OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MINES AND RECLAMATION

POLICY/PROCEDURE DIRECTIVE

Engineering 96-1

SUBJECT: Sediment Pond Design

EFFECTIVE: September 1, 1996

PURPOSE: To revise the sediment storage definition used in Engineering PPD 89-2, to revise the pond clean-out requirement, and to provide an option for pond dewatering.

The following design standards for sediment ponds are intended to improve the effectiveness of ponds in meeting the effluent standards. These standards along with Engineering PPD 89-2 will remain interim until a final pond policy is developed by the Pond Team. The Pond Team which consists of members from Industry, DMR, OSMRE, and Academia agree that pond dewatering will improve the effectiveness of ponds and provide additional benefits beyond current practices. This interim PPD will incorporate pond dewatering into DMR's current pond policy (Engineering PPD 89-2) and will also be part of the final pond policy, but not necessarily in this same form. Any ponds designed and approved using this policy will not require any redesign upon issuance of a final pond policy.

1. Pond Volume - The total pond volume below the principal spillway crest will be required to have a minimum volume of 0.1 acre-foot per acre disturbed. The total pond volume is divided into **sediment volume**, which requires 0.06 acre-foot per acre disturbed, and **settling volume**, which requires 0.04 acre-foot per acre disturbed. To minimize scour and resuspension of accumulated sediment, the sediment pond surface area to discharge ratio should be maximized as reasonably possible. That is, the sediment pond should be designed and constructed so that the surface area is as large as reasonably possible for the given pond site and the discharge rate is as small as reasonably possible for the given pond site with more temporary storage volume being used during the 10 year, 24 hour or lesser precipitation events. Each pond design shall provide a stage-storage curve indicating the sediment volume, settling volume, peak temporary storage volume for the 10 year, 24 hour precipitation event, and the lowest dewatering elevation, if a dewatering device is used.

2. Pond Clean-out - The pond shall be cleaned of sediment prior to the pond sediment storage volume, as defined in 1., being reached.

3. Pond Dewatering - Both new and existing sediment ponds (embankment or excavated) may use drawdown or dewatering devices. The dewatering device can be unprotected to the bottom of the settling volume (e.g. a riser pipe perforated only above the bottom of the settling volume). The entire pond volume may be dewatered only if protected dewatering occurs within the sediment storage volume (e.g. a gravel filter cone or geotextile around a perforated riser pipe from the top of the sediment volume to the pond bottom). Note that the dewatering process needs to be designed. For example, a riser pipe with perforations needs to have planned hole sizes, vertical spacing of holes, number of holes per each elevation, and the estimated time to dewater the settling volume, in days and hours. This information can be included on a separate sheet and submitted with the Attachment 20. The dewatering process must occur slowly. Additionally, if the settling volume is used in routing the precipitation event through the pond, then the dewatering must occur within a 2 to 7 day period (e.g. dewater 50% of the settling volume in the first 24 hours and the balance of the settling volume over the next 24 hours or longer period).

4. Permanent Impoundment - Sediment ponds that are designed with a dewatering device, and use the dewatering device in routing the precipitation event through the pond, may need to remove the dewatering device prior to the impoundment remaining as permanent. For example, a landowner may not want a permanent impoundment with a lowered water surface elevation. The dewatering device may be removed two years after the last augmented seeding, or as directed by Inspection & Enforcement PPD 96-1. The permanent impoundment with the dewatering device removed, as discussed above, must be designed and certified to pass the peak runoff from the 25 year, 6 hour precipitation event.

   Dewatering devices that are not used in routing the precipitation event through the pond may be removed at any time, but generally would not be removed until two years after the last augmented seeding, and shall be designed according to Engineering PPD 89-2, part 1(C).

Included with this PPD is a list of possible advantages and disadvantages for a drawdown or dewatering device (Item #1). Also, Drawing 1 provides a definition, by example, of protected versus unprotected dewatering volumes. Drawing 2 shows a plan view of a sediment pond using a fixed siphon, a perforated riser pipe, and a trickle tube as optional dewatering devices. Drawings 3 through 5 provide details for these three dewatering methods. Drawing 6 is a plan view example of a slow sand filter total dewatering system, and drawings 7 and 8 are details for the slow sand filter. Note that the total dewatering methods, Drawings 6, 7 and 8, cannot be used in conjunction with routing the precipitation event through the pond unless a stage-discharge relationship is provided.

