

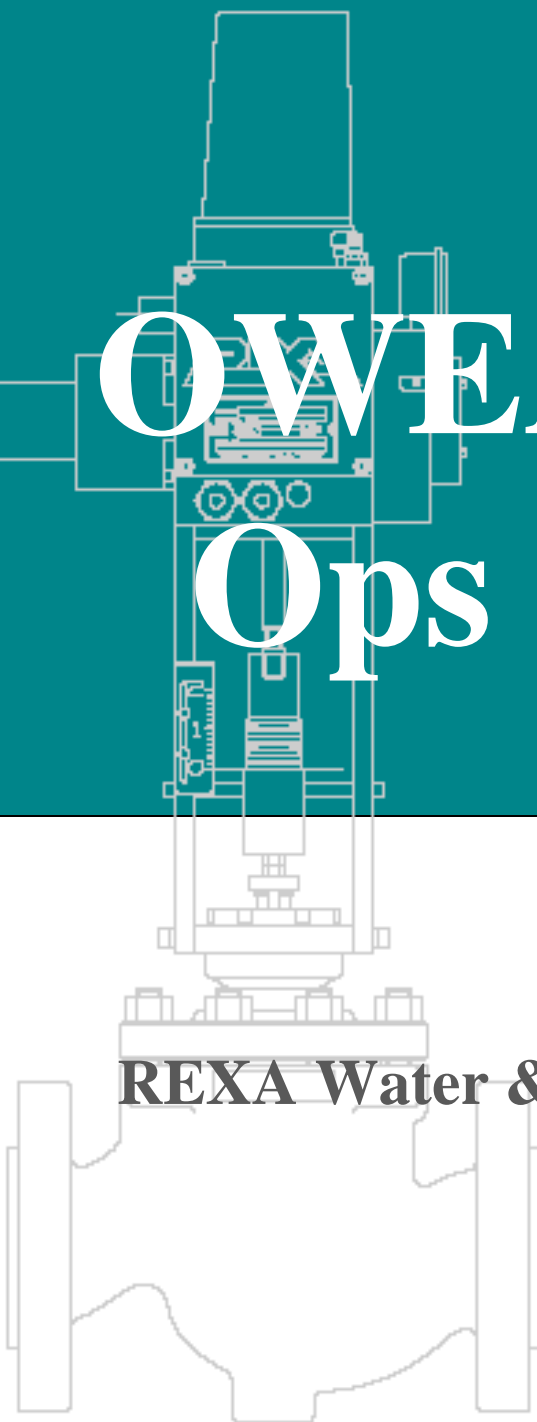


Electraulic™ Actuation

OWEA 2014 Plant Ops Conference

Erik Saitta

REXA Water & Wastewater Industry Manager



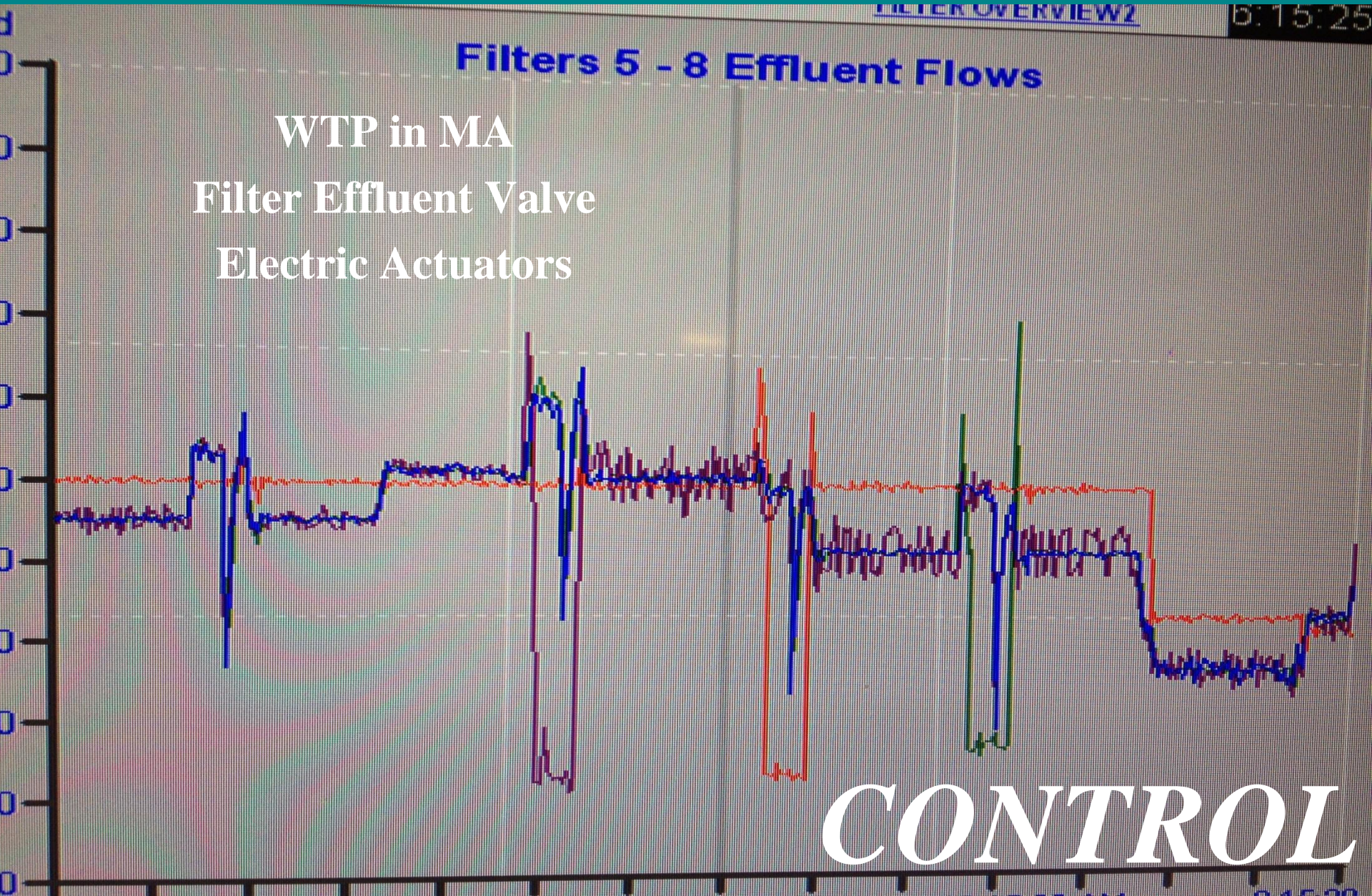


FILTER OVERVIEW 2

6:15:25

Filters 5 - 8 Effluent Flows

WTP in MA
Filter Effluent Valve
Electric Actuators

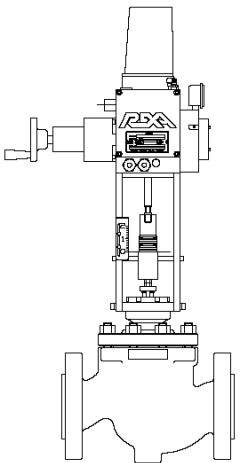


CONTROL



Cost of Ownership

- **Southern Nevada Water Authority**
- **Actuator Audit ~ 2008 to 2009**
- **~ 100 installed EIM Actuators**
- **Maintenance Costs over 3 year period**
- **EIM = ~ \$89,000 (mostly electrical/boards)**



Pneumatic Actuators

Strengths...

- Simple design
- Cost effective
- Reliable
- Easy to maintain
- Continuous duty service
- Fail-safe capable
- Fast speeds





Pneumatic Actuators

Weaknesses...

- Weather Sensitive
- Air compressor costs
- Air quality concerns
- Footprint issues
- Fail-in-place not standard

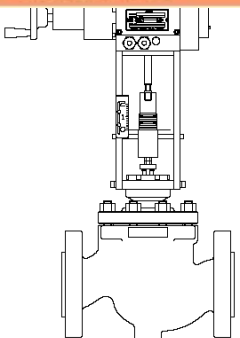
The Balloon & The Boulder...





