

OARS

Flow Diversion Structures



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DEPARTMENT OF
PUBLIC UTILITIES

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 **DLZ**

OARS - Level of Service

- WSST overflows will be eliminated during the typical year
- Discharges from 12 CSOs along OSIS will be eliminated for up to a 10-year flow event
- Overflows at the JPWWTP will be limited to no more than 4 during the typical year
- During the 10-year flow event, overflows still could occur at the WSST and JPWWTP

OARS System

- 23,300 Feet of 20' Diameter Tunnel
- 6 Shafts – 4 receive flow with special drop structures
- 4 Relief Structures
- Deep Screening Structure
- Pumping System
- Treatment Plant Connection
- River Outfall Structure





Legend

-  OARS TUNNEL
-  OSIS



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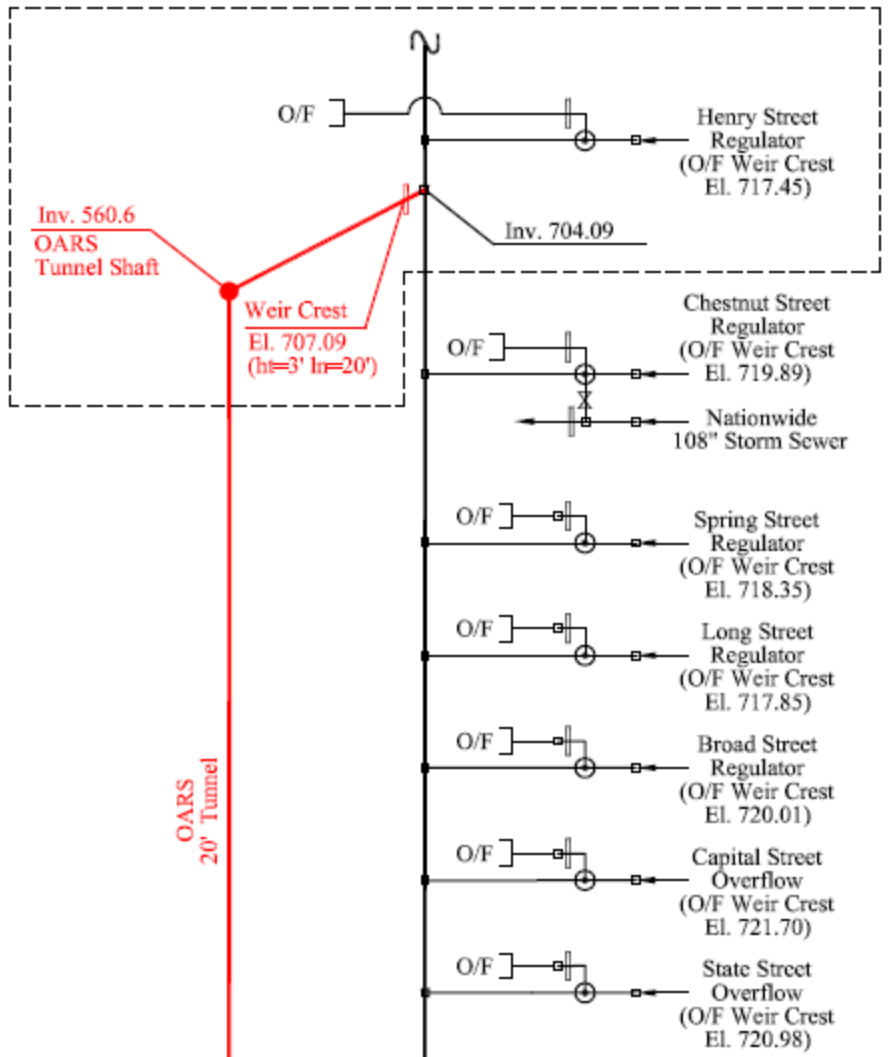
OARS Flow Control Structures

- Shaft 6 Relief Structure
- Shaft 1 – OARS Diversion Structure
- Scioto-Main Relief Structure

Shaft 6 Relief Structure

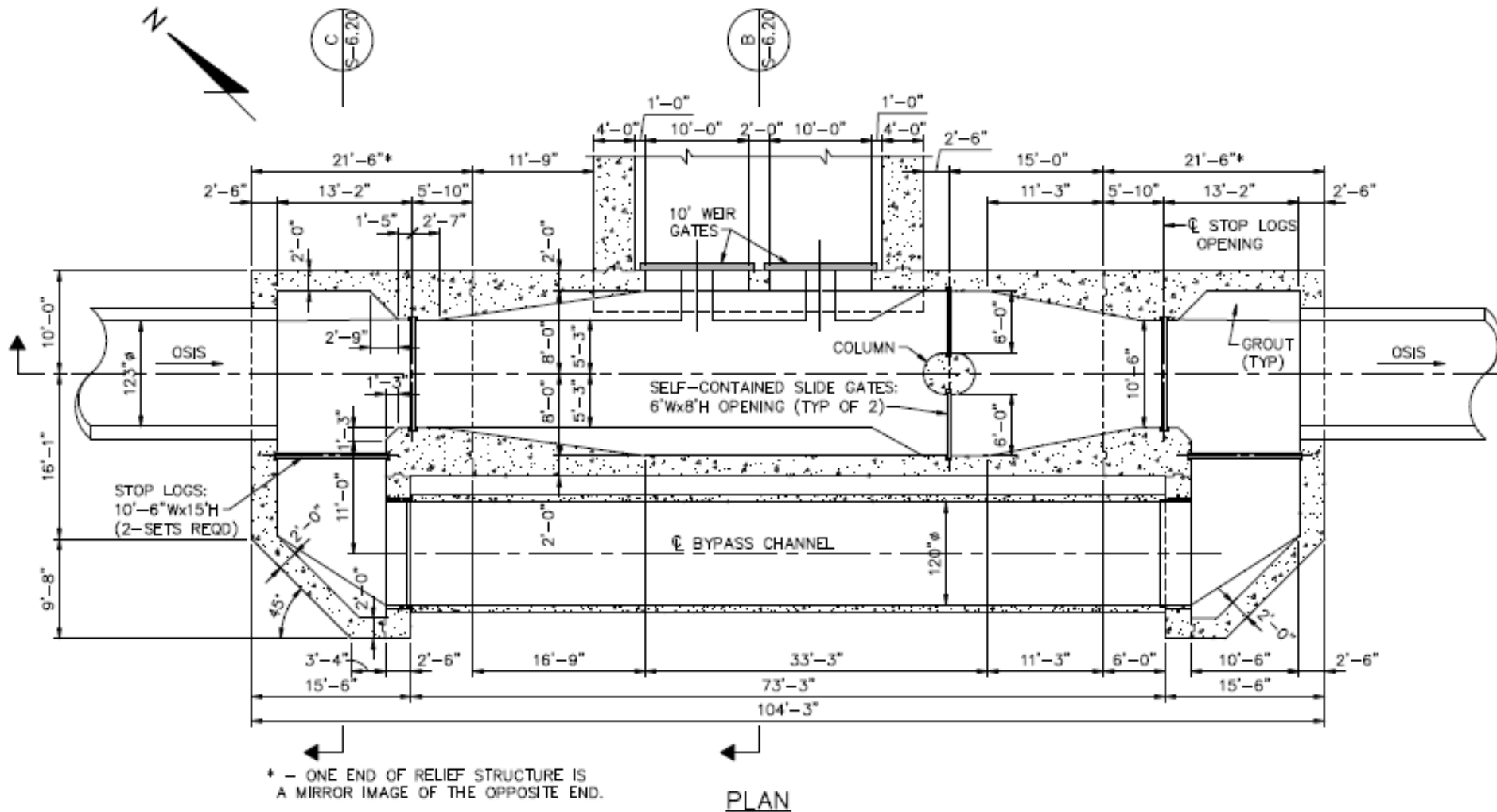
The relief structures serve 2 main purposes:

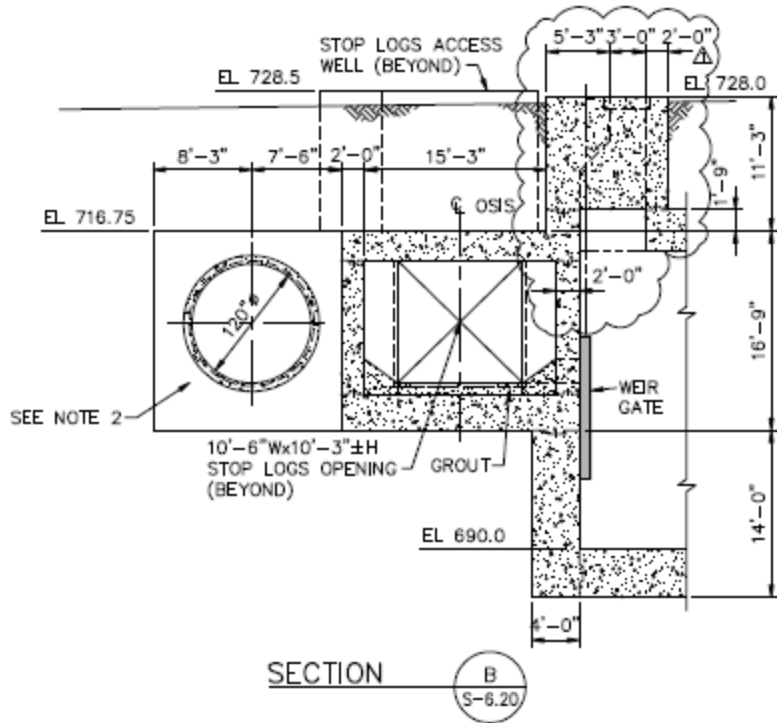
1. Divert wet weather flows from the OSIS to OARS to eliminate CSO activations.
2. Allow for complete bypass of flow to either the OSIS or to the OARS for future maintenance activities.



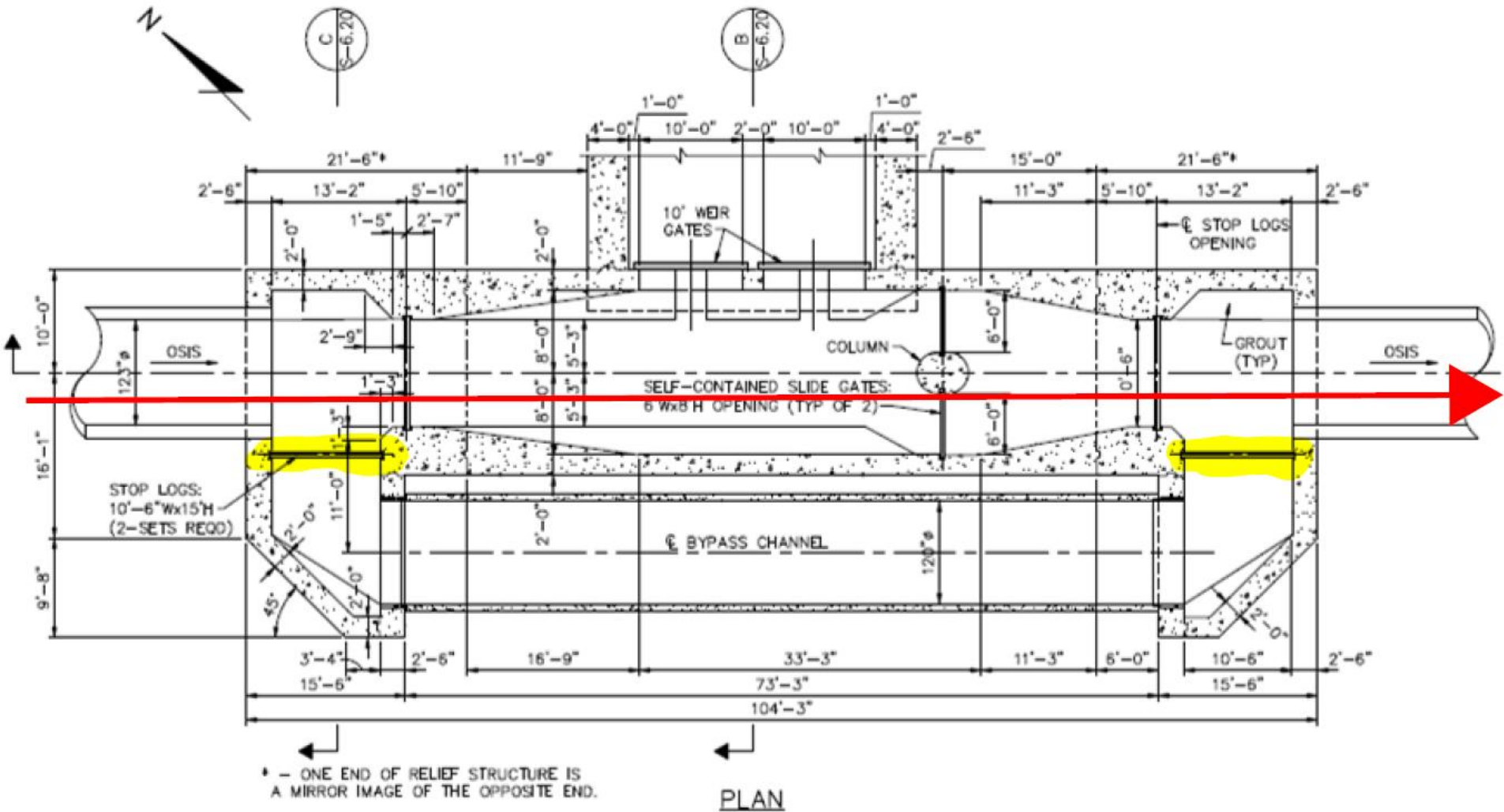
The model required 20' of weir length at a height of 3' above the OSIS invert at Shaft 6.

