Description of document:	Federal Highway Administration (FHWA) Documents from the FHWA Intranet Website, 2007-2015
Requested date:	12-January-2017
Release date:	02-February-2017
Posted date:	11-May-2020
Source of document:	FOIA Request Attn: FOIA Officer (HAD-1) Federal Highway Administration 1200 New Jersey Avenue SE Washington, D.C., 20590 Email: FOIA.Officer@dot.gov

U.S. Department
of Transportation
**Federal Highway
Administration**

February 2, 2017

1200 New Jersey Ave., SE
Washington, D.C. 20590

In Reply Refer To:
HEPH
FOIA Control Number: 2017-0090

This letter is in reply to your January 12 Freedom of Information Act (FOIA) request to the Federal Highway Administration (FHWA). Under the FOIA, you requested digital/electronic copies of documents posted on our internal employee intranet. Our FOIA Team acknowledged receipt of your request on January 12 and asked us to reply.

In response, we are providing digital copies of:

The FHWA Bridge Program Manual (2007)
Questionnaire Use to facilitate collection of information (2007)
The FHWA Field Planner Guidebook (2008)
The Border Information Guide (2009)
The Area Engineers Manual (2010, plus two later additions)
The Risk Assessment Guide (2012)
The FHWA Tribal Consultation State of the Practice Report (2015)

We note that your list of eight items skipped the number three, so your request was for seven, not eight, documents. We are releasing all seven documents, without redaction, that you requested. Our FOIA contact, Mr. Richard F. Weingroff, will e-mail them to you.

The cost of search and review in replying to your FOIA request was below our minimum charge. Because there is no charge, we have not had to make a decision on your request for a fee waiver.

This letter completes our response to your FOIA request.

Sincerely yours,

for Kenneth N. Petty II
Director, Office of Planning

Enclosures

CHAPTER 1
THE HIGHWAY BRIDGE PROGRAM (HBP)

Table of Contents

INTRODUCTION **5**

Purpose 5
Legislation 5
Regulation 6
Definition of Key Terms 6

APPORTIONMENTS **8**

The Apportionment Process 8
(1) Gather NBI and BCUC Information From The States 9
(2) Identify Eligible Bridges (Selection List) 9
(3) Compute State Apportionment Factors 9
(4) Compute the Amount Of HBP Funds To Be Apportioned To Each State 10

ELIGIBILITY **10**

Eligible Projects - General 10
Bridge Inspection 11
Systematic Preventive Maintenance 11
Rehabilitation 11
Replacement 11
Replacement of Destroyed Bridges and Ferryboat Service 11
Off-System Bridge Program (Soft-match) 12
Historic Bridge Preservation 12
The Application Process 12

FUNDING REQUIREMENTS **13**

Availability 13
Obligation Limitations 13
Federal Share Payable 13
Program Requirements 14
Transfer of Funds 14
Designated Projects 14
Congressional Earmarks 14

INSTRUCTIONAL GUIDELINES **15**

Systematic Preventive Maintenance 15
Ten-Year Rule 20
Off-System Bridge Program - Soft Match Program 20
Replacement of Destroyed Bridges and Ferryboat Service 21
Closed Bridges 22
Approach Roadway Funding 22
Funding of Bridge Inspections and Equipment 23
Bridge Inspection 23
Bridge Inspection/BMS Equipment 24

HISTORIC BRIDGE PROGRAM 25
BRIDGE CONSTRUCTION UNIT COST 25
LOAD POSTING SIGNS 27
USE OF DEBRIS FROM DEMOLISHED BRIDGES AND OVERPASSES 28
SURFACE TRANSPORTATION WORKFORCE DEVELOPMENT, TRAINING, AND EDUCATION 28
DIVISION OFFICE PRACTICES....30
ONE-LANE BRIDGES....30
REPLACEMENT JUSTIFICATION FOR BRIDGES WITH SR>50....30
PROCEDURE FOR ESTABLISHING REASONABLE TOUCHDOWN POINTS FOR ELIGIBLE HBRRP BRIDGE PROJECTS....33
ATTACHMENT A – HBP APPORTIONMENT PROCESS....35

Introduction

Purpose

The purpose of this Section is to outline and describe general policies and procedures for administering the Highway Bridge Program (HBP). Several Instructional Guidelines (IGs) used to define and explain major policy applications are contained in the Instructional Guidelines section.

Legislation

In 1978, the 95th Congress legislated the largest bridge program the Nation had ever known. The 1978 Surface Transportation Assistance Act (P.L. 95-599) replaced the then existing Special Bridge Replacement Program with the Highway Bridge Replacement and Rehabilitation Program (HBRRP). By enacting this legislation, Congress declared it to be in the vital interest of the Nation that a highway bridge replacement and rehabilitation program be established to enable State Transportation Departments to replace or rehabilitate highway bridges over waterways, other topographical barriers, other highways, or railroads when it is determined that a bridge is significantly important and exhibits structural deficiencies, physical deterioration, or functional obsolescence.

In 2005, the 109th Congress amended the HBRRP at 23 U.S.C. § 144 and renamed it the Highway Bridge Program through the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users or ‘‘SAFETEA–LU’’ (P.L. 109-59). SAFETEA-LU, Section 1114 - Highway Bridge Program contains the amendments. Therefore, the HBRRP will be referred to as the Highway Bridge Program (HBP). The HBP provides funding to enable States to improve the condition of their highway bridges through replacement, rehabilitation, and systematic preventive maintenance.

A highway bridge program has been extended continuously through every major highway legislation:

- 1978 Surface Transportation Assistance Act (P.L. 95-599) – Sec. 124
- 1982 STAA (P.L. 97-424) – Secs. 121 and 122
- 1987 Surface Transportation & Uniform Relocation Assistance Act (P.L. 100-17) – Sec. 123
- 1991 Intermodal Surface Transportation Efficiency Act (P.L. 102-240) – Sec. 1028
- 1998 Transportation Equity Act for the 21st Century (P.L. 105-178) – Sec. 1109
- 2005 Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users or ‘‘SAFETEA–LU’’. (P.L. 109-59) – Sec. 1114

Section 1114(e) – **Bridge Set-aside** of SAFETEA-LU discontinued the Discretionary Bridge Program after FY 2005 and replaced it with “Designated Projects” in FY 2006 through FY 2009**.** These funds remain available until expended.

Section 1114(r) of SAFETEA-LU requires an annual materials report on new bridge construction and bridge rehabilitation to be published in the Federal Register describing construction materials used in new Federal-aid bridge construction and bridge rehabilitation projects. This report is compiled by the Office of Bridge Technology (HIBT) and is available at FHWA Tables of Frequently Requested NBI Information Website, http://www.fhwa.dot.gov/bridge/britab.htm.

Section 1805 - **Use of Debris From Demolished Bridges and Overpasses** of SAFETEA-LU directs a State to first make the debris from the demolition of such structure available for beneficial use by a Federal, State, or local government, unless such use obstructs navigation. This section covers the beneficial use of debris from a demolished structure that is eligible for Federal assistance under the HBP. The "beneficial use" is defined as the use of the debris for purposes of shore erosion control or stabilization, ecosystem restoration, and marine habitat creation. See IG – Use of Debris from Demolished Bridges and Overpasses for further details.

Section 5204(e) - **Surface Transportation Workforce Development, Training, and Education** of SAFETEA-LU provides discretionary authority for the States to use funds from five primary core programs (STP, NHS, Bridge, IM, CMAQ) to support training, education, and workforce development. See IG - Surface Transportation Workforce Development, Training, and Education for further details.

Regulation

The HBRRP Regulation is described in 23 Code of Federal Regulations 650, Subpart D (23 CFR 650D). This regulation will be updated to reflect amendments by SAFETEA-LU.

Definition of Key Terms

Bridge. A structure, including supports, erected over a depression or an obstruction, such as water, a highway, or a railway, having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet (6.1 meters) between undercopings of abutments or spring lines of arches, or extreme ends of the openings for multiple boxes; it may include multiple pipes where the clear distance between openings is less than half of the smaller contiguous opening.

Deficient Bridge. A highway bridge that is structurally deficient or functionally obsolete.

Functionally Obsolete Bridge. A bridge on which the deck geometry, load carrying capacity (comparison of the original design load to the current State legal load), clearance, or approach roadway alignment no longer meets the usual criteria for the system of which it is an integral part. In order to be considered functionally obsolete, a highway bridge must meet the following criteria from Non-Regulatory Supplement 650D(9a) of the Federal-aid Policy Guide. Each National Bridge

Inventory (NBI) item in the criteria below is further described in the Coding Guide.

1. An appraisal rating of 3 or less for
   Item 68 – Deck Geometry; or
   Item 69 – Underclearances;[1] or
   Item 72 – Approach Roadway Alignment; or
2. An appraisal rating of 3 for
   Item 67 – Structural Evaluation; or
   Item 71 – Waterway Adequacy.[2]

[1] Item 69 applies only if the last digit of Item 42 – Type of Service is coded 0, 1, 2, 4, 6, 7 or 8
[2] Item 71 applies only if the last digit of Item 42 is coded 0, 5, 6, 7, 8 or 9

Historic Bridge. Any bridge that is listed on, or eligible for listing on, the National Register of Historic Places.

Preventive Maintenance (PM). The performance of cost-effective maintenance activities that preserve bridge components and extend the useful service life of a bridge. These activities would typically be performed on a bridge in good condition in order to keep it in good condition. There are two basic types, as follows: (1) Those performed at specified intervals (systematic servicing of bridges on a scheduled basis: cleaning decks, seats, caps and salt splash zones; cleaning drainage systems; cleaning expansion joints; cleaning and lubricating expansion bearing assemblies; sealing concrete decks or substructure elements); and (2) Those performed as needed (resealing expansion joints; painting steel members, removing debris from channel; replace wearing surface, extending or enlarging deck drains).

Rehabilitation. The major work required to restore the structural integrity of a bridge as well as work necessary to correct major safety defects [(23 CFR 650.403(c)]. The work performed should be sufficient to remove the structure from the structurally deficient or functionally obsolete classification for a minimum of 10 years. Refer to IG-Ten-Year Rule for more details.

Replacement. The work required for the total replacement of a structurally deficient or a functionally obsolete bridge in the same general traffic corridor [23 CFR 650.405(b)(1)] .

Selection List. A listing of deficient bridges eligible for HBP funding that have a sufficiency rating of 80 or less and have not been constructed or had major reconstruction within the past 10 years. The list is created annually by HIBT, using the NBI data. The Selection List for a given State and Fiscal Year is available through UPACS (https://apps.fhwa.dot.gov).

State. The term "State" means any of the 50 States, the District of Columbia, or Puerto Rico. [23 U.S.C. 101(a)(32)]

State Transportation Department. The term "State transportation department," means that department, commission, board, or official of any State charged by its laws with the responsibility for highway construction. [23 U.S.C. 101(a)(34)]

Structurally Deficient Bridge. Bridges are considered structurally deficient if significant load carrying elements are found to be in poor or worse condition due to deterioration and/or damage or the adequacy of the waterway opening provided by the bridge is determined to be extremely insufficient to the point of causing overtopping with intolerable traffic interruptions. In order to be considered structurally deficient, a highway bridge must meet the following criteria from Non-Regulatory Supplement 23 650D(9a) of the Federal-aid Policy Guide. Each NBI item in the criteria below is further described in the Coding Guide.

1. A condition rating of 4 or less for
   - Item 58 – Deck; or
   - Item 59 – Superstructure; or
   - Item 60 – Substructure; or
   - Item 62 – Culverts;[1] or
2. An appraisal rating of 2 or less for
   - Item 67 – Structural Condition; or
   - Item 71 – Waterway Adequacy.[2]

[1] Item 62 applies only if the last two digits of Item 43 – Structure Type, Main are coded 19

[2] Item 71 applies only if the last digit of Item 42 – Type of Service is coded 0, 5, 6, 7, 8 or 9

Any bridge classified as structurally deficient is excluded from the functionally obsolete category for the purposes of apportioning HBP funds and reporting statistics on total bridge deficiencies.

Sufficiency Rating. The numerical rating of a bridge from 0 to 100, calculated from NBI data and categorized into three components: structural adequacy and safety; serviceability and functional obsolescence; and essentiality for public use. The Sufficiency Rating formula is described in Appendix B of the Coding Guide.

Apportionments

The Apportionment Process

The apportionment process for HBP funds involves the following steps: (1) gather NBI and bridge construction unit cost (BCUC) information from the States and federal agencies; (2)

identify eligible bridges (Selection List); (3) compute State apportionment factors; and (4) compute the amount of HBP funds to be apportioned to each State.

(1) Gather NBI and BCUC Information From The States

NBI data updates are requested from the States and federal agencies once per year and these updates are required to be sent to HIBT by April 1 of each year. The criteria for submitting the data are identified in an annual memorandum to field offices. States and federal agencies may elect to submit NBI data more frequently than once per year. Chapter 2 – National Bridge Inspection Standards provides more details pertaining to NBI data.

BCUC updates are also requested from the States once per year and these updates are required to be sent to HIBT by April 1 of each year. The criteria for submitting the data are identified in an annual memorandum to field offices. Refer to IG-Bridge Construction Unit Cost for more details.

(2) Identify Eligible Bridges (Selection List)

HIBT will identify the eligible deficient bridges from the NBI data. Refer to The Application Process section for more details.

(3) Compute State Apportionment Factors

The deck area is computed using the structure length (Coding Guide Item 49) and deck width (Coding Guide Item 52) items in the NBI for the eligible deficient bridges (Selection List) in each State. The deck area is computed for bridges needing replacement (SR < 50) and bridges needing rehabilitation (SR $\leq$ 80). Each of these is divided into Federal-aid highway (on-system) and non Federal-aid highway (off-system or roads classified as local roads or rural minor collectors, NBI Item 26 – Functional Classification of Inventory Route = 08, 09 or 19) areas resulting in four categories. The deck area in each category is multiplied by the corresponding replacement or rehabilitation BCUC. The three-year average of the BCUC is used as the replacement cost. The rehabilitation cost is 68% of the replacement cost.

The sum of the four categories is the "bridge investment requirement" at the State level. If a State transfers funds out of the HBP that amount is deducted from their bridge investment requirement the following Fiscal Year. Refer to the Transfer of Funds section. The bridge investment requirement at the National level is the total of the State levels. By dividing the State level by the National level, a States apportionment factor is computed. The final factors then have "0.25 percent minimum" and "10 percent maximum" criteria applied. The final factors are given to the FHWA's Office of the Chief Financial Officer for the computation of funds.

Several checks and edits are made to verify data prior to the calculation of the apportionment factors:

- Counts of deficient bridges and eligible deck area are calculated and compared to the previous year. If large fluctuations are found, a data comparison check is performed to identify the reason for the change.

- All States are screened for large bridges and these bridges are checked for correct dimensions.

- Special funded bridges such as Bridge Set-Aside/Designated Projects are checked for assurance that they are excluded from the "bridge investment requirement."

(4) Compute the Amount Of HBP Funds To Be Apportioned To Each State
Set asides are calculated and adjustments are made to the "bridge investment requirements" before the final apportionment factors are sent to the FHWA's Office of the Chief Financial Officer.

At the beginning of each Fiscal Year (FY) (on or about October 1), the FHWA's Office of the Chief Financial Officer issues an annual apportionment Notice for each Federal-aid program. The purpose of the "Bridge Program Notice" is to transmit the certificate of apportionment of HBP funds authorized for that FY. The Division Office provides copies of the Notice to the State Transportation Department.

Program codes are assigned to be used when obligating these funds. For example, in FY 2007 the program codes were L110 for the mandatory 15 percent of annual HBP funds to be expended on off-system bridge projects and L1C0 for the 85 percent of annual HBP funds to be expended on either on or off-system bridge projects.

Refer to Appendix-The Apportionment Process for Highway Bridge Funds (HBP) Funds for more details.

Eligibility

Eligible Projects - General

Title 23 U.S.C. 144 makes HBP funds available for highway bridge replacement and rehabilitation based on the development of the following: (1) a bridge inventory (NBI); (2) a classification system (Deficiency Status and Sufficiency Rating); (3) a priority system within the classification system (Sufficiency Rating and Selection List); and (4) a cost evaluation of the replacement and rehabilitation options (BCUC). These funds may be expended for replacement, rehabilitation, painting, seismic retrofit, systematic preventive maintenance, installation of scour countermeasures and application of anti-icing or de-icing compositions to eligible (i.e. on Selection List) highway bridge projects on and off the Federal-aid Highway System. Additionally, 23 U.S.C. 144(d) allows these funds to be expended for seismic retrofit, systematic preventive maintenance and scour countermeasures without regard to whether the bridge is eligible for replacement or rehabilitation. The costs of long approach fills, causeways,

connecting roadways, interchanges, ramps, and other extensive earth structures, when constructed beyond the attainable touchdown point, are not eligible under the HBP.

Many of the Instructional Guidelines (IG) and Division Office Practices in their respective sections describe major policy applications and general engineering and economic practices that make other types of work eligible for HBP funding.

Bridge Inspection

FHWA has determined that it is consistent with the purpose of the HBP to allow the use of bridge program funds for the biennial continued inspection of bridges. Refer to Non-Regulatory Supplement 23 CFR 650D(8). Also refer to IG - Funding of Bridge Inspections and Equipment.

Systematic Preventive Maintenance

23 U.S.C. 144(d) allows HBP funds to be expended for systematic preventive maintenance on highway bridges located on public roads regardless of whether a bridge is eligible for replacement or rehabilitation.

HBP funds may be used for certain preventive maintenance activities generated using a systematic process for highway bridges. A systematic process such as a Bridge Management System (BMS) should fully support the State's assessment that the activity is a cost-effective means of extending the useful life of a highway bridge. Refer to IG-Systematic Preventive Maintenance for more details.

Rehabilitation

Highway bridges carrying public roads that are structurally deficient or functionally obsolete with a sufficiency rating of 80 or less and appear on the current or prior Selection List [23 CFR 650.409(b)] are eligible for rehabilitation.

Replacement

Highway bridges carrying public roads that are structurally deficient or functionally obsolete with a sufficiency rating less than 50 and appear on the current or prior Selection List [23 CFR 650.409(b)] are eligible for replacement or rehabilitation.

Current practice permits the replacement of a deficient bridge with a sufficiency rating greater than 50 when engineering and economic data supports this action. See Division Office Practices section.

A Division Administrator (or delegate) could determine that replacing a deficient highway bridge with a shorter span bridge and roadway fills is eligible for HBP funding, if this strategy is more cost-effective than replacing the deficient highway bridge with a similarly sized one (May 15, 1992 Memo.).

Replacement of Destroyed Bridges and Ferryboat Service 23 U.S.C. 144(m)

A State may utilize HBP funds to construct any bridge which:

(A) Replaces any low water crossing (regardless of the length of such low water crossing),
(B) Replaces any bridge which was destroyed prior to 1965,
(C) Replaces any ferry which was in existence on January 1, 1984, or
(D) Replaces any road bridges rendered obsolete as a result of United States Corps of Engineers flood control or channelization projects and not rebuilt with funds from the United States Corps of Engineers.

The Federal share shall be 80 percent of the cost of construction.

See IG-Replacement of Destroyed Bridges and Ferryboat Service.

Bridges not on Federal-aid highways (Soft-match) 23 U.S.C. 144 (m)

In some cases, funds expended wholly from State and local sources on non-Federal-aid highway (off-system) bridge replacement or rehabilitation projects in excess of 20 percent of the cost of construction may be credited to the non-Federal share of the cost of the projects in such State, which are eligible for Federal funds.

See IG-Off-System Bridge Program - Soft-match Program.

Historic Bridge Program 23 U.S.C. 144(n)

Reasonable costs associated with actions to preserve, or reduce the impact of a project on the historic integrity of historic bridges shall be eligible as reimbursable project costs if the load capacity and safety features of the bridge are adequate to serve the intended use for the life of the bridge.

The costs eligible as reimbursable project costs shall not exceed the estimated cost of demolition for a bridge that is no longer used for motorized vehicular traffic.

If a State proposes to demolish a historic bridge and replace it with a new bridge, the State shall first make the bridge available for donation to a State, locality, or responsible private entity if such State, locality, or responsible entity enters into an agreement to:

(A) Maintain the bridge and the features that give it its historic significance; and
(B) Assume all future legal and financial responsibility for the bridge, which may include an agreement to hold the State Transportation Department harmless in any liability action.

Costs incurred by the State to preserve the historic bridge, including funds made available to the State, locality, or private entity to enable it to accept the bridge, shall be eligible as reimbursable project costs, not to exceed the cost of demolition. Preservation of a historic bridge using HBP funds will thereafter not be eligible for any other Title 23 funds. Therefore, use other Federal-aid funds first and then HBP funds. See IG-Historic Bridge Program.

The Application Process

Agencies participate in the HBP by conducting bridge inspections and submitting Structure Inventory and Appraisal (SI&A) data in accordance with the FHWA Recording and Coding

Guide for the Structure Inventory and Appraisal of the Nations' Bridges (Coding Guide). Local government agencies supply SI&A data to the State Transportation Department (STD) for review and processing. The STD is responsible for submitting the SI&A data to the FHWA for final processing. Federal government agencies supply SI&A data to HIBT for review and processing and transmittal to the STD. Refer to Chapter 2.0-National Bridge Inspection Program for details concerning the submittal of National Bridge Inventory (NBI) data.

Upon receipt and evaluation of NBI data, FHWA determines if a bridge is structurally deficient or functionally obsolete, and a sufficiency rating is calculated for each bridge. The deficiency status is used to establish HBP eligibility and the sufficiency rating is used primarily for establishing eligibility for replacement or rehabilitation. The sufficiency rating is an administrative tool used by FHWA for overall program purposes and is not intended to be an accurate representation of priority for replacement or rehabilitation.

After evaluation of the NBI data, determination of deficiency status and the calculation of sufficiency ratings for each bridge, the FHWA provides each State with a Selection List of bridges within the State that are eligible for HBP funds. The State may create projects from bridges on the current Selection List or from previously furnished Selection Lists.

HBP projects are submitted by the State to FHWA in accordance with 23 CFR 630A. Whenever a deficient bridge is replaced or its deficiency alleviated by a new bridge under the HBP, the deficient bridge must be dismantled or demolished or its use limited to the type and volume of traffic the bridge can safely service over its remaining life. For example, if the only deficiency of the existing structure is inadequate roadway width and the combination of the new and existing bridge can be made to meet current standards for the volume of traffic the facility will carry, the existing bridge can remain in place and be incorporated into the system.

Funding Requirements

Availability

Funds apportioned for carrying out the HBP are generally available for obligation at the beginning of the fiscal year for which apportioned and remain available for obligation for a total of four years. Funds not obligated by the State at the end of that four-year interval will lapse.

Obligation Limitations

Fiscal year obligation limitations are established by an Appropriation Act that establishes a ceiling on the sum of all obligations that can be made within a fiscal year. Since this applies to most apportioned and allocated funds, this may restrict the amount of HBP funds that get obligated in a given fiscal year.

Federal Share Payable

The Federal share for all HBP projects, except those on the Interstate System, is 80 percent, subject to the sliding scale adjustment. For those on the Interstate System, the Federal share is 90 percent,

subject to the sliding scale adjustment. See Section 120 – **Federal Share Payable** of 23 U.S.C. for sliding scale adjustments and other exceptions.

The Federal share for surface transportation workforce development, training, and education is 100 percent. See Section 5204(e) of SAFETEA-LU and IG - Surface Transportation Workforce Development, Training, and Education for further details.

The funds appropriated to any Federal land management agency may be used to pay the non-Federal share of the cost of any project the Federal share of which is funded under the HBP. See 23 U.S.C. 120(k) as amended by Section 1119(a) of SAFETEA-LU.

Program Requirements

Not less than 15 percent of the amount apportioned to each State in each fiscal year shall be expended for projects to replace, rehabilitate, paint, perform systematic preventive maintenance, seismic retrofit, or apply calcium magnesium acetate, sodium acetate/formate, or other environmentally acceptable, minimally corrosive anti-icing and de-icing compositions to, or install scour countermeasures to, highway bridges located on public roads, other than those on a Federal-aid highway. However, the Secretary of Transportation, after consultation with the State and local officials, may reduce the requirement for expenditure for bridges not on the Federal-aid highway system when the Secretary determines that the State has inadequate needs to justify the expenditure.

Waiver requests to reduce the 15 percent requirement may only be submitted by a State Transportation Department to the FHWA through the Division Office. Requests must be fully supported by local officials as well as through data analysis. The FHWA analyzes the request submitted and makes a recommendation to the Secretary of Transportation to whom authority for approval of the waiver is granted under 23 U.S.C 144(g)(3).

Transfer of Funds

Current Federal regulations allow States to transfer up to 50 percent of their annual HBP apportionment to the National Highway System (NHS) or Surface Transportation Program (STP). This provision originated with the passage of ISTEA. If a State transfers HBP funds apportioned to the State under 23 U.S.C. 144 in a fiscal year beginning after September 30, 1997, to any other apportionment of funds to such State under Title 23, the total cost of deficient bridges in such State and in all States to be determined for the succeeding fiscal year shall be reduced by the amount of such transferred funds [23 U.S.C. 144(e)].

Designated Projects

Designated Projects is a $100 million annual bridge set-aside portion of the HBP. These projects and funds are described in Section 1114 (g)(1) of SAFETEA-LU. HIBT awards and allocates funds for these set-aside projects and programs upon notification of funding availability by the Office of the Chief Financial Officer.

Congressional Earmarks

Earmarks are a specific statutory designation contained in authorization and appropriation acts; therefore, they are congressional mandates that are funded accordingly. Earmarking language is

used to prescribe the amount of funding available for a particular project. In addition to earmarks contained in statutes, congressional funding recommendations and directives are often contained in Conference, Senate and House committee reports. Only statutory language constitutes mandatory earmarking required by law, but report language is an expression of congressional intent. FHWA honors congressional directing of funding in report language that does not conflict with statutory requirements for the particular program.

Instructional Guidelines

This section contains or references applicable FHWA Policy Memorandums and Policy Guide information regarding the Highway Bridge Program and SAFETEA-LU.

Systematic Preventive Maintenance

References: Section 309 of the NHS Designation Act of 1995; 23 U.S.C. 116(d); Section 1114 of SAFETEA-LU; FHWA Memo, HBRRP Funds For Preventive Maintenance [23 U.S.C. 116(d)], King W. Gee, Program Manager, Infrastructure, January 11, 2002 (Superseded); FHWA Memo, Preventive Maintenance Eligibility, King W. Gee, Associate Administrator for Infrastructure, October 8, 2004; FHWA Preventive Maintenance Questions and Answers Website, http://www.fhwa.dot.gov/preservation/100804qa.htm; AASHTO Maintenance Manual - The Maintenance and Management of Roadways and Bridges, 1999; FHWA Bridge Maintenance Training Manual, 1994; NHI Bridge Maintenance Training (FHWA-NHI-134029).

In 1995, Congress added subsection (d) to 23 U.S.C. 116 under Section 309 of the National Highway System Designation Act. This allowed Federal-aid funds to be obligated for preventive maintenance on Federal-aid highway bridges [23 U.S.C. 116(d)].

> **(d) PREVENTIVE MAINTENANCE** - A preventive maintenance activity shall be eligible for Federal assistance under this title if the State demonstrates to the satisfaction of the Secretary that the activity is a cost-effective means of extending the useful life of a Federal-aid highway.

In 2005, the 109th Congress amended 23 U.S.C. 144. This allowed HBP funds to be used to perform systematic preventive maintenance on highway bridges that carry public roads on and off the Federal-aid Highway System. However, Routine maintenance remains the responsibility of the State and is not eligible for HBP or other Federal-aid highway funding.

The Division Office is responsible for making the determination on what actions can be considered as cost-effective means of extending the service life of a bridge as well as if the State's generation of those actions is achieved through a systematic process.

To meet the intent of 23 U.S.C. 144, 116(d) it is important that system preservation activities for the purpose of PM on bridges be carried out using a systematic process, such as a Bridge Management System (BMS). A properly developed BMS can create benefit/cost scenarios and investment strategies to help the State make the most efficient use of limited funds. An effective BMS should fully support the State's assessment of a strategy's cost-effectiveness. As noted in

AASHTO Policy Resolution PR-5-00, dated April 19, 2001, ". . . many states have developed and are using Bridge Management Systems which when fully utilized by managers will yield systematic approaches to effectively allocate funding for preventative maintenance and system preservation activities."

For any State that has a BMS and wishes to use HBP funds for systematic PM activities, the division office should determine whether the State's BMS uses a systematic process for preservation activities. To clarify the relation between a systematic process and a BMS, a BMS is simply a collection of many interacting systematic processes. A single systematic process may be specific to a given activity such as zone painting, joint replacements, or bridge washing. A systematic process that is limited to specific needs and activities may not have all of the attributes of a BMS, since other needs and activities such as replacements and improvements may not be considered as part of the process. In this situation, the BMS attribute of determining an optimal mix of all activities would not be completely addressed. In 23 CFR 500.107, a BMS is described as follows:

> An effective BMS for bridges on and off Federal-aid highways that should be based on the "AASHTO Guidelines for Bridge Management Systems" and that supplies analyses and summaries of data, uses mathematical models to make forecasts and recommendations, and provides the means by which alternative policies and programs may be efficiently considered. An effective BMS should include, as a minimum, formal procedures for:
>
> (a) Collecting, processing, and updating data;
> (b) Predicting deterioration;
> (c) Identifying alternative actions;
> (d) Predicting costs;
> (e) Determining optimal policies;
> (f) Performing short- and long-term budget forecasting; and
> (g) Recommending programs and schedules for implementation within policy and budget constraints.

A BMS can also be defined as a collection of interacting processes designed to assist decision makers in the selection of cost-effective bridge preservation, rehabilitation, and improvement strategies and actions to improve the efficiency and safety of, and protect the investment in a network of bridges. A *Management System* is defined in 23 CFR 450.104 to include: identification of performance measures; data collection and analysis; determination of needs; evaluation, and selection of appropriate strategies/actions to address the needs; and evaluation of the effectiveness of the implemented strategies/actions.

Using these various definitions along with the AASHTO Guidelines for Bridge Management Systems, an outline of attributes of a BMS can be compiled. An acceptable BMS at a minimum, for a given network of bridges, should be able to:

1. Establish a process for collecting, reporting, and updating bridge inventory and inspection data.
2. Describe the current condition based on field inspection data.

3. Project the condition over time as a function of funds available for improvements and preservation.
4. Identify the cost-effective actions and funds needed to achieve established performance goals.
5. Identify the costs to users of deficiencies in load capacity and substandard clearances.
6. Determine an optimal mix of activities.
7. Identify the cost of deferred maintenance and the savings of preventive maintenance.
8. Provide prioritized lists of rehabilitation, replacement, improvement and preservation projects.
9. Provide a means to analyze alternative funding scenarios, cost assumptions, and various "what-if" questions relative to policy decisions and selection of work.
10. Recommend bridge programs and schedules.

While the January 11, 2002 memo on HBRRP funds for preventive maintenance (PM) was superseded by the more generic October 8, 2004 memo on PM eligibility, the intent to have a systematic process for identifying PM activities has not changed. It is still very important to use a systematic process to identify PM activities, regardless of the funding source. As indicated in the HIBT memo of January 2002, a systematic process is required in order to meet the intent of 23 U.S.C. 144, 116 (d). A systematic process can be defined as a documented methodology regularly applied to repeatedly achieve a desired outcome or goal.

Division offices are encouraged to work with their State Transportation Departments to establish a program that identifies eligible PM measures. The AASHTO Subcommittee on Maintenance adopted the following definition for PM:

> Preventive maintenance is a planned strategy of cost-effective treatments to an existing roadway system and its appurtenances that preserves the system, retards future deterioration and maintains or improves the functional condition of the system (without substantially increasing structural capacity).

The AASHTO definition includes the phrase "a planned strategy of cost-effective treatments." The need to establish a program and a planned strategy is equivalent to having a systematic process. A systematic process defines the strategy, how it is planned, and how activities are determined to be cost effective.

An acceptable systematic process, at a minimum, should have the following six attributes:

1. Define how the needs are identified.
2. Outline how the needs are prioritized and programmed.
3. Define the outcome or goal, including resources necessary & timeframes to reach the outcome/goal.
4. Demonstrate that the proposed activity is a cost-effective means of extending the service life of a bridge.
5. Dedicate resources necessary to reach defined outcome/ goal.
6. Annually track, evaluate, and report on progress in reaching outcome/goal and adjust resources accordingly.

For the purposes of entering bridge preservation projects in the FMIS, use the improvement type code 47 – "Systematic Preventive Maintenance."

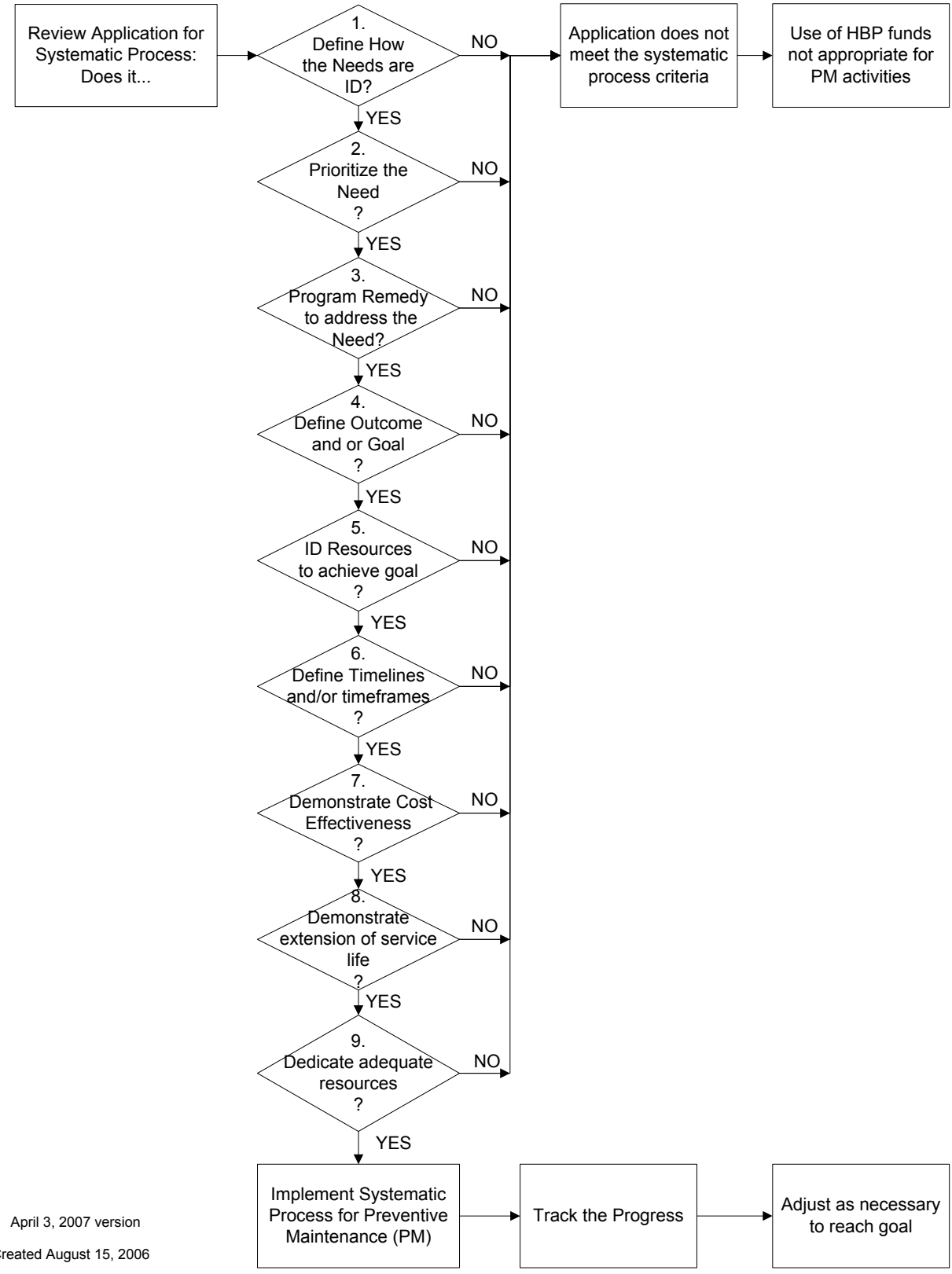
In order for a State to use its own forces to perform PM work, the State would need to demonstrate that to do so would be in the public's interest and that there is a significant advantage (cost, materials, expertise, etc.) when compared to competing the work to contractors. Depending upon the nature and extent of the work throughout the State or region, it could be appropriate to use HBP funds for the crew's work on a full-time or part-time basis.

The October 8, 2004 memo provides broad guidelines for consideration when determining eligibility for Federal-aid funding on PM projects. The intent of the memo was not to make all maintenance eligible for Federal-aid funding. Certain maintenance activities that are considered routine maintenance remain a State funded responsibility. Litter pick-up and removal of roadkill are examples of activities that should be classified as routine maintenance. Although these activities often have the secondary benefit of removing material that might otherwise clog drains, that is not their primary intent. Similar logic would apply to snow removal, which is a necessary action for keeping highways passable during winter weather, but not inherently performed for preservation of the highway surface. Furthermore, a statewide or region-wide program for removal of graffiti from bridge abutments, noisewalls, etc. would serve primarily cosmetic purposes and should be considered routine maintenance.

According to the FHWA Bridge Maintenance Training Manual, PM is the performance of maintenance in order to preserve bridge components in their present condition and is performed on a bridge to keep it in good condition. Additionally, the manual defines two groups of PM:
(1) those performed at specified intervals (systematic servicing of bridges on a scheduled basis…cleaning decks, seats, caps and salt splash zones; cleaning drainage systems; cleaning expansion joints; cleaning and lubricating expansion bearing assemblies; sealing concrete decks or substructure elements); (2) those performed as needed (resealing expansion joints; painting steel members, removing debris from channel; replace wearing surface, extending or enlarging deck drains).

The following process map should be used to evaluate an agency's systematic processes to determine PM eligibility for HBP funds.

Highway Bridge Program: Systematic Process



April 3, 2007 version

Created August 15, 2006

Ten-Year Rule

Reference: Federal-aid Policy Guide, Non-Regulatory Supplement 23CFR650D

The FHWA established a "10-year rule" for determining a bridge's eligibility for HBP funding after construction or major reconstruction has taken place. The rule prevents a bridge from remaining in a deficient classification after major reconstruction and thereby affecting the bridge fund apportionments to a State.

A bridge improvement would be subject to the 10-year rule if it were classed as rehabilitation or replacement under 23 CFR 650.405(b) irrespective of the funding used. Conversely, a bridge improvement would not be subject to the 10-year rule if it cannot be classed as rehabilitation or replacement under one of the 23 CFR 650.405(b) definitions. Such an improvement would not be eligible for HBP funding although it may be eligible for other Federal-aid funding.

Bridges in the NBI with a Year Built date (NBI Item 27) or Year Reconstructed date (NBI Item 106) within the past 10 years will not be considered a deficient bridge, will not be eligible for HBP funds and will not be used to apportion HBP funds. For example, a date of 1976 would be used for the determination through the end of 1985. The following are some rules concerning eligibility for HBP funding:

> The Division offices in consultation with the States should develop the definition of major reconstruction.
>
> (2) The 10-year criteria in which a bridge will not be eligible for HBP funding applies to bridges replaced or reconstructed with any Federal-aid funds, with all State or local funds, private funds, or any combination thereof.
>
> (3) To be eligible for funding, the bridge must be on the current HBP Selection List. Any bridge constructed or reconstructed in the past 10 years will not appear on this list. This will apply whether or not Item 13, Bridge Description, is coded as a temporary structure.
>
> (4) Any State request to use HBP funds for a bridge not on the Selection List should be fully documented and justified to indicate that additional deficiencies have developed through some natural or unforeseen phenomenon. Bridges removed from the Selection List because of the 10-year criteria, but with Federal-aid funds obligated for construction work prior to their removal, will continue to be eligible for HBP funds. Division offices should handle each of the above cases on an individual basis.

Off-System Bridge Program - Soft Match Program

References: 23 U.S.C. 144(n);Federal-aid Policy Guide, Non-regulatory Supplement for Part 650, Subpart D.

Federal regulations originating with Section 123(e) of the 1987 STURAA, permit the expenditure of local funds on an off-system non-Federal-aid project to be used, in some cases, to

offset the local matching share of a subsequent HBP (23 CFR 650, subpart D) bridge project. The FHWA has determined that for the purposes of implementing 23 U.S.C. 144(n), the term "construction" should be broadly defined. It includes most activities incidental to the development and actual replacement or rehabilitation of a highway bridge. However, many States may want to limit the crediting phases of such projects to only the classic "hard construction" activities. These activities are usually easier to track and can be readily quantified at the time the new bridge improvements are ready to accept traffic.

Since the passage of the 1987 STURAA Section 123(e) States are permitted to carry out bridge improvements on non-controversial off-system bridges (on local roads and rural minor collectors) without Federal funding, and then apply 80 percent of the cost of such projects as credit toward the non-Federal share of other HBP projects. The FHWA has developed basic national guidelines for uniform administration of those projects and the guidelines are as follows:

(1) The bridges meet the normal current eligibility requirements for HBP funding (they must be both deficient and have a sufficiency rating of 80 or less to be eligible for rehabilitation or a sufficiency rating of less than 50 to be eligible for replacement).

(2) The projects must be non-controversial.

(3) Projects must be carried out in accordance with standards, which are certified by the State and accepted by the FHWA as meeting all standards applicable to other bridge projects funded under 23 U.S.C. 144.

(4) The resulting improved bridges must not be deficient.

(5) Construction costs are the only expenditures eligible for credit.

(6) Only a minimal amount of approach work is to be applied as a credit.

(7) Credits for future matching of HBP will not be made for these bridge projects until the project is complete, inventoried, inspected and the resulting data entered into the State's bridge inventory file.

Replacement of Destroyed Bridges and Ferryboat Service

References: Federal-aid Policy Guide, Non-Regulatory Supplement 23 CFR 650D; 23 U.S.C. 144(m)

Federal regulations originating with Section 123(d) of the 1987 STURAA make the replacement of destroyed bridges and ferryboat service, 23 U.S.C. 144(l), eligible work under the Highway Bridge Replacement and Rehabilitation Program, 23 CFR 650, Subpart D. The FHWA has developed basic national guidelines for uniform administration of the eligible work and the guidelines are as follows:

(1) Bridges built under this section must meet the highway system requirements of which they are a part. Further, regular Federal-aid procedures and Section 144 requirements, where applicable, shall be used. In particular, the requirement that minimal approach roadway costs will be eligible must be observed.

(2) The program is applicable only to highway bridges.

(3) Bridges constructed under this section will not be added to the National Bridge Inventory until the new bridge is completed.

(4) The completed structure does not have to be of bridge length.

(5) It is possible that a bridge made obsolete by Corps of Engineer actions and in some instances low water crossings, could be classified as deficient bridges. If a bridge is already eligible for the HBP, it shall be programmed under the regular HBP with no special designation.

There is a definition of low water crossing to be used for this program. Low water crossings include public road waterway crossings other than bridges where construction improvements have been made in the stream, river or lake-bed to provide a firm surface for vehicles to travel across the watercourse. The crossings are designed and constructed to be passable to traffic most of the year during periods of ordinary stream flow but are impassable to traffic during periods of high water.

Closed Bridges

References: Federal-aid Policy Guide, Non-Regulatory Supplement 23 CFR 650D; 23 CFR 650.413; FHWA Memo, HBRRP Closed Bridge Report, James D. Cooper, Director of Bridge Technology, November 16, 2001.

The FHWA has developed a funding policy for closed bridges. Bridges out of service (closed) prior to the establishment of the Special Bridge Replacement Program (December 31, 1970) are not eligible for the HBP and were removed from the National Bridge Inventory. Bridges taken out of service after December 31, 1970, are also not eligible unless the State Transportation Department has made reasonable progress in scheduling the rehabilitation or replacement of the facility, thus indicating that the bridge was of significant importance.

Bridges that have been closed for 5 consecutive years, with no corrective action taken, may indicate that the bridge is not significant and should be removed from the NBI (November 16, 2001 Memorandum referenced above).

Approach Roadway Funding

References: Federal-aid Policy Guide, Non-Regulatory Supplement 23 CFR 650D; 23 CFR 650.413; FHWA Memo, Use of Highway Bridge Replacement and Rehabilitation Program (HBRRP) Funds for Approach Roadway Construction, Anthony R. Kane, Associate Administrator for Program Development, May 15, 1992 Memo.

The FHWA is concerned that in some instances approach roadway costs associated with HBP projects are excessive to the point of not falling within the congressional intent for the program "to improve deficient bridges." States and local entities are encouraged to use other categories of funds for approach roadways and miscellaneous non-bridge items. Also the FHWA Division offices are directed to:

1) Review and revise policy relating to inclusion of approach roadway items in HBP projects to provide for more national uniformity in bridge program management and minimize approach roadway project costs. This action should result in a nationwide average of no more than 10 percent. However, the eligible costs for approach roadway work for an HBP project should be limited to that necessary to render the replaced or rehabilitated bridge serviceable, and may exceed 10 percent of the total roadway project within reasonable limits. Using HBP funds for an entire roadway project, which happens to include an eligible deficient bridge, is to be avoided (May 15, 1992 Memo.).

2) Review the overall HBP where average bridge expenditures are not a high percentage of all HBP funds obligated and make appropriate changes to provide more national uniformity in bridge program management.

Funding of Bridge Inspections and Equipment

References: Federal-aid Policy Guide, Non-Regulatory Supplement 23 CFR 650D; 23 CFR 650.413; FHWA Memo, Highway Bridge Replacement and Rehabilitation Program Funding of Bridge Inspections, Rex C. Leathers, Director, Office of Engineering, April 22, 1980; FHWA Memo, Bridge Inspection & Inspection Equipment Revisited, Stanley Gordon, Chief Bridge Division, March 20, 1984; FHWA Memo, Bridge Inspection, Hugh T. O'Reily, Assistant Chief Counsel for General Law, May 21, 1986; FHWA Memo, Funding for Bridge Inspection Equipment and Access Features, M. Myint Lwin, Director, Office of Bridge Technology, October 5, 2005.

Bridge Inspection

The FHWA has determined that it is consistent with the purpose of the HBP to allow the use of bridge program funds for the biennial continued inspection of bridges.

Privately owned bridges--FHWA does not have authority over any privately owned bridges. Even though the FHWA still has a duty to inventory all bridges, because 23 U.S.C. 144 does not cover privately owned bridges, we have no authority to require them to meet our standards. Private bridges can be inventoried and inspected with the owners' permission. It is suggested that this permission be aggressively sought.

Publicly owned toll bridges--Publicly owned toll bridges on the Federal-aid system come under the purview of 23 U.S.C. 144 and must be inventoried. Federal-aid highway funds may be used, provided the conditions of 23 U.S.C. 129(a) are met.

Privately owned railroad bridges--FHWA cannot require inspection of privately owned railroad bridges. Funding would not be available for inspection of privately owned railroad bridges, even

if permission were gained to perform an inspection because 23 U.S.C. 144 only applies to "highway bridges."

Bridge Inspection/BMS Equipment

With the January 2005 update of the National Bridge Inspection Standards (NBIS) and the ever-increasing complexity and cost of bridge inspection activities with more advanced equipment, the FHWA decided to revise its March 20, 1984 policy regarding the use of HBP funds for the purchase of specialized bridge inspection equipment. Increasing demand and a concern that the absence of a funding source for new inspection equipment may be adversely impacting the National Bridge Inspection Program were factors in this determination.

The HBP (23 U.S.C. 144) is primarily a Federal-aid bridge construction program. The distribution of funds is based on bridge needs as determined by inspection data. The inspection data is obtained through the National Bridge Inspection Program, which is required under 23 U.S.C. 151. Bridge inspection has specifically and previously been determined to be an eligible activity for HBP funding. This determination is documented in the Federal-Aid Program Guide Non-Regulatory Supplement for 23 CFR Part 650, Subpart D. With the March 1984 FHWA memorandum, procurement of equipment and supplies that were under five thousand dollars in value were permitted under 49 CFR 18, but more expensive non-expendable specialized bridge inspection equipment was to be charged on a depreciation or rental basis. Part of this 1984 determination was based on policies that apply to construction programs and projects. While the HBP is a construction program, the National Bridge Inspection Program is not and therefore slightly different rules apply.

The Office of Bridge Technology revised its policy regarding the use of Federal-aid funds, specifically HBP funds for the purchase of specialized bridge inspection equipment (such as underbridge inspection vehicles, mobile inspection platforms, non-destructive evaluation equipment and data collection and analysis equipment). Consistent with 49 CFR Part 18, the U.S. DOT's common rule for Grants and Cooperative Agreements with State and Local Governments, and OMB Circular A-87, Cost Principles for State, Local, and Indian Tribal governments, Federal grant funds may be used to purchase equipment if the cost is reasonable and the equipment is necessary for performance of the Federal grant (i.e., project).

If a Division Office determines that the cost of such equipment is reasonable and the equipment is necessary for a federally funded bridge inspection program or a federally funded bridge management system (BMS), the purchase of the equipment may be approved by the Division and be charged directly to the project. If the equipment will be used infrequently, the Division Office may determine that the cost is not reasonable and that equipment should be leased, instead of purchased by the State, and the cost of the lease charged to the Federal-aid inspection or BMS project. Due to the specific nature of the bridge inspection equipment, it is assumed that it will be used for Title 23 activities until its life is expended. Therefore, the State is not required to perform an amortization of purchase costs as is normally done for construction equipment. If the equipment will not be used for a federally funded bridge inspection or BMS project, Federal-aid funds may not be used for either purchase or rental of the equipment. In addition, authorization of a Federal-aid project that includes only the purchase of such equipment is not permissible.

If a State utilizes Federal-aid funds for its bridge inspection/management system, then the cost of equipment utilized to accomplish this work can be charged to an HBP funded bridge inspection project. A separate Federal-aid project that includes only purchase of such equipment may not be established.

Federal HBP funds may also be used for the installation of permanent features that facilitate inspection activities on highway bridges as defined in 23 CFR 650.311. Such features as handrails, anchor points for a horizontal lifeline, and catwalks would be a few examples.

In addition to HBP funds, National Highway System, Surface Transportation Program, and State Planning and Research funds may be used for development, establishment, and implementation of bridge management systems and associated data collection activities. See 23 U.S.C. 303(g), 23 U.S.C. 103(b)(6)(L), 23 U.S.C. 133(b)(10), and 23 U.S.C. 505(a)(3) for relevant law citations. Therefore, if a BMS is being funded with these funds under a Federal-aid project, the cost of the purchase or rental of equipment necessary for the BMS may be charged to that project.

Historic Bridge Program

References: Federal-aid Policy Guide, Non-Regulatory Supplement 23 CFR 650D; 23 CFR 650.413; 23 U.S.C. 144(n); FHWA Memo, Highway Bridge Replacement and Rehabilitation Program - Inventory of Bridges for Historic Significance, Lester A. Herr, Chief, Bridge Division, March 30, 1979; FHWA Memo, Interpretation of Title 23, Section 144(n)(3) Reasonable Costs Associated With the Demolition of Historic Bridges, James D. Cooper, Director, Office of Bridge Technology, April 26, 2001.

The FHWA has determined that it is consistent with the purpose of the HBP to allow the use of bridge program apportioned funds to inventory bridges for historic significance.

Bridge Construction Unit Cost

Bridge construction unit cost data is requested annually from the HIBT shortly after January and is due by April 1st. Electronic data submissions are encouraged and can be completed by submitting the file through the web-based NBI system or by e-mail. The following criteria are used to develop the construction unit costs:

1. A construction unit cost shall be provided for new or replaced bridges constructed with Federal Funds on Federal-aid highways and off-system. The total cost of eligible items used to construct all bridges is to be divided by the total area of all bridges to determine the average unit cost by system.

2. All bridges let or awarded during the federal fiscal year are to be used. Indicate the number of bridges and area used to calculate the unit costs for replacement for each system. Submit the tabulated data according to the process described in the annual request memo.

3. Exclude culverts (multiple cell box culverts, long span culverts and multiple pipe installations) from the calculations.

4. The total deck area of the new or replaced bridge is to be used for all calculations. This is essential for uniform, comparable areas. The length and width dimensions to be used are:

a. Structure Length (NBI Item 49) -- This shall be the length of the roadway that is supported on the bridge structure. The length should be measured back-to-back of backwalls of abutments or from paving notch to paving notch.

b. Deck Width (NBI Item 52) -- This shall be the out-to-out width of the deck. See examples shown on the following page.

5. Bridges involving unusual circumstances or types of construction not routinely used by the State that significantly raise or lower the unit cost should not be included.

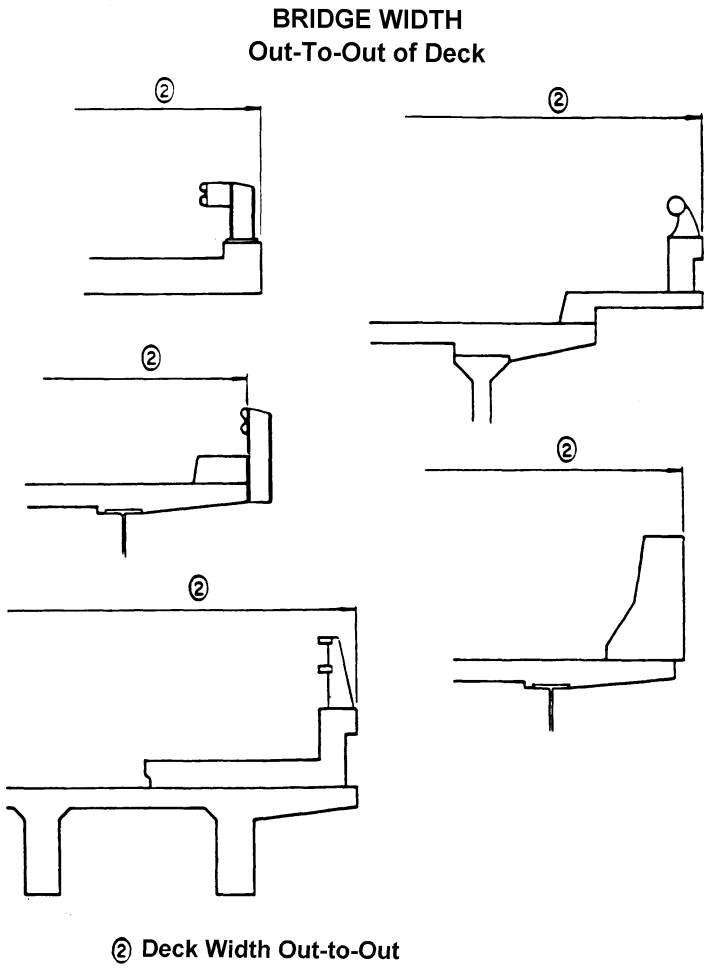
6. Bridges that are under staged construction should not be included unless the final stage has been bid and a total unit cost can be obtained. If a bridge is included in a design-build or lump sum contract, determine the eligible costs for inclusion in the unit cost calculation. If this cannot be accomplished, the State may use the previous year's unit cost for these bridges.

7. Unit costs shall be based on bridge costs only. A list of specific items not to be included is provided in Attachment C of the annual request memo. The list is not all-inclusive and care should be taken to assure that other similar items are not included.

8. The final cost shall be rounded to the next highest dollar.

The following items are to be excluded from the unit cost calculations: Mobilization, Demolition of Existing Bridges, Approach Slabs, Stream Channel Work, Riprap, Slope Paving, Earthwork (exclusive of structural excavation and structural backfill), Clearing and Grubbing, Retaining Walls not attached to the Abutment, Guardrail Transitions to Bridges, Maintenance and Protection of Traffic, Detour Costs, Signing and Marking, Lighting, Electrical Conduit, Inlet Frames and Grates, Field Office, Construction Engineering Items, Training, Right-of-Way, Utility Relocation, and Contingencies.

The Division Office is responsible for reviewing the state's BCUC data to ensure that the above criteria are followed and appropriate items are excluded. Fluctuations in previous years BCUC exceeding 15% need to be justified and documented in the submittal to HIBT. HIBT will review the individual submittals and advise the division offices if additional information or clarification is required.



Load Posting Signs

References: Federal-aid Policy Guide, Non-Regulatory Supplement 23 CFR 650D; 23 CFR 650.413; FHWA Memo, Purchase and Installation of Bridge Load Posting Signs with Highway Bridge Replacement and Rehabilitation Program Funds, Stanley Gordon, Chief, Bridge Division, June 17, 1982.

82-06-17 Purchase and Installation of Bri

The FHWA has determined that it is consistent with the purpose of the HBP to allow the use of bridge program funds to purchase and install load-posting signs to protect the public until such bridges can be replaced or rehabilitated. Therefore, the initial set of load posting signs immediately adjacent to the bridge is considered eligible for HBP funds.

Use of Debris From Demolished Bridges and Overpasses

References: Section 1805 of SAFETEA-LU; FHWA Memo, Use of Debris from Demolished Bridges and Overpasses, M. Myint Lwin, Director, Office of Bridge Technology, March 7, 2006.

States have the responsibility to administer or implement Section 1805 - Use of Debris From Demolished Bridges and Overpasses of SAFETEA-LU. The legislation directs a State to first make the debris from the demolition of such structure available for beneficial use by a Federal, State, or local government, unless such use obstructs navigation. This section covers the beneficial use of debris from a demolished structure that is eligible for Federal assistance under the HBP. The "beneficial use" is defined as the use of the debris for purposes of shore erosion control or stabilization, ecosystem restoration, and marine habitat creation.

Recognizing the differences in each State's highway bridge program, the States may develop their own procedures for notifying recipients of the availability of bridge demolition debris. It is suggested that the States reach out to the local, State and Federal agencies each year and solicit interest in using the bridge debris. The recipient of the debris shall bear the additional cost of processing, delivery, placement and use of the materials, and shall assume all legal responsibility for the placement of the debris. Preconstruction agreements should be established between the States and recipients of the debris, outlining responsibility, cost and compliance with environmental laws and regulations. The agreement should include such language that holds the owner of the demolished structures harmless in any liability action. The State should include appropriate contract provisions to clearly identify the responsibilities of the contractor, the State and the recipient.

Surface Transportation Workforce Development, Training, and Education

References: Section 5204(e) of SAFETEA-LU; FHWA Memo, SAFETEA-LU Implementation, Section 5204(e), State Core Program Funds for Workforce Development, Joseph S. Toole, Associated Administrator, Office of Professional and Corporate Development, January 11, 2006; State Core Program Q and A Website, http://www.fhwa.dot.gov/opd/qanda.htm .

Section 5204(e) of SAFETEA-LU allows funds from five core programs to be used for workforce development activities including employee education and training, and for programs to develop the future transportation workforce through career outreach and preparation. The five core programs are the Surface Transportation Program (STP), National Highway System (NHS), Interstate Maintenance, Bridge Program, and Congestion Mitigation/Air Quality (CMAQ). Program funds used for training, education and workforce development activities receive 100% federal funding.

The Transportation Research Board estimates that approximately 50% of the state transportation agency workforce will be eligible to retire within the next 10 years. According to the Department of Labor, the labor growth rate has declined from a high of 2.6% in the 1980's to a projected rate of 1.2% from 2000 to 2015, and an expected growth rate of only 0.2% from 2015 to 2025. As the labor shortage becomes more pronounced, so to will the competition for workers from all industries. Those industries that invest in developing their next generation of workers will be in a better position to compete for the smaller labor pool. Section 5204(e) will also provide a greater opportunity to develop the current transportation

workforce. As transportation demand continues to grow faster than available resources, the ability to apply innovative technologies, processes and management principles through a skilled, technically competent workforce will provide the greatest return on investment for the transportation industry. The core fund workforce development provisions enhance the states' ability to prepare individuals for transportation careers, and to develop current employees including those with management, technical and vocational job responsibilities.

TEA-21 allowed the states to use up to ½ of 1% of Surface Transportation Program funds for employee training and included a 20% state matching requirement. The SAFETEA-LU provisions supersede TEA-21 and the more limited STP provisions by providing for 100% funding for workforce activities, extending eligibility for workforce development activities to the five core programs, and by not limiting the amount of funding available from each program. The SAFETEA-LU language also expands the types of eligible activities beyond training and education for employees to "pipeline" programs that will help students prepare for transportation careers.

SAFETEA-LU provides for 100% federal funding if the core program funds are used for training, education, or workforce development purposes including "pipeline" activities. If used for these purposes, it is not necessary for the state to match the federal funds. The 100% funding provision is an indication of the continuing interest in transportation workforce development and provides for enhanced opportunities for the states to invest in employee professional development and student transportation career preparation.

Funds may be used for "education activities, including outreach, to develop interest and promote participation in surface transportation careers." Funds may also be used for activities associated with "student transportation career preparation." This could include, but not necessarily be limited to, student transportation related internships; cooperative education programs, university and college support activities, scholarship programs, and other efforts associated with transportation career outreach or that will help students prepare for a career in transportation. Funds could also be used for student outreach and internships associated with a particular project such as the T-REX project in Colorado.

The core program funds can be used for a wide range of professional development activities that include training programs, academic course study, apprenticeship programs, and support for short-term work details or "rotational" assignments for the purpose of employee development. The core program funds may <u>not</u> used to pay any portion of employee salaries. Core program funds could be also be used for employee training and professional development that is necessary to support a specific surface transportation capital project, such as a major roadway or bridge construction project.

The funds can be used for travel, equipment or materials purchases, however the travel or equipment/materials purchase must be directly related to a defined employee training or professional development need, program or activity, or directly associated with a student transportation career awareness or preparation activity. The travel or equipment/material purchase must be used in primary support of the employee training or professional development, or student career activity. Travel to and from an industry meeting where

training was one of several topics of discussion would not qualify for use of core funds. However, core funds could be used to support employee travel to and from a training or professional development program designed to improve the employees' skill, knowledge or abilities in surface transportation management or a technical discipline i.e. travel to a National Highway Institute or other industry training and professional development program.

The core program funds in Section 5204(e) may not be used to pay the non-Federal share of the cost of any project (i.e. core program funds cannot be used as matching funds).

The use of core program funds for workforce development is discretionary. This allows states the flexibility to determine whether they want to invest these funds in projects or programs directed at addressing their workforce needs. While the use of core funds for workforce development will reduce the funds available for capital projects, the investment will help assure transportation workers have the skills and knowledge they need to be efficient and effective in their work, and to apply new and innovative technologies. In this way, the use of core funds for workforce development will not compete with core program activities, but, in fact, will be an important complement to those programs and as a support to the states' overall transportation mission.

Division Office Practices

This section contains Division Office practices for addressing issues that may not be clearly addressed by law, regulation or policy.

One-lane Bridges

Oregon has used HBP funds to build replacement bridges one lane wide. The width varies from AASHTO in that the one-lane bridges are built 16 feet (4.9 m) wide, instead of 18 feet (5.5 m) wide. This is primarily on very low volume local roads (ADT of 25 or less) with short spans and the most economical bridge uses pre-cast, pre-stressed slabs, which are 4 feet (1.2 m) wide. Oregon also has a lot of one-lane bridges on the forest highway system. Autos often tend to try and pass on a bridge that is 18 feet (5.5 m) wide, but they almost never will try to pass on a bridge that is 16 feet (4.9 m) wide.

Replacement justification for bridges with SR>50

In Oregon, if the structure has a sufficiency rating of greater than 50 and the proposal is to replace the structure, the prospectus and the agreement need to state that replacement is conditional on submittal and approval of a cost justification analysis of replacement versus rehabilitation. The approval of the analysis will be by ODOT's bridge section, in consultation with FHWA.

The following is sample text from a letter sent to the OR DOT Bridge Engineer from the OR FHWA Division Bridge Engineer:

> *"We have reviewed the enclosed life cycle cost analysis for the Davis Slough Bridge prepared by Al Heyn. The analysis compares the replacement option with rehabilitation*

over an 80-year life span. The analysis indicates the cost for replacement is less than for rehabilitation, primarily due to the need to widen the existing bridge immediately and to perform substantial periodic maintenance on the timber elements.

We concur in your recommendation that the bridge be replaced. Based on your analysis, we consider this bridge eligible for replacement with HBR funds, even though the sufficiency rating is greater than 50."

The following page is a sample life cycle cost analysis that was developed by the OR DOT for the Davis Slough Bridge to justify replacement.

OR DOT
Davis_HBR_Just.xls

HBR Eligibility Determination - Compare Rehab Option vs Replacement Life Cycle Costs

Retain 39 year old bridge (BR_08282, constructed 1960) with deteriorated timber substructure (SR=51.7 10/25/98)) versus replacement

PW=(1+f)^n/(1+i)^n

interest rate, i = 7 %

inflation rate, f = 4 %

Notes: Widen from 9.14 m roadway to 13.200 m roadway; actual widening = 5.8 m x 134 m @ $1950/m2.

1993-1997 9.20 accidents per year, total 46 (1 accident at the bridge between 1993 & 1997) @ $10400/accident; accident cost $2080/year *

*Based upon cost/PDO accident = $6400 & cost/injury accident = $14400

Replacement cost for 14.02 m x 134.788 m structure based on Final Structure Cost Estimate.

(Detour structure not required for either option.)

Retain and Widen Old Bridge, Bridge No. 08282

Year	PW Factor	Widening	New Rail #	Total Capital Cost	Accidents	PW Accid	Borings	Repl. Piles	Bracing	Girders	Repave Deck	Drains & Gutterlines	PW Maint	Total PW
0	1.000	1520000	0	1520000	20800	20800	0	596000	2000	3000	0	0	601000	2141800
10	0.752	0	0	0	20800	15652	1000	5000	500	3000	13000	15000	28218	43870
20	0.566	0	0	0	20800	11778	1000	10000	500	3000	13000	15000	24065	35842
30	0.426	0	0	0	20800	8862	500	876000	2000	3000	13000	15000	387516	396378
40	0.321	0	0	0	20800	6669	1000	5000	500	3000	13000	15000	12023	18692
50	0.241	0	0	0	20800	5018	1000	10000	500	3000	13000	15000	10253	15272
60	0.182	0	0	0	20800	3776	500	876000	2000	3000	13000	15000	165111	168887
70	0.137	0	0	0	20800	2841	1000	5000	500	3000	13000	15000	5123	7964
80	0.103	0	0	0	20800	2138	1000	10000	500	3000	13000	15000	4369	6507
			#Rail cost included in widening costs									Total Present Worth=		$2,835,212

Replace with New Bridge, Bridge No. 18628

Year	PW Factor	Capital Cost	Accidents	PW Accid	Annual Maintenance (clearing)	PW Maint	Total PW
0	1.000	2570000	0	0	0	0	2570000
10	0.752	0	0	0	9000	6772	6772
20	0.566	0	0	0	9000	5096	5096
30	0.426	0	0	0	9000	3835	3835
40	0.321	0	0	0	9000	2886	2886
50	0.241	0	0	0	9000	2171	2171
60	0.182	0	0	0	9000	1634	1634
70	0.137	0	0	0	9000	1229	1229
80	0.103	0	0	0	9000	925	925
					Total Present Value=	$2,594,548	

Recommendation: The present worth cost comparision to retain, widen and maintain this bridge is greater than to replace it. Therefore we recommend the approval of the use of HBRR funds to replace this bridge under the Davis Slough Bridge project (PCS KN_09064, BR_18628).

Procedure for Establishing Reasonable Touchdown Points for Eligible HBRRP Bridge Projects

Agreed to for applying February 20, 2004 by:
George M. Clendenin – VDOT Structure and Bridge Division
Mohammad Mirshahi – VDOT Location and Design Division
Claude S. Napier, Jr. – FHWA, Virginia Division

1. Requirements specified in 23 CFR Sec. 650.405, Eligible Projects, shall be considered in establishing reasonable touchdown points for approach work to be funded with HBRRP funds.
    a. 650.405(b)(1) Replacement. Total replacement of a structurally deficient or functionally obsolete bridge with a new facility constructed in the same general traffic corridor. A nominal amount of approach work, sufficient to connect the new facility to the existing roadway or to return the gradeline to an attainable touchdown point in accordance with good design practice is also eligible. The replacement structure must meet the current geometric, construction and structural standards required for the types and volume of projected traffic on the facility over its design life.
    b. 650.405(b)(2) Rehabilitation. The project requirements necessary to perform the major work required to restore the structural integrity of a bridge as well as work necessary to correct major safety defects are eligible except as noted under ineligible work. Bridges to be rehabilitated both on or off the Federal-Aid System shall, as a minimum, conform with the provisions of 23 CFR part 625, Design Standards for Federal-aid Highways, for the class of highway on which the bridge is a part.
    c. 650.405(c) Ineligible work. Except as otherwise prescribed by the Administrator, the costs of long approach fills, causeways, connecting roadways, interchanges, ramps, and other extensive earth structures, when constructed beyond the attainable touchdown point, are not eligible under the bridge program.

2. Every deficient bridge scheduled for rehabilitation or replacement shall be evaluated individually to establish reasonable touchdown points for approach work. VDOT shall establish the reasonable touchdown points for all eligible bridges as long as both the cost of the approach work and the limits for the reasonable touchdown points do not exceed the following two criteria:
    a. The cost of the approach work funded with HBRRP funds does not exceed 25% of the bridge rehabilitation or replacement cost on the Federal-aid System and 50% on the Off-System.
    b. The length of the eligible approach work on each side of the bridge is less than 600 feet. For ease in establishing project limits, VDOT may adjust the approach work limits to just one side of the bridge not to exceed 1200 feet for ease in determining quantities and cost.

3. If VDOT feels that the reasonable touchdown points should exceed both of the criteria in paragraph 2, then the project shall be submitted to FHWA with supporting documentation for review and approval. (VDOT will modify their form for "Federal Bridge Replacement Program Determination of Touchdown Points" to indicate that the form is to be submitted to FHWA for review and approval when both the cost of approach work exceeds the cost of the structure by 25% on Federal-aid System and 50% on the Off-System and the total length of approaches exceeds 1200 feet.)

4. The following guidelines shall be used in establishing reasonable touchdown points:
    a. EXISTING LOCATION (Bridge Project Only):
        i. When replacing or rehabilitating a substandard bridge to minimum standards or greater, on existing grade and location, all approach work items required to transition back into the existing roadway and safety appurtenances pertaining to the bridge are eligible. The cost of any temporary detour required to maintain traffic while the structure is being built is eligible.

        ii. When replacing a bridge that conforms to standard widths on existing grade and location, all approach work items and safety appurtenances pertaining to the bridge are eligible. The cost of any temporary detour required to maintain traffic while the structure is being built is eligible.

    b. EXISTING LOCATION (Project to upgrade roadway and rehabilitate or replace a deficient bridge): When replacing or rehabilitating a substandard bridge to minimum standards or greater, on existing grade and location, bridge work items will be limited to 50 feet of approach work at beginning and end of bridge. All approach work items in the 100 feet are eligible for consideration. (This allows the coverage of the cost of approach slabs, select material behind the abutments, guardrail attachments and other approach work items.) If a detour is required, associated roadway costs required to maintain traffic while the structure is being built are eligible.

    c. NEW LOCATION:
        i. When replacing a bridge that needs to be raised or relocated due to substandard vertical and horizontal alignment, substandard clearances, hydraulic design issues, constructability issues, etc., the minimum amount of approach roadway work necessary to tie the relocated alignment back into the existing roadway is eligible. The alignment will conform to current AASHTO standards based on the functional classification and projected traffic volumes for that particular roadway.

When a section of roadway that has poor geometry is being upgraded, and this roadway section includes the replacement of a bridge that does not have a geometric problem, engineering judgment shall be used in determining the amount of approach work to be funded with HBRRP funds.

ATTACHMENT A – HBP APPORTIONMENT PROCESS

The apportionment process for the Highway Bridge Program (HBP) funds involves the following steps: (1) gather National Bridge Inventory (NBI) and bridge construction unit cost (BCUC) information from States and federal agencies; (2) identify eligible bridges (Selection List); (3) compute State apportionment factors; and (4) compute the amount of HBP funds to be apportioned to each State. These steps and the intermediate steps in the process are discussed below.

Step 1 Gather NBI and BCUC information.

NBI data updates are requested from the States and federal agencies once per year and these updates are required to be sent to the FHWA Office of Bridge Technology (HIBT) by April 1 of each year. The criteria for submitting the data are identified in an annual memorandum to field offices. States and federal agencies may elect to submit NBI data more frequently than once per year.

BCUC updates are also requested from the States once per year and these updates are required to be sent to HIBT by April 1 of each year. The criteria for submitting the data are identified in an annual memorandum to the field offices. BCUC are furnished in cost per square meter or cost per square foot of deck area and for on and off system bridges.

Step 2 Identify the eligible deficient bridges from the NBI data. [See Attachment 1 for the NBI Items which affect HBP apportionment and Sufficiency Rating (SR) calculations.]

The bridges are currently identified as deficient according to NS 23 CFR 650D, http://www.fhwa.dot.gov/legsregs/directives/fapg/0650dsup.htm (Attachment 2). Bridges with a sufficiency rating of less than 50 will be eligible for replacement while bridges with a sufficiency rating of 80 or less will be eligible for rehabilitation.

Step 3 Compute State Apportionment Factors.

The deck area is computed using the structure length (NBI Item 49) and deck width (NBI Item 52) for all eligible deficient bridge's in each State. The deck area is computed for bridges needing replacement and bridges needing rehabilitation. Each of these is subdivided in on-system and off-system areas, and results in four categories. The deck area in each category is multiplied by the corresponding replacement or rehabilitation BCUC. The three year average of the BCUC is used as the replacement cost. The rehabilitation cost is 68% of the replacement cost.

The sum of the four categories is the bridge investment requirement at the State level. If a State transfers money out of the HBP that amount is deducted from their bridge investment requirement the following fiscal year. The bridge investment requirement at the National level is the total of the State levels. By dividing the State level by the National level, a States apportionment factor is computed. The final factors then have the minimum 0.25% minimum criteria and 10% maximum criteria applied. The final factors are given to FHWA's Office of the Chief Financial Officer for the computation of funds.

Example of Step 3 Compute State Apportionment Factors

Compute Dollar Federal-aid Replacement Needs	Compute Dollar Federal-aid Rehabilitation Needs	Compute Dollar Non Federal-aid Replacement Needs	Compute Dollar Non Federal-aid Rehabilitation Needs
Total All System Needs			
Minus Amount Transferred			
Adjusted Total All System Needs			
Compute Factor by dividing each State dollar amount into National Total			
Adjust to 0.25% Min and 10% Max for Final Factor for Budget Office			

Step 4 Compute the funds to go to each State. Step 4 is done by the Office of Budget and Finance

Step 4.1 Determine Bridge Program authorization level [PL 109-59 § 1101(a)(3)]

Step 4.2 Determine metropolitan planning takedown percentage [shall set aside 1.25% as stated in 23 U.S.C. § 104(f)(1)]

Step 4.3 Determine discretionary set-asides [23 U.S.C. § 144(g)(1)]

Step 4.4 Determine amount of funds available for apportionment under 23 U.S.C. § 144 (See diagram on Page 3)

Authorization (1)
- Authorization (1) minus Metropolitan Planning takedown percentage

Net Authorization (2)
- Net Authorization (2) minus Discretionary Set-asides

Amount of funds available for apportionment under 23 U.S.C. § 144

Step 4.5 Amount of funds available for apportionment under 23 U.S.C. § 144 is multiplied by the bridge factors provided by HIBT. The bridge factors have already been adjusted to 0.25% minimum and 10% maximum (by HIBT) prior to having been forwarded to the FHWA's Office of the Chief Financial Officer.

Step 4.6 Compute Equity Bonus, 23 U.S.C. § 105, and add to each States apportioned funds.

Step 4.7 Compute 0.50% of 1% of funds apportioned to each State as a limiting amount pursuant to 23 U.S.C. § 140(b) for skills training. Limiting amount is split between the 2 bridge classifications:

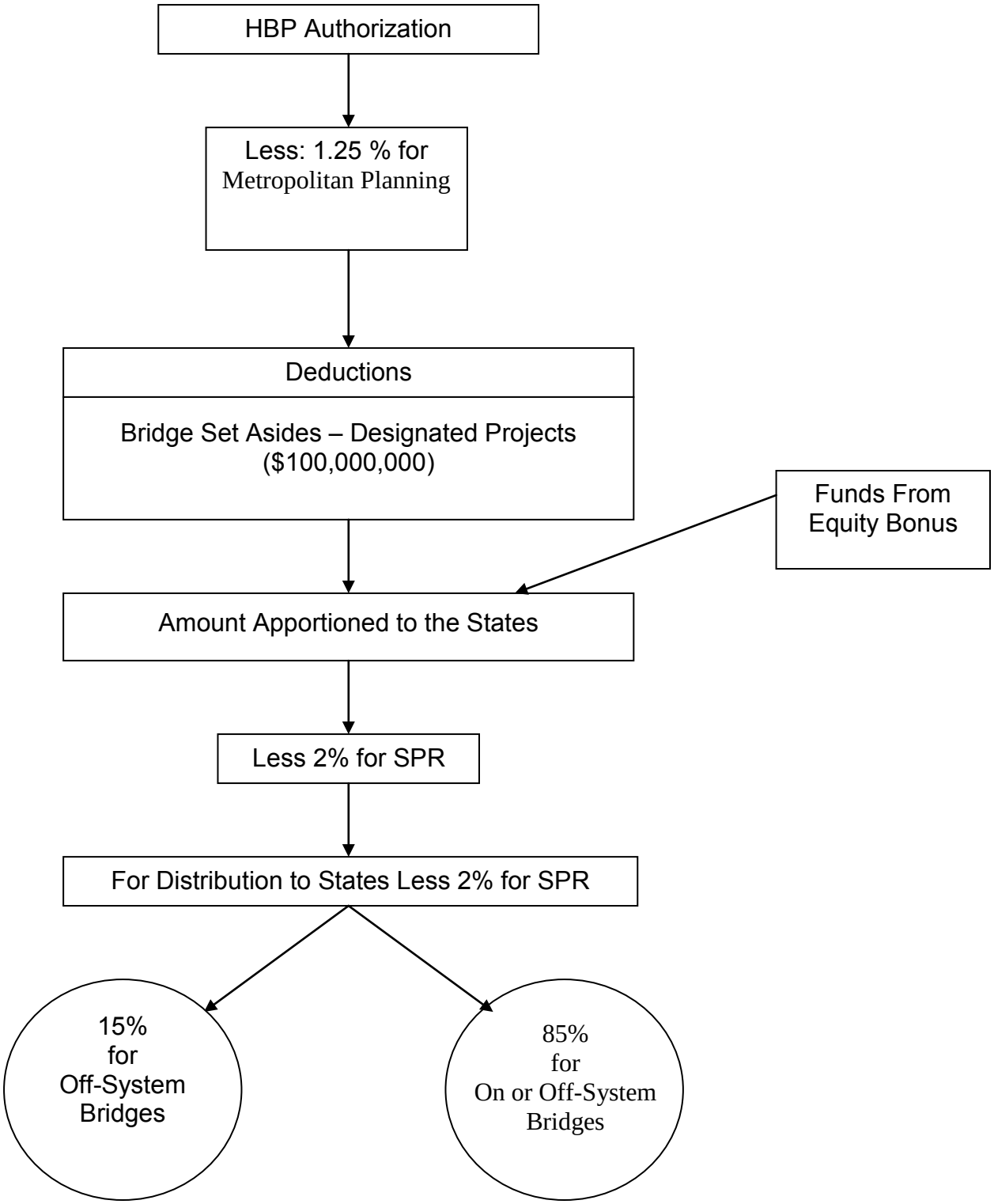
15% for off-system bridges
85% for either on- or off-system bridges

Step 4.8 Compute 2% of funds apportioned to each State as a set-aside for Statewide Planning and Research (SPR) pursuant to 23 U.S.C. § 505 and deduct from funds apportioned to each State yielding a net apportionment.

Step 4.9 Split net apportionment between the 2 bridge classifications:

15% for off-system bridges
85% for either on- or off-system bridges

Example of Step 4 (Sub-Steps 1 through 9):



ATTACHMENT 1

The following table lists NBI Items that directly and indirectly affect HBP eligibility and apportionments. Items in **bold** may have multiple effects or are particularly important. Please note that the list may not be completely inclusive.

NBI ITEMS THAT AFFECT APPORTIONMENTS	**ITEMS**	**DESCRIPTION**
STRUCTURALLY DEFICIENT OR FUNCTIONALLY OBSOLETE (SD/FO) See FHWA FAPG NS 23 CFR 650D (excerpt follows) for complete SD/FO criteria.	**58**	**Deck**
	59	**Superstructure**
	60	**Substructure**
	62	**Culverts**
	67	**Structural Evaluation**
	68	**Deck Geometry**
	69	**Underclearances, Vertical & Horizontal**
	71	**Waterway Adequacy**
	72	**Approach Roadway Alignment**
SUFFICIENCY RATING (SR) See FHWA Coding Guide, Appendix B, for SR formula and example.	**19**	**Bypass/Detour Length**
	28	Lanes On/Under Structure
	29	**Average Daily Traffic**
	32	Approach Roadway Width
	36	Traffic Safety Features
	43	**Structure Type, Main**
	51	Bridge Roadway Width Curb-To-Curb
	53	Minimum Vertical Clearance Over Bridge Roadway
	58	**Deck**
	59	**Superstructure**
	60	**Substructure**
	62	**Culverts**
	66	**Inventory Rating**
	67	**Structural Evaluation**
	68	**Deck Geometry**
	69	**Underclearances, Vertical & Horizontal**
	71	**Waterway Adequacy**
	72	**Approach Roadway Alignment**
	100	**STRAHNET Highway Designation**
INDIRECT ITEMS These are Items that affect the above Items used for: < determining if a bridge is structurally deficient or	5	Inventory Route
	26	**Functional Classification**
	27	**Year Built**
	42	**Type of Service**
	49	**Structure Length**

NBI ITEMS THAT AFFECT APPORTIONMENTS	ITEMS	DESCRIPTION
functionally obsolete (SD/FO); < sufficiency rating (SR) calculations; and < deck area calculations.	**52**	**Deck Width, Out-to-Out**
	54	Minimum Vertical Underclearance
	55	Minimum Lateral Underclearance on Right
	56	Minimum Lateral Underclearance on Left
	75	**Type of Work**
	106	**Year Reconstructed**

NON-REGULATORY SUPPLEMENT (Excerpt)

OPI: HNG-33

9. HIGHWAY BRIDGE REPLACEMENT AND REHABILITATION PROGRAM (23 CFR 650.409). The National Bridge Inventory will be used for preparing the selection list of bridges both on and off of Federal-aid highways. Highway bridges considered structurally deficient or functionally obsolete and with a sufficiency rating of 80 or less will be used for the selection list. Those bridges appearing on the list with a sufficiency rating of less than 50.0 will be eligible for replacement or rehabilitation while those with a sufficiency rating of 80.0 or less will be eligible for rehabilitation. To be considered for the classification of deficient bridge, a structure must be of bridge length, and had not been constructed or had major reconstruction within the past 10 years.

a. General Qualifications: In order to be considered for either the structurally deficient or functionally obsolete classification a highway bridge must meet the following:

Structurally Deficient -

1. A condition rating of 4 or less for
   Item 58 - Deck; or
   Item 59 - Superstructures; or
   Item 60 - Substructures; or
   Item 62 - Culvert and Retaining Walls.[i] or

2. An appraisal rating of 2 or less for
   Item 67 - Structural Condition; or
   Item 71 - Waterway Adequacy.[ii]

Functionally Obsolete -

1. An appraisal rating of 3 or less for
   Item 68 - Deck Geometry; or
   Item 69 - Underclearances;[iii] or
   Item 72 - Approach Roadway Alignment. or

2. An appraisal rating of 3 for
   Item 67 - Structural Condition; or
   Item 71 - Waterway Adequacy.[2]

b. Any bridge classified as structurally deficient is excluded from the functionally obsolete category.

[i] Item 62 applies only if the last digit of Item 43 is coded 19.

[ii] Item 71 applies only if the last digit of Item 42 is coded 0, 5, 6, 7, 8 or 9.

[iii] Item 69 applies only if the last digit of Item 42 is coded 0, 1, 2, 4, 6, 7 or 8.

CHAPTER 2
NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)

Table of Contents

NATIONAL BRIDGE INSPECTION STANDARDS 4

BACKGROUND 4
ANNUAL REVIEW AND REPORTING GUIDELINES 4
STANDARDS AND NON-REGULATORY GUIDANCE 6
JOINT REVIEWS 11
COMPLIANCE MANDATES AND POSSIBLE ACTIONS DUE TO NON-COMPLIANCE 11

NATIONAL BRIDGE INVENTORY (NBI) 12

BACKGROUND 12
CODING GUIDE 13
BORDER BRIDGES 13
STRAHNET ROUTES 13

BRIDGE MANAGEMENT SYSTEMS (BMS) 14

BACKGROUND 14
ELEMENT LEVEL CONDITION STATE GUIDE 14

EXAMPLE FIELD PRACTICES 15

ANNUAL REVIEW ROTATION PLAN 15
FOLLOW-UP OF CRITICAL INSPECTION FINDINGS 16
CROSS CHANNEL PROFILE GUIDELINE 17
REDUCED FREQUENCY INSPECTIONS 18
ODOT BRIDGE INSPECTION PROGRAM QA / QC REVIEWS 19
BRIDGE INSPECTOR CERTIFICATION PROGRAM 24
OKLAHOMA QUALITY CONTROL AND QUALITY ASSURANCE PLAN 32
FHWA MARYLAND DIVISION 46
NATIONAL BRIDGE INSPECTION STANDARDS 58
BRIDGE LOAD RATING AND POSTING RISK ASSESSMENT 67
RISK ASSESSMENT GUIDANCE FOR BRIDGE LOAD RATING AND POSTING 72

National Bridge Inspection Standards

Background

The Silver Bridge in Point Pleasant, West Virginia, collapsed on December 15, 1967. It was an eyebar chain suspension bridge with a 700' main span. The collapse killed 46 people and initiated Congressional action that led to the National Bridge Inspection Program. The purpose of the program was to ensure the "proper safety inspection and evaluation of all highway bridges."

The FHWA bridge inspection program regulations were developed as a result of the Federal-Aid Highway Act of 1968 (Sec. 26, Public Law 90-495, 82 Stat. 815, at 829) that required the Secretary of Transportation to establish National Bridge Inspection Standards (NBIS). The goal of the NBIS is to locate and evaluate existing bridge deficiencies to ensure the safety of the traveling public.

The 1968 Federal-Aid Highway Act directed the States to maintain an inventory of Federal-aid highway system bridges. The Federal-Aid Highway Act of 1970 (sec. 204, Public Law 91-605, 84 Stat. 1713, at 1741) limited the NBIS to bridges on the Federal-aid highway system. After the Surface Transportation Assistance Act of 1978 (STAA) (sec. 124, Public Law 95-599, 92 Stat. 2689, at 2702) was passed, NBIS requirements were extended to bridges greater than 20 feet on all public roads. The Surface Transportation and Uniform Relocation Assistance Act of 1987 (STURAA) (sec.125, Public Law 100-17, 101 Stat. 132, at 166) expanded bridge inspection programs to include special inspection procedures for fracture critical members and underwater inspection. The NBIS is codified at 23 USC § 151.

The Standards apply to all highway bridges open to public travel. The State should have an agreement that outlines inspection standards and responsibilities with other agencies that own and maintain bridges that carry public travel. This includes local road districts, toll authorities, ports, railroads, and other state agencies. FHWA has no authority to require private organizations to inspect bridges according to the NBIS, but we should require states to make arrangements for such inspections as part of their agreement to allow public roads and highways on those bridges.

Annual Review and Reporting Guidelines

An annual review of the State's NBIS Program is required by FHWA administrative policy in the non-regulatory supplement for 23 CFR 650, Subpart C and as requested in the June 22, 2001, memorandum from Office of Bridge Technology. The non-regulatory supplement requires a management review of State bridge inspection and bridge maintenance programs. The review includes an annual review of State compliance with the National Bridge Inspection Standards as well as the overall quality of bridge inspection.

The Annual Review normally consists of the following three parts:

1. A field review of bridges to compare inspection reports for quality and accuracy, (and which may be used as part of an assessment of maintenance adequacy of bridges);

2. Interviews with inspectors and managers to document NBIS procedures, and
3. An office review of various reports of data from the inventory to assess compliance with frequencies, posting, and data accuracy. The following is a sample list of data categories that may be discussed during the review:
    a. Bridges with routine inspection due dates greater than the required frequency
    b. Reduced frequency inspection due dates, and In-depth Inspection frequency
    c. Bridges with approved frequencies greater than 24 months to verify continued applicability of the extended frequency criteria
    d. Master lists of bridges with FCM's, needing Underwater Inspection, or with Special Features
    e. Fracture critical bridges with inspection due dates beyond the required frequency
    f. Bridges with underwater inspection due dates beyond the required frequency
    g. Bridges that should be load posted or restricted, but are not
    h. Bridges not yet load rated (or an approved plan to complete them)
    i. Bridges requiring scour evaluation (unless 100% are completed)
    j. Interstate bridges with fatigue-prone details
    k. Bridges requiring NDE or advanced NDE to assess critical details such as pins
    l. Channel profiles of scour-critical bridges
    m. Bridges that require special access equipment.

The field reviews are normally scheduled for a specific area of the state and are rotated so the whole state is covered over a period of years between 3 and 6 years depending on the size of the State and its bridge inventory. Along with coverage of a specific region or district of the State, various local agencies should be reviewed on a periodic basis. The review should also include a sampling of local agencies, public toll authorities, and other state agencies (forests, universities, airports, and ports) and other public bridge owners.

Many Division offices conduct a comprehensive review of all areas of the NBIS each year. In addition, a periodic in-depth review of specific parts of the state program may be conducted in order to allow for a more thorough review of specific areas, such as fracture critical, underwater, scour, movable bridges, inspection support of bridge management, quality assurance program, follow-up on critical findings and recommendations, and Special Feature Inspections, such as steel fatigue cracking or post-tensioning corrosion. The selection of an in-depth area to include in the review will depend on the occurrence of problems and history of compliance by the State. Risk assessments may also be performed to assist in the selection of review focus areas.

The review should include an assessment of the adequacy of State and local agency maintenance capabilities and activities. This can be done by noting evidence of maintenance work during bridge site reviews and by documenting maintenance policies and funding programs during interviews with the agency maintenance personnel.

Data quality is assessed in three ways. The first is by comparison of Structure Inventory and Appraisal (SI&A) data or element level data with your independent findings on field reviews of bridges. In states where only element level data is collected, the field review can be an independent check of the accuracy of the element level to NBI data translator program. The second method is by checking the inspection report or SI&A data for consistency by comparing

data fields that are similar or related, including comparison of element-level data and NBI condition ratings, if both are collected. The third method is by reviewing the adequacy and findings of the state's quality control or quality assurance program.

To facilitate monitoring of the bridge inspection program at a national level, the Office of Bridge Technology issued a standard format to be used for submitting a summary of the Division's annual review. The format was distributed with the July 1, 2003, memorandum from the Office of Bridge Technology. A copy of the current format and a national summary of annual bridge inspection program reviews are available on our intranet website at http://intra.fhwa.dot.gov/bridge/nbissummary.htm.

State, public agency and consultant inspectors are responsible for using safe inspection practices. While the FHWA does not have a specific standard for this, FHWA employees who participate in field review of bridges as part of the NBIS Review should follow State and OSHA safety procedures and be an exemplary advocate for safe practices. Some specific areas for concern are to avoid working alone, use proper personal safety gear, use extreme caution around traffic, avoid confined spaces unless properly equipped, avoid hazardous climbing, and be alert for animal hazards.

Standards and Non-Regulatory Guidance

The regulations that define the minimum requirements (called standards) for in-service bridge inspection are contained in 23 CFR 650, Subpart C. They were last revised through a December 14, 2004, Final Rulemaking. FHWA established a questions and answers website to address changes resulting from the revisions. Links to the regulations and the questions and answers website are available at http://www.fhwa.dot.gov/bridge/nbis.htm.

Excellent additional guidelines are contained in the non-regulatory supplement to Subpart C. The provisions in the supplement are strongly recommended by FHWA, but not enforceable to the same extent that the regulations are. The supplement covers:

- Follow-up on critical findings and recommendations
- Scour Evaluation
- Training
- Possible Consequences of non-compliance with Inspection Frequency or Load Posting Standards
- Inspection of Fender Systems
- Major Bridge Inspections.

The supplement can be found at:
http://www.fhwa.dot.gov/legsregs/directives/fapg/0650csup.htm

The legal basis for the regulations is in 23 USC, Section 151, and can be found at:
http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=browse_usc&docid=Cite:+23USC151

The AASHTO Manual for Condition Evaluation of Bridges is incorporated by reference in the regulations as a source of information for inspecting and determining the safe load capacity of

bridges. The Bridge Inspector's Reference Manual (BIRM) is also referenced in the CFR as a basis for Inspector Training Programs. The BIRM superseded the old Bridge Inspector's Training Manual, 1990 (Manual 90), which continues to be a valuable reference.

The *Preamble* to the 2004 Revisions to 23 CFR provides valuable insight into the intent of the standards and may provide guidance in interpretation for application of the standards to specific situations in each state.

The following is a brief summary of the main standards:

Organization. Each state highway department must have a bridge inspection organization that is responsible for policies, procedures, inventory, inspections, load ratings, quality assurance, reports, and other requirements of the Standards. This organization must be staffed with at least one Program Manager and Team Leaders who meet the minimum NBIS requirements.

Qualifications. The requirements in CFR 650 Part C are clear, but there has been some confusion about the type of experience necessary to meet the 5-year or 10-year minimums, and the definition of "eligible for registration". The preamble to the Final Rulemaking provides additional guidance and clarification on FHWA policy on establishing minimum criteria for Program Managers and Team Leaders. FHWA policy allows some flexibility in the type of experience that qualifies as "experience". FHWA also believes that continuing education should be an important part of the minimum qualifications.

Inventory. Each State and Federal Agency must prepare and maintain an inventory of bridges subject to the NBIS. Federal agencies submit directly to the FHWA and then from the FHWA to the State. In some States, the local agencies take the responsibility for collecting data for bridges subject to the NBIS and sending the data to the state. In other states the State Highway Agency (SHA) takes the responsibility to collect the local agency bridge data.

The inventory must be checked using the Edit/Update program and submitted to Office of Bridge Technology in Headquarters at least once each year by April 1. The April submittal is used to calculate apportionment factors for HBP funding, to develop the Selection List of bridges eligible for HBP funding, and to prepare performance measures for bridges. Supplemental submittals are accepted whenever necessary to reflect significant changes.

To ensure accuracy of the Inventory, states are required to enter data for new bridges and construction and maintenance work that affects the status of a bridge within specific time frames – 90 days for state and Federal agency bridges and 180 days for all others. This is especially difficult when the bridge is owned by an agency other than the DOT, but the procedures to assure this happens should be periodically reviewed by FHWA.

Inspections. Each bridge must be inspected as thoroughly as necessary to clearly establish its condition and to ensure its continued safe operation. Routine inspections must be conducted every 24 months, unless a 48 month frequency is approved by FHWA Headquarters for specific eligible bridges. Bridges may require inspection at a frequency less than 24 months based on condition. An example field practice for reduced frequency inspections in included in the Field Practices section.

Load rating and posting. The November 5, 1993 and December 22, 1993 memorandum from the Office of Bridge Technology as well as the *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges, December 1995*, require load ratings of all bridges constructed, replaced, or rehabilitated after January 1, 1994 for the National Bridge Inventory (NBI) to be done using Load Factor Design (LFD). The memo recognizes that states have the prerogative to calculate safe load capacity for posting purposes using other approved methods. The memo also requires each state to initiate an aggressive plan to complete the NBI load ratings. The intent was that the National Highway System (NHS) bridge load ratings be completed by April 1996. For bridges off of the NHS that were constructed, replaced, or rehabilitated prior to January 1, 1994, a valid load rating computed by LFD, Allowable Stress Design (ASD), or Load and Resistance Factor Rating (LRFR) is acceptable.

The March 22, 2004 memorandum revises the Coding Guide by providing three additional codes to the Method Used to Determine Operating Rating and Method Used to Determine Inventory Rating (Items 63 and 65). The additions are made to accommodate the reporting of Rating Factor (RF) determined by LRFR, LFD, or ASD methods. This memorandum does not require bridges to be rated or re-rated using LRFR methods, nor does it change our position on using LFD with MS loading as the preferred method for load rating bridges designed by LFD or ASD into the NBI. Instead, this memorandum provides the additional option of reporting RF by allowing LRFR with HL-93 for all structures and encourages the use of LRFR methods with HL-93 loading for all new and reconstructed bridges that are designed by LRFD Specifications.

The October 30, 2006 memorandum clarifies FHWA's policy regarding the appropriate methodology and loads to be used in reporting operating and inventory rating data to the NBI. In general, for bridges and total replacement bridges designed by either Load and Resistance Factor Design (LRFD) Specifications, LFD, ASD, or any combination thereof, load ratings are to be computed and reported to the NBI as a RF or in metric tons based on LRFR or Load Factor Rating (LFR) methods. Allowable Stress Rating (ASR) is a policy exception in some cases. After October 1, 2010, bridges designed by LRFD are to be computed and reported into the NBI as a RF based on LRFR methods. See October 30, 2006 memorandum for more details of all load rating options.

The requirement for a load rating for every bridge is separate and distinct from the original design calculations. The current National Bridge Inspection Standards require posting when calculations show a bridge is not adequate for legal loads in the State. The load capacity for posting purposes may be computed by any AASHTO method or a more accurate method, including load testing, when the procedures are approved by FHWA.

States should also restrict bridges that are not adequate for annual or continuous permit loads. Those are loads exceeding the Bridge Gross Weight Formula (23 CFR 658.17), but legally allowed by exemptions contained in 23 CFR 658, Appendix C.

Once load capacity is determined to be less than State legal loads, the agency must restrict loads by posting as soon as practical, strengthen the bridge by temporary supports, or perform temporary or permanent repairs. Failure to do so should initiate action by FHWA described in Compliance Mandates.

Load rating results should be current and reflect the actual condition of the bridge. The State should have a process to allow comparison of the bridge condition on which the load rating is based to current bridge condition. If conditions change, which could reasonably affect the load rating, a load capacity review process should be initiated to verify the load rating or re-rate the bridge. The inspection file should have a narrative in it indicating what the controlling members are and the condition they were assumed to be in when the rating was done. Any assumptions regarding bridge capacity or engineering judgment need to be adequately documented in the bridge rating analysis and maintained in the inspection records for the bridge inspector's reference. Although not required by FHWA or AASHTO, the bridge rating report should be dated and stamped by the engineer in charge of the rating. A summary should be included that clearly identifies the rating method, live loads used, controlling members and load type (shear, flexure, compression, tension), NBI data to be entered for Items 64, 66 and 70, and load posting recommendations.

Load rating should be conducted both on superstructure and other portions of the structure that are vulnerable to overloading, such as substructure cantilever and long span caps, thin or deteriorated decks, and slender columns. Of particular concern are older elements designed to AASHTO shear requirements of the 1950's and early 1960's. Load rating should be done for state legal loads or the AASHTO legal live loads (Type 3, 3-S2 and 3-3), and continuous or annual permit loads. The rating program should include certain inspection triggers that would flag a bridge for re-evaluation (not necessarily a new load rating calculation) of the bridge rating. Those triggers could include changes in element conditions, damage to an element or elements, or changes in the loading condition (such as increased dead load due to overlay), or a significant time since the last rating analysis conducted. The rating program should also evaluate the need for increased bridge inspection frequency as a result of a low load rating analysis.

The load rating process should be included in the overall bridge inspection Quality Control/Quality Assurance (QC/QA) program. The QC/QA program should spell out the minimum qualifications of the Load Rating Engineer, the individual in charge of the load rating program, and the individual in charge of the overall inspection program. It should include an independent verification process to insure the accuracy of both the load rating calculations and the data provided in the NBIS. It should also include a minimum time line of bridge data flow, defining the time it should take from the inspection event, to load rating and/or posting analysis, to the accurate update of the NBI database. The Division Bridge Engineer should review the QC/QA process during the National Bridge

Inspection Standards annual compliance review to insure that these measures are in place and being followed. The Division Bridge Engineer should also independently review applicable data from the NBI or the State's bridge database to determine how well load rating policies and procedures are being implemented. Several reports to assist the Division Bridge Engineer in these efforts are provided on the FHWA Staffnet website for the NBI, which is accessed through UPACS.

Bridge load rating and posting should be considered an important element in the Division Office's risk assessment process. In order to help consider the risks associated with bridge load rating and posting based on likelihood and impact criteria, a menu of risk statements, suggested likelihood and impact scales, and potential risk response strategies has been developed and is included in the Risk Assessment package. Although there may be many different ways to assess risk, the intent of this information is to provide some ideas on how to approach this process.

Scour Vulnerability. The FHWA National Bridge Scour Evaluation Program was initiated in 1988. Since then, the Office of Bridge Technology has been disseminating guidance to States on the conduct of scour evaluations for bridges over waterways. The States conduct scour evaluations and report their progress to the Federal Highway Administration (FHWA) on a biannual or annual basis, dependent upon the percentage of scour analysis complete.

Each bridge over a waterway should be evaluated for its vulnerability to scour. The NBIS require a plan of action to be developed and implemented for each scour critical bridge to address the deficiencies that made the bridge foundation unstable for the observed or calculated scour condition. Division Bridge Engineers are responsible for working with the States that have not completed scour analysis of at least 90% of their bridges (except those with unknown foundations) and ensure that the States report the status of completion every six months to the FHWA. States with more than 90 % done, but less than 100% complete, should report to HIBT-20 on a yearly basis. (See King Gee's July 16, 2003 Memorandum , "Compliance with the National Bridge Inspection Standards -- Scour Evaluations".)

HEC 18 indicates that Interstate bridges must be evaluated and not be classified as unknown. Henry Rentz's February 26, 1998 Memorandum, "Compliance with The NBIS; Scour Screening and Scour Evaluation of Bridges over Waterways" further directed FHWA Division Bridge Engineers to work with states to conduct investigations of all bridges with unknown foundations to determine their critical status. Cross channel profiles should be taken as part of the routine inspection at a frequency dependent on the nature of the waterway. See example field practice.

Bridge Records. A comprehensive file should be maintained for each bridge. It should include, but not be limited to, inspection reports, current SI&A sheet, load ratings, scour vulnerability data, drawings, cross-channel profiles, NDE results, timber boring results, special inspection reports, photos, drawings, correspondence (such as damage reports, funding documentation, historical information, and agreements), and maintenance

history. Records should be kept for the life of the bridge, if possible, or in accordance with state records retention requirements.

Follow-up of Critical Inspection Findings. The NBIS require each state to have a process for identifying and resolving critical deficiencies identified during inspections. The process should be reviewed and accepted by the Division Office. The process must involve periodic notification to the FHWA of actions taken to resolve or monitor critical findings. See example field practice.

Quality Control/Quality Assurance Plan. Each state is required to have QC/QA procedures to verify inspection findings and records and maintain a high degree of accuracy and consistency. Some of the areas that should be addressed include documentation of roles and qualifications, periodic field review of inspection teams, periodic bridge inspection refresher training, and independent review of inspection reports and computations. The procedures should be reviewed and accepted by the Division Office. Example procedures are included in the Field Practices section. In addition, FHWA has created a recommended framework for the preparation of a QC/QA bridge inspection program. The framework is available at http://www.fhwa.dot.gov/bridge/nbis/nbisframework.cfm. Other State QC/QA plans can also be found at the website.

Inspection Procedures. The Standards require inspections to be conducted in accordance with the AASHTO Manual for Condition Evaluation of Bridges. The Standards also require training to be conducted based on the Bridge Inspectors Reference Manual (BIRM). These resources should be available in each Division Office and should be used as a guide to assess inspection procedures.

Joint Reviews

Washington Office and Resource Center specialists are available to assist or accompany Division Bridge Engineers in the annual review or to comment on the review findings. Both offices are here to assist Division Bridge Engineers in monitoring NBIS compliance and helping to improve the State's inspection programs. The Office of Bridge Technology (HIBT) has overall responsibility for the NBIS and related regulations. The HIBT inspection program specialist may schedule periodic reviews in rotation around the Country, or may respond to requests from the field to accompany a review and provide emphasis, if needed, to enforce the Standards. The Resource Center is also available to coordinate peer exchanges where other state bridge inspection personnel are involved in the program reviews.

Compliance Mandates and Possible Actions Due To Non-Compliance

In a memorandum dated May 14, 1985, then Executive Director Richard Morgan cited the provision for withholding funds for inadequate maintenance in 23 USC 116 as our authority to enforce safety-related provisions of the NBIS. His memo mentioned particularly, Inspection Frequency and Load Posting, as standards that can be mandated by the FHWA as a condition of states receiving Federal funds. A state or local agency must be given 90 days to achieve

compliance or submit an acceptable aggressive short-term plan to achieve compliance. This action should be directed toward the agency or sub-unit that owns and has responsible charge for specific bridges affected by the non-compliance. It could be a single county or city, a state district or region, or an entire state, depending on the extent of the non-compliance. The mechanism normally used to withhold funds is a complete cessation of further Federal-aid authorizations. Previously authorized and on-going projects should not be affected.

FHWA is responsible for oversight of the other standards, also. Each state's program must be reviewed annually and the results reported to the Office of Bridge Technology as covered in Annual Review and Reporting Guidelines section. FHWA is not only responsible to Congress for this oversight, but is held accountable by outside groups and organizations interested in highway safety issues. The Office of the Inspector General (OIG) and the Center for Auto Safety pay close attention to the data in the inventory and FHWA's oversight of the inspection program. These groups consider FHWA responsible to ensure bridge safety and reliability.

National Bridge Inventory (NBI)

Background

Each year the Office of Bridge Technology requests that each State and Federal agency submit, by April 1 of that year, a copy of their most current data on highway bridges carrying public roads. The NBI data items must be submitted in compliance with the 1995 NBI Recording and Coding Guide specifications, and in the 432-character record format. Electronic data submissions are encouraged and can be done by submitting the file through the web based NBI system, e-mail, or FTP. All NBI information submitted should be error checked prior to submittal. An on-line error checking routine is included in the web based NBI system. Registered users can submit the submittal file for error checking prior to submittal and a report is mailed back to the user shortly. The States' inventory submissions should not include bridges owned by Federal Agencies as mentioned in HIBT's January 4, 1995 memorandum.

The Office of Bridge Technology has made the NBI system available in a web-based format that is available through the FHWA User Profile and Access Control System (UPACS) to FHWA, State DOT's and other Federal Agencies. UPACS provides access control for FHWA's applications through system-generated user IDs and user-supplied passwords, in combination with individual access profiles created for users by system owners.
It allows the following processes:

-On line data and unit cost submittal
-Data downloads with the options of adding a delimiter and filtering capabilities
-SI&A reports that do not require the exact positioning of the structure number and filtering capabilities
-Direct printing to your desktop
-Windows based report-generating tools
-On line file error checking
-User friendly through the use of Windows and Internet Explorer.

More information about access to the system or its functions is available from HIBT (Ms. Ann Shemaka at 202-366-1575 or e-mail at ann.shemaka@fhwa.dot.gov).

Each year HIBT prepares data tables from the NBI to establish strategic performance measures for bridges. The data is posted on the HIBT web page (http://www.fhwa.dot.gov/bridge/mobility.htm) and can be downloaded and manipulated to prepare graphs and other formats for presentation.

Coding Guide

The 1995 Recording and Coding Guide for the Structure Inventory and Appraisal of the Nations Bridges (Coding Guide) contains the format and coding instructions for the SI&A sheet. A copy of the guide is available at http://www.fhwa.dot.gov/bridge/bripub.htm. The condition code language in the Coding Guide should be used to evaluate the coding of condition fields. These are used to determine bridge status (Structurally Deficient or Functionally Obsolete) and to calculate the Sufficiency Rating. Supplemental condition coding language is used by some states. State-specific coding guides are to clarify, but must not modify, Federal items.

Border Bridges

Bridges located on state borders that have shared maintenance responsibility should be reported in the NBI on both States' inventories. The other State's structure number should be reported in the appropriate NBI field, along with the percentage share in maintenance costs. The State that conducts the inspection should provide current data to the other State in order to keep both States' condition data and inventory data current.

STRAHNET Routes

The Strategic Highway Network (STRAHNET) is a system of Interstate and primary highways and connectors that provide access to major US military installations and strategic ports. STRAHNET is determined by the Surface Deployment and Distribution Command (SDDC - previously the Military Traffic Management Command, MTMC) in coordination with FHWA. FHWA provides data to the SDDC from the NBI regarding clearances, sufficiency ratings, condition, and load-carrying capabilities on these routes. STRAHNET maps are available at http://www.fhwa.dot.gov/bridge/nbilink.htm. The link leads to a password protected site, which is controlled by US Army and accessible by FHWA and other agencies requiring access. The maps are also available at FHWA HQ, HIPA-20.

A Single Urban 16-foot clearance routing is currently being updated and coordinated with the STRAHNET. The designation of those routes is still in progress. Accurate NBI data regarding the STRAHNET is important to the SDDC.

Bridge Management Systems (BMS)

Background

Management systems are defined in 23 USC 303 to be the following systems:

(1) Highway pavement of Federal-aid highways
(2) Bridges on and off Federal-aid highways
(3) Highway safety
(4) Traffic congestion
(5) Public transportation facilities and equipment
(6) Intermodal transportation facilities and systems.

A State may elect, at any time, to implement, in whole or in part, one or more of the management systems. If the state does elect to have a BMS, the regulations require the State to cooperate with metropolitan planning organizations for urbanized areas of the State and affected agencies receiving Federal assistance in the development of the management system. The State also must then consider the results of the management systems in making project selection decisions. Bridge Management Systems should be capable of demonstrating the cost effectiveness of preservation policies as a basis for approval of Federal-aid funding for preventive maintenance projects.

Subject to project approval by the Secretary, a State may obligate funds apportioned after September 30, 1991, under subsections (b)(1), (b)(2), and (b)(3) of Section 104, Section 144, and Section 505(a)(3) of Title 23 (NHS, Congestion Mitigation and Air Quality Improvement Program, STP, HBP and SPR) for developing and establishing management systems required by this section and funds apportioned under Section 144 of Title 23 for developing and establishing the bridge management system required by this section. Reference 23 CFR 500A at http://www.gpoaccess.gov/cfr/index.html.

PONTIS training is available through the National Highway Institute (NHI). In addition, a CD containing interactive training is available from the FHWA Resource Center Structures Office or the headquarters Office of Asset Management. The CD provides a self-help guide, "Referentia for PONTIS," which will guide the user step-by-step through most needed operations. Resource Center specialists are also available to help implement the systems working directly with the Division office and the State Highway Agency.

Element Level Condition State Guide

FHWA recommends that the AASHTO Guide for Commonly Recognized (Core) Structural Elements be used for element level inspections. Most states have added some elements with their own condition state language. In addition, some states have made slight revisions to the AASHTO condition state language. Since FHWA does not use the element level condition state codes directly, states have the prerogative to make changes that best meet their needs. However, if the State is using the PONTIS Translator Program to convert element-level data to NBI data for submittal to FHWA, the Division Office should make a determination that the condition state language being used is appropriate for use in the conversion Program.

Example Field Practices

Annual Review Rotation Plan

Below is an example of the multi-year program for coverage statewide including the State, local agencies, consultant programs, specialty inspections, and maintenance crews.

1990	Region 5	District 12 Bridge Crew, Movable Span Inspection Program, Morrow County, Umatilla County
1991	Region 3	District 6 Bridge Crew, Douglas County, Josephine County
1992	Region 2	Dist. 4 Bridge Crew (Roy Clark), Lincoln Co., Yamhill Co., Ch2M Hill
1993	Region 4	Dist. 11 Bridge Crew, Deschutes Co., Klamath Co., Anderson Cons. Engrs.
1994	Region 1	District 2A Bridge Crew, District 2B Bridge Crew, Columbia County, City of Portland, Burgess and Niple Consulting Engineers
1995	Region 5	District 14 Bridge Crew, Baker County, Malheur County, Harding Lawson Associates, Infrastructure, Inc., Alpha Engineering Group
1996	Region 3	Drawbridge Crew, Coos County, Curry County
1997	Region 2	District 4 Bridge Crew, Clatsop County, Marion County, OBEC
1998	Region 4	District 9 Bridge Crew, Crook County, Wasco County
1999	Region 1 C	East Portland (District 2B) Bridge Crew, Multnomah County, Clackamas
2000	Region 5	District 13 Bridge Crew, Union County, Wallowa County
2001	Region 3, 4	Dist. 7, Jackson Co., Jefferson Co, Medford
2002	Region 2	Dist. 1, Polk Co., Tillamook Co, Salem, Albany, Corvallis
2003	Region 1, 5	Dist. 12, Grant Co, Harney Co.
2004	Region 3, 4	Dist. 8, Wheeler, Gilliam, Sherman
2005	*Region 2*	*Dist 5, Linn Co, Benton Co, City of Eugene*
2006	*Region 1,5*	*Dist 2C, Hood River Co, Gresham, Beaverton*

Agencies and areas not yet included in Annual Review and needed to schedule:

- Bridge Crews never visited: District 3, 5, 8
- Counties never visited: Linn, Benton, Lake, Wheeler, Sherman, Gilliam, Hood River
- Cities with 10 or more bridges never visited: Eugene, Gresham, Beaverton, Bend, Seaside, Astoria

NOTE: Future planned reviews are in italics.

Follow-up of Critical Inspection Findings

Below is an example of a critical follow-up program.

A critical deficiency is identified when one or more of NBI Items 58 (deck), 59 (superstructure), 60 (substructure), or 61 (channel / channel protection) is rated 3 or less. If the inspector discovers structural deficiencies that are determined as substantially endangering the load carrying capacity of the bridge, the inspector will perform the following:

- immediately contact the appropriate agency officials to inform them of the situation, followed by
- fully written and thorough narrative documentation, supplemented with pertinent photographs.

Critical inspection findings are monitored by the State Inspection Organization. State districts, local agencies, or other owners are notified and asked to respond with how they have mitigated or corrected the deficiency within 90 days. A summary report is provided to the FHWA Division Office every 3 months. Agencies or bridge owners who do not respond are issued letters of non-compliance.

Cross Channel Profile Guideline

Below is an example of a procedure for cross channel profiles.

A Cross-Channel Profile will be performed on all structures located over a waterway. If the structure is scour critical, the Profile will be performed during the next routine inspection. If the structure is not scour critical, the Profile will be performed as the work load permits.

Check and Update the Cross-Channel Profile at least every 10 years if the following conditions exist:

- The NBI Item 113 (Scour Code) is coded as not being scour critical (coding = 4 or greater), or
- The NBI Rating 61 (Channel and Channel Protection) has been rated > 7 - minor debris is present, or
- The scour smart flag has not been used.

Check and Update the Cross-Channel Profile at least every 4 years if the following conditions exist:

- The NBI Item 113 (Scour Code) is coded as being scour critical (coding = 3 or less or a U), or
- The NBI Rating 61 (Channel and Channel Protection) has been rated = 6 - protection has minor damage, or
- The scour smart flag has been used and is in condition state 1.

Check and Update the Cross-Channel Profile at least every 2 years if the following conditions exist:

- The scour smart flag has been used and is in condition state 2 or 3.
- The NBI Rating 61 (Channel and Channel Protection) has been rated 5 or less - protection has major damage.

Reduced Frequency Inspections

Below is an example of a reduced frequency inspection guideline.

Certain bridges, because of features such as age, traffic characteristics, state of maintenance and known deficiencies, require a bridge inspection at some identifiable frequency less than 24 months.

Inspect the structure at least every 12 months if any of the following conditions exist:

- Primary Structural Element has an NBI Condition Rating < 3,
- Primary Structural Element is in a condition state that represents the most advanced deterioration and is affecting the load capacity of the structure.
- The general condition of the bridge is considered to be poor.
- Temporary repairs on a primary structural element are considered to be in a poor condition.
- The bridge has an operating load rating factor < 1.0 for any of the three permit truck configurations.

Inspect the structure more frequent than every 12 months if any of the following conditions exist:

- The bridge has a load capacity issue.
- Local failures are possible.
- Concrete shear cracks are continuing to grow.
- A serious traffic hazard is noted.

Quality Control/ Quality Assurance Plan

Below are examples of QC/QA Plans from Oregon and Oklahoma.

ODOT Bridge Inspection Program QA / QC Reviews (1/1/2007)

Bridge Inspection has played and will continue to play an ever-increasing important role in assuring that a safe infrastructure is available for the publics use. As our bridges continue to age and deteriorate, an accurate and thorough condition assessment of each structure is critical in maintaining a safe, functional and reliable highway system.

The six primary responsibilities of the bridge inspection program are:

1.) Maintain Public Safety and Confidence (Structural Concerns)
2.) Protect Public Investment (Maintenance Concerns)
3.) Maintain a desired level of service (Functionality Concerns)
4.) Provide Bridge Inspection Program Support
5.) Provide Accurate Bridge Records
6.) Fulfill Legal Responsibilities (In Compliance with CFR)

Fulfilling Our Legal Responsibilities

23 CFR Part 650 , subpart C – National Bridge Inspection Standards, section 650.313(g) requires each state department of transportation to "assure systematic quality control (QC) and quality assurance (QA) procedures are used to maintain a high degree of accuracy and consistency in the inspection program. The QA / QC program is required to include periodic field review of inspection teams, periodic bridge refresher training for program managers and team leaders, and independent review of inspection reports and computations. Each FHWA Division Office was directed to work closely with each State to develop a program that would follow-up inspection findings and provide a quality control of inspections performed. The objectives of the program were to be as follows:

- Generate a greater consistency of the data,
- Identification of unclear or misleading guidance,
- Better communication between the inspectors and management, and
- Better understanding and prioritization of urgent inspection findings.

As stated, the Code of Federal Regulations considers QA/QC Reviews to be an integral part of the overall inspection program. So that the State of Oregon remained in full compliance with these federal mandates, ODOT implemented the following:

- A goal was set for the program to perform independent field review on 5% of the completed inspections performed by each inspection team per year. However, this is just a goal, in that the agency will zero in on the larger major structures due to their higher risk and potential of unreported deficiencies.
- Established and implemented a continuing education requirement that must be fulfilled in order to be recertified as a bridge inspection team leader in the State of Oregon. For more specifics refer to the ODOT Bridge Inspector Certification document.

- Require all bridge inspection work performed in the State of Oregon to be performed by bridge inspectors that are certified by ODOT. This certification process not only requires the applicant to submit a resume', as well as, successfully complete a field proficiency test. For more specifics, the proficiency testing provisions are located in the ODOT Bridge Inspector Certification document.

Thoroughness and Accuracy of the Bridge Inspection Report

As with all business practices, we should be cognizant of and continually scrutinize our business practices to assure that each is as efficient and as effective as possible. The word "Efficiency" as used herein refers to "doing things right the first time" (assuring that sufficient time and resources are allocated to each structure to ensure that the inspection was performed as thoroughly as necessary). The word "Effectiveness" as used herein refers to "doing the right things (assuring that each structure is inspected by the due date). Due to the large number of structures that are assigned to each inspector, it is imperative that each region inspector, budget their time and resources wisely. A rushed bridge inspection will quite often result in missed bridge inspection elements and inaccurate condition assessment rating information. A completely independent QA field review of the last bridge inspection will clearly point out differences and provide a measure of it's timeliness, thoroughness and accuracy. In order to physically measure whether or not a given bridge inspection was acceptable, ODOT established 6 areas of importance with associated error thresholds:

1.) Accuracy of the NBI data used to calculate the Sufficiency Rating
2.) The NBI Condition Rating
3.) The list of Bridge Element and their quantities
4.) The Condition State Percentages assigned to each element
5.) The amount and clarity of the remarks describing each reportable deficiency
6.) The bridge maintenance recommendations for the bridge

Overall we expect no more than 4 errors on average per bridge inspection. For more specific information refer to the ODOT Bridge Inspector Certification document.

Accuracy of the data in the bridge inspection database

The entire bridge program revolves around the bridge condition assessment information contained in the bridge inspection database. Large multi-million dollar decisions are made annually based solely on that data. Therefore, it is absolutely paramount that the data is as accurate and correct as possible. There is a lot of political embarrassment and loss of program credibility when it is shown that a program decision was made on faulty information. By performing a QA field review on the structures in the bridge program that are scheduled to receive some action, we are validating the information associated with that structure. Bottom-line, in addition to keeping the State of Oregon in compliance with the Code of Federal Regulations, initiation of such a program just makes good business sense.

STIP Projects

To assure that the right projects are getting into the State Transportation Improvement Program, every project needs a champion. By reviewing the structures, in the worst condition, in each region, the QA Review Team is able to discuss, on site, the appropriate strategy and can help develop the appropriate rehabilitation or replacement plan for every structure in question. The QA Review Team is basically functioning as a "sounding board", if you will.

Major Bridge Maintenance Projects

We consider these projects to be "stopgap" measures until a full rehabilitation or replacement project can be programmed by the STIP. These projects are also generally beyond the resources of the district bridge maintenance crews, in terms of time, money, equipment, or expertise involved. By reviewing the structures in the worst condition, the Review Team is able to discuss, on site, the appropriate repair / rehabilitation / replacement strategy and/or preliminary design concepts.

Load Rating / Load Posting Issues

Implementing Load Restrictions on structures are extremely political. However, on the other hand, one of the major responsibilities we are charged with is to assure that a safe facility is available to the public. Therefore, it is absolutely imperative that all deficiencies that directly influence the load rating calculations be located during the ODOT inspection effort and addressed immediately. By reviewing the bridges in the worst conditions, the QA review team provides a second look and/or a second opinion, regarding the severity of the deficiencies and their potential implications. It's like a person being confronted with a serious medical condition; they are encouraged to seek a second opinion from either another doctor or specialist in a given field of medical science.

Bridge Inspection Training

One of our major responsibilities is to provide a complete, thorough and accurate bridge inventory and condition assessment information. The QA Review Team is made up of bridge inspectors from the other regions and any newly hired bridge inspection staff, in order to assure statewide consistency between the geographically dispersed bridge inspectors and to provide on-the-job training for the new inspection staff. All questions are openly discussed, on site, to assure that everyone is in full agreement and that we are achieving statewide consistency. Also, ODOT Bridge Design Staff are encouraged to participate in the QA reviews, so they can obtain a better understanding of the bridge elements, the language contained in the condition state descriptions, and just exactly what the assigned condition assessment ratings are indicating about the bridge elements.

To assure that all are on the same page, we need to define just exactly what the QA and a QC Reviews are and how they're different:

- A Quality Control (QC) Review uses procedures that are intended to maintain the quality of the data that is contained in the bridge inspection and load rating databases, at or above a specified level. Examples: Programming edit checks in the data entry computer software; Using pick lists to limit data entries; the bridge inventory coordinator performs a routine check of each bridge inspection as it comes in from the inspector in the field; Using the FHWA Edit / Update application prior to the bi-annual FHWA submittal; bridge headquarters hosting quarterly RBI Meetings and annual consultant orientation meetings; keeping the Commentary section of the Element Coding Guide current and up-to-date; and disseminating the QA review FAQ sheets after every QA review.

- A Quality Assurance (QA) Review uses a sampling, or other measures to assure the adequacy of quality control procedures in order to verify or measure the quality level of the entire bridge inspection and load rating program. Examples: shown below.

QA Review Process

A. **Office Review**

1.) Assure all members of the bridge inspection team are certified to perform this type of work in the State of Oregon.

2.) Assure that all inspections are performed by the prescribed due date.

3.) Assure that there is an appropriate level of follow-up on identified critical deficiencies.

B. **Field Review**

1.) Selection of the bridge sampling.

Bridges with urgent or critical maintenance recommendations
Bridges with load rating / load posting issues
Bridges that are in need of bridge rehab / replacement actions
New structures recently opened to traffic – check initial inspection
Strive for a sampling size of at least 5% of the assigned routine inspections performed

2.) Selection of the QA Review Team

A QA Review will be performed in each region annually (host inspector)
Bridge Inspection staff from other regions will rotate onto the team as well as any new bridge inspection staff. Bridge Design personnel are encouraged to participate in the QA Review process (guest inspectors)

3.) Independent inspection of the bridge

The QA Review Team will generate a totally independent inspection report.

4.) Comparing bridge inspection findings

The bridge inspection report generated by the QA Review Team will then be compared with the last bridge inspection report of record.

5.) Differences between the two inspections are then openly discussed so that we can determine why any differences might exist and give each inspector an opportunity to defend their data.

6.) Initiate interviews with the appropriate district bridge maintenance personnel to determine the effectiveness of the bridge inspection effort.

OREGON DEPARTMENT OF TRANSPORTATION

NBIS Safety Inspection of In-service Bridges
Bridge Inspector Certification Program
(Revised 1/1/2007)

The National Bridge Inspection Standards (NBIS) and the Oregon Department of Transportation policy require that all bridge inspections performed for the purpose of maintaining compliance with NBIS requirements be performed by a certified bridge inspector. Minimum standards for certification of bridge inspectors have been prescribed by the Federal Highway Administration in the Code of Federal Regulations (23CFR650 Part C), which has been adopted by the Oregon Department of Transportation. In addition to these minimum standards ODOT has supplemented additional business practices in an effort to insure the inspection information generated in the State of Oregon is complete, thorough, and provides an accurate condition assessment of the structures being inspected so that the bridge managers have the best information possible in which to make program decisions with.

The intent of the Bridge Inspector Certification program is to insure that all persons performing NBIS bridge inspections are:

1.) Thoroughly proficient in all aspects of the bridge inspection process,
2.) Maintain a familiarity with current recording and reporting procedures,
3.) Understand program requirements as related to routine inspection frequency, posting requirements, elements of a fracture critical inspection, underwater inspections, load rating requirements, scour evaluation requirements and other required periodic inspections.

The Bridge Operations Engineer is responsible for certification of bridge inspectors performing NBIS inspections in the State of Oregon. The final determination of any individual's qualifications as a Certified Bridge Inspector in Oregon is made based upon the individual's demonstrated performance and ability and is subject to review at any time.

Each Certified Bridge Inspector and Trainee will be assigned an identification number. This identification number will be coded on the Oregon Bridge Inventory as item #120 for each bridge inspected. Where a bridge inspector trainee is involved in the inspection, the use of the trainee's certification number on the inspection report will allow tracking of the experience of the trainee toward that required for certification as a CBI-Team Leader.

Bridge inspections performed by a single individual require that the inspector be certified as a Bridge Inspector/Team Leader in accordance with the prescribed standards contained within this document. Inspections that are accomplished by a team of two or more, requires that the leader of the team be as a bridge inspection team leader. The team leader is the individual in charge of the work. The team leader must:

* Be on-site during the inspection,

* Assure the accuracy and adequacy of the inspection,
* Assure the completeness and accuracy of the reports, and
* Sign the completed inspection report which becomes the inspection of record.

MINIMUM CERTIFIED BRIDGE INSPECTION TEAM LEADER REQUIREMENTS

In order for a bridge inspector to be certified or maintain their certification as a Bridge Inspection Team Leader in the State of Oregon, they must meet the following minimum requirements:

- Meet Education / Registration / Experience Requirements, and
- Fulfill Bridge Inspection Training Requirements, and
- Satisfactorily complete the Proficiency Examination Requirements, and
- Satisfactorily complete the Recertification Requirements, and
- Provide the Certification Record Requirements.

Education / Registration / Experience Requirements

(1) Be a Registered Professional Civil / Structural Engineer, in the State of Oregon, OR

(2) Be qualified for registration as a professional engineer (Civil or Structural) under the laws of the State of Oregon.

a.) EIT plus 4 years of responsible engineering experience, OR

(3) Have a minimum of 5 years experience in safety inspection of in-service bridges in a responsible capacity, OR

(4) Current certification as a level III or IV Bridge Safety Inspector under the National Society of Professional Engineers' Program for National Certification in Engineering Technologies (NICET).

Allowance for Past Experience

Qualifying bridge inspection experience toward the required 5 years is assumed to be in safety inspection of in-service bridges in accordance with the NBIS and under the supervision of an NBIS Certified Bridge Inspector (Team Leader). One year worth of experience has been determined to be the active participation in at least 25 bridge inspections in a given year.

Allowances may be made for experience other than NBIS inspections under a Certified Team Leader. This may include, but is not necessarily limited to:

* Bridge design,
* Bridge construction inspection,
* Bridge maintenance, or
* Other structural related experience.

Normal practice is to allow a maximum of the equivalent of one year credit for experience not directly related to maintenance inspection of bridges. The other 4 years experience must be performing inspections in the field and reporting the condition of in-service bridges. The Bridge Operations Engineer will determine, on an individual basis, the appropriate level of credit to be allowed upon review of the individual's application, resume', and proficiency inspections performed.

Training Requirements

Satisfactorily completion of a course of instruction or training in reporting and recording procedures for safety inspection of in-service bridges in accordance with current NBIS requirements, such as the 2 week comprehensive NHI Inspection of In-Service Bridges Training Course that is based on the Bridge Inspection Reference Manual (BIRM) and include the Element Level Inspection option or an equivalent course that has been approved by FHWA.

In order for each Certified Bridge Inspection Team Leader to maintain their certification in the State of Oregon, in addition to the comprehensive bridge inspection training requirements, they must satisfactorily complete and document a certain number of Professional Development Hours (PDH) that are associated with the condition assessment of in-service bridges. In accordance with the NBIS (650.305 – Bridge Inspection Refresher Training Definition) the training must be the NHI Bridge Inspection Refresher Training Course or other State, Local, or Federally developed instruction aimed to improve quality of inspections, introduce new techniques, and maintain the consistency of the inspection program. In the State of Oregon, the Profession Development Hours must meet the following criteria:

1.) At least 30 hours over the 5 previous years.
2.) The training must be formal classroom instruction approved by FHWA, like:
   a. NHI Bridge Inspection Refresher (allow 20 hours).
3.) The following exceptions will be allowed due to known training content:
   a. Participation in ODOT's QA field review (10 hours max).
   b. ODOT's Bridge Inspection conference topics that meet criteria (item 4).
   c. ODOT's annual Bridge Inspection Orientation session (4 hours max).
4.) The training content:
   a. Aimed towards improving quality of inspections, or
   b. Introduction of new bridge inspection techniques, or
   c. Maintaining the consistency of the bridge inspection program.

It's up to each applicant to provide attendance documentation and narrative that supports how the training received meets the specified criteria.

Examination Requirements

Each Certified Bridge Inspection Team Leader must be able to exhibit an acceptable level of proficiency by performing a number of independent bridge inspections, over a two day period, and have no more than 4 coding differences per bridge inspection, on average.

Bridge Inspector Proficiency Testing

Since the bridge inspectors work very independently, ODOT desires to establish an acceptable level of comfort for all bridge inspection work, statewide. Generally the proficiency testing will be administered as follows:

1. The Candidate will team up with an ODOT staff person, who will accompany the candidate throughout the proficiency test. The ODOT staff person will not function as a resource to the candidate.
2. The Candidate will be given a map that shows the location of all bridges that are to be inspected and it's up to the candidate to locate and drive to each bridge site.
3. The Candidate will be given a blank QA Review Sheet and a copy of the SI&A sheet for each bridge on the list. The candidate will be instructed to not only fill out the QA Review Sheet, but to also review and update information shown on the SI&A sheet. Both sheets will be turned into ODOT at the end of each day.
4. The inspection results produced by the candidate will be compared to the results produced by an ODOT Bridge Inspection QA Review Team.
5. Each inspection will be graded in 6 specific areas
    a. NBI data used to calculate the Sufficiency Rating
        - Acceptable threshold is expected to be exact.
    b. NBI condition ratings
        - Acceptable threshold is $\pm$ one rating number
    c. List of Bridge Elements and their quantities
        - Acceptable threshold is expected to be exact
    d. Bridge Element Condition Assessment
        - Acceptable threshold is expected to be $\pm$ 1 condition state.
    e. Adequate Condition Assessment Remarks
    f. Adequate Maintenance Recommendations based on assessment
    g. Overall Bridge Inspection / Condition Assessment
        - Acceptable threshold is expected to be no more than 4 errors, per bridge inspection on average.
5. The candidate will be notified as to the average number of errors recorded and whether their proficiency testing was successful.
6. If the candidate was successful, the proficiency testing results should be listed on the candidates resume'. If the candidate was not successful, the candidate will be given another opportunity, after a 6 month wait period.

Quality Assurance Field Reviews of Completed Work

To assure the accuracy and thoroughness of the bridge data being collected, ODOT will be performing periodic QA Field Reviews on a sampling of bridges. If a Certified Bridge Inspector is found to have an average of more than 4 errors per bridge, the work performed by that individual will come under further scrutiny. The results of the QA Reviews will require the following progressive actions to be taken:

(1) Following this initial QA review, differences will be discussed with the inspector and the inspector will be given an opportunity to correct the data. Within 6 months, ODOT will perform a follow-up QA field review on work performed by that inspector following the initial QA review. The work will again be assessed for accuracy, thoroughness, and conformance with ODOT Bridge Inspection Guidelines. This will be called the 1st follow-up review.

(2) If the work performed by the inspector is still found to be unsatisfactory, within 6 months of the first QA review, ODOT will perform another follow-up QA field review on the work performed by the bridge inspector following the 1st follow-up QA field review. If the work performed by the inspector is still found to be unsatisfactory, the inspector will be required to successfully complete additional training that meets the acceptable training criteria and successfully complete an additional proficiency test. This will be referred to as the 2nd follow-up review.

(3) Within 6 months, ODOT will again perform another follow-up QA field review on the work performed by the bridge inspector following the 2nd field review. If the work performed by the inspector is still unsatisfactory, the individual will not be allowed to perform the Certified Bridge Inspection Team Leader duties in the State of Oregon. This will be referred to as the 3rd follow-up review.

***Certification Record Requirements (*Required Documentation)**

It is the responsibility of the applicant to provide documentation that fully supports all experience claimed for the satisfaction of the 5 year requirement, the bridge inspection proficiency testing, and the Continuing Education Requirements. The Bridge Operations Engineer will review the applicant's resume, documentation, and the results of the independent proficiency inspections, to determine the appropriate credit to be considered. This determination will:

* Take into account the number of bridges inspected each year,
* The complexity and type of bridges inspected,
* The level of responsibility and accountability assumed for the inspection,
* Demonstrated Accuracy and completeness of reports,
* Reports generated by the applicant, and
* Such other factors as are deemed appropriate by the Engineer.

Documentation submitted in support of qualifying experience should be certified by a Certified Bridge Inspector (Team Leader) who is able to verify the accuracy of the information and vouch for the qualification of the applicant.

BRIDGE INSPECTOR TRAINEE

There is no requirement that members of a bridge inspection team other than the team leader be certified as NBIS Bridge Inspector. The ODOT, Bridge Operations office, however, has adopted the policy of recognizing those un-certified members of the inspection team as Bridge Inspector Trainee (CBI-T) for the purpose of documenting their experience and training as qualifying toward full certification. Experience claimed toward certification is expected to be work in a responsible capacity in bridge construction and/or safety inspection of bridges and under the supervision of a qualified team leader. Upon the individual's application for certification the time spent as a trainee and the number of bridge inspections that the person actively participated in shall be verified and endorsed by the supervising team leader.

Registered Professional Engineers applying for certification, if otherwise meeting requirements, may be certified as trainees pending completion of the required 2 week comprehensive bridge inspection training and completion of a reporting and recording procedures session. Upon completion of this training and acceptance of the applicant's resume by the ODOT Bridge Operations Engineer, the certification will be change to CBI. Training in reporting and recording procedures may be accomplished by attending a class sponsored by ODOT Bridge Operations section or other recognized agency training bridge inspectors to FHWA standards. Training on a personal one-on-one basis by a certified team leader may also be acceptable. Verification of such training must be submitted to the ODOT Bridge Operations Engineer by the Certified Inspector providing the training and will be reviewed for adequacy. If approved, and all other requirements have been met, a CBI (Team Leader) certification may be issued.

RE-CERTIFICATION PROCESS

Since each Certification Card has an expiration date of 5 years from the date of issuance, all Certified Bridge Inspectors must be re-certified. All Certified Bridge Inspectors must successfully complete at least 30 hours of professional development training that meets the acceptable training criteria over the previous 5 year period.

If a Certified Bridge Inspector has been inactive for a prolonged period of time (longer 5 years), the Bridge Inspector certification will become non-current. Inactivity is that period of time when the amount of completed NBIS inspection work or the level of inspection involvement has decreased to a point where it is no longer practical to assume that the inspector's skills and proficiency are current enough to maintain the level of accuracy required by the NBIS or ODOT.

Determination of whether a bridge inspector certification is current will be made based on guidelines established by the Bridge Operations Engineer and will take into account factors such as:

* Number of bridges inspected on a routine basis,
* Complexity of bridges inspected,
* Types of inspections performed
  (routine, fracture critical, timber boring, movable span, etc.), and

* The level of accountability for inspections performed (Team member vs Team Leader).
* Independent bridge inspection proficiency testing.

When a certification becomes non-current, the inspector will no longer be considered a Team Leader, but will be reclassified as a Bridge Inspector Trainee (CBI-T). As a minimum, the requirement for re-certification will normally be:

* Completion of the 2 week comprehensive Bridge Inspector's Training Course, or
* Completion of an equivalent training course, approved by FHWA, or
* Completion of On-The-Job experience approved by the Bridge Operations Engineer, and
* Successfully complete the ODOT bridge inspection proficiency test.

The Bridge Operations Engineer may include in the re-certification procedure such additional requirements as may deem appropriate, considering the individual circumstances, to insure that when certified, the individual has the necessary knowledge and skills to perform bridge inspections.

Specific requirements for certification of persons performing underwater inspections are being formulated and will be made a part of this certification upon approval and adoption by the Engineer. However, in addition to the minimum qualifications as a certified underwater diver, the person must also meet the same bridge inspection qualifications as an above water inspector. Until such time as these guidelines are published, persons intending to perform underwater inspections under NBIS programs should contact the Bridge Operations Engineer and present a resume of their qualifications. The Engineer will determine the level of certification appropriate commensurate with the resume' presented.

For further information on certification requirements for bridge inspectors or to submit résumé's for certification contact:

Gary Bowling, Bridge Operations Engineer
Oregon Department of Transportation
355 Capitol St., NE, Rm 301
Salem, Oregon 97310
ph. (503) 986-3402
FAX (503) 986-3407

OREGON DEPARTMENT OF TRANSPORTATION
Bridge Inspector Resume'

Name: _____ Date: _____

Agency Represented: _____

Agency Address: _____

Education

List education related to engineering and/or bridge inspection.

College / University / Trade School: _____ Degree: _____
ODOT Bridge Inspector Training Classes Attended (Dates):
Comprehensive: _____ Date / Location: _____
Refresher: _____ Date / Location: _____
Continuing Ed: _____ Date / Location: _____
Continuing Ed: _____ Date / Location: _____
Continuing Ed: _____ Date / Location: _____
Continuing Ed: _____ Date / Location: _____
Continuing Ed: _____ Date / Location: _____
Continuing Ed: _____ Date / Location: _____

Experience

Years of experience as Bridge Inspector:
Trainee _____ Certified Bridge Inspector _____
Approximate number of bridges inspected each year: _____
Agency Represented: State _____ County _____ City _____
Consulting Engineer: _____
Other: _____

License, Registration, and Certifications

Professional Engineer _____ Certified Bridge Inspector (ODOT) _____
NICET Level III _____ NICET Level IV _____
Area of Expertise _____ Other _____
Proficiency Test Date: _____
Type of card issued: Certified Bridge Inspector: _____ Trainee: _____

Other Background Information

List any other relevant background information on the back of this form.

OKLAHOMA QUALITY CONTROL AND QUALITY ASSURANCE PLAN FOR STATE AND LOCAL JURISDICTION BRIDGE SAFETY INSPECTIONS

In order to insure that Oklahoma's bridges are being inspected and data is gathered in an accurate and consistent manner, it is necessary to implement quality control and quality assurance plans. For this purpose, quality control can be defined as the steps the inspecting agency and ODOT take to monitor that the inspections are performed correctly and the data collected is accurate. Quality assurance can be defined as the steps taken to insure that the work is being performed by qualified, quality inspectors and reviewers who are properly trained to perform the work.

QUALITY CONTROL

Internal Quality Control (By Inspecting Agency)

At least once every inspection cycle (24 months), the reviewing engineer *(the engineer who routinely reviews inspection reports)* for the inspecting agency (either Off- or On-System consulting firm) will randomly choose five (5) bridges to review in the field **for each team leader** (the reviewing engineer must be someone other than the team leader). The composition of these five bridges will be such that they represent a cross-section of bridge types inspected. It is strongly recommended that they include one of each of the following; a truss bridge, a timber girder bridge, a steel girder bridge, a concrete girder bridge (prestressed or regularly reinforced) and a bridge length concrete culvert. **One of these representative bridges will include a bridge that is rated three (3) tons (if available in the bridges inspected by the team leader).** This field review will consist of the reviewing engineer assessing the correctness and completeness of the inspection, including codings, elements and quantities, photos required by the contract as well as those needed to depict critical conditions, etc. This review should be done with the inspector so that any improper codings or procedures can be immediately corrected. The internal reviewer for the On-System ODOT team leaders shall be the team leader's supervisor (or supervisor's designee...in most cases the county bridge coordinator in each division).

The Bridge Division will develop a *Quality Control* plan for On-System ODOT inspectors. On- and Off-System consultant inspection firms shall develop their own *Quality Control* plan. As a minimum, the plan will include the following:

- Who the reviewing engineer will be? For smaller firms where the engineer is also the team leader, it may be necessary to trade out reviewing responsibilities with another small firm. The reviewing engineer will not be the same person as the team leader being reviewed.
- List the reviewing engineer's experience and qualifications. This person should have extensive experience in the bridge safety inspection area and should be very familiar with inspection procedures and requirements.
- How the bridges to be reviewed are chosen?
- When the review will take place, so that an ODOT and/or FHWA official can attend if they choose?
- Specific items the review will include.

Quality Control Report

Once the Quality Control Plan is approved by ODOT, the consultant or field division shall implement the plan. Following the field review, the consultant shall submit a report to the Bridge Division (with a copy to the appropriate field division) which contains the following:

- A copy of the inspection report of each bridge being reviewed, including any photographs, drawings, reports, etc., that are part of the inspection.
- The reviewer shall indicate on the inspection report copy any incorrect codings and corrections found during the field review.
- The reviewer shall summarize findings from the review, and provide a plan which will insure these mistakes will not take place in the future (i.e., in-house training, procedural changes, etc.).
- The Quality Control Report shall be stamped and signed by the reviewing engineer.

On-System ODOT team leaders shall be reviewed by their supervisor (or designee, *someone familiar with inspection procedures and codings*) in this same manner, with a written report and suggestions for correcting findings returned to the Bridge Division.

External Quality Control (By ODOT)

Each inspecting agency shall be reviewed by ODOT in the field at least once during a two-year cycle. This review will be conducted by the persons in the field division county bridge coordinators office who are trained and are very familiar with inspection procedures and codings. It will consist of reviewing inspections of at least five (5) bridges in the field. These bridges will represent the different types of bridges commonly found in the counties inspected by that agency. As a minimum, one of each of the following bridge types should be reviewed; a truss bridge, a timber girder bridge, a steel girder bridge, a concrete girder bridge (prestressed or regularly reinforced) and a culvert. One of these representative bridges will include a bridge that is rated three (3) tons (if available). A Quality Control Report of the findings of this review shall be forwarded to the inspecting agency with a copy to the *Bridge Division. In addition, the Bridge Division will randomly review four (4) inspecting agencies each year in the same manner. A copy of their findings will be forwarded to the inspecting agency and the appropriate field division.*

In addition to the field review, the inspecting agency's office procedures may be reviewed. This *may* include load rating procedures**,** filing procedures and bridge file content, consultants in-house quality control plan, procedures and results, consultant's procedures for notification and follow-up with bridge owners for load posting and closing of bridges as required by ODOT policies, etc.

QUALITY ASSURANCE

Continuing Training

As part of this quality control/quality assurance process, some form of continuing training will be required for all team leaders and the reviewing engineer. As a minimum, this training will consist of the following:

- One training session will be held each year. Each team leader and each reviewing engineer will be required to attend one of these training sessions at least once every two years.

Failure to do so will be grounds for disqualification of the team leader or firm as described below. *If necessary to avoid large numbers of scheduling conflicts, additional sessions may be scheduled.*

- Two test bridges will be identified, one in the western half and one in the eastern half of the state. Each attendee must inspect one of these bridges within one month before the training session, on his/her own.
- At the training session, each bridge will be reviewed and proper ratings discussed. Questions, answers and discussion will follow. Any questions and comments that attendees have should be brought to this session for discussion in an open forum, after the inspections are reviewed. It is recommended that these questions and comments be sent to the Bridge Division prior to the session so that adequate time is available to fully develop answers. This training session should be limited to a half day. More time can be used if necessary. These training sessions will be held in the ODOT central office.

Disqualification

When the inspection review indicates that a team leader and/or an inspecting agency continue to make the same or similar mistakes, omissions, etc., ODOT shall implement disqualification procedures as follows:

- Upon receiving the Quality Control Report, the inspecting agency shall address the findings of the report and take steps to correct the problems to insure they will not be repeated in the future.
- The team leader and inspecting agency will be placed on probation and reviewed again in six (6) months. This review will be conducted by a team consisting of the original reviewer, a field division representative, and a member of the FHWA, if they desire.
- If the same or similar mistakes are found during this second review, the inspecting agency and/or the team leader shall be given notification that they will be disqualified if these problems are not corrected and avoided in the future, and placed on a secondary probation period of three (3) months.
- The team leader and inspecting agency shall be reviewed again in three (3) months by the reviewing team. If the same or similar problems are found the inspecting agency and/or the team leader will be notified that they are hereby disqualified for a minimum of two years and will no longer be allowed to perform bridge safety inspections in the State until they have been re-qualified.
- A disqualified team leader and\or inspecting agency may be re-qualified after the two-year period, if they indicate in a written report how they have corrected their deficiencies. Upon approval by ODOT, the team leader or inspecting agency shall be placed back on the qualified list.
- A disqualified team leader may also be re-qualified when he/she has retaken the training course "Safety Inspection of In-Service Bridges" and achieved a score of 70 percent or better on the examination given at the end of the course. *Attendance in the entire course is mandatory for re-qualification (i.e., no "testing out").*
- Henceforth, prospective team leaders taking the training course "Safety Inspection of In-Service Bridges" must *attend the entire course and* achieve a score of 70 percent or better on the examination given at the end of the course to be considered qualified.

Reasons For Disqualification

Typical reasons for disqualification can be, but are not limited to, the following:

- Lack of proper follow-up with the bridge owner for critical findings, such as broken load carrying members, critical scour at foundations, vehicular impacts which could adversely affect load carrying members, bridges requiring closure, etc.
- Lack of follow-up with the bridge owner for correcting load posting deficiencies.
- Failure to correct findings from Quality Control or Quality Assurance reviews.
- Recurring miscoded critical inventory items such as NBI Items 36, 41, 43, 51, 53, 54, 92, 93, and 113.
- Recurring miscoded critical elemental items such as structural elements and smart flags. This can include improper or omitted element numbers, quantities and/or condition states.
- Failure to attend required continuing education sessions as outlined in this policy.
- Failure to submit completed inspection data and/or corrections in a timely manner.

The Oklahoma Department of Transportation has the final authority to carry out this disqualification process. The inspecting agency must agree to these procedures as part of any bridge safety inspection agreement before they will be allowed to perform any bridge safety inspections.

Training Plan for Local Agency Bridge Owners. Below is an example Training Outline for Local Agency Bridge Owners to familiarize them with State Bridge Inspection Practices.

Understanding and Using Bridge Inspection Reports

Assign To	Prep Time	Class time (min)	Course Outline
FHWA			**1 Introduction**
		10	**Why do we perform bridge inspections**
			Federal Requirements - Code of Federal Regulations
			National Bridge Inspection Standards (NBIS)
			Penalties for non-compliance
			Makes Good Sense
		5	**History of Inspection Program**
			Funding
			Contracting
			State Oversight
			Owner's Participation
		5	**HBRR Funding**
			Qualify for a HBRR Funded project: SR < 80 - Rehab; SR < 50 - Replacement
			Project Submittal
			Project Selection
		5	**Program Objectives:**
			1 - Ensure that a safe facility is available to the public (Address Structural Safety Concerns)
			2 - Protect our original capital investment (Maintenance of our Infrastructure)
			3 - Maintain a desired level of service (address functional issues)
		5	**Questions**
			2 Who's Responsible for doing what
Br Ops		30	**State Responsibilities - CFR 23, Part 650**
			1- A bridge inspection organization that is capable of performing the required inspections
			2 - Maintain an inventory of all bridges located on all public roads.
			3 - Perform regular inspections on each bridge at least every 2 years
			The inspections must be performed by a certified bridge inspection team leader

Assign To	Prep Time	Class time (min)	Course Outline
			4 - Each bridge must be inspected as thoroughly as necessary to clearly establish its condition and to insure its continued safe operation.
			5 - Determine the load carrying capacity of each bridge.
			6 - Post load restrictions on bridges when warranted
			7 - Evaluate the scour vulnerability of all bridges over a waterway and determine prudent countermeasures.
			8 - Maintain a comprehensive file on each bridge
			9 - Each state is strongly encouraged to provide a critical follow-up program and a QA / QC program
Br Ops		30	**Responsibilities of the Bridge Inspector**
			Provide complete, thorough and accurate bridge inventory and condition assessment information.
			Ensure that the bridge managers have the latest information regarding the condition of the bridges under their jurisdiction.
			Assure that the State of Oregon is in full compliance with federal reporting requirements.
AOC/LOC		120	**Bridge Owner's Responsibilities**
			Why is bridge maintenance required
			Why a vigorous bridge maintenance organization is needed - "what's in it for you".
			Highest unit investment and presents the greatest danger of all potential highway failures
			Disruption of community welfare + Loss of life + level of community confidence
			Affect the load rating calculations (assignment of risk): level of maintenance plus (+)
			an acceptable level of load enforcement
			Development of a Bridge Maintenance Strategy
			A bridge replacement strategy cannot keep pace with the rate of deterioration of the bridges in our inventory
			Bridge Managers are required to make serious trade-offs.
			Ensuring a safe, well maintained facility can not be totally accomplished with replacement and rehab projects
			It can only be accomplished by preserving the structures through the use of good management practices.
			The trick: spend enough on maintenance at the right time so that rehab

Assign To	Prep Time	Class time (min)	Course Outline
			or replacement is not needed prematurely.
			Step 1 - determine the current condition of the bridge (starting point) using the bridge inspection data.
			Step 2 - Determine the desired level of performance for that specific bridge
			decide whether to maintain the current condition, or
			improve the condition of the bridge, or
			allow the condition to degrade to a lower level.
			It's up the bridge manager to determine where we're going and how to get there.
			Development of a Bridge Maintenance Business Plan
			Bridge Managers must assure that the most important problems on the most critical bridges get the highest priority and are addressed in a cost-effective manner.
			The bridge inspector creates a prioritized list of bridge maintenance recommendations - it's at your finger tips.
			The bridge managers needs to produce a game plan that adequately addresses each recommendation: Doing the right things, at the right time, and doing them correctly.
			A well balanced, cost-effective program includes: preventative maintenance, minor repairs, major repairs, deferred actions.
			The value of performing Preventive Maintenance - deterioration prevention
			The value of performing Minor Repairs - arrest or correct deterioration before it becomes a serious problem - most costly than preventative maintenance.
			The cost of performing Major Repairs - correction of extensive deterioration.
			The cost of doing nothing - Deferred Maintenance.
			Must be responsive (reactionary):
			deal with surprises,
			prepared to fund short-fused rehab projects, or
			perform emergency repairs to eliminate unsafe conditions might include providing stopgap measures on a bridge that

Assign To	Prep Time	Class time (min)	Course Outline
			was removed from the finalized STIP
			Why the local agency should consider retaining certified bridge inspectors on staff
			Familiarity with bridge information and data (validating of bridge inspection data)
			Performing Non-NBI Bridge Inspections
			Performing Annual Inspections
			Performing Specialty Inspections
			Performing Emergency Inspections (traffic impacts, high water events, seismic events, transient fires, etc.)
			Why Partner to Keep Data Current & Correct
			Identify Significant Repairs
			Bridges Being Replaced and Provide Drawings
			Inspection & Maintenance of Non-NBI Structures
			Who's going to inspect these structures?
			File for each bridge
			Map showing each bridge on your inventory
Bridge		**60**	**2** **How does a typical Bridge Structure Work?**
			What are Live Loads and Dead Loads?
			Typical bridge types and their designed load paths
			Culvert
			Simple slab span
			Simple Girder span
			Reinforced Concrete vs Prestressed or Post Tensioning
			Truss configurations (thru, pony, deck)
			Suspension Bridges
			Primary Bridge Members - carries live loads and dead loads
			Secondary Bridge Members - provide a function other than carrying live or dead loads.
			Critical Bridge Members - high potential for a structural collapse
			Typical Bridge Materials and their durability

Assign To	Prep Time	Class time (min)	Course Outline										
						Concrete Bridges							
						Steel Bridges							
						Timber Bridges							
						Culverts							
					Bridge Maintenance Concepts and the ramifications and benefits of each								
						Do nothing program,							
						Progressive bridge maintenance program							
					Bridge Management Systems								
Br Ops		**15**	**3**	**Rules of Orientation and Member Numbering Labeling Conventions**									
					NBI Bridge Number, Local Bridge Number, Design Number								
					Rules of Orientation								
						Upstream & Downstream - River Stream mileposts							
						Compass - Map Directional vs Route Directional							
						Mile Posts, City Street Addresses (Looking Ahead or Back)							
						Highway System Tree							
					Substructure Labeling Convention								
					Rules for Numbering Bridge Bents								
						Bents VS Piers & Abutments							
					Rules for Numbering Bridge Spans								
						Spans							
					Rules for Numbering Bridge Members								
						Numbering Members, Panel Points, Panels							
Br Ops		**15**	**4**	**NBI Data - What is it and what is it used for**									
					Structure Inventory and Appraisal Sheet - (SI & A Sheet)								
					Static Data								
					Dynamic Data								
					Sufficiency Rating Formula								
					Inspection/Owner/State supplied- Data Items used to calculate the sufficiency								

Assign To	Prep Time	Class time (min)		Course Outline
				rating
				Data Items that influence the sufficiency rating the most
Br Ops		**15**	**5**	**Condition Assessment Schemes, how is each used, and for what purpose**
				Element Condition Ratings vs NBI Ratings
				The new "Oregon Priority Criteria System"
Br Ops		**15**	**6**	**NBI Condition Ratings**
				Applies to a portion of the bridge: Deck, Superstructure, Substructure, and Channel
				9 - Excellent
				1 - Failure
				Uses very general subjective terms
Br Ops		**15**	**7**	**NBI Appraisal Items**
				What's the difference between a condition rating and an appraisal rating
Br Ops		**15**	**8**	**Element Condition Ratings**
				Element Coding Guide
				Contents
				How to use it
				Where can I get a copy of a coding guide
Br Ops		15	**9**	**What Bridge Inspection Reports are available,**
				Where can I get a copy of the bridge inspection reports (web page)?
				How is each bridge inspection report used for?
Br Ops		**30**	**10**	**What Information is contained in the Routine Bridge Inspection Report?**
				Heading
				Identifies Bridge, Date, Inspector, Suff Rating, Attributes
				Elements (Parts List) Quantity, Condition Assessment
				ODOT Element Coding Guide
				Temporary Repairs, if any

Assign To	Prep Time	Class time (min)	Course Outline									
					NBI Condition Ratings							
					NBI Appraisal Items							
					Inspection Remarks							
					Bridge Maintenance Recommendations							
					Load Rating Information							
					Load Rating Condition Comparison Chart							
					Inspection Schedules (Inspection Type, last date, frequency, next schedule date)							
					What areas are important to pay attention to.							
		15	**11**	**Element Level Condition Rating**								
					ODOT Element Coding Guide							
					Element Number and Description							
					Environment							
					Element Quantity and Units							
					Condition Assessment							
					Temporary Repairs Installed?							
		15	**12**	**Remarks - Additional inspection explanation**								
		15	**13**	**Maintenance Recommendations - What's wrong with the bridge and where it is.**								
					Priority (one of four) - Critical, Urgent, Routine / Schedule, Monitor							
					Element, Deficiency and Location of Needed Work - A prioritized "To Do" List							
					Estimated Cost							
					Value of posting completed work.							
		60	**14**	**Load Rating**								
					Has a load rating been performed = Date							
					Inventory Items Pertaining to Capacity							
					Oregon Legal Loads - Operating Rating (Tons)							
					Controlling Member							
					Actual Posting at Bridge Site (Tons)							

Assign To	Prep Time	Class time (min)	Course Outline
			Condition Comparison Chart (Rating vs. Last Insp.)
			How priorities are set for ODOT (with HBRR funding) doing load ratings.
			What agencies need to do if they want one of their bridges done sooner?
			How a local agency needs to go about getting a load rating done if they want it quicker.
			It would be at the local agency expense
			What process would be used so that their answer (consultant work) would be accepted by ODOT.
			Load Rating Document
			Inventory & Operating Rating (NBI 66 & 64)
			Legal Loads (Oregon) @ Operating Level
			Recommendation for Posting if needed
			Rating Factors
			Permit Loads
			What does the load posting sign suppose to look like
			Where should the load posting signs be placed
		15	**15** **Inspection Schedule & Frequency**
		30	**16** **Scour Monitoring - what is scour and why is it so important to monitor**
			Scour Evaluation Document
			Answers the question is it critical or not
			How is it useful
			Underwater Bridge Inspections
			Cross-channel Profiles
		15	**17** **Timber Boring Diagram**
			Why sketches are used
			What the numbers mean
		15	**18** **Fracture Critical Report**
			FC Diagram

Assign To	Prep Time	Class time (min)	Course Outline											
					Condition of the Member									
		30	**19**	**Concrete Shear Crack Mapping**										
					Why sketches are used									
					What size of crack is critical									
		30	**20**	**The roll of First Responders to Major Events (Earthquake, Flood, Fire, etc.)**										
					Knowing your Life Line Routes and who's going to do what, when									
					First Responders Training									
		645		***Totals (estimated minutes)***										

Annual Review Checklist Example. The following is an example of a checklist used in Maryland for conducting the Annual NBIS Review. This example was developed before the National Report Format was issued by HIBT, but it can be a guide to collecting information that would be reformatted to the National Report Format.

FHWA MARYLAND DIVISION

NATIONAL BRIDGE INSPECTION STANDARDS

COMPLIANCE REVIEW

State _____ **Date:** _____

Personnel in Attendance:

	Name	**Title**	**Agency**
1.			
2.			
3.			
4.			
5.			
6.			

1. BRIDGE INSPECTION PROGRAM

a. Does the individual in charge of the organizational unit that has bridge inspection, reporting and inventorying responsibilities program meet the minimum NBIS qualifications requirements?

b. Provide the number of structures with a clear span of greater than 20': Does this number agree with what is in the FHWA inventory?

	State List	FHWA List
State		
County		
MTA		
Other		
TOTAL		

c. Has the State developed an inspection program for small structures (20' and less)? What is the inspection frequency? What criteria are used, i.e. size, type, etc.?

d. Does the State inspect noise walls, retaining walls, overhead signs?

2. STATE BRIDGE INSPECTION PERSONNEL

a. Does the individual in charge of the field bridge inspection team meet the minimum NBIS qualification requirements? How many years of experience does he have in bridge inspection assignments?

b. How many bridge inspection personnel do you have within SHA? Give the name and title of each field inspector. Have they taken the FHWA Bridge Inspection Training Course? Other Training? Provide number of years of bridge inspection experience. How many inspectors are assigned to each team?

Name	Title	No. Years Bridge Exp.	FHWA Bridge Inspection Training Course Yes (Date)	No	Other Training (Date)

3. OUTSIDE CONSULTANTS

a. What procedure is used to select consultants to inspect bridges for SHA and the local governments? Who are the bridge inspection consultants?

b. Do they follow the State policy of hands on inspection? On bridges over railroads with electrified lines?

c. Is there a procedure established for the consultant to notify the County/Agency of an emergency or critical defect? If yes, what are the procedures? Is S.H.A. notified?

d. **Are the State and County Agencies satisfied with the work performed by the Consultants?**

e. **How are the bridge inspection costs monitored for the counties?**

4. FREQUENCY OF INSPECTIONS

a. **Has there been a change in the normal two year inspection cycle for any structure since the last compliance review?**

b. **Are certain structures inspected more frequently than others? If so, what is the frequency? What is the reason?**

Bridge Number	Frequency	Reason

c. **How are the more frequent inspections documented? Is the State inventory updated after each inspection?**

d. **Are any inspections delinquent? Which structures by number? When will they be inspected? Reason for being delinquent?**

5. GENERAL INSPECTION PROCEDURES

a. **Does the State follow basic safety requirements and have safety equipment necessary for bridge inspections?**

b. **What standard equipment is supplied to the bridge inspection teams? Is a snooper or inspection crane available when required? Is a boat available?**

c. Does each SHA inspection team have the following reference documents for bridge inspection?

Reference Document List

		Yes	No	N/A
1.	**FHWA Bridge Inspector's Reference Manual (BIRM)**			
2.	**FHWA Culvert Inspection Manual**			
3.	**FHWA Inspection of Fracture Critical Bridge Members**			
4.	**FHWA Underwater Inspection of Bridges**			
5.	**FHWA Bridge Inspector's Manual for Movable Bridges**			
6.	**AASHTO Manual for Condition Evaluation of Bridges (1994)**			
7.	**Maryland S.H.A. Guide for Completing Structure Inventory and Appraisal Input Forms (Forms 1-8)**			
8.	**Maryland S.H.A. Pontis Element Data Collection Manual (Rev. March '96)**			

BASIC SAFETY

Team - Minimum 2 Members

High Tension Wires

Air Meters in Long Culverts

Confined Space Inspection

Two-Way Communications (Two-Way Radios)

Safety Harnesses

Safety Glasses

Safety Shoes

Reflective Vests

Snug Fitting Clothing

Wooden Ladders & Cloth Tapes Around Electric Power Lines

Boat - Life Vests, Anchor and Line

Snoopers and Bucket Trucks - Safety Requirements (Hard Hats & Safety Harnesses)

Hardhats - Where Necessary

Sufficient Lighting

First Aid Training

CPR Training

AMTRAK Safety Training

d. What assistance is provided to the local governments in their bridge program?

e. How is the inspection program monitored for the local governments?

6. QUALIFICATIONS OF INSPECTION PERSONNEL

a. What are the minimum qualification requirements for prospective inspectors and divers?

7. INSPECTION REPORT

a. Does the State maintain a folder for each bridge? If so, what is included in the folder (i.e., field notes, location map, sketches, load rating computations, photographs, scour data, records of repairs, diving report, etc.)?

b. Where are bridge files kept?

c. What inspection data do the local governments furnish the State. How is the data furnished to the State?

d. Who reviews the SHA reports?

e. Does the State have written reports for the more frequent inspections? Are the reports placed in the bridge folder?

8. BRIDGE MANAGEMENT SYSTEM

a. Does the State have a bridge maintenance and replacement management system in place?

b. What assistance is provided to the local governments for bridge replacement?

c. Do you intend to implement the current version of Pontis BMS? What is the status of gathering all the data required to run Pontis?

d. Who is in charge of the State's bridge management system?

9. SPECIAL INSPECTIONS

a. Is there an updated list of all bridges with fracture critical members? How many bridges?

b. Do any structures have fatigue cracks? How many? Which bridges by number? Location of cracks?

c. Does the State have any bridges with unique or special features requiring additional attention during inspection? How many bridges? Which bridges by number? What are the special features?

10. UNDERWATER INSPECTIONS

a. What is the name of the diving firm that performed the State's last inspection?

b. How many bridges require an underwater inspection?

State	_____
Counties	_____
MTA	_____
Others	_____
Total	_____

c. How frequently are underwater inspections performed?

d. Are underwater inspection findings documented and maintained in the bridge file?

11. SCOUR INSPECTIONS

a. Please summarize the results of the bridge scour evaluation studies of State bridges:

Number of low risk bridges (Item 113 = 8) _____

Number of scour critical bridges rated as 3A _____

Number of scour critical bridges rated as 3B _____

Number of scour critical bridges rated as 3C _____

Number of bridges rated as Unknown 6U _____

Number of bridges rated in other categories _____

Total Number of bridges over water _____

b. Please describe the arrangements being made to install scour countermeasures or other protective features at the scour critical (3C) bridges. Are these arrangements in writing? What is the target date for completing the protection of all 3C scour critical bridges?

c. Please describe the procedures being used to design scour countermeasures at scour critical bridges.

d. What instructions have been prepared in writing with regard to inspection during the occurrence of high water of bridges rated as (1) scour critical, 3A, 3B, 3C; (2) unknown foundations, 6U; and (3) low risk, 8L. (Who makes the inspections? When? How are they documented?

e. Who conducts the scour and stream stability assessments of the bridge and stream channel during routine bridge inspections? What training have these bridge inspectors received with regard to scour and stream stability?

f. How are the measurements of the channel cross-sections at and near the bridge being documented? Are the cross-sections from inspection to inspection being compared and the changes documented in writing?

g. Does the State maintain an interdisciplinary team of structural, geotechnical and hydraulic engineers to reevaluate the vulnerability of bridges to damage from scour?

12. CORRECTIVE ACTIONS

a. What policy and procedures are established to review the inspection report recommendations, initiate corrective action and track the corrective actions? How are the repairs documented?

b. What are the procedures to ensure that corrective action is taken upon critical or emergency recommendations by bridge inspection teams?

c. What action is planned for bridges with similar details as the Hoan Bridge?

d. Has a Quality Assurance Program been established? Describe the procedures established.

e. Did the State have any critical maintenance findings during the last cycle?

f. Have there been any bridges closed to traffic in the last year due to dangerous conditions and/or insufficient load capacity? Which bridges? Who decides whether or not a bridge is to be closed?

