

# PAWNEE II, A MODERN DUSTPAN DREDGE





# THE LOUP CANAL



35 mile canal system and  
reservoir

2 mile settling basin

The water speed = 3.9 to 4.3  
knots (4.4 to 5 miles/hr)



# WHY DREDGE THE LOUP CANAL?

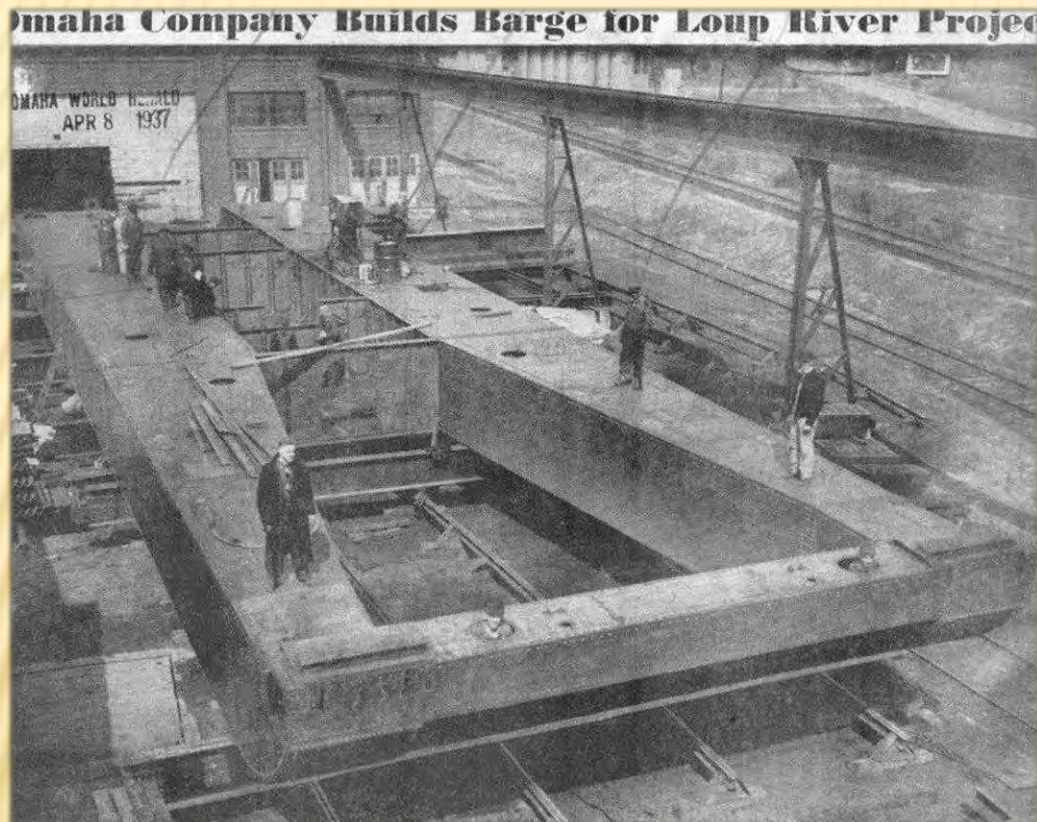
Water from the Loup River is diverted into the manmade canal and used for hydro generation and irrigation. The first two miles of the canal was established as a settling basin to permit silt and sand to settle to the bottom.



The dredge will typically remove 10 feet of sediment from the canal. Approximately 1.5 to 1.6 million cubic yards of sand is taken from the canal each year.



# THE PAWNEE



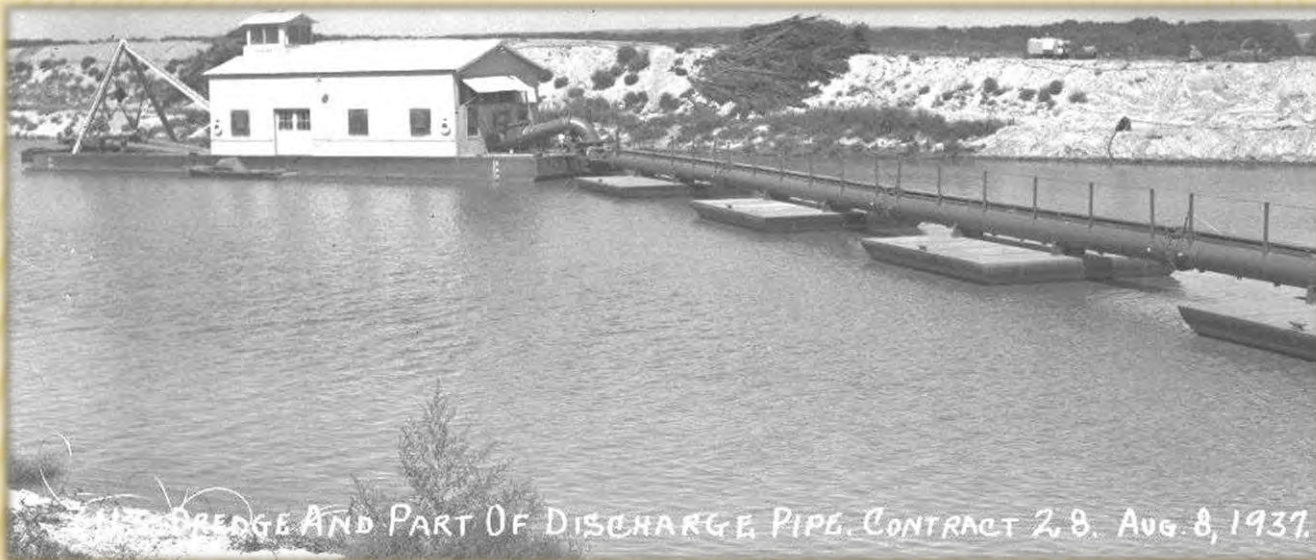
designed and built by  
Omaha Steel Works in  
1937

