An Inventory of Road Drainage Problems

On Class 3 Roads

And a Capital Improvement Plan

Town of Huntington, VT

November 2011

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The Town of Huntington maintains 36 Class 3 gravel roads totaling almost 33 miles. With a grant from the Vermont Better Backroads Program, the Town conducted a detailed inventory of those roads to identify drainage and erosion problems. The roads are identified as 'severe,' 'poor,' 'fair,' or 'good.' From this data the Town developed a ten-year capital improvement plan (CIP) as a guide to correct gravel road deficiencies in a systematic and cost-effective manner.

GENERAL

The old engineer's adage rings true for every road maintainer: "There are three things to remember about maintaining roads: Drainage. Drainage. Drainage." It is especially applicable to Huntington where many gravel roads closely parallel streams and cross the tributaries cascading from both sides of the valley. The Town's 30 bridges and large culverts 20 feet and longer attest to the human encounter of roads with the waters of nature.

Huntington's severe topography poses a significant challenge to road maintainers: steep hillsides, streams in close proximity to roads, driveways, bridges and trees, and the outcropping of ledge.

Over the years, the Town of Huntington has invested millions of dollars in its roads in materials, labor and equipment. Erosion of road gravel translates both into poor roads, a lost resource and additional dollars needed for repair and extra maintenance. The added cost of the deterioration of our treasured natural waters when gravel and silt enter nearby streams is immeasurable.

OBSERVATIONS

Huntington's gravel road surfaces are quite good from a driver's perspective --- fairly smooth and navigable. From a road engineer's perspective, the following deficiencies are evident and are a constant challenge:

- Poor road crowns, flat surfaces. Crowns are needed to direct surface water into roadside ditches.
- Roadside accumulation of material or berms that obstruct water flow to roadside ditches.
- Ditches either filled with material or nonexistent.
- In many cases road surfaces are deficient in gravel or consist of road base only.
- Some cross culvert pipes appear undersized and some lie close to the surface.
- Some driveway culverts are nonexistent or not functioning.

- The road crew spends much time and equipment repairing recurring problems following rain events.

RECOMMENDED REHABILITATION PRACTICES

(Refer to the *Vermont Better Backroads Manual)*

- Apply sufficient gravel to those roads that need it. In some cases roadside gravel can be reclaimed and used on the road. This should be considered an ongoing maintenance practice.
- Establish and maintain road crowns of approximately ½" to ¾" inches per foot.
- Create sloped shoulders by removing accumulated roadside soils.
- Create round bottomed ditches.
- "Armor" ditches with filter fabric and stone. For slopes less than 3% to 5%, use seed and biodegradable matting.
- On steep grades, construct stone check dams in ditches to reduce the speed of water flow.
- Shape and line turnouts with stone. (Water from turnouts should be directed only to highly vegetated areas where it is dispersed and absorbed into the soil.)
- Construct settling ponds near rivers and streams which filters water from ditches.
- At cross culvert pipes and at driveways, insure sufficient stone is in place to limit turbidity at inlets and to eliminate the erosive effect of falling water at outlets.
- Construct cross culvert pipe preferably at a 45° angle to minimize turbidity at inlets.
- Where appropriate, increase the length of culvert pipes under roads to accommodate the reinforcement of roadsides and fore slopes.

POLICY RECOMMENDATIONS

- Take the long view. Investing now to establish erosion resistant roads leads to less expense in the future. As the advertisement goes: "Pay me now or pay me later." Erosion will continue its damage until it is stopped. Rewards begin immediately and will continue for future generations.
- Commit to a ten-year *Capital Improvement Plan* for gravel road improvements.
- Persist in providing adequate funds each year for roads and projects identified in the CIP.
- Provide funds for training operators of road graders and excavators.
- Establish an annual, detailed maintenance plan for road crown, ditches and culverts.
- Consider purchasing an excavator, a versatile piece of equipment that will pay for itself in short order.

Section I Typical Gravel Road Conditions (Forty Photographs)

Roadside gravel could be pulled in as the operator shapes new ditches. In this instance the wire fence conflicts with the ditch line.

Flat roads such as this are typical. Notice where water flows and the accumulation of soil on the roadside.

Similar to previous photo.

A turnout with much useable gravel. For all turnouts, reshape and line with stone and reclaim gravel where possible.

Notice how water flows in the road, carrying material downhill. Note the berms on each side of Beane Road that direct surface water onto the road.

Note where water flows at this point on Bridge Street.

Water flows in the road. Note gravel accumulation. (Lower Carse Road)

On Carse Road, consider placing a new culvert to cross water under the road to the south side into vegetated areas and away from this property.

Typical washing of water in the road. Need to remove berm, reclaim material, construct shallow ditch and line with stone. (Lower Carse Road)

Another turnout with excess gravel. (Carse Road near utility pole #330)

Severe erosion. (Carse Road, up from intersection with Moody Road)

Evidence of erosion and deposits of gravel. Work with property owner to place culvert under driveway. (Carse Road)

Typical on many roads is a flattening of the road surface leaving a ridge of material that directs the flow of water into the road.

Similar to above photo.

Where severe erosion occurs at culvert outlets, increase the length of the pipe. Improve inlet and outlet by reshaping and stone lining. (Carse Road)

Carse Road, north side, at residence #869.

Gravel is carried away because of berm, no ditch. (Upper Carse Road)

Many roads lie close to streams such as Fielder Road at Camels Hump Road.

Pond Road looking downhill toward Mayo Road.

Same point looking uphill on Pond Road. Both sides require ditch maintenance but north side is more severe. Note lack of road crown.

Culvert pipe at Mailbox #190 is askew and does not receive water. Note washing.

Misdirected water above the driveway culvert inlet at mailbox #190 on Pond Road.

At road junctures like this, insure that water is directed by adequate stone-lined ditches. (Happy Hollow Road looking up from Pond Road)

Note accumulation of gravel that has washed down the road and stockpiled.

Lower Happy Hollow Road.

Happy Hollow Road.

