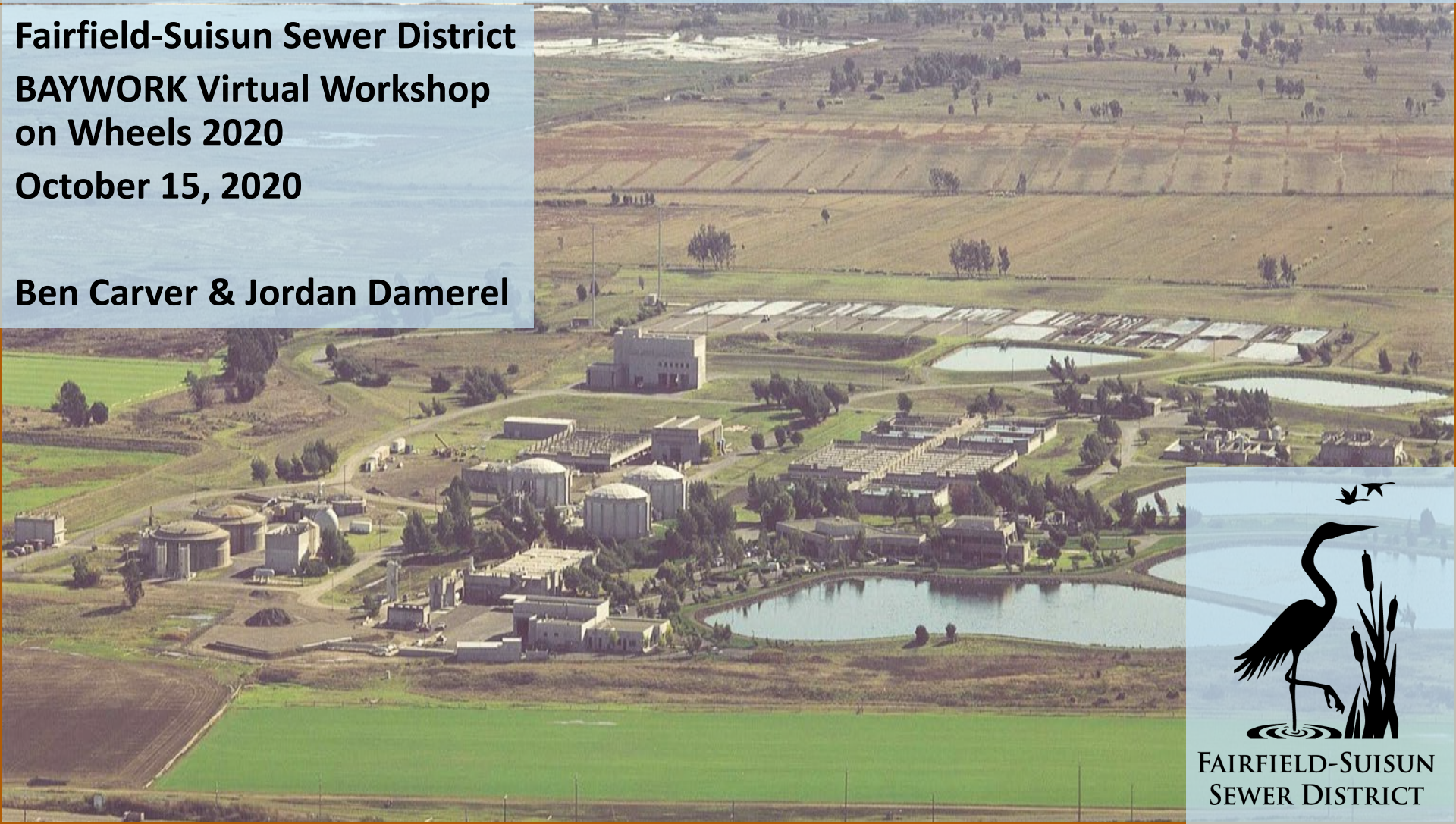


High Speed Turbo Blowers—Engineering and Operational Considerations

Fairfield-Suisun Sewer District
BAYWORK Virtual Workshop
on Wheels 2020
October 15, 2020

