

Preliminary Engineering (PE)

- **Engineering Study**
- Preliminary Design
- Final Design/PS&E
- Bid Phase





Engineering Study

Prior to Beginning

- Local Project Agreement executed by NHDOT and Sponsor ✓
- Consultant firm approved by NHDOT ✓
- “**Received Authorization to Start**” Engineering Study ✓

or “RATS” work is ineligible!!



8 Engineering Study Steps

- 1) Determine existing conditions and existing environmental resources
- 2) Hold local concerns meeting
- 3) Develop purpose and need statement
- 4) Establish design standards



8 Steps – Continued

- 5) Evaluate & vet alternatives
- 6) Select proposed action
- 7) Present results to public
- 8) Submit Engineering Study for NHDOT review and approval



Step #1 - Existing Conditions

Focus on documenting 5 types of existing features in and near your project area:

- 1) Physical features
- 2) Transportation features
- 3) Right-of-Way features
- 4) Utility features
- 5) Environmental features

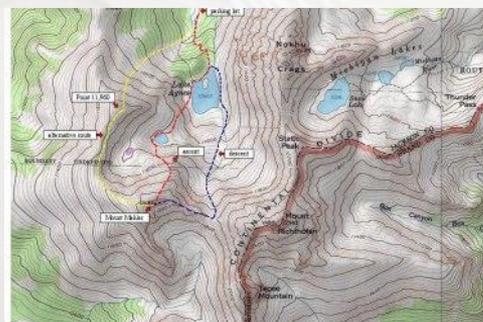




Step #1 - Existing Conditions

Document physical features:

- Ground conditions thru ground survey, aerial images, site visits
- Underground conditions thru test borings and existing plan research
- Physical setting
business, rural, urban
- Water features
natural water features, man-made drainage





Existing Conditions

Document existing transportation features

- Speed limits
- Traffic volumes
- Roadway geometry
(curves, tangents, grades)
- Lane use and shoulder widths
- Trail and sidewalk layouts





Existing Conditions

Transportation features continued

- Sight distance
- Crash data
- Roadway network and users
- Access & driveways
- Railroad facilities in the area
- Airport facilities in the area

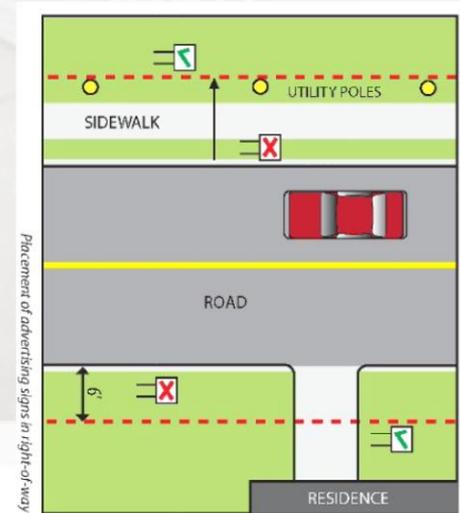


Existing Conditions



Document existing Right-of-Way features

- Where is the existing ROW?
- Are there any existing easements?
- Who are the owners?



Existing Conditions



Where do you find the existing ROW?

- Highway plans and files at NHDOT (Both Concord and District Offices)
- Historic layouts (NHDOT, Towns, and Registry of Deeds)
- Physical evidence (bounds, pins)





Existing Conditions

Where do you find the owners?

- Town tax records
- County Registry of Deeds

Look for both owner of record & other interested parties:

- Mortgage holders
- Lien holders
- Easement holders
- Lease holders

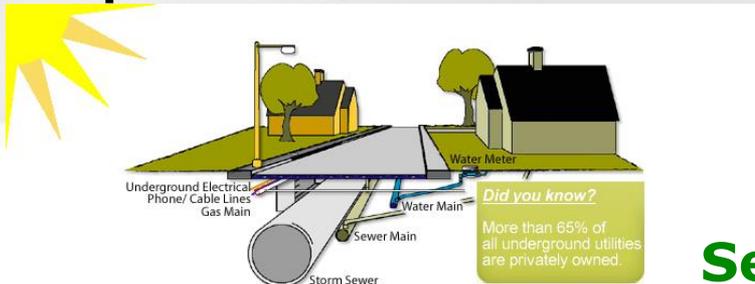




Existing Conditions

Document existing utility features

- Request existing utility locations and utility rights from utility companies
- Look at both aerial and underground
- Can provide them your plans to mark-up and/or field review



Section #20





Existing Conditions

Document existing environmental resources

- Natural Resources
- Cultural Resources
- Contamination
- Others....





