

State of Vermont
Culvert sizing based on the
Stream Alteration General Permit

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River Management Engineers

(aka RMEs - 4 Irene now 6 in 2018)

5 districts

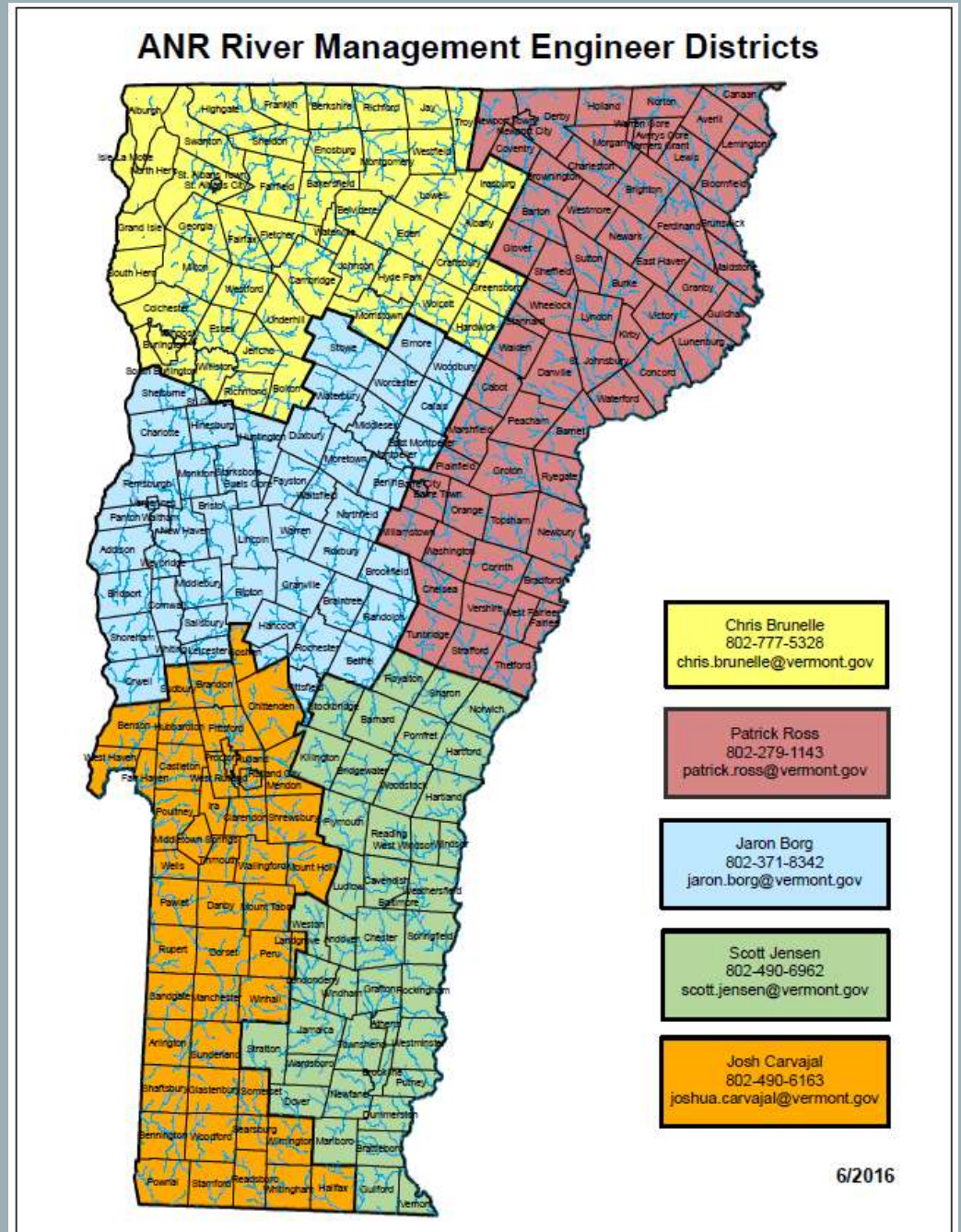
- based on road network (N/S & E/W)