13. INVENTORY

a. Have all bridges under the State's jurisdiction been inventoried and inspected?

b. Are newly completed structures or modified existing structures entered in the inventory within the 180 day reporting requirement according to the Code of Federal Regulations, as found in Appendix C of the Coding Guide? What reminds the State to enter the inventory data within the 180 day period?

14. RATINGS

a. Is each structure rated for the H, the HS, and the Maryland Type 3 vehicles?

b. If not, how many structures do not have the inventory and operating ratings calculated?

c. Does the State rate their structures for vehicles other than the Maryland legal loads? Which vehicles? Maximum vehicle weight?

d. What type of rating method is used? Are new bridges rated at the design stage?
Who inputs inventory data for new bridges?

e. What criteria is used to determine when a bridge is re-rated?

_____
_____
_____

f. Are bridges with an operating rating of less than 3 tons closed to traffic?

_____
_____

15. POSTINGS

a. At what load level are structures posted (inventory, operating, or other)? If structures are posted at operating load levels, at what frequency are they inspected?

b. How many bridges are posted for load restrictions?

State _____
County _____
MTA _____
Other _____

c. How many bridges require posting but are not posted?

State _____
County_____
MTA _____
Other _____

d. Do the inspectors verify that the advance warning signs and the posting signs at the structure are present? Also, do they verify that the posting is correct?

e. What procedures are used to physically close a bridge to traffic? Is guidance provided to the local governments on physically closing a bridge to traffic?

_____
_____
_____

16. BRIDGE FILES REVIEWED

a. _____

b. _____

c. _____

d. _____

e. _____

Comments: _____

17. STRUCTURES VISITED

a. _____

b. _____

c. _____

d. _____

e. _____

Comments: _____

A more updated version of this document may be available at:
http://intra.fhwa.dot.gov/bridge/nbissummary.htm

NATIONAL BRIDGE INSPECTION STANDARDS
ANNUAL PROGRAM REVIEW
SUMMARY REPORT
(Modified 2006)

<ENTER STATE HERE>
FISCAL YEAR <ENTER YEAR HERE>

REPORT PREPARED BY:

<Enter Name Here>, <Enter Title Here>

TABLE OF CONTENTS

		Page
(A)	PURPOSE AND SCOPE……	X
(B)	OBJECTIVES…….	X
(C)	STATE PROGRAM SIZE.……	X
(D)	BRIDGE INSPECTION ORGANIZATION (23CFR650.307)…….	X
(E)	QUALIFICATIONS OF PERSONAL (23CFR650.309)……..	X
(F)	INSPECTION FREQUENCY (23CFR650.311)……	X
	(1) Routine Inspections…….	X
	(2) Underwater Inspections……...	X
	(3) Fracture Critical Inspections……	X
	(4) Other Special Inspections……	X
(G)	INSPECTION PROCEDURES (23CFR650.313)……..	X
	(a-b) General……...…	X
	(c1) Load Rating……...….	X
	(c2) Posting and Closing……...…….	X
	(d) Inspection Reports……..	X
	(e1) Fracture Critical Members……..……	X
	(e2) Underwater Inspection…….	X
	(e3) Scour Evaluation……..	X
	(f) Complex details and fatigue prone details...……	X
	(g) Quality Control and Quality Assurance	
	(h) Follow-up On Critical Findings	
(H)	INVENTORY (23CFR650.315)…….	X
(I)	NBIS AND MAINTENANCE REVIEWS……..	X
(J)	BRIDGE MANAGEMENT ……	X
(K)	PRIORITY IMPROVEMENTS……...	X

(A) PURPOSE AND SCOPE

The purpose and scope of the review is to evaluate the policies, procedures and operating practices used by the <State Department of Transportation> to fulfill the requirements of the National Bridge Inspection Standards (NBIS) (23CFR650C). This review was conducted at < locations where review was performed (State HQ, Districts, Counties, Cities)>. The <State Department of Transportation> < is, is not> in substantial compliance with the requirements of the NBIS.

(B) OBJECTIVES

Determine if the <State Department of Transportation> is conducting inspections, preparing reports and determining ratings in accordance with the NBIS

Identify areas of the <State Department of Transportation> bridge inspection program that could be improved to enhance quality and effectiveness, or shared with others as "best practices."

(C) STATE PROGRAM SIZE (Round total number to the nearest ten)

<What is the total number of NBI bridges? >

<What is the total number of State owned NBI bridges? >

<What is the total number of Non-State owned NBI bridges? >

(D) BRIDGE INSPECTION ORGANIZATION (23CFR650.307)

<Who is the State Bridge Inspection Program Manager (PM)? >

<Does the State Bridge Inspection PM meet the NBIS qualifications? >

<Does the State inspect all the State owned and non-State owned bridges or does the State Bridge Inspection PM delegate inspection authority to the local agencies and owners to inspect their bridges? >

<If the inspection authority is delegated, how does the State monitor and regulate the compliance with the NBIS? >

(E) QUALIFICATIONS OF PERSONNEL (23CFR650.309)

<How are inspector qualification records maintained by the State? Does the State maintain a central statewide database of inspector qualifications and training needs? >

<Does the State have a continuing education program or monitor continuing educational requirements for their inspector personnel? >

<How many Team Leaders does the State have? Do they meet the NBIS qualifications? >

<Do the underwater inspection divers have the required bridge inspection training and is there a Team Leader on site at each underwater inspection? >

<What are the primary issues your State faces with obtaining and retaining qualified inspection personnel? >

(F) FREQUENCY OF INSPECTION (23CFR650.311)

<Describe the State's policy for the frequency (in months) of inspections. >
<Discuss the controls established to assure that all bridges are inspected at designated frequency. >

<Fill in Table of Frequency of Inspections>

Frequency of Inspections	Number of Bridges
= 24 months	
< 24 months	
> 24 months (When approved by HQs)	

<Fill in Table of Past Due Inspections>

Type of Inspection	Number of Past Due State Owned Bridges	Number of Past Due non-State Owned Bridges
Routine		
Underwater		
Fracture Critical		
Other Special		

Key: Past due = previous inspection date plus inspection frequency plus 90 days for state owned bridges or plus 180 days for non-State owned bridges.

G INSPECTION PROCEDURES (23CFR650.313)

(a-b) General

<Does your state collect bridge condition data using NBI Coding Guide criteria or Element Level elements or both? If the State collects Element Level elements do they

collect AASHTO CORE element plus perhaps some additional State data or does the State modify the AASHTO CORE elements? >

<What automated or electronic data collection technologies does your State use to collect field data? >

<What types of inspection are performed and what are the typical frequencies (i.e. Fracture Critical, Underwater, Other Special, Routine, In-depth, seismic, complex, posted structures, etc.)? >

<How many inspectors typically make-up a bridge inspection team? >

<Does each team that performs an initial, routine, in-depth, fracture critical or underwater NBIS inspection have a team leader? >

<How many bridge inspections does an inspection team typically perform per year? >

<How is the State bridge inspection program structured? Do all inspectors work out of headquarters office, or district ... etc.? >

<What types of inspections do consultants perform? What is the approximate percentage of bridge inspections performed by consultants? >

<If consultants are used for bridge inspection how are the consultants' inspectors' qualifications monitored and regulated to meet the NBIS? >

<On average, how much does your State spend on bridge inspection annually? What activities are included in this amount? How much of the annual amount is HBP funds? >

<What types of NDE/NDT equipment are used for inspection? Fill in Table >

NDE/NDT Technology	Routine Use	Special Case Use

(c1) Load Rating

<Briefly describe the State's load rating policy and procedure. Does the State use the AS, LF or LRFR method? >

<Are those charged with the responsibility to load rate bridges a Professional Engineer? >

<How many bridges have not had a load rating analysis performed? >

<Have all NHS bridges been rated and reported to the NBI by LF or LRFR for operating and inventory ratings? > (See HQs Memos dated November 5, 1993 and December 22, 1993.)

<When is the initial load rating performed (part of design, after construction, prior to opening to traffic, after inventory inspection, other-explain)? >

<What criteria are used for re-rating? >

<What is the maximum legal load under State law? >

<What is the heaviest vehicle configuration that your State allows without a permit and with a permit? >

<Is a copy of the load rating included in the bridge file? >

(c2) Posting and Closing

<Describe the State's load posting policy and procedure (inventory rating, operating rating, HS/MS trucks, Type 3, 3S2, 3-3, other).

<How many bridges are posted? >
<How many bridges should be posted, but are not? >

<Describe the State's closing policy and procedure? (Inventory rating, operating rating, HS/MS trucks, Type 3, 3S2, 3-3, other)? >

<How many bridges are closed? >
<How many bridges should be closed, but are not? >

<Is a copy of load posting recommendations and actions taken included in the bridge file? >
(AASHTO Manual for Condition Evaluation of Bridges - 2.2.9)

(d) Inspection Reports

<Briefly describe the States policy for inspection reports to include the reporting process from preparation through review and distribution. >

<When are photos and sketches required? >

<How is inspection report data obtained and maintained? (Hard copy/Electronic)>

(e1) Fracture Critical Members

<Are fracture critical members, components or details identified in the bridge record for inspection? >

<Is the status of the fracture critical members, components or details clearly identified in the report? >

(e2) Underwater inspections

<Are underwater elements identified in the bridge record for inspection? >

<Are underwater inspections findings considered in substructure condition ratings? (Should be clearly noted in the inspection report.)>

(e3) Scour Evaluation

<How many State owned bridges have been evaluated for scour? How many have not? How many scour critical bridges do not have action plans? >

<How many Non-State owned bridges have been evaluated for scour? How many have not? How many scour critical bridges do not have action plans? >

<Are channel profiles included in the inspections reports? Are comparisons of current channel profile to previous channel profile and base (original) channel profile being made? >

(f) Complex structures and fatigue prone details

<Are fatigue prone details identified in the bridge record for inspection. >

<Is the status of fatigue prone details clearly identified in the report? >

<Are special inspection requirements noted for the inspection of complex structures? >

(g) Quality Control and Quality Assurance (QC & QA)

<Briefly describe the QC & QA program and how the procedures are applied and measured. >

<What QC & QA procedures are applied to ensure the quality and integrity of the inventory data? >

<Briefly describe the State's continuing education program for their inspection personnel? >

(h) Follow-up On Critical Findings

<What is your State's definition of a critical recommendation? >

<How are critical recommendations documented and tracked? >

<How many bridges had critical recommendations this year? >

<Does the FHWA Division get copies of the critical findings and follow-up reports on a routine basis? >

(H) INVENTORY (23CFR650.315)

<What is the procedure for updating data in the State's bridge inventory? >

<How frequently is the State's inventory data updated? >

(I) NBIS AND MAINTENANCE REVIEWS

<Describe the State's procedure for performing repairs identified by bridge safety inspectors. >

<Discuss documentation of maintenance work performed between inspection cycles. >

<How many bridges were field evaluated by FHWA for quality and consistency of inspection data and maintenance performance? What types of structures were visited and how were they selected? >

(J) BRIDGE MANAGEMENT

<How does your State prioritize and select bridge preservation and improvement projects? >

<Has the State requested to use HBRRP funds for system preservation? >

<Does the State distinguish between maintenance, bridge preservation, and bridge rehabilitation projects? >

(K) PRIORITY IMPROVEMENTS

< What were the three highest priority improvement recommendations in the division's NBIS review? >

< What areas or items in the bridge inspection program would the State like FHWA to assist them in? >

< Did the division office emphasize any particular aspect of the Bridge Inspection program during its annual review, and if so what was it? >

< What noteworthy bridge inspection practices does the State have that could be shared?>

Bridge Load Rating and Posting Risk Assessment

Likelihood Criteria **The scoring metrics applied to indicate a high probability of sufficient likelihood of the criteria to cause potential damage to the program**	Likelihood Indicators **The scoring metrics applied to indicate a high probability of sufficient likelihood of the criteria to cause potential damage to the program**	Scoring Context	Scoring
FHWA Staffing **(Levels & Experience)** Asks if the FHWA staff assigned to the effort is sufficient. Do they have a clear knowledge, understanding, and ability with the element and its implications?	**Severely understaffed or no experience** (5)	It is unrealistic to expect the staff assigned *not* to need supplementation or augmentation before the end of the effort. The Division staff does not have a bridge engineering background or has no experience with load rating.	
	Understaffed or some experience (2)	Staff assigned will be over utilized and run the risk of being incapable of completion if additional responsibilities are assigned, or lack experience. The Division bridge staff has a bridge engineering background but is not familiar with load rating.	
	Adequately staffed or competent (0)	Adequately staffed or competent. The Division bridge staff has a PE familiar with load rating.	
Considerations - Who on the staff are PE's, how familiar is the staff with load rating, how many years of bridge experience do they have, do they have current training in load rating, and is there an adequate number of staff dedicated to load ratings?			
DOT Staffing (Levels & Experience) Asks if the DOT staff assigned to the effort is sufficient. Do they have a clear knowledge, understanding, and ability with the element and its implications?	**Severely understaffed or no experience (5)**	It is unrealistic to expect the staff assigned *not* to need supplementation or augmentation before the end of the effort	
	Understaffed or some experience (2)	Staff assigned will be over utilized and run the risk of being incapable of completion if additional responsibilities are assigned, or lack experience. The DOT individual charged with load ratings is a PE with sufficient years of experience and current training but the staff are not PE's, lack experience, or do not have current training.	
	Adequately staffed or competent (0)	Adequately staffed or competent. The DOT person in charge of load rating and the staff have PE's, experience, and current training.	
Considerations - Who on the staff are PE's, how familiar is the staff with load rating, how many years of bridge experience do they have, do they have current training in load rating, and is there an adequate number of staff dedicated to load ratings?			
Local Staffing (Levels & Experience) Asks if the local staff assigned to the effort is sufficient. Do they have a clear knowledge, understanding, and ability with the element and its implications?	**Severely understaffed or no experience (5)**	It is unrealistic to expect the staff assigned *not* to need supplementation or augmentation before the end of the effort	
	Understaffed or some experience (2)	Staff assigned will be over utilized and run the risk of being incapable of completion if additional responsibilities are assigned, or lack experience. The local individual charged with load ratings is a PE with sufficient years of experience and current training but the staff are not PE's, lack experience, or do not have current training.	
	Adequately staffed or competent (0)	Adequately staffed or competent. The local person in charge of load rating and the staff have PE's, experience, and current training.	
Considerations - Who on the staff are PE's, how familiar is the staff with load rating, how many years of bridge experience do they have, do they have current training in load rating, and is there an adequate number of staff dedicated to load ratings?			

Operational Procedures Asks whether there are documented and relevant procedures for this element of the program?	**None** (5)	There are no documented or relevant procedures	
	Some (2)	There are some documented procedures or tangentially related procedures	
	Good and up-to-date (0)		
Considerations – Are there documented procedures (procedures could include manuals, memorandums, and examples) for load rating and posting at the State and local levels, are the procedures followed, and does the QA/QC program addresses load ratings and postings (refer to FHWA QC/QA framework)? Are Load ratings calculated using up-to-date procedures and software? (Example: using the ASD load rating method would be a 5)			
Guidance is whether or not there is relevant guidance?	**None** (5)	There is no documented or relevant guidance	
	Some (2)	There is some documented guidance or tangentially related guidance	
	Good and up-to-date (0)		
Considerations - Has the FHWA program office established clear load rating and posting policy, has the Division established clear policy between FHWA and the State, and has the State established clear policy with locals and other entities responsible for load rating and posting? Are the policies followed and current?			
Problem History asks whether the programs of this nature have had significant problems or ongoing series of problems related to this element?	**A lot of** (5)	There are historical events that tie directly to the problem history	
	Some (2)	There are rumors or organizational legend of problems related to this element in this type of program	
	None (0)		
Considerations – Are there past NBIS review findings on load rating and posting, is there a history of bridge failures due to load or closures due to low load ratings, and is there a history/trend in number of bridges not posted but should be? Is the State increasing load limits, and are posting signs current and adequate?			
New Program, Phase or Component is deciding if this program or element of the program is truly novel?	**Cutting Edge** (5)	No one has addressed this type of work in this element before	
	Some experience (2)	Some people have done this type of work in the past or have done related work	
	Old news (0)	It's what we do, routine	
Considerations - Are state and local entities familiar with the load rating method and software in use? How much training and experience have they had with the method? Until familiarity is gained, risks may increase for an agency as it transitions from familiar methods such as allowable stress or load factor to LRFR and the accompanying new software.			
Complexity is asking if there is a high level of intricacy or challenge associated with the Core Element?	**High** (5)	The Core Element involves integration of multiple agencies, consultants, contractors and FHWA HQ	
	Moderate (2)	This Core Element involves integration of DOT, FHWA and one other outside agency	
	Low (0)	This Core Element involves only DOT and FHWA personnel	
Considerations – How complex is the load rating and posting process? Does the State DOT inspect and load rate bridges or is it a more complex process involving consultants, locals and other outside agencies? What is the chain of command necessary to implement load posting?			
Outside Control is whether there is an opportunity for outside agencies to assert control or interference?	**High** (5)	Numerous outside agencies have the opportunity and ability to voice concerns, influence or direct	
	Moderate (2)	One or two outside agencies have the opportunity and ability to voice concerns, influence or direct	
	Low (0)	There is virtually no opportunity or ability for outside agencies to voice concerns related to this Core Element	

Considerations - Does the inspecting or rating agency have the authority to post bridges, or do others control this decision? What is the degree of political interference in posting decisions, and are there truck route, school route, or emergency vehicle route policies that restrict necessary posting? Do groups such as farmers, authorities, trucking associations, and commerce interest groups influence decisions?		
Potential for Waste, Fraud and Abuse asks whether there is an opportunity for this type of inappropriate behavior?	**A lot of** (5)	There is limited oversight and ability to identify waste, fraud and abuse
	Some (2)	There is some oversight, but there are gaps in our ability to identify waste, fraud and abuse
	None (0)	There is virtually total oversight and no opportunity to identify waste, fraud and abuse
Considerations - Is there potential for political or executive self-interest to overrule engineering decisions? Are bridges accurately load rated? Is there adequate DOT oversight of load rating and posting? Is there a load rating and posting component in the QC/QA oversight program? Does the Division review this area annually? Are there verifiable calculations documenting the load ratings? Are there independent checks of load ratings? Are load ratings required to be stamped by PE? Is there evidence that data is manipulated to influence federal funding?		
Work Force Development and Training is asking if there is a program in place to keep training and development in place for the personnel related to this Core Element?	**None** (5)	There are no training or mentoring programs
	Some (2)	There are training and/or mentoring programs, but they are not universally available
	A lot of (0)	There are training and mentoring programs, broadly available to FHWA and DOT personnel
Considerations- Is training provided for load rating personnel? Does the DOT provided training for its staff and other local agencies? Does the DOT require that other agencies and consultants have similar training? Does the training include the latest and current techniques such as LRFR? Is the training on a regular basis?		
FHWA Involvement is whether our division office staff is actively involved in managing the Core Element?	**None** (5)	Division office personnel have visibility but no management control
	Some (2)	Division office personnel have management control over some aspects of the Core Element
	A lot of (0)	Division office personnel have active management control over most aspects of the Core Element
Considerations – What is the level of effort the Division assigns to oversight and management of load ratings and postings? Is load rating documentation reviewed for accuracy; is a sample of postings verified in the field; are there reasonableness checks of load rating items in NBI; does the Division receive posting notifications; is load rating evaluated annually during the Division's NBIS review?		
Consultant Use is whether consultants are actively being applied as primary resources in the effort?	**A lot of** (5)	The DOT is using a broad range of consultant to address the Core Element
	Some (2)	The DOT is sharing responsibilities with consultants related to this Core Element
	None (0)	The DOT has full responsibility for all aspects of this Core Element
Considerations - Does your DOT perform oversight and review of the consultant's work? Are there many different consultants performing load ratings? Are consultants providing load ratings on complex structures?		
Other is asking if there are other areas of concern related to this Element that are not addressed in the frequency criteria?	**High** (5)	Please document criteria used to label this as "high"
	Moderate (2)	Please document criteria used to label this as "moderate"
	Low (0)	Please document criteria used to label this as "low"

Total Likelihood Score:_____

Impact Criteria **Whether these are the areas of concern that are deemed as a high impact to the FHWA.**	Impact Levels **The scoring metrics applied to indicate the impact level of the criteria to cause potential damage to the program.**	Scoring Context	Scoring
Federal Interest is how extensive is the attention that the OIG, Inspector General and other agencies pay to this Core Element?	**High** (5)	One or more agencies have an extensive history of investigation, audit or evaluation in this Core Element.	
	Moderate (2)	This Core Element has been investigated, audited or evaluated once or twice in the past by significant agencies.	
	Low (0)	Never investigated, audited or evaluated.	
OIG has historically performed audits on bridge inspection. The most recent audit was on load ratings and postings. Load rating and posting data is also used in reports to Congress, and other federal agencies forward NBI data to FHWA.			
Stakeholder Interest asks whether this Core Element attracts attention from a broad spectrum of stakeholders?	**High** (5)	Multiple groups of stakeholders have a history of interest and involvement.	
	Moderate (2)	This Core Element has been drawn the attention historically of one or two groups of stakeholders.	
	Low (0)	Very few stakeholders, if any have expressed interest or involvement.	
There are a large number of stakeholders (public, trucking industry, ports, land developers, agricultural interests, commercial interests, emergency response providers, schools, etc.) impacted by postings.			
Exposure (Public, Media or Political) is how extensive the public and/or media interest is in the element?	**High** (5)	The public and media have a history of tracking this element.	
	Moderate (2)	This Core Element has been the subject of media attention once or twice.	
	Low (0)	Virtually no media attention has ever been paid to this element.	
This element has an extensive national history of media interest.			
Funding Level is how significant is the funding related to the Core Element?	**High** (5)	This Core Element accounts for 25% or more of the program costs.	
	Moderate (2)	This Core Element accounts for 5-24% of the program costs.	
	Low (0)	This Core Element accounts for <5% of the program costs.	
Load ratings effect the apportionment of Bridge Program Funds. You could consider what portion your State's Highway Bridge Program apportionment is of the State's total Federal-aid program.			
Goals are the objectives of the program achievable?	**High** (5)	There are clear objectives related to this Core Element that have a direct connection to the objectives in our strategic plan.	
	Moderate (2)	There are objectives related to this Core Element; however, they are only tangentially related to the objectives in our strategic plan.	
	Low (0)	No clear objectives.	
The accurate and timely load rating and posting of bridges impacts both the Mobility and Safety goals in our strategic plan.			
Controversy or Lawsuits is whether this program or element of the program is subject of internal and/or external controversy?	**High** (5)	The Core Element in this environment draws the attention of both internal and external investigators.	
	Moderate (2)	This Core Element has driven controversy, but has the full force and backing of FHWA HQ management.	
	Low (0)	This is a low-controversy issue/area when considered in terms of the Core Element.	

Whenever a load-related bridge failure occurs, the load rating/posting is always at the center of the controversy in the discussion of fault or liability. The history in your State should be considered.			
Effect on Safety	**High** (5)	This Core Element directly affects this area.	
	Moderate (2)	This Core Element indirectly affects this area.	
	Low (0)	This Core Element has no affects on this area.	
The accurate load rating and posting of bridges has a direct impact on safety. The history in your State should be considered.			
Effect on Congestion	**High** (5)	This Core Element directly affects this area.	
	Moderate (2)	This Core Element indirectly affects this area.	
	Low (0)	This Core Element has no affects on this area.	
The accurate load rating and posting of bridges has an indirect impact on congestion on a national level. The history in your State should be considered.			
Effect on the Environment or quality is asking whether the Core Element generate influence in these areas?	**High** (5)	This Core Element directly affects these areas.	
	Moderate (2)	This Core Element indirectly affects these areas.	
	Low (0)	This Core Element has no affects on these areas.	
This item could have environmental social impacts and should be rated accordingly. Examples of such impacts are: farm equipment restricted from moving between fields due to load posted bridges, environmental justice, or one part of town having a concentration of load posted bridges.			
Potential to Effect Public Trust and Confidence is asking if this Core Element has the potential to have these effects?	**High** (5)	Public trust and confidence may potentially be eroded by the impact of this Core Element.	
	Moderate (2)	Public trust and confidence will be only nominally affected by the impact of this Core Element.	
	Low (0)	Public trust and confidence will not be affected at all by this Core Element.	
The public expects that load ratings are accurate and that load postings are timely.			
Emerging Initiatives is whether there will be new ideas, policies, or twists associated with this Core Element?	**High** (5)	This involves multiple emerging initiatives in this program.	
	Moderate (2)	This involves only one emerging initiative in this program.	
	Low (0)	This Core Element involves no emerging initiatives in this program.	
The LRFR method, the emerging revised Coding Guide, the emerging AASHTO Bridge Evaluation Manual, etc. will all influence the coding of this element.			
Other is whether there are other areas of concern related to this Core Element that are not addressed in the severity criteria?	**High** (5)	Please document criteria used to label this as “high”	
	Moderate (2)	Please document criteria used to label this as “moderate”	
	Low (0)	Please document criteria used to label this as “low”	

Total Impact Score: ____

Risk Assessment Guidance for Bridge Load Rating and Posting

Screening

- Include Bridge Load Rating and Posting in your Core Elements list to be screened.
- Begin the screening process using the Division's Likelihood and Impact Criteria. The attached tables provide additional guidance in determining the scoring context specific to bridge load rating and posting.
- Determine a score for Likelihood using the Division's scoring criteria. The attachment suggests a numerical scoring approach, but other scoring options are possible.
- Determine a score for Impact using the Division's scoring criteria.
- Determine an overall score for the Core Element based on the Impact and Likelihood scores. Use the Division's typical mathematical operation or procedure to calculate an overall score.
- This overall score will be used to compare this Core Element against other Core Elements in the Division Office for priority ranking.

Risk Assessment

- If this Core Element is one of the top scorers as determined by the Division, then develop or select from the attached menu appropriate Risk Statements. While the menu provides some suggested Risk Statements specific to bridge load rating and posting, there may be others in your state.
- Using the Division's scoring approach for Risk Statements, determine a Likelihood and Impact score for each Risk Statement.
- Determine an overall score based on the Impact and Likelihood scores. Use the Division's typical mathematical operation or procedure to calculate an overall score.
- This overall score will be used to rank and prioritize all of the Risk Statements from all of the selected high scoring Core Elements in the Division.
- At this point, the Risk Assessment is complete.

Response Strategies

- At the discretion of the Division Office, Risk Response strategies should be determined. The attached menu provides some suggested Risk Response strategies; there may be others that can be used by the Division.

CHAPTER 3
DESIGN REVIEW

PRELIMINARY PLAN REVIEW **5**
ALTERNATE DESIGNS **8**
FINAL DESIGN (AND/OR ADVANCED DETAIL PLAN REVIEW) **9**
PLANS, SPECIFICATIONS AND ESTIMATE REVIEW **13**
DESIGN EXCEPTIONS FOR THE NHS **14**
REVIEWS BY WASHINGTON OFFICE AND RESOURCE CENTER **15**
COAST GUARD COORDINATION AND NAVIGATIONAL CLEARANCES **16**
STRAHNET AND VERTICAL CLEARANCE **17**
HYDRAULICS AND SCOUR **18**
BUY AMERICA **19**
POLICY HISTORY 20
ACCELERATED CONSTRUCTION **21**
DESIGN – BUILD **21**
CONSULTANT CONTRACTS **22**
REIMBURSEMENT METHODS 23
RETAINING WALLS **25**
MOVABLE BRIDGES **27**
AESTHETICS **28**
ENVIRONMENTAL COORDINATION AND PERMITS **28**
CONTEXT SENSITIVE SOLUTIONS **31**
POLICY HISTORY 33
GEOTECHNICAL ENGINEERING AND FOUNDATIONS **34**
HISTORIC PRESERVATION **34**
POLICY HISTORY 36
VALUE ENGINEERING **36**
LIFE CYCLE COST ANALYSIS **37**
POLICY HISTORY 38
BENEFIT COST ANALYSIS **38**
FINAL SCOPE DOCUMENT/INITIAL DESIGN REVIEW GUIDELINES **40**
AESTHETICS EXPLORED IN DETAIL **51**
LOCATION AND SURROUNDINGS 51
HORIZONTAL AND VERTICAL GEOMETRY 51
SUPERSTRUCTURE TYPE AND SHAPE 52
PIER SHAPE AND PLACEMENT 52
ABUTMENT SHAPE AND PLACEMENT 53

PARAPET AND RAILING DETAILS 53
COLORS 54
TEXTURES 54
ORNAMENTATION 54

FOUNDATION REPORT OUTLINE/CHECKLIST 55

CHECKLIST AND GUIDELINES FOR REVIEW OF GEOTECHNICAL REPORTS AND PRELIMINARY PLANS AND SPECIFICATIONS 58

Preliminary Plan Review

Preliminary Plan Review is often referred to as Type, Size and Location review (commonly known as TS&L) for new and replacement structures. It refers to the type of structure selected, general size of the bridge, geometry and clearances, length and width, horizontal and vertical alignment, and the actual location of the bridge itself.

The preliminary plan reviews provide the opportunity for the Division Bridge Engineers to have major input on the type of structure being designed. Major items to be addressed include: use of high performance materials, use of new technologies, new innovative materials, opportunities for accelerated construction, unique/creative new uses of known materials, constructability, appropriateness of construction techniques, maintainability, inspectibility, cost-effectiveness, aesthetic requirements, corrosion protection strategy, improved details to eliminate existing problem areas on bridges (i.e., bridge expansion joints, fatigue prone details, bearings, etc.) hydraulic/scour analysis and deck drainage, geotechnical requirements and types of foundations. Preliminary design studies should consider the bridge location, length, width, span arrangement and superstructure system considering traffic requirements, safety measures, channel configuration, stream flow, etcetera. Feasible alternatives for a proposed bridge crossing, along with their merits and shortcomings, should be identified and discussed.

The AASHTO LRFD (Load and Resistant Factor Design) bridge design specification has a 75-year design life. For major and unusual structures emphasis should be placed on design considerations providing greater service life. All bridges should be designed with minimum future maintenance requirements. Life cycle cost analysis should be used for major and unusual structures to determine the appropriate type of materials to be used. For major and unusual structures and major interchanges, so-called Bridge Preliminary Reports should be considered to formulate the decision for the type or types of structures to advance to final design. To address accelerated bridge construction, prefabricated elements and systems should be considered at this time.

During this stage we determine the overall aspects of the bridge. We see the structure layout, substructure locations, span lengths and hydraulic opening. The bridge should provide adequate openings for the facilities and features being crossed. If an existing bridge is being replaced, we see how the new bridge compares to the old bridge. Should it be longer or shorter, and wider or narrower than the existing?

Does the site require any special construction considerations? Were certain commitments for the bridge design or actual bridge type made during the environmental process? Were context sensitive design issues explored, and/or commitments made. How can traffic be maintained during construction, whether staged construction, or by on-site or off-site detours? Staged construction may limit the available design options or require additional width. And how compatible is the design for future rehabilitation and maintenance of traffic?

A review of HBP participation and eligibility should also be made at this stage, if in fact those types of funds are being used. Special design features being incorporated for context sensitive

solutions and aesthetics may be very costly. Approach roadway costs may be excessive (Refer to the Chapter 1, "Approach Roadway Funding," for more specific information).

Major cost savings can be realized during the TS&L phase, as cost-effective and efficient material types are determined, and as decisions are made as to which designs should be further developed beyond the preliminary stage. Foundation design decisions are being finalized as to which type is most cost effective for the structure as a whole. Moreover, it is during this phase that cost effective span arrangements are determined, and structure types are chosen based on what is most cost effective for required span lengths. For traditional bridges, shorter spans are generally more cost effective if the substructure cost is low. Whereas, high substructure cost may dictate the use of longer spans for the most cost-effective design.

Here are some general guidelines for cost-effective bridge types:

Structure Type	Cost Effective Span
Box culverts	2 to 6 meters
Prestressed voided slabs	9 to 18 meters
Rolled beams	15 to 27 meters
Prestressed beams	12 to 46 meters
Prestressed bulb tees	12 to 60 meters
Plate girders	24 to 76 meters
Box girders	46 to 76 meters
Concrete arch	60 to 180 meters
Steel arch	107 to 230 meters
Steel Trusses	107 to 275 meters
Concrete segmental	90 to 300 meters
Cable stayed	180 to 600 meters
Suspension bridge	600 meters plus

Geotechnical and foundation reports should also be submitted and reviewed at this TS&L stage. However, the report may only be in draft stage at this time, or may not yet be available. The report may not be completed until the bridge design is well along, say the 60-70% stage. **Refer to Geotechnical section later in this chapter.**

Hydraulics and scour reports should be submitted at this TS&L stage for review of design adequacy. Piers and abutments that are not skewed/aligned in the direction of stream flow can substantially aggravate scour at those substructures. Geomorphologic conditions should be considered. Stream stability is an extremely important consideration, which if not considered could result in detrimental consequences to the bridge. **Refer to Hydraulics and Scour section later in this chapter.**

Non-proprietary products must be included as alternates to proprietary products, unless the following is applied. Three or more proprietary products, if known, are generally considered sufficient for contract document bidding purposes. When a sole source product or material is

deemed necessary, justification is required. That justification is essentially a public interest finding. A sole source product can also be incorporated if it is treated as an experimental feature.

Designs considerations should include the use of fiber reinforced polymer (FRP) composites technology. Design guides and specifications for such applications as FRP rods for reinforcement, Carbon Fiber Reinforced Polymer (CFRP) sheets and laminates for repairs and strengthening, and CFRP tendons for pre-tensioned and post-tensioned applications have been developed by the American Concrete Institute. Guidance for testing and acceptance of FRP decks has been developed by FHWA and is available through Turner-Fairbank Highway Research Center.

Inspection access needs to be provided on all bridges, including major bridges like arches, suspension and cable-stayed. Accessibility for inspection would need to be provided on all areas of the bridge and on those bridges not normally accessible. When inspection walkways are required, they should be shown on the preliminary plans submitted for TS&L approval. The owner should identify how the structures will be inspected, which is extremely important for major structures and major multilevel interchange structures. Sound walls on bridges can create difficulties in inspecting wide structures from the deck using a bridge master.

For projects on the NHS, the bridge railing must be successfully crash tested in accordance with NCHRP Report 350. The bridge railing must meet Test Level 3 (TL3) or greater. This requirement is provided in a paper that was presented to the AASHTO Highway Subcommittee on Bridges and Structures on May 14, 1996. An Office of Engineering memorandum dated May 30, 1997, officially transmitted that paper to the field, along with three attachments of bridge rail designs acceptable for use on Federal-aid projects. The LRFD Specifications provide the various test levels corresponding to NCHRP Report 350. Except as required per the above for the NHS and until nationally recognized selection procedures exist, the user agency determines where a feature of a demonstrated test level is appropriate for use. The LRFD Specifications identify design considerations for unfavorable site conditions like substantial truck traffic, steep downgrades, reduced curve radii, and variable cross slopes, where TL5 and TL6 crash tested railings should be used. On the Interstate for example, some states require TL5 for all new bridges; in other states TL4 is considered the norm.

Also, refer to this site http://safety.fhwa.dot.gov/fourthlevel/hardware/bridgerailings.htm for listings of accepted crash tested bridge railings. Proposed bridge railings that have not been successfully crash-tested may be approved by the Division for use on the NHS, if the railing is very similar in design to one that has been successfully crash tested, and expected to act in a crash worthy fashion. Consultation with the Washington Office of Safety Design prior to approving such a railing is highly recommended. For non-NHS projects, the State sets the standards to be used. Some states also use crash testing requirements for projects on the State-system but off the NHS.

The Americans With Disabilities Act needs to be considered on every project where pedestrian/bicycle traffic must be accommodated. The Americans With Disabilities Act Accessibility Guidelines have been adopted as standards by the Department of Justice and the Department of Transportation. A design exception to the requirements may be requested on a

case-by-case basis. In general a design exception is difficult to obtain and based on severe local conditions. Requests for design exceptions should be submitted together with a justification to the Office of Program Administration, HIPA-20, for approval. Refer to this site for more information http://www.fhwa.dot.gov/programadmin/pedestrians.html

Attached to the end of this chapter for your information and use is a design review checklist, developed by the New Jersey Division, titled "Final Scope Document/Initial Design Review Guidelines for Bridges and Structures." And here is a listing of additional design items recommended:

1. Life Cycle Costing should be done for any situation where a choice must be made for structure type.
2. Geometrics should be as simple as can be obtained, to avoid excessive design and construction effort to accommodate such things as spiral and vertical curves. Sag curves should be avoided if at all possible.
3. Continuous designs and jointless bridges should be encouraged whenever possible.
4. New technology should be encouraged where practical.
5. Rehabilitation projects should have a thorough condition evaluation report prepared before any plan detail is developed. It should be detailed and comprehensive enough to effectively design the rehabilitation.
6. Rehabilitation projects should have the goal of bringing deficient structures to acceptable standards. Steel structures should be evaluated for retrofitting fatigue prone details.
7. Rehabilitation projects should be evaluated for the use of innovative technologies to significantly extend the service life of structure elements by considering cathodic protection, electrochemical chloride extraction, and galvanic anodes. Deck overlays are cost effective strategies, however, deck replacement may be necessary.

Alternate Designs

The current regulation on alternate design appears in 23 CFR 635.411(b). That evolved following the notice on Alternate Designs for Bridges in the "Federal Register" dated August 15, 1995. That notice provides a good reference.

That notice issued a revised statement of FHWA policy on the development of alternate designs for major bridges that would be constructed with Federal-aid highway funds. The notice made the new policy on the use of alternate bridge designs optional. Thus, alternate designs may be used by the State Highway Agencies at their discretion.

Alternate bidding is a method used to minimize the overall cost of Federal-aid projects through increased competition. In theory, allowing alternate designs and/or construction methods will attract the greatest number of bidders and result in the lowest possible bid prices.

Alternate bidding procedures should be used when more than one alternate is judged equal over the design service life and there is a reasonable possibility that the least costly design approach

will depend on the competitive circumstances. The potential for using alternates will normally be developed through design studies and value engineering analysis during project development. Careful consideration should be made, as anticipated savings should justify the costs for additional designs.

The bidding documents and contract plans should clearly indicate the design criteria and the type of alternate designs or contractor options that will be acceptable. The contractor should be permitted to bid any designated alternate that is consistent with their expertise and equipment.

Note: As further background, from December 1979 to August 1995, FHWA policy required the development of alternate bridge designs for major bridge structures that were estimated to cost more than a specified dollar amount (initially $5 million, then revised to $10 million in June 1988). That policy was established to get the best possible value in an unstable market by requiring alternate bridge designs. The analysis of cost data from 1979 through 1987 indicated that the alternate bridge design policy resulted in an average savings of $2 million for each major bridge project. Although that policy was effective in providing large savings in the design and construction of major structures, it was discontinued on August 15, 1995. The revised FHWA policy allows States to use their discretion in providing alternate designs where appropriate.

Final Design
(And/Or Advanced Detail Plan Review)

Final Design plans are generally prepared to provide a formal review of the structure as it progresses. This is to review the design before it gets too far along, and to ensure that the design is within the scope of the project. There is no Federal requirement that Final Design plans be developed or submitted to the FHWA; however, the State generally prepares them. There may be a formal agreement between the State and the FHWA Division, regarding their development and submittal at specific stages of completion (e.g. 60% and 90% plans). Review of Final Design Plans and resolution of review comments can expedite the review of the Plans, Specifications, and Estimate packets when submitted for approval.

For major projects it is recommended that the Division Bridge Engineer (DBE) be an active participant in design meetings between the state and the design consultants to address design issues in a timely manner. In addition, the DBE can advocate and provide guidance on FHWA requirements for major projects. At these meetings, the DBE should take the opportunity to promote the use of innovative technologies to extend the service life of the new structures and accelerated construction techniques to minimize construction project duration and the impact on the traveling public.

Below is a listing of appropriate design guidelines for Final Design plans, many of which should also be considered during preliminary plan review. Consideration must be given to future inspection needs, maintenance and rehabilitation of these structures. Polices should be employed, considering best practices, and necessary compromises to balance economic, environmental and bridge-specific goals.

1. Designs should reference the appropriate AASHTO Specifications including subsequent interim Specifications.
2. The design should reference the appropriate AASHTO Guide specifications.
3. Preliminary studies should check girder spacing, related to span arrangement, for optimum design.
4. The minimum vertical clearance being provided should be shown on the plans.
5. Deck cross slopes should not be less than 2% for drainage purposes.
6. Provisions should be made for corrosion protection for deck reinforcement and corrosion protection strategies for all structural elements, with particular emphasis in aggressive situations and/or environments such as decks subject to deicing salts, and bridges subject to heavy salt spray or located in marine environments.
7. Using available technology, decks should be designed to last the life of the bridge. The use of waterproofing membranes and/or surface overlays to maintain deck durability is cost effective.
8. Consideration should be given to minimizing the number and types of bearings. In addition, consideration should be given in the design for the possibility of future bearing replacement. Replacement of bearings implies the use of jacks to lift the superstructure off the permanent bearings. The position of these jacks, and allowable jack loads should be indicated on the drawings. The distribution reinforcement to accommodate the jack loads should be provided in the top of the piers and the soffit of the superstructure. Further, the transverse analysis of the superstructure should consider the relocation of reactions when the jacks are engaged to replace the permanent bearings.
9. Elimination of bridge deck joints should be considered in any alternate that is studied, as leaking joints are the major causes of deterioration of superstructure and substructure elements.
10. There are non-proprietary expansion joints (i.e., Finger Joints) that are acceptable alternates to proprietary joint systems.
11. The latest AASHTO Specifications, with Charpy V-notch toughness requirements where required, should be used to specify structural steel.
12. The use of High Performance Steel should be considered wherever appropriate.
13. Special considerations should be given to eliminating fatigue prone details and using improved fatigue connections. To reduce the effects of out-of-plane bending in girders, all the vertical connection plates for cross frames and diaphragms should be rigidly connected to both top and bottom flanges of the beam or girder.
14. Generally, the minimum fillet size called for in ANSI/AASHTO/AWS Bridge Welding Code should control the fillet size and need not be shown on the plans unless a larger weld is required for stresses.
15. Consideration should be given to allowing a contractor the option to use all bolted connections for cross frames and diaphragms in lieu of the welded connections.
16. Consideration should be given to allowing a contractor the alternative of providing a thicker web plate and eliminating the need for stiffeners on plate girders.

17. High Performance Concrete should be considered for all applications. In addition, the use of light weight high performance concrete and self-consolidating concrete should be considered as appropriate to reap their benefits.
18. The U.S. Coast Guard approval for navigational clearances should be submitted along with the preliminary plans for our review.
19. An inspection and maintenance guide for the future operation of each major or unusual bridge should be developed for the owner along with the development of design and construction plans.
20. The State should require formal constructability and maintainability reviews by the designer (State or consultant) to determine the practicality and feasibility of erection/construction of the structure as assumed in the design as well as adequacy for future maintenance.
21. Design of the structure and preparation of contract documents should include a thorough integrated drawing review to determine that the mild reinforcing and prestressing steel layouts shown on the plans do not present congestion problems that will hamper placement of concrete. The integrated drawings should be of a sufficiently large scale to enable the designer to detect any conflicts and congestion. Self-consolidating concrete should be considered for highly congested areas of reinforced and/or prestressing steel.
22. A Load Rating Analysis should be performed for all new and rehabilitated structures. This will meet NBIS requirements as well, to have current load ratings for all structures. Load Rating Analysis of some special structures, like segmental precast and CIP structures, CIP arch structures, and other structures where the as-built structure may differ from the final design plans should be based on the as-built plans.
23. Details should be sufficient to develop shop drawings.
24. Field welding should be avoided whenever possible on structural members.
25. Drainage scuppers should be avoided over traffic.
26. Drainage in many instances can be taken off the bridge itself, and handled at the end of the bridge.
27. Drainage systems should provide “clean outs” or easily maintainable details, avoiding details like pipes cast into piers or closed drainage behind backwalls. Recesses for drainage pipes in piers and abutments can improve the aesthetics of the unsightly drainage systems.
28. Deck pour sequence should be clearly shown and performed in such a way as not to damage the bridge (e.g. eccentric loading on arches, overstressing negative moment areas).
29. A fracture control plan should be provided with all fracture critical bridges.
30. Try to avoid fatigue prone details such as cover plates. Also, it is good design practice to identify on the plans, fatigue prone details with Category D, E, E’ weld details, as this will help the bridge safety inspectors inspecting fatigue prone details.
31. Fill sequencing or dynamic foundation methods should be clearly shown and logically performed to prevent damage to the bridge (e.g. large fills placed and left in place for a period of time before pier/abutment piles are placed).
32. Ensure that all bolted splices for main members are designed as slip critical connections.
33. All pinned details should be avoided.

34. Staging should be done in such a manner that eccentric loadings will not, or will only marginally affect substructure designs (e.g. very large footings that are designed simply to accommodate staging). In addition, for longer span structures, special consideration should be given to deck placements and differential deflections between the constructed superstructure phase and the phase under construction, and the need for a deck closure placement between phases.
35. Seismic loading must be considered in such a way that excessive and unnecessary stiffness does not result in oversized footings or substructure connections with superstructures.
36. In seismic areas, ensure that the column reinforcement is such that upon column rupture the concrete is contained within the reinforcing cage.
37. In seismic areas, ensure that beam seats are adequately sized to prevent drop off of the superstructure.
38. In seismic areas, ensure that bearings can dissipate energy. In all cases avoid rocker/pedestal bearings.
39. Streams carrying debris should be identified and substructure units should be designed accordingly to facilitate effective passage of the debris.
40. Avoid welding constraints such as intersecting welds.
41. Ensure that reinforcing steel lap length is either noted or shown on the plans.
42. Ensure that reinforcing has the proper embedment length (e.g. length from top of pier into the pier cap)
43. Ensure that pile embedment length within the footing is shown.
44. Ensure that any down drag on piling is accounted for in the design.
45. For integral abutments, ensure that piling is arranged in such as way to accommodate translational movement.
46. For semi-integral abutments, ensure that they are detailed properly to allow for movement and to protect the fill behind the abutment.
47. Ensure that environmental conditions are conducive to the use of the material chosen (e.g. avoid a continual wetting environment for weathering steel)
48. Ensure that for curved girders the cross framing is designed as a primary member. Also, any field welding of curved girder cross framing for erection should be inspected, and tested using non-destructive methods, in accordance with the Bridge Welding Code.
49. Ensure that piers have the proper protection (e.g. dolphins for piers in the navigable channel, and crash walls for piers near railroads).
50. Verify that beam seats and deck evaluations appear reasonable and logical (i.e., superelevations and crowns agree at piers and abutments).
51. Any backup bars should be removed and ground smooth after welding operations.
52. Low maintenance details should always be incorporated on bridges (e.g. exposed steel should not pond water, and snow removal should be easy).
53. For any unusual details, or those unfamiliar, get RC or Headquarters assistance.
54. Structures relying on earth fill for their stability should have the fill sequence shown or explained on the plans.
55. Structure demolition procedures should be engineered (e.g. removing prestressed superstructures, removing decks on spandrel arches, removing decks on post tensioned structures.)

56. The proper design of crown sections for adjacent concrete box girders should provide for uniform contact along the face of the girder. Either a tapered vertical shear key or a sloped face on the girder wall can be specified.
57. Variance of cambers in prestressed girders can be accommodated through varying the haunch or varying the deck thickness. However, this would need to be anticipated in the design of the superstructure. It is difficult to reasonably place tight design tolerances on camber, without associated costs being passed along to the owner and becoming excessive. Negative camber should be avoided.

Plans, Specifications and Estimate Review

At this stage of project development, the Plan, Specifications, and Estimate (PS&E) package for a project is submitted for review and approval. A typical PS&E package will include a set of the completely detailed project plan sheets, the project contract proposal, and a copy of the design engineer's construction cost estimate. The package may include other items such as right-of-way certificates, environmental permit applications, or other documentation specific to the project. The PS&E review consists of examining the submitted package for consistency with the project's scope of work, conformity to acceptable engineering design and construction practices, Federal-aid eligibility, environmental compliance, and adherence to all appropriate Federal rules and regulation. The review also ensures that all previous comments, such as those made at the Advanced Detail Plan (ADP) review have been satisfactorily resolved. In some instances, ADP's may not have been submitted, thus the PS&E review represents the initial evaluation of project plans. Once PS&E approval has been granted, the project can be authorized to proceed to construction. If outstanding issues arise during the PS&E review, a request can be made to resolve the issues prior to granting PS&E approval or the PS&E can be approved with conditions placed on the project authorization, which must be satisfactorily addressed prior to the award of the contract. Sometimes, the State needs to issue addenda to resolve certain aspects of the contract package. The State Highway Agency shall provide assurance that all bidders have received all issued addenda. Addenda for projects that require FHWA oversight must be approved by FHWA because they represent a change to the approved PS&E.

Guidelines for preparing the PS&E are found in the non-regulatory supplement of 23 CFR 630, Subpart B. Section 4.c.6 of that supplement pertains to bridges, and therein includes a listing of several items that should be included in the contract plans for bridges.

a. A site plan,
b. Location and log of each foundation sounding or boring indicating the results of the subsurface explorations,
c. A profile of the crossing,
d. Typical cross section,
e. Sectional drawings, as needed, to detail structure completely,
f. Quantities of materials required,
g. Reinforcing bar list and bar bending diagrams,
h. Design loadings, stresses, class(es) of concrete, and grade(s) of steel,
i. Drainage area and applicable runoff of hydraulic properties,

j. Design and construction details, and all other details essential to completeness, and,
k. Reference to applicable specifications.

References:

- FAPG, Subchapter G, Part 630, Subpart B, Plans, Specifications and Estimates and Non-regulatory Supplement
- FAPG, Subchapter G, Part 635, Subpart A, Contract Procedures and Non-regulatory Supplement
- FAPG, Subchapter G, Part 635, Subpart C, Physical Construction Authorization and Non-regulatory Supplement

Design Exceptions for the NHS

For projects on the NHS, formal approval is required for 13 controlling criteria: design speed, lane and shoulder width, bridge width, structural capacity, horizontal and vertical alignment, grade, stopping sight distance, cross slope, superelevation, and vertical and horizontal clearance. On FHWA-oversight projects, FHWA approves design exceptions. On State-oversight projects, the State approves design exceptions. Design features are generally improved upon as much as is feasible, when considering the approval of the design exceptions.

For bridges, the most applicable criteria are bridge width, structural capacity, and vertical clearance

Bridge width - The criteria contained in 23 CFR 625 apply in determining the width of all bridges to be constructed, reconstructed, or rehabilitated on the NHS. For rehabilitated bridges on non-freeway NHS, the provisions in 23 CFR 625 dealing with 3R projects (i.e. Resurfacing, Restoration, and Rehabilitation) may be applied (in other words, State DOT design criteria as approved by FHWA).

Structural Capacity - All new bridges on the Interstate system shall have at least an HS-20 structural capacity (*A Policy on Design Standards - Interstate System*). Rehabilitated bridges on the Interstate System should have an HS-20 structural capacity (*23 CFR 625, Non-regulatory supplement*). For all other projects on the NHS, refer to the AASHTO standards.

Vertical Clearance - Interstate System: 4.9 meters for rural interstates; 4.3 meters is allowed in urban areas when a 4.9 meter single route is provided (*A Policy on Design Standards - Interstate System*). For all other NHS, 4.9 meters should be provided; a minimum of 4.3 may be provided if there is one route with 4.9 meter clearance (AASHTO “Green Book”). The vertical clearance to sign trusses, pedestrian overpasses and to cross bracing of through-truss structures should be 5.2 meters.

For horizontal clearance, consult the AASHTO Green Book for guidance and the various cases provided for what would be the appropriate design based on the particular situation involved.

For projects on the NHS, bridge railing must be successfully crash-tested in accordance with NCHRP Report 350. The bridge railing must meet Test Level 3 (TL3) or greater. For more information, see the last paragraph in the Preliminary Plan Review section.

Reviews by Washington Office and Resource Center

The Office of Bridge Technology (HIBT) and the Resource Center will assist in the review of projects at the request of the Division office. HIBT has retained responsibility and approval authority of preliminary plans for unusual bridges and structures on the Interstate System. This is by policy memorandum dated November 13, 1998. Specific definitions for what is meant by unusual bridges and unusual structures are found in that memorandum. Early and complete submissions are requested in order to facilitate more meaningful and expeditious reviews and approvals. This generally is not a problem, but on occasion, projects may come into the Division Office at a late date due to unforeseen circumstances, such as when a State Highway Agency (SHA) decides to change to Federal-aid funds during the plan development stage.

This policy on Headquarters review pertains to rehabilitation projects as well as new structures. The policy provides for delegation, upon consultation with Headquarters, when substantial and adequate experience in the Division office or Resource Center is available.

Oversight of Federal-aid projects in the Division Office is determined based on the stewardship agreement between the SHA and the Division. So, for example, projects estimated to cost below a certain dollar value on the Interstate System might not be subject to the Division office's detailed review of plans.

For preliminary review of unusual structures, HIBT requires the feasibility study and bridge type and cost study report (could be combined or separate studies). The feasibility study discusses the feasible location for the proposed structure and considers the highway needs, alignment, traffic volumes, alternatives, grades, terrain, geology, soil, navigation obstacles, and etcetera. The bridge type and cost study lays out all the feasible types of structures suitable for the size, location, terrain, and span openings and compares the costs for each type of proposed structure.

Preliminary Plans sent to HIBT for review should include all of the following, as applicable, at time of submission:

- Selected type of structure with alternates (if any)
- Plan and profile for approaches and main span
- Typical cross sections for approaches and main span
- Bridge geometry (line, grade, width and total length)
- Design criteria and specifications
- Seismic design criteria

- Method of construction (precast, cast-in-place, span-by-span, balance cantilever)
- Incremental launching, falsework, etc.
- Cable anchorages and corrosion protection system, if applicable
- Proposed substructure and foundation type
- Hydraulic design data
- Scour estimates and mitigation measures
- Geotechnical data

The Resource Center (RC) is always available to assist the Divisions with the review of design plans. Although there is no established policy on which projects to coordinate and how often, the Divisions are encouraged to take advantage of the specialty areas in which the RC can offer technical assistance. These areas include complex structures, LRFD for conventional structures, seismic design, high performance materials, finite element modeling, complex foundations, hydraulics/scour analyses, and geotechnical reports and exploration requirements. All requests for plan reviews are to be sent to the RC Structures Team Leader for distribution to the appropriate Team Specialist. RC specialists are available to review structural plans and attend project design meetings, visit construction project sites and research technical issues in order to resolve problems. We should utilize their experience and expertise as much as possible.

Coast Guard Coordination and Navigational Clearances

Guidance for United States Coast Guard coordination for Federal-aid projects is found in 23 CFR 650, Subpart H. The United States Coast Guard (USCG) has jurisdiction over all navigable waters. The USCG essentially requests early coordination with them on a project. As mentioned in the last paragraph of this section, the SHA generally does this coordination. Specific concerns that the USCG may have can easily be learned by contacting them. While certain types of work may not require an actual permit, the USCG may have some other concerns that would need to be addressed during the construction of the project for the safety of navigational traffic, even if that traffic is non-commercial in nature. For example, they may require navigational signals, signs, or notices to local mariners and to alert recreational boaters during certain phases of construction. For rehabilitation projects, deck widening may or may not require a permit, depending on the extent of the widening.

As indicated in 23 CFR 650.805, the FHWA has the responsibility under 23 U.S.C. 144(g) to determine that a USCG permit is <u>not</u> required for bridge construction on certain waterways for Federal-aid projects. These particular waterways are described as: "(1) Those which are not used or are not susceptible for use in their natural condition or by reasonable improvement as a means to transport interstate or foreign commerce, and (2) which are a) non tidal, or b) if tidal, used only by recreational boating, fishing and other small vessels less than 6.4 meters in length." The SHA generally assists in providing the necessary backup information and support for FHWA to make this determination. A permit is not required if the above criteria are met and the FHWA has made that particular determination. As mentioned in the preceding paragraph, coordination is still necessary to address the USCG's concerns.

For non-navigable waterways, the USCG does not need to be contacted. When in doubt about this issue, the SHA or FHWA should consult with the USCG. A phone call should suffice. However, the SHA or FHWA may in fact be interested in written correspondence from the USCG, stating for the record that it is a non-issue.

The Division office can delegate the coordination aspects to the SHA, and this is generally the case. However, the determination that a bridge permit is not required, for those waterways as explained above, cannot be delegated. This determination is in writing, and should be provided to both the SHA and the USCG.

South Carolina best practice: Tidal crossings that have less than 1.5 meters of depth at low tide are typically exempt from USCG permit.

STRAHNET and Vertical Clearance

The STRAHNET (Strategic Highway Network) requires a minimum vertical clearance of 4.9 meters. As defined in 23 CFR 470.107, it includes highways which are important to the United States strategic defense policy and which provide defense access, continuity, and emergency capabilities for the movement of personnel, materials, and equipment in both emergency and war time. The STRAHNET is determined by the Surface Deployment and Distribution Command (SDDC --- previously MTMCTEA). It is about 98,167 km, including the 73,062-km system of Interstate and Defense Highways, and 25,105 km of other important public highways. STRAHNET connectors (about 2736 km) are additional highway routes linking over 200 important military installations and ports to the STRAHNET. With special national security authorization, STRAHNET maps can be accessed on the web.

A September 17, 1999 memorandum from Director of Program Administration reminded us of the 4.9 meter vertical clearance requirement, and the need to continue to coordinate any proposed design exceptions with the MTMCTEA (now the SDDC), for their concurrence. The memorandum instructs us, as required per agreement between FHWA and SDDC, to coordinate all exceptions to the 4.9 meter vertical clearance standard for rural Interstate routes and the single routing in urban areas. On other urban routes (where the 4.3 meter vertical clearance standard applies), there is no requirement to neither coordinate with nor notify the SDDC.

One of our Strategic Objectives is to improve routes on the STRAHNET and STRAHNET connectors. The FY04 National Performance Plan Objective under National Homeland Security directed us to ensure that highway infrastructure and operations support military deployment from forts to ports. FHWA's current focus is mainly on improving the conditions of the system associated with the key military installations.

The clearly established goal is to provide unobstructed defense deployment and mobilization. As such, each SHA needs to evaluate critical bridges for vertical clearance and load rating issues, and to develop their programs to accomplish this. In some states, vertical clearance improvement is generally being accomplished without a wholesale systematic plan of action, and through normal project programming, bridges with insufficient vertical clearance are being

considered in a State's general program of bridge improvement. In other states however, more intensive programs are or could be established to meet these goals.

Hydraulics and Scour

Sometimes, highway projects involve hydraulic structures where technical assistance from outside the Division Office is necessary. For example, a highway may be located on a structure that impounds water (a dam). Also, pumping stations may be required in some cases where highway drainage by gravity alone is not sufficient. Refer to the section titled "Reviews by Washington Office and Resource Center" earlier in this chapter for approval authority and policy memorandum dated November 13, 1998. On FHWA-administered projects, or when requested by the State DOT, assistance from the Resource Center should be sought when these types of structures are encountered. When the Division Bridge Engineer has experience with these types of structures, assistance from the Resource Center may not be needed.

Scour is a critical component of the hydraulics field, and is a major consideration when a highway structure over a waterway is replaced or rehabilitated. The Division Bridge Engineer should have attended the NHI course entitled Stream Stability and Scour at Highway Bridges (Course Number 135046). The reference material for this course primarily consists of HEC-18, entitled "Evaluating Scour at Bridges," and HEC-20, entitled "Stream Stability at Highway Structures."

All existing highway bridges over water must be screened and, if necessary, analyzed for their scour potential. Nationally, with a few exceptions (tidal and unknown foundations), this effort has been accomplished. Once the bridge is analyzed, it may be found to be scour critical. Once a bridge has been identified as scour critical, a plan of action is required. The State DOT may decide to install countermeasures. The installation of scour countermeasures is eligible for HBP funding. Or there may be an upcoming project to replace or rehabilitate a scour-critical bridge. In this case, the State DOT may forgo installing countermeasures and instead include this in a plan of action for monitoring scour-critical bridges.

During the review of plans for highway bridges over waterways, study the plans and accompanying design reports to determine whether all of the foundations that may be subjected to scour have been designed accordingly. Ask yourself the following questions:

- Are the foundations shallow or deep? Given the conditions at the site, should deep foundations be used where shallow foundations are shown?
- Does the foundation depth look adequate for the conditions at the site?
- Does the foundation look adequate given the potential for loss of lateral support from the soil surrounding the elements when scour occurs?

The above are the common types of issues that would be encountered on new or replacement bridge projects.

Buy America

The 23 CFR 635.410 (as amended by enactment of the 1991 ISTEA), contains the basic rule for Buy America coverage. All Federal-aid construction projects must either require no permanently incorporated steel and/or iron materials, or require that all steel and iron materials used in the project be manufactured in the United States. "Manufactured in the United States" means that all manufacturing processes starting with the initial mixing and melting through the final shaping and coating processes must be undertaken in the United States.

The only exceptions permitted are: 1) If the State permits alternate bids for foreign vs. domestic steel and iron materials, and the total bid for the contract using foreign steel and iron materials is lower by more than 25 percent than the total bid using domestic source materials; 2) If the amount of foreign steel and iron materials is minimal, meaning it does not exceed 0.1 percent of the total contract value, or $2,500, whichever is greater; or 3) If the FHWA approves a State requested waiver to permit use of foreign steel and/or iron materials.

Guidance given to the FHWA field offices regarding Buy America application follows:

1) All steel and iron materials are covered by Buy America regardless of the percentage they comprise in a manufactured product or form they take.
2) Minimal amounts of foreign steel and iron materials - less than $2,500 total for steel and iron materials per project, or 0.1 percent of the total project value, whichever is greater - may be used on Federal-aid projects.
3) The manufacturing process for steel or iron materials is complete, and a steel or iron product/component is produced when all grinding, drilling, and finishing of the steel or iron material has been accomplished. The steel or iron product may then be ready for use as such (i.e., fencing, posts, girders, pipe, manhole cover, etc.) or may be incorporated as a component in a further manufacturing process (i.e., prestressed concrete girders, reinforced concrete pipe, traffic control devices, bearing pads, etc.).

   Example: shapes produced domestically from foreign source steel billets are not acceptable under Buy America since the initial melting and mixing of alloys to create the steel occurred in a foreign country.

   Example: all welding must take place domestically since the welding rod is an iron/steel product and the welding process substantially alters the rod.

4) Applying a coating to a finished steel or iron product/component is now subject to Buy America. Coating includes epoxy coating, galvanizing, painting, and any other coating that protects or enhances the value of the coated steel or iron product/component.
5) A product containing both steel and/or iron components and other components, may be assembled outside the United States and meet Buy America requirements if the constituent steel and iron components (in excess of the minimal amounts permitted) were manufactured domestically and are not modified at the assembly location prior to final assembly.

6) Likewise, the final product could be assembled in the United States of foreign and domestic source components, provided that the "value as delivered to the project site" of the foreign components includes some pro-rata share of the shipping, assembly and testing costs.
7) With prior concurrence from Headquarters, the FHWA Division Administrator may grant a waiver for a specific product, project, geographic area, or combination if:
    a. following the Buy America requirements would be inconsistent with the public interest; or
    b. sufficient quantities of satisfactory quality domestic products are not available.
    c. Only the Federal Highway Administrator may grant nationwide waivers, usually through the public rulemaking process.

A Nationwide waiver for specific ferryboat equipment was granted in the February 9, 1994 Federal Register. The waiver covered marine diesel engines, electrical switchboards and switchgear, electric motors, pumps, ventilation fans, boilers, electrical controls, and electronic equipment. Items not specifically covered by the waiver are subject to Buy America requirements.

A nationwide waiver for pig iron and processed, pelletized, and reduced iron ore was granted in the March 24, 1995 Federal Register. This waiver allows the use of foreign pig iron and processed, pelletized, and reduced iron ore to be incorporated into domestic steel and/or iron products that are used in Federal-aid projects. The waiver also permits foreign source raw alloys to be incorporated into domestic steel and/or iron products that are used in Federal-aid projects. The waiver was granted because of insufficient quantities of quality domestic pig iron; processed, pelletized, and reduced iron ore; and raw alloys.

Policy History

There are two separate and distinct domestic purchase programs that affect FHWA operations. The first program was created in 1933 as the "Buy American" policy for all direct Federal procurements; this program affects the Federal Lands highway program. The second program was created in 1982 as the "Buy America" requirements for the Federal-aid highway program. "Buy America" focuses on iron and steel products while "Buy American" affects procurement of approximately 100 products. The two programs have very different requirements and processes.

The Surface Transportation Assistance Act of 1982 (STAA), Section 165 contains the basic Buy America statute applying to Federal-aid highway construction projects. Section 165 requires that Federal-aid funds may not be obligated for a project unless steel, cement and manufactured products used in such projects are produced in the United States.

FHWA published the final rule implementing Section 165 in the January 17, 1983 Federal Register. In the preamble, FHWA noted that its previous Buy America regulation had never covered "all manufactured products" and Congress had not specifically directed a policy change in the STAA. Therefore, the FHWA found it in the public interest to waive the Buy America requirements for all manufactured products except steel manufactured products.

Cement was deleted from the list of products by P.L. 98-2299 enacted March 9, 1984.

Sections 1041(a) and 1048 of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 further expanded Buy America coverage to include iron and clarified Congressional intent that the application of a coating is a manufacturing process.

Accelerated Construction

The FHWA is promoting the use of accelerated construction to reduce the time it takes to construct highways and bridges, and to minimize congestion and improve safety in work zones. Accelerated construction aspects can be found in the construction techniques/operations themselves, through innovative financing, contract administration, materials of construction, innovative processes and practices, design, maintenance and protection of traffic, and increased communication with the public. For a more thorough and better understanding of this concept please refer to this site: http://www.fhwa.dot.gov/bridge/accelerated/index.htm

For Bridge Engineers specifically, the accelerated construction arena can include: the use of prefabricated bridge elements and systems, the use of temporary bridges and off-site detours, improved staging operations, the use of innovative materials that gain high strength quickly, and the use of innovative and durable materials to reduce the frequency of future work zones.

Use of prefabricated bridge elements and systems means that time-consuming formwork and construction, curing, and other associated fabrication tasks can be done off-site, and in a controlled environment without affecting traffic. Use of prefabrication techniques allows the bridge elements to be taken out of the critical path of the project schedule. Work can thus be done ahead of time using as much time as necessary. A controlled environment reduces dependence on weather, and allows an increased measure of quality to be built into resulting elements and systems. All bridges that use prefabricated elements and systems can increase the quality of the structure; most also lower life-cycle costs.

The use of temporary bridges and off-site detours provides for more speedy construction operations by removing traffic from the construction zone. Well thought out and improved staging operations can result in reduced construction time. Use of materials with early strength gain will allow for an increased speed of construction phasing. And the use of more durable materials and bridge elements will provide longer lasting bridges, thereby reducing the frequency of future work zones. All of the above serves to reduce work zone accidents and improve work zone safety, either directly or indirectly.

Design – Build

FHWA's policies and procedures for design-build projects are contained in 23 CFR Part 636, and additional information can be obtained at the following FHWA website for Design Build: http://www.fhwa.dot.gov/programadmin/contracts/d_build.htm

The Deign-build concept allows the contractor maximum flexibility for innovation in the selection of design, materials and construction methods. With design-build procurement, the contracting agency identifies the end result parameters and establishes the design criteria. The prospective bidders then develop design proposals that optimize their construction abilities. The submitted proposals may be rated by the contracting agency on factors such as design quality, timeliness, management capability and cost. These factors may be used to adjust the bids for the purpose of awarding the contract.

By allowing the contractor to optimize its work force, equipment and scheduling, the design-build concept opens up a new degree of flexibility for innovation. However, along with the increased flexibility, the contractor must also assume greater responsibility. Extended liability insurance or warranty clauses may be used to ensure that the finished product will perform as required.

From the contracting agency's perspective, the potential time savings is a significant benefit. Since the design and construction are performed through one procurement, construction can begin before all design details are finalized. For example: pile driving could begin while bridge lighting is still being designed. Because both design and construction are performed under the same contract, claims for design errors or construction delays due to design errors are not allowed, and the potential for other types of claims is greatly reduced.

The design-build method of contracting is an alternative to the traditional design-build contracting method but it should only be used for projects that fit the design-build process. The contracting agency must adequately define the scope of work prior to the request for proposals. A design-build project should have a strong creative design component. Relatively simple projects, such as roadway resurfacing or minor roadway widening projects, do not provide significant design components, and are not the ideal type of projects for design-build. The design-build method will assist an agency in expediting the project delivery process; however, the primary reasons for using the design-build method should not be the obligation of funds or a means for compensating for inadequate state personnel resources.

Section 1307 of the 1998 Transportation Equity Act for the Twenty First Century (TEA-21) required FHWA to develop design-build regulations. The FHWA published a Notice of Proposed Rule Making for design-build contracting in the October 19, 2001 Federal Register. A final rule was published February 19, 2003, and was effective January 9, 2003.

Consultant Contracts

FHWA guidance on procurement and administration of design-related consultant contracts is contained in 23 C.F.R. Part 172. This regulation covers contracts related to construction projects only. The guidance does not apply to planning or research contracts. An excellent source of additional guidance can be obtained at the FHWA Consultants Webpage: http://www.fhwa.dot.gov/programadmin/consultant.html

As mentioned in the previous section, guidance for Design Build contracts is contained primarily in 23 CFR Part 636. And additional information can be obtained at the FHWA website for Design Build: http://www.fhwa.dot.gov/programadmin/contracts/d_build.htm

In general, the procurement of engineering services for construction projects is done through a qualification-based process based on the Brooks Act. (See 40 USC Chapter 11, sections 1101 to 1104.) This Act requires that contracts be advertised and companies ranked based on published criteria for competence and qualifications. Once the top firms have been rated, negotiations begin with the top rated firm. If the type of professional services required cannot be agreed upon at fair and reasonable prices, the agency can proceed to negotiate with the next highest qualified firm.

The Brooks Act allows for procurement using Competitive Negotiation; Small Purchase (less than $100,000, or according to State Statute); Noncompetitive Negotiation, or State Statutory Procedures. If you use the Small Purchase option, the procedures do not have to follow the requirements of the Brooks Act.

Competitive negotiation is the preferred method of procurement for engineering related services and is based on the Brooks Act. As stated in the Brooks Act, the congressional intent is to publicly announce all requirements for architectural and engineering services, and to negotiate contracts for architectural and engineering services on the basis of demonstrated competence and qualification for the type of professional services required and at fair and reasonable prices.

Reimbursement Methods

All payment methods that take into account the scope, complexity and estimated value of the professional services as required by the Brooks Act are allowed. The two listed exceptions in 23 CFR 172.5(C) are the cost plus a percentage of the cost and percentage of construction cost. Those two methods cannot be used.

Commonly used methods include:

- Specific rates of compensation, or Time and Materials (TAM)
- Firm Fixed Price, or Lump Sum (LS)
- Actual Cost Plus Fixed Fee (CPF)
- Cost per unit of work (CPU)

Time and Materials payment is used for service-related task orders, for example in On-call, or Flexible Services (Agreement to Agree) contracts. For each hour worked the consultant staff is reimbursed at a loaded rate that combines wages, overhead, benefits, and profit. The contract

normally includes reimbursement for other direct costs identified in the task order, such as reproduction, vehicles, travel, etc., at the rates established in the contract.

Lump Sum payment provides for a either a full payment upon receipt of a deliverable, or for percentage progress payments based on a schedule in the contract. The contract amount is the agreed lump sum for work completed and accepted. This payment method is used when the scope of work and required hours and direct costs are well known and agreed by the contracting authority and the consultant.

Actual Cost plus Fixed Fee payment provides for reimbursement for actual costs incurred and documented, and for an additional predetermined amount as a fixed fee. The fixed fee is not adjustable for the life of the contract except where there is a significant change in the scope of work, in which case the fee may be renegotiated. The method is used when the extent, scope, complexity, character, or duration of the work is indeterminable at the time of negotiations. It is sometimes used when the work is such that the State lacks experience or previous knowledge needed to evaluate the consultant's proposal or to support an Actual Cost plus Fixed Fee amount.

Cost per unit of work payment is used when the cost per unit of work can be determined with reasonable accuracy in advance of the work being performed, but when the extent of work is indefinite. This method is used occasionally for work orders in on-call or flexible services contracts.

Overhead rates, indirect costs, and direct costs are all subject to either pre-award and post-work audits, in accordance with 23 U.S.C. 112(b)(2)(A).

Retaining Walls

A retaining wall in general terms is a structure that provides lateral support for a mass of soil. They are used in areas where normal earth slopes cannot be provided. A properly designed retaining wall ensures the structure will not fail by overturning, sliding, excessive settlement, excessive bearing pressures or pile capacities. The structure itself needs to provide the necessary adequate strength to resist the applied earth and live loadings and surcharges.

Discussed in the following paragraphs, common retaining walls are cantilever type, steel sheeting, H-pile and lagging systems, and gravity type walls, all of which provide external support to the soil mass. Several innovations in types of retaining walls have since become available, using inherent characteristics or reinforced soil as part of the support system.

Cantilevered walls are by far the most common type of retaining wall used. As such, it is important to achieve as much efficiency in its design as possible. They consist of a spread or pile supported footing that supports a relatively thin concrete stem that is structurally reinforced vertically along the back face. Cantilevered retaining walls remain stable due to their own weight and the weight of the soil located over the heel of the footing.

Cantilevered sheet pile retaining walls consist of a series of interlocking structural shapes that are set into the ground to a sufficient depth to mobilize enough passive earth pressure to withstand the active pressure from the retained soil. The structural shapes are most commonly made of steel and driven into the ground. Concrete shapes have also been used and jetted in place.

A soldier pile and lagging wall system consists of two main structural parts, the piles and the lagging. The piles are driven into the ground or set into augered holes at regular spacings and to a sufficient depth so as to mobilize enough passive earth pressure to withstand the lateral load from the retained fill. That lateral backfill load is transferred to the piles through the lagging which spans horizontally between the piles and behaves like a simple beam between two supports. The piles are commonly steel H-piles and the lagging could be heavy wood timbers or precast concrete panels

Gravity retaining walls have also commonly been used. These are large masses of concrete or masonry that have nominal to no structural reinforcement in the back face of the stem. This type of retaining wall depends on its own large self weight to provide the lateral support to resist overturning forces. A large plan area at the base provides bearing on the soil or it may be pile supported.

The gabion wall falls under the general heading of gravity type wall systems. Gabions use wire-mesh baskets, and are filled with rocks to provide the necessary weight and stability. The wire mesh is generally vinyl coated or galvanized. These units are usually stacked on top of each other to create the retaining wall. They are susceptible to damage from debris or ice flows in high water conditions, and to corrosion of the wire mesh.

Anchored wall systems have been used where it is difficult to attain sufficient embedment to provide cantilever support for a retaining wall. These systems consist of tie-back mechanical anchoring devices, wire strands, steel bar tendons, or soil anchors that develop their capacity by mobilizing the passive resistance of the soil behind the wall. Anchors receive their resistance either by being attached to a deadman, or by being grouted in soil or rock. For a deadman to provide maximum resistance, the passive failure wedge for the deadman has to be outside the active failure wedge of the wall to be supported. A tied-back system can be used on cantilevered sheet pile walls, which essentially utilize a tie-back or anchored bulkhead to support the top portion of the sheet piling. A soldier pile and lagging wall system can also utilize tie-backs into the embankment to support the top portion of the retaining wall.

Proprietary retaining wall systems are vendor designed wall systems that are protected by specific patents that make them unique from other systems. The proprietary retaining wall systems in use today fall within two categories: mechanically stabilized earth systems, and precast modular gravity walls.

Mechanically Stabilized Earth (MSE) retaining walls consist of interlocking concrete shapes that create a wall face, and select granular backfill with high strength metallic or polymeric straps to create a reinforced soil mass. The reinforcement is placed in horizontal layers between successive layers of granular soil backfill. Each of the concrete shapes has a soil anchoring system that mechanically reinforces the retained embankment and uses the weight of the fill as the stabilizing force to hold the panels in place. A geosynthetic version of this wall may consist of layers of geotextile membrane that are covered with soil, in lieu of the interlocking concrete shapes. Here the exposed face of the embankment is formed by folding the lower layer of reinforcing geo-grid over the top of the layer of fill that covers it. Or in a modular block version, layers of geotextile membrane are covered with soil and anchored between prefabricated modular blocks that make up the exposed face of the embankment.

Precast modular gravity walls are concrete or metal bin gravity retaining structures built of adjoining closed-faced or open-faced bins. As mentioned above, these are usually proprietary systems. They consist of interlocking units that stack vertically or at a nominal batter. Each unit of a metal bin retaining wall is comprised of lightweight steel members that are bolted together on the construction site. Each unit of a precast concrete bin wall is comprised of interlocking prefabricated reinforced concrete modules that are placed together like building blocks. Each bin is filled with granular, free draining soil that is compacted. Stability of these systems is achieved by the weight of the soil-filled bin units resisting overturning and sliding forces generated by the lateral stresses from the retained soil behind the bin units. Precast systems such as Sta-Wal and Double Wall precast systems are well known examples of this.

Soil nailed walls are used to support existing soil in a cut situation. The soil nails are installed into a slope or excavation as construction proceeds from the existing ground surface to the proposed bottom of excavation. Soil nailing is an operation in which the soil is reinforced by steel bars or tendons installed to reinforce or strengthen the existing ground, thereby increasing its tensile strength, and thus forming a gravity retaining mass. The soil nailing process creates a reinforced section that is itself stable and able to retain the ground behind it.

Movable Bridges

Moveable bridges are identified as unusual type bridges that require the review of the Office of Bridge Technology (HIBT). As such, HIBT retains the responsibility and approval authority of preliminary plans for these structures.

All bridge rehabilitation or replacement projects involve complex procedures. The rehabilitation or replacement of a movable bridge is equally complex, but with the added complexity of electrical and mechanical components that must be considered in the design and construction process.

The first step towards a successful project will involve the assembly of a multidisciplinary team. This team should include structural, electrical and mechanical engineers who have movable bridge design and construction experience. Bridge maintenance and operation personnel should also be part of the process, as they can bring an eye toward maintainability and operation to the design review. But be forewarned, maintenance personnel can be wary of new technologies that may be introduced (i.e. programmable logic controllers or variable frequency drives). Adequate training of maintenance and operations personnel is critical and should be addressed in the design specifications.

As a second step, in the design process, an in-depth inspection should be performed. The requirements of a movable bridge in-depth inspection will go beyond that of just inspecting structural components and will require hiring personnel with expertise in electrical and mechanical components. Additionally, particular attention should also be made to fender systems and underwater electrical and communication lines. When inspecting structural components, some members may experience stress reversal cycles, which will reduce the fatigue life of these elements. Special considerations should be made to properly identify and inspect these members.

Additional contract requirements include but are not limited to:

a) Testing of electrical and mechanical components
b) One-year call back period for adjustments
c) Spare parts
d) Bridge opening or lifting requirements during construction
e) Maintenance schedules
f) Electrical/Mechanical Operation and Maintenance Manuals

Our Washington Office and other knowledgeable individuals such as Earl Dubin in the New York Division should be contacted for the design of these structures and the issues to be considered and included in the design documents.

A good reference is the AASHTO Movable Bridge Inspection, Evaluation and Maintenance Manual. This reference provides an excellent resource for understanding different types of movable bridges and the elements associated with them. The manual also provides definitions for different terminology used and associated with these structures.

Aesthetics

FHWA has no directive or mandate on aesthetics or aesthetic design. It is a good practice and makes good common sense. Many of the State DOT's have published literature and guidelines for their use. Aesthetics is often involved when considering Context Sensitive Solutions.

One of the major goals of aesthetics is to avoid a negative reaction. It is extremely difficult to please everyone's opinions and expectations. What may be judged as generally appealing to some may be viewed quite differently by others. The aesthetic impact and/or impression by the viewer are the effect made by every aspect of the bridge, its totality and its individual parts. Even those features beyond the designer's control have an aesthetic impact.

When designing a structure, its appearance should be considered from the very beginning. Bridge design could actually be considered an art. Wherein, it uses science and mathematics to support the judgments that are made. The engineer needs to think about the visual object that is going to be created, which will take its place in the environment, and create a lasting visual impression.

There is a misconception that improving appearance always costs more. This is not necessarily true. The challenge to the engineer is to develop the skills, through creativity and ingenuity, to find ways of improving the appearance without increasing cost, as is generally done with other aspects of the design such as structural integrity, safety and maintainability. When people think that improved appearance is going to add costs, they are generally thinking in terms of add-ons, special ornamental features or special colors. The greatest aesthetic impact can be made by the structural elements themselves. These are seen first, and at the greatest distance. The bridge can be made attractive if these major elements are well shaped, and if they fit in well with the surroundings.

The following topics are commonly known to assist in producing visually pleasing structures. They are discussed in more detail in an attachment to this chapter.

- Location and surroundings
- Horizontal and Vertical Geometry
- Superstructure Type and Shape
- Pier Shape and Placement
- Abutment Shape and Placement
- Parapet and Railing Details
- Colors
- Textures
- Ornamentation

Environmental Coordination and Permits

The "engineering side" of the project equation often has a major impact on the environment. For example, selection of one type of structure over another may affect the location and touchdown points, which in turn can affect any aspect of the natural and built environment. For major (new or replacement) bridge projects, the type and cost of the bridge or viaduct has to be balanced against these impacts in a thorough alternatives analysis in the environmental documents.

Under the Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA), there are three levels of project environmental "classifications." From least to most impact, there are categorical exclusions (CE), Environmental Assessments (EA), and Environmental Impact Statements (EIS).

There are three "levels" of CE's. Under 23 CFR 771.117(c), twenty different types of actions are listed as CE's (often referred to as automatic CE's). These are the projects that almost never have any environmental impacts and in virtually all cases do not require additional FHWA approval under NEPA. While there are no "c list" categorical exclusions that are bridge projects, some of the project work types may be occurring on bridges, such as sign installation, emergency repairs, fencing and noise barriers. The next level is the listing in the 23 CFR 771(d). These can be approved programmatically by the SHA under certain circumstances. The bridge type work under the "d list" are "bridge rehabilitation, reconstruction or replacement, or the construction of a grade separation to replace existing at-grade railroad crossings." While these bridge work types can be approved under a state-specific programmatic agreement with the Divisions, they often have to be elevated to the point where they are either submitted to the Division for NEPA clearance (CE "with documentation" – the third level) or become an EA or an EIS. The decision as to which "level" or classification is applied is based purely on environmental impacts (see 23 CFR 771.117(a) & (b)).

Coordination with Federal and State agencies is triggered for specific impacts. Any federal agency that: 1) will have an approval action such as a permit for the project to proceed; or 2) has special expertise that we need to adequately consider environmental impacts, must be asked to be a "cooperating agency." The duties and role of a cooperating agency is spelled out in the CEQ regulations (40 CFR 1500-1508) and guidance. There's an FHWA guidance paper on cooperating agencies dated March 1992 on the following FHWA website: http://environment.fhwa.dot.gov/guidebook/vol2/doc11a.pdf

Section 4(f) of the USDOT Act of 1966 requires the FHWA to make a finding of "no prudent and feasible" alternative to the use of resources protected under the Act. These resources include publicly owned parks, recreational areas, or wildlife refuges and waterfowl refuges of national, state, or local significance, and public or private historic sites of national, state, or local significance. The latter includes bridges listed or eligible for the National Register of Historic Places. There are four nationwide programmatic 4(f)'s that can be applied under certain specific criteria, including one for "use" of historic bridges, which was issued on July 5, 1983. Normally, where the SHPO indicates an opinion of "no effect" under Section 106, there is no 4(f) "use." The 4(f) regulations are found in 23 CFR 774. The purpose, format and content of these evaluation documents are addressed in FHWA Technical Advisory T 6640.8a, *Guidance for Preparing and Processing of Environmental and Section 4(f) Evaluations* and the revised *FHWA*

Section 4(f) Policy Paper (March 1, 2005). Refer also to the Historic Preservation section in this chapter for further discussion of historic bridges.

Section 6009(a) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) amended existing Section 4(f) legislation to simplify the processing and approval of projects that have only de minimis (no adverse) impacts on lands protected by 23 USC §138(b). After consideration of any impact avoidance, minimization, and mitigation or enhancement measures, if the project results in a de minimis impact on that 4(f) property, an analysis of avoidance alternatives is not required and the Section 4(f) evaluation process is complete. Although the de minimis finding may not see a lot of use for historic bridges themselves, the de minimis may be used on bridge projects when other 4(f) protected resources are impacted with no adverse effect. The de minimis provides the FHWA with a procedural mechanism to better balance the impacts of projects, especially in resource rich environments like water crossings.

Some of the agency "environmental approvals" that are required for Federal projects, which relate closely to bridge projects are:

- **Section 9 Rivers and Harbors Act** – Navigation (covered elsewhere in this document)

- **Section 10 Rivers and Harbors Act** [33 USC 403]- The Army Corps of Engineers (Army Corps) has to approve a permit for any proposed obstruction or alteration affecting the course, location, condition or physical capacity of any navigable water of the United States.

- **Section 404 of Clean Water Act** of 1977 as amended. The Clean Water Act is intended to restore/maintain the chemical, physical, and biological integrity of the Nation's waters, including lakes, wetlands, streams and other aquatic habitats. Under Section 404, the Army Corps issues permits to SHAs; these are commonly known as wetland permits. In the vast majority of states, the Army Corps retains the approval authority for permits to excavate and fill in wetlands. Early and close coordination with the Army Corps is required for bridge projects for which an *individual* permit is needed. Nationwide permits are also available, including nationwide #23 for categorical exclusions. The Army Corps and FHWA published one comprehensive document on coordination with the Army Corps on highway projects jointly. It is titled "Applying The Section 404 Permit Process to Federal-Aid Highway Projects," ("The Redbook") dated September 1988.

Some of the environmental coordination that is required for Federal projects, which relate closely to bridge projects, in many cases, is as follows:

- **Fish & Wildlife Coordination Act** [16 USC 661-667(d)]. The US Fish & Wildlife Service and the state agency responsible for these resources administer this Act. It requires consultation with these agencies for projects that involve stream and water body modifications, diversions, or impoundments. This includes channel deepening. Failure to coordinate and address their concerns can affect the issuance of a Section 404 permit.

- **Coastal Zone Management** [15 CFR 930]. Consultation with the state agency designated to be responsible is generally required for mapped coastal zones. This process varies from state to state, as it is a voluntary program not mandated by Federal law. The National Oceanic and Atmospheric Administration (NOAA) administers the program, which is delegated to a state agency. Once the State sets up a program, projects generally must be consistent with the State's "coastal zone management" plans and policies. If not consistent, a complex process is followed which elevates the concerns within the state and federal bureaucracy.

- **Floodplains**. Pursuant to Executive Order 11988, and 23 CFR 650, environmental documents should address the impacts on floodplains or changes to the base flood elevation. Floodplains are delineated using either project "locational hydraulic studies" or FEMA maps, called National Flood Insurance Maps. As a minimum, environmental documents should show the locations of alternatives in relation to the base floodplain and any regulatory floodways that exist, and discuss likely encroachments on those and the impact(s) of the encroachments. A "significant encroachment" on a floodplain [650.103(q)] will require an "only practicable alternative" finding by FHWA Division Administrator per 23 CFR 650.113. Coordination with the Federal Emergency Management Agency (FEMA) will be required with regard to floodplains prior to the Final Environmental Impact Statement (FEIS), and discussed in the FEIS. Any *changes* to the regulatory floodway must be approved by FEMA.

- **National Pollution and Discharge Elimination System**. These requirements are mandated under Section 402 of the Clean Water Act. They are intended to control temporary runoff from projects, both during construction and over the life of the project. Discharge permits are either issued by the United States Environmental Protection Agency (EPA), or by states that have EPA-approved programs. Generally, SHA's have to adopt best management practices in their specifications for controlling temporary runoff, to obtain a general permit. To obtain a project-specific permit for permanent runoff controls, SHA's must consider stormwater discharge facilities such as detention ponds, special catch basins, bridge runoff collection systems, and vegetated ditches, under a project stormwater pollution and prevention plan.

- **Wild and Scenic Rivers Act**. This legislation is intended to protect certain rivers that are *Designated* Rivers, *Inventory* Rivers, or *Study* Rivers. For a project that would have an effect on the free flowing aspect of any of these Wild and Scenic Rivers, or could affect the category itself, coordination with the National Park Service is recommended, but not mandated. *Study* Rivers and *Designated* Rivers are protected equally. *Inventory* Rivers are protected by Presidential Directive. Recommended protections are either avoidance, or mitigation of adverse impacts.

Context Sensitive Solutions

SAFETEA-LU Section 6008, Section 109(c) (2) of title 23, USC includes consideration of identified documents and materials that define the core principles of context sensitive solutions (CSS) by eight "Characteristics of the process that yield excellence" and seven "Qualities that characterize excellence in transportation design". The SAFETEA-LU provisions requiring opportunities for involvement of the public and participating agencies in the development of project purpose and need, and the range of alternatives, support the intent of these CSS principles. The implementation of a CSS approach to navigating the project development process will ensure the best possible outcome to the environmental review process.

CSS is a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility. CSS is an approach that considers the total context within which a transportation improvement project will exist. Its principles include the employment of early, continuous and meaningful involvement of the public and all stakeholders throughout the project development process.

It's an element of Environmental Stewardship and Streamlining efforts. CSS is an approach that places preservation of historic, scenic, natural environment and other community values on an equal basis with mobility, safety and economics. For more information see this site: http://www.fhwa.dot.gov/csd/what.cfm.

As citizens' expectations for better, safer roads have increased, a growing awareness of communities' needs has also emerged among designers. These two key factors contributed to bringing about this transformation in highway design and construction. Congress, the Federal Highway Administration, governors, State legislatures, and State Highway Agencies have all played an integral part in this important evolution of highways. Meanwhile, public interest groups have worked to make developing better methods of highway design a major part of their agendas.

Context Sensitive Solutions (CSS) is already well established in many locations in highway project planning, design, construction, and maintenance. Highways encompass a large percentage of publicly owned land, and are a major visual presence in our landscape; they are social centers for our towns; and they traverse through sensitive environmental and established historical areas. CSS strives to balance scenic, aesthetic, cultural, and natural resources with the community and its transportation service and safety needs.

There are many components of a project's context. CSS are the result of a process that encourages designers to identify all of the components of a project's context for consideration while making design decisions. Consequently, project alternatives are developed though the simultaneous advancement of the issues of mobility and safety in conjunction with enhancement of the natural environment and the preservation of community values.

The best way to achieve context sensitive solutions is to start early in the process. The use of an inter-professional team for project development proves invaluable. Engineers, Planners, Landscape Architects, other professionals and external stakeholders view the context with

distinctly different perspectives. Utilizing the team approach enables a more thorough understanding of the project's true context.

Since some of the components of the context are intangible, such as community values and needs, it is important to have a level of public involvement during the project-planning phase. Early public involvement has two purposes. It allows the community to express the needs and deficiencies of the current transportation system and its effect on the community. It also fosters a degree of trust. Community trust is invaluable to project development.

The CSS process suggests that as the project enters the design development stage, the designer considers all of the components of the context while developing alternatives. CSS promotes joint ownership of the solution. It recognizes that the process continues after the design is complete, to assure that projects are built and maintained in a manner to fulfill commitments made throughout the project development process. The end product is a project that blends with its setting. Transportation needs are met. Community voices are heard, not just sought; they are seriously considered and their impact is apparent in final design. Optimally, natural resources are enhanced or avoided as opposed to mitigated; playgrounds and parks are integrated rather than alienated; and visual, cultural and historic elements are highlighted rather than impacted.

Policy History

The evolution of CSS can be traced back to 1969 with the passing of The National Environmental Policy Act requiring transportation agencies to consider adverse impacts of road projects on the environment. Momentum was gained in the late 1990s when the Maryland Department of Transportation, State Highway Administration conducted Thinking Beyond the Pavement: National Workshop on Integrating Highway Development with Communities and the Environment While Maintaining Safety and Performance in May 1998. The workshop was co-sponsored by AASHTO and FHWA with the advice and support of the National Workshop Advisory Committee.

Other key milestones included the Intermodal Surface Transportation Efficiency Act (ISTEA) which was passed in 1991. That legislation emphasized that, in addition to being safe, projects should be sensitive to their surrounding environment, especially in scenic or historic areas. The National Highway System was formally approved and designated by Congress in the NHS Designation Act of 1995, and 23 USC 109(c) sets forth design criteria for the NHS.The planning and design guidelines take the following into account: the constructed and natural environment of the area; impacts of the project upon environmental, scenic, aesthetic, historic, community and preservation interests; and access for other modes of transportation. And a January 24, 2002 memorandum from FHWA Administrator Mary Peters asked for our support and assistance in advancing CSS (originally termed Context Sensitive Design).

Geotechnical Engineering and Foundations

Sometimes highway projects involve geotechnical structures where technical assistance from outside the Division Office is necessary. These may include new or innovative foundation types, retaining walls, ground improvement technologies, and embankment stabilization techniques. Also included would be cases where the existing technology is "stretched" to its limits, such as a very high mechanically stabilized earth wall or a very large diameter drilled shaft. Refer to the section titled "Reviews by Washington Office and Resource Center" earlier in this chapter for approval authority and policy memorandum dated November 13, 1998. On FHWA-administered projects, or when requested by the State DOT, assistance from the Resource Center should be sought when these types of structures are encountered. When the Division Bridge Engineer has experience with these types of structures, assistance from the Resource Center may not be needed.

When reviewing the designs of geotechnical elements, there are many items to look for, depending on the element. **At the end of this chapter is a checklist to aid in the review of Bridge Foundation Design reports. Also attached is a checklist titled "Checklist and Guidelines for Review of Geotechnical Reports and PS&E."** A subsurface exploration/testing report and a design report for the element(s) on the project should be submitted by the State DOT and reviewed by the Division Bridge Engineer during the preliminary design stage.

Historic Preservation

The need to identify and protect historic bridges is widely recognized and supported by Federal legislation. Requirements have been and are being strengthened so that historic preservation is incorporated early in transportation planning projects. The regulations governing impacts of federal projects on cultural or historic resources, both above ground and below ground (archeological), are found in 36 CFR 800, commonly called "Section 106" (or the National Historic Preservation Act). Section 106 includes all the historic requirements we normally administer on projects. Under Section 106, protection is afforded to historic sites eligible for the National Register of Historic Places (the Register).

The individual States determine which bridges are historic, which of those judged to be historic should be preserved, and what manner of preservation is most appropriate. Historic bridges present many challenges. Many bridges, as identified in most states' historic bridge inventories, are eligible for the Register. Those bridges will be protected via the Section 106 requirements, which include coordination with the State Historic Preservation Officer (SHPO) as to the Register eligibility and the "effect" of the project on the resource. Pursuant to provisions in SAFETEA-LU, states may assume full National Historic Preservation Act (NEPA) and Section 106 responsibility (aside from consultation with American Indian governments). If the SHPO, SHA, and FHWA agree there is an "adverse effect," a Memorandum of Agreement (MOA) must be executed that will outline mitigation. The MOA is sent to the Advisory Council on Historic

Preservation for their information or action. State highway agencies are in various stages of developing Historic Bridge Management or Preservation Plans.

Funding for historic structures needs to be addressed at the National, State, and local levels, depending on the ownership and location of the bridge (See S23 USC 144(n). From a national perspective, the funding depends on the highway system on which the bridge is located. It should also depend on the evaluation of the bridges as candidates for maintenance, rehabilitation, and replacement. There are many factors that could enter into this decision, including the results of a bridge management system, current design standards, historic significance, available funding, and political realities.

The majority of funding for the rehabilitation and reuse of historic bridges resides at the Federal level. Depending upon the system on which an historic structure is located, National Highway System (NHS), Surface Transportation Program (STP), and Highway Bridge Program (HBP) funding can be used. Under the HBP, reasonable costs associated with actions to preserve, or reduce the impact of a project on the historic integrity of a historic bridge are eligible as reimbursable project costs. And as a subset of STP, Transportation Enhancement funds are available through the Transportation Enhancement Program. This Program provides opportunities for funding historic preservation activities that go beyond the scope of conventional highway projects, such as rehabilitation or stabilization of a structure for alternative and non-traffic uses (i.e. non-pedestrian-non-vehicular, as well as non-vehicular). Refer to HIBT's April 26, 2001 memorandum providing the Chief Counsel's interpretation on funding. As a word or caution, in many cases pedestrian loading can be considerably greater than vehicular loading.

The challenge for the next several decades will be to preserve historic structures where practicable and maintain the mobility, safety and economic opportunities that the existing highway and bridge network provide. Bridge owners are encouraged to consider the greatest level of protection feasible for those bridges that are eligible. Every reasonable effort should be made to continue an historic bridge in useful transportation service. Replacement of historic bridges should be considered as a last resort.

If an historic bridge cannot meet a vehicular transportation need, other uses for the bridge may be considered. Analysis of the feasibility of the reuse options should be done on an individual project basis. Some considerations for reuse options include: bicycle/pedestrian traffic, fishing pier, recreational viewing platform, snowmobile trail, artifact in bridge park, move to private property, monument, salvage, adapt as a building, or perhaps simply stabilize and close it.

Engineers must assure themselves that an engineering solution to rehabilitate rather than replace is indeed feasible. There are many challenges and opportunities available when the engineer is willing to pursue preservation techniques and bridge preservation projects. Engineers should avail themselves to the latest available technologies. Refer to Chapter 5 regarding technical issues and High Performance Materials options.

Policy History

Historic preservation is well rooted in two decades of FHWA policy, as National transportation legislation has placed significant emphasis on historic preservation.

The Surface Transportation and Uniform Relocation Assistance Act of 1987 called for the "rehabilitation, reuse, and preservation of bridges significant in American history, architecture, engineering, or culture." That legislation required each State highway agency to complete an inventory of bridges on and off the Federal-aid system to determine the historic significance of the bridges. The legislation, however, did not establish a deadline for completing the inventories. In addition, it encouraged historic preservation endeavors (Ref: 23 USC 144(n), "Highway Bridge Replacement and Rehabilitation Program," and July 22, 1987 Raymond Barnhart, Federal Highway Administrator memorandum).

In 1991, the Intermodal Surface Transportation Efficiency Act (ISTEA) had several sections pertaining to historic preservation. ISTEA also established the transportation enhancement program, strengthened transportation planning requirements, and also created the interim program for National Scenic Byways, which provides opportunities for new and revitalized partnerships in historic preservation. TEA-21 in 1998 made the National Scenic Byways Program permanent, and also created the National Historic Covered Bridge Preservation Program (NHCBP). The NHCBP Program assists the States in their efforts to rehabilitate or repair and to preserve the Nation's historic covered bridges.

Value Engineering

The FHWA regulation and requirements for Value Engineering (VE) appear in 23 CFR 627, where it indicates that VE is required on all Federal-aid highway projects on the National Highway System (NHS) with an estimated total cost of $25 million or more. Additionally, new language in Section 1904 of the SAFETEA-LU requires VE for bridge projects with an estimated total cost of $20 million or more, and for any other project designated by the Secretary of Transportation. Much information can also be found at this Program Administration site: http://www.fhwa.dot.gov/ve/index.htm.

VE can be manifested in two different ways. The first is during the design process. The second is during the construction phase. During construction, the contractor can submit a VE proposal; if approved by the State, any savings to the project is split 50/50 between the contractor and the State and/or FHWA for Federal-aid projects.

Federal, State and local highway agencies are responsible for getting the best overall project value for the taxpayer. Applying the VE process to suitable projects will help you achieve this purpose. Simply stated, VE is an organized application of common sense and technical knowledge directed at finding and eliminating unnecessary costs in a project. [Read More]

The Federal Highway Administration defines VE as "the systematic application of recognized techniques by a multi-disciplined team which identifies the function of a product or service; establishes a worth for that function; generates alternatives through the use of creative thinking; and provides the needed functions, reliably, at the lowest overall cost." The VE process includes user costs as well as agency costs, and thus is not simply about constructing the project cheaper. [Read More]

Highway designers can be proud of the fact that our modern highways are the best in the world. However, if we are to maintain this position, we cannot simply sit back and design highways the "old fashioned way." We need to constantly strive to improve our standards, methods, and philosophy of highway design. One way we can do this is to apply the VE process to our highway designs. [Read More]

Life Cycle Cost Analysis

Life Cycle Cost Analysis (LCCA) is defined by Section 303 of the National Highway System Designation Act of 1995, as "a process for evaluating the total economic worth of a useable project segment by analyzing initial costs and discounted future costs, such as maintenance, reconstruction, rehabilitation, restoring and resurfacing costs over the life of the project segment."

Essentially LCCA is an analytical decision support tool used to provide a cost comparison between two or more competing design alternatives that produce equivalent benefits for the project being analyzed. The process provides decision makers with a logical and supportable analytical framework for making investment decisions. It can account for costs incurred by the agency and roadway users over the life of the project segment being analyzed. The LCCA can also account for uncertainty or risk associated with the variability of input values such as unit prices and traffic parameters. The outputs from the analysis are often less important than the logical analytical evaluation that a LCCA generates. By going through the LCCA process, designers and planners are better informed when analyzing project alternatives. This is particularly true for large or complex projects. FHWA Division offices should assure that when a LCCA is done, it is consistent with the established fundamental principles of good practice.

It is recommended that the analysis be completed early in the project cycle to allow the results of the analysis to influence the investment decision. Support is available from the FHWA LCCA Team which is comprised of members of the Office of Asset Management, Resource Center, and Turner-Fairbank Highway Research Center.

The 2005 Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU) promotes the use of LCCA by requiring the Secretary to develop educational resources for LCCA. In 2002, NCHRP Report 483, *Life-Cycle Cost Analysis for Bridges* was released. This guidance manual gives the procedures for analyzing the life-cycle cost of Highway Bridges and assists decision makers dealing with choices in planning, design, operation, maintenance, rehabilitation and replacement of bridges. The FHWA has not officially

endorsed the NCHRP report as of January 2007; however an FHWA team has been established to evaluate LCCA for Bridges in general and develop guidance.

The FHWA Office of Asset Management is charged with developing tools and guidance for LCCA. A free LCCA software program is available, called RealCost, which uses the procedures outlined in the below-mentioned technical bulletin. The software has been adopted by several states and is supported by FHWA with technical support and training.

You can find more information about LCCA on this following website http://www.fhwa.dot.gov/infrastructure/asstmgmt/primer.htm

Policy History

The National Highway System (NHS) Designation Act of 1995 specifically required States to conduct life cycle cost analysis on NHS projects costing $25 million or more. In 1996, FHWA Executive Director Anthony Kane issued a Memorandum (April 19, 1996) to FHWA Regional Administrators that provided implementing guidance for LCCA. The implementing guidance did not recommend specific LCCA procedures, but rather it specified the use of good practice.

The 1998 Transportation Equity Act for the 21st Century (TEA-21) removed the requirement for states to conduct a formal LCCA on high-cost NHS useable project segments. However, the congressional interest in LCCA is continued in the new requirement that the Secretary of Transportation develop recommended LCCA procedures for NHS projects (23 USC 106). In addition, Section 627 of the Code of Federal Regulations Title 23 (CFR 23) requires that a value engineering study be performed on all federally funded projects over $25 million on the NHS. The consideration of life-cycle costs is an important part of the value engineering process.

In 1998, FHWA issued an Interim Technical Bulletin on LCCA, “Life-Cycle Cost Analysis in Pavement Design” (FHWA-SA-98-079). In August 2002, the Office of Asset Management released a Life Cycle Cost Analysis Primer; this can be found on the above mentioned website. Both of these resources offer background on LCCA, describe LCCA methodology, and provide LCCA approaches and techniques.

Benefit Cost Analysis

For all “mega-projects” a benefit’s analysis should be performed. As generally defined, a benefit-cost analysis is a systematic quantitative method of assessing the desirability of public projects or policies when it is important to take a long view of future effects. Determining benefits is not easy, and they are complex. But they need to be considered when project alternatives are functionally different.

Traditional benefit-cost analysis (B/C) compares the discounted value of user benefits to the discounted value of all costs (construction as well as operations and maintenance) over a specified period of time. In order to more fully account for the benefits of transportation

improvements, however, B/C analyses are increasingly not only considering the user benefits, but also the multiplier effects of those benefits. This is thus a more robust economic impact analysis.

In order to calculate the B/C ratio, a stream of costs and benefits for each project's (alternative's) opening year through its useful life must be calculated and converted to Net Present Value. For each alternative a methodical approach is used to capture the benefits, and capital, operating and maintenance costs.

Benefits should include economic benefits, and user and societal benefits. An example of a primary economic benefit would be an increase in personal income. This could be quantified through economic simulation modeling. Other economic benefits could be business attraction or retention, or resultant cost savings for businesses. User and societal benefits could include reductions in personal travel times, or safety-type benefits such as reduced accident rates, or environmental-type benefits such as reduced air pollution, highway congestion, and noise.

It should be mentioned that there is a considerable amount of uncertainty reflected in the B/C analysis. Costs and benefits can change, and the choice of discount rates can have a significant impact on the analysis outcome. Typically, strong projects have a high enough B/C ratio so that even if less favorable assumptions are used, there is still a benefit that exceeds the cost. B/C ratios of roughly 2.0 may be considered an acceptable benchmark, but certainly this can vary.

You can find more information about Benefit Cost Analysis on this following website http://www.fhwa.dot.gov/infrastructure/asstmgmt/primer.htm

Final Scope Document/Initial Design Review Guidelines

For Bridges and Structures

Category	Question	Num	Y	N	Info. Not Provided
GENERAL					
Specifications	Is LRFD being used?	1			
	Are current NJDOT design specifications being used?	2			
	Are they deviating from NJDOT/AASHTO standards in any way?	3			
	Is the project eligible for a USCG permit waiver?	4			
Funding	Is the bridge eligible for HBP Funds?	5			
	Is approach roadway work within reasonable guidelines?	6			
BRIDGE					
General	Are proposed materials and type of construction considered optimal for the bridge?	7			
	Are there any experimental or innovative features proposed?	8			
	Are bridge geometrics optimal for the given job site and location?	9			
Deck	Are all pay items and quantities accurate for rehabilitation work?	10			
	Do overlays meet NJDOT specifications? Does machine finishing for overlays meet NJDOT procedural guidelines?	11			
Superstructure	Did they optimize the design of the superstructure materials and span arrangement?	12			
	Did they maximize the use of prefabricated elements?	13			
	Are the spans continuous on multi-span bridges?	14			
	If sidewalks are being proposed, are they needed? Are there sidewalks on the approaches?	15			

	Is seismic retrofit considered for major rehabilitation or widening?	16			
Substructure	Does the bridge meet integral abutment design criteria?	17			
	Did they optimize the design of the piers, abutments, and foundation?	18			
	Where there is a potential for scour, are the foundations appropriately designed?	19			
	Are alternate retaining walls being used?	20			
	Are sloped, stepped footings being used?	21			
	Are spread footings founded at a proper elevation?	22			
	Are piles constructed from the appropriate materials?	23			
	If substructure is exposed to harsh environmental conditions, is corrosion protection adequate?	24			
RETAINING WALLS					
General	Are walls proposed where slopes could be used?	25			
	Are alternate proprietary wall types proposed?	26			
MSE	Are utilities constructed within the reinforced zone?	27			
	Is the reinforced fill susceptible to scour?	28			
	Is the water table above the leveling pad?	29			
Pre-fabricated Modular Walls	Can the geometry align with the radius of curvature?	30			
SIGN STRUCTURES					
General	Could existing sign structures be re-used?	32			
	Are the current standards being used?	33			
	Could cantilever or bridge-mounted sign structures be used rather than overheads?	34			
Overhead and Cantilever	Is the vertical clearance at least 17’-9”?	35			
	Can the structure support variable message signs?	36			
	If supported on a bridge, is it located	37			

	at a support?				
Bridge Mounted Signs	Is it mounted as near to the most advantageous position for traffic operation as possible?	38			
	Is it mounted parallel to the structure for skews up to 10 degrees?	39			
NOISE BARRIERS					
General	Could the bridge support the barrier rather than providing a new structure?	40			
	Are NJ's standard noise barrier types being used?	41			
Function	Are the barriers the proper height in accordance with the noise report?	42			
Bridge	Are there provisions for expansion that are aligned with those for the deck?	43			
	For retrofit, is the deck being overstressed?	44			
	Do the connections seem adequate for any dynamic loading that may be observed?	45			
CONSTRUCTION					
Staging	Could a detour be used instead of staging?	46			
	Can the number of stages be reduced?	47			
Temporary Structures	Where temporary structures are proposed for pedestrian and/or vehicular traffic, are they truly necessary?	48			

Question	Notes
1	Load and Resistance Factor Design (LRFD) is a reliability-based approach to bridge design, ensuring an equal level of reliability for all components of a structure. Since 2000, LRFD has been required for all new and reconstructed bridges. Also, complete superstructure replacements and widening > 30% of the existing slab area must be designed by LRFD.
2	The current Bridge Design Manual is the 4th edition, dated 2002. For all new bridges and structures, the AASHTO LRFD Bridge Design Specifications (3rd edition, 2004) are used. For non-bridge structures and rehabilitation, the AASHTO Standard Specifications for Highway Bridges (17th edition, 2005) are still being used.
3	Any deviations from the bridge standards should be discussed. If there is no discussion, assume they are following the standards. Some types of structures, such as moveable bridges, and concrete segmental bridges, are not addressed in the above referenced standards.
4	23 CFR 650, Subpart H – Navigational Clearances for Bridges, permits waivers to the USCG permit when the waters are (1) not navigable for interstate or foreign commerce and (2) not tidal, or if tidal, used only be recreational boating, fishing, and other small vessels less than 21 feet in length. The State shall assess the need for the permit, and if it believes that the permit may not be required, shall provide supporting information early in the environmental process. The supporting information should enable FHWA to make a determination that the permit is not required. Navigational aids and existing and proposed clearances should be addressed. When the State requests a waiver, the written justification should be given to the bridge team for their review and coordination with the USCG.

Question	Notes
5	The Highway Bridge Program (HBP) is a program to replace or rehabilitate deficient bridges. To be eligible, the structure must be on the HBP Selection List. The Selection List is updated each year in July or August. If the sufficiency rating of the bridge is 80 or less, it is eligible for rehabilitation. If the sufficiency rating is less than 50, it is eligible for replacement. Rehabilitation is any type of work other than complete replacement of the structure. Replacement means an entirely new structure. Besides bridge replacement and rehabilitation, there are a few other activities on which bridge funds can be used. These include bridge inspection, management systems, painting, scour countermeasures, seismic retrofitting, application of certain deicing chemicals, and preventive maintenance. HBP funds cannot be used for any other purpose.
6	The goal of the HBP is to replace or rehabilitate deficient bridges. Therefore, any work that does not contribute to this goal should be kept to a minimum. The costs of long approach fills, causeways, connecting roadways, interchanges, ramps, and other extensive earth structures, when constructed beyond the attainable touchdown point, are not eligible under the bridge program. When the profile of the bridge is raised, the attainable touchdown point is considered the point at which the new profile meets existing. Generally, approach roadway costs greater than 15% of the cost of the structure are considered excessive.
7	In planning new bridges, the list of available structure materials and types of construction should be considered. The use of High Performance Steel (HPS) and High Performance Concrete (HPC) is encouraged. At any given location, the ultimate selection should be based on suitability and aesthetics. New materials and developments may be incorporated in the design of the proposed structures, provided that approval has been given by the Manager of Structural Engineering.
8	If there are any plans to include any experimental or innovative features (anything not covered in the Bridge Design Manual), these elements or design features should be discussed in the report. If there is no discussion, assume that there are none.
9	The magnitude and complexity of modern highway bridges are characterized by such features as horizontal curves, vertical curves, variable bridge widths for ramps, and variable cross slopes. These features should be incorporated into bridge design with a rational analysis and evolve as an outgrowth of the adjacent approaches.

Question	Notes
10	Contract pay items for deck rehabilitation shall include, as a minimum, the pay items required by the NJDOT Design Manual, and shall adhere to the corresponding NJDOT Standard Specification references.
11	The standard minimum thickness adopted for concrete overlay protective systems is 1 ¼" and shall be noted on the plans. An additional 10% to 20% should be added to the estimated quantity, but overall thickness should be limited to 2". Currently, the use of Hot Mix Asphalt (HMA) is prohibited on bridge decks. At this time, concrete overlay protective systems shall include Latex Modified Concrete and Silica Fume Concrete. Scarification is always scheduled for reconstruction projects using Concrete Overlay Protective Systems. The following could preclude machine finishing on a deck: the bridge is on a curve less than 250 feet radius, the cross slope is variable, the length less than 60 feet, and the curb to curb distance is less than 24 feet.
12	There should be some discussion of how they arrived at the design they chose, for each element of the structure. What other types of girder were considered? Is there a discussion about pier and abutment types? Sometimes it is intuitive that a certain type of girder will be required for a given span length, or that a certain pier configuration is required, but often there is enough flexibility provided to optimize the design. This is especially true when the entire structure is being replaced. The use of high performance materials (steel and/or concrete) should be discussed. High performance materials are becoming common on bridge projects, particularly for bridge deck concrete, where it is becoming the standard.
13	Prefabricated elements are generally less costly and of higher quality than those produced at the jobsite. Many different types of precast and prestressed concrete elements are available, including girders deck panels.

Question	Notes
14	Continuous spans (no joints at the piers) are more economical than simple spans (with joints), because the negative moment at the piers reduces the positive moment at midspan. This results in a shallower girder depth and less dead load on the substructure. These structures also require less long-term maintenance due to the elimination of the joints. Sometimes it is not feasible to provide continuity, such as in rehabilitation and widening scenarios. It is common to see continuous steel girders. Prestressed concrete girders can also be made continuous by connecting the ends with a CIP concrete segment.
15	If sidewalks are proposed, even if they existed, the need should be justified. This justification would include pedestrian traffic counts and a description of demand based on current development (i.e., a nearby school, local shopping area, group residence for those unable to drive) or proof of planned future development such as a master plan. Sidewalks require 6 feet of additional deck width. This could mean an additional girder for each sidewalk, additional substructure and foundation cost, plus the additional cost of the reinforcing steel and concrete in the deck and raised portion of the structure. Many times, sidewalks are built on a bridge and there are no sidewalks on the approaches leading up to it. Pedestrians are expected to walk on the berm area on the approaches. When pedestrian volume is very low, shoulders can provide ample area for them to use. Bicyclists prefer wide shoulders to sidewalks.
16	New bridges are required to be designed for seismic loading. For projects involving entire deck replacement or greater or widening by more than 30% of existing deck area, seismic retrofit shall be considered. The report should contain a discussion of seismic retrofit considerations. Prior to initial design, it should be determined whether a structure should be fully or partially retrofitted, replaced, or no action should be taken.
17	Integral abutment means that the girders and abutment are monolithically cast with no deck joint at the ends of the structure. Displacement due to thermal conditions is accommodated by providing some flexibility at the girder/abutment location and through inherent flexibility at the soil-structure interface. Usually, a single row of steel H-piles is provided under an abutment seat, which is cast integrally with the girder. Similar to continuous spans, this type of construction is also a more economical design and requires less long-term maintenance. Though integral abutments are not a new design concept, it is relatively new to New Jersey. Integral abutments should be used where possible.

Question	Notes
18	See 12.
19	In areas where hydraulic conditions might induce scour, deep foundations are preferred.
20	Designers are encouraged to use alternate retaining wall systems at select project locations. Mechanically Stabilized Earth (MSE) and Prefabricated Modular Walls, instead of the standard cast-in-place (CIP) system, should be evaluated for use in a project that involves retaining wall construction. The standard is to show at least two alternate proprietary wall types on the plans and have the contractor select and design the wall given the criteria provided. The discussion of retaining walls should demonstrate that alternate proprietary wall types have been considered. Sometimes these systems are not feasible to construct at a certain location. When there are only one or no alternatives, a cast-in-place concrete wall can be considered.
21	When "stepped" footings are used for long walls, the step should preferably not be greater than the depth of the footings, except that when the footing is on piles, the step may be twice the depth of the footing.
22	In order to prevent damage from frost heave, footings shall be founded at an elevation that is a minimum of 4 feet below the existing ground line or, other than when founded on sound rock, shall be embedded a sufficient depth to provide adequate bearing, scour and frost heave protection, whichever is greater.
23	In the NJDOT Design Manual, Section 1.16.3 Subsection 2, "Pile Foundations," shall be used as guidance in this area.
24	When drilled shafts that are constructed in moderately or extremely aggressive environments and that extend through water, are used in bents, they shall be detailed to eliminate construction joints within the Splash Zone. Additionally, it is preferred that such shafts extend to the bottom of the bent cap without a construction joint.

Question	Notes
25	Often, walls are proposed where slopes could be provided instead. The reason usually provided is that it is easier to build the wall than to get the required permit or other environmental clearance. However, walls are much more costly than slopes. When a slope is feasible and a wall is proposed instead (this is often the case), a benefit/cost analysis should be performed to demonstrate why the wall is needed. This does not have to be a quantitative analysis, but it should be demonstrated that the slope option was considered.
26	See 20.
27	MSE walls should not be used when utilities other than highway drainage must be constructed within the reinforced zone.
28	MSE walls should not be used when the floodplain erosion may undermine the reinforced fill zone, or where the depth of scour cannot be reliably determined.
29	MSE walls should not be used when the water table is above the elevation of the top of the leveling pad.
30	Prefabricated modular systems shall not be used on curves with a radius of less than 800 feet, unless the curve can be substituted with a series of chords.
32	Many times, new sign structures are proposed in the approximate location of an existing sign structure with little thought given to re-use of the existing. There may be a good reason for replacing the particular structure (i.e., poor condition, little remaining fatigue life, increased loading), but these reasons should be provided in the documentation. If not, this should be questioned.
33	The current standard drawings for overhead and cantilever sign support structures are dated 2002. These drawings may be found in the bridge office.
34	Many times, overhead sign structures (OHSS) are proposed where the sign could be mounted on a cantilever sign structure or the OHSS is in the vicinity of a bridge where the sign could be mounted. Cantilever and bridge-mounted sign structures are more economical than OHSS's and these should be used wherever possible.
35	Minimum vertical underclearances for overhead and cantilever sign support structures shall be 17'-9".

Question	Notes
36	The design of the VMS structures shall conform to: AASHTO LRFD Bridge Design Standard Specifications and AASHTO Standard Specifications for Structural Supports.
37	While locating overhead and cantilever sign structures on a bridge is not preferred, the best locations from a structural standpoint are usually near an abutment, bent cap, or other support. This will reduce the effect of live load vibrations.
38	The overhead signs should be located as near to the most advantageous position for traffic operations as possible, but where structurally adequate support structure details can be provided.
39	Normally, signs should be placed parallel with the structure for skews up to 10 degrees. At greater angles of skew, support structures shall be detailed to position the sign at approximately right angles to the roadway.
40	Sometimes, when a barrier must be retrofit onto an existing bridge, a new structure adjacent to the existing bridge is proposed. Sometimes the existing bridge has been analyzed and found to be not capable of supporting the additional loading resulting from the barrier, even with structural enhancements. However, this is rarely the case. Usually, the bay between the fascia and first interior girder can be strengthened to accommodate the additional load (mainly transverse load caused by wind on the barrier). When a new structure is proposed for the sole intention of supporting a noise barrier, it should be demonstrated that all other options were exhausted.
41	The standard roadway barrier type, for which standard details are available, is a precast concrete system. Standard drawings of this system can be found in the Bridge Design Manual. This system is used because of its long-term durability and aesthetically pleasing quality. There is no standard bridge-mounted noise barrier system.
42	The noise report, and occasionally structural considerations, dictates the height of the barrier. If barriers are proposed, there should be a statement about the height of the barriers and how this was determined.
43	Provisions for expansion shall be placed in the noise barrier at locations of bridge deck expansion joints and at parapet deflection joints.

Question	Notes
44	For noise barrier retrofit onto existing bridges, the Designer must verify that the dead and live load from the wall do not overstress any component of the bridge including the existing parapets, slab overhang, girders and superstructure members. The dead load of the noise barriers can affect the overload capacity and deflection of some bridges.
45	The Designer shall closely examine all proposed connections, and traffic induced vibration should be considered as part of the examination.
46	Construction time and cost are greatly reduced when staging is not required. This should be considered on every project where staging is proposed.
47	If a detour is not feasible and several stages (more than 2) are proposed, the staging sequence should be reviewed, if possible. Can the structure be widened slightly to reduce the number of stages? Can the sidewalk area be used temporarily for vehicular traffic and the raised portion constructed later? Can the lane widths or the number of lanes provided during staging be reduced? Can the staging be revised so that temporary support of the deck slab (if proposed) is not required?
48	Temporary structures are very costly and their use is discouraged unless there is a demonstrated need and absolutely no other way to accommodate traffic during construction. Construction will cause temporary inconvenience to the traveling public, and the public should and often does accept this. If temporary access is required (i.e., there is a school on one end of the structure and children on the other) and all other options have been exhausted, a temporary structure may be needed.

Aesthetics Explored In Detail

Location and Surroundings

When determining the appearance of a bridge, the bridge must be considered in context with its surroundings. Decisions need to be made regarding what color, shape and type of bridge will look best at a given location. The surrounding area may be industrial, urban, or rural. A bridge that looks pleasing in a rural setting may look totally out of place in an urban area.

Individual bridges that span a major land area or body of water, because of their large size, dramatic location, and carrying capacity, will tend to dominate their surroundings. While these structures must harmonize with the surroundings, their importance and size requires that the aesthetic qualities of the structure stand on their own. Multiple bridges seen in succession create a cumulative aesthetic impact on the landscape that must be considered. In these situations, there is more reason for uniformity, and there should be no noticeable differences between structures, without an obvious reason. A specific theme for a particular route, such as a parkway, is often appropriate.

Routine bridges, such as highway overpasses and stream crossings, should be simple, with minimal changes, and with all of the elements in clear relationship with one another. Since many of these bridges are viewed in elevation by those traveling on a roadway below, the structure type, span lengths, and proportions as viewed in elevation should be carefully considered.

Bridges that are infrequently viewed, such as those on lightly traveled roadways, are rarely seen by anyone. In these cases, attention to the elements that can be seen from the roadway surface such as parapets, railings, transitions, and road surface, are important.

Horizontal and Vertical Geometry

Geometric design standards often dictate the orientation of a bridge. The emphasis is on the need for safe, convenient driving and providing a more attractive highway system. Bridges must adapt to the highway alignment. Thus, they often lie within the curvature of the road and follow the slopes or curvature in elevation. Large curvature is not only desirable from a safety standpoint, but also for aesthetics.

With skewed structures, when it is necessary to orient the substructure parallel to the feature crossed, a wide bridge presents a greater visual impact and additional aesthetic treatments may be necessary. Piers and abutments in waterways that lie parallel to the river's banks look better than those placed perpendicular to the crossing road.

If an alignment requires a curved bridge, then the external longitudinal lines, traffic barriers, and fascia lines of the structure should follow the curved centerline to provide a smooth visual flow.

A smooth transition helps the structure fit in with the local topography. Parallel lines should be maintained by matching barrier, sidewalk, curb and fascia depth across the structure.

Superstructure Type and Shape

The appearance of a bridge is greatly influenced by different aspects of the superstructure. These include the superstructure type, depth, overhang width, number of spans, and span lengths. One way to make the structure light and slender, without making it appear weak and unsafe, is to use a favorable visible slenderness ratio (the ratio of span length to the visible structure depth, including the decking and any concrete traffic barrier or steel railing). The typical visible slenderness ratio will vary from approximately 10 to 40 depending on the type of superstructure chosen.

A girder depth that is too shallow gives the appearance that the bridge is not structurally safe. A girder that is too deep makes the bridge look bulky and overpowering. Bridges with a well-proportioned slenderness ratio denote strength without excessive materials.

An additional guideline that enhances the appearance of multiple spans is to avoid changing girder depths from one span to another. This would give a very awkward appearance and would not allow the structure to flow evenly across the bridge. From an aesthetic standpoint, deck overhang should be proportional to the girder depth; a desirable overhang would be about 2/3 the girder depth. Vertical stiffeners make steel girders seem heavier, and should be avoided on the fascia side of fascia girders. Haunched girders can make a bridge look more slender, and help demonstrate the flow of forces in the bridge. Fishbelly girders create a heavy look, and could tend to look awkward. Some structure types are more visually elegant than others, such as trapezoidal box girders and concrete segmental bridges. An arch bridge is one of the most natural bridge types, and generally considered one of the most pleasing. Both thru and deck arches can be considered.

Pier Shape and Placement

The visual impression that a person gets from a pier is primarily influenced by the proportions, the relative width and height, and the configuration of the pier cap with respect to the pier columns. Pier proportion, in turn, is determined by the bridge geometry and superstructure type and shape. Piers can broadly be classified as either short or tall. Short piers are typically more difficult to design with aesthetic proportions. Care should be taken in proportioning a pier to make sure that horizontal lines of the superstructure are not interrupted. Large piers may direct attention away from the superstructure. Piers that are too slender may convey a feeling of instability. However, there are aesthetic issues that are common to all pier types involving the shape of the columns and the pier caps. The selection of the proper pier type can be dictated by the site, bridge geometry and design considerations.

The shape and location of the columns affect the appearance of the piers. The light reflecting from the surface often controls how the viewer perceives it. A square or rectangular column with beveled corners will appear more slender due to the edge lines and varying shades of

reflected light. The designer needs to assure that the treatments used are in harmony with the rest of the structure. Pier caps, cantilevered ends, and column spacing can be designed to make the pier appear more graceful. For hammerhead piers, the stem width and height, and the cantilever length and depth should be carefully balanced, and in pleasing proportion. Solid piers can be battered to improve their appearance. The batter should be determined by the pier height and the relative dimensions at the top and bottom of the pier. Gradual lines are important. While tall piers are less common than short piers, they allow a greater opportunity for aesthetic treatment.

Abutment Shape and Placement

For most simple span bridges and some multi-span bridges, the abutments are the most visible elements. While the abutment's function is to support the superstructure and transfer loads to the ground, it is important to maintain proper proportion in order to create a good appearance. Good proportions between various elements of the bridge give character to the bridge. For the abutments it is important to consider the relationships between the exposed abutment height and length, the size and type of wingwalls, and the superstructure depth. An attempt should be made to achieve a balance between these elements.

The designer must maintain order between the lines and edges of the structure. Too many lines, or lines that are close to but not parallel to each other, can disrupt the eye and diminish the appearance of the bridge. The monotony of a large flat wingwall can be broken up using textures such as scoring, recessing, or grooving. Surface textures, either by using or simulating natural stone around the area of the bridge, can be used to integrate the structure with its surroundings.

The orientation of the abutments to the feature crossed will create different visual appearances. Abutments on severe skews can have very long stems and wingwalls. Consideration should be given to the aesthetic impact of those concrete surfaces. Wingwalls are often very predominating features. The orientation of the wingwalls allows for more or less visual impact. On divided roadways, the view presented from the opposite direction of travel should be considered.

Parapet and Railing Details

The railings or barriers, along with the deck fascia and fascia girders, are sometimes the most dominant visual aspect of the bridge. The railings are viewed by people traveling under the structure who see them in elevation and by people in vehicles on the bridge traveling parallel to them. When vehicle speeds are high, the railing or barrier should have simple and pronounced details because passengers cannot notice fine details. The shape of the railing or barrier system should relate to its function and the overall aesthetic design of the bridge.

The design and appearance of any fencing to be placed on the bridge should be consistent with the railing or barrier system. The vertical supports of the screening should align with the railing post spacing. Fencing on concrete barriers should be detailed to match the construction joints and the ends of the barriers.

Colors

When there is a reason to color the concrete, steel, or railings, a decision should be made whether the color should complement or contrast with the surrounding environment. Strong consideration should be made to the fact that colored concrete or steel will require a high level of maintenance. The designer should also consider the appearance if regular maintenance is not performed (e.g., peeling paint, rust spots, etc.).

Coloring agents are not frequently used in concrete because of complicated quality control and the high cost of materials; but the idea has not been discounted completely. Some problems have occurred in coloring concrete. It is difficult to get an identical color of concrete from one pour to the next. However, the technology and experience is continuing to improve and there are some ready mix producers that advertise the use of colored concrete. If considering a project using coloring agents, then check with the Eastern Federal Lands Structures Team in Sterling, Virginia. Staining concrete can create a mottled appearance. External coatings are not always applied correctly and can have durability problems.

Textures

Texturing concrete can be achieved through form liners, panels, stone or brick veneer, or acid washing. Any texturing should fit in within the overall design and proportions of the structure.

Several types of commercial form liners are available. Natural stone or brick facades can also be used. Stone is most often used for parkway bridges and those in rural settings. The cost of this treatment is quite high; any may therefore be limited to areas of high visibility. Sometimes a concrete cap is used on the top of a wingwall or retaining wall. Certainly these should be visually proportioned to the wall itself.

Ornamentation

Ornamentation can be added to a bridge in special circumstances. The additional cost of add-ons is rarely justified except in cases of importance to the community (such as a gateway to a city) or of historical significance. Details such as ornamental light posts, columns or pylons, real or simulated gatehouses, plaques or reliefs may be added. The designer should consider these details carefully since it is just as easy to detract from the overall appearance of the bridge, as it is to improve it.

Such details are secondary to the primary purpose of the structure, which is to provide a safe and efficient crossing to the public. Ornamental and non-structural details require additional coordination, sketches and drawings to ensure that the details will add to the aesthetic characteristics of the structure in a way acceptable to all concerned.

Foundation Report Outline/Checklist

YES NO N/A

1	Title/Cover Page
1.1	Heading “Foundation Report” in larger letters
1.2	Bridge Name
1.3	Bridge Number
1.4	Section Name
1.5	Highway & Milepoint
1.6	County
1.7	Key Number
1.8	Date
2	Table of Contents
3	Detailed Vicinity Map
4	Body of Report
4.1	Introduction
4.1.1	Is project scope and purpose summarized?
4.1.2	Is a concise description given for the general geologic setting and topography of the area?
4.2	Office Research
4.2.1	Summary of pertinent records that relate to foundation design and construction.
4.3	Subsurface Explorations and Conditions
4.3.1	"Is a summary of the field explorations, locations, and testing given?"
4.3.2	Is a description of general subsurface soil and rock conditions given?
4.3.3	Is the groundwater condition given?
4.4	Laboratory Data
4.4.1	"Are laboratory test results (e.g., natural moisture, Atterberg Limits," "shear strengths, etc) discussed and summarized in the report?"
4.5	Summarize Hydraulics Information that affects Foundation Recommendations
4.5.1	Bridge options providing required waterway
4.5.2	100 and 500-year scour depths and elevations
4.5.3	"Riprap protection class, depth, and extent"
4.6	Seismic Analysis and Evaluation
4.6.1	Bedrock acceleration coefficient and AASHTO soil profile type
4.6.2	Liquefaction assessment
4.7	Foundation Analyses and Design Recommendations
4.7.1	Foundation Options and Discussion
4.7.2	Pile Foundations
4.7.2.1	Type (displacement/friction or end-bearing)
4.7.2.2	"Material specification (e.g., grade), size (e.g.,O.D. and thickness) and options, open or closed-ended, tip protection"
4.7.2.3	"Ultimate axial capacity, estimated cutoff elevation, estimated tip elevation. estimated” or “order” length and "minimum required tip elevation.
4.7.2.4	Allowable axial capacity and factor of safety
4.7.2.5	Ultimate uplift capacities for multi-span bridges
4.7.2.6	Lateral capacity
4.7.2.6.1	"Soil parameters for LPILE or COM624P analysis (e.g., p-y data)"
4.7.2.7	Pile group settlement
4.7.2.8	Downdrag
4.7.2.8.1	How are downdrag loads to be accounted for or mitigated?
4.7.2.9	"Reduced pile capacities (axial, uplift, lateral, etc) as a result of liquefaction"
4.7.2.10	Driving Criteria and Driveability Analysis
4.7.2.10.1	Gates Equation where driveability or stress problems are not expected

4.7.2.10.2 Wave Equation for ultimate capacities greater than 2400 kN or expected stress problems.
4.7.2.10.2.1 The owner must have the capability to perform or be able to obtain
4.7.2.10.2.2 Wave Equation parameters provided
4.7.2.11 Is a load test recommended? Who monitors?
4.7.3 Drilled Shafts
4.7.3.1 "Shaft type (i.e., end-bearing or friction)"
4.7.3.2 Ultimate axial capacity provided for various diameters and lengths
4.7.3.3 Estimated settlement substantiates shaft type
4.7.3.4 Allowable axial load and factors of safety
4.7.3.5 Lateral capacity
4.7.3.5.1 "Soil parameters for COM624P analysis (e.g., p-y data)"
4.7.3.6 Is a load test recommended? Who monitors?
4.7.4 Spread Footings
4.7.4.1 Ultimate bearing capacity as function of effective footing width and depth of embedment for a given settlement under allowable loads (see example)
4.7.4.2 Maximum elevation for base of footing
4.7.4.3 Description and properties of the anticipated foundation soil

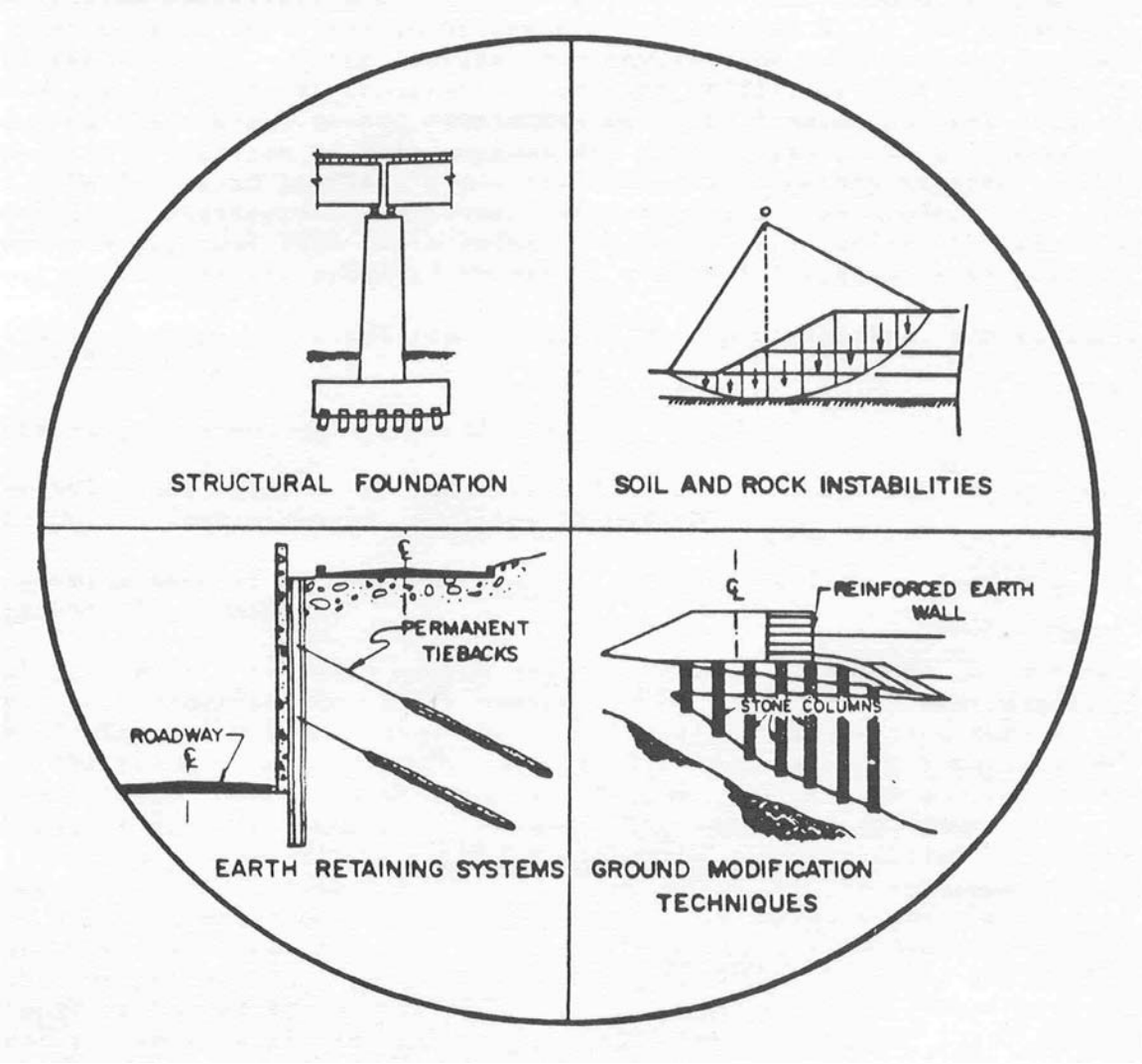
YES NO N/A

4.7.5 Retaining Walls
4.7.5.1 Ultimate bearing capacity as function of effective footing width and depth of embedment for a given settlement under allowable loads (see example)
4.7.5.2 Maximum elevation for base of footing
4.7.5.3 Description and properties of the anticipated foundation soil
4.7.5.4 Global stability
4.7.5.5 Wall type options
4.7.6 Engineered Fills
4.7.6.1 Are gradation and compaction requirements provided for the engineered fill?
4.7.6.2 See example
4.7.7 Are appropriate recommendations provided for Temporary and/or Detour Structures?
4.8 Construction Recommendations
4.8.1 Pile Foundations
4.8.1.1 Minimum hammer field energy (if using Wove Equation)
4.8.1.2 "Have potential obstructions (e.g., boulders) been identified?"
4.8.1.3 Set period and redriving (freeze)
4.8.1.4 Preboring required?
4.8.1.5 Jetting permitted?
4.8.1.6 Is tip protection required?
4.8.1.7 Have the effects of driving on adjacent structures been evaluated?
4.8.1.7.1 Is a preconstruction survey recommended to document existing conditions?
4.8.2 Drilled Shafts
4.8.2.1 "Alternate construction methods discussed and evaluated (e.g., temporary or permanent casing)"
4.8.2.2 Boulders and/or obstructions expected to be encountered?
4.8.2.3 Quality control methods (e.g. concrete integrity tests)
4.8.3 Spread Footings
4.8.3.1 Anticipated foundation material adequately described
4.8.4 Retaining Walls
4.8.4.1 Anticipated foundation material adequately described
4.8.4.2 Backfill requirements identified
4.8.5 Falsework Support

4.8.5.1 Falsework foundation type recommendations
4.8.6 Excavations
4.8.6.1 Shoring and bracing
4.8.6.2 Cofferdams
4.8.6.3 Groundwater mitigation method
4.9 Special Provisions
4.9.1 Are unique special provisions provided?
4.10 Limitations
4.11 General
4.11.1 Has the report been independently reviewed?
4.11.2 "Is the Foundation Report stamped, dated, and signed by a registered PE"
5 Appendices
5.1 Foundation Data Sheet (see example)
5.1.1 Plan Section
5.1.1.1 "Are the locations of the proposed, existing, and detour structure(s) and other important features shown?"
5.1.1.2 Are the locations (station and offset or State Plane Coordinates of all explorations shown on the plan?
5.1.2 Profile Section
5.1.2.1 Is the groundline profile(s) shown?
5.1.2.2 Are the explorations plotted on the profile at the correct elevation and location?
5.1.2.3 Is on identification number and the completion date shown for each exploration?
5.1.2.4 Are the subsurface conditions depicted with soil and rock descriptions in conformance with the ODOT Soil and Rock Classification Manual? Are the appropriate graphic symbols (see attached) used?
5.1.2.5 Is the sample type shown on the profile at the correct depth?
5.1.2.6 Are SPT results ("N" values) shown on the profile?
5.1.2.7 Are the highest measured Groundwater levels and the date shown on the profile?
5.1.2.8 "Are percent rock core recovery, rock hardness, and RQD values shown in a summary table?"
5.1.3 General
5.1.3.1 Is the presentation of the subsurface information adequately shown on the Foundation Data Sheet?
5.1.3.2 Has the Foundation Data Sheet been independently reviewed?
5.1.3.3 "Is the Foundation Data Sheet stamped, dated, and signed by a registered PE?"
5.2 Exploration Logs
5.3 Plan and Elevation of Existing Bridge
5.4 In situ Test Data/Results
5.5 Laboratory Test Data/Results
5.5.1 Results in a tabular format
5.6 Photographs
5.7 Other References as Needed
6 Foundation Analyses and Design Calculations Attached

U.S. Department
of Transportation
Federal Highway Administration

Publication No. FHWA ED-88-053
August 1988
Revised February 2003



CHECKLIST AND GUIDELINES FOR REVIEW OF GEOTECHNICAL REPORTS AND PRELIMINARY PLANS AND SPECIFICATIONS

PREFACE

A set of review checklists and technical guidelines has been developed to aid engineers in their review of projects containing major and unusual geotechnical features. These features may involve any earthwork or foundation related activities such as construction of cuts, fills, or retaining structures, which due to their size, scope, complexity or cost, deserve special attention. A more specific definition of both unusual and major features is presented in Table 1. Table 1 also provides a description of a voluntary program by which FHWA generalists engineers determine what type and size projects may warrant a review by a FHWA geotechnical specialist. The review checklists and technical guidelines are provided to assist generalist highway engineers in:

- Reviewing both geotechnical reports and plan, specification, and estimate (PS&E)* packages;
- Recognizing cost-saving opportunities
- Identifying deficiencies or potential claim problems due to inadequate geotechnical investigation, analysis or design;
- Recognizing when to request additional technical assistance from a geotechnical specialist.

At first glance, the enclosed review checklists will seem to be inordinately lengthy, however, this should not cause great concern. First, approximately 50 percent of the review checklists deal with structural foundation topics, normally the primary responsibility of a bridge engineer; the remaining 50 percent deal with roadway design topics. Second, the general portion of the PS&E checklist is only one page in length. The remaining portions of the PS&E checklist apply to specific geotechnical features – such as pile foundations, embankments, landslide corrections, etc., and would only be completed when those specific features exist on the project. Third, the largest portion of the checklists deals with the review of geotechnical reports, with a separate checklist for each of eight geotechnical features. The checklist for each geotechnical feature is only one to two pages in length. Therefore, on most projects, reviewers will find that only a small portion of the total enclosed checklist needs to be completed.

* For purposes of this document, PS&E refers to a plan and specification review at any time during a project's development. Hence, the review may be at a preliminary or partial stage of plan development.

TABLE OF CONTENTS

TITLE PAGE NO.

PREFACE i

TABLE OF CONTENTS ii

Introduction 1

What is a Geotechnical Report? 3

Use of Review Checklists and Technical Guidelines 4

Geotechnical Report Review Checklists:
- Section A – Site Investigation 12
- Section B – Centerline Cuts and Embankments 14
- Section C – Embankments Over Soft Ground 16
- Section D – Landslide Corrections 18
- Section E – Retaining Walls 20
- Section F – Structural Foundations – Spread Footings 21
- Section G – Structural Foundations – Driven Piles 22
- Section H – Structural Foundations – Drilled Shafts 25
- Section I – Ground Improvement Techniques 27
- Section J – Material Sites 28

PS&E Review Checklists
- Section A – General 21
- Section B – Centerline Cuts and Embankments 32
- Section C – Embankments Over Soft Ground 32
- Section D – Landslide Corrections 33
- Section E – Retaining Walls 33
- Section F – Structural Foundations - Spread Footings 35
- Section G – Structural Foundations - Driven Piles 35
- Section H – Structural Foundations - Drilled Shaft 36
- Section I – Ground Improvement Techniques 37
- Section J – Material Sites 38

LIST OF TABLES

TITLE PAGE NO.

Table 1 – Project Review Guidelines 2

Table 2 – Guideline Minimum Boring, Sampling and Testing Criteria 6

Table 3 – Geotechnical Engineering Analysis Required for Embankments, Cut Slopes, Structure Foundations, and Retaining Walls 8

Table 4 – Correction of Soil and Rock Related Instabilities 10

GEOTECHNICAL REVIEW CHECKLISTS AND TECHNCIAL GUIDLINES

Introduction

The following review checklists and technical guidelines have been developed to aid engineers with review of geotechnical reports, plans and special provisions on projects containing major and unusual geotechnical features. These may involve any earthwork or foundation related activities such as construction of cuts, fills, or retaining structures, which due to their size, scope, complexity or cost, deserve special attention. A more specific definition of both major and unusual features is presented in Table 1. The checklists and review guidelines are intended to serve four primary purposes.

First, for projects that are submitted to a FHWA geotechnical specialist, the checklists and technical guidelines are provided to aid FHWA generalist engineers in making a quick review of the geotechnical report and accompanying support data provided by the State, to insure that the information provided by the State is complete enough to allow adequate technical review by the FHWA geotechnical specialist.

Second, for projects which will not be submitted to a FHWA geotechnical specialist for formal review (which will be the majority of projects handled by the FHWA division office) the checklists and technical guidelines are provided to assist generalist engineers in (1) reviewing geotechnical reports and preliminary plan and specification packages; (2) recognizing cost-saving opportunities; (3) spotting deficiencies or potential claim problems due to inadequate geotechnical investigations, analysis, or design; (4) recognizing when to request technical assistance for a FHWA geotechnical specialist.

Third, it should be noted that the checklists and technical guidelines also include coverage of structure foundations. These review checklists and technical guidelines have been developed to fill an existing need in this area.

Fourth, this document sets forth minimum geotechnical standards or criteria to show transportation agencies and consultants the basic geotechnical information which FHWA recommends be provided in geotechnical reports and PS&E packages.

TABLE 1
PROJECT REVIEW GUIDELINES

The following project review guidelines are given to assist FHWA generalist engineers in determining what type and size projects may warrant review by a FHWA geotechnical specialist.

A FHWA geotechnical specialist should review Geotechnical reports and supporting data for major or unusual geotechnical features, described below. The FHWA division office should also request FHWA geotechnical specialist review for any project that is considered to involve geotechnical risk or excessive expense in its design or construction. Supporting data for these reviews include preliminary plans, specifications, and cost estimates (if available at the time of geotechnical report submittal). Emphasis will be placed on review of these projects in the preliminary stage in order to optimize cost savings through early identification of potential problems or more innovative designs. To be of maximum benefit geotechnical reports and supporting data should be forwarded for review as soon as available, and at least 60 days prior to the scheduled project advertisement date. The review by the FHWA geotechnical specialist should be completed within 10 working days.

A. "Major" Geotechnical Features

Geotechnical reports and supporting data for major geotechnical project features should be submitted to the FHWA geotechnical specialist for review if the following project cost and complexity criteria exist:

		Cost Criteria
1.	Earthwork – soil or rock cuts or fills where (a) the maximum height of cut or fill exceeds 15 m (50 ft), or (b) the cuts or fills are fills are located in topography and/or geological units with known stability problems.	Greater than $1,000,000
2.	Soil and Rock Instability Corrections – cut, fill, or natural slopes which are presently or potentially unstable.	Greater than $ 500,000
3.	Retaining Walls (geotechnical aspects) - maximum height at any point along the length exceeds 9 m (30 ft). Consideration of bidding cost-effective alternatives and geotechnical aspects (bearing capacity, settlement, overturning, sliding, etc.) are of prime concern. Structural design of and footings is beyond the scope of these reviews.	Greater than $ 250,000

B. "Unusual" Geotechnical Features

Geotechnical reports and supporting data for all projects containing unusual geotechnical features should be submitted to the FHWA geotechnical specialist for review.

An unusual geotechnical project feature is any geotechnical feature involving: (1) difficult or unusual problems, e.g. embankment construction on a weak and compressible foundation material (difficult) or fills constructed using degradable shale (unusual); (2) new or complex designs, e.g. geotextile soil reinforcement, permanent ground anchors, wick drains, ground improvement technologies; and (3) questionable design methods, e.g. experimental retaining wall systems, pile foundations where dense soils exists.

What is a Geotechnical Report?

The geotechnical report is the tool used to communicate the site conditions and design and construction recommendations to the roadway design, bridge design, and construction personnel. Site investigations for transportation projects have the objective of providing specific information on subsurface soil, rock, and water conditions. Interpretation of the site investigation information, by a geotechnical engineer, results in design and construction recommendations that should be presented in a project geotechnical report. The importance of preparing an adequate geotechnical report cannot be overstressed. The information contained in this report is referred to often during the design period, construction period, and frequently after completion of the project (resolving claims). Therefore, the report should be as clear, concise, and accurate. Both an adequate site investigation and a comprehensive geotechnical report are necessary to construct a safe, cost-effective project. Engineers need these reports to conduct an adequate review of geotechnical related features, e.g., earthwork and foundations.

The State or their consultant should prepare "Preliminary" geotechnical reports for submittal to the design team whenever this information will benefit the design process. Early submittal of geotechnical information and recommendations or engineering evaluation of preliminary data may be necessary to establish basic design concepts or design criteria. This is commonly the case on large projects or projects containing complex or difficult geotechnical problems where alignment and/or grade changes may be appropriate based on geotechnical recommendations. The development of a "Final" geotechnical report will not normally be completed until design has progressed to the point where specific recommendations can be made for all of the geotechnical aspects of the work. Final alignment, grade, and geometry will usually have been selected prior to issuance of the final geotechnical report.

While the geotechnical report content and format will vary by project size and highway agency, all geotechnical reports should contain certain basic essential information, including:

- Summary of all subsurface exploration data, including subsurface soil profile, exploration logs, laboratory or in situ test results, and ground water information;
- Interpretation and analysis of the subsurface data;
- Specific engineering recommendations for design;
- Discussion of conditions for solution of anticipated problems; and
- Recommended geotechnical special provisions.

It is suggested that the State routinely include this minimum information in the geotechnical report for Federal-Aid highway projects and that a copy of this report be supplied to the FHWA division office at the time when the report is internally distributed in the State.

For brevity in this document, the term geotechnical report will be used as a general term to cover all types of geotechnical reports, e.g., foundation report, centerline soils report, landslide study report, etc.

Use of Review Checklists and Technical Guidelines

Review checklists have been prepared for review of geotechnical reports and review of the geotechnical aspects of preliminary plans, specification and estimate (PS&E)* packages. To simplify their use, the checklists are set up in a question and answer format. The geotechnical report checklists (pages 11 through 27) cover the important information that should be presented in project geotechnical reports. The PS&E review checklists (pages 28 through 33) cover the geotechnical aspects, ranging from assuring continuity between the project geotechnical report and contract documents to avoiding common claim pitfalls. Items that are identified with an asterisk (*) are considered to be of major importance. A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

Groups of related questions and, in some cases, individual questions have been cross referenced to the "Soils and Foundations Workshop Manual"** so as to provide the generalist engineer user a reference on basic geotechnical items. Technical guidelines are presented in Tables 1 through 4. Since it is not possible to establish strict criteria for all geotechnical information that should be obtained or geotechnical analysis that should be performed for a particular project, only general or minimum guidelines can be established. Table 1 provides definitions of both major and unusual features and guidelines as to which projects may be appropriate for review by the FHWA geotechnical specialist. Table 2 presents guideline minimum boring, sampling, and testing criteria for subsurface investigations that should be conducted for major or unusual geotechnical features. Table 3 presents general guidelines on the major types of geotechnical engineering analyses that are normally required for embankments and cut slopes, structure foundations, and retaining structures. Guidance is given for all major soil types. Table 4 presents a list of technical support data that should be provided for correction of soil and rock instabilities (landslides). Due to the unique situation that landslides present in terms of a major expenditure of funds for rehabilitation, a concise and specific list of necessary support information is warranted.

The enclosed review checklists and technical guidelines cover the following geotechnical features:

- Centerline Cuts and Embankments
- Embankments Over Soft Ground
- Landslide Corrections
- Retaining Structures
- Structure Foundations (spread footings, piles, drilled shafts)
- Ground Improvement Techniques
- Material Sites

*For the purposes of this document, PS&E refers to a plan and specification review at anytime during a project's development. Hence, the review may occur at a preliminary or partial stage of plan development.

** "Soils and Foundations Workshop Manual", Publication # FHWA NHI-00-045
Reviews made during the preliminary stage of project development will commonly consist of reviewing the geotechnical report only, since detailed plans and specifications may not yet be prepared.

When reviewing the PS&E, the plans, special provisions, and final geotechnical report should be examined together. A major aspect of the PS&E review of project geotechnical features is to verify that the major design and construction recommendations given in the geotechnical report have been properly incorporated into the plans and specifications. The practice of most highway agencies is to prepare a single geotechnical report that includes subsurface information, interpretations, and design and construction recommendations. However, some agencies prepare two separate reports; one report that only presents the factual subsurface data (made available to bidders), and a separate report or design memorandum (not made available to bidders) which contains the interpretation of subsurface conditions and the design and construction recommendations. These reports not only form the basis of technical reviews but should also be the agency's basis for design and construction of earthwork and foundation features.

The review checklists should be used as the working document while the guidelines in Tables 1 through 4, and the indicated sections of the "Soils and Foundations Workshop Manual" should be used as references. The checklist questions should be completed by referring to the geotechnical report and contract documents, the appropriate sections of the tables, and by use of engineering judgement. For each question, the reviewer should indicate a yes, no, or unknown or non-application response. Upon completion of the checklists, the reviewer should summarize the negative responses and discuss these with the appropriate geotechnical engineers to determine if additional follow-up is appropriate.

Seismic design of geotechnical features has not been considered in this document. For guidance the reader is referred to "Geotechnical Engineering Circular No. 3, Design Guidance: Geotechnical Earthquake Engineering for Highways, Volume I – Design Principles", FHWA SA-97-076. Seismic loads represent an extreme loading condition therefore relatively low factors of safety are generally considered acceptable in a psudeo-static analysis. Factors of safety on the order of 1.1 to 1.15 are typically used in practice for both bearing capacity and sliding resistance. The choice of the factor of safety and of the seismic coefficient are intimately linked. For instance, of a seismic coefficient equal to the PGA (divided by g) has been used in the pseudo-static analysis because the foundation cannot tolerate large movements, a factor of safety of 1.0 may be used. Alternatively, if the seismic coefficient is one-half the PGA and the soil is susceptible to a post-peak strength decrease, a factor of safety of 1.1 to 1.15 should be used.

TABLE 2

GUIDELINE "MINIMUM" BORING, SAMPLING, AND TESTING CRITERIA

The most important step in geotechnical design is to conduct an adequate subsurface investigation. The number, depth, spacing, and character of borings, sampling, and testing to be made in an individual exploration program are so dependent upon site conditions and the type of project and its requirements, that no "rigid" rules may be established. Usually the extent of work is established as the site investigation progresses in the field. However, the following are considered reasonable "guidelines" to follow to produce the minimum subsurface data needed to allow cost-effective geotechnical design and construction and to minimize claim problems. (Reference: "Subsurface Investigations" FHWA HI-97-021)

Geotechnical Feature	Minimum Number of Borings	Minimum Depth of Borings
Structure Foundation	1 per substructure unit under 30 m (100 ft) in width 2 per substructure unit over 30 m (100 ft) in width Additional borings in areas of erratic subsurface conditions	Spread footings: 2B where L< 2B, 4B where L > 2B and interpolate for L between 2B and 4B Deep foundations: 6m (20ft) below tip elevation or two times maximum pile group dimension, whichever is greater If bedrock is encountered: for piles core 3 m (10 ft) below tip elevation; for shafts core 3D or 2 times maximum shaft group dimension below tip elevation, whichever is greater.
Retaining Structures	Borings spaced every 30 to 60 m (100 to 200 ft). Some borings should be at the front of and some in back of the wall face.	Extend borings to depth of 0.75 to 1.5 times wall height When stratum indicates potential deep stability or settlement problem, extend borings to hard stratum
Bridge Approach Embankments over Soft Ground	When approach embankments are to be placed over soft ground, at least one boring should be made at each embankment to determine the problems associated with stability and settlement of the embankment. Typically, test borings taken for the approach embankments are located at the proposed abutment locations to serve a dual function.	Extend borings into competent material and to a depth where added stresses due to embankment load is less than 10% of existing effective overburden stress or 3 m (10 ft) into bedrock if encountered at a shallower depth Additional shallow explorations (hand auger holes) taken at approach embankment locations to determine depth and extent of unsuitable surface soils or topsoil.
Centerline Cuts and Embankments	Borings typically spaced every 60 m (200 ft) (erratic conditions) to 120 m (400 ft) (uniform conditions) with at least one boring taken in each separate landform. For high cuts and fills, should have a minimum of 3 borings along a line perpendicular to centerline or planned slope face to establish geologic cross-section for analysis.	Cuts: (1) in stable materials extend borings minimum 5 m (15 ft) below depth of cut at the ditch line and, (2) in weak soils extend borings below grade to firm materials or to twice the depth of cut whichever occurs first. Embankments: Extend borings to a hard stratum or to a depth of twice the embankment height.
Landslides	Minimum 3 borings along a line perpendicular to centerline or planned slope face to establish geologic cross-section for analysis. Number of sections depends on extent of stability problem. For active slide, place at least on boring each above and below sliding area	Extend borings to an elevation below active or potential failure surface and into hard stratum, or to a depth for which failure is unlikely because of geometry of cross-section. Slope inclinometers used to locate the depth of an active slide must extend below base of slide.
Ground Improvement Techniques	Varies widely depending in the ground improvement technique(s) being employed. For more information see "Ground Improvement Technical Summaries" FHWA SA-98-086R.	
Material Sites (Borrow sources, Quarries)	Borings spaced every 30 to 60 m (100 to 200 ft).	Extend exploration to base of deposit or to depth required to provide needed quantity.

TABLE 2 (Continued)

GUIDELINE "MINIMUM" BORING, SAMPLING, AND TESTING CRITERIA

Sand or Gravel Soils SPT (split-spoon) samples should be taken at 1.5 m (5 ft) intervals or at significant changes in soil strata. Continuous SPT samples are recommended in the top 4.5 m (15 ft) of borings made at locations where spread footings may be placed in natural soils. SPT jar or bag samples should be sent to lab for classification testing and verification of field visual soil identification.
Silt or Clay Soils SPT and "undisturbed" thin wall tube samples should be taken at 1.5 m (5 ft) intervals or at significant changes in strata. Take alternate SPT and tube samples in same boring or take tube samples in separate undisturbed boring. Tube samples should be sent to lab to allow consolidation testing (for settlement analysis) and strength testing (for slope stability and foundation bearing capacity Analysis). Field vane shear testing is also recommended to obtain in-place shear strength of soft clays, silts and well-rotted peat.
Rock Continuous cores should be obtained in rock or shales using double or triple tube core barrels. In structural foundation investigations, core a minimum of 3 m (10 ft) into rock to insure it is bedrock and not a boulder. Core samples should be sent to the lab for possible strength testing (unconfined compression) if for foundation investigation. Percent core recovery and RQD value should be determined in field or lab for each core run and recorded on boring log.
Groundwater Water level encountered during drilling, at completion of boring, and at 24 hours after completion of boring should be recorded on boring log. In low permeability soils such as silts and clays, a false indication of the water level may be obtained when water is used for drilling fluid and adequate time is not permitted after boring completion for the water level to stabilize (more than one week may be required). In such soils a plastic pipe water observation well should be installed to allow monitoring of the water level over a period of time. Seasonal fluctuations of water table should be determined where fluctuation will have significant impact on design or construction (e.g., borrow source, footing excavation, excavation at toe of landslide, etc.). Artesian pressure and seepage zones, if encountered, should also be noted on the boring log. In landslide investigations, slope inclinometer casings can also serve as water observations wells by using "leaky" couplings (either normal aluminum couplings or PVC couplings with small holes drilled through them) and pea gravel backfill. The top 0.3 m (1 ft) or so of the annular space between water observation well pipes and borehole wall should be backfilled with grout, bentonite, or sand-cement mixture to prevent surface water inflow which can cause erroneous groundwater level readings.
Soil Borrow Sources Exploration equipment that will allow direct observation and sampling of the subsurface soil layers is most desirable for material site investigations. Such equipment that can consist of backhoes, dozers, or large diameter augers, is preferred for exploration above the water table. Below the water table, SPT borings can be used. SPT samples should be taken at 1.5 m (5 ft) intervals or at significant changes in strata. Samples should be sent to lab for classification testing to verify field visual identification. Groundwater level should be recorded. Observations wells should be installed to monitor water levels where significant seasonal fluctuation is anticipated.
Quarry Sites Rock coring should be used to explore new quarry sites. Use of double or triple tube core barrels is recommended to maximize core recovery. For riprap source, spacing of fractures should be carefully measured to allow assessment of rock sizes that can be produced by blasting. For aggregate source, the amount and type of joint infilling should be carefully noted. If assessment is made on the basis of an existing quarry site face, it may be necessary to core or use geophysical techniques to verify that nature of rock does not change behind the face or at depth. Core samples should be sent to lab for quality tests to determine suitability for riprap or aggregate.

TABLE 3

REQUIRED GEOTECHNICAL ENGINEERING ANALYSIS

Soil Classification			Embankment and Cut Slopes		Structure Foundations (Bridges and Retaining Structures)		Retaining Structures (Conventional, Crib and MSE)	
Unified	AASHTO[1]	Soil Type	Slope Stability[2] Analysis	Settlement Analysis	Bearing Capacity Analysis	Settlement Analysis	Lateral Earth Pressure	Stability Analysis
GW GP GM GC SW SP SM SC	A-1-a A-1-a A-1-b A-2-6 A-2-7 A-1-b A-3 A-2-4 A-2-5 A-2-6 A-2-7	GRAVEL Well-graded GRAVEL Poorly-graded GRAVEL Silty GRAVEL Clayey SAND Well-graded SAND Poorly-graded SAND Silty SAND Clayey	Generally not required if cut or fill slope is 1.5H to 1V or flatter, and underdrains are used to draw down the water table in a cut slope. Erosion of slopes may be a problem for SW or SM soils.	Generally not required except possibly for SC soils.	Required for spread footings, pile or drilled shaft foundations. Spread footings generally adequate except possibly for SC soils	Generally not needed except for SC soils or for large, heavy structures. Empirical correlations with SPT values usually used to estimate settlement	GW, SP, SW & SP soils generally suitable for backfill behind or in retaining or reinforced soil walls. GM, GC, SM & SC soils generally suitable if have less than 15% fines. Lateral earth pressure analysis required using soil angle of internal friction.	All walls should be designed to provide minimum F.S. = 2 against overturning & F.S. = 1.5 against sliding along base. External slope stability considerations same as previously given for cut slopes & embankments.
ML	A-4	SILT Inorganic silt Sandy	Required unless non-plastic. Erosion of slopes may be a problem.	Required unless non-plastic.	Required. Spread footing generally adequate.	Required. Can use SPT values if non-plastic.	These soils are not recommended for use directly behind or in retaining or reinforced soil walls.	
CL	A-6	CLAY Inorganic Lean Clay	Required	Required				
OL	A-4	SILT Organic	Required	Required				

[1] This is an approximate correlation to Unified (Unified Soil Classification system is preferred for geotechnical engineering usage, AASHTO system was developed for rating pavement subgrades).

[2] These are general guidelines, detailed slope stability analysis may not be required where past experience in area is similar or rock gives required slope angles.

TABLE 3 (Continued)

Soil Classification			Embankment and Cut Slopes		Structure Foundations (Bridges and Retaining Structures)		Retaining Structures (Conventional, Crib and MSE)	
Unified	AASHTO[1]	Soil Type	Slope Stability[2] Analysis	Settlement Analysis	Bearing Capacity Analysis	Settlement Analysis	Lateral Earth Pressure	Stability Analysis
MH	A-5	SILT Inorganic	Required. Erosion of slopes may be a problem.	Required.	Required. Deep foundation generally required unless soil has been preloaded.	Required. Consolidation test data needed to estimate settlement amount and time.	These soils are not recommended for use directly behind or in retaining walls.	All walls should be designed to provide minimum F.S. = 2 against overturning & F.S. = 1.5 against sliding along base. External slope stability considerations same as previously given for cut slopes & embankments
CH	A-7	CLAY Inorganic Fat Clay	Required.	Required.				
OH	A-7	CLAY Organic	Required.	Required.				
PT	----	PEAT Muck	Required.	Required. Long term settlement can be significant	Deep foundation required unless peat excavated and replaced.	Highly compressible and not suitable for foundation support		
Rock			Fills – not required for slopes 1.5H to 1V or flatter. Cuts – required but depends on spacing, orientation and strength of discontinuities and durability of rock		Required for spread footings or drilled shafts. Empirically related to RQD[3]	Required where rock is badly weathered or closely fractured (low RQD). May require in situ test such as pressuremeter.	Required. Use rock backfill angle of internal friction.	

REMARKS:
Soils – temporary ground water control may be needed for foundation excavations in GW through SM soils.
Backfill specifications for reinforced soil walls using metal reinforcements should meet the following requirements in insure use of non-corrosive backfill:
pH range = 5 to 10; Resistivity > 3000 ohm-cm; Chlorides < 100 ppm; Sulfates < 200 ppm; Organic content 1% maximum

Rock – Durability of shales (siltstone, claystone, mudstone, etc.) to be used in fills should be checked. Non-durable shales should be embanked as soils, i.e., placed in maximum 0.3 m (1 ft) loose lifts and compacted with heavy sheepsfoot or grid rollers.

[1] This is an approximate correlation to Unified (Unified Soil Classification system is preferred for geotechnical engineering usage, AASHTO system was developed for rating pavement subgrades).

[2] These are general guidelines, detailed slope stability analysis may not be required where past experience in area is similar or rock gives required slope angles.

[3] RQD (Rock Quality Designation) = sum of pieces of rock core 4" or greater in length divided by the total length of core run.

TABLE 4
CORRECTION OF SOIL AND ROCK-RELATED INSTABLIITIES

Each year hundreds of millions of dollars are spent to correct soil or rock-related instabilities on highways. The purpose of this technical note is to advise field engineers what technical support information is essential such that a complete evaluation can be performed. For the purpose of this technical note, soil and rock-related instabilities are defined as follows: "A condition that currently or threatens to affect the stability or performance the stability or performance of a highway facility and is the result of the inadequate performance of the soil or rock components." This includes major instabilities resulting form or associated with: landslides, rockfalls, sinkholes, and degrading shales. Technical support data needed are:

1. Site plan and typical cross-section(s) representing ground surface conditions prior to failure, along with subsurface configuration after failure. Photographs, including aerials, if available, would also be beneficial.

