

Energy Savings by Combining Mixers and Aeration

WWOA Annual Meeting
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**Rock River WRD
Wastewater Treatment Plant
Rockford, IL**

Rock River WRD - General

Service Area of ~ 100 square miles serving:

- Rockford
- Loves Park
- Machesney Park
- Roscoe
- Cherry Valley
- New Milford
- part of Rockton
- unincorporated areas of Winnebago County

Design Flow 40 MGD (average day)

Brief Plant History

1928 Primary Plant Completed

1958 Secondary Treatment Plant added
(Trickling Filters)

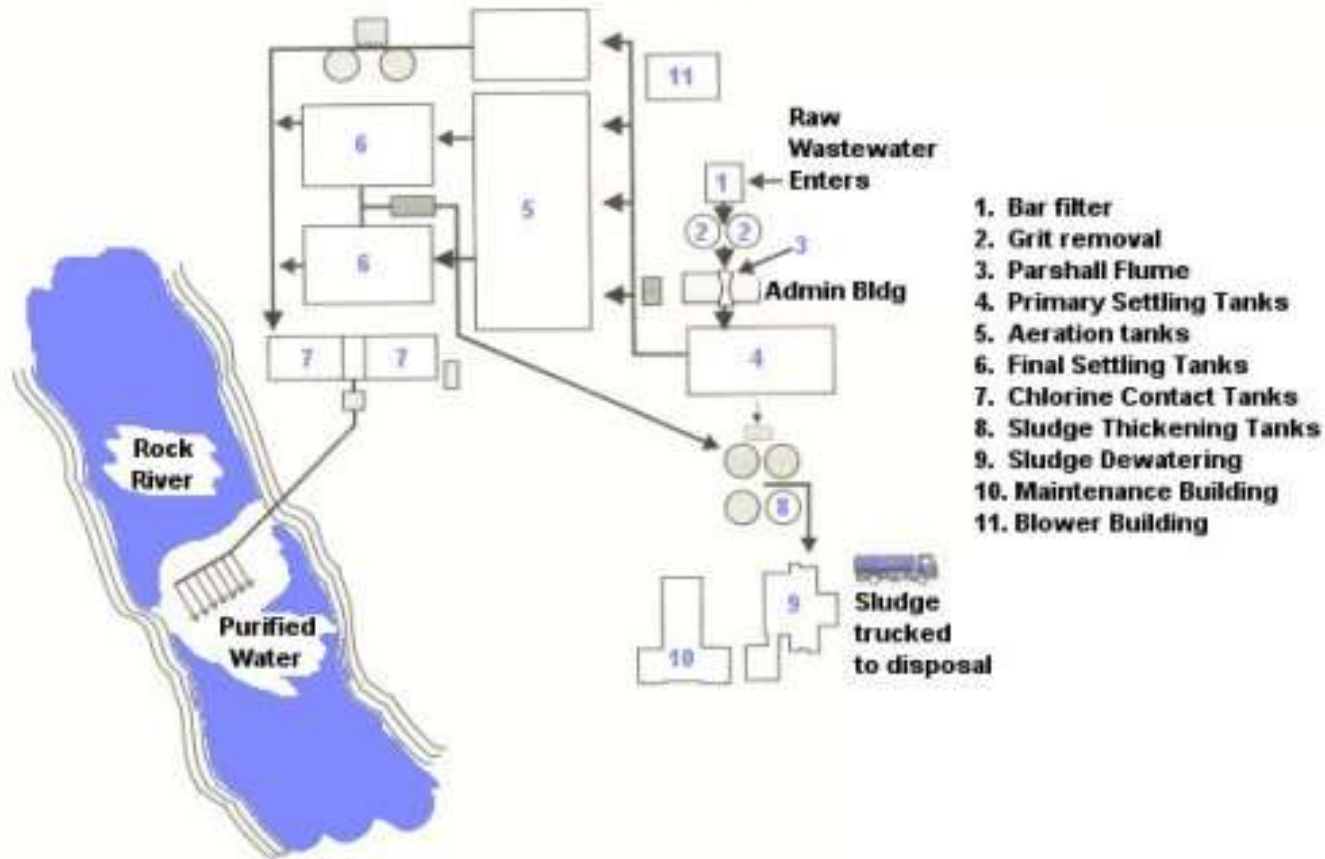
1966 Aeration Basins 1 – 4 built

1975 Aeration Basins 5 and 6 built

1995 Aeration Basins 7 and 8 built

Plant Schematic

Rock River Water Reclamation District
Treatment Plant
Schematic Diagram



Aeration History

1966 Four Aeration Basins
Sparged Turbine Aeration

1975 Two Aeration Basins added
