

MAXIMIZING WET WEATHER TREATMENT AT LOWELL'S DUCK ISLAND WWTF

Michael Stuer

Evan Walsh

HIGH FLOW MANAGEMENT (HFM)

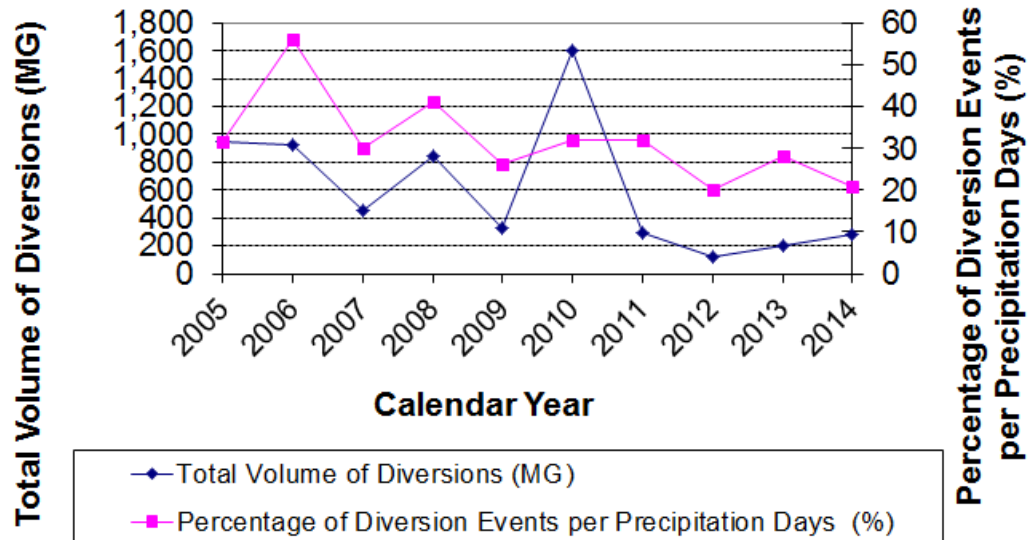
- Minimize CSOs
 - Inline Storage & Peak Flow Treatment
 - Balance CSO Discharges with Meeting Permit
 - Optimize Interceptor Storage
 - SCADA Remote Control of Gates
 - Maximize Plant Flow
 - Secondary Treatment Bypass – Blended Effluent
 - Real Time Monitoring – TSS Effluent Calculation
 - Ongoing HFM Review
 - Bimonthly Data Analysis
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CSO HISTORY

Annual Diversion and Rain Data 2005-2014

Calendar Year	Total Volume of Diversions (MG)	No. of Events	Total Precipitation (Inches)	Percentage of Diversion Events per Precipitation Days (%)
2005	951.97	48	53.88	31.6
2006	926.53	74	52.55	56.1
2007	456.28	41	44.71	29.9
2008	838.79	67	62.08	41.1
2009	324.90	35	46.37	26.3
2010	1,597.64	38	41.85	31.9
2011	289.96	45	49.87	32.1
2012	125.17	26	35.98	20.0
2013	199.80	32	31.73	28.3
2014	278.47	28	31.17	20.7
Minimum	125.17	26	31.17	20.0
Maximum	1,597.64	74	62.08	56.1
Average	598.95	43	45.02	31.8

