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Red River of the North at East Grand Forks, MN & Grand Forks, ND

Flood Control Project – Armada of Pump Stations Protect Both Cities

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GF & EGF Flood Control Project Pumping Stations

Presentation Summary

- ✓ Project location
- ✓ 1997 flood
- ✓ Project background
- ✓ Pump station design
- ✓ Pumps
- ✓ Generators
- ✓ Controls
- ✓ Questions

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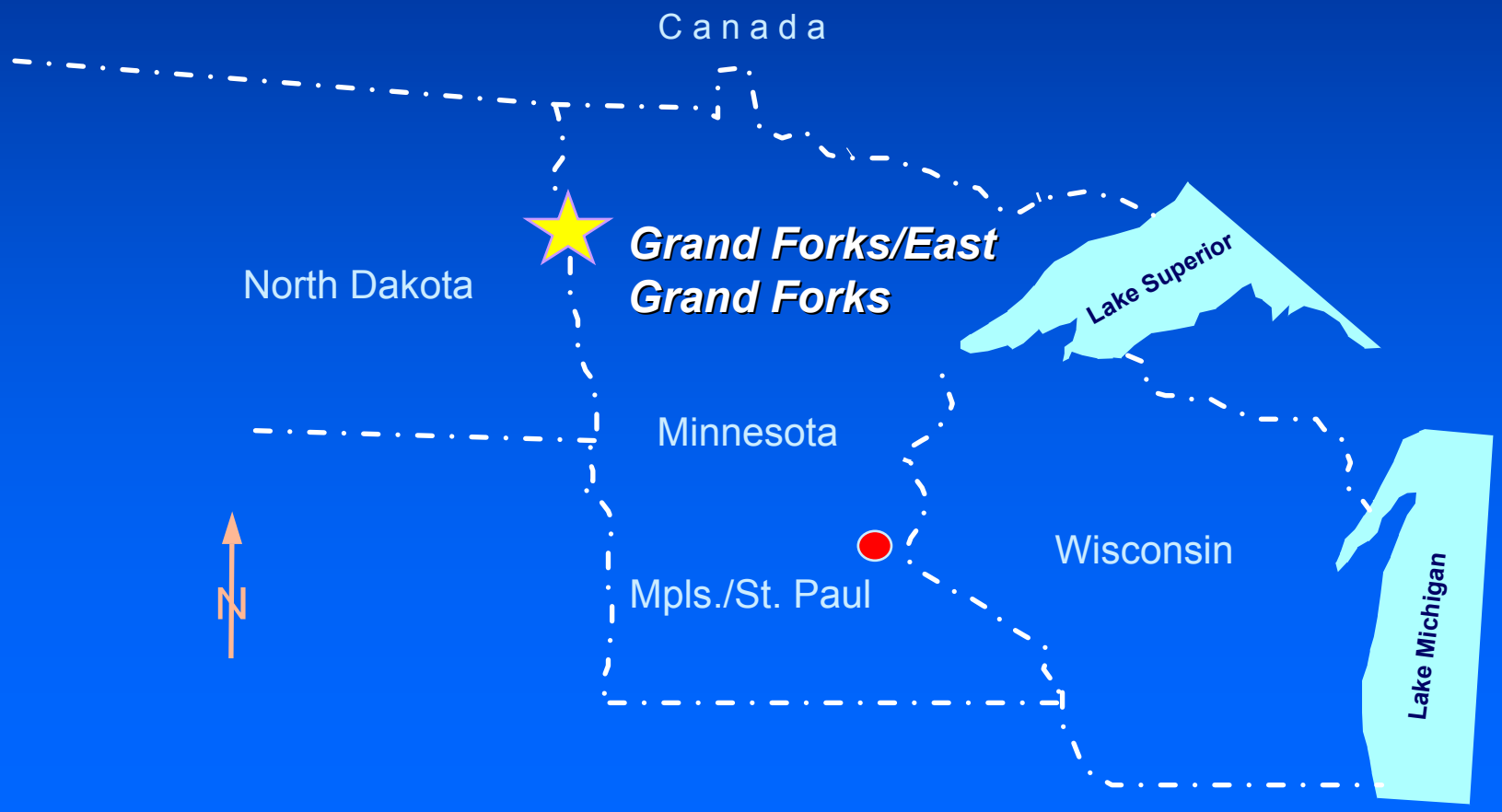
Project Location



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1997 Flood

- ✓ Greatest flood on record for this area
- ✓ 50,000 people evacuated
- ✓ Both Grand Forks and East GF under water
- ✓ Ice storm knocked out power to each City
- ✓ Major blizzard
- ✓ Several buildings in Grand Forks burned
- ✓ Over $1 Billion in damages

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Downtown Grand Forks 1997 Flood

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Grand Forks Lincoln Park 1997 Flood

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Project Background

- ✓ Project started after 1997 flood
- ✓ Multiple construction contracts
- ✓ One project: Grand Forks & East Grand Forks
- ✓ $400 Million cost
- ✓ Completion in 2007 – 10 year anniversary of 1997 Flood
- ✓ 23 Pump Stations (12 GF and 11 EGF)
- ✓ Ring levees around each City
- ✓ 40 miles of levee total
- ✓ 3 miles of floodwall

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Pump Station Design

- ✓ 23 Stations – Optimization and Cost Analysis
- ✓ Size from 6000 GPM to 112,000 GPM
- ✓ English Coulee largest station (GF side)
- ✓ Balance number of stations versus capability of each City to operate and maintain them
- ✓ Pump, control & generator supply contracts
- ✓ Each City wanted superstructures & generators. Lessons learned 1997 flood.
- ✓ Heating and maintaining buildings
- ✓ Maintenance and consistency between stations critical – spare parts