Tree on right is an obstruction to plowing and to creating a roadside ditch. Consider 1 or 2 cross culverts in this area. (Happy Hollow Road)

Gravel lost to the roadside. No ditch. (Happy Hollow Road, below Mail box #557)

Evidence of water traveling down the road and over the shoulder. (Happy Hollow Road)

Severe washing for about 1,500 feet. (Kier Road)

Typical for most of the distance of Kier Road.

Almost the entire length of Salvas Road requires ditching and stone lining. About 12 turnouts need improvement.

Typical lack of ditches, flat surface, washing and deposits of gravel on roadside. (Salvas Road)

Typical Turnout (Weaver Road)

Near Mail Box #339 looking up hill (Weaver Road)

Gravel, muck and debris in ditch (Weaver Road)

Severe erosion. Ditch is filled in and is no longer capable of diverting water. (Weaver Road)

Accumulation of gravel in ditch line. (Weaver Road)

Severe erosion at driveway culvert outlet at Mail Box # 682 (Weaver Road)

Severe erosion at driveway culvert inlet at Mail Box # 682 (Weaver Road).

Further up hill on north side of Weaver Road

Severe erosion, north side of Weaver Road just downhill from Mail Box 867.

Section II Drainage / Erosion Deficiencies Showing Road Segments

(Alphabetical Listing by Class 3 Roads) (Segment distances are approximate)

Beane Road .40 Miles

Condition Poor to Fair
Notes Road parallels brook for about 1,000 feet
Remedies Ditch north side for 800' from Bridge #10
Remove berms from MB #240 west to town line (Mountainside Lane)

Bert White Road 1.45 Miles

Segment #1 From Taft Road to first rise (2,500')
Condition Poor
Notes FEMA estimates $10,775 total cost for repair in worst areas (April 2011 storm)
Remedies North side: renew ditch and stone line
South side: pull in berms, shape shoulders and shallow ditch

Segment #2 From first rise to mailbox #630 (900')
Condition Fair
Notes Minor maintenance required in some spots
Remedies Remove berms; renew shallow ditches; apply biodegradable matting

Segment #3 Mailbox #630 to mailbox #950 (3,000')
Condition Poor
Notes Severe ditch cut on south side for about 1,500'
Seven turn outs
Remedies Ditching on both sides; remove berms; apply stone lining for about 2,000'
Four driveway culverts required

Segment #4 From mailbox #950 to mailbox #1069 (1,000')
Condition Fair
Remedies Ditch and stone line on north side
Intermittent ditching and stone lining on south side

Segment #5 From mailbox #1069 to end of road past sawmill (2,500')'
Condition Fair
Notes Five turn outs

Remedies First 500' cut berms and create shallow ditches; seed and mulch
Next 2,000' cut berms, create shallow ditches; stone line or matting
Reshape and reinforce turn outs

Bridge Street .61 Miles

Condition	Fair
Notes	Typical erosion and ditch issues
	Regular maintenance required
Remedies	Pull in berms; shallow ditch; stone line (2,000')
	Pull in berms; shallow ditch; line with biodegradable matting (2,000')

Camels Hump Road 3.30 Miles

Segment #1 Main Road to new guard rail on north side (1.2 miles)

FEMA has assigned funds for repairs on many sections

Condition	Fair
Notes	Some washing on edges of road
Remedies	Cut berms; form shallow ditches; seed and mulch

Segment #2 From guardrail to blue mobile home on left (1,600')

Condition	Fair
Notes	Road narrows on ascent to top; Washing of material appears in the road
Remedies	Reshape ditch for about 2.500' on south side; stone line
	Improve ditching in immediate area of Bridge #32;
	Create settling pond at lower end of bridge to filter water before entering stream

Segment #3 From Bridge #32 to Bridge #31 at Fielder Road (1,100')

Condition	Fair
Remedies	Create settling pond on upper side of Bridge #32
	Remove large berm on south side for about 150'
	Below mailbox #1786, south side, remove 100' berm
	Shape entire length; some shallow ditching

Segment #4 From Bridge #31 to wooden bridge #30 (600')

Condition	Poor
Notes	Road narrows
Remedies	Improve ditch and discharge area
	Ditch on south side; armor north side toward stream

Segment #5 From wooden bridge uphill for 1,000'

Condition	Severe
Remedies	Reshape severe ditch cutting on north side; stone line
	Remove berms in spots; reshape shoulders
	Form shallow ditch on south side; stone and / or matting

Segment #6 From water tank to parking lot at end of road (1.1 miles)

Condition	Poor
Notes	Area at edge of parking lot shows erosion
	Deep ditch cut on rights side for 150'
	Many turnouts
Remedies	Remove berms
	Ditch and stone line, especially spots with deep erosion in ditch line
	Reshape and armor turn outs

Carse Road **1.4 Miles**

Segment # 1, Main Rd to Moody Rd (About 1,500 feet)

Condition	Poor
Notes	Both sides of road have berms entire distance; water washes into road.
Remedies	Remove berms; create ditches; stone lining; install new cross culvert to south side near Main road Improve turnouts

Segment # 2, From a point 300' east of intersection with Moody Road to mailbox #1045, about 2,500'

Condition	Severe
Notes	South side: deep erosion for most of the distance North side: berms
Remedies	South side: Form ditches; stone line North side: Remove berms; some ditching; apply stone or matting (varies) Improve turnouts

Segment # 3, From mailbox 1045 uphill for about 1,500'

Condition	Fair
Notes	On both sides: roadside berms; accumulated material
Remedy	Remove berms; shallow ditching; stone line ditches.

