

Interagency Collaboration and The Use of Asphalt Shingles in Road Projects in VT

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A Silver Lining to Tropical Storm Irene...



- Encouraged Vtrans/ANR cooperation to rebuild a more resilient, sustainable infrastructure.
- VTrans realizes that infrastructure must account for a dynamic environment. ANR accepts transportation systems as a societal good.

The Dialogue Continues...



- ANR and VTrans senior management have monthly-ish informal meetings to gain understanding of each other's positions, resolve possible conflicts, and share items of mutual interest.
- Recycled materials was a topic at a recent management meeting.

Recycling in Vermont

- Tires have been banned from disposal since 1992, “blue bin” recyclables since 2015, clean wood, leaf, and yard waste since 2016, and all food scraps by 2020.
- Beginning on January 1, 2015, a commercial project that generates more than 40 cubic yards of “architectural waste” (clean wood, plywood, oriented strand board (OSB), drywall, metal, asphalt shingles) is required to bring that waste to an architectural waste recycling facility if there is one located within 20 miles.



Maple Syrup and Progressive Politics



- The Vermont Legislature has taken an active interest in waste management. Advancing recycling laws, setting high diversion goals, and promoting recycled materials market development.
- Both House and Senate committees request annual updates from ANR/VTrans on recycled materials in infrastructure.

Recycled Materials Working Group

- Established working group in Fall of 2016.
- Group is comprised of representatives from the Agency of Natural Resources – Solid Waste Management Program, and representatives from the VTrans Design, Construction, Geotechnical, Maintenance, and Research units.
- The purpose of the group is to evaluate and consider potential recycled materials and how they could be utilized within transportation projects.
- The group's goal is to find uses for recycled materials that:
 - Satisfy a recycling need
 - Are cost effective uses
 - Do not compromise quality
 - Do not compromise long term performance or maintenance requirements
- Currently working on: Shingles, Tires, Glass and Compost

Asphalt, Brick, and Concrete (ABC)

- ANR encourages recycling of uncontaminated ABC, although on-site disposal is allowed in acceptable locations.
- On-project crushing needs no ANR approval; however, facilities collecting and processing ABC into products need ANR certification.



Certified ABC recycling facility, Colchester

Scrap Tire Fun Facts

- Little ol' Vermont generates 700,000 scrap tires/year. A recent survey indicated 62 “legacy” tire piles with ~450,000 tires
- Vermont is one of only a few States with no formal scrap tire program, and no dedicated funding.
- Almost all scrap tires are transported out of state for processing, and most of those are burned for energy.



Tire Pile Clean Up, Milton, VT

Developing New Scrap Tire Markets?

Anti-Moose Fence, Hardwick, VT



“Earthship” Lands! Huntington, VT

Tire Derived Aggregate (TDA)

Shredded Scrap Tires or Tire Derived Aggregate is:

- Lightweight ($\sim 1/3$ density of aggregates)
- Insulative (8x better than gravel)
- Free Draining
- Vibration dampening
- Compressible.
- Has ASTM Standard Practices
- Recycles 75 tires per cubic yard



Tire Derived Aggregate (TDA)

TDA has been used in VT:

