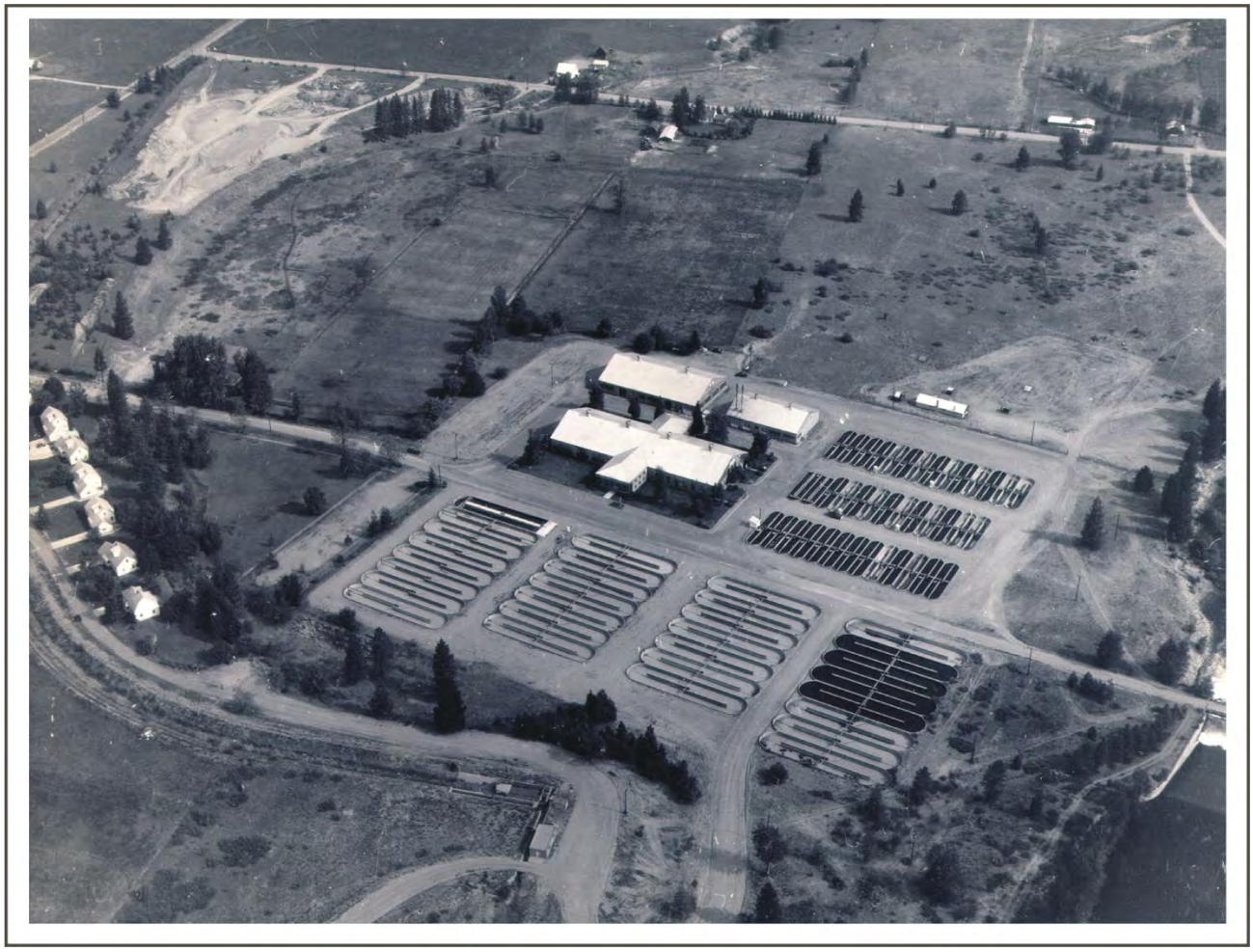
LEAVENWORTH National Fish Hatchery
Historic Structures Report



Leavenworth NFH Aerial Photograph ca. 1950.

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U.S. Fish and Wildlife Service
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Introduction

MANAGEMENT SUMMARY

Leavenworth National Fish Hatchery (NFH) was constructed between 1939 and 1941 by the Bureau of Reclamation (BOR). The hatchery design and plans were developed especially for the site by the BOR office in Denver, Colorado. In 1941, it was the largest hatchery in the world. The plans reflected innovative fish-culture technology and architectural elements, for instance a classical facade on the hatchery building. The hatchery raises Pacific Salmon species and steelhead trout to replace the natural populations reduced by construction of Grand Coulee dam on the Columbia River (Speulda 1997). Leavenworth NFH Historic District was listed in the National Register of Historic Places in 1998. Today, the Leavenworth NFH Historic District encompasses resources reflecting an ensemble of fish culture technology envisioned in 1939, including a hatchery building, garage, cold storage plant, housing, and rearing ponds.

In 1945, the U.S. Fish and Wildlife Service (USFWS) obtained funds directly from Congress for operating the facility. In 1949, the full jurisdiction, custody, and responsibility for the facility transferred to the U.S. Fish and Wildlife Service. Leavenworth NFH is also responsible for complying with the Endangered Species Act (ESA) and meeting mitigation responsibilities under the Mitchell Act as well as Tribal Trust and U.S. v. Oregon obligations (CHMP 2006). Treaty rights established in 1855 are recognized for the Walla Walla, Cayuse, Umatilla, Yakama, and Nez Perce tribes.

This Historic Structures Report (HSR) was prepared in response to the Memorandum of Agreement for the treatment of the Foster Lucas rearing ponds. The Foster-Lucas (F-L) ponds for rearing fish were constructed by the Bureau of Reclamation in 1939-1940 on the Leavenworth National Fish Hatchery (NFH), Chelan County, Washington and are contributing resources of the listed Leavenworth National Fish Hatchery Historic District (LNFH historic district). An Adverse effect was acknowledged because of the need to rehabilitate portions of the ponds to enable the continued mission of the station to rear fish in the best accommodations possible. The initial plan included installing circular tanks in the northernmost bank of small F-L ponds.

This HSR fulfills Stipulation A for resolving an adverse effect to a historic property, in this case the proposed changes to Foster-Lucas Ponds, which are contributing resources to the Leavenworth NFH Historic District (Memorandum of Agreement for the Rehabilitation of Foster-Lucas Ponds (MOA) 2013). Elements stipulated in the MOA and addressed in this HSR, include:

- Identifying a subset of the existing F-L ponds to remove and for on-site preservation of others in perpetuity;
- Preparing a budget plan to identify costs, expenditures, and funding sources for implementing tasks identified in the plan;
- Developing a maintenance log for each of the primary historic properties that provides recommendations that meet the *Secretary of the Interior's Standards for the Treatment of Historic Properties*; and

- Including other elements identified during the plan preparation process determined to be advantageous for the long-term preservation of the National Register listed property.

In 2014, a baseline study was completed, under contract for USFWS, to describe the current condition of each contributing resource and suggest maintenance priorities within a *Hatchery Preservation Plan* (*Plan 2014*) (HRA 2014). However, delays in implementing the Foster-Lucas Pond alterations caused a postponement in submitting the *Plan 2014* for review to the Washington State Historic Preservation Officer (SHPO) in the Department of Archaeology and Historic Preservation (DAHP) until 2019. Based on comments received from DAHP, the USFWS has determined that the *Plan 2014* is obsolete and is thus integrating the salient information from the *Plan 2014* into the revised HSR with additional photographs, updated information, and a simplified formula for treating the Leavenworth NHF historic district's contributing resources. The 2014 study also completed Inventory Sheets for each contributing resource, which are included as an Appendix to this HSR.

This HSR combines historical information and condition assessments for the buildings and structures that contribute to the Leavenworth NFH Historic District and develops maintenance goals that follow the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (*Secretary Standards*) to preserve the character-defining features and encourage preservation or rehabilitation. This HSR includes five chapters: Chapter 1 provides a review of the historic context and construction history of the Leavenworth facility; Chapter 2 presents the method of prioritizing the heritage assets; Chapter 3 includes a brief description of each resource and their character-defining features; Chapter 4 offers treatment considerations and recommendations; and Chapter 5 summarizes the recommendations. Additionally, inventory sheets and photographs for each resource are included as an Appendix.

This HSR addresses the need for preparing a budget plan to identify costs, expenditures, and funding sources for implementing tasks by connecting this HSR with the USFWS's Real Property Inventory (RPI) and maintenance database (SAMMS). The SAMMS database corresponds with the Five-year maintenance plan that is prepared by each station to list necessary projects for funding. The primary funding source is through the Deferred Maintenance program. Deferred Maintenance (DM) funding requires a project description, cost estimate, and implementation date. Therefore, rather than creating a separate step-down maintenance log for the Leavenworth historic properties, this HSR will be integrated into the nation-wide system. Thus, the second and third bulleted items in Stipulation A, are supported by this HSR because it will be incorporated into RPI and SAMMS procedures (a more complete discussion is presented in Chapter 2).

SETTING

Leavenworth NFH, situated in the heart of north-central Washington and tucked into the eastern slopes of the Northern Cascade Mountains, encompasses about 158 acres on a low terrace adjacent to Icicle Creek. Icicle Creek is a tributary to the Wenatchee River, approximately 30 miles above its confluence with the Columbia River, near the town of Leavenworth, Washington (Figure 1). Icicle Creek is a snow fed stream that drains the rugged Northern Cascades in a narrow steep canyon. In its lower stretch, Icicle Creek enters a glacially carved, broad valley where it joins the Wenatchee River (Figure 2). The location is ideal because of the large terrace, water quality, and availability of secondary sources such as well water and water from Snow and Nada lakes above the Icicle Creek drainage.

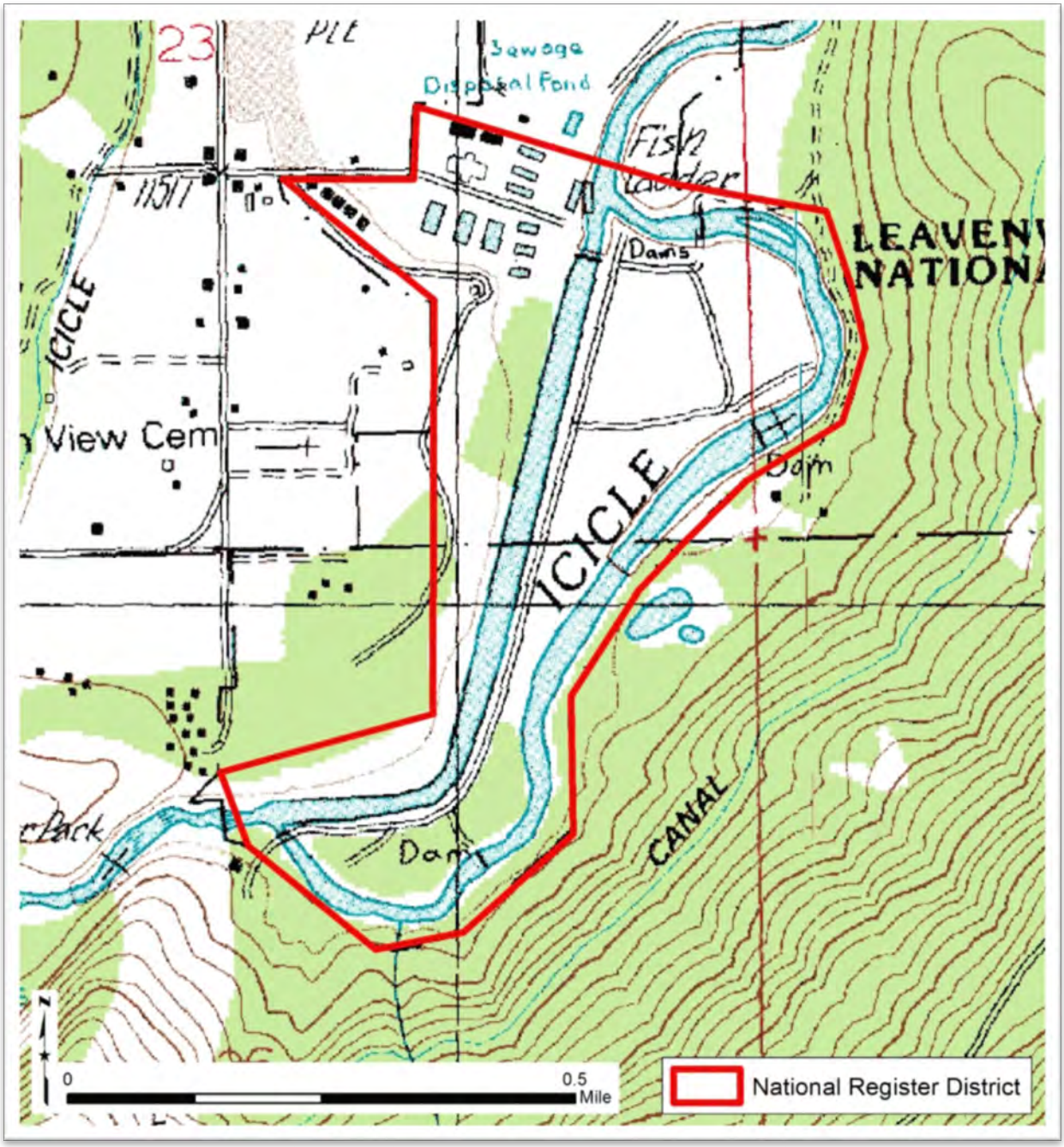

Figure 1. Leavenworth NFH on USGS 7.5' Leavenworth, Washington quadrangle map.

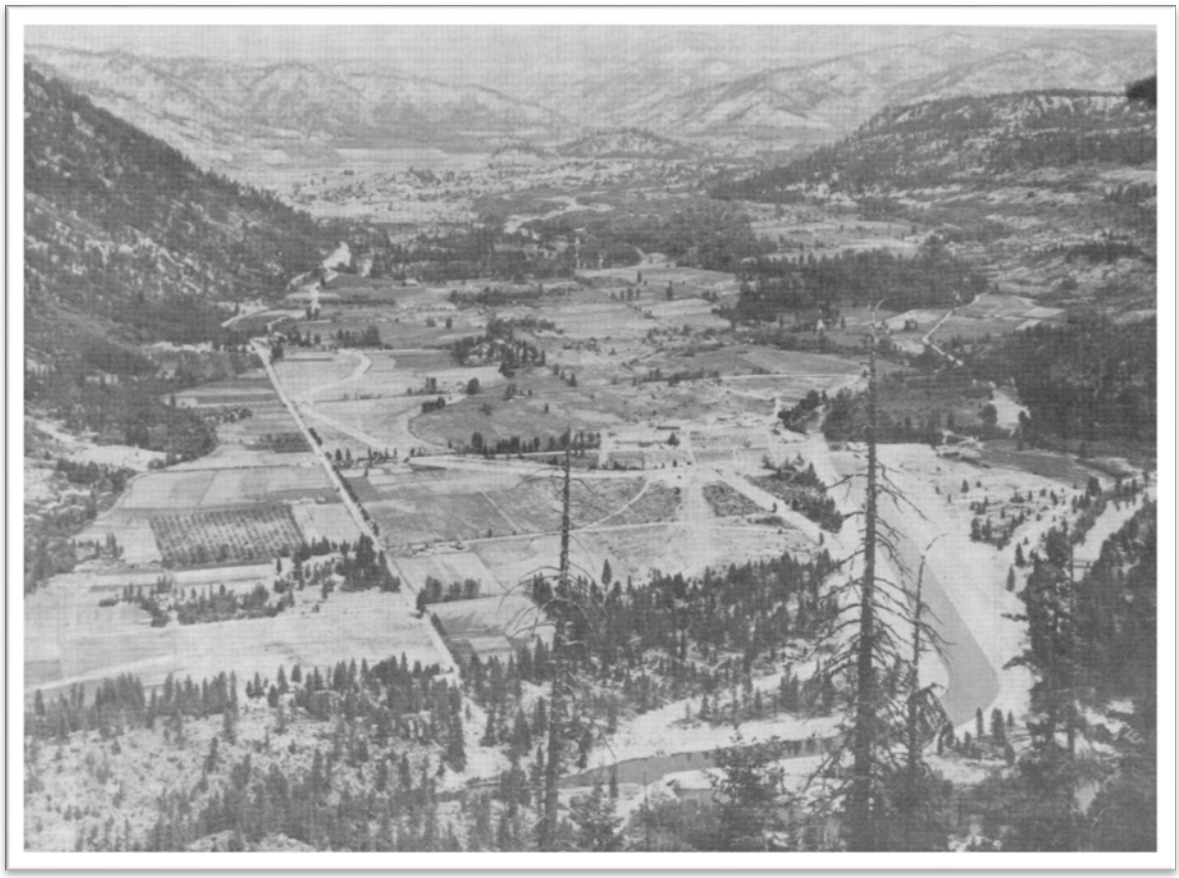

Figure 2. Leavenworth NFH in wide glacially carved valley, Icicle Creek to R of Canal *(Fish Culturalist* 1940).

CHAPTER 1 – HISTORIC CONTEXT/CONSTRUCTION HISTORY

Leavenworth NFH is linked with saving the economic viability of the Columbia River's native salmon runs. Construction of the Grand Coulee dam, the largest dam in the world, forced a pivotal decision for the viability of the salmon fisheries in the northwest. Grand Coulee dam completely blocked the salmon's natural path to spawning grounds in northern Washington and Canada. The question of how to save the salmon was pondered by biologists, conservationists, sport and commercial fishermen, politicians, agencies, and engineers. As Grand Coulee dam was nearing completion, Leavenworth hatchery was rapidly constructed to save the returning salmon runs of 1940. The fish collected and reared at Leavenworth provided a population base to begin restoring the Columbia River salmon. Species produced at Leavenworth could be transplanted in streams below Grand Coulee Dam where they might establish new spawning grounds.

In the 1930s, the methods of artificially rearing huge numbers of salmon, transporting them to new streams, and re-programming their homing instincts was beyond the experience of most biologists or engineers. Plans for Leavenworth varied from a simple, temporary operation to a massive industrial-scale rearing facility. Although controversial, the industrial-scale option was chosen. This enormous

fish restoration program was a team effort, utilizing staff from the Washington State Fisheries program, the University of Washington, U.S. Department of Game, the Western Regional Director of Fisheries (U.S. Fish and Wildlife Service), and U.S. Bureau of Reclamation, along with politicians, and the public to plan and implement this unprecedented project.

Columbia Basin Project

In the 1930s, a massive construction project was promoted to build dams for hydro-electric power and flood control on the Columbia River. As the dams were reaching their final stages, biologists predicted the complete loss of the once abundant, native salmon runs. Frank T. Bell, U.S. Commissioner of Fisheries, was one of the early proponents for artificial propagation in hatcheries, to renew the dwindling numbers of wild species. It was Bell, who between 1937 and 1939 pressured the Federal Government and local agencies to keep their promise of building the necessary hatcheries at Leavenworth, Entiat, and Winthrop as mitigation measures for the blockage of the Columbia River by dams, especially Grand Coulee.

Construction of Grand Coulee Dam would forever close the Columbia above the dam to spawning salmon and necessitate consolidation of fish spawning from 1,816 miles of river into 676 miles (Jett 1938:10). In 1937, the Bureau of Reclamation and the State Department of Fisheries entered into an agreement, "to determine the best means of protecting and continuing the propagation of migratory fish" (Grand Coulee Project Report 1937:87). The first studies considered placing rearing facilities at Grand Coulee, but that plan was soon abandoned because of the physical limitations of the dam site. Leavenworth was suggested as an alternative site for the hatchery facility, along with locations on three other streams.

Leavenworth National Fish Hatchery was authorized by the Grand Coulee Fish Maintenance Project, April 3, 1937 and reauthorized by the Mitchell Act (52 Stat. 345), May 11, 1938. The Mitchell Act authorized the Secretary of Commerce "to establish one or more salmon culture stations in the Columbia Basin in each of the states of Oregon, Washington, and Idaho." The hatchery is one of three mid-Columbia stations constructed by the Bureau of Reclamation as fish mitigation facilities for the Columbia Basin Project.

Leavenworth National Fish Hatchery

Plans for Leavenworth were drawn during the summer of 1937, serving as the basis for recommending the size and methods of the program (*WDW* January 19, 1938:1). Six engineers surveyed the Leavenworth area for an appropriate location for the hatchery. This team included engineers Sterling Hill, Hanford Thayer, Ray Behm, and John Sharp from the Bureau of Reclamation and John Mayhall and Lorenzo Dow from the Washington State Department of Fisheries (*WDW* October 20, 1938). With funding approved in 1939, construction began that fall.

The size of the hatchery was based on the need to mitigate for the loss of habitat inundated or blocked by the dams (Figure 3). With hundreds of miles of rivers affected by the dams, biologists calculated the needed volume of fish to be produced in a hatchery setting in order to replace the loss of naturally spawning fish. The large-scale proportions at Leavenworth directly reflected the numbers and types of salmon passing the Grand Coulee dam site.

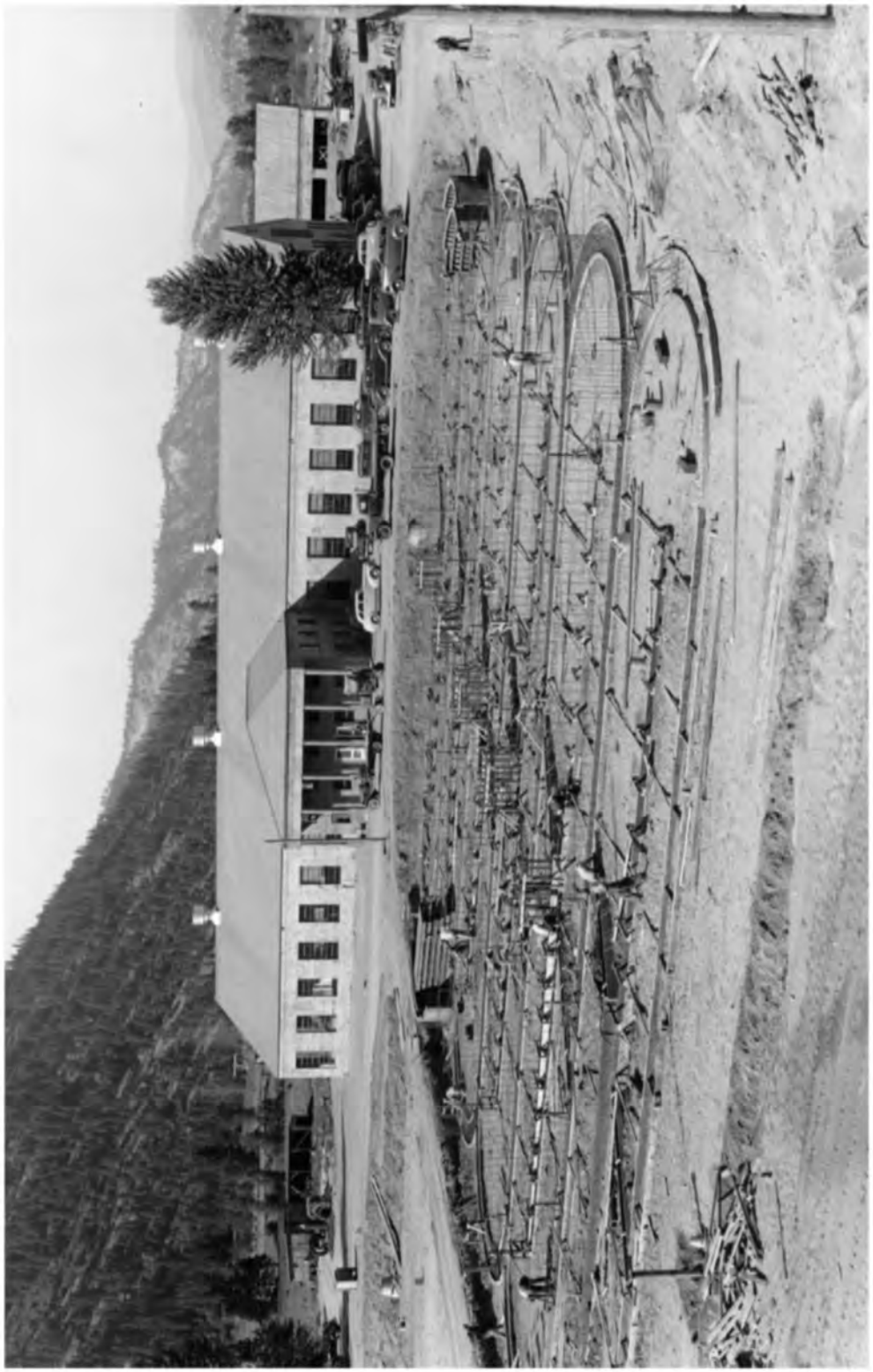

Figure 3. Leavenworth NFH, under construction, 1940 (BOR 2075).

In the fall of 1939, the hatchery was the scene of a great rush of workers and equipment, with "one hundred and ten men, hundreds of tons of construction machinery, and the best engineering skill the United States government can muster" (*WDW* August 29, 1939:9). Work on the hatchery progressed rapidly with seven contractors employed simultaneously.

Although the massive scale was critical, the final costs also influenced the "as-built" hatchery complex. For instance building sizes were smaller than originally designed. Fewer troughs and rearing ponds were completed, therefore limiting the production capability of the hatchery. Seven residences were built, instead of the ten recommended. The house design also was scaled down to a simpler style and the Superintendent's house, guest quarters, and a dormitory were never built. And, proportions of the Foster-Lucas rearing ponds were trimmed from the size and number first suggested. In the final arrangement only 70 concrete rearing ponds were constructed and scaled down in size to include 40 of the primary ponds 17 x 76 ft and 30 of the secondary ponds 29 x 130 feet.

Fish Propagation Strategies

Information for this section was greatly enhanced by Cliff Dickeson, retired hatchery manager and Bill Thorson, deputy hatchery manager. Mr. Dickeson in particular was helpful because of his long association with the hatchery, he helped to build the pack trail to the Snow Lake Tunnel in 1935, and worked at the Leavenworth hatchery for most of his career.

Theories of fish culture in the 1930s was limited and during the planning of Leavenworth a dichotomy developed. Conflicts between natural and artificial methodologies along with the size and types of ponds, and the length of rearing time for fish in an artificial setting were topics widely debated. Engineer, Hanford Thayer, recalled that the biologists felt that the level of natural regeneration was too low, and that only through artificial propagation could levels be generated to compensate for the loss caused by the dams (Hanford Thayer, personal communication 1997).

