

Appendix 1 International Scale of River Difficulty

Class I: Easy. Fast moving water with riffles and small waves. Few obstructions, all obvious and easily missed with little training. Risk to swimmers is slight; self-rescue is easy.

Class II: Novice. Straightforward rapids with wide, clear channels which are evident without scouting. Occasional maneuvering may be required, but rocks and medium sized waves are easily missed by trained paddlers. Swimmers are seldom injured and group assistance, while helpful, is seldom needed. Rapids that are at the upper end of this difficulty range are designated "Class II+".

Class III: Intermediate. Rapids with moderate, irregular waves which may be difficult to avoid and which can swamp an open canoe. Complex maneuvers in fast current and good boat control in tight passages or around ledges are often required; large waves or strainers may be present but are easily avoided. Strong eddies and powerful current effects can be found, particularly on large-volume rivers. Scouting is advisable for inexperienced parties. Injuries while swimming are rare; self-rescue is usually easy but group assistance may be required to avoid long swims. Rapids that are at the lower or upper end of this difficulty range are designated "Class III-" or "Class III+" respectively.

Class IV: Advanced. Intense, powerful but predictable rapids requiring precise boat handling in turbulent water. Depending on the character of the river, it may feature large, unavoidable waves and holes or constricted passages demanding fast maneuvers under pressure. A fast, reliable eddy turn may be needed to initiate maneuvers, scout rapids, or rest. Rapids may require "must" moves above dangerous hazards. Scouting may be necessary the first time down. Risk of injury to swimmers is moderate to high, and water conditions may make self-rescue difficult. Group assistance for rescue is often essential but requires practiced skills. A strong Eskimo roll is highly recommended. Rapids that are at the upper end of this difficulty range are designated "Class IV-" or "Class IV+" respectively.

Class V: Expert. Extremely long, obstructed, or very violent rapids which expose a paddler to added risk. Drops may contain large, unavoidable waves and holes or steep, congested chutes with complex, demanding routes. Rapids may continue for long distances between pools, demanding a high level of fitness. What eddies exist may be small, turbulent, or difficult to reach. At the high end of the scale, several of these factors may be combined. Scouting is Recommended but may be difficult. Swims are dangerous, and rescue is often difficult even for experts. A very reliable Eskimo roll, proper equipment, extensive experience, and practiced rescue skills are essential. Because of the large range of difficulty that exists beyond Class IV, Class V is an open ended, multiple level scale designated by Class 5.0, 5.1, 5.2, etc... Each of these levels is an order of magnitude more difficult than the last. Example: Increasing difficulty from Class 5.0 to class 5.1 is a similar order of magnitude as increasing from Class IV to Class V.

Class VI: Extreme and Exploratory. These runs have almost never been attempted and often exemplify the extremes of difficulty, unpredictability and danger. The consequences of errors are very severe and rescue may be impossible. For teams of experts only, at favorable water levels, after close personal inspection and taking all precautions. After a Class VI rapids has been run many times, It's rating may be changed to an appropriate Class 5.x rating.

Developed by American Whitewater for rating of rivers for private (non commercial) boating. Does not necessarily apply to professionally guided rafting.

