





14. Quality Assurance and Testing Program

On the following pages we have outlined our approach to ensuring all of the DES's expectations for quality are achieved. Additionally, we have attached at the end of this section an example project-specific Table of Contents from a Sellen QA/QC plan, as well as a pre-installation checklist and material confirmation sheet, which we customize for each major activity.

Additionally, as requested in Addendum 6, dated Jan. 22, 2014, we provided a complete QA/QC plan on a separate CD with this submittal. For every project we approach, Sellen completes a project-specific QA/QC plan that is an extensive account of every potential quality issue and measure. The electronic QA/QC plan provided is project-specific and was used on a similar-sized office and laboratory building that encompassed a full block in a heavily trafficked downtown area, completed last year.



When changes are required, we will ensure that they are handled quickly, accurately, and with as little impact to the project budget or schedule as possible.

Quality Control During Design

Our team's control of document delivery and quality throughout the design process is based on: 1) effective project management; 2) a participatory design process that encourages innovation and maintains open communication with the owner and design team at all times; and 3) a Quality Management Program tailored to the individual goals of the owner and project requirements.

During design, our team will make the distinction between quality assurance and quality control. Assurance is a proactive endeavor and an ongoing process, while control is a retrospective means of measuring/monitoring performance. Simply put, placing our emphasis on quality assurance is a reflection of our preference to do the job correctly the first time. We will use quality control as a means of confirming that our process is delivering a complete set of documents that is thoroughly checked and meets all expectations.

At the beginning of the project, Eddie Kung and Victoria Buker, our project managers, will work with the DES to affirm all of the deliverables and assign responsibilities for the execution of each. As documentation proceeds, each item will be reviewed for clarity, consistency and constructability. Process and decisions are well documented in meeting notes and other communication tools that outline action items, due dates and responsible personnel. Email and other electronic links between all

Approach to Quality Control

We understand that quality assurance requires expertise and diligence from the beginning of preconstruction through commissioning, and we are confident we have assembled a team of professionals who share remarkably high standards that will meet or exceed your expectations.

Our entire design-build team encompasses a culture of quality and mutual respect that begins in design and continues through project close-out. We take great pride in the final product to ensure the design intent is achieved, the finish details are flawless and the systems installed operate seamlessly.

Sellen and ZGF measure project success by our ability to deliver the best building of the highest possible value within the framework of a seamless design-build delivery process.

Key to this is the ability to carry design decisions from concept through construction and project close-out, while maintaining the original design intent. Our approach to the 1063 Block Replacement project has focused on these objectives:

- Using the proprietary meetings to establish clarity and commitment to project objectives, and incorporate the DES's and tenants' preferences into our design concept.
- Engaging in an internal and external examination of crucial strategic, programmatic, planning, design, entitlement, sustainability and cost analyses.
- Accommodating future flexibility.
- Documenting the process in a manner that provides a foundation on which to build as the 1063 Block Replacement project moves through its design and implementation phases.

team members facilitate the collection and dissemination of information. A project SharePoint site will be used to simplify team communication, posting information to a single location where everyone on the team can share a common view of the state of the work. The Sellen | ZGF team will be co-located during the design phase at ZGF's offices.

We will jointly develop a project-specific Quality Management Plan that will outline team organizational structure, policies and procedures, communications interface, document control, verifications, corrective actions, reporting and checking/ coordinating and integrating activities. A special focus is placed on lessons learned from other similar projects.

At the end of each design phase, from pre-design through construction administration, reviews of the completeness of documents and coordination between disciplines will occur. We also perform a final peer review by a senior project architect outside of the project team to obtain another perspective on the quality of the completed documents.

The consultant team will be a critical part of project planning and design from the onset of the project. Therefore, all consultants are an integral part of the design team and document quality, including the DES' consultants and the Architect of Record consultants, regardless of the contractual arrangements. Regular team coordination and work sessions will facilitate close coordination of architectural and engineering disciplines. Electronic exchange of drawings will also ensure fully coordinated sets of documents. In the end, under Eddie Kung's and Victoria Buker's management leadership, we are accountable to the DES for a well-coordinated set of documents that meet the design intent.



Case Study: “Learning Lab” Mock-Up at Federal Center South

At the new Federal Center South office building, Sellen postponed demolition of half of the existing on-site warehouse to easily allow for mock-ups to be built on site. The warehouse was used throughout the entire project not only for mock-ups, but also as a testing site for the project team. The testing facility, deemed the “Learning Lab,” provided the design-build team with space to test the building systems such as the under-floor air distribution system and the exterior curtainwall system. This process allowed the team to verify that the products met the project specifications and design intent prior to installation.