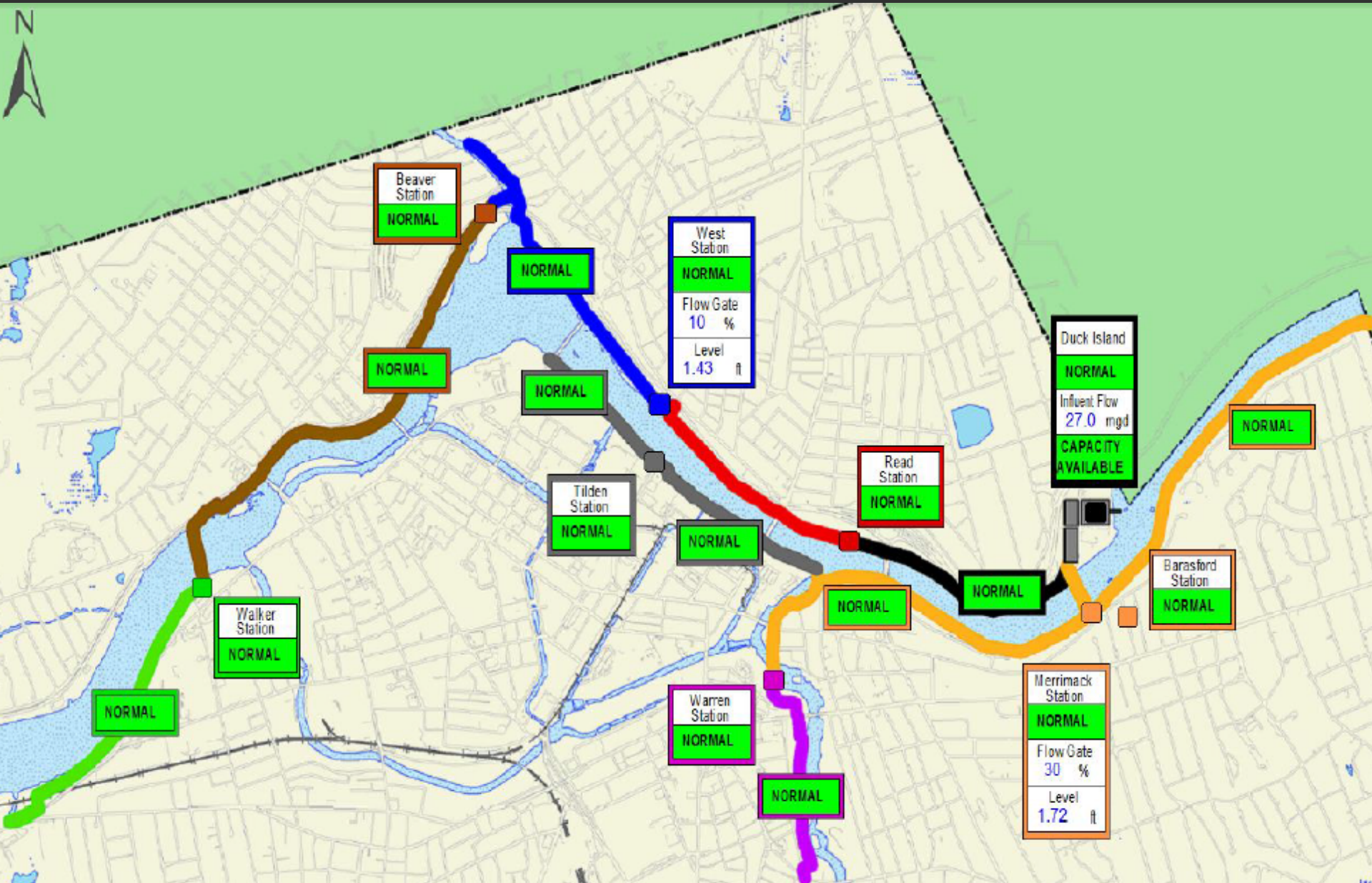
Annual Diversion and Rain Data 2005-2014



