

# **Inspection Report**

**River Falls Hydroelectric Project  
FERC Project No. P-10489**

**Powell Falls Dam  
River Falls, Wisconsin**

**Prepared for:**

**River Falls Municipal Utilities  
River Falls, Wisconsin**

**December 2009**

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FERC Project No. P-10489**

**Powell Falls Dam  
River Falls, Wisconsin**



Engineers/Architects/Scientists/Surveyors

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Ayres Associates Project No. 26-0570.00  
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## Contents

	<u>Page No.</u>
1.0 Project Description.....	1
1.1 Background.....	1
1.2 Powerhouse.....	1
1.3 Wasteway.....	1
1.4 Spillway.....	1
1.5 Right Abutment.....	2
2.0 Field Inspection.....	3
2.1 General.....	3
2.2 Powerhouse.....	3
2.3 Wasteway.....	3
2.4 Spillway.....	3
2.5 Right Abutment.....	3
3.0 Recommendations.....	4
3.1 Powerhouse.....	4
3.2 Wasteway.....	4
3.3 Spillway.....	4
3.4 Right Abutment.....	4

## List of Figures

Figure 1 Location Map  
Figure 2 Location Map

## List of Appendices

Appendix A FERC Letter  
Appendix B Drawings  
    Pages 1 to 2  
Appendix C Inspection Photographs  
    Pages 1 to 11

## **1.0 Project Description**

### **1.1 Background**

The Powell Falls Dam is located on the Kinnickinnic River within the city limits of River Falls, Wisconsin. The project is located in Section 1, Township 27 North, Range 19 West, Pierce County, Wisconsin. This hydropower project consists of two developments, Junction Falls Dam and Powell Falls Dam. Powell Falls Dam (also known as Lower Dam) is located about one-half mile downstream of the Junction Falls Dam. The dam is operated as a run-of-river facility. The dam is owned and operated by the City of River Falls.

From left to right looking downstream, the project consists of a powerhouse, a wasteway with a sluice gate operating deck, an uncontrolled ogee crest shaped spillway and a right abutment. The total length of the spillway crest is approximately 108 feet.

Rehabilitation was performed in 1992 consisting of spillway lift joint repair, concrete repair and crack repair.

The purpose of this inspection is to evaluate the concrete condition of the structures as stated in a letter from the Federal Energy Regulatory Commission (FERC) dated July 21, 2009. This letter is included in Appendix A.

A location map is included as Figures 1 and 2. Structure drawings are included in Appendix B. Photographs are included in Appendix C.

### **1.2 Powerhouse**

The powerhouse (Photos 1 to 6, 9 and 12) consists of a concrete structure with one generating unit. The powerhouse appears to be founded on bedrock. The right powerhouse wall separates the powerhouse from the wasteway. A training wall is located at the downstream right end (Photo 5). A concrete operating deck is located upstream for manual sluice gate operation (Photos 3 and 7). This deck is shared with the wasteway. Access from the powerhouse to the concrete operating deck is via a wood plank walkway (Photo 2).

### **1.3 Wasteway**

The concrete wasteway (Photos 5, 8, and 10) is located between the powerhouse and spillway left abutment and is gated with a steel sluice gate. It appears the concrete structure was built integral with the powerhouse and abutment. The wasteway appears to be founded on bedrock. The sluice gate operator is located on the above operating deck (Photos 3, 7 and 11).

### **1.4 Spillway**

The spillway (Photos 12 to 17) consists of an uncontrolled ogee-shaped concrete gravity structure. The spillway appears to be founded on bedrock. The spillway is bookended by concrete abutments. The left abutment is shared with the wasteway.

## **1.5 Right Abutment**

The right concrete abutment is located to the right of the spillway and is constructed into the bedrock face (Photos 12, 14, and 17 to 20). The right abutment appears to be founded on bedrock.

## **2.0 Field Inspection**

### **2.1 General**

The field inspection was conducted on December 1, 2009 by Todd Rudolph, PE and Ray Fandel of Ayres Associates. Mark Freeborn from the City of River Falls assisted in the inspection. An underwater inspection was not performed. The weather during the inspection was sunny with a temperature of 40 degrees Fahrenheit. Photographs from the field inspection are included in Appendix C.

### **2.2 Powerhouse**

The powerhouse superstructure is generally in good condition. The concrete substructure is in fair condition with cracking, deterioration and efflorescence (Photos 2 and 5). The concrete sluice gate operating deck is in fair condition with cracking and deterioration (Photo 7). The previous left wall crack repairs are in good condition (Photo 9).

The downstream training wall is in fair condition with minor cracking, deterioration and efflorescence. The end of the wall opposite the powerhouse is undermined (Photo 5).

The downstream stoplog slots are deteriorated at the waterline (Photo 6). The massive concrete access walk is deteriorated (Photos 5 and 6).

There is vegetation growth around the powerhouse (Photos 3, 5, and 8).

### **2.3 Wasteway**

The wasteway is in fair condition with cracking, deterioration and efflorescence (Photos 5, 8, and 10).