2. Cross-section(s) showing soil and/or rock conditions and water bearing strata as determined by drilling and possibly geophysical surveys.

3. Description of the latent state of the unstable mass, whether movement has stopped or is still occurring, and if so, at what rate.

4. Boring logs.

5. Instrumentation data and/or other information used to define the depth and location of the failure zone. The underground location of the failure zone should be shown on the cross-section(s).

6. Shear strength test data and a description of the testing method utilized on the materials, through which failure is occurring. Where average shear strength is calculated using an assumed failure surface and a factor of safety of 1.0, the complete analysis should be provided and location of assumed water table(s) shown.

7. Proposed corrective schemes including: estimated costs, final safety factors, and design analysis for each alternative solution.

8. Narrative report containing instability history; record of maintenance costs and activity, and preventative measures taken, if any; reasons for inadequacy of the original design; description and results of subsurface investigation performed; summary and results of stability analysis performed; and recommendations for correction.

GEOTECHNICAL REPORT REVIEW CHECKLISTS

The following checklists cover the major information and recommendations that should be addressed in project geotechnical reports.

Section A covers site investigation information that will be common to all geotechnical reports for any type of geotechnical feature.

Sections B through I cover the basic information and recommendations that should be presented in geotechnical reports for specific geotechnical features: centerline cuts and embankments, embankments over soft ground, landslides, retaining structures, structure foundations and material sites.

Subject Page

SECTION A, Site Investigation Information 12
SECTION B, Centerline Cuts and Embankments 14
SECTION C, Embankments Over Soft Ground 16
SECTION D, Landslide Corrections 18
SECTION E, Retaining Structures 20
SECTION F, Structure Foundations – Spread Footings 21
SECTION G, Structure Foundations – Driven Piles 22
SECTION H, Structure Foundations – Drilled Shafts 25
SECTION I, Ground Improvement Techniques 27
SECTION J, Material Sites 28

In most sections and subsections the user has been provided supplemental page references to the "Soils and Foundations Workshop Manual" FHWA NHI-00-045. These page numbers appear in parentheses ( ) immediately adjacent to the section or subsection topic. Generalist engineers are particularly encouraged to read these references. Additional reference information on these topics is available in the Geotechnical Engineering Notebook, a copy of which is kept in all FHWA Division offices by either the Bridge Engineer or the engineer with the geotechnical collateral duty.

Certain checklist items are of vital importance to have been included in the geotechnical report. These checklist items have been marked with an asterisk (*). A negative response to any of these asterisked items is cause to contact the geotechnical engineer for clarification of this omission.

GTR REVIEW CHECKLIST FOR SITE INVESTIGATION

A. Site Investigation Information

Since the most important step in the geotechnical design process is to conduct an adequate site investigation, presentation of the subsurface information in the geotechnical report and on the plans deserves careful attention.

Geotechnical Report Text (Introduction) (Pgs. 10-1 to 10-4)	Yes	No	Unknown or N/A
1. Is the general location of the investigation described and/or a vicinity map included?	___	___	_____
2. Is scope and purpose of the investigation summarized?	___	___	_____
3. Is concise description given of geologic setting and topography of area?	___	___	_____
4. Are the field explorations and laboratory tests on which the report is based listed?	___	___	_____
5. Is the general description of subsurface soil, rock, and groundwater conditions given?	___	___	_____
*6. Is the following information included with the geotechnical report (typically included in the report appendices):			
a. Test hole logs? (Pgs. 2-24 to 2-32)	___	___	_____
b. Field test data?	___	___	_____
c. Laboratory test data? (Pgs. 4-22 to 4-23)	___	___	_____
d. Photographs (if pertinent)?	___	___	_____
Plan and Subsurface Profile (Pgs. 2-19, 3-9 to 3-12, 10-13)			
*7. Is a plan and subsurface profile of the investigation site provided?	___	___	_____
8. Are the field explorations located on the plan view?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

A. Site Investigation Information (Cont.)	Yes	No	Unknown or N/A
*9. Does the conducted site investigation meet minimum criteria outlined in Table 2?	___	___	_____
10. Are the explorations plotted and correctly numbered on the profile at their true elevation and location?	___	___	_____
11. Does the subsurface profile contain a word description and/or graphic depiction of soil and rock types?	___	___	_____
12. Are groundwater levels and date measured shown on the subsurface profile?	___	___	_____
Subsurface Profile or Field Boring Log (Pgs. 2-14, 2-15, 2-24 to 2-31)			
13. Are sample types and depths recorded?	___	___	_____
*14. Are SPT blow count, percent core recovery, and RQD values shown?	___	___	_____
15. If cone penetration tests were made, are plots of cone resistance and friction ratio shown with depth?			
Laboratory Test Data (Pgs. 4-6, 4-22, 4-23)			
*16. Were lab soil classification tests such as natural moisture content, gradation, Atterberg limits, performed on selected representative samples to verify field visual soil identification?	___	___	_____
17. Are laboratory test results such as shear strength (Pg. 4-14), consolidation (Pg. 4-9), etc., included and/or summarized?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

GTR REVIEW CHECKLIST FOR CENTERLINE CUTS AND EMBANKMENTS

B. Centerline Cuts and Embankments (Pgs. 2-2 to 2-6)

In addition to the basic information listed in Section A, is the following information provided in the project geotechnical report.

Are station-to-station descriptions included for:	Yes	No	Unknown or N/A
1. Existing surface and subsurface drainage?	___	___	_____
2. Evidence of springs and excessively wet areas?	___	___	_____
3. Slides, slumps, and faults noted along the alignment?	___	___	_____

Are station-to-station recommendations included for the following?

General Soil Cut or Fill

4. Specific surface/subsurface drainage recommendations?	___	___	_____
5. Excavation limits of unsuitable materials?	___	___	_____
*6. Erosion protection measures for back slopes, side slopes, and ditches, including riprap recommendations or special slope treatment.	___	___	_____

Soil Cuts (Pgs. 5-23, 5-24)

*7. Recommended cut slope design?	___	___	_____
8. Are clay cut slopes designed for minimum F.S. = 1.50?	___	___	_____
9. Special usage of excavated soils?	___	___	_____
10. Estimated shrink-swell factors for excavated materials?	___	___	_____
11. If answer to 3 is yes, are recommendations provided for design treatment?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

B. Centerline Cuts and Embankments (Cont.)	Yes	No	Unknown or N/A
Fills (Pgs. 5-1 to 5-3)			
12. Recommended fill slope design?	___	___	_____
13. Will fill slope design provide minimum F.S. = 1.25?	___	___	_____
Rock Slopes			
*14. Are recommended slope designs and blasting specifications provided?	___	___	_____
*15. Is the need for special rock slope stabilization measures, e.g., rockfall catch ditch, wire mesh slope protection, shotcrete, rock bolts, addressed?	___	___	_____
16. Has the use of "template" designs been avoided (such as designing all rock slopes on 0.25:1 rather than designing based on orientation of major rock jointing)?	___	___	_____
*17. Have effects of blast induced vibrations on adjacent structures been evaluated?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

C. Embankments Over Soft Ground

Where embankments must be built over soft ground (such as soft clays, organic silts, or peat), stability and settlement of the fill should be carefully evaluated. In addition to the basic information listed in Section A, is the following information provided in the project geotechnical report?

Embankment Stability (Pgs. 5-1 to 5-3, 5-20 to 5-22)	Yes	No	Unknown or N/A
*1. Has the stability of the embankment been evaluated for minimum F.S. = 1.25 for side slope and 1.30 for end slope of bridge approach embankments?	___	___	_____
*2. Has the shear strength of the foundation soil been determined from lab testing and/or field vane shear or cone penetrometer tests?	___	___	_____
*3. If the proposed embankment does not provide minimum factors of safety given above, are recommendations given or feasible treatment alternates, which will increase factor of safety to minimum acceptable (such as change alignment, lower grade, use stabilizing counterberms, excavate and replace weak subsoil, lightweight fill, geotextile fabric reinforcement, etc.)?	___	___	_____
*4. Are cost comparisons of treatment alternates given and a specific alternate recommended?	___	___	_____
Settlement of Subsoil (Pgs. 6-7 to 6-20)			
5. Have consolidation properties of fine-grained soils been determined from laboratory consolidation tests?	___	___	_____
*6. Have settlement amount and time been estimated?	___	___	_____
7. For bridge approach embankments, are recommendations made to get the settlement out before the bridge abutment is constructed (waiting period, surcharge, or wick drains)?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

C. Embankments Over Soft Ground (Cont.)	Yes	No	Unknown or N/A
8. If geotechnical instrumentation is proposed to monitor fill stability and settlement, are detailed recommendations provided on the number, type, and specific locations of the proposed instruments?	___	___	_____
Construction Considerations (Pgs. 10-8, 10-9)			
9. If excavation and replacement of unsuitable shallow surface deposits (peat, muck, top soil) is recommended, are vertical and lateral limits of recommended excavation provided?	___	___	_____
10. Where a surcharge treatment is recommended, are plan and cross-section of surcharge treatment provided in geotechnical report for benefit of the roadway designer?	___	___	_____
11. Are instructions or specifications provided concerning instrumentation, fill placement rates and estimated delay times for the contractor?	___	___	_____
12. Are recommendations provided for disposal of surcharge material after the settlement period is complete?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

GTR REVIEW CHECKLIST FOR LANDSLIDE CORRECTIONS

D. Landslide Corrections (Pgs. 5-1 to 5-4, 5-17 to 5-20)

In addition to the basic information listed in Section A, is the following information provided in the landslide study geotechnical report? (Refer to Table 4 for guidance on the necessary technical support data for correction of slope instabilities.)

		Yes	No	Unknown or N/A
*1.	Is a site plan and scaled cross-section provided showing ground surface conditions both before and after failure?	___	___	_____
*2.	Is the past history of the slide area summarized, including movement history, summary of maintenance work and costs, and previous corrective measures taken, if any?	___	___	_____
*3.	Is a summary given of results of site investigation, field and lab testing, and stability analysis, including cause(s) of the slide?	___	___	_____
	Plan			
4.	Are detailed slide features, including location of ground surface cracks, head scarp, and toe bulge, shown on the site plan?	___	___	_____
	Cross-section			
*5.	Are the cross-sections used for stability analysis included with the soil profile, water table, soil unit weights, soil shear strengths, and failure plane shown as it exists?	___	___	_____
6.	Is slide failure plane location determined from slope indicators?	___	___	_____
*7.	For an active slide, was soil strength along the slide failure plane back-calculated using a F.S. = 1.0 at the time of failure?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

D. Landslide Corrections (Cont.)	Yes	No	Unknown or N/A
Text			
*8. Is the following information presented for each proposed correction alternative (typical correction methods include buttress, shear key, rebuild slope, surface drainage, subsurface drainage-interceptor, drain trenches or horizontal drains, etc.).			
a. Cross-section of proposed alternative?	___	___	_____
b. Estimated safety factor?	___	___	_____
c. Estimated cost?	___	___	_____
c. Advantages and disadvantages?	___	___	_____
9. Is recommended correction alternative(s) given that provide a minimum F.S. = 1.25?	___	___	_____
10. If horizontal drains are proposed as part of slide correction, has subsurface investigation located definite water bearing strata that can be tapped with horizontal drains?	___	___	_____
11. If a toe counterberm is proposed to stabilize an active slide has field investigation confirmed that the toe of the existing slide does not extend beyond the toe of the proposed counterberm?	___	___	_____
Construction considerations			
12. Where proposed correction will require excavation into the toe of an active slide (such as for buttress or shear key) has the “during construction backslope F.S.” with open excavation been determined?	___	___	_____
13. If open excavation F.S. is near 1.0, has excavation stage stage construction been proposed?	___	___	_____
14. Has seasonal fluctuations of groundwater table been considered?	___	___	_____
15. Is stability of excavation backslope to be monitored?	___	___	_____
16. Are special construction features, techniques and materials described and specified?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

GTR REVIEW CHECKLIST FOR RETAINING STRUTURES

E. Retaining Structures (See "Earth Retaining Structures" FHWA NHI-99-025)

In addition to the basic information listed in Section A, is the following information provided in the project geotechnical report?

		Yes	No	Unknown or N/A
*1.	Recommended soil strength parameters and groundwater elevations for use in computing wall design lateral earth pressures and factor of safety for overturning, sliding, and external slope stability.	___	___	_____
2.	Is it proposed to bid alternate wall designs?	___	___	_____
*3.	Are acceptable reasons given for the choice and/or exclusion of certain wall types?	___	___	_____
*4.	Is an analysis of the wall stability included with minimum acceptable factors of safety against overturning (F.S. = 2.0), sliding (F.S. = 1.5), and external slope stability (F.S. = 1.5)?	___	___	_____
5.	If wall will be placed on compressible foundation soils, is estimated total, differential and time rate of settlement given?	___	___	_____
6.	Will wall types selected for compressible foundation soils allow differential movement without distress?	___	___	_____
7.	Are wall drainage details, including materials and compaction, provided?	___	___	_____
	Construction Considerations			
8.	Are excavation requirements covered including safe slopes for open excavations or need for sheeting or shoring?	___	___	_____
9.	Fluctuation of groundwater table?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

Top-down Construction Type Walls (See "Manual for Design & Construction Monitoring of Soil Nail Walls", FHWA SA-96-069R and "Ground Anchors and Anchored Systems", FHWA IF-99-015)

*10. For soil nail and anchor walls are the following included in the geotechnical report?	Yes	No	Unknown or N/A
a. Design soil parameters (ϕ, c, γ)	___	___	_____
b. Minimum bore size (soil nails)?	___	___	_____
c. Design pullout resistance (soil nails)?	___	___	_____
d. Ultimate anchor capacity (anchors)?	___	___	_____
e. Corrosion protection requirements?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

GTR REVIEW CHECKLIST FOR SPREAD FOOTINGS

F. Structure Foundations – Spread Footings (Pgs. 7-1 to 7-17)

In addition to the basic information listed in Section A, is the following information provided in the project foundation report?

		Yes	No	Unknown or N/A
*1.	Are spread footing recommended for foundation support? If not, are reasons for not using them discussed?	___	___	_____
	If spread footing supports are recommended, are conclusions and recommendations given for the following:			
*2.	Is recommended bottom of footing elevation and reason for recommendation (e.g., based on frost depth, estimated scour depth, or depth to competent bearing material) given?	___	___	_____
*3.	Is recommended allowable soil or rock bearing pressure given?	___	___	_____
*4.	Is estimated footing settlement and time given?	___	___	_____
*5.	Where spread footings are recommended to support abutments placed in the bridge end fill, are special gradation and compaction requirements provided for select end fill and backwall drainage material (Pgs. 6-1 to 6-4)	___	___	_____
	Construction Considerations			
6.	Have the materials been adequately described on which the footing is to be placed so the project inspector can verify that material is as expected?	___	___	_____
7.	Have excavation requirements been included for safe slopes in open excavations, need for sheeting or shoring, etc.?	___	___	_____
8.	Has fluctuation of the groundwater table been addressed?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

GTR REVIEW CHECKLIST FOR DRIVEN PILES

G. Structure Foundations – Driven Piles (Pgs. 8-1 to 8-29, 9-1 to 9-35)

In addition to the basic information listed in Section A, if pile support is recommended or given as an alternative, conclusions/recommendations should be provided in the project geotechnical report for the following:

		Yes	No	Unknown or N/A
*1.	Is the recommended pile type given (displacement, non-displacement, steel pipe, concrete, H-pile, etc.) with valid reasons given for choice and/or exclusion? (Pgs. 8-1 to 8-3)	___	___	_____
2.	Do you consider the recommended pile type(s) to be the most suitable and economical?	___	___	_____
*3.	Are estimated pile lengths and estimated tip elevations given for the recommended allowable pile design loads?	___	___	_____
4.	Do you consider the recommended design loads to be reasonable?	___	___	_____
5.	Has pile group settlement been estimated (only of practical significance for friction pile groups ending in cohesive soil)? (Pgs. 8-20 to 8-22)	___	___	_____
6.	If a specified or minimum pile tip elevation is recommended, is a clear reason given for the required tip elevation, such as underlying soft layers, scour, downdrag, piles uneconomically long, etc.?	___	___	_____
*7.	Has design analysis (wave equation analysis) verified that the recommended pile section can be driven to the estimated or specified tip elevation without damage (especially applicable where dense gravel-cobble-boulder layers or other obstructions have to be penetrated)?	___	___	_____
8.	Where scour piles are required, have pile design and driving criteria been established based on mobilizing the full pile design capacity below the scour zone?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

G. Structure Foundations – Driven Piles (Cont.)	Yes	No	Unknown or N/A
9. Where lateral load capacity of large diameter piles is an important design consideration, are p-y curves (load vs. deflection) or soil parameters given in the geotechnical report to allow the structural engineer to evaluate lateral load capacity of all piles?	___	___	_____
*10. For pile supported bridge abutments over soft ground:			
a. Has abutment downdrag load been estimated and solutions such bitumen coating been considered in design? Not generally required if surcharging of the fill is being performed. (Pgs. 8-21, 8-23)	___	___	_____
b. Is bridge approach slab recommended to moderate differential settlement between bridge ends and fill?	___	___	_____
c. If the majority of subsoil settlement will not be removed prior to abutment construction (by surcharging), has estimate been made of abutment rotation that can occur due to lateral squeeze of soil subsoil? (Pgs. 5-25, 5-26)	___	___	_____
d. Does the geotechnical report specifically alert the structural designer to the estimated horizontal abutment movement?	___	___	_____
11. If bridge project is large, has pile load test program been recommended? (Pgs. 9-23 to 9-26)	___	___	_____
12. For major structure in high seismic risk area, has assessment been made of liquefaction potential of foundation soil during design earthquake (only loose saturated sands and silts are susceptible to liquefaction)? (See GEC No. 3, FHWA SA-97-076)	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

G. Structure Foundations – Driven Piles (Cont.)

Construction Considerations (Pgs. 9-4 to 9-35)	Yes	No	Unknown or N/A
13. Pile driving details such as: boulders or obstructions which may be encountered during driving; need for preaugering, jetting, spudding; need for pile tip reinforcement; driving shoes, etc.?	___	___	_____
14. Excavation requirements: safe slope for open excavations; need for sheeting or shoring; fluctuation of groundwater table?	___	___	_____
15. Have effects of pile driving operation on adjacent structures been evaluated such as protection against damage caused by footing excavation or pile driving vibrations?	___	___	_____
16. Is preconstruction condition survey to be made of adjacent structures to prevent unwarranted damage claims?	___	___	_____
17. On large pile driving projects, have other methods of pile driving control been considered such as dynamic testing or wave equation analysis?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

H. Structure Foundations – Drilled Shafts (Pgs. 8-23 to 8-29)

In addition to the basic information listed in Section A, if drilled shaft support is recommended or given as an alternative, are conclusion/recommendations provided in the project foundation report for the following:

		Yes	No	Unknown or N/A
*1.	Are recommended shaft diameter(s) and length(s) for allowable design loads based on an analysis using soil parameters for side friction and end bearing?	___	___	_____
*2.	Settlement estimated for recommended design loads?	___	___	_____
*3.	Where lateral load capacity of shaft is an important design consideration, are p-y (load vs. deflection) curves or soils data provided in geotechnical report that will allow structural engineer to evaluate lateral load capacity of shaft?	___	___	_____
4.	Is static load test (to plunging failure) recommended?	___	___	_____
	Construction Considerations			
5.	Have construction methods been evaluated, i.e., can less expensive dry method or slurry method be used or will casing be required?	___	___	_____
6.	If casing will be required, can casing be pulled as shaft is concreted (this can result in significant cost savings on very large diameter shafts)?	___	___	_____
7.	If artesian water was encountered in explorations, have design provisions been included to handle it (such as by requiring casing and a tremie seal)?	___	___	_____
8.	Will boulders be encountered? (If boulders will be encountered, then the use of shafts should be seriously questioned due to construction installation difficulties and resultant higher cost to boulders can cause.)	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

GTR REVIEW FOR GROUND IMPROVEMENT TECHNIQUES

I. Ground Improvement Techniques

In addition to the basic information listed in Section A, if ground improvement techniques are recommended or given as an alternative, are conclusion/recommendations provided in the project foundation report for the following:

		Yes	No	Unknown or N/A
1.	For wick drains, do recommendations include the coefficient of consolidation for horizontal drainage, c_h, and the length and spacing of wick drains?	___	___	_____
2.	For lightweight fill, do recommendations include the material properties (ϕ, c, γ), permeability, compressibility, and drainage requirements?	___	___	_____
3.	For vibro-compaction, do the recommendations include required degree of densification (e.g., relative density, SPT blow count, etc.), settlement limitations, and quality control?	___	___	_____
4.	For dynamic compaction, do the recommendations include required degree of densification (e.g., relative density, SPT blow count, etc.), settlement limitations, and quality control?	___	___	_____
5.	For stone columns, do the recommendations include spacing and dimensions of columns, bearing capacity, settlement characteristics, and permeability (seismic applications)?	___	___	_____
6.	For grouting, do the recommendations include the grouting method (permeation, compaction, etc.), material improvement criteria, settlement limitations, and quality control?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

GTR REVIEW CHECKLIST FOR MATERIAL SITES

J. Material Sites

In addition to the basic information listed in Section A, is the following information provided in the project Material Site Report.

		Yes	No	Unknown or N/A
1.	Material site location, including description of existing or proposed access routes and bridge load limits, if any?	___	___	_____
*2.	Have soil samples representative of all materials encountered during pit investigation been submitted and tested?	___	___	_____
*3.	Are laboratory quality test results included in the report?	___	___	_____
4.	For aggregate sources, do the laboratory quality test results (such as L.A. abrasion, sodium sulfate, degradation, absorption, reactive aggregate, etc.) indicate if specification materials can be obtained from the deposit using normal processing methods?	___	___	_____
5.	If the lab quality test results indicate that specification material cannot be obtained from the pit materials as they exist naturally, has the source been rejected or are detailed recommendations provided for processing or controlling production so as to ensure a satisfactory product?	___	___	_____
*6.	For soil borrow sources, have possible difficulties been noted, such as above optimum moisture content for clay-silt soils, waste due to high PI, boulders, etc.?	___	___	_____
*7.	Where high moisture content clay-silt soils must be used, are recommendations provided on the need for aeration to allow the materials to dry out sufficiently to meet compaction requirements?	___	___	_____
8.	Are estimated shrink-swell factors provided.	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

I. Material Sites (Cont.)			Yes	No	Unknown or N/A
*9.	Do the proven material site quantities satisfy the estimated project quantity needs?		___	___	_____
10.	Where materials will be executed from below the water table, have seasonal fluctuations of the water table been determined?		___	___	_____
11.	Are special permit requirements been covered?		___	___	_____
12.	Have pit reclaimation requirements been covered adequately?				
13.	Has a material site sketch (plan and profile) been provided for inclusion in the plans, which contains:		___	___	_____
	a.	Material site number?	___	___	_____
	b.	North arrow and legal subdivision?	___	___	_____
	c.	Test hole or test pit logs, locations, numbers and date?	___	___	_____
	d.	Water table elevation and date?	___	___	_____
	e.	Depth of unsuitable overburden, which will have to be stripped?	___	___	_____
	f.	Suggested overburden disposal area?	___	___	_____
	g.	Proposed mining area and previously mined areas?	___	___	_____
	h.	Existing stockpile locations?	___	___	_____
	i.	Existing or suggested access road?	___	___	_____
	j.	Bridge load limits?	___	___	_____
	k.	Reclaimation details?	___	___	_____
14.	Are recommended special provisions provided?		___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

PS&E REVIEW CHECKLISTS

Plans and specifications (PS&E)** reviews of projects with major or unusual geotechnical features[1] should preferably be made by examining the plans, special provisions, and geotechnical report together.***

Subject	Page
SECTION A, General	31
SECTION B, Centerline Cuts and Embankments	32
SECTION C, Embankments Over Soft Ground	32
SECTION D, Landslide Corrections	33
SECTION E, Retaining Structures	33
SECTION F, Structure Foundations – Spread Footings	35
SECTION G, Structure Foundations – Driven Piles	35
SECTION H, Structure Foundations – Drilled Shafts	36
SECTION I, Ground Improvement Techniques	37
SECTION J, Material Sites	38

Certain checklist items are of vital importance to have been included in the PS&E. These checklist items have been marked with an asterisk (*). A negative response to any of these asterisked items is cause to contact the geotechnical engineer for clarification of this omission.

The information covered in Section A, General will apply to all geotechnical features. The rest of the sections cover additional important PS&E review items that pertain to specific geotechnical features.

** For purposes of this document, PS&E refers to a plan and specification review at any time during a project's development. Hence, the review may be at a preliminary or partial stage of plan development.

***When plan reviews are conducted at a partial stage the final geotechnical report may not be available.

[1]Major and unusual geotechnical features are defined in Table 1.

PS&E REVIEW CHECKLIST – GENERAL

A. General		Yes	No	Unknown or N/A
*1.	Has the appropriate geotechnical engineer reviewed the PS&E to ensure that the design and construction recommendations have been incorporated as intended and that the subsurface information has bee presented correctly? This is absolutely necessary.	___	___	_____
2.	Are the finished profile exploration logs and locations included in the plans?	___	___	_____
*3.	Have geotechnical designs prepared by region or district offices or consultants been reviewed and approved by the State Headquarters' geotechnical engineer?	___	___	_____
4.	Do the contract documents contain the special provisions as provided in the project geotechnical report?	___	___	_____
5.	Have the following common pitfalls been avoided:			
	a. Has an adequate site investigation been conducted (reasonably meeting or exceeding the minimum criteria given in Table 2)?	___	___	_____
	b. Has the use of "subjective" subsurface terminology (such as relatively soft rock or gravel with occasional boulders) been avoided?	___	___	_____
	c. If alignment has been shifted, have additional subsurface explorations been conducted along the new alignment?	___	___	_____
	d. Has a note been included in the contract indicating all subsurface information is available to bidders?	___	___	_____
	e. Do you think the wording of the geotechnical special provisions are clear, specific and unambiguous?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

PS&E REVIEW CHECKLIST FOR SPECIFIC FEATURES

		Yes	No	Unknown or N/A
B.	Centerline Cuts and Embankments			
1.	Where excavation is required, are excavation limits and description of unsuitable organic soils shown on the plans?	___	___	_____
2.	Are plan details and special provisions provided for special drainage details, such as lined surface ditches, drainage blanket under sidehill fill, interceptor trench drains, etc.?	___	___	_____
3.	Are special provisions included for fill materials requiring special treatment, such as nondurable shales, lightweight fill, etc.?	___	___	_____
4.	Are special provisions provided for any special rock slope excavation and stabilization measures called for in plans, such as controlled blasting, wire mesh slope protection, rock bolts, shotcrete, etc.?	___	___	_____
C.	Embankments Over Soft Ground			
*1.	Where subexcavation is required, are excavation limits and description of unsuitable soils clearly shown on the plans?	___	___	_____
*2.	Where settlement waiting period will be required, has estimated settlement time been stated in the special provisions to allow bidders to fairly bid the project?	___	___	_____
*3.	If instrumentation will be used to control the rate of fill placement, do special provisions clearly spell out how this will be done and how the readings will be used to control the contractor's operation?	___	___	_____
4.	Do special provisions state that any instrumentation damage by contractor personnel will be repaired at the contractor's expense?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

PS&E REVIEW CHECKLIST FOR SPECIFIC FEATURES

		Yes	No	Unknown or N/A
D.	Landslide Corrections			
1.	Are plan details and special provisions provided for special drainage details, such as lined surface ditches, drainage blankets, horizontal drains, etc.?	___	___	_____
*2.	Where excavation is to be made into the toe of an active slide, such as for a buttress or shear key, and stage construction is required, do the special provisions clearly spell out the stage construction sequence to be followed?	___	___	_____
*3.	Where a toe buttress is to be constructed, do the special provisions clearly state gradation and compaction requirements for the buttress material?	___	___	_____
*4.	If the geotechnical report recommends that slide repair work not be allowed during the wet time of the year, is the proposed construction schedule in accord with this?	___	___	_____
E.	Retaining Structures			
*1.	Are select materials specified for wall backfill with gradation and compaction requirements covered in the specification?	___	___	_____
2.	Are limits of required select backfill zones clearly detailed on the plans?	___	___	_____
3.	Are excavation requirements specified, e.g., safe slopes for excavations, need for sheeting, etc.?	___	___	_____
*4.	Where alternative wall types will be allowed, are fully detailed plans included for all alternatives?	___	___	_____
5.	Were designs prepared by the wall supplier?	___	___	_____
6.	Were wall supplier's design calculations and specifications reviewed and approved by the structural and geotechnical engineers?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

E. Retaining Structures (Cont.)	Yes	No	Unknown or N/A
*7. Where proprietary retaining walls are bid as alternates, does bid schedule require bidders to designate which alternate their bid is for, to prevent bid shopping after contract award?	___	___	_____
8. Have FHWA guidelines for experimental designations for certain proprietary wall types been followed?	___	___	_____
9. Is ROW limit or easements shown on plans and mentioned in specifications where anchors are to be installed?	___	___	_____
Top-down Construction Type Walls (See "Manual for Design & Construction Monitoring of Soil Nail Walls", FHWA SA-96-069R and "Ground Anchors and Anchored Systems", FHWA IF-99-015)			
*10. For soil nail and anchor walls are the following included in the provisions:			
a. Construction tolerances?	___	___	_____
b. Minimum drill-hole size?	___	___	_____
c. Material requirements?	___	___	_____
d. Load testing procedures and acceptance criteria?	___	___	_____
e. Construction monitoring requirements?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

F. Structure Foundations – Spread Footings	Yes	No	Unknown or N/A
*1. Where spread footings are to be placed on natural soil, is the specific bearing strata in which the footing is to be founded clearly described, e.g., placed on Br. Sandy GRAVEL deposit, etc.?	___	___	_____
*2. Where spread footings are to be placed in the bridge end fill, are gradation and compaction requirements, for the select fill and backfill drainage material, covered in the special provisions, standard specifications, or standard structure sheets?	___	___	_____

G. Structure Foundations – Driven Piles			
1. Do plan details adequately cover pile splices tip reinforcement, driving shoes, etc.?	___	___	_____
*2. Where friction piles are to be driven in silty or clayey soils, significant setup or soil freeze affecting long-term capacity may occur. Do specifications require retapping the piles after 24 to 48 hour waiting period when required bearing is not obtained at estimated length at the end of initial driving?	___	___	_____
3. Where friction piles are to be load tested, has a reaction load of four times design load been specified to allow load testing the pile to plunging failure so that the ultimate soil capacity can be determined?	___	___	_____
4. Where end bearing steel piles are to be load tested, has load test been designed to determine if higher than 62 MPa (9 ksi) allowable steel stress can be used, e.g., 83 to 103 MPa (12 – 15 ksi)?	___	___	_____
*5. Where cofferdam construction will be required, have soil gradation results been included in the plans or been made available to bidders to assist them in determining dewatering procedures?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

G. Structure Foundations – Driven Piles (Cont.)	Yes	No	Unknown or N/A
*6. If a wave equation analysis will be used to approve the contractor's pile driving hammer, has a minimum hammer energy or estimated soil resistance in kN (tons) to be overcome to drive the piles to the estimated length, been given in the special provisions?	___	___	_____
*7. Has the appropriate safety factor, based on construction control method (static load test, dynamic load test, wave equation, etc.) been included? Have the specifications for the applicable construction control method been included?	___	___	_____

H. Structure Foundations – Drilled Shafts			
*1. Where drilled shafts are to be placed in soil, is the specified bearing stratum in which the drilled shaft is to be found clearly described, e.g., placed on Br. Sandy GRAVEL deposit, etc.?	___	___	_____
2. Where end bearing drilled shafts are to be founded on rock, has the rock elevation at the shaft pier locations been determined form borings at the pier locations?	___	___	_____
3. Where drilled shafts are to be socketed some depth into rock, have rock cores been extracted at depths to 3 m (10 ft) below proposed socket at location within 3 m (10 ft) of the shaft?	___	___	_____
*4. Are shafts equipped with PVC access tubes to accommodate non-destructive testing (gamma/gamma logging, cross-hole sonic logging) of the shaft? Are provisions for the appropriate non-destructive testing methods included?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

PS&E REVIEW CHECKLIST FOR SPECIFIC FEATURES

I. Ground Improvement Techniques	Yes	No	Unknown or N/A
1. For wick drains, are contractor submittals required that include proposed equipment and materials, method(s) for addressing obstructions, and method(s) for splicing wick drains.	___	___	_____
2. For lightweight fill, are minimum/maximum densities, gradation, lift thickness, and method of compaction specified?	___	___	_____
3. For vibro-compaction, are contractor submittals required that include proposed equipment and materials? Are methods of measurement and acceptance criteria specified?	___	___	_____
4. For dynamic compaction:			
a. If method specification is used, are the following specified: tamper mass and size; drop height, grid spacing; applied energy; number of phases or passes; site preparation requirements; subsequent surface compaction procedures?	___	___	_____
b. If performance specification is used, are the following specified: minimum soil property value to be achieved and method of measurement; maximum permissible settlement?	___	___	_____
5. For stone columns, are the following specified: site preparation, backfill materials, minimum equipment requirements, acceptance criteria and quality assurance procedures?	___	___	_____
6. For grouting, are contractor submittals required that include proposed equipment and materials. Are methods of measurement and acceptance criteria specified?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

PS&E REVIEW CHECKLIST FOR SPECIFIC FEATURES

J. Material Sites		Yes	No	Unknown or N/A
*1.	Is a material site sketch, containing the basic information listed on page 27, included in the plans?	___	___	_____
*2.	Has the material site investigation established a proven quantity of material sufficient to satisfy the project estimated quantity needs?	___	___	_____
3.	Where specification material cannot be obtained directly from the natural deposit, do the special provisions clearly spell out that processing will be required?	___	___	_____
4.	Are contractor special permit requirements covered in the special provisions?	___	___	_____
5.	Are pit reclaimation requirements clearly spelled out on the plans and in the special provisions?	___	___	_____

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

CHAPTER 4
CONSTRUCTION

Table of Contents

CONSTRUCTION REVIEW PROGRAM **4**

ROUTINE CONSTRUCTION REVIEWS **4**

IN-OFFICE PREPARATION 4

Foundations *5*

Formwork and Falsework *5*

Decks & Concrete Members *5*

Precast Elements *6*

Structural Steel Erection *6*

Lighting and Signing Structures *6*

Retaining Walls *6*

IN-FIELD REVIEW 7

FIELD REVIEW FOLLOW UP 8

PLANT REVIEWS **9**

PRESTRESSED/PRECAST CONCRETE PLANT REVIEWS 9

STRUCTURAL STEEL FABRICATION PLANT REVIEWS 9

PLANT REVIEW FOLLOW UP 10

PROCESS/IN-DEPTH REVIEWS **11**

CONTRACT ADMINISTRATION **12**

APPENDIX A – SAMPLE INSPECTION REPORT **14**

Construction Review Program

Every State has an agreement with its Division office concerning Federal oversight of projects. This agreement determines the construction projects for which the Division office is responsible. The construction oversight function is usually the responsibility of the field operations (area) engineers and in some cases the structures team or Division Bridge Engineer has the review responsibility for bridges. The Division Bridge Engineer typically acts as a consultant or technical specialist to the field operations team for in-depth reviews of bridges and bridge construction issues.

The Division Bridge Engineer may independently conduct in-depth or process reviews to be actively involved in the State Highway Agency's (SHA's) construction program, as well as to get experience and to ensure compliance. These reviews may include FHWA-oversight projects only or any Federal-aid project, as determined by the Division office and the SHA. The selection of these other types of reviews may be determined through a "risk assessment" performed in conjunction with our partners at the State Highway Agency. Each Division office has its own method of performing risk assessments to determine the areas on which it will focus its attention in the upcoming year. See Chapter 7, Administration, or the FHWA website at http://staffnet.fhwa.dot.gov/programadmin/risktoc.htm for more information.

Many Federal oversight projects include major and unusual structures that involve complicated and unfamiliar construction techniques. Division Bridge Engineers are generally well versed in routine construction practices, but may not be familiar with some of the specialty items such as installation of continuous flight auger piles, installation of cable stays, post-tensioning and grouting operations, etc. If this is the case, the Division Bridge Engineer should consider inviting resource center personnel on occasional construction reviews. Resource Center personnel have expertise and often have the necessary specialized experience to add value to the construction review program.

Routine Construction Reviews

In-Office Preparation

To do a routine construction review, first contact your FHWA Area Engineer (or FHWA Operations Engineer) for that area to determine what work is in progress at the time you wish to perform the review. Ask your Area Engineer if there are any new or innovative (for the State) materials or methods of construction being used on the project. Inform the FHWA Area Engineer when you would like to visit the project, and invite them to accompany you. Ask your Area Engineer to arrange a time to meet the SHA Resident Engineer or his/her staff at the field office. If the FHWA Area Engineer is unable to go along, ask them to either arrange the meeting or to inform the SHA Resident Engineer of your visit, and get contact information for you to make the arrangements.

Major items of ongoing work should be reviewed (i.e., concrete placement, reinforcing steel placement, beam erection, painting, foundations, etc.). All aspects of these activities should be reviewed for compliance with the approved plans and specifications (i.e., testing, concrete

placement techniques, weather requirements, strength/toughness requirements, surface preparation, etc.).

Review the plans and schedule, and select a few locations or features that are either representative or uncommon. A retaining wall, a foundation, a deck pour, or an abutment scheduled for construction during your planned visit could be representative of others being built on the project. On the other hand, an uncommon feature might be a change-order item, a problem encountered on a previous inspection, or a structurally sensitive item such as grouting or post-tensioning operations. The installation of a cable-stay anchorage or other infrequently found hardware would also be a good choice to observe. Select enough to be flexible, since when you arrive on the job, you may find schedule changes have occurred that force you to select another item to observe. Also review the specifications for the project in advance of the visit. Examples of useful things to note in the specifications:

Foundations

- Drilled Shafts
  - What are the requirements regarding water at the bottom of the shaft/cleaning the shaft base before pouring?
  - Under what conditions must a casing be used?
  - If slurry is being used, is it being maintained according to the Specifications (de-sanded and checked for proper consistency)?
- Driven Piles (Steel or Concrete)
  - What are the requirements for pile driving equipment?
  - How is the capacity checked?
  - What is the placement tolerance?
  - Are there specifications for predrilled holes?
  - What are the requirements for cutting off a pile that has reached capacity? The requirements for building up a pile?
  - If battered piles are used, what is the tolerance on the batter?
  - Are there specifications about when piles may not be driven, either due to other operations (e.g., nearby concrete placement) or due to project constraints (e.g., time of day)?

Formwork and Falsework

- Is formwork within specifications (i.e., condition is acceptable, properly oiled)?
- Is falsework built strictly according to the falsework plan submitted by the contractor?

Decks & Concrete Members

- Placing Steel Reinforcing Bars
  - What are the requirements for steel storage and condition when placed?
  - What are the tolerances for placement and uniformity of spacing?
  - Do chairs or other methods provide for the required bottom steel clearance?
- Placing Concrete

- Are the climactic conditions within Specification limits?
- What are requirements for the slump, air content, water/cement ratio and temperature?
- What is the allowable time for a concrete truck, from leaving the batch plant to placement of the concrete?
- What certification or other requirements must concrete testers meet?
- Will the placement ensure the required top clear cover for the rebar?
- Is the concrete being properly consolidated?
- What are the curing and texturing requirements?

Precast Elements

- What are the specifications for cracks, spall, or damage?
- Are proper lifting points being used? What are the specifications for filling lift holes?
- Are the elements transported using the proper hold-down points on the trailer?
- What are the dimensional tolerances for acceptance of the precast members?
- What are the specifications for girder camber and for bearing pads?

Structural Steel Erection

- Have the girders been certified and welding code requirements met during the shop fabrication?
- What are the specifications regarding bolts, nuts, etc.?
- What are the specifications for tightening the bolts? Is special equipment required?
- What are the specifications for field welding, and the qualifications for the welders?
- What are the specifications regarding painting and the sequence of operations for painted members?
- What are the specifications regarding storage and erection of steel?
- What are the approved procedures for erection, and sequence of erection?
- What are the specifications for girder camber and for bearing pads?
- Are the girders and/or superstructure elements properly braced during construction operations?

Lighting and Signing Structures

- Are there any unique specifications for these that apply to this project?

Retaining Walls

- For Cast-In-Place, what are the requirements on the forms? What are the specifications for the tension steel and the temperature steel?
- What are the specifications for precast panels?
- What are the specs for the foundation and the subgrade?
- What are the specifications for backfill material used on the project?

- How deep are the specified lifts, and what are the acceptable compaction methods?

These are only small samples of things to look at during your specification review. Many more extensive guidelines can be referenced at the following website: http://www.fhwa.dot.gov/construction/reviews.htm

Have a hardhat, safety vest, steel-toed boots, a tape measure or ruler, and a pencil, paper, clipboard or notepad. A digital camera can also be very useful and is highly recommended. Before you go, be sure you are familiar with your FHWA Division Office requirements for documentation of the trip, and what your particular responsibilities are. Before leaving, coordinate any final details with your FHWA Area/Operations Engineer (if they are also going).

When the Division Bridge Engineer arrives at the site, it is often due to a question or a problem that needs some resolution, including fabrication issues. Others, far removed from the project, may review these observations. These construction comments become part of the project record. In order to clarify the issues at hand and generate a resolution, the following simple five-step guide may be used to produce sustainable documentation. The intended outcome is predictably useful and complete reports.

The five steps to documenting issues are as follows:

1. Identify the problem or issue;
2. Explain how and why it happened;
3. State the actual and potential effects;
4. Explain why procedures (State or other) failed (or succeeded) to disclose the problem; and,
5. Make recommendations or summarize the resolution.

In-Field Review

When you arrive at the field office, ask for a copy of the plans and the specifications, and inquire about ongoing work at the time you are on the project and take note of this. The current project status may differ from the schedule you based your visit on, and may change the items you choose to see. Remember that it is hard to see any problems once construction on an item is complete.

Also ask about any upcoming structural (or geotechnical/hydraulic) change orders, or time extensions. Change orders, or time extensions granted, may indicate underlying issues such as differing site conditions, constructability problems, or design problems.

Ask for, and review, approved falsework plans, and if there is structural steel, any approved erection plans. Be sure an adequate number of cranes and necessary equipment will be ready for erection, whether steel or precast concrete is used. Also inquire about any new or innovative (for your State) materials or methods of construction being used on the project, if applicable, as well as the Resident Engineer's experience with these on the project. Get more details on any

innovations used on the project that you were previously unaware of. Ask the Resident Engineer to accompany you on the field review, or their representative, if the Resident Engineer is unavailable.

A discussion of any design issues, differing site conditions, maintenance of traffic, etc., should be discussed with the Resident Engineer. Any significant findings, as well as required follow-up activities, should be noted in the inspection report.

If you are performing the inspection independently, without the Area/Operations Engineer present, you should ask the Resident Engineer about upcoming change orders, potential claims, status of the project (percent complete in time and money), upcoming work, status of Disadvantaged Business Enterprise (DBE) utilization, status of Trainees, and items of controversy. Also review the project records, particularly material test results, material certifications, Buy America certifications, etc.

When your discussion in the field office is complete, request that your SHA representative show you the relevant parts of the project, including the items you selected during the in-office preparation. Proceed to the field, and discuss with the DOT representative any general or particular issues they have had on the jobsite. Observe the work related to structures, geotechnical (e.g., retaining walls) and hydraulic (e.g., bank protection, riprap, etc.) elements and the work in progress to determine whether it is in compliance with the contract documents. Make measurements and take photographs where necessary. Make notes of what you find. Please note that all discussions at the site should be with the SHA representative (not the Contractor).

Environmental requirements must be complied with at all times. If the contractor or the SHA is not following agreements in the environmental document, or there are any obstacles to compliance, FHWA must work with the State to bring the project into compliance as soon as possible. Regulatory and resource agencies may hold FHWA responsible for projects not in compliance and ask FHWA to take action to enforce environmental commitments in FHWA approved environmental documents.

States are responsible to ensure OSHA requirements are met on projects. If an apparent OSHA violation is noted, it should be brought to the attention of the State for resolution as soon as possible.

As you conclude your activities at the site, take time to discuss with the SHA representative your findings and any concerns, and take note of any points they make in the discussion. This last step is easy and important, since it can clear up misunderstandings on the spot, rather than letting them become paper exchanges involving many people before they are resolved. Further, it helps build trust with your SHA partners.

Field Review Follow Up

When your inspection is completed, provide your findings to your FHWA Area Engineer for their report. Depending on Division office practices, you may need to keep separate documentation as well. For example, if you performed the inspection independently, you would

be expected to write the inspection report. In particular, any findings that may suggest future improvements in design or specifications should be documented, for follow up discussions with the SHA personnel responsible for such activities.

If you performed an independent inspection and need to write the inspection report, the basic form for doing so is form FHWA 1446A – Construction Inspection Report, available on Staffnet under Electronic Forms at http://staffnet.fhwa.dot.gov/informs/adobeforms/index.htm. The FHWA 1446A can be used for four types of construction reviews: Process Review/Product Evaluation, Inspection In-Depth, Project, and Final.

Plant Reviews

It is often helpful to visit the plant manufacturing products (i.e., steel fabrication, concrete, prestressed concrete, epoxy-coated rebar, etc.) for the project, to observe the process and ensure that the Specifications are being followed. These visits can be done in conjunction with a routine inspection or as a stand-alone, in-depth type of review. Some brief guidelines for Prestressed/Precast Concrete Plant and Structural Steel Fabrication Plant Reviews are included below. For other products, the Specifications should be thoroughly reviewed to determine the requirements for that product prior to visiting the plant.

Prestressed/Precast Concrete Plant Reviews

When using precast or prestressed concrete members, the precasting plant becomes part of the construction operation. The FHWA Division Bridge Engineer should periodically review precasting plants, especially when producing for specialized or major construction, such as segmental bridges. You should invite your SHA to have someone accompany you on your visit. Be sure to review your SHA's Specifications first – some useful items to review before the site visit:

- Are in-house inspection & testing facilities required at the plant, and if so, what is required? Are specific qualifications required of the personnel?
- What are the specifications regarding shop drawings, approvals, and beginning fabrication?
- What are the specifications regarding storage of materials?
- What are the key specifications regarding forms?
- What are the key specifications relating to tendons, anchorages, jacks, ducts, and grout? Are there special requirements for harped/draped/depressed strands?
- What are the specifications for initial and final tensioning?
- What are the key specifications regarding finishing and curing?
- What are the specifications for handling & storage of the finished members in the yard, and for their transportation to the jobsite?
- How must certifications and jobsite acceptance be handled?

Structural Steel Fabrication Plant Reviews

When using steel structural members, the steel fabricator becomes part of the construction operation. The Division Bridge Engineer should periodically review steel fabrication plants.

You should invite your SHA to have someone accompany you on your visit. Be sure to review your SHA's Specifications first.

When you get on site, check:

- Materials certifications, including heat number and test reports: make sure heat number is always transferred.
- Welding procedure: make sure welders are certified (should be a list with their welder ID numbers), and welding procedures are approved, including preheat procedures.
- Check their work, to make sure they follow their procedures. Various tools, including temperature sticks, should be available to help with this. Be sure welders are only doing work they are certified for.
- Check approved shop drawings and shop drawing process.
- Review NDT test results (e.g., X-ray, ultrasound, etc.)
- Observe or review results of pre-assembly, observe pre-assembly area, to ensure proper fit when assembled at jobsite while traffic is shut down.

Other items that should be checked, especially if the SHA does not:

- How many Federal-Aid Highway Projects are handled at the plant, and percent completion of each
- Up to date Contact List for key plant personnel, including QC personnel
- Are reference documents for the standards that must be followed available to the workers?
- Does the plant have AISC or other required third-party certification?
- Do SHA and plant QC personnel have adequate tools and equipment to properly monitor quality and compliance? Do SHA inspectors have separate and adequate workspace and facilities near the work performed?
- Is other required documentation (besides the materials certifications, etc., above) complete and handled properly? Are structural steel sheets adequate and complete, such as with:
    - Size and Grade of material
    - Number and location of flange and web splices
    - Flange splice state of stress
    - Number and size of fillet welds
    - Welding procedure numbers and heat numbers
    - NDE and paint system information (as applicable)
    - Girder dimensions and project information
- Is required sampling and testing being performed?
- Is the material properly stored (e.g., off the ground, properly blocked, and to prevent injury to workers)?
- Are approved fabrication and repair procedures (besides welding) documented, up to date, and followed?
- Are materials in good condition (surfaces, plate edges, etc.)?

Plant Review Follow Up

Just as with a field review, any outstanding issues that turn up as a result of a plant review should be discussed with the SHA representative who accompanied you on the tour, and make note of any issues that need to be followed up. Keep documentation in as much detail as necessary to

reconstruct the issue several months later. On follow up issues especially, keep documentation that is as full and complete as your Division Office guidance requires.

Process/In-Depth Reviews

Process reviews involve systematically reviewing an entire process to make improvements. In-depth or phase reviews involve studying in depthan aspect of design, construction, maintenance, inspection, or an innovative construction technique or material (generally on one or a very small sampling of projects).

The FHWA has published much information on conducting these types of reviews. The FHWA's Construction and Maintenance Internet site (http://www.fhwa.dot.gov/construction/reviews.htm) offers numerous examples of checklists and completed reports from previous process reviews. Also, recently, an FHWA course and accompanying manual have been developed, titled "Conducting Reviews that Get Results." The course and reference materials serve as an excellent how-to for conducting these reviews, including very useful examples. The course was developed internally, and is available by contacting the Office of Professional and Corporate Development in Headquarters, or on the NHI website at the following address: http://www.nhi.fhwa.dot.gov (search for course number 310111).

Contract Administration

As stated above, every State has an agreement with its Division office concerning Federal oversight of projects. This agreement determines the projects for which the Division is responsible, and the level of responsibility. On all Federal-aid bridge projects, the Division is required to determine whether a project, or portions thereof, is eligible for HBP funding. The Division Bridge Engineer could do this directly or communicate the rules on eligibility to the Operations Engineers who could make this determination on State-administered projects. The arrangements will vary from Division-to-Division.

On an FHWA-administered (Full Oversight) project, the Division Bridge Engineer should review the project at various stages of development, usually preliminary and final design, pre-PS&E (Plans, Specifications and Estimate), and PS&E. The reviews continue during construction of the project until construction is complete and Final Acceptance has been processed. When the FHWA-administered project involves bridges or other structures, the Division Bridge Engineer should be involved with the reviews. In some cases, particularly on large bridge projects where the amount of approach roadway work is minimal, the Division Bridge Engineer may be handling the entire project. This would include authorizing the project during its development, for construction, and then approving addenda, change orders, and changes of plan.

For Federal-aid projects that, under a Stewardship Agreement, are State-administered, the Division Bridge Engineer would have minimal involvement. These projects generally do not require design or construction reviews. However, processes and procedures for State-administered projects may be reviewed using a process review or be included as part of a process review for both FHWA oversight and State-administered Federal-aid projects. In addition, sometimes questions arise on these projects that require the Division Bridge Engineer to provide technical or program assistance. Often, questions arise regarding eligibility of a project or a portion of a project for Highway Bridge Program (HBP) funds. In these cases, the Division Bridge Engineer will be called upon to interpret the regulations and policies of the FHWA.

In reviewing Federal-aid projects, there are some contractual issues that arise frequently. A good source for the identification and thorough discussion of these issues may be found on the FHWA Construction and Maintenance "Construction Program Guide" website. The address for this website is:
http://www.fhwa.dot.gov/construction/cqit/index.htm.

Another resource is the Contract Administration Core Curriculum Participant's Manual and Reference Guide, also available on the Internet at the following address: http://www.fhwa.dot.gov/programadmin/contracts/coretoc.htm.

The Division Bridge Engineer should take the Federal-Aid 101 course [offered by the National Highway Institute (NHI)] as early as possible in during career development to become familiar with Federal-aid requirements.

Typically, the Division Bridge Engineer administers the HBP and National Bridge Inspection Standards (NBIS) programs. The way in which these programs are administered varies from

State to State. For example, some Divisions authorize all HBP projects individually whereas others authorize an annual program. The same applies for NBIS projects. Generally, NBIS projects are authorized by the Division Bridge Engineer. HBP projects/programs may be authorized by either the Division Bridge Engineer, the generalist engineer (sometimes referred to as "Area Engineer"), or the Operations Team Leader (sometimes referred to as the "District Engineer"). When you arrive at a Division office, you should determine when and how the program/projects are authorized and who is responsible for the authorizations.

The Financial Management Information System, or FMIS, is used to authorize Federal-aid projects for design and/or construction. This program is found in UPACS on Staffnet, similar to the National Bridge Inventory (NBI). Access to FMIS must be requested prior to or upon arrival at the Division office, usually through the Division's financial management or administrative team.

Once a Federal-aid project is completed, it must have Final Acceptance by the FHWA before it may be closed. Two actions are involved, reporting final costs on a PR47 form by the Division Office engineer overseeing the project and "closing" the account for the project in the financial system by the Division Office financial clerk. The procedures for final acceptance may vary from Division to Division. However, the basic form is the FHWA 1446B – Final Acceptance Report, available on Staffnet under Electronic Forms (http://staffnet.fhwa.dot.gov/informs/adobeforms).

Appendix A – Sample Inspection Report

U.S Department of Transportation
Federal Highway Administration
Construction Inspection Report

State:	New Jersey	Project Manager:	Sue Dunney
Resident Engineer:	John Smith	Field Manager:	Bruce Springsteen
Inspection Type:	Project	Inspection Date:	June 28, 2004

Inspection Made By	Report No.	County	State Region
Me, Division Bridge Engineer	12	County XYZ	Central

In Company With: Name 1, Field Manager Name 2, Assist. Div. Bridge Engineer Name 3, Area Engineer Name 4, Engineer Trainee	Federal Project Number:	BRM-ABCD(123)
	State Project Number:	Route 82, Section 5J and Route 63, Section 3H

Location:	Route 82, Somewhere Borough, Nowhere Township from Tenth Ave (MP 34.1) to Memorial Drive (MP 35.3). Contract number: 021960338
Description of work:	Bridge Replacement (Replacing moveable bridge with a fixed structure)
Contractor:	US Bridge Builders, Inc.

Award Date	Original Contract Amount	Current Contract Amount	Substantial Completion Date	Final Completion Date	Revised Completion Date
1-7-02	$43,384,594	$46,344,105	11-08-04	1/02/05	07/26/05

Quality of Work	Progress of Work	% Time	% Work
Satisfactory	Satisfactory	68	70

SCOPE OF INSPECTION

This inspection consisted of a field review of the Polluted River Bridge replacement project, a review of the project files for pile driving and deck concrete and a discussion with the Field Manager. The Resident Engineer was not available at the time of the inspection.

WORK IN PROGRESS

Forms were being installed for the coping and barrier curb on one of the retaining walls at the Bayview Circle ramp. Workers were removing curing material from a section of deck where wet curing was completed.

FINDINGS AND COMMENTS

1. We received a telephone call from the Resident Engineer, Mr. John Smith, that piles 18 and 19 in Abutment 4 had cracked as they were being driven. These piles are 20" square prestressed concrete piles on a 3:1 batter. They were being driven with an ICE 120S open-ended diesel hammer. The cracks appeared during driving. It is believed by the project staff that the support of the pile in the leads was inadequate on a batter and/or that limited resistance provided by the top layer of soil combined with the stresses produced by driving was causing the cracking.

2. We reviewed the hammer approval documentation in the files, as well as other relevant pile driving records. All of the records were in order, and the required process was followed.

3. The test pile at Abutment 4 was a plumb pile. The test pile drove acceptably without cracking, although re-strikes were required because capacity was not reached at estimated tip elevation (using PDA and CAPWAP). The pile reached capacity after it was re-struck.

4. A static load test was required at Abutment 4 but it was not performed. The project staff did not provide an explanation at the time of the inspection. We recommend that the Resident Engineer provide a response at his earliest convenience.

5. Pile 18 was observed to be 9¾" off of centerline. This is outside of the tolerances permitted by the Specifications. The inspector should be closely monitoring the pile location and batter as they are driven and have the contractor adjust the leads as necessary. Also, the contractor should ensure that they have adequate control over the location of the pile to achieve conformance with the Specifications.

6. The Department made these recommendations to the Contractor for any further pile driving: 1) use intermediate supports to support the piles in the leads; 2) use minimum energy possible to drive through the first layer of soil; and 3) use the PDA on the next pile to monitor the stresses. On Monday, July 1, the Contractor will drive the next batter pile. Also, the firm GRL is expected to be at the site performing "pile integrity testing" on piles 18 and 19, to determine the in-situ crack locations.

7. We inquired about the deck slabs placed to date. Deck Slab I, consisting of Spans 8S – 6S and Deck Slab V, consisting of Spans 5N and 6N, have been placed. The deck slab contains calcium nitrite corrosion inhibitor for the protection of the reinforcement steel

against corrosion. The 28-day compressive strengths (f'_c) for sections 1 in Deck Slab V were 42.5 and 43.1 MPa, well in excess of the 28 MPa required. A material called "Burlene," consisting of burlap and white polypropylene bonded together, was used to wet-cure the slabs. The slabs were wet-cured for seven days. After 7 days, the Burlene was removed and the slab was permitted to air cure. No cracking was evident in the completed slab sections.

CONCLUSION

Based on this review and discussion with the Field Manager, except as noted above, this project is being constructed in reasonably close conformance with the approved plans and specifications. Some of the items noted above require follow-up action by the Department.

_____

Me
Division Bridge Engineer

Orig: Project File
cc: SHA Federal-aid Section
Executive Director, Central Region
Regional Construction Engineer, Central
Field Manager
Project Manager
Resident Engineer
Reader File

CHAPTER 5
SPECIAL TECHNOLOGY

Table of Contents

INTRODUCTION **4**

HIGH PERFORMANCE MATERIALS **4**

HIGH PERFORMANCE CONCRETE 4
HIGH PERFORMANCE STEEL 8
FIBER REINFORCED POLYMER COMPOSITES 9
ALTERNATIVE REINFORCEMENT TYPES 10

LRFD IMPLEMENTATION **11**

HYDRAULICS AND SCOUR **12**

GEOTECHNICAL ENGINEERING AND FOUNDATIONS **12**

TUNNELS **13**

SAFETY/SECURITY **13**

SEISMIC VULNERABILITY AND DESIGN **15**

Introduction

One of the primary roles of the bridge engineer in FHWA is to promote new bridge technology or new or expanded uses for existing technology. The Division Bridge Engineer is the key to getting technology into practice because he or she is the direct link with the State Highway Agency and its bridge projects. For FHWA oversight projects, it is critical that these concepts, as well as other aspects of the design, constructability, maintainability, and economics, be considered and addressed as early in the project development process as possible. This process was described in the previous Chapter.

One way to promote new technology and to expedite deployment would be to form a group or team with representatives of your State Highway Agency's bridge unit to develop plans for implementing new technology such as LRFD, High Performance Materials, innovative bridge research, etc. This team would study the current procedures and processes and determine what needs to be changed to incorporate the new technology. It would also identify what is required to make those changes happen. The added benefits of such a team are that you would be well informed about the SHA's implementation efforts and add to your leadership experience.

The Office of Corporate Research and Technology has developed a list of priority market ready technologies and innovations. The list contains 24 technologies and innovations, of which, 5 are related directly to the bridge program. Promotion of these technologies is a responsibility of the Division Bridge Engineer. For more information concerning this program you can access the following web site: http://www.fhwa.dot.gov/crt/lifecycle/ptisafety.cfm

High Performance Materials

High Performance Materials are currently referred to as High Performance Concrete, High Performance Steel and Fiber Reinforced Polymer Composites. In the future, when the use of these materials gains complete acceptance and they become standard, the terminology "high performance" may become obsolete.

High Performance Concrete

High Performance Concrete (HPC) is defined by the American Concrete Institute as concrete that meets special combinations of performance and uniformity requirements that cannot always be achieved routinely using conventional constituents and normal mixing, placing, and curing practices (ACI 116R).

Different characteristics of concrete in the fresh and hardened states affect performance. In the fresh state, flowability (workability) is an important characteristic. It describes the ease or difficulty of placing the concrete depending on the equipment available. The adequacy of flow for a specific job will affect the quality of the finished product. Concrete with high flowability is easy to place and facilitates the removal of undesirable air voids in concrete. In fact, self-consolidating concrete (SCC) is available that flows through heavily reinforced areas or

demanding places and consolidates under its own mass. Well-consolidated concretes (either through mechanical vibration or mix design, as in SCC) are essential in achieving low permeability for long-lasting structures. The important characteristics of concrete in the hardened state mainly relate to durability and structural design.

HPC has many advantages over standard concrete mix designs. Mainly, it is an engineered material. This means that the owner can ensure that the mix is designed so that the specific strength and/or durability parameters needed are achieved in the field. For example, the owner may only want to include some or all of the durability parameters for a deck slab where strength is not usually a consideration. On the other hand, for a prestressed concrete girder, the strength parameters may be more important to the long-term performance of the element. Another advantage of HPC is that proportioning and mixing the material is not much different from standard concrete mix designs.

The performance characteristics related to durability include freeze-thaw resistance, scaling resistance, abrasion resistance, chloride ion penetration, alkali-silica reactivity, and sulfate resistance. The four structural design characteristics are compressive strength, modulus of elasticity, shrinkage, and creep. The characteristics are determined using standard test procedures, and grades of performance are suggested for each characteristic. Durability is of utmost importance for structures exposed to the environment and concrete for each project may need one or more of these characteristics.

The characteristics and grades should be selected in accordance with the intended application and the concrete's environment. For example, a bridge deck supported on girders needs a specified compressive strength but is unlikely to require specified values for modulus of elasticity and creep. It is not necessary to require all performance characteristics for a given application. Grades of performance characteristics for high performance structural concrete are given in Table 1. Different grades may be chosen for each performance characteristic as necessary, depending upon the owners' requirements.

Other important features of HPC are uniformity and consistency. Also, it is critical to use the same components in the production concrete that were used in the mix design. With high variability, the concrete has a high potential for not meeting the specifications.

A more detailed explanation of characteristics and grades are given in the FHWA Report *Compilation and Evaluation of Results from High Performance Concrete Bridge Projects* by H. G. Russell, R. A. Miller, H. C. Ozyildirim, and M. K. Tadros. The report also includes test procedures and examples of characteristics specified and achieved in different states.

Since the initiation of the HPC Program many projects in several states have been successfully constructed with HPC for one or more bridge components. The latest survey reflects over 45 states have used HPC for one or more bridges and many states are routinely using HPC. Information about the first HPC bridges is located in numerous published and unpublished technical reports, papers in technical journals and symposium proceedings, and student theses.
The HPC Bridge Views Newsletter published bi-monthly by the National Concrete Bridge Council and FHWA provides success stories and lessons learned from the design and

construction of many HPC bridges. The first Issue was published in January 1999 and Issues have been published and distributed bi-monthly since.

Some of the direct benefits identified from the use of HPC are:

- Reduced number of girder lines (A minimum of one and average of two)
- Increased span length capability for the same girder section
- Lower initial cost for girders
- Durability and longer service life
- Reduced number of substructure units
- Lower maintenance costs

Secondary benefits achieved are:

- Reduced number of girders to fabricate, ship and handle; less truck traffic and job site traffic impacts
- Reduced hydraulic impacts from fewer piers in channel
- Reduced dead loads and foundation costs
- Faster bridge construction

Concrete Strengths specified for prestressed concrete girders have ranged from 8 ksi to 14 ksi. No major problem has been reported in achieving the specified strengths.

Durability parameters based on permeability have been specified for decks and girders that ranged from 1000 to 3000 coulombs. Some difficulties occurred in achieving the specified permeability values but were solved. Some States specify a higher coulomb value for the production mix than the design mix when using permeability for acceptance to make the Specifications more realistic.

There are very few disadvantages to using HPC. There is a learning curve associated with using the material. Specifications must be developed and local concrete producers and field personnel must be on-board. The material may be more costly for the first several years as producers and contractors become more familiar with the mix design and verification requirements. In the field, the material requires more attention to proper curing and deck slabs will require a longer wet-cure period.

The best reference for information on HPC, including the definitions, parameters, and performance criteria can be found at the following website: http://www.fhwa.dot.gov/bridge/hpc.htm. This website contains a knowledge exchange community (http://knowledge.fhwa.dot.gov/cops/hpcx.nsf/home), which has the links to other sites, and 9 topic areas, dealing with research & definition; structural design & specifications; mix design & proportioning; precast prestressed beam fabrication/transportation/erection; cast-in-place construction; instrumentation/monitoring/evaluation; costs; self consolidating concrete; and case studies/lessons.

Table 1 - Grades of Performance Characteristics for HPC[1]

Performance characteristic[2]	Standard test method	FHWA HPC performance characteristic grade[3]		
		1	2	3
Freeze-thaw durability[4] (F/T=relative dynamic modulus of elasticity after 300 cycles)	AASHTO T 161 ASTM C 666 Proc. A	70%≤F/T<80%	80%≤F/T<90%	90%≤F/T
Scaling resistance[5] (SR=visual rating of the surface after 50 cycles)	ASTM C 672	3.0≥SR>2.0	2.0≥SR>1.0	1.0≥SR≥0.0
Abrasion resistance[6] (AR=avg. depth of wear in mm)	ASTM C 944	2.0>AR≥1.0	1.0>AR≥0.5	0.5>AR
Chloride penetration[7] (CP=coulombs)	AASHTO T 277 ASTM C 1202	2500≥CP>1500	1500≥CP>500	500≥CP
Alkali-silica reactivity (ASR=expansion at 56 d) (%)	ASTM C 441	0.20≥ASR>0.15	0.15≥ASR>0.10	0.10≥ASR
Sulfate Resistance (SR=expansion) (%)	ASTM C 1012	SR≤0.10 at 6 months	SR≤0.10 at 12 months	SR≤0.10 at 18 months
Flowability (SL=slump, SF=slump flow)	AASHTO T 119 ASTM C 143, and proposed slump flow test	SL>190 mm (SL>7-1/2 in), and SF<500 mm (SF<20 in)	500≤SF≤600 mm (20≤SF≤24 in)	600 mm<SF (24 in<SF)
Strength (f'_c=compressive strength)	AASHTO T 22 ASTM C 39	55≤f'_c<69 MPa (8≤f'_c<10 ksi)	69≤f'_c<97 MPa (10≤f'_c<14 ksi)	97 MPa≤f'_c (14 ksi≤f'_c)
Elasticity[8] (E_c=modulus of elasticity)	ASTM C 469	34≤E_c<41 GPa (5≤E_c<6x10^6 psi)	41≤E_c<48 GPa (6≤E_c<7x10^6 psi)	48 GPa≤E_c (7x10^6 psi≤E_c)
Shrinkage[9] (S=microstrain)	AASHTO T 160 ASTM C 157	800>S≥600	600>S≥400	400>S
Creep[10] (C=microstrain/pressure unit)	ASTM C 512	75≥C>55/MPa (0.52≥C>0.38/psi)	55≥C>30/MPa (0.38≥C>0.21/psi)	30/MPa≥C (0.21/psi≥C)

Notes for Table 1:

1 This table does not represent a comprehensive list of all characteristics that good concrete should exhibit. It does list characteristics that can quantifiably be divided into different performance groups. Other characteristics should be checked. Only one characteristic is sufficient for HPC.

2 For non-heat cured products, all tests to be performed on concrete samples moist, submersion, or match cured for 56 days or until test age. For heat-cured products, all tests to be performed on concrete samples cured with the member or match cured until test age. See table 13 of the FHWA report for additional information and exceptions.
3 A given HPC mix design is specified by a grade for each desired performance characteristic. A higher grade indicates a higher level of performance. Performance characteristics and grades should be selected for the particular project. For example, a concrete may perform at grade 3 in strength and elasticity, grade 2 in shrinkage and scaling resistance, and grade 2 in all other categories.
4 Based on SHRP C/FR-91-103, p. 3.52.
5 Based on SHRP S-360.
6 Based on SHRP C/FR-91-103.
7 Based on PCA Engineering Properties of Commercially Available High-Strength Concretes, RD104
8 Based on SHRP C/FR-91-103, p. 3.17.
9 Based on SHRP C/FR-91-103, p. 3.25.
10 Based on SHRP C/FR-91-103, p. 3.30.

High Performance Steel

High Performance Steel (HPS) has enhanced toughness, improved weldability and improved weathering properties. The material is commonly available in Grades HPS 50W and HPS 70W. Grade HPS 50W has a yield strength of 50 ksi and Grade 70W has a yield strength of 70 ksi. The governing material Specification is ASTM A709. Although High Performance Steels have the same strength level as the conventional steels, their unique chemical and physical properties facilitate economical fabrication practices and enhance long-term performance.

HPS offers many advantages, including the following:

- The high strength of HPS allows the designers to use fewer lines of girders to reduce weight and cost, use shallower girders to solve vertical clearance problem, and increase span lengths to reduce the number of piers on land or obstructions in the streams.
- Improved weldability of HPS eliminates hydrogen induced cracking, reduces the cost of fabrication by lower preheat requirement, and improves the quality of weldment.
- Significantly higher fracture toughness of HPS minimizes brittle and sudden failures of steel bridges in extreme low service temperatures. Higher fracture toughness also means higher cracking tolerance, allowing more time for detecting and repairing cracks before the bridge becomes unsafe.
- Good 'weathering characteristic' of HPS assures long-term performance of unpainted bridges under atmospheric conditions.
- Optimized HPS girders can be attained by using a hybrid combination of HPS 70W in the negative moment top and bottom flanges, and Grade 50W or HPS 50W in other regions.
- Optimized HPS girders have shown to result in lower first cost and are expected to have lower life cycle cost.[1]

There are very few disadvantages of using HPS. For States that still have deflection requirements, the members made entirely of HPS can be quite slender and often deflection will control the design. However, this can be overcome by using hybrid combinations of HPS and conventional steel for the member. As with all weathering steel, special attention must be paid to

[1] Lwin, Myint, "HPS Designers' Guide," FHWA, 2nd Edition, April 2002. Available at http://www.fhwa.dot.gov/bridge/guidetoc.htm

areas subjected to periods of prolonged wetness. For example, expansion joints, and even the concrete/steel interface area for integral bridges, will require a protective coating.

To learn more about HPS, please refer to the following:
http://www.fhwa.dot.gov/bridge/hps.htm
http://www.fhwa.dot.gov/bridge/guidetoc.htm
http://www.nabro.unl.edu/
AASHTO Guide for Highway Bridge Fabrication with HPS 70W Steel, Publication [Code HBF-1] is available at the bookstore online at:
https://bookstore.transportation.org/item_details.aspx?ID=323

Fiber Reinforced Polymer Composites

Fiber reinforced polymer composites (FRP) are materials composed of fiber reinforcements, resins, fillers and additives. Composites are anisotropic materials since their strength is different in any direction. FRP products can take many forms, from superstructure panels to individual structural members to semi-rigid sheets or flexible wraps that are bonded to a substrate to add structural capacity. They are ideal for projects where high user cost can be mitigated by rapid installation.

There are three basic manufacturing techniques in producing composite structural products, with many variations and patented processes: 1) The pultrusion process involves a continuous pulling of the fiber rovings and mats through a resin bath and then into a heated die. The elevated temperature inside the die cures the composite matrix into a constant cross-section structural shape. 2) The filament winding process can be automated to wrap resin-wetted fibers around a mandrel to produce circular or polygonal shapes. 3) The layup process engages a hand or machine buildup of mats of fibers that are held together permanently by a resin system. This method enables numerous layers of different fiber orientations to be built up to a desired sheet thickness and product shape.[2]

The flexibility that can be achieved with FRP is one of its primary advantages. Depending upon the manufacturing process, composites can be molded to practically any shape, and the fibers oriented to obtain the required mechanical properties. Other advantages of FRP include its high strength to weight ratio, which results in it being relatively lightweight and quick and easy to install. Many times the members can be lifted and erected by people, without the use of any cranes or lifting equipment. The material is also highly resistant to corrosion and chemical attack.

One of the primary disadvantages is the relatively high initial cost. Since FRP is not widely used, the members may not be readily available and have to be fabricated for each application. As the use of FRP becomes more widespread, the cost is expected to decrease. Also, when this material is compared to other standard materials (concrete and steel) using life cycle cost analysis, it may be found to be the lowest cost option. The material is subject to significant creep

[2] Tang, Benjamin. "Fiber Reinforced Polymer Composites Applications in USA." First Korea/U.S.A. Road Workshop Proceedings, January 28-29, 1997.

and shrinkage to varying degrees. With high-grade FRP products these can be significantly mitigated. There is a potential for degradation from exposure to ultraviolet radiation and alkaline substances. The durability of available joining/fastening methods has not been proven. Bonded FRP sheets may require positive anchorage at the ends for development of the composite section. Serviceability could be a concern because thin panels and shallow members may experience excessive deflection. Hydraulic considerations are of concern because the members tend to be very buoyant due to their very low unit weight. Lastly, in the US, standards and design codes are currently unavailable.

To learn more about FRP composites, including examples of current applications and projects, please refer to the following Internet link:
http://www.fhwa.dot.gov/bridge/frp/index.htm

Alternative Reinforcement Types

Alternative reinforcement types are any reinforcement and/or coating system that is not standard. By standard, we mean deformed bars meeting the requirements of ASTM A615 (AASHTO M31). Some examples of these materials are solid stainless steel and stainless steel clad, MMFX and FRP bars, and other specially- manufactured types of steel not meeting the above standard specifications.

The primary advantage of these materials is their resistance to corrosion. The corrosion process is initiated by the presence of chlorides. This improved corrosion resistance greatly improves the durability of reinforced concrete structures.

The primary disadvantage of these materials is their initial cost. Depending on the material, the cost could be 3 to 4 times as much as ordinary A615 bars, though a life cycle cost analysis (LCCA) may show them to be the most economical alternative. The bars are not as readily available as A615 bars since the demand is not as great. This may affect the construction schedule. Some of these products may only be available from a single source, so they may require a public interest finding or be classified as an experimental feature in accordance with 23 CFR 625.3 and 635.411. Also, refer to the following website: http://www.fhwa.dot.gov/programadmin/contracts/expermnt.htm for requirements on handling construction projects incorporating experimental features. Section II.C.5.b. Patented/Proprietary Products, in the *Contract Administration Core Curriculum Participants' Manual and Reference Guide* provides additional discussion on experimental features and related Headquarters' memorandum.

In addition, standard specifications may not be available for some of these products. There may be special requirements for bending, splicing and handling these bars that are not required for A615 bars. The actual mechanical properties should be carefully evaluated with appropriate design requirements to assure compatible structural performance.

If you were considering using these materials on a project, you would want to see an LCCA comparing standard and non-standard reinforcement alternatives. Another approach is to treat the material as experimental and have the State Highway Agency (SHA) put together a work

plan for evaluating the material. If the material is only available from one source and/or is proprietary, 23 CFR 635.411 will have to be observed. This regulation requires a finding, approved by the Division Administrator, that it is in the public interest to use such a product. Usually, this finding would need to be supported by a LCCA for products with a high initial cost (since a generic alternative is readily available).

ASTM A706 reinforcing steel is being specified by California and South Carolina for seismic design purposes. The performance of this steel is more predictable and consistent under extreme loads than ASTM A615 rebars. The A706 rebar has improved chemistry and tighter limits on yield and ultimate strength.

LRFD Implementation

According to the agreement between FHWA and the AASHTO Bridge Subcommittee [Memorandum - 6/28/00], beginning no later than October 1, 2007, all new bridges on which states initiate preliminary engineering are to be designed in accordance with the AASHTO *LRFD Bridge Design Specifications*. In support of this transition effort, the FHWA has developed a strategic plan to assist the States with their planning and implementation efforts. The plan involves the following:

- Identify past, current, and future LRFD implementation plans of States.
- Identify and deploy a showcase of successful LRFD implementation by a LRFD State.
- Develop an implementation plan and guidelines that can be used by States to identify and prioritize the roadmap items that need to be accomplished for a successful LRFD implementation, make decisions, set priorities, determine actions, and review performance on a regular basis and make needed changes to the plan.
- Deploy planning assistance providing hands-on implementation and transition planning that integrates a State into the detailed implementation planning process.
- Develop comprehensive design examples.
- Deploy prompt technical LRFD training and assistance to States.
- Develop detailed, hands-on training courses.
- Compile a comprehensive list of LRFD resources (e.g., textbooks, software, courses).
- Support LRFD research.

In addition, the AASHTO Bridge Subcommittee has created an LRFD Oversight Committee, whose role is to identify and resolve issues and problems related to the LRFD specifications, and support the development and deployment of educational and training materials that can be used to aid State implementation efforts. The committee contains a number of FHWA Bridge Program staff.

The FHWA Internet site has an abundance of useful information regarding LRFD implementation (http://www.fhwa.dot.gov/bridge/lrfd/index.htm). The site includes information on the following:

- Load and Resistance Factor Design (LRFD) Memo

- Tips for Successful LRFD Implementation
- LRFD Implementation Plan
- LRFD Product List
    - Includes Reference Manuals, Textbooks, and Design Examples
    - Includes Computer Design and Analysis Software
    - Includes LRFD Training Courses
    - Includes State Highway Agency Design Manuals, Guidelines and State-specific Design Examples
- Design Examples
    - Prestressed Concrete Girder Superstructure Bridge Design Example
    - Steel Girder Superstructure Bridge Design Example

A website has also been set up on FHWA's Staffnet which contains current information and resource materials which can be used to assist States in this transition effort (http://intra.fhwa.dot.gov/bridge/lrfd/index.htm). For questions regarding LRFD implementation, contact the Headquarters Office of Bridge Technology.

Hydraulics and Scour

Normally, the Division Bridge Engineer is responsible for hydraulics, including the scour program. Preliminary plans for unusual hydraulic structures on the Interstate highway system, including complex stream stability countermeasures or other hydraulic structures that are unique or atypical, must be reviewed and approved by the Office of Bridge Technology. Reference the November 13, 1998, memorandum written by the Director, Office of Engineering (Unusual Oversight Memo).

The FHWA has hydraulic experts located in both the Resource Center and the Washington office. A number of training courses are also available. The FHWA Internet site (http://www.fhwa.dot.gov/engineering/hydraulics/index.cfm) is an excellent reference for both past and current information on hydraulics, including available training courses.

Since the early 1960's, the FHWA has published hydraulic design information in the form of the Hydraulic Design Series (HDS) and Hydraulic Engineering Circulars (HEC). These are available for download on the Internet site referenced above.

Geotechnical Engineering and Foundations

Normally, the Division Bridge Engineer is responsible for geotechnical engineering. Preliminary plans for unusual geotechnical structures on the Interstate highway system, including new or complex wall systems or ground improvement techniques or other geotechnical structures that are unique or atypical, must be reviewed and approved by the Office of Bridge Technology. Reference the November 13, 1998, memorandum written by the Director, Office of Engineering (Unusual Oversight Memo).

The FHWA has geotechnical experts located in both the Resource Center and the Washington office. A number of training courses are also available. The FHWA Internet site (http://www.fhwa.dot.gov/engineering/geotech/index.cfm) is an excellent reference for both past and current information on geotechnical engineering, including available training courses.

Tunnels

Tunnel engineering is another specialty area of structural engineering housed in the Office of Bridge Technology. Tunnels are considered unusual structures and generally require the involvement of the Office of Bridge Technology on FHWA-oversight projects. There are many aspects of tunnels that differ from highway bridge structures, such as the loadings, lighting and ventilation requirements, drainage, requirements for safe egress, and even geometric considerations (lane and shoulder widths). Tunnel expert(s) in Headquarters are very knowledgeable about the state-of-the-art in tunnel engineering and should be consulted with any questions.

In addition, there is a Virtual Team on Road Tunnels (VTRT). This VTRT consists of both SHA and FHWA engineers. The link to the VTRT website is: http://www.fhwa.dot.gov/bridge/tunnel/index.htm. On this website, you can "Ask the Expert," as well as find the latest tunnel publications and links to related websites.

The FHWA and the Federal Transit Administration recently released the Highway and Rail Transit Tunnel Inspection Manual and the Maintenance and Rehabilitation Manual (March 2003). These are very useful documents for SHA's that operate and maintain tunnels (available in the Library at the website referenced above). In conjunction with these manuals, a Tunnel Management System (TMS) is available. The TMS is designed to allow highway and transit tunnel owners to monitor the physical condition of various tunnel features. Used over a period of time, the software provides a tool for spotting trends in the performance of particular components of tunnel systems. The software also provides tunnel owners with online access to data documenting component conditions, such as condition ratings, sketches and photographs of defects, inspector comments, repair logs, and costs associated with repairs.

Safety/Security

The issues of safety and security are relatively new to the bridge community. These issues became critical in the wake of the terrorist attacks on September 11, 2001. It is generally more reasonable and feasible to protect our critical bridges and structures from terrorist threats through increased surveillance and visibility than to strengthen them structurally.

The first step in protecting our structures from terrorist activities is to identify those that are most critical and vulnerable to such attacks. Various methodologies are available to perform such an analysis, and computer programs are available. Since 2001, the majority (if not all) of the States have identified their critical highway facilities, including bridges and structures. Be aware that

this information is sensitive in nature, and your State DOT may not be able or willing to share this information with you.

There are numerous, relatively simple, measures that could be included in projects in either a design or in a retrofit scenario. Some examples are as follows:

1. Restrict parking under a bridge structure. This could be done by the use of concrete barriers. Barriers should be placed to also restrict parking adjacent to a bridge structure.
2. Detail the installation of surveillance cameras that can be tied to a central monitoring location.
3. Restrict the placement of vegetation that would obstruct surveillance measures.
4. Restrict access to ventilation machinery in tunnels. Detail installation of emergency shut-off mechanisms.
5. Restrict access to key details that, if damaged, would result in the loss of the structure.
6. Detail the restriction of access to movable bridge machinery and operator's housing.
7. Detail the installation of lighting throughout a bridge structure to ensure surveillance. This should include lighting under a bridge that is located over a waterway.
8. Detail, in general, all bridge components so that no component is concealed from view.
9. Encourage designs that incorporate load-path redundancy. If designs with non-redundant members are necessary in an unusual situation, those members must be internally redundant.
10. Protect all main load carrying members from direct impact from automobile, marine, or rail traffic.
11. Locate utilities in such a way as to minimize their potential use against the structure. Appropriate shut offs shall be provided adjacent to the structure.

On a new bridge or a reconstruction project, incidental measures necessary to provide a safe and secure structure should be included in the Federal-aid project. The above measures are considered incidental. The determination as to which measures to apply on a particular structure, if any, would have to be made on a project-by-project basis. Clearly, the vulnerability of a particular structure or structural elements to attack would be the major factor in determining which measures to apply.

To give this topic more emphasis, you may want to encourage your respective State DOT to develop design and inspection policies addressing bridge security, if they have not already done so. The State DOT should have a sound and defensible methodology for assessing criticality, vulnerability, and the need for countermeasures. In the meantime, the Transportation Security Administration (TSA), under the Department of Homeland Security, is working with the FHWA to independently assess these needs nationally. Once these needs have been firmly established, independently verified, and the TSA develops and publishes its regulations, a funding source for installation of countermeasures may be established.

For more detailed information on this topic, reference the AASHTO document, "Recommendations for Bridge and Tunnel Security," prepared by the Blue Ribbon Panel on Bridge and Tunnel Security. The Internet address for this document is as follows: http://www.fhwa.dot.gov/bridge/security/brpcover.htm. Also, there is an Engineering

Assessment Team established to assist the Divisions and State Highway Agencies in identifying vulnerable bridges and structures and developing strategies to protect and strengthen them. The Office of Bridge Technology in Headquarters administers this Engineering Assessment Team, and it can be contacted for further information or assistance in this area.

Seismic Vulnerability and Design

It has become apparent in recent years that many bridges in the United States are inadequate to resist seismic loadings. Numerous bridges have collapsed or were severely damaged during major seismic events in Alaska, California, Oregon and Washington. It is important to know that even moderate earthquakes can cause damage or even collapse of a structure. It is estimated that ground motions of sufficient magnitude to cause bridge damage can occur in 37 of the 50 States, Puerto Rico, and the District of Columbia.

In many cases, the goal of seismic design is not to prevent a bridge from sustaining damage but to prevent catastrophic failure after a significant seismic event. If the latter methodology is used, a bridge may not be salvageable after such an event.

Seismic vulnerability of a structure is influenced mainly by three factors:
1. Expected site ground acceleration
2. Soil type at the site
3. Structural details.

Good structural detailing can make a structure highly resistant to earthquake loadings even in high seismic areas. Conversely, structures with poor detailing are vulnerable to being damaged or collapsed during moderate to severe earthquakes. The following is a list of some structural details that have performed poorly during recent earthquakes:

- Inadequate bearing support lengths for girders at abutments, piers and hinges
- Inadequate confinement reinforcement (ties) in columns
- Inadequate confinement at column to cap connections
- Inadequate confinement of splices at column to footing connections
- Single column bents generally performed worse than multi-column bents
- Outrigger (straddle) type bents
- Rocker bearings
- Highly skewed joints
- Abrupt changes in structure stiffness or type in a structure unit
- High variability in column heights within a structure unit
- Double-deck structures

State Highway Agencies, including Puerto Rico and the District of Columbia, that have structures in moderate to high seismic regions should screen their existing bridges for seismic vulnerability. Bridges identified to be highly vulnerable should be seismically retrofitted. New or replacement bridges in these regions should be designed in accordance with the current

seismic provisions contained in the AASHTO Bridge Design Specifications. The following are useful references and websites for seismic design and retrofitting of highway bridges:

- Earthquake Effects: EQ (Section 3.10), AASHTO LRFD Bridge Design Specifications, Fourth Edition , 2007.
- Seismic Design (Division 1A), AASHTO Standard Specifications for Highway Bridges, Seventeenth Edition, 2002 (with March 2005 errata).
- FHWA, Seismic Retrofitting Manual for Highway Structures: Part 1 – Bridges, January 2006.
- FHWA, Seismic Retrofitting Manual for Highway Structures: Part 2 – Retaining Structures, Slopes, Tunnels, Culverts, and Roadways, August 2004
- Proceedings of the 3rd National Seismic Conference & Workshop on Bridges and Highways (limited copies available through the Resource Center).
- http://www.fhwa.dot.gov/bridge/seismic/index.htm
- http://www.dot.ca.gov/hq/esc/earthquake_engineering/.

Some simple retrofitting techniques used on structures include cable restrainers for girders, column jacketing or wrapping with FRP, installation of "catcher" systems for high-profile bearings (rocker bearings), bearing replacement, and/or widening the bridge seats.

CHAPTER 6
RESEARCH AND TECHNOLOGY TRANSFER

Table of Contents

OVERVIEW **4**
RESEARCH AND TECHNOLOGY TRANSFER PROGRAMS **4**
STATE PLANNING AND RESEARCH (SP&R) PROGRAM **4**
NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM (NCHRP) **6**
FHWA STRUCTURES RD&T PROGRAMS **8**
OFFICE OF BRIDGE TECHNOLOGY ROLE IN TECHNOLOGY/RESEARCH DEPLOYMENT **10**
TRANSPORTATION POOLED-FUND (TPF) PROGRAM **11**
TRANSPORTATION RESEARCH BOARD **13**
UNIVERSITY TRANSPORTATION CENTERS (UTC) **14**
SMALL BUSINESS INNOVATION PROGRAM (SBIR) **15**
LOCAL TECHNICAL ASSISTANCE PROGRAM (LTAP) **16**
INNOVATIVE BRIDGE RESEARCH AND DEPLOYMENT PROGRAM (IBRD) **17**
EXPERIMENTAL PROJECTS **19**
FIELD OFFICES R&T FUNDED TECHNOLOGY ADVANCEMENT PROGRAM **19**
PRIORITY, MARKET-READY TECHNOLOGIES AND INNOVATIONS **20**

Overview

The purpose of this chapter is to outline some of the means available to FHWA, the States and Local agencies for pursuing beneficial research and new or innovative bridge technology.

Research And Technology Transfer Programs

Despite the high technical level of the highway engineering community in general, there is a continuing need for development and dissemination of knowledge about new and effective concepts and practices. There is a need to fill gaps in existing knowledge and there are always problems to solve. FHWA conducts or is involved in a number of research and technology transfer programs. While some are led by FHWA personnel or contractors, the majority are carried out in collaboration with other Federal and State agencies, AASHTO, TRB, and the academic community. A significant portion of this effort is directed towards technology transfer to state and local government personnel.

There are a variety of programs available for the FHWA and the States to conduct research and to disseminate the resulting knowledge to end users. Some of these are straightforward research programs, while others are special programs to encourage innovation and small business, and may include a focused effort to transfer the technology and enhance the capability of bridge engineering professionals by special training. This chapter describes some important research programs with an emphasis on the FHWA Division Bridge Engineer's role. They are:

- State Planning and Research
- The National Cooperative Highway Research Program
- Structures R&D within the FHWA
- Transportation Pooled-fund Studies
- Transportation Research Board Studies
- University Transportation Centers
- Small Business Innovative Research
- Local Technical Assistance Centers/Technology Transfer Centers
- The Innovative Bridge Research and Construction Program and its successor, the Innovative Bridge Research and Deployment Program
- The National Experimental Evaluation Program
- Field Offices' R&T Funded Technology Advancement Program
- Priority, Market-Ready Technologies and Innovations, and AASHTO TIG

State Planning and Research (SP&R) Program

The State Planning and Research (SP&R) program, when taken as a whole, is the largest single highway research program in the United States. Established in 1944 as the Highway Planning and Research Program, the SP&R is funded from each State's Federal-aid apportionment.

Section 505 of Title 23 requires each State to set aside 2% of its annual apportionment for this purpose. This is to encourage State DOT's to develop strong RD&T programs, tailored to their specific needs and priorities. Of this 2%, at least one quarter (1/2% of its annual apportionment) must be used for research, development and technology transfer (RD&T).

Each State must develop and conduct a statewide RD&T plan, which usually takes into account the needs of local governments. The research generally focuses on the problems specific to the particular state (such as earthquakes, floods, corrosion, etc.), on development of standards and specifications, improved computer programs, upgrading the skills of the state's staff, and technology transfer and assistance for local governments. As a rule, States tend to award research contracts to universities within the State, (although some States consider out-of-state universities and firms when special research is needed). This often results in a beneficial, long-term relationship and cooperation between the State and its universities. When the State DOT or SHA has a good and well-equipped laboratory system of its own, a significant amount of research can be conducted in-house. The development of the statewide program gives the Division Bridge Engineer a good opportunity to be more involved in research.

Funding for SP&R studies are 80% Federal and 20% State funding. SP&R funding is not subject to the adjustment for the percentage area of Federal Lands, as some Federal-aid is. A State may also conduct research funded entirely with State funds.

In addition to research and technology transfer, SP&R money is also used to help support pooled-fund studies, NCHRP and TRB. In some States, SP&R funds are also used to finance the Local Technical Assistance Program (LTAP) and the University Transportation Centers (UTC). These programs are discussed in more detail below. To sum up,

1. The State, with input from researchers, engineers and other advisors, decides what research is needed in the coming year.
2. The State then develops an Annual Research Work Program
3. The annual research program is reviewed by the appropriate FHWA Division Office personnel (usually the planning and research engineer) who makes a recommendation to the FHWA Division Administrator (DA) who has the authority to approve the annual research plan..
4. The State executes its program, using its own staff, universities, and research firms.
5. The Division Bridge Engineer can help the state's programs and projects succeed by working with the State to identify research needs, serving on technical advisory panels, offering to review interim and final reports, establishing and maintaining informal or formal contacts with researchers at the local universities and taking advantage of opportunities to implement research results in the course of their stewardship and oversight duties.

Much more information on the SP&R Program is available on the FHWA Staffnet Site at http://intra.fhwa.dot.gov/turnerfairbank/sprmanual/memo062201.htm

National Cooperative Highway Research Program (NCHRP)

The National Cooperative Highway Research Program (NCHRP) was created in 1962, and has proven to be very successful. NCHRP's mission is to perform applied research on various aspects of highway planning, design, construction, operations and maintenance. The research subjects are those of interest to State DOT's. NCHRP projects address problems of current national interest that can be solved relatively quickly through applied research. The objective of these projects is to produce information that will improve the state-of-the-practice through new or improved specifications, manuals, guidelines, tools, materials, and methodologies.

In addition to the straightforward research studies, there are two other research venues managed by NCHRP. They are the Highway Syntheses Program and the IDEA Program. The latter will be discussed in a separate section. The Synthesis Program publishes reports on topics where a body of knowledge already exists but is not widely appreciated or utilized.

The NCHRP is supported through annual voluntary contributions, by each State, of 5½ percent of its SP&R funds. In FY 2008, NCHRP funding was on the order of $27 million. The research funded under the NCHRP has had a considerable effect on bridge and highway engineering, both in the U.S. and abroad. The success of NCHRP is due to the immediacy of its research subjects, the technical qualifications and make-up of its technical oversight panels, and the quality of its reports. If the final report from a study falls short of the panel's expectations, it is not published.

NCHRP was created to serve the States and the topics to be studied are determined by the States and AASHTO (with some input from FHWA). There are always a large number of research subjects proposed. These are winnowed out through a lengthy and complicated process, which is detailed below.

1. Each year, the AASHTO Standing Committee on Research (SCOR) solicits problem statements from four authorized sources: (1) the chief administrative officers of the member highway and transportation departments, (2) the chairs of AASHTO's committees and subcommittees, (3) AASHTO's Board of Directors, and (4) the Federal Highway Administrator.

2. On receipt, FHWA and NCHRP evaluations of problem statements are performed. The FHWA review of the problem statements related to structures, hydraulics, geotechnical and foundations topics are usually performed by the R&D staff in the Office of Infrastructure R&D. The NCHRP reviews problem statements related to structures, hydraulics, geotechnical and foundations topics are performed by the NCHRP staff and an expert panel formed by NCHRP. This panel includes subject matter experts from FHWA.

3. These evaluations are sent to submitters, and they have an opportunity to comment on the evaluations and modify them, or withdraw the problem statement.

4. AASHTO and FHWA are then asked to assign priority rankings (1-low thru 5-high) to all of the pending NCHRP problem statements. In this same time frame the AASHTO Research

Advisory Committee (RAC), which is comprised primarily of the research director or manager from each State DOT, also ranks the problem statements.

5. All problem statements, along with rankings and comments from FHWA and RAC, are then summarized, and a combined average ranking of SCOR and RAC is assembled by NCHRP. Problems are then listed sequentially (from high to low) and a cumulative tally of requested funding is created.

6. The AASHTO's SCOR then meets, typically in the spring, to review all submissions, comments, and rankings, and selects the final package of projects for the upcoming Fiscal Year based upon estimates of total NCHRP program funding that will be available that year.

7. This list of projects recommended by SCOR is sent to the AASHTO Board of Directors, who give the final approval.

8. NCHRP then manages the conduct of the approved research projects. NCHRP appoints a select technical panel for each project. The panel, which includes a liaison from FHWA, prepares the NCHRP Problem Statement for that project (the formal Request for Proposals – RFP). The final statement may be changed or amplified by the panel, as needed.

9. NCHRP posts the Project Statement on its web-site and notifies via email all prospective proposers for the project.

10. The Panel meets a second time to review all proposals submitted in response to the Project Statement solicitation, in order to select a contractor.

11. After contract negotiation, the project is awarded to a selected contractor and NCHRP staff and the panel oversee the progress of the study, and review all interim and final reports.

12. NCHRP publishes the report and possibly submits proposed specifications or guides developed as part of the project deliverables to AASHTO and FHWA for consideration for adoption.

13. The NCHRP project panel is formed by the NCHRP program officer in charge of the project. Each panel is chaired by a subject matter expert. Panel members are drawn from State Highway Agencies (often the State Bridge Engineer or his/her designee), FHWA staff, researchers from universities and industry, other Federal agencies, and consulting engineers. Much of the respect accorded NCHRP reports is due to the technical and professional qualifications of the members of the panels. A typical panel includes eight voting members, along with various liaison members (the official FHWA liaison on a panel is not a formal voting member).

The NCHRP program provides an excellent opportunity for Division Bridge Engineers to participate in and influence research projects at the national level, both by submitting research problem statements and by serving on the technical panels. The latter is a very stimulating and rewarding experience, from the viewpoint of professional development and of networking.

As noted above, the AASHTO Subcommittee on Bridges and Structures is one of the authorized sources of problem statements. The Subcommittee manages the generation and submission of problem statements through its own Research Technical Committee (T-11). All members of the Subcommittee on Bridges and Structures and the 19 technical committees may submit problem statements to T-11, Technical Committee for Research. T-11 also considers the problem statements generated by the technical committees related to bridges and structures of the Transportation Research Board. T-11 evaluates and prioritizes all problem statements and submits a list to the full Subcommittee. The Subcommittee ballots on the proposed list and the approved list is forwarded to the Standing Committee on Highways. FHWA influences this process by serving on the AASHTO technical committees. The Division Bridge Engineer can initiate and submit research problem statements directly to the Office of Bridge Technology, in which case it will be folded into the FHWA submitted problem statements, or the Division Bridge Engineer can collaborate with the State Bridge Engineer on a jointly authored problem statement that would be considered by T-11.

FHWA Structures RD&T Programs

While the bridge and structures research conducted directly by FHWA is smaller, in terms of total dollars, than that done under the SP&R and NCHRP programs, it is still very significant. FHWA research usually addresses topics of national interest and scope. The results are often the basis for major changes or revisions to specifications and/or guidance. Whereas NCHRP research is intended to address a short-term pressing need identified primarily by the States, FHWA's research is intended to cover higher-risk, more advanced, and longer-term research projects and needs.

Direction of FHWA's research and technology programs is jointly shared by the Director of the Office of Bridge Technology and the Director of the Office of Infrastructure R&D. The Technical Director for Bridges and Structures R&D directly manages the R&D elements of this program within the Office of Infrastructure R&D (HRDI), while the Office of Bridge Technology, in cooperation with the Resource Center, Federal Lands Highways and the Division Offices, manages the technology deployment and delivery elements of the overall program.

The Office of Infrastructure R&D, located at the Turner-Fairbanks Highway Research Center (TFHRC), in McLean, Va., is FHWA's primary center for research on structures, hydraulics and geotechncial engineering. The Office of Infrastructure R&D's Structures Team develops technology to design, preserve and maintain the Nation's bridges and structures. Researchers conduct research aimed at identifying and/or advancing new design methodologies, materials, and inspection techniques that improve the productivity and mobility of the national highway transportation system. Structures research helps minimize construction and rehabilitation time and costs, and enhances highway safety by reducing closures and work-zone detours. Six TFHRC laboratories support this structures research. The group's long-range, strategically directed research efforts are focused on three broad initiatives:

- The Bridge of the Future
- Stewardship and Management (of the existing inventory)

- Bridge Safety, Reliability, and Security

The Structures R&D program is organized into three teams also aligned with these three broad initiatives:

- Design and Construction Team
- Infrastructure Inspection and Management Team, and
- Safety, Reliability and Security Team

These teams' research products include information, knowledge, technology, test methods, design procedures, and guidelines. Their services include forensic analyses, test services, troubleshooting, and training.

The Infrastructures R&D Bridge Design and Construction Team manages combined contract and in-house research programs that focus on a systems approach to improve highway structure design, construction, and rehabilitation. This approach integrates construction, durability, maintenance, inspection, and long-term performance into the bridge systems of the future. The team's research ensures that bridges are constructed with systems, materials, methods, standards, and practices that significantly reduce construction traffic delays, improve construction quality, improve worker safety, and provide a longer, more reliable design life. Two of the structures laboratories are managed and directed by members of the Design and Construction Team. These are the FHWA Structures Laboratory and the Geotechnology Laboratories. The Structures Laboratory is a large laboratory designed and optimized for the full scale testing of bridge systems and components. The professional staff of the Structures Laboratory is capable of computer analysis and simulation of the linear and non-linear behavior of structural systems. The Structures Laboratory is also capable of materials characterization and forensic analysis of common bridge building materials. The Geotechnology Laboratories are capable of scale model testing of shallow and deep foundations with different soils, testing and evaluation of pile driving systems, and full scale testing and evaluation of mechanically stabilized soil structures.

The Infrastructure R&D Inspection and Management Team manages combined contract and in-house research programs that study and develop technologies to detect, measure, assess and control all processes and mechanisms that limit the useful life of highway structures. The team also develops applications to better preserve, maintain, and manage the Nation's highway infrastructure. Team members develop tools to investigate bridge conditions, study bridge corrosion, and develop technology to support bridge management. Two laboratories are managed and directed by members of the Infrastructure Inspection and Management Team. These are the Nondestructive Evaluation (NDE) Laboratory, and the FHWA Coatings and Corrosion Laboratory. The NDE laboratory is engaged in the development and evaluation of advanced nondestructive evaluation technologies and systems. Some of the capabilities include large scale radiographic and computer aided tomography, ultrasonic inspection, acoustic emission, thermography, electromagnetic inspection, magnetic inspection and eddy current inspection. These capabilities are supported with advanced instrumentation design and fabrication and advanced signal processing and visualization tools. The Coatings and Corrosion Laboratories support the development of new corrosion protection systems. The Infrastructure Inspection and

Management Team is also responsible for the Long-Term Bridge Performance (LTBP) Program, a 20-year effort to collect and document bridge performance nationwide.

The Infrastructure R&D Bridge Safety, Reliability, and Security Team manages a combined contract and in-house research program that works to ensure that highway structures are safe and reliable for all service conditions. Researchers assess and address potential structural, environmental, and human-made threats such as earthquakes, floods, high winds, fires and terrorist attacks. Two laboratories are managed and directed by members of the Bridge Safety, Reliability and Security Team. These are the FHWA Hydraulics Laboratory and the FHWA Aerodynamics Laboratory. The Hydraulics Laboratory is capable of physical modeling and computer simulation of most hydraulics structures of importance to highways. Advanced capabilities include two and three dimensional measurement and visualization of complex fluid structure interactions and computational fluid dynamic analysis in two and three dimensions. The laboratory is especially optimized and capable of studying scour at highway bridges. The special capabilities of the Aerodynamics Laboratory include an open circuit wind tunnel, advanced computational fluid structure interaction modeling, an Aerodynamics database and long term field monitoring of long-span structures for wind events.

The Structures Group and the contract support staff at TFHRC are a tremendous technical resource for FHWA. The Division Bridge Engineers should stay familiar with the current portfolio of research underway at TFHRC. Current information can be found at www.tfhrc.gov.

Office of Bridge Technology Role in Technology/Research Deployment

The Office of Bridge Technology (HIBT) provides technical leadership and support in the advancement of cutting edge and state-of-the-art technologies for the purpose of improving the condition of the nation's bridges and structures. Injecting new technologies during hands-on design and construction reviews of major and unusual bridges, tunnels, and geotechnical as well as hydraulic projects provides technology leadership. Technical leadership is also provided through the development of technical advisories, technical manuals, guidance, and training on bridge inspection as well as structural, hydraulics, and geotechnical engineering.

HIBT is structured into three primary teams, as follows:

- The Major Bridge Team is responsible for the review and approval of preliminary plans for major and unusual structures located on the Interstate System. Through their reviews, they provide technical leadership in new and innovative design concepts including high performance materials and fiber-reinforced composites. They provide technical leadership and guidance through design meetings, publications, and hands-on assistance to the industry, the FHWA, and our partners.

- The Bridge Programs, Inspection, and Technology Team is responsible for the management of the Highway Bridge Replacement and Rehabilitation Program as well as the National

Bridge Inspection Program. The team provides technical leadership and support to the FHWA and our partners through technology advancement, data management, bridge inspection technical assistance, system preservation technology advancement, bridge program guidance, and innovative solutions to funding and related issues for bridge projects. This team supports our customers through management and refinements to the National Bridge Inventory System. This inventory contains information on all structures classified as bridges in the United States. Technology efforts are focused on new and emerging technologies as well as cutting edge technologies, which support our objective of improving the condition of the Nation's bridges.

- The Hydraulics and Geotechnical Team provides technical leadership in the fields of hydraulics and geotechnical engineering. They provide leadership in policy and guidance development, interpretation and clarification on regulations pertaining to flood plains, bridge scour evaluations and plans of action for scour critical bridges, and navigational clearances. This team also provides leadership on technical training development and updates, guidance on technical publications, and technical assistance to our partners and customers on hydrology, urban drainage, culvert, bridge and coastal hydraulics, and stream stability, scour and countermeasures, unknown foundations, shallow and deep foundations, and earth retaining walls.

Transportation Pooled-Fund (TPF) Program

The Transportation Pooled-fund Studies (TPF) program is a well used and proven way for a transportation agency to collaborate and leverage research funding with one or more other agencies in researching a certain topic. By this sharing of financial and knowledge resources, they can then conduct better research on a wider variety of subjects. The TPF program is almost fully supported by the SP&R Program, since the State funds are usually SP&R money. In addition to States and the FHWA, other Federal, Regional, local transportation agencies, TRB, or universities can contribute funding and participate in a pooled-fund study. Other interested parties, including private firms, foundations, and institutions of higher learning, may request to contribute funds and become a partner of a TPF study. However, approval of such requests are considered on a case-by-case basis. Funding of TPF studies is usually 80% Federal and 20% matching, but the FHWA Associate Administrator for RD&T has the delegated authority to waive the matching requirement and approve 100% Federal funding.

While a State or the FHWA usually administers a TFP study, the program permits a State to designate either TRB or FHWA to lead the study. -Once two or more agencies have agreed to initiate a TPF project, the specific steps necessary to do so are as follow:

1. An idea is conceived. At this time, there obviously will be some discussion between the originator and any interested agencies, and they will decide to start a TPF project.

2. The sponsoring agency should prepare a proposal (problem statement). This will include a project title, project description, budget, objective, estimated length of time for the research, the deliverables, and the name, address, etc. of the sponsoring agency and its contact person.

A rough estimate of the amount of money needed from each prospective participant should also be included. State-led proposals must be submitted via their corresponding FHWA Division office for approval. This is done to ensure the proposed study is viable, non-duplicative (from a regional perspective) and in the States work program.

3. While the proposal is being reviewed, the sponsoring State may post the proposal as a project solicitation (usually on a quarterly basis) on the TPF website at http://www.pooledfund.org/. This will alert the AASHTO Research Advisory Committee (RAC) Listserv that the proposed project is available for review. The web site also permits notification of the FHWA headquarters and field offices of the project. (This process does not prevent the sponsor from contacting other potential partners directly.)

4. FHWA-led projects are posted and monitored by the TPF Coordinator.

5. The agencies that are interested make a tentative commitment for funding for the life of the study. This may be lump sum, annual, or at irregular intervals. The funds are pledged online through a password-protected screen. One person per State or FHWA can use the password. This is usually the RAC member from the particular State.

6. If the financial support is deemed adequate, the sponsoring agency will formally contact the TPF Coordinator to request the status of the solicitation be updated as an official pooled-fund study. At this time, the lead State can request 100% Federal funding. If there is not enough funding, the proposed study may be resubmitted, as is, the next year, modified to match the money pledged, or withdrawn. The sponsor is responsible for notifying the other partners of such changes.

7. The planned TPF project is reviewed by the Division Office and then forwarded to the Office of RD&T for approval. The TPF Coordinator reviews the project and identifies a technical liaison, who comments on the proposed study. The technical liaison may be from TFHRC, headquarters program offices, resource centers or the division office. Once the project is identified as an official pooled-fund study, a project number is assigned.

8. Formal commitment of funds to the sponsoring agency starts the research process. The obligation forms are the ones usually used in Federally funded research projects. The FHWA division office works with the States to ensure eligibility of the projects, aid in obligating funds, and may serve as FHWA technical liaison.

9. A Technical Advisory Committee (TAC) is formed. It consists of a representative from each of the partners, an FHWA technical liaison, and any industry or research specialists that are considered necessary. There may also be a technical member (with voting rights) from FHWA. The TAC member from the sponsoring State is usually the chairman. Travel expenses of the TAC members, except for FHWA representatives, are paid from project funds. A TRB-led project does not have a TAC. Instead, TRB solicits nominees for an expert panel. About 8-10 of these are selected for the panel.

10. The lead agency, as directed by the TAC, then develops a work plan, based on the original problem statement. This contains a scope and objective, specific research tasks, budget and time requirements, researcher qualifications and deliverables.

11. Based on the requirements of the work plan, a research contractor is selected. The contracting regulations of the lead agency will govern the selection of a contractor and the form of the contract. The remainder of the process is typical of most research studies. The TAC monitors the progress of the work, reviews and approves the final report.

12. The lead state obtains payment by submitting invoices, which are approved by the Division office and sent to Finance for payment.

Note that payments are tied to satisfactory quarterly progress reports. With an approved invoice from the State or TRB, FHWA will reimburse them from a project fund created by the partner agencies, in proportion to the amount contributed by each.

On an FHWA-led study, payments follow standard FHWA contracting rules.

TPF's are a cost-effective vehicle for performing research, but there are some drawbacks. The first is the amount of time required to find partners. Some projects take more than a year to find enough financial backing. This first step, in itself, calls for considerable patience and perseverance. The other is the need to monitor and encourage the partners' continuing contributions when the payments are spread out over several years. This is a delicate subject with both States and the research agency, especially if it is a university. TPF's require diligent and careful management. The administrative burden associated with proposing and managing a TPF project should be appreciated at the outset. The Division Bridge Engineer can help coordinate and lobby for projects of mutual interest and benefit with their counterparts in other states.

Transportation Research Board

Among field engineers in FHWA, the Transportation Research Board (TRB) is probably best known for its annual meeting every January in Washington, D.C. However, it also maintains a policy research program for topics of national importance, and in response to Congressional inquiries. One pertinent topic was a study of truck size and weight. This is a subject of enduring interest to bridge and pavement people. Federal and State transportation agencies or transportation foundations usually pay for these policy studies.

Of more immediate interest to the Division Bridge Engineers are the TRB Committees. These committees include researchers and engineers from Federal and State DOT's, consulting firms, universities, and representatives from industry. The committees meet one or more times per year. One of the high points of the Annual TRB Meeting every January are the committee meetings. There, the committee members and guests indulge in very thoughtful technical discussions. This is probably one of the best chances for engineers to hear what their peers think. Each committee is encouraged to develop research problem statements. For bridge and structures, primary interest centers on the Design and Construction Group and the Operations

and Maintenance Group. FHWA's bridge and structures engineers are encouraged to participate in TRB and with TRB technical committees; the only drawback is the need to obtain funds to travel to TRB meetings from your local office.

Among the specific technical committees with scopes that overlap areas of interest to FHWA Bridge Engineers are:

- Committee AFB60: Hydraulics, Hydrology and Water Quality
- Committee AFF10: General
- Committee AFF20: Steel
- Committee AFF30: Concrete Bridges
- Committee AFF40: Dynamics and Field Testing of Bridges
  - Subcommittee AFF40(1): Nondestructive Evaluation of Bridges
- Committee AFF50: Seismic Design of Bridges
- Committee AFF60: Tunnels and Underground Structures
- Committee AFF70: Culverts and Hydraulic Structures
- Committee AFF80: Structural Fiber-reinforced Plastics (FRP)
- Committee AFH10: Construction Management
- Committee AFH30: Emerging Technology for Design and Construction
- Committee AFH40: Construction of Bridges and Structures
- Committee AFH70: Fabrication and Inspection of Metal Structures
- Committee AFN10: Basic research and Emerging technologies Related to Concrete
- Committee AFN20: Properties of Concrete
- Committee AFN30: Durability of Concrete
- Committee AFN40: Concrete materials and Placement Techniques
- Committee AFS20: Foundations of Bridges and Other Structures
- Committee AFS40: Subsurface-soil Structure
- Committee AFS70: Geosynthetics
- Committee AHD30: Structures
- Committee AHD45: Corrosion
- Committee AHD35: Bridge Management Systems

The scopes of all of these committees (and many others) and a summary of committee activities are available at http://gulliver.trb.org/directory/

University Transportation Centers (UTC)

The University Transportation Center Program goes back to 1987, when the Surface Transportation Act authorized the establishment of UTCs in each of the 10 standard Federal regions. In 1991, ISTEA reauthorized the 10 existing centers and added 4 more and 6 University Research Institutes (URI). TEA-21 extended the program again in 1998, reauthorizing 20 existing UTCs and adding 13 new ones. (This included the URIs reconstituted as centers.) And, via SAFETEA-LU, the number of authorized UTCs was significantly increased to a total of 60

and responsibility for management of the UTC program was moved to the Research and Innovative Technology Administration (RITA.)).

The mission of the UTCs are to advance U.S. technology and expertise in the transportation field through education, research and technology transfer at the university level. Essentially, the goal is to induce more of the graduating students to enter the transportation field.

Each center is required to have a specific "theme" and an advisory board, and SAFETEA-LU requires each to develop a strategic plan in concert with FHWA. Many UTCs are involved with ITS, metropolitan planning, transit, and other, and only a few have a direct bridge and structures focus.

The advisory boards are comprised of representatives from Federal and State agencies, academia, and industry. Their degree of responsibility varies from board to board.

A typical UTC process for selecting projects is as follows:

1. The faculty of each UTC, working with the advisory board and other interested parties, develops an annual work plan.
2. The work plan is reviewed by RITA and returned to the school to make recommended modifications.
3. RITA approves the work plan and awards funds. SAFETEA-LU requires a 100% match via either hard (e.g., cash, equipment, materials) or soft (e.g., labor, access to laboratories and equipment) contributions from States, industry, or other institutions. Via SAFETEA-LU, certain R&D programs in Title V have been identified as qualified to count toward the required match – including the Innovative Bridge Research and Deployment Program and the Innovative Pavement Research and Deployment Program.
4. The program is executed.

Additional information about the UTC program can be obtained at: http://utc.dot.gov/

Small Business Innovation Program (SBIR)

The Small Business Innovation Program (SBIR) was set up by the Small Business Act, which requires 10 Federal departments or agencies to set aside 2.5% of their research funding for SBIR. Some agencies, e.g., FAA, set aside more. The purpose of the SBIR is to encourage small businesses to develop their technological and entrepreneurial potential through innovative research. This is an attempt to tap the reservoir of creativity that is often stifled in a larger firm. To this end, the small business researcher is permitted and encouraged to profit by commercializing the product developed. SBIR funding for the critical start-up and development stages enables the small firm to compete against much larger ones.

To be eligible for the SBIR, the small business must:

1. be American-owned and independently operated,

2. be a for-profit firm,
3. employ the principal researcher,
4. have no more than 500 employees.

The SBIR is an annual program.

In FHWA, the process works as follows:

1. A bi-annual solicitation for problems is issued. The request is made to the offices of operations, infrastructure, and environment. Problem statements are reviewed in R&D, and the results sent to the Volpe Transportation Research Center in Boston, Massachusetts.
2. Volpe reviews the recommended problems and determines which ones should be advertised.
3. The topics selected are advertised on Volpe's web site.
4. The proposals submitted are evaluated by Volpe (and FHWA's R&D staff) on the basis of innovation, technical merit, and market potential.
5. Awards are made to the successful offerors. This marks the start of the 3-phase research projects.
    a. Phase I is the Feasibility Phase, which explores technical merit of the technology. This award is for up to $100,000 and a 6-month period. If this research is promising, the project moves to,
    b. Phase II, during which the contractor performs the real R&D work and prepares the concept for market. Awards for this phase can range from $250,000 to $750,000, and for a period of 1 to 2 years. If Phase II is successful,
    c. Phase III is used to finalize the product for commercialization and marketing.

The SBIR contracts are awarded on a sole source basis, and managed by the Volpe Center. The number of awards is very limited, while the competition is intense.
For more detailed information see http://www.volpe.dot.gov/sbir/index.html.

Local Technical Assistance Program (LTAP)

The Local Technical Assistance Program (LTAP), established in 1982, provides training and technical assistance to local transportation agencies. It delivers vital training for county engineers, highway superintendents and road professionals. It is one of FHWA's most important programs, and a true grass roots program. LTAP'S mission is to help as many of the 38,000 local agencies as possible tap into new technology, information. and training so that they can operate more efficiently and safely. It is a direct, hands-on means for putting new and innovative technology in the hands of the people who maintain our local road and street systems. While LTAP's original charge was to serve local agencies, it now furnishes help to State DOT's, Municipal and regional planning agencies. Private firms (working for local agencies) also make use of LTAP services. Each LTAP Center must match its Federal dollars with an equal amount of local funds. This funding comes from a variety of sources. Examples include State DOT's and universities, self-generated money, e.g., course fees, Section 402 Highway Safety Program funds, the American Publics Works Association, State contractors' associations, local government agencies and MPO's and RPA's

There are currently 58 LTAP centers, one per State and Puerto Rico, and 7 Tribal Centers. Two-thirds of the centers are located at universities, while the other third is with the State. Each center has from 1 to 5 people. This staff creates a mailing list, writes a newsletter, provides training, and evaluates programs. The centers have libraries with manuals, C/D's, and videos. They have provided about 4,000 training events for 120,000 people and answer 150,000 questions per year. LTAP tries to provide training in the topics of interest to its local constituency. LTAP also has "personalized" training. Two successful examples of these are the Roads Scholar and Safety Circuit Rider programs. The former provides a curriculum of training to enable transportation workers to study road fundamentals, safety, drainage, snow and ice removal and training management. The successful participants are designated as "Roads Scholars". The latter category refers to safety training taken to local agencies with on-site workshops at locations convenient to the trainees.

The total Federal funding for LTAP is currently at $10 million annually. Getting started with LTAP is simple. Just call the local center and they will take it from there. In 1991, the Tribal Technical Assistance Program (TTAP) was established. It serves American Indian Tribal Governments. TTAP has 7 Tribal Centers for the recognized tribes in the U.S. They operate in a similar fashion to the LTAP centers, but are more basic being scaled to the level of the tribes. The LTAP web site is www.ltapt2.org.

Innovative Bridge Research and Deployment Program (IBRD)

The Innovative Bridge Research and Deployment (IBRD) program replaced the FHWA's Innovative Bridge Research and Construction (IBRC) program, which was established under the Transportation Equity Act for the 21st Century. The IBRC program was funded by Congress for six years, FYs 1998-2003. The program was extended for 20 months (through May 31, 2005) with full funding for FY 2004 and with partial funding for FY 2005. Total funds appropriated for the construction portion of the IBRC program was approximately $150 million, which was provided to the States for projects to demonstrate innovative materials applications relating to repair, rehabilitation, and construction of bridges and other highway structures.

With the passage of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) in 2005, the IBRD program was established by Congress to promote, demonstrate, evaluate, and document the application of innovative designs, materials, and construction methods in constructing, repairing, and rehabilitating bridges and other highway structures. The intent is to promote and demonstrate innovation in its broadest sense to move market market-ready technologies into conventional practice. Funds are available each year for bridge projects that meet one or more of the eight program goals listed in 23 U.S.C. Section 503(b)(2). The availability of funds varies each year, depending on annual congressional appropriations.

The goals of the program are:

A. The development of new, cost-effective, innovative highway bridge applications;

B. The development of construction techniques to increase safety and reduce construction time and traffic congestion;
C. The development of engineering design criteria for innovative products, materials, and structural systems for use in highway bridges and structures;
D. The reduction of maintenance costs and life-cycle costs of bridges, including costs of new construction, replacement or rehabilitation of deficient bridges;
E. The development of highway bridges and structures that will withstand natural disasters:
F. The documentation and wide dissemination of objective evaluations of the performance and benefits of these innovative designs, materials, and construction methods;
G. The effective transfer of resulting information and technology; and,
H. The development of improved methods to detect bridge scour and economical bridge foundation designs that will withstand bridge scour.

Application and selection procedures for IBRD state grants are similar to the earlier IBRC program. There are no strict criteria for FHWA's selection from competing candidate projects, but the following factors will be considered:

- The State's priorities among several entries
- Projects that are ready for advertising / awarding (projects that will be let for construction or rehabilitation by September 30 of the award year)
- Geographic distribution of the projects (to be fair to all States)

Additional selection criteria for evaluating State applications include such factors as projects that incorporate innovative materials and/or products that are readily available; use designs, materials, and construction methods that have broad application; already have funding commitments for design and construction or rehabilitation; and projects that leverage Federal funds with other public or private resources will be given preference.

The project may be on any public roadway, including State and locally funded projects. Funds may be used for costs of preliminary engineering, repair, rehabilitation, or construction of bridges or other highway structures, and costs of project performance evaluation including instrumentation and performance monitoring of the structure following construction.

State departments of transportation (DOTs) should coordinate with local and Federal agencies, universities, private sector entities, and nonprofit organizations within their State to develop candidate projects. The State should rank each candidate project when more than one application is to be submitted to their local FHWA division office. After review and consultation with the State DOTs, the FHWA division office will send applications that meet the submission criteria to FHWA's Office of Bridge Technology for evaluation. Applications are due to the Office of Bridge Technology, in general, two months after the solicitation of application by the Office of Bridge Technology.

Information on the IBRD program is available from FHWA's Office of Bridge Technology online at http://www.fhwa.dot.gov/bridge/ibrd/.

Experimental Projects

An experimental project is any Federal-aid Project that incorporates one or more experimental features. An experimental feature is a material, process, method, equipment, or traffic device that has not been sufficiently tested under actual service conditions to permit its use in highway construction without reservation; or has been accepted for use, but requires comparison with acceptable alternatives to decide relative merits and cost effectiveness. The purpose of an experimental project is to encourage agencies to evaluate new or innovative highway technology, or an alternative standard technology, under actual service or construction conditions. A secondary purpose is to provide a means for the results to be disseminated and/or applied.

The portion of an experimental project relevant to the experimental feature is financed with 100% Federal-aid money. SPR funds cannot be used for experimental features. As a rule, there should be a control.

Each experimental feature must be accompanied by a work plan, which is a written plan of action including:

- a description of the experimental feature
- the objective of the experimental feature
- measurements required and characteristics to be evaluated
- a time schedule
- reporting requirements
- cost estimates
- construction and post-constructive inspection schedules
- control sections or features built in the customary way under conditions that are as close as possible to those
- under which the experimental feature was constructed.
- a description of the evaluations to be conducted.

The work plans for experimental features on an interstate highway or proprietary products on a National Highway System (NHS) must be approved by the Division Administrator (DA) prior to or concomitant with the approval of plans, specifications, and estimates (PS&E). For NHS projects under State approval and oversight, approval of the work plan is delegated to the State. Where experimental features are added to an on-going project by change order, the approval of the DA is also required.

The results of a completed experimental project must be reported, in keeping with the approved work plan. The final reports are subject to review and approval by the Division Office.

Field Offices R&T Funded Technology Advancement Program

A small amount of funding is typically made available to the Field Offices to administer research, development, and technology transfer activities. Eligible activities may include

conducting meetings, workshops, and conferences; procuring the services of experts and consultants, including State and local government transportation experts and academic representatives; and the procurement of services from private sector organizations, including not-for-profit organizations. These activities are normally procured via purchase order and/or contracts using appropriate contracting practices.

Other possible eligible activities may include:

- Purchase/production of audio-visuals, training materials, supplies, and publications that are related to FHWA's R&T mission.

- Purchase of ADP hardware or software needed for research, development and technology transfer projects.

- Travel and transportation expenses for invitational travelers**,** whose purpose of travel meet the specific purpose of the appropriation.

NOTE: Invitational Travel authority applies to non-Federal individuals only. It is the FTR authority which permits the authorization of travel expenses to these non-Federal individuals who will provide the Government a direct service**,** e.g., making a presentation, member of an evaluation group, etc. The justification must be specifically documented on the travel authorization. An individual (or his/her employer) under an FHWA contract cannot be an invitational traveler for the same purpose.

- Travel and transportation expenses for FHWA employees, or other Federal employees, whose purpose of travel meet the specific purpose of the appropriation, i.e., instructors, conference planners/coordinators, scientific experts, speaker, may be authorized.

The amount of funding available to Division Offices has varied year to year, from none to as much as $10,000 per office. The use of the funding is generally competitive, where application is made to an evaluation group or person within the office or Resource Center.

Priority, Market-Ready Technologies and Innovations

The Market Ready technologies and innovations are listed on the FHWA website http://www.fhwa.dot.gov/crt/lifecycle/ptisafety.cfm. They are technologies that the Federal Highway Administration (FHWA) believes warrant special attention. Candidates for this list were selected using the following criteria:

- Do they support agency priorities, including strategic goals?
- Is there a user need and likelihood of implementation?
- Are they developed to the point of being truly market-ready, with tools available for the field to market?
- Is expertise available to support deployment and implementation?

The list is not intended to include all technologies available. Numerous technologies are being developed, but are not yet ready to be marketed in the field. In addition, many technologies are considered good concepts, practices, or success stories that should continue to be shared. The initial list was intended to be a living list. It is intended that a process will be developed for reviewing and updating these technologies.

The FHWA Resource Center Technical Service Team (TCT) for Structures is organized to help implement priority and market ready technologies. The team offers services to provide Division Offices with the latest in bridge information and technology. At the RC webpage, http://www.fhwa.dot.gov/resourcecenter/teams/structures/index.cfm, there is additional information about FHWA Structures initiatives along with who to contact for training and assistance. There is a list of the Resource Center Structure experts in various fields.

AASHTO has also implemented a process for emphasizing new and innovative technologies via its Technology Implementation Group (TIG). Its mission is to implement specific technologies. The technologies initially selected for implementation are precast substructure elements for bridges, intelligent transportation system (ITS) technologies for work zones, and accelerated construction methods. Information on AASHTO TIG can also be found at http://www.aashtotig.org.

CHAPTER 7
ADMINISTRATION

Table of Contents

INTRODUCTION **4**

RESPONSIBILITIES **4**

COORDINATION WITH DIVISION OFFICE PERSONNEL **4**

AUTHORIZATIONS 4
FUNDING 5
RESOURCE MANAGEMENT 5
TECHNICAL REVIEWS 5
STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM (STIP) 5
ENVIRONMENTAL REVIEWS 5
MAJOR PROJECTS 6
SAFETY 6
COLLATERAL DUTIES 6
SUPERVISION 6

COORDINATION WITH HIBT **7**

COORDINATION WITH RESOURCE CENTER AND TFHRC **7**

STRATEGIC PLANNING **8**

WORKING WITH OUR CUSTOMERS AND PARTNERS **8**

IDENTIFY CONTACTS 8
State Transportation Department (DOT) *8*
AASHTO *8*
Local Agencies *8*
Universities *9*
Public *9*
CUSTOMER SURVEYS 9
TECHNIQUES FOR DEVELOPING RELATIONSHIPS 9

RISK ASSESSMENT **9**

PROGRAM AND PROCESS REVIEWS **11**

TRAINING **11**

ATTACHMENT A – POSITION DESCRIPTIONS **13**

ATTACHMENT B – COLLATERAL DUTY LIST **22**

ATTACHMENT C – AASHTO **23**

AASHTO ORGANIZATION 23
AASHTO SPECIFICATIONS 24
FHWA SUPPORT OF AASHTO ACTIVITIES 25

ATTACHMENT D – RISK ASSESSMENT **27**

ATTACHMENT E - USEFUL REFERENCE PUBLICATIONS **32**

Introduction

This Chapter will provide some guidance on the less technical issues of being a Division Bridge Engineer. The position of Division Bridge Engineer has the reputation of being one of the most technically demanding positions within the Division office. Many Division Bridge Engineers applied for their position so they could concentrate on the technical aspect of the position. However, to be truly effective, the Division Bridge Engineer must develop extensive knowledge in other areas, and develop working relationships and coordinate with partners and customers. This chapter will provide some insight into fulfilling those aspects of the Division Bridge Engineer position.

Responsibilities

The responsibilities of the Division Bridge Engineer should be clearly defined in the Position Description (PD). Those responsibilities will vary by Division office. Included in Attachment A, at the end of this Chapter, are examples of PDs from various Divisions. As Division Bridge Engineer, one of your first tasks should be to review your PD with your supervisors to determine that it is current and accurate.

In general terms, all Division Bridge Engineers will be responsible for managing the Division bridge programs. Variables may include team leader and supervisory responsibilities, collateral duties, and delegated authorities for authorizations. As Division Bridge Engineer, you should collect and review your Position Description, Division Office organizational chart and delegation of authority, collateral duty assignments, Stewardship Agreement, and Division Office Performance Plan.

Division Bridge Engineers can be most effective by close coordination with internal partners and customers, including those in the Division office, Headquarters (HIBT), the Resource Center, Turner Fairbank Highway Research Center (TFHRC), and Federal Lands Bridge Office (FLBO) staff.

Coordination with Division Office personnel

Authorizations

Most project authorizations are typically electronic and are the responsibility of the Operations personnel. However, you may be responsible for authorizing or approving certain bridge projects, including those funded with Highway Bridge Program (HBP) funds. The Division Bridge Engineer is responsible to ensure that bridge plans and specifications are suitable for authorization. This may be accomplished by providing comments to the Operations Engineer or you may actually execute the authorization within the Fiscal Management Information System (FMIS).

Funding

Division office finance personnel maintain FMIS and from it can generate reports reflecting the status of various bridge funding categories. Using these reports you can monitor all bridge funding categories regarding expenditures, obligations, and possible lapsing problems.

Resource Management

You will be responsible for determining your travel needs and budget as well as any specific GOE expenditures for the bridge program management. Typically you will be asked to submit an estimate of your travel, training, and GOE needs in September or early October. Estimates for the entire Division will be evaluated by the Division's Leadership Team (you may be a part of this) and your estimate will be approved or revised as necessary.

Many Division offices require time tracking. This is typically an electronic program that allows you to track the time you have spent on your various Performance Plan elements. This data is used to assess the effectiveness of the Division office resource allocations.

Technical Reviews

The Division Bridge Engineer is responsible for scheduling and conducting technical reviews supporting management of the bridge program. See Chapter 3 for details on those reviews. In addition, you may be asked to participate on team reviews scheduled by other Division office personnel involving your areas of expertise. Examples may include grading, concrete paving, consultant services, etc.

Statewide Transportation Improvement Program (STIP)

All projects authorized for Federal-Aid funding must be included in the STIP. Although the STIP can be revised, it is expected to be an accurate representation of upcoming projects. The STIP is required to be fiscally constrained; in essence, that means it should not include more projects than can be constructed within the estimated budget. The Division Bridge Engineer should review the STIP to ensure that expected projects are included and that it does not include projects that are not scheduled within the 3-4 year period of the STIP. During this review, the bridge projects included in the STIP can also be checked for HBP eligibility. If you are involved with a project that is not in the STIP but should be, you need to coordinate with the planning section of your state.

Environmental Reviews

An environmental action is required on all Federal-aid projects. You will be asked to review Environmental Impact Statements (EIS's) and Environmental Assessments (EA's) for structural, hydraulics, navigational clearances and floodplain issues. In some Division offices, the Division Bridge Engineer may be responsible for the development and authorization of specialty projects, such as those in the current Innovative Bridge Research and Deployment Program (IBRDP). It will be your responsibility to ensure that the State or local agency processes an environmental document before the project is authorized. Typically, the action will be a Categorical Exclusion.

Major Projects

Section 1904 of SAFETEA-LU included new requirements for Major Projects. The cost threshold for Major Projects was reduced from $1 billion to $500 million and all Major Projects must have Project Management Plans. Financial Plans and Annual Updates continue to be requirements for all Major Projects and for projects with an estimated total cost of $100 million or more. In response to the SAFETEA-LU requirements, the FHWA issued interim Major Project guidance on January 27, 2006.

This guidance was cancelled on January 19, 2007.

The majority of major projects contain one or more structures (large or small). Major projects are unique and are not viewed as simply more expensive versions of normal transportation projects. Major Projects require substantial skill and attention to manage the project successfully. The FHWA has expanded its traditional oversight role to ensure that the cost estimates and schedules for Major Projects are controlled in a manner that maintains the public trust and confidence. It is critical that you become involved in these projects from the beginning, since decisions regarding structure type are made at this time.

Further information about administration of Mega/Major Projects is located at the following FHWA web page, http://www.fhwa.dot.gov/programadmin/mega/index.cfm.

Safety

Safety is an important aspect of the FHWA Performance Plan. Coordination with the Division's Safety Engineer is important on several aspects of bridges, including crash tested bridge rails, guiderail transitions, narrow bridges, and work-zone safety.

Collateral Duties

Collateral duties for the Division Bridge Engineer vary significantly from Division to Division. A collateral duty is typically not in the bridge program area and should take less than 5-10% of your time. However, in many Divisions, the Division Bridge Engineer has been asked to take on major duties outside the bridge program that can account for over 50 percent of their time. Many Divisions will have policies designating collateral duties to their staff. You should review that list and negotiate with your supervisor to ensure adequate time is allocated for your bridge program duties. That time requirement may diminish with experience, but will be substantial for a new Division Bridge Engineer. An example list of major and collateral duties is included in Attachment B at the end of this Chapter.

Supervision

This responsibility varies with the Division. You may be a supervisor, a team leader, a staff engineer or you may be a member of the Operations/Programs or Technical team with no supervisory responsibilities.

Coordination with HIBT

Approval authority for all projects has been delegated to the Divisions. However, current policy requires that the Division Bridge Engineer request the review and approval of HIBT for unusual structures on the Interstate system. See Chapter 3 for more guidance on this. The following in an excerpt from the FHWA policy memorandum:

"For the purpose of this guidance, unusual bridges are those the Divisions determine have: (1) difficult or unique foundation problems, (2) new or complex designs with unique operational or design features, (3) bridges with exceptionally long spans, or (4) bridges being designed with procedures that depart from currently recognized acceptable practices. Examples of unusual bridges include cable-stayed, suspension, arch, segmental concrete, movable, or truss bridges. Other examples are bridge types that deviate from AASHTO bridge design standards, or AASHTO guide specifications for highway bridges; major bridges using load and resistance factor design specifications; bridges requiring abnormal dynamic analysis for seismic design; bridges using a three-dimensional computer analysis; bridges with spans exceeding 152 m (500 feet); and bridges with major supporting elements of "ultra" high strength concrete or steel.

Unusual structures are tunnels, geotechnical structures featuring new or complex wall systems or ground improvement systems, and hydraulic structures that involve complex stream stability countermeasures, or designs or design techniques that are atypical or unique.

Preliminary documents submitted to Headquarters should include the preliminary design plans and supporting data along with the Division's review comments and recommendations. Supporting information should include bridge/structures related environmental concerns and suggested mitigation measures, studies of bridge types and span arrangements, approach bridge span layout plans and profile sheets, controlling vertical and horizontal clearance requirements, roadway geometry, design specifications used, special design criteria, special provisions and cost estimates. Hydraulic and scour design studies/reports should also be submitted showing scour predictions and related mitigation measures. Geotechnical studies/reports should be submitted along with information on substructure and foundation types."

Coordination and discussions with HIBT should not be limited to times dictated by policy. Many of the HIBT engineers have broad experience and expertise that has proven valuable when solving problems or evaluating unique issues.

Coordination with Resource Center and TFHRC

The Resource Center and the Turner-Fairbank Highway Research Center (TFHRC) have engineers with expertise in many diverse areas. You need to take advantage of their expertise. You should involve them in reviews, implementation of innovative materials, and instrumentation and testing. They have also proven to be a valuable resource for problem solving, evaluation of unique issues, and training assistance.

Strategic Planning

There are several layers of strategic planning. The USDOT and FHWA National Strategic Plans (NSP) identify strategic objectives and multi-year goals. Annually (each Fiscal Year), FHWA develops a Performance Plan that outlines the near-term strategies to achieve those multi-year goals. Each Unit within FHWA, including Division offices, then develops a Unit Performance Plan (UPP) that aligns (i.e., supports) with the current Fiscal Year FHWA Performance Plan. To support the FHWA strategic effort, the BLC has developed a FHWA Bridge Program Strategic Plan (BPSP). The BPSP is aligned with the national plan and provides a guide for the efforts of the FHWA bridge community.

The BPSP provides the national focus and emphasis on bridge community issues that was lacking from past strategic plans. The support of the Division Bridge Engineers for the BPSP is essential to the effective implementation of national goals. The Division Bridge Engineer should ensure that their Unit Performance Plan is aligned with and supports the BPSP.

Working with our Customers and Partners

The key to success as a Division Bridge Engineer lies in our relationship with our customers and partners. We must identify our customers/partners and their needs. By developing an effective working relationship with our customers/partners, we can meet their needs while fulfilling our responsibilities as stewards of the Federal-aid bridge program.

Identify Contacts

State Transportation Department (DOT)
In most Divisions, the State DOT is your primary customer and is also considered a partner. You will work closely with several departments within the State DOT, including bridge design, construction, maintenance, geotechnical and soils, hydraulics, materials, local systems, and research. It is essential that you take the time and effort to meet personnel in each of these areas. In some areas you may have several contacts. Your effectiveness will depend on the relationships you develop with these individuals.

AASHTO
FHWA has an active role within the American Association of State Highway and Transportation Officials (AASHTO). Division Bridge Engineers should strive to attend AASHTO meetings and become involved in the technical committees. A description of the AASHTO organization, specifications and FHWA support role is presented in Attachment C at the end of this Chapter.

Local Agencies
Much of your work with local agencies will flow through the State DOT; however, working relationships with individual local agency engineers and their associations will allow you to more effectively administer the aspects of the bridge program that affect them. In many states, the local agencies perform bridge inspections and select candidate bridges for HBP funding.

Individual reviews, peer exchanges, and attendance/presentations at association meetings are effective ways to develop relationships.

Universities
Universities and their Engineering Departments are valuable resources. They are always interested in cutting-edge research, and should be involved in any effort to implement innovative procedures or materials. In addition, they will often work with you and your partners to evaluate and devise solutions to more mundane design and construction problems. Relationships you develop with Universities will often involve students and as a result improves FHWA's ability to recruit top candidates.

Public
The public, most of whom use our transportation facilities throughout their lives, are perhaps our ultimate customer. Law requires their involvement in our transportation decisions. However, to be effective stewards of the bridge program and Federal-aid funds, we must not consider that requirement a burden, but rather a customer service opportunity. As civil servants, we are here to serve the public by designing, constructing, and preserving the safest transportation facility that also meets their needs.

Customer Surveys
Customer surveys have proven to be an effective tool to focus our efforts in meeting customer needs. Surveys do not need to be frequent, but they should be repeated so that progress can be monitored. Surveys can be very broad or they can cover a specific office, such as bridge design. Results of the surveys should be evaluated and your focus adjusted to reflect that evaluation.

Techniques for Developing Relationships
Hold regular meetings with your contacts to discuss issues, upcoming projects, new FHWA objectives, and especially their needs.

Become a resource, by getting involved. The following are examples: (1) Be a training coordinator for NHI and other courses; (2) Facilitate and conduct training; Provide access to National experts in HIBT and the RC; (3) Develop a network of peers to contact for solutions; (4) Facilitate peer exchanges on issues of interest to your customers.

Risk Assessment

Risk is a future event that may or may not occur and has a direct impact on the program to the program's benefit or detriment. Risk management is the systematic identification, assessment, planning, and management of threats and opportunities faced by FHWA programs.

FHWA Risk Management is a tool for focusing limited resources to efficiently manage our programs through improved communication. Applying the principles of risk management to look at decisions being made about delivery of the FHWA programs makes it possible to

identify threats and opportunities, assess and prioritize those threats and opportunities, and determine strategies so that we can decide how to deal with future issues affecting the federal-aid highway program.
The objective of FHWA'S Risk Management Initiative is to establish a consistent process where we identify and prioritize program area risk events. A second objective is to identify strategies for inclusion in Unit Business Plans. A third objective is to identify low risk events so that offices will minimize resources to oversee those activities. A fourth objective is to communicate risks, which allows the agency to manage risks corporately.

FHWA's June 22, 2001, policy memorandum required each office to use a risk/benefit analysis or a similar prioritization process to identify the appropriate oversight initiatives. The OIG reviewed FHWA's risk analysis and in November 2004 stated that risk assessments should be used to prioritize and implement our oversight activities. In May 2006, the FHWA Office of Infrastructure issued guidance and a schedule for the first agency-wide corporate Risk Management Program of which these results are a key component.

Risk assessment is another tool to help you focus your efforts. By working with your partners at the State DOT, you evaluate program areas to determine the likelihood of significant problems developing. Many Division offices have implemented risk assessment procedures. Typically each program area within the Division office conducts similar risk assessments and those ranking the highest risk are selected for more detailed reviews. You can also use your assessments of the bridge program to guide your Performance Plan. An example of risk assessment procedures and forms are presented in Attachment D at the end of this Chapter.

The following is some further guidance on risk assessments:

- Assessments are typically conducted on a 1-2 year cycle.
- Assessments may need to be conducted with a narrow focus rather than a broad overview. For instance, do not assess the entire HBP program implementation by meeting with one State DOT office or region. It may be more beneficial to interview several divisions or sections such as; Bridge, Local Systems, Contracts, and District Offices. Some divisions will be higher risk than others.
- Results of risk assessments should be incorporated into your Performance Plan for future years.
- Follow-up is important to ensure that risks are reduced by your actions.
- You will find that your partners are just as concerned about risk as FHWA is. This process can be another valuable tool to develop relationships and to assist your partners in meeting their stewardship goals.

A Tool Kit that includes a user's manual for Risk Management Planning is available to help update, revise, or draft a risk management plan. The following website presents additional risk management details: http://staffnet.fhwa.dot.gov/programadmin/stewardship/riskmgmt.cfm.

Program and Process Reviews

Program and process reviews should be an integral part of the Division Bridge Engineer stewardship and oversight efforts. Refer to Chapter 4 for more information. These reviews are time-consuming, taking from a few days to several weeks of your time, but are very beneficial. They allow for an in-depth review of processes and program areas based on a much broader perspective than individual project reviews. Program and process reviews are most effective when conducted in cooperation with the State DOT. Consideration should also be given to including experts from the RC and HIBT.

Reviews are initiated for a variety of reasons. The most common are routine and recurring reviews, reviews resulting from risk assessments, and reviews initiated by HIBT. All reviews need to be included in and support the Division Office's Performance Plan.

Routine reviews are generally conducted on a regular interval, such as 3-5 years. That interval can be adjusted based on formal or informal risk assessments. Common focus areas for routine reviews might include: fabrication (steel and prestressed concrete), bridge design, geotechnical design and exploration, hydraulics, and bridge construction (decks, epoxy coating, etc). See sample review outlines at http://www.fhwa.dot.gov/construction/reviews/index.cfm.

Training

The Division Bridge Engineer position has many benefits, one of which is the opportunity to be involved in diverse areas of engineering. Besides bridge design and construction, we are often involved in geotechnical, hydraulics, the NBIS program, materials, design and construction of ancillary structures, water quality, and flood plain management, to name a few. Along with that opportunity comes the responsibility to develop a level of expertise in those areas to more effectively assist our partners. The level of expertise that is considered acceptable is found in the Core Competency Frameworks. The Core Competency Frameworks can be found at the following FHWA intranet site http://intra.fhwa.dot.gov/opt/training/ccf/cmpframe.htm.

There are several methods available to develop your expertise:

- NHI has numerous courses that are applicable to Division Bridge Engineer duties.
- Peer exchanges can be an effective learning tool.
- The RC is available to discuss and provide training on issues.
- Short-term, detailed assignments in Federal Lands or with experienced Division Bridge Engineers.
- Just in time, self-instruction based on the numerous publications is effective. See Attachment E (end of Chapter) for a list of useful publications, many of which are available for downloading from the FHWA Internet site.
- Academic Study Program.

Sharing best practices benefits all Division Bridge Engineers. We can learn from the experiences of other Divisions and share our experiences. Although many hesitate to publicize

failures, they are often the best teachers. The BLC website and newsletter provide venues to publish best practices. See the BLC website at http://staffnet.fhwa.dot.gov/bridge/blc/index.htm.

The BLC is supporting a mentoring program that will be an excellent opportunity to develop expertise. Experienced Division Bridge Engineers will be asked to mentor new Division Bridge Engineers.

Each Division has an annual call for training. This is your opportunity to request training and conference attendance to develop your expertise. Your training requests should support your Individual Development Plan (IDP). Your IDP should reflect your overall career plan.

ATTACHMENT A – POSITION DESCRIPTIONS

STRUCTURAL ENGINEER
(Division Bridge Engineer)
GM-810-13

Position Summary

The incumbent serves as the Bridge Engineer for the State X Division Office of the Federal Highway Administration. As such, the incumbent is a member of the Division Administrator's policy and advisory staff and is responsible for directing, managing, and implementing all structurally related activities of the Division Office.

A. Major Duties

1. Inspects sites for proposed bridges at the preliminary plans stage to check for type, size, and location of proposed structure.

2. Reviews and makes comments on preliminary bridge plans for suitability of structural design, foundations and details, and geometric design. Provides review comments and recommendations to State Bridge Design Engineer.

3. Reviews final bridge plans, specifications and estimates. Prepares related reports and recommends authorization to advertise for bids.

4. Conducts periodic construction inspections on major bridges and inspects other structures. Reviews structural construction change orders and supplemental agreements. Recommends construction changes where appropriate.

5. Conducts maintenance inspections of structures in accordance with the Division Operations Program and prepares related reports.

6. Conducts process type reviews of various aspects of the State's bridge design, construction, maintenance and inspection programs, prepares related reports, and pursues implementation of resulting recommendations.

7. Prepares and signs correspondence on structural matters.

8. Represents the Division at discussions and meetings on structural matters.

9. Reviews and recommends for approval the structural design of highway safety appurtenances and other structures.

10. Incumbent is the Division specialist in hydraulic design. Reviews and recommends for approval risk analyses studies of highway encroachments on

flood plains as part of the environmental assessment process on Federal-aid highway projects.

11. Conducts special engineering studies and prepares related reports on structural matters.

12. Performs overall management and marketing of technology transfer activities related to structural, hydraulic and geotechnical areas.

13. Incumbent is the Division Specialist in Geotechnical Design.

14. Verifies that state and local governmental agencies (counties and cities) are complying with requirements of the NBIS.

B. Evaluation Factors

1. Knowledge required by position:

- Mastery of advanced concepts, principles, and practices of bridge and structural engineering to serve as the technical review authority for the full range of structural engineering programs and projects including the layout, design, construction, and maintenance of highway bridges and other structures.

- Knowledge of Federal and State laws, regulations, policies, and procedures relating to the design, construction, and maintenance of highway bridges and structural elements to apply to functional area of assignment.

- Professional knowledge of hydraulic and geotechnical engineering principles and practices.

- Skill in oral and written communication.

2. Supervisory Controls:

The incumbent's first-line supervisor is the Division Administrator. The employee is the principal contact on structural engineering issues for the Division. The employee has independent responsibility for planning and carrying out work and resolving problems which arise. Receives general policy direction from the Division Administrator. The employee keeps the Division Administrator and Assistant Division Administrator apprised of those issues which may affect the policies of the organization. Decisions, recommendations, and findings pertaining to the incumbent's area of responsibility are considered technically authoritative and are reviewed only with respect to their effect on overall Division operations.

3. Guidelines:

Guidelines include Department and Agency regulations and policy; Federal-aid laws and regulations; State and local laws, regulations, and policies; and legislation directly or indirectly concerned with the transportation program. Interprets and applies policy in devising procedures for implementing the program and in making decisions on difficult and complex engineering problems. Good judgment and technical ability are required to correlate the theoretical structural design engineering considerations with actual situations to evolve engineering compromises. The employee exercises judgment in coordinating aspects of the Federal-aid program for the state to which assigned, advising state officials on the interpretation and application of standard practices to new situations or in relating precedents to situations with comparable but conflicting issues.

4. Complexity:

The assignments are diverse, covering various types of highway bridges and highway structural appurtenances. The employee must adapt and modify conventional practices and apply design and construction criteria to highway structures that involve significant variance in location, type, and site conditions. Individual plans frequently involve difficult or unusual negotiations or coordination concerning technical, socio-economic, administrative, or other aspects; e.g., compromises between a theoretically ideal method and a more economical but technically less satisfactory one. Employee's actions constitute initial and, in many instances, the final regional recommendations or decision concerning the technical adequacy and cost-effectiveness of highway structures.

5. Scope and Effect:

The purpose of the work is to review and advise on the structural engineering design, construction, and maintenance work for new and existing Federal-aid highway bridges and structural appurtenances. The work has a significant impact on the safety, economy, and type of highway bridges and structures constructed in the State.

6. Personal Contacts:

Personal contacts regularly include representatives of State and local highway or transportation departments, other personnel from Federal, State, and local governmental agencies, consultants, researchers, and the general public. Incumbent participates in public meetings as well as technical symposia and research conferences. The work requires regular and recurring coordination with other Division personnel. The purpose and extent of each contact varies with the activity under review so the role and authority of each party is normally identified and developed during the course of the contact.

7. Purpose of Contacts:

The purpose of contacts is to resolve technical problems that become apparent as the result of structural design reviews and construction inspections of structures. Another purpose is to promote personal, Division, and higher Headquarters recommendations, suggestions, and emphasis areas for adoption in State bridge design, construction, and maintenance.

Provides work direction to one assigned secretary. Advice and guidance regarding structures are given to Transportation Engineers and Assistant Transportation Engineer on highway design, location and construction.

8. Physical Demands:

The work is normally sedentary, however, there is some driving, walking, and standing involved when traveling on inspection or review trips. Some climbing and bending at heights associated with bridge construction are required at times during onsite inspections.

9. Work Environment:

Work is usually performed in an office environment with some travel to monitor State activities, to inspect construction or maintenance activities, and to attend meetings, symposia, or conferences.

STATE X DIVISION
POSITION DESCRIPTION
HIGHWAY ENGINEER, GS-810-13
STRUCTURES AND OPERATIONS TEAM LEADER

POSITION SUMMARY

Serves as staff officer to the Division Administrator and as Lead Highway Engineer on all statewide FHWA-State/local Federal highway program activities in the areas of design, construction, maintenance, bridge, hydraulics, specifications, materials, and bridge safety inspection. Provides leadership, coordination and authoritative technical guidance to State and local agency officials in the formulation, direction and execution of these activities.

PRINCIPAL DUTIES AND RESPONSIBILITIES

- Maintains regular contacts with State highway representatives to provide day-to-day policy guidance, to keep informed of emerging activities, and to participate in project development from the earliest stage.

- Provides advice and guidance to State and local highway, and promotes agreement on general concepts, lead time, standards and criteria, and application of policies and technology in the broad functions of project design, construction and maintenance.

- Meets with State and local engineers, other Federal officials, contractors, and other affected parties, to explain Federal-aid policies as a spokesperson for the agency in State and local programs.

- Maintains thorough knowledge of the principles of bridge design including familiarity with AASHTO Bridge Specifications, FHWA policy related to bridge design, and Federal participation.

- Maintains thorough knowledge of the National Bridge Inspection Standards including regulation requirements, inspection methods, State and local government responsibilities, inventory and reporting requirements and ability to access and apply computer inventory resources.

- Advises the Division Administrator, Assistant Division Administrator, and other office staff on Division activities. Provides input in the formulation of Division office policies.

- Reviews and evaluates studies, engineering reports, negotiated contracts and other documents, decides on a course of action and approves alternatives and/or modifications.

- Reviews and takes appropriate action concerning reports and analyses on project location, design, construction, maintenance, and proposals prepared by subordinate staff.

- Oversees reviews of the adequacy of proposed locations, preliminary plans, rights-of-way, construction plans and agreements for utility and railroad work, plans for traffic detours and temporary structures, traffic safety during construction and procedures to eliminate or reduce adverse impact, and authorizes projects and change orders.

- Provides training for engineering training program incumbents (GS-810-05 and 07), including establishing an outline of training topics, arranging for State Department of Transportation interaction, assigning special reports and activities, evaluating and advising as well as coordinating with the Region Engineering Training Coordinator.

- Identifies developmental and training needs for the Team. Provides position influence in equal opportunity supportive of agency plans and objectives. Informs employees of personnel programs, job practices and procedures, and policy interpretations.

- Attends selected public hearings, conferences, and meetings with Federal, State and local personnel.

- Oversees the review of final plans, specifications, and estimates (PS&E) for appropriate application of design standards and criteria, conformance with policy and regulations, eligibility for Federal participation, traffic safety features, reasonableness of estimated unit prices and proper standard specifications, and other contract provisions. Conducts reviews of bridge related PS&E's.

- Authorizes the State to advertise for bids for construction projects. Concurs/non-concurs in award or rejection of contracts by the State.

- Coordinates special engineering studies and the preparation of related reports.

- Leads in-depth reviews of statewide policies and procedures for project design and construction including compliance with Federal requirements and makes recommendations for resolving deficiencies.

- Develops and maintains statewide design, construction, maintenance, and bridge safety inspection monitoring programs including a project tracking system. Prepares annual monitoring plans and oversees preparation of annual reports.

SUPERVISORY FACTORS

A. Supervision Received

The Structures and Operations Team Leader provides administrative and technical direction to a staff of three to four engineers as well as performing bridge specialist functions directly. This is carried out under the general guidance of the Division Administrator and Assistant Division Administrator, who is the incumbent's immediate supervisor. The technical development of decisions is not generally reviewed, but major implications of decisions, recommendations, or commitments made by the incumbent must have a broad understanding of FHWA objectives, legal requirements, major policies, and future needs so that these items may be used in independent operation as well as when advising the Division Administrator in situations where existing guides are not applicable.

Generally, guidance for carrying out these functions is provided by Federal-aid legislation and regulations, AASHTO policy, standards and guides, and a large variety of technical publication in the field of highway engineering.

B. Leadership Exercised

The incumbent exercises a broad range of leadership responsibilities over three to four engineers (GS-810-11 or 12) providing advisory, planning, and reviewing services. As Team Leader, the incumbent is responsible for input into the completion of annual performance ratings, career goal discussions and the development of individual training plans. Responsibilities include ensuring timely performance of a satisfactory amount of quality of work, reviewing work products of subordinate, accepting, amending or rejecting work. The incumbent serves as team leader on group efforts of the Team, plans work, sets priorities, and prepares schedules for completion of work. Work is assigned based on judgment of priorities and selective considerations. The incumbent makes recommendations for awards, assesses promotion potential and hears and resolves complaints.

Leadership influence is provided over the planning, implementing, and direction of equal opportunity principles in the furtherance of agency plans and objectives.

STRUCTURES AND TECHNOLOGY TRANSFER ENGINEER
GS-810-13

I. POSITION SUMMARY

The incumbent serves as the Structures and Technology Transfer Engineer for the State X Division Office. This position provides authoritative, administrative, and technical leadership, guidance and coordination to the State and local agencies in the design and construction of structures, and technology transfer activities including the Strategic Highway Research Program.

II. PRINCIPAL DUTIES AND RESPONSIBILITIES

A. Structures Activities

1. Provides leadership and guidance to the staffs of the Division Office and State X DOT regarding interpretations of FHWA policies and programs for structure related projects. Consults with counterparts in State and local governments, and FHWA Regional and Headquarters bridge staffs regarding Federal bridge programs, projects, and policies.

2. Responsible for monitoring of the State's bridge inventory, inspection, and replacement programs. Conducts process reviews of the State's inspector training, structural ratings, and approval of bridge replacement selection.

3. Studies special engineering problems in the design and construction of structures and assists the State in their resolution.

4. Reviews bridge maintenance practices to determine adequacy and compliance with Federal requirements.

B. Technology Transfer(T2)/Applications

1. Serves as the Division Technology Transfer Coordinator and marketing specialist. Through coordination among State, local, university, and private organizations the incumbent helps analyze and define applications for new technology. Takes action to deliver appropriate products to meet these applications.

2. Identifies and promotes the application of new technology by the State X Transportation Department and local entities with transportation responsibility. Develops marketing plans to promote items identified in Regional priority plans or identified by the State. With assistance from other FHWA staff implements marketing plans and follow-up of accomplishments.

3. Manages the States involvement in various technology transfer activities including. National Highway Institute Training. National Experimental

Projects, Demonstration Projects, and national and regional pooled-fund technology transfer efforts.

4. Monitors, coordinates, and promotes effort resulting from the SHRP and the Long Term Pavement Performance (LTPP) Program. Identifies research results, and in cooperation with State and local officials, evaluates the results for application in Alaska, and implements plans for prompt adoption of research items.

5. Represent the Division at regional and national meetings relating to the SHRP and LTPP efforts. Supports these activities, as appropriate, at conferences, in meetings with public, private, government, and university officials, and at other transportation related functions.

6. Serves as the Division LTAP coordinator. Reviews the State's annual program, monitors accomplishments, and provides guidance and assistance in implementing technology transfer to rural and small urban areas.

C. Program Monitoring

In cooperation with the State, develops program monitoring plan based on current federal legislative, regulatory or executive priorities to assess the effectiveness and acceptability of the management controls, operational policies and procedures, organization, personnel systems, cost controls and work flow. Evaluates current policies, practices and procedures based on specialized knowledge to develop recommendations for FHWA and State management that would improve overall program operations as well as resolve technical problems. As a result, the incumbent recommends changes or revisions of policy and procedural regulations and guidelines on an ongoing basis, ultimately influencing policy and/or program initiatives.

III. SUPERVISORY RELATIONSHIPS

A. Supervision Exercised

None directly.

B. Supervision Received

The incumbent's immediate supervisor is the Assistant Division Administrator. The supervisory direction the incumbent receives is generally related to Division policy and fulfillment of agency goals and objectives. The direction is broad in scope and general in nature. The incumbent plans work and exercises independent judgment within the broad scope of delegated responsibilities.

ATTACHMENT B – COLLATERAL DUTY LIST

Major and Collateral Duty List
(Non-bridge)

Adopt-A-Highway Coordinator
Buy America *(Alternate)*
Coast Guard Permits
DO Improvement Teams
Ferry Boats
Flood Plains
Geotechnical
High Mast Light Poles
Historic Bridges
Hydraulics
Materials *(Alternate)*
MUTCD
Painting
Recruiter
Research
Retaining Walls
Scenic Byways
Seismic
Sign Structures
Sound Walls
Specifications
Team Leader
Technology Transfer
Wellness Program

ATTACHMENT C – AASHTO

AASHTO Organization, Specifications, and FHWA Support of AASHTO Activities

AASHTO Organization

AASHTO is a private, non-profit association with its headquarters located in Washington, DC. The organization has a small number of full-time permanent staff, which is often augmented by loaned staff from State highway agencies and industry for special projects or unique needs. The work of AASHTO, however, is actually conducted by volunteers, representing the member agencies of AASHTO.

In the bridge and structures area, the most important AASHTO committee is the Highway Subcommittee on Bridges and Structures (the Bridge Subcommittee), which operates under its parent committee, the AASHTO Standing Committee on Highways (SCOH). Primary member agencies of the AASHTO Bridge Subcommittee are State transportation departments (including Puerto Rico, District of Columbia, and the U.S. Virgin Islands), FHWA (including the Federal Lands Highway Program), the U.S. Coast Guard, and transportation agencies within each of the Canadian provinces. There are also a number of associate members of the Bridge Committee representing state and regional transportation authorities (e.g., the Port Authority of New York and New Jersey, the New Jersey Turnpike Authority), and other Federal agencies (e.g., the Military Traffic Management Command, Army Corps of Engineers, and USDA Forest Service).

The AASHTO Bridge Subcommittee has a chair and vice-chair, both of whom are appointed by AASHTO and who serve for 3-year terms (the term can be extended for a second 3-year appointment by action of the AASHTO Board of Directors). Both the chair and vice-chair must be from one of the State transportation agencies (including PR, DC, and VI), and must be at least one level above the equivalent of the state bridge engineer.

Each State can have up to three (3) official representatives on the committee (a Primary Member and up to two Members). All State representatives must be nominated by the CAO (Chief Administrative Officer or Secretary of Transportation or equivalent) of the State transportation agency, and must be approved by AASHTO. Note that if a State bridge engineer retires, his or her successor does not automatically become a member of the Bridge Committee; the CAO must still officially nominate the new State bridge engineer and await formal acceptance from AASHTO.

The State bridge engineer is usually appointed as the Primary Member representing that State. The Primary Member is the official voting member on all formal Bridge Committee business items and may be appointed to one or more Technical Committees of the Bridge Committee (as discussed below). The other two Members can represent the State on Bridge Committee activities and can also serve on Technical Committees. Both Members and Primary Members can vote on items discussed within the Technical Committees that they serve, but only the Primary Member can vote during General Sessions of the Bridge Committee.

The business of the AASHTO Subcommittee on Bridges and Structures (SCOBS) is typically conducted on an annual basis during a meeting in May or June of each year. A State volunteers to host the annual meeting and makes all arrangements for that meeting. A typical meeting of the full Subcommittee includes meetings of each Technical Committee during the first 2 days, followed by a 1.5-day General Session meeting of the full Committee. Technical Committees may also meet at other times during the year, or may conduct business by mail, fax, and email.

At the current time, there are 19 Technical Committees within the AASHTO Bridge Committee Structure. These are:

Technical Committee for Security (T-1)
Technical Committee for Bearings and Expansion Devices (T-2)
Technical Committee for Seismic Design (T-3)
Technical Committee for Construction (T-4)
Technical Committee for Loads and Load Distribution (T-5)
Technical Committee for Fiber Reinforced Polymer Composites (T-6)
Technical Committee for Guardrail and Bridge Rail (T-7)
Technical Committee for Moveable Bridges (T-8)
Technical Committee for Bridge Preservation (T-9)
Technical Committee for Concrete Design (T-10)
Technical Committee for Research (T-11)
Technical Committee for Structural Supports for Signs, Luminaries, and Traffic Signals (T-12)
Technical Committee for Culverts (T-13)
Technical Committee for Structural Steel Design (T-14)
Technical Committee for Substructures and Retaining Walls (T-15)
Technical Committee for Timber Structures (T-16)
Technical Committee for Welding (T-17)
Technical Committee for Bridge Management, Evaluation and Rehabilitation (T-18)
Technical Committee for Computers (T-19)
Technical Committee for Tunnels (T-20)

Each Technical Committee has a chair and vice-chair, both of which are appointed by the chair of the Bridge Subcommittee. Other Technical Committee members are also appointed by the Bridge Subcommittee chair, and membership is rotated on a regular basis. Each Technical Committee may have one or more liaison members as well, including at least one each from FHWA (as discussed below), representing other regional or local transportation agencies or industry (e.g., Golden Gate Bridge Authority).

AASHTO Specifications

The primary business of the AASHTO Bridge Committee is to approve and maintain the publication of a number of standards, specifications, manuals, guides and guide specifications related to bridges and structures. Although the Bridge Subcommittee maintains the majority of bridge and structure related documents, other AASHTO committees, including the Highway Subcommittees on Construction and Materials, other Standing or Special Committees, and special task forces maintain some of the documents related to Bridges and Structures.

AASHTO standards and specifications have no formal or legal authority or standing on their own; they are voluntary standards that must be adopted for use by an agency designing or constructing highway structures. The requirement that a State use an AASHTO document for design comes about by requirements in Federal regulations, under which FHWA recognizes and requires the use of AASHTO specifications for all Federal-aid highway construction. An agency may impose standards more restrictive than AASHTO for Federal-aid construction; however, if they are planning on imposing design standards less rigorous than AASHTO for Federal-aid construction, FHWA must be aware of this ahead of time and must approve the application.

The Bridge Committee maintains a number of standards and specifications for highway structures related to design, evaluation and rating, including specifications for highway bridges, light and sign structures, and guiderail. The Committee also maintains a number of "guide specifications" for highway structures, components or special applications, like the Guide Specifications for Seismic Isolation Design and the Guide Specifications for Horizontally Curved Steel Girder Highway Bridges. Guide Specifications are often published by AASHTO as an interim measure – when there is something very new or unique which may take a few years to test, validate or accept. The content of Guide Specifications will then usually be incorporated into a primary specification at some point in the future or de-listed by AASHTO, although there have been examples where a Guide Specification has been in existence for more than 20 years. Although Guide Specifications are not specifically recognized in Federal regulations, FHWA will typically accept the use of a Guide Specification for design of Federal-aid highway construction.

Annual updates to published AASHTO documents are issued as Interims for a given year. After several years of Interims, AASHTO may decide to publish a new edition of a standard or specification, which incorporates all issued Interims since the last new edition was published. In order for a specification to be complete and valid, one must ensure that he or she has the most current edition and all annual interims up through that year (e.g., the 2nd edition (1998) *LRFD Bridge Design Specifications* and all interims from 1999 through 2003).

The complete list of AASHTO standards, specifications, guides and reports can be found on the AASHTO website at https://bookstore.transportation.org/.

FHWA Support of AASHTO Activities

As noted earlier, FHWA maintains membership on the AASHTO Bridge Subcommittee and supports its activities in a number of ways. FHWA serves as the secretariat to the Subcommittee, and the Director of the Office of Bridge Technology is typically designated as an Officer of the Subcommittee and its official secretary. The Director is assisted by staff within the Office of Bridge Technology, who provide the day-to-day technical support for the chair and vice-chair, and membership of the Committee. Among the activities conducted under the secretary's role are maintaining the roster of Bridge Committee membership; preparing the agenda, agenda package, and ballot for the annual business meeting of the Committee; and certifying the vote on all formal business items related to standards and specifications.

In addition, FHWA appoints "ex-officio" liaisons to each Technical Committee. The Director of the Office of Bridge Technology will usually make these appointments, but anyone within the FHWA bridge program staff may volunteer to serve as a liaison by conferring with the Director.

There are specific roles and responsibilities for FHWA liaisons to the Bridge Committee's Technical Committees. These roles and responsibilities will be reviewed and adjusted, as required, on a continuing basis. The basic intent, however, is for each liaison to provide assistance to, and report on FHWA activities related to, each Technical Committee (and to the extent possible, become the chair's "best friend" and strive to be indispensable to the Technical Committee).

Suggested roles for FHWA liaisons include the following:

- Provide assistance to Technical Committee chairs and members on all aspects of Committee activity.
- Contact the Technical Committee chair and offer to act as the secretary to Committee, and to prepare notes of Committee meetings, if requested.
- Help shape the agenda for each meeting of the Technical Committee.
- Provide information regarding FHWA activities that may be of value or interest to the Technical Committee.
- Provide feedback regarding activities of the Technical Committee and States that may be of importance or interest to FHWA staff.
- Provide assistance in reviewing proposed specification changes and Bridge Committee agenda items.

