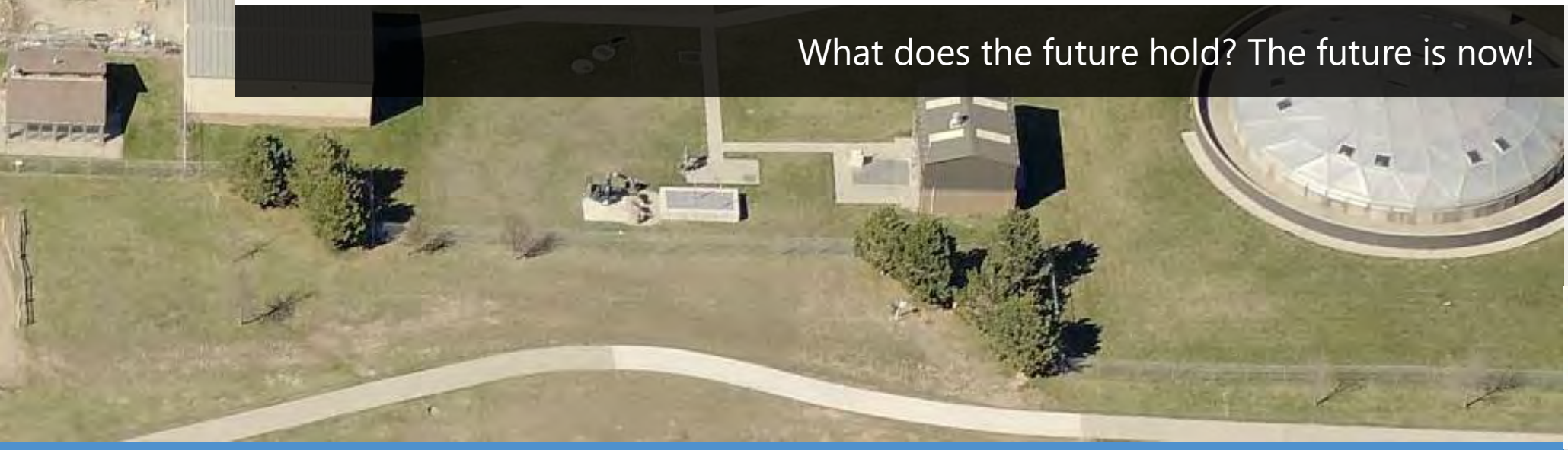
City of Yankton Wastewater Facility



What does the future hold? The future is now!

City of Yankton SOUTH DAKOTA
Ideas flow here

- Pretreatment: Screening and Grit Removal, Odor Control
- Primary Treatment: Flow Measurement, Primary Clarification
- Secondary Treatment: Biological Treatment, Aeration Basins
- Secondary Treatment: Secondary Clarification
- Disinfection
- Solids Dewatering
- Solids Digestion: Primary and Secondary Anaerobic Digesters
- Sludge Lagoons/Land Application

About Us

What we do at the Wastewater Facility

Screen & Grit Removal

- Raw sewage enters the facility
- Mechanical Bar Screen removes large debris like rags, sticks, and paper (Wipes and Shop Towels)
- Grit Basin separates and removes large heavy particles like sand, gravel, rice, egg shells, etc.
- Material is conveyed to a “Grit Wagon” and hauled to bury site

Primary Clarification

- 2 Primary Clarifiers
- Water velocity is slowed
- Allows heavy materials to settle
- Allows oils and greases to float
- Materials are pumped off the bottom or skimmed off the top
- Materials are sent to the Primary Digesters

Secondary Treatment
Aeration Building

- Primary Effluent gravity flows to the aeration building wet well where it is mixed with activated sludge
- Primary Effluent contains suspended and dissolved solids
- The water is then pumped to the aeration basin