The concrete sluice gate operating deck is in fair condition with cracking, deterioration and efflorescence (Photos 7 and 11).

Minor gate leakage was observed (Photo 10).

### **2.4 Spillway**

The spillway is in good condition, however, the algae growth limited the inspection. There were no visible signs of structure undermining. The horizontal lift joints were visible (Photos 14 and 15) and there was minor deterioration and spalling. Minor flow was observed from the weep holes.

There was minor deterioration and spalling at the vertical joints (Photo 16).

### **2.5 Right Abutment**

The right abutment is in fair condition with cracking, deterioration and efflorescence (Photo 18). There is vegetation growth in the cracks and spalls. There is seepage through the cracks, spalls and at the wall/ bedrock interface (Photos 19 and 20). Water is also seeping through the rock joints.

## **3.0 Recommendations**

### **3.1 Powerhouse**

No visual observations from the inspection indicate that there is a threat to dam safety.

The downstream training wall undermining should be repaired within three years to prevent concrete damage.

The brush and trees growing around the powerhouse should be removed within one year to facilitate inspection and to eliminate potential seepage paths and concrete damage due to the root systems.

### **3.2 Wasteway**

No visual observations from the inspection indicate that there is a threat to dam safety.

### **3.3 Spillway**

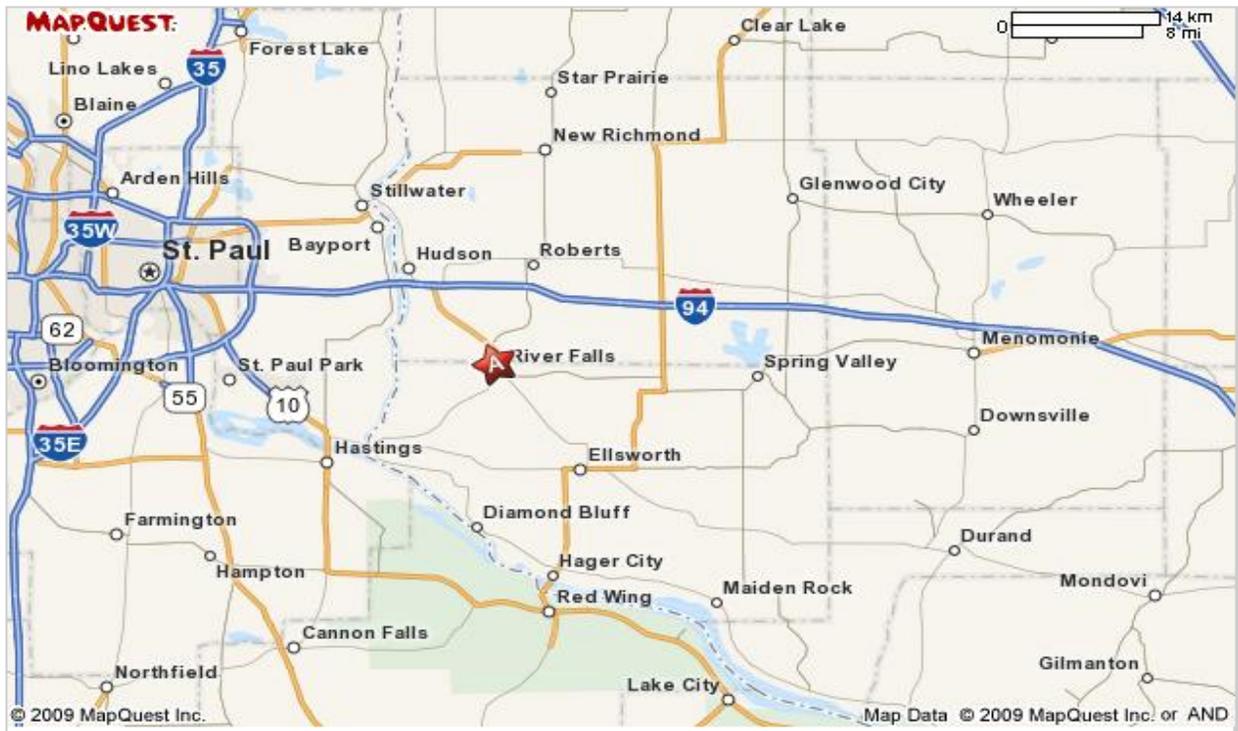
No visual observations from the inspection indicate that there is a threat to dam safety.

### **3.4 Right Abutment**

No visual observations from the inspection indicate that there is a threat to dam safety.

The vegetation around the abutment should be removed within one year to facilitate inspection and to eliminate potential seepage paths and concrete damage due to the root systems.

When vegetation removal has been completed, an inspection (with photographic record) of the right abutment downstream face should be performed at least two times per year. The inspections should be performed at least three months apart during non-freezing months and the water should not be flowing over the spillway. The purpose is to observe and document the concrete condition and seepage locations to aid a future structural assessment.



