Software Engineering Methodology

Appendix E
Stage Exit Process Guide

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Revision date: 10/12/95
Author: Andy Bicocchi

a. Section(s): Throughout document
    Page number(s): Throughout document
    Summary of change(s): Revise the process to align it with the Software Engineering Methodology
    (SEM), which is replacing the System Development Guide (SDG).

b. Section(s): Throughout document
    Page number(s): Throughout document
    Summary of change(s): Changed Service Areas to the more generic Support Areas.

c. Section(s): Change Control Page
    Page number(s): E-v
    Summary of change(s): Added the change control page.

d. Section(s): Process measurements
    Page number(s): E.1-3
    Summary of change(s): Revised the process measurements section; added qualifications
    measurements.

e. Section(s): Responsibility Matrix
    Page number(s): E.2-6
    Summary of change(s): Updated the responsibility matrix to reflect current environment.

f. Section(s): Management Briefings
    Page number(s): E.2-5
    Summary of change(s): Added management briefings section - a new process activity.

g. Section(s): Diagram/Process Flow
    Page number(s): E.2-2
    Summary of change(s): Added management briefing box to the process flow diagram.

Revision date:
Author:

Section: **1.0**
                Overview

Introduction: The DOE Software Engineering Methodology (SEM) describes the standard system
                development lifecycle (SDLC) methodology used for systems developed and maintained
                for the Department Of Energy. For better manageability and control, each system
                development effort is organized into logical, related segments called stages. Each stage
                must be officially exited (approved) before the next stage can begin. The decision points
                at the end of each stage are called Stage Exits.

                A Stage Exit is the vehicle for securing the concurrence (i.e., approval) of designated
                individuals to continue with the project and move forward into the next stage of
                development or maintenance. The concurrence is an approval (sign-off) of the
                deliverables for the current stage of development including the project plan. It indicates
                that all qualifications (issues and concerns) have been closed or have an acceptable plan
                for resolution.

Purpose: The purpose of a Stage Exit is to:

                •   Allow all functional areas involved with the project to review the current project
                        plan. This includes, at a minimum, a detailed plan for the next stage, and high-level
                        plans for the remainder of the project.

                •   Provide a forum to raise qualifications (issues and concerns) if issues exist that will
                        impact the project plan.

                •   Ensure an acceptable action plan exists for all qualifications raised.

                •   Obtain concurrence on current stage deliverables, and to begin the next stage of
                        development.

Applicability: This process is applicable to all system development and maintenance efforts that follow
                the SEM.

Timing/
Frequency: A Stage Exit is conducted at the end of each stage of development or maintenance.

Diagram: The following figure shows the timing of Stage Exits, relative to the SDLC.

```
                          Stage Exits

        +))))))))0))))))))0))))))))0))))))))0))))))))0)))))))),
        *        *        *        *        *        *        *
        ▼        ▼        ▼        ▼        ▼        ▼        ▼

    *        *        *        *        *        *        *        *
    /))))))))3))))))))3))))))))3))))))))3))))))))3))))))))3))))))))1
    *Planning*Reqrmts *Fnc Dsgn*Sys Dsgn*Programg*Soft Int*Installa*
    R        RDefinitnR        R        R        R& TestngR & AcptnR

    S)))))))))))))))))))))))))))) S D L C ))))))))))))))))))))))))))))Q▶
```
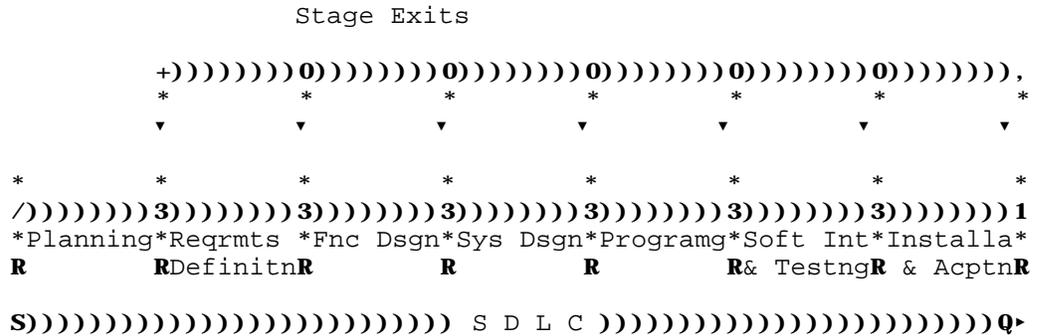
Process
Ownership: The following table identifies the Stage Exit process sponsor and process owner. The
              responsibilities of the process sponsor include approving the initial process definition
              document and changes during process improvement. The responsibilities of the process
              owner include assuring the process is working once implemented, and conducting ongoing
              process improvement. The process was originally developed with the support of a cross-
              functional process team. Some of the team members have since moved on to other
              positions, and have been deleted from the table.