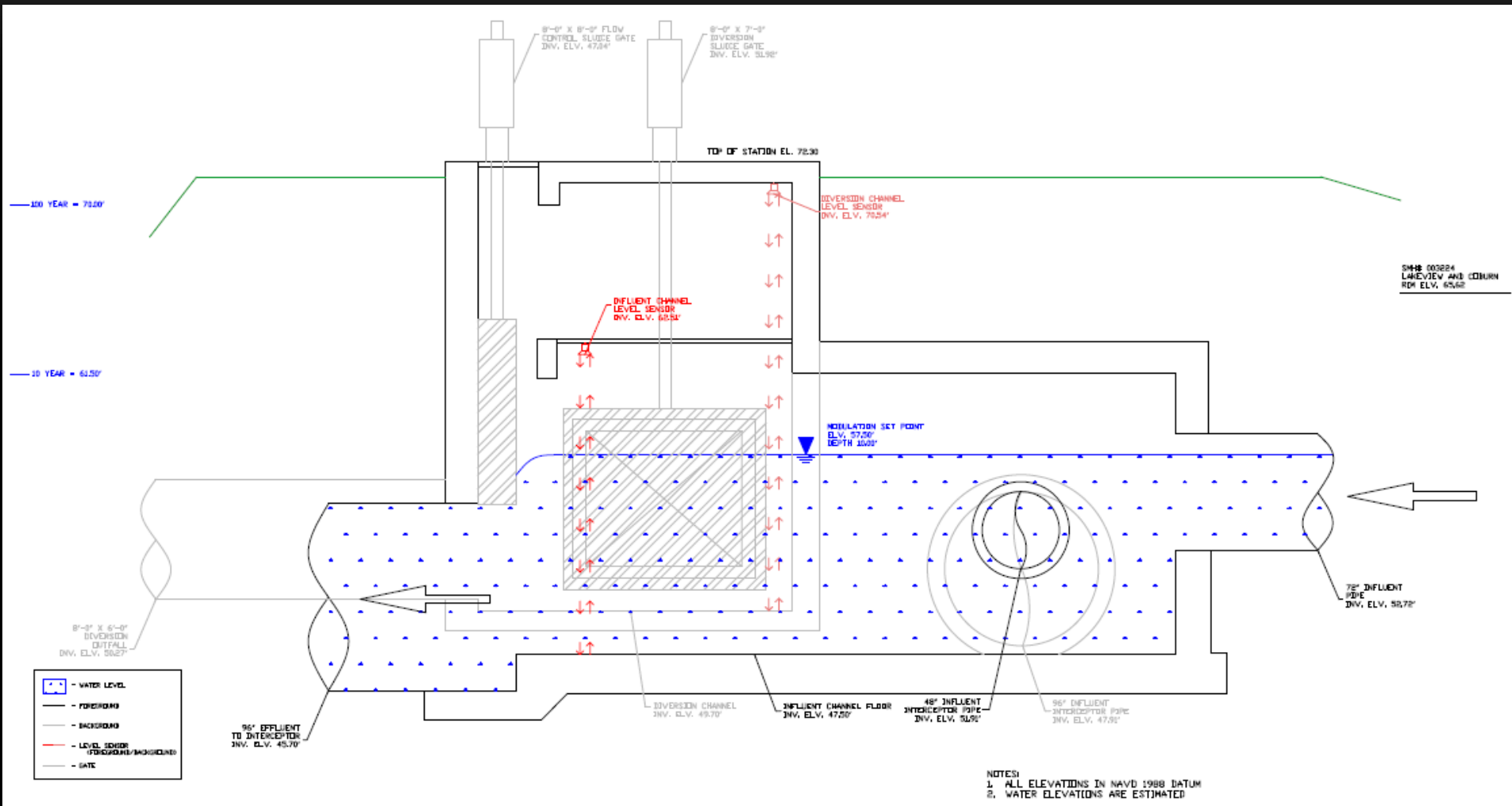
INTERCEPTOR STORAGE

- Control Optimization
 - Assessment & Documentation
 - Understanding of the System
 - Automatic Control
 - Gate Modulation Produces Consistent Operation
 - Provides a Greater Level of Operational Safety
 - Minimize Restricted Space Entries
 - GOAL: Maximize Storage and Minimize CSO Duration
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LRWWU INTERCEPTOR SYSTEM