 = SITE

Pierce County, WI  
River Falls, WI

MapQuest  
www.mapquest.com

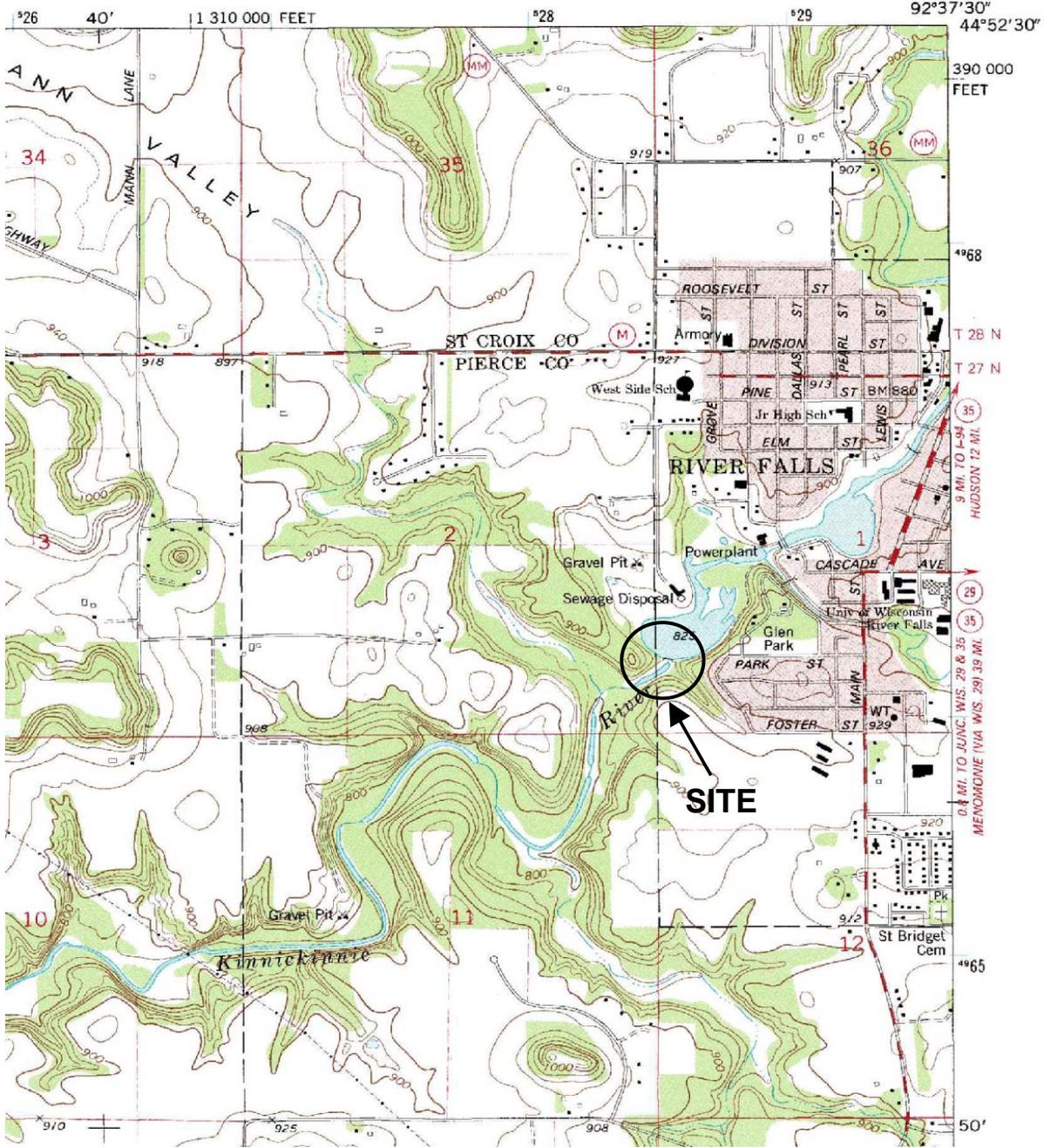
December 2009

**Location Map**

**Figure 1**

RIVER FALLS WEST QUADRANGLE  
WISCONSIN  
7.5 MINUTE SERIES (TOPOGRAPHIC)  
SW/4 RIVER FALLS 15' QUADRANGLE.

2473 1/4 INE  
(ROBERTS)



**Powell Falls Dam**  
**Pierce County, WI**  
**River Falls, WI**

**USGS 7.5' Quadrangle: River Falls West, WI**  
**Section 1, T27N, R19W**

December 2009

**Location Map**

**Figure 2**

**Appendix A**  
**FERC Letter**

Rec'd 7-24-09

**FEDERAL ENERGY REGULATORY COMMISSION****Office of Energy Projects**

Division of Dam Safety and Inspections - Chicago Regional Office

230 South Dearborn Street, Suite 3130

Chicago, Illinois 60604

(312) 596-4430 Office - (312) 596-4460 Facsimile

In reply refer to P-10489

NATDAM No. WI00021&amp;

WI00079

July 21, 2009

Mr. Mark Freeborn  
Electric Generation Superintendent  
City of River Falls  
River Falls, Wisconsin 54022

Re: 2009 FERC Special Inspection for River Falls Hydroelectric Project

Dear Mr. Freeborn:

On July 7, 2009, Mr. Teodor Strat, P.E., conducted a special inspection of your River Falls Hydroelectric Project P-10489. The area of the project that was given special attention was the area to the right abutment of your Powell Falls Dam which was inaccessible during last year's inspection. In addition, Mr. Strat assessed the effectiveness of your vegetation control program.