Lisa J. Morris
Chief
Division of Mines and Reclamation

Dewatering Devices for Sedimen Ponds

Advantages

1. Increased temporary storage volume for storm runoff.
2. Lower peak discharges from ponds.
3. Minimizes potential downstream channel erosion.
4. Potentially easier to remove accumulated sediment depending on amount of dewatering (i.e. total vs. partial dewatering).
5. The temporary storage of storm water can be released over a longer period of time (i.e. 2 to 7 days) which potentially helps support any downstream aquatic environment in droughty periods.
6. Lower peak stage, thus, the overall dam height may be lowered.
7. Easily observe sediment accumulation levels.
8. If properly designed, the sediment trapping efficency will be improved.
9. The sediment particles entering the pond during the early stages of a storm event will have less distance to fall, thus, improved trapping of sediment.
10. Longer detention times.

Disadvantages

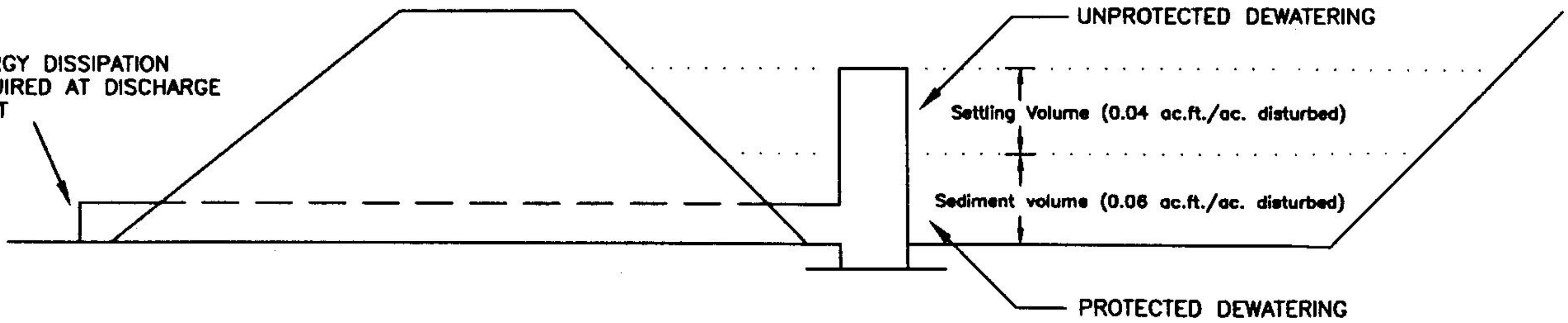
1. Potentially have to plug or remove the dewatering device to provide a permanent impoundment for landowners.
2. Need to stabilize diversion inlets with rip rap or similar down to the lowest water level.
3. The dilution effect from water already within the pond will be reduced or eliminated.
4. There will be an initial resuspension of accumulated sediment under total dewatering conditions.
5. May have to move riser pipe out of the pond embankment to access the riser for perforations.

11. Maintenance of spillway systems may be minimized due to fluctuating water surface (i.e. discourages beavers and muskrats).

12. Potentially lower phreatic surface within the pond embankment which may provide for a more stable embankment.

13. May provide for more stable perimeter slopes due to lower normal pool elevation.

PROTECTED vs. UNPROTECTED DEWATERING



Total pond volume = 0.1 ac.ft./acre disturbed = settling volume + sediment volume