Specific responsibilities for FHWA liaisons include the following:

- Attend all meetings of the Technical Committee; if unable to attend, contact the Director of the Office of Bridge Technology to discuss the need for sending an alternate to the meeting.
- Confer or coordinate with other FHWA Bridge Program staff who have interests and activities in the areas of responsibility of the Technical Committee to gather information to present to the Technical Committee, and to relay important information resulting from Technical Committee meetings.
- If requested, prepare and submit notes of the meeting to the Technical Committee chair within one week following the meeting. Once accepted/approved by the Technical Committee chair, send a copy of the notes to the FHWA coordinator assigned to assemble the notes from all Technical Committee meetings.
- If not acting as secretary to the Technical Committee, prepare brief notes of the meeting, describing some of the important or interesting actions taken or discussed during the meeting, which may be of interest to FHWA staff. Within two weeks following the meeting, send the notes to the FHWA coordinator assigned to assemble notes from all the Technical Committee meetings.

ATTACHMENT D – RISK ASSESSMENT

State X Division's Risk Assessment Process

During 2001, Congress showed increasing interest in FHWA's stewardship and oversight of the Federal-aid Highway Program (FAHP). In response, FHWA established a task force that, after reviewing the agency's national guidance on stewardship and oversight, issued a policy memorandum on June 22, 2001, titled "FHWA Policy on Stewardship and Oversight of the Federal-aid Highway Program." The main thrust of the policy is that while FHWA has been directed to delegate project-level authorities to the State DOTs, the FHWA remains responsible for program-level oversight to ensure effective delivery of the FAHP.

In the policy statement, "stewardship" is defined as "*the efficient and effective management of the public funds which have been entrusted to the Federal Highway Administration.*" Stewardship reflects FHWA's responsibility for the development and implementation of the various elements of the FAHP, and involves all FHWA program delivery activities such as: leadership, technology deployment, technical assistance, problem solving, program administration, and oversight.

"Oversight" is defined as "*the act of ensuring that the Federal highway program is delivered consistent with laws, regulations and policies*." This definition makes "oversight" the compliance or verification component of FHWA's stewardship activities. Viewed narrowly, oversight ensures that implementation of the FAHP complies with applicable laws, regulations and policies; however, in the broader view, oversight enables FHWA to ensure the effective delivery and operation of the transportation system envisioned in its base Federal statutes.

Oversight is one of several stewardship functions carried out by a division office; therefore, allocating a division's staff time and other resources amongst its stewardship activities requires an assessment of the relative risk inherent in those activities. Since the State X DOT assumed certain stewardship responsibilities under the April 1999 Oversight Agreement, the risk assessment must be jointly conducted by the State X Division and the State X DOT. High-risk elements will be identified based on the following criteria:

1. Significant potential to stop or substantially delay the program;
2. Significant potential for waste, fraud or abuse;
3. Significantly affect the safety of the traveling public;
4. Significantly affect the quality of the system;
5. Significantly affect the service life of the facility;
6. Significantly affect the environment; or
7. Significantly affect the protected rights of, or intended benefits to, individuals.

The State X Division developed its risk assessment process by combining elements of processes used in other division offices. The evaluation form has been adapted from the Ohio Division. While originally drawn from Vermont's listing, the program areas listing has been adapted to fit local conditions, and indicate both the Division teams and State X DOT offices interested in specific program areas.

The Division will conduct its risk assessment on at least a biannual basis. Carried out as part of the annual performance plan development process, the division will conduct risk assessments of program areas in partnership with relevant State X DOT staff at the office director level. Once the program risk assessments are complete, the Division will compile the results and identify the five top areas of concern. These areas of concern will assessed for their potential as a PR/PE to be included in the annual performance plan. External drivers such as funding level or a defined national area of concern may also push a program into the high risk level.

The five top areas of concern identified by the risk assessment will be combined with a review of on-going activities within the Division to define a two-tiered approach to oversight for the upcoming year. Tier 1 activities are designed to address high risk areas of immediate concern. Among these will be included general construction oversight since the Federal-aid highway program funding in State X is predominantly spent on construction activities. Tier 2 activities are activities that address high risk areas where the Division had identified a concern prior to the risk assessment and therefore had already defined a countermeasure.

The three attachments will assist with the identification of high risk elements. Attachment 1 contains a listing of required actions for the Division (Illinois Required Action List). Attachment 2 contains a matrix of program elements to be analyzed using Attachment 3. The score associated with any given element is an indicator of the risk to the overall program area associated with that element, not an indicator of how good, bad or indifferent that element may be. To ensure a common understanding by all evaluators, the State X Division has defined the program area elements to be evaluated as:

Assessment of Control Environment:

A1 - Emphasis on Process Controls: Has the State X DOT (and/or pertinent local entities) defined its processes?

A2 – Coverage by Written Procedures: To what extent do written procedures exist that define and control the processes to be used in this program area?

A3 – Scope of Written Authority: Has the State X DOT clearly defined its delegations of authority and the scope, latitude or limitations of that authority? As a basis for comparison, use the FHWA delegation of authority from the Administrator to Division Administrator that has been re-delegated according the Division's Delegation of Authority.

A4 – Adequacy of Checks and Balances: Does the process have inherent checks and balances?

A5 – Personnel Considerations: Is the workforce charged with carrying out the program qualified and trained to do the work? Is training routinely provided for new staff to bring them up to speed? As needed, is refresher/in-service training provided to all staff?

A6 – Administrative Resources – Staff: Has the State X DOT assigned the appropriate workforce (not too many or too few) to carry the workload? "Adequately staffed" means that, during peak workloads, the workforce is somewhat overloaded but the work gets done.

A7 – Administrative Resources – GOE: Has the State X DOT assigned appropriate general operating expense (GOE) funding for the program? Does the workforce have access to vehicles, equipment, software, etc., necessary to carry out the program?

A8 – Program Administration: To what degree does the Division control the process/program? Risk increases as additional parties become involved in or share in program administration. Therefore, a program area or process controlled by the Division exposes FHWA to less risk than a process that has been decentralized by the state.

Analysis of Inherent Risk:

B1 – Age/Status of Program: Has the program in its current form been in place long? Has the State X DOT modified its processes related to the program? Has administration of the program been shifted to other entities either in State X DOT or outside?

B2 – Level of External Interest or Sensitivity: What is the degree of outside interest in a program or its products? External interest may come from any level, and may or may not be political. Construction contractors should be viewed as external parties as should the general public. Sensitivity may be the level of exposure a program has or can withstand relative to adverse external interest or publicity.

B3 – Documentation Used in the Process/System: Does the process produce a solid document trail, or is the documentation fluid? A "nonconvertible" document would be a document that cannot be modified once produced such as a materials quality lab testing result. A "controlled" document can be modified but only through a prescribed process such as a project agreement. By contrast, a "negotiable" document is one that can be easily changed without an audit trail.

B4 – Interval since Last PR/PE: When did the Division and/or the State X DOT last conduct a process review/evaluation of the program? The PR/PE might cover the entire program area or some specific aspect but would extend beyond the risk assessment level of review.

B5 – Recent Instances of Findings or Deficiencies: Have there been any findings or deficiencies which indicate problems with how the program is being administered? A deficiency may come to light through normal stewardship activities, rather than through a PR/PE. Section 1.9 requests, construction inspection findings, debarment requests or routine inquiries could be the source of information about potential deficiencies in a program area.

B6 – Data Collection: Is data being collected? Is the data that is collected relevant, timely and comprehensive? What's the level of automation in the data collection (higher levels of automation may decrease the risk of human error corrupting the data)? "Data" encompasses both data collected for the program as well as data used to monitor the program.

B7 – Adequacy of Data Use & Reports: Is the data used to control the process or make process improvements? Are accurate reports generally available in a timely manner, or do individuals have to search hard to get relevant information? Availability should be interpreted as either the data is generally accessible, or is being distributed to appropriate/pertinent staff.

B8 – Time Constraints: Does the process generally allow sufficient time to carry out the program well? Are there external drivers (such as Congressional or state legislative action, Transportation Commission, and/or) other federal or state agencies) with the potential to impact the program/process timeline?

Program Area

Applicable Regulations and Policies

Assessment of Control Environment				Analysis of Inherent Risk			
A1	**Emphasis on Process Controls**		**0**	**B1**	**Age/Status of Program**		**0**
		Major Emphasis	1			Relatively Stable	1
		Moderate Emphasis	3			Changing	3
		Minor Emphasis	5			New	5
A2	**Coverage by Written Procedures**		**0**	**B2**	**Level of External Interest or Sensitivity**		**0**
		Specific Guidance	1			Not Applicable	0
		Guidance Allowing Flexibility in Interpretation	3			Low Level	1
		No Written Procedures	5			Moderate Level	3
A3	**Scope of Written Authority**		**0**			High Level	5
		Precise	1	**B3**	**Documentation Used in the Process/System**		**0**
		Clarification Necessary	3			NonConvertible Documents	1
		No Written Authority	5			Controlled Documents	3
A4	**Adequacy of Checks & Balances**		**0**			Negotiable Documents	5
		Not Applicable	0	**B4**	**Interval Since Last PR/PE**		**0**
		Adequate	1			Within the Past Year	1
		Needs Improvement	3			Last 1-3 Years	3
		Required but Lacking	5			More than 3 Years	5
A5	**Personnel Considerations**		**0**	**B5**	**Recent Instances of Findings or Deficiencies**		**0**
		Fully Trained & Qualified	1			None in Last 18 Months	1
		Qualified, but require Training	3			Fully Corrected in 18 Months	3
		Lack Necessary Skills & Abilities	5			Not Corrected after 18 Months	5
A6	**Administrative Resources-Staff**		**0**	**B6**	**Data Collection**		**0**
		Optimally Staffed	1			Not Applicable	0
		Adequately Staffed	3			Satisfactory	1
		Insufficiently Staffed	5			Needs Improvement	3
A7	**Administrative Resources-GOE**		**0**			Major Problem	5
		Optimally Funded	1	**B7**	**Adequacy of Reports & Data Use**		**0**
		Adequately Funded	3			Not Applicable	0
		Insufficiently Funded	5			Accurate, Pertinent, Timely & Available	1
A8	**Program Administration**		**0**			Sometimes Inaccurate, Incomplete, Late, Limited Use and/or Limited Availability	3
		Federal Only Controls	1			Useless, Inadequate, Late, or Unavailable	5
		Joint Federal/Centralized State Administration	3	**B8**	**Time Constraints**		**0**
		Significant 3rd Party Involvement or Decentralized State Administration	5			Not a Significant Factor	1
						Occasionally a Factor	3
						Significant Factor	5

Numeric Control Assessment Score **0.00**
Numeric Risk Assessment Score **0.00**

Total Risk Assessment Score **0.00**

Assessment of Safeguards Rated in Risk Assessment Score

Qualitative Overall Risk Assessment

Follow Up Activities/Process Reviews

Comments

ATTACHMENT E - Useful Reference Publications

Bridge (See the FHWA internet site at http://www.fhwa.dot.gov/bridge/ and intranet site http://staffnet.fhwa.dot.gov/bridge/index.cfm for updates)

- Expedited Concrete Box Girder Bridge Removals Over the Interstate in One-Night Interstate Closures
- Structural Engineering Series
  - SES No.1 – Ice Loads on Bridge Piers, January, 1976
  - SES No.2 - Arch Bridges, September, 1977
  - SES No.4 – Cable-stayed Bridges, June, 1978
  - SES No.6 – Prestressed Concrete Segmental Bridges, August, 1979
- Fatigue Manuals
  - Fatigue Cracking of Steel Bridge Structures, Volume I: A Survey of Localized Cracking in Steel Bridges – 1981 to 1988, FHWA-RD-89-166, March 1990
  - Fatigue Cracking of Steel Bridge Structures, Volume II: A Commentary and Guide for Design, Evaluation and Investigation of Cracking, FHWA-RD-89-167, March 1990
  - Fatigue Cracking of Steel Bridge Structures, Volume III: Executive Summary, FHWA-RD-89-168, March 1990
- Bridge Maintenance Manual
  - Bridge Maintenance Training Manual, 2002
  - Bridge Maintenance Training Instructor's Guide, FHWA-NHI-03-048, March 2003

Bridge Program

- Errata Sheet for Coding Guide
- Heated Bridge Technology Report on ISTEA Sec. 6005 Program (8.1 mb)
- Recording and Coding Guide for the Structure Inventory and Appraisal of the Nations Bridges
- Tables of Frequently Requested Information
- Underwater Evaluation And Repair of Bridge Components (ISDDC)
- Underwater Inspection of Bridges (ISDDC)

Fiber Reinforced Polymer Composites

- Fiber Reinforced Polymer Composites - Applications in the USA
- A Successful Beginning for Fiber Reinforced Polymer (FRP) Composite Materials in Bridge Applications

- Fiber Reinforced Polymer (FRP) Composite Materials for Bridges

Geotechnical

- Appendices and CADD files for Manual for the Design and Construction of Soil Nail Walls
- Demonstration Project 103 Design & Construction Monitoring of Soil Nail Walls Project Summary Report (pdf - 0.5 mb)
- Drilled Shafts: Construction Procedures and Design Methods (FHWA-IF-99-025) Errata Sheet
- Driven User's Manual (pdf - 1.5 mb)
- Geotechnical Engineering Circular No. 4 - Ground Anchors and Anchored Systems (pdf - 4.4 mb)
- Geotechnical Engineering Practices in Canada and Europe (ISDDC)
- GT-15 - Geotechnical Differing Site Conditions
- GT-16 - "Determination of Unknown Subsurface Bridge Foundations," NCHRP 21-5 Interim Report Summary
- Manual for Abandoned Mine Inventory and Risk Assessment (ISDDC)
- Manual for Design and Construction Monitoring of Soil Nail Walls (ISDDC)
- Soil Nailing Field Inspectors Manual (ISDDC)
- More FHWA Electronic Geotechnical Publications

High Performance Concrete

- Implementation Program on High Performance Concrete Guidelines for Instrumentation of Bridges

Hydraulics

- Best Management Practices for Erosion and Sediment Control (ISDDC)
- Countermeasures for Hydraulic Problems at Bridges, Vol. 1 Analysis and Assessment (ISDDC)
- Countermeasures for Hydraulic Problems at Bridges, Vol. 2 Case Histories (ISDDC)
- Highways in the River Environment
- Stream Stability at Highway Structures
- Evaluating Scour at Bridges
- Bridge Scour and Stream Instability Countermeasures
- Highways in the Coastal Environment

-
- More FHWA Electronic Hydraulics Publications

Tunnels

- Prevention and Control of Highway Tunnel Fires (197 kb)

Geotechnical

(See the FHWA internet site at http://www.fhwa.dot.gov/engineering/geotech/index.cfm for updates.)

Drilled Shafts

TITLE	FHWA#	NTIS#
Bored Piles	TS-86-206	PB87-164794
Drilled Shafts for Bridge Foundations	RD-92-004	
Drilled Shafts: Construction Procedures and Design Methods (ISDDC) Errata Sheet (pdf 22 kb) updated 6/00	IF-99-025	PB97-183974
Handbook on Design And Construction of Drilled Shafts Under Lateral Load	IP-84-11	PB85-201085
Load Transfer for Drilled Shafts in Intermediate Geomaterials	RD-95-172	

Expansive Soils

TITLE	FHWA#	NTIS#
A Review of Engineering Experiences with Expansive Soils in Highway Subgrades (ISDDC)	RD-75-48	PB76-248658/AS
An Evaluation of Expedient Methodology for Identification of Potentially Expansive Soils	RD-77-94	PB77-289164/AS
An Evaluation of Methodology for Prediction and Minimization of Detrimental Volume Change of Expansive Soils in Highway Subgrades, Volume 1	RD-79-49	PB80-301254
An Evaluation of Methodology for Prediction and Minimization of Detrimental Volume Change of Expansive Soils in Highway Subgrades, Volume 2	RD-79-50	PB80-301254
An Investigation of the Natural Microscale Mechanisms That Cause Volume Change in Expansive Clays	RD-77-75	PB77-291782/AS
An Occurrence and Distribution Survey of Expansive Materials in the United States by Physiographic Areas (ISDDC)	RD-76-82	PB76-265230/AS
Expansive Soils in Highway Subgrades, Summary	TS-80-236	

Proceedings of Workshop on Expansive Clays and Shales in Highway Design and Construction	RD-73-72	PB74-225843/AS
Technical Guidelines for Expansive Soils in Highway Subgrades, Final Report	RD-79-51	PB80-139660

Frost Action

TITLE	FHWA#	NTIS#
Frost Action Predictive Techniques for Roads and Airfields: Volume 1	RD-87-057	PB88-144050
Frost Susceptibility of Soil, Review of Index Tests	RD-82-081	AD-A111752
Mathematical Model to Correlate Frost Heave of Pavements with Laboratory Predictions	RD-79-71	AD-A084737

Geosynthetics

TITLE	FHWA#	NTIS#
Geocomposite Drains, Volume 1	RD-86-171	PB87-154993/AS
Geocomposite Drains, Volume 2	RD-86-172	PB87-190682
Geosynthetic Design and Construction Guidelines Participant Notebook (ISDDC)	HI-95-038	PB95-270500
Prefabricated Vertical Drains, Volume 1 (ISDDC)	RD-86-168	PB87-155008/AS
Prefabricated Vertical Drains, Volume 2, Summary of Research Effort	RD-86-169	PB87-192761/AS
Prefabricated Vertical Drains, Volume 3	RD-86-170	PB87-192779/AS

Geotechnical Engineering Circulars

TITLE	FHWA#	NTIS#
Geotechnical Engineering Circular No. 1 - Dynamic Compaction (ISDDC)	SA-95-037	PB96-146105
Geotechnical Engineering Circular No. 2 - Earth Retaining Systems	SA-96-038	PB97-173629
Geotechnical Engineering Circular No. 3 - Earthquake Engineering for Highways, Design Principles, Volume 1 (ISDDC)	SA-97-076	PB98-11560
Geotechnical Engineering Circular No. 3 - Earthquake Engineering for Highways, Design Examples, Volume 2 (ISDDC)	SA-97-077	PB98-11578

Geotechnical Engineering Circular No. 4 - Ground Anchors and Anchored Systems (pdf - 4.4 mb)	IF-99-015	PB99-166191
Geotechnical Engineering Circular No. 5 - Evaluation of Soil and Rock Properties (ISDDC)	IF-02-034	
Geotechnical Engineering Circular - Shallow Foundations No. 6	IF-02-054	

Geotechnical Notebook Issuances

TITLE	FHWA#	NTIS#
GT-15 - Geotechnical Differing Site Conditions (0.2 mb, pdf)		
GT-16 - "Determination of Unknown Subsurface Bridge Foundations," NCHRP 21-5 Interim Report Summary (0.7 mb, pdf)		

Ground Improvement

TITLE	FHWA#	NTIS#
AASHTO Task Force 27 Report - In Situ Soil Improvement Techniques	SA-92-041	
Design and Construction of Stone Columns, Volume 1 (ISDDC)	RD-83-026	PB84-190024
Design and Construction of Stone Columns, Volume 2 (ISDDC)	RD-83-027	PB85-215416/AS
Geotechnical Engineering Circular No. 1 - Dynamic Compaction (ISDDC)	SA-95-037	PB96-146105
Micropile Design and Construction Guidelines - Implementation Manual (ISDDC)	SA-97-070	

Grouting

TITLE	FHWA#	NTIS#
Chemical Grouts for Soils, Volume 1, Available Materials	RD-77-50	PB-279685
Chemical Grouts for Soils, Volume 2, Engineering Evaluation of Available Materials	RD-77-51	PB-279686
Design and Control of Chemical Grouting, Volume 1	RD-82-036	PB83-238774
Design and Control of Chemical Grouting, Volume 2	RD-82-037	PB83-238782
Design and Control of Chemical Grouting, Volume 3	RD-82-038	PB84-231091

Design and Control of Chemical Grouting, Volume 4	RD-82-039	PB84-231109
Grouting in Soils, Volume 1	RD-76-26	PB-259043
Grouting in Soils, Volume 2	RD-76-27	PB-259044

Miscellaneous

TITLE	FHWA#	NTIS#
Manual for Abandoned Mine Inventory and Risk Assessment (ISDDC)	IF-99-007	
FHWA Checklist and Guidelines for Review of Geotechnical Reports and Preliminary Plans and Specifications	ED-88-053	
FHWA Metrication Guidelines	SA-95-035	PB95-241709
Geotechnical Engineering Practices in Canada and Europe - International Technology Exchange Program (ISDDC)	PL-99-013	
Geotechnical Instrumentation	HI-98-034	
Highway Subdrainage Design	TS-80-224	
Rock and Mineral Identification for Engineers	HI-91-025	
Soils and Foundations Workshop Manual	NHI-00-045	
The National Geotechnical Engineering Improvement Program	PD-97-050	PB97-194013
Training Course in Geotechnical and Foundation Engineering: Geotechnical Earthquake Engineering - Participants Manual	HI-99-012	
Training Course in Geotechnical and Foundation Engineering: Geotechnical Earthquake Engineering - Student Exercises	HI-99-014	

Permanent Ground Anchors

TITLE	FHWA#	NTIS#
Geotechnical Engineering Circular No. 4 - Ground Anchors and Anchored Systems (pdf - 4.4 mb)	IF-99-015	PB99-166191
Permanent Ground Anchors	DP-68-1R	PB85-1780107/A
Permanent Ground Anchors, Volume 1, Final Report (ISDDC)	DP-90-068	PB91-129445

Permanent Ground Anchors, Volume 2, Field Demonstration Project Summaries (ISDDC)	DP-90-068	PB91-129932
Permanent Ground Anchors-Nicholson Design Criteria	RD-81-151	PB83-167312
Permanent Ground Anchors-Soletanche Design Criteria	RD-81-150	PB83-165993
Permanent Ground Anchors-Stump Design Criteria	RD-81-152	PB83-165985
Tiebacks (ISDDC)	RD-82-047	PB83-178368
Tiebacks, Executive Summary	RD-82-046	PB83-178350

Pile Foundations

TITLE	FHWA#	NTIS#
Allowable Stresses in Piles (ISDDC)	RD-83-059	PB84-199462
Behavior of Piles and Pile Groups in Cohesionless Soils	RD-83-038	PB86-152089/AS
Behavior of Piles and Pile Groups under Lateral Loads	RD-85-106	PB86-238466
Centrifugal Testing of Model Piles and Pile Groups Volume 1, Executive Summary	RD-84-002	PB85-247708
Centrifugal Testing of Model Piles and Pile Groups Volume 2, Centrifuge Tests in Sand	RD-84-003	PB85-247716/AS
Centrifuge Tests in Clay, Volume 3	RD-84-004	PB85-247724/AS
Design and Construction of Driven Pile Foundations, Volumes 1 (ISDDC) and 2 (ISDDC)	HI-97-013 HI-97-014	PB97-134407 PB97-141311
Dynamic Pile Driving Measurements for University Of Houston Pile Group Study	RD-81-009	PB81-245680
Field Study of Pile Group Action, Detailed Graphical Presentation of Reduced Data, Appendix D	RD-81-006	
Field Study of Pile Group Action, Documentation For Program Pilgp1, Appendix B	RD-81-004	PB82-137647
Field Study of Pile Group Action, Evaluation of Instrumentation, Appendix E	RD-81-007	
Field Study of Pile Group Action, Final Report	RD-81-002	PB82-249146
Field Study of Pile Group Action, Geotechnical Investigation, Appendix C	RD-81-005	PB82-196288
Field Study of Pile Group Action, Interim Report	RD-81-001	PB82-139270

Field Study of Pile Group Action, Supplementary Information, Appendix F	RD-81-008	
Field Study of Pile Group Action, User's Guide for Program Pilgp1, Appendix A	RD-81-003	PB82-137639
Load and Resistance Factor Design (LRFD) for Highway Bridge Substructures	HI-98-032	
Static Testing of Deep Foundations (ISDDC)	SA-91-042	PB-92176817
Texas Quick Load Method for Foundation Load Testing	IP-77-8	PB-267353
The Osterberg Cell for Load Testing Drilled Shafts And Driven Piles	SA-94-035	PB95-209508
The Performance of Pile Driving Systems (ISDDC)	RD-86-160	
User's Manual for Computer Program DRIVEN: Ultimate Static Capacity for Driven Piles (pdf, 1.5 Mb)	SA-98-074	
User's Manual for Computer Program SPILE: Ultimate Static Capacity for Driven Piles	SA-92-044	PB93-216802
User's Manual for Laterally Loaded Pile Analysis Program for the Microcomputer, (COM624P) Version 2.0 (ISDDC)	SA-91-048	PB-94108305

Reinforced Soil Structures

TITLE	FHWA#	NTIS#
Corrosion/Degradation of Soil Reinforcements for Mechanically Stabilized Earth Walls and Reinforced Slopes (ISDDC)	NHI-00-044	
Demonstration Project 103 Design & Construction Monitoring of Soil Nail Walls Project Summary Report (0.5 mb)	IF-99-026	
Durability/Corrosion of Soil Reinforced Structures (ISDDC)	RD-89-186	PB91-176610
Geotechnical Engineering Circular No. 2 - Earth Retaining Systems	SA-96-038	PB97-173629
Guidelines for Design Specifications & Contracting of Geosynthetic Mechanically Stabilized Earth Slopes on Firm Foundations	SA-93-025	PB93-207140

Manual for Design & Construction of Soil Nail Walls (ISDDC) CADD Files (1.5 MB, zip) Appendices (Word/WP) (0.2 MB)	SA-96-069R	PB99-146862
Mechanically Stabilized Earth Walls and Reinforced Soil Slopes Design and Construction Guidelines (ISDDC)	NHI-00-043	
Reinforced Soil Structures, Volume 2 - Summary of Research and Systems Information	RD-89-044	
Reinforced Soils Structures, Volume 1	RD-89-043	PB91-197269
RSS Reinforced Slope Stability - A Microcomputer Program - User's Manual	SA-96-039	PB97-146484
Soil Nailing Field Inspectors Manual-Soil Nail Walls (ISDDC)	SA-93-068	PB94-193315
Soil Nailing for Stabilization of Highway Slopes and Excavations	RD-89-198	PB-92117696
Training Course in Geotechnical and Foundation Engineering: Earth Retaining Structures - Participants Manual	NHI-99-025	
Training Course in Geotechnical and Foundation Engineering: Earth Retaining Structures - Student Exercises	NHI-99-026	

Retaining Walls

TITLE	FHWA#	NTIS#
Analysis And Design Problems in Modeling Slurry Wall Construction	RD-73-93	PB-230940
Concepts for Improved Lateral Support Systems	RD-75-131	PB-255706
Lateral Support Systems and Underpinning, Volume 1 (ISDDC)	RD-75-128	PB-257210/AS
Lateral Support Systems and Underpinning, Volume 2 (ISDDC)	RD-75-129	PB-257211/AS
Lateral Support Systems and Underpinning, Volume 3 (ISDDC)	RD-75-130	PB-257212/AS
Slurry Walls as an Integral Part of Underground Transportation Structures	RD-80-047	PB82-145061

Rock Slopes

TITLE	FHWA#	NTIS#
Rock Blasting and Overbreak Control (ISDDC)	HI-92-001	PB97-186548
Rock Slope Engineering	TS-79-208	PB80-103294
Rockfall Hazard Mitigation Methods - Participant's Notebook (ISDDC)	SA-93-085	PB97-183396
Rockfall Hazard Rating System - Participant's Manual (ISDDC)	SA-93-057	PB96-129127
Rockslopes: Design, Excavation, Stabilization	TS-89-045	
Training Course in Geotechnical and Foundation Engineering: Rock Slopes - Participants Manual	HI-99-007	
Training Course in Geotechnical and Foundation Engineering: Rock Slopes - Student Exercises	NHI-99-036	

Seismic Design

TITLE	FHWA#	NTIS#
Determination of Seismically Induced Soil Liquefaction Potential at Proposed Bridge Sites, Volume 1	RD-77-127	PB-282354
Determination of Seismically Induced Soil Liquefaction Potential at Proposed Bridge Sites, Volume 2	RD-77-128	PB-282355
Geotechnical Engineering Circular No. 3 - Earthquake Engineering for Highways, Design Principles, Volume 1 (ISDDC)	SA-97-076	PB98-11560
Geotechnical Engineering Circular No. 3 - Earthquake Engineering for Highways, Design Examples, Volume 2 (ISDDC)	SA-97-077	PB98-11578
Seismic Design of Highway Bridge Foundations, Volume 1	RD-86-101	PB87-133062
Seismic Design of Highway Bridge Foundations, Volume 2	RD-86-102	PB88-157276
Seismic Design of Highway Bridge Foundations, Volume 3	RD-86-103	PB88-157284

Shale

TITLE	FHWA#	NTIS#
Design and Construction of Compacted Shale Embankments, Volume 1	RD-75-61	PB76-253120/AS
Design and Construction of Compacted Shale Embankments, Volume 2	RD-75-62	PB76-253121/AS

Design and Construction of Compacted Shale Embankments, Volume 3	RD-77-1	PB77-275396/AS
Design and Construction of Compacted Shale Embankments, Volume 4	RD-78-140	PB78-292418/AS
Design and Construction of Compacted Shale Embankments, Volume 5	RD-78-141	PB78-296506/AS
Design and Construction of Shale Embankments, Summary (ISDDC)	TS-80-219	PB89-229330

Slope & Embankment Stability

TITLE	FHWA#	NTIS#
Advanced Course on Slope Stability, Volume 2	SA-94-006	PB95-249553A
Advanced Course on Soil Stability, Volume 1	SA-94-005	PB95-225819
EMBANK-One Dimensional Compression Due to Embankment Loads - User's Manual (ISDDC)	SA-92-045	PB93-219046
Factors That Influence the Stability of Slopes--A Literary Review	RD-79-54	PB80-112360
Foundation Design of Embankments on Varved Clays	TS-77-214	PB-275727
High Resolution Sensing Techniques for Slope Stability Studies, Final Report	RD-79-32	PB80-124621
Highway Slope Maintenance and Slide Restoration Workshop (ISDDC)	RT-88-040	PB97-186530
Proceedings of the Foundation Deformation Prediction Symposium, Volume 1	RD-75-515	PB25476218
Proceedings of the Foundation Deformation Prediction Symposium, Volume 2	RD-75-516	PB25476316

Soil Compaction & Stabilization

TITLE	FHWA#	NTIS#
A Laboratory Evaluation of Two Proprietary Materials as Compaction Aids and Soil Stabilizers	RD-75-32	PB88-136353/AS
Chemical Compaction Aids for Fine Grained Soils, Volume 1	RD-79-63	PB80-301115
Chemical Compaction Aids for Fine Grained Soils, Volume 2	RD-79-64	PB80-102411

Development and Evaluation of Chemical Soil Stabilizers, Final Report	RD-75-17	PB-242556
Soil and Base Stabilization and Associated Drainage Considerations, Volume 1	SA-93-004	PB93-190148
Soil and Base Stabilization and Associated Drainage Considerations, Volume 2	SA-93-005	PB94-193315
Soil Stabilization in Pavement Structures, Volumes 1 and 2	IP-80-2	PB83-186403 PB83-186411
The Role of Magnesium Oxide in Lime Stabilization, Volume 1	RD-75-98	
The Role of Magnesium Oxide in Lime Stabilization, Volume 2	RD-75-99	
The Role of Magnesium Oxide in Lime Stabilization, Volume 3	RD-75-100	

Spread Footings

TITLE	FHWA#	NTIS#
Performance of Highway Bridge Abutments Supported By Spread Footings on Compacted Fill (ISDDC)	RD-81-184	PB83-201822
Spread Footings for Highway Bridges	RD-86-185	PB88-181706
Training Course in Geotechnical and Foundation Engineering: Shallow Foundations - Participants Manual	NHI-01-023	
Training Course in Geotechnical and Foundation Engineering: Shallow Foundations - Student Exercises	NHI-01-024	
Users Manual for Computer Program CBEAR: Bearing Capacity Analysis of Shallow Foundations	SA-94-034	PB96-210869

Structural Foundations

TITLE	FHWA#	NTIS#
Bridge Foundation Needs	RD-82-050	PB82-263294
Evaluation and Improvement of Existing Bridge Foundations	RD-83-061	PB84-199454
Tolerable Movement Criteria for Highway Bridges (ISDDC)	RD-81-162	PB83-198804

Tolerable Movement Criteria for Highway Bridges (ISDDC)	RD-85-107	PB86-150745/AS

Subsurface Exploration

TITLE	FHWA#	NTIS#
Data Processing Applied to Site Characterization	RD-82-049	PB83-148726
Detection of Subsurface Cavities by Surface Remote Sensing Techniques	RD-75-80	PB-253379
Development of Airborne Electromagnetic Survey Instrumentation and Application to the Search for Buried Sand and Gravel, Summary Report	RD-77-35	PB-271331
Sensing Systems for Measuring Mechanical Properties in Ground Masses, Volume 1	RD-81-109	PB82-190448
Sensing Systems for Measuring Mechanical Properties in Ground Masses, Volume 2	RD-81-110	PB83-155952
Sensing Systems for Measuring Mechanical Properties in Ground Masses, Volume 3	RD-81-111	PB83-155960
Sensing Systems for Measuring Mechanical Properties in Ground Masses, Volume 4	RD-81-112	PB83-155978
Sensing Systems for Measuring Mechanical Properties in Ground Masses, Volume 5	RD-81-113	PB82-154576
Training Course in Geotechnical and Foundation Engineering: Subsurface Investigations - Participants Manual (ISDDC)	HI-97-021	

Testing

TITLE	FHWA#	NTIS#
Compilation and Analysis of Cyclic Triaxial Test Data, Final Report	RD-77-129	PB-281951
Cone Penetrometer Test	SA-91-043	PB92-178524
Determination of Consistency Characteristics of Soils	RD-77-101	PB-277465
Determination of Horizontal Stress in Soils	RD-81-118	PB82-117789
Determination of the in Situ Permeability of Base and Subbase Courses	RD-79-88	PB-300908
Determination of the In Situ State of Stress of Soil Masses	RD-74-68	PB-242710

Dynamic Testing of Slotted Underdrain Pipe	RD-79-501	PB80-120090
Evaluation of Self-boring Pressuremeter Tests in Boston Blue Clay, Interim Report	RD-80-052	PB81-154361
Flat Dilatometer Test	SA-91-044	PB92-177120
Geotechnical Risk Analysis: A Users Guide	RD-87-111	
Geotechnical Risk and Reliability: The State of the Art	RD-87-110	
Pressuremeter Test for Highway Applications	IP-89-008	

Tunneling

TITLE	FHWA#	NTIS#
Aerial Remote Sensing Techniques for Defining Critical Geologic Features Pertinent to Tunnel Location & Design	RD-76-72	PB-278032
Cut-and-cover Tunneling, Volume 1	RD-76-28	PB-222997
Drilling and Preparation of Reusable, Long Range, Horizontal Bore Holes in Rock and in Gouge, Volume 1	RD-75-95	PB-251749
Drilling and Preparation of Reusable, Long Range, Horizontal Bore Holes in Rock and in Gouge, Volume 2	RD-75-96	PB-251613
Earthquake Engineering of Large Underground Structures	RD-80-195	PB81-247918
Evaluation of Second Eisenhower Tunnel Instrumentation Results	RD-83-010	PB83-202606
Highway and Rail Transit Tunnel Inspection Manual and the Maintenance and Rehabilitation Manual		
Improved Subsurface Investigation for Highway Tunnel Design and Construction, Volume 1	RD-74-29	PB-242394
Prevention and Control of Highway Tunnel Fires (197 kb)	RD-83-032	

Waste Utilization

TITLE	FHWA#	NTIS#
Availability of Mining Wastes and Their Potential for use as Highway Materials, Volume 1	RD-76-106	PB-266169
Availability of Mining Wastes and Their Potential For Use as Highway Materials, Volume 2	RD-76-107	PB-266169
Availability of Mining Wastes and Their Potential For Use as Highway Materials, Volume 3	RD-76-108	PB-266169

Coal Mine Refuse in Highway Embankments	TS-80-213	GPO-050-001-00
Evaluation of Sulfate Bearing Waste Material from Fluidized Bed Combustion of Coals for Soil Stabilization	RD-77-136	PB-278031
Feasibility of Using Sewage Sludge in Highway Embankment Construction, Interim Report	RD-75-38	PB-242260
Fly Ash as a Construction Material	IP-76-16	PB-259302
Use of Waste Sulfate for Remedial Treatment of Soils, Volume 1 - Discussion of Results	RD-76-143	PB-278140
Use of Waste Sulfate for Remedial Treatment of Soils, Volume 2 - Appendixes	RD-76-144	PB-278141

Hydraulics

(See FHWA internet site at http://www.fhwa.dot.gov/engineering/hydraulics/index.cfm for updates.)

	Hydraulic Design Series (HDS)	YEAR	FHWA-#	NTIS-#
	HDS Archived Publications			
HDS 1	Hydraulics of Bridge Waterways (4.8 Mb, pdf)	1978	EPD-86-101	PB86-181708
HDS 2	Highway Hydrology Second Edition (ISDDC)	2002	NHI-02-001	
HDS 3	Design Charts for Open-Channel Flow (10.9 Mb, pdf)	1961	EPD-86-102	PB86-179249
HDS 4	Introduction to Highway Hydraulics (ISDDC)	2001	NHI-01-019	
HDS 5	Hydraulic Design of Highway Culverts (.pdf, 9.25 mb, includes corrections) Corrections to SI Nomographs	2001	NHI-01-020	
HDS 5	Hydraulic Design of Highway Culverts	2005	NHI-01-020	
HDS 6	River Engineering for Highway Encroachments (ISDDC)	2001	NHI-01-004	

Top

	Hydraulic Engineering Circulars (HEC)	YEAR	FHWA-#	NTIS-#
	HEC Archived Publications			
HEC 9	Debris-Control Structures (2.1 Mb, pdf)	1971	EPD-86-106	PB86-179801
HEC 11	Design of Riprap Revetment (ISDDC)	1989	IP-89-016	PB89-218424
HEC 11SI	Design of Riprap Revetment (3.7 Mb, pdf)	2000	IF-00-022	
HEC 14	Hydraulic Design of Energy Dissipators for Culverts & Channels (ISDDC)	1983	EPD-86-110	PB86-180205
HEC 14SI	Hydraulic Design of Energy Dissipators for Culverts & Channels (SI) (6.7 Mb, pdf) (Errata Sheet)	2000	IF-00-022	
HEC 14	Hydraulic Design of Energy Dissipators for Culverts and Channels	2006	NHI-06-086	
HEC 15	Design of Roadside Channels with Flexible Linings (ISDDC)	1988	IP-87-7	PB89-122584
HEC 15SI	Design of Roadside Channels with	2000	IF-00-022	

	Flexible Linings (6.7 Mb, pdf)			
HEC 15	Design of Roadside Channels with Flexible Linings, Third Edition	2005	IF-05-114	
HEC 17	The Design of Encroachments on Flood Plains using Risk Analysis (3.6 Mb, pdf)	1981	EPD-86-112	PB86-182110
HEC 18	Evaluating Scour at Bridges, Fourth Edition (Errata Sheet) (ISDDC)	2001	NHI-01-001	
HEC 20	Stream Stability at Highway Structures, Third Edition (Errata Sheet) (ISDDC)	2001	NHI-01-002	
HEC 21	Bridge Deck Drainage Systems (2.4 Mb, pdf)	1993	SA-92-010	PB94-109584
HEC 22	Urban Drainage Design Manual Second Edition (ISDDC)	2001	NHI-01-021	
HEC 23	Bridge Scour and Stream Instability Countermeasures Experience, Selection, and Design Guidance, Second Edition (Errata Sheet) (ISDDC)	2001	NHI-01-003	
HEC 24	Highway Stormwater Pump Station Design (2.8 Mb, pdf) Word Version (10.0 Mb, doc) HEC 24 Cover for Word Version (56 kb, doc) (ISDDC)	2001	NHI-01-007	
HEC 25	Highways in the Coastal Environment, Second Edition (5 Mb, pdf) (ISDDC)	2008	NHI-07-096	

Top

	Hydraulic Reports	**YEAR**	**FHWA-#**	**NTIS-#**
	Hydraulics Reports Archived Publications			
DP	Underwater Inspection of Bridges (ISDDC)	1980	DP-80-1	
DP	Underwater Evaluation And Repair of Bridge Components (ISDDC)	1998	DP-98-1	
FLP	Best management Practices for Erosion and Sediment Control (ISDDC)	1995	FLP-94-005	
HI	Geosynthetic Design and Construction Guidelines (ISDDC)	1995	HI-95-038	PB95-270500
IP	Culvert Inspection Manual (ISDDC)	1986	IP-86-2	PB87-151809
IP	Structural Design Manual for Improved Inlets and Culverts (9.8 Mb, pdf)	1983	IP-83-6	PB84-153485
RD	Countermeasures for Hydraulic	1978	RD-78-162	PB-297132

	Problems at Bridges, Vol. 1 Analysis and Assessment (ISDDC)			
RD	Countermeasures for Hydraulic Problems at Bridges, Vol. 2 Case Histories (ISDDC)	1978	RD-78-163	PB-297685
RD	Culvert Repair Practices Manual Volume I (ISDDC)	1994	RD-94-096	
RD	Culvert Repair Practices Manual Volume 2 (ISDDC)	1995	RD-95-089	
RD	Development of Hydraulic Computer Models to Analyze Tidal and Coastal Stream Hydraulic Conditions at Highway Structures (Phase 3 for Pooled Fund Study) (ISDDC)	2002	SC-02-03	
RD	Hydraulic Flow Resistance Factors for Corrugated Metal Conduits (ISDDC)	1980	RD-80-216	
TS	Guide for Selecting Manning's Roughness Coefficient For Natural Channels & Flood Plains (WSP 2339) (3.5 Mb, pdf) (ISDDC)	1984	TS-84-204	PB84-242585
TS	Underground Disposal of Storm Water Runoff, Design Guidelines Manual (5.7 Mb, pdf)	1980	TS-80-218	PB83-180257
WSP	Roughness Characteristics of Natural Channels (Geological Survey Water-Supply Paper 1849)	1967		

Top

	Publications on CD-ROM	**YEAR**	**FHWA-#**	**NTIS-#**
	CD-ROM Archived Publications			
Alliance	FHWA Hydraulics Library on CD-ROM Updated Browser	2002		N/A

Bridge Program

Bridge Programs Software and Publications

To view PDF files, you need the Acrobat® Reader®

Publications:

- Recording and Coding Guide for the Structure Inventory and Appraisal of the Nations Bridges (pdf 0.8 Mb) (doc 2.2 mb)
    - Errata Sheet for Coding Guide (10/2001)
- Heated Bridge Technology Report on ISTEA Sec. 6005 Program (8.1 mb, pdf)
  Publication No. FHWA-RD-99-158 July 1999
- Edit Update Program Documentation Users Guide (205 kb, pdf)
- Conversion Program Documentation Users Guide (73 kb, pdf)
- SI&A Program Documentation Users Guide (41 kb, pdf)

Software:

- Edit/Update Program Mainframe Version
- Edit/Update Program PC Version
- Conversion Program Mainframe Version
- Conversion Program PC Version
- SI&A Program Mainframe Version
- SI&A Program PC Version

CHAPTER 8
APPENDIX

Many memos, guidance, technical advisories and other key documents have been referenced in the FHWA Bridge Program Manual. These documents are subject to revision or other action that means that they might not be controlling documents with respect to the administration of the Highway Bridge Program. The FHWA has established a database to house laws, regulation, policy and guidance, and this resource is the best location to find the documents referenced in this manual. Please refer to the Policy and Guidance Center for clarification on the latest versions of any documents.

The FHWA Policy and Guidance Center can be accessed at the following website: http://intra.fhwa.dot.gov/pgc.

Example Load Rating and Posting Questionnaire

The following questions were developed for use when conducting a focused in-depth review of load ratings and postings or as a supplement to the annual review of the National Bridge Inspection Standards (NBIS) compliance. The questions were also developed to facilitate the collection of information necessary to complete a risk assessment specific to the element of bridge load ratings and postings.

Staffing/Training

What are the qualifications of the individual in charge of load ratings? Does he/she?

- Have a P.E.?
- Have an engineering degree?
- Has he/she attended any recent training?

How many years of experience?

What are the qualifications of the individuals performing the load ratings? Do they...

- Have P.E.s?
- Have engineering degrees?
- Have they attended any training recently?
- Typically how many years of experience?

Is routine training typically provided to all load rating personnel?

Does training include current load rating topics such as LRFR?

Operational Procedures

What documents are available as guidance for load rating and posting procedures?

- Are these documents up-to-date?
- Are the documented procedures followed?
- Are the documents readily available and in a usable format?

Are up-to-date load rating procedures used?

FHWA Guidance/Involvement

What (if any) load rating and/or posting policies have been established between:

The FHWA Division Office and the State?

The State and locals?

Are these policies up-to-date and followed?

What review measures are taken by the FHWA for load rating and posting?

Are load rating calculation and documentation checked?

Are field verifications made of postings?

Are posting and closing notifications checked?

Problem History/Public Interest

Are there any notable past issues pertaining to load rating or posting?

NBIS review findings?

History of bridge failures due to over loading?

History of bridges that should be posted but are not or have incorrect posting signs?

Is the State increasing legal load limits?

Has load rating or posting been the subject of media or public interest recently?

New Components/Emerging Initiatives

Are there any new load rating/posting methods, software, features, or emerging initiatives that are being introduced to the program?

If yes, how much training or experience does the staff have with new method, software, or feature?

Relations with Partners/Outside Agencies

How are the local counties and cities involved in the loading/posting process?

Are consultants used for load rating?

- Are they used for complex bridges?
- Are there many different consultant used?
- What oversight and review measures are taken of consultants?
- What training and qualification are required for consultants?

Do outside groups such as farmers, politicians, trucking association, or commerce interest group influence load rating/posting decisions?

- Which groups?
- To what extent?

Are there emergency, trucking, or school routes that restrict or influence necessary posting?

Quality Control & Quality Assurance

What QA/QC measures are followed for load rating and posting?

Are calculations, logic, assumptions, and decisions well documented?

How is the accuracy of load rating procedures checked?

Are load ratings stamped by a P.E.?

Social Environmental/Congestion Impacts

What social impacts are considered when posting or closing bridges?

- How are these impacts mitigated?

Is the potential effect on traffic congestion considered in the load rating/posting process?

When posting is required on heavily traveled routes, are repairs typically made instead?

Additional Questions

See *NATIONAL BRIDGE INSPECTION STANDARDS (NBIS) ANNUAL PROGRAM REVIEW SUMMARY REPORT* for additional questions in the subject areas of:

Timeliness of:

Completion of load ratings

Updating bridge inventory data

Installation of load postings

Procedures, Policies, and Standard Operating Practices

Quality Control and Quality Assurance

FOREWORD

In Fiscal Year 2004, the Federal Highway Administration's (FHWA's) Office of Planning, in cooperation with the Federal Transit Administration's (FTA's) Office of Planning, launched an initiative to develop a prototype reference document on Federal transportation planning and programming provisions.

This resulting document, entitled the *Field Planner Guidebook*, is envisioned as a "next generation" version of the former Bureau of Public Road's *Highway Planning Program Manual* (historically known as the "Turquoise Book"), with similarities to the *FHWA Environmental Guidebook*.

The contents of this *Guidebook* focus on key transportation planning-related oversight and stewardship issues, activities, and products that can be used by FHWA Division Office and FTA Regional Office planners in the effective administration of Federal transportation planning programs in their respective States and metropolitan areas. A key focus of the *Guidebook* is to institutionally capture past informal and/or undocumented program guidance into a single, user-friendly repository.

This *Guidebook* will be a "living document" posted on the FHWA Office of Planning's *StaffNet* and the FHWA/FTA Oversight (www.oversight.volpe.dot.gov) websites, to be periodically updated and expanded. Comments and feedback on the current *Guidebook* sections, as well as ideas for future *Guidebook* sections, should be provided to Ms. Lorrie Lau, FHWA Office of Planning, at (415) 744-2628.

Introduction

Background

What is the Field Planner Guidebook?

- The Guidebook is an internal reference manual developed for use by FHWA/FTA field office transportation planners to provide information on the administration of the planning program.
- The Guidebook addresses numerous areas of the transportation planning program for which the field planners are responsible.

What needs do the Guidebook serve?

- This Guidebook serves as a reference manual on planning administration for new planners and a refresher for more experienced planners.
- It pulls the legislative and regulatory requirements together and provides a roadmap for the field planners to follow in implementing the transportation planning program.

How does the Guidebook apply to my day-to-day work?

- It was written with the field planners in mind, from their perspective.
- Although the Guidebook cannot address every aspect of the particular program areas, we have compiled background information and some of the most commonly asked questions pertaining to those program areas.
- If you have questions and issues that are applicable to all field planners, but are not addressed in the current Guidebook, you may want to forward your question and comments to the Planning Liaison to include and incorporate in future updates.

How do I use the Guidebook?

- The Guidebook is written in a question and answer format.
- Each chapter is organized in the following format:
    - Background
    - Legislation and Regulation reference
    - Detail Subject material issues
    - Actions by the divisions/regions
    - Resources

How will the Guidebook be updated?

- Over the course of the next year or so, the Office of Planning will be working to add more chapter topics to the Guidebook.
- We anticipate that this Guidebook will be a dynamic document, and will be continuously updated to reflect changes in statutes and regulations.
- When a new chapter topic is posted, it will be marked "draft" at the top. The Guidebook Team will ask for feedback on the "draft" chapter, during a set comment period. Once finished, the chapter will have a "last update" date to denote when the chapter was finalized.
- The guidebook, as well as updated and addendums, will be available on the StaffNet and FHWA/FTA Oversight (www.oversight.volpe.dot.gov) websites.

Legislation and Regulations

What are the primary provisions that govern, direct, or influence the administration of the Federal-aid Highway Program (FAHP) and the Mass Transportation Program, particularly the transportation planning program?

- There are several key sources:
  - **Title 23, "Highways**", also referred to as 23 United State Code (USC), includes most of the laws that govern the Federal-Aid Highway Program (FAHP) in a systematic, or codified manner. New surface transportation authorization acts may amend Title 23 Most provisions pertaining to planning are found in Section 134 (metropolitan) and Section 135 (statewide). Those sections are cited as 23 U.S.C. 134 and 23 U.S.C. 135, respectively. Some provisions of surface transportation law are not incorporated into 23 U.S.C. For example, authorization amounts are not usually codified, and the Transportation, Community, and System Preservation (TCSP) program, authorized in SAFETEA-LU Section 1117, has not been codified into Title 23. Congressional earmarks are not normally codified either.
  - **Title 49, "Mass Transportation"**, as codified in 49 U.S.C., Chapter 53, is the body of laws governing the federal Mass Transportation Program and explicitly codifies legislation applicable to FTA. The majority of provisions related to planning may be found in Sections 5303 through 5305 and Section 5313(b). Section 5303 pertains to metropolitan planning and 5313(b) relates to statewide planning. Title 49 ensures that metropolitan areas develop plans that consider intermodal transportation solutions at the regional level. Other important parts of Title 49 to be aware of and familiar with include Section 5307 (Urbanized Area Formula Grants) and Section 5309 (Capital Investment Program).
  - **Titles 23 and 49 of the Code of Federal Regulations (CFR),** also referred to as 23 CFR/49 CFR, are the FHWA's and FTA's implementation of the laws passed by Congress. The primary regulations governing the federal-aid transportation planning program are found in 23 CFR Part 450/49 CFR 613 (Joint FHWA/FTA regulation on Planning Assistance and Standards) and 23 CFR Part 420 (FHWA's Planning and Research Program Administration). Other parts of 23 CFR and other CFR titles may contain regulations that affect the planning program. Many of these are referenced in subsequent chapters of this Guidebook.
    - For regulations to become formalized and be recognized as law, they must be announced and adopted through the Federal Register. The Federal Register describes itself as "a uniform system for making available to the public regulations and legal notices issued by Federal agencies. These include Presidential proclamations and Executive Orders, Federal agency documents having general applicability and legal effect, documents required to be published by act of Congress, and other Federal agency documents of public interest."
    - For more information on the Federal Register and the process which applies to the development and adoption of regulations, you can click on: http://www.archives.gov/federal-register/index.html
  - Formal guidance developed by the agency; as well as any informal "administrative" guidelines.
  - Other agencies' regulations or guidance (such as OMB Circulars) can apply to certain situations.
  - Finally, there are instances that require checking the language of appropriations bills for exact information. These are often not codified into Title 23, as they are not intended to apply permanently to the program.

Is there an order of authority? Is this important?

- In general, our activities are governed by the following:
  - The U.S. Constitution
  - Statute (e.g. ISTEA , TEA-21, and SAFETEA-LU) –as codified in Title 23 or Title 49 of the United States Code, cannot be overruled except by Congress, or a decision handed down by a Federal court. If Congress specifies something, we have to do it. Often, however, Congress will direct us to develop regulations and/or guidance based on general stated principles. There are two types of bills that Congress passes:
    - Authorization -Substantive legislation enacted by Congress that sets up or continues the legal operation of a Federal program or agency either indefinitely or for a specific period of time, or that sanctions a particular type of obligation or expenditure with a program.
    - Appropriation -An authorization by an act of Congress and signed by the President that provides authority to permit Federal agencies to incur obligations and to make payments out of the Treasury for specified purposes. An Appropriations act generally follows enactment of authorizing legislation unless the authorizing legislation itself provides the budget authority.
  - Regulation - FHWA and FTA develop these to implement the Statutes: frequently must go through a public rulemaking process, and can be challenged in court if inconsistent with laws. Regulations are based largely on the language and content of the statutes and on the accompanying Congressional reports. To change a regulation, the process initially required to develop and adopt the regulation must be followed. Government-wide Directives – OMB Circulars and Executive Orders prescribe or establish policy, organization, methods, procedures, requirements, guidelines, or delegations of authority.
  - Circulars – FTA develops these in response to Statutes for managing its grant programs as well as for general management purposes and agency policy. FTA Circulars can be changed administratively. Circulars can be found at the following website: http://www.fta.dot.gov/270_ENG_HTML.htm
  - Policy - Policy memorandums are official FHWA and FTA issuances that establish new and/or revised policy and guidance for implementing the requirements related to FHWA's and FTA's programs. Some of the policies are found in the Federal-aid Policy Guide (FAPG), or are stand-alone memos issued by the appropriate program offices.
  - Guidance - FHWA/DOT develops these in response either to statute, regulations or both. These can be changed administratively, but not capriciously. For example, an environmental group might complain if we suddenly altered our guidance for Environmental Impact Statements.
  - "Administrative guidelines"/guidance memos - these are often internal and do not need a process to change.

How can legislation or the CFR be accessed?

- The easiest way to search for a code section is to go to the following website: http://www.gpoaccess.gov/U.S.C.ode/index.html and type in the following into the search box: *title number, "U.S.C.," then section number* (i.e., 23 U.S.C. 134 for metropolitan planning). Regulations, Congressional bills, and the Federal Register can be obtained at the following site: http://www.gpoaccess.gov/index.html. FTA legislation can be found at the following website**:** http://www.fta.dot.gov/legal/statutes/441_ENG_HTML.htm

What regulations are in place to implement SAFETEA-LU?

- The Final Rulemaking was published in the February 14, 2007 ***Federal Register***, and is effective as of March 16, 2007. The new rules are codified in 23 CFR Part 450 and 49 CFR Part 613. This rulemaking also contains a revision to 23 CFR 500.109 related to congestion management process (formerly the congestion management systems) in Transportation Management Areas (TMAs).

- It's recommended that you read the Preamble of the Final Rulemaking to gain an insight into regulations. The Preamble provides important background information, summary of the comments, and the reasoning behind the development of the final regulations.
- For more information, go to the following website, http://a257.g.akamaitech.net/7/257/2422/01jan20071800/edocket.access.gpo.gov/2007/07-493.htm

Why are there two U.S.C. Titles governing the FHWA and FTA programs, 23 U.S.C. and 49 U.S.C.?

- Statutes governing the Federal-Aid Highway Program were enacted and codified (1958) under Title 23 Highways.
- With the formation of US Department of Transportation (USDOT), Title 49 was enacted and codified in 1978.
- FHWA must adhere to many of the statutes, as amended, related to USDOT.
- 23 U.S.C. contains codified legislation applicable directly to FHWA, while 49 U.S.C. Chapter 53 has all the codified legislation applicable to FTA.
- Other aspects of FHWA's overall authority and related activities are codified in Titles such as 16 U.S.C., and 42 U.S.C. Although infrequent, there may be a need to review and interpret program responsibilities under other Codified Titles.

Once I have all the required information, how do I interpret the information?

- There is an order of authority. Utilizing this hierarchy, interpretations should be based on the following analysis:
  - All elements listed in the hierarchy formulate an operational policy for FHWA's and FTA's conduct of day-to-day activities.
  - "Shall/must" conditions indicate a requirement that the agency's representatives must adhere to and enforce.
  - Other conditions of wording (should, may, recommended, etc.) are areas left up to the discretion of agency representatives to apply on a case-by-case basis utilizing facts pertinent to that specific project, program or process.

It is strongly suggested, should you find yourself in an area of concern in which there is no documentation in any elements of the order of authority, that you seek assistance as indicated in the last Q&A in this section.

Resources

Are there other resources that are available?

- The website, http://www.fhwa.dot.gov/hep/legreg.htm, provides links to Congressional bills (enacted and proposed), the Code of Federal Regulations, and written policy and guidance on a wide array of planning, environmental, or right-of-way program issues.
- This website includes a link to the Library of Congress, "Thomas" website that provides access to current and past Congressional legislation and other legislative activities, including access to committee and conference reports.
  - These reports provide background and insights into the intended Congressional purpose and meaning of enacted legislation.
  - Access "Thomas" directly at: http://thomas.loc.gov.
- This website http://www.fta.dot.gov/ has in-depth information regarding FTA's grant programs, planning and technical assistance.

What training opportunities are available?

- Many of the NHI and NTI courses describe and explain laws and regulations that apply to the planning program. (http://www.ntionline.com/ and http://www.nhi.fhwa.dot.gov/)
- The following courses are more focused than the typical NHI and NTI offerings on the details of certain laws, regulations, and policy/guidance that impact the transportation planning program as it applies to Title 23.
  - *Financing Federal-aid Highways* – discusses how the federal-aid highway program came about, the major legislation that over the years has established and revised the structure for the program, the importance of contract authority, the funding mechanisms, and other key legislative provisions that affect how we administer the program.
  - *The Administration of FHWA Planning and Research Funds* – focuses on the administrative requirements for reviewing and approving state and MPO work programs, the authorization of the obligation of planning and research funds, and state and MPO expenditures of FHWA funds for their respective activities supporting planning and research.

What if I need to talk about a "situation" or "issue" with someone?

- Contact your assigned HEPP Planning Stewardship Liaison or designated HEPP "specialist" on the topic of concern, or
- Contact the FTA Office of Planning and Environment with specific questions.
- Check the FHWA and FTA planning websites for assistance and contact information:
  - www.fhwa.dot.gov/hep/contacts.htm
  - www.fhwa.dot.gov/hep/index.htm
  - www.fta.dot.gov/3875_ENG_HTML.htm
  - www.planning.dot.gov
- Contact the Resource Center's planning, air quality, or environment Technical Services Teams, depending on the issue
- Review the resources available on the Planning Community of Practice Website: http://knowledge.fhwa.dot.gov/planning.
- Discuss with other experienced FHWA Division Office or FTA Regional Office planners.

Air Quality & Transportation Conformity

Background

What are the major transportation-related air pollutants that are subject to transportation conformity?
EPA sets **National Ambient Air Quality Standards**, or NAAQS (40 CFR Part 50) for pollutants considered harmful to public health and the environment. Of the six pollutants with standards, four are applicable to transportation conformity.

NAAQS Pollutant	Transportation conformity applicable?
Carbon monoxide	YES
Lead	NO
Nitrogen Dioxide	YES
Particulate Matter (PM2.5 and PM10)	YES
Ozone	YES
Sulfur Dioxide	NO

What is a State Implementation Plan (SIP)?

- A State Implementation Plan (SIP) is the state air quality plan for meeting the NAAQS.
- It is a compilation of legally enforceable rules and regulations prepared by a state or local air quality agency and submitted by the state's governor to EPA for approval.
- The SIP assigns emissions reductions for each pollutant or precursors for all sources of pollution in the state, including stationary, mobile and area sources.

What is the difference between stationary, mobile, and area sources?

- **Stationary source** -- Relatively large, fixed sources of emissions, such as power plants, and refineries.
- **Mobile sources** -- a term used to describe a wide variety of vehicles, engines, and equipment that generate air pollution and that move, or can be moved, from place to place.
  - ***On-road*** or highway sources include vehicles used on roads for transportation of passengers or freight such as cars, trucks, and buses.
  - ***Non-road*** sources include vehicles, engines, and equipment that you would not typically expect to find on the roadways, such as construction equipment, airplanes, and agricultural equipment.
- **Area sources** -- these are smaller sources of air pollution that may not emit a lot of pollutants individually but collectively contribute to the air pollution burden, such as drycleaners, and emissions given off by paints and solvents.

How are nonattainment /maintenance /attainment areas defined?

- ***Nonattainment* area** - Any geographic region of the United States that has been designated by EPA as a nonattainment area under section 107 of the CAA for any pollutants for which an NAAQS exists. An area may be a nonattainment area for one pollutant and in attainment area for others.

- **Maintenance Area -** Any geographic region of the United States previously designated nonattainment pursuant to the CAA Amendments of 1990 and subsequently redesignated to attainment subject to the requirements to develop a maintenance plan under section 175(A) of the CAA, as amended.

- **Attainment area** - An area considered to have air quality that meets or exceeds the NAAQS, which EPA establishes according to the requirements of the CAA.

What are the different boundary area definitions for air quality verses planning? Are the non-attainment/maintenance boundaries the same as the MPO planning boundaries?

- **MPO planning boundary** - the geographic area determined by agreement between the MPO for the area and the Governor, in which the metropolitan transportation planning process is carried out.
- **Nonattainment boundary** – the boundary delineating a geographic region of the United States which EPA has been designated as not meeting the NAAQS for one or more pollutants.
- **Donut Area** – the geographic area outside a metropolitan planning area boundary, but within the boundary of a nonattainment or maintenance area that contains any part of a metropolitan area(s). This "donut area" is not typically included in the transportation modeling or planning process of the adjacent MPO(s). These areas are also not considered to be isolated rural nonattainment or maintenance areas.
- **Isolated Rural Area** – a nonattainment or maintenance area that does not contain or is not part of any metropolitan planning area as designated under the transportation planning regulations. An isolated rural area is not covered by a Federally required MTP or TIP and does not have projects that are part of the emissions analysis of any MPO MTP or TI., Instead projects are only included in the relevant statewide transportation improvement program (STIP). These are not donut areas.

Legislation and Regulations

What laws addresses transportation conformity?

The air quality provisions of the Clean Air Act Section 176(c) and the transportation planning provisions of Title 23 and Title 49 of the United States Code require a planning process that integrates air quality and transportation planning such that transportation investments support clean air goals.

What regulations address Transportation Conformity?

Regulations governing transportation conformity are found in Title 40 of the Code of Federal Regulations (40 CFR Parts 51 and 93), and are closely linked with the joint FHWA/FTA transportation planning regulations found in 23 CFR Part 450.

- **Transportation Conformity Rule** (FR with the Preamble): http://www.fhwa.dot.gov/environment/conformity/rule.htm
- **Transportation Conformity Rulemakings** website: http://www.fhwa.dot.gov/environment/conformity/rulemake.htm

Are there policies and guidance that can provide additional information?

Yes, this following website captures all the applicable transportation conformity policies and guidance that were issued by FHWA/FTA and EPA: http://www.fhwa.dot.gov/environment/conformity/con_pol.htm.

Transportation Conformity

What is Transportation Conformity?

- Transportation conformity is required under the Clean Air Act (CAA - Section 176(c) and (42 U.S.C. 7506(c)) to ensure that federally supported highway and transit project activities are consistent with ("conform to") the purpose of the State Implementation Plan.

- Conformity to the purpose of the SIP means that FHWA/FTA funded or approved activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant national ambient air quality standards.
- EPA's transportation conformity rule (40 CFR Parts 51 and 93) establishes the criteria and procedures for determining whether metropolitan transportation plans (MTP or plan), metropolitan transportation improvement programs (TIPs), and FHWA/FTA projects conform to the SIP.
- Transportation conformity applies to areas designated nonattainment and/or maintenance for carbon monoxide (CO), ozone (O3), nitrogen dioxide (NO2) or particulate matter (PM10 and PM2.5). These areas are referred to throughout the rest of this document as “nonattainment areas” or “maintenance areas”.

What is a Transportation Control Measure (TCM)?

- TCMs are specifically identified and committed strategies in approved SIPs designed to reduce emissions from transportation sources.
- These strategies are defined in Section 108 of CAA, or are regionally targeted strategies that will reduce transportation-related emissions by reducing vehicle use or improving traffic flow.
    - Transportation control measures defined in Section 108 of the CAA include:
        - Improved public transit,
        - Traffic flow improvements
        - High-occupancy vehicle lanes,
        - Shared-ride services and travel demand management (TDM) activities,
        - Bicycle/pedestrian facilities,
        - Flexible work schedules.
- Measures which reduce emissions by improving vehicle technologies, fuels, or maintenance practices are not TCMs.

What is a motor vehicle emissions budget?

- The SIP places limits on emissions of each pollutant for each source type (mobile, stationary and area sources). *Projected* emissions from highway and transit usage must be less than or equal to the emissions limits for on-road mobile vehicles that are established by the SIP. These emissions limits for motor vehicle emissions sources are called "motor vehicle emissions budgets."
- Budgets are developed as part of the air quality planning process by State or local air quality/ environmental agencies, and are approved or found adequate by EPA. Transportation agencies (DOTs and MPOs) are expected participate in this process, both due to such a requirement in the conformity rule and because these budgets can have profound impacts on the transportation plans and TIPs for the area.

Who makes a conformity determination?

- Metropolitan Planning Organization (MPO) policy boards make initial conformity determinations on metropolitan plans and TIPs in metropolitan areas, while State Departments of Transportation (DOTs) usually do so in isolated rural areas who, by definition, do not have any associated MPO.
- Final conformity determinations must be made at the Federal level by FHWA/FTA.
- EPA reviews and comments on the conformity determinations prior to the FHWA/FTA determination.

How is a conformity determination made?

- The conformity determination is an assessment that the projects proposed for an area’s transportation plan and TIP will not: (a) cause a new violation of the NAAQS; (b) increase the frequency or severity of a NAAQS violation; or (c) delay timely attainment or any interim milestone.
- The determination is done by assessing whether the key requirements have been met, including:
    - Interagency Consultation
    - Public Involvement
    - Latest Planning Assumptions and Emissions Model

- Regional Emissions Analysis
  - Motor Vehicle Emissions Budget
- Timely Implementation of TCMs
- Fiscal Constraint

How often must conformity be determined?

Conformity determinations must be made at least every four years, but may occur more often if metropolitan plans or TIPs are updated more frequently than every four years or amended with non-exempt projects. Also, conformity determinations must be made within 24 months after SIP motor vehicle emissions budgets are found adequate or approved, whichever is first. Project-level conformity must be determined prior to the first time a non-exempt federal project is adopted, accepted, approved or funded. In addition, conformity determinations must be made within 12-months of an area being designated by EPA as nonattainment for ozone, carbon monoxide, particulate matter, or nitrogen dioxide.

What happens if an MPO cannot make a conformity determination?

- When a conformity determination is not made according to schedule, areas have a one-year grace period to make the determination before there is a conformity lapse. During a lapse, only certain types of projects can proceed:
  - Projects exempt from conformity;
  - TCMs in approved SIPs; and
  - Projects or project phases already authorized.
- Also, during a lapse, no new non-exempt projects can be amended into the plan/TIP and the use of Federal-aid funds is restricted.
- The one-year conformity lapse grace period does not apply to new nonattainment areas that must make a determination on their metropolitan plans and TIPs within 12 months of final designation.

What is interagency consultation?

A formal interagency consultation process is required in each nonattainment and maintenance area to address technical and procedural issues related to transportation conformity. Public consultation procedures for transportation conformity will be developed in accordance with the requirements for public involvement in 23 CFR Part 450. Interagency consultation procedures include general and specific processes, such as:

- Identification of the roles and responsibilities of each agency at each stage in the SIP development and transportation planning process, including technical meetings.
- A process for the development of a list of transportation control measures (TCMs) in the applicable implementation plan.
- Evaluating and choosing models and associated methods and assumptions.
- Determining which projects should be considered regionally significant for inclusion in the TIP and MTP.
- A process for circulating documents (or draft documents) and supporting materials for comment before formal adoption or publication.
- A process for resolving conflicts.

Who are the transportation partners and what are their roles in transportation conformity?

Metropolitan Planning Organization

- Conduct analysis on MTP/TIP and projects
- Incorporate latest emissions factors, planning assumptions, and emissions models
- Circulate draft MTP/TIP for interagency consultation and public comment
- Ensure public involvement procedures are followed
- Ensure timely implementation of TCMs
- Respond to significant comments on TIP/plan conformity documents
- Determine conformity on plan/TIP
- Consult with agencies throughout the conformity determination process

- Consult on the development of the SIP and motor vehicle emissions budgets
- Participate in the TCM substitution process
- Concur on TCM substitutions

State/Local Transportation Agency

- Consult with agencies throughout the conformity determination process
- Conduct regional conformity analysis on projects not in metropolitan areas, based on interagency consultation
- In CO and PM nonattainment areas, conduct "hot-spot" analysis, if necessary as part of a project level conformity determination
- Provide public involvement opportunities and agency responses to significant comments
- Ensure timely implementation of TCMs
- Review and approve staff regional and hot-spot analysis
- Consult on the development of the SIP and motor vehicle emissions budgets
- Participate in the TCM substitution process
- Concur on TCM substitutions in isolated rural areas

State/Local Air Quality/Environmental Agency

- Prepare SIP and motor vehicle emissions budgets for each relevant pollutant
- Ensure interagency involvement during SIP development (including the state DOT and MPO(s))
- Hold public hearings prior to SIP adoption
- Ensure SIPs are complete and transportation control measures are enforceable under the 1990 CAA, prior to board approval action
- Ensure latest emissions factors and planning assumptions are used for SIP development
- Review and approve SIP, forward to EPA for Federal approval
- Participate in the interagency consultation process for plan/TIP development and conformity determination
- Participate in the TCM substitution process and submit substitute TCM to EPA
- Concur on TCM substitution

State Legislature

- Adopt State legislation to develop and enforce applicable CAA provisions
- Ensure funding available for implementation of programs

U.S. DOT-FHWA/FTA

- Make joint conformity determinations on MPO plans/TIPs (and amendments) and projects
- Participate in the interagency consultation process for MTP/TIP development and amendments, and conformity determinations
- Ensure timely implementation of TCMs
- Ensure MPOs allow for adequate public involvement as part of the metropolitan planning process
- Ensure that all other conformity and transportation planning requirements are met
- Develop technical guidance on traffic demand and forecasting, and the Federal aid program
- Consult on the development of the SIP and motor vehicle emissions budgets

U.S. EPA

- Develop conformity rules, regulations, and guidance documents
- Consult on the development of the SIP and motor vehicle emissions budgets
- Review submitted budgets for adequacy and implement adequacy process
- Provide technical guidance on TCMs and SIP development
- Review and comment on draft and submitted control strategy and maintenance SIPs
- Review, comment, and approve SIPs
- Participate in the interagency consultation process for MTP/TIP/project development and conformity determinations

- Review and comment on proposed conformity determinations
- Designate approved emissions models for use in SIP development and conformity determinations
- Designate "guideline" dispersion models for hotspot analysis
- Participate in the TCM substitution process to permit TCMs to be replaced by other appropriate TCMs in SIPs

What is a regionally significant project?
A regionally significant project, as defined in the conformity rule at 40 CFR 93.101, is a transportation project (other than an exempt project) that is on a facility which serves regional transportation needs (such as access to and from the area outside of the region, major activity centers in the region, major planned developments such as new retail malls, sports complexes, etc., or transportation terminals as well as most terminals themselves) and would normally be included in the modeling of a metropolitan area's transportation network, including at a minimum all principal arterial highways and all fixed guideway transit facilities that offer an alternative to regional highway travel.

What does fiscal constraint have to do with Transportation Conformity?
- The conformity rule (40 CFR 93.108) requires that a plan or TIP must meet the fiscal constraint requirements as described in the planning regulations.
- The planning regulations require that projects included in MTPs and TIPs be based upon reasonable assumptions about future revenues and project costs.
- In addition, in the first two years of the TIP, projects are limited to those for which funds are known to be available or committed.

Do the Statewide Long-Transportation Plan and STIP require a conformity determination?
No. The Statewide Long-Range Plan and STIP are not subject to conformity. The TIPs developed by nonattainment/maintenance area MPOs, however, must be found in conformity before they can be included in a STIP.

What is the time horizon of the Transportation Conformity?
- The timeframe of the conformity determination must be through the last year of the transportation plan, that is, at least 20 years.
- However, the Clean Air Act and the conformity rule provide the option to shorten the timeframe of plan/TIP conformity determinations. At the election of the MPO, after consultation with the air pollution control agency and solicitation of public comments and consideration of such comments, the conformity determination period may be shortened, ending with the longest of the following periods:
    - The first 10-year period of any such transportation plan.
    - The latest year in the SIP applicable to the area that contains a motor vehicle emission budget.
    - The year after the completion date of a regionally significant project if the project is included in the TIP, or the project requires approval before the subsequent conformity determination.

  For more information on this option, please refer to ***40 CFR Part 93.106(d) -- Timeframe of Conformity Determination***

Project Level Conformity

What is project-level conformity?
- All Federally funded or approved highway and public transportation projects subject to conformity are required to meet project-level conformity requirements in carbon monoxide and particulate matter nonattainment and maintenance areas. This project level or localized air quality analysis is referred to as a “hot-spot” analysis.

- To demonstrate project-level conformity when necessary, a project must come from a conforming metropolitan plan and TIP; its design concept and scope must not have changed significantly from that in the transportation plan and TIP; the analysis must have used the latest planning assumptions and latest emissions model; and in PM nonattainment/ maintenance areas, there must a demonstration of compliance with any control measures in the SIP.
- Before the NEPA review process is completed on a project, a hot-spot analysis must be addressed according to the requirements described in40 CFR 93.123

.

Tools and Models

What models are needed for Air quality analysis?
Air quality analysis for mobile sources, in most cases, is very complex and performed by combinations of computer models. There are basically three types of models required to perform air quality analysis.

- ***Transportation planning models*** (regional analysis) or ***traffic model*** (traffic flow in individual roadways, intersection, and ramps, etc) -- This type is the model describing and projecting vehicle activities of the facilities to be analyzed.
  - Output: AADT or VMT, speed by functional classification
- ***Emissions rate models*** -- This type of analysis represents the process of estimating emissions by vehicle fleets. When emission rates are combined with vehicle activity data (i.e., VMT), the result is an estimate of emissions by time and space
  - Output: emission rate by speed/vehicle type/vehicle mix, emission output or budget for the different scenarios
- ***Pollution dispersion model*** -- Once the vehicle activities are estimated, and combined with the emissions rates, emissions output, they would be able to estimate the total emission dispersed in the atmosphere. This analysis is performed to estimate pollution concentrations.
  - Output: Concentration by pollutants

What model does EPA require to validate the emission analysis?

- MOVES2010 is EPA's approved motor vehicle emission factor model for estimating pollutants and precursors from cars, trucks, motorcycles, and buses by state and local agencies outside of California.
- To learn more, please visit the following EPA's website on modeling: http://www.epa.gov/otaq/models/moves/index.htm

Actions by the Divisions/Regions

What background information and other materials do I need to prepare the plan/TIP conformity determination?

- Defined horizon years for MTP regional emissions analysis
- Descriptions of latest planning assumptions and latest emissions models
- Confirmation of all appropriate regional emissions analysis requirements are met
- The outputs of the regional emissions analysis to compare against the appropriate tests
- Confirmation of fiscal constraint of the relevant MTP and TIP (or amendment)
- Identification of regionally significant projects, regardless of funding source, within the MPO planning boundaries
- Verification of sufficient public involvement requirements
- Evidence of interagency consultation and documentation of any decisions made through interagency consultation that would affect the conformity process and the ultimate determination
- Proof of timely implementation of Transportation Control Measures

For more detailed information on each of these items see
http://www.fhwa.dot.gov/environment/conformity/ref_guid/chap1.htm#assumptions

How do I actually make a conformity determination?

Many of the steps and activities that are the foundation of the formal joint FHWA/FTA conformity determination are accomplished well in advance of the request by a MPO or State DOT for a federal finding of conformity.

- The interagency consultation process is one primary arena in which most of the items described in the question immediately above are discussed, debated, and decided upon to achieve an acceptable conformity determination.
  - The specifics and operational timeframes of this process are detailed as part of the relevant conformity SIP and perhaps in additional supportive agreements between all or some of the participants in the conformity process.
  - FHWA and FTA staffs need to be active participants in all related consultation activities, to the extent possible.
  - As a crucial part of consultation, EPA comments and concerns in regards to the conformity process and regional emissions analysis must be carefully considered and satisfactorily addressed.
- "Sufficient" public involvement should be demonstrated through the documentation of comments and responses generated through the public involvement processes and how the MPO or State addressed the public feedback. (Note: In non-attainment TMAs, the MPO shall provide at least one formal public meeting during the TIP development process.).
- The emissions analysis numbers and their comparisons to the appropriate tests in each of the horizon analysis years are also very critical
- The formal review undertaken by FHWA and FTA staff will require a review of all of the needed information described above.

What consultation do I need to do between FHWA/FTA and EPA?

- The Clean Air Act does not give EPA direct authority and the final conformity regulation does not require EPA to concur on conformity determinations. However, the Interagency Consultation Process must provide a mechanism to respond to significant comments of involved agencies and the public, including EPA.
- The basic consultation information is contained in the 2000 Memorandum of Understanding between USDOT and USEPA, which can be found at either of the following web locations: http://www.epa.gov/oms/stateresources/transconf/generalinfo/mou.pdf or http://www.fhwa.dot.gov/environment/cnfmou.htm
- USDOT will notify EPA when conformity determinations are submitted to the DOT. The EPA and DOT should also utilize existing opportunities and coordination of transportation and air quality planning activities among the Federal agencies through the interagency consultation processes for transportation conformity.
- USDOT field offices will provide the opportunity for EPA to comment on the conformity determinations of transportation plans, TIPs, (and on new conformity determinations required by plan/TIP amendments), and projects within a reasonable, expedient and mutually agreeable time frame, such as within 30 days.
  - All comments and responses to comments should be documented. USDOT field staff and managers will notify EPA when issues arise, so that there will be a reasonable opportunity for discussion.
  - This coordination will ensure that issues can be escalated to EPA and DOT Regional and Division Administrators when necessary.
  - Details for achieving close coordination on conformity and SIP reviews should be determined collaboratively by individual EPA and DOT field offices. If such details are included in the existing interagency consultation process, they should be followed.
- If the issues remain unresolved and efforts to resolve the issues are exhausted between the affected EPA Regional Administrator and FHWA Division Administrator and FTA Regional

Administrator, the issues must be escalated to EPA and DOT headquarters offices for the purpose of seeking resolution within 30 days, before DOT makes its final conformity determination. If both DOT and EPA agree, this time period may be extended. Ultimately, under the CAA it is DOT's affirmative responsibility to make the final conformity determination.

Do I need to issue a separate formal letter for the Conformity Determination?

- Although the conformity rule does not require USDOT to issue a separate formal conformity determination letter, the Division should document the conformity determination on the plan/TIP to establish the start of the 4-year conformity determination cycle.
- As long as there is a recognizable specific affirmation by USDOT, a conformity determination can be made in conjunction with a related USDOT approval activity such as the approval of the State's STIP/TIP. This is generally, the acceptable process in that it synchronizes two closely related 4 –year approval timeframes (STIP/TIP, and MTP/conformity determination).

  Note: ***It is important that a conformity determination on a TIP must be made before it can be included in the STIP for approval.***

How often do I have to issue a conformity determination?

- After designation of an area as non-attainment, the initial conformity determination by FHWA/FTA must be completed within one year of the effective date of EPA's designation.
- A new conformity determination must be completed within 24 months of when EPA:
  - Finds a motor vehicle emissions budget to be adequate
  - Approves an implementation plan that establishes a motor vehicle emissions budget if that budget has not yet been determined to be adequate, or
  - Promulgates an implementation plan that establishes or revises a motor vehicle emission budget
- After the initial conformity determination, conformity determinations must be made at least every four (4) years, or when the MTP/TIP is updated or amended with the addition or removal of non-exempt projects.

When does the four-year clock start for a MTP or TIP?

- The four-year clock starts when the FHWA/FTA makes the conformity determination on the MPO plan or TIP, not the date when the MPO adopts or transmits the plan to FHWA/FTA. If four years pass after we have made a plan/TIP conformity determination, and a new conformity determination is not made within 12 months after that deadline, conformity on the plan/TIP will lapse.

Conformity Freeze

What is a conformity freeze?

- A conformity freeze results when the EPA disapproves a SIP without a protective finding (see definition below). The freeze goes into effect on the day the disapproval (without a protective finding) is in effect, normally 60-90 days after EPA notifies the State, through a Federal Register Notice, of the EPA's disapproval of the SIP.
- A conformity freeze rarely happens. But if a freeze is imminent, the Air Quality and Transportation Conformity Team will be working with the Division/Region to provide technical assistance.

What is a protective finding?

- A protective finding is a determination by the EPA that a submitted control strategy implementation plan revision contains adopted control measures or written commitments to adopt enforceable control measures that fully satisfy the emissions reductions requirements

relevant to the statutory provision for which the implementation plan was submitted, such as reasonable further progress or attainment.

- You can find more information on ***Conformity Freeze*** and ***Protective Finding*** in the Transportation Conformity Reference Guide: http://www.fhwa.dot.gov/environment/conformity/ref_guid/chap4.htm#freeze2

Conformity Lapse

What is a conformity lapse?

- When a conformity determination is not made according to schedule, areas have a one-year grace period to make the determination before there is a ***conformity lapse.*** A conformity lapse can have major impacts on the project development /implementation process and restricts the use of Federal-aid funds.

When does the lapse grace period come into play?

- The 12-month conformity lapse grace period begins when the conformity determination required for a MTP or TIP is not made by the applicable deadline. Division offices need to notify the FHWA's Office of Natural Environment in headquarters if an area is about to enter the lapse grace period so headquarters may assist with resolving any issue with developing a conforming plan and TIP prior to the area entering a lapse.

What is the Division's/Region's role when a conformity l apse or conformity freeze is about to occur?

- The following provisions apply 6 months prior to an anticipated conformity lapse/freeze, unless the EPA and FTA Regional Administrators and FHWA Division Administrator agree that additional Federal coordination is unnecessary:

    - The EPA and DOT field managers will meet periodically to discuss pending conformity determinations, transportation project development actions, and SIP deficiencies, as appropriate, for the particular nonattainment or maintenance area.
    - The EPA and DOT field managers will meet at least 90 days before an anticipated conformity lapse to determine which projects could receive funding commitments (plans, specifications, and estimates approval, full funding grant agreement, or an equivalent approval or authorization) before the lapse, which projects could potentially be delayed, and which actions are necessary to correct transportation-related SIP deficiencies prior to the lapse. The EPA and DOT meetings are encouraged more than 90 days before an anticipated conformity lapse. The EPA and DOT headquarters offices encourage their regional and division offices to negotiate more specific consultation procedures where appropriate. The EPA and DOT regions and divisions will exchange information necessary to facilitate timely discussions.
    - The EPA and DOT field offices agree to notify EPA and DOT headquarters when this situation occurs and these procedures are initiated. If it is anticipated that an issue cannot be resolved at the EPA and DOT Regional and Division Administrator levels, the issue must be escalated to EPA and DOT headquarters offices for the purpose of seeking resolution within 30 days of escalation, before the DOT regional or division office makes its conformity determination. If both DOT and EPA agree, this time period may be extended. Similar steps will be taken when a conformity lapse is caused or exacerbated by SIP issues.

When the transportation conformity has lapsed, what actions does the MPO need to take to continue to advance projects?

- MPOs must create an Interim Plan and TIP for any projects to be federally-funded and approved during the lapse, including exempt projects and transportation control measures (TCMs).

- The Interim Plan and TIP must be developed in a manner consistent with 23 U.S.C. 134, particularly these criteria:
  - The Interim Plan and TIP must be developed using appropriately adjusted, currently available projections for population growth, economic activity and other relevant data.
  - The Interim Plan and TIP must be developed using public involvement procedures consistent with the normal transportation plan and program development processes.
  - The Interim Plan and TIP must satisfy the Title 23 and 49 requirements for financial planning and constraint, and, as appropriate, for congestion management processes.
  - The Interim Plan must be approved by the MPO.
  - The Interim TIP must be approved by the MPO and the Governor (or the Governor's designee).

What projects can be approved during a conformity lapse?

During a conformity lapse, FHWA and FTA can only make approvals or grants for:

- Projects that are exempt from the conformity process (pursuant to 40 CFR 93.126, 93.127and 93.128 of the conformity rule) such as safety projects, and
- Transportation control measures (TCMs) that are included in approved SIPs.

How can projects be advanced pursuant to transportation planning requirements during the conformity lapse grace period?

The 12-month conformity lapse grace period begins when the conformity determination required for a transportation plan or TIP is not made by the applicable deadline. During the grace period, the state or MPO may continue to advance projects as long as there is a valid STIP/TIP in place. Project-level conformity requirements must be met. Three specific scenarios are presented below to show how expiration of the plan and/or STIP/TIP at the time of the missed deadline affects the ability to advance projects during the grace period:

1. If the transportation plan has expired, but the TIP is still in effect, the nonattainment or maintenance area can continue to authorize and take action on projects in the STIP/TIP throughout the duration of the grace period or the duration of the STIP/TIP, whichever is shorter. The TIP and affected portion of the STIP cannot be amended once the transportation plan expires. Prior to plan expiration, MPOs and states should ensure their STIP/TIP have the desired projects from their transportation plan to continue to operate during the conformity lapse grace period.
2. If the transportation plan is still in effect, but the TIP has expired, FHWA/FTA cannot authorize projects from the expired TIP. In order to advance projects, a new TIP must be developed containing only non-exempt and/or exempt projects that are consistent with the transportation plan. A conformity determination must be made for the new TIP unless it includes only exempt projects or TCMs in an approved SIP. For example, including a non-exempt project from the transportation plan into the existing TIP would require a conformity determination for the TIP.
3. If both the transportation plan and the STIP/TIP have expired, FHWA/FTA will not authorize projects.

`Resources

Are there other resources that are available?

- http://www.fhwa.dot.gov/hep/legreg.htm
- http://www.fhwa.dot.gov/environment/conform.htm
- http://www.fhwa.dot.gov/environment/conformity/ref_guid/index.htm

What training opportunities are available?

- This website provides information on Air quality training opportunities, http://www.fhwa.dot.gov/environment/aqupdate/airtrain.htm

The FHWA Resource Center Air Quality Team also conducts workshop and webinar on air quality: http://www.fhwa.dot.gov/resourcecenter/teams/airquality/courses.cfm

FHWA Division staff can also take a web-based self directed transportation conformity training available at: http://staffnet.fhwa.dot.gov/hep/staffepn/conform/training/index.htm

What if I need to talk about a "situation" or "issue" with someone?

- For issues related to transportation conformity, please contact the Air Quality and Transportation Conformity Team.
- For issues relating to the transportation planning and conformity, please contact your planning stewardship liaison.

Federal Land Management Agencies Consultation

Background

What is a Federal Land Management Agency?

- Federal land management agency means units of the Federal Government currently responsible for the administration of public lands including the following:
  - Department of Agriculture: U.S. Forest Service and other agencies (FS)
  - Department of Interior: U.S. Fish and Wildlife Service (FWS), Bureau of Land Management (BLM), the Bureau of Reclamation (USBR), and the National Park Service (NPS)
  - National Oceanic and Atmospheric Administration (NOAA)
  - U.S. Army Corps of Engineers (USACE)

What does "Consultation" mean?

- The definition provided in 23 CFR 450.104 ***does not*** apply to the term "consultation" as used in the statutory and regulatory language referring to interactions between Federal land management agencies and the States and MPO.
- ***"Consultation"*** means a process by which the State and MPO work with the Federal land management agencies to reach an understanding of the roles and responsibilities determined to be appropriate for exchanging information in the development of the Statewide and Metropolitan planning and programming process, and most importantly in the development of the environmental mitigation discussion included in the Long Range Statewide Transportation Plan (SLRTP) and Metropolitan Transportation Plan (MTP).

Who needs to consult with Federal land management agencies?

- Each State must develop a consultation process with all relevant Federal land management agencies with responsibilities for managing public land within the State. The consultation process must address both the development of the SLRTP and the STIP.
- Each MPO that has public land managed by a Federal land management agency within its planning boundaries must develop a consultation process for the development of the MTP and the TIP.

What is the difference between Public Involvement/Participation and consultation?

- Public involvement/participation is a process open to all interested parties, and the general public including other agencies such as those who administer public land.
  - The purpose of public involvement is to inform and to gain input from a broad range of interested parties and the public prior to decision-making.
  - This process is generally developed by the State/MPO and provided to the public for their input and comment before taking actions and making key decisions.
- Consultation is a specific process designed to gain input and information from a specific agency or group.
  - Consultation requires understanding between agencies regarding their respective roles and responsibilities in the planning process, and includes an exchange of data, information and input on how proposed projects and programs may impact public lands.
  - Interagency process should be developed with their input to facilitate their participation and understanding of each agencies role and responsibility in the transportation planning process.

Are Tribes Considered Federal land management agencies?

- Under this Federal requirement, Tribes are not considered Federal land management agencies.
- Coordination with Tribes is often included within the same regulatory citation that requires consultation with Federal land management agencies. However, the entities (Tribes and Federal agencies) are not considered the same, and are not inclusive of each other.

Is the FHWA's Federal Lands Highway (FLH) Office considered a Federal land management Agency?

- Federal Lands Highway Office is not considered a Federal land management agency because they do not have direct responsibility for the administration of the public lands even though they work on projects on Federal lands.
- Federal Land Highway Office is a good resource to help the divisions determine which Federal land management agencies are appropriate for the MPO/State to include in their consultation processes. FLH has relevant information about transportation projects and programs on Federal lands.

Legislation/Regulations

What laws and regulations govern the consultation with Federal Land Management agencies in the planning process?

Action	*Description*	*Reference*
Statewide planning processes	• Consider the concerns of Federal land management agencies	23 U.S.C. 135 (e)(2) 23 CFR 450.208 (a) (3)
Statewide Public Involvement and Consultation	• Document the consultation process, roles, responsibilities and key decision points for consulting with Federal land management agencies	23 CFR 450.210 (c)
Statewide long-range transportation plan	• Developed in consultation with State, tribal, and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation • Develop environmental mitigation discussion in consultation with Federal, State, and tribal wildlife, land management, and regulatory agencies.	23 U.S.C. 135 (f) (2) (D) (i) 23 U.S.C. 135 (f) (4) (A) 23 CFR 450.210 (c) 23 CFR 450.214 (i) 23 CFR 450.214 (j)
Statewide Transportation Improvement Program	• Developed in consultation with State, tribal, and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation	23 CFR 450.210 (c) 12 CFR 450.220 (d)
Metropolitan Public Participation Plan	• Document involvement of Federal land management agencies in the development of the Metropolitan Transportation Plan and TIP	23 CFR 450.316 (d) 23 CFR 450.316 (e) 23 U.S.C. 134 (i) (2) (B) (ii)

Metropolitan Transportation Plan	• Developed in consultation with State, tribal, and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation • Develop environmental mitigation discussion in consultation with Federal, State, and tribal wildlife, land management, and regulatory agencies that involves the comparison of conservation plans, maps and inventories of environmental and historical resources	23 U.S.C. 134 (i) (4) (A) 23 CFR 450.316 (d) 23 CFR 450.322 (f) (7) 23 CFR 450.322 (g), (g) (1) and (g) (2)
Metropolitan Transportation Improvement Program	• Document involvement of Federal land management agencies in the development of the Metropolitan Transportation Plan and TIP	23 CFR 450.316 (d)

Consultation Overview

How do you know which Federal land management agencies should be consulted?

- Any Federal agency that is responsible for the public lands administration within the state's or MPO's jurisdiction is subject to consultation under this regulation. These agencies may include: U.S. Forest Service and other DOA agencies; the DOI, including the USFWS, BR, BLM, and NPS; as well as the NOAA; and the USACE.
- Generally, public lands may include National Forests, National Parks and Parkways, National Monuments, Federal wilderness areas or grassland reserves, Federal reservoirs, National trails, Federally managed lakes or rivers, Federal dams, and/or Federal Wildlife Reserves. When these lands or properties are found within an area which is part of a transportation planning process, then the State/MPO must contact the agency responsible for managing these lands or facilities.

Does consultation with Federal land management agencies require face-to-face meetings?

- There is no requirement that the agencies meet face-to-face, nor is there any outlined structure for consultation specified or described in the statutory or regulatory language.
- The structure or format used for consultation is at the discretion of and should be appropriate for the State and MPO and their affected land management agencies.

Does the consultation process have to be designed and developed through a process that includes consulting with the land management agencies?

- The consultation process should be developed with involvement by the affected agencies.
- The documentation of the consultation process should include evidence that the process was developed with agency involvement, either through a comment review period, or some other means of enabling Federal land management agencies to express their needs and understanding of their role and responsibilities for consultation.

Within the planning process, when should consultation with Federal land management agencies take place?

- Consultation should take place at key decision-making points prior to taking actions. For example, it may be prior to the approval of the MTP and TIP by the MPO Board or the adoption of the LRTP and STIP by the state.
- To facilitate land management agency time and resources, the MPO and State should work with the land management agencies to determine at what point in the planning processes the agencies would like to confer.

Consultation Requirements

Does the consultation process have to be documented?

- Yes, to the extent practical. The consultation process documentation should outline the agency roles and responsibilities and the key decision points at the time consultation with Federal land management agencies is needed or desired.
- The documentation may be included as part of the State's Public Involvement or MPO's Public Participation Plan or provided in a separate document.

Is there a specific element of the LRTP or MTP that needs to be consulted with Federal land management agencies?

- The entire document is subject to consultation with Federal land management agencies. No element or portion of the plan is exempt from consultation. However, the land management agencies may identify only those selected planning issues that are of interest or value to them, and the consultation process may just narrowly focused on only those elements or point the land management agencies identify as relevant.
- At a minimum, and if available, the consultation must include the comparison of Federal land management/conservation plans or maps with transportation plans; and comparison of transportation plans to natural or historic resources inventory.
- Land management agencies should have the opportunity to understand how a transportation plan or program may potentially impact the lands/resources that they are managing
- The consultation with Federal land management agencies may include discussion of the environmental mitigation strategies or activities. The mitigation activities are those carried out to restore and maintain environmental functions affected by the LRTP or the MTP.

What portions of the STIP or TIP should the MPO/State consult with Federal land management agencies on?

- The entire document is subject to consultation with Federal land management agencies. No portion of the STIP or TIP is exempt from consultation.
- The results of the consultation process between the State/MPO(s) and land management agencies may be more fully described in the associated transportation plans or other planning documents. Therefore, the STIP or TIP may summarize or reference those documents instead of repeating the material within the body of STIP or TIP.

What is the State or MPO supposed to do if the Federal land management agency is non-responsive to consultation requests?

- The State/MPO may set reasonable timeframes within which the Federal land management agencies can respond to the consultation requests.
- If the Federal land management agencies are non-responsive to review/comment requests on the proposed consultation process, and the State or MPO has documentation that a good faith effort was made to secure their input within a reasonable timeframes, then the state/MPO may take formal actions to adopt the resulting consultation process. The consultation process shall be documented and implemented as proposed.
- If during the development of the LRTP/MTP or STIP/TIP Federal land management agencies fail to respond to the consultation request within the timeframes provided, then, once again, documentation of the attempted consultation in the LRTP/MTP or STIP/TIP demonstrates that the consultation requirement has been satisfied.
- If Federal land management agencies are non-responsive to the consultation request as was originally agreed to, the State/MPO may want to follow-up with the Federal agency(s) to verify the agreed to consultation process, and to determine if future adjustments are needed to ensure timely input and participation. The State/MPO may want to explore and applied new approaches

or strategies to foster better consultation, if the initial process does not seem to achieving the desired results.

Environmental Mitigation Discussion Requirements

What is meant by "environmental mitigation discussion" in the State LRTP or MPO MTP?

- The State LRTP and MPO MTP must include a discussion of likely environmental mitigation activities developed in consultation with Federal land management agencies. 23 CFR 450.104 defines environmental mitigation activities as " strategies, policies, programs, actions and activities that, over time will serve to avoid, minimize, or compensate for the impacts to or disruption of elements of the human and natural environment associate width the implementation of the LRTP or MTP. The human and natural environment includes, for example, neighborhoods and communities, homes and businesses, cultural resources, parks and recreation areas, wetlands and water sources, forested and other natural areas, agricultural areas, endangered and threatened species, and the ambient air. The environmental mitigation strategies and activities are intended to be regional in scope, and may not necessarily address potential project level impacts."
- This discussion may be drawn in part from the comparison of State/Regional conservation plans or maps to transportation plans and(or) comparison of transportation plans to inventories of natural or historic resources.

What MPO and State documents must include a "discussion of environmental mitigation activities"?

- The Statewide long-range transportation plan and the MPO metropolitan transportation plan are the only documents required to include a discussion of environmental mitigation activities. This discussion may cover policies, program, or strategies, rather than at project level. More detail information can be included in an appendix to a transportation plan or in separate documents.
- The discussion should address likely impacts to environmentally sensitive areas based on the proposed changes or improvements to the transportation system as a whole.
- In addition, the discussion is intended to be regional in scope and may not necessarily address the potential impacts of specific projects included in the plan.
- Finally, discussion may address specific locations or resources that may have particular sensitivities that would require extra care if any major changes to the transportation system are considered in proximity to those locations or resources.

Who determines what environmental mitigation activities are most appropriate to include in the "environmental mitigation discussion" of the State LRTP or MPO MTP?

- Through the consultation process, the State/MPO will consider input from Federal land management agencies regarding the areas likely to be impacted by the proposals included in the plan, and the likely mitigation activities to address these impacts.
- The State/MPO is responsible for finalizing that discussion as part of the LRTP/MTP document.

Actions by the FHWA Division and FTA Region

At a minimum, what do FHWA Division offices and FTA Region Offices need to look for in the state/MPO Federal land management agency consultation?

- The FHWA Division Offices and FTA Regions can review and comment on the consultation process, but they do **not** approve the consultation process. However, for state DOTs, the Federal Planning Finding should review the documented Federal land management agency consultation process for the state DOT as well as non-TMA MPOs.
- In TMAs, the TMA certification process should include a review of the Federal land management agency consultation process.

- If FHWA/FTA have concerns regarding the validity or quality of the Federal land management agency consultation process, a process review can be conducted of the consultation process, covering all or part of a State or region.
- Specifically, look for:
    - Documentation of a consultation process with Federal land management agencies that is either included in the public involvement/participation process or is separate and discrete from the general public involvement process; and
    - Evidence that the state/MPO is using the documented consultation process accordingly. This evidence may be included in the LRTP/MTP and STIP/TIP as part of the documentation for public involvement/consultation. Furthermore, once the State/MPO revised or adopted a process, they should send a copy of their adopted Federal land management consultation process to the applicable FTA and FHWA field offices, for their information.

What actions do I take if I find the state/MPO process does not meet Federal requirements for either consultation with Federal land management agencies and/or the inclusion of a discussion of environmental mitigation activities in the LRTP/MTP?

- Discuss issues and concerns first to fully understand the issues:
    - Coordinate and discuss with FTA Region/FHWA Division staff to inform them of your concerns and to establish a Federal assessment of the situation.
    - Discuss issues and concerns with the state/MPO staff and/or officials to clarify issues and to help mediate Federal land management agency concerns.
    - If Federal land management agencies have indicated there are issues with the consultation process, work with them to fully understand why they are dissatisfied and what's needed to resolve the issues.
    - Seek resolution of any problems informally, if possible.
- Make note of your concerns in the Federal Planning Finding (23 CFR 450.218) and/or, the TMA certification review (23 CFR 450.334)
    - Document what the Federal land management agencies' and other sources' issues in that the State/MPO is not following their own documented consultation process.
    - Document agreements with the State/MPO regarding modifications to the consultation process to address the identified shortfalls and the timeframe(s) within which resolution of these issues are reached.
- If the state/MPO does not resolve or address the problems within the identified timeframe, inform Division/Regional Office management of the issues and identify options to deal with the situation. They may including the following:
    - Notifying the state/MPO of consequences that failure to consult with Federal land management agencies may require that you defer the approval of the next STIP/TIP amendment or new STIP/TIP until these issues are resolved.
    - After notification, if the problem is not adequately resolved or addressed in a timely manner, you may withhold approval of STIP/TIP amendments or new STIP/TIP until the issues are satisfactorily resolved.

What should the FHWA and FTA review regarding consultation with Federal land management agencies when making the Federal Planning Finding and TMA Certification?

- States and MPOs should be able to demonstrate that they are following their adopted consultation processes through relevant meeting minutes, letters, e-mails, etc. used in the consultation process. The documented process should clearly outline the roles and responsibilities of the consultation participants and the key decision points of when to consult with each other. Likewise, if the State or MPO is not following its documented process, these same meeting notes, letters, etc. will demonstrate that a different process is being used other than that which was originally agreed upon and documented.

- If it is found that the documented process is not followed or is not working well, and that the Federal land management agencies have expressed to the State/MPO that a revised or new process is needed, then the Federal Planning finding or TMA Certification should reflect these findings. Appropriate actions should be made to ensure consultation process is revised or improved accordingly.

Resources

Are there examples of consultation processes with Federal land management agencies that I can share with the state/MPO?

- The requirement for consultation with Federal land management agencies during the transportation planning process is new under SAFETEA-LU. As such, a compendium of case studies or best practices specific to consultation with Federal land management agencies in the development of the LRTP/MTP and STIP/TIP as described in the current regulations is not yet explicitly available. We expect to collect and share the case studies, as we document these noteworthy practices.
- The FHWA Planning and Environment Linkages web page http://environment.fhwa.dot.gov/integ/index.asp, provides several case-studies, publications, and examples of practices that include consultation with Federal land management agencies and the development of environmental mitigation activities in the planning process. Each of the links below may be shared with the State and MPO and is accessed through the FHWA web site:
  - http://environment.fhwa.dot.gov/integ/resources_publications.asp
  - http://www.environment.fhwa.dot.gov/integ/case_studies.asp
  - http://www.environment.fhwa.dot.gov/strmlng/es3stateprac.asp
  - http://www.gis.fhwa.dot.gov/documents/geospatialPEL_rpt.pdf
  - http://www.tfhrc.gov/pubrds/08mar/01.htm
  - http://www.environment.fhwa.dot.gov/strmlng/intapproach.asp
  - http://www.environment.transportation.org/pdf/practitioners_handbook10.pdf
  - http://onlinepubs.trb.org/Onlinepubs/nchrp/nchrp_rpt_541.pdf
- The FHWA Federal Lands Highway Division has planning staff that works with the federal land management agencies on a regular basis. They can provide information on FLMA planning efforts, projects, contacts and other useful knowledge to assist you in helping the State DOT and MPOs develop a consultation process with the appropriate agency contacts. Each of the links below may be shared with the State and MPO and is accessed through the FHWA web site:
  - http://flh.fhwa.dot.gov/index.htm
    - Western Federal Lands: http://www.wfl.fhwa.dot.gov/
    - Central Federal Lands: http://www.cflhd.gov/
    - Eastern Federal Lands: http://www.efl.fhwa.dot.gov/

Federal Planning Finding and Self Certifications

Background/Legislation and Regulations:

What is a Planning Finding?

- It is a formal action taken by the FHWA and FTA to ensure that STIPs and TIPs are developed according to Statewide and metropolitan transportation planning processes that are consistent with required statutory and regulatory planning and related provisions.
- It must be made to the extent projects in the STIP (including projects from TIPs) are based on a planning process that substantially meets the requirements of Title 23 and Title 49.
- It is a formal opportunity to highlight what works well and what needs improvement in a Statewide or metropolitan transportation planning process.
- It is a prerequisite to FTA/FHWA approval of the STIP.

What are the statutory and regulatory bases for requiring planning findings?

- SAFETEA-LU contained a statutory requirement for a Planning Finding associated with the STIP, which has been codified in 23 U.S.C. 135 (g)(7).
    - 23 U.S.C. does not contain a similar statutory requirement for a Planning Finding associated with TIPs.
- Through regulation, the requirement for a Planning Finding applies to both the TIP (23 CFR 450.328(a)) and the STIP (23 CFR 450.218(b)).

What is the history/background of planning findings?

- FHWA/FTA initially developed the requirement through rulemaking.
    - 1983 Urban Planning Regulations - 23 CFR 450 and 49 CFR 613 required a Planning Finding for TIPs and for the 105 Program (23 U.S.C. 105 - the statewide program of highway projects, pre-STIP).
    - Post-ISTEA rulemaking (see CFR citations above) was consistent with existing regulations and associated planning finding mandated for newly created STIPs
- TEA-21 codified the regulatory language for a Planning Finding in conjunction with STIP approvals.
- SAFETEA-LU continued the statutory requirement for a Planning Finding in conjunction with STIP approval (23 U.S.C. 135(g)(7)).

What is the difference between a MPO TIP Planning Finding and a STIP Planning Finding?

- These Planning Findings are very similar.
- The FHWA/FTA Metropolitan Planning Finding:
    - Must ascertain that the metropolitan TIP development was consistent with the provisions of 23 U.S.C. 134; 49 U.S.C. 5303 and 5304; and subparts A and C of 23 CFR 450.
    - Is based on joint MPO/State DOT self-certification statements, documentation of routine FHWA/FTA involvement in the metropolitan planning processes (e.g., review, concurrence, or approval of various MPO documents), and findings from FHWA/FTA Certification Reviews of TMA planning processes.
- The FHWA/FTA Statewide Planning Finding:
    - Must ascertain that the State's development of the STIP was consistent with the provisions of 23 U.S.C. 134 and 135; 49 U.S.C. 5303 and 5304; subparts A, B, and C of 23 CFR 450; and other applicable Federal requirements.

- Can be based on the State DOT's self-certification and the MPO/State DOT self-certifications, documentation of routine FHWA/FTA involvement in the statewide and metropolitan planning processes (e.g., review, concurrence, or approval of various planning documents), and the State's progress in addressing past planning findings.

What is the required cycle for the planning finding?

- The Planning Finding will be made at the time of the STIP approval, at least every 4 years.
- Exceptions to this require that a planning finding also be made at the time of an approval of a STIP amendment.

Elements of a Planning Finding:

What should FHWA and FTA base their Planning Findings on?

- FHWA and FTA should base their Planning Finding on the following activities:
  - State DOT self-certifications and the MPO/State DOT self-certifications
  - Routine FHWA/FTA involvement in the statewide and metropolitan planning processes
  - Formal process-oriented reviews (e.g., TMA certifications)
  - In-depth reviews of selected areas, (e.g., public involvement, STIP/TIP development, environmental justice, fiscal constraint, etc.)
  - State and/or MPO progress in addressing past planning findings
  - Outstanding corrective actions and recommendations from TMA Certification reviews.
- FHWA and FTA need to reach agreement on which specific review activities and elements of the Planning Finding they will examine.

What is frequency of the reviews in support of the Planning Finding?

- On a periodic basis, FHWA and FTA should review the self-certifications.
- At least every four years, TMA Certification Review results and findings are issued.
- As appropriate, FHWA and FTA can conduct periodic in-depth reviews of the planning process or selected portions of the planning process.
- The emphasis should be on improving the planning processes and identifying noteworthy practices through these reviews so that these practices can be shared with others.

What specific review activities/areas should the FHWA and FTA consider in the Planning Finding?

- Self-Certifications
- Planning Factors
- Inter-agency Coordination
- Involvement of Interested Parties
- Conformity Determinations
- Current Transportation Plans
- Current TIP/STIPs
- Consideration of Transportation Alternatives
- Planning Regulations
- Decision-making Process
- Air Quality
- TMA Certifications Reviews

What self-certification information needs to be reviewed?

- Self-Certifications for the following:
  - Title VI of the Civil Rights Act

  - Americans With Disabilities Act
  - Clean Air Act
  - DBE, and others [23 CFR 450. 218(a)]
- State and MPO(s) self-certifications must be well-justified and documented. The State and MPOs need significant supporting documentation as the basis for the self-certifications.
- For Statewide and metropolitan self-certification references, please see *Attachments Finding-1 and Finding-2*

Does the self-certification need to include information on anti-lobbying, drug-free work place, or suspension and debarment?

- This has always been covered under project authorization and agreements in 23 CFR 630.112 – Agreement Provisions. When the states enter into a project (or grant) agreement, they are certifying that the above certification requirements have been met. These requirements do not need to be part of state's self-certification, but the state can attach the certifications to the STIP for information purposes.

How should Planning Factors be reviewed?

- Assess how the statewide and metropolitan planning processes in question consider, analyze and reflect each of the eight broad planning factors [23 U.S.C. 134(h), 23 U.S.C. 135(d), 49 U.S.C. 5303(a)] in planning process products, as appropriate or needed.

Do stakeholders understand and follow the planning process?

Evaluate the following:

- The level of coordination within the transportation planning process, including coordination between the Statewide and the metropolitan transportation planning processes.
- The overall coordination within the State planning process for transit service provisions among transit operators and human service providers.
- The coordination necessary to consider the concerns of local elected officials in non-metropolitan areas, Indian tribal governments and Federal land management agencies.

What is meant by the involvement of interested parties?

- Based on their adopted public involvement processes, the extent to which the Statewide and metropolitan planning processes carry out a public involvement effort to the general public and how well these processes are working through the MPO and State periodic evaluations.
- The transportation planning process ensures that consultation with other interested parties including Indian tribal governments and Federal lands agencies are satisfied.

What range of alternatives must be considered?

- The transportation plan and planning process should study a range of transportation options designed to meet bicycle, pedestrian, passenger and freight transportation needs.

How closely does the planning process follow the Planning Regulations?

- The extent to which the STIP and TIP (e.g., development, processing, approval, listing of obligations, amendments, etc.) meet the planning requirements.
- For more information on how to determine this, please see chapter on STIP and TIP.

What guides decision-making within the transportation planning process?

- The transportation plan(s) is used as the basis for State and local transportation decision on projects to be included in TIPs/STIPs.

- The individuals, units, agencies, jurisdictions, and organizations that approve and use the plan and STIP acknowledge, understand, and know the significance of the plan and STIP.
- The Metropolitan Plan is adopted every four or five years.
- The Statewide Plan is continually evaluated, revised, and periodically updated.

What is the relevant Air Quality issue in the Planning Finding?

- The coordination and integration of the transportation and air quality planning processes in non-attainment and maintenance areas.

What actions from TMA Certification Reviews need to be addressed?

- Significant findings from TMA certification reviews and the follow-up of corrective actions and/or recommendations (if any) cited in recent TMA certifications must be referenced or addressed in the Planning Finding.

Actions by the Divisions/Regions:

How should the self-certifications be used to support the Planning Finding?

- Self-certifications by the State and MPOs should be reviewed during the planning finding. If requested by FHWA/FTA, the State and MPOs should provide materials to verify and substantiate their self-certifications.

What steps should FHWA/FTA field offices follow to draft, finalize, and issue a planning finding?

- The steps necessary for issuing a Planning Finding should be covered in a MOA/MOU between the Division Office and FTA Regional Office, covering when a finding is necessary, the role of each agency and the time schedule for completing the finding and for amendments
- If your MOA does not cover those specific items, you may want to complete the following steps:
    - Coordinate and consult with your FHWA /FTA counterparts to determine what general or specific areas on which you want to concentrate and review, based on your daily work experience with the State/MPOs.
    - Review the previous Planning Finding to see if there are any corrective actions that require follow-up.
    - Next, if deemed necessary, schedule a meeting with the State/MPOs to review with them the self-certifications materials, their planning processes that they used to developed the transportation plan and STIP, and the supporting activities (e.g., public involvement, fiscal constraint, non-metropolitan local official consultation, and conformity).
    - If you only need to concentrate on a specific area, (e.g., public involvement) inform the State/MPOs on the focus of the Planning Finding meeting and ask them to be prepared to discuss the specific area at length.
    - Jointly organize and document the information supporting the Planning Finding for your records.
    - Prepare the Planning Finding to send to the State DOT.
        - You may want to use a format similar to the template provided in *Attachment Finding –1*.
    - FHWA and FTA should sign off on the Planning Finding either in advance of or concurrently with the approval of the STIP.
        - The Planning Finding can be submitted as part of or with the STIP approval letter or as a separate transmittal to the State DOT

        - Determine how you would want the MPOs to be informed of any items in the planning finding that affects them (e.g., "cc" on the STIP approval letter or planning finding or ask the State DOT to inform them)
    - If the Planning Finding includes corrective actions, provide information to the State and MPOs on the nature of these corrective actions, and work with them to ensure remedies and solutions will be accomplished.

Can the Planning Finding be conducted in conjunction with other findings, determinations, and actions by FHWA Divisions and FTA Regional Offices?

- Yes.
- For Example: Preparation of a joint FHWA/FTA approval letter for the STIP that:
    - Makes the Planning Finding on both the statewide and metropolitan transportation planning processes,
    - Makes the FHWA/FTA transportation conformity determinations on the TIP(s) and/or STIP in air quality non-attainment and maintenance area(s), and
    - Transmits a summary report to substantiate the basis for the Planning Finding.

Can I use the TMA certification review as my Planning Finding?

- No.
- A TMA certification review should be used as one of the elements to consider during the Planning Finding but it does not constitute the finding.

How detailed should a Planning Finding be? Should I provide recommendations to improve the planning process in the planning finding or use another mechanism?

- The Planning Finding should be as detailed as necessary to support its recommendations.
- The Planning Finding is an excellent opportunity to make recommendations on ways to improve the transportation planning process at both the State and metropolitan levels that should be subsequently addressed in the State and Metropolitan UPWPs.

What should be covered in a Planning Finding? How should it be used to manage the planning program?

- The primary requirements for and process of developing a planning finding are discussed previously in this document, under the section "*Elements of a Planning Finding."*
- The finding can highlight noteworthy practices that the State/MPOs have developed.
- The finding needs to underscore the weaknesses in any of the elements of your State's/MPOs' planning and/or programming process and the need to strengthen those elements, particularly any lapsed Plans and TIPs/STIPs.
- Point out areas where your State's/MPOs' processes do not meet Federal requirements and identify corrective actions.
- The Finding is one of the main mechanisms for ensuring that the planning process is being carried out in a satisfactory manner on an annual /biennial basis.

How are the recommendations/conditions presented in a planning finding monitored or addressed?

- Serious problems that are identified in the planning finding should have deadlines for corrective actions.
- Less serious problems should be monitored during the normal oversight activities.
- Progress should be expected before the next finding is due.

What would prevent FHWA/FTA from making a positive Planning Finding on either a STIP or a TIP? How should such a situation be addressed?

- Failure of the State, either prior to or at the time of STIP approval request, to submit the State and individual MPO self-certifications containing:
  - The appropriate statements for each required certification; and
  - Signed by the authorized agency officials
- Knowledge by the Division or Region that the certifications are inaccurate or the STIP and/or TIP were not developed based upon a planning process meeting the requirements of Title 23 and Title 49 (i.e., no current adopted Transportation Plan).
- Upon lack of the necessary documentation, immediately contact the appropriate State official to determine if the lack of sufficient documentation can be quickly rectified.
- Should the documentation not be readily available, your front office should be notified of the potential delay in the approval of the STIP or portion thereof.

Can I make a "partial" Planning Finding?

- Consistent with the joint planning regulations, there are instances when a "partial" STIP approval is appropriate. In such cases, it might also be appropriate to issue a partial Planning Finding.
- A "partial" Planning Finding would occur whenever problems with the transportation planning process are the reason for a portion of the STIP not being approved.

Can I make a "conditional" Planning Finding? If so, what conditions can FHWA/FTA impose and what do we require of the State/MPO to lift the conditions?

- As with most approvals associated with the Federal-aid Highway and Transit Programs, a conditional Planning Finding can be made on the entire STIP or a portion thereof.
  - However, when deciding to make a conditional Planning Finding on less than the entire STIP, additional attention to resolution of the condition(s) must be assured prior to authorization of the affected projects.
- The type of conditions placed on a Planning Finding would be to correct any deficiency in the planning process or the self-certifications that can reasonably be expected in a short timeframe (i.e. failure to have both State and MPO signatures on the self-certifications, TMA certification lapse awaiting a new joint FTA/FHWA certification letter, Plan lapse, Conformity lapse, or TIP lapse).
  - The conditional certification will be satisfied by the provision of additional information or a new self-certification by the State with assistance from an MPO as appropriate.
  - Upon correction of the condition placed on the Planning Finding, a revised Planning Finding should be issued.

Should we request advice/feedback from other FHWA/FTA staff in assessing the state/MPO planning processes?

- Considering the wide array of expertise and scenarios that may be involved in the evaluation of the self-certifications, it is reasonable to assume that all of the necessary expertise is not housed within a Division or Regional Office.
- Additional assistance is available and can be provided through either the FHWA Resource Center or your Headquarters' Offices.

What happens if FHWA and FTA do not agree on the Planning Finding conditions?

- Since the Planning Finding requires the evaluation of all aspects of the planning processes listed above in the third question under ***Elements of the Planning Finding*****,** a disagreement is likely to occur at some time.

- It will be necessary to develop an open dialogue between FHWA and FTA, to reach a consensus on what if any conditions should be placed on the Planning Finding or possibly even if any Planning Finding should be issued.
- If consensus cannot be reached at the working staff level, the discussion should be elevated up through the managerial levels of both agencies as necessary to achieve consensus based on the salient issue(s).

Does approval of a STIP revision constitute a STIP approval thus requiring a new Planning Finding?

- A new Planning Finding is not necessary for routine TIP and/or STIP Administrative Modifications, which are generally those that do not involve regionally significant projects.
- FHWA Divisions and FTA Regional Offices should issue a new Planning Finding if they initially issued a partial STIP approval with a partial Planning finding.
- A new Planning Finding is required with the approval of each STIP amendment.
- When the State DOT and/or MPO have numerous amendments or amendments with numerous projects, there likely is a need to take a closer look at their respective planning process(s) to determine why so many amendments are requested and what can/should be done to reduce them.

How do we share any noteworthy planning practices we recognize in the planning finding?

- In order to provide better disclosure of noteworthy practices, FHWA-Office of Planning is attempting to populate its website with documentation useful to the planning community and informative to the general public.
- Contact and provide a copy of the notable practice to your designated FHWA Office of Planning (HQ) Planning Stewardship Liaison, or the FTA Office of Systems Planning. They will then assume the lead on coordination with the appropriate individuals to review and make the noteworthy practice available on the FHWA website.

Resources:

Are there examples of or templates for a planning finding on a STIP and TIP?

- A template of a FHWA/FTA Transportation Planning Finding is located at the end of the chapter (*see Attachment Finding-3*)

Where can I find additional information on to how prepare a planning finding?

- May 1, 2000 Memorandum on Statewide and Metropolitan Planning Findings signed by Kenneth R. Wykle, FHWA Administrator and Nuria I. Fernandez, FTA Acting Administrator
- Contact your designated Office of Planning (HEP) "Planning Stewardship Liaison" for your Division Office
- Contact the FTA (HQ) Office of Systems Planning, Planning Oversight Division
- Network with other Division/Regional planners to find out how the Planning Finding was handled in their respective states/Regions

Attachment Finding-1

STATE CERTIFICATIONS REQUIRED FOR THE STIP[1]

At least every four years, each State shall submit the entire proposed STIP, and amendments as necessary, concurrently to the FHWA and the FTA for joint approval. The State shall certify that the transportation planning process is being carried out in accordance with all applicable requirements of:

(1) 23 U.S.C. 135, 49 U.S.C. 5303 and 5304, and 23 CFR Part 450;

(2) Title VI of the Civil Rights Act of 1964 , as amended (42 U.S.C. 2000d-1) and 49 CFR Part 21;

(3) 49 U.S.C. 5332, prohibiting discrimination on the basis of race, color, creed, national origin, sex, or age in employment or business opportunities;

(4) Section 1101(b) of the SAFETEA-LU (Pub. L. 109-59) and 49 CFR Part 26 regarding the involvement of disadvantaged business enterprises in the FHWA and the FTA funded projects;

(5) 23 CFR Part 230, regarding implementation of an equal employment opportunity program on Federal and Federal-aid highway construction contracts;

(6) The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 *et seq*.) and 49 CFR Part 27 (*Nondiscrimination On The Basis Of Disability In Programs Or Activities Receiving Federal Financial Assistance*); 49 CFR Part 37 (*Transportation Services For Individuals With Disabilities (ADA)*); and 49 CFR Part 38 (*Americans With Disabilities Act (ADA) Accessibility Specifications For Transportation Vehicles*).

(7) In States containing nonattainment and maintenance areas, sections 174 and 176 (c) and (d) of the Clean Air Act as amended (42 U.S.C. 7504, 7506 (c) and (d), and 40 CFR Part 93).

(8) The Older Americans Act, as amended (42 U.S.C. 6101), prohibiting discrimination on the basis of age in programs or activities receiving Federal financial assistance;

(9) Section 324 of title 23 U.S.C., regarding the prohibition against discrimination based on gender; and

(10) Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. 794) and 49 CFR part 27 regarding discrimination against individuals with disabilities.

[1] From 23 CFR 450.218.

Attachment Finding-2

MPO/STATE CERTIFICATIONS FOR THE TIP[2]

The State and the MPO shall certify at least every four years (450.334(a))to the FHWA and the FTA that the planning process is addressing the major issues facing the area and is being conducted in accordance with all applicable requirements of:

(1) 23 U.S.C. 134, 49 U.S.C. 5303, and 23 CFR 450;

(2) In nonattainment and maintenance areas, Sections 174 and 176 (c) and (d) of the Clean Air Act, as amended (42 U.S.C. 7504, 7506 (c) and (d)), and 40 CFR Part 93;

(3) Title VI of the Civil Rights Act of 1964 , as amended (42 U.S.C. 2000d-1) and 49 CFR Part 21;

(4) 49 U.S.C. 5332, prohibiting discrimination on the basis of race, color, creed, national origin, sex, or age in employment or business opportunities;

(5) Section 1101(b) of the SAFETEA-LU (Pub. L. 109-59) and 49 CFR Part 26 regarding the involvement of disadvantaged business enterprises in the FHWA and the FTA funded projects;

(6) 23 CFR Part 230, regarding implementation of an equal employment opportunity program on Federal and Federal-aid highway construction contracts;

(7) The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 *et seq*.) and 49 CFR Part 27 (*Nondiscrimination On The Basis Of Disability In Programs Or Activities Receiving Federal Financial Assistance*); 49 CFR Part 37 (*Transportation Services For Individuals With Disabilities (ADA)*); and 49 CFR Part 38 (*Americans With Disabilities Act (ADA) Accessibility Specifications For Transportation Vehicles*).

(8) The Older Americans Act, as amended (42 U.S.C. 6101), prohibiting discrimination on the basis of age in programs or activities receiving Federal financial assistance;

(9) Section 324 of title 23 U.S.C., regarding the prohibition against discrimination based on gender; and

(10) Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. 794) and 49 CFR part 27 regarding discrimination against individuals with disabilities.

[2] From 23 CFR 450.334.

Attachment Finding-3

(Template)

FHWA/FTA TRANSPORTATION PLANNING FINDING

Introduction/Background

(*Sample Language)* To approve the STIP document, including TIPs contained by reference or directly in the STIP, the Federal Highway Administration and Federal Transit Administration must make a determination that each metropolitan TIP is based on a continuing, cooperative, and comprehensive planning process. In addition, this Planning Finding is based upon the extent that all the projects in the STIP are based on a planning process in accordance with 23 U.S.C. 134, 135, and 49 U.S.C. 5303 and 5304. This is the documented Planning Finding for ***STATE NAME***s FY 20***XX*** STIP, and all the incorporated TIPs for the following metropolitan areas: ***METRO A, METRO B, etc …***

PLANNING PROCESS OBSERVATIONS AND SUGGESTED IMPROVEMENTS

The following strengths of the statewide and metropolitan transportation planning processes have been identified:

-
-
-
-
-
-
-

The following areas of the statewide and metropolitan transportation planning processes have been identified for improvement:

-
-
-
-

The following suggestions are offered for enhancing the statewide and metropolitan transportation planning processes:

-
-
-
-
-
-
-
-

The following are outstanding Corrective Actions/Recommendations requiring follow up:

-
-
-

Accordingly, the FHWA and the FTA, based on the State DOT and MPO(s) self-certifications of their statewide and metropolitan transportation planning processes, review of self-certification supporting documentation, Federal certification of TMAs within the State, and our involvement in the State and MPO transportation planning processes, hereby find that the STIP is based on a transportation planning process that substantially meets the requirements of 23 U.S.C. Sections 134 and 135 and 49 U.S.C. Sections 5303-5305.

Federal Highway Administration	**Federal Transit Administration**
_____	_____
Signature	Signature
_____	_____
Printed Name	Printed Name
_____	_____
Title	Title
_____	_____
Date	Date

Financial Planning for Transportation

Background

What is Financial Planning for Transportation?

- Financial planning, in this context, is a systematic approach whereby a State, transit operator, or a MPO manages its existing financial resources by utilizing financial tools and analyses to determine how to fund the maintenance and operation of, as well as capital improvements to its transportation system over both the short-term (4-year TIP) and long-term (20-year MTP) minimally.

- Under federal requirements, financial planning for transportation must not only be conducted by an individual agency within its jurisdiction, but also must be conducted in a cooperative manner among appropriate agencies at the state, regional, and local levels for the purpose of establishing and substantiating fiscal constraint for the TIP, STIP, and MTP.

- Financial planning is the process of meeting the agencies' visions and goals through proper management of its finances to operate, maintain and construct its transportation system.

- Financial planning includes a periodic assessment of the costs to operate, manage, preserve, maintain and build a transportation system in order to compare with the financial resources available to do so.

Why is Financial Planning important?

- Within the transportation planning continuum, the financial planning process provides the State DOT(s), transit operator(s), and MPO(s), along with policymakers and the general public, with a financial picture of what resources are available, what resources are needed, and what gaps or shortfalls need to be addressed.

- Financial planning requires that a State, transit operator, and MPO evaluate the present and future financial health, needs, and expenditures of the transportation systems relative to the current and projected economic climate.

- It can help the States, transit operators, and MPOs identify other funding resources that have not previously been designated for transportation or identify other potential new funding resources.

- Determination of the "quality" of fiscal constraint in TIPs, STIPs, and MTPs can provide a State, transit operator, or MPO the basis and background information necessary to go to the public or its policy makers (e.g., legislators) to develop and advance future funding proposals, or plans based on different funding scenarios. These proposals may range from gas tax increases, additional local sales taxes, toll revenues from certain facilities, innovative financing, Public Private Partnerships (PPP), and more.

- As part of financial planning, the estimation of realistic costs to build, operate, and maintain the transportation system gives the public and policy makers a better understanding of what resources

are needed to achieve the level and quality of transportation services and facilities they expect or desire.

- Financial planning also provides for the assessment of sufficiency and reliability of current and proposed revenue streams to support the continued operation and maintenance of the existing (and planned) system, as well as planned capital expansion.

- Financial planning enables the State DOT, transit operator, and MPO to continuously monitor and manage system or project costs, revenues, and funding adequacy over a given time period. This helps the agencies avoid programming too many projects too soon and the possibility of running out of sufficient funds in later years.

Why is financial planning (financial element) part of the transportation planning process?

- Prior to ISTEA, there was no binding commitment required to implement a transportation plan. Many of the plans provided long-range visions and goals for the development and operation of a transportation system, but often did not evaluate or discuss the needed financial resources. At best, the early transportation plans presented only an ungrounded financial budget.

- Prior to ISTEA (1991) and reconfirmed in subsequent federal transportation legislation, a State DOT, transit operator, or MPO must make federally required planning decisions based on "realistic" financial forecasts and implement only those projects and strategies that they can afford within their anticipated capital budget.

- Financial planning requires that a State DOT, transit operator, and MPO carefully consider their existing and future transportation investment decisions, and select and prioritize future projects on a needs basis with a credible financial budget in mind. (Note: Differences between financial requirements for specific agencies are discussed below.)

- By developing transportation plans and programs that are constrained to include only projects that have reasonably anticipated funding sources, a State, transit operator, and MPO will gain credibility and trust among their planning partners and the general public.

What are the different components of Financial Planning?

- Revenue Forecasting – an estimation method that examines and analyzes historical economic trends and evaluates additional or enhanced revenue sources to develop a projected future revenue stream estimate for use in developing a projected transportation budget.

- Cost estimation – the process of determining projected capital outlay or full expenditure to implement, operate, and maintain the current or anticipated transportation system as a whole (or at least the federally-supported system), as well as, proposed individual projects.

- Fiscal Constraint – A demonstration that there will be sufficient revenue to implement proposed improvements and other activities described in a transportation plan or program. Additional information regarding the definition of fiscal constraint is provided with the next question.

- Financial plan:
    - The mechanism for demonstrating fiscal constraint or the feasibility of achieving the desired transportation system within the revenue streams anticipated or planned.
    - The documentation may be included directly in plan and program documents, or may be prepared in the form of a background, supporting working papers and must demonstrate the consistency between the reasonably available and projected funds and the costs of implementing, operating, and maintaining the current and proposed transportation system. (23 CFR 450.104)
    - A financial plan may be a comprehensive document that reflects the estimated cost of a "major project" and associated funding structure and provides a reasonable assurance that there will be sufficient financial resources available to implement and complete the project as planned. (Major Project Guidance – 1/17/2007)

What is Fiscal Constraint?

- Required for the following:
    - Metropolitan Transportation Plan (MTP) (23 CFR 450.322(f)(10)),
    - Transportation Improvement Program (TIP) (23 CFR 450.324(h), and
    - Statewide Transportation Improvement Program (STIP). (23 CFR 450.216(l))

- Requires that financial information provided in the plan or program demonstrates that projects can be implemented using committed, available, or reasonably available revenue resources with reasonable assurance that the federally-supported transportation system is being adequately operated and maintained. (23 CFR 450.104)

- For non-attainment and maintenance areas, further limits projects in the first two years of the TIP and STIP to those for which project funds are demonstrated to be either "committed" or "available".

- In the case of proposed funding sources, identifies strategies for ensuring their availability. For instance, a statewide gas tax increase necessary to fiscally constrain the MTP in the out years, should be accompanied by documentation as to how legislation is progressing that would implement that increase.

- Documents the process of balancing the overall anticipated revenue resources with the costs of proposed transportation projects and services, while adequately maintaining the federally-supported transportation system.

- Strengthens the transportation planning process by tying constrained transportation budgets to the decision making process. It challenges policy makers and citizens alike to consider trade-offs between projects and to make difficult choices while meeting the constraints of a realistic financial plan.

- Results in better transportation plans, programs and projects, enhancing credibility and trust among the planning partners and the public. The demonstration of fiscal constraint provides a disclosure to the public on what improvements can be implemented with the resources expected to be available.

- Revenue and cost estimates for the MTP, TIP, and STIP must use an inflation rate(s) to reflect "year of expenditure dollars," based on reasonable financial principles and information, developed cooperatively by the State, MPOs, and public transportation operators.

What is the difference between financial planning and fiscal constraint?

- Financial planning is the umbrella term used to describe the documented process for all aspects of funding and financing, revenue forecasting, cost estimation, innovative financing and most importantly, ***fiscal constraint***, within the transportation planning process.

- Fiscal constraint is a specific demonstration that there will be sufficient revenue to implement proposed improvements and other activities described in a transportation plan or program, while adequately maintaining and operating the existing and proposed transportation system. It verifies that there will be sufficient revenue to ultimately implement the elements of the plan or program by balancing costs with financial resources. Absent fiscal constraint, transportation plans and programs could be nothing more than project "wish lists" for policy makers and the public.

Resources

Where can I find more information on Financial Planning?

- You may want to visit the TCPB website and review the following documents:
  - Financing the Statewide Plan: A Guidebook: http://www.fhwa.dot.gov/planning/state/04703r04.pdf
  - Peer Exchanges on Financial Management and Cooperation: http://www.planning.dot.gov/peer.asp#report

- You can read more about plan/TIP air quality conformity and fiscal constraint requirements at the following:
  - Transportation Conformity Reference Guide: http://www.fhwa.dot.gov/environment/conformity/ref_guid/chap1.htm
  - Transportation Conformity: A Basic Guide for State and Local Officials: http://www.fhwa.dot.gov/environment/conformity/basic_gd.htm#toc

- For a historical perspective on financial planning and fiscal constraint, you may want to review the following:
  - "Interim FHWA/FTA Guidance on Fiscal Constraint for STIPs, TIPs, and Metro Plans" at http://www.fhwa.dot.gov/planning/fcindex.htm
  - "Questions And Answers On Financial Plans/Fiscal Constraint For Transportation Plans And Programs" at http://www.fhwa.dot.gov/planning/fcqa62805.htm.

- For information and references on ***Major (Mega) Projects - financial planning***, please visit the following websites:
  - Financial Plan Guidance: http://www.fhwa.dot.gov/programadmin/mega/fplans.cfm.
  - Cost Estimating Guidance: http://www.fhwa.dot.gov/programadmin/mega/cefinal.cfm.

- For information on ***Transit - financial Planning***, please visit the following website:

  - Guidance for Transit Financial plans: http://www.fta.dot.gov/funding/finance/grants_financing_1336.html

- You may find additional in-depth information regarding topics related to financial planning in the following upcoming chapters (under development) in this handbook:
  - Revenue Forecasting
  - Cost Estimation
  - Fiscal Constraint
  - Financial Plans

Advance Construction (AC)

Background

What is Advance Construction (AC)?

- 23 U.S.C. Section 115 authorizes advance construction projects.
- Advance construction permits a State to advance a project with State, local or other sources of funds subject to Federal requirements as if the project were a Federally-funded project without committing any Federal funds to the project.
- Projects that are identified as AC must be processed, approved, and meet the same Federal requirements as any Federally-funded project.
- When a project is authorized as AC, there is no initial obligation (commitment) of Federal funds for the payment of the authorized AC project.

Legislation and Regulations

What are the applicable statutory and regulatory requirements?

- 23 U.S.C. Section 115 – Advance Construction
- 23 CFR Section 630.701-709, Subpart G – Advance Construction of Federal-Aid Projects
- Advance Construction Final Rule – August 26, 2008
- 23 U.S.C. Section 135(g) – Statewide Transportation Improvement Program

Elements of Advance Construction

How does AC work?

- After FHWA approval, States can initiate the construction of an AC project using State funds.
- Subsequent to the incurring of eligible costs, the State may request that the project be "converted" or partially "converted" to a regular Federal-aid project by obligating all or a portion of the Federal share, provided that sufficient amounts of Federal-aid funds and obligation authority are available.
- The Federal government is legally responsible to the State, at the time of conversion, for the amount of Federal funds obligated.

To what extent must AC be shown in the TIP/STIP?

- AC and Partial Conversion of Advance Construction (PCAC) are cash flow management tools that permit States to advance projects with their own (or other non-Federal) funds and later convert these projects for Federal assistance.
- AC allows a State to request and receive approval to construct projects in advance of the apportionment of authorized Federal-aid funds.
- States (at their discretion) may "convert" AC projects to Federal-aid at any time when sufficient Federal-aid funds and obligation authority are available to accommodate the conversion. Under PCAC, a State (at its discretion) partially "converts" AC project costs to Federal-aid funds in stages.

- 23 U.S.C. 115(c) specifies that an AC project application may be approved ***"only if the project is included in the transportation improvement program of the State developed under section 135(f)*** [1]***."***
    - Because AC does not constitute a commitment of Federal funds to a project, the financial plan and/or funding information for the TIP and STIP, needs to **demonstrate sufficient non-Federal revenues to provide all funding for the costs of projects listed as "AC" in the TIP and/or STIP (see 23 U.S.C. 135(g)(4)(E)).**
    - This demonstration of sufficient non-Federal revenues is paramount in that the total amount of allowable AC in the TIP, STIP, or total Federal program is limited by the requirement for a fiscally constrained STIP/TIP, not the current availability of Federal funds or obligation authority.

What should the Division ensure in programming AC projects?

- In practice, an AC project/project phase is included in the TIP and/or STIP at <u>two distinct points</u> in time:
    (1) As State or local funds prior to the initial approval[2] of the AC project (including a demonstration from the State that adequate State, local and/or private funds are available to fund the full cost of the project), and
    (2) In stages prior to the approval of the project to "convert" amount from AC to a Federal-aid funded project (including a demonstration from the State that this "conversion" maintains fiscal constraint with other STIP/TIP projects).
- Therefore, as part of the STIP, in the year(s) an AC project is "converted," to Federal funds, the amount of funds attributed to the project is considered both a non-Federal revenue source and a Federal-aid cost. This occurs because the conversion of the AC project results in a cash payment to the State (i.e. revenue) with a reduction in the amount of available Federal category apportionment and total obligation authority (i.e. debit).

Are there any limits to the amount of AC projects a State can program and have approved?
From a strictly Federal funding perspective, there is <u>*no limit*</u> to the number or value of AC projects the State can have approved for possible Federal-aid conversion. The two key actions governing AC projects are:

- At the time of Federal approval of a project as AC, <u>the project must be included in the Federally-approved STIP</u>.
    - The project will be demonstrated as supporting the fiscally constrained element of the STIP using all or some combination of State, local and private funds.
    - The financial limit on the amount of AC is actually set by the State's or MPO's ability to demonstrate fiscal constraint of the STIP or TIP respectively.

- Generally, when an AC project is converted to a Federally-funded project, <u>the STIP will document the full or partial conversion of the project as an individual project or as part of a project grouping.</u>

[1] The statutory citation (f) is incorrect. At the time of enactment of the NHS Act of 1995 section (f) was "Statewide Transportation Improvement Program". SAFETEA-LU recodified the STIP section to 23 USC 135(g) "Statewide Transportation Improvement Program".

[2] Prior to Federal project approval, AC projects must be identified in a fiscally constrained TIP and/or STIP. At the programming stage, the MPO and/or State needs to document, by year, the non-Federal revenues necessary for the AC project(s) sufficient to fund the estimated costs that will be incurred by non-Federal entities on all projects contained in the TIP/STIP on a Federal fiscal year basis.

- This project or group of projects needs to meet all TIP/STIP requirements, including the indication of the Federal funding category(ies) that are intended to be used for the conversion.
- Fiscal constraint must be demonstrated for the individual categories of Federal-aid funds.
- The amount of conversion is limited to either the amount of apportioned Federal-funds available in the category to be converted or the amount of obligation authority available at the time of the conversion, whichever is less. As with any project, it should be noted that the State is not locked into the category of funds identified in the approved STIP/TIP. However should the approved AC "conversion" substantially change the current STIP/TIP's fiscal constraint determination, the STIP/TIP may need to be amended.

Resources

What technical resources are available?
If you need more information, please contact the following offices:

- AC & TIP/STIP and Fiscal Constraint, contact your Planning Stewardship Liaison
- AC Limits & Financial Management, contact the Federal-aid Financial Management Division
- AC & Major Projects and Financial Plans, contact the Office of Infrastructure
- AC Legal Interpretation, contact Office of Chief Counsel

Cost Estimation

Background

What is the Regulatory Background?

- The metropolitan transportation plan (MTP) must include project design concept and scope in sufficient detail to develop cost estimates [23 CFR §450.322(f)(6)];
- The MTP must include a financial plan that demonstrates how the adopted transportation plan can be implemented [§450.322(f)(10)];
- For the outer years of the metropolitan transportation plan (i.e., beyond the first 10 years), the financial plan may reflect aggregate cost ranges/cost bands, as long as the future funding sources are reasonably expected to be available to support the projected cost ranges/cost bands [§450.322(f)(10)(v)];
- The statewide and metropolitan transportation improvement programs (STIP and TIP) must include estimated total project cost [§450.216(i)(2) and §450.324(i)]; and ***shall include a project only if full funding can reasonably be anticipated to be available for the project within the time period contemplated for completion of the project;***
- The State shall maintain a process to adjust project cost estimates [§630.106 (4)].

Elements of Cost Estimation

What is the project cost, and what needs to be included in the MTP or financially constrained Statewide Long Range Plan (if the State desires to develop one)?

The total cost of the project needs to reflect the various project phases, incorporating how funds will be spent and approximately when they will be spent. The total project cost represents the costs for the design, right-of-way activities, environmental studies, construction, project management, etc. as well as costs and resources paid for project related work such as planning, utility adjustments, environmental mitigations, and railroad relocations. An initial total project cost is included in the MTP at time of project inception, with cost figures subsequently updated and fed back into the financial plan when the MTP is updated or amended as the project details and schedule becomes more definitive. Typically, costs will be revisited and updated in the planning/programming process, and again at the preliminary engineering, environment, final design, right of way and construction/project award phases.

What is Year of Expenditure (YOE) Cost?

It is an estimation of the cost of a project or phase of a project at the time of its implementation, which primarily reflects the increased costs of inflation. The costs of projects in MTPs, TIPs, and STIPs are required to be shown in YOE dollars [23 CFR 450.216(l), 450.322(f)(10) and 450.324(h)] since an essential part of planning for transportation improvements and verifying fiscal constraint is determining the purchasing power of the construction/project dollar in future years. (More information on YOE is provided in the YOE fiscal constraint fact sheet and in the resources provided below.)

What inflation factors should be considered in cost estimating?

Long term (more than 5 years) inflation factors are not typically available. However, FTA and FHWA are both involved in developing and tracking long term cost estimating for New Starts and Major Projects (YOE cost of $500 million or more), respectively.

FTA has developed a methodology for estimating optimistic/ pessimistic baseline cost estimated for New Starts projects. It can be found at http://www.fta.dot.gov/documents/OP40_Risk_and_Contingency_Review_Rev._2May_2010MB.pdf .

FHWA does not prescribe a particular inflation rate for developing YOE cost estimates but does provide guidance on how to determine inflation rates for the project phases:

- Inflation rates should be applied at the midpoint of a project phase (PE, ENV, ROW and Construction) as each phase is estimated
- Inflation rates may be different for the different phases
- Multiple financial sources should be considered when determining an inflation rate, including national and local references
- Locality-specific cost factors that reflect growth rates significantly in excess of the inflation rate, such as land acquisition costs in highly active markets, should be considered

For planning purposes, if the State and locals do not develop their own individual inflation rates, the annual rate developed by FTA or the standard four (4%) percent rate as suggested in the Gloria Shepherd's August 18, 2006 memorandum can be used.

Who or which offices/groups need to be involved in project cost estimating?

Those involved should include representatives from the engineering, project design/development, operations, maintenance, and/or financial offices of the major political jurisdictions and transit operators who provide the cost estimates to maintain, operate and expand the federal-aid transportation system. Obviously, this includes the State DOT and the transit operators. Additionally, in many areas the local jurisdictions (counties and cities) maintain and operate portions of the federal-aid and local transportation system and/or sponsor federal-aid projects and programs. Also, with growing private sector involvement in providing transportation facilities or services, public agencies may need to exercise greater diligence to request and understand private sector project financing and cost proposals.

Without an adequate process or input from other offices/groups to obtain planning and program level project and system operations/maintenance cost estimates, the State and MPO will not be able to provide sufficient financial information to demonstrate a fiscally constrained MTP, TIP and STIP.

How should costs be estimated?

Cost estimates may be established in a number of ways. Early in planning or project development, there are many unknowns in defining project scope and design and, therefore, in identifying project costs. Recently programmed, designed, or completed projects can provide the cost basis for estimating the costs of proposed projects or groups of projects for planning purposes.

The estimated cost of a project is often expressed in terms of a cost per mile for highway and transit investments and can be calculated from similar, completed projects. Another approach to estimate costs relies on using typical project components (e.g., concrete, steel, labor, land, etc.) representing common facilities types for highway and transit projects. Historical costs can be applied for capital projects of

comparable scale and design or to estimate future operations and maintenance costs, with an appropriate inflation or growth factor included in the estimate. More detailed project cost information from more advanced or completed projects should be used if it is available.

The increasingly refined cost estimates prepared during project development should be incorporated into the TIP's/STIP's project information as well as the underlying financial plans, when the TIP/STIP is updated. See "Financial Planning and Fiscal Constraint for Transportation Plans and Programs Questions and Answers" issued on April 15, 2009, especially question 7. Examples of cost estimating are referenced at the end of this chapter.

What needs to be documented?

To assure that project or system maintenance and operations costs are reasonable, documentation should be available to demonstrate how the costs were developed. The MPO, State DOT, and transit agencies should agree to factors, assumptions and processes on how cost estimates will be developed, documented, and updated, as needed. At a minimum, the agency accepting cost estimates from transportation project sponsors and for system maintenance and operations for inclusion in plans and transportation programs should be able to understand and explain to the public and policy-makers:

- Who developed the costs,
- The assumptions, factors, and data that were used to develop the costs,
- The process that was used to develop the cost,
- How costs refinements (updates) will be fed back into the transportation financial planning process, and
- Other information needed to feel comfortable with the cost estimates provided.

Documentation should provide evidence that the cost estimation process is reasonable and therefore assures a credible fiscal constraint finding, assuming transportation revenues have been based on realistic expectations and thoughtful analysis, as well.

Division and Region Review and Action

What is my role in State/MPO's cost estimating?

FHWA and FTA determine the viability of the project and system-level cost estimates (both short term for TIPs and STIPs and longer term in MTPs), and the reasonableness of the estimation processes. Therefore, FHWA and FTA need to be involved in the early stages of financial planning when assumptions and data are identified and estimation procedures are developed.

What should be reviewed or verified?

- Are the estimates for maintenance, operations and proposed capital costs, as well as, debt service, system preservation and major expansion projects included?
- Is there a process to monitor project cost as the project advances through planning, project development, and project development and feed those refined cost estimates back into the financial planning process throughout the transportation planning process?
- Is there a common cost estimating process that is used by the cooperating transportation planning agencies, so the development of costs is consistent?

- Are various inflation factors and assumptions that influence cost estimating based on documented reasonable financial research and information?
- Are all involved parties in agreement with the cost estimates?
- Are total costs for regionally significant longer term projects included in STIPs (and TIPs) or the financial elements of associated plans?

What happens if we find the cost estimating to be deficient?

Project cost estimating is necessary to determine that a STIP or a MTP is fiscally constrained. As such, when the project cost estimating process is found to be deficient, FHWA and FTA will be unable to make a conformity determination on the Plan/TIP or determine that the STIP is financially constrained and affected projects cannot advance.

What actions can we take to correct or revise the cost estimating?

- As early as possible, engage and maintain an ongoing dialogue with the State and MPOs (and/or project sponsors, if necessary) to insure proactive responses and revisions to project and system O&M cost estimating issues;
- Be aware and discuss with States and MPOs actions that might significantly impact cost estimation (e.g., sharp increases in commodity prices) and how those may affect future federal actions on State/MPO programs and projects;
- Advise management of the importance of cost estimating and the ramifications of a failure to determine fiscal constraint;
- Consult with other Office staff with expertise in cost estimating; and
- If needed, involve FHWA and FTA HQ or Resource Center offices.

Resources

Where can I find information about cost estimating?

There are several resources, tools, and other information about cost estimation. Here are just a few of them.

- Office of Innovative Program Delivery, Tools & Programs, Cost Estimating: http://www.fhwa.dot.gov/ipd/project_delivery/tools_programs/cost_estimating/
- New Cost Estimating Tool, Vol. 7, No. 1, *Public Roads:* http://www.fhwa.dot.gov/publications/publicroads/11julaug/02.cfm
- NCHRP Report 574, *Guidance for Cost Estimation and Management for Highway Projects During Planning, Programming, and Preconstruction*: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_574.pdf
- NCHRP Report 635, Procedures Guide for Right-of-Way Cost Estimation and Cost Management: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_635.pdf
- FHWA Major Projects Cost Estimation Guidance: http://www.fhwa.dot.gov/ipd/project_delivery/tools_programs/cost_estimating/guidance.htm
- FTA Project and Construction Management Guidelines: Cost Estimation Methodology: http://www.fta.dot.gov/documents/15_Appendix_A-CostEstMeth_final.doc

Where can I find the current inflation factors?

- The U.S. Bureau of Labor Standards is the source for the Consumer Price Index (CPI). The home page web site for the CPI and related links is http://www.bls.gov/cpi/home.htm.
- Construction and building cost indexes are developed and updated regularly by the *Engineering News-Record* (ENR) for 20 major cities, as well as the national average: http://enr.construction.com/economics/.
- Most State DOTs maintain a construction cost index (CCI) based on tabulated bids from let projects from which inflation factors could be derived. Generally, a CCI is used as a multiplier that converts costs from past projects into the estimated cost of performing the same project today. Most State DOT's follow similar the techniques in calculating cost indexes and incorporate their own historical data to improve the accuracy of the index for their projects.
- FHWA also has a National Highway Construction Cost Index (NHCCI) which is intended as a price index that can be used both to track pure price-changes associated with highway construction costs and to convert current-dollar expenditures on highway construction to real- or constant-dollar expenditures.
- As indicated previously, FTA develops annual inflation factors and FHWA allows the use of the "default" rate of **4%**.

Are there notable examples of cost estimating?

- Washington State DOT developed a Planning Level Cost Estimating tool for use by districts, MPOs, and local governments. http://www.wsdot.wa.gov/mapsdata/travel/pdf/PLCEManual_12-12-2012.pdf
- The Atlanta Regional Council (ARC) has a spreadsheet with preloaded costs by project type for use by member jurisdictions: http://www.atlantaregional.com/transportation/roads--highways
- Georgia DOT provides access to the cost estimate module of AASHTO's Transport software to the State's MPOs: http://www.dot.ga.gov/informationcenter/programs/studies/Lists/FAQ/AllItems.aspx
- Case studies of several MPOs and State DOTs (including both cost estimating and revenue forecasting): Fiscal Constraint in Long-Range Transportation Planning

Revenue Forecasting

Background

What is Revenue Forecasting?

It is an estimation process based on historic experience and projected future experience. It entails an educated view of the future. Forecasting often includes several scenarios a baseline, an optimistic scenario and a pessimistic scenario, in order to establish a range of possible revenues. Usually a historical approach to revenue forecasting results in finances being predicted in YOE numbers, so no additional adjustments to the predicted numbers are normally required once forecasted into the future.

Elements of Revenue Forecasting

What information is used to do Revenue Forecasting?

- Comprehensive listing of historical revenue source(s) that have been used to operate, maintain and/or improve the transportation system
- Evaluation of past financing and determination of growth rates for use in future projections by source
- Understanding of economic and population figures and their influence on individual funding sources
- Agreement among the planning partners as to growth rates for revenues, particularly when they are the provider of certain revenue sources.

What is the correct forecasting methodology?

The correct forecasting method is dependent on the financial drivers for each individual funding source. A few of the more common sources of revenue and a recommended forecasting methodology are as follows:

- Federal/State Highway Trust Fund (HTF) – The baseline is established by examining HTF revenues over the last 2 or 3 authorization acts to estimate an annual growth rate. A pessimistic forecast could be developed by estimating a reduction in the growth of VMT (a result of increased gas prices) and/or a reduction in gasoline consumption as newer, more efficient cars are marketed in line with future CAFE standards and the increasing availability of alternatively-fueled vehicles. An optimistic forecast can be estimated using recommendations and ongoing Congressional discussions about increasing gas tax revenues and/or alternative revenue producing items (such as mileage based taxes).
- State/local general funds – Establish the historical baseline on both growth of and transportation share of general funds. Forecast ranges can be developed based on income and population growth or other factors used to generate revenues for general funds (e.g. real estate appraisals, utility taxes, etc.)
- Sales Tax – The baseline is established using historic numbers for an annual growth rate of sales within a pertinent region or jurisdiction(s). New taxes without historic numbers can be based on economic factors such as the inflation rates for the cost of goods, projected growth in income, and projected population growth. Pessimistic and optimistic forecasts would be established by looking at recognized state and local agencies projections and acceptable ranges.

- Highway vehicle use taxes or excise taxes – The baseline is historically established. Trends such as inflation, fleet change to a different type of vehicle (e.g. SUV growth), driving population growth, and income can all be used to develop upper and lower projections.
- Tolls – Historical growth is generally linked to growth in AADT. Ranges based on much the same projections for the HTF can be used on a local/state level to develop reasonable ranges of income.
- Transit Fares – Historical growth is generally linked to the growth in passengers and the increase in the transit fare structure.
- Innovative Financing – This can include strategies such as bonding, TIFIA loans, lines of credit and Public Private Partnerships (PPP), etc. These methods can all be included with estimates of potential revenues as long as they are described and justifiable, based on past and current experiences, feasible proposals based on a sound analysis, current laws or pending legislation, or other circumstances demonstrating a reasonably strong probability these strategies will advance.

What inflation factors should be considered in revenue forecasting?

Each revenue source should be independently evaluated to establish the initial baseline scenario:

- The HTF and most state transportation revenue sources derive their revenues from a gasoline tax, which is typically consumption based. HTF revenues can be extrapolated based on the growth rate across the last authorization period or two. Bonus revenues such as from the "Realigned Budget Authority" (RABA) should be excluded.

  Future discretionary funding can be determined based on the entire amount of discretionary program funding received throughout the time period used to determine HTF growth rate. For example, if TEA-21 and SAFETEA-LU were used to calculate a HTF growth rate, then the total amount of discretionary funds (12 years) allocated to the State would be represented by an annual rate.

  (Total discretionary $) / (12 years) = (future annual discretionary projection)

  However, some states generate fuel taxes with a tax component that is based on the price of gas. In this case, the revenue stream is a function of the price of gas. However, considering the recent volatility in the price of gas, long-term projections must be carefully evaluated to establish a reasonably accurate forecast.

- State and local general funds are probably the most diverse of the revenue producing categories as well as being the most volatile because of the many administrative, social and political demands which those funds are used to meet. The best source of determining the total revenue, which comprises general funds, is the State or local department of taxation. The transportation share is preferably calculated based on historical outlays.

- For most sales taxes, the inflationary growth can best be derived using the Consumer Price Index to determine the inflation factor. . If more specific inflation factors are available for an area or jurisdiction, then those should be applied.

- Although a smaller portion of the revenue available for transportation, ad valorem, highway vehicle use taxes, and excise taxes have typically shown stronger growth because in addition to inflation factors, there have been several other factors to influence the revenue stream. Factors that need to be considered are the increase in the number of drivers and thus vehicles, the tendency to purchase more expensive vehicles, and fleet change (SUVs). With the growing

evidence that fuel prices are continuing to increase, however, the relatively recent upturn in the purchase of bigger, heavier, and most likely, more expensive vehicles may slow or even decline.

- Tolls although linked to overall traffic growth can be influenced by the health of the economy. As variable pricing on facilities becomes more common as a tool to manage traffic congestion, more time of day analysis will be required to determine the amount of revenue generated from those facilities.

- Transit fares are linked to both the rate of growth in ridership and the historical growth in the fare structure.

- Each element of innovative financing, identified as a revenue source, will need to develop a reasonable approach and revenue amount based on legislative authority and an economic analysis which either mimics other States'/regions' experiences or is supported by a set of logical assumptions.

Who or which offices/groups need to be involved in revenue forecasting?

Among those who should be involved include, representatives from the financial offices of the major political jurisdictions and transit operators who provide revenues to maintain, operate and expand the federally aid transportation system. Obviously, this includes the State DOT and the transit operators. Additionally, in many areas the local jurisdictions (counties and cities) provide funding to maintain and operate the federal-aid transportation system and/or provide match to federal funds. Without adequately representing these financial interests, the State and MPO will not be able to provide sufficient financial information to demonstrate a fiscally constrained MTP, TIP and STIP.

What needs to be documented?

To assist other Federal/State and local agencies, as well as the general public, to understand and feel comfortable that the projected revenues are reasonable, adequate documentation must be available to demonstrate both historical and future revenue sources.

New funding sources and assumptions which result in major modifications to the revenue resources should be explained to facilitate a level of comfort that the analysis was rational and the likelihood of achieving the revenues is within the life of the Plan or STIP/TIP within the time-frame contemplated for completion of the project(s).

Division and Region Review and Action

What is my role in State/MPO's revenue forecasting?

FHWA and FTA must be able to determine the viability of the identified funding sources (both historical and proposed additional revenue sources), and the reasonableness of the amount of revenue forecasted (both in the short and long-term). Therefore, FHWA and FTA need to be involved in the early stages of determining reasonable amounts of funding by providing guidance on the reasonableness of baseline and alternative scenario assumptions.

What should be reviewed or verified?

- Are revenue forecasts for maintenance, operations and proposed capital costs, as well as, debt service, system preservation and major expansion projects included?

- Are new funding sources or major increase to existing funding sources projected? If so:
  - What is their current status?
  - Are they in the later years of the Plan?
  - Is a logical realistic plan for acquiring/insuring these revenues become viable provided?
  - Is there a history, which lends confidence to these new/additional funds becoming a reality in the time frame needed?
- Are various inflation factors based on documented sound financial research and information?
- Are all involved parties in agreement with the revenue forecasts?

What happens if we find the revenue forecasting to be deficient?

Revenue forecasting is one of the major components necessary to determine that a STIP or a MTP is fiscally constrained. As such, if the result of or the revenue forecasting process is found to be deficient, FHWA and FTA will be unable to make a conformity determination on the Plan/STIP or determine that the STIP is financially constrained. These actions are prerequisite to advancing projects in a non-attainment / maintenance area or statewide respectively.

What actions can we take to correct or revise the revenue forecasting?

- As early as possible, engage and maintain an ongoing dialogue with the State (and MPOs, if necessary) to insure proactive responses and revisions to revenue forecasting issues;
- Be aware and discuss with States and MPOs actions taken by the state legislature and how it affects future federal actions on State/MPO programs;
- Advise management of the importance of revenue forecasting and the ramifications of a failure to determine fiscal constraint
- If needed, involve FHWA and FTA HQ offices.

Resources

Are there examples of good revenue forecasting?

- Atlanta, GA – population about 4 million – (page 89)
  http://www.atlantaregional.com/documents/Envision6_RTP.pdf
- Phoenix, AZ – 2000 population about 3 million -
  http://www.mag.maricopa.gov/pdf/cms.resource/RTP_2007-Update_07July.pdf
- Sacramento, CA – population about 2 million – (Chapter 7)
  http://sacog.org/mtp/pdf/MTP2006/2006%20MTP%203-16-06.pdf
- Tuscon, AZ - population about 850,000 - update version (Page 23)
  http://www.pagnet.org/documents/RTP/RTP2030/RTP2030FullUpdateSeptember2006.pdf
- Fargo, ND – Moorhead, MN – 2000 population 160,000 – (Chapter 7)
  http://www.fmmetrocog.org/content/downloads/projects/MTP.pdf

Where can I find the current inflation factors?

The U.S. Bureau of Labor Standards is the typical source for the Consumer Price Index (CPI). The home page web site for the CPI and related links is http://www.bls.gov/cpi/home.htm . The CPI for all urban consumers can be found at http://data.bls.gov/cgi-bin/surveymost

However, there are other factors, which may need to be evaluated and included in calculations of future revenue growth:

- Fuel consumption and related HTF funding on both the state and federal levels can be ascertained from FHWA Highway Statistics. http://www.fhwa.dot.gov/ohim/hs01/index.htm This site also contains useful data relative to maintenance, operations and the cost of highway improvements on a national and statewide basis.
- Retail Sales Tax Revenues normally are available from the State Department of Revenue and Taxation (SDRT).
- Fare and Local/State revenues are available from transit agencies annual reports.

Where can I find general information about revenue forecasting?

- TRB has several reports: an overall report: http://ntlsearch.bts.gov/tris/record/tris/00473265.html , as well as state specific reports, such as: http://pubsindex.trb.org/document/view/default.asp?lbid=204662 and http://pubsindex.trb.org/document/view/default.asp?lbid=578156
- State of Virginia had an audit conducted recently http://www.apa.state.va.us/reports/DPBInterim06.pdf

Metropolitan Transportation Plan

Background

What is a metropolitan transportation plan (MTP)?

- It is a multi-modal plan that is developed and adopted through the metropolitan planning process reflecting the collaborative decision making efforts among its stakeholders for its metropolitan planning area.
- The plan should reflect the values and the vision of its metropolitan planning area.
- In brief, the plan identifies the current transportation system, the future demand on the system, and strategies/actions to best meet these future demands given the perceived resources available.

Why does the MPO need a transportation plan?

- This is a federal requirement under 23 U.S.C. 134 (c)(1) that the MPO, in cooperation with the State and public transit operators, shall develop a transportation plan for the metropolitan planning area.
- For projects in the metropolitan planning area to be eligible for Federal-aid, they must come from the metropolitan planning process and be identified in the transportation plan.
- For projects in the transportation planning area that are funded with State/local funds but require federal action (i.e., new/revised Interstate access approval, NEPA clearance, and ROW clearance), they must be identified in the transportation plan.

What is the relationship between the statewide plan and the MTP?

- The metropolitan transportation plan should be consistent with the statewide plan.
- The portion of statewide plan that covers a metropolitan planning area should reflect the policies and vision of the metropolitan transportation plan.

What is the relationship between the plan and TIP?

- The transportation plan is usually referred to as the long-range (minimum of 20 years) plan.
- The TIP is a prioritized listing/program of transportation projects consistent with the metropolitan transportation plan. [23 CFR 450.104]

What does "consistency" between the plan and TIP mean?

- The policies and vision identified in the plan are clearly supported and implemented by projects identified in the TIP.
- Project concept and scope (i.e. mode and "size") are identified and established in the planning process and in the transportation plan, and further prioritized and advanced through the TIP.
- The TIP may be viewed as a "subset" of the more comprehensive MTP

What planning activities and tasks are needed to support a plan update?

- In completing a new or updating an existing transportation plan, the following data sets need to be developed, reviewed and analyzed:
    - Population and employment projections
    - Land use plans (e.g. expected growth and development patterns) for the region
    - Existing transportation system inventories/networks
    - Travel demand forecasts (TDF) using the above parameters

What laws and regulations must the metropolitan transportation plan consider?

- 23 U.S.C. 134 (c), (h), (i)

- 49 U.S.C. 5303 (c), (h), (i)
- 23 CFR 450.322

Elements of a Metropolitan Transportation Plan (MTP)

What is in the plan?

The MTP shall:

- Include short and long-term strategies that lead to an integrated multimodal transportation system
- Facilitate the movement of people and goods
- Forecast transportation needs of people and goods over the period of the plan
- Identify congestion management strategies that demonstrate a systematic approach to meeting current and future transportation needs
- Identify pedestrian and bicycle facilities
- Reflect consideration given to pertinent management systems
    - Include only those SOV projects coming from Congestion Management Process (CMP) in nonattainment TMAs
- Assess investments and other measures needed to maintain and make the most efficient use of the existing transportation system
- In air quality nonattainment/maintenance areas, include the design concept and scope (mode and alignment) descriptions of all existing and proposed transportation facilities to permit conformity determinations.
- Reflect a multimodal evaluation of the transportation, socioeconomic, environmental, and financial impact of the plan
- Reflect consideration of existing and pertinent land use plans and community development, employment, environmental, housing, and other relevant goals, objectives and strategies
- Describe proposed transportation enhancements
- Include a financial plan that demonstrates consistency of proposed transportation investments with available and forecasted sources of revenue, using year of expenditure (YOE) dollars (as of 12/11/07)
    - Demonstrate, through the financial plan and other supporting documentation, the fiscal constraint of the MTP
- Discuss potential environmental mitigation activities and potential areas to carry out these activities
- Describe operational and management strategies to improve performance
- Include transportation and transit enhancement activities

What are the basic requirements for a long-range plan?

In addition to the elements required above, a MTP shall:

- Indicate where the design concept and scope of a proposed project has not yet fully developed that further analysis is needed
    - The MTP can include a set of assumptions as a "place-holder" for the proposed project or use the no-build scenario until a final alternative is identified and amended into the plan
    - In nonattainment/maintenance areas, sufficient parameters of the proposed alternative must be identified for conformity analysis purposes
- Be developed in such a way to provide involvement of public officials, interested parties, and the general public before it is adopted by the MPO.
    - The public must be provided a reasonable opportunity to comment on the transportation plan using the participation plan developed under 23 CFR 450.316.
    - To the extent practicable, the plan shall be made available in electronically accessible format.

What are the planning factors and what are their significance?

- In the development of a MTP, the MPO and its planning partners will consider projects and strategies to include in the plan that address the following factors:
  - Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;
  - Increase the safety of the transportation system for motorized and non-motorized users;
  - Increase the security of the transportation system for motorized and non-motorized users;
  - Increase the accessibility and mobility options available to people and for freight;
  - Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;
  - Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns;
  - Promote efficient system management and operation;
  - Emphasize the preservation of the existing transportation system;
- Since each metropolitan area planning process has its own unique characteristics, advantages, challenges, and needs, how a metropolitan plan considers, weights, and addresses the planning factors will vary
- To some degree, as determined through the 3-C planning process, each factor should be evaluated and integrated into the development of a plan (and other planning processes/documents)
- Review documentation of this effort, either in the plan or elsewhere, and determine that, given your knowledge of the pertinent transportation issues, sufficient consideration of each factor is demonstrated in the plan and throughout the planning process

What areas or boundaries should be covered by the long-range plan?

- The MTP will extend at least to the official metropolitan planning area (MPA) boundaries as delineated by the MPO (the official urbanized area plus 20 years of expected growth) and accepted by U.S. DOT
- The plan can cover a larger area, with the acknowledgement that areas outside of the MPA are not eligible for federal funds designated for urbanized/metropolitan areas

Who is involved in the development of a plan?