Based on this inspection we concluded that the vegetation control at your project needs to be improved. Please ensure that your project structures are kept free of large vegetation throughout the year. We will assess this condition during our next dam safety inspection. We understand that the condition of the concrete at your project will be evaluated by a professional by the end of the 2009 inspection season. This is acceptable. The report and the consultant's recommendations, if any, should be submitted to this office by **January 30, 2010**.

We note the foundation rock for the gas turbine powerhouse adjacent to the hydro powerhouse appears to be experiencing severe weathering. This condition is not related to dam safety at this time; however, you should consider implementing procedures to prevent its future deterioration. Please include your response to this concern in your January 30, 2010 submittal.

If you have any questions, please call Mr. Strat at (312) 596-4450 or me at (312) 596-4430.

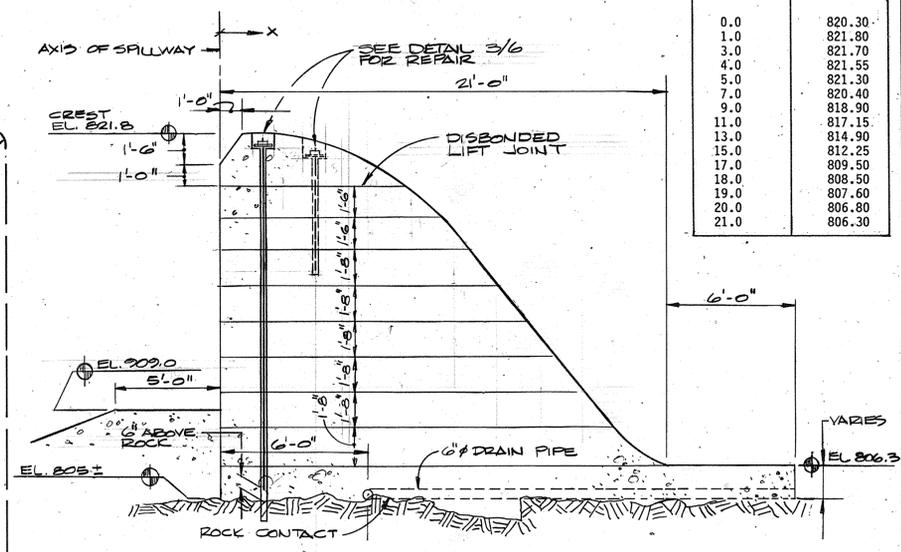
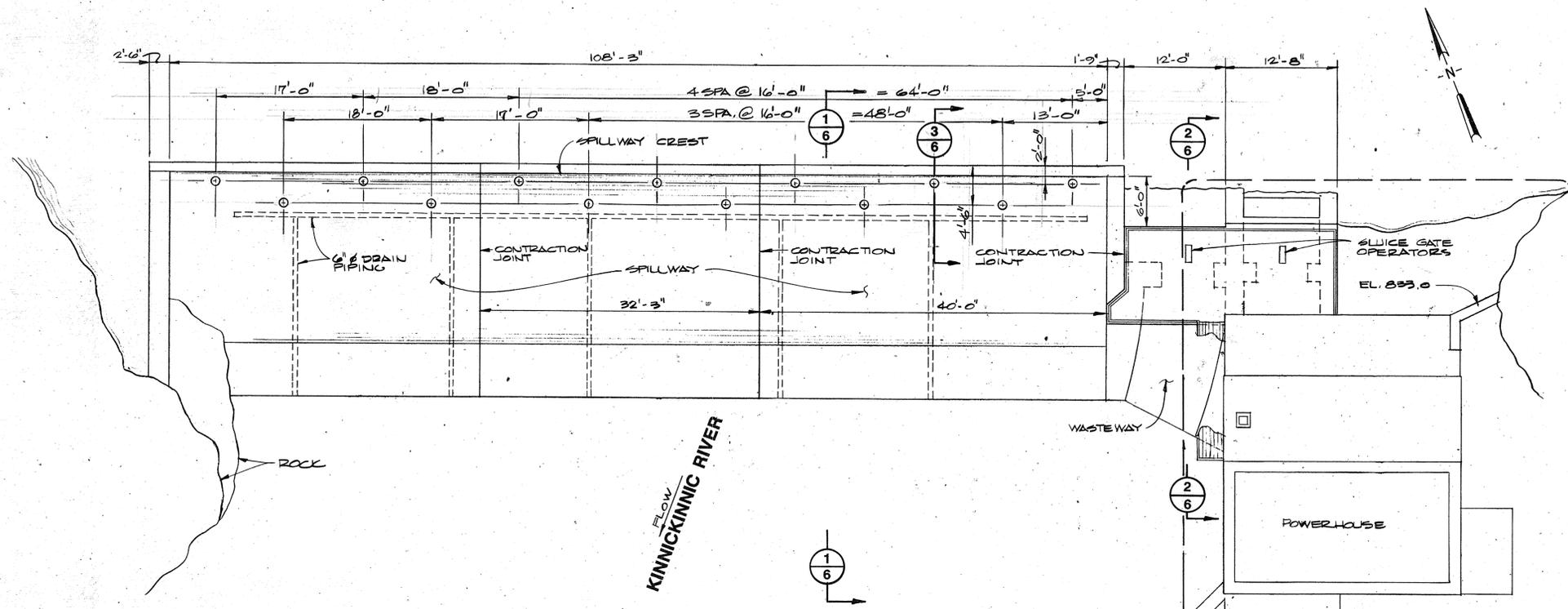
Sincerely,

