

# LAKE BRAZOS DAM

## ENGINEERING SERVICES



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Presentation to City Council

August 16, 2022

# TODAY'S PRESENTATION

- Dam History
- Project Background and Purpose
- Proposed Project - Embankment Modifications and Outlet Upgrades

# ORIGINAL LAKE BRAZOS DAM

- Constructed in 1970
- Gated Spillway with Concrete-lined Embankment





# ORIGINAL LAKE BRAZOS DAM

- Gates replaced in 1985 with Hydraulic Leaf Gates
- Extended Stilling Basin



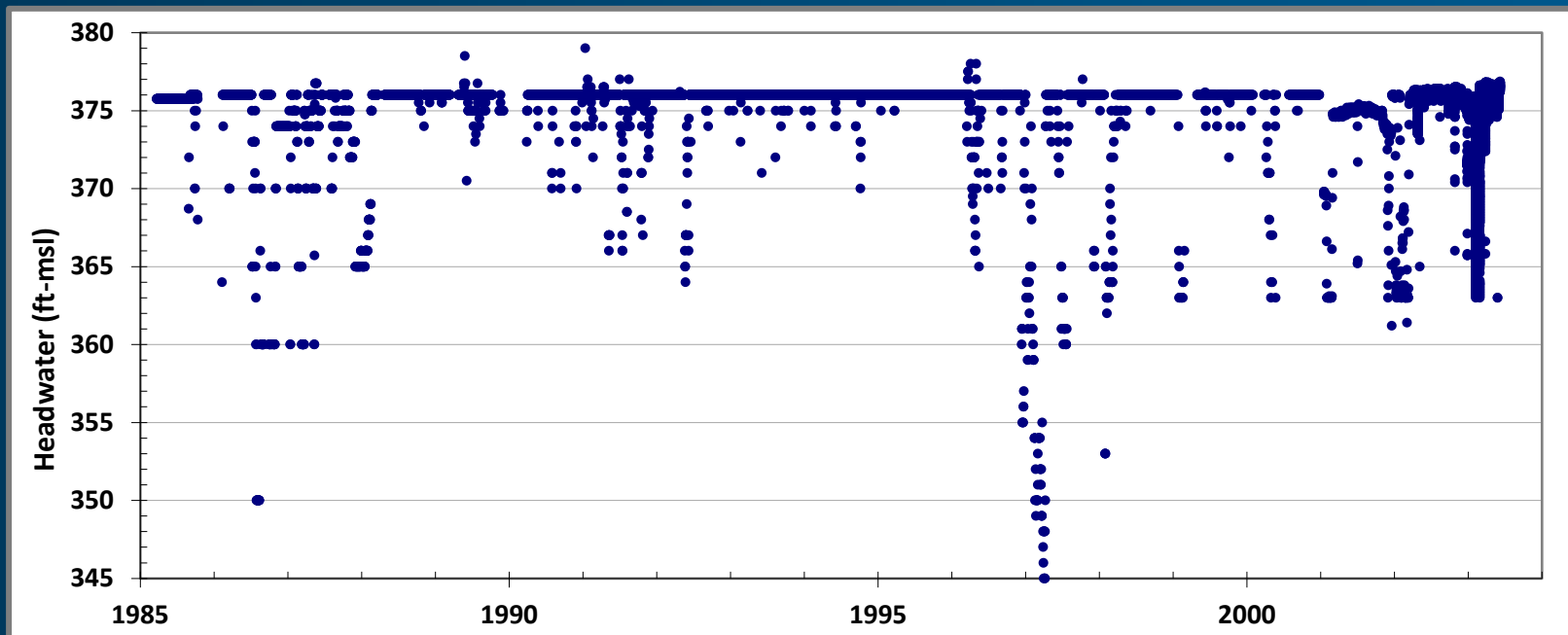


# ORIGINAL LAKE BRAZOS DAM



# PROBLEMS

- Costly gate operations
- Unreliable lake level
- Environmental impacts
- Long-term stability



\*20% of lake level readings are below normal pool. Approximately 2.8 years of low lake levels over the past 20 years.



# LABYRINTH WEIR DESIGN AND CONSTRUCTION (2003-2009)

## PROJECT GOALS

- Improve lake reliability
- Maintain FEMA floodplain upstream
- Revitalize Downtown

## DESIGN CONSIDERATIONS

- Flood impacts
- Long-term maintenance
- Environmental permits
- Construction risk



*Riverwalk during Normal Conditions*



*Riverwalk during Flood*

RIGHT LEFT  
 BUOY AND ANCHOR  
 SEE DETAIL 3 SHEET C-28.  
 PROVIDE SOLAR LIGHT ON  
 EVERY OTHER BUOY.  
 EL. 363.5 FT-MSL  
 NEW UPSTREAM  
 IMPACT SLAB  
 EL. 363.5 FT-MSL  
 19+00  
 LEFT LABYRINTH  
 NEW SHEETPILE  
 18+00 17+00  
 NEW RIGHT OUTLET WORKS  
 (ALTERNATE BID ITEM)  
 RIGHT LABYRINTH  
 NEW REINFORCED  
 CONCRETE IMPACT SLAB  
 EL. 354 FT-MSL  
 EXISTING RIGHT PIER  
 EXISTING MIDDLE PIER  
 NEW DOWNSTREAM  
 ACCESS ROAD  
 EL. 358 FT-MSL  
 NEW ROCK RIPRAP  
 EL. 355 FT-MSL  
 NEW REINFORCED  
 CONCRETE IMPACT SLAB  
 EL. 355 FT-MSL  
 GRADE FILL  
 EL. 355 FT-MSL  
 EXISTING 36" ROCK RIPRAP  
 PHASE III  
 FOR ADDITIONAL AND  
 SE III  
 AND IMPROVEMENTS  
 FLOW SECTION,  
 SET C-18  
 AND GATED SECTION  
 AND EXCAVATION,  
 SET C-22  
 RIGHT OUTLET WORKS,  
 MULTI-STRAND  
 POST-TENSIONED ANCHOR  
 (TYP.)  
 LEFT OUTLET WORKS  
 TRASH RACK  
 NEW ACCESS ROAD  
 EL. 388 FT-MSL  
 NEW ACCESS ROAD  
 NEW ROCK  
 RIPRAP  
 NEW GROUTED  
 ROCK RIPRAP  
 EXISTING CONCRETE  
 LEFT OUTLET WORKS  
 STILLING BASIN





