

## **RED BRIDGE WATER REUSE PROJECT**

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### **ABSTRACT**

The Strawberry High Line Canal Company (SHLCC) recently completed the Red Bridge Water Reuse Project. The project developed approximately 10 cfs of an underutilized water supply in Spring Creek, near Payson, Utah. The water is primarily return flow from the United States Bureau of Reclamation's (USBR) Strawberry Valley Project lands. The return flows, which SHLCC has rights to, had not been fully utilized before the project. The majority of the return flows were being released into Utah Lake.

The project constructed a new diversion structure on Spring Creek to replace the existing one. A new pump station, pipeline, and pond were constructed in conjunction with the new diversion. The pumped water is delivered to Laterals 20 and 20S of SHLCC's system. The lands serviced by Laterals 20 and 20S had previously limited water supply, but are now able to receive a full supply. By supplying water to these Laterals, water higher in the system can now be provided to municipal users for their secondary water systems and irrigators within the service area.

The Red Bridge Water Reuse Project better manages SHLCC's water. There is 1,800 ac-ft of increased supply, which became 1,800 ac-ft of indirect water conservation. This is reuse water that is being marketed to existing SHLCC stockholders. The increase in water supply is approximately three percent of the total SHLCC water supply. Water is now available to shareholders elsewhere within the system or left in storage within the Strawberry Reservoir for future use.

### **INTRODUCTION**

The main goal of the Red Bridge Water Reuse Project was to fully utilize SHLCC's water right within Spring Creek. The water right had been put to beneficial use for flood irrigation but was not being fully utilized. Not all of the water supply could be used under current conditions and was flowing into Utah Lake. SHLCC saw the potential to supplement shareholders located on Lateral 20 and 20S with additional water, as well as replacing some of their existing water supply. By replacing the existing water supply, this allowed water to be used higher in the system or held in Strawberry Reservoir for future use. The project achieved this specified goal.

SHLCC needed the ability to pump water from Spring Creek to the newly piped Lateral 20S where it could be distributed to shareholders there as well as Lateral 20. This project

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provided SHLCC with a way to put to use all of their water rights, including their high flow water right.

The water right for this project is Utah Water Right #51-2577 which has a priority date of 08/25/1921 and an amount of 9.867 cfs or 2,368.0 ac-ft. The Red Bridge Project has the ability to take full advantage of this right, but currently is only using 1,800 ac-ft in the following manner:

- Irrigation: 600 ac-ft delivered to approximately 4,500 acres.
- M&I: 1,200 ac-ft delivered to secondary connections in the Payson area, which has a current population of about 12,700.

### HISTORY

The Strawberry High Line Canal Company (SHLCC) was formed to deliver the United States Bureau of Reclamation's (USBR) Strawberry Valley Project (SVP) water to landowners in the areas of Payson, Genola, Salem, Spring Lake, and West Mountain, Utah. SHLCC also receives water from the USBR's Bonneville Unit of the Central Utah Project (CUP). It has contracts with the USBR for operation and maintenance of the High Line unit of the SVP. SHLCC water is used primarily for municipal and irrigation purposes (Figure 1).

SHLCC delivers an average annual water supply of 56,300 ac-ft. It has approximately 17 miles of canals, many miles of laterals, and 30 storage ponds. They service 17,500 acres of agricultural land, as well as 22,000 people in southern Utah County. Approximately sixty percent of the system is irrigated by pressurized irrigation and the remaining forty percent by flood irrigation (Figure 2).

### PLANNING

Funding for the Red Bridge Project was supplemented through the USBR's Water 2025 Challenge Grant Program. SHLCC received a grant for \$260,000 from the program. The Challenge Grant Program was established to assist "irrigation and water districts that want to leverage their money and resources in partnership with Reclamation, to make more efficient use of existing water supplies through water conservation, efficiency and water marketing projects."<sup>3</sup>

Eligible projects had to be completed within 24 months of receiving funding and reduce future water conflict. The Red Bridge Water Reuse Project is located in an area identified by the Bureau of Reclamation as a hot spot due to its rapid growth and limited existing water supplies. By utilizing the existing water supply, SHLCC was able to reduce future water conflict through this project.