*fw*   
Peggy A. Harding, P.E.  
Regional Engineer

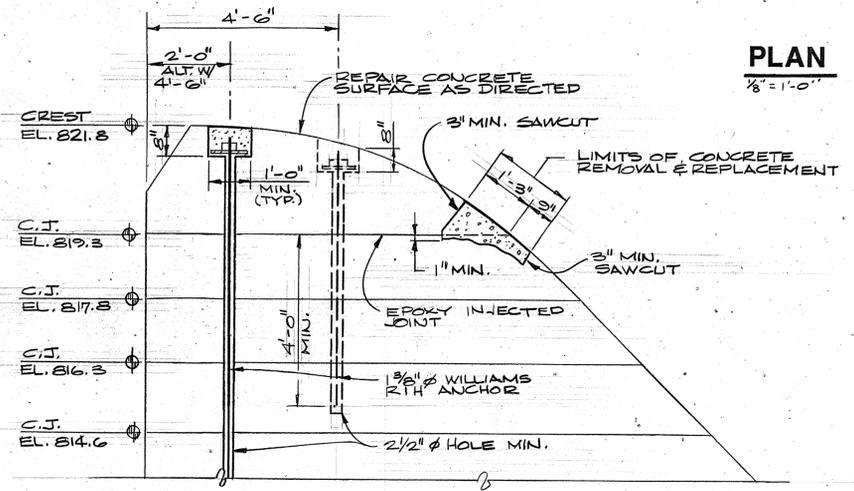
# **Appendix B**

## **Drawings**

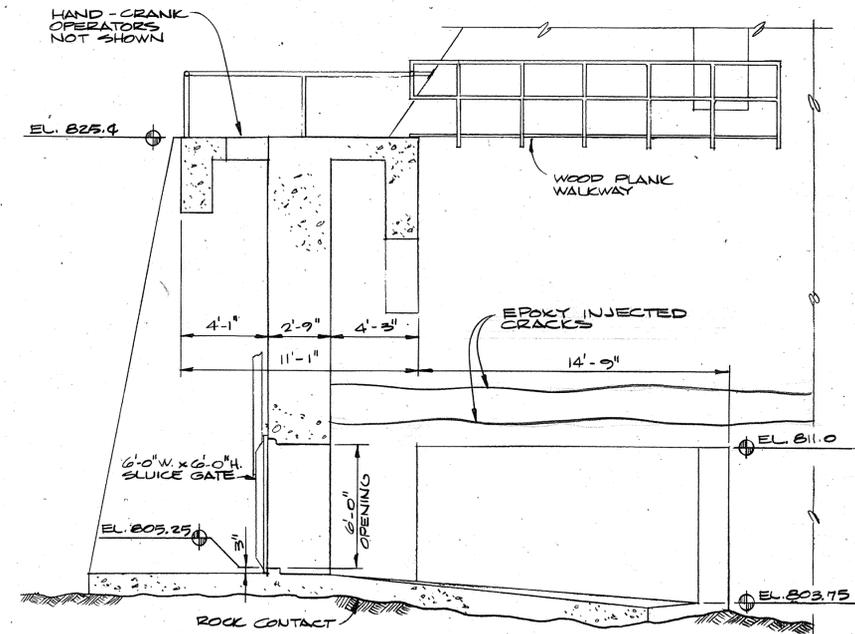
SPILLWAY	
CREST (FT)	PROFILE EL (FT)
0.0	820.30
1.0	821.80
3.0	821.70
4.0	821.55
5.0	821.30
7.0	820.40
9.0	818.90
11.0	817.15
13.0	814.90
15.0	812.25
17.0	809.50
18.0	808.50
19.0	807.60
20.0	806.80
21.0	806.30