WEST STATION STORAGE

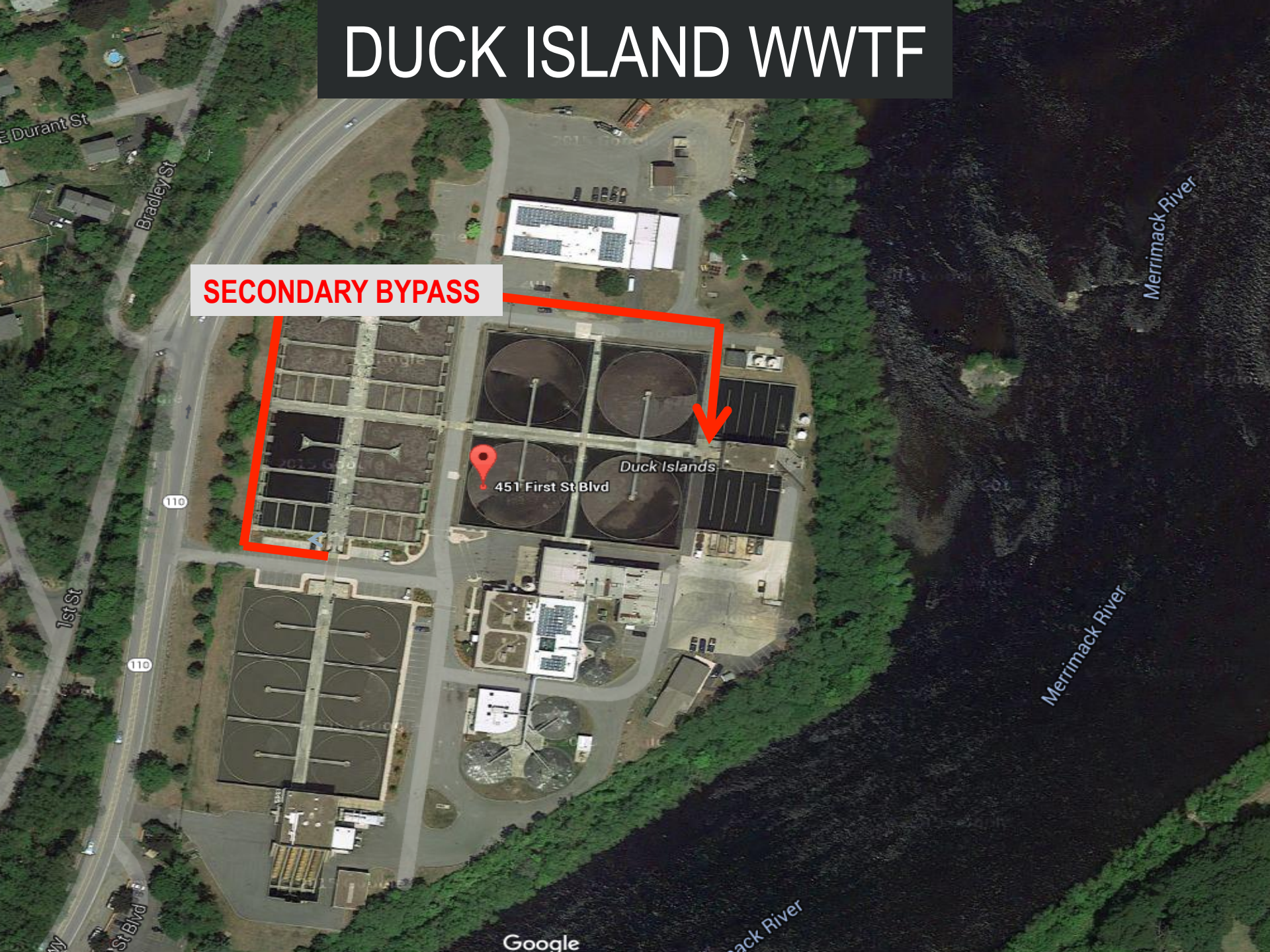


HFM: MAXIMIZING PLANT FLOW

- Flow Set Point
 - Screw Pump Limits
 - RAS & Flow through Aeration
 - Maximizing Secondary Bypass
 - TSS Monitoring
 - Calculated Instantaneous & Daily Average Effluent TSS
 - Calculation Based on Inline TSS Monitoring Instrumentation
 - GOAL: Maximize flow through plant without violating NPDES permit
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DUCK ISLAND WWTF