Chalet Heights Road **.13 Miles**

No significant drainage issues. Regular Maintenance Improve turnouts

Charlie Smith Road **.20 Miles**

Condition	Fair
Notes	Berms / gravel on both sides Road is near brook
Remedies	Pull in berms; Ditching; biodegradable matting in many locations

Cozzens Road **.15 Miles**

Condition	Poor to Fair
Notes	Steep; typical erosion; berms
Remedies	Ditch entire and rock line both sides (1,500') Reshape and armor 7 turnouts on east side

Delfrate Road .60 Miles

Condition	Poor
Notes	Much washing of sand and gravel at top of hill for 500' to 600'
Remedies	Reshape ditch; stone line to top of first rise (525')
	Remove berms; reinforce shoulders; shallow ditches to mailbox #325 (1,500')
	Mailbox #325 to mailbox #475: remove berms; create shallow ditch
	From mailbox #475 to end: form ditches and stone line (550')

East Street 1.75 Miles

Condition	Fair
Notes	Overall, sound maintenance would bring road up to standard
	Intersection is wide at Delfrate road; consider redesign
	Guardrail near Taft road is substandard
Remedies	Taft Road west to STOP: reshape ditch on north side; seed and mulch
	South side: remove berm; shape shoulder and ditch line; mulch
	Delfrate Road west to paved section, both sides:
	reshape ditches & shoulders; seed & mulch

Economou Road 1.4 Miles

Condition	Severe
Notes	New stone lined ditches installed by FEMA/State funded (April 2011 storm)
	For a distance of about 2,500' on east side
Remedies	Remove berms and reshape ditches /stone line for 1,000' (From Texas Hill Extension uphill to mailbox #256)
	From mailbox #256 on east side: ditch and stone line for 2,500'
	Same on west side, though shallower ditches required
	From top end of new stone, east side, to mailbox #898 (1,000'), repair deep cuts in ditch; stone line.
	Shallow ditch needed on west side.
	From mailbox #898 up: on east side, new stone lining to Mailbox #986 (500')
	From mailbox #986 to Furno Road, both sides: ditch shaping and stone (1,500')

Fielder Road .15 Miles

Condition	Poor
Notes	Short, steep road with turns; near Brush Brook
	Three gravelly turnouts discharge directly into brook
	Cross culvert discharges directly into brook
Remedies	Armor cross culvert inlet, west side
	Armor heavily the outlet discharge area
	Ditch and stone line both sides (1,000')
	Shape and armor outlets with stone

Handy Road .55 Miles

Condition Poor
Notes FEMA / State of Vermont have assigned funds for partial repair (4 / 2011 storm)
Severe erosion on west side just before curve
Much loose gravel at top of hill on both sides
Most severe section is at top toward end of road, last 600'
Remedies Remove berm on west side; re shape shoulders and ditch on east (150')
Reshape shoulders before mailbox #305 (200')
Reshape ditches; stone line for entire distance from here (2,500')
Extra armoring needed near curve and steep section

Happy Hollow Road 1.84 Miles

Condition Poor
Notes Steep inclines; narrow road sections; berms in many places.
Remedies Consider cross culverts in some locations
Reshape ditches entire length
First 1,000 from bottom to driveway with "Innovative Landscaping" sign: Ditch and stone line on south side.
Ditch and place biodegradable matting on both sides to Kier Road (400')
On south side, ditch and stone line to utility pole 33/208X (600')
Remainder of road to end: ditch and stone line, mostly on north side (some shallow ditching, maybe not full width.)

Huntington Acres .24 miles

No significant drainage issues. Regular Maintenance

Huntington Woods Road .34 Miles

Condition Fair to Good
Notes Minor, regular maintenance issues.
Remedies Remove berms in spots
At mailbox #299, water that runs into driveway could be alleviated by improved ditch and a cross culvert, or a swale at the end of the driveway.
From mailbox #129 to intersection: improve shoulder by cutting berm and reinforcing; some washing at this location.

Kier Road .25 Miles

Condition Severe
Notes Severe ditch erosion on south side (1,000')
Remedies South side: shape ditch and line with stone (2,500')
North side: pull in berms; build ditch; line with stone (2,500')
Install 3 or 4 cross culverts and armor inlet / outlet with stone

Lerner Road .14 Miles

Condition Fair
Remedy Ditch and rock line east side from #158 to end (600')

Lincoln Hill Road .75 Miles

Condition Fair
Notes Seems to function OK except washing on south side of road
Remedies Pull in berms, south side
From turn around on top, ditch and stone line (2,500')

Mayo Road 1.50 Miles

Condition Fair to Good
Notes Selected spots for ditching & stone lining
Standing water & muddy area near mailbox #1225, east side
Remedies From mailbox #81 north to first rise, east side: Ditch and stone line (1,000')
From mailbox #1225 north to mailbox # 1405, west side: ditch / matting (1,000')

Moody Road 1.55 Miles

Segment # 1, From intersection with Main Road to top Galloping Hill Farm (1,600')
Condition Fair
Notes FEMA and State of Vermont have assigned funds to repair a severe section approaching the bridge near intersection with Carse Road

Remedies At bottom on east side reshape and armor inlet at culvert that crosses Main Road
East side: new ditches; line with stone;
West side: create 3 or 4 turnouts; remove berms; reshape shoulders.

Segment # 2, From farm south to Johns Brook (1,500')
Condition Severe to poor
Notes Severe erosion at bottom of hill at inlet and outlet sides of road
(FEMA / State of Vermont have identified this area for repair
Remedies East side ditch and stone lining
West side, primarily remove berms and create shallow ditches;
Some stone lining, some matting
Reshape inlet and outlet areas at cross culvert; use stone extensively

Segment # 3, From mailbox # 1235 to end (1,000')
Condition Fair
Remedies East side: ditch and stone line on east side
West side: remove berms, create ditches and improve turnouts

Piper Place .10 Miles

No significant drainage issues. Regular Maintenance.

Pond Road 1.40 Miles

Condition	Poor to Fair
Notes	Berms; lack of ditches; water runs down road in most areas
	Inoperative driveway culvert at Mailbox #190
Remedies	Ditch and stone line both sides for 1,500' from Mayo Road intersection
	Next 2,000' to Happy Hollow Road, road levels off; ditch and apply biodegradable matting both sides.
	Remainder of road to turnoff (.7 miles): pull in berms; shape shoulders

Robert Parks Road .30 Miles

No significant drainage issues. Regular maintenance.

Robert Parks West Road .10 Miles

No significant drainage issues. Regular maintenance.

Salvas Road .95 Miles

Condition	Poor
Notes	FEMA / State of Vermont have assigned funds for partial repair (4/2011 storm)
	Blocked driveway culvert at #298 & #302
	At least a dozen turnouts need attention
	Some gravel may be reclaimed
Remedies	Ditch and stone line almost entire length on east side
	Selectively pull in berms
	A short portion at the bottom of road after the first rise: ditch and place matting
	A short level portion at top of hill: ditch and place matting

School Street .11 Miles

No significant drainage issues. Regular Maintenance.

