

**CHAPTER 6**

**GRADING AND DRAINAGE**

6.0 GENERAL

6.1 SUBDIVISION GRADING

6.1.1 Relative to subdivision lot house pads, it is suggested that the grade be left 18"-24" below proposed finished yard grade.

6.1.2 All fill areas shall be compacted in one foot lifts. A soil-testing firm approved by the City, paid by the developer, shall check compaction during the entire filling operation. At the end of the filing operation, the soil-testing firm shall submit a final report to the City Engineer indicating areas of structural fill. The grading contractor shall notify the soil testing firm to monitor/test structural fill areas.

6.1.3 All areas of structural fill greater than three and one-half (3-1/2) feet (not including topsoil) shall be shown as shaded areas on grading plan. Compaction reports will be required. See chart below.

**SIZING OF HOUSE PAD  
PER ZONING DISTRICT**

DISTRICT	ZONING RESTRICTIONS		HOUSE PAD		
	<u>A</u> Width at 1. Building line 2. Less side yard set backs	<u>B</u> Depth lot size width	<u>c</u> WIDTH	<u>D</u> Depth	<u>A2-C</u>
<u>R-1</u>	<u>200'</u> 140	<u>435'</u>	<u>100</u>	<u>80</u>	<u>40</u>
<u>R-2</u>	<u>150'</u> 110	<u>267'</u>	<u>80</u>	<u>60</u>	<u>30</u>
<u>R-3</u>	<u>100/110</u> 80/90	<u>200'</u>	<u>60</u>	<u>50</u>	<u>20</u>
<u>R-3E</u>	<u>115/125</u> 85/95	<u>217.4'</u>	<u>65</u>	<u>60</u>	<u>20</u>
<u>R-4</u>	<u>95/110</u> 75/90	<u>169'</u>	<u>60</u>	<u>50</u>	<u>15</u>
<u>R-5</u>	<u>90/105</u> 70/85	<u>145'</u>	<u>55</u>	<u>40</u>	<u>15</u>
<u>R-6</u>	<u>85/100</u> 65/80	<u>118'</u>	<u>50</u>	<u>40</u>	<u>15</u>
<u>R-7</u>	<u>100</u> 80	<u>125'</u>	<u>50</u>	<u>40</u>	<u>30</u>

- 6.1.4 All fill placed in the street right-of-way shall be engineered compacted fill. Compaction reports will be required. A full time geotechnical engineer shall be on site during the filling process. The standards to be followed are fill shall be computed at 90% modified proctor to 1 (one) foot below subgrade. The top 2(two) feet shall be compacted to 95% modified proctor. Fill shall be placed and tested in no greater than 8-inch lifts. Test shall be done in no greater than 100-foot intervals.
- 6.1.5 All organic material shall be removed and stockpiled prior to placing structural fill.
- 6.1.6 All grading shall conform standards as given in appendix No. 5.
- 6.1.7 Soils compaction testing shall be done to these minimum standards. Lots having fill placed exceeding 3 ½ feet shall have a minimum of tests done at the four corners of the house pad shown on the grading plan. For street right-of-ways where fill exceeds one (1) foot from existing grade to proposed grade as shown on the plan, testing shall be done at 100 ft. intervals at street center line and curb lines within the pavement area.

## 6.2 EROSION CONTROL

- 6.2.1 All subdivision grading and erosion control shall conform to the Wisconsin Construction Site best Management Practice Handbook, distributed by the Wisconsin Department of Natural Resources Bureau of Water Resources Management.
- 6.2.2 Erosion control shall conform to City of Franklin Ordinance **Division 15-8.300**.
- 6.2.3 An erosion control plan shall be submitted for construction projects and subdivision development. This plan shall be approved by the City Engineer.
- 6.2.4 The developer shall be responsible for erosion control until all areas are stabilized by vegetative cover regardless of ownership. The standard for cover shall be 95%.
- 6.2.5 After the disturbed areas have been stabilized by revegetation, existing silt fence, hay bales, check dams, etc. must be removed by the developer's contractor and that area restored.

## 6.3 DITCH GRADING

- 6.3.1 All natural grass ditches shall have a minimum flow line gradient of 1% and a maximum of 5%. Less than 1% or greater than 5% requires special design considerations and approval of City Engineer.