Secondary Treatment
Aeration Basins

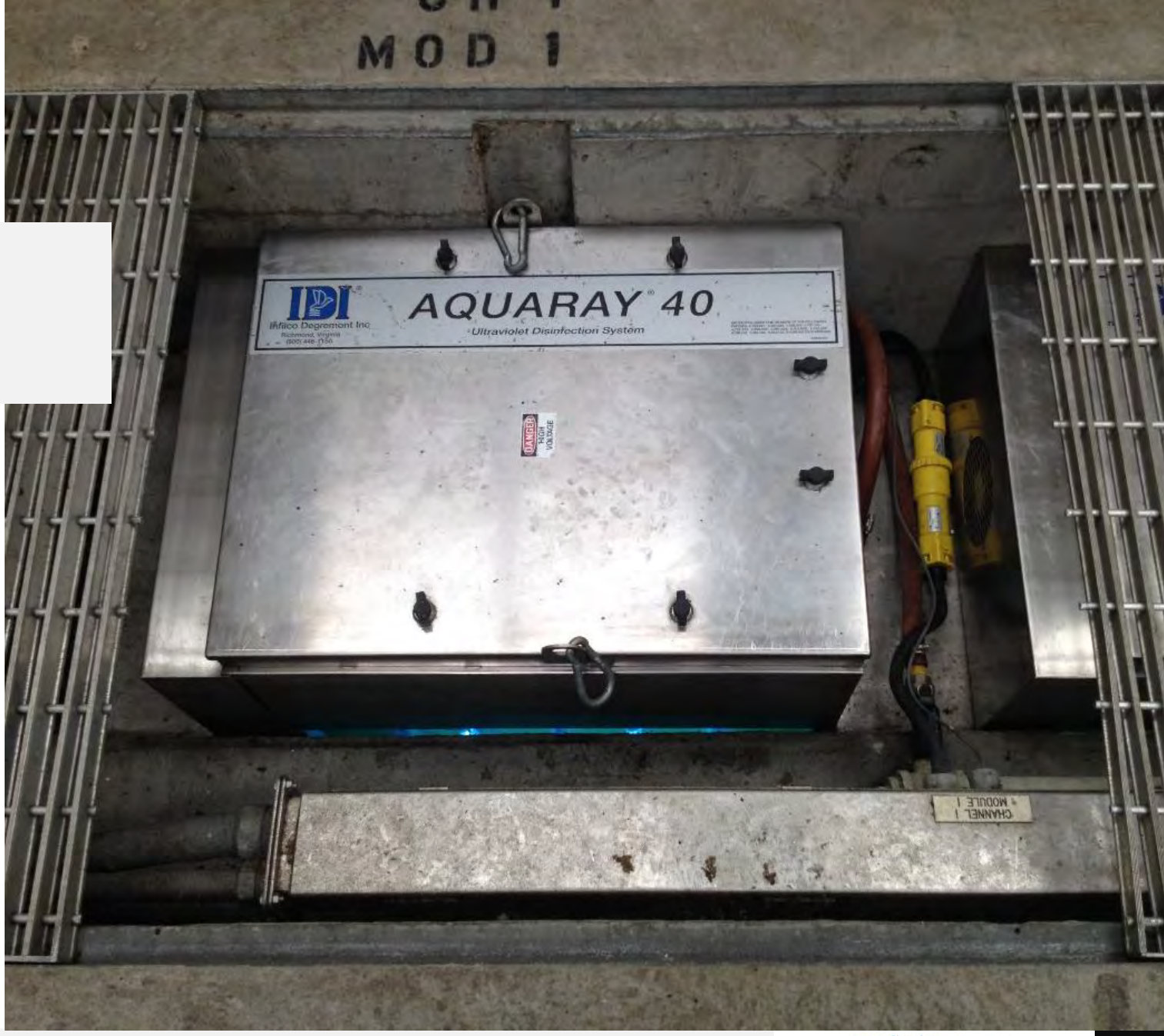
- Living organisms feed on the solids in the aeration basin
- Staff maintains the proper oxygen and food to mass ratio to promote a healthy environment for the bacteria (“bugs”)
- The biomass of bugs is referred to as “activated sludge”
- This combination of bugs and water is referred to as “mixed liquor”