# LABYRINTH WEIR CONSTRUCTION

April 2007





# EMBANKMENT OVERVIEW





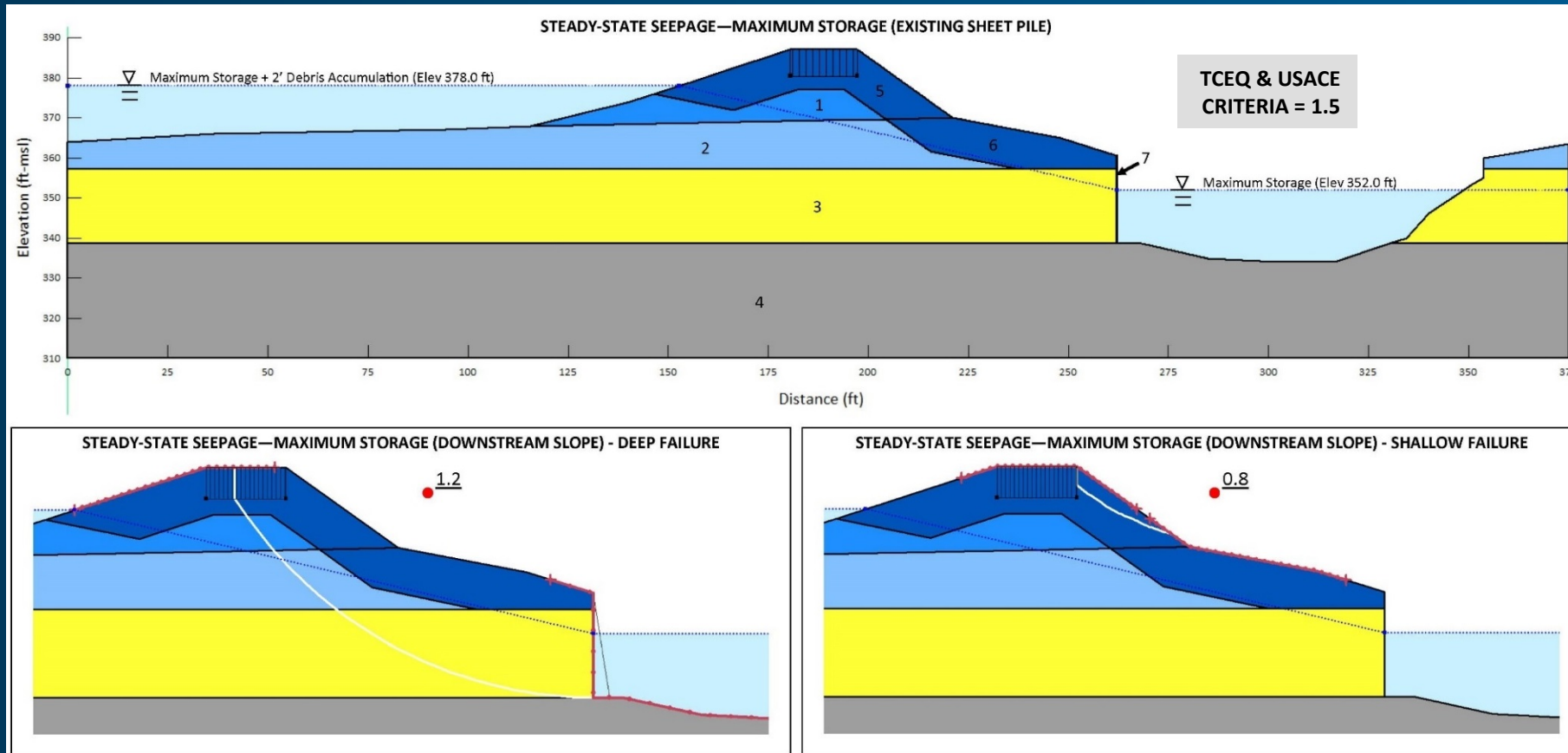
# DAM SAFETY INSPECTION

- 2007: TCEQ recommended monitoring until permanent repair is implemented
- 2014: Existing sheetpile condition noted to be worsening
- 2016: FNI evaluated the existing condition of the embankment and earth retaining system



# EMBANKMENT EVALUATION (2016-2017)

- Embankment downstream slope stability does not meet recommended safety factors





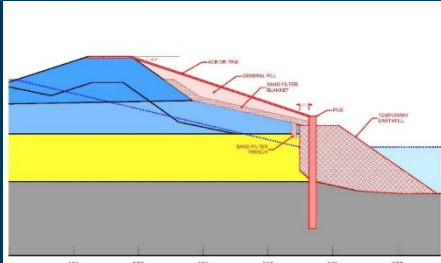
# EMBANKMENT EVALUATION (2016-2017)

- *Significant risk* of failure of the embankment
- Failure would result in loss of the reservoir
  - Dam impounds the City's oldest water right
  - Amenity: Riverwalk and Baylor stadium

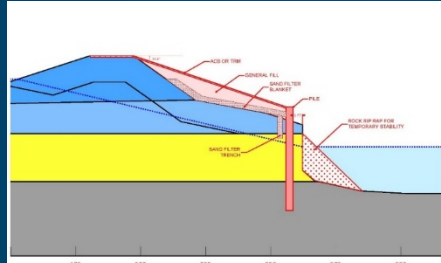


# EMBANKMENT EVALUATION (2016-2020)

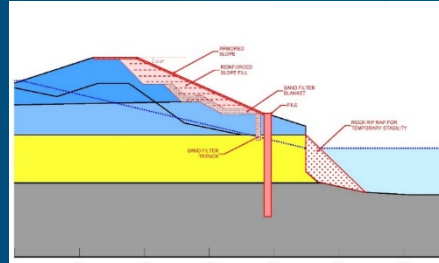
- Secant pile repair options to stabilize embankment



