

The Afghanistan Engineering Support Program assembled this deliverable. It is an approved, official USAID document. Budget information contained herein is for illustrative purposes. All policy, personal, financial, and procurement sensitive information has been removed. Additional information on the report can be obtained from Firouz Rooyani, Tetra Tech Sr. VP International Operations, (703) 387-2151.



**USAID**  
FROM THE AMERICAN PEOPLE

**AFGHANISTAN**

# ENGINEERING SUPPORT PROGRAM

Contract No. EDH-I-00-08-00027-00

Task Order No. 1

WO-LT-0090-Interim QA Monitoring and Evaluation Services

## QUALITY ASSURANCE PLAN



May 12, 2015

This publication was produced for review by the United States Agency for International Development. It was prepared by Tetra Tech, Inc.

**This report was prepared for the United States Agency for International Development, Contract No. EDH-I-00-08-00027-00, Task Order 01, Afghanistan Engineering Support Program.**

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Chief of Party  
Tetra Tech, Inc.  
Kabul, Afghanistan  
██████████



May 12, 2015

[REDACTED]  
[REDACTED] ACOR

Office of Economic Growth and Infrastructure (OEGI)  
U.S. Agency for International Development  
Great Massoud Road  
Kabul, Afghanistan

**Re:** Contract No. EDH-I-00-08-00027-00 / Task Order No. 1  
Afghanistan Engineering Support Program (AESP)

**LT0090 NEPS-SEPS Interim QA Monitoring and Evaluation  
Quality Assurance Plan**

[REDACTED]:

It is with great pleasure that Tetra Tech submits this *Quality Assurance Plan* to guide WO-LT-0090: Interim Quality Assurance, Monitoring, and Evaluation Services. This plan is designed to guide our efforts toward quality assurance of the PTEC program and other projects and programs as assigned by USAID.

The objectives of the QA process are to identify, define, and mitigate issues that may negatively impact the project, and that all equipment, systems and structures covered under this work order are constructed and/or fabricated in accordance with the approved Quality Control plans and in compliance with required specifications, standards, and codes.

This *QA Plan* is accompanied by a detailed *Quality Assurance Technical Manual* prepared by Tetra Tech. Whereas the *QA Plan* is a generalized outline for specified quality assurance activities, the *Quality Assurance Technical Manual* provides a more detailed description for the specific tasks, activities, policies, and procedures necessary for Tt to assure PTEC construction meets international standards and quality. This *QA Plan* document shall be used in conjunction with the *QA Technical Manual* to implement the QA program.

Please contact me at your convenience should you have any questions or comments regarding this plan.

Respectfully,  
Tetra Tech, Inc.

[REDACTED]

cc: Kevin Pieters (USAID OEGI)  
Gregory Wang (USAID OAA)

# AFGHANISTAN ENGINEERING SUPPORT PROGRAM

Contract No. EDH-I-00-08-00027-00  
Task Order No. 1  
WO-LT-0090

## QUALITY ASSURANCE PLAN

May 12, 2015

### **DISCLAIMER**

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

## EXECUTIVE SUMMARY

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The Tetra Tech (Tt) Afghanistan Engineering Support Program (AESP) has been tasked by USAID to provide Quality Assurance (QA) services to oversee the Power Transmission Expansion and Connectivity (PTEC) program. It is Tetra Tech's responsibility to review contractor QA/QC Plans and assure USAID that the contractor is operating in accordance within approved quality standards.

Tetra Tech is also cognizant of its responsibility to aid in monitoring project costs and schedules. As part of the team consisting of USAID and its implementing partners i.e. Da Afghan Breshna Sherkat (DABS), the contractors, and the construction management teams Tt's role is to provide oversight of the Quality Control process, and to safeguard and protect the interests of USAID. This oversight will include the tasks necessary to substantiate the progress and adherence of the construction management teams and contractors to schedules, budgets, and acceptable quality.

This Quality Assurance Plan is the outline for Tt to assess contractor compliance and adherence to plans and specifications as outlined in the approved Quality Control plans provided by the construction manager and the relevant contractors. The objective of the QA process is to identify, define, and mitigate any issues that may negatively impact the project.

This document was developed to act as a generalized outline for the activities Tt will perform under the AESP long term work order 0090 (WO-LT-0090). To supplement this document, a second document titled *Quality Assurance Technical Manual*, provides a more detailed description for the specific tasks, activities, policies, and procedures necessary for Tt to assure PTEC construction meets international standards and quality. This *QA Plan* document is to be used in conjunction with the *QA Technical Manual* to implement the QA program.

In order to meet the needs of USAID, this Quality Assurance Plan outlines the QA activities of AESP in the following areas:

- Pre-construction Activities
- Design and Drawing Reviews
- Field Observations
- Testing
- Environmental Compliance
- Review of Quality Control Procedures
- Healthy and Safety Oversight
- Schedule Reviews
- Invoice Reviews
- Factory Quality Assurance
- Site Quality Assurance
- Regular Reporting to USAID

Tetra Tech is aware that quality and compliance cannot be "inspected in" to a product. Quality must be built into the product or service and therefore must be controlled by the contractor. Clear communication is key between Tt, the contracting entities, and stakeholders. Clear communication and cooperation will allow Tt AESP to provide a high level of assurance to the client that projects are being constructed within the approved schedule, budget, and with the requisite quality.

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## 1.0 SCOPE

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This document outlines the general scope of the Quality Assurance Program. Due to the significant technical scope of work involved in the projects covered under this work order, the QAP documentation has been divided into two parts to make it more efficient. This first document provides an overview of the QA process including: scope, roles and responsibilities, and general implementation. The second document, titled *Quality Assurance Technical Manual* provides comprehensive technical details regarding acceptance criteria, test procedures, and standards for specific reviews and inspections. These two documents are interdependent and should be used in conjunction to provide an effective implementation of the QA process.

It should be understood that Quality Control (QC) activities are the responsibility of the Contractor and Construction Management firm. The Quality Assurance Program is the responsibility of Tetra Tech, and provides monitoring and assessment of the QC activities.