108' long x 29' wide x 6'  
hull depth

original cost = \$186,000



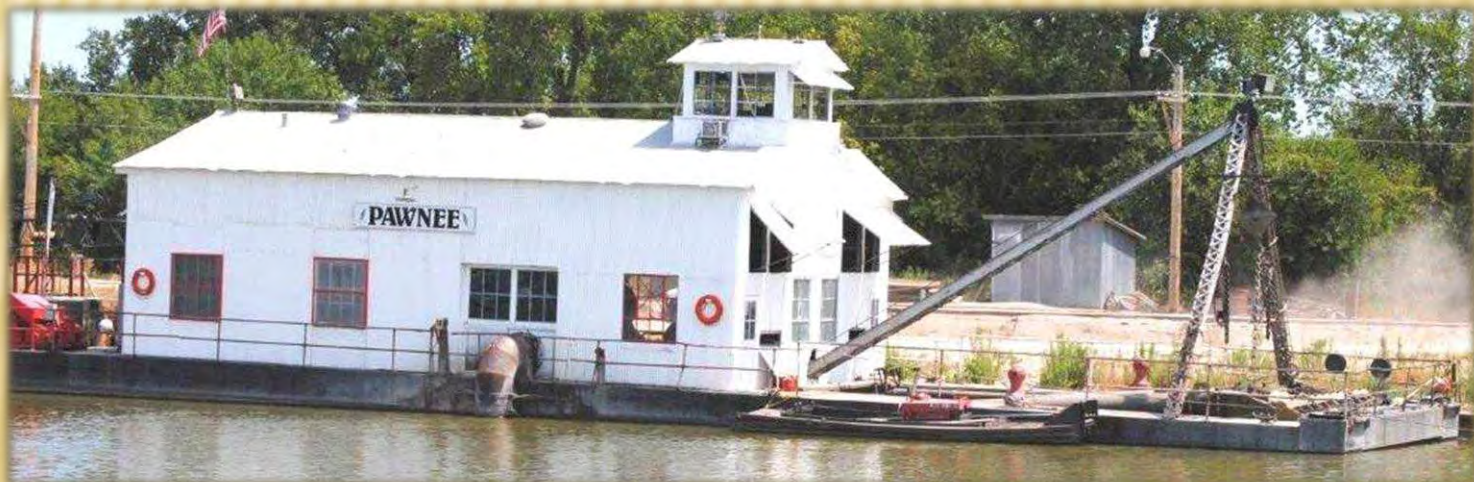
# THE PAWNEE



Original pump motor  
= 1,200 HP

Replaced pump  
motor in 1984 =  
2,500 HP

20 HP digging jet





# THE NEED FOR A NEW DREDGE

## Contributing Factors to Replace the Dredge Pawnee

- ☐ The age of the Pawnee was a factor in the replacement, including hull integrity
- ☐ Need to upgrade pumping and digging power
- ☐ Efficiency (power consumption)
- ☐ Monitoring and control technology
- ☐ Maintenance parts availability
- ☐ Reliability
- ☐ Rising maintenance costs





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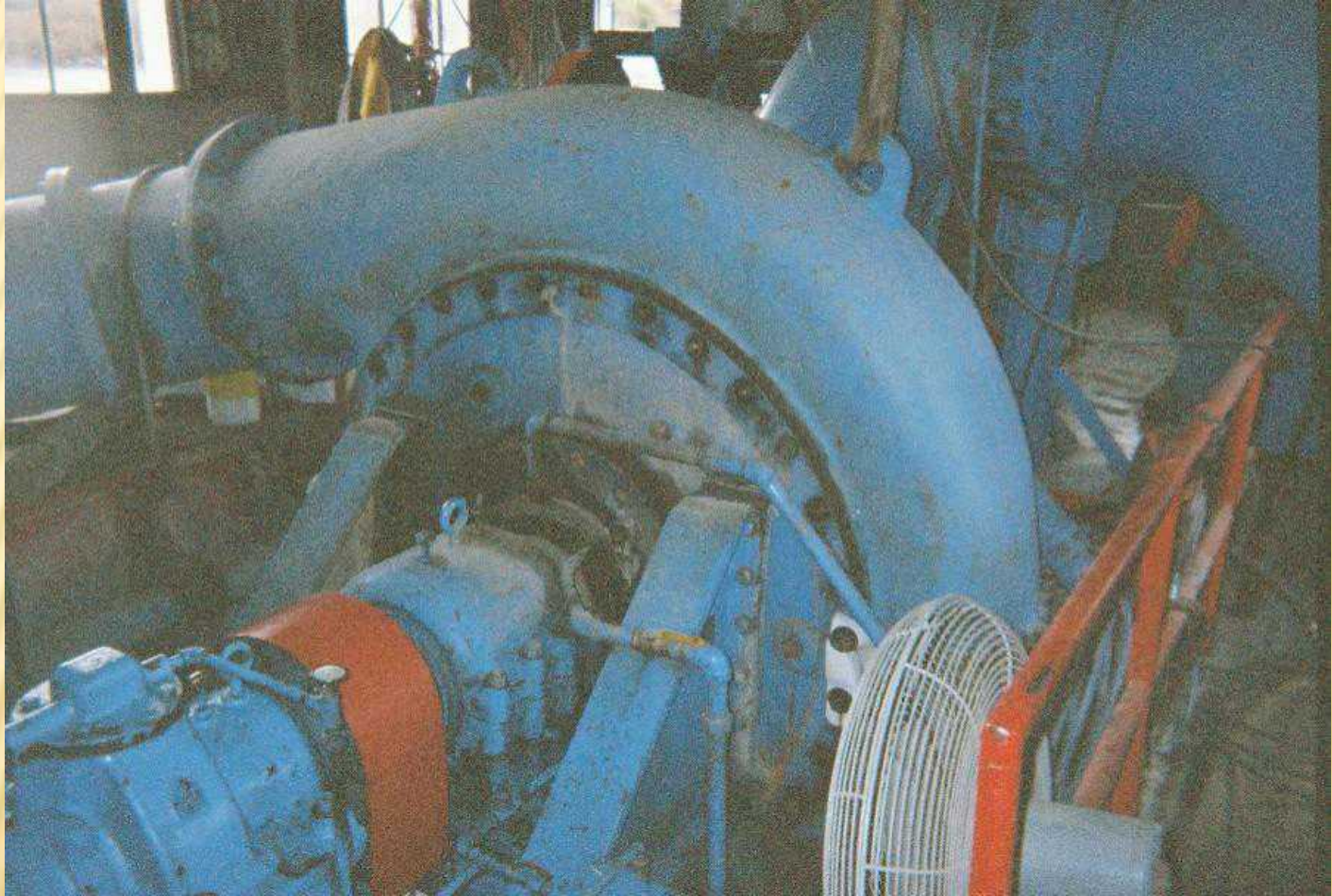
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20 HP Jet System