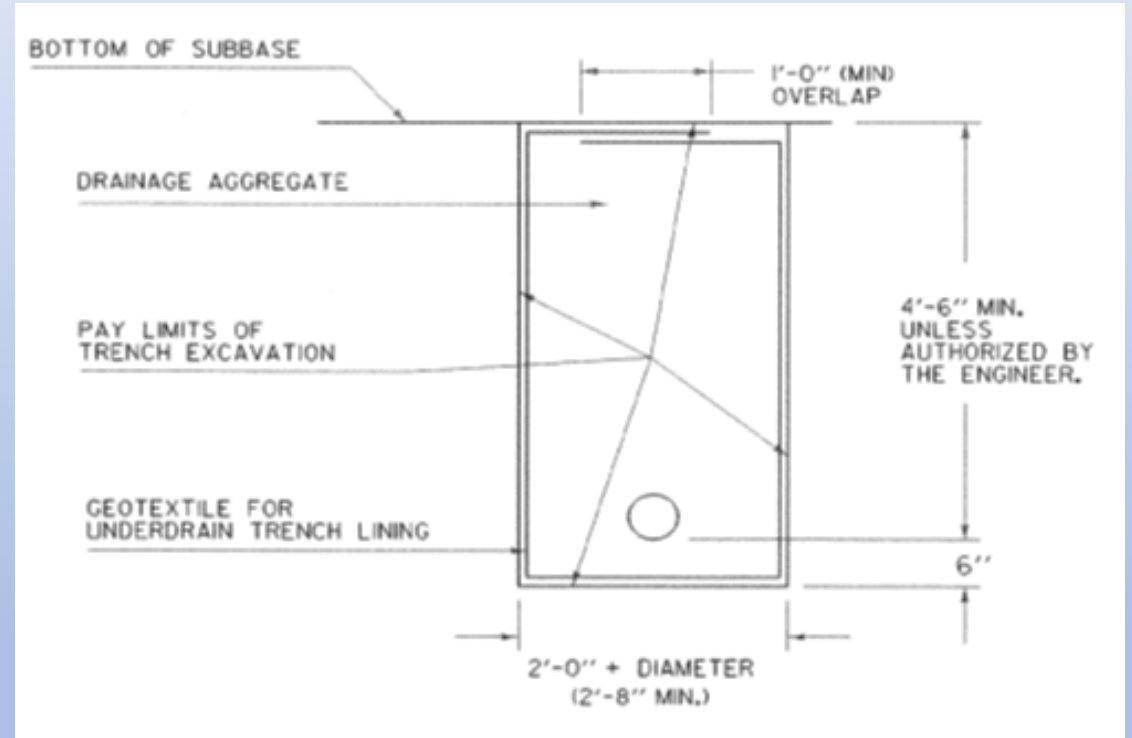
- Timber bin wall backfill
- Embankment stabilization
- Town Highway subbase
- Foundation drains
- Septic systems



Timber Bin Wall with TDA Backfill, River Road, Arlington, VT

Shredded Tires for Underdrain

- VTrans currently has limited experience utilizing shredded tires as components of projects
- Previously attempted to utilize as a backfill material, however difficulties were encountered when trying to source the material locally
- VTrans will be piloting a project in 2019 that will utilize shredded tires as a drainage aggregate for highway underdrain installations
- This application will be paid for and defined through a project special provision
- VTrans will be analyzing these installations with a focus on evaluating performance and long term maintenance



Tire workplan testing

- Applying for a FHWA Experimental Feature
- Londonderry-Chester VT11 Project Fall '19- Fall '20
- Done with a Special Provision, calls for ASTM D2670 Type A
- Will include site observations before, during and after construction
- Comparison to conventional underdrain, including water quality monitoring
 - Background water sampling to establish baseline
 - Collection and testing of underdrain output
 - Expanded testing should initial results raise concern

Processed Glass Aggregate (PGA)

- Glass is difficult to recycle into new glass containers, so most is crushed and screened to make PGA. Facilities in Williston, Rutland, and Lyndon make PGA.
- PGA must meet ANR and VTrans (for VTrans projects) specifications for sizing and contamination. No running over beer bottles with a dozer and calling it PGA!