Those who should or can be involved include the following:

- The MPO (the MPO staff and local member agencies and staffs)
- Local public transit operators
- The state DOT (including headquarters and field office staffs and officials)
- A variety of federal, state, and local governmental agencies
- The general public
- Providers of private transportation services and facilities (toll authorities)
- Airport and seaport authorities
- Freight companies/representatives (rail and truck)
- Law enforcement
- Public health and safety organizations
- Environmental groups (including groups advocating “smart growth”/sustainable development)
- Non-motorized transportation advocacy/user groups
- School districts and local colleges/universities
- Neighborhood and community associations
- Historic preservation societies
- Business sector representatives, including Chambers of Commerce, major employers, and major land use developers
- Providers/users of paratransit and services for the disabled and elderly

- The media
- Other groups, organizations, or associations with particular interests in transportation, land use, economic development, environmental justice, employment, environmental, and related issues (e.g., tourism industry in resort communities)

What is the public/agency participation relative to plan development?

- Local residents, employers, other stakeholder and interest groups, and local elected and appointed officials all have a role to play in the development of a transportation plan
- The MPO and its planning partners must rely on the public to craft a vision, goals, objectives, policies, criteria and strategies to direct the development of the MTP
- Public participation is vital to producing a viable plan with a high probability of guiding the implementation of transportation projects

What is considered "adequate" public involvement?

- Each MPO shall follow a Public Participation Plan (PPP) that was developed in consultation with all interested parties
- Each MPO must have a documented and adopted PPP that describes how the MPO, and its partners, will involve and engage the public in the transportation planning process
- Some MPOs may choose to further refine those procedures for the development of a particular plan or study
- A successful public involvement process will ensure the public many opportunities to be actively involved in all phases of plan development, from beginning to end
- A public involvement process which only provides limited access to and information on plan development and/or only shares draft and final copies of the plan after major decisions have been made is **not** acceptable

Does the area need a vision and how does the plan relate to the vision?

- A "vision" can consist of graphic images of physical characteristics of what current residents and officials hope their area will look like at some point in the future, or it can be a set of goals, objectives, and policies concerning quality of life measures they expect to meet in the future, or a combination of those elements and others
- While a commonly accepted, formally adopted vision is not required to develop a MTP, a vision of what the metropolitan area wishes to achieve and hopes to resemble in 20 to 50 years (or even beyond) can be the guiding mechanism for the development of the transportation plan
- Some metropolitan areas have adopted comprehensive visions which address land use, economic development, environmental, and sustainability/livability issues, which the transportation plan is crafted to complement and assist in achieving; Other areas have developed long-term unconstrained transportation system plan visions from which the fiscally-constrained transportation plan is produced
- A visioning process involving a wide-range of citizens and stakeholders can be used to establish the goals and priorities of the transportation planning process
- Having a "vision" for the future of a metropolitan area can provide a clear structure and purpose to a MTP

How do the transit, bikeway, and highway plans relate?

- The various modes must be integrated into one transportation plan
- Chapters or sections addressing the different modes should never be "stapled" together to create the plan document
- To the extent practical, the goals and objectives of the plan and the criteria and process used to select projects for the plan should be fashioned to be "mode neutral"

- The staffs of the MPO, the local transit operator(s), and the state DOT must work collectively to develop an integrated, multi-modal plan that assures consideration of the relationships between modal facilities, services and programs

What financial information should be included in the plan?

The financial plan for the MTP shall:

- Demonstrate consistency of proposed transportation investments with already available and projected sources of revenue
- Compare estimated revenue from existing and current sources that can reasonably be expected to be available for transportation uses against the estimated costs of constructing, maintaining, and operating the federally-supported (existing plus planned) transportation system over the period of the plan
- Identify shortfalls in revenue by source (federal, state, local, and private)
- Propose new revenues or new revenue sources to cover shortfalls, including identifying strategies for ensuring their availability for new investments
- Identify existing and proposed revenues to cover all forecasted capital, operating, and maintenance costs for the federally-supported transportation system
- Include all appropriate cost and revenue projections based on data reflecting the existing situation and historical trends
- Provide financial forecasts in YOE dollars, based on cooperatively developed/agreed to inflation factors and other assumptions
- In nonattainment/maintenance areas, address the specific financial strategies required to ensure the implementation of projects and programs to reach air quality compliance

Are non-federal projects and revenues included in the plan?

- All anticipated major surface transportation projects, programs, and activities that will be implemented within the metropolitan areas through the horizon year of the plan, must be reflected in the plan, regardless of funding source or implementing agency, if those projects support or otherwise impact the federally-supported transportation system.
- This is, in part, tied to the requirement that MTPs are to be financially constrained and demonstrate the existing and future regional transportation system can be adequately maintained and operated with forecasted revenues
- Much of the cost of maintaining and operating a regional transportation system is the responsibility of local and state governments and local/regional transit operators
- To produce a valid, comprehensive long-range transportation plan that considers the viability of the entire regional, federally-supported transportation system, revenues from nonfederal sources and the costs of nonfederal projects must be included

What should be the relationship between plans of adjacent MPOs?

- Where more than one MPO has authority within a metropolitan area or a nonattainment/maintenance area, the relevant planning agencies (e.g., MPOs, state DOTs) shall develop an agreement describing how the planning processes will be coordinated to ensure the development of an overall transportation plan for the entire area
  - This applies to multi-state metropolitan areas, as well
- Where two or more MPOs are adjacent or nearly adjacent, but do not share the same metropolitan area, the MPOs should consult with each other to share information, identify common issues, and coordinate their respective planning processes, as appropriate

Plan Horizon Year

What time period should the long-range plan cover?

- A metropolitan plan must address a minimum of a 20-year planning horizon from the time it is adopted by the MPO (in an attainment area) or from the date a conformity determination is issued by FHWA and FTA (a nonattainment/maintenance area MPO must take that potential delay into account)
- The MPO may revise the transportation plan at any time using the required and appropriate procedures without the need to extend the plan horizon year

How far out can the horizon year of the plan be?

- Beyond the 20-year minimum, the horizon year can be set as far into the future as the MPO and its partners determine.
- Plans with exceedingly long horizon years could have difficulties in demonstrating reasonable revenue and cost projections
  - Could raise unreasonable expectations among the public
- Developing longer-term fiscally unconstrained or "vision" transportation plans in addition to a constrained plan can offer an alternative approach for those areas that want to identify and address longer-term needs of the regional transportation system

Does the plan require a 20-year horizon any time the federal agencies make a conformity determination?

- No. A conformity determination can still be made even if the plan has less than 20 years left at the time of the conformity determination.
- This is due to the fact, in such a case as above, the conformity determination does not restart the conformity clock; it only "reconfirms" the conformity determination which was based on a regional analysis conducted on a plan with at least 20 years. The MPO can choose to extend their plan but this is not a requirement.

Timing: Plan Adoption/Plan Updates/Plan Lapsing

When does a plan go into "effect"?

- For attainment areas, a plan is in place effectively when formally approved and adopted by the MPO Board.
- For non-attainment/maintenance areas, both MPO Board adoption and the transportation conformity determination issued by federal agencies (FHWA and FTA) must be in place.
- The plan update cycle and conformity determination cycle starts from the date the plan is in place

What are plan amendments?

- Plan amendments occur when an adopted plan is in place and a formal plan update is not imminent or necessary, but major changes to the plan are wanted.. Amendments are completed to accommodate:
  - A major change to a project or projects described in the metropolitan plan, including
    - the addition or deletion of a regionally significant project, or
    - a major change in project cost or project/project phase initiation dates, or
    - a major change in project design concept or design scope (e.g., changing project termini or number of through lanes)

    - A change that requires
        - public review and comment (as described in the pertinent PPP), or
        - a redemonstration of fiscal constraint, or
        - a conformity determination for nonattainment/maintenance areas
    - Each division office should work with the State and MPOs (and FTA/transit operators) to develop an agreement that defines what actions require an "amendment" to the metropolitan plan, giving consideration to the above guidelines
- Amendments are usually not necessary for the addition or deletion of minor projects or change in the mix of projects for the region which involve maintenance, operations, and/or other projects not regionally significant which are not usually listed individually in the plan
    - Minor changes to the plan are referred to as "administrative modifications", as defined in the 23 CFR 104 or otherwise determined through an agreement between FHWA/FTA and the State and MPOs

What is considered a plan update?

- Once a MPO is established, the MPO must prepare a MTP. An update of a plan is the equivalent of developing a new transportation plan.
- As part of the 3-C planning process (Cooperative, Comprehensive and Continuing), the MPO is required to review, validate and update the plan periodically [23 U.S.C. 134 (i)(1)]:
    - Every 4 years in non-attainment/maintenance areas
    - Every 5 years in attainment areas; or
    - More frequently, if MPO elects
- The MPO needs to review, revise and update all the population/employment and land use data, extend the forecast period to a minimum of 20 years, and conduct a full public involvement process.
- Projects, strategies/actions from current "in place" MTP need to be reviewed and evaluated to determine if they are still valid and address current and forecasted transportation needs, and then be included in the updated plan.
- The MPO Board must take formal approval/adoption action, as the final step of the update process. In non-attainment/maintenance area, MPO, FHWA and FTA must make a conformity determination on the plan update.
- Once the plan update has been adopted, the update replaces the old plan and becomes the currently valid MTP.

When does a plan "lapse" and when does a plan "expire"?

- If a conformity determination for the metropolitan plan is not made by an applicable deadline and such failure is not corrected by either adding measures to reduce motor vehicle emissions or taking other needed actions sufficient to reestablish conformity within 12 months after such deadline, the transportation plan shall lapse (i.e. an area has a 12-month "grace" period to reestablish conformity before facing a plan lapse).
    - The term 'lapse' means that the conformity determination for a transportation plan is no longer valid, and thus there is no currently conforming transportation plan or transportation improvement program.
- The term "expire" refers to a plan which has not been updated to meet the federal planning requirements within the designated update timeframe.. Plan expirations mean no new TIPs or TIP amendments can be included in the STIP for project implementation. A plan expiration also results in a conformity lapse subject to the "grace period" discussed in the previous bullet.

How do I provide an extension to the long-range plan rather than letting it lapse?

- If a plan lapses in a non-attainment/maintenance area, the MPO must develop/adopt an "Interim" MTP and TIP so the FHWA and FTA can make approvals or grants limited to:

  - Projects that are exempt from the conformity process (pursuant to 40 CFR 93.126 and 93.127 of the conformity rule) such as safety projects, and Transportation Control Measures (TCMs) included in approved SIPs.
  - Only those project phases, which have received approval of the project agreement, and transit projects that have received a full funding grant agreement (FFGA), or equivalent approvals, prior to the conformity lapse may proceed during a conformity lapse.
- If a plan is expected to expire before an update is ready for adoption,
  - The MPO must show a good faith effort to complete the plan update in an expeditious manner
  - In attainment areas, projects in the current TIP can advance, but the TIP cannot be amended or adopted until the updated MTP is completed/approved by the MPO.
  - The expiring MTP can be updated on an "interim" basis if plan goals/policies, demographic and financial information, traffic forecasts, and project listings do not require major revisions. This could still result in a conformity lapse in non-attainment/maintenance areas, depending upon conformity update cycle and the allowed grace period.
    - A short-term, "Interim" plan can be adopted by the MPO Board to allow TIP amendments to proceed, after consultation with other planning partners, the public, and FHWA/FTA

What is required when a plan is in danger of lapsing due to conformity-related issues?

- Six months prior to an anticipated lapse, FHWA, FTA, and EPA need to coordinate with the State and MPO to determine a course of action to update the MTP and complete and approve the conformity determination as expediently as possible.
- In the interim, the MPO must create an Interim Plan and TIP for any projects to be federally-funded and approved during the lapse, which are limited to exempt projects and transportation control measures (TCMs). The Interim Plan and TIP must be developed in a manner consistent with 23 U.S.C. 134, particularly these criteria:
  - The Interim Plan and TIP must be developed based on previous planning assumptions and goals; appropriately adjusted for currently available projections for population growth, economic activity and other relevant data.
  - The Interim Plan and TIP must be developed with public involvement consistent with the normal transportation plan and program development processes.
  - The Interim Plan and TIP must satisfy the Title 23 and 49 requirements for financial planning and constraint, and, as appropriate, for congestion management systems.

We frequently amend the plan. Does this result in a new time frame for plan updating or does the old date apply?

- An amendment to the MTP does not constitute a plan update (see response above), and the date of the plan amendment adoption and/or conformity determination by FHWA and FTA does not restart the plan update or conformity clocks.

If conformity lapses, what does that do to project authorizations and/or STIP amendments?

- If there is not a valid MTP, then no project authorization can occur. When a conformity lapse occurs, then obviously no federally recognized plan exists unless an "Interim" Plan has been adopted, as described above.
  - In non-attainment/maintenance areas, this equates to the inability to authorize projects, approve environmental documents, and amend/develop TIPs/STIPs in the lapsed area, unless they come from an adopted Interim Plan.

Actions by the Divisions/Regions

What is my role in the development of the plan?
The field planner role is multifaceted including the following:

- Provide planning guidance to the state and MPOs
- Identify the federal planning emphasis areas and national priorities
- Provide technical guidance/assistance
- Serve on the MPO Technical Advisory Committee
- Facilitate peer exchanges to identify best practices within planning process

What actions do the MPO, transit operators, and State need to take on the plan?

- The transportation plan is a product of the MPO. The MPO is ultimately responsible for developing, validating and approving the transportation plan.
- The transit operator(s) and State are cooperative partners and provide guidance and assistance to the MPO throughout the planning process. The State needs to review and provide comments to ensure that the MTP and the statewide plan are consistent and the MTP meets state requirements.
- The roles and responsibilities of the transit operator(s) and the State DOT in developing the transportation plan should be addressed in the metropolitan area planning agreement with the MPO and more specifically described in the UPWP.

What actions do I have to take on the plan?

- The field planner should review and provide comments on MTP, through all stages of development and finalization.
- The transportation plan should be shared, as appropriate, with the transportation engineers/grant managers in the division/region for their information and review.
    - For example, the proposed MTP financial plan should be shared with the FHWA Division Office financial manager for his/her consideration and comment
- In nonattainment/maintenance areas, FHWA and FTA must approve the conformity determination for the plan. The field planner will coordinate with EPA/FTA to ensure reviews and comments are adequately addressed in a timely manner.
- In attainment areas, no additional actions are needed once the MPO adopts the plan and the plan is submitted to both the Governor and the US DOT for informational purposes

How/when do I get involved with plan amendments?

- At the earliest stage, the field planner, when aware that an amendment is being proposed, should review the amendment to ensure that it is consistent with and does not degrade the integrity of the plan (e.g., undermine financial constraint, conformity [see plan amendments above]) or require a plan update.
- FHWA/FTA involvement in an MTP amendment may depend upon:
    - An agreement developed between US DOT and the MPO and/or State DOT that defines what constitutes an amendment, particularly when plan conformity is at issue,
    - A Planning Collaboration Initiative (PCI) agreement between FHWA and FTA that delineates when one agency may act for the other.

What if there are items in the long-range plan that the Division/Region disagrees with?

- During the plan development, the field planner needs to be proactive and participate in the relevant meetings to resolve issues before the MTP is finalized.
- In nonattainment/maintenance areas where there is still disagreement after a final plan is completed, the field planner needs to work with the MPO to resolve these issues adequately, in particular, before he/she approves the conformity determination.

- In attainment areas, the field planner can highlight the issues and possible resolutions in the Federal Planning Finding during the approval of the STIP/TIP and in response to the MPO's self-certification or during the development/review of the UPWP. Following, the field planner will need to work closely to MPO to address these issues in a mutually acceptable manner.

Resources

Where can I find the technical assistance and training resources on the MTP?

- Check the Transportation Planning Capacity Building website: www.planning.dot.gov
  - Provides resources on various topics that should be addressed in the plan or during the plan development process (e.g. public involvement, financial planning, etc.)
- For nonattainment/maintenance areas, refer to the Air Quality Conformity regulations and other supporting documents for specific requirements pertaining to plans: www.fhwa.dot.gov/environment/conform.htm
- Attend training courses:
  - Introduction to Metropolitan Transportation Planning (NTI/NHI)
  - Other courses covering financial planning, air quality conformity, safety-conscious planning, etc.
- Review the resources available on the Planning Community of Practice Website: http://knowledge.fhwa.dot.gov/planning
- Contact the HQ Office of Planning (HEPP) staff member designated as the STIP specialist or the designated "Planning Stewardship Liaison" for your division office
- Network with other division planners to identify common issues and experiences with MTPs in their respective states

Non-Metropolitan Local Official Consultation Process

Background

What is consultation?

- *Consultation* means that one or more parties confer with other identified parties in accordance with an established process and, prior to taking action(s), considers the views of the other parties and periodically informs them about action(s) taken.

What is the definition of non-metropolitan areas?

- *Non-metropolitan area* means a geographic area outside a designated metropolitan planning area, as designated under 23 U.S.C. 134 and 49 U.S.C. 5303.

Who's covered under the term non-metropolitan local official?

- *Non-metropolitan local official* means the elected or appointed officials of general purpose local government in a non-metropolitan area, with responsibility for transportation.

Are tribal officials considered non-metropolitan local officials?

- Under this Federal requirement, the tribal officials are not considered non-metropolitan local elected officials, but as sovereign government officials.
- The requirement that the concerns of Indian tribal governments must be considered will be accomplished within the transportation planning process (23 CFR 450.208 (a) (5), and 450.210(c)).

Are there any States that do not have non-metropolitan, local officials?

- The District of Columbia, New Jersey, and Rhode Island do not have non-metropolitan areas outside their designated MPO metropolitan planning areas.
- Accordingly, these States are not subject to the non-metropolitan local official consultation rule.

What laws or regulations govern the non-metropolitan local official consultation process?

- 23 U.S.C. 135 (d)(1) – Statewide Planning
- 23 CFR 450.208 (a)(4) – Statewide Planning – Coordination of planning process activities
- 23 CFR 450.210 (b) – Interested Parties, Public Involvement, and Consultation
- 23 CFR 450.214 (g) – Statewide transportation plan
- 23 CFR 450.216 (c) – Statewide transportation improvement program (STIP).

Elements of Non-Metropolitan Local Official Consultation Process

Are States required to consult with non-metropolitan, local officials from Regional Highway Districts, Development Districts, and other similar local entities?

- The State must consult with elected and appointed officials from general purpose local government entities. They can be from the following:
  - Counties, cities, towns, townships, villages, boroughs, and parishes.
- The State may consult with other local entities and although it may prove advantageous in the planning process, the State is not required to do so under this rule.

Does the State process need to demonstrate consultation with every local, non-metropolitan official?

- The requirement says that States shall request comments from the "non-metropolitan local officials representing units of general purpose local and/or local officials with responsibility for transportation..." (23 CFR 450.210(b)).
- Rural consultation may not need to include every local agency. However, the State has several options (not limited to just those listed here) to facilitate consultation:
  - States may consult with Regional Planning Organizations that include elected officials on the board.
  - States may have an annual county-by-county tour to review the STIP.
  - States may meet with statewide associations of county or city officials.
- Many officials may not serve as board members or otherwise participate in Regional Planning Organizations.
  - This is true in the Midwest where some States have over 1,000 general purpose, local agencies.
  - Similarly with county-by-county tours, sub-county general purpose units of government (cities, towns, townships) may not be present.
  - Many officials may not attend statewide meetings.

May a State have different processes for different parts of a State?

- The regulation requires the State to have a documented process(es) … for consulting with non-metropolitan local officials (23 CFR 450.210(b), emphasis added).
- A State may have more than one process in response to non-metropolitan regions with different transportation needs or local governments with varying types of resources.

May a State work with an Association or group that represents non-metropolitan local officials in reviewing current or proposed consultation practices?

- Yes. States shall request comments from "State association of counties, State municipal league, regional planning agencies or directly to non-metropolitan local officials." (23 CFR 450.210(b)(1))

What are some documented methods that States use to consult with non-metropolitan, local officials?

- Some States use the following separate and discrete methods to consult with non-metropolitan local officials (based on self-reporting from 1999):
  - Support of Regional Planning Organizations that may develop or review Plans, TIPs, or other statewide activities;
  - State county-by-county consultation tours during the STIP development process;
  - Statewide or district-level advisory commissions composed of non-metropolitan, local officials;
  - Presentations at local meetings;
  - Mailed notices and invitations;
  - Attending State City/County Association meetings.
- These methods may work in some States, but not in other States.
- Each State should identify and resolve its own consultation needs in its adopted documented consultation process.

Who needs to demonstrate that there is a separate and discrete consultation process for non-metropolitan officials?

- The State is required to have a documented process(es) … for consulting with non-metropolitan local officials (23 CFR 450.210(b), emphasis added).

- The State Department of Transportation has the responsibility for carrying out the Federal transportation program. (See 23 U.S.C. 302(a).)

Is this different from the public involvement process?

- Yes, they are different.
- The States are required to confer with specific parties, namely local officials outside the metropolitan areas, on their views, decision-making, and actions resulting from these decisions.
- Public involvement is a process that includes the general public. The public involvement process is proactive, provides complete information, timely public notice, full public access to key decisions, and opportunities for early and continuing involvement.
    - The general public includes the following: citizens, affected public agencies, transit labor representatives, private transportation provider, other interested parties, and segments of the community.
    - For more information on public involvement, please see the TPCB Public Involvement website at, http://www.planning.dot.gov/technical.asp#pub.

What activities, process, or products require non-metropolitan local official consultation?

- Statewide transportation plan development and updates.
- STIP development –
    - Revenue Forecasting and Allocation
    - Project Selection
        - Projects in non-metropolitan areas funded by NHS, Bridge or Interstate Maintenance shall be selected by the state in consultation with local officials.
        - Projects funded by other programs shall be selected by the state in cooperation with local officials.
- Revising Public Involvement Procedures (PIP)
- Project identification – development of "purpose and need" statement

Actions by the Divisions/Regions

What is my role in this, now that the process has been implemented?

- At least every five years (as of February 24, 2006), the State shall have a period of not less than 60 days for non-metropolitan, local officials, and other interested parties to comment on the effectiveness of the consultation process.
- With these comments, the State then has to modify the process or make public the reasons for not doing so.

At a minimum, what do FHWA Division Offices and FTA Region Offices need to look for in the state's consultation process?

- The FHWA Division Offices and FTA Region do **not** formally review the adopted document. However, as with any outreach process, the State is required to periodically solicit comments and evaluate the process' effectiveness. As such, the USDOT needs to insure the State has:
    - Documentation of a process that is "separate and discrete" from the State's general public involvement process (23 CFR 450.210(b)), and
    - At least every five years, solicited and reviewed comments on the process by local officials, regional councils or their State associations (23 CFR 450.210(b)(1)). States need to send a copy of their adopted State consultation process to the applicable FTA and FHWA field offices.

What actions do I take if I find the State's process does not meet our requirements?

- Discuss issues and concerns with appropriate State DOT staff and/or officials
  - Consult with FTA/FHWA staff to inform them of your concerns and to understand their assessment of the situation
  - Be sure to understand why local officials and perhaps others are dissatisfied with the State's process or implementation of the process
  - Seek resolution of problems informally, if possible
- If necessary, make note of your concerns in the next Federal Planning Finding (23 CFR 450.218)
  - Document what you have heard from local officials and other sources that lead you to believe the State is not following its own process
  - Indicate to the State what you expect the state to do to address these concerns regarding consultation with local officials
- If the State does not resolve or address the problems as you determine necessary, let the state DOT know a consequence of its failure to act may require your office to delay the approval of the next STIP amendment or new STIP (or at least the rural portion of the STIP) until these issues are satisfactorily resolved
  - Keep your Division/Regional Office management apprised of the issues
- Discuss what your options are to deal with this situation before reaching the point of warning the state about possible ramifications to the STIP

What should the FHWA and FTA review regarding State consultation with non-metropolitan officials when making the Federal Planning Finding?

- In the Federal planning findings, you should note that the State is following its adopted process or that based on meetings, letters, etc. that the process has not been followed, or that there appear to be implementation issues.
- In subsequent years, the Finding should note if the State solicited and reviewed comments for a period of 60 days regarding effectiveness of the process and implemented modifications, if needed. Appropriate comments in the Statewide Planning Findings should track this follow-up.

Resources

Are there good non-metropolitan local official consultation processes that I may share with the state?

- The States were required to develop a consultation process that was appropriate for their state; and Federal reviews were not requisite to the adoption of that process. There has been no analysis or comparison of the different State processes.
- FHWA and FTA, in association with AASHTO, NACO and NADO have not identified any "best practice" processes.
- However, below are samples of the consultation process available on the internet:
  Alaska - http://www.dot.state.ak.us/stwdplng/cip_stip/assets/regulations/localconsult030104.pdf
  Delaware - http://www.deldot.net/static/pubs_forms/ fhwa_rural_consultation.pdf
  Florida - http://www.dot.state.fl.us/planning/policy/ pdfs/nonmetro_process.pdf
  Iowa - http://www.dot.state.ia.us/pdf_files/local_consultation.pdf
  Maine - http://www.maine.gov/mdot/pdf/fhwaruralplanningruledraft.pdf.
  Ohio - http://www.dot.state.oh.us/planning/ODOTStandards/pip/Draft%204-03%20Rural%20Consult%20Process.pdf.

Where can I find additional information on non-metropolitan consultation process?

- FHWA's website: http://www.fhwa.dot.gov/hep10/state/localoff.html

- The National Association of Development Officials (NADO) and the National Association of County Officials (NACO) have a joint website with information on rural consultation: www.ruraltransportation.org

Where can State DOTs or non-metropolitan officials get more information about consultation processes?

- State DOTs may contact AASHTO for more information about non-metropolitan consultation.
- Non-metropolitan officials may get additional information from NADO, NACO, CTAA, or statewide associations or development officials, counties, cities, or regional councils.
  - NACO/NADO Website: http://www.ruraltransportation.org/index.shtml
  - Rural Consultation Practices: http://www.ruraltransportation.org/consultation/index.shtml

Performance-Based Planning and Programming

Background

What is performance-based planning and programming (PBPP)?
PBPP is systematic and analytic process, building upon the following components:

- Policy goals in terms of quantifiable objectives
- Measures of system performance
- Setting specific and measurable performance targets
- Analytic methods to predict the impacts of different types of investments on system performance
- Decision-support tools to assist in evaluating a range of investments throughout the transportation system network
- Periodic data monitoring to track performance of the transportation system; and
- Feedback mechanisms to assess performance trends and identify needed adjustments in investment priorities.

For PBPP, what specific performance goals are required?
Under MAP-21 [23 U.S.C §150], the seven national performance goals for the Federal-aid highway program are:

- Safety
- Infrastructure Condition (i.e., NBIS, IRI, and etc.)
- Congestion Reduction
- System Reliability
- Freight Movement and Economic Vitality
- Environmental Sustainability, and
- Reduced Project Delivery Delays.

MAP-21 [49 U.S.C 5326 and 5329] also requires that recipients of federal financial assistance for transit develop performance targets based on performance measures established by the DOT Secretary for:

- State of good repair, and
- Safety

What laws and regulations govern the performance-based Metropolitan transportation planning and Statewide and Nonmetropolitan transportation planning processes?

Statutory Requirements:

- 23 U.S.C. 134 (h)(2) –Scope of the (Metropolitan) Planning Process, Performance-based Approach
  - Includes requirements for…
    - Performance Targets
    - Timing
    - Integration of Other Performance-based Plans
- 23 U.S.C. 134 (i) – (Metropolitan) Transportation Plan:
  - Includes requirements for…
    - Performance Measures and Targets
    - Optional Scenario Development
- 23 U.S.C. 134 (j)(2)(D) – Metropolitan TIP: Content
- 23 U.S.C. 134 (l) – Report on Performance-Based Planning Process
- 23 U.S.C. 135 (d)(2)(B-D) –Statewide Scope of Planning Process: Performance-based Approach
- 23 U.S.C. 135 (f) (7) (A-B) – Long-Range Statewide Transportation Plan
- 23 U.S.C. 135 (g)(4) – Statewide Transportation Improvement Program
- 23 U.S.C. 135 (h)(1) – Performance-Base Planning Process Evaluation

- 23 U.S.C. 150 – National Goals and Performance Management Measures
- 23 U.S.C. 119 – National Highway Performance Program
- 49 U.S.C. 5326 – Transit Asset Management
- 49 U.S.C. 5329 – Public Transportation Safety Program

Regulatory Requirements:

- Planning requirements will be incorporated into 23 CFR 450
- The requirements for 23 U.S.C. §150 will be developed by the FHWA Office of Performance Review.
- Requirements for the NHS will be developed by FHWA Office of Infrastructure
- Requirements for Safety will be developed by FHWA Office of Safety
- Requirements for transit programs will be developed by FTA.

Elements of Performance-Based Planning and Programming

What are the elements of the performance-based transportation planning (PBPP)?

PBPP evaluates future investment outcomes and their potential impact on the projected transportation system performance and the degree to which these expected outcomes support the stated goals and objectives of a particular agency/jurisdiction.

The performance-based planning approach includes:

- Setting vision, goals, and objectives to guide the planning efforts.
- Deriving performance measures that capture the fundamental outcomes of the agency's goals and objectives.
- Identifying strategies that are consistent with those identified in other planning efforts: the CMP, SHSP, Asset Management Plans, Transit Asset Management Plans, Transit Safety Plans and other required and voluntary planning efforts (feasibility studies, corridor plans, modal plans, and others).
- Using analytic methods and decision-support tools to evaluate and predict the impacts of different types of investments on system performance.
- Evaluating and prioritizing strategies through trade-off or scenario analysis.
- Using the trade-off or scenario analysis results to set resource-constrained targets or trends and to develop program investment levels with the planning process (the statewide long-range plan for the state or MTP).
- Conducting resource allocation exercises that translate the overall investment plan into a specific selection of projects for the S/TIP or an agency's capital program.
- Using project delivery and system operations to provide feedback into the planning process and provide performance measure data/information.
- Providing decision/information feedback.
- Continuously coordinating and collaborating with stakeholders and the public.
- Using available data and tools that support planning process, including the strategy evaluations, targets development, and resource allocation.

Who needs to meet the PBPP requirements?

These requirements apply to MPOs, State DOTs and public transportation providers. To carry out a successful PBPP processes, these agencies, with other parties as appropriate, must work collaboratively to ensure that the planning process leads to projects that are intended to achieve adopted performance-based planning goals, objectives, and relevant performance targets.

This collaboration should lead to a decision-making process for project prioritization and selection prioritization, and that monitors the outcomes achieved through those implemented projects. Key factors for successful collaboration include:

- A clearly defined performance-based decision-making process that assigns appropriate roles and responsibilities to all parties,
- Relevant and reliable data and other information readily available to all participants, and
- Procedures and/or mechanisms in place for joint decision-making.

What is the relationship between the performance-based elements of the statewide long-range plan and the metropolitan transportation plan (MTP)?

- The performance-based elements of metropolitan transportation plan and the statewide long-range transportation plan or planning process must be consistent.
- The portion of a performance-based statewide plan that covers a metropolitan planning area should reflect the performance based elements of the MTP.

What is the relationship between performance-based planning process and the S/TIP?

- The S/TIP contains a list of prioritized transportation projects consistent with the relevant metropolitan transportation plan(s) and the Statewide and nonmetropolitan transportation plan(s).
- Performance-based planning should lead to a specific set of projects for a S/TIP.

Who is involved in performance-based planning?

- Federal Agencies (USDOT, FHWA, FTA, FRA, NHTSA, EPA, and others as appropriate)
- State DOTs (including headquarters and field offices)
- Local Agencies
    - The MPO (the MPO staff and local member agencies and staffs)
    - Counties, Cities, and townships and other local jurisdictions or authorities
    - Airport and seaport authorities
    - Law enforcement agencies
    - School districts and local colleges/universities
    - Public health and safety organizations
- Transportation Partners
    - Local/regional/state public transportation operators
    - Providers of private transportation services and facilities (toll authorities)
    - Providers/users of paratransit and other transportation services for the disabled and elderly
    - Freight companies/representatives (rail and truck)
- Community Groups
    - Environmental groups (including groups advocating “smart growth”/sustainable development)
    - Non-motorized transportation advocacy/user groups
    - Neighborhood and community associations
    - Historic preservation societies
    - Business sector representatives: Chambers of Commerce, major employers, and major land use developers
    - Groups, organizations, or associations with particular interests in transportation, land use, economic development, environmental justice, employment, environmental, and related issues (e.g., tourism industry in resort communities)
- The general public
- The media

Reporting and Timing: Performance-Based Planning and Programming

When do performance targets have to be set?

- Title 23 U.S.C. 150(d) requires that "… not later than 1 year after the Secretary has promulgated the final rulemaking under subsection (c), each **State shall set performance targets** that reflect the measures identified in…" this section.
- Title 23 U.S.C. 134 (h)(2)(C) states **each metropolitan planning organization shall establish the performance targets** under subparagraph (B) not later than 180 days after the date on which the relevant State or provider of public transportation establishes the performance targets.
- Title 49 U.S.C. 5326 states "… a **recipient** of Federal financial assistance under this chapter **shall establish performance measures** established by the Secretary " not more than 3 months after the Secretary issues a final rule defining performance measures for state of good repair standards".
- Title 49 U.S.C. 5329 requires that one year after the Secretary issues the relevant final rule, **recipients/States shall have** a safety plan that establishes "**performance targets** based on the safety performance criteria and state of good repair standards…" as described in the national public safety plan.

What are some examples of performance measures?

Safety	Number of fatalities
Roadway Condition	Percent of bridges in at least "fair" structural condition
System Reliability	Travel time delay per capita during scheduled and/or unscheduled disruptions to travel

What are some examples of performance targets?

Safety	Reduce fatalities by 5% by 2015, which will save more than 150 lives. Reduce serious (fatal/incapacitating injury) intersection crashes by 10% by 2015. This would represent an annual reduction of 516 serious intersection crashes compared to the baseline year 2002. [From Ohio Department of Transportation 2008-2009 Business Plan and Strategic Highway Safety Plan]
Roadway Condition	Maintain the conditions of principal arterial bridges so that more than 55% are in good condition, less than 16 % are in fair or poor condition, and less than 2% are in poor condition based on the National Bridge Inventory Structural Condition Index. [Minnesota Statewide Transportation Policy Plan published in 2009]
System Reliability	Reduce total person hours of delay (or travel-time delay per capita) by time period (peak, off-peak) caused by unscheduled disruptions to travel X hours in Y years.

Where can the state and the MPOs get their data?

Some performance areas have significant on-going data collection efforts, such as the National Fatality Analysis Reporting System (FARS), the Highway Performance Monitoring System (HPMS), the National Bridge Inspection (NBI) Program, and the National Transit Database (NTD).

Geographic Information Systems (GIS) also may support performance-based planning and sharing data among agencies, and provide a spatial component to data that can be helpful in identifying specific needs for targeted investments. Data sharing between DOT, MPOs and transit agencies is a common practice and these opportunities should be investigated.

More detailed information is available at the PBPP Website (http://www.fhwa.dot.gov/planning/pbp/).

What is the reporting requirement for PBPP?
Five (5) years after the MAP-21's enactment (October 1, 2013), FHWA and FTA will submit a report to Congress evaluating the following:

- Statewide Planning:
  - The effectiveness of performance-based planning as a tool for guiding transportation investments, and
  - The effectiveness of each State's PBPP process.
- Metropolitan Planning:
  - The effectiveness of performance-based planning as a tool for guiding transportation investments,
  - The effectiveness of each metropolitan planning organizations' PBPP process,
  - The progress of the MPOs' in meeting this requirement: the performance targets specified for metropolitan planning process and whether they are developing meaningful performance targets, and
  - The technical capability of the smaller MPO (< 200,000) and their ability to carry out this requirement.

Actions by the Divisions/Regions

What is my role in the development of PBPP?
The field planner role is multifaceted and includes the following:

- Learning about PBPP
  - Become familiar with the PBPP through training opportunities, review of guidance documents and reference materials, and other resources, and
  - Identify and understand the federal planning emphasis areas and national priorities.
- Working with your State, MPOs, and public transportation operators:
  - Ensure the agencies work in collaboration to establish performance measures and targets,
  - Provide guidance and technical assistance to the State, MPOs, and public transportation providers and others involved in the performance-based planning process, and
  - Be prepared to advise and offer guidance to MPO/State Technical Advisory Committees and other teams or committees which are part of the performance-based planning process, as appropriate.
- Identifying Opportunities
  - Identify and encourage participation in relevant training courses, workshops, and webinars that will be beneficial to our partner transportation and planning agencies, and
  - Facilitate peer exchanges and other sharing of experiences to identify best practices within the PBPP process.

Resources

Where can I find the technical assistance and training resources on PBPP?

- Attend training and webinar courses, such as the HQ and RC- developed course/workshop on performance based planning and programming.
- Review the resources available on the PBPP Website: http://www.fhwa.dot.gov/planning/pbp/
- Contact your designated HQ Planning Stewardship Liaison for your state.
- Network with the other division planners to identify common issues and experiences with PBPP in their respective states.

Rural Transportation Planning

(For this chapter, the terms "*rural*" and "*non-metropolitan*" are interchangeable.)

Background

What is rural transportation planning?

- Rural transportation planning is a collaborative decision-making process regarding the development, management, and operation of safe and efficient multimodal transportation systems in the rural areas. It is often considered as part of the overall statewide and non-metropolitan planning process and may be approached various ways by the states. For example, some states have established rural regions where local officials or agencies are responsible for developing region-focused transportation plans and projects that are then integrated into the long-range statewide transportation plan. In other states, the State DOT has prime responsibility for planning in rural areas, in consultation with local officials.
- Rural transportation planning seeks to serve the mobility needs of people and freight and foster economic growth and development within and between States and urbanized areas, while minimizing the adverse effects of transportation-related fuel consumption and air pollution as well as unintended consequences of secondary and cumulative impacts of transportation-related land use development.

What is a rural area?

- All areas of a State **not** included in urban areas [23 U.S.C. 101(a)(29)].
  - Urban areas are those areas that are classified as urbanized area (50,000+ population) or urban place (cluster) with a population of 5,000 or more [23 U.S.C. 101(a)(36)].
  - Since 2000, the Census has adopted "urban cluster" concept to replace the "urban place." The urban cluster is defined as having a population of at least 2,500 and less than 50,000 people.
  - U.S. Census background information on their definition of rural and urban areas: http://www.census.gov/history/www/programs/geography/urban_and_rural_areas.html

What is a non-metropolitan area?

- A geographic area outside a designated metropolitan planning area [23 USC 134 (b)(3)].

Are all rural areas the same?

- No, rural areas vary in size, density, geography, economics, demographics, cultures, environments, and governance.
- In the Federal Highway Administration's (FHWA) guidance on "Planning for Transportation in Rural Areas," rural areas can be categorized into three general forms:
  - **Basic Rural** – dispersed counties or regions with few or no major population centers of 5,000 or more. Mainly characterized by agricultural and natural resource based economies, stable or declining populations, and "farm-to-market" localized transportation patterns.
  - **Developed Rural** – dispersed counties or regions with one or more population center(s) of 5,000 or more. Economies in these areas tend to be mixed industrial and service based in the cities, and agricultural and natural resource based in the (basic) rural areas.

Populations tend to be stable or growing, and transportation options and use are more diverse (commuting intercity travel/freight, and other purposes).

- **Urban Boundary Rural** – counties or regions that border metropolitan areas and are highly developed. Economic growth, population growth, and transportation are tied to the urban center. Many of these areas have experienced high levels of growth in recent years.

What laws or regulations govern rural transportation planning?

- There are no specific statutes that requires a rural transportation planning program, but many non-metropolitan statutory requirements are addressed in 23 U.S.C. 135(d)(3), (e)(2)(B), (f)(1)(B)(ii), and (m).
- Rural/Non-Metropolitan area regulatory considerations are addressed in 23 CFR 450.208(a)(4), 450.210(b), 450.214(g), and 450.216(c).

Elements of Rural Transportation Planning and RTPOs

Who is involved in rural transportation planning?

- Rural transportation planning is often undertaken by local government authorities, counties, public/paratransit operators, rural/regional planning organizations (RPOs-see below), state Departments of Transportation (DOTs), and Federal land management agencies (FLMAs).
- The agency that has jurisdiction over the area transportation system generally takes the lead in developing rural transportation plans, programs, and project development. This is often the State DOT; however, there is considerable variation due to differing state laws and jurisdictional structures.
- For rural area highways, responsibility varies depending on the road's functional classification, geography, and the entity which owns and maintains the facility.
    - In many States, rural transportation planning, project prioritization and funding is led primarily by the State DOT. The State DOT determines statewide rural project needs, develops transportation plans, and determines priorities and funding for state and/or federally funded rural transportation projects through consultations with non-metropolitan local government officials and/or rural planning organizations.
    - In a local- or regional-led planning approach, rural transportation planning, project prioritization and funding is undertaken primarily by local and/or regional planning agencies with the State DOT at the table as a key partner and stakeholder.
- Public transportation typically is provided in rural areas by a collection of small, community-based transit and paratransit operators, as well as possibly the State.

What is a regional transportation planning organization (RTPO)?

- Regional Transportation Planning Organizations (RTPOs) are planning entities that facilitate the input and participation of local government officials serving designated geographic areas, usually outside a MPO planning boundary and covering rural areas and/or small towns, in the statewide transportation planning process.
- MAP-21 recognizes these or similar organizations as agents of transportation planning primarily outside of metropolitan areas and provides the states with the option to establish formal "Regional Transportation Planning Organizations" with certain planning and consultation requirements [23 USC 135(m)].

- Where a RTPO boundary may overlap or include portions of a MPO planning boundary, the metropolitan transportation planning requirements prevail over the "shared" area that is within the RTPO and the MPO boundaries. However, the RTPO can serve an important coordination function in these cases, and it is important for there to be ongoing cooperation between the RTPO and the MPO.
- These non-metropolitan planning entities may use other names or titles, such as "rural or regional planning organization (RPO)", "transportation planning region (TPR)", "rural transportation authority (RTA)", or "council of governments (COG)".
- In addition to the concept of an optional RTPO included in Federal law, there may be state-level authorization of the formation and function of rural planning organizations, sometimes complemented by MOUs between affected local governments.
- Typically, RTPOs may be supported with federal statewide planning and research (SPRP) funds and FTA 5305(e) funds, state funds, local contributions, or a mix of funds to support the partnerships. There are no special federal planning funds designated specifically for RTPOs.

What roles can and should RTPOs serve in the statewide transportation planning process?

- RTPOs may provide a forum through which a state DOT can consult with non-metropolitan local officials in carrying out the statewide and nonmetropolitan transportation planning process.
- RTPOs serve as a link between state DOTs, local officials and citizens in ensuring there is formal and continuous input from rural leaders and residents into the statewide transportation planning and decision-making process.
- RTPOs often work with many public and private sector stakeholders and organizations to identify and prioritize transportation project needs on a regional basis.
- RTPOs provide technical assistance to local officials, and assist state transportation officials with public participation and coordination efforts.
- RTPOs may also develop regional transportation plans and improvement programs to be integrated into the statewide plan and the STIP.
- RTPOs may coordinate planning efforts with neighboring MPOs and/or other RTPOs.

What is the importance of the non-metropolitan local official consultation process?

- Separate from the general public involvement procedures, a distinct consultation process must be created between the State DOT and non-metropolitan local officials, as described in 23 CFR 450.210(b).
- For detailed information on those requirements, refer to the chapter in the Field Planner Guidebook on "Non-metropolitan Local Official Consultation."

Rural Transportation Planning Process

What are transportation challenges for rural communities?

Just as in metropolitan areas, rural areas face many transportation and other infrastructure, economic, and environmental challenges, such as:

- Aging and deficient infrastructure with limited resources for improvements
- Demographic changes (e.g. rapid population gains near urban areas and population losses in isolated areas; residents aging in place or movement of retirees to rural areas)
- Land use changes (e.g. suburbanization, loss of agricultural land and open space)
- Limited transportation options for access to economic and educational opportunities, affordable housing, health services, and other daily needs for people of all ages, abilities, and incomes

- Lack of economic diversity or vitality
- Safety and security for motorized and nonmotorized users
- Preserving the rural character (e.g. scenic qualities, natural resources, historic and cultural assets)
- High travel times and costs
- Growing demands for urban amenities and services (e.g. transit, electronic connectivity) in areas not readily able to provide them

What are potential outcomes of rural transportation planning?

If done with the appropriate tools, preparation, and viewpoint, planning can achieve:

- Integrated planning and increased public outreach and buy-in
- Transportation decision-making that is sensitive to the needs, desires, and qualities of the community or region
- Collaborative partnerships built to achieve multiple community objectives, including access to desired goods and services and preservation of environmental resources and amenities.
- A strong, resilient economy with multiple and diverse employment opportunities
- Safe sidewalks, bikeways, streets, neighborhoods, and communities
- Public transportation that reliably serves the needs of the community

What are potential challenges for rural transportation planners?

- Funding the development, maintenance, operation, and expansion of the rural transportation system
- Developing multi-modal plans and projects and providing transportation options
- Coordinating transportation plans and programs across agencies and disciplines
- Including local officials, interested parties, and the general public in the transportation planning process
- Integrating transportation, land use, and economic development
- Preserving and enhancing the environment while supporting economic growth
- Planning collaboratively at a regional and statewide scale
- Developing the planning capabilities of local professionals and decision-makers
- Responding appropriately to local/regional social and demographic changes

What are some strategies to enhance the development, maintenance, and operation of rural transportation systems?

Possible strategies include:

- Addressing road safety and capacity issues through better planning, design, and construction
- Integrating community design considerations into the transportation planning process to create places where residents and workers have a broader range of transportation choices
- Using transportation demand management (TDM) approaches and system maintenance and operation strategies to maximize the efficiency of transportation investments
- Leveraging new technologies such as ITS, green infrastructure, and quiet pavements
- Examining how public transportation and paratransit, as well as other travel modes can be improved and expanded in a rural context to foster economic development and accessibility to a wider range of goods, services, and facilities
- Strategically connecting the modal pieces—roadways, bikeways, pedestrian facilities, transit services—into a truly intermodal, interconnected surface transportation system

- Protecting the natural environment and the well-being of residents through means such as improved storm water mitigation, enhanced air quality, and decreased greenhouse gases

Statewide/Rural Transportation Plan

Does the statewide (or the rural) transportation plan need to consider modal elements and intermodal connections in rural areas besides use of the single-occupant vehicles (SOVs)?

- These considerations need to be documented in the statewide transportation plan and include (as specified in 23 CFR 450.214 (a))
    - Public transportation
    - Non-motorized modes (bicycles and pedestrians)
    - Rail
    - Commercial motor (freight) vehicles

Does the statewide transportation plan reference, or contain any other plans or reports regarding rural areas?

- The plan could include reference to various reports, studies, or activities that relate to or impact rural areas [23 CFR 450.208], such as:
    - Statewide and multistate trade and economic development planning activities
    - Related planning activities being conducted by Federal land management agencies, by local elected and appointed officials, by Indian Tribal governments, and conducted outside of metropolitan planning areas and between States
    - Recreational trails or scenic byways plans
    - Other activities or proposals relating to the management and use of public lands or extraction of natural resources (e.g. energy development)
    - The development of applicable regional intelligent transportation systems (ITS) architectures
    - Asset management systems (for example, bridges, pavements, transit vehicle, or operation/maintenance equipment).
    - The coordinated public transit-human services transportation plan
    - The Strategic Highway Safety Plan

Does the statewide transportation plan include a discussion of potential environmental mitigation activities in rural areas?

- Discussion may include system level activities that may have the greatest potential to restore and maintain the environmental functions affected by the long-range statewide transportation plan.
- The discussion may focus on policies, programs, or strategies, rather than projects.

What is the relationship between rural transportation projects and the STIP and statewide transportation plan?

- Federal-aid rural (and any federally-funded) projects in the STIP must be consistent with the statewide long range plan (i.e., either consistent with specific projects identified in the statewide plan or with statewide transportation goals, policies, program/project priorities and/or issue specific plans, such as the Strategic Highway Safety Plan)

- For those SLRP(s) that include the optional financial plan or analysis, the Federal-aid rural projects should be included in that financial analysis.
- The State DOT is required to consult with non-metropolitan local officials with responsibility for transportation in the development of the STIP which must include any proposed federally-funded transportation projects within the local officials' respective jurisdictions. [23 CFR 450.216(c)]
- Rural areas are not required or expected to develop "rural" TIPs, although some RTPOs or similar agencies may do so in accordance with State law or STIP development processes.

Actions by the Division and Regions:

How can Field (FHWA/FTA) Planners provide stewardship and oversight?

- Jointly certify that the statewide planning process is consistent with the required statutory and regulatory planning provisions through the ***Federal Planning Finding*** associated with approval of the STIP
- Work with the State DOT to ensure that the issues and concerns of those living, working, and traveling to or through rural areas are identified and considered throughout the transportation planning process.
- Confirm that the non-metropolitan local official consultation process is documented and used in the statewide transportation planning process and in the development of the STIP
- Ensure that the state DOT's public involvement process is documented and used in the development of the statewide transportation plan, STIP, and other planning products, as appropriate
- Ensure consultations with Tribal Indian governments and FLMAs are used in the development of the statewide transportation plan and STIP
- Monitor the coordination of the statewide planning process and related planning activities, plans, and studies

Resources

What resources are available on rural transportation planning?

- Rural and Small Community Planning: http://www.planning.dot.gov/focus_rural.asp
- Federal Highway Administration. "Planning for Transportation in Rural Areas." United States Department of Transportation. http://www.fhwa.dot.gov/planning/rural/planningfortrans/index.html
- Federal Highway Administration. "Serving Rural America." United States Department of Transportation. http://www.fhwa.dot.gov/planning/rural/ruralamerica/index.html
- National Association of Development Organizations Research Foundation. "Metropolitan and Rural Transportation Planning: Case Studies and Checklists for Regional Collaboration." http://www.ruraltransportation.org/uploads/rpompo.pdf
- National Association of Development Organizations Research Foundation. "Transportation Planning in Rural America: Emerging Models for Local Consultation, Regional Coordination & Rural Planning Organizations." http://www.nado.org/wp-content/uploads/2011/08/scan2005.pdf
- Federal Transit Administration, Transit at the Table III: A Guide to Effective Participation in Statewide Decision-Making for Transit Agencies in Non-Urbanized Areas, http://www.planning.dot.gov/documents/TransPlanning/TAT_III_FinalReport.pdf

Self – Certification Process

Background

What is self-certification?

- The State and the MPO shall periodically (at least every four years) certify to the FHWA and the FTA that they have a 3-C (Comprehensive, Cooperative, and Continuing) planning process addressing the major issues facing the region or area and is conducted in accordance with all applicable requirements listed in 23 CFR 450.218 (State) and 450.334 (MPO).

Why is this needed? What is the legal and regulatory basis for the self-certification process?

- This is a regulatory requirement. 23 CFR 450.218 and 450.334.

- The self-certification by the MPOs and the states should compliment and support any TMA certification review findings, recommendations, and corrective actions. This self-certification may also refer to and address findings from other process reviews of the transportation planning process conducted by or with FHWA/FTA.

- The self-certification is based on how the state and MPO and other partners conduct their respective and joint planning processes, how the processes and products are documented (e.g., through agency actions and documents and/or through FHWA/FTA staff involvement, reviews, concurrences, approvals), and how past planning findings (corrective actions) have been addressed.

Who has to certify? Who signs the certifications?

- For the MPO, it is the MPO policy Board or its designee (e.g., MPO executive director if delegated by the MPO Policy Board).

- For the State DOT, it is the governor or his/her designee (e.g., the State DOT's CEO or the Transportation Commissioner).

What is the difference between the State's and MPO's self-certification processes?

- Both the MPO and the state certify that they have a 3-C planning process for the region.

- The State DOT additionally must certify that it meets the statewide planning requirements (23 U.S.C 135 and 47 U.S.C. 5304) for the entire state, including the MPO regions.

What is the required cycle for the self-certification process?

- The State and MPO shall certify at least every four years, concurrent with the submittal of the proposed STIP/TIP.

- Additionally, the State is required to submit a self-certification when it submits a STIP amendment for approval (23 CFR 450.218(a)).

- The state and MPO may continue to certify annually or biennially with their UPWP or SPR Work Programs, if they decide to do so.

Elements of a Self-Certification

What statutory and regulatory requirements must self-certification process address?

23 U.S.C. 134 and 135, 49 USC 5303-5304, and 23 CFR Part 450;

Section 174 and 176 (c) and (d) of the Clean Air Act (if applicable), and 40 CFR Part 93;

Title VI of the Civil Rights Act of 1964 and the Title VI assurance, and 49 CFR Part 21;

49 U.S.C. 5332, prohibiting discrimination on the basis of race, color, creed, national origin, sex or age in employment or business opportunity;

Section 1101 (b) of SAFETEA-LU and 49 CFR Part 26 regarding involvement of disadvantaged business enterprises in US DOT funded planning projects;

23 CFR Part 230, regarding the implementation of an equal employment opportunity program on Federal and Federal-aid highway construction contracts;

Americans with Disabilities Act and US DOT regulations governing transportation for people with disabilities (42 U.S.C. 12101 et seq.) and 49 CFR Parts 27, 37, and 38;

Older Americans Act, as amended, prohibiting the discrimination on the basis of age in program and activities receiving Federal financial assistance;

Section 324 of title 23 USC regarding the prohibition of discrimination based on gender;

Section 504 of the Rehabilitation Act of 1973 and 49 CFR Part 27 regarding discrimination against individuals with disabilities; and

All other applicable provisions of Federal law (e.g., while no longer specifically noted in a self-certification, prohibition of use of federal funds for "lobbying" still applies and should be covered in all grant agreement documents – see 23 CFR 630.112).

What is the required documentation to support these self-certification elements?

- Much of the back-up information should be on file with the certifying or appropriate agency (or in your own office files), and/or incorporated into planning products/documents. Information may also be documented in the TMA planning certification review findings or in the periodic process review reports conducted by the Division/Region or state.

Actions by the Divisions/Regions:

How do I review the Self-Certification?

- Review and acceptance of the self-certification should be based on your working knowledge of the MPO and/or state planning processes and their respective planning products, and your day-to-day oversight and monitoring of the planning programs. You can undertake periodic process or

quality assurance reviews to evaluate in-depth, particular activities or issues and to back up your findings on MPO/State self-certifications.

  - At a minimum, consider the adequacy of the subject planning process and products (UPWP/SPR work program, public participation/involvement plan, long-range transportation plan, and transportation improvement program) to address the planning factors, the major provisions of 23 USC 134 and 135, 23 CFR 450, and the SIP/AQ conformity requirements (where applicable).

- For TMA planning processes, you can refer to information gathered from and findings of recent planning certification reviews.

- For provisions that foster the protection of civil/employment rights and equity in the provision of federal-aid programs, the following may be used to verify compliance:

  - Written transportation/planning agency policies, programs, or procedures to address these requirements and to review internal or external complaints.

  - Documentation that another agency meets these requirements on behalf of the agency self-certifying (e.g., a statewide DBE program that includes the MPOs).

  - The efforts of the transportation/planning agencies to collect and maintain demographic and travel information based on ethnicity, race, age, income level, etc., for populations within the planning boundaries.

  - The adequacy of public participation /public involvement plans to verify agency outreach and opportunities provided for diverse populations, sectors, and stakeholders to meaningfully participate in the planning process.

  - Development of pertinent planning documents and other information that are published in languages other than English, as appropriate, to meet the needs of non-English speaking groups within the community/state.

  - Status of the Coordinated Public Human Service Transportation Plan.

  - The level and type of transit and other transportation services provided to disadvantaged and traditionally underserved communities.

  - Analysis of benefits/burdens of transportation programs and projects on various socio-economic groups within the planning area.

  - Much of the back-up information should be on file with the appropriate agency (or in your own office files) or incorporated into planning products/documents. Information may also be documented in the TMA planning certification review findings or in process review reports conducted by the Division/Region or state.

- If there are any deficiencies in the planning process that can not be readily corrected or are in the process of being corrected, this should be noted in your findings. The options open to FHWA/FTA after the self-certification has been submitted are listed below.

What final action is needed to process the self-certification?

- If the self-certification has been submitted, and after your review/evaluation you agree that the state and MPOs are meeting or substantially meeting all the planning and Federal-aid requirements, FHWA/FTA may take the following actions, and document it in the Federal Finding:
    - Approve the entire STIP (including the TIPs);
    - Approve the STIP (including the TIPs) subjected to certain corrective actions; or
    - Under special circumstances, partially approve the STIP covering only portion of the state.
- If the self-certification is not accepted, see the next question for follow-up actions.

What happens if we don't accept the self-certifications?

- If you do not accept the self-certification(s), then the Division/Region will need to individually review and certify each of the program areas listed in 23 CFR 450.218 and 450.334.
- The Division/Region will need to work with the State or the MPO to identify corrective actions/steps and timeframes to meet the planning and federal-aid program requirements.

What happens if we conclude the planning process does not substantially meet the requirements of 23 U.S.C. 134 and 135, and 49 U.S.C. 5303-5304?

- The Division/Region can not approve the STIP or STIP amendments.
- If the Division/Region cannot approve the STIP (or portion of the STIP) because the self-certification is deficient, the federal-aid projects from the STIP (or pertinent portion of the STIP (i.e., TIP)) cannot be advanced.

Resources

Metropolitan Planning

The State and the MPO shall certify to FHWA and FTA, at least every four years, that the planning process is addressing major issues facing their area and is being conducted in accordance with all applicable transportation planning requirements. The planning process will undergo joint review and evaluation by FHWA, FTA and State DOT to determine if the process meets requirements. The Federal administrators will take the appropriate action for each TMA to either issue certification action, or deny certification if the TMA planning process fails to substantially meet requirements. If FHWA and FTA jointly determine that the transportation planning process in a TMA does not substantially meet the requirements, they may withhold up to 20% of the funds attributed to the relevant metropolitan planning area or withhold approval of all or certain categories of projects. Upon full, joint certification by FHWA and FTA, all funds withheld will be restored to the metropolitan area, unless they have lapsed.

(23 CFR 450.334; USC Title 23, Sec. 134; and USC Title 49, Ch. 53, Sec's 5303 – 5306)

Statewide Planning
The process for developing the transportation plans and programs shall provide for consideration of all modes of transportation and shall be continuing, cooperative, and comprehensive to the degree appropriate, based on the complexity of the transportation problems to be addressed. The State shall coordinate transportation planning activities for metropolitan areas of the State, and shall carry out its responsibilities for the development of the transportation portion of the STIP to the extent required by the Clean Air Act.

The State will carry out the long range planning processes and the STIP in cooperation and consultation with designated metropolitan planning organizations, affected local transportation officials and affected tribal governments.

Transportation improvement programs should include financial plans that demonstrate how the programs can be implemented, indicate resources from public and private sources reasonably expected to be made available for carrying out the programs, and recommend any additional financing strategies for needed projects.

(23 CFR 450.220; USC Title 23, Sec. 135; and USC Title 49, Ch. 53, Sec. 5307–5311, 5323(l))

Title VI, Civil Rights Act of 1964
Title VI prohibits exclusion from participation in, denial of benefits of, and discrimination under federally assisted programs on grounds of race, color, or national origin. Title VI assurance regulations were also executed by each State, prohibiting discrimination on the basis of sex or disability.

(23 USC 324, 29 USC 794)

Disadvantaged Business Enterprises (DBE)
The DBE program ensures equal opportunity in transportation contracting markets, addresses the effects of discrimination in transportation contracting, and promotes increased participation in Federally funded contracts by small, socially and economically disadvantaged businesses, including minority and women owned enterprises. The statute provides that at least 10% of the amounts made available for any Federal-aid highways, mass transit, and transportation research and technology program be expended with certified DBEs.

(SAFETEA-LU, Pub. L. 109-59, Sec. 1101(b); CFR 49, Subtitle A, Part 26)

Americans with Disabilities Act of 1990 (ADA)
Programs and activities funded with Federal dollars are prohibited from discrimination based on disability. Compliance with the applicable regulations is a condition of receiving Federal financial assistance from the Department of Transportation.

Older Americans Act
Confirms opportunity for employment with no discriminatory personnel practices because of age.

(Pub. L. 89-73, as amended and 42 USC 6101)

Section 324 of 23 USC
No one on the basis of sex shall be denied participation in or benefits of any program or activity receiving Federal assistance under title 23

Rehabilitation Act of 1973
This law protects *qualified* individuals from discrimination based on their disability**.** The nondiscrimination requirements of the law apply to employers and organizations that receive financial assistance from any Federal department or agency, including the U.S. Department of Health and Human Services (DHHS).

(29 USC 794 and 49 CFR, Part 27)

Clean Air Act: Air Pollution Prevention & Control
All State and local transportation officials will take part in a 3C planning process in nonattainment areas to determine which planning elements will be developed, adopted and implemented to maintain or improve the air quality for said area. In nonattainment areas that include more than one state, the affected states may jointly undertake and implement air quality planning procedures.

The Federal government will not financially support activities that do not conform to approved plans. Priority of funding will be given to those projects or programs that achieve and maintain national primary ambient air quality standards.

(42 USC, Ch. 85, Sec's. 7408, 7410, 7504, 7505a, 7511, 7512, 7506 (c) and (d) and 7604; 49 USC, Ch. 53, 23 USC, Sec. 134)

Attachment 1

MPO SELF-CERTIFICATION

In accordance with 23 CFR 450.334, the STATE DEPARTMENT OF TRANSPORTATION, and the _____ Metropolitan Planning Organization for the _____ urbanized area(s) hereby certify that the transportation planning process is addressing the major issues in the metropolitan planning area and is being conducted in accordance with all applicable requirements of:

(1) 23 USC 134, 49 U.S.C. Section 5303, and 23 CFR Part 450.

(2) In nonattainment and maintenance areas, Sections 174 and 176(c) and (d) of the Clean Air Act as amended (42 U.S.C. 7504, 7506(c) and (d)) and 40 CFR Part 93.

(3) Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d-1) and 49 CFR Part 21.

(4) 49 U.S.C. 5332, prohibiting discrimination on the basis of race, color, creed, national origin, sex or age in employment or business opportunity.

(5) Section 1101(b) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: Legacy for Users (Pub. L. 109-59) and 49 CFR Part 26 regarding the involvement of Disadvantaged Business Enterprises in USDOT funded planning projects.

(6) 23 CFR Part 230, regarding the implementation of an equal employment opportunity program on Federal and Federal-aid highway construction contracts.

(7) The provisions of the Americans with Disabilities Act of 1990 ((42 U.S.C. 12101 et seq.) and 49 CFR Parts 27, 37, and 38.

(8) Older Americans Act, as amended (42 U.S.C. 6101), prohibiting discrimination on the basis of age in programs or activities receiving Federal financial assistance.

(9) Section 324 of CFR 23, regarding prohibition of discrimination based on gender.

(10) Section 504 of the Rehabilitation Act of 1973 and 49 CFR Part 27 regarding discrimination against individuals with disabilities.

STATE DEPARTMENT OF TRANSPORTATION _____ DISTRICT	METROPOLITAN PLANNNG ORGANIZATION POLICY BOARD
District Engineer	Chairperson
Date	Date

Attachment 2

STATE SELF-CERTIFICATION

In accordance with 23 CFR 450.218, the STATE DEPARTMENT OF TRANSPORTATION hereby certifies that the transportation planning process is addressing the major issues in the state and is being conducted in accordance with all applicable requirements of:

(1) 23 USC 134 and 135, 49 U.S.C. Section 5303 and 5304, and 23 CFR Part 450;

(2) Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d-1) and 49 CFR Part 21.

(3) 49 U.S.C. 5332, prohibiting discrimination on the basis of race, color, creed, national origin, sex or age in employment or business opportunity.

(4) Section 1101(b) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: Legacy for Users (Pub. L. 109-59) and 49 CFR Part 26 regarding the involvement of Disadvantaged Business Enterprises in USDOT funded planning projects.

(5) 23 CFR Part 230, regarding the implementation of an equal employment opportunity program on Federal and Federal-aid highway construction contracts.

(6) The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) and 49 CFR Parts 27, 37, and 38.

(7) In States containing nonattainment and maintenance areas , Sections 174 and 176(c) and (d) of the Clean Air Act as amended (42 U.S.C. 7504, 7506(c) and (d)) and 40 CFR 93.

(8) The Older Americans Act, as amended (42 USC 6101), prohibiting discrimination on the basis of age in programs or activities receiving Federal financial assistance.

(9) Section 324 of Title 23 U.S.C., regarding prohibition of discrimination based on gender.

(10) Section 504 of the Rehabilitation Act of 1973 and 49 CFR Part 27 regarding discrimination against individuals with disabilities.

STATE DEPARTMENT
OF TRANSPORTATION

_____
Director

_____
Date

Self-Certification: ADA and Section 504

Background

What are the Americans with Disabilities Act (ADA) of 1990 and Section 504 of the Rehabilitation Act of 1973 (Section 504)?

- Both the ADA and Section 504 are Federal laws which, along with their respective implementing regulations, prohibit discrimination against individuals on the basis of disability.
- Section 504 applies to entities that receive financial assistance from the Federal government and to each program or activity that receives Federal assistance.
- Title II of the ADA (42 USC §12131 *et seq* or 28 C.F.R. 35 *et seq*.) applies to State and local public entities regardless of whether they receive Federal financial assistance.
- A State or local public entity that receives Federal financial assistance must comply with both Section 504 and the ADA and the Federal regulations implementing both laws.

Why are these requirements (ADA and Section 504) important to the State and MPO planning processes?

- ADA and Section 504 are two of the applicable requirements that the State or MPO must include in their self-certifications to FHWA and FTA with their STIP, TIP, or work program.
- FHWA and FTA review and accept the self-certifications when we are assured that all applicable Federal requirements have been met in the conduct of the transportation process. The acceptance of the self-certification is documented in the STIP approval and Federal Planning Finding or the TMA certification findings.

Legislation and Regulations

What are the statutory bases for ADA and Section 504 Compliance?

- The Rehabilitation Act of 1973 was signed into law on September 26, 1973 (P.L. 93-112). Section 504 of the Act provides that no otherwise qualified individual with a disability in the United States shall, solely by reason of his or her disability, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.(29 USC § 794)
- The Americans with Disabilities Act of 1990 (ADA) was signed into law on July 26, 1990 (P.L. 101-336; 42 U.S.C. § 12101 *et seq*), and was modeled after the Civil Rights Act of 1964 (which prohibits discrimination on the basis of race, color, religion, sex, or national origin) and Section 504. The ADA prohibits discrimination and guarantees that persons with disabilities have the same daily life opportunities as everyone else– to enjoy employment opportunities, to purchase goods and services, and to participate in State and local government programs and services.

What are the implementing regulations?

- 28 CFR § Part 35 – Nondiscrimination on the Basis of Disability in State and Local Government Services
- 49 CFR § Part 27 – Nondiscrimination on the Basis of Disability in Programs or Activities Receiving Federal Financial Assistance
- 49 CFR § Part 37 – Transportation Services for Individuals with Disabilities
- 49 CFR § Part 38 – Americans with Disabilities Act (ADA) Accessibility Specifications for Transportation Vehicles

- 49 CFR § Part 39 – Transportation for Individuals with Disabilities: Passenger Vessels
- 23 CFR § 450.218 – Self-certifications, Federal findings, and Federal approvals (State)
- 23 CFR § 450.334 – Self-certifications and Federal certification. (MPOs)

What is the required ADA and Section 504 documentation to support the State's or MPO's self-certification?

- Every public agency (i.e., States and local public entities) with 50 or more employees is required by Section 504 and by the ADA, to have completed a self-evaluation and an ADA transition plan (or a program access plan if the agency has fewer than 50 employees). The self-evaluation must include an inventory of the public entity's facilities within the public rights-of-way (e.g., curb ramps and sidewalks) to determine if they are accessible to persons with disabilities and meet the laws' regulatory requirements.
- Once barriers to accessibility are identified through the inventory, entities must develop an ADA transition plan demonstrating how the barriers will be addressed to reach full compliance.
- Section 504 required recipients of Federal financial assistance to complete their transition plans by December 29, 1979.
- The ADA required State and local public entities to develop a transition plan by July 26, 1992; corrective measures identified in the transition plan were required to be completed by January 26, 1995.

Regulatory Requirements of an ADA Transition Plan

What is an ADA Transition Plan?

- The ADA transition plan identifies the steps and strategies to make the necessary changes to the agency's inventoried facilities including facilities within the public rights-of-way (PROW), and to bring them up to ADA standards; facilities may include sidewalks, curb ramps, detectable warnings, etc.
- The ADA transition plan should include the following items at a minimum:
  a) Identify physical obstacles that limit an individual's access to its programs or activities;
  b) Describe in detail the actions that will be taken to make the facilities accessible;
  c) Specify the steps and prioritized schedule that provide pedestrian accessibility during each year of the transition period;
  d) Identify the responsible individual or office for plan implementation; and
  e) Initiate opportunities and steps to recruit persons with disabilities, or organizations representing persons with disabilities to help develop and update the plan.
- While not required, the transition plan should also include cost estimates for the needed work so these can be incorporated into the public entity's planning processes and budgets. Also, the transition plan must be made available for public review. (28 CFR § 35.150(d)(1))

Who is required to have an ADA Transition Plan?

- Public agencies with 50 or more employees are required to develop and implement an ADA transition plan. Public agencies that have fewer than 50 employees are not required to have an ADA coordinator, but must still have a program access plan, (similar to an ADA transition plan but with fewer administrative requirements) that addresses non-compliant facilities.

What are FHWA/FTA's stewardship and oversight responsibilities for the ADA and Section 504 programs?

- The ADA and Section 504 programs fall under the Office of Civil Rights.
- Each FHWA Division and FTA Region Office has an assigned individual or a civil rights specialist that provides oversight and stewardship for its State's civil rights programs, including ADA and Section 504.

How does the ADA Transition Plan impact the Federal-aid Program and our transportation planning program?

- The ADA transition plan describes the detailed actions that the public agency will complete to make its facilities accessible and the prioritized schedule for implementing these corrections. (28 CFR 35.150(d)).
- The ADA transition plan is a living document that is periodically updated to continuously meet the needs of the community. The associated actions/projects in the ADA plan may be coordinated with or be included in the STIP. Updates to the ADA transition plan should include a listing of completed corrective actions, and the updated schedule for remaining work to be accomplished. (49 CFR 27.11(c)(2)(v)).

Elements of Self-Certification for ADA and Section 504

How does a State or MPO demonstrate compliance with ADA and Section 504?

- The State's and MPO's self-certification confirms that the transportation planning process meets all applicable Federal requirements (23 CFR 450.218 and 23 CFR 450.334)
- The self-certification is based on supporting documentation in the agency's files. For ADA and Section 504, the supporting documentation for the State is the State's approved ADA transition plan.

How do I know if the State has an approved ADA transition plan?

- The Civil Rights Specialist will have the most current information about the State's compliance with ADA and Section 504.

What if the State has certified to ADA and Section 504 but does not have an approved ADA transition plan?

- The State should include with their self-certification a statement that outlines its compliance status, including their completion of the ADA self-evaluation (i.e., the inventory).
- The State should indicate when its ADA transition plan will be completed and submitted to FHWA/FTA for review and approval.
- The MPO should indicate to FHWA/FTA when it anticipates full compliance with the ADA and Section 504. .

Actions by the Divisions/Regions

How do I review self-certifications for ADA and Section 504 compliance?

- You should talk with the your Civil Rights Specialist to verify the following:
  - The State has conducted a self-evaluation or inventory;
  - The State has a current ADA transition plan that meets the regulatory requirements in 28 CFR 35. 150(d), and
- If the State has a verified federally approved ADA transition plan, no additional action is required. The transition plan satisfies these two self-certification Federal requirements.

- If the MPO has verified that it fully complies with the ADA and Section 504, no additional action is required.

If the State does not have an approved ADA transition plan, can I accept the self-certifications for ADA and Section 504?

- The State may only self-certify to those requirements that it has met.
- The State may certify compliance with all ADA requirements, with the exception of the ADA transition plan. Under this scenario, the State must document as part of their self-certification submittal, their completion status for their self-evaluation/inventory and for developing the ADA transition plan, and the reasonable target date for submitting the transition plan to appropriate agency.

How do I document the status of ADA and Section 504 compliance in the Statewide Federal Planning Finding?

- The Statewide Federal Planning Finding should document the additional status information provided with the self-certification for the State and/or MPO.
- Federal certification for a State is conditional based on continued progress toward compliance with ADA and Section 504 through the development of an ADA transition plan that meets the regulatory requirements.

How do I document the status of ADA and Section 504 compliance and what recommendation/actions can be given in the TMA Certification Review?

- The TMA Certification review and report should document the compliance status information provided with the self-certification.
- The TMA's Federal certification may include the following:
  - No action or commendation, if the MPO meets all the relevant Civil Rights requirements, including ADA and Section 504 requirements.
  - Recommendation for continued progress toward ADA and Section 504 compliance, if the State has verified its status withits self-certification plan, but does not yet have an approved ADA transition plan. The State needs to develop an ADA transition plan that meets the regulatory requirements
  - Corrective Action, if the MPO has not demonstrated current actions or committed resources to fully comply with the ADA and Section 504.

Resources

What resources and technical assistance are available for Field planners?

- Office of Civil Rights' (HCR) November 17, 2014 Memorandum on, "Submission of State ADA Transition Plans" (see Attachment 1 – **CORRECTION:** Enclosure 2: The second paragraph citation, 28 CFR 27.11 should be, 49 CFR 27.11.)
- Technical Assistance is available through the following:
  - The FHWA and FTA Office of Civil Rights
  - The FHWA Resource Center's Civil Rights Technical Services Team
  - Please refer to FHWA's Accessibility Resource Library at http://www.fhwa.dot.gov/accessibility/ for links to current available resources on accessible design and construction.
- FHWA/FTA Field Planner Guidebook: Self-Certification Chapter

Is training available for States and MPOs on the ADA and Transition Plans for the Field Planners?

- FHWA's HCR and the Resource Center Civil Rights Team conduct periodic training webinars on ADA Transition Plans.
- Inform your Civil Rights Specialist, the Resource Center or FHWA/FTA Office of Civil Rights that you are interested in the subject training, and request that you and the partner agencies be included on future training announcements.

Where can I find additional information on ADA Transition Plans?

- ADA/Section 504 and Self Certification Frequently Asked Questions (June, 2015)
- FHWA - HCR has a template for a transition plan, as well as examples of complete transition plans for review.
- NCHRP Report 20-7(232), May 2009: State "ADA Transition Plans: A Guide to Best Management Practices." This report contains checklists for self-evaluation and transition plans.
- To determine if your State has an approved ADA Transition Plan, please contact the FHWA Office of Civil Rights at CivilRights.FHWA@dot.gov or Phone:202-366-0693 or TTY: 202-366-5132.

Attachment 1

U.S. Department of Transportation
Federal Highway Administration

Memorandum

Subject: **INFORMATION and ACTION:**
Submission of State ADA Transition Plans

Date: November 17, 2014

In Reply Refer To: HCR-20

From: Warren S. Whitlock
Associate Administrator
Office of Civil Rights

To: FHWA Division
Administrators and
Civil Rights Personnel

Part of the reorganization of the headquarters Office of Civil Rights (HCR) is a renewed focus on ensuring that the programs administered by our office conform to the regulatory and other legal requirements of each program. As part of ensuring that the programs are running effectively and are being consistently administered across the country, HCR is striving to clarify our policies and procedures and give background to those who are tasked with carrying out the oversight, compliance and implementation of these programs.

To this end, I wanted to address one important policy and guidance question that has recently been brought to my attention: that of the "approval" process for State Transportation Agency (STA) Transition Plans under the Americans with Disabilities Act (ADA). We ask that all Division Offices review their STA ADA Transition Plan and determine if it meets the regulatory requirements as set out in 28 CFR 35.150(d) (3). If so, please send documentation of such to both the STA and to HCR (Attention Nichole McWhorter). Upon receipt of such documentation, HCR will report that the STA has an approved transition plan.

In support of this approval process, I have attached the statutory and regulatory requirements related to the ADA transition plan approval process. In addition, you will find attached a draft letter that may be used to document whether or not the STA ADA Transition Plan meets the regulatory requirements as set out in 28 CFR 35.150(d)(3).

enclosures

Enclosure 1

FHWA Division Offices Approval of STA Transition Plans

Under **49 CFR Part 27,** public entities may not discriminate on the basis of disability in programs or activities receiving federal financial assistance. Specifically in **49 CFR 27.3(a)** this applies to each recipient of federal financial assistance from the U. S. Department of Transportation (DOT) and to each program or activity that receives such assistance. In effect this means that a recipient may not, directly or through contractual or other arrangements, utilize criteria or methods of administration that have the effect of subjecting qualified handicapped persons to discrimination on the basis of disability. **49 CFR 27.7(b)(vii)(4) (i).**

I. Jurisdiction

By ADA regulations (**28 C.F.R. 35.190**), the DOT has been designated by the Department of Justice (DOJ) as the federal agency responsible for overseeing and implementing ADA compliance for all programs, services and regulatory activities relating to transportation. Under **49 C.F.R. 27.19**, DOT recipients must comply with DOJ's ADA regulations to be considered in compliance with DOJ's regulations under Section 504 of the Rehabilitation Act of 1973 (Section 504). DOT has designated FHWA as the responsible operating administration to oversee and implement compliance with DOJ's regulations for FHWA funded projects. In doing so, FHWA Division Offices work with STAs to ensure that the ADA and Section 504 requirements are incorporated in all program activities for projects within the public rights-of-way. The Section 504 regulations at **49 C.F.R. 27.11** require FHWA to monitor an STA's compliance with the ADA, DOJ and DOT regulations that address self-evaluation and transition plans. This includes conducting periodic program reviews of STAs' highway planning, design and construction activities so as to ensure pedestrian accessibility compliance.

II. Transition Plan a requirement under ADA and the Rehabilitation Act

Every STA is required by the DOJ's regulations at **28 CFR 35.150(d)** to have developed an ADA Transition Plan within six months of January 26, 1992. The DOT regulations at **49 CFR 27.3-7** prohibit discrimination on the basis of disability in any "method of administration," including programs that have the effect of subjecting persons with a disability to discrimination. This includes the lack of an ADA Transition Plan, which we use to ensure that existing facilities of recipients come into compliance. So, a failure to have a compliant Transition Plan would violate **49 CFR 27.7,** because it would be a discriminatory method of administration.

III. Transition Plan as part of compliance review

Under **49 CFR 27.123**, if FHWA receives any information that indicates a possible failure to comply, including not having a Transition Plan that meets the regulatory requirements, the responsible Departmental official will inform the recipient and seek to correct the failure by informal means. If informal means do not correct the problem, the responsible Departmental

1

official may recommend suspension or termination of, or refusal to grant or to continue, Federal financial assistance, or take any other steps authorized by law. **49 CFR 27.125.**

IV. Requirements for approval of the ADA and Section 504 provisions

At least every four years, the State shall submit an updated STIP concurrently to the FHWA and the FTA for joint approval. At the time the STIP or STIP amendments are submitted, the State shall certify that the transportation planning process is being carried out in accordance with all applicable requirements of the provisions of the ADA and Section 504 of the Rehabilitation Act. **23 CFR 450.218(a)(6), (10).** So, every four years the STAs are certifying that they meet the requirements of the ADA and Section 504, which in the planning process would include transition plans. FHWA and FTA are approving these plans and amendments as meeting all of the requirements of ADA and Section 504. However, it is possible for the Division Civil Rights personnel to note the lack of an approved transition plan at the time of approval and certify the STIP with the deficiency noted.

Conclusion

The regulations cited support HCR's direction that Division Offices review and approve ADA transition plans. More specifically, in its review of a transition plan, a Division Office receiving "any…information that indicates a possible failure to comply" with the ADA Transition Plan requirement should work with the STA to correct that deficiency prior to approving the Plan. In addition, the regulation at **23 CFR 450.218** requires that every State submit an updated STIP to the FHWA for approval which certifies that the transportation planning process in being carried out in accordance with all applicable requirements of the ADA. A current ADA transition plan is clearly one of these "applicable requirements."

Enclosure 2

U.S. Department of Transportation
Federal Highway Administration

Jane Doe
CEO, State DOT
Home City, X ZipCode

Subject: ADA Transition Plan

Dear Ms. Jane Doe,

The Federal Highway Administration's (FHWA) _____ Division Office has received the Transition Plan that your State has submitted, as required by the Americans with Disabilities Act of 1990 (ADA). Based upon our analysis, it appears that your Transition Plan meets the requirements of regulations implementing the ADA at 28 CFR Part 35.

While your current Transition Plan appears to meet the regulatory requirements, FHWA Guidelines provide that ….[insert plans for strengthening Plan here]. The self-evaluation portion of the Transition Plan is intended to be regularly revised and updated, as required by 28 CFR Part 27.11.

As part of our oversight responsibilities, our office will continue to monitor ADA activities and ask that you submit regular progress updates on the fulfillment of your ADA responsibilities.

Sincerely,

John Doe
Division Administrator
FHWA ____ Division (HAD-X)

cc: Nichole McWhorter, Division Manager, Coordination and Compliance Division

Statewide Planning and Research (SPR) Work Program
Unified Planning Work Program (UPWP)

Background

What are Work Programs?

- Work Programs are Statements of Work that:
  - Document eligible planning work activities a State DOT or MPO proposes to undertake with FHWA and FTA planning funds.
  - Detail the estimated cost (Federal and matching funds) to perform these activities.
  - Identify who will perform the work (e.g., State staff, MPO staff, local government staff, consultant, etc.).
  - Include proposed funding by work activity and an overall budget summary that identify the category of Federal funds and the source of matching funds.

What is a simplified statement of work?

- For MPOs that do not serve a Transportation Management Area (TMA), a simplified statement of work may be used instead of a more detailed UPWP. A simplified statement of work can be as small as a few a couple of pages and would:
  - Include a general description of the work to be accomplished with federal funds.
  - Identify who will perform the work (e.g., MPO staff, local government, consultant, etc.).
  - Be developed in cooperation with the State DOT and local public transit operator(s).

What is the difference between a SPR Work Program and a UPWP?

- The SPR Work Program is the State DOT's work program that describes what "statewide" planning and research work activities the state will perform during the grant period.
- The UPWP is an MPO's work program that describes what planning work activities the MPO will perform during the grant period.

Who needs to have a work program[1]?

- State and MPOs must have a work program if they plan to use SPR, PL, other FHWA, MPP, or SPRP funds.

Who sets planning priorities for the work programs?

- The States and MPOs decide what eligible planning activities they propose for funding.
- Also annually, FTA issues a list of suggested Planning Emphasis Areas (PEAs) in the Federal Register.
- In addition to this list, the FHWA and FTA field offices may suggest other areas they feel are appropriate and/or needed in their state and MPOs, that should be addressed through targeted oversight or outreach activities. This should not be confused with the National PEAs, as noted above.

Note: Be sure to forward the PEAs and field offices' information to the State and MPOs in advance of the development of the draft work programs.

Why is it necessary to have a work program?

- Work programs are considered to be grant applications for Federal planning funds.
- They allow FHWA and FTA to determine if the proposed work is eligible for Federal funding.

[1] For the purpose of this document, the term "work programs" represents both work programs and simplified statement of works.

- Approval and authorization of the work establishes eligibility of later reimbursement to the State and MPO for the eligible work performed.

What is a grant?

- A grant is an award of Federal funds when the principal purpose is to carry out a public purpose of support or stimulation authorized by a law.
- FHWA and FTA planning funds are granted to State transportation agencies to support planning related activities as specified in 23 U.S.C. 134, 135 and 505 and 49 U.S.C. 5303-5305 and 5313(b).
- State transportation agencies subgrant funds to MPOs and other subrecipients to carry out the metropolitan planning process and other eligible activities.

What is a Consolidated Planning Grant (CPG)?

- Under a the CPG, FHWA PL and FTA MPP funds are combined and awarded as a single grant to the State by either FHWA or FTA. Under a CPG, the State can select either FHWA or FTA as the lead grant agency that would administer the combined grant on behalf of both agencies.
- See the September 15, 2004, memorandum from Cindy Burbank and Lynn Sahaj for the latest information on the CPG.

What is the purpose of work program review?

- Allow FHWA/FTA to determine eligibility of proposed activities and whether suitable activities are included to meet legislative and regulatory requirements for metropolitan and statewide planning.

Legislation and Regulations

What laws/regulations govern the use of FHWA and FTA planning funds and the work programs?
Legislation:

- **23 U.S.C. 104(f)** – source of FHWA PL funds and apportionment formula for the funds.
- **23 U.S.C. 134 and 49 U.S.C. 5303-5305** – legislative requirements for metropolitan planning.
- **23 U.S.C. 135** – legislative requirements of statewide planning.
- **23 U.S.C. 505** – source of FHWA SPR funds; includes list of eligible SPR activities.
- **49 U.S.C. 5303-5** – legislative requirements/eligibility of FTA MPP funds.
- **49 U.S.C. 5313(b)** – legislative requirements/eligibility of FTA SPRP funds.
- **49 U.S.C. –** source of FTA MPP and SPRP funds.

Regulations:

- **23 CFR 420, Planning and Research Program Administration** – regulation governing the administration of FHWA planning and research funds including requirements for work programs, State PL fund distribution formula, cost eligibility, approval/authorization procedures, program monitoring, etc…
- **23 CFR 450 and 49 CFR 613, Planning Assistance and Standards** – regulation governing the implementation of the statewide and metropolitan planning requirements including the planning process factors, long-range plans, STIP/TIPs, conformity, public involvement, MPO designations, metropolitan planning area boundaries, etc.
- **49 CFR Part 18, Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments** – U.S. DOT regulation that applies to FHWA and FTA grants to States and subgrants by States to local governments, including planning funds. The requirements in 49 CFR Part 18 apply to funds expended by the State and funds expended by MPO staff agencies that are local governments (including Councils of Governments, Planning District Commissions, etc.).

- **49 CFR Part 19, Uniform Administrative Requirements for Grants and Cooperative with Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations** – USDOT regulation that applies to subgrants of FHWA and planning funds that are pass through by States to MPO staff agencies that are universities.

FTA Circulars:

- **8100.1B Program Guidance and Application Instructions for Metropolitan Planning Grants** – describes policies & procedures for the Metropolitan Planning Program (5303).
- **8200.1 Program Guidance and Application Instructions for State Planning and Research Program Grants** – describes policies & procedures for the State Planning and Research Program (5313(b)) and describes other 5313(b)-eligible programs, e.g., Metropolitan Planning (5303), Research, Development, and Demonstration activities (formerly section 5312(a)); Training activities (formerly section 5312(c)); Research and Training in Urban Transportation Problems (formerly section 5312(b)); and Human Resource activities (formerly section 5322).

OMB Circulars:

- **A-21, Cost Principles for Educational Institutions** – establishes principles and standards for determining allowability of costs incurred by educational institutions.
- **A-87, Cost Principles for State, Local, and Indian Tribal Governments** – establishes principles and standards for allowability of costs incurred by State, local and Indian tribal governments.
- **A-102, Grants and Cooperative Agreements With State and Local Governments** – see 49 CFR Part 18 for implementing regulations.
- **A-110, Uniform Administrative Requirements for Grants and Other Agreements with Institutions of Higher Education, Hospitals and Other Non-Profit Organizations.**
- **A-122, Cost Principles for Non-Profit Organizations** – establishes principles and standards for determining allowability of costs incurred by non-profit organizations -- see 49 CFR Part 19 for implementing regulations.
- **A-133, Audits of States, Local Governments, and Non-Profit Organizations** – Audit requirements for non-Federal entities that expend $500,000 or more in federal funds from all sources in it's the entities fiscal year.

Funding and Eligibility

How is Federal Funding determined for States and MPOs?

- FHWA PL [23 USC 104(f)(2)] and FTA MPP [49 USC 5303(h)(2)(A)] and SPRP [49 USC 5313(b)] funds are apportioned annually to the States according to statutory formulas.
- FHWA SPR [23 USC 505(a)] funds are set-aside from each State's apportionments of the core highway programs after those funds are apportioned to the States.

How do States determine intra-State allocations of metropolitan planning funds?

- By statute, each State must distribute FHWA PL [23 USC 104(f)(4)] and FTA MPP [49 USC 5303(h)(2)(B)] funds to its MPOs, based on formula that consider the factors in the legislation and that are developed by the State in cooperation with the MPOs.
- The State distribution formula for PL and MPP funds, and any revisions to them, must be submitted by the State to FHWA or FTA, respectively, for approval.
- States should periodically review their metropolitan planning fund distribution formula to determine if they need to be revised to reflect changing conditions or new Census data.
- In a CPG State, the combined FHWA and FTA metropolitan planning funds may be distributed to the MPOs using a single formula where FTA and FHWA use the same formula.

How is eligibility determined?

- 23 U.S.C. 103(b)(6)(E), NHS funds for transportation planning in accordance with 23 U.S.C. 134 and 135 – see 23 USC 134 and 135 to determine if the activity is necessary to perform metropolitan or statewide planning.
- 23 U.S.C. 104(f), PL funds – see 23 U.S.C. 134 to determine if the activity is necessary to perform metropolitan planning.
- 23 USC 105, Minimum Guarantee funds – same eligibility as STP funds.
- 23 U.S.C. 133(b)(7), STP funds used for surface transportation planning programs – see 23 USC 134, 135 and 505 to determine if the activity is necessary to perform metropolitan or statewide planning or if it is one of the eligible activities listed as eligible for SPR funds.
- 23 U.S.C. 505 – SPR funds, only for the following purposes:
  - Engineering and economic **surveys and investigations**.
  - The **planning** of future highway programs and local public transportation systems and the planning of the financing of such programs and systems, including metropolitan and statewide planning under Title 23 Sections 134 and 135.
  - **Development and implementation of management systems** under section 303, Title 23.
  - **Studies** of the economy, safety, and convenience of surface transportation systems and the desirable regulation and equitable taxation of such systems.
  - **Research, development, and technology transfer** activities necessary in connection with the planning, design, construction, management, and maintenance of highway, public transportation, and intermodal transportation systems.
  - **Study, research, and training on the engineering standards and construction materials** for transportation systems described in paragraph (5), **including the evaluation and accreditation of inspection and testing** and the regulation and taxation of their use.
- 49 U.S.C. 5303(g) – (MPP funds for Metropolitan Planning)
  - Administrative costs incurred by the State are not an allowable expense.
- 49 U.S.C. 5313(b) – (SPRP funds for Statewide Planning and Research) Research, Development, and Demonstration activities (formerly section 5312(a)); Metropolitan Planning (5303); Training activities (formerly section 5312(c)); Research and Training in Urban Transportation Problems (formerly section 5312(b)); and Human Resource activities (formerly section 5322).
- PL and MPP funds are interchangeable for metropolitan planning work. For example, PL funds may be used to support transit related planning and MPP funds may be used to support highway related planning.

When can PL funds be used for planning outside of metropolitan areas?

- PL funds not needed for carrying out metropolitan planning provisions may be made available by the MPO(s) to the State DOT for statewide planning activities with approval of the FHWA Division Administrator.
- In a minimum PL apportionment state, if the State DOT determines the MPO receives more funds then necessary to carry out 23 U.S.C. 134, the State may use those funds for statewide planning, after considering the MPO(s)' views AND with approval of the FHWA Division Administrator.

When can FTA Section 5313(b) SPRP funds be used for Metropolitan Planning?

- FTA's 5313(b) funds are available for a wide range of activities including both Statewide and Metropolitan Planning at the State's discretion and with the FTA Regional Administrator's approval. Section 5313(b) should be noted as the fund source when these funds are used in Work Programs and UPWPs.

Work Program Content, Review, and Approval

What are the key elements of an acceptable work program?

- At a minimum, a UPWPs and State work programs must include:
  - A description of work with sufficient detail to allow you to determine eligibility and who (e.g., MPO staff, local staff, or consultants) will perform the work. Work program activities can be "grouped" according to the type of work to be undertaken (e.g., Administrative, Data Collection, Technical Analysis/Modeling, or Transportation Plan Development). How refined those "groups" of activities should be delineated can usually be negotiated between the MPO, State and USDOT, unless dictated by State or local requirements.
  - Estimated cost of each activity/task and funding sources with a funding summary that shows:
    - Federal share by type of fund,
    - Matching rate by type of fund,
    - State and/or local matching share, and
    - Other State or local funds.
  - Schedule for accomplishing each activity.
  - Anticipated products.
  - It must include all activities planning proposed for FHWA and FTA funding.
  - For TMAs, all major transportation planning efforts should be described (including corridor and sub-area studies in accordance with 23 CFR 450.318), for information purposes, regardless of source of funding or entity undertaking the work
  - In nonattainment areas, all transportation-related air quality planning activities should be described.
  - The work program should also discuss the major planning priorities and challenges for the area to put the work program into the larger context of what should be accomplished to address the surface transportation issues within the pertinent jurisdiction.
- For MPOs that do not serve a TMA, a simplified statement of work may be used instead of a more detailed UPWP. A simplified statement of work would:
  - Include a general description of the work to be accomplished with federal funds.
  - Identify who will perform the work (e.g., MPO staff, local government, consultant, etc.).
- A work program may cover one or more years of planning activities, with updates/revisions as necessary.

What preparation work should be done before a work program is submitted for our approval?

- Discuss with agencies the work they expect to continue or begin in the upcoming fiscal year(s)
- Become familiar with the planning agencies schedule for developing new work programs.
- Start with discussions on status of current planning activities, available and anticipated funding, upcoming deadlines for renewing plans, TIPs, conformity findings, and other required activities, national planning emphasis areas, requirements established in newly adopted law or regulations, Federally identified Corrective Actions and Recommendations for TMA MPOs, changing circumstances/needs within the jurisdiction developing the work program, and/or any outstanding issues or findings from past work program and FHWA/FTA Metropolitan and Statewide planning findings.
- Come to agreement among parties as what will be included in the draft work program.
- Request and review draft work programs, and provide appropriate agency(ies) with comments well in advance of when the final is due.
  Note: Providing written comments is highly recommended.
- Coordinate or consult with your FHWA/FTA counterpart on all major meetings, discussions, reviews, and final actions concerning MPO work programs.

- Refer to any written agreements between your office and the pertinent FHWA/FTA counterpart defining each agency's roles and responsibilities in reviewing and acting on UPWPs. If no agreement exists, consider developing an MOU/MOA that describes respective responsibilities

Are UPWPs joint or separate FHWA/FTA documents? Do they need joint or separate actions?

- The joint FHWA/FTA metropolitan planning regulations (23 CFR 450.314(a)(2), require that UPWPs document planning activities performed with both FHWA and FTA planning funds.
- Unless an agreement has been reached by the effected FHWA and FTA field offices that either office would act on behalf of both agencies, the FHWA Division and FTA Region would each review the metropolitan work programs in coordination with each other.
- If one agency (FHWA or FTA) is delegated authority through a MOU/MOA to act as the executive agent, that agency may approve a UPWP on behalf of both agencies, after consultation with the other agency as necessary.

Are State planning work programs joint or separate FHWA/FTA documents? Do they need joint or separate actions?

- Unless a State has included its State planning funds in a CPG, the State work program could be separate documents acted upon separately by each agency.
- If a State has included State planning funds in a CPG, one consolidated work program would be submitted to the lead Federal agency for the CPG which will then coordinate with the nonlead agency on review and approval.

Who needs to approve the work programs?

- SPR work program - USDOT (FHWA and FTA) needs to approve and authorize the work program. FTA's approval and authorization is automatically a part of TEAM electronic grant approval.
- UPWP - USDOT (FHWA and FTA) has final UPWP approval authority.
    - The State as our grantee makes sub-grants to the MPOs. The State may and does, in most cases, approve the UPWP, either as part of its state administrative process and/or as a portion of its overall state program, which also funds state-sponsored work activities.
    - The State's approval of the UPWP would be in addition to the approval by USDOT.

Administering the Work Program

What happens if I think an item is not eligible for planning funds?

- Ask for clarification of the activity (e.g., how is it related to the transportation planning process? Can the description be improved to better reflect what will be accomplished in terms of support for or connections to the transportation planning process?).
- If the activity still does not appear to be eligible, ask the activity sponsors to revise the proposed activity to make it eligible.
- If it still fails the eligibility test, ask the pertinent agency to remove it or change the funding source to one for which it is eligible.
  Note: These first three options can be handled through E-Mail correspondence, telephone conversations, meetings (particularly ones set up specifically to discuss the draft or final work program), or formal written comments.
- If, after attempts have failed to convince the sponsoring agency to revise the ineligible portions of the work program or the entire document does not substantially meet our requirements, do not approve it and do not authorize expenditure of associated funding until an acceptable document is submitted. Another option is to let the activity remain in the work program, but specify in the approval/authorization letter that the activity is not eligible for Federal funding reimbursement.

What steps must a planner follow to take action?

- Ensure the SPR Work Program:
  - Provides sufficient data to support FHWA/FTA statutory and regulatory responsibilities.
  - Only includes eligible activities.
  - Avoids duplication of efforts
  - Expends at least 25 percent of FHWA's SPR funds on RD&T activities [see 23 U.S.C. 505(b)) and 23 CFR 420.107].
  - Meets requirements of acceptable work program as described above.
- Ensure the UPWP:
  - Includes all of the information in "SPR Work Program" response described above.
  - Discusses the MPO planning priorities.
  - Documents planning activities funded with Title 23 and the Federal Transit Act funds.
  - Includes information on transportation planning related activities funded from other sources (for MPOs in TMAs).
  - Documents planning activities that address Federal Corrective Actions and Recommendations, if necessary, for MPOs in TMAs.
- Encourage the State and MPOs in non-TMAs to include information on transportation planning related activities funded from other sources.
- Prepare and send approval actions.
  (Note: This applies only to FHWA. The FTA Transportation Electronic Award and Management (TEAM) system serves to approve both the fund request and the activities on which the fund request is based as well as to authorize and obligate the funds.)
  - Letter to approve work program content.
  - Letter/other document authorizing expenditures of funds to cover costs of activities described in the work program.
  - Approval and authorization may be combined into one document.
- Check your FHWA office files for copies of approval letters or other actions from previous years – use as appropriate with necessary updates to legislation and regulatory citations.
- See document attached for standard conditions/waivers that should be included in work program approval letters *(Attachment SPR-1)*.
  (Note: This is for FHWA only; this is done automatically through TEAM for FTA through the State's acceptance by electronic penning.)
- Other conditions on work program approval that you and FTA agree to can also be included in the approval letter
  (Note: This is for FHWA only; this is done automatically through TEAM for FTA.)

What if I work with a state that has adopted the Consolidated Planning Grant (CPG)?

- The work programs and simplified statements of work will be the official grant application for both FHWA and FTA funds. The work programs will not need to identify which agency funds are budgeted for specific activities.
- If FHWA planning funds are transferred to FTA, the combined funds will be obligated and awarded through FTA's TEAM system and FTA will execute a grant agreement with the State DOT. Funds will be reimbursed to the State DOT though FTA's Electronic Clearing House Organization (ECHO).
- If FTA funds are transferred to FHWA, the combined funds will be obligated and awarded through FHWA's Fiscal Management Information System (FMIS) and FHWA will execute a grant agreement with the State DOT. Reimbursements to the State will be made through FHWA's Rapid Approval and State Payment System (RASPS).
- MPO bills will not need to indicate the agency source of Federal funds claimed. Requests for reimbursement from the State DOT to FTA or FHWA will need to identify whether the requested

fund draw down is for Metropolitan or Statewide Planning and which agency's funds. Both ECHO system and RASPS will draw down the oldest funds first for the appropriate fund category.

- Program management, monitoring, and oversight will be handled by either agency, FTA or FHWA, as the Lead Grant Agency in consultation with the other Federal agency, as determined by agreement between the two agencies.

How are amendments handled?

- Consider proposed amendments within the context of the current work program
- Appropriate action can depend upon type/magnitude of amendment
- Recommend development of procedures to define how to process amendments
  - Develop with FHWA/FTA, State DOT, MPOs
- Certain amendments require prior Federal approval:
  - Increase in Federal funds [49 CFR 18.30(c)(1)(i) and FTA Circular 5010.0C,I.6.e(1)]
  - Cumulative transfer among already approved work program line items of 10% of the total Federal funds or $100,000, whichever is larger [49 CFR 18.30(c)(1)(ii)].
    Note: For FTA, the cumulative transfer among already approved work program line items that total 30 percent or more in a grant of at least $100,000 [FTA Circular 5010.1C, I.6.e(4)].
  - Change in the scope or objectives of activities (e.g., adding or deleting line items) [49 CFR 18.30(d)(1) and FTA Circular 5010.1C, I.6.e(1)(a)].
    - Extending the period of performance past the approved work program period (i.e. no-cost time extension). [49 CFR 18.30(d)(2)]
      Note: FTA requirement; FTA grants can remain open as long as activity on the work program continues.
  - Transferring substantive programmatic work to a third party (e.g., consultant work not identified in the original work program) [49CFR18.30(d)(4)].
  - Capital expenditures including purchase of equipment [OMB Circular A-87)].
- Certain amendments do not require Federal action, for example:
  - Cumulative transfer among already approved work program line items of less than $100,000 in Federal funds if there is no change in scope of work.
- FHWA and FTA can agree that either agency can unilaterally take Federal action for both agencies.
- Depending upon state rules/procedures and subject to waiver of prior approval by FHWA/FTA, the State DOT can take action on amendments on its work program and approve revisions to MPO work programs except for the need for additional Federal funds.
- Other procedures can be established, as needed or appropriate, for specific situations.

Resources

Where is technical assistance available?

- For programs that come under the auspices of the FHWA Office of Planning, Environment, and Realty, the current program area specialists can be located at the following web site: http://www.fhwa.dot.gov/hep/hepsubj.htm.
- For programs for which the FTA Office of Planning and Environment is responsible, contact FTA Headquarters.

Attachment SPR-1

Suggested Items to Include in FHWA's Planning Work Program (SPR and PL) Approval Letter

- Statement that FHWA planning and research funds (as defined in 23 CFR 420.103) shall be administered in accordance with the provisions of 49 CFR Part 18 and 23 CFR Part 420.
- Effective date of when the authorized work can proceed (if it is different from the date of your approval letter).
- Statement that the authorization is subject to the availability of funds.
- Time period of the authorization if not all needed Federal funds are available at the time of authorization for the full work program period.
- The category and amount of funds that are being authorized (PL, SPR, STP, NHS, etc.) in this work program/grant approval
- Period for which the work is authorized. (starting and ending date)
- Work program activities must be eligible under 23 U.S.C. 134, 135, 505 or 49 U.S.C. 5303-5305,5313(b) and the provision of 23 CFR 420 and 23 CFR 450.
- Prior Approval is required for the following changes:
    - Budgetary Changes –
        - Increase in federal funds [49 CFR 18.30(c)(1)(i)].
        - Cumulative transfer among already approved work program line items of 10% of the total federal funds or $100,000 [49 CFR 18.30(c)(1)(ii)].
    - Programmatic Changes –
        - Change in the scope or objectives of activities (e.g., adding or deleting line items) [49 CFR 18.30(d)(1)].
        - Extending the period of performance past the approved work program period. [49 CFR 18.30(d)(2)].
        - Transferring substantive programmatic work to a third party (e.g., consultant work not identified in the originals work program) [49 CFR 18.30(d)(4)].
    - Capital expenditures including purchase of equipment [OMB Circular A-87)].
- The following prior approval requirements are waived:
    - Change in key person. [49 CFR 18.30(d)(3)].
    - Publish reports resulting from the activities in the work program. Reports prepared for FHWA funded work shall include appropriate credits references and disclaimer statements (23 CFR 420.117(e)).
    - The use of program income as a match for Federal funds or to perform additional eligible work [49 CFR 18.25(g)].
- If not included in the Federal-aid project agreement, the SPR work program shall include a certification that the State transportation agency will provide a drug-free workplace as required by 49 CFR Part 32.

- If not included in the Federal-aid project agreement, the SPR Work Program and each UPWP shall include certifications that the State transportation agency and the recipients of PL funds will comply with the suspension and debarment provisions of 49 CFR Part 29 and the lobbying restrictions set forth in 49 CFR Part 20.

- The Single Audit Act Amendment of 1996 requires that an independent audit be completed of any non-federal entity expending $500,000 or more in Federal funds from all sources in a fiscal year that ends after December 31, 2003. (49 CFR 18.26, OMB Circular A-133)

- Annual progress and financial summaries shall be submitted within 90 days (3 months) after the end of the report period. The report may be more frequent if deemed necessary by FHWA. [23 CFR 420.117(c)].

Statewide Transportation Improvement Program (STIP)

Background

What is a STIP?

- The STIP is a complete list and description of all FHWA/FTA-funded projects that are to be advanced by year for the next four-year period.
- While 23 CFR 450.216(a) requires a four-year STIP, a STIP that covers a longer period may be submitted, with the projects beyond the first four years included for informational purposes only.
- The TIP portion of a STIP in a metropolitan area needs to be developed cooperatively with the MPO and must be included wholly or by reference in the STIP. [23 CFR 450.216(b)]
- The portion of a STIP in each non-metropolitan area needs to be developed in consultation with affected non-metropolitan officials responsible for transportation. [23 CFR 450.216(c)]
- The STIP shall include all capital and non-capital projects (i.e., transit operations) or phases of project development, which are targeted to use FHWA and/or FTA funding. . [23 CFR 450.216(g)]
- The STIP also includes all regionally significant transportation projects requiring Federal approval or permits even if no FHWA or FTA funds are to be used in their construction. A regionally significant project is generally defined as a project on a facility which serves regional transportation needs. . [23 CFR 450.216(h)]
- Projects that are not considered to be of appropriate scale for individual identification in a given program year may be grouped by function, work type, and/or geographic area. [23 CFR 450.216(j)]

When were the STIP requirements first instituted?

- Under PL 102-240, the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991.

What laws/regulations govern the STIP?

- 23 U.S.C. 135(g)
- 23 CFR 450.216 (49 CFR 613.200)

Who needs to have a STIP?

- Each State must develop a Statewide Transportation Improvement Program for all areas of the State. [23 CFR 450.216(a)]

Does the STIP have to cover the entire state program? What is a Partial STIP?

- If particular areas have difficulties developing their portion of the STIP, the State may develop a partial STIP covering the remaining portion of the State (e.g., metropolitan area, Indian tribal lands, etc.) [23 CFR 450.216(a)]

What is the MPO's role in development of the STIP?

- The MPO provides the metropolitan TIP portions of the STIP developed through the metropolitan planning process.

Is public involvement needed for the STIP?

- The Governor must provide for public involvement in development of the STIP. [23CFR 450.216(f)]
- As is the case in all areas of statewide planning, the public must be provided ample opportunity for involvement in STIP development. . [23 CFR 450.210(a)]

Tribal Consultation Process

Background/Legislation and Regulations

What is consultation?

- Consultation means that one or more parties confer with other identified parties in accordance with an established process and, prior to taking action(s), considers the views of the other parties and periodically informs them about action(s) taken.

What is the definition of Indian Tribal Government?

- Indian Tribal Government is a duly formed governing body for an Indian or Alaska Native tribe, band, nation, pueblo, village or community that the Secretary of the Interior acknowledges to exist as an Indian Tribe pursuant to the Federally Recognized Indian Tribe List Act of 1994, public Law 103-454.

How Does Tribal Sovereignty factor into the consultation process?

- The Federal Government through the US Constitution and Indian Treaties views Indian Tribal Governments as independent nations. In so doing, it is the policy of the United States Government to work with Indian Tribal Governments on a "government-to-government" basis, recognizing their sovereignty.
- Tribal consultation must also recognize tribal sovereignty as an independent nation. This means that each individual tribe must be considered independent and separate from any other tribe. Assumptions that all tribes may be treated the same is contrary to Federal policy and Federal regulations related to consultation.
- Tribal consultation processes must meet individual tribe needs and interests. A single process may be used by a state/MPO to address all tribal consultation requirements, if all tribes involved find the process acceptable to their interests and needs. Likewise, it is possible that a state/MPO implement several different tribal consultation processes based on individual tribal needs and interests.

Are all States/MPOs subject to the requirements for Tribal Consultation?

- Only those states/MPOs that have areas under Indian Tribal Governments' jurisdiction is required to do Tribal Consultation. This means that states/MPOs are subject to tribal consultation only if a tribe(s) is living within the State/MPO area, or if there is traditional or culturally significant land located within the State/MPO area.

Does Tribal Consultation still apply if there are no Indian Tribal Governments living within the borders of the State/MPO?

- There are approximately 14 states that do not have tribes living within their state, but that do have land within their borders that is considered by outside tribes as traditionally or culturally significant tribal land. Traditional/cultural tribal land is defined as land that holds historical value to the traditional culture of a tribe. Generally, these lands contain archeological artifacts, or are considered a historical resource under Section 106 of the environmental process. For those states/MPOs that have traditional/cultural land located within their borders, the tribal consultation rules apply.
- There are approximately 5 states that do not have either Indian Tribal Governments or traditional or cultural tribal lands located within their borders. Accordingly, states/MPOs that do not have either Indian Tribal Governments or traditional/cultural tribal lands are not subject to the tribal consultation rules.

What laws or regulations govern tribal consultation for statewide transportation planning?

- 23 U.S.C. 135 (e)-(g) - Statewide planning
- 23 U.S.C. 135 (f)(4)(B) - Statewide long range transportation plan
- 23 CFR 450.104 Definition of consultation, coordination, collaboration
- 23 CFR 450.208 (a)(5) - Coordination of planning process activities.
- 23 CFR 450.210 (c) - Interested parties, public involvement, and consultation
- 23 CFR 450.214 (h)-(i) - Development and content of the long-range statewide transportation plan
- 23 CFR 450.216 (d) - Development and content of the statewide transportation improvement program (STIP)

What laws or regulations govern tribal consultation in metropolitan transportation planning?

- 23 U.S.C. 134 (j)(3)(B) - Metropolitan planning
- 23 U.S.C. 134 (i)(2)(B)(ii) - Metropolitan plan development
- 23 CFR 450.104 Definition of consultation, coordination, collaboration
- 23 CFR 450.316 - Interested parties, participation, and consultation

Elements of the Tribal Consultation Process

Are states and MPOs required to consult with individual tribes, or can consultation be fulfilled by consulting with a tribal organization to which all tribes are members?

- The State and/or MPO must consult with each individual Indian Tribal Government that has jurisdiction over land within the boundaries of the state or MPO, or
- Individual tribes may decide to delegate a tribal organization as their representative to consult on their behalf. However, the decision to do so must be made by the tribe through consultation with the state and/or MPO. Only after this has been agreed upon should the state and/or MPO consult with the tribal organization.

May a state or MPO have different consultation processes for each tribe?

- Yes. Because consultation is individual to each tribe located within the boundary of the state/MPO, it is possible to have more than one process in order to address each tribe's interests, needs and technical expertise.
- It is also possible for a state/MPO to have a single process for all tribes within the planning area. If all tribes find this process acceptable, then that process may be used for consultation. However, it is the state/MPOs responsibility to consider a tribes needs and interests in developing a consultation process, which may require separate consultation processes in order to meet tribal expectations.

What are some documented methods that states/MPOs use to consult with tribes?

- There are a variety of methods currently used to consult with tribes. Examples of consultation methods currently in use may be found at the following website:
  - http://www.fhwa.dot.gov/hep/tribaltrans/ttpcs/index.htm

Where and how is the consultation process documented at the state and the MPO?

- Tribal consultation must be developed with the tribes and must address their tribal interests and needs. Therefore, before implementing a tribal consultation process, the state/MPO need to discuss and consider with the tribes, the tribal roles, responsibilities, and the key decision points on which they will be consulted. Once the consultation process is found to be acceptable, it should be documented and fully implemented in the planning and programming processes.
- Tribal consultation is a separate and discreet process from normal public involvement. However, it may often be documented as part of the public involvement/participation process as one element of a

state/MPO's outreach efforts. It is acceptable to include the tribal consultation process with the public involvement/participation process; but the differences and unique requirements of tribal consultation should be identified. Likewise, the flexibility to make adjustments to that process should not be restricted because of its placement within the over-arching public participation document.

How is the consultation process different from the public participation process?

- States and MPOs are required to establish a separate and discreet tribal consultation process that documents each agency's role, responsibilities and key decision points to be consulted. Each individual tribe must be consulted that has jurisdiction within the planning area of the state/MPO. States and MPOs must consider the views of each tribe before taking action on the long range plan or transportation improvement program. The consultation process should include a process that informs the tribes when actions are taken by the planning agency.
- Public participation is a process that includes the general public. It is designed to be pro-active outreach, inviting the public to learn, listen and provide input to key decisions.
    - The general public is defined very broadly and includes: all citizens, affected public agencies, transit labor representatives, private representatives of public transportation employees, freight shippers, providers of freight transportation services, private providers of transportation, representatives of users of public transportation, representatives of users of pedestrian walkways and bicycle transportation facilities, representatives of the disabled, and other interested parties.
    - For more information on public participation please see the FHWA's Public Involvement website at http://www.fhwa.dot.gov/planning/ppasgpi.htm

What activities, processes or products require tribal consultation?

- States shall consult with tribes during the development of their long range statewide transportation plan and the statewide transportation improvement program.
- MPOs must consult with tribes during the development of their metropolitan transportation plan and their transportation improvement program.

Actions by the Divisions/Regions

At a minimum, what do FHWA Division offices and FTA Region Offices need to look for in the state/MPO tribal consultation process?

- The FHWA Division Offices and FTA Regions do **not** approve the adopted consultation process document. However, for state DOTs, the Federal Planning Finding should include a review of the documented tribal consultation process for the state DOT as well as non-TMA MPOs that are subject to tribal consultation requirements.
- In TMAs that have tribal responsibilities, the TMA certification review should include a discussion of the tribal consultation process.
- Specifically, this discussion may include reviewing the following:
    - Documentation of a process that is separate and discrete from the general public participation process;
    - Evidence the state/MPO is following the process according to how it is documented. FTA and FHWA field offices should have the latest adopted consultation process on file.
    - Documentation on the feedback process, that informs the tribes the actions taken by the agencies, in particular on those decisions on which they are consulted.

What actions do I take if I find the state/MPO process does not meet Federal requirements?

- The following coordination/discussion steps should be taken:
    - Coordinate and discuss with your counterpart FTA Region/FHWA Division staff to inform them of your concerns and to establish a Federal assessment of the situation.
    - Discuss issues and concerns with the state/MPO staff and/or officials to clarify issues and to help mediate tribal concerns
    - If tribes have indicated dissatisfaction, work with them to fully understand why they are dissatisfied and what they need to resolve the issues
    - Seek resolution of problems informally if possible.
- Make note of your concerns in the next Federal Planning Finding (23 CFR 450.218) and/or, the next TMA certification review (23 CFR 450.334)
    - Document what you have heard from tribal members and other sources that validate that the State/MPO is not following their own tribal consultation process.
    - Document discussions and agreements with the State/MPO on how they will modify the tribal consultation process to address the identified concerns and the timeframe within which resolution must be reached.
- If the state/MPO does not resolve or address the problems as prescribed within identified timeframe, inform Division/Regional Office's management of the issues and identify options to deal with the situation that includes the following:
    - Notify the state/MPO of consequences of failure to consult with Indian Tribal Governments, which may require your office to delay the approval of the SPR Work Program/UPWP, next STIP amendment or new STIP because they do not have an adequate planning process that meets 23 U.S.C. 134 and 135.
    - After notification has been issued and the problem is still not resolved or being addressed in an adequate and timely manner, then approvals of SPR Work Program/UPWP, STIP amendments or new STIPs will be on hold until the issues are satisfactorily resolved.

What should the FHWA and FTA review regarding tribal consultation when making the Federal Planning Finding and TMA Certification?

- States and MPOs should be able to demonstrate that they are following their adopted, documented tribal consultation processes through relevant meeting notes, letters, etc. used in the consultation process. Likewise, if the state/MPO is not following their documented process, these same meeting notes, letters, etc. will demonstrate that a different process is being used other than that which was originally agreed upon and documented.
- States and MPOs are required to inform the tribes about actions taken through the planning processes for which they were consulted. The review of the consultation process should also verify evidence that this action information was provided to tribal governments.
- If it is found that the documented process is not followed, and/or that the process or subsequent follow-up information was not provided to the tribes, the Federal Planning finding and/or TMA Certification should reflect these findings and appropriate actions should be made to ensure consultation is resolved accordingly.

Resources

Are there good Tribal consultation processes that I may share with the state/MPO?

- FHWA and FTA do not approve tribal consultation processes. In addition, the structure of the consultation process is a flexible to ensure that it meets the specific needs of individual tribes and the agencies. Therefore, it would not be appropriate for FHWA and FTA to determine if one process is better than another. However, there are several case studies that highlight examples processes that have improved the communication and coordination between the entities involved.

- The FHWA public website: (http://www.fhwa.dot.gov/hep/tribaltrans/ttpcs/index.htm) offers several examples and case studies of tribal consultation and coordination. Examples include:
    - http://www.fhwa.dot.gov/hep/tribaltrans/ttpcs/arizona.htm
    - http://www.fhwa.dot.gov/hep/tribaltrans/ttpcs/maine.htm
    - http://www.fhwa.dot.gov/hep/tribaltrans/ttpcs/california.htm
    - http://www.fhwa.dot.gov/hep/tribaltrans/ttpcs/southdakota.htm
    - http://www.fhwa.dot.gov/hep/tribaltrans/ttpcs/washington.htm

Where can I find additional information on tribal consultation?

- The FHWA public website: (http://www.fhwa.dot.gov/hep/tribaltrans/ttpcs/index.htm) offers several examples and case studies of tribal consultation and coordination.
- The FHWA Tribal Transportation Capacity Building Program website (http://www.planning.dot.gov/tribal.asp) offers several resources designed to offer technical information relative to tribal planning and building transportation expertise among tribal agencies.
- The Tribal Technical Assistance Program (TTAP) website offers insight into tribal activities, interests and programs by state (http://www.ltapt2.org/centers/).

Where can states/MPOs and tribes get more information about consultation processes?

- The FHWA public website: (http://www.fhwa.dot.gov/hep/tribaltrans/ttpcs/index.htm) offers several examples and case studies of tribal consultation and coordination.
- The FHWA Tribal Transportation Capacity Building Program website (http://www.planning.dot.gov/tribal.asp) offers several resources designed to offer technical information relative to tribal planning and building transportation expertise among tribal agencies.
- The Tribal Technical Assistance Program (TTAP) website offers insight into tribal activities, interests and programs by state (http://www.ltapt2.org/centers/).

Who are the "affected" officials? What is the requirement for non-metropolitan local official consultation on the STIP?

- "Affected" *Non-metropolitan local official* means elected and appointed officials of general purpose local government in non-metropolitan area with responsibility for transportation.
- The State will provide for non-metropolitan local official participation. The State must have a documented process that is separate and discrete from the public involvement process for consulting with non-metropolitan local officials representing units of local government and/or local officials with responsibility for transportation that provides an opportunity for their participation in the …development of the STIP. [23 CFR 450.210(b)]
- The State shall review and solicit comments on this consultation process from non-metropolitan local officials and other interested parties for a period of not less than 60 calendar days at least once every 5 years. A specific request for comments shall be directed to the State association of counties, State municipal league, regional planning agencies, or directly to non-metropolitan local officials. [23 CFR 450.210(b)(1)]
- The State, at its discretion, shall be responsible for determining whether to adopt any proposed changes. If a proposed change is not adopted, the State shall make publicly available its reasons for not accepting the proposed change, including notification to non-metropolitan local officials or their associations. [23 CFR 450.210(b)(2)]

Timing

What period of time does a STIP cover?

- The State shall submit an updated STIP at least every four years, and amendments as necessary, concurrently to the FHWA /FTA for joint approval. [23 CFR 450.218(a)]
- The STIP must cover a period of not less than four years, but may cover a longer period. If the STIP covers more than four years, the projects in the latter years will be considered by the FHWA /FTA only as informational. [23 CFR 450.216(a)]
- A STIP submitted with less than four years of projects is not acceptable.
- Under certain circumstances (see the question on extensions, below), a STIP can be extended beyond its four-year life as a "bridge" until a complete, formal STIP is submitted and approved.

Who determines the timeframe of a valid STIP?

- Federal law establishes requirements for the STIP.
- The approval for the STIP is good for, at a maximum, a four-year period or until a new updated STIP has been approved and in place during the four-year period.
- FHWA/FTA have the flexibility to extend the timeframe of the STIP under certain circumstances (see below).

What if a State wishes to extend a STIP? Under what the extenuating circumstances, would FHWA/FTA permit an extension of the STIP?

- Where the State demonstrates, in writing, that extenuating circumstances will delay the submittal of a new STIP or amended STIP for approval, FHWA /FTA will consider and take action on requests to extend the approval beyond four years for all or part of the STIP for a period not to exceed 180 calendar days.
- Where the request involves projects in a metropolitan planning area(s), the affected MPO(s) must concur in the request and if the delay was due to the development and approval of the TIP, the affected MPO(s) must provide supporting information, in writing, for the request. [23 CFR 450.218(c)]
- Example of extenuating circumstances include the following:
    - Inadequate public involvement on the new STIP, or appropriate public involvement procedures are not in place,

- Conformity issues on the TIPs, or
- Major budget shortfall necessitating the reprioritization of the program of projects.

Connection to the Planning Process

What funds can be used to develop a STIP?

- Funds provided under the following sections may be used to develop the STIP [23 CFR 450.206(d)]:
  - Sections 5305(e) and 5307 of the Federal Transit Act and
  - 23 U.S.C. 104(b)(1) **NHS**, 104(b)(3) **STP**, 104(f)(3) **PL** and 505 **SPR**.

How is consistency between the statewide transportation plan and STIP defined?

- [The STIP] contain[s] only projects consistent with the long-range statewide plan. [23 CFR 450.216(k)]
  - For States with facility or project long-range transportation plans, projects should correlate with projects/facilities identified in the long-range transportation plan.
  - For States that have policy plans, the projects in the STIP should support the goals identified in the plan, and the strategies defined in the implementation of the plan.
  - Similarly, projects from the metropolitan TIP must come from or be consistent with the metropolitan long-range transportation plan.
- If the STIP projects are shown to address and support the planning factors, and the statewide transportation plan considers the same set of planning factors, then there is consistency between the plan and STIP.
- For those States that still use management systems (initially defined under ISTEA), there is consistency between the STIP and plan if these systems are identified; are part of the planning process; are input to the plan; and identify projects for the STIP.

Relationship to the TIP

How is the STIP different from the TIP?

- The Transportation Improvement Program (TIP) is the metropolitan area counterpart, as well as, a subset of the STIP.
  - In addition to transportation funding for metropolitan projects, the TIP also includes a direct linkage to Federal air quality requirements for "conformity".
- The STIP includes additional FTA and FHWA funded projects in geographical areas of the State not covered by the TIPs.

How does the TIP become part of the STIP?

- The metropolitan planning area portion of the STIP (the metropolitan TIP) must be developed in cooperation with the MPO. [23 CFR 450.216(b)]
- TIPs shall be included without change in the STIP, directly or by reference, once approved by the MPO and the Governor or his designated representative, and after conformity findings are made. [23CFR 450.216(b)]

- The linkage between the TIP and STIP is an important reason for the State and designated transit operators[1] to work proactively with MPOs in developing the metropolitan area transportation plan and resulting TIP.

Relationship to Conformity

How are projects from nonattainment/maintenance areas handled?

- In nonattainment or maintenance areas, the STIP/TIP shall contain only transportation projects included in the regional emissions analysis that supported the conformity determination. [23 CFR 450.216(b)]
- TIPs in nonattainment and maintenance areas are subject to the FHWA /FTA conformity findings before their inclusion in the STIP. [23 CFR 450.216(b)]
- In rural nonattainment and maintenance areas, Federal findings of project conformity must be made prior to placing projects in the STIP. [23 CFR 450.216(b)]

How do I know if the conformity determination is still valid?

- Reconfirm validity of FHWA/FTA conformity determinations on TIPs from nonattainment/ maintenance areas. Unless the area is covered by an applicable conformity lapse grace period [42 USC 7506(c)(9) & (10)], projects from nonattainment/maintenance area TIPs without current conformity determinations cannot be approved in a proposed STIP.
- A non-metropolitan nonattainment/maintenance area or the State DOT should include a verification of the validity of a conformity determination for proposed non-exempt projects coming from a nonattainment or maintenance area without a TIP. The verification should include the title/dates of the documentation for the rural regional emissions analysis and the dates of the associated federal conformity determinations (for definitions of "exempt" projects, refer to the Conformity Regulations, 40 CFR 93.126-128).
- If no confirmation is provided, the FHWA/FTA should request such a confirmation.
- If considered necessary, the FHWA/FTA should directly refer to the appropriate conformity determination(s) for the area in question (i.e., current Plan and/or TIP or environmental document for projects in rural areas).
- No Federal approval of a STIP or STIP amendment can occur until conformity determinations are verified for projects in nonattainment/maintenance areas.

Financial Constraint

How does financial constraint apply to a STIP?

- The STIP must be financially constrained by year and funding category and include sufficient financial information to demonstrate which projects are to be implemented using current revenues and which projects are to be implemented using proposed revenue sources. [23 CFR 450.216(m)]
- In nonattainment and maintenance areas, projects included in the first two years of the current STIP/TIP shall be limited to those for which funds are available or committed. [23 CFR 450.216(m)]
- The STIP shall include financial information containing system-level estimates of costs and revenues sources that are reasonably expected to be available to adequately operate and maintain Federal-aid highways and public transportation. [23 CFR 450.216(m)]

[1] For the purpose of this document, the term "designated transit operators" denotes designated recipients, e.g. representatives of transit operators.

- In the case of proposed funding sources, strategies for ensuring their availability shall be identified. [23CFR 450.216(m)]
- In metropolitan areas, the MPO's transportation plan and TIP both must be financially constrained, so consistency between State, designated transit operators, and MPO funding estimates is important.
- In metropolitan areas classified by EPA as nonattainment or maintenance, projects included in the first two years of the TIP (which are placed in the STIP after the Governor's approval of the TIP) are limited to those for which funds are available or committed.
- To ensure consistency in financial planning, the State and designated transit operator should provide each MPO with estimates of Federal and State funding expected to be available over the period of the TIP and the plan. These financial targets are important because the State/designated transit operators control much of the transportation funding available throughout the State. The State/designated transit operators must, therefore, have a process for estimating expected revenues from all sources of funds over the time frame of the TIP/STIP.

Projects (type, source, description)

Where do STIP projects come from?

- STIP projects can come from many different sources:
  - Statewide and Metropolitan Long-range Transportation Plans
    - All projects must be consistent with these plans
    - All metropolitan major, FTA New Starts, and regionally significant projects must come from metropolitan (MPO) plans
  - Alternatives Analysis
  - Corridor and Feasibility Studies
  - System Plans: (e.g., Scenic Byways, Recreational Trails, and Highway System)
  - Management Systems (Pavement, Bridge, Safety, Congestion, Public Facilities, Intermodal, Maintenance, Transportation Assets)…
  - Discretionary Program – Congressional Earmarks
  - Transit Capital Improvement Program
  - Transit System Studies
  - Local Plans/Capital Improvement Programs (e.g., Toll authority, Transportation Authority, and County)
  - Safety (HSIP) and Hazard Elimination Plans
  - Strategic Highway Safety Plans (SHSP)
  - National Bridge Inventory (NBIS) Program
  - Tribal Indian Reservation Roads TIPs
  - Private proposals

What projects must be in a STIP?

- STIP must include a list of priority transportation projects proposed to be carried out in the first four years of the STIP.
  - TIP priorities will dictate STIP priorities for each individual metropolitan area.
  - As a minimum, the lists shall group the projects that are to be undertaken in each of the years, (e.g., Year 1,Year 2,Year 3,Year 4). [23 CFR 450.216(i)]
  -
- Contain all capital and non-capital transportation projects other than FTA-funded planning projects (including transportation enhancements, Federal lands highways projects, trails projects, pedestrian walkways, and bicycle transportation facilities), or identified phases of transportation projects, proposed for funding under Title 23 and the Federal Transit Act. [23 CFR 450.216(g)]

- Contain all regionally significant transportation projects requiring an action by the FHWA or the FTA **whether or not** the projects are to be funded with title 23, U.S.C. or Federal Transit Act funds. [23 CFR 450.216(h)]

What projects are not required to be in a STIP?

- Projects that do **not** need to be in the STIP include:
  - 23 USC 402 and 49 USC 31102 Safety Projects;
  - Metropolitan planning (PL) projects funded under 23 USC 104(f), 49 USC 5305(d), and 49 USC 5339;
  - State planning and research (SPR) projects funded under 23 USC 505 and 49 USC 5305(e) (Note: This does not include projects funded with NHS, STP and minimum allocation (MA) funds that the State and MPO for a metropolitan area agree should be in the TIP and consequently must be in the STIP);
  - Emergency relief (ER) projects (except those involving substantial functional, locational or capacity changes);
  - National planning and research projects funded under 49 USC 5314; and
  - Project management oversight projects funded under 49 USC 5327. [23 CFR 450.216(g)]

What project description information must be provided in a STIP?

- Include for each project the following information:
  - Sufficient descriptive material (e.g., type of work, termini, and length) to identify the project or phase;
  - Estimated total cost, or a project cost range, which may extend beyond the four years of the STIP;
  - The amount of Federal funds proposed to be obligated during each program year;
  - For the first year, the proposed category of Federal funds and source(s) of non-Federal funds;
  - For the second, third and fourth years, the likely category or possible categories of Federal funds and sources of non-Federal funds; and
  - Identification of the agencies responsible for carrying out the project or phase. [23 CFR 450.216(i)]

Do projects from other agencies' (e.g., DOD, FS, NPS, NHTSA, and BIA) need to be in the STIP?

- If these projects are funded in part with Title 23 and/or FTA funds; require FHWA or FTA approval for implementation; or have regional significance, they need to be in the STIP.
- If these projects are coordinated with and through Federal Lands Highway Division, they need to be part of the FLHD's program TIP and included without change into the STIP. [23 CFR 450.216(e)]

Project Selection Procedures

What is consultation?

- *Consultation* means that one or more parties confers with other identified parties in accordance with an established process and, prior to taking action(s), considers the views of the other parties and periodically informs those parties about action(s) taken. [23 CFR 450.104]

What is cooperation?

- *Cooperation* means that the parties involved in carrying out the transportation planning and programming processes work together to achieve a common goal or objective. [23 CFR 450.104]

What are project selection procedures?

- Project selection means the procedures followed by MPOs, States, and public transportation operators to advance projects from the first four years of an approved TIP and/or STIP to implementation, in accordance with agreed upon procedures. [23 CFR 450.104]
- The selection of projects for inclusion in the TIP and/or STIP is based upon a cooperative decision making process between the State, transit operator, and MPOs in metropolitan areas, and the State and local officials in non-metropolitan areas.
- In rural areas, transportation projects undertaken on the National Highway System with Title 23 funds and under the bridge and Interstate Maintenance programs shall be selected by the State in consultation with the affected local officials. Transit projects undertaken under Title 49, 5310 and 5311 shall be selected by the State in consultation with local officials. [23 CFR 450.220(c)]
- In metropolitan planning areas, transportation projects requiring title 23 or Federal Transit Act funds shall be selected with MPO's project selection procedures. [23 CFR 450.220(b)]
- Only projects included in the Federally approved STIP shall be eligible for funds administered by the FHWA or the FTA. [23 CFR 450.220(a)]
- Projects funded from Federal Transit Act funds shall be selected from the approved STIP by the State in consultation with the appropriate affected local officials and transit operators. [23 CFR 450.220(c)]
- The implementing agency (usually the State or a transit operator) is responsible for scheduling projects for implementation once included in the TIP and/or STIP.
- Other transportation projects undertaken with funds administered by the FHWA shall be selected by the State in cooperation with the affected local officials.
- The projects in the Year 1 of an approved STIP shall constitute an "agreed to" list of projects for future scheduling and implementation. [23 CFR 450.220(e)]
- If an implementing agency wishes to proceed with a project from Year 2 , Year 3 and/or Year 4 of the STIP, specific project selection procedures must be followed. Expedited selection procedures that advance projects from the Year 2, Year 3 and Year 4 of the STIP may be used if agreed to by all the parties involved in the selection. [23 CFR 450.220(e)]
- No further project selection action is required to proceed except that if available Federal funds are significantly less than the authorized amounts, or where there is significant shifting of projects among years, 23 CFR 450.330(a) provides for a revised list of "agreed to" projects to be developed upon the request of the State, MPO, or public transportation operator(s).

How do we know that the project selection process was used?

- At the time of submittal of the STIP or amendments thereto, the State shall certify that the transportation planning process is being carried out in accordance with all applicable requirements.
- Based upon knowledge and oversight of the process, FHWA/FTA will make a finding on the STIP or STIP amendment that the projects contained in the submittal are based on a planning process that meets or substantially meets the requirements of 23 USC, the Federal Transit Act, and 23 CFR 450.
- If any of the participants allege the process was not appropriately followed, FHWA and FTA will evaluate the process (or part thereof) to ensure its acceptability.

What is the significance of an "agreed to list"?

- The first year of both the STIP and TIP constitute the "agreed to list" of projects for project selection purposes. The inclusion of projects in the first year of the approved STIP shall be viewed as a firm commitment to advance these projects during the STIP year, unless unforeseen problems arise with specific projects.
- The regulations provide an opportunity to revisit project selection if actual financial resourses , including the highway obligation ceiling and transit appropriations, are significantly less than the

initially expected or authorized amounts. In such cases, if requested by the MPO, State or transit operator, a revised "agreed to list" of projects for project selection purposes must be developed.

Who has agreed to the list?

- For projects located within the metropolitan planning area, all MPO participants (locals, transit operator(s) and State) have agreed to the implementation of those projects in the first year of the TIP.
- For the non-metropolitan areas, all affected local officials with responsibility for transportation have been consulted through the rural consultation process and STIP development.

What is meant by subsequent scheduling and implementation?

- Even though projects have been placed on the "agreed to list" and may have been selected by a prioritized selection process for a specific category of funds, the implementing agency may advance the projects in any specific order throughout the year.
- The FHWA and FTA expect that all projects contained in the first year of the approved STIP will be initiated during the first year of the STIP.

What happens to projects in Year 1, if other projects are moved forward?

- The State, in cooperation with the MPO or non-metropolitan local officials, have either
  - Applied the project selection criteria, or
  - Agreed to procedures to advance a project from Year 2, Year 3 or Year 4 of the approved STIP.
- The advanced project is treated as if initially approved in Year 1 of the STIP.
- The State need not identify which projects are <u>not</u> proceeding forward from Year 1 at the current time.

What does this [project selection] require of USDOT?

- Understand and assure that
  - Project selection procedures for each category of funds have been applied
  - Expedited project selection criteria, if existing, have been followed in advancing projects to Year 1 of STIP.
- Projects proposed for advancement in the first four years are consistent in concept and scope as described in the metropolitan or statewide plan.
- First year of the STIP constitutes an "agreed to" list of projects, which the implementing agency may advance at anytime during the year.
- Projects in Years 2, 3 and 4 of the STIP may be advanced to the first year by applying regulatory project selection criteria or expedited procedures for second and third year projects if agreed to by all parties involved in the selection. There is no Federal approval of the STIP required for projects advanced from the second, third, or fourth years of the STIP. Refer to proceeding question.

What are the requirements for the selection of FLH projects?

- Federal lands highway projects shall be selected in accordance with 23 U.S.C. 204.
- FLHD has developed a long-range plan, and a program of projects (TIP). The program of projects is selected and prioritized based on the FLHD planning process.
- FLHD consults with the Federal agencies, and states concerning the projects selected for advancement. Once the project list is approved by the FLHD, the list is forwarded to the State for inclusion into the STIP. The TIP shall be included without change in the STIP, directly or by reference. [23 CFR 450.216(e)]

Division and Region Review and Approvals

How do I process the STIP approval?

- FHWA/FTA, in consultation with Federal lands agencies (where applicable) will review the STIP or amendment and jointly make a finding as to the extent the projects in the STIP are based on a planning process that meets or substantially meets the requirements of title 23, U.S.C., the Federal Transit Act and subparts A, B and C of 23 CFR Part 450. [23 CFR 450.218(b)]
- If FHWA /FTA jointly determine that the STIP or amendment meet the requirements of 23 U.S.C. 135, 49 USC 5304 and 23 CFR Part 450 (including subpart C where a metropolitan TIP is involved), they will approve the STIP.
- If an MOU/MOA between the FHWA Division Office and FTA Regional Office describes the process to act on a STIP or STIP amendment already exists, follow those procedures. If none exists, it is recommended that such a memorandum be developed.
- See *Attachment STIP-1* at the end of this chapter for more details on actions that need to be followed and items that need review.

How much time should FHWA/FTA field offices spend in reviewing and approving the STIP once it's received from the State?

- The amount of time needed to review the STIP prior to taking action depends on the agreement between the FHWA Division Office and FTA Regional Office that outlines the STIP approval process. FHWA/FTA field offices can and, in some cases, have developed MOU/MOA that details the STIP approval process and the submission/review timeframes (For more details, please refer to the Planning Collaboration Initiative [PCI]).
- The STIP review period should not take longer than 30 days, unless the submittal package is incomplete or has major problems. In which case, the FHWA Division Office and FTA Regional Office need to advise the state and corresponding MPOs, what corrective actions need to be taken before FHWA/FTA can take action.

What additional documents/assurances should accompany or be included in the STIP?

- The State shall certify that the transportation planning process is being carried out in accordance with all applicable requirements of (*see Attachment Finding –1*):

    - 23 U.S.C. 134 and 135, 49 U.S.C. 5303 –and 5304, and 23 CFR Part 450;
    - Title VI of the Civil Rights Act of 1964 as amended (42 USC 2000d-1) and 49 CFR part 21;
    - 49 USC 5332, prohibiting discrimination on the basis of race, color, creed, national origin, sex or age in employment or business opportunity;
    - Section 1001(b) of the SAFETEA-LU (Pub. L. 109-59) regarding the involvement of disadvantaged business enterprises in the FHWA and the FTA funded projects (see also 49 CFR Part 26);
    - 23 CFR part 230, regarding implementation of an equal employment opportunity program on Federal and Federal-aid highway construction contracts;
    - The provisions of the Americans with Disabilities Act of 1990 (42 USC 12101 *et seq.*) and USDOT regulations "Transportation for Individuals with Disabilities" (49 CFR Part 27 (*Nondiscrimination On The Basis Of Disability In Programs Or Activities Receiving Federal Financial Assistance*); 49 CFR Part 37 (*Transportation Services For Individuals With Disabilities (ADA)*); and 49 CFR Part 38 (*Americans With Disabilities Act (ADA) Accessibility Specifications For Transportation Vehicles*).

    - In States containing nonattainment and maintenance areas, sections 174 and 176 (c) and (d) of the Clean Air Act as amended (42 U.S.C. 7504, 7506 (c) and (d)), and 40 CFR Part 93;

- The Older Americans Act, as amended (42 USC 6101), prohibiting discrimination on the basis of age in programs or activities receiving Federal financial assistance;
- Section 324 of 23 USC, regarding prohibition of discrimination based on gender; and
- Section 504 of the Rehabilitation Act of 1973 (29 USC 794) and 49 CFR part 27 regarding discrimination against individuals with disabilities.

Who needs to sign the STIP and STIP amendment approval letter?

- Both the FHWA Division Office (Division Administrator) and FTA Regional Office (Regional Administrator) will sign the STIP and STIP amendment approval letter.
- The FHWA Division Administrator and the FTA Regional Administrator can formally delegate to others within their respective offices to sign STIP approval and amendment letters. The STIP approval delegation of authority within the FHWA Division Office needs to be specifically identified, documented in writing, kept current, and followed accordingly.
- The redelegation shall be to the Assistance Division Administration (ADA) or other leadership level such as the Planning Manager, and clearly prescribe to the position by official title, rather than the individual. STIP approvals shall only be made by the persons assigned to the positions specifically identified in the delegation of authority.

How do we decide which of these approval actions to take?

- Approval action will take one of the following forms, as appropriate:
  - Joint approval of the STIP;
  - Joint approval of the STIP subject to certain corrective actions being taken; or
  - Under special circumstances, joint approval of a partial STIP covering only a portion of the State. [23 CFR 450.218(b)]

What are acceptable corrective actions?

- Corrective actions are used when project(s) in the STIP do not currently meet all the STIP requirements, and further actions by the state, MPO(s), or project sponsor is needed to meet or complete the requirements.
- Corrective actions may include the following:
  - Projects had poor or no fiscal information. Projects may be approved and included in the STIP as soon as funding is assured, and fiscal constraint is determined.
  - Funding cannot be assured for specific phase of a project, and proposed innovative financing package is not yet completed. Projects can be amended into the STIP when the funding estimate and source are identified.
  - Projects in the STIP are not consistent or in the long-range transportation plan. Projects will be approved when the plan is amended.

When do certain categories get approved and others not?

- If FHWA/FTA jointly determine that the STIP or amendment does not substantially meet the requirements of 23 U.S.C. 135 and 23CFR 450.220 for any identified categories of projects, they will not approve the STIP. [23 CFR 450.218(b)]
- Congressionally earmarked projects may be conditionally approved subject to meeting all applicable planning and environmental requirements.

Why don't we just disapprove the STIP rather than choose one of the lesser approvals?

- We do not disapprove, as much as we have not taken action on the STIP.
- We review the STIP to determine if the document or any portion thereof meets the Federal requirements and can be partially approved.
- If the entire document is not acceptable and FHWA/FTA agrees not to take any action, the STIP package needs to be returned to the State with comments identifying the problems and corrective steps for future resubmittal.

What special circumstances result in approval of a partial STIP?

- Here are examples of special circumstances that may result in a partial STIP:
  - The rural portion of STIP or the metropolitan TIP could not meet the set STIP schedule, and other STIP portions were ready to be advanced for approval. The State requested partial approval for the advanced portion only.
  - The metropolitan TIPs did not have the conformity determination analysis completed yet, but the rural portion of the STIP was completed. The state requested FHWA/FTA's approval of STIP containing the rural projects.
  - The State did not have adequate public involvement procedures, which resulted in delaying the rural portion of the STIP. The MPO's TIPs had adequate public involvement, and met all the TIP requirements. The State was facing a lapsed STIP, and decided to forward the TIPs for partial STIP approval.
  - FLH projects could not meet the set STIP schedule.

When approving a partial version of any State submitted STIP approval request, how should we determine what partial approval to use?

- There are different types of partial approvals based on the following: geographical areas (e.g. MPO regions, State districts/regions, or rural region) specific categories of funds (e.g. NHS, STP, HBRR, or CMAQ) or specific categories of projects (e.g., Safety, Bridge Replacement, Transportation Enhancement, or Scenic Byways).
- In most cases for partial STIP approvals, the State will identify which portion of the STIP is ready to advance and request approval for only those portions of the STIP.
  -

How is the State notified of such actions? How do we ensure the notification to and from STIP partners?

- FHWA/FTA will notify the State, in writing, of the outcome of the FHWA/FTA review of the State's request for STIP or STIP amendment process.
- In metropolitan areas, the project sponsor/agency needs to regularly communicate appropriate project status information to the MPO.

What projects can advance even though FHWA/FTA have not taken any action on the STIP or portion of the STIP? Why are they exempt from the STIP?

- FTA and/or FHWA may approve operating assistance for specific projects or programs even though the projects or programs may not be included in an approved STIP. [23 CFR 450.218(d)]

Post STIP Approval

What role does the STIP play when projects come in to the Division and Regional Office for approval/authorization?

- Projects submitted to the Division/Region by the State for the obligation of funds or similar action should be checked against the projects listed in the STIP (includes projects submitted individually or grouped in a quarterly list of projects)
- Project budget and funding category, phase, scope, description, and other elements should be consistent with information contained in the STIP
  - "Grouped" projects may be checked against other information, (e.g., a list of those types of projects expected to be advanced during the life of the STIP provided by the State which may be revised every so often to reflect changes in priorities)
- If the project is not listed in the STIP or if the project budget, or description, is not consistent with what is contained in the STIP, do not allow the project to proceed.

    - Check with the State DOT to ensure the project information submitted is accurate.
- Depending upon the degree of any remaining discrepancies and any agreement with the State DOT and/or FTA that defines what project changes require FHWA/FTA action, the State may need to submit a STIP amendment before FHWA/FTA can allow the project to advance.

What happens when there are discrepancies between projects listed in the STIP and projects that are submitted to the Division for authorization to proceed or the Region for grant award?

- Discrepancies should raise several red flags.
- Ask whether the project proposed for authorization or grant approval is:
    - Consistent with the Statewide or Metropolitan Plan, as appropriate?
    - The same project (location, termini, major design features and mitigation) evaluated in the approved environmental document?
    - Able to be processed into the current STIP by an Administrative Modification?
    - If in a non-attainment or maintenance area (urban or rural), representative of the design concept and scope analyzed in the currently approved conformity determination?
- A negative response to any of these scenarios will require substantial follow-up to approve the authorization to proceed or to make a grant award.

Amendments

Can the STIP be amended?

- The STIP may be amended at any time under procedures agreed to by the cooperating partners. [23 CFR 450.216(o)]
- Projects in any of the first four years of the STIP may be moved to any other of the first four years of the STIP subject to the project selection requirements. [23 CFR 450.216(o)]

Are there different types of revisions to a STIP?

- Revisions can be categorized as:
    - Administrative Modifications
    - Amendments
- Definitions of different types of revisions should be developed jointly between FHWA, FTA, the State DOT, and MPOs and documented (this should be part of a STIP process MOU/MOA)
- Amendments would include: (1) Federally-funded, regionally significant projects where major budget, concept or scope changes, and (2) additions/deletions of projects to the STIP
- Administrative Modifications could include "grouped" projects as classified under 23 CFR 771.117(c) and/or 40 CFR Part 51 or limited changes to project information of a defined magnitude
- The respective protocols to process STIP revisions and highway/transit project only amendments should be defined by FHWA, FTA, the State DOT, and MPOs

What do I do with STIP revisions?

- This really depends on the type of STIP revision and whether there is an FHWA/FTA agreement (MOU/MOA) on how to process the STIP and STIP amendments.
    - If this is an Administrative Modification (see question on types of revisions), and the state is revising minor cost estimates, project description, or moving projects from Year 1 to latter years, no action may be required (per your MOU) and these are for your information only. Otherwise process the approval of the amendment.
    - If it is an Amendment, you need to determine and review the following:
        - Are new projects being added to the STIP?
        - Are these Year 2, Year 3 or Year 4 projects moving to Year 1? Have these projects been selected using the "expedited" project selection procedures?

- Are these projects in the pertinent long-range transportation plan?
- Is there sufficient funding for these projects?
- Does the addition or exclusion of these projects significantly impact the fiscal constraint determination? If yes, what projects were deleted to allow the new projects to advance as part of the amendment?
- In nonattainment and maintenance areas, were these projects part of the conformity analysis? Does it require a revised conformity determination?
- Have they gone through public involvement?

- If the FHWA/FTA MOU requires joint approval on amendments or there is not a MOU, the FHWA and FTA field offices will need to coordinate and possibly include EPA (if a revised conformity determination is required) before proceeding with processing the amendment.
- If your MOU allows FHWA or FTA unilateral approval of projects that do not impact the other mode, then proceed to process and approve the amendment in accordance with the MOU as appropriate.. Copies of the approvals should be provided to the other agency.
- Prepare a letter informing the State that the amendment (and the projects listed) is approved, and that they are now part of the current STIP.

Do FHWA/FTA have to approve every STIP amendment?

- All STIP amendments require joint approval by FHWA and FTA.

How often can a State submit a STIP or STIP amendments?

- The State may submit amendments at any time, as appropriate to keep the STIP information current and accurate.
- Many States bundle the Administrative Modifications together and submit them to FHWA and FTA monthly, bimonthly, or quarterly.

Resources

Is the State required to have an electronic STIP?

- The State is not required to develop an electronic STIP.
- However, some States have developed electronic STIPs to provide easy information to the general public through the Internet, to better access the information, and to manage workflow and the update of STIP information.

Where can I find the technical assistance and training resources on the STIP?

- Check the Transportation Planning Capacity Building website: www.planning.dot.gov or the FHWA Planning website: www.fhwa.dot.gov/planning.
- Attend training courses:
  - Statewide and Metropolitan Transportation Programming (NTI)
  - Introduction to Statewide Transportation Planning (NTI/NHI)
  - Other courses covering financial planning, metropolitan planning, air quality conformity, etc.
- Check the PCI website for examples of MOUs defining the STIP approval process for FHWA divisions and FTA regions (http://pci.volpe.dot.gov).
- Contact the FHWA (HQ) Office of Planning (HEPP) staff member designated as the STIP specialist or the designated "Planning Stewardship Liaison" for your -Division Office
- Contact the FTA (HQ) Office of Systems Planning, Planning Oversight Division
- Network with other division and Regional planners to find out how STIP process works in their respective States

Attachment STIP-1

STIP Review/Approval Process

Once the STIP is received from the State:

1. If the STIP contains projects from rural nonattainment/maintenance areas, send a copy(ies) to the EPA Regional Office counterpart.

2. Review STIP for
    a. Governor's (or official designee) approval;
    b. meeting requirements of 23 U.S.C. 134 and 135;
    c. consistency with Statewide Transportation Plan;
    d. public involvement procedures;
    e. air quality conformity requirements;
    f. fiscal constraint;
    g. inclusion of all Title 23 and Federal Transit Act projects;
    h. inclusion of /reference to all projects from TIPs; and
    i. inclusion of Federal Lands projects.

3. Coordinate and cooperate with the appropriate FTA Regional Office/FHWA Division Office on comments and findings.

4. Resolve any differences or discrepancies in FHWA and FTA review findings and questions concerning the STIP.

5. Take action only upon receipt of full STIP documentation, State and metropolitan certifications, including:
    - 23 U.S.C. 134 and 135, 49 U.S.C. 5303 –and 5304, and 23 CFR Part 450;
    - Title VI of the Civil Rights Act of 1964 as amended (42 USC 2000d-1) and 49 CFR part 21;
    - 49 USC 5332, prohibiting discrimination on the basis of race, color, creed, national origin, sex or age in employment or business opportunity;
    - Section 1001(b) of the SAFETEA-LU (Pub. L. 109-59) regarding the involvement of disadvantaged business enterprises in the FHWA and the FTA funded projects (see also 49 CFR Part 26);
    - 23 CFR part 230, regarding implementation of an equal employment opportunity program on Federal and Federal-aid highway construction contracts;
    - The provisions of the Americans with Disabilities Act of 1990 (42 USC 12101 *et seq.*) and USDOT regulations "Transportation for Individuals with Disabilities" (49 CFR Part 27 (*Nondiscrimination On The Basis Of Disability In Programs Or Activities Receiving Federal Financial Assistance*); 49 CFR Part 37 (*Transportation Services For Individuals With Disabilities (ADA)*); and 49 CFR Part 38 (*Americans With Disabilities Act (ADA) Accessibility Specifications For Transportation Vehicles*).
    - In States containing nonattainment and maintenance areas, sections 174 and 176 (c) and (d) of the Clean Air Act as amended (42 U.S.C. 7504, 7506 (c) and (d)), and 40 CFR Part 93;
    - The Older Americans Act, as amended (42 USC 6101), prohibiting discrimination on the basis of age in programs or activities receiving Federal financial assistance;
    - Section 324 of 23 USC, regarding prohibition of discrimination based on gender; and
    - Section 504 of the Rehabilitation Act of 1973 (29 USC 794) and 49 CFR part 27 regarding discrimination against individuals with disabilities.

6. Develop/sign joint FHWA/FTA approval letter, which should
    a. Find the STIP to be in compliance with 23 U.S.C. 134, 135, and 49 U.S.C. 5303 –and 5304
    b. Convey the acceptance of the joint State/MPO self-certifications of the urban transportation planning processes
    c. Approve the STIP for four years
    d. Provide any exceptions to the approval or other comments on the STIP.

7. Partial STIP approval is allowed.

8. Conditional project approval subject to funding availability (i.e., New Starts appropriations or other earmarks) is allowed.

9. Other procedures may apply, depending upon
    a. Procedures documented in FHWA/FTA STIP MOU/MOA
    b. Documented agreements with or between State DOT, MPOs, state air quality agencies, and/or EPA
    c. Internal state procedures
    d. Other extenuating circumstances

Inspection Report

U.S. Department of Transportation
Federal Highway Administration

DIVISION	REPORT NO.	DATE OF INSPECTION	DATE OF REPORT	STATE #
	1			FEDERAL #

DATE CONTRACT STARTED	COMPLETION DATE	OWNER ACCEPTANCE DATE	COUNTY

PROGRESS OF WORK	QUALITY OF WORK	FUNDS EXPENDED	TIME ELAPSED
Unsatisfactory☐ Satisfactory ☐	Unsatisfactory☐ Satisfactory ☐	%	%

PROJECT TITLE AND LOCATION

INSPECTOR(S)

☐ Process Review/Product Evaluation ☐ Inspection In-Depth ☐ Project ☐Final ☐Final Acceptance

Project Scope and Location:

Project Records and Inspection Observations:

Conclusion:

*The following is a list of items to be considered during a construction inspection. This list is not all inclusive and does not apply to all projects. Professional judgment is required by the inspector(s) to prioritize focus of inspection:

- Project Manager:
- Number of Inspectors/tester on site the day of inspection:
- Prime Contractor:
- Original Contract Work Days / Completion Date:
- Current Contract Work Days / Completion Date:
- Notice to Proceed:
- Work Started:
- Time Stopped:
- Work Days Charged:
- Original Contract Amount:
- Current Contract Amount:
- Total Contract Amount Paid to Date:
- Major executed Change Orders:
- Potential Change Orders:
- Contract DBE Goal:
- Contractor's DBE Commitment:
- DBE Goal and DBE % achieved:
- Training Hours goal and hours achieved:
- Payroll Wage and Fringe Benefits:
- EEO/Wage Rate Posters:
- Approved Sub-contractors and contract amount:
- Approved DBEs and contract amount:
- Prompt Progress Payment:
- Utilities and ROW:
- Storm Water Pollution Prevention Plan:
- Materials sampling, testing, acceptance:
- Materials Certification:
- Detours:
- Buy America Steel Certifications:
- Traffic Control:
- Pavement Markings:
- Change Orders:
- Seeding:
- Construction Quality:
- Construction Sequencing:
- Materials Storage:
- Compliance with PS&E:
- Incentive and Disincentive Validation and Payment:
- Railroad Release Letter
- Temporary Pedestrian and Bicycle Access:
- As-Built Plans

- Overruns and Under runs:
- Public Communication:
- Notice of Disputes/Claim Filed:
- Liquidated Damages Assessed:
- Payments Withheld:
- Environmental Commitment Tracking
- Accident History:
- Time Stopped:
- Final Inspection:
- Final Estimate:
- Punch list Furnished and Completed:
- Punch list completed

Project Final Acceptance and Closure
Full Oversight Projects

The process of closing a federal-aid construction project consists of a final acceptance report and fiscal closure within the Financial Management Information System (FMIS). The preparation of a final acceptance report, sometimes combined with a final inspection, is an important function of the Division Office. The final acceptance process will differ among FHWA Division Offices because of staffing levels, stewardship agreements, complexity, or perceived risk of differing projects and programs. Please refer to your STA and FHWA Division Office stewardship agreement (23 U.S.C. 106) for details concerning the responsibility and depth associated with the project final acceptance process and project closure.

Through the final acceptance process, the FHWA affirms that the project was constructed in accordance with the approved project plans, specifications, and estimate via the physical construction authorization requirements (23 CFR 635.309). In addition, the final acceptance process verifies that projects do not have outstanding claims, unfinished work, or other contract administration issues pending. Any unacceptable issues need to be corrected prior to the final closure of the project within FMIS. The FHWA Form-1446 should be used to document the final acceptance review. The appendix presents examples of check off lists that are used by various Division Offices to assist in the process.

When the project is not a FHWA full oversight project, as identified in the stewardship agreement, it is recommended that the project final acceptance be performed by the agency responsible for oversight. The stewardship agreement should contain guiding criteria as related to the level of review detail necessary by the oversight agency for final acceptance. The appendix presents examples of STA final acceptance review reports.

Timely closeout of projects reduces inactive obligations; thus, frees up funds for other valid obligations. Project closeout incorporates several interdependent actions including final acceptance, authorization/approval of the FMIS final voucher as described in the September 2006, Project Authorization Responsibility Policy Memo from the FHWA Chief Financial Officer (appendix), final payment, and federal records retention (appendix).

The final acceptance process ensures that projects do not have outstanding claims, unfinished work, quality, or other contract administration issues pending.

▪ Documentation Review

Various pieces of documentation are either required or recommended for closing out a federal-aid construction project. For full oversight projects, form FHWA 1446 (or equivalent) should be used to document the final acceptance process. The supporting documents/information must be included with the report whether it is stored electronically or physically in a paper file.

The appendix presents some example check sheets to assist in the final review of project documents. In addition, the following are some suggested documents to be reviewed in the final acceptance process to determine acceptability of the project:

Recommended documentation to review:

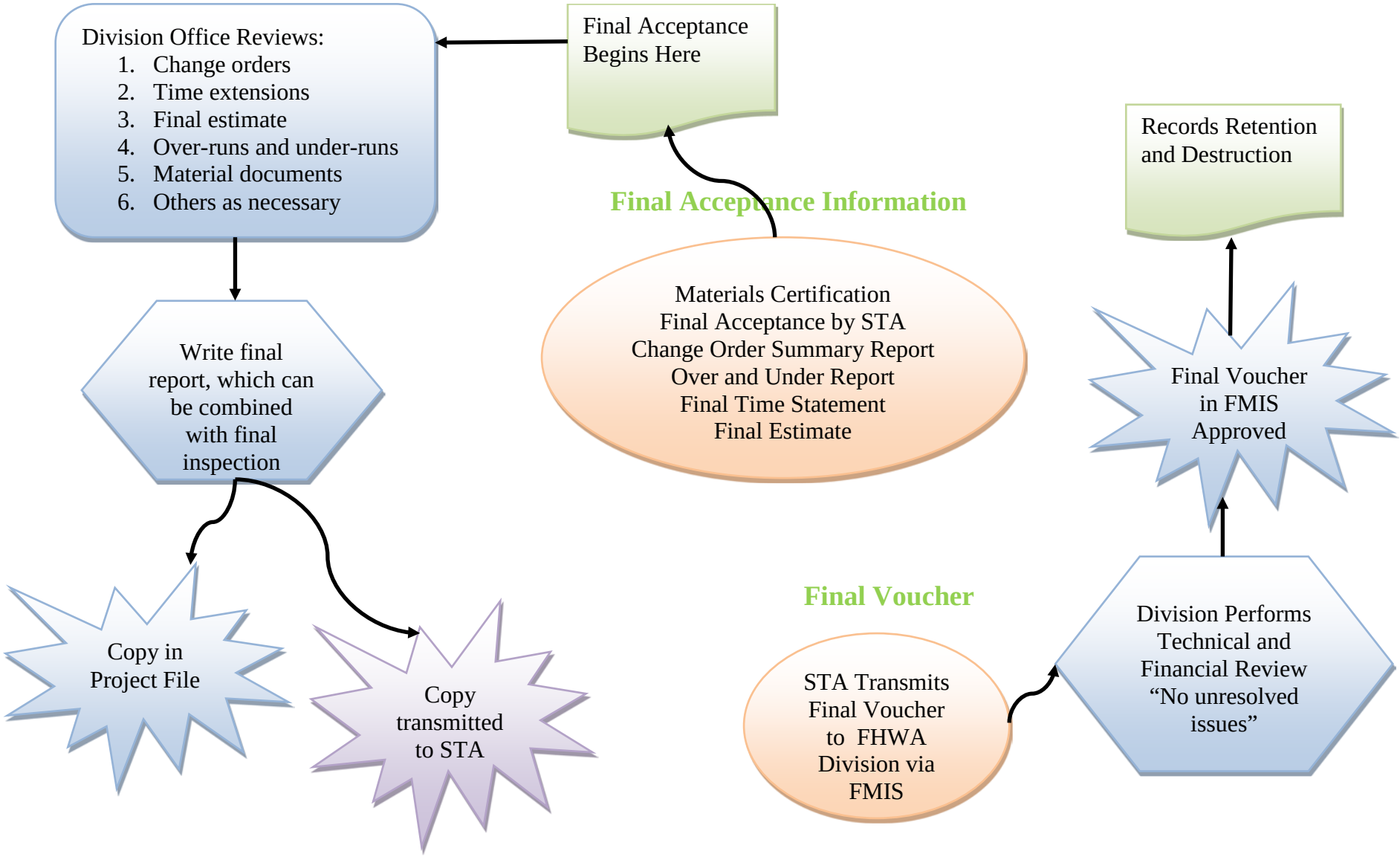
- Letter of acceptance from SHA to contractor
- Project documentation and correspondence between the SHA, prime contractor, subcontractor, and public.
- Total construction cost (i.e. Final Estimate) with the actual costs incurred and the project specific Federal-aid eligible amounts for the construction project. This consists of identifying non-participating items/amounts that may have been determined throughout the life of the project via any combination of decision documents. The primary documents would normally be:

  - Original authorization to advance project to construction between STA and FHWA (FMIS authorization agreements)
  - Project correspondence between STA and FHWA.
  - Materials certification (23CFR637.207(a)(3)).
  - Contract time analysis with assessment of liquidated damages (23 CFR 635.127(e)(2))
  - Claims, arbitration, and mediation decisions (23CFR 635.124)
  - Final Estimate (23 CFR 630.106(f)(3)) including approved change orders or contract modifications and over and under run report.
- Disadvantage business enterprise (DBE) usage summary
- Equal employment opportunity (EEO) interviews.
- Project construction journal.
- Previous FHWA or STA project inspection reports.
- Status of special project provisions or commitments included in the PS&E package approval such as:
  - Environmental commitments
  - Funding for continued FWS, COE, etc. studies
  - Warranties

Following the final inspection and the completion of the final acceptance process, the project may be closed within FMIS. It is recommended that all FHWA FMIS actions be accomplished via a combination of a technical and a financial review for approval within FMIS. It is required that all FMIS actions be performed by two different individuals. Once FMIS project closure actions are completed, project files should be cleaned per the project record retention requirements (appendix).

The follow figure visually presents the process described above.

Final Inspection / Acceptance Process
Full Oversight Projects



U.S. Department of Transportation
Federal Highway Administration

Federal Highway Administration

Area Engineer Manual

2010

This Area Engineer Manual is dedicated
in memory of
James Sorenson.
Senior Construction and System Preservation Engineer,
Federal Highway Administration.

It was his conviction, fortitude, and
commitment to excellence
that led to the development
of this manual and its distribution to field engineers.

Dear Colleague:

As the Nation's transportation infrastructure carries us through the 21st century, highway officials are struggling with the challenges of an ever-expanding, still-evolving, yet aging highway network. State and local highway agencies are faced with increasingly complex project management issues that require special skills and significant attention to detail for safe and efficient project implementation. The demands on our Nation's highways are greater than ever, and they will continue to grow in future years. With this increasing demand comes the expectation of a higher standard of performance.

As stewards of the public funds invested in highways, the Federal Highway Administration (FHWA) plays a critical role in ensuring that our Nation's future highway demands are met. The active involvement of the FHWA field engineer is essential for continuous quality improvement, promotion of innovation and new technology, and providing value-added technical support. Our Federal-aid highway projects must deliver quality products that meet scope and commitment requirements are delivered on time and within budget; and are constructed in a safe manner. In order for the FHWA to continue to meet its growing construction stewardship responsibilities, the FHWA field engineer (whether he/she is focused on an air quality, bridge, environmental, operations, pavement, planning, safety, or structural improvement project) must continually find effective ways of conducting business. This presents a tremendous challenge.

Over the years the role of the FHWA division office engineering staff has continued to evolve. Today, our field engineers are typically involved in a diverse array of issues that were not common in the Federal-aid program of decades past. The FHWA field engineer's duty is now increasingly one of forging State, local and industry partnerships that are customer-driven, and quality and technology conscious, while also providing the necessary oversight needed to ensure accountability.

This *Area Engineer Manual* highlights the FHWA field engineer's role in construction stewardship and in assisting the States in delivering a quality construction program. The document provides specific details and tips for effective construction program management and it offers an excellent tool for adding value, enhancing technical expertise, and maintaining accountability. I encourage you to become familiar with this manual, and use it as a reference as you undertake your construction stewardship responsibilities.

More than $1.75 trillion dollars has been invested in our Nation's highway system. Effective management of our highway investment is essential for ensuring the public's trust and confidence in our ability to be good stewards of the resources entrusted to us. While this effort presents a challenge, we can meet it. It's simply good business. It's what our customers want and deserve.