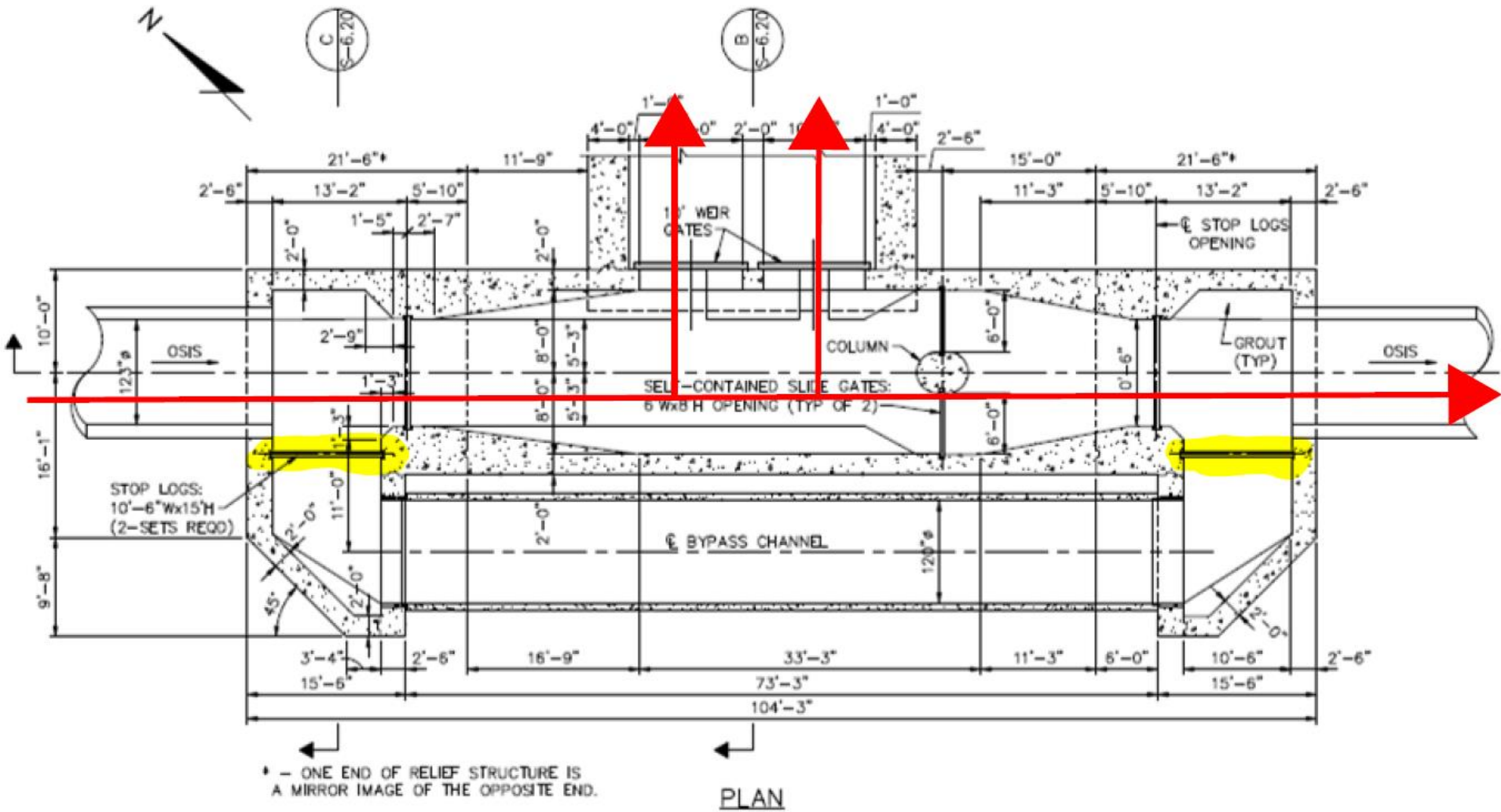
OSIS Relief Structures were required at 3 locations along the OSIS to successfully eliminate CSO activations.



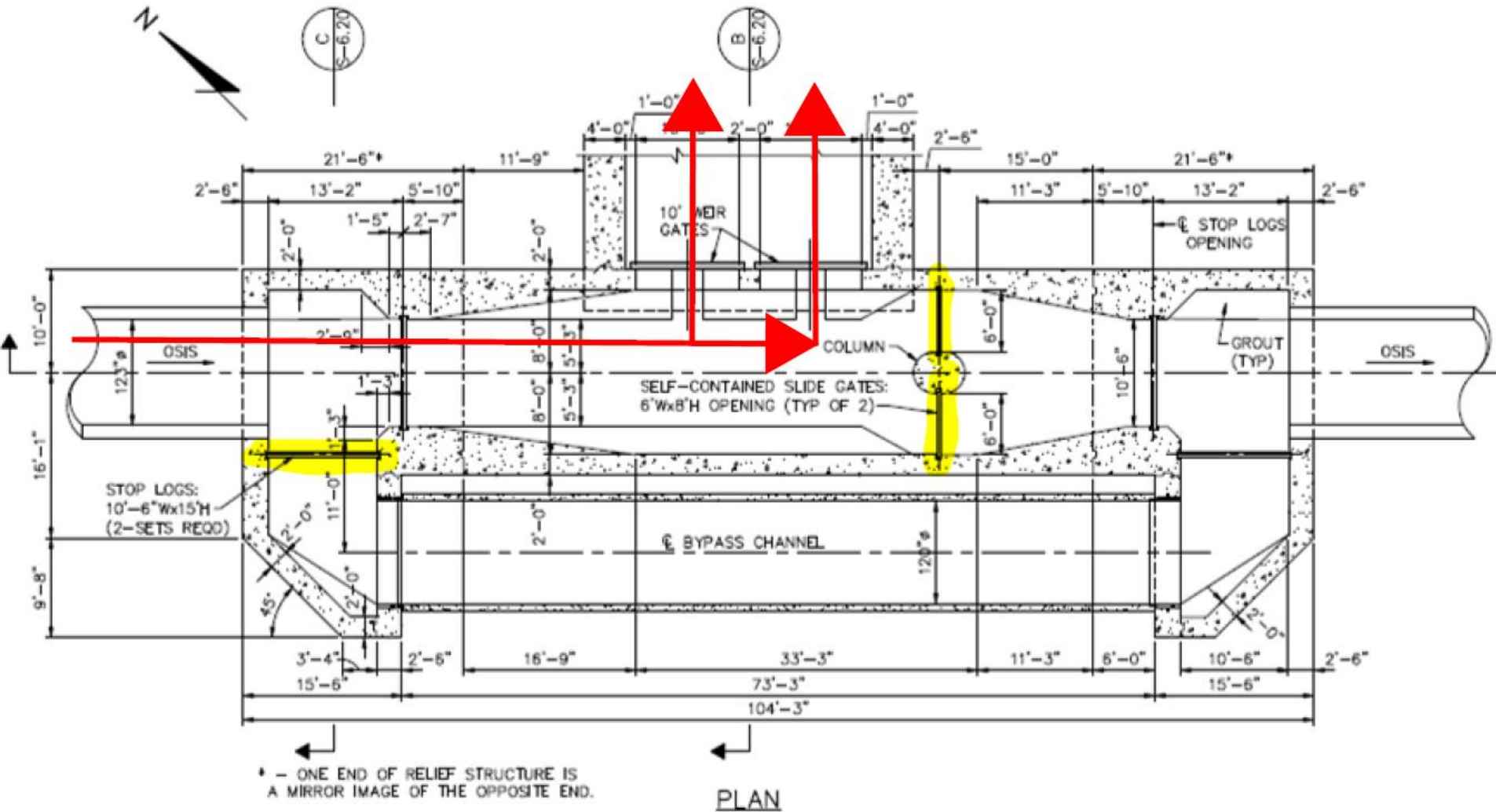


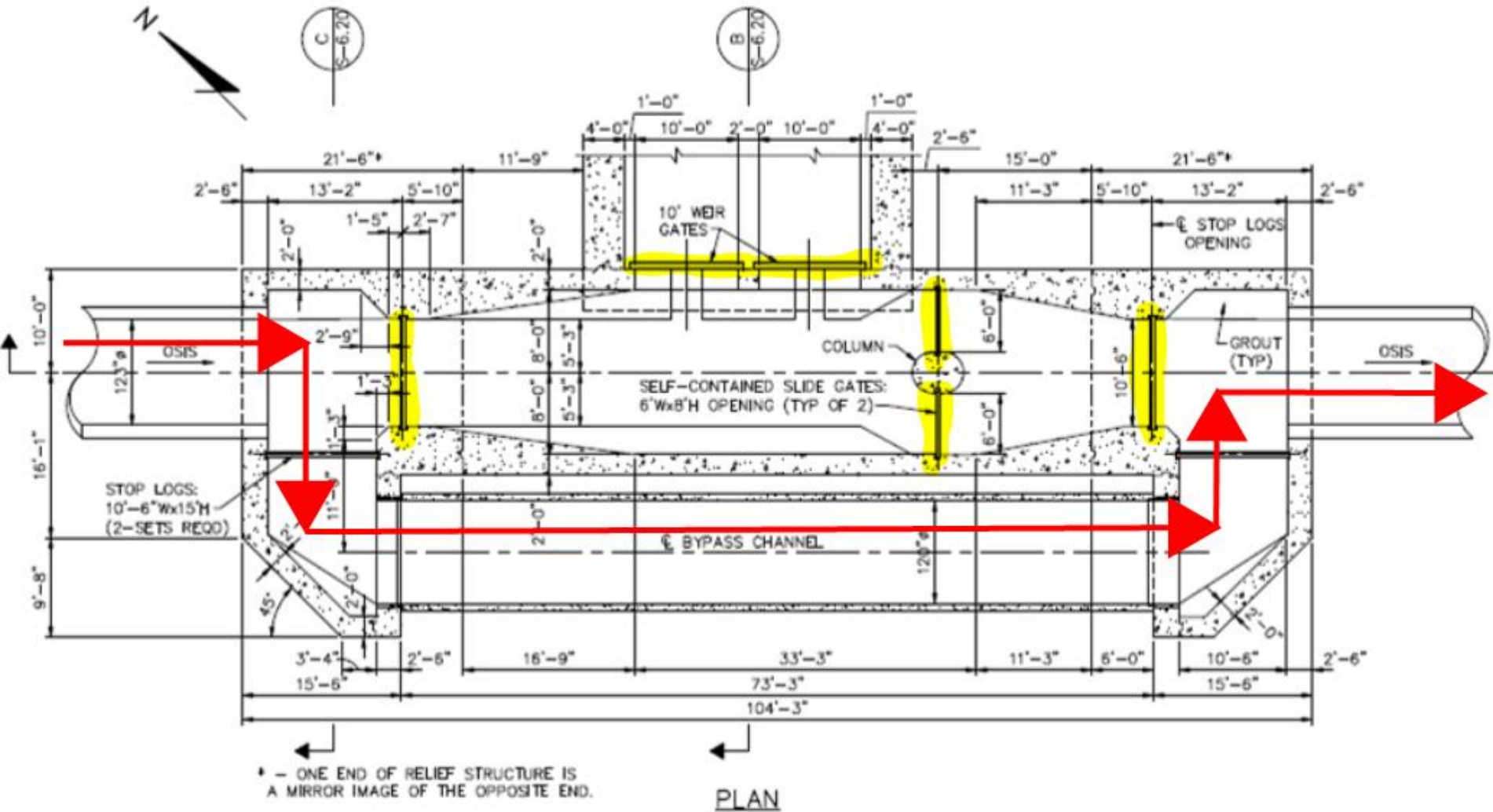
- The weirs will initially be set at 3' above invert. Dry weather flow stays in OSIS.
- Peak flow over weirs to OARS = 1,146 cfs (or 741 MGD)
- Adjustable weirs can be connected to be controlled under RTC to perform as desired.

