

MEMO

TO: 1-10542

FROM: Cherie Padilla

DATE: April 28, 2010

RE: Water Right 1-10542 License Processing

This right is meant to make up for the extra rate not covered by right 1-7103. Right 1-7103 was licensed for 1 cfs (the rate authorized by the permit) for flow through for Gem Lake Harbor.

The rate for this right was calculated based on normal high river levels at the culvert in Gem Lake Harbor. These measurements were made on 6/07 and 9/09. Using the high water level on the culvert, the best estimate of the capacity of 26.8 seems reasonable.

A simple check of the diversion rate was performed on the Manning's Equation calculator. The 40' concrete pipe (the point of diversion) has a diameter of 36" and is sitting on a very slight, if any, slope. I measured the elevation at the beginning and end of the pipe and calculate a slope less the 0.025'. I ran the calculator with a rise of anywhere from 1' to 0.08' to get a range. According to the calculator, the concrete pipe is capable of diverting 29.9 cfs to 105.6 cfs.

Based on that check and all supporting evidence that Brockway provided, the right will be licensed for 25.8 cfs.

Note: During the appropriation process, right 1-7103 was noted by the watermaster and the field examiner that the right holder should rent water from WD 01 each year at the rate of 2af/surface acre. I checked with Tony Olenichak from WD01 and he said that water had never been rented for the Gem Lake Harbor. Neither right 1-7103 nor 1-10542 stipulated that water be rented, so at this point it cannot be enforced.

Manning's Equation Calculator for Flow Rate in a Circular Conduit Flowing Full

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Manning's Equation (1) is used to compute velocity (v) in a circular conduit flowing full. The equation is used in the computation of the flow rate (Q).

In equations (1) and (2), the roughness coefficient (n) is a function of the channel type. For a circular conduit, the hydraulic radius (R) is equal to the area (A) divided by the wetted perimeter (WP). The roughness coefficient (n) is often assumed to be constant.

Because Manning's Equation (1) is used to compute velocity (v) in a circular conduit flowing full, the velocity (v) is reported in ft/s. The velocity (v) can be reported in ft/s or ft/min. The velocity (v) is a unitless constant.

S = 0.0020 ft/ft
 n = 0.013 Manning's coefficient
 d = 36.0 pipe diameter (inches)
 D = 3.00 pipe diameter (feet)
 r = 1.50 pipe radius (feet)
 A = 7.07 area (ft²)
 WP = 9.42 wetted perimeter (ft)
 R = 0.75 hydraulic radius (ft)

Q = 29.86 flow rate (CFS)

Channel Slope

Slope Options

☐ Manual Entry ☒ Slope Calculator

Slope Calculator

Rise = 0.08 feet

Run = 40 feet

Slope, S = 0.0020 ft/ft

Pipe Material, (n):

concrete, average

Pipe Diameter (inches)

36.0 inches

$$(1) \quad v = 1.49$$

$$(2) \quad Q = v \times A$$

$$(3) \quad Q = 1.49$$

42" Waterman C-10 canal gate

40' length of 36" reinforced concrete pipe discharges to the harbor.

Rise component in the slope was determined by measuring the elevation at the beginning and end of the concrete pipe.

Manning's Equation Calculator for Flow Rate in a Circular Conduit Flowing Full

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S = 0.0250 ft/ft
n = 0.013 manning's coefficient
d = 36.0 pipe diameter (inches)
D = 3.00 pipe diameter (feet)
r = 1.50 pipe radius (feet)
A = 7.07 area (ft²)
WP = 9.42 wetted perimeter (ft)
R = 0.75 hydraulic radius (ft)

Q = 105.59 flow rate (CFS)

Channel Slope

Slope Options

☐ Manual Entry ☒ Slope Calculator

Slope Calculator

Rise = feet

Run = feet

Slope, S = 0.0250 ft/ft

Pipe Material, (n):

Pipe Diameter (inches)