Construction of Leavenworth was behind schedule in the fall of 1939, creating a crisis for the fall fish runs. Egg collection and rearing had to be accomplished or an entire year's worth of salmon would be lost. The adult holding ponds constructed in Icicle Creek alongside the hatchery terrace satisfied the immediate need for a place to maintain adults prior to harvesting the eggs. A series of three ponds, defined by dams and electrically controlled, rotating metal racks offered an innovative, technologically advanced solution for the immediate need of an adult holding pond. The ponds served a vital need for providing a place to hold Columbia River salmon until they matured. The supply of fertilized eggs collected at Leavenworth began the artificial propagation in the winter of 1939-1940. Three spawning sheds built adjacent to the ponds served as covered egg collecting stations.

Yet, the "natural" stream ponds in Icicle Creek did not function as efficiently as originally planned because the water level and temperature could not be controlled. The wide variety of species transported to the ponds led to problems with diseases. And, the shallow holding ponds created an especially attractive captive food source for predators. According to Dickeson, only one spawning shelter was used and all were abandoned by the 1950s.

The concrete rearing ponds constructed at Leavenworth also were experimental. Construction of 30 large and 40 small Foster-Lucas (F-L) ponds was a costly commitment to this relatively new rearing technology. The ponds were designed to contain high numbers of fish needed to meet the population requirements for maintaining the Columbia River runs. The F-L ponds proved to be unsatisfactory, but they provided scientific data for improving rearing pond designs. In fact, the preeminent study on fish rearing pond shapes and sizes was conducted at Leavenworth in 1946. Results from the Leavenworth experiments and others led to the conclusion that the large Foster-Lucas ponds were inferior to either the raceway or the circular pond (Burrows and Chenowith 1955:23, 28). Thus, within 10 years many of the F-L ponds were abandoned.

Once the eggs were collected and fertilized, the hatchery faced additional difficulties with feeding the fish to the stage where they could be released. Fish development stages and diet requirements were two interrelated topics that were advanced by studies at Leavenworth hatchery. The Cold Storage facilities at Leavenworth offered refrigeration space to store large quantities of meat and meal. Initially, fish food included "finely ground beef heart or liver. As the fish grew the diet was changed by adding pork liver, pork and beef spleen, salmon viscera, horse meat, beef and sheep lungs, and beef tripe. All of these meat products came to the hatchery in frozen blocks and were stored in the cold storage room" (Dickeson 1991:6). The meat scraps were delivered at wholesale prices from the local slaughterhouses. The hatchery staff made fish food on a daily basis. Experiments at Leavenworth and other hatcheries found that diseases were often passed to the fish through the meat diet, especially when salmon carcasses were used (Netboy 1980:107). Adding salt to the feed, using a potato ricer to break up the feed into tiny bits, and developing a wet pellet for Chinook salmon are important research contributions developed and tested at Leavenworth (Clifford Dickeson, personal communication 1996; William Thorson, personal communication 1996).

Hatchery Alterations

Changes to the hatchery operation occurred very soon after construction was completed. The holding ponds in Icicle Creek, the F-L ponds, and even the canal source for water did not work as well as planned. The large oval shaped F-L ponds with internal drains and sweeping mechanisms created polluted water and issues when fish dropped into the drains. In 1976, a major rehabilitation project was implemented to increase the water supply and improve production facilities. Completed in 1980 the hallmark of the rehabilitation was construction of 45 raceways, two adult holding ponds, a fish ladder, pollution abatement pond, aeration chamber, pipelines to accommodate all facilities, and installation of an emergency backup generator (Figure 4). In 1995, a sand-settling basin was built to filter water used in the hatchery (CHMP 2006). The raceways have also been covered and netted to keep predators from feasting on the juvenile fish. Of the seven houses built, only four remain. Three of the houses are still serving as residential units for hatchery staff and one house is available as office space for the Friends group and hatchery staff.

Figure 4. Overview of Leavenworth NFH (USFWS).

Leavenworth NFH Historic District – Contributing Resources

Leavenworth's three main hatchery buildings, Icicle Creek diversion canal with Dam #2, F-L ponds, residences, and Snow Lake tunnel are tangible links to the important historic events surrounding construction of Grand Coulee Dam and restoration of Columbia River salmon. The resources constructed between 1939 and 1941 are identified as the Leavenworth NFH-Historic District and are eligible under Criteria A and C. The integrity of location, setting, design, feeling, association, materials, and workmanship are all represented, although the design, materials, and workmanship are diminished by the alterations. Dams #3, 4, and 5 defined the three holding ponds in Icicle Creek, but have been removed. Of the four houses remaining, only three retained integrity and are contributing to the district (Table 1).

Table 1: LNFH Historic District Contributing Resources

Resource ID #	Building/Structure	Number of Resources	Date Constructed
1	Icicle Creek Diversion Canal and Dam #2	1	1939
2	Snow Lake Tunnel and Valve	1	1939
4	Screen Chamber	1	1939
6	Large Foster-Lucas (F-L) Ponds (30) 15 converted to raceways prior to 1997.	15	1940
~~7~~	Small Foster-Lucas (F-L) Ponds (40) 4 removed from service prior to 1997.	36	1940
8	Hatchery Building	1	1939
9	Garage	1	1940
10	Cold Storage	1	1940
11	Residence 1	1	1941
12	Residence 2	1	1941

Resource ID #	Building/Structure	Number of Resources	Date Constructed
13	Residence 3	1	1941
14	Island Road Network	1	1939
15	Diversion Canal Bridge	1	1939
	Total Resources:	62	

CHAPTER 2 – PRIORITY HERITAGE ASSETS

Leavenworth NFH is a listed historic district. Elements that reflect the eligibility values includes: the grand scale of the hatchery building, the size and numbers of fish rearing ponds, and the extent of the complex as a whole that supplies a direct link to the efforts by local, state, and federal agencies to address the loss of fish runs created by the construction of Grand Coulee Dam. Leavenworth, built as the largest fish hatchery in the world, was designed to inspire confidence in the Government's response to controlling native fish runs.

The primary historical significance of the LNFH is as a fish hatchery, a physical manifestation of the relationships between the theory, practice, technology, and design of artificial fish propagation with supporting themes that include architectural trends and the Depression Era.

The NRHP nomination developed the hatchery's historic context, evaluated the eligibility of its various components under the four NRHP criteria, delineated the boundaries of the historic district, and identified the contributing resources (refer to Table 1).

Setting Treatment Priorities

Treatment in the broadest sense includes all maintenance and repair tasks that fall under the heading of preservation or rehabilitation. Not all resources need attention equally, and once treated may not need attention again for many years. Thus, the priorities for repair and maintenance are always shifting. Setting priorities depends on many factors including budgets, critical need, and physical condition of the resource. For instance, maintenance of the hatchery building, shop, cold storage, and residences has occurred over the years because of life and safety concerns that included code enforcement and seismic upgrades. Other resources such as the Icicle Creek diversion canal, island road network, and diversion canal bridge have required less intensive maintenance schedules.

Yet, for all of LNFH historic district's contributing properties there are character-defining elements that need to be understood and integrated into all proposed work plans. For instance, maintenance of the concrete walls and cornice of the Screen Chamber building or repairing the steel-sash windows are important to consider when preparing any repair program. For all of the contributing resources, the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (*SOI Standards*) will be followed to ensure that the identified important elements are retained. Character-defining features are included in Chapter 3 with the resource descriptions. Chapter 4 presents the treatment recommendations. One further consideration is the material type and special needs associated with

cast-in-place, reinforced concrete, steel sash windows, and rustic wood siding. Therefore, Chapter 4 distinguishes building materials that will need special attention.

USFWS Priority Heritage Assets

The USFWS has developed a nation-wide system for defining historic resources that meet a threshold for importance that assists with determining the priority for Deferred Maintenance (DM) funding allocations. In order to be considered as a Priority Heritage Asset (PHA) the resource must be at least 50 years old and been determined eligible for or listed in the National Register of Historic Places (NRHP). Leavenworth National Historic District meets the threshold of being more than 50 years old and listed in the NRHP.

The second step of determining if a resource is a "Priority Heritage Asset" based on attributes such as: uniqueness of the resource; mission-related function; the potential for community support; and whether the resource supports other aspects of the USFWS mission, such as a priority public activity. PHAs are primarily buildings that serve the mission of the agency but can meet other needs such as for a community group. Therefore, not all buildings and structures within the Leavenworth NFH Historic District meet the threshold of a PHA. The PHA recognition is a value added to the resource to improve the prospective for receiving DM funding, which is the primary mechanism for financial support within the USFWS.

Each PHA is a resource connected with the Real Property Inventory (RPI) and maintenance database (SAMMS) used by the USFWS to track all properties, their physical condition, recommendations for repairs, and lists the repairs that have occurred. It is also the mechanism for building a "5-year" plan for requesting funding. Each station develops a list of projects that are submitted to the Region Office where projects are ranked and funding allocations dispersed. Deferred maintenance is the only predictable source of funding for maintaining real property. Thus, each project submitted by Leavenworth NFH is competing regionally for limited funds.

The PHA process combines historical information and documentation within the framework of the RPI/SAMMS database providing a bridge between treatments recommended in the HSR with the proposed 5-year maintenance plans.

The 2013 MOA for the Foster-Lucas Pond Rehabilitation project was completed prior to the advancement of the PHA process. Establishing primary buildings at Leavenworth as PHAs meets the stipulation of preparing a budget plan to identify costs, expenditures, and funding sources for implementing tasks identified in the plan and the stipulation for developing a maintenance log for each of the primary historic properties (Stipulation A, Bulleted items 2 and 3).

Developing cost estimates for historic preservation projects is challenging because of several factors: the variable of skilled workers; materials may require special orders/fabrication; and the amount of time the agency takes to fund the project. The DM funding is the only consistent mechanism for funding repairs, rehabilitation, and maintenance. However, it can take many years to move a project through the DM funding process. Thus, the Stipulation A requirement to track maintenance of historic resources at Leavenworth NFH will be accomplished within the RPI/SAMMS process and database. The

PHA process, recognized nationwide, adds information for historic resources, such as this HSR within the database.

However, the USFWS's capacity for completing projects is not robust and it is unlikely that there will be many changes during a 5-year cycle. Therefore, this HSR is recommending that rather than a report being sent to DAHP for review every five years, that any proposed projects to the PHAs be referred to DHAP for review under the National Historic Preservation Act, Section 106 process.

Within this context the Leavenworth NFH Historic District include the Hatchery Building and Residence #1 as PHAs, because they are unique, are associated with mission-related functions, have community support, and contribute to priority public use activities.

CHAPTER 3 – RESOURCE DESCRIPTIONS and CHARACTER-DEFINING FEATURES

Leavenworth NFH historic district's contributing resources are listed in Table 1 and briefly described below, along with their character-defining features. Chapter 4 presents the treatment options for each resource. Appendix A includes individual inventory forms with additional information and photographs.

Icicle Creek Diversion Canal and Structure #2 Dam (Resource #1)

The canal is a 4,085-foot by-pass or diversion of Icicle Creek, beginning at a sharp meander in the creek and oriented in a nearly straight (north-south) passage alongside the hatchery (Figures 5-6). A fish ladder and spillway are located at the downstream end and dam (#2) is located at the upstream point of the canal to control water flowing into the canal or Icicle Creek. The water diverted into the meander channel discharges below the downstream dam. Bureau of Reclamation official S.E. Hutton described the original canal in the following terms:

> The Icicle Creek diversion canal is 115 feet wide on the bottom, with sides sloping 2 to 1. The bottom and left bank were covered with a 12-inch layer of coarse gravel, and the right bank, along the creek, was riprapped with rock taken from excavations. The canal is 17.45 feet deep, and, with water depth of 14.45 feet, will carry 10,000 cubic feet per second, twice the maximum recorded flow of Icicle Creek.
>
> The diversion canal drops only about a foot in its 4,085-foot length, leaving a difference of 10 to 12 feet between the bottom of the canal and the water level in Icicle Creek below Dam No. 5 (Hutton 1940:26).

<u>Character-Defining Features</u>

The canal's character-defining features relate to fish-hatchery design of the late 1930s; especially the large-scale control of water flow. Specific character-defining features that reflect the canal's importance in the overall hatchery water system are the 4,085-foot length of the canal from the diversion structure (Dam #2) to the lower spillway. The uniformity of the sloped walls and packed crushed-rock finish materials are important characteristics. Dam #2 is a cast-in-place, reinforced concrete structure with steel screens and gates operable by mechanisms on the top of the dam.

Figure 5. Canal under construction, 1939 (BOR 2-3638).

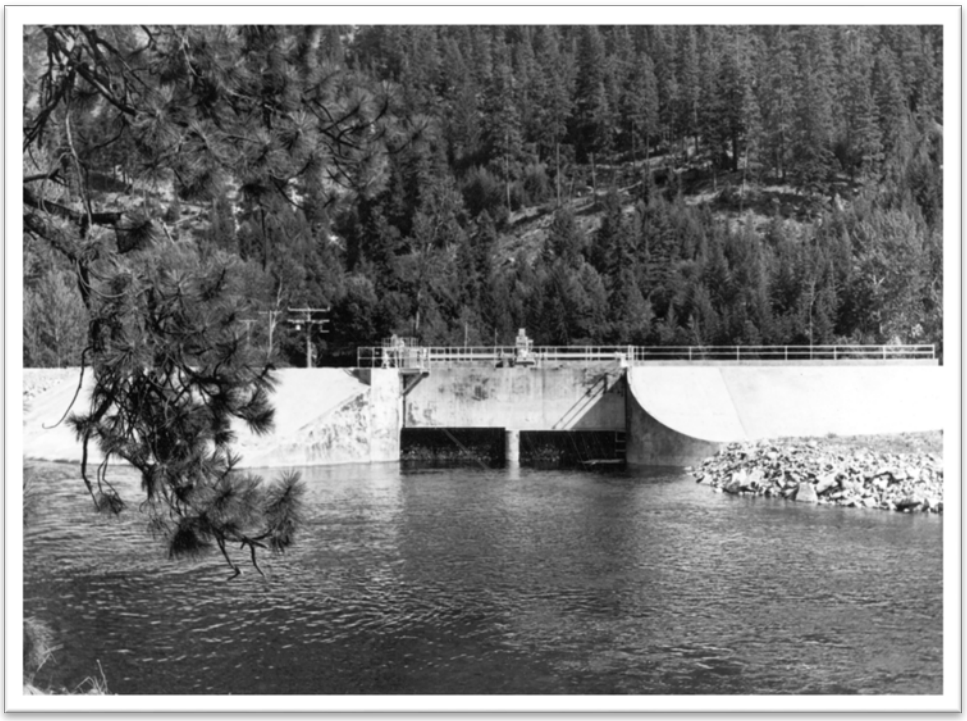

Figure 6. Diversion Structure - Dam #2, 1939 (BOR 3-6551).

Snow Lake Tunnel and Valve (Resource #2)

The summertime low volume and warm temperatures of Icicle Creek required an alternate source of cool water for the hatchery. The Bureau of Reclamation's solution was to use a natural reservoir, Snow Lake, approximately 8 miles to the southwest and 3,000 feet above the hatchery. The engineering solution was to tap the lake near its base with a pipe and valve system. The concept works much like a faucet, when water is needed, the valve is opened and water sprays from the pipe, down the rocky slope into Snow Creek, which feeds directly into Icicle Creek. Because the distance from water source to the hatchery is short, the lake water helps maintain a consistent, cool water flow in Icicle Creek during the warm, dry summer months (Nielsen 1940). Bureau of Reclamation engineer, Louis Ackerman was principally involved in the design of the Snow Lake tunnel project. Sterling Hill, was the hydraulic engineer who correctly calculated the water pressure to be held by the valve gate.

In order to accomplish the plan a 7 x 9 ft tunnel was cut through 2,250 ft of solid granite rock to the bottom of Snow Lake (Annual Report 1955:21) (Figure 7). This amazing engineering feat required several crews of men to cut the tunnel. While two other crews built a trail to haul the supplies, pipe, and a huge valve up the steep mountain (Stoffel 1939: 1,3). In the summer of 1938, the Forest Service constructed the 30 in. wide trail from the highway near Icicle Creek into Nada and Snow Lakes. A camp at Nada Lake housed the construction crews (Grand Coulee Project Report 1938:46).

On October 16, 1939, the 13-month project had reached its final stage and everyone assembled to view the blast, from above the lake. Unfortunately, the blast did not occur on schedule because of a short in the electrical wire to the powder charge. Finally, the successful charge detonated and the dynamite blast cracked the bottom of the lake and water gushed to fill the tunnel, held in check by the gate valve, just as the engineers had designed.

In 1940, a slight modification in the operation of the Snow Lake tunnel was necessary because of "high winds, up to 60 m.p.h., experienced in the tunnel when the valve was open. To remedy the condition, the 30-in. diameter pipe was extended 124 ft to the tunnel portal, and the 28-in. valve was relocated outside the tunnel. A shelter was constructed over the valve at the tunnel portal" (Grand Coulee Project Report 1940:207).

<u>Character-Defining Features</u>

The Snow Lake water source remains in use exactly as designed and each summer when cold water is required for the hatchery, the valve is turned manually to allow lake water to join Snow Creek.
The setting, structure of the portal opening, and function are the most evocative of the character-defining features of the Snow Lake Tunnel. The valve and pipes are subject to repairs and replacement as needed over the years to continue the operation. Therefore, while the pipes and valve continue to operate the water flow as originally intended, the actual mechanisms no longer date to the 1940s. The portal entry bored into solid rock, tunnel, and function are key elements.

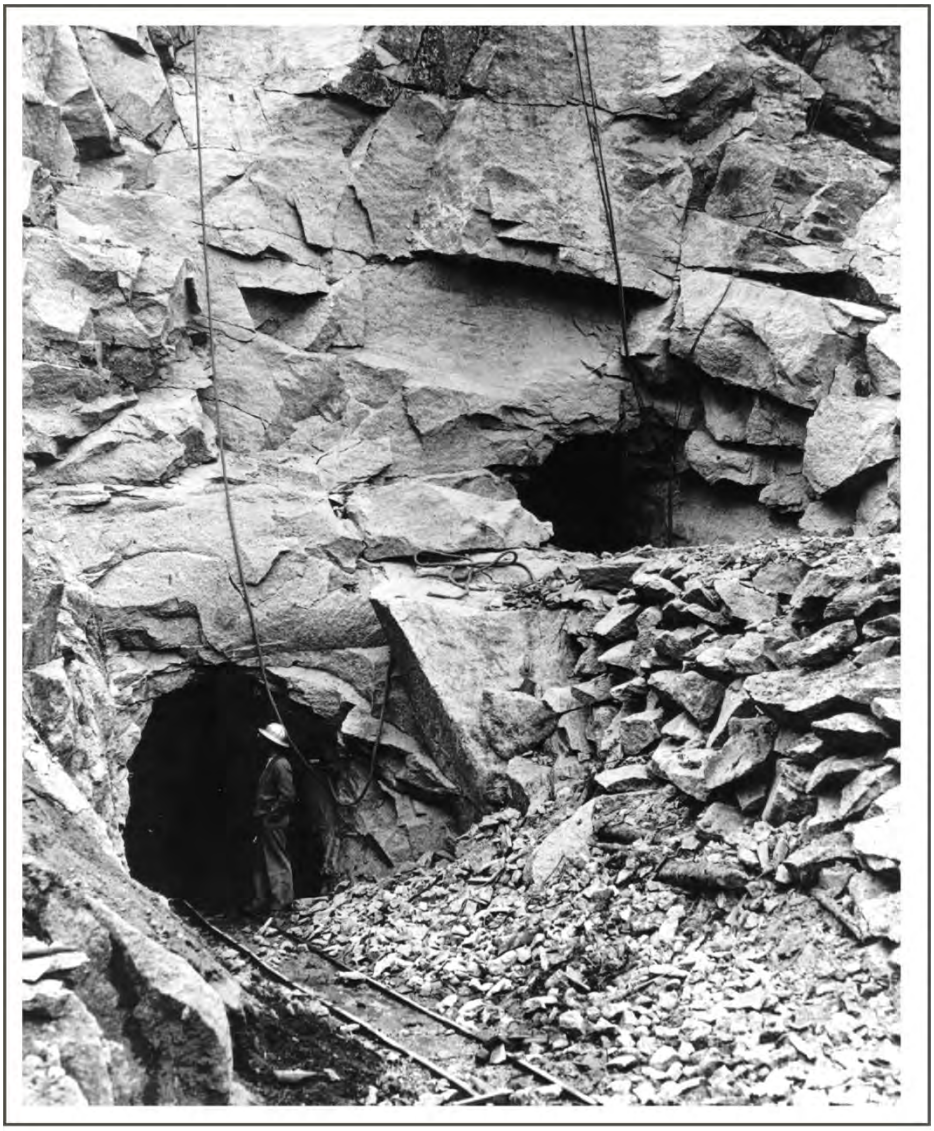

Figure 7. Snow Lake tunnel portals, 1939 (BOR 4079).

Screen Chamber (Resource #4)

Built in 1939 by the contracting firm of David A. Richardson, the screen chamber continues to function as a mixing and screening facility for water piped from Icicle Creek. The screen chamber is a small, flat roofed, concrete building with a square, plain cornice (Figure 8). Single wooden doors are present on the east and south elevations. Steel-frame sash, multi-pane windows are on the east and west walls. Interior flooring is a metal grate covering the screens through which water flows from two sets of pipes. The grate can be removed and the screens repaired or cleaned when needed. The screens are important for collecting large woody debris from the water before it entering the hatchery water system.

Character-Defining Features

The screen chamber shares the cast-in-place concrete structure and steel-sash windows as the others in the complex. The screen chamber's interior reflects its specialized purpose.

Figure 8. Screen Chamber, view northwest (HRA 2014).

Foster-Lucas Ponds (Large Ponds -15, Resource #6)

The original hatchery plan included the construction of 30 large rearing ponds, designed by the Bureau of Reclamation. The pond design name honored Fred Foster, Director of the U.S. Bureau of Fisheries (U.S. Fish and Wildlife Service) and his assistant Clarence Lucas.

The Foster-Lucas (F-L) pond is an elongated oval, with curved end walls, and a center partition wall running lengthwise (Figure 9). The ponds operated as circulating raceways, with a central water feed and discharge system built into the partition wall in the center of the oval (Burrows and Chenoweth 1955:4). Brushes swept sediment to the center discharge area. Metal grate cat-walks connected the ponds for cleaning and repairing equipment and valves. The ponds are cast-in-place, reinforced concrete. The larger ponds are 130 ft long, 29 ft wide and 5 ft deep with a floor that slopes slightly toward the center (Grand Coulee Project Report 1940:204). The large ponds were arranged in banks of 7 or 8 units (Figure 10).

Unfortunately, the design proved unsatisfactory and the large F-L ponds in front of the hatchery building have remained empty and unused almost from the beginning. Studies beginning in 1946 were critical of the F-L ponds and led to a report published in 1955 that outlined the problems. "The Foster-Lucas pond is hydraulically inferior to either the circular or the raceway pond" (Burrows and Chenoweth 1955:8,17). Essentially, the rotating arm kept the sediment in constant motion, creating very unhealthy conditions

for the fingerling fish. Recommendations for replacing the F-L ponds with raceways started in the 1950s, listing "better use of the available water supply, increased production, and reduction of diseases" as reasons for the change (Annual Report 1954, 1955, 1956).

Character-Defining Features

The F-L ponds were an unproven design but considered the state-of-the-art when installed at Leavenworth NFH in 1940. The character-defining feature of the F-L ponds is the oval form with interior dividing wall. Important innovations were the water circulation mechanism with the sweeping arm, steel supply gate, central water supply, and central drainage pipe, however these are no longer extant having been removed a few years after the ponds were built because of failure to perform as planned. The cast-in-place reinforced concrete base and walls are also characteristic of this pond. The metal screens and catwalk are similar to other ponds.

Figure 9. Large F-L Pond #8 (2017-04-02:80).

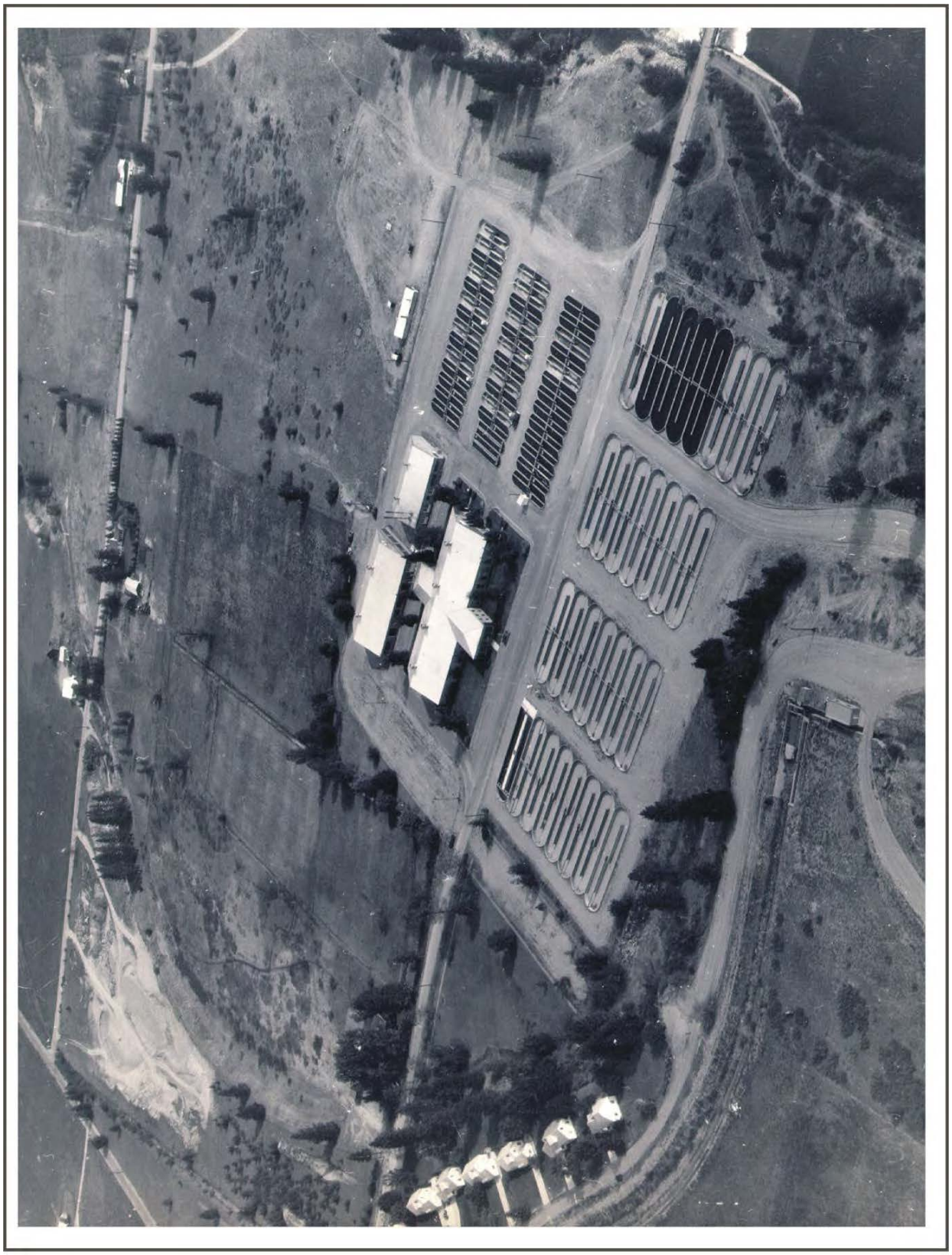

Figure 10. Aerial view of Leavenworth Hatchery with all original F-L Ponds, ca. 1950.

