

APPENDIX A
SCOPE OF STUDY FOR
KANSAS AQUEDUCT STUDY

11152013

INTRODUCTION

The U.S. Department of Commerce conducted the Six-State High Plains-Ogallala Aquifer Regional Resources Study (also known as the “Six State” or “1982 High Plains Study”) which included an examination of a Missouri River water diversion and an aqueduct to western Kansas. Under the 1982 concept water would be diverted during Missouri River flows occurring over and above the navigation requirement, then be stored and transferred to western Kansas (and/or other western states) and eventually be used to help offset the rate of depletion occurring in the Ogallala Aquifer. The U.S. Army Corps of Engineers (USACE) Kansas City District assisted in the 1982 High Plains Study, as authorized by the Water Resources Development Act of 1976, by preparing the Reconnaissance Study for Water Transfer from the Missouri River to Western Kansas in September, 1982.

Under the Corps 1982 Reconnaissance Study, quantification of water availability was simplified through assumptions. Availability would occur when Missouri River flows exceeded the base flow established for navigation, i.e. “Withdrawals from the Missouri River would not be taken when the stream flow was equal to or less than an established navigation base flow.” Storage of the diverted water would take place in a source reservoir 35 miles upstream of St Joseph, Missouri, and would then eventually undergo aqueduct transfer 360 miles westward to a terminal reservoir in western Kansas to support aquifer recharge, crop irrigation and other beneficial water uses.

PURPOSE AND SCOPE OF STUDY

This PAS Study will be known as the “Kansas Aqueduct Study.” This PAS study will update certain components of the 1982 High Plains Study, especially those which directly relate to the water transfer routing plan in the original USACE-developed Water Transfer Element of the High Plains Study; and will specifically focus on the “Kansas Alternative B South Route” plan as described in that 1982 documentation. At that time, the “Kansas Alternative B South Route” had one of the lowest investment costs, the least expensive energy cost, the lowest unit cost (dollars per acre-foot) for water transfer, and the shortest transfer distance at 360 miles. The PAS study will evaluate a baseline condition and future conditions including, but not limited to, technical, legal, political, environmental, economic, and related planning characteristics of the “Kansas Alternative B South Route.” It is conceivable that this PAS study may proffer recommendations for additional study, if warranted, in order to better understand the risks, costs, and benefits of constructing the Kansas aqueduct.

The study is generally arranged into two groups of tasks: a) State of Kansas led tasks and b) Corps of Engineers led tasks. Schedules for the two task groups will overlap and selected tasks will be conducted concurrently.

- The State of Kansas will generally lead tasks related to the formation of a Stakeholder Advisory Committee and a legislative/political review and analysis of project feasibility. The State will oversee evaluation of the “Kansas Alternative B South Route” plan in terms of political acceptance at the local, state, and Federal level and the potential implications from a perspective of interstate and other water rights issues. The State will also lead analysis of potential project financing, water demand, environmental clearances (tasks 1, 2, 3, and 4) and provide support in the data collection and report preparation (tasks 8 and 9) .
- The Corps of Engineers will generally lead the tasks and supporting studies related to the technical and engineering aspects, economic benefits, and estimated project cost. The Corps will produce the documentation necessary to capture study findings, conclusions, and any forthcoming recommendations (tasks 5, 6,7 ,8, and 9).

Task 1 – Legislative Review

This task would provide a preliminary review to determine whether a Kansas Aqueduct concept conflicts with existing legislation such as the State Appropriation Act, as well as, interstate water compacts. This preliminary review may identify areas of potential conflict regarding the aqueduct that could warrant a more comprehensive review. The 1982 study did not address these water compact issues.

There may also be a need to investigate legislation that would be required for storing water in existing lakes and reservoirs along the aqueduct route. Legislation in the Pick Sloan Act and flood control will also need to be identified with relation to plans for aqueduct water transfer. Legislation related to water quality and potential impacts to streams along the aqueduct corridor will also be addressed here at a general level and in more detail in Task 4 Environmental Constraints.

Investigations will also be needed to determine the institutional options available to construct, operate, and maintain an aqueduct that has taxing and eminent domain authority.

Task 2 – Political Assessment and Stakeholder Coordination

A Stakeholder Advisory Committee would be formed comprised of individuals from communities located geographically within the Ogallala Aquifer study area and in areas along the proposed project route. Stakeholders selected would represent various use and interest categories such as city and county government, public utilities, industries, agriculture, and financial institutions. In addition to being involved in reviewing the findings from the technical, environmental, financial, and legal reviews, the committee would assist in identifying the other issues impacting the feasibility of the Kansas Aqueduct project. This task would also include interstate coordination regarding any water transfer plans developed under this study.