Sparged Turbine Aeration

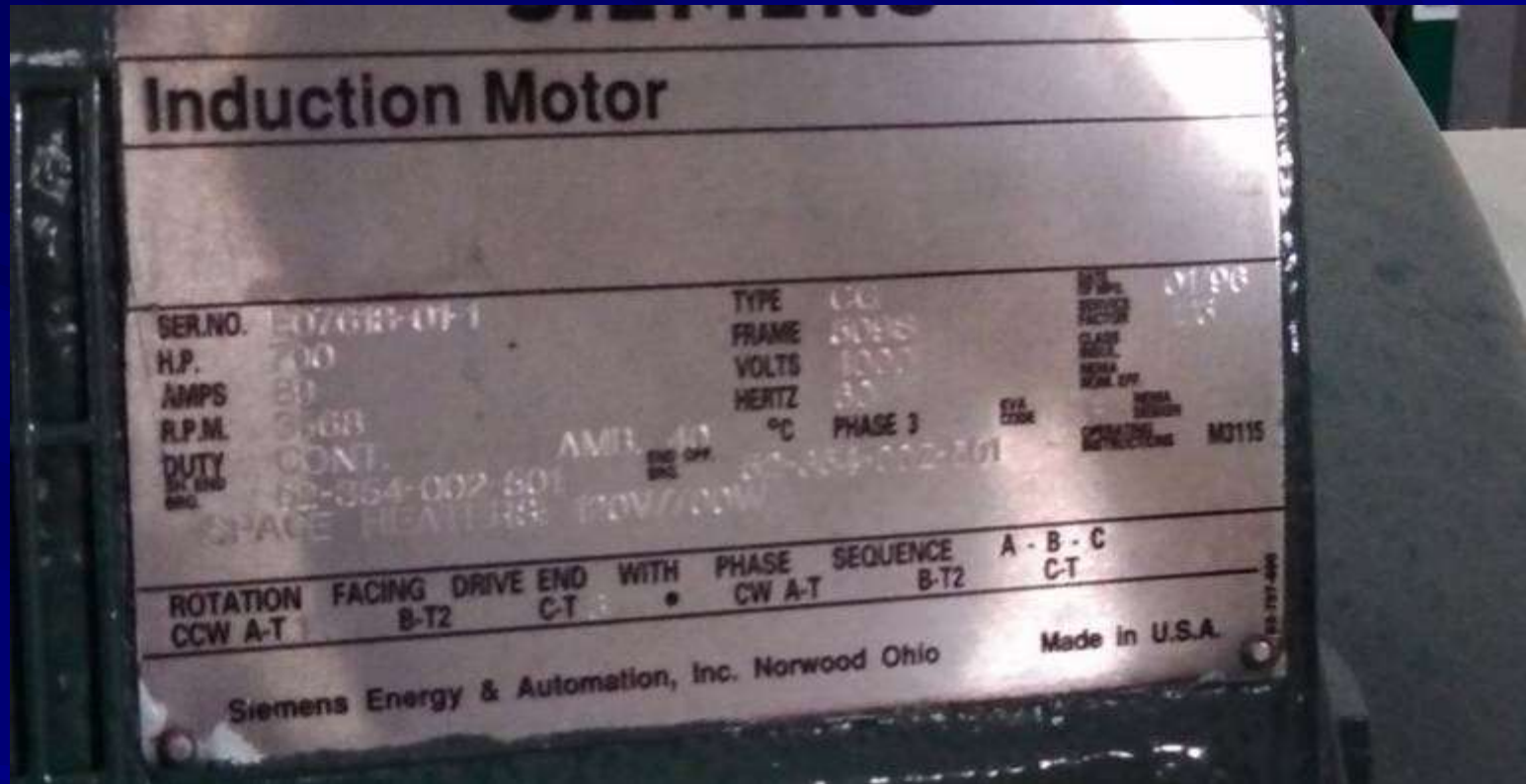
1995 Two Aeration Basins added
Upgrade all basins to ceramic disc diffusers

2006 Aeration Upgrade
Membrane disc diffusers replace ceramic disc
diffusers

Air Delivery System



Air Delivery System



700 HP motor

Air Delivery Energy Use

Two 700 HP centrifugal blowers operating
(with one standby)

Energy draw 860 kW (430 kW per blower)

Recent Operational History

Energy efficient aeration results in little to no oxygen demand toward effluent of Aeration Basins

Aeration system operated at minimum air flow to maintain solids in suspension

Excessive dissolved oxygen in Aeration Basin effluent

Aeration Grid



District Action

Identified an opportunity to reduce energy use and improve plant performance

District Action

Evaluate use of mixers in last grid and turn off air to that grid.

