CITY CONSULTANTS

March 30, 2022

Larry Johnson, Owner

RE: Flow analysis.

This memo summarizes the flow capacity analysis conducted for the existing ditch along with the newly installed on the west side of 5500 West Street. The software used was AutoCAD Hydraflow Analysis along with Manning's Equation.

The total flow directed into the ditch is 6 cubic feet per second (cfs). A survey was conducted of the existing ditch to calculate the dimensions, associated cross section, and slope. The ditch is earth lined with weeds growing in some locations. The attached calculation sheet shows the flow of the existing ditch at 4.2 cfs.

A new 30-inch concrete pipe was installed in the ditch with a calculated flow capacity of 8.9 cfs.

Please let me know if there are further question.

LICENSED PROFESSIONAL ENGINEER
No. 7935851-2202
GREGORY B. DAY
3-30-22
STATE OF UTAH

Greg Day, PE

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Mar 21 2022

Angie's Acres Ditch Capacity

Trapezoidal

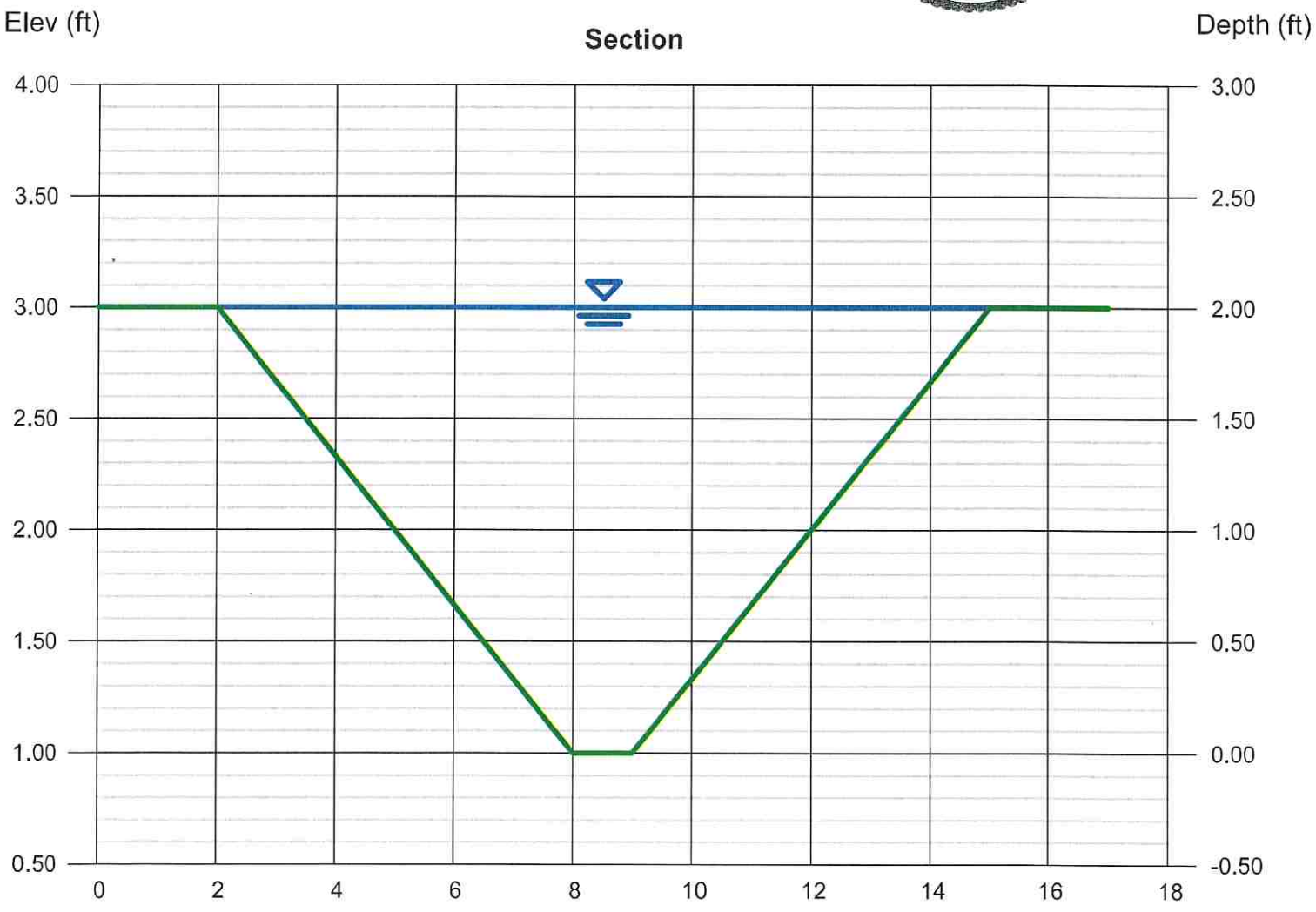
Bottom Width (ft)	= 1.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 1.00
Slope (%)	= 0.01
N-Value	= 0.050

Calculations

Compute by:	Q vs Depth
No. Increments	= 3

Highlighted

Depth (ft)	= 2.00
Q (cfs)	= 4.232
Area (sqft)	= 14.00
Velocity (ft/s)	= 0.30
Wetted Perim (ft)	= 13.65
Crit Depth, Yc (ft)	= 0.52
Top Width (ft)	= 13.00
EGL (ft)	= 2.00



Manning Formula Uniform Pipe Flow at Given Slope and Depth

Angie's Acres

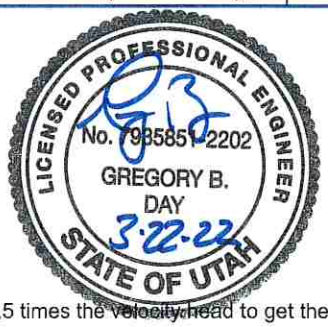
Ditch Capacity

Inputs

Pipe diameter, d_0	2.5	ft
Manning roughness, n	0.011	
Pressure slope (possibly ? equal to pipe slope), S_0	0.03	% rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	90	%

Results

Flow, Q (See notes)	8.9479	cfs
Velocity, v	1.9229	ft/sec
Velocity head, h_v	0.0249	psi
Flow area	4.6534	ft^2
Wetted perimeter	6.2452	ft
Hydraulic radius	0.7451	ft
Top width, T	1.5000	ft
Froude number, F	0.19	
Average shear stress (tractive force), tau	0.0140	psf



Notes:

This is the flow and depth *inside* the pipe.

Getting the flow into the pipe may require significantly higher headwater depth. Add at least 1.5 times the velocity head to get the headwater depth or see my 2-minute tutorial for standard culvert headwater calculations using HY-8.