



Construction Issues at WWTPs

What the Owner/Operator Needs to Know



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General Overview

Basic Introduction to Construction Issues

- Common terminology (Or lingo)
- Owner and Engineer Relationship
- Happy Ending to Project (hopefully)





Topics Covered

#1 - Common Terminology:

- Plans
- Specs
- Shop Drawings
- Change Orders
- Substantial/Final Completion
- As Built Plans
- Bonds





Topics Covered

#2 - What the Owner should expect from the Engineer prior to and during the project:

- Involvement during the design phase
- Involvement during equipment selection
- Involvement during SCADA design





Topics Covered

#3 - What happens if the Contractor doesn't finish the job?

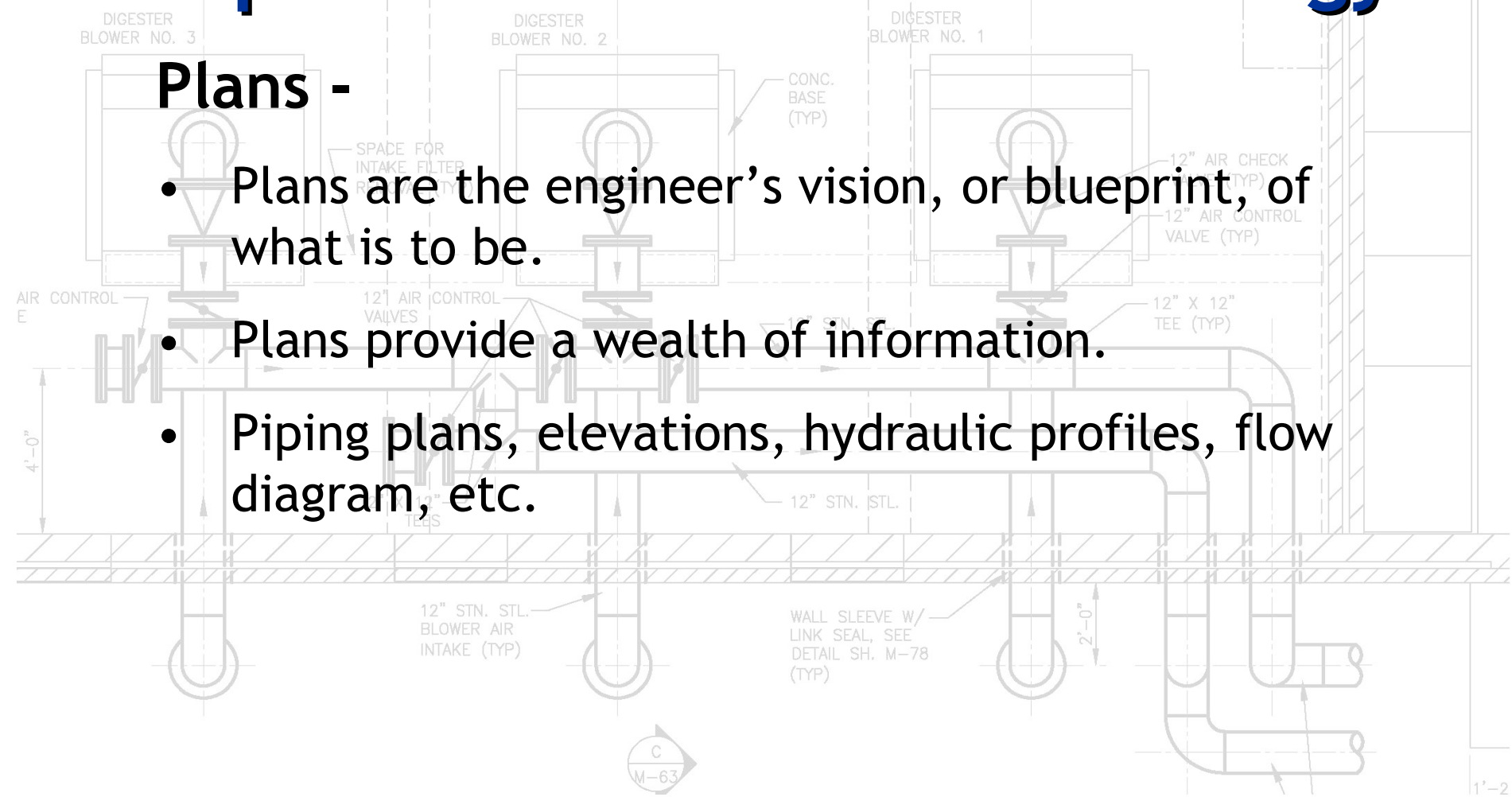




Topic #1- Common Terminology

Plans -

- Plans are the engineer's vision, or blueprint, of what is to be.
- Plans provide a wealth of information.
- Piping plans, elevations, hydraulic profiles, flow diagram, etc.