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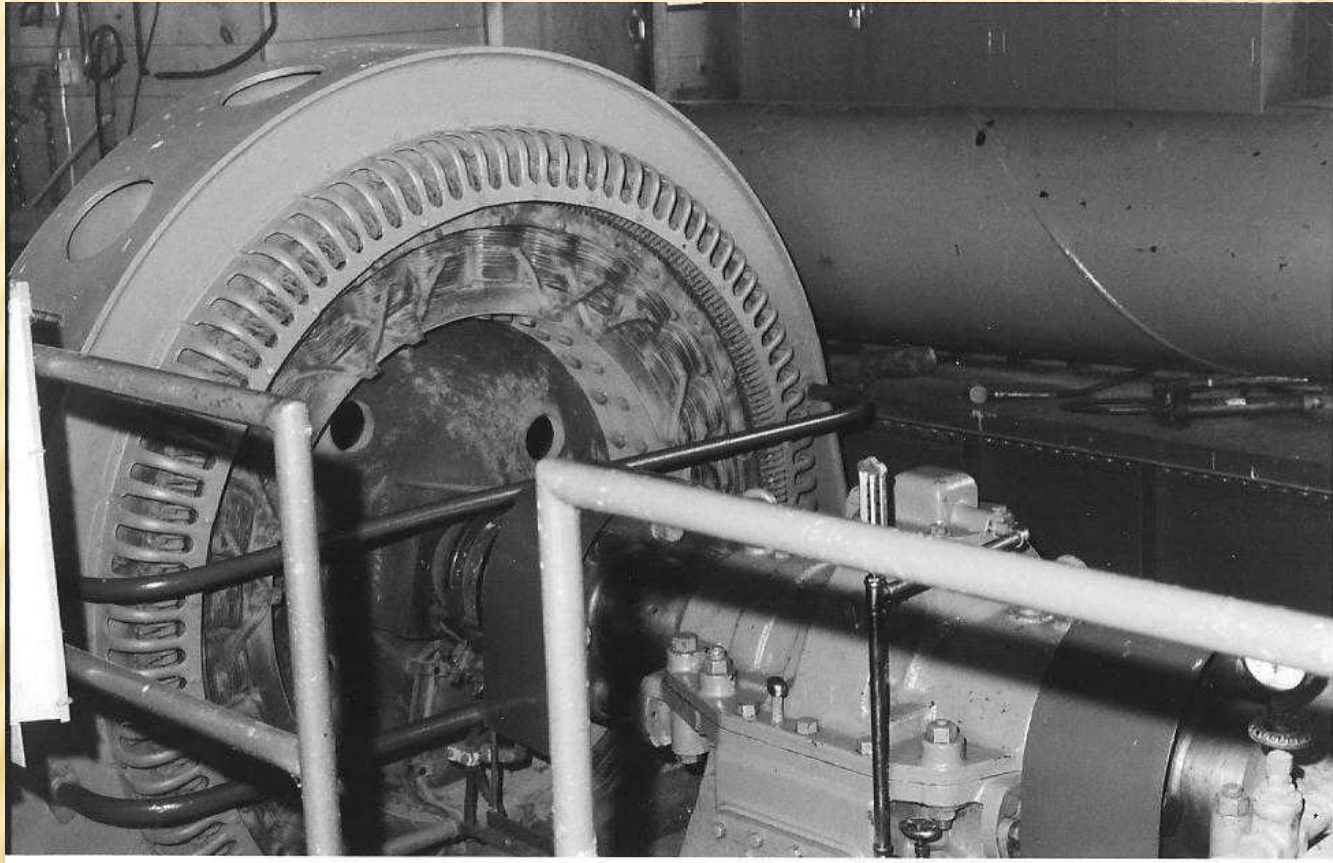
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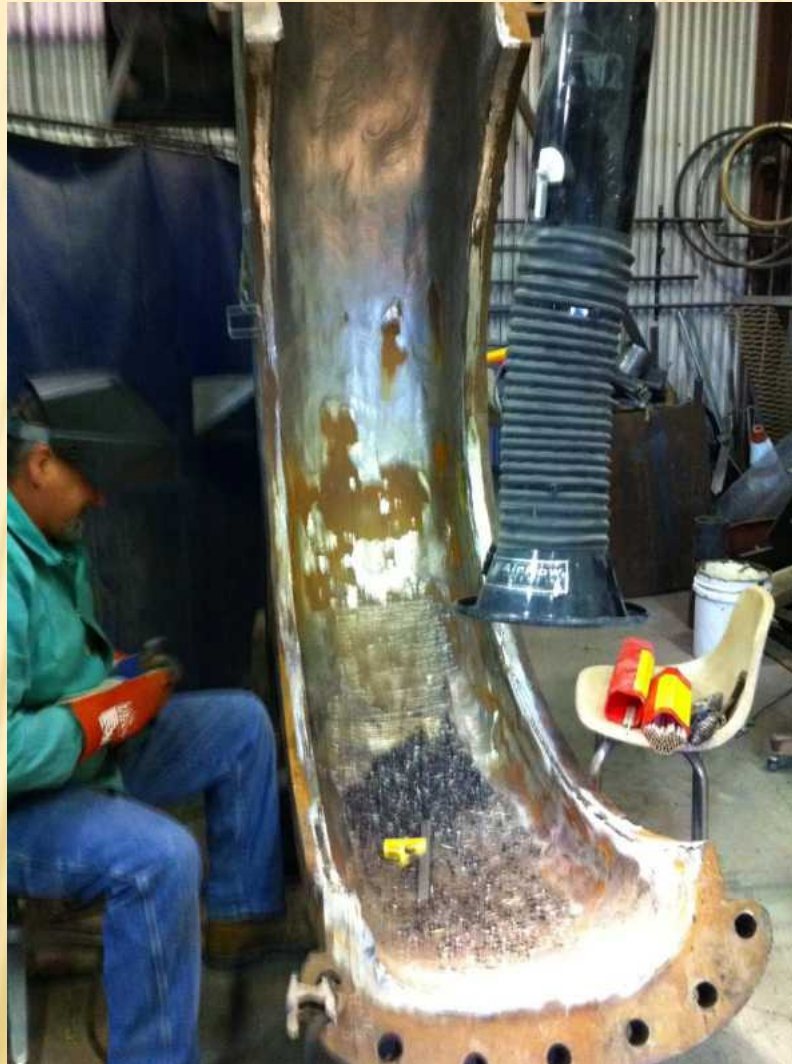


