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# Simple Water Elevation Transit System

Preliminary Requirements Notes

January 6, 2025

# Water Elevation Transit System (WETS) Requirements

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## Overall Plan

- STEP 1: Consider a manual, single lock WETS to clarify:
  - vocabulary, basic operations, operational policies (KISS)
- STEP 2: Consider a manual, multi lock WETS to further clarify:
  - vocabulary, operations, operational policies (KISS)
- STEP 3: Consider devices to automate a WETS operation (e.g., hydraulic gates, flow meters, water level meters, etc.) and define logical interfaces (e.g., commands, responses, behavior, etc.) to these devices. This assumes there will be a separate Process I/O domain dealing with the lower level communication protocols and presenting the desired behavior.
- STEP 4: Produce a final requirements summary for an automated, multi lock WETS (KISS)



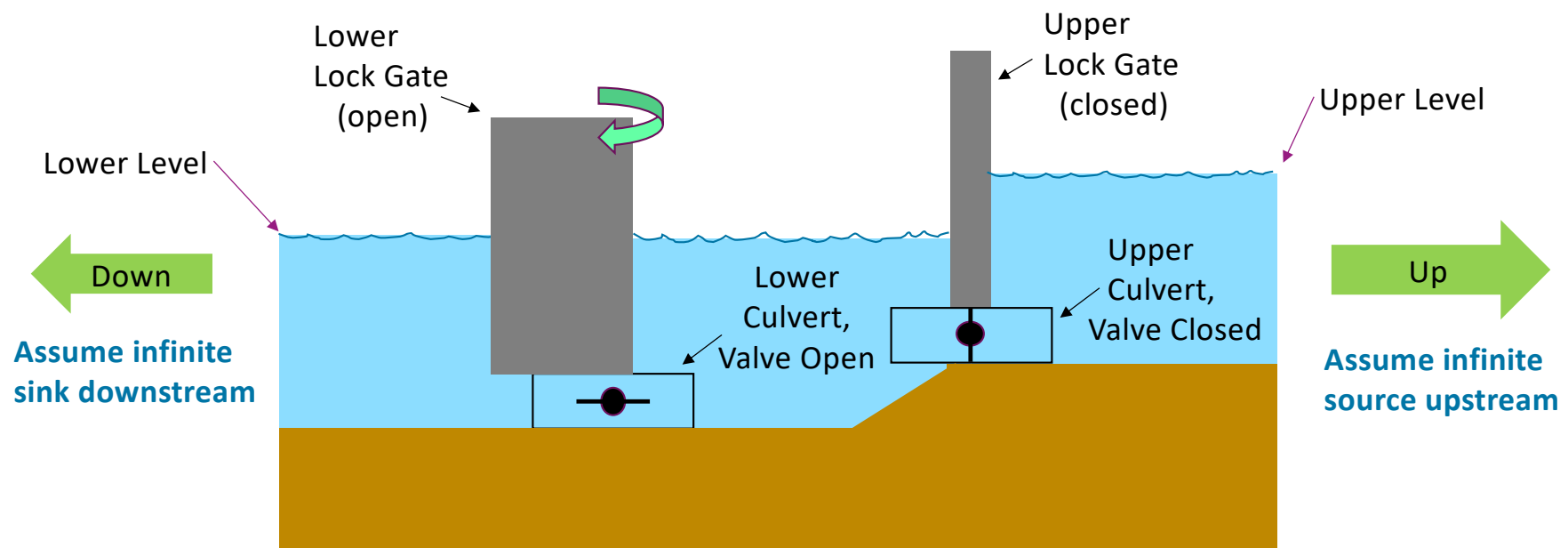


## A Few Basic Terms

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- In its simplest form, a water elevation transit system consists a sloped waterway with two gates which can be opened and closed to allow the water level between them to be manipulated up and down in order to allow vessels to move up and down the waterway.
- This set of two gates is commonly called a lock. When both gates are closed the space between them where the water level is manipulated is called a chamber.
- The movement of a vessel is through the gates is referred to as a transfer.
- The water level in a chamber is manipulated by controlling the water flow through culverts at each gate.
- There are valves in each culvert that can be opened and closed to control the flow of water through the culvert.

