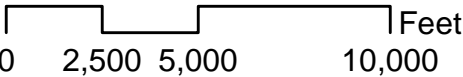


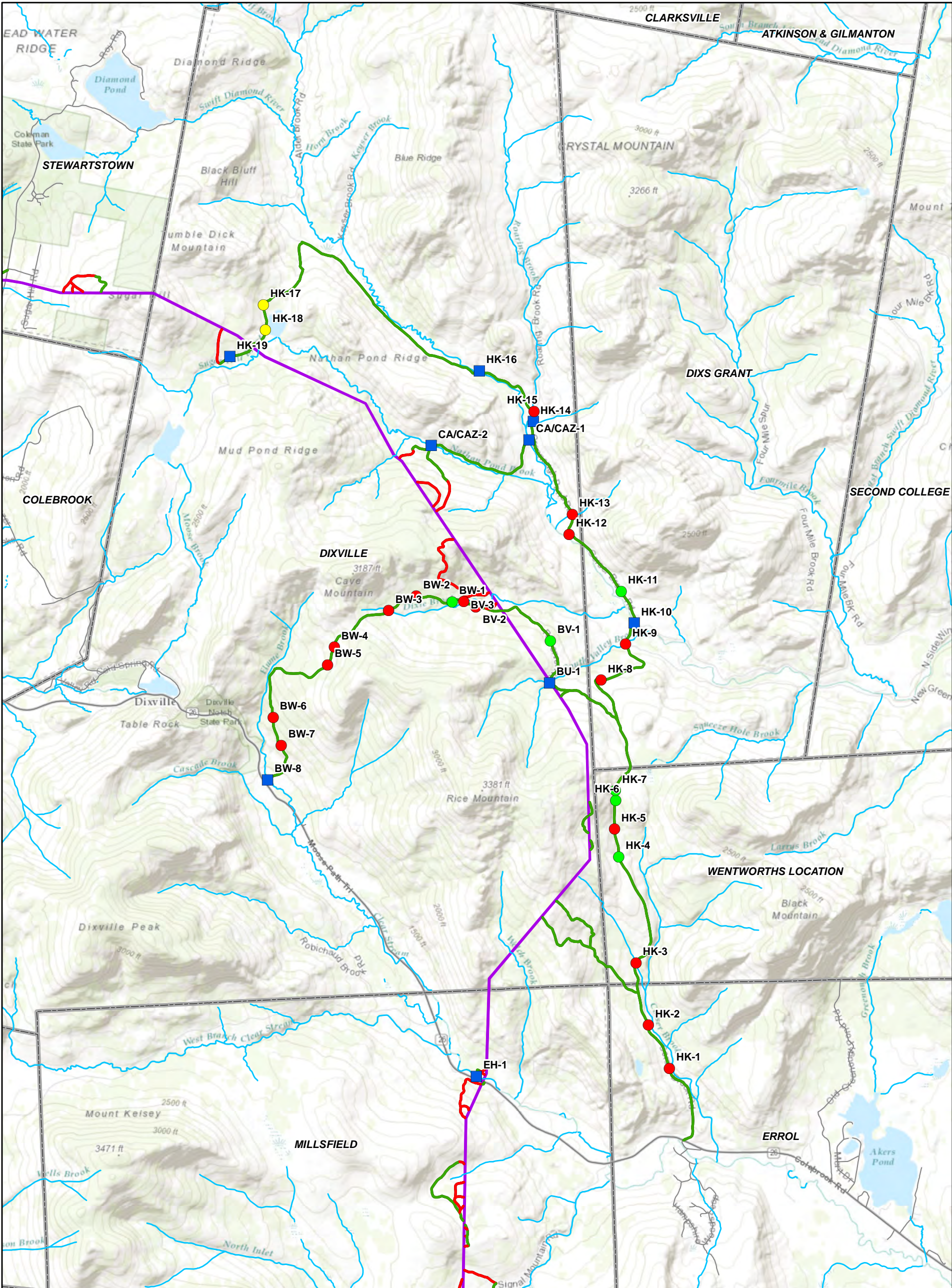
- Bridge - No Action
- Culvert - No Action
- Culvert - Pending
- Culvert - Upgrade
- Road surveyed
- Road not surveyed; or not improved
- Access Routes
- Proposed OH ROW
- Proposed UG ROW
- Municipal Border

Data provided by: NH GRANIT & ESRI



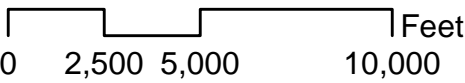
**Northern Pass Figure 1
ORARs Stream Crossings
Map 1 of 3**
Northern New Hampshire, USA