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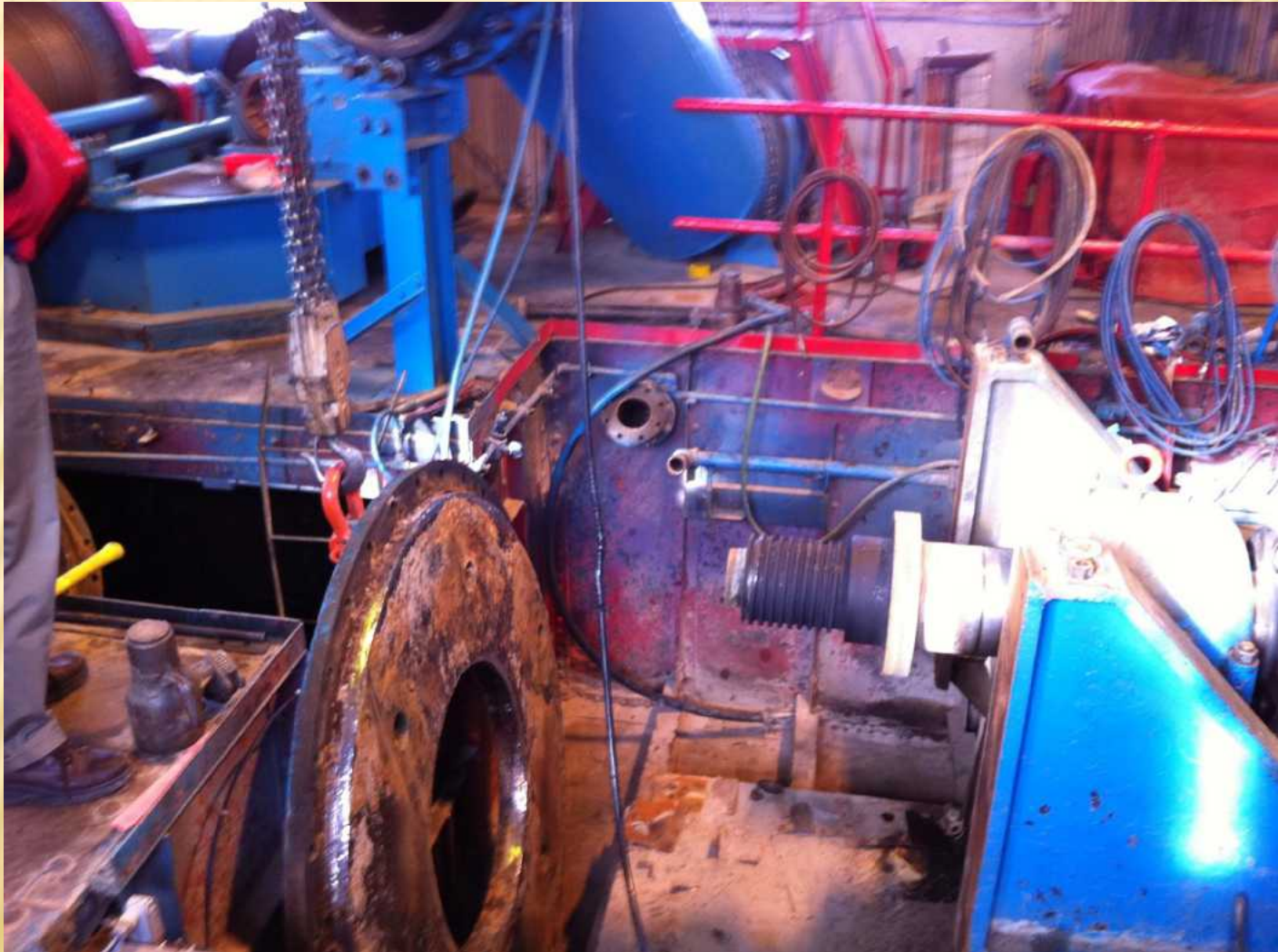
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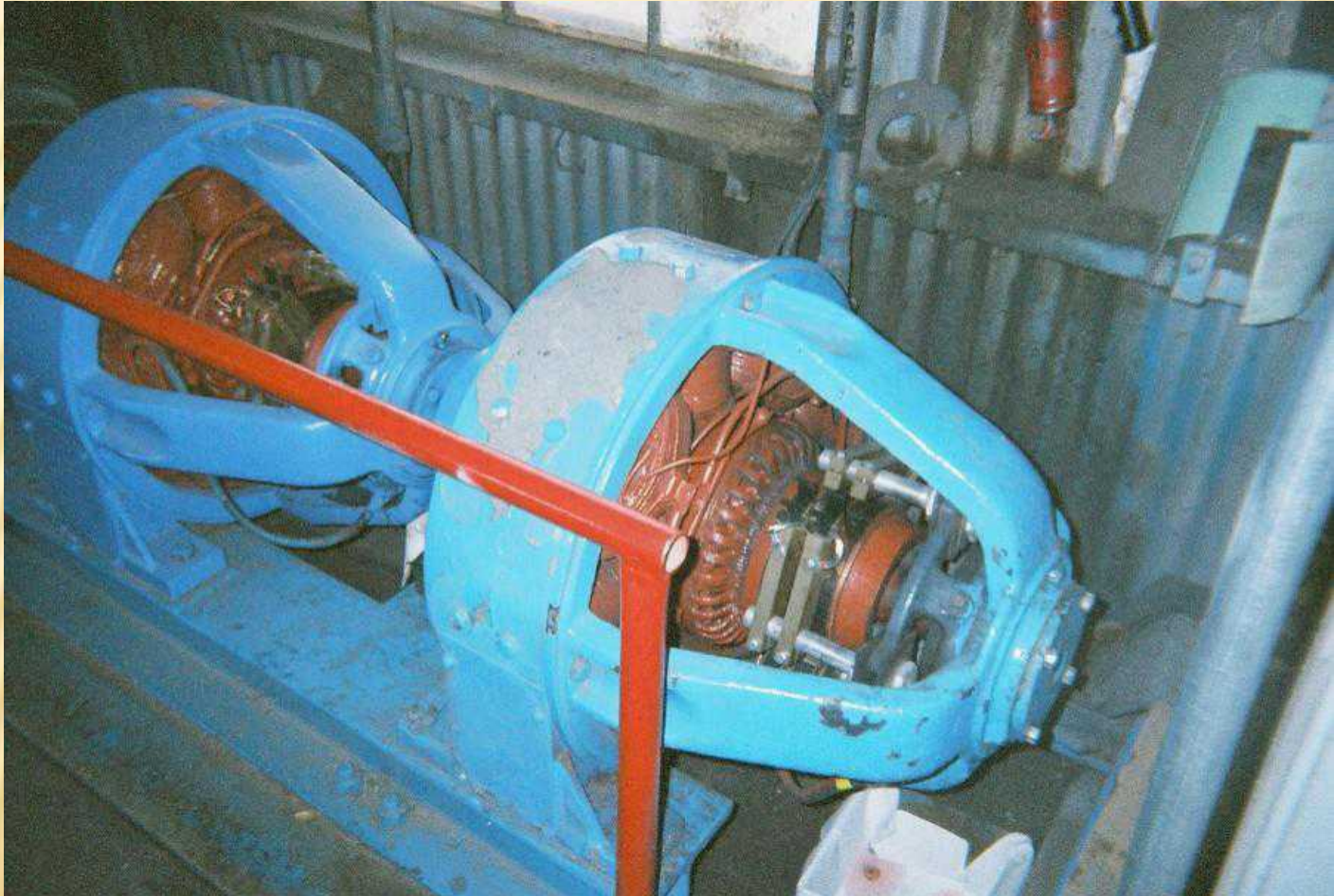


