U.S. DOT Federal Railroad Administration
Office of Passenger and Freight Programs

Monitoring Procedure MP39 – Preliminary Engineering, Final Design, Readiness to Procure Construction

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1.0 PURPOSE

This Monitoring Procedure describes the Monitoring and Technical Assistance Contractor's (MTAC) review and analysis of the Grantee's activities in Preliminary Engineering (PE), Final Design (FD), and the Grantee's readiness to procure construction.

2.0 KEY PRINCIPLES

Completion of the Preliminary Engineering phase encompasses a level of design that demonstrates the project is feasible and program requirements are fulfilled; completion of the environmental review and issuance of decision document; a cost estimate that is deemed sufficiently reliable to remain unchanged through construction.

Final Design is refinement of PE work and preparation of contract documents for bids.

Regardless of the Grantee's selected delivery method, readiness to procure construction requires

- procurement packages consistent with the scope, schedule, and budget;
- procurement packages that are complete -- including plans, specifications, and contract provisions, with federal procurement requirements addressed;
- a Grantee organization prepared to successfully manage procurement and construction; having in place the necessary qualified project staff;
- consistent project management plans, procurement and construction management procedures, including project controls procedures;
- resolved agreements with railroads, other governmental agencies, third parties, including real estate agreements;
- the required financial resources.

3.0 REQUIRED DOCUMENTS

Materials referenced below and in Appendix A.

4.0 SCOPE OF WORK

4.1 Overview of Review and Assessment

The MTAC will apply its planning expertise, knowledge, and experience in the railroad industry to study and evaluate the Grantee's PE and FD activities and documents, as well as the Grantee's preparations to procure construction. The MTAC will provide its professional opinion on their adequacy and merits, and make recommendations for improvement.

The MTAC should propose to FRA an approach to the review, with appropriate on-site meetings with the Grantee and its project team, to become fully informed on the project history, rationale, current status, and changes since the previous project phase.

The MTAC should review and discuss with the Grantee its plan for project management, the scope of work, plan for project delivery, and other topics in Appendix A. The MTAC should document the review in a report, identify apparent discrepancies and deficiencies, state findings and make recommendations for modifications or additional work to be performed by the Grantee, along with a time frame for performance of the work. (See MP 01 for report outline.)

The MTAC should obtain and study the materials for topics noted below and in Appendix A, and notify FRA of missing information that would hinder a thorough review.

4.2 Preliminary Engineering

For major corridors, planning and concept design are summarized in the Alternatives Analysis Report, Tier I NEPA document and decision, and Service Development Plan. In PE, the selected corridor alternative is developed further. Specific design alternatives are developed to effect new or improved intercity passenger rail service in the corridor. Project NEPA is prepared for these alternatives. Design and engineering outputs of PE are inputs to the evaluation of environmental impacts just as identified impacts are inputs for design and engineering. Refer to MP 32B for more info.

To obtain the most benefit from reviews such as Value Engineering (MP 30) and Risk Assessment (MP 40), they should be conducted one-half to three-quarters of the way through PE.

The amount of time and effort required for PE and the NEPA decision depend on the scope and complexity of the engineering, environmental, social, and regulatory issues to be addressed.

PE completion is marked by:

1. A level of design demonstrating project feasibility and fulfillment of program requirements
2. Completion of the NEPA review and issuance of a decision document.
3. Sign-off on a scaled set of drawings by all affected parties (typically includes Grantee, host railroad, Amtrak, cities, and FRA) indicating support for the project, knowledge of project contents, and understanding that they will pay for any changes they initiate.
4. Applicable federal and FRA program requirements for PE having been satisfied.
5. A cost estimate and schedule that fully reflect the scope of work in the design documents. This cost estimate should be considered sufficiently reliable to remain unchanged through construction completion, barring subsequent major scope or schedule changes.
6. FRA's acceptance of PE completion based in part on the results of the MTAC's evaluation.

4.3 Final Design (FD)

In FD, the work of PE is refined, and contract documents are prepared for construction bids. FD can be performed by the Grantee's design consultants in Design-Bid-Build or by the Contractor's design consultants in Design-Build.

Refer to Appendix A for expectations of the Grantee.