Although no document can completely cover all situations, guidelines, checklists, and instructions necessary for the QA of this project, the two documents comprising the QAP will be an effective tool in assuring the quality of components and systems being installed. The information within these two documents does not replace or supersede contracts, requisitions, specifications, standards, or drawings. In the case of a conflict, project specific documents prevail. When called upon to process elements not specifically covered in this document, QA personnel will refer to appropriate specifications, contracts, and standards to perform their duties.

Documents and standards referenced herein are applicable when others are not provided in the specifications.

The protocols identified herein are appropriate for many construction disciplines, but due to the emphasis on power generation and transmission under this work order, the QAP will focus heavily on electrical power systems.

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## 2.0 PURPOSE

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The QA program documents (*Quality Assurance Plan* and the *Quality Assurance Technical Manual*) are intended to provide uniform information to USAID for implementation of an effective quality assurance plan. This plan allows Tetra Tech to provide consistent, comprehensive, and appropriate quality verification.

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## 3.0 DOCUMENT DISTRIBUTION

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Since the nature and timing of reviews and field observations is the primary interest of USAID, distribution of this document and all revisions shall be restricted to USAID unless additional parties are authorized by USAID.

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## 4.0 BACKGROUND

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### 4.1 GENERAL BACKGROUND

The Tetra Tech (Tt) Afghan Engineering Support Program (AESP) has been providing engineering services to USAID since 2009 within the country of Afghanistan.

Recently, USAID requested Tetra Tech to provide Quality Assurance (QA) services for power services under long term work order 0090: *Interim QA Monitoring and Evaluation Services*.

Under this work order, Tetra Tech will provide technical services for QA Monitoring and Evaluation of the Power Transmission Expansion and Connectivity program (PTEC). Specifically, Tt will provide

independent QA for ongoing and planned construction works during the interim period from Notice to Proceed (NTP) through October 31, 2015.

## 4.2 OBJECTIVE

The purpose of the QA activities is to ensure the sustainability of USAID supported infrastructure projects through:

- Assuring USAID-funded infrastructure development projects are structurally sound and built according to established engineering standards.
- Enhancing the Government of Afghanistan’s ability to govern infrastructure investments.

The QA activities shall support the Power Transmission Expansion and Connectivity program (PTEC) consisting of the following ongoing and planned projects:

Work Order	DABS No.	Project Name
WO-LT-0048 AMD 3	DABS-92-ICB-004	220kV Transmission Line and 220/20kV Substations from Arghandi to Qarabagh (Ghazni and Sayedabad Substations)
WO-LT-0048 AMD 4 and 6	DABS-94-ICB-014	220/20kV Substations from Qarabagh to Kandahar East (Qarabagh, Muqur, Shah Joy, Qalat and Kandahar East Substations) and Reactive Power Compensation System for the Northeast Power System – Southeast Power System (NEPS-SEPS) Connector
WO-LT-0048 AMD 5	DABS-92-ICB-015	220kV Transmission Lines from Ghazni to Kandahar East
WO-LT-0059 AMD 3	N/A	Northeast Power System (NEPS) Substations
WO-LT-0063 AMD 6	DABS-94-ICB-016	Salang Tunnel Substation
WO-LT-0070	N/A	Tarakhil Power Plant
WO-LT-0091	N/A	Southeast Power System (SEPS) Completion

Additional projects may be added to the above list at the request of USAID.

## 4.3 PERSONNEL

Experienced and appropriate personnel will be assigned to perform the relevant QA functions. An expatriate Long Term Technical Assistance (LTTA) Senior Electrical Engineer will act as the Technical Lead, along with Local National (LN) and Reachback staff as necessary to complete this Work Order. This interdisciplinary group will report to the Tt Chief of Party (COP).

See Appendix A for a detailed roster of personnel and positions.

## 4.4 ELECTRONIC DOCUMENT MANAGEMENT SYSTEM (EDMS)

To facilitate the QA process, Tt will employ Bentley ProjectWise 8i® to efficiently control and manage documentation and workflows for the relevant team partners. This system will provide the following benefits:

- Enable project teams, suppliers, and contractors to create, manage, review, and approve documentation with secure document control
- Enable secure remote/mobile field access to essential project documents

- Streamline and automate transmittal processes including incoming requests, internal review, and external distribution of controlled documents to multiple parties
- Track progress against project milestones by means of dashboards and reports

Refer to Appendix B for specific details on the proposed EDMS.

Authorized EDMS users will be able to access single or multiple project documents from the desktop application (within Tt network) or via a secured Tt-EDMS web portal.

The EDMS secured data servers will be installed at the Tt-Kabul office and maintained by the Tt-Information Technology (IT) Department. Only PTEC project documents covered under this Work Order will be managed and stored on the EDMS Servers.

## 5.0 REPORTING

Reporting responsibilities for the QA process will include the following:

- a.) Non-Conformance Report (NCR) – This report will highlight any significant deficiencies or omissions noted. It will not have a regular distribution interval as NCRs will be issued when deficiencies are observed. As part of the NCR process, the contractor will be required to provide a Corrective Action (CA) Plan to rectify the non-conformance. The CA Plan will provide specific detailed steps required to correct the non-conformance, including a schedule of when the non-conformance will be resolved. The NCR will remain open until the deficiency has been corrected, at which time the NCR will be change from “open” to “resolved”. All open NCRs will be tracked on an “Aging” file. All NCRs shall be tracked using the EDMS system. The unique identification number will consist of the project ID followed by the work sector, the letters NCR, the Author, and a sequential 5 digit tracking number. See Appendix C for the NCR format.
- b.) Bi-Weekly Report – This report will include all relevant QA activities performed during a two week time period from Friday through Thursday. The report will be issued prior to the biweekly meeting with USAID. Each biweekly report will each have a unique identification number that will consist of the project ID followed by the work sector, the letters RPT, the author and a sequential 5 digit tracking number. See Appendix D for the Biweekly Report format.
- c.) Monthly Reports – This report format will review the information in the previous biweekly reports, as well any other information relevant to the QA process that was not covered in the biweekly report. Accordingly, monthly reports will each have a unique identification number which will consist of the project ID, followed by the work sector, the letters NCR, the author, and a sequential 5 digit tracking number. See Appendix E for the Monthly Report format.

In addition to the above reporting requirements, Tetra Tech will meet with USAID on a biweekly basis to discuss work order status and any questions or concerns that might arise regarding Quality Assurance for the projects.

