

IAH WWTP Expansion Facilitates Houston's North Corridor Consolidation Program

Prepared for:
Texas Association of Clean Water
Agencies (TACWA)

Speakers:
Shari Lin, P.E.
Andy Shaw, Ph.D., P.E., BCEE, ENV SP
Justin Sandt, P.E.

July 22nd, 2022



Introductions: Our Project Delivery Team

Jing He
Engineer - Capital Projects

Farid Sadeghian
Managing Engineer – WWO

Mariluz Padilla
Supervising Engineer/WWO

Fazle Rabbi
Managing Engineer - Planning

Walid Samarneh
Managing Engineer - Regulatory
Compliance
Other Offices




BLACK & VEATCH

Shari Lin
COH Project Manager
Over 10 years with City of Houston Wastewater Facilities

Justin Sandt
BV Project Manager
14 years COH WWTP design experience, encompassing all plant components.

Andy Shaw
BV Global Process Expert
28 years of global wastewater process design and modeling

Farr Fakheri
Principal-in-Charge

John D'Antoni
Technical Advisor

Maggie Li
Project Support

Tori Haugvoll
Project Engineer

Dylan Christenson
Process Engineer

Jose Mendiola
Project Support

Katie Fye
Project Support

Jeff Boos
Structural

Stephane Lecina
Hydraulics

Major
Subs

Kalluri Group
EI&C Support

CP&Y
Structural Support

5-Engineering
Civil/Mechanical Support

Gunda
Civil/Mechanical Support

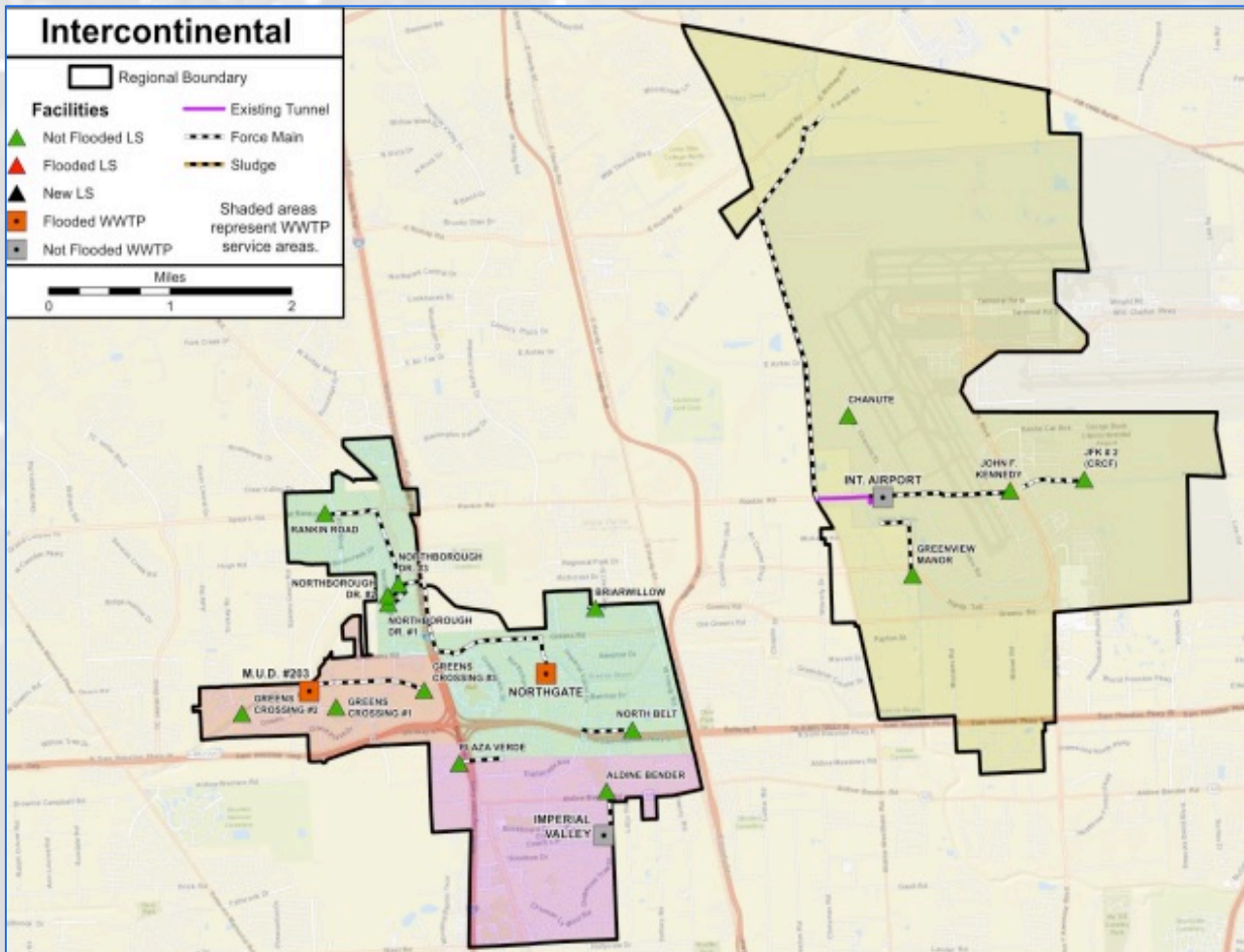
WJEIS
Operations Support

United
Survey

GET
Geotech

Agenda

- Shari Lin
 - Project Background/Purpose
 - North Corridor Consolidation Overview
 - Expansion Project Scope
- Andy Shaw
 - Basis of Design - Loading
 - Dynamic Modeling/Process Evaluation
- Justin Sandt
 - Key Features
 - Grit
 - UV
- Discussion/Questions



Background

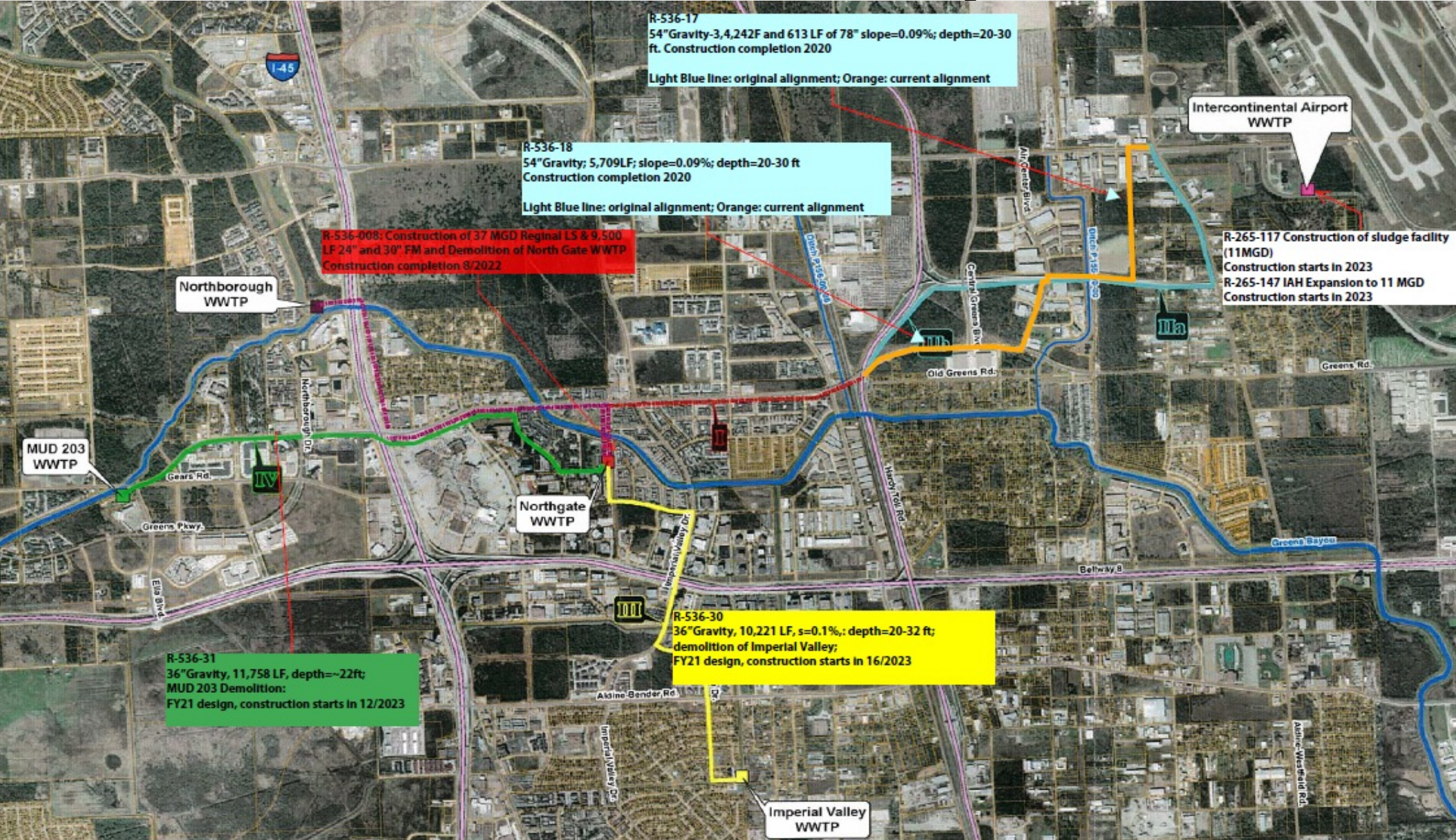
Expansion Project Purpose

- Consolidate Northgate, Imperial Valley, MUD #203 WWTPs flow to IAH WWTP
- Increase IAH WWTP treatment capacity
 - 8 MGD to 11 MGD AADF
 - 32 MGD to 55 MGD Peak 2-hr
 - Provision for future 14 MGD AADF and 78 MGD Peak 2-hr

North Corridor Consolidation Overview

- City has 39 WWTPs
- Consent Decree includes plan to start consolidation of plants
 - North Corridor Consolidation
 - Imperial Valley, MUD 203, Northgate transfer to IAH WWTP
 - IAH WWTP (indirectly related)
- Completion of initial projects 2026

North Corridor Consolidation Projects



IAH WWTP Expansion Project Scope

- Evaluate existing conditions
- Assess hydraulics and process
- Identify alternatives
- Recommended expansion/
improvements
- **Final Design**
- Construction Phase Services

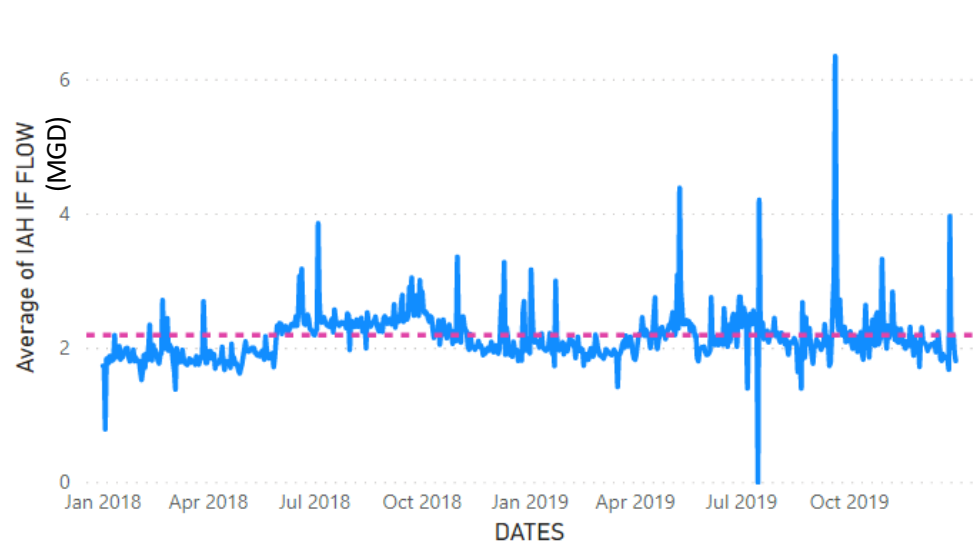


Basis of Design

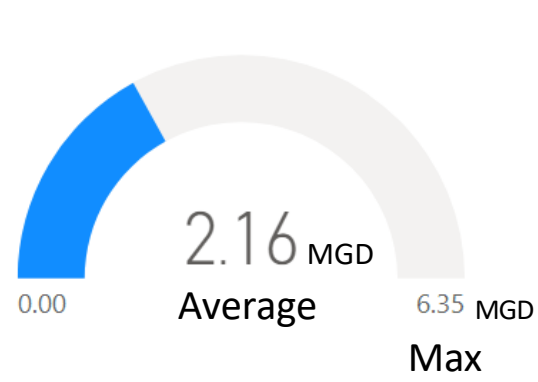
HISTORICAL FLOW DATA (2018 & 2019) – IAH WWTP

Average Daily Flow

Average of IAH IF FLOW by DATES

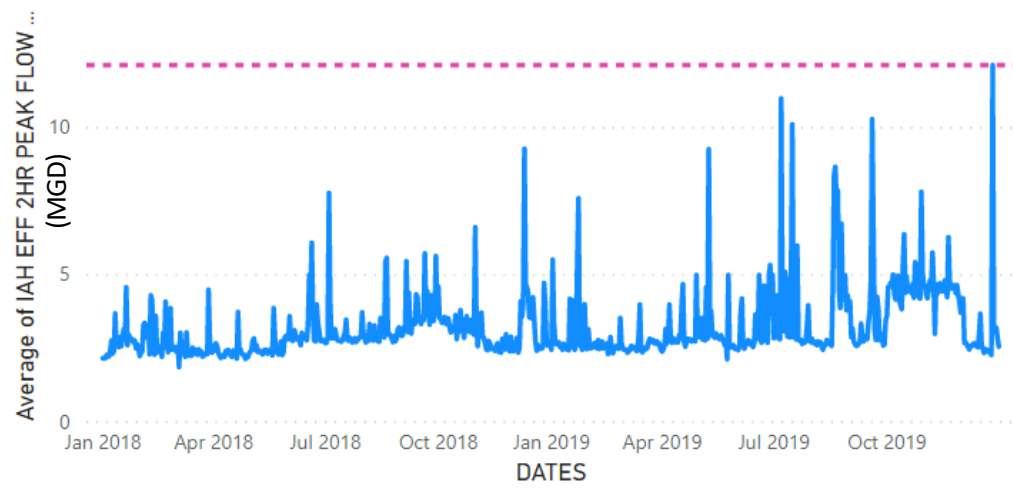


Average of IAH IF FLOW and Max of IAH IF FLOW

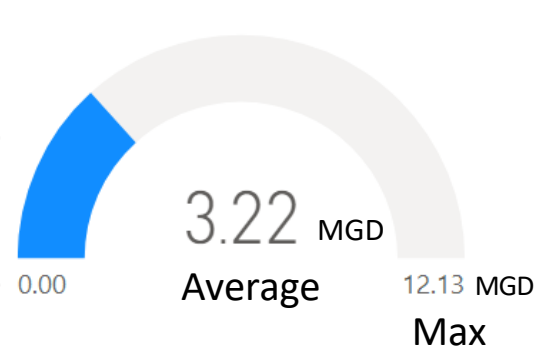


Peak 2HR Flow

Average of IAH EFF 2HR PEAK FLOW (MGD) by DATES



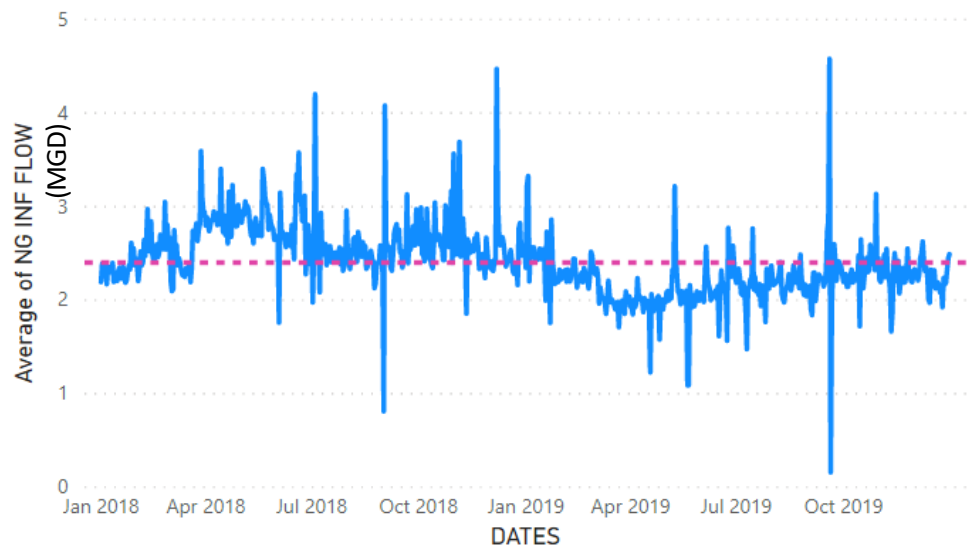
Average of IAH EFF 2HR PEAK FLOW (MGD) and Max of IAH EFF 2HR PEAK FLOW (MGD)



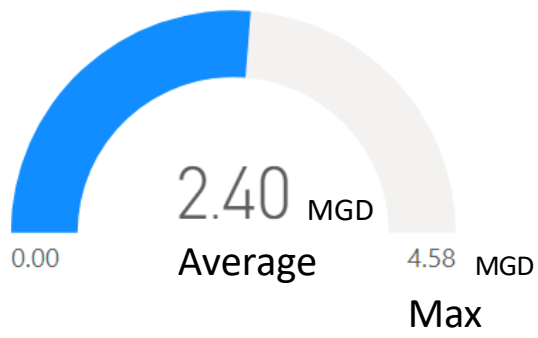
HISTORICAL FLOW DATA (2018 & 2019) – NORTHGATE WWTP