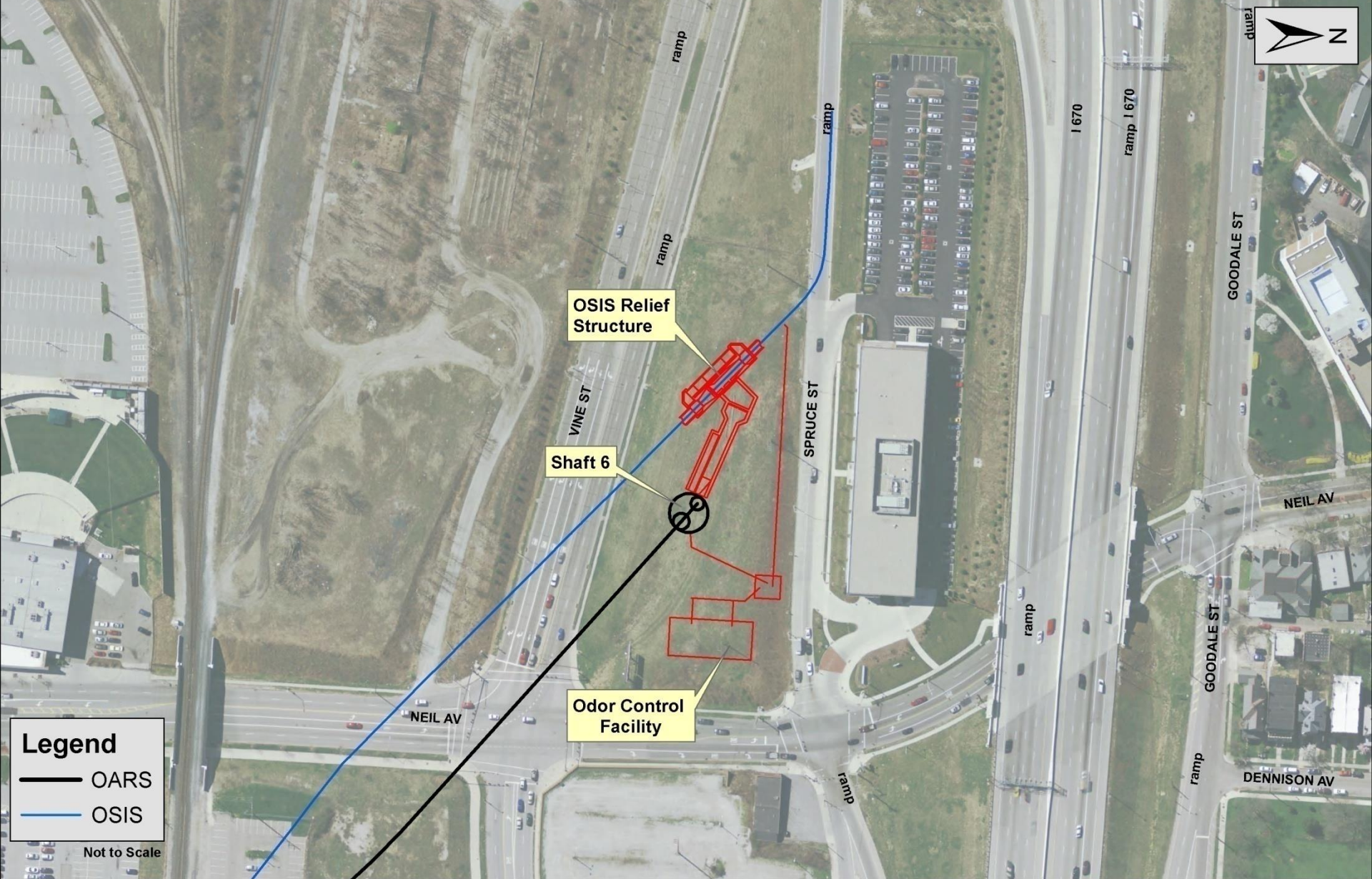


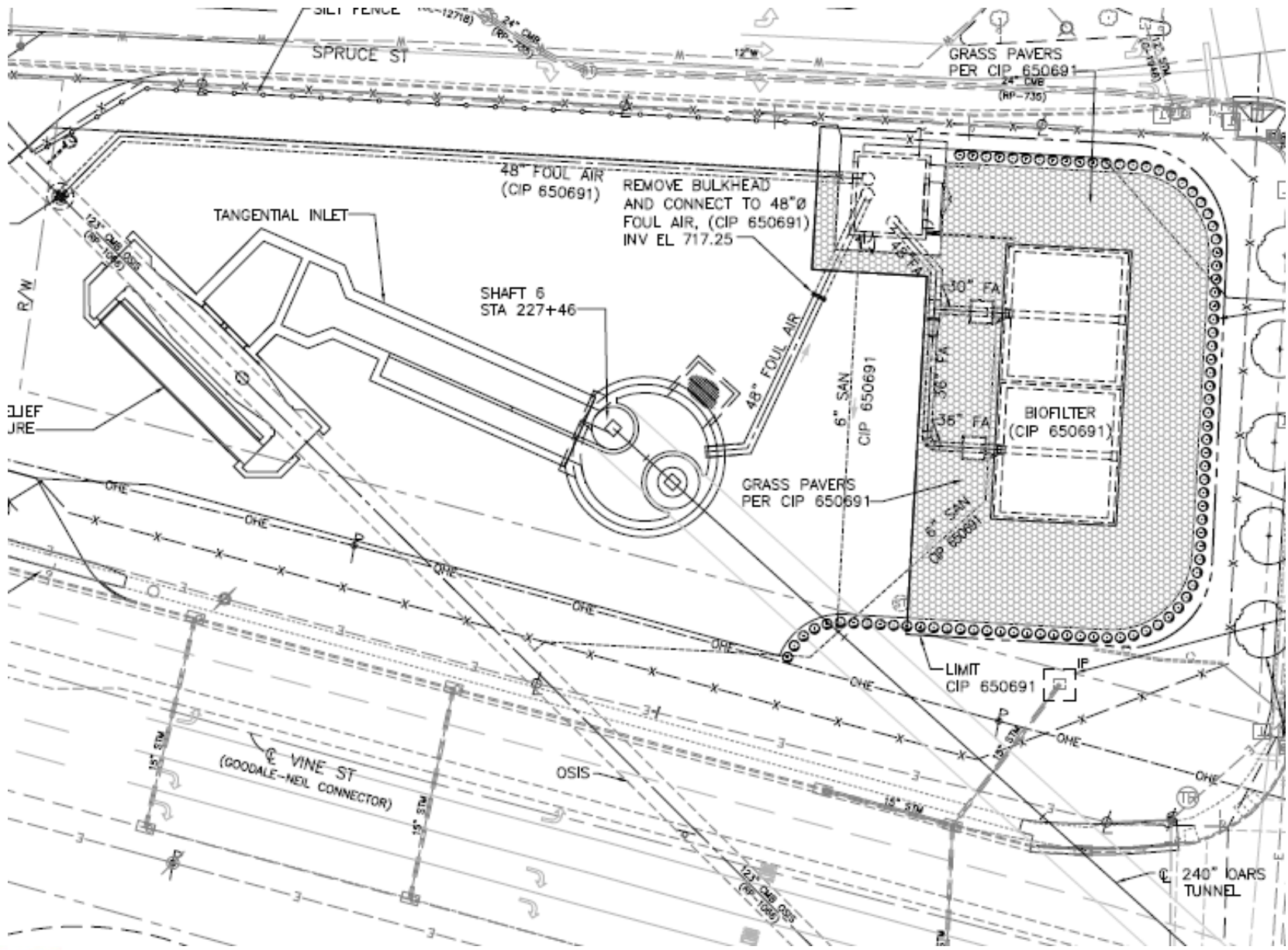


Normal Setting Wet Weather Flow











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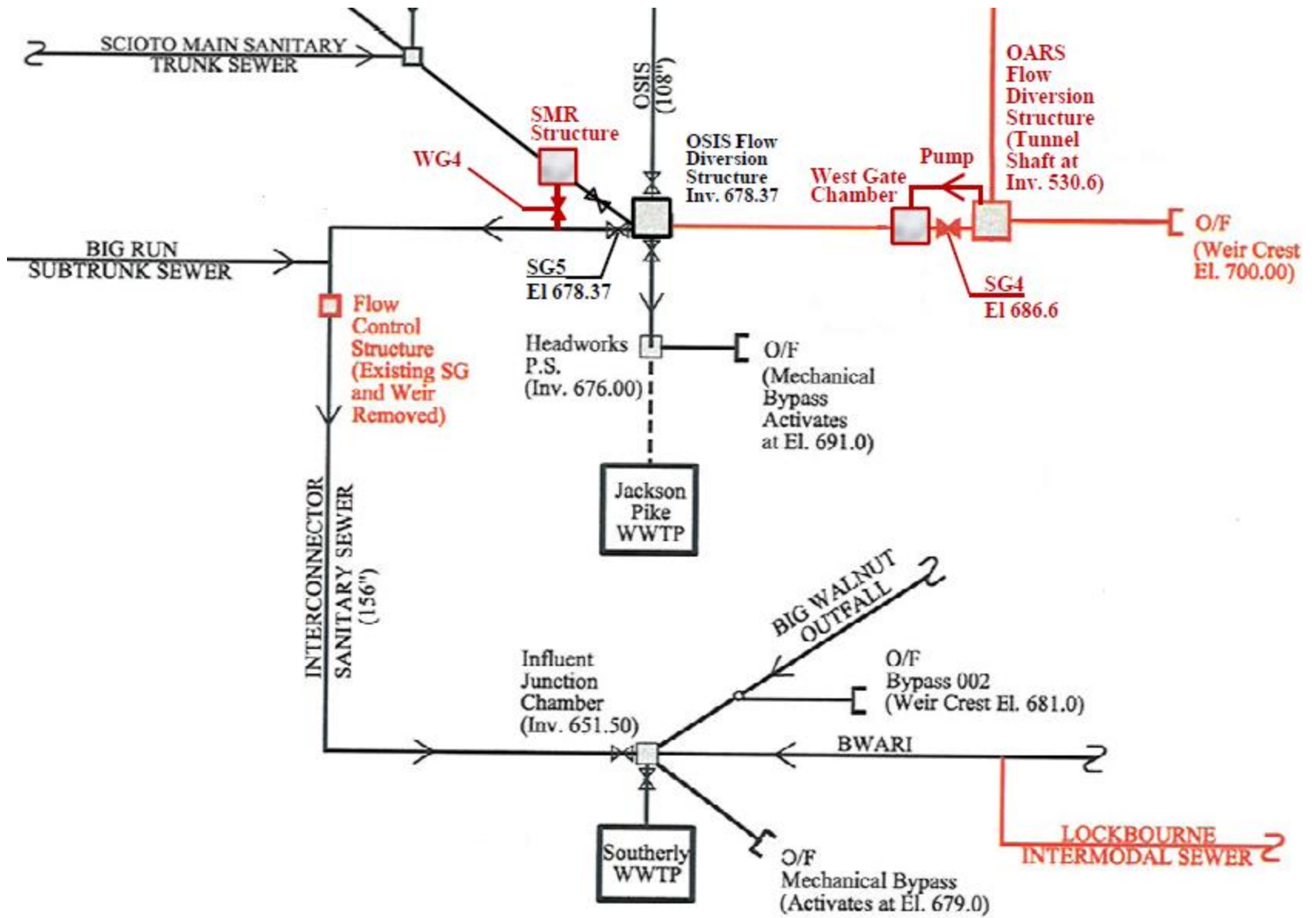