## 6.0 QUALITY ASSURANCE ACTIVITIES

Tetra Tech will perform the following activities as part of the monitoring and evaluation services requested through this work order. This document will provide a guideline for each activity; for specific procedures and protocols please refer to the Quality Assurance Technical Manual.

### 6.1 PRE-CONSTRUCTION MEETINGS

Tetra Tech will attend pre-construction and project coordination meetings. This will provide information on the following topics:

- Job site safety

- Pertinent technical requirements of the specification
- Notification requirements
- Contractor's obligation to provide production and delivery schedules
- Information regarding the contractor's Quality Control organization
- Specification requirements on submittals
- Inform the contractor that prior approval is required on all substitutions upon submittal of written requests. All approvals must also be in writing from USAID.
- Transmittal of required drawings, specifications, permits and any other items required from the contractor should be done at this time
- Establish lines of communication between the Contractor and Tetra Tech personnel
- Anticipated frequency and scope of site visits
- Testing requirements and the preparation and storage of test samples
- Job site protection of construction work and materials (i.e. the protection of concrete during cold or hot periods, storage of all construction materials)

## 6.2 DESIGN REVIEWS

Tetra Tech will perform design reviews at the 10%, 30%, 60%, 90% and 100% stages. The reviews will be conducted by a multidisciplinary team. The team will review: engineering designs; specifications, including the contractor's work plans and procedures; and provide comments at each design phase.

The contractor or construction manager will provide a copy of all necessary contract drawings and bidder's documents.

The provided drawings will be compared with the list of drawing required in the specifications. Drawings will be checked for correct revisions and numbers, as well as conformance to accepted engineering and drafting practices.

### 6.2.1 Codes and Standards

All codes, regulations and standards referenced in this manual shall be "as last revised" unless explicitly stated otherwise.

The applicable portions of the codes should be reviewed as needed to verify compliance by the contractor. Applicable standards referred to in the specification may include the following:

- ACI – American Concrete Institute
- API – American Petroleum Institute
- AWS – American Welding Society
- AWWA – American Water Works Association
- ANSI – American National Standards Institute
- ANST – American Society of Nondestructive Testing
- ASTM – American Society for Testing Materials
- AISC – American Institute of Steel Construction
- CRSI – Concrete Reinforcing Steel Institute
- IBC - The International Building Code
- IEC - The International Electrotechnical Commission
- IEEE - The Institute of Electrical and Electronics Engineers
- SSPWC – Standard Specification for Public Works Construction

## 6.3 FIELD OBSERVATIONS

Tetra Tech will perform periodic site visits during the construction life of the projects. Full time field supervisors will rotate through active work sites to perform field observations. The purpose of these observations will be to corroborate information recorded in field reports provided by contractors and

construction management firms, and to observe additional facets of the projects not covered under standard field reporting.

### 6.3.1 Site Visits

The field QA team will conduct periodic on-site visits to the PTEC construction projects. During the visits, the QA team will:

- a. Verify and assure that the quality of materials used meet contract specifications
- b. Verify the correctness of the quantities used
- c. Monitor field testing procedures; including testing frequency and report failed tests to Tt/USAID/DABS for corrective action
- d. Verify the quality of construction/installation work and conformity to contract design plans, specifications, and requirements
- e. Evaluate progress of work against the approved construction schedule. Report deviations and their causes and recommend corrective actions
- f. Verify security incident reports, weather problems, and any other events that could affect construction schedule in a timely manner

Field personnel will visit the project site as soon as practical after the project has been awarded and the contractor has set up the field facilities. This initial visit will serve several functions including:

- A chance to discuss job schedules and notifications in an informal manner.
- Discussion of storage and handling of test samples such as concrete or mortar cylinders.
- Reviewing the limits of the work area.
- Meet with the Contractor's QC manager and/or site QA/QC representatives (e.g. subcontracted third party inspectors.)

Oral reports to the Technical Lead shall be made on a regular basis by the field supervisor. In the event of an accident, emergency, or other significant event; a phone call to the Tech Lead should be made immediately and documented the same day.

## 6.4 TESTING

### 6.4.1 Test Specimens

Tetra Tech will periodically monitor test specimen preparation to insure specification compliance with preparation and identification.

### 6.4.2 Test Results

QA shall at random intervals monitor the performance of required materials tests. Monitoring may include documenting the test procedures, recording any failures, recommending corrections and preparing any required non-conformance reports.

Tests shall be submitted to Tt for review. In the event the test reports indicate a failure, the report shall include the estimated impact on the job schedule.

## 6.5 PHOTOGRAPHS

Tetra Tech shall take photographs of job progress during their site visits, especially where work will be inaccessible at a later date (i.e. underground utilities). All photographs will be filed and logged in the EDMS.

## **6.6 AS-BUILT DRAWINGS**

Tetra Tech will monitor the progress of the generation of as-built drawings to assure the revisions are accurate and timely. Tetra Tech will perform a final review of all as-built drawings as part of the close-out process.

## **6.7 ENVIRONMENTAL COMPLIANCE**

Tetra Tech will perform a review of the Environmental Management Plan provided by the contractor to assure that it meets required environmental compliance documentation during the life of the project.

## **6.8 QUALITY CONTROL MANUAL**

The Contractor's finalized Quality Control documents will be evaluated for compliance with the specification's quality requirements.

## **6.9 HEALTH AND SAFETY**

Tetra Tech will review all approved health and safety plans for conformance to relevant specifications. These documents will include approved contractor site-specific health and safety plans.

## **6.10 PROJECT SCHEDULE**

Tetra Tech will maintain a professional scheduling staff to review the contractor and construction manager's schedules to assure that there are no unexplained deviations from the baseline schedule. The primary metrics to be assessed will include percentage of physical completion and resource loaded percentage complete.

Tetra Tech will also maintain an independent master schedule, which will act as a baseline to monitor contractors' schedules.

## **6.11 SUBMITTAL REVIEWS**

Tetra Tech will review the master submittal register periodically to assure that all submittals required by the contract have been submitted and approved, with no adverse impacts to the construction schedule.

## **6.12 INVOICE REVIEW**

Tetra Tech will review project cost and invoices as submitted by the contractors for monitoring of project progress and performance.

