

**Chapter: 6.0 Construction and Testing Stage****Stage****Introduction:**

The goal of the Construction and Testing Stage is to translate the set of technical, computer-oriented system design specifications into a language the computer can understand and execute, and then assure that the system meets the business and technical requirements through testing.

Construction involves coding, validation and unit testing by a developer. Any hardware or software procured to support the construction effort is installed.

Testing activities focus on interfaces between and among components of the product, such as functional correctness, system stability, overall system operability, system security, privacy and sensitive information control, and system performance requirements (e.g., reliability, maintainability, and availability). Incrementally performed testing provides feedback on quality, errors, and design weaknesses early in the integration process.

The activities in this stage result in the transformation of the system design into the complete executable representation of the product. If required, the source code, including suitable comments, is generated using the approved program specifications. The source code is then grouped into executable units and all high-level language units are compiled into object code. Unit testing is performed by developers to determine if the code satisfies the program specifications and is complete, logical, and error free.

Components are then integrated and tested by a test team to determine whether the product meets predetermined functionality, performance, quality, interface, and security requirements. Once the product is fully integrated, system testing is conducted to validate that the product will operate in its intended environment, satisfies all user requirements, and is supported with complete and accurate operating documentation. User Acceptance Testing (UAT) follows System Testing, and solicits feedback from users to make any final adjustments to the programming before releasing the product for implementation.

The operating documentation is also produced in the Construction and Testing Stage. The operating documentation is required for installing, operating, and supporting the product through its lifecycle.

This stage involves development of the condensed Construction and Testing Plan (SEM Exp-02). This template contains the essentials for test reporting, transition planning, conversion planning, installation planning, and client acceptance of the tested system.

**Stage Inputs:** The following items provide input to the Construction and Testing Stage:

*SEM Express*

- Initiation, Requirements and Design Plan
  - Including attached SEM templates

*PMM Express*

- Project Plan

Security

- Security Plan

**Stage High-Level Activities:**

High-Level activities in the Construction and Testing Stage include, as applicable:

Construction

- Establish Development Environment
- Develop Programs
- Plan Transition to Operational Status
- Generate Operating Documentation
- Develop Installation Plan

Testing

- Conduct Unit Testing
- Conduct Integration Testing
- Conduct System Testing
- Conduct User Acceptance Testing

Refer to the Systems Engineering Methodology for further detail regarding how to perform these activities, as needed.

**Stage Touch Points:**

The following touch points are involved in the Construction and Testing Stage:

Contracts and Procurement

- Contract Liaison involvement if contract issues arise

Infrastructure Services

- Infrastructure Specialist involvement as documented in the Infrastructure Services Request (ISR)

Security

- Finalize Network and Data Flow diagrams
- Include application testing for security controls

**Stage Outputs:**

Several work products are developed during this stage. The work products listed below are the minimum requirements for a small project. Deviations in the content and delivery of these work products are determined by the size and complexity of a project. Explanations of the work products are provided under the applicable activities described either in the SEM, in the PMM or other applicable documents.

*SEM Express*

- Initiation, Requirements and Design Plan (*final*)
- Construction and Testing Template (*initial*)

*PMM Express*

- Project Plan (*final*)

## Security

- Security Plan (*revised*)

## Other Outputs:

- Development baselines
- Operating documentation
  - Users manual
  - Developer's reference manual
- System units and modules
- Test reports