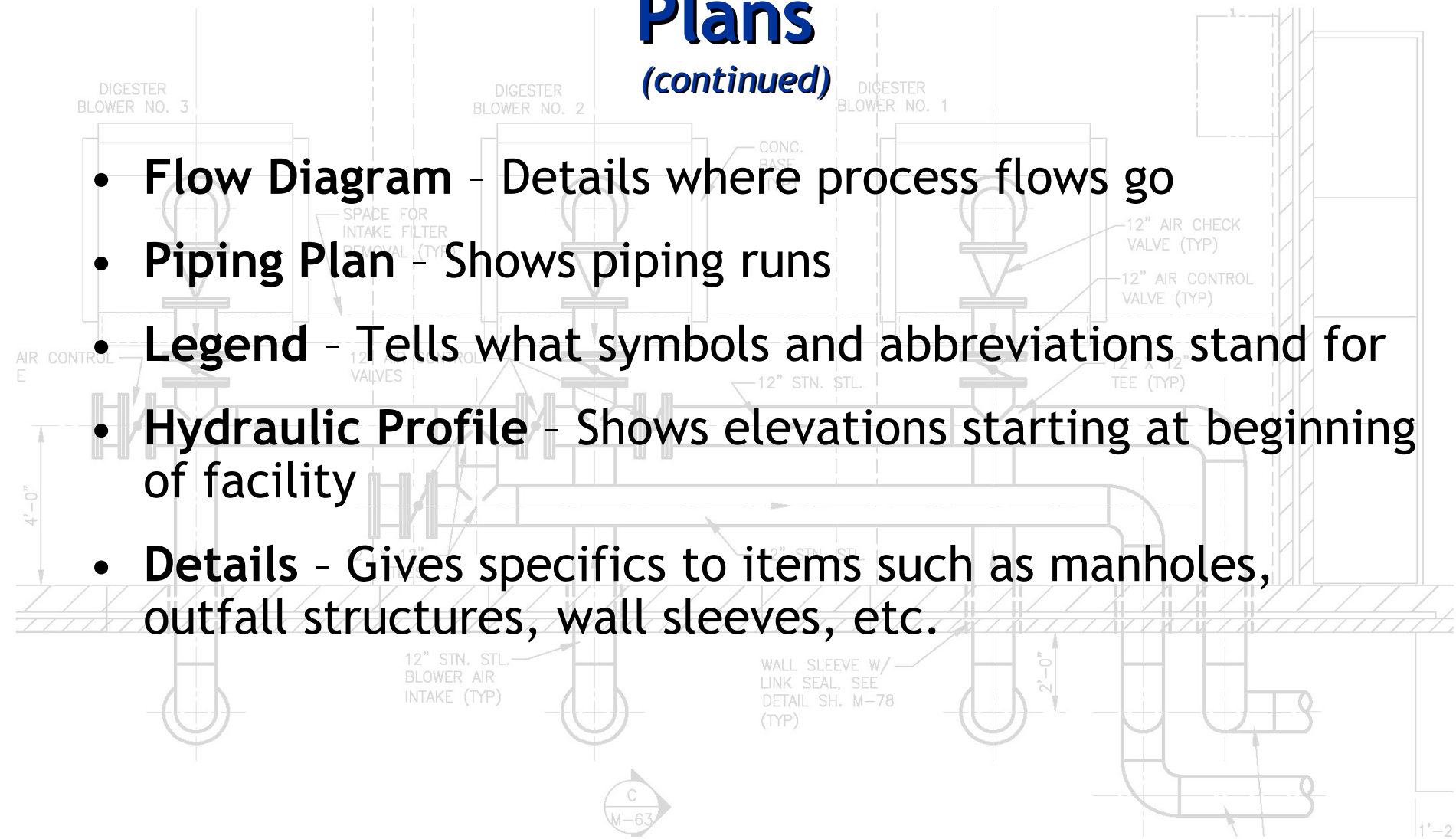




Plans

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- **Flow Diagram** - Details where process flows go
- **Piping Plan** - Shows piping runs
- **Legend** - Tells what symbols and abbreviations stand for
- **Hydraulic Profile** - Shows elevations starting at beginning of facility
- **Details** - Gives specifics to items such as manholes, outfall structures, wall sleeves, etc.





Specs

- Spec Sections in Project Manual provide detail of equipment specified
- May not specify manufacturer, but provides enough detail to eliminate non-worthy equipment
- Also details things such as door/hardware, masonry, pipe materials, contractor guidelines, etc.





Shop Drawings

Provide detailed information about particular piece of equipment.

- Submitted to engineer by equipment supplier for approval prior to purchase of equipment
- Model #, features, drawings, ancillary equipment, controls and spare parts
- Example- Blower + associated valves, filters and motor





Change Order

- A change in work due to unforeseen circumstances. It might include:
 - A time extension
 - Piping modifications
 - Equipment changes
