



**COUPON**



**FN** **FREESE  
AND  
NICHOLS**

**TODAY'S COUPON:**

**425 MGD Pump Station at 30% OFF**

**Bryan Jann, P.E. – Freese and Nichols, Inc.**

**July 26, 2012**

# The Big Picture



South Dallas  
**Peak Flow**  
Pump Station

# DWU Central Wastewater Treatment Plant

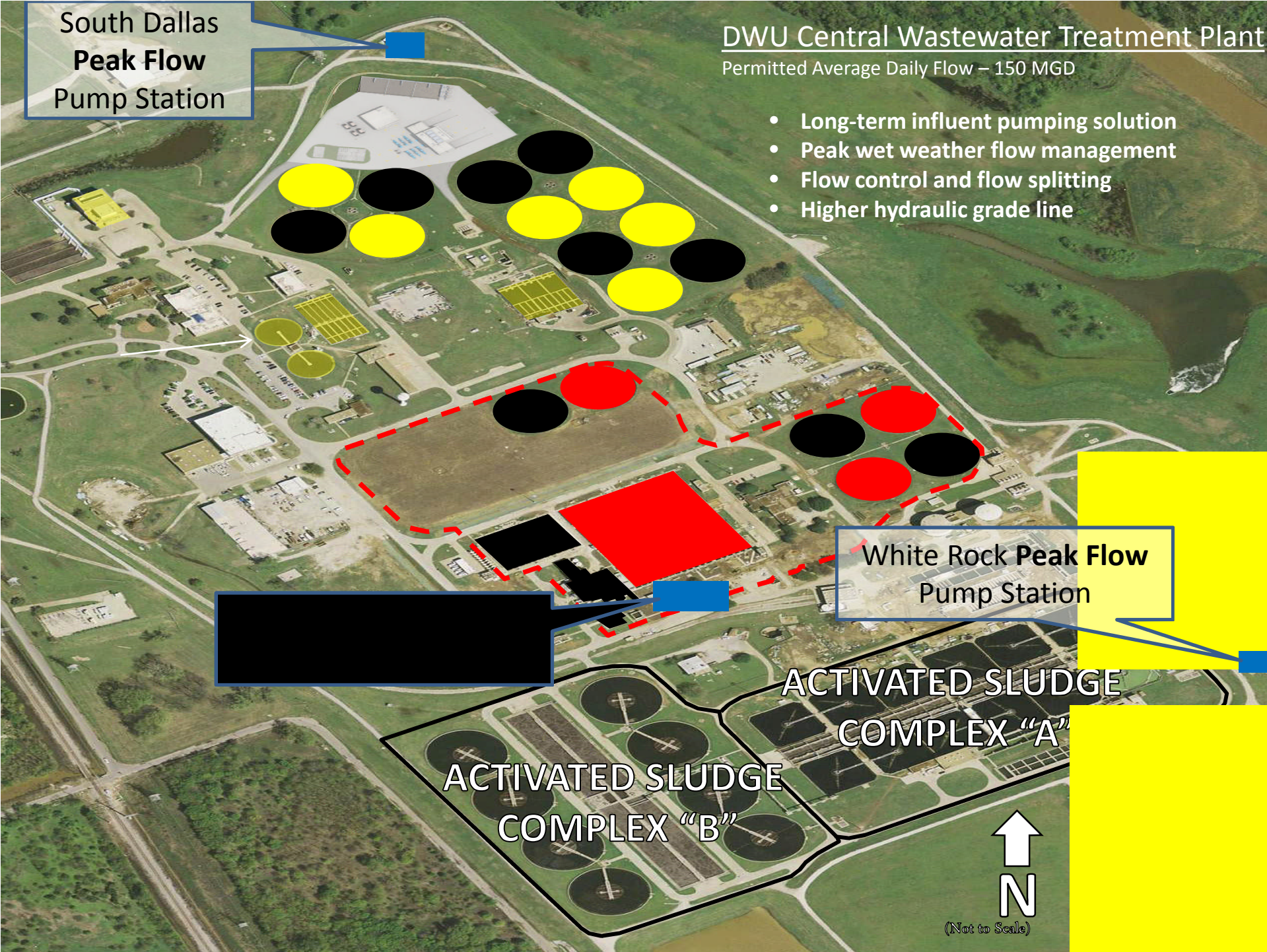
Permitted Average Daily Flow – 150 MGD

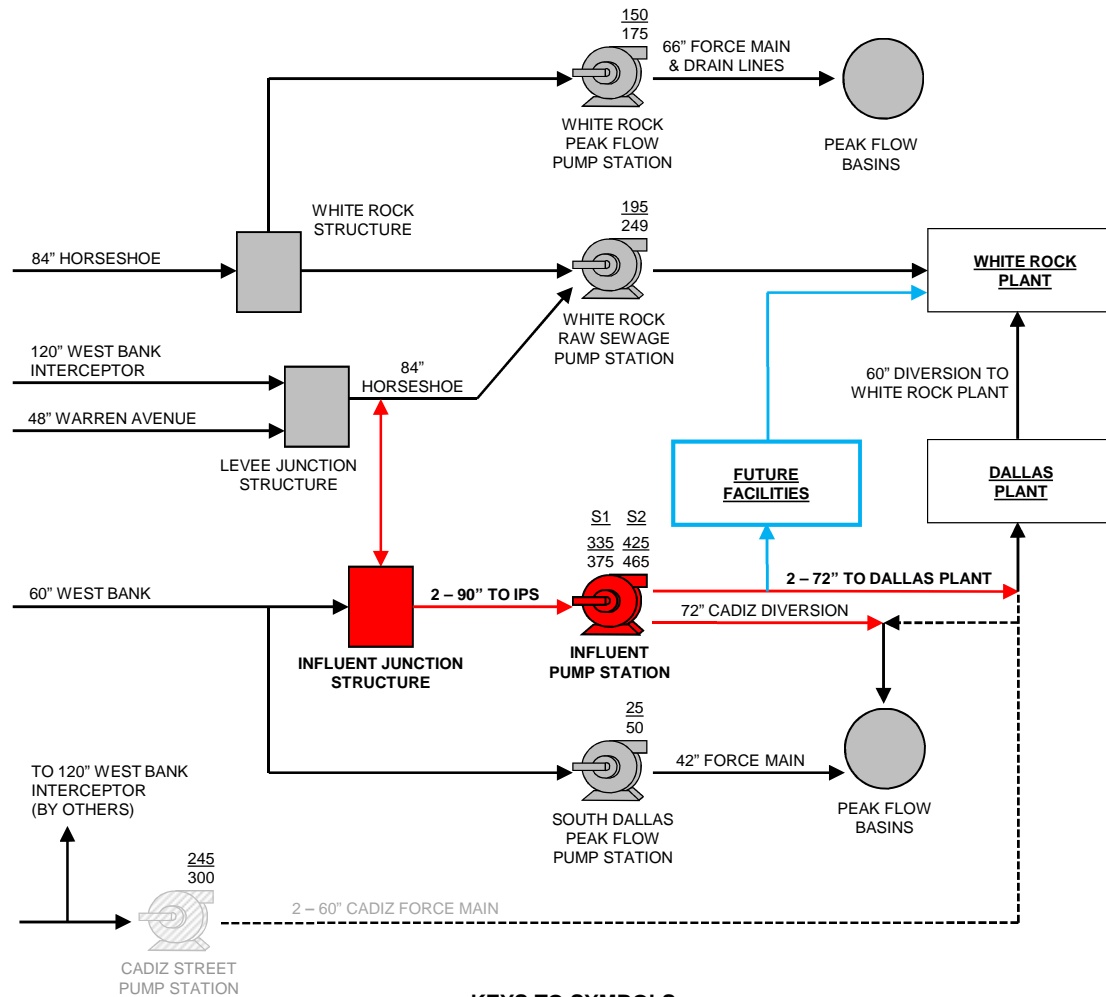
- Long-term influent pumping solution
- Peak wet weather flow management
- Flow control and flow splitting
- Higher hydraulic grade line

White Rock **Peak Flow**  
Pump Station









ACTIVATED SLUDGE  
COMPLEX "A"

ACTIVATED SLUDGE  
COMPLEX "B"





**KEYS TO SYMBOLS**

- |   |                                  |   |                             |
|---|----------------------------------|---|-----------------------------|
|  | EXISTING STRUCTURE               |  | EXISTING LINE               |
|  | DECOMMISSIONED PUMP STATION      |  | DECOMMISSIONED LINE         |
|  | IPS STAGE 1 STRUCTURE            |  | IPS STAGE 1 LINE            |
|  | IPS STAGE 2 STRUCTURE (PROPOSED) |  | IPS STAGE 2 LINE (PROPOSED) |
| $\frac{245}{300}$   | FIRM / TOTAL PUMPING CAPACITY    |   |                             |



