DECISION DOCUMENT AND IMPLEMENTATION PHASE REVIEW PLAN

for

CUP MCCOOK RESERVOIR, ILLINOIS FLOOD RISK MANAGEMENT PROJECT

Chicago District

January 2013

US Army Corps of Engineers ®

DECISION DOCUMENT AND IMPLEMENTATION PHASE REVIEW PLAN

CUP MCCOOK RESERVOIR, ILLINOIS
FLOOD RISK MANAGEMENT PROJECT
Planning, Design and Construction Activities

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1. PURPOSE AND REQUIREMENTS

a. Purpose. This Decision Document and Implementation Phase Review Plan defines the scope and level of peer review for the design and construction activities of the CUP McCook Reservoir Project. It also includes activities to develop the Operation and Maintenance Manuals for the project.

b. References

(1) Engineer Circular (EC) 1165-2-214, Civil Works Review Policy, 15 December 2012.
(2) Engineer Regulation (ER) 1110-1-12, Quality Management, 31 July 2006.
(3) CUP McCook Reservoir Project, Project Management Plan.
(4) CUP McCook Reservoir Project, Special Re-evaluation Report, February 1999.
(5) CUP McCook Reservoir Project, Limited Reevaluation Report (LRR), October 2011.
(6) CUP McCook Reservoir Map Exhibit, November 2012.

c. Requirements. This review plan was developed in accordance with EC 1165-2-214, which establishes an accountable, comprehensive, life-cycle review strategy for Civil Works products by providing a seamless process for review of all Civil Works projects from initial planning through design, construction, and Operation, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R). It provides the procedures for ensuring the quality and credibility of U.S. Army Corps of Engineers (USACE) decision, implementation, and operations and maintenance documents and work products. The EC outlines four general levels of review: District Quality Control/Quality Assurance (DQC), Agency Technical Review (ATR), Independent External Peer Review (IEPR), and Policy and Legal Compliance Review. In addition to these levels of review, decision documents are subject to cost engineering review and certification (per EC 1165-2-214) and ensuring that planning models and analysis are compliant with Corps policy, theoretically sound, computationally accurate, transparent, described to address any limitations of the model or its use, and documented in study reports (per EC 1105-2-412).

(1) District Quality Control (DQC). DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). Basic quality control tools include Quality Control Plan (QCP) and Quality Assurance Plan (QAP) providing for seamless review, quality checks and reviews, supervisory reviews, and Project Delivery Team (PDT) reviews. It is managed in the home district. Quality checks may be performed by staff responsible for the work, such as supervisors, work leaders, team leaders, designated individuals from the senior staff, or other qualified personnel. However, they are not to be performed by the same people who performed the original work, including managing/reviewing the work in the case of contracted efforts. Additionally, the PDT is responsible for a complete reading of any reports and accompanying appendices prepared by or for the PDT to assure the overall coherence and integrity of the report, technical appendices, and the recommendations before approval by the District Commander. The Major Subordinate Command (MSC) Regional Business Process/District Quality Control Process addresses the conduct and documentation of this fundamental level of review.

(2) Agency Technical Review (ATR). ATR is an in-depth review, managed within USACE, and conducted by a qualified team outside of the home district that is not involved in the day-to-day production of the project/product. The purpose of this review is to ensure the proper application of clearly established criteria, regulations, laws, codes, principles and professional practices. The ATR team reviews the various work products and assure that all the parts fit together in a coherent whole. ATR teams will be comprised of senior USACE personnel,

preferably recognized subject matter experts with the appropriate technical expertise such as regional technical specialists (RTS), and may be supplemented by outside experts as appropriate. To assure independence, the leader of the ATR team shall be from outside the home MSC.

(3) Independent External Peer Review (IEPR). IEPR is the most independent level of review, and is applied in cases that meet certain criteria where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside of USACE is warranted. For clarity, IEPR is divided into two types, Type 1 is generally for decision documents and Type II is generally for implementation documents.

- Type I IEPR is conducted on project studies. It is of critical importance for those decision documents and supporting work products where there are public safety concerns, significant controversy, a high level of complexity, or significant economic, environmental and social effects to the nation. However, it is not limited to only those cases and most studies should undergo Type I IEPR. The requirement for Type I IEPR is based upon Section 2034 of WRDA 2007, the OMB Peer Review Bulletin and other USACE policy considerations. Type I IEPR reviews are managed outside the USACE, panel members will be selected by an Outside Eligible Organization (OEO) using the National Academies of Science (NAS) policy for selecting reviewers. The panels will conduct reviews that cover the entire project concurrent with the product development. For IEPR on decision documents, the RMO will be the appropriate PCX.

- A Type II IEPR (SAR) shall be conducted on design and construction activities for hurricane and storm risk management and flood risk management projects, as well as other projects where potential hazards pose a significant threat to human life. This applies to new projects and to the major repair, rehabilitation, replacement, or modification of existing facilities. External panels will review the design and construction activities prior to initiation of physical construction and periodically thereafter until construction activities are completed. The review shall be on a regular schedule sufficient to inform the Chief of Engineers on the adequacy, appropriateness, and acceptability of the design and construction activities for the purpose of assuring that good science, sound engineering, and public health, safety, and welfare are the most important factors that determine a project's fate.

2. PROJECT INFORMATION

a. Project Description. The authorized project consists of a reservoir to reduce flood damages within the Tunnel and Reservoir Plan (TARP) Mainstream and Des Plaines combined sewer areas. This area includes most of the City of Chicago and 36 surrounding suburban communities. This 252 square mile area contains over 3,000,000 people and over 1,240,000 housing units. During storm events, area watercourses do not have adequate capacity. This causes high water levels on the watercourses and backup of the combined sewer system into basements and streets. Discharge of combined sewer overflow also causes poor water quality in the watercourses. These problems cause an estimated $188 million in damages every year. The design of the 22,000 acre-foot McCook Reservoir was recommended in the February 1999 Special Reevaluation Report and Final Environmental Impact Statement (SRR/EIS). The reservoir will store floodwater from the Tunnel and Reservoir Plan (TARP) tunnel system of the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC). The project will be constructed in two stages, referred to as Stage 1 and Stage 2. Stage 1 will include a fully functioning flood storage reservoir with all connections to tunnels and pumping

facilities. Stage 2 will provide more storage volume and will be completed after mining operations in the area are complete.

b. General Site Location. The CUP McCook Reservoir project is located in central west Cook County, Illinois within the Village of Hodgkins. The reservoir will use land currently occupied by a portion of the Lawndale Avenue Solids Management Area (LASMA) solids drying lagoons. The lagoons are located between the Des Plaines River and the Chicago Sanitary and Ship Canal. All the project surface features are located on property owned by MWRDGC. The conveyance tunnels and some of the monitoring wells are the only features that are located on or under properties owned by other parties. See Figure 1 below for Project Map.

c. Factors Affecting the Scope and Level of Review. Construction for the McCook Project began in the early 2000's. Stage 1 of the reservoir is expected to be completed by 2016, but it is dependent upon the rate of mining of the reservoir area by the local sponsor. Stage 2 of the reservoir will be completed in 2026 according to the current schedule.

Approximately 50% of the project has been constructed. The IEPR II review team will ensure that the Reservoir Project will function according to the authorized purpose and that it will meet current safety standards.

