Locations	Problems	Solutions		
		Cost	Description	Benefit
GA-3	Small bare soil areas in the right-of-way of Galax Dr. between driveways. Does not appear to be eroding.	Maintenance	Install roadside channel protection (light rip rap).	Would prevent further soil erosion.
GA-4	Soil erosion and roadway flooding in the right-of-way of Galax Dr. appears to be caused by: - Private driveway culvert at #4336 Galax Dr. is undersized; - Road runoff flowing along the edge of road pavement; - Only one of two private culvert pipes that convey this flowing stream under the driveway of #4332 appears to be functioning, causing stream flow backup into the roadway; and - Occasional backup from high flows in Crabtree Creek.	$89,400	Remove the existing double culvert and replace with single, shorter driveway culverts under 4332 and 4336 and open stream channel between.	Would increase the capacity of the system across fronts of #4332 and #4336 Galax Dr. and reduce frequency and severity of road flooding.
WP-1	Large quantities of concentrated runoff from large upland areas converge in this drainage system on private property down to the sag in White Pine Dr. Between #4107 and #4115 White Pine Dr., front yard flooding, driveway overtopping, and occasional driveway flooding (#4115) resulting from undersized, poorly located, aged, and failing piping and channels and from low driveways. The street culvert at the sag of White Pine Dr. occasionally overtops because it is undersized.	*Higher Cost Solution*		
		$456,500	Replace/upgrade private drainage infrastructure from #4107 White Pine Dr. through and including the culvert at the sag of White Pine Dr.	Yard flooding, driveway overtopping/ flooding, and street overtopping would be reduced by increasing pipe, ditch, and culvert capacities along this drainage system.
		Lower Cost Solution		
		$178,700	Replace/upgrade private drainage infrastructure from #4107 White Pine Dr. through #4115 White Pine Dr.	Yard flooding and driveway overtopping/flooding would be reduced by increasing pipe and ditch capacities along this part of the drainage system. (The culvert at the sag of White Pine Dr. would not be replaced.)
RD-1	Small bare soil areas in the right-of-way of Laurel Hills Rd. Does not appear to be eroding.	Maintenance	Install roadside channel protection (light rip rap).	Would prevent soil erosion.
RD-2	Some puddling of water in the street right-of-way. Possible overtopping of street culvert under Rhododendron Dr. investigated; no evidence of overtopping was observed.	Maintenance	Check street culvert for blockage and remove any blockage.	Would eliminate the culvert as the cause of puddling in the right-of-way.

Locations	Problems	Solutions		
		Cost	Description	Benefit
LH-1	Flow of street runoff through landscaped areas of #4505 and #4517 Laurel Hills Rd., causing some soil erosion and landscape damage. Cause appears to be lack of roadside runoff conveyance on opposite (south) side of Laurel Hills Rd. in the right-of-way, forcing runoff to cross the road where it flows onto #4505 and #4517. These owners have placed stones in the flow path in an effort to prevent further erosion and damage.	$40,400	Construct/reconstruct roadside ditch along the south side right-of-way of Laurel Hills Rd. to intercept runoff from that side of the road.	Would convey runoff from the south side of Laurel Hills Rd. along that side to the road culvert in front of #4530 and would prevent runoff from crossing the road and flowing onto #4517 and #4505.
LH-7	The street culvert at the sag of Laurel Hills Rd. occasionally overtops because it is in poor condition, accumulates debris, and is undersized. The front yard on the upstream end of this culvert (#4530 Laurel Hills Rd.) floods and experiences some soil erosion and landscape damage.	$78,600	Replace the street culvert at the sag of Laurel Hills Rd.	Street overtopping and yard flooding and damage would be reduced by increasing the culvert capacity.
LR-2	Moderate roadside ditch erosion. Uphill neighbor's mulch washes off hillside. Cinder block obstructions have been placed in roadside ditch as check dams. No significant erosion noted on 4225 property. 4229 has significant erosion down driveway/sanitary sewer access to property.	$43,300	Construct roadside ditch on east side of existing cross culvert. Provide armoring of ditch to west.	Intercepts runoff from private properties before it crosses the cul-de-sac and collects at top of Sherron property.
LR-1	Street runoff overflows a right-of-way roadside ditch and driveway culvert (#4115 Laurel Ridge Rd.) and runs down this driveway to a garage and along the front of the house. The roadside ditch upstream of the driveway culvert is poorly defined, partly because of the height of the culvert inlet, and appears to not have capacity and structure to convey runoff flows.	$31,600	Regrade the roadside ditch and replace and lower the driveway culvert.	Would reduce the frequency of ditch overflows down this driveway.

