quantities of expensive rip rap (up to 11 feet in diameter). This requirement means to bring the auxiliary spillway to a higher standard than pre-existing conditions would cost more than previously estimated and require a higher level of funding to complete the work.

This requirement was somewhat unexpected to some on the project team. The original project scope for financial assistance was based on bringing the auxiliary spillway up to preexisting conditions. Based on this requirement the alternatives report will need to only consider the following two alternatives.

- 1.) DWR to issue a waiver to allow hardening to a level the auxiliary spillway sufficient to withstand the last flood that occurred in 2019.
- 2.) Bring the auxiliary spillway up the existing KDA Dams and Safety Codes & Standards

DWR now have familiarity with the project, and McClure plans to continue to remain engaged by sending them a copy of this engineering alternatives report for comment. DWR stated McClure should plan on a 3-month timeframe for them to review the work and issue a permit for construction. Details on permitting requirements are provided later in this report.

### **1.3.2 Kansas Division OF Emergency Management (KDEM)**

The staff at KDEM have made themselves available, answered questions, participated collaboratively, and have been very helpful in sharing knowledge related to the needs for a successful FEMA qualifying public assistance grant project. KDEM staff stated they have no authority for permitting. However, they will review all permits, environmental reviews, and associated costs to ensure the project meets the FEMA/KDEM public assistance grant requirements. This is a Category D (Water Control Facilities) project that addresses only permanent work that originally was thought to restore the facility back to pre-disaster condition. However, as previously pointed out, DWR requires the improvements be brought up to minimum standards. KDEM due diligence includes review of all permits, plans, and technical specifications, costs, environmental and historical preservation compliance issues. This process is a part of KDEM/FEMA PA Public Assistance Grant Review to ensure compliance with terms and conditions to qualify for financial assistance. KDEM PA FEMA 406 Mitigation is additional funding to assist with hardening of a facility beyond restoration and restoration based on Codes & Standards.



Upon their FEMA review and approval, KDEM will control the financial reimbursements for the City of Garnett to obtain their percentage of reimbursements once the project goes to construction. Once the project obtains KDEM approval, funding will be set up. KDEM has a keen interest in anticipated project costs, so MEC developed anticipated project cost information for both alternatives.

Once the project is approved by KDEM PA and deemed eligible by FEMA, the project would then be bid by the City of Garnett. KDEM PA require the City must follow their procurement policy for contract bidding and letting. These detailed requirements will be incorporated into the contract documents before the project is bid. During project award and contract execution, KDEM is anticipated to be engaged in the financial review to ensure funding differences in bids versus planning estimates are resolved. Once the construction contract is awarded, KDEM will remain engaged in the project. KDEM controls the project expense reimbursements to the City of Garnett during construction. KDEM PA reimbursements are based on actual costs submitted to State KDEM staff. The City of Garnett will need to use their cash reserves, or other funding sources, to finance payments for construction of the project and other project expenses. Quarterly requests to KDEM for reimbursement will be submitted.

A major concern for the City of Garnett relates to the overall project construction completion date. Within the requirements of a FEMA project is the need for all construction work to be completed within 4 years of the project disaster declaration date of June 20, 2019. This four-year period of performance (POP) deadline for this project is June 20, 2023. MEC's concern is there is not sufficient time for the project to be designed, permitted, bid, and constructed in less than the 11 months, i.e., time remaining between the writing of this report and June 2023. Therefore, another time extension will be required. The issue is any time extensions beyond 4-years is controlled by FEMA and not KDEM and there is always uncertainty that it would not be approved. Thus, timing on when to apply for this time extension request becomes an important risk mitigation issue for the City of Garnett moving forward.

#### **1.3.2.1 KDEM Time Extension**

The City of Garnett submitted and received approval from KDEM for what was supposed to be the last and final time extension for this project on June 13, 2022. See time extension approval letter from KDEM dated June 13, 2022, in Appendix C. Terms of this time extension state all work must be completed by June 20, 2023, and to keep Amy McGonigle, PA Closeout Manager with KDEM, updated with quarterly progress reports related to the project. Our opinion is there is not sufficient time in the most current time extension issued by KDEM for all the work to be completed by the June 20, 2023, deadline. KDEM staff have also discussed their concerns and made the project team aware that any work not completed by the June 20, 2023, deadline would be at risk for not being reimbursed. There is also a possibility that not completing the project by the deadline could make the entire project disqualified for reimbursement status. Thus, the City of Garnett would be held responsible for potentially all costs for the project.

The time completion issue is a major concern, so potential solutions were explored and identified based on collaborative discussions from the project team. After this 4-year time frame expires, the applicant can submit a 3<sup>rd</sup> extension request taking the deadline for completion from June 20, 2023 out to 20 June 2024. The request flow is from the applicant to KDEM (for review and approval), to FEMA Region VII (for review and approval), then to FEMA National Headquarters (for final review and approval). An approval letter is then generated by FEMA National Headquarters and sent back to the applicant. Our recommendation is to plan for 6-months for this request to make its way through

KDEM PA FEMA after further discussion with KDEM staff (submittal would need to occur by December 20, 2022). The time extension request is for a full year until June 20, 2024.

There is no guarantee that FEMA will approve the work past the June 20, 2023, deadline. The City of Garnett is at risk for engineering-related costs to get the project designed within the anticipated 90-day fast track design schedule towards the end of this 2022 calendar year. See the referenced project schedule in Section 4.4 for timeline of all work. Permitting is anticipated to take 3 months, assuming the regulatory agencies do not have any unknown requirements. See KDEM Environmental and Historical Preservation Review permitting Section 1.3.3 of this report for details on what is included and expected within a 3-month permitting review. The plan is to start the time extension request well before the project is bid, which is anticipated to be around March 2023. The recommended solution is to award the construction of the project as soon as possible. This is based on feedback from the project team that having the project under construction places much higher probability that FEMA will in fact approve this final time extension beyond June 20, 2023. The City of Garnett needs to have approval from FEMA for the project time extension no later than June 20, 2023. The schedule assumes all permitting takes only 3-months and assumes no serious environmental and historical preservation items come up that could require additional cultural investigations, time delays, or things like no construction during sensitive endangered species reproduction seasons. There are many things that can delay the project that make the June 20, 2023, project completion goal difficult to achieve. Weather delays can stall the project. The anticipated project schedule shows award of construction contract in May 2023, before approval of time extension deadline of June 20, 2023. Six (6) months construction is anticipated with construction being completed in November 2023. Project close out would take another 1-2 months, which could take close out into early 2024. This timeline assumes normal permitting and normal delivery of materials.

### **1.3.3 KDEM PA FEMA/KS SHPO Environmental and Historical Preservation Office Review**

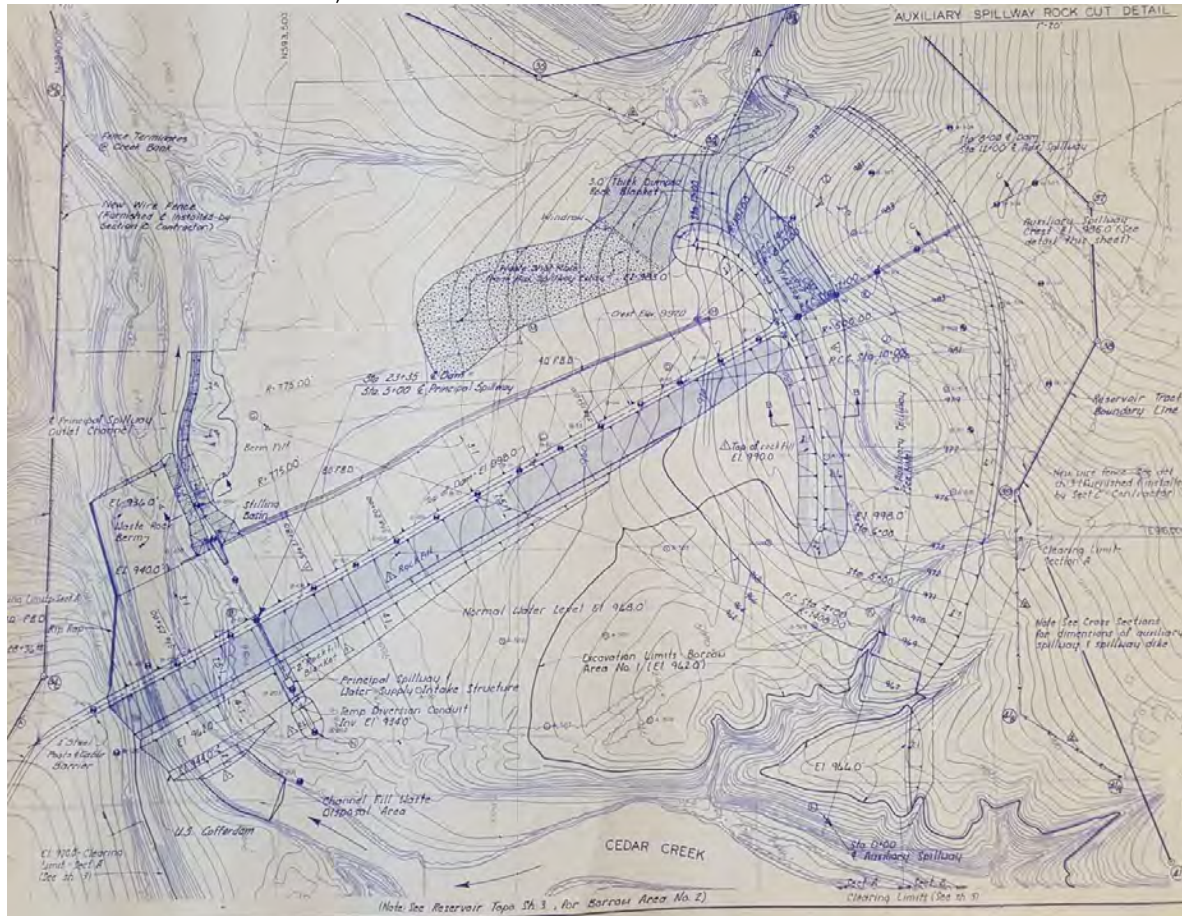
Part of KDEM PA FEMA requirements includes a review that all Environmental and Historic Preservation (EHP) requirements are followed. This process is anticipated to be like other state environmental reviews required within Kansas, which are typically geographically sensitive. Approximately 12 different regulatory agencies will be asked to review the project. Some may have comments that could trigger the need for additional environmental, research, or mandatory timing delays causing work beyond the anticipated 3-month permitting window. Items that come up in their area of concern typically identify restrictions in work that may need to be considered in the project contract documents and design. Some of the possible comments may require additional investigations for the project to move forward to the construction phase. Based on past experiences, this process is anticipated to take 60-90 days. The timing of EHP approvals would be completed before or concurrently with the DWR permitting. Once the EHP agencies complete their review, and all notification requirements have been documented and met, then the EHP communication documentation will allow KDEM to document the satisfactory completion of the environment review process.

The following is a list of regulatory agencies that are typically requested to comment on dam auxiliary spillway construction work:

- a. United States Army Corps of Engineer (USACOE)
  - i. USACOE will likely have comments and will be engaged in the overall review process in collaboration with DWR review. These two agencies have similar review concerns and standards. USACOE jurisdiction is out of the Kansas City

Regional office for this project. USACOE requirements have been known to be rigorous and follow strict technical requirements.

- b. Kansas Corporation Commission
- c. Kansas Biological Survey
  - i. Possible endangered orchid flower or endangered milkweed.
- d. Kansas Conservation Commission
- e. Kansas Water Office
- f. Kansas Department of Health & Environment (KDHE)
  - i. KDHE has already been contacted as a part of our due diligence for this project. It is anticipated that KDHE will have no comments other than standard requirements.
  - ii. Storm Water Pollution Prevention Plan (SWPPP) - See Below.
- g. Kansas Geological Survey
- h. Kansas Water Commission
- i. Kansas Department of Agriculture Division of Water Resources (DWR)
  - i. DWR will have key permitting jurisdiction. Other DWR departments will be officially notified to sign off. Things mentioned previously like water rights litigation should prove out no issue to obtain approvals.
- j. Kansas Dept of Wildlife and Parks
  - i. Nothing is anticipated, but possible fish, turtle, or other species protection.
- k. US Fish & Wildlife
  - i. Possible endangered bat protection and not allowed to remove any trees outside of specific timeframes. This is not anticipated to be a concern.
- l. Kansas State Historical Preservation Office (SHPO)
  - i. SHPO review is one area that could have requests for further review requirements, beyond the 3-months anticipated for normal permitting.
    - 1. Archeological
      - a. This is an area of concern that can add a few months to a project review. Phase 1 work is desk top Archaeological Research, which is a good preventative action item to circumvent any possible Phase 2 field work. Phase 2 work will take anywhere from 2-3 months and require boots on the ground field work to identify possible historical artifacts. Phase 3 work means additional cultural investigations are needed because they found something during Phase 2 field work.
      - b. It is a good idea to know what might be of local concern going into any SHPO requested review. Top of list requiring additional reviews is the Osage Nation, who have strong concerns over historical & cultural items. MEC was told by an engineering archeological partner that there are archaeological sites near the area. A Cultural Resource Phase 2 Investigation may be required. This could take an additional 2-3 months to complete a Phase 2 Archeological Study, and that assumes Findings of No significant Impacts (FONSI). No property will be disturbed that was not previously disturbed during the original dam construction or subsequent modifications. See attached Exhibit 1.5, showing limits of original dam construction and areas of previous disturbance.



**Exhibit 1.5**  
*Original Dam Construction and Areas of Disturbance*

### 1.3.4 Storm Water Pollution Prevention Plan (SWPPP)

Due to the size of the project, the design will include a Storm Water Pollution Prevention Plan (SWPPP). A project specific plan will be developed for the land disturbance and follow KDHE requirements. This requirement shall conform to state guidelines and include proper standards to ensure storm water is not allowed to wash debris soil and job site particulates off site, onto adjacent properties and into nearby streams. Plans and technical specifications shall incorporate these requirements during design along with proper maintenance and record keeping during construction ensure the project conforms to all rules and regulations.

### 1.3.5 Local Permitting - City of Garnett

There are no known local permitting requirements required by the City for the work, other than City Commissioners project approval for City Administrator to enter into a contract/agreement to complete authorized work.

### 1.3.6 Local Permitting – Anderson County, Kansas

There are no known Anderson County Kansas permitting requirements. All work will be on property owned and managed by the City of Garnett. A boundary survey or ALTA survey to obtain property related information was not performed for this report. Property ownership information from the original reservoir construction plans and county appraiser mapping shows the City of Garnett has



property ownership (there is also based on boundary fencing placed around the reservoir that is located 2' inside the actual property line). A boundary survey and other legal research may be required may be required.

#### **1.4 Funding Recommendations**

As mentioned in previous sections, the project is eligible and has already qualified for a FEMA/KDEM Public Assistance grant for work related to the auxiliary spillway damage. Project costs and approach require full transparency and review by KDEM. Once EHP requirements are met along with anticipated construction compliance items, then construction will be authorized. The City has already received funding to help pay for fees including engineering. Engineering design fees are eligible to be reimbursed along with construction engineering related costs. Funding reimbursements are anticipated to be based on the following percentages.

- KDEM 10%
- FEMA 75%
- City of Garnett 15%

This is viewed as very good news for the City of Garnett in that 85% of the project costs are anticipated to be eligible for public assistance FEMA grant funding. The project must follow program requirements. Any work not 100% completed and beyond any completion deadline places the entire project at risk for reimbursement.

During the review of the eligible costs, our understanding is that the City of Garnett also received payment for unrelated flood damage work as KDEM PA FEMA emergency work category B project #144299. Work associated with this work is not included with this project.

#### **1.5 Historical Reports**

##### **1.5.1 Original Reservoir Construction**

The Cedar Valley Reservoir was designed by Larkin & Associates Consulting Engineers based on plans dated 1982 and as-built record drawings stamped November 1984. See Exhibit 1.6 showing the Original Reservoir Plan. The reservoir was constructed based on the following information shown on the plans.

- The lake has a drainage area of 63 square miles
- Lake surface area normal pool is 320 acres
- Reservoir can provide up to 1,900-acre feet of water supply storage (Elev. 962 – Elev. 968)
- Water storage at Elev. 968 (Principal Spillway Crest Elevation) is 4,400-acre feet.
- Auxiliary Spillway frequency of use 50 years+.

CEDAR VALLEY RESERVOIR – ENGINEERING ALTERNATIVES REPORT - AUXILIARY SPILLWAY RESTORATION  
 FEMA – DR4449-KS, CFDA: #97.036, PROJECT #144302  
 CITY OF GARNETT – GARNETT, KANSAS



**Exhibit 1.6**  
*Cedar Valley Reservoir Original Reservoir Plan*

### 1.5.2 Repairs to Auxiliary Spillway 2009

During 2008, there was a major flood event where a large volume of water passed through the auxiliary spillway. See Exhibit 1.7 Photo 2008 flood water flowing over the concrete weir control section and down the auxiliary spillway. It's worth mentioning that the plans of the bottom portion of the auxiliary spillway show a 3' thick rock blanket that sustained major erosional damage during the flood of 2008 (based on photos reviewed). The flood of 2008 washed away nearly all materials within the auxiliary spillway and even dislodge large amounts of bedrock. See Exhibit 1.8 Photo of Auxiliary Spillway Condition Post flood of 2008.





**Exhibit 1.7**

*Photo of Flood in 2008 Water Flowing Over Auxiliary Spillway Control Section*



**Exhibit 1.8**

*Photo 2008 Auxiliary Spillway Post Flood Damaged Concrete Weir Control Section*

Trees allowed to grow within the auxiliary spillway can cause water channels to develop during the flooding that can enhance erosion in some areas. See Exhibit 1.9 Photo of Post 2008 Flood Channelized Flow suspected to be caused by trees.





**Exhibit 1.9**

*Photo of Post 2008 Flood Channelized Flow Likely Caused by Trees*

Design of repairs were completed in 2008 by the consulting engineering firm SKW. Based on project information, construction was completed in the 2009 timeframe. MEC has access to some of the archived project information. The project plans show the concrete weir control section was replaced due to the original concrete weir control section being severely damaged. See Exhibit 1.10 Photo of Replacement Concrete Weir Control Section Post Flood 2008 and Exhibit 1.11 Plan Detail of 2009 Construction Plan Sheet Auxiliary Spillway.



CEDAR VALLEY RESERVOIR – ENGINEERING ALTERNATIVES REPORT - AUXILIARY SPILLWAY RESTORATION  
 FEMA – DR4449-KS, CFDA: #97.036, PROJECT #144302  
 CITY OF GARNETT – GARNETT, KANSAS



Exhibit 1.10

Photo Post 2008 Flood – Auxiliary Spillway Replacement Concrete Weir Control Section

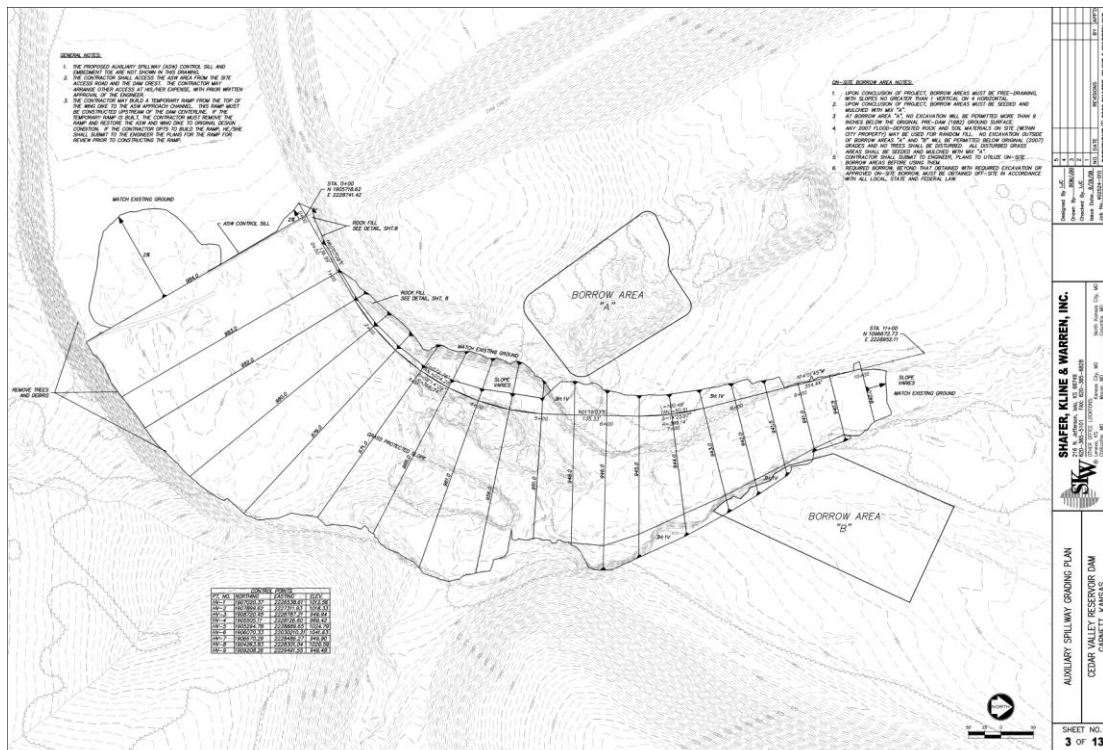


Exhibit 1.11

Plan Detail of 2009 Construction Plan Sheet Auxiliary Spillway.



Water flowing over the auxiliary spillway has exceeded the 2% or 50-year rain event (according to the original design) at least twice in the last 15 years. One flood event happened around 2008 and at least one more event occurred in 2019.

The auxiliary spillway was rebuilt in 2009. A review of those repairs shows the use of smaller rip rap along outside curvature in the downstream section got washed out the event(s) that occurred in 2019. Exhibit 1.12 Photo shows the 2009 Auxiliary Spillway Repairs Completed.



**Exhibit 1.12**

*Photo 2009 Auxiliary Spillway Repairs Completed. Note rock blanket on sides.*



**Exhibit 1.13**

*Photo taken in 2021 Showing Washout Area Outside Bend of Auxiliary Spillway*

Note Exhibit 1.13 photo shows scour along the outside bend of the auxiliary spillway where the rock blanket was washed away. This is the area where larger rip rap would be needed to withstand strong erosional forces. This is especially important as the curve of the auxiliary spillway is almost 90 degrees trying to withstand the water forces pushing straight ahead that will need to be overcome.

### **1.5.3 Dam Inspection Reports**

DWR standards require the dam to be inspected every 3-years. The most current dam inspection report was completed in June 2022. A copy of the inspection report is included in Appendix B. The inspection report confirms the surrounding dam and principal spillway are in overall good shape. Aside from addressing the scour in the auxiliary spillway, additional repairs to the overall dam structure are not needed.

## **2.0 TECHNICAL INFORMATION**

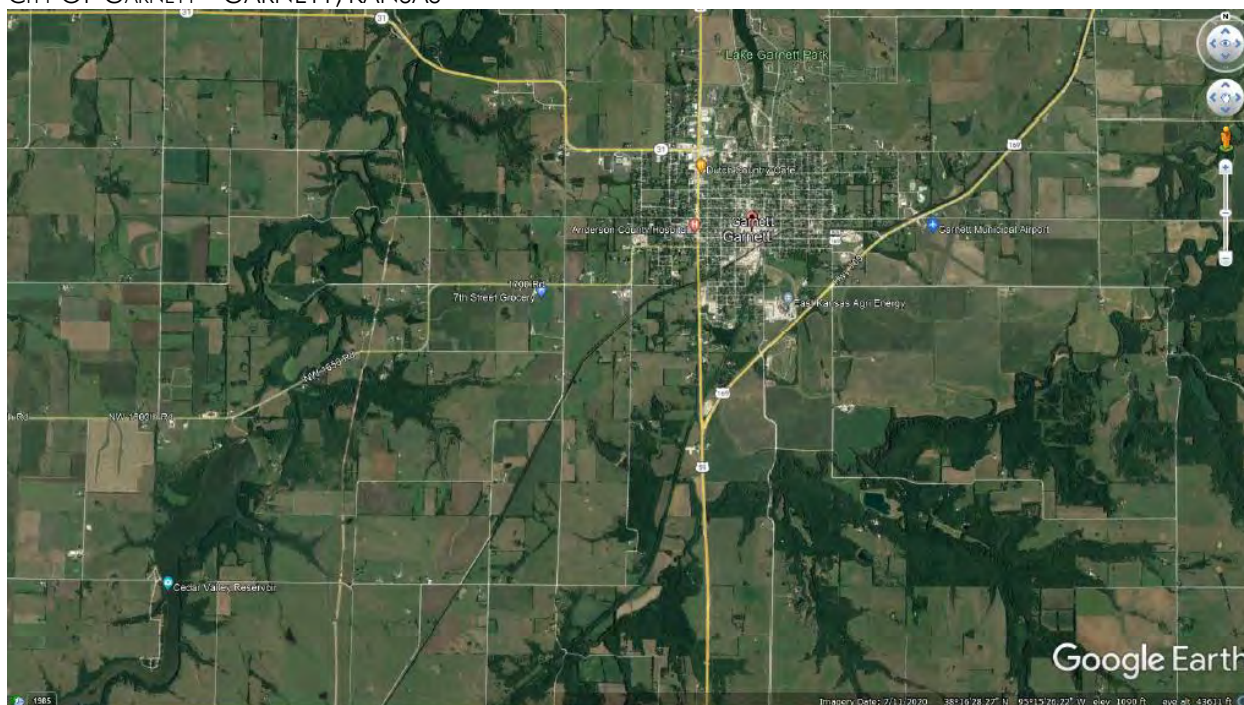
### **2.1 Project Location**

The Cedar Valley Reservoir is located south of the intersection of Louisiana Road and NW 1650<sup>th</sup> Road, approximately 4 miles southwest of Garnett, Kansas. Latitude/Longitude 38.2534 deg N, 95.3081 Deg. W. (approximately). See Exhibit 2.1 showing aerial view of Cedar Valley Reservoir. The reservoir is located about 4 miles West Southwest of City of Garnett. Exhibit 2.2 shows the Cedar Valley Reservoir in relationship to the City of Garnett.





**Exhibit 2.1**  
*Aerial View Cedar Valley Reservoir*



**Exhibit 2.2**  
*Cedar Valley Reservoir in Relation to City of Garnett*

## 2.2 Geotechnical Evaluation and Report

As a part of this study, a geotechnical investigation was completed for the Cedar Valley Reservoir auxiliary spillway. The field investigation and laboratory testing was completed by Terracon, a subconsultant. Reference the attached geotechnical data report by Terracon, dated June 27, 2022, in Appendix D.

Six soil borings were performed in the spillway. The soil borings extended through the existing soil layers to auger refusal and 10-foot rock cores were collected at each location.

The soil thickness encountered at each boring location ranged from 1.5 to 4 feet thick. Each soil boring encountered 6 inches of root zone over fat clay. Below the fat clay was sandstone and shale bedrock. The soil borings were extended with solid stem auger until refusal, and then 10-foot rock cores were collected. Table 1 summarizes the soil thickness encountered at each boring location.

**Table 1**  
*Soil Thickness Summary*

Boring Number	Soil Thickness (Depth to Rock) (feet)	Depth to Auger Refusal (feet)
SB-01	2	9
SB-02	2	9
SB-03	1.5	8.5
SB-04	4	9.5
SB-05	1.5	3
SB-06	2	8.5

Slake durability tests were performed on the rock core samples. The Slake Durability Index Classification ranges from very low to extremely high and described below:

- 0 to 25: Very Low Durability
- 25 to 50: Low Durability
- 50 to 75: Medium Durability
- 75 to 90: High Durability
- 90 to 95: Very High Durability
- 95 to 100: Extremely High Durability

The results of the slake durability testing are summarized in Table 2.

**Table 2**  
*Slake Durability Test Summary*

Boring Number	Sample Depth (feet)	Fragment Type	Slake Index	Durability
SB-01	9 to 14	Type 2 – Large and small fragments	94.4	very high
SB-02	9 to 14	Type 2 – Large and small fragments	95.4	extremely high
SB-03	8.5 to 13.5	Type 1 - Unchanged	92.9	very high
SB-04	9.5 to 14.5	Type 2 – Large and small fragments	93.6	very high
SB-05	3 to 8	Type 2 – Large and small fragments	77.1	high
SB-06	8.5 to 13.5	Type 2 – Large and small fragments	76.3	high

Based on the results of the slake durability tests, the bedrock encountered in the rock core samples ranges in durability from high to extremely high. These results suggest that the rock on site beyond auger refusal is not prone to erosion.

## 2.3 Lidar Survey

MEC completed an advanced topographical survey of the dam and surrounding property using a drone with Lidar Survey capability. This allows for a quick and accurate survey that captures topographical information. The Lidar survey technology allows for accurate elevation comparisons of the before and after flood impacts. This also allows a much greater area to be surveyed while the drone is in the air and capturing data. This information will be prove useful and save potential costs for additional surveying typically needed during design and construction. Exhibit 2.3 shows the 2022 Lidar Survey of the Cedar Valley Reservoir and Auxiliary Spillway.





**Exhibit 2.3**  
 2022 Lidar Survey of the Cedar Valley Reservoir and Auxiliary Spillway

## 3.0 ENGINEERING ANALYSIS OF FLOOD CONDITIONS

### 3.1 Flood Routing

Flood routing analysis was performed on the dam for the Cedar Valley Reservoir. The analysis was performed in accordance with regulations outlined in K.A.R. 5-40-30 ("Time of Concentration"), K.A.R. 5-40-31 ("Design Duration Rainfall Depth") & K.A.R. 5-40-32 ("Determination of Rainfall Excess").

The reservoir drainage area was calculated at 64.6 square miles using Streamstats (compared with 63 square miles noted in the original plans). The SCS Runoff Curve Number was calculated to be 91 at Antecedent Moisture Condition III (compared to the 80 at Antecedent Moisture Condition II in the original plans). The time of concentration ( $T_c$ ) was calculated at 10.42 hours (compared to 9.5 hours noted in the original plans).

With this hydrologic data in hand, the Pondpack software by Bentley was used to route the 2yr, 5yr, 25yr, 50yr, 100yr, 40% PMP, PMP storms through the reservoir.

The dam has both a principal and auxiliary spillway. The principal spillway is a 5' x 10' concrete riser with a 5' x 5' RCB box going through the dam and into a plunge pool downstream of the dam. The auxiliary spillway is 400' wide at the concrete weir control section and is 14' deep from top of control section to the top of the dam (998 – 984, see Exhibit 2.3, 2022 Lidar Survey of the Cedar Valley Reservoir and Auxiliary Spillway).

Stage-Storage from the original plans was used in the Pondpack Analysis. Outflow was computed based on the rating curve from the original plans (NOTE: the rating curve was updated based on the control section being at 984 compared to 985 from the original plans based on changes to the spillway in 2009/2010 to lower the control section by one (1) foot (this was confirmed by the survey noted in the appendix showing the control section having a flowline of 984). As seen in the table of results below, the flood routing shows the Cedar Valley Reservoir to be hydrologically adequate based on the ability to pass the 40% PMP storm event with > 3' of freeboard from the top of the dam (998 – 991.72 = 6.28' > 3' required).

**Table 3**

Return Event / Probability of Occurrence (years)	6hr rainfall (inches)	Peak Flow into Reservoir (cfs)	Peak Flow out of Reservoir (cfs)	Peak Flow through Auxiliary Spillway (cfs)	Maximum Water Surface Elevation in Reservoir (ft)	Dam Overtopped? (Top of Dam at 998)
2 / 50%	2.7	5,573	919	0	976.89	NO
5 / 20%	3.5	8,066	1,018	0	980.53	NO
25 / 4%	4.8	12,197	1,746	745	985.15	NO
50 / 2%	5.3	13,855	3,356	2,344	986.18	NO
100 / 1%	6.78	18,741	9,109	8,090	987.79	NO
40% PMP	12.12	36,543	28,485	27,417	991.72	NO
PMP	27.8	109,078	104,017	88,800	999.88	YES

**Note:** Auxiliary Spillway is engaged for Water Surface Elevations > 984.00

### 3.2 Alternative 1 – Hardening to meet last Flood event.

The last flood event occurred in May of 2019. Our best information for the storms during that period comes from the Kansas Water Office, which showed 18 inches of rain falling for the month. Relating this 18" rainfall amount over 30 days to precipitation frequency estimates from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 document for the City of Garnett, this amount of rainfall equates to just over the 50-year storm event that occurred. Both the Kansas Water Office and NOAA Atlas 14 reports are included in the Appendix E.

Using the amount of water flowing through the auxiliary spillway, Manning's equation was used to calculate velocity at each major contour interval downstream of the control section. See table 4 below.

Table 4

Contour	Channel Slope (%)	Channel Width (ft)	Channel Depth—50yr (feet)	Velocity—50yr (feet/second)	Shear Stress—50yr (pounds/square foot)
980	2.69	390	0.99	6.04	1.65
975	7.11	338	0.81	8.57	3.55
970	8.98	277	0.85	9.94	4.71
965	8.90	250	0.90	10.32	4.97
960	8.50	262	0.89	9.99	4.68
955	9.26	234	0.93	10.71	5.31
950	7.02	182	1.17	10.85	5.05

**Note:** The complete table with all calculations is shown in Appendix F

With this in mind, the velocities propagating through the spillway downstream of the control section were plugged into the Irbash Equation to generate a mean grain diameter ( $D_{50}$ ) of riprap. This riprap is large enough the withstand the velocities and subsequent shear stress being exerted by the water as it flows through the spillway. The sizes of riprap vary from 18 to 24 inches for the 50-year (2%) storm event. See Exhibit 3.1 for the layout of Alternative 1 to withstand the flood of 2019.

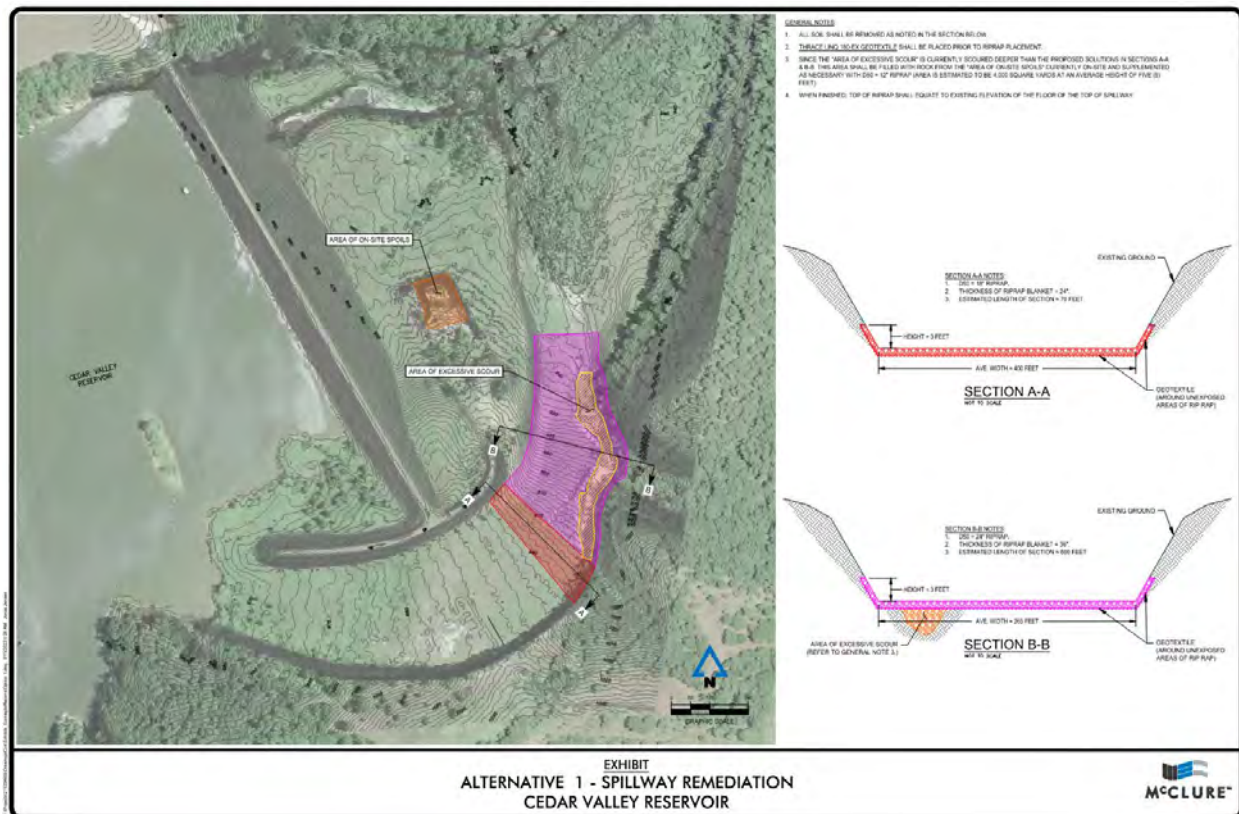


Exhibit 3.1

Alternative 1, Auxiliary Spillway Layout to Withstand the Flood in 2019.



**3.3 Alternative 2- Meet DWR Codes & Standards**

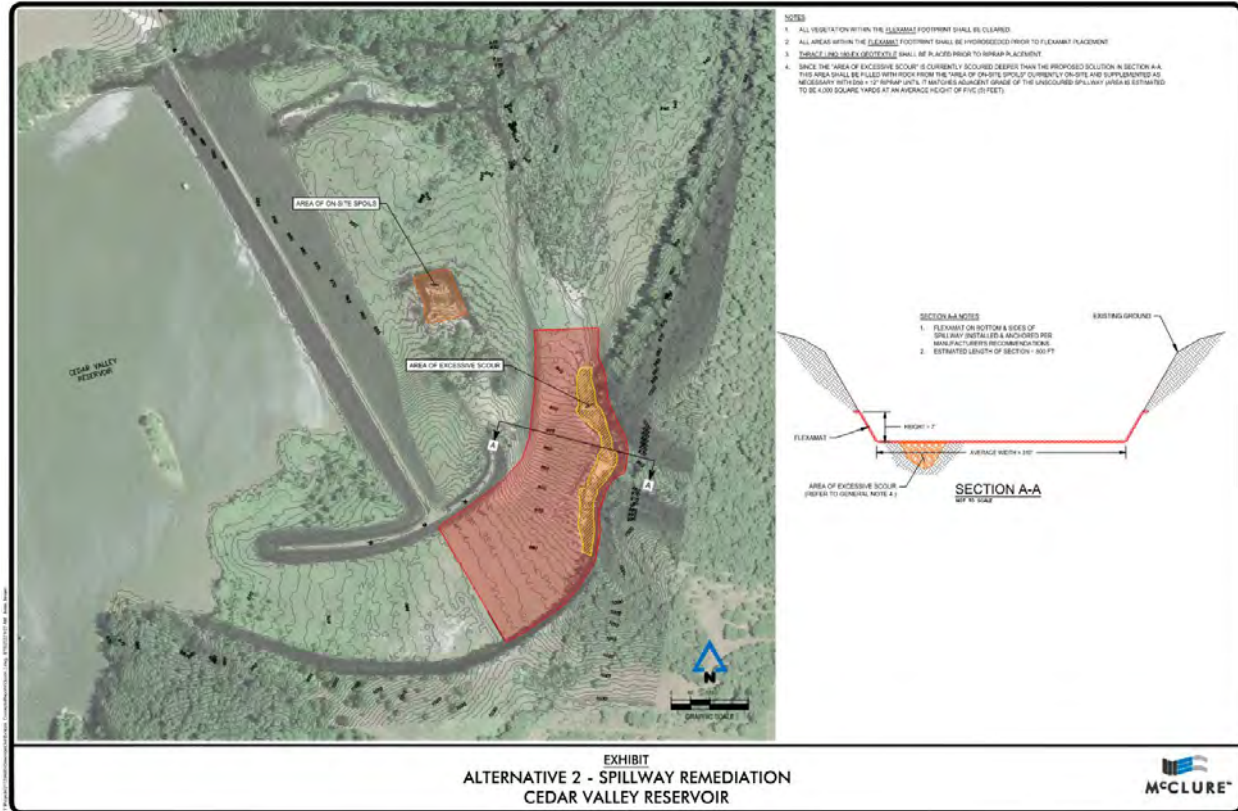
In order to meet DWR design criteria outlined in K.A.R. 5-40-55 (“Earthen Auxiliary Spillways”) and K.A.R. 5-40-56 (“Maximum Design Velocity”), the auxiliary spillway will need to withstand the velocity and subsequent shear stress resulting from the 40% PMP storm event.