Appendix 2 PowerPoint, Working Group Afternoon of Oct. 28, 2015



Granite Falls MN Whitewater Professional Work Group

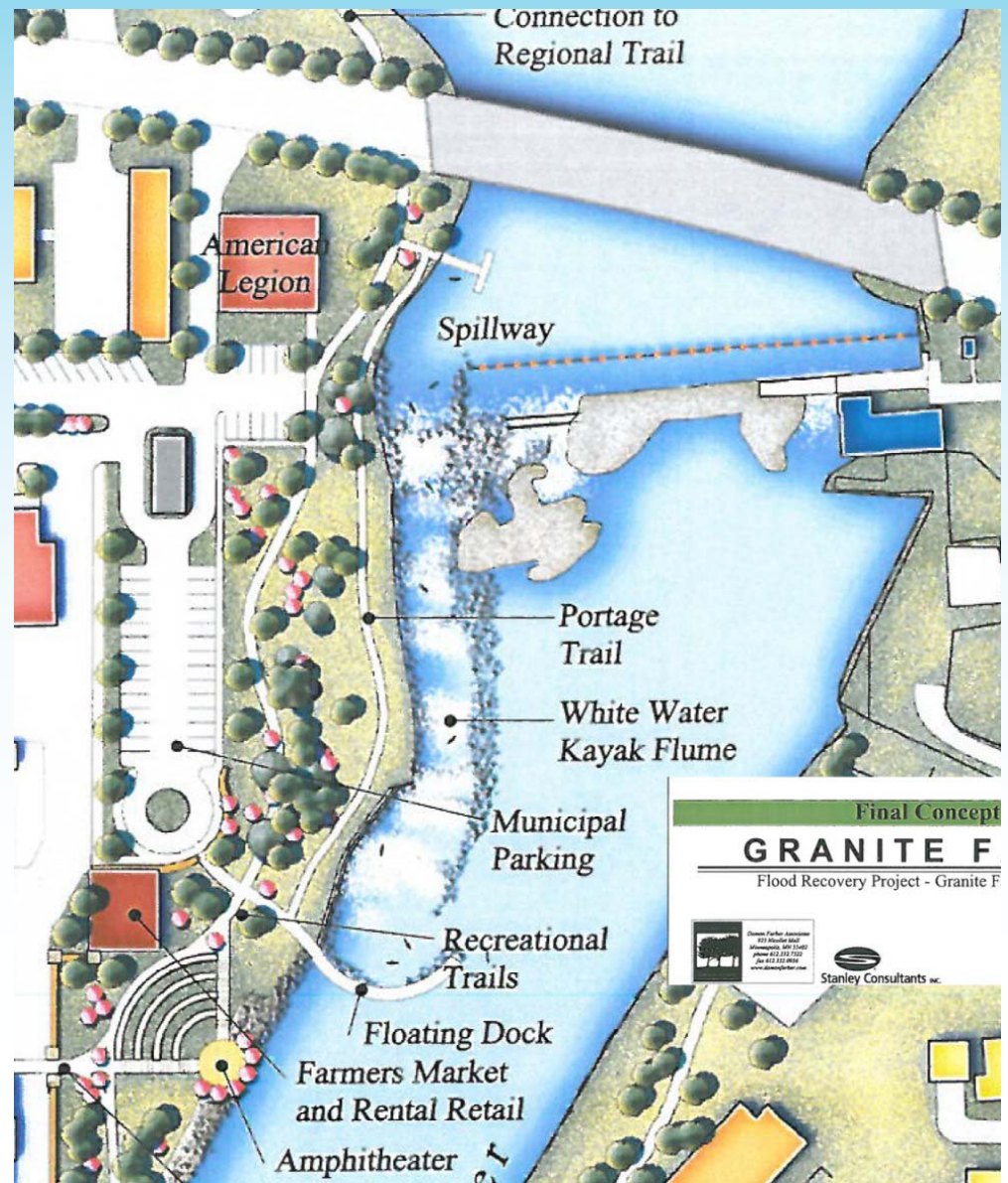
John Anderson

Risa Shimoda

October 29, 2015

Background

- 2004 ~ Whitewater bypass included in Flood Recovery Master Plan
- 2015 ~ \$20,000 grant from EDA and City of Granite Falls for downtown whitewater



What is a Whitewater Park?

- Man made destination for whitewater boating and watching



Why a Whitewater Park?

Integrated, Multipurpose Whitewater Recreation

- Pure recreation
 - Economic development
 - Olympic / international competition
 - Boating Access
 - River Trips / Livery
- Environmental
 - Dam safety
 - Fish passage



Why a Whitewater Park

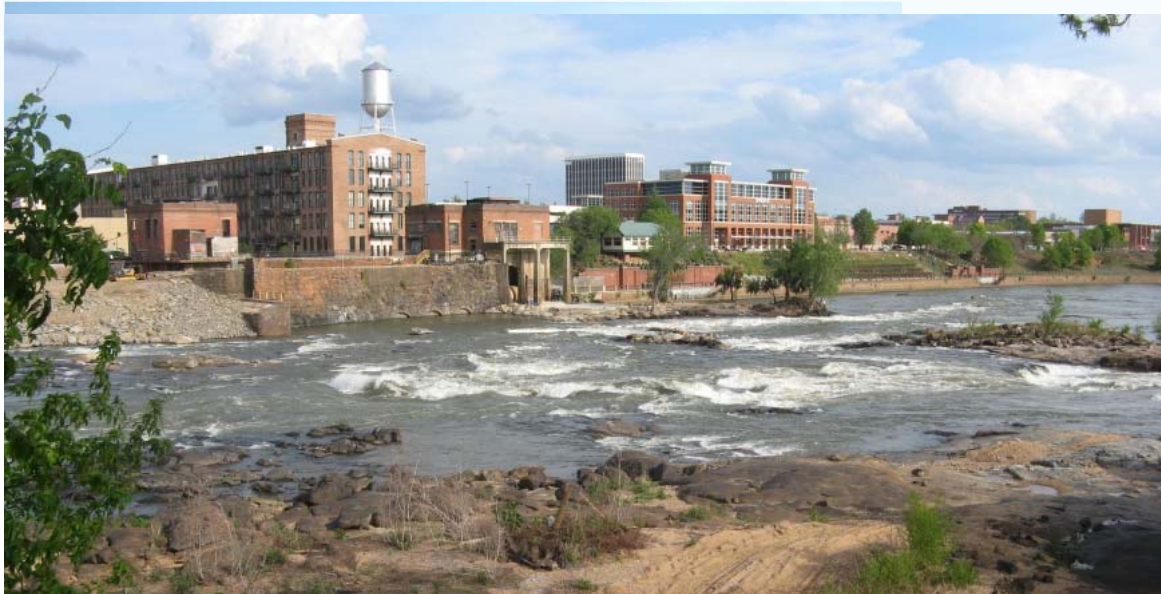
- Its fun to watch!
- 10 to 20 viewers for each boater



Economic Development

Chattahoochee River Restoration

- 60,000 to 100,000 visitors per year
- \$4m to \$7m annual economic impact
- Significant increases in river front real estate development and values



US Whitewater Industry Trends

- Decreased interest in Olympic Slalom
- Increased interest in Freestyle
- River surfing
- Stand up paddling