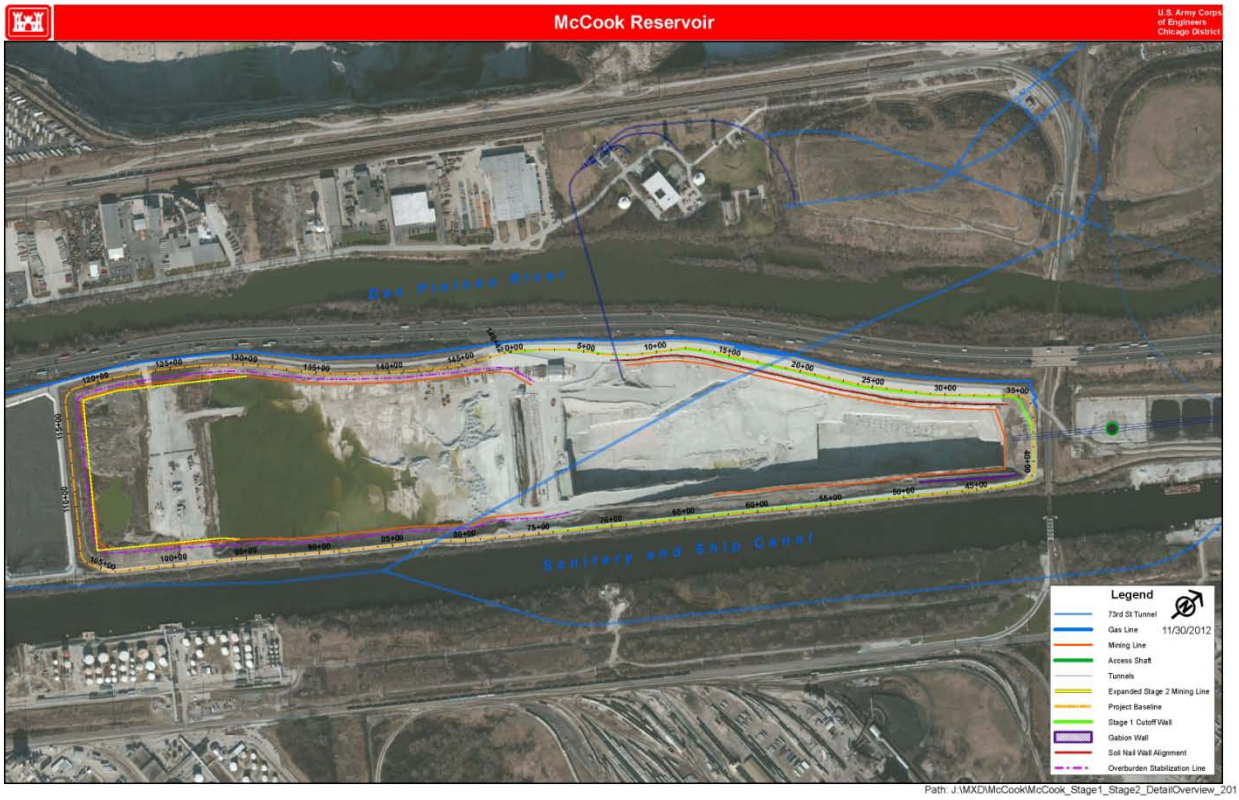

Figure 1 Project Map

d. Recommended Plan. The major construction features of the recommended plan include tunnels, gates, pumps, aquifer protection, hydraulic structures, rock wall stabilization, and aeration. The recommended plan was generally described in the 1999 Special Re-evaluation Report and Environmental Impact Statement (SRR-EIS). The plan was elaborated in the project Design Documentation Report (DDR). Subsequently the designs of the DDR were further developed into

plans and specifications for construction according to funding and the PMP. Value Engineering Studies were also performed on all features of the project and most notably resulted in changes to the original design for the project aeration system.

e. Products. A summary of the project phases and products are shown in Attachment 5 to this document. The list of the products includes status of the design or construction phase and ATR/ITR completion dates.

f. Factors Affecting the Scope and Level of Review. Reviews will be conducted for the project for technical adequacy and with respect to public health, safety, and welfare. Failure of the reservoir to maintain public health, safety, and welfare is most likely through one of two ways. First, the project aquifer protection could fail leading to CSO contamination of the groundwater in areas adjacent to the reservoir which includes the Des Plaines River. Second, failure of operational components of the reservoir could lead to conditions similar to the current "without project" condition. If the reservoir is taken off line for any reason, the Mainstream and Des Plaines tunnel systems could be overwhelmed during storm events leading to flooding and area watercourse contamination by CSO. In addition, basement flooding has been known to cause deaths through electrocution.

g. In-Kind Contributions. The Non Federal Cost Share Sponsor for this project is the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC).

3. REVIEW MANAGEMENT ORGANIZATION (RMO) COORDINATION

The RMO is responsible for managing the overall peer review effort described in this Review Plan. The RMO for ATRs shall be the MSC as stated in EC 1165-2-214, paragraph. 9.c.(2). The RMO for the LRR Decision Document ATR and associated Type I IEPR will be the Flood Risk Management (FRM) PCX as stated in EC 1165-2-214, paragraph. 9.c.(1)., and paragraph 11.(d.). The RMO for the SAR Type II IEPR shall be the USACE Risk Management Center (RMC) as stated in EC 1165-2-214, Appendix E, paragraph 1.b.

4. DISTRICT QUALITY CONTROL (DQC)

All products shall undergo DQC. DQC efforts will include the necessary expertise to address compliance with published Corps policy. DQC was performed on all of the completed projects and will be performed on all the remaining work products of the project.

a. Documentation of DQC. Comments and responses from peer and Chief's reviews for the design products shall be documented and maintained in shared electronic folders. The design product PDT member checklist will be completed and signed by the Section Chiefs. All calculations will be checked and initialed by the reviewer.

b. Products to Undergo DQC. DQC shall be performed on all design products consistent with the Regional Business Process and Chicago District Quality Control Process..

5. AGENCY TECHNICAL REVIEW (ATR)

a. General. ATR reviews shall be performed in accordance with EC 1165-2-214. ATR will be managed within USACE by the designated RMO. ATR teams will be comprised of senior USACE personnel and may be supplemented by outside experts as appropriate. Members of the ATR team will be from outside the Chicago District. The ATR lead will be from outside the Great Lakes & Ohio River Division. The ATR shall ensure that the product is consistent with established criteria,

guidance, procedures, and policy. The ATR will assess whether the analyses presented are technically correct and comply with published USACE guidance, and that the document explains the analyses and the results in a reasonably clear manner for the public and decision makers. The ATR review is intended to be on going throughout product development, using a team concept, not a cumulative process performed at the end. The McCook Reservoir project has spanned nearly 30 years and technical review requirements and policies have changed over the years. The required technical reviews were completed for the products during the design phase. Prior to the ATR policy released in January 2010, Internal Technical Review (ITR) was performed on some of the products and the certification dates are documented in Attachment 5.

b. Products for Review. All products under the McCook Reservoir project are listed in Attachment 5. Technical reviews (ATR/ITR) were done for all the completed design and construction products on the dates shown in Attachment 5. The list also includes products that have not yet been completed. ATR reviews will be conducted separately for these products according to the scheduled dates shown. The Chicago District will maintain the same ATR team for each product, if possible, but ultimately coordination of ATR is the responsibility of the RMO .