Stats:
Extents

File Name	Seconds	Date	Time	Tag	Status	Units	Mean	% 1Sigma
eri0085a.csd		6/14/2011	1:04:01pm	Control Signal	Auto	percent	14.3280	14.3748
eri0085c.csd		6/14/2011	1:04:01pm	Pressure Transmitter	Auto	percent	13.7680	14.7472



Poor response, repeatability & accuracy
Dead-time & Overshoot



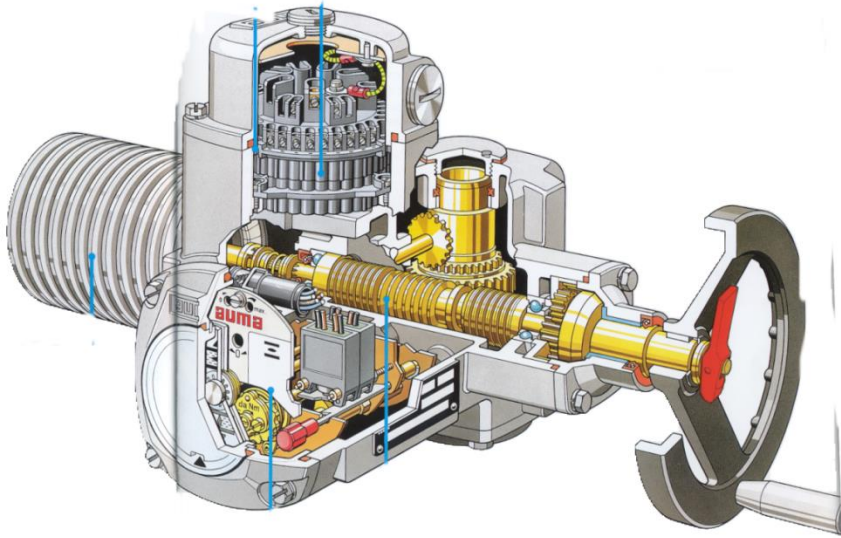
Electric Actuators

Strengths...

- Inexpensive
- Reliable 2-position control
- Great at low-duty cycles
- Scalable via gear-boxes
- Fail-in-place inherently
- W&WW Industry standard



