

REFINING VERTICAL ALIGNMENT

Vertical alignments or grades are to be reviewed and computed for smooth, exact tie-ins with adjoining projects and existing road elevations. Also, connections, interchange ramps, etc., are to be computed considering pavement crowns, variable widths, etc.

Grades on divided highways are to provide for allowable median crossover grades (See [Appendix F, Section 2-MEDIAN CROSSOVER GRADES](#)). Grades are to be checked for proper mainline [sight distances](#) at median crossovers, connections, and entrances.

Connection grades are to provide for a smooth tie-in with the mainline edge of pavement in accordance with [Appendix F, Section 2-INTERSECTING CROSS ROAD GRADES](#) and are to provide for adequate sight distance.

Current practice is to eliminate scuppers on most bridge designs. For this reason a minimum gradient of 0.5 percent is desirable to facilitate surface run-off. There will be instances where flatter gradients are required, through vertical curves, long water crossings, etc.; therefore, the water should be removed by means of inlets in lieu of open scuppers. Gradients are to be computed to as few decimal places as possible and should be in numbers evenly divisible by four, where feasible.

All grades are to be checked, as accurately as possible at this stage. See [GS standards](#) or proper minimum vertical clearances at underpasses and overpasses.

Minimum vertical clearances for structures or limits of work at grade crossing of railroads are to be obtained from the Department of Rail and Public Transportation.

Drainage of the existing terrain and adequate cover for drainage structures are also important factors to be considered in designing grades.

Proposed grades for roadside ditches and/or special design ditches are to be shown on corresponding profile sheet. See [Chapter 7 of VDOT *Drainage Manual*](#).

Conflicts with utilities are to be avoided wherever practicable. See [VDOT *Survey Manual*, Chapter 8*](#) for additional analysis information.

The Department's permit policy allows vehicles with excess heights to operate on our highways under an over-height permit. In view of this, 14'-0" has been accepted as the maximum allowable height to be provided for during construction, reconstruction, or maintenance operations. Every effort must be made to insure that a minimum vertical clearance of 14'-2" is provided on existing grade separation structures during construction, reconstruction, or maintenance. If temporary reduction in the vertical clearance below 14'-2" is unavoidable and is apparent in the design stage, the Permit Office is to be advised when the project is turned in to the Construction Division.

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