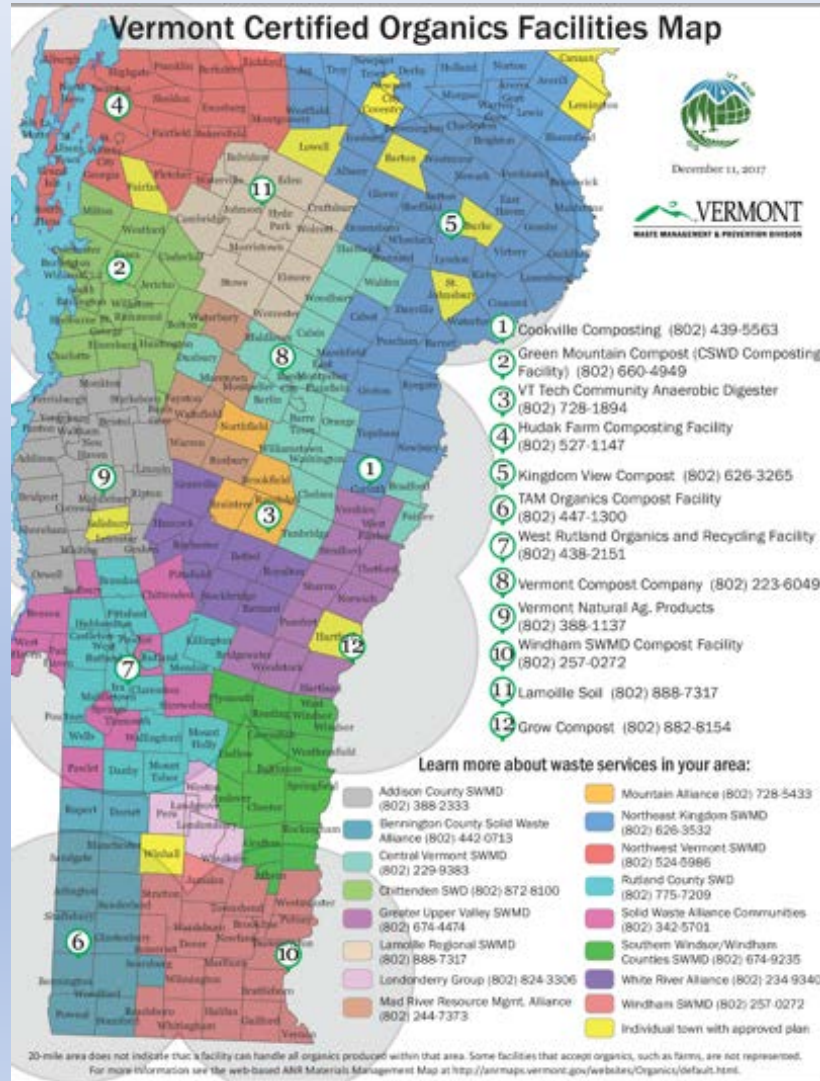
PGA produced by Windham County Solid Waste District MRF

Processed Glass Aggregate (PGA)

- Chittenden Solid Waste District makes 7000 TPY of PGA. Until recently, they had difficulty proving <1% “deleterious material” (paper, neck rings, etc.) standard. Process improvements have led to a consistent, quality product that should meet applicable VTrans specifications.
- CSWD, ANR and VTrans have been working together and have requested that CSWD provide VTrans appropriate quality control documentation for further consideration of the material. |
- Potential uses within transportation project includes backfill material, sand replacement, or additive in reclaim operations.
- Foam glass aggregate plant scheduled to open in VT, hopefully becoming a user for recycled glass

Compost in Construction

All wood and yard waste banned from disposal in VT. By 2020, all food waste will be banned. The result: More compost being created!



TAM Compost, Bennington, VT

Compost in Construction cont.

Compost:

- Increases infiltration rates
- Increases water retention
- Accelerates plant growth
- Reduced chemical need



A 1% increase in organic content in the top 6" of soil can hold approximately 27,000 gallons of water per acre (about the amount of a 1" rain event).

Compost in Construction cont.

- VTrans' "Landscape Backfill" spec 755.01 requires a mix with 25% compost
- As of 2017, on average VTrans uses 17,390 CY/year of topsoil, averaging 367 CY/project.
- Vermont Stormwater Treatment Standards (for use in any project needing a stormwater permit) encourages compost use to improve soil quality on disturbed sites.
- Municipal Roads General Permit is intended to reduce town highway erosion, and what better way? Compost!



Compost socks and blankets installed post-Irene, Jamaica, VT

Recycled Asphalt Shingles (RAS)

- Roofing shingles are asphalt, aggregate, and a small amount of paper or fiberglass binder; in principal, suitable for recycling for road construction materials.
- Vermont produces about 25,000 tons of waste shingles per year. Our one shingle recycler is collecting and processing about 2500 tons per year.



Recycled Asphalt Materials for Bituminous Pavement

- 2018 Standard Specifications for Construction book includes the option to use RAS in HMA
- VTrans specification allows RAS up to 3% of the total aggregate weight in the HMA mix design
- RAS is allowable in shim, base, and intermediate courses (not wearing course)
- Since its only an option it has not been utilized to date on a VTrans project
- Has been used by HMA producers for local projects



Recycled Asphalt Shingles (RAS)

- RAS has been used in Vermont and elsewhere in unbound aggregate mixtures, including shoulder mix, and the surface course in unpaved roads. Less dust, less maintenance.
- In 2000, around 4000 tons of 10/30/60 RAS/RAP/Gravel was used in seven town roads. Packed very firmly, performed well for multiple seasons without maintenance



