

Introduction

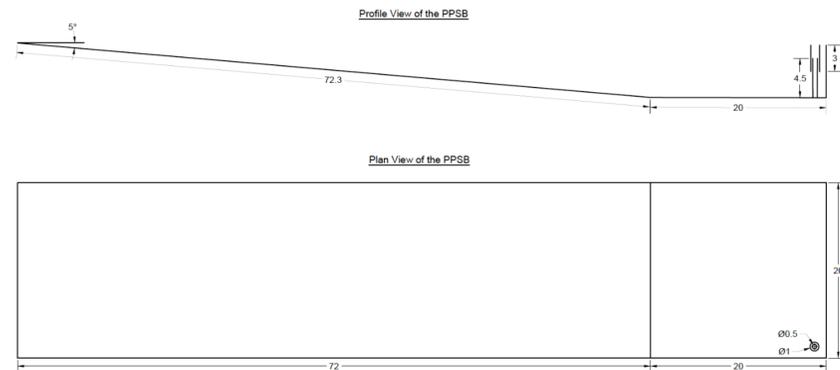
- A pull-plug sedimentation basin (PPSB) is a passive solids removal system that can reduce the operational time and cost of the overall manure management system by acting as both a sedimentation basin and pre-lagoon solids filter system.
- The PPSB was developed as part of a collaborative effort between USDA NRCS and small dairy producers in Missouri

Objectives

- Provides background and basic information on the PPSB, performance evaluation of the system, costs, and maintenance and operational considerations.

Materials and Methods

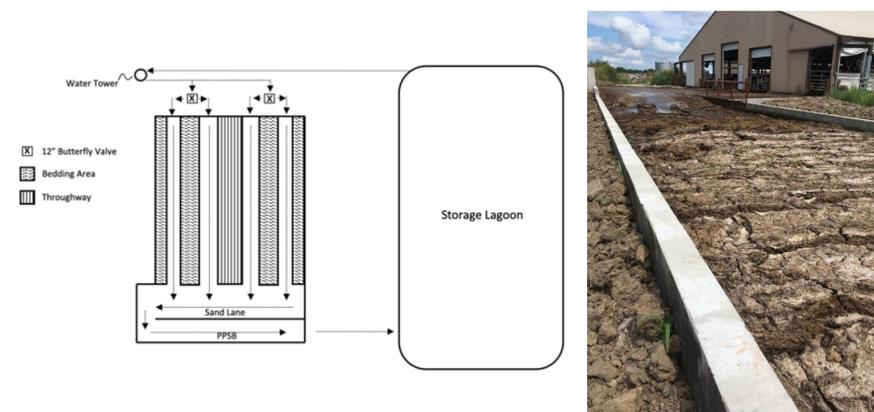
- Critical design considerations including size, hydraulic loading, location of the pull-plug, and construction details were reported in Extension publication.
- The concrete entry ramp should have a maximum slope of 12:1 (or 5 degrees).
- A minimum depth of 6 feet is needed to keep settling solids out of the discharge stream.
- Larger, denser particles accumulate on the basin floor, while buoyant particles (e.g., undigested fiber, waste forage, bedding, etc.) form a floating mat on the surface.
- The mat acts as a natural filter and retains some of the solids from the waste stream.



Profile and plan views of typical PPSB (dimensions in feet).

Results and Discussion

- Approximately 13% and 28% of manure-based nitrogen and phosphorous, respectively, was retained by the PPSB.
- The owners are satisfied with the performance, which is considered a low-maintenance, low-technology option for dairy with a flush system.
- The primary benefit of the PPSB is reduction in time spent agitating, and removing solids/sludge in the lagoon.
- There are typically three to four clean-out periods per year, depending on PPSB and herd sizes and other factors.
- The primary benefit is removal of manure solids, resulting in longer intervals between lagoon agitation and land applications.



Location of PPSB and mat development on the PPSB.



PPSB and sand lane in operation.



Solids removal and effluent discharging from the PPSB.

Conclusions

- The owners are satisfied with the performance of the PPSB, which is considered a low-maintenance, low-technology option to efficiently manage manure solids within a flush system.
- Future work: Additional sampling just before or during clean-out, and different bedding should be evaluated for performance; and document the cost savings.

Acknowledgement

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- University of Missouri Extension publication Eq302 (Canter et al., 2021).