FUSS & O'NEILL
Disciplines to Deliver

Barre Micro-Hydro Project

Community Energy and Climate Change Conference



EcoStrategies & Fuss & O' Neill, Inc

South Burlington, VT

Introduction

What is Micro-Hydro?

- Recover energy from existing infrastructure
- Low head and/or low flow applications
- Open or closed conduit

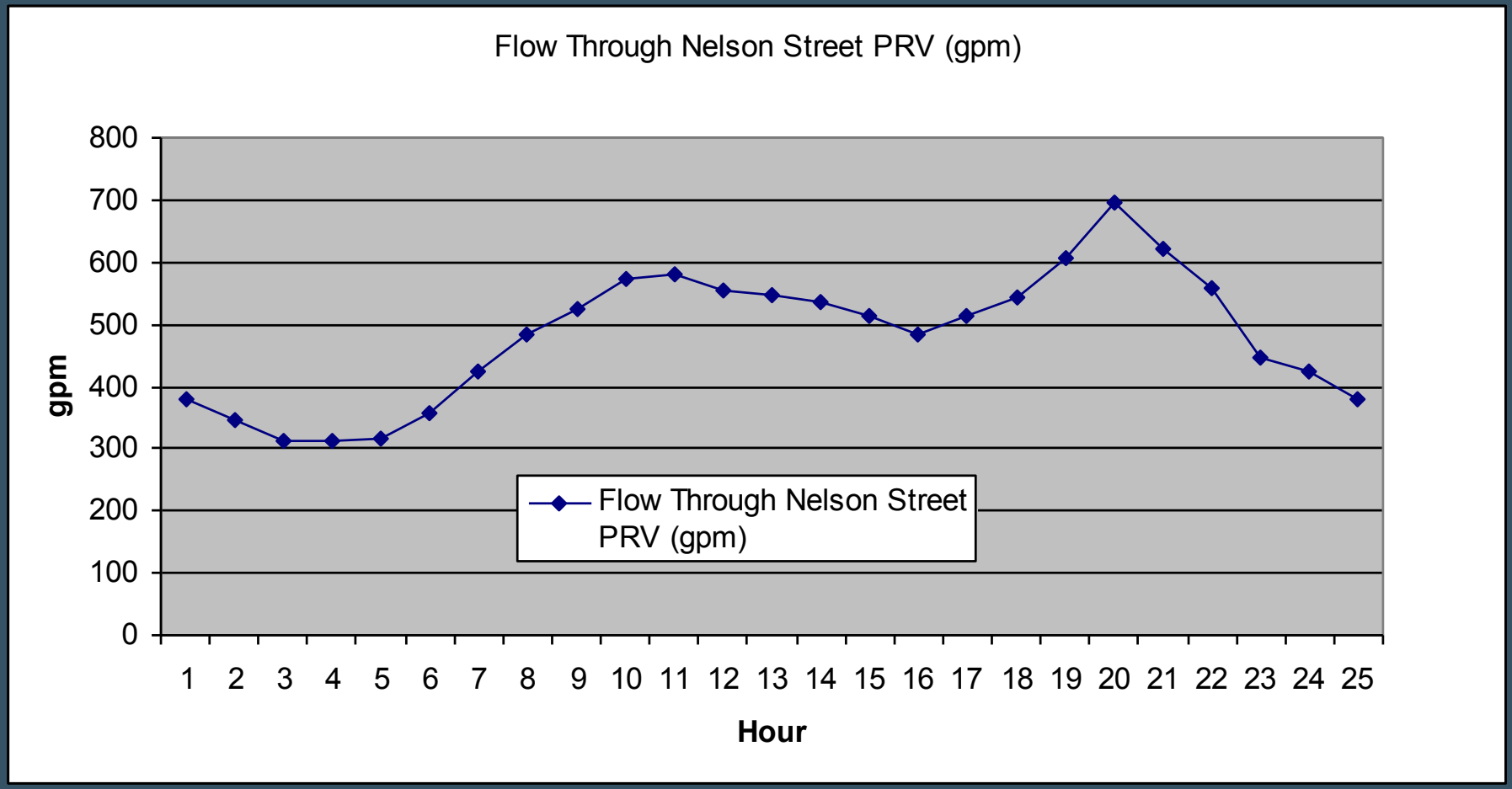