Using the amount of water flowing through the auxiliary spillway, Manning’s equation was used to calculate velocity at each major contour interval downstream of the control section (see table below)

Contour	Channel Slope (%)	Channel Width (ft)	Channel Depth—40% PMP (feet)	Velocity—40% PMP (feet/second)	Shear Stress—40% PMP (pounds/square foot)
980	2.69	390	4.32	15.92	7.06
975	7.11	338	3.52	22.59	15.22
970	8.98	277	3.69	26.11	20.05
965	8.90	250	3.93	27.02	21.06
960	8.50	262	3.88	26.20	19.87
955	9.26	234	4.04	28.01	22.44
950	7.02	182	5.09	28.01	20.94

**Note:** The complete table with all calculations is shown in Appendix F

This is not a viable alternative with riprap, because the velocities calculated at the 40% PMP event result in riprap sizing that is unrealistic (reference riprap calculations in the Appendix F and note that the D50 riprap range from 3.6 to over 11 feet in diameter). However, the Flexamat product provides protection for velocities up to 30 feet per second and shear stresses up to 24 pounds per square foot. See Exhibit 3.2 for the layout of Proposed Alternative 2 utilizing Flexamat. Reference Appendix G for more information on the Flexamat product.



### Exhibit 3.2

*Alternative 2, Meets Codes and Standards 40% PMP Using Flexamat.*

#### NOTES:

- Any calculations used in the analysis that are not already noted in the appendix can be made available upon request.
- 11x17 versions of Exhibits 3.1 (Alternative 1) and 3.2 (Alternative 2) are included in Appendix H

## 4.0 COST ESTIMATES ALTERNATIVES

### 4.1 Quarried Rock

There is a large stockpile of 12" limestone riprap 500' away from the proposed remediation. This volume is over 10,000 cubic yards based on estimates taken from the survey, and is more than enough to fill in the 'area of excessive scour' (estimated to be 5,500 cubic yards) before either of the Alternatives are employed.

Quarried rock could be either created from borrow pits located on site or from local quarries. Potential on-site quarry areas were not easily identifiable based on survey and geotechnical information reviewed. Locating a source of rock suitable for use to meet weathering and toughness requirements is difficult and not likely. Any construction work on undisturbed land would also require Phase 2 Archaeological review at a minimum and add 3-months to the schedule. The rock would require multiple tests to confirm it meets quality standards as a viable material. Other sources for riprap were investigated, with three (3) local quarries capable of delivering suitable riprap material.

The plan is to use as much material from within the site that has already been disturbed as possible. Trucking from local material sources will still be needed with transportation and associated high fuel costs adding premiums to already high inflation costs. The road along the top of the dam will need to be reinforced to withstand multiple trucks of heavy materials.

## Table 5

*Hardened Auxiliary Spillway Construction Costs*

NOTES: 1. Item 9 is zero based on obtaining fill via the existing on-site spoils area located ~500' north of auxiliary spillway and ~300' south of the top of the dam (costs are included in items 5 & 6); 5,500 CY of excavation added to Item 3 & 5,500 CY of embankment added to Item 4)  
2. Items 3 & 4 will be removed upon completion of the project



### 4.3 Alternative 2 – Meet DWR Codes & Standards

The use of the Flexamat as a viable system was investigated and the engineering properties of the material were found to meet key engineering design requirements. As of the publishing of this report, DWR is open to using Flexamat for this application as long as the standards are met.

**Table 6**  
*Codes & Standards Auxiliary Spillway Construction Costs*

Cedar Valley Reservoir Auxiliary Spillway					
Opinion of Probable Cost - ALTERNATIVE 2					
Garnett, Kansas					
August 2022					
Item No.	Item	Unit	Unit Price	Quantity	Total Cost
1	MOBILIZATION (5% OF ITEMS 2-11)	LS	\$ 128,620.00	1	\$ 128,620
2	CLEARING, GRUBBING, AND DEMOLITION	ACRES	\$ -4,000.00	5.7	\$ 22,764
3	TEMPORARY GRAVEL ACCESS DRIVE (1" MINUS)	CV	\$ 15.00	1400	\$ 21,000
4	GEOGRID UNDER TEMPORARY ACCESS	SY	\$ 20.00	1400	\$ 28,000
5	EXCAVATION	CV	\$ 10.00	5500	\$ 55,000
6	EMBANKMENT	CV	\$ 20.00	5500	\$ 110,000
7	SEDIMENTATION BASIN (PLACEHOLDER)	LS	\$ 50,000.00	1	\$ 50,000
8	SILT FENCE (PLACEHOLDER)	LF	\$ 5.00	2000	\$ 10,000
9	FLEXAMAT	SF	\$ 7.50	292455	\$ 2,193,413
10	FLEXAMAT CROSS PLATE ANCHORS	LS	\$ 50,000.00	1	\$ 50,000
11	RIP RAP, D50 = 12", FILLING AREA OF EXCESSIVE SCOUR	CV	\$ 50.00	0	\$ -
12	HYDROSEEDING	ACRES	\$ -4,000.00	5.7	\$ 22,800
13	TRACE LINQ 180-EX GEOTEXTILE (FOR AREA OF EXCESSIVE SCOUR)	SY	\$ 5.00	1902	\$ 9,510
	<b>SUBTOTAL CONSTRUCTION</b>			\$	<b>2,701,107</b>
	CONSTRUCTION CONTINGENCY			30%	\$ 810,332
	<b>SUBTOTAL CONSTRUCTION WITH CONTINGENCY</b>			\$	<b>3,511,438</b>
	ENGINEERING DESIGN			10%	\$ 351,144
	CONSTRUCTION OBSERVATION			10%	\$ 351,144
	<b>TOTAL CONSTRUCTION</b>			\$	<b>4,213,726</b>

NOTES: 1. Item 11 is zero based on obtaining fill via the existing on-site spoils area located ~500' north of auxiliary spillway and ~300' south of the top of the dam (costs are included in Items 5 & 6; 5,500 CY of excavation added to Item 3 & 5,500 CY of embankment added to Item 4)

2. Items 3 & 4 will be removed upon completion of the project

#### 4.4 Schedule

**Table 7**  
*Proposed Overall Project Schedule*

	Task Completion
Draft Preliminary Engineering Report to City of Garnett	July 15, 2022
Preliminary Engineering Report to All Parties	July 21, 2022
KDEM- FEMA review of project costs and concept	August 1, 2022
Submit Final Engineering Report to City of Garnett	August 17, 2022
Present Engineering Report to City of Garnett	August 23, 2022
Submit Design, Bid, and Construction Administration Proposal to City of Garnett	August 17, 2022
Approval to proceed: Design, Bid, and Construction Administration for Auxiliary Spillway Project	September 1, 2022
60% Design Review	October 15, 2022
100% Plans, Contract Documents, Design Memorandum	December 1, 2022
Early KDEM FEMA Time Extension Request	September 2022
Permitting: DWR, KDEM, USAOCE, FEMA-EHP, FEMA	December – February 2023
Possible Prolonged Permitting (KDEM PA FEMA-EHP)	*(March-July 2023)
Project Out to Bid	April 2023
Obtain Necessary Authorizations from KDEM	April 2023
Execute Contract Documents	May 2023
Construction NTP	May 2023
Obtain Time Extension Authorization FEMA	June 2023
Completion of Construction	October 2023
Construction punch list, project close out	December 2023
Final project close out final cost submittal KDEM	January 2024

\* Possible prolonged permitting is dependent of factors out of our control and can be anywhere from 3-9 additional months, and possibly more.

## 5.0 RECOMMENDATIONS

### 5.1 Recommendations

Based on previous flood events uncovering not only the southern portion of the auxiliary spillway, but also more severe rain events stripping topsoil from the entire portion of the auxiliary spillway, Alternative 2 is recommended. Use of Flexamat to meet Kansas Department of Agricultural Division of Water Resources Codes and Standards as the preferred alternative. The following items are recommended along with Alternative 2:

A. Fill in the large hole along the southern outside area of the auxiliary spillway with riprap and spoils currently available onsite and supplement with 12" D50 riprap within 1' of existing grade (Fill as necessary to get within 1' of the spillway elevations from the 2009/2010 plan). Then add 1' of topsoil to reach the aforementioned spillway grades.

- B. Clear & grub remaining grassy areas within the floor and 7' up both sides of the auxiliary spillway.
- C. Place and anchor Flexamat armoring system to bed rock after having used fiber mulch with grass seed so vegetation will grow and interlock with the Flexamat over time.

## 5.2 Summary

The City of Garnett has been able to successfully operate and maintain the Cedar Valley Reservoir since inception as a raw water source of supply and recreation lake for the local community. There are known to be at least two previous flood events that resulted in water flowing down the auxiliary spillway. One in the 2009-time frame that resulted in subsequent erosion damage to the auxiliary spillway. The more recent during the 2019 flood event. Whether it is coincidence or a result of climate change there seems to be stronger and longer lasting storm events and associated heavy and prolonged rainfall, that indicates a 50- or 100-year probability event can happen more frequently than original anticipated. The likelihood of a very heavy long lasting rain event happening again in the future seems more probable than it did 40 years ago when the reservoir was initially constructed. Due to this increased likelihood, and the need for the City of Garnett to maintain reliable and affordable potable water supply to its citizens and surrounding communities, the damage sustained to the auxiliary spillway needs to be repaired. The dam is in overall good condition, but the damage to the auxiliary spillway needs to be hardened to the degree necessary to withstand future flood events without significant damage or concern the dam will fail. State and Federal grants through FEMA and KDEM will supply up to 85% of the funding to restore the auxiliary spillway to a standard that meets current DWR Dam & Safety requirements. MEC recommends the project be approved for design, permitting, bid assistance and construction repairs to the auxiliary spillway at the Cedar Valley Reservoir immediately.

## 5.3 Routine Maintenance

As with any large water reservoir used for water supply and recreation, routine maintenance will continue to be required throughout the reservoir's useful life. Without preventative maintenance, such as mowing, tree & brush clearing, and monitoring of limestone rip rap, the longevity of the reservoir becomes a question. Heavy rain events that dump several inches of rainwater in a short amount of time in a localized setting within the watershed create challenges if programmed maintenance is not completed. These maintenance activities should include removal of trees along the embankment and inspection of riprap along the wet side of the dam. Any storm event that causes water to flow over the auxiliary spillway should have a post event inspection, with the expectations that some sort of maintenance should be required. Trees allowed to grow in the channel can collect debris and cause scour that can displace even the largest riprap. Continue with the DWR required dam inspections at the frequency they require to identify new issues that develop so they can be mitigated without creating a bigger problem.

## 5.4 Improvements – Auxiliary Spillway Hardening

It is recommended that the City of Garnett proceed with the design and construction of Alternative 2 to meet Codes and Standards using a Flexamat lined auxiliary spillway (downstream of the concrete weir control section) as described within this report. As mentioned earlier, Kansas Department of Agriculture Division of Water Resources Dams & Safety recommend hardening to withstand water velocities over 10 feet per second. The Flexamat provides an alternative cost-effective solution as compared to 11-foot diameter rip rap that would be costly to truck in and place due to its large size.



#### **5.4.1 Other Improvements – Principal Spillway**

The sluice gate valve used for water release in a controlled fashion needs replacement. The valve is used to release water when the reservoir water inflow is not sufficient for water to pass through the principal spillway into Cedar Creek. The valve was recently inspected by divers and found to need replacement. This valve should be planned for replacement soon. The failure of the sluice gate valve could allow uncontrolled release of the reserve water storage needed in times of drought. The City needs to have more precise control of the discharge rate as a prolonged drought could challenge any raw water supply.

## **6.0 FINANCIAL ANALYSIS**

### **6.1 Opinion of Probable Project Costs**

The following cost information is provided for the City of Garnett to consider for the proposed improvements included within this report. MEC's scope of work did not include a detailed evaluation of how the City should plan for a possible water rate increase nor how they need to finance monthly progress payments due to the contractor. The intent of this financial cost information is to serve as a guide for the City of Garnett to plan for anticipated costs regarding the proposed improvements and inform KDEM and FEMA of the anticipated costs, which includes engineering, construction observation and a 30% contingency. Information obtained from KDEM and FEMA states they are going to contribute 85% of the overall project costs. Given the magnitude of responsibility of the proposed improvements, the City of Garnett's share is anticipated to be 15% of the overall project cost. The total project amount is therefore calculated to be \$4,213,726. The City's options on how they may want to finance their share of the project has not been completed. The City will need a source of funds to cover the project expenses until quarterly reimbursements are made. However, FEMA/KDEM have made it clear their reimbursement costs are made quarterly. Reimbursable fees include engineering costs and construction costs.

The City of Garnett is going to need sufficient funds to pay for the construction phase of the project. Quarterly reimbursements will be paid by KDEM/FMEA to cover project expenses. The overall construction schedule is a relatively short duration of 5-months. MEC will provide construction administration services. It is recommended the City have sufficient funding to pay for a minimum the entire construction phase cost out of pocket.

The cost difference between the Alternative 1 hardening to withstand the last flood event vs. Alternative 2 to meet Codes and Standards is an additional \$1,239,081. This amount represents a 41.7% increase in overall project construction costs. Based on the Public Assistance Grant providing 85% of the funds by KDEM/FEMA, this results in \$185,862 additional expenditure by the City of Garnett compared to Alternative 1.

# APPENDIX A

## DWR STANDARDS

(d) If cutoff collars or a drainage diaphragm is located in a zoned fill, the location shall be justified in the design report and established in accordance with sound engineering principles and commonly accepted engineering practices.

(e) If another drain included in the design meets the requirements for a diaphragm in subsection (b), that other drain may be considered to be the diaphragm required by subsection (a).

(f) If the applicant desires to use any other type of seepage control, the applicant shall demonstrate to the chief engineer that the proposed type of seepage control protects the dam from seepage along the conduit and meets the requirements of sound engineering principles and commonly accepted engineering practices. (Authorized by K.S.A. 2006 Supp. 82a-303a; implementing K.S.A. 2006 Supp. 82a-302 and 82a-303a; effective May 18, 2007.)

**K.A.R. 5-40-55. Earthen auxiliary spillways.** Each earthen auxiliary spillway shall meet all of the following requirements: (a) If the design discharge from the auxiliary spillway is directed so that the discharge impinges on the downstream toe of the dam, a wing dike shall be designed and constructed to direct spillway flows away from the downstream toe of the dam.

(b) If the auxiliary spillway is located on the embankment of the dam, adequate armor protection, including articulated blocks, concrete paving, gabion baskets underlain with properly designed bedding, or engineered riprap, shall be placed on the portion of the dam where the auxiliary spillway is located.

(c) The side slopes shall be no steeper than three horizontal units to one vertical unit, unless the spillway is constructed through competent sandstone or limestone.

(d) There shall be at least a 30-foot level section immediately upstream of the control section. Immediately downstream of the control section, the slope of the spillway outlet shall be sufficient to ensure that flows at and above 50 percent of the design storm discharge will flow at a supercritical velocity.

(e) The auxiliary spillway shall be a minimum of three feet deep, as measured from the elevation of the control section to the design top of the dam.

(f) The entrance channel from the reservoir to the level section shall provide a smooth transition that prevents turbulent flow.

(g) The outlet channel shall convey flow to the receiving stream channel with a minimum of erosion.

(h) If a fish screen is installed, the screen shall not impair the functioning of the auxiliary spillway. If a fish screen is proposed, the design report shall demonstrate that the screen will not



impair the functioning of the auxiliary spillway. (Authorized by K.S.A. 2006 Supp. 82a-303a; implementing K.S.A. 2006 Supp. 82a-302 and 82a-303a; effective May 18, 2007.)

**K.A.R. 5-40-56. Maximum design velocity for an auxiliary spillway.** (a) The maximum velocity in feet per second during the design storm for water flowing in a vegetated earthen auxiliary spillway shall be determined from the following table:

Vegetation	Slope of the exit channel			
	Erosion-resistant soils		Easily erodible soils	
	0% to 5%	5% to 10%	0% to 5%	5% to 10%
Bermuda grass and Bahia grass	8	7	6	5
buffalo grass, Kentucky blue grass, smooth brome grass, tall fescue, and reed canary grass	7	6	5	4
sod-forming grass-legume mixtures	5	4	4	3
weeping love grass, yellow bluestem, and native grass mixtures	3.5	3.5	2.5	2.5

(b) The maximum design velocities specified in subsection (a) may be increased by not more than 10 percent if the design frequency of use of the auxiliary spillway is not more than two percent. The maximum design velocities may be increased by not more than 25 percent if the design frequency of use of the auxiliary spillway is not more than one percent.

(c) For exit channel slopes greater than 10 percent, the applicant shall provide analyses showing both of the following:

(1) There is no more than 0.5 foot of erosion depth within 20 feet of the control section for the one-percent chance storm.

(2) The auxiliary spillway does not fail by breaching during the spillway stability design event indicated in the following table:

Hazard class	Size class	Spillway stability design event
A	1, 2, or 3	0.3 PMP
A	4	0.4 PMP
B	1, 2, 3, or 4	0.5 PMP
C	1, 2, 3, or 4	PMP

(d) The provisions of paragraphs (c)(1) and (2) may be used for slopes of 10 percent or less in lieu of the maximum values specified in the table in subsection (a).

(e) The maximum allowable design velocity for water flowing over the following types of materials shall be determined from the following table:

Material	Maximum velocity allowed in feet per second
stratified rock	8.0
sound rock	13.0

(f) Channel lining materials not reliant on vegetation, including concrete, riprap, and grouted riprap, may be used if the applicant demonstrates that the lining will not fail during the spillway stability design event specified in paragraph (c)(2). (Authorized by K.S.A. 2006 Supp. 82a-303a; implementing K.S.A. 2006 Supp. 82a-302 and 82a-303a; effective May 18, 2007.)

**K.A.R. 5-40-57. Service spillway design.** (a) If a dam will have a service spillway, the spillway shall be designed and constructed with a lining material that meets the following requirements:

(1) Covers the channel floor and walls up to the depth of flow required to bypass the flows of the storm specified as the detention requirement in K.A.R. 5-40-23(a), at a minimum; and

(2) will not fail during the spillway stability design event specified in K.A.R. 5-40-56(c)(2).

(b) Each design report required by K.A.R. 5-40-2b shall include all hydraulic, structural, and geotechnical design information necessary to show that the criteria in subsection (a) are met.

(c) If a fish screen is installed, the screen shall not impair the functioning of the service spillway. If a fish screen is proposed, the design report shall demonstrate that the screen will not impair the functioning of the service spillway. (Authorized by K.S.A. 2006 Supp. 82a-303a; implementing K.S.A. 2006 Supp. 82a-302 and 82a-303a; effective May 18, 2007.)

**K.A.R. 5-40-70. Construction notification to the chief engineer.** Each holder of a permit to construct, or an approval to repair or modify a dam, shall notify the chief engineer at least 48 hours before any of the following stages of construction and shall obtain the approval of the chief engineer before proceeding with each of these stages of construction: (a) Starting construction;

(b) placing backfill in the cutoff trench;

(c) placing backfill around the primary spillway conduit or any other conduit that extends through the dam embankment and exits the downstream slope; and

(d) starting any stage of construction not specified in this regulation for which the permit requires that the chief engineer shall be notified. (Authorized by K.S.A. 2006 Supp. 82a-303a; implementing K.S.A. 2006 Supp. 82a-301a and 82a-303a; effective May 18, 2007.)

## APPENDIX B

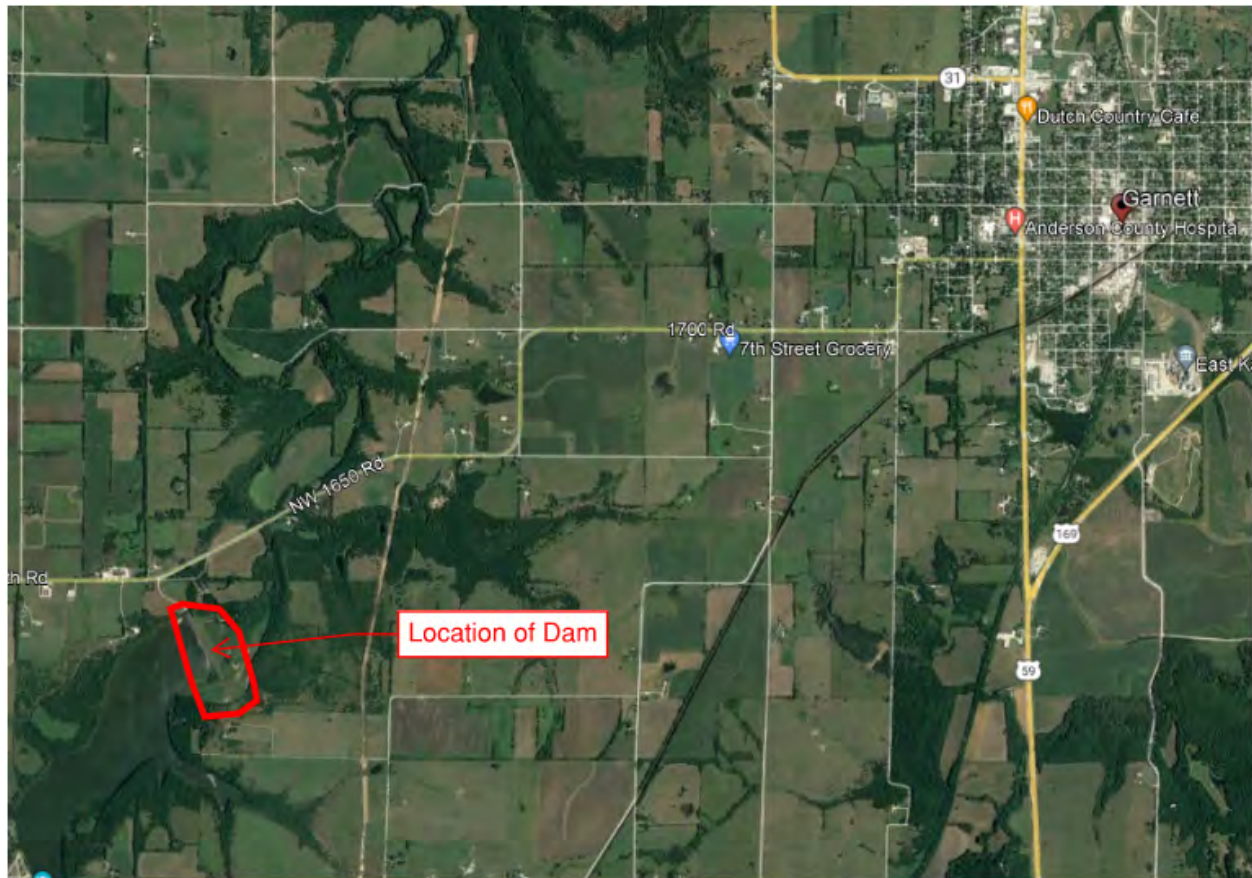
# DAM SAFETY INSPECTION REPORT



# Dam Safety Inspection Report

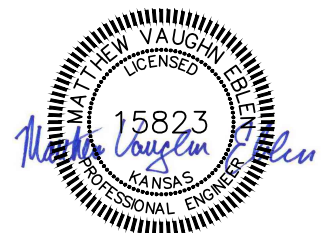
City of Garnett  
Anderson County, Kansas  
Cedar Creek Reservoir Dam

WSN: DAN-0047



Inspection Date: April 22, 2022

Report prepared by: Matt Eblen, P.E., LEED A.P.  
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06/22/2022

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## **Appendix**

- A. Copy of Dam Safety Field Inspection Checklist
- B. Field Sketch
- C. Photographs

# **DAM SAFETY INSPECTION REPORT**

**City of Garnett  
Cedar Creek Reservoir Dam  
WSN: DAN-0047**

## **A. Executive Summary**

Cedar Creek Reservoir Dam is owned by the City of Garnett and is located in the SE ¼ of the NW ¼ of the NW ¼ of Section 3; Township 21 South; Range 19 East in Anderson County, Kansas. It was inspected on April 22, 2022, by Matt Eblen P.E., McClure (formerly Shafer Kline & Warren (SKW)). The inspection was conducted under the requirements of the Obstructions in Streams Act, K.S.A. 82a-303b, which requires an inspection to be conducted once every three (3) years for class 'c' high hazard dams.

Previous inspections are noted below:

- December 11, 2018 – Jason Hoskinson (BG Consultants)
- April 30, 2015 – Matt Eblen (SKW)
- October 10, 2013 – Matt Eblen (SKW)
- February 5, 2009 – KDA Division of Water Resources
- March 6, 2006 - SKW
- April 4, 2003 - SKW
- August 8, 1996 - KDA Division of Water Resources
- March 6, 1985 - KDA Division of Water Resources

Major findings from the current inspection include:

- Repair is needed for scour that has occurred within the auxiliary spillway.
- Repair is needed for a broken sluice gate within the riser section of the primary spillway
- Riprap is missing or covered in portions of the lake side slope.
- Areas of little or no vegetation exist in portions of the auxiliary spillway and the embankment.

## **B. History**

This dam was constructed for water supply purposes. It was designed by Larkin & Associates for the City of Garnett. Cedar Creek Reservoir Dam is a size 4, high hazard dam. A permit was issued pending completion on July 22, 1983. Construction was completed in 1984.

The dam is approximately 70 feet high and 1750 feet long. The outlet works consist of a 10 feet by 5 feet drop inlet with an inlet elevation of 968 feet. The trash rack consists of two 8 feet 3 inch by 10 feet openings and one 8 feet 3 inch by 19 feet opening. The tower is connected to a 5 feet by 5 feet reinforced concrete box conduit that discharges to a concrete lined chute with energy dissipaters and then into a rip rap lined stilling basin.



The drawdown pipe is an 18 inch by 18 inch sluice gate located at an elevation of 956 feet in the concrete drop inlet. A 5 feet corrugated metal temporary diversion pipe was installed during construction and capped after completion. A 400 feet wide auxiliary spillway is located in the tight abutment.

A longitudinal crack on the dam crest was noted in the 1996 inspection and the 2003 inspection but was not noticed in the 2006 or subsequent inspections.

### C. Summary of Previous Inspection

The most previous inspection was conducted on December 11, 2018 by Jason Hoskinson (BG Consultants) and Ken Amaya/Brian Maloan (City of Garnett). Findings from that inspection are as follows:

- **General Condition** –The dam appears to be in good overall condition with some repairs needed in the auxiliary spillway. A good stand of grass is present and trees/brush have been controlled to a minimum on the embankment. The gradients of the slopes and profile of the top of dam appear to be in general conformity to the pictures recorded in the prior inspection report. No deformities in the embankment which would jeopardize the performance of the structure were observed during this inspection.
- **Fence** – the access gate on the north end of the top of dam appears to be adequately controlling vehicular access to the dam.
- **Rodents/Animals** – There was one small animal trail observed on the downstream slope near the southern end of the dam. The vegetation was slightly weedier/brushier in that area.
- **Trees, brush and grass cover on Dam** – Nearly all saplings/woody vegetation has been controlled from growing on the embankment and a good stand of grass is present with only a few isolated areas of weedy vegetation. Some brush and logs are on the upstream slope due to a significant rainfall event in the autumn of 2018, causing brush and debris to flat down Cedar Creek and into the reservoir.
- **Wave erosion/Rip-rap** – The reservoir at normal pool elevation appears to be performing sufficiently. There does not appear to be any significant scarping along the shoreline.
- **Undesirable paths or trails** – A pedestrian path is visible from the gate to the primary spillway outlet area. Vegetation is somewhat matted from pedestrian traffic but does not appear to have been killed off as there is no visible bare soil.

- **Primary Spillway Intake** – The portion of the primary spillway intake structure visible from the shoreline appears to be in good condition. There is no apparent debris blocking the intake.
- **Primary Spillway Outlet** – The primary spillway outlet and stilling basin appear to be in good condition and operating as designed.
- **Downstream Conditions** – Downstream conditions appear similar to prior reports.
- **Auxiliary Spillway** – There are some cedars beginning to grow sporadically upstream of the control section but is primarily clear of obstructions downstream of the control section. The spillway experienced at least one significant flow in the autumn of 2018. There is some minor erosion in various locations abutting the concrete control section wall. There is a dead tree with rootball hung-up on the control section. There is a large area of erosion along the south side of the spillway channel floor. This area appears to be the location of the most recent erosion repair project as geo-fabric is visible. A head cut was found in the north side of the spillway floor.

#### **D. Current Inspection Findings**

The dam was inspected on April 22, 2022, by Matt Eblen, P.E., (SKW). The weather was sunny with a temperature of 80°F. The inspection was done by walking the upstream slope, downstream slope, top of dam, and a visual inspection of the primary spillway inlet and outlet pool area, auxiliary spillway and spillway channel.

- **General Condition** – The dam appears to be in good overall condition with some repairs needed in the auxiliary spillway. A good stand of grass is present along the back slope of the dam and trees/brush have been controlled to a minimum on the embankment. The gradients of the slopes and profile of the top of dam appear to be in general conformity to the pictures recorded in the prior inspection report. No deformities in the embankment which would jeopardize the performance of the structure were observed during this inspection.
- **Fence** – the access gate on the north end of the top of dam appears to be adequately controlling vehicular access to the dam.
- **Rodents/Animals** – No rodent holes or animal trails were observed.
- **Trees, brush and grass cover on Dam** – Nearly all saplings/woody vegetation have been controlled from growing and a good stand of grass is present with only a few isolated areas of dead or weedy vegetation on the downstream side of the

embankment. Some brush and logs remain on the upstream side of the embankment due to a significant recent rainfall events.

- **Wave erosion/Rip-rap** – The reservoir at normal pool elevation appears to be performing sufficiently. There does not appear to be any significant scarping along the shoreline.
- **Undesirable paths or trails** – A pedestrian path is still visible from the gate to the primary spillway outlet area. The path has been used enough that no vegetation is growing (but the maximum width of bare soil is < 12”).
- **Primary Spillway Intake** – The portion of the primary spillway intake structure visible from the shoreline appears to be in good condition. There is no apparent debris blocking the intake. The City reported that the sluice gate used to release water downstream (within the riser of the Principal Spillway Intake) into Cedar Creek is broken. The City is in the process of fixing the gate.
- **Primary Spillway Outlet** – The primary spillway outlet and stilling basin appear to be in good condition and operating as designed.
- **Downstream Conditions** – Downstream conditions appear similar to prior inspections.

**Auxiliary Spillway** – The areas upstream and downstream of the control section are clear of trees on the spillway floor. The head-cut on the north side of the spillway has been addressed, but the large area of erosion along the south side of the spillway has worsened. Based on discussions with City Staff, the spillway experienced at least one significant flow since the previous inspection. The minor erosion in various locations along the upstream side of the concrete control section wall still remain.

#### **E. Survey Information**

A survey was not conducted during this inspection.

#### **F. Discharge from Spillways and Drains**

Heavy winds at the time of inspection caused the reservoir level to fluctuate between zero (0) and six (6) inches above normal pool.



**G. Monitoring Devices**

There are no known monitoring devices for this dam.

**H. Hazard Classification**

The dam was previously classified as a size 4, class 'c' high hazard dam. With the reservoir being used for water supply purposes for the City of Garnett along with NW 1650th Rd, and one home 4.5 miles downstream located in the breach wave inundation zone, the class 'c' high hazard rating should be maintained.

**I. Hydrology and Hydraulics Review**

Current Division of Water Resources requirements for a high hazard size 4 dam dictate that the dam should pass a flood event generated by the equivalent of 40% of the 6-hour probable maximum precipitation (PMP) with three (3) feet of freeboard. Flood routing from DWR for this design storm indicates the dam will meet the necessary freeboard requirements with approximately 4.4 feet of freeboard. Therefore, the dam is considered to be hydrologically adequate.

**J. Emergency Action Plan (EAP)**

An EAP was submitted to DWR and accepted in October of 2010. The EAP should be maintained and updated if any problems to the dam occur or if contact protocol/persons change in the future.

**K. Maintenance and Operation Plan**

There is no known maintenance and operation plan for this dam.

**L. Items Needing Immediate Attention**

- Repair the sluice gate within the riser of the principal spillway.
- Repair the scour that has occurred in the Auxiliary Spillway and fortify the spillway against future storm events.

**M. Maintenance Recommendations**

- Annual maintenance to remove all trees from and within 10' of the dam embankment, spillways, and outlet channel. Trees under 12 inches in diameter maybe cut off near the ground level and sprayed with herbicide to prevent regrowth.
- Re-seed areas of sparse vegetation along the embankment or within the auxiliary spillway.
- Replenish riprap along the upstream slope.
- Update the Emergency Action Plan

**N. Conclusion**

This high hazard class 4 dam is overall in good shape. Repairs are needed on the sluice gate on the primary spillway and to portions of the auxiliary spillway. There is generally a good stand of grass along both the upstream and downstream slopes, and the trees (while spotty) can be removed easily with annual maintenance. Provided the repairs are made and annual maintenance occurs, the dam should continue to stay in good shape.

**Appendix A - Copy of Dam Safety Field Inspection Checklist**



# DAM SAFETY FIELD INSPECTION CHECKLIST

7 grade, appears to be a swale <sup>heading toward</sup> ~~the~~  
plunge and starts very flat (it doesn't  
drain well)

**Deficiency Codes:**

0=Adequate/None. 1=Monitor Deficiency. 2=Deficiency Requires Future Repair.

3=Maintenance Action Needs Immediate Action. 4=Deficiency Requires Immediate Action.

**Code**

**Comment**

**Principal Spillway Outlet/Stilling Basin**

- 0 - Damage to concrete/outlet pipe?
- 0 - Leakage?
- 0 - Joint material lost?
- 0 - Under-cutting pipe?
- 0 - Riprap/scour protection adequate?
- 0 - Outlet channel obstruction?

**Dam Crest**

- 0 - Any settlement, misalignment?
- 0 - Erosion?
- 0 - Cracks, bulges?
- 0 - Undesirable vegetation?
- 0 - Roadway or trails?

**Reservoir**

- 0 - Development or fill?
- 0 - Unstable banks or slopes?

**Emergency Spillway**

- 3 - Erosion?
- 0 - Obstructions?
- 3 - Trees?

**Downstream**

- 0 - Downstream development changes?
- 0 - Sand boils?

**Other observations/comments:**

**DISCLAIMER:**

The Chief Engineer, by providing this dam safety field inspection checklist does not assume responsibility for any unsafe condition of the subject dam. The responsibility for the safety of this dam rests with the dam owner or operator, subject to the regulatory authority of the Chief Engineer as provided by the Obstruction in Streams Act, K.S.A. 82a-301 *et seq.* The dam owner or operator should take every step necessary to prevent damages caused by leakage or overflow of waters from the reservoir or floods resulting from a failure of the dam.

Inspected by: Matt Eilen Date: 4/22/2022

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_

## DAM SAFETY INSPECTION REPORT REQUIREMENTS AND GUIDELINES

Fill the form out and returned it with your written inspection report to meet the requirements of K.A.R. 5-40-90. A further description of these items should be included in the report. There are additional instructions below.

### LICENSED PROFESSIONAL ENGINEER CONDUCTING INSPECTION

Name			
Business Name			
Business Address			
Phone Number	Work:	Cell:	
Email Address			

### DAM OWNER INFORMATION

Owner Name			
Owner Address			
Phone Number	Home:	Cell:	
Email Address			

### DAM INFORMATION

Water Structure Number		National Inventory Number	
Inspection Team Members			
Date of Inspection			
Current Hazard Classification	<input type="checkbox"/> High (Class C) <input type="checkbox"/> Significant (Class B) <input type="checkbox"/> Low (Class A)		
Recommended Hazard Classification	<input type="checkbox"/> High (Class C) <input type="checkbox"/> Significant (Class B) <input type="checkbox"/> Low (Class A)		
Size Class	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4		
Ground Moisture Conditions	<input type="checkbox"/> Dry <input type="checkbox"/> Wet <input type="checkbox"/> Snowcover <input type="checkbox"/> Recent Rain Event <input type="checkbox"/> Other (us the report to further describe the condition)		
Temperature (°F):	Weather Condition:		

**SPILLWAYS** (If any of the spillways listed below are not present check "NA" and do not fill out the information for that spillway)

PRIMARY SPILLWAY <input type="checkbox"/> or NA <input type="checkbox"/>			
Description			
Reservoir Level	<input type="checkbox"/> Above or <input type="checkbox"/> Below Inlet Elevation (inches or feet)		
Spillway Dimensions			
Barrel Diameter (inches)		Riser Dimensions(Inches or feet) or NA: <input type="checkbox"/>	
Discharge (gpm or cfs) or <input type="checkbox"/> None			
Is there a trashrack?	<input type="checkbox"/> Yes <input type="checkbox"/> No		

SERVICE SPILLWAY <input type="checkbox"/> or NA <input type="checkbox"/>			
Description			
Reservoir Level	<input type="checkbox"/> Above or <input type="checkbox"/> Below Inlet Elevation (inches or feet)		
Spillway Dimensions			
Weir Length (feet)			
Discharge (gpm or cfs) or <input type="checkbox"/> None			

AUXILIARY SPILLWAY <input type="checkbox"/> or NA <input type="checkbox"/>			
Description			
Spillway Bottom Width (ft) :		Discharge (cfs) or <input type="checkbox"/> None	



**EMBANKMENT DRAINS**

Are there designed drains for the dam? <input type="checkbox"/> Yes <input type="checkbox"/> No			
Drains (describe)	Color/Turbidity (describe or check)	Outlet Located	Discharge (gpm)
#1	<input type="checkbox"/> Clear	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> None
#2	<input type="checkbox"/> Clear	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> None
#3	<input type="checkbox"/> Clear	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> None

**DRAWDOWN VALVE** (via a sluice gate attached to the primary spillway)

Does it have a valve? <input type="checkbox"/> Yes <input type="checkbox"/> No	Was the drawdown operated? <input type="checkbox"/> Yes <input type="checkbox"/> No
Date of Last Operation	<input type="checkbox"/> Unknown by owner
Discharge (gpm)	<input type="checkbox"/> None

**SEEPAGE** (describe within report)

Is there seepage present? <input type="checkbox"/> Yes <input type="checkbox"/> No	Discharge (gpm or cfs) or <input type="checkbox"/> NA
Color/Turbidity (describe)	
Location(s) (describe)	

**SURVEY INFORMATION** (If there are changes to documented conditions or items that should be monitored please describe in report)

Was a Survey Required? <input type="checkbox"/> Yes <input type="checkbox"/> No
---

**EMERGENCY ACTION PLAN**

Is there an EAP on file at DWR? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Date of last update	Does it need updated? <input type="checkbox"/> Yes <input type="checkbox"/> No

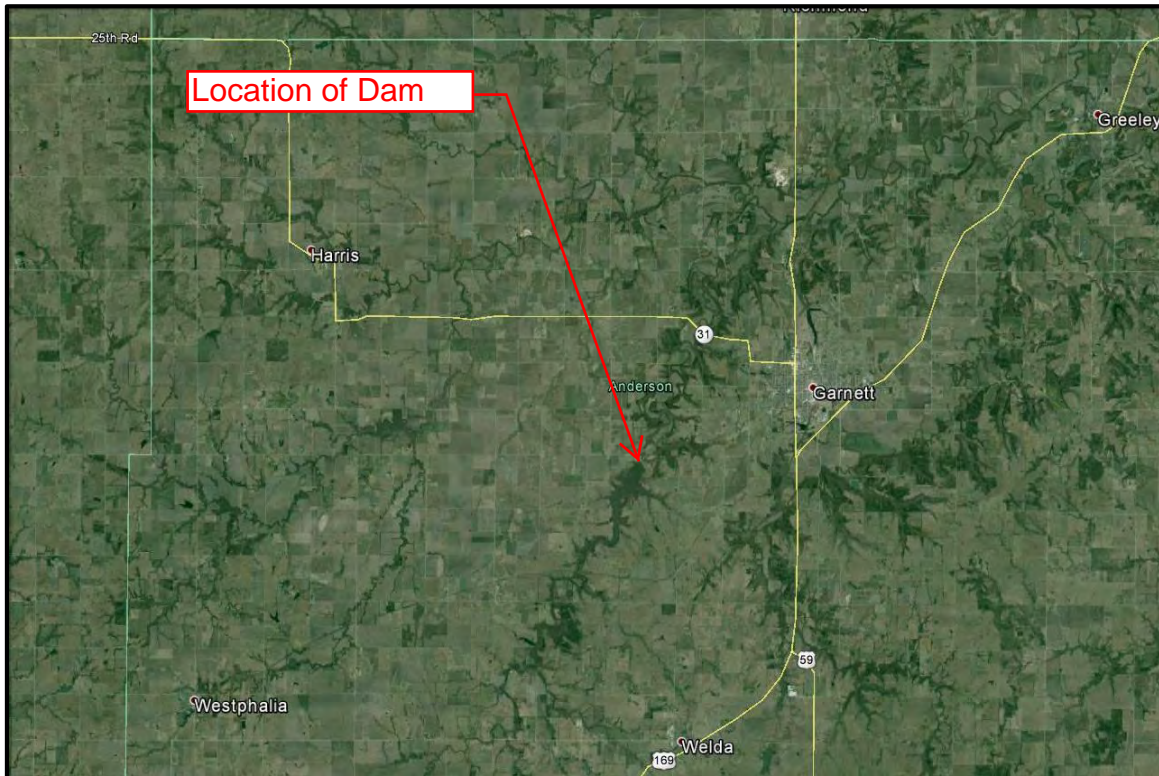
**APPENDIX**

- ☐ **Color Photographs (K.A. R. 5-40-90 (c)):** Color photographs documenting the condition of the dam appurtenances and embankment and any observed deficiencies in the appurtenances and embankment.
- ☐ **Plan View Sketch of Photo Locations (K.A.R. 5-40-90 (d)):** A plan view sketch of the dam and the vicinity, showing the location where each photograph was taken and the direction in which the photograph was taken.
- ☐ **Plan View Sketch of Location of Deficiencies (K.A.R. 5-40-90 (e)):** Sketch of the dam and appurtenances showing location of deficiencies.
- ☐ **Hazard Location Map (K.A.R. 5-40-90 (k)):** A map drawn to a scale of 1:24,000 or larger showing the location of any hazards added, removed, or not previously shown downstream of the dam, in addition to those identified in previous reports, that would require a modification of the emergency action plan or might change the hazard classification of the dam if required.
- ☐ **Safety Inspection Check List:** Attach a copy of the inspection checklist used to conduct the inspection.