SECONDARY BYPASS



451 First St Blvd

Duck Islands

Merrimack River

Merrimack River

Merrimack River

Google

110

110

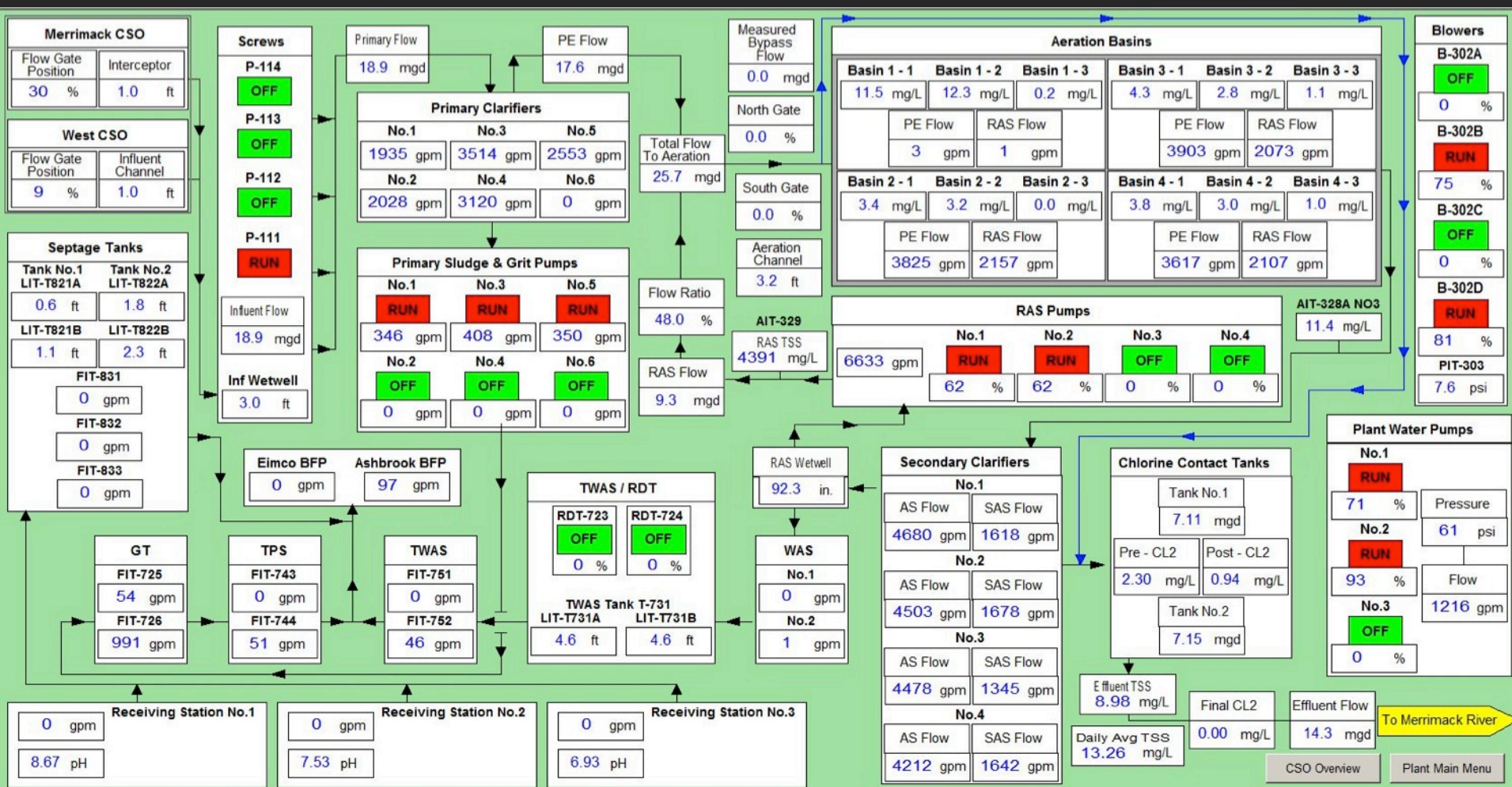
1st St

Bradley St

E Durant St

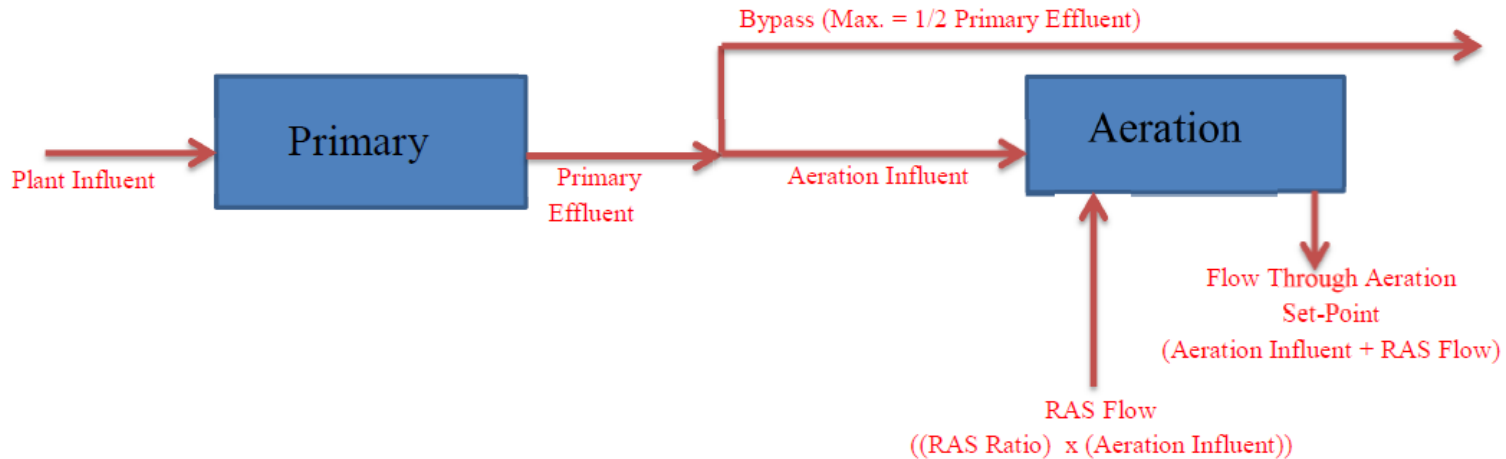
St Blvd

SCADA PLANT OVERVIEW



PEAK FLOW SET POINT

Flow Diagram

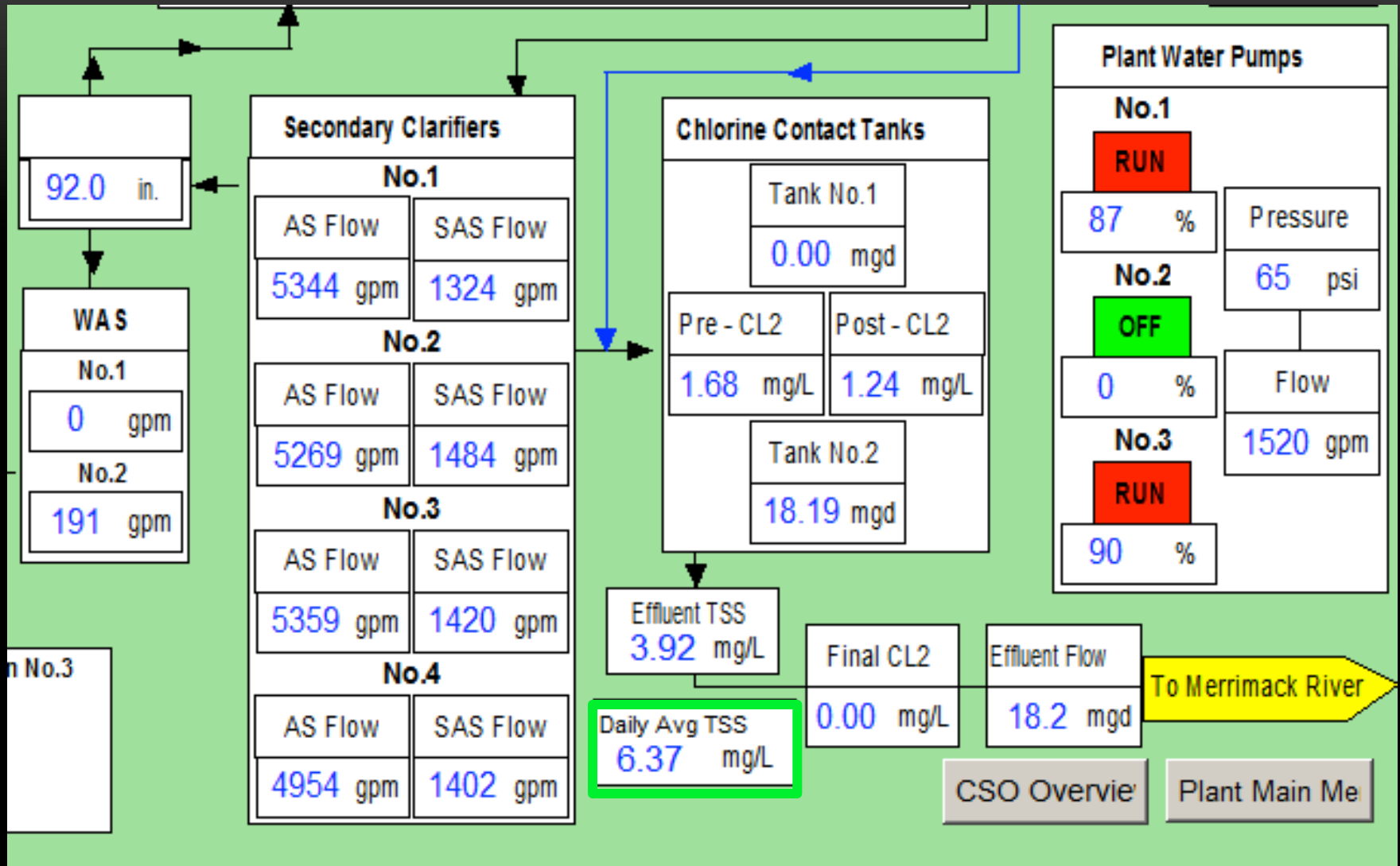


RAS Flow Ratio vs. Aeration Flow vs. Influent Flow

30% RAS Flow Ratio				35% RAS Flow Ratio				40% RAS Flow Ratio			
Flow Through Aeration Set-point (MGD)	*Aeration Influent (MGD)	**Influent Flow (MGD)	***Influent Level (inches)	Flow Through Aeration Set-point (MGD)	*Aeration Influent (MGD)	**Influent Flow (MGD)	***Influent Level (inches)	Flow Through Aeration Set-point (MGD)	*Aeration Influent (MGD)	**Influent Flow (MGD)	***Influent Level (inches)
50	38	77	56	50	37	74	55	50	36	71	54
55	42	85	59	55	41	81	58	55	39	79	57
60	46	92	63	60	44	89	61	60	43	86	60
65	50	100	66	65	48	96	64	65	46	93	63
70	54	108	69	70	52	104	67	70	50	100	66
				75	56	111	71	75	54	107	69

