

RECLAMATION

Managing Water in the West

TR-2016-02

Travel to Grand Coulee Third Powerplant

Travel to Grand Coulee Third Powerplant for strain gauge tests on unit G21 stator spring system

Date(s) of Travel: June 5 – 10, 2016



**U.S. Department of the Interior
Bureau of Reclamation
Technical Service Center
Hydraulic Investigations and Laboratory Services Group
Denver, Colorado**

BUREAU OF RECLAMATION
Technical Service Center
Denver, Colorado

TRAVEL REPORT

Code: 86-68560

Date: July 1, 2016

To: Manager, Hydraulic Investigations and Laboratory Services Group
From: Josh Mortensen, Hydraulic Engineer

Subject: Travel to Grand Coulee Third Powerplant for strain gauge tests on unit G21 stator spring system

1. Travel period: 5 – 10 June 2016
2. Places or offices visited: Grand Coulee Dam and Third Powerplant
3. Purpose of trip: Install strain gauges and obtain measurements on the spring and tensioning system for the unit G21 stator. Test data will be provided to engineers from the subcontractor ElectroMechanical Engineering Associates (EME) for analysis.

The spring and tensioning system for the G21 stator includes 15 large steel columns, known as webs which are placed evenly around the outside diameter of the stator. Each web contains 64 tensioning rods and springs that work in a system to properly secure the stator during operation (Figure 1). Strain gauges were installed on 4 different tensioning rods (Figure 2) from each web. Webs 2, 5, 8, 11, and 14 also contained strain gauges on the left and right sides of one outer spring and adjacent tensioning rod (Figure 3). A total of 70 strain gauges were installed. All gauges were installed in a quarter-bridge configuration and were aligned to measure strain in the axial direction. Gauges were purchased from Omega Engineering Inc and contained 3-wires, 3-mm grid size, and 350 ohm resistance.

Testing included manually loosening the block bolts behind the tensioning rod and then re-tightening the bolts to the recommended torque. Before each test the strain gauges were zeroed in the existing condition under tension. Strain data were then acquired as the tensioning rod went from tension, to zero strain, and then back to tension (the cycle appears as zero strain, followed by compression and then a return near zero strain, see Figure 3). All test data were collected with a Micro Measurements D4 conditioner data acquisition unit at a rate of 8 samples/second.

4. Synopsis of trip: The Hydraulic Investigation's group from Reclamation's Technical Service Center (TSC) was asked to perform strain measurements on the spring and tensioning system for the unit G21 stator which is located in the Grand Coulee Third Powerplant. Josh Mortensen and Kit Shupe (86-68560) traveled to Spokane, WA Sunday June 5th and arrived at Grand Coulee the morning of Monday June 6th. Monday and Tuesday were spent ensuring all safety training and preparation tasks were in order and walking the G21 clearance.

Strain gauge installation began Tuesday afternoon with the help of Mike Rauh from TSC's Mechanical Equipment group (86-68410) and continued through Wednesday. The first test was performed late Wednesday afternoon and testing was completed late Thursday afternoon. On Friday Josh and Kit shipped equipment back to Denver and drove to Spokane, WA for return flight home. Mike Rauh stayed at Grand Coulee for other duties.

5. Conclusions: Strain measurements were acquired at 70 locations for the spring and tensioning system on the stator of the G21 generator in Grand Coulee's Third Powerplant. Data will be sent to the subcontractor EME for compilation and analysis.

6. Action correspondence initiated or required: N/A

7. Client feedback received: N/A

cc:

Coy Webb (GCP-1102)
Tom Cunningham (tcunningham@emeassociates.com)
Ben Wagner (bwagner@emeassociates.com)
Mike Rauh (86-68410)
Kit Shupe (86-68560)
Eric Eastment (86-68450)

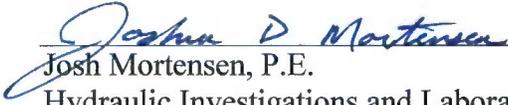
SIGNATURES AND SURNAMES FOR:

Travel to: Grand Coulee Dam and Third Powerplant, Grand Coulee, WA

Dates of Travel: 5 – 10 June 2016

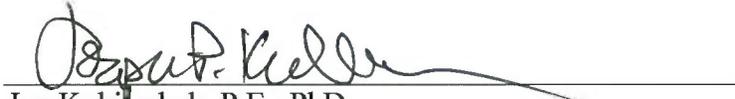
Names and Codes of Travelers: Josh Mortensen & Kit Shupe, 86-8560