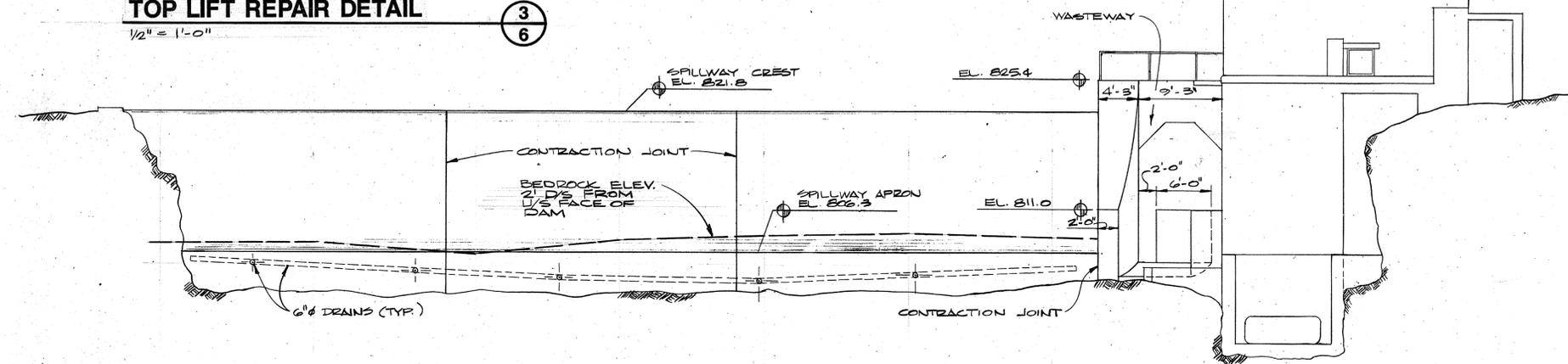
**SECTION 1**  
1/4" = 1'-0"



**TOP LIFT REPAIR DETAIL**  
1/2" = 1'-0"



**WASTEWAY SECTION**  
1/4" = 1'-0"



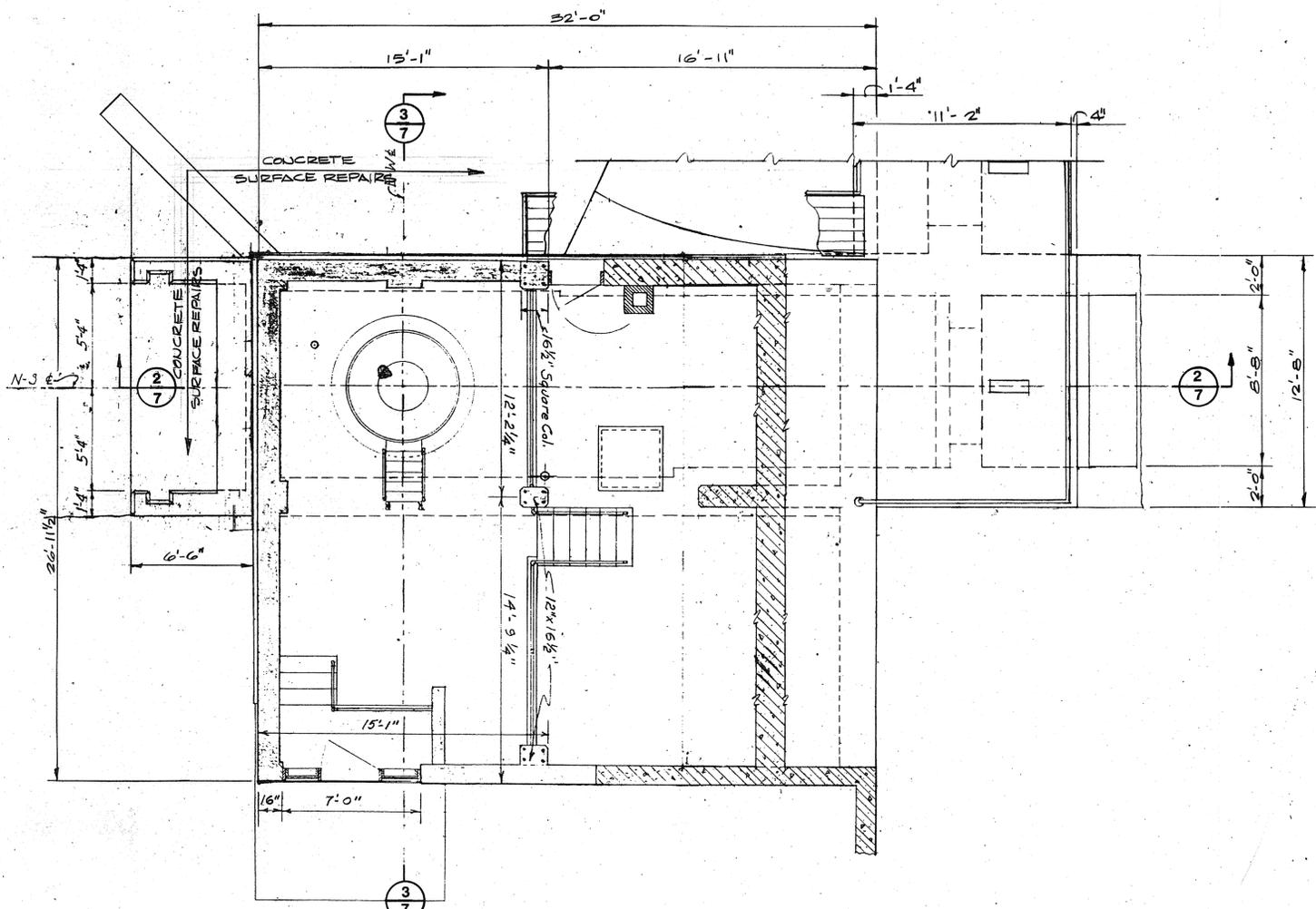
**DOWNSTREAM ELEVATION**  
1/8" = 1'-0"