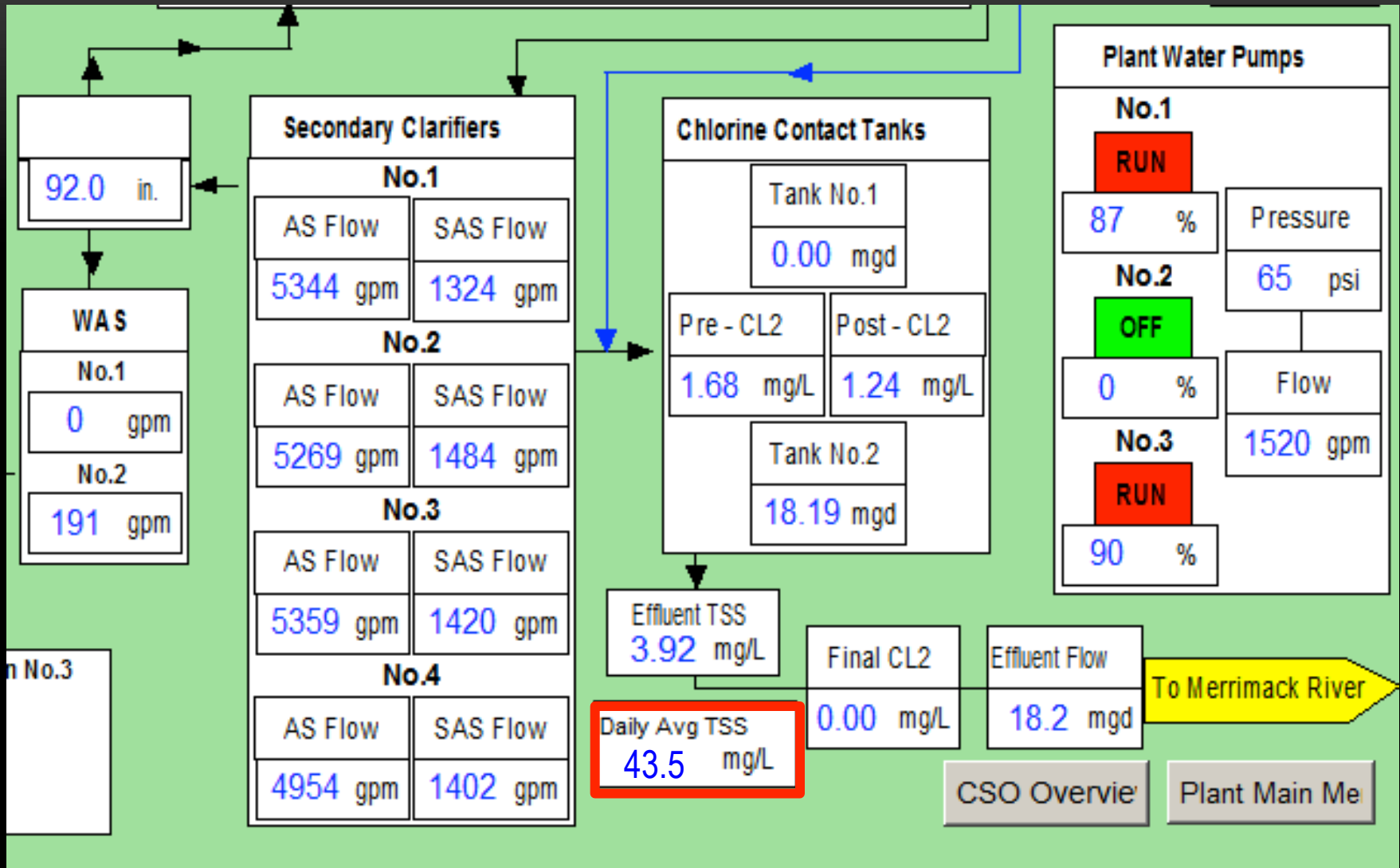
* Do Not set Influent Level higher than 67 inches. Do Not go over the Red Line

TSS Tool



- Flashing Green (TSS <20 mg/L) indicates that you can increase the flow to the plant without violating the Daily Average TSS permit.