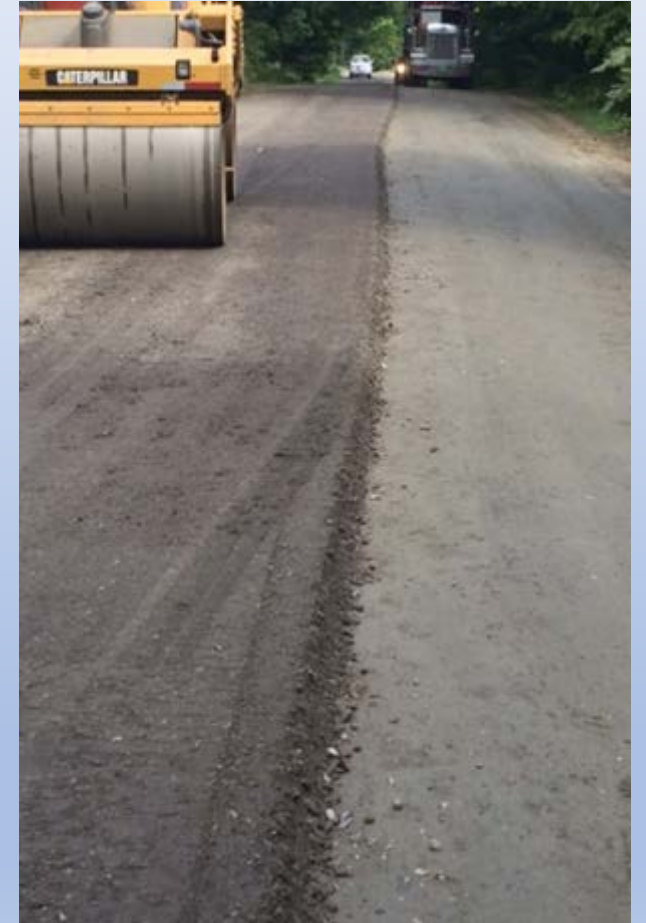
RAS/RAP/Gravel placement, Huntington, VT

Aggregate Shoulders, RAP with RAS

- Paid for and defined via a project Special Provision
- Mixture recycled asphalt pavement (RAP) and 15% RAS
- Utilized in 4 projects 2016, 3 projects in 2017, and 5 projects in 2018
- No recognized concerns with performance or constructability to date
- Specification is in the 2018 Standard Specifications for Construction book
- VTrans intends to continue to identify projects that will implement this RAS application in order to:
 - Obtain additional information regarding performance and constructability
 - Obtain additional bid history in order to analyze cost effectiveness

2016 Aggregate Surface Course, RAS

- Initial test site was on VT Route 65 in Brookfield, one of the few State owned gravel roads
- Paid for and defined via a Project Special Provision
- Mixture of aggregate and RAS, using approximately 1200 tons of RAS
- Performance issues were realized on this project, and has provided “lessons learned” associated with aggregate selection, compaction, mixing procedure, and debris



2018 RAS in Gravel Road - Pilot Projects

- VTrans and VANR-DEC are working together to get \$10,000 to help subsidize the costs of using RAS in several Pilot Projects.
- Projects will use a 80/20 mix of gravel and 3/8 minus RAS (AASHTO MP 23)
- Advertised and promoted through RPC TAC meeting
- Due to source locations, RAS will mixed with local aggregate
- Funds go to cover RAS and Transport costs, to ease any burden on the towns
- Constructed to current town standards and practices
- VTrans and VANR-DEC document, observe and will report on the test sites