2 - 3 counties and RPCs

- VT has no county government

+/- 50 municipalities

- primary contact is road foreman



RME Roles and Responsibilities

- 1) Stream crossing design and permitting**
 - 2) Emergency response during flood events**
 - 3) Technical assistance for road/river conflicts**
 - 4) Grant assistance and education/outreach**
- We work with All Sectors of Society**

Stream Alteration Permitting

Vermont Stream Alteration Rule:

Chapter 27 of Environmental Protection Rule by Agency of Natural Resources (ANR) for all perennial streams

- Regulates emergency and non-emergency activities

Stream Alteration General Permit:

Under 10 V.S.A. § 41, the Department of Environmental Conservation (DEC) issues permit authorizations for the alteration of streams (administered by Rivers Program)

Stream Alteration Jurisdiction

Perennial Stream:

A perennial stream is a watercourse, or portion, segment or reach of a watercourse that, in the absence of abnormal, extended or severe drought, continuously conveys surface water flow

- ANR guidance document of defining characteristics

and

10 cubic yards or more of instream material:

- movement of material top of bank to top of bank

SAGP Authorization Process

Site Meeting:

with RME to discuss problems and find a good solution

Application Form:

2 pages - applicant contact information, project location, Lat/Long, project description, and landowner signature

Public Notice Draft:

Environmental Notice Bulletin (ENB) - posting for public

Stream Alteration Permit Standards

Statutory Standards:

Will not adversely affect public safety by increasing flood or fluvial erosion hazards; damage fish life or wildlife; damage rights of riparian owners; or water quality values

Performance Standards:

Equilibrium – maintain integrity of stream processes (i.e. channel width, depth, meanders, slope, sediment, wood)

Connectivity – physical form, hydraulics, bank stability, floodplain access, and aquatic organism passage (AOP)

Stream Crossing Standards for Design

Agency of Natural Resources DEC Rivers:

SAGP – bank full dimensions and AOP criteria

VT Agency of Transportation (VTrans):

Hydraulics Manual - road classification, minimum design flow, H & H models, and scour protection

- *Materials used are specified by the town*

VTrans Design Standards

- 1) **Road Class:** 1 - 4, minor or major collectors
 - 2) **Hydrology:** USGS Streamstats/SCS Rational
 - 3) **Hydraulics:** HEC-RAS or HY-8 modeling
 - 4) **Scour:** footings 6 ft below bed or on ledge
- *Hydraulics Reports by VTrans Hydraulics Unit*

SAGP Design Standards

- 1) **Span:** bank full width (from field or VT HGC)
- 2) **Rise:** 4x mean bank full depth and for the design flow a HW/D of 1.0 or 1ft of freeboard
- 3) **Embedment:** > of 30% open height or 1.5 ft D
- 4) **Infill:** ANR E-stone in the structure for AOP
- 5) **Slope:** match stream profile in the structure

SAGP Standard Conditions

Time of Year: instream work July 1 to October 1

Pre-construction Meeting: at the site with permittee, contractor and RME

Flow Bypass & Sediment Control Plan:
contractor develops and RME reviews/approves

Bed Material: ANR E-Stone (E1 to E4 based on exit velocities of Q50 and observed bed material)

ANR E-Stone

Gradation: E-1 has a longest dimension of 18", d50 of 12", 25% is 2" minus and is well graded

Source Material: salvaged from bed excavation and/or mixed with angular blasted rock/bank run

Placement: inside structure over retention sills

Settlement: flushed down to settle the fines and ensure stream flows are not going subsurface

ANR E-Stone



SAGP Design Standards - Deviations

Span/Rise: in an urban setting with immovable infrastructure or habitable structures

Embedment: a reduced depth is allowed when slope less than 0.5% or if under outlet control

AOP: not needed due to natural obstructions (i.e. a ledge waterfall but not man-made blockages)

Time of Year: isolated work area and controls

Websites

VT DEC Rivers Program:

<http://dec.vermont.gov/watershed/rivers/river-management>

VTrans Hydraulics Unit

<http://vtrans.vermont.gov/highway/structures-hydraulics/hydraulics>