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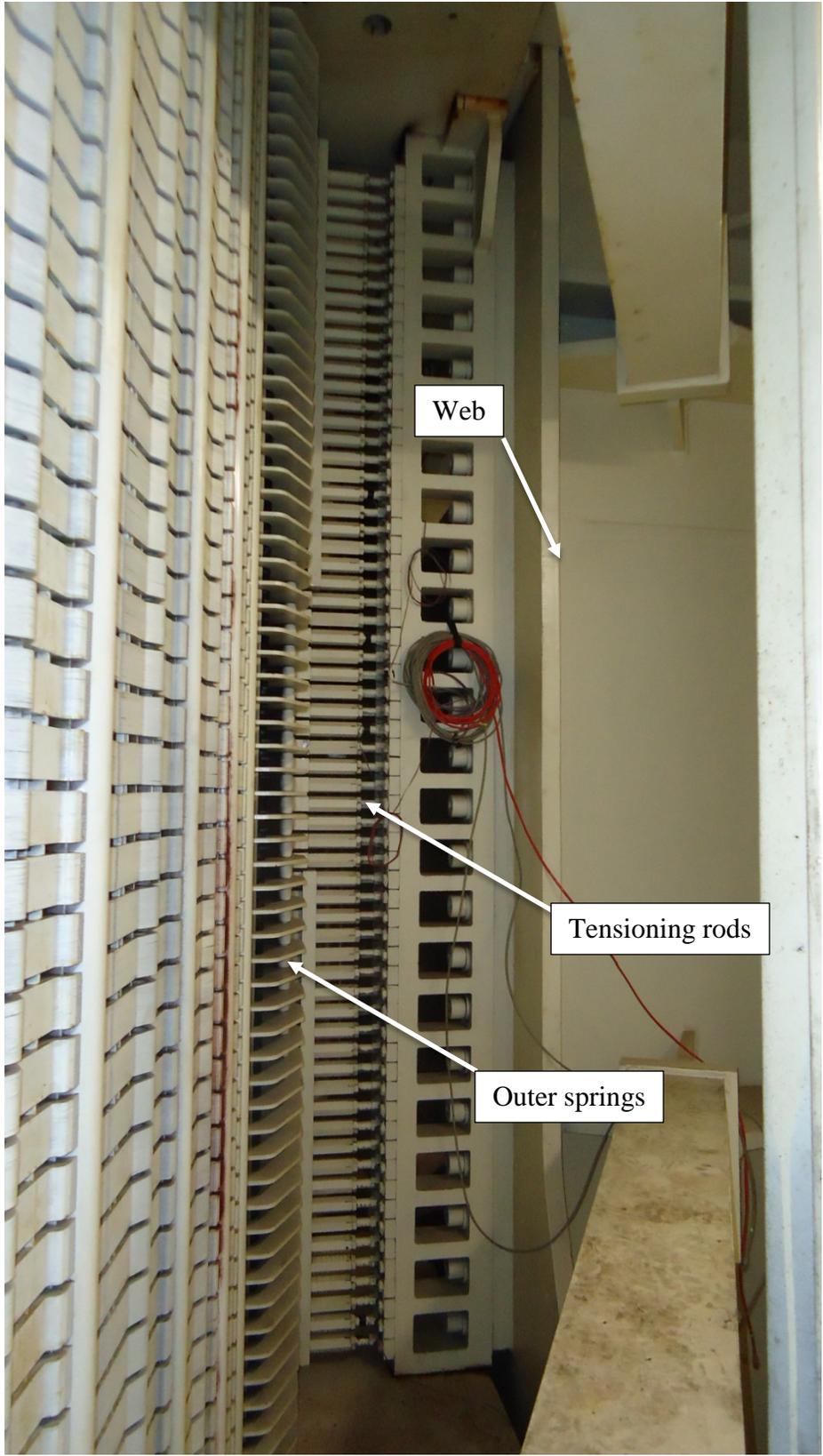