## **6.13 CLOSEOUT PROCEDURES**

Tetra Tech will review the close-out procedures for each project and verify that on-budget contractors follow closeout procedures including close out submittals such as: as-built drawings, as-built record of materials, equipment/product warranties, or similar.

## **6.14 FACTORY QUALITY ASSURANCE**

This procedure describes quality assurance (QA) activities related to the procurement, fabrication, and delivery of structural components, equipment, and electrical apparatus which are manufactured or fabricated at vendor facilities.

These activities consist primarily of reviewing specifications, auditing factory/shop production capabilities and QC programs, evaluating bids, inspecting work, witnessing tests, issuing nonconformance reports, issuing shipment releases, inspecting material or equipment after receipt, and writing reports.

### 6.14.1 Specifications Review

Proof copies of all formal material specifications shall be reviewed and approved by Tetra Tech. Standard review topics include:

- Access to vendor and subcontractor's factories
- Submittal of vendor production schedule
- Right to audit QA/QC Manual and safety related documents
- Verification of personnel qualifications
- Production schedule
- Adequate notice for required inspections and tests
- Shipment release and hold points for critical inspections
- Welding

### 6.14.2 Witnessing of Tests

The QA Engineer shall review the test requirements in the contract specifications, in related standards and codes, and in the contractor's inspection and test plan. QA personnel will witness selected production tests and will generally witness all significant design tests. The QA personnel will participate in the resolution of the deviations, and will include the test results and findings in a written report. When catalogued (non-custom) equipment is selected, factory shop testing may be omitted with the Design Engineer's approval; provided the appropriate industry testing is performed by the manufacturer. Documentation for this testing shall be provided with the equipment upon delivery or upon request.

### 6.14.3 Laboratory Reports

Laboratory reports should be transmitted directly to Tetra Tech for review.

## **APPENDICES**

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## **APPENDIX A – QA PERSONNEL ROSTER**

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## Responsibility Matrix

USAID OEGI Contract EDH-I-00-08-00027 Task Order No. 1

Afghanistan Engineering Support Program (AESP)

Work Order WO-LT-0090 Quality Assurance Monitoring and Evaluation

Project	Name	Organization	Functional Title	Function	Responsibility
PTEC		USAID	Senior Program Engineer/COR	Sponsor	POC
PTEC		USAID	Contracting Officer	Sponsor	POC
PTEC		USAID	Alternative On Budget Manager	Sponsor	POC
			International		
WO-LT 0090 QA		Tt AESP	Chief Of Party	Sponsor's Engineer	
WO-LT 0090 QA		Tt AESP	Technical Services Manager	Internal Quality Assurance	
WO-LT 0090 QA		Tt AESP	MIS Manager	Document Control	
			International		
WO-LT 0090 QA		Tt AESP	Senior Electrical Engineer	Team Leader	POC
WO-LT 0090 QA		Tt AESP	QA Program Manager	Substation/TL	POC
WO-LT 0090 QA		Tt AESP	Senior Civil/Structural Engineer	Substation/TL	
WO-LT 0090 QA		Tt AESP	Scheduler/Cost Engineer	Scheduler/Cost Engineer	
			Afghan National		
WO-LT 0090 QA		Tt AESP	Senior Project Engineer	LN Project Coordinator	
WO-LT 0090 QA		Tt AESP	Electrical Engineer	Substations	
WO-LT 0090 QA		Tt AESP	Electrical Engineer	Transmission Lines	
WO-LT 0090 QA		Tt AESP	Civil/Structural Engineer	Substations	
WO-LT 0090 QA		Tt AESP	Civil/Structural Engineer	Transmission Lines	
WO-LT 0090 QA		Tt AESP	Electrical Engineer	Field QA Supervisor	
WO-LT 0090 QA		Tt AESP	Electrical Engineer	Field QA Supervisor	
WO-LT 0090 QA		Tt AESP	Civil Engineer	Field QA Supervisor	
WO-LT 0090 QA		Tt AESP	Civil Engineer	Field QA Supervisor	
WO-LT 0090 QA		Tt AESP	Project Administrator	EDMS Project Coordinator	
WO-LT 0090 QA		Tt AESP	Project Engineer	Scheduler/Cost Engineer	
DABS-94-ICB-007		DABS	Electrical Engineer/PIU Member	Owner Representative	POC

Salang Tunnel Substation	TBD	TBD	Construction Manager	POC
	TBD	TBD	Construction Contractor	POC
DABS-92-ICB-004 Arghandi – Ghazni Substation/TL	DABS	Energy Control Director	Owner Representative	POC
	GFA	Substation/TL Team Leader	Construction Manager	POC
	KEC	Construction Supervisor	Construction Contractor	POC
DABS-93-ICB-037 Ghazni – Kandahar E. Substations/RPC/SVC	DABS	Energy Control Director	Owner Representative	POC
	TBD	TBD	Construction Manager	POC
	TBD	TBD	Construction Contractor	POC
DABS-93-ICB-038 Ghazni – Kandahar E. Transmission Lines	DABS	Energy Control Director	Owner Representative	POC
	TBD	TBD	Construction Manager	POC
	TBD	TBD	Construction Contractor	POC

## **APPENDIX B – EDMS DETAILS**

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# ProjectWise



A Proven System of Collaboration Servers  
and Services for Infrastructure Projects



# Market Facts

## Enterprise Scale:

- ProjectWise enterprises range from tens of users to hundreds of thousands
- Representative ProjectWise accounts average over 1000 users
- Representative ProjectWise user organizations manage over 400,000 documents averaging 7.5 MB each

## System of Choice for:

- Half of the U.S. state departments of transportation
- 24 of the ENR Top 25, 42 of the ENR Top 50, and 67 of the ENR Top 100 Design Firms
- 29 of the ENR Top 50 Design-Build Firms
- 234 of the Bentley Infrastructure 500 Top Owners

# Proven, Reliable, Broad Industry Adoption

ProjectWise is used in 92 countries by many of the world's leading infrastructure organizations. A sampling appears below.