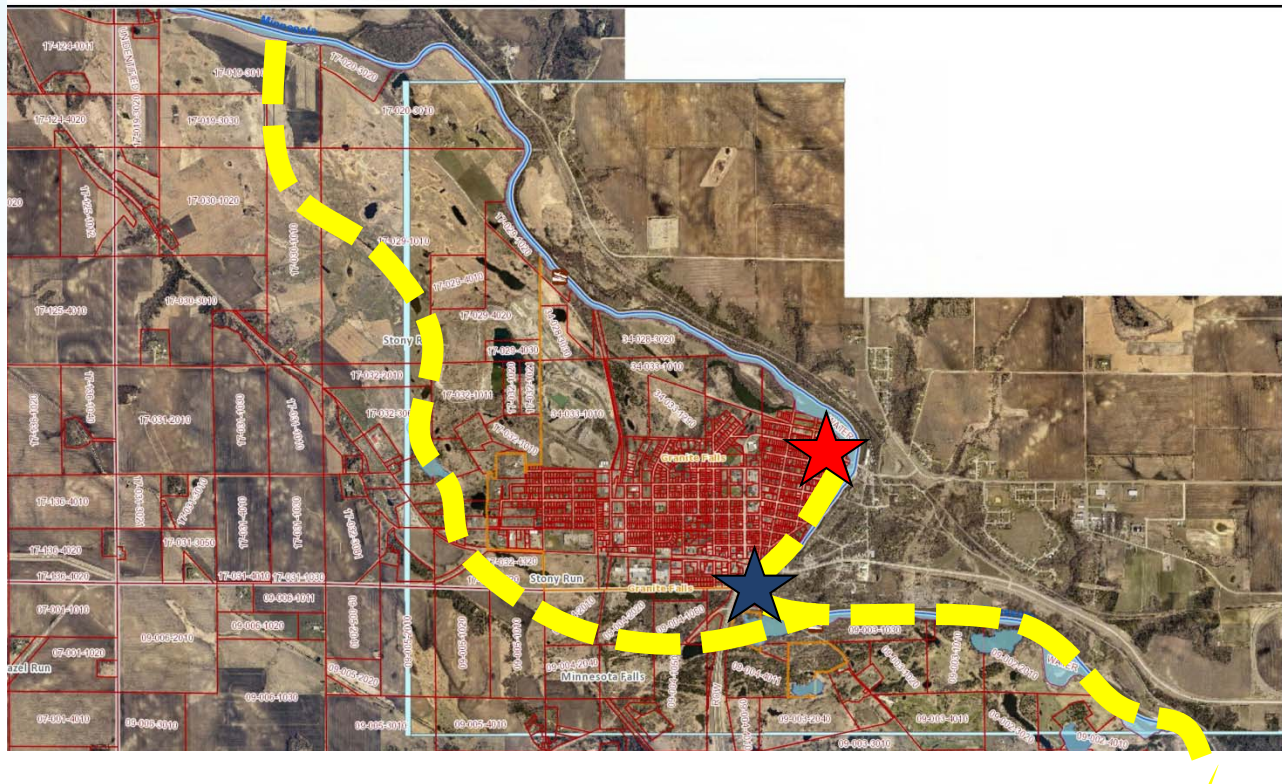
Granite Falls Dam

- City of Granite Falls granted FERC exempt hydro license in 1987
- 18-foot head (including flashboards)
- 1200 Kw max output
- 1100 cfs discharge capacity, 100 cfs min. in-stream flow



Scope of Study at Granite Falls

- 1. Whitewater passage at dam
- 2. Overflow channel
- 3. River run, Granite Falls to Minnesota Falls
- 4. In-river whitewater features



1A Whitewater Bypass

- Hydraulically Connected Channel
 - Whitewater bypass at dam
 - Connected to river at top and bottom
 - Low hazard spillway



1B Off River Channel

- Recreation channel hydraulically separate from main river
- Water control gate or siphon
- Spillway return to river



1B Off River Channel

- 1972 Olympics, Germany
- South Bend IN 1984





Discussion

Appendix 3 PowerPoint, GFRR Annual Meeting, evening of Oct. 28, 2015



Granite Falls, MN

Whitewater Opportunities

John Anderson

Risa Shimoda

October 29, 2015

What is a whitewater park?

Destination for whitewater recreation and anchor for river-based visitation



Why a whitewater park?

Integrated, Multipurpose Whitewater Recreation

- Recreation destination
- Economic development
 - Urban revitalization
 - Boating access
 - Liveries, outfitters, related hospitality
 - Olympic / international competition
- Environmental
 - Dam safety
 - Habitat improvement (fish passage)



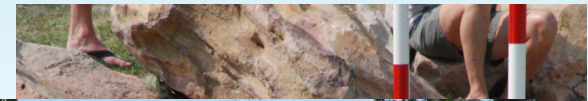
Why a Whitewater Park

- Visual anchor: 10 to 20 viewers for each boater
- Low hazard venue for skill building, river safety
- Appealing to young people



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Whitewater Fundamentals

Flow

Drop

+ Access

Potential!