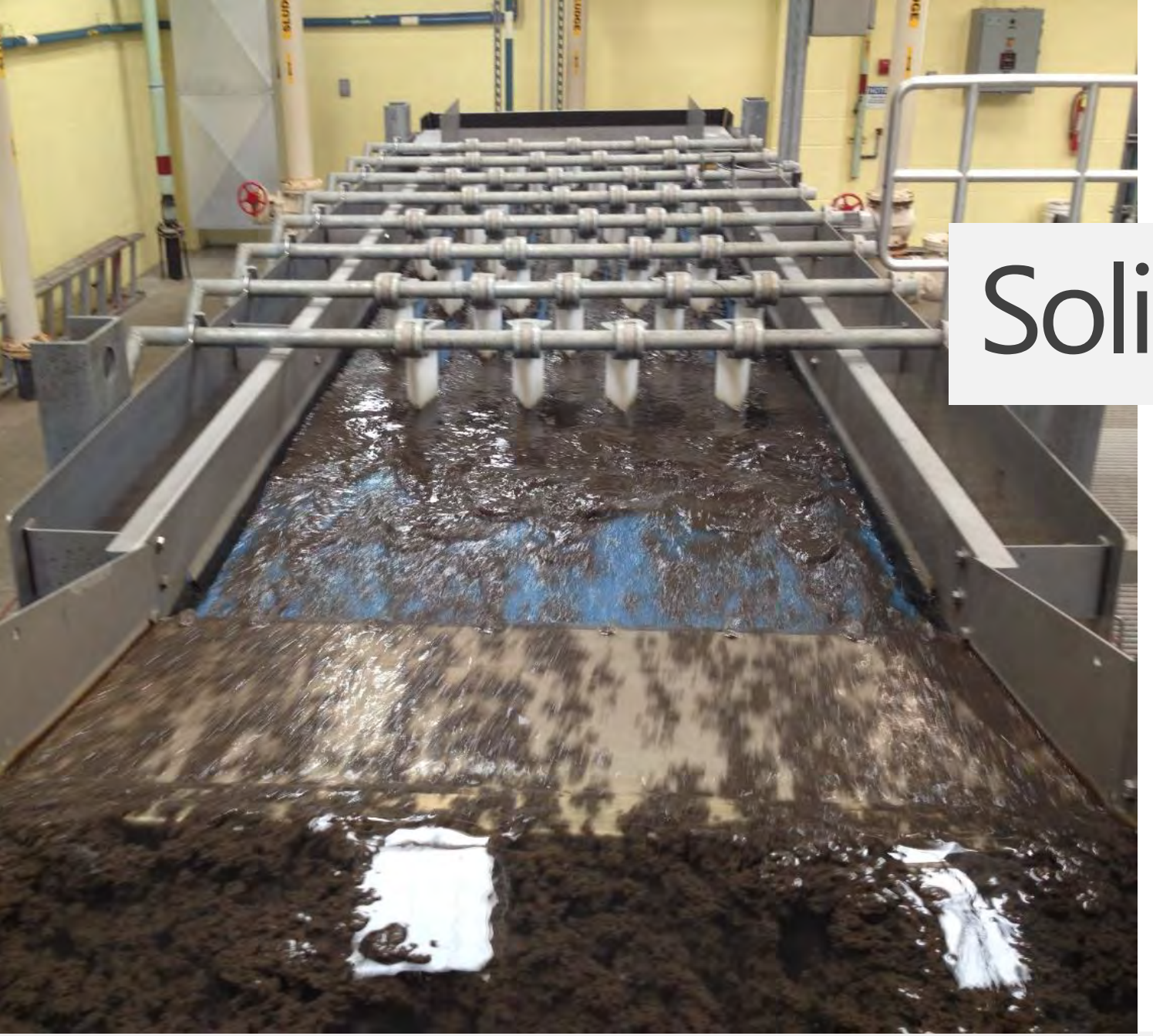
Secondary Clarifier

- The Secondary Clarifier separates the micro organisms from the water
- The resulting activated sludge is either returned to the aeration wet well to promote continued biological growth or wasted away to remove bacteria in order to maintain the desired amount of micro life

Disinfection

- Secondary effluent flows through Ultra Violet (UV) light disinfection
- UV light destroys potential pathogens such as viruses, bacteria, and parasites
- UV light damages the nucleic acids (DNA and RNA) which prevents the organisms ability to replicate





Solids Dewatering

- The Waste Activated Sludge is pumped to the gravity belt
- A polymer is added to bind the solids
- As the sludge runs over the belt the water is allowed pass through the belt and recycled back to aeration
- The sludge is sent to the Secondary Digester

Solids Digestion

- The solids from the clarifiers are pumped to separate anaerobic digesters (oxygen deprived)
- The anaerobic microorganisms break down the solids into a more stable form and reduce solids
