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Instructor Guide
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Environmental Factors in Construction and Maintenance

Instructor-led Training Session
Instructor Guide

NATIONAL HIGHWAY INSTITUTE

U.S. Department of Transportation
Federal Highway Administration

Table of Contents

I. Introduction

Every State's highway agency participates in construction projects that have environmental considerations. Highway construction and maintenance activities can have direct effects and unintended consequences on the surrounding environment. Contract documents contain provisions and commitments to protect environmental resources. It is important for personnel to understand the nature of project environmental commitments, as well as best practices to minimize the impacts to natural resources and the surrounding community.

These commitments, their importance, and their application to the project are not always apparent to the construction and maintenance crews. This course intends to bridge the gap between "why" environmental commitments are assigned and "how" environmental commitments are carried out.

"Honoring environmental commitments" is the main theme that runs throughout the entire course. Complications in honoring those commitments may affect the timeline and budget of the project. In many cases, complications can be prevented or reduced by inspectors' understanding of environmental commitments, adherence to the plan, early and frequent communication around construction complications, and greater awareness of the potential for unexpected encounters.

This course provides knowledge and resources that enable participants to identify and address potential issues at the earliest possible stage of the project, and to encourage affective changes in participants that lead to consideration of environmental commitments and the application of early intervention techniques where possible.

II. Course Goal and Outcomes

A. Course Goal

The goal of NHI 134080 is to promote balance: the need for environmental protection balanced with the need to complete construction and maintenance activities in a timely and financially responsible manner.

Generally, the design and content of the course strive to take the learners beyond their recognized discipline expertise to encourage building environmental considerations into their standard practice.

B. Course Outcomes

At the end of this course, participants will be able to:

- Relate design-phase environmental commitments to construction documents
- Explain your role in early and continuous communication to support commitments that occurred during design phase

- Recognize the importance of environmental protection during construction and maintenance operations
- Describe quality control measures and documentation that can be implemented through the construction sequence to provide environmental mitigation measures
- Recognize the role of the project inspectors (and environmental inspectors, when used) in addressing environmental issues
- Describe a variety of environmental compliance and commitment tracking tools
- Identify resources for consultation on environmental issues

Each module in the independent study materials (IS) and each lesson in the instructor-led training (ILT) session contains learning outcomes that, together, support mastery of these goals. An end-of-course assessment will test to ensure mastery of the goals.

III. Target Audience

This course is intended primarily for Federal, State, and local highway construction inspectors, maintenance supervisors, and other inspection and field personnel who must ensure that environmental impacts are identified and mitigated during construction and maintenance operations.

Highway designers, environmental agency representatives, and consultants also are encouraged to attend to share a variety of points of view and to understand the roles and processes of environmental commitments on construction and maintenance operations.

IV. Class Size

The maximum class size permitted by NHI is 30 people, with a minimum of 20.

V. Course Organization

The course is delivered in two parts. First, participants complete an independent study (IS) workbook. The workbook contains the first six modules of the training course. The materials focus on the agencies, regulations, permits, and commitments that construction and maintenance crews might encounter in a typical project. They explain the NEPA process and how it affects transportation projects. The IS content also explores construction and maintenance practices that can promote environmental stewardship.

Completing the independent study lessons involves reading the content, answering a variety of questions, locating departmental resources, and reviewing the individual State's guidance on each topic. Participants will share answers from their workbook with

classmates during the instructor-led training (ILT) session.

The ILT comprises 1.5 days, which typically includes classroom contact time each day, a one-hour lunch break and two 15-minute breaks on the first day, and one 15-minute break the second day . The session is modeled after a workshop, and includes case studies and discussion topics. The ILT is not lecture-based.

Below is the amount of time allotted to each lesson. Note that independent study times are approximate, and are dependent upon individual learning styles. The independent study materials do not need to be completed in one “sitting,” but they should be completed in order.

Activity	**Time (minutes)**
Independent Study Module I	60
Independent Study Module II	40
Independent Study Module III	60
Independent Study Module IV	40
Independent Study Module V	75
Independent Study Module VI	20

The instructor-led training session agenda begins on the next page. Note that start and end times may vary in accordance with State preferences and instructor availability. The upcoming agenda is a suggested format.

VI. Instructor-led Training Session Agenda

Time	Lesson Title	Est. Time (min)
Day 1		
8:00 – 9:00	Lesson 0: Introduction	60
9:00 – 10:00	Lesson 1: Review Independent Study Materials	60
10:00 – 10:15	*Break*	*15*
10:15 – 11:45	Lesson 1, continued	90
11:45 – 12:45	*Lunch*	*60*
12:45 – 2:05	Lesson 2, Case Study #1	80
2:05 – 2:20	*Break*	*15*
2:20 – 3:50	Lesson 2, Case Study #2	90
Day 2		
8:00 – 8:10	Reconvene	10
8:10 – 9:40	Lesson 2, Case Study #3	90
9:40 – 10:10	Review	30
10:10 – 10:25	*Break*	*15*
10:25 – 10:55	Lesson 3: Hot Topics	30
10:55 – 11:55	End-of-course Assessment (exam)	60
11:55 – 12:00	Course Evaluation	5

VII. Coordination of Course Scheduling and Registration

The following individuals work together to coordinate the delivery of this course.

- NHI Training Program Manager
- Delivery contractor
- Course instructors
- State DOT Training Coordinator

Typically, the State DOT Training Coordinator provides Form FHWA-1530 with requested dates and training sites to the NHI Course Scheduler, who forwards this information to the delivery contractor. The contractor then contacts the State DOT Training Coordinator to discuss possible dates for the course. When a list of potential dates has been compiled, the contractor verifies the availability of instructors. The contractor then confirms the delivery date with the State DOT Training Coordinator, the NHI Course Scheduler, and instructors.

After the date is confirmed, NHI's Course Scheduler submits the FHWA-1530 with the agreed-upon date to the NHI Training Program Manager (TPM) for approval. When the TPM approves the FHWA-1530, the course session is formally scheduled. This authorizes the contractor to conduct the course. NHI emails confirmation (including the NHI session identification number) to the instructors.

After the course date and location is confirmed, NHI 134080 requires the lead instructor to send an email to the DOT Training Coordinator or other contact person. This email includes information about downloading and completing the required independent study workbook and preparing for the classroom session.

See the example email on the next page.

A. Sample Pre-event Email

From: {Course Instructor}
Sent: {Date}
To: { Local Training Coordinator}
Cc: {Training Program Manager, Co-Instructors, FHWA Division Training Coordinator}
Subject: NHI 134080 Environmental Factors in Construction and Maintenance: Accessing and Completing Independent Study Materials

Please forward this email to all training participants at least two weeks in advance of the scheduled instructor-led training session.

Hello!

We will be hosting The National Highway Institute's Environmental Factors in Construction and Maintenance course on **{days, mm/dd/yy}.** The course is completed in two parts: an independent study workbook and the 1.5-day classroom session.

You must complete the independent study workbook before attending the instructor-led training session. The independent study workbook will take approximately five to six hours to complete. The workbook does not need to be completed at one time. However, all the modules and exercises in the independent study workbook need to be completed before attending the classroom session on **{days, mm/dd/yy}.**

Download the independent study workbook at **http://fhwa.adobeconnect.com/p47e7wlpkdn/** and **http://fhwa.adobeconnect.com/p7oitv9zzao/**. If you have any trouble accessing or downloading the independent study workbook, contact NHITraining@dot.gov to receive technical support or call (703)235-0500. You may access the materials today.

Print the workbook in black and white, double-sided. Print on 3-hole paper or use a 3-hole punch, and then insert the workbook into a binder. **Bring your completed workbook to the instructor-led classroom session.**

The instructor-led session is not lecture-based. It relies on your ability to use information you learned in the independent study. If you have not completed that material, you will not be able to participate fully in the classroom activities.

In order to receive full credit for this course, you must complete all independent study workbook materials, attend the entire instructor-led session, and pass the final exam with a score of 70% or better.

Thank you,
{Course Instructor}
{Course Instructor Organization}
{Course Instructor Office Number}
{Course Instructor Email Address}

VIII. Course Materials

NHI will ship 30 copies of each instructor-led training session participant workbook and the administrative package to the address specified by the State DOT Training Coordinator on the course request form (FHWA-1530). The administrative package contains registration forms, name cards, course evaluations, pencils, and course certificates. The State DOT Training Coordinator must notify the NHI Course Scheduler concerning any changes to the shipping address.

NHI course materials are produced and delivered with the expectation of 30 participants. A request for additional participants must be approved by the NHI Training Program Manager.

IX. Instructor: Presentation Requirements

A. Checklist: Before the Training Event

Three Weeks before Training

1. Confirm the training dates, location, and number of participants. (Thirty is the maximum number of participants.)
2. Send the pre-event email to the State Training Coordinator at least three weeks prior to instructor-led training event. NHI recommends allowing at least two weeks for participants to complete the independent study materials.
3. Collect necessary State-specific documents to make the session relevant and accurate. (See “Example Documents” checklist on page 13.)
4. Read and study the instructor guide and PowerPoint presentation. Familiarize yourself with the participant workbook.
5. Arrange for equipment and supplies with the State DOT Training Coordinator. Ensure you have the following items.

   - ❑ A computer loaded with Windows® 98 (or higher) and PowerPoint 2007
   - ❑ Electronic remote device to advance slides in the PowerPoint presentation, if available
   - ❑ LCD projector compatible with the available computer or the instructor’s laptop
   - ❑ Cables to connect projector to computer, if necessary
   - ❑ Spare projector bulb, if possible
   - ❑ Speakers to project audio for video clips played via the laptop or PC, if necessary
   - ❑ Projection screen
   - ❑ Microphone, if necessary
   - ❑ Power strip
   - ❑ Twenty-foot or longer extension cord
   - ❑ **Six** flip charts with **adequate number of large markers**, assorted colors (Note: this course requires five flip charts for participant activities and at least one flip chart for instructor notes)
   - ❑ Large black markers for student name tents (at least one marker for every two participants)
   - ❑ Masking tape

Day before or Several Hours before Training

1. Ensure you have the facilities and resources for a successful training event, as requested from State Training Coordinator. (See item #4, above.)
2. Check training facility to ensure that all the following materials have arrived.
   - ❑ Participant workbook, one copy for each participant
   - ❑ Participant registration forms, one for each participant
   - ❑ Course and instructor evaluation, one for each participant
   - ❑ NHI session roster
   - ❑ Certificates of attendance
   - ❑ Pencils, one for each participant
3. Make sure you have brought the following items with you.
   - ❑ Instructor guide, one copy for each instructor
   - ❑ PowerPoint presentation
   - ❑ Course exam(s) and answer key(s)
   - ❑ NHI instructor number for each instructor
   - ❑ NHI session identification number
4. Post the course title, course number, session number, and instructor names and identification numbers on flip chart paper at the front of the room. Leave this information posted until participants have all turned in their completed registration and course evaluation forms.
5. Prepare a flip chart of ground rules. Post it in a visible location throughout the training session.
6. Ensure the room is set up properly. (This course requires 6 small group tables with room to talk in between, set up flipcharts, and actively engage in case study activities. Do not set up the room in auditorium or lecture hall style.)
7. Test the equipment.
8. Sign the certificates of attendance.
9. Ensure the following items are placed at each attendee's seat.
   - ❑ One copy of the participant workbook
   - ❑ One tent card
   - ❑ One pencil
   - ❑ One black marker for every two participants (so they can write their names on the tent card)
   - ❑ One participant registration form

B. During the Training Event

1. Arrive early. Give yourself plenty of time to get organized.
2. Start on time and stay on track. Always start on time, even if only one participant is in the room. Keep exercises within their time limits. End discussions when they cease to be productive. Lead participants away from digressions and tangents, and back to the lesson.
3. Mentor participants during the case studies, and answer questions and offer guidance as appropriate. Ensure participants are on track as they work. Give constructive feedback during the study sessions and discussions.
4. At the beginning of each lesson, review that lesson's learning outcomes. Make sure participants are fully aware of the topics to be addressed in the lesson. Then, at the end of each lesson, review the outcomes again using review questions or an activity/exercise to ensure the outcomes were met.
5. Provide the certificate of attendance after the participants have returned the worksheet packets, evaluation forms, and course evaluation.

C. After the Training Event

1. Ensure you have gathered the following materials.
   - ❑ All participant registration forms, with both participant and instructor sections completed
   - ❑ All course and instructor evaluations
   - ❑ All completed exams
   - ❑ Completed NHI session roster
   - ❑ Completed NHI session cover sheet
2. Remove all excess items from the training site, such as flip chart notes and blank copies of the exam.
3. Within five days after the last day of the classroom session, fax or scan the session roster to NHI and mail the cover sheet, original session roster, worksheet packets and evaluation forms, course evaluations, and participant registration forms to the NHI Training Program Manager. The NHI Training Program Coordinator will send copies of the evaluation forms to the contractor.

X. Example Documents Checklist

The instructor should collect, at minimum, the documents and process flows indicated below. Use these documents throughout the course to make each lesson relevant to the participants in that particular State.

- ❑ NEPA examples
  - ❑ Categorical Exclusion Evaluation (CEE)

  or
  - ❑ Environmental Assessment FONSI with commitments
- ❑ NPDES Permit (copy of a permit issued to the State DOT, including conditions, drawings, signatures, and so forth)
  - ❑ Notice of Violation to facilitate discussion of unexpected encounters and their effects on projects
  - ❑ Notice of Termination to highlight a successful project completion
- ❑ Section 404 Permit (and State equivalent, if available)
  - ❑ Copy of cover letter from USACE District Office
  - ❑ Permit including general and special conditions
  - ❑ Drawings
  - ❑ Associated forms (such as project completion form)
- ❑ Environmental Commitment Tracking Form (copy of the State tool that helps them track commitments)
- ❑ Process flow to show origin of commitments, phases of project development and delivery (construction), owners of each part of the process, and rough timelines
- ❑ Contact lists
  - ❑ State DOT Environmental Units
  - ❑ Emergency response contacts
  - ❑ Organization chart of DOT structure and how Environmental Unit functions in the “big picture”

XI. Instructor-led Training Session Content

NOTICE

It is important for the instructor to **present this course as directed in the instructor guide.** "Hitting the mark" on the course goals and outcomes requires that all questions are answered completely and correctly, and that all case studies are explored fully. Because this session is not lecture-based, all of the questions and activities must be fully realized so that the learning comes from those activities and the participants master the intended learning outcomes.

The strength of a course such as this one is the way participants come to many conclusions and learn much of the content through their own means. Using knowledge they already have, sharing practices within small and large groups, and building knowledge through critical thinking are all ways that learners acquire knowledge. However, the instructor facilitates the activities and guides the conversation so that learners take away the ability to apply that knowledge in the field, internalize the best practices, and understand how one area directly affects another area. It is the instructor's job to synthesize content and ideas so that participants can have that "Aha!" moment.

For example, there are three case studies. Each case study asks essentially the same questions. However, engaging in each case study should feel like a fresh experience for the learners. It is up to the instructor to remind learners that the case study questions are ones that he or she should ask every time on every project. The answers should not be the same; there is no boilerplate group of agencies or set of expectations that apply to every project or geographical area.

In other words, it is up to the instructor—with support and guidance from the instructor guide—to make this course relevant, exciting, and important.

1. Remind participants that they have an "Instructor-led Training Session Participant Workbook" on the table in front of them today. The slides in the "Instructor-led Session Participant Workbook" are included so that participants can follow along with the slides being shown in class (if desired). However, it **is not necessary** for participants to use that book until we begin the case studies.

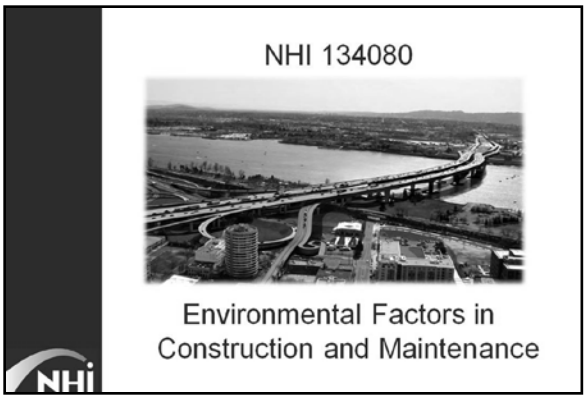
   Instead, they should be referring to the **"Independent Study Participant Workbook"** that they previously completed and brought with them today. **All the information they need for the first morning of instructor-led class is in the independent study materials.**

   The instructor must consistently provide page numbers (as stated in the instructor guide) so participants use the independent study materials in class.
2. Enough time has been provided so that the first morning's review is meaningful. Use the time and fully explore the answers to the questions.
3. Provide as many Sate-specific example documents and regulations as possible. Be prepared by researching the State ahead of class time. Simply asking participants, "How do you do that in your State?" will not be adequate for this class.
4. Provide plenty of opportunities for participants to share their ideas on local and State

resources. They may have captured some of these resources in their independent study workbook.

5. Follow the guidance in this instructor guide. It contains important verbiage and ideas for tying together ideas and themes. Where bold instructions indicate, follow that guidance exactly or use those words.

Thank you. Have fun; this course provides a great level of exploration and can be full of exciting discoveries for the learners.



Slide 1

Transition Message

Display this slide while participants are arriving in the classroom.

Instruction

As participants arrive:

- Instruct them to write their names on the tent cards at their seats.
- Ask them to add the instructor-led session workbook pages to their independent study workbooks.
- Explain how to begin filling out the necessary forms. Point out the instructor number and session number posted at the front of the room.

Interactivity

Informally welcome each participant as he or she arrives. Make the participants feel at ease.

Timing

This is a pre-class event.

Notes

See “Notice” on next page.

Advance to the next slide.

Slide 2

LESSON PLAN

Lesson Number and Title

Lesson 0: Introduction to Instructor-led Training Session

Learning Outcomes

This lesson supports all independent study learning outcomes.

Instructional Methodology

This lesson utilizes a variety of methods to encourage participants to form a cohesive unit so they can engage in supportive actions in small groups throughout the rest of the session. It offers the opportunity to emphasize the instructor's credibility and accessibility. Finally, this lesson provides a means to begin reinforcing independent study content.

Specifically, the lesson includes these methods: brief lecture, facilitated discussions, an icebreaker, and an opportunity to explore "What's in it for me?"

Instruction Day and Time Allocation

Day 1; Morning; 60 minutes

Evaluation Plan

Participant learning will be evaluated throughout the session by instructor questioning and assessment, engagement and contributions during discussions of independent study materials, participation in activities exercises, and case studies, and the formal end-of-course evaluation instrument.