Locations	Problems	Solutions		
		Cost	Description	Benefit
LH-5	Street culvert under Laurel Hills Rd. at Boxwood Rd. is blocked and does not appear to be functioning, causing water to stand in the roadside ditch adjacent to #4206 Laurel Hills Rd. driveway.	$26,000	Regrade the roadside ditch adjacent to the driveway of #4206 so that runoff flow is directed along, rather than under, Laurel Hills Rd.	Would eliminate standing water in this roadside ditch.
BX-3	Because of lack of runoff conveyance at the end of Boxwood Rd. (right-of-way not developed, not paved), street runoff is eroding a slope from the street right-of-way onto the front yard of #4505. Also, the east bank of a stream that flows adjacent to #4505 is eroding significantly, migrating in the direction of the house, and the owner has attempted limited stabilization.	$88,900	Install a stormwater inlet in the right-of-way at the end of Boxwood Dr. with a pipe conveyance to the stream. Install toe-stone and vegetation to stabilize stream bank.	Would prevent erosion in the undeveloped right-of-way and the yard of #4505 and would stabilize the stream bank that is migrating in the direction of the house.
JP-1	The amount of street runoff to the sag of Juniper St. exceeds the capacity of existing inlets to convey runoff from the street to the channel, resulting in street flooding. Runoff from a large drainage area to the channel that flows to a street culvert at this sag is more than this culvert can convey, further contributing to street flooding. Also, a channel in the back yard of #4003 Juniper Ct. is progressively deepening in an upstream direction ("head cutting"), transporting eroded soil downstream via the channel.	*Higher Cost Solution*		
		$476,200	Replace/upsize the culvert under Juniper St. and extend the existing street conveyance system from the sag up Juniper St. and onto Spruce Dr. toward Picardy Dr.	Would meet City standards for stormwater conveyance from roads (culvert would convey the 10-year storm flow, and inlets on road surface would convey the 2-year storm flow).
		Lower Cost Solution		
		$248,100	Install a new drainage system in the right-of-way of Juniper St. in both directions from the sag. Install a custom inlet at the sag to further improve conveyance of street runoff.	Would reduce depth of flooding at the center of Juniper St. (to less than 1" during a 2-year storm).
BA-1	Street runoff flows down driveways and front yards along the east side of Balsam Dr., causing garage and crawlspace flooding (4005-4025).	*Higher Cost Solution*		
		$405,200	Install curbing in the right-of-way along the west side of Balsam Dr. and a roadside ditch/swale in the righ-of-way along the east side of Balsam from Boxwood Dr. to Azalea Dr.	Would prevent runoff from the east side of Balsam Dr. from crossing to the other side of the road and then flowing down yards and driveways, causing property and structure damage.

Locations	Problems	Solutions		
		Cost	Description	Benefit
BA-1	Street runoff flows down driveways and front yards along the east side of Balsam Dr., causing garage and crawlspace flooding (4005-4025).	*Lower Cost Solution*		
		$213,800	Rebuild driveways of affected properties and install curbing in the right-of-way along east side of Balsam Dr. Remove driveway/yard pipe at #4032 and #4100 Balsam Dr. and construct a drainage ditch.	Would prevent problems reported along the east side of Balsam Dr. Flooding at the center of Balsam Dr. would be reduced (less 1" during a 2-year storm).
BA-2	Runoff water stands at #4104 Huckleberry Dr. front yard/right-of-way because of a low area with an aged, deteriorated, and blocked drainage system. #4105 Huckleberry Dr. experiences overflows from roadway when standing water overflows onto property. House at #4028 Balsam Dr. floods at first floor level because the channel in the side yard overflows and the house first floor is close to the channel, both horizontally and vertically.	$154,300	Reconstruct the drainage system in the right-of-way of Huckleberry Dr. and on private property (#4105). Remove an existing pipe and regrade and enlarge the channel on private property alongside #4028 Balsam Dr.	Standing water would be alleviated at Huckleberry Dr., and the channel alongside #4028 Balsam Dr. would have increased capacity and reduced frequency and severity of flooding.
BA-3	Drainage from #4028 Balsam Dr. flows down the right-of-way of Balsam Dr. in a roadside ditch to a driveway culvert (#4032-4100). This driveway culvert is significantly undersized, and there is no roadside ditch along the fronts of the two lots downstream of this culvert. This condition causes runoff to spill into the street, where it causes roadside and right-of-way erosion down to a sag in Balsam Dr. Runoff concentrates at the sag and discharges down the road sideslope, causing significant pavement deterioration, slope erosion, and soggy front yard	$59,200	Replace/upsize the street culvert at the sag of Balsam Dr. (Managing runoff from the street is addressed as part of the solution for Location BA-1.)	When coupled with alternatives proposed for BA-1, would prevent street runoff from causing R/W erosion and pavement deterioration. Would increase the capacity of the culvert in the sag of Balsam Dr. and reduce potential for future flooding across Balsam.
BA-4	Minor roadside ditch erosion in the right-of-way of Balsam Dr.	Maintenance	Install roadside channel protection (light rip rap).	Would prevent further soil erosion.