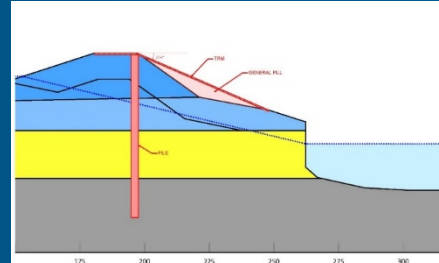
IN CHANNEL WITH 3:1  
FLATTENED SLOPE



AT TOE WITH 2.3:1  
FLATTENED SLOPE

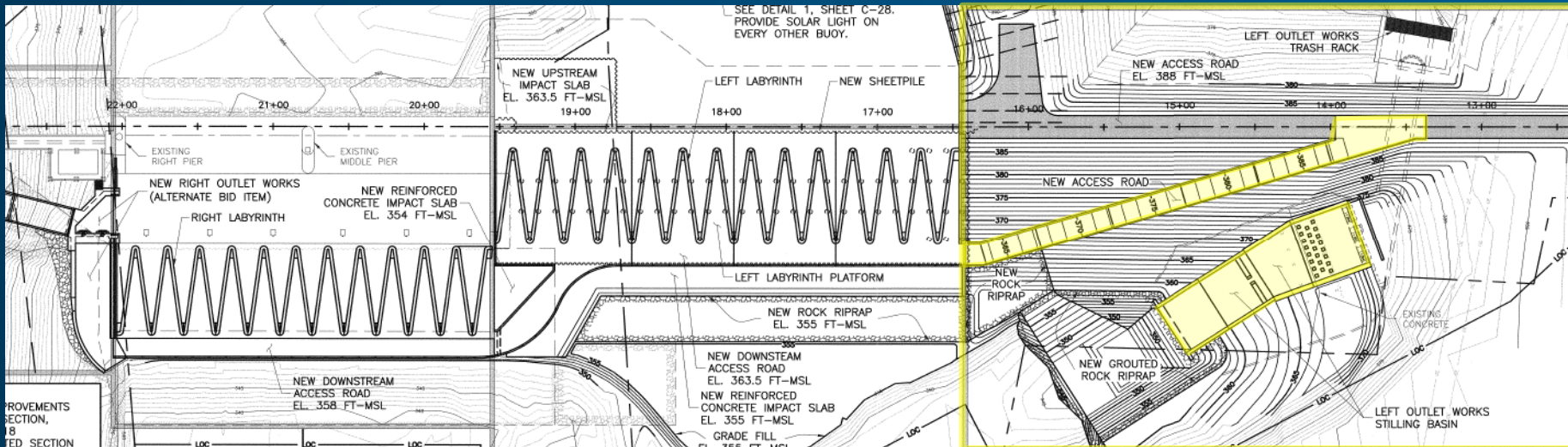


AT TOE WITH 3:1  
FLATTENED SLOPE



THRU CREST WITH 2.3:1  
FLATTENED SLOPE

- Embankment and left outlet works improvements

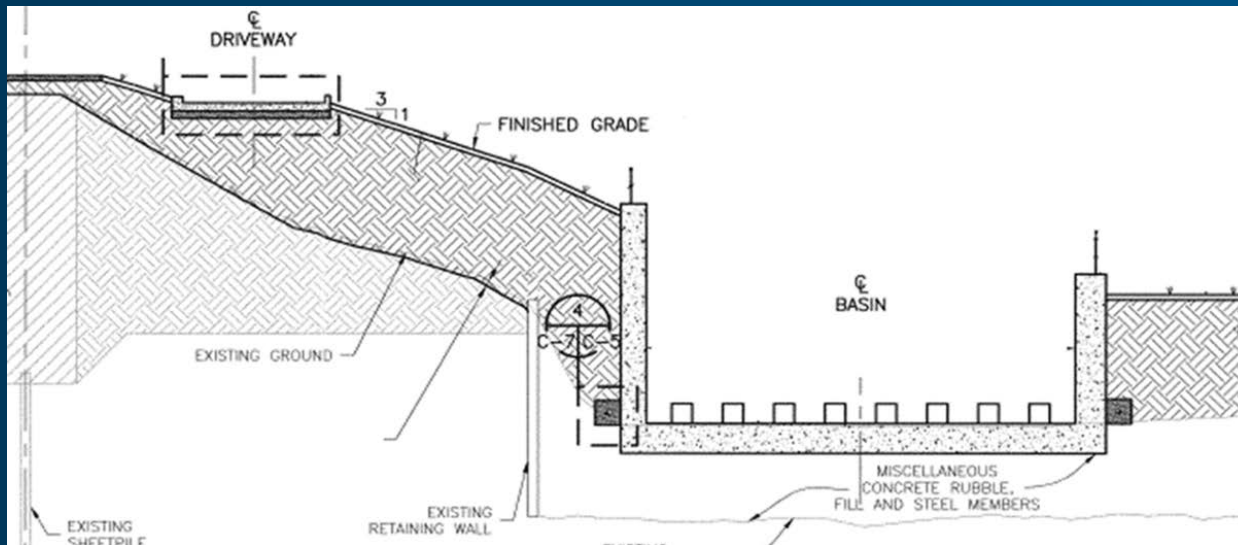
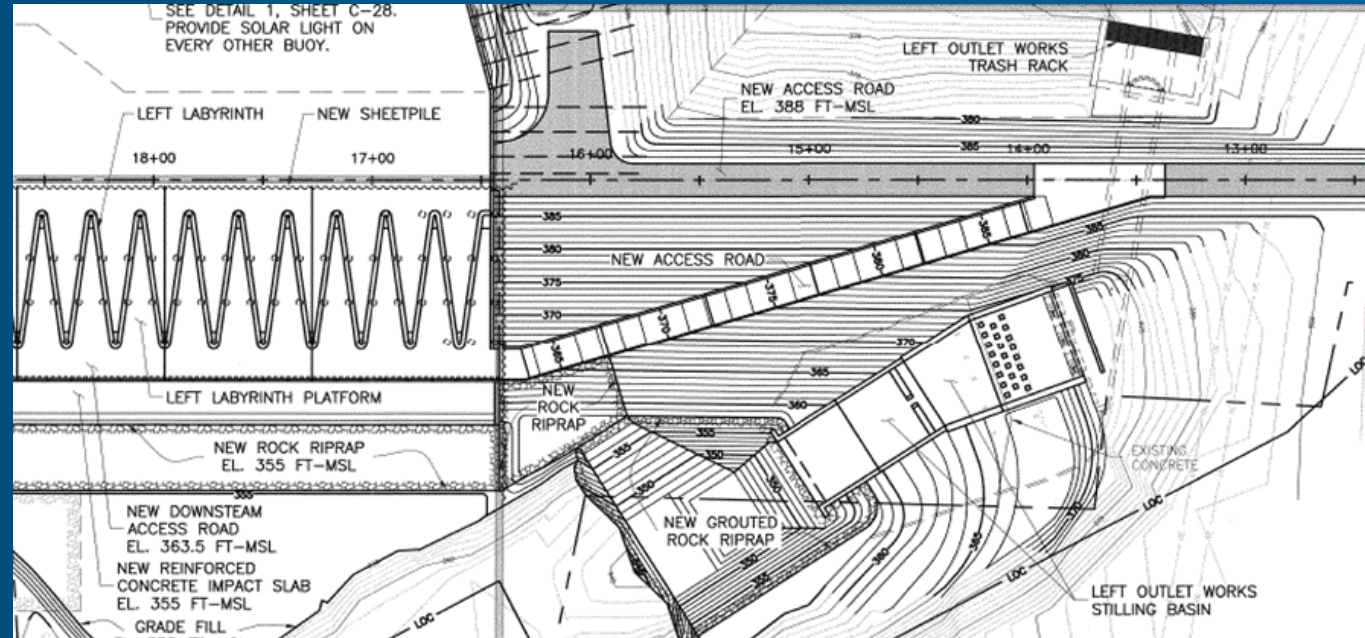