NOT TO SCALE

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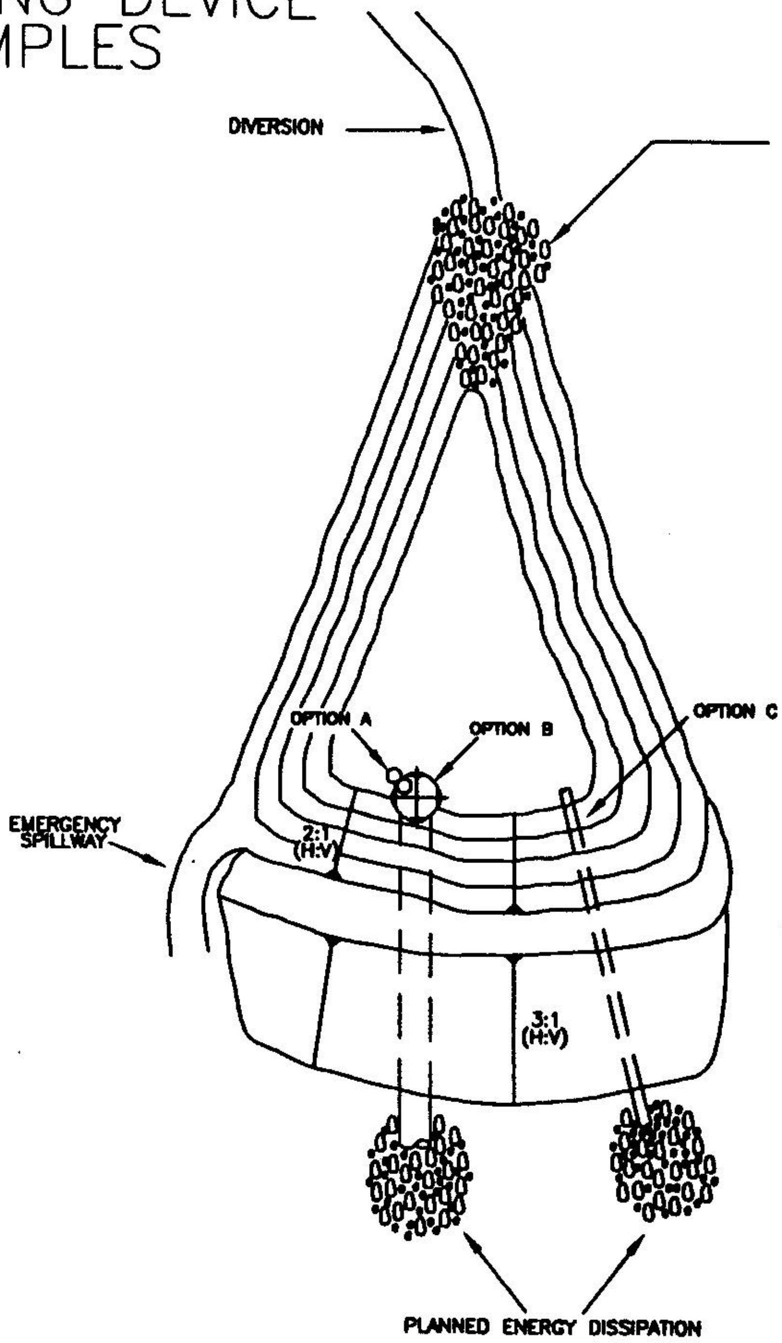
DRAWING: 1	DATE: 7/96

DE' 'ATERING DEVICE EXAMPLES



STABILIZED DIVERSION ENTERING POND DOWN TO THE DEWATERING ELEVATION OR LOWER. TYPICALLY, DIVERSION STABILIZATION WILL OCCUR WHERE A LOW GRADIENT DIVERSION TRANSITIONS TO A STEEPER GRADIENT DIVERSION THAT DISCHARGES INTO THE POND.

OPTION A – FIXED SIPHON (SEE DRAWING 3)

OPTION B – PERFORATED RISER PIPE (SEE DRAWING 4)

OPTION C – TRICKLE TUBE (SEE DRAWING 5)