# Design Flow Determination

- Minimum Flow
- Peak 2-hr Flow
- 0.31 (MFF)
- 2.89 (PF)

Year	CWWTP Minimum Hourly Design Flow (MGD)	CWWTP Average Day Design Flow (MGD)	CWWTP Peak 2-hr Design Flow (MGD)
2005	47	152	440
2010	52	166	481
2015	53	172	496
2020	55	178	513
2025	56	180	520
2030	57	183	528

- 27 MGD minimum influent pumping at WRRSPS

Influent Pump Station	Minimum Design Flow (MGD)	Base Load Flow (MGD)	Maximum Pumping Capacity (MGD)	Maximum Hydraulic Capacity (MGD)
Stage 1	20	55	335	375
Stage 2	20	55	425	465

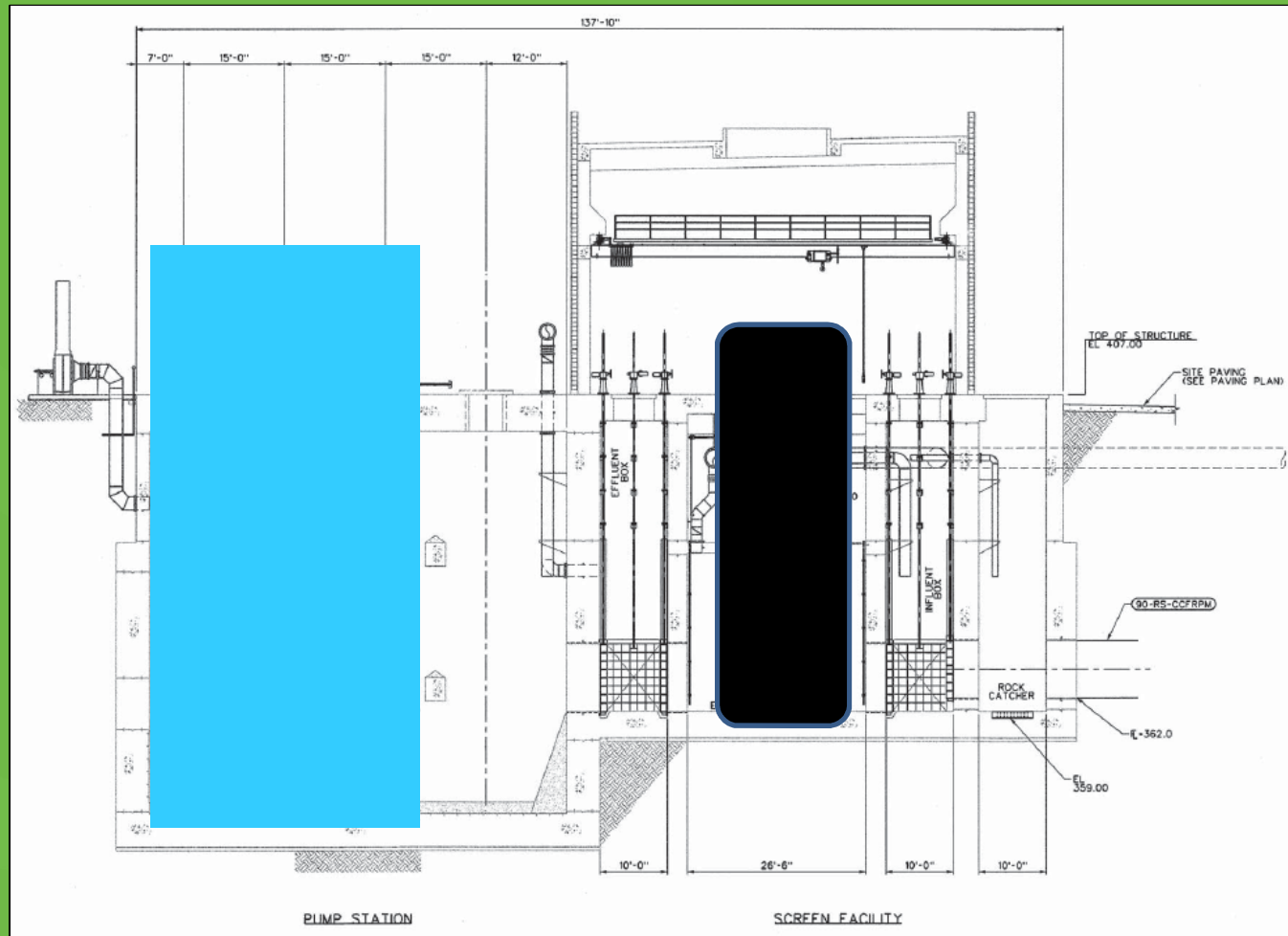


# Maximum Discharge Allocations

<b>Discharge Location</b>	<b>Stage 1</b>	<b>Stage 2 (Y2020/Y2025)</b>
<b>Dallas Plant</b>	<b>80</b>	<b>100</b>
<b>White Rock Diversion</b>	<b>60</b>	<b>60</b>
<b>Future Facilities</b>	<b>0</b>	<b>100</b>
<b>Peak Flow Basins*</b>	<b>150</b>	<b>150</b>

\* Allocations are MG

