

Sun City Technical Assistance

Kansas Department of Agriculture,
Division of Water Resources

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Prepared for:

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Table of Contents

Introduction	4
Approach	4
Costs and Schedule	5
Final Deliverables.....	5

Tables

Table 1: Task Costs	5
Table 2: Baseline Schedule	5

Introduction

Sun City, Kansas has recently experienced flooding throughout the city. A report provided from the mayor of Sun City, Michael Wayne, outlines the current issues they are facing and how the flood is being routed through the city. The flood waters are coming from Turkey Creek northwest of the city. The flooding from Turkey Creek runs east along both sides of the railroad embankment toward the city. The flood waters eventually cross Sun City road and work their way through the city, eventually discharging back into the Medicine Lodge River southeast of Elm Street.

Sun City has requested technical assistance to analyze the flooding issues in the town and to determine possible mitigation efforts that could reduce the flood hazard in the city. AECOM will perform this analysis through a Technical Assistance grant from the Kansas Department of Agriculture (KDA), Division of Water Resources to provide Sun City with multiple options for mitigation and associated costs. AECOM will participate in a planning meeting with representatives from the City of Sun City and KDA prior to analyzing flood risk and mitigation. Using feedback from the planning meeting and existing 2D base level engineering (BLE) model data, AECOM will perform hydraulic analyses of several mitigation scenarios using HEC-RAS 5.0.7 2D modeling. The modeling will then be used to develop a report summarizing the scenarios, mitigation, actions, high-level estimated design/construction costs and estimated impacts of the mitigation efforts.

Approach

Pre-Planning and Community Meeting

AECOM will review the report from Michael Wayne about current flooding issues and develop initial mitigation strategies internally. An initial planning meeting will be conducted with the City of Sun City and KDA through virtual means. The community meeting will be used to solicit feedback from the community on flood effects and discuss potential mitigation actions. After consideration of topics discussed in the meeting, AECOM will develop mitigation scenarios to be analyzed with HEC-RAS 2D hydraulic modeling.

Data Development

AECOM will begin data development after the community meeting has been conducted. AECOM will utilize HEC-RAS 5.0.7 to perform 2D hydraulic analyses of the area of interest. The previous 2D BLE model 'ML-1' from the Lower Arkansas Custom Watershed project will be leveraged as the base flood condition to compare flooding impacts with other possible mitigation scenarios. The hydrology inputs will remain the same as the previous 2D BLE model and will stay consistent for each possible scenario. AECOM will build 2D models for each possible mitigation scenario that may include levees, detention ponds, culvert improvement, and/or drainage ditches. Terrain modification may be required for some scenarios. AECOM will use GIS-based tools to modify terrain and used in modeling for mitigation scenarios. Each mitigation scenario may also require hydraulic edits such as incorporating breaklines or structures to best represent the respective mitigation scenario. Several iterations of model runs may be necessary for a given mitigation scenario. Once the models representing each scenario are finalized, the 2D model results will be used to create Depth, Water Surface Elevation, and Velocity grids for each mitigation strategy.

Reporting and Design/Build Estimate

AECOM will develop a report to describe the engineering methods and assumptions used to create the 2D modeling mitigation scenarios. The report will also include mapping exhibits of each scenario. AECOM will analyze the effectiveness of each mitigation strategy to reduce the flood hazard in Sun City. High-level design/build cost estimates will also be provided for each scenario. The cost and the resulting impacts on the flood hazard will be compared to determine the efficiency of each mitigation possibility.

Post-Modeling Meeting

AECOM will conduct a virtual meeting to discuss the findings of the mitigation assessment. The modeling process and results of the proposed mitigation strategies will be shared. Advantages and disadvantages of each scenario will be presented to the City of Sun City so they may determine an actionable plan appropriate for their needs.

Costs and Schedule

The costs associated with the tasks defined in the approach are listed in Table 1.

Scope Element	Cost
Pre-planning Meeting	\$1,000
Scenario-based Modeling	\$16,000
Reporting	\$2,000
Post-Modeling Meeting	\$1,000
Total Cost	\$20,000

Table 1: Task Costs

AECOM estimates the schedule in Table 2 to complete the City of Sun City Technical Assistance. This schedule assumes pre-planning and meeting with Sun City, KDA, and AECOM to be completed by the end of May 2020, modeling to be completed by the end of July 2020, reporting to be completed by the end of August 2020, and a final meeting to be completed in September 2020.

Scope Element	Start Date	End Date
Pre-planning Meeting	May 15, 2020	May 31, 2020
Scenario-based Modeling	June 1, 2020	July 31, 2020
Reporting	August 1, 2020	August 31, 2020
Post-Modeling Meeting	September 1, 2020	September 30, 2020
Total Cost		\$20,000

Table 2: Baseline Schedule

Final Deliverables

Deliverables from the Technical Assistance will include:

- 2D HEC-RAS models for each scenario analyzing the 1% and 0.2% annual exceedance probability events
- 1% and 0.2% AEP Water Surface Elevation Rasters for each mitigation scenario
- 1% and 0.2% AEP Depth Rasters for each mitigation scenario
- 1% and 0.2% AEP Velocity Rasters for each mitigation scenario
- Mapping exhibit for each scenario
- Final Report outlining engineering methods, results, and estimated design/build costs
- 2 virtual community meetings to inform community