Existing membrane disc aeration system to remain in place - if aeration demand increases.

Mixers must be able to be installed / removed without basin draining.

Mixers must be low maintenance and not foul with rags or stringy material.

District Action

Evaluate mixing systems available that meet the project requirements

Significant energy savings predicted

Research funding sources

Grant application process

Plant staff to do the installation to save cost

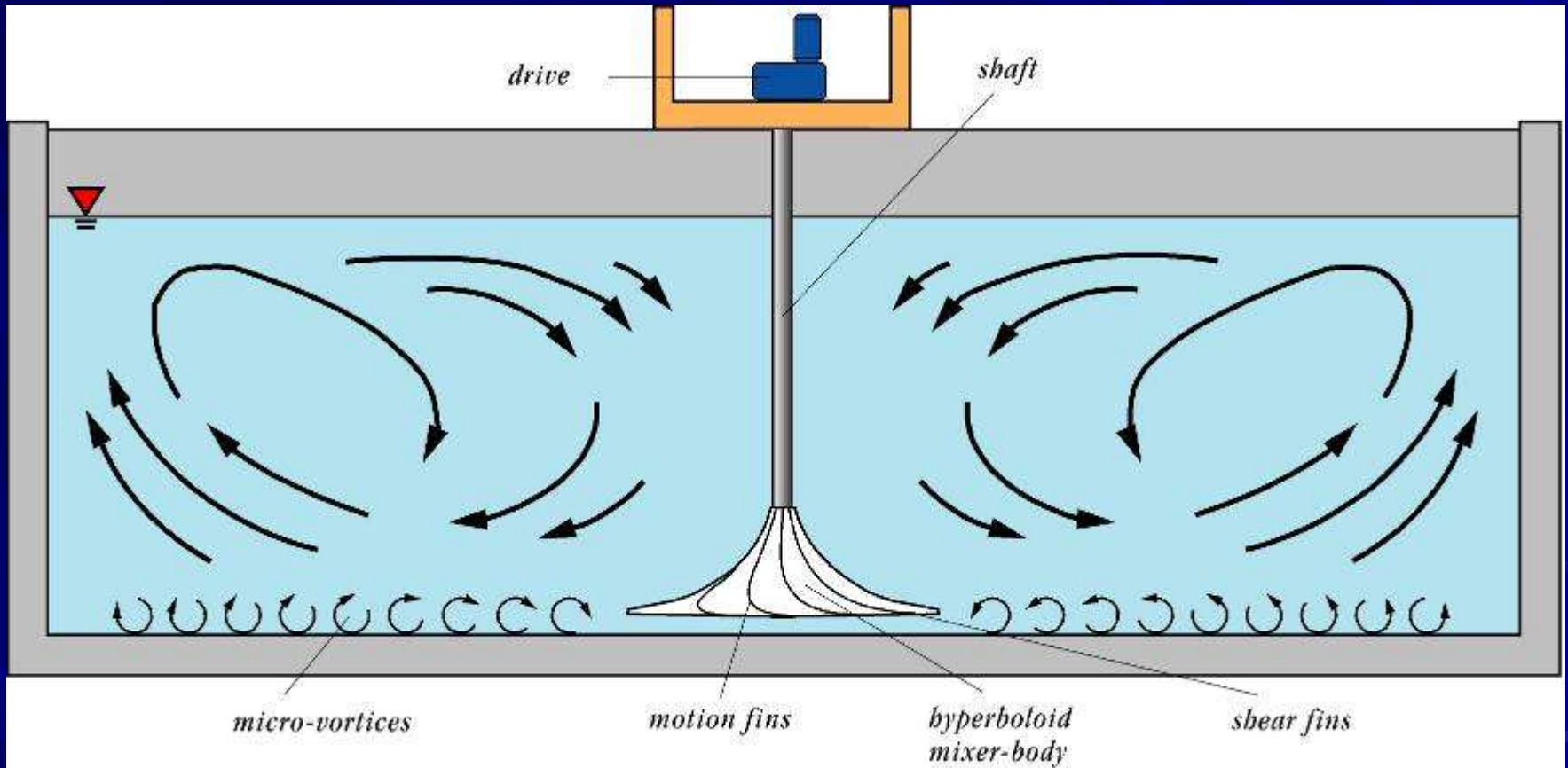
Pursue the project

Mixing Zones

One zone in each of eight basins

59 feet by 59 feet with 15 ft SWD

Mixer Selection



INVENT Hyper Classic™ Mixers

Mixer Features

Hyperboloid Shape
Close to floor placement
Slow rotational speed
Light weight
Energy efficient
Gentle uniform mixing
Polished FRP body
Non ragging / fouling
Minimal maintenance