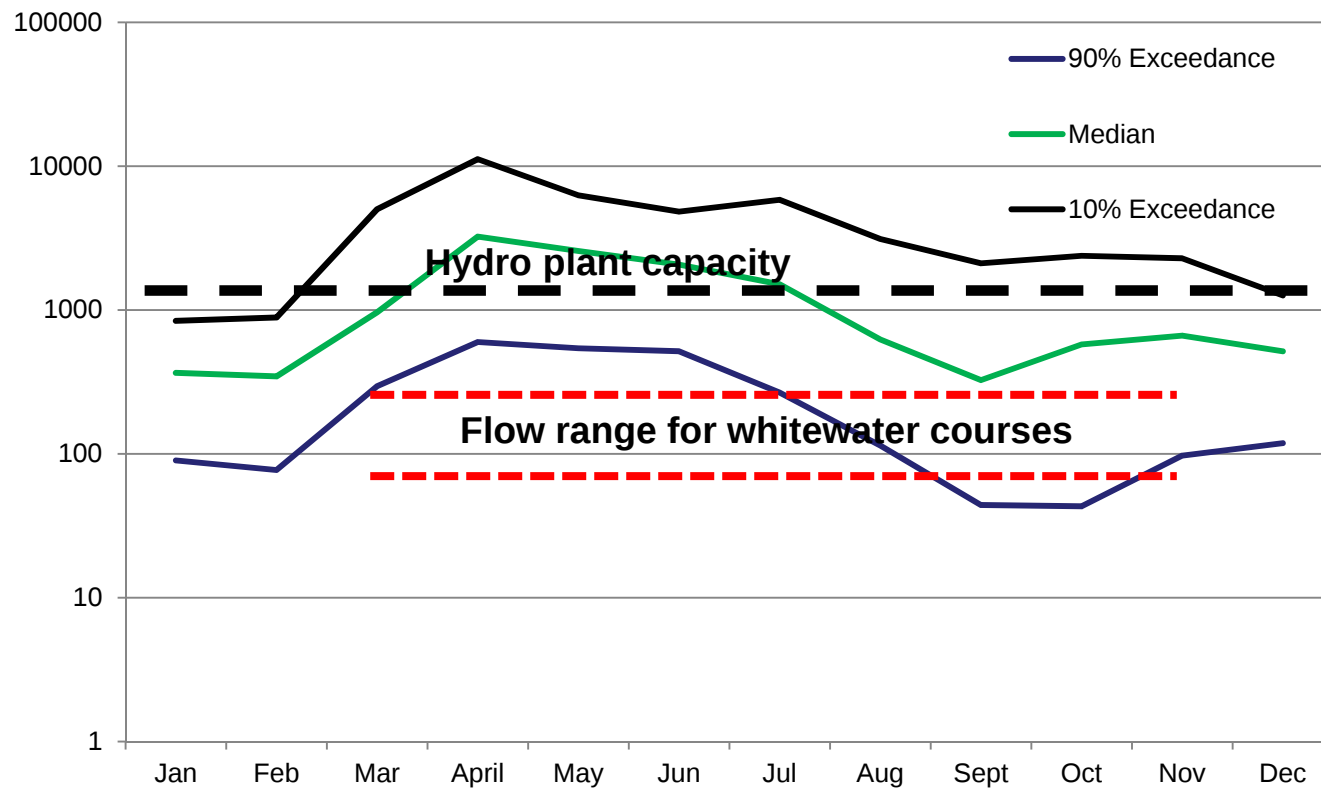


Flow

- 70 cubic feet/second to 600+ cubic feet/second



Flow

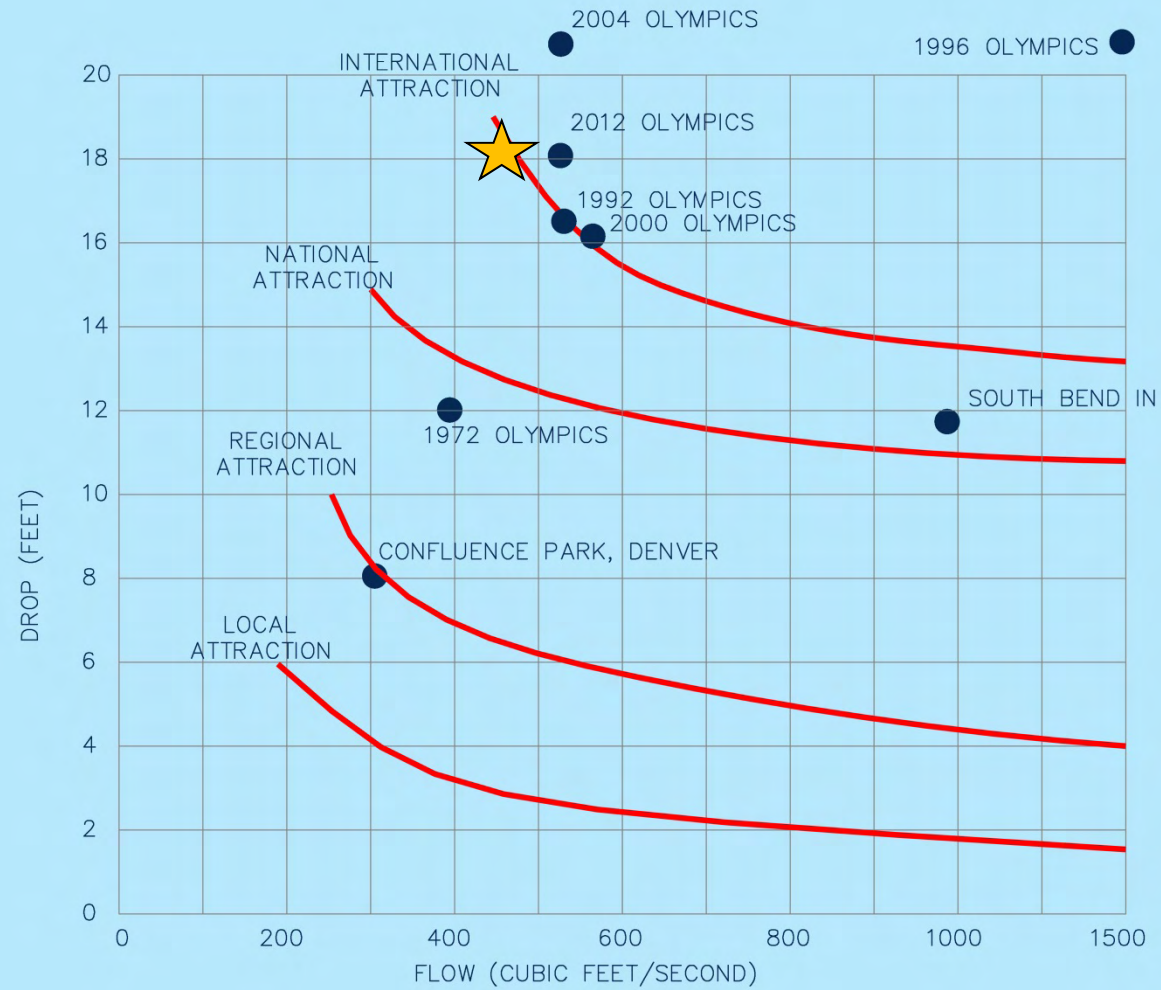


Drop

- 18-foot drop at Granite Falls dam



Flow + Drop = Fun