Foster-Lucas Ponds (Small Ponds-26, Resource #7)

The original hatchery plan included the construction of 40 small rearing ponds, designed by the Bureau of Reclamation. The pond design name honored Fred Foster, Director of the U.S. Bureau of Fisheries (U.S. Fish and Wildlife Service) and his assistant Clarence Lucas.

The Foster-Lucas (F-L) pond is an elongated oval, with curved end walls, and a center partition wall running lengthwise. The ponds operated as circulating raceways, with a central water feed and discharge system built into the partition wall in the center of the oval (Burrows and Chenoweth 1955:4). Brushes swept sediment to the center discharge area. Metal grate cat-walks connected the ponds for cleaning and repairing equipment and valves. The ponds are cast-in-place, reinforced concrete. The ponds were built in two sizes: the smaller F-L ponds are 76 ft long, 17 ft wide, and 4 ft deep (Grand Coulee Project Report 1940:204). The small ponds are grouped into banks of 13 units (Figure 11).

Character-Defining Features

The primary character-defining feature of the F-L ponds is the oval form with interior dividing wall. Important innovations were the water circulation mechanism with the sweeping arm, steel supply gate, central water supply and central drainage pipe, however these are no longer extant having been removed a few years after the ponds were built because of failure to perform as planned. The cast-in-place reinforced concrete base and walls are also characteristic of this pond. The metal screens and catwalk are similar to other ponds.

Figure 11. Small F-L ponds, view to SW (2011-04-03:45).

Hatchery Building (Resource #8)

Leavenworth was the main administrative headquarters and laboratory for the extensive upper Columbia River fish rearing operation. The symmetrical and uniform appearance of the concrete building is both grand and industrial (Figure 12). The front facing two-story, hipped-roof extension is 36 x 45 ft, supported by six square columns the rear extension is 44 x 45 feet. The full-story columns replicate the rhythm of the side gable building with its full-height windows. Exterior architectural details are clean and simple, with close verges, boxed eaves and plain cornices. Each elevation is enlivened by the symmetrical placement of steel-frame, multi-pane windows. Four 36 in. ventilators with dampers are present on the roof peak.

The 90 x 225 ft building was constructed between August 7, 1939 and April 27, 1940, at a cost of about $159,999 on contract from the Bureau of Reclamation to McDonald Construction Company. Apparently, the original plan for the building was an even grander, 162 x 308 ft, as reported in the local newspaper (*WDW* June 16, 1937:1).

The building's function for rearing eggs and fry-stage fish determined the size of the primary east-west gable form. The front hipped extension contains offices, a public area, and storage. The rear hipped extension contains offices, a laboratory, and storage. The main hatchery interior is intact: an open, unheated, single room, filled with hatchery rearing troughs. The open truss roof provides an expansive volume lighted by the tall windows. The height of the roof is somewhat unusual, but reflects input in design by engineer, Hanford Thayer. "The height was necessary because there was never enough storage room for items needed in the hatchery, thus the idea for the loft" (Hanford Thayer, personal communication 1996). The loft or balcony, as designed by Thayer, is 28 ft wide and runs the full length of the building. The loft is accessed by stairs at both ends and ladders in the center. The balcony is constructed of wood with side-walls but no ceiling.

<u>Character-Defining Features</u>

As standard-bearer of the effort to mitigate the effects of the Grand Coulee Dam on Columbia River salmon populations, the Hatchery Building represents the grandest expression of a relatively cohesive architectural program developed for Bureau hatcheries. The design is at heart a warehouse, but stylized with elements of a 1930s, utilitarian adaptation of Colonial Revival. While the moderately pitched gable roof, symmetrical design, and equally spaced multi-light windows were general characteristics of the Colonial Revival, the more distinctive aspects of the style were reserved for the front elevation “wing,” a two-story, five-bay, hipped-roof office space fronted by a two-story portico with squared column supports.

As noted in the National Register of Historic Places nomination for the Leavenworth Fish Hatchery Complex, the interior spaces reflected a specialized and unique design based on input from experienced fish biologists. The open hatchery warehouse space with built-in piping and trench gutters allowed for the continual flow of water along with a public space and staff offices (Speulda 1997:3). Given this context, the building’s character-defining features relate to several architectural and historical themes of the 1930s including Bureau of Reclamation architecture; hatchery architecture and design; Colonial Revival elements; and fisheries management.

Specific character-defining features that reflect these themes on the exterior are the symmetrical façade, two-story portico with supporting squared columns, multi-light steel-sash full height windows, and cast-in-place reinforced concrete walls.

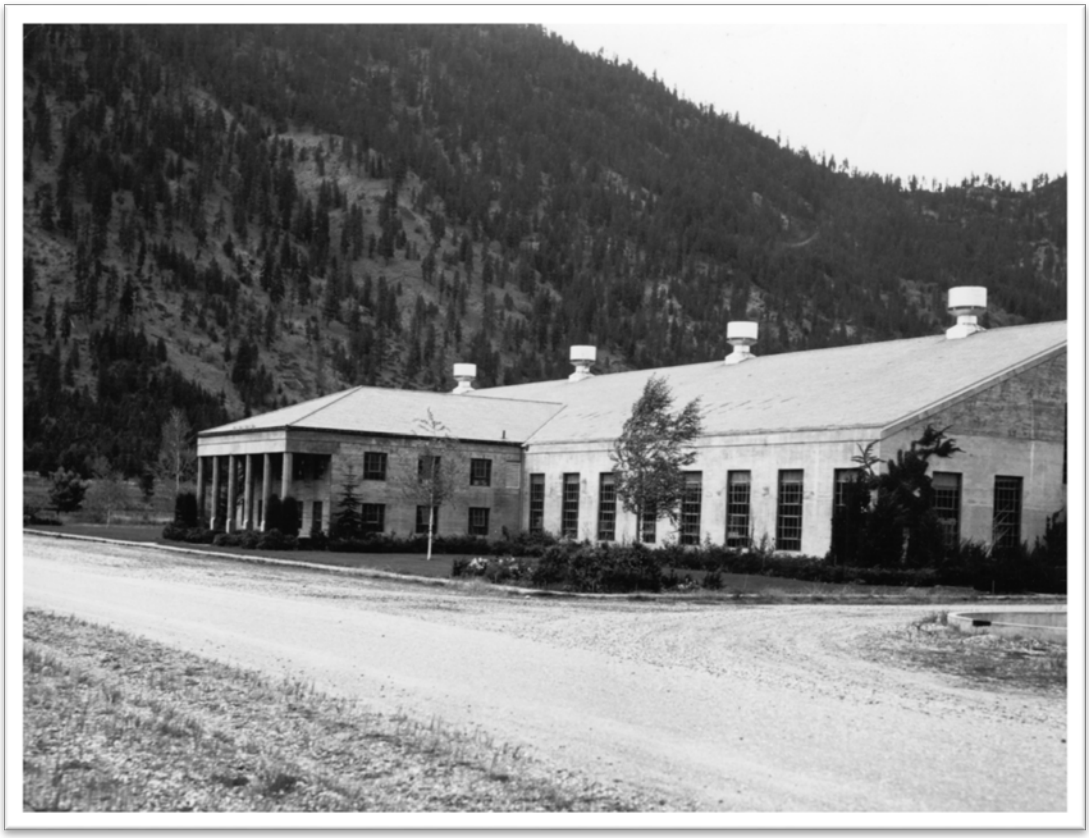

Figure 12. Hatchery building, ca. 1950 (FWS).

Shop/Garage (Resource #9)

This rectangular plan, side gable, reinforced concrete walled building, is 89 ft 8 in. x 142 ft 8 in. and cost about $65,686 to build, in 1940 (Figure 13). The Shop/Garage was constructed by the David A. Richardson Company of Idaho. The Garage portion was designed to "house the 8 fish hauling trucks, other cars and trucks, carpenter shop, and blacksmith and repair shop, as well as furnish storage room for general supplies and equipment" (Grand Coulee Report 1939:260). Two 36 in. ventilators are present on the gable roof peak. Windows are arranged in banks of alternating three by five and four by five steel-sashes and grouped in sets of five. Windows are intact on the south and east walls. The north elevation contains six garage-door bays. The original wooden accordion garage doors have been replaced and the gasoline pumps have been removed.

The building interior is divided in half lengthwise by a hollow clay tile block wall and separates the Garage on the north (rear) elevation from the Shop on the south side (front). Divisions across the front of the building are the carpenter shop, blacksmith shop, and general machine shop. In the rear of the building is a storage area for fish trucks, cars, and a grease pit (Annual Report 1945:23). The shops provided all the necessary parts for building and repairing pipes and fashioning equipment and

hardware for the hatchery. The roof truss is steel and the ceiling is finished with cedar tongue-in-groove boards, although it was originally to be plastered (*WDW* August 29, 1939:9).

Character-Defining Features

The Shop/Garage represents a more utilitarian execution of the design developed for the hatchery complex. It shares the same moderately pitched gable roof, equally spaced multi-light, steel-sash windows, and concrete walls, but lacks decoration or distinctive Colonial Revival elements. The building retains its original hollow tile walls and most of original interior spacing, which reflects its original function for three shops.

Character-defining features relate to several architectural and historical themes of the 1930s, including the multi-light fenestration, cast-in-place concrete walls, and support function for hatchery operations. The interior spatial arrangement is defined by the hollow-tile partition walls and much of the original equipment is present.

Figure 13. Shop/Garage, front, south elevation and east elevation, view northwest (HRA 2014).

Cold Storage (Resource #10)

The need for refrigeration of large quantities of fish food provided the functional requirements for the Cold Storage building's design (Figure 14). This large rectangular building (67 ft 8 in. x 96 ft 8 in.) with side-gable roof was constructed by MacDonald Construction Company in 1940 at a cost of $84,007. The building housed "the heating plant, refrigeration machinery, cold storage space, and food preparation and storage rooms for all types of fish food. The heating system for the hatchery and garage and office building is a two-pipe steam system, consisting of two mechanically-fired boilers equipped with complete automatic control equipment" (Grand Coulee Project Report 1940:204-205).

The reinforced concrete building has clipped gable ends, boxed eaves, and a plain cornice. Multi-pane windows and wooden accordion garage doors with windows offered relief to the building's austere exterior. Two 24 in. ventilators are present on the gable roof peak, along with a ventilating duct and twin chimney stacks for the boilers. Windows are primarily three panes tall by five panes wide, however, three by three and three by four windows are also represented. The southwest corner windows are arranged in a block of three windows with four by six panes.

Interior walls are constructed of hollow clay tile blocks. The steel-truss roof is open above the tile walls and the ceiling is finished with cedar tongue-and-groove boards. The interior arrangement included a "boiler room, coal bin, loading platform room, food preparation room, ice making room, ice storage room, compressor room, two cold storage rooms, a freezer room, and corridor" (Annual Report 1945:23).

Character-Defining Features

The Cold Storage Building represents a more utilitarian execution of the design developed for the hatchery complex. It shares the same moderately pitched gable roof, equally spaced multi-light, steel-sash windows, concrete walls, but lacks the ornamentation or characteristics of the Colonial Revival style.

The Cold Storage Building's character-defining features relate to several architectural and historical themes of the 1930s, including the multi-light fenestration, cast-in-place concrete walls, and interior features that reflect the support function for hatchery operations, such as the walk-in freezer.

Figure 14. Cold Storage building (HRA 2014).

Residence 1 (Resource #11)

Original plans for Leavenworth included construction of 10 cottages, a dormitory, and a superintendent's house (*WDW* June 16, 1937: 1). However, only seven residences, all following the same floor plan, were constructed (Figure 15). The building style and floor plan was the Bureau of Reclamation's design Type-4, USBR drawing 40-0-3162. The Type-4 plan is very plain when compared to other styles available in the Bureau of Reclamation's design book. In fact, at an early planning stage a more elaborate "rustic style" was suggested. The location of the houses also changed from a single straight row facing the main highway, to a curved row facing the hatchery. Alterations in the "as-built" form suggest that Leavenworth's residences were scaled down from the original design. The houses were completed on March 27, 1941.

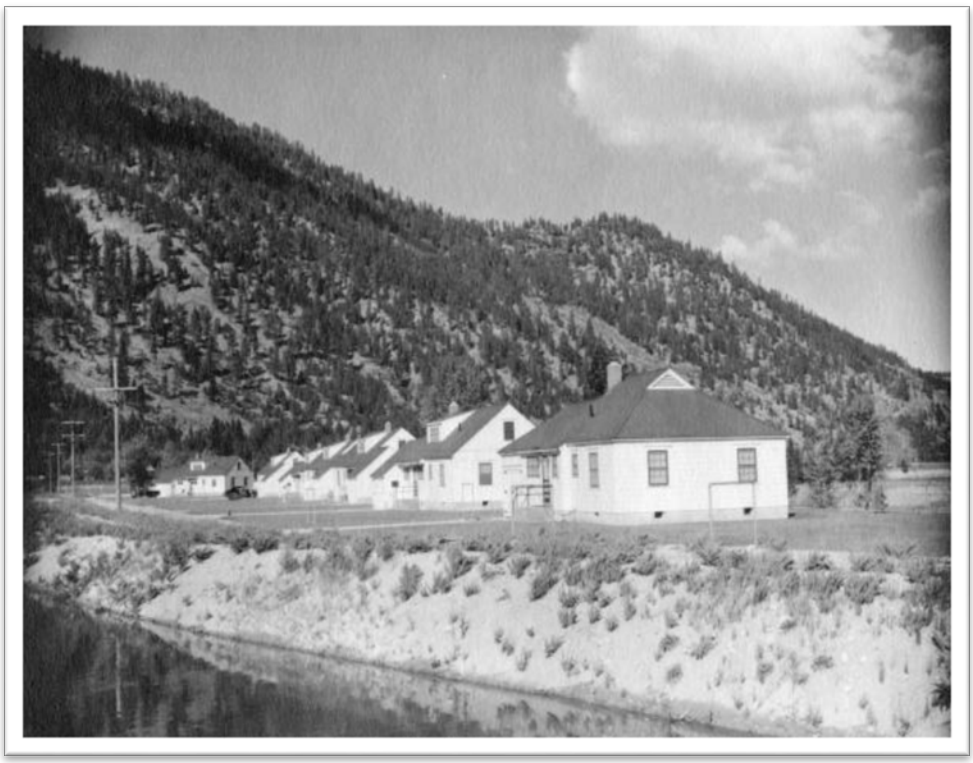

Figure 15. Original LNFH residences on bank of Wenatchee Canal (1941) (from HRA 2014).

The 1½-story, side-gable houses have moderately pitched roofs and are simply finished with clipped gables, boxed eaves, and decorative cap window trim. The wood-frame houses are clad with rustic drop siding and finished with corner boards. A single-car garage is attached. The houses have asymmetrical facades with the concrete porch entrance flanked by a ribbon of five small single-pane double-hung sash windows on one side and a six-over-six double-hung sash on the other side. A curved pipe railing outlines the small front porch. The gable ends are symmetrically designed with two windows on the main floor and a single window centered in the gable end. All of the houses have a rear shed-roof dormer. Small, double-hung, single pane windows were arranged as a trio in the dormer. The rear of the house contains the kitchen, bathroom, and dining room windows that are single-pane, double-hung style, and the bedroom window that is a multi-pane, double-hung style. All of the houses have a three-quarter, finished basement.

Character-Defining Features

The project included a row of seven houses—six identical six-room types and one five-room type—for hatchery workers that, when originally constructed, stood along the northern bank of the Wenatchee Canal. Plans for the residences originated in the Denver headquarters, which was responsible for creating standardized designs for many of the buildings and structures needed for the Bureau's projects. In the 1930s, Bureau architects turned to the Cape Cod Revival style, which was becoming widely popular at the time. A number of designs for three-, four-, and five-bedroom houses in this style were developed for the Grand Coulee project and used elsewhere (Pfaff 2007:139). Typical characteristics of the Cape Cod Revival included "a simple rectangular footprint, one to one-and-a-half stories, steep pitched roofs with little overhang, multi-pane windows , brick chimneys, detailed entries, minimal ornamentation, wood clapboard siding, and wood-shingle roofs, occasionally augmented by subservient wings that served as garages" (Pfaff 2007:139) (Figure 16). The Cape Cod Revival paired well with the loosely Colonial Revival motif of the main hatchery complex.

Given this context, Residence #1's character-defining features relate to several architectural and historical themes of the 1930s, including Bureau of Reclamation architecture; hatchery architecture and design; and Cape Cod Revival as reflected by the 1½ story form with attached garage, beaded, novelty wood siding, small concrete entry porch with metal tube railing.

Figure 16. Residence 1, front elevation (Resource #11) (FWS 2011-04-03:27).

Residence 2 (Resource #12)

Original plans for Leavenworth included construction of 10 cottages, a dormitory, and a superintendent's house (*WDW* June 16, 1937: 1). However, only seven residences, all following the same floor plan, were constructed (refer to Figure 15). The building style and floor plan was the Bureau of Reclamation's design Type-4, USBR drawing 40-0-3162. The Type-4 plan is very plain when compared to other styles available in the Bureau of Reclamation's design book. The location of the houses also changed from a single straight row facing the main highway, to a curved row facing the hatchery. Alterations in the "as-built" form suggest that Leavenworth's residences were scaled down from the original design. The houses were completed on March 27, 1941.

The 1½-story, side-gable houses have moderately pitched roofs and are simply finished with clipped gables, boxed eaves, and decorative cap window trim. The wood-frame houses are clad with rustic drop siding and finished with corner boards. A single-car garage is attached. The houses have asymmetrical facades with the concrete porch entrance flanked by a ribbon of five small single-pane double-hung sash windows on one side and a six-over-six double-hung sash on the other side. A curved pipe railing outlines the small front porch. The gable ends are symmetrically designed with two windows on the main floor and a single window centered in the gable end. All of the houses have a rear shed-roof dormer. Small, double-hung, single pane windows were arranged as a trio in the dormer. The rear of the house contains the kitchen, bathroom, and dining room windows that are single-pane, double-hung style, and the bedroom window that is a multi-pane, double-hung style. The house has a three-quarter, finished basement.

<u>Character-Defining Features</u>

The project included a row of seven houses—six identical six-room types and one five-room type—for hatchery workers that, when originally constructed, stood along the northern bank of the Wenatchee Canal. Typical characteristics of the Cape Cod Revival included “a simple rectangular footprint, one to one-and-a-half stories, steep pitched roofs with little overhang, multi-pane windows , brick chimneys, detailed entries, minimal ornamentation, wood clapboard siding, and wood-shingle roofs, occasionally augmented by subservient wings that served as garages” (Pfaff 2007:139) (Figure 17). The Cape Cod Revival paired well with the loosely Colonial Revival motif of the main hatchery complex.

Given this context, Residence #2’s character-defining features relate to several architectural and historical themes of the 1930s, including Bureau of Reclamation architecture; hatchery architecture and design; and Cape Cod Revival. The 1½ story form, small concrete entry porch with metal tube railing, and attached garage.

Figure 17. Residence 2 (Resource #12) Quarters #6 (FWS 2017-04-02:73).

Residence 3 (Resource #13)

Original plans for Leavenworth included construction of 10 cottages, a dormitory, and a superintendent's house (*WDW* June 16, 1937: 1). However, only seven residences, all following the same floor plan, were constructed (refer to Figure 15). The building style and floor plan was the Bureau of Reclamation's design Type-4, USBR drawing 40-0-3162. The Type-4 plan is very plain when compared to other styles available in the Bureau of Reclamation's design book. The location of the houses also changed from a single straight row facing the main highway, to a curved row facing the hatchery. Alterations in the "as-built" form suggest that Leavenworth's residences were scaled down from the original design. The houses were completed on March 27, 1941.

The 1½-story, side-gable houses have moderately pitched roofs and are simply finished with clipped gables, boxed eaves, and decorative cap window trim. The wood-frame houses are clad with rustic drop siding and finished with corner boards. A single-car garage is attached. The houses have asymmetrical facades with the concrete porch entrance flanked by a ribbon of five small single-pane double-hung sash windows on one side and a six-over-six double-hung sash on the other side. A curved pipe railing outlines the small front porch. The gable ends are symmetrically designed with two windows on the main floor and a single window centered in the gable end. All of the houses have a rear shed-roof dormer. Small, double-hung, single pane windows were arranged as a trio in the dormer. The rear of the house contains the kitchen, bathroom, and dining room windows that are single-pane, double-hung style, and the bedroom window that is a multi-pane, double-hung style. All of the houses have a three-quarter, finished basement.

Character-Defining Features

The project included a row of seven houses—six identical six-room types and one five-room type—for hatchery workers that, when originally constructed, stood along the northern bank of the Wenatchee Canal. Typical characteristics of the Cape Cod Revival included "a simple rectangular footprint, one to one-and-a-half stories, steep pitched roofs with little overhang, multi-pane windows , brick chimneys, detailed entries, minimal ornamentation, wood clapboard siding, and wood-shingle roofs, occasionally augmented by subservient wings that served as garages" (Pfaff 2007:139) (Figure 18). The Cape Cod Revival paired well with the loosely Colonial Revival motif of the main hatchery complex.

Given this context, Residence #3's character-defining features relate to several architectural and historical themes of the 1930s, including Bureau of Reclamation architecture; hatchery architecture and design; and Cape Cod Revival. The 1½ story form, small concrete entry porch with metal tube railing, and attached garage.

Figure 18. Residence 3 (Resource #13) Quarters #7 (FWS 2017-04-02:75).

Island Road Network (Resource #14)

The blacktop roads, constructed in 1939, leading to the Icicle Creek spawning sheds and ponds served as the transportation routes for moving fish in tanker trucks. Today the roads are only used for service vehicle traffic and pedestrians (Figures 19-20).

Character-Defining Features

The only part of the road network that serves the Leavenworth National Fish Hatchery designated as a contributing resource is that portion confined to the island between the Diversion Canal and Icicle Creek. The hatchery roads to the spawning sheds and Icicle Creek holding ponds were important for providing

access to the tanker trucks that carried fish from the barrier at Rock Island Dam and spawned steelhead back to streams.

Figure 19. Typical surface patch (HRA 2014).

Figure 20. Hard packed dirt section (HRA 2014).

Diversion Canal Bridge (Resource #15)

Hatchery records indicate that the bridge over the Diversion Canal was constructed in 1940 (Figure 21). The riveted, Warren pony truss with alternating verticals was a relatively common design for shorter spans in the first half of the twentieth century. The single lane, pony truss, steel bridge spans the outfall structure on the Icicle Creek Diversion Canal.

Character-Defining Features

Character-defining features are the design of the Warren pony truss with alternating verticals, the connection type (rivets, gusset plates), and structural components (steel floor beams, timber stringers, steel cross bracing, angle irons, channel beams).

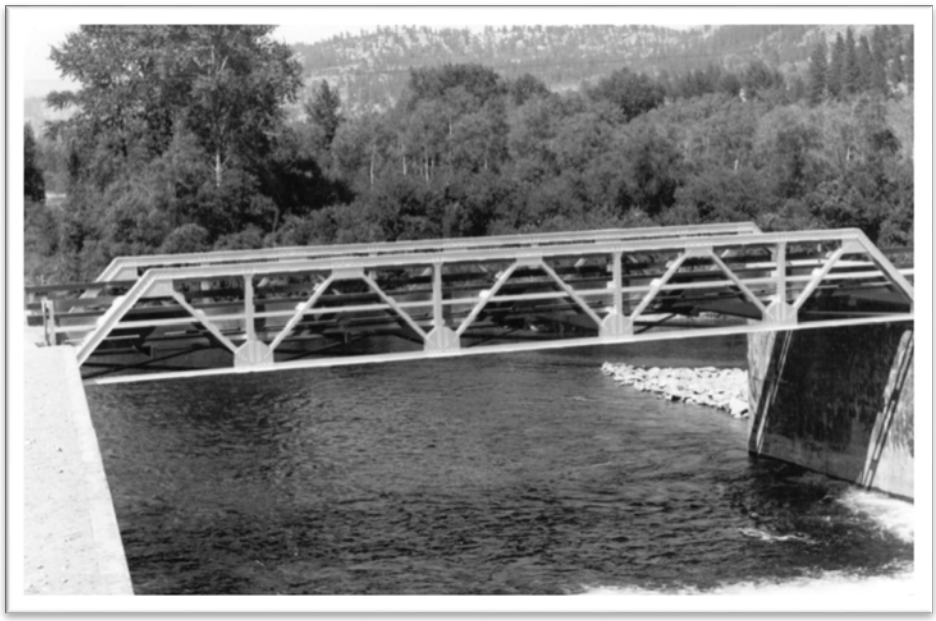

Figure 21. Diversion Canal Bridge (July 2, 1940) (USFWS).

Chapter 4 – Treatment Recommendations

The evolving hatchery design focuses on the paramount function of fish rearing. Recommendations for preservation and rehabilitation will follow guidance provided by the *Secretary of the Interior's Standards for the Treatment of Historic Properties.* It is unlikely that restoration or reconstruction would be triggered by any proposed treatment options (Table 2).

Guidelines for Treatment of Historic Resources

Any changes planned for LNFH that affect historic resources will follow the *Secretary of the Interior's Standards for the Treatment of Historic Properties*, which outline requirements in terms of the following four categories:

Preservation: the act or process of applying measures necessary to sustain the existing form, integrity and materials of an historic property.

Rehabilitation: the act or process of returning a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while preserving those portions and features of the property which are significant to its historic, architectural, and cultural values.

Restoration: the act or process of accurately depicting the form, features and character of a property as it appeared at a particular period of time by means of the removal of features from other periods in its history and reconstruction of missing features from the restoration period.

Reconstruction: the act or process of depicting, by means of new construction, the form, features and detailing of a non-surviving site, landscape, building, structure or object for the purpose of replicating its appearance at a specific period of time and in its historic location.