Purpose

To Generate Power

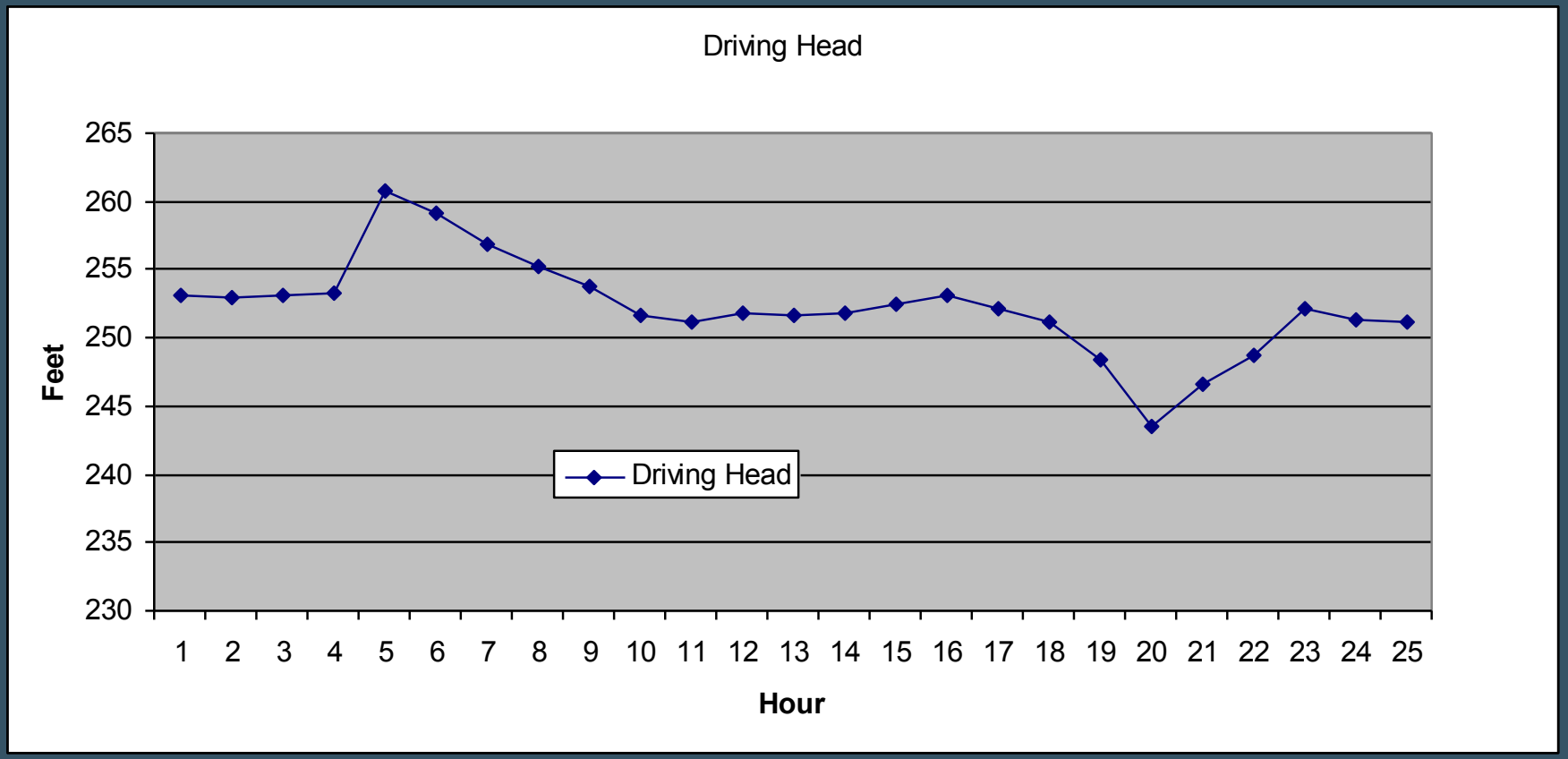
Barre City Hydro

Current Nelson Street Vault, March, 2011

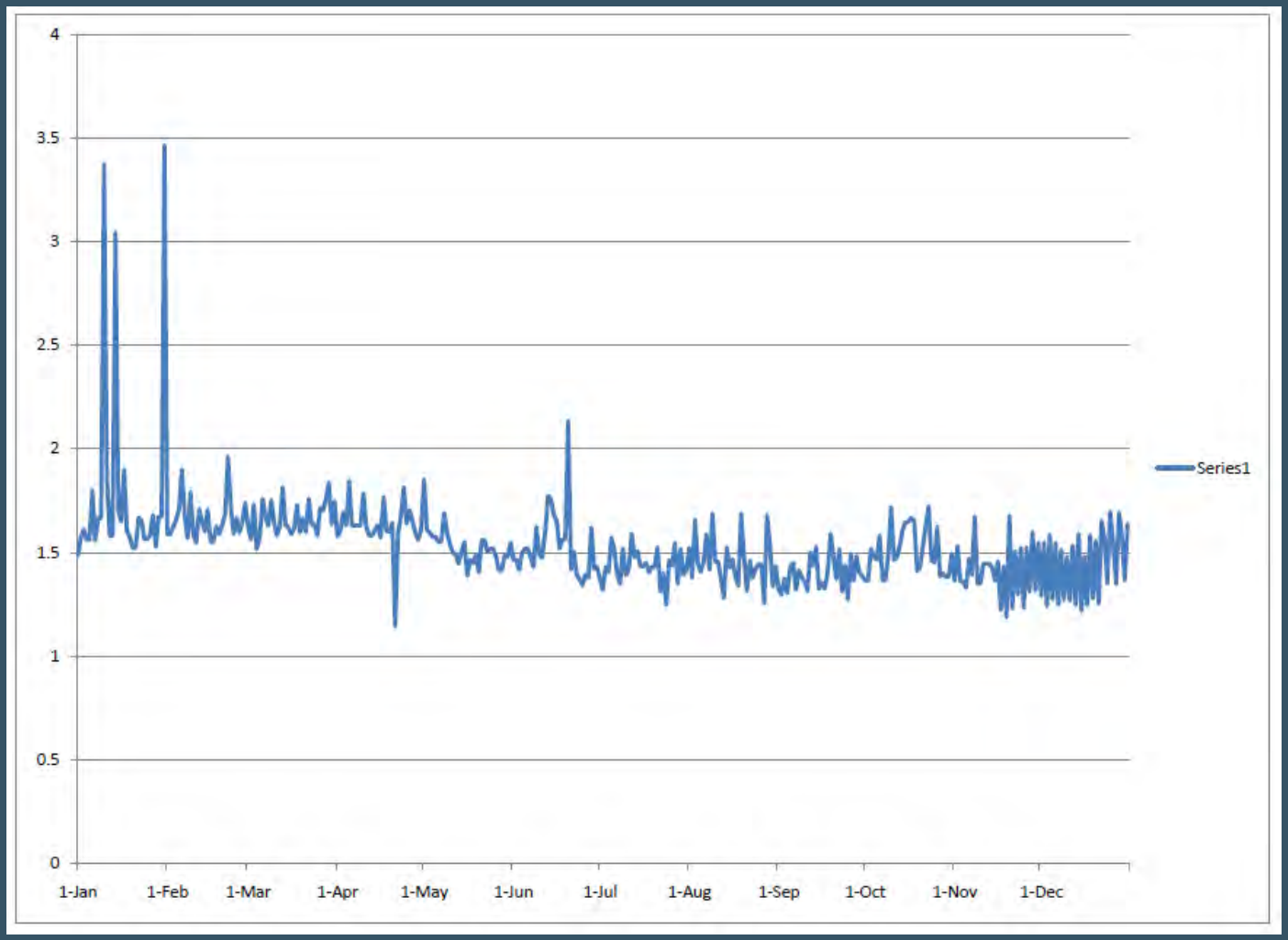