## Low Gate Open

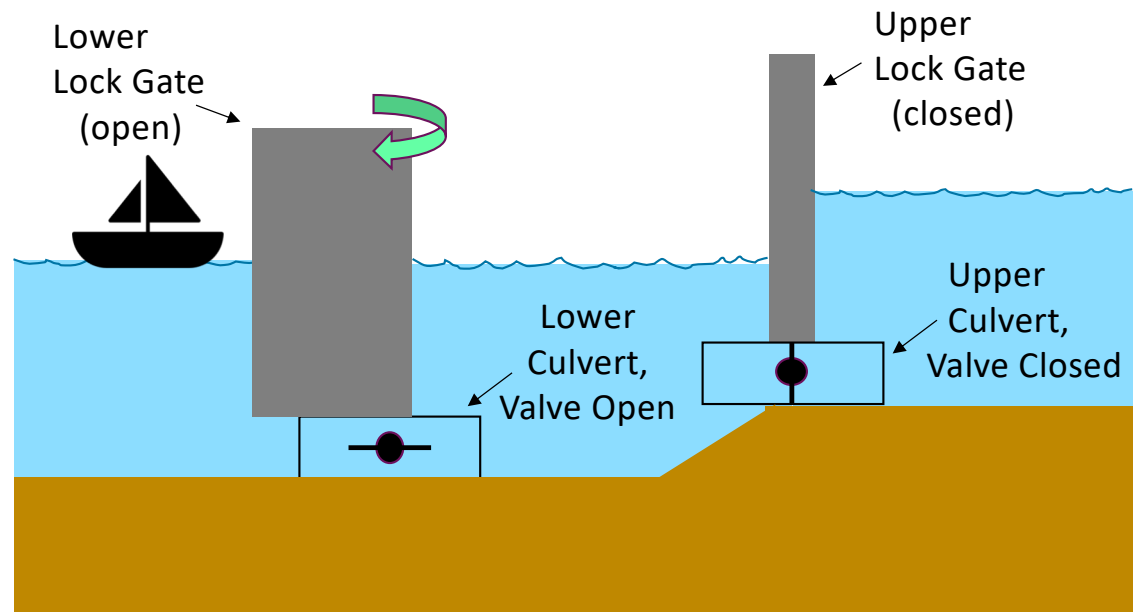


## Low Gate Open + Transfer Up

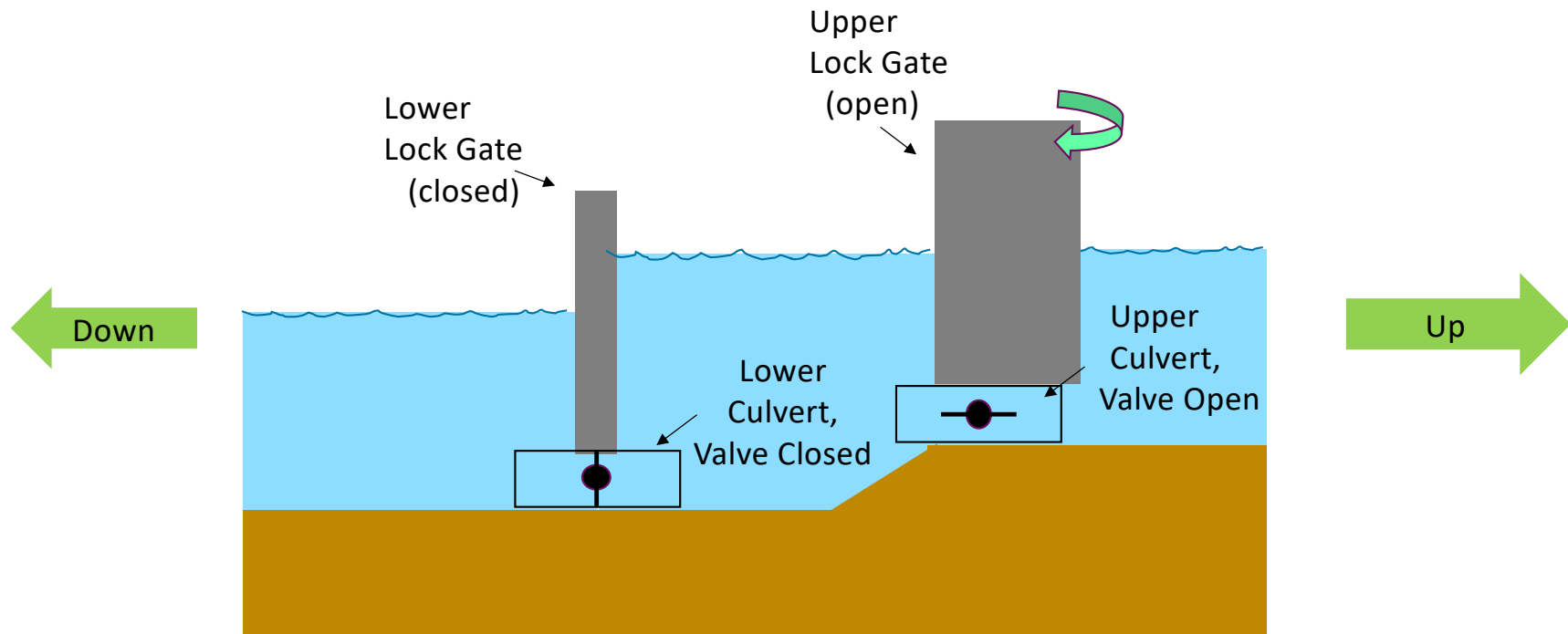


### Transfer Up

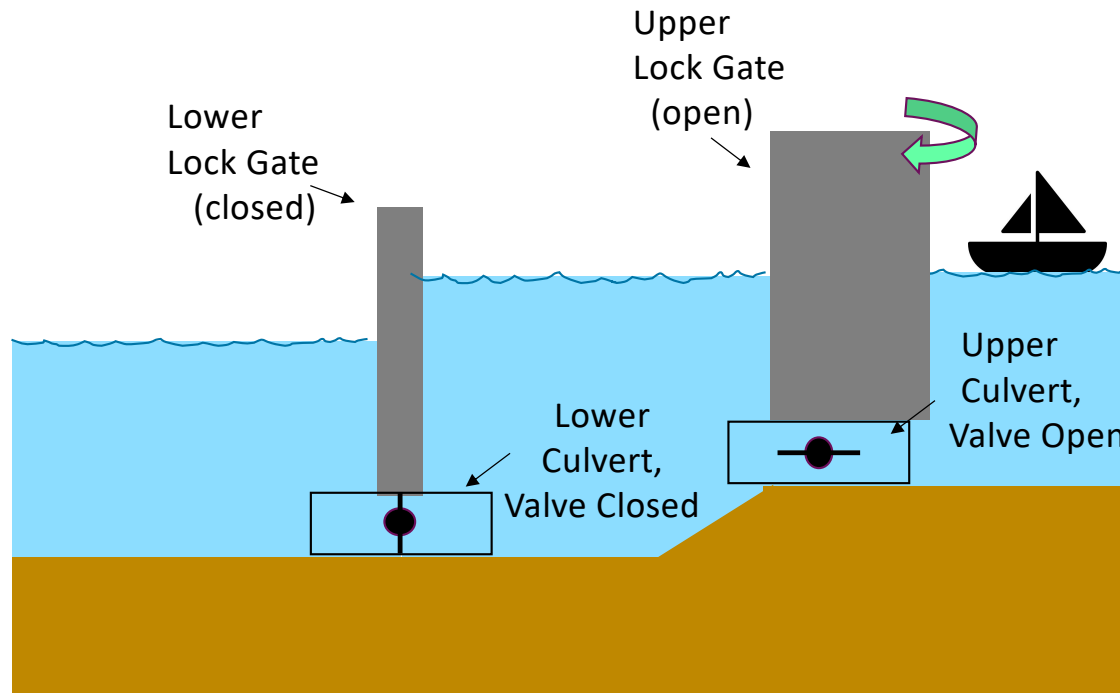
- Move vessel into lock
- Close lower lock gate
- Close lower culvert valve
- Open upper culvert valve
- When chamber level equals upper level
  - Open upper gate
  - Move vessel out of lock



