

Appendix 10-A

Symbols and Acronyms

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If you require assistance accessing this information or require it in an alternative format, contact the Michigan Department of Transportation's (MDOT) Americans with disabilities Act (ADA) coordinator at Michigan.gov/MDOT-ADA.

Symbols

Symbol	Definitions	Units
a	$\frac{1}{2}$ free water surface width	ft
A	cross-sectional area of the base	sft
B	Free water surface width	ft
c	Vertical distance between water surface and center of pipe	ft
C	Friction factor	-
C _u	unit conversion factor	-
d	Depth of water	ft
D	Pipe diameter	ft
e	Efficiency	-
Δh	Pump-start elevation above minimum water level in wet-pit	ft
H	Head	ft
H _f	Loss due to friction in the pipe	ft
H _p	Minor losses through appurtenances	ft
H _s	Static head	ft
H _v	Velocity head	ft
H _x	Depth for storage volume	ft
K	Minor loss factor	-
L	Length of ungula	ft
L	Length of pipe	ft
N	Total number of equal size pumps	-
P	Brake horsepower	Hp
Q	Discharge in pipe	cfs
Q	Pump capacity	cfs
Q _i	Flow rate into the pump station	cfs
r	Radius of pipe	ft
t	Cycle time	s

Symbol	Definitions	Units
t_c	Minimum cycle time	s
v	velocity in pipe	fps
v	velocity in appurtenance	fts
V	Usable volume in wet well between elevations where pump starts and stops	cft
V_t	Minimum required volume for pump cycling	cft
V_u	Volume of ungula	cft
V_x	Individual pump cycling volumes	cft
γ	Specific weight of liquid	lb/cft
α	angle marked on Figure 10-B-4	radians

Acronyms

AASHTO	American Association of State Highway and Transportation Officials
AEP	Annual Exceedance Probability
AHW	Allowable High-Water Elevation
AOR	Allowable Operating Range
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
AWG	American Wire Gage
AWWA	American Water Works Association
FHWA	Federal Highway Administration
HDPE	High-Density Polyethylene
HEC	Hydraulic Engineering Circular
HGL	Hydraulic Grade Line
HI	Hydraulic Institute
IEEE	Institute of Electrical and Electronics Engineers
LED	Light Emitting Diode
MCC	Motor Control Center
MCL	Michigan Compiled Laws
MDOT	Michigan Department of Transportation
MIOSHA	Michigan Occupational Safety and Health Act
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NPSH	Net Positive Suction Head
PVC	Polyvinyl Chloride
RMS	Root Mean Square
RVSS	Reduced Voltage Soft Starters
SCADA	Supervisory Control and Data Acquisition

Acronyms

SPH	Starts per Hour
TDH	Total Dynamic Head
TEFC	Totally Enclosed Fan Cooled Enclosures
UL	Underwriters Laboratories
VFD	Variable Frequency Drive