# EMBANKMENT EVALUATION (2016-2017)

## Recommended Solution

- Stilling Basin Addition
- Riprap Armoring
- Actuator Modifications
- Dewatering System Upgrades





# TEMPORARY REPAIRS (2019)

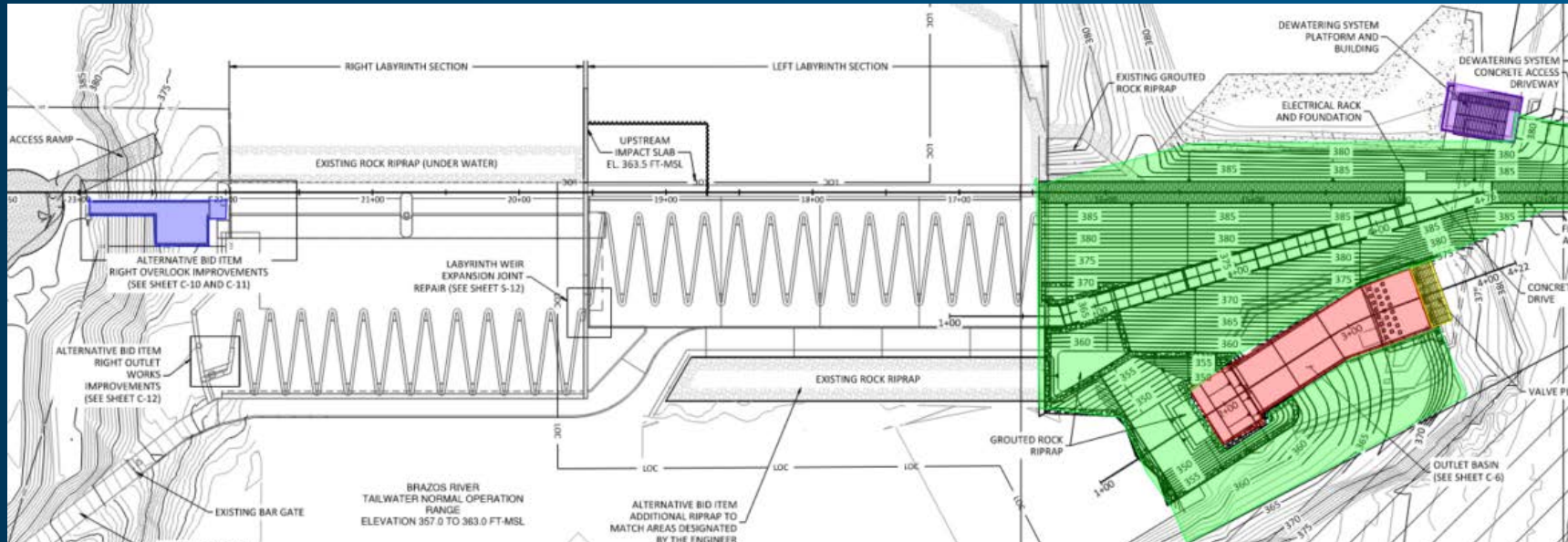
- 2019: City made temporary repairs to the worsening condition (sinkhole) of the embankment toe





# EMBANKMENT REPAIR AND OUTLET UPDATE DESIGN

- Embankment Repairs and Outlet Basin Addition
- Left Outlet Works Improvements:
  - Dewatering System
  - Mechanical and Electrical Improvements
- Right Outlet Works Improvements



