A Guide to Develop Small Projects

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Historic Structure on Meredith Neck Road, Meredith NH

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Objectives

- Crucial Steps to Develop Project
  - The Field Review
  - Research
  - Preliminary Engineering
- Project's Purpose and Need
- Design Considerations
- Why Alternatives are Required
- Choosing your Preferred Alternative

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The Field Review – What To Look For

- Bring a camera
- Water sources (streams, ponds).
- Potential flood hazards (beaver or compromised dams)
- Patterns of damage (headwalls, pavement).
- Characterize your surroundings (urban, rural, historic, industrial etc.)
- Proximity of private property to public infrastructure.
- Footprint of the roadway.
- Indicators of animal crossings.
- Presence of utilities.
- Proximity of cemeteries, graveyards, or potential historic infrastructure.

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Field review….

Looking Southeast Down Meredith Neck Road

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Field review….

Looking Northwest Down Meredith Neck Road

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Field review….

Looking downstream at inlet

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Field review….

Looking upstream at outlet wall

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Field review….

Looking upstream inside the structure

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Field review….

Deterioration and Destabilization of the Causeway Wall

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Field review….

Looking northwest from adjacent cemetery.

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Research

Existing Roadway Plans (Town, State)
Traffic Data (Traffic's Website)
Crash Data (Local PD)
Existing Permits (DES)
Cultural Resource Information (Historic Society)
Natural Resource Information (NHB)
Drainage Area – Estimated Storm Flow (Streamstats)
Anecdotal Information
Town Master Plans

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Purpose and Need

- This is something you really want to put some time developing, it is typically required in grant applications.
- The statement should clearly define why the project is needed and how the project will solve the problem creating the need.

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Meredith's Purpose and Need

- Address active safety concerns and structural deficiencies (lack of functional guardrail system, sinkholes, evidence of the retaining wall tipping over)
- Inability to install standard guardrail system along the existing stone structure.
- Proposed design that meets current safety and design standards, and meets with current environmental requirements

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Design Considerations

- Type of Road, Traffic volume.
- Is the project adjacent to historic buildings, cemeteries, or rock walls?
- Do you have a roadway adjacent hazard that will require guardrail?
- Should you augment the scope of work to include the rehabilitation of adjacent features?
- Is water quality a consideration?
- Will you impact environmental and or cultural resources? And if so, will permitting and or mitigation be likely required?
- Note that proposed culverts should meet current stream crossing rules.
- Will the proposed project fit into the site's existing aesthetics?
- Constructability of the project (don't forget utilities) and Traffic Control.
- Long term maintenance.
- What is the cost of the project, both capital and long term.

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Meredith's Design Considerations

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Meredith's Primary Design Considerations

Vertical Drop Hazards
Utility Poles
Private Drives
Roadway Drainage
Agricultural Setting
Existing Aesthetics
Rustic Fencing
Adjacent Cemetery
Historic Rock Walls
Historic Causeway
Cultural Mitigation
Stream Crossing
Wetland Permitting
Narrow Site
Constructability
Traffic Control
Limited Budget

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Alternatives Considered – and why are these required?

Alternatives that should always be considered:

- No Build
- Repair existing
- Replace structure – more than one type of replacement may be developed

Why should they be considered?

- Failure Analysis
- Cost/Benefit Analysis
- Determining the “Best Fit” for considerations
- Permitting and Grants

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Choosing your preferred alternative

This can be highly subjective, and it can differ for each project depending on multiple factors (cultural, environmental, site constraints, aesthetics, and public opinion to name a few). For the Meredith project, it came down to what design would address the bulk, if not all, of the project's design considerations while maintaining the Department's limited budget (100% state funded project).

When determining the cost of each design alternative, it is best to include the following: construction items (include traffic control and erosion control items), environmental permits, preliminary engineering investigations (geotechnical), and mitigation. Ideally, you want to develop a design that is self mitigating. Don't forget constructability and impacts to utilities as these can drive up the cost of the project if they are complex.

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Meredith Neck Road Alternative

- No Build was not an option, the existing structure was actively failing.
- Repairing the structure was not an option, the structure had deteriorated beyond repair and the underlying structure was unknown.
- Full replacement was required, and several options were explored.

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Meredith Neck Road Replacement Alternatives

- Initially, a design was developed that closely matched the characteristics and proximity of the existing structure. It would have required guardrail.
- A second design looked at fill slopes. This option would have required an extremely long culvert and significant impacts to historic properties.
- A third design looked at installing a retaining wall system outside of the roadway clear zone. This allowed for the elimination of guardrail. This design also allowed for a retaining wall system that closely mimicked the character of the existing historic causeway. This third option was selected.

