Structured Design Process Improvement for Complex Sediment Site Remedial Designs

Michael J. Erickson (Arcadis U.S., Inc., Novi, MI, USA)
Rhiannon Faber (Arcadis U.S., Inc., Highlands Ranch, CO, USA)
Alain Hebert (Arcadis U.S., Inc., Cranbury, NJ, USA)

Background/Objectives. Complex sediment site remedy designs benefit greatly from a structured design process, especially under fast-paced work schedules with multi-disciplinary teams and numerous inter-linked design tasks and regulatory submittals. The diverse and large project teams required to deliver these designs face communication and information flow challenges to link information among the many interdependent activities – to avoid generating unforeseen critical paths and to maximize the value of the pre-design investigation (PDI) phase to generate the right information. Opportunity costs of missing the right information accrue if these challenges are not overcome and can reduce the robustness and value of the design in maximizing remedy effectiveness and implementation efficiency. A step-wise approach of designing a PDI, implementing the PDI and then moving into design can result in after-the-fact discovery of these opportunities. A structured planning approach adds value in capturing these opportunities early and avoiding design process delays.

Approach/Activities. A structured approach to design that focuses on Information Management was developed as a design process management tool on major complex sediment site design effort. This approach involved preparation of several guiding documents, including identification of PDI needs and integration of PDI information. The principal document was the Information Management Plan (IMP) that is based on breaking a design into Major Work Elements, identifying inputs needed, critical decisions needed, task inter-dependencies, and work element schedules that all link to the critical path delivery schedule and timeline. This IMP is supported by a Design Principles matrix that specifies the key assumptions and hierarchy of design choices and application of these in the design process. The Design Principles are structured to incorporate the Design Criteria, which are developed hand-in-hand with the Design Principles. The IMP, Design Principles, and Design Criteria set the roadmap for delivery of the design.

Results/Lessons Learned. This structured design planning process has proven advantageous for complex site remedial design for multiple reasons: 1) It provides a core design management team the tools needed to ensure the right information is developed and provided to the numerous task teams when needed; 2) it allows the Task leaders to clearly identify interdependencies of their work with other design elements and impact to the overall design schedule, 3) it drives a level of task planning that is difficult to generate among a task team when a clear picture of the overall design elements and how they fit together is not available, and 4) provides a design process verification tool for quality control by back checking that the intended information was applied in the design as intended. This presentation will present this structured design process as an approach that can help in the delivery of remedial designs for other complex sediment sites.