# EMBANKMENT REPAIRS AND OUTLET UPGRADES DESIGN

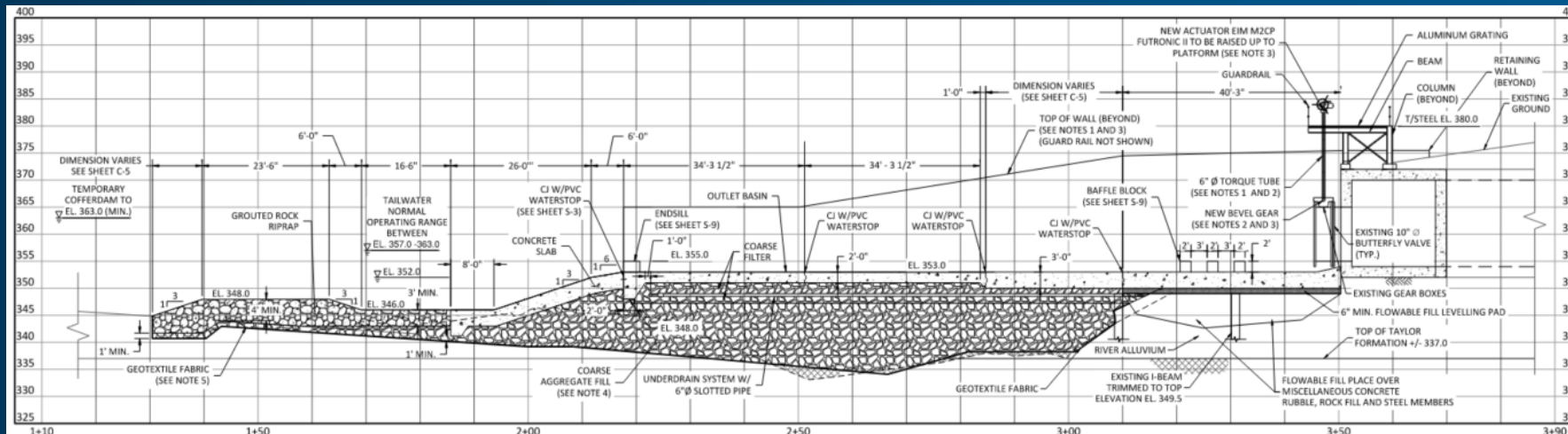
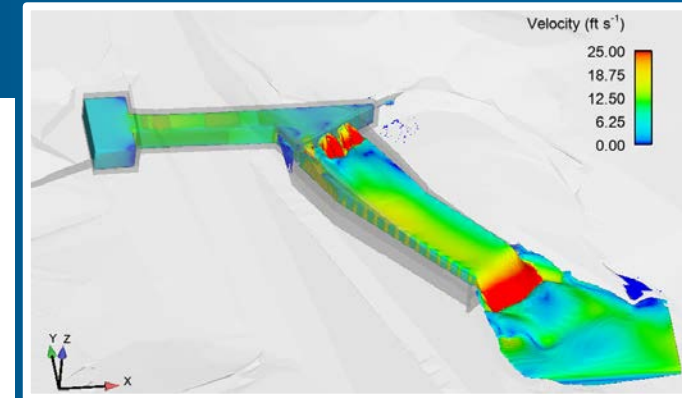
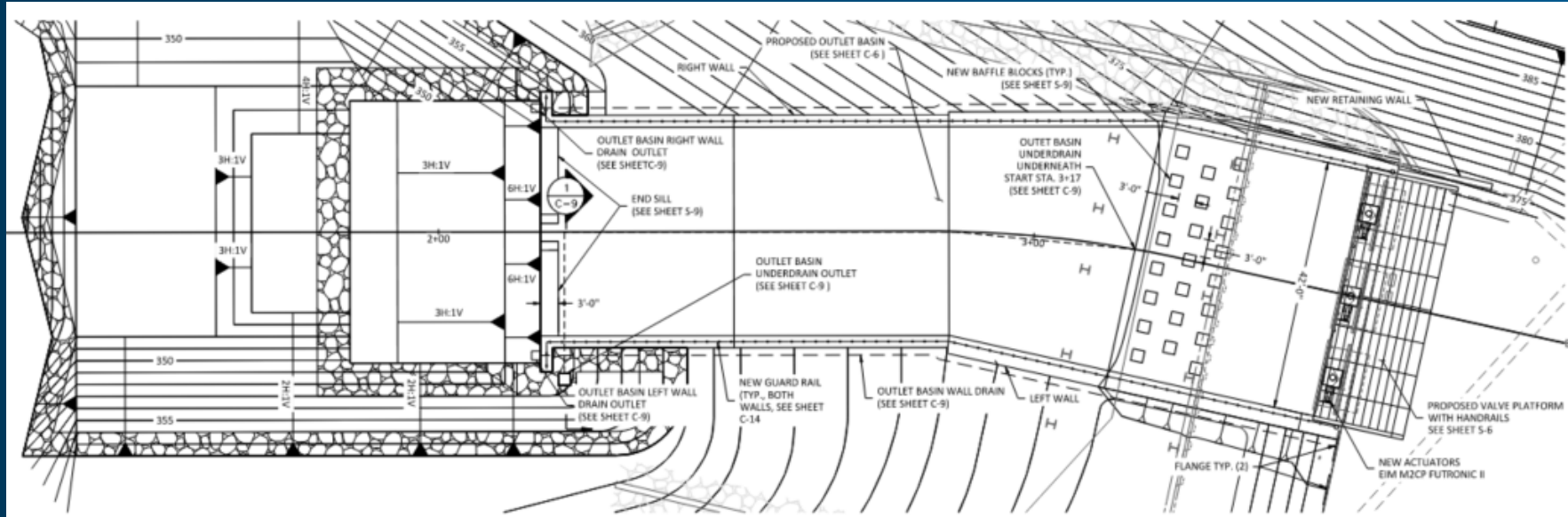
## Existing Conditions





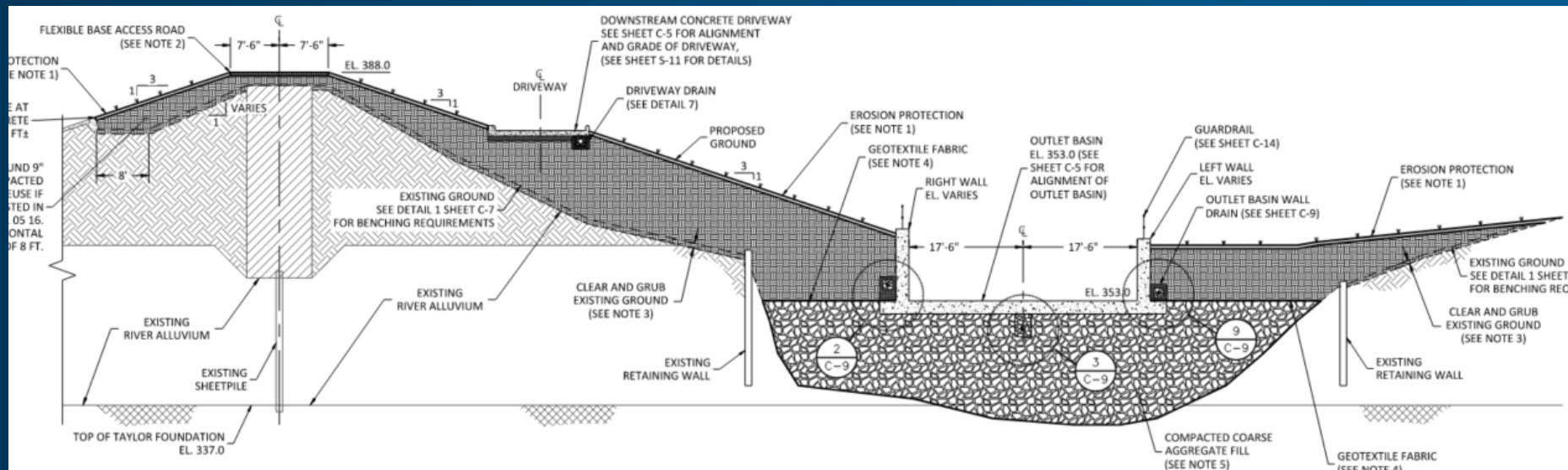
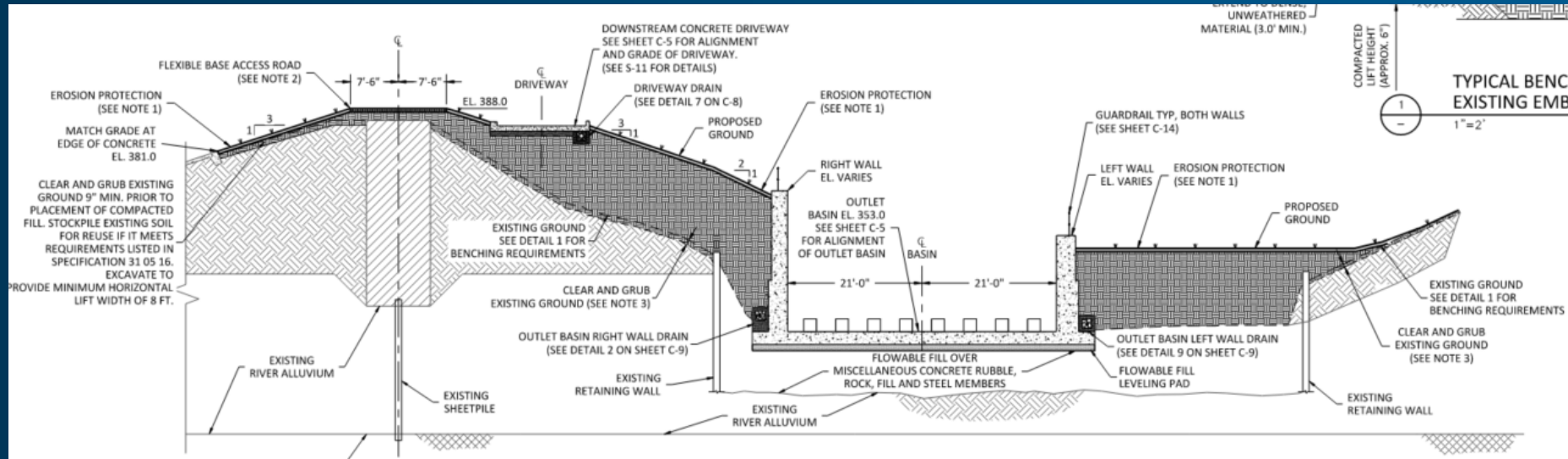
# EMBANKMENT REPAIRS AND OUTLET UPGRADES DESIGN