Average Daily Flow

Average of NG INF FLOW by DATES

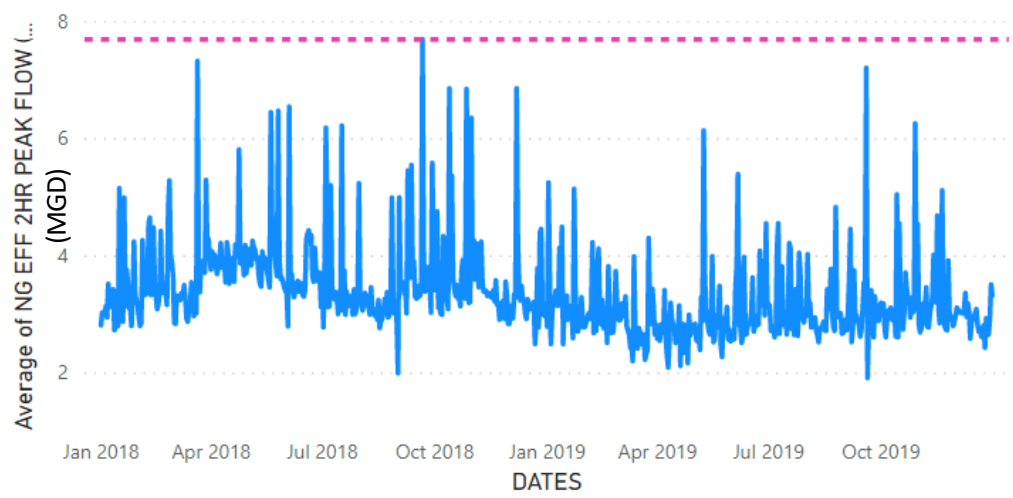


Average of NG INF FLOW and Max of NG INF FLOW

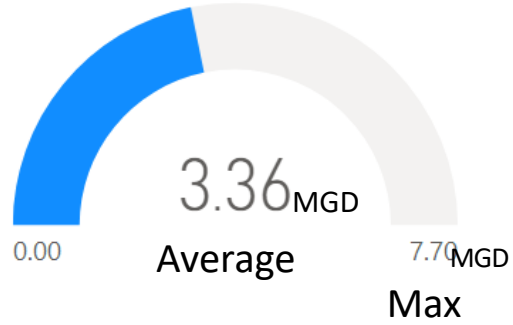


Peak 2HR Flow

Average of NG EFF 2HR PEAK FLOW (MGD) by DATES

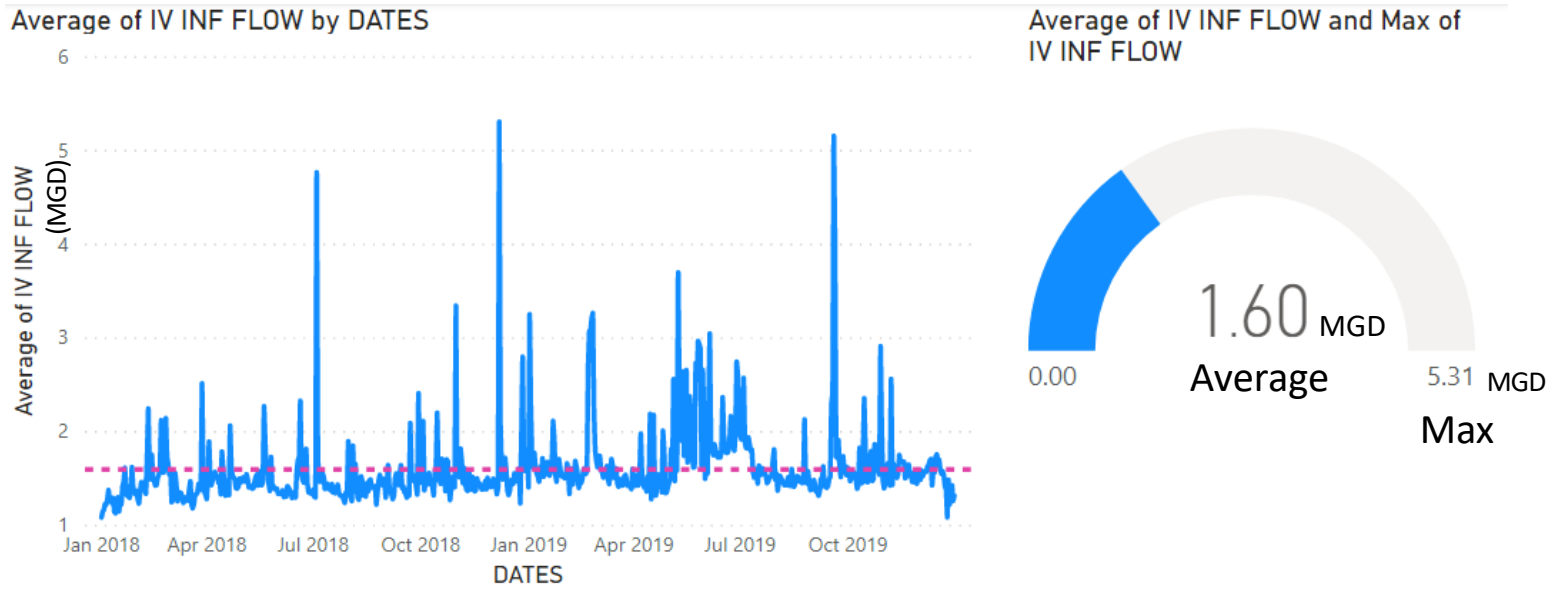


Average of NG EFF 2HR PEAK FLOW (MGD) and Max of NG EFF 2HR PEAK FLOW (MGD)

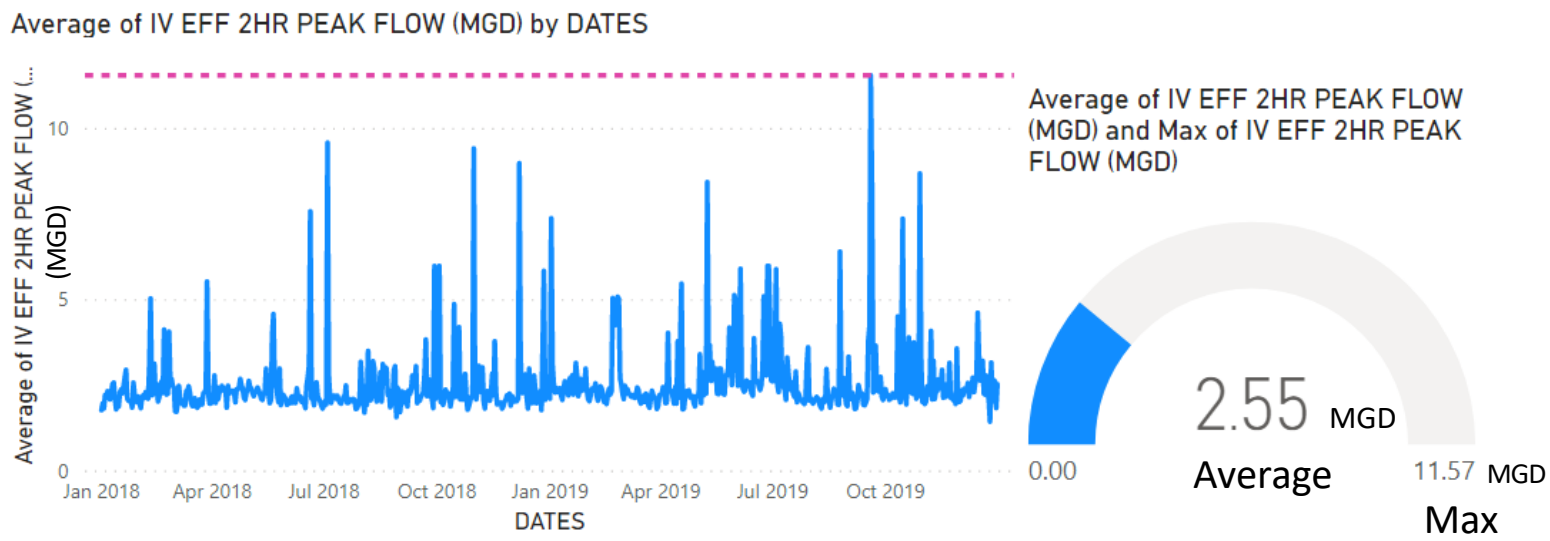


HISTORICAL FLOW DATA (2018 & 2019) – IMPERIAL VALLEY WWTP

Average Daily Flow

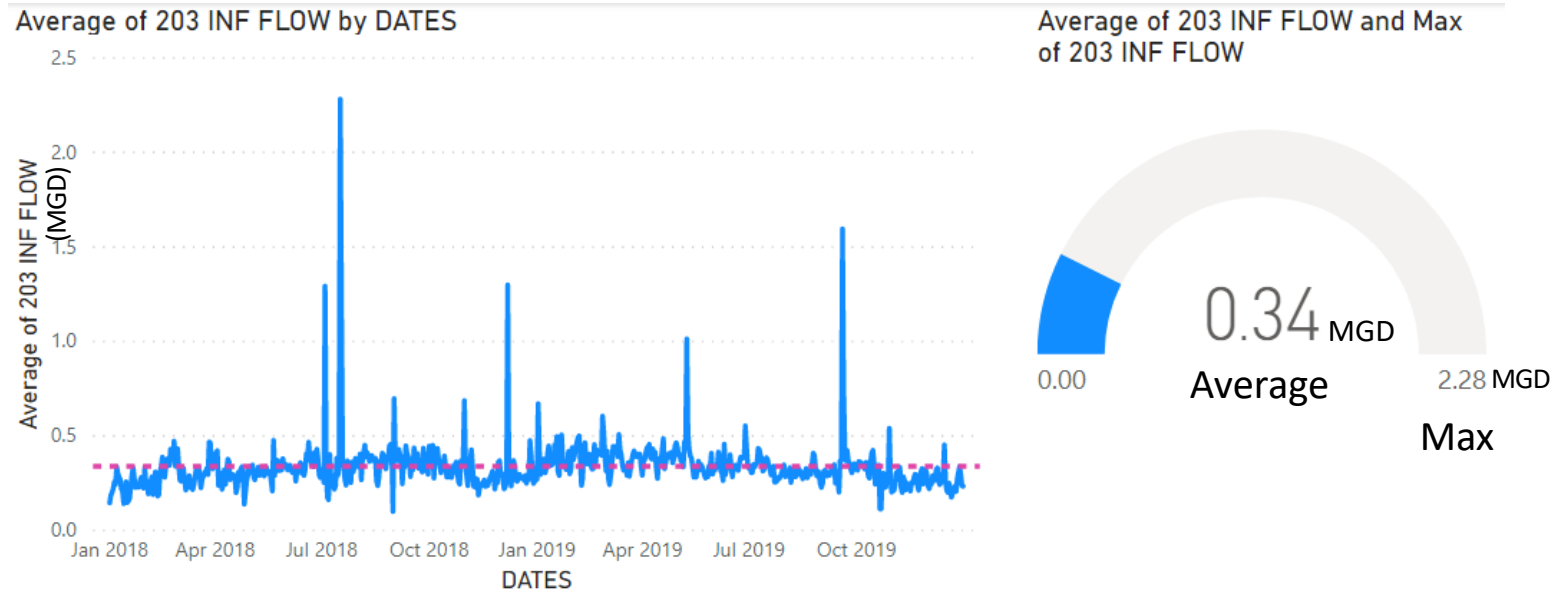


Peak 2HR Flow

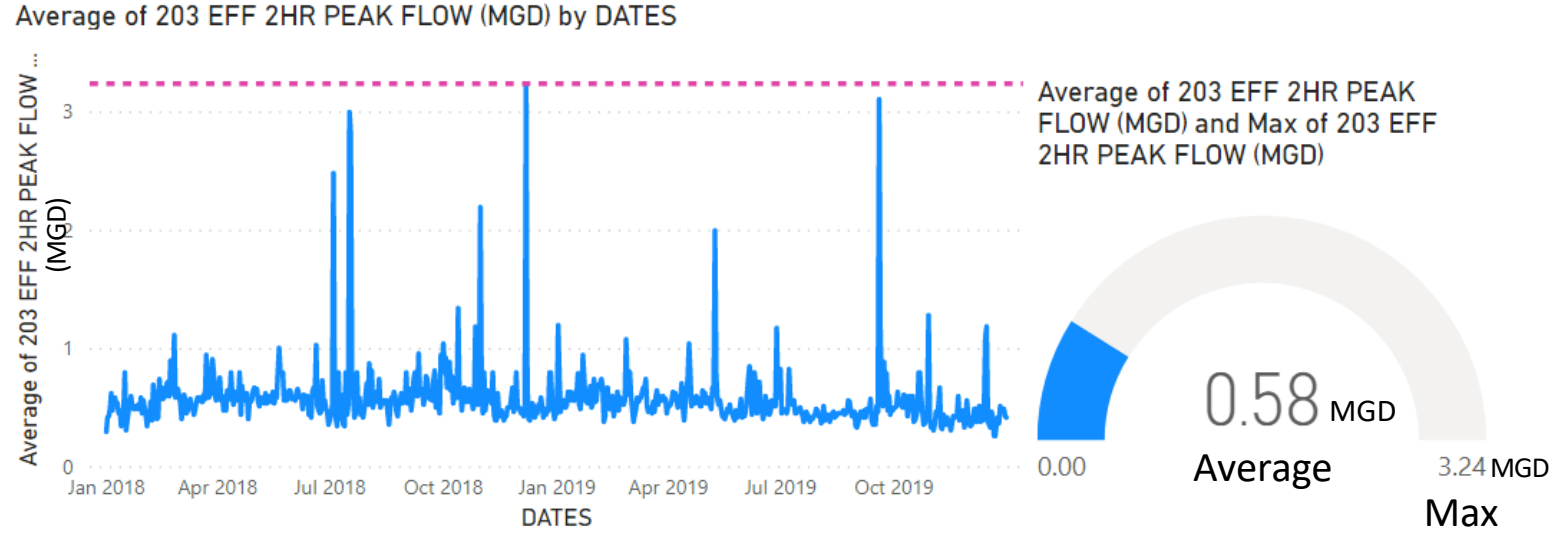


HISTORICAL FLOW DATA (2018 & 2019) – MUD #203 WWTP

Average Daily Flow



Peak 2HR Flow



BASIS OF DESIGN FLOWS – PLANT EXPANSION

WWTP	Permitted design flow (MGD)		Historical Flow Data (MGD)		Peaking Factor (2HR)	Percent Used Capacity	
	ADF	PEAK 2HR	ADF	PEAK 2HR		ADF	PEAK 2HR
IAH	8	32	2.2	12.1	5.50	28%	38%
Northgate	3.7	11.1	2.5	7.7	3.08	68%	69%
Imperial Valley	4	9.7	1.6	11.6	7.25	40%	120%
MUD #203	3	9	0.4	3.3	8.25	13%	37%
Consolidated	11	55	6.5¹	32.2¹	4.95	59%	59%

Note: 1 – Consolidated flow based on summation of individual days

Basis of Design - Loading

Permitted Flows

Flow Scenario	Existing	Phase 1 Expansion	Phase 2 Expansion
Permitted AADF	8	11	14
Permitted 2hr Peak	32	55	78

Design Concentrations

Parameter	Units	Phase 1 Expansion	Phase 2 Expansion
TSS	mg/L	350	
cBOD ₅	mg/L	250	
NH ₃ -N	mg/L	35	

Effluent Limitations

*Based on TPDES current permitted requirements

Summary of Effluent Parameters

Effluent Characteristics	Units	Discharge Limitations	
		Daily Avg.	Daily Max.
cBOD ₅	mg/L	10	25
TSS	mg/L	15	40
NH ₃ -N	mg/L	3(5) ¹	10
E.Coli ²	cfu/100mL	63	200

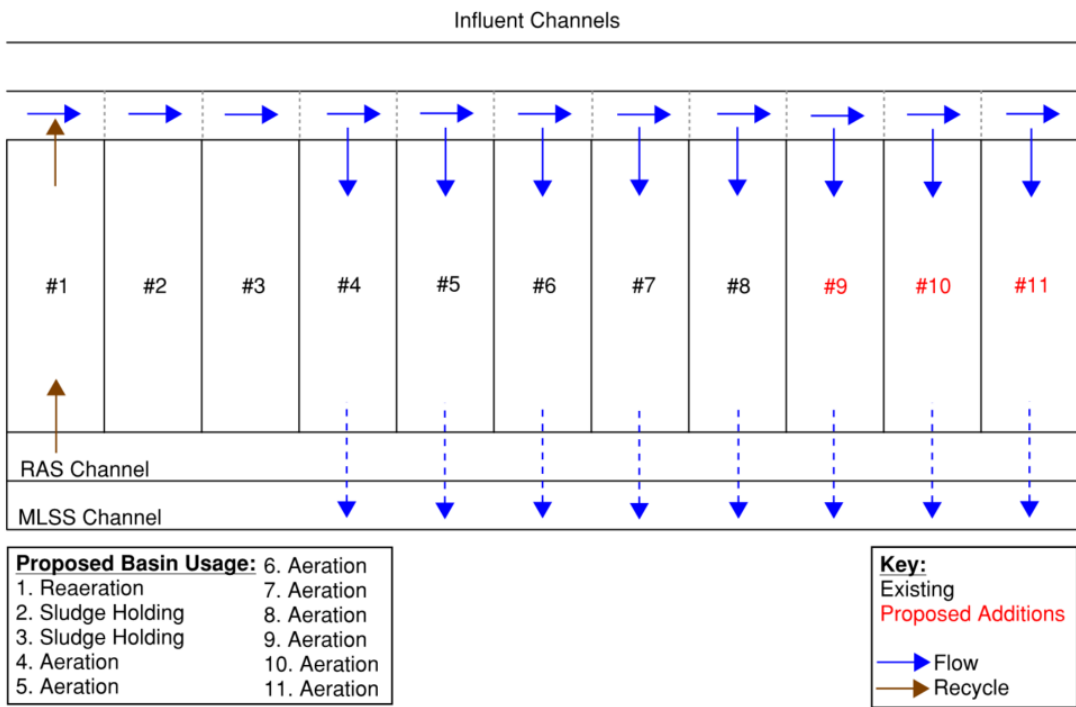
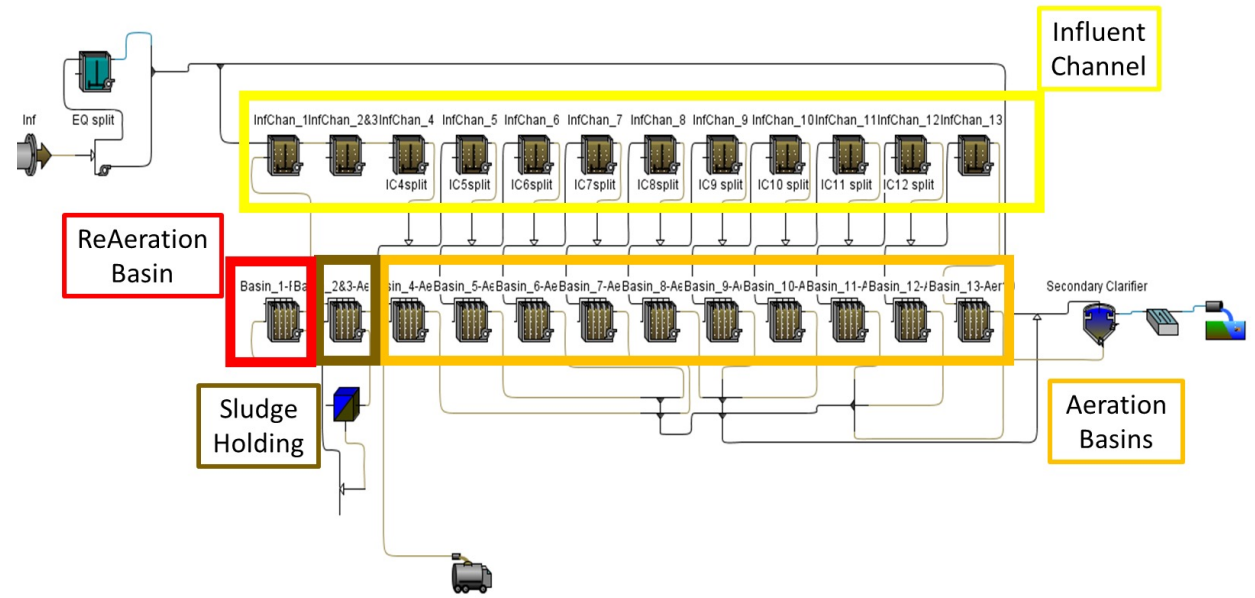
¹NH₃-N daily average limitations for April-October are 3 mg/L and 5 mg/L for November-March