Average Daily Flows



Average Day Driving Head



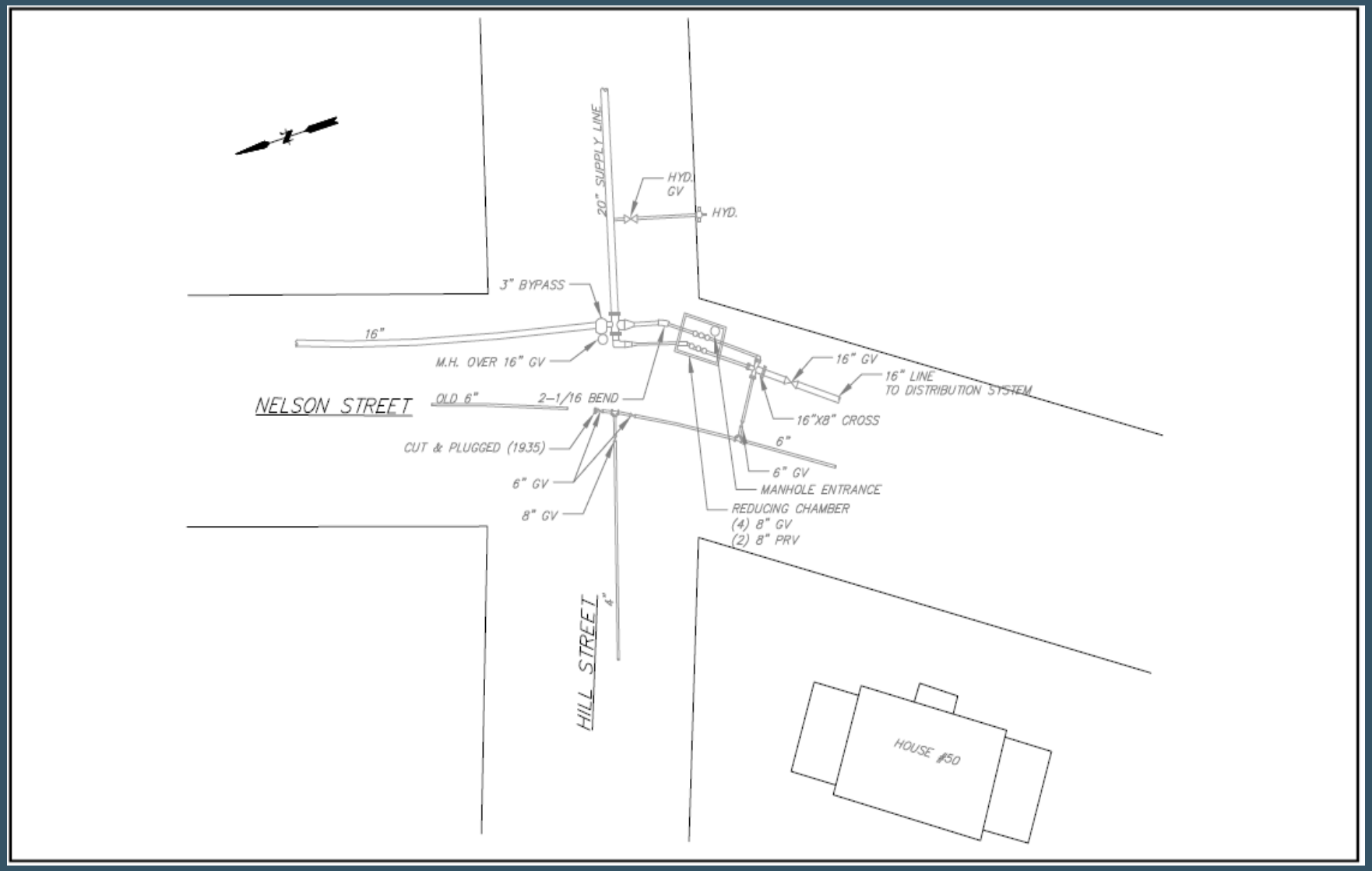
Barre City Demands (MGD)



Nelson and Hill Streets (existing)