MTAC's Constructability review - To obtain benefit from a constructability review, the MTAC should undertake this no later than midway through FD. For **CONSTRUCTION IN EXISTING OPERATING RAILROAD ENVIRONMENTS**, the MTAC should comprehensively consider the adequacy of the Grantee's plans to successfully handle the complexity of construction within an existing operating railroad environment, including:

- Plans to reroute, shutdown, reschedule, stage, phase, worker-protect, and work-around existing rail traffic;
- The presence of agreements with existing freight or passenger train owners and other affected third parties to plans to reroute, shutdown, etc.;
- The adequacy of the Grantee's project cost and schedule to cover such rerouting, shutdowns, including if necessary, monetary compensation to the railroads.

4.4 Readiness to Procure Construction

The Grantee's issuance of contract documents for bid or proposal is a final step before the Grantee enters into binding construction contracts. The MTAC's review of the Grantee's readiness to procure construction work helps to ensure:

- The Grantee's organization is prepared to successfully manage the contract packages through procurement, construction and start-up, or in the case of a D/B or CM/GC contract, through design, construction, and revenue operations;
- The Grantee's plan for qualification, bid and award follows accepted best industry practices; the procedures provide for unexpected procurement issues (e.g., no bids, single bid, unacceptably high bids and protests);
- The Grantee's design documents are developed to an appropriate level of completion given the selected delivery method; the procurement packages and supporting documents are complete, accurate, and consistent with the project scope; the procurement package is consistent with appropriate Federal requirements, including Buy America requirements;
- The Grantee's cost estimates accurately reflect contractual requirements; project risks have been subject to mitigation measures to the greatest extent possible.

The MTAC's review should be conducted when the Grantee's contract document work is internally consistent and sufficiently complete. This is typically around the ninety percent (90%) design level for traditional design-bid-build contracts. If the Grantee plans to use an alternate delivery method such as design-build (D/B) or construction manager/general contractor (CM/GC) (also known as construction manager-at-risk (CMR), the timing of the review should be advanced accordingly.

The MTAC shall review the following for each segment or contract package:

- The adequacy of the entity identified to construct – a freight railroad, a general contractor, an operator such as Amtrak, a utility company, or governmental agency – and its organization, staff capabilities, and history of performing similar work.
- The risk allocation associated with the proposed contract terms;
- The unit costs, allowances, specifications, drawings, provision for staging and phasing, and contract package interface.

The MTAC's review team should consist of senior technical managers qualified to actually perform the work being reviewed. Because rail projects are complex and interdisciplinary in nature, the reviewers should have a broad range of knowledge, experience and capabilities. Structural plans should be reviewed by structural engineers; signaling plans should be reviewed by signaling engineers, etc.

READINESS REVIEW:

Review Item	**Review Objective**	**Review Method**
Construction Plans/Specifications	To confirm that the plans and specifications completely and clearly define the required work and that there are no major/significant omissions. To confirm that construction documents reflect results of Value Engineering choices and constructability reviews.	Review by qualified engineer(s) with expertise in the area(s) of design.
Construction Plans/ Specifications for Design-Build Delivery or other alternate delivery method	To confirm that the construction plans, specifications, bridging documents and/or performance requirements for design and construction are at the appropriate level of completion to adequately define the scope of work. A separate review of the Grantee's D/B procurement documents may be required to confirm that the process is sound and conforms to good industry practice.	Review by qualified engineer(s) and construction manager(s)
Construction Contract Terms and Conditions	To confirm that the construction contract completely and clearly defines the terms and conditions under which the Work will be performed. To confirm that federal procurement requirements are addressed, including Buy America requirements.	Review by a person or contract administrator with experience in managing construction contracts of similar scope and complexity
Construction Contract Document Terms and Conditions for DB and other alternate methods	To ensure consistency between the bid package and the contract packaging plan. For D/B Contracts, to confirm the contract defines both design and construction requirements. For CM/GC contracts, to confirm that both design and construction phase services are adequately defined; to confirm the amount of the contractor's fee; to confirm the CM/GC contract requirements correspond to requirements in the Grantee's design contract.	Review by a person or contract administrator with experience in managing a design-build contract of similar scope and complexity.
Quality assurance records	To confirm that quality assurance checks and reviews have been performed in accordance with approved QA QC Plan.	Review by a person with experience in performing quality assurance reviews.
Construction Cost Estimate	To confirm that the estimate is consistent with the Plans, Specifications, and Contract General and Special	Review by a cost estimator experienced in the

	Conditions, and that it is based upon contemporary cost information. To confirm that the estimate of General Conditions' costs reflects actual contract requirements and not an industry average factor.	estimation of cost impacts of contract special provisions, terms, conditions, allowances, etc., related to risk transfer and construction limitations.