²E.Coli, colony-forming units or most probable number per 100 mL

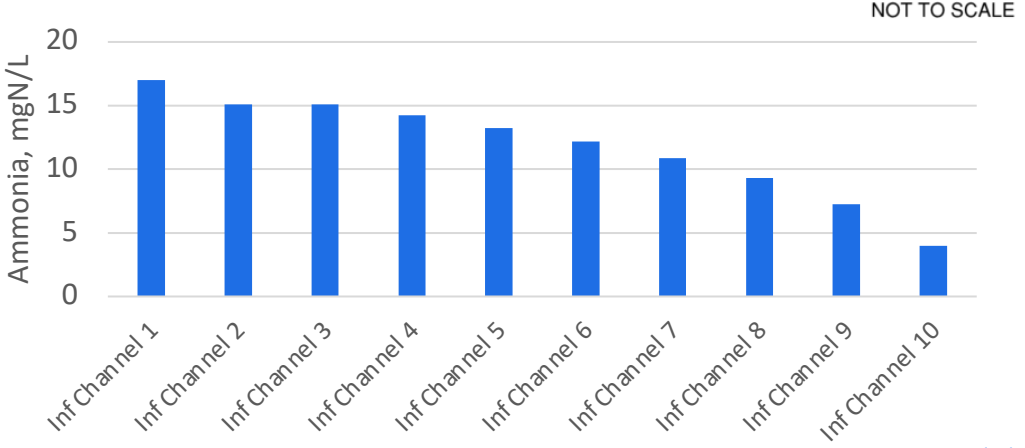
Dynamic Process Modeling Used to Investigate Options

Aeration Basin Configuration with Influent Channel Acting as Reactors in Series

GPS-X Model Layout

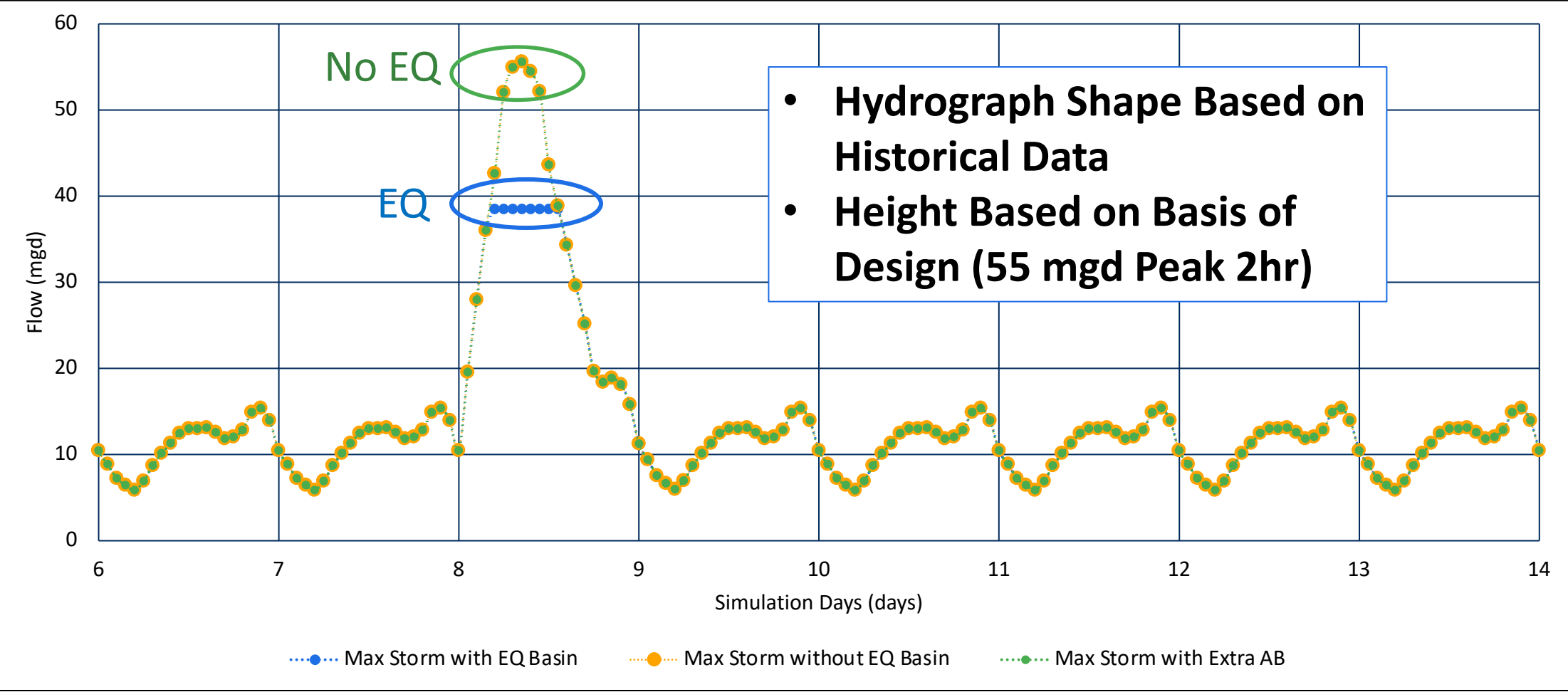


Individual Trains Modeled due to Large/long Influent Channel Producing an Inlet Profile



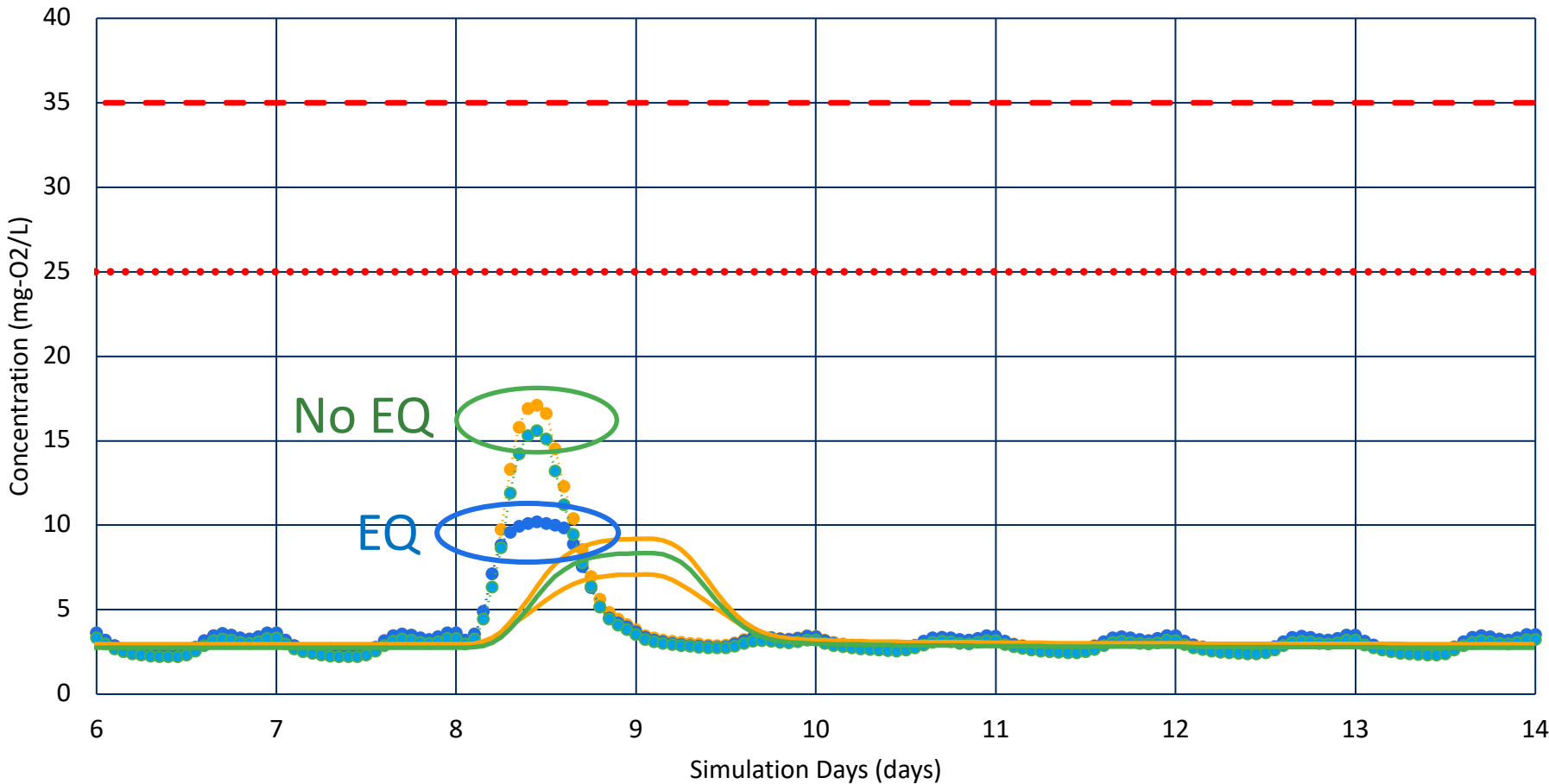
Simulations Used to Investigate Potential Benefit of Influent EQ

Maximum Storm Flow Diurnal



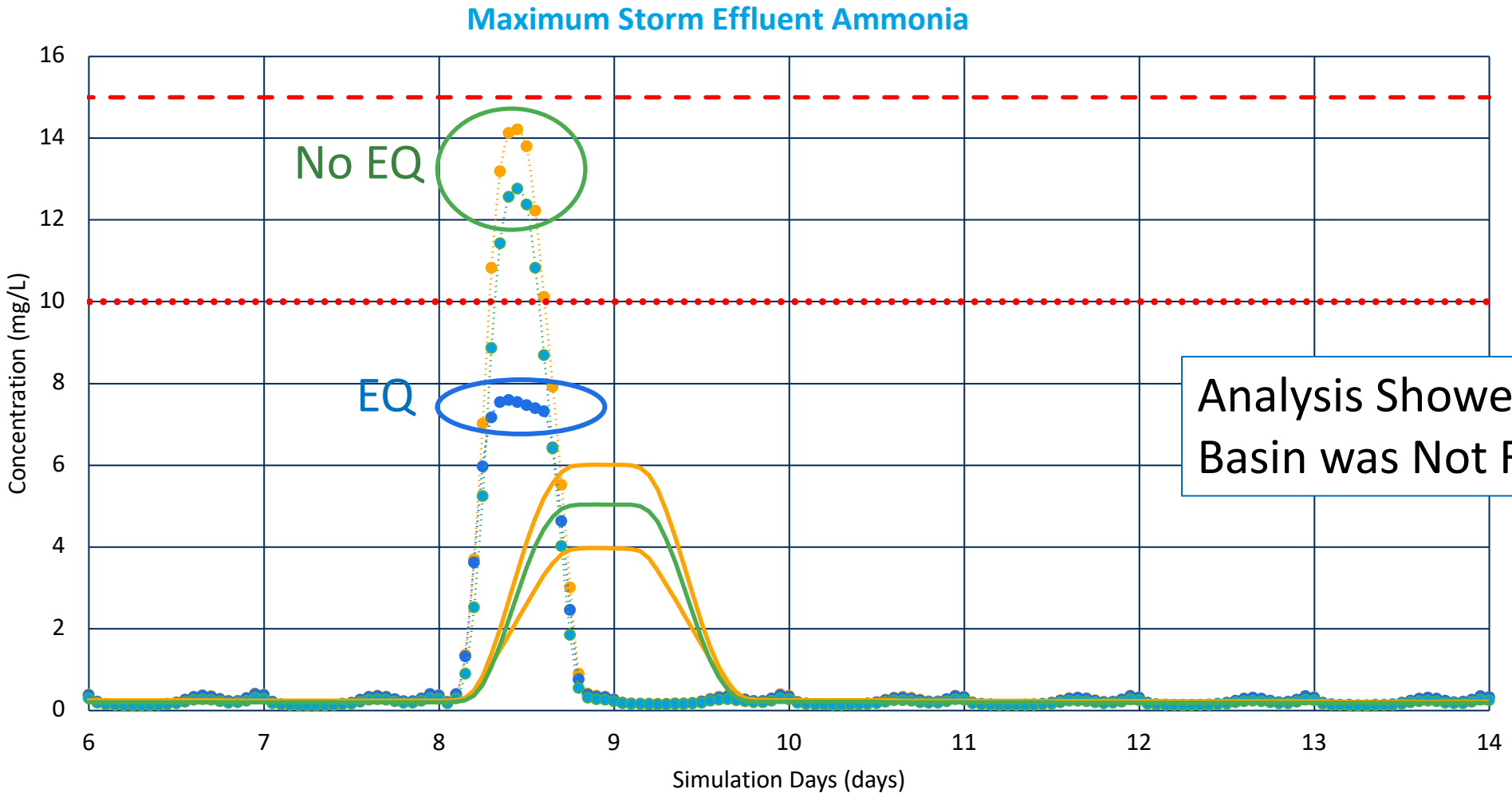
Simulations – Wet Weather Analysis – Effluent cBOD

Maximum Storm Effluent cBOD



-●..... Max Storm without EQ Basin
-●..... Max Storm with EQ Basin
-●..... Daily Max
- - - - - Single Grab
-●..... Max Storm with Extra AB
- Daily Avg - Without EQ Basin
- Daily Avg - With EQ Basin
- Daily Avg - +1AB

Simulations – Wet Weather Analysis – Effluent Ammonia



- Max Storm without EQ Basin ●●● Max Storm with EQ Basin ●●● Daily Max
- Single Grab ●●● Max Storm with Extra AB — Daily Avg - Without EQ Basin
- Daily Avg - With EQ Basin — Daily Avg - +1AB

Key Features – Overview, Grit, UV

LIFT STATION:

- Replace pumps
- Partial VFDs
- New Electrical Bldg

HEADWORKS:

- Install 3rd Mechanical Screen

GRIT REMOVAL:

- Install New Aerated Grit System

SLUDGE:

- Install WAS Submersible Pumps

STANDBY POWER:

- Temporary generator provisions for Lift Station
- Permanent Natural Gas generator for UV Disinfection

PLANT SITE:

- Access road extension
- New Detention Pond

AERATION BASINS:

- Install 2 new Aeration Basins
- Implement aeration control via DO monitoring and airflow measurement/adjustment
- Replace gates/valves (10 basins)

SECONDARY CLARIFIERS:

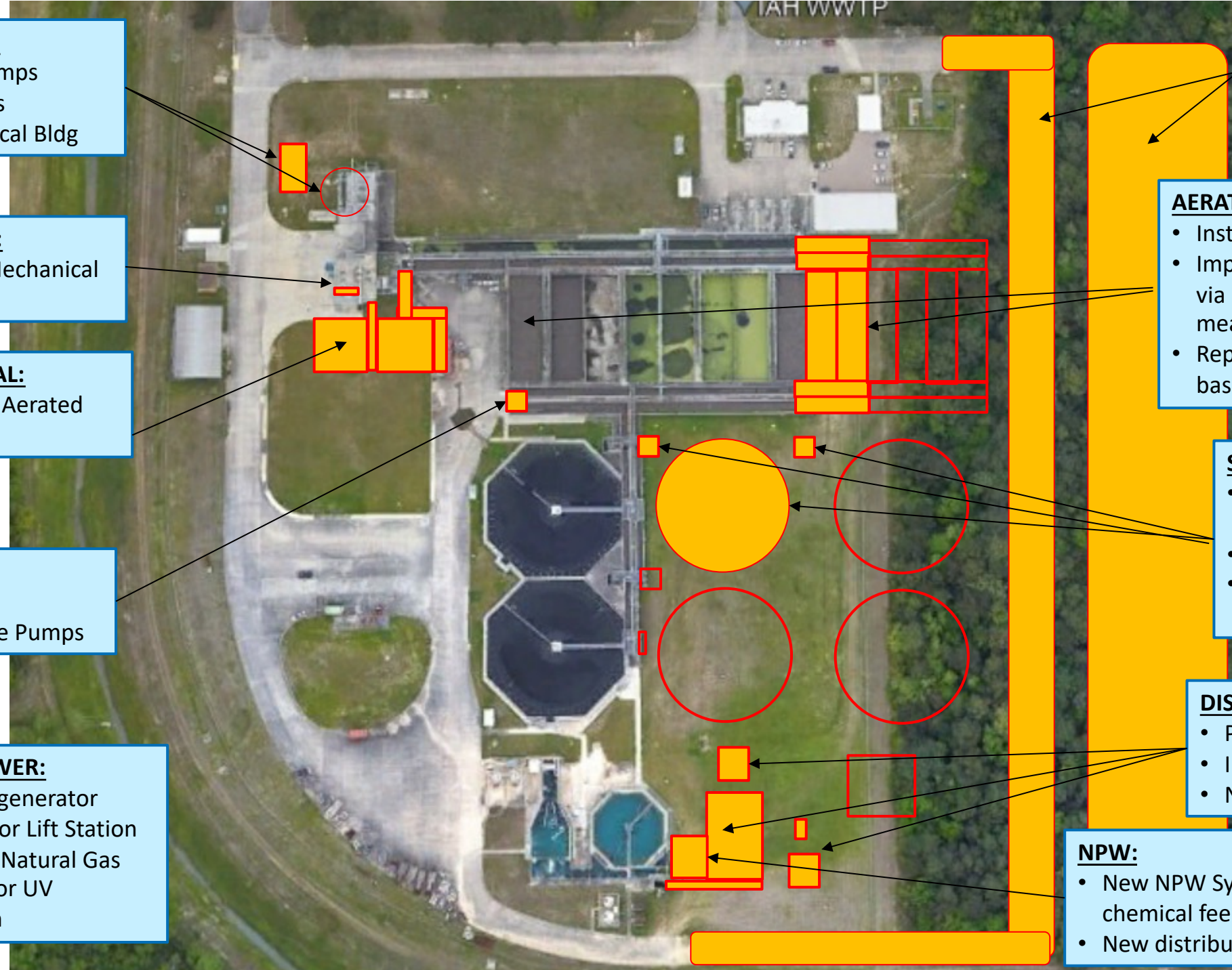
- Install 1 new Circular Secondary Clarifier
- RAS Airlift Pump Stations
- Duplicate Scum Disposal System