Shaker Mountain Road .55 Miles

Condition Fair
Notes Typical; ditching and stone lining or matting would bring this road up to par
Some gravel wash on south side
Remedies From Meadow Drive to mail box #315: remove berms, shape ditches & line with stone (800')
From two short guardrails downhill: shape ditches & stone line (500')
Remainder of road, alternate stone lining / biodegradable matting

Sherman Hollow Road 2.55 Miles

Condition Fair
Notes This road is typical in that regular maintenance procedures would bring it up to par. Except for the lower section, the road gradually climbs westward. From the Bird Center to the Hinesburg town line, there is evidence of road washing due to no crown and small berms; no ditch on north side.
Remedies Selectively pull in berms and create ditches entire length.
Ditch and stone line from Meadow View Drive to Mail Box # 315 (800')
Ditch remainder & line with biodegradable matting; selective stone lining
On the lower section at approach to Main Road, ditch, stone line and reinforce shoulders, especially on north side.

Spence Road .30 Miles

No significant drainage issues. Regular maintenance.

Taft Road 1.63 Miles

Segment #1 From Camels Hump Road to top of hill (2,000')
Condition Severe
Notes Fairly steep section; deep erosion in ditches
FEMA identified as area for repair due to 4/2011 storm ($12,000 total estimate)
Road narrows on approach to mailbox #1470
Remedies West side: form ditches and stone line entire length.
East side: remove berms, reinforce shoulders entire length.
Cut brush and widen road to uniform width as part of reconstruction
Consider adding two cross culverts

Segment #2, From farm yard to Terrian Road intersection (2,000')
Condition Poor
Notes Fairly level
At .6 miles, much washing at outlet of culvert
Remedies Cut berms; create ditches both sides; apply biodegradable matting
Extend length of culvert pipe; reinforce fore slope with heavy stone

Taft Road (Continued)

Segment #3 Terrian Road intersection to mailbox #415 (1,600')

Condition	Fair
Remedies	Ditch east side; seed and biodegradable matting
	Remove berms and form shoulders on west side
	Add 3 or 4 cross culverts where appropriate

Segment #4 Mailbox #415 to intersection with East Street (2,000')

Condition	Fair
Notes	Most of ditch west side is stone lined
Remedies	Improve ditch and reinforce with stone for 1,000' on east side

Terrian Road .26 Miles

Condition	Severe to Poor
Notes	FEMA has assigned funds to repair much of this road damaged in April 2011
	At bottom on south side to 1,100: no ditch causing water to run down road
	Deep cuts in ditch on north side for entire length
Remedies	Remove high berms on south side; shape shallow ditches; stone with check dams
	Ditch entire north side; reinforce with stone;
	Clean two cross culverts
	At curve on top end, reshape ditches and turnouts; steep section here
	Reshape and stone line large turnout at top of hill at connecting drives and roads

Texas Hill Circle 1.05 Miles

Condition	Fair
Notes	West to east
Remedies	Clean up debris by guardrail at brook; improve slope; seed / matting to stabilize area at bridge and brook
	Improve ditch outlet at the bridge by constructing settling pond; armor entire area.
	From Economou Road west: Reshape ditch & line with rock (150')
	Below mailbox 341 to 6' culvert: ditch & line with rock (300')
	From mailbox #61 to cross culvert, north side: ditch & line with rock (300')

Texas Hill Road **1.62 Miles**

Condition	Fair
Notes	Overall, sound maintenance practices would raise road to good standard
Remedies	From intersection with Texas Hill Circle down to outlet on right side: Reshape ditch & line with stone. (300')
	From mailbox #650 downhill on right: reshape ditch & line with stone (350')
	Below mailbox #831: cut berm; reshape ditch; reclaim soil; seed & mulch
	From Longhorn Drive eastward: seed & mulch / matting needed (1,000')

Trapp Road **1.85 Miles (FEMA / State funds assigned for part)**

Segment #1 Main Road to road levels off (.9 miles)

Condition	Fair
Notes	Gravel is pushed out extra wide for first .2 miles
	15 turnouts total on either side
Remedies	Remove berms; create shallow ditch
	Reinforce ditches and turnouts with stone
	At .3 miles, extend cross culvert reinforce fore slope with stone

Segment #2 From .9 miles to end of Class 3 road (1 mile)

Condition	Poor
Notes	Road begins to level off a bit; not as steep
	Plastic culvert at .9 miles lies at road surface
	At .1 miles, rock ledge protrudes at center of road
Remedies	Remove berms; create or re-form ditches; stone line in some sections; seed and mulch in others.

Weaver Road **1.2 Miles**

Condition	Severe to Fair
Notes	Ditching needed for entire length.
	Varied conditions: Severe erosion in spots; roadside berms; poor ditches
	Severe erosion at inlet and outlet of driveway culvert at mailbox # 682
Remedies	At bottom for 1,000' create shallow ditches with periodic turnouts.
	From mailbox # 350 downhill on south side (400'), create ditch and stone line
	At mailbox # 535, downhill on south side, ditching and stone lining
	Talk with property owner at #535 to ditch and armor driveway to road
	At mailbox # 682, reshape inlet/outlet areas; considerable stone armor (300')
	North side, from # 682 to # 720 (600'), ditching and stone line
	Both sides to #900 (750'), ditching and stone lining
	From #867 to end (1,000'), ditch both sides; apply biodegradable matting

Section III A Summary of Road Condition Ratings

Ratings are somewhat subjective. A severe rating calls for immediate attention. A poor rating suggests the road or segment is serviceable but has many issues. If not remedied soon the road or road segment will rapidly deteriorate into costly rehabilitation. A rating of fair suggests some deterioration taking place that sound maintenance could remedy. Seven roads having a good rating are italicized as *no significant drainage issues, regular maintenance required.*