## **Appendix B – Field Sketch**

City of Garnett, Kansas  
Cedar Creek Reservoir Dam  
WSN: DAN-0047  
Inspection Date: April 22, 2022

Photos by Matt Eblen





## **Appendix C – Photographs**

Photos by Matt Eblen





**Photo A**



**Photo D**



**Photo B**



**Photo E**



**Photo C**



**Photo F**





**Photo G**



**Photo J**



**Photo H**



**Photo K**



**Photo I**



**Photo L**





**Photo M**



**Photo P**



**Photo N**



**Photo Q**



**Photo O**



**Photo R**





**Photo S**



**Photo V**



**Photo T**



**Photo W**



**Photo U**



**Photo X**





**Photo Y**



**Photo AB**



**Photo Z**



**Photo AC**



**Photo AA**



**Photo AD**





**Photo AE**



**Photo AH**



**Photo AF**



**Photo AI**



**Photo AG**



**Photo AJ**





**Photo AK**



**Photo AN**



**Photo AL**



**Photo AO**



**Photo AM**



**Photo AP**





**Photo AQ**



**Photo AT**



**Photo AR**



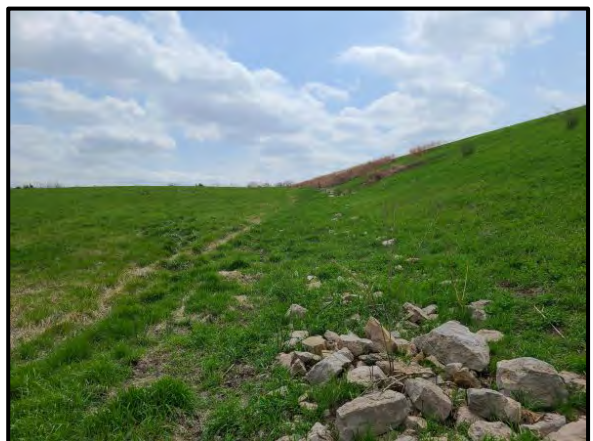
**Photo AU**



**Photo AS**



**Photo AV**





**Photo AW**



**Photo AZ**



**Photo AX**



**Photo BA/BB**



**Photo AY**



**Photo BC**





**Photo BC**



**Photo BF**



**Photo BD**



**Photo BG**



**Photo BE**



**Photo BH**





**Photo BI**



**Photo BL**



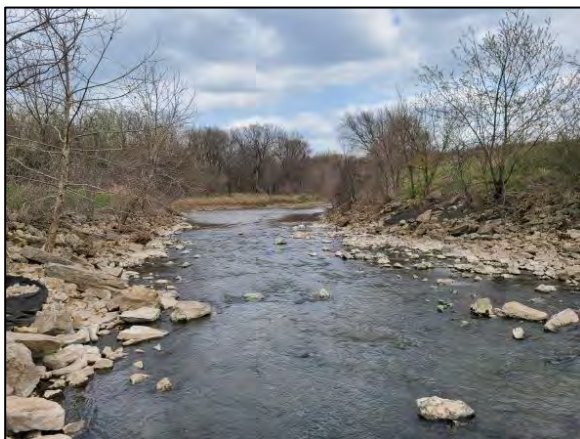
**Photo BJ**



**Photo BM**



**Photo BK**



**Photo BN**





**Photo BO**



**Photo BR**



**Photo BP**



**Photo BS**



**Photo BQ**



**Photo BT**





**Photo BU**



**Photo BX**



**Photo BV**



**Photo BY**



**Photo BW**



**Photo BZ**





**Photo CA**



**Photo CD**



**Photo CB**



**Photo CE**



**Photo CC**



**Photo CF**





**Photo CG**



**Photo CJ**



**Photo CH**



**Photo CK**



**Photo CI**



**Photo CL**



City of Garnett, Kansas  
Cedar Creek Reservoir Dam  
WSN: DAN-0047  
Inspection Date: April 22, 2022

Photos by Matt Eblen

**Photo CM**





## APPENDIX C

# GARNETT TIME EXTENSION REQUEST FEMA DR-4449-KS



2800 SW Topeka Blvd.  
Topeka, KS 66611-1220

Adjutant General  
*Division of Emergency Management*

Phone: 785-646-0001  
Fax: 785-646-0004  
[www.kansastag.gov](http://www.kansastag.gov)

Major General David A. Weishaar  
The Adjutant General and Director of  
Emergency Management & Homeland Security

Laura Kelly, Governor

06/13/2022  
FEMA – DR4449 – KS  
CFDA: #97.036

Travis Wilson, City Manager  
City of Garnett, Anderson County  
131 West 5<sup>th</sup> Avenue, P.O. Box H  
Garnett KS 66032

Subject: Time Extension Request FEMA DR-4449-KS – Project 144302

Travis, reference your correspondence for an extension dated 05/19/2022:

Due to delays caused in part by Covid-19, suppliers, and contract availability for construction personnel and numerous other issues to include a turnover in leadership, this office is approving your extension request until 6/10/2023. If you are unable to complete this project by your new extension deadline, please notify the undersigned 30 days prior.

Request you notify me upon completion of this project. **You will also need to keep me updated on the percentage of completed work every 3 months.**

Please call me at 785-646-2525/785-215-5607 if you have any questions concerning this extension.

MCGONIGLE.AMY.A.1165402142 Digitally signed by MCGONIGLE.AMY.A.1165402142  
Date: 2022.06.13 10:20:44 -05'00'

Amy McGonigle  
PA Closeout Manager  
2800 SW Topeka Blvd., Room 25  
Topeka, KS 66611-1220

## APPENDIX D

# TERRACON SUBSURFACE EXPLORATION REPORT





# Subsurface Exploration Report

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**Cedar Creek Reservoir Spillway Repair  
Garnett, Kansas**

June 3, 2022

Terracon Project No. 02215359

**Prepared for:**

McClure Engineering Company  
North Kansas City, Missouri

**Prepared by:**

Terracon Consultants, Inc.  
Lenexa, Kansas



June 3, 2022

McClure Engineering Company  
November 12, 2021  
North Kansas City, Missouri 64116



Attn: Mr. Mark Griffin, P.E.  
P: 816.207.0150  
E: mgriffin@mcclurevision.com

Re: Subsurface Exploration Report  
Cedar Creek Reservoir Spillway Repair  
Louisiana Road and NW 1650<sup>th</sup> Road  
Garnett, Kansas  
Terracon Project No. 02215359

Dear Mr. Griffin:

We have completed a subsurface exploration for the above referenced project. This study was performed in general accordance with Terracon Proposal No. P02215359, dated November 12, 2021. This report presents the findings of the subsurface exploration and laboratory test results.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,  
**Terracon Consultants, Inc.**

A handwritten signature in blue ink that reads "Tom Mast".

Thomas R. Mast, E.I.T.  
Staff Engineer

A handwritten signature in blue ink that reads "Kole C. Berg".

Kole C. Berg, P.E.  
Senior Consultant



## REPORT TOPICS

INTRODUCTION.....	1
SITE CONDITIONS.....	1
PROJECT DESCRIPTION.....	2
GENERAL COMMENTS.....	2

**Note:** This report was originally delivered in a web-based format. For more interactive features, please view your project online at [client.terracon.com](http://client.terracon.com).

## ATTACHMENTS

**EXPLORATION AND TESTING PROCEDURES**

**SITE LOCATION AND EXPLORATION PLANS**

**EXPLORATION RESULTS** (Boring Logs and Laboratory Data)

**SUPPORTING INFORMATION** (General Notes, USCS, and Description of Rock Properties)

**Note:** Refer to each individual Attachment for a listing of contents.



**Subsurface Exploration Report**  
**Cedar Creek Reservoir Spillway Repair**  
Louisiana Road and NW 1650th Road  
Garnett, Kansas  
Terracon Project No. 02215359  
June 3, 2022

## INTRODUCTION

This report presents the results of our subsurface exploration performed for the proposed Cedar Creek Reservoir Spillway Repair at Louisiana Road and NW 1650th Road in Garnett, Kansas. Six exploratory borings were performed at the site. This report describes the subsurface conditions encountered at the boring locations and presents the test data.

Maps showing the site and boring locations are shown in the **Site Location and Exploration Plan** section. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the boring logs in the **Exploration Results** section.

## SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
<b>Project Location</b>	Cedar Creek Reservoir is located south of the intersection of Louisiana Road and NW 1650 <sup>th</sup> Road, approximately 4 miles southwest of Garnett, Kansas. Latitude/Longitude: 38.2534° N, 95.3081° W (approximate)
<b>Site Conditions</b>	The project site is grass-covered area near the auxiliary spillway of an existing dam.
<b>Existing Topography</b>	The site slopes downward toward the north with elevations ranging from 950 feet to 980 feet.
<b>Geology</b>	The subsurface at the site consists of the soil and rock of the Kansas City Group. Our borings consisted of brown, fat clay overlying gray sandstone with intermittent shale seams.

## Subsurface Exploration Report

Cedar Creek Reservoir Spillway Repair ■ Garnett, Kansas

June 3, 2022 ■ Terracon Project No. 02215359



## PROJECT DESCRIPTION

Item	Description
Project Description	We understand this project includes repair of erosion and other improvements to reduce the potential for future erosion of the spillway. McClure requested subsurface exploration and laboratory testing services to support their geotechnical engineering program. We understand no engineering recommendations pertaining to the results of the exploration were requested or will be made.

## GENERAL COMMENTS

Natural variations will occur between boring locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction.

Our scope of services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client, and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, cost estimating, excavation support, and dewatering requirements/design are the responsibility of others.

## ATTACHMENTS



## **EXPLORATION AND TESTING PROCEDURES**

### **Field Exploration**

The borings were located in the field by Terracon personnel using a hand-held GPS unit with a horizontal precision of  $\pm 20$  feet. Ground surface elevations were not obtained.

The borings were drilled with an ATV-mounted, rotary drill rig using solid-stem, continuous flight augers and NQ coring to advance the boreholes. Samples of the soil encountered in the borings were obtained using thin-walled tube and split-barrel sampling procedures. In the thin-walled tube sampling procedure, a thin-walled, seamless steel tube with a sharp cutting edge is pushed hydraulically into the soil to obtain a relatively undisturbed sample. In the split-barrel sampling procedure, a standard 2-inch outside diameter split-barrel sampling spoon is driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths.

The samples were tagged for identification, sealed to reduce moisture loss, and taken to our laboratory for further examination, testing, and classification. The drill crew backfilled the borings with auger cuttings after completion of drilling/sampling and prior to leaving the site.

The drill crew prepared a field log of each boring to record data including visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. The final boring logs included with this report represent the engineer's interpretation of the subsurface conditions at the borings based on field and laboratory data and observation of the samples.

### **Laboratory Testing**

Representative soil samples were tested in the laboratory to measure their natural water content, dry unit weight, grain size analysis, and Atterberg limits. Additional testing, on select samples, included unconfined compressive strength tests on rock core samples, slake durability, crumb tests, and pinhole tests for dispersive clay soils. The test results are provided on the boring logs and test data sheets included in **Exploration Results**.

The soil samples were classified in the laboratory based on visual observation, texture, plasticity, and the laboratory testing described above. The soil descriptions presented on the boring logs are in accordance with the enclosed General Notes and Unified Soil Classification System (USCS). The estimated USCS group symbols for native soils are shown on the boring logs, and a brief description of the USCS is included in this report.

## **Subsurface Exploration Report**

Cedar Creek Reservoir Spillway Repair ■ Garnett, Kansas

June 3, 2022 ■ Terracon Project No. 02215359



The bedrock materials encountered in the borings were described in accordance with the appended Description of Rock Properties on the basis of drilling characteristics and visual classification of disturbed auger cuttings. Petrographic analysis and rock core may indicate other rock types.

## **SITE LOCATION AND EXPLORATION PLANS**

### **Contents:**

Site Location Plan

Exploration Plan

Note: All attachments are one page unless noted above.



## SITE LOCATION

Cedar Creek Reservoir Spillway Repair ■ Garnett, Kansas

June 3, 2022 ■ Terracon Project No. 02215359

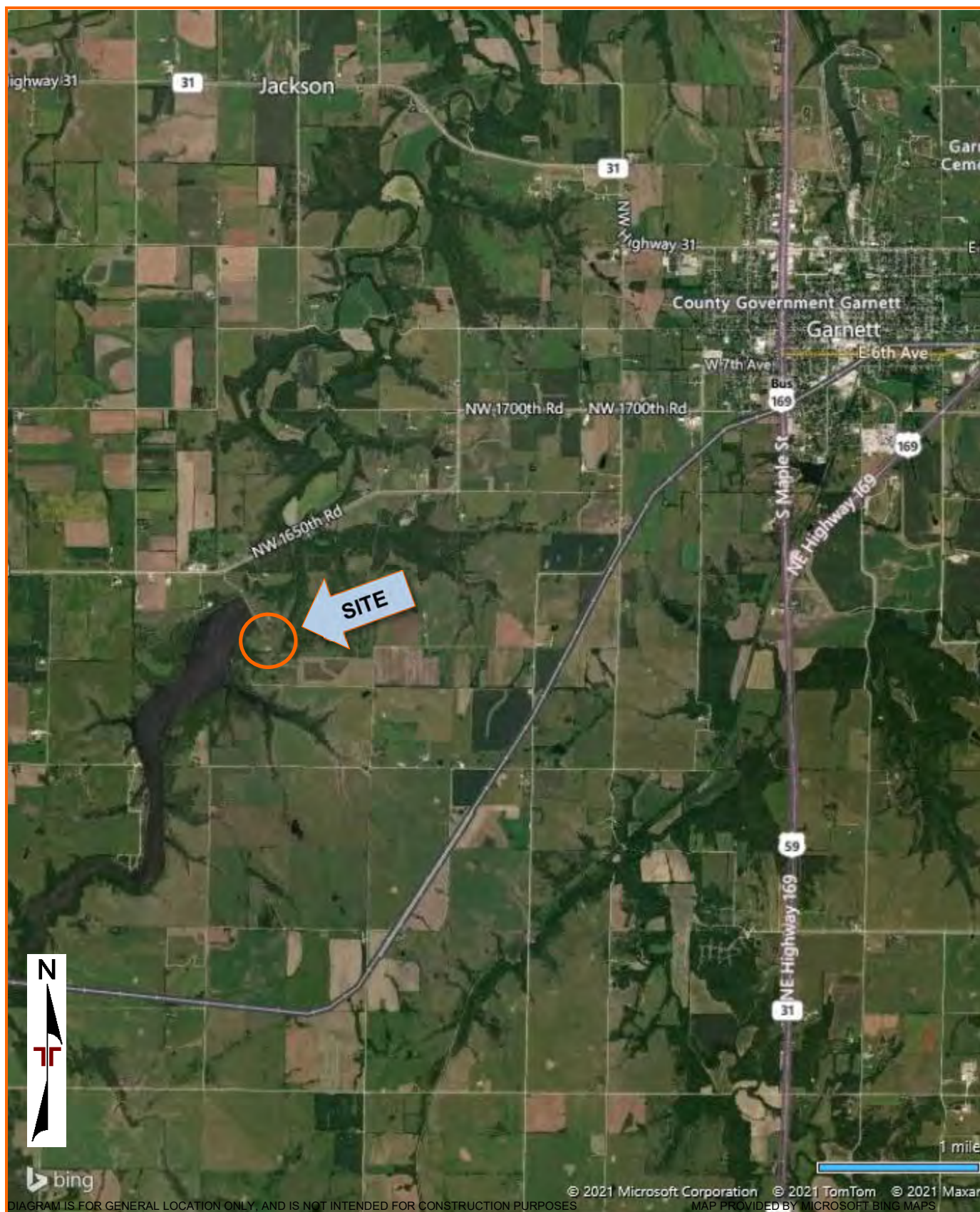


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES



## EXPLORATION PLAN

Cedar Creek Reservoir Spillway Repair ■ Garnett, Kansas

June 3, 2022 ■ Terracon Project No. 02215359



DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

## **EXPLORATION RESULTS**

### **Contents:**

Boring Logs (SB-1 through SB-6)

Atterberg Limits

Grain Size Distribution

Slake Durability of Shales and Similar Weak Rocks (6 pages)

Crumb Test (2 pages)

Dispersive Clay Soils by the Pinhole Test (2 pages)

Photography Log (3 pages)

Note: All attachments are one page unless noted above.



## Page 1 of 1

**CLIENT: McClure Engineering Company  
North Kansas City, Missouri**

GRAPHIC LOG	LOCATION See Exploration Plan		DEPTH (Ft.)	<div></div>	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
												LL-PL-PI	
	Latitude: 38.2541° Longitude: -95.3063°  Surface Elev.: 953.6 (Ft.)		ELEVATION (Ft.)										
	0.5	6" ROOT ZONE	953										
		FAT CLAY (CH), brown		X	8	4-50/3"		10.3				60-20-40	82
	2.0	SANDSTONE, fine grained, gray, moderately to slightly weathered	951.5		X	3	50/6"						
					X	5	50/6"						
		with shale seams below 9 feet											
	19.0	Boring Terminated at 19 Feet	934.5						820		143		

Stratification lines are approximate. In-situ, the transition may be gradual.

Notes:

Elevations were provided by others.

**Terracon**  
15620 W 113th St  
Lenexa, KS

Project No.: 02215359

## Page 1 of 1

**CLIENT: McClure Engineering Company  
North Kansas City, Missouri**

[illegible]

Stratification lines are approximate. In-situ, the transition may be gradual.

Notes:

Elevations were provided by others.

**Terracon**  
15620 W 113th St  
Lenexa, KS

Project No.: 02215359



# BORING LOG NO. SB-03

Page 1 of 1

**PROJECT:** Cedar Creek Reservoir Dam Spillway

**CLIENT:** McClure Engineering Company  
North Kansas City, Missouri

**SITE:** Louisiana Road and NW 1650 Road  
Garnett, Kansas

GRAPHIC LOG	LOCATION See <span>Exploration Plan</span>		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	Latitude: 38.2530° Longitude: -95.3066°										LL-PL-PI	
	Surface Elev.: 975.2 (Ft.)											
	DEPTH	ELEVATION (Ft.)										
	0.5	<b>6" ROOT ZONE</b>	974.5									
	1.5	<b>FAT CLAY (CH)</b> , brown	973.5									
		<b>SANDSTONE</b> , fine grained, brown to gray, moderately to slightly weathered			X	4	50/4"		9.3		21-18-3	
					X	5	50/5"					
			5									
						1	50/1"					
		with shale seams below 8.5 feet										
			10				REC: 100% RQD: 14%					
			15				REC: 100% RQD: 75%	4450		132		
	18.5		956.5									
	<b>Boring Terminated at 18.5 Feet</b>											

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:  
0'-8.5': solid-stem augers  
below 8.5': NQ rock coring

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Notes:

Abandonment Method:  
Boring backfilled with cement-bentonite grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevations were provided by others.

## WATER LEVEL OBSERVATIONS

Groundwater not encountered while auger drilling

**Terracon**  
15620 W 113th St  
Lenexa, KS

Boring Started: 04-12-2022

Boring Completed: 04-12-2022

Drill Rig: CME 850

Driller: DB

Project No.: 02215359

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 02215359 CEDAR CREEK RESER GPJ TERRACON\_DATATEMPLATE.GDT 6/2/22



## Page 1 of 1

**CLIENT: McClure Engineering Company  
North Kansas City, Missouri**

GRAPHIC LOG	LOCATION See <a href="#">Exploration Plan</a>		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	DEPTH	ELEVATION (Ft.)									LL-PL-PI	
	0.5	959										
	<b>6" ROOT ZONE</b> <b>FAT CLAY (CH)</b> , brown											
	4.0	955.5	5		12		6-25-40 N=65					
	<b>SANDSTONE</b> , fine grained, brown to gray, moderately to slightly weathered											
						5	50/5"					
						3	50/3"					
			10				REC: 98% RQD: 27%					
			15				REC: 98% RQD: 27%	3370		126		
	with shale seams below 14.5 feet											
	19.5	940										
<b>Boring Terminated at 19.5 Feet</b>												

Project No.: 02215359

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 02215359 CEDAR CREEK RESER.GPJ TERRACON DATATEMPLATE.GDT 6/2/22


# BORING LOG NO. SB-05

Page 1 of 1

**PROJECT:** Cedar Creek Reservoir Dam Spillway

**CLIENT:** McClure Engineering Company  
North Kansas City, Missouri

**SITE:** Louisiana Road and NW 1650 Road  
Garnett, Kansas

GRAPHIC LOG	LOCATION See <span>Exploration Plan</span>		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
	Latitude: 38.2534° Longitude: -95.3072°										LL-PL-PI	
	Surface Elev.: 975.3 (Ft.)											
	DEPTH	ELEVATION (Ft.)										
	0.5	<b>6" ROOT ZONE</b>	975									
	1.5	<b>FAT CLAY (CH)</b> , brown	974									
		<b>SANDSTONE</b> , fine grained, brown to gray, moderately to slightly weathered										
			5									
			10									
	13.0		962.5									
	<b>Boring Terminated at 13 Feet</b>											

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:  
0'-3': solid-stem augers  
below 3': NQ rock coring

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:  
Boring backfilled with cement-bentonite grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevations were provided by others.

## WATER LEVEL OBSERVATIONS

Groundwater not encountered while auger drilling

**Terracon**  
15620 W 113th St  
Lenexa, KS

Boring Started: 04-12-2022

Boring Completed: 04-12-2022


Drill Rig: CME 850

Driller: DB

Project No.: 02215359

## Page 1 of 1

**CLIENT: McClure Engineering Company  
North Kansas City, Missouri**

GRAPHIC LOG	LOCATION See <a href="#">Exploration Plan</a>		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	PERCENT FINES
											LL-PL-PI	
	Latitude: 38.2544° Longitude: -95.3069°	Surface Elev.: 968.2 (Ft.)										
	DEPTH	ELEVATION (Ft.)										
	0.5	967.5										
	<b>6" ROOT ZONE</b>											
	<b>FAT CLAY (CH)</b> , shaley, gray											
	2.0	966				11			24.0	101	61-24-37	93
	<b>SANDSTONE</b> , fine grained, gray, moderately to slightly weathered											
	with shale seams below 8.5 feet											
	18.5	949.5				0	50/0"	REC: 77% RQD: 23%	3790	131		
	<b>Boring Terminated at 18.5 Feet</b>											

Stratification lines are approximate. In-situ, the transition may be gradual.

Notes:

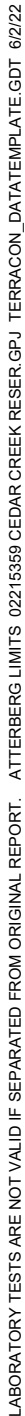
Elevations were provided by others.

**Terracon**  
15620 W 113th St  
Lenexa, KS

Project No.: 02215359



## ASTM D4318

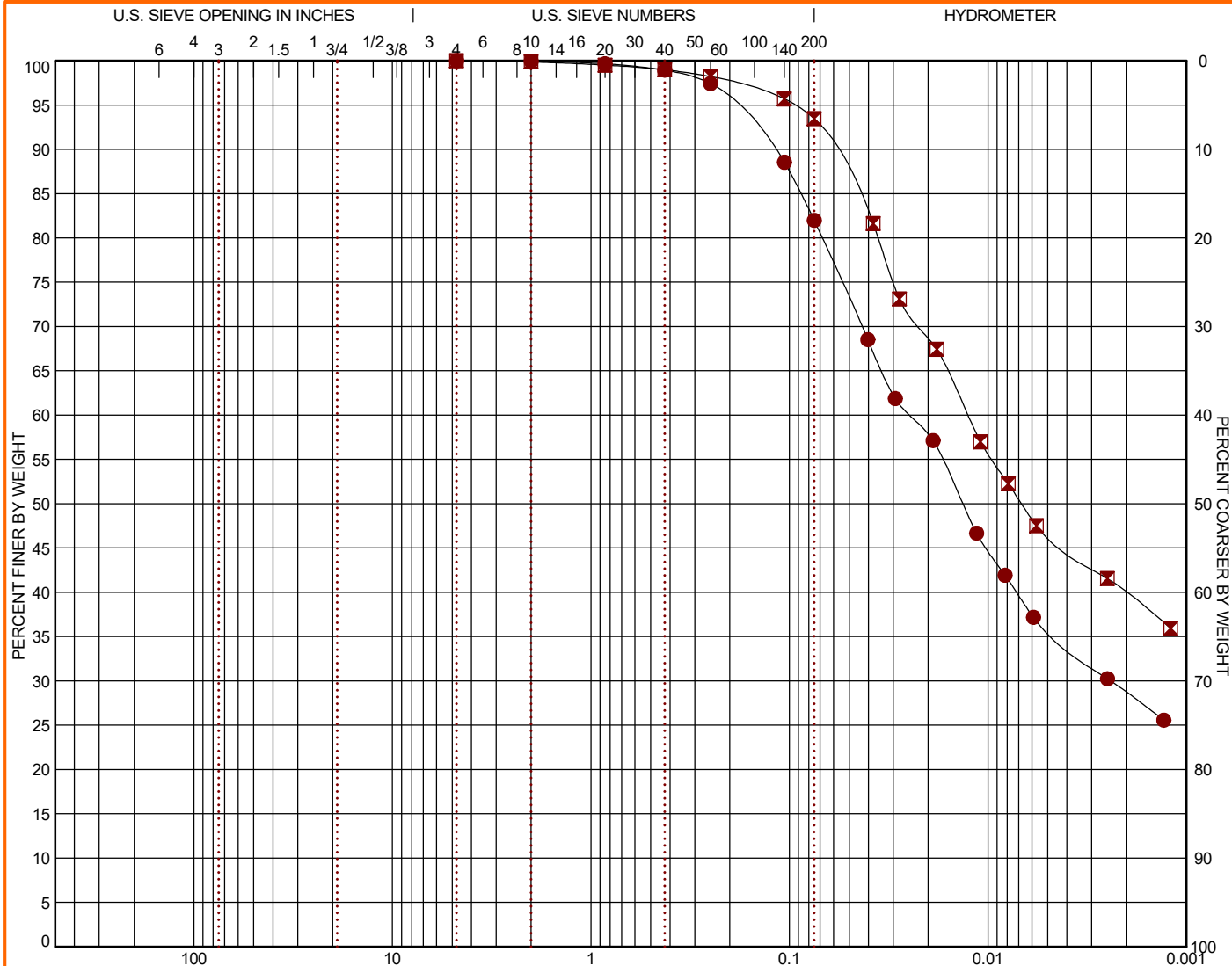


CLIENT: McClure Engineering Company  
North Kansas City, Missouri

# GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS 1 02215359 CEDAR CREEK RESER.GPJ TERRACON DATATEMPLATE.GDT 6/2/22



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
● SB-01	1.5 - 2.3	0.0	0.0	18.0	46.1		35.8	CH
☒ SB-06	1 - 2	0.0	0.0	6.5	46.9		46.6	CH

GRAIN SIZE			
	●	☒	
D <sub>60</sub>	0.025	0.013	
D <sub>30</sub>	0.002		
D <sub>10</sub>			

COEFFICIENTS			
	●	☒	
C <sub>c</sub>			
C <sub>u</sub>			

Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
●		☒			
#4	100.0	#4	100.0		
#10	99.94	#10	99.86		
#20	99.65	#20	99.51		
#40	98.93	#40	98.98		
#60	97.42	#60	98.22		
#140	88.54	#140	95.69		
#200	81.98	#200	93.46		

SOIL DESCRIPTION	
●	FAT CLAY with SAND (CH)
☒	FAT CLAY (CH)

REMARKS	
●	
☒	

PROJECT: Cedar Creek Reservoir Dam Spillway	 15620 W 113th St Lenexa, KS	PROJECT NUMBER: 02215359
SITE: Louisiana Road and NW 1650 Road Garnett, Kansas		CLIENT: McClure Engineering Company North Kansas City, Missouri

**SLAKE DURABILITY OF SHALES AND SIMILAR WEAK ROCKS  
ASTM D4644**

**CEDAR CREEK RESERVOIR DAM SPILLWAY  
02215359**

**SB-1**

**R1**

**9.0 - 14.0**

**SHALE AND SANDSTONE MIX, GRAY**

6.8		NATURAL MOISTURE CONTENT, %
1213.8		MASS OF DRUM, grams
1723.7		MASS OF DRUM PLUS OVEN-DRIED SPECIMEN BEFORE THE FIRST CYCLE, grams
1695.1		MASS OF DRUM PLUS OVEN-DRIED SPECIMEN RETAINED AFTER THE SECOND CYCLE, grams
72	72	WATER TEMPERATURE OF FIRST CYCLE, deg F
Before	After	
70	71	WATER TEMPERATURE OF SECOND CYCLE, deg F
71		AVERAGE WATER TEMPERATURE, deg F
TYPE 2		DESCRIPTION OF THE APPEARANCE OF THE FRAGMENTS RETAINED IN THE DRUM TYPE 1 - UNCHANGED; TYPE 2 - LARGE AND SMALL FRAGMENTS; TYPE 3 - ALL SMALL FRAGMENTS
94.4		SLAKE DURABILITY INDEX



**OVEN-DRIED BEFORE FIRST CYCLE**

**OVEN-DRIED AFTER SECOND CYCLE**



**SLAKE DURABILITY OF SHALES AND SIMILAR WEAK ROCKS  
ASTM D4644**

**CEDAR CREEK RESERVOIR DAM SPILLWAY  
02215359**

**SB-6**

**R1**

**8.5 - 13.5**

**SANDSTONE AND SHALE MIX, GRAY**

8.2		NATURAL MOISTURE CONTENT, %
1214.4		MASS OF DRUM, grams
1717.7		MASS OF DRUM PLUS OVEN-DRIED SPECIMEN BEFORE THE FIRST CYCLE, grams
1598.2		MASS OF DRUM PLUS OVEN-DRIED SPECIMEN RETAINED AFTER THE SECOND CYCLE, grams
70	71	WATER TEMPERATURE OF FIRST CYCLE, deg F
Before	After	
71	72	WATER TEMPERATURE OF SECOND CYCLE, deg F
71		AVERAGE WATER TEMPERATURE, deg F
TYPE 2		DESCRIPTION OF THE APPEARANCE OF THE FRAGMENTS RETAINED IN THE DRUM TYPE 1 - UNCHANGED; TYPE 2 - LARGE AND SMALL FRAGMENTS; TYPE 3 - ALL SMALL FRAGMENTS
<b>76.3</b>		<b>SLAKE DURABILTY INDEX</b>



**OVEN-DRIED BEFORE FIRST CYCLE**

**OVEN-DRIED AFTER SECOND CYCLE**

**SLAKE DURABILITY OF SHALES AND SIMILAR WEAK ROCKS  
ASTM D4644**

**CEDAR CREEK RESERVOIR DAM SPILLWAY  
02215359**

**SB-5**

**R1**

**3.0 - 8.0**

**SANDSTONE, LIGHT OLIVE BROWN**

7.0		NATURAL MOISTURE CONTENT, %
1213.8		MASS OF DRUM, grams
1706.5		MASS OF DRUM PLUS OVEN-DRIED SPECIMEN BEFORE THE FIRST CYCLE, grams
1593.8		MASS OF DRUM PLUS OVEN-DRIED SPECIMEN RETAINED AFTER THE SECOND CYCLE, grams
70	71	WATER TEMPERATURE OF FIRST CYCLE, deg F
Before	After	
71	72	WATER TEMPERATURE OF SECOND CYCLE, deg F
71		AVERAGE WATER TEMPERATURE, deg F
TYPE 2		DESCRIPTION OF THE APPEARANCE OF THE FRAGMENTS RETAINED IN THE DRUM TYPE 1 - UNCHANGED; TYPE 2 - LARGE AND SMALL FRAGMENTS; TYPE 3 - ALL SMALL FRAGMENTS
77.1		<b>SLAKE DURABILITY INDEX</b>



**OVEN-DRIED BEFORE FIRST CYCLE**

**OVEN-DRIED AFTER SECOND CYCLE**

**SLAKE DURABILITY OF SHALES AND SIMILAR WEAK ROCKS  
ASTM D4644**

**CEDAR CREEK RESERVOIR DAM SPILLWAY  
02215359**

**SB-4  
R1**

**9.5 - 14.5**

**SHALE AND SANDSTONE MIX, GRAY**

6.4		NATURAL MOISTURE CONTENT, %
1214.4		MASS OF DRUM, grams
1731.3		MASS OF DRUM PLUS OVEN-DRIED SPECIMEN BEFORE THE FIRST CYCLE, grams
1698.3		MASS OF DRUM PLUS OVEN-DRIED SPECIMEN RETAINED AFTER THE SECOND CYCLE, grams
70	70	WATER TEMPERATURE OF FIRST CYCLE, deg F
Before	After	
70	71	WATER TEMPERATURE OF SECOND CYCLE, deg F
70		AVERAGE WATER TEMPERATURE, deg F
TYPE 2		DESCRIPTION OF THE APPEARANCE OF THE FRAGMENTS RETAINED IN THE DRUM TYPE 1 - UNCHANGED; TYPE 2 - LARGE AND SMALL FRAGMENTS; TYPE 3 - ALL SMALL FRAGMENTS
93.6		SLAKE DURABILTY INDEX



**OVEN-DRIED BEFORE FIRST CYCLE**

**OVEN-DRIED AFTER SECOND CYCLE**



**SLAKE DURABILITY OF SHALES AND SIMILAR WEAK ROCKS  
ASTM D4644**

**CEDAR CREEK RESERVOIR DAM SPILLWAY  
02215359**

**SB-3**

**R1**

**8.5 - 13.5**

**SHALE AND SANDSTONE MIX, GRAY**

6.1		NATURAL MOISTURE CONTENT, %
1213.8		MASS OF DRUM, grams
1709.2		MASS OF DRUM PLUS OVEN-DRIED SPECIMEN BEFORE THE FIRST CYCLE, grams
1674.2		MASS OF DRUM PLUS OVEN-DRIED SPECIMEN RETAINED AFTER THE SECOND CYCLE, grams
70	70	WATER TEMPERATURE OF FIRST CYCLE, deg F
Before	After	
70	71	WATER TEMPERATURE OF SECOND CYCLE, deg F
70		AVERAGE WATER TEMPERATURE, deg F
TYPE 1		DESCRIPTION OF THE APPEARANCE OF THE FRAGMENTS RETAINED IN THE DRUM TYPE 1 - UNCHANGED; TYPE 2 - LARGE AND SMALL FRAGMENTS; TYPE 3 - ALL SMALL FRAGMENTS
92.9		SLAKE DURABILITY INDEX



**OVEN-DRIED BEFORE FIRST CYCLE**

**OVEN-DRIED AFTER SECOND CYCLE**

**SLAKE DURABILITY OF SHALES AND SIMILAR WEAK ROCKS  
ASTM D4644**

**CEDAR CREEK RESERVOIR DAM SPILLWAY  
02215359**

**SB-2**

**R1**

**9.0 - 14.0**

**SHALE AND SANDSTONE MIX, DARK GRAY**

5.8		NATURAL MOISTURE CONTENT, %
1214.4		MASS OF DRUM, grams
1719.9		MASS OF DRUM PLUS OVEN-DRIED SPECIMEN BEFORE THE FIRST CYCLE, grams
1696.6		MASS OF DRUM PLUS OVEN-DRIED SPECIMEN RETAINED AFTER THE SECOND CYCLE, grams
73 Before	72 After	WATER TEMPERATURE OF FIRST CYCLE, deg F
70	71	WATER TEMPERATURE OF SECOND CYCLE, deg F
72		AVERAGE WATER TEMPERATURE, deg F
TYPE 2		DESCRIPTION OF THE APPEARANCE OF THE FRAGMENTS RETAINED IN THE DRUM TYPE 1 - UNCHANGED; TYPE 2 - LARGE AND SMALL FRAGMENTS; TYPE 3 - ALL SMALL FRAGMENTS
95.4		SLAKE DURABILITY INDEX



**OVEN-DRIED BEFORE FIRST CYCLE**

**OVEN-DRIED AFTER SECOND CYCLE**

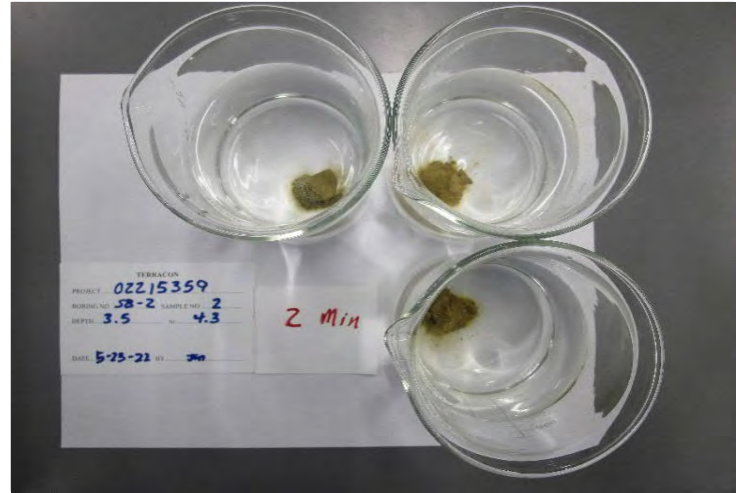
CRUMB TEST D6572  
CEDAR CREEK RESERVOIR DAM SPILLWAY