(1) The following documents are scheduled to undergo ATR according to schedules contained in the individual document QCP and as shown in Attachment 6.

- McCook Final Reservoir Preparation Plans and Specs (currently under development).
- McCook Alternate Des Plaines System Reservoir Inflow Tunnel Plans and Specs (currently under development).
- McCook Reservoir Water Control Manual (currently under development).
- McCook Reservoir Operation and Maintenance Manual (currently under development).

c. Required ATR Team Expertise. ATR teams will comprise senior USACE personnel (Regional Technical Specialists (RTS), Subject Matter Expect (SME), etc.), and may be supplemented by outside experts as appropriate. The disciplines represented on the ATR team will reflect the significant disciplines involved in the planning, engineering, design, and construction effort. These disciplines include civil, geotechnical, structural, hydraulics and hydrology, and cost engineering. The ATR team required expertise and the list of the ATR members and disciplines are provided in Attachment 1. The chief criterion for being a member of the ATR team is knowledge of the technical discipline and relevant experience.

d. Documentation of ATR. DrChecks review software will be used to document all ATR comments, responses and associated resolutions accomplished throughout the review process. Comments should be limited to those that are required to ensure adequacy of the product. The four key parts of a quality review comment will normally include:

(1) The review concern – identify the product's information deficiency or incorrect application of policy, guidance, or procedures;
(2) The basis for the concern – cite the appropriate law, ASA (CW)/USACE policy, guidance or procedure that has not been properly followed;
(3) The significance of the concern – indicate the importance of the concern with regard to its potential impact on the plan selection, recommended plan components, efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, Federal interest, or public acceptability; and
(4) The probable specific action needed to resolve the concern – identify the action(s) that must take to resolve the concern.

In some situations, especially addressing incomplete or unclear information, comments may seek clarification in order to then assess whether further specific concerns may exist. The ATR documentation in DrChecks will include the text of each ATR concern, the PDT response, a brief summary of the pertinent points in any discussion, including any vertical coordination, and lastly the agreed upon resolution. The ATR team will prepare a Review Report which includes a summary of each unresolved issue; each unresolved issue will be raised to the vertical team for resolution. Review Reports will be considered an integral part of the ATR documentation.

ATR may be certified when all ATR concerns are either resolved or referred to the vertical team for resolution and the ATR documentation is complete. Certification of ATR should be completed, based on work reviewed to date, for the draft and final document. A Certification of ATR is included in ATTACHMENT 2.

6. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)

a. General. IEPR may be required for decision documents and/or design and construction activities under certain circumstances. IEPR is the most independent level of review, and is applied in cases that meet certain criteria where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside of USACE is warranted. A risk-informed decision, as described in EC 1165-2-214, is made as to whether IEPR is appropriate. IEPR panels will consist of independent, recognized experts from outside of the USACE in the appropriate disciplines, representing a balance of areas of expertise suitable for the review being conducted. The two types of IEPR are discussed above in Paragraph 1c, *Requirements*.

b. Decision on Type I IEPR. A Type I IEPR will be done for the Limited Re-evaluation Report (LRR) planned for the CUP McCook Reservoir Project. The LRR is at the beginning stages and does not have a completion schedule associated with it at this time. As soon as more information about the LRR becomes available, this Review Plan will be updated.

c. Products to Undergo Type I IEPR. LRR for the CUP McCook Reservoir Project.

d. Documentation of Type I IEPR: The IEPR panel will be selected and managed by an Outside Eligible Organization (OEO) per EC 1165-2-214, Appendix D. Panel comments will be compiled by the OEO and should address the adequacy and acceptability of the economic, engineering and environmental methods, models, and analyses used. IEPR comments should generally include the same four key parts as described for ATR comments in Section 4.d above. The OEO will prepare a final Review Report that will accompany the publication of the final decision document and shall:

- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers;
- Describe the nature of their review and their findings and conclusions; and
- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

The final Review Report will be submitted by the OEO no later than 60 days following the close of the public comment period for the draft decision document. USACE shall consider all recommendations contained in the Review Report and prepare a written response for all

recommendations adopted or not adopted. The final decision document will summarize the Review Report and USACE response. The Review Report and USACE response will be made available to the public, including through electronic means on the internet.

e. Decision on Type II IEPR. In accordance with EC 1165-2-214 a Type II IEPR (SAR) shall be conducted on design and construction activities for the McCook Reservoir Project. The IEPR Type II review is critical to ensure that safety risks and concerns are addressed and that safety standards are emphasized.

f. Products for Type II IEPR. Subject to review and approval by the RMO (in this case, the MSC), it is recommended by the project PDT that the IEPR team should examine the authorizing documents, the project history and design analyses, and perform reviews of the following products:

(1) Main Document – CUP-McCook Reservoir Special Re-evaluation Report and Environmental Impact Statement, February 1999
(2) Main Document – CUP-McCook Reservoir DDR, November 1999
(3) Groundwater DDR 2006
(4) CUP-McCook Reservoir Stage 1 Overburden Cutoff Wall, DACW27-00-C-0008
(5) CUP-McCook Reservoir Stage 2 Overburden Cutoff Wall, W912P6-06-C-0001
(6) CUP-McCook Reservoir Stage 2 Grout Curtain, W912P6-09-C-0024
(7) CUP-McCook Reservoir Main Tunnel System, W912P6-11-C-0014 (*Active)
(8) CUP-McCook Reservoir Stage 1B Rock Wall Stabilization, W912P6-12-C-0015(*Active)
(9) McCook Reservoir Water Control Manual (currently under development).
(10) McCook Reservoir Operation and Maintenance Manual (currently under development).

These documents are recommended for their relevance to public health, safety, and welfare. There are numerous other McCook Project documents. However, in order to keep the review scope reasonable and manageable, these documents were selected as those most representative and relevant to IEPR SAR review. However, the actual scope or charge of the Type II IEPR is the responsibility of the RMO.

g. IEPR Review Team. SAR Type II IEPR Review Team will be established, in consultation with the RMO, and will be comprised of independent, recognized experts from outside of the USACE in the appropriate disciplines, representing a balance of areas of expertise suitable for the review being conducted. The public, scientific or professional societies will not be asked to nominate potential reviewers. The Review Team will be selected based on their technical qualifications and experience. The Review Team should be independent of USACE and free of conflicts of interests. The Review Team will be able to evaluate whether the interpretation of analysis and conclusions based on analysis are reasonable. The Review Team will be given the flexibility to bring important issues to the attention of decision makers. However, the Review Team will be instructed to not make a recommendation on whether a particular alternative should be implemented, as the Chief of Engineers is ultimately responsible for the final decision on a planning or reoperations study. The Review Team may, however, offer their opinion as to whether there are sufficient analyses upon which to base a recommendation. The Review Team will have experience in design and construction of projects similar in scope to the CUP McCook Reservoir Project. The Review Team shall be registered professional engineers in the United States, or similarly credentialed in their home country. The Review Team members must also have engineering degrees. A Master's degree in engineering is preferable, but not required, as hands-on relevant engineering experience in the listed disciplines is more important. The Review Team members shall have a minimum of 15 years experience and

responsible charge of engineering work. See ATTACHMENT 1 for the required experience in the required disciplines.