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Proposed alternative and scope of work

- 5.0’ wide x 4’ tall x 75.4’ long precast concrete box and headwalls
- 37.0’ long (combined) dry laid granite block retaining wall (Upstream) using the granite stones from the existing culvert, headwall, and retaining wall
- 107’ long (combined) dry laid granite block retaining wall (Downstream) using the granite stones from the existing culvert, headwall, and retaining wall
- Replace/update the closed drainage system
- Widen roadway to 24’ wide over culvert

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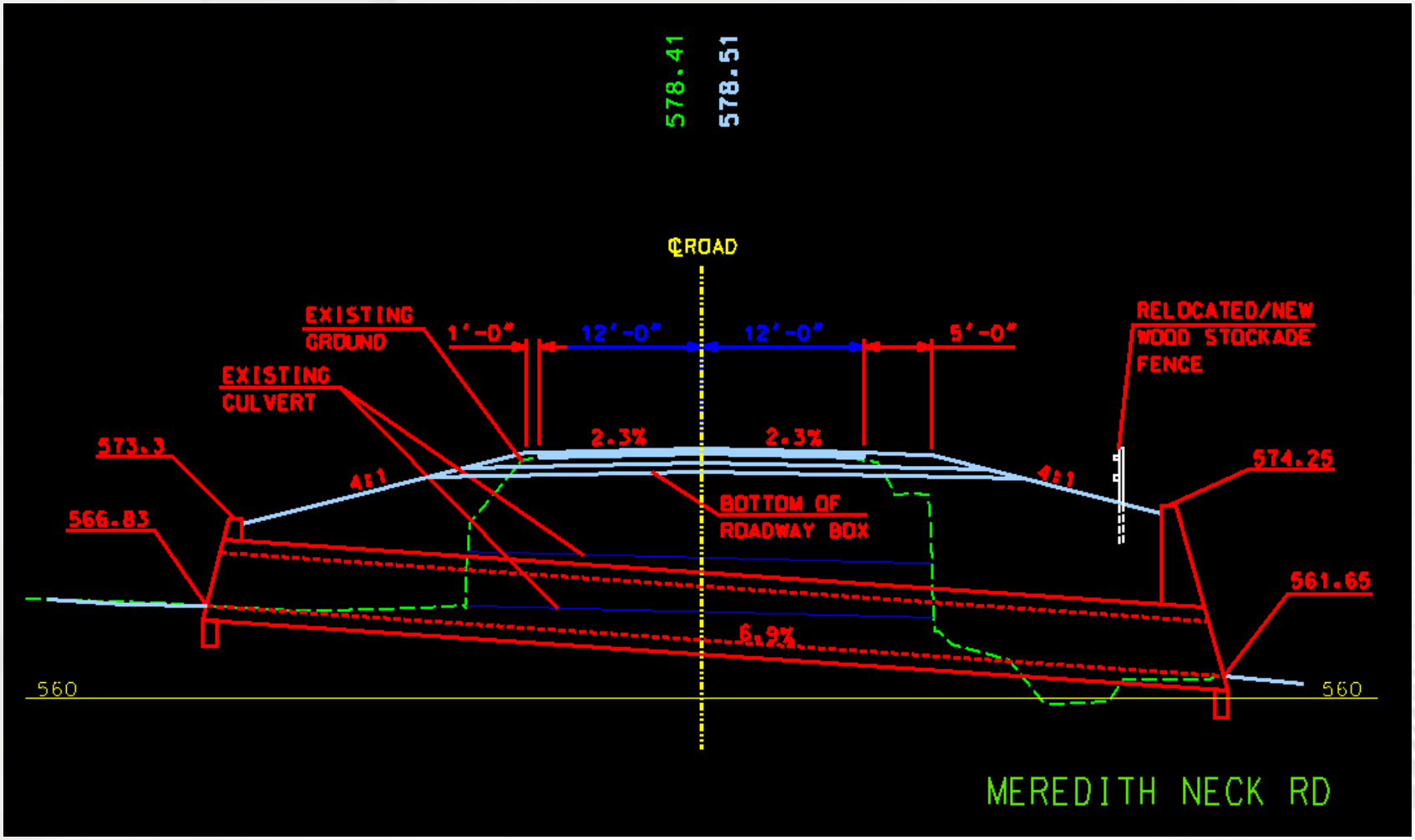
Meredith Neck Road Culvert Profile