By receiving the grant from USBR, SHLCC was able to execute the project with a total cost just over \$750,000. SHLCC contributed \$490,000 to the project from their general

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<sup>3</sup> <http://www.usbr.gov/newsroom/newsrelease/detail.cfm?RecordID=2541>

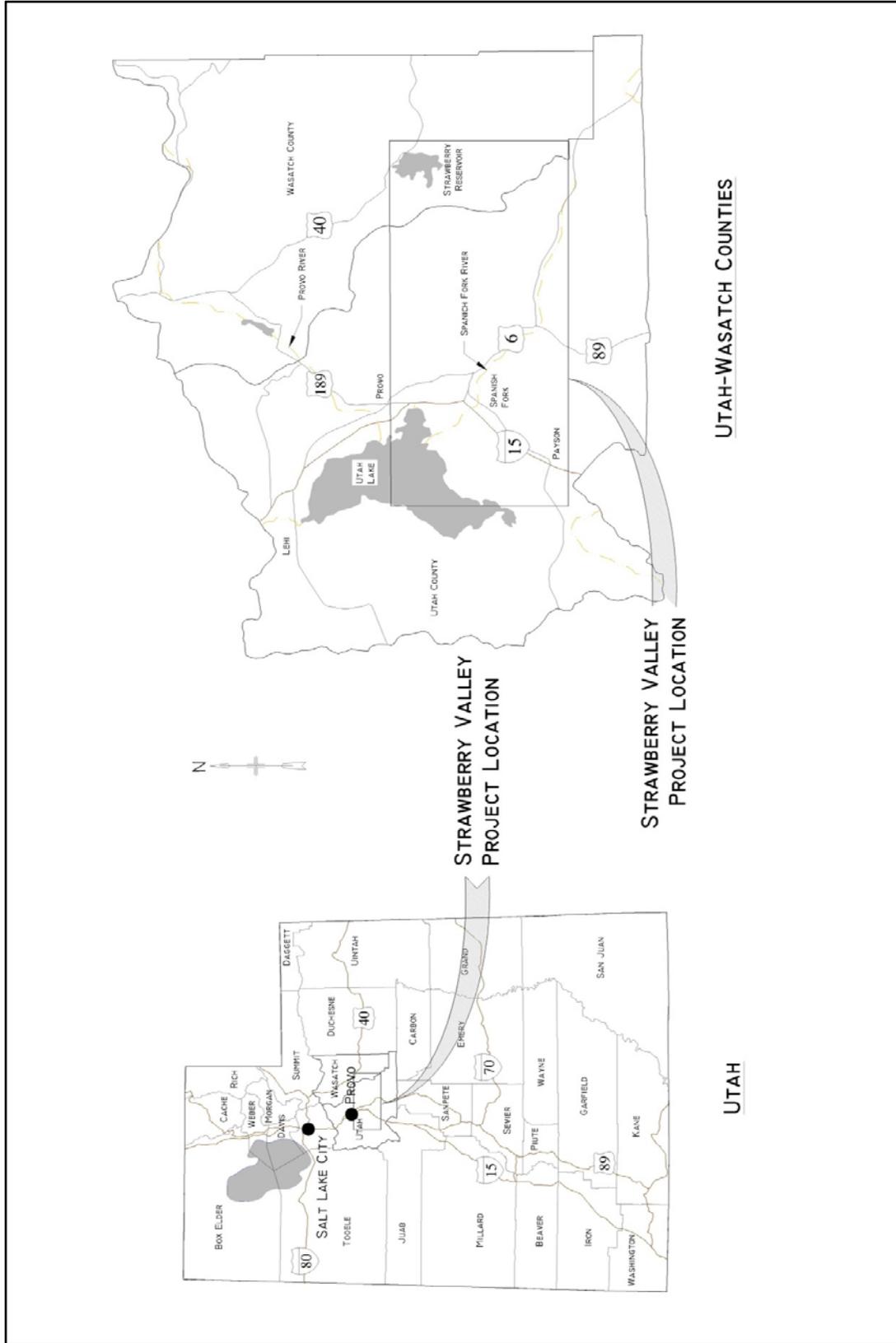


Figure 1. Strawberry Valley Project Area

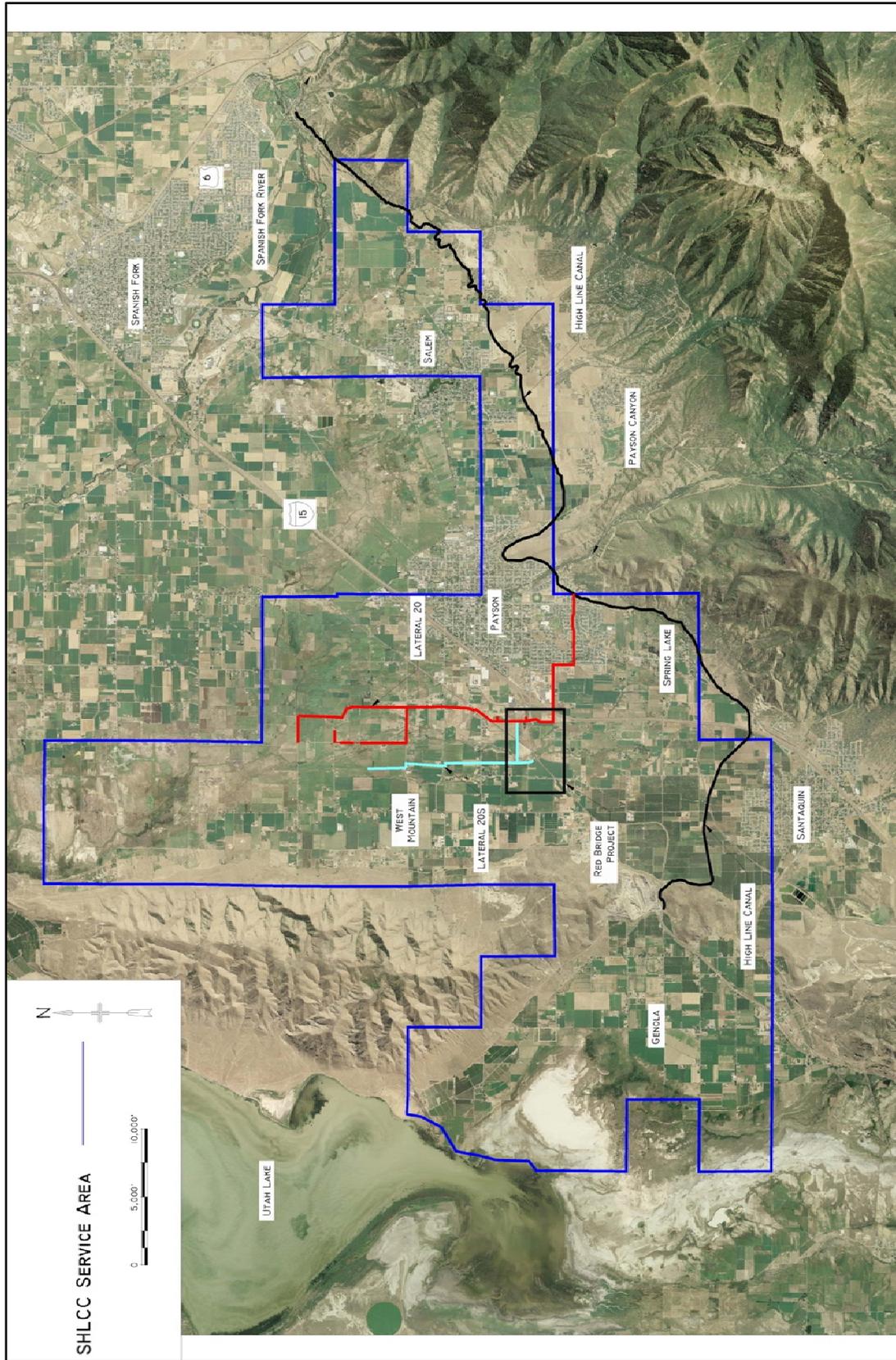


Figure 2. Strawberry High Line Canal Company Service Area

funds account. Project planning and budgeting had to be considered to set aside the necessary funds to pay for the Red Bridge Water Reuse Project (Figure 3).

During the planning phase of the project, coordination with several agencies and private land owners was critical. Coordination included: the USBR, the Union Pacific Railroad, South Utah Valley Electric Service District, the State Historical Preservation Office, Utah Dam Safety Office and Mr. Gerald Finch. Coordination with Mr. Finch occurred to acquire the necessary property for the project. The SHLCC shareholders were also involved to express their opinions for, or against the project.

Before the project could receive funding the USBR performed an Environmental Assessment in accordance with NEPA compliance. The necessary biological and archeological surveys were performed as well. Since the project received federal funding, these items were a requirement for the project.