SB-2 02215359 2 3.5 - 4.3 feet

2 MIN

GRADE: 3

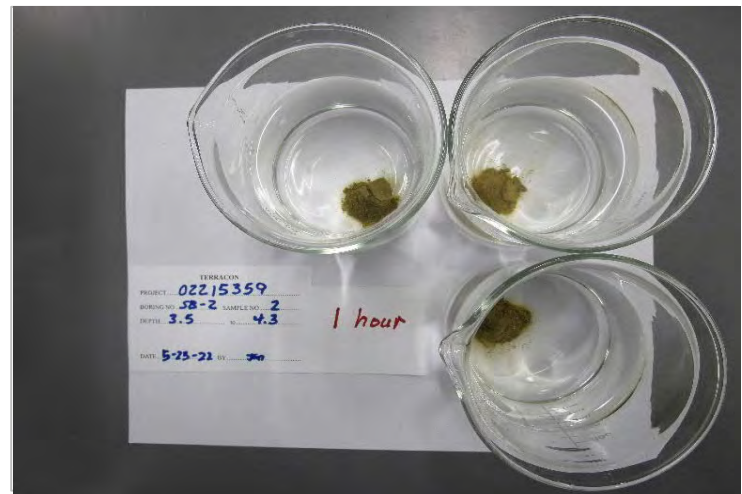
DISPERSIVE CALSSIFICATION: DISPERSIVE



1 HOUR

GRADE: 3

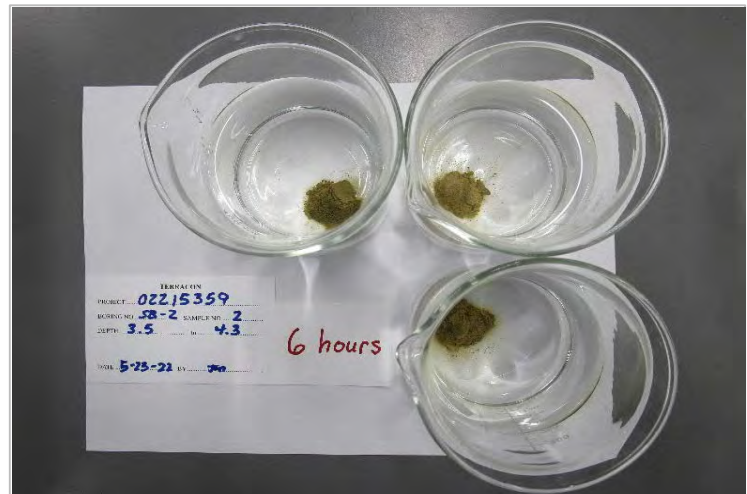
DISPERSIVE CALSSIFICATION: DISPERSIVE



6 HOUR

GRADE: 3

DISPERSIVE CALSSIFICATION: DISPERSIVE



- Grade 1 - Nondipersive
- Grade 2 - Intermediate
- Grade 3 - Dispersive
- Grade 4 - Highly Dispersive



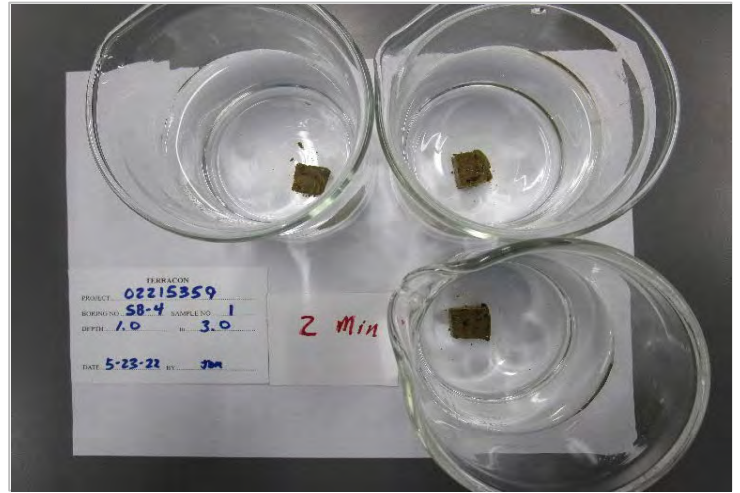
CRUMB TEST D6572  
CEDAR CREEK RESERVOIR DAM SPILLWAY

SB-4 02215359 1 1.0 - 3.0 feet

2 MIN

GRADE: 1

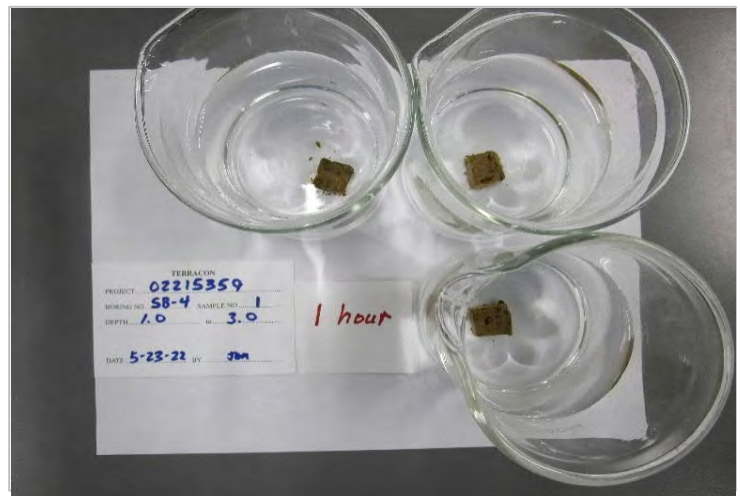
DISPERSIVE CALSSIFICATION: NONDISPERSIVE



1 HOUR

GRADE: 1

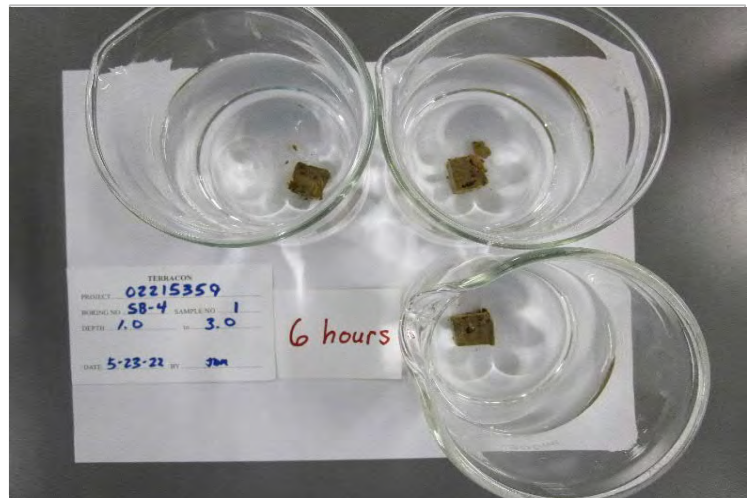
DISPERSIVE CALSSIFICATION: NONDISPERSIVE



6 HOUR

GRADE: 1

DISPERSIVE CALSSIFICATION: NONDISPERSIVE

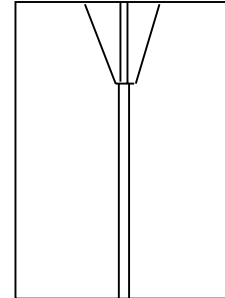


- Grade 1 - Nondipersive
- Grade 2 - Intermediate
- Grade 3 - Dispersive
- Grade 4 - Highly Dispersive

**DISPERSIVE CLAY SOILS BY THE PINHOLE TEST**  
**ASTM D 4647, METHOD A**  
**5/25/2022**

**PROJECT** CEDAR CREEK RESERVOIR DAM SPILLWAY  
**JOB NO.** 02215359  
**SAMPLE ID** SB-2; S-2; 3.5 - 4.4  
**COMPACTION CHARACTERISTICS** GOOD  
**WATER CONTENT** 9.8%  
**DISTILLED WATER ADDED** YES X NO  
**CURE TIME** NONE  
**BY** JDM  
**SAMPLE DESC.** SILTY CLAY / CLAYEY SILT, yellow

FINAL HOLE  
20.1 mm



**FLOW STARTED ON** 2nd TRIAL

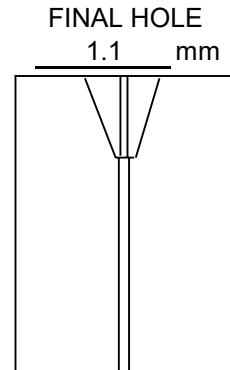
TIME, min	HEAD, inch	FLOW,		FLOW RATE, ml/sec	TURBIDITY FROM SIDE						CLEAR FROM TOP	REMARKS
		ml	sec		VERY DARK	DARK	MOD. DARK	SLIGHT DARK	BARELY VISIBLE	CLEAR		
1	2	4.7	60	0.08				X				MODERATELY DARK
2	2	2.9	60	0.05					X			SLIGHT DARK
3	2	2.6	60	0.04					X			SLIGHT DARK
4	2	2.0	60	0.03						X		BARELY VISIBLE
5	2	1.8	60	0.03						X		BARELY VISIBLE
6	2	1.6	60	0.03						X		BARELY VISIBLE
7	2	2.6	60	0.04					X			SLIGHT DARK
8	2	4.4	60	0.07					X			SLIGHT DARK
9	2	4.4	60	0.07						X		BARELY VISIBLE
10	2	3.8	60	0.06						X		BARELY VISIBLE
1	7	33.0	60	0.55			X					MODERATELY DARK
2	7	73.0	60	1.22			X					MODERATELY DARK
3	7	100.0	60	1.67			X					MODERATELY DARK
4	7	68.0	60	1.13			X					DARK
5	7	35.0	60	0.58			X					DARK
1	15	118.0	60	1.97		X						DARK
2	15	112.0	60	1.87			X					DARK
3	15	118.0	60	1.97		X						DARK
4	15	92.0	60	1.53		X						DARK
5	15	102.0	60	1.70			X					DARK
1	40	280.0	60	4.67	X							VERY DARK
2	40	280.0	60	4.67		X						DARK
3	40	290.0	60	4.83	X							VERY DARK
4	40	303.0	60	5.05		X						DARK
5	40	280.0	60	4.67		X						DARK

**CLASSIFICATION =** D2

**Terracon**

**DISPERSIVE CLAY SOILS BY THE PINHOLE TEST**  
**ASTM D 4647, METHOD A**  
**5/25/2022**

**PROJECT** CEDAR CREEK RESERVOIR DAM SPILLWAY  
**JOB NO.** 02215359  
**SAMPLE ID** SB-4; S-1; 1.0 - 3.0  
**COMPACTION CHARACTERISTICS** GOOD  
**WATER CONTENT** 18.9 %  
**DISTILLED WATER ADDED**        YES   X   NO  
**CURE TIME** NONE  
**BY** JDM  
**SAMPLE DESC.** FAT CLAY, reddish yellow, grayish brown, and brown



**FLOW STARTED ON**   1st   TRIAL

TIME,	HEAD,	FLOW,		FLOW RATE,	TURBIDITY FROM SIDE					CLEAR FROM TOP	REMARKS
					VERY DARK	DARK	MOD. DARK	SLIGHT DARK	BARELY VISIBLE	CLEAR	
min	inch	ml	sec	ml/sec							
1	2	11.8	60	0.20						X	X
2	2	10.5	60	0.18						X	X
3	2	9.0	60	0.15						X	X
4	2	9.0	60	0.15						X	X
5	2	6.5	60	0.11						X	X
6	2	7.3	60	0.12						X	X
7	2	13.5	60	0.23						X	X
8	2	13.5	60	0.23						X	X
9	2	13.0	60	0.22						X	X
10	2	13.0	60	0.22						X	X
1	7	39.0	60	0.65						X	X
2	7	39.0	60	0.65						X	X
3	7	38.5	60	0.64						X	X
4	7	38.5	60	0.64						X	X
5	7	38.5	60	0.64						X	X
1	15	66.0	60	1.10						X	X
2	15	65.5	60	1.09					X		SLIGHT DARK
3	15	70.0	60	1.17						X	X
4	15	67.0	60	1.12						X	BARELY VISIBLE
5	15	70.0	60	1.17						X	X
1	40	134.0	60	2.23						X	BARELY VISIBLE
2	40	136.0	60	2.27						X	X
3	40	138.0	60	2.30						X	X
4	40	135.0	60	2.25						X	X
5	40	136.0	60	2.27						X	X

**CLASSIFICATION =** **ND1**



## PHOTOGRAPHY LOG



SB-1, 9-19 ft



SB-2, 9-19 ft

## Subsurface Exploration Report

Cedar Creek Reservoir Spillway Repair ■ Garnett, Kansas

June 3, 2022 ■ Terracon Project No. 02215359



SB-3, 8.5-18.5 ft



SB-4, 9.5-19.5 ft



## Subsurface Exploration Report

Cedar Creek Reservoir Spillway Repair ■ Garnett, Kansas

June 3, 2022 ■ Terracon Project No. 02215359



SB-5, 3-13 ft



SB-6, 8.5-18.5 ft



## **SUPPORTING INFORMATION**

### **Contents:**

General Notes

Unified Soil Classification System

Description of Rock Properties








Note: All attachments are one page unless noted above.

# GENERAL NOTES

## DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

Cedar Creek Reservoir Dam Spillway ■ Garnett, Kansas

Terracon Project No. 02215359

SAMPLING	WATER LEVEL	FIELD TESTS
 Rock Core  Shelby Tube  Split Spoon	 Water Initially Encountered  Water Level After a Specified Period of Time  Water Level After a Specified Period of Time  Cave In Encountered <p>Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.</p>	<b>N</b> Standard Penetration Test Resistance (Blows/Ft.) <b>(HP)</b> Hand Penetrometer <b>(T)</b> Torvane <b>(DCP)</b> Dynamic Cone Penetrometer <b>UC</b> Unconfined Compressive Strength <b>(PID)</b> Photo-Ionization Detector <b>(OVA)</b> Organic Vapor Analyzer

## DESCRIPTIVE SOIL CLASSIFICATION

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

## LOCATION AND ELEVATION NOTES

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See [Exploration and Testing Procedures](#) in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

## STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength Qu, (psf)	Standard Penetration or N-Value Blows/Ft.
Very Loose	0 - 3	Very Soft	less than 500	0 - 1
Loose	4 - 9	Soft	500 to 1,000	2 - 4
Medium Dense	10 - 29	Medium Stiff	1,000 to 2,000	4 - 8
Dense	30 - 50	Stiff	2,000 to 4,000	8 - 15
Very Dense	> 50	Very Stiff	4,000 to 8,000	15 - 30
		Hard	> 8,000	> 30

## RELEVANCE OF SOIL BORING LOG

The soil boring logs contained within this document are intended for application to the project as described in this document. Use of these soil boring logs for any other purpose may not be appropriate.

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests <sup>A</sup>					Soil Classification	
					Group Symbol	Group Name <sup>B</sup>
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines <sup>C</sup>	$Cu \geq 4$ and $1 \leq Cc \leq 3$ <sup>E</sup>	GW	Well-graded gravel <sup>F</sup>	
			$Cu < 4$ and/or $[Cc < 1$ or $Cc > 3.0]$ <sup>E</sup>	GP	Poorly graded gravel <sup>F</sup>	
		Gravels with Fines: More than 12% fines <sup>C</sup>	Fines classify as ML or MH	GM	Silty gravel <sup>F, G, H</sup>	
			Fines classify as CL or CH	GC	Clayey gravel <sup>F, G, H</sup>	
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines <sup>D</sup>	$Cu \geq 6$ and $1 \leq Cc \leq 3$ <sup>E</sup>	SW	Well-graded sand <sup>I</sup>	
			$Cu < 6$ and/or $[Cc < 1$ or $Cc > 3.0]$ <sup>E</sup>	SP	Poorly graded sand <sup>I</sup>	
		Sands with Fines: More than 12% fines <sup>D</sup>	Fines classify as ML or MH	SM	Silty sand <sup>G, H, I</sup>	
			Fines classify as CL or CH	SC	Clayey sand <sup>G, H, I</sup>	
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	$PI > 7$ and plots on or above “A”	CL	Lean clay <sup>K, L, M</sup>	
			$PI < 4$ or plots below “A” line <sup>J</sup>	ML	Silt <sup>K, L, M</sup>	
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay <sup>K, L, M, N</sup>
			Liquid limit - not dried			Organic silt <sup>K, L, M, O</sup>
	Silts and Clays: Liquid limit 50 or more	Inorganic:	$PI$ plots on or above “A” line	CH	Fat clay <sup>K, L, M</sup>	
			$PI$ plots below “A” line	MH	Elastic Silt <sup>K, L, M</sup>	
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay <sup>K, L, M, P</sup>
			Liquid limit - not dried			Organic silt <sup>K, L, M, Q</sup>
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat	

<sup>A</sup> Based on the material passing the 3-inch (75-mm) sieve.

<sup>B</sup> If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

<sup>C</sup> Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

<sup>D</sup> Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

$$^E Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

<sup>F</sup> If soil contains  $\geq 15\%$  sand, add "with sand" to group name.

<sup>G</sup> If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

<sup>H</sup> If fines are organic, add "with organic fines" to group name.

<sup>I</sup> If soil contains  $\geq 15\%$  gravel, add "with gravel" to group name.

<sup>J</sup> If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

<sup>K</sup> If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

<sup>L</sup> If soil contains  $\geq 30\%$  plus No. 200 predominantly sand, add "sandy" to group name.

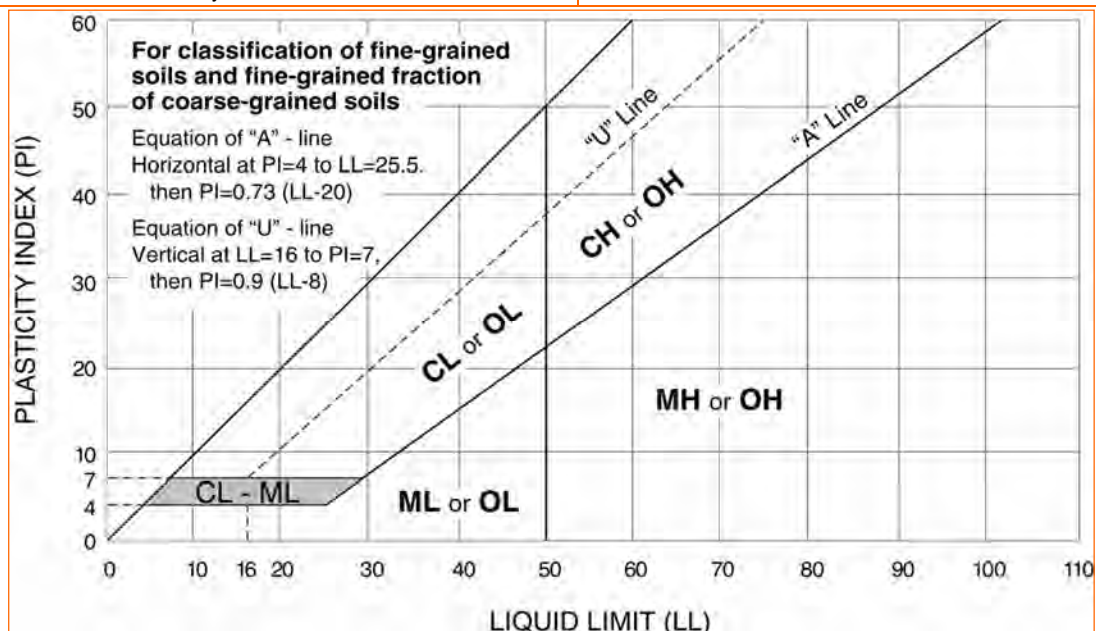
<sup>M</sup> If soil contains  $\geq 30\%$  plus No. 200, predominantly gravel, add "gravelly" to group name.

<sup>N</sup>  $PI \geq 4$  and plots on or above "A" line.

<sup>O</sup>  $PI < 4$  or plots below "A" line.

<sup>P</sup> PI plots on or above "A" line.

<sup>Q</sup> PI plots below "A" line.





WEATHERING	
Term	Description
<b>Unweathered</b>	No visible sign of rock material weathering, perhaps slight discoloration on major discontinuity surfaces.
<b>Slightly weathered</b>	Discoloration indicates weathering of rock material and discontinuity surfaces. All the rock material may be discolored by weathering and may be somewhat weaker externally than in its fresh condition.
<b>Moderately weathered</b>	Less than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a continuous framework or as corestones.
<b>Highly weathered</b>	More than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a discontinuous framework or as corestones.
<b>Completely weathered</b>	All rock material is decomposed and/or disintegrated to soil. The original mass structure is still largely intact.
<b>Residual soil</b>	All rock material is converted to soil. The mass structure and material fabric are destroyed. There is a large change in volume, but the soil has not been significantly transported.

STRENGTH OR HARDNESS		
Description	Field Identification	Uniaxial Compressive Strength, psi (MPa)
<b>Extremely weak</b>	Indented by thumbnail	40-150 (0.3-1)
<b>Very weak</b>	Crumbles under firm blows with point of geological hammer, can be peeled by a pocket knife	150-700 (1-5)
<b>Weak rock</b>	Can be peeled by a pocket knife with difficulty, shallow indentations made by firm blow with point of geological hammer	700-4,000 (5-30)
<b>Medium strong</b>	Cannot be scraped or peeled with a pocket knife, specimen can be fractured with single firm blow of geological hammer	4,000-7,000 (30-50)
<b>Strong rock</b>	Specimen requires more than one blow of geological hammer to fracture it	7,000-15,000 (50-100)
<b>Very strong</b>	Specimen requires many blows of geological hammer to fracture it	15,000-36,000 (100-250)
<b>Extremely strong</b>	Specimen can only be chipped with geological hammer	>36,000 (>250)

DISCONTINUITY DESCRIPTION			
Fracture Spacing (Joints, Faults, Other Fractures)		Bedding Spacing (May Include Foliation or Banding)	
Description	Spacing	Description	Spacing
<b>Extremely close</b>	< ¾ in (<19 mm)	<b>Laminated</b>	< ½ in (<12 mm)
<b>Very close</b>	¾ in – 2-1/2 in (19 - 60 mm)	<b>Very thin</b>	½ in – 2 in (12 – 50 mm)
<b>Close</b>	2-1/2 in – 8 in (60 – 200 mm)	<b>Thin</b>	2 in – 1 ft. (50 – 300 mm)
<b>Moderate</b>	8 in – 2 ft. (200 – 600 mm)	<b>Medium</b>	1 ft. – 3 ft. (300 – 900 mm)
<b>Wide</b>	2 ft. – 6 ft. (600 mm – 2.0 m)	<b>Thick</b>	3 ft. – 10 ft. (900 mm – 3 m)
<b>Very Wide</b>	6 ft. – 20 ft. (2.0 – 6 m)	<b>Massive</b>	> 10 ft. (3 m)

**Discontinuity Orientation (Angle):** Measure the angle of discontinuity relative to a plane perpendicular to the longitudinal axis of the core. (For most cases, the core axis is vertical; therefore, the plane perpendicular to the core axis is horizontal.) For example, a horizontal bedding plane would have a 0-degree angle.

ROCK QUALITY DESIGNATION (RQD) <sup>1</sup>	
Description	RQD Value (%)
<b>Very Poor</b>	0 - 25
<b>Poor</b>	25 – 50
<b>Fair</b>	50 – 75
<b>Good</b>	75 – 90
<b>Excellent</b>	90 - 100

1. The combined length of all sound and intact core segments equal to or greater than 4 inches in length, expressed as a percentage of the total core run length.

Reference: U.S. Department of Transportation, Federal Highway Administration, Publication No FHWA-NHI-10-034, December 2009  
Technical Manual for Design and Construction of Road Tunnels – Civil Elements

## APPENDIX E

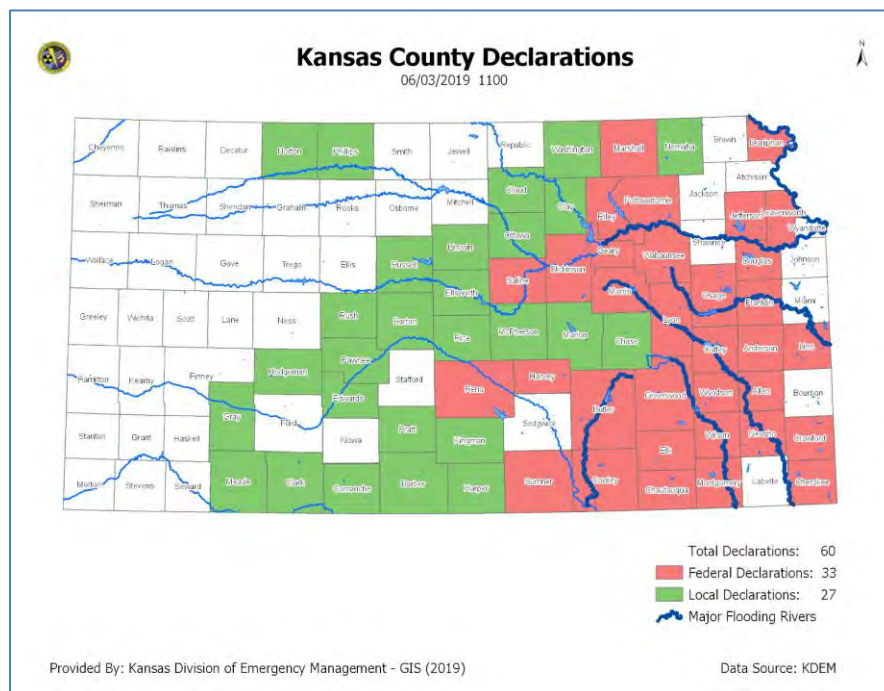
# KANSAS CLIMATE UPDATE AND POINT PRECIPITATION FREQUENCY ESTIMATE

## KANSAS CLIMATE UPDATE

### May 2019 Summary

#### Highlights

- May 2019 sets the record not only for the wettest May since 1895, but also the wettest month ever.
- Emergency declarations were made in May 2019 for flooding beginning May 9. County declarations were made locally for many counties in May and early June. Federal declarations are in place for 33 counties June 4, 2019 for the May flooding. FEMA-3412-EM allows for federal assistance to supplement state and local efforts.

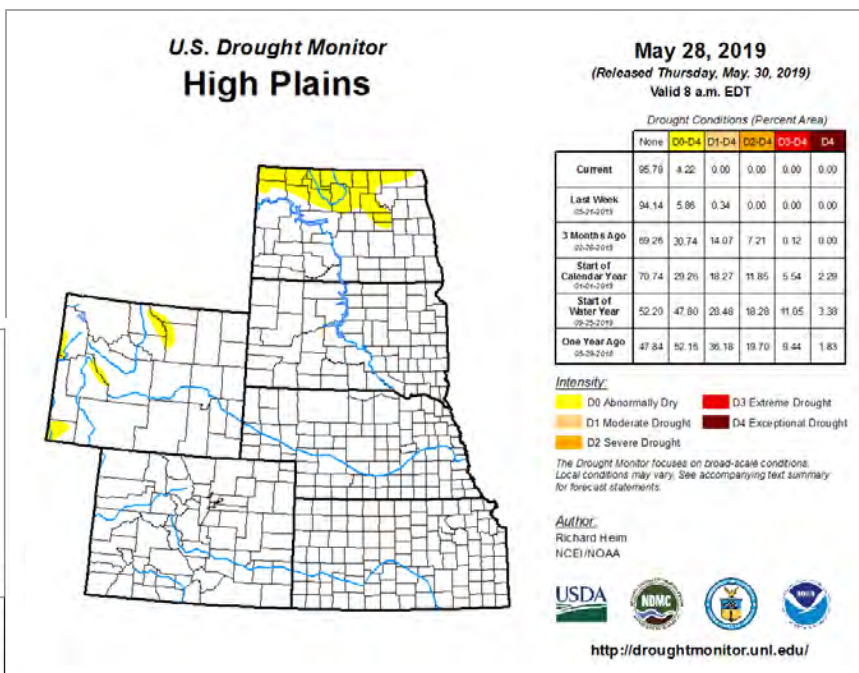
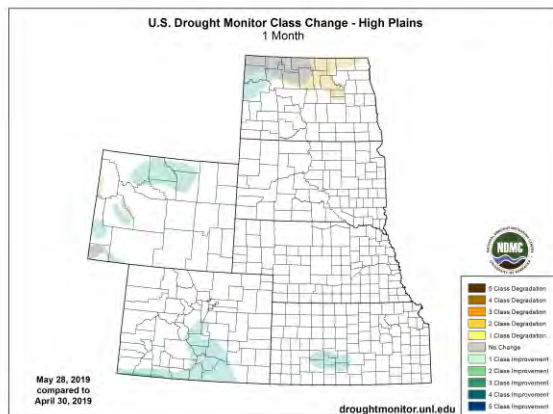


- May flooding occurred at over 90 USGS stream gages on at least 50 streams for one to as much as 31 days in May.
- Major flood category was reached along the Neosho, Arkansas, Verdigris and Walnut rivers with numerous other rivers reaching moderate flood stage.
- Multiple Corps of Engineer flood control reservoirs reached over 90 percent of flood pool capacity
- May precipitation exceeded month total normal by mid-May in many locations particularly in the eastern third across the state. Monthly totals were 150% to over 300% of normal precipitation.
- An El Niño Advisory is in effect, with weak El Niño conditions present. Weak El Niño conditions are expected to continue in the Northern Hemisphere through summer and possibly into the fall of 2019.



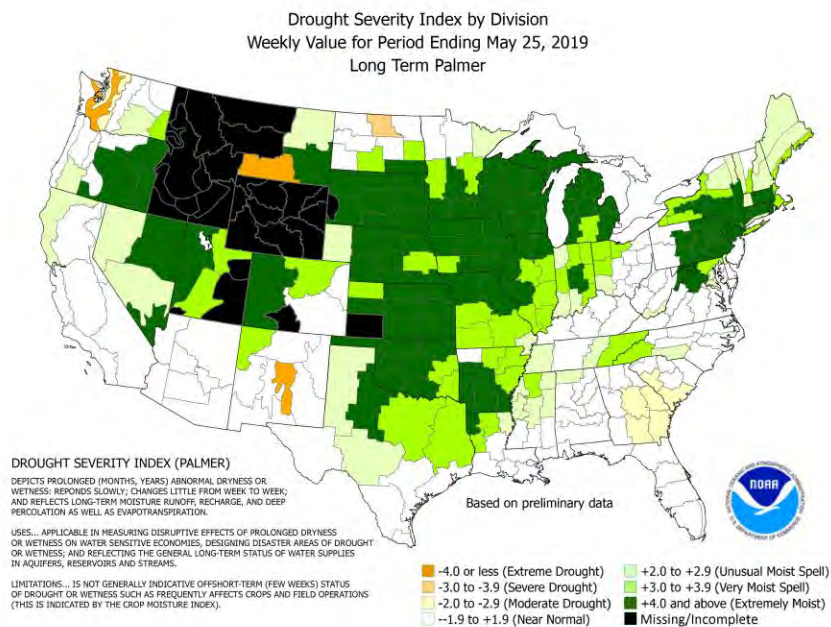
## General Drought Conditions

Kansas became drought free by the U.S. Drought Monitor in January 2019, but as the year has progressed it is flooding due to above normal rains that is the major climate issue. Minor pockets of abnormally dry conditions developed for a week or two in April and May. Changes in drought classification over the month for the High Plains, including Kansas is also shown for perspective.



More information can be found on the U.S. Drought Monitor web site <https://droughtmonitor.unl.edu/>.

Palmer Drought Severity Index (PDSI) - The Palmer Drought Severity Index is an indicator of relative dryness or wetness and is one factor used the U.S. Drought Monitor. More information on the PDSI can be found at [http://www.cpc.ncep.noaa.gov/products/monitoring\\_and\\_data/drought.shtml](http://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml).



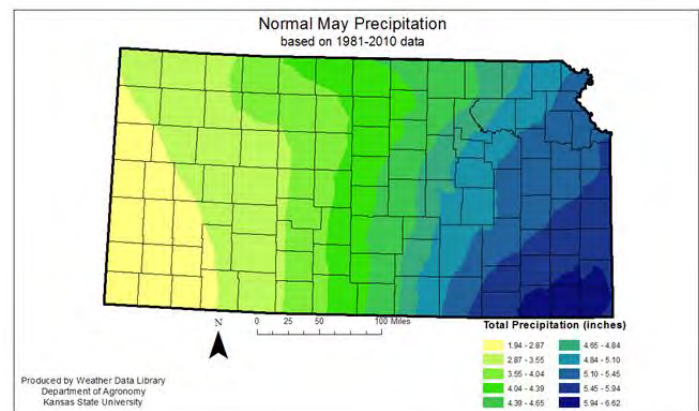
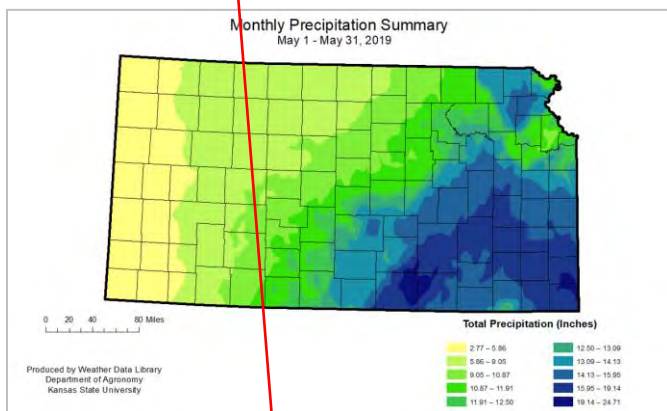
## Climate Summary - Precipitation

May 2019 sets the record not only for the wettest May since 1895, but also the wettest month ever. State-wide average precipitation for the month was 10.26 inches, 246 percent of normal. All divisions averaged above normal for the month. The Northwest Division was the driest, compared to normal, with an average of 5.46 inches, 158 percent of normal. In contrast, the Southeast Division averaged 17.00 inches, 294 percent of normal. The highest 24-hour rainfall total for a National Weather Service Cooperative station 9.42 inches at Horton, Brown County, on the 24th. The greatest 24-hour rainfall total for a Community Collaborative Rain, Hail and Snow network station was 9.32 inches at Rose Hill 2.7 ESE, Butler County on the 8th. The greatest monthly precipitation totals for May: 26.14 inches at Rock 3SW, Cowley County (NWS) and 30.08 inches at Rose Hill 2.7 ESE, Butler County (CoCoRaHS). Monthly snowfall was largely confined to the Northwest Division, with the highest amount reported 1.0 inches at Colby 1S, Thomas County (NWS). (KSU Weather Data Library)

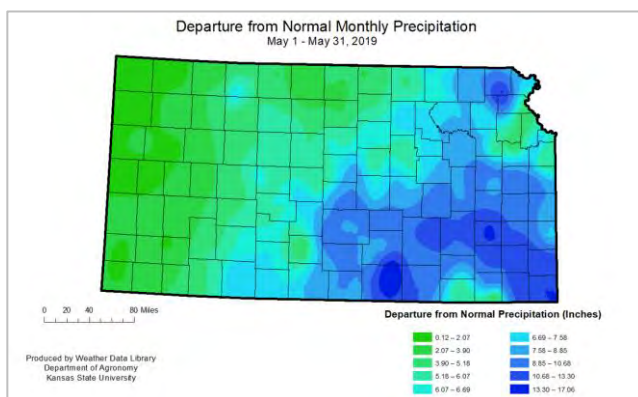
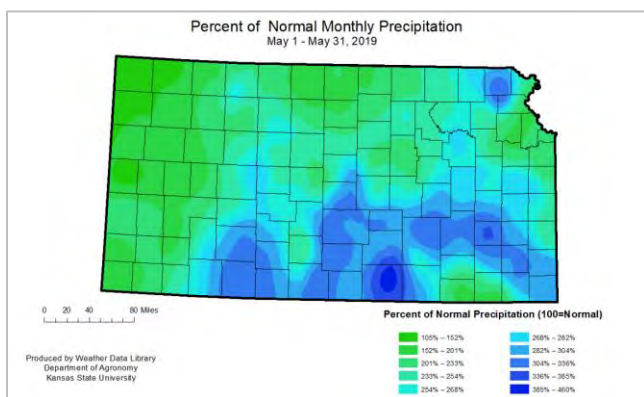
Kansas Climate Division Precipitation Summary (inches)												
Climate Division	May 1-31, 2019			January 1- May 31, 2019			April 1, 2019- May 31, 2019			Sept 1, 2018- May 31, 2019		
	Actual	Depart Normal*		Actual	Depart Normal*		Actual	Depart Normal*		Actual	Depart Normal*	
Northwest	5.46	2	158	8.19	0.36	105	5.83	0.30	105	15.30	2.99	124
West Central	5.31	2.28	175	9.47	2.04	127	6.17	1.23	125	18.59	6.68	156
Southwest	7.29	4.56	267	10.84	4.09	161	7.55	3.18	173	19.45	8.24	174
North Central	8.56	4.48	210	13.26	3.17	131	9.62	3.02	146	26.96	10.14	160
Central	10.30	6.03	241	15.96	5.08	147	12.18	5.25	176	30.05	12.35	170
South Central	14.33	9.94	326	20.47	8.76	175	16.46	9.37	232	35.27	15.70	180
Northeast	9.69	4.90	202	17.19	4.94	140	11.78	3.74	147	32.36	10.78	150
East Central	12.04	6.89	234	20.48	6.85	150	14.90	6.20	171	33.50	9.56	140
<b>Southeast</b>	<b>17.00</b>	<b>11.21</b>	<b>294</b>	<b>26.40</b>	<b>10.74</b>	<b>169</b>	<b>20.31</b>	<b>10.65</b>	<b>210</b>	<b>41.20</b>	<b>13.45</b>	<b>148</b>
<b>STATE</b>	<b>10.26</b>	<b>6.09</b>	<b>246</b>	<b>16.06</b>	<b>5.37</b>	<b>150</b>	<b>11.91</b>	<b>5.07</b>	<b>174</b>	<b>28.33</b>	<b>10.26</b>	<b>157</b>

\*Departure from normal is departure from the base period of 1981-2010, KSU Weather Data Library.

The maps below summarizing normal precipitation for the month are from the K-State Weather Data Library and / or the High Plains Regional Climate Center. (National Weather Service maps use data from the Applied Climate Information Network. State maps based on data from the Cooperative Observer and Kansas Mesonet, and provided by KSU Weather Data Library. State weekly maps of precipitation information can be accessed at <http://climate.k-state.edu/maps/weekly/>.)