References

All references are listed at the end of the workbook. If a specific resource is required for a discussion topic during the instructor-led session, it will be noted on the appropriate page.

Slide 3

Transition Message

Welcome! It is important to begin promptly so that we can cover all the materials.

Instruction

- Introduce yourself by name only; you will explain your credentials and interest in the course in a few minutes.
- Be sure everyone has completed a name tent card, properly registered and signed the attendance form for NHI, and signed the attendance form from the State (if any).
- Remind participants to sign in this morning and afternoon—as well as tomorrow morning—in order to receive full credit for attending.

Animate the slide once to display an exit sign.
Animate the slide once more to display rest room graphics.
Animate the slide again to display snack graphics.

- With each slide animation, offer housekeeping details, such as the location of emergency exits, rest rooms, break rooms, and so forth.

Animate the slide once more to display "clock" graphic.

- Provide some information about the local area or lunch suggestions if possible.
- Also emphasize the importance of returning to class promptly at the end of breaks and lunch.

Animate the slide a final time to display a cell phone.

- State your expectations on the use of cell phones and email or texting. Point out appropriate areas of the building (outside the training room) where phone and email use is permitted.
- Explain how you prefer to manage the classroom experience. For example, should participants ask questions at any time or wait for a specific time?; should participants raise hands and wait to be called on or simply call out a question?

Interactivity

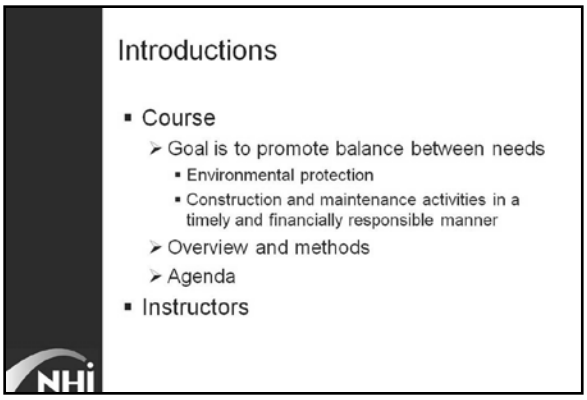
N/A

Timing

8 minutes

Notes

Advance to the next slide.



Slide 4

Transition Message

Now it is time to start the introductions.

First, let's introduce the session.

This session will provide opportunities to apply the lessons learned from independent study.

Instruction

Animate the slide once to display the first bullet item.

Review the overall goals of this course. Refer participants to page 6 in their independent study (IS) workbooks to view the goals.

- Relate design-phase environmental commitments to construction documents
- Explain your role in early and continuous communication to support commitments that occurred during design phase
- Recognize the importance of environmental protection during construction and maintenance operations
- Describe quality control measures and documentation that can be implemented through the construction sequence to provide environmental mitigation measures
- Recognize the role of the project inspectors (and environmental inspectors, when used) in addressing environmental issues
- Describe a variety of environmental compliance and commitment tracking tools
- Identify resources for consultation on environmental issues

Animate the slide to display the next bullet.

Remind the class that everyone started working towards the course goals during the independent study. The instructor-led session will help us complete the mastery of those goals.

This session is not a traditional, lecture-based session. It will be more of a workshop or work session. Everyone is expected to share answers from the independent study exercises, and then we will apply that content to three case studies from around the US.

Towards the end of the session, some time will be devoted to hot topics and emerging trends in

the environment and transportation construction and maintenance practices.

Animate the slide to display the next (agenda) bullet.

Review the agenda.

Animate the slide to display the final bullet.

Instructors now introduce themselves and share their experience with this content area and with instructing any other courses.

Interactivity

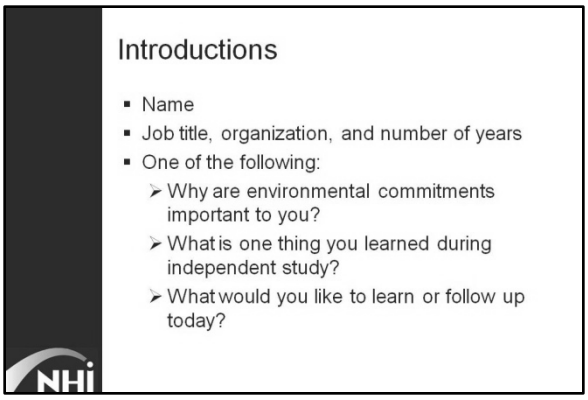
N/A

Timing

15 minutes

Notes

Advance to the next slide.



Slide 5

Transition Message

Now let's find out a little about each of you.

Instruction

N/A

Interactivity

Ask each participant to introduce himself or herself with name, job title, agency or company (if appropriate), and number of years' experience.

Then ask each participant to choose and answer one of the remaining questions on the slide.

(Note that the answer to the first question comes from the independent study workbook, page 14.)

Capture the answers to different questions on separate flip charts. (There will be three flip charts—why commitments are important; what participants learned from IS; and what new knowledge participant wants to learn.) Note: if the class is small, participants can write their own answers on the flip charts.

Timing

30 minutes (allow approximately one minute per participant)

Notes

Advance to the next slide.

Slide 6

Transition Message

Some of you are here because you want to be, and some because your boss said you should be. No matter what the reason you came, we think you will learn something—and contribute something to others' learning—if you participate fully.

It's not unusual—in fact, everyone who goes to training wants to know—what is in it for me? What will make this class worth my time? Let's answer that question now.

Instruction

NOTE: Below is essential information to introduce the course. Present exactly as written.

Environmental commitments are not going to go away. Neither are construction and maintenance projects. The challenge is to balance the need for environmental protection with those transportation jobs.

If you are alert and aware of your job site, and if you are knowledgeable about the project documents, you will have a great advantage over some others.

Animate the slide to display photo of angry man.

You see, right now, **some** where, **some** body, is doing **some** thing that is getting him or her into big trouble. She might have dug up, cut down, displaced, or mowed over something.

Animate the slide to show photo of angry woman on phone.

He might have caused vibratory damage to expensive equipment or caused a loss of income to a small business.

Animate the slide to show photo of fireworks.

We want **you** to be the somebody that knows enough about the many agencies, regulations, and commitments to not only stay out of hot water, but also to get noticed for the **right** reasons.

In this course, we will try to bridge that knowledge gap so that you understand not only **what and why** certain restrictions are in place, but also **how** to accommodate them.

You see, you do not need to become an expert on all these agencies and regulations. You need to know enough to realize what should happen on a project and you need to know enough to realize when something isn't quite right.

Animate the slide to show photo of street sign.

In the end, you will be the ones who complete the projects, honor the commitments, and provide that healthy balance in all the communities.

Interactivity

N/A

Timing

7 minutes

Notes

Advance to the next slide.

Slide 7

LESSON PLAN

Lesson Number and Title

Lesson 1: Review of Independent Study Materials

Learning Outcomes

This lesson supports all independent study learning outcomes.

Instructional Methodology

This lesson utilizes a variety of methods to review and reinforce the independent study content.

Specifically, the lesson includes these methods: brief lecture, facilitated discussions, small group discussions, and individual sharing of best practices and experiences.

NOTE: This material is meant to be covered by questioning the audience. The instructor does not lecture.

Instruction Day and Time Allocation

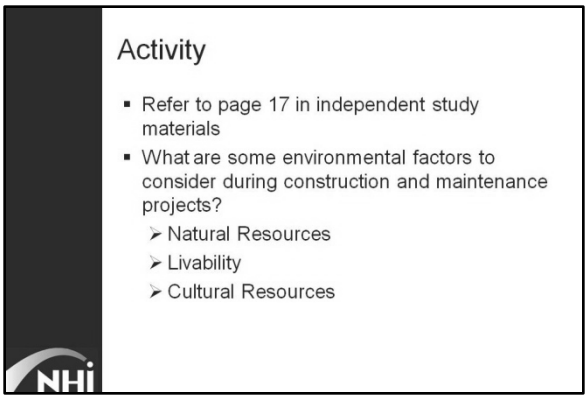
Day 1; Morning; 150 minutes (plus a 15-minute break at the halfway point)

Evaluation Plan

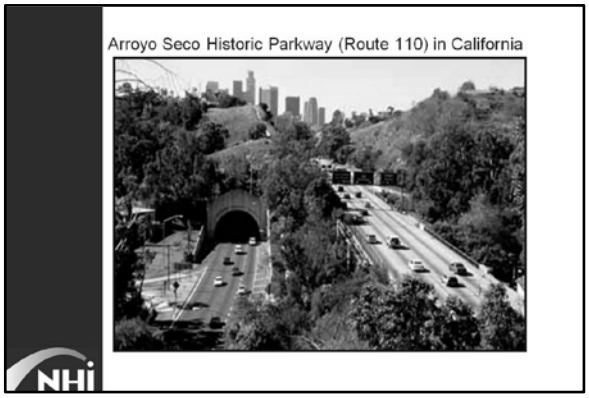
Participant learning will be evaluated throughout the session by instructor questioning and assessment, engagement and contributions during discussions of independent study materials, participation in activities exercises, and case studies, and the formal end-of-course evaluation instrument.

References

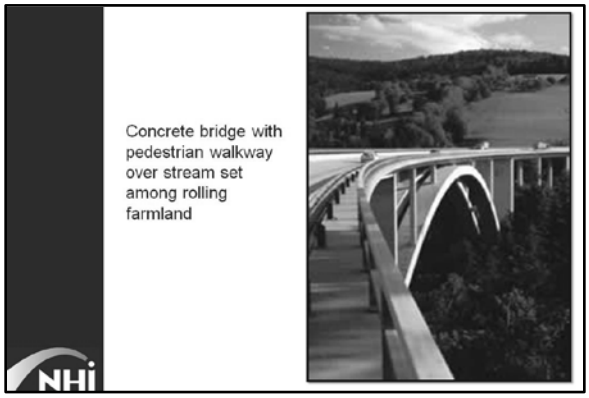
All references are listed at the end of the workbook. If a specific resource is required for a discussion topic during the instructor-led session, it will be noted on the appropriate page.



Slide 8



Slide 9



Slide 10

Transition Message

We are going to get right to work. We will divide into six small groups.

Instruction

N/A

Interactivity

Divide the participants into six groups. Provide flip chart paper and markers to each of the groups. There are three categories in this exercise, so two groups will cover each category.

The three categories are: Natural Resources; Livability; and Cultural Resources.

Display Slide 8.

Assign each of the categories to the groups. The groups write on flip chart paper all the answers that their group members had written in the IS workbook, page 17,

During debrief, allow one group to list items and then the other group with that category can add any that have not already been identified. Then ask class members if anyone has anything else to add under the category.

To make this most meaningful, engage the participants in the following discussions:

- Encourage **discussion of specific activities** that pertain to the items listed. **Add some practical guidance**, such as using a monitoring well or checking turbidity up and down stream; discuss permit requirements; ask for participants' experiences with winter range, migration, or herd disruption.
- Ask participants to **indicate what activities they engage in that affect the resources** they listed. (This was an activity in independent study. Ask them to name a few so the instructor can help "connect the dots" between the environment, the commitments, and the construction or maintenance activities.)
- Summarize at the end by asking, **"What can you do to make your projects more environmentally friendly?"**

Make sure that the answers shown on the following page, at minimum, are brought out during the exercise. If groups or individuals do not list these items, the instructor should add them to the list.

Post flip charts around the room, and refer to them throughout the rest of the session.

Display Slide 9.

After each category has been reported on, ask some members of the class to look at the photo on the slide and point out some of the factors that will apply to the environment(s) depicted. Relate the discussion to the three factors just discussed. Ask what types of construction or maintenance tasks could be limited in this type environment(s).

Display Slide 10.

Then ask several participants to look at the photo on this slide, comparing it to the previous slide and pointing out some of the factors that will apply to the environment(s) depicted. Relate the discussion to the three factors just discussed. Also note what types of construction activities might be of most concern.

Emphasize that knowing some of the basics about environmental agencies and commitments, along with knowing about the uniqueness of each project's environments, is the first step in realizing what is going "right" and what should send up red flags on any given project.

Timing

23 minutes (allow 8 minutes for groups to write answers and 15 minutes for debriefing)

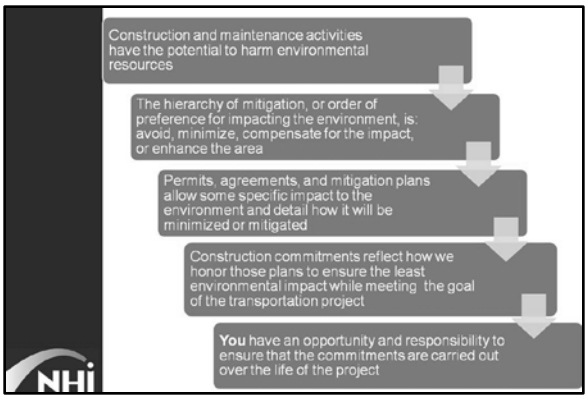
Notes

A grid from page 17 of the IS with example answers is shown on the next page. No slide shows correct answers; this exercise is debriefed using answers on flip charts.

Advance to the next slide when exercise is completed.

Environmental Factors to Consider During Construction and Maintenance Projects

Natural Resources	Livability (social factors or quality of life issues)	Cultural Resources
Water Wetlands, streams, rivers, lakes, floodplains Water quality, pollutants to streams by impervious surfaces	**Noise, light, and vibrations** Time of day restrictions for noise Vibration near hospitals Light affecting species	**Historical structures (above ground)** Historic bridges Removal of historic structures
Air Air quality, dust, carbon dioxide emissions, ozone, particulates Dust from construction equipment	**Time-of-day restrictions** Noise Construction Traffic patterns	**Prehistoric archaeological resources** Arrowheads Removal of resources
Soils Taking prime farmland, soils of statewide importance, hydric soils, etc. Erosion from cuts and fills	**Socio-economic impacts (environmental justice)** Effects on a minority population Effects on jobs, businesses Residential displacements	**Historic archaeological resources (below ground)** Arrowheads or pottery Human remains Removal of resources
Wildlife Endangered species, species of special concern, threatened species, migratory birds Invasive species Impacts on wildlife from highway mortality	**Public safety** Crashes Truck traffic Americans with Disabilities Act (ADA) compliance	**Paleontological resources (bones and plants)** Discovery of bones or fossils
Vegetation Invasive species Introduction of species near highways	**Underground storage tanks** Leaks; threats to groundwater	
Other: Geology Aesthetics Sustainability Budget concerns	**Other:** Changes to land use Aesthetics and livable, walkable communities Sustainability Budget concerns	**Other:** Aesthetics Budget concerns Sustainability



Slide 11

Transition Message

It is obvious that construction and maintenance activities—while necessary for public good—can cause some environmental impacts. That is why we try to achieve balance.

Instruction

Animate the slide five times to display each of the graphical elements, one at a time, discussing each as necessary before displaying the next.

First preference is to avoid harming the environment. Then, if that is not possible, we look for ways to minimize the impact. Finally, if we must have impact, then we mitigate or enhance what existed.

Permits authorizing impacts and agreements are made long before construction begins. There is a project development continuum. Everything along the life of a project is connected—planning, design, permitting, construction, maintenance, and so forth. Construction and maintenance activities are affected by decisions and permits that occurred months or years prior to the let and notice to proceed. (Remember from the workbook the Caltrans story of the 3.5 million-year-old bones!)

Construction and maintenance have the responsibility to comply with decisions and permits.

Interactivity

We might think of it this way: when we buy a fishing license, we agree to abide by the conditions and rules that apply to our State's fishing codes. We might buy the license well before it is time to go fishing. But when the time comes to hit the stream, we live by the rules we agreed to—so that we can avoid fines and we can come back next week to fish again. It is not only keeping out of trouble that lets us fish again. It also is the lessened impact on the environment and the total fish population that all fishing enthusiasts have because the State set limits.

Ask participants to think of other ways we agree to rules and conditions for the public good. (Example answer: driving)

What does fishing (or the other participant answers) have in common with construction and maintenance activities that are permitted? Two answers: we follow rules; and there is risk in violation.

Summarize by noting we have an obligation to our employer to follow the rules and to do our

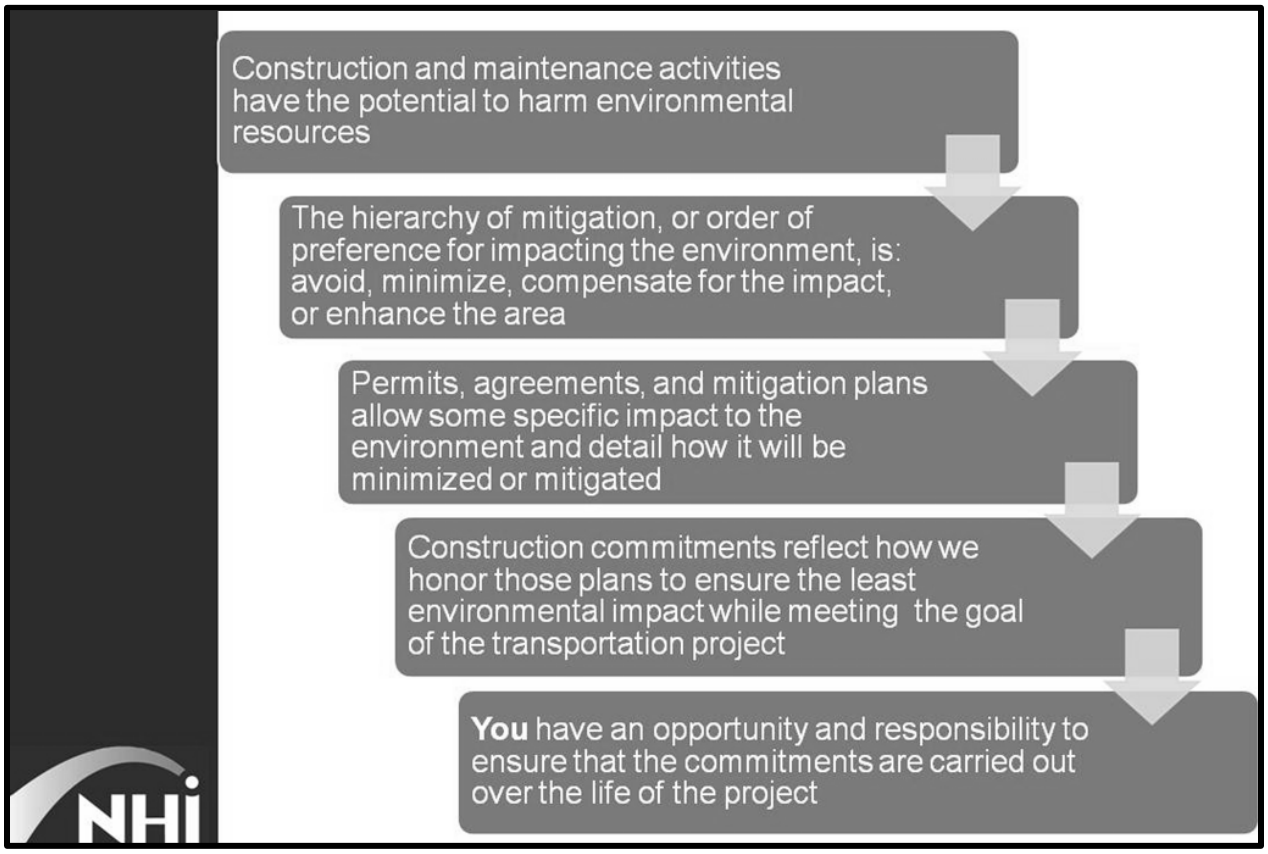
jobs well and correctly without incurring violations.