*"We've made ProjectWise our global work-sharing platform to streamline team collaboration on projects of all sizes and complexities. We're really happy with the way it allows widely distributed project teams to confidently share and manage project data. In addition, our strategic partnership with Bentley enables us to develop and implement world-class solutions that meet the needs of our integrated project teams around the globe."*

*Bruce A. Strupp/ATL, CPE-Design Technology Director, CH2M HILL*

*"We currently utilize ProjectWise in 32 projects, across more than 1,300 users, representing \$3 billion in construction costs alone. As most of the design data we currently manage is Revit based, ProjectWise V8i (SELECTseries 2) with Revit integration, as well as delta file transfer, will further enhance our Revit community by incorporating their workflows with supercharged network performance. ProjectWise has been tremendous in helping us collaborate with our business partners."*

*Radhika Menon, CIO, DPR Construction*



# How Much Is Inefficient Collaboration Costing You?

## Is Conventional Document Management the Answer? Think Again...

Is your organization trying to use conventional document management or collaboration software to support project teams?

These “generic” systems aren’t set up to address the challenges specific to infrastructure project workflows. They can’t meet the unique requirements of securely managing, sharing, and distributing work-in-progress architectural, engineering, and construction content. They aren’t integrated with the design, analysis, and simulation applications commonly used by your teams, and aren’t suited to properly handle the sets of large and interrelated files distributed across team members in multiple geographies, including multiple countries and continents as organizations seek to deploy 24/7 engineering.

What’s more, document management systems don’t offer capabilities for effectively and efficiently publishing information to project stakeholders, or for the demanding review and markup needs unique to infrastructure projects.

As a result, most teams struggle with ineffective collaboration, work sharing, and communication – increasing time spent moving talent to project locations, driving up costs, increasing risk, and hurting the bottom line. It’s well understood that as much as 40 percent of an engineer’s working day can be spent on looking for and validating specific information and files for use, and in ensuring that the results of the work are properly communicated and distributed – all because there’s no single, trusted, and secure environment for collaboration and work sharing. But this is just the

tip of the iceberg when it comes to work-in-progress inefficiencies. For example, how many times have:

- Your teams sent design files that were too large – or which reviewers couldn’t open because of the file format?
- The inherently complex relationships among files in your engineering content been broken, endangering project quality and schedules?
- Your distributed, multidisciplinary teams been unable to work on projects simultaneously, rather than sequentially, limiting your ability to meet tight deadlines?
- You struggled to get stakeholder feedback faster and more frequently during design and construction, or perhaps even lost valuable feedback that later resulted in costly change orders?

Given the unique challenges of engineering information management and collaboration for infrastructure projects, what’s needed is information mobility in a secure, interoperable environment. Such an environment empowers collaboration, in the context of the entire project, including the input of all disciplines, and with continuity of information across all project teams, project stakeholders, and project phases, including design, engineering, construction, and operations—so information “hand-off” and “handover” become a positive “hands-on” experience.

## ProjectWise Secures Information Mobility

The ProjectWise system of collaboration servers and services ensures information mobility *with integrity* for AECO information used in the design and construction of infrastructure projects while the work is in progress. It provides scalable, industry-proven, interoperable AECO **work-sharing, content reuse,** and **dynamic feedback capabilities** that are so essential to leveraging *information modeling* through *integrated projects* for high-performing, *intelligent infrastructure*.

ProjectWise helps you achieve:

- **Organizational Agility in a Managed Environment:** Create and manage ongoing work-product effectively – where the right people quickly and reliably accelerate work in progress using infrastructure tools and workflows of choice.
- **Maximized Value Across the Enterprise:** Inform project stakeholders and enterprise systems in a more consistent, timely, and predictable manner using high-impact deliverables.
- **Timely and Actionable Participation:** Synchronize comments to resolve issues quickly and effectively in a closed loop, returning feedback in context to all the relevant designers so as to be actionable.





# Work Sharing: Create and Manage Ongoing Work Efficiently

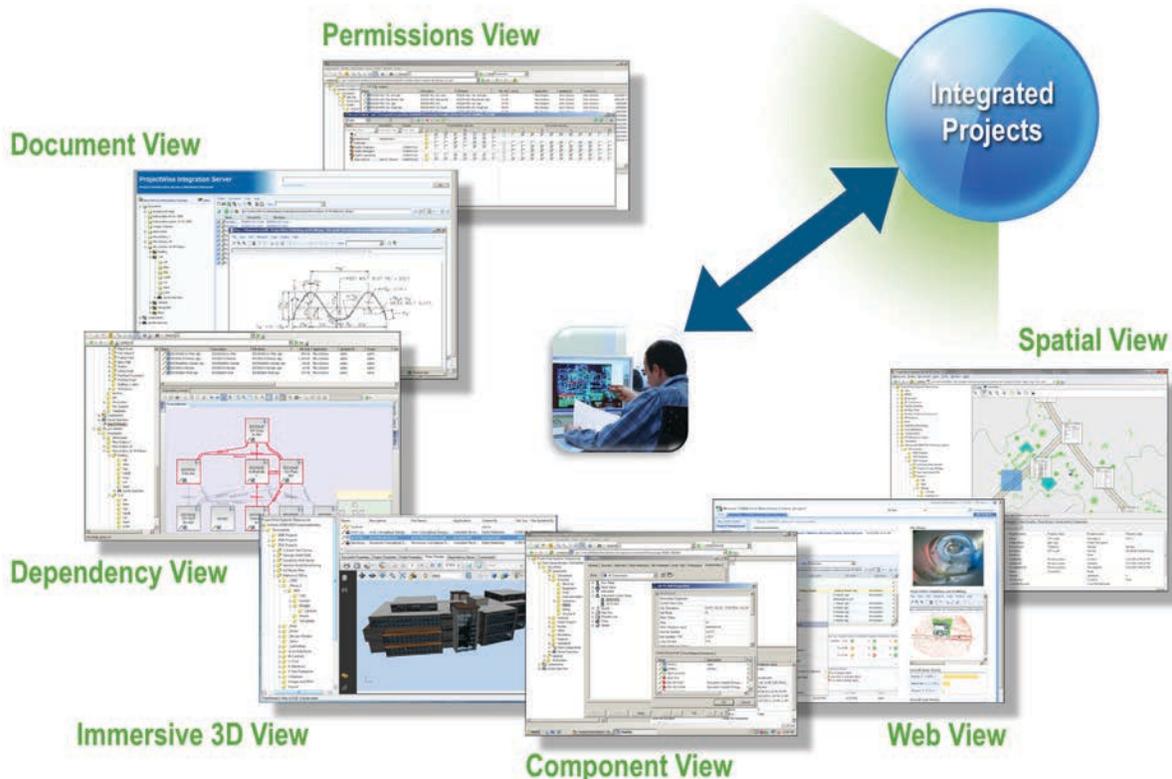
- With ProjectWise, everyone can collaborate on projects, which is how today's interdisciplinary project teams must work to meet the challenges of sustaining infrastructure. Distributed team members can use their

own applications and file formats in their own locations. And through ProjectWise, they can quickly find, share, and interact with appropriately managed, interrelated engineering content using their preferred workflows.