- The methane gas produced from this reaction is used to fuel the boilers that maintain the 95 degree temperature

Sludge Lagoons/Land Application

- The digested sludge is pumped to holding lagoons where it is allowed to settle and separate
- The water is brought back to the head of the plant and treated again
- The solids are then land applied per our SD DENR approved Biosolids Application Program

Why We Do What We Do.

- Protect Public Health and Environment
- In 1899 with the Rivers and Harbors **Act**
- In 1948 established the Federal Pollution Control **Act**
- Transformed into the **Clean Water Act** in the 1970s
- 1972 amendment established the basic structure for regulating pollutant discharges into the **waters** of the United States
- EPA's National Pollutant Discharge Elimination System (NPDES) permit program controls discharges
- Future NPDES permits to include Nutrient Removal (Nitrogen, Phosphorous)

Wastewater Facility History

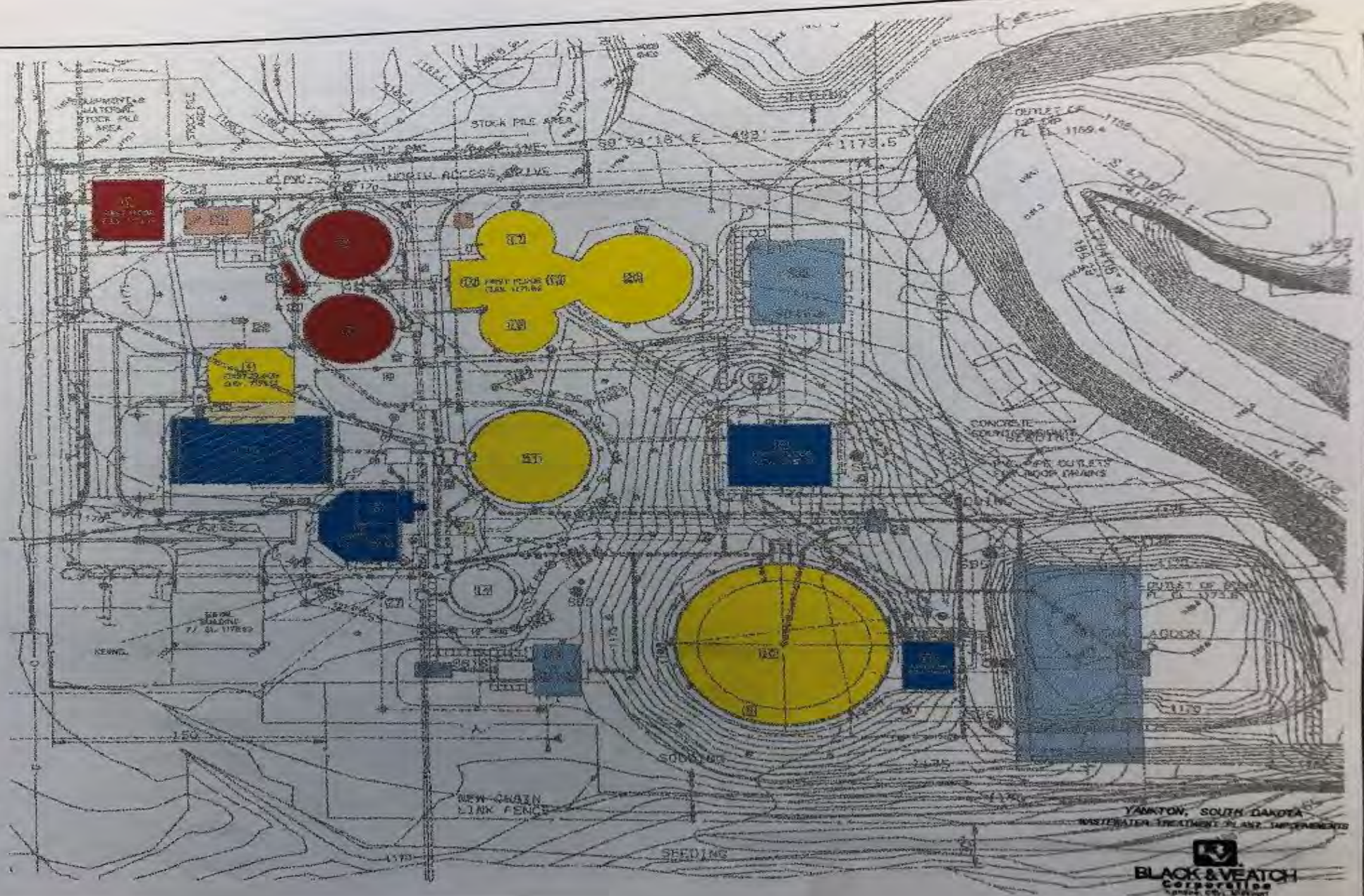
- The original Primary Treatment Plant was installed in 1964
- Major upgrades in 1974 and 1982
- 1982 was the addition of secondary treatment
- 1999-2003 major upgrades