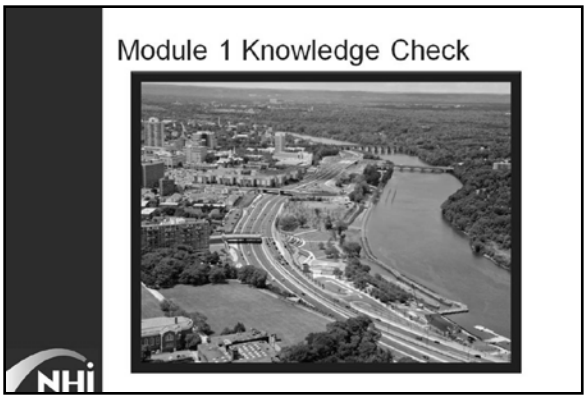
Timing

5 minutes

Notes

Advance to the next slide.





Slide 12

Transition Message

Throughout the classroom session, we will review the knowledge checks and other activities from the independent study materials. This will help ensure your understanding of the individual concepts, but it will also help us start building our knowledge, one step on top of another.

On pages 24-25 of the independent study materials, we asked for some generic ideas about issues that could have occurred during a project. This $215 million rehabilitation project occurred in New Jersey.

Instruction

Inform participants of the purpose of these generic activities in the IS workbook: to get them thinking about what **could** be involved in any given site, and to encourage them to start thinking about what documents and commitments they **should** know about on a project.

Interactivity

Ask participants to consult pages 24-25 of the IS workbook and call out answers to these questions. Do not spend much time on this; simply acknowledge answers and move on.

Note that there are countless answers to each question. A few possible answers are shown in the instructor's guide.

As a result of construction activities during the rehabilitation project shown:

- what short-term effects to the environment might have occurred during the project?

Possible answers: noise, traffic congestion, dust

- what long-term effects to the environment might have occurred during this project?

Possible answers: removal of wetlands; pervious surfaces; floodplains; wildlife highway mortality

- what could be some positive environmental effects of the project?

Possible answers: better flow of traffic; crash reduction; reduced queuing; economic development

- what could be some negative environmental effects of the project?

Possible answers: highway mortality; invasive species; wetland impacts; residential and

business displacements

- what could be some neutral (or mitigated) environmental effects of the project?

Wetlands, vegetation

As a result of environmental conditions that were present when the project began…

- how would construction activities have been affected or altered?

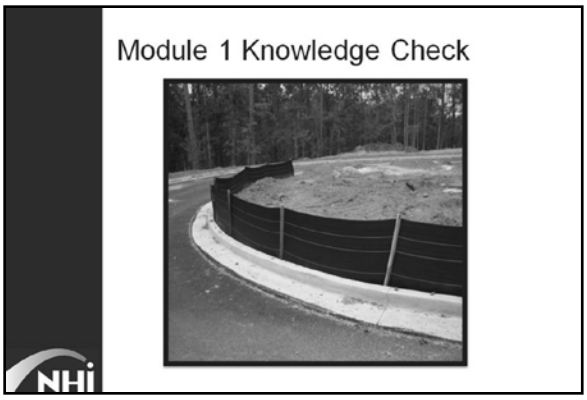
Delays; increased costs

Timing

10 minutes

Notes

Advance to the next slide.



Slide 13

Transition Message

On page 26 of the independent study materials, we asked for some generic ideas about issues that could have occurred during a project. This silt fence was erected on a side street off an inter-county connector.

Instruction

N/A

Interactivity

Ask participants to consult page 26 of the IS workbook and call out answers to these questions. Do not spend much time on this; simply acknowledge answers and move on.

As a result of construction or maintenance activities in the project shown above…

- what short-term effects to the environment might have occurred during this project?

Possible answers: erosion

- what long-term effects to the environment might have occurred during this project?

Possible answers: removal of habitat; wildlife mortality

As a result of environmental conditions that were present when the project began…

- what construction activities might have been affected by environmental concerns and commitments?

Instructor follows up by asking such questions as:

- What if a silt fence is there, but not installed correctly?
- What if it were not maintained correctly?
- What should you check after major storm events?

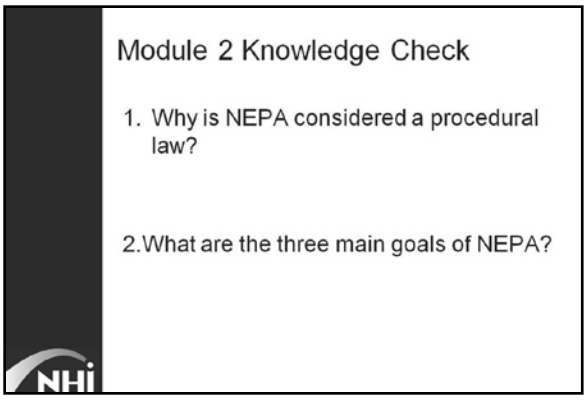
Timing

7 minutes

Notes

Ask participants to share questions or comments about independent study Module 1.

Advance to the next slide.



Slide 14

Transition Message

One of the ways NEPA is of great benefit is to serve as an umbrella for all those agencies and regulations that were discussed in the workbook. Imagine the challenges and frustrations we would face if we did not use this decisionmaking model!

The questions on this knowledge check mirror the expected learning outcomes for this lesson. Because our projects are so affected by the NEPA process, let's take just a few minutes to establish your understanding of it. If we can answer these questions, then we have definitely mastered the learning outcomes for Module 2.

Instruction

If there are questions about the material, the instructor should call on other members of the class to help. The instructor can provide the answer if no participant knows the answer. In that case, the instructor should be sure to explain the answer so that it is understood by all.

Interactivity

Animate the slide to display the first question.

1. Why is NEPA considered a "procedural law?"

*Possible answers: NEPA is a **process** that must be completed before construction begins. There are **laws under NEPA** that must be complied with. It is not a substantive law.*

Animate the slide to display the next question.

2. What are the three main goals of NEPA?

Answers: (a) declare national environmental policy; (b) establish procedural or decisionmaking framework; and (c) establish a CEQ.

Timing

8 minutes

Notes

Advance to the next slide.

Slide 15

Transition Message

This slide corresponds to Knowledge Check question #3 on page 45 of the workbook.

Instruction

If the class does not understand the material, the instructor should briefly explain. Otherwise, allow participants to answer the question and move on quickly.

Interactivity

Ask: How is public involvement and agency coordination utilized in the NEPA process?

Possible answer from workbooks: public involvement allows the public to provide input in the decisionmaking process. This can include meetings, Web sites, public hearings. Agency coordination allows agencies to provide input in its area of expertise into the decisionmaking process.

Animate the slide to display first two photos. Encourage participant responses that indicate that sound barriers might be in response to public requirements and that the look of a wall is often a result of community standards or input.

Animate the slide to display the next photograph.

Encourage participants to discuss public involvement techniques, such as the meeting shown here, discuss representing the entire community; and discuss other methods for public communication, such as news media, radio ads, handouts.

Animate the slide to display the final photograph.

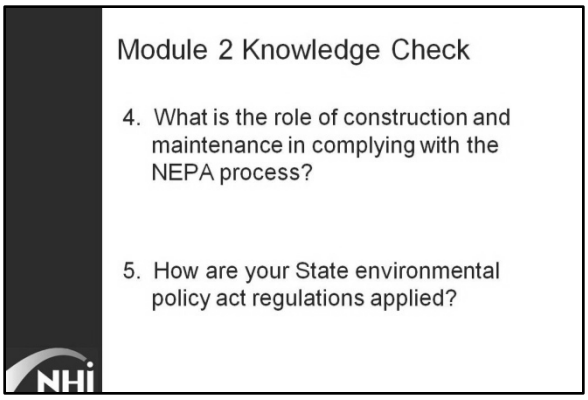
Encourage participants to discuss traffic delays, overloaded routes, and other public concerns that will be addressed in public involvement and agency coordination efforts.

Timing

7 minutes

Notes

Advance to the next slide.



Slide 16

Transition Message

This slide corresponds to questions #4 and #5 from the Knowledge Check for Module 2 (page 45 of the independent study workbook).

Instruction

Make the connection between the NEPA process and the participants' roles and responsibilities in the field. Emphasize the importance of the construction and maintenance personnel as you debrief question #4.

Also use the flipchart or a discussion to tie together the NEPA content. Recall the NEPA umbrella analogy. Also remind learners that commitments from NEPA process will be found in contract documents, and it is the construction and maintenance personnel's responsibility to know what the commitments are, know how to honor the commitments, and know when there is something out of the ordinary that should be reported.

Interactivity

Animate the slide to display the first question.

Ask participants to call out answers.

Possible answers: mitigation measures and environmental commitments that are identified and agreed to during NEPA are completed during construction and maintenance; might have tracking or documenting responsibilities; mitigation and maintenance might be for many years in the future.

Make sure that the answers also include: construction input is important at the earliest stage possible. Plans and commitments must be realistic and buildable; construction perspective can help ensure this.

Emphasize that there is incredible value in their ability to: be knowledgeable about contract documents; be aware of the commitments they are required to honor; and be on the lookout for unanticipated or unacceptable conditions.

Animate the slide to display the last question.

Ask participants to call out answers.

Possible answers: The State's environmental policy act is applied in each State through its own environmental policies, which may be more restrictive than the Federal counterpart.

Instructor must be prepared by knowing if the host State has an environmental policy act and, if so, what kind of policies it contains and how restrictive it is.

Timing

15 minutes

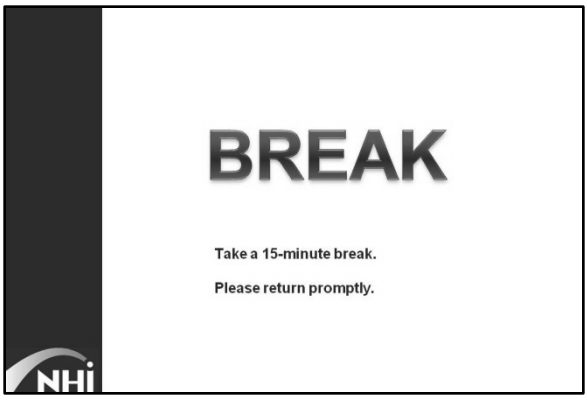
Notes

Take a minute to make a brief explanation—beginning to end—of how the NEPA process fits into project development and to reinforce how the commitments that flow out of NEPA process become the responsibility of Construction and Maintenance. **This is essential information to tie together, as many learners have expressed that they do not understand how NEPA applies to their own jobs.**

Follow up by asking for any outstanding questions or comments on the independent study material in Module 2.

Remind participants that NHI offers in-depth NEPA training. That training, along with many others, is identified in the independent study workbook resources. Participants can also visit www.nhi.fhwa.dot.gov for more information.

Advance to the next slide.



Slide 17

Transition Message

Now it is time for a short break before moving on to discuss what you learned in Module 3. Please return promptly after 15 minutes.

Instruction

N/A

Interactivity

N/A

Timing

15 minutes

Notes

Slide 18

Transition Message

Now let's turn our attention to Module 3. There we focused on the agencies, their permits, and the commitments stemming from them.

The logos of some of the most frequently involved agencies are shown here.

Instruction

Review the logos and the names of each organization. Refer participants to the independent study workbook pages 55-56 for more information if needed.

Interactivity

Animate the slide five times to display each logo, one at a time. The order of presentation is NOAA, USACE, ACHP, USEPA, and USFWS.

Ask participants to name the agency and one or two important ways each is involved with environmental factors in construction and maintenance.

Ask participants what answer they found when the workbook instructed them to discover if their state held a general NPDES permit? Ask what limits and requirements there might be on that permit? Ask what kinds of activities they might perform that are not covered by (or outside the bounds of) that permit?

End this discussion by asking participants about any State and local agencies they encounter regularly.

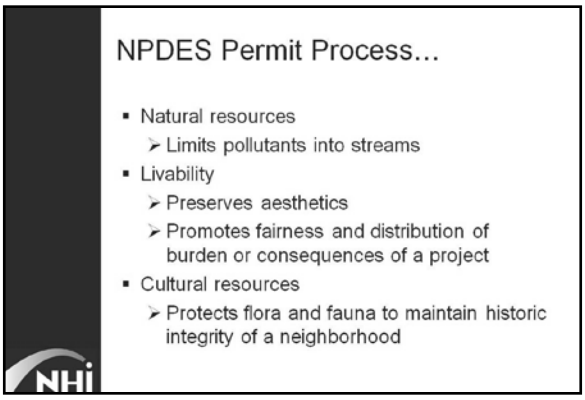
The instructor can introduce some of the State-specific documents and processes he or she collected before the session. Discuss what makes their State or area unique.

Timing

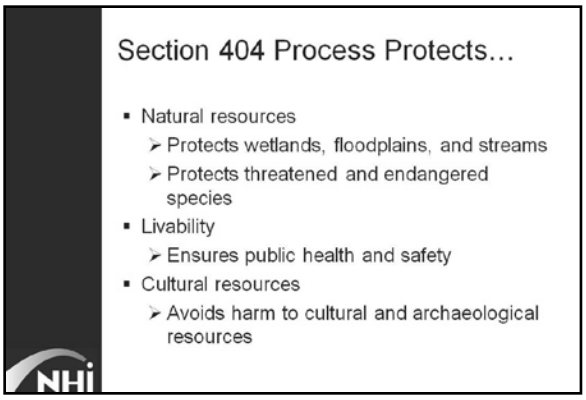
5 minutes

Notes

Advance to the next slide.

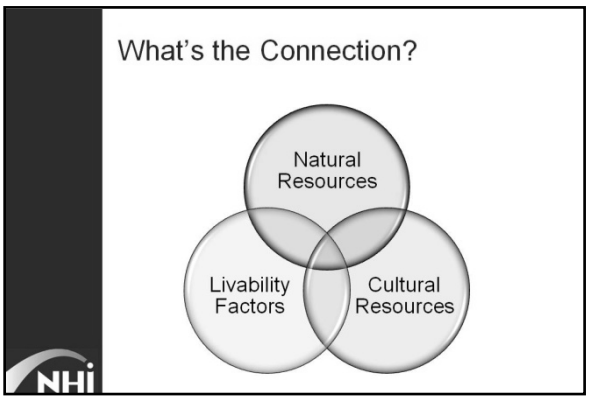


Slide 19



Slide 20

Slide 21



Slide 22

Transition Message

The many agencies, laws, and orders serve to protect different parts of the environment. However, all these pieces of the environment work together to make one ecosystem that includes every living thing. Protecting one element of the environment also benefits all three environmental factors we have been concentrating on.

Instruction

Note: Go through the first three slides quickly. Point out how it seems as if the permit is designed to protect something specific (water, air, wildlife, and so forth). But note how all three factors we have focused on (natural resources, livability, and cultural resources) are actually protected or affected by each permit or process. Emphasize the "sameness" of the three slides; this is intended to be presented in a humorous way if desired.

Point out that NPDES permit process may seem to protect "water" and prevent erosion. All the commitments and the protections it offers, however, are interrelated.

Animate the "NPDES" slide three times to display each environmental factor, one at a time, discussing the possible protections NPDES offers to each factor before displaying the next bullet.

Then advance to the next slide (Section 404).

Point out the intention of Section 404 and the ways its efforts are interrelated with all three

environmental factors.

Animate the Section 404 slide three times to display each environmental factor, one at a time, discussing each as necessary before displaying the next.

Then advance to the Protecting Wildlife and Plants slide.

Point out the ways these protections also affect other environmental factors.

Animate the slide three times to display each environmental factor, one at a time, discussing each as necessary before displaying the next.

Advance to Slide 22.

Use this slide to summarize and remind participants of the interrelatedness of all environmental factors.

Interactivity

Make sure that on each slide, you point out how similar each is to the other three slides in this series. Encourage discussion on this topic.

Timing

5 minutes

Notes

Advance to the next slide.

Slide 23

Transition Message

Local ordinances can be challenging to understand and implement. You will often find that they are well-monitored, especially by local residents who know the law and know whom to contact if the laws are broken.

Instruction

N/A

Interactivity

Ask: What specific local ordinances have you encountered? Have there been challenges to implementing these requirements?

Ask participants to share ideas on tips to help work with local agencies.

To summarize the facilitated discussion:

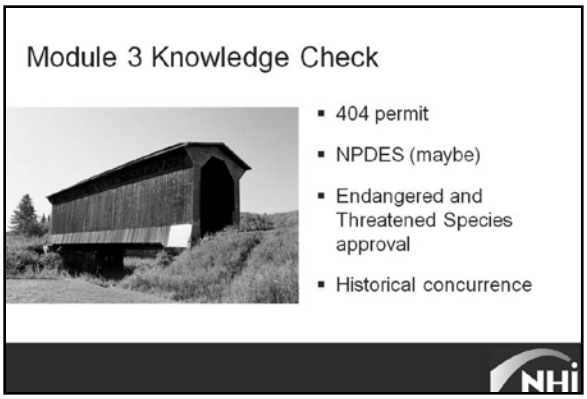
Look at graphics on the slide. State that the best tips would be to remember to value everyone's time (first graphic); follow the laws (second graphic); value the funding limitations (third graphic) and establish good relationships and clear communication lines (fourth graphic). If you have any questions, ASK THEM!

Timing

10 minutes

Notes

Advance to the next slide.



Slide 24

Transition Message

Module 3 presented lots of information on agencies and regulations. The last question on the Knowledge Check (page 80) of the IS workbook related a story about a covered bridge. Let's review that question together.

Instruction

After debriefing, facilitate a short discussion on a related topic: bird habitats and bridges. (See information below.)

Interactivity

Ask: Your project requires the replacement of a 19th century covered bridge across a trout-stocked stream. The proposed improvements will require more than one acre of earth disturbance. What permits would you anticipate for this project?