With the smart work sharing that ProjectWise facilitates, your team realizes the higher productivity, increased project performance, and improved project quality that result from the ability to automate the management of complex relationships among documents and the countless components within them; share large work-in-progress datasets across offices in real time, instantly seeing the impact of design changes made by others; automatically enforce document standards across distributed teams; control document access; and make it easy to search at

the file and component level. ProjectWise also provides powerful work-sharing capabilities such as spatial view for map-based navigation, web view for online browser access, permissions view for access control management, dependency view for understanding and managing complex file relationships, component view to search for information across file types, and 2D and 3D views without needing the authoring applications. These empower team members to interact with project information in views that directly relate to their specific task requirements.





## Content Reuse: Keep Project Stakeholders Informed

With ProjectWise, you can keep project stakeholders informed by creating consistent, timely, high-impact deliverables in a predictable manner. Designers can publish project information according to a predefined schedule or on demand – and always in accordance with user-defined standards. Now you can publish precise, data-rich, native engineering content in media that are appropriate for different audiences, such as electronic files, drawings, renderings, 3D PDFs, and 3D prints. You can also publish digital files to devices such as plotters, tablets, iPads, and the Web.

With flexible publishing capabilities, you benefit from improved project quality, faster design approvals, and broader project awareness. Project teams can:

- Transform digital designs into high-quality, precise deliverables.
- Securely publish engineering content.
- Package and publish 2D drawings and 3D models in highly portable formats that anyone can view.
- Improve communication with stakeholders through photorealistic visualizations (including images and movies).



## Dynamic Feedback: Synchronize With the Source to Resolve Issues

ProjectWise supports a dynamic, closed-loop review process that captures feedback from reviewers – regardless of their respective locations – and returns it in context to all relevant designers in a way that's instantly actionable. You can capture comments and feedback on designs from anywhere – on a PC, using an iPad, on paper while at a construction site, and online or offline.

### Bentley Navigator and Acrobat

You can capture and synchronize electronic markups provided through Bentley Navigator or Acrobat™ files. Reviewers can open these files using any computer or iPad – without the need for costly, proprietary design software – and comment on 2D and 3D i-models and PDFs. When markups are returned to

ProjectWise, they are automatically synchronized with the correct design files and team members, and include an audit trail of all comments and changes.

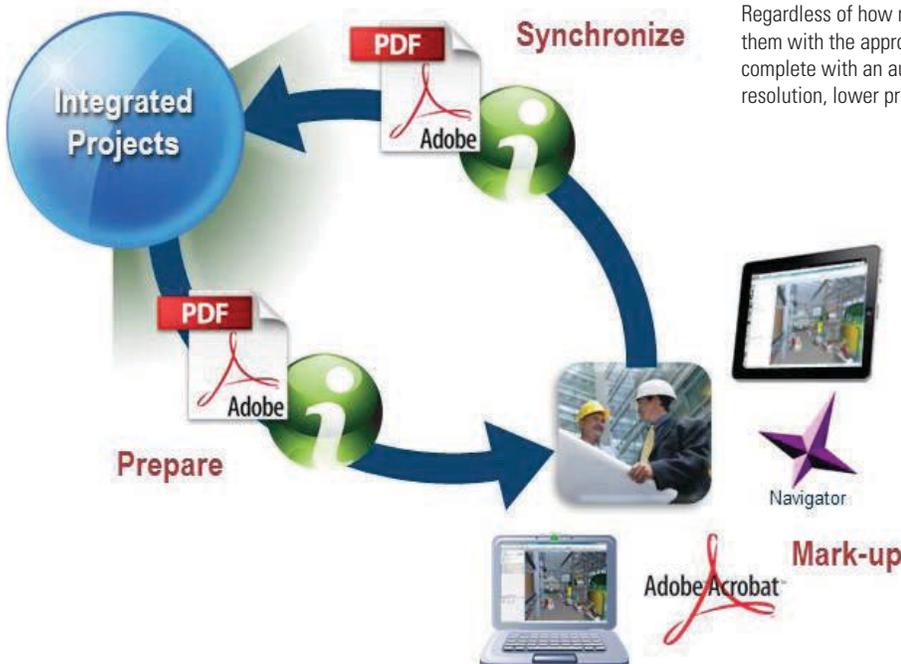
### Pen and Paper

Since a hard copy is sometimes the best medium for sharing designs with stakeholders, Bentley provides a fast, easy way to synchronize markups created using pen and paper. Using ProjectWise Dynamic Plot, you can print versions of documents that can be marked up using a special digital pen. As markups are made, they are immediately captured by the pen. Once the digital pen is placed in its docking station, the markups are instantly synchronized with the original design file in ProjectWise.

### Markup Synchronization

Regardless of how markups are captured, ProjectWise automatically synchronizes them with the appropriate project source documents and team members for action, complete with an audit trail. With dynamic reviews, you benefit from faster issue resolution, lower project risk, and reduced project time. Your project teams:

- Accelerate the creation and sharing of markups and feedback.
- Simulate and resolve clashes during the design phase and optimize schedules to eliminate on-site errors.
- View valuable component information, filter views of models, and precisely measure distances.
- Ensure feedback is routed to the right team members and associated with originating design files.
- Streamline review workflows and automate approval processes.





# Business Benefits

ProjectWise transforms how project teams collaborate and makes your businesses more competitive by reducing the costs of inefficient collaboration. And as users can attest, the investment pays for itself through:

- **Rapid return on investment:** Pennsylvania-based Michael Baker Corporation achieved a 500% return on investment on ProjectWise for one project, with full payback in just six months.
- **Increased employee efficiency:** Genoa Port Authority in Italy cut the time employees spend locating, copying, and printing documents by 50%, saving two hours of work per employee per day.
- **Time savings:** London-based URS/Scott Wilson can find and validate information 25% faster, saving £5 million on a single project.