TSS Tool



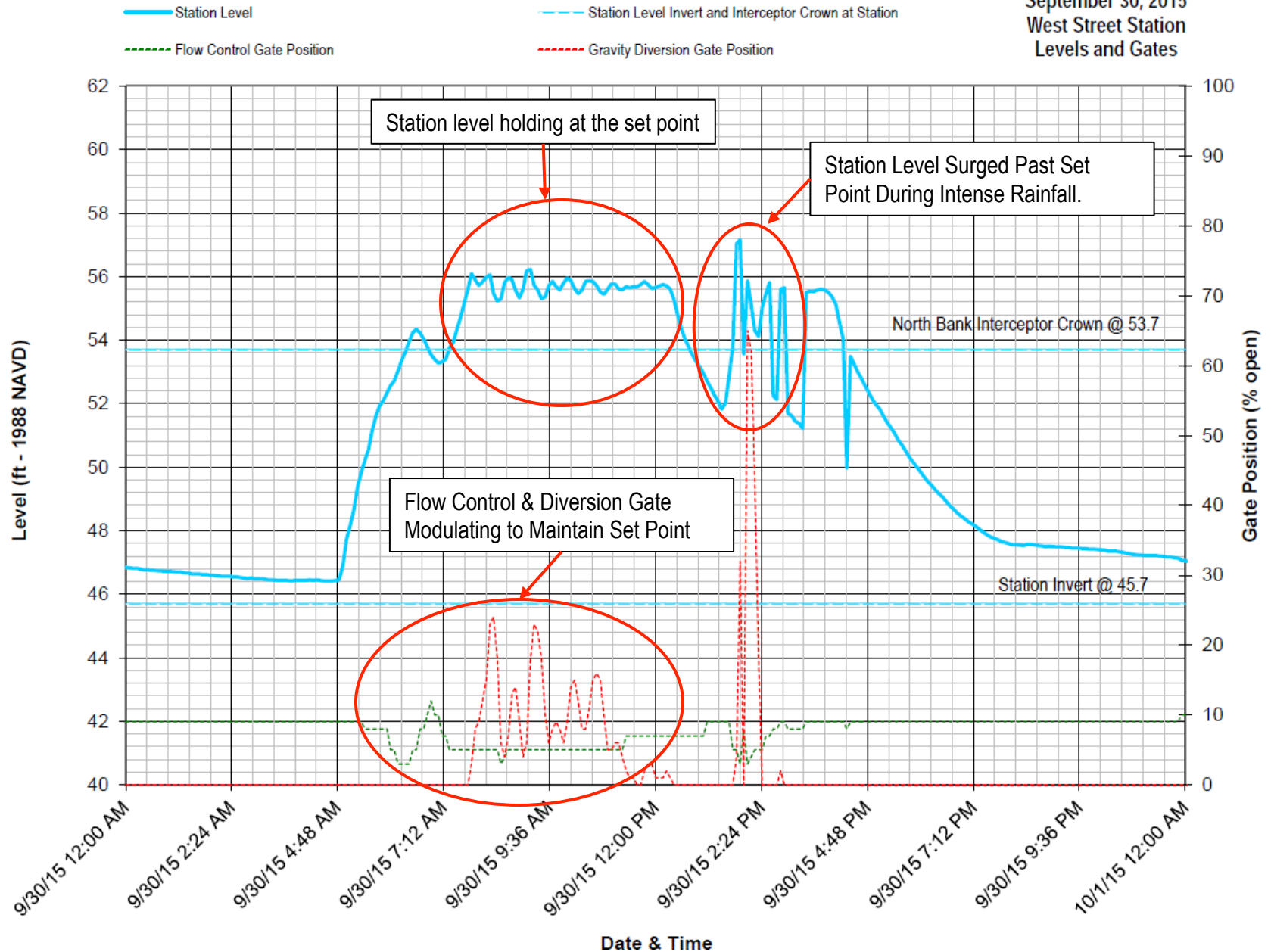
- Flashing Red (TSS>40 mg/L) indicates the permit is about to be/being violated and the TSS needs to be lowered

HFM: DATA REVIEW

- Bimonthly Meeting
 - LRWWU Staff from each department represented
 - Data from All Stations are Reviewed
 - Set Point Refinement
 - Maintenance Issues Resolved
 - Operational Inconsistences fixed
 - Continual Process
 - GOAL: Verify the system is operating properly while identifying potential system improvements
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HFM DATA REVIEW

September 30, 2015
West Street Station
Levels and Gates



QUESTIONS?

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