KEY

- PHASE I REHABILITATION 2000-02
- PHASE I NEW
- PHASE II REHABILITAITON 02-03
- PHASE II NEW
- PHASE III REHABILITATION 03-04
- PHASE III NEW

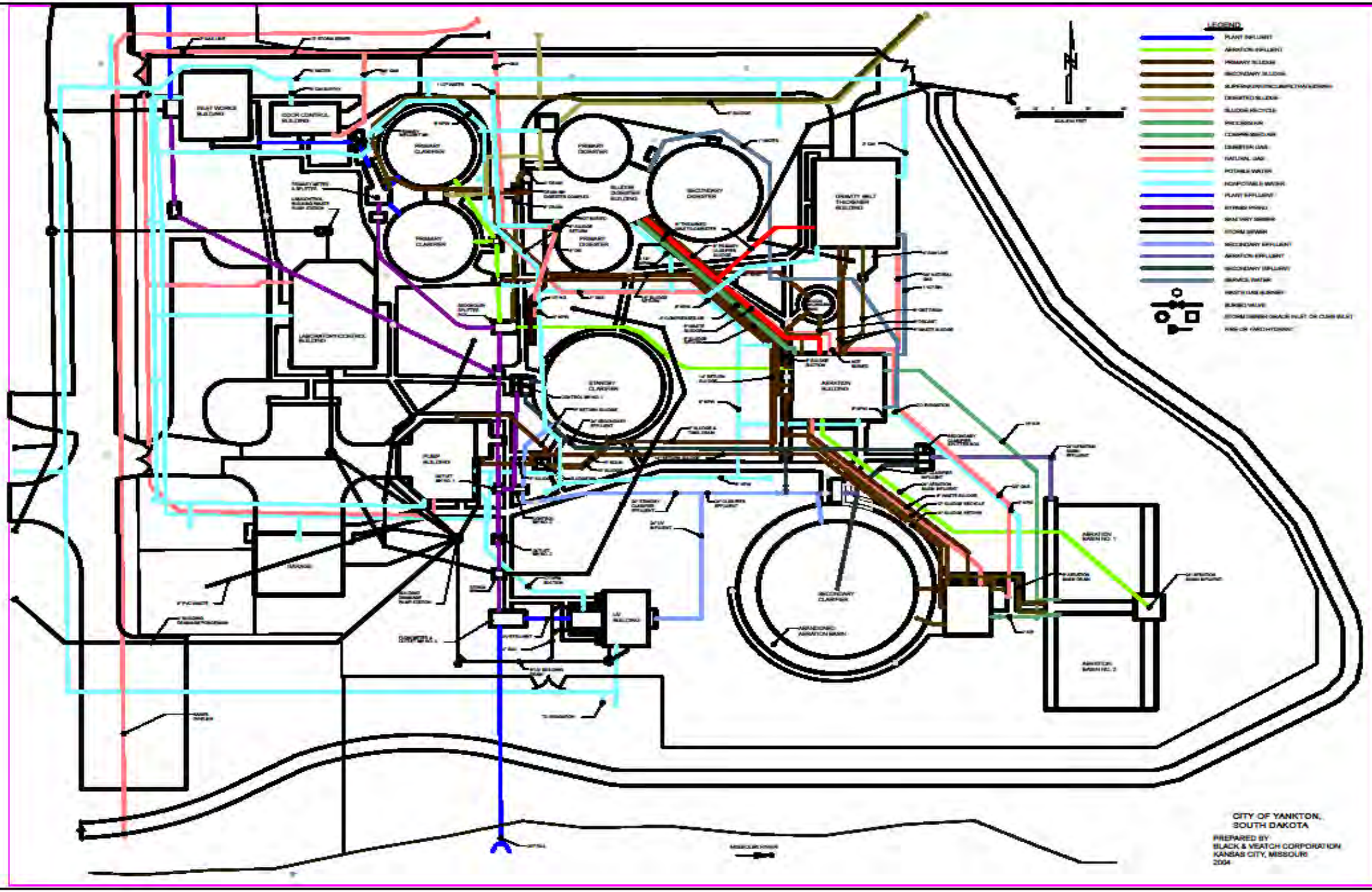
FACILITIES

1. INLET BUILDING
2. PRIMARY CLARIFIER
3. PRIMARY CLARIFIER
4. LABORATORY/CONTROL BUILDING
5. ABF TOWER (TO BE ABANDONED)
6. FILTER PUMP BUILDING
7. PUMP/CHLORINATION BUILDING
8. AERATION BUILDING
9. AERATION TANK (TO BE ABANDONED)
10. FINAL CLARIFIER
11. CHLORINE CONTACT TANK (FUTURE STANDBY SECONDARY CLARIFIER
12. RECIRCULATION STRUCTURE (TO BE ABANDONED)
13. SECONDARY SLUDGE DRAWOFF STRUCTURE
14. NON-POTABLE WATER TANK (TO BE DEMOLISHED)
15. SOLIDS BALANCING TANK (SBT)(TO BE ABANDONED)
16. SLUDGE DIGESTER BUILDING
17. PRIMARY SLUDGE DIGESTER (FIRST STAGE)
18. PRIMARY SLUDGE DIGESTER (SECOND STAGE)
19. SLUDGE DIGESTER BUILDING ADDITION
20. WAS DIGESTER
21. ODOR CONTROL BUILDING
22. GRAVITY BELT THICKENER BUILDING
23. AERATION BASINS
24. UV BUILDING
25. FLOW METER AND OUTLET MANHOLE NO.3 STRUCTURE
26. SECONDARY CLARIFIER SPLITTER BOX
27. BUILDING DRAINAGE PUMP STATION
28. LAB/CONTROL BUILDING WASTE PUMP STATION
29. PRIMARY SLUDGE DRAWOFF STRUCTURE
30. PRIMARY METER & SPLITER BOX



YANKTON, SOUTH DAKOTA
WASTEWATER TREATMENT PLANT IMPROVEMENTS

BLACK & VEATCH
Corporation


LEGEND
CITY OF YANKTON,
SOUTH DAKOTA
PREPARED BY
BLACK & VEATCH CORPORATION
KANSAS CITY, MISSOURI
2004

2011 Plant Failures

- Primary Effluent Line Sink Hole
- Outfall Pipe Collapse

Recent Failures 2018

- Start of Some Very Wet Conditions
- Primary Clarifier Effluent Pipe Sink Hole

Picture of Defeat

Pipe Failure

Secondary Clarifier Arm

March 2019 Flood

- Emergency Discharge of 2.5 MG
- Sanitary Sewer Overflow of 0.5 MG

Primary Clarifier Overloaded with Solids

Sink Hole Expanded

Condition Assessment Scope

Provide information to determine initial short term investments

- Scope of services
- Task 100 Background Data
- Task 300 Condition Assessment
- Task 350 Collection System Damage Assessment

- CIP Budgeting and Planning
- Potential EDA and Mitigation Funded Projects
- Technical Memorandums to be used in a future Master Plan

Condition Assessment

Staff Recommended a full Condition Assessment of the WWF in 2019

- Architectural
- Electrical
- Mechanical
- Instrumentation and Controls
- Structural
- Process

- Existing Facility Inspections
- Maintenance Record Review
- Technical Memorandum
  - Building/Equipment Upgrades
  - Estimate of Probable Construction Cost
  - Schedule for Improvements
  - City/Technical Review
  - Cost of Engineering Services