Existing Conditions

Contact affected groups to help identify existing environmental resources

Send letters to:

- Local officials
- State and Federal officials responsible for documented resources
- Others as appropriate



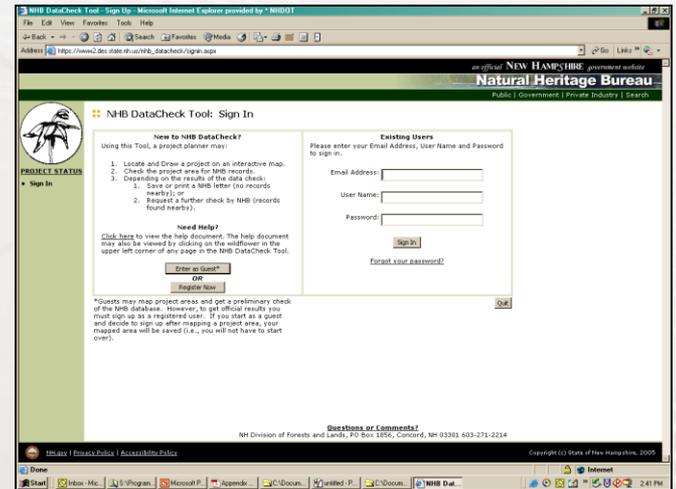
Section #17



Existing Conditions

Identify some documented resources thru on-line databases

- GRANIT Database
- NHDES One-Stop Database
- FIRMETTE – Floodway and Floodplain Database
- US Fish & Wildlife Service:
IPAC – Information for Planning and Consultation Database (new)





Existing Conditions

Some resources require field work to document

Natural Resources

- Wetlands
- Rivers/streams
- Shore lands
- Floodplains
- Invasive species
- Stream crossings
- Etc...





Existing Conditions

Document potential cultural resources



- **Historic**
- **Archaeological**
(may require field work too)



Existing Conditions

Document Section 4(f) resources:

- Publicly owned public parks and recreation Areas
- Fish & waterfowl/wildlife refuges
- National Register listed/eligible historic properties





Existing Conditions

Document Other Potential Environmental Resources

Minority Populations
Elderly Populations
Low Income Populations
(Consult Census Data)



Section 6(f) Properties
(Land & Water Conservation Fund)



Consult Dept. of Natural and Cultural Resources
(Formally DRED)



Section #17





Existing Conditions

Document any Contamination

- Adjacent sites
- Landfills
- Dry Cleaners
- Manufactured gas plants
- Urban fills
- Railroads
- Asbestos
- Lead Paint



Need Manifests, Proper Handling, Transportation, & Disposal



Existing Conditions

Identify contamination thru:

On-Line Resources

- DES – UIC, LUST, GMP, AUR,
- Spills/releases (OneStop)

On Site Evidence

- Stained soils
- Stressed vegetation
- Monitoring wells
- People in hazmat suits





Existing Conditions

Asbestos may be present in:

- Bridges between 1958 and 1978
 - Mastic
 - Pavement
 - Membrane
- Transite pipe
- **Any project in Nashua or Hudson**





Existing Conditions

Plan for potential expenses

- Contamination surveys
- Archaeological surveys
- Historic surveys
- Endangered species/habitat surveys
- Air/Noise analyses
- Stream crossing analysis





Existing Conditions

Gather all of your existing conditions to:

- Develop a comprehensive summary of existing conditions
- Develop the “purpose and need statement”
- Determine constraints and controls
- Prepare for 1st public meeting





Step#2 - Hold Local Concerns Meeting

- Present existing conditions
- Present project area
- Present funding and schedule
- Present basic scope without a solution presented

- Ask for local issues of concern
- Ask for consulting parties- if cultural resources are expected





Hold Local Concerns Meeting

Who should be invited?