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CONSISTENCY REVIEW:

Review Item	**Review Objective**
Plans, specifications, and special contract conditions wrt Env. documents	To confirm the design and construction requirements of the Environmental Document are reflected in the design and requirements of the bid package.
Plans, specifications, and special contract conditions wrt the project Scope of Work.	To ensure that the documents reflect the scope of work developed during previous phases and reflected in the grant agreement with FRA.
Plans, specifications, and special contract conditions wrt Project Master Schedule	To ensure consistency between the bid package and the Project Master Schedule. Review the schedule in context with the Cost Estimate(s); ensuring that cost associated with all work activities have been properly accounted for in the cost estimate and vice versa. Pay particular attention to schedule contingency for delay and re-bid, and ensure that predecessor activities will not interfere with construction per the bid package schedule (examples: preceding contractors, utilities relocations, real estate acquisition).
Construction Cost Estimate with respect to Project Budget	To confirm that the Construction Cost Estimate plus appropriate contingencies is affordable within the overall Project Budget. To confirm consistency of Cost (and Schedule) Package Level products and documentation with package management baselines. To confirm that the Project Schedule & Cost Estimate are in sync, i.e. time allocated for work activities in the cost estimate agrees with time allocation is schedule

GRANTEE ORGANIZATION AND PMP REVIEW:

Review Item	**Review Objective**
Third Party Agreements	To confirm that necessary third party agreements are in place to support the construction. Pay particular attention to design standards; utility agreements; agreement with other railroads; inclusion of enhancements; concurrent non-project activities, and timing of reviews, permits, land transfers, and funds transfers.
Real Estate	To confirm that all necessary real estate and rights-of-way (ROW) will be available for use

requirements in contract documents	by the contractor at Notice to Proceed (NTP). If not, confirm that the contract documents, including plans, clearly identify those parcels that are not immediately available, when each parcel will be available for use by the contractor and any associated contract conditions for further delays. Compare the Real Estate requirements in the contract documents with the approved Real Estate Acquisition and Management Plan (RAMP).
Procurement Policies and Procedures	To ensure Procurement Policies and Procedures are in place that are in compliance with federal policies, ensure a fair bidding environment, and are able to efficiently resolve issues and disputes that may arise during the course of the Construction Contract. Review project sponsor's policies and procedures.
Project Staffing Plan	To ensure that the Grantee has adequately implemented a project staffing plan that ensures the necessary qualified staff will be available at an appropriate time to manage and support the work that is being bid. Review staffing plan to ensure it is consistent with the PMP approved for construction.
Risk Register, Risk and Contingency Management Plan (RCMP)	To confirm the Grantee has incorporated appropriate risk mitigation measures into the contract plans and specifications. To confirm the Grantee has a plan to mitigate project budget and schedule risks if they come to fruition. Review Risk Register and RCMP and compare to contract documents
Financing Plan	To ensure that money will be available to pay the contractor for the work on a timely basis.

APPENDIX A
Preliminary Engineering and Final Design - Additional Information / Requirements