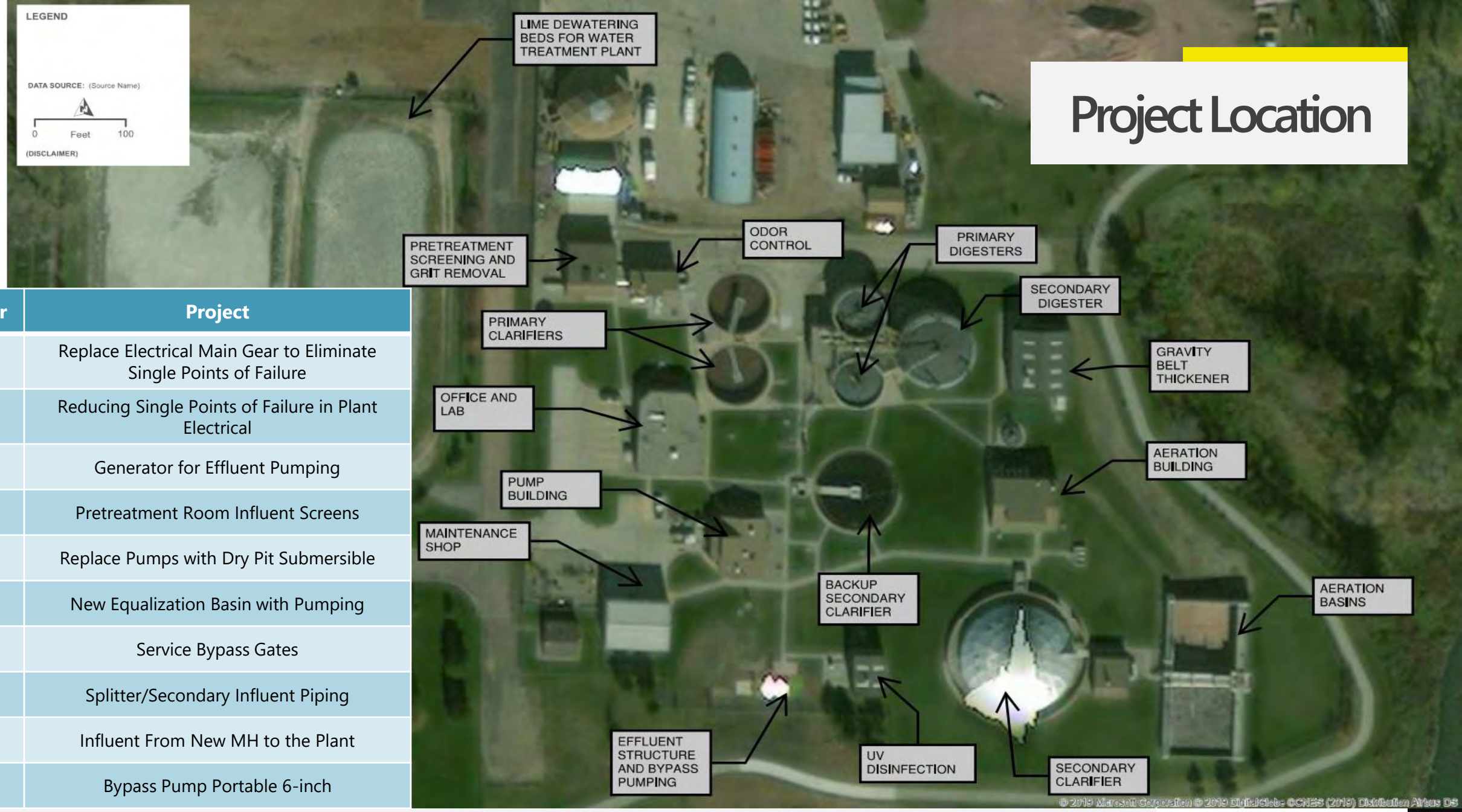
Master Planning
Wastewater Facility

Last conditions assessment/master plan occurred in 1995

EDA Project

- State has reviewed plans and approved
- Waiting for EDA final plan review. EDA staff turnover.
- Bid out in early 2022 → Start construction spring of 2022
- 6.4 million grant

Project Location



Number	Project
1	Replace Electrical Main Gear to Eliminate Single Points of Failure
2	Reducing Single Points of Failure in Plant Electrical
3	Generator for Effluent Pumping
4	Pretreatment Room Influent Screens
5	Replace Pumps with Dry Pit Submersible
6	New Equalization Basin with Pumping
7	Service Bypass Gates
8	Splitter/Secondary Influent Piping
9	Influent From New MH to the Plant
10	Bypass Pump Portable 6-inch

Project Location

HDR HASTINGS DRIVE MANHOLE CASTING REPLACEMENT AND SEALING PROJECT 11

Project Purpose and Need

Yankton's infrastructure recovery and critical capacity project is based upon several disaster related factors. The storm event and corresponding flooding crisis illustrated the City's:

1. **System Weaknesses and the Need for Facility Strengthening**
   - Treatment facilities, controls, and backup equipment were found to be inadequate or undersized
2. **Service Failures and the Need for Essential Capacity Building**
   - Critical segments of pipe are failing, and excessive flows caused the treatment plant's hydraulic capacity to be exceeded
3. **Economic Vulnerability and the Need for Anticipatory Measures**
   - Key local industries were forced to stop operations or were threatened with service restrictions as the treatment plant attempted to cope with unanticipated conditions
4. **Operational Shortcomings and the Need for Systemic Analysis and Planning**
   - A lack of master planning and scenario modeling inhibited the City's decision-making ability and forced system managers to make "educated guesses" instead of informed choices

Header

#	Project
1	Replace Electrical Main
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11	Manholes at Hastings LS/Inflow issue
12	Planning Documents

EDA Project Considerations

- All Projects must be completed per the Preliminary Engineering Report included in the application
- Cost overages are the responsibility of the City
- EDA has voiced concerns about recent cost inflation
- EDA has advised the City of several options in anticipation of increased project cost
- Development of the GIS, Modeling, and Master Plans are not “Professional Services” and must be completed through a competitive process
- The scope for that process will result in the final project