- Users of the transportation facility
- Those affected by the project
schools, business, hospitals, etc..
- Elected officials in the community
- Direct abutters
- Others interested in the outcome of the project

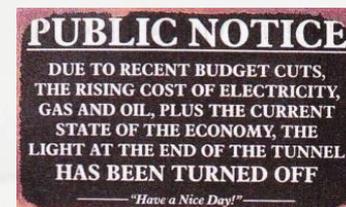


Hold Local Concerns Meeting

Shall be Publicly Noticed

Also notify:

- NHDOT Project Manager
- District Engineer (if State Highway)
- Railroad Owner (if applicable)
- Resource Agencies & Advocacy Groups



**Keep copies of Meeting Notices,
Sign-In Sheets & Meeting Minutes**

Section #18



Step #3 – Develop the Purpose and Need Statement

The Purpose and Need Statement must demonstrate that the project is:

- Justified
- Worth federal expenditures and
- Worth impacts to the environment





Purpose and Need Statement

- It's the backbone of the project
- **Has clear description of goals**
- **Does not describe a solution**
- Is used to evaluate alternatives



Purpose and Need Statement

The Purpose

The Purpose is NOT the Proposed Action

- The purpose of this project is to replace the bridge... **(WRONG)**
- The purpose of this project is to **correct structural deficiencies** associated with a red list bridge... **(RIGHT)**



Purpose and Need Statement

The need is the reason(s) why

- Structural deficiencies in bridge deck
- Limited sight distance
- Weight restrictions
- Substandard guardrail
- Frequent flooding



Purpose and Need Statement

Example

- The **purpose** of this project is to remove a structurally deficient bridge from the NHDOT Red List and increase safety of the traveling public
- The **need** for this project is demonstrated by the structurally deteriorated condition of the bridge deck and structural steel, poor sight distance, high frequency of flooding at the bridge and substandard approach guardrail



Step #4 – Establish Design Standards



Section #16



Establish Design Standards

Prior to developing **Alternatives**, the **Design Standards** that will be used to govern the development of potential alternatives shall be stated in the Engineering Study



Establish Design Standards

Why have standards?

- Reflect sound engineering
- Draw upon previous experience
- Establish minimum criteria
- Protect the LPA



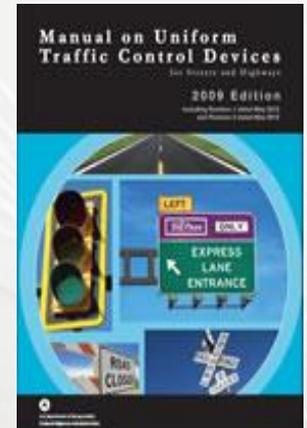
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Establish Design Standards

Found in reference documents

- The Green Book – A Policy on Geometric Design of Highways and Streets
- NHDOT Highway Design Manual
- NHDOT Bridge Design Manual
- NHDOT Standard Specifications for Road and Bridge Construction
- Roadside Design Guide
- MUTCD – Manual on Uniform Traffic Control Devices



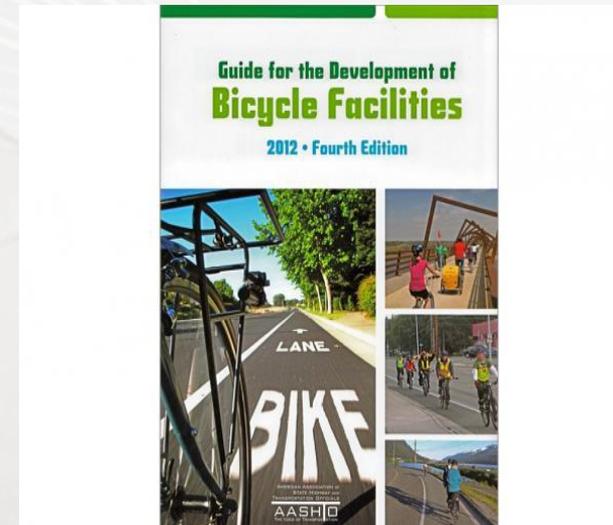
Section #16



Establish Design Standards

Reference documents – cont.

- New Hampshire State Trails Plan (NHDOT)
- Guide for the Development of Bicycle Facilities (by AASHTO)
- Guide for the Planning, Design and Operation of Pedestrian Facilities (AASHTO)



➤ And many more.....