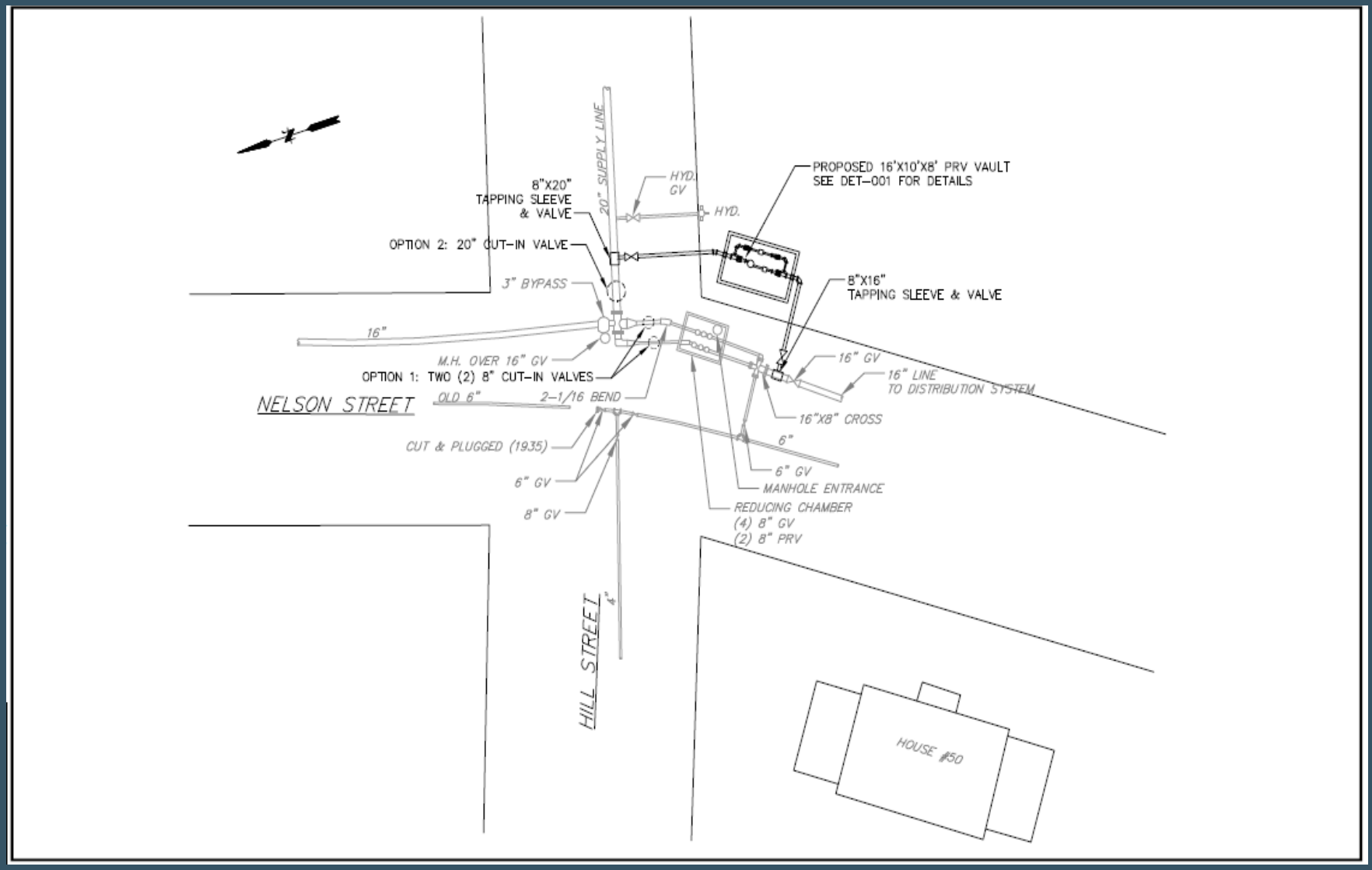
FUSS & O'NEILL

Site Conditions



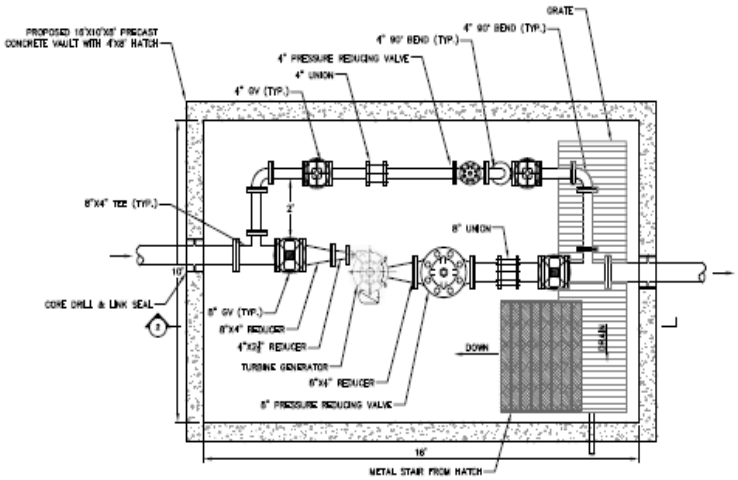
FUSS & O'NEILL

Proposed Site Improvements

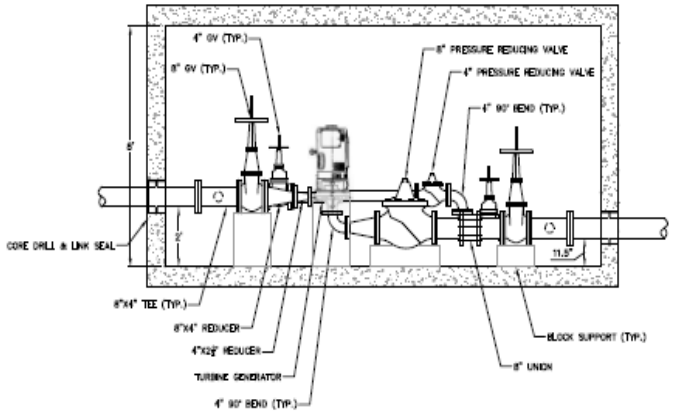


FUSS & O'NEILL

New PRV/Turbine Vault



1 PRV VAULT – PLAN VIEW
SCALE: 1/4" = 1'-0"



2 PRV VAULT – SECTION VIEW
SCALE: 1/4" = 1'-0"

FUSS & O'NEILL

Development of Nelson Street In-Pipe Hydropower Probable Costs

Cost Item	Water System Improvements: Base Project New PRV Vault and Appurtenant Construction	Energy Component Options: Alternative A 50% ADF ~0.7MGD	Energy Component Options: Alternative B 70% ADF ~1.05 MGD
Capital Cost Summary			
Base Project Cost	$ 190,000	$ 135,000	$169,588
Vender Options		13,500	16,412
Extra Features		37,500	47,000
Total Construction Cost	$ 190,000	$ 186,000	$ 233,000
	5,000	0	0
	0	10,000	10,000
Estimated Easement Cost	37,000	36,000	46,000
Preliminary Engineering	28,000	28,000	35,000
Development Costs (~20%) Contingency (~15%)	$ 260,000	$ 260,000	$ 324,000
Total Project Costs			
Grant Funding	$ 0	$ 100,000	$ 100,000
Net Project Cost	260,000	160,000*	224,000*
Revenue Summary		15 kW	25 kW
Turbine Power		18 hrs/d	24 hrs/d
Operating Time		$ 12,500/yr	$ 28,500/yr
Group Net Metering Projected Initial Revenue			
(at 13 cents/KWh)			
Simple Payback		~ 13 Years**	~8 Years**

- * w/out additional grant funds
- ** simple payback maybe lower with additional grant funding