The physical mock-ups also allowed field workers the opportunity to refine their approach and increase their productivity in a convenient location directly adjacent to the new building. By producing mock-ups early, rather than making changes after systems and finishes had been ordered and installed, the team had better control over project costs and quality.

The large warehouse also provided a staging area that shifted the burden away from the new building and allowed for a portion of the new project's exterior to be prefabricated on site, saving time and money and increasing quality.

Quality Control During Construction

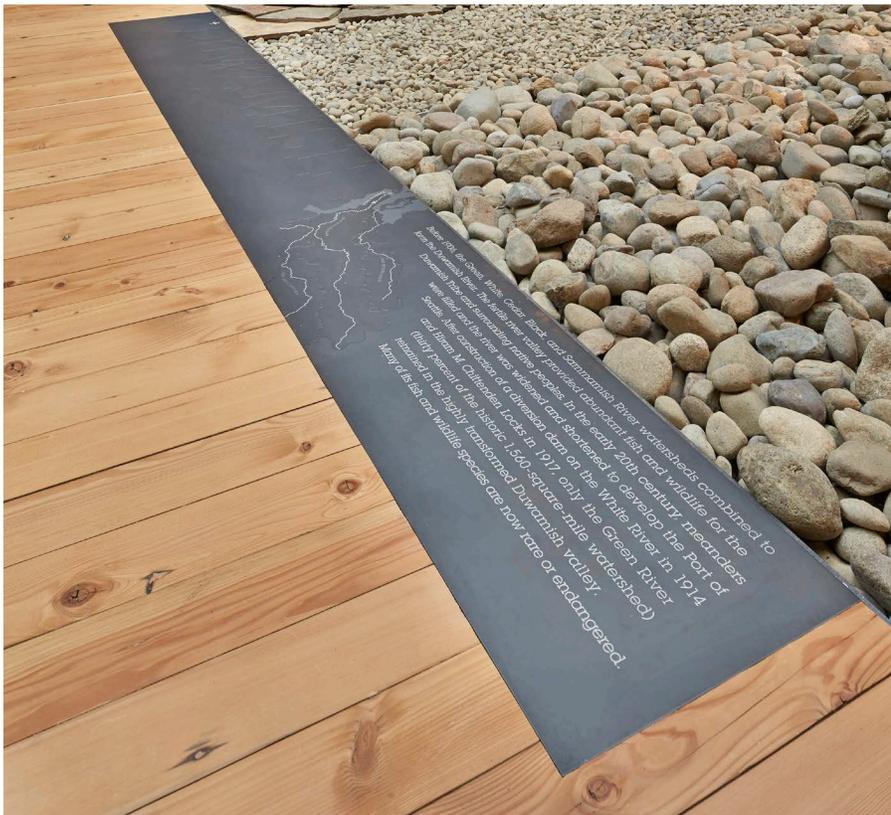
Through worker orientation and pre-installation conferences, everyone who touches the 1063 Block Replacement project will be fully aware of the design intent and quality expectations. We will implement a step-by-step process to guarantee all systems are built and installed to the highest level of workmanship. Quality is a continuum – from contract specifications, submittals, checking material when it arrives on site, and finally checking that the correct materials are installed where intended. Quality inspections will be made regularly by Sellen, ZGF, construction inspectors, and the DES representatives.

In construction, Sr. Superintendent Lauren Barnwell will implement the following key QA/QC strategies:

- A project-wide awareness of quality expectations that involve design and engineering, material selection, material receipt and handling, workmanship and protection.
- Quality teams that include representatives from the DES, Sellen and ZGF representing all levels of work to be performed and providing ongoing input and resolution to quality challenges before they occur.
- Swift execution of quality control inspections, tests and certifications, clear-cut hold-and-inspect points, comprehensive and manageable documentation, and a timely resolution of nonconforming work that supports the project schedule.
- A comprehensive quality program

that monitors and drives the timely execution of the QC process, assures compliance with the established milestones, and provides a clear audit trail.