- Request for information (RFI) usually precedes the Change Order
- Change Orders must be approved by Engineer/Owner.
Note: NOT BY OPERATOR!





Substantial/Final Completion

- **Substantial Completion**

Allows for start up of facility, with major work being completed. Facility must run effectively and meet all permit limits.

- **Final Completion**

All items have been completed, including punch list (laundry list) items.





As Built Plans

Also known as “As Builts”

- Revised plans/drawings due to changes in the field
- Example: Change in piping due to unforeseen circumstances
- Are the latest and most accurate drawings





As Built Plans

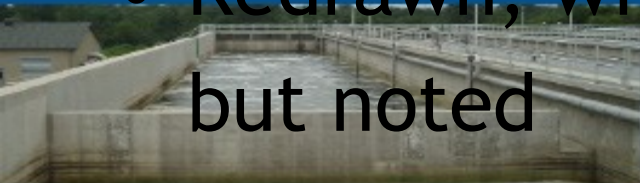
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What happens next?

- Marked up in field, dated and signed
- Original plan/drawing marked up

OR

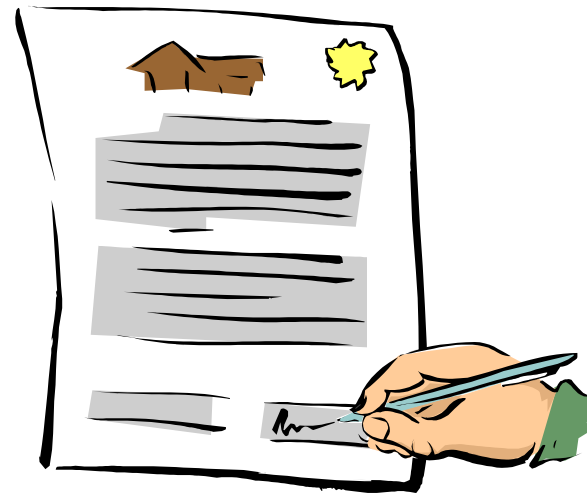
- Marked up in field
- Redrawn, with original plan/drawing left in, but noted





Bonds

- Bid Bond
- Performance Bond
- Payment Bond





Bid Bond

- Required of a contractor submitting lowest bid
- Ensures contractor is serious about his bid
- If contractor negates, developer is paid the difference between that bid and the next lowest bid.