# Pump Station Overall Section



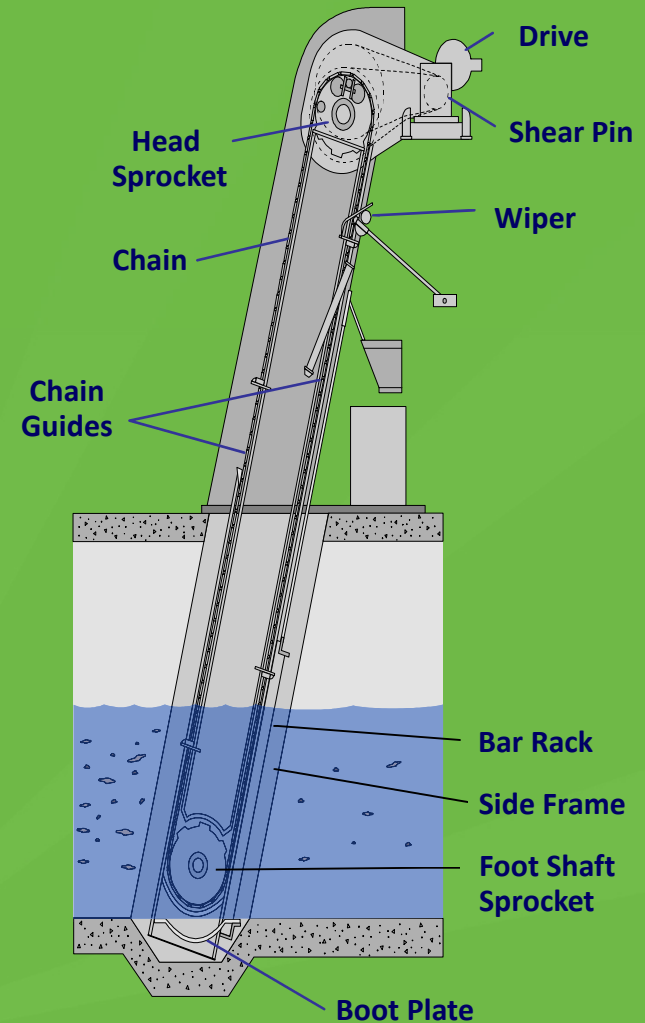
# Equipment Selection – Coarse Screens

COARSE SCREENING EQUIPMENT EVALUATION MATRIX			Chain Type (Conv)	Chain Type (Catenary)	Cog Wheel/Climber	Hydraulic Telescoping	Gripper	Rope/Cable
Item	Wt %	Score	Score	Score	Score	Score	Score	Score
1 Capital Cost	20	0.60	0.60	0.60	0.60	1.40	0.60	0.60
2 Operation and Maintenance	20	1.35	0.65	0.65	0.65	0.65	0.65	0.65
3 Space Requirements	20	1.52	1.12	1.12	1.28	1.12	1.28	1.52
4 Odor Control and Cleanliness	15	0.89	0.68	0.68	0.89	0.15	0.15	0.68
5 Equipment Function	15	1.32	0.75	0.75	1.10	0.66	0.32	0.58
6 Constructability	10	0.80	0.50	0.50	0.80	0.35	0.35	0.55
<b>Total</b>	<b>100</b>	<b>6.48</b>	<b>4.30</b>	<b>4.30</b>	<b>5.92</b>	<b>4.38</b>	<b>4.75</b>	<b>4.57</b>

- ✓ Multi-rake for peak flow
- ✓ Low Headroom requirement
- ✓ Positive DWU experience

