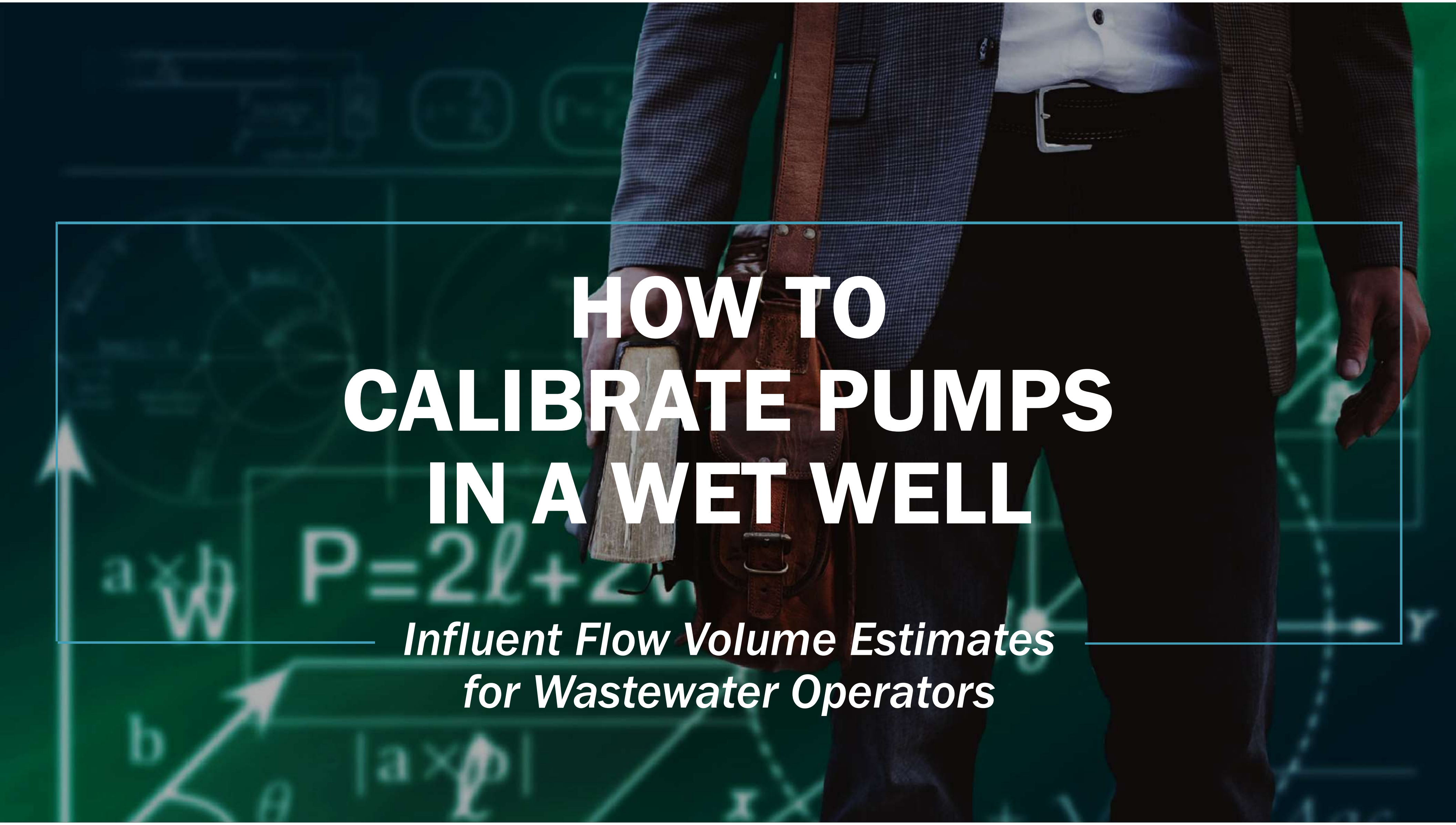

HOW TO CALIBRATE PUMPS IN A WET WELL

Influent Flow Volume Estimates for Wastewater Operators

ESTIMATE CROSS SECTIONAL AREA OF WET WELL (A_w)

1. MEASURE THE DIAMETER OF THE WET WELL (D)
2. CALCULATE THE AREA OF A CIRCLE: $D^2 * 0.785 = A_w$

FILL TIME (T_f)

1. NOTE THE TIME
IT TAKES TO FILL THE WET WELL BETWEEN THE BOTTOM FLOAT SWITCH (DOWN POSITION) AND THE FLOAT SWITCH THAT STARTS THE LEAD PUMP (UP POSITION)

2. CALL THIS TIME THE
FILL TIME (T_f)

HEIGHT OF WATER PUMPED FROM THE WET WELL (H)