Additional Information and Requirements		Preliminary Engineering	Final Design
Description	**MP**	Refer to Monitoring Procedures listed	
Legal Authority			
		Grantee's review of State statutes to demonstrate its authority to implement the project, and its knowledge of requirements and constraints flowing from State law that may impact project cost and schedule if not addressed proactively. If the Grantee is planning to use a project delivery method other than Design-Bid-Build, the Grantee must establish its legal authority to do so under State law.	
PMP and subplans			
	20	Project Management Plan	Project Management Plan
	21	Management & Technical Capacity/Capability	Management & Technical Capacity/Capability
	22	Safety and Security Management Plan	Safety and Security Management Plan
	23	Real Estate Acquisition and Management Plan	Real Estate Acquisition and Management Plan
	24	QA/QC Plan	QA/QC Plan
	38	Vehicle Acquisition and Management Plan	Vehicle Acquisition and Management Plan
	49	Finance Plan	Finance Plan
Service Planning	32A		
Service Planning Refinements		Service Planning Refinements - ridership/revenue forecasts, railroad and train capacity analysis - detailed operations modeling w timetables - operations and maintenance cost estimate - confirmation of entities responsible for services such as equipment maintenance, maintenance of way, and train operations - development/finalization of agreements with host railroads/other rail/transport providers	

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Description	**MP**	Refer to Monitoring Procedures listed	
Service Outcome Agreements (SOA)		When construction funding is identified, the SOA should be negotiated/finalized with the involved parties for train frequencies, run times, and host railroad delay minutes. Finalize plans for performance improvement through strategies such as: - Revision to contract language to improve performance of vendors to train - Additional marketing to attract riders - Capital Investments to improve infrastructure capacity - Operational changes to improve schedule efficiency	Implement terms of SOA regarding performance objectives; taking corrective action where necessary. Implement strategies for performance improvement through the FD/contract documents, operational agreements.
Environmental Review	32B		
		Project level NEPA - completion of project environmental evaluation and public participation and finalization of CE, FONSI, or Record of Decision	
Design Level	32C	**Level of Design Expected for PE (30%)**	**Level of Design Expected for FD (evolution from 30% to 100%)**
General Requirements		The project design satisfies the capacity and operational objectives established in the Service Plan and approved environmental document. Documents should be brought to a level of completion sufficient for the related capital cost estimate to be reliable enough to remain unchanged through construction. - Design, construction, system and vehicle interfaces are known, defined, including vehicle dynamic clearance and structure clearances. - Design Reports, Concept of Operations Report, and configuration studies are adequate and complete. - The documents possess an appropriate level of definition, clarity, presentation and cross-referencing. - The project is constructible. Adequate construction access and staging areas are identified.	Design / Contract Documents are developed to an appropriate level of completion. - The work to be constructed is consistent with that shown in the environmental documents and scope established in PE. - Plans and specifications completely and clearly define the required work. - Civil, structural, architectural, electrical, mechanical, communications, trackwork, and sitework documents have a comparable level of definition, clarity, presentation, and cross-referencing. - Consistency exists between the project schedule, bid packages, and applicable Federal requirements, including Buy America/n and ADA. - QA/QC checks and reviews have been performed in accordance with the approved Quality Assurance Plan.

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Design Criteria		Grantee accepted design standards and performance requirements - Civil engineering criteria - Safety and security criteria; results of hazard and threat and vulnerability analyses are incorporated into design criteria and the scope of work - ADA criteria	Fully prepared Basis of Design Reports Fully prepared analyses for track and structures, utilities, safety, security, FRA Safety regulation compliance, ADA compliance General Design Criteria Survey and Mapping Criteria Track Way Clearances, Geometry and Work Criteria Civil, Drainage, and Utility Criteria Geotechnical Criteria Seismic and Structural Criteria Criteria for Mechanical, Plumbing, and Electrical incl. Motive Power, signal, communications, safety, security Rolling Stock Criteria Other safety and security Criteria
Outline Specifications		Draft General and Special Conditions Outlines specifications	Fully developed specifications, instructions to bidders, general and special conditions of the contract
Documentation of Existing Conditions		Digitized aerial photogrammetry, aerial photo background, planimetric and topographic mapping Photos, photosimulations, schematic renderings As is survey and mapping of existing area, including topography, infrastructure, track, ROW, structures ROW/environmental footprint is clearly identified	Full survey of project area
Guideway - Plans and Sections	32C	Guideway (track and roadbed), general notes, standard abbreviations, symbols, key; - Appropriately scaled track geometry (spirals, curves, tangents), points of switch, existing track, new track, track to be removed, future track work, etc.; horizontal and vertical controls; alignment geometry in plan and profile; curve data in table and drawing	Guideway - Fully developed drawings with all horizontal and vertical controls, full geometry including plan and profile, complete curve information on table and drawings, all typical and special sections