# Screen Specifications

- 1-inch bar spacing
- 47-foot channel depth
- 6-foot channel width
- 85 degree incline from horizontal
- Low headroom
- Discharge to water sluice



# Equipment Selection - Pumps

PUMP EQUIPMENT EVALUATION MATRIX			Submersible		Vertical Turbine (VTSH)		Horizontal Centrifugal		Vertical Centrifugal	
Item	Category Wt%	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	
1	Capital Cost	25	7	175	10	250	8	200	8	200
2	Maintenance	20	5	100	5	100	10	200	8	160
3	Ancillary S	15	10	120	10	150	7	105	8	120
4	Size of Pump Station	15	6	90	10	150	5	75	8	120
5	Applications	10	5	50	6	60	10	100	10	100
6	Energy Cost	10	7	70	10	100	9	90	9	90
7	Equipment Flood Protection	5	10	50	10	50	2	10	10	50
Total		100		655		860		780		840

✓ **30% Cost Savings**  
 ✓ **Above-grade Maintenance**  
 ✓ **Ease of Expansion**

# Pump Specifications

- 42-inch diameter columns
- 62-foot overall length
- 50 ton unit weight
- Stage 1
  - 2 Pumps
    - 43,000 gpm (~62 MGD)  
@ 70 TDH
    - 1,000 HP motors (VFD)
  - 4 Pumps
    - 34,500 gpm (~50 MGD)  
@ 70 TDH
    - 800 HP motors (VFD)



# Owner's Perspective

- **Owner's Early Involvement in Pump Design**
  - Equipment Site Visits
  - Specifications
  - Pre-submittal Meetings
- **Extensive Vibration Monitoring Equipment**
  - Six Probes per Pump
  - Portable Equipment
  - Classroom Training



# Owner's Perspective

- **Single-point of Responsibility**
  - Pump Manufacture (motor, VFD)
  - Complete System Testing
- **Warranty, Service Agreement**
  - 2 year warranty
  - 3 year service agreement



# Design Challenges (1)

- **Pumps**
  - **Materials of Construction**
  - **Hydraulic Requirements**
  - **Vibration Requirements**
  - **Pump Servicing**
  - **Limited Similar Size Applications**
  - **Pump Selection**



# Design Challenges (2)

- **Trickling Filter Demolition**
- **Station Hydraulics**
  - Multiple Discharge Locations
  - Varied Flows
  - Coordination with Other On-Site Pump Stations
  - Influent Flow Control and Junction Structure
  - Hydraulic Modeling



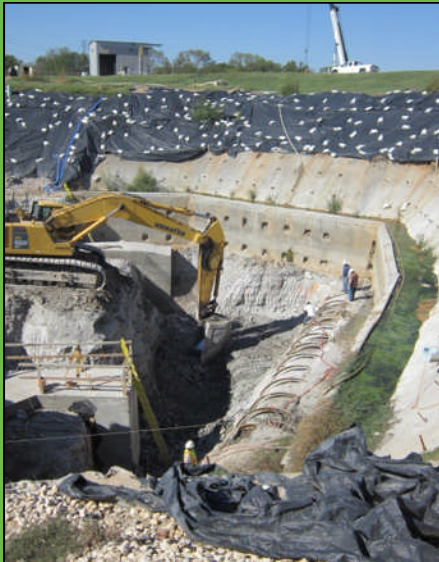
# Design Challenges (3)

- **Proximity to the Federal Levee**
  - **USACE Coordination/Permit Process**
  - **Additional Geotechnical Investigation**
  - **Specialized Shoring and Slope Protection**
  - **Relocation and Reorientation of Site**



# Design Challenges (4)

- **Construction Sequencing**
  - Isolation of Flows
  - Use of Existing Facilities
  - Provisions for Peak Flow Events



# Under Construction (1)

- Demolition
- Rock Excavation
- Varying Site Conditions



# Under Construction (2)

- Major Structures Complete
- Influent Connection Made
- Discharge Connections to be Made in September 2013



# Under Construction (3)

- Estimated Completion of March 2014





# Acknowledgements

Thank you to DWU for selecting the Freese and Nichols, Inc. team for the development and execution of the Influent Pump Station.

The  **FREESE  
AND  
NICHOLS** Team:

AECOM – Yard Piping

Gupta and Associates – Power Supply and Controls

JQ – Structural

Perkins Engineering Consultants – Odor Control/Biofilters

VAI Architects – Architectural

Lim & Associates – Surveying and Site Civil

# Questions and Answers



DWU has purchased this deal!