Performance Bond

- Replaces Bid Bond
- Ensures work is completed as specified
- Guarantees client will be compensated for any monetary loss up to the amount of the bond





Payment Bond

- Guarantees payment to laborers, suppliers and subcontractors in the event of the contractor defaulting
- Usually issued with the Performance Bond





Topic #2 - Expectations During Project

Involvement during design phase

- Owner involvement when developing vision
- Owner takes part in design meetings
- Engineer keeps owner involved along the way





Owner Involvement

- Owner/Operator need to contribute
- Should present/discuss
 - ✓ Past operational issues
 - ✓ Problems meeting permit limits
 - ✓ Equipment performance issues
 - ✓ Develop a “Wish List” for consideration
 - ✓ Discuss issues with staff



Equipment Selection

Owner should have input, based on:

- Past experiences
- Current needs/problems
- Preference





Flow Sheets

Plan sheets outlining each step of process

- Work with Engineer on Flow Sheets
- Discuss each process, and what you expect it to do





SCADA Design

- What are you trying to accomplish?
Monitoring vs. complete control
- Be creative when controlling equipment
- Reporting
- Alarms
 - Who?
 - What?
 - When?

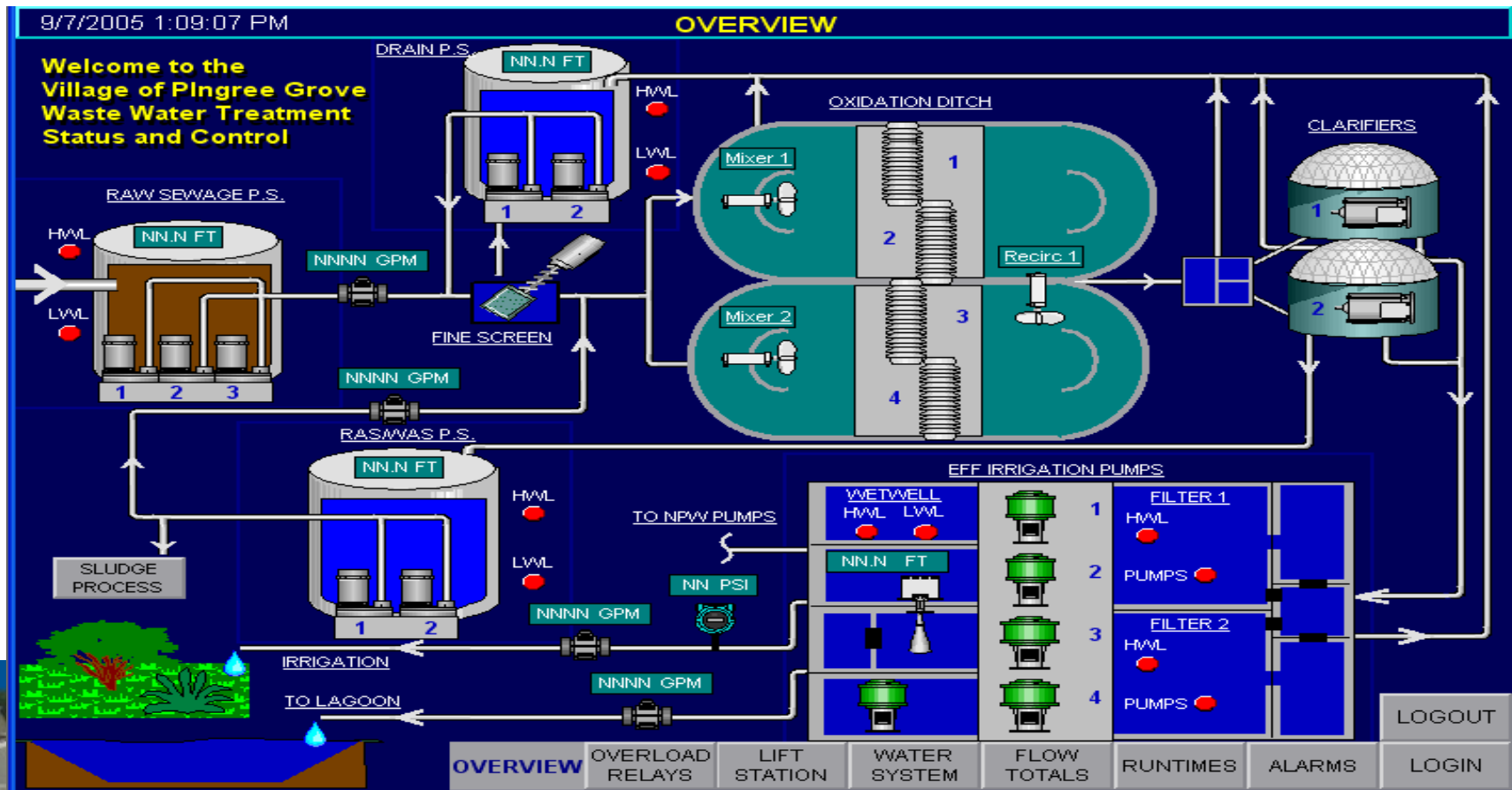


SCADA Design

Examples of screens:

- **General Overview**
Provides a “quick glance” status report
- **Maintenance**
Notification when maintenance is due
- **Trending**
Provides history of events

General Overview





General Overview

File Special Development!

MAIN MENU

LIFT STATION SUMMARY

SCREEN: LIFT STATION SUMMAR ALARM STATUS: ● USER: None 4:47:12 PM 2/12/2008

Tower 1:	49.8 FT	99.6 %
Tower 2:	28.2 FT	56.4 %
Tower 3:	15.9 FT	31.8 %
Tower 4:	28.5 FT	57.0 %
Tower 5:	9.3 FT	18.6 %