DISINFECTION:

- Pre-Disinfection Junction Box
- Install new UV System
- New UV Electrical Building

NPW:

- New NPW System with chemical feed
- New distribution piping



Lack of Existing Grit Removal

Existing Conditions:

- Out of service/Obsolete

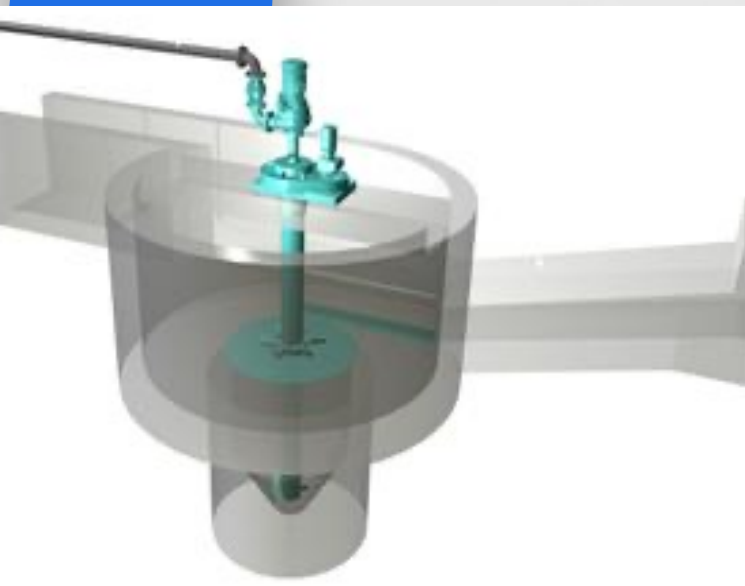
Drivers for Improvements:

- Current system not functional
- Grit in influent channels and aeration basins
- Handle wide range of flows

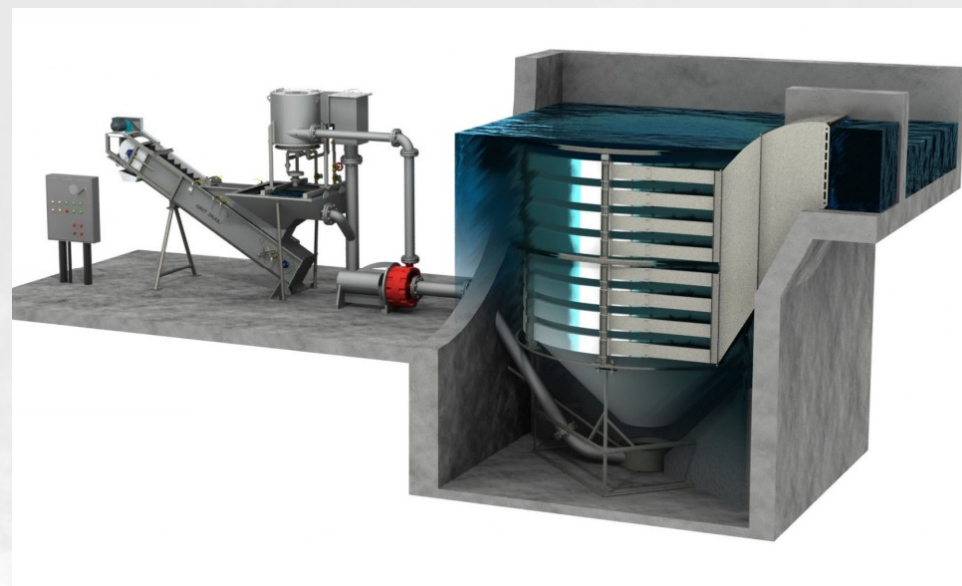


COH desired some means of simple, robust grit removal before downstream process

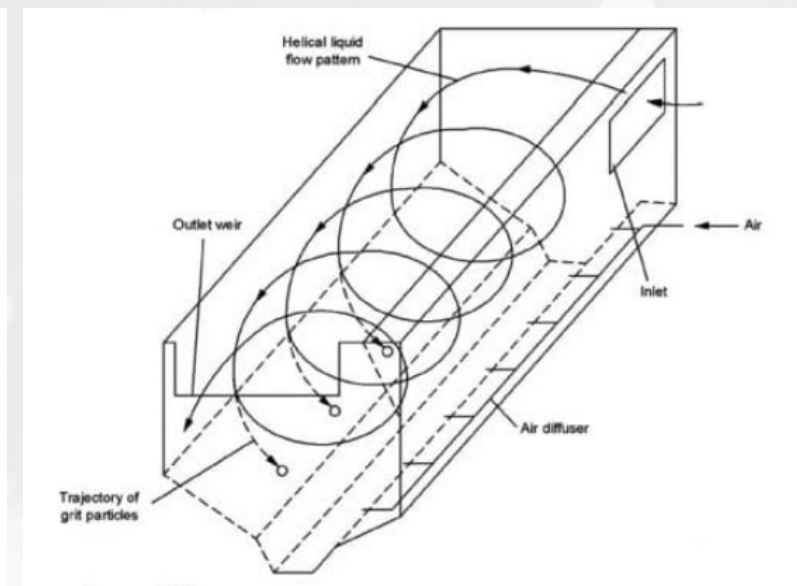
Three Types of Grit Systems Evaluated



**Mechanical Vortex
Pista Grit**



**Hydraulic Vortex
HeadCell**



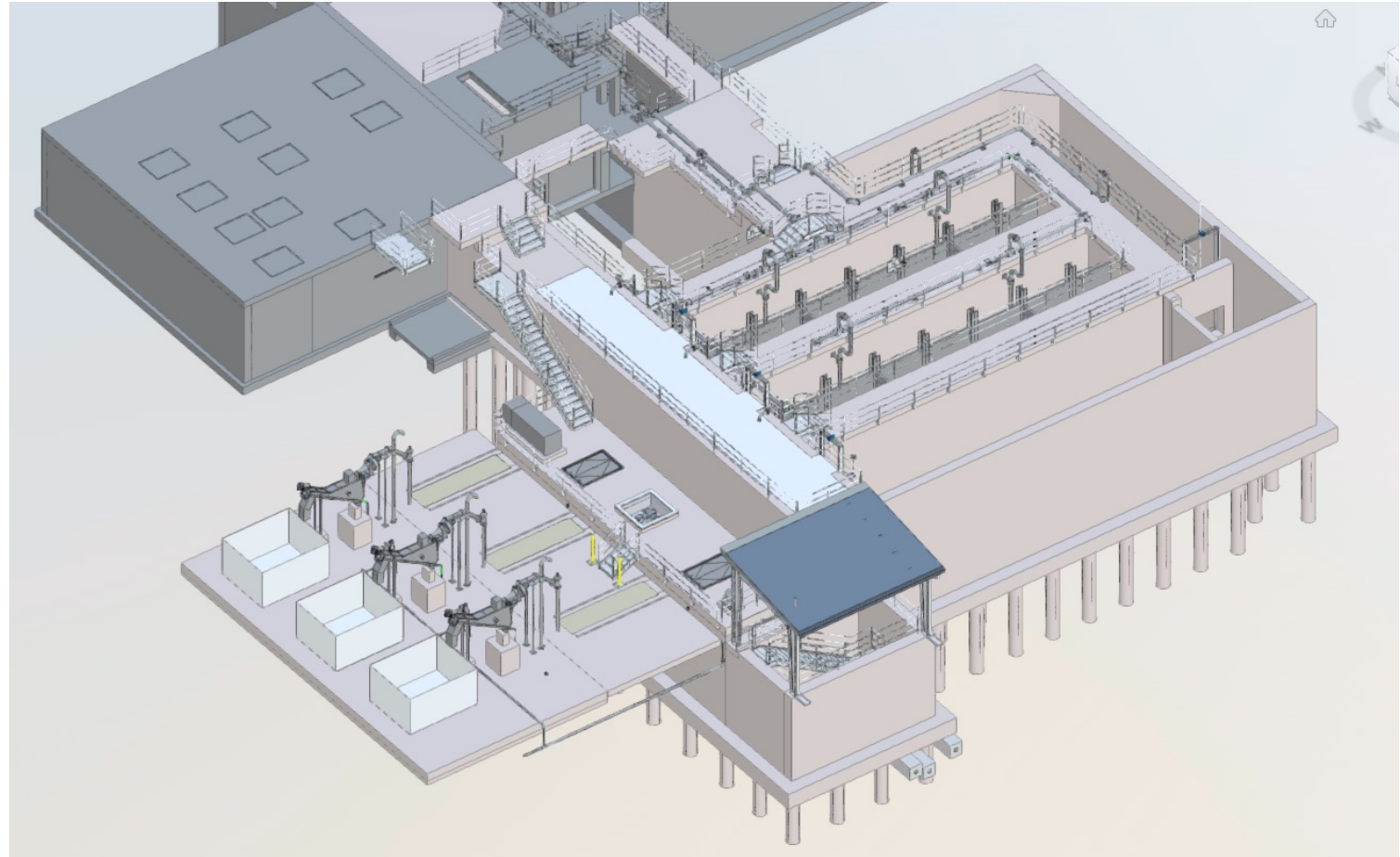
**Aerated Grit
Basins**

Alt	Description	Advantages	Disadvantages
1	Continue Current Operations	<ul style="list-style-type: none"> No capital cost No construction Impact 	<ul style="list-style-type: none"> Labor intensive Inefficient oversized Bypass for removal Dirty grit
2	Mechanical Vortex Grit (Pista Grit)	<ul style="list-style-type: none"> Low headloss (< 2 ft) Variable Flow range Clean grit Robust removal 	<ul style="list-style-type: none"> High capital cost More equipment Moving part/fluidity Complex construction/Operation
3	Hydraulic Vortex System (HeadCell)	<ul style="list-style-type: none"> Simple operation Fine grit removal Clean grit No submerged parts No power required 	<ul style="list-style-type: none"> High headloss (2-4 ft) High capital cost Proprietary Flush water Basin cleanout
4	Equalization Basin	<ul style="list-style-type: none"> Storage flexibility 	<ul style="list-style-type: none"> Highest capital cost Increased O&M Potential odor issues Peak flow only
5	Aerated Grit Basin	<ul style="list-style-type: none"> Ease of operation (On/Off) Clean grit Consistent/Robust removal efficiency over wide flow range 	<ul style="list-style-type: none"> Less removal efficiency High capital cost Submerged part requires additional maintenance

Aerated Grit Facility (COH Preference)

Recommendations

- Demolish/fill in existing grit basin
- New Aerated Grit Facility
 - 2 Aerated Grit Basins equipped with screw conveyors
 - 3 grit pumps in underground pump room (2+ shelf spare)
 - 3 Grit Classifiers
 - 1 Emergency Bypass Basin (Future 78 MGD Basin)
- Tie in to existing on influent/effluent
- Associated NPW supply improvements

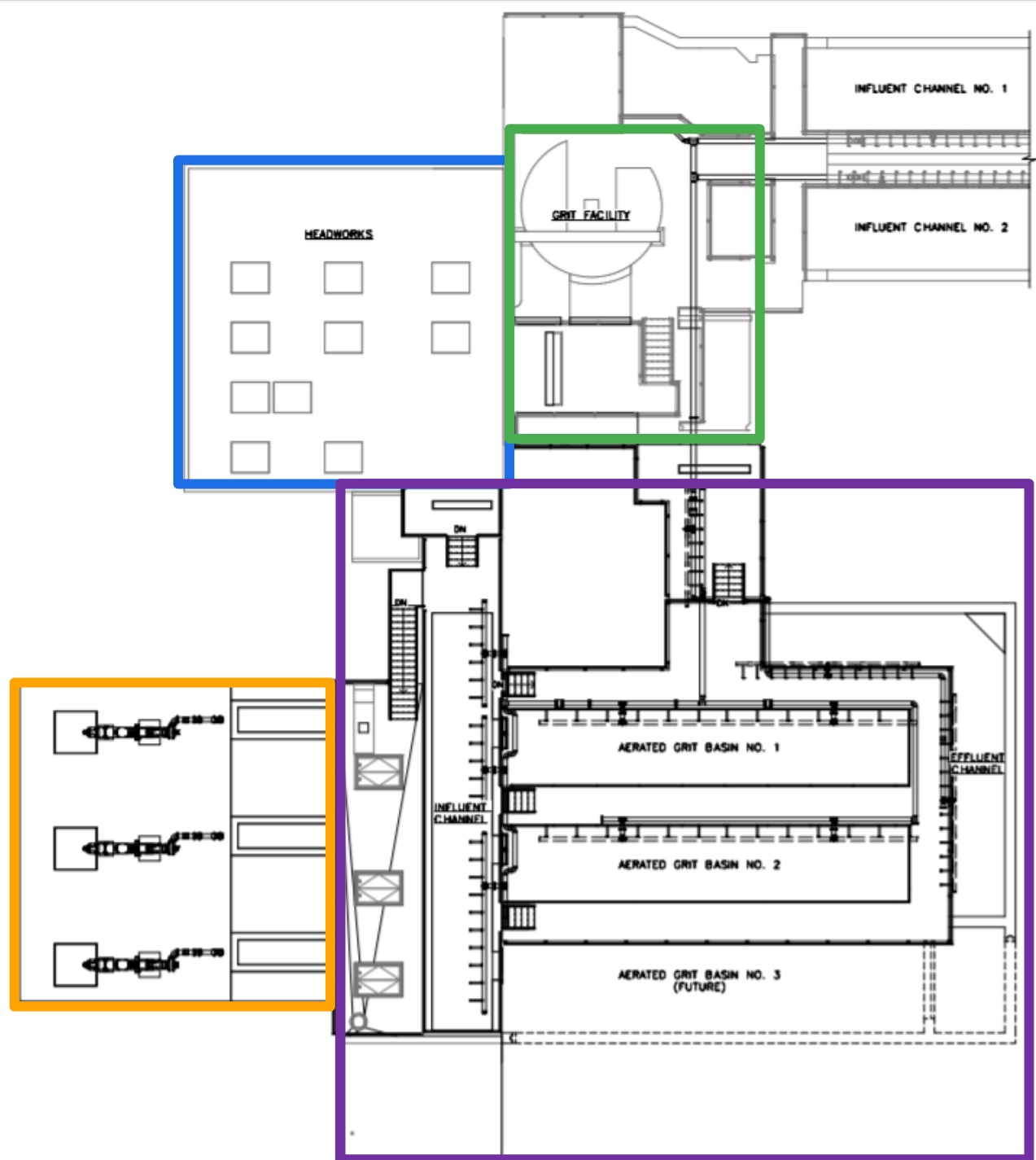


HEADWORKS SCREENING

HEADWORKS GRIT REMOVAL

PROPOSED GRIT FACILITY

PROPOSED GRIT CLASSIFIERS



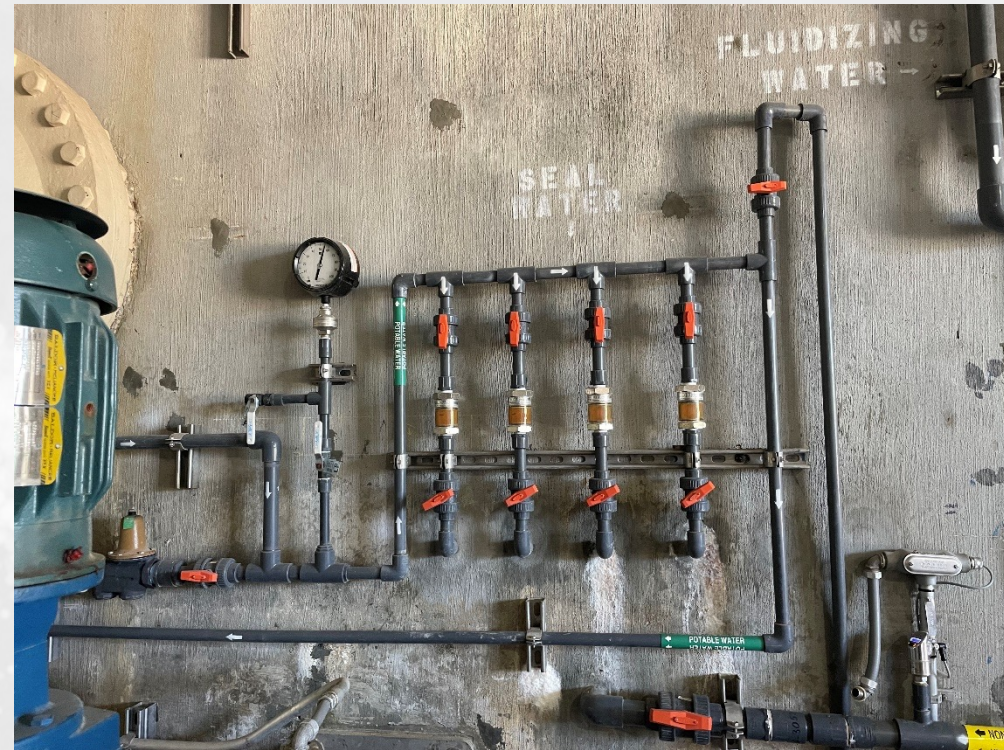
Aerated Grit Key Design Features

- 60-70% removal of 150 microns
- Baffling for increased removal efficiency
- Piping interconnections for redundancy and easy cleaning
- Spare/redundant pumps and classifiers
- NPW supply for pump sump flushing, cleaning, and classifiers
- Third basin for future expansion/bypass



Operation and Maintenance

- Continuous operation to prevent clogging
- Operate both basins at all time
- Piping configuration facilitates ease of cleaning/unclogging
- Regular inspection/maintenance of conveyor, pumps, classifiers



DISINFECTION

Existing Conditions:

- Facility includes:
 - Mixing and flow measurement (aerated)
 - Octagonal CCB
 - Chemical feed systems

List of Drivers for Improvements:

- Capacity/Turndown (4 to 55 mgd)
- Flow measurement
- Short circuiting (Peak)/Overdosing (ADF)
- Condition concerns
- Lowest cost alternative and ease of operation



Alt.	Description	Advantages	Disadvantages
1	Rehab and expand existing CCB Chem Feed	<ul style="list-style-type: none"> • Lowest capital cost • Maintains existing system 	<ul style="list-style-type: none"> • Chemical feed systems • Limited turndown and redundancy • Construction impact • Difficult to expand • Higher LCC
2	New CCB Chem Feed	<ul style="list-style-type: none"> • Turndown and flexibility • Matches existing system • Less construction impact • Easy to expand 	<ul style="list-style-type: none"> • Highest capital cost • Chemical feed systems • New power supply • Higher LCC
3	New UV System	<ul style="list-style-type: none"> • Lower capital cost • Lowest O&M cost • Turndown and flexibility • Less construction impact • Easy to expand 	<ul style="list-style-type: none"> • Higher power cost • Larger generator • New power supply • Operator familiarity

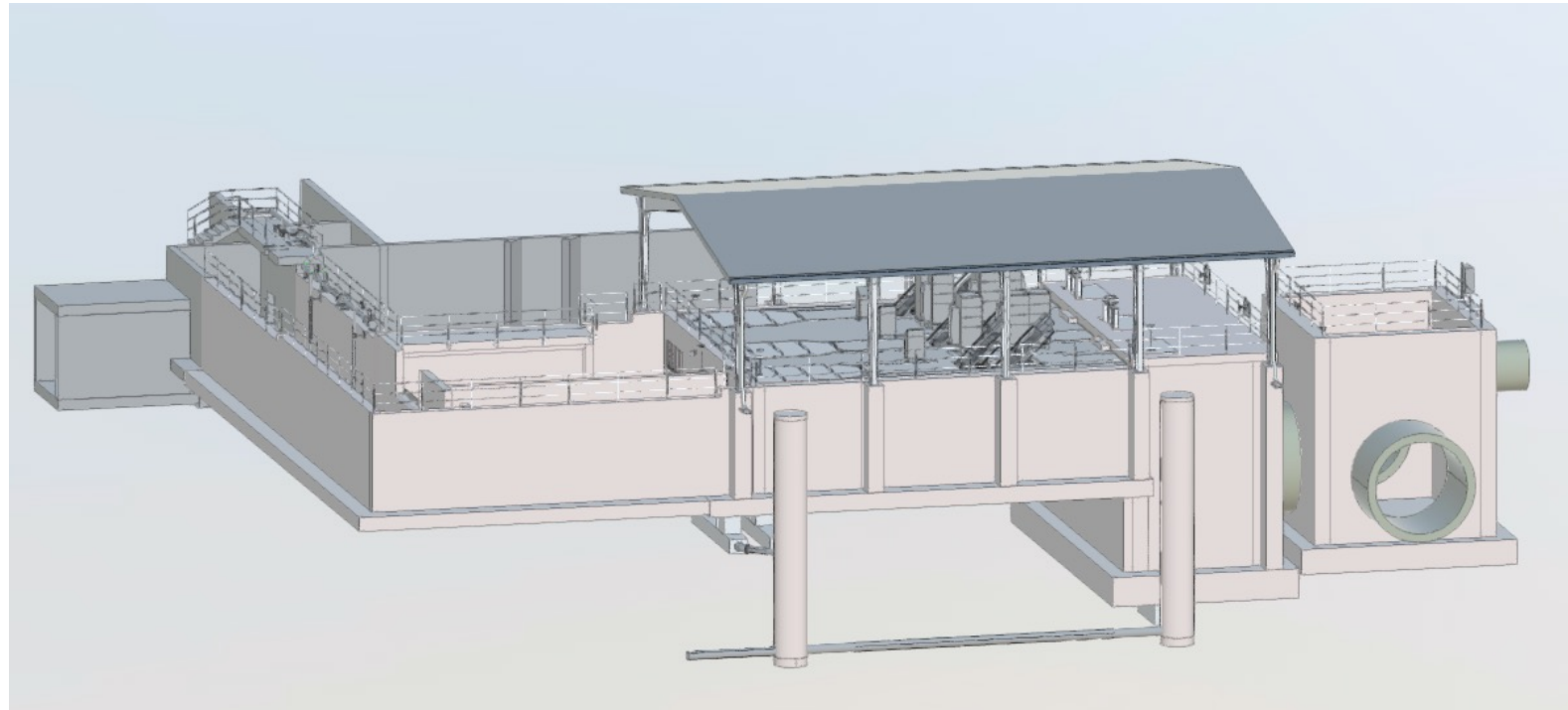
Lowest LCC was UV with approx. 7-year payback over rehab

All alternatives included emergency back-up generator for comparison

UV Disinfection

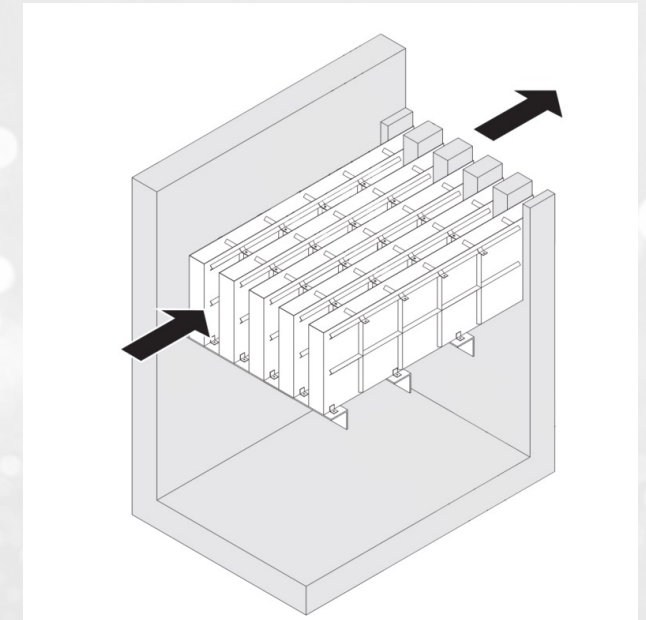
Recommendations

- Install new UV Disinfection Facility with canopy
- Connection of UV to existing CCB and plant outfall
- Construction of new UV electrical building
- New standby natural gas engine generator
- Associated Lift Station/NPW improvements



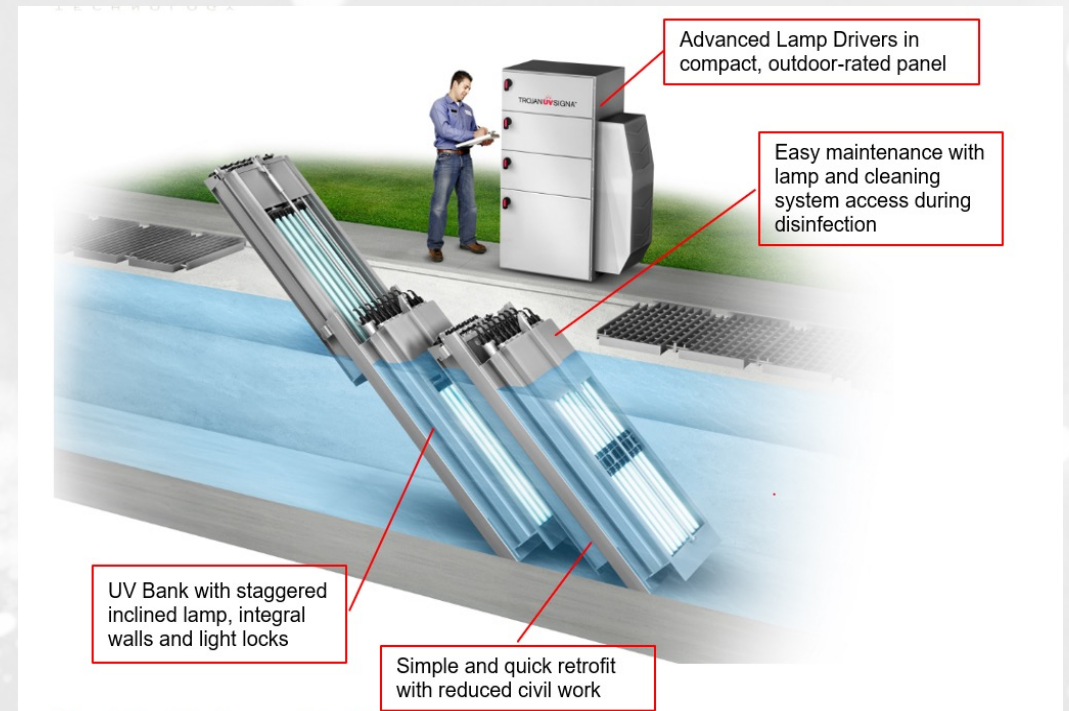
Key Design Features

- Rated for UVT of 65% and TSS of 15 mg/l at 55 MGD
- Long weir for level control over full range
- UV Sizing and Redundancy
 - 27.5 MGD per channel (2 duty , 1 future)
 - UV Banks per Channel – 4 (3 duty, 1 redundant); 24 lamps/bank
 - Hydraulic and Power Turndown (3-27.5 MGD)
 - Existing CCB facility will remain in place and available as backup
- 2 to 3 year service agreement with supplier



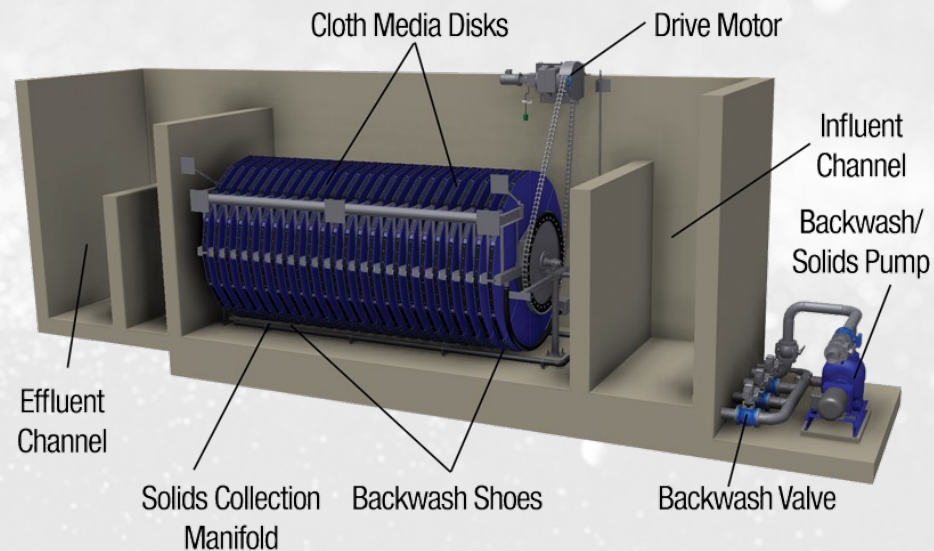
Operation and Maintenance

- Automated control to meet disinfection target with manual override
- Typically operate one channel and rotate channels weekly
- Bulb Cleaning
- Bulb and Ballast Replacement



Disk Filter Provisions

- Considerations for Use of Disc Filters
 - Typically for reuse and/or to address issues with high TSS or low UVT.
 - When TSS discharge requirement is < 10 mg/L (IAH is currently 15 mg/L)
 - Can improve UV performance – reduce UV sizing
 - BV has dozens of UV installations across country (+/- 50% without filters)
- UVT testing during design verified design parameters (UVT $> 65\%$)
- Plant hydraulics and stub-outs can accommodate future filters if necessary

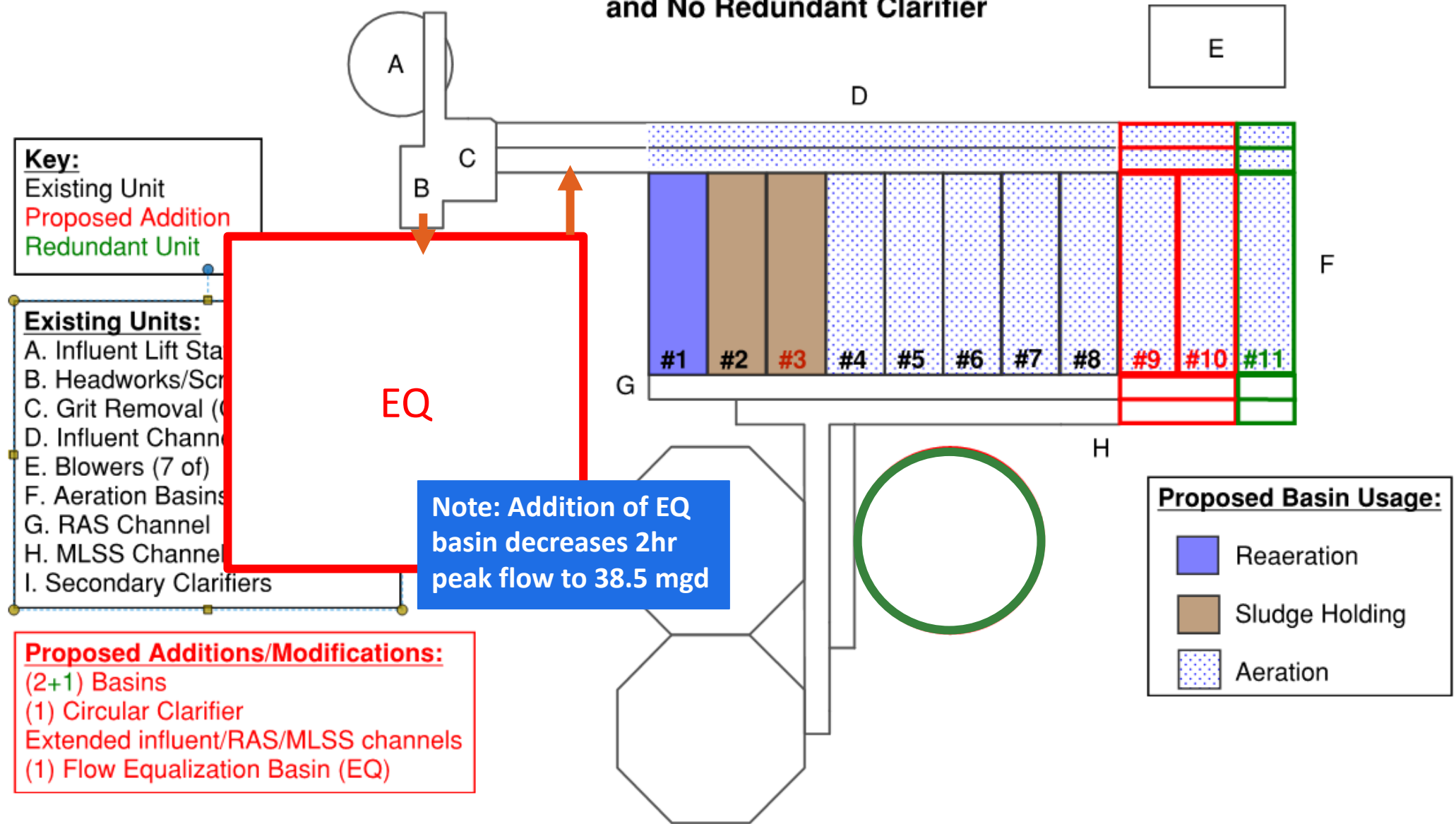


Discussion.

**Building
a World of
Difference.®**

Option 2

IAH WWTP Layout of Proposed Additions with Flow Equalization Basin and No Redundant Clarifier



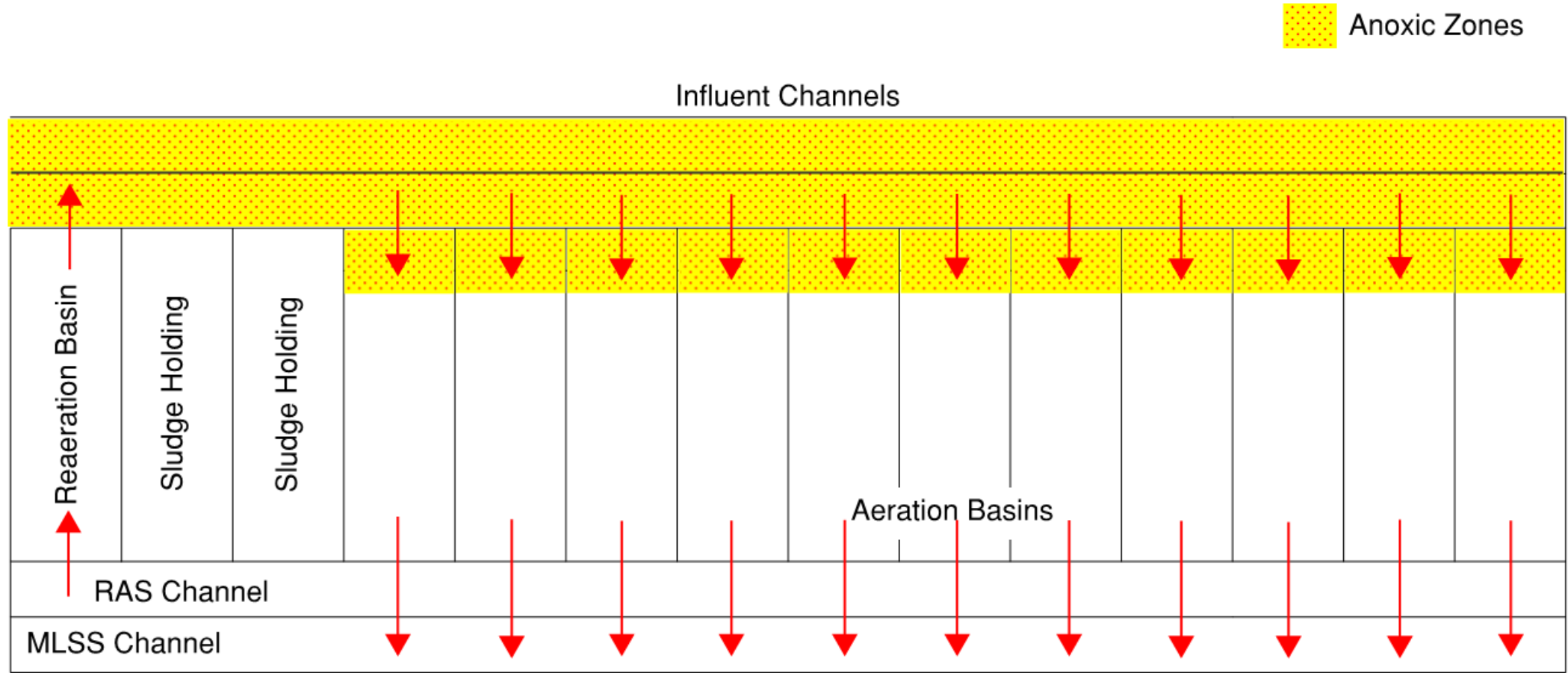
NOT TO SCALE

NUTRIENT REMOVAL – NITROGEN REMOVAL

- Conventional Activated Sludge treatment with Anoxic Zones
 - Allows for nitrogen removal via denitrification
 - Anoxic zones are areas where oxygen is only available in combined form (<1 mg/L DO)
- Configurations considered:
 - Anoxic Influent Channels
 - Anoxic Reaeration Zone
 - Anoxic Selector Zones (10-20% of basin volume) at the front of each basin
 - Separate Anoxic Basin
 - Optimal MLR Sizing