              The team developed the Stage Exit process under the direction of the DOE Chief
              Information Officer. After initial implementation, some members of the team have met
              periodically to review process improvement recommendations.

NAME	RESPONSIBILITY	BUSINESS FUNCTION	E-MAIL	PHONE
Wayne Jones	Process Sponsor	Technical Monitor	wayne.jones@ hq.doe.gov	(301) 903-4655
Andy Bicocchi	Process Owner	Quality Assurance	andrew.bicocchi @hq.doe.gov	(301) 903-0616
Lew Bachman	Consultant	Quality Assur.	lew.bachman@ hq.doe.gov	(301) 903-0880
Beth Willis	Consultant	Software Development	elizabeth.willis@ hq.doe.gov	(301) 903-0878

Change
Control: The Stage Exit process is a component of the SEM. Changes to this process will be instituted using the same change mechanism that has been implemented to process changes to the SEM. All requests for change should be directed to the Manager of the site Quality Team.

Relationship to
Other System
Development
Processes: The Stage Exit process is a primary component of the DOE SDLC. Together with other processes it serves to assure a consistent and predictable outcome in the resulting software products. The Stage Exit process is complementary to other processes such as In-Stage Assessments and Structured Walkthroughs.

Process
Measurements:
                Defines the measurements that will allow for determining the effectiveness of the process at work. The main process measurement vehicle will be qualifications (issues) that are raised and closed. For each stage, the following qualification data will be collected:

·   Quantity
·   Severity Level
        -        Low
        -        Medium
        -        High
·   Qualifications Closed
·   Qualifications Remaining Open

                There are a number of tools that can be used to help track qualifications. These range from a word processor like Word Perfect to a project manager like Microsoft Project.

Section: **2.0**
                  Process

Scope: The Stage Exit process begins with a notification to the extended development team (e.g., system
        Owner, user point-of-contact, support areas) that a stage exit has been scheduled. The process
        ends with the receipt of concurrence from the designated approvers to proceed to the next stage.
        Concurrence indicates that all known issues have an acceptable plan for resolution.

Customers: The customers of the Stage Exit process are those individuals or organizations that will
                  use the output of the process. The primary customers are:

        •   Software development department
        •   System owner
        •   User point of contact (POC)
        •   Quality Assurance (QA)

Suppliers: The following individuals or organizations provide input to the Stage Exit process:

        •   System owner
        •   Project manager's manager
        •   User POC
        •   QA
        •   Support areas

Input: The following are the minimum inputs to the Stage Exit process:

        •   System development lifecycle deliverable(s)
        •   Initial project plan developed during the planning stage
        •   Updated project plan revised during all subsequent stages
        •   Issues to be addressed (generic)
        •   Qualifications from the approvers
        •   Issues that remain open from the In-Stage Assessment