needs to be edited

L.S. 3.4 FT

3-PH HWL LWL INTR VFD FLD ● 1 2 3

BACKUP FLOATS NOT ENABLED

LEAD LAG LWL HWL

LEAD LAG LWL HWL

TEMP SEAL

L.S. 3.4 FT

3-PH HWL LWL INTR VFD FLD ● 1 2 3

BACKUP FLOATS NOT ENABLED

LEAD LAG LWL HWL

LEAD LAG LWL HWL

TEMP SEAL

L.S. 3.4 FT

3-PH HWL LWL INTR VFD FLD ● 1 2 3

BACKUP FLOATS NOT ENABLED

LEAD LAG LWL HWL

LEAD LAG LWL HWL

TEMP SEAL

L.S. 6.3 FT

3-PH HWL LWL INTR VFD FLD ● 1 ● 2 ● 3

BACKUP FLOATS NOT ENABLED

LEAD LAG LWL HWL

LEAD LAG LWL HWL

1 L.S. 8.2 FT

3-PH HWL LWL INTR ● 1 ● 2 ● 3

BACKUP FLOATS ENABLED

LEAD LAG LWL HWL

LEAD LAG LWL HWL

2 L.S. 1.4 FT

3-PH HWL LWL INTR ● 1 ● 2 ● 3

BACKUP FLOATS NOT ENABLED

LEAD LAG LWL HWL

LEAD LAG LWL HWL

AUTO ALTERNATE

L.S. 7.8 FT

3-PH HWL LWL INTR VFD FLD ● 1 ● 2 ● 3

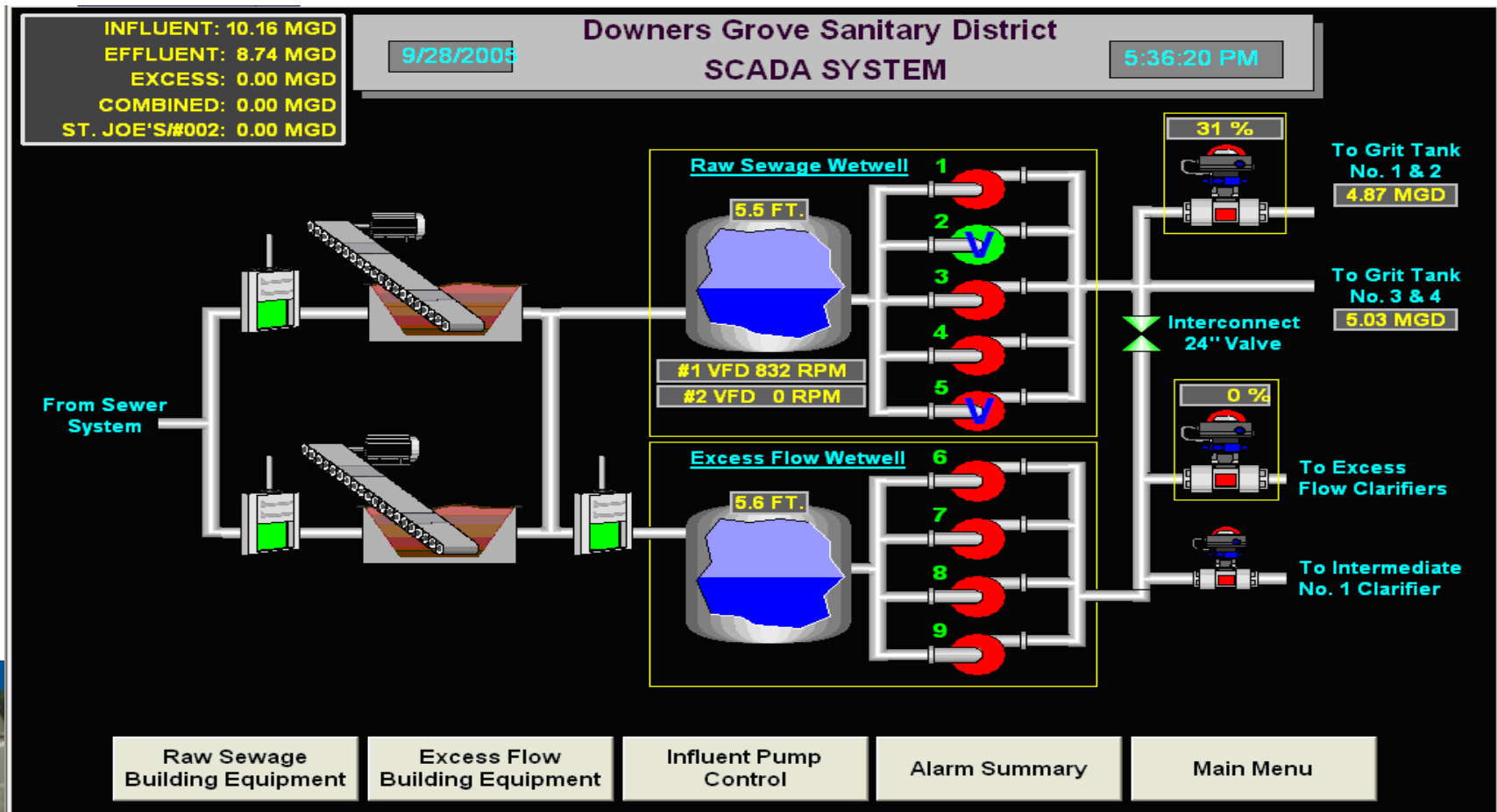
BACKUP FLOATS NOT ENABLED

LEAD LAG LWL HWL