King W. Gee
Associate Administrator
for Infrastructure

Table of Contents

Section *Page*

INTRODUCTION 1

THE FEDERAL-AID HIGHWAY PROGRAM: A GENERAL PERSPECTIVE 2
- Stewardship and Oversight Agreement 3
- Delegation of Authority 3
- Federal-aid Highway Program Funding 4

PLANNING, ENVIRONMENT, AND RIGHT-OF-WAY 5
- Planning 5
  - Highway Performance Monitoring System (HPMS) 5
  - Intelligent Transportation Systems Regional/Statewide Architecture 5
  - Metropolitan Planning Organizations (MPO) 6
  - National Highway System (NHS) 6
  - Plans and Programs 7
  - Role of the State DOT in Planning 8
- Environment 8
  - FHWA and NEPA 8
  - NEPA (National Environmental Policy Act) 10
    - Categorical Exclusion (CE or CATEX)
    - Environmental Assessment (EA) and Finding of No Significant Impacts (FONSI)
      - Environmental Assessment
      - Finding of No Significant Impact (FONSI)
    - Environmental Impact Statements (EIS) and Record of Decision (ROD)
      - Environmental Impact Statements (EIS)
      - Record of Decision (ROD)
    - Clean Air Act Amendments of 1990 (CAAA)
    - Environmental Justice (EJ)
  - Noise 16
  - Section 4(f) 17
  - Section 6(f) of the Land and Water Conservation Fund Act 19
  - Section 7 of Endangered Species Act (ESA) of 1973 19
  - Section 106 of the National Historic Preservation Act (NHPA) of 1966 19
  - Section 404 of the Clean Water Act (CWA) 20
- Right-of-Way (ROW) 21
  - Early Acquisition 21
  - Railroads 22
  - Uniform Relocation Assistance & Real Property Acquisition Policies Act of 1970 22
  - Utilities Rights-of-Way 23

MAJOR PROJECTS 23

DESIGN-BUILD 24

Section *Page*

DESIGN 25

Design Standards 25
Design Exceptions 26
Americans with Disabilities Act (ADA) of 1990 27
Bridges 28
Consultant Management and Use of Consultants 28
Context Sensitive Solutions (CSS) 29
Environmental Mitigation and Commitments 30
Intelligent Transportation Systems (ITS) 30
- ITS Standards 31
- ITS Systems Engineering 32

Interstate Access Requests/Interstate Justification Report (IJR) 33
Pavement Design 34
Reviews 34
- Constructability 34
- Design 36
  - Initial field
  - Intermediate
  - Semi-final
  - Final

Road Safety Audits 37
Roadside Hardware 37
Traffic Analysis 37
Traffic Control Devices on Federal-aid Projects 38
Value Engineering (VE) 39
Work Zone Traffic Management 40

PRECONSTRUCTION (PS&E APPROVAL, ADVERTISING, AND AWARD) 41

Plans, Specifications, and Estimates (PS&E) 41
- Plans 41
- Specifications 41
  - Standard Specifications
  - Supplemental Specifications
  - Special Provisions (SP)
  - Civil Rights
    - Disadvantaged Business Enterprise
    - On the Job Training
  - Contract Provisions
    - FHWA 1273
    - Buy America and Buy American
    - Changed Condition Clauses
    - Incentives/Disincentives (I/D)
    - Partnering

Section *Page*

- Patented and Proprietary Products
- Price Adjustments
- Public Interest Findings

o Engineers Estimate
o ROW Clearances

Project Authorization and Project Agreements 51
- Pre-qualification 52
- Advertising for Bids 53
- Conditional Approvals 53
- Pre-bid Meetings 54
- Bid Analysis and Concurrence in Award 54

Innovative Contracting 55
State Contracting Procedures 56

CONSTRUCTION 56
Construction Management Systems 56
Construction Quality Assurance Program 56
Construction Monitoring Program 57
Design-Build Division Office Responsibilities 58
Inspections 58
- Initial 59
- Intermediate 59
- In-depth 59
- Final 59
- Special Reports 59
- Process Reviews 60

Report Distribution 60
- Frequency of Reviews

Project Meetings 60
Role in Field Oversight 61
Work Zone Reviews 63
Final Acceptance 64
- Final Acceptance Criteria

CONTRACT ADMINISTRATION 65
Assigning Risk 65
Change Orders 65
Claims Avoidance/Dispute Resolution 67
Contractor Claims 68
Critical Path Method (CPM) 68
Errors and Omissions 69
Freedom of Information Act 70
General Project Management 71
- Intelligent Transportation Systems/Systems Engineering Management Plan 71

Liquidated Damages 72
Notice of Noncompliance 72

Section *Page*

Plan Revisions (during construction) 73
Project Acceleration of a Contract 73
Suspension and Debarment 73
Suspension of Work 74
Time Extensions 74
Value Engineering Change Proposals 75

MAINTENANCE 76
23 USC Section 116 Maintenance 76
Outdoor Advertising 76
System Preservation 76

Appendix A – Contacts 78
FHWA, Local, and National
Sample State Contacts Map

Appendix B – References 80
Construction Program Management & Inspection Guide 80
Contract Administration Core Curriculum Manual 80
Federal Reference Links 80
- Legislation, Regulations and Guidance
- FHWA Directives and Policy Memorandums
  - Federal-aid Policy Guide (regulatory and non-regulatory), FHWA Technical Advisories, FHWA Orders, FHWA Notices, and Stewardship Portal

FOIA 80
Major Projects 80
FHWA Policy Memorandums 80

Appendix C – Correspondence & Other Samples 88
Correspondence
Division office correspondence/memos
- Request for Approval of Public Interest Finding (PIF) 89
- ARRA Conditional Authorization to Advertise Letter 90
- Authorization to Advertise 91
- Conditional Approval to Bid Letter 92
- Concurrent/Final Settlement Offer Letter 94
- Memo Recommending Concurrence in Final Offer 96

Other Samples
- Sample inspection report ***http://www.fhwa.dot.gov/construction/cpmi04gc.cfm***
- Sample Inspection In-Depth report outlines 98
  - *Generic Construction Related Review Guidelines* ***http://www.fhwa.dot.gov/construction/reviews***
- Standard Operating Procedure for the FHWA Change Order and Claims Approval Process - FHWA Ohio Division Engineering & Operations Team 103

Section *Page*

Appendix D – FHWA Checklists 108

Pre-Award

- o PS&E Approvals ***http://www.fhwa.dot.gov/construction/cqit/pse.cfm***
- o PS&E Checklist 109

Post-Award

- o Deck Placement Checklist 111
- o In-Depth Inspection Checklist 113
- o Bridge Deck Rebar Checklist 114
- o Change Order Participant Checklist 115

Appendix E – Construction QA Program Requirements 116

- Construction Quality Assurance Program Requirements August 2009

Appendix F – FHWA Forms & Sample Reports 120

- Record of Prior Approval for Major Contract Change Order 121
- ACTIVE CONSTRUCTION UTILITY AGREEMENT 122
  (Unforeseen Utility Relocation Documentation Form)
- Form PR-2 (Rev.1-84) - Federal-aid Project Agreement 123
- Form FHWA 1446A (Rev.10-89) - CONSTRUCTION INSPECTION REPORT 127
- Form FHWA 1446B (Rev. 3-90) - FINAL ACCEPTANCE REPORT 129
- Sample inspection report – California Version 130
- Sample inspection in-depth report outlines ***http://www.fhwa.dot.gov/construction/reviews***

* FHWA electronic forms (can be found on-line in INFORMS)

Appendix G – Acronyms 136

Appendix H – Definitions 141

Acknowledgements

FHWA Area Engineer Manual

INTRODUCTION

This Field Manual is intended to provide "cradle-to-grave" related actions and information for field staff (e.g., Area Engineers, Transportation Engineers, Highway Engineers,) working in the Federal Highway Administration (FHWA) division offices to assist in administering the Federal-aid Highway Program as it pertains to highway project development and construction related activities. The Federal-aid Highway Program provides Federal financial resources and technical assistance to State and local governments for constructing, preserving, and improving the National Highway System (NHS), a road network containing more than 163,000 miles of roads. The NHS comprises only 4 percent of the Nation's total road mileage, but carries approximately 45 percent of the nation's highway traffic. The program also provides resources for one million additional miles of urban and rural roads that are not on the System, but that are eligible for Federal-aid.

This document provides a general introduction to various aspects of project stewardship for the FHWA Area Engineer. It is intended as a guide to assist in attaining more uniform oversight practices across division offices, however, it is not meant to be all-inclusive. The expectation is that each division office will expand, at their discretion, in the areas of this manual that need to be adapted for use in each office that will meet division-specific requirements. Each office will need to check their division-specific standard operating procedures (SOP) and elements of their Stewardship and Oversight Agreement.

For clarification purposes, cradle-to-grave activities include: planning, environmental studies (reviews), right-of-way, design, construction, maintenance (system preservation), and operations. Generally this process can also be broken down into pre-award and post-award activities. Pre-award includes planning, environmental studies (reviews), right-of-way, and design, while post-award includes construction, contract administration, and maintenance (system preservation) and operations. Construction management doesn't just begin when the contract is awarded, but when the project is first initiated in the planning and environmental stages.

This manual provides:

- A clearinghouse for division office procedures and sound business practices, and encourages division offices to maintain uniformity in their procedures;
- Discussion on why certain processes are important;
- Present-day/working examples for construction and system preservation activities;
- Documents, or links to documents, for key construction-related activities, such as change order procedures or public interest findings (PIFs); and
- Details for how to approach construction program management work duties.

Other resources available to the FHWA Area Engineer include the *Construction Program Guide* located on the Web at: ***http://www.fhwa.dot.gov/construction/cgit/***, the *Contract Administration Core Curriculum Manual and Guide* ***http://www.fhwa.dot.gov/programadmin/contracts/coretoc.cfm***, and the *Construction Program Management and Inspection Guide* ***http://www.fhwa.dot.gov/construction/cpmi04tc.cfm***.

All of these resources are intended to provide fast, easy access to Federal-aid construction program regulations, policy, guidance, and training. All construction-related information is consolidated under key subject areas, with links to related information. The *Construction Program Guide* website provides a consolidated source for Federal and State construction personnel to find updated information about the FHWA's construction program.

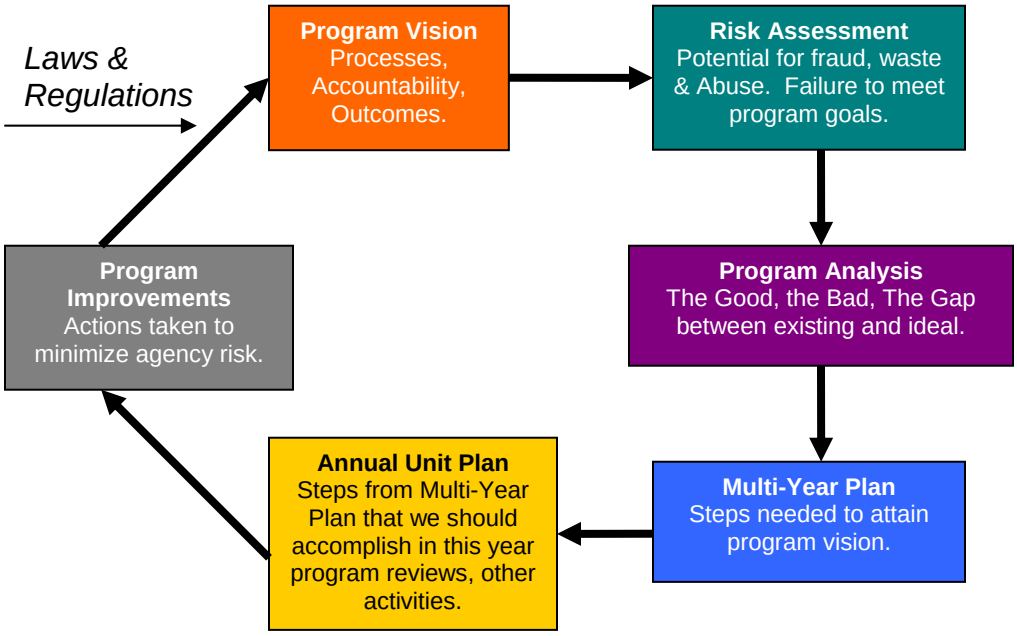
THE FEDERAL-AID HIGHWAY PROGRAM: A GENERAL PERSPECTIVE

The ability of a small group of Federal Highway Administration (FHWA) personnel to provide oversight to the entire Federal-aid Highway Program within a State necessitates a strategy for focusing resources where they may be most productive. Also, under various laws and regulations, some responsibilities cannot be assigned to State or local agencies, and must be carried out by division office personnel. The responsibilities transferred to the State highway agency (SHA) are clarified in a Stewardship and Oversight Agreement.

Although responsibility is transferred to the SHA, the FHWA is ultimately accountable for the Federal-aid program. In managing the Federal-aid Highway Program, each division office is required to perform an annual risk assessment to identify those areas in the program with the greatest risk. ***Risk*** is defined as the product of the likelihood and the severity of a problem being realized. The FHWA engineer should actively participate in the annual risk assessment to ensure that risks are accurately identified for the programs over which they provide oversight. The Area Engineer's role is to work with the SHA as a partner, but also be able to separate and remain objective in delivering the Federal-aid Highway Program, i.e., to trust but verify.

The FHWA's Vision is "Our Agency and our Transportation System are the Best in the World" and the FHWA's Mission is to "Improve Mobility on our Nation's Highways through National Leadership, Innovation and Program Delivery." How we accomplish the FHWA Vision and Mission is through program administration.

Figure 1. *Flow Chart for Addressing a Program Vision.*



Stewardship and Oversight Agreement

Section 106 of Title 23, United States Code, requires the FHWA and the State to enter into an agreement documenting the extent to which the State assumes the responsibilities of the FHWA under Title 23. Each FHWA division office and SHA develop and implement a Stewardship and Oversight Agreement to formalize these delegated responsibilities and agreements to address how the Federal-aid Highway Program will be administered in the State.

These agreements are specific to each State, so it is important that you are familiar with the agreement in your State and to recognize and respect the differences as you work in different States.

The SHAs have been given the authority by legislation to transfer Federal-aid Highway Program funds to local public agencies (LPA) to perform work. Under existing statutes and regulations, the SHA is responsible for ensuring that all Federal-aid projects are carried out in accordance with Federal requirements. This responsibility was clarified in 23 U.S.C. 106, as amended by Section 1904(a)) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU, Public Law 109-59). This amendment to Section 106 specifically charges the States with the responsibility for determining whether sub-recipients of Federal funds (including LPAs) have adequate project delivery systems for projects and sufficient accounting controls to properly manage Federal funds. As the recipient of Federal-aid funds, the SHA may not delegate this responsibility and the SHA is ultimately accountable for ensuring that Federal requirements are met for all LPA-administered Federal-aid projects.

References:

- Stewardship and Oversight website
  http://www.fhwa.dot.gov/infrastructure/stewardship/
- Office of Program Administration website
  http://intra.fhwa.dot.gov/programadmin/stewardship/
- Stewardship Portal ***http://rc.fhwa.dot.gov/stewardshipportal/***
  Includes a listing various Division Stewardship Agreements
- LPA – HQ's Local Public Agency website
  http://intra.fhwa.dot.gov/programadmin/localovr.cfm
- *Construction Program Management and Inspection Guide and Workshops memo dated April 11, 2006* ***http://www.fhwa.dot.gov/construction/041106.cfm***

> ***AE Heads-Up*****:** *Most States have some form of an LPA program. Some division offices and SHAs have developed manuals to assist in the administration of LPA projects utilizing Federal-aid. You should familiarize yourself with your State program or manual and know the SHA and your responsibilities.*

Delegation of Authority

Two areas of law: Title 23, United States Code (23 U.S.C.), Regulatory requirements; and Title 23, Highways, of the Code of Federal Regulations (23 CFR), give approval authority to the Secretary of Transportation. An FHWA Order (M1100.1A *FHWA Delegations and Organization Manual*) delegates much of the approval authority to the Division Administrator.

***AE Heads-Up*:** All division office's have a Delegation of Authority document. You should familiarize yourself with your division office's Delegation of Authority document.

Federal-aid Highway Program Funding

Federal-aid Highway Program funds are authorized by the U.S. Congress to assist the States in providing for construction, reconstruction, and improvement of highways and bridges on eligible Federal-aid highway routes and for other special purpose programs and projects. Through the Federal Lands Highway Program, funding is provided for improving access to and within National Forests, National Parks, Indian Lands and other public lands. The principal statutes establishing the Federal-aid Highway Program are found in Title 23, United States Code (23 U.S.C.). Regulatory requirements are generally found in Title 23, Highways, of the Code of Federal Regulations (23 CFR).

The Federal-aid Highway Program has a variety of eligibility criteria in which the Highway Trust Fund is the main source of funding and the Federal-aid highway system is the main transportation routes. The FHWA program funding covers a variety of areas, including Interstate maintenance, bridges, National Highway System, and safety. Each of these funding categories has specific eligibility requirements that must be followed.

The Federal-aid Highway Program was designed to be a jointly administered and funded program between the FHWA and the State DOTs. With few exceptions, the FHWA does not provide full funding. Each funding category has an established funding ratio, called *pro-rata*, which defines the Federal share of the project cost. The remaining funding comes from the State or local agency. State and local funds may come from a variety of sources including state and local taxes, toll credits, private donations, fair market value of any donated right-of-way for the project, and in some cases, may include Federal funds from another agency when permitted by that agency.

While the Federal-aid Highway Program is legally known as a "grant program," no funds are actually disbursed at the time of project authorization. It is operated as a reimbursable program, in that Federal-aid projects are authorized, funds are obligated, and then the FHWA reimburses the State for actual costs as they are incurred. Typically the billing and reimbursement are done electronically. Usually the U.S. Treasury credits the State's account within 3 days after the State submits a voucher to the FHWA division office and the division then enters and approves it in the Federal Management Information System (FMIS).

For the Area Engineer, there are three phases of funding authorization which you must be familiar with:

1. **Preliminary Engineering** (PE), which includes those activities needed to complete Planning, Environment, and Design;
2. **Right-of-Way** (ROW), which includes the activities necessary to obtain/clear ROW; and
3. **Construction**, which begins at the point the project is authorized for advertisement/bidding and continues through the project until the work is finished and the final voucher is processed.

It is important that you ensure that each phase is authorized prior to the beginning of any work. The date that project funds are eligible to be incurred on a project is the date which the division office authorizes funds (not the date the SHA submits for authorization) in the FHWA FMIS.

References:

- *A Guide to Federal-aid Programs and Projects* ***http://www.fhwa.dot.gov/federalaid/projects.cfm***
- Financing Federal-aid Highways website ***http://www.fhwa.dot.gov/reports/financingfederalaid/index.htm***
- *Highway Trust Fund Primer* ***http://www.fhwa.dot.gov/policy/primer98.pdf***
- *Federal-aid 101 Course (NHI Course No. FHWA-NHI-310109).* Course description available at ***http://www.nhi.fhwa.dot.gov/***

AE Heads-Up: *For questions on eligibility and specific Federal-aid programs, please see A Guide To Federal-Aid Programs And Projects (**http://www.fhwa.dot.gov/federalaid/projects.cfm**).*

PLANNING, ENVIRONMENT, AND RIGHT-OF-WAY

Planning

▪ Highway Performance Monitoring System

The Highway Performance Monitoring System (HPMS) provides data that reflects the extent, condition, performance, use, and operating characteristics of the Nation's highways. It includes limited data on all public roads, more detailed data for a sample of the arterial and collector functional systems, and certain statewide summary information. The HPMS data form the basis of the analyses that support the biennial Condition and Performance Reports to the U.S. Congress, and are used for apportioning Federal-aid funds back to the States. The Administration extensively uses pavement condition data, congestion-related data, and traffic data used to determine fatality and injury rates to measure the FHWA's and the State's progress in meeting performance objectives.

By November 1st of each year, all of the FHWA division offices must provide the results of an annual review of their State's HPMS program to FHWA Headquarters including a certification that the State's public road mileage data, vehicle miles traveled (VMT), and lane mile data are valid and suitable for use in apportionment of Federal-aid highway funds.

▪ Intelligent Transportation Systems Regional/Statewide Architecture

Federal regulations 23 CFR, Parts 655 and 940, Intelligent Transportation System (ITS) Architecture and Standards; *Final Rule* now requires that any project that includes ITS (such as traffic signals, dynamic message signs), funded with the Highway Trust Fund to conform to the Regional ITS Architecture and Standards be guided by a regional architecture with geographic boundaries defined by stakeholder needs; and use systems engineering analysis on a scale commensurate with the project scope.

You should be familiar with these plans and how planning can impact the overall project development process and funding.

AE Heads-Up: *For questions on ITS Architecture, systems engineering, or standards please see **www.ops.fhwa.dot.gov/int_its_deployment/index.htm***

▪ Metropolitan Planning Organizations

In the planning area, the division office may have to coordinate with the SHA planning section and the metropolitan planning organization (MPO). The MPO is a regional policy body, required in urbanized areas with populations over 50,000, and designated by local officials and the Governor of the State. These MPOs are responsible for coordination with their State DOT and other transportation providers in their regions for carrying out the metropolitan transportation planning requirements of Federal highway and transit legislation. The MPO is formed in cooperation with the State and develops transportation plans and programs for their metropolitan area.

▪ National Highway System

The National Highway System (NHS) is approximately 163,000 miles of roadway important to the Nation's economy, defense, and mobility. The U.S. Department of Transportation (DOT), in cooperation with the States, local officials and MPOs, determined the roadways that are included as part of the NHS. The NHS includes the following subsystems of roadways (note that a specific highway route may be on more than one subsystem:

- **Interstate:** The Eisenhower Interstate System of highways retains its separate identity within the NHS.
- **Other Principal Arterials:** These are highways in rural and urban areas which provide access between an arterial and a major port, airport, public transportation facility, or other intermodal transportation facility.
- **Strategic Highway Network (STRAHNET):** This is a network of highways which are important to the United States' strategic defense policy and which provide defense access, continuity and emergency capabilities for defense purposes.
- **Major Strategic Highway Network Connectors:** These are highways which provide access between major military installations and highways which are part of the Strategic Highway Network.
- **Intermodal Connectors:** These highways provide access between major intermodal facilities and the other four subsystems making up the NHS. A listing of all official NHS Intermodal Connectors is available at the FHWA Planning webpage ***http://www.fhwa.dot.gov/planning/nhs/intermodalconnectors/index.html***

To determine eligibility of the routes and projects, you should reference *A Guide to Federal-aid Programs and Projects* at: ***http://www.fhwa.dot.gov/federalaid/projects.cfm,*** review your State NHS map (*See:* ***http://www. fhwa.dot.gov/planning/nhs/index.html***, scroll down on page)**,** and work with your division office Planner.

▪ Plans and Programs

Planning is a comprehensive process used to arrive at transportation decisions. These decisions need to balance the public's need for transportation mobility with the environment, land use, development, safety, and security. Transportation planners undertake a comprehensive analysis and evaluation of the potential impact of transportation plans and programs while addressing the aspirations and concerns of the society served by these plans and programs. Incorporating public input and involvement at each stage of the process, planners examine past, present, and prospective trends and issues associated with the demand for the movement of people, goods, and information at local, rural, tribal, metropolitan, statewide, national, and international levels.

The primary planning documents that you should be familiar with include:

- **Transportation Improvement Program (TIP)** - A document prepared by an MPO that lists projects to be funded with FHWA/Federal Transit Administration (FTA) funds for the near term. This duration varies from region to region, but generally is for a 1- to 6-year time frame, though Federal regulations require it to be updated at least every 4 years. **The FHWA may not authorize funding for a project unless it is contained in the TIP.**

- **Statewide Transportation Improvement Program (STIP)** - A staged, multi-year, statewide, fiscally constrained, intermodal program of transportation projects, consistent with the statewide transportation plan and planning processes as well as metropolitan plans, TIPs, and processes. The STIP must be approved by the FHWA and the FTA. **The FHWA may not authorize funding for a project unless it is contained in the STIP.**

- **Long Range Transportation Plan (LRTP)** - A document resulting from regional or statewide collaboration and consensus on a region or State's transportation system, and serving as the defining vision for the region's or State's transportation systems and services. In metropolitan areas, the plan indicates all of the transportation improvements scheduled for funding over the next 20 years, must be fiscally constrained, and must be updated at least every 4 years.

- **Intelligent Transportation Systems (ITS) Regional and Statewide Architecture –** A document that provides a common framework for planning, defining, and integrating intelligent transportation systems. It is a mature product that reflects the contributions of a broad cross-section of the ITS community (transportation practitioners, systems engineers, system developers, technology specialists, consultants, etc.). ITS/technology projects that will be included in the STIP or TIP must be identified in the Statewide or Regional ITS Architecture prior to inclusion. The architecture defines:
  - The functions (e.g., gather or disseminating traffic information, controlling traffic, etc) that are required for ITS.
  - The physical devices or subsystems that perform the functions (e.g., in the field, a traffic management center or in the vehicle).
  - The information being exchanged between systems and how they are physically connected.

As these programs and plans are developed, they should take into account future transportation needs such as capacity while also taking into consideration potential effects on safety and operations of the roadway facilities. The traffic modeling developed with the LRTP is the basis for justification for new interstate access, increases in capacity, and other project considerations through design.

The metropolitan LRTP, TIP, and STIP must be fiscally constrained. This requires a demonstration of sufficient funds (Federal, State, local, and private) to implement proposed transportation system improvements, as well as to operate and maintain the entire system, through the comparison of revenues and costs.

If your State has Environmental Protection Agency (EPA) designated air quality non-attainment areas, the LRTP, TIP, and STIP will also address air quality conformity. The projects and programs contained in the LRTP, TIP, and STIP must “conform” to the State’s plans for bringing those areas back into attainment of the air quality standards. Coordination with the SHA, MPO, Federal Transit Administration (FTA), the State air quality agency, and the EPA will be required to determine whether the plan and program are in conformity, though it is the FHWA and the FTA that jointly make the formal determination. There are certain funds that have been setup to address air quality issues, namely the Congestion Mitigation & Air Quality Improvement Program (CMAQ), which is available to non-attainment areas, and directs funding to projects that contribute to meeting national air quality standards.

▪ Role of the State DOT in Planning

State DOTs conduct the entire planning process for those areas of the State that lie outside of MPO boundaries, in consultation with local elected officials. They also coordinate the process among the various MPOs within the State. The State DOTs also conduct planning for the NHS throughout the State, and collect and maintain data about the statewide transportation system including HPMS.

References:

- FHWA Planning website ***http://www.fhwa.dot.gov/planning/index.htm***
- National ITS Architecture website ***http://www.its.dot.gov/exit/iteris_arch.htm?link=http://www.iteris.com/itsarch/***

Environment

Transportation planning and project development must reflect the desires of communities, and take into account the impacts on both the natural and human environments. Transportation projects are closely looked at to see how they might impact the community, the natural environment, and our health and welfare. Before any project can move forward to construction, the FHWA must address and comply with laws related to the environment. These laws cover social, economic, and environmental concerns ranging from community cohesion to threatened and endangered species. The National Environmental Policy Act (NEPA) directs and explains the process of evaluating impacts associated with each individual project.

▪ FHWA and NEPA

NEPA requires, to the fullest extent possible, that the policies, regulations and laws of the Federal Government be interpreted and administered in accordance with its environmental protection goals. NEPA also requires Federal agencies to use an interdisciplinary approach in planning and decision making for any action that adversely impacts the environment. The SHA develops NEPA documents as defined in the Stewardship and Oversight Agreement. You should be aware of your responsibilities as an Area Engineer in the NEPA process and coordinate with your division office Environmental Specialist.

NEPA requires, and the FHWA is committed to, the identification and avoidance of potential impacts to the social and natural environment when considering approval of proposed transportation projects. In addition to evaluating the potential environmental effects, we must also take into account the transportation needs of the public in reaching a decision that is in the best overall public interest. The FHWA NEPA project development process is an approach to balanced transportation decision making that takes into account both the potential impacts on the human and natural environment and the public's need for safe and efficient transportation. One way to minimize potential impacts is to incorporate Context Sensitive Solutions (CSS) methods in the design process.

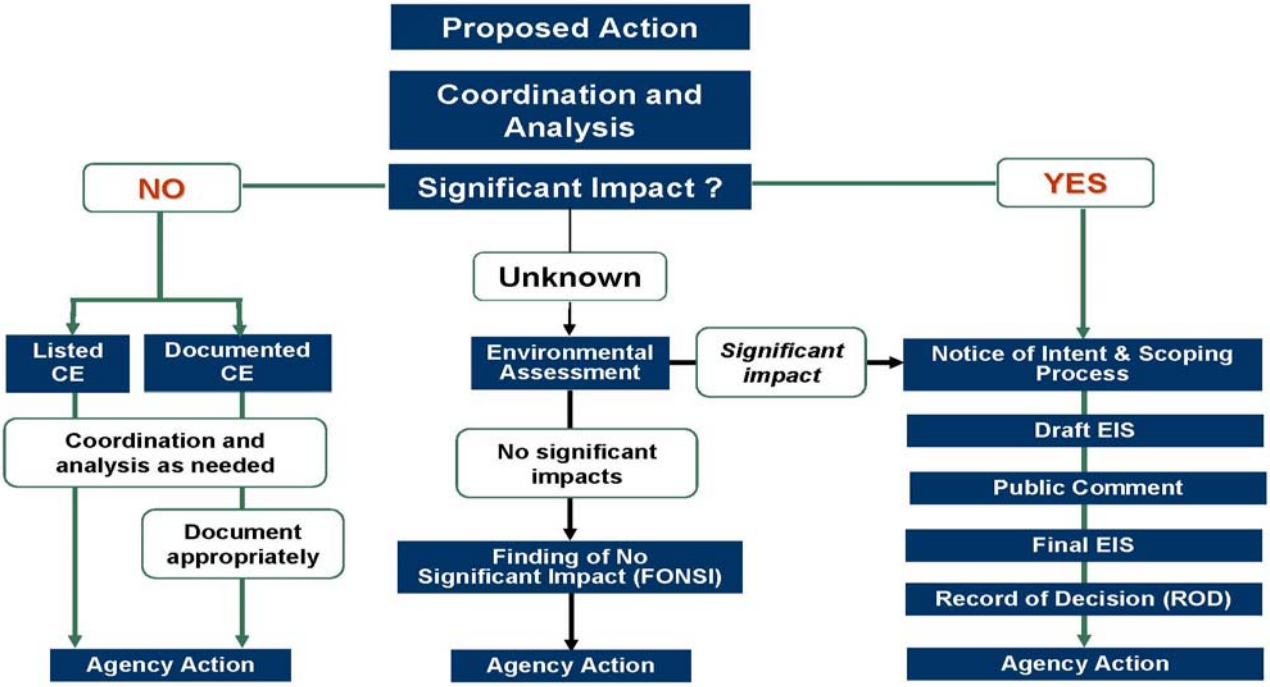
The overall goal of the NEPA process is not to develop the document, but to engage in a sound *process* by which environmental decisions are made. The NEPA document is the record of those decisions and how they are to be carried out through the design, construction, and future maintenance of the project.

There are three levels of environmental documents under NEPA that the FHWA uses to carryout the regulations; Categorical Exclusions (CE), Environmental Assessments (EA), and Environmental Impact Statements (EIS). Depending on the Stewardship and Oversight Agreement developed in each State, the level of delegation on these documents may vary. When it is determined that project actions will result in no significant impacts, a CE document can be prepared. If it has been determined that project actions will cause significant impacts, an EIS will need to be prepared. If the level of significance of impact is unknown or uncertain, an EA may be prepared. If in the preparation of the EA it is determined that there will be significant impacts, an EIS document will need to be prepared.

The NEPA process is completed when the action has been classified as a Categorical Exclusions (CE), or a Finding of No Significant Impact (FONSI) has been approved to close-out an EA or a Record of Decision (ROD) has been signed and placed in the *Federal Register* to close-out an EIS. The FHWA shall not approve right-of-way (ROW) acquisition, final design, purchase of construction materials, or construction prior to completion of the NEPA process.

The general NEPA process is depicted in the flow chart *(found in Figure 2 below).*

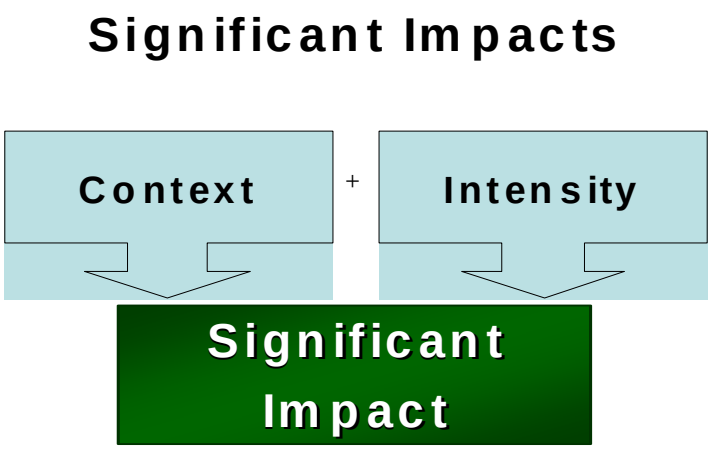
Figure 2. *NEPA Process*



NEPA regulations promulgated by the Council for Environmental Quality state that the determination of a significant impact is a function of both **context** and **intensity**. Context means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole, both short- and long-term effects are relevant. Intensity refers to the severity of impact. To determine **significance**, the severity of the impact must be examined in terms of the type, quality and sensitivity of the resource involved; the location of the proposed project; the duration of the effect (short- or long-term) and other consideration of context. This is illustrated in Figure 3 *(found on page 10).*

Significance of the impact will vary with the setting of the proposed action and the surrounding area (including residential, industrial, commercial, and natural sites). NEPA significance is a primary factor in determining the type of environmental document and process to use for a particular project. NEPA requires an EIS for major Federal actions that significantly affect the quality of the human environment. To determine the appropriate class of action and the requisite level of documentation necessary to comply with NEPA, it is essential to understand the term "significance" and the process for its determination.

Figure 3. *Determining Significance of Impact.*



The following three sections cover the general aspects of the three levels of NEPA documents; however, there may be additional requirements based on your State's laws and regulations. The level of documentation to be used for your project may require coordination between the SHA and your division office Environmental Specialist.

▪ NEPA (National Environmental Policy Act)

On January 1, 1970 the National Environmental Policy Act of 1969 (NEPA) was signed into law. NEPA established, for the first time, a national environmental policy intentionally focused on Federal activities and the desire for a sustainable environment balanced with other essential needs of present and future generations of Americans.

NEPA established a supplemental mandate for Federal agencies to consider the potential environmental consequences of their proposals, document the analysis, and make this information available to the public for comment prior to implementation. The environmental protection policy established in NEPA, known as Section 101, is supported by a set of "action forcing" provisions in Section 102 that form the basic framework for Federal decision making and the NEPA process. Section 102 (D) of NEPA allows State agencies with statewide jurisdiction to prepare NEPA documents under the guidance and direction of Federal agencies. The Federal agencies must independently evaluate such NEPA documentation prior to its approval and adoption.

While NEPA established the basic framework for integrating environmental considerations into Federal decision making, it did not provide the details of the process for which it would be accomplished. Federal implementation of NEPA was the charge of the Council on Environmental Quality (CEQ), which interpreted the law and addressed

NEPA's action forcing provisions in the form of regulations and guidance. In addition to the CEQ regulations, NEPA allows each Federal agency to issue its own NEPA regulations tailored to its specific missions and programs. The FHWA's and the FTA's joint NEPA regulation is found at 23 CFR 771.

o Categorical Exclusion

Categorical Exclusions (CEs) are actions that do not individually or cumulatively have a significant effect on the environment.

23 CFR 771.117 (a) defines CEs as actions which meet the definition contained in 40 CFR 1508.4, and, based on past experience with similar actions, do not involve significant environmental impacts. They are actions which: do not induce significant impacts to planned growth or land use for the area; do not require the relocation of significant numbers of people; do not have a significant impact on any natural, cultural, recreational, historic or other resource; do not involve significant air, noise, or water quality impacts; do not have significant impacts on travel patterns; or do not otherwise, either individually or cumulatively, have any significant environmental impacts.

SAFETEA-LU Section 6004 allows the FHWA to assign responsibility for making CE determinations to the SHAs. Under this provision, the SHAs and not the FHWA are responsible and liable for the decisions they make.

There are two types or levels of CEs: "C list" and "Documented CEs"

C list:

- 23 CFR 771.117(c) contains a list of actions that meet the criteria for CEs; these are sometimes referred to as "C list."
- These actions normally require no further NEPA approvals.
- These actions may require other environmental consultations or approvals, such as Endangered Species Act consultation or a Clean Water Act permit.
- This list is all-inclusive; no other actions can be included without the FHWA's or the FTA's approval.
- Several division offices and SHAs have entered into programmatic agreements where the State routinely processes C list CE's with oversight from the division office. The FHWA remains responsible for compliance under NEPA and related laws.

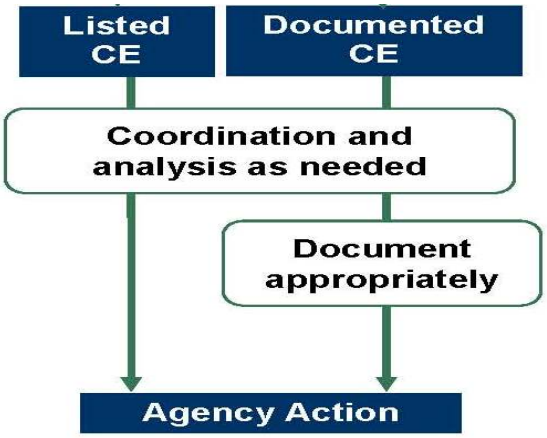
There should be a decision memo in the project file that documents that (1) the action is on the C list, (2) no unusual circumstances apply, and (3) there is compliance with applicable environmental laws and regulations.

Documented CEs:

- 23 CFR 771.117(d) contains a list of examples of actions that may be designated as CEs after FHWA approval, these are sometimes referred to as "D list." In some States, the FHWA has entered into programmatic agreements with the SHA by which the SHAs review and approve some of the listed actions.
- Types of documentation that may be needed:
  - Definition of the extent of impacts
  - Identification of mitigation and commitments
  - Addressing known or foreseeable public and agency concerns
  - Addressing Federal or other actions required
- Individual project approval requires submitted documentation. That is why these are referred to as Documented CEs.
- Actions other than those listed at 23 CFR 771.117(d) may meet the criteria for a CE. Therefore, unlike the C list CE's, the "D list" is not all-inclusive.

There should be a decision memo in the project file that documents that (1) the action is a CE, (2) significant environmental effects will not result, (3) there is compliance with applicable environmental laws and regulations, (4) a list of any environmental commitments is created and, (5) there has been individual project approval.

Figure 4. *NEPA Flow Chart – Categorical Exclusions.*



References:

- *40 CFR 1508.4*
- *23 CFR 771.117*
- *FHWA Memorandum - Categorical Exclusion Documentation and Approval, Dated March 30, 1989* ***http://environment.fhwa.dot.gov/projdev/docuceda.asp***
- Categorical Exclusion (CE) website ***http://environment.fhwa.dot.gov/projdev/docuce.asp***

o Environmental Assessment and Finding of No Significant Impacts

Environmental Assessments (EAs) are prepared for actions in which the significance of the environmental impact is not clearly established. Should environmental analysis and interagency review during the EA process find a project to have no significant impacts on the quality of the environment, a Finding of No Significant Impact (FONSI) is issued. If in the development of an EA it is found that significant impacts will result, the preparation of an Environmental Impact Statement (EIS) should commence immediately. Note that significant impacts are based on "context and intensity," as shown in Figure 3 *(found on page 10).*

– **Environmental Assessments** ***http://environment.fhwa.dot.gov/projdev/docuea.asp***)
Environmental Assessments (EA) are meant to be concise public documents for which a Federal agency is responsible that serves to:

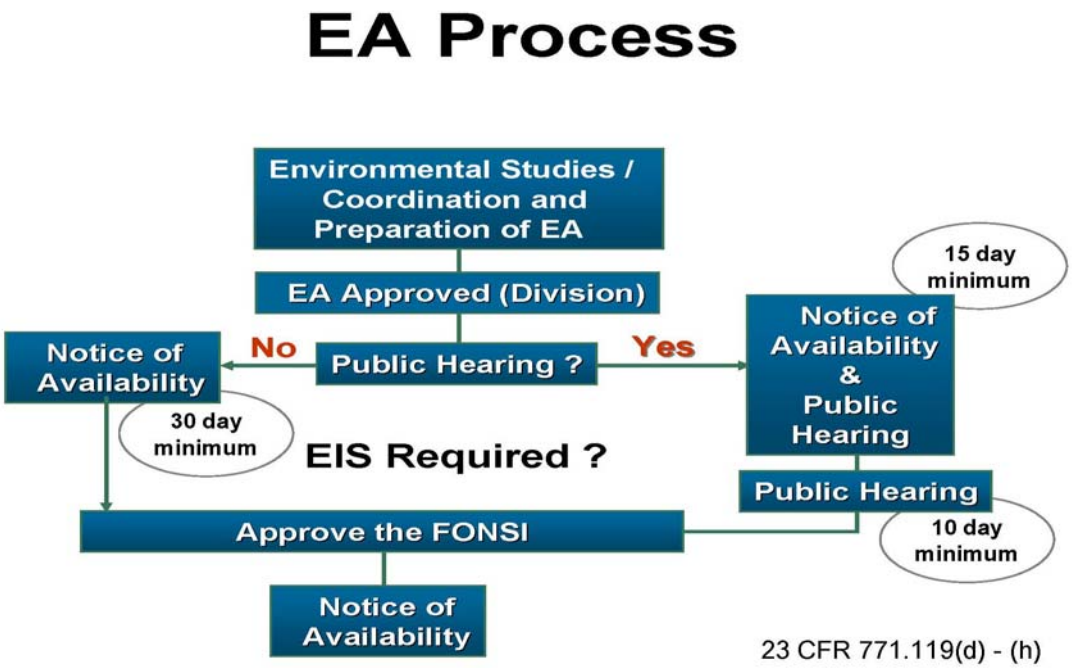
- Briefly provide sufficient evidence and analysis for determining whether to prepare an EIS or a FONSI.
- Aid an agency's compliance with the Act when no EIS is necessary.
- Facilitate preparation of a statement when one is necessary.

The FHWA must approve an EA before it is made available to the public. An EA does not need to be circulated but it must be made available to the public through notices of availability in local, State, or regional clearinghouses, newspapers and other means. Depending on the FHWA-approved State public involvement procedures, a public hearing may or may not be required. A 30-day review period is required but may be reduced in rare circumstances.

After public comments are received and considered, a determination of the significance of the impacts is made:

- If at any point in the process of preparing an EA it is discovered that the project would result in significant impacts, an EIS must be prepared.
- If, after completing the EA, it is evident that there are no significant impacts associated with the project, a FONSI may be prepared.

Figure 5. *NEPA Flow Chart – Environmental Assessments*



References:

- *40 CFR 1508.9 Environmental Assessment* - ***http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title40/40cfr1508_main_02.tpl***
- *23 CFR 771.119 Environmental Assessments* – ***http://www.fhwa.dot.gov/hep/23cfr771.htm***
- FHWA Environmental Assessments (EA) website ***http://environment.fhwa.dot.gov/projdev/docuea.asp***

- Finding of No Significant Impact

http://environment.fhwa.dot.gov/projdev/docuFONSI.asp

If it is determined that there will be no significant impacts, a Finding of No Significant Impact (FONSI) will be prepared for the division office's approval to conclude the process and document the decision. A FONSI is issued when environmental analysis and interagency review during the EA process find a project to have no significant impacts on the quality of the environment. The FONSI document is the EA modified to reflect all applicable comments and responses. If it was not done in the EA, the FONSI must include the project sponsor's recommendation or selected alternative. No formal public circulation of the FONSI is required, but the State clearinghouse must be notified of the availability of the FONSI. In addition, the FHWA recommends that the public be notified through notices in local newspapers.

o Environmental Impact Statements and Record of Decision

– Environmental Impact Statements

http://environment.fhwa.dot.gov/projdev/docueis.asp

An Environmental Impact Statement (EIS) is prepared for a project or action when it is known that the action will have a significant effect on the environment. Section 6002 of SAFETEA-LU created new requirements for EIS started after August 2005. These additional requirements can be found on the FHWA Environmental website and have been incorporated into 23 CFR 771. An EIS is a full disclosure document that details the process through which a transportation project was developed, includes consideration of a range of reasonable alternatives, analyzes the potential impacts resulting from the alternatives, and demonstrates compliance with other applicable environmental laws and executive orders. The EIS process in completed in the following ordered steps: Project Initiation Letter, Notice of Intent (NOI), draft EIS (DEIS), final EIS (FEIS), and Record of Decision (ROD). The EIS provides a detailed description of the proposal, purpose and need, reasonable alternatives and affected environment, presents analysis of the anticipated beneficial, and presents adverse environmental effects of the alternatives.

After the FHWA approves the DEIS for publication, it is made available for public comment. Following a formal comment period and receipt and consideration of comments from the public and other agencies, the Final Environmental Impact Statement (FEIS) will be developed and issued. The FEIS will address the comments on the draft. Based on this analysis, the FEIS will identify the "preferred alternative" for the project.

– Record of Decision

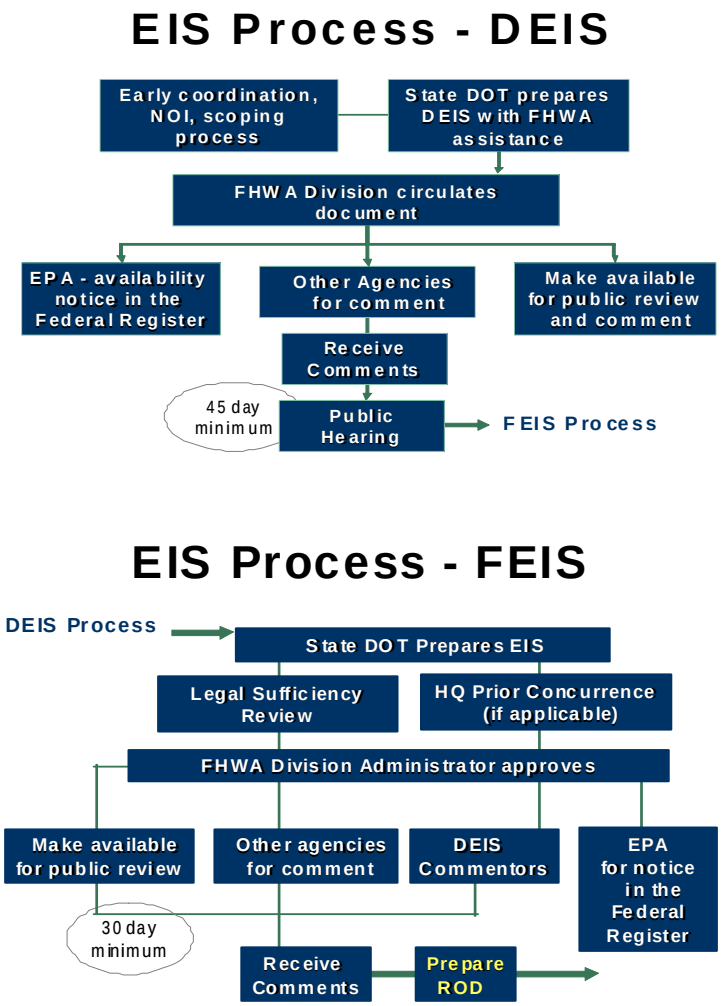
The Record of Decision (ROD) is the final step in the EIS process and may not be issued sooner than 30 days after the approved FEIS is distributed nor 90 days after the DEIS is circulated. Once the ROD has been published, there is a 180-day statute of limitations for challenges to the document.

The ROD identifies the selected alternative and presents the basis for the decision. This includes an identification of the alternatives considered, the "environmentally preferable alternative," and information on the commitments to avoid, minimize and compensate for environmental impacts (mitigation). A ROD can only be approved if it is fiscally constrained and, if the project is located in an air quality non-attainment area, if it is included in a State's conforming plan. The ROD does not commit the approval of a request to fund the preferred alternative.

Written reevaluations are necessary and required for EIS documents where the FEIS has not been issued within 3 years of the DEISs or no major steps to advance a project have occurred in the last three years. A reevaluation is an analysis of the changes in a project or existing environment at specified times in the project development process. The purpose of a reevaluation is to assess whether any changes that may have occurred in project design, concept, or scope, the affected environment, or proposed mitigation measures would require supplemental environmental documentation or if the environmental document and resultant project decisions are still valid. It is also advisable to review and reevaluate EAs where there has been no significant action.

It may be beneficial to utilize a checklist that includes reviews for legal sufficiency, prior concurrence, cost estimates, and an approved STIP when reviewing an EIS document for approval. An example of an EIS review checklist is included in **Appendix D**.

Figure 6. *NEPA Flow Charts – Environmental Impact Statements (EIS)*



For additional information on the steps required for an EIS, you can review the guidance contained on the FHWA Environmental website (***http://environment.fhwa.dot.gov/projdev/docueis.asp***), and you should coordinate with your Environmental Specialists.

References:

- Section 6002 guidance ***http://www.fhwa.dot.gov/hep/section6002/index.htm***
- ***23 CFR 771.123 (a) Notice of Intent*** *(**http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=5ca73b0dc48f0f02b289452b38a5ee4d&rgn=div8&view=text&node=23:1.0.1.8.44.0.1.12&idno=23**)*
- *40 CFR 1502* Environmental Impact Statement *(**http://ceq.hss.doe.gov/nepa/regs/ceq/1502.htm**)*
- *23 CFR 771.127* Record of Decision *(**http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=5ca73b0dc48f0f02b289452b38a5ee4d&rgn=div8&view=text&node=23:1.0.1.8.44.0.1.14&idno=23**)*
- *Technical Advisory T6640.8A* Guidance for Preparing and Processing Environmental and Section 4(f) Documents *(**http://www.fhwa.dot.gov/legsregs/directives/techadvs/t664008a.htm**)*

o Clean Air Act Amendments of 1990

The Federal Clean Air Act Amendments of 1990 (CAAA) may be the most powerful of all environmental laws affecting transportation. They are intended to significantly affect transportation decision-making, not only to achieve air quality goals but also to affect broader environmental goals related to land use, travel mode choice, and reductions in vehicle miles traveled. The CAAA require greater integration of transport-ation and air quality planning, and assign a greater responsibility to transportation plans and programs for reducing mobile source emissions. By expanding the requirements for determining the conformity of transportation plans, programs, and projects with State Implementation Plans for air quality, and by expanding the use of highway funding sanctions to enforce those requirements, the CAAA ensure a continuing linkage between transportation and environmental goals.

References:

- Clean Air Act from EPA website ***http://www.epa.gov/air/caa/index.html***
- FHWA Air Quality website ***http://www.fhwa.dot.gov/environment/aqupdate/index.htm***

AE Heads-Up: You should work closely with the division office planning and air quality staff as they review and approve the State's Long-Range Transportation Plan and Transportation Improvement Program. If these documents are not found to conform with the State Implementation Plan for air quality, the applicable funding phase request may not be approvable.

o Environmental Justice

A 1994 Presidential Executive Order directed every Federal agency to make environmental justice (EJ) part of its mission by identifying and addressing the effects of all programs, policies, and activities on minority and low-income populations. The DOT's environmental justice initiatives accomplish this goal by involving the potentially affected public in developing transportation projects that fit harmoniously within their communities without sacrificing safety or mobility.

Rooted in Title VI of the Civil Rights Act of 1964, environmental justice is not a new concern. Today, because of the evolution of the transportation planning process, they are receiving greater emphasis. Effective transportation decision making depends upon understanding and properly addressing the unique needs of different socioeconomic groups. This is more than a desktop exercise; it requires involving the public. These changes make sure that every transportation project nationwide considers the human environment.

There are three fundamental environmental justice principles:

1. To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
2. To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
3. To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

Reference:

- FHWA Environmental Justice website ***http://www.fhwa.dot.gov/environment/ej2000.htm***

▪ Noise

Noise Analysis and Abatement Policy July 1997 (23 CFR 772) – Although there is no written requirement for a Noise Policy, the FHWA required the States to develop one to address some of the terms that were not defined in the regulations. The definitions were best left to the States.

AE Heads-Up: You should locate and become familiar with this document, as the construction funding authorization cannot be approved unless the PS&E includes the noise abatement that may have been considered for identified noise impacts.

▪ Section 4(f)

The Department of Transportation Act (DOT Act) of 1966 included a special provision - Section 4(f) ***http://www.environment.fhwa.dot.gov/4f/index.asp*** - which stipulated that the Federal Highway Administration (FHWA) and other DOT agencies **cannot approve** the use of land from publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites **unless** the following conditions apply:

- There is no feasible and prudent alternative to the use of land, and
- The action includes all possible planning to minimize harm to the property resulting from use; or
- The Administration determines the use of the property will have a de minimis impact, as defined in 23 CFR 774.17, on the property.

AE Heads-Up: De minimis is a term used in NEPA that comes from a Latin expression meaning about minimal things, concerning things that are so minor as to be negligible Section 4(f) of the U.S. Department of Transportation (USDOT) Act of 1966 was set forth in Title 49 United States Code (U.S.C.), Section 1653(f).

A similar provision was added to Title 23 U.S.C. Section 138, which applies only to the Federal-aid Highway Program. Where many environmental laws are *procedural,* specifying a process to follow, this provision is a *substantive* law, specifying an outcome- the avoidance of the "use" of a Section 4(f) property. Section 4(f) is a substantive law implemented by the USDOT. Although coordination, especially with the Department of the Interior, is critical, Section 4(f) is implemented by USDOT, and the decision is ultimately the responsibility of the DOT. When working on joint projects, be advised that different DOT Administrations may implement Section 4(f) differently.

Since 1966, Section 4(f) has undergone few changes. The first of these changes was a 1968 amendment to Section 4(f)'s wording-an effort by lawmakers to reconcile the language of 49 U.S.C. Section 1653(f) and 23 U.S.C. Section 138. The wording in the two provisions was somewhat different; therefore, the Federal-aid Highway Act of 1968 amended the wording in both sections to be consistent. The second change was a result of the 1983 recodification of the USDOT Act, in which Section 4(f) became 49 U.S.C. Section 303.

In August 2005, Section 6009(a) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), (***http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_public_laws &docid=f:publ059.109***) made the first substantive revision to Section 4(f) since the 1966 USDOT Act. Section 6009 amended amended existing Section 4(f) legislation by simplifying the process and approval of projects that have only de minimis impacts on lands impacted by Section 4(f). Under the new provisions, once the USDOT determines that a transportation use of Section 4(f) property results in a de minimis impact, analysis of avoidance alternatives is not required and the Section 4(f) evaluation process is complete. Section 6009 also required the USDOT to issue regulations that clarify the factors to be considered and the standards to be applied when determining if an alternative for avoiding the use of a section 4(f) property is feasible and prudent.

On March 12, 2008, the FHWA issued a *Final Rule* ***http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;sid=d2f8dcabc9b29425cf1202dc33970a46;rgn=div2;view=text;node=20080312%3A1.19;idno=23;cc=ecfr;start=1;size=25*** on Section 4(f), which clarifies the 4(f) approval process and simplifies

its regulatory requirements. In addition, the *Final Rule* moves the Section 4(f) regulation to 23 CFR 774 ***http://ecfr.gpoaccess.gov/ cgi/t/text/text-idx?c=ecfr;sid=d2f8dcabc9b29425cf1202dc33970a46;rgn=div2;view=text;node= 20080312%3A1.19;idno=23;cc=ecfr;start=1;size=25***.

In general, a de minimis impact finding is made when the use of a Section 4(f) property does not result in an adverse effect to that property. However, the de minimis impact criteria and associated determination requirements are different for historic sites than for parks, recreation areas, and wildlife and waterfowl refuges. De minimis impacts related to historic sites are defined as the determination of either "no adverse effect" or "no historic properties affected" in compliance with Section 106 of the National Historic Preservation Act. De minimis impacts on publicly owned parks, recreation areas, and wildlife and waterfowl refuges are defined as those that do not "adversely affect the activities, features and attributes" of the Section 4(f) resource. When a de minimis impact finding is made, an analysis of feasible and prudent avoidance alternatives is not required.

References:

- De minimis Questions and Answers website: ***http://www.fhwa.dot.gov/hep/qasdeminimus.htm***
- Section 4(f) Laws and Regulations:
  - *Title 49 U.S.C Section 303* ***http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=browse_usc&docid=Cite:+49USC303***
  - *Title 23 U.S.C. Section 138* ***http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=browse_usc&docid=Cite:+23USC138***
  - *Technical Correction to Final Rule on Section 4(f)* (***http://environment.fhwa.dot.gov/projdev/docs/FRNotice_774-3.pdf***)
  - *Final Rule on Section 4(f)*
  - *23 CFR 774* ***http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;sid=d2f8dcabc9b29425cf1202dc33970a46;rgn=div2;view=text;node=20080312%3A1.19;idno=23;cc=ecfr;start=1;size=25***
- Section 4(f) Guidance Documents:
  - *Section 4(f) Policy Paper (March 1, 2005)* ***http://www.environment.fhwa.dot.gov/projdev/4fpolicy.asp***
  - *Guidance for Determining De Minimis Impacts to Section 4(f) Resources (December 13, 2005)* ***http://www.fhwa.dot.gov/hep/guidedeminimis.htm***
  - *Successes in Stewardship Newsletter - Section 4(f) Final Rule: New Guidance on a Complex Regulation* ***http://www.environment.fhwa.dot.gov/strmlng/newsletters/mar08nl.asp***
  - Nationwide Section 4(f) Programmatic Evaluations
  - Programmatic Section 4(f) evaluations can be used in place of individual evaluations for highway projects where uses are considered minor. To date, there are five programmatic evaluations that have been approved for use nationwide:
    - Independent Walkway and Bikeways Construction Projects website ***http://www.environment.fhwa.dot.gov/projdev/4fbikeways.asp***
    - Historic Bridges website ***http://www.environment.fhwa.dot.gov/projdev/4fbridge.asp***
    - Minor Involvements with Historic Sites ***http://www.environment.fhwa.dot.gov/projdev/4fmhist.asp***
    - Minor Involvements with Parks, Recreation Areas and Waterfowl and Wildlife Refuges website ***http://www.environment.fhwa.dot.gov/projdev/4fmparks.asp***
    - Net Benefits to a Section 4(f) Property website ***http://www.environment.fhwa.dot.gov/4f/4fnetbenefits.asp***

▪ Section 6(f) of the Land and Water Conservation Fund Act

Land and Water Conservation Fund Act (Section 6(f)) [*See* ***http://wildlifelaw.unm.edu/fedbook/lwcfact.html***] – The U.S. Congress clearly indicated that the new Federal program should have a lasting effect on the supply of recreation sites and facilities by requiring that sites assisted be added permanently to the national recreation estate. As a result, Section 6(f)(3) of the Act states unequivocally that grant-assisted areas are to remain forever available for "public outdoor recreation use," or be replaced by lands of equal market value and recreation usefulness. Each State has a Section 6(f) coordinator that can assist the SHAs in identifying 6(f) lands that may be affected by the proposed project.

Section 6(f) directs the U.S. Department of the Interior (DOI) to assure that replacement lands of equal value, location and usefulness are provided as conditions to approval of land conversions. Therefore, where a Section 6(f) land conversion is proposed for a highway project, replacement land will be necessary, and the DOI's position on the land transfer must be documented.

▪ Section 7 of Endangered Species Act (ESA) of 1973

The Endangered Species Act (ESA) of 1973, as amended, contains both substantive and procedural requirements to prevent actions that would jeopardize the continued existence of listed species. Unauthorized take of listed species, which includes harming the species, is punishable by both criminal and civil penalties. The Fish and Wildlife Service, part of the Department of the Interior, and the National Marine Fisheries Service, part of the National Oceanic and Atmospheric Administration, share responsibilities for ESA's administration.

Under Section 7 of the ESA, Federal agencies are required to consult on actions that may adversely affect listed species or adversely modify designated critical habitat. For transportation projects, FHWA or the State DOT initiates consultation, and the Fish and Wildlife Service provides information regarding threatened or endangered species in the project area. The State DOT then conducts a Biological Assessment to allow FHWA to make a determination of effect. A determination of "no effect" or "not likely to adversely affect" finalizes the consultation. A finding of "no jeopardy" means that an opinion is required to advance the project.

The regulations governing interagency cooperation under Section 7 are found at 50 CFR 402.

References:

- *16 U.S.C. 1531*
- *50 CFR 402*
- Biological Assessment website ***http://sero.nmfs.noaa.gov/pr/pdf/BA_guide_comboeh081105.pdf***
- Memo - Joint Agency Agreement on ESA's Formal Consultation Process website ***http://environment.fhwa.dot.gov/strmlng/jointagency.asp***

▪ Section 106 of the National Historic Preservation Act (NHPA) of 1966

Historic preservation has been a Federal concern since the 1906 Antiquities Act, which provided for the protection of historic and prehistoric remains and monuments on Federal lands. Since that time, the U.S. Congress has made historic preservation a responsibility of each Federal agency, enacting multiple laws that reflect the importance the American people attach to safeguarding and maintaining the places that reflect our nation's rich heritage. Chief among these are the National Historic Preservation Act (NHPA) and Section 4(f) of the USDOT Act of 1966.

Section 106 of the NHPA requires Federal agencies to consider effects to the nation's historic and archeological resources beyond Federal lands. The **FHWA Historic Preservation and Archeology Program** provides guidance and technical assistance to Federal, State, and local government staff regarding these Federal laws, as well as regulations, executive orders, policy, procedures, and training on topics related to historic preservation and cultural resources.

This Historic Preservation website provides information geared to the Federal-aid Highway Program and its related projects. Information contained on this website offers guidance, recommendations, and successful practices to help address historic preservation/cultural resource issues during the transportation project planning and development process. The "Resources" section of this website provides other useful information related to partner agencies, professional organizations, relevant legislation, publications, and conferences and meetings.

References:

- *16 U.S.C. 470*
- *36 CFR Part 800*
- Program Overview website ***http://www.environment.fhwa.dot.gov/histpres/index.asp***
- Archeology website ***http://www.environment.fhwa.dot.gov/histpres/archaeology.asp***
- Historic Bridges website ***http://www.environment.fhwa.dot.gov/histpres/bridges.asp***
- Historic Roads website ***http://www.environment.fhwa.dot.gov/histpres/roads.asp***
- Interstate Highway System website ***http://www.environment.fhwa.dot.gov/histpres/highways.asp***
- Tribal Issues website ***http://www.environment.fhwa.dot.gov/histpres/tribal.asp***
- Streamlining Historic Preservation website ***http://www.environment.fhwa.dot.gov/histpres/recommend.asp***
- Resources website ***http://www.environment.fhwa.dot.gov/histpres/resources.asp***

▪ Section 404 of the Clean Water Act (CWA)

Section 404 of the Clean Water Act (CWA) (***http://sero.nmfs.noaa.gov/pr/pdf/BA_guide_comboeh081105.pdf***) establishes a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. The purpose of the program is to maintain the chemical, physical and biological integrity of the nation's waters by preventing or reducing pollution.

Activities in waters of the United States regulated under this program include fill for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports) and mining projects. Section 404 requires a permit before dredged or fill material may be discharged, unless the activity is exempt from Section 404 regulation. No discharge of dredged or fill material can be permitted if a practicable alternative exists that is less damaging to the aquatic environment or if water quality would be significantly degraded. Certain farming or forestry activities may be exempt.

The U.S. Army Corps of Engineers administers the Section 404 permit program; however, the EPA has veto authority over the permits. To obtain a permit, an application must be submitted to the Corps of Engineers; the application must show that the applicant has taken steps to avoid wetland impacts where practicable, minimize potential impacts to wetlands, and provided compensation for any remaining, unavoidable impacts through activities to restore or create wetlands.

References:

- *Clean Water Act (CWA)* *33 U.S.C. 1344*
- *USACE Implementing Regulations* *33 CFR 323*
- *EPA 404(b)(1) guidelines* *40 CFR 230*
- *FHWA Wetland Regulations* *23 CFR 777*
- *FHWA Environmental Toolkit* ***http://www.environment.fhwa.dot.gov/index.asp***
- *Summary of Environmental Legislation Affecting Transportation* ***http://www.fhwa.dot.gov/environment/env_sum.htm***

Right-of-Way (ROW)

In a changing America, government programs designed to benefit the public as a whole often result in acquisition of private property, and sometimes in the displacement of people from their homes, businesses or farms.

▪ Early Acquisition

The SHA may initiate acquisition of real property at any time it has the legal authority to do so based on program or project considerations. The SHA may undertake early acquisition for corridor preservation, access management, or other purposes. Acquisition costs incurred by a SHA prior to executing a project agreement with the FHWA are not eligible for Federal-aid reimbursement. However, such costs may become eligible for use as a credit towards the SHA share of a Federal-aid project.

Reference:

- *Eligibility Costs – 23 CFR 510.501 (b)*
  http://edocket.access.gpo.gov/cfr_2008/aprqtr/pdf/23cfr710.751.pdf

- Protective Buying and Hardship Acquisition

The SHA may request FHWA agreement to provide reimbursement for advance acquisition of a particular parcel or a limited number of parcels, before obtaining final environmental approval. This is done to prevent imminent development and increased costs on the preferred location (Protective Buying), or to alleviate hardship to a property owner or owners on the preferred location (Hardship Acquisition).

Protective Buying

The SHA must clearly demonstrate that development of the property is imminent and such development would limit future transportation choices. A significant increase in cost may be considered as an element justifying a protective purchase. (See reference for requirements)

Hardship Acquisitions

The SHA must accept and concur in a request for a hardship acquisition based on a property owner's written submission that:

(1) Supports the hardship acquisition by providing justification, on the basis of health, safety or financial reasons, that remaining in the property poses an undue hardship compared to others; and

(2) Documents an inability to sell the property because of the impending project, at fair market value, within a time period that is typical for properties not impacted by the impending project.

Environmental Decisions

Acquisition of property under this section shall not influence the environmental assessment of a project, including the decision relative to the need to construct the project or the selection of a specific location.

References:

- *23 CFR 710.503 Protective Buying and Hardship Acquisition Requirements (a) (1-4)*
  http://edocket.access.gpo.gov/cfr_2008/aprqtr/pdf/23cfr710.751.pdf
- *FHWA Realty* ***http://www.fhwa.dot.gov/realestate/index.htm***
- *The Uniform Act*

***AE Heads-Up*:** 23 CFR 710.201(c)(1) requires the State to have an approved *Right-of-Way Manual*. You should locate and become familiar with this document.

▪ Railroads

When railroads are located in the project vicinity, coordination with the railroad may be required to address property rights and features to satisfaction of all involved. There may be a question of railroad liability insurance if your project is on or over railroad property. The railroad may require special training or certification to enter/work on their property, and may also require additional safety gear, such as safety glasses or steel toed boots before you can access their property.

Note that railroad work can be completed by the railroad themselves under a force account agreement that does not require a public interest finding.

A copy of an executed railroad agreement needs to be provided at the time of PS&E approval. Obtaining an agreement with a railroad can be a lengthy process. If an agreement is required, it should be initiated as soon as possible in the project development stage.

References:

- *23 CFR 646 – Railroads*
- Federal Railroad Administration – U.S.DOT website ***http://www.fra.dot.gov/***

AE Heads-Up: When you have "public" rail facilities, such as Amtrak or light rail, you need to be aware that there are other rules and regulations that come into effect. Be sure to coordinate with your ROW Specialist within your division office for further information. 23 CFR 646.216(d)(5) permits development of a State – Railroad Master agreement and 23 CFR 646.220 permits alternate procedures for railroad work approval. If these documents were developed, you should locate and become familiar with them.

▪ Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Act)

On January 2, 1971, Public Law 91-646, the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970," (Uniform Act) was signed into law. The Uniform Act provides important protections and assistance for property owners affected by Federally-funded projects, and ensures that they are treated fairly and equitably.

Clearances/Certifications – Before construction authorization can be approved, the State needs to obtain temporary and/or permanent rights to land so the contractor has necessary access to construct the project as designed. Generally, any delays which cause an increased cost to the project (time and or money) will be non-participating (including construction engineering costs).

There are three levels of right-of-way clearances:

Cert #1 – all rights to property have been obtained
Cert #2 – rights to enter has been obtained
Cert #3 – work arounds have been identified

NOTE: Cert #3 and/or Cert #2 should be upgraded before award. In the division offices, the AE should be working with their ROW Specialist to ensure that the Uniform Act is followed.

▪ Utilities Rights-of-Way

Accommodating public utilities on highway ROW has traditionally been at no cost to the utility or only involves direct cost reimbursement for replacement ROW. This reflects society's public service policy that supports limiting the burden on taxpayers for basic municipal services. Pressure to accommodate a growing number of new powerful, profit-making entities who seek private uses of public rights of way may require changes in State laws and agency regulations.

Prior Rights – Generally a utility has legal or contractual rights to an area where the SHA acquires property to build a transportation element. In these cases, the SHA will bear the costs of moving the utility.

NOTE: Utility work can be completed by the utilities themselves under a force account agreement that does not require a public interest finding.

References:

- *23 CFR 645.201 Accommodation of Utilities*
- FHWA Utilities Program website ***http://www.fhwa.dot.gov/programadmin/utility.cfm***
- Utility Adjustments and Accommodations on Federal-aid Projects website ***http://www.fhwa.dot.gov/reports/utilguid/***
- *Highway/Utility Guide* ***http://isddc.dot.gov/OLPWeb.ASP?WCI= DocInfo&WCE= id%3d10604%26oa%3dany%26cn%3dadvancedsearch%26cv%3dUPPER(%20d.title)%20LIKE%20'%25UTILITY%20GUIDE%25'%26fr%3d1%26lr%3d1%26rc%3d1&WCU***

AE Heads-Up: 23 CFR 645.215 requires a Utility Accommodation Document and 23 CFR 645.119 permits alternate procedures for utility approval. You should locate and become familiar with these documents.

MAJOR PROJECTS

Section 1904 of the Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU) amended 23 U.S.C. 106 and made several significant changes to the requirements for Major Projects. The monetary threshold for classification as a Major Project was lowered from an estimated total cost of $1 billion to $500 million or greater as determined by the scope in the NEPA document and includes the entire costs (including non-Federal-aid) associated with preliminary engineering, ROW, and construction based on the project's (and/or portions thereof) scheduled year of expenditure (YOE) dollars. A Project Management Plan (PMP) and a Finance Plan (FP) are required for all Major Projects, as well as a cost estimate review (CER). It is extremely important that an updated estimate and YOE dollars are used to support running the crystal ball© software (or comparable) to determine the price range of a project's total cost. In addition, projects with a total cost between $100 million and $500 million, while not classified as Major Projects, require the preparation of Finance Plans that must be made available to FHWA upon request. Financial Plans are also required to be updated annually in ensure the funds are available and committed.

AE Heads-Up: The following sections of this manual include information that will be used as part of the review and management of Major Projects.

References:

- FHWA Major Projects website ***http://www.fhwa.dot.gov/programadmin/mega/***
- FHWA Major Projects Guidance ***http://www.fhwa.dot.gov/programadmin/mega/011907.cfm***

DESIGN-BUILD

The design-build concept allows the contractor increased flexibility for innovation in the selection of design, materials, and construction methods. Under the design-build concept, the contracting agency identifies the parameters for the desired end result and establishes the minimum design criteria. The prospective bidders then develop design proposals which optimize their construction abilities. The submitted proposals are rated by the contracting agency on the basis of design quality, timeliness, management capability, and cost.

The design-build concept opens up a new degree of flexibility for innovation. Basing the project design on the contractor's preferred construction methods and expertise provides the flexibility to compensate for cost increases in one area through efficiencies in another. This concept allows the contractor to optimize the work force, equipment, and scheduling.

However, along with the increased flexibility, the contractor must also assume greater responsibility. Because both design and construction are performed under the same contract, claims for design errors or delays due to redesign are not allowed, and the potential for other types of claims is greatly reduced. Extended liability insurance or warranty clauses may be used to ensure that the finished product will perform as required.

From a SHA's perspective, the potential time savings can be a significant benefit. Since the design and construction are performed through one procurement, construction can begin before all design details are finalized (e.g., pile driving could begin while bridge lighting is still being designed). However, this approach should only be applied to those projects for which the end product or facility can be well defined.

References:

- 23 CFR 635.413 – *Design-Build with Warranties*
- 23 CFR 636 – *Design-Build* ***http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;sid=3d7269995d7cabff0a5ae0232f40b368;rgn=div5;view=text;node=23%3A1.0.1.7.25;idno= 23;cc=ecfr***
- *Design Build – Construction Program Guide* ***http://www.fhwa.dot.gov/construction/cgit/desbuild.cfm***

AE Heads-Up: Design-Build is a contracting method used to expedite projects. The 23 CFR 636 – Design-Build link provided in the references above is written in a question and answer format and provides a good deal of information. Not all States allow Design-Build projects, so you should be aware of your specific State's policies and requirements.

DESIGN

Project Development is the process that takes a transportation improvement from concept through design. The primary function of design is to designate those standards, policies, and standard specifications that are acceptable to the FHWA for application in the geometric and structural features of highways. Processes and procedures related to the design phase are a sub-element within the continuum of the overall project development process. A well-designed project can only emerge if the decisions and processes preceding it in the pre-award process (i.e. Planning, Environment, Right-of-Way, and Design) phases were responsive to a broad range of factors and the project context. FHWA in its stewardship role for project development, and design in particular, has the following interests and objectives:

- Improving safety for all users
- Promoting project design choices that are consistent with the applicable transportation plans and policies
- Provide a facility designed to meet the functional and operational goals established by the project purpose and need
- Provide accessibility for people with disabilities
- Compatibility with other transportation modes, facilities and land uses
- Cost effectiveness to ensure value returned for the transportation investment made and that projects are sensitive to the local context and meets the needs of the people it serves

An important concept in design is that every project is unique and requires designers to address the needed improvements, while safely integrating the design into the surrounding natural and built environment. The process through which a project is developed is often of greater importance than the design standards employed. The need for early identification of issues and alternatives, open and continuous involvement with project constituents, and a clear decision-making process is the foundation of a quality design. The overall project development process must be seamlessly coordinated to ensure that community values, natural, historic, and cultural resources, and transportation needs are fully considered throughout the planning, design, and construction phases of a project. The sequence of decisions made through the project development process progressively narrows the project focus and, ultimately, leads to a project that addresses the identified needs. There should be ample opportunities for public participation throughout the process.

Design Standards

Title 23 U.S.C. 109 stipulates that design standards for projects on the National Highway System (NHS) (***http://www.fhwa.dot.gov/legsregs/nhs.html***) must be approved by the Secretary of the USDOT in cooperation with the State highway departments. The Secretary has delegated this authority to the Federal Highway Administrator. The State highway departments, working through the American Association of State Highway and Transportation Officials (AASHTO) (***http://www.transportation.org***) develop design standards through a series of committees and task forces. The FHWA contributes to the development of the design standards through membership on these working units, sponsoring and participating in research efforts, and many other initiatives. Following development of the design standards, the FHWA uses a formal rulemaking process to adopt those it considers suitable for application on the NHS.

The FHWA's current design standards can be found at 23 CFR 625 (***http://www.fhwa.dot.gov/legsregs/directives/fapgtoc.htm***). Additional design guides and references can be found in the Federal-aid Policy Guide, (***http://www.fhwa.dot.gov/legsregs/directives/fapgtoc.htm***), Non-regulatory Supplement NS 23 CFR 625 (***http://www.fhwa.dot.gov/legsregs/directives/fapgtoc.htm***), paragraph 16. The CFR and Non-regulatory Supplement do not include the standards themselves, but rather a list of publications which contain the standards. Probably the most frequently used document in 23 CFR 625 is *A Policy on Geometric Design of Highways and Streets*. This 1000+ page document, sometimes called the Green Book because of the color of its cover, is published by AASHTO.

The Interstate System (***http://www.fhwa.dot.gov/programadmin/interstate.cfm***), all of which is included as part of the NHS, has a special set of standards as listed in 23 CFR 625. FHWA has adopted the AASHTO publication *A Policy on Design Standards--Interstate System* as its standard for projects on the Interstate System. This publication stipulates that access to the Interstate System shall be fully controlled by constructing grade separations at selected public crossroads and all railroad crossings. Where interchanges with selected public crossroads are constructed, access control must extend the full length of ramps and terminals on the crossroad. For projects off the NHS, 23 USC 109 requires that projects shall be designed, constructed, operated, and maintained in accordance with State laws, regulations, directives, safety standards, design standards, and construction standards.

References:

- National Specification website ***http://fhwapap04.fhwa.dot.gov/nhswp/index.jsp*** *(This site includes standard and emerging specifications, construction manuals, and standard plans for all SHA's).*
- FHWA Design website ***http://www.fhwa.dot.gov/design/***
- References you should be aware of and should be in your division office's library:
  - *A Policy on Geometric Design of Highways and Streets, AASHTO, 2004.*
  - *Guide for the Development of Bicycle Facilities, AASHTO, 1999.*
  - *Guide for the Planning and Design of Pedestrian Facilities, AASHTO, 2004*
  - *A Guide to Achieving Flexibility in Highway Design, AASHTO, 2004.*
  - *Highway Capacity Manual, Transportation Research Board, 2000.*
  - *Manual on Uniform Traffic Control Devices, Federal Highway Administration, 2003.*
  - *Development of the Bicycle Compatibility Index: A Level of Service Concept, Implementation Manual, FHWA-RD-98-095,1998.*
  - *Transit Capacity and Quality of Service Manual, Transportation Research Board, Transit Cooperative Research Program. Report 100, 2nd Edition, 2003.*
  - *A Guide to Best Practices in Context Sensitive Solutions, Transportation Research Board, National Cooperative Highway Research Program. Report 480. Washington, DC, 2002.*
  - *Roadside Design Guide, AASHTO, 2002.*

AE Heads-Up: The FHWA standards refer to the *AASHTO Green Book*, but many States and local governments have adopted their own standards that may be more/less restrictive. These standards need to be approved for use by the FHWA for use on Federal-aid projects. When these standards are less than those in the Green Book, the FHWA cannot approve them. When the State and local governments want to deviate from their standards, the division office needs to approve the change. Your office should have complete copies of all applicable standards used in your State.

Design Exceptions

Design exceptions are deviations from the accepted FHWA design standards, which includes division office approved State and local government standards. The design criteria contained in the *AASHTO Green Book* are intended to provide sufficient flexibility to address the unique and diverse conditions encountered on most projects; however, there may still be occasions when design exceptions are necessary. The AASHTO criteria are the recognized standard for design based on years of research and empirical data for safe and efficient movement of traffic. Departure from these guidelines requires documentation to support the decision making process.

The FHWA recognizes 13 controlling criteria from AASHTO policy that must be met on the NHS system which, if not met, require formal approval of design exceptions. (If the project is on the local system, the 13 controlling criteria may not always apply; this must be verified on a State-by-State basis.) These criteria are:

- **Design speed**
- **Lane width**
- **Shoulder width**
- **Bridge width**
- **Horizontal alignment**
- **Vertical alignment**
- **Grades**
- **Stopping sight distance**
- **Cross slope**
- **Super-elevation**
- **Lateral Offset to Obstruction or Horizontal clearance (other than "clear zone")**
- **Vertical Clearance**
- **Structural Capacity**

If minimum controlling criteria cannot be met, documentation of a design exception is required for all projects, regardless of functional classification or funding, to demonstrate that sound engineering judgment was used to design the improvements. Documentation for all design exceptions should follow the guidelines included in the FHWA procedures from the *Federal-aid Program Guide (FAPG) Transmittal 9* and *23 CFR, Part 625* as revised, and relevant FHWA Policy and Engineering Directives.

References:

- FHWA 13 Controlling Criteria website ***http://safety.fhwa.dot.gov/index.cfm***
- Design Standards website ***http://www.fhwa.dot.gov/programadmin/standards.cfm***

Americans with Disabilities Act of 1990

Under the Americans With Disabilities Act of 1990 (ADA), "[a] public entity shall construct any new facility to be used in providing designated public transportation services so that the facility is readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs."(49 CFR 37.41) Also, "[w]hen a public entity alters an existing facility or a part of an existing facility used in providing designated public transportation services in a way that affects the usability of the facility, the entity shall make the alterations in such a manner, to the maximum extent feasible, that the altered portions of the facility are readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs, upon the completion of such alterations." (49 CFR 37.43(a)(1)).

The USDOT is one of eight designated agencies with regulatory responsibilities under ADA. As such, the Department of Justice refers any ADA-instigated complaints that are even remotely related to transportation to the agency. Within the USDOT, these complaints are handled by the most appropriate entity. Consequently, a wide variety of issues fall within the FHWA's scope, which covers basically anything part of or related to a road or highway. Thus, complaints received about the design of accessibility related to traffic lights, curb cuts, median strips, ramps, sidewalks, pedestrian crosswalks, interstate and highway restroom facilities, parking spaces, parking lots, and any other highway-related facility are the FHWA's responsibility. The agency reviews and investigates the complaints and works with the involved State or local organization to resolve the situation.

References:

- U.S. Department of Transportation Accessibility Homepage ***http://www.dot.gov/citizen_services/disability/disability.html***
- FHWA Accessibility Resource Library ***www.fhwa.dot.gov/accessibility/index.cfm***
- Title 49 CFR 37 - Transportation Services For Individuals With Disabilities (ADA) ***http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid= 7ab617ce32f98b5ca450bacf078d2c54&rgn=div5&view=text&node=49:1.0.1.1.26&idno=49***
- ADA Regulations and Technical Assistance Materials (U.S. Department of Justice) ***http://www.ada.gov/publicat.htm***

- *Americans With Disabilities Act Accessibility Guidelines* ***http://www.access-board.gov/adaag/html/adaag.htm***
- Architectural and Transportation Barriers Compliance Board (Access Board) website ***http://www.access-board.gov/***

Bridges

If there is going to be a bridge structure on a project, it is important during the design phase of project development to verify the type and complexity of the structures. For unusual bridges and structures on other Federal-aid and non-Federal-aid highways, project responsibilities shall be in accordance with the August 20, 1998 guidance. The Bridge Engineer in your division office will be able to provide technical assistance.

Unusual bridges are those the division office determines to have: (1) difficult or unique foundation problems, (2) new or complex designs with unique operational or design features, (3) bridges with exceptionally long spans, or (4) bridges being designed with procedures that depart from currently recognized acceptable practices.

Examples of unusual bridges include cable-stayed, suspension, arch, segmental concrete, movable, or truss bridges. Other examples are bridge types that deviate from AASHTO bridge design standards, or AASHTO guide specifications for highway bridges; major bridges using load and resistance factor design specifications; bridges requiring abnormal dynamic analysis for seismic design; bridges using a three-dimensional computer analysis; bridges with spans exceeding 152 meters (500 feet); and bridges with major supporting elements of "ultra" high strength concrete or steel.

Unusual structures are tunnels, geotechnical structures featuring new or complex wall systems or ground improvement systems, and hydraulic structures that involve complex stream stability countermeasures, or designs or design techniques that are atypical or unique.

Reference:

- Project Oversight Unusual Bridges and Structures ***http://www.fhwa.dot.gov/bridge/unusual.htm***

***AE Heads-Up*:** If there is a structure on your project, it would be good to discuss the coordinating reviews and comments with the Division Bridge Engineer.

Consultant Management and Use of Consultants

As stated in 23 U.S.C. 112 and 23 C.F.R. Part 172 engineering and design related service contracts (Architect and Engineering contracts) using Federal-aid funds must be directly related to a construction project. These requirements do not apply to planning or research contracts where a construction project is not directly involved or to design-build contracts; guidance for Design Build contracts is still pending.

In general, the procurement of engineering services for construction projects is done through a qualification-based process based on the Brooks Act. This Act requires that contracts be advertised and companies ranked based on published criteria for competence and qualifications. Once the top firms have been rated, negotiations begin with the top rated firm. If the type of professional services required cannot be agreed upon at fair and reasonable prices, the agency can proceed to negotiate with the next highest qualified firm.

The administration of engineering and design related service contracts under 23 U.S.C. 112 as supplemented by the common grant rule, located at 49 CFR part 18. It is not the intent of this part to release the grantee from the requirements of the common grant rule. The policies and procedures involve federally

funded contracts for engineering and design related services for projects subject to the provisions of 23 U.S.C. 112(a) and are issued to ensure that a qualified consultant is obtained through an equitable selection process, that prescribed work is properly accomplished in a timely manner, and at fair and reasonable cost.

References:

- *23 CFR 172 – Administration of Engineering and Design Related Services Contracts* ***http://www.access.gpo.gov/nara/cfr/waisidx_03/23cfr172_03.html***
- *Employment of Consultants* ***http://www.fhwa.dot.gov/programadmin/consultant.cfm***
- *CACC Manual IV.B – Architect/engineer consultant procurement:* ***http://www.fhwa.dot.gov/programadmin/contracts/core04.cfm#s4B***
- ***12/12/05 Memo: Awarding Engineering and Design Services Contracts Based on Brooks Act Requirements***
- *Administration of Engineering and Design Related Service Contracts – Questions and Answers* ***http://www.fhwa.dot.gov/programadmin/172qa.cfm***
- *49 CFR 18 Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments -* ***http://www.dot.gov/ost/m60/grant/49cfr18.htm***

AE Heads-Up: 23 CFR 172.9 requires the State to have an approved "Consultant Services Contract Procedure." You should locate and become familiar with this document.

Context Sensitive Solutions (CSS)

CSS is a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility. CSS is an ***approach*** that considers the *total context within which a transportation improvement project will exist.* CSS principles include the employment of early, continuous and meaningful involvement of the public and all stakeholders throughout the project development process.

Some basic characteristics of a good CSS project, is one where:

- The project satisfies the purpose and needs as agreed to by a full range of stakeholders. This agreement is forged in the earliest phase of the project and amended as warranted as the project develops.
- The project is a safe facility for both the user and the community.
- The project is in harmony with the community, and it preserves environmental, scenic, aesthetic, historic, and natural resource values of the area, i.e., exhibits context sensitive design.
- The project exceeds the expectations of both designers and stakeholders and achieves a level of excellence in people's minds.
- The project involves efficient and effective use of the resources (time, budget, community) of all involved parties.
- The project is designed and built with minimal disruption to the community.
- The project is seen as having added lasting value to the community.

Reference:

- Context Sensitive Solutions website ***http://www.fhwa.dot.gov/context/index.cfm***

AE Heads-Up: CSS is not a requirement by FHWA, but a design approach that FHWA supports and recommends. CSS is one way to address environmental commitments made during the NEPA process.

Environmental Mitigation and Commitments

As part of the environmental NEPA process, environmental mitigation may be identified and required. During the design process, all efforts should be made to avoid, then minimize, and last, mitigate impacts accordingly. To move environmental commitments forward, a list of commitments should be included in the NEPA approval documents.

Additional commitments will be codified in any permits (i.e., 404 or other State wetland permit). This list will be used later to support the PS&E approval and eventual the FHWA Final Inspection/Final Acceptance prior to closing out the contracts final voucher by the FHWA.

References:

- 23 CFR 771 Environmental Impact and Related Procedures website ***http://www.access.gpo.gov/nara/cfr/waisidx_08/23cfr771_08.html***
- 23 CFR 772 Procedures for abatement of highway traffic noise and construction noise website ***http://www.access.gpo.gov/nara/cfr/waisidx_08/23cfr772_08.html***
- 23 CFR 635 Construction and Maintenance website ***http://www.access.gpo.gov/nara/cfr/waisidx_08/23cfr635_08.html***
- Environmental Review Toolkit site ***http://environment.fhwa.dot.gov/index.asp***

AE Heads-Up: The importance of following up on the environmental commitments is critical as the construction funding request is not to be approved (per 23 CFR 635) unless you can verify they are in the applicable PS&E. For instance, an environmental document may call for open road tolling as a form of ITS to be used to mitigate and reduce the size of a toll facility. When you are reviewing the design aspect of the project, you need to ensure that commitments are included in the design.

Intelligent Transportation Systems (ITS)

Intelligent Transportation Systems (ITS) is a national program aimed at using computers and communications to make travel smarter, faster, safer and more convenient. Here are just a few of the ways national ITS helps us:

- Intelligent traffic control systems help us by reducing the time we spend stopped at red lights or waiting on freeways when an accident occurs.
- Automatic toll collection moves vehicles more quickly through toll booths, reducing congestion and pollution.
- Traveler information systems help us by giving us current, multi-modal information on travel conditions allowing us to make smarter choices about how, when and where to travel.
- In-vehicle systems will help us by giving us in-vehicle maps, guiding us to our destination and improving our safety by automatically notifying emergency services when a serious accident occurs and exactly where the accident is located.
- Advanced transit systems help transit agencies operate more efficiently and provide travelers with real time information that makes using transit easier and more attractive.
- Intelligent commercial vehicle systems will help commercial vehicle operators process the paperwork associated with moving goods. These systems will also help public agencies improve safety by inspecting the vehicles that need it the most.

Policies and procedures for implementing Intelligent Transportation Systems are provided in 23 CFR Subchapter K. Part 940.3 of this subchapter states that, "Intelligent Transportation Systems (ITS) means electronics, communications, or information processing used singly or in combination to improve the efficiency or safety of a surface transportation system."

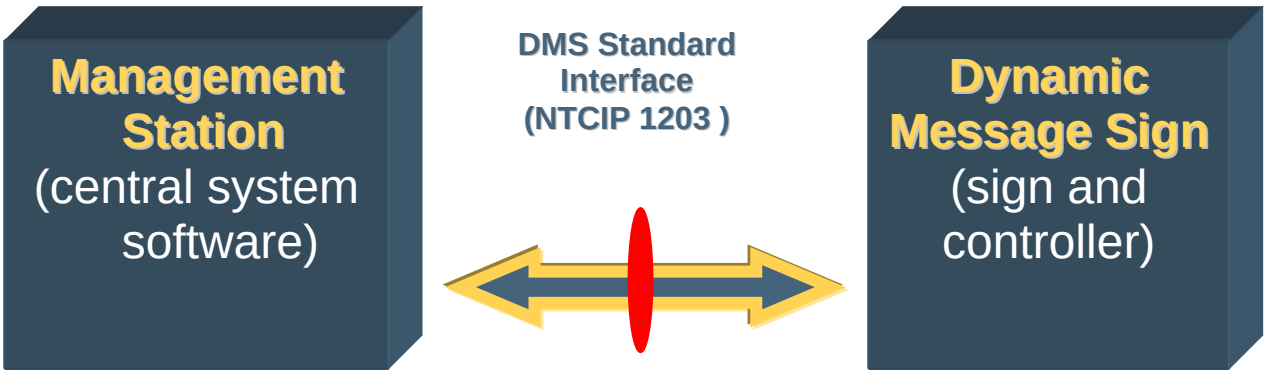
- **ITS Standards**

Section 940 of Title 23 CFR specifies that regions that are implementing ITS projects must develop a regional ITS architecture to guide their development of ITS projects and programs. Among other things, the regional architecture defines a paired data flow, or flow of information, between the various systems, subsystems, and the field located devices (e.g. traffic signal controller) that comprise the overall regional ITS system.

An interface exists between the paired components to allow the exchange of information to occur. To enable the communications to occur, ITS standards define the rules that apply at the interface. These rules consist of the data definitions, syntax, semantics, and dialogues.

Figure 7 *(below)* illustrates an example of data flow in ITS projects. In this example, a management station, or central sign computer, is communicating with a dynamic message sign. The data flow is represented by the two-headed arrow between the two boxes, and the interface is depicted as a red oval. The specific ITS standard that applies to this interface is shown above the interface—it is identified as NTCIP 1203.

Figure 7. *Sample Data Flow on ITS Projects*



The ITS standard is used by a computer programmer to write the communications software for the devices on either side of the interface (e.g. for the central system or for the sign). By specifying that the software be developed in conformance to the ITS standard, signs from various vendors can be used with same central system because the signs and the computer are identical at the interface.

The details of ITS standards are intended for use by programmers and are not of particular use to an AE. However, information of interest to an AE is available at ***http://www.standards.its.dot.gov/***. Technical assistance is available through the Resource Center and the Office of Transportation Management. Technical assistance contact information can be found at ***http://ops.fhwa.dot.gov/int_its_deployment/standards_imp/ standards.htm***.

AE Heads-Up: *When a project is called an "ITS project," it means any project that in whole or in part funds the acquisition of technologies or systems of technologies that provide or significantly contribute to the provisions of one or more ITS user service as defined in the National ITS Architecture."*

▪ ITS Systems Engineering

Systems Engineering is a systematic approach to planning, designing, installing and operating/ maintaining the ITS and technology portions of a project. Systems engineering is a management tool that facilitates the completion of ITS/technology projects on time, within budget and so they meet the intended need for their deployment. Stand-alone and embedded (road/bridge projects that will install ITS as well) ITS projects that use Highway Trust Funds, must conduct a systems engineering analysis as required by 23 CFR 940.11. 940.11, which states the following seven (7) questions will be addressed prior to final design:

1. **What part of the ITS regional architecture is being implemented by this project?**
2. **Who are the stakeholders of the project and what are their roles and responsibilities?**
3. **What are the high level system requirements the project will implement?**

The answers to these three questions should be obtained directly from the ITS regional/statewide architecture the within which the project is physically located. Question 1 should describe the geographic boundaries, the ITS transportation services that will be provided and the physical connection and information that will be exchanged between the system being procured and existing/future systems.

4. **Are alternative analyses (i.e., where equipment should be placed, the type of equipment to use, software to control equipment, etc) being conducted at key decision points of the project?**

This will occur at various design stages of the project. Depending on complexity, selection of hardware and software may occur after the project has been let by the design team.

5. **Is the right procurement option being used?**

This question can and should be answered after fully understanding the complexity of the project. Using invitation for bids, request for proposals or another contracting method depends on the agency's expertise on the project specifics and their available resources in developing the project, managing it during construction and accepting it once it is completed.

6. **Does the ITS portion of the project identify appropriate ITS standards and testing procedures?**

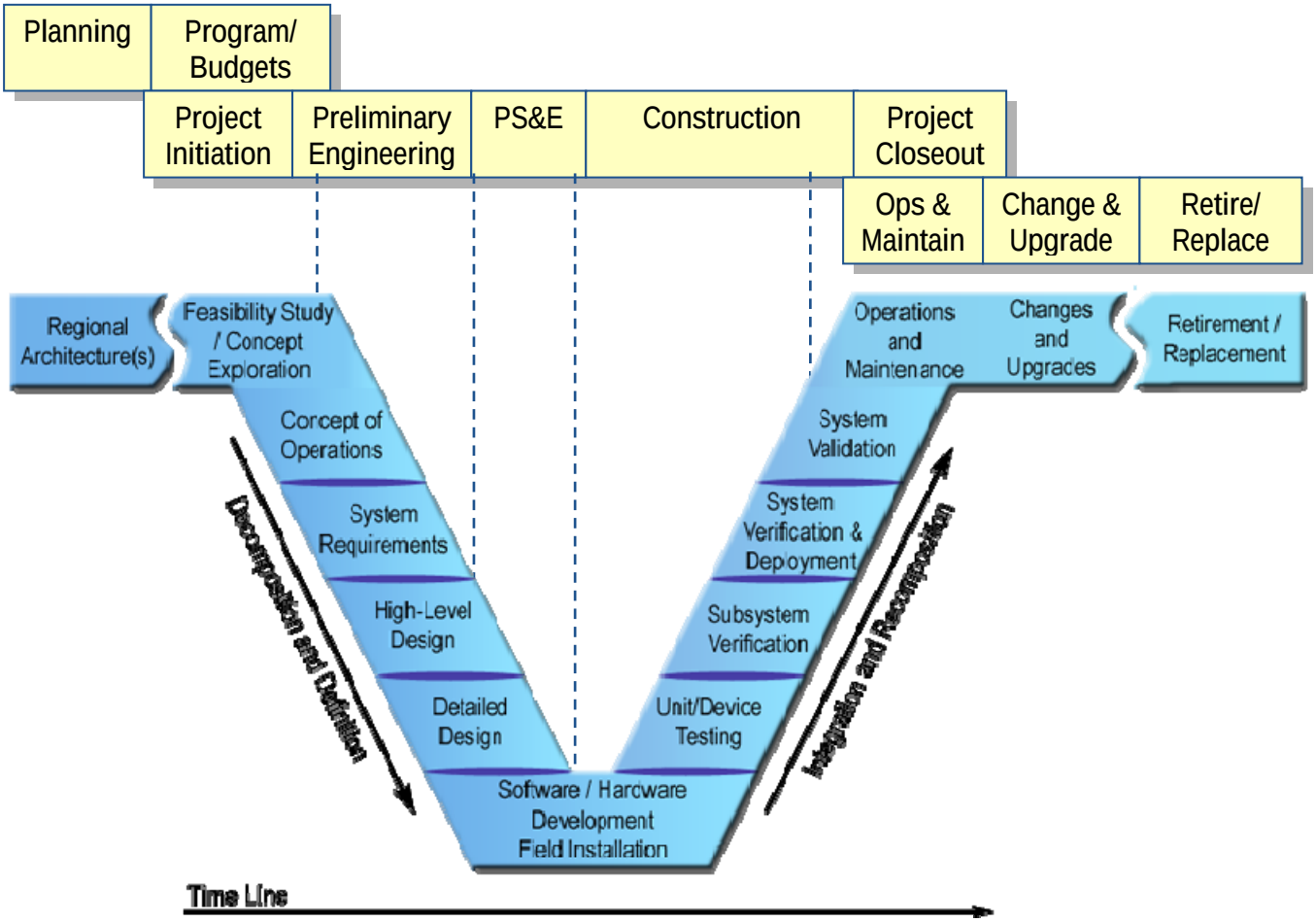
This question should be answered once the hardware and software have been selected.

7. **How will operations and maintenance of the system be supported once the agency has accepted it?**

This question should have been partially answered prior to the project being included in the STIP/TIP. Once the project is fully defined, the project sponsor needs to detail roles and responsibilities. This includes funding as well as personnel need to operate and maintain the ITS portions of the project.

Figure 8 *(found on page 33)* illustrates the FHWA's systems engineering "V", which verifies compliance of applicable laws and regulations for ITS. In general, Figure 6 indicates where in the traditional project development process to expect the various systems engineering documents. An important feature of the systems engineering "V" is that various control documents and processes are created and executed during the decomposition and definition (or development and design) phases of the project. These documents and processes will later be used to verify and validate the identified project requirements and project needs. The control documents/processes usually are test plans and traceability matrices. A traceability matrix is a spreadsheet that shows the relationship between the needs, the associated requirements the system will perform and the tests that will verify the requirements have been met.

Figure 8 – *Systems Engineering "V"*



Reference:

- FHWA ITS website ***http://www.ops.fhwa.dot.gov/its_arch_imp/index.htm***

Interstate Access Requests/Interstate Justification Report

It is in the national interest to maintain the Interstate System to provide the highest level of service in terms of safety and mobility. Adequate control of access is critical to providing such service. Consistent with stewardship responsibilities, the FHWA is committed to preserving the integrity and safety of the Interstate System through preservation of access control and ensuring that the ROW of the facility is utilized for approved purposes.

The FHWA division office will ensure that all requests for new or revised access submitted by the SHA for FHWA consideration contain sufficient information to allow the FHWA to independently evaluate the request and ensure that all pertinent factors and alternatives have been appropriately considered. The extent and format of the required justification and documentation should be developed jointly by the SHA and the FHWA to accommodate the operations of both agencies, and should also be consistent with the complexity and expected impact of the proposals. For example, information in support of isolated rural interchanges may not need to be as extensive as for a complex or potentially controversial interchange in an urban area. No specific documentation format or content is prescribed by this policy.

On an Interstate roadway, a new interchange, new partial interchange, or new ramps to-from frontage roads always requires an Interstate Justification Report (IJR).

References:

- *23 CFR part 450*
- *40 CFR parts 51 and 93* - These sections were expanded to cover breaks in access requests and process for completing the review and approval of Interstate Justification Requests (IJRs)
- FHWA Policy on Adding Additional Interchanges website ***http://www.fhwa.dot.gov/programadmin/fraccess.cfm***

Pavement Design

As part of project development, consideration should be given to pavement design in accordance with applicable laws and regulations set forth in 23 CFR 626. Pavements shall be designed to accommodate current and predicted traffic needs in a safe, durable, and cost-effective manner. The regulations do not specify the procedures to be followed to meet this requirement. Instead, each SHA is expected to use a design procedure that is appropriate for its conditions. The SHA may use the design procedures outlined in the *AASHTO Guide for Design of Pavement Structures*, or it may use other pavement design procedures that, based on past performance or research, are expected to produce satisfactory pavement designs. You should recognize that Life Cycle Cost Analysis (LCCA) is a major consideration for pavement selection and design.

References:

- *FEDERAL-AID POLICY GUIDE, GENERAL PAVEMENT DESIGN CONSIDERATIONS* ***http://www.fhwa.dot.gov/legsregs/directives/fapg/cfr06261.htm***
- FHWA Pavement Information website ***http://www.fhwa.dot.gov/pavement/***
- Life Cycle Cost Analysis (LCCA) website ***http://www.fhwa.dot.gov/infrastructure/asstmgmt/lcca.cfm***

Reviews

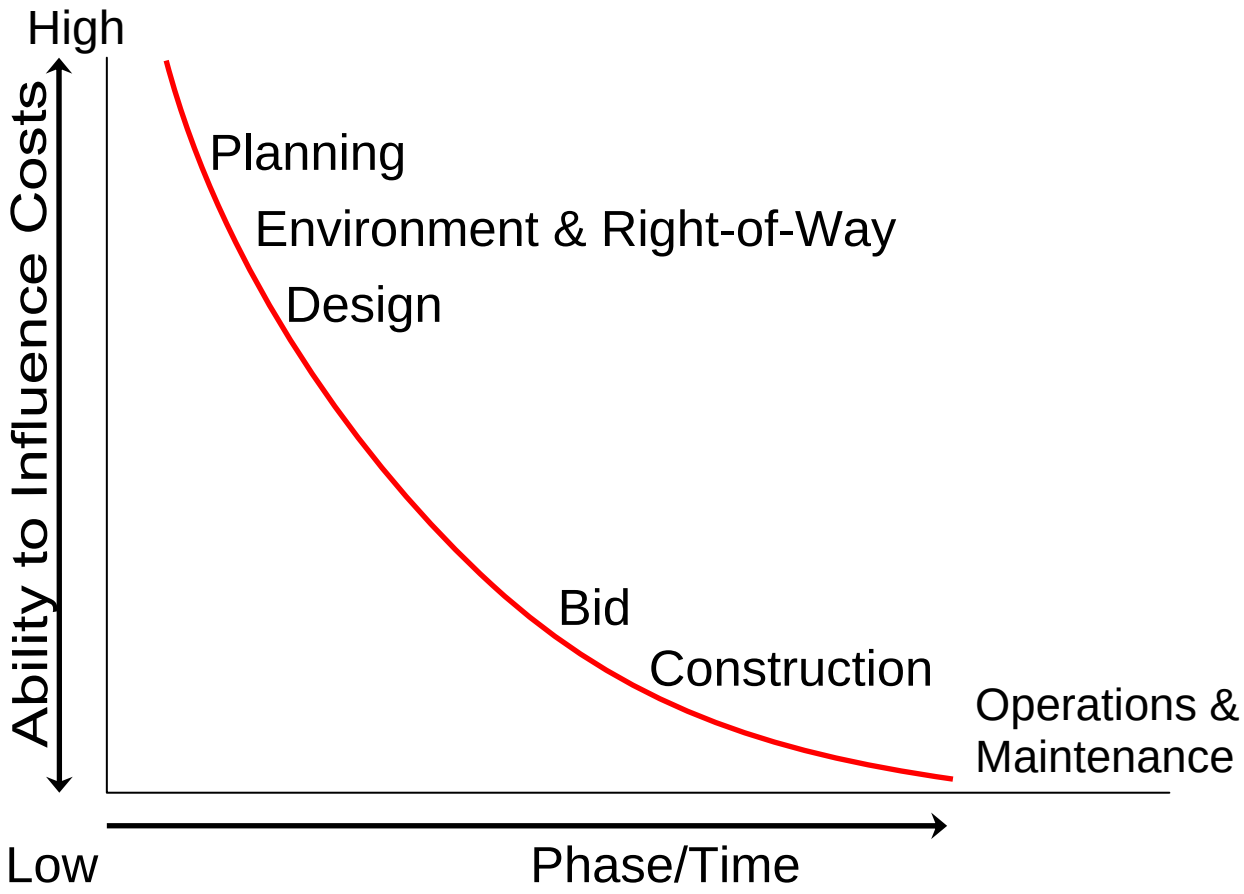
Constructability

The main purpose of a constructability review is to ensure the design will result in a project that is constructible, can be constructed in a cost-effective manner, is bidder friendly, and it is easy to maintain. This review needs to be a formal and documented process to help recognize and track potential issues and trends. Can the project be built? Is the project biddable? The constructability review can be performed at various stages in the design process, but prior to final PS&E submittal. The FHWA encourages constructability reviews at Project Initiation (PI), semi-final and final design stages. The assigned division office staff will encourage the SHA to conduct an appropriate number of constructability reviews commensurate with the scope of the project.

As part of the constructability review, you should be reviewing the phasing, staging, and sequencing of work. Consider construction sequencing in the design of features that may need to be constructed in a specific order to enable traffic management through the work zone, utility accommodation, environmental restrictions, earthwork, drainage, structural considerations and other factors. At a minimum, the design must reflect an orderly sequence of construction such that all design and environmental commitments can be efficiently accomplished. Preferably, the design should demonstrate a comprehensive analysis and design details for a fully optimized construction sequence that appropriately balances the overall cost, time, resources, quality, stakeholder and public concerns and environmental protection. As applicable, provide construction sequencing details, or applicable special contract requirements, or both, in the design and PS&E documents that depict the intended construction sequencing.

The role of the Area Engineer is to oversee implementation of a project from infancy as a concept through its development to a final facility being used by travelers. It is important that the Area Engineer play an active role throughout the project's entire life, providing direct oversight and often giving comments and input to guide the projects development. As illustrated in Figure 9 *(below),* the Area Engineer has greatest influence over the projects overall development, including project costs, in the early stages. For this reason, it is important to make comments and raise red flags early. It may be more difficult or not possible later to make needed changes or corrections.

Figure 9. *Constructability*



AE Heads-Up: In general, in evaluating constructability, is there a logical progression of construction activities? For example, if traffic is being moved to a new portion of roadway in the project phasing, but the plan shows that that section of road will not be complete for three more months, this indicates a constructability issue. The planned traffic control plan for the project sets forth traffic control items to be used to provide a safe work zone. If the contractor wants to build it differently for their own convenience, they should not receive additional compensation if there is increased cost.

▪ Design

Design reviews take place during the design process for the purpose of ensuring that the project is buildable within financial constraints, and meets both design standards and NEPA requirements. The review also enables the project sponsors to ensure that they are getting the project they want/need. The following sections point out various points in the design process where these reviews take place. There are four basic points in the design process where reviews may occur: initial field, intermediate, semi-final, and final. However, the points in the design process where specific reviews occur can be specific by State.

o Initial field

Initial field reviews are done during the environmental phase of the project. These reviews are preliminary, and incorporate only enough design work to complete the environmental document (30 percent as a general rule of thumb). At this point, the FHWA Area Engineer has opportunity to provide comments on the project development and provide guidance for the development of the environmental and design documents. The review should focus on:

- Determination of Consistency with Transportation Policy and Planning Initiatives (i.e. Growth Management Policies, Regional Transportation Plan, State and Regional modal plans)
- Assessment based on project evaluation criteria ("goals and objectives")
- Mobility
- Safety
- Cost Effectiveness
- Community Effects and Support
- Land Use and Economic Development
- Environmental Effects

o Intermediate

Intermediate reviews are usually done with the plans at the 30 to 50 percent design stage. Reviews at this phase should stress the basic roadway horizontal and vertical geometry. All geometric data must be calculated at this stage (stations, bearings, distances, horizontal and vertical curve data). Typical cross-sections are developed based on design requirements. Typical cross-sections show design elements that will predominate throughout the project. Particular attention should be paid to multimodal accommodations in the definition of these cross-sections and work completed during the planning phase to address user needs. The design should also seek to minimize impacts to utilities, to the extent feasible and without compromising user accommodation, as utility impacts can significantly contribute to project costs and delays.

- **Semi-final**

Semi-final reviews are usually done with the plans at the 85 to 95 percent design stage. Reviews at this phase confirm that the horizontal and vertical geometry developed in the preceding activities are further refined. The semi-final plans should include nearly all the drawings and data necessary for construction of the proposed project.

- **Final**

Final reviews will be done when the plans are complete. Expect this review to occur prior to receiving the final PS&E package. However, in some States, the final plan review is done at the time the PS&E package is received. (The PS&E process is covered in more detail in the next section of this manual.)

Road Safety Audits

Road safety audits are a relatively new activity in the United States with emphasis on crash prevention—designing safer new roads and modifying existing roads before crash statistics reveal a problem. Road safety audit findings can be incorporated into the design of projects. Road safety audits foster safer road projects by promoting elimination or mitigation of safety hazards (such as dangerous intersection layouts) and encouraging incorporation of crash-reducing features (such as traffic control devices, delineation, etc.) during the planning and design stages of project development.

Roadside Hardware

The FHWA policy requires that all permanent and temporary roadside appurtenances, such as traffic barriers, barrier terminals, bridge railings, work zone traffic control devices, and sign and luminaire supports, used within the clear zone on the on the NHS meet the performance criteria contained in either the National Cooperative Highway Research Program (NCHRP) Report 350, *Recommended Procedures for the Safety Performance Evaluation of Highway Features* or the AASHTO *Manual for Assessing Safety Hardware (MASH).* The NCHRP Report 350 and MASH specify the vehicles, speeds, and angles of impact used in full-scale crash testing of safety features. Devices that have been accepted by the FHWA are posted on the Office of Safety Web site (***http://safety.fhwa.dot.goc.roadways_dept/policy_guide/road_hardware***). The hardware guides posted on the AASHTO/AGC/ARTBA Joint Committee Task Force 13 Web site (***www.aashtotf13.org***) identify crashworthy hardware and include drawings, photographs, and links to the FHWA Acceptance Letters.

Reference:

- NCHRP Report 350-Roadside Hardware Web site ***http://www.trb.org/publications/nchrp/nchrp_rpt_350-a.pdf***

Traffic Analysis

During design, there are various aspects of traffic analysis that should be taken into account. The analysis should identify the types of operational and geometric strategies available to improve the flow of traffic and reduce congestion or address the defined problem. Defining the problem may be performance measure driven, based around a number of Measures of Effectiveness. The measures should be agency or project specific to meet the needs of the study and what support the local stewardship of maintaining integrity of the highway system. Examples include but are not limited to the following list:

- Access to community resources such as hospitals or special generators
- Travel Time to Interstate (minutes)
- Schedule Adherence of Transit
- Number of Phase Failures on Major Arterial connecting to Interstate
- Percent of demand served

- Percent of demand served in peak hour
- Percent of capacity used on signalized ramp terminals
- Maximum / Average Queue Length
- Travel Time On Network (vehicle-hours)
- Persons/vehicles served (vehicle-miles)
- Average speed and density
- Average trip length (vehicle/hours per trip)
- Duration of Congestion (hours at a defined density, speed or flow rate)
- Time of Onset For Congested Condition
- Extent (segment miles congested)
- Reliability (buffer index)
- Variability in Travel Time
- LOS as defined by Highway Capacity Manual (HCM)

In association with traffic analysis, one of the important areas that must be reviewed is accident data. Since one of the FHWA's top priorities is safety, analyzing accident data is essential to ensure the projects scope is being correctly defined. Accident concentrations need to be identified for assessment of design needs to correct the problems. This analysis needs to occur for all Federal-aid projects prior to NEPA completion to make sure the alternatives in the environmental process incorporates design features to address the concentrations. Whether adding capacity or making safety or operational improvements, accident data needs to be reviewed.

References:

- Traffic Analysis Toolbox website ***http://ops.fhwa.dot.gov/trafficanalysistools/index.htm***
- Travel Demand Management website ***http://ops.fhwa.dot.gov/tdm/index.htm***
- Work Zone Analysis website ***http://ops.fhwa.dot.gov/wz/traffic_analysis/index.htm***

Traffic Control Devices on Federal-aid Projects

The *Manual on Uniform Traffic Control Device*s (MUTCD) is a national standard that is adopted, regularly updated, and published online by the FHWA. Its purpose is to maintain the safety and efficiency of the transportation network by ensuring that signs, pavement markings, traffic signals, and other traffic control devices are designed, applied, and located uniformly so that drivers, pedestrians, and bicyclists can instantaneously recognize and easily understand these important devices, no matter where they travel in the United States. The provisions in the MUTCD are based on scientific research and experimentation results, consensus recommendations of many traffic control device experts and organizations, and the formal rulemaking process involving public review and comments.

It is critical to remember that, unlike many other FHWA publications which provide guidance or suggested best practices, the MUTCD is actually part of the Code of Federal Regulations [23 CFR 655] and has the force of law. Traffic control devices on all roads open to public travel must comply with the MUTCD.

Of particular importance to Area Engineers is the requirement in 23 CFR 655 that the traffic control devices installed (temporary or permanent) on Federal-aid projects for new highway or bikeway construction or reconstruction *shall be in conformance* with the most recent edition of the national MUTCD *before that highway or bikeway is opened or re-opened to the public for unrestricted travel.* This regulation is enforced by the FHWA division office as a part of the review and approval of project PS&E documents and project inspection.

References:

- *Manual on Uniform Traffic Control Devices* ***http://mutcd.fhwa.dot.gov/***
- MUTCD Team Contacts in the Office of Operations ***http://mutcd.fhwa.dot.gov/team.htm***

AE Heads-Up: Each Division office has a staff member assigned to handle MUTCD-related issues. Area Engineers should determine who that person is in their office and work closely with them on any MUTCD-related issues. In addition, MUTCD interpretations and other traffic control device policy issues are handled at FHWA Headquarters by the MUTCD Team in the Office of Operations.

Value Engineering

Value Engineering (VE) is defined as the systematic application of recognized techniques by a multi-disciplined team to identify the function of a product or service, establish a worth for that function, generate alternatives through the use of creative thinking, and provide the needed functions to accomplish the original purpose of the project, reliably, and at the lowest life-cycle cost without sacrificing safety, necessary quality, and environmental attributes of the project. The successful application of the VE process can contribute measurable benefits to the quality of the surface transportation improvement projects and to the effective delivery of the overall Federal-Aid Highway Program.

VE activities are performed by the project sponsor prior to bidding. VEs can be completed during the NEPA stage and/or prior to completion of final design. (Value Engineering Change Proposals (VECP) are performed after award. *(See Construction section).*

VE is required prior to authorization in the following cases:

- All projects on the Federal-aid system with an estimated total cost of $25 million or more;
- Bridge project with an estimated total cost of $20 million or more;
- Any other Federal-aid project the FHWA determines to be appropriate.
- Major Projects with an estimated cost of $500 million or more may require more than one VE analysis

References:

- VE and VEPC ***http://www.fhwa.dot.gov/ve/vepolicy.cfm***
- FHWA Frequently Asked Questions on VE website ***http://www.fhwa.dot.gov/ve/vefaq.cfm***
- All Value Engineering website ***http://www.fhwa.dot.gov/ve/***
- *FHWA Contract Administration Core Curriculum Manual* ***http://www.fhwa.dot.gov/programadmin/contracts/core03.cfm#s3A14***
- Life Cycle Cost Analysis (LCCA) website ***http://www.fhwa.dot.gov/infrastructure/asstmgmt/lcca.cfm***

AE Heads-Up: Be aware that the project and its related cost is ultimately defined by the project scope in the Environmental Document, with the total project cost (PE, ROW, Design, and Construction) in year of expenditure, not just the estimated construction cost. The VE analysis should cover the entire project, not just one or two elements. Your division office may make the determination that all projects utilizing Federal-aid that are $25 million or greater ($20 million for bridge projects) require a VE as well as Full Oversight. If your division office makes this determination, it should be addressed in your Stewardship and Oversight Agreement with the SHA.

Work Zone Traffic Management

Managing traffic during construction is necessary to minimize traffic delays, maintain or improve motorist and worker safety, complete roadwork in a timely manner, and maintain access for businesses and residents. Work zone traffic management strategies should be identified based on the project constraints, construction phasing/staging plan, type of work zone, and anticipated work zone impacts.

Once these strategies are implemented, they need to be consistently monitored to ensure they are effective in managing work zone impacts.

23 CFR 630 subpart J includes 3 primary components that address work zone safety and mobility:

- Implementation of a work zone safety and mobility policy at the State level.
- Implementation of standard processes and procedures to support policy implementation, including procedures for work zone impacts assessment, analyzing work zone data, training, and process reviews.
- Implementation of procedures to assess and manage work zone impacts on individual projects. This includes requirements for identifying significant projects and developing and implementing transportation management plans (TMPs).

A TMP lays out a set of strategies for managing the work zone impacts of a project. The scope and content of the TMP required for a project are based on the agency's work zone policies, its understanding of the expected work zone impacts of the project, and whether a project is determined to be significant. Although a full TMP is not developed until design, conducting some TMP analyses during systems planning and preliminary engineering will help ensure that the TMP development and implementation costs are included in the project budget. Early TMP development will also help with scheduling and coordinating projects to minimize the cumulative work zone impacts of multiple projects along a corridor or in a region.

At a minimum, the TMP for all projects will include a temporary traffic control plan that addresses traffic safety and control through the work zone. If a project is expected to be significant, the TMP for that project must also include a transportation operations component that addresses operations of the transportation system in the work zone impact area, and a public information component that addresses appropriate communication with the public and concerned stakeholders both before and during the project.

References:

- Work Zone Regulations and Policies: ***http://www.ops.fhwa.dot.gov/wz/resources/policy.htm***

- *23 CFR 630 subpart J – Work zone Safety and Mobility Rule*
- *23 CFR 630 subpart K – Temporary Traffic Control Devices*
- *23 CFR 634 – Worker Visibility*
- *MUTCD Part 6 – Temporary Traffic Control*

- Work Zone Safety and Mobility Rule Implementation Guidance: ***http://ops.fhwa.dot.gov/wz/resources/final_rule/guidance.htm***
- Traffic Analysis Tools: ***http://ops.fhwa.dot.gov/trafficanalysistools/index.htm***

FHWA Work Zone websites:

- Operations Work Zone website ***http://ops.fhwa.dot.gov/wz/index.asp***
- Safety Work Zone website ***http://safety.fhwa.dot.gov/index.cfm***

AE Heads-Up: 23 CFR 630.1006 requires the State to have an approved *"Work Zone Safety and Mobility Policy."* You should locate and become familiar with this document.

PRECONSTRUCTION (PS&E APPROVAL, ADVERTISING, AND AWARD)

The preconstruction phase for project oversight includes approval of Plans, Specifications and Estimates (termed "PS&E approval"), authorization, advertising, and award of the project. The preconstruction process begins when the PS&E package has been submitted by the SHA for review and approval. Once the PS&E has been approved, construction funds can be authorized, and the project can be advertised. After the project has been advertised and the bids have been received by the SHA, FHWA will review the bids and concur in award (or rejection) of the project. To aid in the review and approval of the PS&E package, many division offices have developed checklists for their review of the package to ensure that all the applicable requirements have been met.

Plans, Specifications, and Estimates (PS&E)

Plans and specifications must describe the location and design features and the construction requirements in sufficient detail to allow for accurate bids, to facilitate the construction, and to enable the SHA to control the contract. The FHWA regulations do not require that the SHAs have standard plans or standard specifications, though it encourages consistency. However, the regulations require that, on projects with FHWA oversight, the PS&E for each project must be approved by FHWA prior to advertisement of the project. In the absence of pre-approved standard specifications and standard plans, all of the required specifications and plan information would have to be included and approved as part of the PS&E package for each project. Therefore, FHWA approval of standard specifications and standard plans simplifies the PS&E review process. Once approved, the standard specifications and standard plans may be used on Federal-aid projects in the State without further review. The State may also have standard special provisions that the division office may want to review on a District or project basis.

▪ Plans

Hopefully this is not the first time you have seen the plans. If so, review the design section of this manual for additional guidance. Take a look at the list of all bid items tabulation for comparison between plans and engineers estimate. Verification of numerous items is needed such as: type, size, and location (TSL), design exceptions, erosion control, traffic control plan, environmental mitigation and commitments, ROW notes, etc. These are often added to the plans at the end of process. Are they easy to understand? We will cover these issues in more detail later.

▪ Specifications

Specifications contain the written instructions for constructing transportation projects, outlining in detail a description of the work, materials, construction methods, method of measurement, basis of payment, and the pay item for each item of work involved in the contract. There are three types of specifications to look at: ***standard specifications, supplemental specifications, and special provisions.***

o Standard Specifications

Standard Specifications are Specifications approved for general application and repetitive use, typically compiled and made available in book form. Standard specifications are generally updated and are re-issued every several years by the SHA. The FHWA division offices have delegated authority for reviewing and approving the States' construction specifications. These delegations are outlined in the *FHWA Delegations Manual, Chapter 5* (***http://www.fhwa.dot.gov/legsregs/directives/orders/m11001a.htm***), and as allowed by 23 CFR 630 Subpart B (***http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div5&view=text&node=23:1.0.1.7.21&idno=23***). Standard Specifications should be reviewed and approved by the division office for general application and repetitive use for all Federal-aid projects. You should read them to have a general understanding of what they contain and how the special provisions relate to them.

o Supplemental Specifications

Supplemental Specifications are additions and revisions to the standard specifications that are used to update the standard specifications between publications. As with the standard specifications, supplemental specifications should be reviewed by the division office for general application and repetitive use. Supplemental Specifications should be the latest version and the same in all contracts. They supersede the Standard Specifications. Changes since the last time you reviewed a project should have been reviewed and approved by the office's specification engineer (normally a collateral duty). If you have any questions ask the specification engineer or appropriate technical expert.

o Special Provisions (SP)

Special Provisions are project specific specifications that are written specifically for individual projects. They supersede the Standard and Supplemental specifications to reduce inconsistency in specifications within a State. It is recommended that they are reviewed and approved by the SHA specification engineer. The SPs are often used with specific items of work and as experimental specifications. Since almost all ITS/technology projects are unique, special provisions may be developed specific to the software and hardware development. Special provisions may include but not be limited to:

- Scope of Work (including project limits, and project length)
- Provisions for work schedule, milestones, completion dates and Prosecution of Work
- List of Utility owners (with name and address, of contact person)
- List of Items which have material options
- Individual contract items not covered in Standard Specifications, or if deviations to the Standard Specifications are made.
- Special Precautions (other facilities such as structural foundations, ponds, streams, etc.)
- Special permission or construction methods stipulated in the environmental permits
- Copies of Permits, Licenses, Certificates, or Orders of Conditions (when available)

References:

- 23 CFR 625 ***http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div5&view=text&node=23:1.0.1.7.18&idno=23***
- 23 CFR 630, Subpart B
- Non Regulatory Supplement for 23 CFR 630 Subpart B ***http://www.fhwa.dot.gov/legsregs/directives/fapg/0625sup.htm***
- Technical Advisory T 5080.16 ***http://www.fhwa.dot.gov/legsregs/directives/techadvs/t508016.htm***
- National Highway Specifications ***http://fhwapap04.fhwa.dot.gov/nhswp/index.jsp***

AE Heads-Up: The division office generally accepts and approves a Standard Specification manual, but the Area Engineer will be responsible for reviewing and approving any special contract provisions on a project by project basis. It is suggested that you have a personal copy of the Standard Specifications. Take your copy and notate references to the supplemental specifications. This will provide a note as you read the specifications to look at changes in the supplemental specifications. When there are Supplemental and Special Provisions on a project, you should be aware of what the changes are and why they are needed. In some cases Special Provisions are used so frequently that they become known as "Standard Special Provisions," so it becomes very important to understand what is "special" about them. For some local public agencies they may elect not to use the SHAs standard specification. If this is the case, you should ensure that the SHA has reviewed and approved them for use on projects that utilize Federal-aid. The SHA should also document its review and approval of the LPA specifications.

AE Heads-Up: The National Highway Specifications Website (NHSW) is an online searchable library of highway construction specifications, construction manual and plans. As part of the specification review and approval process, the division offices should actively work with the State DOTs to ensure that all updated specifications are placed on the NHSW in a timely manner. Because the NHSW is an FHWA information system, State DOT personnel may only update the site if they are registered in the FHWA's User Profile and Access Control System (UPACS) and are granted a UPACS ID and access rights to the NHSW. The process for a State DOT user to register and gain access to the NHSW requires approval by the UPACS Administrator within each division office, as well as a division office sponsor.

- **Civil Rights**

  - **Disadvantaged Business Enterprise (DBE)** – During the review of the PS&E package, you should determine if DBE goals have been included in the contract. The DBE program ensures equal opportunity in transportation contracting markets, addresses the effects of discrimination in transportation contracting, and promotes increased participation in federally-funded contracts by small, socially and economically disadvantaged businesses, including minority- and women-owned enterprises.

    Statutory law provides that at least 10 percent of the amounts made available for any Federal-aid highways, mass transit, and transportation research and technology program be expended with certified DBEs. DBE participation requirements in Federal-aid highway contracts are contract provisions like any other contract provisions and should be administered as such. DBE administrative issues that will require review and attention may arise during a project.

    The FHWA must approve each State's DBE program and its annual goals to ensure compliance with all DBE Program requirements. The main objective of the DBE Program is to ensure that DBE firms have an opportunity to participate in DOT funded contracts. Effective administration of the DBE program requires full understanding of the program, including its goals and objectives.

The FHWA Area Engineer should be familiar with the general provisions of the DBE Program and have the ability to:

- encourage the utilization of DBE contractors and subcontractors,
- encourage the utilization of DBE consulting firms,
- include DBE considerations in such functions as:
  - PS&E reviews,
  - authorization actions,
  - contract solicitation and award processes,
  - project inspections, and
  - process reviews, etc.
- provide technical advice, assistance, and services to the SHA in regard to the administration of the DBE program, and
- coordinate with the FHWA Resource Center Office of Civil Rights and other program office activities.

– **On the Job Training (OJT)** – As part of the Civil Rights program, the OJT program should also be included in the contract. The objectives of the OJT Program are to:

- provide training and improve the skills of women and minorities so that they have the opportunity and access to higher paying skilled trade jobs and journeyman positions, and
- broaden the labor pool to meet the projected future labor needs in the construction industry.

The FHWA does not require that 100 percent of the trainees and apprentices on a project be minorities or women. However, for trades in which minorities or women are under-represented, a majority of the training positions on that project must be filled by minorities or women. The contractor must demonstrate a systematic and direct recruitment effort to comply with the contract's training and special provisions.

The contract training goal is the actual number of training positions or slots required on the project. The OJT Program requires that a special provision be included in the contract which specifies the number of trainees that are to be assigned to various appropriate highway construction skilled crafts for actual hands on experience unless your State has a pilot program that implements the objectives without individual project goals.

References:

- Civil Rights ***http://www.fhwa.dot.gov/civilrights/index.htm***
- Equal Opportunity ***http://www.fhwa.dot.gov/civilrights/eo.htm***
- Equal Employment Opportunity ***http://www.fhwa.dot.gov/civilrights/eeo.htm***
- Nondiscrimination ***http://www.fhwa.dot.gov/civilrights/nondis.htm***

o Contract Provisions

– **FHWA 1273** – Required Contract Provisions, Form FHWA-1273 (i.e., “the boilerplate”), is a convenient collection of contract provisions and proposal notices that are required by regulations promulgated by the FHWA and other Federal agencies which must be **physically incorporated (not by reference)** into all Federal-aid construction contracts as well as appropriate subcontracts and purchase orders. However, certain provisions, such as the Davis-Bacon and the Copeland Act, are only required for projects located on a Federal-aid Highway System.

Reference:

- *Form FHWA 1273* ***http://www.fhwa.dot.gov/programadmin/contracts/1273.cfm***

– **Buy America and Buy American** – All iron and steel products permanently incorporated into a Federal-aid project **must be manufactured in the USA**. Also applying a coating such as epoxy must also be performed in the USA. Buy America does not apply to temporary steel items, such as temporary sheet piling, temporary bridges, steel scaffolding and falsework. Further, Buy America does not apply to materials which remain in place at the contractor's convenience. Waivers and allowances are permitted with proper support. If the SHA or contractor wishes to incorporate foreign iron or steel products into a project, review the requirements stated in the *Contract Administration Core Curriculum Participant's Manual and Reference Guide 2006* and discuss with your offices leadership. All waivers require the FHWA HQ's review/approval, which is estimated to take up to 6 weeks. **Note:** This waiver authority is not allowed to be delegated to the division offices.

Minimal Use Criteria - Non-domestic iron and steel materials may be used, provided the cost of such material does not exceed one-tenth of one percent (0.1 percent) of the total contract cost or $2,500, whichever is greater. For purposes of this paragraph, the cost is that shown to be the value of the steel and iron products as they are delivered to the project. Typically, every State has a standard specification that acknowledges this requirement.

Buy America cannot be delegated to SHAs or LPAs, and the division office must coordinate with FHWA Headquarters for all waivers. The Office of Program Administration currently maintains a list of all recent waivers that is viewable on the Memorandum referenced below.

References:

- *Headquarters memorandum, Subject: "Revised Policy for the Approval of Buy America Waivers" – March 13, 2008.* ***http://www.fhwa.dot.gov/construction/contracts/080313.cfm***
- Buy America website ***http://www.fhwa.dot.gov/construction/cqit/buyam.cfm***
- *Quick facts about Buy America* ***http://www.fhwa.dot.gov/programadmin/contracts/b-amquck.cfm***
- List of Buy America Waivers ***http://www.fhwa.dot.gov/construction/contracts/waivers.cfm***

AE Heads-Up: Buy America waivers require a public comment period and publication in the *Federal Register*; therefore, it is important to identify the uses of foreign materials as soon as possible. Headquarters also needs to review and approve all Buy America requests. Due to the length of time required to process a Buy America waiver, it could delay award of a project and/or construction. After the contract has been awarded and is in construction, it is good to do spot checks on materials on the project that may be of import origin, i.e., steel conduit, rebar, pipes, girders, etc.

– **Changed Condition Clauses** – The standardized changed condition clauses in 23 U.S.C. 112(e) must be included verbatim in all contracts, unless State statute prohibits their inclusion. An alternate clause developed by the SHA may be used, provided it has been developed and implemented in accordance with State statute. The Division Administrator must approve this alternate clause.

The regulation requires the use of three different clauses:

1. Differing Site Conditions Clause – This clause provides for the adjustment of the contract terms if the contractor encounters:

- Type I Condition - subsurface or latent physical conditions that differ materially from those indicated in the contract, or
- Type II Condition - unknown physical conditions of an unusual nature that differ materially from those ordinarily encountered and generally recognized as inherent to the work.

Some examples of potential Type I conditions include encountering the following: more rock than indicated in the contract, larger rock, rock that is harder to drill, permafrost when the boring had given no indication of its general extent, or unexpected quantities of underground water not indicated on the boring logs.

2. Suspensions of Work Ordered by the Engineer – This clause provides for the adjustment of the contract terms if the performance of all or a portion of the work is suspended or delayed by the engineer, in writing, for an unreasonable period of time (not originally anticipated, customary, or inherent to the construction industry). The contractor is required to submit a request for adjustment, in writing, to the Engineer within 7 calendar days of receipt of the notice to resume work. Recovery of profit on costs resulting from suspensions of work is not allowed.

This clause does not preclude the recognition of constructive suspensions or delays resulting from the contracting agency's actions, without written notification. These are delays caused by the owner's instructions that are not in writing. The contractor may receive verbal orders from the engineer, or be delayed by the owner's lengthy review of submittals. Some States recognized constructive delays in their specifications prior to the FHWA regulation. The preamble to the regulation indicates that States may continue to recognize construction delays if this is provided in their standard specifications and contract administration procedures.

To qualify for an adjustment, suspensions must be for unreasonable periods and do not include brief, customary suspensions for reasons inherent to highway construction (i.e., material sampling and testing; approval of shop drawings, material sources, etc.; and other reasonable and customary suspensions necessary for the supervision of construction by the contracting agency). In addition, an adjustment under this clause is not allowed if the work is suspended for other reasons or if an adjustment is provided for, or excluded, under other terms or conditions of the contract.

3. Material Changes in the Scope of the Work – This clause provides for the adjustment of the contract terms if the Engineer orders, in writing, an alteration in the work or in the quantities that significantly change the character of work. The term "significant change" shall be construed to apply only to the following circumstances:

- the altered character of the work differs materially from that of the original contract, or
- a major item of work, as defined in the contract, is increased or decreased by more than 25 percent of the original contract quantity (adjustments shall apply only to that portion in excess of 125 percent of original contract quantity, or in case of a decrease, to the actual quantity performed.

This clause provides for adjustments resulting from formal change orders by the Engineer, in writing, to the extent that the impacted work is part of the contract. Either party may initiate an adjustment and both must be in agreement before the work is performed. As with the suspension of work provision, this clause does not preclude the recognition of constructive suspensions or delays.

Reference:

- Changed Condition Clause
  http://www.fhwa.dot.gov/programadmin/contracts/core02.cfm#s2B06

– **Incentives/Disincentives (I/D)** – An I/D provision for early completion is defined as a contract provision, which compensates the contractor for each day that identified critical work is completed ahead of schedule and assesses a deduction for each day that completion of the critical work is delayed. The use of I/D provisions should be restricted to critical projects where it is essential that traffic inconvenience and delays be held to a minimum. Consider paying only for what you really need, and let the contractors compete in their bids and schedules.

A project's suitability for I/D provisions must be identified during the early stages of project development in order that resources may be fully deployed on the design and coordination of the project.

Generally, the use of I/D provisions should be limited to those projects that would severely disrupt highway traffic. I/D provisions should **not** be used routinely. The determination of the rate of compensation or penalty must be based on the estimated road user costs.

Reference:

- Time-Related Incentive/Disincentive (I/D) Provisions - CACC
  http://www.fhwa.dot.gov/programadmin/contracts/core03.cfm#s3A08

– **Partnering** – Partnering is the creation of a relationship between SHAs and the contractor that promotes mutual and beneficial goals. Partnering is a win-win approach based on trust, cooperation and communication from the earliest stage of the project through completion. The purpose of the partnering agreement is to utilize a structured systematic methodology for developing a spirit of teamwork and cooperation through shared goals, open communication, problem identification and solving, formal conflict resolution, and the evaluation and feedback of team performance. Some benefits of partnering are a better quality product, lower risk of cost overruns, increased time savings, and reduced exposure to litigation on construction projects.

References:

- Engineer's Estimate – CACC
  http://www.fhwa.dot.gov/programadmin/contracts/core03.cfm#s3A02
- *Guidelines on Preparing Engineer's Estimate, Bid Reviews and Evaluation*
  http://www.fhwa.dot.gov/programadmin/contracts/ta508046.cfm

AE Heads-Up: Partnering is not an FHWA requirement, but is recommended. The cost of the partnering process should be split equality been the contracting agency and the contractor. This should be included in the contract documents.

– **Patented and Proprietary Products** – In delivering highway projects, the FHWA does not endorse specific products or brands. The primary purpose for this policy is to allow both for competition in selection of materials and for development of new materials and products. The policy further permits:

- Materials and products that are judged equal may be bid under generic specifications. If only patented or proprietary products are acceptable, they shall be bid as alternatives with all, or at least a reasonable number of, acceptable materials or products listed; and
- The Division Administrator may approve a single source if it can be found that its utilization is in the public interest.

The improper use of patented or proprietary products has been a major issue in the past. Review the contract items and look for any specific brand name. Pavement marking, traffic control items, signs and erosion control items are often the problem. The erosion control plan is often prepared by a consultant who may not be aware of Federal requirements on the use of patented or proprietary products. Also look for overly restricted specifications which may indicate that they have been written for only one project. Often a good working relationship with field staff is the only way to know if a specification is proprietary in nature.

The FHWA will not participate, directly or indirectly, in payment for any premium or royalty on any patented or proprietary material, specification, or process specifically set forth in the plans and specifications for a Federal-aid project (on or off the NHS including LPA's) unless:

- The item is purchased or obtained through competitive bidding with equally suitable unpatented items;
- The SHA certifies either that the proprietary or patented item is essential for synchronization with the existing highway facilities or that no equally suitable alternative exists; or
- The item is used for research or for a special type of construction on relatively short sections of road for experimental purposes. States should follow the FHWA's procedures for Experimental Work Plans for Proprietary Products (***http://www.fhwa.dot.gov/construction/cqit/workplan.cfm***) for the submittal of work plans and evaluations.

Trade names are generally the key to identifying patented or proprietary materials. Trade name examples include 3M or Corten. Generally, products identified by their brand or trade name are not to be specified without an "or equal" phrase, and, if trade names are used, all, or at least a reasonable number (two, three, etc) of acceptable "equal" materials or products should be listed. The licensing of several suppliers to produce a product does not change the fact that it is a single product and should not be specified to the exclusion of other equally suitable products.

Reference:

- Patented and Proprietary Products
  http://www.fhwa.dot.gov/construction/cqit/propriet.cfm

AE Heads-Up: When determining if a reasonable number (two, three, etc.) of acceptable "equal" materials or products are provided, you should be aware that some division offices have determined that two items are acceptable, while others have determined that three items are required. You should verify what your division office has determined is a reasonable number.

– **Price Adjustments** – Price adjustment clauses may/should be applied only to materials with uncontrollable price volatility which may greatly affect contract prices. In general, price adjustment clauses may be invoked if:

- The price trend is extremely volatile,
- Suppliers are unable to provide a price quotation for the usual term of the typical contract,
- The price quote may be based on date of delivery or spot market conditions, or
- Shortages may be expected.

The standard, upon which price adjustments are to be based, should be real, quantifiable, and identified in the contract specifications. This standard should represent a price, or base index, which is not susceptible to manipulation by contractors or suppliers. The SHA may develop its own price index or adopt any of the published commonly available data. The Consumer Price Index is an example of a commonly used published index.

References:

- *Guidelines on Preparing Engineer's Estimate, Bid Reviews and Evaluation:* ***http://www.fhwa.dot.gov/programadmin/contracts/ta508046.cfm***
- *PS&E Approvals:* ***http://www.fhwa.dot.gov/construction/cqit/pse.cfm***
- *Non-regulatory Supplement for Part 630, Subpart B:* ***http://www.fhwa.dot.gov/legsregs/directives/fapg/0630bsup.htm***
- *Construction Program Management and Inspection Guide, August 2004:* ***http://www.fhwa.dot.gov/legsregs/directives/fapg/0630bsup.htm***

AE Heads-Up: Some of the typical items that use price adjustments are diesel, asphalt binder, and steel.

– **Public Interest Findings (PIF)** – Public interest findings, commonly known as PIFs, are made in instances where it is determined to best serve the public to deviate from statutory or regulatory requirements. These instances should be rare since a public interest and/or cost effectiveness determination is an acknowledgment that the needs of the public will be better served by not following policy. However, the FHWA allows public interest findings to be used (with adequate documentation) in the following areas: use of proprietary products, use of public equipment, and contract award based on a method other than competitive bidding.

The actual cost effectiveness/public interest finding will consist of a written document outlining the basis for the request and any supporting documentation such as a cost/benefit analysis, discussion of product compatibility, logistical concerns, or other considerations.

The cost effectiveness/public interest finding is generally approved by the Division Administrator for Interstate and NHS projects, and the appropriate SHA official for all other projects; however, the specific conditions of approval authority should be described in the oversight agreement between the FHWA division office and the SHA. This agreement should address the appropriate approval levels for public interest findings related to different oversight levels. Note that some issues may require the Division Administrator 's concurrence regardless of oversight levels; among these issues are DBE requirements, and method of construction.

References:

- FHWA Stewardship Portal ***http://rc.fhwa.dot.gov/stewardshipportal/***
  - Click on *Local Stewardship Tools Library* button,
  - It is listed under the *Resource Center* or *Construction & Contract Administration* as the *Public Interest Findings (PIF)* database
- *Headquarters memorandum - Product Selection, November 25, 1987:* ***http://www.fhwa.dot.gov/programadmin/contracts/112587.cfm***
- *Headquarters memorandum - "Guidance on Patented and Proprietary Product Approvals", January 11, 2006:* ***http://www.fhwa.dot.gov/programadmin/contracts/011106.cfm***
- Questions and Answers Regarding Title 23 CFR 635.411 ***http://www.fhwa.dot.gov/programadmin/contracts/011106qa.cfm***
- *Guidelines for Public Interest Findings and Certifications for Retroreflective Sign Sheeting* ***http://www.fhwa.dot.gov/construction/cqit/findings.cfm***

- *Guidelines for Public Interest Findings and Certifications for Retroreflective Sign Sheeting, July 2006*
  http://safety.fhwa.dot.gov/roadway_dept/night_visib/policy_guide/memo_retroguid/
- *FHWA Contract Administration Core Curriculum Manual:*
  http://www.fhwa.dot.gov/programadmin/contracts/core03.cfm#s3A14

AE Heads-Up: A nationwide PIF database has been developed and is available at the referenced "FHWA Stewardship Portal". The information available on the Stewardship Portal is an invaluable aid when you are developing or reviewing PIFs or waivers. When you have completed PIFs or waivers, you need to forward them to the FHWA Resource Center. To state that a certain product or means of construction is "cheaper" without showing the cost basis for such determinations is not acceptable. It is also not acceptable to make line items in the contract non-participating to avoid the requirement of a PIF. **In addition, a material or product that may be on a State's Approved Products List (APL), does not suffice for a PIF as proper justification is still required.**

o Engineers Estimate

The engineers estimate is an essential element in project approval. The estimate should reflect the anticipated cost of the project in sufficient detail to permit an effective review and comparison of the bids received. In addition, the estimate serves as a guide for analyzing bids. Estimates are based on historical or actual cost.

The SHA normally has a database of historical item/unit costs. Be aware that prices differ based on item quantities, project location, schedule and numerous other factors. If you have a question concerning how an estimate was put together, you can request the SHA to provide the supporting documentation used to determine item/unit costs.

AE Heads-Up: **Keep the estimate confidential**. Do not share the estimate information with anyone outside your office or the SHA. After the bids have been opened, some States release the engineer's estimate, but this varies by State. In some States, though discouraged by the FHWA, the engineers estimate amount is released at the time the contract is advertised.

Here are some general considerations regarding Engineers Estimates:

- The Engineers Estimate should be prepared and reviewed carefully to reflect as realistically and accurately as possible the expected costs of the work at the time of receipt of bids.
- The SHA should establish consistent and compatible procedures for the preparation, review, and updating of estimates.
- The unit prices used for estimates, and corresponding actual unit bid prices when available, for the preceding 12 months should be reviewed to determine if changes in estimated unit prices are needed to reflect any trends that have occurred.
  (1) The estimate should reflect prices that are realistic for the areas, times, and characteristics of the work to be done (regional adjustment and seasonal adjustment are especially important).

(2) Incentive/disincentive or escalation clauses should be considered in determining the estimated unit costs since such clauses may affect the estimate considerably.
(3) Other factors that can affect the estimated cost of a project such as labor rates, equipment rates, interest rates, time to complete, competition levels, and material shortages should be considered and estimated costs adjusted as necessary.
(4) Bid price data bases should be current at the time of estimate preparation and should be current (within 4 weeks) at the time of advertisement.

- Estimates should include a number of descriptions of the item, estimated quantity, unit, and price (words and numerals) for each proposed item of work.
- For accounting purposes, the Engineer's Estimate should identify separately:
  (1) urban and rural quantities,
  (2) county-by-county breakdown,
  (3) tabulations of items coded on the basis of the predominant Improvement and Construction Type Code.
- Construction Engineering should be shown as a separate line item.

o ROW Clearances

During the PS&E review, it is important to verify that proper ROW clearances (temporary and/or permanent) have been obtained prior to authorization of construction funds. ROW clearances are commonly referred to as:

- Cert #1 – all rights to property have been obtained
- Cert #2 – rights to enter have been obtained
- Cert #3 - work arounds have been identified
  NOTE: Cert #3 and /or #2 should be upgraded before award.

The ROW section in this manual has more information on this issue.

References:

- *Utilities – Construction Program Guide:* ***http://www.fhwa.dot.gov/construction/cgit/utilities.cfm***
- FHWA Utility Program site ***http://www.fhwa.dot.gov/programadmin/utility.cfm***

> ***AE Heads-Up:*** You should ensure that utility and/or railroad agreements are in place. Public and/or private utilities are eligible to be moved using Federal-aid funds, depending on your State's specific statutes (you need to verify what your State's requirements are). Federal-aid may be used if State law allows for reimbursement in whole or partial sharing of costs, whichever is more restrictive. Also, you need to refer to the terms of occupancy agreement/permit to verify if relocation costs are to be borne by the utility owner.

Project Authorization and Project Agreements

No work is eligible for FHWA funds prior to its funding request being approved by the appropriate division office staff. **NOTE:** FHWA Emergency Relief (ER) projects for emergency repair can be an exception. For a list of items to consider before supporting the authorization, see the PS&E checklist.

The FHWA's current regulations for Project Authorization and Agreements in 23 CFR 630A provide flexibility and allow the States to use their own format for project agreements. The regulations allow electronic submission of the project agreement and modifications, provided the format is compatible with

the FHWA's Fiscal Management Information System (FMIS). The provisions of the Project Agreement are included in 23 CFR 630A. The required elements of a project agreement format are described in 23 CFR 630.108.

A form called the Project Agreement form (PR-2) used to be attached to all project authorizations. The PR-2 generally included project scope, the estimated total project cost, and use of Federal funds. This form stipulated that the SHA would maintain the project, stating that "*The State highway agency will maintain, or by formal agreement with appropriate officials for a county or municipal government cause to be maintained, the project covered by this agreement."* While this form is no longer used, it is important to ensure that it is understood that the SHA will maintain the project in order to receive Federal-aid funds. For reference, a copy of the old PR-2 is included in **Appendix F**.

References:

- 23 CFR 630 Subpart A – Project Authorization and Agreements
- 23 CFR 635 Subpart C - Authorization
- 23 CFR 668 – Emergency Relief
- Fiscal Management Information Systems (FMIS) website ***http://staffnet.fhwa.dot.gov/financial/index.htm#fiscal#fiscal***
- Project Authorization / Project Agreement – CACC website ***http://www.fhwa.dot.gov/programadmin/contracts/core01.cfm#s1J***

AE Heads-Up: Ensure that the SHA understands that it will maintain the project in order to receive Federal-aid funds.

▪ Pre-qualification

Pre-qualification is a means of predetermining job experience and work capacity and to identify individuals and organizations from whom the agency may accept a bid.

Generally, pre-qualification consists of an evaluation of the contractor's experience, personnel, equipment, financial resources, and performance record. The evaluation is normally performed annually. The information required for pre-qualification may be extensive; however, the pre-qualification process should be relatively short so that it may be completed during the project advertising period. A State's pre-qualification process should not be used to limit competition or discourage the submission of a bid by an otherwise responsible contractor. Any changes should be reviewed closely.

References:

- *23 U.S.C. 112*
- *23 CFR 635.110*

AE Heads-Up: The contractor must be pre-qualified prior to bidding or award, depending on your State's rules. The contractor does not need to be pre-qualified to receive a bid package. 23 CFR 635.110 requires the State to get approval for their licensing and qualifying of contractors procedure if they have them. You should locate and become familiar with these procedures.

▪ Advertising for Bids

A project may be advertised following PS&E approval by the Division Administrator, as established in 23 CFR 635.112. Authorization must be based on the assurances prescribed in 23 CFR 635.309, which include:

- PS&E approval;
- Assurances that all ROW clearances, utility, and railroad work have been completed, or that arrangements have been made for coordination during construction with proper notice provided in the bid proposal;
- Assurances for relocation of individuals and families when such circumstances exist,
- Assurances that the public hearing process and that the location and design approval requirements have been met;
- Assurances, where applicable, that required area-wide agency reviews have been accomplished; and
- Assurances that all environmental commitments are included in the project authorization. NOTE: Not all environmental commitments/features may be eligible for FHWA funds just because they are in an approved NEPA document!

The FHWA's policy requires that the SHA's advertising policies and practices must assure free and open competition. This policy includes issues concerning licensing, bonding, prequalification, and bidding, as well as the announcement itself in relation to compliance with Title VI, nondiscrimination on the basis of age, race, religion, color, sex, national origin, or disability.

For projects that utilize Federal-aid, the minimum advertisement period is 3 weeks. With approval by the Division Administrator, the advertisement period may be reduced where circumstances warrant.

Reference:

- Advertising for Bids – Construction Program Guide website ***http://www.fhwa.dot.gov/construction/cqit/bids.cfm***

AE Heads-Up: Once the construction funds are authorized, subsequent changes to the advertised contract may occur in the issuance of an addendum prior to bid opening. For Federal oversight projects, an addendum is a revision to the approved PS&E which must be reviewed and approved by the FHWA. If an addendum is issued, adequate time is needed to ensure all bidders receive it. Seven to ten days is typical, depending on the addendums stated revisions.

▪ Conditional Approvals

Conditional approvals are formal documentation to support moving an issue or action forward, pending minor corrections or submissions of additional required information. Such actions that may be moved forward in this manner include authorization, bid letting (advertisement), or change orders. In writing the conditional approval, you could stipulate that the contract could be advertised, but the bids could not be opened until such time that required stipulations have been met.

▪ Pre-bid Meetings

The goal of the pre-bid meeting that is typically used on larger/complex projects is to help make the potential contractor aware of unique project specifics. Also, it provides an opportunity to clarify and address the contractor's questions or solicit contractor input on the contract. Pre-bid meeting notes need to be documented and provided to all bidders. It is highly suggested that a pre-bid meeting be held if the SHA is deploying a new system or type of construction before the project is bid.

The FHWA does not prohibit the use of mandatory pre-bid meetings; however, if attendance at a pre-bid meeting is made a condition of bid responsiveness, in essence prequalifying the contractor, the project advertisement and all bidding documents must reflect this requirement. The contracting community must be given adequate notice to comply with such a requirement.

Reference:

- *FHWA Contract Administration Core Curriculum Manual* site **http://www.fhwa.dot.gov/programadmin/contracts/core03.cfm#s3A14**

▪ Bid Analysis and Concurrence in Award

The bid analysis process, pursuant to 23 CFR 635.113 and 114, is an examination of the unit bid prices for reasonable conformance with the engineer's estimated prices. Beyond the comparison of prices, other factors that a bid analysis may consider include:

- number of bids
- distribution or range of the bids
- mathematical or material imbalance of bids
- identity and geographic location of the bidders
- urgency of the project
- current market conditions and workloads
- comparison of bid prices with similar projects in the letting
- justification for significant bid price differences
- potential for savings if the project is re-advertised
- all agreements and certifications have been met
- verify DBE and OJT goals and commitments have been met, or if not met an adequate good faith effort has been made
- other factors as warranted.

Not all of these factors need to be considered for bids that indicate reasonable prices or show good competition. However, when the low bid differs from the engineer's estimate by an unreasonable amount, a thorough analysis of all bids should be undertaken to justify award of the contract. In order to justify award of a contract under these circumstances, the following questions should be considered.

- Was competition adequate?
- Is the timing of the project award critical?
- Would deferral be contrary to the public interest?
- Would re-advertisement result in higher or lower bids?
- Was there an error in the engineer's estimate?
- Are there particular items that may under/overrun?

The issue of how to assess whether competition for a specific project was "good" is addressed in the FHWA's guidelines. The guidelines also note that some projects may be so essential that deferral, even for 60 days, would not be in the public's interest. Examples of such projects might include:

- safety projects to correct an extremely hazardous condition which endangers the traveling public,
- emergency repairs or replacement of damaged facilities,
- projects to close substantial gaps in otherwise completed facilities, or
- projects that are critical to staged or phased construction such that delaying this element will adversely impact the completion of the whole project.

After the bid analysis is complete, the division office should send the SHA a written concurrence/rejection in award, which should contain any qualifying statements or contingencies. Concurrence serves as notification to proceed unless specifically stated.

Reference:

- *Bid Analysis and Award of Contact – Construction Program Guide*: ***http://www.fhwa.dot.gov/construction/cqit/award.cfm***

AE Heads-Up: If during the review of the bids for Federal-aid projects, the SHA has made the determination that the bids will not be accepted, then the division office needs to concur in that decision also.

Innovative Contracting

Since 1990, the FHWA has been allowing the SHA to evaluate non-traditional contracting techniques which are competitive in nature but do not fully comply with the requirements in Title 23. Federal-aid construction contracts that utilize a method of award other than the lowest responsive bid must be evaluated under the FHWA's Special Experimental Project No 14 (SEP-14) - "Innovative Contracting."

In addition to SEP-14, SEP-15 is a new experimental process for the FHWA to identify new public-private partnership approaches to project delivery for trial evaluation.

References:

- *SEP-14: Innovative Contracting – Construction Program Guide* ***http://www.fhwa.dot.gov/construction/cqit/sep14.cfm***
- SEP-15: Public Private Partnerships website ***http://www.fhwa.dot.gov/ppp/index.htm***
- Non-traditional Contracting Practices – CACC website ***http://www.fhwa.dot.gov/programadmin/contracts/core04.cfm#s4A***
- *Innovative Contracting: States Implement New Approaches* ***http://www.fhwa.dot.gov/construction/fs01026.cfm***

AE Heads-Up: All SEP-14 and SEP-15 proposals must be approved by the Headquarters Office of Program Administration.

State Contracting Procedures

In some instances, the State is permitted to use its own procedures for contracting. For example, enhancement projects that are not directly related to highways and are not located on highway ROWs may use these contracting procedures. The FHWA needs to makes a determination that these contracting procedures conform to applicable Federal law and standards identified in 49 CFR 18.36(b).

CONSTRUCTION

The construction section of this manual generally covers the monitoring of the construction activities from the first day of construction through final acceptance/final voucher of the project. The issues related to contract administration are covered in the next section.

The purpose of the FHWA's construction monitoring program is to facilitate the Division Administrator's evaluation of the State's use of Federal-aid funds and to provide support for the disbursement of Federal funds based on State policies, practices, staffing, and to ensure a quality product. For the purpose of Construction Program Management, the term 'construction' pertains primarily to all post-award activities. However, knowledge of pre-award activities such as PS&E development, NEPA mitigation measures, and the project award process is necessary.

Construction Management Systems

To help reduce administrative duties of a project, various software (Site Manager is one such example) packages have been developed to take advantage of the electronic technology. Electronic reports that can be developed range from the grading inspector's daily reports to the back-up, processing of information needed to write a change order. Since this technology is relatively new, each SHA has its own criteria as to what they can and cannot do based on coordination with their legal and financial specialists.

Reference:

- *Construction Management Systems: Automated Contract Tracking*
  http://www.fhwa.dot.gov/construction/fs01022.cfm

Construction Quality Assurance Program

Quality Assurance (QA) activities are those planned and systematic actions necessary to provide confidence that a product is in conformance with the SHA plans and specifications. Quality Assurance is an umbrella term that includes Quality Control (QC) activities by the contractor, as well as Acceptance activities by the SHA.

Title 23 CFR 637B, *Quality Assurance Procedures for Construction*, specifies the FHWA policies, procedures, and guidelines to address the quality of materials and construction on Federal-aid projects on the NHS. Each SHA is required to have a construction Quality Assurance Program in place that is approved by FHWA (23 CFR 637.205). Most SHAs apply the same QA procedures to all of their projects regardless of the system the roadway is on. Depending on your stewardship agreements with the SHA, your LPAs may be handled differently.

The QA Program should not focus solely on materials sampling and testing. Inspection of workmanship is a critical part of QA and must be reflected in the SHA's QA Program document. A comprehensive QA Program is all-encompassing, and includes the following six core elements:

- Contractor Quality Control
- SHA Acceptance System
- SHA Independent Assurance (IA)

- Dispute Resolution
- Laboratory Accreditation and Qualification
- Personnel Qualification and Certification

Contractor Quality Control is the system used by a contractor party to monitor, assess and adjust production or placement processes to ensure that the final product meets the specified level of quality. The contractor is responsible for all QC activities.

The SHA Acceptance system includes all sampling, testing, and inspection information used to evaluate compliance with the contract requirements and to determine the corresponding pay for a given product. The regulations allow for flexibility to include a contractor's QC results in the SHA acceptance decision, provided certain checks and balances are in place. The SHA is responsible for all acceptance activity.

Independent Assurance (IA) evaluates the personnel and equipment used in the acceptance process. The SHA is responsible for all IA activities independent of all contract testing and inspection.

An overview of construction QA Program requirements is included in **Appendix E**.

References:

- *"Quality Assurance Procedures for Construction," Title 23, Code of Federal Regulations, Part 637 (23 CFR 637), published on June 29, 1995, with revisions on December 10, 2002, and September 24, 2007.*
- *Federal-Aid Policy Guide, NS 23 CFR 637B, transmittal #36, published July 19, 2006.*
- *Questions and Answers on the Quality Assurance Regulation (23 CFR 637) - **http://www.fhwa.dot.gov/pavement/materials/qanda637.cfm:** **http://www.fhwa.dot.gov/pavement/materials/qanda637.cfm***
- *Technical Advisory T 6120.3 Use of Contractor Test Results in the Acceptance Decision, Recommended Quality Measures, and the Identification of Contractor/Department Risks, published on August 9, 2004.*
- *Quality Assurance Stewardship Review - Summary Report for Fiscal Years 2003 through 2006 - **http://www.fhwa.dot.gov/pavement/materials/stewardreview2007.cfm:** **http://www.fhwa.dot.gov/pavement/materials/stewardreview2007.cfm***
- *NHI "Transportation Construction Quality Assurance" Reference Manual – Course No. FHWA-NHI-134064, published July 2008.*

AE Heads-Up: The SHA's QA Program should include the six core elements listed above and address all sampling, testing, and inspection activities that support the program in your State. You should be familiar with your State's approved QA Program and related QA requirements in the specifications that the contractors and the SHA construction and materials staff are to follow. You need to pay particular attention to the SHA's random sampling system to ensure that the Acceptance locations are not "telegraphed" to the contractor too far in advance.

Construction Monitoring Program

The FHWA staff should meet with their SHAs on a regular basis for the purpose of performing project reviews and product evaluations. For projects that include control software for ITS/technology equipment, specific evidence should be kept showing software development status and its ability to be ready at project completion. Since software and other ITS/technology hardware-related development might be outside the expertise of the SHA or the FHWA, it is recommended that presentation of documents be

provided in a format that explains issues, challenges and percent complete on a level the review team is able to understand. During these reviews and evaluations, specific attention should be directed to the following:

- Active work
- Project status/schedule
- Environmental mitigation monitoring
- Design and construction deficiencies
- Status of change orders (COs)/potential claims
- Verify Major & Minor COs
- Determine eligibility as appropriate (dollars and/or time)
- Closing out COs (dollars/time) ASAP after work completed
- Identification of problem areas
- Follow-up on identified problem areas
- Traffic control through construction
- Erosion and sediment control
- Adequacy of project records/materials summary
- Adequacy/qualifications of project staff
- Material sampling and testing
- Other factors as appropriate

Design-Build Division Responsibilities

On design-build projects, the level of SHA construction inspection and testing activity may be reduced, because more risk has been transferred to the design-builder. However, as stated in 23 CFR 637.207(b), all Quality Assurance Program requirements set forth in 23 CFR 637 for standard design-bid-build projects are applicable to design-build projects. The SHA, or a consultant under direct contract to the SHA (i.e. Designated Agent), must perform all Acceptance inspection, sampling, and testing independent of the design-build contractor. Though design-build has gone mainstream with 23 CFR 636, some division offices are more knowledgeable about requirements than others; therefore caution needs to be taken when dealing with these projects. Some SHAs do not allow design-build contracts based on State statutes.

Inspections

An important part of construction monitoring is completing project-level inspections. An on-site review is required to evaluate project activities, the quality and progress of the work, and, if appropriate, to follow-up on findings from previous inspections. The type of inspection will vary depending on the time at which it is conducted and the FHWA/SHA stewardship criteria. Various types of inspections may be combined depending on the circumstances.

The inspection combines a field review of physical work / actual conditions and an office review of administrative actions supporting the field work. Due to time constraints, the reviews may be done on the same day or independently; however, documentation of the review, consisting of a written report with photos, is critical to leave a trail of the “snapshot” of your observations. Completion of field review reports should be given top priority for timeliness of reporting and timely follow-up of recommendations, as applicable.

There are four basic types of project-level inspections that are completed; initial, intermediate, inspection in-depth, and final. There are also special reports that may be required if the project contains experimental or innovative activities. For projects that include development of software and/or hardware

inspection should also be conducted for those elements. The tools to evaluate progress should be defined and initially created during the design phase of the system. One example of a tool is a traceability matrix that details what functions the software will be required to perform.

▪ Initial Inspections

This is the first inspection of an active construction project. Though the actual physical work of the new construction contract may be minimal since this review is done in the early stages, it is intended to help establish communication with the respective State staff on numerous matters, such as eligibility, change orders, environmental commitments, work zone safety, etc. This report is normally numbered #1 and the FHWA Form 1446A is used.

▪ Intermediate Inspections

This report includes follow-up from the initial report. Subsequent reviews take place addressing the various activities that you may wish to review. The FHWA Form 1446A is used and numbered in sequence stemming from the prior review(s).

▪ In-depth Inspections

Inspections-in-depth (IID) may be made on individual projects or may be part of a statewide review effort. They are a detailed type of inspection involving the review of specifications, procedural manuals, and specific contract requirements. Subjects for these inspections may include, but are not limited to, bridge decks, structural concrete, hotmix and portland cement concrete pavement, earth work, aggregate bases and erosion and sediment control. The FHWA Form 1446A is used and numbered in sequence stemming from the prior review(s). *See* **Appendix D** *of the FHWA Construction Program Management Inspection Guide* (CPMIG).

Reference:

- Generic Construction-Related Review Guidelines
  http://www.fhwa.dot.gov/construction/reviews/

▪ Final Inspections

Final inspections should be completed when a project is 90 to 95 percent complete. This way, deficiencies can be detected, and corrected while the contractor is still on the project. All reviews, including final inspections, should be made in the company of the responsible SHA construction staff. The final inspection needs to document close-out of field features which have been constructed, accepted by the SHA and the related office records. Like the other inspections, documentation of the work items that have and have not been closed out should be recorded accordingly and should be followed up on as this report will be used to support the division office's Final Acceptance. The FHWA Form 1446A is used and numbered in sequence stemming from the prior review(s). Many division offices have modified the Form 1446A to include additional information. An example of a modified Form 1446A can be found in **Appendix F**.

▪ Special Reports

Any experimental or innovative construction features or procedures should be described in a separate report with a cross-reference to the applicable inspection report number. The inspection report should mention the special report. Coordination with the applicable division office technology transfer staff will be needed along with providing them a copy of the report.

Reference:

- Experimental Work Plans for Proprietary Products website **http://www.fhwa.dot.gov/construction/cqit/workplan.cfm**

▪ Process Reviews

Statewide or region-wide reviews should be addressed in process reviews where detailed evaluation of the construction elements can be evaluated. Process reviews are conducted with the SHA and normally include multiple projects in multiple areas. Division office reports are generated and submitted to the State for remediation of any findings.

AE Heads-Up*:** The standard FHWA Form 1446A should be used as a minimum to document construction inspections. Many division offices have modified the standard form to include additional project information. For further information on conducting inspections, please see the *Construction Program Management and Inspection Guide* (http://www.fhwa.dot. gov/construction/cpmi04.pdf***).

Report Distribution

For continuous quality improvement all reports should be routinely distributed to others within the division office and SHA, after being screened for proper documentation of facts and any observations/findings/recommendations needing follow-up.

▪ Frequency of Reviews

The scheduling of inspections should be commensurate with the complexity or uniqueness of the contract's scope of work. Each division office should establish minimum inspection frequency guidelines.

***AE Heads-Up*:** The division office should have a procedure for the internal and external distribution of the inspection reports. This procedure should cover who internally and externally gets copies of the reports, and should address management review. At a minimum, the Team Leader responsible for the AEs should receive all inspection reports and initial/sign them indicating they have reviewed it as well as identifying any trends (good or bad) to track.

Project Meetings

Throughout the life of an active construction project, day-to-day communication between the SHA and the contractor is needed to reduce misinterpretation of the plans and specifications. Listed below are the project milestones at which communication should occur.

- Preconstruction – The contractor and SHA staff should schedule an initial meeting prior to starting any work to share contact information and discuss in detail basic and complex requirements.
- Monthly status – Monthly meetings should be held between the contractor and SHA staff to monitor project activities and address issues that arise. **NOTE:** Partnering is a formalized effort to improve communication.
- Other activity-specific meetings such as Pre-Pave, Pre-Pour, Pre-Erection, etc., that are held prior to major construction activities to familiarize those involved with the topic to address last-minute concerns.

***AE Heads-Up*:** For ITS/technology projects a technical walk-through is strongly advised along with the pre-construction meeting. During the walk through, the winning bidder and the sponsoring agency (and any other appropriate stakeholders in the project) review line by line the ITS/technology portion of the contract to ensure there is agreement on the requirements and the bidders interpretation/planned approach to meet the requirements. The State shall assure that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract. The State may satisfy this requirement by certifying that each subcontract arrangement will be in the form of a written agreement containing all the requirements and pertinent provisions of the prime contract (23 CFR 635.116(b)). You should become familiar with this State procedure.

Role in Field Oversight

Depending on the division office, various levels of oversight will be incorporated into the Division's Stewardship Agreement with their SHA partner. The Agreement should be reviewed for additional details.

The following are some examples of the types of work or activities that may be reviewed:

- Earthwork - This item may use a variety of names such as: excavation, roadway excavation, common excavation, waste, borrow, etc. At the time a project is developed, a mass haul diagram is typically used to create a balanced contract to minimize waste and/or borrow. Applicable soil investigation should be done to determine shrink/swell factors for the material to be used.
- Trenching and Pipes – Drainage design is a key element in assuring that the transportation facility is able to accommodate the appropriate hydraulic conditions. Depending on the location and type of route, a particular storm year design will be needed. Pipes come in a variety of sizes and types of materials. Corrugated metal pipe, concrete pipe, and high polyethylene are a couple of the more common pipe materials.
- HMA Paving – Hot Mix Asphalt, also called "blacktop," is one of two pavement types normally used. Depending on its design life, traffic, weather conditions for a life cycle cost analysis (LCCA), HMA may be preferable over PCC.
- PCC Paving – Portland Cement Concrete, also called "whitetop," is one of two pavement types normally used. Depending on its design life, traffic, weather conditions for a life cycle cost analysis (LCCA), PCC may be preferable over HMA.
- Substructure – The substructure is a critical feature for a bridge that the superstructure and bridge deck sit on. Without proper design, the structure can fail.
- Pile Installation– Depending on the type of subsurface investigation reflected in the geotechnical report, various foundations may be prescribed for a structure. Piling is one underground method used to help stabilize the foundation.
- Safety Hardware – These manmade features help further supplement the roadways cross-section to protect the traveling public. It is essential that they be installed in accordance with the applicable State plans, specifications and manufacturer's recommendations. Any variance from the requirements must be documented accordingly to reduce tort liability cases. *See FHWA Safety Hardware NCHRP Report 350 - Roadside Hardware* and *AASHTO Manual for Assessing Safety Hardware (MASH).*
- OSHA Compliance – The Office of Safety and Health Agency (OSHA) was established years ago to provide standards to protect construction workers. All project work sites must be in compliance with OSHA standards.