OTHER DEWATERING OPTIONS MAY BE USED

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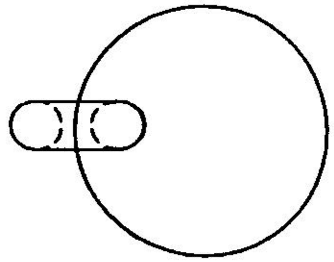
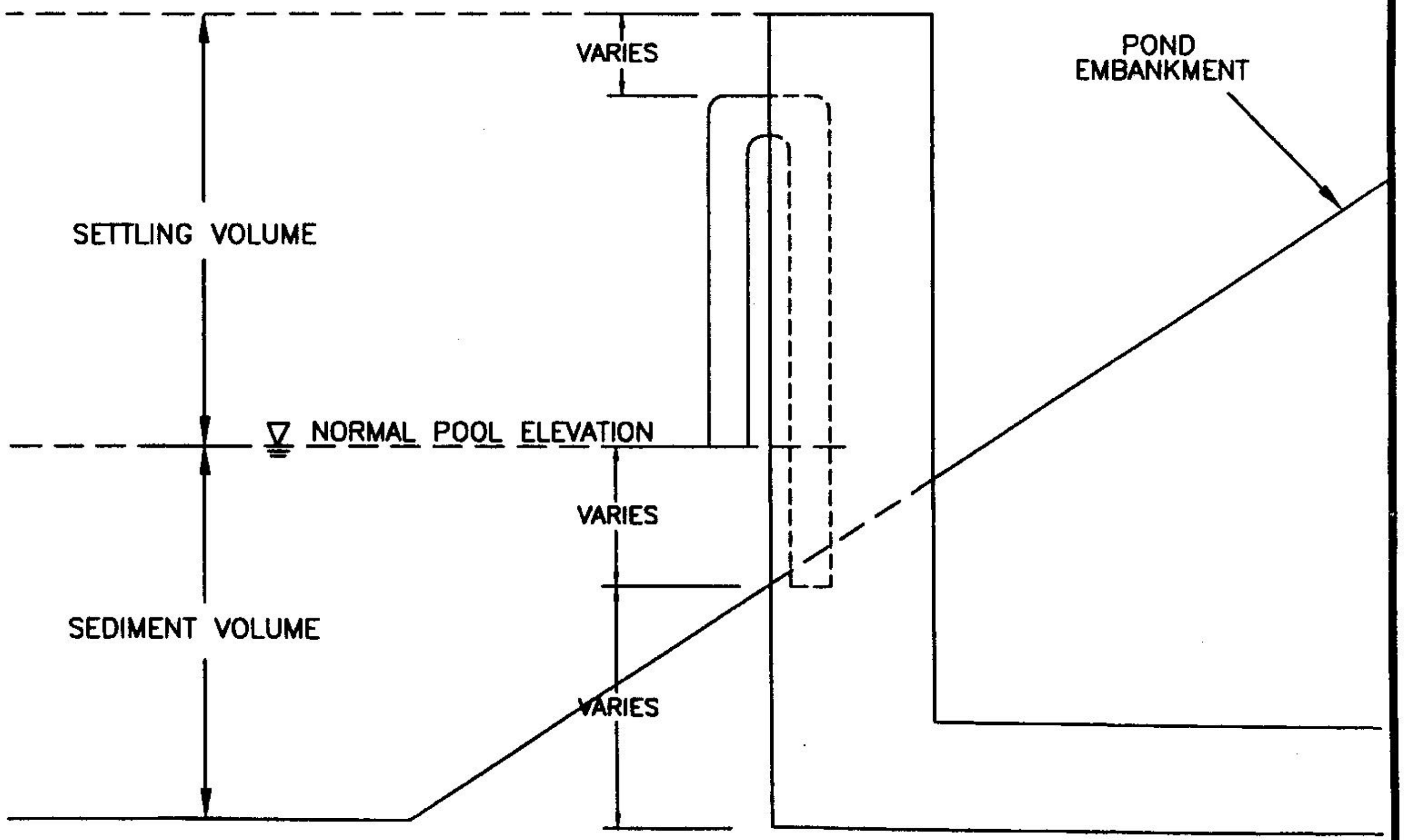
FIXED SIPHON ON A RISER PIPE

Revise as needed



TOP VIEW OF RISER SHOWING FIXED SIPHON



PLANNED UNPROTECTED DEWATERING MAY OCCUR AT ANY ELEVATION WITHIN THE SETTLING VOLUME, WITH THE BOTTOM OF THE SETTLING VOLUME BEING THE LOWEST ELEVATION THAT UNPROTECTED DEWATERING MAY OCCUR.