## **DESIGN & CONSTRUCTION**

### **Diversion Structure**

An entirely new diversion structure was built in the same location as the original diversion structure. The original structure was used to divert water to an open ditch that supplied water for flood irrigation. The new diversion structure for the Red Bridge Water Reuse Project serves the same purpose but now diverts water to a regulating pond. The structure dams the flow in Spring Creek, allowing the backed up water to be sent through a 24-inch HDPE pipe to the pond. The structure includes a 12-foot weir that allows high flows to continue down Spring Creek. A slide gate, adjacent to the weir, was installed to flush built-up sediment down Spring Creek. The new diversion was retrofitted to the wing walls of the adjacent railroad bridge (Figure 4).

### **Pond**

A regulating pond was constructed as part of the project. The pond is supplied through the 24-inch HDPE pipeline from Spring Creek at the same location as water was previously supplied to the open irrigation ditch. The ditch was abandoned and the pond constructed in its place.

The pond was constructed below the native ground surface. The normal water surface of the reservoir is at the same elevation as the water surface of the irrigation ditch that previously occupied this space. A spillway has not been designed for the reservoir since the water surface elevation will be controlled by the water surface elevation of Spring Creek. A control gate at the diversion structure is used to regulate flow into the pond. The pond is designed with three feet of freeboard as a safety precaution. The outlet from the pond is a 42-inch HDPE outlet pipe connected to three pumps.