Shaft 1 – OARS Diversion Structure (ODS)

- Shaft 1 is the end of the line
- Peak flow coming in is 1,700 MGD
- Pump to WWTP(s)
- High level gravity flow to WWTP(s)
- Stubs for potential future HRT
- Final overflow weir to Scioto River





JPWWTP

SMR
(Scioto Main Relief)

WGC
(West Gate Chamber)

Shaft 1 - ODS
(OARS Diversion Structure)

ROS
(River Outfall Structure)

Shaft 2 - OSS
(OARS Screen Structure)

<< Scioto River

Legend

- OARS
- OSIS

Not to Scale

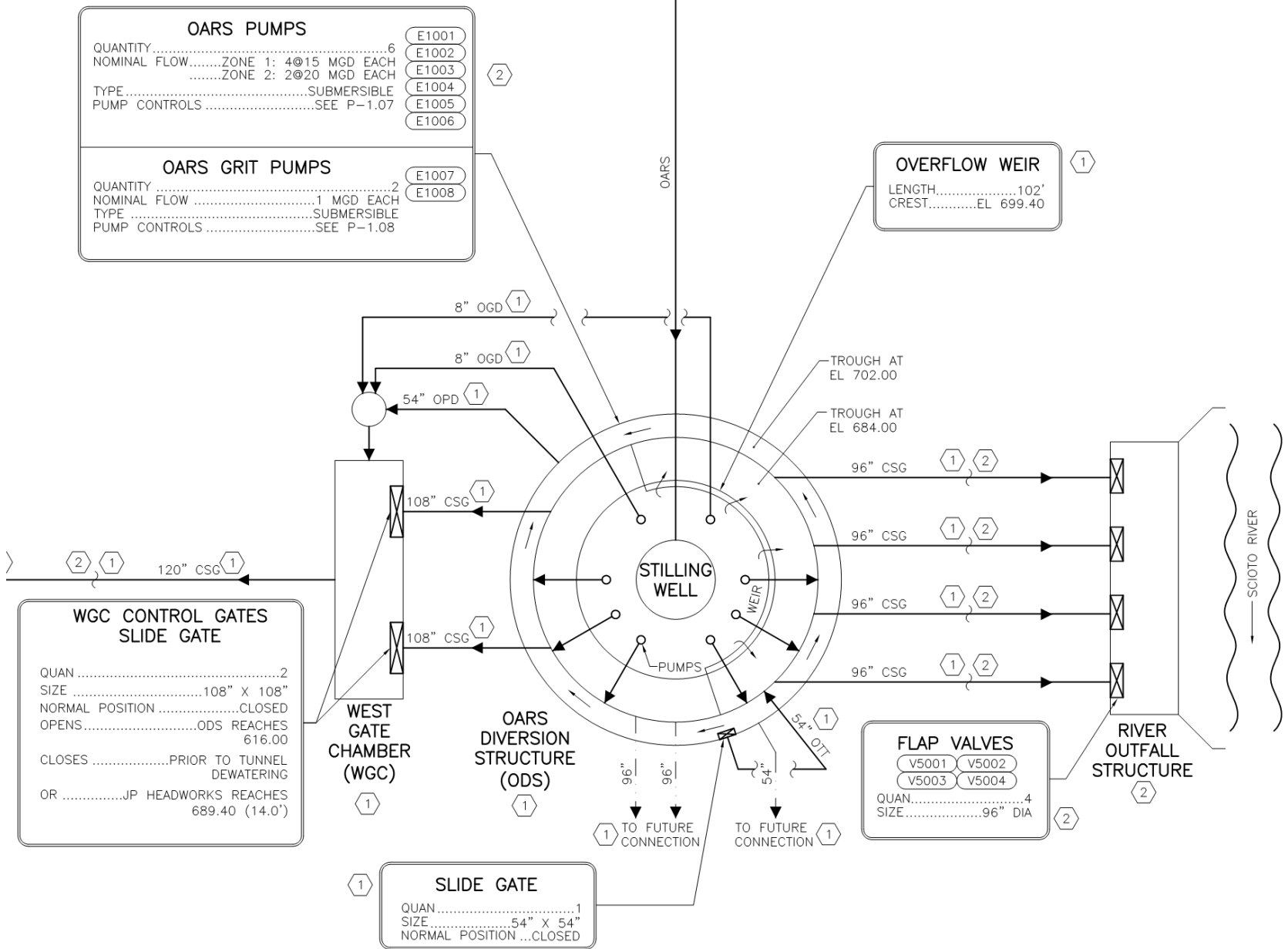
OARS PUMPS	
QUANTITY.....	6
NOMINAL FLOW.....	ZONE 1: 4@15 MGD EACH
	ZONE 2: 2@20 MGD EACH
TYPE.....	SUBMERSIBLE
PUMP CONTROLS.....	SEE P-1.07

OARS GRIT PUMPS	
QUANTITY.....	2
NOMINAL FLOW.....	1 MGD EACH
TYPE.....	SUBMERSIBLE
PUMP CONTROLS.....	SEE P-1.08

- (E1001)
- (E1002)
- (E1003)
- (E1004)
- (E1005)
- (E1006)

- (E1007)
- (E1008)

OVERFLOW WEIR	
LENGTH.....	102'
CREST.....	EL 699.40



WGC CONTROL GATES SLIDE GATE	
QUAN.....	2
SIZE.....	108" X 108"
NORMAL POSITION.....	CLOSED
OPENS.....	ODS REACHES 616.00
CLOSES.....	PRIOR TO TUNNEL DEWATERING
OR.....	JP HEADWORKS REACHES 689.40 (14.0')

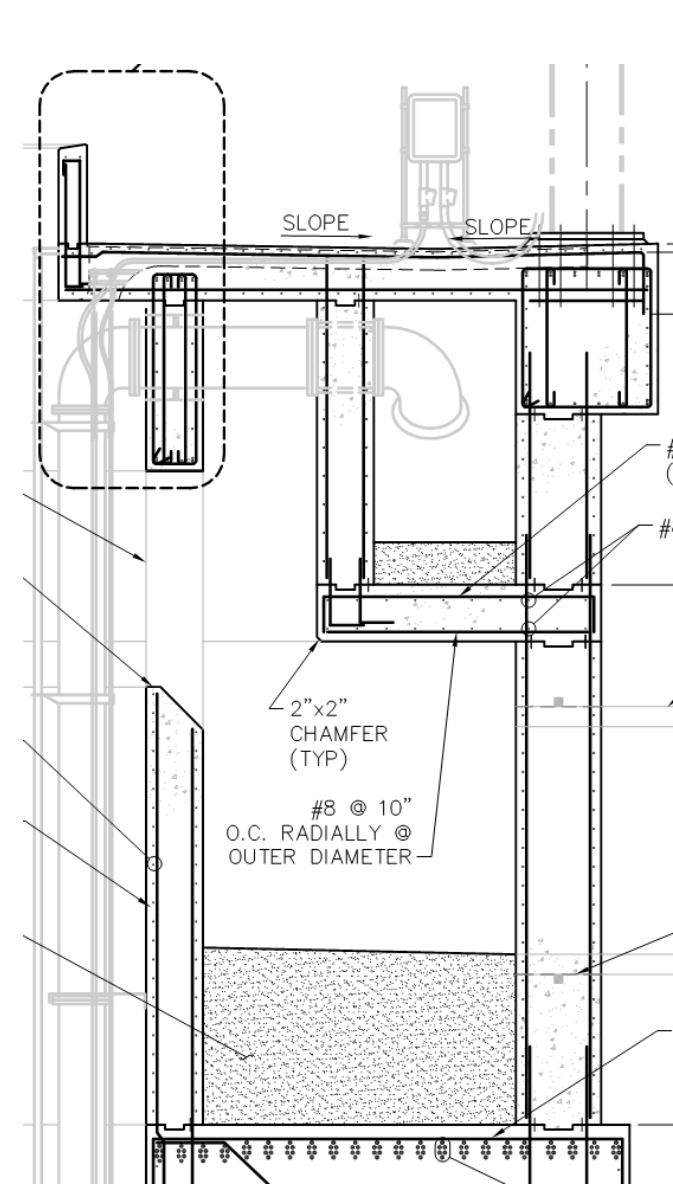
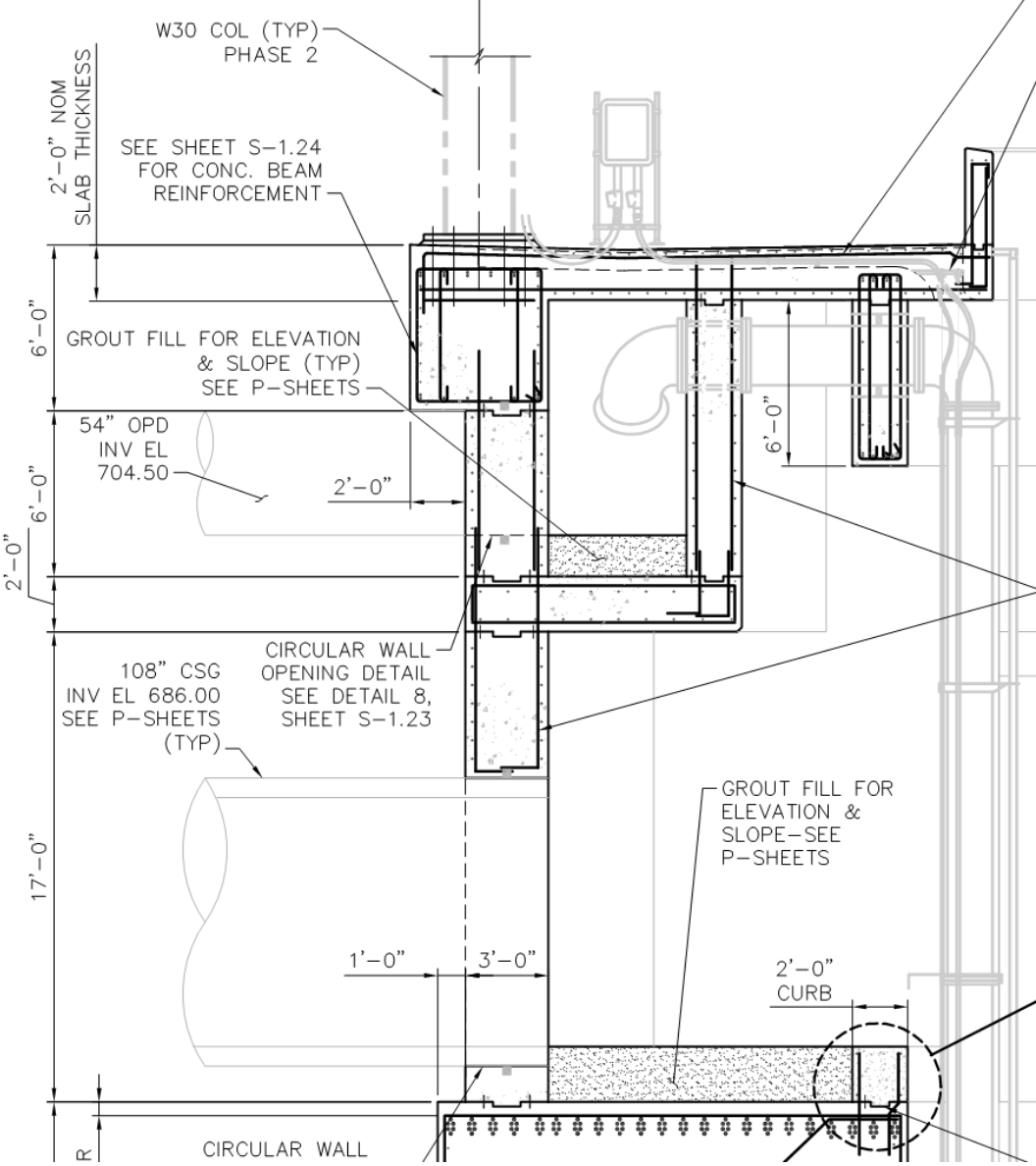
WEST GATE CHAMBER (WGC)	
QUAN.....	2
SIZE.....	108" X 108"
NORMAL POSITION.....	CLOSED
OPENS.....	ODS REACHES 616.00
CLOSES.....	PRIOR TO TUNNEL DEWATERING
OR.....	JP HEADWORKS REACHES 689.40 (14.0')