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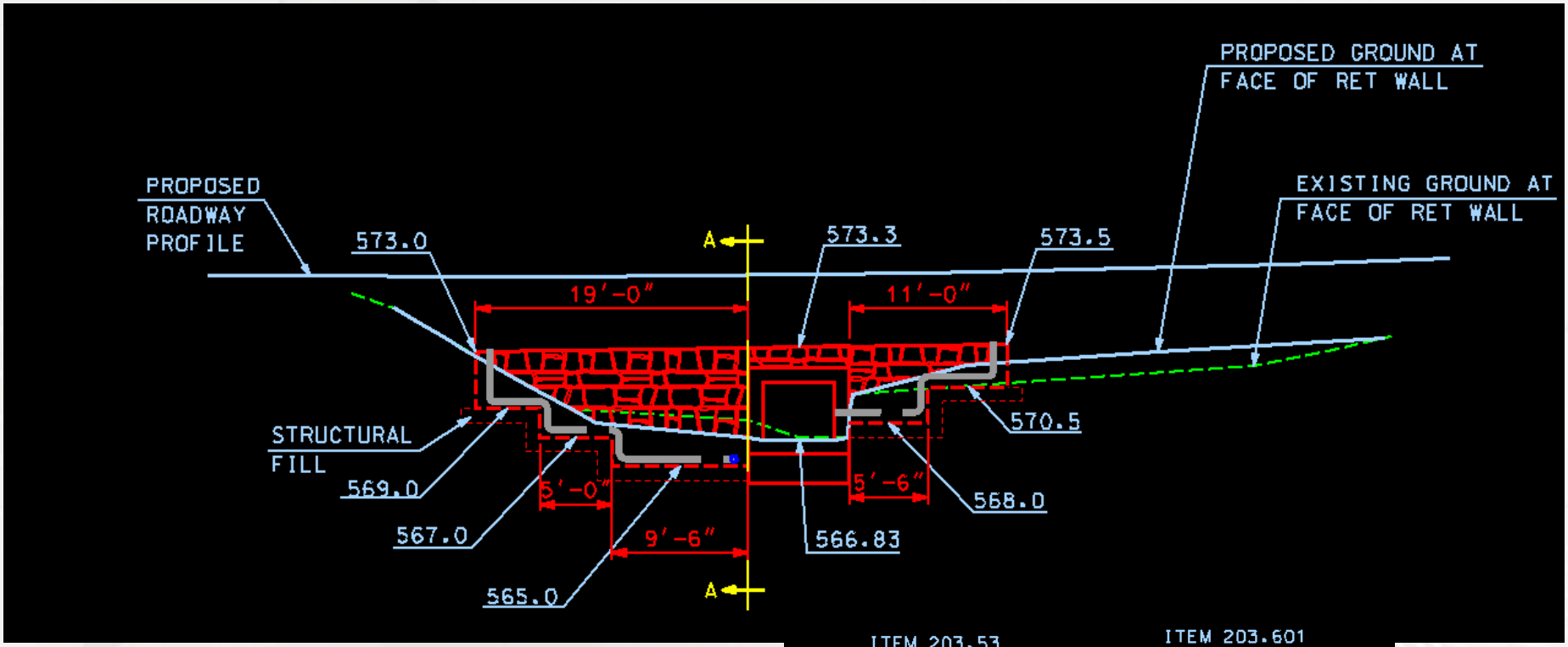
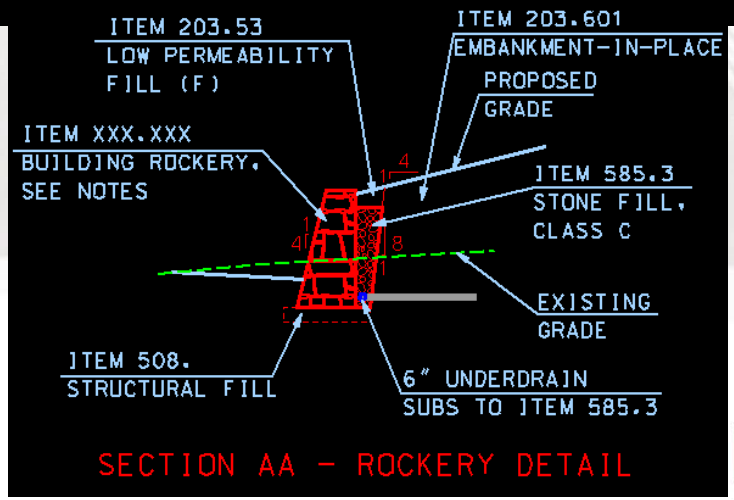
Meredith Neck Road Upstream Structure