- NOTES:
- ELEVATIONS REFER TO NATIONAL GEODETIC VERTICAL DATUM, 1929 ADJUSTMENT
  - DRAWING DEVELOPED FROM DRAWINGS "DAM REPLACEMENT" BY CARROL A. GRUBB DATED 9-10-65, & "LOWER HYDROELECTRIC PLANT IMPROVEMENTS" BY HERMAN T. HAGESTAD, DATED FEBRUARY & MARCH 1947 AND FIELD SURVEY ON MARCH 23, 1988 BY AYRES ASSOCIATES

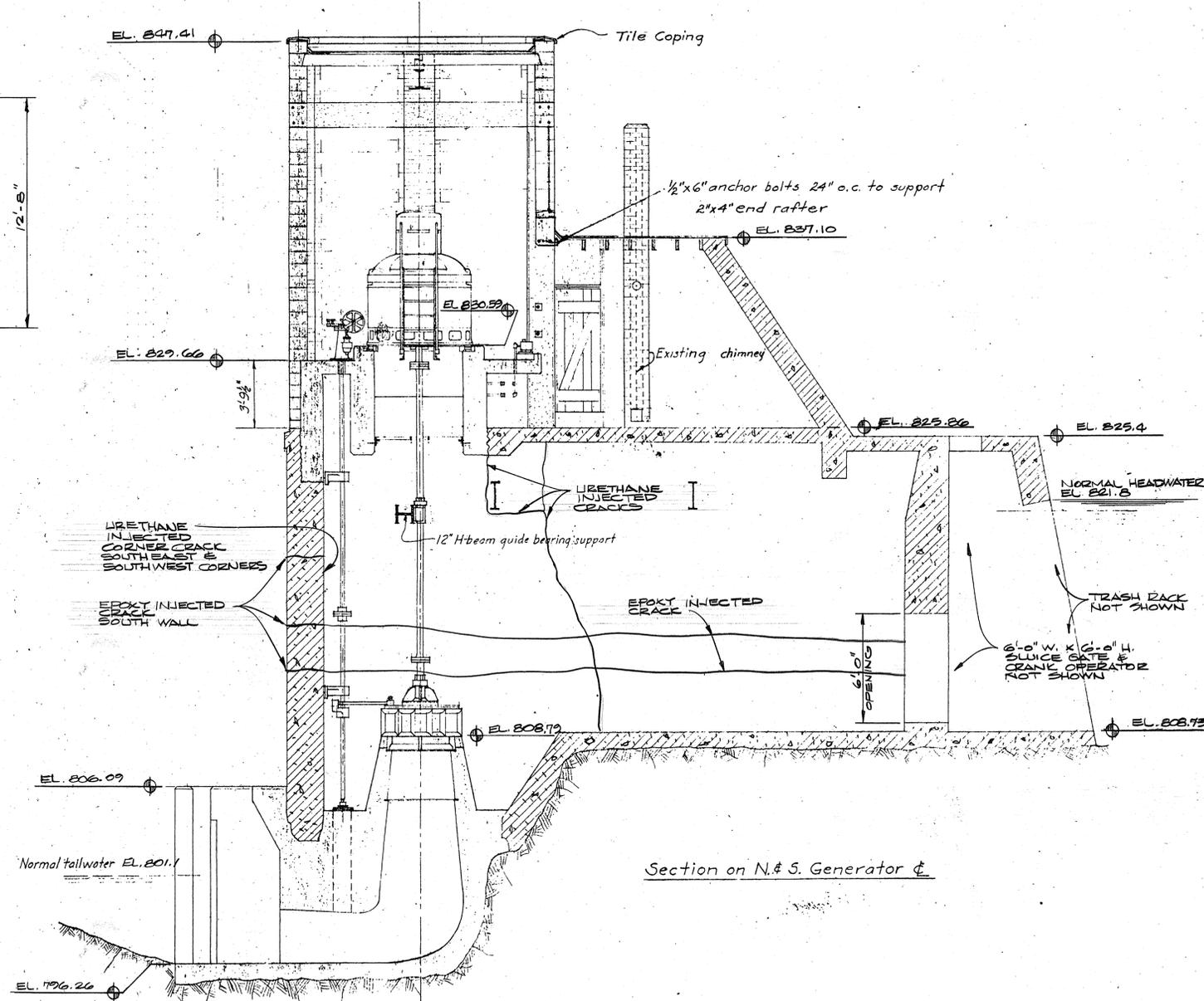
RECORD DRAWING REVISED BY  
OCTOBER 30, 1992 CHECKED BY