LEAD LAG LWL HWL

AUTO ALTERNATE

General Overview





Maintenance

INFLUENT: 10.13 MGD

EFFLUENT: 8.59 MGD

EXCESS: 0.00 MGD

COMBINED: 0.00 MGD

ST. JOE'S#002: 0.00 MGD

Downers Grove Sanitary District

SCADA SYSTEM

9/28/2005

5:37:07 PM

RAW SEWAGE BUILDING EQUIPMENT

	STATUS	RUNTIME METER (Hrs.)			NUMBER OF STARTS	
		TODAY	YESTERDAY	CUMULATIVE	TODAY	YESTERDAY
Raw Sewage Pump No. 1:	OFF	0.0	0.0	202.5	0	0
Raw Sewage Pump No. 2:	RUNNING	17.6	24.0	191.6	2	0
Raw Sewage Pump No. 3:	OFF	0.0	0.0	49.8	0	0
Raw Sewage Pump No. 4:	OFF	0.0	0.0	0.0	0	0
Raw Sewage Pump No. 5:	OFF	0.0	0.8	79.3	0	1
Seal Water Pump No. 1:	RUNNING	3.0	3.3	21.7	120	125
Seal Water Pump No. 2:	OFF	3.4	5.9	45.5	85	145
Intermediate Clarifier No. 1:	RUNNING	17.6	24.0	315.1	2	0
Intermediate Clarifier No. 2:	RUNNING	17.6	24.0	315.1	2	0
Intermediate Clarifier No. 3:	RUNNING	17.6	24.0	314.3	2	0