– Oil change annually (dry mounted drive)



Project Challenges

Desire to install / remove mixers without basin draining

Six existing platforms need to be modified

Two newer basins have no bridges / platforms

Project Challenges

Basins 1 – 6

Aeration drop pipe in center of platform
(same opening as preferred for Mixer)



Project Challenges

Basins 7 and 8

No bridges across basins



Problem Solving

Brainstorming

Plant Staff

Design Engineer

Equipment Supplier

Manufacturer's Representative

Solution

Basins 1 – 6

New platforms mounted off side of existing platform



Solution

Basins 1 – 6

New platforms - off set mixer placement



Handrail and grating not yet installed

Solution

Basins 1 – 6

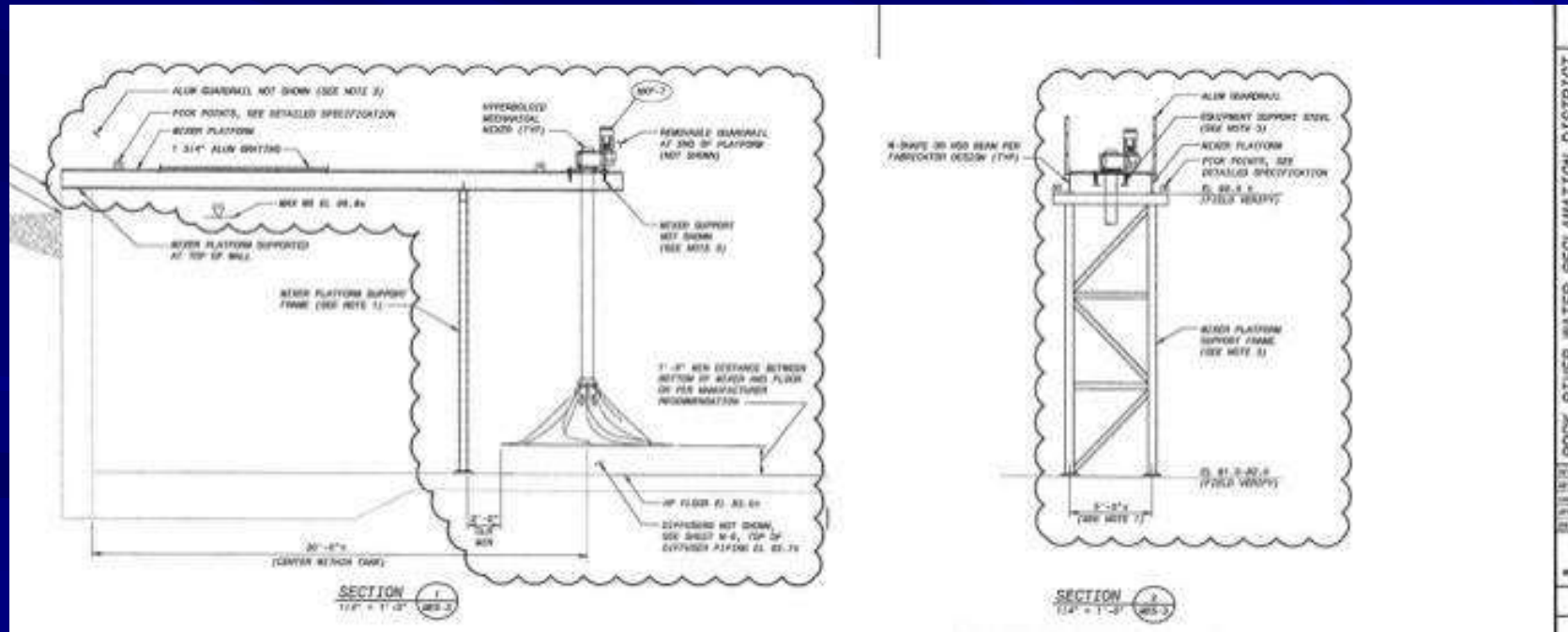
New platforms with “slot” to allow mixer placement / removal without basin draining