Figure 1 Overview photo of G21 stator tensioning & spring system

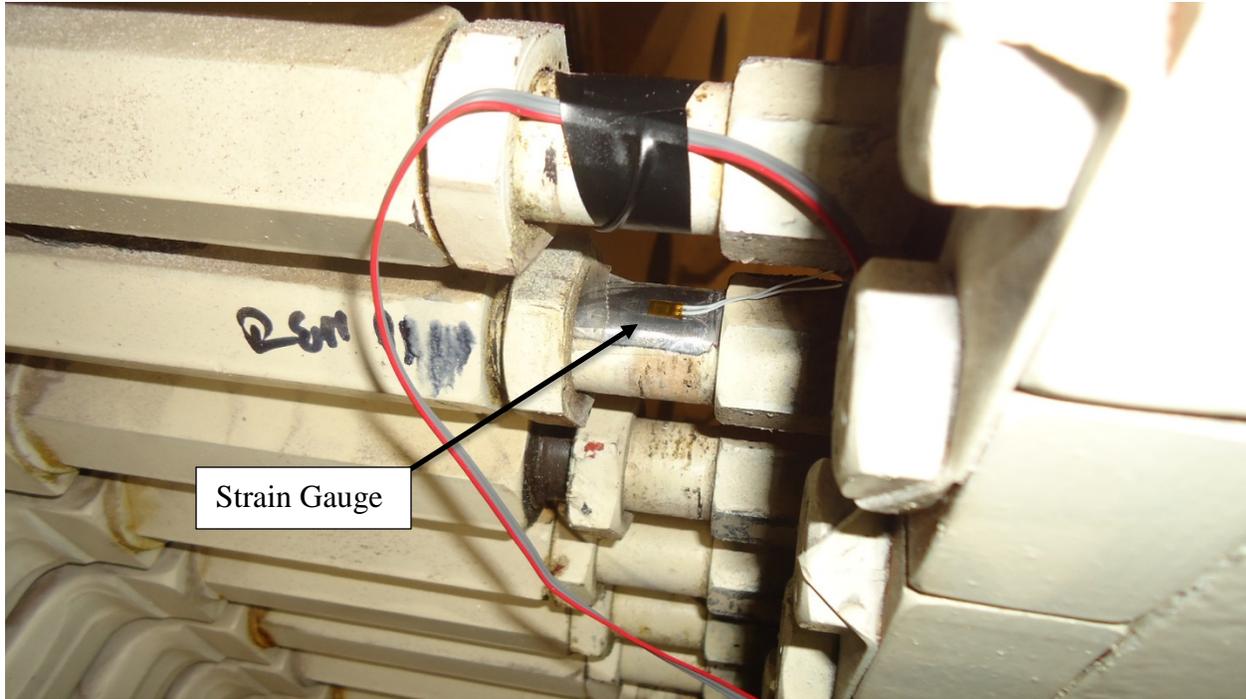


Figure 2. Axially-oriented strain gauge installed on tensioning rod.