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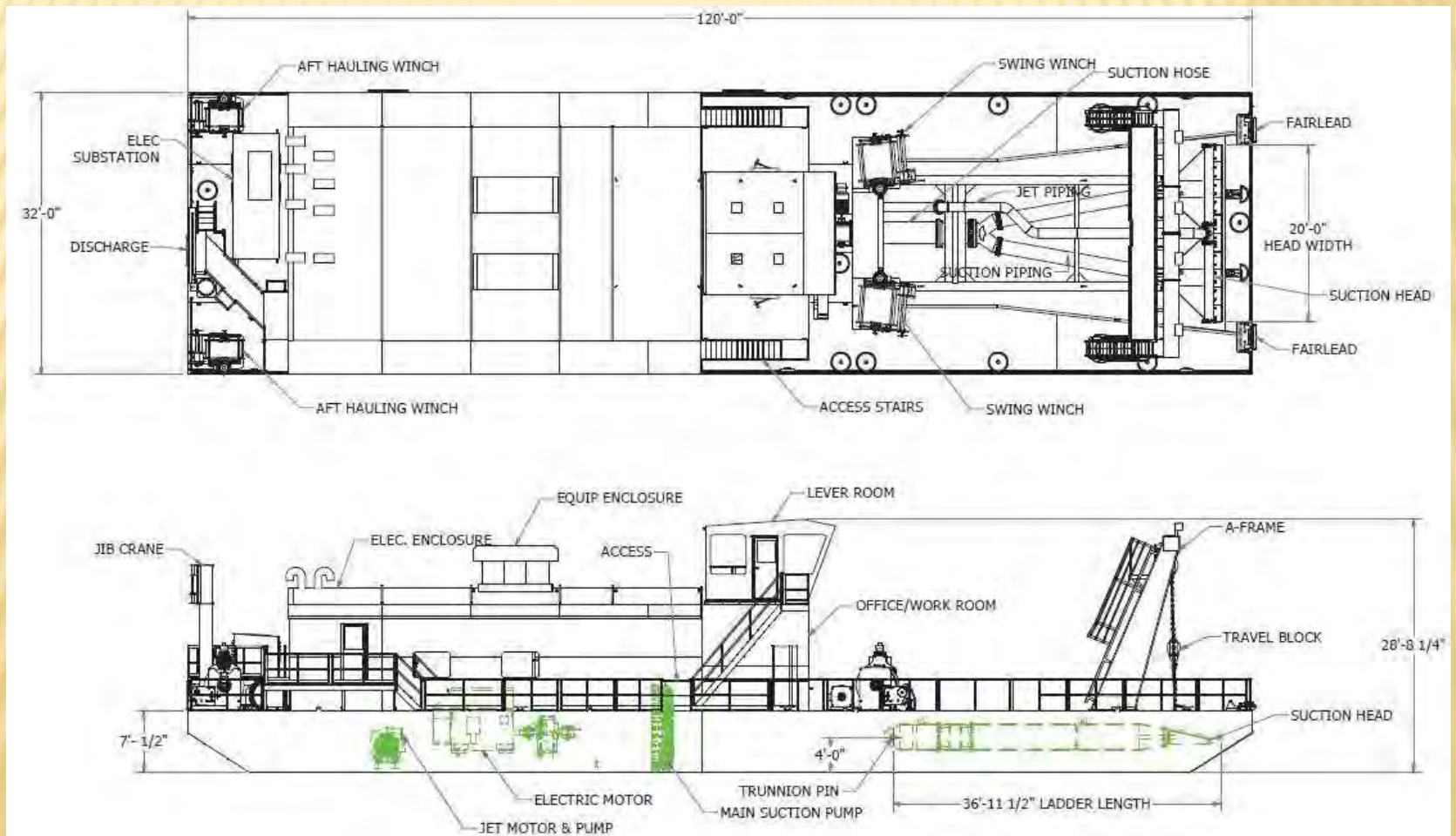
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# WELCOME PAWNEE II