FUSS & O'NEILL

North Vancouver Utilities PRV

BRIAN HARRINGTON, P. ENG, PROJECT ENGINEER

DISTRICT OF NORTH VANOUVER

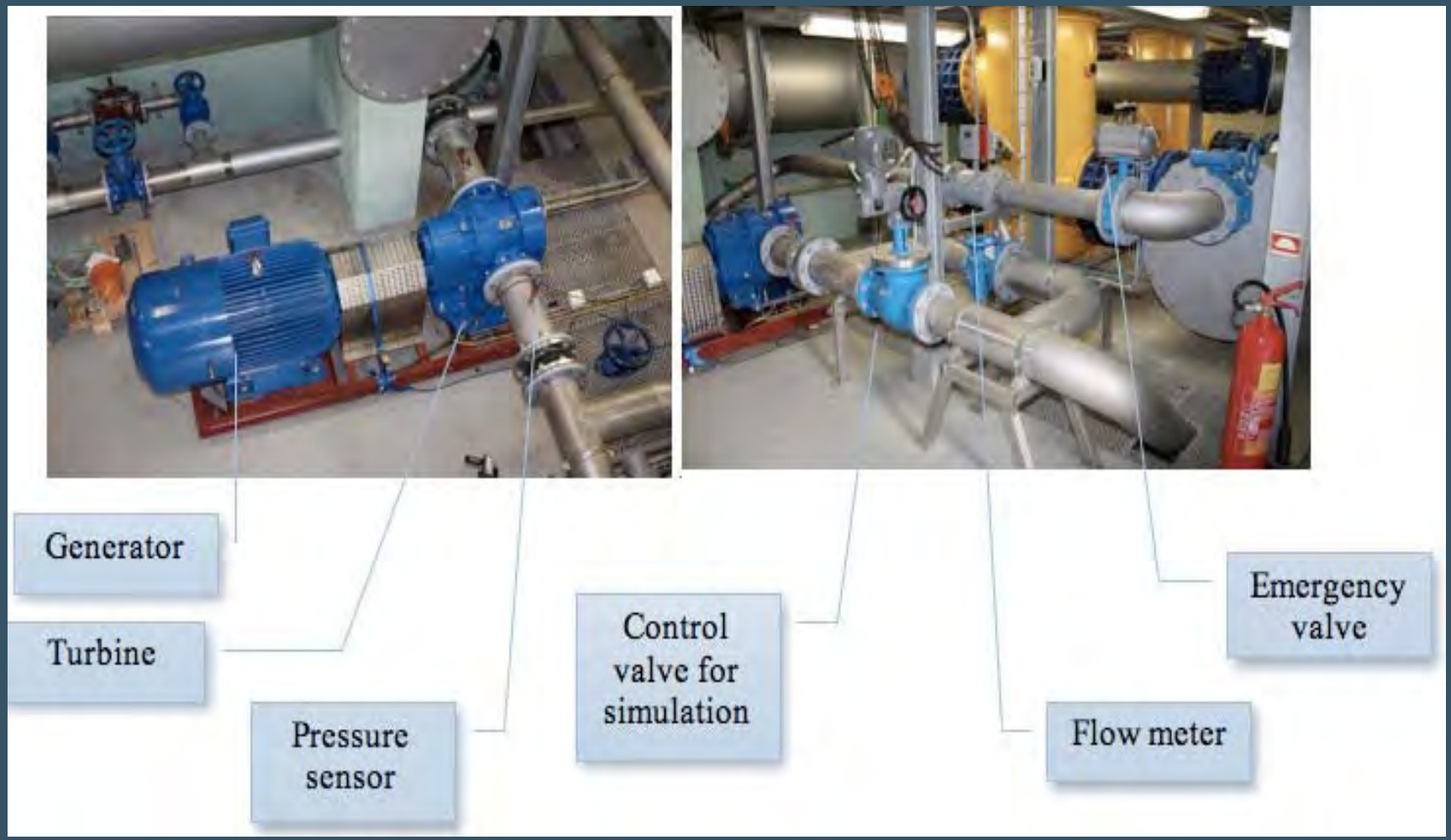
FUSS & O'NEILL

Bennington Drinking Water System—Gravity flows produce 15 kw power

http://www.canyonhydro.com/projects/conduit.html

FUSS & O'NEILL

Displacement Type Turbine



Displacement Type Turbine

Pressure management – the ADDITIONAL energy source

Volumetric displacement turbines – a patented method to **combine**:

- Pressure control (replacing PRV')
- Harvesting the energy from the intended pressure drop as electricity

zeropex difgen

FUSS & O'NEILL

Vertical Turbine

A modified vertical turbine with fly wheel, as offered by Rentricity

Keene, NH

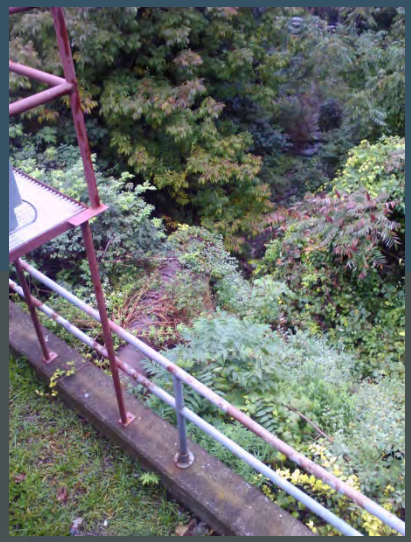
Rentricity - Keene Project

Link to video of the Keene Site:

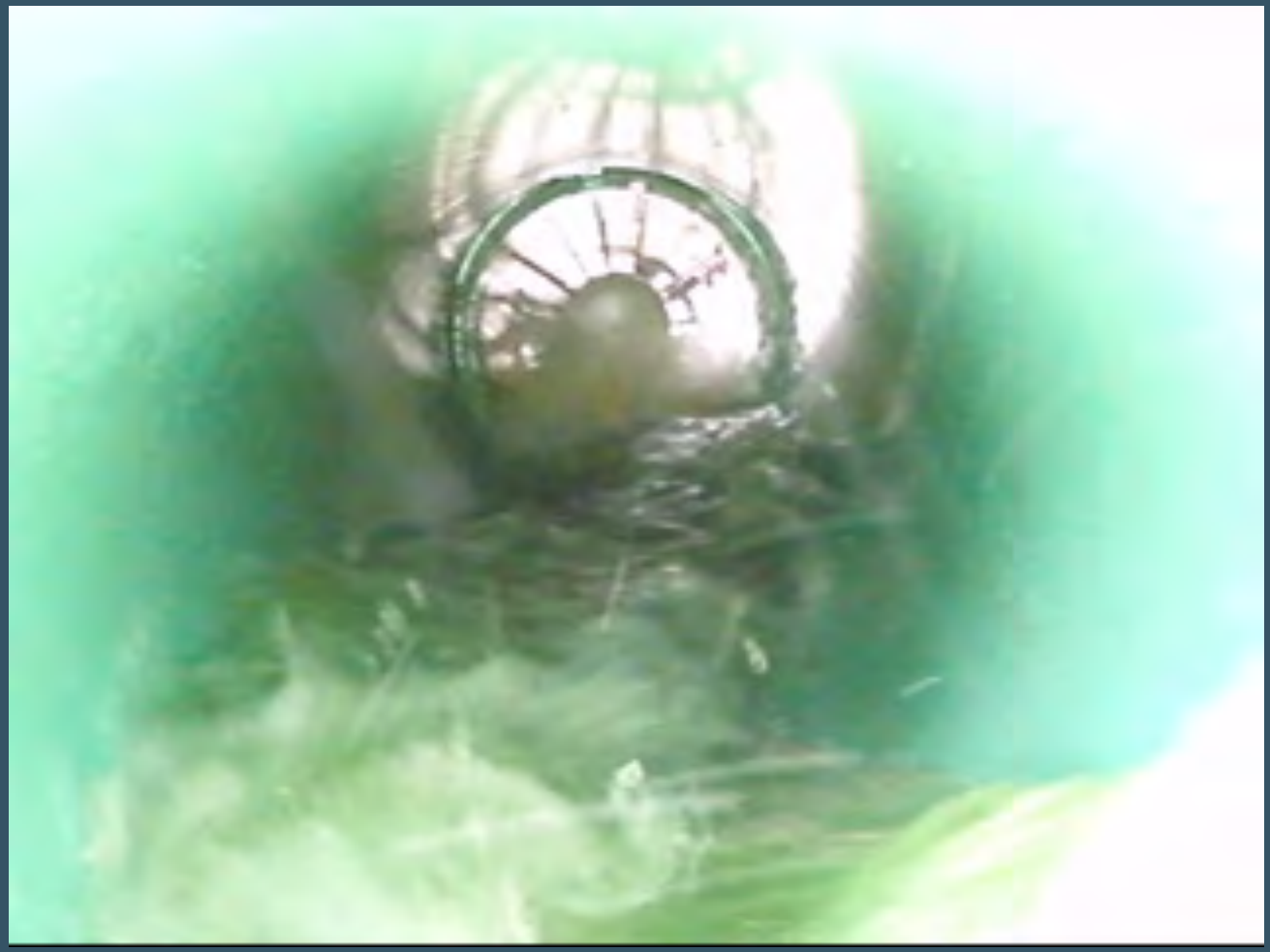
http://www.youtube.com/watch?v=hLE9TrwLFZE&feature=player_embedded

Contact: Frank Zammataro (frankz@rentricity.com) or 732-319-4501

Wastewater Applications



Wastewater Applications



Discussion?