EXHIBIT F-6 SHEET 6 OF 7  
**RIVER FALLS MUNICIPAL HYDROELECTRIC FACILITIES**  
 CITY OF RIVER FALLS, WISCONSIN  
**POWELL FALLS DAM**  
 PLAN, ELEVATION & SECTIONS  
 SCALE: 1/4" = 1'-0"

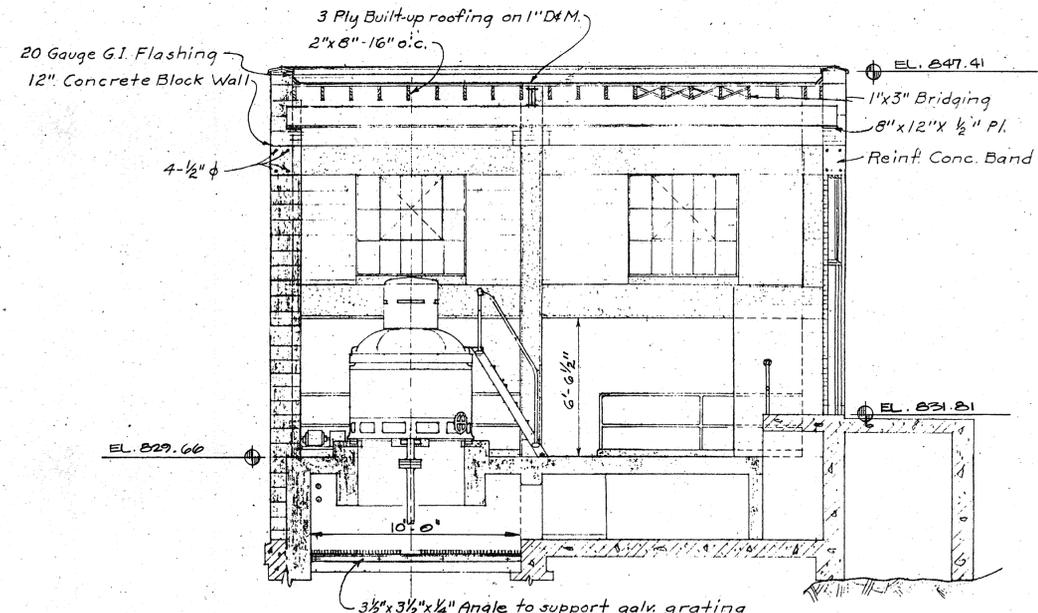
This drawing is a part of the application for license made by the undersigned  
 this 16 day of April, 1988.  
 By: *Jerry E. Wilkens*  
 Jerry E. Wilkens, Mayor  
 City of River Falls, Wisconsin



**POWERHOUSE PLAN** ①  
1/4" = 1'-0"



**SECTION** ②  
1/4" = 1'-0"



**SECTION** ③  
1/4" = 1'-0"

**NOTES:**

1. ELEVATIONS REFER TO NATIONAL GEODETIC VERTICAL DATUM, 1929 ADJUSTMENT
2. DRAWING DEVELOPED FROM DRAWINGS "DAM REPLACEMENT" BY CAROL A. GRUBB DATED 9-10-65, & "LOWER HYDROELECTRIC PLANT IMPROVEMENTS" BY HERMAN T. HAGESTAD, DATED FEBRUARY & MARCH 1947 AND FIELD SURVEY ON MARCH 23, 1988 BY AYRES ASSOCIATES

This drawing is a part of the application for license made by the undersigned this 12 day of April, 1988.  
By: *Jerry E. Wilkens*  
Jerry E. Wilkens, Mayor  
City of River Falls, Wisconsin

RECORD DRAWING OCTOBER 30, 1992 REVISED BY *RJA* CHECKED BY *thee*

EXHIBIT F-7 SHEET 7 OF 7

**RIVER FALLS MUNICIPAL HYDROELECTRIC FACILITIES,**  
CITY OF RIVER FALLS, WISCONSIN  
**POWELL FALLS DAM**  
**POWERHOUSE PLAN & SECTIONS**

4' 0 4' 8'  
SCALE: 1/4" = 1'-0"

**Appendix C**  
**Inspection Photographs**



1. Upstream view of powerhouse



2. Left powerhouse wall and left spillway abutment

3 (left). Powerhouse upstream face, gate operator deck and spillway (background)



4 (below). Upstream face of powerhouse





5. Downstream face of powerhouse and wasteway



6. Typical slot downstream of powerhouse



7. Operating deck for gates



8. Downstream view of wasteway



9. Left powerhouse wall (note previous crack repairs)



10. Closed sluice gate



11. Underneath operator's deck



12. Powerhouse (foreground), spillway and right abutment



13. Downstream view of spillway and abutments



14. Downstream view of spillway and right abutment



15. Typical spillway downstream joints



16. Typical vertical joint in downstream of spillway



17. Downstream face of spillway and right abutment



18. Right abutment



19. Right abutment (note seepage through rock)



20. Right abutment (note seepage through rock)