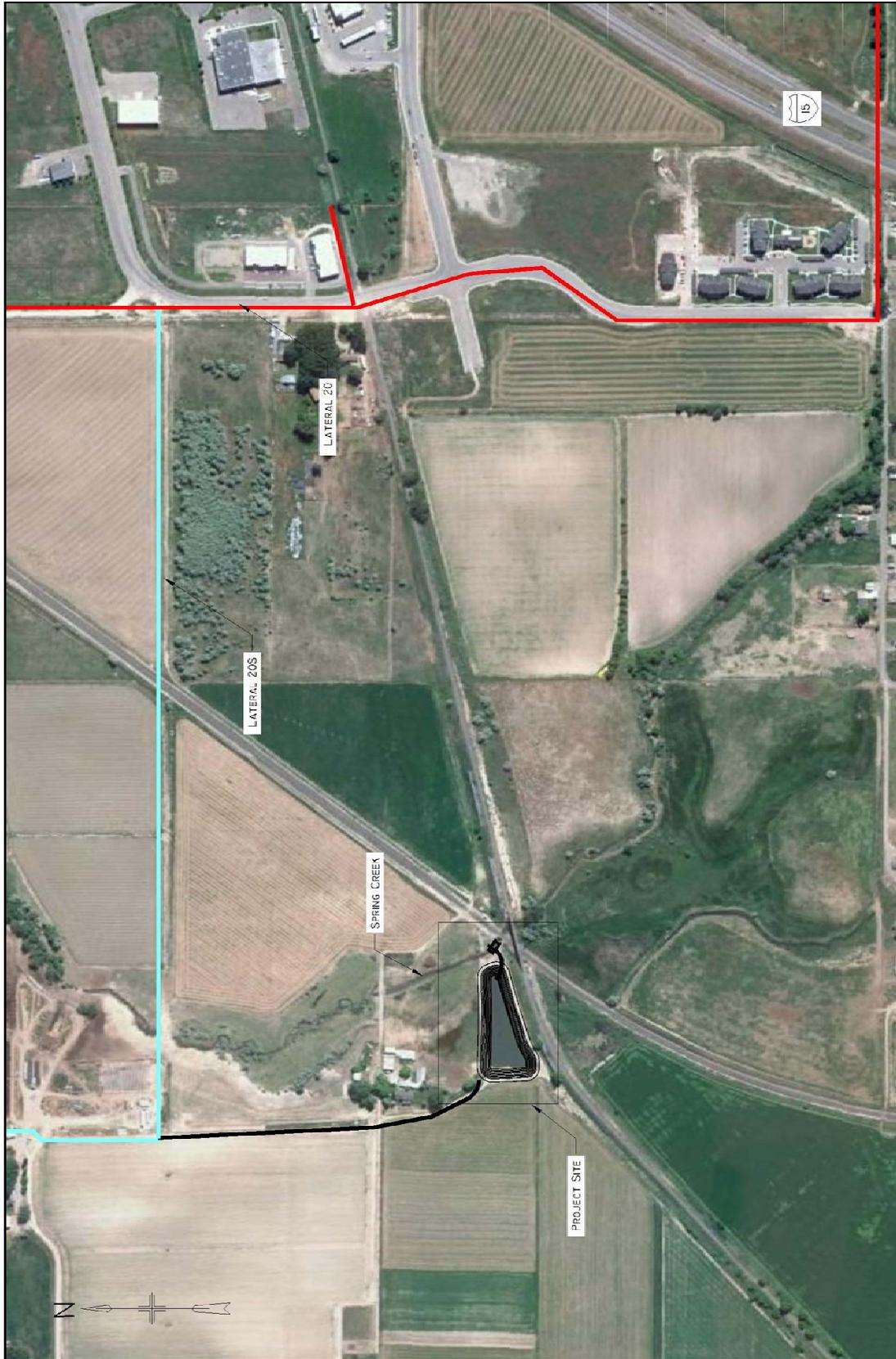


Figure 3. Red Bridge Project Location



Figure 4. Red Bridge Project Site

### **Pump Station**

Three Flowserve vertical turbine pumps, capable of pumping a total of 10 cfs (4,500 gpm), pressurize a distribution line and convey water to SHLCC shareholders through a 24-inch HDPE pipeline. The pumps are equipped with variable speed drives in order to efficiently provide water to shareholders when needed. They pump 120 feet of head in order to push the water over a high point in the system and maintain the desired pressure in the pipeline.

### **Pipeline**

A 24-inch HDPE pipeline was installed from the pump station to Lateral 20S. The pipeline is 1,250 feet long. The pipeline was needed to convey water from Spring Creek to the newly piped Lateral 20S. This allowed the water to be used in the Lateral 20S service area as well as the Lateral 20 service area.

### **Survey Control**

A survey control was installed throughout the area. Established control points were set up on all corners of Section 13; Township 9S; Range 1E. Digital Elevation Models (DEM) were also used for survey control on the project. The surveyed control points were used to create the design drawings used during construction. A few additional survey control points were used during construction to help monitor elevation and grade.

### **Gates**

Gate selection was based on a design flow of 10 cfs, along with additional capacity to handle more as demands increase in the future. With future expansion in mind, a 24-inch Waterman sluice gate was installed. An automatic gate control can be installed in the future as additional funds become available. The actuators will regulate flows to the pond without the need for manual operation.

A sluice was also designed adjacent to the diversion structure weir in order to flush out any sediment that would build up behind the structure. The sluice gate dimensions were designed based on the dimensions of the overflow weir. The dimensions of the sluice gate were 48 inches by 40 inches.

### **Utility Location**

During the design phase, all local utilities were contacted, and existing utilities within the project area were located in the field. Care was taken to reduce conflicts with existing utilities within the area.

**Quantity of Flow**

Based on discussions with SHLCC it was determined that 100 cfs would be expected to pass across the overflow weir. This flow governed the design of the diversion structure. The flow was verified by searching peak flow records.

**Construction Considerations**

SHLCC performed the majority of the construction of the Red Bridge Water Reuse Project. Franson Civil Engineers provided on-site construction review to ensure the project was constructed according to design.

**CONCLUSION**

The Red Bridge Water Reuse Project has developed an additional water supply of approximately 10 cfs by constructing a pump station, pond, pipeline, and diversion structure on Spring Creek. The structures allow SHLCC to put to beneficial use, return flows that they own in Spring Creek. The water, which is primarily return flows from Strawberry Valley Project lands, is delivered to Laterals 20 and 20S of the Strawberry High Line Canal System. These lands previously had a limited water supply, and are now able to receive a full supply. By supplying water to Lateral 20, some water can now be exchanged to municipal users for their secondary water systems within the project area, such as Payson and Spring Creek.

The main goal of the project was to apply the reuse water owned by SHLCC in Spring Creek, and to supplement the water supply to shareholders located on Laterals 20 and 20S. This project achieved that goal. The goal was realized through the creative thinking, problem solving, and coordination efforts of all parties involved.

As funds become available, actuators should be installed on the diversion structure control gates. A SCADA system needs to be installed to operate the actuators and pumps. It could also be used to take flow measurements of the water flowing into the pond and measure the flow in the pipeline.

**ACKNOWLEDGEMENTS**

We would like to take this opportunity to thank the United States Bureau of Reclamation for their \$260,000 contribution to this project. Without this contribution, the project would not have been possible. We would like to thank the Strawberry High Line Canal Company board and Mr. Gerald Finch for his cooperation and willingness to sell a portion of his property.