Town of Hinesburg

McGee Hill Road Drainage

July 18, 2013

Background: In the violent rainstorms in July of 2013, McGee Hill Road, like many other town roads in Chittenden County, sustained considerable damage. The effected section of McGee Hill Road runs approximately from house 567 to house 814. The road runs roughly east west across a moderate north facing slope. Land use is primarily agricultural (fields and meadows), forest and residential with a scattering of homes along the road.

Drainage patterns: The drainage which flows toward the road is divided into 3 nearly equal sub-basins, labeled 1, 2 and 3 on the attached sketch. Area 1 is 27 acres, 2 is 25 acres and 3 is 27 acres. Each of the sub-basins is served by a 24" culvert crossing the road.

Culvert sizing: Using a 25 year storm (a storm which can statistically be expected once every 25 years – also commonly used for culvert sizing on town roads) and taking into consideration the land use of each sub-basin (forest, meadow), the culvert sizes required at each basin are as follows:

Basin 1	Between 24" and 30"	Use 30"
Basin 2	Between 24" and 30"	Use 30"
Basin 3	Between 24" and 30"	Use 30"

These sizes assume that each culvert will have at least 15" of freeboard below the road level and that each culvert will include an inlet headwall, either concrete or laid stone.

A check was made of recommended size for the 50 year storm, since weather patterns seem to be changing these days (has the old 50 year storm now become the new 25 year storm?). Because the 25 year pipes were in between sizes, it turns out that the 30" size will meet the 50 year requirement as well. That being said, it seems likely that the event that damaged McGee Hill Road was well in excess of a 25 year or even a 50 year storm – culverts throughout the county which had historically performed satisfactorily were found to be deficient – so even if the cross culverts are replaced with 30" pipes, another event like the recent one may exceed their capacity.

Ditches: Culverts are one part of the drainage equation. Ditches are the other. Starting at the uphill end of the segment and referring to the sketch, the ditch along sub-basin 1 is in good condition. The shape and size are fine, and there is evidence of previous stone lining. Just east of Jinny's Way, a field ditch flows into the road

ditch. If permission from the landowner could be obtained, this field ditch might be redirected to enter the road ditch on the other side of the sub-basin dividing line, thus sending this water toward Swamp Road. If this is done, consideration should be given to the culverts and ditch conditions in the easterly direction, such that the added water does not create problems in the other direction.

The short section of ditch between driveway 686 and the cross culvert to its east is intended to flow east to the culvert. This short ditch should be cleaned and reshaped to accomplish this.

The first section of road slope below drive 686 has recently been graded, seeded and mulched by the landowner and he has created a nice swale well off the edge of the road. One small improvement would be to slightly regrade the end of his driveway so the drive drainage will pass behind his mailbox and on into his swale without coming to the edge of the road as it does now. West of the new slope and swale, the ditch needs to be rebuilt all the way to the cross culvert by driveway 592. It has been badly eroded and is too close to the road. The trees should be cut back to the stone wall marking the ROW and the back slope should be brought down to the ditch line from the wall. This will allow creation of a 2' deep, stone lined ditch that is farther away from the edge of travelled way.

Sub-basin 3 has several features of note. First, the uphill ditch on the south side of the road needs to be reshaped and stone lined. A few selected trees will need to be cut. From the cross culvert at 592 down almost to the next driveway on the north side of the road (house number unknown), a shallow swale should be graded along the north edge of the road to carry drainage to an existing cut-out and allow it to proceed to an existing 18" culvert laid beneath the driveway. West of this driveway, drainage continues along the north edge of the road in front of house 567. 567 has created a swale in front of his drive to prevent water from running into his driveway. This feature seems to be working so it would appear prudent to let it continue. There doesn't appear to be any other economical, reliable way to prevent road runoff from entering his property.

Sub-basin 3 contains three additional culverts which should be mentioned. The first is an 18" pipe at drive 592. It has been set higher than the 24" cross culvert, so if water begins to back up at the cross culvert, the 18" pipe will bleed off some of the water and send it west along the south side of the road, thus increasing the load on the cross culvert at 567. It would be best to replace the 592 cross culvert with the proper size and eliminate the 18"pipe.

The second is the 24"culvert beneath Butternut Lane. Because some of the water from sub-basin 3 comes down out of the woods near the 567 cross culvert (see sketch), the existing Butternut pipe may be large enough to handle the ditch flow, but this is uncertain. One approach would be to replace it with a 30" pipe. The other approach would be to wait and see - if by eliminating the 18" pipe at 592, the ditch flow will reduced somewhat and it may be enough to render the 24" Butternut culvert sufficient.

The third is a 24" pipe beneath a second driveway at 567. This drive is located west of the house and leads down behind the building. If the cross culvert in the road is replaced with a 30" pipe, it is likely that the existing 24" pipe beneath the driveway will be rendered undersized. The homeowner should be apprised of this situation so he can respond by enlarging his pipe.

Summary:

- Replace all three cross culverts with 30" pipes and construct inlet headwalls
- Investigate potential for and consequences of redirecting Jinny's Way field drainage toward Swamp Road
- Regrade the end of driveway 686 to direct water to new swale
- Rebuild ditch between the new 686 slope and the cross culvert at 592
- Eliminate the 18" culvert under driveway 592
- Reshape the south side ditch from 592 to the cross culvert at 567
- Construct a shallow swale along the north side of the road to carry drainage to the existing cut-out above the driveway of the unknown house number (first house east of 567)
- "Wait and see" on Butternut Lane culvert

Cost: The estimated cost for these improvements, based on contracting the job is as follows:

ITEM	UNIT	QUANTITY	UNIT COST	COST
30" culvert	lf	120	$50	$6000
Stone headwall	ea	3	$1500	$4500
Reshape ditch	lf	500	$20	$10000
Rebuild ditch	lf	300	$35	$10500
Construct swale	lf	200	$5	$1000
Miscellaneous*	LS	1	$2000	$2000
Traffic control	LS	1	$2000	$2000
				$36,000

If the work is done by the Town crew, the cost will be significantly less.