Reference rainfall amount that occurred in Southeast Kansas during the month of May



## Climate Summary-Temperature

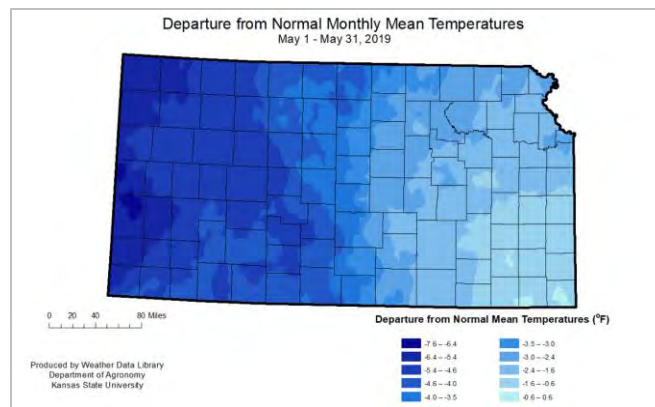
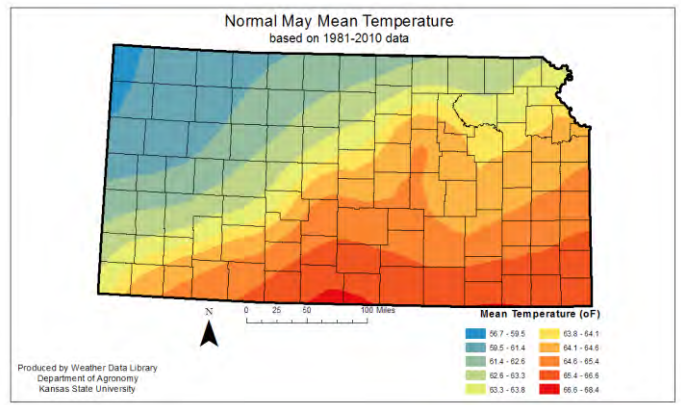
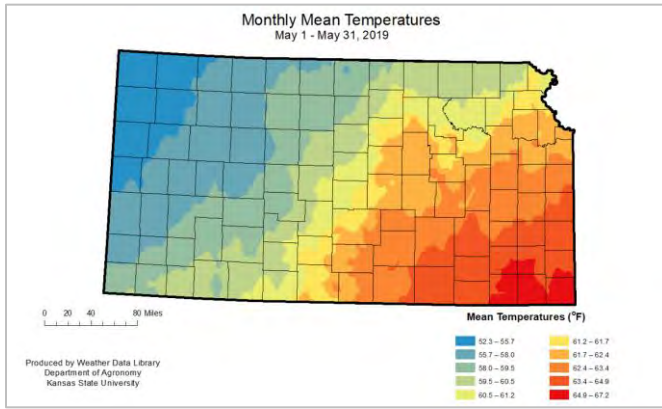
May returned to the cooler-than-normal trend that has been in place since the start of the year. State-wide average temperature for the month was 60.2 °F, which is 3.3 degrees cooler than normal. This ranks as the 14th coolest on record. The Southeast Division came closest to normal with an average of 64.2 °F, 1.2 degrees cooler than normal. The Northwest Division had the largest departure with an average of 55.0 °F, 5.3 degrees cooler than normal. Despite the cooler pattern, the warmest maximum temperature was 97 °F at Tribune 14N, Greeley County, on the 17th. The coldest minimum temperature was St. Francis, Cheyenne County, on the 2nd coming in at 25 °F. Multiple warm daily records were set including four high temperatures and 95 lows. Cold daily records numbered less with only 8 high temperatures and 15 lows. (KSU Weather Data Library)

Climate Division	Kansas Climate Division Temperature Summary (°F)							
	May 2019							
	Maximum	Minimum	Average	Departure	High	Date	Low	Date
Northwest	67.2	42.8	55.0	-5.3	95	17	25	2
West Central	69.4	44.3	56.8	-4.3	97	17	30	22
Southwest	72.0	47.0	59.5	-4.3	94	16	31	22
North Central	70.3	49.2	59.7	-3.5	95	17	31	10
Central	71.5	50.2	60.9	-3.4	93	17	31	10
South Central	72.3	51.9	62.1	-3.3	90	15	35	10
Northeast	70.4	51.6	61.0	-2.8	91	17	37	10
East Central	71.2	53.1	62.2	-2.0	92	16	37	10
Southeast	73.6	54.9	64.2	-1.2	89	16	37	10
STATE	70.9	49.4	60.2	-3.3	97	17th	25	2nd

The 2019 tornado season roared continued in May. There were 81 tornadoes reported during the month. Preliminary reports indicate 18 injured and no fatalities. May 28th was the most active day when 21 tornadoes were reported. Hail and damaging wind events were also numerous. There was one fatality reported in Leavenworth County, when strong winds toppled a tree on a house, killing the occupant. In addition to the severe storms, flooding was a major concern. The National Weather Service at Wichita at one time had river flood warning for 43 river points! Some rivers reached levels not seen in over a decade or even longer.

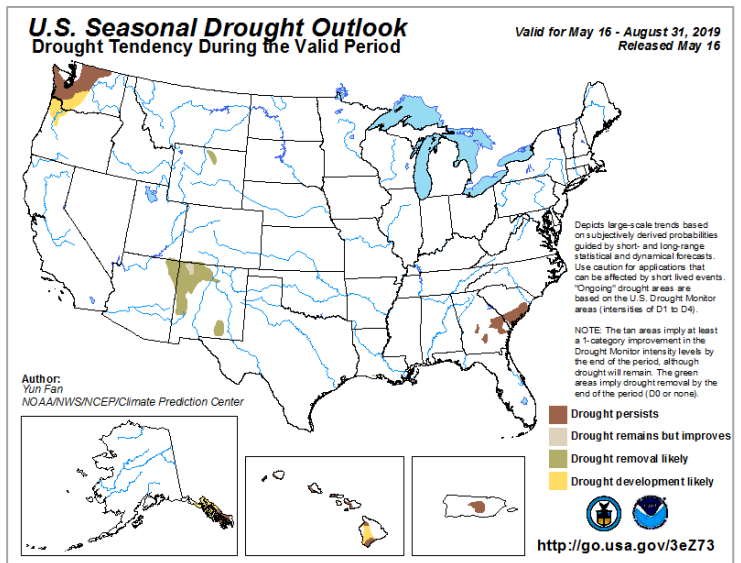
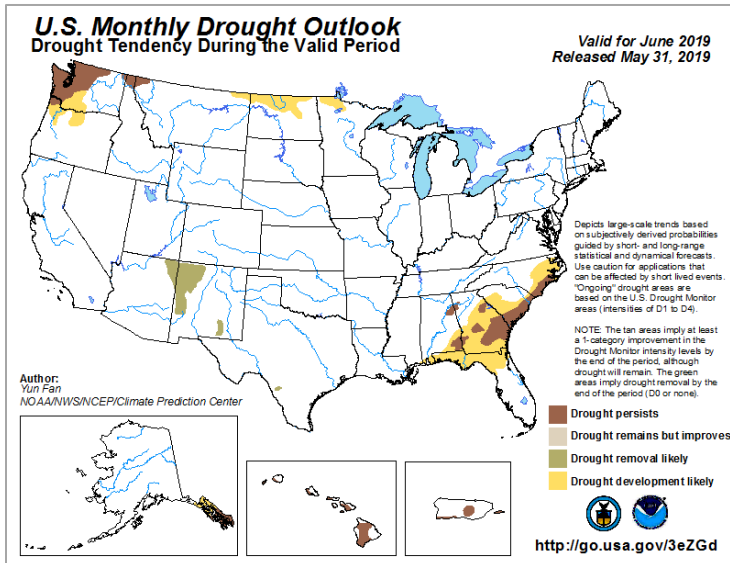
The maps below summarizing temperature for the month are from the K-State Weather Data Library and / or the High Plains Regional Climate Center. (National Weather Service maps use data from the Applied Climate Information Network. State maps based on data from the Cooperative Observer and Kansas Mesonet, and provided by KSU Weather Data Library. State weekly maps of precipitation information can be accessed at <http://climate.k-state.edu/maps/weekly/>.)



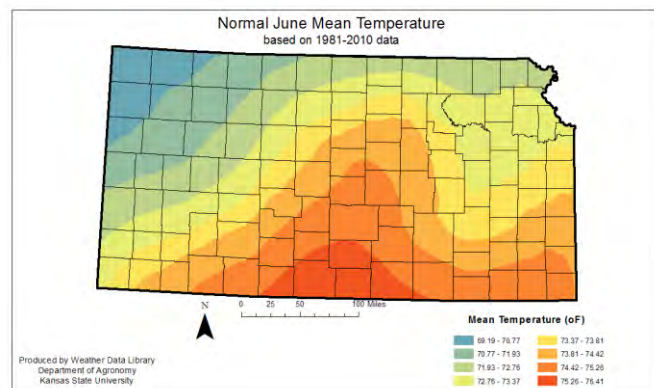
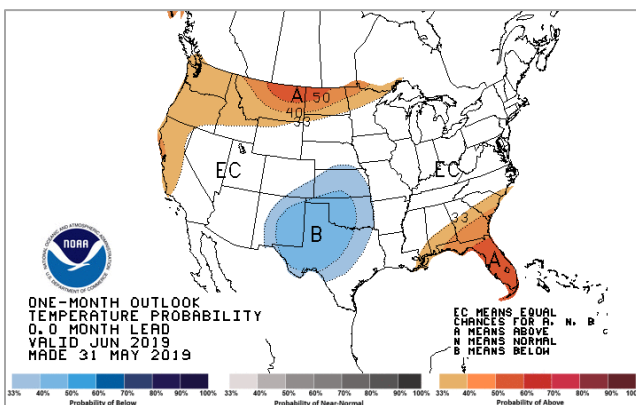
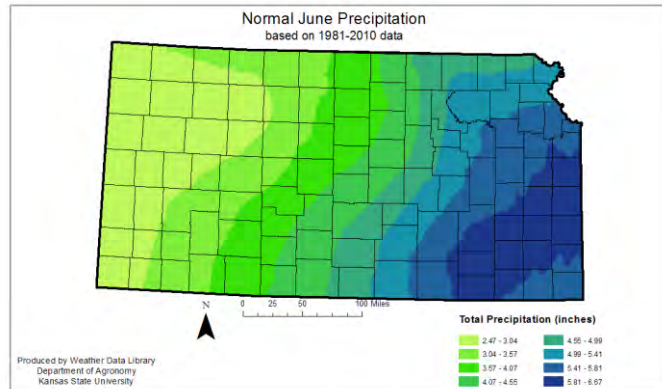
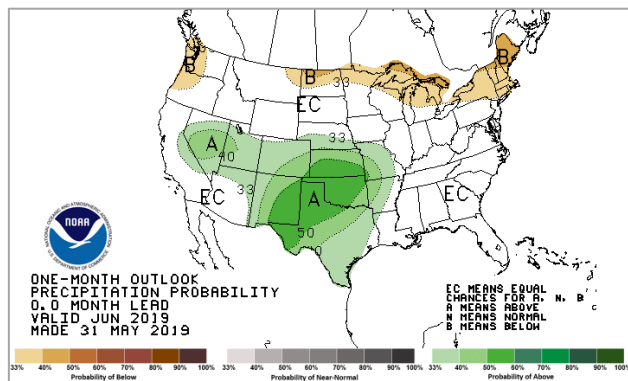


## Future Outlook

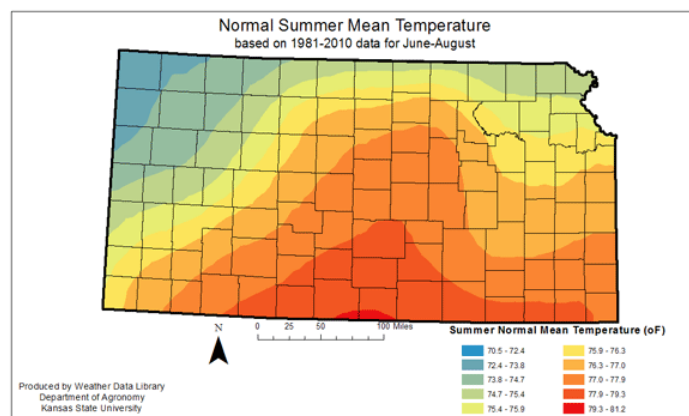
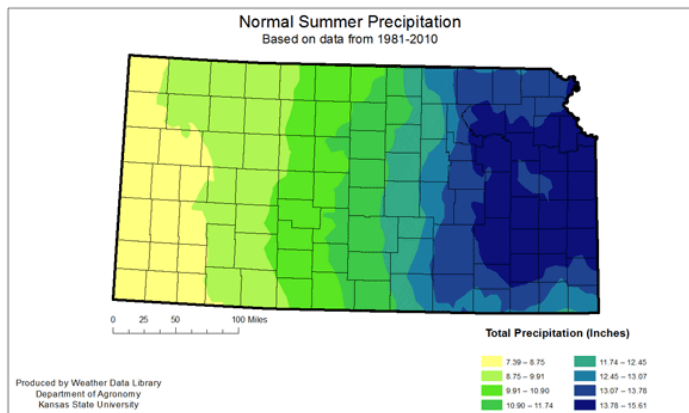
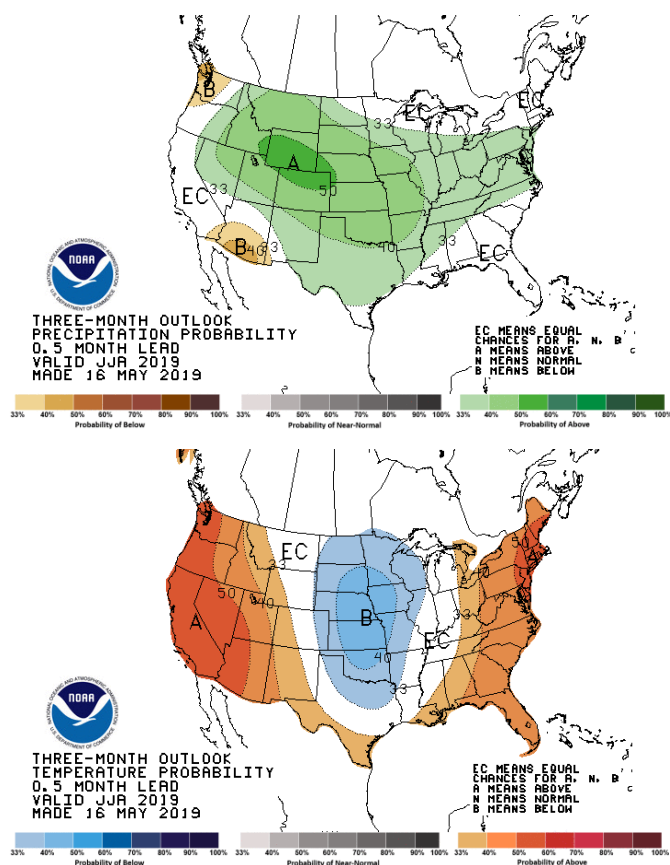
The Monthly Drought Outlook for June 2019 indicates no anticipated drought conditions in Kansas. The Seasonal Outlook (3-month) also favors no drought in Kansas through the summer. The individual temperature and precipitation outlooks that contribute to these outlooks are available below.



The June precipitation outlook favors a slightly increased chance of above normal precipitation across the state. With the limited dry conditions and the climatologically increased amounts of normal precipitation at this time of the year, drought conditions are unlikely. The temperature outlook is for cooler than normal temperature state-wide. Concerns for flooding continue into June along major rivers particularly in the eastern parts of the state as releases continue from reservoirs.



The U.S. three month outlook for June through August slightly favors above-average precipitation for almost all of Kansas and below normal temperatures for the entire state.



El Nino conditions are present and expected to continue in the northern hemisphere through spring and summer 2019 according to NOAA's Climate Prediction Center. El Nino favors wetter than normal conditions in the Central Plains.

Additional outlooks for various timeframes are available from the national CPC for up to 13 months.

(<http://www.cpc.ncep.noaa.gov/products/predictions/90day/>)



## Water

### Public Water Supplies

Storm and flooding created known issues for at least 25 water and wastewater systems around the state as of May 29, 2019.

At least 17 boil orders were issued by KDHE in May to protect public health. The need to boil public water supply waters was primarily due to flood waters entering wells or loss of pressure in the systems. Once the systems are able to ensure the water is again safe the boil order is lifted.

### Reservoir Storage

At the end of May all reservoir conservation pools were full except Keith Sebelius and Cedar Bluff, which have filled to over 75% and 55% of conservation pools respectively. As we enter June, all other reservoirs are into flood pool, with many releasing water to reduce those flood pools.

### Kansas Federal Reservoir Conservation Pool Levels

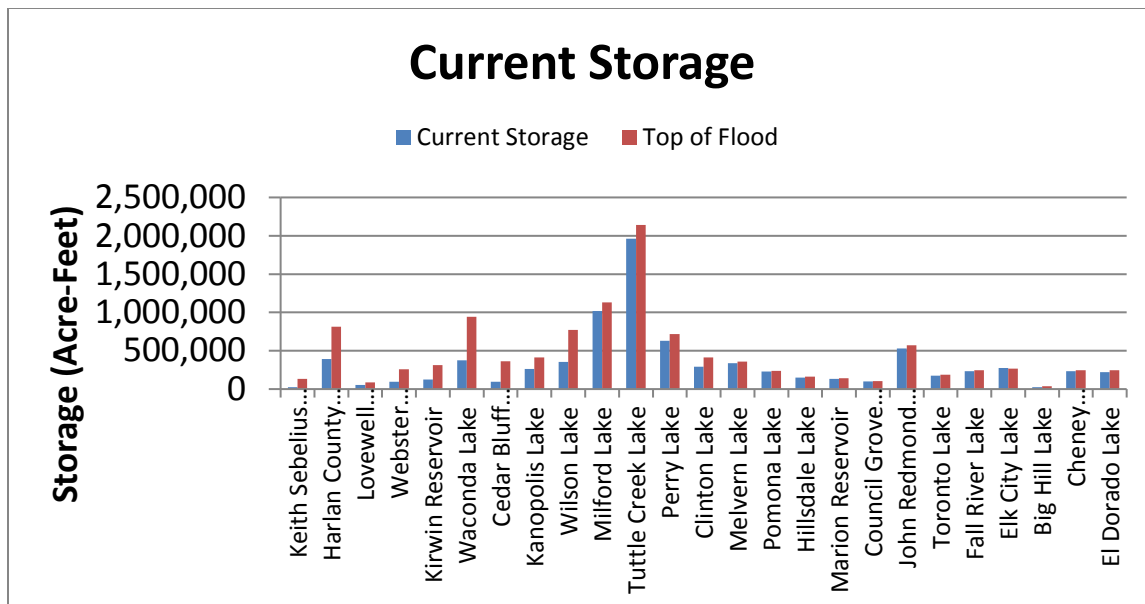
Reservoir	Top of Multipurpose / Conservation Pool (Feet MSL)	Multipurpose/Conservation Pool Elevation (Feet MSL)	Change from Top of Pool (Feet)	Percent of Conservation Pool Full
<b>Kansas River Basin</b>		<b>6/6/19</b>		
Keith Sebelius Lake <sup>1</sup>	2304.3	2300.06	-4.24	75.5%
Harlan County Lake NE	1945.73	1951.12	5.39	100.0%
Lovewell Reservoir <sup>1</sup>	1582.6	1588.33	5.73	100.0%
Webster Reservoir <sup>1</sup>	1892.45	1897.00	4.55	100.0%
Kirwin Reservoir	1729.25	1734.02	4.77	100.0%
Waconda Lake <sup>1</sup>	1455.6	1465.88	10.28	100.0%
Cedar Bluff Reservoir	2144	2130.26	-13.74	55.0%
Kanopolis Lake <sup>1</sup>	1463	1495.48	32.48	100.0%
Wilson Lake <sup>1</sup>	1516	1526.98	10.98	100.0%
Milford Lake <sup>1</sup>	1144.4	1172.62	28.22	100.0%
Tuttle Creek Lake <sup>1</sup>	1075	1132.54	57.54	100.0%
Perry Lake <sup>1</sup>	891.5	917.04	25.54	100.0%
Clinton Lake <sup>1</sup>	875.5	893.67	18.17	100.0%
Melvorn Lake <sup>1</sup>	1036	1055.55	19.55	100.0%
Pomona Lake <sup>1</sup>	974	1001.79	27.79	100.0%
Hillsdale Lake <sup>1</sup>	917	929.23	12.23	100.0%
<b>Arkansas River Basin</b>		<b>6/6/19</b>		
Marion Reservoir <sup>1</sup>	1350.5	1357.30	6.80	100.0%
Council Grove Lake <sup>1</sup>	1274	1287.96	13.96	100.0%
John Redmond Reservoir	1041	1066.54	25.54	100.0%
Toronto Lake	901.5	929.72	28.22	100.0%
Fall River Lake	948.5	986.50	38.00	100.0%
Elk City Lake	796	825.60	29.60	100.0%
Big Hill Lake	858	858.32	0.32	100.0%
Cheney Reservoir	1421.6	1427.77	6.17	100.0%
El Dorado Lake	1339	1345.67	6.67	100.0%

<sup>1</sup>Lake level management plan in place

Source: U.S. Army Corps of Engineers, U.S. Bureau of Reclamation and U.S. Geological Survey

Note: The conservation pool is the water storage for non-flood purposes of the reservoir, set by the elevation of the top of the pool.

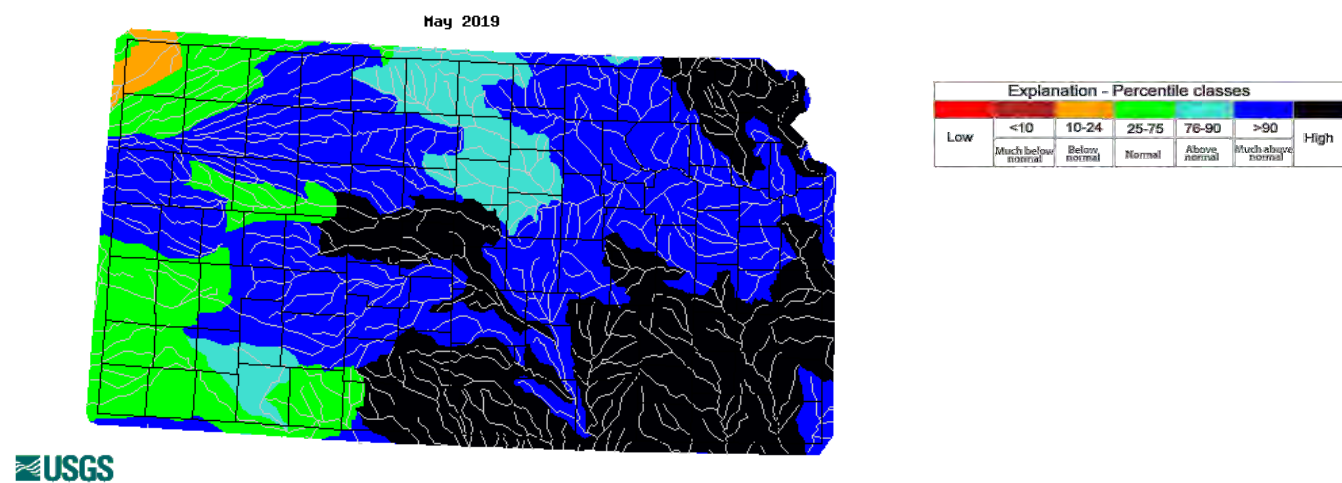
In the graph that follows blue bars indicate water in storage at that reservoir, with red bars indicate top of the flood pool storage. Some reservoirs have storage space remaining for flood flows but the available space varies. Reservoir releases continue to increase space for flood flows should they occur.



### Streamflow Conditions

WaterWatch summarizes streamflow conditions in a region (state or hydrologic unit) in terms of the long-term typical condition at stream gages in the region. In general, a streamflow which is greater than the 75 percentile is considered *above normal*, a streamflow which is between 25 and 75 percentiles is considered *normal* and a streamflow which is less than the 25 percentile is considered *below normal*. Color codes are for basins with streamflow averages less than 25 percent of historic values. This comparison aids in evaluating water resources conditions for a time period. A summary of flooding in April is found later in this report.

### May streamflow compared to historical streamflow



### Water Right Administration/Minimum Desirable Streamflow (MDS)

Minimum Desirable Streamflow (MDS) is not being administered in Kansas. MDS administration requires water rights junior to MDS, usually with priority dates after April 12, 1984, to stop diverting water. Administration is ordered when streamflow drops below MDS for more than seven days. To rescind orders at most gages, daily average flow must be above MDS for 14 days.

There was no water right administration due to MDS in May by the Kansas Department of Agriculture, Division of Water Resources.

## Flooding

In early May, the National Weather Service Wichita had river flood warnings out for 38 river points with 20 additional counties in an area flood warning! Significant flash flooding occurred during the night of May 8th, when areas southeast of Wichita picked-up between 7 and 10 inches of rainfall in a 24 hours period. Numerous water rescues took place across Mulvane, Augusta, Wellington and Rose Hill. In addition, several miles of the Kansas Turnpike was closed south of Mulvane due to the Slate Creek reaching record levels. Closing this much of the Kansas Turnpike due to flooding hasn't happened in over 30 years!

General flooding for May is shown in the USGS WaterWatch maps in the streamflow section of this report. However this does not provide all the specifics of severity of impacts and duration at specific locations. Additional flooding information can be found for USGS stream gage sites at <https://waterwatch.usgs.gov/?m=flood&r=ks&w=flood%2Ctable> for current stage. The USGS gage monitoring records indicate 94 gages in Kansas were at flood stage in May. Six gages were considered to have major, 48 moderate and 40 minor flooding in May. Major flooding was on the Marmaton River near Fort Scott, the Arkansas river near Hutchinson, Slate Creek at Wellington, the Walnut River at Winfield and Arkansas City and the Neosho River near Erie.

State Disaster Declarations were issued for 41 counties in May in response to flooding and storms. They are:

Original Declaration - 5/9/2019 – 07:42: Barber, Chase, Clark, Cowley, Geary, Greenwood, Harvey, Marion, Meade, Neosho, Osage, Ottawa, Reno, Rice, Sumner

Amendment - 5/20/2019: Barton, Pratt, Butler, Cloud, McPherson, Pottawatomie, Wabaunsee, Morris

Amendment –5/21/2019: Lincoln, Saline, Riley, Elk, **Anderson**, Crawford

Amendment –5/22/2019: Chautauqua, Clay, Coffey, Franklin, Jefferson, Montgomery

Amendment –5/24/2019: Rush

Amendment –5/29/2019: Phillips, Russell, Ellsworth, Washington, Leavenworth

Eighteen counties were identified in a Federal Emergency Declaration initialized on May 28, 2018, with additional counties added for a total of 33 counties in Kansas. The federal declarations authorize FEMA to identify, mobilize, and provide at its discretion, equipment and resources necessary to alleviate the impacts of the emergency. Emergency protective measures (Category B), limited to direct federal assistance under the Public Assistance program, will be provided at 75 percent federal funding. This assistance will be provided Allen, Anderson, Butler, Chautauqua, Cherokee, Coffey, Cowley, Crawford, Doniphan, Dickinson, Douglas, Elk, Franklin, Geary, Greenwood, Harvey, Jefferson, Leavenworth, Linn, Lyon, Marshall, Montgomery, Morris, Neosho, Osage, Pottawatomie, Reno, Riley, Saline, Sumner, Wabaunsee, Wilson, and Woodson counties.

Appendix B provides an overview of Kansas flooding in May 2019 at USGS stream gages in the WaterWatch system.

### **Harmful Blue-Green Algal Blooms (lake water safety)**

The 2019 HAB monitoring began on April 1, 2019. KDHE samples public use lakes only in response to complaints of human or animal illness or visual sighting of possible blue-green algae by the public or lake officials.

KDHE issues three levels of public health protection notifications for blue-green algae (BGA) Blooms. Public Health Watch–Notifies public that a harmful algae may be present, that the water may be unsafe for humans and animals and contact with the water is discouraged. Public Health Warning–Notifies public that harmful algae is present of expected, that contact with the water should not occur, and all conditions of Public Health Watch remain in effect. Lake Closure –Notifies



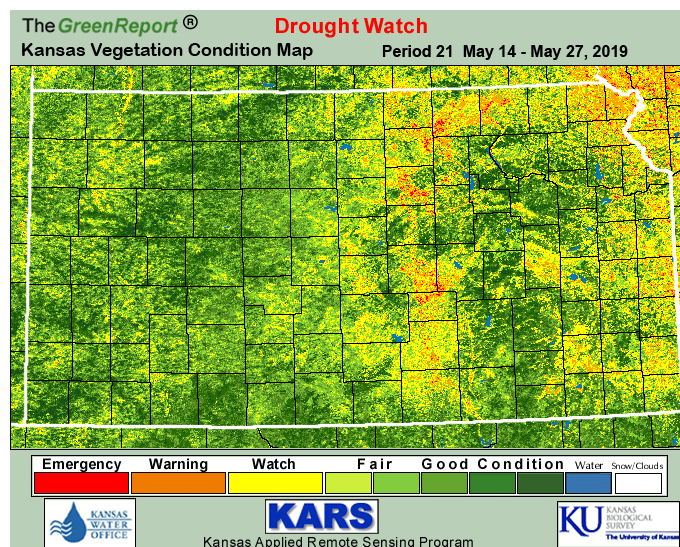
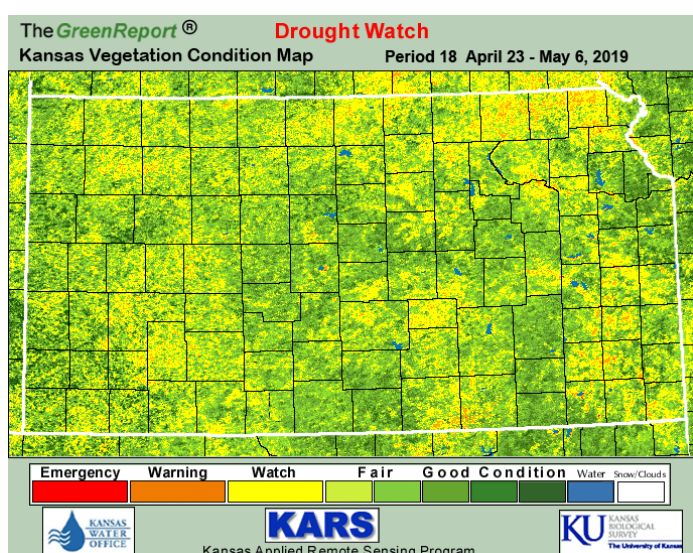
the public that a portion of the lake or the entire lake be closed to public because harmful algae is present and extreme conditions exist. More information can be found at <http://www.kdheks.gov/algae-illness/index.htm>.

KDHE Lake Health Advisories issued in May 2019						
Lake	County	05/02/2019	05/09/2019	05/16/2019	05/23/2019	05/30/2019
Atchison County State Fishing Lake					Watch	Watch
Central Park	Shawnee			Watch	Watch	
Marion County Lake	Marion	Warning	Watch	Warning	Watch	Watch

## Vegetation and Soil Moisture

### Vegetative Conditions

The Vegetative Condition map provides current conditions related to drought effects on vegetation. It is produced using satellite data. Areas in yellow, orange and red indicate areas of vegetative stress. The green areas are considered to be in good or excellent condition. Change can be seen comparing the two GreenReports below from early and late May.



### Soil Moisture and Rangeland

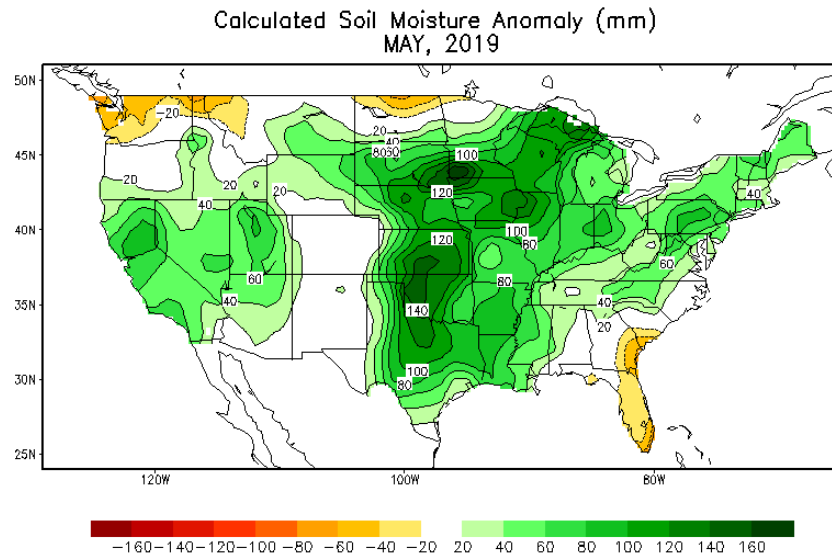
The National Agricultural Statistics Service, USDA Crop Progress and Condition provides a summary of the climatic effects on soil, and livestock feed. For the week ending May 26, 2019, topsoil moisture supplies rated 0 percent very short, 0 short, 51 adequate, and 49 surplus. Subsoil moisture supplies rated 0 percent very short, 1 short, 60 adequate, and 39 surplus.

Field Crops Report: Winter wheat condition rated 3 percent very poor, 9 poor, 33 fair, 45 good, and 10 excellent. Winter wheat jointed was 64 percent.

Soybeans planted was 22 percent, behind 63 last year and 41 average.

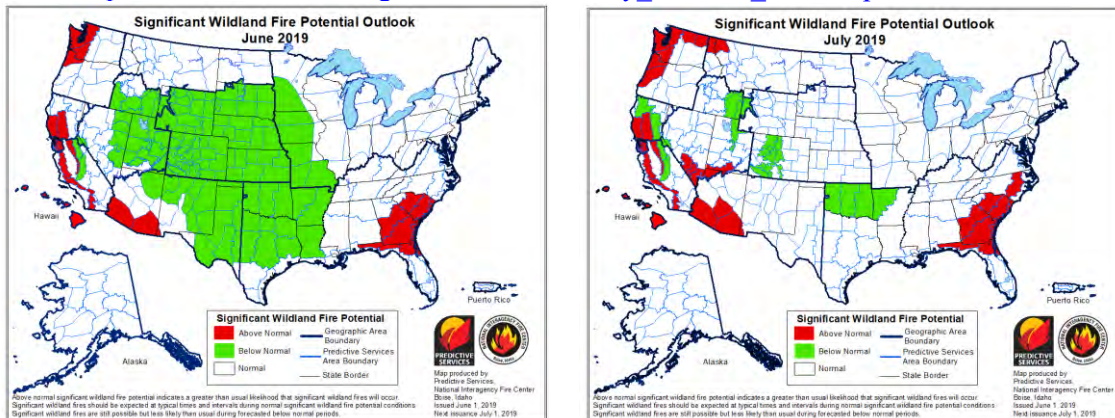
Corn planted was 70 percent, behind average of 88 and last year's 91 percent.

The Climate Prediction Center (CPC), also monitors soil moisture and predicts future soil moisture. Anomalies are defined as deviations from the 1971-2000 monthly climatology. The soil anomaly is provided below. ([http://www.cpc.ncep.noaa.gov/products/Soilmst\\_Monitoring/US/Soilmst/Soilmst.shtml](http://www.cpc.ncep.noaa.gov/products/Soilmst_Monitoring/US/Soilmst/Soilmst.shtml))



## Fire

Significant Wildland Fire Potential Outlook is issued monthly for the United States,  
[https://www.predictiveservices.nifc.gov/outlooks/monthly\\_seasonal\\_outlook.pdf](https://www.predictiveservices.nifc.gov/outlooks/monthly_seasonal_outlook.pdf).



Kansas Forest Service provides a grassland fire danger index at:  
[http://www.kansasforests.org/fire\\_management/grasslandfireindex.html](http://www.kansasforests.org/fire_management/grasslandfireindex.html).

### Kansas Climate Summary

The Kansas Weekly Climate Summary and Drought Report are compiled at least monthly, more frequently when conditions warrant, by the KWO. Information from various federal, state, local and academic sources is used. Some of the data is preliminary and subject to change once final data is available. The KWO web site, <http://www.kwo.ks.gov/reports2/climate-and-drought-monitoring-response>, contains additional drought information including links to other agencies with drought information and past issues of the Kansas Climate Summary and Drought Report. Kansas State Climatologist, Mary Knapp, is the primary source of the narrative on weather. She works closely with meteorologists throughout the state and region. Details of current conditions at Evapotranspiration (ET) and Mesonet sites across Kansas are available at <http://mesonet.k-state.edu/>

## RESOURCES and REFERENCES

Kansas climate data is provided by Kansas State University, Weather Data Library through the Kansas Mesonet. (<http://www.ksre.k-state.edu/wdl/>). Soil moisture data was added in 2018 (<http://mesonet.k-state.edu/agriculture/soilmoist>)

The [U.S. Drought Monitor](#), from the National Drought Mitigation Center at the University of Nebraska-Lincoln, provides a “big picture” perspective of conditions across the nation. In the Kansas county drought stage scheme, a Drought Watch equates roughly to moderate drought in the U.S. Drought Monitor, while a Drought Warning is the equivalent of severe drought. A Drought Emergency is reserved for extreme or exceptional drought. Palmer Drought Severity Index - The Palmer Index (PDSI) is one indicator used in the U.S. Drought Monitor.

The High Plains Regional Climate Center (<https://hprcc.unl.edu/> ) has precipitation and temperature summary maps available at the state, region and nation.

The U.S. Geological Survey (USGS) [Drought Watch](#) provides information average streamflow measured at long-term gaging stations and compares them to normal flows.

The Kansas Department of Agriculture-Division of Water Resources monitors stream flow using the USGS gages for determination of administrative needs. Administration may be needed due to Minimum Desirable Streamflow (MDS) requirements, impairments and reservoir release protection. (<https://agriculture.ks.gov/divisions-programs/dwr/water-appropriation/minimum-desirable-streamflow>.)

The water levels of the federal lakes fluctuate during a year according to the management plan. Lake level Management plans are posted on the Kansas Water Office web site [www.kwo.ks.gov](http://www.kwo.ks.gov) .

The Kansas Applied Remote Sensing Program (KARS) at the University of Kansas produces a [Kansas Green Report](#) each week during the growing season. For a full set of national and regional **GreenReport**® maps, go to: <http://www.kars.ku.edu/products/greenreport/greenreport.shtml>. This Kansas Vegetation Drought Response Index map is developed weekly by the Kansas Biological Survey using state drought triggers as its key. In addition the VegDRI maps may be found at <http://vegdrv.unl.edu/>

The National Weather Service (NWS) provides fire weather products and services for Kansas that include the Rangeland Fire Danger Index, Fire Weather Forecasts, Red Flag Watches/Warnings and Spot Forecasts. The five NWS offices that serve Kansas websites may be accessed from the [NWS Offices’ page](#).

The Monthly and Seasonal Drought Outlooks, developed by the NOAA Climate Prediction Center, assess the likelihood for improvement, persistence or deterioration in drought conditions for areas currently experiencing drought as identified by the U.S. Drought Monitor. (<http://www.cpc.ncep.noaa.gov/> ) Also see: <http://www.noaa.gov/>.

Responding to Drought: A Guide for City, County and Water System Officials provides an overview of Kansas county drought stage declarations, local planning and coordination, disaster declarations and available state and federal assistance. The 2007 Municipal Water Conservation Plan Guidelines and the Drought Vulnerability Assessment Report, both by KWO, provide guidance regarding drought preparedness and response. These are available at <http://www.kwo.ks.gov/reports2/climate-and-drought-monitoring-response>.

USDA Drought Programs and Assistance website (<https://www.usda.gov/topics/disaster/drought/usda-drought-programs-and-assistance>) listing the various USDA programs and agencies to assist with drought issues.

The National Interagency Coordination Center in Boise, Idaho, produces wildfire potential outlook maps monthly. (<https://www.predictiveservices.nifc.gov/outlooks/outlooks.htm> )

Please contact Diane Knowles at the Kansas Water Office (785) 296-3185 or [diane.knowles@kwo.ks.gov](mailto:diane.knowles@kwo.ks.gov) should you have any questions or suggestions.