NUTRIENT REMOVAL – NITROGEN REMOVAL

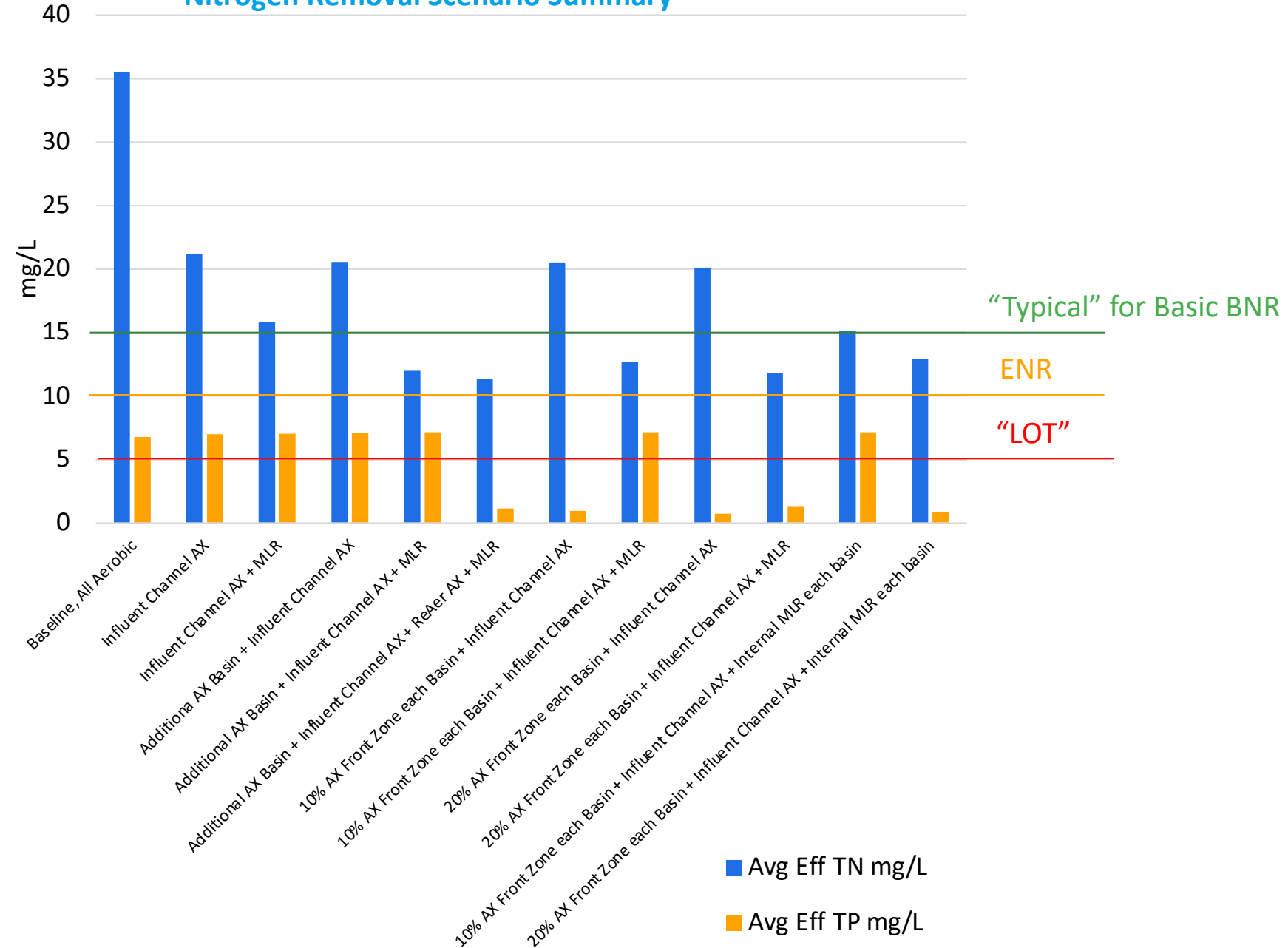
Figure 22: Proposed Anoxic Zones (20% Basin Usage)



NOT TO SCALE

NUTRIENT REMOVAL – NITROGEN REMOVAL SUMMARY

Nitrogen Removal Scenario Summary



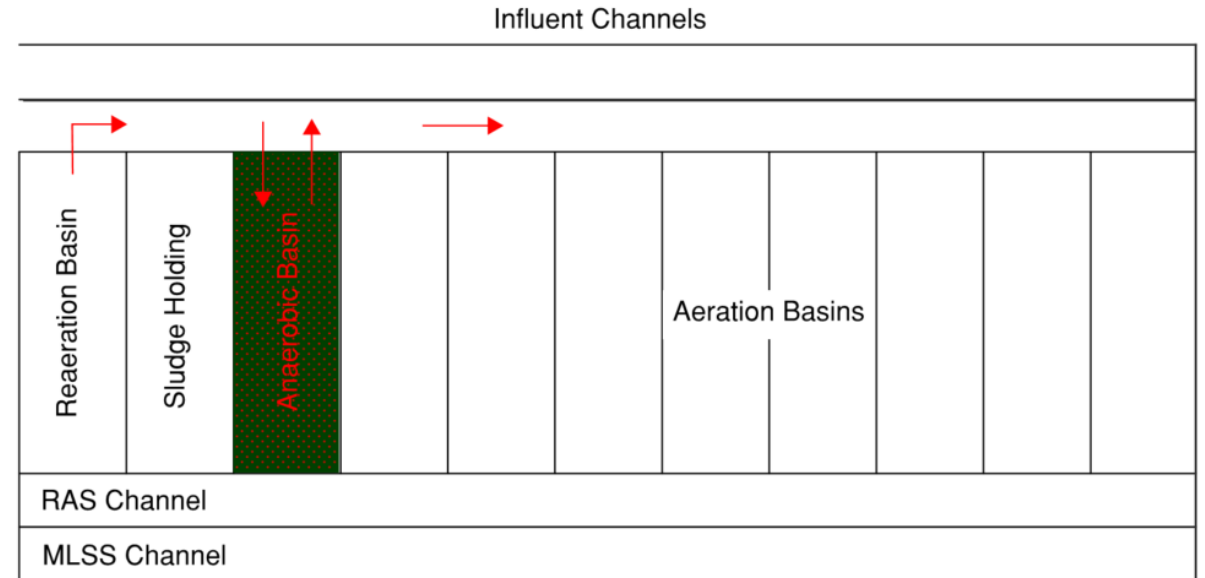
NUTRIENT REMOVAL – PHOSPHORUS REMOVAL

Phosphorus removal can be achieved using one of two approaches:

1. Biological phosphorus removal
2. Chemical precipitation

- Biological Phosphorus Removal
 - Lower operating cost
 - Anaerobic zones
 - COD dependent/”strong” WW
 - BV – S2EBPR
- Chemical Precipitation
 - Ferric or aluminum salts
 - Added to secondary treatment or to tertiary if future effluent P limit

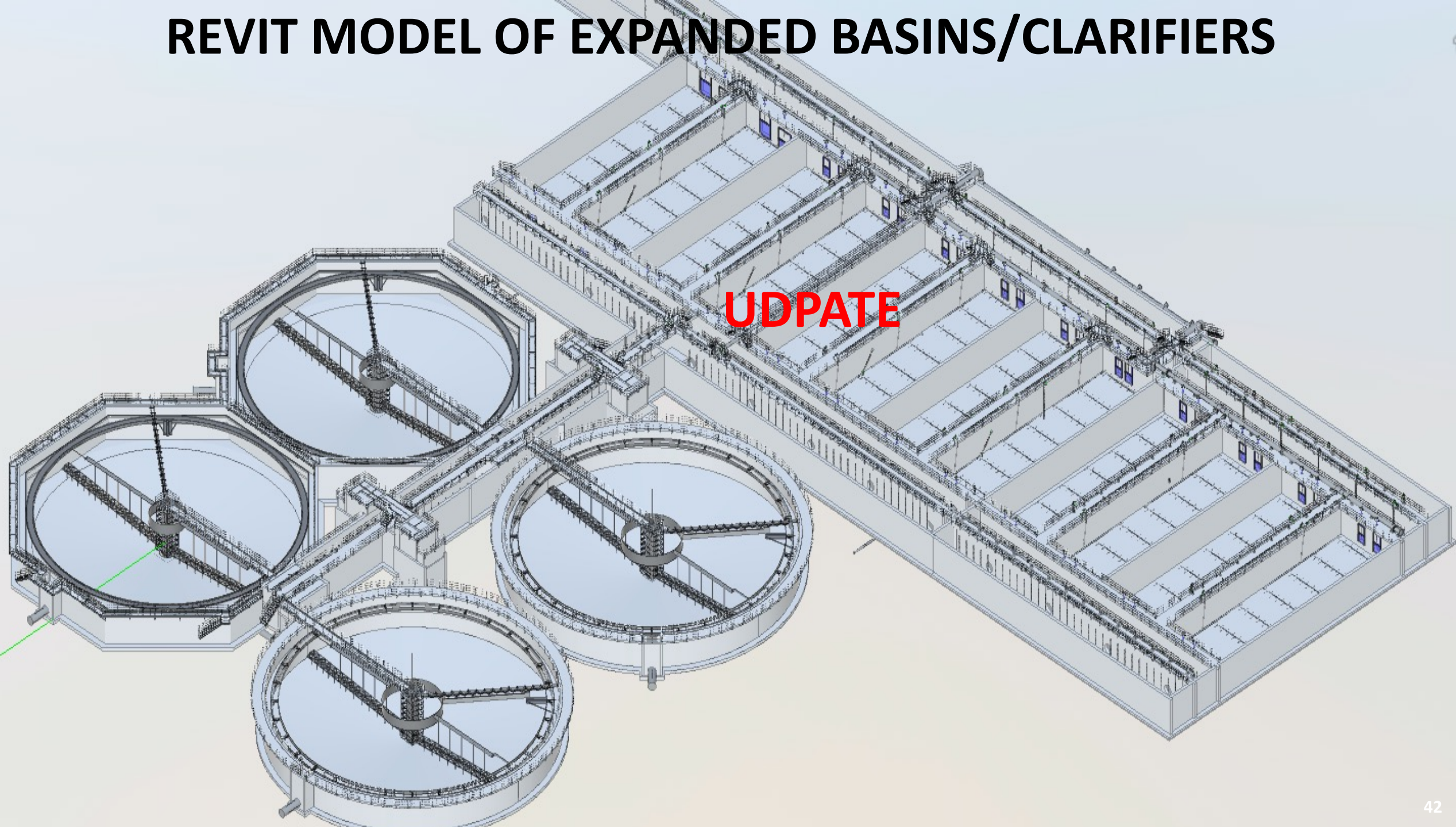
Potential S2EBPR Configuration for IAH WWTP



NOT TO SCALE

- BNR? – add as separate slide, levels of treatment, BNR wo carbon/ENR add carbon/IOT tertiary filtrate

REVIT MODEL OF EXPANDED BASINS/CLARIFIERS



AERATION ZONING AND CONTROL

Aeration Zoning

- **New basins - 2-zone aeration system**
- Existing basins - simplified to 2-zone aeration system from 3-zone

Aeration Control

- **DO and Ammonia monitoring and airflow control**
 - Probes proposed in each zone
 - Motorized control valves
 - Thermal dispersion flow meters
- Optimize aeration and blower efficiency reducing energy consumption
- Consider flow-paced automation



Types of Aeration Control:

- **Alternative 1: No Control:** This is the current control method at the plant and is common for older WWTPs. The air flows wherever the piping system allows and is only controlled by operator-dependent manual isolation valve adjustment. This method not only results in increased energy costs but could also deprive air from the aeration basins when the water levels in the sludge holding tanks are low as air follows the path of least resistance.

- **Alternative 2: Basic Manual Control:** The operator would adjust valves on the individual drop legs. The operator would make adjustments to the valves once in a while and then forget about them. This method would need to be at least one size smaller than the current piping. This would result in a disproportionately large change in air flow.

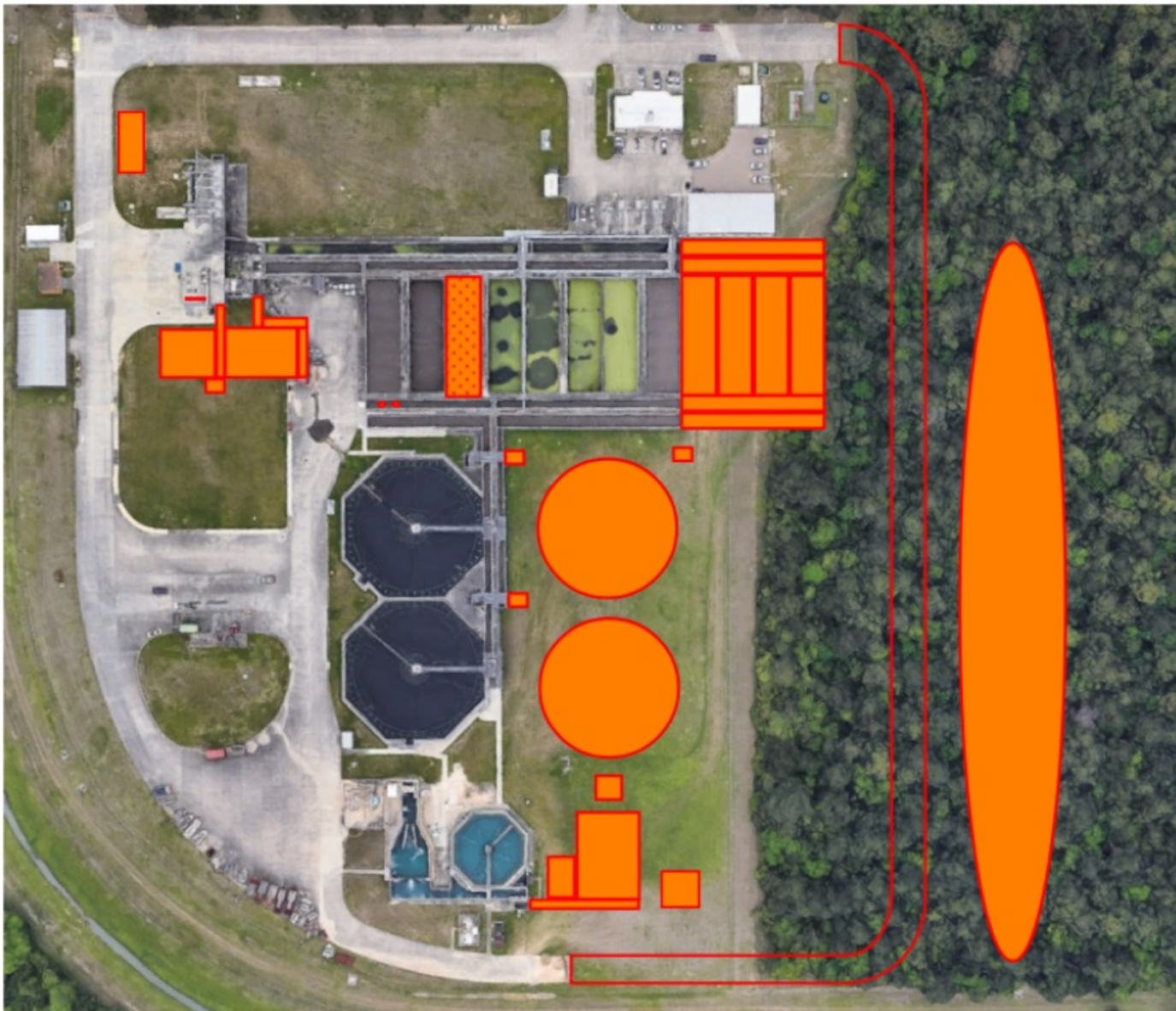
- **Alternative 3: Basic Manual Control with Meters:** The advantage of adding airflow meters is that it provides a baseline. The recommended for air flow measurement is mass flow meters. These flow meters need to be installed with a straight run.

- **Alternative 4: Automated Control Based on SCADA:** The operator would set valve positions from the SCADA system. The operator would set valve positions and close valves to certain percentages to provide the intended airflow. This would control how many blowers are needed to supply the required airflow.

- **Alternative 5: Automated Cascade Control:** This method is used for ammonia limitation and is one of the most common methods for nitrification. DO probes would be placed in the aeration basins to measure the intended DO concentration through the cascade control. The speed of blowers to ensure sufficient airflow would be controlled.

- **Alternative 6: Automated Control Based on DO Measurements:** This method would be used in conjunction with DO measurements. The DO measurements from the DO probes would ensure that sufficient airflows go to the aeration basins.

- **Alternative 7: Ammonia Based Aeration Control:** This method would be used for ammonia removal technologies. A prerequisite for this method is an automated control system based on DO measurements in the aeration basin and would help ensure the ammonia limit is met for nutrient removal.



adjusting valves on the drop legs. The operator would make adjustments to the valves once in a while and then forget about them. This method would need to be at least one size smaller than the current piping. This would result in a disproportionately large change in air flow. Butterfly valves on the drop legs will result in

with added airflow meters. The recommended for air flow measurement is mass flow meters. These flow meters need to be installed with a straight run.

valve positions can be set from the SCADA system. The operator would set valve positions and close valves to certain percentages to provide the intended airflow. This would control how many blowers are needed to supply the required airflow.

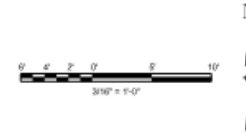
tanks with an effluent ammonia limitation and is one of the most common methods for nitrification. DO probes would be placed in the aeration basins to measure the intended DO concentration through the cascade control. The speed of blowers to ensure sufficient airflow would be controlled.

flow measurements are used in conjunction with DO measurements. The DO measurements from the DO probes would ensure that sufficient airflows go to the aeration basins.

control with nutrient removal technologies. A prerequisite for this method is an automated control system based on DO measurements in the aeration basin and would help ensure the ammonia limit is met for nutrient removal.