Facilitate a brief discussion on the answers. Then *animate the slide four times to display four possible correct answers, one at a time, discussing each as necessary before displaying the next.*

- Section 404 permit
- NPDES (maybe)
- Endangered and threatened species approval
- Historical concurrence

Then discuss possible state or local ordinances that could occur as well.

After the interactivity answering the knowledge check, facilitate a brief discussion on habitats for birds and bats. Covered bridges—and other bridges—are sometimes used as habitat by birds and bats. **Consider possible consequences of providing habitat on bridges. The habitat can hinder inspection and maintenance activities. The birds and bats can leave droppings on the structure, which accumulate, trap moisture, and potentially accelerate deterioration.**

Timing

5 minutes

Notes

In case participants would like to discuss them, the answers to the other Knowledge Check questions for Module 3 are shown here:

1. What Federal agencies are commonly encountered when preparing permit applications?

Possible answers: USEPA; USACE; USFWS: NMFS

2. With what State agencies relating to environmental permits and approvals would you coordinate in your geographic area?

Possible answers will vary depending upon the State.

3. Describe the coordination process with State and Federal agencies during and after the permitting process.

Possible answers vary but could include: Coordination occurs during planning, design, and permit phases. Take pre-construction meetings seriously. Know whom to contact when there are questions. Keep open communication lines and have meetings throughout the process.

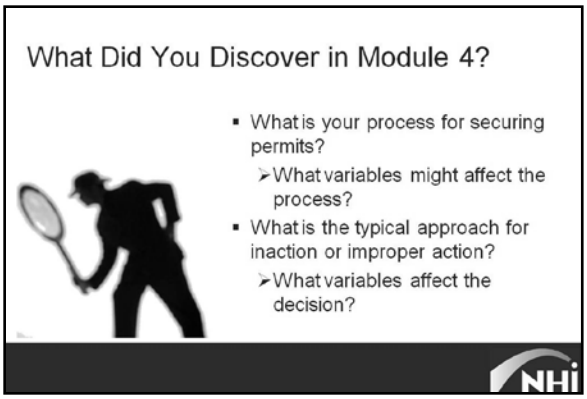
4. What are some examples of commitments and conditions that are commonly included in environmental permits or approvals?

Possible answers include: implementation of BMPs, seasonal restrictions for in-stream work, mitigation of wetlands, limited hours of operation, reduced emissions equipment, etc.

5. Your project requires the replacement of a 19th century covered bridge across a trout-stocked stream. The proposed improvements will require more than one acre of earth disturbance. What permits would you anticipate for your project?

Possible answers include: Section 404 permit; NPDES; Endangered and Threatened Species approval; historical concurrence; State and local involvement.

Advance to the next slide.



Slide 25

Transition Message

In the 4th module, we explored some tools for compliance. To accomplish these learning outcomes, everyone had to find out some details about environmental monitoring in your own State. Let's share some of what you found out.

Instruction

N/A

Interactivity

Animate the slide two times to display each bullet with its sub-bullet, answering the questions before moving on to the next.

Ask participants to share the answers to the questions on the slide as found in the IS workbook page 91.

If participants do not know the answer, the instructor should provide information and contacts.

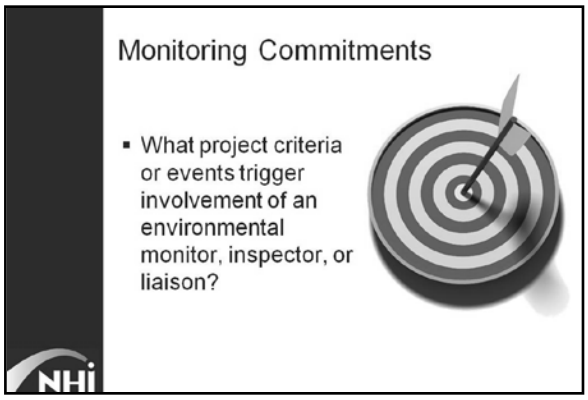
Timing

5 minutes

Notes

Instructors should be prepared and know these answers as they are unique to each host State.

Advance to the next slide.



Slide 26

Transition Message

The last hunt for information involved checking out how an environmental monitor, inspector, or liaison is used in the State.

What did you find out?

Instruction

N/A

Interactivity

Ask participants questions from page 94 of the IS workbook. What title does the State use to designate a monitor, inspector, or liaison?

What project criteria determine if the monitor, inspector, or liaison is used? *(Possible answers: site conditions; political sensitivity of project; area in which work will occur; type of work or number of events, such as displacements; dollar value of project)*

Some States use a trigger to involve the monitor, inspector, or liaison. What events constitute a trigger? (*Possible answers: large rain event, air quality alert days, public outcry)*

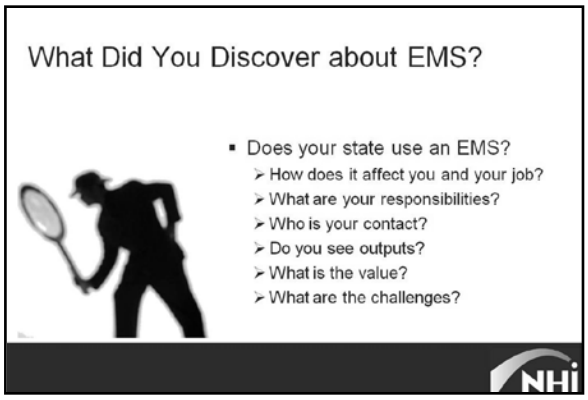
Timing

5 minutes

Notes

The instructor should be prepared to answer questions about the host State if participants cannot.

Advance to the next slide.



Slide 27

Transition Message

Another item everyone was asked to explore was the environmental management system that might be used in your state.

Instruction

N/A

Interactivity

Ask participants to answer the questions on the slide and found on page 97 of the independent study workbook.

Facilitate a discussion about ways the EMS can be used to benefit the construction and maintenance teams, and the ways those teams can help support the agency and the EMS.

If there is no EMS in use, ask if there is one planned.

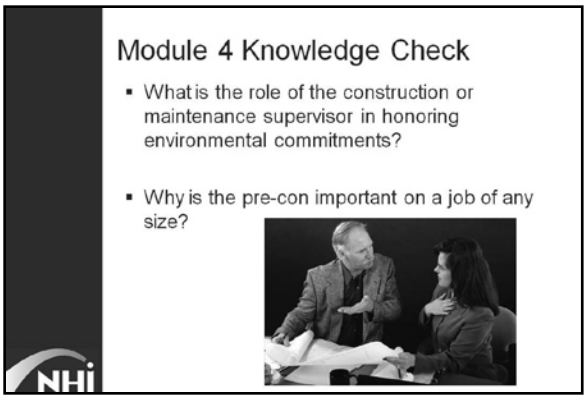
Timing

5 minutes

Notes

The instructor should be prepared to provide this answer (if participants cannot) based upon pre-training session research.

Advance to the next slide.



Slide 28

Transition Message

Let's wrap up the discussions from Module 4.

Instruction

N/A

Interactivity

Facilitate a brief discussion or opportunity for participants to answer each of these questions.

Tie this together with Module 5's lists of construction and maintenance practices. In other words, be sure that participants list some **specific tasks that serve to protect the environment and other practices that the inspector must ensure do not happen**. (Watching construction workers to be sure they handle materials safely; communicating well so maintenance workers do not mow down mitigated vegetation; halting actions that include bridge preservation project debris going into the waters below.)

Animate the slide to introduce the bottom bullet and the photograph.

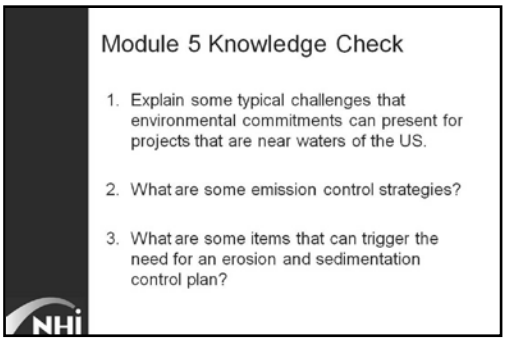
Ask why the preconstruction conference is valuable, even if the job is small or ordinary. Make sure answers, at minimum, include the ability to open lines of communication and the ability to ensure that all parties acknowledge the environmental commitments, restrictions, and boundaries.

Timing

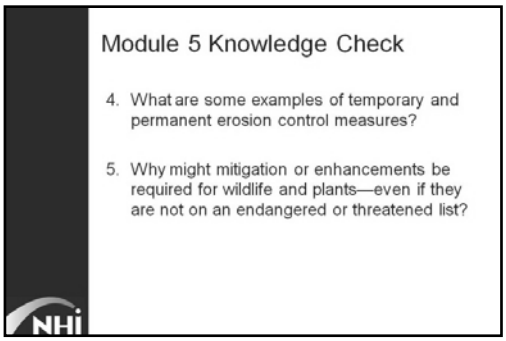
5 minutes

Notes

Advance to the next slide.



Slide 29



Slide 30

Transition Message

The learning outcomes from Module 5 will be reviewed—and used—during our case studies.

Everyone should consult the lists and activities in Module 5 and bring all those ideas to the table during case studies.

Instruction

N/A

Interactivity

Right now let's just take a quick peek at the knowledge check for Module 5 to be sure there are no unanswered questions.

Review the questions and encourage participants to simply call out a few answers for each question. Be sure to review these fully and bring out any important information during the upcoming case studies.

Slide 29

Possible answers (question 1): chronic runoff, leachates, sediment, temperature changes to water, acute runoff

Possible answers (question 2): manage dust through proper water usage, wind and erosion controls, ultra-low sulfur diesel regulations that apply

Possible answers (question 3): it is required under Section 401, 404 and NPDES permits. Items that can trigger are culvert or drainage, dredging and filling, securing or containing material eroded from stockpiles, erosion caused by excessive runoff, etc.

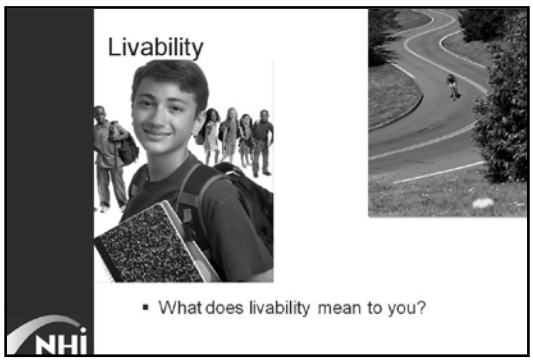
Slide 30

Possible answers (question 4): silt fence, ditches, control ponds; tackifiers, straw mats, seeding, clean water ditch, limiting areas of disturbance

Possible answers (question 5): additional concerns include habitat removal or degradation, stressors to native species, introduction of invasive species, habitat fragmentation, exposed edge effect

Timing

10 minutes



Slide 31

Transition Message

"Livability" is sometimes called social factors or quality of life issues.

Instruction

N/A

Interactivity

Ask participants to call out what livability means in the context of the training. **Write all the answers on a flipchart. Add the other discussion topics (below) to flipchart, as well.**

Answers should include but not be limited to: noise, light, vibration, traffic, safety, context sensitive solutions, consideration of community needs and standards.

- Make sure there is some discussion of transportation's relationship with schools, businesses, and jobs.
- Start a conversation about open collaboration in sequencing of construction.
- Facilitate some talk about "trip reliability," where residents expect the same trip every day. If one leaves home at 7:00 a.m. and arrives at work at 7:40 a.m. on a Tuesday in March, then it should take the same 40 minutes to get to work on a Thursday in October.
- Make sure to mention that construction zones in urban areas cannot block access for those with disabilities.

Finish this segment by asking participants what livability means to them in their own words, as applied to their own communities.

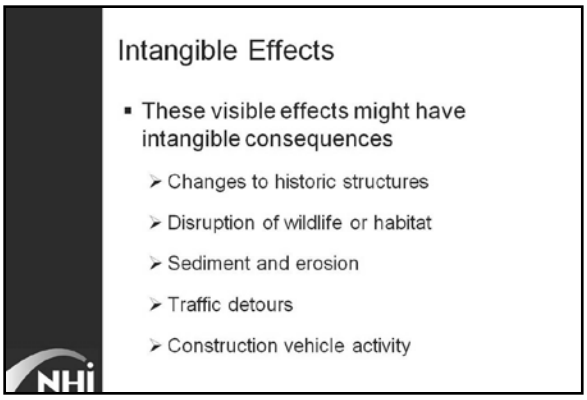
Encourage participants to call out a few answers. Relate their answers to the importance of respecting everyone's community during our transportation and construction projects.

Timing

10 minutes

Notes

Advance to the next slide.



Slide 32

Transition Message

Not all environmental impacts can be seen or heard or smelled. Some are intangible or more nuanced.

But, they are effects nonetheless.

Instruction

N/A

Interactivity

Animate the slide to display five bullet points, one at a time, discussing each as necessary before moving to the next.

Facilitate brief discussions, allowing participants to answer the questions

Changes to historical structures (*Possible answers: loss of history; change context of structure; change neighborhood "feel")*

Disruption of wildlife habitat *(Possible answers: aesthetics; temporary or permanent displacement of species; changes to vegetation)*

Sediment and erosion *(Possible answers: water looks dirty and affects people's feeling of safety; affects trust in project and in local, State officials)*

Traffic detours *(Possible answers: noise, emissions, vibrations that lead to frustration and changes to quality of life)*

Construction vehicle activity (*Possible answers: noise, emissions, vibrations that lead to frustration and changes to quality of life; concerns for safety)*

Timing

5 minutes

Notes

Advance to the next slide.

Slide 33

Transition Message

Module 6 provided a brief review of sustainability. One of the FHWA's initiatives to encourage sustainability is the self-evaluation tool.

Instruction

Emphasize the construction and maintenance personnel's ability to affect real changes. Point out how they can see the impact of those changes by using a quantitative measure such as the self-assessment tool.

Interactivity

Ask participants to share what they thought about the INVEST assessment tool. Ask them to indicate what contributions they can make to help ensure sustainability. Review a few pages, if desired, and note the items that this audience is empowered to promote or perform.

Animate the slide once to display the bottom bullet.

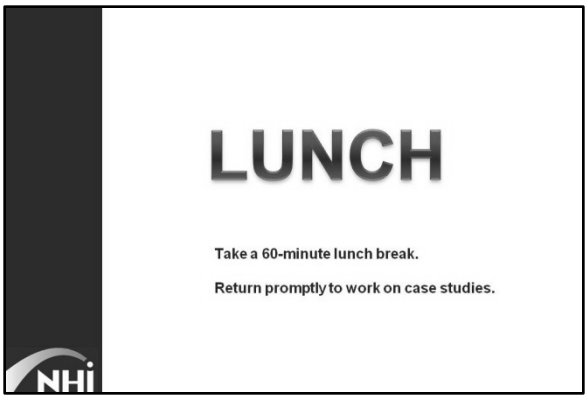
Facilitate a brief discussion, asking participants to share some thoughts about smart transportation.

Timing

5 minutes

Notes

Advance to the next slide.



Slide 34

Transition Message

Take a one-hour break for lunch. Please return promptly so we can get started working on case studies and applying everything you've learned so far!

Instruction

N/A

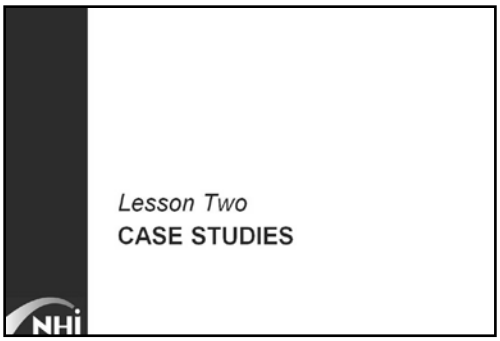
Interactivity

N/A

Timing

60 minutes

Notes



Slide 35

LESSON PLAN

Lesson Number and Title

Lesson 2: Case Studies

Learning Outcomes

1. Find environmental commitments in project documents.
2. Explain the benefits of incorporating a commitment into a construction plan at the earliest possible stage.
3. Determine how environmental commitments can impact budget, personnel, schedule, materials, and other construction aspects.
4. Assess a given project to determine potential unexpected discoveries.
5. Describe the effect of construction delays on commitments.
6. Determine the extent of flexibility and problem-solving that might be appropriate for the inspector on a given project.

Instructional Methodology

Specifically, the lesson includes these methods: facilitated discussions, small group activities and discussions, and individual sharing of best practices and experiences.

Note to instructor: the plans and documents are included in the participant workbooks as fold-out sheets where necessary. **Be sure to review the participant workbook to familiarize yourself with their materials.**

Note that each case study is presented a bit differently. For example, you might need to show a few photos, then hold a discussion, and then show remaining photos. Or, you might need to wait to show all the photos until the debrief session. Be sure to read the instructions for each case study.

There are three main lessons to be learned from these studies. They are: expect the unexpected (first case); know whom to contact and keep communication strong (second case); and construction and maintenance crews who know what to look for can make all the difference (third case). **It is the instructor's responsibility to direct the conversations and reinforce the lesson at each case study.**

The instructor is tasked with debriefing the three case studies with the following items in mind:

1. It is not possible for the participants to be provided with all the contracts, plans, and other documents pertaining to these multi-year, multi-million dollar projects. Therefore, they will be required to make some inferences based on knowledge gleaned from independent study workbook material.

   In fact, it is instructionally appropriate for there to be "missing" information in the case studies. One goal of the case studies is to encourage participants to think about what permits or commitments should be included in documents, what environmental considerations might be encountered, and what agencies could be concerned with such a project. They will also anticipate what unexpected encounters might occur. These are the types of answers they should be able to determine from the background information and photographs provided. Encourage them!

   For example, if sidewalk repairs are included in a project, then that explains why the Governor's Committee of Concerns of the Handicapped may be listed as potential stakeholders. The participants might not have known the name of a particular State's group, but they certainly could infer or guess that some group of people concerned with disability rights would be a stakeholder for a project that includes sidewalks and accessibility issues. These are the types of inferences the instructor must nurture and point out.

2. The instructor is tasked with reminding participants about the main agencies, permits, and regulations as presented in the independent study workbook. Make sure participants can relate those agencies and permits with real-life concerns in each project.

3. The instructor must facilitate discussions in which the participants share information from their independent study workbook, such as construction and maintenance practices, red flags, and so forth.

4. Encourage them to share any contact names or other resources and references they entered into the space provided in the independent study workbook. If they have any questions about agencies in their own State or contact persons therein, help gather that information.

5. Debrief each question fully and thoughtfully.

6. Point out that each case study contains nearly identical questions. However, each study's answers should be quite different. It is important to ask these questions on every project. Each case study should be fresh and interesting; it is the instructor's responsibility to explain to participants why the questions are similar and how those questions should be applied in real-life on every project.