	Class 3 Roads	Mile Length	Roads and Road Segments with Conditions
1	Beane Road	0.40	Poor to Fair
2	Bert White Road	1.45	Segment 1: Poor Segment 2: Fair Segment 3: Poor Segment 4: Fair Segment 5: Fair
3	Bridge Street	0.61	Fair
4	Camels Hump Road	3.30	Segment 1: Fair Segment 2: Fair Segment 3: Fair Segment 4: Poor Segment 5: Severe Segment 6: Poor
5	Carse Road	1.40	Segment 1: Poor Segment 2: Severe Segment 3: Fair
6	*Chalet Heights Road*	*0.13*	*Good: No significant drainage issues; regular maintenance*
7	Charlie Smith Road	0.20	Fair
8	Cozzens Road	0.15	Poor to Fair
9	Delfrate Road	0.60	Poor
10	East Street	1.75	Fair
11	Economou Road	1.40	Severe
12	Fielder Road	0.15	Poor
13	Handy Road	0.55	Poor
14	Happy Hollow Road	1.84	Poor
15	*Huntington Acres*	*0.24*	*Good: No significant drainage issues; regular maintenance*
16	Huntington Woods Road	0.34	Fair to Good
17	Kier Road	0.25	Severe
18	Lerner Road	0.14	Fair
19	Lincoln Hill Road	0.75	Fair
20	Mayo Road	1.50	Fair to Good
21	Moody Road	1.55	Segment 1: Fair Segment 2: Severe to Poor Segment 3: Fair
22	*Piper Place*	*0.10*	*Good: No significant drainage issues; regular maintenance*
23	Pond Road	1.40	Poor to Fair
24	*Robert Parks Road*	*0.30*	*Good: No significant drainage issues; regular maintenance*
25	*Robert Parks Road West*	*0.10*	*Good: No significant drainage issues; regular maintenance*
26	Salvas Road	0.95	Poor
27	*School Street*	*0.11*	*Good: No significant drainage issues; regular maintenance*
28	Shaker Mountain Road	0.55	Fair
29	Sherman Hollow Road	2.55	Fair
30	*Spence Road*	*0.30*	*Good: No significant drainage issues; regular maintenance*
31	Taft Road	1.63	Seg. 1: Severe Seg. 2: Poor Seg. 3: Fair Seg. 4: Fair
32	Terrien Road	0.26	Severe to Poor
33	Texas Hill Circle	1.05	Fair
34	Texas Hill Road	1.62	Fair
35	Trapp Road	1.85	Segment 1: Fair Segment 2: Poor
36	Weaver Road	1.20	Severe to Fair

Section IV A Ten-Year Capital Improvement Plan

by Rank of Road and Road Segments

The following is a suggested approach for repairing the drainage and erosion problems on Huntington's Class 3 roads over a ten year period.

Projects are listed in a chronological sequence tackling the worst problem sites first. Road sections and sites rated 'severe' should be repaired as soon as possible. They are like a hole in the roof. If not repaired, they will only get worse and lead to ruinous, costly repairs. Next, the order of projects calls for undertaking problem areas rated as 'poor.'

The first six years of the plan pose a significant financial challenge. Repairing roads is more costly than maintaining them. The goal of this plan is to repair and stabilize all roads to achieve a 'good' rating, moving from an expensive repair and rehabilitation mode to a less expensive annual maintenance schedule only.

As the Town repairs and stabilizes 'severe' and 'poor' areas over time, it should simultaneously engage in a systematic road maintenance schedule for all roads. Otherwise 'fair' and even 'good' roads will deteriorate.

Some 'severe' and 'poor' sites were damaged during the April 2011 storm or by Tropical Storm Irene in August. Fortunately funds from FEMA and the State of Vermont have been assigned to repair many of them and restoration has been ongoing over the summer and fall of 2011. This plan includes uncompleted projects as of November 2011. The ten-year schedule begins in 2012.

The following remaining roads rated as 'fair,' or 'fair' to 'good' are not on the plan. The Road Foreman should incorporate them into the plan as his schedule allows.

- Charlie Smith Road
- Huntington Woods Road
- Lerner Road
- Lincoln Hill Road
- Mayo Road.

<u>Assumptions</u>

1. The Road Foreman must decide the amount of new gravel to apply to bring roads to an acceptable standard. In many cases, accumulated roadside gravel may be immediately reclaimed.
2. Costs shown are estimates and do not include the cost of new road gravel.
3. Stone lining includes placing geotextile material at the bottom of the ditch.
4. Constructing check dams in ditches, especially on steep sections, is highly recommended.
5. The *Vermont Better Backroads Manual* is a good reference for road crews.

A plan to move from repair & rehabilitation to an annual maintenance schedule:

November / December 2011 (FEMA / State support: $22,000)

1. Terrian Road: North side and intersection ditching. Repairs at top of hill.		$ 9,000
2. Moody Road: Ditching at north approach to bridge		16,000
		$25,000

2012 An aggressive schedule this year to repair remaining 'Severe' sections, most having FEMA / State support (Approximately $75,000 total)

1. Salvas Road	East side	$15,000
2. Trapp Road	Segment #2	24,000
3. Bert White Road	Segments #1 and #3	10,000
4. Camels Hump Road	Segment #5	16,000
5. Carse Road	Segment #2	5,000
6. Economou Road	Repair intermittent deep cuts in ditches	20,000
7. Kier Road	Entire .25 miles	25,000
8. Taft Road	Segment #1	12,000
9. Weaver Road	Repair intermittent deep cuts in ditches	10,000
		$137,000
	Less FEMA/State:	75,000
		$ 62,000

2013

1. Fielder Road	Entire .15 miles	$12,000
2. Handy Road	Entire .55 miles	20,000
3. Terrien Road	South side	8,000
4. Beane Road	Entire .40 miles	18,000
		$68,000

