

Albemarle County Engineering

Drainage Plan checklist for plan reviewers

January 25, 2022 (Rev. 04/22/2022) (Use the latest checklist from the Team Services engineering forms site)

A drainage plan is typically a component of a road plan, site plan, or stormwater management plan. It consists of the channel, ditch, culvert, or storm sewer design drawings, drainage maps, and computations for hydrology and hydraulics.

Reference key:

[Square Brackets] are County Code references, {Curved Brackets} are policy references, and (regular parenthesis) are explanatory. [Links](#) to reference documents are provided where possible.

_____ A professional seal should be provided for any computation packages where are separate from sealed plans.

Drainage: [18-32.6.2d, 14-305, 311]

- _____ drainage area maps (This is a basic element, and without this there is no review)
- _____ drainage computations (usually in the form of tables from the [VDOT Drainage Manual](#) App. 9B-1 LD-2014, App.7B-1 LD-268, App., App. 8B-1 LD-269, etc. – computations are a basic element, and without them, there is no review)
- _____ all proposed and existing storm sewer must be shown in plan view
- _____ for residential development, principle access free of flooding during the 25-yr storm [14-410]
- _____ site runoff and entrances do not drain into streets (from [VDOT Drainage Manual](#) 9.4.5.2, 9.4.6.2)
- _____ concentrated runoff (1 cfs or greater) does not run across travelways/streets (as above following VDOT design)
- _____ drainage does not run across, through, or backwater in dumpster areas [18-4.12.19]
- _____ overland relief is provided for any drainage structure or inlet in case of clogging. The failure of any system will not cause structures, streets or yards to flood {Policy}
- _____ direction of flow change (or deflection angle) in each drainage structure is 90 degrees or greater (flow should not have to reverse direction) (from guide of VDOT Drainage Manual 9.4.9.3.2.3)
- _____ labels on all drainage structures provided (and should match the drainage computations and profiles)
- _____ provisions and easements for drainage across 3 or more lots. Dense development where fencing, decking, etc is expected should provide yard inlets and pipes in easements, rather than ditches. Underground collection of roof drains system to prevent flooding, especially in dense developments such as townhome projects. Roof downspouts cannot drain across sidewalks {Policy}
- _____ drainage easements between structures must be minimum width 20-ft, including private drainage easements {Policy}

Drainage profiles: (applicable to site plans, road and drainage plans) [14-311, 18-32]

drainage profiles for each pipe, structure or channel must contain:

- _____ existing ground
- _____ proposed ground

- ___ any channel linings
- ___ all utility crossings
- ___ a VDOT designation (MH-1, DI-3B, etc.) for each structure
- ___ throat length for each drop inlet
- ___ grate type for each grate inlet
- ___ a label on each structure to correspond with the computations
- ___ material and strength class or gage of each pipe
- ___ manhole access every 300-ft for 15" to 42" or 800-ft for 48" or greater
- ___ pipe slopes at 0.5% min. to 16% max. (per VDOT stnds for anchors over 16%)
- ___ concrete inlet shaping (IS-1) specified on any structure with a 4' or greater drop
- ___ safety slabs (SL-1) in any structure taller than 12-ft
- ___ top or rim elevation for each structure
- ___ all invert elevations for each structure (with positive flow drop between inverts (0.10-ft))
- ___ end sections (ES-1) or endwalls (EW-1) on all pipe outlets. Endwalls for culverts 48" or taller
- ___ scour outlet protection at all outlets, corresponding to computations (VESCH, OP)

Drainage computations: (applicable to any plan proposing pipes, channels, etc.)

- ___ Pipe computations for all pipes
 - ___ All proposed systems are designed within open channel flow capacities. (HGL computations are not necessary, and should not be relied upon unless the entire system is designed to be watertight.)
 - ___ For systems within drainage easements, all proposed pipes are a minimum 15" in diameter
 - ___ There are no excessive outlet velocities (> 15fps)
- ___ Curb inlet computations for any curb inlets on grade
 - ___ All spreads are less than 10-ft
 - ___ carryover is accounted for
 - ___ 100% capture at entrances so no flow runs out entrances into travel lanes
 - ___ 100% capture, or overland flow of capacity storm, to stormwater management facilities. Typically, stormwater management is designed to the 10-year storm, and inlets on grade cannot capture this.
- ___ Curb inlet computations for any curb inlets in sump conditions
 - ___ All flow depths are below 6" in the capacity table
 - ___ All spreads are less than 10-ft
 - ___ 100% capture to stormwater management facilities
- ___ Ditch computations for any ditches
 - ___ ditch linings specified per plans meet velocity requirements
- ___ Culvert computations for any culverts
 - ___ headwaters < 1.5 x culvert height, and 18" below shoulder elevation of streets.
- ___ Outlet protection computations for all outlets
 - ___ dimensions and stone sizes for all outfalls
- ___ Proposed pipe and inlet drainage area map
 - ___ limits of all areas and sub-areas draining to proposed structures, and existing structures or channels which will be impacted
 - ___ acreage of each drainage area as used in computations
 - ___ hydrologic coefficient for each drainage area as used in the computations
 - ___ time of concentration for each drainage area as used in the computations

_____ destination structure labeled for each drainage area (if not obvious)