- ITS Elements – Since the early 1990's, Intelligent Transportation System features have been incorporated into Federal-aid projects to greatly improve the operations of a route. The ITS features include a variety of items such as: traffic signals, ramp monitoring, changeable message signs, etc. Typically, a Traffic Management Center (TMC) is the hub of the ITS features where on time reporting, analysis, and direction is provided.
- Quality Assurance – Quality Assurance, including contractor QC and SHA Acceptance, is critical to the success of highway projects. Please see the previous section for an overview of QA Program requirements with respect to highway projects.
- Staffing – As a condition of using Federal-aid funds (23 CFR 635), the SHA is required to have adequate staff and resources to administer the Federal-aid program. With Stewardship delegation and more involvement by Local Public Agency's (LPA) and consultants, this is considered a high risk area.
- Responsible Charge – One of the most commonly used phrases by the FHWA staff in promoting Stewardship, "Responsible Charge" is required for the applicable SHA to be delegated FHWA responsibilities. The SHA's workforce must be adequately involved in the project to "act on FHWA's behalf." If the SHA decides to delegate actions to a LPA, the FHWA still expects the SHA to be in "responsible charge."

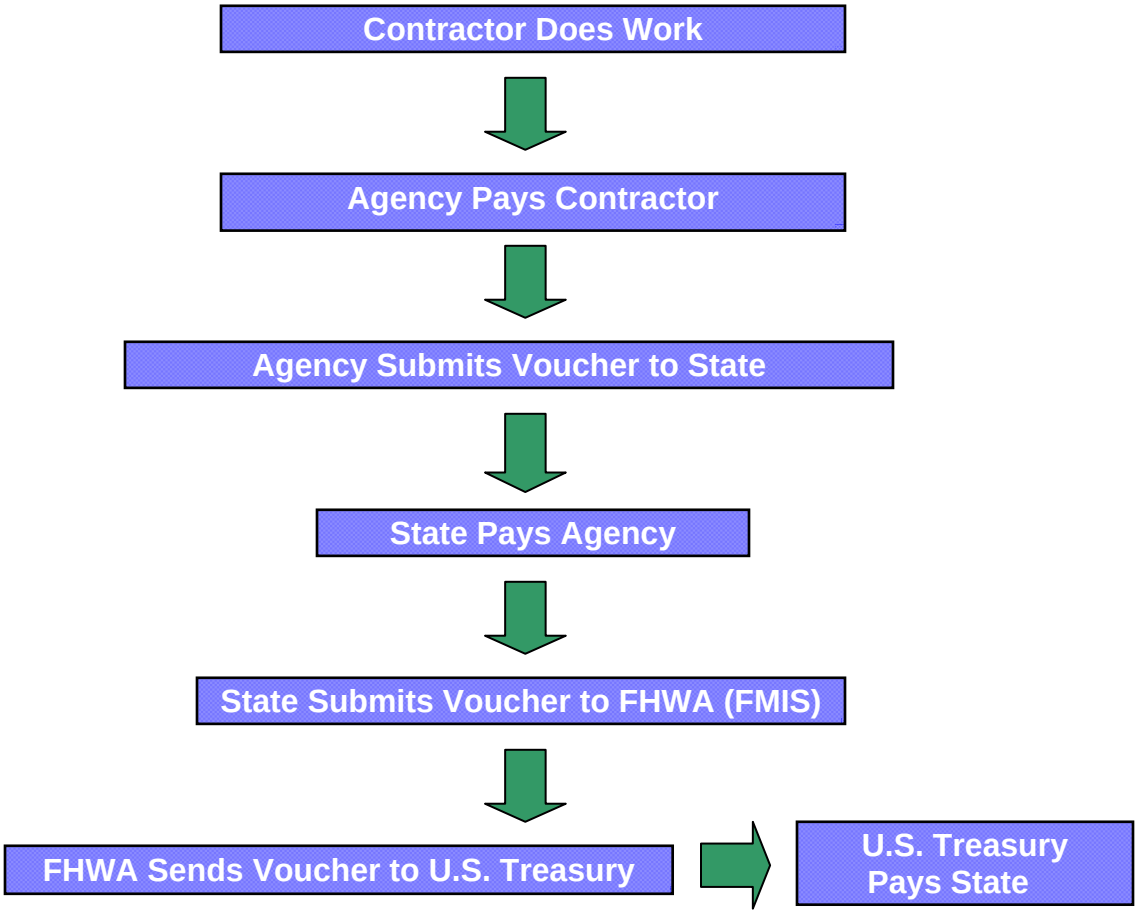
For Federal-aid projects to be constructed on a facility that is under the SHA's jurisdiction, a full-time State engineer is required. However, for Federal-aid projects to be constructed on a facility that is not under the SHA's jurisdiction, the SHA may arrange for the local public agency having jurisdiction to perform work with its own forces, or by contract, provided that all of following is met:

- All Federal requirements, including 23 CFR 635 Subpart A and 23 CFR 637 Subpart B when on the NHS, shall be met on contracts awarded by a local agency.
- Force account work shall comply with 23 CFR 635 Subpart B.
- The local agency is adequately staffed & suitably equipped to undertake & satisfactorily complete the work.
- The local agency shall provide a full-time employee of agency to be in "responsible charge" of each Federal-aid project, including those with consultant services.

This does not relieve the SHA of overall responsibility for the project.

Figure 10 *(found on page 63)* illustrates the typical process that shows SHA/LPA reimbursement. If it is determined that money needs to be reimbursed from the LPA back to the Federal-aid funds, the division office will bill the SHA.

Figure 10. SHA/LPA Reimbursement



Work Zone Reviews

Periodic evaluation of work zone policies, procedures, and impacts aids in the process of addressing and managing the safety and mobility impacts of work zones. Process reviews help assess the effectiveness of a program and/or a set of policies and procedures. They enable the agency and respective FHWA division office to confirm that a problem does not exist, and to make recommendations to improve situations where shortcomings might exist. With 23CFR 635 requiring traffic control plans being part of a construction contract, field inspection of that control plan within the project's limits during day and night is essential. In further promotion of the FHWA's commitment to safety, "high-visibility" signs, striping, pavement markers, workers clothing, etc. are items always needing to be reviewed for proper placement and use. Recent rulemaking now requires a "transportation management plan (TMP)" be developed and implemented for all projects, as well as performance of a work zone process review at least once every 2 years.

Reference:

- Work Zone Process Review Toolbox website
  http://ops.fhwa.dot.gov/wz/prtoolbox/pr_toolbox.htm

Final Acceptance

Suggested items needed for FHWA Engineers to support changes or credits to write a Final Acceptance report include:

- Letter of acceptance from SHA to contractor
- Final Estimate Voucher
- Final Inspection and Review of Final Estimate and Records:
- Final acceptance of ITS/technology related elements of the project should be based on the test plans initially developed during the design phase of the project where hardware specifications and software requirements have been defined
- Materials Certification (comply with 23CFR 637)
- All Change Orders (approved with copies in the project file)
- Documentation of all claims, arbitration and mediation (approved with copies in the file)
- Verify completion and/or status of environmental commitments

Reference:

- Final Acceptance Checklist in the CPMIG, G-15
  http://www.fhwa.dot.gov/construction/cpmi04.pdf

▪ Final Acceptance Criteria

Before a Federal-aid project can be closed and have its final voucher paid, a Final Inspection (1446A) and Final Acceptance report (1446B) should be prepared for closing out the engineering and financial accountability responsibilities [in which both sections need to sign off[. The agency responsible for this documentation depends on the type of project, based on the division office's Stewardship Agreement with the SHA. To help flag the division office's involvement in a project and provide easier identification to the applicable State staff, an alpha character is suggested to be added to the end of the Federal-aid project number string such as (F), (N), (S), or (E).

F or **N** – Full FHWA Oversight or Normal Federal Oversight
S or **E** – State-Administered Oversight or Oversight Extended to State

***AE Heads-Up*:** It is advisable to not use the terms "exempt" or "non-oversight" when referring to a project since it may imply to some that Federal rules and regulations do not apply. *See above for some suggested terms.*

CONTRACT ADMINISTRATION

Contract administration encompasses all dealings between the SHA and the prime contractor from contract award through completion and acceptance of the work, final payment, and the resolution of any outstanding disputes. The broad goals of contract administration are to ensure that the SHA receives the needed work on time for a fair price and at the quality level specified in the contract, while the contractor receives proper compensation. To do so requires that both parties fulfill their contractual obligations; however, in many contracts, adjustments must be made to the contract for situations where the initial contract assumptions do not address the conditions observed during construction of the project. Therefore, a major activity within contract administration involves the proper adjustment of the contract requirements to meet field and/or current conditions.

Administration of Federal-aid contracts is further complicated by the requirements of the Federal-aid highway construction program as defined in law and regulations. While, in many cases, the requirements are routinely incorporated into all of their contract bid packages by SHAs because the requirements are good business practice, some of the other Federal-aid requirements are only incorporated in Federal-aid contracts (examples: FHWA-1273 and Buy America). In addition, there are other requirements that directly affect the eligibility of a project for Federal-aid construction funding but occur prior to contract award (examples: environmental clearance and right-of-way acquisition).

Assigning Risk

Additional risk assessment may be warranted within the engineering program of each division office. Risk should be quantified for the following areas:

1) **Construction Inspection**
2) **Construction Documentation**
3) **Change Orders**
4) **Value Engineering**
5) **Maintenance and Protection of Traffic**
6) **Worksite Safety**

Change Orders

It is essential that all projects be constructed as close to the original design plans as reasonably possible; however, it is generally understood within the construction industry that it is an unrealistic expectation that a project be constructed without ever deviating from the project plans. Change Orders provide a formal mechanism by which revisions to the original plans and contract documents may be made. Change Orders are typically defined as supplemental agreements to the original contract between the SHA and the contractor.

The regulations governing the execution of change orders are 23 CFR 635.120 and 635.121. These regulations identify two subsets of change orders, 1) ‘Major Changes’ and, 2) ‘Non-Major Changes.’ The FHWA has not adopted a national definition of what constitutes a ‘Major Change’ and has left this responsibility with each Division Administrator to provide flexibility for differing needs. The important distinction between how these two subsets of change orders are processed is that ‘Major Changes’ require formal approval of the Division Administrator (or as delegated) prior to the effective date of the change.

The review and approval of change orders is an activity typically governed by the applicable Stewardship and Oversight Agreement. Many division offices have delegated this responsibility to the SHA for certain Federal-aid projects. When the applicable Stewardship Agreement requires the FHWA review and

approval of change orders, there are differing methods for granting these approvals throughout the country. Each FHWA division office should develop a Change Order Policy & Procedure (standard operating procedure) that reflects the State Change Order Submittal Process and defines the "criteria" for what is considered a "major change order." *See* **Appendix C** *for samples.* In general, there are two methods used, 1) Hardcopy submittal, and 2) Electronic Contract Administration Systems (Site Manager, etc.).

When reviewing a change order submitted for FHWA action, it is necessary to evaluate the requested change with respect to 1) Federal-aid eligibility, 2) Impact on the projects "Scope of Work", 3) Cost Justification, and 4) Time Adjustments. Further information on each of these four points is available in the *Contract Administration Core Curriculum Manual and Reference Guide* (***http://www.fhwa.dot.gov/programadmin/contracts/coretoc.cfm***) and Construction Program Management and Inspection Guide (***http://www.fhwa.dot.gov/construction/cpmi04tc.cfm***) available on the Web.

One type of change order warranting additional discussion is Force Account or Cost-Plus work. This contracting method is only used when a negotiated price cannot be reached between the SHA and the contractor and the SHA then directs the contractor to perform the work and makes payment based on the contractor's actual labor, equipment, and material expenses plus regulatory markups. This type of work is typically controlled by the SHA's Standard Specifications. Because payment to the contractor is based on his hourly labor and equipment usage and actual material costs it is critical that the SHA Resident Engineer provide inspection and documentation of these costs to ensure accurate payment to the contractor. Before approving a change order with a basis of payment as Force Account it is necessary to verify that the SHA has provided accurate inspection and documentation of these costs.

Another important consideration related to change orders is when the work authorized is allowed to proceed. The use of completion dates and liquidated damages on construction projects creates urgency in providing direction to the contractor in order to avoid potential delay claims. As noted in 23 CFR 635 any 'Major Change' requires formal FHWA approval prior to the effective date of the change, meaning that work may not proceed until formal approval has been granted; form FHWA-1365, Record of Authorization to Proceed With Major Contract Revision is an option to document the prior approval. For those changes not meeting the division office's definition of a 'Major Change' FHWA approval may be given retroactively, after the work has been completed. However, in these situations the work covered within a change order should not typically commence until the SHA has formally approved the change order because the contractor will be contractually at-risk. In reality, work considered to be a 'Non-Major Change' is frequently initiated based upon verbal approval (still eventually needs to be documented) of the SHA management because of the typical time-frames required to formally execute a change order. In these situations it is necessary for the FHWA engineer to verify that accurate direction was provided to the contractor at the time the work was completed and that work was performed in accordance with the terms of the eventual formal change order. In the event that disputes arise with respect to extra work that was performed prior to being formally authorized by a change order, the FHWA engineer must carefully consider the applicability of Federal-aid to any resolution. Other than small overruns of contract quantities, a contract cannot be paid for any additional work that is not included in an approved CO.

When a change order, or item within a change order, is determined to not meet all requirements for approval the FHWA engineer should first work at the lowest level to reach agreement on amendments to the requested change order. If a resolution cannot be reached it will often be necessary to coordinate with other SHA personnel to make the necessary changes. If it becomes apparent that no resolution exists to allow approval of the requested change the FHWA engineer should contact their supervisor and follow the division office's procedures for declaring the extra work as non-participating for Federal-aid.

***AE Heads-Up*:** Because of the complexities that can surround change orders, it is very important for AEs to fully understand their Division's definitions of major and minor changes, as well as the process for reviewing and approving them as timeliness, especially for major changes, can play into its eligibility for Federal funds. It is also good to discuss potential change order issues with project staff early in the project.

References:

- 23 CFR 635.120
- 23 CFR 635.121
- *Federal-aid Policy Guide (FAPG)* (***http://www.fhwa.dot.gov/legsregs/directives/fapgtoc.htm***)
- *FHWA Contract Administration Core Curriculum Manual* (***http://www.fhwa.dot.gov/programadmin/contracts/coretoc.cfm***)
- *Construction Program Management and Inspection Guide* (***http://www.fhwa.dot.gov/construction/cpmi04tc.cfm***)

Claims Avoidance/Dispute Resolution

A claims avoidance system should be thought of as a system (or collection of actions) working independently, and in concert, to reduce the number of claims filed on a project and enhance the chances of quick resolution of claims that are filed. Successful claims avoidance systems foster a culture of issue resolution. The roots of these systems are anchored in the design, the contract, and the project procedures. The conduct of the project participants is paramount to the success or failure of this system. The components of a claims avoidance system include the following:

- Open, frequent, and continued communications between project participants
- Partnering
- Careful preparation of design documents
- Careful preparation of contract documents
- Pre-bid meetings
- Maintenance of proper project documentation
- Workable dispute resolution procedures

The SHAs should have a well-defined dispute resolution process for both construction activities and material compliance issues. The purpose of the dispute resolution process is to ensure that any potential disagreements are resolved timely and in an equitable manner. The process should define the levels that a dispute go through along with the time period prior to being elevated. The lowest level of resolution would be at the project level, with elevation to the District level then SHA Headquarters level. If a dispute cannot be resolved at SHA Headquarters, it would be heard before a Dispute Resolution Board. This is usually reserved for large projects. If resolution is unsuccessful at the Dispute Resolution Board, the dispute would go to court. Disputes should be resolved at the lowest level possible if an equitable agreement can be reached.

Contractor Claims

A claim can be defined as a demand for additional compensation that is formally submitted to someone in the SHA outside of the normal process for change approvals. In simple terms, a continued demand for payment is termed a claim if it has been previously denied under the SHA's normal procedures for change approval.

Both the SHA and the contractor share in the responsibility for claims. Many claims could be avoided if review of the contract documents were more thorough, both in preparation of the project and in bidding the project. Contractors may contribute to claims through ineffective project management, scheduling practices and substandard work.

The eligibility for Federal-aid participation in a claim is made on a case-by-case basis. Federal funds can be used to the extent that any contract adjustments made are supported, and have a basis in terms of the contract and applicable State, as fairly construed. It is essential that the SHA makes FHWA aware of the claim at an early stage so that coordination of efforts can be satisfactorily accomplished. On a Federal oversight project, a claim is routinely treated as needing advance approval.

For Federal-aid eligibility participation in costs associated with interest, attorney fees, and anticipated profit, see the *FHWA Contract Administration Core Curriculum Manual* (***http://www.fhwa.dot.gov/programadmin/contracts/coretoc.cfm***).

References:

- 23 CFR635.124 - Participation in contract claim awards and settlements
- *FHWA Contract Administration Core Curriculum Manual* ***http://www.fhwa.dot.gov/programadmin/contracts/coretoc.cfm***

In addition to Dispute Resolution Boards there are several other methods of Alternative Dispute Resolution (ADR). These are discussed in more detail in the CACC manual.

References:

- *FHWA Contract Administration Core Curriculum Manual* ***http://www.fhwa.dot.gov/programadmin/contracts/coretoc.cfm***
- Dispute Review Boards: Resolving Construction Conflicts website ***http://www.fhwa.dot.gov/construction/fs02009.cfm***

AE Heads-Up: Contractors are generally able to request any and all documents that FHWA has for projects through a Freedom of Information Act (FOIA) request. This includes both paper and electronic files, so when you are writing emails and memos, stick with 'the facts" and do not use hearsay or unsupported opinions.

Critical Path Method (CPM)

A Critical Path Method (CPM) Schedule is a specialized scheduling tool used by some SHAs. There is no Federal requirement for the use of CPM schedules. This type of schedule uses a specialized logic to identify all major work items on a project and identifies a logical flow of work activities. Delays on work items on the 'critical path' may delay the entire project. Determinations are made on time expected to

perform a task to determine if delay on a specific task will delay the entire project. A best-practice in the use of these schedules requires the contractor to identify the resources (labor and equipment) that will be available to complete each activity in order to validate product rates.

The FHWA engineer should encourage the use of CPM schedules on certain projects meeting local needs for size, complexity, or sensitivity to timely completion. The SHA should be encouraged to develop specifications detailing the requirements for CPM schedules. The FHWA engineer should periodically review CPM schedules and ensure that adequate SHA review and approval is made by trained staff.

Advantages of using the CPM include:

- It is an accurate technique for determining contract time and verifying that the project can be constructed as designed and with identified construction sequences;
- It is a useful tool for project managers in monitoring a project, especially when dealing with relationships of work items with respect to time; and
- Activities responsible for delays can be identified and corrective measures to keep a project on schedule can be determined.

Disadvantages of using the CPM include:

- The CPM requires experienced and knowledgeable staff to be used effectively;
- They require regular updates to assure that the contractor's operation is accurately represented.

Reference:

- *Improving Safety, Reducing Delays: Finishing on Time, on Budget With the Critical Path Method* ***http://www.fhwa.dot.gov/construction/fs02001.cfm***

Errors and Omissions

Engineering errors and omissions will occur on occasion during highway design and construction. Each such engineering error should be considered on its own merits to determine whether any corrective work is eligible for Federal-aid participation. Where carelessness, negligence, incompetence, or understaffing on the part of the SHA are not contributing factors, favorable consideration may be justified for errors that might occasionally occur despite the exercise of normal diligence. In all other instances Federal participation should be denied.

A good rule to follow for omissions is; did the omission cost the project additional money once it was discovered? For example, if during earthwork operations it is determined that the plans did not include a required drainage pipe, then the pipe can easily be put in with out any real additional project cost. If however, the need for the pipe is determined once final paving is completed; there will be additional costs to install the pipe (removal of embankment, final grading, aggregate, and pavement). FHWA should participate in the cost of the pipe if it were to have been put in at the correct time, but not the additional amount to put the pipe in after the road was paved.

References:

- *Employment of Consultants:* ***http://www.fhwa.dot.gov/programadmin/consultant.cfm***
- *Headquarters memorandum dated September 8, 1978, Subject: Participation in the Cost of Corrective Work Resulting from Construction Engineering Errors:* ***http://www.fhwa.dot.gov/programadmin/contracts/090878.cfm***

AE Heads-Up: FHWA participation with errors and omissions may depend on State statutes and contract provisions for errors and omissions. Wanting to help out the design or inspection firm is not a good reason to participate. It is also important to consider who made the error/omission. Was it the SHA or a consultant? In these cases, you need to consider all the facts. Additionally the State is required to have approved procedures for handling Errors and Omissions, 23 CFR 172.9(a)(6).

Freedom of Information Act

The Freedom of Information Act (FOIA) is a disclosure statute, 5 U.S.C. 552, which works to ensure that the general public has access to government records. Openness in government is essential to accountability, and the FOIA has become an integral part of that process. FOIA is based on the presumption that an informed citizenry is essential to the democratic process and that the more the American people know about their Government the better they will be governed.

The FOIA (Electronic FOIA Amendments of 1996-commonly referred to as "EFOIA") requires agencies to:

- Respond to FOIA requesters within 20 working days
- Search for information in electronic form in response to a FOIA request according to "reasonable efforts" standards
- Produce information in the particular form or format that a FOIA requester prefers
- Place requested records, that may be the subject of future FOIA requests, into agency reading rooms
- Make newly created reading room records available to the public electronically
- Authorizes agencies to process FOIA requests in multiple tracks.
- Encourages agencies to negotiate the scope of FOIA requests and response times with requesters.
- Establishes a mechanism for the "expedited processing" of FOIA requests filed by members of the news media.

In preparing for potential FOIA requests, it is important to plan for potential FOIA requests by having consultant contracts include a provision to maintain an administrative record throughout the project, when possible. This would result in efficient FOIA responses that do not tie up State and FHWA resources. Maintaining an administrative record would also result in efficient responses to lawsuits.

References:

- Department of Justice FOIA - The Freedom of Information Act website ***http://www.usdoj.gov/oip/foiastat.htm***
- FHWA StaffNet FOIA Help website ***http://intra.fhwa.dot.gov/foia/***

AE Heads-Up: The Area Engineer should be familiar with your Division office's procedures for addressing FOIA requests, so that you will know what to do if you receive a FOIA request related to one of your projects or program areas. You should not provide information without understanding the requirements of FOIA, FHWA, and your office's protocol.

General Project Management

All Federal-aid projects must meet the requirements of Title 23 of the United Sates Code (USC) and the Code of Federal Regulations. The FHWA monitors projects and programs to ensure all of the statutory and regulatory requirements are being met. To accomplish this, FHWA reviews and approves selected State actions on some Federal-aid projects. The FHWA division office/State Oversight Agreements identify which actions the FHWA reviews and approves. The FHWA approval could include actions related to transportation planning, preliminary engineering, engineering, environmental evaluations, public hearings, ROW acquisition, PS&E, contract awards, construction, final inspection.

The State is responsible for the design and construction of projects. The State will perform the daily management activities of the consultants and contractors. The State is also responsible for insuring that all projects receive adequate supervision and inspection.

Section 302 of Title 23 USC requires SHAs to be suitably equipped and organized to carry out the Federal-aid program. Therefore, the SHAs are responsible for design, contract administration, and construction inspection of all Federal-aid construction projects. This responsibility is formalized by the project agreement that is executed for each Federal-aid project.

Adequate construction personnel should be provided to ensure that quality highways are constructed. However, for many reasons the States are typically operating with less staff for the size of their program than historic staffing levels. It is important to be mindful of this when conducting project oversight.

▪ Intelligent Transportation Systems/ Systems Engineering Management Plan

For large and complex ITS/technology projects a systems engineering management plan (SEMP) should be considered. The SEMP may be needed to supplement the details of the Project Plan. When used, the SEMP focuses on the technical plan of the project and the systems engineering (***http://www.fhwa.dot.gov/cadiv/segb/glossary/s.htm#text_Systems_engineering***) processes to be used for the project. Its purpose is to detail those engineering tasks, especially to provide detailed information on the processes to be used. Preparation of a SEMP is most important if the project involves development of custom software. The engineering tasks of producing custom software (***http://www.fhwa.dot.gov/cadiv/segb/glossary/s.htm#text_Software***) [from requirements, through design implementation, integration, and verification (***http://www.fhwa.dot.gov/cadiv/segb/glossary/ d.htm#text_Design***)] are very complex, and are new to many transportation engineers. Given the level of process detail needed in the SEMP, it often written in two steps. In the first step, the framework for the document is prepared, usually by the project management staff. Enough detail is included to identify all the needed tasks [including analysis tasks] and any important constraints on the performance (***http://www.fhwa.dot.gov/cadiv/segb/glossary/p.htm#text_Performance***) of a task [such as use of a specific systems engineering and design methodology]. In the second step, the various sections of the SEMP framework are completed, this time by the team that will perform each task. For instance, the requirements (***http://www.fhwa.dot.gov/cadiv/segb/glossary/r.htm#text_Requirements***) team provides details on the analysis and the tools used to manage requirements. The design team provides details on use of the software design methodology. The software coder provides details on configuration management of the software code. The verification team provides details on their verification methods.

References:

- *23 U.S.C. 114*
- *23 U.S.C. 302*
- *23 CFR 635.105 – Supervising Agency*
- *Systems Engineering Guide Book*

Liquidated Damages

Liquidated damages (LD) are not a penalty to the contractor, but rather are the daily amount set forth in the contract to be deducted from the contract price to cover additional costs incurred by a SHA because of the contractor's failure to complete all the contract work within the number of calendar days or workdays specified or by the completion date specified.

Contract time is an essential element of the contract, and it is important that the work be pressed vigorously to completion. The cost to the contracting agency for the administration of the contract, including engineering, inspection, and supervision, increases as the contract time increases. The liquidated damages contract provision provides a mechanism for the contracting agency to recover these costs associated with the contract time overrun. An SHA is required to incorporate LD provisions into its Federal-aid contracts as a condition of the project agreement. Likewise, the road user costs also increase as the completion date of the contemplated facility is extended. Road user costs can be used to calculate a disincentive or penalty that can be added to LD where warranted on a project by project determination.

States are required to analyze construction engineering costs every 2 years and update their LD amounts. The FHWA is required to concur with this analysis.

References:

- *23 CFR 635.127* - Agreement provisions regarding overruns in contract time
- *FHWA Contract Administration Core Curriculum Manual:* ***http://www.fhwa.dot.gov/programadmin/contracts/coretoc.cfm***

AE Heads-Up: The daily dollar amount included in the LD rates cannot include penalties for not completing the work in the specified time. These need to be included in Incentive/Disincentive contract provisions. Conversely, Incentive/Disincentive cannot include costs already included in the LD rates.

Notice of Noncompliance (Federal-aid Ineligibility Notification - FIN)

If it is determined that a violation or failure to comply with the Federal laws or regulations has taken place during the progress of a project, payment or reimbursement in part or whole may be withheld from the State on account of non-compliance. The prescribed method for notifying the State of noncompliance issues is form FHWA-1367 or “Pink Slip.” Some division offices may notify their State partners by letter, memorandum, or email of noncompliance issues.

References:

- *23 CFR 1.36* Compliance with Federal Law and Regulations
- *Form FHWA-1367:* ***http://intra.fhwa.dot.gov/informs/adobeforms/fhwa1367.pdf***

Plan Revisions (during construction)

At the time of advertisement of projects, plans and specifications are approved by the FHWA or through delegation by the State on the FHWA's behalf per the division office's Stewardship Agreement. Sometimes during construction, it is necessary to modify the plans or specifications. When the change is a Major Change, FHWA approval is required prior to issuing the change. For ITS/technology projects, configuration management should be performed. Configuration management is the process of keeping track of all software or hardware changes as the project progresses. The purpose of configuration management is to document changes so that a blueprint of the system is created. For complex ITS/technology projects, creation of a configuration control board (CCB) should be considered to control, review and approve changes. The CCB might consist of management from the system designer, operations/maintenance management, and IT.

Reference:

- 23 CFR 635.112(c)

AE Heads-Up: Changes to plans or specifications should not be done by the field until they have coordinated with the designer and other relevant parties. When you are reviewing plan revisions, you should verify that the project designer agrees to the changes. Also, are the changes necessities or niceties?

Project Acceleration of a Contract

Circumstances may arise which require the construction contract be accelerated faster than the approved schedule. There are no legal impediments to prevent Federal-aid participation in accelerating construction by amending the contract. The FHWA's policy in general is to not participate in additional costs for the acceleration of a project, beyond what is provided for in the contract provisions, subsequent to award of the contract. Such acceleration amendments should only be utilized when unusual circumstances occur and it can be clearly shown to be in the public interest. This position is taken because contract time and the scope of work are two of the key elements on which bids are based in the competitive bidding process. The division office has the authority to approve such a change.

References:

- *Office of Highway Operations Memorandum dated September 18, 1990:* ***http://www.fhwa.dot.gov/programadmin/contracts/091890.cfm***
- *Construction Program Management and Inspection Guide:* ***http://www.fhwa.dot.gov/construction/cpmi04tc.cfm***

Suspension and Debarment

Suspension and debarment (S/D) are discretionary administrative actions taken to protect the Federal Government by excluding persons and / or companies from participation in the Federal assistance programs. A S/D action ensures that the Federal Government does not conduct business with a person or a company who has an unsatisfactory record of integrity and business ethics. The S/D actions are administered government-wide; consequently, a person excluded by one Federal agency is excluded from doing business with any Federal agency.

Reference:

- *Contract Administration Core Curriculum Participant's Manual and Reference Guide* ***http://www.fhwa.dot.gov/programadmin/contracts/coretoc.cfm***

Suspension of Work

Most contracts contain specifications that give the contracting agency's engineer the authority to suspend work wholly or in part for both short term and long term. Work may be suspended for a variety of reasons, including but not limited to conditions unsafe for the workmen or the general public, weather or conditions unsuitable for work, failure to carry out contract provisions, and, in some cases, any condition or reason determined to be in the public interest.

Depending on the cause of the suspension, adjustment of the contract (time, money, elimination of work) may be warranted. On all Federal-aid construction projects a standardized change condition clause will be included in the contract for "Suspensions for Work Ordered by the Engineer." This clause provides for the adjustment of the contract (in writing) if the performance of all or a portion of the work is suspended or delayed by the contracting agencies Engineer for an unreasonable period of time.

Reference:

- 23 CFR 635.109(a) (2)

Time Extensions

The FHWA places a high importance on contract time so it is very important in the project development stage that a proper time duration is assigned to the project. Insufficient or excessive contract time may result in higher bid prices, safety problems, increased time overruns, and claims. On the other hand, excessive contract time may result in increased inefficiencies, equating to increased costs, to the SHA and contractor as well as increased user costs to the public. In addition, delay and inconvenience to the public and the hazard of driving through a work zone may be unnecessarily extended.

Contract time is defined as the maximum time allowed in the contract for completion of all work contained in the contract documents. Contract time can become a public relations issue when the traveling public is inconvenienced for no apparent reason. Some reasons why there are time extension requests include work added to the contract, weather delays, national or regional material delays, utility issues, ROW issues, among others.

For each request for contract time extension, there should be an explanation/justification for the extension. For example, adding additional work to the contract does not automatically warrant a time extension. There must be a review of the project schedule to see how it affects the contractors work.

Scheduling, using the Critical Path Method, needs to remain, as this is another major time management issue that many Area Engineers do not seem to be aware of. Contract time is handled differently depending upon the SHA's procedures. Some use calendar day completion dates while others use working day contracts. The treatment of time will also vary depending upon the contract. It is treated differently on A+B (cost + time) bid projects as contrasted against a traditional calendar day completion date. It is important to understand the methods used by the SHA and the method included in the contract for a particular project.

References:

- 23 CFR 635.121 *Contract time and contract time extensions*
- 23 CFR 635.127 *Agreement Provisions Regarding Overruns in Contract Time*
- *FHWA Contract Administration Core Curriculum Manual:* ***http://www.fhwa.dot.gov/programadmin/contracts/coretoc.cfm***

AE Heads-Up: Time extensions cost money, both with respect to road user costs and the management costs borne by the SHA and the FHWA To say that the time extension is a no cost time extension is generally not a true statement. For those change orders written which affect time, the amount of time needs to determined and included in the signed change order or depending on complexity of work, determine the amount of time upon completion of the change order work, and document it as part of the change order within a few days.

When a division office refuses to participate in a time extension, but the State approves a time extension, equivalent liquidated damages need to be deducted from the project funds.

Value Engineering Change Proposals

Value Engineering Change Proposals (VECP) are post-award value engineering proposals made by construction contractors during the course of construction under a value engineering clause in the contract. Basically, they are contractor requests to complete contract requirements in a different way as required in the contract. In doing so, the change will have to accomplish the project's functional requirements at a less cost or improve value or service at no increase or a minor increase in cost. The value of this change should be equally shared by the contractor and SHA. The net savings of each proposal is usually shared with the contractor at a stated reasonable rate. Net savings can also refer to time. If a method of operation saves the contractor time, this savings should be shared.

An example of a requested project change that may be considered as a regular change but should be considered as a VECP, could be where the contractor requests that they be allowed to use precast junction boxes at the same bid price for cast in-place junction boxes. On the surface it seems reasonable, and there would be no direct cost, but if the project has an incentive provision of $25,000 per day for an early completion, the time saved by the contractor could mean hundreds of thousands of dollars in bonus payments. In this example, the benefits to the contractor and the SHA should be considered prior to approving. *(Value engineering performed pre-award, see Design section on page 34.)*

References:

- Value Engineering Change Proposals (VECP) website ***http://www.fhwa.dot.gov/construction/cqit/vecp.cfm***
- Value Engineering website ***http://www.fhwa.dot.gov/ve/***

AE Heads-Up: A VECP should not be considered if it is being done for the sole benefit of the contractor. Also, advance approval on Federal oversight projects is suggested for the applicable change order.

MAINTENANCE

The responsibility imposed upon the State highway department, pursuant to 23 U.S.C. 116, for the maintenance of projects shall be carried out in accordance with policies and procedures issued by the Administrator. The State highway department may provide for such maintenance by formal agreement with any adequately equipped county, municipality or other governmental instrumentality, but such an agreement shall not relieve the State highway department of its responsibility for such maintenance. As per 23 CFR 940.11, long term operation and maintenance shall also be addressed for ITS/technology projects.

23 USC Section 116 Maintenance (23 U.S.C. 116)

> (a) It shall be the duty of the State transportation department to maintain, or cause to be maintained, any project constructed under the provisions of this chapter or constructed under the provisions of prior Acts. The State's obligation to the United States to maintain any such project shall cease when it no longer constitutes a part of a Federal-aid system.
>
> (b) In any State wherein the State transportation department is without legal authority to maintain a project constructed on the Federal-aid secondary system, or within a municipality, such transportation department shall enter into a formal agreement for its maintenance with the appropriate officials of the county or municipality in which such project is located.
>
> (c) If at any time the Secretary shall find that any project constructed under the provisions of this chapter, or constructed under the provisions of prior Acts, is not being properly maintained, he shall call such fact to the attention of the State transportation department. If, within ninety days after receipt of such notice, such project has not been put in proper condition of maintenance, the Secretary shall withhold approval of further projects of all types in the State highway district, municipality, county, other political or administrative subdivision of the State, or the entire State in which such project is located, whichever the Secretary deems most appropriate, until such project shall have been put in proper condition of maintenance.
>
> (d) Preventive Maintenance.--A preventive maintenance activity shall be eligible for Federal assistance under this title if the State demonstrates to the satisfaction of the Secretary that the activity is a cost-effective means of extending the useful life of a Federal-aid highway.

The project agreement between the SHA and the FHWA states that the SHA will maintain the project.

Outdoor Advertising

The State is required to have policies and procedures for implementing its sign removal program under State law and in compliance with 23 U.S.C. 131 (23 CFR 750.304)

System Preservation

System Preservation is a term commonly used to describe a program that emphasizes activities related to routine maintenance, preventive maintenance, and minor (non-structural) rehabilitation. The key factor in the success of any preservation treatment is to apply it early in the life of the asset. That means the pavement or bridge must still be in good structural condition with only minor surface defects. This will help ensure the greatest cost benefit in the treatment.

As far as Federal-aid eligibility goes, all activities related to preservation are eligible with the exception of routine maintenance, such as snow and ice removal and roadside mowing.
An Effective System Preservation Program should have the following components:

- Support from all levels of the organization, particularly upper management
- A system for collecting condition data of the pavements and bridges
- A Pavement Management System (PMS) and a Bridge Management System (BMS) to used to analysis the data and make effective decisions
- Resource allocation focused toward preservation activities
- A way to report and document performance of treatments.
- The ability to demonstrate benefits and cost effectiveness
- Smoother and safer roads
- Shorter work zone duration
- Improved Network Performance
- Interal Communication between departments
- An extensive toolbox of methods for system preservation

The division office has a responsibility regarding maintenance and system preservation. The responsibility imposed upon the SHA, pursuant to 23 U.S.C. 116, for the maintenance of projects shall be carried out in accordance with policies and procedures issued by the Administrator. The SHA may provide for such maintenance by formal agreement with any adequately equipped county, municipality or other governmental instrumentality, but such an agreement shall not relieve the SHA of its responsibility for such maintenance.

References:

- Headquarters Memorandum on Preventative Maintenance Eligibility, dated October 8, 2004: ***http://www.fhwa.dot.gov/preservation/100804.cfm***
- *23 USC Section 116* Maintenance (*23 U.S.C. 116*) ***http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=browse_usc&docid=Cite:+23USC116***
- Federal-aid Project Agreement – FORM PR-2 – Agreement Provisions
- Preventive Maintenance Eligibility website ***http://www.fhwa.dot.gov/preservation/100804.cfm***
- *23 CFR 1.27* Maintenance ***http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;sid=3f3f60ea6c8c47063a5fb452fd7a9b00;rgn=div5;view=text;node=23%3A1.0.1.1.1;idno=23;cc=ecfr#23:1.0.1.1.1.0.1.10***
- Headquarters Memorandum dated September 12, 2005, Pavement Preservation Definitions: ***http://www.fhwa.dot.gov/pavement/preservation/091205.cfm***
- *23 USC 116:* ***http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=browse_usc&docid=Cite:+23USC116***
- *23 CFR 1.27* Maintenance: ***http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;sid=3f3f60ea6c8c47063a5fb452fd7a9b00;rgn=div5;view=text;node=23%3A1.0.1.1.1;idno=23;cc=ecfr#23:1.0.1.1.1.0.1.10***

AE Heads-Up: In the course of your project and programmatic duties, you generally travel on the NHS in your State. While you are driving, you should note any maintenance deficiencies that need to be addressed. For example, you may note that a guardrail that was hit 3 months ago has not been fixed. When you see issues such as these, you should contact the SHA and report and request immediate rectification of the issue. You should also be generally aware of the condition of the roadways as they relate to system preservation.

Appendix A – Contacts

The division office should be aware of the various contacts to improve networking and to meet technical assistance needs. Below is a list of various offices that may be able to assist you. It is suggested that you bookmark them on your computer accordingly for easier and timely coordination.

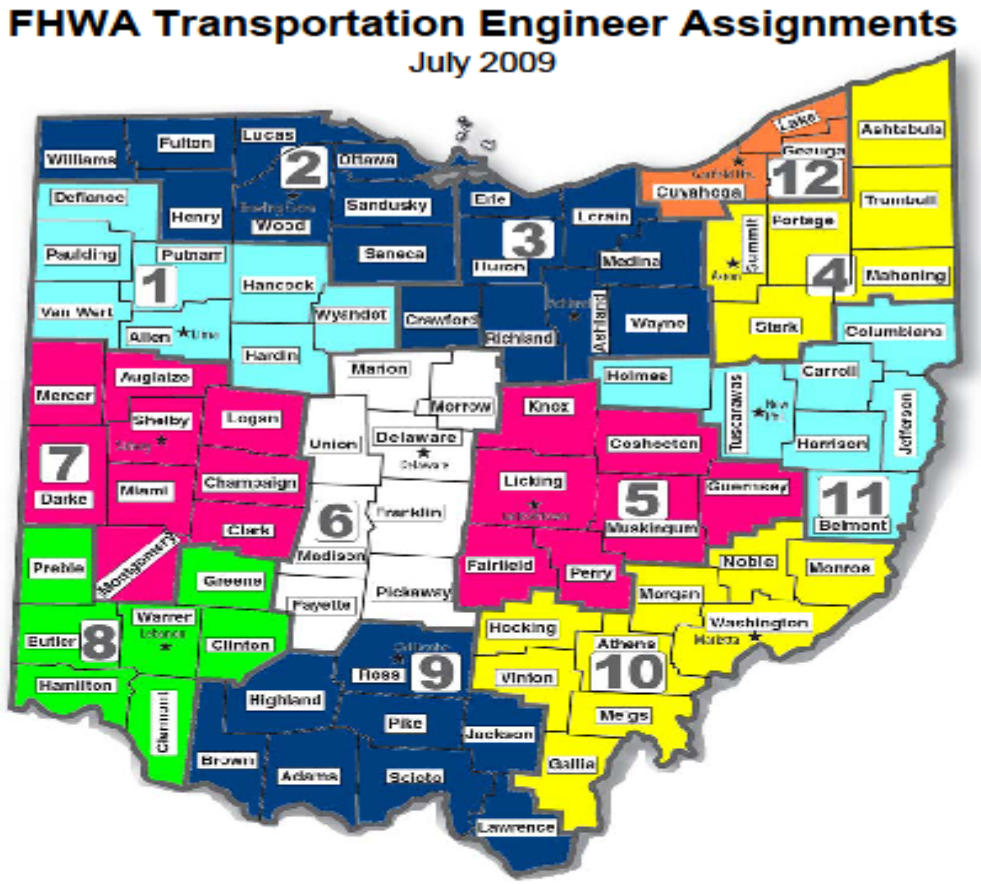
- FHWA
  - Headquarters, Washington, DC, particularly
    - ***http://www.fhwa.dot.gov/construction/***
    - ***http://www.fhwa.dot.gov/pavement/index.cfm***
  - FHWA Resource Center ***http://www.fhwa.dot.gov/resourcecenter/index.cfm***
    - Atlanta, GA
    - Baltimore, MD
    - Lakewood, CO
    - Matteson, IL
    - San Francisco, CA
  - Research, Development and Technology ***http://www.tfhrc.gov/index.html***
    - McLean, VA
  - FHWA Division Offices ***http://www.fhwa.dot.gov/field.html***
    - All 50 States, the District of Columbia, Puerto Rico, Guam
  - Directors of Field Services ***https://fhwaapps.fhwa.dot.gov/foisp/keyFieldDirFieldServices.do***
    - DFS East, Baltimore, MD
    - DFS South, Atlanta, GA
    - DFS West, Salt Lake City, UT
  - Federal Lands Highway Divisions
    - Eastern, Sterling, VA: ***http://www.efl.fhwa.dot.gov/***
    - Central, Denver, CO: ***http://www.cflhd.gov/***
    - Western, Vancouver, WA: ***http://www.wfl.fhwa.dot.gov/***

- It is recommended that each division office develop a list of contacts specific to their State which would cover State, county, and local contacts. The division office should also develop maps such as districts, NHS eligible routes, etc. *(See next page for Sample State Contact map.)*
  - State map with Districts
  - State
  - County
  - Local

- National Organizations
  - American Association of State Highway and Transportation Officials (AASHTO): ***http://www.transportation.org/?siteid=37&pageid=310***
  - American Traffic Safety Services Association (ATSSA): ***http://www.atssa.com/***
  - National Center for Pavement Preservation (NCPP): ***http://www.pavementpreservation.org/***

Appendix A – Contacts

Sample State Contacts Map



	FMIS Code	ODOT District	Responsible Person	Telephone Number
	AA	1 & 11	Ron Garczewski	614-280-6840
	BB	12	Michael Armstrong	614-280-6855
	CC	5 & 7 (except MOT-75)	Sara Lowry	614-280-6835
	DD	6	Roger Ryder	614-280-6849
	EE	8 & (MOT-75 in D-7)	Mark Vonder Embse	614-280-6854
	FF	4 & 10	Andy Blalock	614-280-6823
	GG	2 & 3 & 9	Adam Johnson	614-280-6843
	LP	Local Programs	Dan Dobson	614-280-6853
Bridge Review and Coordination				
		1, 4, 5, 7, 8, 9, 10	Matt Shamis	614-280-6847
		2, 3, 6, 11, 12	Tom Lefchik	614-280-6845

Appendix B – References

- **Construction Program Management & Inspection Guide**
  - Construction Program Management and Inspection Guide and Workshops (04/11/06): ***http://www.fhwa.dot.gov/construction/041106.cfm***
  - Construction Program Management and Inspection Guide, August 2004: ***http://www.fhwa.dot.gov/construction/cpmi04tc.cfm***

- **Contract Administration Core Curriculum Manual**
  - *FHWA Contract Administration Core Curriculum Manual* ***http://www.fhwa.dot.gov/programadmin/contracts/coretoc.cfm***

- **Federal Reference Links – USC, 23 CFR, FAPG,**
  - Legislation, Regulations and Guidance ***http://www.fhwa.dot.gov/legsregs/legislat.html***
  - FHWA Directives and Policy Memorandums ***http://www.fhwa.dot.gov/legsregs/elecdirs.htm***
    - Federal-aid Policy Guide (regulatory and non-regulatory), FHWA Technical Advisories, FHWA Orders, FHWA Notices, and FHWA Policy Memorandums
    - Stewardship Portal

- **FOIA** ***http://www.fhwa.dot.gov/foia/index.htm***

- **Major Projects**
  - Major Projects ***http://www.fhwa.dot.gov/programadmin/mega/***
  - STAFFNET - ***http://intra.fhwa.dot.gov/programadmin/major/***

- **FHWA Policy Memorandums**
  http://www.fhwa.dot.gov/legsregs/directives/policy/

Appendix B – References

FHWA Policy Memorandums

http://www.fhwa.dot.gov/legsregs/directives/policy/

Any questions concerning these policy memorandums should be addressed to the Office of Primary Interest (OPI).

Office of Planning, Environment, & Realty

Issued	Subject	OPI
1/27/07	Policy and Guidance Supercompensation Payments Incurred for Acquisition of Real Property on Projects Eligible for Federal Funding	HEPR
8/17/06	Guidance on 23 U.S.C. §328 Environmental Restoration and Pollution Abatement	HEPN-30
7/12/06	Recreational Trails Program Compliance for FY 2007 Apportionments	HEPH-50
5/25/06	Highway Traffic Noise	HEPN-20
5/5/06	SAFETEA-LU Deadline for New Planning Requirements (July 1, 2007)	HEP-1/TPL-1
4/26/06	Policy and Guidance for Acquisition and/or Relocation Incentive Programs-Voluntary	HEPR
4/4/06	Sec. 6004: State Assumption of Responsibility for Categorical Exclusions	HEPE
3/29/06	Transportation Conformity Guidance for Qualitative Hot-spot Analysis in PM2.5 and PM10 Nonattainment and Maintenance Areas	HEPN-40
2/24/06	Guidance on Eminent Domain Provision of Department of Transportation Appropriations Act, 2006	Division Realty Professional
2/15/06	Release of FHWA Roadway Construction Noise Model (FHWA RCNM) Version 1.0	HEPN-20
2/14/06	Interim Guidance for Implementing the Transportation Conformity Provisions in the SAFETEA-LU, February 14, 2006	HEP
2/6/06	Flexible Funding for Highways and Transit and Funding for Bicycle & Pedestrian	HEP
2/6/06	Major Project Guidance and the Division Right-of-Way Function	HEPR
2/3/06	Interim Guidance on Air Toxic Analysis in NEPA Documents	HEPN-10
2/1/06	Guidance on the Coordinated Border Infrastructure Program	HEPI-10
1/13/05	Guidance for applying the 4(f) exemption for the Interstate Highway System	HEPE
12/1/05	Interim Guidance on the Use of 23 USC §139(1) Limitation on Claims Notices	HEP-1
10/6/05	Uniform Act Eligibility In Areas Impacted by Hurricane Katrina	HEPR-1
8/30/05	Guidance on the Approval Process For Outdoor Advertising Control Pilots	HEPR
4/13/05	Rails-with-Trails: Lessons Learned	HEPN-50
3/10/05	Federal-aid Eligibility of Wetland and Natural Habitat Mitigation	HEPN-30
3/8/05	Guidance on Adjustment of Non-conforming Outdoor Advertising Signs	HEPR-1
11/30/04	Guidance on New Iowa Regulations Relating to Bonus Act Control Areas	HEPR

Issued	Subject	OPI
8/9/99	Illegal Aliens and the Uniform Act	HEPR
4/28/99	Guidance on the Congestion Mitigation and Air Quality Improvement (CMAQ) Program Under the Transportation Equity Act of the 21st Century (TEA-21)	HENE/TPL-1
2/24/99	Transmittal of Guidance on Bicycle and Pedestrian Provisions of the Federal-aid Program	HEPH-30
6/11/97	Programmatic Agreement on Transportation Enhancements	HEP-40
1/2/97	Highway Traffic Noise	HEPN-20
3/12/97	Eligibility of ISTEA Funds to Mitigate Historic Impacts to Wetlands	HEPN-30
11/12/96	Procurement of Transportation Enhancement Projects	HNG-22
11/01/96	The Uniform Act and Transportation Enhancements	HRE-01
10/28/96	NEPA Requirements for Transportation Enhancement Activities	HEP-30
3/11/96	Exemption Criteria During Highway Sanctions	HEPN-10
12/15/95	Memorandum of Understanding to Foster the Ecosystem Approach	HEPN-30
12/13/95	Use of Private Wetland Mitigation Banks	HEPN-30
11/2/95	Guidance Implementing Executive Memorandum on Landscaping	HEPN-30
10/11/95	Highway Noise-The Audible Landscape: A Manual for Highway Noise and Land Use	HEPN-20
9/26/95	Executive Order on Recreational Fisheries	HEPN-30
7/25/95	Participation in Funding for Ecological Mitigation	HEPN-30
7/5/95	Use of Private Wetland Mitigation Banks as Compensatory Mitigation for Highway Project Impacts	HEPN-30
6/12/95	Highway Traffic Noise Guidance and Policies and Written Noise Policies	HEPN-20
2/3/95	Analyzing Exempt Projects in the Conformity Process	HEPN-10
11/8/94	Federal Interagency Memorandum of Understanding (MOU) for Implementation of the Endangered Species Act (ESA)	HEPN-30
10/24/94	Funding for Establishment of Wetland and Mitigation Banks	HEPN-30
8/22/94	Interim Guidance of Applying Section 4(f) on Transportation Enhancement Projects and National Recreational Trails Projects	HEP-31
7/28/94	Applicability of Davis-Bacon For Transportation Enhancement Projects	HNG-22
4/19/94	Wetland Delineation and Mitigation	HEPN-30
4/4/92	Inclusion of Administrators And Operators of Major Modes of Transportation on MPOs	HEPM-10
1/17/92	Designation of Bicycle and Pedestrian Coordinators within State Departments of Transportation	HEP-1

Office of Infrastructure

Issued	Subject	OPI
09/10/08	Highway Embankments versus Levees and other Flood Control Structures	HIBT-20
06/26/08	Repayment of Preliminary Engineering Costs	HIPA-10
06/26/08	Procurement of Federal-aid Construction Projects	HIPA-30
06/25/08	Surface Transportation Program (STP) Section 1108(f) of TEA-21, Funding of Minor Collectors Amended by SAFETEA-LU Technical Corrections	HIPA-10
06/24/08	Applicability of Prevailing Wage Rate Requirements to Federal-aid Construction Projects	HIPA-30
06/10/08	Eligibility of Replacement Parts for Safety-related Hardware	HIPA-30
04/25/08	Division K, Title I, FHWA Federal-Aid Highways (Additional Obligation Limitation) (Highway Trust Fund) of the Consolidated Appropriations Act, 2008 (P.L. 110-161)	HIBT-30
03/27/08	Division K, Title I, FHWA Federal-Aid Highways (Additional Obligation Limitation) (Highway Trust Fund) of the Consolidated Appropriations Act, 2008 (P.L. 110-161)	HIBT-30
03/18/08	Eligibility of Replacement Parts for Safety-related Hardware	HIPA-30
03/13/08	Revised Policy for the Approval of Buy America Waivers	HIPA-30
07/09/07	Culvert Selection Procedures	HIPA-30
05/22/07	The Discontinuance of the FHWA-45, FHWA-47 & FHWA-810	HIPA-10
02/08/07	Toll Credit for Non-Federal Share, Section 1905 of SAFETEA-LU	HIPA-10
01/19/07	Final Major Project Guidance	HIPA-40
11/30/06	Pipe Selection Final Rule	HIPA-30
10/31/06	Sections 1701 and 1702 of SAFETEA-LU Revised High Priority Projects Program Implementing Guidance	HIPA-10
10/30/06	Bridge Load Ratings for the National Bridge Inventory	HIBT-30
03/07/06	Use of Debris from Demolished Bridges and Overpasses	HIBT-10
01/11/06	Guidance on Patented and Proprietary Product Approvals	HIPA-30
12/23/05	Sections 1701 and 1702 of SAFETEA-LU High Priority Projects Program Implementing Guidance	HIPA-10
12/12/05	Awarding Engineering and Design Services Contracts Based on Brooks Act Requirements	HIPA-20
11/30/05	Surface Transportation Program (STP) Implementation Guidance under SAFETEA-LU	HIPA-10
02/11/05	Retroactive Use of Toll Credits	HIPA-10
10/14/04	SEP-15 Application Process	HIPA-30
10/8/04	Preventive Maintenance Eligibility	HIAM-20
03/22/04	Revisions to Items 63-66 to Support Load Reporting by Rating Factor	HIBT-30
7/3/03	Re-Delegation of Buy America Waiver Approval - Guidance	HIPA-30

Issued	Subject	OPI
1/8/03	Stewardship and Oversight of the FHWA Construction Programs	HIAM-20
10/7/02	Owner Controlled Insurance Program Policy	HIPA-30
2/11/02	Incident Management Programs Funding Eligibility	HIPA-10
2/7/02	Formal Policy on the Use of Recycled Materials	HIPT
1/1/02	HBRRP Funds For Preventive Maintenance (23 U.S.C. 116(d))	HIBT
4/27/01	Revision of Coding Guide, Item 113 - Scour Critical Bridges	HIBT-30
4/26/01	Interpretation of Title 23, Section 144(o) Reasonable Costs Associated With the Demolition of Historic Bridges	HIBT-30
6/28/00	Load and Resistance Factor Design (LRFD)	HIBT
10/21/99	Terminated Preliminary Engineering Projects - Payback of Federal Funds	HIPA
9/17/99	Vertical Clearance, Interstate System Coordination of Design Exceptions	HIPA
12/24/98	Interstate Highway Reconstruction/Rehabilitation Pilot Program Section 1216(b) of TEA-21 Solicitation for Candidate Proposals	HIPA-10
11/13/98	Project Oversight Unusual Bridges and Structures	HIBT-30
10/30/98	Implementation TEA-21- Interstate Maintenance Guidelines	HIAM-20
8/19/98	Phase Construction for Safety Considerations	HNG-14
8/7/98	Interstate Construction Funds and Availability of Unobligated Balances of Interstate Substitute Funds	HIPA-10
8/7/98	Interstate Maintenance Program TEA-21 Provisions, Implementing Guidance	HIPA-10
8/7/98	Toll Credit for Non-Federal Share Section 1111(c) of TEA-21, Implementing Guidance	HIPA-10
4/13/98	Guidance for Department of Labor Semi-annual Enforcement Reports	HIPA-30
12/22/97	Buy America Policy Response	HIPA-30
8/15/97	Vertical Clearance, Interstate System Coordination of Design Exceptions	HIPA
7/25/97	Identifying Acceptable Highway Safety Features	HMHS-10
2/11/97	Agreement for the Implementation of Scour Countermeasures to Protect Foundations of Scour Critical Bridges	HIPA
1/16/97	Use of State Planning and Research (SP&R) Funds for Technician Certification Program Course Development	HIAM-20
11/12/96	Surface Finishing of Portland Cement Concrete Pavements - Final Report FHWA-SA-96-068, Tire Pavement Noise and Safety Performance, May 1996	HIPT-10
11/12/96	Procurement of Transportation Enhancement Projects	HIAM-20
8/7/96	Electronic Submission of Weekly Payroll Records	HIPA-30
5/9/96	Applicability of Convict Labor Prohibition Transportation Enhancement Projects	HIPA-30
4/19/96	National Highway System Designation Act; Life-Cycle Cost Analysis Requirements	HIAM-30
3/21/96	Preventive Maintenance Revision to 23 U.S.C. 116	HIBT
2/20/96	Comprehensive Guideline for Procurement of Products Containing Recovered Materials	HIPT

Issued	Subject	OPI
11/1/95	Surface Finishing of Portland Cement Concrete Pavement (PCCP)	HIPT-20
6/23/94	Reporting Requirements for Bid Tabulations, Forms FHWA-45 and FHWA-47	HIPA-10
3/18/94	Pre-bid Conferences on Lead-Based Paint Abatement	HIBT-10
3/4/94	Reporting Requirements and Metrication; Bid Tabulations, Forms FHWA-45 and FHWA-47	HIPA-30
12/22/93	Bridge Load Ratings for the National Bridge Inventory	HIBT-30
11/5/93	Bridge Load Ratings for the National Bridge Inventory	HIBT-30
10/12/93	Safety and Geometric Considerations for Interstate Maintenance Program Projects	HIAM-20
6/14/93	Interstate Maintenance Program	HIAM-20
3/26/93	Lead-Based Paint Removal Worker Health and Safety Issues	HIBT-10
7/27/92	Preventive Maintenance	HIAM-20
5/21/92	1991 Intermodal Surface Transportation Efficiency Act (ISTEA) Implementation Interstate Maintenance Program	HNG-13
3/17/92	Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991-Bridge Painting, Seismic Retrofit, and Acetate Application	HIBT-10
2/13/92	ISTEA of 1991 - Construction and Maintenance Requirements	HIAM-20
9/18/90	Contract Procedures Federal Participation in Premium Time (Overtime) Payments to Contractors	HIPA-30
11/04/88	Design Speed	HIPA-20
8/21/85	Design Speed	HIPA-20
5/15/85	Utility and Railwork - Wage Rate and EEO Requirements	HIPA-30
5/14/85	Compliance with the National Bridge Inspection Standards, Frequency of Inspection and Load Posting of Bridges	HIBT-30

Office of Operations

Issued	Subject	OPI
8/3/07	Traffic Control Devices for Preferential Lane Facilities	HOTO
2/28/07	Safety Issues Related to Use of Acknowledgement and Advertising Signs on Toll Facilities Memo	HOTO
12/21/06	Terminated all Experimentations with the use of Yellow-Green Colored Pavement Markings for Crosswalks	HOTO
10/24/06	Consideration of Trucks in Work Zone Planning	HOTO
10/18/06	Interstate Oasis Program	HOTO
10/12/06	Traffic Control Strategies for Toll Plazas	HOTO
5/4/06	Memorandum of Understanding Between FHWA and National Park Service Regarding Traffic Control Devices on Roads in National Parks	HOTO
3/17/06	Guidance for Use of YIELD or STOP Signs with the Crossbuck Sign at Passive Highway-Rail Grade Crossings	HOTO
8/10/05	Optional Use of Acknowledgment Signs on Highway Rights-of-Way	HOTO

Issued	Subject	OPI
7/16/04	Dynamic Message Sign (DMS) Recommended Practice and Guidance	HOTO
3/21/03	Use of Changeable Message Sign (CMS) for Emergency Security Messages	HOTM
8/16/02	AMBER Alert Use of Changeable Message Sign (CMS)	HOTM
3/6/02	Safety Message Signs Interpretation 2-488(1)("Click it or Ticket" Signs)	HOTO-1
11/9/01	Adopt-a-Highway Signs - Interpretation	HOTO-1
4/27/01	Adopt-a-Highway Signs - Interpretation (II- 477(I)--"Advertising on Adopt-a-Highway Signs")	HOTO-1
3/28/01	Program Guidance on High Occupancy Vehicle Lanes	HOTM
12/21/01	"Congestion Ahead" Messages	HOTO
1/19/01	Use of Changeable Message Sign	HOTM
1/3/00	Guidance on Federal-aid Eligibility of Operating Costs for Transportation Management Systems	HOTM-1

Office of Chief Counsel

Issued	Subject	OPI
5/7/03	Participation in the FHWA Office of Acquisition Management Contracting and Federal Assistance Process	HAAM
2/18/97	Eligibility of "Historic Wetlands" for ISTEA Funding	HCC

Office of Research, Development and Technology

Issued	Subject	OPI
11/3/94	State Planning and Research Program Administration; Guidelines	HRPD-1

Office of the Chief Financial Officer

Issued	Subject	OPI
6/29/09	Congestion Mitigation and Air Quality - Increased Federal Share Supplement	HCFM-10
8/8/08	Indirect Cost Allocation Dispute Resolution Process for State DOTs	HCF-1
4/10/08	Congestion Mitigation and Air Quality - Increased Federal Share	HCFM-10
3/9/07	Use of Excess Funds and Funds for Inactive Projects	HCFM-10
7/19/07	INFORMATION: Fund Transfers to Other Agencies and Among Title 23 Programs	HCFM-1
9/25/06	Project Authorization Responsibility	HCF-30
5/5/04	Clarification of Policy on Indirect Costs of State and Local Governments	HABF-40

Office of Administration

Issued	Subject	OPI
4/11/01	Revised Process for Suspension and Debarment Actions	HAAM-10
7/7/99	Tapered Match on Federal-aid Projects	HABF-40
9/17/98	Guidance on Transfer Provisions Contained in the Transportation Equity Act for the 21st Century	HABF-1
12/3/97	Guidance on Transfer Provisions Contained in the Surface Transportation Extension Act of 1997	HABF-1
6/26/92	Guidance on Transfer Provisions Contained in the Intermodal Surface Transportation Act of 1991 (ISTEA)	HABF-1

Appendix C – Correspondence & Other Samples

Correspondence

- Division office sample correspondence/memos/forms
  - Request for Approval of Public Interest Finding (PIF)
  - ARRA Conditional Authorization to Advertise Letter
  - Authorization to Advertise
  - Conditional Approval to Bid Letter
  - Concurrent/Final Settlement Offer Letter
  - Memo Recommending Concurrence in Final Offer

- HQs memos and Technical Advisories
  FHWA Policy memoranda ***http://www.fhwa.dot.gov/legsregs/directives/policy/***

Other Samples

- Sample inspection report ***http://www.fhwa.dot.gov/construction/cpmi04gc.cfm***
- Sample inspection in-depth report outlines
  - *Generic Construction Related Review Guidelines*
    http://www.fhwa.dot.gov/construction/reviews
- Standard Operating Procedure for the FHWA Change Order and Claims Approval Process - FHWA Ohio Division Engineering & Operations Team

Appendix C – Correspondence

Request for Approval of Public Interest Finding (PIF)

U.S. Department of Transportation
Federal Highway Administration

Request for Approval of Public Interest Finding (PIF)

- ☐ Use of patented and proprietary materials, sole source (23) CFR 635.411)
- ☐ Use of State-furnished materials (23 CFR 635.407)
- ☐ Mandatory use of borrow/disposal sites (23 CFR 635.407)
- ☐ Waiver to Buy America Requirements (only FHWA can approve) (23 CFR 635.410)
- ☐ Other

PIF Duration	Project-Specific Information	
☐ Project Specific Approval Statewide Blanket Approval (3yrs. Maximum for blanket)	Contact Name:	
	FA Project #:	State Project #:
	Stewardship: ☐ Full Oversight ☐ Exempt/State Oversight	

Description of Item(s)/Work (clearly describe the item(s)/work involved:

Estimated cost associated with Public Interest Finding (please provide breakout if items):

Justification for Public Interest Finding (Clearly describe the reasons and/or justification for the PIF):

Supporting/Reference Documents (drawing sheet numbers, specifications, correspondence, etc.):

SHA Request By (signature):	Name and Title:	Date of Request:
FHWA Remarks:		
FHWA Approval for PIF Granted By::	Name and Title:	Date of Authorization:

FHWA PIF 3/06

Appendix C – Correspondence
ARRA CONDITIONAL AUTHORIZATION TO ADVERTISE

U.S. Department of Transportation
Federal Highway Administration

February 19, 2009

Refer to: HDA-00

Tom Timpson, P.E.
Chief Engineer
Department of Transportation
City, Delaware

Dear Mr. Timpson:

We have reviewed your request to advertise the SHA Contract 00-000-00, Pavement & Rehabilitation, South II-II, 2009 in anticipation of the Federal Economic Recovery Bill. We approve your request with the following conditions/stipulations:

1) The SHA is advertising the project at its own risk. No Federal funding will be approved/obligated at the time of advertisement for the project.

2) Before awarding the contract, the SHA is planning to submit a request to federalize the contract using the Economic Recovery funding that has been approved by the U.S. Congress but not appropriated to the State transportation agencies at this time. We will federalize the contract if at the time when the request is submitted: a) it meets all Title 23 and applicable non-Title 23 requirements; 2) it meets any special requirements imposed by the Economic Recovery Bill, and 3) the availability of Federal funds.

3) Our approval to advertise the contract does not constitute the commitment of Federal funds on the part of the Federal government. The FHWA's commitment to provide funding occurs when project agreement/authorization is approved in FMIS4.

4) Any expenses incurred prior to the FHWA's approval of the project agreement/authorization will not be eligible for Federal-aid reimbursement.

5) The SHA will abide by FHWA/SHA Stewardship Agreement dated June 13, 2007.

If you have a questions or comments concerning this approval, please contact Dan Juan at (123) 555-1212.

Sincerely yours,

Ron Jonin, P.E.
Division Administrator

cc: Chief Engineer, SHA
Director of Finance, SHA
ARRA Coordinator, SHA
Team Leader, FHWA
Area Engineer, FHWA
File: Recovery Act (2009)

Appendix C – Correspondence

AUTHORIZATION TO ADVERTISE

REGULATION REFERENCE FOR

DELAWARE DIVISION OFFICE

Plans, Specifications, and Estimates, 23 CFR 630.205 Preparation, submission and approval

The plans and specifications adequately describe the construction requirements in sufficient detail to facilitate the construction, contract control, and the estimation of construction costs of the project.

The estimate accurately reflects anticipated costs in sufficient detail to provide a prediction of financial obligations and to permit and effective review of bids.

Physical Construction Authorization, 23 CFR 635.309 Authorization (to advertise for bids)

(a) Plans, specifications, and estimates (PS&E) have been approved.

(b) Statement from the SHA that either all of the right-of-way clearance, utility, and railroad work has been completed or that all necessary arrangements have been made for it to be undertaken and completed as required for proper coordination with the physical construction schedules.

(c) Statement from the SHA certifying that relocation of all individuals and families has been addressed in accordance with the Highway Relocation Assistance Program.

(d) Submission by the SHA of public hearing documents as applicable.

(e) When construction by some method other than competitive bidding is contemplated, submission by the SHA of an affirmative finding of cost effectiveness or that an emergency exists, and determination of such made by the FHWA.

(f) Minimum wage rates are in effect and will not expire before the contract is expected to be awarded.

(g) Statement from the SHA that right-of-way has been acquired or will be acquired or that acquisition of right-of- way is not required.

(h) Statement from the SHA that steps relative to relocation advisory assistance and payments as required by the Highway Relocation Assistance Program have been taken or are not required.

(i) Appropriate measures have been included in the PS&E for minimizing soil erosion and water pollution as a result of construction operations.

(j) Appropriate measures have been included in the PS&E to ensure conditions and commitments made in project development to mitigate environmental harm will be met.

(k) Where utilities will occupy the right-of-way, the SHA has demonstrated that the provisions of 23 CFR 645.119(b) have been met.

(l) FHWA has verified that adequate replacement housing is in place or has been made available to all affected persons.

(m) Where applicable, area wide agency review has been accomplished.

(n) FHWA has determined that the PS&E provides for only information signs and traffic control devices conforming to MUTCD standards and does not include promotional or other unauthorized signs.

(o) FHWA has determined that, where applicable, provisions are included for the erection of funding source signs.

Appendix C – Correspondence

Conditional Approval to Bid

U.S. Department of Transportation
Federal Highway Administration

DelMar Division
Maryland Office
City Crescent Building
10 S. Howard Street, Suite 2450
Baltimore, Maryland 21201

March 27, 2009

Refer to: HDA-MD

Mr. Neil J. Pedersen
State Highway Administrator
Maryland State Highway Administration
707 North Calvert Street
Baltimore, MD 21202

Attn: Michael Rowe

Subject: Conditional Approval to Bid MD 404, from East of Tuckahoe Creek to East of MD 480

Dear Mr. Pedersen:

We have reviewed your request to advertise MD 404 (Shore Highway), from East of Tuckahoe Creek to East of MD 480 (Phase 1A), State Contract Number CO3235168, Federal-aid Project ES-NH-STPD-300-1(46)N / HP-1277(002) N / HP-4290(004)N for which Maryland State Highway Administration (SHA) is planning to use American Recovery and Reinvestment Act (ARRA) funds. The SHA is specifically requesting our concurrence to advertise this project concurrently while you are working towards meeting all of the ARRA requirements. We concur with your request with the following conditions/stipulations:

This authorization is subject to the following agreement/conditions:

1) SHA is advertising this project at its own risk. No Federal funding will be approved/obligated at the time of advertisement for the project.
2) Before awarding the contract, SHA is planning to submit a request to federalize the contract using the ARRA funding apportioned to the SHA. We will federalize the contract if at the time when the request is submitted: a) it meets all Title 23 and applicable non-Title 23 requirements; 2) it meets any special requirements imposed by ARRA, and 3) the availability of requested funds (ARRA or other Federal funds).
3) Our approval to advertise the contract does not constitute the commitment of Federal funds on the part of the Federal government. The FHWA's commitment to provide funding occurs when project agreement/authorization is approved in FMIS4.
4) Any expenses incurred prior to FHWA's approval of the project agreement/authorization will not be eligible for Federal-aid reimbursement.
5) SHA will abide by SHA/Division Office Stewardship Agreement dated April 2, 2007.
6) The follow updates to the PS&E package will be included:
    a. ARRA Employment reporting specification
    b. MBE/DBE Compliance Field Meeting Spec
    c. Addition of a statement that all permits will be received prior to bid opening in the permits section
    d. R/W status statement (will reflect the language in the R/W certification)
    e. Removing the duplicate specification on page 109 (same as page 108)

f. Updating the specification on page 193 with the 2008 specification, currently it is the 2001 version of the specification
g. Addition of the workzone pennant signs that are being added to all high visibility project

If you have a questions or comments concerning this authorization, please contact Dan Montag at (302) 734-1719.

Sincerely yours,

Nelson J. Castellanos
Division Administrator

Attachment: 1

cc: Michael Rowe, SHA
Project File: CO3235168

Appendix C – Correspondence
Concurrent/Final Settlement Offer

U.S. Department of Transportation
Federal Highway Administration

April 7, 2009

Refer to: HDA-00

Park Place Boardwalk, P.E.
Chief Engineer
Department of Transportation
City, State 12345

Dear Mr. Boardwalk:

We have reviewed your memorandum and submitted documentation concerning the Final Settlement with Able Construction for the 00-000-00, BROS-000(0), Bridge 0-000 on RT 1 over Peru Inlet for a negotiated amount of $2.1 million and find it to be acceptable to the Federal Highway Administration (FHWA). The FHWA will participate in the $2.1 million settlement offer.

In making this determination we offer the following justification.

1. Unrecovered Bond Costs
    - Original bid amount: $34,428,026.95
    - Original bid + COs: $36,731,863.94
    - Estimates Pd to Date: $23,354,307.55
    - Remaining Value: $13,377,556.39
    - Unrecovered Bond Cost of 1%: $133,775.56

    The FHWA agrees with the determination of $133,775.56

2. Sheetpiling
    - Total amount to settle issue: $1,300,393.67
    - Pd to date previously agreed to by FHWA: $850,849.44
    - Additional compensation per attached spreadsheet justification: $449,544.23

    The FHWA agrees with the determination of $449,544.23

3. Excavation and Embankment
    - Considering anticipated/actual production rates and hot mix salvage value, amount to settle this issue: $313,068.19

    The FHWA agrees with the determination of $313,068.19

4. Overhead Costs
    - Considering overhead costs and justification provided, amount to settle this issue: $1,203,612.02

    The FHWA agrees with the determination of $1,203,612.02

Considering the four listed issues, the FHWA agrees to participate in the amount of $2.1 million to close out these outstanding issues. We also understand that once this settlement offer is made and agreed to by the contractor, that there will be no more requests for compensation from the contractor to close this project.

Sincerely yours,

John Hancock, P.E.
Division Administrator

Attachments (2)

cc: Chief Engineer, SHA
Deputy Attorney General, SHA
Group Engineer, SHA
Area Engineer, SHA
Project Supervisor, SHA
Team Leader, FHWA
Area Engineer, FHWA

Project File: 00-000-00

Appendix C – Correspondence
Memo Recommending Concurrence of Award

U.S. Department of Transportation
Federal Highway Administration

Memorandum

Subject: **Recommendation for Approval:** Concurrence in award of the US 113, North of Goody Hill Road to South of Massey Branch, Phase 2B Design-Build

Date: March 27, 2009

From: Dan Montag
Sr. Area Engineer
DelMar Division
Dover, DE

In Reply Refer To:
HDA-MD

To: Basharat Siddiqi or Bill Wade
Asst. Division Administrator/s
DelMar Division
Dover DE Baltimore, MD

Per the DelMar Delegation of Authority, I am recommending concurrence in award for the US 113, North of Goody Hill Road to South of Massey Branch, Phase 2B Design-Build, MD Contract No. WO6345270, FHWA No. AC/HP-NH-1208(004)N and AC/HP-NH-4297(002)N to the Design-Build team of David A. Bramble, Inc./Johnson, Mirmiran & Thompson, Inc for the bid amount of $11,970,000.00. The engineer's estimate was $15,300,000.00; the bid was 21.8 percent below the engineer's estimate.

In making this recommendation I have received and reviewed the following:

- Technical Proposal & Price Proposal Evaluation Summary – BAFO, March 17, 2009
- Request for Clarification and Answers
- SHA Request for Proposals Evaluations, Best and Final Offer, and Concurrence - Evaluation Summary Report, 3/17/09
- Lump-Sum Breakdown
- Affirmative Action Plan
- Copy of ROW Certificate

The submittals are in compliance with the SHA Design-Build Manual as agreed to by FHWA. In addition to the submittals provided, I was given a brief of the project evaluation process at SHA by the Procurement Management Team prior to recommendation of award by the team.

This design-build project required a SEP-14 waiver to 23 CFR 636.209 to use an Alternate Technical Concept Proposal. A waiver was granted by FHWA HQ on November 14, 2008 and is in the project files. Under the SEP-14 program, SHA is required to provide a short evaluation of the process (one to two pages) after the contract has been awarded. This document will be submitted to our office within 30 days of project award.

The overall design-build evaluations are as follows:

Evaluation Factor	Bramble/JMT	R.E. Pierson/Century	Lane/ Dewberry
Project Technical Elements & Approach	G	A+	NR
Environmental Approach	G	A (G -)	NR
Project Management	G+	A	NR
Project Schedule	A+	A	NR
Overall Rating	G	A (A +)	NR
Legal/Financial	P	P	NR
Price	$11,970,000.00	$15,150,000.00	$20,402,957.00 Non-responsive

Attachment (1): SHA Request for Proposals Evaluations, Best and Final Offer, and Concurrence - Evaluation Summary Report, 3/17/09

Appendix C – Other Samples

Inspection Report (Peru Inlet)

Construction Progress & Inspection Report **U. S. Department of Transportation** Federal Highway Administration **Delaware Division** FHWA 1446A (DE Modified 6-06)			
REPORT NO. **9**	DATE OF INSPECTION **4/10/07**	DATE OF REPORT **4/18/07**	
FEDERAL-AID NO. **BROS-S000(0)**	SHA NO. **23-073-03**	COUNTY	
LOCATION: **BR 0-000 ON RT 1 OVER PERU INLET ROADWAYS & APPROACHES**			
DESCRIPTION: **ROADWAY, EMBANKMENT, RETAINING WALLS, PARK ACCESS ROADS, UTILITY RELOCATIONS, & LANDSCAPING**			
PROJECT ENGINEER **Dan Juan (SHA)**		CONTRACTOR **Able Construction Company**	
AWARD DATE **5/6/05**	NOTICE TO PROCEED	START DATE **6/30/2005**	CONTRACT AMOUNT **$34,428,026.95**
CONTRACT TIME **1625 CDs**	TIME EXTENSIONS **183 ***	TIME ELAPSED **650 (36%)***	WORK COMPLETED **50.52% by value**
NO. OF CHANGE ORDERS **37 (not all part.)**	AMOUNT OF CHANGE ORDERS **$2,127,036.63***	DBE GOAL **7.5 %**	TRAINING POSITIONS **3**
INSPECTION MADE BY **FHWA AE**		IN COMPANY WITH **Dan Juan**	
INSPECTION TYPE ☑ INITIAL ☑ INTERMEDIATE ☐ IN-DEPTH ☐ FINAL			
QUALITY OF WORK ☑ Satisfactory ☑ Unsatisfactory		PROGRESS OF WORK ☐ Satisfactory ☐ Unsatisfactory	

Purpose: The project was visited to attend a project public meeting, attend job progress meeting, assess project progress, perform an intermediate inspection, and to discuss project issues with the field staff.

Scope: Review the fresh pond mitigation sites, approach embankments, general work zone traffic control, and project records.

Time: The project contract time was 1625 calendar days. There has been 183 days of additional time added to the project. 60 days is participating (CO 9 + 7 days, CO 20 + 1 day, CO 21 + 30 days, and CO 27 + 22 days). CO 15 granted 90 additional days to the contract which has been determined to be non-participating. There is an additional 33 days that FHWA has not made a determination on. The current participating contract time is 1,685 calendar days, potentially 1,718 days. The current SHA contract time is 1,808 calendar days.

- FHWA Completion Date 2/8/2010 (FHWA considers this the contract completion date, the FHWA will charge SHA LDs if not completed on time)
- SHA Completion Date 7/2/2010
  CPM update #20 was submitted on April 4, 2007 and is showing 19 days negative float.

DBE: Project has a DBE percentage goal of 7.5% or $2,818,450.61, currently at 40.43% by dollars of this goal. Major outstanding DBE items are related to scour protection.

Change Orders: To date the project has had 37 change orders with a value of $2,127,036.63.
- Changer Orders Not Reviewed/Approved: 6, 29, 30, 31, 32, 33
- Change Orders Non-Participating: 15 (90 day extension), 28 ($15, 861.70), 37 ($1,271.08)

The value of participation in the COs will be determined once all the COs have been reviewed.

See the Following Attachments: (file copy only)
- Job Progress Meeting Minutes, Meeting No. 19, April 10, 2007 for description of progress of work and project issues.
- Daily Field Data Collection Summary Sheets (Inspector Daily Reports and Project Diary) for March 22, 2007 and April 3, 2007.
- Sediment, Stormwater Management and Wetland Inspection Report, April 14, 2007
- Supplemental Geotechnical Scope of Services Indian River Inlet Bridge Project April 17, 2007

Project Documentation: A review of the above attachments was completed.
- The Job Progress Meeting Minutes included all necessary information related to progress of work and project issues.
- The Daily Data Collection Summary Sheets (Inspector Daily Reports and Project Diary) and Daily Field Source Documentation were reviewed for adequate documentation.
  - The Traffic Control Work Sheet completed for March 22, 2007 included adequate documentation for pay items, but the sheet was not signed by the inspector or the contractor. If it is the intent of the work sheet to be used by the project as a basis of payment of traffic items, the sheet should be signed by the inspector, but does not require the contractor's signature. If the report is used also as a basis of acceptance of the adequacy of the traffic control work zone then this sheet should be completed by the contractor since the adequacy of the work zone is the responsibility of the contractor's ATSSA representative (Item 763500 – Maintenance of Traffic).
- The Sediment, Stormwater Management and Wetland Inspection Report was reviewed for adequacy.
  - The report included Action Needed/Corrective Measure with correct by dates.
  - The report also included a status sheet for previous inspections which is a good follow-up practice. "Status of last report: No corrective measures required."
  - The contractor will now be performing the CCR responsibilities, not SHA staff.

Supplemental Geotechnical Investigation: Due to the consolidation/settlement of the South Embankment Approach, SHA has contracted with Geocomp Corporation (Geocomp) to perform an independent comprehensive geotechnical investigation/evaluation.

The Objective of the investigation will be:
(1) accuracy/reliability and adequacy of geotechnical design parameters derived from field and laboratory testing
(2) global stability of the embankments
(3) total and differential settlements and lateral deformations
(4) rate of settlement
(5) adequacy of the current embankment surcharges

Please see the attached Supplemental Geotechnical Scope of Services Indian River Inlet Bridge Project April 17, 2007 for further information.)

Active Project Work: There is limited construction activity at this time. The roadway approaches are being left to consolidate/settle. The SHA and the contractor are waiting to see which design/build team will be awarded the bridge construction contract. Once this has been determined, planned construction activities will need to be reevaluated.

Project Pictures with Comments: Please see the following pictures with brief descriptions:

P1: Fresh Ponds South – East Pond: Pond is not complete. Surcharge from the approach sections of the bridge will need to be placed in the pond. Additional work will be done to raise the islands from .25 ft to .4 ft in the center and from 0.0 ft to .2 ft at the water edge line. The pond is currently at approximately 75 percent with survey and temporary seeding completed. Due to the consolidation issues at the approaches, material from other sources may have to be brought in to complete this work.

P2: Fresh Pond South – West Pond: Major construction is complete, additional minor grading will be required in April/May 2007.

P3: Fresh Pond North – The pond construction is complete. All planting has been completed and an animal (geese) exclusion fence has been installed to protect the plantings. The fences should be removed at the end of the 2007 growing season, Nov/Dec. Currently the Spartina grass is growing well and is putting off additional rhizomes.

The Spartina grass is a very strong rhizome (a rhizome is when the roots shoot out runners) grass found along the Eastern seaboard in sand or mudflats in salt marshes. Spartina is able to survive where many other plants can't.


P4/5: South Roadway Approach Embankment – Surcharge placement was completed on February 20, 2007. Surcharge elevation is at 51 ft. The embankment is currently being left to consolidate/settle. Once sufficient settlement has occurred, the additional surcharge will be removed, the drainage system will be installed, and the concrete facing on the MSE walls will be installed. There has been 2 months of surcharge completed, with 6 months more anticipated.


P6/7: North Roadway Approach Embankment – Surcharge placement has been completed. Surcharge elevation is at 51 ft. The embankment is currently being left to consolidate/settle. Once sufficient settlement has occurred, the additional surcharge will be removed, the drainage system will be installed, and the concrete facing on the MSE walls will be installed. There has been 4 months of surcharge completed, with 4 months more anticipated.

P8: Movement in the existing SR-1 roadway on the South approach continues. It appears that the roadway is being moved to the West as the new South approach consolidates/settles. This movement is causing cracking/ripping in the pavement. SHA plans on putting an overlay over this section this spring.

Work Zone Traffic Control: A full work zone traffic control review was not completed during this visit. The existing traffic pattern will remain in place until the new bridge is completed. However, in the course of driving through the project, the work zone appeared to be in substantial compliance with the approved work zone plan requirements.

cc: District Engineer, SHA
Area Engineer, SHA
Project Resident, SHA
Team Leader, FHWA
Area Engineer, FHWA
Project File (w/ attachments)

Appendix C – Other Samples

Standard Operating Procedure for the FHWA Change Order and Claims Approval Process

FHWA Ohio Division
Engineering & Operations Team
10/21/08

General /Background

A statewide 2007 Quality Improvement Review (QIR) was performed by the Federal Highway Administration (FHWA) on the Construction Change Orders, Claims, and Liquidated Damages Processes followed by the Ohio Department of Transportation (ODOT) on Federal-aid highway construction projects in Ohio. The QIR was performed to provide assurance that the ODOT executes construction contract change orders, evaluates and administers claims, and assesses liquidated damages in accordance with 23 CFR 635, *Construction and Maintenance*.

Overall, the FHWA QIR Team determined that the ODOT policies and procedures have been developed and are being consistently applied to properly assure that changes to construction plans and contract provisions provide appropriate adjustments for extra or deleted work, and review findings regarding compliance related recommendations (to state and federal requirements, policies and procedures), opportunities for improvement, and successful practices were identified. These review findings to ODOT were addressed and resolved in May 2008 with the FHWA's formal acceptance of ODOT's Interim Standard Procedure No. 510-010(SP) titled "Interim Standard Procedure for Processing Change Orders". The FHWA worked with the ODOT Office of Construction Management in its development and the Interim Standard Procedure was modified to include language to address and implement the QIR reports recommendations. For example, Section V of the Interim Standard Procedure outlines the required consultation with the FHWA when a change order is first contemplated, and their required approval by the FHWA.

Additionally, the 2007 QIR recommended that an *internal FHWA Standard Operating Procedure (SOP)* also be developed and implemented by the FHWA Ohio Division Office to help standardize the change order and claims review and approval process. The QIR found that there were inconsistencies with regard to obtaining the FHWA approval of change orders; specifically, there were inconsistencies with the notification of change orders by the ODOT Districts, and the processing of change orders internally by FHWA Transportation Engineers. This SOP will help to standardize the processing of change orders and claims by the FHWA in the future.

Procedures:

A. On all Federal oversight projects, each of the following apply (per 23 CFR 635.120): Following authorization to proceed with a project, all major changes in the plans and contract provisions and all major extra work shall have formal approval by FHWA in advance of their effective dates. (per 23 CFR 635.120 (a)). This formal advance approval is commonly referred to as "FHWA Pre-Approval" of major extra work change orders.

   For non-major changes and for non-major work, formal FHWA approval is necessary but such approval may be given retroactively. (per 23 CFR 635.120(b))

   All change orders amending contract time shall be submitted for approval by the FHWA. When possible, change orders for contract time resulting from contract changes or extra work, should be submitted at the same time as the change order for said contract change or extra work for approval by FHWA. (per 23 CFR 635.120(c))

B. The ODOT District shall consult with the appropriate FHWA Transportation Engineer when a major change is first contemplated on a full Federal oversight project. The purpose of the consultation is for FHWA to determine and provide the ODOT with the eligibility of the change for Federal participation, the effect on Federal project funding, and for the ODOT to obtain the FHWA approval to execute the change order under the terms and conditions agreed upon in this consultation.

   1. **This consultation may be made by the ODOT by e-mail or by telephone with a follow up e-mail to the FHWA. The e-mail from the ODOT will need to have the Project Number, PID, and the County-Route-Section in the subject line and include adequate information to determine the nature and extent of the proposed change. The results of this consultation shall ultimately be documented by FHWA by a saved copy of the FHWA's response e-mail to the ODOT into the FHWA's electronic project files.** The results of this consultation will be also be documented by the ODOT in their project files and in their future change order report's "Explanation of Necessity" block.

C. The FHWA considers a change order to be a "major" change if it:

1. Results in a project cost increase exceeding the lesser of $250,000 or 5 percent of the award amount.

2. Alters the planned access controls, highway operations (highway operational characteristics), or work limits.

3. Results in new or additional environmental impacts.

D. Price adjustment clause change orders in the amount over the above mentioned threshold for major change orders ($250k or 5 percent of the award amount) will continue to require the FHWA Pre-Approval (i.e., FHWA Advance Approval) in the future.

E. The FHWA does not participate in maintenance items or the purchase of surplus material.

F. The FHWA does not participate in the repair of completed permanent items of work damaged by traffic and compensated under C&MS Section 107.15 *with the following exceptions*:

i. The FHWA participation is allowed on federally-funded projects off the NHS as determined by State law and policy.

ii. The FHWA participation is allowed on federally-funded projects on the NHS when the proximate cause of damage was the result of traffic being diverted from its normal path by construction activity.

G. Paper hardcopies or electronic versions, presented through an ftp website or document management system, of all change orders shall be submitted by the ODOT Districts to the FHWA for approval on federal oversight projects only.

H. Final formal/written approval of all major and minor change orders by the FHWA is permitted following execution of the change order by ODOT.

I. Transportation Engineers will periodically request copies of all ODOT processed & approved change orders on federal oversight projects. The assigned FHWA Transportation Engineer will review the change order in accordance with 23 CFR 635.120. The Transportation Engineer will review the change order, evaluate whether or not it is accompanied with adequate support documentation, and determine its eligibility for payment/participation with Federal funding. As needed, additional backup support documentation from the ODOT for

change orders may be requested by the TE, or obtained and reviewed by the TE during the on-site FHWA Construction Inspection; if documentation is reviewed by the TE during the on-site FHWA Construction Inspection, it shall be documented by the TE in the FHWA Construction Inspection Report prior to formal FHWA approval of the change order.

Upon receipt and review of each ODOT approved/signed change order, each change order will then be appropriately "stamped and signed" (either manually or electronically) as "approved" or "not approved" for participation with Federal-aid funding by the FHWA Transportation Engineer and then saved in the FHWA's electronic project file.

The FHWA Transportation Engineer will follow-up by notifying ODOT *in writing* of the status of processed change order in one of the following ways: (1) via an FHWA e-mail, with copy of the e-mail saved to the FHWA's project files, and/or (2) documentation in an "FHWA Construction Inspection Report" for the project.

J. The ODOT approves change orders on behalf of the FHWA for "State-administered" federally-funded projects. The ODOT retains final approval of change order documents on State-administered, federally-funded projects only. The ODOT is required to obtain the FHWA approval for all change order documents on federal oversight projects.

K. The ODOT Division of Construction Management will coordinate the review and advance approval of all claims on full Federal oversight projects with the FHWA.

   i. The ODOT Division of Construction Management will provide notification to the assigned FHWA Transportation Engineer upon receipt of Notice of Intent to File a Claim.

   ii. The ODOT Division of Construction Management will provide the assigned FHWA Transportation Engineer with a copy of all claims decisions for review and advance approval prior to final execution of any change order that may result from the decision.

   iii. The assigned FHWA Transportation Engineer will review the claim(s) in accordance with 23 CFR 635.124, Participation in Contract Claim Awards and Settlements. The Transportation Engineer will review the claim, evaluate whether or not it is accompanied with adequate support documentation, and determine its eligibility for payment/participation with federal funding. As deemed necessary, the Transportation Engineer will coordinate internally within the FHWA as needed, to determine eligibility and/or to obtain technical expertise to assist with the FHWA's

review of the claim). The Transportation Engineer will keep the ODOT apprised of the status of the FHWA's review of the claim and respond back to the ODOT in writing, normally no less than 30 days after receipt of the claim, with the FHWA's review comments and/or approval determination regarding the claim's eligibility for payment with Federal funds.

L. The ODOT Interim Standard Procedure for Change Orders and Claims includes the federal oversight criteria and the FHWA Transportation Engineer Map, to assist the ODOT in answering related questions.

Federal oversight project criteria are provided in the ODOT/FHWA Stewardship & Oversight Agreement which can be found at: ***http://www.fhwa.dot.gov/ohdiv/soa.htm*.**

The current FHWA Transportation Engineer map can be found at ***http://www.fhwa.dot.gov/ohdiv/engassignments.htm***

References:

Title 23 CFR 635, Construction and Maintenance:
§ 635.109 Standardized changed condition clauses.
§ 635.120 Changes and extra work.
§ 635.124 Participation in contract claim awards and settlements.

Federal-Aid Policy Guide Non-Regulatory Supplements
FHWA Contract Administration Manual
FHWA Construction Program Management and Inspection Guide
FHWA Program Assessment for the Construction and Contract Administration

Ohio Revised Code, State of Ohio
Construction and Materials Specifications, ODOT, 2005 and 2002
ODOT Construction Inspection Manual of Procedures, 2006
ODOT Policy 27-010(P):
http://www.dot.state.oh.us/policy/27-010(P).pdf
ODOT Standard Operating Procedures 510-101 (SIP), Interim Standard Procedure for Processing Change Orders, dated 5/29/08:
http://www.dot.state.oh.us/construction/OCA/Policy/510-010(SIP)-05292008.pdf

Standard Operating Procedure (*SP) 510-010,* dated 6/30/03:
http://www.dot.state.oh.us/policy/510-010(SP).pdf

PN 109 Dispute Resolution and Administrative Claims Process
http://www.dot.state.oh.us/construction/OCA/Specs/SSandPN2005/PN109_04152005%20for%202005.pdf

PN 108 Dispute Review Board Process
http://www.dot.state.oh.us/construction/OCA/Specs/SSandPN2005/PN%20108_01202006%20for%202005.PDF

23 CFR 635.124
§ 635.124 *Participation in contract claim awards and settlements*.

APPENDIX D – FHWA CHECKLISTS

Pre-Award

- PS&E Approvals ***http://www.fhwa.dot.gov/construction/cqit/pse.cfm***
- PS&E Checklist

Post-Award

- Bridge Deck Placement Checklist
- In-Depth Inspection Checklist
- Rebar Checklist
- Change Order Participation Checklist (Sample)

* *Also See* Appendix G of CPMIG

APPENDIX D – FHWA CHECKLISTS
(*Pre-Award – PS&E Checklist*)

DIVISION OFFICE AUTHORIZATION TO ADVERTISE CHECKLIST

Federal-aid Project No. _____ SHA Contract No. _____

Title _____

Location/Description _____

FHWA Reviewer _____

Funding (State Form FS-1)
Based on the roadway classification, is the project eligible for the category of funds being requested? _____

For the type of funds, is the Federal-aid ratio correct? _____

For CMAQ projects, has an eligibility determination been approved by FHWA? _____

Planning
Is the appropriate phase of the project listed in the approved STIP for FY? _____

Environment
Has the environmental document or clearance been approved by FHWA? _____
Type_____Date_____

Has Section 4(f) or 106 clearance been obtained, as appropriate? _____

Have all necessary permits (404, Coast Guard, Local Jurisdiction, etc.) been obtained? _____

Right-of-Way

Has the ROW Certificate been reviewed by the FHWA Realty & Environmental Program Manager? _____

If ROW is not clear prior to authorization, are proper stipulations contained in the proposal? _____

Utilities

Have arrangements been made for utility and/or railroad adjustments (agreements)? _____

If utility/railroad agreements have not been signed, are proper stipulations contained in the proposal? _____

If a railroad crossing is located within the limits or near the terminus of the project, has a determination of adequacy of the crossing warning devices been made in accordance with 23 CFR 646.214(b)(2)? _____

If DelTRAC fiber optics is located within the limits of the project, is it properly identified?_____

Engineering

Are there any design exceptions to minimum standards? If so, describe type and date of FHWA approval._____
_____

Have previous design review comments been resolved? _____

If applicable, was DelTRAC appropriately incorporated into the project? _____

Bid Proposal Package Documents

Are the Required Contract Provisions (FHWA-1273) included? _____

Are all necessary Special Provisions included in the specifications? _____

Are all specified work items identified on the Bid Proposal Forms including Breakout Sheets? _____

Are Liquidated Damages specified? _____ Amount:_____

Engineer's Estimate:_____Contract Time:_____ DBE Goal:_____%
Trainee Positions:_____

Other Comments

_____
_____
_____

APPENDIX D – FHWA CHECKLISTS
(*Post-Award – Bridge Deck Placement Checklist*)

CHECKLIST FOR HAULING, PLACEMENT, AND FINISHING OF BRIDGE DECK CONCRETE

HAULING

1.) Are all trucks used for transporting concrete equipped with working revolution counters?

2.) Have trucks been checked to insure the drums and blades are adequate and in good repair?

3.) Are all trucks equipped with a method of accurately measuring water added at the job site?

4.) Are initial mixing revolutions being placed on the haul tickets?

5.) If water is added at the site are an additional 30 mixing revolutions being accomplished and is this recorded on tickets?

6.) Are the total mixing and agitating revolutions being placed on the haul tickets? This number can not exceed 300.

7.) Are the batch (when cement contacts aggregate) and discharge times being placed on the tickets?

8.) Are the proper batch proportions being placed on the haul tickets?

PLACEMENT

1.) Are forms and reinforcing steel being lightly wetted in front of placement?

2.) Has all debris been removed from forms?

3.) Is concrete being deposited at or near it final position?

4.) Is the free fall of the concrete from the end of the pump or bucket 5’ or less?

5.) Is the required pour rate being met? Unless otherwise shown in the contract the minimum pour rate should be 30 ft/hr for entire width of pour or 20 ft/hr for slab bridges.

6.) If epoxy coated re-bar is used is the vibrator covered with nonmetallic sleeve?

7.) Are vibrators being used properly? They should not be used to move concrete around.

8.) Have vibrators been properly certified within the last 90 days to insure proper impulses per minute?

9.) Does the contractor have adequate tools and personnel to properly place and finish the deck? There should be back up vibrators, concrete pump or crain and bucket, and generator.

10.) If more than 45 minutes have elapsed since concrete has been placed the contractor should place a bulk head and stop the pour.

11.) If the temperature of the superstructure concrete is 80°F. or above the time of discharge is 60 minutes. If below 80°F. the time of discharge is 90 minutes or 300 revolutions.

12.) Are instruments available on site to measure wind velocity, concrete temperature, air temperature, and relative humidity? These are needed to determine the rate of surface evaporation of concrete. The evaporation rate can't exceed 0.20 lbs/sq.ft./hr (0.98 kg/m²/hr).

13.) If the wind should increase during the pour does the contractor have material to erect windbreaks?

14.) Does the contractor have 10 foot straight edge or float to check the trueness of the deck so corrections can be made while the concrete is still plastic?

TESTING

1.) Do the project personnel have all of the required equipment to perform the testing? This should include 2 pressure meters or two roll-a-meters, slump cone, thermometers, scales, wheelbarrow, tamping rods, rubber mallet, and all of the scoops and shovels needed to complete the tests.

2.) Are the testers ACI certified?

3.) Are there sufficient personnel to adequately accomplish the testing? Should be 2 to 3.

4.) Are there sufficient cylinder molds?

APPENDIX D – FHWA CHECKLISTS

(*Post-Award – In-Depth Inspection Checklist*)

Federal Highway Administration, Maryland Division
Focus Area/Project In-Depth Inspection Checklist
Fiscal Year 2002

Project Description:	SHA Contract No:	County:	Area Engineer:
	Federal-aid Contract No.:		Date:

Focus Area Checklist	Mark X	Comments
Maintenance of Traffic, Signing, Pavement Marking		
Traffic Barriers		
Progress Payment/Monthly Estimate		
Redline Revisions/Change Order		
MSHA Project Inspections/Quality of Staff and Management		
Design and Construction Coordination		
Other Area/Major Phase Checklist	**Mark X**	**Comments**
GRADING AND DRAINAGE		
Clearing and Grubbing		
Earthwork		
Culvert, Pipe & Inlets		
Erosion Control		
STRUCTURES		
Piling		
Footings		
Sub-structure—Retaining Walls, Noise Walls		
Bridge Deck		
Structural Steel		
BASE & PAVING		
Soil Stabalization		
Sub-base and Base		
Bituminous Concrete Pavement		
Portland Cement Concrete Pavement		
MISCELLANEOUS		
Signalization		
Lighting		
Landscaping		
Utilities		
Portland Cement Concrete Plants		
Asphalt Concrete Plants		
Railroad		
CONSTRUCTION ADMINISTRATION		
Project Record		
Labor Compliance (On-the-Job Training, MBE)		
Materials Sampling		
Other (Specifiy)		
Area Wide Maintenance Contracts		
Overruns/Under runs		
Specification Enforcement		
Environmental Mitigation		
Time Extensions		
Other (Specify)		

APPENDIX D – FHWA CHECKLISTS
(*Post-Award – Rebar Checklist*)

State Transportation Department
Bridge Deck
Re-bar Checklist

1. Before Placement
    a. Obtain certificates of compliance
    b. Check bundles of steel for proper tags and identification
    c. Check for specification requirements as to grade, size, type, coating, bending, length, supplementary requirements, etc.
    d. Check coated rebar for handling and transportation damage
    e. Assure damaged areas are coated prior to use
    f. Assure metal chairs and other rebar support accessories meet requirements
    g. Assure that tie wire and support chairs for coated rebar are plastic coated
    h. Check for proper storage of rebar

2. Placement
    a. Check size, location and spacing against plans
    b. Check rebar cover
    c. Check adequacy of ties and tie downs
    d. Check type and adequacy of support system
    e. Check clearance from forms and cover depth
    f. Check that forms are clean and free from oil, dirt, sawdust, etc.
    g. Check splice locations against plans
    h. Recheck coated rebar for coating damage. Patch as required.
    i. Record placement in daily report

3. During Concrete Placement
    a. Assure that rebar is not displaced during concrete placement
    b. Assure that rebar is not excessively vibrated
    c. Spot check rebar cover on bridge decks behind finishing machine

APPENDIX D – FHWA CHECKLISTS
(Post-Award – Change Order Participation Checklist)

THE FOLLOWING IS A LIST O F NON-PARTICIPATING ITEMS FROM THE NJDOT CONSTRUCTION PROCEDURES HANDBOOK		
Maintenance Activities e.g. drainage clean out – mowing		
Payment for re-do of faulty work		
Items damaged by traffic		
Time extensions or additional costs due to utility or ROW delays		
Additional survey costs for extra work when survey costs have been prorated throughout the project		
Spare parts		
Material not incorporated into the project		
Material not meeting specifications but incorporated into the project		
Additional work resulting from an unapproved change order		
THE FOLLOWING IS A LIST OF ITEMS THAT ARE NON-PARTICIATING BY REGULATION		
Payment for major changes or extra work which will significantly affect the cost of the project to the Federal Government or alter the termini, character, or scope of the work when prior FHWA approval is not obtained.		
Changes in contract time, as related to contract changes or extra work, when not submitted at the same time as the respective work change.		
Payment for changes that do not adequately document a cost analysis of each negotiated contract change or negotiated extra work order.		
Contract time extensions that have not been fully justified and adequately documented.		
Payment for claim settlements if it is determined by FHWA that there was negligence or wrongdoing of any kind by SHA officials with respect to the claim.		
Payment for costs not incurred in conformity with applicable Federal and State law, regulations, policies and procedures.		
Costs resulting from errors or omissions which are a result of gross negligence or carelessness.		

APPENDIX E – CONSTRUCTION QUALITY ASSURANCE PROGRAM REQUIREMENTS

Construction Quality Assurance Program Requirements August 2009

Defining Quality Assurance

TRB Circular E-C037 defines the term ***Quality Assurance*** as follows:

Quality Assurance (QA) - "All those planned and systematic actions necessary to provide confidence that a product or facility will perform satisfactorily in service/"

The same, or similar, versions of this definition appear from AASHTO, ANSI, ASQC, FHWA, and NCHRP. AASHTO R10-06 provides the following definition:

Quality Assurance (QA) - (1) All those planned and systematic actions necessary to provide confidence that a product or facility will perform satisfactorily in service; or (2) making sure the quality of a product is what it should be. [*QA* addresses the overall process of obtaining the quality of a service, product, or facility in the most efficient, economical, and satisfactory manner possible. Within this broad context, *QA* includes the elements of quality control, independent assurance, acceptance, dispute resolution etc. The **use of the term *QA*/*QC* or *QC*/*QA* is discouraged** and **the term *QA* should be used**. *QA* involves continued evaluation of the activities of planning, design, development of plans and specifications, advertising and awarding of contracts, construction, and maintenance, and the interactions of these activities.]

In short, Quality Assurance, or QA, is an umbrella term that includes Quality Control (QC) activities by the Contractor, as well as Acceptance activities by the Agency. Contrary to past misuse, QA is not "*the activity performed by the Agency.*"

Core Elements of a QA Program

A successful Quality Assurance Program requires more than Contractor Quality Control and Agency Acceptance. As presented in the *National Quality Improvement Task Force Report on QA Procedures for Highway Construction* (NQI/FHWA Report, June 1994), the *AASHTO Implementation Manual for Quality Assurance* (AASHTO SOC, February 1996), and *23 CFR 637*, the six core elements of a construction Quality Assurance Program include:

1. Contractor Quality Control (QC)
2. Agency Acceptance
3. Agency Independent Assurance (IA)
4. Dispute Resolution
5. Laboratory Accreditation and Qualification
6. Personnel Qualification/Certification

All six elements are needed in order to have a complete and effective QA Program. A QA Program having only four or five out of the six program elements is not sufficient and should not be construed as being "substantially compliant" with the intent of the AASHTO guidelines or the federal regulation.

Overview of QA Program Elements

Contractor Quality Control (QC) - The Contractor is responsible for performing all QC activities. This includes inspection, sampling, and testing. The purpose of the QC system and activities, first and foremost, is to provide the Contractor with sufficient information to monitor, assess and adjust their production and placement processes to ensure that the final product will meet the specified level of quality. Secondarily, QC test results may be included in the Agency acceptance determination as further described below. QC activities may be performed by personnel directly employed by the Contractor or by personnel of a Consultant under contract to the Contractor.

The Agency should identify the minimum Contractor QC system requirements in its written QA Program document and in its QA Specifications (if QA Specifications are developed and in use). If QA Specifications are not being used, the Agency should at least identify the minimum QC requirements in a standard provision. Such a standard provision should at least state that the Contractor is responsible for implementing a Quality Control system for both production facilities and field placement operations of all work items.

Agency Acceptance (or Verification per 23 CFR 637) - The State Agency must have a system for performing Acceptance (Verification) inspection, sampling, & testing independent of the Contractor. Acceptance (Verification) activity should also include monitoring of the Contractor's QC activity. Acceptance (Verification) activities may be performed either by personnel directly employed by the Agency or by personnel of a Consultant (i.e. a "Designated Agent") under direct contract to the Agency (i.e. not under contract to the Contractor). The Agency Acceptance system needs to identify:

- The specific Quality Characteristics that will be tested for Acceptance.
- The specific Attributes that will be inspected for Acceptance.
- Lot and Sublot sizes for sampling, testing and inspection of items.
- The random sampling procedure that will be used for obtaining Acceptance samples (e.g. ASTM D 3665).

Contractor QC test data may be utilized by the Agency in the acceptance determination (along with its own independently obtained Acceptance data) provided that:

1. The QC samples are randomly obtained by the Contractor (e.g. using ASTM D 3665 procedure).
2. The QC samples are obtained independent of the Agency Acceptance (or Verification) samples.
3. The QC test result data is mathematically compared (Validated) against the Agency Acceptance test data (e.g. F & t tests)

When Contractor QC sample test results are included in the Agency acceptance determination, the frequency of Agency Acceptance (Verification) sampling & testing is usually reduced (typically in the range of 25-50% of the Contractor QC sampling frequency).

Independent Assurance (IA) - Independent Assurance is a management tool intended to provide an assessment of the process, not the product. AASHTO R 44-07 defines IA as “activities that are an unbiased and independent evaluation of all the sampling and testing (or inspection) procedures used in the QA Program”. The State Agency must have an IA program and personnel to perform IA sampling & testing that periodically evaluates all Agency (or their Designated Agent) Acceptance personnel and their equipment (and all Contractor QC personnel and their equipment, if Contractor QC data is included in the acceptance determination).

IA activities are to be performed by personnel who are not directly responsible for Acceptance (Verification) sampling & testing. The IA personnel must be either personnel directly employed by the Agency (e.g. the Agency Central Lab or a District/Regional Lab) or Consultant personnel (i.e. a "Designated Agent") under direct contract to the Agency (i.e. not under contract to the Contractor).

Dispute Resolution - When Contractor QC sample test results are included in the Agency acceptance determination, a Dispute Resolution process must be in place. Even when Contractor QC results are not included in the acceptance determination, it is recommended to have Dispute Resolution to address possible disputes that may arise due to differences between Contractor QC data and Agency Acceptance data.

Dispute Resolution activities are to be performed by personnel who are not directly responsible for Acceptance (Verification) sampling & testing. The Dispute Resolution personnel may be either personnel directly employed by the Agency (e.g. the Agency Central Lab or a District/Regional Lab) or Consultant personnel (i.e. a "Designated Agent") under direct contract to the Agency (i.e. not under contract to the Contractor).

Accredited or Qualified Laboratories - The Agency Central Laboratory is required to be Accredited by AASHTO or through a comparable program approved by FHWA. All other Agency laboratories performing Acceptance (Verification) testing and Contractor Laboratories (if Contractor QC data is included in the acceptance determination) must be Qualified through a Laboratory Qualification Program (LQP) established by the Agency and acceptable to FHWA. All laboratories operated by a Designated Agent of the Agency (under direct contract to the Agency) that are used for IA or Dispute Resolution must be Accredited by AASHTO or through a comparable program approved by FHWA.

Qualified (or Certified) Personnel - All Agency personnel performing Acceptance (Verification) sampling, testing and inspection (and Contractor personnel if Contractor QC data is included in the acceptance determination) must be Qualified through an appropriate Qualification (or Certification) program established by the Agency and acceptable to FHWA. All IA personnel must also be Qualified. Though not explicitly stated in 23 CFR 637, it is recommended that personnel performing Dispute Resolution sampling & testing be Qualified.

Requirements for Construction QA Program Document

It is necessary for each State Transportation Agency to prepare a written QA Program document that addresses the six (6) core elements required for complete construction Quality Assurance implementation. Each Agency Construction QA Program must meet the requirements of 23 CFR 637B (*Quality Assurance Procedures for Construction*) and is required to be approved by the FHWA. Once an Agency's QA Program document is approved by the FHWA Division Office, it becomes the guiding instrument for construction quality on all federally funded National Highway System (NHS) projects.

QA Program Document Contents and Format

It is important to keep in mind that the QA Program is intended to establish the core programmatic elements necessary to achieve quality materials and quality workmanship. Construction Quality Assurance and a QA Program, therefore, are not focused solely on materials sampling and testing. Inspection of workmanship is a critical part of Quality Assurance and must be reflected in the QA Program document.

While there is no prescribed format for a QA Program document, it is recommended that the general outline follow the six core elements (i.e. Quality Control, Acceptance, Independent Assurance, Dispute Resolution, Laboratory Accreditation and Qualification, Personnel Qualification/Certification). The document should address the above core elements for all three of the principal materials categories (i.e. Project Produced Materials, Fabricated Structural Materials, Standard Manufactured Materials). The QA Program document may be a stand-alone document or may reference some information contained in other Agency documents (e.g. Agency Construction Manual, Agency Materials Manual). The AASHTO Subcommittee on Construction, Roadways and Structures Section, established a Task Force to prepare recommended guidelines for developing a comprehensive QA Program. The guidelines are expected to be published in 2010.

Development of QA Program Document

Transportation Agency Construction QA Program documents should be jointly developed and implemented by the Agency Construction Section and Materials Section in consultation with FHWA. It is recommended that input from Industry partners be obtained when developing the QA Program. Once developed and approved, it is recommended that the QA Program be shared with all Agency construction and materials personnel, as well as with Contractor personnel, through training or workshops.

Design-Build Requirements of 23 CFR 637

Unfortunately, a number of permutations of QA Programs for Design-Build (D-B) projects have shown up from state to state in recent years. NCHRP Synthesis 38-01 (*Quality Assurance in Design-Build Projects*) identifies many inappropriate "QA organizations" that have appeared (and the synthesis unfortunately continues to misapply the term QA). However, as stated in the preamble of the Final Rulemaking which clarified the requirements of 23 CFR 637 for Quality Assurance on D-B projects; "*the concept of **State DOT responsibility** for Quality Assurance procedures **remains the same as for traditional Design-Bid-Build projects**. The provisions of Section 637.205(d) requiring verification sampling and testing by the State DOT, or its Agent, are maintained for Design-Build projects.*"

Essentially, the State Agency cannot relinquish its responsibility for performing Acceptance (or Verification - the term used in 23 CFR 637) activities on D-B projects as required by 23 CFR 637.207(a)(1). As stated in 23 CFR 637.207(b), "*…All provisions of paragraph (a) of this section are applicable to Design-Build projects. **In addition**, the Quality Assurance Program may include the following:*

(1) Reliance on a combination of contractual provisions and acceptance methods;
(2) Reliance on Quality Control sampling and testing as part of the Acceptance decision, provided that adequate Verification of the Design-Builder's Quality Control sampling and testing is performed to ensure that the Design-Builder is providing the quality of materials and construction required by the contract documents;
(3) Contractual provisions which require the operation of the completed facility for a specific time period."

The D-B Contractor cannot be assigned responsibility to perform any Acceptance (Verification) functions.

APPENDIX F – FHWA FORMS & SAMPLE REPORTS

- **Record of Prior Approval for Major Contract Change Order**
- **ACTIVE CONSTRUCTION UTILITY AGREEMENT** ***(Unforeseen Utility Relocation Documentation Form)***
- **Form PR-2 (Rev.1-84) - Federal-aid Project Agreement**
- **Form FHWA 1446A (Rev.10-89) - CONSTRUCTION INSPECTION REPORT**
- **Form FHWA 1446B (Rev. 3-90) - FINAL ACCEPTANCE REPORT**
- **Sample inspection report – California Version**
- **Sample inspection in-depth report outlines** ***http://www.fhwa.dot.gov/construction/reviews***
- **FHWA electronic forms (IN FORMS) Electronic Forms** ***http://staffnet.fhwa.dot.gov/informs/formfile.htm***

Appendix F – FHWA Forms & Sample Reports

ACTIVE CONSTRUCTION UTILITY AGREEMENT

RECORD OF PRIOR APPROVAL FOR MAJOR CONTRACT CHANGE ORDER

U.S. Department of Transportation
Federal Highway Administration

Contract Name:	State Project No.:	FA Project Number:
Requested By (SHA Project Representative):		Date:
Proposed Change Description (clearly describe the major items of work involved):		
Reason for Change (clearly describe the reasons and/or justification for the change):		
Supporting/Reference Documentation (drawing sheet numbers, specifications, correspondence, etc.):		
Activity on Critical Path Affected by CO (explain impact to project critical path):		
Total Estimated Cost of Change Order: $ Increase ☐ Decrease	Time Extensions: ☐ None ☐ Days ☐ Deferred (explain reason)	CO Payment Method: ☐ Contract Items ☐ Negotiated Price ☐ Extra Work by Force Account ☐ Other (explain)
The work covered by the proposed change as described above is approved subject to submission of supporting documentation including cost evaluation and justification of time extensions. Other Conditions:		
FHWA Prior Approval to Proceed Granted by:		Date of Authorization:

FHWA COPA 5/06

(Unforeseen Utility Relocation Documentation Form)

Appendix F – FHWA Forms & Sample Reports

Date: _____

Section I - General Information:

1. **State Contract Number -** _____ **FHWA Number -** _____
2. **Contract Title -** _____
3. **Involved Utility Company -** _____

Section II (to be completed by State Project Resident) –

1. **Description of Utility Conflict:**

2. **Proposed Solution:**

Section III (to be completed by SHA Utility Section) –

1. **Is the work described above Reimbursable by SHA? __Yes __No**
2. **If yes, the estimated cost of the work is** _____ **.** (see attached submission from Utility Company)

Authorizations:

Prepared By _____
(SHA Project Resident)

Concurred _____ _____
(SHA Area Engineer) (SHA Design Manager)

Approved _____ _____
(SHA Utility Engineer) (FHWA – if applicable)

Agreed _____
(Authorized Utility Company Representative)

Appendix F – FHWA Forms & Sample Reports

TO BE COMPLETED BY FHWA	U.S.Department of Transportation **Federal Highway Administration** **FEDERAL-AID PROJECT AGREEMENT**	STATE COUNTY PROJECT NO.

The State, through its Highway Agency, having complied, or hereby agreeing to comply, with the applicable terms and conditions set forth in (1) Title 23, U. S. Code, Highways, (2) the Regulations issued pursuant thereto, and, (3) the policies and procedures promulgated by the Federal Highway Administrator relative to the above designated project, and the Federal Highway Administration having authorized certain work to proceed as evidenced by the date entered opposite the specific item of work, Federal funds are obligated for the project not to exceed the amount shown herein, the balance of the estimate total cost being an obligation of the State. Such obligation of Federal funds extends only to project costs incurred by the State after the Federal Highway Administration authorization to proceed with the project involving such costs.

PROJECT TERMINI

PROJECT CLASSIICATION OR PHASE OF WORK	EFFECTIVE DATE OF AUTHORIZATION	APPROXIMATE LENGTH (Miiles)
HIGHWAY PLANNING AND RESEARCH (HP & R)		
PRELIMIINARY ENGINEERING		
RIGHTS-OF-WAY		
CONSTRUCTION		
OTHER *(Specify)*		

FUNDS	
ESTIMATED TOTAL COST OF PROJECT $	FEDERAL FUNDS $

The State further stipulates that as a condition to payment of the Federal funds obligated, it accepts and will comply with the applicable provisions set forth on the following pages.

_____
(Official name of Highway Agency)

By _____

_____
(Title)

By _____

_____
(Title)

By _____

_____
(Title)

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

By _____

_____
(Title)

Date executed by
Division Administrator _____

FORM PR-2 (REV. 1-84) PREVIOUS EDITIONS ARE OBSOLETE

AGREEMENT PROVISIONS

1. RESPONSIBILITY FOR WORK.
a. Except for projects constructed under Certification Acceptance procedures, the State highway agency will perform the work, cause it to be performed, in compliance with the approved plans and specifications or project proposal which, by reference, are made a part hereof.
b. With regard to projects performed under Certification Acceptance procedures, the State highway agency will perform the work, or cause it to be performed, in accordance with the terms of its approved Certification, or exceptions thereto as may have been approved by the Federal Highway Administration.

2. HIGHWAY PLANNING AND RESEARCH (HP&R) PROJECT. The State highway agency will (a) conduct or cause to be conducted, under its direct control, engineering and economic investigations of projects for future construction, together with highway research necessary in connection therewith, pursuant to the work program approved by the Federal Highway Administration and (b) prepare reports suitable for publication of the result of such investigations and research, but no report will be published without the prior approval of the Federal Highway Administration.

3. PROJECT FOR ACQUISITION OF RIGHTS-OF-WAY.
In the event that actual construction of a road on the right-of-way is not undertaken by the close of the tenth fiscal year following the fiscal year in which this agreement is executed, the State highway agency will repay to the Federal Highway Administration the sum or sums of Federal funds paid to the highway agency under the terms of this agreement.

4. PRELIMINARY ENGINEERING PROJECTS.
In the event that right-of-way acquisition for, or actual construction of the road for which this preliminary engineering is undertaken is not started by the close of the fifth fiscal year following the fiscal year in which this agreement is executed, the State highway agency will repay to the Federal Highway Administration the sum or sums of Federal funds paid to the highway agency under the terms of this agreement.

5. INTERSTATE SYSTEM PROJECT.
a. The State highway agency will not add or permit to be added, without the prior approval of the Federal Highway Administration any points of access to, or exit from, the project in addition to those approved in the plans and specifications for the project.
b. The State highway agency will not permit automotive service stations, or other commercial establishments for servicing motor vehicle users, to be constructed or located on the right-of-way of the Interstate System.
c. The State highway agency will not after June 30, 1968, permit the construction of any portion of the Interstate Route on which this project is located, including spurs and loops, as a toll road without written concurrence of the Secretary of Transportation or his officially designated representative. The term "toll road" does not include toll bridges or toll tunnels.

6. PROJECT FOR CONSTRUCTION IN ADVANCE OF APPORTIONMENT.
a. This project authorized pursuant to 23 U.S.C. 115 as amended, will be subject to all procedures and requirements, and conform to the standards applicable to projects on the system on which located, financed with the aid of Federal funds.

FORM PR-2 (Rev. 1-84) Previous editions are obsolete.

b. No present or immediate obligation of Federal funds created by this agreement, it's purpose and intent being to provide that, upon application by the State highway agency, and approval thereof by the Federal Highway Administration, any Federal-aid funds of the class designated by the project number prefix apportioned or allocated to the State under 23 U.S.C. 103(e)(4), 104, or 144 subsequent to the date of this agreement, may be used to reimburse the State for the Federal share of the cost of work done on the project.

7. STAGE CONSTRUCTION.
The State highway agency agrees that all stages of construction necessary to provide the initially planned complete facility, within the limits of the project, will conform to at least the minimum values set by the approved AASHTO design standards
applicable to this class of highways, even though such additional work is financed without Federal-aid participation.

8. BOND ISSUE PROJECT.
Construction, inspection, and maintenance of the project will be accomplished in the same manner as for regular Federal-aid projects. No present or immediate obligation is created by this Agreement against Federal funds, its purpose and intent being to provide aid to the State, as authorized by 23 U.S.C. 122, for retiring maturities of the principle indebtedness of the bonds referred to below. When the State requests Federal reimbursement to aid in the retirement of such bonds, the request will be supported by the appropriate certification required by 23 CFR Part 140, Subpart F, and Volume 1, Chapter 4, Section 8 of the Federal-aid Highway Program Manual, and payment of the authorized Federal share will be made from appropriate funds available. If in any year there is no obligated balance of any apportioned Federal funds available from which payments hereunder may be made, there will be no obligation on the part of the Federal Government on account of bond maturities for the year. Funds available to the highway agency for this project are the proceeds of bonds issued by the governmental unit indicated on the attached tabulation pursuant to the authority and in the amounts by date of issue beginning date of maturities set forth therein.

9. SPECIAL HIGHWAY PLANNING AND RESEARCH PROJECT. The State highway agency hereby authorizes the Federal Highway Administration to charge the State's pro rata share of costs incurred against funds apportioned to the State under 23 U.S.C. 307 (c), as amended. In the event a project is financed with both Federal-aid funds and State matching funds, the State agrees to advance to the Federal Highway Administration the State matching funds for its share of the estimated cost. For a National Pooled-Fund study, the State hereby assigns its responsibility for the work to the Federal Highway Administration. For an Intra-Regional Cooperative Study, the State hereby assigns its responsibility for the work to the lead State for the study.

10. PARKING REGUALTION AND TRAFFIC CONTROL.
The State highway agency will not permit any changes to be made in the provisions for parking regulations and traffic control as contained in the agreement between the State and the local unit of Government referred to in the paragraph on "Additional Provisions," without the prior approval of the Federal Highway Administration, unless the State determines, and the Division Administrator concurs, that the local unit of Government has a functioning traffic engineering unit with the demonstrated ability to apply and maintain sound traffic operations and control.

11. SIGNS AND MARKING.
The State highway agency will not install, or permit to be installed, any signs, signals, or markings not in compliance with the standards approved by the Federal Highway Administrator pursuant to 23 U.S.C. 109 (d) or the State's Certificate as applicable.

12. MAINTENANCE. The State highway agency will maintain, or by formal agreement with appropriate officials of a county or municipal government cause to be maintained, the project covered by this Agreement.

13. LIQUIDATED DAMAGES.
The State highway agency agrees that on Federal-aid highway construction projects not under Certification Acceptance the provisions of 23 CFR Part 630, Subpart C, and Volume 6, Chapter 3, Section 1 of the Federal-aid Highway Program Manual, as supplemented, relative to the basis of Federal participation in the project cost shall be applicable in the event the contractor fails to complete the contract within the contract time.

14. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLUTION CONTROL ACT (APPLICABLE TO CONTRACTS AND SUBCONTRACTS WHICH EXCEED $100,000).
a. The State highway agency stipulates that any facility to be utilized in performance under or to benefit from this agreement is not listed on the Environmental Protection Agency (EPA) List of Violating Facilities issued pursuant to the requirements of the Clean Air Act, as amended, and the Federal Water Pollution Control Act, as amended.
b. The State highway agency agrees to comply with all of the requirements of section 114 of the Clean Air Act and section 308 of the Federal Water Pollution Control Act, and all regulations and guidelines issued thereunder.
c. The State highway agency stipulates that as a condition of Federal-aid pursuant to this agreement it shall notify the Federal Highway Administration of the receipt of any advice indicating that a facility to be utilized in performance under or to benefit from this agreement is under consideration to be listed on the EPA List of Violating Facilities.
d. The State highway agency agrees that it will include or cause to be included in any Federal-aid to highways agreement with a political subdivision of the State which exceeds $100,000 the criteria and requirements in these subparagraphs a. through d.

15. EQUAL OPPORTUNITY.
The State highway agency hereby agrees that it will incorporate or cause to be incorporated into any contract for construction work, or modification thereof, as defined in the rules and regulations of the Secretary of Labor at 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained from the Federal Government or borrowed on the credit of the Federal Government pursuant to a grant, contract, loan, insurance or guarantee, or undertaken pursuant to any Federal program involving such grant, contract, loan, insurance or guarantee, the following equal opportunity clause:
"During the performance of this contract, the contractor agrees as follows:
a. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising; layoffs or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the State highway agency setting forth the provisions of this nondiscrimination clause.
b. The contractor will, in all solicitations or advertisements for employees, placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment, without regard to race, color, religion, sex or national origin.
c. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided by the State highway agency advising the said labor union or workers' representative of the contractor's commitments under Section 202 of the Executive Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
d. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations and relevant orders of the Secretary of Labor.
e. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by the rules, regulations and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the Federal Highway Administration and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations and orders.
f. In the event of the contractor's non-compliance with the nondiscrimination clauses of this contract or with any of such rules, regulations or orders, this contract may be cancelled, terminated or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or Federally-assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation or order of the Secretary of Labor, or as otherwise provided by law.
g. The contractor will include the provisions of Section 202 of Executive Order 11246 of September 24, 1965, in every subcontract or purchase order unless exempted by rules, regulations or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the State highway agency or the Federal Highway Administration may direct as a means of enforcing such provisions including sanctions for noncompliance; provided, however, that in the event a contractor becomes involved in, or is threatened with litigation with a subcontractor or vendor as a result of such direction by the Administration, the contractor may request the United States to enter in such litigation to protect the interests of the United States."

The State highway agency further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally-assisted construction work: Provided, that if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

FORM PR-2 (Rev. 1-84) Previous editions are obsolete

The State highway agency also agrees:
(1) To assist and cooperate actively with the Federal Highway Administration and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor.
(2) To furnish the Federal Highway Administration and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the Federal Highway Administration in the discharge of its primary responsibility for securing compliance.
(3) To refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally-assisted construction contracts pursuant to the Executive Order.
(4) To carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the Federal Highway Administration or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order.

In addition, the State highway agency agrees that if it fails or refuses to comply with these undertakings, the Federal Highway Administration may take any or all of the following actions:
(a) Cancel, terminate, or suspend this agreement in whole or in part;
(b) Refrain from extending any further assistance to the State highway agency under the program with respect to which the failure or refusal occurred until satisfactory assurance of future compliance has been received from the State highway agency; and
(c) Refer the case to the Department of Justice for appropriate legal proceedings.

16. NONDISCRIMINATION. The State highway agency (SHA) hereby agrees that is will comply with Title VI of the 1964 Civil Rights Act and related statutes and implementing regulations to the end that no person shall on the grounds of race, color, national origin, handicap, age, sex or religion be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under the project covered by this agreement and, further, the SHA agrees that:
a. It will insert the nondiscrimination notice required by the Standard Department of Transportation (DOT) Title VI Assurance (DOT Order 1050.2) in all solicitations for bids for work or material, and, in adapted form, in all proposals for negotiated agreements.
b. It will insert the clauses in Appendixes A, B, C, of DOT Order 1050.2, as appropriate, in all contracts, deeds transferring real property, structures, or improvements thereon or interest therein (as a covenant running with the land) and in future deeds, leases, permits, licenses, and similar agreements, related to this project, entered into by the SHA with other parties.
c. It will comply with, and cooperate with, FHWA in ensuring compliance with the terms of the standard Title VI Assurance, the act and related statutes, and implementing regulations.

17. MINORITY BUSINESS ENTERPRISES (MBE's).
a. The State highway agency hereby agrees to the following statements and agrees that these statements shall be included in all subsequent agreements between the recipient and any subrecipient and in all subsequent DOT-assisted contracts between recipients or subrecipients and any contractor.

(1) "Policy. It is the policy of the Department of Transportation that minority business enterprises (MBE's), as they are defined in 49 CFR Part 23 [for the purposes of 49 CFR Part 23, Subpart D, MBE's refer to disadvantaged business enterprises (DBE's); for the purposes of other suparts of Part 23, MBE's include women's business enterprises (WBE's)], shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with Federal funds under this agreement. Consequently, all applicable requirements of 49 CFR Part 23 apply to this agreement.
(2) "Obligation. The recipient or its contractor agrees to ensure that MBE's, as defined in 49 CFR Part 23, have the maximum opportunity to participate in the performance of contracts and subcontracts financed in whole or in part with Federal funds provided under this agreement."

In this regard, all recipients or contractors shall take all necessary and reasonable steps in accordance with the applicable section of 40 CFR Part 23 to ensure that MBE's have the maximum opportunity to compete for and perform contracts. Recipients and their contractors shall not discriminate on the bases of race, color, national origin, handicap, religion, age, sex, as provided in Federal and State law, in the award and performance of DOT-assisted contracts."
b. If, as a condition of assistance, the recipient has submitted and the Department has approved an MBE affirmative action program which the recipient agrees to carry out, this program is incorporated into this financial assistance agreement by reference. This program shall be treated as a legal obligation and failure to carry out its terms shall be treated as a violation of this financial assistance agreement. Upon notification, the Department shall impose such sanctions as are noted in 49 CFR Part 23, Subparts D or E, which sanctions may include termination of the agreement or other measures that may affect the ability of the recipient to obtain future DOT financial assistance.

18. BICYCLE TRANPORTATION AND PEDESTRIN WALKWAYS. No motorized vehicles shall be permitted on bikeways or walkways authorized under this project except for maintenance purposes and, when snow conditions and State or local regulations permit, snowmobiles.

19. MODIFIED OR TERMINATED HIGHWAY PROJECTS. For certain projects described in 23 CFR Part 480 or as prescribed in other parts of Title 23, Code of Federal Regulations, the payback provisions found in these parts shall supersede provisions 3 and 4 of this agreement.

20. ENVIRONMENTAL IMPACT MITIGATION FEATURES. The State highway agency shall ensure that the project is constructed in accordance with and incorporates all committed environmental impact mitigation measures listed in approved environmental documents unless the State requests and receives written Federal Highway Administration approval to modify or delete such mitigation features.

FORM PR-2 (Rev. 1-84) Previous editions are obsolete

Appendix F – FHWA Forms & Sample Reports

U.S. Department of Transportation
Federal Highway Administration

CONSTRUCTION INSPECTION REPORT

DIVISION	REPORT NO.	DATE OF INSPECTION	DATE OF REPORT	PROJECT NO.

INSPECTION MADE BY	QUALITY OF WORK	PROGRESS OF WORK	TIME ELAPSED %	WORK COMPLETED %
	☐ Unsatisfactory ☐ Satisfactory	☐ Unsatisfactory ☐ Satisfactory		

IN COMPANY WITH

(Check appropriate box)

☐ Process Review/Product Evaluation ☐ In-depth inspection ☐ Project ☐ Final

FORM FHWA 1446A (REV. 10-89) (Continue on next page if necessary)

(Continued)

FORM FHWA 1446A (REV. 10-89)

Appendix F – FHWA Forms & Sample Reports

U.S. Department of Transportation
Federal Highway Administration

FINAL ACCEPTANCE REPORT

DIVISION	REPORT NO.	DATE OF FINAL INSPECTION REPORT	PROJECT NO.

DATE CONTRACT STARTED	DATE WORK COMPLETED	ACCEPTANCE BY CONTRACT AGENCY	TIME ELAPSED
			%

LOCATION

SCOPE OF PROJECT

NOTE: FHWA-47 ☐ Submitted ☐ Not Required

Materials Certification ☐ Submitted ☐ Not Required

There is compliance with section 1.23 of the Regulations pertaining to encroachments on the right-of-way

REMARKS: SHA procedures and controls were sufficient to assure that this project has been completed in reasonable close conformance with the approved plans and specifications including authorized changes and extra work.

ACCEPTANCE OF PROJECT IS RECOMMENDED		ACCEPTED BY FEDERAL HIGHWAY ADMINISTRATION	
Signature		Signature	
Title	Date	Title	Date

FORM FHWA 1446B (REV. 3-90)

Appendix F – FHWA Forms & Sample Reports

Construction Inspection Report (California Version)

U.S. Department of Transportation **Federal Highway Administration**		**CONSTRUCTION INSPECTION REPORT**		
DIVISION California	**REPORT NO.** [X]	**DATE OF INSPECTION** [M / D / YY]	**DATE OF REPORT** [M / D / YY]	**PROJECT NO.** [XXXXX-XXX-X(XXX)XN]
INSPECTION MADE BY [Name, Title]	**QUALITY OF WORK** __ Unsatisfactory __ Satisfactory	**PROGRESS OF WORK** __ Unsatisfactory __ Satisfactory	**TIME ELAPSED** ___ %	**WORK COMPLETED** ___ %
IN COMPANY WITH [Name, Title]				
__ Process Review/Product Evaluation __ Inspection-In-Depth __ Project __ Final				

LOCATION:	[fill in the blank]
PROJECT DESCRIPTION/WORK TYPE:	[fill in the blank]
PROJECT INFORMATION:	[Acquire a copy of *Contract Award Summary* once at the beginning of the project]
CONTRACTOR	[Name]
	[Address]
	[City]
	[Phone]
CONTRACT AMOUNT	[$XXXX]
STATE CONTRACT OR EA NO.	[XX-XXXXXX]

RESIDENT ENGINEER [RE]	[Name]		
	[Address]		
	[City]		
	[Phone]		
	[Fax]		
	[E-mail]		
CONTRACT TIME SUMMARY:	[Acquire a copy of *Weekly Statement of Working Days andProgress Payment Voucher* after each construction inspection]		
STATUS OF CONTRACT TIME AS OF	[M/D/YY]	**TIME EXTENSIONS**	[XX] *
CONTRACT AWARDED	[M/D/YY]	**NON-WORKING DAYS**	[XX]
FIRST WORKDAY	[M/D/YY]	**REVISED WORKING DAYS**	[XX]
ESTIMATED COMPLETION DATE	[M/D/YY]	**TOTAL WORKING DAYS TO DATE**	[XX]
WORKING DAYS IN CONTRACT	[XX]	**REMAINING WORKING DAYS**	[XX]
* Note: If a Contract Change Order is non-participating then days are non-participating.			
PURPOSE OF INSPECTION:	The purpose of this inspection was to review and discuss the completed work, work in progress, and to evaluate the performance and effectiveness of the contract administration performed by the Department.		
PROJECT STATUS:			
WORK COMPLETED (Comments):			

CONTROLLING ITEM (Comments):

WORK IN PROGRESS (Comments):

CONSTRUCTION ACTIVITIES OBSERVED (Comments):

[Photos of the project and any current work that may be taking place]

Work zone safety: (note any of the following)

Cones, drums, tabular delineators, barricades (type I, II, III)
Detours
Concrete barriers
Signs
Pavement markings
Workers, equipment, material
Clear zone
Use of Intelligent Transportation Systems

UPCOMING WORK (report)	

RECORDS REVIEW

Is the uniform filing system being used?
The following records were reviewed at the construction field office:

CONTRACT CHANGE ORDERS (list of approved and pending)

- To date, a total of (XX) CCOs have been issued for this project and are considered minor change orders. Since the last inspection of (M/D/YY), the following minor CCOs have been updated or issued for this project.
- FHWA has reviewed and issued prior approvals for CCO# (XX).
- Were there any CCOs requiring prior approval that were executed without receiving prior approval or prior to making a contact with FHWA?
- If so, what steps are being taken to assure that FHWA sees these major CCOs in the future?
- Were there any CCOs that might cause an environmental issue?
- How is contingency balance on the contract being tracked?

- NOTICE OF POTENTIAL CLAIM (NOPC)
  - Up to now how many NOPCs have you received from the contractor for your job?
  - What are the related issues?
  - How many NOPCs were found to have no merit?
  - How many NOPCs did the contractor drop?

- How many NOPCs were considered incomplete (i.e. missing costs, reference to correct plan or specification, reason for submittal)?
- How many NOPCs were resolved to the satisfaction of both parties?
- Are all NOPCs on file?

- MATERIAL TESTING - Test reports (were or were not) reviewed.
  - Were forms TL-29 and HC-30 on file?
  - Are Certifications of Compliance being filed?
  - If so, do they contain the required information?
  - Are "Buy America" requirements included on invoices and certifications for **all** iron and steel products?
  - Are Acceptance Sampling and Testing Reports in the files?
  - Is there a "Summary Log" of tests?
  - What types of material have been tested for this project? Are they on file?
  - Were the materials sampling and testing conducted at the required frequencies shown in the Construction Manual?
  - Is the frequency of tests being monitored?
  - Are failed tests documented in the files with the cross-references to re-tests?
  - Does the Resident Engineer see the test reports?
  - Have any disputes resulted from failing tests? If yes, what were the solutions?
  - Are there any signed material certifications on file?
  - Are there any approved mix designs for asphalt cement and portland cement concrete?
  - Are trial batch test results properly identified and acceptable?
  - Review the construction area and the contractor on-site yard; check to make sure foreign iron and steel are not being incorporated into the project.
- INDEPENDENT ASSURANCE RECORDS - Forms TL-0100, TL-0108T, TL-0108L, etc.
  - Are copies of the material tester's certification in the project files? If not, where?
  - Has a consultant been hired to do the materials testing for this project? If so, is there a copy of the consultant material tester's certifications in the project files?
- DISADVANTAGED BUSINESS ENTERPRISE (DBE) - A review of the DBE records indicated the following:
  - Is a copy of the contract Bidder DBE Information Form in the project files?
  - What was the contract DBE goal?
  - What is the contractor's DBE goal?
  - If the contractor's goal is less than the contract goal, is there a "good faith" statement in the project files?
  - How are you checking for DBE goal compliance and that the DBEs listed are performing a commercial useful function? By payrolls, interviews, diaries, or material invoices? Any changes made?
- RESIDENT ENGINEER'S DAILY DIARIES
  - Records reviewed and (were or were not) current, thorough, well organized, neat, and up to date.
- LABOR COMPLIANCE
  - Were/were not any withholdings made by the Department.
  - Are diaries spot-checked against certified payrolls?
  - What is the established method?
- EQUAL EMPLOYMENT OPPORTUNITY WAGE RATE POSTERS
  - Are the Federal posters posted for every worker to see at, or near, the Contractor's office at the construction site, or at the contractor worker's central gathering point?
- EMPLOYEE INTERVIEWS
  - Are employee interviews being conducted? Findings? Frequency?
- FEDERAL TRAINING REQUIREMENTS
  - Are training requirements included in the contract?
  - Is there documentation to show that the contractor and/or subcontractors are meeting the apprenticeship (training) goal?
- PROMPT PAYMENT
  - Are the subcontractor prompt payment requirements in the contract (CM 3-807)?
  - Are they being followed?

- ENVIRONMENTAL COMMITMENTS
  - Is the environmental document or Project Report for this project in the Resident Engineer's files?
  - Are you aware of any environmental commitments on your project? If there are some environmental commitments on your project, then what is your action plan to work with the Contractor to commit these requirements?
  - Is the construction project adhering to the mitigation requirements in the environmental document? How?
- PROGRESS PAYMENT
  - Are there on file any Contractor-submitted monthly lists of items and quantities for payment?
  - Review the estimate for accuracy prior to its being approved for payment.
  - What do you do to prevent double payment of contract items?
- TRAFFIC CONTROL
  - Has the State approved a traffic contingency plan from the Contractor for the job?
  - What does the contingency plan include?
  - Were the Contractor's traffic control plans adequate?
  - Were they approved by the Resident Engineer and when (before or after construction began)
  - Were any substantial changes made to the traffic control plans? If so, would these changes result in additional costs and/or delays or savings?
  - A drive through the project (day and/or night) for traffic control was made. Project's traffic control measures appeared to be (adequate/not adequate). (e.g., signs clean, reflective, distance, etc.)
- SAFETY
  - Records reviewed and there (were XX or were not) injury/fatal/non-fatal accidents reported within the construction zone.
  - Meeting scheduled every (XX) weeks.
- CRITICAL PATH METHOD SCHEDULE
  - (XX) Revisions have been made and (were or were not) available for our review.
- PRE-CONSTRUCTION MEETING
  - Records reviewed and the attendee list (were or were not) found.
- STORM WATER POLLUTION PREVENTION PLAN (SWPPP)
  - Approved by the Resident Engineer? Date? Before construction started? (yes/no)
  - Has the project's SWPPP been updated to reflect the recent changes required by State Water Resource Board?
  - Is the updated SWPPP on file?
  - Any problems?
- UTILITY/RIGHT-OF-WAY DELAYS
  - There were/were not any utility/ROW delays at this review.
- PUBLIC NOTIFICATION
  - News release notices were/were not sent out notifying the public of construction activities taking place.

FINDINGS AND RECOMMENDATIONS:

Special attention is being given to environmental permits with the resource agencies. Overall, the project seemed to be going well and appeared to be in accordance with plans and specifications.

Other findings:

[Note]

CONCLUSION: To date, the overall progress of the contract and the quality of work are satisfactory/non-satisfactory.	
* * *	
cc:	(e-mail) (Name), HTA-CA
cc:	(mail) (Name), Caltrans District X (Deputy Director for Construction) (REs name), Caltrans District X (Construction)

Form FHWA 1446A (Rev. 2-03) California Division

Appendix G – Acronyms

AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
AC	Asphalt Binder Content (pavement), Alternating Current (traffic)
ACBF	Air Cooled Blast Furnace slag (aggregate)
ACHP	Advisory Council on Historic Preservation
ACI	American Concrete Institute
ACIA	Asynchronous Communications Interface Adapter (traffic controller)
ADA	Americans with Disabilities Act
ADR	Alternative Dispute Resolution
ADT	Average Daily Traffic
ADTT	Average Daily Truck Traffic
AIC	Amps Interrupting Capacity
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANFO	Ammonium Nitrate Fuel Oil
ANSI	American National Standards Institute
AOS	Apparent Opening Size (fabric)
APE	Area of Potential Effect
AR	Administrative Record
AREA	American Railway Engineering Association
ARS	Asphalt Roofing Shingles
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
ATFDB	Asphalt treated Free Draining Base
AWG	American Wire Gauge
AWPA	American Wood Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
BA	Biological Assessment
BBR	Bending Beam Rheometer (binder test)
BCA	Benefit-Cost Analysis
BMP	Best Management Practice (erosion)
BO	Biological Option
BOF	Basic Oxygen Furnace (aggregate)
BSG	Bulk Specific Gravity
BTEX	Benzene, toluene, ethyl benzene, and xylene (a soil test)
C&MS	Construction and Material Specifications
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CAPWAP	Case Pile Wave Analysis Program
CAS	Construction Administration System
CBAE	Cut Back Asphalt Emulsion
CCRL	Cement and Concrete Reference Laboratory
CCS	Crushed Carbonate Stone
CE	Categorical Exclusion
CECI	Contactors Erosion Control Inspector
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations

CFR	Code of Federal Regulations
CIE	Commission Internationale d'Eclairage (illumination)
CMD	Concrete Mix Designs (concrete)
CMS	Construction Management System
CPESC	Certified Professional in Erosion and Sediment Control
CRS	Cationic Rapid Set (asphalt emulsion)
CRSI	Concrete Reinforcing Steel Institute
CSE	Cement Stabilized Embankment (soil)
CSS	Cement Stabilized Subgrade (soil), Cationic Slow Set (asphalt emulsion)
CSS/CSD	Context Sensitive Solutions/Context Sensitive Design
CTFDB	Cement Treated Free Draining Base (soil)
CVN	Charpy V-notch (steel test)
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DC	Direct Current
DEIS	Draft Environmental Impact Statement
DLS	Data Logging System (traffic markings)
DOJ	Department of Justice
DOI	Department of Interior
DMF	Design Mix Formula (HMA)
DRC	Dry Rodded Condition (aggregate test)
DSR	Dynamic Shear Rheometer (binder test)
DZA	Deficient Zone Average (concrete test)
EA	Environmental Assessment
EAF	Electric Arc Furnace
EDA	Earth Disturbing Activity
EEI	Edison Electric Institute
EIA	Electronic Industries Alliance
EIS	Environmental Impact Statement
EJ	Environmental Justice
EO	Executive Order
EPA	Environmental Protection Agency
EQS	Exceptional Quality Solids (compost)
ESA	Endangered Species Act
ESAL	Equivalent Single Axle Loads
FAA	Fine Aggregate Angularity (aggregate test)
FAA	Federal Aviation Administration
FCM	Fracture Critical Member (steel test)
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FOIA	Freedom of Information Act
FONSI	Finding of No Significant Impact
FRA	Federal Railroad Administration
FRP	Fiber Reinforced Polymer
FSS	Federal Specifications and Standards, General Services Administration
FTA	Federal Transit Administration
GGBFS	Ground Granulated Blast Furnace Slag
GIS	Geographic Information Systems
GS	Granulated Slag
HDPE	High Density Polyethylene

HFRS	High Float Rapid Setting (emulsion)
HMA	Hot Mix Asphalt
HMWM	High Molecular Weight Methacrylate
HOV	High Occupancy Vehicle
IA	Independent Assurance
ICEA	Insulated Cable Engineers Association
ICI	Indirect and Cumulative Impacts
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IMSA	International Municipal Signal Association
IPCEA	Insulated Power Cable Engineers Association
IPS	International Pipe Standard
ISSA	International Slurry Seal Association
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation Systems
ITSA	Intelligent Transportation Society of America
IZEU	Inorganic Zinc Epoxy Urethane
JMF	Job Mix Formula (HMA)
LCCA	Life-cycle cost analysis
LED	Light Emitting Diode
LEDPA	Least Environmentally Damaging Practicable Alternative
LPA	Local Planning Area
LRTP	Long-Range Transportation Plan
LSS	Lime Stabilized Subgrade
LWCF	Land and Water Conservation Fund Act
LWT	Loaded Wheel Test (HMA test)
MBF	Thousand Board Feet (wood) This does not match the acronym
MC	Medium Cure (asphalt emulsion)
MCB	Microchannel Bus (traffic controller)
MIS	Major Investment Study
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MOV	Metal Oxide Varistor (traffic controller)
MPI	Magnetic Particle Inspection (steel test)
MPO	Metropolitan Planning Organization
MSDS	Material Safety Data Sheets
MSG	Maximum Specific Gravity (HMA)
MTD	Maximum Theoretical Density (HMA)
MUTCD	Manual on Uniform Traffic Control Devices
NACE	National Association of Corrosion Engineers
NCHRP	National Cooperative Highway Research Program
NEMA	National Electrical Manufacturers Association
NEPA	National Environmental Policy Act
NGO	Non-Governmental Organization
NHI	National Highway Institute
NIST	National Institute of Standards and Technology
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NSA	Noise Sensitive Area

NSDB	Non-stabilized Drainage Base
OGFC	Open Graded Friction Course
OH	Open Hearth (aggregate)
OHWM	Ordinary High Water Mark
OSHA	Occupational Safety and Health Administration
OZEU	Organic Zinc Epoxy Urethane
PAT	Project Average Thickness (concrete test)
PAV	Pressure Aging Vessel (binder test)
PB	Polybutylene (conduit)
PCC	Portland Cement Concrete
PCCP	Portland Cement Concrete Pavement
PCS	Petroleum Contaminated Soil
PDA	Pile Dynamic Analysis (steel piling)
PE	Polyethylene (conduit)
PGAB	Performance-Graded Asphalt Binder
pH	Potential of Hydrogen
PLS	Pure Live Seed
PS&E	Plans, Specifications & Estimates
PVC	Polyvinyl chloride
PWL	Percent Within Limits
QA	Quality Assurance
QC	Quality Control
QPL	Qualified Products List
RA	Regional Architecture (ITS)
RACP	Reclaimed Asphalt Concrete Pavement
RAP	Reclaimed Asphalt Pavement (or Recycled Asphalt Pavement)
RC	Rapid Cure (asphalt emulsion)
REA	Rural Electrification Administration
RFI	Radio Frequency Interference (traffic controller)
RH	Relative Humidity
RMS	Root Mean Square (traffic controller)
ROD	Record of Decision
ROW	Right-of-Way
RPCC	Recycled Portland Cement Concrete
RPM	Raised Pavement Marker (traffic)
RPO	Rural Planning Organization
RS	Rapid Set (asphalt emulsion)
RTFO	Rolling Thin-Film Oven (binder test)
RUS	Rural Utilities Service
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act, A Legacy for Users (2005)
SBA	Styrene-Butadiene-Amene
SBR	Styrene-Butadiene-Rubber
SBS	Styrene-Butadiene-Styrene
SCD	Standard Construction Drawing
SE	Systems Engineering
SEMP	Systems Engineering Management Plan

Section 106	A section of the National Historic Preservation Act of 1966
Section 4(f)	A section of the US DOT Act of 1966
Section 404	A section of the Clean Water Act of 1972
Section 7	A section of the Endangered Species Act of 1973
SF	Standard Fabricated members (structures)
SHA/STA/	State Highway Administration/State Transportation Agency/
STD/SDOT	State Transportation Department/State Department of Transportation (terms all used interchangeably)
SHPO	State Historic Preservation Officer
SI	International System of Units (Metric)
SIP	State Implementation Plan
SMA	Stone Matrix Asphalt
SPD	Surge Protection Device (traffic controller)
SPST	Single Pole / Single Throw (traffic controller)
SS	Slow Set (asphalt emulsion)
SSD	Saturated Surface Dry (aggregate test)
SSPC	Society for Protective Coatings
STIP	Statewide Transportation Improvement Program
SWPPP	Storm Water Pollution Prevention Plan
TCE	Trichloroethylene
TCM	Transportation Control Measure
TDM	Transportation Demand Management
TEA - 21	Transportation Equity Act for the 21st Century (1998)
THPO	Tribal Historic Preservation Officer
TIP	Transportation Improvement Program
TMA	Transportation Management Association
TMPTA	Tri-methyolpropane Tri-acrylate (paint)
TNP	Total Neutralizing Power
TODS	Tourist-Oriented Directional Signs
TRB	Transportation Research Board
TSEC	Temporary Sediment and Erosion Control
TSM	Transportation System Management
TSR	Tensile Strength Ratio (binder test)
UF	Unique Fabricated members (structures)
UL	Underwriters' Laboratories, Inc
USACE	United States Army Corps of Engineers (also USCOE or USACOE)
USC	United States Code
USCG	United States Coast Guard
USDOT	United States Department of Transportation
USFWS	United States Fish and Wildlife Service
VAC	Volts Alternating Current
VCA	Volume of Coarse Aggregate (aggregate test)
VECP	Value Engineering Change Proposal
VMA	Voids in the Mineral Aggregate
VME	VersaModule Eurocard (traffic controller)
WDT	Watchdog Timer
WEAP	Wave Equation Analysis (steel piling)
WPS	Welding Procedure Specification (steel test)
WZRPM	Work Zone Raised Pavement Marker (traffic)

Appendix H – Definitions

AASHTO - American Association of State Highway and Transportation Officials. The national association representing the State DOTs.

Absorption - The soaking up of moisture (water) by aggregate.

Acceleration Lane - An additional lane provided to allow traffic to merge onto a roadway.

Access Control - The restriction of direct access between a roadway and an immediately adjacent property. These restrictions are generally categorized as full control of access, partial control of access and access management.

Access Management - Limits and/or removes the number of points at which a vehicle may enter or exit a highway. Access management may include combining entrances and parking lots and adding service roads.

Access Rights - Right of ingress to and egress from a property that abuts a street or highway.

Acceptance – All factors used by the Agency (i.e. sampling, testing, and inspection) to evaluate the degree of compliance with contract requirements and to determine the corresponding value for a given product.

Acceptance Sampling & Testing – Also called *Verification sampling and testing*. Sampling and testing performed by the Agency, or its Designated Agent, to measure the quality of the final product.

Acquiring Agency - State agency, other entity, or person acquiring real property for purposes related to Title 23 of the United States Code.

Acquisition - Activities to obtain an interest in, and possession of, real property.

Admixture - A substance other than cement, water or aggregate added to a batch of fresh concrete to alter one of the normal properties of concrete.

Advertisement - The public announcement, as required by law, inviting bids for work to be performed or materials to be furnished.

Aerial Photography - High resolution photographs taken from aircraft which are used to assess features in a study area, which are also used to produce topographic base maps of varying scales for alignment studies, engineering, and final design work.

Affected Environment - The physical features, land, area, or areas to be influenced, affected or created by an alternative alignment under consideration; also includes various social and environmental factors and conditions pertinent to an area.

Agency Testing – Testing performed by the SHA or its designated agent (consultant under direct contract to the Agency), but not including contractor tests.

Aggregate - Mineral material, such as natural or manufactured material produced from limestone, dolomite, gravels, sandstones, steel furnace slag, air-cooled blast furnace slag, granulated blast furnace, wet bottom boiler slag or other geologic rock types.

Aggregate Base - The layer of specified, compacted material placed on the subgrade to serve as a base for pavement.

Agitation - Slow stirring or turning over of freshly mixed concrete to keep it in workable condition until it is placed into forms.

Air Entrained Cement – Cement into which the air entrainment admixture has been incorporated at the concrete mixing plant.

Air Rights - Real property interests defined by agreement, and conveyed by deed, lease, or permit for the use of airspace.

Airspace – The space located above and/or below a highway or other transportation facility's established grade line, lying within the horizontal limits of the approved right-of-way or project boundaries.

Alignment - The actual location of a highway or transit facility or improvement.

Alternatives - Potential solutions for a project that are evaluated to determine whether or not they will address the project's purpose and need. Each alternative is developed and evaluated in relation to the purpose and need of the project. Sometimes, the term "alternate" is used interchangeably with the term "alternative".

Amendments – Materials that are mixed with the soil removed from the plant hole to improve the soil texture or ph, or to add organic material. Sphagnum peat moss, shredded pine bark, yard waste compost, and sand are all accepted amendments.

Anadromous – Fish which migrate upstream to spawn in freshwater.

Aquifer – A water-bearing unit or stratum of permeable rock, sand, or gravel capable of yielding considerable quantities of water to wells or springs.

Area of Potential Effect (APE) - The geographical area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of the undertaking, and there may be different kinds of effects caused by the undertaking.

Asphalt Binder- A cementitious material obtained from petroleum processes.

Asphalt Concrete - A mixture of aggregate and asphalt binder. (i.e., Hot Mix, AC Pavement)

Asphalt Concrete Base - A type of asphalt concrete which is used as a base course in the construction of a pavement.

At-Grade Intersection - The location where roadways meet or cross at the same level.

Atterberg Limits - The moisture content at certain stages of soil behavior.

Attribute – A characteristic that, by its presence or absence, classifies an item as conforming or nonconforming. [Inspection Attributes should be selected that directly relate to one of the four inspection components (i.e. equipment, environmental conditions, materials, and product workmanship). Inspection Attributes used for QC should be directly related to maintaining control of production and placement processes to ensure conformance with the requirements for each item of work. Inspection Attributes for Acceptance should relate directly to long-term product performance.]

Average Daily Traffic (ADT) - The average number of vehicles passing a location on a road during a 24-hour period.

Avoidance Alternative – Any alignment proposal that has been developed, modified shifted or downsized specifically in order to avoid affecting any one or more resources regarded as significant.

Award - The written acceptance of a contractors bid by a State Highway Agency.

Balanced Project - A condition that occurs when the amount of embankment is equal to the amount of excavation on a project.

Bare Root - A method of shipping plants without the soil from which they were grown. Seedlings, perennials, roses, and fruit trees may be shipped by this method. To ship, the roots should be white and unbroken.

Batch - The amounts of cement, aggregate, water and admixture which will be mixed at one time in a mixer.

Batch Plant - A plant in which dry, hot aggregate and binder material are proportioned in fixed or batched quantities into a pugmill (mixer) for mixing. Then the resulting Hot Mix Asphalt is either loaded directly into a haul truck or stored in a storage bin for later use.

Batch Weights -The individual weights of the cement, aggregate and water used in each batch of concrete. Aggregate is adjusted for moisture content and specific gravity.

Batching Operation – The process of proportioning and assembling the materials which will comprise one batch.

Batching Plant - The location, either on or off the work site, where the materials are assembled by batches for the mixer. Water and admixtures usually are added as the batch is introduced into the mixer.

Beam, Test - A beam of specified size molded on the job and later broken in a testing machine to determine the flexural strength of the concrete.

Benching - The excavation of an existing embankment so that the new and the old embankments are properly connected.

Best Management Practices (BMPs) – Measures used to control the quantity and quality of stormwater leaving a drainage basin. Local and state jurisdictions have adopted BMPs to counteract physical development and construction activity that may concentrate stormwater or produce soil erosion.

Bid Documents - Documents submitted to the State Highway Agency to bid a project, including the invitation for bids, addenda, proposal, contract form and required bonds, specifications, supplemental specifications, special provisions, general and detailed plans, plan notes, standard construction drawings identified in the plans, notice to contractor, and any other document designated by the SHA. All of the documents collectively constitute one instrument.

Bidder - An individual, firm, or corporation submitting a bid for the advertised work.

Blasting - The used of explosives to fracture rock or shale.

Borrow - Material obtained from approved sources that are required for the construction of the embankment.

Bypass- A roadway, typically a freeway or arterial, that permits traffic to avoid part or all of an urban area.

Calendar Day or Day - Every day shown on the calendar.

Caliper - The width of a single stem plant.

Canvas Shroud - A curtain used to keep the dust down during the spreading operation.

Cap - A short tube, closed at one end, placed on the oiled end of a dowel in an expansion joint to provide space for movement of the dowel in hardened concrete. A stop in the tube prevents it from being pushed all the way onto the dowel before the concrete hardens.

Capacity – The maximum sustainable flow rate at which persons or vehicles reasonably can be expected to traverse a point or a uniform section of a roadway during a given time period, under prevailing conditions. Prevailing conditions primarily include roadway, traffic and control conditions, but may also incorporate weather, construction, incidents, lighting and area type" (Typically, the maximum expressway capacity for automobiles is 2000 vehicles per lane per hour).

CAS - Construction Administration System, a part of CMS which provides support to all construction administration activities from the time at which a contract has been signed to the time at which the contract has been finalized.

Categorical Exclusions (CE) – A classification given to Federal-aid projects or actions which signifies that the project or action does not have a significant effect on the environment, either individually or cumulatively. Categorical Exclusions do not require extensive levels of documentation for NEPA purposes, but may require documentation to demonstrate compliance with other applicable environmental laws and requirements. A Categorical Exclusion refers to both the determination, as well as the written documentation to support a class of action that satisfies Federal criteria describing non-significant impacts.

Cement - A mixture of clay, limestone and other selected materials heated to high temperature to form clinker. The clinker is then ground into powder. Cement when mixed with water it forms a paste to surround and binds the aggregate into a solid and durable mass.

Centrifugal Force - The roller force or load on a base course or material that adds the weight and the vibration energies.

Certified Test Data - A test report from a manufacturer or an independent laboratory approved by the SHA listing actual test results of samples tested for compliance with specified SHA requirements.

Change Order - A written order issued by the SHA to the Contractor, covering changes in the plans or quantities or both, within or beyond the scope of the contract and establishing the basis of payment and time adjustments for the work affected by the changes.

Channelized Intersection - An at-grade intersection in which traffic is directed into definite paths by islands and/or medians.

Charging - Filling. Charging a mixer is placing the ingredients for concrete into it.

Checking - The cracking of a base or stabilized subgrade due to over-rolling.

Choke - Aggregate used for the purpose of filling the surface voids of a coarse aggregate mixture.

Circulator Bus – Collector buses which serve local trips and make frequent stops on demand.

Clearing - Cutting down trees and brush.

Cloverleaf - A form of interchange that provides indirect right-turn movements in all four quadrants by means of loops.

Cluster Development – Concentration of development on one part of a site or area, including reducing the size of residential lots, to preserve open space on the remainder of the site or area.

Collector/Distributor Road (C/D) – A one-way road, parallel to the main traffic lanes, that provides access to or from more than one ramp. The C/D road collects traffic from on-ramps or the main lanes, and distributes traffic to off-ramps or back to the main lanes.

Comment Period – The period of time during which a document (e.g. the Draft and Final Environmental Impacts Statements) is reviewed by agencies and the public, who may submit verbal or written comments. It can be applicable to all types of engineering and environmental documents which are circulated, as well to formal presentations such as those which may be given by the SHA officials at a Public Hearing.

Commenting Agency – The agency that is responsible for reviewing and commenting on an Environmental Impact Statement (EIS). Their comments are considered by the lead agency in the preparation of the Draft EIS, Final EIS and Record of Decision.

Community Impact Assessment (CIA) - An evaluation of the effects of a transportation project on a community and its quality of life. The assessment evaluates community issues such as mobility, safety, employment, relocation, isolation, and others. It also documents the current and anticipated social environment with and without a build alternative. The assessment results are summarized in the Environmental Impact Statement.

Compaction - A consolidation or compression of materials resulting in an increase in density of the materials.

Compaction Equipment - Equipment used to compact materials.

Completion Date - The date, as shown in the contract documents, on which the work contemplated shall be completed.

Compression Rolls - The compaction load of a steel wheel roller, expressed in pounds per inch (kN/m), which is defined as the weight of the roller divided by the combined width of all the drums on the roller.

Concrete – A mixture of cement and water. Examples include concrete sidewalks, concrete pavements, or concrete structures.

Conformity – A process of demonstrating compliance with the State Implementation Plan (SIP) for Air Quality, as required by the Clean Air Act. Any approved transportation project, plan, or program must conform to the SIP in order to receive funds.

Conifer - Cone-bearing plants; mostly evergreen but not always true

Connected Actions – Actions or projects that are closely related. They either automatically trigger other actions that have environmental impacts; they cannot or will not proceed unless other actions have been taken previously or simultaneously; or they are interdependent parts of a larger action and/or depend on the larger action for their justification.

Conservation Planning and Impact Assessment – The National Park Service's version of the NEPA process. This process evaluates alternative courses of action and impacts so that decisions are made in accord with the conservation and preservation mandate of the NPS Organic Act.

Consolidation - The removal of water from a soil over time to increase its strength.

Constrained Areas – Targeted areas within a corridor surrounded by imminent development. These areas are thought to contain sensitive environmental resources, where detailed wetland delineation studies are required.

Constraints –Significant resources, facilities, or other features or study areas located in or adjacent to an existing or proposed transportation corridor that serve to restrain, restrict, or prevent the ready implementation of proposed transportation improvements in a given area. Constraints may include natural or physical resources, important structures, communities facilities, or topographic features. Constraints are more commonly described as *environmental features.*

Construction Joint - A joint formed in concrete pavement at the end of the day's production or any time production is interrupted for 30 minutes or longer.

Construction Underdrains - Sacrificial underdrains placed to drain the subgrade.

Contract - The written agreement between the SHA and the contractor setting forth the obligations of the parties, including, but not limited to, the performance of the work and the basis of payment.

Contract Bond - The approved forms of security, executed by the contractor and its sureties, guaranteeing complete execution of the work as required by the contract documents and the payment of all legal debts pertaining to the construction of the project.

Contract Documents - Documents submitted to the State Highway Agency to support a contract, including the bid documents (see the definition in this section for an explanation of bid documents).

Contract Item (Pay Item) - A specifically described unit of work for which a price is provided in the Contract.

Contract Time – The amount of time allowed for completion of a project. It is usually shown as the number of work days or calendar days, including adjustments but may also be given in terms of a specified completion date for the project. Specified completion date and calendar day contracts shall be completed on or before the day indicated, even if it is a Saturday, Sunday, or holiday.

Contraction Joint - A sawed joint which controls the location of a transverse crack and permits the slab to contract and expand with changes in temperature.

Contractor - The individual, firm or corporation contracting with the SHA for the performance of prescribed work, acting directly or through a duly authorized representative and qualified under provisions of the law. The term may also refer generically to all contracted parties who are involved with building an individual project, including; the Prime (General) Contractor, Subcontractors, and all Producers, Fabricators, and Manufacturers who provide construction materials for the project.

Conversion - The adaptation of one unit of measure to another unit of measure.

Cooperating Agency – Any organization other than a lead agency which has jurisdiction by law or special expertise with respect to any environmental impact involved in a major Federal action significantly affecting the quality of the human environment.

Core - A cylinder cut from pavement with a hollow drill. Cores are 4 inches or 6 inches in diameter and are used to check the thickness and strength of the concrete or HMA pavement.

Corridor – A band width encompassing certain areas within the project limits, generally used for planning and NEPA documents.

Corridor Preservation – Cooperative planning efforts and/or specific administrative, fiscal, or legal methods for reserving land area for future transportation needs.

Course - A layer or layers of a given material or mixture placed as a part of the pavement structure.

Cross-Section - In the field, elevations taken along a line at right angles to the centerline. On a drawing, a profile of the existing ground at right angles to the centerline. The drawing of an earthwork cross section also shows the shape of the finished excavation or embankment at the same point. A roadway cross section shows the thickness and width of the pavement courses.

Cross-Slope - The transverse slope of the pavement, either crown or superelevation.

Crown - The height of the center of the roadway surface above a straight line drawn between its edges.

Cultural or Historic Resources - Any resource listed on or determined eligible for listing in the National Register of Historic Places. These resources can include historic sites, objects, structures, buildings, districts or archeological sites.

Culvert - Any structure not classified as a bridge that provides an opening under the roadway.

Cumulative Impact – The sum of all direct, indirect, and secondary impacts resulting from a transportation improvement project.

Cure - The treatment given concrete to assure sufficient water and heat necessary for chemical action so that concrete attains the strength and durability for which it was designed.

Curing Membrane - A compound sprayed over the exposed surface and edges of newly placed concrete to prevent the evaporation of water during curing.

Cut Back Asphalt - Asphalt binder which has been rendered fluid by fluxing it with a light volatile petroleum distillate. Upon exposure to atmospheric conditions, the volatile distillate evaporates, leaving only the asphalt cement which reverts to its original semi-solid condition. Cut back asphalts are classified as rapid curing (RC), medium curing (MC), or slow curing (SC).