h. Documentation of IEPR. Dr Checks review software will be used to document IEPR comments and aid in the preparation of the Review Report. Comments should address the adequacy and acceptability of the economic, engineering and environmental methods, models, and analyses used. IEPR comments should generally include the same four key parts as described for ATR comments in Section 3. The IEPR team will be responsible for compiling and entering comments into DrChecks. The IEPR team will prepare a Review Report that will accompany the publication of the final report for the project and shall:

1) Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
2) Include the charge to the reviewers prepared by the Contractor (TBD);
3) Describe the nature of their review and their findings and conclusions; and
4) Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

7. REVIEW SCHEDULES AND COSTS

a. DQC Schedule and Cost. The cost for DQC is included in the costs for PDT activities and is not broken out separately. DQC has and will occur seamlessly throughout the development of project documents. Quality checks and reviews occur during the development process and are carried out as a routine management practice. The schedules of the PDT review of products currently under development are shown in the respective QCP's and on the schedule shown in Attachment 6. The schedules of the PDT review of products for future planned products will be determined during the development of the product Quality Control Plans and are projected in the schedule shown in Attachment 6.

b. ATR Schedule and Cost. The estimated cost for the ATR of the design products is estimated to be $5000 to $20,000 per product but could be more for complex designs. The product Quality Control Plan will include documentation of the estimate. The schedule for the ATR will also be included in the product QCP. See Attachments 5 and 6 for a list of ATR completion dates and projected dates for future products.

c. IEPR Schedule and Cost. The estimated cost for the Type I IEPR for the LRR document , including the cost for the RMO to administer and manage the review, is in the range of $100,000 to $150,000. The LRR Type I IEPR schedule will be coordinated with the RMO upon approval of this Review Plan and is projected in the schedule shown in Attachment 6. The estimated cost for Type II IEPR (SAR), including the cost for the RMO to administer and manage the review, is in the range of $250,000 to $350,000. The Type II IEPR schedule will be coordinated with the RMO upon approval of this Review Plan and is projected in the schedule shown in Attachment 6.

8. PUBLIC PARTICIPATION

Public coordination for the CUP McCook Reservoir Project including public meetings occurred during the decision phase of the project at the time of development of the SRR. Since approval of the project, public coordination has been limited to public notification of construction that could impact traffic, etc. Information has also been conveyed to the public through the use of press releases and media interviews

as necessary and through the use of the Chicago District's web site. The LRR requires a public review and comment period because it is a decision document. The plan and schedule for the LRR is still under development. When more information regarding public participation for the LRR is available, this plan will be updated. In addition, upon MSC approval of this Review Plan, the Review Plan will be posted on the Chicago District Internet for Public Review.

9. MSC APPROVAL

The Great Lakes and Ohio River Division Regional Business Technical (RBT) is the lead organization responsible for this review plan. Approval is provided by the MSC Commander. The commander's approval should reflect vertical team input (involving district, MSC, RMC, and HQUSACE members) as to the appropriate scope and level of review for the project. Like the PMP, the review plan is a living document and may change as the study progresses. Changes to the review plan should be approved by following the process used for initially approving the plan. In all cases the MSCs will review the decision on the level of review and any changes made in updates to the project. The approved Review Plan will be posted on the Chicago District's webpage.

10. REVIEW PLAN POINTS OF CONTACT

Questions and/or comments on this review plan can be directed to the following points of contact:

- Names removed for public posting

ATTACHMENT 1: TEAM ROSTERS (Names removed for Public Posting)

TABLE 1: Product Delivery Team		
Functional Area	**Name**	**Office**
Project Management Branch		PM-PM
Project Lead Engineer		TS-DC
Economic Analysis Section		PM-PL-F
Environmental Analysis Section		PM-PL-S
Mech/Elec Design Section		TS-DM
Mech/Elec Design Section		TS-DM
Hydraulic Engineering Section		TS-HH
Environmental Engineering Section		TS-HE
Geotechnical Section		TS-DG
Structural Engineering Section		TS-DS
Cost Engineering Section		TS-DE
Specifications Section		TS-DE
Real Estate Division		LRE-RE
Contracting Office		CT
Construction Section		TS-C-C
Construction Section		TS-C-C
Office of Counsel		OC
Public Affairs		PO
McCook Resident Office		TS-CO-NM

TABLE 2: Agency Technical Review Team Expertise	
ATR Team Disciplines	**Expertise Required**
ATR Lead	The ATR lead should be a senior professional with extensive experience in preparing Civil Works decision documents and conducting ATR. The lead should also have the necessary skills and experience to lead a virtual team through the ATR process. The ATR lead may also serve as a reviewer for a specific discipline (such as Hydraulics and Hydrology, Geotechnical Engineer, Structural Engineer, etc).
Hydraulics and Hydrology	Hydraulic engineering reviewer shall be a senior engineer, an expert in the field of hydraulics, and have a thorough understanding of the application of tunnels and reservoirs??, non-structural solutions involving flood warning systems and flood proofing, etc and computer modeling techniques that will be used such as HEC-RAS, FLO-2D, UNET, TABS, etc. The hydraulic engineer shall be a licensed Professional Engineer.
Geotechnical Engineering / Engineering Geology	The Geotechnical Engineer shall be a senior engineer, an expert in the field of engineering, and have knowledge of advance engineering concepts, principles and practices of geotechnical engineering including design of soil embankments, rock slope reinforcement, retaining walls, cutoff walls in soil and rock, and tunneling. The reviewer shall have thorough understanding of rock and soil mechanics, subsurface investigation, groundwater hydrology and seepage, soil and rock slope stability analyses, earthwork construction and other geotechnical applications. The geotechnical engineer shall be a licensed Professional Engineer.
Cost Engineering	The Cost Engineer shall be an expert in the field and have knowledge of a wide range of engineering concepts, principles, and practices applicable to the design of levees and floodwalls. The cost engineer shall have at least 5 years experience in cost estimating and have a cost engineering certification issued by the Tri-Service Cost Engineering Certification Board. The cost engineer shall be proficient in the current cost engineering software.
Civil Engineering	The civil engineer shall be a senior engineer, an expert in the field, and have a thorough understanding of the application of tunnels and reservoirs. The reviewer shall have experiences in the design and layout of tunnels and reservoir structures. The civil engineer shall demonstrate engineering knowledge regarding hydraulic structures, earthwork, utility relocation, erosion

	control and general site development features. The civil engineer shall be a licensed Professional Engineer.
Structural Engineering	The structural engineer shall be a senior engineer, an expert in the field of structural engineering, and have thorough knowledge of stability analyses and structural design hydraulic structures and tunnels. The structural engineer shall be familiar with current design software. The structural engineer shall be a licensed Professional Engineer and/or Structural Engineer.
Real Estate	Team member must be approved by the LRD to perform ATR for FRM projects and have knowledge of Real Estate acquisition process.