1. DETERMINE ELEVATION OF WATER WHEN THE LEAD PUMP SHUTS OFF
2. DETERMINE ELEVATION OF WATER WHEN LEAD PUMP KICKS ON
3. SUBTRACT SHUT-OFF FROM KICK-ON ELEVATION TO DETERMINE HEIGHT OF WATER PUMPED FROM THE WET WELL (H)

CALCULATE WET WELL VOLUME (V_w)

(A_w)	*	(H)	=	(V_w)
CROSS SECTIONAL AREA OF WET WELL		HEIGHT OF WATER PUMPED FROM WET WELL		WET WELL VOLUME
				

CALCULATE FILL RATE (R_f)

$$(V_w) \div (T_f) = (R_f)$$

WET WELL VOLUME ÷ FILL TIME = FILL RATE

DRAWDOWN SHOULD OCCUR
WHILE THE LEAD PUMP RUNS

1. NOTE TIME
WHEN DRAWDOWN BEGINS

2. NOTE TIME
WHEN DRAWDOWN ENDS

3. SUBTRACT
BEGINNING TIME (T_{b1}, T_{b2})
FROM ENDING TIME (T_{e1}, T_{e2})
TO GET DRAWDOWN TIME
FOR EACH PUMP (T_{d1}, T_{d2})

DRAWDOWN TIME

(T_{d1}, T_{d2})

$$T_{e1} - T_{b1} = T_{d1}$$

$$T_{e2} - T_{b2} = T_{d2}$$

CALCULATE ENTERING VOLUME (V_{e1}, V_{e2})

$$(R_f) \quad * \quad (T_{d1}, T_{d2}) \quad = \quad (V_{e1}, V_{e2})$$

FILL RATE

DRAWDOWN TIME

ENTERING VOLUME

$$R_f * T_{d1} = V_{e1}$$

$$R_f * T_{d2} = V_{e2}$$

CALCULATE VOLUME PUMPED DURING EACH PUMP'S DRAWDOWN CYCLE (V_{p1}, V_{p2})

(V_{e1}, V_{e2}) + (V_w) = (V_{p1}, V_{p2})

ENTERING VOLUME | WET WELL VOLUME | VOLUME PUMPED

$V_{e1} + V_w = V_{p1}$

$V_{e2} + V_w = V_{p2}$

CALCULATE PUMP RATE (R_{p1}, R_{p2})

(V_{p1}, V_{p2}) ÷ (T_{d1}, T_{d2}) = (R_{p1}, R_{p2})

VOLUME PUMPED

DRAWDOWN TIME

PUMP RATE

$V_{p1} \div T_{d1} = R_{p1}$

$V_{p2} \div T_{d2} = R_{p2}$

NOTE PUMP RUNTIMES

1

NOTE PUMP'S RUNTIME AT LAST READING (T_{L1}, T_{L2})

2

NOTE PUMP'S CURRENT RUNTIME (T_{c1}, T_{c2})

CALCULATE PUMP'S RUNTIME (T_{p1}, T_{p2})

1

CURRENT RUNTIME (T_{c1}, T_{c2})
– LAST RUNTIME (T_{L1}, T_{L2})
= PUMP's RUNTIME (T_{p1}, T_{p2})

2

$$T_{c1} - T_{L1} = T_{p1}$$

$$T_{c2} - T_{L2} = T_{p2}$$

CALCULATE TOTAL VOLUME PUMPED BY EACH PUMP (V_{p1}, V_{p2})

(R_{p1}, R_{p2}) * (T_{p1}, T_{p2}) = (V_{p1}, V_{p2})

PUMP RATE

PUMP's RUNTIME

VOLUME PUMPED BY EACH PUMP SINCE LAST RUNTIME (V_{p1}, V_{p2})

$R_{p1} * T_{p1} = V_{p1}$

$R_{p2} * T_{p2} = V_{p2}$

ADD VOLUMES PUMPED SINCE PREVIOUS VOLUME RECORDED (V_T)

(V_{p1}) + (V_{p2}) = (V_T)

(V_{p1})	+	(V_{p2})	=	(V_T)
PUMP$_1$ VOLUME		PUMP$_2$ VOLUME		TOTAL VOLUME PUMPED SINCE LAST VOLUME RECORDED

RECORD TOTAL VOLUME PUMPED (V_T)

WRITE THE VOLUME PUMPED SINCE THE LAST PUMP-VOLUME WAS RECORDED ON THE MONTHLY OPERATING REPORT (MOR)

Conversions

cubic feet (cf) to gallons (g):
cf * 7.48g/cf = gallons

cubic inches (ci) to gallons (g):
ci / 231ci/g = gallons

hours (h) to minutes (m):
h * 60m/h = minutes

gpm to gpd:
gpm * 1440m/d = gpd