Electric Actuators



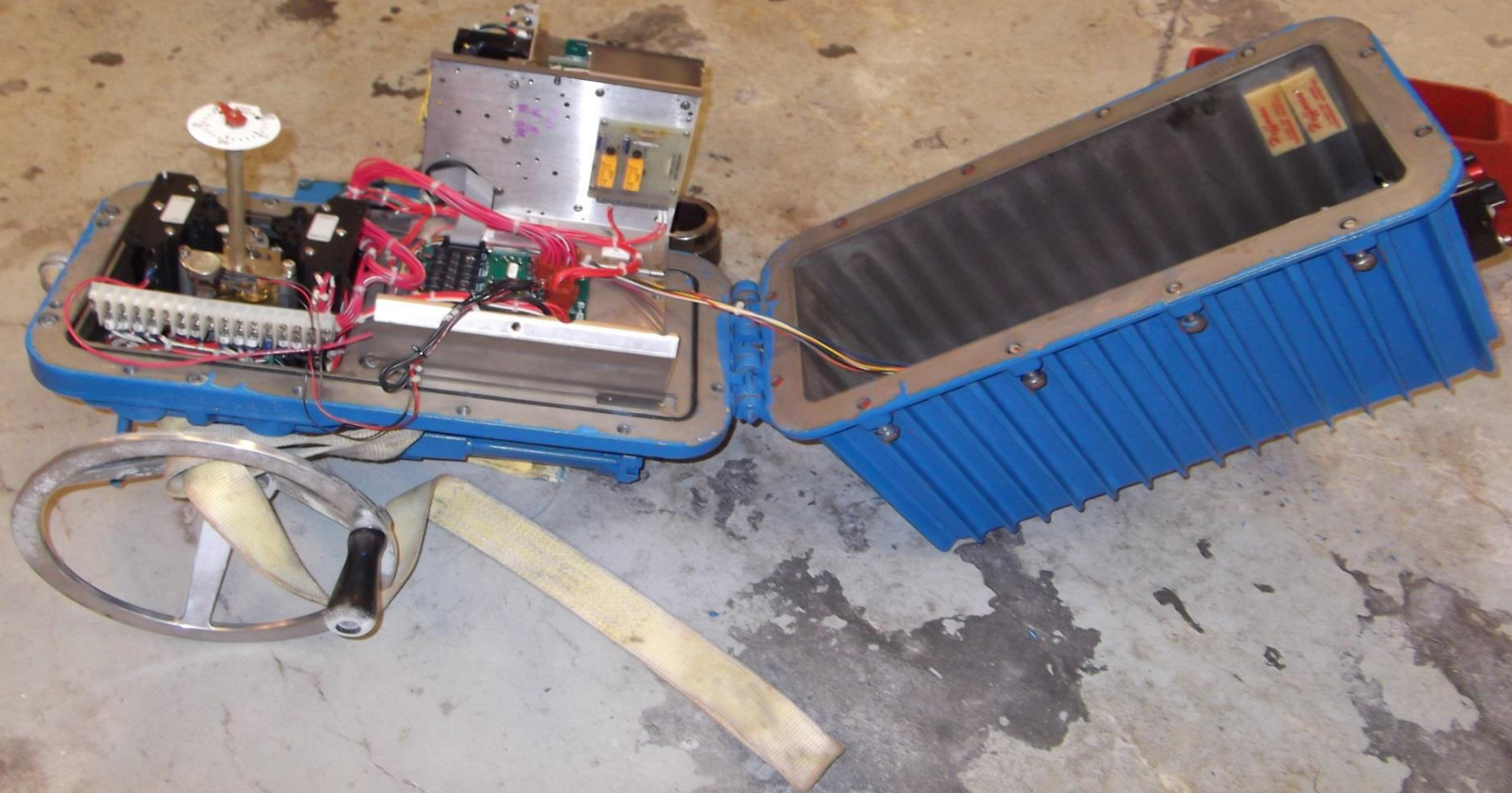
Weaknesses...

- Not built for high duty-cycles
- Gear wear
- Frequent grease maintenance
- Difficult to repair/maintain/install
- Limits on motor starts/stops
- Dead-time due to contactor
- Difficult to set-up
- Limit switches issues





Electraulic™ Actuation





Electric Actuators

Weaknesses...

- Trouble resisting high forces
- Speed limited
- No mechanical fail-safe
- UPS / battery back-up can be \$\$\$
- 480 VAC, 3- Φ power

*Electric actuators work great when used
on proper applications!*

Rely on REXA





Hydraulic Actuators

Strengths...

- Excellent response
- Unmatched accuracy
- Great repeatability
- Not size or speed limited
- Fail-safe options
- Built for continuous duty
- Compact for size vs. force



ROTORK Electrohydraulic Actuator



Model: EH161-160F-D1, For Ball Valve. 36"