Instruction Day and Time Allocation

Day 1; Afternoon and

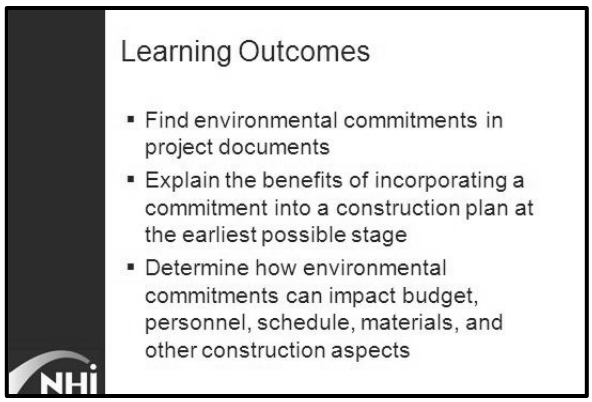
Day 2; Morning; 260 minutes (a 15-minute break occurs after the first case study; the first day of class ends after the second case study; and the last case study begins on the morning of the second day)

Evaluation Plan

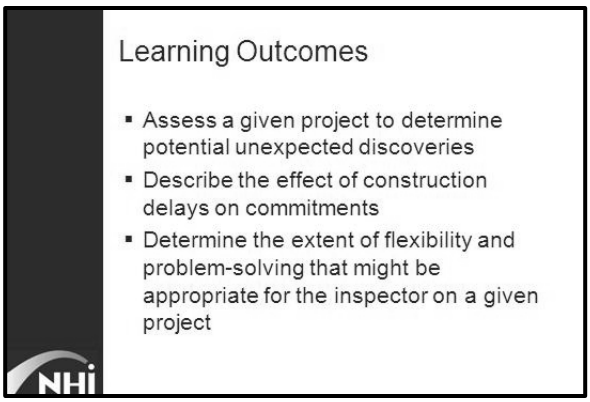
Participant learning will be evaluated by instructor questioning and assessment, engagement and contributions during discussions of independent study materials, participation in activities exercises, and case studies, and the formal end-of-course evaluation instrument.

References

All references are listed at the end of the workbook. If a specific resource is required for a discussion topic during the instructor-led session, it will be noted on the appropriate page.



Slide 36



Slide 37

Transition Message

Now that we have reviewed some training material that should help us be aware of potential environmental commitments on our next projects, we will spend most of the rest of the session using case studies to apply what you learned.

The learning outcomes we are expected to achieve for this lesson are listed here.

Instruction

Briefly review the learning outcomes as shown on the first slide. There is no animation.

Advance to the second learning outcomes slide.

Briefly review these learning outcomes.

Interactivity

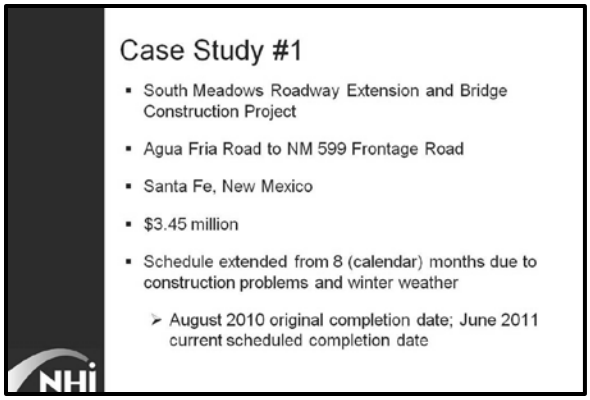
N/A

Timing

4 minutes

Notes

Advance to the next slide.



Slide 38

Transition Message

The first case study is from New Mexico. It is relatively simple, but we will learn something very important from it.

Instruction

Hand out maps of project areas.

Alert participants that they will receive handouts with "suggested answers" at the end of the course. They should try to capture as much information in their workbooks as possible during the exercises and debriefs, but if they don't capture everything, that is OK.

Note that they will now use the "Instructor-led Training Participant Workbook." Case studies, photos, plans, documents, and activity questions are included there.

However, participants should continue to refer to the construction measures, red flags, resources, and other content from their independent study workbook. They are expected to apply those to the case studies and to contribute ideas they wrote in their workbooks with the whole class during debriefing sessions for each case study.

Interactivity

Assign the class into small groups. Each group ideally contains four to six members.

After they have had 30 minutes to work the case, ask someone to briefly provide an overview of the case study. **Do not allow participants to read the case study aloud during debrief session.**

Begin the debriefing session by moving to the next slides with the questions displayed on them.

Timing

80 minutes (30 to work the case; 30 to debrief; and 20 to discuss the actual case outcome)

Notes

Advance to the next slide.

Case Study #1

South Meadows Roadway Extension and Bridge Construction Project

Agua Fria Road to NM 599 Frontage Road

Santa Fe, New Mexico

Project Background

This project involved the construction of approximately 1.0 mile of new roadway in a suburban area of Santa Fe, linking NM Route 599 with the city and county sectors of Agua Fria and South Meadows. South Meadows Road would provide traffic relief in the Airport Road area and would provide an alternative for highway users wanting to access NM 599, which may reduce conflicts on the surrounding arterial streets. The lack of arterial streets, along with population growth in the southwestern part of Santa Fe has contributed to traffic congestion on the existing street system; this is particularly evident along Agua Fria Road. Based on traffic forecast data, it was estimated that the South Meadows Road extension would carry approximately 5,000 vehicles per day by the year 2020.

Santa Fe is the state capital; many State and Federal agencies have offices in the area. The people of Santa Fe are typically a high-interest community in all public projects; therefore public awareness and scrutiny of the project was anticipated.

Natural Environmental Factors

Santa Fe is located in high mountain desert climate near the base of the Sangre de Cristo Mountains. Total annual rainfall may be less than in other states; however, the rainfall events here can be fast and furious. High mountain desert environments typically have sparse groundcover, which can exasperate soil erosion when coupled with high discharge peaks.

The project included an improved crossing of the Santa Fe River, and connected to a municipal separate storm sewer system (MS4), which carries stormwater for the city of Santa Fe.

Livability (Quality of Life) Factors

Recent development near the proposed roadway included a large mobile home park and development in the abutting city sector (including significant housing and business infill in the South Meadows-Airport road sector).

State and Federal lands located in the area have limited access in this area. South Meadows Road will allow the management agencies to make the highest land use possible in these areas.

Cultural Factors

No cultural resources were identified in or near the site.

Construction

The project occurred over two construction seasons. The base assumption was for concurrent bridge and roadway utility work.

Construction Activities

The project work types included:

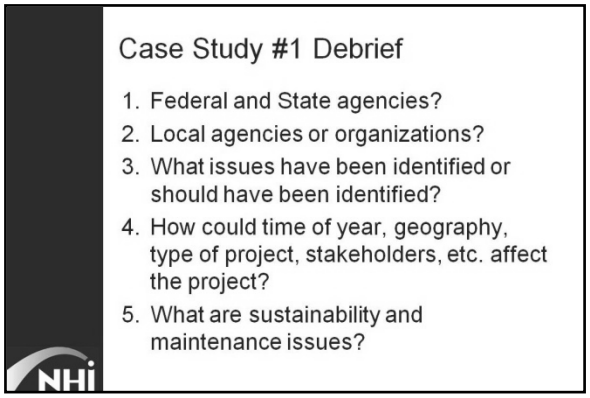
1) Roadway construction
    a. Earthwork for roadway embankment
    b. Aggregate base course
    c. HMA surface course
    d. Sidewalk, curb, and gutter
    e. Riprap
    f. Traffic signal, signing, and striping
2) Bridge construction (two span)
    a. Drilled shaft abutment and center piers
    b. Bridge superstructure (deck, AASHTO girders, diaphragms)
    c. Bridge sleeper slab (approach slabs)
    d. Bridge approach and departure protection
    e. Bridge scour protection
3) Water and sewer construction
    a. 8” waterline relocation
    b. New 12” water service line
    c. New 10” sewer line and manholes
    d. New 24” water supply line for Buckman Diversion District (BDD) with an economic penalty associated with this project feature if it was not completed by August 31st, 2010. (Public Private Agreement between BDD, Santa Fe County, and the City of Santa Fe)
4) Temporary erosion and sediment control measures
5) SWPPP
6) Project seeding

Construction Equipment

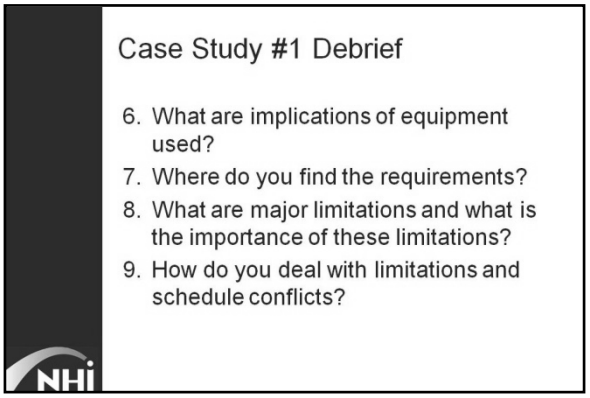
Anticipated equipment: roadway graders, excavators, demolition rock drill, material haul equipment, front end loaders, dump trucks, overhead cranes, concrete pumping equipment, concrete delivery trucks, crew trucks, specialty service vehicles (ex: spray-applied temporary soil stabilant)

Plans

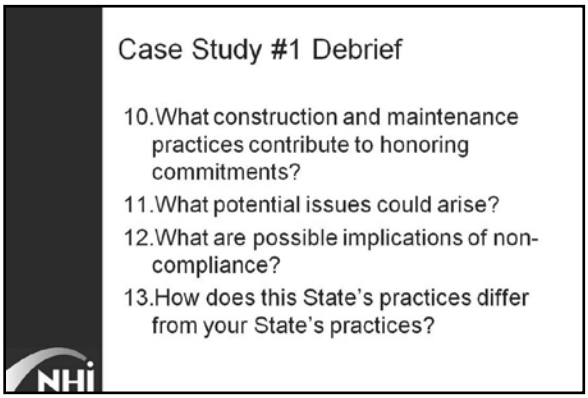
See attached.



Slide 39



Slide 40



Slide 41

Transition Message

This begins the debriefing activity for Case Study #1.

Instruction

NOTE: Complete the debriefing activity before moving on to the photographs.

After completing the debrief, you will advance through the remaining slides with photographs that show the effects of major rain events at this project. **Emphasize the importance of being aware of your site and to expect the unexpected.** When working in this type of geography or environment, the supervisors should have been inspecting and staying on top of all work that could have helped prevent an "unexpected" rain occurrence that should be expected in the high desert.

Interactivity

See questions and suggested answers beginning on the next page.

Animate the first slide five times, displaying each bullet point one at a time, discussing each as necessary before displaying the next.

Animate the second slide five times, displaying each bullet point one at a time, discussing each as necessary before displaying the next.

Animate the third slide four times, displaying each bullet point one at a time, discussing each as necessary before displaying the next.

Ask one group to begin by answering the questions. After answers are provided, ask the other groups if they would like to contribute anything further.

After all groups have the chance to answer the questions, tell the participants that this particular case was relatively simple. However, a few things did go wrong during the actual project. Tell them you will now show them what really happened. Show the photographs associated with this case study.

Timing

Allow 30 minutes to debrief the questions, and then another 20 to debrief with photos of the rain event. (All debriefing time was included as part of the 80 minutes total for this case study.)

Notes

Advance to the next slide.

Questions for Debriefing

1. What Federal and state agencies would you expect to be involved with this project?

Possible answers include, but are not limited to:

NM Department of Transportation; NM Department of Game and Fish; NM Environment Department; US Fish and Wildlife; US Army Corps of Engineers; Bureau of Land Management; NM Energy and Mineral Natural Resources Department; US Department of Agriculture Natural Resource Conservation Service

2. What local agencies or organizations would you expect to be involved with this project?

Possible answers include, but are not limited to:

Santa Fe County and county departments; the City of Santa Fe and city departments; Santa Fe River Groups, Buckman Diversion District(BDD); Cottonwood Mobile Home Park, Santa Fe Fire Department; Santa Fe Public Schools; Santa Fe Watershed Association; Santa Fe County Sheriff; Governors Committee on the Concerns of the Handicapped; Agua Fria Neighborhood Association

3. What issues have been identified or should have been identified during planning and design?

Answers include, at minimum the items on page 7 of plan sheets. Refer participants to sheet for details on:

Erosion; access; utilities; hazardous materials; migratory birds; Section 404 permits; archaeological sites; use of pesticides; hazardous material spills; Title VI; excess excavated materials; restoration and rehabilitation; fire prevention; prairie dogs; and arch sites, among others

4. How could time of year, geographical region, type of project, stakeholders, public involvement, and other relevant details affect this project?

Possible answers include, but are not limited to: rain event of unusual magnitude; snow and snowmelt runoff; near mobile home park and other community issues; length of construction (over two seasons); time and location restrictions; more-than-average involvement by community and informed community

5. What are sustainability and long-term maintenances implications that arise from the commitments on this project?

Flooding concerns; maintaining new areas; increased use and increased access to Federal lands

6. What are the implications of equipment being used?

Possible answers include, but are not limited to:

Noise, dust, emissions; on-site and off-site fueling (avoid water features); note that another job on existing road would have other equipment and issues

7. Where in the contract documents do you find the requirements and limitations that you are responsible for honoring?

Page 7 of plan sheets

8. What are the major limitations, and what is the importance of the limitations? How do they affect the environment? How do they affect the project?

Possible answers include, but are not limited to:

Environment: protects water, soil, cultural resources; community/livability; habitat conversion

Project: can increase cost and duration; could affect sequencing

9. How would you deal with limitations that might affect the schedule? Whom do you contact?

Know what is expected and what is unusual; know what to do if encountering something unusual; notify your supervisor, and supervisor will notify DOT environmental unit for further direction.

10. What construction and maintenance practices contribute to honoring commitments?

Example answers include, but are not limited to:

- Read construction documents to know and fully understand commitments.
- Read and follow sequencing in SWPPP; install in correct order sediment retention ponds, clean water ditch, dirty water ditch, silt fence, filter bags, inlet filter protection, etc.
- Follow BMPs, such as delineate and fence restricted area and honor dates for no tree cutting.
- Document discussions with contractor of his or her understanding of commitments. (Typically this is first done during pre-construction conference.)
- Maintain items in SWPPP according to notes in the plan.

11. What are the potential issues that could arise? What response should occur to unexpected issues in the work zone?

Possible answers include, but are not limited to:

- Rain, snow, or water events. First, be prepared by having emergency response plan; also listen to weather reports.
- Negative impacts to existing wildlife and habitat. Delineate and fence restricted areas; understand and comply with restrictions (dates, locations) for certain species.
- Livability issues, such as excessive noise and dust: if complaints occur, usually officials (local or state) will escalate and then send down DOT chain of command. Contractor may need a change order due to changed levels of efficiency or time of work. Follow BMPs and protocol to keep dust and other problems under control; keep watered down.

12. What would be possible implications of non-compliance on this project?

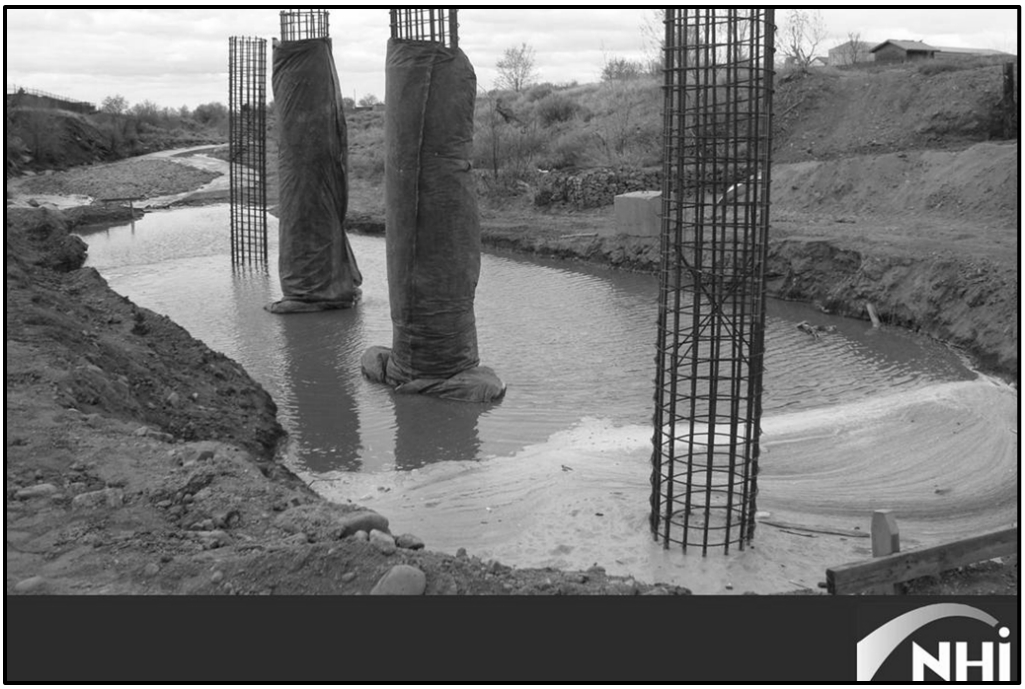
Possible answers include, but are not limited to: temporary shut-down of project; fines; and delays.

13. What differences do you see between the practices noted in the case study and your own State practices?

Instructor facilitates a brief discussion to encourage participants to apply practices to his or her own State.

Slide 42 shows the pipe that was supposed to be piping water out of the area where bridge work occurred. When a big storm event occurred, this diversion pipe broke.

Slide 43 shows a close-up of the breach of diversion pipe



Slide 44 illustrates where the stream was meant to be diverted (see back left). The storm event allowed water into the area.

Ask participants what this might have meant to project. *Example answers include lost time for drying out; could have poured concrete or done other work that needed to be reworked.*

Slide 45 is a view of the water protection plan failure 8” WL looking back upstream

Slide 46 shows water protection plan failure 8”WL turning down into river. Take note of the equipment shown here and ask participants what might be happening.

Slide 47 shows water diver failure looking south

Slide 48 showing water diver failure looking southeast

Slide 49 showing erosion

Slide 50 shows another view of erosion due to flood management release and rainfall

Slide 51 illustrates erosion due to July 3, 2010, flood management release and rainfall

Slide 52 is the final view of the July 3 flood management release and rainfall

Slide 53 with 95% complete photo

Slide 54 showing 95% complete

Slide 55 showing some roadway and bridge at 95%

Slide 56 with a view of some commitment items at 95% complete

Slide 57 shows project 95% complete
(In PowerPoint presentation, point out graffiti on concrete. This is a mild example; most components of the new project exhibited vandalism including graffiti by 95% completion)

Slide 58 shows the roadway at 95% complete

Slide 59

Transition Message

Let's take a 15-minute break before beginning the next case study. Please return promptly.