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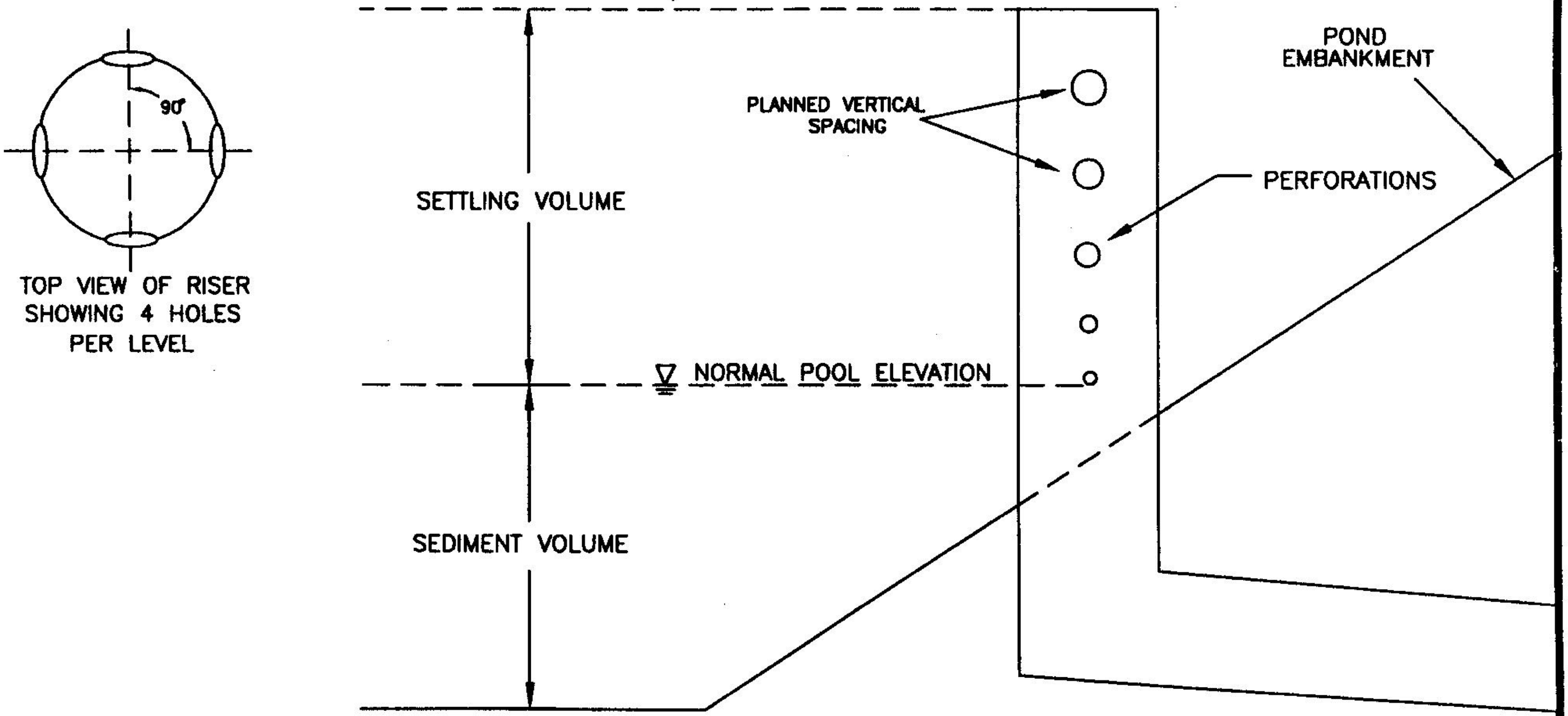
PERFORATED RISER PIPE



PLANNED UNPROTECTED DEWATERING MAY OCCUR AT ANY ELEVATION WITHIN THE SETTLING VOLUME, WITH THE BOTTOM OF THE SETTLING VOLUME BEING THE LOWEST ELEVATION THAT UNPROTECTED DEWATERING MAY OCCUR.