Diagram: The following diagram depicts the Stage Exit process flow.

```
                    +)))))))))))))))))),
PLANNING            *                  *   Stage Exit milestones
STAGE               * PLAN PROJECT's   *   defined in the project
                    *  STAGE EXITS     *   plan for each SEM stage
                    *                  *
                    .))))))))))))))))))-

                    +)))))))))))))))))),
 ALL                *                  *   Schedule exit for the
STAGES              *    SCHEDULE      *   current stage; notify
                    *  CURRENT EXIT    *   participants (memo)
        *           *                  *
        *           .))))))))0))))))))-
        *                    ▼
        *           +)))))))))))))))))),
        *           *                  *   Distribute current project
        *           *   DISTRIBUTE     *   plan and any other items
        *           *    CURRENT       *   needed to exit stage
        *           *  PROJECT PLAN    *
        *           .))))))))0))))))))-
        *                    ▼
        *           +)))))))))))))))))),
        *           *                  *   Receive positions and
        *           *    RECEIVE       *   qualifications (if any)
        *           *    POSITIONS     *   from participants
        *           *                  *
        *           .))))))))0))))))))-
        *                    ▼
        *           +)))))))))))))))))),
        *           *                  *   Prepare plans to resolve
        *           *    PREPARE       *   qualifications (if any
        *           *  ACTION PLANS    *   were raised)
        *           *                  *
        *           .))))))))0))))))))-
        *                    ▼
        *           +)))))))))))))))))),
        *           *                  *   Present plans for addressing
        *           *    CONDUCT       *   qualifications and secure
        ▼           * CLOSURE MEETING  *   concurrence
                    *                  *
                    .))))))))))))))))))-

                    +)))))))))))))))))),
                    *                  *   Provide a briefing of status, issues,
PERIODIC            *  BRIEF UPPER     *   risk, from the QA analyst's
                    * LEVEL MANAGER    *   perspective
                    *                  *
                    .))))))))))))))))))-
```

Plan Stage

Exits: In the Planning stage, the planned date for exiting each stage of development is identified and documented in the project plan. It is common practice for the Stage Exit date for the next stage to be more specific and the dates for subsequent stages to be high level milestones.

Schedule

Exit: For each stage, as soon as practical, the actual Stage Exit date should be established and the exit meeting scheduled. Two or three weeks prior to the exit meeting, a memo is sent to all persons participating in the stage exit to communicate the following information.

- Notify participants that a stage exit has been scheduled. Participants include approvers (e.g., system owner), support area representatives (e.g., Network Engineering), and individuals with a need to know (e.g., contractor management).

- Request that the approvers provide feedback one week before the exit meeting. This will allow the project manager[1] time to work issues and develop action plans prior to the exit meeting.

- Invite participants to attend the exit meeting.

Examples of a memo, distribution list, and response forms are provided in the example section of this guide.

Distribute

Materials: The current project plan, and any other material relevant to exiting the stage, should be distributed to the participants[2] along with the memo. Relevant materials include for example known issues, and unplanned deliverables.

The participants should be familiar with planned deliverables (e.g. the Requirements document in the Requirements Definition stage) since it is common practice for them to review drafts as they are developed. If this is not the case, then planned deliverables also need to be distributed at this time.

The project plan is dynamic and typically undergoing changes up to the last minute, and is distributed (together or under separate cover) at the same time as the stage exit notification memo.

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[1] Project manager is the generic term for the person responsible for planning and day-to-day control of the project; e.g., task leader, team manager, or project leader.

[2] In the Planning Stage, participants include <u>all</u> support areas.

Receive
Positions: A position is required from the list of approvers. This position can be concur, concur with
                qualifications, or non-concur. The implication of each is as follows:

    •   Concur - Proceed with the project according to the current plan. An example
             would be where the approver is not aware of any issues for the current stage.

    •   Concur with qualifications - There are issues or concerns. The project can proceed
             according to the current plan if an acceptable action plan is developed for each
             issue by the stage exit meeting. An example would be where there is no plan for
             testing an interface to an existing system that is being changed.

    •   Non-concur - There are very significant issues or concerns. The project should not
             move to the next stage until issue(s) are resolved. An example would be where
             funding for the project has been withdrawn or not appropriated.

                All qualifications (issues/concerns) must be communicated to the project manager. The
                position response form contains space for this purpose, however other forms of
                communication may be used.

                Responses are not required from individuals in the "Support" or "Information" categories
                of the distribution list; however, they are encouraged to review the deliverables and
                provide feedback that may have an impact on the project plan.

Prepare
Action
Plans: The project manager must prepare an action plan to address each qualification received.
                Sometimes action plans extend beyond the stage exit milestone. This is acceptable, if it
                will not negatively impact the current project plan. These action plans are then presented
                at the stage exit meeting.

Conduct Exit
Meeting: At the exit meeting, the project manager presents positions from the approvers, along with
                qualifications raised during the stage exit process, and issues that remain open from the In-
                Stage Assessment (ISA). Action plans must also be presented for each qualification or
                issue. The objective is to demonstrate that all issues have been resolved, the current plan
                is sound, and the project is under control. The results of the meeting are documented in
                summary form, and include positions, qualifications, action plans, and follow up activity.