Instruction

N/A

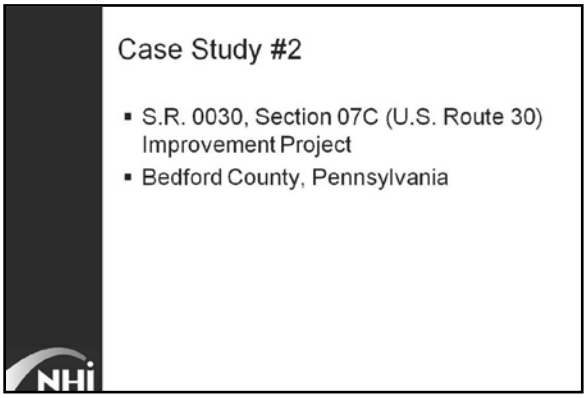
Interactivity

N/A

Timing

15 minutes

Notes



Slide 60

Transition Message

The next case study is a project from Pennsylvania.

Instruction

N/A

Interactivity

Inform participants that they can watch and listen first (before reading their case study documents).

Display PowerPoint slides and provide a synopsis of the case while reviewing the photograph slides. Then tell participants to review their map handout of the project location.

Then provide the participants with time to work through the case study materials and answer the questions.

When debriefing, make sure to **call attention to the large number of stakeholders in this case and the wide variety of environmental concerns.**

Emphasize the importance of being able to look at the site and know what kinds of regulations and commitments will probably apply. **Emphasize the importance of communication.**

Timing

90 minutes (allow 15 minutes to review case study background; 10 minutes to review photos as whole group; 30 minutes for the small groups to answer questions; and 35 minutes to debrief)

Notes

Advance to the next slide.

Case Study #2

S.R. 0030, Section 07C (U.S. Route 30) Improvement Project

Bedford County, Pennsylvania

Project Background

The project entailed the widening of approximately five miles of existing roadway from a varied two-, three-, and four-lane cross-section to an improved five-lane section (two lanes per direction with a center turn lane); the rehabilitation of the existing bridge that carries US Route 30 over the Raystown Branch of the Juniata River ("Narrows Bridge") to carry westbound traffic; and construction of a new bridge to carry US Route 30 eastbound traffic over the Raystown Branch of the Juniata River. Additionally, two existing bridges would be replaced and two new bridges built at new interchanges.

The existing US Route 30 corridor does not have adequate capacity to handle existing or predicted future traffic volumes, which results in unacceptable levels of service for travelers and substantial delays at key intersections. Roadway deficiencies include substandard horizontal geometry, number of travel lanes, shoulder width, and control of access. Safety issues and a high crash rate have also been identified within the project area.

From a community perspective, congestion and roadway deficiencies on existing US Route 30 impedes accessibility to commercial, medical, cultural, emergency, and educational services in the Bedford and Everett area. Improvements are also needed for the project area to accommodate its planned economic potential.

The project crossed under the Pennsylvania Turnpike.

Natural Environmental Factors

The project area is situated in the mountainous Snake Spring Valley between Evitts Mountain to the west and Tussey Mountain to the east. Land use and land cover types within the area include: residential and commercial development in the western portion; a mix of agriculture, residential and commercial development in the center section; and agriculture and sparse residential development along the eastern end of the project area. Large forest parcels are found throughout the corridor. The area has a four-season weather climate, with substantial winter weather conditions involving snow, wind, and icing.

Ten wetland areas would be impacted by the project; however, total wetland impacts are less than 0.5 acre. Associated with these stream crossings were 4.7 acres of floodplain impacts.

Nine stream crossings were necessary, including two involving streams classified as wild or stocked trout streams. The PA Fish and Boat Commission does not allow work in *stocked* streams during spring, and does not allow work in *wild* streams during fall.

Note that in PA, small streams with canoeable waters must have warning, such as

signage or buoys if certain work is done in or over the stream.

Terrestrial wildlife habitat types affected by the project consist of forest, agricultural land, herbaceous rangeland, and palustrine wetland. Approximately 23 acres of wildlife habitat would be impacted by the project.

Livability/Social/Quality of Life Factors

Eleven residential and three commercial properties were projected to be displaced by the project. The Rivercrest neighborhood was in an area prone to frequent flooding.

Nine receptor groups within the project area warranted noise analysis based on changes in the proximity of the highway and the location of the sensitive receptors. It was determined that 20 receptors or 5 noise receptor groups would be impacted.

Cultural Environmental Factors

US Route 30 is an historic highway, and the portion of the roadway in the project area is part of a State Heritage Park.

The Narrows Bridge is listed on the National Register of Historic Places. The bridge is an open spandrel concrete arch bridge that carries US Route 30 over the Raystown Branch of the Juniata River. An inspection determined that the deck, spandrels, and parapets of the bridge needed to be replaced due to weathering and wear from de-icing materials used on the bridge over the past 60 years.

Construction

The entire project required a five-year construction period, with two construction seasons necessary to perform the bridge rehabilitation/construction.

Construction Activities

The project work types included:

1) Roadway construction
2) Bridge construction
3) Bridge replacement
4) Bridge rehabilitation
5) Water and sewer construction
6) Temporary erosion and sediment control measures
7) Permanent stormwater facilities
8) Project seeding
9) Traffic signalization

10) Demolition of Rivercrest buildings

Construction Equipment

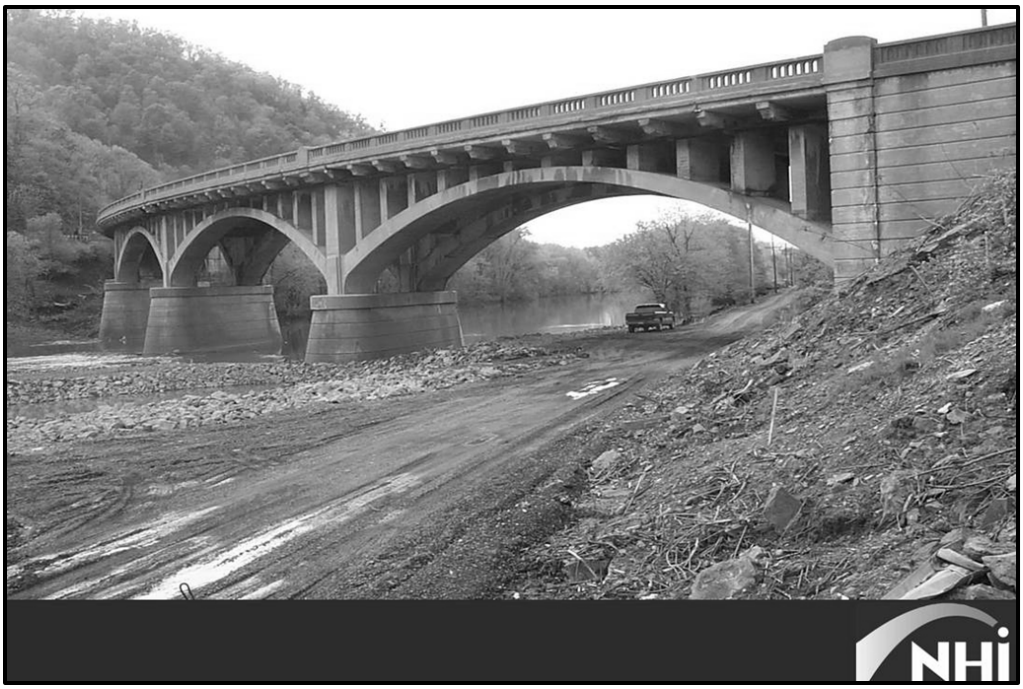
Equipment anticipated to be required: roadway graders, excavators, demolition rock drill, material haul equipment, front end loaders, dump trucks, overhead cranes, concrete pumping equipment, concrete delivery trucks, crew trucks, specialty service vehicles, such as spray-applied temporary soil stabilant.

Plans

See attachments.

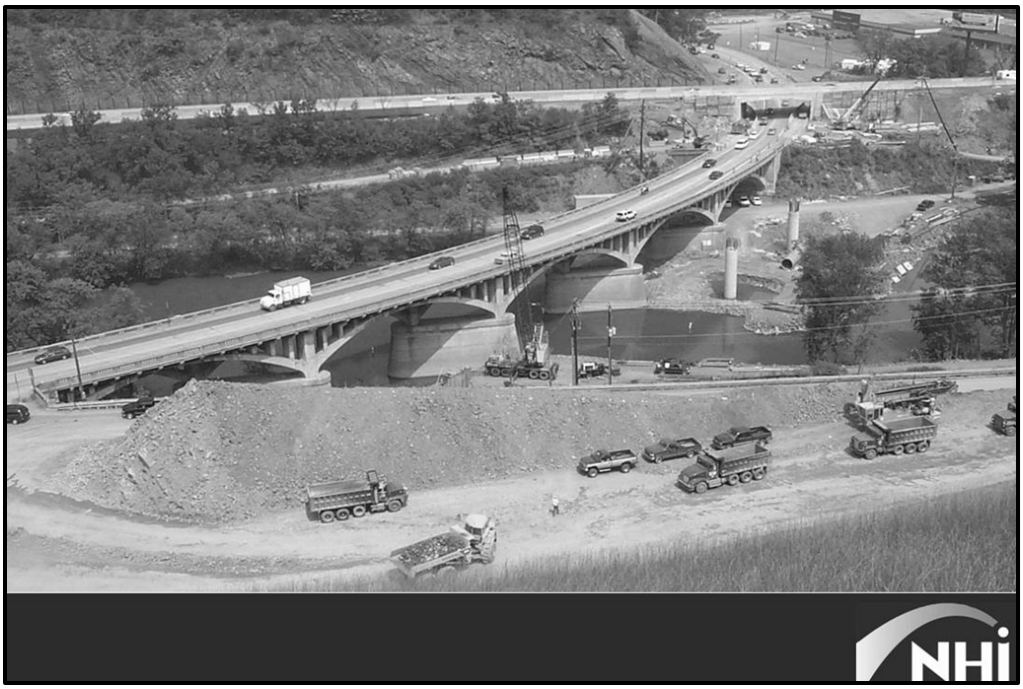
Slide 61 provides an overview and a “feel” for one of the areas in which work occurred

Slide 62 shows existing bridge over Juniata River (built in 1930s)

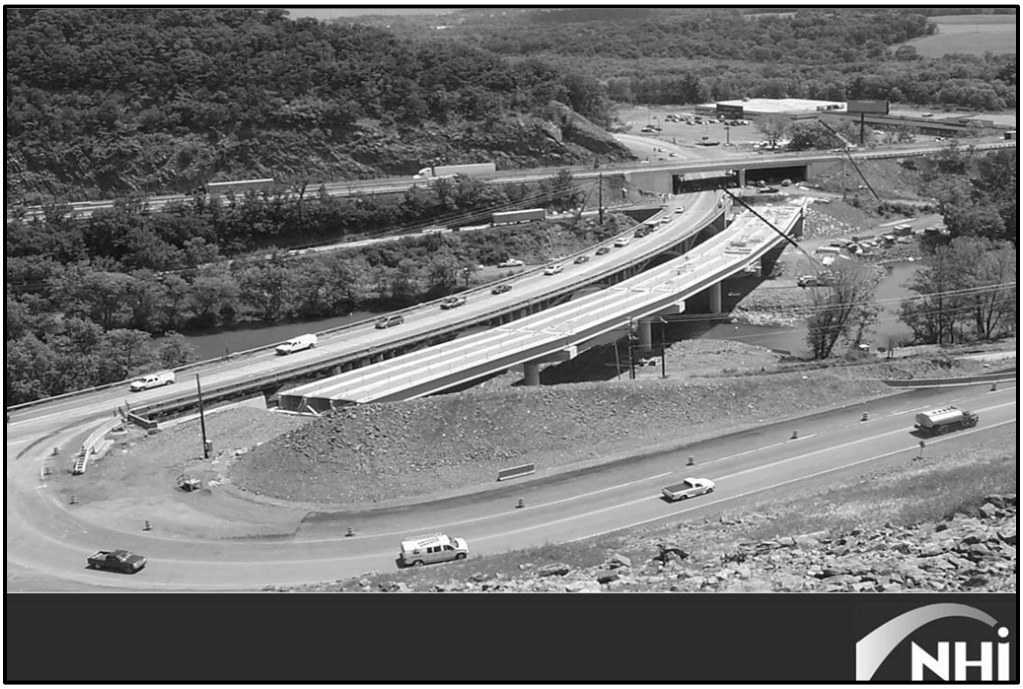


Slide 63 shows existing historic structure

On Slide 64, note the existing historic bridge, river, existing road, and the Pennsylvania Turnpike



Slide 65 shows sheeting removed and water around pier. See the causeway as opposed to diverting techniques such as those in New Mexico case study.



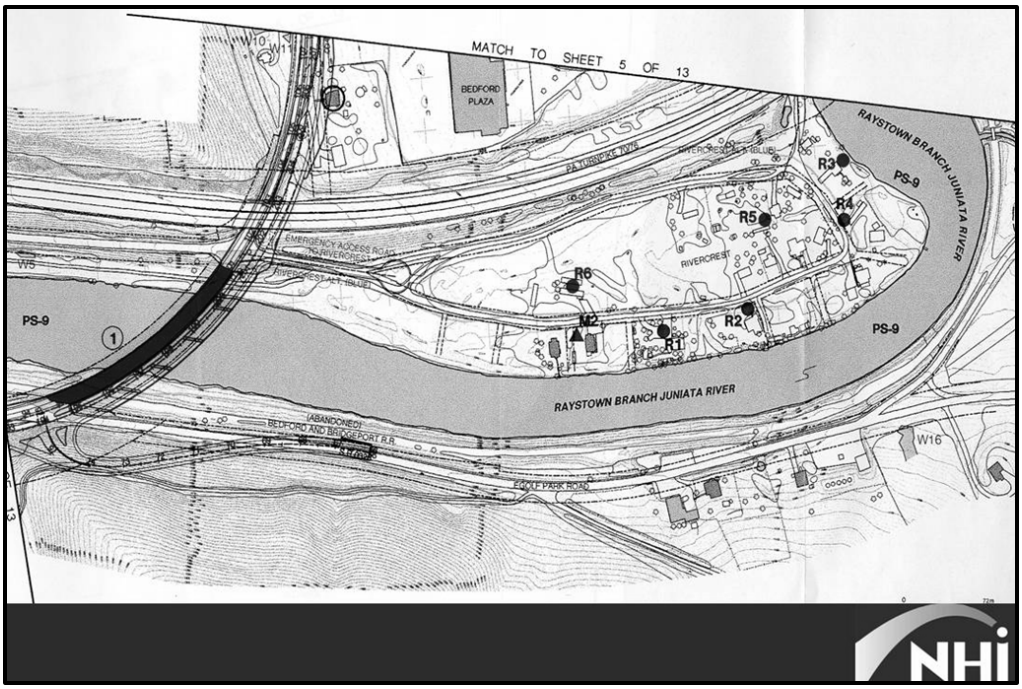
Slide 66 shows progress occurring and work through PA Turnpike

On Slide 67 we can see the new bridge up, and the start of work on the historic bridge

Slide 68 views work on arches

Slide 69 is a view from below

Slide 70 shows both sides completed



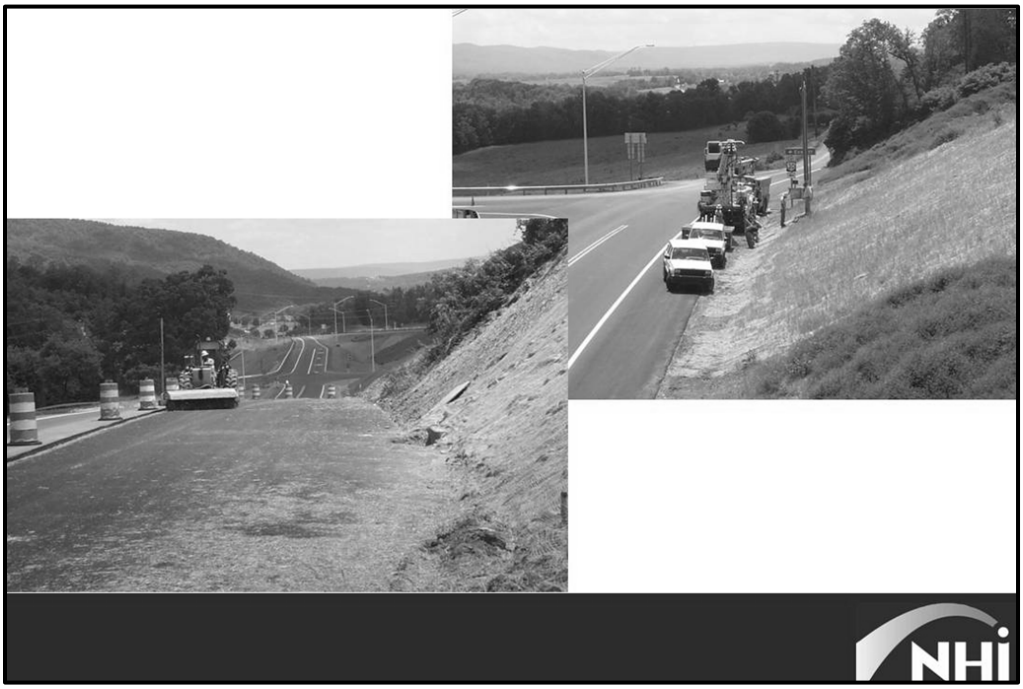
Slide 71 showing plan sheet with Rivercrest neighborhood

NOTE: Animate the slide to display an arrow highlighting Rivercrest neighborhood

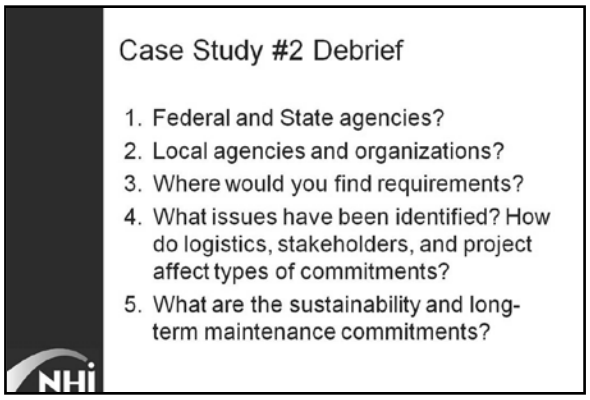
NOTE: Stream flows left to right as depicted here

NOTE: No stream mitigation was involved

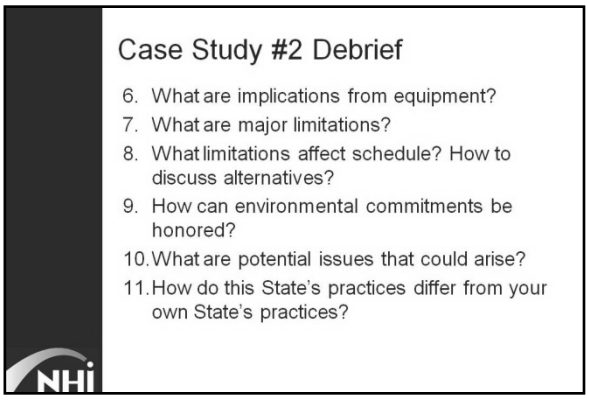
In Slide 72, note businesses nearby including acute care center
Also note the water truck



Slide 73 depicts seeding operation and the early results of seeding



Slide 74



Slide 75

Transition Message

These slides show the questions that participants answer in small groups.