# APPENDIX A

## Monthly Weather Summary

May Summary							
Station <sup>1</sup>	Precipitation (inches)			Temperature oF			
						Extreme (Date)	
	Total	Departure <sup>2</sup>	Percent Normal	Mean	Departure <sup>2</sup>	Highest	Lowest
<b>West</b>							
Burlington, CO	3.72	1.14	144%	54.7	-3.9	92 (16)	32 (10)
Dodge City	8.42	5.57	295%	60.8	-3.4	89 (16)	36 (10)
Garden City	5.40	2.52	188%	58.5	-4.8	89 (16)	34 (22)
Goodland	5.10	2.15	173%	55.0	-4.4	91 (16)	32 (2)
Guymon, OK	3.88	1.44	159%	61.2	-3.2	92 (16)	36 (22,10)
Hill City	8.01	4.23	212%	58.9	-3.6	94 (16)	30 (10)
Lamar, CO	1.22	-1.80	40%	57.6	-4.6	96 (16)	26 (22)
McCook, NE	4.56	1.42	145%	56.0	-3.6	93 (16)	28 (22)
Springfield, CO	2.92	0.56	124%	55.6	-5.8	90 (16)	30 (22)
<b>Central</b>							
Concordia	8.76	4.60	211%	62.5	-0.6	93 (16)	39 (10)
Hebron, NE	7.61	2.81	159%	60.3	-1.4	93 (16)	37 (10)
Medicine Lodge	12.12	8.82	367%	63.6	-3.7	91 (15)	37 (10)
Ponca City, OK	10.82	6.01	225%	66.7	-0.9	89 (16,15)	41 (10)
Salina	8.72	3.97	184%	62.8	-2.5	91 (16)	39 (10)
Wichita (ICT)	12.64	8.07	277%	64.8	-1.2	89 (16)	43 (10)
<b>East</b>							
Bartlesville, OK	15.41	10.09	290%	67.0	-0.7	88 (16,15)	39 (10)
Chanute	18.01	12.21	311%	66.5	0.6	89 (16)	39 (10)
Falls City, NE	10.00	5.42	218%	61.8	-2.0	92 (16)	37 (10)
Johnson Co. Exec. Apt	9.24	3.81	170%	62.7	-2.1	87 (16)	38 (10)
Joplin, MO	14.17	8.46	248%	64.4	-0.6	85 (24,23)	40 (10)
Kansas City (MCI), MO	12.82	7.59	245%	62.9	-1.6	89 (16)	36 (10)
St. Joseph, MO	7.04	1.62	130%	62.7	-1.7	93 (16)	38 (13,10)
Topeka (TOP)	9.99	5.08	203%	64.0	-1.0	93 (16)	37 (10)
1. Airport Automated Observation Stations (NWS/FAA) 2. Departure from 1981-2010 normal value T - Trace; M - Missing; --- no normal value from which to calculate departure or percent of normal Source: National Weather Service F-6 Climate Summaries							

Reference rainfall amount that occurred in Chanute, Kansas during the month of May

## APPENDIX B-Flooding

### Data from WaterWatch-USGS

Summary of May Flooding and High Flows								
["--", no data; "<", less than all historical peak]								
USGS Station Name	No. Days above flood stage	NWS flood class	Highest peak 2019-05-01 to 2019-05-31				Historical Peaks	
			Date	Stage [ft]	Stream flow (date) [ft <sup>3</sup> /s]	Rank	No. of years	Max. (year) [ft <sup>3</sup> /s]
TURKEY C NR SENECA, KS	5	Minor	5/24/2019	23.26	10400	24	69	21400 (1973)
MISSOURI R AT ATCHISON, KS	25	Moderate	5/31/2019	29.26	--	--	--	--
MISSOURI R AT LEAVENWORTH, KS	16	Moderate	5/31/2019	28.59	--	--	--	--
PRAIRIE DOG C AB KEITH SEBELIUS LAKE, KS	1	Moderate	5/27/2019	12.94	1220	13	56	65500 (1953)
PRAIRIE DOG C NR WOODRUFF, KS	1	Minor	5/27/2019	22.26	3200	10	77	15000 (1947)
REPUBLICAN R NR HARDY, NE	3	Minor	5/30/2019	11.99	6760	43	99	225000 (1935)
REPUBLICAN R AT CLAY CENTER, KS	16	Minor	5/8/2019	19.91	12600 (2019-05-09)	52	102	195000 (1935)
SMOKY HILL R BL SCHOENCHEN, KS	2	Minor	5/22/2019	12.26	3800	4	35	20500 (1993)
SMOKY HILL R NR RUSSELL, KS	2	Moderate	5/25/2019	20.48	10500	13	43	70000 (1938)
SMOKY HILL R AT ELLSWORTH, KS	3	Minor	5/26/2019	20.9	13400	25	110	61000 (1938)
SMOKY HILL R AT LINDSBORG, KS	7	Minor	5/22/2019	23.99	6530	11	44	32000 (1903)
SMOKY HILL R NR MENTOR, KS	5	Minor	5/22/2019	21.47	5060	33	83	32000 (1903)
SALINE R AT TESCOTT, KS	10	Moderate	5/23/2019	29.69	4730	28	99	61400 (1951)
MULBERRY C NR SALINA, KS	4	Moderate	5/8/2019	26.04	9380	3	56	29900 (2007)
SMOKY HILL R AT NEW CAMBRIA, KS	14	Moderate	5/23/2019	30.67	--	--	--	--
NF SOLOMON R AT GLADE, KS	2	Minor	5/28/2019	13.67	2960	20	65	23300 (1957)
BOW C NR STOCKTON, KS	1	Minor	5/28/2019	9.88	867	32	67	12900 (1951)
NF SOLOMON R AT PORTIS, KS	2	Minor	5/29/2019	18.81	3960	34	72	35700 (1951)
SF SOLOMON R AT WOODSTON, KS	4	Minor	5/28/2019	13.39	1810	8	39	8710 (1993)
SF SOLOMON R AT OSBORNE, KS	9	Minor	5/29/2019	16.9	2490 (2019-05-30)	27	72	81200 (1951)
SALT C NR ADA, KS	15	Moderate	5/24/2019	20.68	2880	14	58	16000 (1961)
SOLOMON R AT NILES, KS	14	Moderate	5/25/2019	29.1	10100	20	107	178000 (1951)
SMOKY HILL R AT ENTERPRISE, KS	18	Moderate	5/25/2019	30.52	28700	10	87	233000 (1951)
CHAPMAN C NR CHAPMAN, KS	11	Minor	5/22/2019	21.52	5800	18	65	46700 (1951)
LYON C NR JUNCTION CITY, KS	5	Minor	5/9/2019	28.17	9360	1	7	5957 (2015)
WILDCAT C AT KEATS, KS	2	Moderate	5/8/2019	21.17	--	--	--	--
WILDCAT C AT SCENIC DRIVE, MANHATTAN, KS	2	Moderate	5/8/2019	20.02	4400	1	6	3920 (2014)
KANSAS R AT MANHATTAN, KS	9	Minor	5/26/2019	19.29	--	--	--	--
MILL C AT WASHINGTON, KS	2	Moderate	5/25/2019	22.42	6740	18	59	14600 (1993)
L BLUE R NR BARNES, KS	7	Minor	5/31/2019	19.46	19000 (2019-05-29)	16	60	56000 (2015)
BIG BLUE R AT BLUE RAPIDS, KS	31	Moderate	5/31/2019	61.31	--	--	--	--

BLACK VERMILLION R NR FRANKFORT, KS	16	Moderate	5/31/2019	29.21	17000 (2019-05-08)	11	66	38300 (1959)
FANCY C AT WINKLER, KS	24	Moderate	5/31/2019	34.43	6900 (2019-05-08)	16	37	24000 (1972)
BIG BLUE R NR MANHATTAN, KS	3	Minor	5/31/2019	22.35	31200	6	65	93400 (1951)
MILL C NR PAXICO, KS	5	Minor	5/26/2019	27.64	22100	14	65	77200 (1951)
KANSAS R AT LECOMPTON, KS	5	Minor	5/9/2019	18.02	78300	28	104	483000 (1951)
KANSAS R AT LAWRENCE, KS	7	Minor	5/9/2019	19.06	73300	3	5	92600 (2016)
WAKARUSA R AT WAKARUSA, KS	2	Minor	5/8/2019	17.02	--	--	--	--
STRANGER C AT EASTON, KS	7	Moderate	5/22/2019	20.31	6220	3	3	10213 (2016)
STRANGER C NR TONGANOXIE, KS	3	Minor	5/21/2019	23.28	6770	42	89	40000 (2001)
KANSAS R AT KANSAS CITY, KS	12	Minor	5/31/2019	39	--	--	--	--
INDIAN C AT STATE LINE RD, LEAWOOD, KS	3	Minor	5/24/2019	21.87	9280	10	14	23573 (2017)
MARAIS DES CYGNES R NR READING, KS	5	Moderate	5/7/2019	23.45	8340	20	49	67400 (1982)
SALT C AT LYNDON, KS	3	Minor	5/1/2019	15.44	11400	2	18	16400 (2007)
DRAGOON C NR BURLINGAME, KS	3	Minor	5/8/2019	21.22	9450	14	58	25000 (2007)
MARAIS DES CYGNES R NR POMONA, KS	12	Minor	5/22/2019	29.31	18400	11	64	69400 (1928)
MARAIS DES CYGNES R NR OTTAWA, KS	6	Moderate	5/22/2019	34.2	19100	21	110	142000 (1951)
POTTAWATOMIE C NR GARNETT, KS	6	Minor	5/21/2019	30.92	21700	13	63	57000 (1961)
POTTAWATOMIE C AT LANE, KS	7	Moderate	5/22/2019	27.44	24300	7	28	75000 (1961)
MARAIS DES CYGNES R AT LA CYGNE, KS	23	Moderate	5/23/2019	33.18	36700	8	33	131000 (2007)
MARAIS DES CYGNES R NR KS-MO ST LINE, KS	21	Moderate	5/26/2019	38.55	51500	4	59	137000 (2007)
L OSAGE R AT FULTON, KS	9	Moderate	5/22/2019	28.96	19200	6	69	62800 (1986)
MARMATON R NR FORT SCOTT, KS	4	Major	5/21/2019	43.45	22500	14	59	38100 (1961)
PAWNEE R AT ROZEL, KS	5	Moderate	5/25/2019	34.53	5440	14	93	16300 (1958)
ARKANSAS R AT GREAT BEND, KS	7	Minor	5/28/2019	14.37	10200 (2019-05-29)	7	78	27800 (1965)
WALNUT C AT ALBERT, KS	7	Moderate	5/26/2019	25.11	2530 (2019-05-27)	12	60	12700 (1959)
RATTLESNAKE C NR ZENITH, KS	3	Minor	5/29/2019	17.24	761	12	45	29300 (1993)
COW C NR LYONS, KS	11	Minor	5/9/2019	19.45	9740	7	73	28000 (1929)
COW C NR HUTCHINSON, KS	21	Moderate	5/9/2019	12.38	--	--	--	--
ARKANSAS R NR HUTCHINSON, KS	17	Major	5/10/2019	12.99	16500 (2019-05-22)	5	58	24700 (1973)
L ARKANSAS R AT ALTA MILLS, KS	13	Moderate	5/9/2019	25.79	10800	9	45	30100 (1973)
L ARKANSAS R AT HWY 50 NR HALSTEAD, KS	13	Moderate	5/9/2019	27.12	9960	3	22	11000 (2007)
EMMA C AT SEDGWICK, KS	4	Minor	5/21/2019	20.14	7690	1	3	7308 (2016)
L ARKANSAS R NR SEDGWICK, KS	12	Moderate	5/22/2019	25.82	19400	1	24	17600 (1998)
COWSKIN C AT 119TH ST AT WICHITA, KS	5	Minor	5/8/2019	20.04	4020	3	17	5870 (2009)



ARKANSAS R AT DERBY, KS	13	Moderate	5/24/2019	15.53	40300 (2019-05-22)	7	49	58300 (1998)
ARKANSAS R AT MULVANE, KS	15	Moderate	5/25/2019	20.28	40800	1	3	28238 (2016)
SF NINNESCAH R NR PRATT, KS	1	Minor	5/8/2019	11.08	3350	6	37	26200 (1991)
SF NINNESCAH R NR MURDOCK, KS	9	Moderate	5/21/2019	11.02	11900	14	67	28700 (1979)
NINNESCAH R NR PECK, KS	9	Minor	5/9/2019	19.94	23700 (2019-05-22)	13	81	70000 (1923)
ARKANSAS R ON HWY 160 AT OXFORD, KS	18	Moderate	5/10/2019	21.67	51600	1	4	36449 (2016)
SLATE C AT WELLINGTON, KS	12	Major	5/8/2019	26.05	24400	2	58	28500 (1975)
ARKANSAS R AT ARKANSAS CITY, KS	21	Moderate	5/9/2019	20.91	65500	9	100	103000 (1923)
WB WALNUT R NR EL DORADO, KS	2	Minor	5/25/2019	21.41	6950	1	8	6469 (2016)
WHITEWATER R AT AUGUSTA, KS	11	Moderate	5/8/2019	29.23	--	--	--	--
WALNUT R AT WINFIELD, KS	16	Major	5/8/2019	36.84	77700	6	99	105000 (1944)
WALNUT R AT ARKANSAS CITY, KS	15	Major	5/9/2019	28.52	--	--	--	--
MEDICINE LODGE R NR KIOWA, KS	6	Moderate	5/9/2019	12.14	7350	11	74	16000 (1941)
CHIKASKIA R NR CORBIN, KS	12	Moderate	5/8/2019	19.53	25800	8	59	60000 (1923)
CROOKED C NR ENGLEWOOD, KS	1	Minor	5/30/2019	6.5	227	49	75	13600 (1955)
VERDIGRIS R NR ALTOONA, KS	10	Moderate	5/26/2019	21.79	29600	12	79	71000 (1951)
FALL R AT FREDONIA, KS	8	Moderate	5/26/2019	31.77	28700	11	83	77800 (2007)
VERDIGRIS R AT INDEPENDENCE, KS	12	Minor	5/27/2019	45.35	75900	10	103	168823 (2017)
NEOSHO R NR AMERICUS, KS	4	Moderate	5/8/2019	27.22	13500	6	54	17400 (1993)
COTTONWOOD R NR FLORENCE, KS	4	Moderate	5/8/2019	27.2	35300	5	57	73700 (1998)
COTTONWOOD R NR PLYMOUTH, KS	11	Moderate	5/9/2019	34.34	37700	5	55	92900 (1998)
COTTONWOOD R AT EMPORIA, KS	20	Moderate	5/9/2019	26.17	19000	1	4	18672 (2017)
NEOSHO R AT NEOSHO RAPIDS, KS	24	Moderate	5/10/2019	27.11	30700	1	8	26451 (2016)
NEOSHO R AT BURLINGTON, KS	9	Minor	5/26/2019	32.73	36500	1	57	26200 (1961)
NEOSHO R NR IOLA, KS	18	Moderate	5/25/2019	21.38	54800	9	111	436000 (1951)
NEOSHO R NR ERIE, KS	19	Major	5/27/2019	38.92	--	--	--	--
NEOSHO R NR PARSONS, KS	22	Moderate	5/28/2019	29.75	69900	6	96	410000 (1951)
LIGHTNING C NR MCCUNE, KS	15	Moderate	5/21/2019	17.8	19600	13	67	67500 (1993)
SPRING R NR BAXTER SPRINGS, KS	10	Moderate	5/23/2019	27.35	98500	3	8	145714 (2015)



NOAA Atlas 14, Volume 8, Version 2  
Location name: Garnett, Kansas, USA\*  
Latitude: 38.2798°, Longitude: -95.2419°  
Elevation: 1066.43 ft\*\*  
\* source: ESRI Maps  
\*\* source: USGS



## POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffrey Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

[PF\\_tabular](#) | [PF\\_graphical](#) | [Maps & aerals](#)

### PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) <sup>1</sup>										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.406 (0.324-0.516)	0.472 (0.376-0.600)	0.581 (0.461-0.739)	0.671 (0.531-0.855)	0.796 (0.614-1.03)	0.892 (0.676-1.16)	0.989 (0.731-1.30)	1.09 (0.780-1.44)	1.22 (0.849-1.64)	1.32 (0.901-1.78)
10-min	0.595 (0.474-0.756)	0.692 (0.551-0.879)	0.850 (0.675-1.08)	0.983 (0.777-1.25)	1.17 (0.899-1.51)	1.31 (0.990-1.70)	1.45 (1.07-1.90)	1.59 (1.14-2.11)	1.78 (1.24-2.40)	1.93 (1.32-2.61)
15-min	0.725 (0.578-0.922)	0.843 (0.671-1.07)	1.04 (0.824-1.32)	1.20 (0.948-1.53)	1.42 (1.10-1.84)	1.59 (1.21-2.07)	1.77 (1.31-2.32)	1.94 (1.39-2.58)	2.18 (1.52-2.92)	2.35 (1.61-3.19)
30-min	1.08 (0.858-1.37)	1.26 (1.00-1.60)	1.55 (1.23-1.97)	1.79 (1.42-2.29)	2.12 (1.64-2.74)	2.38 (1.80-3.09)	2.63 (1.94-3.45)	2.89 (2.07-3.83)	3.22 (2.24-4.33)	3.48 (2.38-4.70)
60-min	1.44 (1.15-1.83)	1.69 (1.34-2.14)	2.09 (1.66-2.66)	2.42 (1.92-3.09)	2.89 (2.22-3.73)	3.24 (2.46-4.21)	3.60 (2.66-4.73)	3.97 (2.85-5.27)	4.45 (3.10-5.99)	4.82 (3.30-6.53)
2-hr	1.81 (1.46-2.27)	2.12 (1.70-2.66)	2.63 (2.11-3.30)	3.05 (2.44-3.84)	3.65 (2.84-4.66)	4.11 (3.15-5.29)	4.57 (3.42-5.95)	5.05 (3.66-6.65)	5.69 (4.00-7.59)	6.17 (4.26-8.30)
3-hr	2.03 (1.64-2.53)	2.38 (1.93-2.96)	2.96 (2.39-3.69)	3.45 (2.78-4.31)	4.14 (3.25-5.27)	4.68 (3.61-6.00)	5.24 (3.94-6.79)	5.81 (4.23-7.62)	6.58 (4.65-8.75)	7.17 (4.97-9.61)
6-hr	2.39 (1.96-2.94)	2.81 (2.30-3.46)	3.52 (2.87-4.33)	4.12 (3.36-5.09)	4.99 (3.97-6.30)	5.68 (4.43-7.21)	6.39 (4.86-8.22)	7.13 (5.25-9.30)	8.15 (5.82-10.8)	8.94 (6.25-11.9)
12-hr	2.74 (2.27-3.33)	3.22 (2.67-3.92)	4.06 (3.35-4.94)	4.78 (3.93-5.83)	5.81 (4.68-7.28)	6.65 (5.25-8.37)	7.52 (5.78-9.59)	8.43 (6.28-10.9)	9.69 (6.99-12.7)	10.7 (7.53-14.1)
24-hr	3.13 (2.63-3.76)	3.68 (3.08-4.41)	4.60 (3.85-5.54)	5.42 (4.51-6.53)	6.60 (5.38-8.18)	7.56 (6.04-9.43)	8.57 (6.66-10.8)	9.63 (7.25-12.4)	11.1 (8.10-14.5)	12.3 (8.74-16.1)
2-day	3.63 (3.09-4.30)	4.22 (3.59-5.01)	5.25 (4.44-6.23)	6.14 (5.18-7.31)	7.45 (6.15-9.14)	8.52 (6.89-10.5)	9.65 (7.58-12.1)	10.8 (8.24-13.8)	12.5 (9.19-16.2)	13.8 (9.92-18.0)
3-day	3.95 (3.38-4.64)	4.61 (3.95-5.42)	5.75 (4.90-6.77)	6.73 (5.71-7.95)	8.16 (6.77-9.91)	9.31 (7.57-11.4)	10.5 (8.31-13.1)	11.8 (8.99-14.9)	13.5 (10.00-17.5)	14.9 (10.8-19.4)
4-day	4.22 (3.63-4.93)	4.93 (4.24-5.77)	6.14 (5.26-7.19)	7.19 (6.13-8.44)	8.69 (7.24-10.5)	9.90 (8.08-12.1)	11.2 (8.85-13.8)	12.5 (9.56-15.7)	14.3 (10.6-18.4)	15.7 (11.4-20.4)
7-day	4.95 (4.30-5.73)	5.72 (4.97-6.62)	7.02 (6.08-8.14)	8.14 (7.02-9.47)	9.75 (8.20-11.7)	11.0 (9.09-13.3)	12.4 (9.90-15.2)	13.8 (10.6-17.3)	15.7 (11.7-20.1)	17.2 (12.6-22.2)
10-day	5.65 (4.94-6.49)	6.46 (5.64-7.42)	7.83 (6.82-9.01)	9.00 (7.80-10.4)	10.7 (9.02-12.7)	12.0 (9.94-14.4)	13.4 (10.8-16.3)	14.8 (11.5-18.4)	16.8 (12.6-21.3)	18.3 (13.4-23.5)
20-day	7.69 (6.81-8.72)	8.71 (7.71-9.88)	10.4 (9.15-11.8)	11.7 (10.3-13.4)	13.6 (11.6-15.9)	15.1 (12.6-17.8)	16.5 (13.4-19.9)	18.0 (14.1-22.1)	19.9 (15.0-25.0)	21.3 (15.8-27.2)
30-day	9.37 (8.36-10.5)	10.6 (9.44-11.9)	12.6 (11.2-14.2)	14.1 (12.5-16.0)	16.2 (13.9-18.7)	17.8 (14.9-20.8)	19.3 (15.7-23.0)	20.8 (16.4-25.4)	22.7 (17.3-28.4)	24.1 (17.9-30.6)
45-day	11.4 (10.3-12.7)	12.9 (11.6-14.4)	15.3 (13.7-17.1)	17.2 (15.3-19.3)	19.6 (16.9-22.4)	21.4 (18.0-24.7)	23.0 (18.9-27.2)	24.6 (19.4-29.8)	26.5 (20.2-32.9)	27.9 (20.9-35.3)
60-day	13.2 (11.9-14.6)	14.9 (13.5-16.5)	17.6 (15.9-19.6)	19.8 (17.7-22.1)	22.5 (19.4-25.5)	24.4 (20.7-28.1)	26.3 (21.6-30.9)	27.9 (22.1-33.7)	30.0 (22.9-37.0)	31.3 (23.5-39.5)

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).  
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.  
Please refer to NOAA Atlas 14 document for more information.

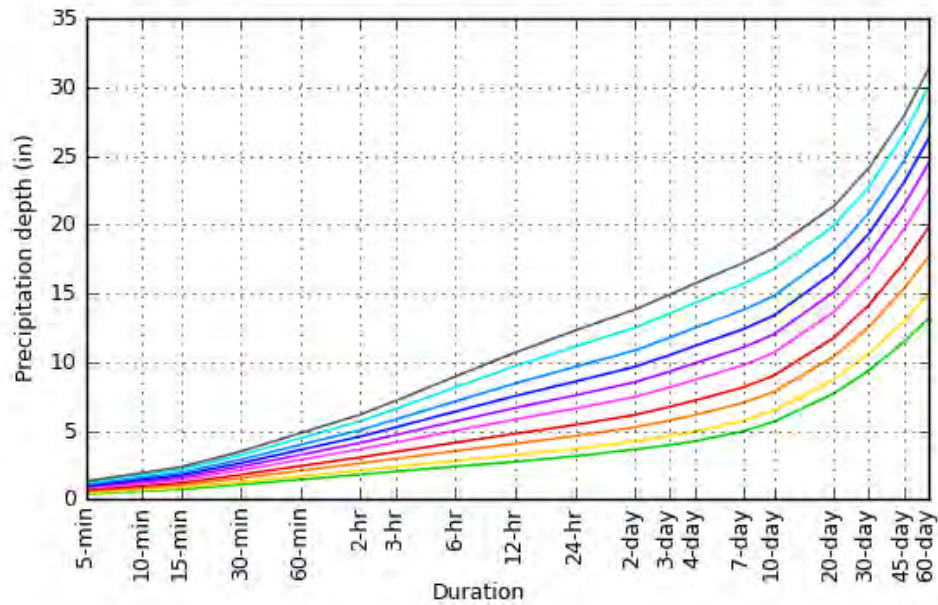
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### PF graphical

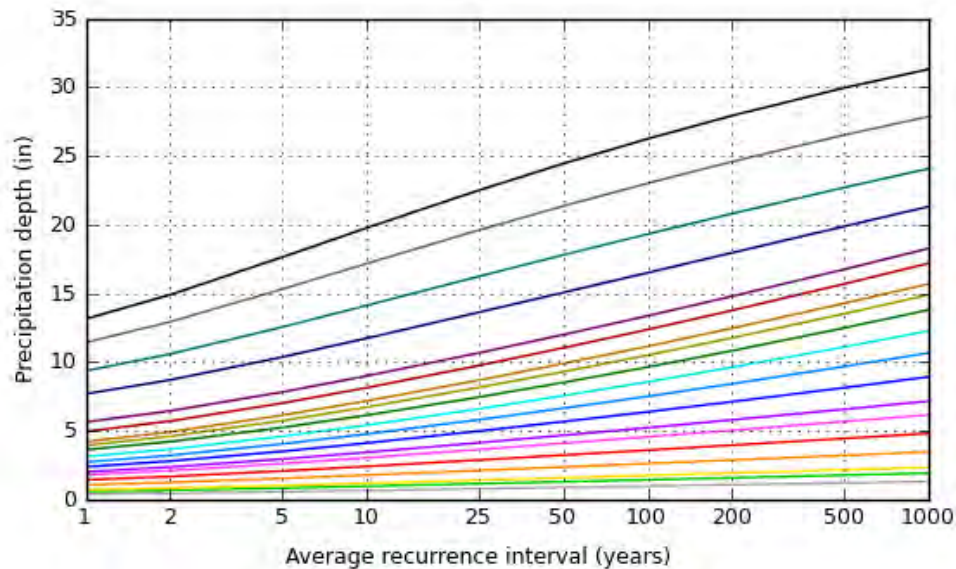
Per report from the Kansas Water Office, between 17" & 18" of rain fell in the month of May in the Garnett area. This is how we determined the 50-year storm occurred in May 2019

## PDS-based depth-duration-frequency (DDF) curves

Latitude: 38.2798°, Longitude: -95.2419°



Average recurrence interval (years)
1
2
5
10
25
50
100
200
500
1000

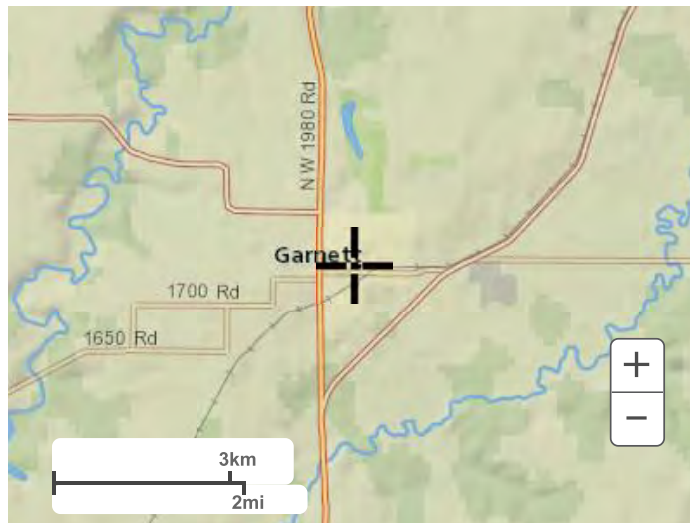


Duration	
5-min	2-day
10-min	3-day
15-min	4-day
30-min	7-day
60-min	10-day
2-hr	20-day
3-hr	30-day
6-hr	45-day
12-hr	60-day
24-hr	

## Maps & aerials

Small scale terrain





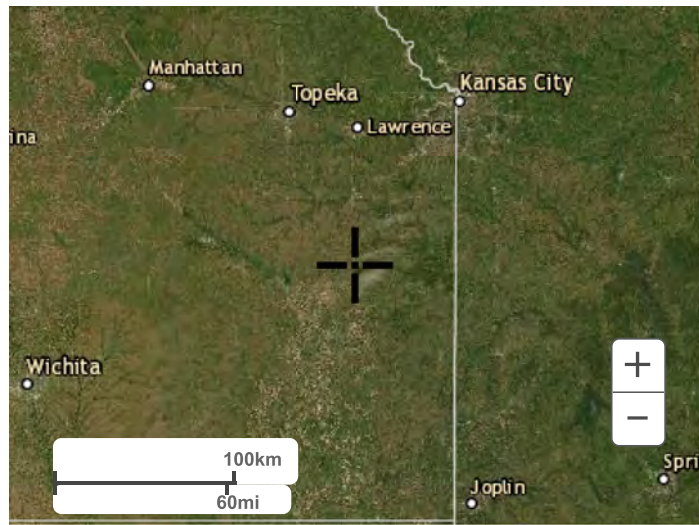
Large scale terrain



Large scale map



Large scale aerial



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## APPENDIX F

# SHEAR STRESS AND RIPRAP SIZING



RIPRAP CALCULATIONS – 50yr design event

Location	n	Y (ft)	B (ft)	m (ft/ft)	Top Width (ft)	SLOPE (ft/ft)	AREA (ft <sup>2</sup> )	Pw (ft)	Q (ft <sup>3</sup> /s)	VEL (ft/s)	R (ft)	Avg Shear Stress (lb/ft <sup>2</sup> )	Froude Number	TARGET FLOW (ft <sup>3</sup> /s)	Per Flood Routing (pondpack)	Rock Spherical Diameter (D50) (ft)	50yr (2%) design
At the 980 contour	0.04	0.36	390	2	391.46	0.02690	142.3	391.63	443	3.11	0.36327	0.610	0.825		2yr (50%)		
	0.04	0.67	390	2	392.67	0.02690	261.2	392.98	1215	4.65	0.66454	1.115	1.007	745	5yr (20%)		
	0.04	0.50	390	2	391.99	0.02690	194.6	392.23	745	3.83	0.4833	0.833	0.915	2344	25yr (4%)		
	0.04	0.99	390	2	393.96	0.02690	387.9	394.43	2344	6.04	0.98354	1.651	1.146	8090	50yr (2%)		No riprap needed
	0.04	2.08	390	2	398.32	0.02690	819.8	399.30	8090	9.87	2.05296	3.446	1.454	8090	100yr (1%)		
At the 975 contour	0.04	4.32	390	2	407.28	0.02690	1722	409.32	27417	15.92	4.20689	7.062	1.823	88800	40% PMP		
	0.04	8.72	390	2	424.87	0.02690	3551	428.98	88800	25.00	8.27875	13.896	2.227	88800	PMP		
	0.04	0.30	338	2	339.19	0.07110	100.4	339.33	443	4.41	0.29577	1.312	2.037		2yr (50%)		
	0.04	0.50	338	2	339.99	0.07110	169	340.23	1053	6.23	0.49680	2.204	2.418	745	5yr (20%)		
	0.04	0.81	338	2	339.62	0.07110	137.3	339.81	745	5.43	0.3918	1.792	2.258	2344	25yr (4%)		
At the 970 contour	0.04	0.43	277	2	278.70	0.08980	118.3	278.90	745	6.30	0.42400	2.376	2.896	745	50yr (2%)		USE 18" D50
	0.04	0.85	277	2	280.39	0.08980	235.9	280.78	2344	9.94	0.84003	4.707	3.624	2344	100yr (1%)		
	0.04	1.78	277	2	284.11	0.08980	498.9	284.95	8090	16.22	1.75082	9.811	4.592	8090	40% PMP		
	0.04	3.69	277	2	291.77	0.08980	1050	293.51	27417	26.11	3.57739	20.046	5.735	27417	PMP		
	0.04	7.48	277	2	306.78	0.08980	2173	310.29	88800	40.86	7.00338	39.244	6.965	88800			
At the 965 contour	0.04	0.33	250	2	251.33	0.08900	83.23	251.48	442	5.32	0.33095	1.838	2.644		2yr (50%)		
	0.04	0.61	250	2	252.43	0.08900	152.9	252.72	1215	7.95	0.60488	3.359	3.224	745	5yr (20%)		
	0.04	0.45	250	2	251.82	0.08900	113.9	252.03	745	6.54	0.45179	2.509	2.930	2344	25yr (4%)		
	0.04	0.90	250	2	253.61	0.08900	227.2	254.04	2344	10.32	0.89443	4.967	3.663	8090	50yr (2%)		USE 24" D50
	0.04	1.90	250	2	257.58	0.08900	481.1	258.48	8090	16.82	1.86130	10.337	4.632	8090	100yr (1%)		
At the 960 contour	0.04	3.93	250	2	265.74	0.08900	1015	267.60	27417	27.02	3.79158	21.057	5.763	27417	40% PMP		
	0.04	7.93	250	2	281.71	0.08900	2107	285.45	88800	42.14	7.38277	41.001	6.956	88800	PMP		
	0.04	0.33	262	2	263.31	0.08500	85.97	263.46	442	5.15	0.32630	1.731	2.514		2yr (50%)		
	0.04	0.60	262	2	264.40	0.08500	157.9	264.68	1215	7.70	0.59650	3.164	3.066	745	5yr (20%)		
	0.04	0.45	262	2	263.79	0.08500	117.6	264.00	745	6.33	0.44549	2.363	2.786	2344	25yr (4%)		
At the 955 contour	0.04	0.89	262	2	265.56	0.08500	234.6	265.98	2344	9.99	0.88220	4.679	3.484	8090	50yr (2%)		USE 24" D50
	0.04	1.87	262	2	269.48	0.08500	496.6	270.36	8090	16.29	1.83696	9.743	4.409	8090	100yr (1%)		
	0.04	3.88	262	2	277.52	0.08500	1047	279.35	27417	26.20	3.74636	19.871	5.494	27417	40% PMP		
	0.04	7.82	262	2	293.27	0.08500	2171	296.97	88800	40.91	7.30979	38.771	6.647	88800	PMP		
	0.04	0.34	234	2	235.37	0.09260	80.12	235.53	442	5.52	0.34015	1.965	2.775		2yr (50%)		
At the 950 contour	0.04	0.63	234	2	236.50	0.09260	147.2	236.80	1215	8.26	0.62153	3.591	3.383	745	5yr (20%)		
	0.04	0.47	234	2	235.87	0.09260	109.6	236.09	745	6.80	0.46430	2.683	3.075	2344	25yr (4%)		
	0.04	0.93	234	2	237.71	0.09260	218.8	238.15	2344	10.71	0.91877	5.309	3.842	8090	50yr (2%)		USE 24" D50
	0.04	1.95	234	2	241.79	0.09260	463.6	242.72	8090	17.45	1.91006	11.037	4.853	8090	100yr (1%)		
	0.04	4.04	234	2	250.18	0.09260	978.9	252.08	27417	28.01	3.88341	22.439	6.024	27417	40% PMP		
At the 950 contour	0.04	8.14	234	2	266.57	0.09260	2038	270.41	88800	43.57	7.53623	43.546	7.242	88800	PMP		
	0.04	0.43	182	2	183.72	0.07020	78.86	183.93	442	5.61	0.42873	1.878	2.268		2yr (50%)		
	0.04	0.79	182	2	185.16	0.07020	145.1	185.53	1215	8.38	0.78184	3.425	2.757	745	5yr (20%)		
	0.04	0.59	182	2	184.36	0.07020	108	184.64	745	6.90	0.58470	2.561	2.510	2344	25yr (4%)		
	0.04	1.17	182	2	186.69	0.07020	216	187.24	2344	10.85	1.15334	5.052	3.123	8090	50yr (2%)		USE 24" D50
At the 950 contour	0.04	2.46	182	2	191.84	0.07020	459.6	193.00	8090	17.60	2.38152	10.432	3.913	8090	100yr (1%)		
	0.04	5.09	182	2	202.37	0.07020	978.9	204.78	27417	28.01	4.78025	20.940	4.783	27417	40% PMP		
	0.04	10.21	182	2	222.85	0.07020	2067	227.67	88800	42.96	9.07964	39.773	5.612	88800	PMP		

NOTES:

1. Velocity Calculations based on Manning's equation at each major contour (980, 970, 965, etc) per the LiDAR survey
2. Riprap Sizing from Isbach Equation from Technical Supplement 14C from the National Engineering Handbook,

## APPENDIX G

# FLEXAMAT BROCHURE – PERMANENT EROSION CONTROL SOLUTIONS





# PERMANENT EROSION CONTROL SOLUTIONS



**Flexamat® - Permanent Solution  
for a Wide Range of Applications Including:**

**AIRPORTS**

**DOT ROADSIDE**

**DRIVABLE SURFACES**

**ENERGY SECTOR**

**INLETS/OUTLETS**

**LANDFILL/MINE RECLAMATION**

**SHORELINE**

**STREAM AND RIVERBANK**





# PERMANENT EROSION CONTROL SOLUTIONS

*Erosion Prevention and Protection*

## OUR COMPANY

Motz Enterprises, Inc. is the manufacturer of **Flexamat**®. The company has been in business for over 30 years and is headquartered in Cincinnati, Ohio.

**Flexamat** is sold throughout the United States and Canada with material available locally in most areas.

We take pride in our performance and specifying the right product for the right application.

**Flexamat** is an effective, long term solution. We look forward to working with you.



**Flexamat**®

# Learn More About How Flexamat® Is The Best Permanent Erosion Solution!



## About Flexamat®

### Permanent Erosion Control

**Flexamat** is a permanent erosion control mat utilized for stabilizing slopes, channels, low water crossings, inlet/outlet protection, and shorelines. Tied Concrete Block Mat is a generic term for **Flexamat**. It consists of concrete blocks (6.5" x 6.5" with a 2.25" profile) locked together and embedded into a high strength geogrid. There is 1.5" spacing between the blocks that gives the mat flexibility and allows for optional vegetation growth. The mat is packaged in rolls, making transporting and installing **Flexamat** efficient. It is manufactured with various underlayments, determined by onsite conditions.

### Vegetated Solution

**Flexamat** offers permanent, hard armor protection, with a natural vegetation. **Flexamat** may be mowed over with commercial mowing equipment or left to grow wild. Besides grass, there are many other types of native plant species that can be planted to grow within the mat. For example, Willow stakes and other native plugs can be planted within **Flexamat**.

### Work With Nature, Not Against

Incorporating perennial vegetation into storm water treatment plans will encourage the benefits of phytoremediation which is the direct use of living green plants for the removal, degradation or containments of contaminants. The establishment of perennial vegetation increases infiltration of storm water runoff into the soil, increased removal of pollutants found in road and parking lots runoff (oils & grease, metals, break dust salt, garbage, nutrients) through filtration and phytoremediation. The perennial vegetation also reduces or eliminates the thermal impacts to storm water runoff by shading the concrete blocks from sunlight and aiding in infiltration and filtering of the runoff, unlike rip rap or other hard armor alternatives.