# High Gate Open



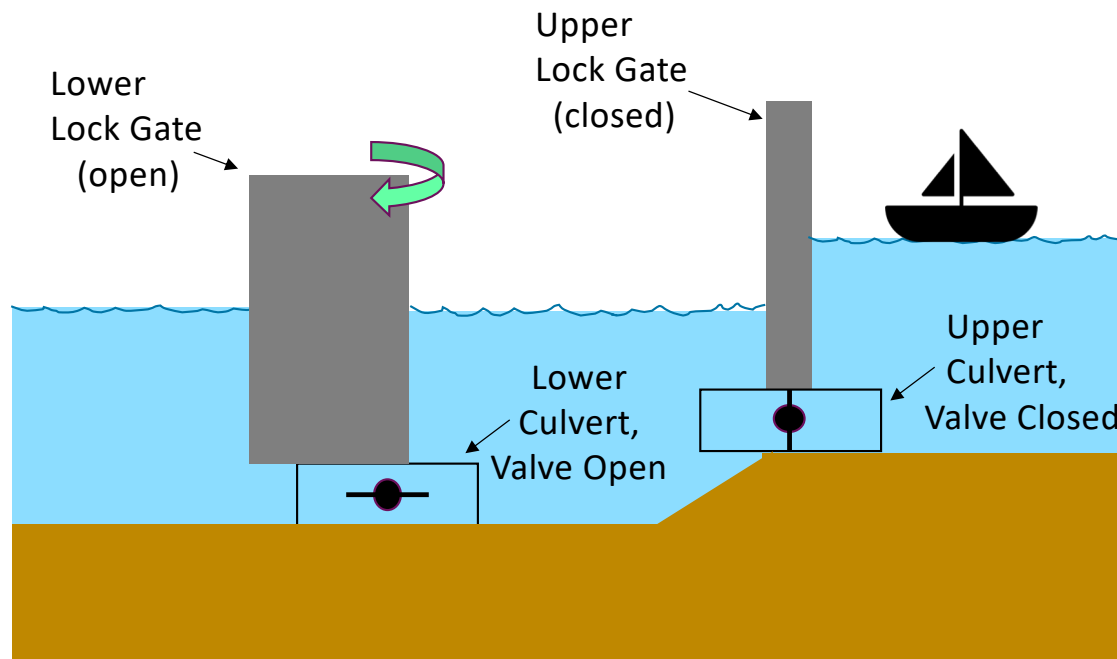
## High Gate Open + Transfer Down



### Transfer Down

- Move vessel into lock
- Close upper lock gate
- Close upper culvert valve
- Open lower culvert valve
- When chamber level equals lower level
  - Open lower gate
  - Move vessel out of lock

## Low Gate Open + Transfer Down



### Raise Lock Water Level

- Close lower gate
- Close lower culvert valve
- Open upper culvert valve
- When chamber level equals upper level
  - Open upper gate

### Transfer Down

- Like before...