Section #16



Establish Design Standards

ADA

Americans with Disabilities Act

ADA **25** years

Celebrate the
Americans with
Disabilities Act

Boston Common July 22, 2015



Establish Design Standards

ADA Standards

- Apply to the construction and alteration of transportation facilities
- The NHDOT has adopted these standards





Establish Design Standards

ADA reference documents

- **ADAAG** – Americans with Disabilities Act Accessibility Guidelines
- **PROW** - Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way, dated July 26, 2011

PROW recommended, not yet adopted

Establish Design Standards



Improper ADA installation



- Does not achieve the intended goal of accessibility
- Violate the Americans with Disabilities Act

Section #16



Step #5 – Evaluate & Vet Alternatives

Alternatives should always:

- Include No Build
- Relate back to Purpose and Need Statement





Evaluate & Vet Alternatives

Environmental Vetting

- Process to examine alternatives with resource agencies and others responsible for protecting resources
- NHDOT has forums to facilitate the process





Evaluate & Vet Alternatives

Monthly Natural Resource Meetings

- 3rd Wednesday of each month
- At NHDOT HQ
- Submit Agenda Item Request (AIR) form
- **See handout for sample AIR form**



May not be necessary if natural resource impacts are not anticipated

Section #17



Evaluate & Vet Alternatives

Monthly Cultural Resource Meetings

- 2nd Thursday of each month
- At NHDOT HQ
- Submit Project Review (RPR) form approximately one month ahead
- **State Historic Preservation Office (SHPO) attends meeting**

See handout for sample RPR form



Evaluate & Vet Alternatives

Avoid, then Minimize, then Mitigate

- 1st** Avoid impacts if possible
- 2nd** Minimize impacts by varying alternative
- 3rd** Mitigate by doing additional actions to offset unavoidable impacts

Applies to environmental impacts, abutter impacts, utility impacts, etc.....



Evaluate & Vet Alternatives

Design exceptions

In the process of avoiding and or minimizing impacts to abutters and/or the environment, the transportation **design standards** may need to be modified by obtaining a **design exception**

Covered in Preliminary Design



Evaluate & Vet Alternatives

Costs:

- Shall be developed for each alternative
- Can include contingencies at Engineering Study level
- Shall include **NHDOT 2016** major items
- Shall include Non-Participating items



Step #6 - Select Proposed Action

- A **detailed analysis and narrative of each alternative** should be provided and logically lead to the identification of the **Proposed Action**
- Narratives shall include discussions on costs, proposed features, impacts to environmental resources, utilities and private property, as well as, traffic and construction impacts



Select Proposed Action

Proposed Action should be the alternative that:

- Most meets the **Purpose and Need Statement**
- Represents the **Least Environmentally Damaging Practicable Alternative (LEDPA)**





Step#7 – Public Presentation of Proposed Action

- Present Pros and Cons of each Alternative
- Present detailed narrative of why **Proposed Action** best meets the **Purpose and Need Statement**
- Similar format and invite list as Local Concerns Meeting (Step #2)