## Benefits of Flexamat®

HIGH PERFORMANCE

EASY MAINTENANCE

FAST INSTALLATION

SIMPLE INSTALLATION

AESTHETICALLY PLEASING

IMPROVES SAFETY

ENVIRONMENTALLY FRIENDLY

REDUCES CONSTRUCTION COSTS

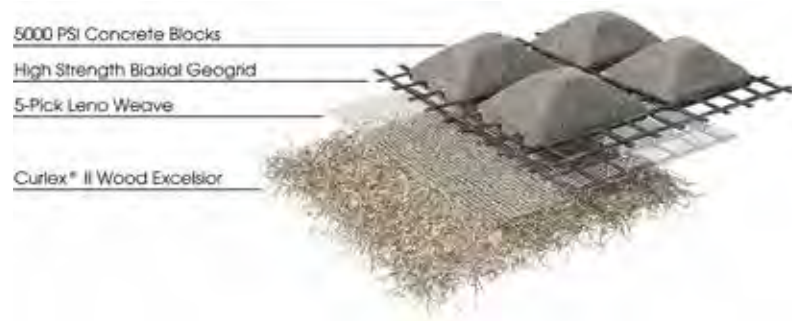
DISCOURAGES GRAFFITI

IMPROVES WATER QUALITY

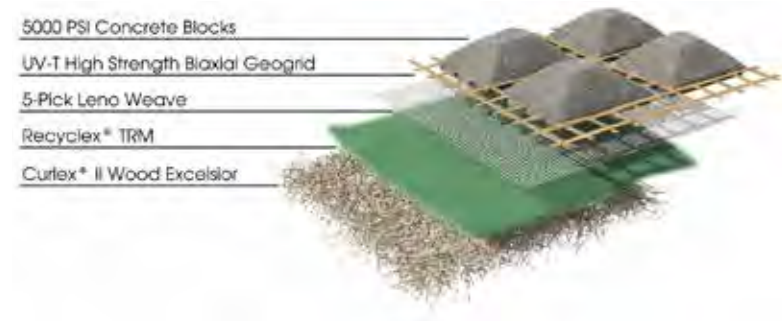
LOW-IMPACT DEVELOPMENT (LID)



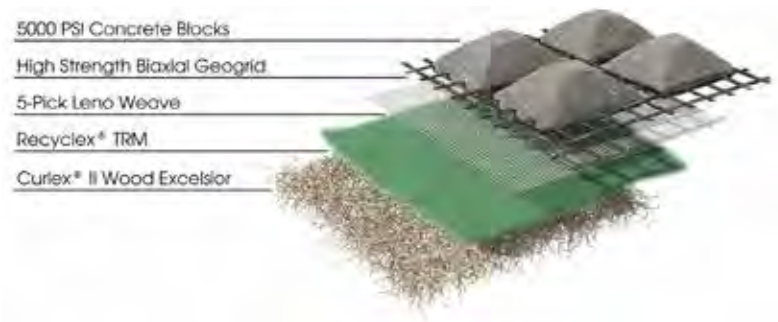
## Flexamat Standard



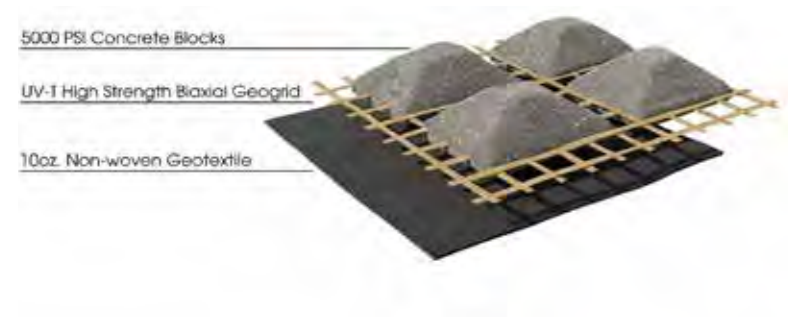
## Flexamat Plus UV-T



## Flexamat Plus



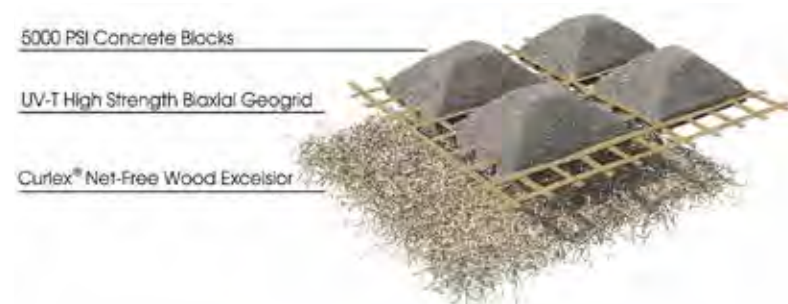
## Flexamat 10NW UV-T



## Flexamat 10NW



## Flexamat NF UV-T





## GENERAL COMPOSITION OF MATERIALS

<b>Blocks</b>	5000 PSI, Wet-cast Portland Cement
<b>Interlocking Biaxial Geogrid</b>	Fornit 30/30 Polypropylene Geogrid with 2,055 lb/ft biaxial strength UV-T Polypropylene Geogrid with 2,055 lb/ft biaxial strength
<b>Underlayment Options</b>	<b>Standard</b> - Curlex® II ECB & Leno Weave <b>Plus</b> - Recyclax® TRM-V, Curlex® II ECB & Leno Weave <b>Fabric</b> - 10 oz Non-Woven Geotextile *More options available upon request, including Net Free underlayment.

## MANUFACTURING VALUES

<b>Flexamat® Properties</b>	Values
<b>Roll Widths</b>	4' 5.5' 8' 10' 12' 16' 15.5' with geogrid and underlayment extensions (for areas wider than 16')
<b>Roll Lengths</b>	30' 40' 50' / Custom
<b>Material Weight</b>	10 lbs./sf
<b>Block Size</b>	6.5" x 6.5" x 2.25"
<b>Percentage Open Area (POA)</b>	30% min.

## PERFORMANCE

Test	Tested Value	Bed Slope	Soil Classification	Limiting Value
<b>ASTM 6460</b>	Shear Stress	30%	Sandy Loam (USDA)	24+PSF
<b>ASTM 6460</b>	Velocity	20%	Loam (USDA)	30+ ft/sec

# Departments of Transportation Roadways Protection





# Departments of Transportation

## Roadways Protection

FEDERAL | STATE | MUNICIPAL



Three months after installation



One year after installation





# Departments of Transportation Roadways Protection





# Departments of Transportation

## Roadways Protection

FEDERAL | STATE | MUNICIPAL



One year after installation.



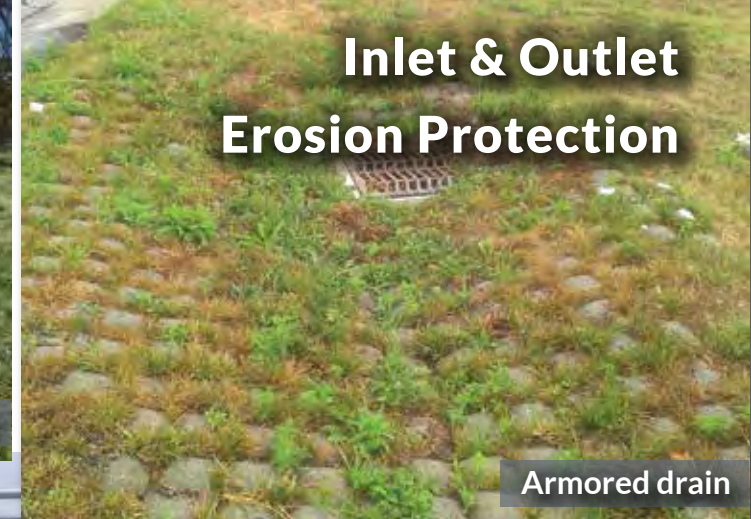




Failing riprap



Outlet armored with Flexamat®, 3 years later



## Inlet & Outlet Erosion Protection

Armored drain



Eroded outlet



Repaired outlet



# Landfill Erosion Protection





# Energy Erosion Protection

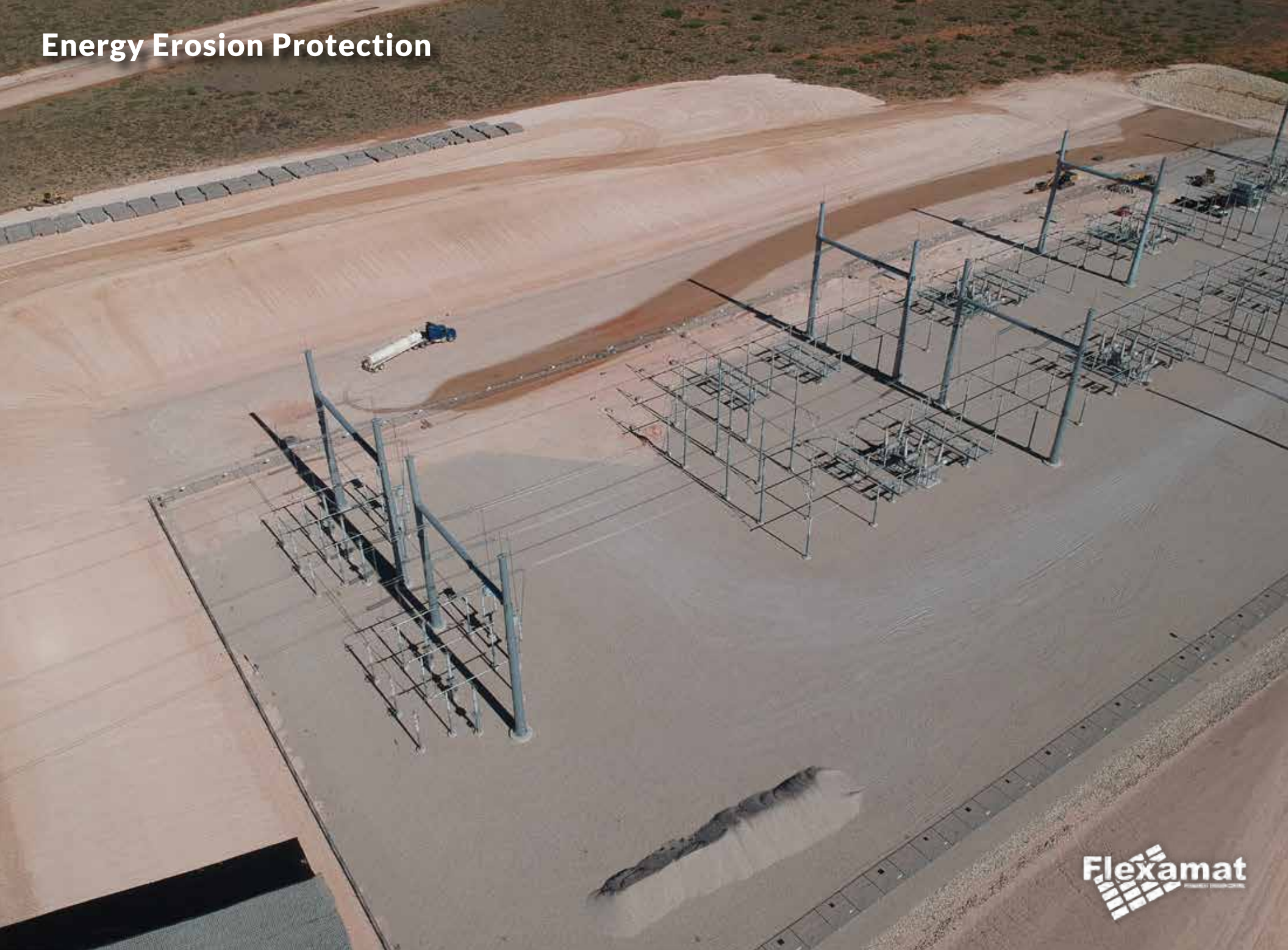


**Flexamat**

Exposed high pressure gas pipeline



# Energy Erosion Protection







One year after installation





# Flood Control







Three months after installation





# Percussion Anchors



Gas powered driver  
installation



Loading anchor  
with Jack Jaw®



Installed anchors















**Flexamat**  
Geotextiles & Geomembranes



# Shoreline Erosion Protection







**Flexamat**



# Streambank Protection



Fully vegetated Flexamat® with  
native littorals thriving





## Drivable Surfaces Erosion Protection



Boat ramp



Gravel infill for residential driveway



Access road

**Flexamat**  
EROSION PROTECTION



# Schools Erosion Protection















Up to 4800 square feet of material can ship on one truckload



Motz Enterprises, Inc.  
3153 Madison Road  
Cincinnati, OH 45209

web: [www.flexamat.com](http://www.flexamat.com)  
email: [info@flexamat.com](mailto:info@flexamat.com)  
phone: 513-772-6689





## APPENDIX H

### EXHIBIT 3.1 (ALTERNATIVE 1) & EXHIBIT 3.2 (ALTERNATIVE 2)



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GENERAL NOTES:

1. ALL SOIL SHALL BE REMOVED AS NOTED IN THE SECTION BELOW.
2. THRACE LINQ 180-EX GEOTEXTILE SHALL BE PLACED PRIOR TO RIPRAP PLACEMENT.
3. SINCE THE "AREA OF EXCESSIVE SCOUR" IS CURRENTLY SCoured DEEPER THAN THE PROPOSED SOLUTIONS IN SECTIONS A-A & B-B, THIS AREA SHALL BE FILLED WITH ROCK FROM THE "AREA OF ON-SITE SPOILS" CURRENTLY ON-SITE AND SUPPLEMENTED AS NECESSARY WITH D50 = 12" RIPRAP (AREA IS ESTIMATED TO BE 4,000 SQUARE YARDS AT AN AVERAGE HEIGHT OF FIVE (5) FEET).
4. WHEN FINISHED, TOP OF RIPRAP SHALL EQUATE TO EXISTING ELEVATION OF THE FLOOR OF THE TOP OF SPILLWAY.

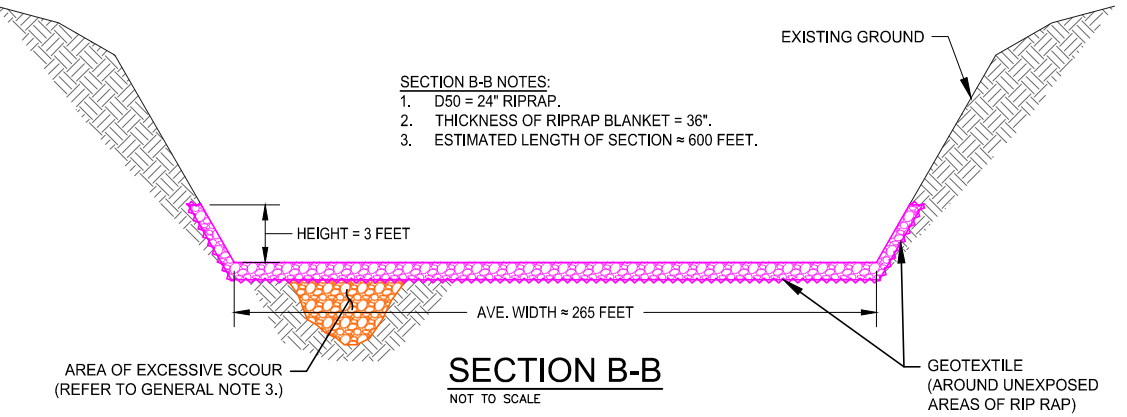
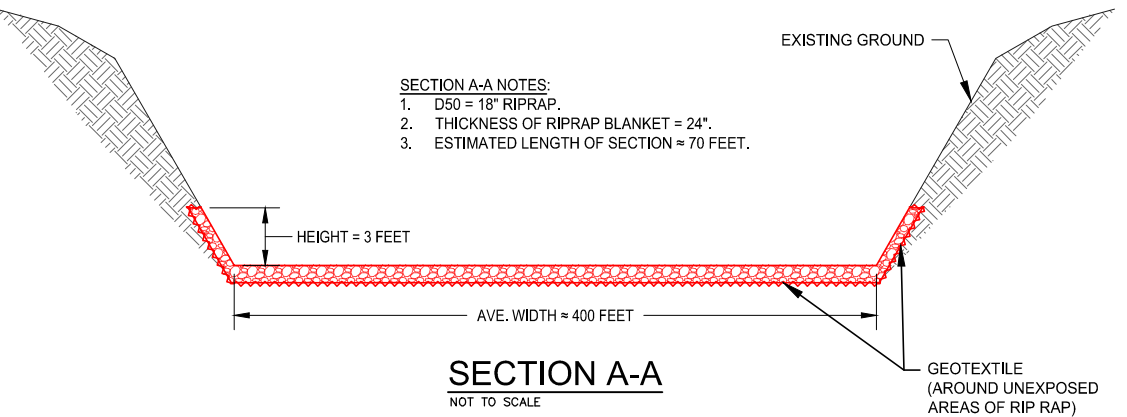


EXHIBIT  
ALTERNATIVE 1 - SPILLWAY REMEDIATION  
CEDAR VALLEY RESERVOIR





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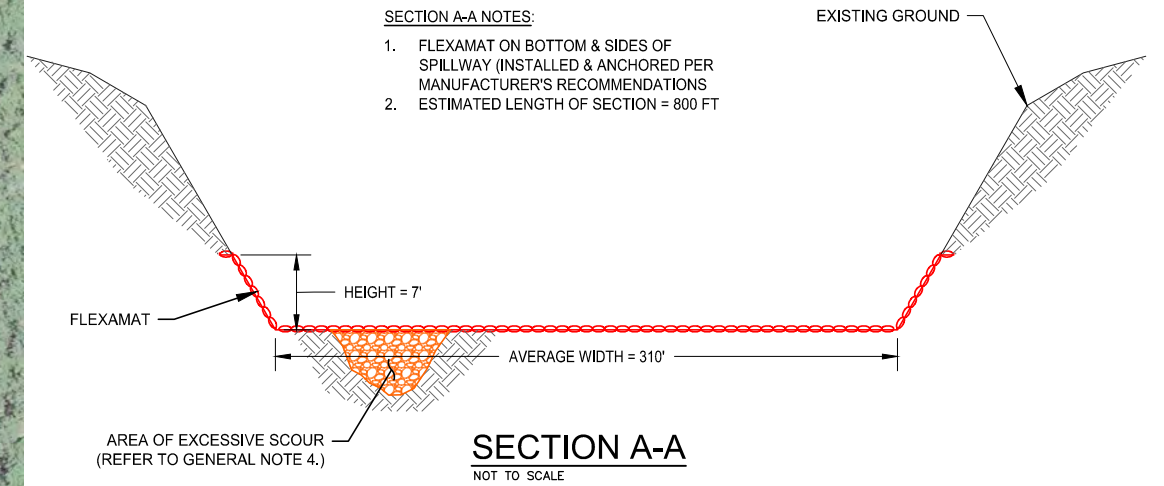


**NOTES:**

1. ALL VEGETATION WITHIN THE FLEXAMAT FOOTPRINT SHALL BE CLEARED.
2. ALL AREAS WITHIN THE FLEXAMAT FOOTPRINT SHALL BE HYDROSEED PRIOR TO FLEXAMAT PLACEMENT.
3. THRACE LINQ 180-EX GEOTEXTILE SHALL BE PLACED PRIOR TO RIPRAP PLACEMENT.
4. SINCE THE "AREA OF EXCESSIVE SCOUR" IS CURRENTLY SCoured DEEPER THAN THE PROPOSED SOLUTION IN SECTION A-A, THIS AREA SHALL BE FILLED WITH ROCK FROM THE "AREA OF ON-SITE SPOILS" CURRENTLY ON-SITE AND SUPPLEMENTED AS NECESSARY WITH D50 = 12" RIPRAP UNTIL IT MATCHES ADJACENT GRADE OF THE UNSCoured SPILLWAY (AREA IS ESTIMATED TO BE 4,000 SQUARE YARDS AT AN AVERAGE HEIGHT OF FIVE (5) FEET).

**SECTION A-A NOTES:**

1. FLEXAMAT ON BOTTOM & SIDES OF SPILLWAY (INSTALLED & ANCHORED PER MANUFACTURER'S RECOMMENDATIONS)
2. ESTIMATED LENGTH OF SECTION = 800 FT



**EXHIBIT  
ALTERNATIVE 2 - SPILLWAY REMEDIATION  
CEDAR VALLEY RESERVOIR**



**AMENDMENT 1**  
**FOR DESIGN, BID ASSISTANCE, CONSTRUCTION ADMINISTRATION AND RESIDENT PROJECT**  
**REPRESENTATIVE ENGINEERING SERVICES**  
Cedar Valley Reservoir Emergency Spillway Repair  
**Garnett, Kansas**

This Amendment is made on the \_\_\_\_\_ day of \_\_\_\_\_, 2022, by and between **McClure Engineering Company, of Lenexa, Kansas** (herein referred to as "**Engineer**") and the **City of Garnett, Kansas** (hereinafter referred to as "**Owner**"). Services shall be performed per the fees, terms and conditions outlined in this Amendment and/or the Hourly Rates established on Exhibit 'A'. The **Engineer** shall provide services for the Project which consists of the services detailed in Exhibit 'B'.

It is the intent of the Owner to amend the previous Agreement dated March 8, 2022, to add the following Scope items and Fees, which were not included in the original Agreement: Design, Permitting, Bid Assistance, Construction Administration, Resident Project Representative, Record Drawings, and Additional Meetings to the Cedar Creek Reservoir Emergency Spillway Repair.

1. The **Owner** shall provide information, which shall set forth the **Owner's** objectives, schedule, constraints, budget with reasonable contingencies and other applicable criteria. (See Exhibit 'C' for **Owner's** Responsibilities).
2. The **Engineer** shall conduct the following services marked "Included", for approval by the **Owner**:

ITEM		INCLUDED	NOT INCLUDED
<b>SECTION 2. DESIGN PHASE SERVICES</b>			
<b>2.01</b>	<b>Preliminary Design</b> <ol style="list-style-type: none"> <li>1. Conduct Project Kickoff Meeting with <b>OWNER</b>. (1 Meeting)</li> <li>2. Confirm Scope, Extent and Character of the Project.</li> <li>3. Review Design Criteria.</li> <li>4. Review Project Questions and Issues.</li> <li>5. Topographic Survey.</li> <li>6. Phase 1 Archaeological Survey.</li> <li>7. Draft Design Report to KDA Division of Water Resources (DWR).</li> <li>8. Prepare Preliminary Project Drawings.</li> <li>9. Prepare Preliminary Project Specifications.</li> <li>10. Prepare Revised "Opinion of Probable Costs"</li> <li>11. Review 60% Preliminary Design with the <b>OWNER</b> (1 Meeting)</li> </ol> <b>Deliverables:</b> <i>Project Kickoff Meeting Agenda and Minutes, sent as PDF</i> <i>60% Design Review Meeting Agenda and Minutes, sent as PDF</i> <i>Draft Opinion of Probable Costs, sent as PDF</i> <i>60% Preliminary Plans and associated contract documents, sent as PDF</i> <i>Phase 1 "Desk-Top" Archaeological Survey</i>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>2.02</b>	<b>Final Design</b> <ol style="list-style-type: none"> <li>1. Prepare final project drawings</li> <li>2. Prepare final project specifications</li> <li>3. Prepare final Design Memorandum Report to KDA DWR</li> <li>4. Prepare revised Opinion of Probable Cost based on final drawings and specifications</li> <li>5. Prepare Contract Agreement Form, General Conditions, Supplementary Conditions, Bid Forms, Invitation to Bid, and Instructions to Bidders</li> <li>6. Review 90% Design with the <b>OWNER</b> (1 Meeting)</li> <li>7. Prepare Final Plan set: Contract Documents, Detailed Plan Set, Design Memorandum</li> </ol> <b>Deliverables:</b> <i>Draft 90% Plan Set, sent as PDF</i> <i>Draft Contract Bid Documents, with Technical Specifications, sent as PDF</i> <i>90% Design Memorandum sent as PDF</i> <i>Final Plan set including: Contract Documents, Design Memorandum, and Detailed Plans. All signed and sealed by a Kansas Professional Engineer sent as a PDF.</i>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

ITEM		INCLUDED	NOT INCLUDED
<b>SECTION 3. BIDDING AND CONSTRUCTION PHASE SERVICES</b>			
3.01	<u><b>Advertising, Bidding, Contract Award</b></u> <ol style="list-style-type: none"> <li>1. Assist <b>OWNER</b> in advertising for and obtaining bids.</li> <li>2. Conduct Prebid conference at <b>OWNER'S</b> location. (1 Meeting)</li> <li>3. Provide drawings, specifications, contract documents and bid documents to prospective bidders, and <b>OWNER</b> requested bid sites.</li> <li>4. Issue addenda to interpret or clarify bid documents.</li> <li>5. Review Prebid submittals from bidders.</li> <li>6. Attend bid opening (at <b>OWNER</b> location), prepare Bid Tabulation. (1 Meeting)</li> <li>7. Review bidder's qualifications, bids, and other documents and make recommendation for award of contract.</li> <li>8. Present Bids to <b>OWNER</b>. (1 Meeting)</li> </ol> <b>Deliverables:</b> <i>Draft and Final Sets of following documents, sent as PDF.</i> <i>Minutes of Prebid conference</i> <i>Addendum's, if any</i> <i>Bid Tabulations</i> <i>Meeting minutes of bid presentation</i>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>  <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>  <input checked="" type="checkbox"/>  <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>
3.02	<u><b>Construction Administration</b></u> <ol style="list-style-type: none"> <li>1. Provide general administration of construction contract as <b>OWNER'S</b> representative.</li> <li>2. Visit site of construction at appropriate stages to observe the Contractor's work. (This does not include On-Site Resident Project Representative Services.)</li> <li>3. Issue interpretations and clarifications of contract documents.</li> <li>4. Review shop drawings.</li> <li>5. Act as initial interpreter of the requirements of the contract documents.</li> <li>6. Review and process Contractor's application for payments.</li> <li>7. Conduct Monthly Progress Meetings. (6 Meetings)</li> </ol> <b>Deliverables:</b> <i>Draft and Final Progress Meeting Minutes, sent as PDF.</i>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>  <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>  <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/>
3.03	<u><b>Resident Project Representative</b></u> <ol style="list-style-type: none"> <li>1. Provide a Resident Project Representative to be on site during construction (see Exhibit 'D', A Listing of Duties, Responsibilities and Limitations of Authority of the Resident Project Representative).</li> </ol>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3.04	<u><b>Project Management</b></u> <ol style="list-style-type: none"> <li>1. Prepare Project Management Plan.</li> <li>2. Setup/update project financial system.</li> <li>3. Subconsultant coordination.</li> <li>4. Update project schedule.</li> <li>5. Prepare invoices, progress reports, budget notifications.</li> </ol>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>SECTION 4. OTHER SERVICES</b>			
4.01	<u><b>Construction Field Control</b></u> <ol style="list-style-type: none"> <li>1. Establish Field Construction Controls</li> <li>2. Set Control Points</li> </ol>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
4.02	<u><b>Permit Coordination</b></u> <ol style="list-style-type: none"> <li>1. Kansas Department of Agriculture (KDA)</li> <li>2. Kansas Department of Health &amp; Environment (KDHE)</li> <li>3. United States Army Corps of Engineers (USACE)</li> <li>4. Kansas Department of Emergency Management (KDEM)</li> <li>5. Kansas Department of Emergency Management – Environmental &amp; Historic Preservation (KDEM – EHP)</li> <li>6. Federal Emergency Management Agency (FEMA)</li> <li>7. Prepare Storm Water Pollution Prevention Plan (SWPPP) <ul style="list-style-type: none"> <li>• Engineer will not be liable for fines arising from noncompliance with SWPPP.</li> <li>• The Owner shall be the Permit holder and shall pay for all costs associated with permit application?</li> </ul> </li> </ol>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>  <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/>
4.07	<u><b>Storm Water Pollution Prevention Plan Observation (SWPPP)</b></u> <ol style="list-style-type: none"> <li>1. Perform Weekly On-Site Observations of construction site and provide written reports to <b>OWNER</b>.</li> <li>2. Storm Water Pollution Prevention Plan Services shall end not more than 1-year from the date this Agreement is originally signed.</li> </ol>	<input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>

ITEM		INCLUDED	NOT INCLUDED
4.09	<b><u>Record Drawings</u></b> 1. As-Built Record Drawings. 2. Hard Copies Set EA @ \$250. 3. Electronic Copies set EA @ \$10.00.	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
4.10	<b><u>Additional Meetings</u></b> 1. Special Meetings with Council/Staff 2. Kick-off Meeting with Public. 3. One-on-One Meetings with Property Owners outside of scope. 4. Pre-Construction walk-thru with Property Owners. 5. Other meetings as requested by OWNER. <b>Deliverables:</b> <i>Draft and Final Minute Meetings, sent as PDF</i>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
4.12	<b><u>Funding Administration</u></b> 1. Coordinate with Funding Agencies. 2. Prepare funding Outlay/Reimbursement Requests. 3. Funding Closeout.	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
4.13	<b><u>Quality Control/Quality Assurance</u></b> 1. Prepare Project Quality Plan. 2. Provide QA/QC on deliverables. 3. Provide QA/QC on sub-consultant submittals.	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b><u>SECTION 5. PROJECT MANAGEMENT AND CORDINATION</u></b>			
5.01	<b><u>Project Management</u></b> 1. Coordinate monthly project management team meetings to discuss contractual issues (scope, schedule, supplemental work, client feedback, etc.)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5.02	<b><u>Quality Control/Quality Assurance</u></b> 1. Prepare Project Quality Plan. 2. Provide QA/QC on deliverables. 3. Provide QA/QC on sub-consultant submittals.	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

### 3. Fee Schedule:

Fees for Services are shown below:

1.0 PRELIMINARY PLANNING/ FUNDING PHASE SERVICES.....	LS.....	\$ <u>Completed</u>
2.0 DESIGN PHASE SERVICES .....	LS.....	\$ <u>120,000</u>
3.0 CONSTRUCTION PHASE SERVICES.....	NTE.....	\$ <u>211,070</u>
4.0 OTHER SERVICES .....	LS.....	\$ <u>51,466</u>
5.0 PROJECT MANAGEMENT .....	LS.....	\$ <u>25,990</u>
Total Fee:		\$ <u>408,526</u>

LS	Lump Sum
NTE	Not-to-Exceed
N/A	Not Applicable
NIC	Not Included
TBD	To Be Determined
T&M	Time and Materials
Est.	Estimated

The Hourly Rate Schedule is included in Exhibit 'A' and attached to this Agreement to be used for work performed on a *Time and Material* basis.



4. Past due amounts owed shall accrue interest at 1.5% per month from the 30<sup>th</sup> day. If the Owner fails to make monthly payments due the Engineer, the Engineer may, after giving (7) days written notice to the Owner, suspend services under this Agreement.
5. This Agreement represents the entire and integrated agreement between the Owner and the Engineer and supersedes all prior negotiations, representations, or agreements, either written or oral. This Agreement may be amended only by written instrument signed by both the Owner and the Engineer.
6. This Agreement is subject to all the Terms and Conditions listed on the following pages.

Exhibits		Included	Not Included
	Standard Terms and Conditions	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Exhibit 'A'	Hourly Rate Schedule	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Exhibit 'B'	Project Scope	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Exhibit 'C'	Preliminary Project Schedule	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Exhibit 'D'	Preliminary Opinion of Probable Project Cost	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Exhibit 'E'	Owner's Responsibilities	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Exhibit 'F'	Duties, Responsibilities and Limitations of Authority of the Resident Project Representative	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**SPECIAL INSTRUCTIONS:**

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**OWNER: CITY OF GARNETT  
GARNETT, KANSAS**

Signed: \_\_\_\_\_

Title: \_\_\_\_\_

Phone: \_\_\_\_\_

Email: \_\_\_\_\_

**ENGINEER: MCCLURE ENGINEERING COMPANY  
LENEXA, KANSAS**

Signed:  \_\_\_\_\_  
Mark Griffin, P.E.\* (\*MO & CA)

Title: Senior Project Manager

Phone: 816-944-1476

Email: [mgriffin@mcclurevision.com](mailto:mgriffin@mcclurevision.com)

# McCLURE ENGINEERING COMPANY

## STANDARD TERMS AND CONDITIONS

**ACCESS TO SITE:** The **Engineer** shall at all times have access to the site to complete his Work.

**INFORMATION PROVIDED BY OTHERS:** The **Engineer** shall be entitled to rely upon the accuracy and completeness of data provided by the **Owner** and shall not assume liability for such data. The **Engineer** does not practice law, insurance or financing, therefore, the **Owner** shall furnish all legal, accounting and insurance counseling services as may be necessary to protect themselves at any time during the Project. **Owner** shall hold **Engineer** harmless from damages that may arise as a result of inaccuracies of information or data supplied by **Owner** or others to **Engineer**.

**ADDITIONAL SERVICES:** As an Additional Service in connection with changes in the scope of the **Engineer's** work by the **Owner**, the **Engineer** shall prepare Drawings, Specifications and other documentation and data, evaluate Contractor's proposal and provide any other services made necessary by such Change Orders and Construction Change Directives. The **Engineer** will be entitled to additional compensation to coordinate such changes and schedules shall be adjusted accordingly.

**OWNERSHIP AND REUSE OF DOCUMENTS:** All documents are instruments of service, and **Engineer** shall retain an ownership and property interested therein (including the copyright and the right of reuse at the discretion of the **Engineer**) whether or not the Project is completed.

**Owner** may make and retain copies of documents for information and reference in connection with the use of the documents on the Project. **Engineer** grants **Owner** a limited license to use the documents on the Project, extensions of the Project, and for related uses of the **Owner**, subject to receipt by **Engineer** of full payment due and owing for all services relating to preparation of the documents, and subject to the following limitations: (1) **Owner** acknowledges that such documents are not intended or represented to be suitable for use on the Project unless completed by **Engineer**, or for use or reuse by **Owner** or others on extensions of the Project, on any other project, or for any other use or purpose, without written verification or adaptation by **Engineer**; (2) any such use or reuse, or any modification of the documents, without written verification, completion, or adaptation by **Engineer**, as appropriate for the specific purpose intended, will be at **Owner's** sole risk and without liability or legal exposure to **Engineer** or to its officers, directors, members, partners, agents, employees, and consultants; (3) **Owner** shall indemnify and hold harmless **Engineer** and its officers, directors, members, partners, agents, employees, and consultants from all claims, damages, losses, and expenses, including attorneys' fees, arising out of or resulting from any use, reuse, or modification of the documents without written verification, completion, or adaptation by **Engineer**; and (4) such limited license to **Owner** shall not create any rights in third parties.

If **Engineer** at **Owner's** request verifies the suitability of the documents, completes them, or adapts them for extensions of the Project or for any other purpose, then **Owner** shall compensate **Engineer** at rates or in an amount agreed upon by **Owner** and **Engineer**.

**OPINIONS OF PROBABLE COSTS:** **Engineer's** opinions (if any) of probable construction costs are to be made on the basis of **Engineer's** experience, qualifications, and general familiarity with the construction industry. However, because **Engineer** has no control over the cost of labor, materials, equipment, or services furnished by others, or over contractors' methods of determining prices, or over competitive bidding or market conditions, **Engineer** cannot and does not guarantee that proposals, bids, or actual construction cost will not vary from opinions of probable construction cost prepared by **Engineer**. If **Owner** requires greater assurance as to probable construction cost, then **Owner** agrees to obtain an independent cost estimate.

**BETTERMENT:** If a required item or component of the **Owner's** project should be omitted from **Engineer's** construction documents, **Engineer** shall not be responsible for paying the cost required to add such item or component to the extent that such item or component would have been required and included in the original construction documents. In no event will **Engineer** be responsible for any cost or expense that provides betterment or upgrades or enhances the value of the **Owner's** project.

**SHOP DRAWING REVIEW:** If, as part of this Agreement **Engineer** reviews Contractor submittals, such as shop drawings, product data, samples and other data, as required by **Engineer**, these reviews and approvals shall be only for the limited purpose of checking for conformance with the design concept and the information expressed in the contract documents. This review shall not include review of the accuracy or completeness of details, such as quantities, dimensions, weights or gauges, fabrication processes, construction means or methods, coordination of the work with other trades or construction safety precautions, all of which are the sole responsibility of the Contractor. **Engineer** shall not be responsible for any deviations from the contract documents not brought to the attention of **Engineer** in writing by the contractor. **Engineer** shall not be required to review partial submissions or those for which submissions of correlated items have not been received.

**CONSTRUCTION OBSERVATION:** If, as part of this Agreement, **Engineer** is providing construction observation services, **Engineer** shall visit the project at appropriate intervals during construction to become generally familiar with the progress and quality of the Contractor's work and to determine if the work is preceding in general accordance with the Contract Documents. **Engineer** shall not at any time supervise, direct, control, or have authority over any contractor's work, nor shall **Engineer** have authority over or be responsible for the means, methods, techniques, sequences, schedule, or procedures of construction selected or used by any contractor, or the safety precautions and programs incident thereto, for the security or safety at the site, nor for any failure of a contractor to comply with laws and regulations applicable to that contractor's furnishing and performing of its work. **Engineer** shall not be responsible for the acts or omissions of any contractor.

**Engineer** neither guarantees the performance of any contractor nor assumes responsibility for any contractor's failure to furnish and perform the work in accordance with the construction contract documents.

**Engineer** shall not be responsible for any decision made regarding the construction contract documents, or any application, interpretation, clarification, or modification of the construction contract documents, other than those made by the **Engineer** or its consultants.

Unless otherwise specified in this Agreement, the **Owner** has not retained the **Engineer** to make detailed inspections or to provide exhaustive or continuous project review and observation services.

**DESIGN WITHOUT CONSTRUCTION PHASE SERVICES:** If **Engineer** is not retained for construction observation and/or on-site resident observation services, **Engineer** shall have no

design, shop drawing review, or other obligations during construction, and **Owner** assumes all responsibility for the application and interpretation of construction contract documents, review and response to contractor claims, construction contract administration, processing of change orders and submittals, revisions to the construction contract documents during construction, construction observation and review, review of contractor's payment applications, and all other necessary construction phase administrative, engineering, and professional services. **Owner** waives all claims against the **Engineer** that may be connected in any way to construction phase administrative, engineering, or professional services.

**UNDERGROUND UTILITIES:** Information for location of underground utilities may come from the **Owner**, third parties, and/or research performed by the **Engineer** or its subcontractors. Unfortunately, the information the **Engineer** must rely on from various utilities and other records may be inaccurate or incomplete. Therefore, the **Owner** agrees to indemnify and hold harmless the **Engineer** for all claims, losses, costs and damages arising out of the location of underground utilities provided by the **Engineer** under this Agreement.

**SUBSURFACE CONDITIONS:** The **Engineer** may advise the **Owner** to conduct soil and/or subsurface testing and analysis to provide information to the **Owner**, **Engineer**, and contractor(s) as to the subsurface conditions that may generally be encountered during subsurface construction.

The **Engineer** cannot warrant or guarantee that the information provided is reflective of all subsurface conditions that may be encountered, or to the extent that subsurface conditions such as soil properties, groundwater, rock, etc., may vary from location to location throughout subsurface construction.

Any unexpected change or unforeseen subsurface conditions (including those that may be caused by weather conditions) will be addressed when encountered and may result in a change in construction price and/or schedule, and the **Engineer** shall be held harmless from issues arising out of these unseen subsurface conditions.

**HAZARDOUS MATERIALS – INDEMNIFICATION:** The **Engineer** is not in the business of making environmental site assessments for purposes of determining the presence of any toxic, hazardous or other environmental damaging substances. The purpose of this provision is to be certain that the **Owner** is aware of the potential liability if toxic, hazardous or environmental damaging substances are found on or under the property. **Engineer** makes no representations regarding an environmental site assessment, relies upon **Owner** to have fully investigated the need and/or scope of such assessment and assumes no responsibility for the determination to make an environmental site assessment on the subject property.

**DISPUTE RESOLUTION:** Claims, disputes or other matters, involving a value less than \$200,000.00, in question between the parties to this Agreement arising out of or relating to this Agreement or breach thereof shall be subject to mediation unless each of the parties mutually agrees otherwise. No mediation arising out of or relating to this Agreement shall include, by consolidation, joinder or in any other manner, an additional person or entity not a party to this Agreement, except by written consent containing a specific reference to this Agreement signed by the **Owner**, **Engineer**, and any other person or entity sought to be joined. In no event shall the demand for mediation be made after the date when the institution of legal or equitable proceedings based upon such claim would be barred by the applicable statute of limitations. The award rendered in the mediation shall be non-binding.

**TERMINATION:** This Agreement may be terminated by either party upon not less than seven days written notice should the other party fail substantially to perform in accordance with the terms of the Agreement through no fault of the party initiating the termination. This Agreement may be terminated by the **Owner** upon not less than seven days' written notice to the **Engineer** in the event the Project is permanently abandoned.

Failure of the **Owner** to make payments to the **Engineer** in accordance with the Agreement shall be considered substantial non-performance and cause for termination. If the **Owner** fails to make payment when due the **Engineer** for services, the **Engineer** may, upon seven days' written notice to the **Owner**, suspend performance of services under this Agreement. Unless payment in full is received by the **Engineer** within seven days of the date of the notice, the suspension shall take effect without further notice. In the event of a suspension of services, the **Engineer** shall have no liability to the **Owner** for delay or damage caused the **Owner** because of such suspension of services.

In the event of termination not the fault of the **Engineer**, the **Engineer** shall be compensated for services performed prior to termination and all termination expenses. Termination expenses are in addition to compensation for *Basic and Additional Services*, and include expenses which are directly attributable to termination.

**LIMITATION OF LIABILITY:** The **Engineer's** liability shall be limited to \$50,000.00 or the fee for the work performed, whichever is greater, or as specifically agreed to by separate agreement.

**PAYMENT:** Amounts unpaid 30 days after invoice date shall bear interest from the date payment is due at a rate of 1.5% per month compounded and shall include costs for attorney fees and other collection fees related to collecting fees for service.

**WAIVERS:** The **Owner** and the **Engineer** waive all rights against each other and against the contractors, consultants, agents and employees of the other for damages, but only to the extent covered by property insurance during construction. The **Owner** and **Engineer** each shall require similar waivers from their contractors, consultants and agents.