## General Arrangement

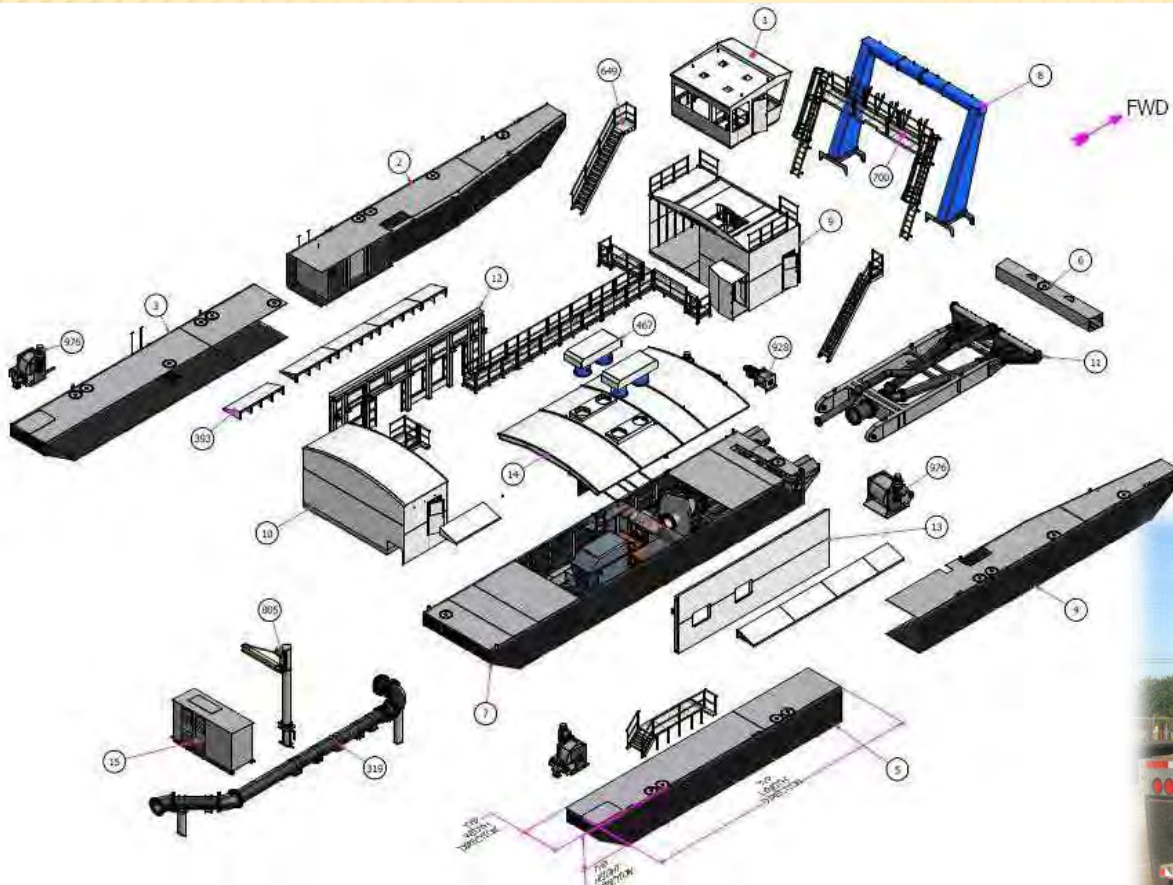




# WELCOME PAWNEE II

## Shipment/Delivery

19  
truckloads





# WELCOME PAWNEE II

Commissioned August 2012

Pawnee II Principal Data	
Hull Dimensions (LxWxD)	37 m x 9.8 m x 2.3 m (120' x 32' x 7')
Suction Head Width	6 m (20')
Suction Diameter	650 mm (26")
Discharge Diameter	600 mm (24")
Total Installed Power	2,667 kW (3,577 HP)
Prime Mover Power	2,237 kW (3,000 HP)
Digging Jet Power	298 kW (400 HP)
Dredging Depth	1.5 m to 5.5 m (5' to 18')
Displacement	322 tonnes (710,000 lb)

Manufacturer responsible for transportation, field assembly, launching & training





# WELCOME PAWNEE II

## Design Info

- ☐ 10,000+ engineering man-hours
- ☐ 30,000+ manufacturing man-hours
- ☐ the dredge is energized by a single 4160v input trailing cable
- ☐ the dredge was manufactured as a mono-hull design and the final mating of the hull sections took place at the assembly site
- ☐ efficiency, efficiency, efficiency
- ☐ increased digging jet power
- ☐ good availability or wear components
- ☐ electric winches with level-wind
- ☐ similar operating techniques as Pawnee – familiarity
- ☐ modern operating systems
- ☐ data monitoring – control system

The Pawnee II's VFD drive is a major upgrade from the Pawnee's dredge pump motor that was started across the line. The VFD drive allows for an increased efficiency and allows the operators to start and stop the dredge pump when required for servicing or shutdown. The VFD drive allows the operator to easily adjust dredge pump speed to accommodate bank conditions and required feed rates



# WELCOME PAWNEE II

## Primary Features

The dredge pump motor is a 3,000 HP AC motor that is driven by a Variable Frequency Drive (VFD)