TABLE 3: Project ATR Team

Functional Area	Name	Office
Project Management Branch		
Project Lead Engineer		
Economic Analysis Section		
Environmental Analysis Section		
Mech/Elec Design Section		
Mech/Elec Design Section		
Hydraulic Engineering Section		
Environmental Engineering Section		
Geotechnical Section		
Structural Engineering Section		
Cost Engineering Section		
Specifications Section		
Real Estate Division		
Contracting Office		
Construction Section		
Construction Section		
Office of Counsel		
Public Affairs		
McCook Resident Office		

TABLE 4: Type II Independent External Peer Review Team		
NAME	**DISCIPLINE**	**EXPERIENCE**
TBD	Geotechnical Engineer	Recognized expert in the field of geotechnical engineering analysis, design and construction of tunnels and reservoirs??, with extensive experience in subsurface investigations, soil mechanics, retaining wall design, seepage and slope stability evaluations, erosion protection design and construction, and earthwork construction. The Geotechnical Engineer shall be a licensed Professional Engineer, familiar with USACE regulations.
TBD	Structural Engineer	Extensive experience in the design, layout, and construction of flood control structures including tunnels? and gatewells. Demonstrated knowledge regarding hydraulic structures, floodwall design, sheet pile, rebar, concrete placement, formwork, and relocation of underground utilities. The Structural Engineer shall be a licensed Professional Engineer, familiar with USACE regulations.
TBD	Hydraulic Engineer	Extensive experience in the analysis and design of hydraulic structures related to flood control levee projects. The Hydraulic Engineer must have performed work with HEC-RAS unsteady flow modeling, H&H related risk analysis, and be familiar with interior drainage analysis and design of erosion control for culvert outlets and levee bank protection. The Hydraulic Engineer shall be a licensed Professional Engineer, familiar with USACE regulations.

Vertical Team

The Vertical Team consists of members of the HQUSACE and Great Lakes & Ohio River Division Offices. The Vertical Team plays a key role in facilitating execution of the project in accordance with the PMP. The Vertical Team is responsible for providing the PDT with Issue Resolution support and guidance as required. The Vertical Team will remain engaged seamlessly throughout the project via monthly telecons as required and will attend In Progress Reviews and other key decision briefings as required. The District Liaison from CELRD-PD-R, is the District PM's primary Point of Contact on the Vertical Team. MSC Vertical Team Members will include the MSC Dam Safety Officer and the Flood Risk Management Business Line Manager.

ATTACHMENT 2: ATR CERTIFICATION TEMPLATE

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the *<type of product>* for *<project name and location>*. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-214. During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks[sm].

SIGNATURE _____ _____

Name Date
ATR Team Leader
Office Symbol/Company

SIGNATURE _____ _____

Name Date
Project Lead/Quality Manager
Office Symbol

SIGNATURE _____ _____

Name Date
Architect Engineer Project Manager[1]
Office Symbol

SIGNATURE _____ _____

Name Date
Review Management Office Representative
Office Symbol

CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows: *(Describe the major technical concerns, possible impact, and resolution)*

As noted above, all concerns resulting from the agency technical review of the CUP McCook Reservoir Project have been fully resolved.

SIGNATURE

Name
Chief, Design Branch
TS-D

Date

ATTACHMENT 3: REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number

ATTACHMENT 4: ACRONYMS AND ABBREVIATIONS

Term	Definition	Term	Definition
AFB	Alternative Formulation Briefing	NED	National Economic Development
ASA(CW)	Assistant Secretary of the Army for Civil Works	NER	National Ecosystem Restoration
ATR	Agency Technical Review	NEPA	National Environmental Policy Act
CAP	Continuing Authorities Program	O&M	Operation and maintenance
CSDR	Coastal Storm Damage Reduction	OMB	Office and Management and Budget
DPR	Detailed Project Report	OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
DQC	District Quality Control/Quality Assurance	OEO	Outside Eligible Organization
DX	Directory of Expertise	OSE	Other Social Effects
EA	Environmental Assessment	PCX	Planning Center of Expertise
EC	Engineer Circular	PDT	Project Delivery Team
EIS	Environmental Impact Statement	PAC	Post Authorization Change
EO	Executive Order	PMP	Project Management Plan
ER	Ecosystem Restoration	PL	Public Law
FDR	Flood Damage Reduction	QMP	Quality Management Plan
FEMA	Federal Emergency Management Agency	QA	Quality Assurance
FRM	Flood Risk Management	QC	Quality Control
FSM	Feasibility Scoping Meeting	RED	Regional Economic Development
GRR	General Reevaluation Report	RMC	Risk Management Center
HQUSACE	Headquarters, U.S. Army Corps of Engineers	RMO	Review Management Organization
IEPR	Independent External Peer Review	RTS	Regional Technical Specialist
ITR	Independent Technical Review	SAR	Safety Assurance Review
LRR	Limited Reevaluation Report	USACE	U.S. Army Corps of Engineers
MSC	Major Subordinate Command	WRDA	Water Resources Development Act

ATTACHMENT 5: LIST OF PROJECT DOCUMENTS FOR REVIEW PLAN

Authorizing Document

Main Document – CUP-McCook Reservoir Special Re-evaluation Report and Environmental Impact Statement, February 1999

Reviews: Public and Various Agency Reviewers

Design Documentation Reports (DDRs)

Main Document – CUP-McCook Reservoir DDR, November 1999

Abstract: *This report documents the design of the 22,000 acre-foot McCook Reservoir recommended in the February 1999 Special Reevaluation Report and Final Environmental Impact Statement (SRR/EIS). The reservoir will store floodwater from the Tunnel and Reservoir Plan (T ARP) tunnel system of the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC). The major components of the project include tunnels, shafts and chambers, rock excavation, inlet structure, inflow/outflow structure, washdown system, aeration system, groundwater protection system, reservoir grading and overburden stabilization, pumps, and site development.*

The purpose of the reservoir is to reduce flood damages within the TARP Mainstream and Des Plaines combined sewer areas. This includes most of the City of Chicago and 36 surrounding suburban communities. This 252 square mile area contains over 3,000,000 people and over 1,240,000 housing units. During storm events, area watercourses do not have adequate capacity. This causes high water levels on the watercourses and backup of the combined sewer system into basements and streets. Discharge of combined sewer overflow also causes poor water quality in the watercourses. These problems cause an estimated $188 million in damages every year.

The McCook Reservoir was originally authorized in the Water Resources Development Act of 1988. Congress subsequently directed the Corps to reevaluate reservoir alternatives. The Chicago District completed the Special Reevaluation Report and Environmental Impact Statement in February 1999. The SRR/EIS evaluated 5 reservoir alternatives and the no action alternative. The document recommended implementation of the 22,000 acre-foot Lagoons Open Pit reservoir. This plan has the greatest net benefits, the lowest economic costs, increases the long term regional supply of stone, minimizes the disruption of the Vulcan Materials Company activities, and has the least impact on the surrounding residential areas. A third reservoir stage was found to be not economically feasible. The SRR/EIS was approved by the Assistant Secretary of the Army (Civil Works) and a Record of Decision signed in May 1999. The Corps of Engineers and MWRDGC signed the Project Cooperation Agreement in May 1999.

A Technical Review Conference was held in August 1998 to discuss the general aspects of this Design Documentation Report (DDR). The conference objectives discussed the features of the project, the design approach for each feature, and the design changes from a Design Memorandum completed in 1994 on a similar reservoir alternative. The consensus of the conference was that no major conceptual design changes have been made to the features since the 1994 Design Memorandum.