Raw Sewage Building Seal Water Supply: **EFFLUENT**

Influent Pump
Control

Influent Pumping
System Overview

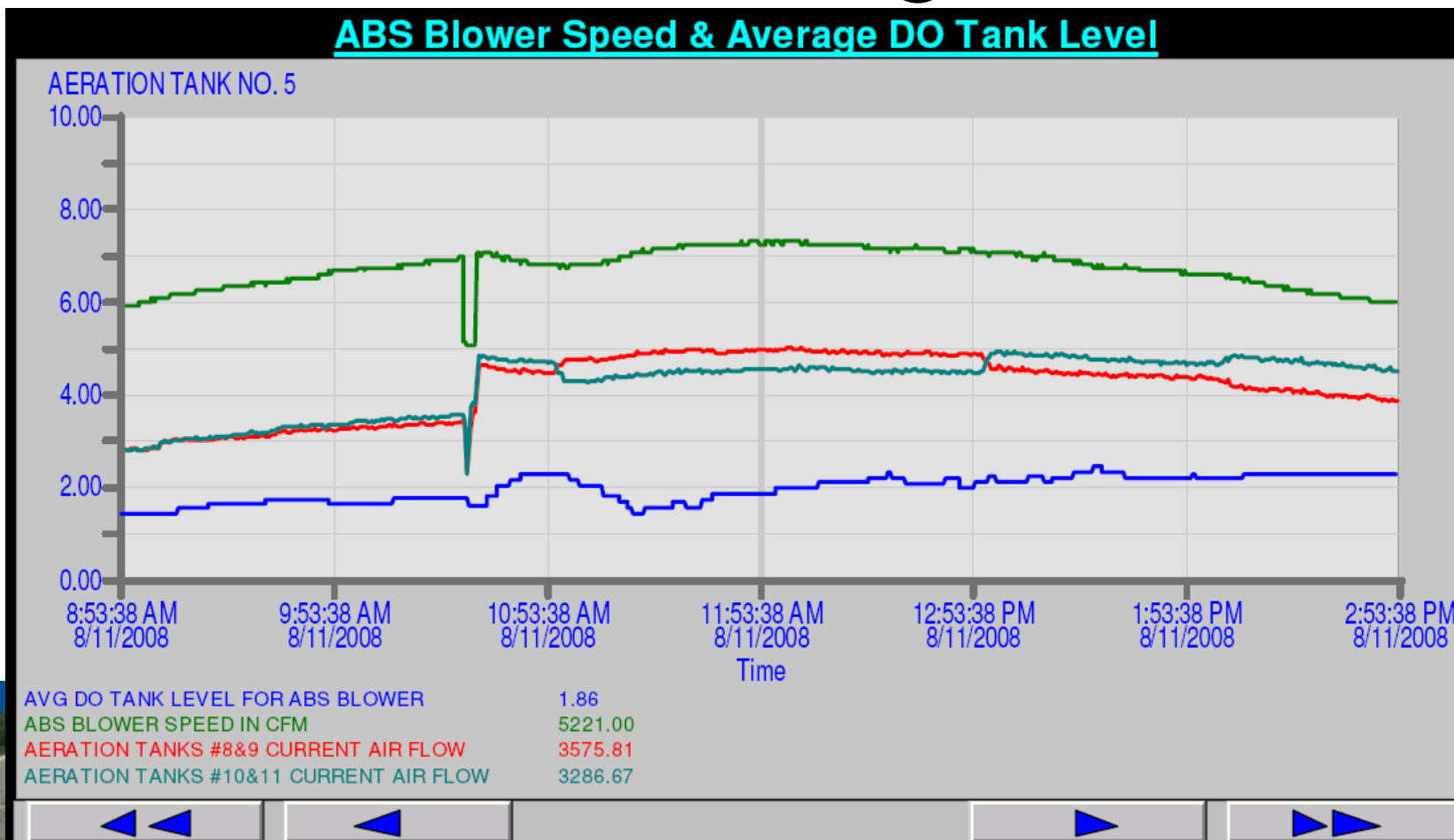
Alarm Summary

Main Menu



Trending

ABS Blower Speed & Average DO Tank Level





Reporting

Village of Somewhere
Waste Water Treatment Plant
NPDES Permit No. XX1234567

Wastewater Treatment Facility Daily Report for September, 2006

Rainfall 0.01" - 1.99"
 Rainfall >2.00"

Date	Day	Weather	Effluent Flow Total (Gallons)	Total Potable Water Usage (Gallons)
		Rainfall (Inches)		
09/01/2006	Wednesday	0.00	2,621,312	0
09/02/2006	Thursday	0.00	2,754,229	0
09/03/2006	Friday	0.30	2,713,223	0
09/04/2006	Saturday	0.20	2,918,428	0
09/05/2006	Sunday	0.00	2,708,929	390
09/06/2006	Monday	0.10	2,688,635	0
09/07/2006	Tuesday	0.00	2,837,221	-390
09/08/2006	Wednesday	0.00	2,901,950	0
09/09/2006	Thursday	0.00	2,980,666	0
09/10/2006	Friday	2.00	2,821,894	0
09/11/2006	Saturday	0.00	3,010,451	0
09/12/2006	Sunday	0.00	2,856,452	390
09/13/2006	Monday	0.00	2,724,597	0
09/14/2006	Tuesday	0.00	2,747,718	0
09/15/2006	Wednesday	0.00	3,029,939	0