2014

1. Taft Road	Segment #2	$35,000
2. Economou Road	Remainder	20,000
3. Weaver Road	Remainder	20,000
		$75,000

2015

1. Sherman Hollow Road	Entire	$40,000
2. Bert White Road	Remaining Segments #2, #4, and #5	20,000
		$60,000

2016

1. Camels Hump Road	Segments #4 and #6	$25,000
2. Carse Road	Segment #1	14,000
3. Cozzens Road	Entire .15 miles	15,000

		$54,000
2017		
1. Delfrate Road	Entire .60 miles	$18,000
2. Happy Hollow Road	Entire 1.84 miles	35,000
		$53,000
2018		
1. Pond Road	Entire 1.40 miles	$40,000
2. Salvas Road	West side (.95 miles)	18,000
		$58,000
2019		
1. Shaker Mountain Road	Entire	$20,000
2. Carse Road	Segment #3	8,000
3. Camels Hump Road	Remaining Segments #1, #2, and #3	20,000
		$48,000
2020		
1. Taft Road	Remaining Segments #3 and #4	$20,000
2. Bridge Street	Entire	8,000
3. Moody Road	Remaining Segments #1 and #3	10,000
		$38,000
2021		
1. Trapp Road	Segment #1	$ 7,000
2. Texas Hill Road	Entire	15,000
3. Texas Hill Circle	Entire	10,000
		$32,000

Drainage / Erosion Deficiencies Showing Road Segments

(Alphabetical Listing by Class 3 Roads) (Segment distances are approximate)

Beane Road .40 Miles

Condition	Poor to Fair
Notes	Road parallels brook for about 1,000 feet
Remedies	Ditch north side for 800' from Bridge #10
	Remove berms from MB #240 west to town line (Mountainside Lane)

Bert White Road 1.45 Miles

Segment #1 From Taft Road to first rise (2,500')

Condition	Poor
Notes	FEMA estimates $10,775 total cost for repair in worst areas (April 2011 storm)
Remedies	North side: renew ditch and stone line
	South side: pull in berms, shape shoulders and shallow ditch

Segment #2 From first rise to mailbox #630 (900')

Condition	Fair
Notes	Minor maintenance required in some spots
Remedies	Remove berms; renew shallow ditches; apply biodegradable matting

Segment #3 Mailbox #630 to mailbox #950 (3,000')

Condition	Poor
Notes	Severe ditch cut on south side for about 1,500'
	Seven turn outs
Remedies	Ditching on both sides; remove berms; apply stone lining for about 2,000'
	Four driveway culverts required

Segment #4 From mailbox #950 to mailbox #1069 (1,000')

Condition	Fair
Remedies	Ditch and stone line on north side
	Intermittent ditching and stone lining on south side

Segment #5 From mailbox #1069 to end of road past sawmill (2,500')'

Condition	Fair
Notes	Five turn outs
Remedies	First 500' cut berms and create shallow ditches; seed and mulch
	Next 2,000' cut berms, create shallow ditches; stone line or matting
	Reshape and reinforce turn outs

Bridge Street .61 Miles

Condition	Fair
Notes	Typical erosion and ditch issues
	Regular maintenance required
Remedies	Pull in berms; shallow ditch; stone line (2,000')
	Pull in berms; shallow ditch; line with biodegradable matting (2,000')

Camels Hump Road 3.30 Miles

Segment #1 Main Road to new guard rail on north side (1.2 miles)

FEMA has assigned funds for repairs on many sections

Condition	Fair
Notes	Some washing on edges of road
Remedies	Cut berms; form shallow ditches; seed and mulch

Segment #2 From guardrail to blue mobile home on left (1,600')

Condition	Fair
Notes	Road narrows on ascent to top; Washing of material appears in the road
Remedies	Reshape ditch for about 2.500' on south side; stone line
	Improve ditching in immediate area of Bridge #32;
	Create settling pond at lower end of bridge to filter water before entering stream

Segment #3 From Bridge #32 to Bridge #31 at Fielder Road (1,100')

Condition	Fair
Remedies	Create settling pond on upper side of Bridge #32
	Remove large berm on south side for about 150'
	Below mailbox #1786, south side, remove 100' berm
	Shape entire length; some shallow ditching

Segment #4 From Bridge #31 to wooden bridge #30 (600')

Condition	Poor
Notes	Road narrows
Remedies	Improve ditch and discharge area
	Ditch on south side; armor north side toward stream

Segment #5 From wooden bridge uphill for 1,000'

Condition	Severe
Remedies	Reshape severe ditch cutting on north side; stone line
	Remove berms in spots; reshape shoulders
	Form shallow ditch on south side; stone and / or matting

Segment #6 From water tank to parking lot at end of road (1.1 miles)

Condition	Poor
Notes	Area at edge of parking lot shows erosion
	Deep ditch cut on rights side for 150'
	Many turnouts
Remedies	Remove berms
	Ditch and stone line, especially spots with deep erosion in ditch line
	Reshape and armor turn outs

Carse Road **1.4 Miles**

Segment # 1, Main Rd to Moody Rd (About 1,500 feet)

Condition	Poor
Notes	Both sides of road have berms entire distance; water washes into road.
Remedies	Remove berms; create ditches; stone lining; install new cross culvert to south side near Main road Improve turnouts

Segment # 2, From a point 300' east of intersection with Moody Road to mailbox #1045, about 2,500'

Condition	Severe
Notes	South side: deep erosion for most of the distance North side: berms
Remedies	South side: Form ditches; stone line North side: Remove berms; some ditching; apply stone or matting (varies) Improve turnouts

Segment # 3, From mailbox 1045 uphill for about 1,500'

Condition	Fair
Notes	On both sides: roadside berms; accumulated material
Remedy	Remove berms; shallow ditching; stone line ditches.

Chalet Heights Road **.13 Miles**

No significant drainage issues. Regular Maintenance Improve turnouts

Charlie Smith Road **.20 Miles**

Condition	Fair
Notes	Berms / gravel on both sides Road is near brook
Remedies	Pull in berms; Ditching; biodegradable matting in many locations

Cozzens Road **.15 Miles**

Condition	Poor to Fair
Notes	Steep; typical erosion; berms
Remedies	Ditch entire and rock line both sides (1,500') Reshape and armor 7 turnouts on east side

Delfrate Road .60 Miles

Condition	Poor
Notes	Much washing of sand and gravel at top of hill for 500' to 600'
Remedies	Reshape ditch; stone line to top of first rise (525')
	Remove berms; reinforce shoulders; shallow ditches to mailbox #325 (1,500')
	Mailbox #325 to mailbox #475: remove berms; create shallow ditch
	From mailbox #475 to end: form ditches and stone line (550')