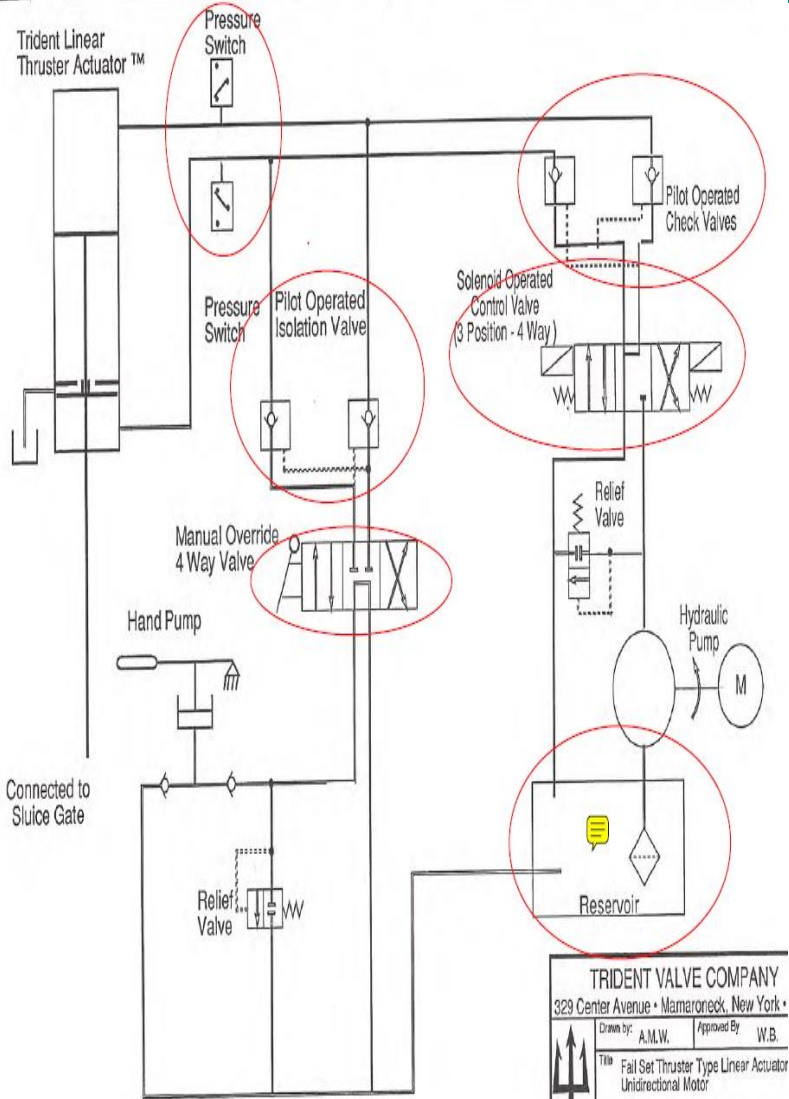
Hydraulic Actuators

Weaknesses...

- Expensive (especially HPU)
- Complex designs
- Large oil volumes
- Leak concerns (reportable?)
- Constantly running motors
- Require routine maintenance
- Unreliable



Understanding Typical Hydraulic Actuators



- **Self-contained vs. HPU**
- **Single-acting vs. double-acting hydraulic cylinders**
- **All cannot evenly match fluid metering volumes**
- **All require oil/fluid make-up volumes**
- **All require oil/fluid cleanliness**
- **All require internal pressures**
- **All require routine maintenance**
- **All have reliability concerns**