Instruction

The answers are shown in the instructor guide starting on the next page.

Emphasize that knowing what is expected and what is typical, as well as knowing what to do when encountering something unusual, is essential.

Example: contractor says he needs a stream crossing next month or it will cost more money. DOT could say, "No way," or "Let's see if we can work around the current restriction." Then construction inspector will contact environmental unit; parties may be able to negotiate a way to change the commitment and still protect resources. Moral of this story is to have and maintain a good relationship with communication between contractors, DOT construction and maintenance, and DOT environmental unit and the agencies***. Note that this is the embodiment of balancing project needs with environmental commitments. This is the message of this course…Know the commitments and know how to get the job done on time, on budget, and while honoring those commitments.***

Interactivity

Animate each slide five times, displaying each question one at a time and discussing as necessary before displaying the next.

Ask small groups to take turns answering the questions. Each group can add to the answers of another group. If any answers are missed, the instructor can add information.

Timing

Allow 20 minutes for the debriefing; this is part of the 60 minutes total allotted to this case study activity.

Notes

Advance to the next slide.

Questions and Answers for Debriefing

1. What Federal and State agencies would you expect to be involved with this project?

US Fish and Wildlife Service, US Army Corps of Engineers, US Department of Agriculture, Natural Resources Conservation Service, Federal Highway Administration, Pennsylvania Department of Transportation, Pennsylvania Turnpike Commission, Pennsylvania Historical and Museum Commission (the SHPO for Pennsylvania), Pennsylvania Department of Agriculture, Pennsylvania Game Commission, Pennsylvania Fish and Boat Commission, Pennsylvania Department of Environmental Protection, Pennsylvania Department of Natural Resources, Chesapeake Bay organizations, Metropolitan Planning Organization (MPO)

2. What local agencies or organizations would you expect to be involved with this project?

Bedford County Conservation District, Bedford County Planning Commission, Lincoln Highway Heritage Corridor, Citizens Advisory Committee, Bedford Historical Society, utilities, some type of “Friends of the River” group, recreational users of the water, watershed organizations, fishing organizations, Ducks Unlimited

3. Where in the contract documents do you find the requirements and limitations that you are responsible for honoring?

- Plans, specifications, and contracts
- Joint Permit Application
- NPDES Permit Application
- SWPP Plans

4. What issues have been identified or should have been identified during planning and design? How do the logistics, the stakeholders, and the project itself affect the types of commitments?

- The bridge rehabilitation would improve the existing historic bridge with in-kind replacement of the spandrel columns, floor beams, deck, and parapet walls
- To improve floodplain and riparian areas and eliminate frequent flooding damage to the Rivercrest community, residential structures were removed, the area re-seeded for wetland plants to improve land cover and habitat conditions, and bat and duck nesting structures provided to attract and accommodate wildlife
- Noise issues were addressed for nearby residents
- Economic justice issues, such as displacement; also, there may be a significant Amish population

- Historic resources (“Narrows Bridge”) were identified and avoidance and mitigation measures planned
- Temporary crossings
- Effects of recreation
- Residential and commercial displacements
- Floodplain and flooding issues along Juniata River
- Business and emergency services access
- Length of construction
- Time and location restrictions
- Sunlight orientation on east-west highway

5. What are the sustainability and long-term maintenance implications that arise from commitments made on this project?

- Salt
- Runoff
- Spandrel arch design has more concrete, different loads than new design
- Detentions and treatment
- Maintenance issues that come from weighing historic value; need to consider things such as using sealants to delay maintenance needs

6. What are the implications for construction and maintenance because of the specific equipment being used?

- Noise, dust, emissions
- On-site and off-site fueling (avoid water features)
- Traffic control

7. What are the major limitations, such as what areas must be avoided, and when?

See the associated spreadsheet and note with this case study material, especially, those items below.

Also be sure to note Lines 6 and 7 on the spreadsheet, where we can see that temporary and permanent mitigation at same station mark. However, the permanent impact is shown to be smaller. This makes sense as construction activities can cause a larger temporary impact.

- Wetland areas

- Stream areas, especially wild and stocked streams

8. What limitations might affect the schedule? What do you do if you need to discuss alternatives?

- Climate
- Trout restrictions
- Finding other animals or habitats
- Flooding and other weather issues
- Noise and nighttime construction
- Conflicts with boating concerns, such as during installation of arches (Consider if this could be nighttime or winter work?)
- Materials required for historic structures (types of materials might be included in MOU and might require permissions if changes are required)
- Causeway restrictions (note that you might be able to leave items in place, but not able to build or stir up the streams during certain times)
- Traffic control at businesses and alignment

Know what is expected and what is unusual; know what to do if encountering something unusual; notify your supervisor, and supervisor will notify DOT environmental unit for further direction.

Example: contractor says he needs a stream crossing next month or it will cost more money. DOT could say, "No way," or "Let's see if we can work around the current restriction." Then construction inspector will contact environmental unit; parties may be able to negotiate a way to change the commitment and still protect resources. Moral of this story is to have and maintain a good relationship with communication between contractors, DOT construction and maintenance, and DOT environmental unit and the agencies***. Note that this is the embodiment of balancing project needs with environmental commitments.***

9. How can environmental commitments be honored during construction and maintenance?

- Designate someone to be responsible for compliance
- Utilities coordination
- Post-construction monitoring, such as required for wetlands

In addition to the above, this case requires particular attention to:

- Noise
- Idling

- Work in streams
- Attention to detail for historic structure

10. What are some potential issues that could arise? What response should occur to unexpected issues in the work zone?

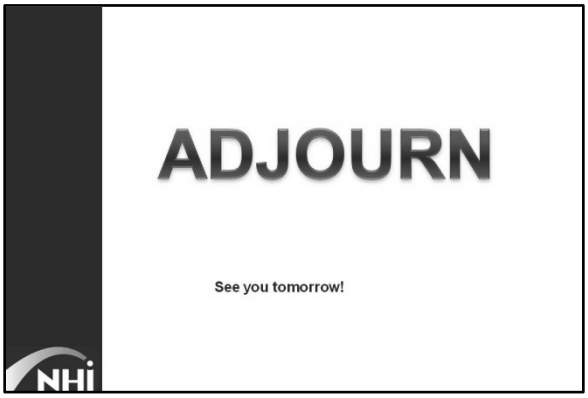
- Rain, snow, water events. First, be prepared by having emergency response plan; also listen to weather.
- Negative impacts to existing wildlife and habitat. Delineate and fence restricted areas; understand and comply with restrictions (dates, locations) for certain species.
- Some requirements that occur include saving the view, installing retaining walls, and keeping records of old documents.
- Problems can occur when material availability changes (especially on historic projects).
- Context sensitive solutions require close attention to detail because they often include design solutions that construction and maintenance crews are not familiar with.
- Might need to consider special events coordination.
- Utility disruptions can occur.
- Livability issues, such as excessive noise and dust: if complaints occur, usually officials (local or state) will escalate and then send down DOT chain of command. Contractor may need change order due to changed levels of efficiency and/or time of work. Follow BMPs and protocol to keep dust and other problems under control; keep watered down.

Note here that the new "historic" bridge has cold joints. These are troubling because ice and salt can get in there. The inclusion of these joints, however, was made as a concession to the historic requirements. This is an excellent example of trying to maintain that balance and the conflicts between sustainability, costs, and historic preservation.

Another item of interest to point out to participants is that project documents mention quite a few encroachments into the stream and even a temporary encroachment in the floodways. FHWA has coordinated with FEMA with respect to temporary causeways in floodways. If the causeway is truly temporary for a season or two, then nothing would need to be done; but if the construction schedule becomes multi-year, then the causeway is not really temporary.

11. What differences do you see between the practices noted in the case study and your own State practices?

- Facilitate a brief discussion that encourages participants to contribute similarities and differences



Slide 76

Transition Message

It is time to adjourn for the day. We will begin tomorrow promptly at _____.

Instruction

N/A

Interactivity

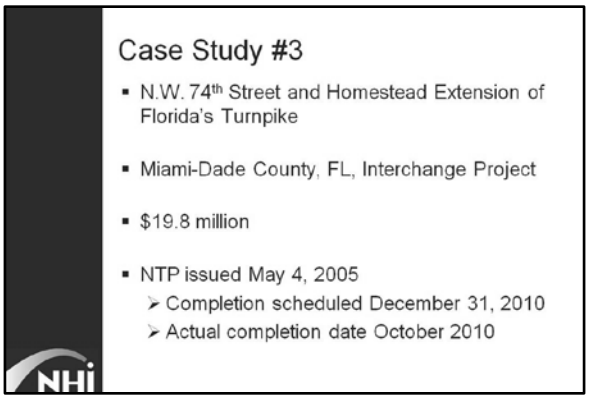
N/A

Timing

N/A

Notes

Slide 77



Slide 78

Transition Message

Welcome back! We will start our final case study in a few minutes.

Instruction

N/A

Interactivity

Display Slide 77.

Encourage participants to ask questions or give comments for a few minutes at the beginning of class today.

Display Slide 78.

Tell participants that this case study will be reviewed as a large-group activity.

Review the basic information on the slide.

Then display the next two slides (photos; Slides 79 and 80). While reviewing the photos, ask what types of environmental concerns this project will entail.

Potential answers include, at minimum: wetlands; neighborhoods; waterways; working over or in waterways; coordination with toll road.

Display the remaining slides (up to Slide 85). Then allow participants a few minutes to review the case study background. (Note: save the last three slides for discussion at end of debrief.)

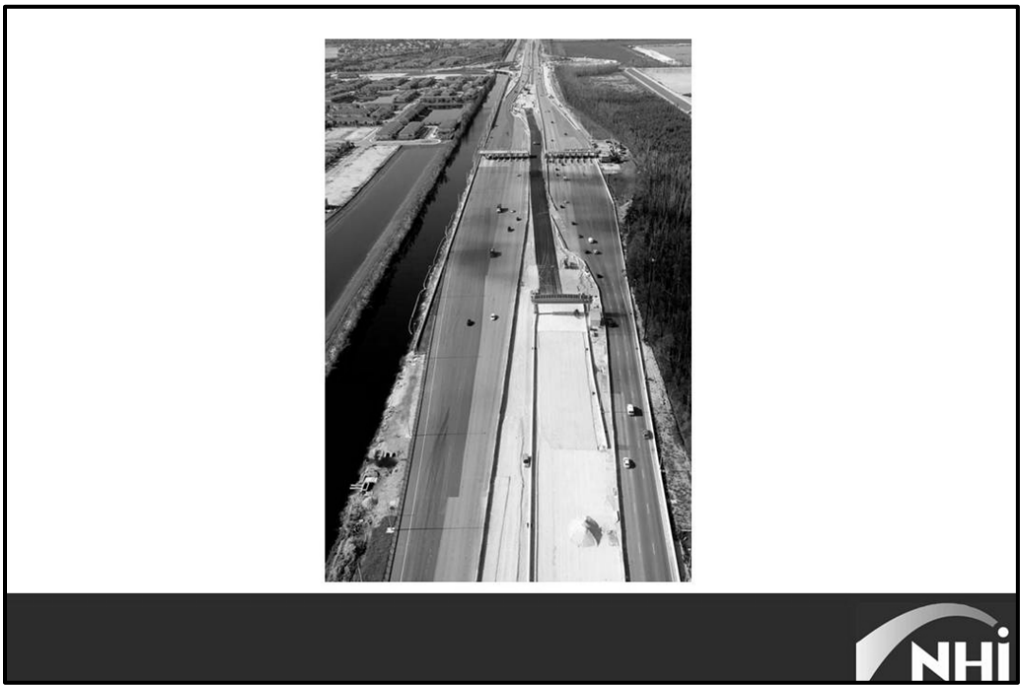
Together, the whole class participates in a discussion of the questions.

Timing

90 minutes (Allow 25 minutes for reviewing the case background and photo slides through Slide 85; then allow 40 minutes for the discussion of the questions, and 25 more for discussion of Slides 89 through 91 detailing sound barrier installation issues.)

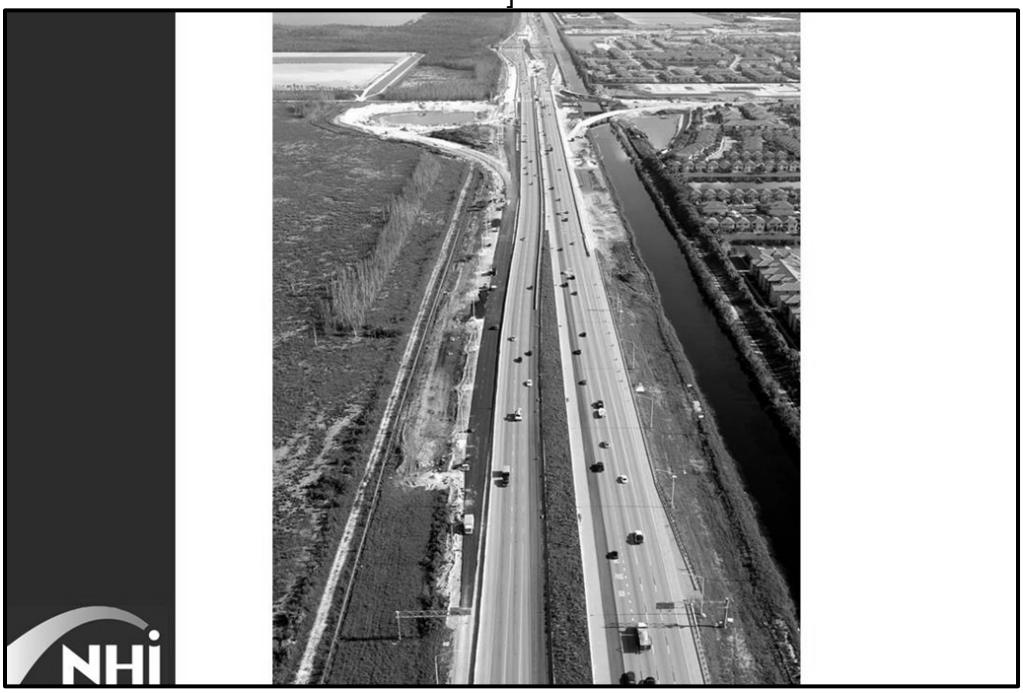
Notes

Advance to the next slide.



Slide 79 from August 2008
Use this slide to discuss various environmental factors that will be considered.

]



Slide 80 from 2008, looking in opposite direction.
Use this slide to discuss possible environmental factors that will be considered.

Case Study #3

N.W. 74th Street and Homestead Extension of Florida's Turnpike Interchange Project

Miami-Dade County, FL

Project Background

This project involved construction of a new interchange at the intersection of NW 74th Street and the Homestead Extension of Florida's Turnpike (HEFT) in Miami-Dade County in southern Florida.

The new interchange would create access to and from NW 74th Street and the HEFT to provide congestion relief to the City of Doral and Town of Medley. In addition, having an interchange at NW 74th Street would provide a vital link via NW 74th Street between the HEFT and SR-826/Palmetto Expressway to the east.

The project is adjacent to an existing urban community.

The project was designed on an accelerated schedule as requested by the client; one project plan set phase submittal and review was eliminated.

Two other adjacent roadway construction projects were taking place simultaneously and used a different contractor.

Natural Environmental Factors

The south Florida climate is characterized as tropical, generally having two seasons; wet (May through October) and dry (November through April). South Florida experiences approximately 50 to 60 inches of rainfall annually, with most rain events occurring over the summer. Evening thunderstorms are practically a daily occurrence during the summer.

The project site/area contained naturally occurring wetlands and a drainage canal.

Livability/Social/Quality of Life Factors

The primary livability concern for the project was an increase in noise levels in surrounding residential developments due to increased traffic. Land to the west of the site is undeveloped; however, several single family housing communities exist to the east. Adjacent communities also expressed a concern for safety due to increased traffic.

Increases in noise levels were mitigated through the installation of noise abatement barriers. The noise barriers were designed to be constructed in the vicinity of an existing drainage swale. During construction it was determined that a noise barrier needed to be lengthened.

Cultural Environmental Factors

No cultural resources were identified in or near the site.

Construction

Construction occurred over 3 years.

Construction Activities

Construction activities included:

- Interchange and roadway construction.
- Bridge construction.
- Drainage work.
- Temporary Erosion and Sediment Control Measures.
- Storm Water Pollution Prevention Plan.
- Project seeding.
- Noise Barriers.

Construction Equipment

Equipment anticipated included: roadway graders, excavators, material haul equipment, front end loaders, dump trucks, concrete pumping equipment, concrete delivery trucks, crew trucks.

Construction Issues

Issue #1: Sound Barrier Wall and Water Control Structure

Two letters of modifications for permits were submitted. They addressed:

- Changes in sound barrier design to accommodate the minor extension of a noise barrier atop a berm (not realizing that the extension would impact an existing swale overflow structure).
- Replacement of an existing overflow structure that was impacted by noise barrier extension.

Challenges from this issue included:

- Submitting two separate letters of modifications for permits separately caused an unexpected delay in construction due to SFWMD review and comment times.
- According to the contractor, he had to demobilize equipment from the site due to the lengthy approval process of the permit modifications.
- The contractor submitted a $29,420.70 claim to Florida Turnpike Exchange (FTE) for costs associated with the additional mobilization and inefficiency impacts.

- A meeting was held with interested stakeholders including the engineering consultant, the FTE, and the contractor; a settlement was reached in the amount of $10,000.