Table 2 provides a quick reference for the resources, character-defining features, and recommended treatments discussed in more detail below.

Table 2: LNFH-Historic District Contributing Elements and Treatment Recommendations.

ID #	Building/Structure	Character-defining features	Treatment
1	Icicle Creek Diversion Canal and Dam #2	Design, function.	*Preservation:* canal shape, size, and finish materials *Preservation:* Reinforced concrete, and mechanical equipment
2	Snow Lake Tunnel and Valve	Engineering and function	*Preservation:* Tunnel entry/Portal *Rehabilitation:* valves and pipes
4	Screen Chamber	Design, function	*Preservation:* Reinforced concrete, Steel-sash windows
6	Large F-L Ponds	Association with original design	*Rehabilitation:* 12 ponds *Preservation:* 3 ponds & Interpret

ID #	Building/Structure	Character-defining features	Treatment
7	Small F-L Ponds	Association with original design	*Rehabilitation:* all ponds
8	Hatchery Building	Design, function	*Preservation:* Reinforced concrete, Steel-sash windows, columns, portico
9	Garage	Design, Function	*Preservation:* Reinforced concrete, Steel-sash windows
10	Cold Storage	Design, Function	*Preservation:* Reinforced concrete, Steel-sash windows
11	Residence 1	Design, function	*Preservation:* Wooden siding, front porch and railing
12-13	Residence 2, 3	Design, function	*Rehabilitation:* Maintain as needed
14	Island Road Network	Route	*Rehabilitation:* Surface material
15	Diversion Canal Bridge	Design	*Preservation:* Steel-truss bridge

Treatment Recommendations for LNFH Resources

Recommendations for treating the LNFH contributing historic resources are presented in Table 2 and in more detail below with additional discussion and information. The treatment options reflect the *Secretary Standards* for Preservation or Rehabilitation.

Icicle Creek Canal and Dam #2

The Diversion Canal is in good condition. Minor areas of concern from a historic preservation standpoint include vegetative growth that may affect bank stability. *Preservation* is the recommended treatment -- applying measures necessary to sustain the existing form, integrity and materials of the Diversion Canal. Significant attributes include the shape, size, and finish materials.

Dam #2 is a concrete structure with a metal gate and mechanism for lifting the gate. *Preservation* is the recommended treatment -- applying measures necessary to sustain the existing form, integrity and materials of Dam #2. This entails repairing the concrete walls, steel gate, lifting mechanisms to continue its operational value.

Snow Lake Tunnel

The original hand-wheel operated, 30-in cast-steel, Chapman gate valve with an integrated bypass valve assembly at the end of the service tunnel near the lake intake is still intact. Two concrete saddles and two metal supports hold the pipe near the valve. The steel grate floor above the valve and pipe may be original, but modern flow monitoring control equipment has been installed in the valve access

area. The original steel pipeline is visible below the grate as it extends into the tunnel through the rock. At least one bolted pipe joint has been repaired and a section of pipe was replaced.

Preservation is the recommended treatment -- applying measures necessary to sustain the existing form, integrity and materials. The portal entry bored into solid rock, tunnel, and function are key elements to preserve.

Screen Chamber

Exterior surfaces and features of the screen chamber appear to be in generally good condition. Areas of concern include the original fenestration, which shows signs of rust and deterioration in the metal frames and sashes, and some concrete spalling at cornice and window sills. Original interior features include the steel floor grates, screen-lift motors, and valves. Windows are covered with metal screens to protect them from snow.

Preservation is the recommended treatment -- applying measures necessary to sustain the existing form, integrity and materials to the Screen Chamber. The screen chamber is a small building with an important connection to the hatchery function. The cast-in-place concrete walls with cornice, opening locations, original steel sash windows, and function are important elements to preserve.

Large F-L Ponds

The large F-L ponds were abandoned shortly after their construction because the design and mechanisms failed. In 1979, the easternmost bank of 8 large F-L ponds were replaced with three banks of 15-unit raceways. And, a second bank of 7 large F-L ponds were replaced with 14 single lane raceways.

The historical integrity of the F-L Ponds is diminished because the pond design failed after only a few years. The remaining large ponds do not reflect the progressive story of fish rearing that is the history of Leavenworth NFH. In fact, their presence is presenting a false narrative to the public. The F-L ponds continue to occupy a sizeable and centrally located area of the hatchery complex, but most visitors are confused about the function of the empty ponds. Consequently, rehabilitating or finding an adaptive reuse for the ponds with a new type of functioning rearing pond will provide the public with the historically important goal of the hatchery.

Today, the physical condition of the ponds is poor because of the various degrees of deterioration of the concrete structure, which is particularly acute along the curbing and tops of dividing walls. None of the ponds retain water supply and drainage apparatus. Areas of concern include the concrete catwalks and wall tops, and rusting water circulation features. Only a single pond, #8 located in the southwest corner, retains its original supply header, globe valve, drain pipe, and outlet or drainage screen (Figure 22). Several ponds have been adapted for use as holding ponds, but they do not reflect the original functioning because the water source, drain, and sweeping arm mechanism are no longer used.

Figure 22. Large F-L Pond #8, view to E (2017-04-02:80).

Thus, *Preservation* is the recommended treatment for a few of the ponds and interpreting the way they operated will benefit the public's understanding of the historic hatchery operation, rather than preserving 15 of the inoperable F-L ponds. Preservation will focus on the ponds in the southwest corner of the western bank (#6-8). Preserving an example of the ponds will provide a representation of the design-type of the original F-L ponds that reflects character-defining features of the shape, size, and interior mechanisms. Additionally, repairing the concrete of the representative F-L ponds and interpreting how the mechanisms worked within the ponds will provide the public with an adequate exhibit of the unique design of these rearing ponds. The historic character-defining elements of the F-L ponds can be represented by interpreting the functioning system, because the ponds cannot function as originally designed.

Rehabilitation is recommended for the remaining 12 large F-L ponds, to "return a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while preserving those portions and features of the property which are significant to its historic, architectural, and cultural values." In this case, the Large F-L ponds will be adaptively reused or rehabilitated to accommodate more beneficial fish rearing facilities (Figure 23). The location of rearing ponds in front of the hatchery is a character-defining element.

Figure 23. Aerial view of LNFH, 2006, with red outline of F-L ponds proposed for rehabilitation (FWS).

Small F-L Ponds

The three banks of small F-L ponds (40) located to the east of the hatchery building have sustained alterations over the years when the mechanical sweeping mechanisms and water delivery systems failed. In the 1950s, Ponds #42 and #56 were removed from service and altered to permit installation of two large water supply mains from the pump houses, and Ponds Nos. 44 and 45 were converted to a more raceway-type configuration where water flows in a single direction. Small F-L Ponds #37–42 and #46–55 have been modified for seasonal use by installing sun shades on steel frames, anti-predation netting, metal catwalk grates, and a PVC header for water supply. There are no ponds that function as originally designed.

The integrity of the small F-L ponds is diminished because, even though several of the ponds are used for fish rearing, they do not reflect the original functioning because the water source, drain, and sweeping arm mechanism for cleaning no longer are used. The ponds do not use the design elements that made them unique. The cast-in-place concrete walls retain integrity of location (Figure 24).

Rehabilitation is recommended for the remaining small F-L ponds, which will "return a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while preserving those portions and features of the property which are significant to its historic, architectural, and cultural values." One bank of the small F-L ponds will be rehabilitated for circular ponds within the oval shell of the F-L pond.

Figure 24. Small F-L ponds proposed for rehabilitation to circular ponds (2017-04-02:105).

Hatchery Building

The integrity of the Hatchery Building is good. Alterations have occurred, but do not detract from the significant attributes of the two-story portico, squared columns, full height multi-light steel-sash windows, and cast-in-place concrete walls.

Exterior alterations include installation of rough brick planters between the columns and around the flag pole in 1952 (Leavenworth Station Plan 1985). Severe weather, commonly experienced at Leavenworth was not considered in the building's design. The moderately pitched roof with flush eaves allows snow to build up and hang off the roof. Shutters were attached to the lower portion of the windows in 1944, to prevent breakage from snow falling from the roof (Annual Report 1944:26). Full-length shutters continue to protect the windows each winter. The building was unpainted until 1976.

More recent alteration include installation of a standing-seam metal roof in 1998, along with gabled canopies over the front entryway and rear doorway to protect pedestrians from snow. Interior changes include the conversion of the public area into a visitor's center in 2002, with exhibits, artwork, and computer-based presentations that explain the history of the facility, the ecology and biology of the salmon life cycle, and the US Fish and Wildlife Service's fish-propagation efforts. Due to concerns about contamination from lead paint, the last of the original rearing troughs were replaced with fiberglass troughs. Seismic bracing was added to the roof and loft structural supports in 2003.

A lunch room occupies the laboratory area and offices have been added to the second story. Windows in the office wings have been replaced with duplex thermal-pane, aluminum frame, fixed light over a slider. The windows fit the original size of the steel frame sash windows. One window has been

replaced with glass blocks for privacy in the remodeled restrooms. The front entrance doors have been replaced with double, glass doors. Accordion type garage doors at the gable ends have been replaced with overhead, roll-up metal doors. The end gable pedestrian doors have been closed off.

The physical condition of the building includes areas of concern. The original fenestration shows signs of rust and deterioration in the metal frames and sashes, and concrete wall damage, particularly at some window sills and expansion joints have been identified as needing repair (Figures 25-27). Some sections of the walls show evidence of water damage and spalling.

Preservation is the recommended treatment -- applying measures necessary to sustain the existing form, integrity and materials to maintain and repair the cast-in-place concrete walls and steel sash windows. The two-story portico and columns also need to be preserved.

Figure 25. Spalling at corner expansion joint (HRA 2014).

Figure 26. Deterioration at window sill (HRA 2014).

Figure 27. Water damage in wall face (HRA 2014).

Shop/Garage

The integrity of the Shop/Garage Building is good. Alterations have occurred, but do not detract from the significant attributes of multi-light steel-sash windows, cast-in-place concrete walls, and interior arrangement that reflects the working operation of the three shops. Exterior alterations include, replacement of the accordion wooden garage doors with overhead metal doors by 1997, replacing pedestrian doors, and filling of the westernmost bay, on the north elevation, with concrete blocks and a metal louver vent. On the west elevation, one five by five window unit has been replaced by a metal louver and the two adjoining window units have been replaced with concrete blocks. Two panes have been replaced with a chimney vent for a new wood stove to heat the shop area. Gas pumps and underground tanks that were in front (south side) of the building have been removed. The roof is clad with red standing seam metal panels.

The westernmost garage bay on the south elevation has been divided by the addition of a metal security door, with metal panels to infill above, framed within the existing opening and next to a narrower overhead metal garage door. A wood-framed Plexiglas “window wall” has been inserted behind the existing metal-sash windows on the interior of the east wall to reduce heat loss during the

winter. Most of the original shop equipment is still extant, although the forge has been converted into a welding station.

Preservation is the recommended treatment -- applying measures necessary to sustain the existing form, integrity and materials of the cast-in-place concrete walls, steel sash windows, and interior arrangement and equipment.

Cold Storage

The integrity of the Cold Storage Building is good. Alterations have occurred, but do not detract from the significant attributes of the cast-in-place concrete walls, steel sash windows, and interior arrangement and equipment. The heating plant was converted from coal to oil in 1958 (Annual Report 1958:10). Several areas of the building have been re-configured with the addition of concrete walls and drop ceilings. The interior retains the cold storage lockers, walk in cold storage rooms, and interior food preparation rooms. The boiler/coal storage area has been converted for vehicle storage. The chimney stacks have been removed. The accordion wooden doors have been replaced with overhead metal doors. Pedestrian doors are intact, except for one window that has been replaced with safety glass.

The primary changes include installation of a standing-seam metal roof, and replacement of two ribbons of windows on the southeast corner and a pedestrian door that were in very poor condition. Although not an exact replacement in-kind, the new metal-frame, metal-sash windows retain the same multi-light pattern and central six-light pivoting section as the originals (Figure 28). The metal pedestrian door with six-light glazing and sidelight replace an original set of paneled double doors with four-light glazing in the upper third. The concrete stairway that serves this east-end door has been resurfaced. The original windows and doors at the northwestern corner of the north elevation have been painted and boarded over on the inside.

The physical condition of the exterior surfaces of the Cold Storage Building appear generally good. Some window frames and sashes show signs of minor rust. The concrete stairs that serve the north and west doorways have minor spalling, and the paint on the doors is peeling and exposing the wood doors to rot.

Preservation is the recommended treatment -- applying measures necessary to sustain the existing form, integrity and materials of the cast-in-place concrete walls, steel sash windows, and interior arrangement and equipment.

Figure 28. Cold Storage with windows replaced (2017-04-02:27).

Residence #1

The first house, from the west end (Residence 1), retains the most intact character with the original beaded, novelty wood siding, small concrete entry porch with metal tube railing, an original window, and 1½ story form.

Alterations have occurred over the years. Roofs were covered with metal in 1954 and have been updated with new metal roofs over the years. The ribbon of five small windows on the facade have been replaced with a picture window flanked by small, single-pane double-hung windows. New storm doors have been installed and the garages were updated several times to accommodate larger vehicles. The most extensive modifications are on the rear elevation. In most instances, the kitchen entrance has been enclosed with a porch (Figure 29). But, the treatment of the enclosure is different for each house. Likewise, the dormer windows have been replaced with either a single aluminum slider or double-hung metal sash windows. The interiors have been altered and updated through the years. The houses had some minor interior seismic retrofits in 2003 to strengthen wall connections with hold-downs and foundation plate connectors. The setting has been more critically altered because some of the houses have been removed and the Wenatchee Canal is covered.

Residence #1 is clad with the original siding—an unusual type that has a substantial curved bead between novelty or drop siding planks. Although most of the interior materials have been replaced, the front, rear, and several interior doors are likely original. The enclosed rear porch is wood-framed, sided with T1-11, covered with a short section of standing-seam metal roof and incorporates a ribbon of three fixed-pane windows and a two-light slider at the east end.

Figure 29. Residence #1, rear porch addition and altered windows in dormer (2011-04-03:24).

Preservation is the recommended treatment -- applying measures necessary to sustain the existing form, integrity and materials, especially the original wood siding, as per the 2011 MOA for residing the residences, salvaged siding will be used to replace material if needed. Additionally, there is an original window in the garage that should be preserved. The metal tube railing on the front entry porch should also be preserved. Additionally, if window replacement is needed in the future the new windows should be chosen that are similar to the original style as illustrated in the house elevation (Figure 30).

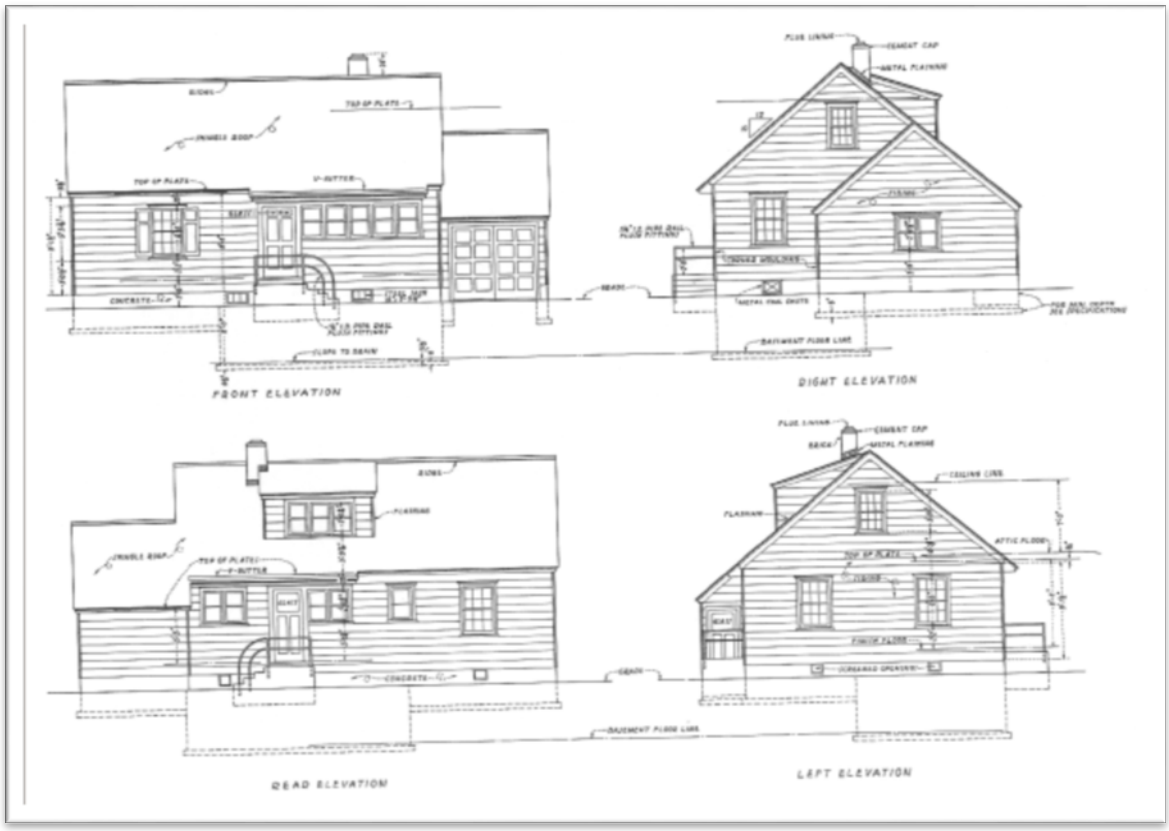

Figure 30. House elevation plan, 1939 (BOR).

<u>Residence #2</u>

The integrity of Residence #2 is fair. Alterations have occurred, but do not detract from the significant attributes of the 1½ story form, small concrete entry porch with metal tube railing, and attached garage. Exterior alterations include the installation of a standing-seam metal roof, a four-panel overhead garage door, and replacing windows. The majority of the window replacements are single-hung vinyl windows, except for a two-light slider in the dormer, three fixed panes on the west end, and a large picture window on the front, north elevation. One window opening has been filled in except for a small one-over-one, single-hung window and vent. The east end of the garage is connected to the garage of the neighboring house by a short section of gable roofing that covers an open storage area. The rear porch addition is not fully enclosed but has 3-ft high wood panels placed in front of the original metal railings. Residence 2, as of 2017 had not been resided with metal, but is slated to be sided in the near future, as per the MOA for residing the residences (2011) (Figure 31).

Rehabilitation is the current treatment option for House #2, maintaining "a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while preserving those portions and features of the property which are significant to its historic, architectural, and cultural values." In this case, Residence #2 retains its function as quarters for USFWS staff, although the exterior envelope and windows have been altered.

Figure 31. Residence #2, rear covered porch and altered windows in dormer (2017-04-02:62).

Residence #3

The integrity of the Residence #3 is fair. Alterations have occurred, but do not detract from the significant attributes of the 1½ story form, small concrete entry porch with metal tube railing, and attached garage. Residence #3 is largely similar in condition and integrity to its adjoining neighbor, Residence #2, and reflects the alterations of a standing-seam metal roof, a four-panel overhead garage door, a rear porch addition, replacement windows, and replacement metal siding (Figure 32). The house retains its basic footprint, roofline, and interior plan.

Rehabilitation is the current treatment option for House #3, maintaining "a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while preserving those portions and features of the property which are significant to its historic, architectural, and cultural values." In this case, Residence #3 retains its function as quarters for USFWS staff, although the exterior envelope and windows have been altered.

Figure 32. Residence #3, rear covered porch entry, altered windows, and resided (2017-04-02:69).

Island Road Network

The integrity of the Island road network is fair. Changes to the circulation patterns and usage of the roads have decreased their historic character, but the significant attributes of the route, materials (asphalt, crushed rock, and dirt), width, and alignment are still evident.

The physical condition of the road network is determined by the type of usage. The more heavily used sections of road connecting the hatchery complex to Icicle Creek have been maintained and resurfaced with asphalt. The more lightly used sections of road that originally served the spawning sheds consist of crushed rock and hard-packed dirt. Chain-link and wood post-and-beam fencing line the road in a few places. The main sections of the road appear in good to fair condition aside from a few isolated potholes and surface cracks (Figure 33).

Preservation is the recommended treatment -- applying measures necessary to sustain the existing form, integrity and materials of the road. The road trace and surface materials of asphalt or packed dirt are the critical elements to preserve.

Figure 33. Segment of road with asphalt and packed dirt surface (2017-04-02:05).

Diversion Canal Bridge

The integrity of the diversion canal bridge is good. This bridge appears in largely original condition, except for a chain-link fence, removal of the original guard rails, and replacement of the decking material from wood to asphalt (Figure 34).

Preservation is the recommended treatment -- applying measures necessary to sustain the existing form, integrity and materials of the steel truss bridge design.

Treatment Considerations by Material Type

Another aspect of maintenance to consider is the types of materials that are similar throughout the compound, especially reinforced concrete, steel-sash windows, and wood siding on Residence #1.

Reinforced Concrete: Nearly all of the historic buildings and structures at LNFH are constructed with cast-in-place, reinforced concrete. Another aspect of this material type is the size of the aggregate and type of reinforcement. In 1939-1940, a fairly large size of aggregate was used in the mix. Thus, when concrete begins to crack and spall the aggregate is exposed and once exposed, the concrete mix crumbles causing rapid deterioration. Structural capacity of walls, foundations, dams, and rearing ponds are subject to freeze-thaw conditions and water penetration that weakens the concrete. Repair and maintenance of all concrete walls and foundations should include yearly inspections to identify cracks, spalls, or damage with repair occurring immediately.

Figure 34. Diversion Canal Bridge, deck detail, view northwest (HRA 2014).

Steel-sash windows: Steel-sash, multi-pane windows are a character-defining feature of the three hatchery buildings. These windows are subject to weather that can cause rust and even deformation of the frames. Maintaining a painted surface on the exterior of the sash, re-sealing the window glass, and replacing broken or cracked glass panes will ensure longevity of the windows. Repairing the concrete openings surrounding the windows is also critical. Exterior storm windows should be used to protect the metal sash windows. If windows are too damaged to be repaired, replacing them with in-kind windows is recommended.

Wood Siding: Residence #1 retains the original and distinctive curved wooden siding. Because of the difficulty finding and exact match, siding was salvaged from houses #3 and #4 when they were resided with aluminum siding. Therefore, any damaged or deteriorated boards on Residence #1 can be replaced with original siding. This was described in the MOA (2011) for the residing of Residences 2 and 3. To date, Residence #2 has not been resided. Residence #4 was determined non-contributing because of many alterations prior to the residing.

Replacing windows: The residences windows have been replaced with a variety of sash styles and materials. In the future it recommended that if a window needs to be replaced that the new window be comparable or in-kind with the original plan as noted in Figure 30.

Rehabilitation Guidelines for Treatment of Historic Resources

Rehabilitation will follow the *Secretary of the Interior's Standards for the Treatment of Historic Properties*, which entails addressing the 10 questions presented below prior to implementing rehabilitation. Once again, *Rehabilitation,* is "the act or process of returning a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while

preserving those portions and features of the property which are significant to its historic, architectural, and cultural values."

Questions to address during rehabilitation process:

1. *A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces, and spatial relationships.*

2. *The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.*

3. *Each property will be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.*

4. *Changes to a property that have acquired historic significance in their own right will be retained and preserved.*

5. *Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.*

6. *Deteriorated character-defining features will be repaired rather than replaced whenever possible. In instances where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.*

7. *Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.*

8. *Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.*

9. *New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.*

10. *New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.*

Chapter 5 – SUMMARY

The operation of Leavenworth NFH is continually reviewed to ensure the fish health and rearing capacity meets the targets set by regulations and treaties. Each of the buildings and structures are listed on the agency's Real Property Inventory (RPI) and periodically reviewed for condition, costs for

maintenance, replacement, and use-life expectancy. The RPI report provides the basis for the planning and funding cycles. A new element of the RPI review is the addition of historical status. The Priority Heritage Asset (PHA) status will add an additional variable for consideration in the RPI review process.

As noted in Chapter 2, funding priorities are set each year by the Regional Director and Washington Office directives. Therefore, while recommendations for repairs and maintenance can be detailed in this report, the potential for funding is difficult to predict. A time table for completing repairs and a budget for the repairs is impossible to define. Current maintenance efforts can be found in the Deferred Maintenance 5-year plan or Station Plan. This HSR will be included with the Station Plan and RPI database to articulate the historic preservation values and guidance with the station's maintenance plans.

Within this context the Hatchery Building and Residence #1 will be recognized as PHAs, because they are unique, are associated with mission-related functions, have community support and public use, and contribute to priority public activities such as environmental education and interpretation.

Preservation is recommended for most of the contributing resources encompassed by the Leavenworth NFH historic district, including the Hatchery, Cold Storage, Shop/garage, and Residence #1, along with the Icicle Creek canal, Dam #2, Snow Lake Tunnel, Screen chamber, Road network, and bridge to ensure the legacy of the hatchery within the Columbia River Fisheries program is secured.

Preserving three of the large F-L ponds is recommended with the enhanced interpretation.
An interpretive panel to explain the design function and description of the operation of the F-L ponds will greatly enhance the public's understanding of these large structures.

Rehabilitation is recommended for the F-L ponds that are non-functional and could serve a more dynamic purpose to support fish rearing. Rehabilitation is also recommended for Residences #2 and #3 which have been heavily altered, but are important for their function and contribution to the setting of the row of houses.

Two principal issues facing the resources are deteriorating concrete and steel-sash windows. Maintaining and repairing the concrete when it is just beginning to crack or spall is critical to the survival of the resource. Additionally, protecting the concrete walls and steel-sash windows from the effects of weather, especially snow, ice, and rain. Protecting windows with storm windows and walls with snow guards is highly recommended. The F-L ponds to be preserved need to have the concrete tops of the ponds treated and repaired, along with the cracked walls, floors, and interior divider wall.

Finally, because implementing changes is controlled by many variable and may be inconsistent, this HSR is recommending that rather preparing a report every five years, that the USFWS will consult with DAHP on any proposed projects to the contributing resources as per review under the National Historic Preservation Act, Section 106 process.

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1939 7 Contractors to be Working This Fall Building Big Fish Hatchery, July 26, 1939, pg. 7.
1939 Contractors Rush Work at Leavenworth Hatchery, August 29, 1939, pg 9.
1939 $200,000 Earmarked for Leavenworth Fish Pond, September 1, 1939, pg 2.
1939 Leavenworth Canal Contract Awarded, Thursday, October 12, 1939, pg 2.
1939 Human Gophers will Tap Lake From Bottom, October 13, 1939, pg. 1.
1940 Fish Work Starts When Spring Comes, Thursday, February 22, 1940, pg. 1.
N.d. Is There Anything Bigger Anywhere? Asks Fish Chief, n.d. pgs. 1, 14.