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Description	**MP**	Refer to Monitoring Procedures listed	
		Other - Guideway drainage plans; grade crossings, general layout - Pedestrian connections to the public way - Transit accessways, auto parking, railroad crossings	
Guideway Structures	32C	Bridge and wall nomenclature, symbols and abbreviations, and general notes; - Bridge and wall general plans and sections - Bridge foundation, abutment, bent plans, and deck plans - Load diagrams for structures (e.g., aerial guideway) - Retaining walls, including typical wall sections	Fully developed seismic and gravity load calculations and completed structural design for all structures
		Tunnel layout plans, structural plans, typical sections, excavation plans, approach wall plans and sections; - Other tunnel detail optional: emergency walkway, groundwater control and tunnel drainage, safety and security, fire protection, communications, lighting, ventilation	
Stations and Finishes	32C	Station design characteristics including station locations and station sizing. Should identify platform lengths and support spaces for mechanical/electrical equipment	Complete station documents
		General information, including notes and legend	
		Architectural design of building/facilities plans, including footprint, floor plans, sections, elevations, platform detail demonstrating compliance with ADA	
		Grading, drainage plans, site cross sections, urban design, utilities, landscaping, paving for ped, transit, auto parking, bikes	
		For stations on elevated or underground, show structure	

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Description	**MP**	Refer to Monitoring Procedures listed	
Real Estate and Right of Way Plans	32C	Right of way limits Parcel/property acquisitions and easements, if known	Fully detailed parcel maps; for acquisition or sale
Roadways	32C	Roadway/pedestrian access plans and profiles; typical sections; drainage plans; signing plans; intersection traffic signal plans	Key map showing roadways plan with signalized and other intersections
Utility Plans	32C	Utilities key map, list of owners, symbols, and notes, utility plans	Fully detailed utilities plans, utilities report
Environmental Mitigation Plans		Mitigations committed to in the ROD, when involving a physical or operational feature, are incorporated into project documents. Examples: changes in design, use of different material, modification to traffic, restriction on construction activities, etc.	Mitigations fully incorporated into contract documents
Third party requirements		Third-party agreements in draft form / at least an outline or term sheet. If not, issues and obstacles are identified. Types of agreements and information: - utility relocation agreements, public-water, sewer, etc. - intergovernmental agreements with local entities - agreements with host railroads and Amtrak for design, construction, operations - third-party franchise agreements - gas, telephone, cable TV, other communications, power; - public/private funding arrangements - master permitting plan and schedule Agreements should be negotiated and completed to the extent possible prior to start of FD; where incomplete, a defined process for achieving completion should be in place.	Necessary third party agreements are in place to support the construction and revenue operations. Permitting report and permits
Geotechnical Baseline		Geotechnical baseline report based on geotechnical investigations, subsurface exploration and laboratory testing. Requirements for additional geotechnical investigations are defined. Buried structures, utilities, contaminated soils, hazmat are identified.	Additional geotech studies as needed. Full geotechnical design complete.

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Description	**MP**	Refer to Monitoring Procedures listed	
Systems		Traction power plans, including location of substations and feeds; OCS layouts, as relevant	Complete Systems plans
		Train/vehicle control plans, including schematic guideway layout (e.g., circuits/block diagrams)	
		Signal design considering signal locations, particularly at stations, to maximize platform length and pockets; and speed, considering different classes of track, and braking distances	
		Operations control center plan, including basic layout and space allocations	
		Communications plans, including equipment locations, and provisions for station message signs, phones, cameras, other	
Maintenance Facility		Overall site plan (existing and proposed conditions)	Complete Maintenance Facility plans
		Grading and drainage plans, site cross sections	
		Urban design/general landscaping features	
		Utilities	
		Paving for pedestrian access, transit access, and parking plans	
		Yard/lot layout, with typical sections	
		Access (roadway, parking) plans compliant with ADA	
		Demolition plans	
		Architectural design of building/facilities plans, including footprint, floor plans, sections	
		Foundation and foundation section plans	
		Safety and security, fire protection plans	
		Basic equipment lists	
		Traction power (OCS, substation locations) plans for rail systems	
Vehicle Acquis & Mgmt	38	criteria, specifications	Detailed drawings for Vehicle manufacturing