Issue #2: Signage and Barrier Wall

- The eastside drill shaft was constructed per the plans.
- When the westside drill shaft was being constructed, it became apparent the drill shaft was in conflict with an existing median barrier wall.
- The entire assembly was shifted to avoid the conflict.
- The eastside drill shaft was abandoned and cut below grade.
- A meeting was held with interested stakeholders including the engineering consultant, Florida Turnpike Exchange (FTE), and the contractor; and a settlement was reached in the amount of $15,000.

Issue #3: Maintenance of Traffic (MOT)

- The client selected a different contractor to perform the two adjacent projects.
- The Traffic Control Plans of two contiguous projects to be constructed at the same time did not match.

Plans

See attached.

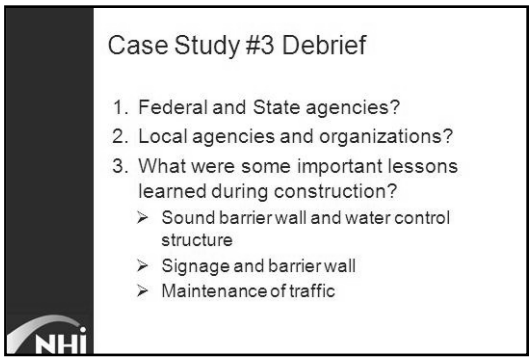
Slide 81 noting MOT in action (also note toll booths)

Slide 82 showing wetlands mitigation area (August 2008)

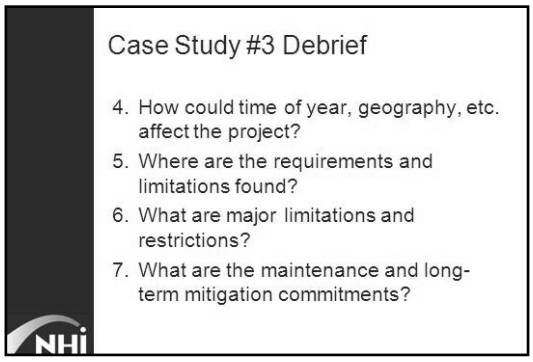
Slide 83 showing same mitigation area in May 2010 (nearly two years after previous photo)

Slide 84 from December 2008 (showing neighborhoods)

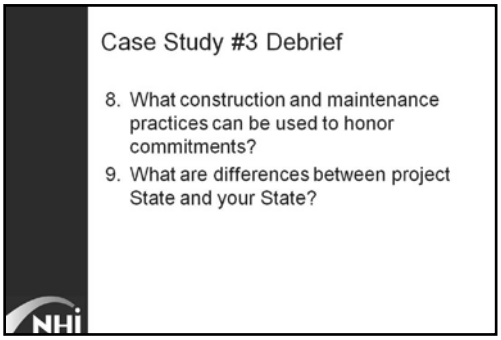
Slide 85 showing neighborhoods in May 2010



Slide 86



Slide 87



Slide 88

Transition Message

These questions highlight some important features from our last case study.

Instruction

Animate the slides to display one question at a time, exploring the answers fully before displaying the next question.

Note that the three slides with photos of the existing structure that interfered with erection of the barrier wall are shown next—after the other debriefing questions have been answered. Use those photos to emphasize the importance of construction and maintenance folks who are on site. Be sure to call attention to the fact that the crews on this project were the ones who identified each serious issue and were able to call them to the attention of the people who could fix the problems.

Interactivity

Encourage participants to share responses to these questions.

Timing

This activity is included in the time allotted for Case Study #3.

Notes

Advance to the next slide.

Questions and Answers for Debriefing

1. What Federal and State agencies would you expect to be involved with this project?

Florida Department of Transportation, Florida Turnpike Enterprise (FTE), South Florida Water Management District (SFWMD), US Army Corps of Engineers, Miami-Dade Department of Environmental Resources Management (DERM)

2. What local agencies or organizations would you expect to be involved with this project?

Homeowner's association

3. What were some important lessons learned during construction?

Issue #1: Sound Barrier Wall and Water Control Structure

- Lesson Learned: The engineering consultant prepared a response explaining the delay and the subsequent demobilization could have been avoided had the two permit modifications been combined into one, thereby reducing review and approval times by SFWMD and avoiding the demobilization of equipment.

Note that this is where project personnel on site can find something that has been overlooked. Perhaps someone planned the barrier without a site visit and the most current plans and maps did not include the water control structure, or perhaps it was just overlooked. Construction and maintenance personnel on the job need to know what is unusual enough to contact someone, and need to know whom to contact.

Issue #2: Signage/Barrier Wall

- Lesson Learned: The project was designed on an accelerated schedule as requested by the client and one project plan set phase submittal and review was eliminated by FTE. During the expedited design process it appears that the Level I and II Drawing Verification steps were not performed on the Signing and Pavement Marking Plans for the subject project as no documentation was found in the project file.
- Originator and Reviewer did not:
  - Consider the sign's foundation size and constructability.
  - Measure existing width between barrier walls at designated station in plans.
  - Coordinate with structural engineer designing foundation.
  - Draw the sign and support correctly to scale in the cross section sheet.
  - Review plans, including independent peer review.

Note that this is where construction and maintenance personnel's knowledge of constructability is helpful.

Issue #3: Maintenance of Traffic (MOT)

- The Engineer of Record for both projects did not coordinate the MOT during the design phase, which caused inconsistency in plans when the contractor started merging activities and construction phases.
- The issue was resolved through coordination between design consultants and the client, and modifications/revisions of MOT plans.
- A Master Schedule would have included all projects and ensured similar construction sequences.

4. How could time of year, geographical region, type of project, stakeholders, public involvement, and other relevant details affect this project?

- Daily rain events, at times unusual heavy, during summer months
- Near residential communities (noise/safety concerns)
- Length of construction

5. Where in the contract documents do you find the requirements and limitations that you are responsible for honoring?

Permits

6. What are the major limitations, such as what areas must be avoided, and when?

Wetland areas and drainage canals

7. Are there any associated maintenance activities and long-term mitigation commitments?

Unavoidable impacts to wetlands were mitigated by purchasing wetland mitigation bank credits from the "Hole-in-the-Donut Restoration and Mitigation Banking Program" in Everglades National Park

8. How can environmental commitments be honored on this project using best construction and maintenance practices?

- Read construction/environmental documents to understand commitments.
- Read and follow sequencing in SWPPP.
- Follow BMPs.

- Avoid or minimize impacts to wetlands and water quality.

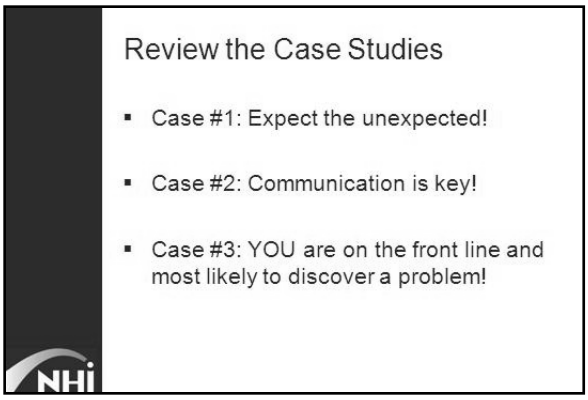
9. What differences do you see between the practices noted in the case study and your own State practices?

- Facilitate brief discussion

Slide 89 displaying area of sound barrier erection

Slide 90 showing unexpected encounter with existing structure

Slide 91 looking downwards to existing overflow structure impacted by noise barrier extension



Slide 92

Transition Message

Let's summarize some of the key concepts from our three case studies.

Instruction

Remind participants how each case study presented a clear message. Summarize as needed.

Animate the slide three times to display the bullet points, one at a time, discussing each as necessary before displaying the next.

Tie together these key ideas with the introduction to this course: You need to know not only what and why certain restrictions are in place, but also how to accommodate them. You do not need to become an expert on the agencies and regulations, but you need to know enough to realize what should happen on a project and you need to know enough to realize when something isn't quite right.

Interactivity

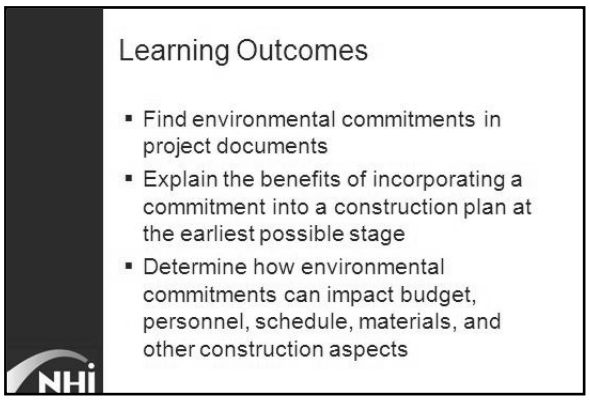
N/A

Timing

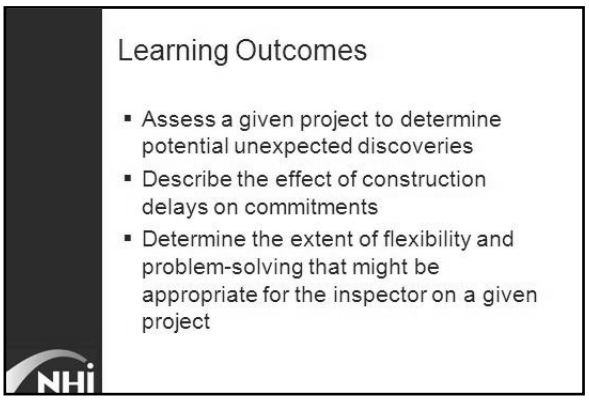
10 minutes

Notes

Advance to the next slide.



Slide 93



Slide 94

Transition Message

Here's an opportunity to review the learning outcomes from this lesson.

Instruction

Emphasize the ways that the small group discussions, questions, and large group discussions enabled the participants to master these learning outcomes.

Review the first slide, and then advance to the next. Review that slide, as well.

Interactivity

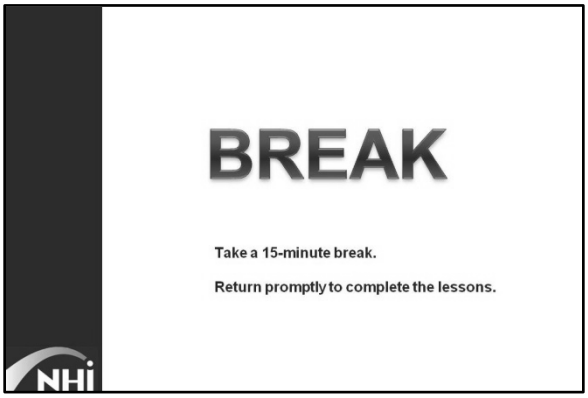
Let participants call out some successful practices and some practical guidance to each other as they recap the content that supported these learning outcomes. The instructor might ask how each of these outcomes is accomplished on a real project.

Timing

10 minutes

Notes

Advance to the next slide.



Slide 95

Transition Message

It is time for a 15-minute break.

Everyone should return promptly so the class can move on to the next topic.

Instruction

N/A

Interactivity

N/A

Timing

N/A

Notes

When participants return to the classroom, advance to the next slide.

Slide 96

LESSON PLAN

Lesson Number and Title

Lesson 3: Hot Topics

Learning Outcomes

1. Discuss new technology and emerging trends in environmental protection and construction monitoring.

Instructional Methodology

The instructor will make brief presentations, and participants engage in large group discussions to explore some of the hot topics, new technology, and emerging trends that affect environmental factors in construction and maintenance.

Instruction Day and Time Allocation

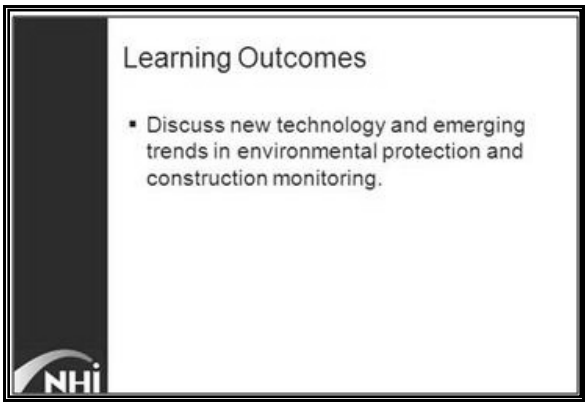
Day 2; afternoon; 30 minutes

Evaluation Plan

Participant learning will be evaluated throughout the session by instructor questioning and assessment, engagement and contributions during discussions of independent study materials, participation in activities exercises, and case studies, and the formal end-of-course evaluation instrument.

References

All references are listed at the end of the workbook. If a specific resource is required for a discussion topic during the instructor-led session, it will be noted on the appropriate page.



Slide 97

Transition Message

The final learning outcome for this class involves your participation in a discussion of hot topics.

Instruction

Inform participants that the next few minutes will be open for a discussion of hot topics, new technology, and emerging trends as they affect environmental factors in construction and maintenance.

Interactivity

Timing

1 minute

Notes

Advance to the next slide.

Slide 98

Transition Message

A variety of topics are open for discussion.

Instruction

Write on the flipchart some of the current hottest topics, such as:

- Environmental justice (especially relate this to health concerns)
- Livability
- Sustainability
- EDC (Every Day Counts) initiatives
- CSS (Context-sensitive solutions)

If the instructor wishes to share any specific new technology, he or she can do it at this time.

Updates to Federal programs, such as the self-evaluation tool, can be provided now.

Interactivity

Encourage participants to share topics as prompted on the bulleted slide.

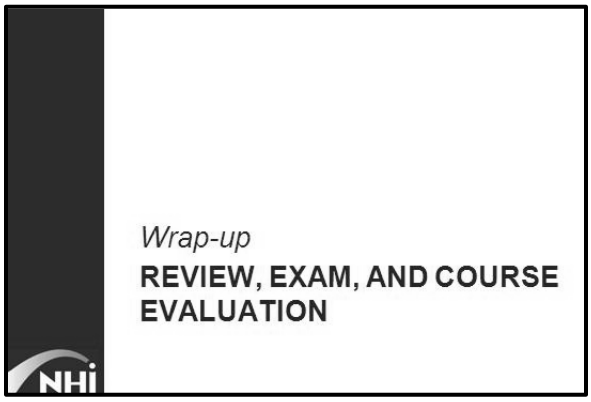
No animation is required; leave all the ideas on the slide to prompt participant interaction.

Timing

29 minutes

Notes

Advance to the next slide.



Slide 99

Transition Message

That concludes the content for this course.

Let’s take a few minutes to make sure we have accomplished what we set out to do.

Instruction

N/A

Interactivity

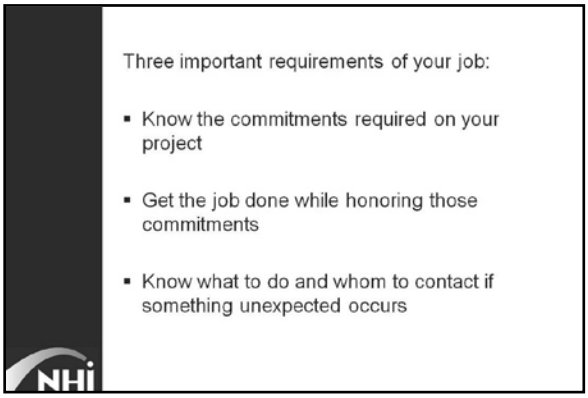
N/A

Timing

1 minute

Notes

Advance to the next slide.



Slide 100

Transition Message

In addition to mastering the stated learning outcomes, let's make sure we accomplished the goals of this course.

Instruction

Recall that—near the beginning of the independent study workbook—we mentioned that there are three important requirements of your job that can help you achieve the balance of completing a quality project while honoring environmental commitments.

Animate the slide three times to display the bullet points, one at a time, discussing each as necessary before displaying the next.

Interactivity

N/A

Timing

2 minutes

Notes

Advance to the next slide.

Slide 101

Slide 102

Slide 103

Transition Message

In addition to mastering the stated learning outcomes, let's make sure we accomplished the goals of this course.

Instruction

Answer any questions participants might have about this course material.

Interactivity

These are the overall course goals, as shown on independent study workbook page 5. Notice that each one of these goals starts with a verb—something you can do. You should feel comfortable doing each of these tasks—or at least more comfortable than you did before you took this course.

Ask: Did we accomplish these goals? Have you learned something about each of these goals?

Encourage participants to look back at the flipchart pages from the beginning of class; some participants listed what they wanted to learn. Ask if they accomplished what they wanted. If not, how can you help them get the knowledge they need or want?

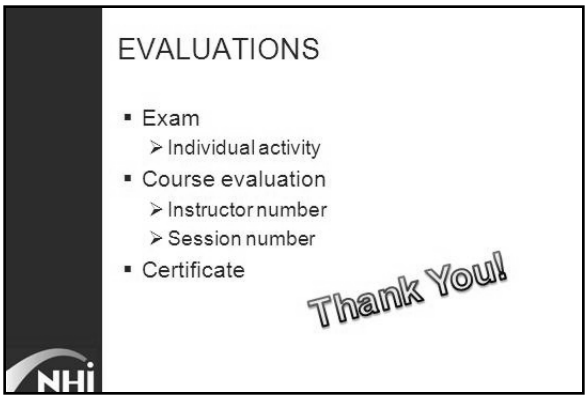
Then, encourage participants to ask any remaining questions they might have about this course material.

Timing

17 minutes

Notes

Advance to the next slide.



Slide 104

Transition Message

Now it is time to evaluate your learning and the course materials.

Instruction

Remind participants to take the exam independently.

Animate the slide to display the next bullet point.

Then explain how to complete the course evaluation materials.

Animate the slide to display the next bullet point.

Explain the process for returning the evaluation instruments and claiming their certificates.

Animate the slide to display the "Thank You" text.

Finally, thank participants for their attendance and participation.

Interactivity

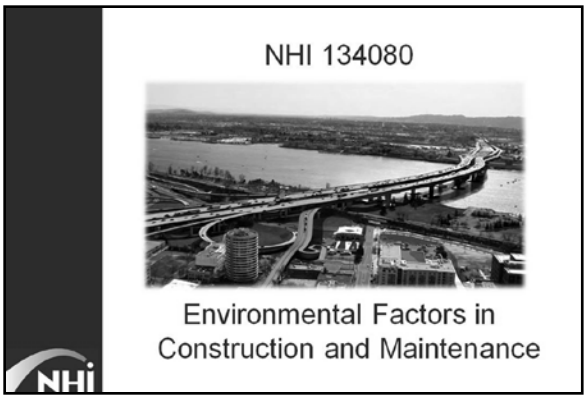
N/A

Timing

65 minutes (allow 60 minutes for the exam and 5 minutes for the course evaluation)

Notes

End of session.



Slide 105

Course title slide