The DDR was completed in accordance with the current Quality Management Regulations. A Quality Control Plan was developed and approved by the senior leadership of the Chicago District. An 11 member Independent Technical Review Team including members of the Chicago District, Great Lakes and Ohio River Division and Architect-Engineering firms was formed. The ITR team was involved in an initial orientation meeting, review of design decision documents, a 75% DDR review, a 100% DDR review as well as ongoing consultations during the document preparation.

ITR Completed: July 1999 (In-house product)

Groundwater DDR, August 2006

Abstract: *The purpose of the CUP-McCook Reservoir – Groundwater Protection Design Documentation Report (GW-DDR) is to evaluate the groundwater conditions that may be impacted by the construction of the reservoir and consider potential measures to minimize the negative consequences of those impacts. The negative impacts identified were excessive groundwater infiltration into the reservoir that could destabilize the rock walls and incur significant costs for pumping and treatment, as well as exfiltration of combined storm and sanitary sewer overflow (CSO) water that could potentially degrade the surrounding groundwater aquifer. The design of the overall reservoir project was*

developed in the CUP-McCook Reservoir – Design Documentation Report (DDR) dated November 1999, in which the groundwater system was developed to a conceptual level.

Extensive subsurface investigations were performed following the DDR to further develop an understanding of the soil, bedrock and groundwater conditions within and around the reservoir site and their influences. These investigations included:

- *drilling and sampling in the adjacent waterways to determine sediment and soil thickness to bedrock,*
- *conducting an additional water well survey in the reservoir area to re-verify groundwater users that might be impacted by the reservoir and groundwater withdrawal rates,*
- *installation of deep observation wells and in-situ hydraulic conductivity testing to further evaluate the groundwater conditions,*
- *pump tests to establish the hydrogeologic properties of the bedrock and interactions with the adjacent waterways with respect to groundwater pumping and injection, and*
- *a large-scale grout test program to evaluate the ability to grout the bedrock and the effective residual hydraulic conductivity that could be achieved.*

The information obtained, in addition to the data already available from the DDR, was used to characterize the site and create the groundwater models. Based on this information, it was determined that a 100-foot thick shale layer underlying the reservoir appeared to effectively restrict vertical groundwater flow, such that groundwater and CSO would move primarily horizontally. Based on these site conditions, we determined that horizontal flow through the fractured bedrock and vertical flow through the underlying shale layer could be modeled separately. To accomplish this groundwater modeling effort, the project team listed below was assembled:

- *STS Consultants, Ltd. (STS) – develop horizontal groundwater flow model, prepare design alternatives, develop cost estimates, principal author of GW-DDR*
- *US Army Corps of Engineers, Chicago District (USACE) – develop vertical and horizontal contaminant transport models, project oversight and coordination*
- *Metropolitan Water Reclamation District of Greater Chicago (MWRD) – project local sponsor to provide input on operation and maintenance issues.*
- *US Geologic Service (USGS) – provide independent technical review of groundwater flow and contaminant transport modeling.*

The horizontal flow model needed to consider the volume of flow exfiltrating and infiltrating the reservoir and the direction of flow to indicate the likely sources of groundwater infiltration and the sinks for exfiltration. The groundwater model developed to evaluate these conditions used the MODFLOW and MODPATH modeling programs developed by the USGS and included in GMS v.4.0. The horizontal flow model considered the overburden and bedrock layers above the underlying shale layer and was calibrated by simulating the known conditions at the site based on the pump tests and other data available. A 'baseline condition' was then established by incorporating the proposed reservoir into the model. This 'baseline' allowed comparisons to be made to evaluate the effectiveness of various groundwater protection alternatives. Initially, these alternatives were:

- *Option 0 – Project Baseline*
- *Option 1 – Reservoir with Grout Curtain (effective hydraulic conductivity 1 x 10-5 cm/s)*
- *Option 2 – Reservoir with Grout Curtain and Drainage Adits*
- *Option 3 – Reservoir with Grout Curtain and Extraction Wells*
- *Option 4 – Reservoir with Grout Curtain and Injection Wells*

Different reservoir pool conditions were evaluated for each of these alternatives. The pool levels considered included an empty and full reservoir as steady state conditions to evaluate the maximum infiltration and exfiltation potential that would exist. In addition, 3 separate transient conditions were evaluated to develop more realistic major exfiltration conditions that were taken from several storm events noted from the hydraulic modeling period of record. These 3 transient events were: 1) a large single event with dry periods before and after in 1961; 2) several distinct intermediate sized events in 1982; and 3) numerous closely spaced events of short duration and moderate intensity in 1950.

ITR Completed: 25 May 2005 (In-house product)

Aeration DDR, September 2006

Abstract: *The CUP-McCook Reservoir will be used to hold approximately 10 billion gallons of combined sewer overflow (CSO) until the water can be treated at the Stickney Water Reclamation Plant. The water will be held for various lengths of time, depending on storm size and treatment plant capacity. During the NEPA process, the local community questioned whether the reservoir would be a source of odors, either from the water or from sediment contained in the water. To address these questions, it was proposed that an aeration system would be used to maintain aerobic conditions in the water, while sediment would be removed from the reservoir to prevent accumulation and accompanying odors. Previous design documents addressed the aeration and washdown issues to varying degrees, however it was recognized that a separate design document was needed to fully delineate issues and to document the system design.*

The McCook Reservoir Aeration and Washdown Design Documentation Report (DDR) is intended to address all of the major design related issues associated with the aeration and washdown systems, to select fina1 designs, to document the design calculations and supporting information, and to present a cost estimate. The document begins with a discussion of past review comments and previously unresolved issues, followed by a summary of the research conducted to gather data. Research activities included laboratory scale experiments, large field scale experiments, and numerical modeling of the system. Following the presentation of research results, there is a discussion of the range of possible aeration and washdown systems and a discussion of the characteristics of the "ideal" solutions. For the 50% document, several aeration and washdown alternatives were considered, and these systems are presented in more detail (including cost information).

The final selected plan for the aeration system is solar powered surface aerators, anchored by a fixed cable system that allows vertical movement of the aerators while limiting horizontal movement. Capital costs, life cycle costs, design calculations, and a system layout are presented. The final selected plan for washdown is to use a wet bottom system with a minimum of once per year cleanout. An estimate of sediment quantities and maintenance costs for the case of a once per year cleanout is presented later in this report as a design example.

The proposed aeration and washdown design and details that are presented in the McCook Reservoir Aeration and Washdown Design Documentation Report, including the data and calculations that support those decisions, are considered to be a sufficient and complete resolution to the odor comments made during the 1998 NEP A process, and documented in the EIS for the McCook Reservoir. The Aeration and Washdown Design Documentation Report is presented to fulfill the NEPA requirements, and to serve as a basis for the development of plans and specifications, and the construction of the aeration system.