- **Lower travel costs:** Omaha-based HDR saved \$1.5 million in travel costs by connecting a virtual design team of 174 people across five U.S. states.
- **More efficient content management:** Energy Australia in New South Wales manages engineering content more effectively, saving \$500,000 in design and \$500,000 in construction on one project.

At the same time, ProjectWise reduces the cost of collecting the data needed for project handovers to asset management teams. For projects completed in ProjectWise, there is a single trusted and secure environment that contains the critical engineering data needed by asset management and operations teams. This data can be utilized by an asset management solution such as AssetWise.

## Flexible Deployment Options

ProjectWise provides the flexibility and scalability to support the needs of both large and small project teams and can be deployed onsite or online. Its modular design allows you to expand an initial implementation as project requirements change. Also available are packaged offerings tailored for specific industries and project requirements, as well as deployments specifically tailored to the needs of your enterprise.

Provides you with full control and confidence, and may be required for compliance with project requirements or corporate IT standards.



### Onsite

(Hosted on your servers)



### Online

(Hosted by Bentley)

Ensures full control and confidence while off-loading IT requirements to Bentley as a trusted service provider.

## Work-Sharing Services

Empower and manage engineering content and team collaboration	ProjectWise Integration Server
Solve the geographically distributed 'big files' problem	ProjectWise Caching Server
Provide passport-enabled project team member access via a web browser	ProjectWise Web Server
Package, register, deliver and track AECO submittals and transmittals	Bentley Transmittal Services
Follow a best practice for AEC project management from the UK	ProjectWise Business Process Template (for BS1192)

## Content Reuse Services

Automate production plotting for paper, PDF, and 3D plots	ProjectWise InterPlot Server
Automate i-models, PDFs, and raster production	ProjectWise Dynamic Composition Server
Define and enforce explicit dependency relationships	ProjectWise Dependency Service
Enable read-only browser access to broader stakeholders (no passport required)	ProjectWise Web View Server
Enterprise access to spatial data stored in ArcGIS	ProjectWise Connector for ArcGIS
Enterprise access to spatial data stored in Oracle databases	ProjectWise Connector for Oracle Spatial

## Actionable Feedback Services

Review, mark-up, clash resolution, and visualization of i-models	Bentley Navigator
Produce paper plots for dynamic review with digital pens	ProjectWise Dynamic Plot Service
Access PDS models and data without requiring PDS software	ProjectWise PDx Dynamic Review Service



# Enabling Technology



## i-models: Delivering Information Mobility

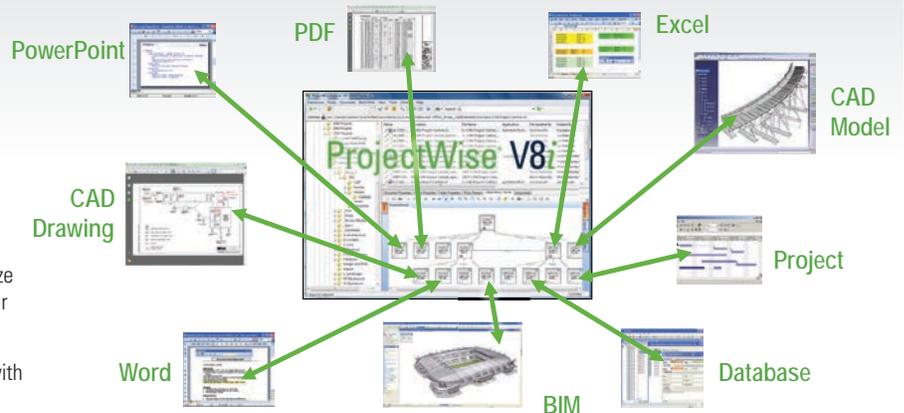
i-models are containers of information developed by Bentley to enable the fast, easy exchange of precise engineering content. Team members can share information generated from various applications without requiring recipients to have the source application used to create the data. ProjectWise and i-models address one of the fundamental weaknesses of conventional document management systems: how to seamlessly integrate everyone into project review and markup workflows.

- **Self describing:** Carry with them the associated data-model specifications (schema) to describe their content.
- **Portable:** Are optimized for sharing and distribution.
- **Provenance:** Retain knowledge about their original source, the purpose, and the state of the information at the time they were created.
- **Precise:** Contain 2D and 3D geometry and business properties and data with no loss of fidelity.

## Trusted Shared Source of Project Information

Unlike systems that employ a centralized approach, ProjectWise utilizes a federated approach to provide the speed and flexibility needed when working with sets of large and interrelated files and data that are distributed across multiple sources and locations.

- Allows interdisciplinary project teams to utilize their own applications and file formats in their own locations.
- Enables project teams to always be in sync with the most up-to-date project information.
- Facilitates quick access to large and interrelated files by geographically distributed teams.



## ProjectWise Collaboration Now Anywhere

The growing use of mobile devices has driven demand for effective tools to support mobile workflows. With the introduction of Bentley's mobile apps including ProjectWise Explorer, Field Supervisor, and Navigator Mobile, Bentley enables project participants to easily interact with content managed in ProjectWise.