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McCleary, Rocky, Interview on site with author, May 8, 1996.
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Thayer, Hanford, Telephone interview, with author December 17, 1996 and personal interview at residence on Whidby Island, March 25-26, 1997.
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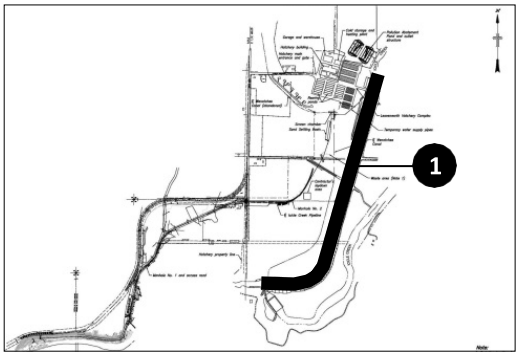
Icicle Creek Diversion Canal Resource 1



GENERAL PROPERTY INFORMATION

Construction Completed 1940

Location 12790 Fish Hatchery Road, east of main hatchery complex

ARCHITECTURAL INFORMATION

Architectural Description

The canal is a 4,085-foot by-pass or diversion of Icicle Creek, beginning at a sharp meander in the creek and oriented in a nearly straight (north-south) passage alongside the hatchery. A fish ladder and spillway are located at the downstream end and Dam #2 is located at the upstream point of the canal with a spillway to control the water flow into the meander channel. The water diverted into the meander channel discharges below the downstream spillway. Bureau of Reclamation official S.E. Hutton described the original canal in the following terms:

> The Icicle Creek diversion canal or wasteway is 115 feet wide on the bottom, with sides sloping 2 to 1. The bottom and left bank were covered with a 12-inch layer of coarse gravel, and the right bank, along the creek, was riprapped with rock taken from excavations. The canal is 17.45 feet deep, and, with water depth of 14.45 feet, will carry 10,000 cubic feet per second, twice the maximum recorded flow of Icicle Creek.
>
> The diversion canal drops only about a foot in its 4,085-foot length, leaving a difference of 10 to 12 feet between the bottom of the canal and the water level in Icicle Creek below Dam No. 5. Connection between the diversion canal and the creek channel is made through a concrete outlet structure 210 feet long. In the upper 40 feet of the structure, wing walls reduce the width of the channel to 100 feet, and an apron slopes up from the canal bottom at elevation 1,124.65 to a crest at elevation 1,129. From that point, the channel is reduced to 80 feet in width, and falls 22 feet in elevation in 130 feet, to a second apron 40 feet wide and provided with dentated sills to reduce the velocity of water discharged into Icicle Creek. A steel highway bridge spans the outlet structure at its lower end (Hutton 1940:26).

Alterations

1997: The canal remains virtually unchanged since its construction and is an important element of the hatchery landscape.

2014: Sediment accumulation has formed a small island near the upstream end of the canal, and heavy vegetative growth exists on both banks. The original Wenatchee Canal outlet structure is still extant on the north bank near the canal's upstream end and in good condition, although long out of service. Concrete in both Dam #2 (regulates flow to the canal) and the canal outlet structure exhibit minor signs of erosion. Some modern communications equipment and chain-link fences have been installed at Structure No. 2, and a fish ladder was integrated into the outlet structure in 1977, but as a whole, the canal retains good historic integrity.

STRUCTURE EVALUATION

Character-Defining Features

The canal's character-defining features relate to fish-hatchery design of the late 1930s, especially the control of water flow to the holding and spawning ponds. Specific character-defining features that reflect the canal's importance in the overall hatchery water system are listed below:

Icicle Creek Diversion Canal Resource 1

Diversion Canal

- basic dimensions and shape
- riprap and gravel banks
- Wenatchee Canal outlet structure (materials and shape)
- outlet structure (materials and design)

Dam No. 2

- concrete construction and form
- radial gates
- gate hoist and controls
- pumps

Historic Integrity

Aspect	Excellent	Good	Fair	Poor	Description
Location	☒	☐	☐	☐	Original location.
Design	☒	☐	☐	☐	Retains essential design elements including dimensions, shape, and materials.
Setting	☒	☐	☐	☐	Still functioning part of national fish hatchery; relatively rural surroundings.
Materials	☐	☒	☐	☐	Retains original materials, including rock and fill banks although now obscured in places by vegetation.
Workmanship	☒	☐	☐	☐	Reflects basic excavation and ditch construction methods.
Feeling	☒	☐	☐	☐	Because of setting and retention of many design and material elements feeling associated with original hatchery water system is still strong.
Association	☐	☒	☐	☐	Retains strong association through continued function as water diversion structure, diminished to some degree by elimination of original holding and spawning pond design and Wenatchee Canal.

DESIGN AND MAINTENANCE RECOMMENDATIONS

Current Condition

The Diversion Canal appears in good condition. Although likely not functional problems, minor areas of concern from a historic preservation standpoint include sediment accumulations that have created small islands in the canal, and vegetative growth that may at some point impact bank stability.

Maintenance and Design Priorities

1. Preservation of basic canal shape.
2. Preservation of Dam #2 structure and function.
3. Potential dredging of sandbar and sediment accumulation.

References

Hutton, S. E. “The New Salmon Hatchery at Leavenworth,” *The Reclamation Era* (December 1940): 24–30.

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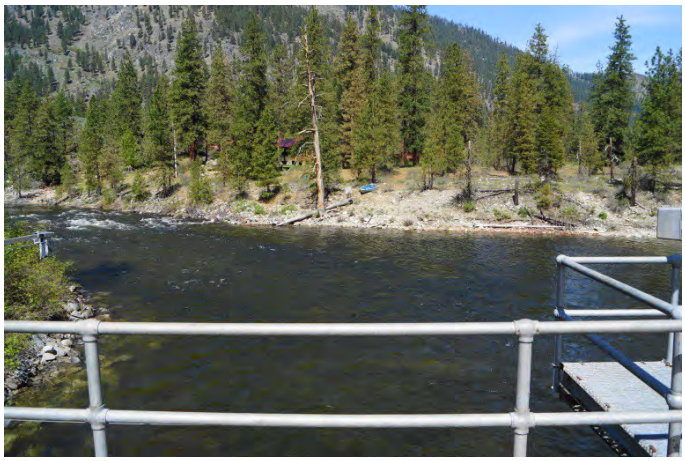
Icicle Creek Diversion Canal Resource 1

ADDITIONAL PHOTOS AND DRAWINGS

Diversion Canal under construction, December 1939.
Source: WSU Libraries, Digital Collections

Completed Diversion Canal, 1940.
Source: WSU Libraries, Digital Collections



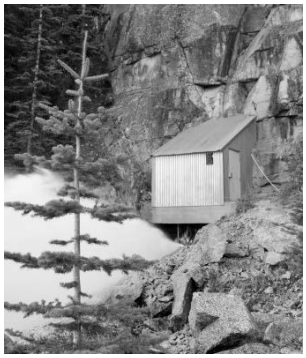
Diversion Canal, view northwest (2014).

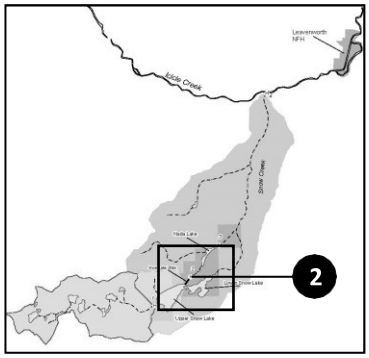
Diversion Canal showing Wentachee Canal outlet structure and sediment accumulation, view north (2014).

Diversion Canal, view north (2014).

Diversion Canal, view south from outlet structure (2014).

Snow Lake Tunnel and Valve **Resource 2**





GENERAL PROPERTY INFORMATION

Construction Completed 1939

Location Snow Lake, approximately 8 miles west of hatchery complex

ARCHITECTURAL INFORMATION

Architectural Description

The summertime low volume and warm temperatures of Icicle Creek required an alternate source of cool water for the hatchery. The Bureau of Reclamation's solution was to use a natural reservoir, Snow Lake, approximately 8 miles to the southwest and 3,000 feet above the hatchery. The engineering solution was to tap the lake near its base with a pipe and valve system. The concept works much like a faucet, when water is needed, the valve is opened and water sprays from the pipe, down the rocky slope into Snow Creek, which feeds directly into Icicle Creek. Because the distance from water source to the hatchery is short, the lake water helps maintain a consistent, cool water flow in Icicle Creek during the warm, dry summer months (Nielsen 1940). Bureau of Reclamation engineer, Louis Ackerman was principally involved in the design of the Snow Lake tunnel water source project. Sterling Hill, was the hydraulic engineer who correctly calculated the water pressure to be held by the valve gate.

In order to accomplish the plan a 7 x 9 ft tunnel was cut through 2,250 ft of solid granite rock to the bottom of Snow Lake (Annual Report 1955:21). This amazing engineering feat required several crews of men to cut the tunnel. While two other crews built a trail to haul the supplies, pipe, and a huge valve up the steep mountain (Stoffel 1939: 1,3). In the summer of 1938, the Forest Service constructed the 30 in. wide trail from the highway near Icicle Creek into Nada and Snow Lakes. A camp at Nada Lake housed the construction crews (Grand Coulee Project Report 1938:46).

The toughest individual task was moving the 2,800-pound gate valve which fits into the pipe in the tunnel's mouth. This job took a month to complete, the valve was hauled up the narrow, 6 mile path in two pieces. Some places in the path had to be blasted to widen it enough to allow the packhorses and sled to proceed (Roullier 1982:n.p.).

On October 16, 1939, the 13-month project had reached its final stage and everyone was assembled to view the blast, from above the lake. Unfortunately, the blast did not occur on schedule because of a short in the electrical wire to the powder charge. Fixing the wire required several men to "crawl through the 30-inch steel pipe that has been imbedded in concrete at the tunnel's mouth. They then had to haul in scaffolding and a ladder to get across the numerous sump holes in the floor of the bore. These sumps were dug to catch any rocks or debris that might get into the tunnel when the dynamite blast was set off and the rush of water came in" (Stoffel 1939: 1,3). The successful charge detonated at 6:15 in the evening, the dynamite blast cracked the bottom of the lake and water gushed to fill the tunnel, held in check by the gate valve exactly as designed..

In 1940, a slight modification in the operation of the Snow Lake tunnel was necessary because of "high winds, up to 60 m.p.h., experienced in the tunnel when the valve was open. To remedy the condition, the 30-in. diameter pipe was extended 124 ft to the tunnel portal, and the 28-in. valve was relocated outside the tunnel. A shelter was constructed over the valve at the tunnel portal" (Grand Coulee Project Report 1940:207).

Alterations

1997: The Snow Lake tunnel and valve are intact, except for the modification in 1940, no upgrade of the equipment has occurred. A shed was built over the outside valve and has been rebuilt as needed over the years. The Snow Lake water source remains in use exactly as it was designed and each summer when cold water is required for the hatchery, the valve is turned manually to allow lake water to join Snow Creek.

2014: In 2001, a portion of the steel pipe downstream of the original control valve and guard gate was replaced as part of the installation of a manually operated 20-inch butterfly valve at the end of the pipe. Other work included construction of a new control valve shed and installation of a metal screen entrance door to the service tunnel. The steel-framed structure has galvanized corrugated-metal siding and a shed roof. Inside, a wood-plank floor provides access to the control valve, a hand- wheel operated butterfly valve with a position indicator on the actuator shaft.

The original hand-wheel operated, 30-in cast-steel, Chapman gate valve with an integrated bypass valve assembly at the end of the service tunnel near the lake intake is still intact. Two concrete saddles and two metal pipe supports support the pipe near the valve. The steel grate floor above the valve and pipe may be original, but modern flow monitoring control equipment has been installed in the valve access area. The original steel pipeline is still visible below the grate as it extends into the tunnel through the rock. At least one bolted pipe joint has been repaired, and a section of the pipe was replaced as discussed above.

STRUCTURE EVALUATION

Character-Defining Features

The Snow Lake Tunnel and Valve character-defining features relate to fish hatchery design of the late 1930s; especially the control of water flow to the hatchery. The Snow Lake Tunnel's unique qualities and importance as a water source are contributing elements to the hatchery, even though located on a non-contiguous parcel. Specific character-defining features that reflect the valve and tunnel's importance in the overall hatchery water system include:

- valves and piping, especially original components (Chapman gate valve, steel pipe)
- access tunnel/portal

Historic Integrity

Aspect	Excellent	Good	Fair	Poor	Description
Location	☒	☐	☐	☐	Original location.
Design	☒	☐	☐	☐	Retains essential design elements valves, piping, and access tunnel. New elements, downstream butterfly valve and shed, represent 1940 modifications.
Setting	☒	☐	☐	☐	Still functioning part of national fish hatchery water supply system, wilderness surroundings in Enchantments Basin.
Materials	☐	☐	☒	☐	Retains some original materials, including Chapman gate valve and pipe. Other materials, including valve shed (siding, frame, roofing, and door), downstream butterfly valve, and security gate are replacements.
Workmanship	☐	☒	☐	☐	Reflects basic construction methods of the twentieth century, rough-cut blasted tunnel, mass-manufactured materials such as standardized pipes, valves, metal siding, and poured-concrete foundation.
Feeling	☐	☒	☐	☐	Because of setting and retention of many design and material elements, feeling associated with water supply system is still strong; diminished by new shed materials, valve, and security gate.
Association	☒	☐	☐	☐	Retains strong association through continued function as supplementary seasonal water supply for hatchery.

DESIGN AND MAINTENANCE RECOMMENDATIONS

Current Condition

Most visible components are relatively new (downstream valve, valve shed, and pipe) appear in generally good condition. Little rust is evident on pipe and valve. Original gate valve and controls appear in superficially good condition; pipe shows evidence of some joint repairs. No substantial leaks evident.

Maintenance and Design Priorities

1. Preservation of original gate valve and steel pipe; treat to inhibit rust.
2. Replace water conveyance components in kind if possible.

ADDITIONAL PHOTOS AND DRAWINGS

Snow Lake valve shed, view south (2014).

Snow Lake valve shed, view southeast (2014).

Snow Lake pipe outlet (2006).

Snow Lake pipe oulet during discharge (2014).

Valve house interior, view southeast (2006).

Detail, outlet end valve controls (2014)

Tunnel security gate, view southwest (2006).

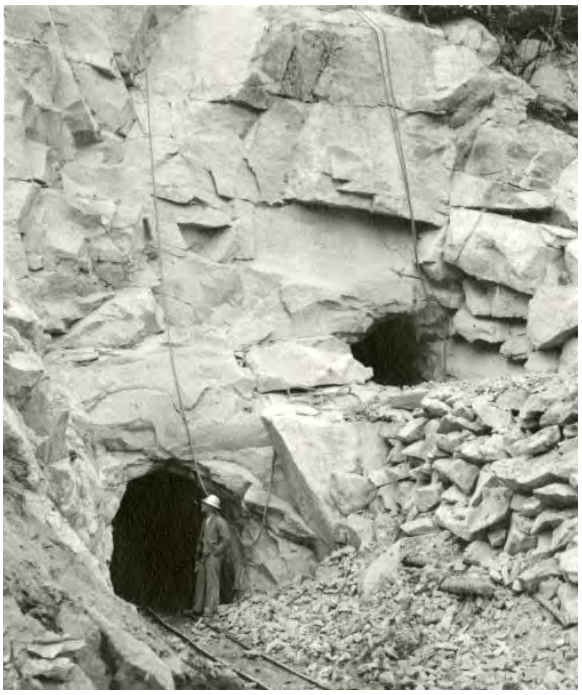
Access tunnel (2006).

Snow Lake intake end gate valve controls (2006).

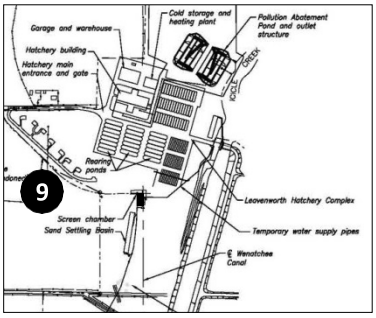
Original Chapman gate valve at lake, intake end (2014).

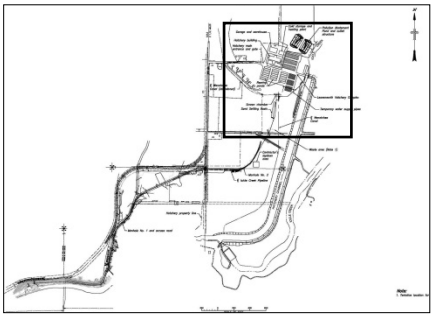
30-inch steel pipeline extended from gate valve through tunnel toward discharge end (2014).

Installation of original Chapman gate valve at lake end of pipe (1939).
Source: WSU Libraries Digital Collections



Work on pipeline and service tunnels (1939).
Source: WSU Libraries Digital Collections





GENERAL PROPERTY INFORMATION

Construction Completed 1939

Location Just south of main hatchery complex

ARCHITECTURAL INFORMATION

Architectural Description

Built in 1939 by the contracting firm of David A. Richardson, the screen chamber continues to function as a mixing and screening facility for water piped from Icicle Creek. The screen chamber is a small, flat roofed, concrete building with a square, plain cornice. Single wooden doors are present on the east and south elevations. Steel-frame sash, multi-pane windows are on the east and west walls. Interior flooring is a metal grate covering the screens over the two sets of pipes. The grate can be removed and the screens repaired or cleaned when needed. The screens are important for collecting large woody debris from the water before entering the hatchery water system.

Alterations

1997: A second screen chamber was built in 1978 and is a metal frame, gable roof building clad with T-1-11 siding. The new screen chamber is a non- contributing resource. The original screen chamber building is in fair condition, has not been altered, and continues to serve an important function.

2014: The 1939 screen chamber remains in near-original condition. The two solid-panel, metal-over-wood-core doors are replacements and the electrical system (including lights) have been updated, but most of the exterior and interior features are original, including the steel-sash windows, floor grates, screen-lift motors, and valves.

BUILDING EVALUATION

Character-Defining Features

Stylistically, the 1939 screen chamber is somewhat unusual compared to other hatchery structures. The rectangular, flat-roofed form and more stark, utilitarian design contrasts with the gable-roofed buildings and loosely Colonial Revival motifs of the main hatchery complex area. From a materials standpoint, the screen chamber shares the cast-in-place concrete structure and steel-sash windows as the others in the complex. The screen chamber's interior reflects its specialized purpose of screening and mixing for temperature control, a vital function given the temperature-sensitive nature of salmon rearing.

The building's character-defining features relate primarily to the historical theme of Bureau of Reclamation architecture and hatchery design. Specific character-defining features that reflect these themes are listed below:

Exterior

- rectangular form
- multi-light, steel-sash fenestration (location and type)
- cast-in-place, reinforced-concrete walls
- relationship to water distribution features

Interior

- original lift equipment (motors, pulleys)
- grate floors
- screens

Historic Integrity

Aspect	Excellent	Good	Fair	Poor	Description
Location	☒	☐	☐	☐	Original location.
Design	☒	☐	☐	☐	Retains essential design elements including plan, patterns of fenestration, rooflines, interior space, and function.
Setting	☒	☐	☐	☐	Still functioning part of national fish hatchery; relatively rural surroundings.
Materials	☒	☐	☐	☐	Retains many original materials, including exterior walls, fenestration, and interior screening elements. Two doors are replacements.
Workmanship	☒	☐	☐	☐	Reflects basic construction methods of the twentieth century, such as board-formed, reinforced, poured concrete, and use of mass-manufactured materials such as steel-sash windows.
Feeling	☐	☒	☐	☐	Because of setting and retention of many design and material elements, feeling associated with original hatchery building design is still strong; diminished slightly by new screening chamber in close proximity.
Association	☒	☐	☐	☐	Retains strong association through continued function as salmon-rearing facility using methods similar to original.

DESIGN AND MAINTENANCE RECOMMENDATIONS

Current Condition

Exterior surfaces and features of the screen chamber appear generally good. Areas of concern include the original fenestration, which shows signs of rust and deterioration in the metal frames and sashes, and some concrete spalling at cornice and window sills. Original screen lift motors, long out of service, are rusted.

Spalling at corner of cornice, rust and water damage (2014).

Rusted lift motor, broken window pane (2014).

Maintenance and Design Priorities

1. Preservation of original steel-sash fenestration, treat to inhibit rust.
2. Preserve floor grates and debris screens.
3. Preserve concrete walls and cornice.
4. Repair concrete damage at cornice and window sill.

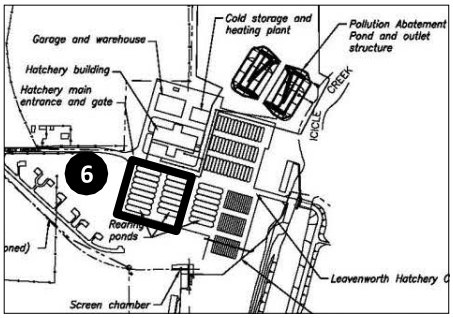
ADDITIONAL PHOTOS AND DRAWINGS

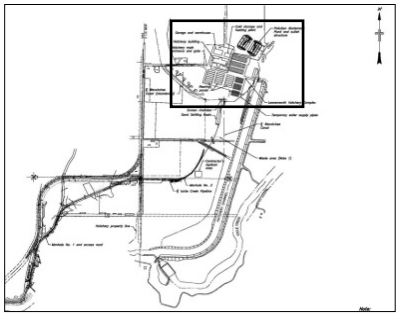
Screen Chamber, view north (2014).

Screen Chamber, interior, view north (2014).
Screen Chamber, interior (2014).

Trench connecting original Wenatchee Canal screening chamber with fish pipeline Screen Chamber, view south (2014).

Foster-Lucas Ponds (Large) Resource 6





GENERAL PROPERTY INFORMATION

Construction Completed 1940

Location 12790 Fish Hatchery Road, main hatchery complex

ARCHITECTURAL INFORMATION

Architectural Description

The original hatchery plan included the construction of 40 small and 30 large rearing ponds, designed by the Bureau of Reclamation, and built at a cost of $200,000 (WOW September 1, 1939:2). The contract was awarded to "David Nygren of Seattle, Washington, for the construction of rearing ponds and appurtenant works to provide rearing facilities for young salmon hatched at the Leavenworth station. Construction work was started on March 4, 1940 and completed on November 3, 1940" (Grand Coulee Project Report 1940:204).

The pond design was named in honor of Fred Foster, Director of the U.S. Bureau of Fisheries (U.S. Fish and Wildlife Service) for the 13 western states, at the time when Leavenworth was in the planning stages. Foster along with his assistant Clarence Lucas and son-in-law Hanford Thayer developed the prototype for the ponds.

As designed the Foster-Lucas (F-L) pond is an elongated oval, with curved end walls, and a center partition wall running lengthwise. The ponds were designed as circulating raceways, with a central water feed and discharge system built into the partition wall in the center of the oval (Burrows and Chenoweth 1955:4). Brushes were designed to sweep sediment to the center discharge area. Metal grate cat-walks connected the ponds for cleaning and repairing equipment and valves. The reinforced concrete ponds were built in two sizes: the larger are 130 ft long, 29 ft wide and 5 ft deep with a floor that slopes slightly toward the center; the smaller F-L ponds are 76 ft long, 17 ft wide, and 4 ft deep (Grand Coulee Project Report 1940:204). The ponds are arranged in banks of 7 or 8 large units and 13 small units.

Unfortunately, the design proved unsatisfactory and the large F-L ponds in front of the hatchery building have remained empty and unused almost from the beginning. In fact, research studies conducted in 1946 at Leavenworth assessed the three types of rearing containers: F-L circulating ponds, circular tanks, and rectangular raceways (Annual Report 1946:26). The rearing pond studies were critical of the F-L ponds and led to a report published in 1955 that outlined the problems. "The Foster-Lucas pond is hydraulically inferior to either the circular or the raceway pond" (Burrows and Chenoweth 1955:8,17). Essentially, the rotating arm kept the sediment in constant motion, creating very unhealthy conditions for the fingerling fish. Recommendations for replacing the F-L ponds with raceways started in the 1950s, listing "better use of the available water supply, increased production, and reduction of diseases" as reasons for the change (Annual Report 1954,1955,1956).

Alterations

1997: In 1979 the easternmost bank of 8 large F-L ponds were replaced with three banks of raceways. Each bank of raceways consist of 15 units. In 1998, a second bank of 7 large F-L ponds were replaced with 14 single lane raceways. The concrete work is in fair to poor condition and the metal grate cat-walks, metal screens, and valves have deteriorated. Many of the pipe connections have corroded, spilling water and fish beneath the ponds. Of the large F-L ponds the westernmost bank was used the longest, and one pond has been converted into an interpretive station for viewing fish.

Currently, two western-most banks of large F-L ponds (15) and the three banks of small F-L ponds (40) located to the east of the hatchery building are remaining.

2014: While the basic structure of the large F-L ponds remain, much of the original water circulation and screening apparatus are no longer extant. Only a single pond, #8 located in the southwest corner, retains its original supply header, globe valve, drain pipe, and outlet or drainage screen. The concrete pond structures continue to deteriorate, especially at the tops of dividing walls designed to serve as catwalks for maintenance. The Yakama Nation currently leases three ponds in the easternmost bank (Ponds #9, #10, and #11) for rearing fingerlings. Water supply to these ponds has been modified by installation of a PVC header and water circulation pipes. A few metal grate-type walkways are used to access the internal dividing walls, replacements for dimension-cut lumber shown in original drawings. The interpretive station, originally Pond #1, appears no longer in use.

STRUCTURE EVALUATION

Character-Defining Features

As noted above, the Foster-Lucas pond was an unproven design yet considered state-of-the-art when installed at the Leavenworth National Fish Hatchery. Specific character-defining features of the Foster-Lucas type are listed below:

- oval form with internal dividing wall, recessed curbs for sediment control, central water supply and drainage area
- water circulation features (steel supply pipe and perforated header; globe valve; drainage pipe)
- metal screens and screen brackets
- catwalks (metal support brackets, dimension-cut lumber “bridges” (no longer extant))
- cast-in-place, reinforced-concrete walls

Historic Integrity

Aspect	Excellent	Good	Fair	Poor	Description
Location	☒	☐	☐	☐	Extant large ponds in original location.
Design	☐	☐	☒	☐	All ponds retain basic form (with internal dividing wall, recessed curbs for sediment control, central water supply and drainage area); few have original water circulation features.
Setting	☐	☐	☒	☐	Although still set within national fish hatchery, lack of functionality and new hatchery structures diminish original setting.
Materials	☐	☐	☐	☒	Pond structures retain basic concrete materials, but water circulation and maintenance (catwalk access bridges) features are largely missing or replacements.
Workmanship	☐	☐	☒	☐	Reflects basic construction methods of the twentieth century, such as board-formed, reinforced, poured concrete and use of mass-manufactured materials such as dimension-cut lumber, steel pipe, and valves, where extant.
Feeling	☐	☐	☒	☐	Because of setting and retention of design and material elements, feeling associated with hatchery is still strong; diminished by lack of functionality, deterioration of concrete, and lack of water circulation apparatus.
Association	☐	☐	☒	☐	Ponds represent original period, use and function albeit in a non-functional way.