ITR Completed: 09 August 2006 (In-house product)

Instrumentation DDR, April 2012 (100% Review Level)

Abstract: *The purpose of the Instrumentation DDR is to facilitate the permanent monitoring of various permanent features of the McCook Reservoir. This plan is intended to identify appropriate instrumentation technologies, and monitoring activities which will aid in ensuring project safety, proper functioning of features, and early warning signs of possible failures. The Instrumentation DDR will identify the purpose, type, and location of instrumentation; procedures for monitoring and visual inspections, analyzing and reporting; maintenance needs, as well as the appropriate acquisition approach and schedule.*

ATR: To be performed (In-house product)

Construction Plans & Specifications (P&S)

CUP-McCook Reservoir Stage 1 Overburden Cutoff Wall, DACW27-00-C-0008

Abstract: *Work consists of constructing approximately 7,445 linear feet of earthen material based cut-off wall on the north, east, and south sides of Lagoons 1 through 10 at the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) Lawndale Avenue Solids Management Area (LASMA). The cut-off wall is to be constructed through approximately 35 to 60 feet of overburden to the top of bedrock. Minimum wall thickness shall be 1 foot. Construct a test section to verify performance of the proposed cut-off wall.*

ITR Completed: 04 August 1999 (A-E product)
Contract Amount: $11.0M

CUP-McCook Reservoir Grout Test, DACW23-02-C-0006

Abstract: *The work consists of constructing a double-row test grout curtain in the vicinity of Lagoons 1 and 2 at the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) Lawndale Avenue Solids Management Area (LASMA) site. A suite of balanced, stabilized grouts in conjunction with computer aided, real-time on-screen displays and analyses of grouting parameters shall be used. Two 200-foot sections of grout curtain to be completed using separate drilling techniques with an optional 800-foot section to complete a third side of the curtain depending on the results. The grout holes shall be drilled at a 15 degree inclination from vertical to intercept the near vertical joint systems. The grout curtain shall extend from the dolomitic limestone bedrock surface, which is approximately 30 to 60 feet below ground surface to a maximum depth of -350 feet Chicago City Datum (CCD). Verification of performance will include permeability testing before and after grouting.*

ITR Completed: 06 September 2001 (A-E product)
Contract Amount: $5.4M

CUP-McCook Reservoir Addition of Pumps and Motors, DACW23-02-C-0008

Abstract: *The work consists of the addition of two pumps, motors and associated systems at the existing Mainstream Pumping Station in Hodgkins, Illinois, operated by the Metropolitan Water Reclamation District of Greater Chicago, in order to serve the pumping needs of the CUP McCook Reservoir Project. Structural work will consist of forming concrete for pump embedment, including pump and motor foundations, machine work, welding, painting and coating. Mechanical work consists of the design, manufacture, shop test, delivery, and installation of one low head vertical-shaft, single-suction, single volute, centrifugal type pump with a capacity of 330 cfs discharge at 150 feet head and one high head capacity of 330 cfs discharge at 330 feet head. Additional work includes furnishing and installing all piping, valves, fittings, and related accessories to connect the existing gland water, drains, and compressed air systems to the pumps.*

ITR Completed: 03 January 2002 (In-house product)
Contract Amount: $12.2M

CUP-McCook Reservoir Distribution Tunnel System, DACW27-02-C-0025

Abstract: *The work consists of constructing two 11.5-ft and two 8.5·ft ID concrete-lined tunnels approximately 3,320 and 850 feet in length, respectively; temporary rock plugs or concrete/steel bulkheads; 11.5-ft ID concrete-lined access shaft; 60-ft by 100-ft underground chamber with a 26-ft ID access shaft approximately 340 feet deep and 12-ft diameter shaft approximately 32 feet deep for ventilation; six 60-inch conical plug valves; four 5-ft by 5-ft bonneted slide gates; 4-ft by 60 ft control (service) building at the ground surface; and site work to include excavation, site grading, utilities, maintenance of traffic plan, staging/storage area and project signage.*

ITR Completed: 02 November 2001 (A-E product)
Contract Amount: $60.6M

CUP-McCook Reservoir Stage 2 Overburden Cutoff Wall, W912P6-06-C-0001

Abstract: *The work will involve constructing approximately 7,640 linear feet of soil-bentonite cut-off wall at the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) Lawndale Avenue Solids Management Area (LASMA). The cut-off wall is to be constructed through approximately 35 to 60 feet of overburden and keyed a minimum of 2 feet and maximum of 5 feet into bedrock and tie into an existing soil-bentonite cutoff wall. The minimum wall thickness shall be 3 foot. Construction of a test section is required to verify the construction method will achieve a 5-foot key into bedrock and the permeability of the cut-off wall backfill is less than 1x10-6 cm/s. The project also has tight schedule constraints and interactions with other on-site contractors and operations.*

ITR Completed: 23 September 2005 (A-E product)
Contract Amount: $16.3M

CUP-McCook Reservoir Stage 1 Grout Curtain, W912P6-06-C-0009

Abstract: *The construction work involves constructing a double-row grout curtain at the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) Lawndale Avenue Solids Management Area (LASMA). The*

performance requirement is for the Grout Curtain to achieve an effective residual permeability of less than 1 lugeon as measured by verification holes between the two grout lines. The Grout Curtain shall use split-space technique with primary grout holes to start 40 feet apart. The base work of the contract will consist of approximately 2,700 LF of double-row grout curtain and installation of a plug in an abandoned 14-foot diameter tunnel.

ITR Completed: 06 March 2006 (In-house product)
Contract Amount: $38.6M

CUP-McCook Reservoir Stage 1 Rock Wall Stabilization, W912P6-07-D-0002

Abstract: *The Contractor will be responsible for providing all the necessary facilities, plants, labor, transportation, materials, and equipment to stabilize the near-vertical excavated walls of the reservoir through the installation of rock bolts, rock dowels, cable bolts, chain link wire mesh, shotcrete and concrete at locations where deemed necessary. The Contractor will be required to have a Rock Mechanics Specialist on site whose responsibilities will include evaluating rock conditions, performing mapping and rock slope stability analysis and communicating recommendations to the Contracting Officer's Representative with regard to rock stabilization.*

ITR Completed: 18 December 2006 (In-house product)
Contract Amount (IDIQ-Task Orders): $6.0M

CUP-McCook Reservoir Main Tunnel System - Main Gates, W912P6-08-C-0023 (*Active)

Abstract: *This project covers activities required for fabrication of the main gates and the hydraulic system components. Operation and maintenance of the gates have been considered in the design and layout of the system components. The activities included in this project are as follows: Fabricate two main gates, fabricate four guard gates, fabricate sill and guide embedments for all six gates, fabricate two Hydraulic Power Units (HPUs), fabricate six hydraulic cylinders, fabricate control valves and blocking valves for all six cylinders.*

ITR Completed: 22 July 2008 (A-E product)
Contract Amount: *$51.7M

CUP-McCook Support IDIQ, W912P6-09-D-0003 (*Active)

Abstract: *The work consists of but may not be limited to: site preparation, excavation, earth fill and compaction, grading, slope shaping, rip rap placement, geotextile placement, rock placement and hauling, debris removal and disposal (i.e. from rock bench), dirt hauling , installation of retaining walls, installation of seepage/erosion control measure, roadway repairs, drainage installation, seeding/planting, storm water pollution prevention plan development, permanent/temporary fence relocation, surveying, removing/relocating stone stockpiles , ramp construction, and other heavy civil work.*

ITR Completed-Task Order 0003: 03 August 2009 (In-house product)
ITR Completed-Task Order 0004: 27 October 2009 (In-house product)
ATR Completed-Task Order 0006: 08 June 2011 (In-house product)
ATR Completed-Task Order 0007: 18 November 2011 (In-house product)
Task Order 0008 (currently under development)
Note: Other Task Orders awarded in this sequence not listed were for Construction Contractor Quality / Environmental Plans and Performance Bonds
Contract Amount (IDIQ-Task Orders): *$19.8M

CUP-McCook Reservoir Stage 2 Grout Curtain, W912P6-09-C-0024

Abstract: *The Contractor will construct a multi-line grout curtain at the Metropolitan Water Reclamation District of Greater Chicago's Lawndale Avenue Solids Management Area (LASMA). The requirement includes a Grout Curtain to consist of outer and inner row s of holes with possible center-line holes for closure around the southeast and*

northeast perimeter of the CUP McCook Reservoir currently under excavation on site by another contractor, operating a quarry there.