Output: The work products produced when the Stage Exit process is executed consists of the
                following:

    •   Positions from the approvers
    •   Qualifications (if any) from review of the deliverables
    •   Action plans to resolve all qualifications/issues.

Meeting
Outcome: The results of the exit meeting will determine the next step in the development process. The project will proceed in one of the following directions.

- Project proceeds to the next stage according to plan. There were no qualifications raised.

- Project proceeds to the next stage according to plan. All qualifications raised had an acceptable action plan.

- Project cannot proceed to the next stage because significant issues were raised that do not have acceptable action plans to resolve; e.g., funding withdrawn. Schedule a follow-up exit meeting to review action plans and reach concurrence to proceed.

Management
Briefings: Periodically, (e.g. quarterly) the quality assurance analyst will brief the senior or upper level manager (e.g. functional, or contract manager if appropriate) regarding the health and well being of the project, from the QA analyst's perspective. This will minimize the possibility of any surprises later and, if issues exhist, they can be addressed timely. The briefing should cover the following areas:

- Project status
- Issue(s) (if any)
- Project risk(s)
- Action(s) required to remove issues or mitigate risk

Prior to briefing the upper level manager, the QA analyst will brief the project manager and the project managers's manager. This should be more as a matter of courtesy; there should be no surprises, since these persons are involved with the project ongoing.

If serious issues exhist, the QA analyst will provide a briefing on an unscheduled basis, rather than wait until the next periodic meeting.

Responsibility
Matrix: The following matrix defines the responsibilities of the various parties involved in the Stage Exit process.

	Project Manager (1)	Support Areas (2)	Quality Assurance (QA)	System Owner	User POC	Project Mgr.'s Mgr. (3)	Process Owner/Team		
Schedule Stage Exit	P		R						
Distribute current project plan and other materials	P								
Review project plan etc.		R	R	R	R	R			
Concur/non-concur			P	P	P	P			
Prepare action plans	P								
Conduct exit meeting	P		S						
Monitor process effectiveness			P				S		
Continuous process improvement	S		S			S	P		

P = Perform   R = Review   S = Support

(1) Project Manager is the generic term for the person responsible for planning and day-to-day control of the project; e.g., task leader, team manager, project leader.

(2) For example, Information Development, Training, Network Planning.

(3) The Project Manager's manager or above.

Example Forms

The following pages provide filled in examples that can be used as a guide for completing the Stage Exit documents.

Example 1
Stage Exit Notification Memo

Date: April 15, 1996

To: Distribution list

From: John Doe, Project Manager

Subject: Requirements Defintion Stage Exit for the New Billing System

The Requirements Definition Stage Exit for the New Billing System (NBS) has been scheduled. The exit meeting will be held on June 1, 1996 from 9:00 a.m. to 11:00 a.m. at the Important Building, room A410. Positions, qualifications, and action plans will be reviewed at this meeting.

The review material is attached. A response is required by May 15, from those persons designated as approvers on the distribution list. All others are encouraged to provide feedback and attend the exit meeting. The approver's response may be a position of concur, concur with qualifications (issues), or non-concur. A position form is attached for your convenience. A non-response has the effect of a concurrence for that approver.

If you have any questions, please contact me at (301) 555-1234 or Mary Smith at (301) 555-1235 for assistance.

Project Manager

Attachment

cc: Distribution list (attached)
       Project notebook/file

       (memo only)
       As appropriate

Example 2
Stage Exit Distribution List

Distribution list:

APPROVAL   Function
A. B. Brown   Client Representative   Concurs that project is ready to proceed
C. D. Green   Project Mgr.'s Mgr.   into next stage, based on completed
E. F. Grey   User POC   deliverables for the current stage, a
G. H. White   Quality Assurance   sound revised project plan for next stage,
A. A. Azur   System Owner   and no open issues.

SUPPORT[3]   Function
I. J. Smith   Documentation   Reviews revised project plan for their
K. L. Jones   Network Engineering   functional area involvement and services
M. N. King   Training   that project is dependent upon.
O. P. Johnson   Security   Provides feedback to the project manager.
Q. R. Other   others as appropriate

INFORMATION   Function
Q. R. Here   Owner management   Provided for information purposes.
S. T. There   User management   Feedback is welcome, but not required.
U. V. Every   Contractor management
W. X. Where   others as appropriate

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[3] In the Planning Stage, the distribution list must include <u>all</u> support areas. In subsequent stages, only the support areas involved.