The Stakeholder Advisory Committee would be directly involved in the assessment of the project’s political acceptability and the potential project financing sources across the local, state

and federal levels. Examination of secondary uses of the transferred water to include wildlife water supply and other industrial and municipal purposes maybe be explored.

Landowners along the aqueduct corridor and in proximity to support infrastructure would be identified in the initial stages of this study and a database and communication plan will be developed to ensure communication of the status of the aqueduct planning process to this stakeholder group. This task will also address a methodology and develop an initial approach for identifying benefits and costs that would accrue to areas within the aqueduct corridor and the Kansas Ogallala Aquifer Region.

Task 3 – Water Demand Analysis

Water demand for both existing as well as new irrigation and other purposes in the region will be updated and forecasted to determine overall potential demand. Current water demand at all levels of industrial, residential, and in the agricultural sector would need to be identified and forecasted. Demand for agriculture use in addition to irrigation including dairies, swine, beef cattle production and other agricultural industries will also be identified. Existing and forecasted water demand from communities, i.e. Wichita, Hays, etc., located along the aqueduct corridor would also be determined in terms of future water needs for these communities.

A gap analysis would be developed based on the water availability and water demand forecast for all sectors along the Ogallala Aqueduct service area.

Task 4 – Environmental Constraints

Based on the study area configuration boundaries identified and facility characteristics developed in prior task, a broad-brush assessment will be made of the potential environmental concerns associated with the construction of the facility. National Environmental Policy Act, Section 404, jurisdictional waters determination, Historic Preservation Act Section 106 concurrence, and other environmental compliance will be addressed in terms of identifying initial regulatory requirements for the overall water transfer system.

The 1982 Ogallala Aquifer Study conducted an inventory of environmental constraints that can be updated in this current study. These updates may identify a need to modify the existing southern route alignment in order to avoid sensitive environmental resources.

Task 5 – Water Availability

This task will make estimates and projections of the amount of water available at flow levels over and above the Missouri River's navigation requirements. This would require analysis of USGS gages along the Missouri River. This analysis will estimate the potential amount of water available from the Missouri River at a water transfer diversion site upstream of St Joseph, Missouri (on the right bank near White Cloud, Kansas).

Estimates made in the 1982 study will be revised to reflect current conditions. The 1982 study estimated a range of potential transfer quantities from 1.615 million acre-feet annually (MAFA)

(projected available supply) to 3.404 MAFA (maximum demand) for the Kansas Alternative B South Route aqueduct system. New baseline data will require updating such factors as the holding capacity of system source reservoirs, size of the transfer feature (canal or aqueduct) and the capacity of the pumping system.

Task 6 – Water Transfer System and Alternative Features

The “water transfer system” is defined as source and terminal reservoirs and the actual conveyance aqueduct and any associated conveyance facilities. This task will be closely coordinated with task 4 and task 7 using an iterative review process.

Source Reservoir: The 1982 plan called for a lake 2.5 miles southeast of White Cloud, Kansas, with a design capacity of 700,000 acre-feet requiring a surface area of 13,000 acres and a land requirement of 19,000 acres for the entire feature. Required intake structures and all aspects of the operation of the lake will be taken into consideration for an analysis of alternative approaches to the 1982 report recommendation. Updated computer modeling in terms of water availability and water demand may require resizing and modifications to the design of the source reservoir. Alternatives to use of a reservoir will be evaluated.

Aqueduct and Associated Conveyance Facilities: The primary water transfer means proposed in the 1982 Kansas Alternative B South Route plan is an open aqueduct/canal with a trapezoidal, concrete -lined structure 137 feet across and 23 feet deep providing a capacity of 6,830 CFS and running for 360 miles westward with 16 pump stations and one hydropower station. A review will be made of the canal alignment and all features of that 1982 plan to determine impacts to farm land, transportation routes, cities, and wildlife habitat. Alternatives to a canal such as pipelines will be evaluated.

Terminal Reservoir: The terminal reservoir would store water at the end of the water transfer system until it is needed. The land requirements for the reservoir was based on typical seasonal irrigation water needs for the high plains region and would range between 23,000 to 35,500 acres of land to store water to meet seasonal demand.