- 6.3.2 Landscaping of ditches with a flow line gradient between 1% and 3% requires topsoil and seed restoration; between 3% and 5% requires sod/staked or stabilized by erosion control matting; greater than 5% requires conduit.
- 6.3.3 Roadside ditches shall be a minimum of 24 inches deep and a maximum of 36 inches deep as referenced from the centerline elevation of the finished road. Ditches greater than 36 inches deep shall be piped.
- 6.3.4 All crossroad culverts shall be designed to provide a minimum of 12 inches of cover as referenced from the centerline elevation of the finished road to the top of the pipe.
- 6.3.5 Side slopes of roadside ditches shall be graded no steeper than one foot of rise to four foot horizontally (4:1).  
  
Back slopes of roadside ditches and side slopes of all other ditches shall be graded no steeper than 1 foot of rise to 3 foot horizontally (3:1). A 4:1 back slope is preferred.
- 6.3.6 Back slopes and side slopes 4:1 or greater for roadside ditches shall be covered by erosion control matting.
- 6.3.7 Off road drainageways affecting the buildable area of any lot or greater than 36" deep between homesites shall be piped.
- 6.3.8 All existing ditches fronting on existing roadways or existing drainageways within developments shall be regraded to conform to these specifications.

#### 6.4 STORM SEWER

- 6.4.1 All materials and installations shall conform to the Standard Specifications for Sewer and Water Construction, dated December 22, 2003, and are subject to the City Engineer's approval.
- 6.4.2 Manholes and inlets shall be designed and constructed to allow easy access for maintenance and cleaning. Easy access is defined as any structure conforming to File No. 28 of the Standard Specifications for Sewer and Water Construction.
- 6.4.3 Endwalls, flared end sections or junction structures shall be required at all crossroad culverts and piped installed through or between homesites. Riprap on fabric shall be required at outfalls.

- 6.4.4 All precast manhole barrel joints and all chimney sections shall be mortared and smoothed off inside and outside.
- 6.4.5 Inlets shall be of precast design in accordance with figure 16. Concrete block inlets will only be allowed with written permission of the City Engineer or shown as an exception on the approved construction drawing.
- 6.4.6 When an inlet is within a driveway, a curbless casting 3227C will be required.
- 6.4.7 The inlets are to be set three inches plus or minus 1/4" low prior to the curb and gutter construction. This will allow for the addition of a two-inch adjusting ring and the necessary mortar and mastic. No brick adjustments will be allowed. This construction should allow for the curb and gutter construction with a curb machine. Type "M" mortar shall be used per Section 6.37.1 of Wisconsin Standard Specifications.

At time of final lift of asphalt trowelable mastic shall be used between the top adjusting ring and the inlet frame. The mastic shall cover the entire top of the adjusting ring with a 1/2 inch thickness.

- 6.4.8 The final setting of the inlet frame and grate shall be completed with the construction of the curb and gutter. With this method, no tuckpointing beneath the frame should be required.

In addition to the above, the staking for inlet construction will be consistent and will be done as follows:

1. Two offset stakes, each 10 feet from the centerline of inlet, will indicate the face of curb and/or inlet box and the inside back of the inlet.
2. One offset stake will be set 5' back of the face of curb and/or inlet box and will be on the centerline of the inlet perpendicular to the curb and gutter.
3. It will be the responsibility of the storm sewer contractor to protect these stakes to ensure proper construction.
4. Inlets constructed with improper alignment (See 2.3.2 Q) will be unacceptable and will have to be removed and reconstructed.

To set the frame and grate to conform to the slope of the gutter line (final inch) a commercial grate, high early strength concrete, Quickrete 5000 or equal shall be used.

- 6.4.9 Yard inlet shall be two (2) feet internal diameter. A beehive grate and frame, R 2564 Neenah or approved equal shall be used. See Figure **No. 28**.
- 6.4.10 On extended (greater than 200 feet) slopes of three (3) percent or greater an inlet with directional grate in frame, Neenah R3246 shall be used. The precast concrete inlet shall be increased to 30 x 20 internal dimensions to receive the frame.

#### 6.5 STORM SEWER LATERALS

- 6.5.1 All storm sewers constructed will include lateral lines if required by the development agreement. Laterals shall be designed to receive storm water runoff from roof drains, localized areaways, and sump pumps.
- 6.5.2 Laterals shall meet all the requirements of the storm sewer system as detailed in this chapter and have a minimum diameter of six (6) inches.
- 6.5.3 Laterals will be laid to one(1) foot of right of way line. Laterals can be "shelved" in the same trench with sanitary sewer and water service laterals. Typically the storm lateral to lie to the right of the sanitary lateral (street to property).