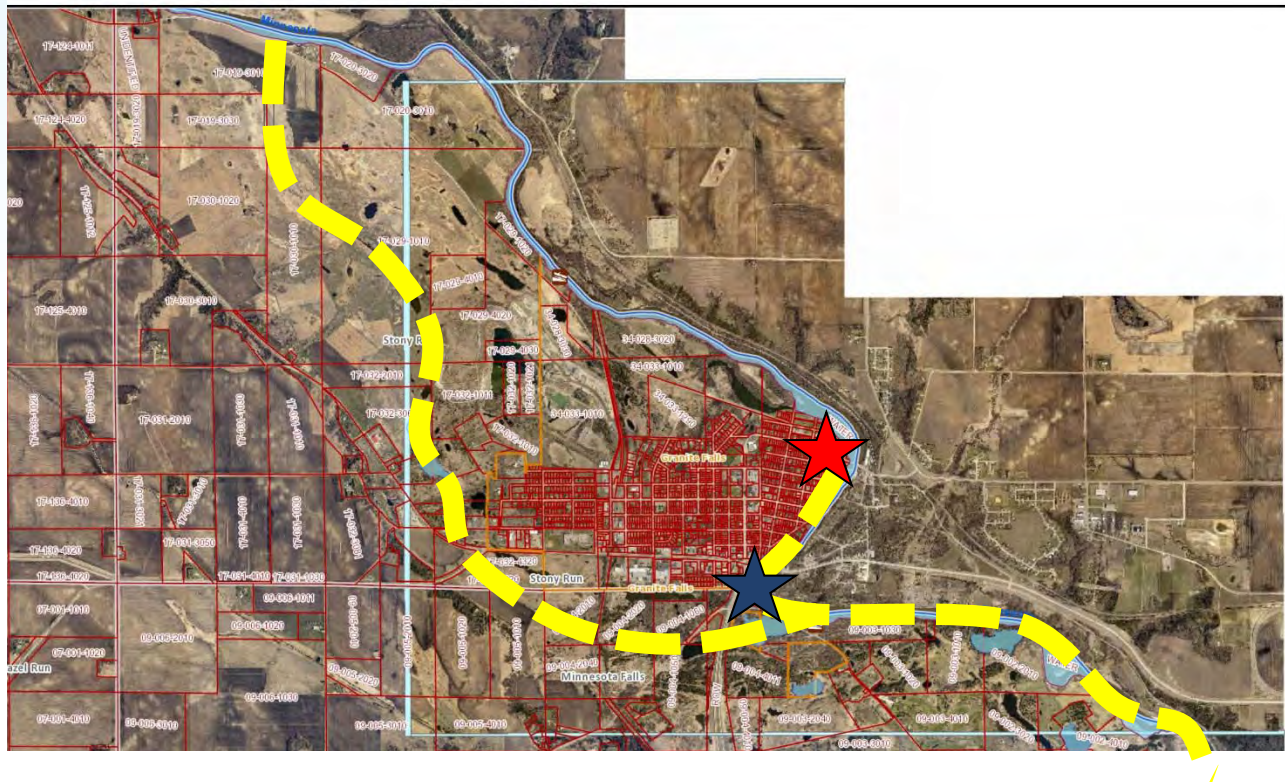
Access

- Visibility from shore
- Construction access
- Spectator and participant access
- Portage path-self rescue



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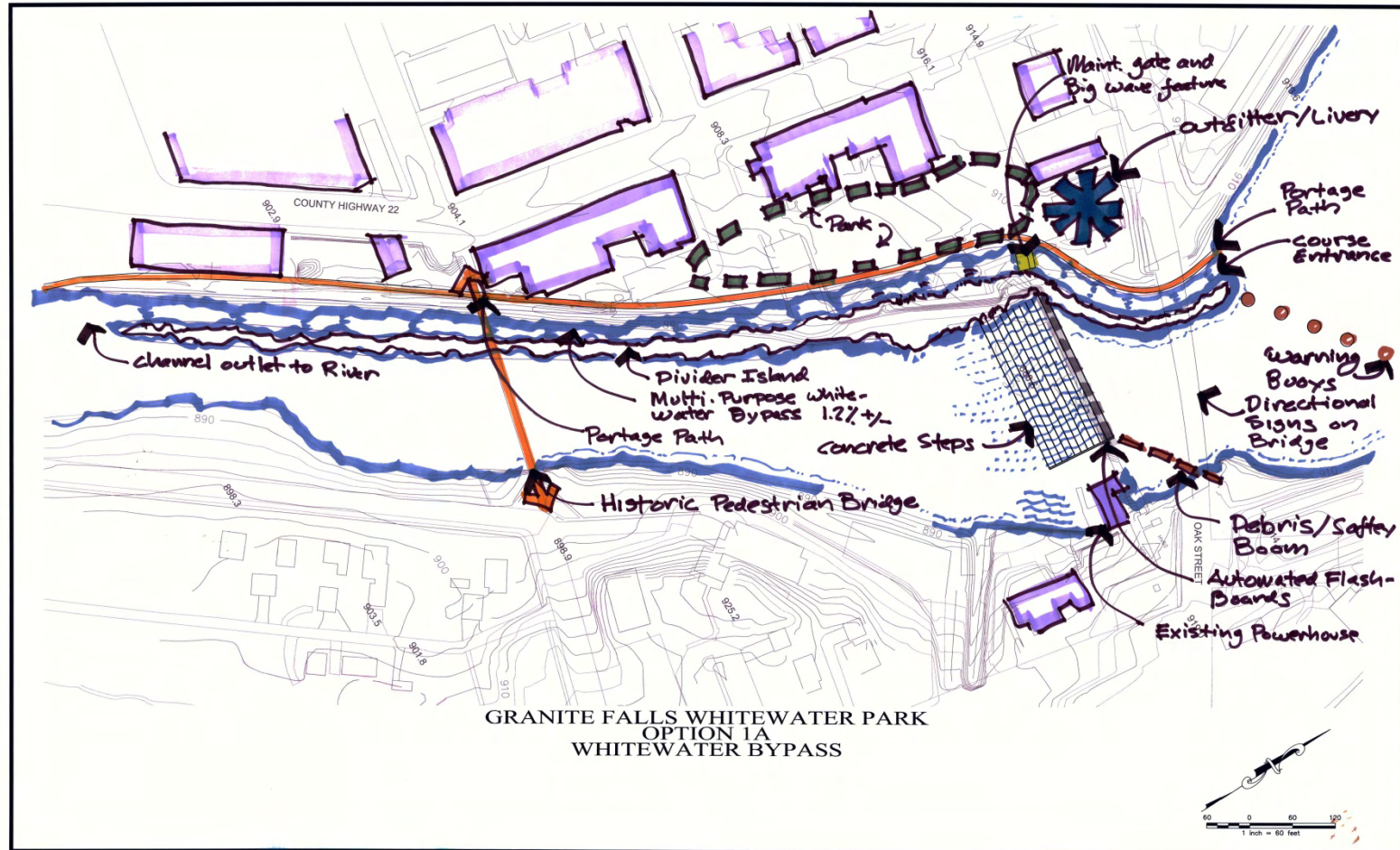