09/16/2006	Thursday	0.00	3,007,695	0
09/17/2006	Friday	0.00	2,883,850	0
09/18/2006	Saturday	2.10	2,661,795	0
09/19/2006	Sunday	0.00	2,958,096	0
09/20/2006	Monday	0.00	2,806,361	0
09/21/2006	Tuesday	0.00	2,916,666	0
09/22/2006	Wednesday	1.00	3,067,327	0
09/23/2006	Thursday	5.60	3,193,670	0
09/24/2006	Friday	0.50	2,775,575	0
09/25/2006	Saturday	0.00	2,636,766	0
09/26/2006	Sunday	0.00	2,696,596	0
09/27/2006	Monday	1.90	2,437,770	0
09/28/2006	Tuesday	0.00	2,519,330	0
09/29/2006	Wednesday	0.00	2,636,766	0
09/30/2006	Thursday	0.00	2,696,596	31,277,516
	Min.:	0.00	2,437,770	-390
	Avg.:	0.46	2,807,673	1,042,597
	Max.:	5.60	3,193,670	31,277,516
	TOTAL:	13.70	84,230,203	31,277,506





Topic #3 - What Happens if the Contractor Doesn't Finish?

- Performance Bond
- Engineer/Owner informs contractor that Bond Company will be notified
- 30-day period to respond
- If no action, Bond Company responds
- Contractor's rating is affected



Summary

- Owner involvement critical
- Engineer and Owner need to work together
- Engineer and Owner need to have same long range goals





Questions?