ITR Completed: 27 February 2008 (In-house product)
Contract Amount: $31.9M

CUP-McCook Reservoir Main Tunnel Access Shaft, W912P6-09-C-0026

Abstract: *The Contractor will be responsible for providing all necessary labor, transportation, materials, and equipment to construct an 88-foot diameter shaft at the Metropolitan Water Reclamation District of Greater Chicago's (MWRDGC) Lawndale Avenue Solids management area (LASMA). The requirement includes excavating approximately 8,000 cubic yards of overburden and approximately 47,000 cubic yards of dolomite limestone. The work also includes installing an 1,800 cubic yard permanent concrete liner in the overburden; 13,000 linear feet of rock reinforcement; and 650 cubic yards of reinforced shotcrete.*

ITR Completed: 19 June 2009 (In-house product)
Contract Amount: $14.9M

CUP-McCook Reservoir Main Tunnel System, W912P6-11-C-0014 (*Active)

Abstract: *The purpose of the McCook Reservoir Main Tunnel System (MTS) is to connect the Mainstream Tunnel to the McCook Reservoir to reduce flood damages in the greater Chicagoland combined sewer system area. The MTS is part of the larger Chicagoland Underflow Plan (CUP), which includes tunnels for storm water storage and conveyance, and reservoirs for storm water storage. The CUP is also known as the Tunnel and Reservoir Plan (TARP). The McCook Reservoir will be located in a limestone/dolomite quarry, with nearly vertical pre-split perimeter walls.*

The existing Mainstream Tunnel is a 33 ft ID circular tunnel with 1 ft thick unreinforced concrete lining. The Main Tunnel which will be constructed under the MTS Contract is a 33 ft ID tunnel with reinforced concrete and steel-lined sections. The Main Tunnel will connect the McCook Reservoir to the existing Mainstream Tunnel and controlling gates (currently being fabricated) will be installed in the Main Gate Access Shaft (currently under construction) located at the approximate midpoint between the reservoir and Mainstream Tunnel to regulate the flow of the storm water.

The McCook Reservoir MTS main gates will comprise of three wheel gates on each of the bifurcations within the MTS located in the Main Gate/Access Shaft. The gates will control flow from the existing TARP tunnel into the reservoir and will also be used to dewater the sump area of the reservoir. The main gates (center gates) will be designed to seal in either direction. The upstream guard gates (located on the mainstream tunnel side) will be designed to seal against hydrostatic head on the upstream side. The downstream guard gates (located on the reservoir side) will be designed to seal against hydrostatic head on the downstream side. Additional gates and valves in the Dewatering and Discharge Tunnels direct the flow to and from the reservoir and to the Stickney Water Reclamation Plant through the existing conveyance tunnels.

Under the Contract, the Government will furnish fabricated vertical lift gates and associated gate control components (currently being fabricated) which for all intents and purpose will constitute "Government Furnished Items" (GFI). The Contractor will be responsible for obtaining GFI from the gate fabricator in Portland, Oregon and transporting the gates to the site before installing the GFI. The GFI includes vertical lift gates, seals, gate sill embeds, gate wheel guide embeds, gate seal lintel embeds, cylinder support beams, anchor rods for cylinder support beams and dogging devices, pins for connecting cylinder to gates, hydraulic cylinders, hydraulic power units, and hydraulic cylinder control panels. The MTS includes the following major components:

- *Main Tunnel – A 1,600 ft long, 33 ft inside diameter (ID) tunnel connecting the Mainstream Tunnel and the McCook Reservoir, bifurcated for approximately 290 ft through the Main Gate/Access Shaft (MGS).*
- *Main Gate/Access Shaft (MGS) – An 88 ft ID, approximately 295 ft below grade circular shaft located near the midpoint of the Main Tunnel.*
- *Construction Shaft (Contractor Option) – An optional, 25 ft ID, approximately 285 ft below grade shaft located approximately 300 ft downstream of the Main Tunnel/Mainstream Tunnel Connection.*
- *Gates – Six rectangular steel wheel gates and the associated gate control structures. Each bifurcation of the Main Tunnel contains one main gate and two guard gates - one upstream and one downstream of the main*

gate. The six gates and associated gate control equipment are currently being fabricated under a separate Contract (W912P6-08-R-0019).

- *Main Tunnel/Mainstream Tunnel Connection – Live connection of the Main Tunnel to the existing Mainstream Tunnel.*
- *Main Tunnel/McCook Reservoir Connection (Government Option) – Portal connection of the Main Tunnel to the McCook Reservoir, including construction of an Energy Dissipation Structure.*
- *Gate Control Building – A surface facility located at the MGS that houses the gate operating controls, hydraulic power units (HPUs) and provides limited storage.*

The MTS construction will be coordinated with overall McCook Reservoir Water Control Plan including other activities such as the concurrent mining operations of the reservoir, high wall stabilization, groundwater protection system construction, Distribution Tunnels connection, and ongoing operations and maintenance of the Metropolitan Water Reclamation District of Greater Chicago's LASMA facilities.

ITR Completed: 18 May 2011 (A-E product)
Awarded Amount: *$117.8M

CUP-McCook Reservoir Stage 1B Rock Wall Stabilization, W912P6-12-C-0015(*Active)

Abstract: *This contract is intended to provide rock slope stabilization and related work in support of the CUP McCook Reservoir site. The work consists of: site preparation, installing stationing signage at coordinates provided, rock slope scaling (removal of loose or unsound rock) on exposed near-vertical and vertical high walls up to 300-feet, drilling and installation of rock dowels, drilling of drain holes into rock, structural rock support mesh, shotcreting, providing inspection assistance to government personnel for hands-on access to high walls of the quarry utilizing recognized rope access protocols and incidental activities associated with this work.*

ATR Completed: 06 June 2012 (In-house product)
Awarded Amount: *$5.7M

Other Relevant Documents / Reports

McCook Final Reservoir Preparation Plans and Specs (currently under development).

McCook Alternate Des Plaines System Reservoir Inflow Tunnel Plans and Specs (currently under development).

McCook Reservoir Water Control Manual (currently under development).

McCook Reservoir Operation and Maintenance Manual (currently under development).

ATTACHMENT 6: SCHEDULE OF REVIEWS OF PROJECT DOCUMENTS