## Proposed Design



# EMBANKMENT REPAIRS AND OUTLET UPGRADES DESIGN

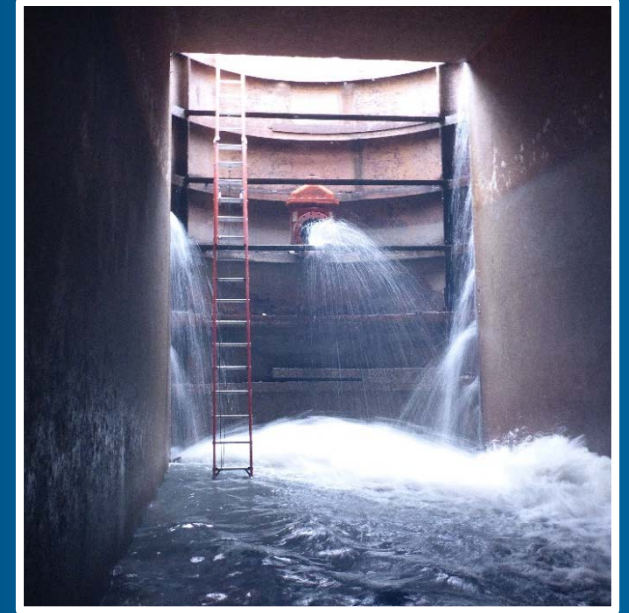
## Proposed Design





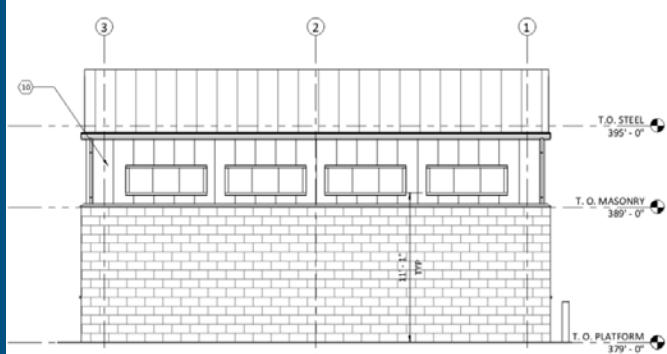
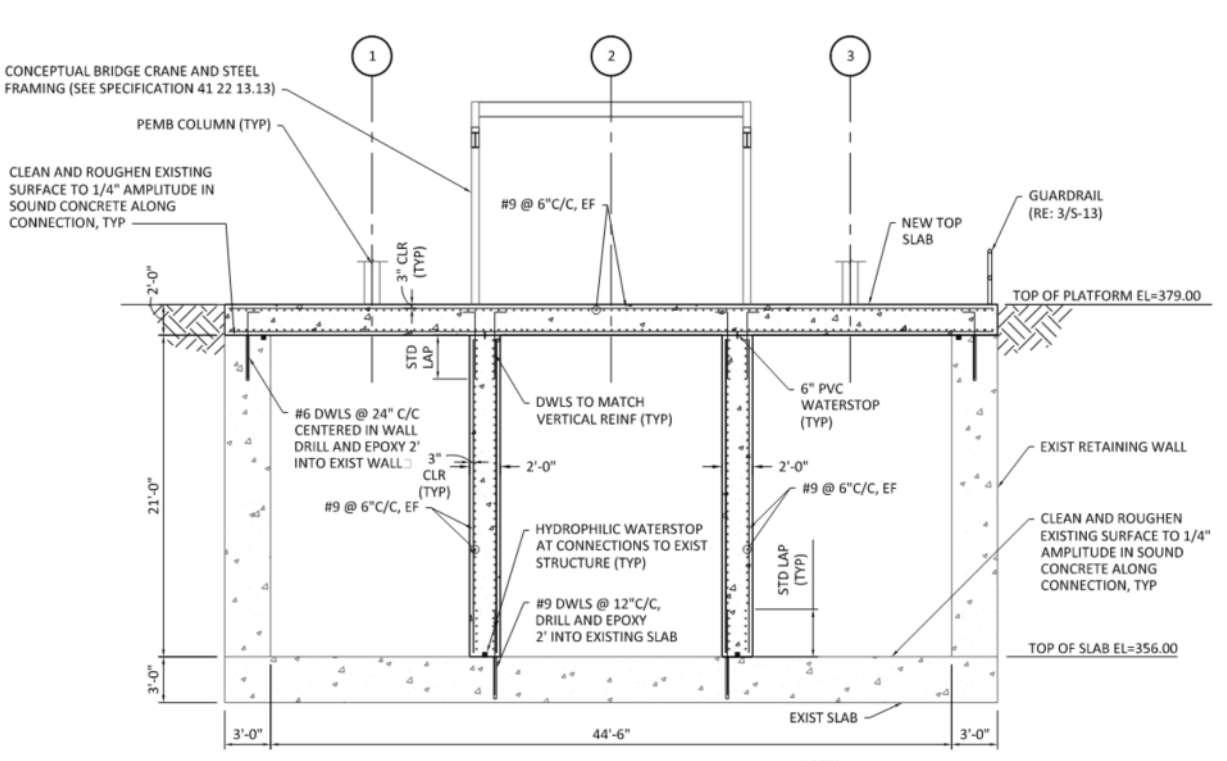
# LEFT OUTLET WORKS DEWATERING SYSTEM