**ASSIGNMENT:** The **Owner** and **Engineer**, respectively, bind themselves, their partners, successors, assigns and legal representatives to the other party to this Agreement and to the partners, successors, assigns and legal representatives of such other party with respect to all covenants of this Agreement. Neither **Owner** nor **Engineer** shall assign this Agreement without the written consent of the other.

**GOVERNING LAW:** Unless otherwise provided, the Agreement shall be governed by the laws of the State of Iowa.

**COMPLETE AGREEMENT:** This Agreement represents the entire and integrated agreement between the **Owner** and **Engineer** and supersedes all prior negotiations, representations or agreements, either written or oral. This Agreement may be amended only by written instrument signed by both **Owner** and **Engineer**. Nothing contained in this Agreement shall create a contractual relationship with or a cause of action in favor of a third party against either the **Owner** or **Engineer**.

EXHIBIT 'A'  
McCLURE ENGINEERING COMPANY  
HOURLY RATE SCHEDULE  
(Effective through December 31, 2022\*)

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<u>PERSONNEL</u>	<u>HOURLY RATE</u>
Principal .....	\$270 - \$295
Project Manager .....	\$185 - \$230
Senior Professional .....	\$185 - \$285
Professional .....	\$155 - \$185
Junior Professional .....	\$125 - \$155
Senior Technician .....	\$135 - \$175
Technician .....	\$115 - \$135
Landscape Architect .....	\$120 - \$155
On-Site Representative .....	\$115 - \$155
Client/Project Liaison .....	\$135 - \$185
Administrative .....	\$65 - \$85
Public Relations .....	\$115 - \$150
3 Member Survey Crew .....	\$270
2 Member Survey Crew .....	\$200
1 Member Survey Crew .....	\$135

EQUIPMENT

3D Scanner per Scan .....	\$30.00
UAV per Flight .....	\$125.00
Sonar Boat .....	\$125.00

MISCELLANEOUS EXPENSES

Survey Vehicle Mileage .....	\$0.70/Mile
Automobile Mileage (at current IRS rate) .....	Current IRS Rate
Printing .....	Per Contract
Survey Supplies (Hubs, Lath, Paint, Nails, etc.) .....	Per Contract
Out-of-Pocket Expenses (Meals, Hotels, etc.) .....	Per Contract

\*Rates are subject to change based on billing rates for future years





# Exhibit 'B'

## Preliminary Project Scope

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Design, Permitting, Bid Assistance, Construction Administration, RPR Services

Garnett, Kansas

### Project Description:

The City of Garnett, Kansas (City), owns and maintains the Cedar Valley Reservoir located southwest of the City. The auxiliary spillway was damaged during severe flooding that caused significant erosion to areas within the spillway that, if left in its current state of erosion, could cause the dam to eventually fail. The flooding was significant enough that the entire State of Kansas was declared a federal disaster. Therefore, the City qualifies for Federal Grant assistance through Federal Emergency Management Agency (FEMA) and Kansas Department of Emergency Management (KDEM).

McClure Engineering Company (McClure) was hired by the City to complete a review of the flood damage, determine funding alternatives, schedule, costs, and necessary steps to complete repairs to the auxiliary spillway. An Engineering Alternatives Report (EAR) dated August 16, 2022, was prepared by McClure, and details the improvements that are covered by this Amendment.

### Scope of Engineering Services:

The scope of engineering services for the project are generally described as follows:

- **Design Phase:** This phase will include development of a detailed design for Alternative 2, and meet Codes and Standards. A Phase 1 Archeological "Desktop" study will be completed by a subconsultant working for McClure to gain a better understanding of possible historical and cultural resource items that might trigger additional work unknown at this time. Final detailed engineering plans, final technical specifications, and final design memorandum, all shall be prepared and signed and sealed by a Kansas Professional Engineer.
- **Permitting Phase:** This phase begins upon approval from KDEM and will continue until receipt of all necessary permits.
- **Bid Phase:** The Bid Phase services will commence upon approval of KDEM and authorization by the City. McClure will provide necessary bid documents to the City and assist in a Prebid meeting, answer questions, issue any addendums as needed, and make a recommendation for award.
- **Construction Administration and RPR Phase:** These services will commence upon approval of KDEM and the City. A full-time resident project representative (RPR), under the supervision of the project Professional Engineer, will be provided during construction phase services.

## Exhibit 'C'

### Preliminary Project Schedule

**Table 1**

*Proposed Overall Project Schedule*

	Task Completion
Draft Preliminary Engineering Report to City of Garnett	July 15, 2022
Preliminary Engineering Report to All Parties	July 21, 2022
Submit Final Engineering Report to City of Garnett	August 5, 2022
KDEM- FEMA approval of project costs and concept	August 1, 2022
Present Engineering Report to City of Garnett	August 23, 2022
Submit Design, Bid, and Construction Management Proposal to City of Garnett	August 15, 2022
Approval to proceed: Design, Bid, and Construction Management for Auxiliary Spillway Project	September 1, 2022
60% Design Review	October 15, 2022
100% Plans, Contract Documents, Engineering Report	December 1, 2022
Early KDEM PA FEMA Time Extension Request	September 2022
Permitting: DWR, KDEM, USAOCE, FEMA-EHP, FEMA	December – February 2023
Possible Prolonged Permitting (KDEM PA FEMA-EHP)	*(March-July 2023)
Project Out to Bid	April 2023
Obtain Necessary Authorizations from KDEM	April 2023
Obtain Time Extension Authorization FEMA	June 2023
Execute Contract Documents	May 2023
Construction NTP	May 2023
Completion of Construction	November 2023
Construction punch list, project close out	December 2023
Final project close out final cost submittal KDEM	January 2024

\* Possible prolonged permitting is dependent of factors out of our control and can be anywhere from 3-9 additional months, and possibly more.

**Table 1**  
*Codes & Standards Auxiliary Spillway Construction Costs*



Exhibit 'E'  
**OWNER's Responsibilities**

OWNER shall do the following in a timely manner so as not to delay the services of the ENGINEER:

1. Designate in writing a person to act, as **OWNER'S** representative with respect to the services to be rendered under this Agreement. Such person shall have complete authority to transmit instructions, receive information, interpret and define OWNER'S policies and decisions with respect to ENGINEER'S services for the Project.
2. Provide all criteria and full information as to OWNER'S requirements for the Project, including design objectives and constraints, space, capacity and performance requirements, flexibility and expendability, and any budgetary limitations; and furnish copies of all design and construction standards, which OWNER will require to be included in the drawings and specifications.
3. Assist ENGINEER by placing at ENGINEER'S disposal all available information pertinent to the Project including previous reports and any other data relative to design or construction of the Project.
4. Arrange for access to make all provisions for ENGINEER to enter upon public and private property as required for ENGINEER to perform services under this Agreement.
5. Examine all studies, reports, sketches, drawings, specifications, proposals and other documents presented by ENGINEER, obtain advice of an attorney, insurance counselor and other consultants as OWNER deems appropriate for such examination and render in writing decisions pertaining thereto within a reasonable time so as not to delay the services of ENGINEER.
6. Furnish approvals and permits from all governmental authorities having jurisdiction over the Project and such approvals and consents from others as may be necessary for completion of the Project.
7. Attend the prebid conference, bid opening, preconstruction conferences, construction progress and other job related meetings and substantial completion inspection and final payment inspection.
8. Give prompt written notice to ENGINEER whenever OWNER observes or otherwise becomes aware of any development that affects the scope or timing of ENGINEER'S services, or any defect or non-conformance in the work of any Contractor.
9. Arrange for financing and pay for services as agreed to in this Agreement.

## Exhibit F:

### A Listing of The Duties, Responsibilities and Limitations of Authority of The Resident Project Representative

ENGINEER shall furnish a Resident Project Representative (RPR), assistants and other field staff to assist OWNER in observing performance of the Work of the Contractor.

Through on-site observations of the Work in progress and field checks of materials and equipment by the RPR and assistants, ENGINEER shall endeavor to provide further protection for OWNER against defects and deficiencies in the Work; but, the furnishing of such services will not make ENGINEER responsible for or give ENGINEER control over construction means, methods, techniques, sequences, procedures, storm water runoff, erosion control, or for safety precautions or programs, or responsibility for CONTRACTOR's failure to perform the Work in accordance with the Contract Documents.

The duties and responsibilities of the RPR are limited to those of ENGINEER in ENGINEER'S agreement with the OWNER and in the construction Contract Documents, and are further limited and described as follows:

#### A. General

RPR is OWNER'S agent at the site, will act as directed by and under the direction of OWNER, and will confer with OWNER regarding RPR's actions. RPR's dealings in matters pertaining to the on-site work shall in general be with OWNER and CONTRACTOR keeping OWNER advised as necessary. RPR's dealings with sub-contractors shall only be through or with the full knowledge and approval of CONTRACTOR.

#### B. Duties and Responsibilities of RPR

1. *Conferences and Meetings:* Attend meetings with CONTRACTOR, such as pre-construction conferences, progress meetings, job conferences and other project-related meetings.
2. *Liaison:*
  - a. Serve as OWNER'S liaison with CONTRACTOR, working principally through CONTRACTOR's superintendent and assist in understanding the intent of the Contract Documents; and assist OWNER in serving as OWNER'S liaison with CONTRACTOR when CONTRACTOR's operations affect OWNER'S on-site operations.
  - b. Assist in obtaining from OWNER additional details or information, when required for proper execution of the Work.
4. *Shop Drawings and Samples:*
  - a. Receive samples that are furnished at the site by CONTRACTOR and notify OWNER of availability of samples for examination.
  - b. Advise OWNER and CONTRACTOR of the commencement of any Work requiring a Shop Drawing or sample if the submittal has not been approved by OWNER.
5. *Review of Work, Rejection of Defective Work, Inspections and Tests:*
  - a. Conduct on-site observations of the Work in progress to assist OWNER in determining if the work is in general proceeding in accordance with the Contract Documents.
  - b. Report to OWNER whenever RPR believes that any Work is unsatisfactory, faulty or

- defective or does not conform to the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise OWNER of Work that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
- c. Verify that tests, equipment and systems startups and operating and maintenance training are conducted in the presence of appropriate personnel and that CONTRACTOR maintains adequate records thereof; and observe, record and report to OWNER appropriate details relative to the test procedures and startups.
  - d. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Project, record the results of these inspections and report to OWNER.
6. *Interpretation of Contract Documents:* Report to OWNER when clarifications and interpretations of the Contract Documents are needed and transmit to OWNER clarifications and interpretations as issued by OWNER.
  7. *Modifications:* Consider and evaluate CONTRACTOR's suggestions for modifications in Drawing or Specifications and report with RPR's recommendations to OWNER. Transmit to CONTRACTOR decisions as issued by OWNER.
  8. *Records:*
    - a. Maintain at the job site orderly files for correspondence, reports of job conferences. Shop Drawings and samples, reproductions of original Contract Documents including all Work Directive Changes, Addenda, Change Orders, Field Orders, and additional Drawings issued subsequent to the execution of the Contract. OWNER'S clarifications and interpretations of the Contract Documents, progress reports, and other Project related documents.
    - b. Keep a diary or log book, recording CONTRACTOR hours on the job site, weather conditions, data relative to questions of Work Directive Changes, Change Orders or changed conditions, list of job site visitors, daily activities, decisions, observations in general and specific observations in more detail as in the case of observing test procedures; and send copies to OWNER.
    - c. Record names, addresses and telephone numbers of all CONTRACTORS, subcontractors and major suppliers of materials and equipment.
  9. *Reports:*
    - a. Furnish OWNER periodic reports as required of progress of the Work and of CONTRACTOR's compliance with the progress schedule and schedule of Shop Drawing and sample submittals.
    - b. Consult with OWNER in advance of schedule major tests, inspections or start of important phases of the Work.
    - c. Draft proposed Change Orders and Work Directive Changes, obtaining backup material from CONTRACTOR and recommend to ENGINEER Change Orders, Work Directive Changes and Field Orders.
    - d. Report immediately to OWNER upon occurrence of any accident.
  10. *Payment Requests:* Review applications for payment with CONTRACTOR for compliance with the established procedure for their submission and forward with recommendations to ENGINEER, noting particularly the relationship of the payment requested to the schedule of values. Work completed, and materials and equipment delivered at the site but not incorporated in the Work.
  11. *Certificates, Maintenance and Operation Manuals:* During the course of the Work, verify that certificates, maintenance and operation manuals and other data required to be assembled and furnished by CONTRACTOR are applicable to the items actually installed and in accordance with the Contract Documents, and have this material



delivered to OWNER for review and forwarding to OWNER prior to final payment for the Work.

C. Limitations of Authority

Resident Project Representative:

1. Shall not authorize any deviation from the Contract Documents or substitution of materials or equipment, unless authorized by OWNER.
2. Shall not exceed limitations of OWNER'S **authority** as set forth in the Contract Documents.
3. Shall not undertake any of the responsibilities of CONTRACTOR, subcontractors or CONTRACTOR's superintendent.
4. Shall not advise on, issue directions relative to or assume control over any aspect of the means, methods, techniques, sequences, storm water management, erosion control or other procedures of construction.
5. Shall not advise on, issue directions regarding or assume control over safety precautions and programs in connection with the Work.
6. Shall not accept Shop Drawings or sample submittals from anyone other than CONTRACTOR.
7. Shall not authorize OWNER to occupy the Project in whole or in part.
8. Shall not participate in specialized field or laboratory tests or inspections conducted by other except as specifically authorized by OWNER.

DEPARTMENT	FUND	VENDOR NAME	DESCRIPTION	AMOUNT
GOVERNMENT ADMINISTRAT	GENERAL	ADVANTAGE COMPUTER	CITY HALL COMPUTER SETUP/I	50.00
		CITY OF GARNETT PETTY CASH	UTILITY BILL POSTAGE	588.64
		DOLLAR GENERAL CORPORATION	CITY HALL JANITORIAL SUPPL	65.40
			JANITORIAL SUPPLY	41.10
		TRAVELERS INSURANCE	COURT CLERK BOND	50.00
		LANDON, HEATHER R.	LANDON, HEATHER R.	300.00
		PYRAMID FOODS/RAMEY/PRICE CUTTER	CITY HALL CUPS/ICE/SUGAR	36.89
			JUDGE ROBE CLEANING	10.85
		TRUSTPOINT INSURANCE	COURT CLERK NOTARY FILING	25.00
		VYVE BROADBAND	CITY HALL INTERNET	155.00
			CITY HALL TELEPHONE	502.70
		VYVE TECHNOLOGY SOLUTIONS	CITY HALL TECH SOLUTIONS	160.20
			TOTAL:	1,985.78
COMMUNITY DEVELOPMENT	GENERAL	SUBURBAN LAWN & GARDEN	COMM DEV LANDSCAPING	161.20
		VYVE TECHNOLOGY SOLUTIONS	COM DEV TECH SOLUTIONS	80.11
			TOTAL:	241.31
PARKS, RECREATION & CE	GENERAL	ANCHOR SALES & SERV CO, INC.	PARK DIRECTOR TRUCK TIRES	498.96
			PARKS TRACTOR TIRES	330.50
		D & S SANITATION LLC	CAMPBGROUND/SOCCER/OPTIMST	255.00
			CAMPGROUND/SOCCER FIELD	170.00
		DOLLAR GENERAL CORPORATION	PARKS TOWELS	23.00
		GENERAL MACHINERY & SUPPLY COMPANY	PARK SAFETY GLASSES (3)	17.97
		GERKEN RENT-ALL PAOLA	PORTABLE TOILET NORTH LAKE	357.50
		HAMPEL OIL DISTRIBUTORS, INC.	PARK EQUIPMENT FUEL	895.46
			PARK VEHICLE FUEL	298.48
			PARKS FUEL	54.16
		HAWKINS, INC.	POOL CHEMICALS	450.06
		KING, KIMBERLY	CHEER PROGRAM/REGISTRATIO	1,240.00
		CINTAS FIRE 636525	REC CENTER LIGHT EXIT/EMER	232.71
		PEPSI-COLA	LATE FEE/MAIL DELAY	26.98
		PYRAMID FOODS/RAMEY/PRICE CUTTER	POOL MASKING TAPE/DRINKS	170.94
		WOLKEN PLBG. & ELECTRIC, INC.	HVAC WEIGHT ROOM	202.85
			TOTAL:	5,224.57
STREET & STORMWATER	GENERAL	GENERAL MACHINERY & SUPPLY COMPANY	STREET (5) HARD HATS	129.95
			STREET HARD HAT LINER	19.95
			STREET EAR PLUGS	32.00
			STREET SAFETY GLASSES (4)	23.26
		HAMPEL OIL DISTRIBUTORS, INC.	STREET FUEL	168.30
		OLATHE WINWATER WORKS CO.	SALT BRINE	1,710.00
		R & S TOOLS	SOFTWARE-SNAP ON 4m@46.75	187.00
		VERMEER GREAT PLAINS	STREET TOOTH	184.20
		VYVE TECHNOLOGY SOLUTIONS	STREET TECH SOLUTIONS	120.16
		WHITAKER AGGREGATES, INC.	CRUSHER RUN/CA-6/WASHED	101.53
			TOTAL:	2,676.35
MUNICIPAL AIRPORT	AIRPORT	SCHETTLER, PAT	AIRPORT TIRE	99.00
			AIRPORT FLAG	26.59
			TOTAL:	125.59
LIBRARY	LIBRARY	BAKER & TAYLOR BOOKS	LIBRARY BOOKS	338.35
		BLACKSTONE PUBLISHING	LIBRARY CD PURCHASES	57.89
			LIBRARY CD PURCHASES	81.89
			LIBRARY CD PURCHASES	69.90

DEPARTMENT	FUND	VENDOR NAME	DESCRIPTION	AMOUNT_
			LIBRARY CD PURCHASE	69.08
			LIBRARY CD PURCHASE	30.95
		CINTAS FIRE 636525	LIBRARY (8) LIGHT COMBO EX	787.76
			LIBRARY (4) LIGHT COMBO EX	403.88
		KS. LIBRARY ASSOCIATION	KS. LIBRARY ASSOCIATION DU	50.00
		MIDWEST TAPE	LIBRARY DIGITAL MATERIAL	430.07
		MILLER HARDWARE	LIBRARY DRILL BIT/MARKERS	10.88
		THE LIBRARY STORE, INC.	LABEL PROTECTORS	74.51
		VYVE BROADBAND	LIBRARY INTERNET	150.00
			LIBRARY TELEPHONE	102.71_
			TOTAL:	2,657.87
FIRE DEPARTMENT	PUBLIC SAFETY	VYVE BROADBAND	FIRE INTERNET	99.95
			FIRE TELEPHONE	12.15_
			TOTAL:	112.10
POLICE DEPARTMENT	PUBLIC SAFETY	ANDERSON CO. SHERIFF'S DEPT.	JAIL HOUSING JULY	210.00
			JULY 2022 LIVE SCAN	150.00
		DIGITAL CONNECTIONS, INC.	POLICE DEPT COPIER	43.34
		MFA OIL CO - PETRO CARD 24	FUEL POLICE DEPARTMENT	921.25
		RICHMOND BODY WORKS	PD DODGE CHARGER 2014	89.00
			DODGE CHARGER 2014	2,919.70
		VYVE BROADBAND	POLICE INTERNET	99.95
			POLICE TELEPHONE	161.82
		VYVE TECHNOLOGY SOLUTIONS	POLICE TECH SOLUTIONS	109.95_
			TOTAL:	4,705.01
SPECIAL HIGHWAY	SPECIAL HIGHWAY	MCCLURE ENGINEERING	TRANSP MASTER PLAN	14,421.50_
			TOTAL:	14,421.50
ELECTRIC PRODUCTION	ELECTRIC	BRUMMEL FARM SERVICE	TORDON RTU	16.00
		CINTAS CORPORATION # 430	POWER PLANT SHOP TOWELS	48.75
			ELEC/POWER PLANT UNIFORM/J	46.66_
			TOTAL:	111.41
ELECTRIC DISTRIBUTION	ELECTRIC	CINTAS CORPORATION # 430	ELECTRIC UNIFORMS	113.67
			SM SHOP TOWELS	6.75
			ELEC/POWER PLANT UNIFORM/J	113.67
			ELEC/POWER PLANT UNIFORM/J	6.75
		CITY OF GARNETT PETTY CASH	ELEC TOOLS PETTY CASH	162.00
		GENERAL MACHINERY & SUPPLY COMPANY	ELEC SAFETY GLASSES (2)	11.98
		HAMPEL OIL DISTRIBUTORS, INC.	ELEC FUEL	318.25
		STANION WHOLESALE ELECT. CO.	ELEC HI LUMEN SHOW BOX	602.44
		WETTSTEIN AUTO & WELDING	THREADED GRIP SERTS -- ELE	53.73_
			TOTAL:	1,389.24
GAS	GAS	GENERAL MACHINERY & SUPPLY COMPANY	GAS SAFETY GLASSES (2)	11.98
		OLATHE WINWATER WORKS CO.	GAS MARKING PAINT	102.00_
			TOTAL:	113.98
SANITATION	SANITATION	HAMPEL OIL DISTRIBUTORS, INC.	SANITATION FUEL	1,177.82_
			TOTAL:	1,177.82
WASTEWATER	WASTEWATER	BRUMMEL FARM SERVICE	SEWER PROMITOL/BUCCANEER	345.00
		GENERAL MACHINERY & SUPPLY COMPANY	WASTEWTR SAFETY GLASSES (1	5.99
		GRAINGER	PUSH BUTTON CONTROL STATIO	42.42



DEPARTMENT	FUND	VENDOR NAME	DESCRIPTION	AMOUNT_
		PYRAMID FOODS/RAMEY/PRICE CUTTER	SEWER WATER TESTING	13.53
		WHITAKER AGGREGATES, INC.	CRUSHER RUN/CA-6/WASHED	547.43_
			TOTAL:	954.37
WATER	WATER	ACCURATE ENVIRONMENTAL LLC	WATER - CHEMICAL	870.18
		EUROFINS EATON ANALYTICAL, INC	INV8100014750	75.00
			INV8100015542	200.00
		HAWKINS, INC.	WATER CHEMICALS	7,497.38
			WATER PLANT CHEMICALS	3,651.42
			WATER PLANT CHEMICALS	6,121.19
		LUNDSCO	WATER LG A TORK TOWELS	32.00
			WATER HAND CLEANER	24.37
			WATER LG A TORK TOWELS	69.44
		MCCLURE ENGINEERING	RESERVOIR EMER SPILLWAY RE	13,692.50
		OLATHE WINWATER WORKS CO.	WATER MARKING PAINT	102.00
			WATER PLUMBING MATERIAL	97.00_
			TOTAL:	32,432.48
ECONOMIC DEVELOPMENT	ECONOMIC DEVELOPME	CITY OF GARNETT PETTY CASH	ECO DEV MEETING	33.06
		VYVE TECHNOLOGY SOLUTIONS	ECO DEV TECH SOLUTIONS	20.03_
			TOTAL:	53.09
PARKSIDE #1	PARKSIDE #1	SMITH, DEBORAH	SMITH, DEB (GHA DEPOSIT RE	542.00
		MILLER HARDWARE	GHA PARKSIDE#1 LIGHT, BLAD	74.46
		QUILL CORPORATION	PARKSIDE 1 JANITORIAL SUPP	51.77
		THOLEN HVAC	THOLEN HVAC	145.00
			GHA PARKSIDE #1 WALL UNIT	1,014.65_
			TOTAL:	1,827.88
PARKSIDE #2	PARKSIDE #2	MILLER HARDWARE	PARKSIDE #2 LIGHTS, BLADE	104.43
		QUILL CORPORATION	PARKSIDE 2 JANITORIAL SUPP	51.77_
			TOTAL:	156.20
PARK PLAZA NORTH	PARK PLAZA NORTH	MILLER HARDWARE	PARK PL NORTH LIGHTS/BLADE	8.96
		QUILL CORPORATION	PARK PL NO.JANITORIAL SUPP	51.78_
			TOTAL:	60.74

DEPARTMENT	FUND	VENDOR NAME	DESCRIPTION	AMOUNT_
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## ===== FUND TOTALS =====

101	GENERAL	10,128.01
102	AIRPORT	125.59
104	LIBRARY	2,657.87
105	PUBLIC SAFETY	4,817.11
106	SPECIAL HIGHWAY	14,421.50
109	ELECTRIC	1,500.65
110	GAS	113.98
111	SANITATION	1,177.82
112	WASTEWATER	954.37
113	WATER	32,432.48
114	ECONOMIC DEVELOPMENT	53.09
115	PARKSIDE #1	1,827.88
116	PARKSIDE #2	156.20
117	PARK PLAZA NORTH	60.74

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GRAND TOTAL:	70,427.29
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TOTAL PAGES: 4

VENDOR SORT KEY	DESCRIPTION	FUND	DEPARTMENT	AMOUNT_
ACCURATE ENVIRONMENTAL LLC	WATER - CHEMICAL	WATER	WATER	870.18_
			TOTAL:	870.18
ADVANTAGE COMPUTER	CITY HALL COMPUTER SETUP/I	GENERAL	GOVERNMENT ADMINISTRAT	50.00_
			TOTAL:	50.00
ANCHOR SALES & SERV CO, INC.	PARK DIRECTOR TRUCK TIRES	GENERAL	PARKS, RECREATION & CE	498.96
	PARKS TRACTOR TIRES	GENERAL	PARKS, RECREATION & CE	330.50_
			TOTAL:	829.46
ANDERSON CO. SHERIFF'S DEPT.	JAIL HOUSING JULY	PUBLIC SAFETY	POLICE DEPARTMENT	210.00
	JULY 2022 LIVE SCAN	PUBLIC SAFETY	POLICE DEPARTMENT	150.00_
			TOTAL:	360.00
BAKER & TAYLOR BOOKS	LIBRARY BOOKS	LIBRARY	LIBRARY	338.35_
			TOTAL:	338.35
BLACKSTONE PUBLISHING	LIBRARY CD PURCHASES	LIBRARY	LIBRARY	57.89
	LIBRARY CD PURCHASES	LIBRARY	LIBRARY	81.89
	LIBRARY CD PURCHASES	LIBRARY	LIBRARY	69.90
	LIBRARY CD PURCHASE	LIBRARY	LIBRARY	69.08
	LIBRARY CD PURCHASE	LIBRARY	LIBRARY	30.95_
			TOTAL:	309.71
BRUMMEL FARM SERVICE	TORDON RTU	ELECTRIC	ELECTRIC PRODUCTION	16.00
	SEWER PROMITOL/BUCCANEER	WASTEWATER	WASTEWATER	345.00_
			TOTAL:	361.00
CINTAS CORPORATION # 430	POWER PLANT SHOP TOWELS	ELECTRIC	ELECTRIC PRODUCTION	48.75
	ELEC/POWER PLANT UNIFROM/J	ELECTRIC	ELECTRIC PRODUCTION	46.66
	ELECTRIC UNIFORMS	ELECTRIC	ELECTRIC DISTRIBUTION	113.67
	SM SHOP TOWELS	ELECTRIC	ELECTRIC DISTRIBUTION	6.75
	ELEC/POWER PLANT UNIFROM/J	ELECTRIC	ELECTRIC DISTRIBUTION	113.67
	ELEC/POWER PLANT UNIFROM/J	ELECTRIC	ELECTRIC DISTRIBUTION	6.75_
			TOTAL:	336.25
CINTAS FIRE 636525	REC CENTER LIGHT EXIT/EMER	GENERAL	PARKS, RECREATION & CE	232.71
	LIBRARY (8) LIGHT COMBO EX	LIBRARY	LIBRARY	787.76
	LIBRARY (4) LIGHT COMBO EX	LIBRARY	LIBRARY	403.88_
			TOTAL:	1,424.35
CITY OF GARNETT PETTY CASH	UTILITY BILL POSTAGE	GENERAL	GOVERNMENT ADMINISTRAT	588.64
	ELEC TOOLS PETTY CASH	ELECTRIC	ELECTRIC DISTRIBUTION	162.00
	ECO DEV MEETING	ECONOMIC DEVELOPME	ECONOMIC DEVELOPMENT	33.06_
			TOTAL:	783.70
D & S SANITATION LLC	CAMPBGROUND/SOCCER/OPTIMST	GENERAL	PARKS, RECREATION & CE	255.00
	CAMPGROUND/SOCCER FIELD	GENERAL	PARKS, RECREATION & CE	170.00_
			TOTAL:	425.00
DIGITAL CONNECTIONS, INC.	POLICE DEPT COPIER	PUBLIC SAFETY	POLICE DEPARTMENT	43.34_
			TOTAL:	43.34
DOLLAR GENERAL CORPORATION	CITY HALL JANITORIAL SUPPL	GENERAL	GOVERNMENT ADMINISTRAT	65.40
	JANITORIAL SUPPLY	GENERAL	GOVERNMENT ADMINISTRAT	41.10
	PARKS TOWELS	GENERAL	PARKS, RECREATION & CE	23.00



VENDOR SORT KEY	DESCRIPTION	FUND	DEPARTMENT	AMOUNT_
			TOTAL:	129.50
EUROFINS EATON ANALYTICAL, INC	INV8100014750	WATER	WATER	75.00
	INV8100015542	WATER	WATER	200.00_
			TOTAL:	275.00
GENERAL MACHINERY & SUPPLY COMPANY	PARK SAFETY GLASSES (3)	GENERAL	PARKS, RECREATION & CE	17.97
	STREET (5) HARD HATS	GENERAL	STREET & STORMWATER	129.95
	STREET HARD HAT LINER	GENERAL	STREET & STORMWATER	19.95
	STREET EAR PLUGS	GENERAL	STREET & STORMWATER	32.00
	STREET SAFETY GLASSES (4)	GENERAL	STREET & STORMWATER	23.26
	ELEC SAFETY GLASSES (2)	ELECTRIC	ELECTRIC DISTRIBUTION	11.98
	GAS SAFETY GLASSES (2)	GAS	GAS	11.98
	WASTEWTR SAFETY GLASSES (1 WASTEWATER		WASTEWATER	5.99_
			TOTAL:	253.08
GERKEN RENT-ALL PAOLA	PORTABLE TOILET NORTH LAKE	GENERAL	PARKS, RECREATION & CE	357.50_
			TOTAL:	357.50
GRAINGER	PUSH BUTTON CONTROL STATIO	WASTEWATER	WASTEWATER	42.42_
			TOTAL:	42.42
HAMPEL OIL DISTRIBUTORS, INC.	PARK EQUIPMENT FUEL	GENERAL	PARKS, RECREATION & CE	895.46
	PARK VEHICLE FUEL	GENERAL	PARKS, RECREATION & CE	298.48
	PARKS FUEL	GENERAL	PARKS, RECREATION & CE	54.16
	STREET FUEL	GENERAL	STREET & STORMWATER	168.30
	ELEC FUEL	ELECTRIC	ELECTRIC DISTRIBUTION	318.25
	SANITATION FUEL	SANITATION	SANITATION	1,177.82_
			TOTAL:	2,912.47
HAWKINS, INC.	POOL CHEMICALS	GENERAL	PARKS, RECREATION & CE	450.06
	WATER CHEMICALS	WATER	WATER	7,497.38
	WATER PLANT CHEMICALS	WATER	WATER	3,651.42
	WATER PLANT CHEMICALS	WATER	WATER	6,121.19_
			TOTAL:	17,720.05
MIDWEST TAPE	LIBRARY DIGITAL MATERIAL	LIBRARY	LIBRARY	430.07_
			TOTAL:	430.07
KING, KIMBERLY	CHEER PROGRAM/REGISTRATIO	GENERAL	PARKS, RECREATION & CE	1,240.00_
			TOTAL:	1,240.00
KS. LIBRARY ASSOCIATION	KS. LIBRARY ASSOCIATION DU	LIBRARY	LIBRARY	50.00_
			TOTAL:	50.00
LANDON, HEATHER R.	LANDON, HEATHER R.	GENERAL	GOVERNMENT ADMINISTRAT	300.00_
			TOTAL:	300.00
HLUNDGO	WATER LG A TORK TOWELS	WATER	WATER	32.00
	WATER HAND CLEANER	WATER	WATER	24.37
	WATER LG A TORK TOWELS	WATER	WATER	69.44_
			TOTAL:	125.81
MCCLURE ENGINEERING	TRANSP MASTER PLAN	SPECIAL HIGHWAY	SPECIAL HIGHWAY	14,421.50
	RESERVOIR EMER SPILLWAY RE	WATER	WATER	13,692.50_
			TOTAL:	28,114.00

VENDOR SORT KEY	DESCRIPTION	FUND	DEPARTMENT	AMOUNT_
MPFA OIL CO - PETRO CARD 24	FUEL POLICE DEPARTMENT	PUBLIC SAFETY	POLICE DEPARTMENT	921.25_
			TOTAL:	921.25
MILLER HARDWARE	LIBRARY DRILL BIT/MARKERS	LIBRARY	LIBRARY	10.88
	GHA PARKSIDE#1 LIGHT, BLAD	PARKSIDE #1	PARKSIDE #1	74.46
	PARKSIDE #2 LIGHTS, BLADE	PARKSIDE #2	PARKSIDE #2	104.43
	PARK PL NORTH LIGHTS/BLADE	PARK PLAZA NORTH	PARK PLAZA NORTH	8.96_
			TOTAL:	198.73
OLATHE WINWATER WORKS CO.	SALT BRINE	GENERAL	STREET & STORMWATER	1,710.00
	GAS MARKING PAINT	GAS	GAS	102.00
	WATER MARKING PAINT	WATER	WATER	102.00
	WATER PLUMBING MATERIAL	WATER	WATER	97.00_
			TOTAL:	2,011.00
PEPSI-COLA	LATE FEE/MAIL DELAY	GENERAL	PARKS, RECREATION & CE	26.98_
			TOTAL:	26.98
PYRAMID FOODS/RAMEY/PRICE CUTTER	CITY HALL CUPS/ICE/SUGAR	GENERAL	GOVERNMENT ADMINISTRAT	36.89
	JUDGE ROBE CLEANING	GENERAL	GOVERNMENT ADMINISTRAT	10.85
	POOL MASKING TAPE/DRINKS	GENERAL	PARKS, RECREATION & CE	170.94
	SEWER WATER TESTING	WASTEWATER	WASTEWATER	13.53_
			TOTAL:	232.21
QUILL CORPORATION	PARKSIDE 1 JANITORIAL SUPP	PARKSIDE #1	PARKSIDE #1	51.77
	PARKSIDE 2 JANITORIAL SUPP	PARKSIDE #2	PARKSIDE #2	51.77
	PARK PL NO.JANITORIAL SUPP	PARK PLAZA NORTH	PARK PLAZA NORTH	51.78_
			TOTAL:	155.32
R & S TOOLS	SOFTWARE-SNAP ON 4m@46.75	GENERAL	STREET & STORMWATER	187.00_
			TOTAL:	187.00
RICHMOND BODY WORKS	PD DODGE CHARGER 2014	PUBLIC SAFETY	POLICE DEPARTMENT	89.00
	DODGE CHARGER 2014	PUBLIC SAFETY	POLICE DEPARTMENT	2,919.70_
			TOTAL:	3,008.70
SCHETTLE, PAT	AIRPORT TIRE	AIRPORT	MUNICIPAL AIRPORT	99.00
	AIRPORT FLAG	AIRPORT	MUNICIPAL AIRPORT	26.59_
			TOTAL:	125.59
SMITH, DEBORAH	SMITH, DEB (GHA DEPOSIT RE	PARKSIDE #1	PARKSIDE #1	542.00_
			TOTAL:	542.00
STANION WHOLESALE ELECT. CO.	ELEC HI LUMEN SHOW BOX	ELECTRIC	ELECTRIC DISTRIBUTION	602.44_
			TOTAL:	602.44
SUBURBAN LAWN & GARDEN	COMM DEV LANDSCAPING	GENERAL	COMMUNITY DEVELOPMENT	161.20_
			TOTAL:	161.20
THE LIBRARY STORE, INC.	LABEL PROTECTORS	LIBRARY	LIBRARY	74.51_
			TOTAL:	74.51
THOLEN HVAC	THOLEN HVAC	PARKSIDE #1	PARKSIDE #1	145.00
	GHA PARKSIDE #1 WALL UNIT	PARKSIDE #1	PARKSIDE #1	1,014.65_
			TOTAL:	1,159.65

VENDOR SORT KEY	DESCRIPTION	FUND	DEPARTMENT	AMOUNT_
TRAVELERS INSURANCE	COURT CLERK BOND	GENERAL	GOVERNMENT ADMINISTRAT	50.00_
			TOTAL:	50.00
TRUSTPOINT INSURANCE	COURT CLERK NOTARY FILING	GENERAL	GOVERNMENT ADMINISTRAT	25.00_
			TOTAL:	25.00
VERMEER GREAT PLAINS	STREET TOOTH	GENERAL	STREET & STORMWATER	184.20_
			TOTAL:	184.20
VYVE BROADBAND	CITY HALL INTERNET	GENERAL	GOVERNMENT ADMINISTRAT	155.00
	CITY HALL TELEPHONE	GENERAL	GOVERNMENT ADMINISTRAT	502.70
	LIBRARY INTERNET	LIBRARY	LIBRARY	150.00
	LIBRARY TELEPHONE	LIBRARY	LIBRARY	102.71
	FIRE INTERNET	PUBLIC SAFETY	FIRE DEPARTMENT	99.95
	FIRE TELEPHONE	PUBLIC SAFETY	FIRE DEPARTMENT	12.15
	POLICE INTERNET	PUBLIC SAFETY	POLICE DEPARTMENT	99.95
	POLICE TELEPHONE	PUBLIC SAFETY	POLICE DEPARTMENT	161.82_
			TOTAL:	1,284.28
VYVE TECHNOLOGY SOLUTIONS	CITY HALL TECH SOLUTIONS	GENERAL	GOVERNMENT ADMINISTRAT	160.20
	COM DEV TECH SOLUTIONS	GENERAL	COMMUNITY DEVELOPMENT	80.11
	STREET TECH SOLUTIONS	GENERAL	STREET & STORMWATER	120.16
	POLICE TECH SOLUTIONS	PUBLIC SAFETY	POLICE DEPARTMENT	109.95
	ECO DEV TECH SOLUTIONS	ECONOMIC DEVELOPME	ECONOMIC DEVELOPMENT	20.03_
			TOTAL:	490.45
WETTSTEIN AUTO & WELDING	THREADED GRIP SERTS -- ELE	ELECTRIC	ELECTRIC DISTRIBUTION	53.73_
			TOTAL:	53.73
WHITAKER AGGREGATES, INC.	CRUSHER RUN/CA-6/WASHED	GENERAL	STREET & STORMWATER	101.53
	CRUSHER RUN/CA-6/WASHED	WASTEWATER	WASTEWATER	547.43_
			TOTAL:	648.96
WOLKEN PLBG. & ELECTRIC, INC.	HVAC WEIGHT ROOM	GENERAL	PARKS, RECREATION & CE	202.85_
			TOTAL:	202.85



VENDOR SORT KEY	DESCRIPTION	FUND	DEPARTMENT	AMOUNT_
===== FUND TOTALS =====				
101	GENERAL	10,128.01		
102	AIRPORT	125.59		
104	LIBRARY	2,657.87		
105	PUBLIC SAFETY	4,817.11		
106	SPECIAL HIGHWAY	14,421.50		
109	ELECTRIC	1,500.65		
110	GAS	113.98		
111	SANITATION	1,177.82		
112	WASTEWATER	954.37		
113	WATER	32,432.48		
114	ECONOMIC DEVELOPMENT	53.09		
115	PARKSIDE #1	1,827.88		
116	PARKSIDE #2	156.20		
117	PARK PLAZA NORTH	60.74		
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	GRAND TOTAL:	70,427.29		
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TOTAL PAGES: 5

PAYROLL:	\$115,058.36
BILLS:	\$70,427.29
VYVE DRAFT:	(\$1,284.28)
TOTAL:	\$184,201.37