1A Whitewater Bypass

- Dam function is preserved
- Allows free movement of fish and boaters



1A Whitewater Bypass



1A Whitewater Bypass

- Water Control Gate
- Big Wave Feature



Whitewater Bypass 1A

- Dam Hazard Reduction
- Dangerous hydraulic jump can form downstream of dam
- Concrete steps to break up hydraulic jump



Photo credit Illinois DNR

1B Off River Channel

- Recreation channel hydraulically separate from main river
- Water control gate or siphon
- Spillway return to river

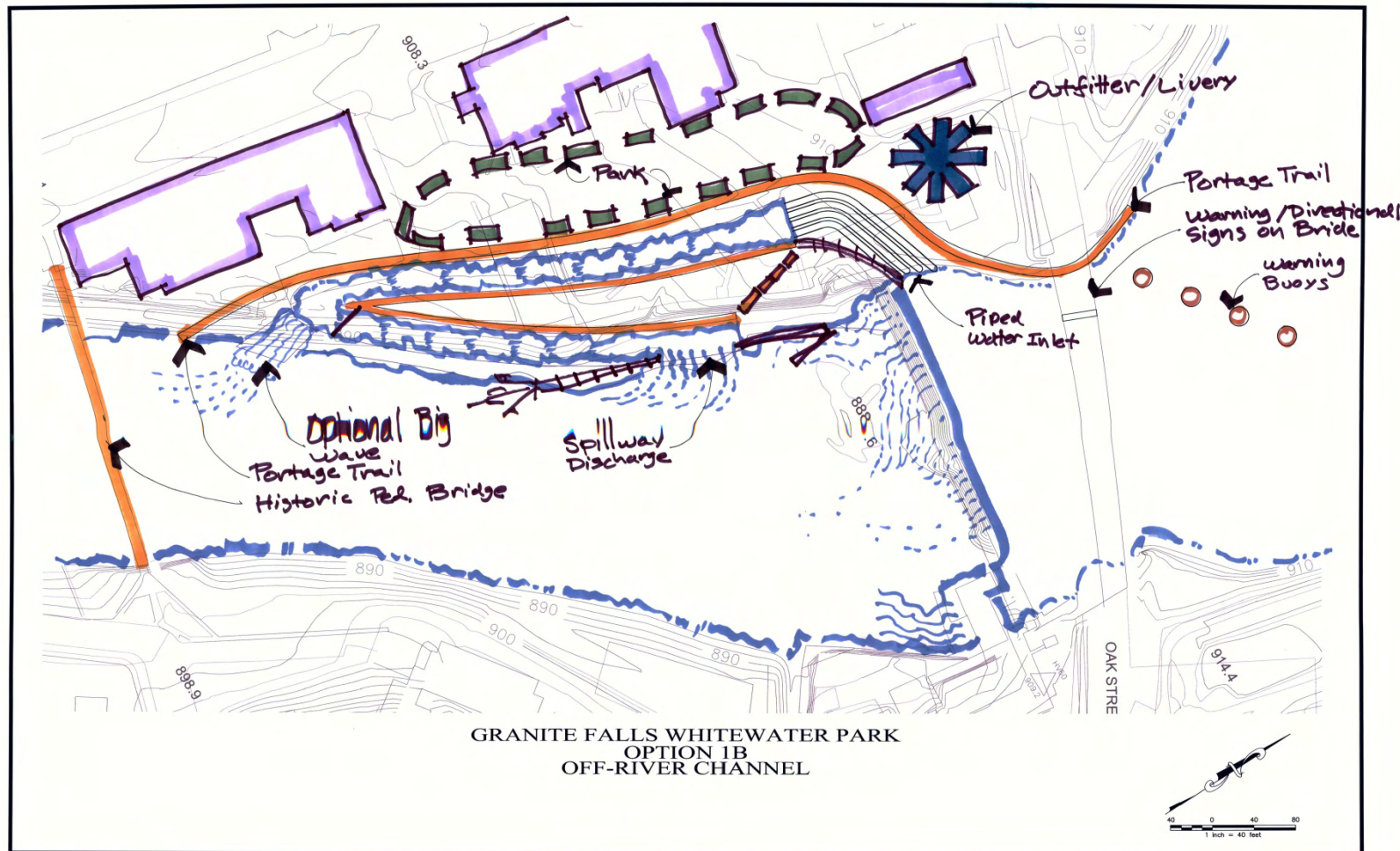


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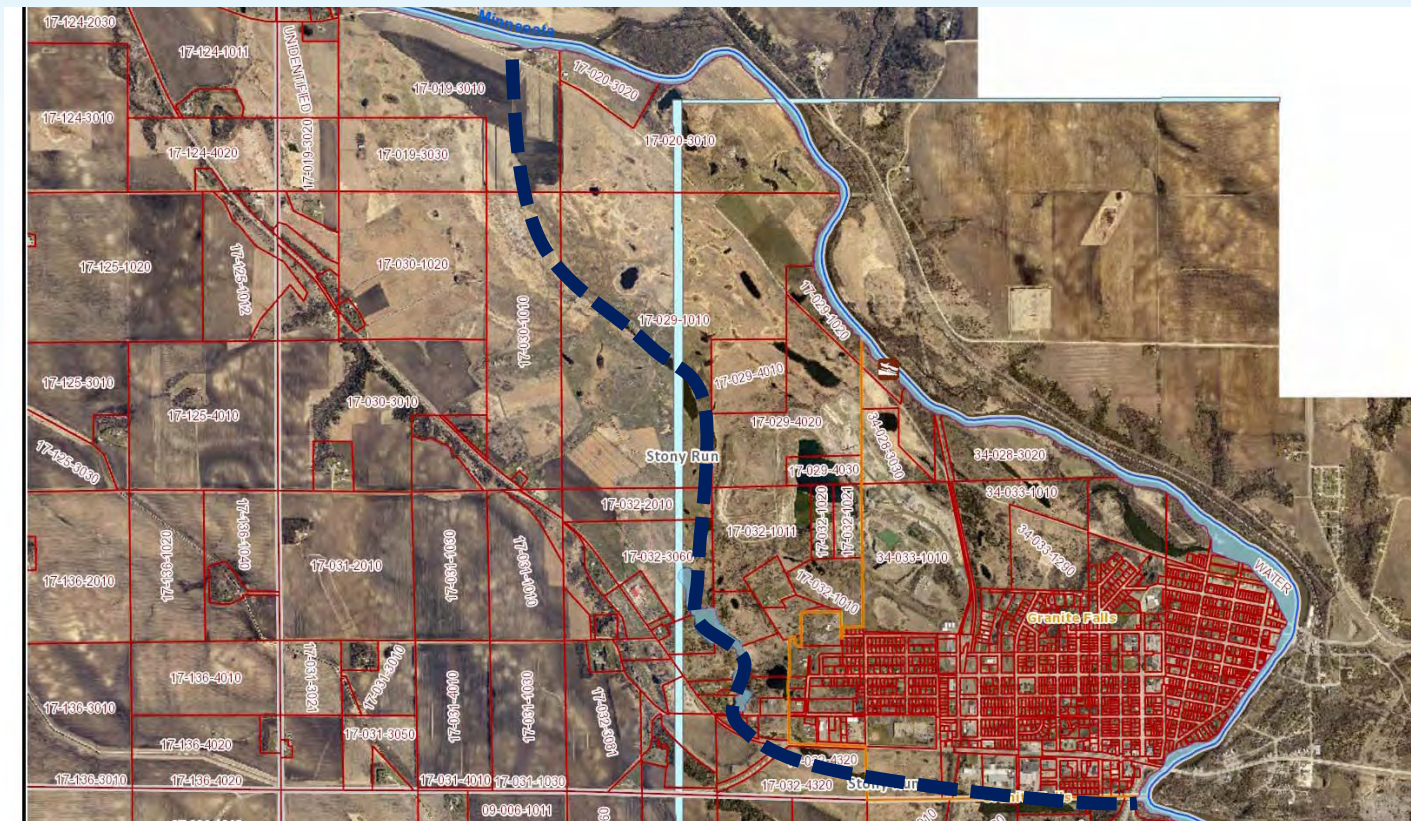


1B Off-River Channel



2 Overflow Channel

- Existing overflow enlarged and deepened for fish passage
- Requires land acquisition
- Requires engineered breach of levee at Dyke Road



2 Overflow Channel

- 5-mile-long quiet water paddle
- Family canoeing on small, intimate river
- Cost and hydraulics are challenging



2 Overflow Channel

Project Precedent: Alton Baker Park, Eugene, Oregon

- 2.5 mile canoeing river reclaimed from a historic high water channel
- 70 cfs water right to divert flow around the main river
- Extensive parkland and running trails
- Underutilized due to poorly designed drop structures



3 River trip to Minnesota Falls

- 1+- mile Class II trip to Memorial Park
- 3+ mile Class II+ trip to Excel property at Minnesota Falls (pending acquisition and improved take-out)
- 9 mile Class II+ trip to DNR boat ramp at Pete's Point Rd
- Improved put-in and portage at Granite Falls
- Great Class III surf wave possible



4 In-River Whitewater Feature

- Redesign weir at Route 218 bridge for surfing wave and boat/fish passage
- Utilizes normal discharge from dam operations