East Street 1.75 Miles

Condition	Fair
Notes	Overall, sound maintenance would bring road up to standard
	Intersection is wide at Delfrate road; consider redesign
	Guardrail near Taft road is substandard
Remedies	Taft Road west to STOP: reshape ditch on north side; seed and mulch
	South side: remove berm; shape shoulder and ditch line; mulch
	Delfrate Road west to paved section, both sides:
	reshape ditches & shoulders; seed & mulch

Economou Road 1.4 Miles

Condition	Severe
Notes	New stone lined ditches installed by FEMA/State funded (April 2011 storm)
	For a distance of about 2,500' on east side
Remedies	Remove berms and reshape ditches /stone line for 1,000' (From Texas Hill Extension uphill to mailbox #256)
	From mailbox #256 on east side: ditch and stone line for 2,500'
	Same on west side, though shallower ditches required
	From top end of new stone, east side, to mailbox #898 (1,000'), repair deep cuts in ditch; stone line.
	Shallow ditch needed on west side.
	From mailbox #898 up: on east side, new stone lining to Mailbox #986 (500')
	From mailbox #986 to Furno Road, both sides: ditch shaping and stone (1,500')

Fielder Road .15 Miles

Condition	Poor
Notes	Short, steep road with turns; near Brush Brook
	Three gravelly turnouts discharge directly into brook
	Cross culvert discharges directly into brook
Remedies	Armor cross culvert inlet, west side
	Armor heavily the outlet discharge area
	Ditch and stone line both sides (1,000')
	Shape and armor outlets with stone

Handy Road .55 Miles

Condition Poor
Notes FEMA / State of Vermont have assigned funds for partial repair (4 / 2011 storm)
Severe erosion on west side just before curve
Much loose gravel at top of hill on both sides
Most severe section is at top toward end of road, last 600'
Remedies Remove berm on west side; re shape shoulders and ditch on east (150')
Reshape shoulders before mailbox #305 (200')
Reshape ditches; stone line for entire distance from here (2,500')
Extra armoring needed near curve and steep section

Happy Hollow Road 1.84 Miles

Condition Poor
Notes Steep inclines; narrow road sections; berms in many places.
Remedies Consider cross culverts in some locations
Reshape ditches entire length
First 1,000 from bottom to driveway with "Innovative Landscaping" sign: Ditch and stone line on south side.
Ditch and place biodegradable matting on both sides to Kier Road (400')
On south side, ditch and stone line to utility pole 33/208X (600')
Remainder of road to end: ditch and stone line, mostly on north side (some shallow ditching, maybe not full width.)

Huntington Acres .24 miles

No significant drainage issues. Regular Maintenance

Huntington Woods Road .34 Miles

Condition Fair to Good
Notes Minor, regular maintenance issues.
Remedies Remove berms in spots
At mailbox #299, water that runs into driveway could be alleviated by improved ditch and a cross culvert, or a swale at the end of the driveway.
From mailbox #129 to intersection: improve shoulder by cutting berm and reinforcing; some washing at this location.

Kier Road .25 Miles

Condition Severe
Notes Severe ditch erosion on south side (1,000')
Remedies South side: shape ditch and line with stone (2,500')
North side: pull in berms; build ditch; line with stone (2,500')
Install 3 or 4 cross culverts and armor inlet / outlet with stone

Lerner Road .14 Miles

Condition Fair
Remedy Ditch and rock line east side from #158 to end (600')

Lincoln Hill Road .75 Miles

Condition Fair
Notes Seems to function OK except washing on south side of road
Remedies Pull in berms, south side
From turn around on top, ditch and stone line (2,500')

Mayo Road 1.50 Miles

Condition Fair to Good
Notes Selected spots for ditching & stone lining
Standing water & muddy area near mailbox #1225, east side
Remedies From mailbox #81 north to first rise, east side: Ditch and stone line (1,000')
From mailbox #1225 north to mailbox # 1405, west side: ditch / matting (1,000')

Moody Road 1.55 Miles

Segment # 1, From intersection with Main Road to top Galloping Hill Farm (1,600')
Condition Fair
Notes FEMA and State of Vermont have assigned funds to repair a severe section approaching the bridge near intersection with Carse Road

Remedies At bottom on east side reshape and armor inlet at culvert that crosses Main Road
East side: new ditches; line with stone;
West side: create 3 or 4 turnouts; remove berms; reshape shoulders.

Segment # 2, From farm south to Johns Brook (1,500')
Condition Severe to poor
Notes Severe erosion at bottom of hill at inlet and outlet sides of road
(FEMA / State of Vermont have identified this area for repair
Remedies East side ditch and stone lining
West side, primarily remove berms and create shallow ditches;
Some stone lining, some matting
Reshape inlet and outlet areas at cross culvert; use stone extensively

Segment # 3, From mailbox # 1235 to end (1,000')
Condition Fair
Remedies East side: ditch and stone line on east side
West side: remove berms, create ditches and improve turnouts

Piper Place .10 Miles

No significant drainage issues. Regular Maintenance.

Pond Road 1.40 Miles

Condition	Poor to Fair
Notes	Berms; lack of ditches; water runs down road in most areas
	Inoperative driveway culvert at Mailbox #190
Remedies	Ditch and stone line both sides for 1,500' from Mayo Road intersection
	Next 2,000' to Happy Hollow Road, road levels off; ditch and apply biodegradable matting both sides.
	Remainder of road to turnoff (.7 miles): pull in berms; shape shoulders

Robert Parks Road .30 Miles

No significant drainage issues. Regular maintenance.

Robert Parks West Road .10 Miles

No significant drainage issues. Regular maintenance.

Salvas Road .95 Miles

Condition	Poor
Notes	FEMA / State of Vermont have assigned funds for partial repair (4/2011 storm)
	Blocked driveway culvert at #298 & #302
	At least a dozen turnouts need attention
	Some gravel may be reclaimed
Remedies	Ditch and stone line almost entire length on east side
	Selectively pull in berms
	A short portion at the bottom of road after the first rise: ditch and place matting
	A short level portion at top of hill: ditch and place matting

School Street .11 Miles

No significant drainage issues. Regular Maintenance.