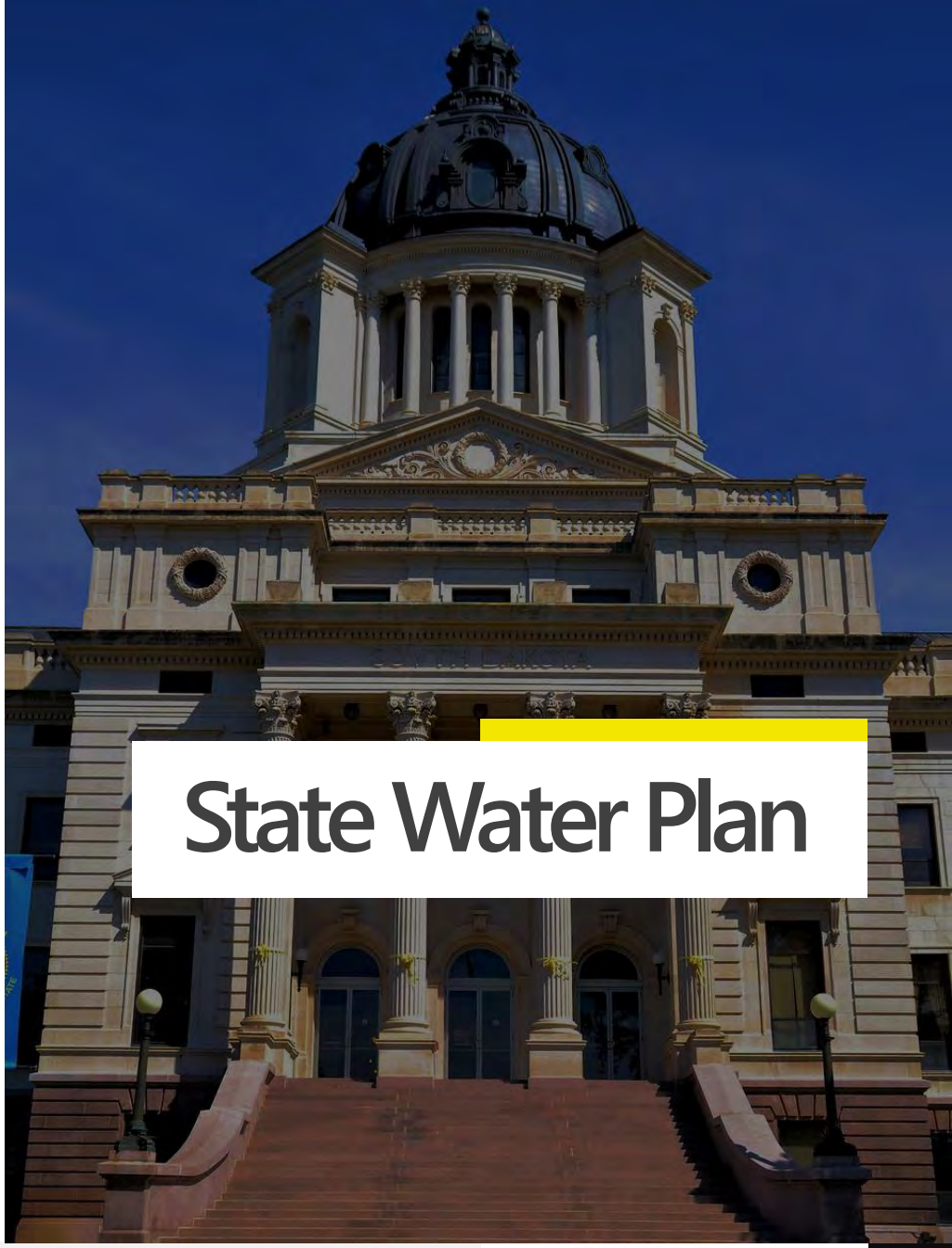
Project Schedule

Start Design	January 2021
Preliminary Design Review	March 2021
Final Design Review	May 2021
Final Contract Documents	June 2021
Advertise	June 2021
Bid Letting	July 2021
Begin Construction	August 2021
Substantial Completion of Construction	January 2023
Complete Construction	May 2023

COVID-19

- American Rescue Plan Act of 2021 (ARPA)
- City receives a letter end of August from Department of Agriculture and Natural Resources requesting State Water Plan Applications
- Deadline for State Water Plan was October 1st
- Think big, but not to big
- State received $974.5 million in ARPA funds
- How much will go to water/wastewater infrastructure?
- How much will go to DANR Environmental Funding Program?
- ARPA funds must be spent by December of 2026

- Wastewater Treatment Plant (WWTP) Project $88 million vs $44.5 million
- Water Distribution Project ($8.2 million)
- Wastewater Collection Project ($7.2 million)
- State received roughly $3.2 billion in projects
- How many projects ($3.2 billion) will apply by Jan 1st?
- ARPA funds = $974.5 million
- State will match Local ARPA fund 100%
- City ARPA $2.6 Million total of $5.2 Million.
- State Grant 30% of remaining project cost.



WWTP Master Planning/Facilities Plan

- Rehab at existing location
- New Plant at alternative locations
- Do nothing - not sustainable

Current Wastewater Debt

SRF #3 Wastewater Plant $1,946,158.17 Expires 2023

SRF Lift Station/Gravity Sewer $3,000,000.00 Expires 2037

Wastewater Area

- Wastewater Plant- Facility 5.4 acres
- Wastewater Lagoon- 7.5 acres

Rehabilitation of Existing Facility

- $44.5 million project
- Building off work completed in 2000
- Building off work to be completed as part of the EDA project
- Rehabilitation/Retrofits will have more unknowns=increased change orders
- Increased risk for compliance issues during project
- $27.5 million project cost with grant.
- Roughly a 42.3% increase to user rates on a 20 year loan
- Average user - 5,500 gallons
  - $48.62 x 0.423= increase of $20.57 per month - final $69.19

New Treatment Plant at New Location

- Estimated cost $88 million
- Funding issues - can we borrow that amount, may not get grant money for additional cost of relocation
- Can we have the ARPA funds spent by December of 2026
- Location? Accessible for staff during all weather conditions, discharge to the Missouri River, discharge in South Dakota, flood plain
- Land acquisition and easements - Can we find a seller? Eminent domain and condemnation?
- Does $88 million in debt prevent future projects from happening?

New Treatment Plant at New Location Continued

- Roughly a 81.06% increase to user rates on a 30 year loan
- $71 million Project after grant.
- Average user - 5,500 gallons
  - $48.62 x .8106 = increase of $39.41 per month - final $88.03
- Staff recommends the equipment portion be on a 20 year loan
- Can we meet the 2026 deadline?
- Will require extra support from the public.