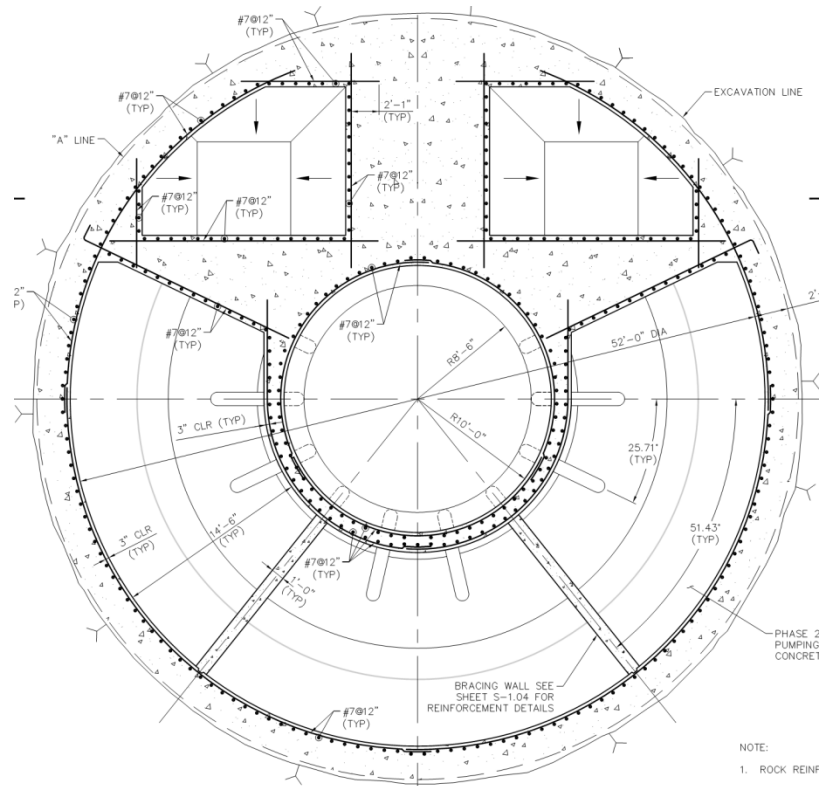
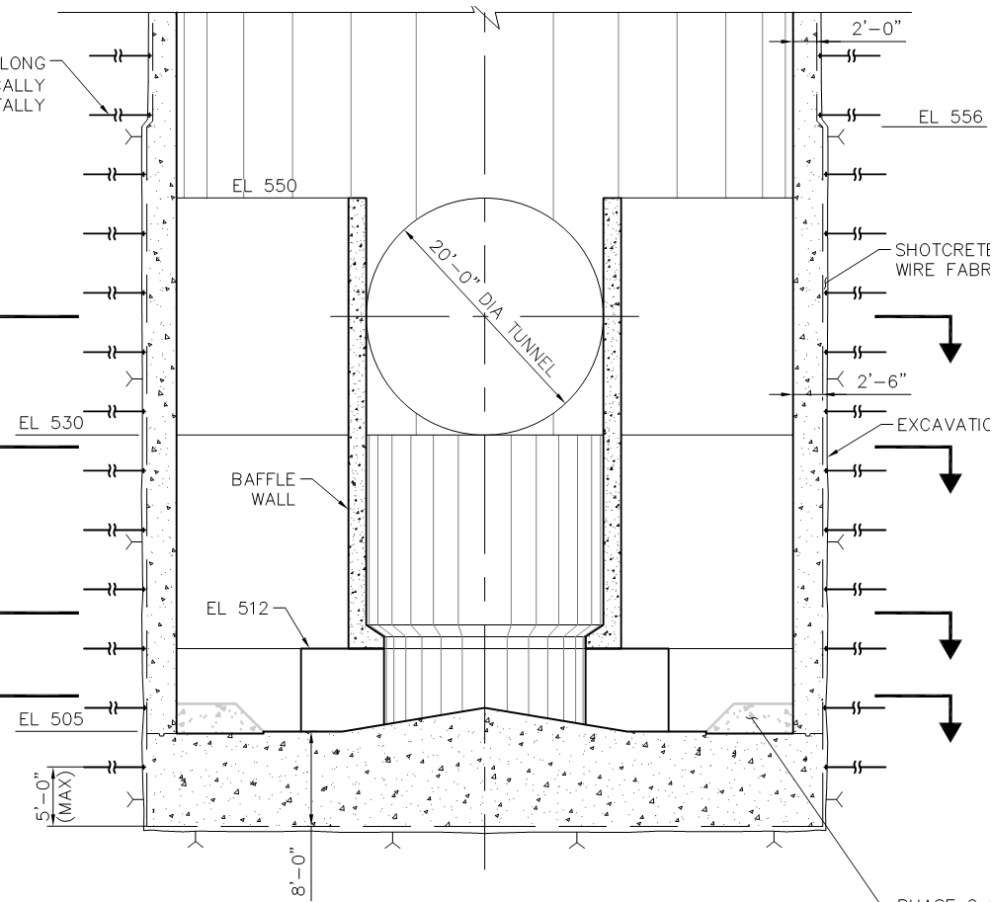
SLIDE GATE	
QUAN.....	1
SIZE.....	54" X 54"
NORMAL POSITION.....	CLOSED

FLAP VALVES	
V5001	V5002
V5003	V5004
QUAN.....	4
SIZE.....	96" DIA

Shaft 1 – ODS Stats

- Shaft 1 is 215' deep and 52' in diameter
- Surface elevation is 715
- Tunnel invert is at 530;
- Shaft invert elevation is 500
- Various outlet structures at the top of the shaft allow for diverting flow by gravity
- Special baffling at the bottom for the wet well for pump performance





Shaft 1 (ODS) Pumping System

- 1st Requirement was to be able to dewater the OARS shafts and tunnel within 2 days
- Volume of OARS Tunnel = 55 MG
- Volume of Shafts = 5 MG
- 30 MGD minimum pump rate
- Variable Gravity Head ($686 - 530 = 156'$)

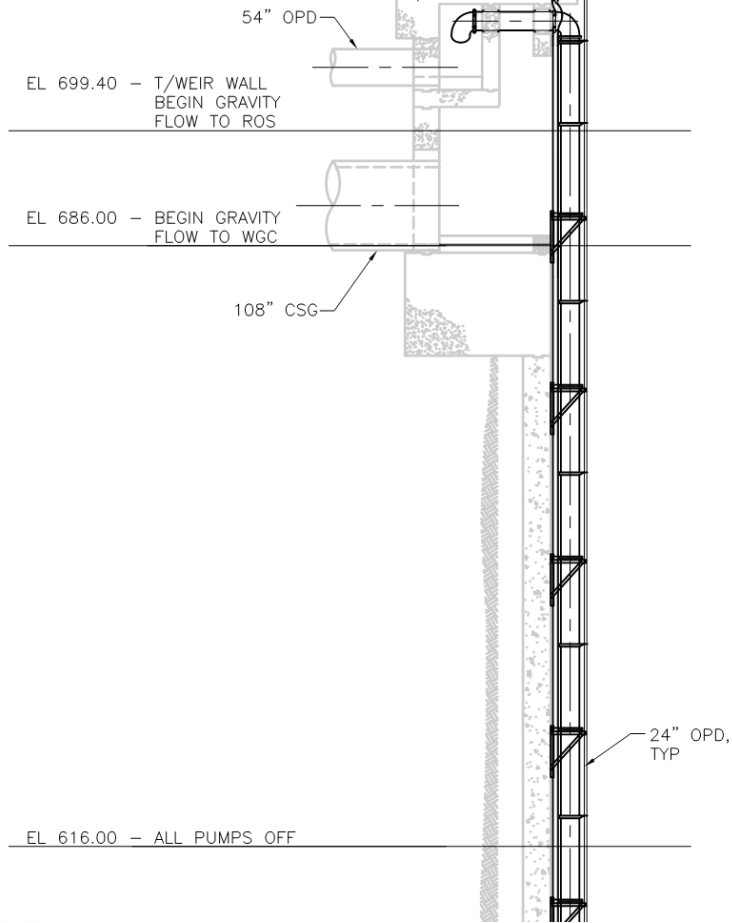
Shaft 1 (ODS) Pumping System

- 2nd Requirement is to maximize treatment and storage when a high flow event occurs
- Pump up to 60 MGD as the tunnel fills up
- Variable Gravity Head (580 – 530 = 50')

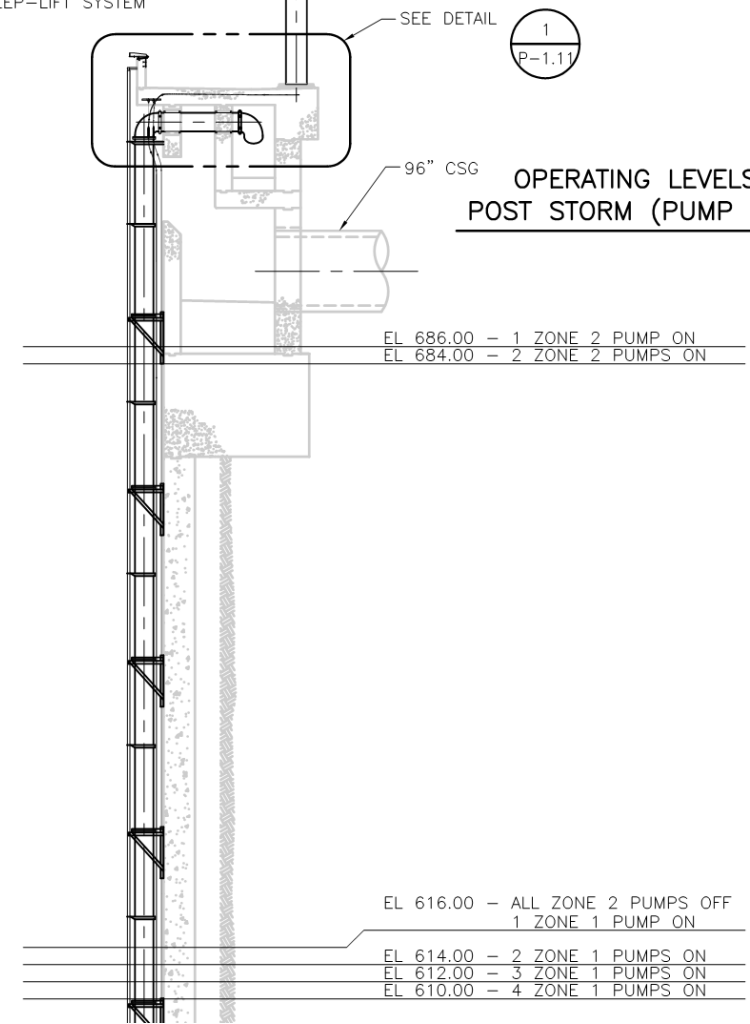
Shaft 1 (ODS) Pumping System

- 2 Pumps for the shaft level (20 MGD each)
- 4 Pumps for the tunnel level (15 MGD each)
- 2 Grit Pumps (1 MGD each)
- All 8 pumps have VFDs to operate efficiently
- 1 Shaft Mixing System