Example 3
Stage Exit Participation - LAN Project

	S))) SYSTEM DEVELOPMENT LIFECYCLE STAGES / EXITS S))▸						
	Planning	Reqrmts	Functl Design	System Design	Progrmg	Soft Intg & Testng	Instaln & Acptn
APPROVERS	SE	SE	SE	SE	SE	SE	SE
System Owner	R	R	R	R	R	R	R
User POC	R	R	R	R	R	R	R
Project Mgr.'s Mgr.	R	R	R	R	R	R	R
Quality Assurance	R	R	R	R	R	R	R
SUPPORT AREAS							
Network Engineering	N	X			X		X
Network Operations	N		X		X		X
Computer Operations	N						
System Programming	N						
Data Base Administration	N						
System Software Administr.	N						
Capacity Planning	N						
Security	N	X					
Documentation	N	X	X	X	X		X
Training	N		X		X	X	X
Records Management	N					X	
Micro Systems Research	N		X				
IRM Planning	N					X	

SE = Stage Exit.
R = Participation is required.
N = Notification.   All areas are notified when the first Stage Exit is scheduled.
X = Sample selection.

Note: This is only an example. The project manager must identify those support areas who need to participate in each stage of development for a given project. The actual list of participants may vary from the example provided.

Example 4
Stage Exit Participation - Mainframe Project

	S))) SYSTEM DEVELOPMENT LIFECYCLE STAGES / EXITS S)) ▸						
	Planning	Reqrmts	Functl Design	System Design	Progrmg	Soft Intg & Testng	Instaln & Acptn
APPROVERS	SE	SE	SE	SE	SE	SE	SE
System Owner	R	R	R	R	R	R	R
User POC	R	R	R	R	R	R	R
Project Mgr.'s Mgr.	R	R	R	R	R	R	R
Quality Assurance	R	R	R	R	R	R	R
SUPPORT AREAS							
Network Engineering	N						
Network Operations	N						
Computer Operations	N			X	X	X	X
System Programming	N			X	X		X
Data Base Administration	N	X			X	X	X
System Software Administr.	N	X		X	X	X	
Capacity Planning	N			X	X		
Security	N	X					
Documentation	N	X	X	X	X		X
Training	N		X		X	X	X
Records Management	N					X	
Micro Systems Research	N		X				
IRM Planning	N					X	

SE = Stage Exit.
R = Participation is required.
N = Notification. All areas are notified when the first Stage Exit for a project is scheduled.
X = Sample selection.

Note: This is only an example. The project manager must identify those support areas who need to participate in each stage of development for a given project. The actual list of participants may vary from the example provided.

| | S))) SYSTEM DEVELOPMENT LIFECYCLE STAGES / EXITS S))▸ | | | | | | |
| | Planning | Reqrmts | Fuctnl Design | System Design | Progrmg | Soft Intg & Testng | Instaln & Acptn |
APPROVERS	SE	SE	SE	SE	SE	SE	SE
System Owner	R	R	R	R	R	R	R
User POC	R	R	R	R	R	R	R
Project Mgr.'s Mgr.	R	R	R	R	R	R	R
Quality Assurance	R	R	R	R	R	R	R
SUPPORT AREAS							
Network Engineering	N	X			X		X
Network Operations	N		X		X		X
Computer Operations	N	X					
System Programming	N		X				
Data Base Administration	N	X	X	X			
System Software Administr.	N						
Capacity Planning	N		X	X			
Security	N	X					
Documentation	N	X	X	X	X		X
Training	N		X		X	X	X
Records Management	N					X	
Micro Systems Research	N		X				
IRM Planning	N					X	

SE = Stage Exit.
R = Participation is required.
N = Notification.   All areas are notified when the first Stage Exit is scheduled.
X = Sample selection.

Note: This is only an example. The project manager must identify those support areas who need to participate in each stage of development for a given project. The actual list of participants may vary from the example provided.

Example 5
Stage Exit Position Response Form

******** TO BE SENT TO APPROVERS ********

Project name: <u>New Billing System (NBS)</u>

Project stage: <u>Analysis</u>

Return form to: <u>John Doe, Project Manager</u>   <u>CDSI / CXXI / Room 1234</u>

Return by: <u>May 15, 1996</u>

Position:

☐ Concur.