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Description	**MP**	Refer to Monitoring Procedures listed	
Value Engineering	30	Conduct VE review about half-way through PE	
Constructability Review		Grantee's PE work has conducted a constructability review, has considered Buy America/n compliance for materials, products, and availability of domestic labor to produce custom work, and related costs.	Full constructability review performed including consideration for adequate construction access and staging areas, temporary construction to maintain operations.
Project Delivery Methods	32D		
		Cogent rationale provided for selection of project delivery method (design-bid-build, design-build, etc.) Design packages and contract packages are defined and delineated. - Procedures for Procurement (advertising, bidding, awarding of contracts for consultants and construction contractors, procurement for equipment, etc.) are established	The Grantee's organization is fully prepared to manage contract packages through procurement, construction and start-up, or in the case of a D/B or CM/GC contract, through the design/construction and start-up phase. - Grantee has a project staffing plan that ensures the necessary qualified staff will be available to manage and support the work. - The Grantee has established a plan for contractor qualification, bid and award that follows accepted best industry practices - The Grantee has procedures in place to deal with unexpected procurement issues (e.g., no bids, single bid, high bids, protests)
Capital Cost Estimate	33		
		Cost estimating methods memo and cost estimate (ref MP 33)	The construction cost estimate is consistent with plans, specifications, contract general and special conditions, and is based on contemporary cost information. It includes appropriate contingencies and fits within overall project budget.

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Description	**MP**	Refer to Monitoring Procedures listed	
Project Schedule	34	**Level of detail to be included in Schedule during PE**	**Level of Detail to be included in Schedule during FD**
Representation of PE Activities		All major PE activities including main tasks for each design discipline (civil, structural, systems, other)	
Reviews		Identification and duration of all reviews by FRA and others	
Agreements		Identification of agreements that are on critical path (e.g. real estate transactions, utility relo, railroad and interagency agreements, procurement agreements (such as for mfr of vehicles, long lead items, grantee purchased items)	
Environmental Clearance		Detailed activities/milestones for completion of environmental document, including FRA, public and agency review periods	
		FRA Record of Decision / Finding of No Significant Impact or other actions at close of environmental review phase	
		Approvals at completion of environmental review and PE, e.g., permits, interagency and third party agreements, funding	
Representation of FD Activities		Major design packages identified	All contract packages identified and sequenced properly
		Milestones for 60%, 90% and 100% complete (or similar %) Key dates for funding and approvals	Milestones for 60%, 90% and 100% (or similar) percent complete indicated
Advertise and Bid		Includes adequate time for bid and award, with contingency time for rebidding. Construction milestones indicated, including advertise/bid dates, start construction, substantial completion targets.	
Construction		Outline level of detail, indicating construction segments and contract units	Schedule clearly showing sequencing of segments, critical path and major construction packages for each segment
Utilities		Outline level of detail, which utilities, with durations	Detailed level of information
Real Estate		Key activities such as appraisals, acquisitions, relocations, sales, tie to specific segments or construction packages	Detailed level of information with tie to construction access and funding if applicable
Final Testing and Startup		Placeholder information, indicating duration and predecessor logic; for phased openings include milestones and start of revenue service	

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Description	**MP**	Refer to Monitoring Procedures listed	
Risk and Contingency	40		
		Risk is addressed through identification, quantification, and mitigation, with three types of mitigation: - proactive project management (primary mitigation); - pre-planned, potential scope or process changes that may be triggered when risk events occur (secondary mitigation); - cost and time set-asides to overcome events for which no other mitigation is available (contingencies.)	Updated risk assessment, risk register, and mitigation strategies; Control of risk through active management with all three types of mitigation.
Finance Plan	49		
		Financial Plan is developed to identify costs, funding requirements (initial capital funding and cash flow, and ongoing operational expenses) and sources (non-Federal and Federal).	Finance Plan is complete. Funding is fully committed to be available through cash flow consistent with the timing in the project schedule.
Before and After Study	27	gather and preserve required information	gather and preserve required information