**OPERATING LEVELS,
DURING STORM**



**OPERATING LEVELS,
POST STORM (PUMP OUT)**



EL 616.00 - ALL PUMPS OFF

EL 616.00 - ALL ZONE 2 PUMPS OFF
1 ZONE 1 PUMP ON

EL 614.00 - 2 ZONE 1 PUMPS ON
EL 612.00 - 3 ZONE 1 PUMPS ON
EL 610.00 - 4 ZONE 1 PUMPS ON

OARS UPSTREAM CROWN EL 580.00

OARS UPSTREAM CROWN EL 580.00

CL OARS TUNNEL

SEE DETAIL



EL 539.00 - 4 ZONE 1 PUMPS ON
EL 537.00 - 3 ZONE 1 PUMPS ON
EL 535.00 - 2 ZONE 1 PUMPS ON
EL 533.00 - 1 ZONE 1 PUMP ON

EL 539.00 - 4 ZONE 1 PUMPS ON
EL 537.00 - 3 ZONE 1 PUMPS ON
EL 535.00 - 2 ZONE 1 PUMPS ON
EL 533.00 - 1 ZONE 1 PUMP ON

OARS DOWNSTREAM INV EL 530.00
ALL PUMPS OFF

OARS DOWNSTREAM INV EL 530.00
ALL PUMPS OFF

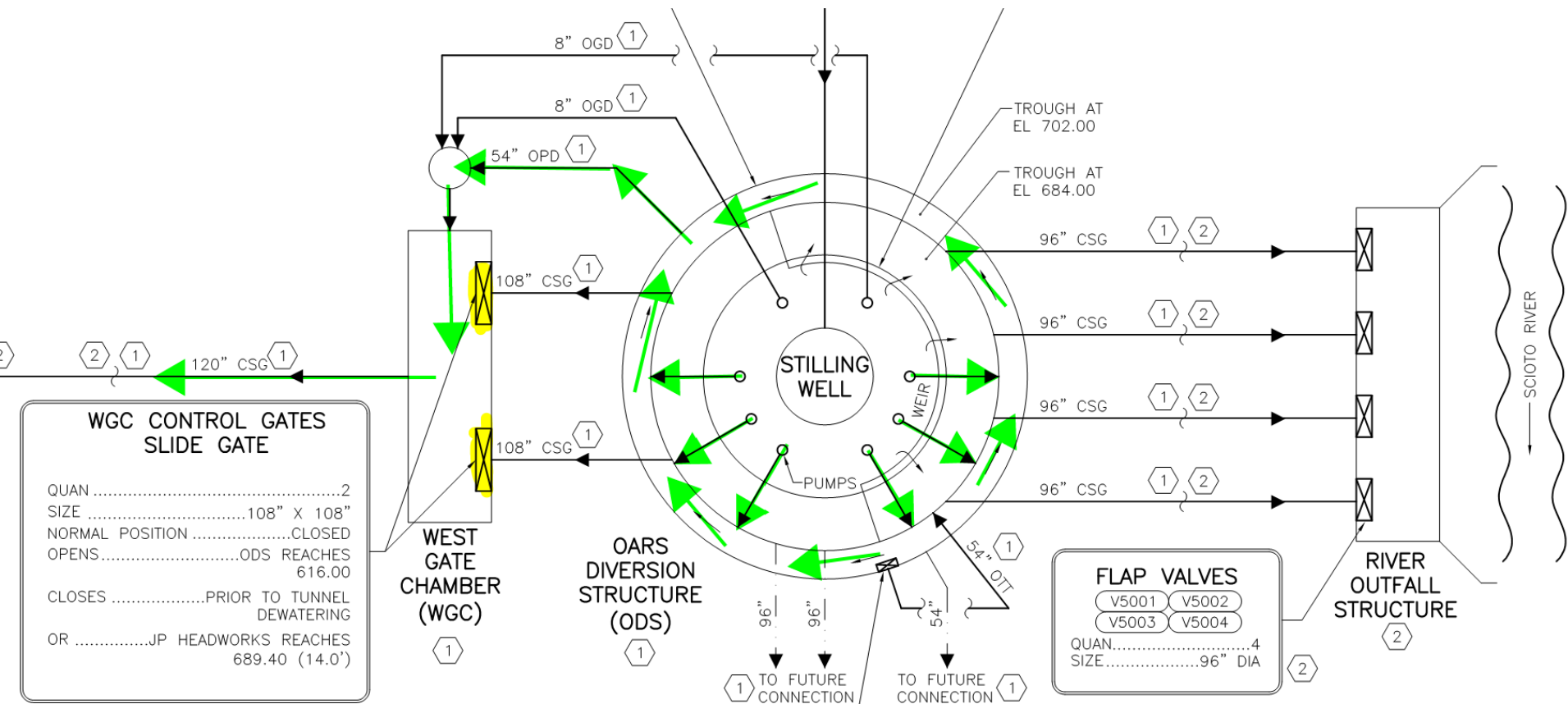
10" MW

OARS PUMP 1

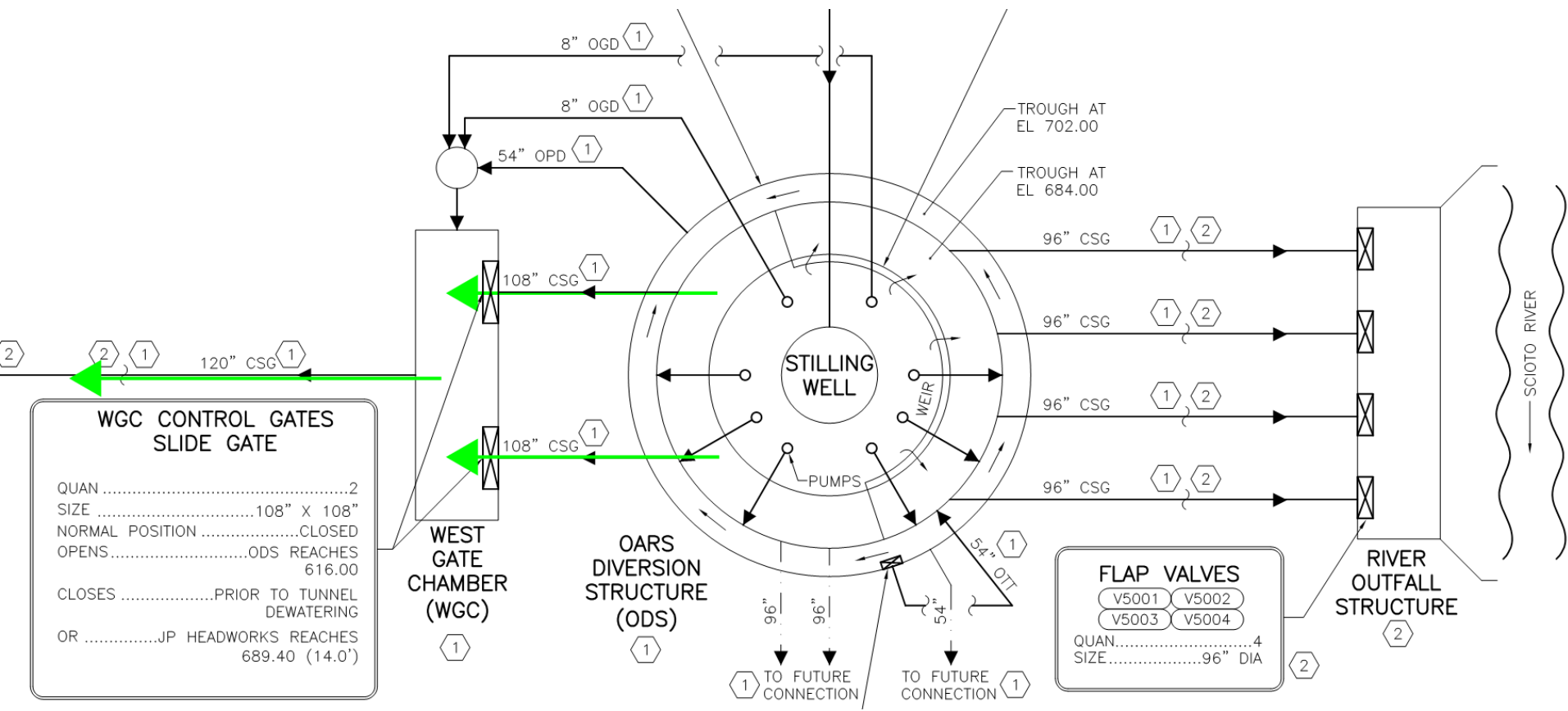
EL 505.00

SEE DETAIL

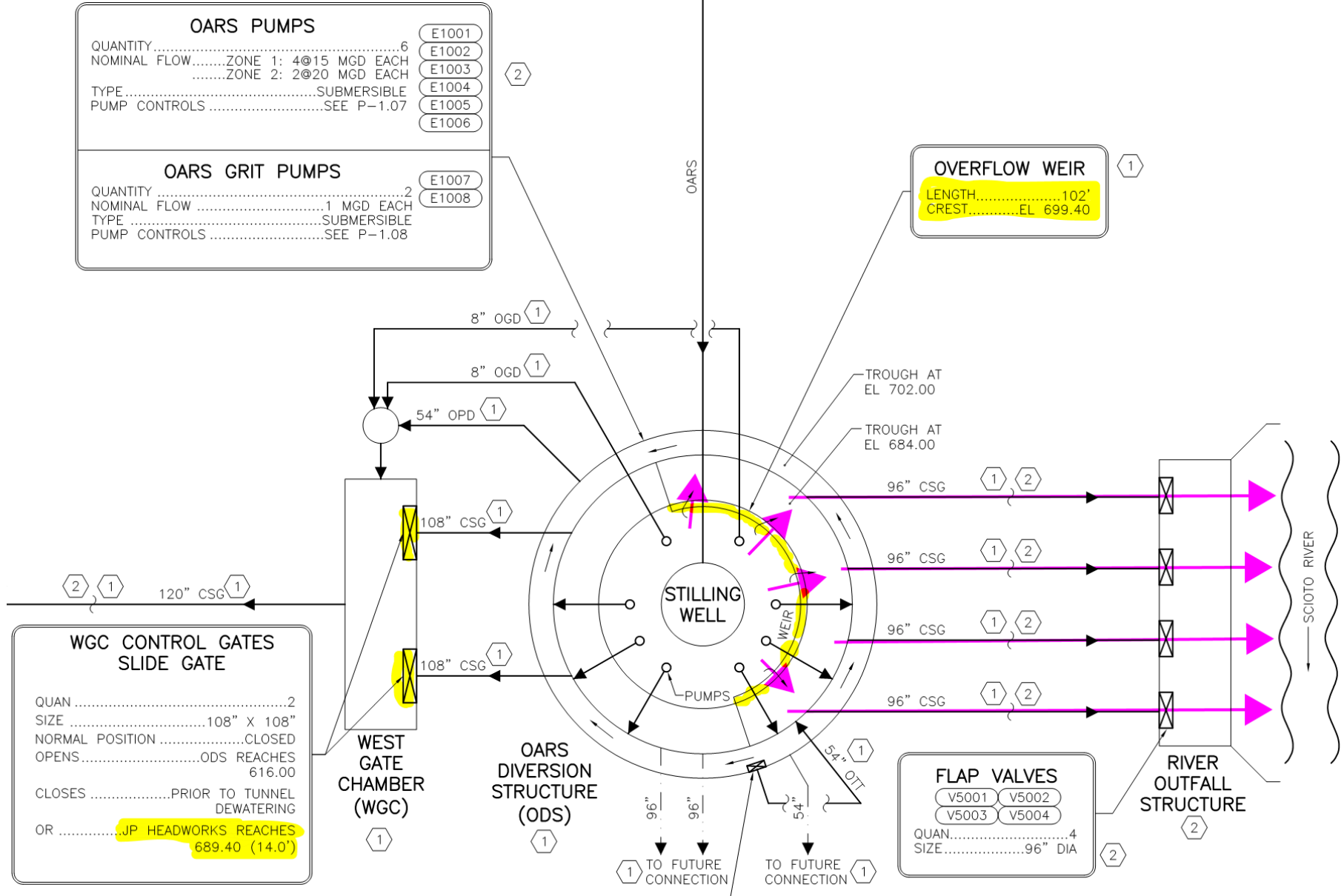




OARS starts to fill – pump to WWTP



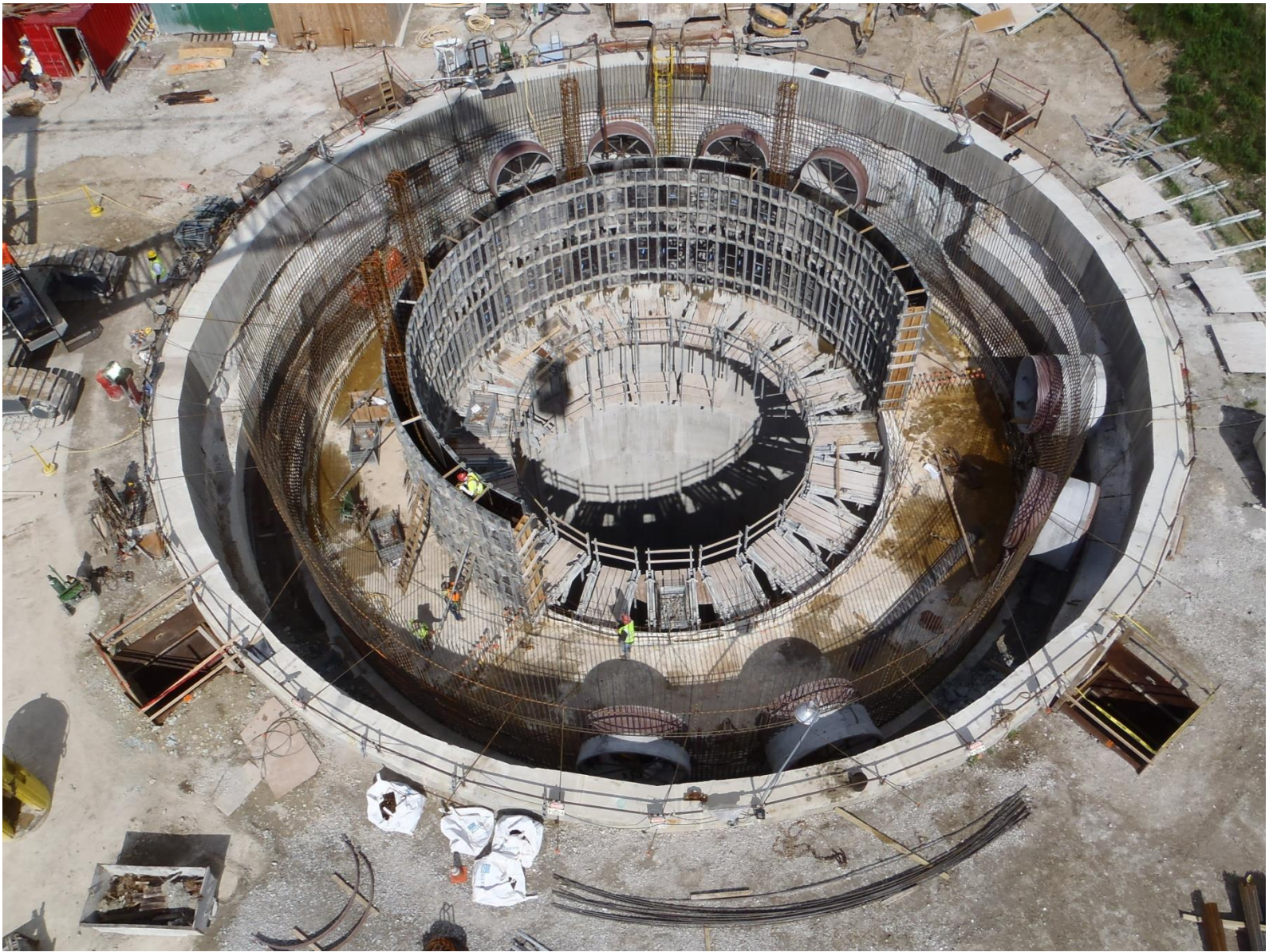
OARS Tunnel is full & shafts are filling – gravity flow to WWTP



OARS Tunnel & shafts are full and
 WWTP(s) are at capacity





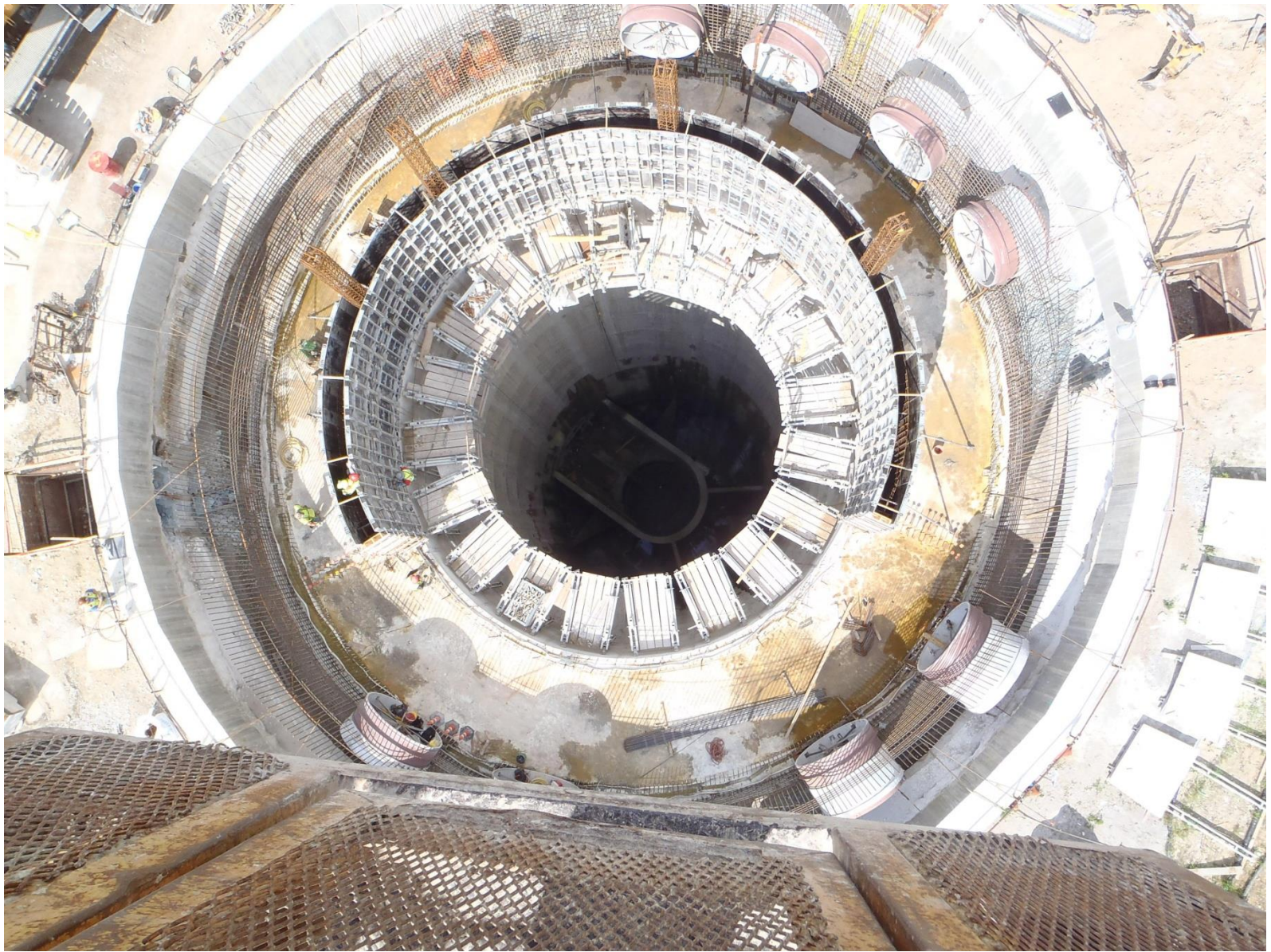


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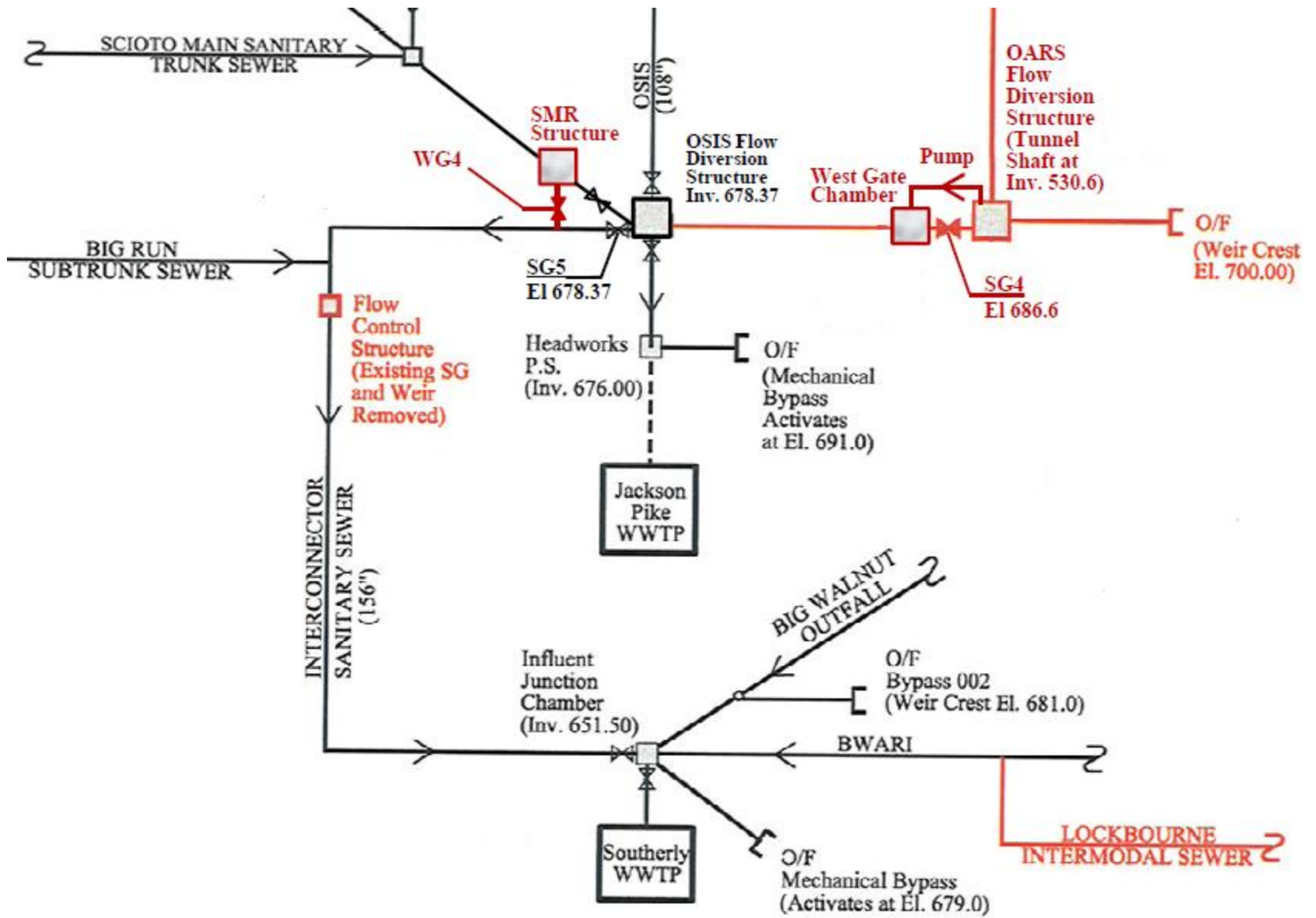


