

CHAPTER 3

Grading Standards

A. Introduction

A grading plan is an important element in preventing property damage, flooding, standing water, and erosion of embankment areas. The design engineer must consider the existing topography of the development and its relationship with adjacent properties. Proper grading eliminates costly corrective work such as retaining walls, regrading operations, and unnecessary drainage systems, such as storm sewers, french drains, or swales.

In all cases, grading plans must ensure positive drainage and conform to the following standards.

Development and streets shall be designed and graded to provide overland gravity flow routes to major drainageways so that drainage will not be affected in the event of failure of the local storm sewer network. Each grading phase shall be stabilized with vegetative cover before proceeding to the next phase.

B. Design Requirements

1. All engineering plans shall be designed, prepared, stamped, and signed by a qualified, professional, and registered engineer in the State of Wisconsin.
2. Minimum and Maximum Slopes
 - a. 2% yard drainage is desired and 1% shall be minimum to overland drainage facilities.
 - b. All drainage rear and side yard swales and roadside ditches shall have a minimum of a 1% swale gradient.
 - c. All rear and side yard swales shall be centered on property lines.
 - d. The maximum side slope of detention areas shall be 4:1. See chapter 4 for further details.
 - e. The maximum slope for any grading, except berms, shall be 4:1
 - f. All side yard slopes shall be between 2% and 25% (4:1.)
 - g. In the urban and rural-B cross sections, the minimum cross slope in the ROW shall be 2% towards the street.

3. Maximum Allowed Ponding

When the storm sewer system has reached its capacity, the maximum allowable ponding shall be:

- a. 18" in a rear yards.
- b. The maximum depth of ponding in a parking lot is 6" over 50% of its area.
- c. The maximum depth of ponding on any street in the gutter line is 9".

4. Grading operations must anticipate all private and public utility locations.

5. All utility crossings, including culverts, shall have a minimum 12" cover from the top of the pipe to the subgrade.

6. The minimum distance between a rear yard swale and a residential house is 25'.

7. The distance between a rear or side yard swale and an accessory building shall be 5' minimum.

8. The difference between the top of foundation elevation of a structure and the outside finished grade must be a minimum of 6" for residential, commercial, and industrial areas.

9. Drainage swales shall be provided along rear and side yards of proposed buildings or parcels.

10. Other design requirements may be applicable, such as retaining walls or terracing of the property, depending on the land plan and site topography. The City Engineer must approve each special design feature before its incorporation into the plans.

11. All grading plans shall match existing grades at the property lines with a slope not to exceed 4:1, unless an approved grading plan or a proposed established street grade exists for the future development of adjacent properties, that indicates different elevations. The grading plan shall be consistent with all proposed established street grade plans on file with the City Engineer.

12. All grading plans shall accommodate offsite drainage.

13. Berms
 - a. Maximum slope 4:1.
 - b. Shall be constructed in a way not to impede or restrict surface water drainage.
 - c. Shall not obstruct traffic vision at road intersections.
 - d. Specialty berms and those with uneven toes will be reviewed by the City Engineer.

14. The minimum residential building lot pad sizes used for design and shown on the plans shall conform to the following:

| Zoning | Building Pad Size | |
|------------|---------------------|---------------------|
| | No Exposure | With Exposure |
| RS-1, RS-2 | 70' wide x 50' deep | 70' wide x 60' deep |
| RS-3 | 60' wide x 50' deep | 60' wide x 60' deep |
| RS-4 | 50' wide x 40' deep | 50' wide x 50' deep |

15. Topsoil depth shall be 3” on all non-paved ROW areas.

16. Final grading shall maintain the intent of the grading plan and be within:
 - a. + or – 0.1’ of the approved proposed grade with topsoil and or sod/seed in place
 - b. + 0.0’ to –0.3’ of the approved grade without topsoil and sod/seed in place.

C. Construction Requirements

1. All construction methods involved with the grading plan shall comply with Part II of the State Specifications and the General Specifications.

2. After the engineering plans are approved and before beginning grading operations for a subdivision or parcel of land, a pre-construction meeting shall be held. The City Engineer shall be notified a minimum of one week in advance to arrange for appropriate pre-construction meetings and construction inspection. The meeting will not be held until all required bonds are posted and permits obtained.

3. All material classified as unsuitable for street construction must be removed from the proposed ROW area.

4. All mass grading operations of a subdivision or individual building parcel, as well as any road improvements, must be performed in accordance with the construction specifications or as outlined in the State Specifications.
5. Fill material placed in the existing or future public ROW shall be:
 - a. approved by the City Engineer.
 - b. compacted in layers not to exceed 12".
 - c. compacted to at least 95% of their maximum density, as determined by the Modified Proctor Test (ASTM Designation: D-1557 or AASHTO Designation: T-180), within 6' of the final subgrade.
 - d. compacted to at least 90% of their maximum density, as determined by the Modified Proctor Test, below 6' or more from the final subgrade.
6. Compaction tests shall be:
 - a. performed on each 12" lift in fill areas within the ROW.
 - b. spaced to represent the fill area, not to exceed 100' along the ROW.
 - c. performed at the road centerline and edge lines for each location.
 - d. performed on all unstable subgrade areas.
7. All pertinent information shall be recorded for each test including but not limited to soil density (dry, bulk, and as percent of modified proctor), moisture (as percentage of bulk and dry density), type of test performed, test location, subgrade elevation at the test location, and soil type (description.)
8. If the City Engineer does not have a required density on file for the fill material, filling operations shall stop until:
 - a. the required density of the material is determined by the Modified Proctor Test, or as specified in the contract.
 - b. an interim required density value is approved by the City Engineer.
9. All cut areas shall have the top 6" compacted to 95% of the modified proctor density. The City Engineer may opt for a proof roll instead of soil compaction testing in these cut areas.

10. A soil-testing firm, approved by the city and paid by the developer, shall check compaction during the entire filling operation. The soil-testing firm shall provide a copy of the compaction test reports to the City.
11. Remove and stockpile all topsoil from any cut or fill areas.
12. Remove from the ROW all organic material from any cut or fill areas.
13. Full-time inspection shall be required when any grading work is taking place in the ROW.
14. Compaction and testing shall be required when filling of 12" in depth or greater is required to bring ROW to proposed subgrade elevation.
15. The site shall be graded to within $\pm 0.1'$, not consistently high or low, of the approved ROW subgrade, prior to construction of the pavement structure.
16. Prior to pavement construction, all road subgrades shall be proof-rolled with a quad-axle truck carrying a ticketed 20-ton load and City inspection. Areas failing the proof roll shall be reworked and retested.