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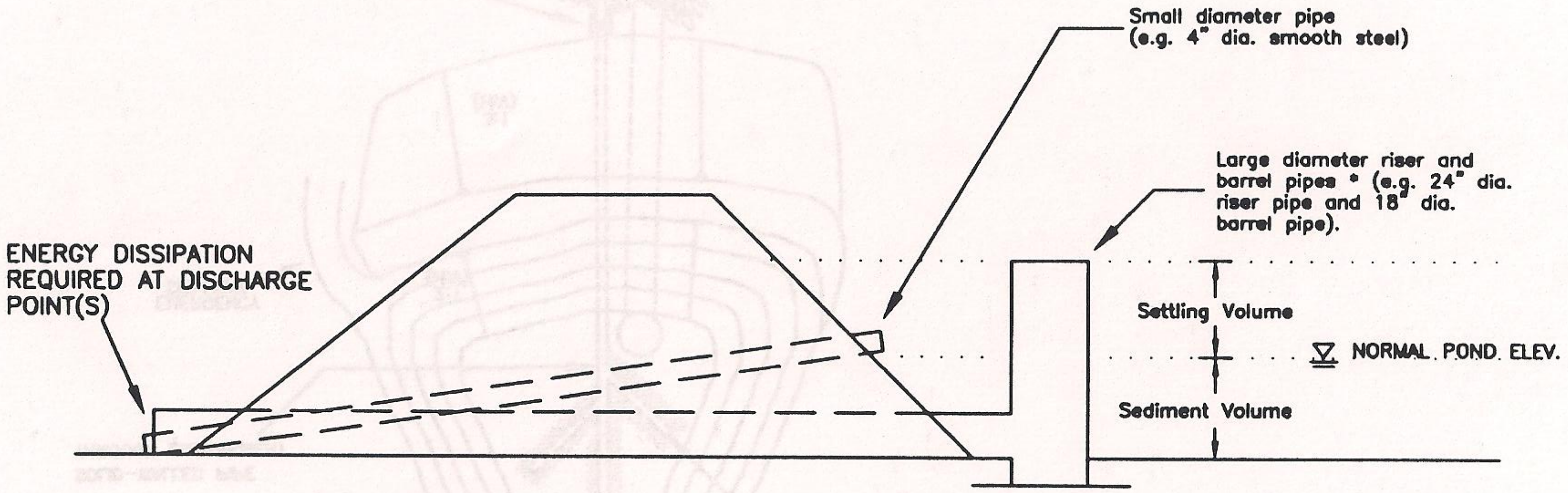
TRICKLE TUBE



PLANNED UNPROTECTED DEWATERING MAY OCCUR AT ANY ELEVATION WITHIN THE SETTLING VOLUME, WITH THE BOTTOM OF THE SETTLING VOLUME BEING THE LOWEST ELEVATION THAT UNPROTECTED DEWATERING MAY OCCUR.

* PIPE DIAMETERS AND TYPES WILL VARY BASED ON SITE CONDITIONS AND MATERIALS AVAILABLE.

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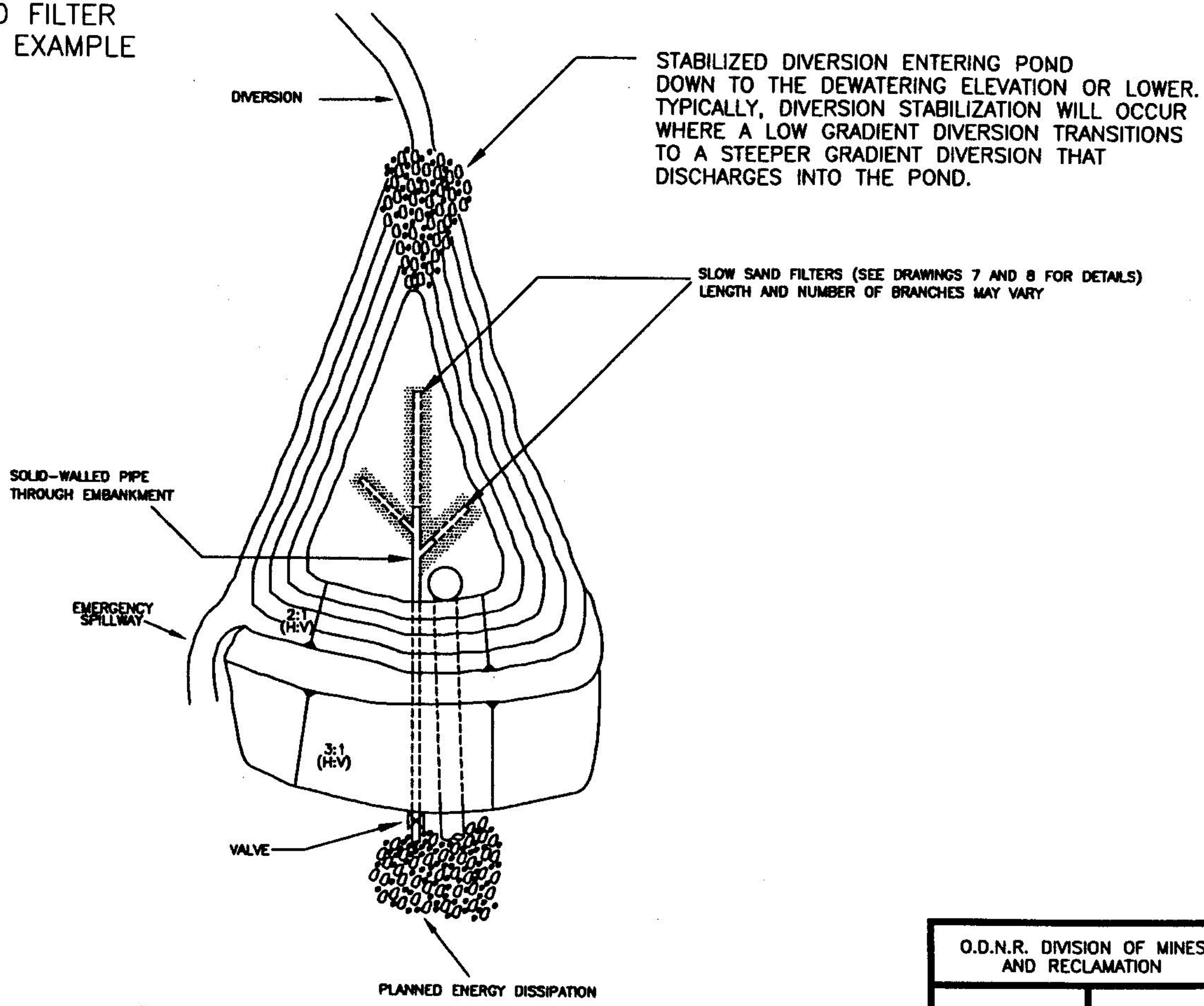
SLOW SAND FILTER PLAN VIEW EXAMPLE