Solution

Basins 7 and 8

Install “finger piers” - cantilever for mixer placement



Solution

Basins 7 and 8



Solution

Basins 7 and 8



Mixer Installation



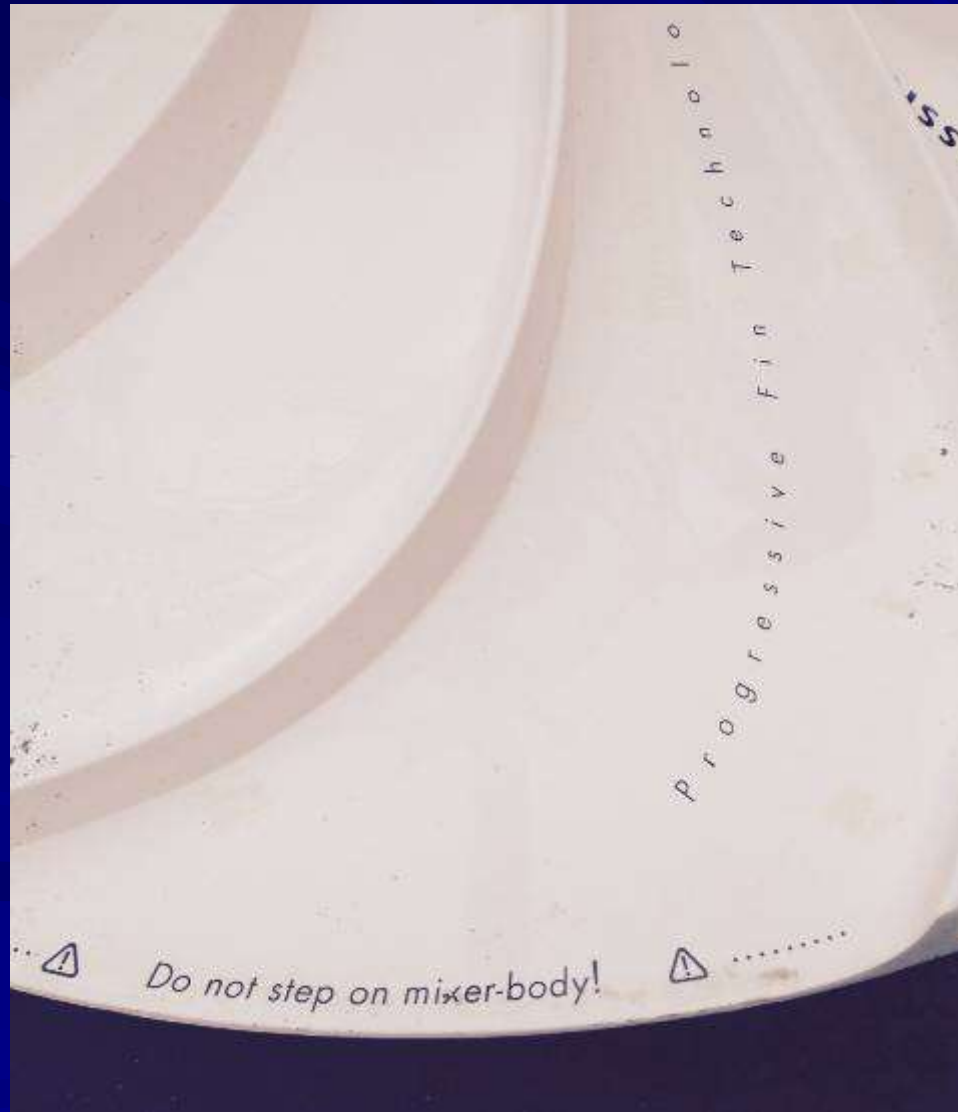
Mixer Installation



Mixer Installation



Mixer Installation



Mixer Installation



Mixer Installation



Mixer Installation



Mixer in Operation



Mixer in Operation



Results

December 2014 – 6 mixers installed

Turned off one 700 HP blower

Inlet valve of operational blower throttled to 80% capacity

Dissolved Oxygen ranges from 2 – 4 mg / l

April 2015 – final 2 mixers installed

Results

Blower Energy Draw

Prior to project - 860 kW

After 6 mixers installed- 521 kW

Total Mixer Power Draw (with all eight in service)

39 kW

Results – *other than energy*

Plant reports

Better settling in clarifiers

Reduced floc shear

Successful Upgrade

Reduced energy use

Improved plant performance

Increased operational versatility

Is your plant next?

Thank you for your attention.

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