Current Condition

Although the tops of the concrete dividing walls are deteriorating, the lower wall sections and pond floors appear in generally good condition. Debris has accumulated in some of the ponds, which also have minor vegetation growth in some places. Areas of concern include the concrete catwalks and wall tops, and rusting water circulation features.

Deterioration of concrete dividing walls and debris (2014).

Typical lack of water circulation features (2014).

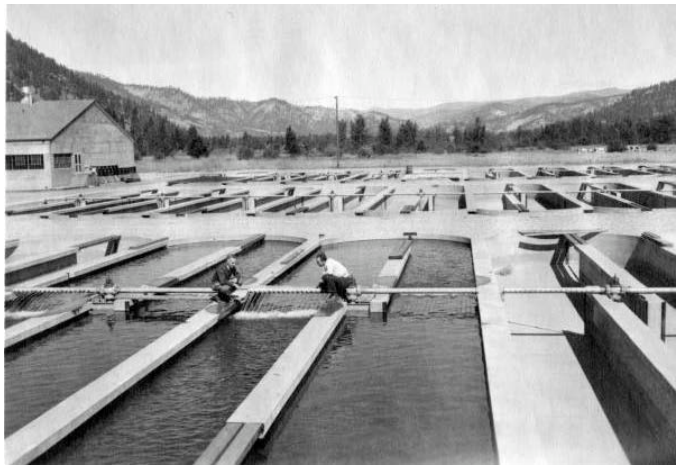
Large F-L Pond #8 (2017-04-02:80).

Maintenance and Design Priorities

1. Preservation of extant original water circulation features (steel supply pipe and perforated header; globe valve; drainage pipe; screens) and stabilizing concrete on exhibit ponds.
2. Interpretation of design and function.
3. Rehabilitation of ponds to restore function for fish rearing.

ADDITIONAL PHOTOS AND DRAWINGS

Easternmost bank of large Foster-Lucas ponds in left foreground (n.d.).
Source: WSU Libraries, Digital Collections



Small Foster-Lucas ponds included as an example of typical Foster-Lucas pond in operation (1940).
Source: WSU Libraries, Digital Collections.

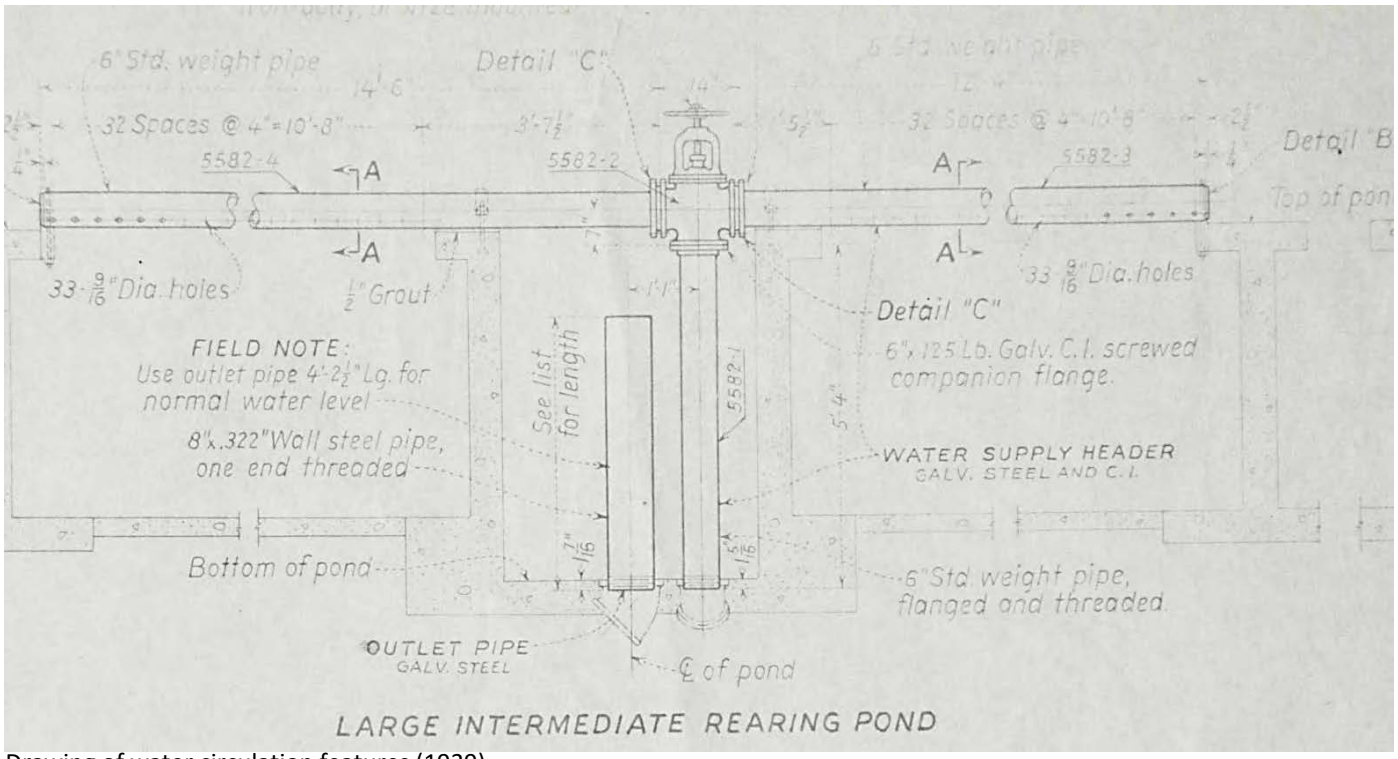
Large Foster-Lucas Pond #8 showing original water circulation features and screens. View east (2014).

Large Foster-Lucas Pond #15, showing replacement PVC water circulation feature. View west (2014).

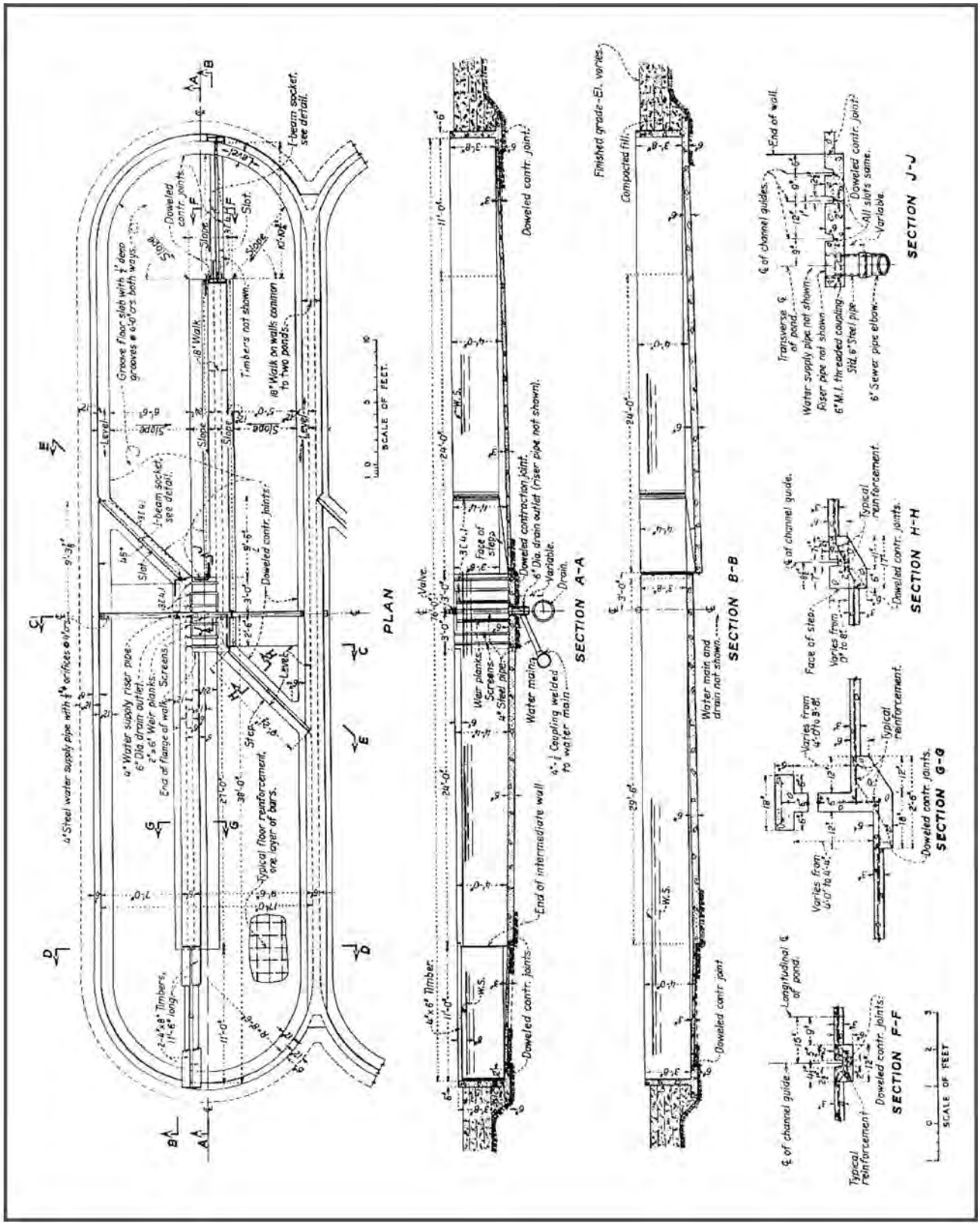
Large Foster-Lucas Pond #10, showing typical condition of pond used by Yakama Nation with metal catwalk, PVC header and water circulation features, view west (2014).

Overview of large Foster-Lucas ponds with Hatchery Building in background, view northeast (2017-04-02:81).

Salmon-rearing interpretive station, former Pond #1 (2014).

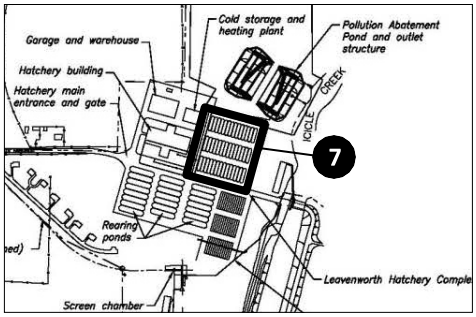


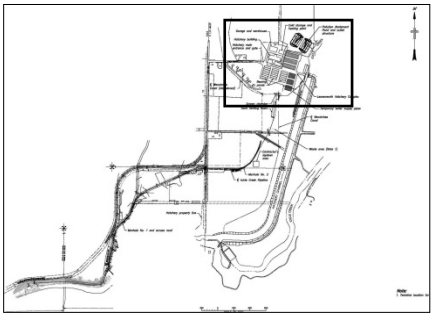
Drawing of water circulation features (1939).
Source: USFWS, LNFH



Original drawing, large Foster-Lucas pond (1939).
Source: Lou Ann Speulda, NRHP Nomination Form, Leavenworth National Fish Hatchery, 1997.

Foster-Lucas Ponds (Small) Resource 7





GENERAL PROPERTY INFORMATION

Construction Completed 1940

Location 12790 Fish Hatchery Road, main hatchery complex

ARCHITECTURAL INFORMATION

Architectural Description

The original hatchery plan included the construction of 40 small rearing ponds, designed by the Bureau of Reclamation, and built at a cost of $200,000 (WOW September 1, 1939:2). The contract was awarded to "David Nygren of Seattle, Washington, for the construction of rearing ponds and appurtenant works to provide rearing facilities for young salmon hatched at the Leavenworth station. Construction work was started on March 4, 1940 and completed on November 3, 1940" (Grand Coulee Project Report 1940:204).

The pond design was named in honor of Fred Foster, Director of the U.S. Bureau of Fisheries (U.S. Fish and Wildlife Service) for the 13 western states, at the time when Leavenworth was in the planning stages. Foster along with his assistant Clarence Lucas and son-in-law Hanford Thayer developed the prototype for the ponds.

As designed the Foster-Lucas (F-L) pond is an elongated oval, with curved end walls, and a center partition wall running lengthwise. The ponds were designed as circulating raceways, with a central water feed and discharge system built into the partition wall in the center of the oval (Burrows and Chenoweth 1955:4). Brushes were designed to sweep sediment to the center discharge area. Metal grate cat-walks connected the ponds for cleaning and repairing equipment and valves. The reinforced concrete ponds were built in two sizes: the larger are 130 ft long, 29 ft wide and 5 ft deep with a floor that slopes slightly toward the center; the smaller F-L ponds are 76 ft long, 17 ft wide, and 4 ft deep (Grand Coulee Project Report 1940:204). The ponds are arranged in banks of 7 or 8 large units and 13 and 14 small units.

Unfortunately, the design proved unsatisfactory and the large F-L ponds in front of the hatchery building have remained empty and unused almost from the beginning. In fact, research studies conducted in 1946 at Leavenworth assessed the three types of rearing containers: F-L circulating ponds, circular tanks, and rectangular raceways (Annual Report 1946:26). The rearing pond studies were critical of the F-L ponds and led to a report published in 1955 that outlined the problems. "The Foster-Lucas pond is hydraulically inferior to either the circular or the raceway pond" (Burrows and Chenoweth 1955:8,17). Essentially, the rotating arm kept the sediment in constant motion, creating very unhealthy conditions for the fingerling fish. Recommendations for replacing the F-L ponds with raceways started in the 1950s, listing "better use of the available water supply, increased production, and reduction of diseases" as reasons for the change (Annual Report 1954,1955,1956).

Alterations

1997: In the 1950s—Ponds #42 and #56 were removed from service and altered to permit installation of two large water supply mains from the pump houses, and ponds Nos. 44 and 45 were converted to a more raceway-type configuration where water flowed in a single direction. The remaining ponds lack original water circulation features and catwalks. The remaining ponds have been slightly modified by removing the mechanical sweeping equipment and increasing the water flow. The concrete work is in fair to poor condition and the metal grate cat-walks, metal screens, and valves have deteriorated. Many of the pipe connections have corroded and are no longer used.

2014: None of the 40 small F-L ponds (numbered 31 through 70) retain all aspects of their original design. Ponds #37–42 and #46–55 have been modified for seasonal use by installing sun shades on steel frames, anti-predation netting, metal catwalk grates, and a PVC header for water supply.

STRUCTURE EVALUATION

Character-Defining Features

As noted above, although the F-L pond was an unproven design, it was considered state-of-the-art when installed at the Leavenworth National Hatchery. The Foster-Lucas type was selected for rearing fingerlings at the most ambitious federal hatchery project planned to date: the three hatcheries at Leavenworth, Entiat, and Winthrop. Specific character-defining features of the Foster-Lucas type are listed below:

Foster-Lucas Type

- oval form with internal dividing wall, recessed curbs for sediment control, central water supply and drainage area
- water circulation features (steel supply pipe and perforated header; globe valve; drainage pipe)
- metal screens and screen brackets
- catwalks (metal support brackets, dimension-cut lumber "bridges" (no longer extant))
- cast-in-place, reinforced-concrete walls

Modified Foster-Lucas

- U-shaped form, with central dividing wall and curved end.
- water circulation features (dual supply headers with discharge nozzles and valves; drainage integrated into central dividing wall).
- metal screens and screen brackets, splash boards.
- cast-in-place, reinforced-concrete walls

Historic Integrity

Aspect	Excellent	Good	Fair	Poor	Description
Location	☒	☐	☐	☐	Extant small ponds in original location.
Design	☐	☐	☒	☐	All ponds retain basic form (with internal dividing wall, recessed curbs for sediment control, central water supply and drainage area) except for Ponds #44-45; none have unaltered original water circulation features.
Setting	☐	☐	☒	☐	Some ponds are still functional, but severe deterioration of other ponds, modified condition, and new hatchery structures diminish original setting.
Materials	☐	☐	☐	☒	Pond structures retain basic concrete materials, but water circulation and maintenance features are largely missing or replacements.
Workmanship	☐	☐	☒	☐	Reflects basic construction methods of the twentieth century, such as board-formed, reinforced, poured concrete and use of mass-manufactured materials such as dimension-cut lumber, steel pipe, and valves, where extant.
Feeling	☐	☐	☒	☐	Because of setting and retention of design and material elements, feeling associated with hatchery is still strong; diminished by lack of functionality, deterioration of concrete, and lack of water circulation apparatus.
Association	☐	☐	☒	☐	Ponds represent original period, use, and function albeit in a nonfunctional way.

DESIGN AND MAINTENANCE RECOMMENDATIONS

Current Condition

The condition of the small F-L ponds has greater variability than the large versions. All ponds have various degrees of deterioration of the concrete structure, which is particularly acute along the curbing and tops of dividing walls. Some of the ponds retain original water supply headers and standpipes, which exhibit signs of minor rust but otherwise in fair condition. In some places, metal grates have been installed on top of the dividing walls to improve usability. None of the ponds retain full water supply and drainage apparatus. Areas of concern include the concrete deterioration, and rusting water circulation features.

Concrete deterioration and lack of water circulation features, Pond #68 (2014).

Sun shades, metal grate catwalks, Pond #39 (2014).

Maintenance and Design Priorities

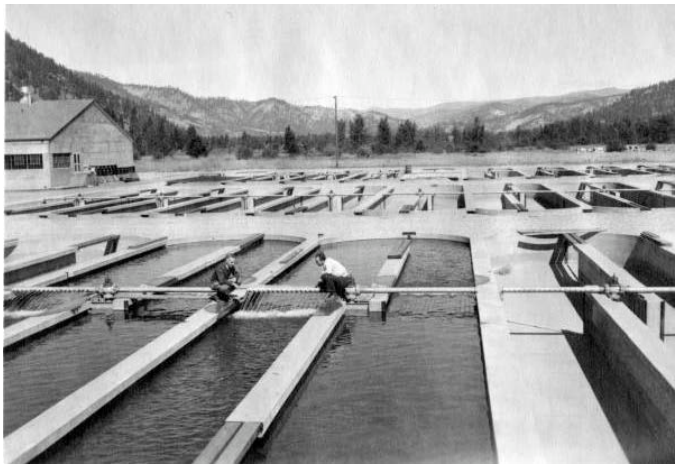
1. Rehabilitation to functioning fish rearing pond.
2. Repair or stabilization of concrete.

ADDITIONAL PHOTOS AND DRAWINGS

Small F-L pond #, view south, showing pvc header and lack of original water circulation features (2014).

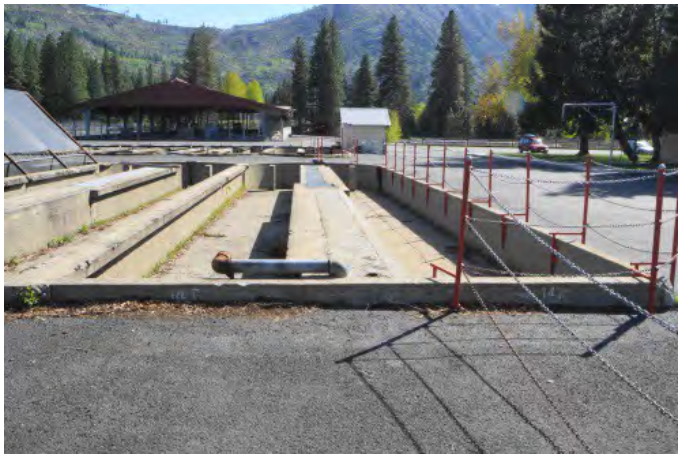
Small F-L pond #x, view north, showing moderate to heavy deterioration of wall tops and dividing wall (2014).

Small F-L pond #x converted to water supply header pit, view south (2014).



Small Foster-Lucas ponds in operation (1940). Source: WSU Libraries, Digital Collections.

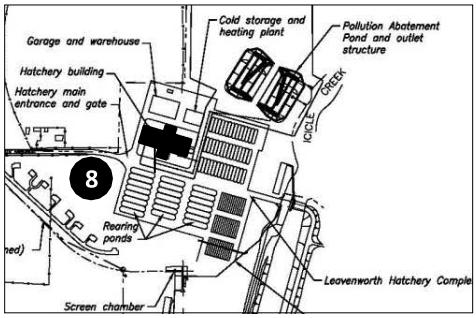
Small F-L pond #x converted to water supply header pit, view north (2014).

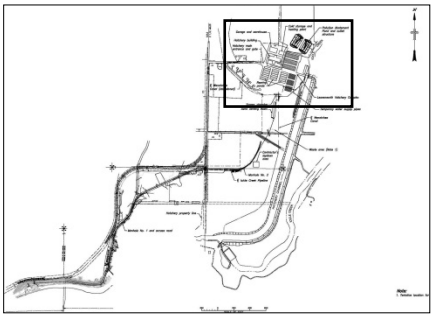


Converted raceway type pond #44, view south (2014).

Converted raceway type pond #44, view north (2014).

Hatchery Building Resource 8





GENERAL PROPERTY INFORMATION

Construction Completed 1940

Location 12790 Fish Hatchery Road, main hatchery complex

ARCHITECTURAL INFORMATION

Architectural Description

Leavenworth was the main administrative headquarters and laboratory for the extensive upper Columbia River fish rearing operation. Leavenworth was built as the center-piece of a multi-hatchery plan that included hatcheries at Entiat, Winthrop, and one proposed for the Okanagan. The symmetrical and uniform appearance of the concrete building is both grand and industrial. The front facing two-story, hipped-roof extension is 36 x 45 ft, supported by six square columns the rear extension is 44 x 45 feet. The full-story columns replicate the rhythm of the side gable building with its full-height windows. Exterior architectural details are clean and simple, with close verges, boxed eaves and plain cornices. Each elevation is enlivened by the symmetrical placement of steel-frame, multi-pane windows. Four 36 in ventilators with dampers are present on the roof peak.

The 90 x 225 ft building was constructed between August 7, 1939 and April 27, 1940, at a cost of about $159,999 on contract from the Bureau of Reclamation to McDonald Construction Company. Apparently, the original plan for the building was an even grander, 162 x 308 ft, as reported in the local newspaper (WOW June 16, 1937:1).

The building's function for rearing eggs and fry-stage fish determined the size of the primary east-west gable form. The front hipped extension contained offices, a public area, and storage. The rear hipped extension contained offices, a laboratory, and storage. The main hatchery interior is intact: an open, unheated, single room, filled with hatchery rearing troughs. As designed there were 288 troughs, 36 of the original are still in use. The open truss roof provides an expansive volume lighted by the tall windows. The height of the roof is somewhat unusual, but reflects the input in design by engineer, Hanford Thayer. "The height was necessary because there was never enough storage room for items needed in the hatchery, thus the idea for the loft" (Hanford Thayer, personal communication 1996). The loft or balcony, as designed by Thayer, is 28 ft wide and runs the full length of the building. The loft is accessed by stairs at either end and ladders in the center. The balcony is constructed of wood with side-walls but no ceiling. Although conceived by Thayer as filling a critical need, the unheated balcony has seen limited use.

Alterations

1997: In 1952 rough brick planters were added between the columns and around the flag pole (Leavenworth Station Plan 1985). The front entrance doors have been replaced with double, glass doors. Accordion type garage doors and two pedestrian wooden doors were originally placed at the hatchery's gable ends. The accordion style doors have been replaced with overhead, roll-up metal doors. The pedestrian doors have been closed off. Severe weather, commonly experienced at Leavenworth was not considered in the building's design. The moderately pitched roof with flush eaves allows snow to build up and hang off the roof. Shutters were attached to the lower portion of the windows in 1944, to prevent breakage from snow falling from the roof (Annual Report 1944:26). Shutters continue to be used to protect the windows each winter. The windows show signs of deterioration, where exposure to precipitation and freezing is damaging the concrete wall. The building was left unpainted until 1976. Interior modifications include remodeling offices and public area, updating the restrooms, and creating a gift shop. A lunch room occupies the laboratory area and offices have been added to the second story. Windows in the office wings have been replaced with duplex thermal-pane, aluminum frame, fixed light over a slider. The windows fit the original size of the steel frame sash windows. One window has been replaced with glass blocks for privacy in the remodeled restrooms.

2014: The Hatchery Building has undergone few changes since 1997. Exterior alterations include a standing-seam metal roof installed in 1998, and short metal, gable canopies added over the front entryway and rear doorway to protect pedestrians from snow. The full-length metal shutters may be replacements. Interior changes include the conversion of the public area into a visitors center in 2002, with exhibits, artwork, and computer-based presentations that explain the history of the facility, the ecology and biology of the salmon life cycle, and the US Fish and Wildlife Service's fish-propagation efforts. Due to concerns about contamination from lead paint, the last of the original rearing troughs were replaced with those made of fiberglass; incubating trays appear contemporary as well. Pedestrian doors were reinstalled in three of the four doorways on the west and east hatchery wings, with one doorway remaining boarded up. Seismic bracing was added to the roof and loft structural supports in 2003.

BUILDING EVALUATION

Character-Defining Features

The Leavenworth facility was one of the few fish hatcheries in the United States built by the Bureau of Reclamation. The design originated in the Denver headquarters, which was responsible for creating standardized designs for many of the buildings and structures needed for the Bureau's projects. As standard-bearer of the effort to mitigate the effects of the Grand Coulee Dam on Columbia River salmon populations, the Hatchery Building represents the grandest expression of a relatively cohesive architectural program developed for Bureau hatcheries. The design is at heart a warehouse-type structure born from several decades of practical experience and commonly used in hatcheries, but stylized with elements of a 1930s, utilitarian adaptation of Colonial Revival. While the moderately pitched end-gable roof, symmetrical design, and equally spaced multi-light windows were general characteristics of the Colonial Revival, the more distinctive aspects of the style were reserved for the front elevation "wing," a two-story, five-bay, hipped-roof office space fronted by a two-story portico with squared column supports. The Hatchery Building fits in architecturally with other headquarters the Bureau designed in the late 1930s, such as the Estes Park headquarters of the Colorado–Big Thompson Irrigation Project, and the Toyon headquarters of Central Valley Irrigation Project (Pfaff 2007:150, 157). As one architectural historian pointed out, these buildings bore a slight resemblance to Mount Vernon, which may have served as a source of inspiration (Pfaff 2007:150).