Public Presentation of Proposed Action

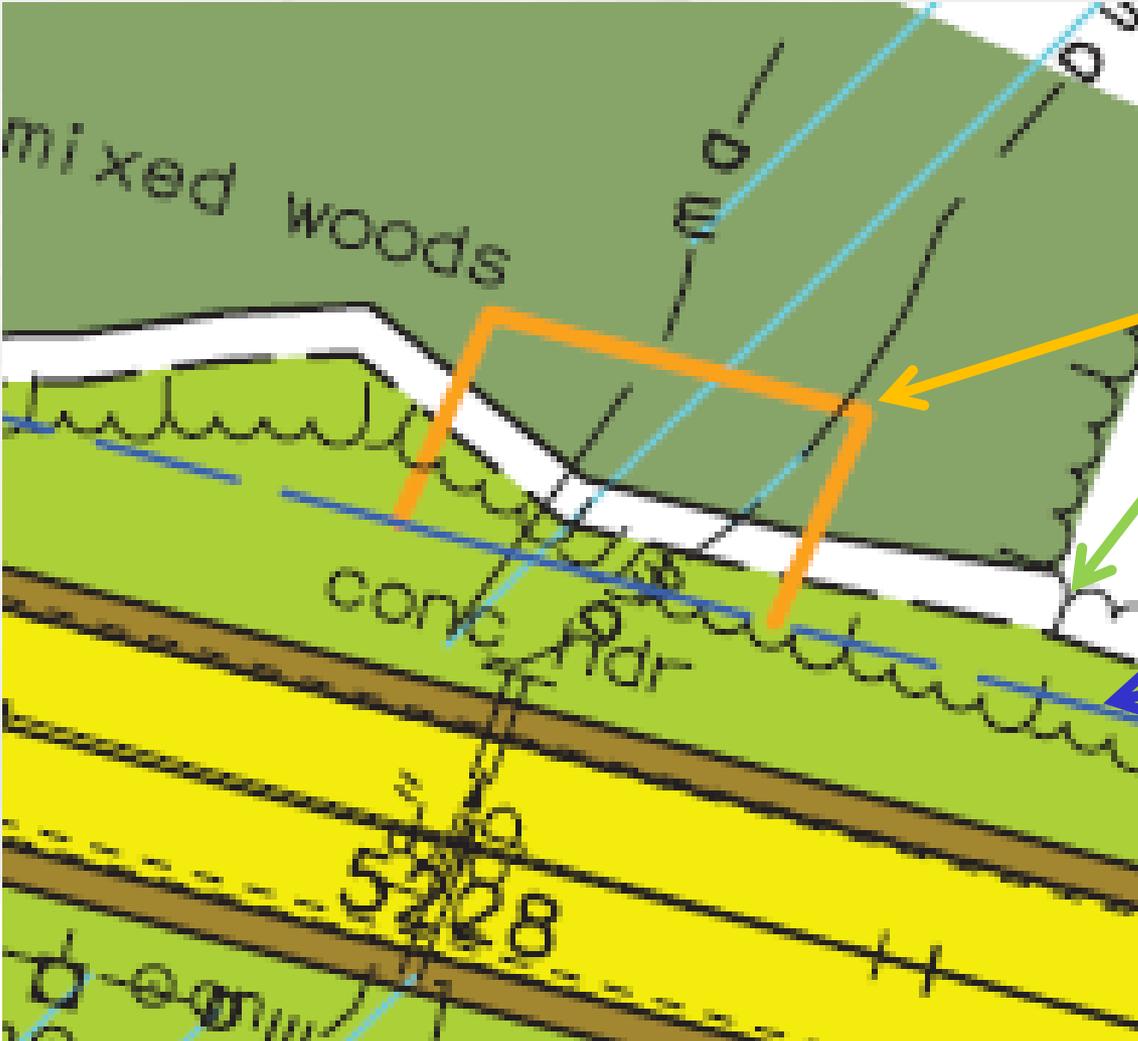
Present Abutter Impacts

- You must illustrate the impacts outside of the existing right-of-way to the public and abutters
- Include temporary impacts for equipment, access, driveway matches, etc....



**ES
#7**

Public Presentation of Proposed Action



Example
Slope,
Drainage,
and Clearing
Easements

**Existing
ROW**

Section #15

The logo consists of a white square with a black border. Inside the square, the letters 'ES' are written in a large, bold, red font at the top, and the number '#8' is written in a large, bold, red font below it. The background of the square is white, and there is a faint, stylized map of New Hampshire behind the text.

**ES
#8**

Step #8 – Submit Engineering Study for NHDOT Review and Approval

Submission requirements

- Sponsor Letterhead
- Bound Document and 11"x17" Plan Sheets
- Back up material, calculations, etc..
- Verify number of copies & format with NHDOT Project Manager



8 Engineering Study Steps

Re-Cap:

- 1) Determine Existing Conditions and Existing Environmental Resources
- 2) Hold Local Concerns Meeting
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8 Steps – Continued

Re-Cap:

- 5) Evaluate & Vet Alternatives
- 6) Select Proposed Action
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End of Engineering Study

Project Status

- Project Agreement ✓
- Consultant Selection (QBS) ✓
- Scope and Fee ✓
- Engineering Study ✓
- Received letter from NHDOT to Proceed to Preliminary Design



Engineering Study

Questions ?



Next Up:
Preliminary Design