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Downtown East Grand Forks Station

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Grand Forks Elmwood Drive Station

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Grand Forks English Coulee PS (-40F)

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Pumps

- ✓ Purchased under supply contract
- ✓ KSB submersible storm water pumps
- ✓ Pumps installed on guide rails
- ✓ Hoist system provided for pump removal
- ✓ Interior Flood Control Analysis Optimization
- ✓ Settled on 3 Pump Sizes
- ✓ English Coulee Station utilizes vertical pumps
- ✓ Farval automatic lubrication system
- ✓ Use compressed air system for filling Farval lubricators

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KSB Submersible Pumps

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Vertical Pumps at English Coulee PS

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Generators

- ✓ Purchased under supply contract with Onan
- ✓ Automatic transfer switches
- ✓ Skid mounted fuel tanks and 24 hr operation
- ✓ Fuel tanks double wall construction
- ✓ Alarm system tied into SCADA. Limit data sent back to master station.
- ✓ Need to be operated monthly
- ✓ Load banks built Into exhaust ductwork and sized at 50% of generator capacity
- ✓ Winter operation

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250 KW Generator

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500 KW Generator English Coulee

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100 KW Generator, Fuel Pipe, & Exhaust

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Detail of Exhaust Duct and Load Bank

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Controls

- ✓ Supply contract with SCIPAR
- ✓ Individual Motor Starters
- ✓ Incorporates SCADA and Telemetry
- ✓ Radio system
- ✓ Central computer at each City
- ✓ Transducers for measuring water levels
- ✓ No Remote Operation – We want operators at each station
- ✓ Data overload – Limit what is sent
- ✓ Programming issues – Training for each City

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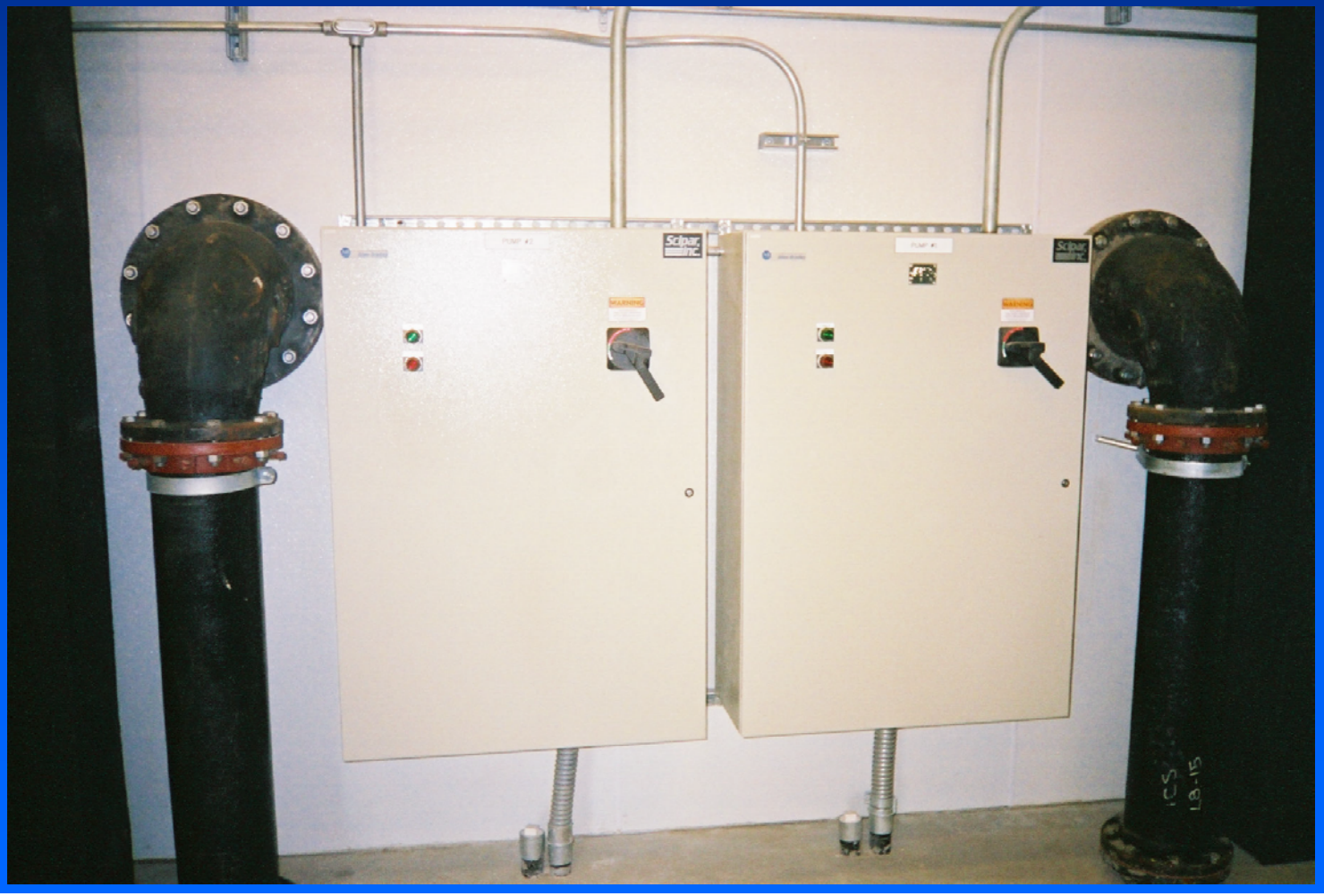
Starter Panels 6000 GPM Pumps



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SCIPAR Control Panel

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SCIPAR Control Panel at English Coulee

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Questions or Comments?

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