Task 7 – Cost Estimates

Based on current study updates and the 1982 Kansas Alternative B South Route plan and any current modifications thereto, a new baseline cost estimate for the entire water transfer system will be developed. The cost estimate will include a breakout of all construction related costs, anticipated annual recurring costs for maintenance and repair of the overall system, and energy costs. A resulting cost per acre foot of water delivered will be calculated using appropriate availability and delivery factors. The cost estimate is considered a critical product for effective governmental decisions.

Estimate costs associated with potential environmental mitigation requirements will be developed. These mitigation requirements are developed under a separate environmental task item below. This will involve a variety of discussions at the local, state and federal level so as to

adequately identify these costs. Development of appropriate simplifying assumptions may be necessary.

Included within this overall task is the development of a cost estimate risk analysis which identifies those areas of significant project risk and the associated affects on projects cost uncertainty. Also develop risk mitigation strategies that may help reduce cost estimate uncertainties in the longer-term.

Task 8 – Field Data Collection, GIS Development and Base Mapping

This task would include any field data collection necessary to support the overall Kansas Aqueduct analysis and the mapping efforts needed for this PAS study. Available GIS information would be used to the extent available and practical during the development of base mapping for the identified study areas and the water transfer corridor. A GIS map will be prepared for the alignment and support facilities for the water transfer system to include existing topographical and man-made features which must be considered in the aqueduct routing analysis. User-friendly maps and associated geographically-based illustrations of key study concepts and findings are a critical product.

Task 9 Study Documentation, Reports and Support for Meetings

The results of this PAS study will be submitted in technical memorandums and a draft and final report. Technical memorandums and PowerPoint formatted slides will be used to present the study findings for individual tasks as they are completed in order to provide review and input as the study progresses through completion of tasks.

This task includes the necessary personnel and logistical support to accomplish effective in-progress and final presentations to the Kansas Water Authority, the stakeholder group, and various other presentation forums for interested parties. The Corps will work closely with the State of Kansas to set study meeting agendas.

LIMITATIONS

The current study will **not** address: hydropower potential, examination of water distribution systems supplying end-users from the terminal reservoir, multi-purpose benefit trade-off evaluation, NEPA-compliance documentation, nor detailed federal NED feasibility analysis.

PROJECT MANAGEMENT AND QUALITY CONTROL.

The Corps will manage this study in accordance with requirements for the Planning Assistance to States Program. The Corps will hold meetings with participants and technical elements to review progress, prepare budget information, and report on or discuss the progress of the study. The Corps will develop appropriate quality control plans and project management information and reports as required by Corps guidance for effective product development, scheduling, and project programming actions. This task includes Corps technical contract oversight and administration if and when contract support is needed.

STUDY BUDGET AND SCHEDULE ESTIMATES.

As required by Federal law, a non-Federal Sponsor must bear an equal share of the cost of this PAS study. It is estimated that the study would require 12 to 18 months to complete. The total cost of the study will not be increased without the mutual approval of the Sponsor and the Corps of Engineers. The budget estimates for study tasks are estimates subject to further adjustment after development of detailed labor and any architect-engineer contract cost requirements pursuant to the Agreement. The study cost estimate and matrix of task responsibilities is shown in Appendix B.

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**APPENDIX B
COST ESTIMATE**

**COST SHARING AGREEMENT FOR PLANNING ASSISTANCE
BETWEEN THE U.S. ARMY CORPS OF ENGINEERS
AND THE KANSAS WATER OFFICE
FOR
KANSAS AQUEDUCT STUDY**

	COST
STATE OF KANSAS - Tasks 1-4	\$75,000
Task 1 – Legislative Review	
Task 2 - Political Assessment and Stakeholder Coordination	
Task 3 – Water Demand Analysis	
Task 4 - Environmental Constraints	
CORPS OF ENGINEERS AND AE FIRM Tasks 5-9	\$205,000
Task 5 - Water Availability	
Task 6 - Water Transfer System and Alternative Features	
Task 7 - Cost Estimates	
Task 8 - Field Data Collection, GIS Development and Base Mapping	
Task 9 - Study Documentation, Reports and Support for Meetings	
Project Management	\$20,000
TOTAL ESTIMATED PROJECT COSTS	\$300,000
TOTAL ESTIMATED FEDERAL COSTS (50%)	\$150,000
TOTAL ESTIMATED NON-FEDERAL COSTS (50%)	\$150,000
Cash	\$75,000
Work in Kind	\$75,000