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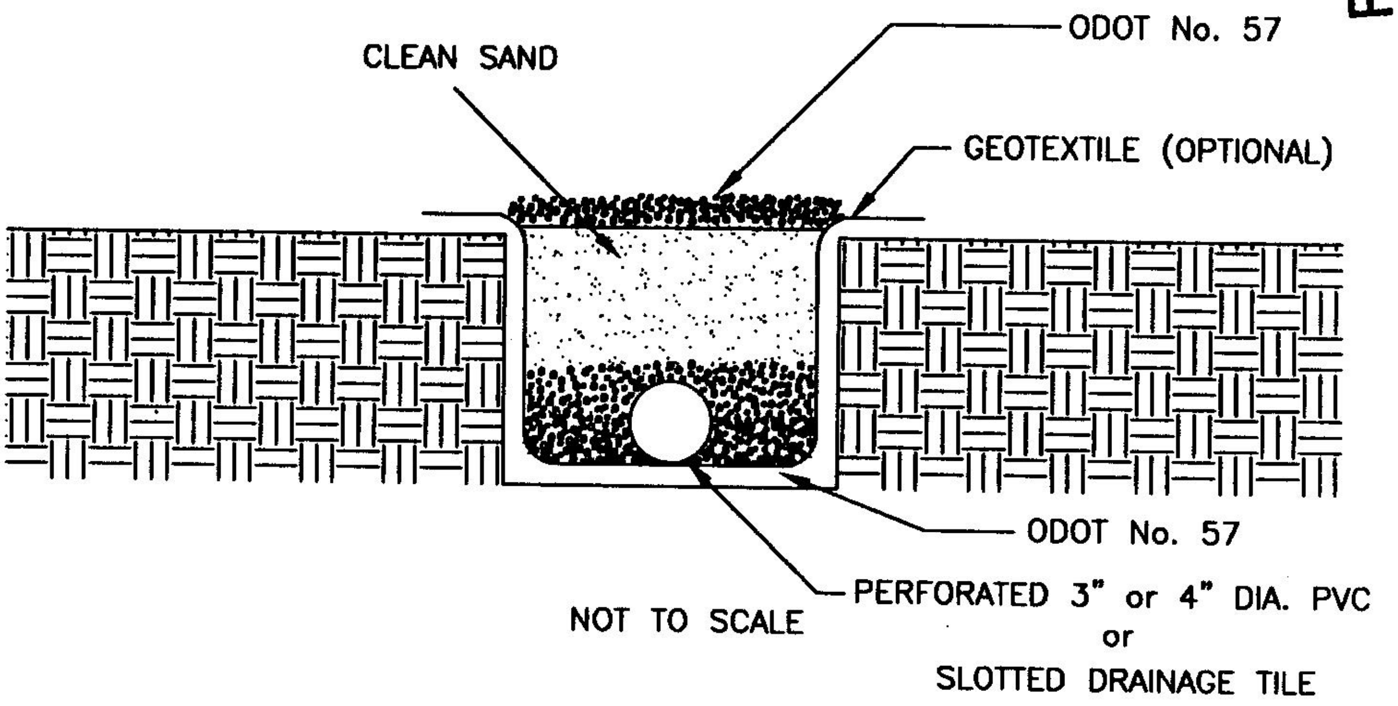
TOTAL DEWATERING METHOD