Shaker Mountain Road .55 Miles

Condition Fair
Notes Typical; ditching and stone lining or matting would bring this road up to par
Some gravel wash on south side
Remedies From Meadow Drive to mail box #315: remove berms, shape ditches & line with stone (800')
From two short guardrails downhill: shape ditches & stone line (500')
Remainder of road, alternate stone lining / biodegradable matting

Sherman Hollow Road 2.55 Miles

Condition Fair
Notes This road is typical in that regular maintenance procedures would bring it up to par. Except for the lower section, the road gradually climbs westward. From the Bird Center to the Hinesburg town line, there is evidence of road washing due to no crown and small berms; no ditch on north side.
Remedies Selectively pull in berms and create ditches entire length.
Ditch and stone line from Meadow View Drive to Mail Box # 315 (800')
Ditch remainder & line with biodegradable matting; selective stone lining
On the lower section at approach to Main Road, ditch, stone line and reinforce shoulders, especially on north side.

Spence Road .30 Miles

No significant drainage issues. Regular maintenance.

Taft Road 1.63 Miles

Segment #1 From Camels Hump Road to top of hill (2,000')
Condition Severe
Notes Fairly steep section; deep erosion in ditches
FEMA identified as area for repair due to 4/2011 storm ($12,000 total estimate)
Road narrows on approach to mailbox #1470
Remedies West side: form ditches and stone line entire length.
East side: remove berms, reinforce shoulders entire length.
Cut brush and widen road to uniform width as part of reconstruction
Consider adding two cross culverts

Segment #2, From farm yard to Terrian Road intersection (2,000')
Condition Poor
Notes Fairly level
At .6 miles, much washing at outlet of culvert
Remedies Cut berms; create ditches both sides; apply biodegradable matting
Extend length of culvert pipe; reinforce fore slope with heavy stone

Taft Road (Continued)

Segment #3 Terrian Road intersection to mailbox #415 (1,600')

Condition	Fair
Remedies	Ditch east side; seed and biodegradable matting
	Remove berms and form shoulders on west side
	Add 3 or 4 cross culverts where appropriate

Segment #4 Mailbox #415 to intersection with East Street (2,000')

Condition	Fair
Notes	Most of ditch west side is stone lined
Remedies	Improve ditch and reinforce with stone for 1,000' on east side

Terrian Road .26 Miles

Condition	Severe to Poor
Notes	FEMA has assigned funds to repair much of this road damaged in April 2011
	At bottom on south side to 1,100: no ditch causing water to run down road
	Deep cuts in ditch on north side for entire length
Remedies	Remove high berms on south side; shape shallow ditches; stone with check dams
	Ditch entire north side; reinforce with stone;
	Clean two cross culverts
	At curve on top end, reshape ditches and turnouts; steep section here
	Reshape and stone line large turnout at top of hill at connecting drives and roads

Texas Hill Circle 1.05 Miles

Condition	Fair
Notes	West to east
Remedies	Clean up debris by guardrail at brook; improve slope; seed / matting to stabilize area at bridge and brook
	Improve ditch outlet at the bridge by constructing settling pond; armor entire area.
	From Economou Road west: Reshape ditch & line with rock (150')
	Below mailbox 341 to 6' culvert: ditch & line with rock (300')
	From mailbox #61 to cross culvert, north side: ditch & line with rock (300')

Texas Hill Road **1.62 Miles**

Condition	Fair
Notes	Overall, sound maintenance practices would raise road to good standard
Remedies	From intersection with Texas Hill Circle down to outlet on right side: Reshape ditch & line with stone. (300')
	From mailbox #650 downhill on right: reshape ditch & line with stone (350')
	Below mailbox #831: cut berm; reshape ditch; reclaim soil; seed & mulch
	From Longhorn Drive eastward: seed & mulch / matting needed (1,000')

Trapp Road **1.85 Miles (FEMA / State funds assigned for part)**

Segment #1 Main Road to road levels off (.9 miles)

Condition	Fair
Notes	Gravel is pushed out extra wide for first .2 miles
	15 turnouts total on either side
Remedies	Remove berms; create shallow ditch
	Reinforce ditches and turnouts with stone
	At .3 miles, extend cross culvert reinforce fore slope with stone

Segment #2 From .9 miles to end of Class 3 road (1 mile)

Condition	Poor
Notes	Road begins to level off a bit; not as steep
	Plastic culvert at .9 miles lies at road surface
	At .1 miles, rock ledge protrudes at center of road
Remedies	Remove berms; create or re-form ditches; stone line in some sections; seed and mulch in others.

Weaver Road **1.2 Miles**

Condition	Severe to Fair
Notes	Ditching needed for entire length.
	Varied conditions: Severe erosion in spots; roadside berms; poor ditches
	Severe erosion at inlet and outlet of driveway culvert at mailbox # 682
Remedies	At bottom for 1,000' create shallow ditches with periodic turnouts.
	From mailbox # 350 downhill on south side (400'), create ditch and stone line
	At mailbox # 535, downhill on south side, ditching and stone lining
	Talk with property owner at #535 to ditch and armor driveway to road
	At mailbox # 682, reshape inlet/outlet areas; considerable stone armor (300')
	North side, from # 682 to # 720 (600'), ditching and stone line
	Both sides to #900 (750'), ditching and stone lining
	From #867 to end (1,000'), ditch both sides; apply biodegradable matting

Private Roads (Not assessed)

Agnes Lane
Blackberry Lane
Blackbird Swale Drive
Cherry Lane
Cummings Drive
Dogwood Lane
Evergreen Drive
Ewerts Drive
Fargo Drive
Haskins Drive
Hemlock Hill Drive
Highland Drive
Johns Drive
Lapierre Drive
Lavalle Drive
Lavalle Drive Ext.
Ledge View Drive
Longhorn Drive
Maple Drive
Meadow View Drive
Moulton Drive
Pillsbury Way
Poole Drive
Raven Ridge
Ridge Drive
Roque Drive
Ross Hill
Sunrise Drive
Wildwoods Drive
Windy Pines Drive

Class IV Roads (Not assessed)

Charlie Smith Road (1.45 mi)
Economou Road (upper)
Hallock Road (0.29 mi)
Stage Coach Road (0.33 mi)
State Forest Highway
Town Highway 9