Existing Conditions



# LEFT OUTLET WORKS DEWATERING SYSTEM

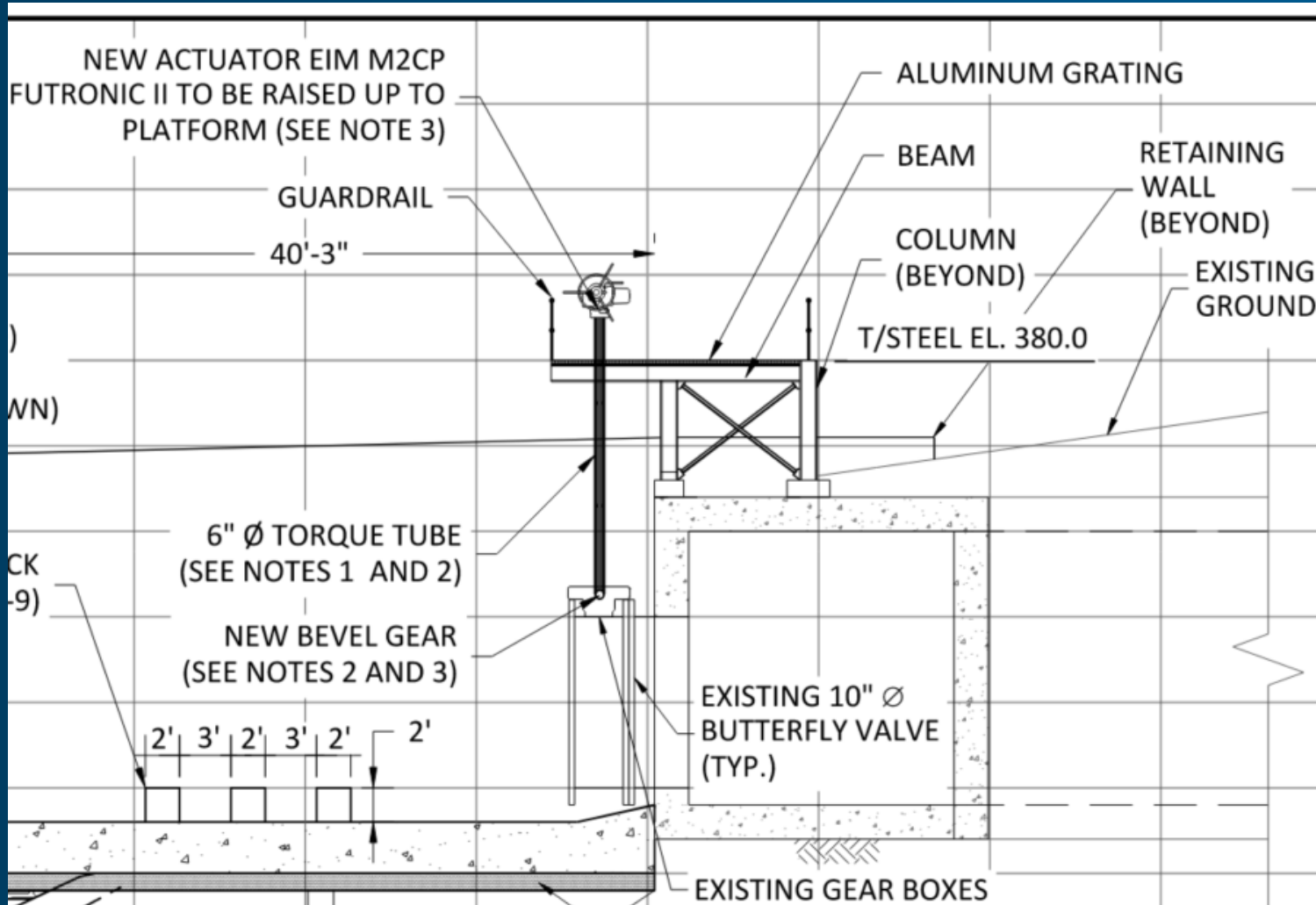
## Proposed Design





# LEFT OUTLET WORKS

## Proposed Design



# RIGHT NON-OVERFLOW IMPROVEMENTS

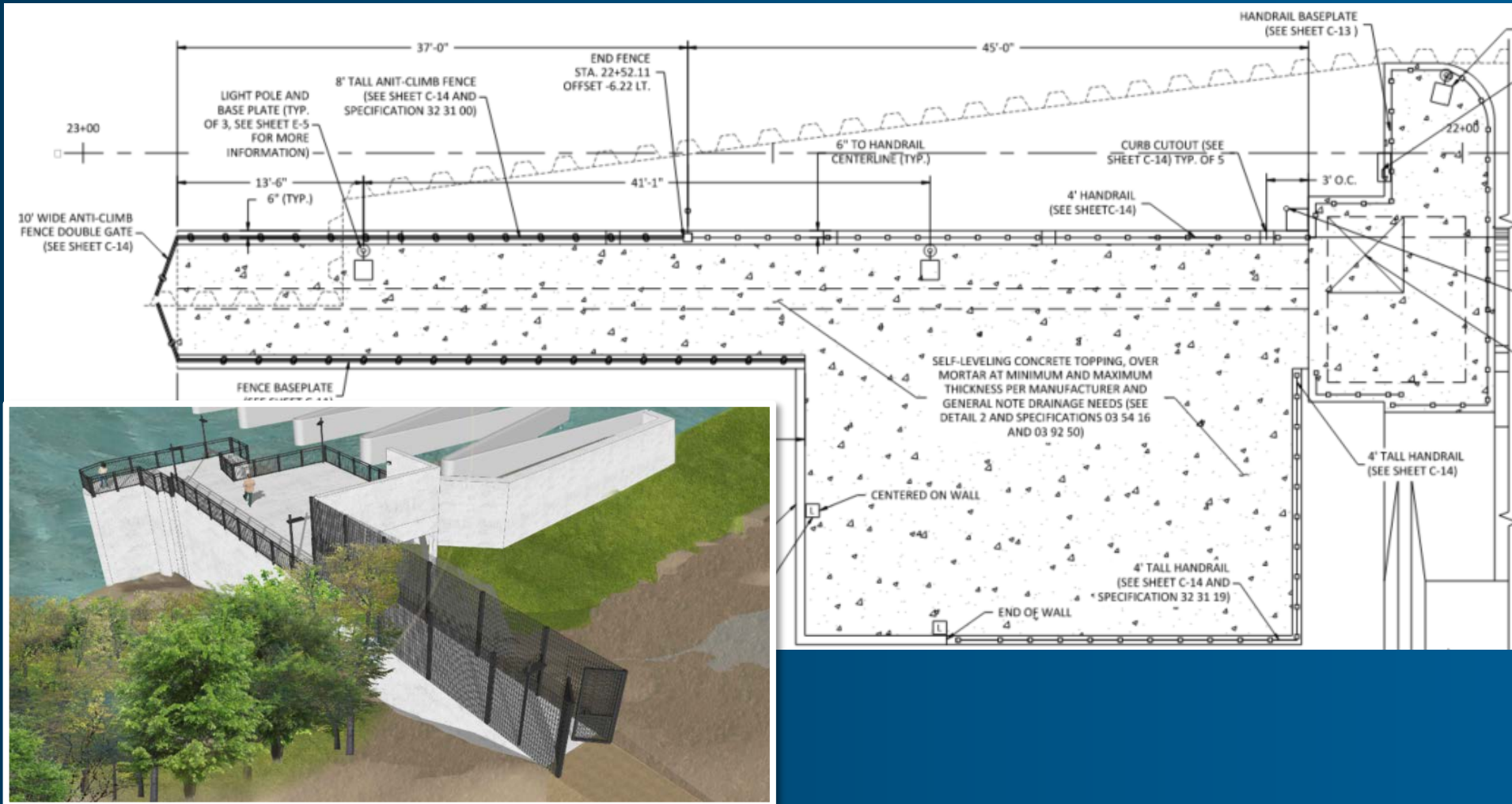
## Existing Conditions





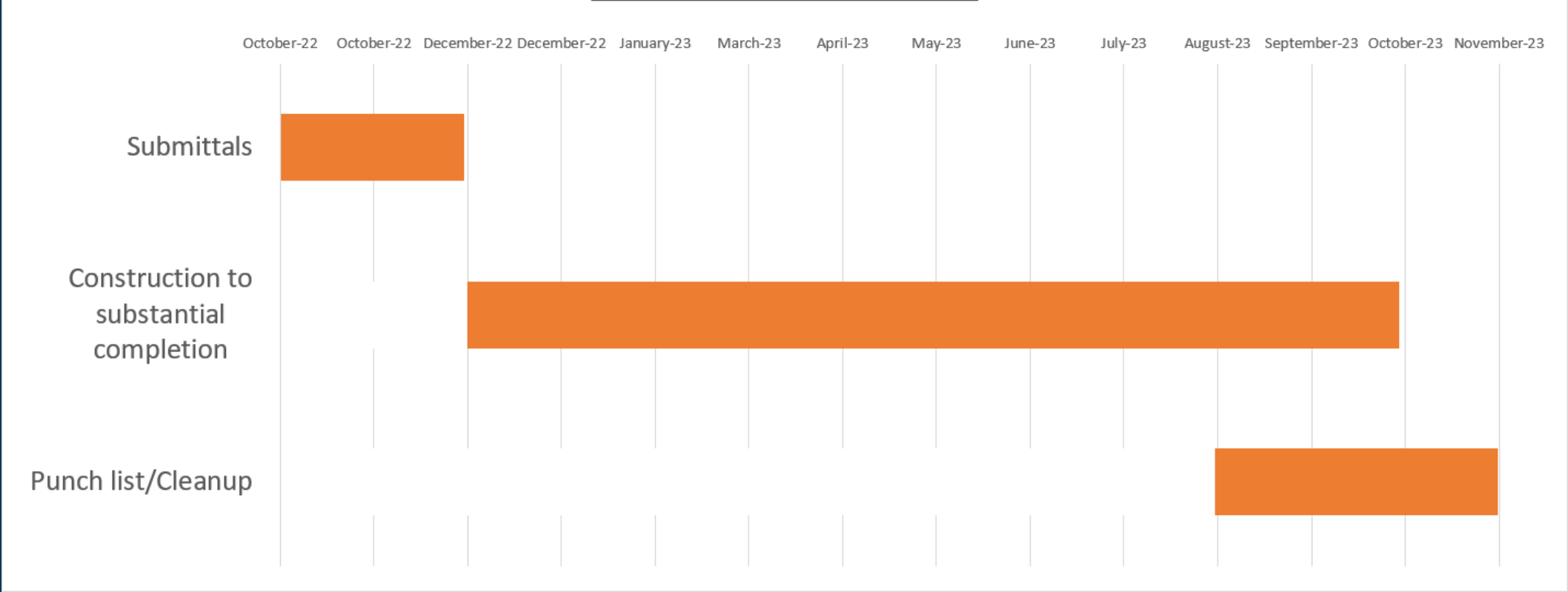
# RIGHT NON-OVERFLOW IMPROVEMENTS

## Proposed Design



# PROJECT TIMELINE

## Lake Brazos Dam Improvements





# RECOMMENDATION

Water Utility Services staff recommends awarding the Lake Brazos Dam Improvements construction contract to McMillen LLC, (d/b/a McMillen Jacobs Associates) for \$ 9, 179, 235.00 and establishing a construction contingency in the amount of \$320,765.00.

Funding:	2021 Water Bonds	\$7,000,000.00
	Water Cash CIP Fund	\$2,500,000.00