Given this context, the building's character-defining features relate to several architectural and historical themes of the 1930s including Bureau of Reclamation architecture; hatchery architecture and design; Colonial Revival; and fisheries management. Specific character-defining features that reflect these themes are listed below:

Exterior

- symmetry
- portico with supporting squared columns
- multi-light, steel-sash fenestration (location and type)
- moderately pitched gable and hipped roofline, close eaves and verges
- cast-in-place, reinforced-concrete walls

Interior

- rearing hall (space, water supply piping, trenches)
- public space
- loft/mezzanine design
- steel roof truss

Historic Integrity

Aspect	Excellent	Good	Fair	Poor	Description
Location	☒	☐	☐	☐	Original location.
Design	☐	☒	☐	☐	Retains essential design elements including plan, patterns of fenestration, rooflines, and most interior spaces. Some alterations of interior spaces, fenestration types, and minor additions (planter boxes, shutters, and structural bracing).
Setting	☒	☐	☐	☐	Still functioning part of national fish hatchery; relatively rural surroundings.
Materials	☐	☒	☐	☐	Retains many original materials, including exterior walls, some fenestration, interior walls, stairways, and loft structure. Replacement materials include roof, some fenestration, and interior and exterior doors.
Workmanship	☐	☒	☐	☐	Reflects basic construction methods of the twentieth century, such as board-formed, reinforced, poured concrete, and use of mass-manufactured materials such as dimension-cut lumber, riveted-steel roof trusses, and steel-sash windows.
Feeling	☐	☒	☐	☐	Because of setting and retention of many design and material elements, feeling associated with original hatchery building design is still strong; diminished slightly by new roof, office fenestration and doors.
Association	☒	☐	☐	☐	Retains strong association through continued function as salmon-rearing facility using methods similar to original.

DESIGN AND MAINTENANCE RECOMMENDATIONS

Current Condition

Exterior surfaces and features of the Hatchery Building appear generally good, especially the non-original components such as the standing-seam metal roof, aluminum office windows, shutters, and doors. Areas of concern include original fenestration, which shows signs of rust and deterioration in the metal frames and sashes, and concrete wall damage, particularly at some window sills and expansion joints. Some sections of the walls show evidence of water damage and spalling.

Spalling at corner expansion joint (2014).

Deterioration at window sill (2014).

Water damage in wall face (2014).

Maintenance and Design Priorities

1. Preservation of original steel-sash fenestration, an increasingly rare window type; treat to inhibit rust.
2. Preservation of cast-in-place concrete walls and columns.
3. Monitor concrete for evidence of deterioration on a yearly cycle. Repair as needed.

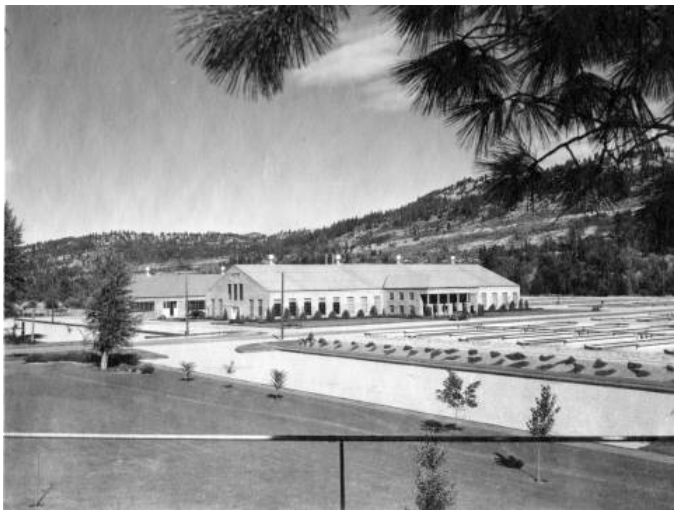
References

Pfaff, Christine E. *The Bureau of Reclamation's Architectural Legacy: 1902 to 1955*. Denver: US Department of the Interior, Bureau of Reclamation 2007.

Speulda, Lou Ann. "Leavenworth National Fish Hatchery." National Register of Historic Places Nomination Form. US Fish & Wildlife Service, 1997.

ADDITIONAL PHOTOS AND DRAWINGS

Hatchery Building under construction (1939–1940).
Source: WSU Libraries, Digital Collections



Hatchery Building (1940).
Source: WSU Libraries, Digital Collections

Hatchery Building, front elevation, view northwest (2014).

Hatchery Building, front portico and entrance, view north (2014).

Hatchery Building, front oblique, view northeast (2014).

Hatchery Building, rear oblique, view southwest (2014).

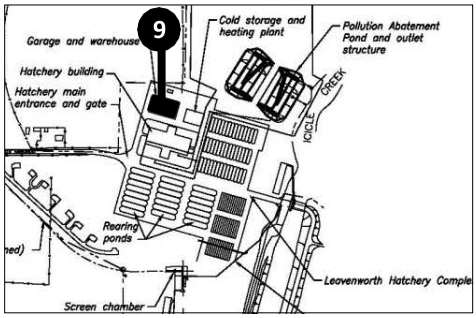
Hatchery Building, rear entrance, view south (2014).

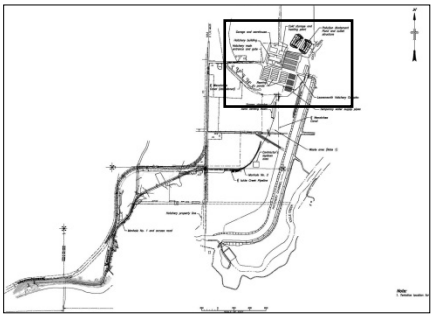
Hatchery Building, front window detail, view north (2014).

Hatchery Building, interior loft and roof trusses, view west (2014).

Hatchery Building, rearing troughs, view west (2014).

Shop/Garage Resource 9





GENERAL PROPERTY INFORMATION

Construction Completed 1940

Location 12790 Fish Hatchery Road, main hatchery complex

ARCHITECTURAL INFORMATION

Architectural Description

This rectangular plan, side gable, reinforced concrete walled building, is 89 ft 8 in. x 142 ft 8 in. and cost about $65,686 to build, in 1940. The Garage/Shop was constructed by the David A. Richardson Company of Idaho. The Garage was designed to "house the 8 fish hauling trucks, other cars and trucks, carpenter shop, and blacksmith and repair shop, as well as furnish storage room for general supplies and equipment" (Grand Coulee Report 1939:260). Two 36 in. ventilators are present on the gable roof peak. Windows are arranged in banks of alternating three by five and four by five steel-frame sashes and grouped in sets of five. The south elevation also included three accordion door entrances, and one pedestrian door. Two gasoline pumps were located near the southeast corner. The north elevation contains six garage-door bays.

The Garage interior is divided in half lengthwise by a hollow clay tile block wall, like the Cold Storage building. The roof truss is steel and the ceiling is finished with cedar tongue-in-groove boards, although it was originally to be plastered (WOW August 29, 1939:9). The interior is intact. Across the front half of the building are the carpenter shop, blacksmith shop, and generalachine shop. In the rear of the building is a storage area for fish trucks, cars, and a grease pit (Annual Report 1945:23). The wood shop is still functional and contains some of the original equipment and the metal shop includes the blacksmith forge and vent. Equipment in the shops includes "a drill press (ca. 1920); a band saw; a wood drill; a brake shoe; a joiner; a Rockwell sander; a metal lathe; and, an anvil" (Rocky McCleary, personal communication 1996). The shops provided all the necessary parts for building and repairing pipes and fashioning equipment and hardware for the hatchery.

Alterations

1997: On the north and south elevations, the accordion wooden doors have been replaced with overhead metal doors. The new doors fit within the same bays. A vent fan has been installed through the window in the metal shop. The pedestrian entrance on the south elevation has been replaced with a metal security door covered by a small porch. The westernmost bay, on the north elevation, has been altered by in-filling with concrete blocks and a metal louver vent. On the west elevation, one five by five window unit has been replaced by a metal louver and the two adjoining window units have been replaced with concrete blocks. Two panes have been replaced with a chimney vent for a new wood stove to heat the shop area. Windows are intact on the south and east walls. Gas pumps and underground tanks that were in front (south side) of the building have been removed. The roof is covered with gray metal panels.

2014: In 1998, the US Fish and Wildlife Service installed a new standing-seam metal roof that matches others in the immediate vicinity. The westernmost garage bay on south elevation has been divided by the addition of a metal security door, with metal panels to infill above, framed within the existing opening and next to a narrower overhead metal garage door. A wood-framed plexiglass “window wall” has been inserted behind the existing metal-sash windows on the interior of the east wall to reduce heat loss during the winter. Most of the shop equipment described in paragraph above are still extant, although the forge has been converted into a welding station.

BUILDING EVALUATION

Character-Defining Features

The Garage represents a more utilitarian execution of the design program developed for the hatchery complex. It shares the same moderately pitched end-gable roof, equally spaced multi-light, steel-sash windows, concrete walls, and lack of decoration and ornament that were general characteristics of the three primary hatchery buildings, but lacks the symmetry and more distinctive Colonial Revival elements such as the hipped-roof portico of the Hatchery Building.

Although the wood-leaf, accordion-type doors are gone, the building retains its original hollow tile walls, roof trusses, wood plank ceiling, corrugated-metal sliding doors, and most of original interior spacing, which reflects its original function as a maintenance and carpenter's shop.

The Garage's character-defining features relate to several architectural and historical themes of the 1930s, including Bureau of Reclamation architecture; hatchery architecture and design; and support function. Specific character- defining features that reflect these themes are listed below:

Exterior

- moderately pitched end-gable roofline, close eaves and verges, and ventilators
- multi-light, steel-sash fenestration (location and type)
- cast-in-place, reinforced-concrete walls
- garage doors (openings)

Interior

- spatial arrangements (shop rooms, vehicular maintenance space)
- hollow-tile partition walls
- original shop equipment
- steel roof truss and wood-plank ceiling
- corrugated-metal sliding doors

Historic Integrity

Aspect	Excellent	Good	Fair	Poor	Description
Location	☒	☐	☐	☐	Original location.
Design	☐	☒	☐	☐	Retains many essential design elements, including plan, most patterns of fenestration, rooflines, and interior spaces. Some alterations of interior spaces, fenestration (infilling), garage doors, and minor additions (vents, pedestrian doors).
Setting	☒	☐	☐	☐	Still functioning part of national fish hatchery; relatively rural surroundings.
Materials	☐	☒	☐	☐	Retains many original materials, including exterior walls, fenestration, interior walls and sliding doors, ventilators, and roof trusses. Replacement materials include roof, infilling, and interior and exterior doors.
Workmanship	☐	☒	☐	☐	Reflects basic construction methods of the twentieth century, such as board-formed, reinforced, poured concrete, and use of mass-manufactured materials such as dimension-cut lumber, riveted-steel roof trusses, and steel-sash windows.
Feeling	☐	☒	☐	☐	Because of setting and retention of many design and material elements, feeling associated with original hatchery building design is still strong; diminished slightly by new roof, infilling, and doors.
Association	☒	☐	☐	☐	Retains strong association through continued function as hatchery support facility and wood shop.

DESIGN AND MAINTENANCE RECOMMENDATIONS

Current Condition

Exterior surfaces and features of the Garage appear generally good, especially the non-original components such as the standing-seam metal roof, and garage doors. Unlike the Hatchery Building, window sashes, frames, and sills show little evidence of rust and deterioration. Only a small CMU section of infilling shows some signs of water damage and discoloration from stack exhaust.

Water and exhaust stains on CMU and concrete wall near stack vent (2014).

Wood-framed plexiglass behind original metal-sash windows(2014).

Maintenance and Design Priorities

1. Preservation of original steel-sash fenestration, an increasingly rare window type; treat to inhibit rust.
2. Retention of original interior features if possible (hollow tile walls, sliding doors, wood-plank ceiling, and shop equipment).
3. Monitor concrete for evidence of deterioration on a yearly cycle. Repair as needed.

References

ADDITIONAL PHOTOS AND DRAWINGS

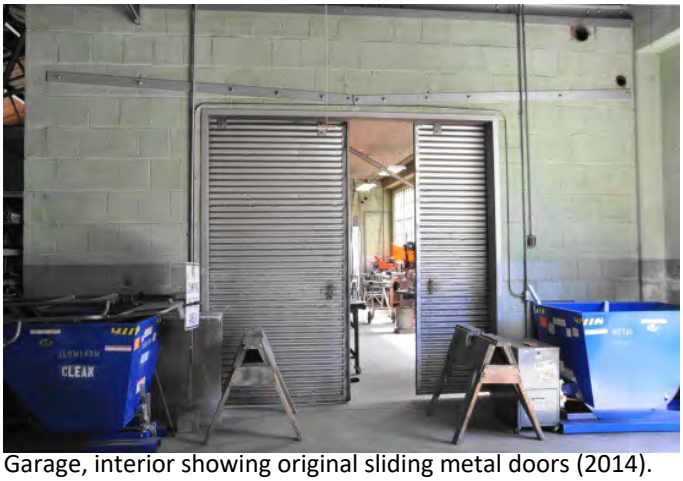
Garage, oblique of front, south elevation and east elevation, view northwest (2014).

Garage, front, south elevation, view north (2014).

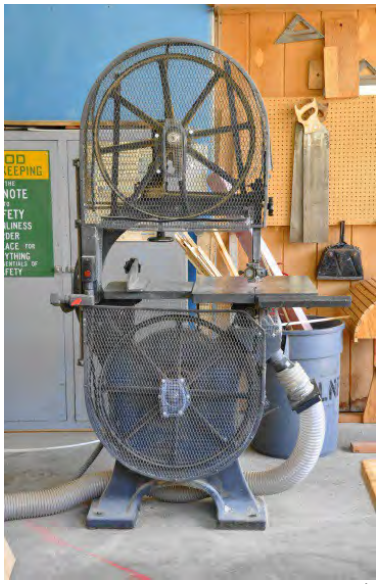
Garage, east elevation, view west (2014).

Garage, west elevation, view east (2014).

Garage, interior showing hollow tile partition walls, roof trusses, and wood plank ceiling (2014).

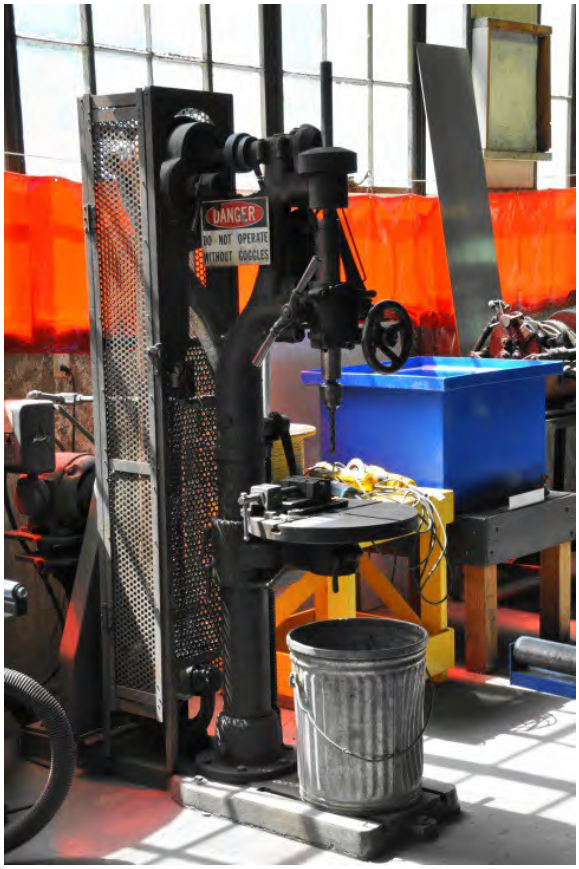


Garage, interior showing original sliding metal doors (2014).



Garage, saw in wood shop room (2014).

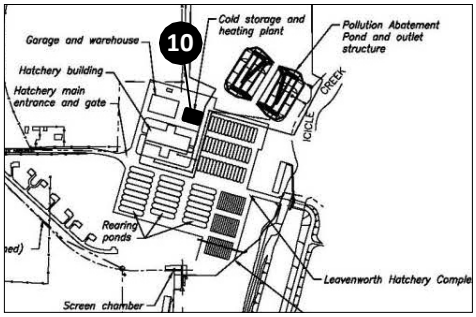
Garage, fan behind heater in wood shop room (2014).

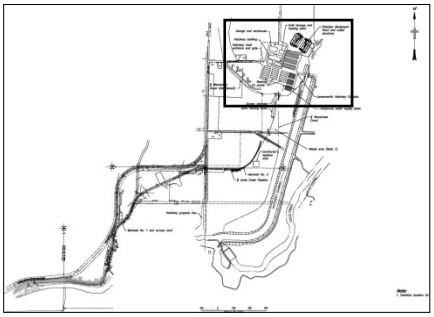


Garage, drill press (2014).

Garage, die press (2014).

Cold Storage Resource 10





GENERAL PROPERTY INFORMATION

Construction Completed 1940

Location 12790 Fish Hatchery Road, main hatchery complex

ARCHITECTURAL INFORMATION

Architectural Description

The need for refrigeration of large quantities of fish food provided the functional requirements for the Cold Storage building's design. This large rectangular building (67 ft 8 in. x 96 ft 8 in.) with side-gable roof was constructed by MacDonald Construction Company in 1940 at a cost of $84,007. The building housed "the heating plant, refrigeration machinery, cold storage space, and food preparation and storage rooms for all types of fish food. The heating system for the hatchery and garage and office building is a two-pipe steam system, consisting of two mechanically-fired boilers equipped with complete automatic control equipment" (Grand Coulee Project Report 1940:204-205). The reinforced concrete building has clipped gable ends, boxed eaves, and a plain cornice. Multi-pane windows and accordion style garage doors with windows offered relief to the building's austere exterior. Two 24 in. ventilators are present on the gable roof peak, along with a ventilating duct and twin chimney stacks for the boilers. Windows are primarily three panes tall by five panes wide, however, three by three and three by four windows also are present on the building. And, the southwest corner windows are arranged in a block of three windows with four by six panes.

Interior walls are constructed of hollow clay tile blocks. The steel-truss roof is open above the tile walls and the ceiling is finished with cedar tongue-and-groove boards. The interior arrangement included a "boiler room, coal bin, loading platform room, food preparation room, ice making room, ice storage room, compressor room, two cold storage rooms, sharp freezer room, and corridor" (Annual Report 1945:23). The York Ice Machinery Corporation was awarded the contract for furnishing and installing refrigeration equipment for the cold storage plant (Grand Coulee Project Report 1940:205).

Alterations

1997: The heating plant was converted from coal to oil in 1958 (Annual Report 1958:10). Several areas of the building have been re-configured with the addition of concrete walls and drop ceilings. The interior retains the cold storage lockers, walk in cold storage rooms, and interior food preparation rooms. The boiler/coal storage area has been converted for vehicle storage. The moderately sloped asbestos shingle roof is currently covered with red metal panels. The chimney stacks have been removed. The accordion wooden doors have been replaced with overhead metal doors. All of the windows are intact. The southeastern corner windows are deteriorating because of exposure to weather. Pedestrian doors are intact, except for one window that has been replaced with safety glass.

2014: The primary changes since 1997 include installation of a standing-seam metal roof, and replacement of two ribbons of windows on the southeast corner and a pedestrian door. Although not an exact replacement in-kind, the new metal-frame, metal-sash windows retain the same multi-light pattern and central six-light pivoting section as the originals. The metal pedestrian door with six-light glazing and sidelight replace an original set of paneled double doors with four-light glazing in the upper third. The concrete stairway that serves this east-end door have been resurfaced. The original windows and doors at the northwestern corner of the north elevation have been painted over and boarded up on the inside. The west elevation appears intact, except for modern security lights and utility lines.

BUILDING EVALUATION

The Cold Storage Building represents a more utilitarian execution of the design program developed for the hatchery complex. It shares the same moderately pitched end-gable roof, equally spaced multi-light, steel-sash windows, concrete walls, and lack of decoration and ornament that were general characteristics of the three primary hatchery buildings, but lacks the symmetry and more distinctive Colonial Revival elements such as the hipped-roof portico of the Hatchery Building.

Although some components such as the wood-leaf, accordion-type garage doors, asbestos shingle roof, some windows and pedestrian doors have been replaced, the building retains much of its original appearance and design. The Cold Storage Building's character-defining features relate to several architectural and historical themes of the 1930s, including Bureau of Reclamation architecture; hatchery architecture and design; and support function. Specific character-defining features that reflect these themes are listed below:

Exterior

- moderately pitched side-gable roofline, close eaves and verges, and ventilators
- multi-light, steel-sash fenestration (location and type)
- cast-in-place, reinforced-concrete walls
- garage doors (openings)

Interior

- Original cold storage walk-in refrigeration room with metal door
- spatial arrangements
- hollow-tile partition walls
- steel roof truss and wood-plank ceiling

Historic Integrity

Aspect	Excellent	Good	Fair	Poor	Description
Location	☒	☐	☐	☐	Original location.
Design	☐	☒	☐	☐	Retains many essential design elements including plan, most patterns of fenestration, rooflines, and interior spaces. No evidence of ice elevator originally installed to cool fish truck water.
Setting	☒	☐	☐	☐	Still functioning part of national fish hatchery; relatively rural surroundings.
Materials	☐	☒	☐	☐	Retains many original materials, including exterior walls, some fenestration, pedestrian doors (northeast corner), ventilators, and roof trusses. Replacement materials include roof, and some doors and windows (southeast corner).
Workmanship	☐	☐	☒	☐	Reflects basic construction methods of the twentieth century, such as board-formed, reinforced, poured concrete, and use of mass-manufactured materials such as dimension-cut lumber, riveted-steel roof trusses, and steel-sash windows. Diminished slightly by new materials (roof and windows).
Feeling	☐	☒	☐	☐	Because of setting and retention of many design and material elements, feeling associated with original hatchery building design is still strong; diminished slightly by new roof, windows, and doors.
Association	☒	☐	☐	☐	Retains strong association through continued function as hatchery support facility.

DESIGN AND MAINTENANCE RECOMMENDATIONS

Current Condition

Exterior surfaces and features of the Cold Storage Building appear generally good. Some window frames and sashes show signs of minor rust. The concrete stairs that serve the north and west doorways have minor spalling, and the paint on the doors is peeling and exposing the wood doors to rot.

Peeling paint and wood deterioration on doors (2014).

Light spalling on concrete platforms (2014).

Light rust on window frames (2014).

Maintenance and Design Priorities

1. Preservation of original steel-sash fenestration, an increasingly rare window type; treat to inhibit rust.
2. Preservation of original wood doors with four-light glazing.
3. Repair of areas of concrete spalling.
4. Consistency of window replacement program, if continued.
5. Monitor concrete for evidence of deterioration on a yearly cycle. Repair as needed.

References

ADDITIONAL PHOTOS AND DRAWINGS

Cold Storage, oblique showing front, south elevation and east elevation, view northwest (2014).

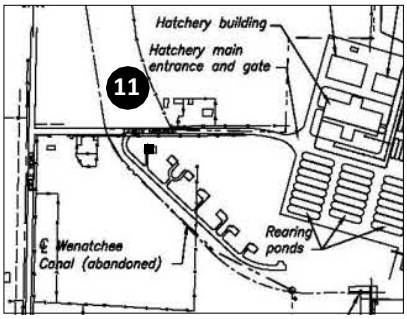
Cold Storage, oblique showing rear, north elevation and west elevation, view southeast (2014).

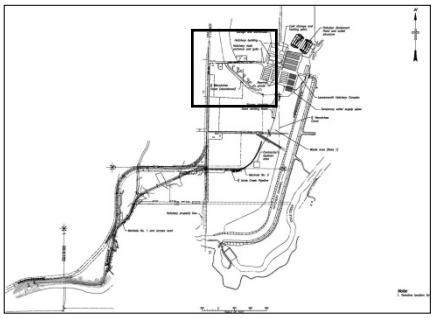
Cold Storage, front, south elevation, view northeast (2014).

Cold Storage, replacement window and door detail on east wall, view northwest (2014).

Cold Storage, showing original and replacement windows, south wall, view north (2014).

Residence #1 Resource 11





GENERAL PROPERTY INFORMATION

Construction Completed 1941

Location 12790 Fish Hatchery Road

ARCHITECTURAL INFORMATION

Architectural Description

A contract valued at $55,859 was awarded to W. J. Park and Son, of Yakima, Washington, for the construction of residences at the Leavenworth and Entiat Stations (Grand Coulee Project Report 1940:205-206). Work on the seven Leavenworth residences was started in September 1940, but heavy winter snows stopped construction. The houses were completed on March 27, 1941.

Original plans for Leavenworth included construction of 10 cottages, a dormitory, and a superintendent's house (WOW June 16, 1937: 1). However, only seven residences were constructed. The building style and floor plan for six of the houses was the Bureau of Reclamation's design Type-4, USBR drawing 40-0-3162. One house was a smaller, 1-story version of this plan style. The Type-4 plan is very plain when compared to other styles available in the Bureau of Reclamation's design book. In fact, at an early planning stage a more elaborate "rustic style" house plan was suggested. The location of the houses also changed from a single straight row facing the main highway, to a curved row facing the hatchery. Alterations in the "as-built" form suggest that Leavenworth's residences were scaled down from the original design.

Residential units near the hatchery are crucial to the success of the operation. Feeding and water control require round-the- clock coverage, seven days a week. The houses are situated with an overview of the hatchery to accommodate the staff. A steep embankment separates the houses from the hatchery. The main entrance road to the hatchery descends the slope in front of the houses. Large conifers screen the houses from the entrance drive. All of the houses were built with the same design plans, but were altered slightly to accommodate the setting. The availability of supplies also may have been a factor, for instance, the front windows installed were different at each of the hatcheries.

The 1½-story, side-gable houses have moderately pitched roofs and are simply finished with clipped gables, boxed eaves, and decorative cap window trim. The wood-frame houses are clad with rustic drop siding and finished with corner boards. A single-car garage is attached. The houses have asymmetrical facades with the concrete porch entrance flanked by a ribbon of five small single-pane double-hung sash windows on one side and a six-over-six double-hung sash on the other side. A curved pipe railing outlines the small front porch. The gable ends are symmetrically designed with two windows on the main floor and a single window centered in the gable end. All of the houses have a rear shed-roof dormer. Small, double-hung, single pane windows were arranged as a trio in the dormer. The rear of the house contains the kitchen, bathroom, and dining room windows that are single-pane, double-hung style, and the bedroom window that is a multi-pane, double-hung style. All of the houses have a three-quarter, finished basement.