    Proceed with the project according to the current plan.

☐ Concur with qualifications.

    Issue(s) exist. The project can proceed according to the current plan if there is an acceptable action plan for each issue by the stage exit meeting.

☐ Non-concur.

    Significant issue(s) exist. The project should not proceed to the next stage until the issue(s) is resolved.

Qualifications (issues):

_____

_____

_____

_____

_____

Approver: <u>C. D. Whomever</u>
              (please print)

Signed: _____ Date _____

Example 6
Stage Exit Position Response Form

******** RECEIVED FROM AN APPROVER - CONCUR WITH QUALIFICATIONS ********

Project name: New Billing System (NBS)

Project stage: Analysis

Return form to: John Doe, Project Manager   CDSI / CXXI / Room 1234

Return by: May 15, 1996

Position:

☐ Concur.

      Proceed with the project according to the current plan.

√ ☐ Concur with qualifications.

      Issue(s) exist. The project can proceed according to the current plan if there is an acceptable action plan for each issue by
      the stage exit meeting.

☐ Non-concur.

      Significant issue(s) exist. The project should not proceed to the next stage until the issue(s) is resolved.

Qualifications (issues):

 1. In the requirements document, there are no requirements for expected response times, for both the

 first and subsequent screens of each transaction.
 2. The maximum concurrent number of users will be 150, rather than 130 as stated in the
requirements document.

 3. The prerequisite equipment cannot be installed earlier than October 1, 1996. This creates a 2-week

variance from the current project plan of record.

Approver: C. D. Whomever
           (please print)

Signed: Signature   Date   April 26, 1996

Example 7
Stage Exit Position Response Form

******** RECEIVED FROM AN APPROVER - NON-CONCUR ********

Project name: New Billing System (NBS)

Project stage: Analysis

Return form to: John Doe, Project Manager   CDSI / CXXI / Room 1234

Return by: May 15, 1995

Position:

☐ Concur.

    Proceed with the project according to the current plan.

☐ Concur with qualifications.

    Issue(s) exist. The project can proceed according to the current plan   if there is an acceptable action plan for each issue by the stage exit meeting.

√ ☐ Non-concur.

    Significant issue(s) exist. The project should not proceed to the next stage until the issue(s) is resolved.

Qualifications (issues):

1. The proposed technical solution will require extensive retraining of personnel in the branch

offices. There is no funding available for this activity this year or in the foreseeable future. A different solution must be explored.

Approver: C. D. Whomever
                (please print)

Signed: Signature   Date   April 26,1994

Templates

The following pages can be copied and used for the Stage Exit documents.

Stage Exit Notification Memo

Date:

To: Distribution list

From: *[project manager]*

Subject: *[stage name]* Stage Exit

The *[stage name]* Stage Exit for *[project name]* has been scheduled. The exit meeting will be held on *[date]*, from *[start time]* to *[end time]*, at *[location including room number]*. Positions, qualifications, and action plans will be reviewed at this meeting.

The review material is *[attached or has been distributed previously]*. A response is required by *[date]* from those persons designated as approvers on the distribution list. All others are encouraged to provide feedback and attend the exit meeting. The approver's response may be a position of concur, concur with qualifications (issues), or non-concur. A position form is attached for your convenience. If no response is received, a position of concur will be assumed for that approver.

If you have any questions, please contact me at *[area code/phone number or electronic address]* or *[alternate name, phone number]* for assistance.

[sign here if hardcopy]

Project Manager

Attachment

cc: Distribution list (attached)
       Project notebook/file

       (memo only)
       [list individuals as appropriate]

Stage Exit Position Response Form

Project name: _____

Project stage: _____

Return form to: _____ _____

Return by: _____

Position:

☐ Concur.

    Proceed with the project according to the current plan.

☐ Concur with qualifications.

    Issue(s) exist. The project can proceed according to the current plan if there is an acceptable action plan for each issue by the stage exit meeting.

☐ Non-concur.

    Significant issue(s) exist. The project should not proceed to the next stage until the issue(s) is resolved.

Qualifications (issues):

_____

_____

_____

_____

_____

_____

Approver: _____
      (please print)

Signed: _____ Date _____