TxDOT Houston District
Permits Pump Discharge Criteria

SUBJECT 1

The concept of Lead and Lag pump versus main and secondary (backup) pump are two different concepts:

Lead and Lag Pump Operation Method:

The lead pump turns on at a certain design water surface elevation (WSEL) (usually 18" – 24" or more, above the pump well floor). The lead pump discharges a portion of the maximum allowable pump discharge. The lag pump starts when the WSEL rises to another design elevation. The lag pumps assist the lead pump and shuts off when the WSEL drops to a certain design level, leaving the lead pump to finish the job. For smaller storms, the lag pump may not even turn on. For this reason, a good design is to alternate the lead and lag pumps with each storm to ensure even operation for both pumps. This is good design practice and enhances the longevity and reliability of the pump, but this is not a requirement. The two pumps' combined discharge shall not exceed the allowable pump discharge.

Main and Backup Pump Operation Method:

This is not the ideal situation. The lead pump is sized for maximum (100%) allowable pump discharge. The backup pump is also sized for maximum discharge. The backup pump is supposed to be used only when the lead pump has completely failed; however, if the backup pump can be turned on manually by the operator/owner during the lead pump operation, the pump discharge would become double the allowable pump discharge, potentially causing adverse impact. The Texas Department of Transportation (TxDOT) Houston District (HOU) Hydraulics Section (HYD) strongly discourages this type of operation. Only one hand-off-automatic (HOA) pump control will be allowed on the motor control center. Operating both pumps at once, especially during construction, is not acceptable.

SUBJECT 2

In the case of pumped discharge to a TxDOT roadside ditch or storm sewer system, the maximum allowable pumped discharge shall be calculated per the following steps:

1. Determine the allowable discharge as detailed in the *Drainage Design Guidelines* document.
2. The total pumped discharge rate must not exceed 20% of the allowable discharge as determined in Subject 2 Item 1 for sites greater than one acre but less than or equal to five acres.
3. For the gravity portion of the detention volume, the full allowable discharge as calculated in Subject 2 Item 1 may be used. The restrictor will be designed based on full allowable discharge. All pumps shall cease to operate when gravity discharge begins. Combined gravity and pumped discharge will not be permitted under most conditions.
4. The pump force main discharge must be located upstream of the restrictor.
5. If the site is equal to or less than one acre and does not receive any offsite flow, the maximum pump discharge must not exceed 0.50 cubic feet per second (cfs).
6. **If the site exceeds 5 acres in size, please meet with TxDOT HOU HYD (email:** HOU_HYD_Permits@txdot.gov**) to discuss the maximum allowable pumped discharge.**

SUBJECT 3

Allowable percentage of detention volume to be pumped

The Development's Engineer shall design the proposed discharge of the detention volume to allow minimum 25% by gravity and maximum 75% by pumped discharge. No more than 75% of the total detention volume may be pumped.

SUBJECT 4

Pumped discharge Stormwater Pollution Prevention Plan (SWPPP) and how to minimize and prevent silt deposit in TxDOT right-of-way (ROW)

Due to the energy imparted to stormwater by the pump and the shearing action of centrifugal pumps, such stormwater is more likely to carry suspended solids in the discharge. Significant effort must be applied to prevent the suspension of silt in the pumped stormwater discharged to TxDOT ROW:

1. Include construction of a temporary stilling basin next to the pond (depth and size to be determined by the Development's Engineer and drawn on the plan), that the contractor can use to discharge the polluted standing water on low areas of the project and bottom of the pond. This will allow silt and sediment to sink and settle to the bottom of the stilling basin. The basin will include a PVC or flexible gravity pipe that will be set above the bottom of the basin and will discharge a cleaner water to an on-site temporary grass-lined flat swale before draining to the TxDOT ROW, preferably to an inlet or roadside ditch. This recommendation is for temporary condition and will be used during construction until the site and the detention berms and side slopes are stabilized. Please see Figure 1 below for a conceptual example:

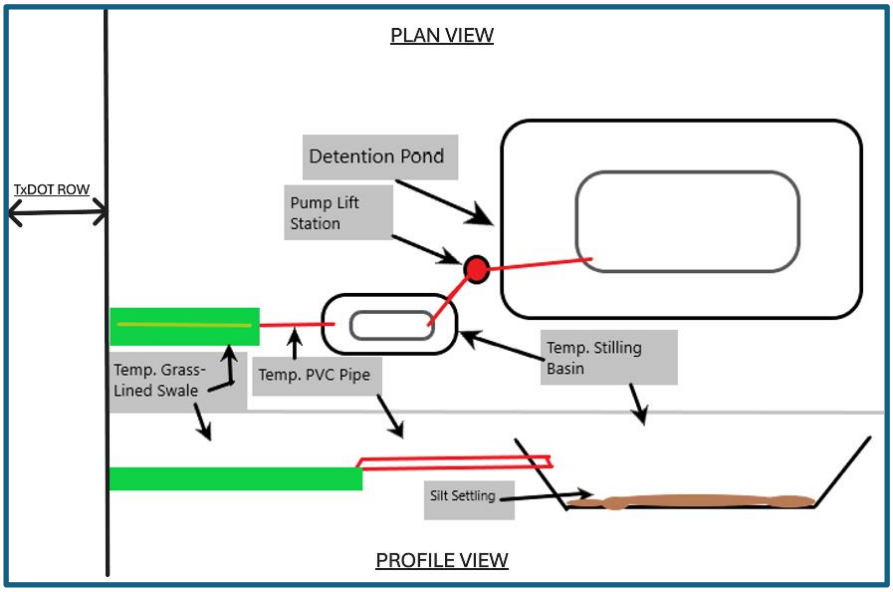

Figure 1: Example of Temporary Stilling Basin

2. In lieu of a stilling basin as described in Subject 4 Item 1, the Development's Engineer must design a system which is capable of allowing suspended solids to settle before entering TxDOT ROW.
3. *The permanent main pump shall not discharge to TxDOT at any time if the water being pumped exceeds the turbidity levels that are considered pollutant in accordance with Texas Commission on Environmental Quality (TCEQ) guidelines.* As such, please include this italicized text as a note on the SWPPP plan sheet.

SUBJECT 5

Pump Return Line and Shut-Down Junction Box

The pump force main must discharge into the private property drainage system upstream of the restrictor. The restrictor must be contained within the private property for the owner to maintain. The return line shall be designed to return the flow back to the internal drainage system and the detention pond once the restrictor capacity is exceeded.

A junction box must be provided downstream of the restrictor that is equipped with a float that will automatically shut-down the pump operation once the WSEL in the junction box reaches a certain elevation. Please note the automatic pump shut-down float operates based on the WSEL in the receiving TxDOT system and functions independently of the detention pond WSEL. The purpose of this separate float is to shut off the pump when the WSEL in the receiving TxDOT system is too high to receive additional pumped flow. The pump shut-down elevation is site specific and will vary on a case by case which requires coordination with TxDOT HOU HYD Section.

SUBJECT 6

Pump information required on the plan for review

1. Pump system and performance curve
2. Pump vendor / manufacturing information
3. The pump's Rising and Falling cycle table
4. Discharge rate
5. NOTE: Two pumps may operate at the same time, if both pumps discharge does not exceed the allowable pump discharge; otherwise, provide only one control operating either pump with an arrangement such as a single pole – dual throw switch. To test an individual pump then a momentary-on jog button can be installed for each pump.

SUBJECT 7

Groundwater discharge not allowed

The permit is for the discharge of stormwater only. The applicant shall demonstrate that groundwater infiltration shall not occur during or after construction. This can be accomplished with a water table map that clearly demonstrates that the flow line elevation of the pumped detention pond is above the seasonally adjusted water table. The water table shall be established by a new survey that maps the water table surface for the entire site, with emphasis at the proposed detention pond location. The map shall be signed and sealed by a P.G. or a P.E. registered to practice in Texas. Alternatively, a geotechnical investigation may be performed to establish the ground water table elevation or determine ground water elevation is not present. The information determined by the geotechnical investigation must be included in the civil drawing set and reference the geotechnical report name, author/prepared by, and date it was signed and sealed. In no cases shall groundwater be pumped to the TxDOT ROW at any time. The discharge of groundwater to the TxDOT ROW is not acceptable.