### Using Bentley's iPad apps, users can:

- Prepare and collate information, package and distribute it, perform a field task, and then return the package of information for analysis and reporting, whenever and wherever they might be.
- Extend anytime, anywhere access to their ProjectWise database through Wi-Fi or 3G, enabling users to access and browse folders and files at their finger tips. While connected, users can check out files on the iPad, perform field work, check the file in, and make it immediately available to other project stakeholders.
- Visit [www.bentley.com/ipad](http://www.bentley.com/ipad) for more information





## Learn More

Are you ready to empower your project teams to work smarter and more efficiently? Contact your Bentley sales professional or visit us online at [www.bentley.com/ProjectWise](http://www.bentley.com/ProjectWise)

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## **APPENDIX C – NCR REPORT FORMAT**

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## NON-CONFORMANCE REPORT

<b>NCR No.</b>		<b>Status:</b>	Ongoing <input type="checkbox"/> Resolved <input type="checkbox"/>
<b>Project:</b>			
<b>Organization:</b>		<b>Location:</b>	
<b>Tt POC:</b>		<b>Report Date:</b>	
<b>NCR Subject:</b>			
<b>Description:</b>			
<b>Findings (including references):</b>			
<b>Response:</b>			

**APPENDIX D – BIWEEKLY REPORT FORMAT**

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<b>Biweekly Status Report No. X</b>	Project: <b>AESP Work Order WO-LT-0090</b>
Location: <b>Kabul, Afghanistan</b>	Project Title: <b>Interim Quality Assurance Monitoring &amp; Evaluation</b>
Week End Date: <b>April 2, 2015</b>	

**PRESENTED TO**

**United States Agency for International Development (USAID)  
Office of Economic Growth and Infrastructure (OEGI)**  
Kabul, Afghanistan

Tetra Tech Reviewed by:

Name: [REDACTED] Date: 04-02-2015  
Title: Senior Electrical Lead

**PRESENTED BY**

**Tetra Tech, Inc.  
Afghanistan Engineering Support Program  
Contract No. EDH-I-00-08-00027-00  
Task Order No. 1**  
Kabul, Afghanistan

Tetra Tech Approved by:

Name: [REDACTED], PE, BCEE Date: 04-02-2015  
Title: AESP Chief of Party

**EXECUTIVE SUMMARY**

Active Projects in Construction:

- DABS-ICB-92-004 Lot 1 Arghandi to Ghazni Transmission Lines
- DABS-ICB-92-004 Lot 2 Arghandi to Ghazni Substations

Preconstruction activities continue, including design, procurement and factory testing (FAT). Issues with FAT are reported herein.

Active Projects in Bidding:

- DABS-94-ICB-014 Qarabagh to Kandahar East Substations and RPC/SVC
- DABS-94-ICB-015 Ghazni to Kandahar East Transmission Lines
- DABS-94-ICB-016 Salang Tunnel Substation

Pre-bid meetings and processing bidder RFI's continues. No significant bidding issues to report.

**DISCLAIMER**

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

## 1.0 PREVIOUS TWO WEEKS' PROGRESS

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- LT0090 QA Notice to Proceed February 9, 2015
- LT0090 QA Staffing Memo submitted on February 12, 2015
- LT0090 QA Kick off Meeting held on February 28, 2015 (meeting minutes attached)
- Responsibility Matrix circulated ... collecting comments
- Master PTEC schedule circulated as draft and is being revised (see attached)
- DABS-94-ICB-016 Salang Tunnel Substation Pre-Bid Meeting completed on March 14, 2015
- DABS-94-ICB-014 Qarabagh to Kandahar East Substations RPC/SVC completed on March 15, 2015
- GFA furnished signed KEC Construction Contracts for Lot 1 and Lot 2 on March 8, 2015
- GFA furnished KEC quality control (QC) test plan
- GFA furnished KEC factory acceptance test (FAT) plan for Type Tower FAT
- KEC initiated Type DA Tower FAT on March 16, 2015 in India (Tt present as observer)
- First LT0090 Weekly QA Meeting convened on March 19, 2015
- DABS-94-ICB-016 Salang Tunnel Substation bidder RFI period closed March 15, 2015

## 2.0 TWO-WEEK LOOK AHEAD

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- Type DA Tower FAT continues through next week (Tt present as observer)
- Tt to submit LT0090 QA Plan
- Tt will continue to process bidder RFI's for DABS-94-ICB-014 and 015 SS and T/L
- Submit comprehensive information request to GFA for:
  - Complete KEC Quality Control Test Plan
  - KEC design, procurement and construction schedule
  - KEC detailed design plans and specifications
  - KEC Health & Safety Plan
  - KEC Environmental Plan
  - KEC Land Acquisition & Resettlement Plan
  - GFA reports and approvals of aforementioned documents

## 3.0 NON-CONFORMANCE REPORTS

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## ATTACHMENTS

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### Photo Documentation

## **APPENDIX E – MONTHLY REPORT FORMAT**

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**USAID**  
FROM THE AMERICAN PEOPLE

United States Agency for International Development  
Office of Economic Growth and Infrastructure  
Afghanistan Engineering Support Program

<b>Monthly QA Report No. X</b>	Project: <b>WO-LT-0090 – Interim QA Services</b>
Date:	Report Duration:

**PRESENTED TO**

---

**United States Agency for International Development (USAID)  
Office of Economic Growth and Infrastructure (OEGI)**

Great Massoud Road  
Kabul, Afghanistan

Prepared by:

**PRESENTED BY**

---

**Tetra Tech, Inc.  
Afghanistan Engineering Support Program  
Contract No. EDH-I-00-08-00027-00  
Task Order No. 1**

Shash Darak  
Kabul, Afghanistan

Tt Reviewed by:

Name: [Redacted] Date:  
Title: **Technical Services Manager**

[Redacted] Date:

**EXECUTIVE SUMMARY**

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**DISCLAIMER**

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This report was prepared for the United States Agency for International Development, Contract No. EDH-I-00-08-00027-00, Task Order 01, Afghanistan Engineering Support Program.

## **1.0 DOCUMENT REVIEW**

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### **1.1.1 Drawings**

### **1.1.2 Submittals**

### **1.1.3 Construction Manager QA Reports**

### **1.1.4 XXXXXX**

## **2.0 FIELD ACTIVITIES**

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### **2.1.1 Site Inspections**

### **2.1.2 Testing and Monitoring**

### **2.1.3 Contractor Staffing Levels**

## **3.0 DEFICIENCIES AND OMISSIONS**

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## **4.0 CONTRACT ISSUES**

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## **5.0 SCHEDULE REVIEW**

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## **6.0 INVOICE VERIFICATION**

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## **7.0 HEALTH AND SAFETY**

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## **8.0 SECURITY**

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## APPENDICES

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## APPENDIX A – PHOTO DOCUMENTATION

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## APPENDIX B – BIWEEKLY QA REPORTS

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## APPENDIX C – CONTRACTOR QC REPORTS

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## APPENDIX D – MASTER SCHEDULE

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## APPENDIX E – CONTRACTOR SCHEDULES

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**APPENDIX F – EXCEPTION REPORTS**

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