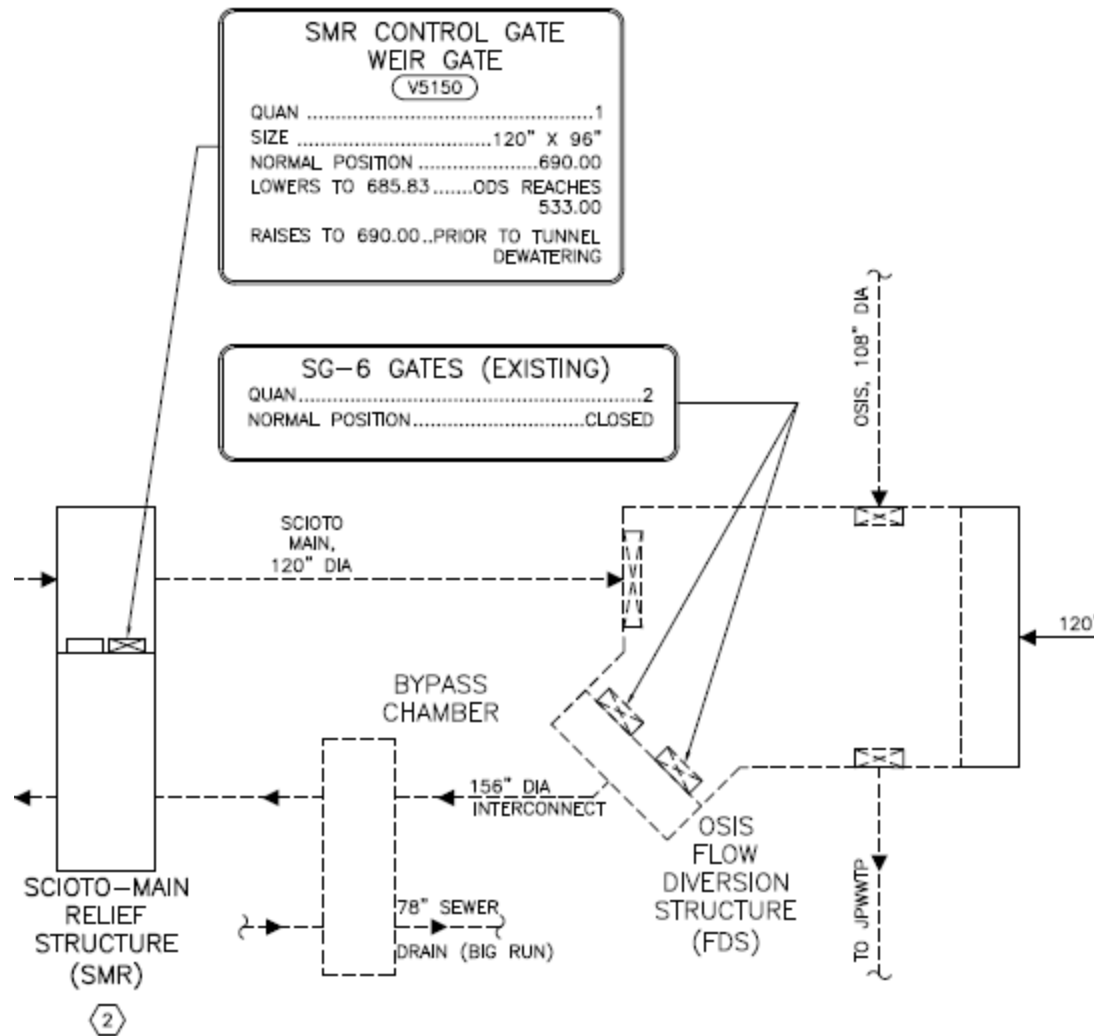


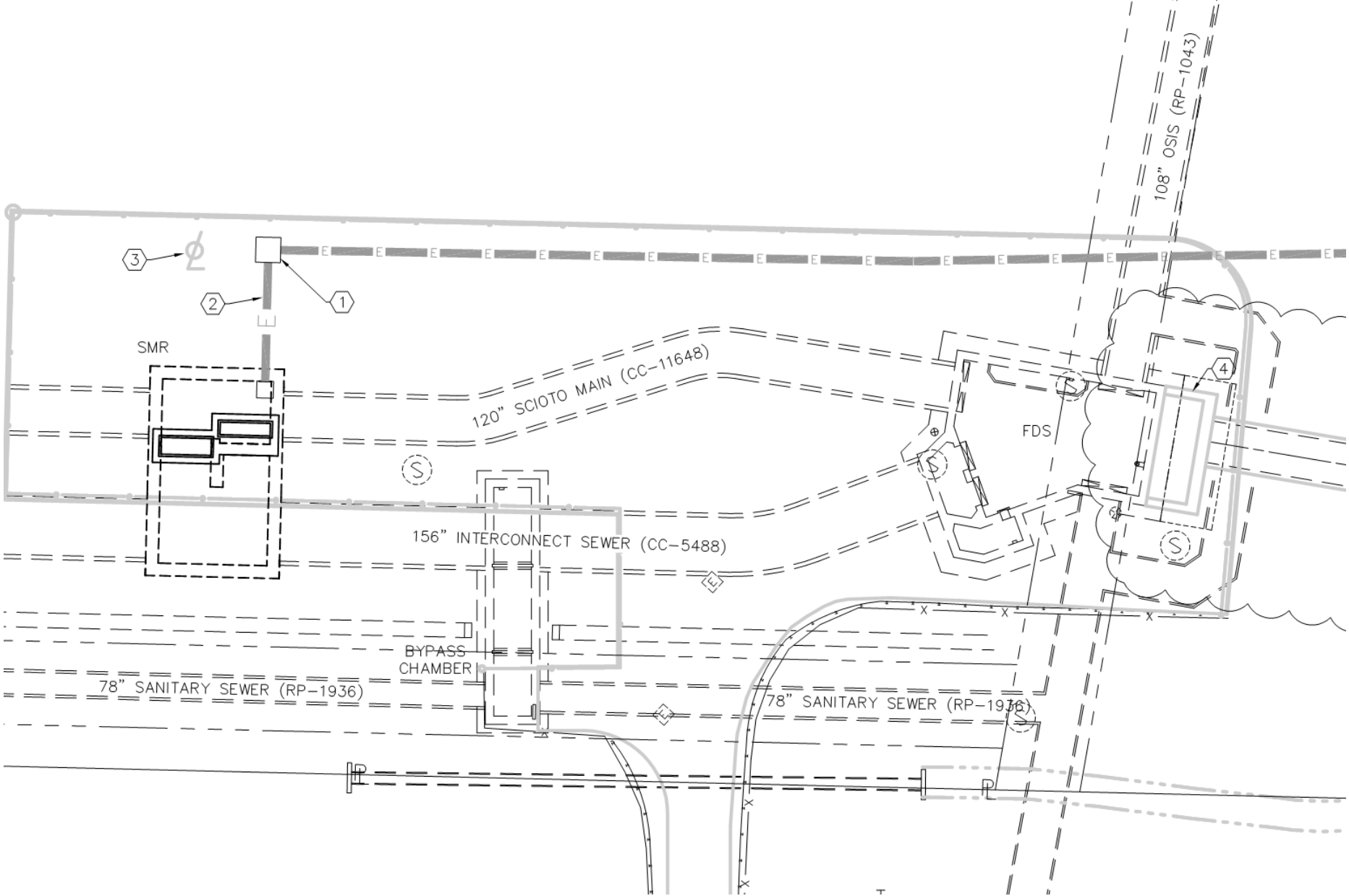
Scioto-Main Relief Structure (SMR)

The SMR serves 2 main design functions:

1. Relieve flow to the interconnect sewer when OARS is sending flow to the Jackson Pike WWTP.
2. Maintains the optimal level in the FDS, which improves influent pump performance. The weir gate provides “self-leveling” of the FDS.

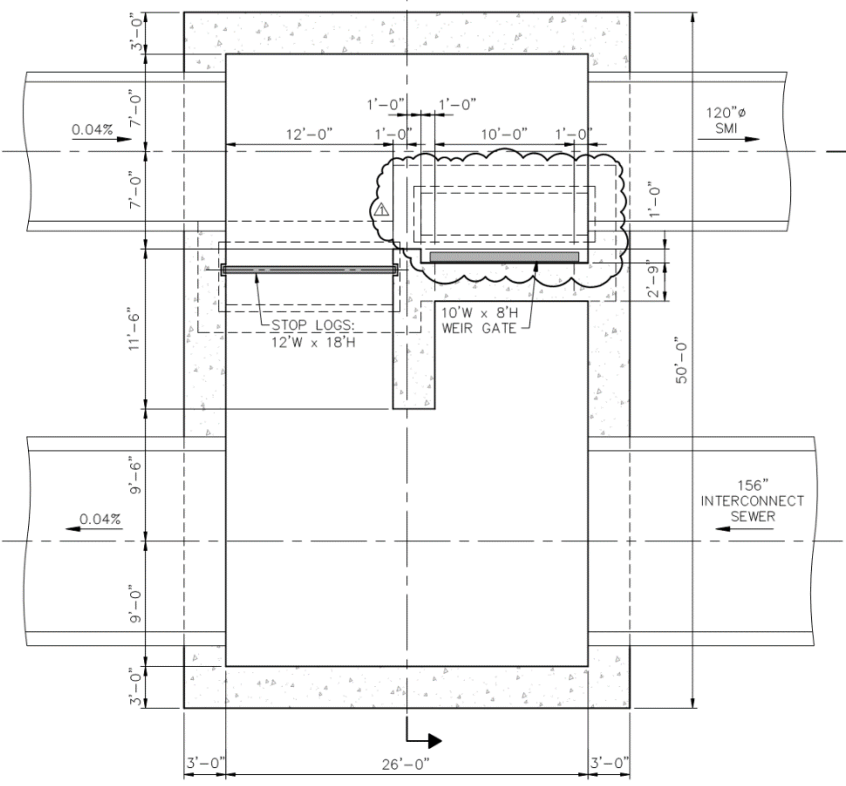




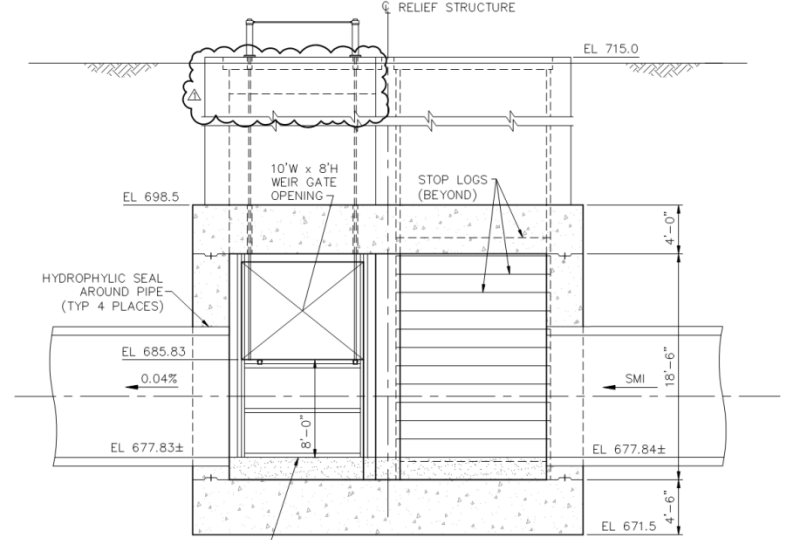




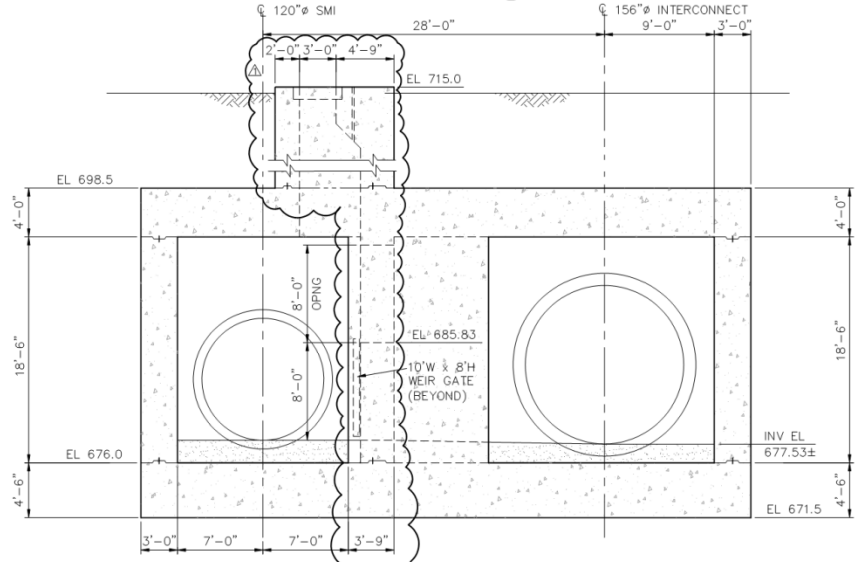
B
P-1.19
RELIEF STRUCTURE



PLAN



SECTION A
P-1.19



SECTION B
P-1.19



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OARS Project Team

- **DLZ**
 - **CH2M Hill**
 - **Jenny Engineering**
 - **Prime AE**
 - **EMH&T**
 - **Dynotec**
 - **Eagon & Associates**
 - **Multivista**
 - **CDM Smith**
 - **Black & Veatch**
 - **HR Gray**
 - **Smoot**
 - **Aldea Services**
- Phase 1 – Kenny / Obayashi**
- Phase 2 – Trumbull**
- Igel**
- Capital Tunneling**
- Miles McClellan**