40 Liter Reservoir Tank



Electraulic™ Actuation





Electraulic™ Actuation

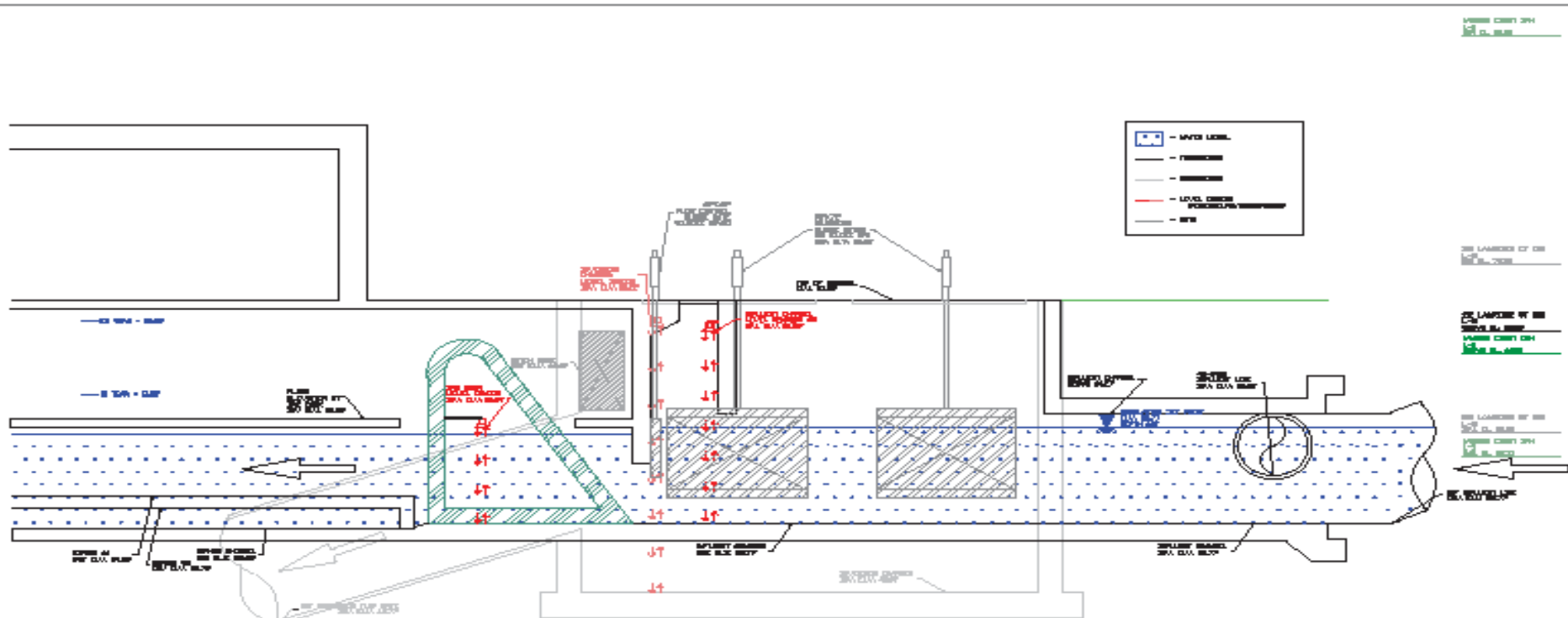




Electraulic™ Actuation



LRWWU Warren Interceptor



NOTES:
 1. ALL ELEVATIONS IN NAVD 1988 DATUM
 2. WATER ELEVATIONS ARE ESTIMATED



**LOWELL REGIONAL
 WASTEWATER UTILITY**

REV	DESCRIPTION	DATE

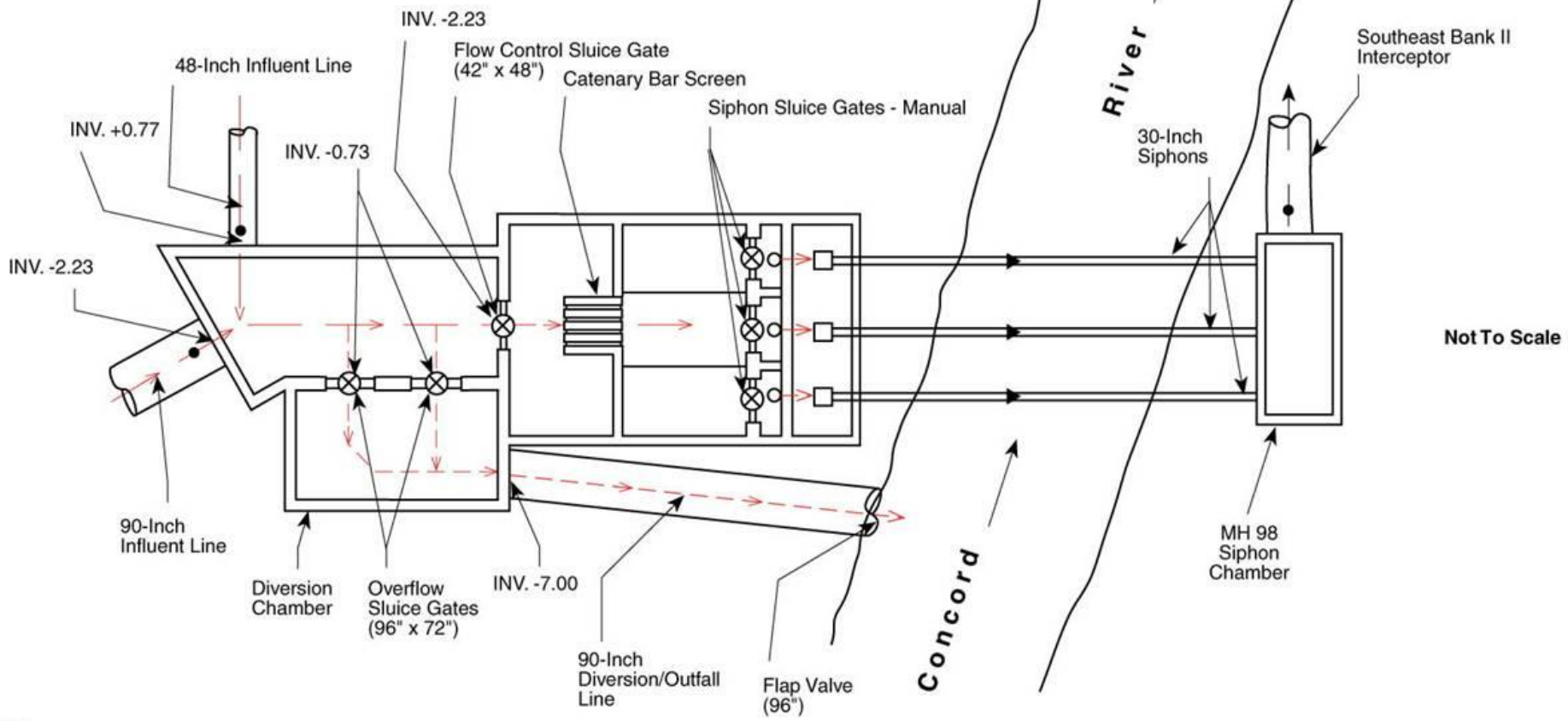
DESIGNED BY: AF	APPROVED BY: MC
DRAWN BY: ALM	FILED