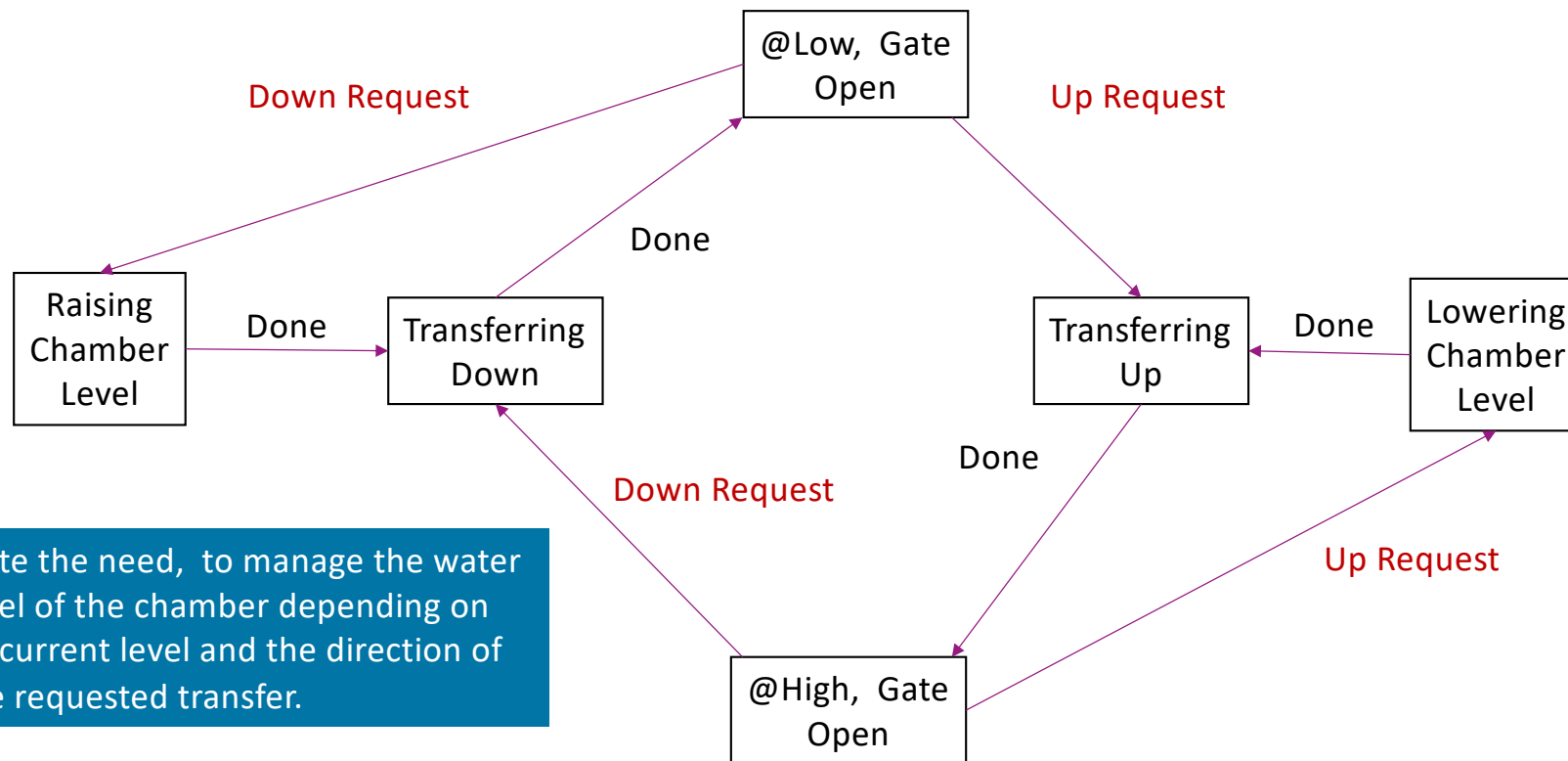


- ## Transfer Up

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- The diagram illustrates a two-stage lock system. On the left, a black silhouette of a boat is in a lower water chamber. A vertical grey gate, labeled "Lower Lock Gate (closed)", separates this chamber from the middle chamber. Below this gate is a rectangular box labeled "Lower Culvert, Valve Closed" with a black dot representing a closed valve. The middle chamber is at a higher water level than the lower chamber. To the right of the middle chamber is another vertical grey gate, labeled "Upper Lock Gate (open)". Below this gate is a rectangular box labeled "Upper Culvert, Valve Open" with a black dot and a horizontal line representing an open valve. A green curved arrow indicates the water level in the middle chamber is rising to match the upper chamber. The entire system is set against a light blue background representing water and a brown background representing the ground.



## Simple Behavior of a Single Chamber WETS



Note the need, to manage the water level of the chamber depending on its current level and the direction of the requested transfer.

# Questions? Comments?? Suggestions???

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Water Elevation Transit System – [mint.wets.tn.1](http://mint.wets.tn.1)