**Section 570.204 Component Design Criteria**

a) Settling Basin

1) Basin volume shall be 4.5 cubic feet per 100 square feet of area contributing runoff plus an additional 10% volume safety factor.

2) Ramp slope shall not be steeper than 12:1 (H:V), with 15:1 being preferred.

3) Basin depth shall be 2 to 4 feet.

4) Settling basins located where groundwater tables rise to within 2 feet of the surface shall be provided with foundation drainage.

5) The settling basin riser pipe should be 18 to 24 inches in diameter with vertical slots 1 inch by 4 inches high spaced at 120° intervals around the pipe. There should be 6 slots per foot of height with the bottom row of slots even with the settling basin floor. To avoid excess clogging, offset or locate the riser pipe as far as practicable from the inlet of the settling basin and attach ¾ inch mesh expanded metal screen cover over the top of the riser pipe. Provide a ¾ inch mesh expanded metal screen ahead of the riser pipe so that all runoff entering the riser pipe must first cross the screen. Refer to Appendix I for a diagram.

6) The settling basin ramp, floor, end-wall, and side-walls should be designed, constructed, and maintained to withstand normal operation practices involving power machinery.

b) Effluent Transport System

1) Pressurized effluent transport systems shall be designed by normal engineering hydraulic considerations including but not limited to static head, friction losses, flow velocity, and pipe diameter.

2) Gravity flow effluent transport systems may be designed as pipes flowing full or as open channels. Design velocity shall be 2 feet per second or greater to prevent solids deposition. Minimum pipe capacity shall equal or exceed the design flow rate (Qf) over the field application area. The design feedlot runoff volume (VR) shall be calculated by Appendix B. Design flow rate (Qf) can be obtained from Appendix G.

3) Closed pipes used for effluent transport systems shall be provided with some means of cleaning by rodding or flushing.

c) Junction Box

1) A junction box shall be provided at the intersection of the effluent transport system and distribution manifold to dissipate the energy of the anticipated hydraulic jump from the effluent transport system discharge and to proportionally split the flow to the distribution manifold(s).

2) The recommended junction box design specifications are provided in Appendix H.

3) The junction box should be provided with a removable cover to allow entry for maintenance and prevent entry of objects that would interfere with the operation of the runoff field application system.

d) Distribution Manifold

1) Pressurized distribution manifolds shall be designed by normal engineering considerations including but not limited to static head, friction losses, flow velocity, and pipe diameter.

2) Gravity flow distribution manifolds shall be less than 50 feet long each and at least 2 feet shorter than the width of the field application area.

3) The following must be considered in the distribution manifold design:

A) Construction material

B) Length

C) Capacity

D) Slope (level)

E) Solids removal and cleaning

F) Providing uniform sheet flow

i) Effluent transport system connection point

ii) Capped ends

iii) Orifice or V-notch weir design and spacing

iv) Splash apron such as pea gravel or concrete

G) Location of junction box

4) Recommended designs of distribution manifolds are provided in Appendix H.

5) Distribution manifolds must be anchored securely while in operation.

e) Runoff Field Application Area

1) The runoff field application area shall be located on gently sloping soils of moderate permeability supporting a heavy stand of grass vegetation and designed to operate by overland flow.

2) Slopes shall be shaped to cause applied runoff to flow uniformly across the design width for the entire length of the field application area.

3) The uniform sheet flow shall move downslope through the field application area flow length at a velocity that will provide a minimum contact time of two hours. Appendix E, gives minimum flow lengths needed to provide a contact time of 2 hours at various slopes.

4) Field application areas shall have a minimum width of 20 feet and a maximum width of 100 feet.

5) The range of soil infiltration rates specified in the planning considerations (1.0 to 6.0 inches per hour) insures that the infiltration capacity of the field application area will equal or exceed the volume of feedlot runoff to be infiltrated for the 1 year – 2 hour design rainstorm event. The following equation shall be used for designing the field application area (FAA):

|  |  |  |
| --- | --- | --- |
| FAA | = | VR x 12 |
| (2 hours x S1) – 1.69 |

when: 1.0 < SI < 6.0 inches per hour

FAA in square feet.

VR in cubic feet.

6) The procedures for determining VR and SI are provided in Appendix B and C, respectively.