**WARREN STREET STATION
 OUTFALL NUMBER 020-SD686
 SECTIONAL DRAWING - NORTH VIEW**

JOB NO.:	
DATE:	5/18/2010
SCALE:	
SHEET:	



LRWWU Warren



Not To Scale

Legend

	Normal Flow
	Diversion Flow

HFM



Electraulic™ Actuation



LRWWU Warren
Original Hydraulic Actuators





LRWWU Warren *Multi-turn Upgrade*

- Implementation of LTCP
- High Flow Event Storage
- Flow monitoring installed
- Required reliable actuator control
- Discovered frequent modulation required for efficient storage
- Electricians could not modulate heavy gates reliably
- Maintenance & down-time resurfaced

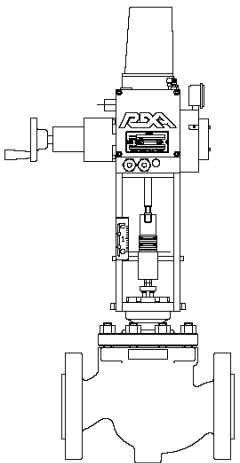


MWRA Chelsea Creek Headworks (MA)
Main Influent Sluice Gates



Electraulic™ Actuation

Sewer Collection & Wastewater Treatment Plants

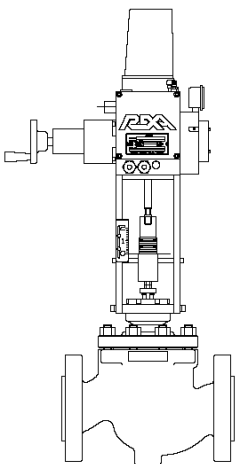


Rely on REXA



Common Wastewater Applications

Collections	Wet Weather Storage, CSO & Flood Controls
Head-works	Influent Control Gates
Clarifiers	Level Control
Aeration	Air/Oxygen Flow Control
	Blower/Compressor Controls
	Secondary Bypass
	Primary Effluent Supply
Sludge	RAS, WAS, DAF
Tertiary	Filter Effluent/Backwash
UV	Effluent Control
Pumps	Control Valves
MISC	Flares, Digesters, Flow Diversion, Etc.



HFM



Electraulic™ Actuation



**Interceptor
Main Plant Trunk
Influent Sluice (54 inch)
Installed 2005**

Aeration



Electraulic™ Actuation

WWTP CA

Aeration Tank Air Flow Control Butterfly Valves





Electraulic™ Actuation

MBRs

**Ovivo employs Bettis Electric's
Opportunity to Reduce Maintenance
Control Improvements Apparently Dramatic**



Aeration



Electraulic™ Actuation



**Texas WWTP
Dresser Compressor Guide Vanes**