Aerated Grit Facility – Top Plan

CONTINUED ON DRAWING P-30-101



GENERAL NOTES:

1. CONTRACTOR RESPONSIBILITY TO VERIFY ALL DIMENSIONS WITH EQUIPMENT MANUFACTURERS.
2. CONTRACTOR TO VERIFY ALL ANCHORS, BOLT QUANTITIES, SIZES, TYPES, AND LOCATIONS WITH EQUIPMENT MANUFACTURERS.
3. REFER TO SPECIFICATION SECTION 15140 FOR PIPE SUPPORT/HANGER SPACING AND MECHANICAL DETAILS FOR POSSIBLE ALTERNATIVES TO BE USED WITH ENGINEER'S APPROVAL.
4. *DIFFUSERS, BAFFLES, AND BAFFLE COLUMNS NOT SHOWN IN THE EFFLUENT CHANNEL AND AERATED GRIT BASINS 1 AND 2 FOR CLARITY, REFER TO M-31-102 AND SECTIONS FOR DETAILS.

NOTES BY SYMBOL (in a circle)

1. NEW STAINLESS STEEL 8" AIR PIPING
2. NEW STAINLESS STEEL 6" AIR PIPING
3. NEW 8" THERMAL DISPERSION MASS FLOW METER, PROVIDE MINIMUM 10 PIPE DIAMETERS UPSTREAM STRAIGHT RUN AND 5 PIPE DIAMETERS DOWNSTREAM STRAIGHT RUN FOR THE FLOW METER.
4. NEW 6" THERMAL DISPERSION MASS FLOW METER, PROVIDE MINIMUM 10 PIPE DIAMETERS UPSTREAM STRAIGHT RUN AND 5 PIPE DIAMETERS DOWNSTREAM STRAIGHT RUN FOR THE FLOW METER.
5. NEW 6" BUTTERFLY VALVE
6. NEW 4" BUTTERFLY VALVE
7. NEW 3" BUTTERFLY VALVE
8. NEW 6" STAINLESS STEEL DROPLEG BUTTERFLY VALVE
9. NEW 4" STAINLESS STEEL DROPLEG WITH 4" BUTTERFLY VALVE
10. NEW 4" STAINLESS STEEL DIFFUSER HEADER
11. NEW 48" X 72" MOTOR ACTUATED SELF-CONTAINED SLIDE GATE
12. NEW 60" X 60" MOTOR ACTUATED SELF-CONTAINED SLIDE GATE
13. NEW 8" MFD VALVE
14. NEW 6" ASSEMBLY FLANGE
15. ANGLE GLIDE SUPPORT, SEE DETAIL B/S-99-510.
16. PIPE SADDLE ANCHOR, SEE DETAIL D/S-99-508.
17. WALL BRACKET PIPE SUPPORT, SEE DETAIL C/S-99-509.
18. INSTALL EXPANSION JOINT AT EXISTING PIPE FLANGE.
19. TYPE B POST MOUNTED UTILITY STATION, SEE DETAIL B/M-99-506.
20. DISMANTLING JOINT, SEE DETAIL E/M-99-501.

PRELIMINARY
NOT FOR CONSTRUCTION



BLACK & VEATCH CORPORATION
900 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

DOCUMENT RELEASED FOR
INTERIM REVIEW ONLY UNDER
THE AUTHORITY OF
JUSTIN SANDT P.E.
(TX LICENSE NO. 116888)
ON 04/11/2022. IT IS NOT
TO BE USED FOR BIDDING,
PERMITTING OR CONSTRUCTION
PURPOSES.

SURVEYED BY:
UNITED ENGINEERS, INC.
PR NO. P-6182

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

INTERCONTINENTAL AIRPORT
WASTEWATER TREATMENT
PLANT EXPANSION
PROCESS MECHANICAL
AERATED GRIT FACILITY
TOP PLAN

WBS NUMBER FOR CITY OF HOUSTON USE ONLY

R-02265-0147-3

DRAWING SCALE

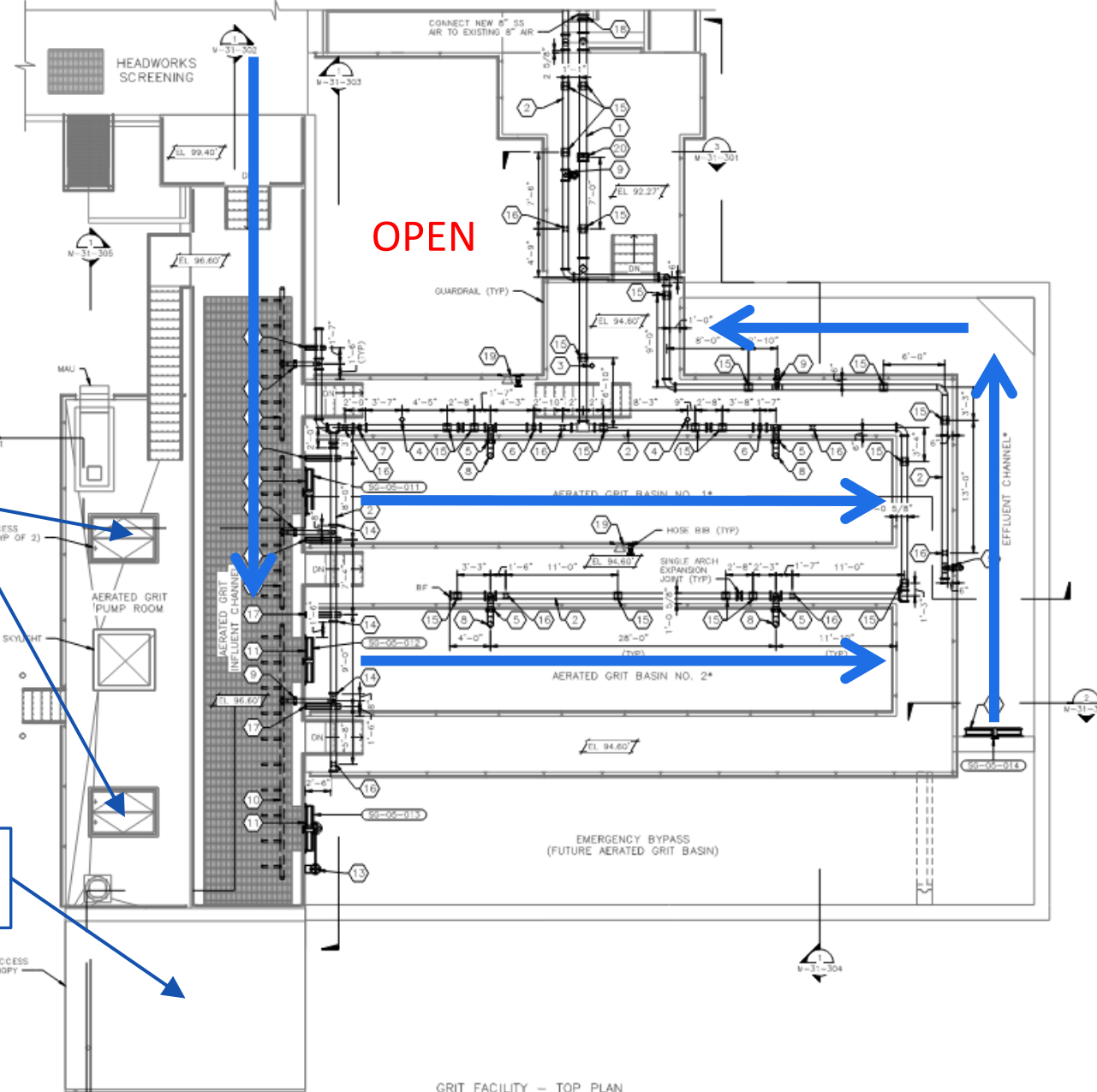
AS NOTED

CITY OF HOUSTON PM

XIAOJIA (SHANG) LIN, P.E.

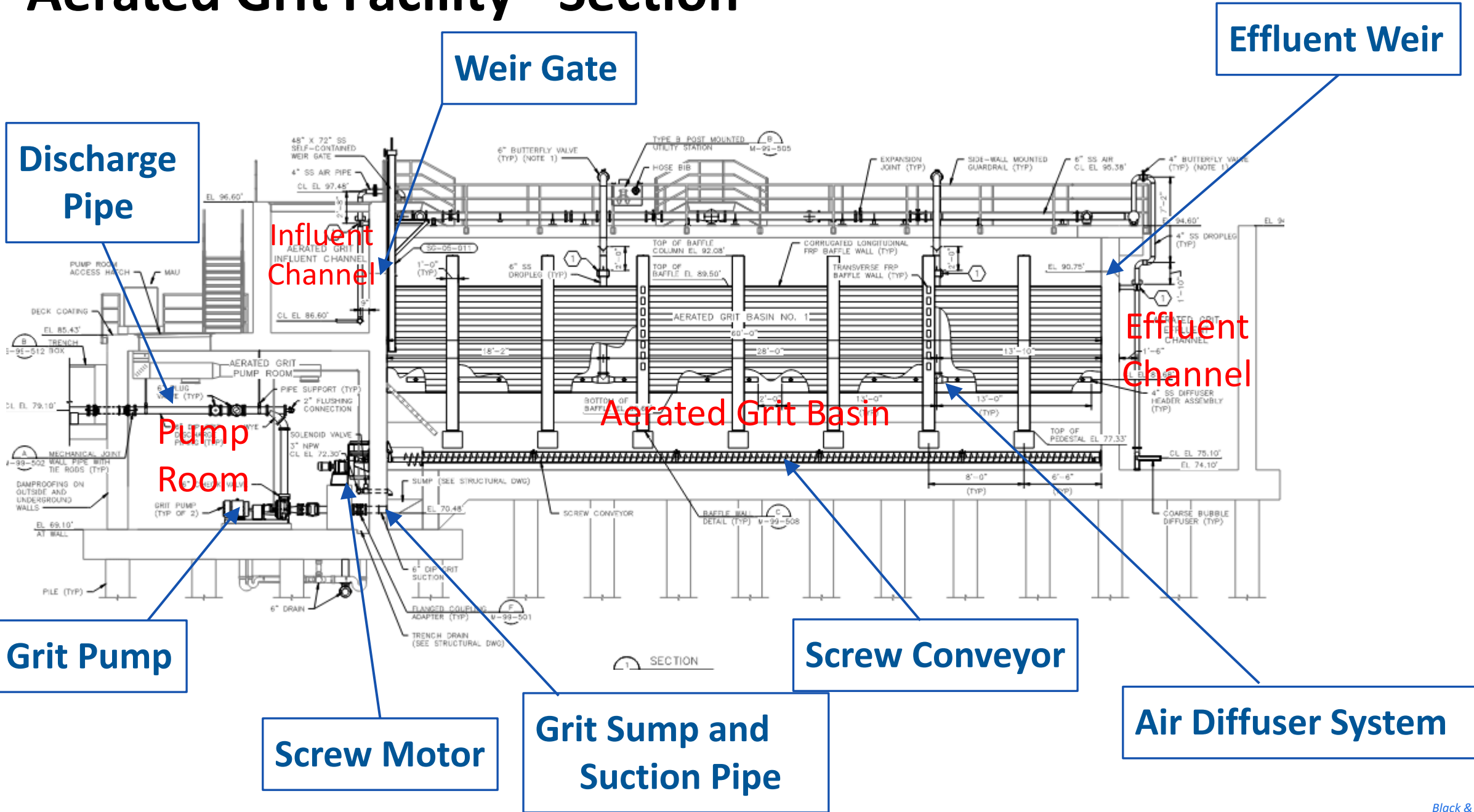
Pump Access
Hatches

Access Stairwell



GRIT FACILITY – TOP PLAN
3/16" = 1'-0"

Aerated Grit Facility - Section



Discharge Pipe

Weir Gate

Effluent Weir

Influent Channel

Effluent Channel

Pump Room

Aerated Grit Basin

Grit Pump

Screw Motor

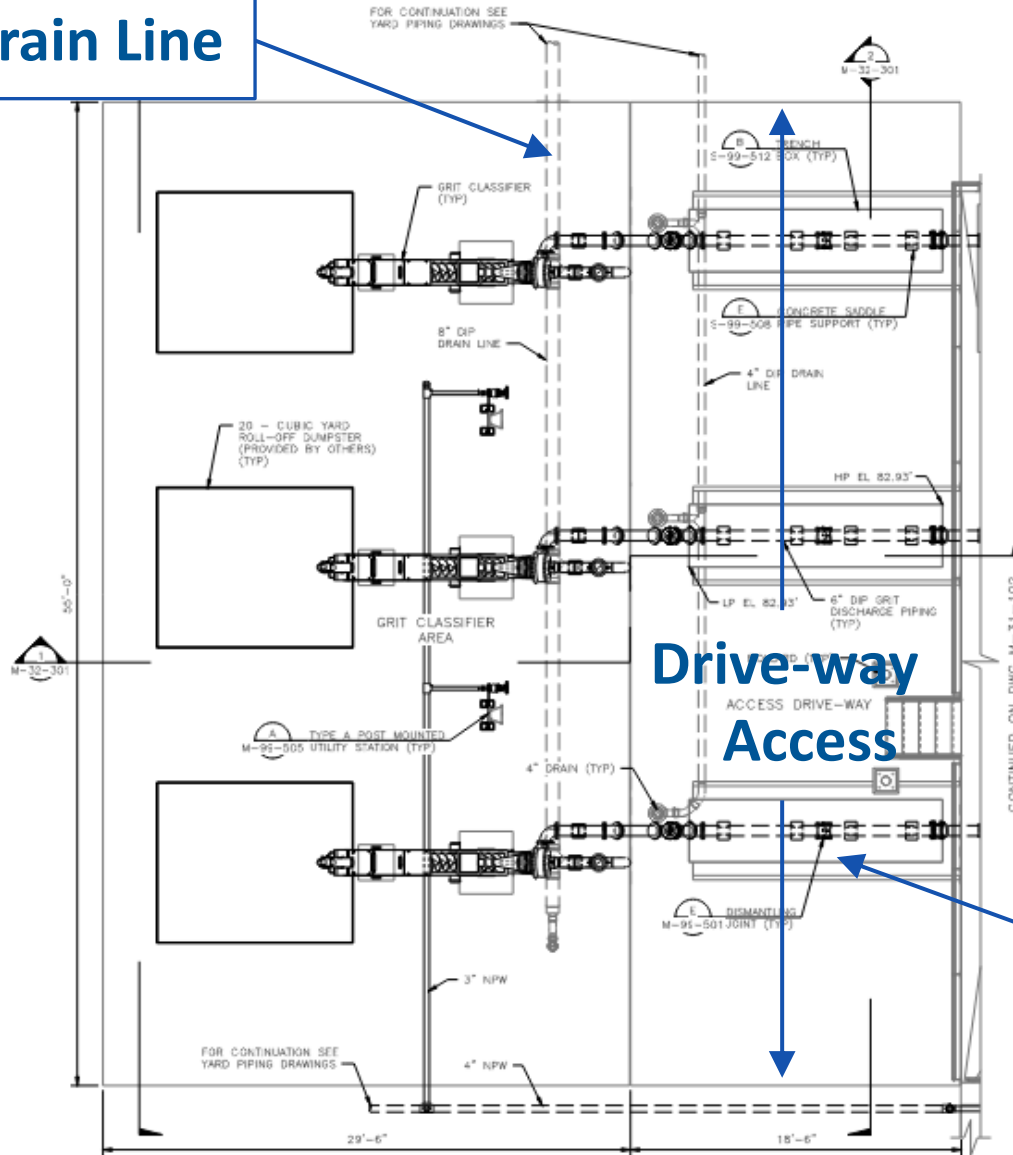
Grit Sump and Suction Pipe

Screw Conveyor

Air Diffuser System

Aerated Grit Facility – Classifiers

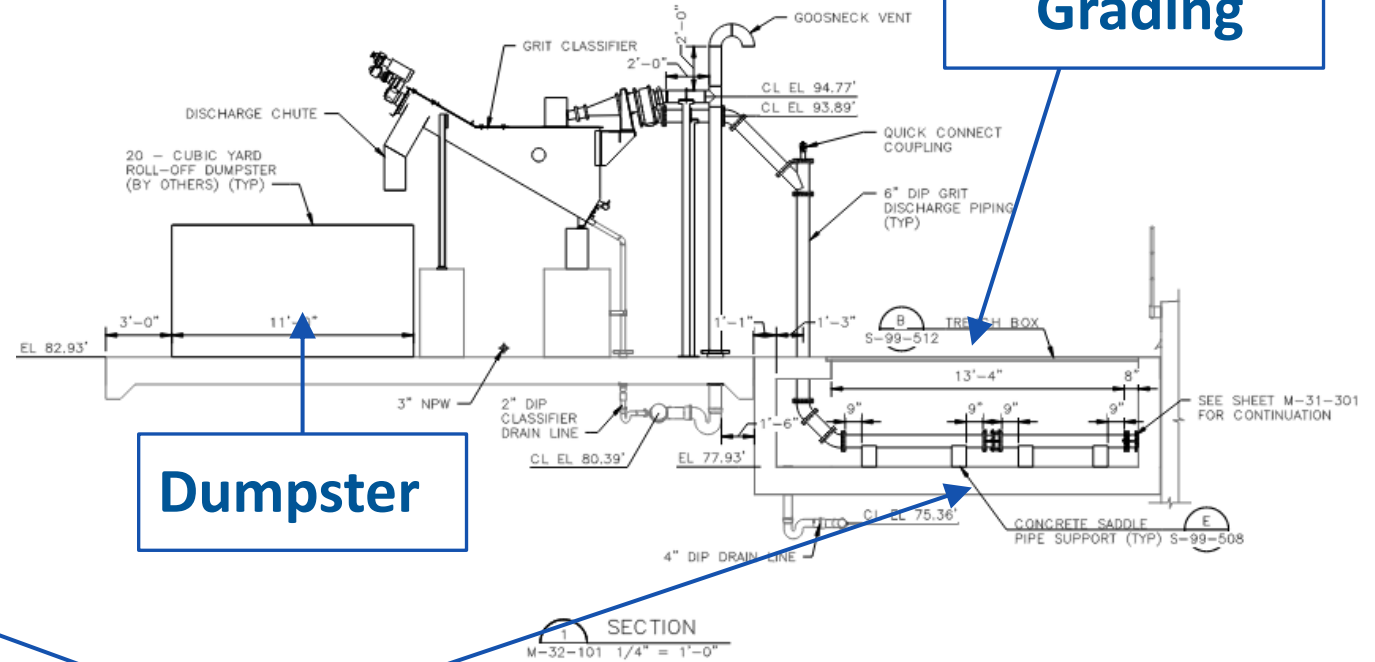
Drain Line



GRIT DEWATERING – PLAN
1/4" = 1'-0"