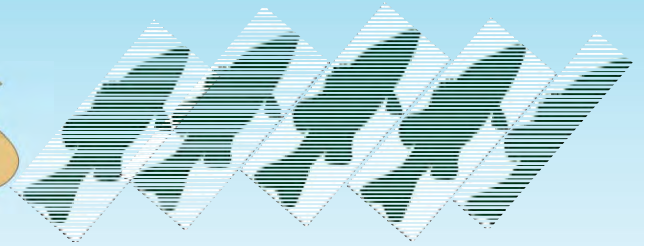


Inclusiveness

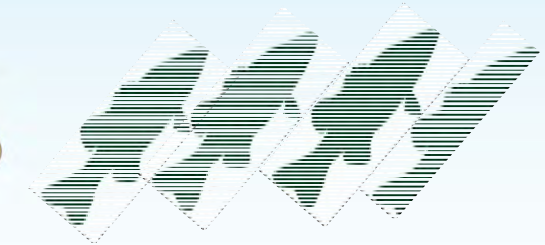
Cost

Environmental

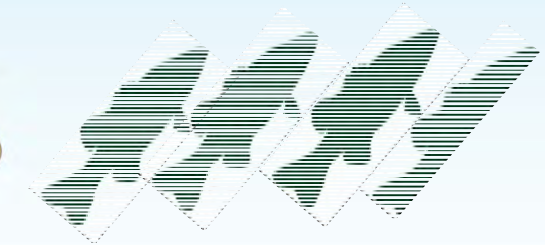
1A



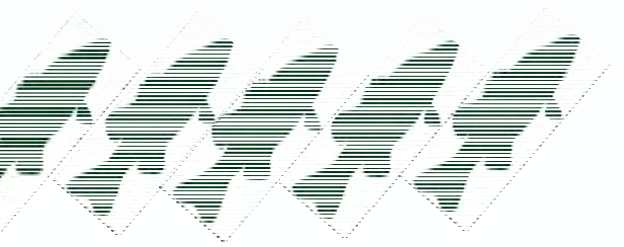
1B



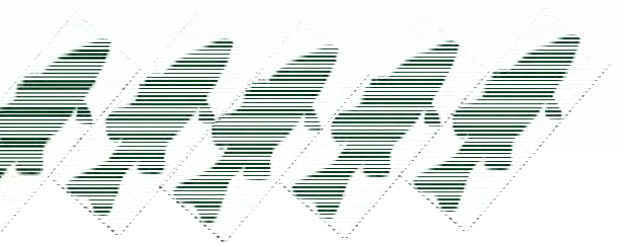
2



3



4



An Inclusive Project

- Multipurpose whitewater bypass
- Rafts and inflatables at low flow
- Experienced kayakers and surfers at high flow
- Fish passage



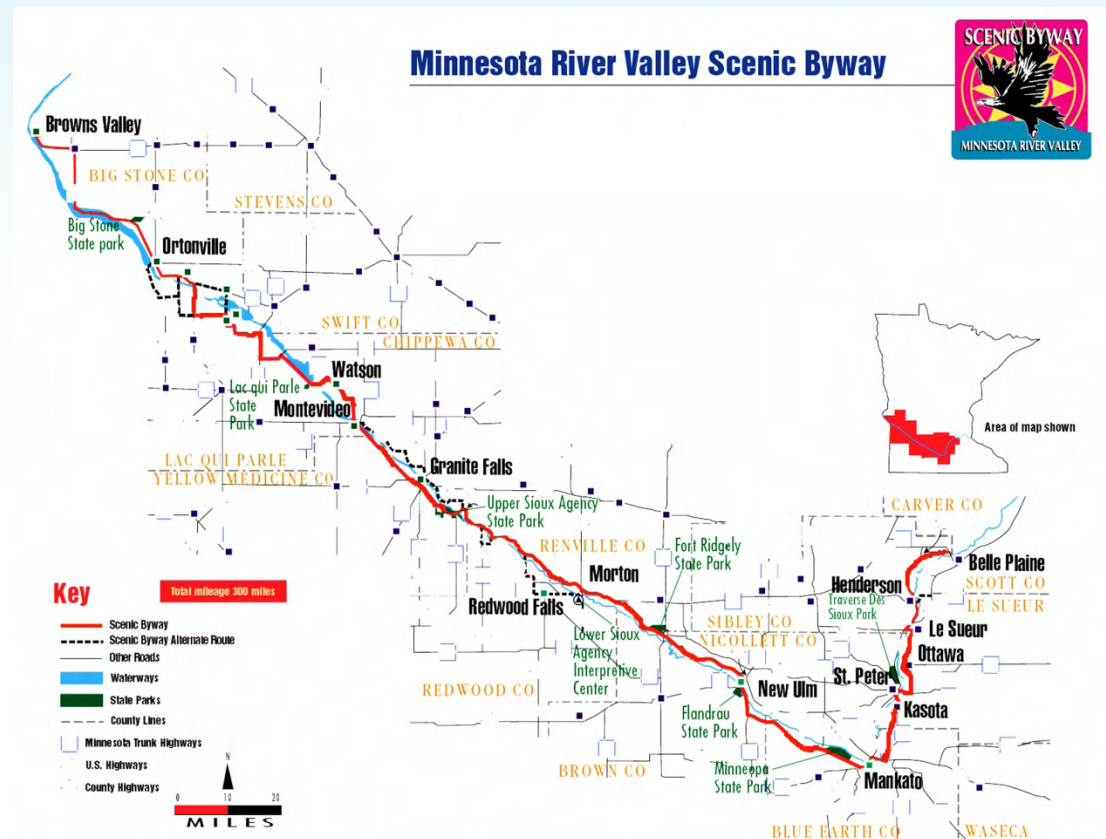
An Inclusive Project

- Canoe livery at the dam
- Quiet water canoeing on dam impoundment
- Three-mile long river trip with defined take-out and shuttle service. Longer trips also available.



Granite Falls as a Focus for the Minnesota River Recreation Corridor

- Outfitter support
- Lodging and camping
- Restaurants groceries and supplies
- **Whitewater!**





Questions!