- Update and maintain QA/QC documentation on a weekly basis.
- Continually take photos and organize photographic records to document QA/QC elements.
- Identify critical building systems that require extra oversight.
- Review specifications, qualifications, and QA/QC strategies with the team on site.
- Carefully review material deliveries for conformance with approved submittals and specifications.
- Complete physical and 3-D mock-ups and secure necessary approvals.
- Prepare detailed installation verification checklists and complete during regular review of field installation. Log deficiencies and track to satisfactory completion.
- Sellen will lead the start-up, testing and commissioning phase. We will begin preparing for this phase during preconstruction to help ensure a smooth commissioning process. As part of our turnover process, Sellen will provide end user and facility maintenance personnel training for all systems.
- Collaborate with city inspectors as required and involve them in the process as soon as possible.
- Use of Bluebeam Revu's punchlist application maximizes communication and efficiency during the punchlist stage.
- Subcontractors attend weekly site meetings to discuss progress and expectations for deliverables. Sr. Superintendent Lauren Barnwell will continuously monitor the Sellen crew and subcontractor performance to ensure that all completed work complies with contract documents and approved submittal information.



Federal Center South, Sellen | ZGF Design-Build Team (Pursuing LEED Gold)



**EXAMPLE
SITE-SPECIFIC QUALITY CONTROL/QUALITY ASSURANCE PLAN**

TABLE OF CONTENTS

ORGANIZATION/REPORTING STRATEGY 3

ON-SITE RESPONSIBILITY MATRIX..... 3

DOCUMENT CONTROL/REVIEW 3

SAFETY..... 4

SUSTAINABILITY/LEED 4

SUBMITTALS/SUBMITTAL SCHEDULE 4

MOCK-UPS..... 5

CONTINUOUS QA/QC INSPECTIONS..... 6

PRE-INSTALLATION MEETINGS/CHECKLISTS 6

PRE-POUR CHECKLISTS..... 7

STRUCTURAL & MISC. STEEL..... 7

EXTERIOR CLADDING/ROOFING/WATERPROOFING 8

WALL & CEILING SIGN-OFF..... 8

MEP QUALITY CONTROL 8

MATERIAL & EQUIPMENT VERIFICATION FORMS 8

FACTORY TESTING/WITNESS 8

MANUFACTURER REPRESENTATIVE INSPECTIONS 9

NON-CONFORMANCE & RESOLUTION TRACKING 9

SELLEN PRE-PUNCHLIST 9

AS-BUILT & RECORD DOCUMENTS 9

SITE OBSERVATION REPORTS..... 10

ADDITIONAL FORMS

ON-SITE RESPONSIBILITY MATRIX..... 11

MOCK-UP IDENTIFICATION..... 12

PRE-INSTALLATION MEETINGS/CHECKLISTS..... 13

WALL & CEILING SIGN-OFF SHEET 14

MATERIAL & EQUIPMENT VERIFICATION FORMS 15

NON-CONFORMANCE/RESOLUTION TRACKING..... 16

SELLEN QA/QC ROAD MAP 17



QA/QC Pre-Installation Meeting/Checklist

Work Scope: _____

Project: _____ Date: _____

Project Sellen QA/QC
Engineer: _____ Rep: _____

Subcontractor: _____ Manufacturer: _____

Submittals Reviewed & Approved? Yes/No:_____

Manufacturer's Installation & QA/QC Checklist Received? Yes/No:_____

Preconstruction Meeting Held? Yes/No:_____

Manufacturer Site Inspections Required? Yes/No._____ If Yes, frequency:_____

Temperature/Weather Restrictions? Yes/No._____ If Yes, list general restrictions:_____

Additional Comments:_____

QA/QC Responsibilities

Sellen Construction

- Gather Product Material and fill out QA/QC Pre-Installation Checklist.
- Review Sub Daily Reports for conformance to manufacturer's installation instructions.
- Document and review installation including use of photographs where appropriate.

Subcontractor:

- Submit Daily Reports with emphasis on QA/QC program. QA/QC write-up to be complete and comprehensive.
- Schedule Manufacturer Site Visits as necessary



MATERIAL CONFIRMATION SHEET

Date: _____

Material Delivered to: _____

Description / Area to be used: _____

Material Checked By (Sellen Employee): _____

Spec Section: _____ Submittal # _____

Is material what was specified? Y / N Sellen PE or Super Initial _____

Is material what was specified? Y / N Special Inspector Initial _____

Notes: _____

DELIVERY INFO

Delivered By: _____

Company Name: _____

Driver Name: _____

Time Delivered: _____