Grit Classifier

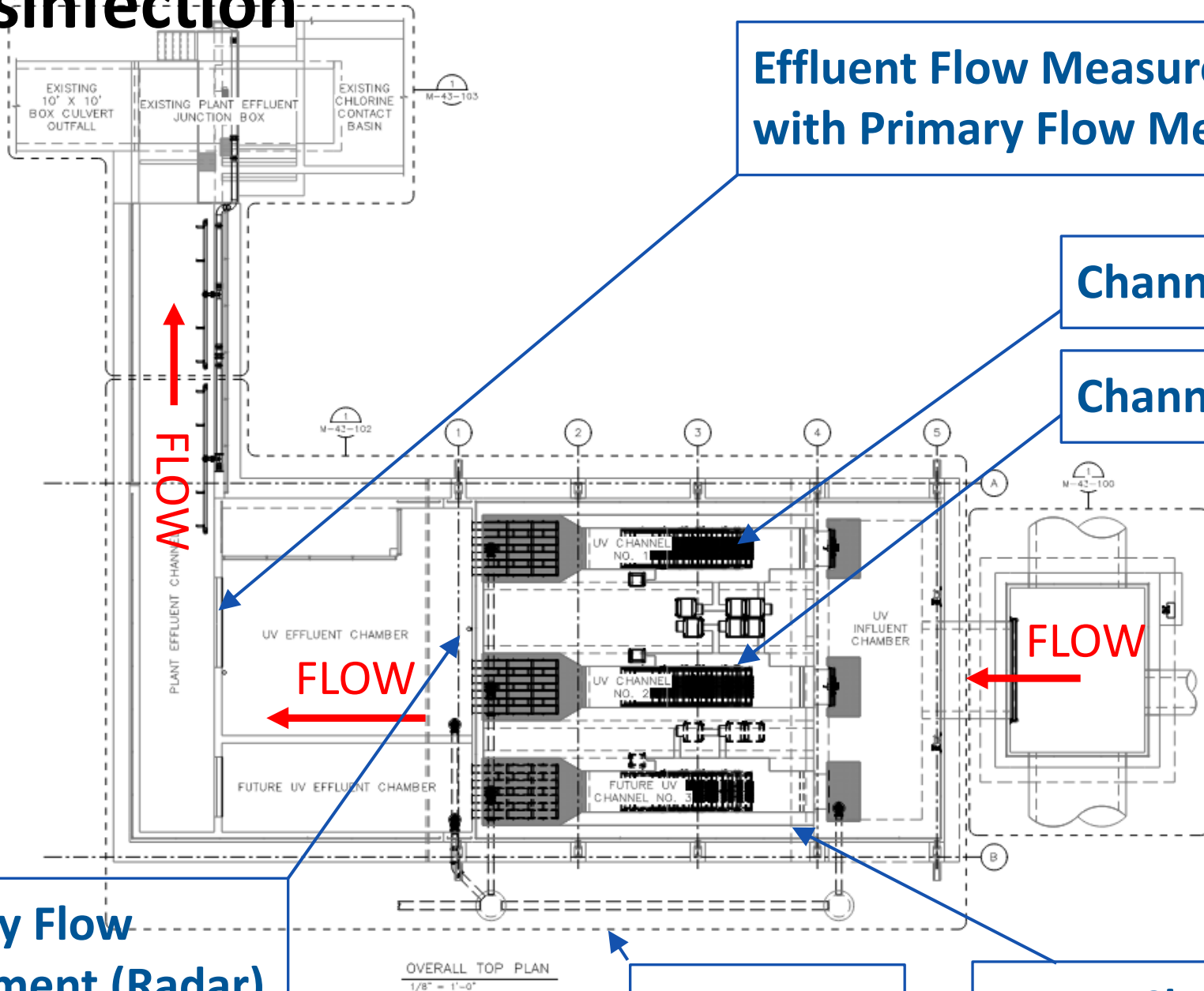
Traffic Rated Grading



Dumpster

Trench Boxes

UV Disinfection



Effluent Flow Measurement Weir with Primary Flow Measurement

Channel 1

Channel 2

Secondary Flow Measurement (Radar)

Drain Line

Future Channel

PRELIMINARY NOT FOR CONSTRUCTION



BLACK & VEATCH CORPORATION
920 MEMORIAL CITY WAY
SUITE 600
HOUSTON, TX 77024
(713) 961-1100
TX FIRM NUMBER 258

SURVEYED BY:
UNITED ENGINEERS, INC.
FB NO. P-6182

DOCUMENT RELEASED FOR INTERIM REVIEW ONLY UNDER THE AUTHORITY OF JUSTIN SANDT P.E. (TX LICENSE NO. 116988) ON 04/11/2022. IT IS NOT TO BE USED FOR BIDDING, PERMITTING OR CONSTRUCTION PURPOSES.

CITY OF HOUSTON
HOUSTON PUBLIC WORKS

INTERCONTINENTAL AIRPORT WASTEWATER TREATMENT PLANT EXPANSION
PROCESS MECHANICAL
UV FACILITY
OVERALL TOP PLAN

WBS NUMBER

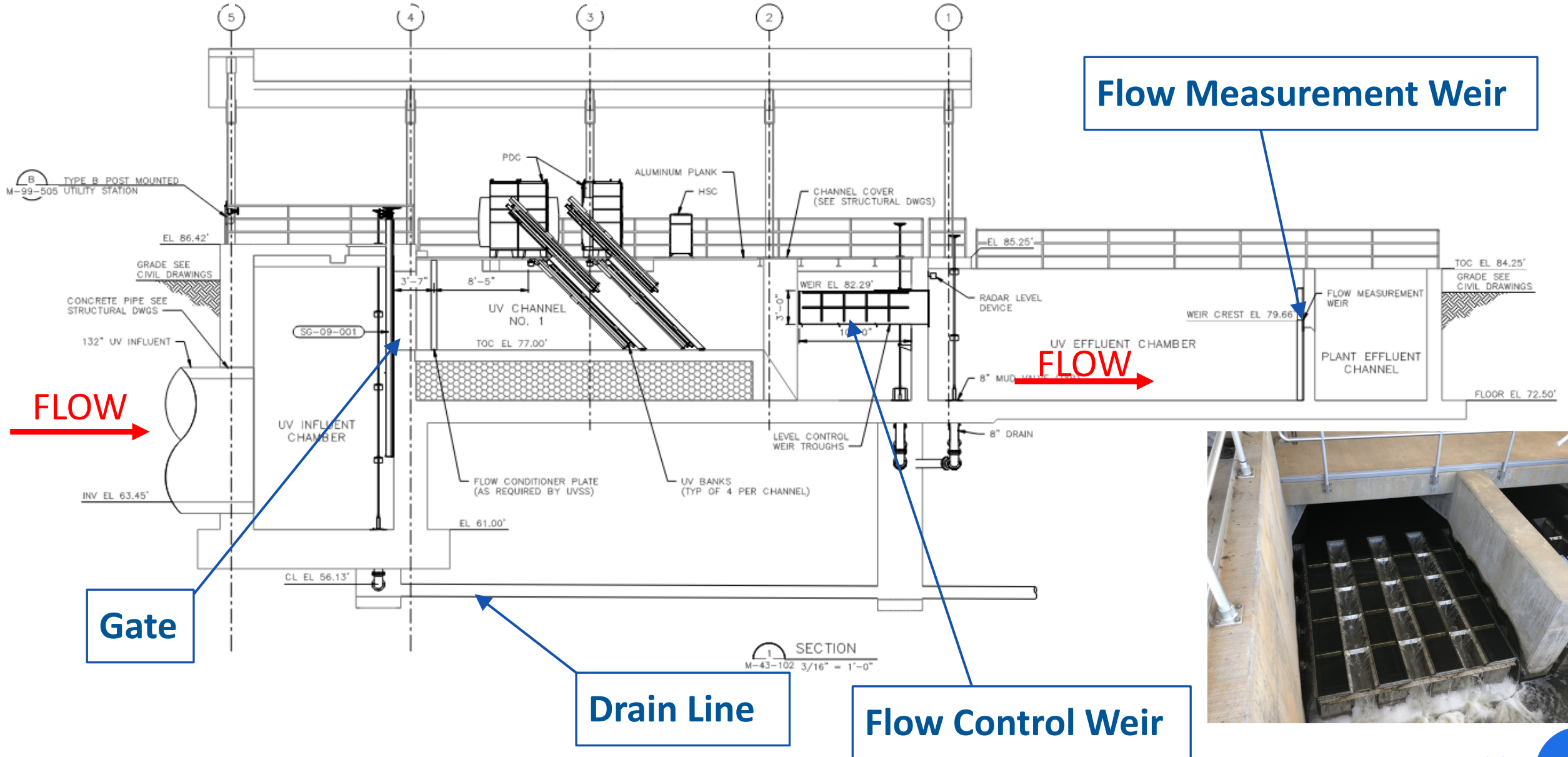
R-00265-0147-3

DRAWING SCALE

AS NOTED

FOR CITY OF HOUSTON USE ONLY

UV Disinfection



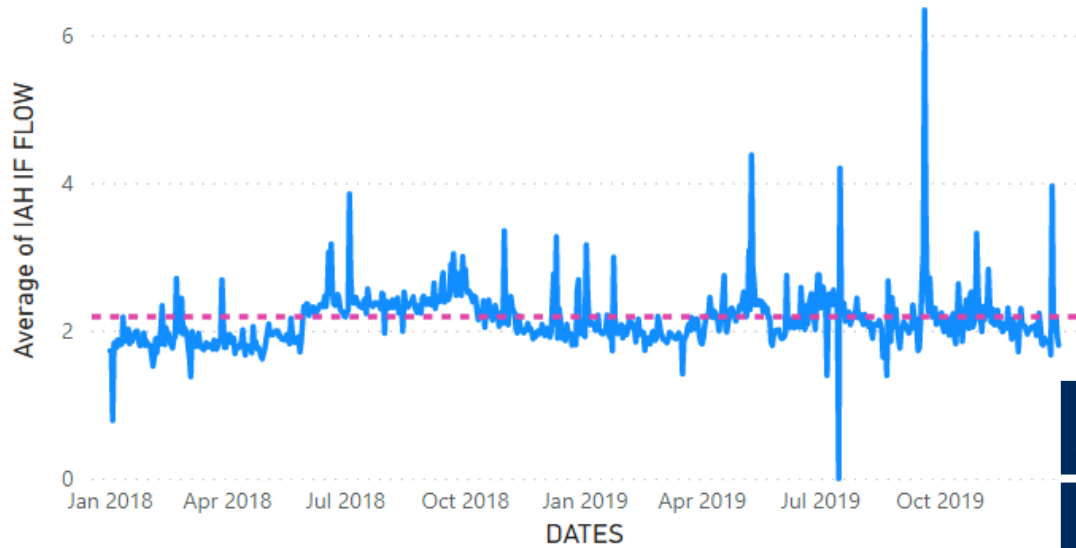
Flow Range – Recommended Turndown Capability

- 30% to 100% Hydraulic Turndown Per Channel (9-27.5 MGD)
- 30% to 100% Power Turndown with 3 Banks Per Channel (6-9 MGD)
- System will operate with 2 banks for low flows (3-6 MGD)

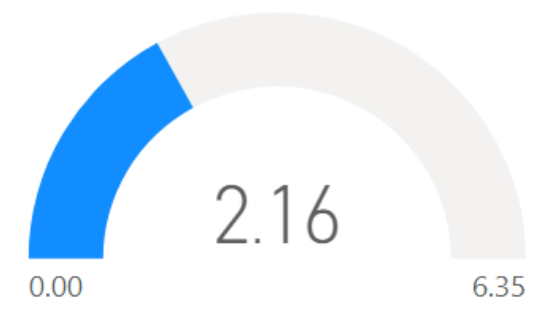
WWTP	Units	Full ADF Range	Dry Weather Flow	Wet Weather Flow
IAH	mgd	0.10 – 6.35	0.10 – 2.55	2.55 – 6.35
Northgate	mgd	0.16 – 4.58	0.16 – 3.12	3.12 – 4.58
Imperial Valley	mgd	1.09 – 5.31	1.09 – 1.65	1.65 – 5.31
MUD #203	mgd	0.10 – 2.28	0.10 – 0.46	0.46 – 2.28
Consolidated	mgd	4.55 – 17.7	4.55 – 7.00	7.00 – 17.7

LIFT STATION REASON FOR IMPROVEMENT -

Average of IAH IF FLOW by DATES INCREASED CAPACITY

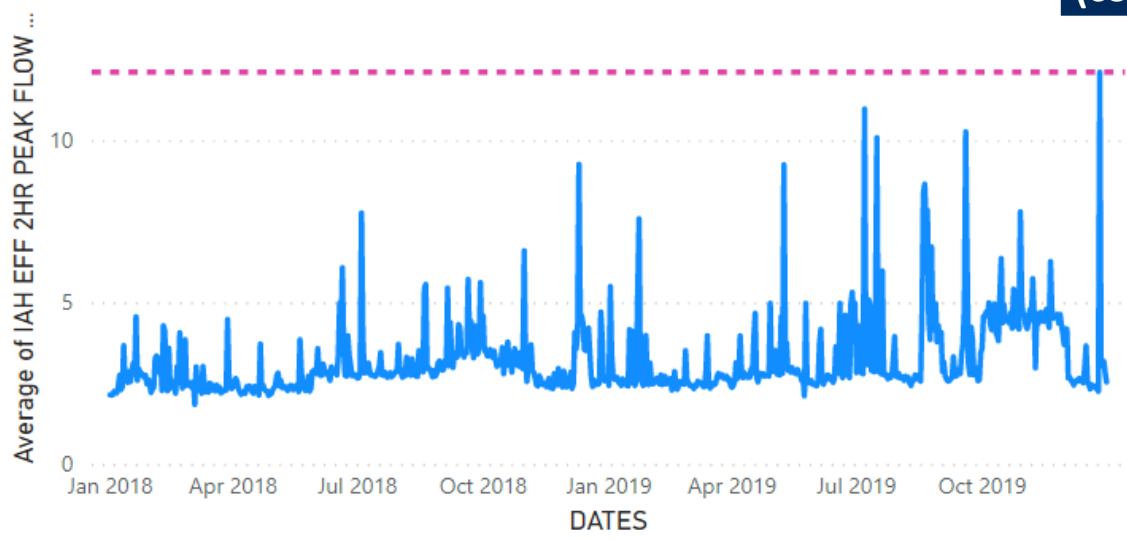


Average of IAH IF FLOW and Max of IAH IF FLOW



CONDITION	Units	Full Range (mgd)	Average ADF (mgd)	Permit (mgd)
EXISTING	mgd	0.10 – 12.1	2.0	8/32
FUTURE (consolidated)	mgd	3.7 – 32.2	6.2	11/55

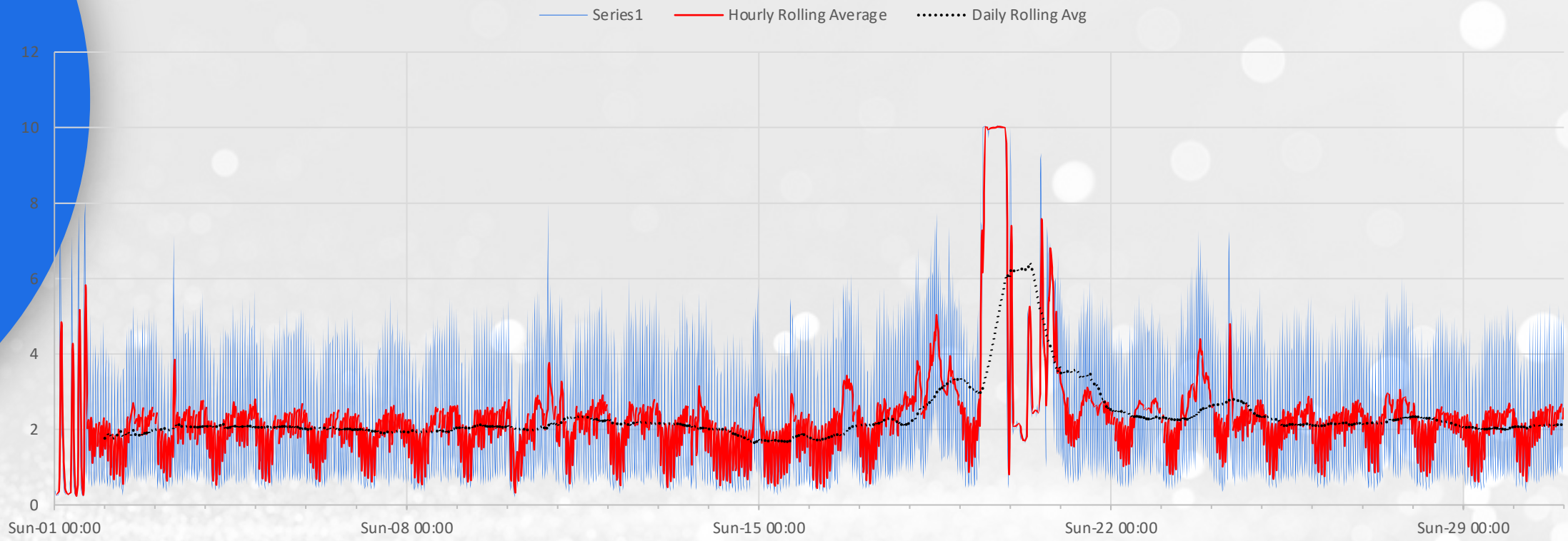
Average of IAH EFF 2HR PEAK FLOW (MGD) by DATES



Average of IAH EFF 2HR PEAK FLOW (MGD) and Max of IAH EFF 2HR PEAK FLOW (MGD)



LIFT STATION REASONS FOR IMPROVEMENT – PUMP CYCLING/PULSING → NON-CONTINUOUS FLOW, GRIT/DEBRIS



10-minute Effluent Flow Data from September 2019

LIFT STATION REASONS FOR IMPROVEMENT – PUMP CYCLING/PULSING → NON-CONTINUOUS FLOW, GRIT/DEBRIS

One pump (3.5 or 8 mgd) in operation, sometimes both (10 mgd)
Approx. 18-20 start/stops per day
1-2 hours between start/stops