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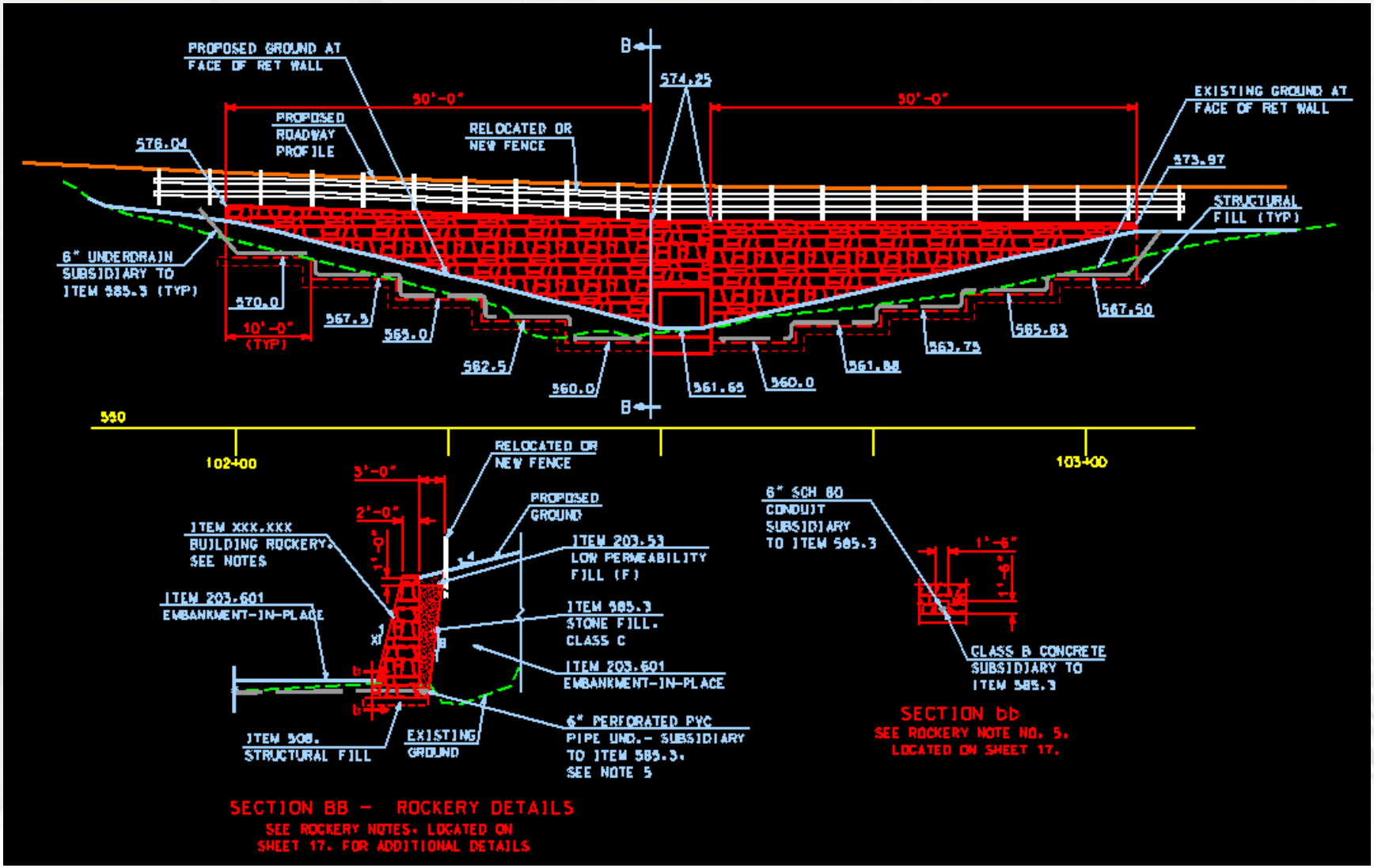
Meredith Neck Road Downstream Structure



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Meredith Neck Road Post Construction

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Resources

- NHDOT Website: https://www.dot.nh.gov/
- Traffic Count Data: https://nhdot.public.ms2soft.com/tcds/tsearch.asp?loc=Nhdot&mod=TCDS
- NH Roads: https://granitweb.sr.unh.edu/Geocortex/WebViewer/?app=9ec207d1970d4ddab771dce0d57f82aa
- NHDOT Plan Inventory: https://maps.dot.nh.gov/reports/plan-inventory/
- DES's Wetland Permit Planning Tool: https://nhdeswppt.unh.edu/Html5Viewer/index.html?viewer=WPPT.gvh
- Certified Culvert Maintainer: https://t2.unh.edu/certifications-recognition/certified-culvert-maintainer-ccm
- Streamstats: https://streamstats.usgs.gov/ss/
- NHB website: https://www4.des.state.nh.us/NHB-DataCheck/

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Questions

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