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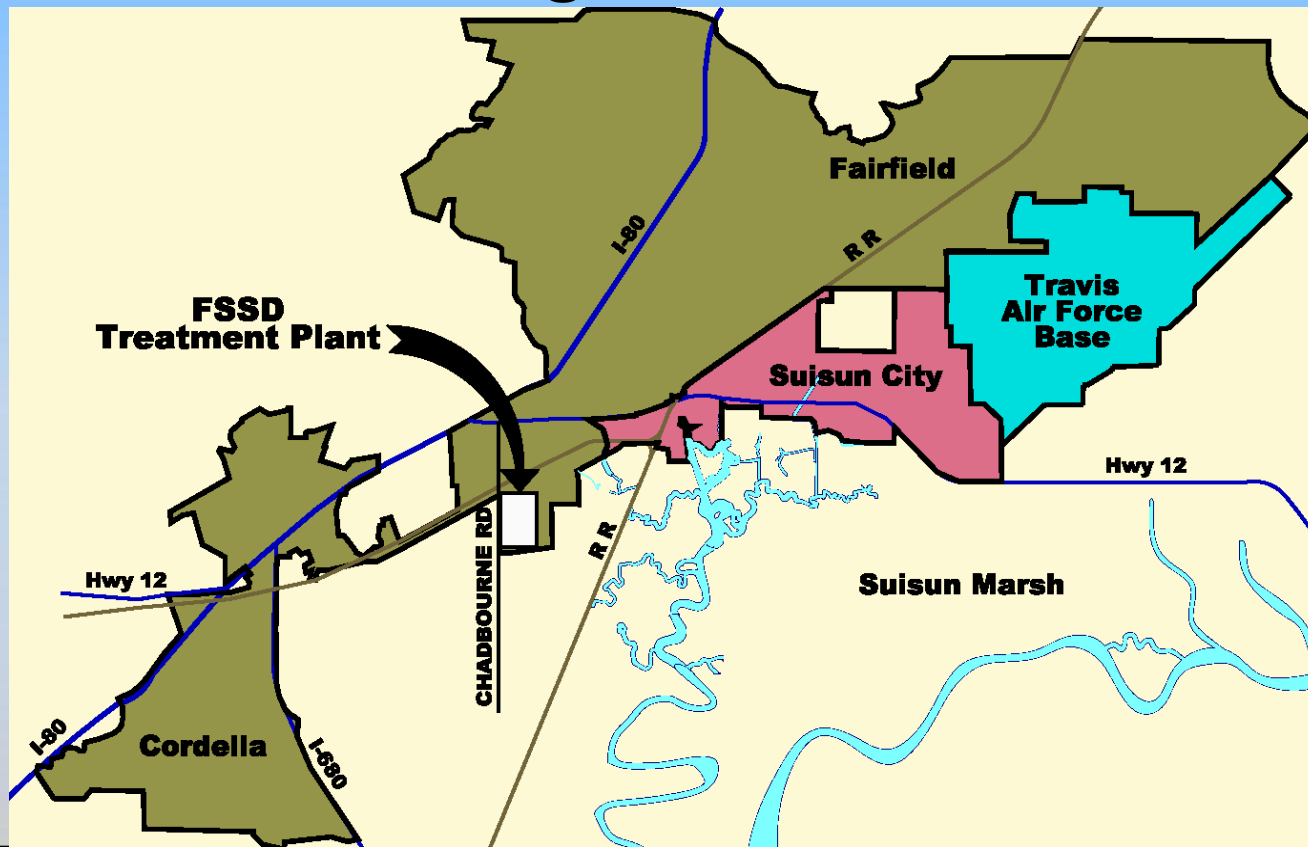


FAIRFIELD-SUISUN
SEWER DISTRICT

Fairfield-Suisun Sewer District



- Special District established in 1951
- The District provides:
 - Wastewater conveyance and treatment
 - Stormwater drainage maintenance services



Key District Stats



23.7
MGD

DRY WEATHER TREATMENT
CAPACITY

11.0
MGD

CURRENT AVERAGE DRY
WEATHER FLOW

85
MILES

LENGTH OF DISTRICT-
OWNED GRAVITY SEWERS
AND FORCE MAINS

140,000
PEOPLE

SERVICE AREA
POPULATION

Blower Replacement Project



GOALS:

• ***Aeration***

- Replace 20+ year old duty Turblex blower (600hp)
- Replace 40+ year old backup blowers (2 x 1,250hp electric, 1 x 1,250hp diesel-driven)
- Right-size the aeration capacity now and into the future
- Improve aeration system controls (MOV)

• ***Electrical***

- Eliminate medium voltage system (4,160V) to allow District staff to maintain it
- New breakers, transformers, MCC, and PLC for Blower Building

• ***Backup Power***

- Replace 40+ year old standby diesel engine-generator (800kW) that provides backup to half of the treatment plant
- Provide backup power to blowers for reliability

Existing Equipment



The Project



- \$10.5M total project cost
 - Design engineer: Carollo Engineers
 - Contractor: C. Overaa & Co.
 - District's programmer: Telstar Instruments
- Installed:
 - 4 APG-Neuros high-speed turbo blowers
 - New 2MW standby diesel engine-generator
 - New 12kV feeder breakers, new 12kV-480V transformers, new MCC with ATS
 - New aeration header pipe to each aeration basin
 - New aeration control system including Most-Open-Valve controls and integrated blower-DO control loops

Engineering Considerations



- Blower Technology
 - Evaluated single-stage centrifugal blowers and high-speed turbo blowers
 - Different technologies have different sweet spots
 - Consider life cycle evaluation
- Truth out O&M costs by discussing with other agencies
- Carefully consider CURRENT and FUTURE conditions to ensure blowers are correctly sized

New Equipment



Before and After



Funding



- Financed project through State Revolving Fund loan
- Received **\$4M of principal forgiveness** through SRF's Green Project Reserve (~38% of project cost)
 - Demonstrated over 20% energy savings from higher efficiency blowers (and less wasted air), treatment process modifications due to higher aeration capacity, and improved control strategy
- Green Project Reserve provided prioritization through SRF's process
- SRF was time-consuming and delayed the start of the project, but was worth it in the end!
- Received \$50,000 rebate from PG&E for energy savings

O&M Considerations

- ***Power costs***
 - Significant energy savings by switching to more efficient technology
- ***High-speed turbo blowers***
 - Significantly reduced number of parts compared to older technology
 - Turbo blowers highly sensitive to dust/dirt particles
 - Requires frequent filter changes
- ***Aeration control system***
 - Challenging to fine-tune the aeration system controls and responsiveness of blowers to changes in DO
- ***Electrical system***
 - District staff can now maintain 480V electrical components
 - Blowers can be operated on generator power during power failure (e.g., during Public Safety Power Shutdowns)

Filter Change Procedure



Blower Housing Inspection



Thank you!



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