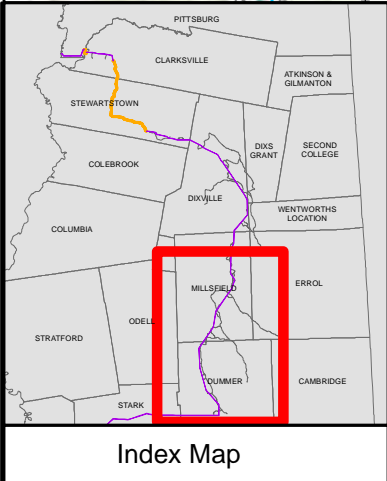
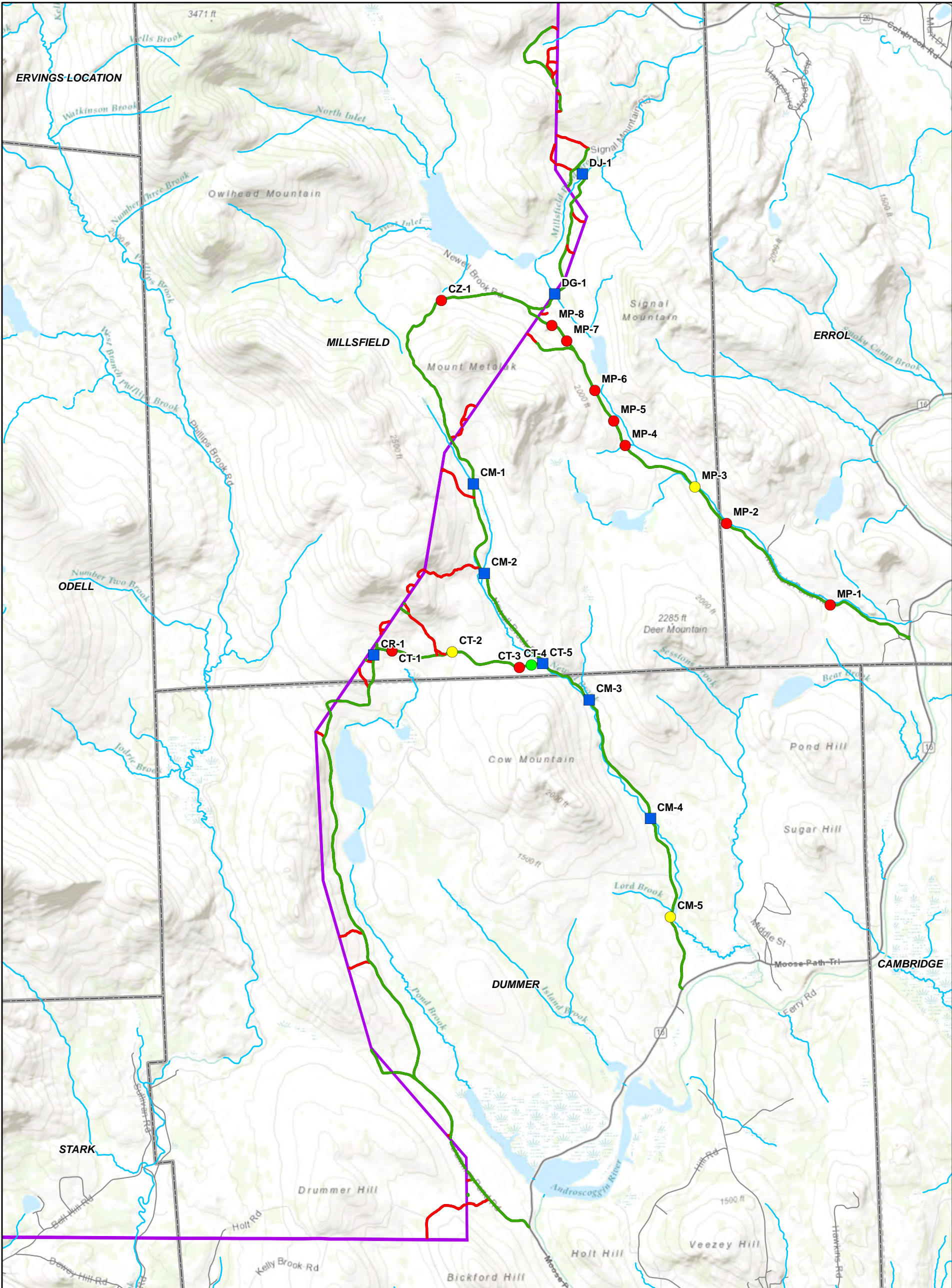
- Bridge - No Action
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- Proposed OH ROW
- Proposed UG ROW
- Municipal Border

Data provided by: NH GRANIT & ESRI



Northern Pass Figure 1
ORARs Stream Crossings
Map 2 of 3
Northern New Hampshire, USA





- Bridge - No Action
- Culvert - No Action
- Culvert - Pending
- Culvert - Upgrade
- Road surveyed
- Road not surveyed; or not improved
- Access Routes
- Proposed OH ROW
- Proposed UG ROW
- Municipal Border

Data provided by: NH GRANIT & ESRI



0 2,500 5,000 10,000 Feet

Northern Pass Figure 1 ORARs Stream Crossings Map 3 of 3

Northern New Hampshire, USA





Memorandum

To: Mr. Jacob Tinus, CWS, CPESC
Burns & McDonnell
780 North Commercial Street
Manchester, NH 03101

Date: January 13, 2017

Project #: 13563.21

From: David Fenstermacher, PE

Re: NPT Culvert Improvement Project
Response to Comment

The following memorandum has been prepared in response to comments related to the use of twin pipes at three locations within the NPT Culvert Improvement Project. The culverts noted (CZ-1, MP-2, and MP-6) were identified as being undersized during the site evaluation of the existing conditions, as such the culverts were required to be replaced. The table below highlights the existing and proposed culvert dimensions, as well as the existing elevations of the stream bed invert and the top of roadway,

Culvert	Existing Condition	Proposed Condition	Invert	Top of Roadway	Cover
CZ-1	18" Round CMP	2 – 30" Round CMP	2032.00	2036.24	1.66 FT
MP-2	36" Round CMP	2 - 30" Round CMP	1563.20	1567.30	1.52 FT
MP-6	18" Round CMP	2 – 24" Round CMP	1853.90	1857.20	1.22 FT

As demonstrated in the table above, in order to increase the capacity of the existing culvert and maintain an appropriate cover between the top of pipe and the roadway, the use of two side-by-side culverts was required.

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