#### 6.6 DISCHARGE FROM SUMP PUMPS, DOWN SPOUTS, AND ROOF DRAINS

- a. Sump pumps, down spouts, and roof drains shall be connected, within a year, to a storm sewer system as it is installed adjacent to a property.
- b. If storm sewer is not available or if a rural section exists, then sump pumps shall be installed to discharge:
  - 1) To an open ditch located within the site.
  - 2) Onto the ground within the building lot if:
    - a) The discharge point is at least 5' back from the front lot line, any side or rear lot lines.
    - b) An adequate swale exists to receive the flow.
    - c) Adjoining property is not adversely affected.

#### 6.7 ON-SITE STORMWATER BASINS

- 6.7.1 Design Engineers shall investigate the need for stormwater controls for all development sites and

shall contact the City Engineer's office to determine if ponds (detention, retention, nutrient traps) have been designated for the site in the City of Franklin Stormwater Management Plan - 1993 as completed by Bonestroo, Rosene, Anderlik & Assoc.

- 6.7.2 When designing **storm water** facilities, the technical and physical factors listed below shall be taken into consideration and addressed in the final report:
- A. Design rainfall frequency, intensity and duration.
  - B. Size and location of the drainage area tributary to the proposed detention facility.
  - C. Hydrologic data of the tributary area.
  - D. Rate of inflow to the detention facility (cfs) vs: time.
  - E. Maximum permitted release rate from the detention facility.
  - F. Storage volume required for the detention facility.
  - G. Spillway, or other means, for release of stored water and for bypassing excess flows that cannot be accommodated by the storage facility.
  - H. Time limitations for draining the stored runoff without causing secondary problems.
  - I. Type of facility for detention (rooftop, parking lot, park pond, etc.)
  - J. Safety precautions.
  - K. Means for efficient maintenance and operation.
  - L. Flood routing for runoff greater than the design capacity of the detention facility.
  - M. All piping inletting to and discharging from retention basins shall be encased in a bentonite material to seal off lateral seepage.
  - N. Wet Detention Ponds shall have a property setback/maintenance access shelf, a minimum 15 feet wide, with a maximum slope of 10 to 1 around entire pond perimeter. The maximum 5 to 1 slope to edge of pond will be allowed to be 4 to 1.

## 6.8 EARTH BERMS

- 6.8.1 The bottom (toe) of an earth berm shall not be constructed closer than 4 (four) feet from any property line.
- 6.8.2 Berm height shall not exceed 6 (six) feet from adjacent ground level.
- 6.8.3 Side slopes on berms, unless landscaped, shall not exceed 3:1. Slopes not greater than 4:1 **are recommended.**
- 6.8.4 Berm(s) shall not be constructed as to obstruct drainage. Berms will not be allowed in existing or proposed drainage areas or swales.

## 6.9 Retaining Walls

- 6.9.1 For all retaining walls **greater than 3 (three) feet proposed as part of development plans approved by a licensed professional engineer,** a plan shall be submitted to the City Engineer for approval. The plan shall show the material of construction, wall ties, location relative to property lines, structures, utilities, easements and wall height. Plan shall be stamped and signed by a professional engineer.
- 6.9.2 Retaining walls shall be a minimum of 5 (five) feet from any lot line.
- 6.9.3 Wall height shall not exceed 3(three) feet. Terracing will be required for elevation changes greater than 3 feet. The distance between terrace walls shall be a minimum of 4 (four) feet.
- 6.9.4 The appearance of the retaining wall and wall materials shall be considered with respect to the view from the low side of the wall.
- 6.9.5 The long term durability and maintenance requirements of the retaining wall shall be considered. Adequate safety features and precautions shall be incorporated into the retaining wall design to mitigate the hazard of the abrupt drop off created by the wall.
- 6.9.6 Retaining wall shall be designed in a manner that frost and hydrostatic pressure will not compromise the integrity of the wall.
- 6.9.7 Retaining walls shall not interfere with the surface water drainage pattern or create disruption of the approved drainage or grading plan. Walls may not be constructed in drainage swales.
- 6.9.8 Retaining walls shall be designed and located in a manner that will not have a negative impact on abutting properties.