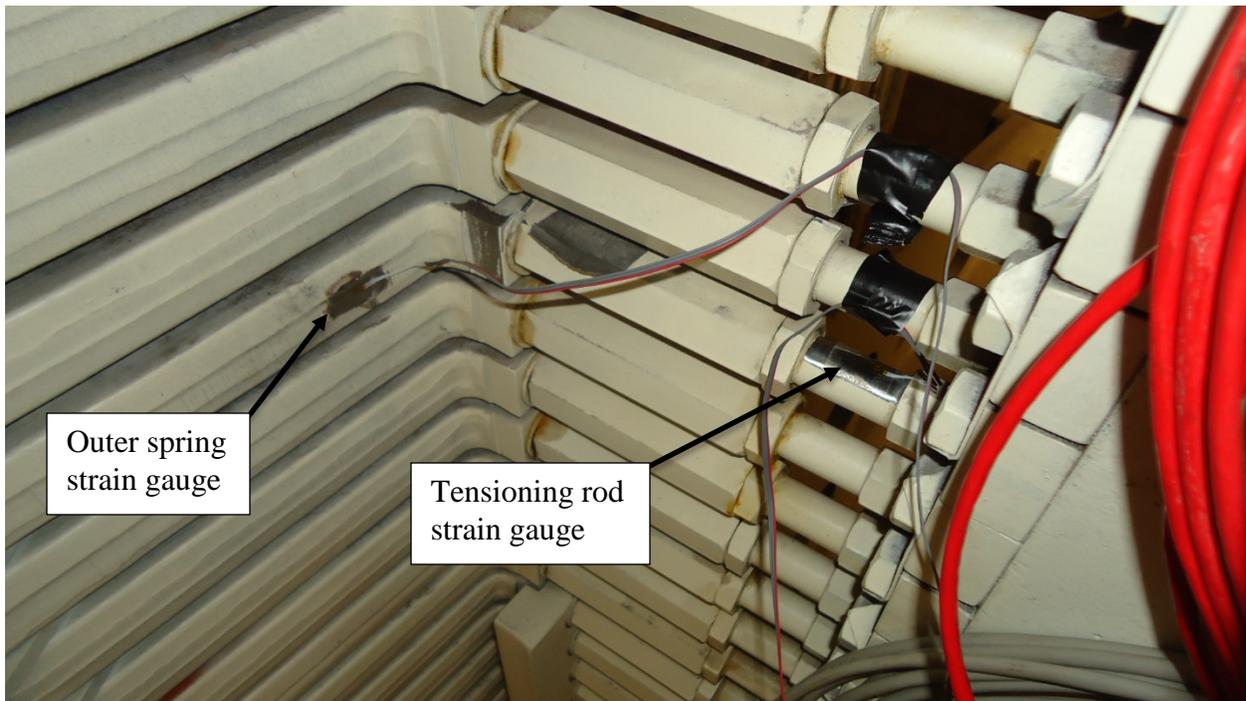


Figure 3. Strain gauges installed on the left side of an outer spring (gauge also installed on right side but not visible in the photo) and tensioning rod.

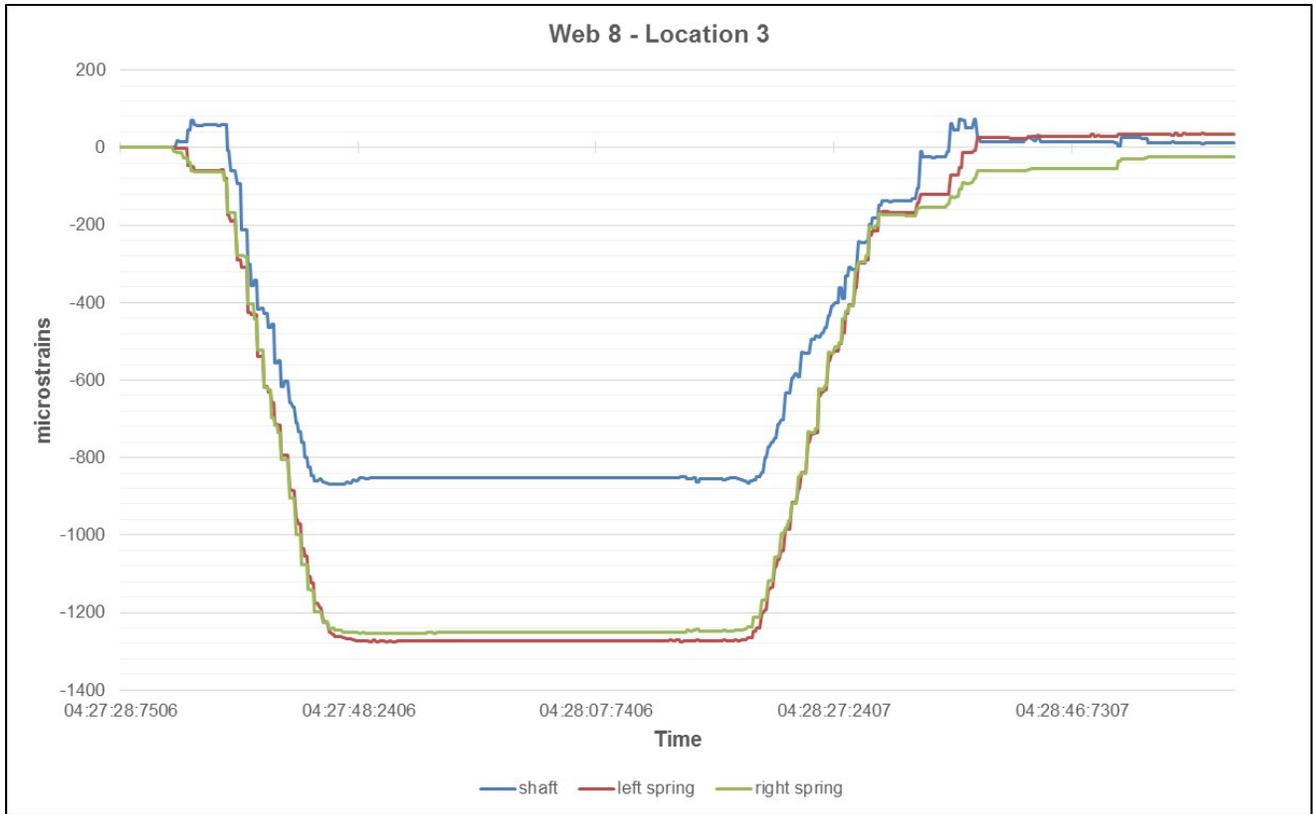


Figure 4. Example of test data for location 3 of web 8 which included two gauges on the outer spring and one on the tensioning rod.