SUBSURFACE SAND FILTER

(a protected dewatering method)



NOT TO SCALE

1) MAINTENANCE OF SLOW SAND FILTERS IS GENERALLY REQUIRED AT 12 MONTH (+/-) INTERVALS.

2) THE PERFORATED PIPE IS GENERALLY CLAMPED ONTO THE SOLID-WALLED PIPE THAT EXTENDS THROUGH THE EMBANKMENT.

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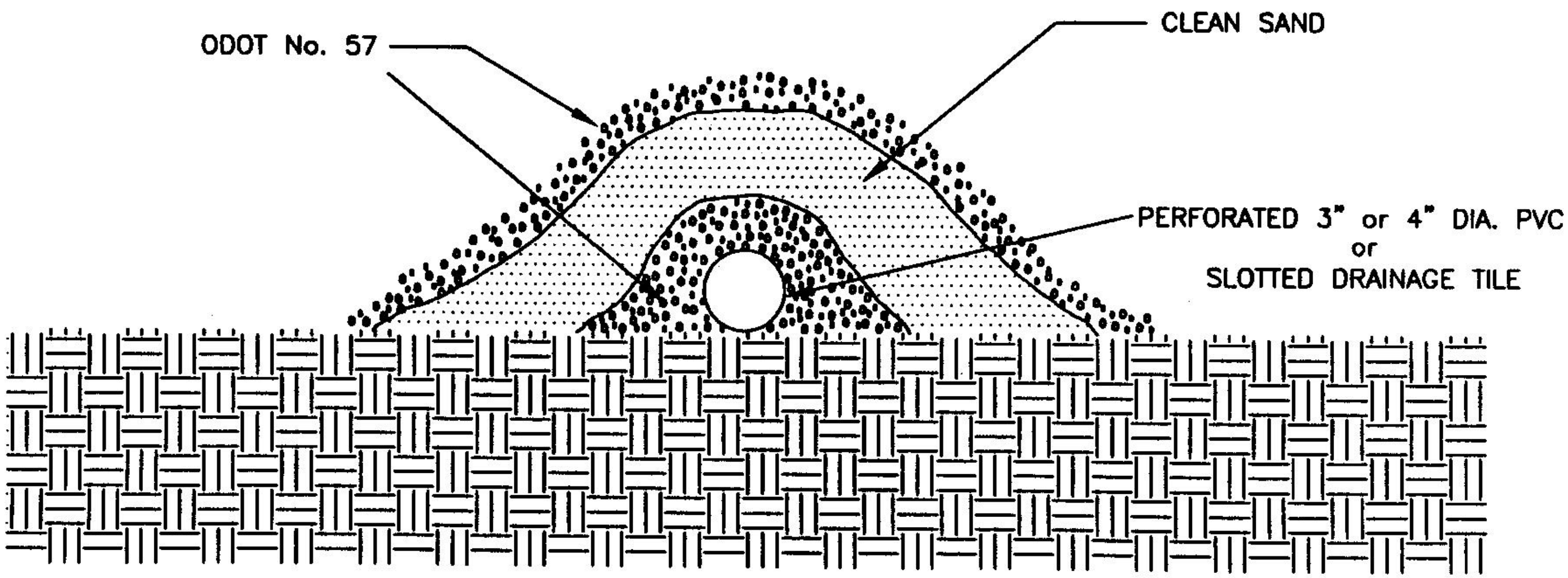
TOTAL DEWATERING METHOD

SAND FILTER DRAIN

(a protected dewatering method)



NOT TO SCALE

1) MAINTENANCE OF SLOW SAND FILTERS IS GENERALLY REQUIRED AT 12 MONTH (+/−) INTERVALS.

2) THE PERFORATED PIPE IS GENERALLY CLAMPED ONTO THE SOLID–WALLED PIPE THAT EXTENDS THROUGH THE EMBANKMENT.

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DRAWING: 8	: 7/96