2018 Pilot Project 1: Pownal



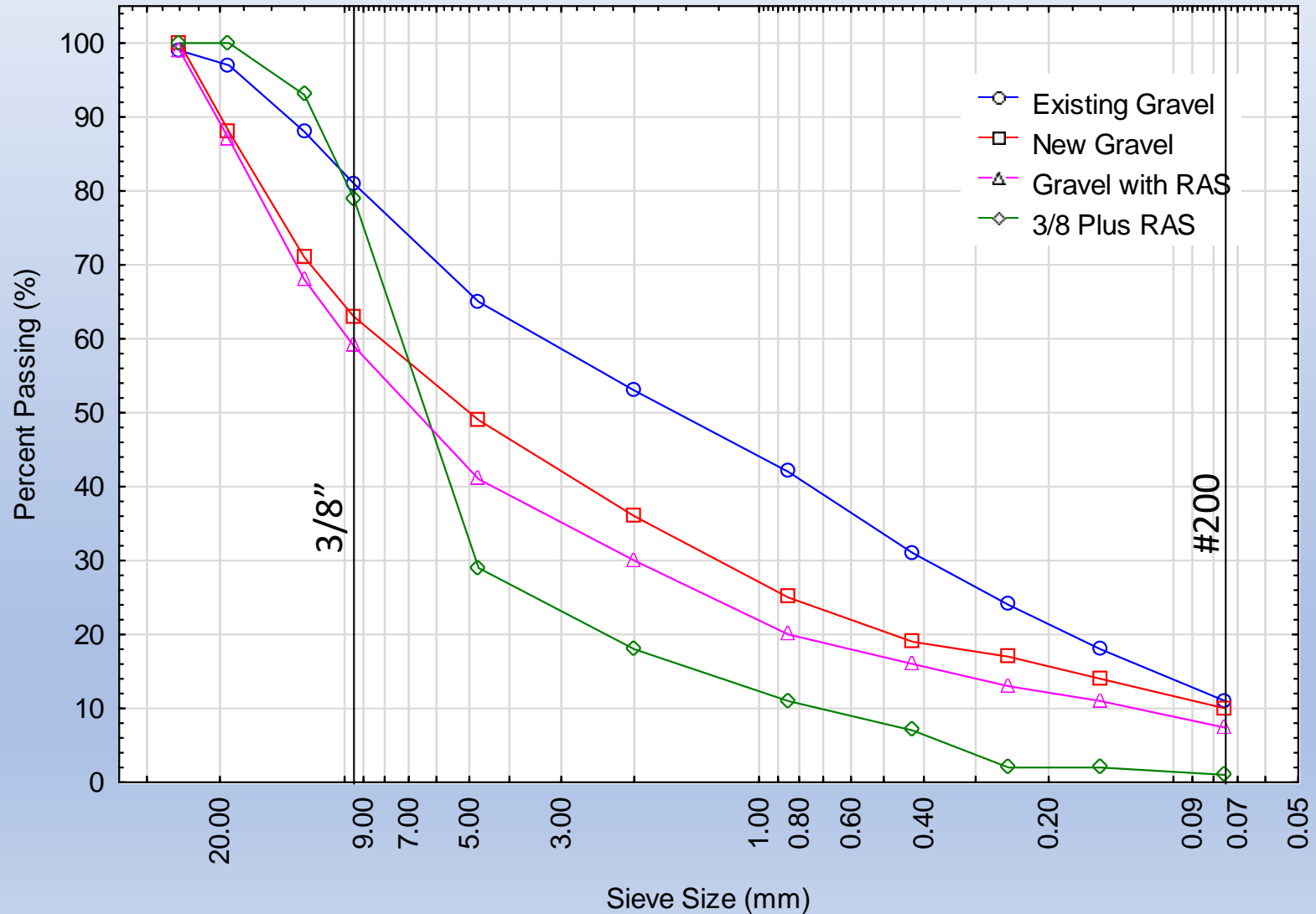
750 ft of Cedar Hill Rd
19 ft wide
5-6% crown
10-15% slope