# WELCOME PAWNEE II

## Primary Features

Dredge Pump - GIW  
model 24x28TBC





# WELCOME PAWNEE II

## Primary Features

### Lufkin Pump Reduction Gear





# WELCOME PAWNEE II

## Primary Features

### Dustpan Head and Jets





# WELCOME PAWNEE II

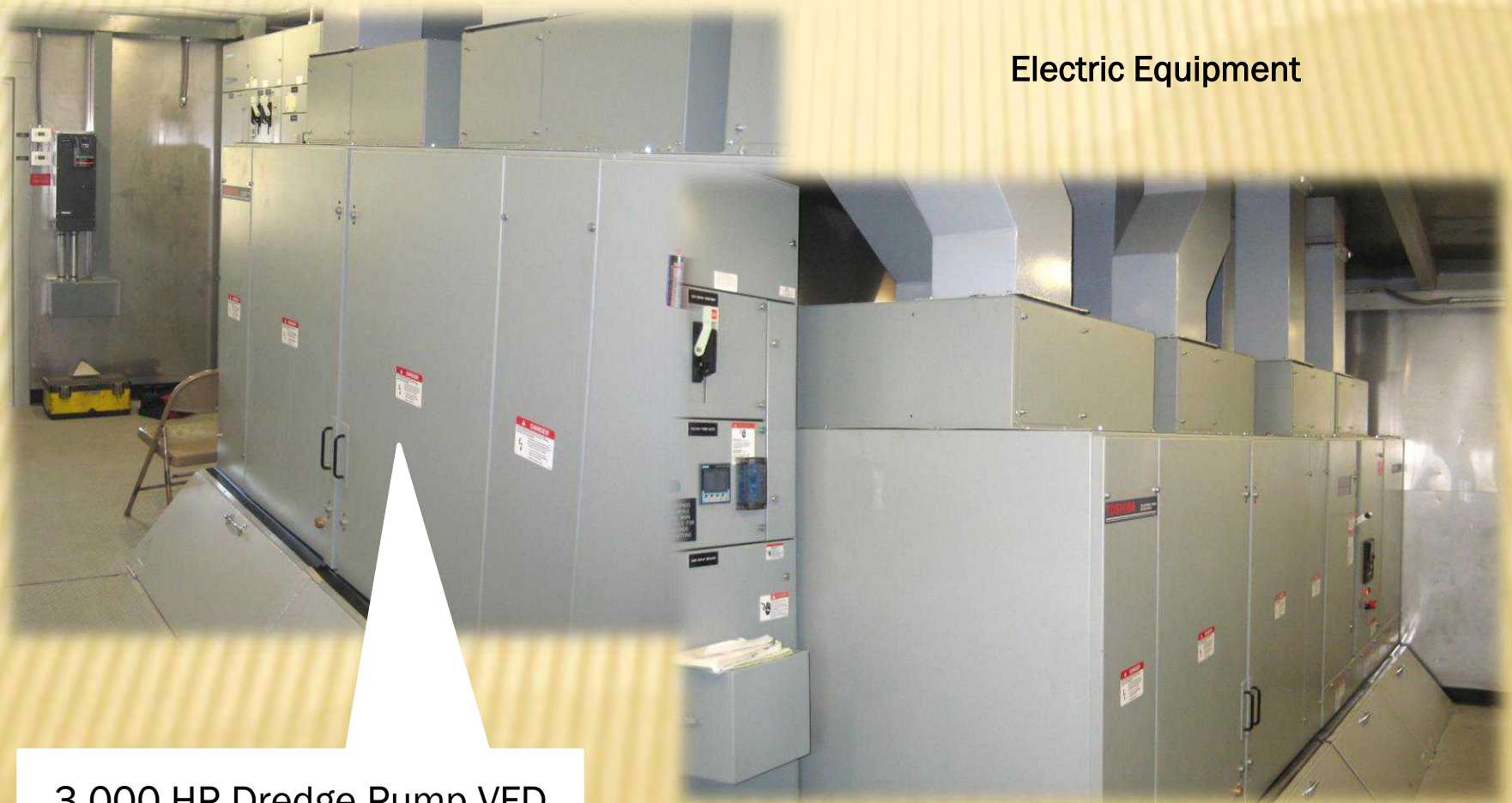




# WELCOME PAWNEE II

## Primary Features

### Electric Equipment



3,000 HP Dredge Pump VFD



# WELCOME PAWNEE II

## Primary Features

(4) Hauling Winch VFDs

Electric Equipment

Modern Efficient Switchgear



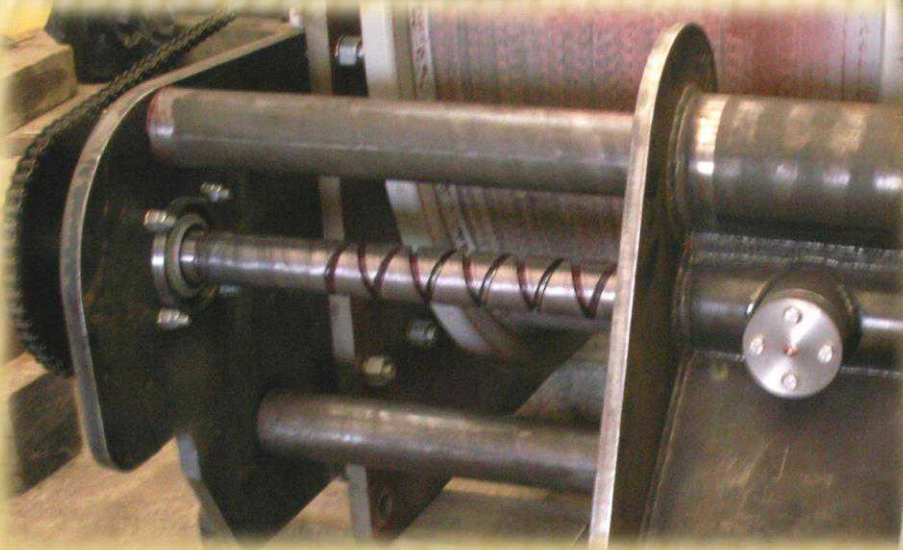
400 HP Jet System  
VFD



# WELCOME PAWNEE II

## Primary Features

Winches





# WELCOME PAWNEE II

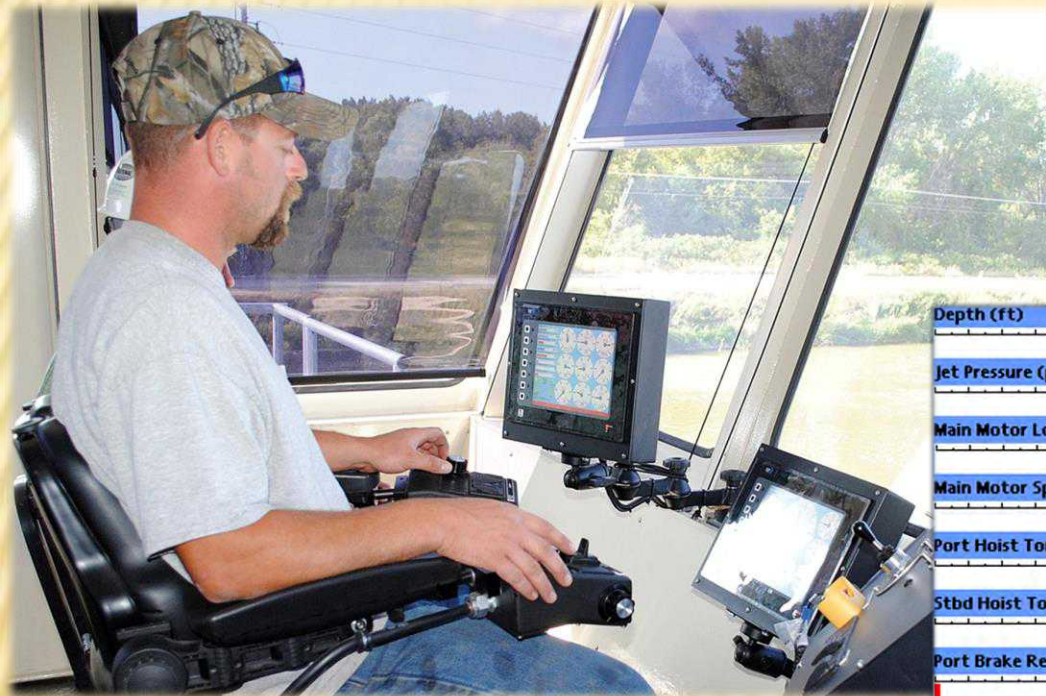




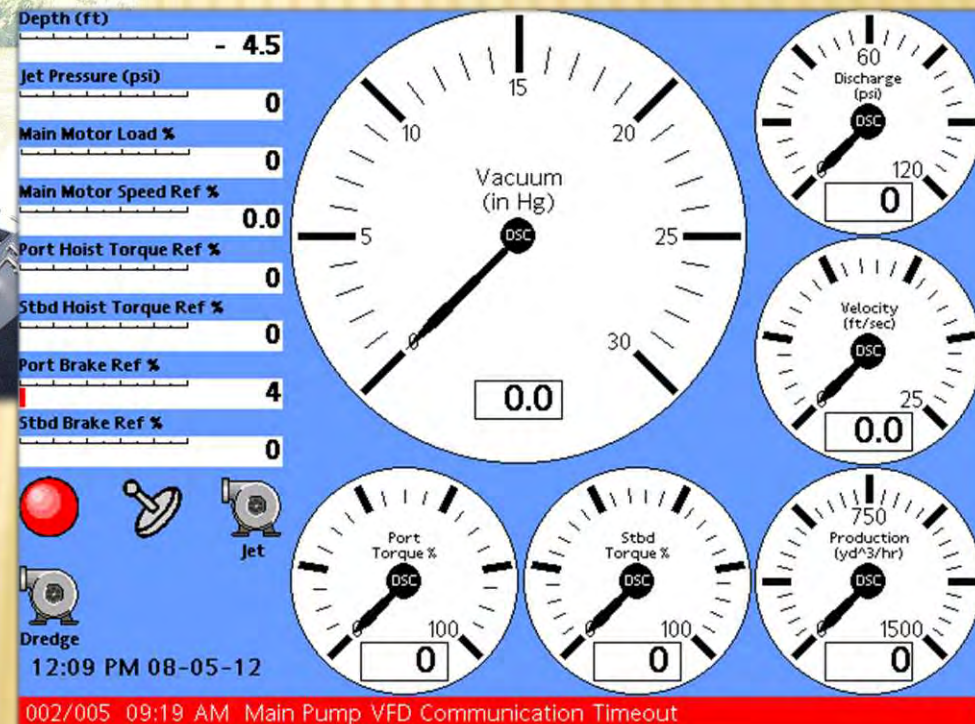
# WELCOME PAWNEE II

## Controls/Control System

Remote monitoring through telemetry



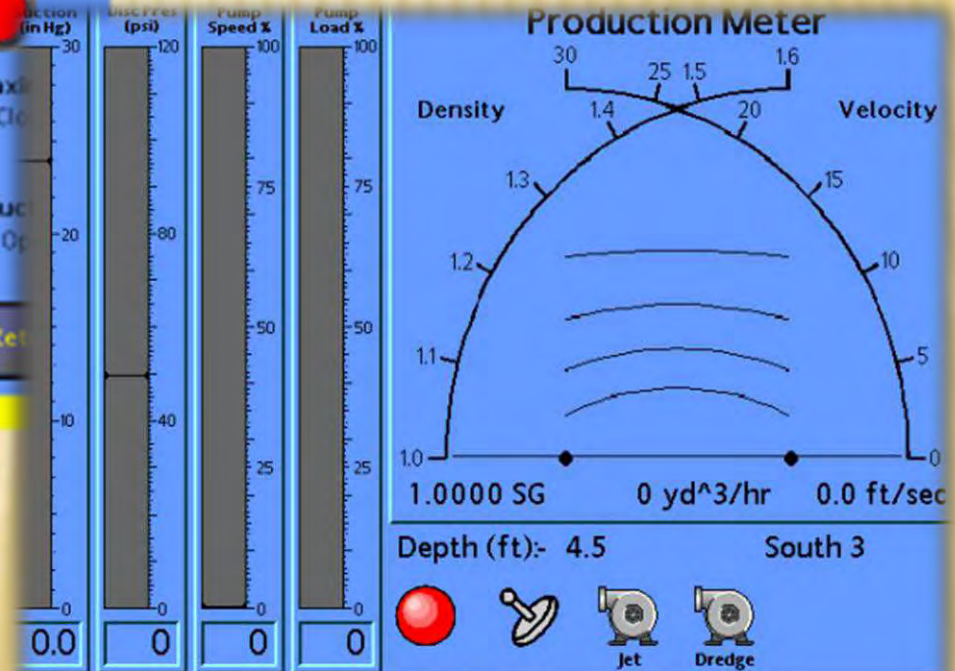
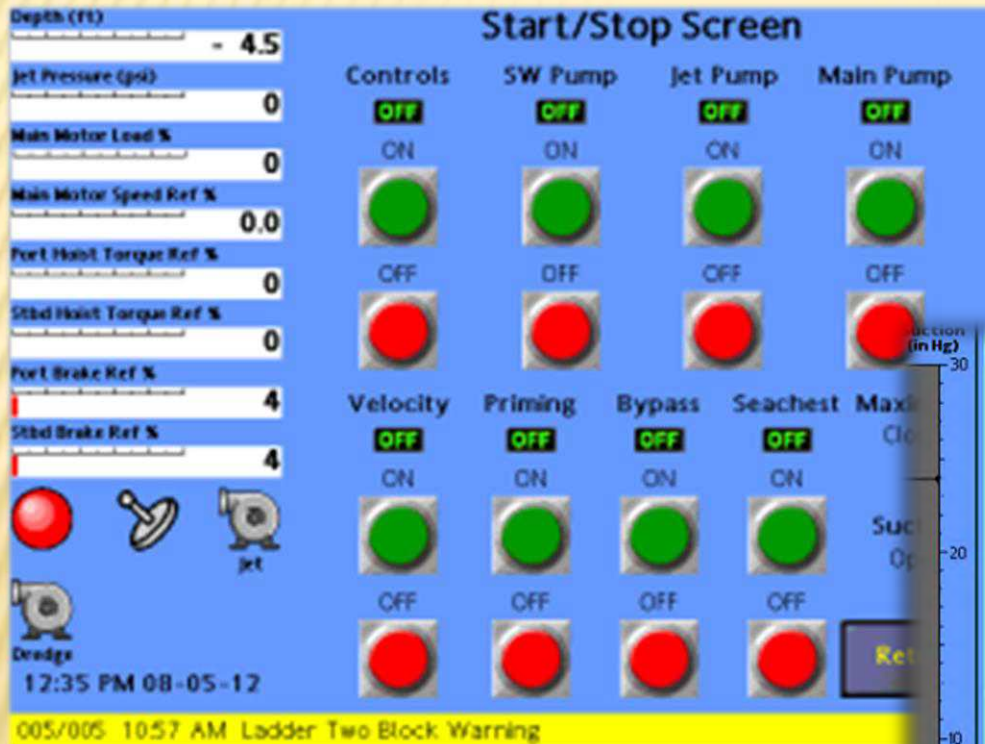
PLC based operating system allows for high level of automation





# WELCOME PAWNEE II

## Controls/Control System



04/005 09:19 AM Starboard Stern Winch VED Communication Timeout



# WELCOME PAWNEE II

Convenience



Maintenance Crane/Trolley



# WELCOME PAWNEE II

## Convenience





# WELCOME PAWNEE II

## Lighting





# WELCOME PAWNEE II

## Pumping



Dredge designed to pump on existing pipeline system

Nozzle test



# WELCOME PAWNEE II





# WELCOME PAWNEE II

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## Conclusions

From the manufacturers perspective and because this was their first dustpan dredge design/build, DSC was skeptical that a dustpan dredge truly had defined application. Once the Pawnee II was operational it was evident that a dustpan dredge does indeed serve a niche application. The Loup Canal was certainly identified as one of these niches. When working in this type of waterway and when bulk natural removal of sediments are required, a dustpan dredge should be considered as an option to the type of dredging equipment to be used. When used in the right application a dustpan dredge can produce higher densities than a conventional cutter suction dredge and might be the most economical and efficient tool for the job.



# WELCOME PAWNEE II

Questions ???