Rates

WWTP Rehabilitation

- Current $48.62 for 5,500 gallons
- $48.62- increase of $20.57 final $69.19
- $750 – increase $316.95 final $1,066.95

WWTP New Location

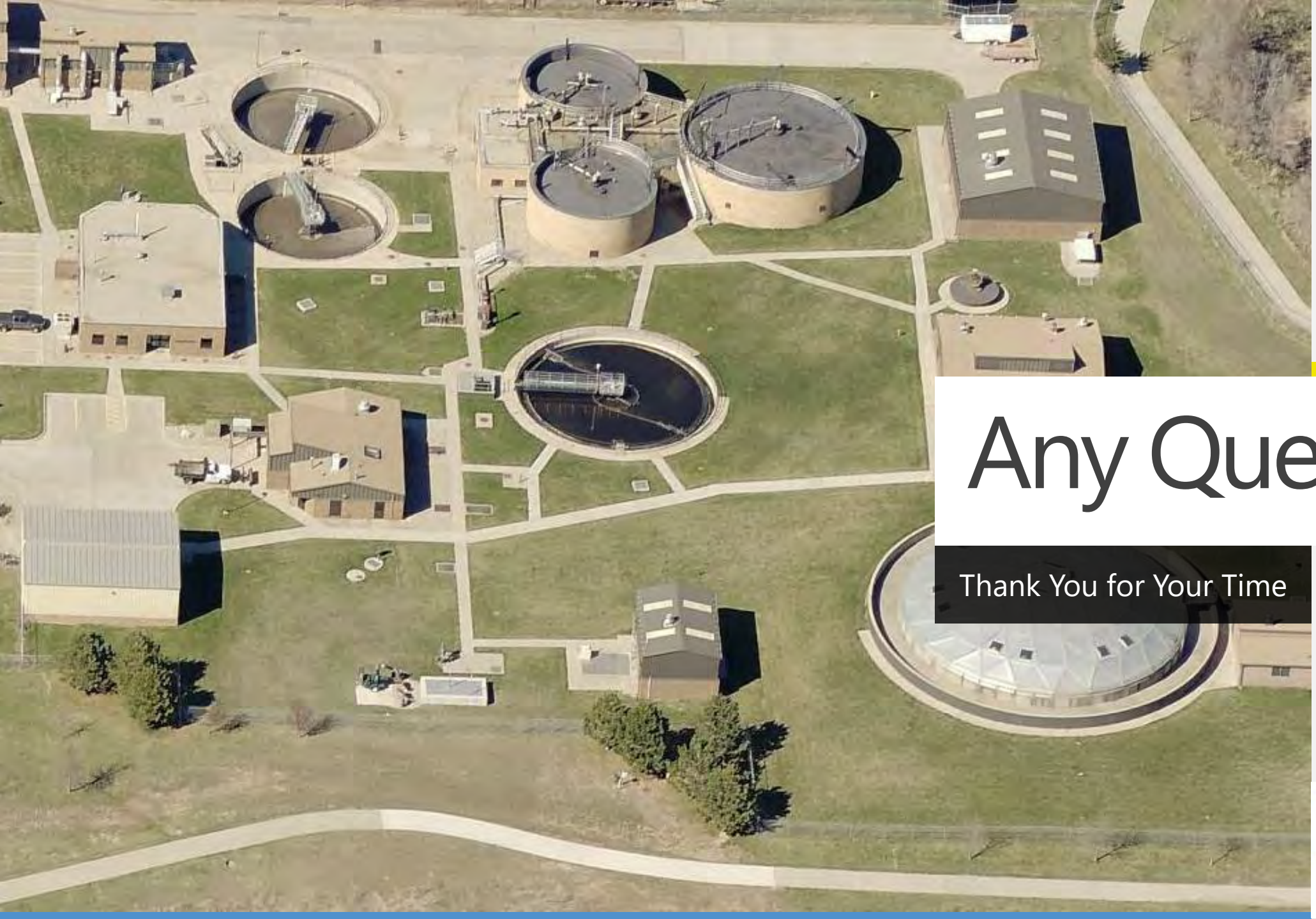
- 40% @20year, 60% @30year
- $48.62 increase of $44.87 final $93.50
- $750 increase of $692.10 final $1,442.10

Facilities Plan/SRF Application

- SRF application deadline Jan 1st
- Dec 13th public hearing and approval of the WWTP Facilities Plan
- Memorandum - Approval for City Manager Leon to sign SRF application documents
- Funding would be approved in March.
- WWTP Facility Plan-City staff completing final review.

Timeline

- State Revolving Fund Application January 1st, 2022
- Request for Qualifications- Select Consultant
- Funding award March of 2022 SRF and ARPA
- April 2022 establish future rate increases to secure funds.
- Bid EDA project and start construction
- Start design April/May 2022
- Final Contract Documents June of 2023
- Contract Award August of 2023
- Begin Construction August/September of 2023
- Substantial Completion of Construction November 2025
- Complete Construction December of 2026



Any Questions?

Thank You for Your Time

City of Yankton SOUTH DAKOTA
Ideas flow here

Grant and Rates

WWTP Rehabilitation

- Current $48.62 for 5,500 gallons
- $44 million = increase of $33.32 final $81.94
- 20% grant – increase $26.29 final $74.91
- 30% grant – increase $23.01 final $71.63
- $750 @20%-increase of $405 final $1,156

WWTP New Location

- 40% @20year, 60% @30year
- $88 million-increase of $55.42 final $104.04
- 20% grant -increase of $50.05 final $98.67
- 30% grant -increase of $47.27 final $95.89
- $750 @20%-increase $771 final $1,521.75