RAS mixed at 22-25% volume
RAS was not 3/8" minus



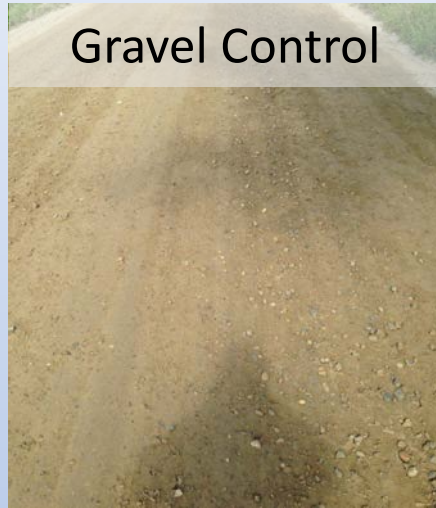
2018 Pilot Project 1: Pownal

Grain Size Distribution for Pownal RAS Project



2018 Pilot Project 1: Pownal

The surface deteriorated, with large aggregate floating out



Large gravel was worn off, and the surface eventually reconsolidated



Recent feedback is positive

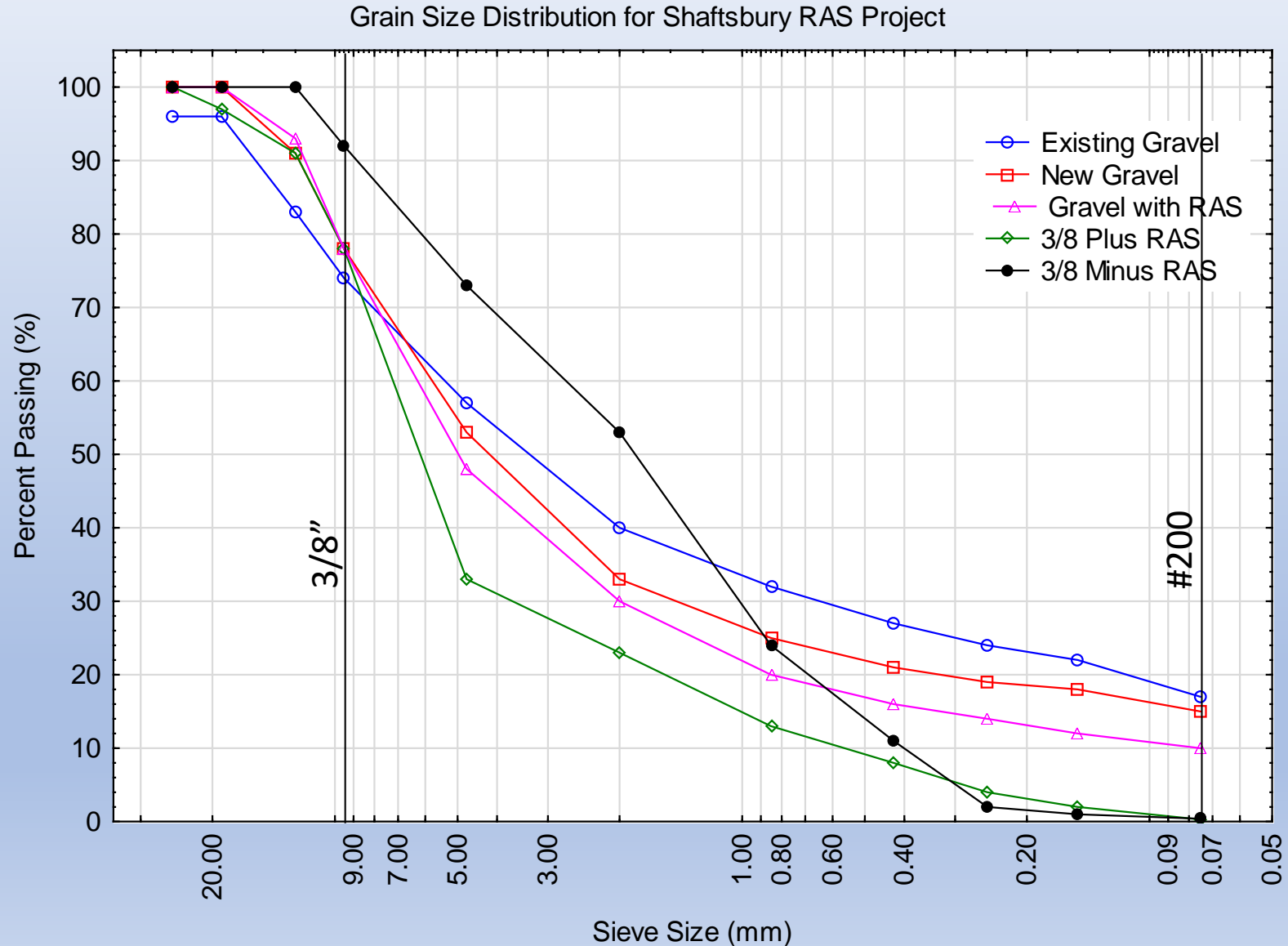
- Doing well through Mud Season
- Outperforming control section

2018 Pilot Project 2: Shaftsbury



1000 ft of Myers Rd, 6-7% grade, 20 ft wide, 3-4% crown
20% RAS, which was 50% 3/8" minus and over

2018 Pilot Project 2: Shaftsbury



2018 Pilot Project 2: Shaftsbury



Recent reports from the road foreman are positive. Happy with performance, seeing less issues during mud season, and impressed with the RAS section



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