Cycle Length - A signal cycle is the number of seconds it takes for one complete sequence of phases (red, yellow, green) to occur. THIS DEFINITION IS UNCLEAR

Cylinder - A test sample of concrete molded into a cylinder 12 inches (600 mm) high and 6 inches (300 mm) in diameter, to be sent to the laboratory for determination of strength and density.
Damages – The loss in value attributable to the remainder of the property due to severance or consequential damages that arise when only part of an owner's property is acquired for a project. Damages are limited by state law.

Deceleration Lane - An additional lane provided to allow traffic to exit off of a roadway.

Deciduous - Term used to describe plants which loose their leaves at the end of a growing season; typically this occurs in the fall.

Deflections or Rutting - The vertical movement of the subgrade during proof rolling.

Deformed Bar - A steel bar which has projections on its surface for increasing the bond between the concrete and the bar.

Degradation - A reduction in aggregate particle size due to breakage and water.

De minimis – A Latin expression meaning about minimal things, concerning things that are so minor as to be negligible.

Density - The ratio of the weight of a given material to its volume.

Depth Checks - The measuring of the thickness of the base course or embankment material.

Design Criteria – Established state and national standards and procedures that guide the establishment of roadway layouts, alignments, geometry, and dimensions for specified types of highways in certain defined conditions. The principal design criteria for highways are traffic volume, design speed, the physical characteristics of vehicles, the classification of vehicles, and the percentage of various vehicle classification types that use the highway.

Design Exception – An approval issued by a state or federal agency to permit certain deviation from a specified, accepted standard granted on the basis of a report explaining the need for the exception and the consequences that will result from the action.

Design Speed - The speed used for design and relationship of the physical features of a highway that influence vehicle operation. It is the maximum safe speed that can be maintained over a specified section of highway when conditions are favorable (i.e. – clear, dry, daylight)

Designated Development Areas – Areas designated by local governments in master, comprehensive or general plans as the primary areas for future development, usually planned for urban densities of development and served by water and sewer systems.

Diamond Interchange - A four-ramp interchange between a freeway and a surface street. The four diagonal ramps, one in each quadrant, suggest a diamond shape.

Direct Effect – An impact that occurs as a result of the proposed action or alternative in the same place and at the same time as the action.

Disking - The act of using a disk to dry or break up a material.

Disposal – The sale of real property or rights therein, including access or air rights, when the property is no longer needed for highway right-of-way or other uses eligible for funding under title 23 of the United States Code.

Dispute Resolution –The procedure used to resolve conflicts resulting from discrepancies between the Agency's and Contractor's results of sufficient magnitude to impact payment.

Diverge - The dividing of a single lane of traffic into separate streams without traffic signals or other right-of-way controls.

Documentation – The process of recording and filing evidence that the material or work is in conformance with specifications and in the amounts required.

Donation - The voluntary transfer of privately owned real property for the benefit of a public transportation project without compensation or with compensation at less than fair market value.

Dowel Assembly - A cage or basket used to hold dowels in position during placement jointed concrete pavement.

Dowel or Dowel Bar - A smooth steel bar extending across a contraction joint to transfer the applied load, prevent future misalignment of the slab and permit movement at the joint.

Dozer - A machine that pushes and levels material.

Draft Environmental Impact Statement (DEIS) - An environmental document that includes examination of the natural, cultural and socioeconomic environmental impacts of various alternatives and indicates that significant impacts are likely to occur if the proposed action is implemented. The DEIS must be made available to the public and other agencies for review and comment.

Drainage - Constructing the embankment to drain the water away as fast a possible.

Drainage Blanket - A system of coarse aggregate, fabric and pipe that is designed to drain large areas of the slope.

Drum Mix Plant - A continuous production plant in which cold aggregate is proportioned and dried in the first half of a drum and then mixed with binder material in the second half of the drum at high temperatures. Then the resulting HMA may be dumped directly into haul trucks to go to the paving site or may be stored in a storage bin for later use.

Dry Density – The density of a soil that uses only the weight of the soil. The density of the soil when the soil is completely dry.

Drying - The act of lowering the moisture content of a material by disking, plowing or other means.

Early Acquisition – The acquisition of real property by State or local governments in advance of Federal authorization or agreement.

Earth Moving Equipment - Equipment used to move earthen materials.

Earthwork Volumes - The calculation of a three dimensional earthwork quantities.

Easement - An interest in real property that conveys a right to use a portion of an owner's property or a portion of an owner's rights in the property.

Ecosystem – A functional system which includes the organisms of a total community together with their environment.

Edging - Rounding the edges of concrete pavement and hand-formed joints while the concrete still is workable, using an edging tool of specified radius.

Electronic Grade Control – A means of controlling the grade via instruments on construction equipment.

Elevation or Grade - The height as measured from a predetermined point denoted in the plans.

Embankment - A structure consisting of suitable materials and constructed in lifts to a predetermined elevation and cross-section.

Emulsion - A suspension of extremely small droplets of asphalt in water in the presence of an emulsifying agent, usually is a type of soap.

End Area - The cross sectional area on the plans that represents a two-dimensional plane.

End Dumping - The direct loading of the base or embankment material from the truck to the subgrade or foundation.

Engineer - The person representing the Department who is charged with the overall responsibility at the project site for seeing that construction is in conformance with plans and specifications, checks for job control and verification testing, and preparation of job estimates for payment to the Contractor.

Engineering Limits – The absolute limiting value(s) placed on a Quality Characteristic beyond which the test result for an individual sample is considered to be unacceptable. [Engineering Limits are established to identify material that does not provide the minimum required engineering properties. They usually have an Upper Engineering Limit (UEL), a Lower Engineering Limit (LEL), or both. The Engineering Limits may be the same as the Specification Limits.]

Entrained Air - Millions of microscopic voids introduced into concrete through an admixture to permit the cured concrete to undergo freezing and thawing without damage.

Environmental Assessment (EA) - A brief NEPA document that is prepared to (a) help determine whether the impact of a proposed action or alternatives could be significant; (b) aid in compliance with NEPA by evaluating a proposal that will have no significant impacts, but that may have measurable adverse impacts; or (c) evaluate a proposal that either is not described on the list of categorically excluded actions, or is on the list but exceptional circumstances apply.

Environmental Impact Statement (EIS) - A detailed NEPA document that is prepared when a proposed action or alternatives have the potential for significant impact on the human environment.

Environmental Justice - refers to inequitable environmental burdens borne by groups such as racial minorities, women, or residents of economically disadvantaged areas as a result of infrastructure projects. Environmental justice initiatives seek to redress inequitable distributions of environmental burdens (pollution, industrial facilities, crime, etc.) and equitably distribute access to environmental goods. For highway projects, the State Highway Agency will reach out to the public throughout the project to identify affected populations and avoid disproportionately adverse impacts of the project to those groups, as required by Executive Order 12898.

Environmental Screening Process - The analysis that precedes a determination of the appropriate level of NEPA documentation. The minimum requirements of the environmental screening process are a site visit, consultation and documentation of likely environmental effects.

Environmental Streamlining - An initiative aimed at identifying ways that transportation and environmental agency representatives can more effectively work together in a collaborative and cooperative manner to avoid unnecessary delays in processing environmental documents, approvals and permits. The environmental streamlining provision is contained in the Federal transportation law passed in 1998, the Transportation Equity Act for the 21st Century (TEA-21). This provision calls on Federal agencies to jointly develop a coordinated environmental review process for transportation projects.
Environmental Traffic - Data used to conduct environmental impact studies, including forecasted build year and design year volumes, diurnal curves, and Level of Service information.

Environmentally preferred alternative – The project's action alternative identified as the best option to best promote the policies of NEPA. The environmentally preferred alternative is encouraged to be identified in the Draft EIS or EA, but is only required to be stipulated in the Record of Decision.

Equipment - All machinery and equipment, together with the necessary supplies for upkeep and maintenance, and also tools and apparatus necessary for the proper construction and acceptable completion of the work.

Equivalent Single Axle Loads - Equivalent (18000 lb) single-axle loads used in the design of HMA mixtures to meet desired performance criteria of the roadways projected ADT. . THIS DEFINITION IS UNCLEAR

Excavation - The removal of materials to predetermined elevations and cross-sections.

Excavator - A machine that removes material with a bucket.

Expansion Joint - A joint adjacent to a bridge or intersection to absorb expansion of concrete pavement and prevent expansive pressure on the bridge or intersecting pavement.

Express Bus Service – Service which is usually associated with longer distance commuter travel. Outside the downtown area, these buses normally only stop at Park and Ride facilities or densely developed town centers.

Expressway - A divided highway, to which access is controlled, where all crossing roads are grade separated so that all entrances and exits are made via interchange ramps.

Extra Work - An item of work not provided for in the contract as awarded but found essential to the satisfactory completion of the contract within its intended scope.

Fabricator – A company which produces Fabricated Structural Materials (e.g. Precast/Prestressed Concrete Structural Elements, Fabricated Structural Steel) for either the Prime Contractor or a Subcontractor.

Falsework – A system to temporarily brace concrete structural forms. The bracing system will be removed after the concrete has cured sufficiently to support its own weight.

Feeder Bus Service – Local bus service connecting residential developments with stations offering express bus service or other forms of high-speed transit.

Fertilizer - A natural or synthetic material added to or spread on soil to increase its fertility; the three numbers indicate its percentage of ingredients; in order, these numbers are nitrogen, phosphorus and potassium.

FHWA – Federal Highway Administration, an operating administration of the U.S. Department of Transportation.

Final Environmental Impact Study (FEIS) - A full disclosure document that provides a full description of the proposed project, the existing environment, and analysis of the anticipated beneficial and adverse environmental and social effects of reasonable alternatives. The FEIS must address comments received on the Draft EIS, making any appropriate revisions or decisions. It must identify and describe the preferred alternative and the basis for the decision.

Finding of No Significant Impact (FONSI) – A types of environmental document prepared for proposed projects where it has been determined through the preparation of an Environmental Assessment that a project will not have a significant impact on the environment.

Fine Grading - The act for trimming the surface to meet the specification tolerances.

Finished Surface - The top of the base or subgrade materials that has been fine graded or trimmed.

Finishing - Shaping the surface of cement that is not shaped by forms. Also it includes filling visible voids in the concrete after the forms are removed.

Finishing Machine - A machine which the concrete mortar to the contract requirements and includes a float for smoothing the concrete pavement.

Float - A straight piece of wood or metal used to smooth the surface of plastic concrete. Small hand-held floats are called paddle floats.

Floodplain – A flat or nearly flat lowland that borders a stream and is covered by its waters at flood stage.

Flushing - The drawing of binder material to the surface of an HMA mixture, due to the action of traffic or an excess of binder material.

Flyover - A directional or semi-directional ramp which usually handles left turns (instead of using a loop ramp) and often passes over the main traffic lanes.

Foliage - This is the leaf structure of a plant; can be composted of needles or deciduous leaves.

Footed Rollers - Rollers that knit clay-like materials together.

Footer - The concrete pad which spreads the load of a structure over an area of supporting earthwork.

Forms, Pavement - Metal plates secured together and to the subbase for shaping the sides of the pavement and controlling alignment, grade and thickness. Also, the forms serve as a track for paving equipment.

Foundation - The location at the base of an embankment.

Free Flow - The continuous movement of traffic.

Freeway – A facility designed to carry the highest traffic volumes and the longest trips.

Frontage Road - A local street or road located next to an arterial highway which provides access to properties along the roadway and controls access to the arterial highway from the properties.

Full Control – A means of describing highway facility access which is characterized by access only via an interchange with its related on and off ramps and elimination of median crossovers except for emergency vehicles. Private driveway access is also eliminated.

Gradation - The classification of different sizes of aggregate within a given size of aggregate as determined by sieve tests.

Grade - The rate of change of the profile elevations.

Grade Separation - An intersection in which one road passes over the other on a bridge.

Grader - A machine used to level surfaces.

Groundwater – Naturally occurring water that moves through the earth's crust, usually at a depth of several feet to several hundred feet below the earth's surface.

Grubbing - Clearing by digging up roots and stumps.

Hand Finishing - Correcting manually irregularities left by the finishing machine or performing those functions which cannot be accomplished by machine, such as edging or forming of joints.

Herbicide - A natural or synthetic product typically used to eradicate weeds. Herbicide should be applied by a licensed applicator and as directed by the manufacturer's label.

High Occupancy Vehicle (HOV) - A vehicle carrying more than one person, or a minimum of its designated number (i.e., HOV-3 must have a minimum of three people in order to qualify). HOVs are sometimes given preferential treatment, such as an HOV-only travel lane, because they carry people more efficiently than vehicles with a single occupant.

High-Early-Strength Concrete - Concrete made with a special cement (Type III) that reaches design strength and hardness in considerably shorter time than concrete made with regular cement.

Hot Mix Asphalt Base - A type of HMA which is used as a base course in the construction of a pavement.

Honeycombs - Large voids in the concrete which are due to inadequate spading or consolidating.

Hook Bolt - A short steel bar with hooked ends joined by a threaded connection. It is used to fasten a concrete slab to another which is later constructed beside it.

Hot Mix Asphalt - Defined as a mixture of aggregate and asphalt binder produced from a HMA plant.

Human environment - The natural and physical environment, and the relationship of people with that environment. It includes the socioeconomic environment, communities, and infrastructure.

Hydrated Lime - A finer form of lime.

Independent Assurance – Activities that are an unbiased and independent evaluation of all the sampling and testing (or inspection) procedures used in the Quality Assurance program. [IA provides an independent verification of the reliability of the Acceptance (or Verification) data obtained by the Agency and the QC data obtained by the Contractor. The results of IA testing or inspection are not to be used as a basis of material acceptance. IA provides information for Quality System management.]

Impact Topics—Specific natural, cultural, or socioeconomic resources that would be affected by the proposed action or alternatives (including no action). The magnitude, duration, and timing of the effect to each of these resources is evaluated in the impact section of an EA or an EIS.

Indirect Impact - Reasonably foreseeable impacts that occur removed in time or space from the proposed action. These are “downstream” impacts, future impacts, or the impacts of reasonably expected connected actions (e.g., growth of an area after a highway to it is complete).

Inspection – The process of visual examination or physical measurement of an item for comparison against applicable requirements. [Inspection activities are primarily visual in nature. The characteristics (i.e. Attributes) of a product or item are assessed using both visual observations (i.e. examination) and check measurements (i.e. physical measurement) of equipment, environmental conditions, materials, and product workmanship.]

Inspector - The engineer’s authorized representative assigned to make detailed inspections of contract performance.

Inspector’s Daily Report - A form used by an inspector to document the activities performed by a contractor.

Interchange - A grade-separated intersection with ramps to connect them

Intermingling - The unintentional dilution of one size of aggregate by aggregate of a different size as a result of improper storage or careless handling.

Intermittent – Carries water a considerable portion of the time, but which ceases to flow occasionally or seasonally. THIS DEFINITION IS AWKWARD

Intersection - The area where vehicles traveling on different roadway may come in conflict. They may be at grade or grade separated.

Invitation for Bids – The document soliciting bids on a project. The invitation for bids indicates with reasonable accuracy the quantity and location of the work to be done, or the character and quality of the material to be furnished, and the time and place of the opening of proposals.

Iron Slag - Air-cooled blast furnace slag (ACBF) and Granulated slag (GS).

Issues – Environmental, social, and economic problems or effects that may occur if the proposed action or alternatives (including no action) are implemented or continue to be implemented.

Joint Lock - The device at each end of a section of paving form for attaching the sections together.

Joint Sealer - A compound for preventing entrance of water and solid particles into a joint. The sealer may either be preformed or liquid.

Keying - The interlocking of aggregate particles by compaction.

Laitance - An accumulation of fine particles on the surface of freshly placed concrete occurring when there is an upward movement of water through the concrete due to the presence of too much mixing water or excessive vibration.

Lane or Traffic Lane - A strip of pavement of specified width, usually 12 feet.

Lead agency – The entity either preparing or taking primary responsibility for preparing the NEPA document.

Level-of-Service (LOS) – A rating from A (best) to F (worst) to describe the quality of service provided by a roadway facility. See the Highway Capacity Manual for additional information.

Lift Thickness - The thickness of the material when placed on a horizontal surface.

Light Rail Transit – A transit system which includes electrically powered, low-to-medium speed trains operating in an exclusive or shared right-or-way. Light rail is characterized by short-to-medium trip lengths, 2-3 car trains, and frequent station stops.

Lime - A by-product of limestone that reacts with clay-like soils.

Link - The section of roadway between two intersections.

Liquid Limit - Moisture content at which a soil passes from a plastic to a liquid state.

Local Road - A street or road which primarily provide access to residences, businesses, or other properties

Logical Termini – Known features (land uses economic areas, population concentrations, cross route locations, etc.) at either end of a proposed transportation route that enhance good planning and which serve to make the route usable. Logical termini are considered rational end points for a transportation improvement.

Longitudinal Joint - A joint which extends lengthwise in the roadway, parallel to the centerline.

Lot – A specific quantity of material from a single source which is assumed to be produced or placed by the same controlled process. Lot sizes are typically based on material quantities or area.

Maintenance - The act of constructing an embankment that minimizes construction problems. For example grading and draining to keep water off the embankment.

Major Federal Action – Actions that have a large Federal presence and that have the potential for significant impacts to the human environment. They include adopting policy, implementing rules or regulations; adopting plans, programs, or projects; ongoing activities; issuing permits; or financing projects completed by another entity.

Major Investment Study (MIS) – A cooperative process to establish a range of alternatives including the effectiveness and cost effectiveness, direct and indirect costs, mobility improvements, environmental effects, safety, operating efficiencies, land use and economic development, financing and energy consumption. The goal of a MIS is to have results adopted by the Metropolitan Planning Organization to be included in the comprehensive Long Range Transportation Plan.

Marshall Mix Design - Volumetric mix design procedure used to establish the optimum Asphalt binder content for a HMA.

Median - The area that divides traffic moving in opposite directions on a single roadway.

Median Opening - A gap in a median provided for crossing and/or turning traffic.

Median Turn Lane - A separate lane, within the median, primarily used to accommodate left turn vehicles.

Merge - A movement in which two separate lanes of traffic combine to form a single lane without the aid of traffic signals or other right-of-way controls. Merging – The process by which two separate traffic streams moving in to the same general direction combine to form a single stream.

Mesh - A fabric of steel wires welded together at their intersections for placement in concrete pavement as distributed reinforcement.

Mesh Installer – A machine for imbedding wire mesh into freshly placed concrete pavement.

Metropolitan Planning Organization (MPO) - a transportation (***http://en.wikipedia.org/wiki/Transportation***) policy-making organization comprised of representatives from local government (***http://en.wikipedia.org/wiki/Government***) and transportation authorities. In 1962, the U.S. Congress (***http://en.wikipedia.org/wiki/United_States_Congress***) passed legislation that required the formation of an MPO for any Urbanized Area (UZA) (***http://en.wikipedia.org/wiki/Urbanized_Area***) with a population greater than 50,000. MPOs are required to develop a long-range transportation plan and a shorter-range Transportation Improvement Program. Congress created MPOs in order to ensure that existing and future expenditures for transportation projects and programs are based on a continuing, cooperative, and comprehensive ("3-C") planning process. Federal funding for transportation projects and programs are channeled through this planning process.

Mineral Filler - Limestone dust, portland cement, or other inert mineral matter.

Mitigated EA - An Environmental Assessment that is rewritten to incorporate mitigation into a proposal or to change a proposal to reduce impacts to below significance.

Mitigation - A modification of the proposal or alternative that lessens the intensity of its impact on a particular resource.

Mitigation Measures – Specified design commitments made during the environmental evaluation and study process that serve to moderate or lessen impacts deriving from the proposed action. These measures may include planning and development commitments, environmental measures, right-of-way improvements, and agreements with resource or other agencies to effect construction or post construction action.

Moderately Soft Foundation - A foundation that is constructible with moderate changes to embankment construction techniques.

Moisture Content - The percentage by weight of water contained in aggregate as compared to the same aggregate in a completely dry condition. It is expressed as a percentage of the material's dry weight.

Moisture Density Curve - A plot of the moisture content verses the weight of a soil. This plot determines their relationship.

Mortar - A mixture of water, sand and cement. Mixed with coarse aggregate, this mortar completely envelopes each particle of coarse aggregate to form concrete. Also, mortar is used to fill honeycombing which becomes apparent upon removal of forms.

Mulch – material that is placed onto top of a plant's rootball that keeps the ground cool, retains moisture, prevents heaving and breaks down, and provides nutrients to the root system.

Multi-modal – A range of alternatives, or modes, for transporting people and goods. Modes include bus, walking, bicycles, trains, light or heavy rail, and highway. . Federal legislation ties transportation funding to the provision of many transportation options in the planning of transportation improvements.

Multi-stem – A plan that has two or more main stems; defined as clump or shrub form.

National Environmental Policy Act (NEPA) – A law enacted in 1969 that establishes a legislative mandate that Federal agencies consider the environment in all major Federal actions and investments. The NEPA process involves the detailed study of alternatives for projects, the evaluation of environmental impacts of those alternatives, and measures for mitigating those impacts.

National Register of Historic Places (NR) – The nation's official list of cultural resources worthy of preservation. Authorized under the National Historic Preservation Act of 1966, the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archeological resources.

National Register Eligible (NRE) – Cultural resources that are eligible for listing on the National Register of Historic Places.

Natural Environment – The elements of our environment that are not man-made, such as streams, forests and natural wetlands and other natural bodies of water.

Natural Granular Materials - Broken or crushed rock, gravel, sand, durable siltstone, and durable sandstone generally placed in 8-inch (200 mm) loose lifts.

Natural Soils - All natural earth materials, organic or inorganic, resulting from natural processes such as weathering, decay, and chemical action.

NEPA Process – The objective analysis of a proposed action to determine the degree of its environmental and interrelated social and economic impacts on the human environment, alternatives and mitigation that reduce that impact, and the full and candid presentation of the analysis to, and involvement of, the interested and affected public.

No-Action ("No-Build") Alternative - The project alternative that encompasses not constructing the project. Also called "no-action" or “no-build”, the no-action alternative is always studied, because it may be a reasonable alternative, especially where the impacts of build alternatives are high and the need is relatively minor. Second, no-action serves as a benchmark against which the impacts of the other alternatives can be compared. As part of this alternative, short-term minor reconstruction, such as safety upgrading and maintenance projects, can be considered.

Noise Sensitive Area/Receptor Site (NSA) - An area involving regular human use or activities which would be susceptible to adverse impacts due to highway traffic-generated noise. NSAs typically include residences, churches, schools, parklands, or hospitals, and may include individual sites, groups of sites, or an entire community. Individual analysis sites within the NSA are called Noise Receptor Sites.

Normal Circumstances – Under the definition of wetlands, refers to the soil and hydrology conditions that are normally present, without regard to whether the vegetation has been removed.

Notice of Intent (NOI) - The Notice of Intent (NOI) is an announcement to the public and to interested agencies that a project is being developed and that an EIS will be prepared. It briefly describes the study area, the proposed action, its proposed purpose and need, the agency’s proposed public scoping process, and identifies the agency contact person (name and address).

Notices of Availability – Separate notices submitted to the *Federal Register* that the draft EIS and the final EIS are ready for distribution.

Nuclear Gauge - A device that uses nuclear radiation to determine a soil’s density and moisture content of in-situ materials or HMA.

Odometer - An instrument used for measuring traveled distance.

One Point Proctor Method - A method that determines the compaction of a soil. It requires making a proctor and using Typical Density Curves to pick the correct curve.

Optimum Moisture - The water content at which the maximum density is produced in an embankment material.

Origin-Destination Survey - Use of any one of several methods to determine where trips are coming from and going to or where they desire to travel.

Oscillate - To swing back and forth, operating between fixed limits, such as the movement of a screed on a finishing machine.

Oscillating Wheel - The vertical movement of pneumatic tire roller's wheels over irregularities in the surface on which the roller is operated, providing a kneading action.

Overpass - A grade separation where a highway passes over an intersecting highway, railroad or watercourse.

Oversight Agreement - The project approval and agreement concluded between the State and the FHWA to outline which projects will be monitored at the plans, specifications, and estimate stage by FHWA as required by 23 U.S.C. 106(c)(3).

Partial Cloverleaf - An interchange with one or more loop ramps, but fewer than the eight ramps needed to form a full cloverleaf.

Partial Control of Access – Allows access to the highway facility only from public roads (no private driveways) through intersections or interchanges.

Paved - An area covered with a hard surface to support traffic or material storage.

Pavement - The location above the subgrade that traffic runs on that is made of aggregate, concrete, or HMA.

Pay Item - A specifically described unit of work for which a price is provided in the contract.

Peak Period – Time when a highway carries its highest volume of traffic, usually the morning of evening rush period when commuters travel to and from work.

Percent Within Limits – A Quality Measure used to evaluate the quality of a Lot. It is the cumulative area under a standard curve which represents the estimated percentage of a Lot that falls above the Lower Specification Limit (LSL), beneath the Upper Specification Limit (USL), or between the Upper and Lower Specification Limits.

Performance-Graded Asphalt Binder –An asphalt-based cement that is produced from a petroleum residue to specified temperature regimes related to performance.

Placement Rate - The placement of paving materials on the basis of a given weight and area covered.

Plans - The plans, profiles, typical cross sections, working drawings and supplemental drawings, approved by the SHA, or exact reproductions thereof, which show the location, character, dimensions, and details of the work.

Plant - The plant where aggregate and asphalt material are mixed together or the plant which produces the aggregate or the HMA.

Plant Bins - Bins at the hatching plant for temporary storage of aggregate and cement for use in proportioning concrete batches.

Plastic Limit - The moisture content at which the material breaks a part at an 1/8" diameter. Indicates how much clay is in the material. The moisture content at which a soil changes from a semisolid to a plastic state.

Plasticity Index – A measure of the amount of clay in a material. The higher the Plasticity Index, the more clay in the material.

Pneumatic Tire Roller - A roller with three to five rubber tires mounted on two tandem axles. The wheels that the tires are mounted to oscillate, which means they are capable of moving up and down independently of each other. The pneumatic roller compacts a HMA using the combined force of weight and the kneading action of the oscillating wheels.

Power Driven Mixer - A big roto-tiller used to mix the soil and the lime.

Preferred Alternative - The recommended alternative identified in the Final Environmental Impact Statement. A recommended Preferred Alternative may also be identified in the Draft Environmental Impact Statement, but it is not required.

Prime Coat - An application of asphalt material made on the surface of a pavement layer for the purpose of binding the surface particles together.

Proctor Hammer - a device that is used to compact a soil in a proctor mold. It weighs 5.5 pounds, compacts the soil 25 times for each soil lift in the proctor. The soil is placed in the proctor mold in three lifts.

Proctor Test – a procedure that uses a standard compactive effort to determine or pick a soil moisture density curve.

Profile - A line on a drawing which shows elevation of points along a selected route. A profile usually shows both ground elevations and grade-line elevations.

Profile Grade - The trace of a vertical plane intersecting the top surface of the proposed wearing surface, usually along the longitudinal centerline of the roadbed. Profile grade means either elevation or gradient of such trace according to the context.

Programmatic Documents—Broader scope EAs or EISs that describe the impacts of proposed policy changes, programs, or plans.

Progress Samples - Samples taken by the SHA lab or project personnel not engaged in job control sampling. Samples are obtained at random from materials delivered for incorporation in the work to provide an independent spot check on the reliability of the results obtained in job control sampling and testing.

Project - The specific section of the highway together with all appurtenances and construction to be performed thereon under the contract.

Project Engineer (or Engineer) –The person representing the State Highway Agency who is charged with the overall responsibility at the project site for seeing that construction is in conformance with plans and specifications, and that all checks for job control and validation of pay items are documented and filed properly.

Project Limits – The physical end points of a proposed project, usually designated at geographic or municipal boundaries, at intersections, at roadway segments where cross sections change, or at the beginning or end of numbered state traffic routes.

Proof Rolling - The use of heavy rollers to test a material's subgrade stability.

Proportioning Concrete - Determination of the amount of each ingredient used in a class of concrete with adjustments as determined by tests called for in the specifications.

Proposal - The offer of a bidder, on the prescribed form properly signed and guaranteed, to perform the work and to finish the labor and materials at the prices quoted.

Proposal Guaranty - The security furnished with a bid to guarantee that the bidder will enter into the contract if its bid is accepted.

Public Hearing – A meeting designed to afford the public the fullest opportunity to express support of or opposition to a transportation project in an open forum at which a verbatim record (transcript) of the proceeding is kept.

Public Involvement – The full range of activities and initiatives that a transportation agency uses to engage the public in the transportation decision-making and project planning processes. Such activities could include coordination events, informational materials, outreach, and other activities.

Public Meeting (may also be called Public Information Meeting) – An announced meeting conducted by transportation officials designed to facilitate participation in the decision-making process and to assist the public in gaining an informed view of a proposed project at any level of the project planning process.

Purpose and Need Statement - A statement establishing why a transportation project is proposed. This statement is the foundation to determine if alternatives meet the needs in the area, and is developed in consultation with local, state and federal agencies as well as the public.

Quadrant - One of four slices of land created when two roads intersect. This term is used in reference to ramp placement.

Qualified Laboratories – Laboratories that are capable as defined by appropriate programs established or recognized by each Agency. [Accredited Laboratories are considered Qualified. However, a Qualified Laboratory need not be Accredited.]

Qualified Personnel – Personnel who are capable as defined by appropriate programs established or recognized by each Agency.

Quality – (1) The degree of excellence of a product or service; (2) The degree to which a product or service satisfies the needs of a specific customer; (3) The degree to which a product or service conforms with a given requirement; or (4) Conformance to requirements.

Quality Assurance – (1) All those planned and systematic actions necessary to provide confidence that a product or facility will perform satisfactorily in service; or (2) Making sure the quality of a product is what it should be. Quality Assurance (QA) is an umbrella term that includes both contractor Quality Control and Agency Acceptance as two separate functions.

Quality Characteristic – A product characteristic that is measured through testing, either for Quality Control (QC) purposes or for conformance with Acceptance requirements. [Quality Characteristics are specific material properties or product requirements which are evaluated by QC and Acceptance testing. Quality Characteristics which are specified are normally selected because they: a) Relate to initial and long-term performance; b) Are quantifiable or measurable; and c) Can be measured with good repeatability.] Examples for HMA include: Air voids in the mixture, voids in the mineral aggregate, binder content, density, and smoothness. Examples for Concrete Pavement include: Strength, thickness, air content, permeability, and smoothness.

Quality Control – The system used by a Contractor party to monitor, assess and adjust their production or placement processes to ensure that the final product will meet the specified level of quality. [Quality Control includes sampling, testing, inspection, evaluation, and corrective action (where required) to maintain continuous control of a production or placement process.]

Quality Control Plan – A project specific document prepared by the Contractor which identifies all QC personnel and procedures that will be used to maintain all production and placement processes “in control” and meet the Agency specification requirements.

Quality Measure – Any one of several mathematical tools that are used to quantify the level of quality of an individual Quality Characteristic. [Application of a Quality Measure to a set of testing data provides an overall numeric representation of Quality for a specific Quality Characteristic. Typical Quality Measures used in Quality Assurance are selected because they quantify the average quality, the variability, or both. Examples of Quality Measures that may be used include; Mean, Standard Deviation, Percent Defective (PD), Percent Within Limits (PWL), Average Absolute Deviation (AAD), Moving Average, and Conformal Index (CI). PWL or PD are the Quality Measures that are recommended for use in Quality Assurance Specifications.]

Queue - A line of vehicles stopped at an intersection, merge or diverge point.

Quick Lime - A coarser and more concentrated form of lime.

Ramp - A connecting roadway providing access in one direction from one road to another.

Random Cracks - Cracks which appear in concrete pavement due to contraction in the early stages of curing, and which follow no set pattern.

Random Material - Mixtures of suitable materials that can be placed in 8-inch (200 mm) loose lifts.

Random Sampling – A sampling procedure whereby each sample obtained from the Lot has an equal probability of being selected.

Raveling - Slightly disturbing the surface of concrete pavement adjacent to sawing of a joint, or the loss of aggregate from the surface of a HMA pavement due to a lack of adequate compaction, segregation of the mixture, moisture damage, high dust content, or a lack of binder for binding the aggregate particles together.

Real Property – The land and any improvements thereto, including but not limited to, fee interests, easements, air or access rights, and the rights to control use, leasehold, and leased fee interests.

Reasonably Close Conformity - Compliance with reasonable and customary manufacturing and construction tolerances where working tolerances are not specified. Where working tolerances are specified, reasonably close conformity means compliance with such working tolerances. Without detracting from the complete and absolute discretion of the engineer to insist upon such tolerances as establishing reasonably close conformity, the engineer may accept variations beyond such tolerances as reasonably close conformity where they will not materially affect the value or utility of the work and the interests of the department.

Record of Decision (ROD) – A document prepared at the conclusion of the NEPA process that presents the selected alternative for a transportation project, and the basis for selecting and approving this alternative. It also identifies the other alternatives studied, summarizes the analysis on the various alternatives, and addresses comments received on the Final Environmental Impact Statement. This document is prepared by the FHWA division office.

Rectangular Foot - A footed roller with rectangular feet.

Recycled Materials - Fly ash, bottom ash, foundry sand, recycled glass, tire shreds.

Recycled Portland Cement Concrete (RPCC) - Recycled portland cement concrete blended with natural soil or granular material.

Registered Professional Engineer (PE) – An engineer registered with the State Board of Registration for Professional Engineers and Surveyors to practice professional engineering in the State.

Relinquishment - The conveyance of a portion of a highway right-of-way or facility by a State Highway Agency to another government agency for continued transportation use.

Retarder - An admixture placed in concrete which slows the setting of the concrete.

Right-of-Way - A general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to transportation purposes.

Rigid Pavement Inspector - An authorized representative of the engineer to make detailed inspections and documentation of contract performance as pertain directly to concrete paving operations.

Riparian – Pertaining to anything connected with or immediately adjacent to the banks of a stream.

Roadbed - The graded portion of a highway within top and side slopes, prepared as a foundation for the pavement structure and shoulder.

Roadside - The areas between the outside edges of the shoulders and the right-of-way boundaries. Unpaved median areas between inside shoulders of divided highways and infield areas of interchanges are included.

Roadside Development - Those items necessary to the highway that provide for the preservation of landscape materials and features; the rehabilitation and protection against erosion of all areas disturbed by construction through seeding, sodding, mulching, and the placing of other ground covers; such suitable planting; and other improvements as may increase the effectiveness and enhance the appearance of the highway.

Roadway - The portion of a highway within limits of construction.

Rodding - Consolidation of a concrete mix sample by the repeated insertion of the prescribed steel tamping rod.

Roller Pass - One pass over a given location.

Root Crown - The union between a plant's roots and stem; care should be taken not to bury this union with soil when planting.

Sand Blanket - The sand that is placed to drain the underlying soft material.

Saturated Embankment - Embankment that is full of water to the point of being unstable.

Saturation - Condition of aggregate when it is completely soaked and will not absorb additional water.

Sawing - Using a circular saw to cut a groove in the surface of the pavement to control the location of transverse cracks.

Scaling - Peeling away of small amounts of the concrete surface.

Scalping - Removal of remaining roots, sod, grass, agriculture crop, sawdust, and other vegetation so that the soil is completely exposed; however, topsoil should not be removed.

Scoping - A formal coordination process conducted to assist in determining the issues to be addressed and for identifying the significant issues related to the proposed action. Scoping occurs early in the process, after the Notice of Intent (NOI) is published, and involves both agencies and the public. Scoping is an iterative process that continues throughout the study. Informal scoping can also be conducted for environmental assessments.

Scraper Plate - A device that is used to establish a location for the nuclear gauge.

Screed - A rectangular trowel on an asphalt paver used to cut off the asphalt mixture at the desired thickness, to smooth the surface and consolidate the material.

Section 106 Procedures – Derived from Section 106 of the National Historic Preservation Act of 1996 which governs the identification, evaluation, and protection of historical and archaeological resources affected by state and Federal transportation projects. Principal areas identified included required evaluations to determine the presence or absence of sites, the eligibility based on National Register of Historic Places criteria and the significance and effect of a proposed project upon such a site. The procedures require the Federal agency to consult with State and/or Tribal Historic Preservation Officers, and other consulting parties. The Federal agency must also the views of the public when evaluating effects to historic properties.

Section 4(f) – A portion of the Department of Transportation Act of 1966 which declares "that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites."

Section 404 Alternatives Analysis – A process of examining practical alternatives to the possible discharge or dredged or fill material into certain aquatic ecosystems, such as wetlands, mudflats, vegetated shallows or other special aquatic system. Required under the 1972 Clean Water Act, which established a program to regulate the discharge of dredged or fill material into waters of the United States, this analysis is performed during the NEPA phase of the project planning process. It is required to be completed before the U.S. Army Corps of Engineers will issue a permit, which is required for the project to move forward.

Segregation - The unintentional separation of the larger pieces of aggregate from the smaller pieces within one size of aggregate or within a mixture of sizes in fresh concrete or MHA.

Selective Sampling – A non-random procedure in which a sample is obtained only for informational purposes to guide Quality Control or Acceptance actions.

Self Propelled Spreading Machine - A piece of equipment that receives the base course from the truck and spreads it evenly on the subgrade.

Semi-Anadromous Fish – Fish which live in brackish water but spawn in freshwater.

Service Roads – Parallel roadways constructed on the outside of major highways to accommodate local traffic and provide access to adjacent land owners.

Settlement - The compression of a soil into a more stable condition.

Settlement - The result of negotiations based on fair market value in which the amount of just compensation is agreed upon for the purchase of real property or an interest therein. This term includes the following:

> **(1) An Administrative Settlement** is a settlement reached prior to filing a condemnation proceeding based on value related evidence, administrative consideration, or other factors approved by an authorized agency official.
> **(2) A Legal settlement** is a settlement reached by a responsible State legal representative after filing a condemnation proceeding, including stipulated settlements approved by the court in which the condemnation action had been filed.
> **(3) A Court Settlement** or court award is any decision by a court that follows a contested trial or hearing before a jury, commission, judge, or other legal entity having the authority to establish the amount of compensation for a taking under the laws of eminent domain.

Shale - Laminated material with a finely stratified structure formed by the natural 'consolidation' of a clay or silt. The material is sometimes cemented together.

Shim - A thin piece of stone, wood or other material used to raise the object resting on it to the desired elevation. (Not permitted in adjusting forms to grade.)

Shoulder - The portion of the roadway contiguous to the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses.

Shoving - The plastic deformation or displacement of HMA in the direction of traffic movement.

Shrubs - Multi-stemmed evergreen or deciduous plants with numerous side branches.

Side Drainage - Ditches that drain the embankment away from the embankment construction.

Side Slopes - Embankment slopes that are perpendicular to the roadway.

Sidewalk - The portion of the roadway primarily constructed for the use of pedestrians.

Sieve Analysis - Determination of the gradation of an aggregate sample by passing through a series of screens with specified openings and weighing the separated particle sizes.

Sight Distance - The length of roadway ahead visible to the driver.

Significant Impact - Social, environmental, or economic effects of a proposed transportation project whose intensity and context require preparation of an Environmental Impact Statement.

Significantly - A determination that effects will be significant based on their context and intensity. The CEQ regulations at (40 CFR 1508.27) list potential criteria for significant impacts, such as impacts to threatened and endangered species, historic properties, and relocations of large numbers of people.

Single Point Urban Interchange (SPUI) Or Single-Point Diamond - A newer type of diamond interchange where the diagonal ramps are instead placed as close as possible paralleling the freeway, so that ramp traffic in effect meets at a single point on the surface street directly below (or above) the freeway.

Single Stem - A plant's central leader or trunk, which gradually from root crown to top.

Slab - A continuous portion of concrete paving bounded by joints and/or the edge of the pavement.

Slip Form Paving - Concrete paving by use of a machine carrying its own forms between which low slump concrete is compacted sufficiently to retain its shape after the machine has progressed onward.

Slip Ramp - An angular connection between an expressway and a parallel (frontage) road.

Slump - Measured in inches (millimeters) on a vertical axis, the amount that a sample of fresh concrete that has filled a standard inverted cone will sink down after the cone has been removed. Slump provides a measure of the consistency and workability of concrete.

Slurry Lime - Lime mixed with water to form slurry.

Socio-Economics – The study of the relationship between economic activity and social life. A socio-economic impact is any change to this environment, positive or negative, that wholly or partially results from a transportation project or associated process. .

Soil Classification – The process of defining different types of soil by gradation and characteristics of the soil materials.

Spading -Repeatedly inserting a flat steel blade edgewise into fresh poured concrete for consolidation and to drive out entrapped air, particularly where the concrete meets the forms or embedded objects.

Spalling - The breaking away of hardened parts of concrete from the main body at surface points.

Special Provisions - Additions and revisions to the standard and Supplemental Specifications covering conditions peculiar to an individual project.

Specific Gravity - The ratio of weight of any volume of a substance to the weight of an equal volume of water.

Specification(s) – (1) The compilation of provisions and requirements to perform prescribed work; or (2) A document that states the requirements to which a product must conform (i.e. materials and construction procedures) and the procedures for measurement and payment of Work completed.

Specification Limits – The statistically based limiting values(s) placed on a Quality Characteristic which are applied with a particular Quality Measure (such as PWL) to evaluate the quality of a Lot. [Specification Limits are usually comprised of an Upper Specification Limit (USL), a Lower Specification Limit (LSL), or both. It is important to recognize that since Specification Limits are statistical limits, individual sample test results may fall beyond the USL or LSL and still be included in the Acceptance determination. The Specification Limits will ultimately be used for computation of Quality Levels (e.g. PWL), which will be used in calculating pay factors for a Lot.]

Spreader - A machine which distributes fresh concrete generally over the area between the forms.

Spreading - Moving material in preparation for compaction.

Spring Drains - A system of coarse aggregate, fabric and pipe that is designed to drain small areas of the slope.

Stabilize - To make or hold steady, and preventing fluctuations.

Standard Count – A procedure performed on a nuclear gauge to ensure that the readings are accurate.

State Highway Agency (SHA) - The State highway department, transportation department, or other State transportation agency or commission to which title 23 of the United States Code funds are apportioned. This organization may also be called a State Highway Department, State Transportation Department, or State Department of Transportation.

State Implementation Plan (SIP) – A state document that prescribes procedures for the implementation, maintenance and enforcement of primary and secondary pollutants.

Station Marker - A numeral impressed into the surface of newly finished concrete pavement and located at specified longitudinal intervals near the edge of the roadway for purposes of future location references.

Steel Wheel Roller - A roller which compacts HMA pavement with static steel drums. Types of steel wheel rollers are the three-wheel roller, tandem roller, trench roller, and vibratory roller.

Stockpile - A large amount of aggregate placed in a pile at a concrete or HMA plant for storage until ready for use. Can also mean any natural material stored for use on a project such as fill material or topsoil.

Stormwater Management (SWM) - Physical design features such as ponds or drainage swales which are incorporated into a highway project as measures to retain or direct stormwater run-off in a manner that controls discharge volumes and/or water quality, replicating the preconstruction drainage conditions.

Straight-edging - Placing a 10 foot straightedge on the finished pavement surface to determine if the surface is within tolerance.

Stream Restoration & Enhancement – The process of reconstructing a stream using techniques based on a state-of-the-art science termed Fluvial Geomorphology. This science provides tools to engineers and designers to transfer knowledge of stable and natural stream channels to stabilize or reconstruct unstable stream segments. In other words, intricate patterns and details found in nature are artificially reproduced to establish a stable stream that can support aquatic life.

Street - A general term denoting a public way for purpose of vehicular travel, including the entire area within the Right-of-Way.

Strike Off - Using a straight edge to scrape off excess concrete which may protrude above the mold or forms.

Structures - Bridges, culverts, catch basins, drop inlets, retaining walls, cribbing, manholes, endwalls, buildings, sewers, service pipes, underdrains, foundation drains, and other features that may be encountered in the work and not otherwise classed herein.

Study Area – A geographic area selected and defined at the outset of engineering or environmental evaluations, which is sufficiently adequate in size to address all pertinent project matters occurring within it.

Subbase - The layer of specified, compacted material placed on the prepared subgrade to serve as a base for pavement.

Subcontractor – A company which is responsible for field placement or installation of an individual item of work under contract to the Prime Contractor.

Subgrade - The portion of a roadbed upon which the pavement structure and shoulders are constructed.

Subgrade Compaction - The compaction of the top of the subgrade, typically 6 to 24 inches.

Sublot – A subdivision of a Lot. [A Sublot is an equal (usually) division or part of a Lot from which a sample of material is obtained in order to assess the Inspection Attributes or Quality Characteristics of the Lot. Sublots are established to ensure that samples of material obtained from the Lot are not all concentrated in one location. Sublots allow samples to be taken from within different segments (beginning, middle, end) of the Lot.]

Substructure - The part of a structure below the bearings of simple and continuous spans, skewbacks of arches, and tops of footings of rigid frames, together with backwalls and wings.

Suitable Material - Natural soil, natural granular material, granular material types, slag material, brick, shale, rock, random material, or other materials that are appropriate for use in embankment construction.

Superelevation - The difference in elevation between the inside and outside edges of a roadway on a horizontal curve.

Superintendent - The contractor's authorized representative in responsible charge of the work.

Superpave - Mix design procedure, which establishes material properties of a HMA mix by using a gyratory compactor.

Superstructure - The entire structure except the Substructure.

Supplemental Agreement - A written agreement executed by the contractor and by the SHA covering necessary alterations.

Supplemental Specifications - Detailed specifications supplemental to or superseding the Standard Specifications.

Surety - The corporation, partnership, or individual, other than the contractor, executing a bond furnished by the contractor.

Surface Street - A street that allows access by traffic signal or stop sign, or allows turns across opposing traffic.

Surface Texture - A term used to describe the appearance of the surface of a pavement such as sandy, coarse, open, dense, uniform, etc.

Surface Treatment - See the definitions for chip seal, prime coat, or tack coat.

Surge - The rise in the surface of plastic concrete following the release of compaction after the screed has passed over it.

System Linkage – Interconnection of roadway segments that comprise an overall transportation network, and a discussion of both how a proposed project fits into the existing and future transportation system , and how it contributes to develop a sound transportation network in an area or region.

Systems Planning – A methodical approach to the formation of plans and programs for safe, efficient, and balanced transportation network; involves setting goals and objectives, collecting data on existing conditions, simulating future activities, formulating alternative feasible, desirable, and appropriate action.

Tachometer - An instrument for measuring the speed of rotation or vibration.

Tack Coat - An application of asphalt material made on a pavement surface for the purpose of bonding the existing course to the overlying course.

Tamping Foot - A highly productive footed roller that has can cover 40 percent of an area with one pass. It can be used for soil, rock or shale.

Tandem Roller - A steel wheel roller with two drums mounted on tandem axles, which compacts a pavement using the force of the roller's weight.

Test Rolling - The use of a proof roller to test the stability of the subgrade prior to undercutting or stabilizing the subgrade. It is used when spot locations are detailed in the plans.

Testing Equipment - That equipment furnished to the project for conducting field tests.

Texturing - Slight roughening of the finished surface of concrete pavement to provide greater safety through increased traction to the tires of vehicles which will pass over it.

Thin-Bonded Patching - Repairing concrete pavement only to the depth of unsound concrete rather than the full depth of the pavement.

Three Wheel Roller - A steel wheel roller with three drums, two drums mounted on the rear axle and a smaller drum mounted on the front tandem axle, which compacts a pavement using the force of the roller's weight. The configuration of the drums on a three wheel roller allows it to compact longitudinal joints without interfering with traffic in the adjacent lane.

Ticket - A form that records the quality, quantity, and other pertinent information which may accompany a shipment of construction materials to the project.

Tie Bar - A deformed bar or hook-bolt placed across longitudinal joints of concrete pavement near middle depth to tie the slabs together and hold the joint closed.

Tiering - The use of broader, programmatic NEPA documents to discuss and analyze cumulative regional impacts and define policy direction, and the incorporation by reference of this material in subsequent narrower NEPA documents to avoid duplication and focus on issues "ripe for decision" in each case.

Tolerance – (1) The allowable limits of variation from a specified measurement; or (2) The permitted variation from a specified condition.

Traction Speed - The rate of forward movement parallel to the centerline by the paving equipment.

Transferable Development Rights – The sale of property development rights by landowners in non-development areas to landowners in areas designated for development. The transferred rights can be used to increase the amount of permitted development in designated development areas while preserving land in non-development areas.

Transit Oriented Development – A development pattern designed to provide proximity and convenient access to bus routes, rail stations, and nearby day-to-day services such as shops and schools through a network of interconnected streets, pedestrian walks, and bicycle paths.

Transition Section - The distance in which a change is made gradually from one pavement cross-section to another.

Transportation Control Measures (TCM) – Actions taken to implement a Travel Demand Management Program to reduce peak period travel and overall travel demand. The Clean Air Act Amendments of 1990 mandate the consideration of TCMs to reduce vehicle emissions in air quality non-attainment areas. Examples include ridesharing, increased transit use and employer-sponsored flexible work hour programs.

Transportation Demand Management (TDM) – An initiative focused on reducing the number of vehicles on a roadway by changing the behavior of motorists. TDM includes policies, programs and actions implemented to reduce peak period congestion and overall travel demand. Transportation Control Measures (TCMs) are the actual strategies used to employ TDM.

Transportation Management Associations (TMAs) – Public or private non-profit organizations that provide TDM-oriented services to employers and businesses in designated activity centers. Traditionally, TMAs have concentrated on providing TDM support services such as rideshare matching, guaranteed ride home programs and other initiatives.

Transportation Systems Management (TSM) – A transportation alternative which seeks to reduce traffic congestion without altering the existing roadway. This alternative considers options such as improvements to the mass transit system, minor intersection improvements, and traffic management TSM is considered to be a viable alternative only in urban areas.

Transverse - A theoretical line running perpendicular to the longitudinal or centerline of a roadway.

Travel Time - The average time spent by vehicles traveling along a highway segment, including the delays at intersection.

Tree Wrap – A material placed around a deciduous tree trunk to protect it from frost cracking, sunscald or insect damage.

Trip Generation - The analysis and application of the relationships that exist between land uses and travel demand.

Turning Movement Count - A manual count to determine what direction vehicles take after approaching an intersection.

Tying - Wiring together overlapped mesh that is hand-tied by use of rings similar to hog rings.

Underpass - A grade separation where one highway passes underneath an intersection highway or railroad.

Uneconomic Remnant - A remainder property which the acquiring agency has determined has little or no utility or value to the owner.

Uniform Act – A Federal law that establishes minimum standards for federally-funded programs and projects that require the acquisition of real property or displace persons from their homes, businesses, or farms. The Uniform Act's protections and assistance apply to the acquisition, rehabilitation, or demolition of real property for federal or federally funded projects. The law's official title is the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970*.

Underdrains – Longitudinal drainage pipes that drains the subgrade in support of the pavement.

Upgrade Alternative –A study alternative or a proposed action in which all proposed improvement efforts are focused within the corridor or land area of a facility that is already built. This alternative is examined and studied first, often in conjunction with a TSM Alternative, before other alignments that may be on a new location are considered.

Validation – The mathematical comparison of two independently obtained sets of data (e.g. Agency Acceptance data vs. Contractor QC data) to determine whether it can be assumed they came from the same Population.

Verification Sampling and Testing – Also called *Acceptance sampling and testing*. Sampling and testing performed by the Agency, or its Designated Agent, to measure the quality of the final product.

Vibrator - A device for pulsating fresh concrete so that entrapped air is released, and the concrete settles uniformly about reinforcement and to the forms.

Vibratory Roller - A steel wheel roller with one (single drum) or two (double drum) drums, which compacts a pavement using the combined force of weight and the vibration of the drum or drums.

Viscosity - Resistance to flow in a liquid. The higher the viscosity, the greater the resistance to flow.

Waste - Excess material removed from the project limits.

Water-Cement Ratio (W/C) - The proportion of an amount of water to the specified amount of cement used to produce concrete. Such amount of water is the sum of the calculated amount of water contained in the aggregates, plus all the water added both at the plant and at the site, less the calculated amount of water absorbed by the aggregates.

Watering - The act of adding moisture to a material for proper compaction.

Waters of the United States - Waters that are under the jurisdiction of the Corps of Engineers under the Clean Water Act as defined by 33 CFR Ch. II Part 328.

Weak Plane - An area in the embankment where the soil is weak and could slide apart.

Wearing Plate - A small plate which drags over the top of the pavement forms or adjacent paving to control the height of the screed plate.

Weave - A type of conflict where traffic veering right and traffic veering left must cross paths within a limited distance. Typically this occurs when an exit ramp closely follows an entrance ramp, between two closely spaced interchanges or two loops of a cloverleaf. Weaving introduces safety and capacity problems, and is a primary reason some older full cloverleafs are being converted to other types of interchanges. Loop ramps are either removed outright (diagonal ramps assume their traffic) or replaced by flyovers.

Wet Density - The density of wet soil that includes the weight of water and soil. It is also expressed as the total weight of the soil.

Wetland - Transitional areas between terrestrial (land) and aquatic (water) systems where the water table is usually at or near the surface or the land is covered by shallow water. Wetlands serve an important environmental function such as filtering runoff and providing high quality natural habitats.

Wetland Creation & Protection - Efforts made during the planning, design and construction of highway projects to avoid and/or minimize impacts to wetlands created by highway projects. Unavoidable wetland impacts often require wetland restoration or other mitigation.

Windrow - An accumulation of material as a result of rolling up or sliding off to the side. The term is used here to refer to loose material just inside of the forms left by the subgrader in the fine grading operation.

Workday - A calendar day that the contractor normally works.

Working Drawings - Stress sheets, shop drawings, erection plans, falsework plans, frame work plans, cofferdam plans, bending diagrams for reinforcing steel, or any other supplementary plans or similar data that the contractor is required to submit for acceptance.

Yield - A check on the mix design made by dividing the total batch weight by the determined unit weight, weight per cubic yard (weight per cubic foot). The actual volume thus obtained is compared to the design volume.

Zero Air Void Curve - A theoretical line that is used to ensure that the nuclear gauge readings are not dramatically incorrect. It plots the moisture density curve without the voids.

ACKNOWLEDGEMENTS:

Manual prepared by:

Technical Contacts:

Rob Elliott, *Team Leader*
Construction & Project Development --
Technical Service Team
61 Forsyth Street, Suite 17T26
Atlanta, GA 30303-31404
Phone: (404) 562-3941

Ken Jacoby, *Quality Engineer*
FHWA Office of Infrastructure - Asset Management
1200 New Jersey Ave., S.E. (HIAM-20)
Washington, D.C. 20590
Phone: (202) 366-6503

Joseph Jurasic*, Transportation/Construction Engineer*
FHWA Iowa Division Office
105 Sixth Street
Ames, IA 50010
Phone: (515) 233-7304

Jeff Lewis, *Proj. Management Engineer*
FHWA Resource Center
650 Capitol Mall, Suite 4-100
Sacramento, CA 95814-4708
Phone: (916) 498-5035

Daniel Montag, P.E., *Sr. Area Engineer*
FHWA DelMar Division
Delaware Office
300 S. New St., Suite 2101
Dover, DE 19904
Phone: (302) 734-1719

Editorial Review:

Stephanie Roth
Communications Specialist
FHWA Resource Center
4600 N. Fairfax Drive, Suite 800
Arlington, VA 22203
Phone: (703) 235-0520

Editorial/Graphic Production:

Deborah Vocke
Marketing Specialist
FHWA Resource Center
10 S. Howard Street, Suite 4000
Baltimore, MD 21201
Phone: (410) 962-3744

U.S. Department
of Transportation

**Federal Highway
Administration**

FHWA PUB. NO. FHWA-HIF-10-0001

U.S. Department of Transportation
Federal Highway Administration

Federal Highway Administration

Risk Management Process

User Manual

January 2012

This page was intentionally left blank.

RISK MANAGEMENT PROCESS USER MANUAL CONTENTS

How to update, revise, or put together your risk management plan

(Revised January 2012)

Risk Management Process User Manual Contents iii
Purpose 1
Background 2
How to Use this Guide 3
Communication and Consultation 4
Identify the Context 6
Risk Assessment - Identify the Risks 9
Risk Assessment - Risk Analysis 12
Risk Assessment - Evaluate and Prioritize 14
Risk Response 16
Monitoring, Evaluate, and Adjust 18
Appendix 20

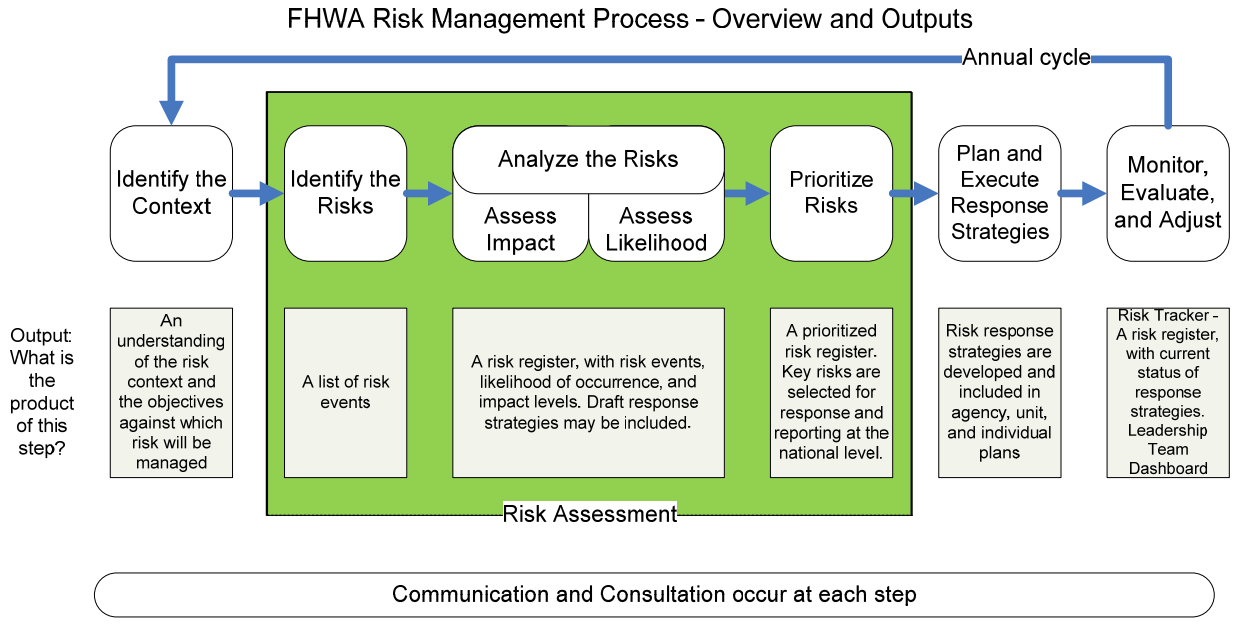
PURPOSE

This user manual gives brief instruction, explanation, and corporate perspective on the risk management process. This user manual will walk you through the steps to create or update a unit risk management plan. It is part of a toolkit that includes assessment and analysis tools, and the risk response tracking system.

The risk management process should be

- an integral part of management,
- embedded in the culture and practices, and
- tailored to the business processes of the organization.

It comprises the activities of communication and consultation, establishing the context, risk assessment (risk identification, analysis, and prioritization), risk response, and monitoring and review.



BACKGROUND

FHWA risk management is a tool for focusing limited resources to efficiently manage our programs and advance our strategic objectives. The goal of risk management within FHWA is to provide reasonable assurance that we understand the risks associated with achieving our agency's objectives and that we are responding appropriately.

The international definition of risk is "*the effect of uncertainty on objectives."* In FHWA we define risk as *"a future event that may or may not occur and has a direct impact on the program, stewardship or organizational objectives, to their benefit or detriment*." By identifying these events, their likelihood of occurrence and the impact they would have, FHWA can assess and prioritize those impacts and likelihoods; and determine and prioritize strategies to respond to them.

The objective of FHWA's risk management initiative is to establish a consistent process where we identify and prioritize program area risk events. Applying the principles of risk makes it possible to identify threats and opportunities; assess and prioritize those threats and opportunities; and determine and prioritize strategies so that we can decide how to address future issues affecting the Federal-aid and Federal Lands Highway Programs and national objectives. In FHWA, risk management is a way to:

- **Focus limited resources** – focus staff and budget resources to maximize opportunities and minimize events that threaten FHWA programs and national objectives.
- **Strengthen the ability to efficiently manage program delivery** – make informed decisions about the scope, approach, and intensity of our efforts.
- **Improve communication and manage risk corporately** – communicate consistently to leadership about what the Agency should focus on and why.

FHWA's June 22, 2001 policy required each office to use a risk/benefit analysis or a similar prioritization process to identify the appropriate oversight initiatives. The OIG reviewed FHWA's risk analysis and in November 2004 stated that risk assessments should be used to prioritize and implement our oversight activities. In May 2006, the FHWA Office of Infrastructure issued guidance and a schedule for the first agency-wide corporate Risk Management Initiative. This was followed by a risk management data base and user guide in 2007. In 2009 a corporate risk assessment team was formed and a corporate risk approach was developed. In early 2009 FHWA used its risk management process to identify and respond to risks associated with delivering the $27.5 billion Recovery Act program. Also in 2009, the Government Accountability Office found that FHWA had improved its risk management approach and recommended that FHWA enhance its risk management tracking activities. In 2009 and 2010, FHWA headquarters offices were required to conduct risk assessments for the first time. In 2011 FHWA participated in an international scan of risk management practice, all FHWA units completed an internal control risk profile and used the new "risk tracker" application to roll up and track unit risks and their response strategies. This user manual is the latest effort in FHWA's continuous improvement of its risk management framework. It combines the approaches, tools, and lessons learned over ten years of agency practice with current industry state of the practice.

HOW TO USE THIS GUIDE

This user manual is organized by the steps in the risk management process. The chart below summarizes each step, the question that step is answering, what tools and techniques to use in that step, and the output from each step.

FHWA Risk Management Process – Overview, Questions, Tools, and Outputs

Steps: What do I do?	Tools and Techniques: What are the questions and what tools do I use to answer them?		Output: What is the product of this step?
Communication and Consultation occur at each step	Who needs to be involved? How will we communicate and consult with them?	FMFIA Risk Profile, Stewardship Agreement	Meetings, verbal or written reports, surveys, teams, leadership activities
Identify the Context	What program or other objective areas will we assess? What are the things to consider when we assess them? What criteria will we use to assess our risks? Who will do the assessment?	FMFIA Risk Profile Program Areas Strategic Plan (SIP) Unit Plan, Program Delivery Improvement Tool (PDIT), Core Elements	An understanding of the risk context and the objectives against which risk will be managed
Identify the Risks	What events could happen that would affective my program areas or objectives? What are the corresponding impacts? What are my If...then… statements?	Brainstorming Strengths, Weaknesses, Opportunities and Threats (SWOT) Subject matter experts Surveys	A list of risk statements
Analyze the Risks Assess Impact	What is the severity of this impact according to my criteria?	Impact Criteria Matrix (Impact Tools)	A risk register, with risk events, likelihood of occurrence, and impact levels. Draft response strategies may be included.
Assess Likelihood	What is the likelihood that this risk event will occur?	Likelihood Criteria Matrix (Likelihood Tools)	
Prioritize Risks	What is the expected value of each risk statement? How do the risks compare? Which risks does leadership consider the “key risks?” Which risks will require a response?	Expected Value Rank Order Risk Tolerance Leadership Validation Consultation	A prioritized risk register. Key risks are selected for response and reporting at the national level.
Plan and Execute Risk Response Strategies	What actions will we take to mitigate, avoid, accept, transfer, or enhance our risks? What actions are important to take now? Who is accountable, when will they start, and when will it be done?	Response Context Corporate, Unit, and Individual Performance Plans	Risk response strategies are developed and included in agency, unit, and individual plans
Monitor, evaluate, and adjust	What is the status of our response actions? Are they completed, in progress, not started, or has the action been deferred? Did the action have the desired effect? What is the residual risk and how should we respond?	Risk Tracker Roll up, Dashboards, Monitoring, Response level	Risk Tracker - A risk register, with current status of response strategies. Leadership Team Dashboard

COMMUNICATION AND CONSULTATION

OVERVIEW

Communication and consultation is the continual and iterative process to provide, share or obtain information and engage in dialogue with stakeholders and others regarding the management of risk. The information can relate to the existence, nature, form, likelihood, severity, evaluation, acceptability, response strategies or other aspects of the management of risk. Consultation is a two-way process of informed communication between an organization and its stakeholders or others on an issue prior to making a decision or determining a direction on a particular issue. Consultation is an input to decision making, not joint decision making.

Communication and consultation with internal and external stakeholders should take place during all steps of the risk management process.

Early in the process you should consider your approach for effective communication and consultation. Your approach should address issues relating to the risks themselves, their sources, impacts, and the strategies being taken to respond to them. Effective external and internal communication and consultation means that those accountable for implementing the risk management process and stakeholders understand the basis on which decisions are made, and the reasons why particular actions are required.

Communication and consultation with stakeholders is important as they make judgments about risk based on their perceptions of risk. These perceptions can vary due to differences in values, needs, assumptions, concepts and concerns of stakeholders. Since their views can have a significant impact on the decisions made, the stakeholders' perceptions should be identified, recorded, and taken into account in the decision making process.

Communication and consultation should facilitate truthful, relevant, accurate and understandable exchanges of information, taking into account confidential and personal integrity aspects.

DESIRED OUTCOMES

Consulting with stakeholders may:

- help establish the context;
- ensure that the interests of stakeholders are understood and considered;
- help ensure that risks are adequately identified;
- bring different areas of expertise together for analyzing risks;
- ensure that different views are appropriately considered when defining risk criteria and in evaluating and prioritizing risks;
- secure endorsement and support for risk response strategies;
- enhance appropriate change management during the risk management process.

COMMUNICATION AND CONSULTATION

IN THIS STEP

Communicate and consult with stakeholders as needed throughout the risk management process and cycle.

KEY QUESTIONS

Who needs to be involved? How will we communicate and consult with them?

HOW TO DO IT

Identify your stakeholders. Ask who can affect, be affected by, or perceive themselves to be affected by a decision or activity. For FHWA, stakeholders can be organizational leaders, Congress, state departments of transportation, tribes, other federal agencies, regional or metropolitan planning organizations, other local public entities, environmental or civic groups, or individuals. Stakeholders can be internal or external to the organization. Consider the desired outputs of communication and consultation, and decide where in your risk process to engage stakeholders.

TOOLS AND TECHNIQUES

Communication and consultation involves the activities below when used to identify context, and assess, respond or monitor risks. These activities may occur throughout the risk cycle:

- formal and informal meetings with internal and external stakeholders;
- verbal or written reports, surveys, or emails;
- teams that address specific risks, programs, or objectives;
- leadership activities

Use your stewardship agreement, program areas, strategic implementation plan and unit performance plans to consider who can affect, be affected by, or perceive themselves to be affected by a decision or activity regarding a specific program area or objective.

For assessable units, use the FHWA Federal Managers Financial Integrity Act (FMFIA) unit risk profile to identify and document stakeholders. Stakeholders are identified and documented in the sections on organizational structure, management roles and responsibilities, operating and support locations, customers, business processes owners (under major business activities), and service level agreements.

EXAMPLES

A team leader wants to identify risks for the upcoming performance year. She identifies her State counterpart as a stakeholder in several program or objective areas. She holds a joint meeting to identify the risk events and consider the impacts and likelihoods of different risk events.

A Division office has assessed several risks as having a high likelihood and impacts; they hold a meeting to consult with their state on proposed response strategies.

An office is monitoring the implementation of risk response strategies that were included in the unit plan. At the end of the year, they develop an internal report to communicate the status of those actions.

IDENTIFY THE CONTEXT

IN THIS STEP

You will get organized and determine how you will approach risk management and what information you will need. This is where you will think about objectives, internal and external context and establish the criteria for managing risk.

KEY QUESTIONS

What program or other objective areas will we assess? What are the things to consider when we assess them? What criteria will we use to assess our risks? Who will do the assessment?

WHAT IS YOUR SCOPE FOR RISKS? WHAT PROGRAM OR OTHER OBJECTIVE AREAS WILL WE ASSESS?

Consider the risks involved in achieving each of your organizational objectives.

- the unit or national performance objectives in the Strategic Implementation Plan (if these are too broad, use the initiatives or activities);
- the program areas of your office (i.e., Environment, Planning, Right-of-way, Design, System Preservation, Construction, Safety, Operations, Civil Rights, and Finance). If these program areas are too broad, use functional areas (core elements or PDIT areas).

WHAT INFORMATION WILL YOU NEED? WHAT ARE THE THINGS TO CONSIDER WHEN WE ASSESS OUR RISKS?

Whatever information you use to help make decisions will also be useful for establishing your risk context.

Consider the external, internal, and risk management context. The external context is the external environment in which the FHWA seeks to achieve its objectives. It includes but is not limited to the public (public perception, trust and confidence), political, legal, regulatory, financial, technological, economic, and natural environment, whether international, national, regional or local; key drivers and trends having impact on the objectives of the organization; and relationships with, perceptions and values of external stakeholders. The internal context is the internal environment in which the organization seeks to achieve its objectives. It is anything within the organization that can influence the way in which an organization will manage risk. This can include, but is not limited to:

- office structure, delegation of authority, governance, roles and responsibilities;
- policies, program and organizational goals and objectives, performance metrics, and the strategies that are in place to achieve them;
- organizational capacity, understood in terms of resources and knowledge (e.g. funds, assets, time, people, processes, systems and technologies);
- the relationships with and perceptions and values of internal stakeholders and the organization's culture;
- information systems, communication flows and decision making processes (both formal and informal);
- standards, guidelines and models adopted by the organization; and

- form and extent of contractual and regulatory relationships.

The risk management context also includes whether this is a reassessment, a comprehensive (detailed) assessment, or a new identification. Are you reassessing previously identified risks or identifying emergent risks?

If you have done a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis, it will be helpful in that the opportunities and threats look toward the future and can be reused in your risk management.

WHAT CRITERIA WILL WE USE TO ASSESS OUR RISKS?
Define the criteria to be used to evaluate the significance of risk. The criteria should reflect the organization's values, objectives and resources.

FHWA has adopted a tool that defines criteria of likelihood and impact. The tool includes a scale for evaluating impacts (minor, moderate, major, catastrophic) and likelihood (possible, unlikely, likely, almost certain). This tool should be used along with communication and consultation to assess the level at which risk requires a response and the level of that response.

The impact criteria in the tool are Financial; Reputation; Business Operations; Legal and Compliance; Infrastructure Assets; Resources and Effort Required; Environment and Culture; Safety.

The likelihood criteria in the tool are Staffing (Levels & Experience); Operational Procedures; Guidance; Problem History; New Program, Phase or Component; Complexity; Outside Control; Potential for Waste, Fraud and Abuse; Work Force Development and Training; FHWA Involvement; Consultant Use.

A unit's top 5-10 risks are considered key risks. These are rolled up nationally to provide corporate visibility for communications, monitoring, and review.

WHAT APPROACH WILL YOU CHOOSE? WHO WILL DO THE ASSESSMENT?
How you approach this process will affect the results and the time required to perform the analysis.

- A multi-disciplinary team provides a more complete perspective but requires time and facilitation.
- Relying on your subject matter expert may be quicker but doesn't always consider crosscutting threats and opportunities.
- Communication and consultation with State and partner agency counterparts, or other stakeholders provides mutual understanding and verification — do you want them to help you brainstorm, or provide verification of your risks?

TOOLS
FMFIA Risk Profile. For assessable units, use the FMFIA unit risk profile to identify and document internal and external context. Most of the items listed above are identified or included as part of the profile.

Use a list of program areas, subprogram areas (core elements), and national performance objectives. Use the tool that shows the crosswalk between the areas.

Use the FHWA tool attached to this guide to define criteria for likelihood and impact. The tool includes a scale for evaluating impacts (insignificant, minor, moderate, major, catastrophic) and likelihood (possible, unlikely, likely, almost certain).

Other information needed to provide context can include: Objectives and goals, the current FHWA strategic plan, the strategic implementation plan, previous risk assessments, unit plan, FMFIA profile, FIRE plans, stewardship and oversight agreements.

EXAMPLE

The final SIP has been released. You identify national performance objectives and national initiatives that will be developed into unit objectives. Each unit objective is assigned to a team or individual who will assess the risks to those objectives. To properly identify and assess the risk, they consider the external context, including the State's fiscal and political environment, the internal context, including unit resources and stewardship responsibilities and consult with stakeholders.

RISK ASSESSMENT - IDENTIFY THE RISKS

OVERVIEW

Identify sources of risk, areas of impacts, events (including changes in circumstances) and their causes and their potential consequences. The aim of this step is to generate a comprehensive list of risks based on those events that might create, enhance, prevent, degrade, accelerate or delay the achievement of objectives. Comprehensive identification is critical, because a risk that is not identified at this stage will not be included in further analysis.

Identification should include risks whether or not their source is under the control of the organization. Risk identification should include consideration of the secondary and cumulative effects of particular impacts. It should also consider a wide range of impacts even if the risk source or cause may not be apparent. As well as identifying what might happen, it is necessary to consider possible causes and scenarios that show what impacts can occur. All significant causes and consequences should be considered.

Relevant and up-to-date information is important in identifying risks. This should include appropriate background information where possible. People with appropriate knowledge should be involved in identifying risks.

IN THIS STEP

You will generate a list of the risks to your programs and objectives. Risk management is an art more than a science. This step is the art of turning threats and opportunities into risk statements. This is a way of verbalizing what it is you are making decisions about and why.

KEY QUESTIONS

What events could happen that would affective my program areas or objectives? What are the corresponding impacts? What are my "If...then…" statements?

DEFINITION

The international definition of risk is "*the effect of uncertainty on objectives*." In FHWA we define risk as a *future event that may or may not occur and has a direct impact on the program, stewardship or organizational objectives, to their benefit or detriment*.

Events are the things that happen sometime in the future that will trigger your opportunity or threat.

A risk is a threat if the effect is a detriment to your ability to deliver the Federal-aid or Federal Lands highway programs or achieve an objective.

A risk is an opportunity if it offers a benefit to your ability to deliver the Federal-aid or Federal Lands highway programs or achieve an objective

DO YOU ALREADY HAVE A RISK MANAGEMENT PLAN?

Are you reassessing an existing risk management plan or creating a new one? If your risk is about a current issue or weakness, what event may happen tomorrow or next week that will trigger the weakness? If you are updating a plan, add any new risks that will be affecting the program or the objective.

THE RISK STATEMENT

- Think of the future threats and opportunities to the work you do in delivering the Federal-aid or Federal Lands highway programs or achieving an objective.
- What events may occur that will trigger your threats and opportunities?
- How will that event affect your delivery of the Federal-aid or Federal Lands highway programs or ability to achieve an objective?

Document these in this form:

- If the YOUR EVENT happens...
- …then DESCRIBE THE EFFECT TO YOU AND YOUR ABILITY to carry out (if necessary, describe the particular function/element) the Federal-aid or Federal Lands highway program or objective.

One event may have several effects. You can reuse the "If... happens..." part of the statement with a description of different opportunities or threats

AT THE CORPORATE LEVEL

Consistently identifying and stating risks makes it possible to roll them up and see across the agency what common events are anticipated, the opportunities and threats those events trigger, and how those events may affect our delivery of the Federal-aid or Federal Lands highway programs and achievement of objectives.

USING THE RISK TRACKER

The risk tracker is an FHWA risk register application that allows units to track risks and their response strategies. It also provides for consistent categorization or and national roll up of unit top risks.

Create a new risk if needed. In the field “Risk Event (If…)”, type in your event statement. Then in the field “Risk Impact (Then…)”, type its effect. Use the format stated above.

EXAMPLE RISK STATEMENTS

IF a schedule to better distribute the obligation rate throughout the fiscal year is not developed and followed, THEN the last quarter workload could be unmanageable and potentially affect project quality

IF adequate federal oversight is not provided for the expenditure of ARRA funds, THEN there is a potential for improper payment and reimbursement of ineligible costs.

IF projects are not constructed in compliance with regulation on runoff water quality, THEN a non-DOT state agency will assess fines and/or stop construction.

IF local governments, including those within MPO Areas, fail to coordinate with the State DOT and, proceed too far in project development, such as purchasing right of way and announcing local decisions prematurely prior to NEPA or an FHWA NEPA decision, THEN predetermined project schedules may be unrealistic resulting in perceived project delays and waste related to additional time and money.

IF any NBIP metrics are found to be in non-compliance, THEN there may be a threat of infrastructure failure and public danger.

IF Major Projects are not properly identified and managed; THEN, projects are less likely to stay within the defined project Scope, Schedule and Budget.

IF the State DOT does not perform adequate quality assurance (QA) regarding PS&E, construction, and materials acceptance, THEN project design, quality, and workmanship could result in reduced durability and safety issues.

RISK ASSESSMENT - RISK ANALYSIS

OVERVIEW

Risk analysis involves developing an understanding of the risk. Risk analysis provides an input to risk evaluation and to decisions on where to respond, and on the most appropriate risk response strategies and methods. Risk analysis can also provide an input into making decisions where choices must be made and the options involve different types and levels of risk.

Risk analysis involves consideration of the causes and sources of risk, their positive and negative impacts, and the likelihood that those impacts can occur. Factors that affect impacts and likelihood should be identified. Risk is analyzed by determining impacts and their likelihood, and other attributes of the risk. An event can have multiple impacts and can affect multiple objectives. Existing management controls and their effectiveness and efficiency should also be taken into account. The confidence in determining the level of risk should be considered in the analysis, and communicated effectively to decision makers and, as appropriate, other stakeholders. Factors such as divergence of opinion among experts, uncertainty, availability, quality, quantity and ongoing relevance of information, or limitations on modeling should be stated and can be highlighted.

Risk analysis can be undertaken with varying degrees of detail, depending on the risk, the purpose of the analysis, and the information, data and resources available. Analysis can be qualitative, semi-quantitative or quantitative, or a combination of these, depending on the circumstances.

Impacts and likelihood are expressed using a range of potential impacts and a range of likelihood.

IN THIS STEP

You will assess your risks based on the likelihood of the event happening, and the impact of threat or opportunity being triggered. Assessing your risks gives you a way to understand them better and to sort your risks based on a consistent expected value. The “expected value” is the product of numerical values assigned to likelihood and impact assessments.

KEY QUESTIONS

What is the severity of this impact according to my criteria? What is the likelihood that this risk event will occur?

ASSESSMENT

We are assessing programmatic or performance objective risks so your likelihood and impact values may be based on collaboration and/or subject matter expertise —making an informed assessment. Likelihood and impact assessments are estimates and are different from project-based risk assessment. Project based risk relies on criteria that can quantify cost, schedule, and even scope.

IMPACT ASSESSMENT

Estimate the level of impact based on what will happen if the event occurs. Make the assessment based on data with a future projection or based on expert or a group’s knowledge and opinion of the risk being assessed. Use the risk impact criteria to inform your assessment.

The impact step is used to gauge how large the impact will be. Is there a threat to human life? Is there a threat to fraud waste and abuse? Is there a threat to fulfilling stewardship and oversight? Is there an opportunity to fully deliver the program? Is there an opportunity for technology implementation? Is there an opportunity to meet strategic goals?

Use the impact estimate scale insignificant, minor, moderate, severe, catastrophic for all of your risks. Document your impact estimate.

LIKELIHOOD ASSESSMENT

Estimate the likelihood of risk events based on data when available with a future projection OR based on an expert's or a group's knowledge and opinion of the risk being assessed. Certain conditions may increase or decrease the likelihood of a risk event and an impact. Use the risk likelihood criteria to inform your assessment.

The likelihood step is used to gauge how likely an event is to occur. For example, events that may happen every day have a far higher likelihood than events that may only happen once in 10 years.

Use the likelihood estimate scale of unlikely, possible, probable, and almost certain for all of your risks. Document your likelihood estimate.

ALREADY HAVE A RISK PLAN?

In cases where risk is currently identified in your risk management plan, consider how the impact and likelihood have changed given your response activities over the past year. Some risk may remain. This is your residual risk.

EXPECTED VALUE

Calculate your "expected value" by multiplying values for likelihood by the values for impact. This expected value gives you a way to sort your risks.

USING THE RISK TRACKER

For the risk you have identified, in the field "**Likelihood**", select the appropriate likelihood (Unlikely; Possible; Likely; Almost Certain). In the field "**Impact**", select the appropriate impact (Minor; Moderate; Major; Catastrophic).

AT A CORPORATE LEVEL:

We see similar events identified and assessed across the Agency. As we compile consecutive risk plans, we can look to see if likelihoods or impacts are changing for these events. We look for frequency of events within a State or across States. We read through the statements for qualitative and contextual analysis for how our programs and strategic objectives are affected.

EXAMPLE RISK ASSESSMENTS

Consider the risk statement, "IF the State DOT does not perform adequate quality assurance (QA) regarding PS&E, construction, and materials acceptance, THEN project design, quality, and workmanship could result in reduced durability and safety issues." Considering your unit context, compare this risk statement to range of possible impacts and make an assessment of the level of impact. Then compare this risk and impact to the range of likelihood statements. Make an assessment of the likelihood of this risk and impact occurring.

RISK ASSESSMENT - EVALUATE AND PRIORITIZE

OVERVIEW

The purpose of risk evaluation is to assist in making decisions, based on the outcomes of risk analysis, about which risks require response and the priority for implementation of that response. Your risks, their priorities, and the corresponding responses are important inputs to your annual unit planning, your program of oversight, and leadership dashboards.

Risk evaluation involves comparing the level of risk found during the analysis process with risk criteria established when the context was considered. Based on this comparison, the need for treatment can be considered.

Decisions should take account of the wider context of the risk and include consideration of the tolerance of the risks stakeholder outside the organization. Decisions should be made in accordance with legal, regulatory and other requirements.

Risk evaluation can also lead to a decision to conduct further analysis or a decision not to treat the risk in any way other than maintaining existing controls. This decision will be influenced by the your risk attitude and the risk criteria that have been established.

IN THIS STEP

Look at how your risks fall out in expected value and then select the priority risks for your office and the State. This will give you a list of your risks by relative importance, and gives you a priority ranking. Decide which represent your key issues (top risks). If risks are key issues to the future of your office, choose them as a priority even though they may include limited or no action.

KEY QUESTIONS

What is the expected value of each risk statement? How do the risks compare? Which risks does leadership consider the “top risks?” Which risks will require a response?

DEFINITION

Creating a priority ranking communicates what are the most important issues on which you are making decisions. Not all of your priority risks will require actions. So, your prioritization shows which risks are the most important OR which risks have response strategies you want to make a priority. This is an effective tool for communicating about decisions facing us in delivery of the Federal-aid or Federal Lands highway programs and achieving organizational objectives.

PRIORITIZE

Use the "expected value" (multiplying values for likelihood by the values for impact) to sort your risks. Have leadership or a collaborative group give a priority ranking to risks based on their expected value (likelihood times impact), OR how successful their associated strategy will be for the risk.

Opportunity risks may have a low expected value yet are a priority for the office because they offer opportunities where your response strategy will have the greatest benefit.

Offices may decide to add weighting factors to all risks for a particular program area or objective because it is an office priority**.**

An example of the above may be a bridge initiative, which may have a lower expected value yet may be a focus for your office and therefore rise in priority.

COLLABORATE

Have your stakeholders involved in prioritizing and/or verifying the priorities that you create.

LEADERSHIP VALIDATION

Ask your office leadership to review the priorities and rank them in priority order. Your office leadership can provide a systems perspective giving them the ability to normalize across program and performance areas. The environment which you work may change, the conditions affecting your success may change, and your strengths and weaknesses may have affected what are your priorities.

AT THE CORPORATE LEVEL

Your risks have relative importance within your own unit. At a national level, we do not compare division priorities one against another. We look for where there is a frequency of priorities for a particular program, objective, type of risk. We collect your top 5 to 10 risks and use them to improve communication and manage risk corporately by communicating consistently to leadership about what the agency should focus on and why.

USING THE RISK TRACKER

For the risks you have identified, in the field "**Order of Priority**", enter a number to indicate the prioritization of your top risks. Use the number "1" to represent your top priority risk, number "2" is your second highest risk, and so on. Your top 5-10 risks should be "rolled up" to the corporate risk register. This ranking made by leadership will be reflected in the reports along with the likelihood and impact.

RISK RESPONSE

OVERVIEW

Risk response is the FHWA approach to treating risk. It involves selecting one or more strategies for modifying risks, prioritizing, and implementing those strategies. Risk response involves a cyclical process of:

- assessing a risk response;
- deciding whether residual risk levels are tolerable;
- if not tolerable, generating a new risk response; and
- assessing the effectiveness of that response.

Selecting the most appropriate risk response strategy involves balancing the costs and efforts of implementation against the benefits derived. Decisions should consider where active response is not appropriate or justifiable on economic grounds, e.g. catastrophic (high negative impact) but rare (low likelihood) risks.

A number of response strategies can be considered and applied either individually or in combination. The organization can normally benefit from the adoption of a combination of responses.

When selecting risk response strategies, consider the values and perceptions of stakeholders and the most appropriate ways to communicate with them. Where a given response can have an impact on risk elsewhere in the organization or with stakeholders, they should be involved in the decision. Though equally effective, some risk response strategies can be more acceptable to some stakeholders than to others.

IN THIS STEP

You will decide what new strategies you may undertake, what business as usual strategies are acceptable, and if there are some strategies that make it possible to trim the level of effort required on programs with lower risk. Your risk response strategies will help you identify actions and priorities to be included in the office work plan and individual work plans

KEY QUESTIONS

What actions will we take to mitigate, avoid, accept, transfer, or enhance our risks? What actions are important to take now? Who is accountable, when will they start, and when will it be done?

DEFINITIONS

Response strategies are the decisions we are making and actions we will take to deal with the risk. Response strategies should be identified and then categorized and prioritized. The different categories of response are:

- AVOID the risk by deciding not to start or continue with the activity that gives rise to the risk (i.e., not taking on a major project);
- ENHANCE or increasing the risk in order to pursue an opportunity;
- MITIGATE by removing the risk source; changing the likelihood; or

changing the impact; for example changing practices and procedures in response to the risk (i.e., initiating a new crash data collection system for input to the HSIP).

- TRANSFER sharing the risk with another party or having another office take responsibility for the program (i.e. warranties, public private partnerships, or NHTSA with the 402 program);
- ACCEPT the risk by informed decision that your business as usual will be sufficient for dealing with a risk OR that if your risk does occur you will have a contingency plan for dealing with the consequences (i.e., accepting the existence of roadside advertisements not in accordance with highway beautification act but being prepared to stop the creation of additional signs).

Document which of the response strategies you will take, what you will do to implement the strategy, and when you will take the action. Avoiding and Transferring may require little effort but document what you will do to make the avoidance and transfers happen. Mitigating and Enhancing strategies usually require activities such as technical assistance, training, strengthening partnerships, monitoring, tracking, or conducting a review. Are these actions that are or can be put in your unit plan?

USING THE RISK TRACKER

For the risk you have identified, create a risk response. In the field “Response Strategy Type”, select the dropdown to indicate the strategy type (Accept; Avoid; Enhance, Mitigate, Transfer). In the field “**Response Strategy,”** enter a narrative description of the actions you will undertake, along with the name of the FHWA person assigned to lead or implement the strategy, a start date and target date for completion, and the status.

MONITORING, EVALUATE, AND ADJUST

OVERVIEW

Monitoring and review should be periodic and involve regular checking or surveillance. Each unit should monitor and review their risks to:

- ensure that controls are effective and efficient in both design and operation;
- obtain further information to improve risk assessment;
- analyze and learn lessons from events (including near-misses), changes, trends, successes and failures;
- detect changes in the external and internal context, including changes to risk criteria and the risk itself which can require revision of risk treatments and priorities; and
- identify emerging risks.

Progress in implementing risk response strategies provides a performance measure. The results can be incorporated into the organization's overall performance management, measurement and external and internal reporting activities.

IN THIS STEP

Follow up and measure the strategies you put in place. Did your strategies change your risk in terms of likelihood and/or impact? This step is for use in your office as a performance indicator. This step is part of how you update your risk management plan.

KEY QUESTIONS

What is the status of our response actions? Are they completed, in progress, not started, or has the action been deferred? Did the action have the desired effect? What is the residual risk and how should we respond?

DEFINITION

Monitoring your strategies and reassessing your risks will show how your risk response strategies and actions have been effective. It is a way of annually updating your unit plan and your risk management plan.

TRACK OR MONITOR

Use a system for tracking the status of risks and their response strategies. Check to see actions and work of the office get completed.

Do you already have a plan?

On a Quarterly basis look at your planned response strategies. Have they been started, are they on schedule or completed, have they been deferred or cancelled?

On a yearly basis read through your risk statements. Do they need tweaking? Are there new risks in the program areas? If so edit and add.

Reassess your likelihood and impact. Did the likelihood and impact value for each risk stay the same? If they changed as a result of actions your office has taken, use this as a performance indicator.

AT THE CORPORATE LEVEL

Seeing if events change likelihood or impact provides a general perspective. This helps communicate about changes in risks and successes in response strategies. One of the primary goals of the risk management initiative is to communicate more globally about our programmatic decisions.

USING THE RISK TRACKER

Risks are entered by year, so if you reassess a risk, enter it in the new year with the updated likelihood and impact. You can then compare like risks year to year. Quarterly, update the status of your planned response strategies. Have they been started, are they on schedule or completed, have they been deferred or cancelled?

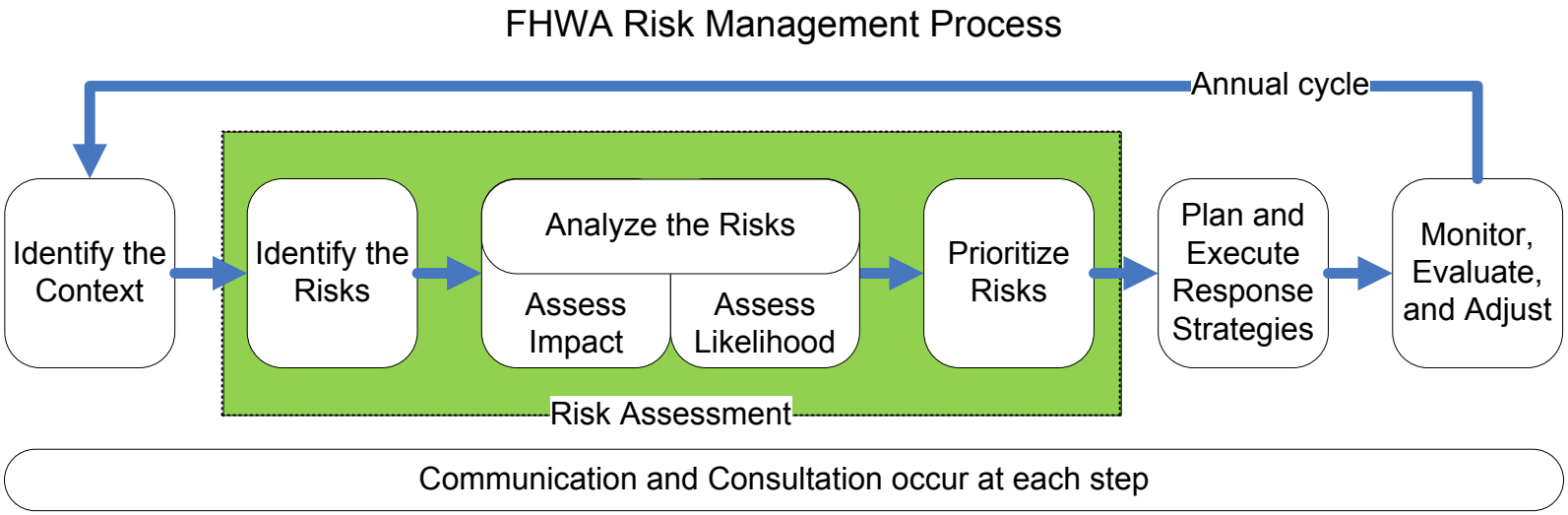
EXAMPLE

In 2010, you evaluated your top risk as "If the scour evaluation process is not fully implemented, then bridges at risk may not be closed due to a lack of information" with a likelihood of possible and impact of catastrophic. You established a strategy to mitigate the risk event by requiring a corrective action plan & monitoring compliance with the plan. In 2011 you reassessed the likelihood and impact and determined that your strategy was successful, and the threat had receded. This risk was no longer among your top risks.

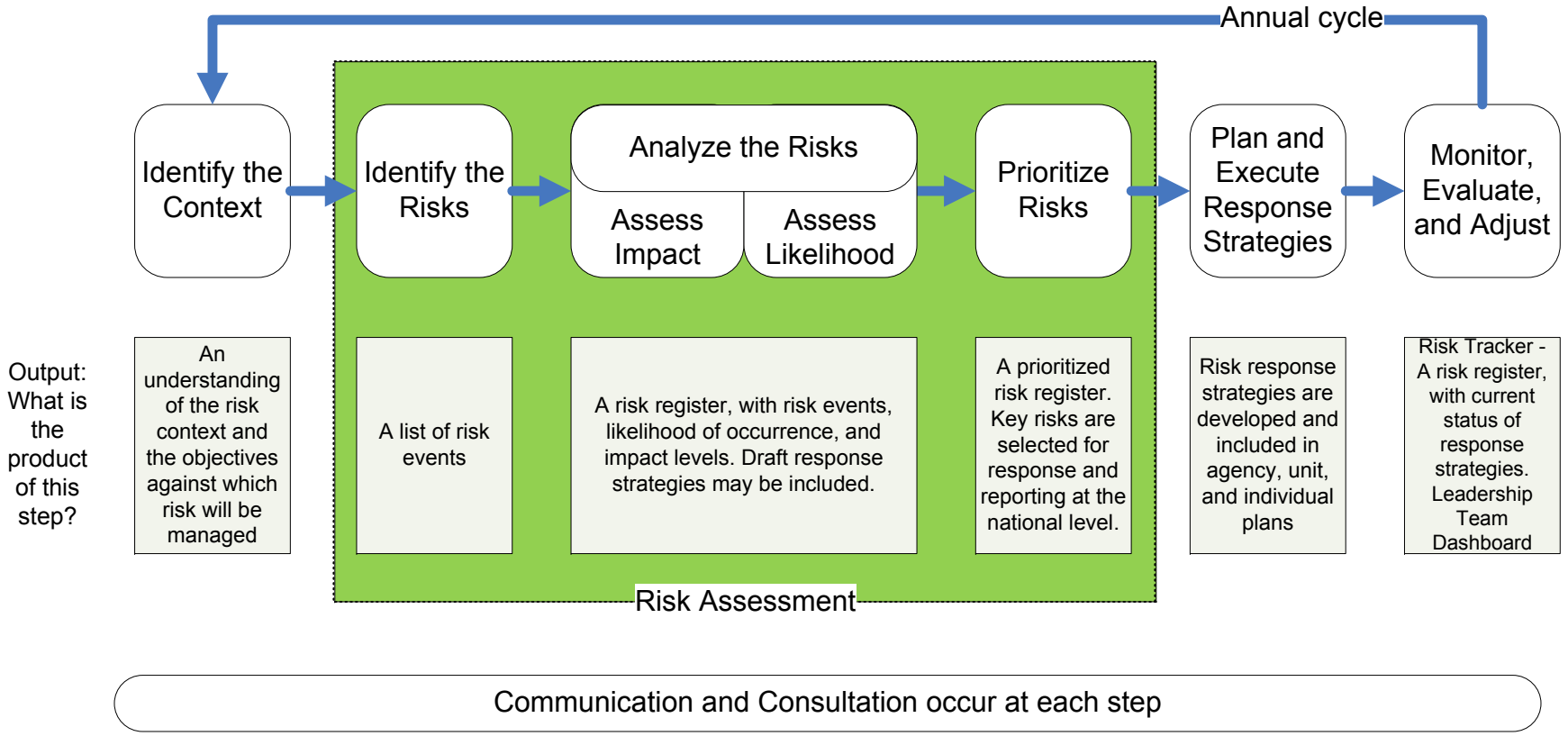
In 2010, you identified an opportunity risk "If EDC initiatives are promoted and implemented, then projects are delivered sooner and goals of the Fed-aid program will also be realized sooner." You assessed this as a top ten (number 7) risk and identified strategies to respond to it. In 2011, you reassessed the likelihood and impact and determined that your strategy was successful, but the opportunity remained high. You reassessed this risk as a high priority top ten (number 4) and identified new strategies for this year to respond to it.

APPENDIX

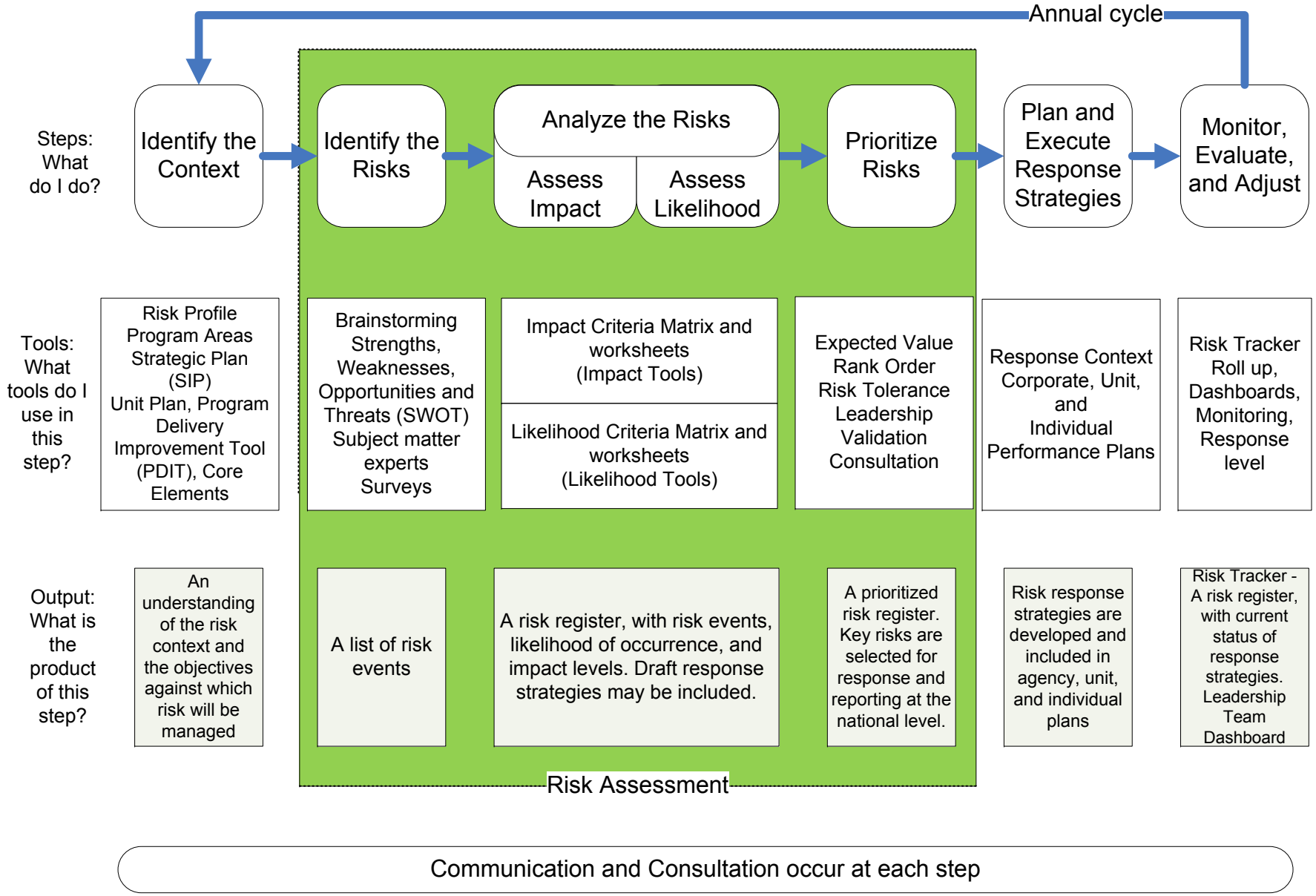
A. Risk Management Diagrams – Annual Cycle, Steps and Outputs, Process Questions and Tools (copy of diagram on page 3)
B. Impact Criteria Matrix
C. Likelihood Criteria Matrix
D. Heat Map
E. Response Context
F. Process examples. Safety, Operations, Performance and Asset Management
G. Glossary


FHWA Risk Management Process
Annual cycle
Identify the Context
Identify the Risks
Analyze the Risks
Assess Impact
Assess Likelihood
Prioritize Risks
Plan and Execute Response Strategies
Monitor, Evaluate, and Adjust
Risk Assessment
Communication and Consultation occur at each step

FHWA Risk Management Process - Overview and Outputs



FHWA Risk Management Process – Overview, Tools, and Outputs



FHWA Risk Management Process – Overview, Questions, Tools, and Outputs

Steps: What do I do?	Tools and Techniques: What are the questions and what tools do I use to answer them?		Output: What is the product of this step?
Communication and Consultation occur at each step	Who needs to be involved? How will we communicate and consult with them?	FMFIA Risk Profile, Stewardship Agreement	Meetings, verbal or written reports, surveys, teams, leadership activities
Identify the Context	What program or other objective areas will we assess? What are the things to consider when we assess them? What criteria will we use to assess our risks? Who will do the assessment?	FMFIA Risk Profile Program Areas Strategic Plan (SIP) Unit Plan, Program Delivery Improvement Tool (PDIT), Core Elements	An understanding of the risk context and the objectives against which risk will be managed
Identify the Risks	What events could happen that would affective my program areas or objectives? What are the corresponding impacts? What are my If...then… statements?	Brainstorming Strengths, Weaknesses, Opportunities and Threats (SWOT) Subject matter experts Surveys	A list of risk statements
Analyze the Risks Assess Impact	What is the severity of this impact according to my criteria?	Impact Criteria Matrix (Impact Tools)	A risk register, with risk events, likelihood of occurrence, and impact levels. Draft response strategies may be included.
Assess Likelihood	What is the likelihood that this risk event will occur?	Likelihood Criteria Matrix (Likelihood Tools)	
Prioritize Risks	What is the expected value of each risk statement? How do the risks compare? Which risks does leadership consider the “key risks?” Which risks will require a response?	Expected Value Rank Order Risk Tolerance Leadership Validation Consultation	A prioritized risk register. Key risks are selected for response and reporting at the national level.
Plan and Execute Risk Response Strategies	What actions will we take to mitigate, avoid, accept, transfer, or enhance our risks? What actions are important to take now? Who is accountable, when will they start, and when will it be done?	Response Context Corporate, Unit, and Individual Performance Plans	Risk response strategies are developed and included in agency, unit, and individual plans
Monitor, evaluate, and adjust	What is the status of our response actions? Are they completed, in progress, not started, or has the action been deferred? Did the action have the desired effect? What is the residual risk and how should we respond?	Risk Tracker Roll up, Dashboards, Monitoring, Response level	Risk Tracker - A risk register, with current status of response strategies. Leadership Team Dashboard

Risk - Impact Matrix

Date:		Performance Year:	Risk Statement:					Overall Impact Assessment:		
Value	**Impact**	**Financial**	**Reputation**	**Business Operations**	**Legal and Compliance**	**Infrastructure Assets**	**Resources and Effort Required**	**Environment and Culture**	**Safety**	**Local Impact consideration**
4	**Catastrophic**	Large unacceptable financial loss, severe budget variance. Critical long term impact on budget/finances (e.g. more than 5% of annual budget, Not recoverable within current or next fiscal year) Critical business functions could be vulnerable	Very significant harm to image with substantial impact on effectiveness. Significant adverse community impact and condemnation Consistent extreme negative media attention (months) Irreconcilable community loss of confidence in the organization's intentions and capabilities and possibly in the government Department Secretary level intervention	Large and unacceptable operational impact, long term business interruption. System failure and overall survival of the organization is threatened Full business disruption for more than one week or a key service more than two weeks Majority of critical programs cannot be achieved Department Secretary level intervention	Material compliance infraction. Significant prosecution and fines Major litigation involving class actions Major non-compliance with legislation	Significant or critical infrastructure assets are destroyed Significant or critical infrastructure assets are unusable for months	Impact cannot be managed within the organization's existing resources and threatens the survival of the organization Department Secretary level intervention	The event will permanently affect the environment, air quality, or public health The impact covers a wide area and is difficult to contain The effects are irreversible Threat to survival of flora, fauna, and or cultural heritage	Many fatalities	
3	**Major**	Very significant financial loss, major budget variance. Significant impact on budget/finances (e.g. less than 5% of annual budget, Not recoverable within current or next fiscal year)	Major embarrassment leading to significant impact on effectiveness. Considerable and prolonged community impact and dissatisfaction publicly expressed Community loss of confidence in the organization's and capabilities (weeks) Consistent negative media attention (weeks) Administrator or Executive Director level intervention	Unacceptable operational impact, short term business interruption. Continued capability of the organization is threatened Full business disruption for up to one week or a key service up to two weeks One or more critical programs or projects cannot be achieved	Reportable compliance infraction. Major breach of regulations Major litigation	Non critical infrastructure assets are destroyed Significant or critical infrastructure assets are unusable for weeks	Impact requires significant long term management and organizational resources to respond	Medium to long term impact to the environment, air quality, or public health The impact covers a wide area but can be contained Able to be remediated but will require dedicated expert resources	Fatalities or permanent disabilities	
2	**Moderate**	Significant financial loss and variance to budget. Major impact on budget/finances (e.g. less than 5% of annual budget, may be recoverable within current fiscal year, but requires reprioritization)	Moderate embarrassment impacting short term effectiveness. Community impact and concerns publicly expressed (days) Negative media attention (days) Loss of confidence by the community in organization processes Administrator or Executive Director level concern	Moderate operational impact, business not interrupted. Effectiveness and efficiency of major elements of the organization are reduced Full business disruption for one day or a key service disruption up to one week	Significant compliance infraction. Serious incident requires investigation and legal representation to determine legal liability Non compliance with regulation	A range of assets, including some significant assets are unusable for weeks	Impact requires management and resources from a key area of the organization to respond	Medium term impact to the environment, air quality, or public health Limited to a small area Able to be remediated but will require intervention or management by external parties	Injuries requiring medical treatment with possible fatalities	
1	**Minor**	Minor financial loss, small budget variance. Slight but noticeable impact on budget/finances (e.g. less than 1% of annual budget, recoverable within current fiscal year.)	Minor embarrassment, but no harm to image or reputation. Local community impact and concerns Occasional or once off negative media attention	Minor operational impact, business not interrupted. Effectiveness and efficiency elements of the organization are reduced Partial business disruption for less than three days Ability to achieve objectives or deliver outcomes is affected	Minor compliance infraction. Complex legal issue to be addressed	A number of assets are unusable but can be replaced within an acceptable timeframe	Impact requires additional local management effort and redirection of resources to respond	Short term impact to the environment, air quality, or public health Able to be remediated through existing processes Minimal threat to flora, fauna, and or cultural heritage	Injuries requiring medical treatment	
0	**Insignificant**	Minimal impact on budget/finances (e.g. less than 0.5% of annual budget. Recoverable within current fiscal year.)	Isolated local community or individual issue-based concerns	Negligible impact on the effectiveness of the organization Isolated or short term business service disruption	Legal issues managed by routine procedures	Assets receive minimal damage or are only temporarily unavailable	Impact can be managed through routine activities	No measurable impact to the environment, air quality, or community health No action required for management or containment No impact to flora, fauna, and or cultural heritage	Incident with or without minor injury	

Comments:

Risk - Likelihood Matrix

Date:	Performance Year:	Risk Statement:					Overall Impact Assessment:					

Value	Likelihood	Staffing (Levels & Experience)	Operational Procedures	Guidance	Problem History	New Program, Phase or Component	Complexity	Outside Control	Potential for Waste, Fraud and Abuse	Work Force Development and Training	FHWA Involvement	Consultant Use	Other
		Is the FHWA and DOT staff assigned to the effort sufficient? Do they have a clear knowledge, understanding, and ability with the program area or objective and its implications	Are there documented and relevant procedures for this program area or objective of the program?	Is there relevant guidance?	Have there been significant problems or ongoing series of problems related to this program area or objective?	Is program area or objective of the program is truly novel?	Is there a high level of intricacy or challenge associated with the program area or objective?	Is there an opportunity for outside agencies to assert control or interference?	What is the opportunity waste, fraud, and abuse?	Is there program in place to keep training and development in place for the personnel related to this program area or objective?	Is our division office staff actively is involved in managing the program area or objective?	Are consultants actively being applied as primary resources in the effort?	Are there other areas of concern related to this program area or objective that are not addressed in the frequency criteria? (Document the criteria below)
4	Almost Certain	Severely understaffed or no experience: It is unrealistic to expect the staff assigned not to need supplementation or augmentation before the end of the effort	None: There are no documented or relevant procedures	None: There are no documented or relevant guidance	A lot of: There are historical events that tie directly to the problem history	Cutting Edge: No one has addressed this type of work in this program area or objective before	Almost Certain: The program area or objective involves integration of multiple agencies, consultants, contractors and FHWA HQ	Almost Certain: Numerous outside agencies and the public have the opportunity and ability to voice concerns, influence or direct	A lot of: There is almost no oversight and a almost no ability to identify waste, fraud and abuse	None: There are no training or mentoring programs	None: Division office personnel have no visibility or no management control	A lot of: The DOT is using a broad range of consultant to address the program area or objective	
3	Likely	Understaffed or no experience: Staff assigned will be over utilized and likely incapable of completion of with out immediate training.	Some: There are some documented procedures or tangentially related procedures	Some: There is some documented guidance or tangentially related guidance	Some: There have been some incidents of problems related to this program area or objective in this type of program	Done in other transportation agencies: This type of work has been done in other transportation agencies, but no experience at this agency	Likely: The program area or objective involves integration of multiple agencies and FHWA HQ	Likely: One or two outside agencies and the public have the opportunity and ability to voice concerns, influence or direct	Some: There is some oversight, but certain gaps in our ability to identify waste, fraud and abuse	Limited: There are training and/or mentoring programs, but no funding and/ or leadership commitment	Limited: Division office personnel have visibility but no management control	Some: The DOT is sharing significant responsibilities with consultants related to this program area or objective	
2	Possible	Understaffed or some experience: Staff assigned will be over utilized and run the risk of being incapable of completion if additional responsibilities are assigned, or lack experience	Out-of-date: There are documented procedures, but they are out-of-date with existing laws and regulations.	Out-to-date: There are documented guidance, but they are out-of-date with existing laws and regulations.	Possible: There are rumors or organizational legend of problems related to this program area or objective in this type of program	Some experience: Some people have done this type of work in the past or have done related work	Possible: This program area or objective involves integration of DOT, FHWA and one other outside agency	Possible: One or two outside agencies have the opportunity and ability to voice concerns, influence or direct	Possible: There is oversight, but possible gaps in our ability to identify waste, fraud and abuse	Some: There are training and/or mentoring programs, but they are not universally available	Some: Division office personnel have management control over some aspects of the program area or objective	Limited: The DOT is sharing limited responsibilities with consultants related to this program area or objective	
1	Unlikely	Adequately staffed or competent: Adequately staffed or competent	Good and up-to-date: Procedures are good and up to date.	Good and up-to-date: Guidance is good and up to date.	None: There have been no significant or ongoing problems.	Old news: It's what we do, routine	Unlikely: This program area or objective involves only DOT and FHWA personnel	Unlikely: There is virtually no opportunity or ability for outside agencies to voice concerns related to this program area or objective	None: There is virtually total oversight and a high opportunity to identify waste, fraud and abuse	A lot of: There are training and mentoring programs, broadly available to FHWA and DOT personnel	A lot of: Division office personnel have active management control over most aspects of the program area or objective	None: The DOT has full responsibility for all aspects of this program area or objective	

Comments:

Risk - Heat Map

Impact	Value	Description
Catastrophic	4	Large unacceptable financial loss, severe budget variance. Very significant harm to image with substantial impact on effectiveness. Large and unacceptable operational impact, long term business interruption. Material compliance infraction.
Major	3	Very significant financial loss, major budget variance. Major embarrassment leading to significant impact on effectiveness. Unacceptable operational impact, short term business interruption. Reportable compliance infraction.
Moderate	2	Significant financial loss and variance to budget. Moderate embarrassment impacting short term effectiveness. Moderate operational impact, business not interrupted. Significant compliance infraction.
Minor	1	Minor financial loss, small budget variance. Minor embarrassment, but no harm to image or reputation. Minor operational impact, business not interrupted. Minor compliance infraction.

Likelihood Value	Unlikely 1	Possible 2	Likely 3	Almost Certain 4
	The event could possibly occur, but is unlikely at this time.	The event could occur under specific conditions and some of those conditions are currently evidenced.	The event is most likely to occur in most circumstances.	The event is expected to occur in most circumstances or is happening now.
	<10%	10-49%	50%-90%	>90%
4	4	8	12	16
3	3	6	9	12
2	2	4	6	8
1	1	2	3	4

How to use this Tool: Multiply the values from the risk impact and likelihood assessments. Using the values from the impact and likelihood matrices will give a maximum value of 16 and a minimum value of zero. This is your risk "expected value." Use the expected value to sort your risks and help with risk prioritization. Use your expected values and prioritization to decide which risks require response strategies.

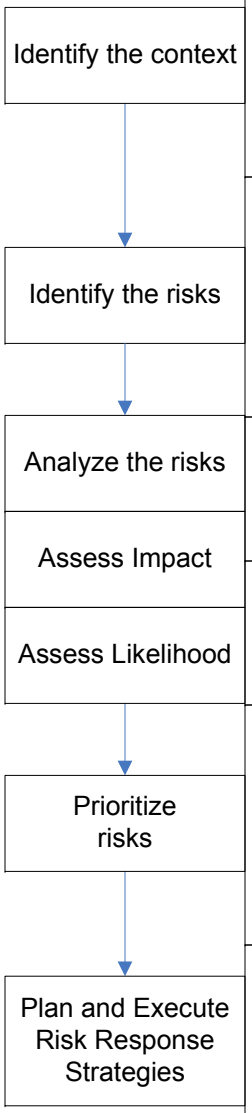
Risk Response Context / Risk Tolerance

Final step in Process, after Unit Leadership Risk Prioritization and Ranking, which is after Impact and Likelihood Assessment Heat Map

Risk	**Report as Top 5 to 10**	**Track and Monitor**	**Reassess annually or as needed**
High (Ranked Top Ten)	Yes	In Risk Tracker, POI, Leadership Dashboard*, response strategies possibly in Unit Performance Plan	Annual
High (Red)	No	No special tracking required. Response strategies possibly in Unit Performance Plan and Risk Tracker (not Rolled Up).	Annual
Medium (Orange and Yellow)	No	No special tracking required. Response strategies possibly in Unit Performance Plan and Risk Tracker (not Rolled Up).	As Needed
Low (Green)	No	Manage with current practices. No special tracking required. Response strategies possibly in Unit Performance Plan and Risk Tracker (not Rolled Up).	As Needed

Risk response strategies include activities to mitigate, enhance, avoid, transfer, or accept risks. Use the risk prioritization to help determine the level of response, monitoring, and reassessment.

* Beginning of Performance Year, roll up nationally using the Risk Response Tracker System (Risk Tracker). On PY quarters, update Risk Tracker status. National "completed" status is used for Leadership Dashboard on a FY quarterly basis.



		Example	
Identify the context	What program or other objective areas will we assess? What are the things to consider when we assess them? What criteria will we use to assess our risks? Who will do the assessment?	Implementation of roadway departure prevention technologies such as the Safety Edge.	SIP Objectives
		Safety – Roadway Departure	Core Element List
		Safety – Required Safety Initiatives	PDIT
Identify the risks	What events could happen that would affective my program areas or objectives? What are the corresponding impacts? What are my If...then… statements?	If a lack of focus on roadway departure crashes exists, then this will result in a continued high number of crashes and fatalities in RD crashes, particularly on local roads.	
Analyze the risks Assess Impact	What is the severity of this impact according to my criteria?	Catastrophic	
Assess Likelihood	What is the likelihood that this risk event will occur?	Almost Certain	
Prioritize risks	What is the expected value of each risk statement? How do the risks compare? Which risks does leadership consider the “top risks?” Which risks will require a response?	An Office Top Risk	
Plan and Execute Risk Response Strategies	What actions will we take to mitigate, avoid, accept, transfer, or enhance our risks? What actions are important to take now? Who is accountable, when will they start, and when will it be done?	“Assure the inclusion of RD elements in the state HSIP. Promote use of Centerline Rumble Strips for State and local roads. Coordinate Division's involvement in development of specifications for Safety Edge and their use.”	

		Example	
Identify the context	What program or other objective areas will we assess? What are the things to consider when we assess them? What criteria will we use to assess our risks? Who will do the assessment?	Implementation of a performance management approach for highway and bridge assets in cooperation with partners and stakeholders	SIP Objectives
		System Preservation – Bridge Management Systems	Core Element List
		Transportation Asset Management – Management Systems	PDIT
Identify the risks	What events could happen that would affective my program areas or objectives? What are the corresponding impacts? What are my If...then… statements?	If the State's bridge inspection program is not adequately implemented per the National Bridge Inspection Standards, then the potential exists that the state's bridge assets are not being adequately maintained and the safety of the traveling public could be at risk	
Analyze the risks Assess Impact	What is the severity of this impact according to my criteria?	Major	
Assess Likelihood	What is the likelihood that this risk event will occur?	Possible	
Prioritize risks	What is the expected value of each risk statement? How do the risks compare? Which risks does leadership consider the "top risks?" Which risks will require a response?	An Office Top Risk	
Plan and Execute Risk Response Strategies	What actions will we take to mitigate, avoid, accept, transfer, or enhance our risks? What actions are important to take now? Who is accountable, when will they start, and when will it be done?	Conduct a baseline review of the State's bridge inspection program using the FHWAs new National Bridge Inspection Program review protocols.	

		Example	
Identify the context	What program or other objective areas will we assess? What are the things to consider when we assess them? What criteria will we use to assess our risks? Who will do the assessment?	Implement operations-based, congestion-reduction strategies...such as traffic incident mgmt, traffic signal mgmt, work zone bottleneck reduction, and congestion pricing.	SIP Objectives
		Operations – Congestion Pricing	Core Element List
		Operations - Pricing	PDIT
Identify the risks	What events could happen that would affective my program areas or objectives? What are the corresponding impacts? What are my If...then… statements?	If the tolling component of the metro area Urban Partnership Agreement is not well planned, designed, implemented, and operated, then the traffic congestion will stay the same or increase, credibility in other congestion pricing projects in the state will be undermined, the credit rating of the state could be affected.	
Analyze the risks Assess Impact	What is the severity of this impact according to my criteria?	Major	
Assess Likelihood	What is the likelihood that this risk event will occur?	Possible	
Prioritize risks	What is the expected value of each risk statement? How do the risks compare? Which risks does leadership consider the “top risks?” Which risks will require a response?	An Office Top Risk	
Plan and Execute Risk Response Strategies	What actions will we take to mitigate, avoid, accept, transfer, or enhance our risks? What actions are important to take now? Who is accountable, when will they start, and when will it be done?	Be fully engaged in all phases of the Tolling project. Use FHWA resources (such as the Resource Center, ITS Peer to Peer Program, and Operations Support Program) as needed to provide technical support.	

Glossary of Terms and Definitions

Assessable Unit (AU)
A division or program office defined by the Unit Risk Profile and Inherent Risk Assessment. These are tools utilized by the Office of the Secretary of Transportation for determining risk on a department scale.

Business
As used on the Impact Matrix, its definition is dependent on the context of the risk and the level of the risk assessment. It can refer to the business operations of the agency, a program office, a division office, or a subunit of them.

Communication and Consultation
The continual and iterative processes that an organization conducts to provide, share or obtain information and to engage in dialogue with stakeholders and others regarding the management of risk.

- The information can relate to the existence, nature, form, likelihood, severity, evaluation, acceptability, response or other aspects of the management of risk.
- Consultation is a two-way process of informed communication between an organization and its stakeholders or others on an issue prior to making a decision or determining a direction on a particular issue. Consultation is
- a process which impacts on a decision through influence rather than power; and
- an input to decision making, not joint decision making.

Community
As used on the Impact Matrix, its definition is dependent on the context of the risk and the level of the risk assessment. It can refer to the international community, the US public citizenry, the state citizenry or a subdivision of it. It can also refer the professional, business, and special interest communities we operate in. Communities can also be stakeholders.

- American Association of State Highway and Transportation Officials (AASHTO) is an example of a professional community.
- Associated General Contractors (AGC) is an example of a business community that we deal with.
- A special interest community would include environmental groups such as the Sierra Club.

Context
The external and internal parameters to be taken into account when managing risk, and setting the scope and risk criteria for the risk management policy.

External Context
The external environment in which the organization seeks to achieve its objectives. External context can include

- the cultural, social, political, legal, regulatory, financial, technological, economic, natural and competitive environment, whether international, national, regional or local;

- key drivers and trends having impact on the objectives of the organization; and
- relationships with, and perceptions and values of, external stakeholders.

Internal Context

The internal environment in which the organization seeks to achieve its objectives. Internal context can include

- office structure, delegation of authority, governance, roles and responsibilities;
- policies, program and organizational goals and objectives, performance metrics, and the strategies that are in place to achieve them;
- organizational capacity, understood in terms of resources and knowledge (e.g. funds, assets, time, people, processes, systems and technologies);
- the relationships with and perceptions and values of internal stakeholders and the organization's culture;
- information systems, communication flows and decision making processes (both formal and informal);
- standards, guidelines and models adopted by the organization; and
- form and extent of contractual and regulatory relationships.

Control

Any measure that is modifying risk or implementing the risk response.

- Controls include any initiatives, process, policy, device, practice, or other actions which respond to the risk.
- Often times control and response are intermingled in use.
- Controls may not always exert the intended or assumed modifying effect that is why risk monitoring is done.

Core Elements

A list of typical functional areas, programs, and activities within a division office. It is a tool. It can be used to categorize risks and to ensure that all areas are considered for risk. Federal Lands would not have the same listing

Division Office

A field office of the FHWA located in each of the 50 states plus Washington D.C. and Puerto Rico. Some divisions may have sub-offices with the state. In addition to these offices, there are three Federal Lands field offices.

Event

occurrence or change of a particular set of circumstances.

- An event can be one or more occurrences, and can have several causes.
- An event can consist of something not happening.
- An event can sometimes be referred to as an “incident” or “accident”.
- An event without consequences can also be referred to as a “near miss”, “incident”, “near hit” or “close call”.

Expected Value (EV)

The product of the risk likelihood and impact. This can be done qualitatively or quantitatively. The expected value allows for comparison, ranking or placement of the risk on a heat map or other graphical representation. In qualitative terms, low-medium-high-extreme are commonly used.

Federal Highway Administration (FHWA)
A modal unit of the U.S. Department of Transportation.

Federal Lands Highway (FLH)
A unit of the Federal Highway Administration consisting of a headquarters office and three field offices (called divisions).

Heat Map
A graphical plot or visual tool used to represent the relative placement of risks. The expected value of the risk determines its location. For example, on a grid, a catastrophic impact and almost certain likelihood risk would be in the upper right quadrant. The heat map can also be used to indicate risk tolerance or residual risk.

Impact
The outcome of an event affecting objectives
- An event can lead to a range of impacts.
- An impact can be certain or uncertain and can have positive (opportunity) or negative (threat) effects on objectives.
- Impacts can be expressed qualitatively or quantitatively.
- Initial impact can escalate through a domino effect.

Likelihood
The chance of something happening.
- In risk management terminology, the word “likelihood” is used to refer to the chance of something happening, whether defined, measured or determined objectively or subjectively, qualitatively or quantitatively. It can be described using general terms (ex. unlikely, probable) or mathematically (such as a probability – 10%, or a frequency over a given time period – 3 times/year).
- For high level risk assessments, probability with any mathematical precision is difficult to do without historical data. New legislation or programs will typically have similar issues.

Monitoring
The continual checking, supervising, critically observing or determining the status in order to identify change from the performance level required or expected. Monitoring can also be a communication tool.
- Monitoring can be applied to a risk management framework, risk management process, risk or control.
- For FHWA this is done using by using SUPPS, Risk Tracker, dashboards, or risk registers.

Objective

At the strategic level it is a broad statement of a general direction or result to be achieved. At the division or unit level it is more narrowly defined.

Opportunity
A risk that has positive impact or result.

Program Delivery Improvement Tool (PDIT)
A database listing program areas and performance criteria. It was developed to provide a consistent approach for identifying opportunities to improve program delivery and by identifying successful practices that can be shared among the transportation community.

Residual/Retained Risk
Risk remaining after implementing the risk response. In many situations it is not possible or practical to completely eliminate a risk. Residual risk can contain unidentified risk.

Review
An activity undertaken to determine the suitability, adequacy and effectiveness of the subject matter to achieve established objectives. A review can be initiated in response to information from monitoring activities. It can be done by internal or external (Office of Inspector General, General Accountability Office) entities.

- Review can be applied to a policy, risk management framework, risk management process, risk, or control.
- The breadth, depth, and format of the review will be determined by the purpose and subject of the review.

Risk
In FHWA we define risk as a future event that may or may not occur and has a direct impact on the program, stewardship or organizational objectives, to their benefit or detriment. Internationally, risk is the “effect of uncertainty on objectives.”

- An effect is a deviation from the expected — positive or negative.
- Objectives can have different aspects (such as financial, health and safety, and environmental goals) and can apply at different levels (such as strategic, organization-wide, program, project, product, and process).
- Risk is often characterized by reference to potential events and impacts or a combination of these.
- Risk is often expressed in terms of a combination of the impact of an event (including changes in circumstances) and the associated likelihood of occurrence.
- Uncertainty is the state, even partial, of deficiency of information related to, understanding or knowledge of an event, its impact, or likelihood.

Risk Analysis
The process to comprehend the nature of risk and to determine the level of risk.

- Risk analysis provides the basis for risk evaluation and decisions about risk treatment.
- Risk analysis includes risk estimation.

Risk Assessment
The overall process of risk identification, risk analysis, and risk evaluation.

Risk Attitude
An organization's or unit's approach to assess and eventually pursue, retain, take or turn away from risk. This can vary across program areas, divisions, or offices. The risk attitude plays into determining the risk response.

Risk Aversion
The attitude to turn away from risk. In some situations the risk may be able to be transferred or avoided. Risk aversion is closely linked to risk attitude.

Risk Criteria
The terms of reference against which the impact, likelihood and significance of a risk is evaluated. Developing the criteria allows for comparison of risk. General criteria typically include such areas as: financial, safety, or environment. At the project level scope, schedule, and budget are typically included.

- Risk criteria are based on organizational objectives, and external and internal context
- Risk criteria can be derived from standards, specifications, laws, policies, and other requirements.

Risk Evaluation
The process of comparing the results of risk analysis with risk criteria to determine whether the risk and/or its magnitude is acceptable or tolerable. Risk evaluation assists in the decision about risk response.

Risk Identification
The process of finding, recognizing and describing risks.

- Risk identification involves the identification of risk sources, events, their causes and their potential impacts.
- Risk identification can involve historical data, theoretical analysis, informed and expert opinions, brainstorming, stakeholder's needs or other methods.

Risk Management
Coordinated activities to direct and control an organization with regard to risk.

Risk Management Framework
The set of components that provide the foundations and organizational arrangements for designing, implementing, monitoring, reviewing and continually improving risk management throughout the organization.

- The foundations include the policy, objectives, mandate and commitment to manage risk.
- The organizational arrangements include plans, tools, relationships, accountabilities, resources, processes and activities.
- The risk management framework is embedded within the organization's overall strategic and operational policies and practices.

Risk Management Plan
Scheme within the risk management framework specifying the response strategies, the management components and resources to be applied to the management of risk.

- Management components typically include procedures, practices, resources, assignment of responsibilities, sequence and timing of activities.
- The risk management plan can be applied to a particular product, process and project, and part or whole of the organization.

Risk Management Policy
A high level statement of the overall intentions and direction of an organization related to risk management.

Risk Management Process
The systematic application of management policies, procedures and practices to the activities of communicating, consulting, establishing the context, and identifying, analyzing, evaluating, treating, monitoring and reviewing risk.

Risk Owner
The person or entity within FHWA having the accountability and authority to manage, or responsibility to track the risk.

Risk Profile
A description of any set of risks. The set of risks can contain those that relate to the whole organization, part of the organization, or as otherwise defined.

Risk Response (Risk Response Strategy)
The process to modify risk. Risk response can involve

  - Mitigate the risk. This can involve removing the risk source, reducing the likelihood or reducing the consequences.
  - Avoid the risk by deciding not to start or continue with the activity that gives rise to the risk;
  - Transfer (or share) the risk to another party or parties
  - Accept the risk by informed choice. Use existing controls, process or procedures to deal with the risk should it occur.
  - Enhance or exploit risk in order to pursue an opportunity.
- Risk responses that deal with negative consequences are sometimes referred to as “risk mitigation”, “risk elimination”, “risk prevention” and “risk reduction” in literature on the subject.
- Risk responses can create new risks or modify existing risks.

Risk Source
An activity, process, project, or program which alone or in combination has the intrinsic potential to give rise to risk. Lack of something can also give rise to risk.

Risk Statement
A two part statement composed of the event and the impact should that event occur. Generally it is forward looking and put in the format of an “If <event> occurs, then <impact> will happen” statement. One event may have multiple impacts.

Risk Tracker
An FHWA risk register application that allows units to track risks and their response strategies. It also provides for consistent categorization or and national roll up of unit top risks.

Risk Response Tracking System
See Risk Tracker

Shared Unit Performance Plan System (SUPPS)
A Web-based planning database that is used to house and archive annual unit performance plans, Directors of Field Services dashboard measures data, and related information. Unit-level performance objectives are aligned with the SIP national performance objectives in the SUPPS..

Subject Matter Expert (SME)
An individual or team possessing unique, historical, or specialized knowledge on a subject, program, process, law, regulation, or activity. This knowledge can be formally obtained through education or informally obtained through experience.

Stakeholder
A person or organization that can affect, be affected by, or perceive themselves to be affected by a decision or activity. For FHWA stakeholders can be Congress, state departments of transportation, tribes, other federal agencies, regional or metropolitan planning organizations, other local public entities, environmental or civic groups, or individuals.

- A decision maker can be a stakeholder.
- A stakeholder can be internal or external to the organizational unit.

Strategic Implementation Plan (SIP)
An annual plan document, aligned with the FHWA Strategic Plan, that lays out the priority national performance objectives, measures, and initiatives for the coming year.

Strategic Plan (SP)
A multi-year plan document, typically written for a 3-5 year time horizon, that identifies the long term goals, strategic objectives, and national strategies the FHWA will adopt to achieve its vision and mission.

Strengths, Weaknesses, Opportunities, and Threats (SWOT or SWOT Analysis)
A tool or method of collecting and categorizing data about the unit, division, office, or agency for analysis. It is both present and forward looking and includes internal and external assessments..

Threat
A risk that has negative or detrimental impact or result.

Unit Performance Plan (UPP)
An annual plan document developed by a FHWA office to align and support the FHWA SIP. It can contain activities that support division or office goals not defined by the

Strategic Plan or Strategic Implementation Plan. An office or division may assign another name to this document (unit action plan) to fit their operating environment.

Validation
A process by which leadership of the unit, office, division, or agency review the risk register or risk evaluation. They may not have been involved in the risk identification process or criteria development. Since this step is done near the end of the process, leadership may have access to information not previously available. The process for this step is situational.

TRIBAL CONSULTATION IN THE PLANNING PROCESS STATE-OF-THE-PRACTICE REPORT:

Performance Year 2015

Final Report
June 2015

Prepared for:
U.S. Department of Transportation
Office of Planning, Environment, and Realty
Federal Highway Administration

U.S. Department of Transportation
Federal Highway Administration

Prepared by:
U.S. Department of Transportation
Research and Innovative Technology Administration
John A. Volpe National Transportation Systems Center

Volpe

Notice

This document is distributed by the U.S. Department of Transportation, in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturer's name or products are mentioned, it is because they are considered essential to the objective of the publication and should not be considered as an endorsement. The United States Government does not endorse products or manufacturers.

Quality Assurance Statement

The Federal Highway Administration (FHWA) provides high-quality information to serve Government, industry, and the public in a manner that promotes public understanding. Standards and policies are used to ensure and maximize the quality, objectivity, utility, and integrity of its information. FHWA periodically reviews quality issues and adjusts its programs and processes to ensure continuous quality improvement.

Table of Contents

Introduction 1

Background 1

Goals 2

Methodology 2

Review Process 3

Focus Area 1: Division Office Oversight of Tribal Consultation in the Statewide Planning Process 4

1.1 Documentation of Division Office Processes for Statewide Tribal Consultation Oversight 4

1.2 Division Office Oversight of State DOT Documentation of Tribal Consultation Processes 4

1.3 Division Office Oversight of State DOT Implementation of Consultation Processes 5

Focus Area 2: Division Office Oversight of Tribal Consultation in the Metropolitan Planning Process 8

2.1 Documentation of Division Office Processes for Metropolitan Tribal Consultation Oversight 8

2.2 Division Office Oversight of Documented MPO Tribal Consultation Processes 9

2.3 Division Office Oversight of MPO Implementation of Consultation Processes 9

Focus Area 3: Conversations with the Tribes 11

3.1 Tribal Needs in the Planning Process 11

3.2 Division Office Coordination with Tribes 11

Conclusion 12

Appendix A: Legislation, Regulations, and Resources 13

Appendix B: Review Team Members 14

Appendix C: Discussion Questions 15

Appendix D: Requested Desk Review Documents 19

Appendix E: Acronyms 20

Introduction

This report documents the Federal Highway Administration's (FHWA) Performance Year 2015 State-of-the-Practice Review of Division Office oversight processes relating to tribal consultation in the planning process. This is the first review of Division Offices on this topic. The report documents the processes used by three FHWA Division Offices (Maine, Oklahoma, and Washington) to perform their stewardship and oversight roles for tribal consultation in the transportation planning process by State Departments of Transportation (DOTs) and Metropolitan Planning Organizations (MPOs).

FHWA's Virtual Tribal Team (VTT) implemented the State-of-the-Practice Review as a means of assessing the consistency of specific planning oversight processes conducted by Division Offices. It is designed to be an on-going assessment and will continue to document Division Office oversight procedures to ensure that State DOTs and MPOs are properly consulting with federally recognized tribes in the planning process.

The report outlines the background, goals, methodology, review process, and focus areas of this review. Each focus area includes a summary of the current state of the practice, descriptions of effective practices, and recommendations to support improved FHWA oversight for tribal consultation in the planning process.

Background

Tribal sovereignty is the basis and reason for tribal consultation. It is the right of tribal governments to self-governance, self-determination and economic self-sufficiency. Tribal sovereignty is defined by U.S. DOT as:

> "…the unique legal status of federally recognized Indian tribes as set forth in the U. S. Constitution, treaties and Federal statutes, executive orders and court decisions, which establish…tribes, as domestic dependent nations…"[1]

Each federally recognized tribe is respected as a sovereign nation. Hence, activity between a tribe and the Federal government is defined as a 'government-to-government' activity that fosters 'government-to-government' relations.

23 CFR 450.104 states that:

> "Consultation means that one or more parties confer with other identified parties in accordance with an established process and, prior to taking action(s), considers the views of the other parties and periodically informs them about action(s) taken."[2]

[1] DOT Order 5301.1 – Department of Transportation Programs, Policies, and Procedures Affecting American Indians, Alaska Natives, and Tribes.
[2] 23 CFR 450.104.

Federal laws and regulations, which are listed in Appendix A, require States to consult with federally recognized tribes in the development of the statewide long-range transportation plan (LRTP) and Statewide Transportation Improvement Program (STIP). Similarly, MPOs are also required, by Federal law and regulation (listed in Appendix A), to consult with federally recognized tribal governments in the development of the Metropolitan Transportation Plan (MTP), Transportation Improvement Program (TIP), and Unified Planning Work Program (UPWP).

State DOTs and MPOs may consult with tribes in a variety of ways, but they should work with each individual tribe's governing body to identify the tribe's preferences for being consulted. For example, some tribes may choose to allow the State DOT to work directly with tribal planning staff, who share pertinent information with their governing tribal leadership. Other tribes may prefer that the State DOT share information formally and in-person at the meetings of the tribe's governing body. It is best to agree to the parameters of the consultation between a State DOT or an MPO and a tribe and document those parameters in a memorandum of agreement.

FHWA Division Offices are responsible for performing oversight for the statewide and metropolitan planning processes through activities such as the Federal Planning Finding for State DOTs and MPOs under 200,000 in population and TMA Certification Reviews for MPOs over 200,000 in population. In addition to the laws and regulations listed in Appendix A, the *FHWA Field Planner Guidebook* and *Transportation Management Area (TMA) Certification Process Handbook* provide guidance on how to assess compliance with tribal consultation regulations.

Goals

This review focuses on the oversight provided by the FHWA Division Office of the State DOT and MPO consultation processes. There are three main goals of the State-of-the-Practice Review:

1. Assess the state of the practice for how FHWA Division Offices conduct oversight over consultation with tribes in the transportation planning process. Identifying current practices related to this topic is critical to understanding the level of consistency in oversight processes among Division Offices.
2. Identify effective practices for Division Offices to foster effective consultation among State DOTs, MPOs, and tribes. Effective practices serve as models for other Division Offices and help support ideas and concepts that foster consistency throughout FHWA.
3. Recommend improvements to current practices and processes to support consistent oversight of tribal consultation in the planning process. These recommendations can also help define mechanisms within the Division Office to support flexibility in practices to meet tribal, State, and/or regional needs.

Methodology

The State-of-the-Practice Review is conducted using a team (participants are listed in Appendix B) comprised of VTT members from FHWA's Office of Planning, Resource Center, Office of Federal Lands

Highway, and the U.S. DOT Volpe Center. The roles and responsibilities of the Review Team included reviewing relevant documents, developing review questions, participating in one or more of the on-site reviews, documenting the observations from each review, and developing the State-of-the-Practice Review report.

The Review Team submitted to FHWA leadership three Division Offices to review (Maine, Oklahoma, and Washington) that were diverse in geographic location, population, and number of federally recognized tribes. Maine is a small East Coast State with only four federally recognized tribes[3]. Oklahoma is a geographically large Plains State with 38 federally recognized tribes. Washington is a geographically large West Coast State with 29 federally recognized tribes.

Review Process

The review process has five major components:

- Identify key questions to guide the review.
- Desk reviews of relevant Division Office, State DOT, and MPO documents.
- On-site interviews with Division Office, State DOT and MPO staff and leadership and/or staff of two tribes per State.
- Documentation of observations from each on-site interview.
- Compilation of key observations and recommendations in a final report.

The Review Team developed a set of general questions to ask the Division Offices regarding their oversight of tribal consultation in the planning process. A list of these questions, organized by topic, can be found in Appendix C. Working with the three Division Offices, the Review Team collected information and then reviewed documents relating to tribal consultation in the planning process. The list of documents requested for the desk review can be found in Appendix D. Based on the desk review, Review Team members developed specific interview questions to explore with each Division Office during the on-site interviews. The interview questions were designed to help the Review Team fully understand how the Division Office conducts oversight for tribal consultation in the planning process.

At the on-site interviews, Review Team members met separately with Division Office, State DOT, and MPO staff, as well as staff and/or leadership from two tribes in the State, to explore the Division Office's oversight of tribal consultation in the transportation planning process. The Review Team followed each site visit with a memo to each Division Office outlining observations identified during each site visit as well as both effective practices and areas where each Division Office might consider improvements based on Federal planning requirements for tribal consultation in the planning process.

[3] On April 16, 2015, Maine Governor Paul R. LePage issued Executive Order 2015-006 to rescind Executive Order 21 FY 11/12, which had ordered every Department and Agency within the State Government to develop and implement a tribal consultation policy and to designate a Tribal Liaison. The information contained in this report was gathered before the signing of Executive Order 2015-006. The impact that this change may have on tribal consultation in the statewide and metropolitan planning processes in Maine is unknown at the time of the completion of this report.

This report details observations, effective practices, and recommendations for improvement in FHWA's oversight of tribal consultation within the Division Offices, based on the three Division Offices reviewed.

Focus Area 1: Division Office Oversight of Tribal Consultation in the Statewide Planning Process

1.1 Documentation of Division Office Processes for Statewide Tribal Consultation Oversight

State of the Practice

Each of the three Division Offices conducts oversight for tribal consultation in the statewide planning process and is aware of the tribal coordination being conducted by the State DOT. However, none of the Division Offices document their oversight of tribal consultation for planning in Standard Operating Procedures (SOPs) or the FHWA/Federal Transit Administration (FTA) Memorandum of Agreement (MOA) for their State.

Recommendations

1.1.1 Division Offices would benefit from documenting their processes related to tribal consultation in the statewide planning process. This documentation should include the procedures for conducting oversight of State DOT tribal consultation documentation and activities in the planning process.

- **Office of Planning:** None.
- **Resource Center:** None.
- **Division Offices:** Document the Division Office's internal procedures for conducting oversight of State DOT tribal consultation documentation and activities in the planning process in SOPs or the FHWA/FTA MOA.

1.2 Division Office Oversight of State DOT Documentation of Tribal Consultation Processes

State of the Practice

Two of the three State DOTs have documented their tribal consultation procedures to some degree. Each of these consultation policies defines the purpose of the policy, states the role of the State DOT tribal liaison, lists the STIP and LRTP as processes for which tribes will be consulted, and generally describes how the State DOT will conduct its consultation with the tribes. However, the documentation is not sufficient to meet Federal regulations for documenting the

Effective Practice: Division Office Involvement in Developing State DOT Tribal Consultation Procedures

The Maine Division Office worked closely with the State DOT to assist in developing its tribal consultation procedures. This technical assistance resulted in a set of procedures that the Division Office was satisfied with, and helped to foster a relationship between the State DOT and the Division Office on tribal consultation issues.

tribal consultation process.

One State DOT developed its tribal consultation policy in coordination with most, but not all of the tribes in the State. Those that agreed to the terms of the consultation policy signed the document in support of its procedures. This indicates that these tribes agree to the State DOT's plans for consulting with them in the transportation planning process.

In one of the States, the Division Office assisted the State DOT in documenting its tribal consultation processes; in the other State, the Division Office was not actively involved in the documentation of the tribal consultation process for planning. The third State DOT has not documented its tribal consultation policy.

Recommendations

1.2.1 Division Office planning staff should ensure that State DOTs have documented policies and procedures that define how the agency will consult with tribes for the planning process. State DOTs should develop policies and procedures in consultation with each individual tribe in the State. Consultation policies and procedures may vary among the tribes in the State, as tribes should agree to their terms. The policies and procedures should outline the steps to be taken in tribal consultation for the planning process, define the protocols for communication, and identify the parties to be involved.

- **Office of Planning:** Provide guidance on how State DOTs can develop and document their procedures for tribal consultation in the statewide planning process.
- **Resource Center:** Develop training on how State DOTs and MPOs should conduct and document effective tribal consultation in the planning process.
- **Division Offices:** Work with the State DOT to ensure that their policies and procedures for consulting with tribes in the planning process are detailed and documented.

1.3 Division Office Oversight of State DOT Implementation of Consultation Processes

State of the Practice

Each of the three State DOTs has a tribal liaison on-staff, who serves as the tribes' point of contact at the State DOT. Each Division Office has a relationship with the tribal liaisons and is aware of their general activities. Each liaison said that they meet with tribes individually at least annually to discuss transportation issues and/or the STIP. One liaison said that it would be helpful to receive training on how to serve as an effective liaison to tribes.

The three State DOTs differ in their approaches to consulting with tribes on the STIP. The Division Offices were knowledgeable about how the State DOTs consult with tribes on the STIP, but the levels of consultation being conducted do not meet Federal requirements for consulting with tribes throughout the planning process. The approaches include:

- State DOT regional staff meet with the individual tribes annually to present the draft plan from which the STIP is later created. The State DOT gathers comments from the tribes and uses the

meetings to coordinate the State DOT's plans with the tribal TIPs. However, the State DOT only involves the tribes once the draft document is completed, as opposed to involving the tribes throughout the development of the document.

- The State DOT relies on the Regional Planning Organizations to coordinate with tribes and municipalities on identifying projects for the plan from which the STIP is created. The State DOT includes tribes in its public outreach for the STIP but do not consult with tribes beyond the normal public involvement process.
- The State DOT sends the draft STIP to the tribes in a batch email for review. The State DOT only involves the tribes once the draft document is developed and does not involve the tribes throughout the process of selecting projects to include in the STIP.

Effective Practices: Tribal Transportation Planning Organizations

The Washington Tribal Transportation Planning Organization (TTPO) is a group of tribal transportation staff representing many of the tribes in the State. The TTPO is self-governing (not managed by the State DOT) and meets quarterly to discuss transportation issues that the tribes are facing. The Oklahoma Tribal Transportation Council (OTTC) holds discussions on various transportation topics that affect tribes. Any tribal organization can be a member, and agendas are set by the OTTC executive board. The Oklahoma DOT tribal liaison helps to advise and coordinate the OTTC. The TTPO and OTTC are effective forums for tribes to share information, coordinate their transportation activities, and learn from one another.

The three State DOTs also approach consulting with tribes on the LRTP in different ways. Similar to the STIP, the Division Offices were knowledgeable about how the State DOTs consult with tribes on their LRTPs, but the levels of consultation being conducted do not meet Federal requirements for consulting with tribes throughout the planning process. The approaches include:

- The State DOT's tribal liaison discussed the development of the LRTP during its annual meetings with each tribe.
- The State DOT informed each tribe about the LRTP development process and held one meeting to discuss it with the tribes in attendance. The State DOT also created an LRTP advisory committee consisting of selected tribal representatives.
- The State DOT sent the draft LRTP to the tribes and provided a 45-day comment period.

Two of the three States have tribal transportation organizations, each of which provides a forum for tribes to share information about transportation issues that they face. In addition, the same two States also have tribal advisory committees which were created by the State DOTs to advise the agency on policy issues. The tribal transportation organizations are typically made up of tribal planning staff members, whereas the tribal advisory committees consist of tribal elected officials or their delegates. Both sets of organizations provide opportunities for the Division Office and the State DOT to present information on the transportation planning process and receive feedback on their activities. The Division

Offices in these two States reported that they participate in these meetings whenever they are invited to do so.

The Review Team noted that the three Division Offices were more reactive than proactive in the State DOTs' tribal consultation processes for planning, meaning that they participated in State DOT outreach to tribes when invited, but typically were not inserting themselves into the process. Furthermore, none of the Division Offices reported addressing tribal consultation in the planning process through the Federal Planning Finding.

Through their oversight role, Division Office staff have an opportunity to encourage State DOTs to improve their consultation with tribes in the planning process. Division Office staff can serve as advisors and facilitators as State DOTs develop, document, and implement their tribal consultation policies and procedures.

Recommendations

1.3.1 Division Offices are responsible for conducting oversight for the transportation planning process, which includes tribal consultation. Division Office staff should address statewide tribal consultation processes through the Federal Planning Finding.

- **Office of Planning:** Highlight and clarify guidance on conducting oversight for tribal consultation in the statewide planning process.
- **Resource Center:** Develop training for Division Office staff on effective tribal consultation oversight activities.
- **Division Offices:** Review tribal consultation in the planning process via the Federal Planning Finding.

1.3.2 Division Office staff should serve as advisors and facilitators as State DOTs develop and implement their tribal consultation policies and procedures. Division Offices should seek training to improve their understanding of tribal culture, sovereignty, and the Federal government's responsibilities towards tribes and tribal consultation in the planning process.

- **Office of Planning:** None.
- **Resource Center:** Develop and deliver training for Division Office staff on conducting oversight of tribal consultation in the planning process and encouraging effective practices among State DOTs.
- **Division Offices:** Seek training opportunities on oversight of tribal consultation in the planning process and encouraging effective tribal consultation practices among State DOTs.

1.3.3 One State DOT tribal liaison requested training on effective practices for tribal liaisons in carrying out tribal consultation in the planning process. Tribal liaisons could benefit from learning from their peers about how to best implement the tribal consultation process.

- **Office of Planning:** None.

- **Resource Center:** Develop training materials to educate State DOT tribal liaisons about effective practices in conducting tribal consultation.
- **Division Offices:** Encourage State DOT tribal liaisons to seek out training and to contact their counterparts at other State DOTs to identify ways to improve their consultation with tribes in their State.

1.3.4 Participating in statewide tribal transportation organizations can be an effective way for the Division Office, State DOTs, MPOs, and tribes to develop relationships, share information, and gather input on important issues. However, participation in these organizations does not take the place of tribal consultation with each individual tribe. Even if State DOTs and MPOs actively participate in statewide tribal transportation organizations, they are still required to conduct consultation with tribes in the planning process.

- **Office of Planning:** None.
- **Resource Center:** None.
- **Division Offices:** Participate in statewide tribal transportation organizations as is allowed by the organization, but ensure that the State DOT and MPOs are conducting consultation in the planning process beyond these meetings.

Focus Area 2: Division Office Oversight of Tribal Consultation in the Metropolitan Planning Process

2.1 Documentation of Division Office Processes for Metropolitan Tribal Consultation Oversight

State of the Practice

Similar to statewide oversight, each of the three Division Offices provides oversight for tribal consultation in the MPOs' planning processes and is aware of the tribal coordination being conducted by the relevant MPOs. However, none of the Division Offices document their oversight of tribal consultation for planning in SOPs or the FHWA/FTA MOA.

Recommendations

2.1.1 Division Offices would benefit from documenting their processes related to tribal consultation in the metropolitan planning process. This documentation should include the procedures for conducting oversight of MPO tribal consultation documentation and activities in the planning process.

- **Office of Planning:** None.
- **Resource Center:** None.
- **Division Offices:** Document the Division Office's internal procedures for conducting oversight of MPO tribal consultation documentation and activities in the planning process in SOPs or the FHWA/FTA MOA.

2.2 Division Office Oversight of Documented MPO Tribal Consultation Processes

State of the Practice

None of the three MPOs that the Review Team interviewed had written procedures for conducting tribal consultation. The Division Offices have not encouraged the MPOs to document their tribal consultation processes. However, the MPOs have modified their bylaws to allow for tribes to become members of the MPO and to serve on the technical or policy committees.

Recommendations

2.1.1 MPOs are required to have documented policies and procedures that define how the agency will consult with tribes for the planning process. MPOs should develop policies and procedures in consultation with each individual tribe in the region. Consultation policies and procedures may vary among the tribes in the region, as tribes should agree to their terms. The policies and procedures should outline the steps to be taken in tribal consultation for the planning process, define the protocols for communication, and identify the parties to be involved.

- **Office of Planning:** Provide guidance on how MPOs can develop and document their procedures for tribal consultation in the planning process.
- **Resource Center:** None.
- **Division Offices:** Work with MPOs to ensure that their policies and procedures for consulting with tribes in the planning process are detailed and documented.

2.3 Division Office Oversight of MPO Implementation of Consultation Processes

State of the Practice

Each of the MPOs has at least one tribe on their policy and/or technical committees/boards. The MPOs rely on their committee/board membership status to consult with tribes on the TIP, UPWP, and MTP. Generally, the MPOs conduct outreach to tribes in the same way that they conduct outreach to municipalities and to the general public. Some MPOs noted that they have worked directly with tribes in the past, but in the project development and implementation processes, not the planning process. The Division Offices were aware of tribal representation on MPO boards, but did not play a role in getting tribes a seat at the MPO table.

Effective Practice: Tribal Representation on MPO Boards and Committees

Each of the MPOs that the Review Team interviewed has a tribe on their policy board and/or technical committees. This allows for the tribes to be engaged in the metropolitan transportation planning process and to influence the planning for the region. In some cases, the MPOs modified their bylaws to allow tribes to join boards and committees.

The Review Team noted that the three Division Offices were more reactive than proactive in the MPOs' tribal consultation processes for planning, meaning that they participated in MPO meetings where tribes

had a seat at the table, but typically were not inserting themselves into tribal consultation in the metropolitan planning process. Furthermore, only one Division Office reviews MPO tribal consultation for planning through the TMA Certification Review process (one of the three Division Offices did not have a TMA in their State until after the 2010 Census, and that TMA has not had a Certification Review yet).

Through their oversight role, Division Office staff have an opportunity to encourage MPOs to improve their consultation with tribes in the planning process. Division Office staff can serve as advisors and facilitators as MPOs develop, document, and implement their tribal consultation policies and procedures.

Recommendations

2.3.1 Consultation with one tribe may be different than consultation with another tribe based on each individual tribe's needs and desires. However, the consultation that is conducted by the MPO should meet the expectations of each individual tribe.

- **Office of Planning:** None.
- **Resource Center:** None.
- **Division Offices:** Encourage and support MPOs as they work with each individual tribe in their regions to develop a consultation process that meets the needs of that tribe. Monitor the consultation process to ensure that tribes are satisfied with its implementation.

2.3.2 Division Offices are responsible for conducting oversight for the transportation planning process, which includes tribal consultation. Division Office staff should address tribal consultation through TMA Certification Reviews.

- **Office of Planning:** Highlight and clarify guidance on conducting oversight for tribal consultation in the metropolitan planning process.
- **Resource Center:** Develop training for Division Office staff on effective tribal consultation oversight.
- **Division Offices:** Review tribal consultation in the planning process via TMA Certification Reviews.

2.3.3 Division Office staff should serve as advisors and facilitators as MPOs develop and implement their tribal consultation policies and procedures. Division Offices should seek training to improve their understanding of tribal culture, sovereignty, and the Federal government's responsibilities towards tribes and tribal consultation in the planning process.

- **Office of Planning:** None.
- **Resource Center:** Develop and deliver training for Division Office staff on conducting oversight of tribal consultation in the planning process and encouraging effective practices among and MPOs.
- **Division Offices:** Seek training opportunities on oversight of tribal consultation in the planning process and encouraging effective tribal consultation practices among MPOs.

Focus Area 3: Conversations with the Tribes

3.1 Tribal Needs in the Planning Process

State of the Practice

The Review Team met with a total of six tribes in the three States it visited (two tribes per State), each of which had a unique perspective on tribal consultation in the planning process. Three of the tribes were satisfied with the consultation that the State DOT was conducting and, therefore, the Division Office's oversight of the State DOT for consultation in planning. Three of the tribes felt that the State DOT's consultation activities in planning and the Division Office's oversight did not meet their needs. Interestingly, each State had one tribe that was satisfied with tribal consultation in the planning process, and one that was dissatisfied. This indicates that there is a lack of consistency in how the State DOTs are conducting consultation in the planning process. Additionally, it indicates that the State DOTs are not tailoring their consultation activities to the needs of each individual tribe.

Recommendations

3.1.1 State DOTs should ensure that their consultation activities for planning meet the needs of each individual tribe. That may mean that the State DOT consults with one tribe in a different way than it consults with another. The Division Office, through its stewardship and oversight responsibilities, can help the State DOT to work with tribes directly to tailor their consultation activities to meet each tribe's needs.

- **Office of Planning:** None.
- **Resource Center:** None.
- **Division Offices:** Support or facilitate meetings with the State DOT and individual tribes to encourage them to come to an agreement on how to conduct tribal consultation in the planning process to meet the needs of that individual tribe.

3.2 Division Office Coordination with Tribes

State of the Practice

Two of the three Division Offices interact with tribes in the planning process through activities organized by other entities, but they have not developed individual relationships with the tribes outside of these external activities. The three Division Offices communicate and coordinate with tribes through activities organized by the State DOT and/or MPO (e.g., meetings with tribal representatives on the development of the LRTP).

All three Division Offices provide direct technical

Effective Practice: Division Office Staff Visiting Tribes with State DOT Tribal Liaison

Staff from the Maine Division Office travel to each tribe in the State with the Maine DOT tribal liaison once a year to discuss transportation issues. Meeting with tribal staff and/or leaders face-to-face helps to facilitate a relationship between FHWA and the tribes. In addition, the Division Office is able to assist with and provide direct oversight for the State DOT's one-on-one outreach to tribes.

assistance to tribes on the planning process, as requested by the tribes or by statewide tribal transportation organizations. The two Division Offices in States with statewide tribal transportation organizations noted that they present at these organizations' meetings on various planning topics.

Recommendations

3.2.1 Division Offices are encouraged to develop their own relationships with tribes in their State in the context of the transportation planning process. This helps build trust among tribal leadership and staff, who may feel more comfortable reaching out to the Division Office with questions or concerns if they have met someone face-to-face. If a tribe is not comfortable reaching out to FHWA, their needs may go unmet, particularly if the tribe has an adversarial relationship with the State DOT.

- **Office of Planning:** None.
- **Resource Center:** None.
- **Division Offices:** Meet with tribal leadership and/or staff, either in conjunction with the State DOT and MPOs, or separate, in order to understand their needs and to build relationships between FHWA and tribes for transportation planning.

Conclusion

Overall, the Review Team found that State DOTs and MPOs are coordinating with tribes in the transportation planning process, but that their activities do not always meet the threshold of consultation. State DOTs and MPOs need to develop mutually acceptable consultation processes with each of the tribes in their jurisdiction. Tribal consultation in the planning process must be documented. Also, Division Offices should enhance their oversight of State DOT and MPO tribal consultation to ensure that they are meeting the Federal requirements for tribal consultation.

Division Offices should review the effective practices described in this report for ideas to implement in their own States. The recommendations outlined in this report provide FHWA Headquarters, the Resource Center, and Division Offices suggestions for improving tribal consultation in the transportation planning process.

Appendix A: Legislation, Regulations, and Resources

Legislation

- Statewide Transportation Planning: 23 U.S.C. 135(e)-(g) and 23 U.S.C 135 (f)(4)(B)
- Metropolitan Transportation Planning: 23 U.S.C. 134(j)(3)(B), 23 U.S.C. 134(i)(2)(B)(ii), 23 U.S.C. 134(k)(5), and 23 U.S.C. 101(a)(23)

Regulations

- Statewide Transportation Planning: 23 CFR 450.104, 450.208(a)(5), 450.210(c), 450.214(h-i), and 450.216(d)
- Metropolitan Transportation Planning: 23 CFR 450.104, 450.302, 450.312(i), 450.316(c),and 450.330(a)
- Executive Order 13175 – Consultation and Coordination with Indian Tribal Governments. November 6, 2000.
- DOT Order 5301.1 – Department of Transportation Programs, Policies, and Procedures Affecting American Indians, Alaska Natives, and Tribes. November 16, 1999.
- Presidential Memorandum for the Heads of Executive Departments and Agencies: Tribal Consultation. November 5, 2009.

Resources

- Tribal Transportation Planning Module Series: Tribal Consultation
- FHWA/FTA Field Planner Guidebook: Tribal Consultation Process
- FHWA Office of Planning Tribal Transportation Planning Resource Guide

Appendix B: Review Team Members

Brian Betlyon	FHWA Resource Center
Travis Black	FHWA Office of Planning
Jared Fijalkowski	U.S. DOT Volpe Center
Theresa Hutchins	FHWA Office of Planning
Kyle Kitchel	FHWA Office of Federal Lands Highway
Michelle Noch	FHWA Office of Planning

Appendix C: Discussion Questions

Questions Posed to Division Office

Division Office Consultation

- Have the tribes reached out to the Division Office directly? How has the Division Office responded to inquiries from tribes?
- What has the Division Office's interaction been with the tribes that the Review Team is visiting? At what level within the tribes has this interaction been?
- Has the Division Office coordinated with Federal Lands Highway for projects to be included in the STIP? Have any of these projects been related to tribes?
- Is there a statewide tribal transportation organization to which tribes belong? Has the Division Office been involved this organization?
- Are you aware of the Consultation guidance? How has that influenced your involvement with the tribes?

State DOT Consultation

- Are you familiar with the State DOT's tribal consultation process for planning? What is your involvement in it? Have you participated in it directly?
- How has tribal consultation in planning been addressed through the Federal Planning Finding process? Are there specific questions you ask or issues you've found? How have you followed up to ensure they are resolved?
- How does the State DOT's tribal consultation process for planning compare to its Section 106 consultation process?

MPO Consultation

- Are you familiar with the MPO's tribal consultation process for planning? What is your involvement in it? Have you participated in it directly?
- How has tribal consultation in planning been addressed through the TMA Certification Review process? Are there specific questions you ask or issues you've found? How have you followed up to ensure they are resolved?

Questions Posed to State DOT

State DOT Tribal Consultation in the Planning Process

- Could you describe your tribal consultation process for planning? With whom and at what level within the tribe do you consult? Is there a different process for each individual tribe?
- How was the current planning tribal consultation process developed? What process did you go through initially to ensure the tribe is involved in a way that meets their needs and expectations? How was the process negotiated with each tribe?
- How are you implementing the consultation policy?
- How has the consultation process evolved over time? Have you made any changes that have improved the consultation process or your relationships with the tribes?
- What improvements do you see in the future for tribal consultation for planning?

- Is your tribal consultation process for planning related to your Section 106 process? If so, how?
- How do you involve tribes in the development of the STIP? The LRTP? Could you tell us more about the upcoming LRTP meetings with tribes?
- How have you evaluated your tribal consultation process for effectiveness? What are your indicators? How often do you evaluate it?
- What have been some of your successes in tribal consultation for planning? What have been some of your challenges? How have you overcome them?
- What are some of your lessons learned from working with tribes in the consultation process for planning?
- Have you been involved in a statewide tribal transportation organization? What has been the nature of your involvement?
- How do you accommodate cultural differences (meeting face to face, training staff for cultural awareness, etc.)? What role does technology play in your interactions with tribes?
- Is this process included explicitly in your public involvement procedures?
- What has your relationship been like for the tribes that the Review Team is visiting? How do you communicate with them? Have there been any challenges in working with these tribes?
- Have you developed a relationship with the tribes or individuals within the tribes?
- Has the Division Office provided you guidance or answered your questions about tribal consultation for planning?
- What do you need to reach your goals (resources, technical assistance, training, etc.)?

Questions Posed to MPO

MPO Tribal Consultation in the Planning Process

- Do you have a documented tribal consultation process for planning? If so, could you describe it? With whom and at what level within the tribe do you consult? Is there a different process for each individual tribe?
- How was the current planning tribal consultation process developed? What process did you go through initially to ensure the tribe is involved in a way that meets their needs and expectations? How was the process negotiated with each tribe?
- How has the consultation process evolved over time? Have you made any changes that have improved the consultation process or your relationships with the tribes?
- What improvements do you see in the future for tribal consultation for planning?
- How do you involve tribes in the development of the TIP?
- How have you evaluated your tribal consultation process for effectiveness? What are your indicators? How often do you evaluate it?
- What have been some of your successes in tribal consultation for planning? What have been some of your challenges? How have you overcome them?
- What are some of your lessons learned from working with tribes in the consultation process for planning?
- Have you been involved in a statewide tribal transportation organization? What has been the nature of your involvement?

- How do you accommodate cultural differences (meeting face to face, training staff for cultural awareness, etc.)? What role does technology play in your interactions with tribes?
- Is the tribal consultation process for planning included as a stand-alone chapter in the Public Involvement Plan?
- We are visiting the Penobscot Tribe. What has your relationship been like for this this tribe? How do you communicate with them? Have there been any challenges in working with them?
- Have you developed a relationship with the tribe or individuals within the tribe?
- Do you have any non-resident tribes in your planning area? If so, how do you consult with them?
- Has the Division Office provided you guidance or answered your questions about tribal consultation for planning?
- What do you need to reach your goals (resources, technical assistance, training, etc.)?

Questions Posed to Tribes

Tribal Transportation Planning Overview

- Could you please tell us anything you'd like us to know about your tribe?
- What are the most important transportation issues that your tribe faces? How are you addressing those issues?
- Could you please describe your transportation planning process? Who is involved? How are decisions about which issues to address or which projects to implement made?
- Have you been involved in a statewide tribal transportation organization? How has it helped you address your transportation issues?

Coordination with FHWA

- Have you reached out to the Division Office in your State with questions about transportation planning? Did you get the information you needed?
- How could FHWA help you implement your transportation planning process to address your transportation issues?

Coordination with State DOT

- How was consultation with the State DOT developed? What process did you go through initially to ensure you were involved in a way that meets your needs and expectations? What was Tribal Leadership's role in determining how tribal consultation would be executed?
- How has the consultation process evolved over time? Was there a specific issue that changed it? How have you worked with the State DOT to ensure the process remains valuable to the tribe? What has the State DOT done to add value to you? Do you see any gaps in the consultation policy?
- How has the State DOT consulted with your tribe on the development of the STIP and LRTP? Has this consultation been working for you?
- Do you have any representatives on any State DOT committees?
- Are you satisfied with the consultation that the State DOT is conducting? What would you like to see change?

Coordination with MPO

- How was consultation with the MPO developed? What process did you go through initially to ensure you were involved in a way that meets your needs and expectations? What was Tribal Leadership's role in determining how tribal consultation would be executed?
- How has the consultation process evolved over time? Was there a specific issue that changed it? How have you worked with the MPO to ensure the process remains valuable to the tribe? What has the MPO done to add value to you?
- How has the State DOT consulted with your tribe on the development of the TIP? Has this consultation been working for you?
- What has been Tribal leadership's role in the consultation process?
- Are you satisfied with the consultation that the MPO is conducting? What would you like to see change?

Appendix D: Requested Desk Review Documents

The Review Team requested that the Division Offices participating in the State-of-the-Practice Review send the following documents for review:

- Documented Division Office processes or procedures for conducting oversight of State DOT and/or MPO consultation with tribes in the planning process
- State DOT tribal consultation policy
- MPO tribal consultation policy
- Statewide tribal transportation organization meeting agendas and materials
- MPO bylaws (as they relate to tribal involvement)
- Communications between the Division Office, State DOT, and or MPO and tribes

Appendix E: Acronyms

DOT	Department of Transportation
FTA	Federal Transit Administration
FHWA	Federal Highway Administration
LRTP	Long-Range Transportation Plan
MOA	Memorandum of Agreement
MPO	Metropolitan Planning Organization
MTP	Metropolitan Transportation Plan
OTTC	Oklahoma Tribal Transportation Council
STIP	Statewide Transportation Improvement Program
TIP	Transportation Improvement Program
TMA	Transportation Management Area
TTAP	Tribal Technical Assistance Program
TTPO	Washington Tribal Transportation Planning Organization
UPWP	Unified Planning Work Program
VTT	Virtual Tribal Team