Alterations

1997: Four houses remain today, and all have been altered to some degree. The first, from the west end, retains the most intact character. The siding, the front door, and metal porch railings are intact on all of the houses. Roofs were covered with metal in 1954 (Annual Report 1954: 18). The ribbon of five small windows on the facade have been replaced with a picture window flanked by small, single-pane double-hung windows. New storm doors have been installed and the garages were updated several times to accommodate larger vehicles. The most extensive modifications are to the rear of the buildings. In most instances, the kitchen entrance has been enclosed with a porch. But, the treatment of the enclosure is different for each house.

Likewise, the dormer windows have been replaced with either a single aluminum slider or double-hung metal sash windows. Unfortunately, the most prominent view of the houses is toward the rear, the most altered elevation. The interiors have been altered and updated through the years. The three houses at the western end of the street are considered contributing resources reflecting the association of a "row of housing" for hatchery employees.

2014: The US Fish and Wildlife Service converted Residence #1, the westernmost of the four houses, to office and meeting space for the Nasikelt River Discovery Center. However, in 2019 the building is again being used as staff housing. One original window on the garage's west wall is intact. All other windows are replacements, but the wood frames appear original. Alterations since 1997 include the installation of a standing-seam metal roof and a four-panel overhead door, and some minor interior seismic retrofits in 2003 to strengthen wall connections with hold-downs and foundation plate connectors. The house still retains its basic footprint, roofline, interior plan, and most of its original window and door openings. Additionally, Residence #1 is clad with the original siding—an unusual type that has a substantial curved bead between novelty or drop siding planks. Although most of the interior materials have been replaced, the front, rear, and several interior doors are likely original. The enclosed porch is wood-framed, sided with T1- 11, covered with a short section of standing-seam metal roof at a shallow pitch than the main roof, and incorporates a ribbon of three fixed-pane windows and a two-light slider at the east end.

BUILDING EVALUATION

Character-Defining Features

The project included a row of seven houses—six identical six-room types and one five-room type—for hatchery workers that, when originally constructed, stood along the northern bank of the Wenatchee Canal (see additional photos below). Plans for the residences originated in the Denver headquarters, which was responsible for creating standardized designs for many of the buildings and structures needed for the Bureau's projects. In residential designs created between 1918 and 1930, Bureau architects embraced a Bungalow style, but in the 1930s, they turned to the Cape Cod Revival style, which was becoming widely popular at the time. A number of designs for three-, four-, and five-bedroom houses in this style were developed for the Grand Coulee project and used elsewhere (Pfaff 2007:139). Typical characteristics of the Cape Cod Revival included a simple rectangular footprint, one to one-and-a-half stories, steep pitched roofs with little overhang, multi-pane windows (often with decorative shutters), brick chimneys, detailed entries, minimal ornamentation, wood clapboard siding, and wood-shingle roofs, occasionally augmented by subservient wings that served as garages—a nearly exact description of the six-room design used at the Leavenworth hatchery (DAHP 2014). The Cape Cod Revival paired well with the loosely Colonial Revival motif of the main hatchery complex. Whether other examples of the six-room model are still extant at other Bureau facilities is unknown, but Pfaff records that some were built at the Anderson Ranch Camp in Idaho in the early 1940s (Pfaff 2007:165).

Given this context, Residence #1's character-defining features relate to several architectural and historical themes of the 1930s, including Bureau of Reclamation architecture; hatchery architecture and design; and Cape Cod Revival. Specific character- defining features that reflect these themes are listed below:

Exterior

- rectangular footprint
- multi-pane windows (no longer extant) and openings
- beaded, novelty wood siding
- moderately pitched side-gable roof, close eaves and verges
- paneled and glazed doors
- attached garage
- one-and-one-half stories

Interior

- six-room configuration
- built-in cabinetry
- solid paneled wood doors and metal hardware

Historic Integrity

Aspect	Excellent	Good	Fair	Poor	Description
Location	☒	☐	☐	☐	Original location.
Design	☐	☒	☐	☐	Retains essential design elements including plan, patterns of fenestration, rooflines, doorways, and most interior spaces. Slightly diminished by addition of an enclosed porch.
Setting	☐	☒	☐	☐	No longer serves as residence but retains residential and relatively rural surroundings (except absence of Wenatchee Canal).
Materials	☐	☒	☐	☐	Retains some original materials, most importantly the siding and many doors, but most windows and roof are replacements.
Workmanship	☐	☐	☒	☐	Reflects basic construction methods of the twentieth century, such as wood-framed structure, and use of mass-manufactured materials such as dimension-cut lumber, siding, and doors. Metal standing-seam roofing, vinyl windows, and T1-11 represent later methods and workmanship.
Feeling	☐	☒	☐	☐	Because of setting and retention of many design and material elements, feeling associated with original hatchery building design is still strong; diminished slightly by new roof, office fenestration, and doors.
Association	☐	☒	☐	☐	Retains strong association with hatchery.

DESIGN AND MAINTENANCE RECOMMENDATIONS

Current Condition

Exterior surfaces and features of Residence #1 appear generally good. Aside from minor surface wearing of some paint surfaces, no significant areas of concern.

Minor paint surface wearing (2014).

Maintenance and Design Priorities

1. Preservation of original footprint, design elements (dormers, window openings, doorways, roofline).
2. Preservation of original wood siding (one of two remaining examples in the operators' housing).
3. Preservation of wood double-hung window in garage (last remaining example).
4. Preservation of interior and exterior doors or in-kind replacement.
5. Metal railing on front entrance.
6. Eventual restoration of multi-light windows that more closely approximate original appearance.

References

Pfaff, Christine E. *The Bureau of Reclamation's Architectural Legacy: 1902 to 1955*. Denver: US Department of the Interior, Bureau of Reclamation, 2007.

Washington Department of Archaeology and Historic Preservation (DAHP), Cape Cod Revival. Electronic document, http://www.dahp.wa.gov/styles/cape-cod-revival.

ADDITIONAL PHOTOS AND DRAWINGS

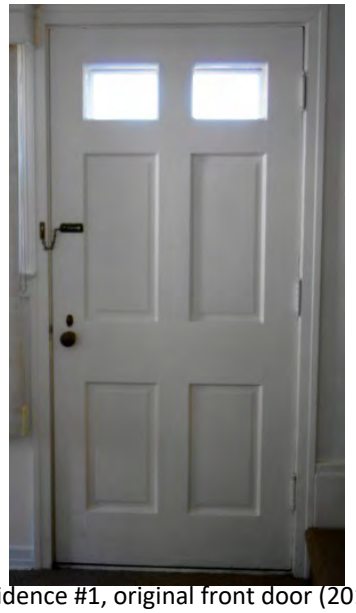
Original LNFH residences on bank of Wenatchee Canal (1941).
Source: WSU Libraries, Digital Collections

Residence #1, south elevation, view north (2014).

Residence #1, west elevation, view east (2014).

Residence #1, oblique view to southwest (2014).

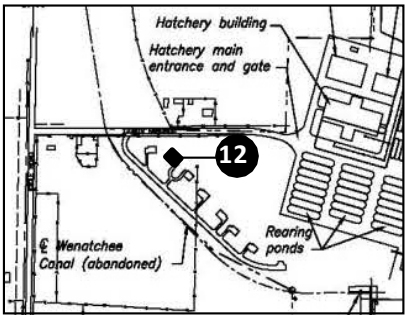
Residence #1, built-in cabinets (2014).

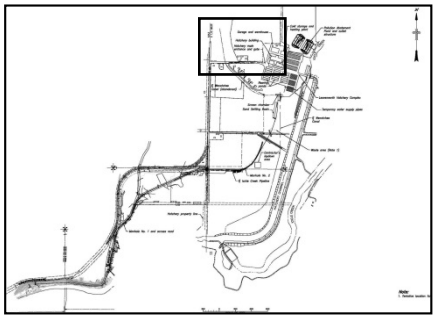


Residence #1, original front door (2014).

Residence #1, west and north elevations, view southeast (2017-04-02:58).

Residence #2 Resource 11





GENERAL PROPERTY INFORMATION

Construction Completed 1941

Location 12790 Fish Hatchery Road

ARCHITECTURAL INFORMATION

Architectural Description

A contract valued at $55,859 was awarded to W. J. Park and Son, of Yakima, Washington, for the construction of residences at the Leavenworth and Entiat Stations (Grand Coulee Project Report 1940:205-206). Work on the seven Leavenworth residences was started in September 1940, but heavy winter snows stopped construction. The houses were completed on March 27, 1941.

Original plans for Leavenworth included construction of 10 cottages, a dormitory, and a superintendent's house (WOW June 16, 1937: 1). However, only seven residences, all following the same floor plan, were constructed. The building style and floor plan was the Bureau of Reclamation's design Type-4, USBR drawing 40-0-3162. One house was a smaller, 1-story version of this plan style. The Type-4 plan is very plain when compared to other styles available in the Bureau of Reclamation's design book. In fact, at an early planning stage a more elaborate "rustic style" house plan was suggested. The location of the houses also changed from a single straight row facing the main highway, to a curved row facing the hatchery. Alterations in the "as-built" form suggest that Leavenworth's residences were scaled down from the original design.

Residential units near the hatchery are crucial to the success of the operation. Feeding and water control require round-the- clock coverage, seven days a week. The houses are sited with an overview of the hatchery to accommodate the staff. A steep embankment separates the houses from the hatchery. The main entrance road to the hatchery descends the slope in front of the houses. Large conifers screen the houses from the entrance drive. Housing at Entiat and Winthrop are sited in similar positions on a terrace, over-looking the hatchery complex. All of the houses were built with the same design plans, but were altered slightly to accommodate the setting. The availability of supplies also may have been a factor, for instance, the front windows installed were different at each of the hatcheries.

The 1½-story, side-gable houses have moderately pitched roofs and are simply finished with clipped gables, boxed eaves, and decorative cap window trim. The wood-frame houses are clad with rustic drop siding and finished with corner boards. A single-car garage is attached. The houses have asymmetrical facades with the concrete porch entrance flanked by a ribbon of five small single-pane double-hung sash windows on one side and a six-over-six double-hung sash on the other side. A curved pipe railing outlines the small front porch. The gable ends are symmetrically designed with two windows on the main floor and a single window centered in the gable end. All of the houses have a rear shed-roof dormer. Small, double-hung, single pane windows were arranged as a trio in the dormer. The rear of the house contains the kitchen, bathroom, and dining room windows that are single-pane, double-hung style, and the bedroom window that is a multi-pane, double-hung style. All of the houses have a three-quarter, finished basement.

Alterations

1997: Four houses remain today, and all have been altered to some degree. The first, from the west end, retains the most intact character. The siding, the front door, and metal porch railings are intact on all of the houses. Roofs were covered with metal in 1954 (Annual Report 1954: 18). The ribbon of five small windows on the facade have been replaced with a picture window flanked by small, single-pane double-hung windows. New storm doors have been installed and the garages were updated several times to accommodate larger vehicles. The most extensive modifications are to the rear of the buildings. In most instances, the kitchen entrance has been enclosed with a porch. But, the treatment of the enclosure is different for each house.

Likewise, the dormer windows have been replaced with either a single aluminum slider or double-hung metal sash windows. Unfortunately, the most prominent view of the houses is toward the rear, the most altered elevation. The interiors have been altered and updated through the years. The three houses at the western end of the street are considered contributing resources reflecting the association of a "row of housing" for hatchery employees.

2014: Alterations since 1997 include the installation of a standing-seam metal roof, a four-panel overhead garage door, a metal stack at northeast corner that starts near floor line and carries up the side of north wall, and some minor interior seismic retrofits in 2003 to strengthen wall connections with hold-downs and foundation plate connectors. As noted above, the windows have been replaced, but the wood frames appear original. The majority of the replacements are single-hung vinyl windows, except for a two-light slider in the dormer, three fixed panes on the west end, and a large picture window on the front, north elevation. One window opening has been filled in except for a small one-over-one, single-hung window and vent. The east end of the garage is connected to the garage of the neighboring house by a short section of gable roofing that covers an open storage area. A short section of standing seam metal roof at a shallow pitch than the main roof covers the rear- entryway porch. Unlike Residence #1, the porch is not fully enclosed but has 3-ft high wood panels placed in front of the original metal railings. The house still retains its basic footprint, roofline, interior plan, and most of its original window and door openings. Additionally, Residence #2 is clad with the original siding—an unusual type that has a substantial curved bead between drop siding planks. The building will be sided with aluminum siding in the near future, by 2020.

BUILDING EVALUATION

Character-Defining Features

The project included a row of seven houses—six identical six-room types and one five-room type—for hatchery workers that, when originally constructed, stood along the northern bank of the Wenatchee Canal (see additional photos below). Plans for the residences originated in the Denver headquarters, which was responsible for creating standardized designs for many of the buildings and structures needed for the Bureau's projects. In residential designs created between 1918 and 1930, Bureau architects embraced a Bungalow style, but in the 1930s, they turned to the Cape Cod Revival style, which was becoming widely popular at the time. A number of designs for three-, four-, and five-bedroom houses in this style were developed for the Grand Coulee project and used elsewhere (Pfaff 2007:139). Typical characteristics of the Cape Cod Revival included a simple rectangular footprint, one to one-and-a-half stories, steep pitched roofs with little overhang, multi-pane windows (often with decorative shutters), brick chimneys, detailed entries, minimal ornamentation, wood clapboard siding, and wood-shingle roofs, occasionally augmented by subservient wings that served as garages—a nearly exact description of the six-room design used at the Leavenworth hatchery (DAHP 2014). The Cape Cod Revival paired well with the loosely Colonial Revival motif of the main hatchery complex. Whether other examples of the six-room model are still extant at other Bureau facilities is unknown, but Pfaff records that some were built at the Anderson Ranch Camp in Idaho in the early 1940s (Pfaff 2007:165).

Given this context, Residence #2's character-defining features relate to several architectural and historical themes of the 1930s including Bureau of Reclamation architecture; hatchery architecture and design; and Cape Cod Revival. Specific character- defining features that reflect these themes are listed below:

Exterior

- rectangular footprint
- multi-pane windows (no longer extant) and openings
- moderately pitched side-gable roof, close eaves and verges
- one-and-one-half stories
- paneled and glazed doors
- attached garage
- dormer with three-window configuration (converted to two-light slider configuration)

Interior

- six-room configuration
- built-in cabinetry

Historic Integrity

Aspect	Excellent	Good	Fair	Poor	Description
Location	☒	☐	☐	☐	Original location.
Design	☐	☐	☒	☐	Retains essential design elements including plan, rooflines, doorways, and most interior spaces. Slightly diminished by changes to fenestration, and addition of covered porch and metal stack.
Setting	☐	☒	☐	☐	Retains residential and relatively rural surroundings (except absence of Wenatchee Canal).
Materials	☐	☒	☐	☐	Retains some original materials, most importantly the siding and many doors, but windows and roof are replacements.
Workmanship	☐	☐	☒	☐	Reflects basic construction methods of the twentieth century, such as wood-framed structure, and use of mass-manufactured materials such as dimension-cut lumber, siding, and doors. Metal standing-seam roofing and vinyl windows represent later methods and workmanship.
Feeling	☐	☒	☐	☐	Because of setting and retention of many design and material elements, feeling associated with original hatchery building design is still strong; diminished slightly by new roof, fenestration, and storm windows and doors.
Association	☐	☒	☐	☐	Retains strong association with hatchery as an employee residence.

DESIGN AND MAINTENANCE RECOMMENDATIONS

Current Condition

Exterior surfaces and features of Residence #2 appear generally good. Aside from minor surface wearing of some paint surfaces, no significant areas of concern.

Maintenance and Design Priorities

1. Preservation of original footprint, design elements (dormers, window openings, doorways, roofline).
2. Preservation of metal railings on porches.

References

Pfaff, Christine E. *The Bureau of Reclamation's Architectural Legacy: 1902 to 1955*. Denver: US Department of the Interior, Bureau of Reclamation 2007.

Washington Department of Archaeology and Historic Preservation (DAHP). "Cape Cod Revival." Electronic document, http://www.dahp.wa.gov/styles/cape-cod-revival.

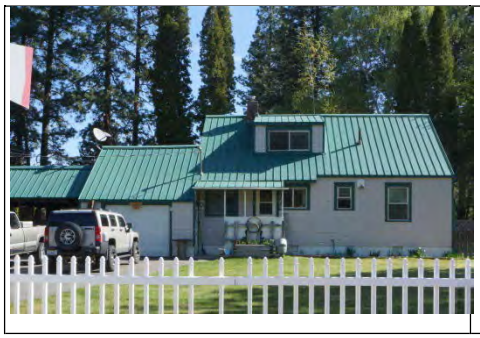
ADDITIONAL PHOTOS AND DRAWINGS

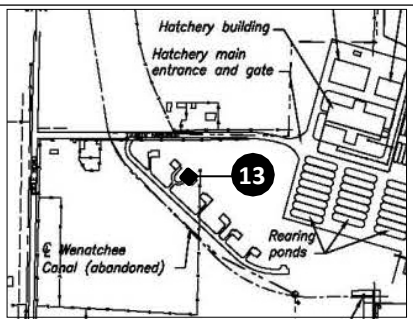
Residence #2, view north (2014).

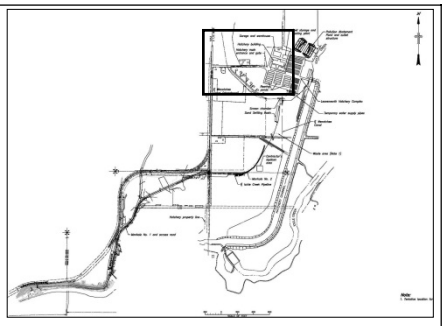
Residence #2, oblique showing west and south elevations, view northeast (2014).

Residence #2, north elevation, view southwest (2017-04-02:73).

Residence #2, front elevation, view south (2017-04-02:74).







GENERAL PROPERTY INFORMATION

Construction Completed 1941

Location 12790 Fish Hatchery Road

ARCHITECTURAL INFORMATION

Architectural Description

A contract valued at $55,859 was awarded to W. J. Park and Son, of Yakima, Washington, for the construction of residences at the Leavenworth and Entiat Stations (Grand Coulee Project Report 1940:205-206). Work on the seven Leavenworth residences was started in September 1940, but heavy winter snows stopped construction. The houses were completed on March 27, 1941.

Original plans for Leavenworth included construction of 10 cottages, a dormitory, and a superintendent's house (WOW June 16, 1937: 1). However, only seven residences were constructed. The building style and floor plan was the Bureau of Reclamation's design Type-4, USBR drawing 40-0-3162. The Type-4 plan is very plain when compared to other styles available in the Bureau of Reclamation's design book. In fact, at an early planning stage a more elaborate "rustic style" house plan was suggested. The location of the houses also changed from a single straight row facing the main highway, to a curved row facing the hatchery. Alterations in the "as-built" form suggest that Leavenworth's residences were scaled down from the original design.

Residential units near the hatchery are crucial to the success of the operation. Feeding and water control require round-the- clock coverage, seven days a week. The houses are situated with an overview of the hatchery to accommodate the staff. A steep embankment separates the houses from the hatchery. The main entrance road to the hatchery descends the slope in front of the houses. Large conifers screen the houses from the entrance drive. All of the houses were built with the same design plans, but were altered slightly to accommodate the setting. The availability of supplies also may have been a factor, for instance, the front windows installed were different at each of the hatcheries.

The 1½-story, side-gable houses have moderately pitched roofs and are simply finished with clipped gables, boxed eaves, and decorative cap window trim. The wood-frame houses are clad with rustic drop siding and finished with corner boards. A single-car garage is attached. The houses have asymmetrical facades with the concrete porch entrance flanked by a ribbon of five small single-pane double-hung sash windows on one side and a six-over-six double-hung sash on the other side. A curved pipe railing outlines the small front porch. The gable ends are symmetrically designed with two windows on the main floor and a single window centered in the gable end. All of the houses have a rear shed-roof dormer. Small, double-hung, single pane windows were arranged as a trio in the dormer. The rear of the house contains the kitchen, bathroom, and dining room windows that are single-pane, double-hung style, and the bedroom window that is a multi-pane, double-hung style. All of the houses have a three-quarter, finished basement.

Alterations

1997: Four houses remain today, and all have been altered to some degree. Roofs were covered with metal in 1954 (Annual Report 1954: 18). The ribbon of five small windows on the facade have been replaced with a picture window flanked by small, single-pane double-hung windows. New storm doors have been installed and the garages were updated several times to accommodate larger vehicles. The most extensive modifications are to the rear of the buildings. In most instances, the kitchen entrance has been enclosed with a porch. But, the treatment of the enclosure is different for each house. Likewise, the dormer windows have been replaced with either a single aluminum slider or double-hung metal sash windows. Unfortunately, the most prominent view of the houses is toward the rear, the most altered elevation. The interiors have been altered and updated through the years. The three houses at the western end of the street are considered contributing resources reflecting the association of a "row of housing" for hatchery employees.

2014: Residence #3 is largely similar in condition and integrity to its eastern neighbor, Residence #2, except for the siding, which

is no longer original. Alterations since 1997 include the installation of a standing-seam metal roof, metal siding, a four-panel overhead garage door, and some minor interior seismic retrofits in 2003 to strengthen wall connections with hold-downs and foundation plate connectors. The porch is covered with a short section of standing-seam metal roof at a shallower pitch than the main roof but not enclosed. The house still retains its basic footprint, roofline, and interior plan.

BUILDING EVALUATION

Character-Defining Features

The project included a row of seven houses—six identical six-room types and one five-room type—for hatchery workers that when originally constructed, stood along the northern bank of the Wenatchee Canal (see additional photos below). Plans for the residences originated in the Denver headquarters, which was responsible for creating standardized designs for many of the buildings and structures needed for the Bureau's projects. In residential designs created between 1918 and 1930, Bureau architects embraced a Bungalow style, but in the 1930s, they turned to the Cape Cod Revival style, which was becoming widely popular at the time. A number of designs for three-, four-, and five-bedroom houses in this style were developed for the Grand Coulee project and used elsewhere (Pfaff 2007:139). Typical characteristics of the Cape Cod Revival included a simple rectangular footprint, one to one-and-a-half stories, steep pitched roofs with little overhang, multi-pane windows (often with decorative shutters), brick chimneys, detailed entries, minimal ornamentation, wood clapboard siding, and wood-shingle roofs, occasionally augmented by subservient wings that served as garages—a nearly exact description of the six-room design used at the Leavenworth hatchery (DAHP 2014). The Cape Cod Revival paired well with the loosely Colonial Revival motif of the main hatchery complex. Whether other examples of the six-room model are still extant at other Bureau facilities is unknown, but Pfaff records that some were built at the Anderson Ranch Camp in Idaho in the early 1940s (Pfaff 2007:165).

Given this context, Residence #3's character-defining features relate to several architectural and historical themes of the 1930s, including Bureau of Reclamation architecture; hatchery architecture and design; and Cape Cod Revival. Specific character- defining features that reflect these themes are listed below:

Exterior

- rectangular footprint
- one-and-one-half stories
- attached garage
- moderately pitched side-gable roof, close eaves and verges
- paneled and glazed doors
- shed dormer

Interior

- six-room configuration
- built-in cabinetry
- solid paneled wood doors and metal hardware

Historic Integrity

Aspect	Excellent	Good	Fair	Poor	Description
Location	☒	☐	☐	☐	Original location.
Design	☐	☐	☒	☐	Retains essential design elements including plan, rooflines, doorways, and most interior spaces. Slightly diminished by changes to fenestration, and addition of covered porch.
Setting	☒	☐	☐	☐	Retains residential and relatively rural surroundings (except absence of Wenatchee Canal).
Materials	☐	☐	☐	☒	Retains few original exterior materials apart from doors and concrete foundation.
Workmanship	☐	☐	☒	☐	Reflects basic construction methods of the twentieth century, such as wood-framed structure, and use of mass-manufactured materials such as dimension-cut lumber, siding, and doors. Metal standing-seam roofing and vinyl windows represent later methods and workmanship.
Feeling	☐	☐	☒	☐	Because of setting and retention of many design elements, feeling associated with hatchery housing is strong; diminished by new roof, fenestration, siding, and storm windows and doors.
Association	☒	☐	☐	☐	Retains strong association with hatchery as an employee residence.

DESIGN AND MAINTENANCE RECOMMENDATIONS

Current Condition

Exterior surfaces and features of Residence #3 appear generally good.

Maintenance and Design Priorities

1. Preservation of original footprint, design elements (dormers, window openings, doorways, roofline).
2. Preservation of front porch and metal tube railing.

References

Pfaff, Christine E. *The Bureau of Reclamation's Architectural Legacy: 1902 to 1955*. Denver: US Department of the Interior, Bureau of Reclamation 2007.

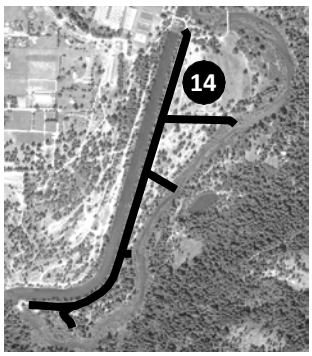
Washington Department of Archaeology and Historic Preservation (DAHP). "Cape Cod Revival." Electronic document, http://www.dahp.wa.gov/styles/cape-cod-revival.

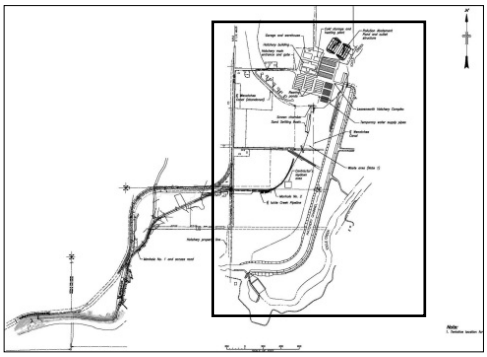
ADDITIONAL PHOTOS AND DRAWINGS

Residence #3, front and west side (2017-04-02:76).

Residence #3, rear elevation (2017-04-02:71).

Island Road Network Resource 14





GENERAL PROPERTY INFORMATION

Construction Completed 1939

Location Road network on the island between the Diversion Canal and Icicle Creek

ARCHITECTURAL INFORMATION

Architectural Description

The blacktop roads, constructed in 1939, leading to the Icicle Creek spawning sheds and ponds are still in good condition. Today the roads are only used for service vehicle traffic and pedestrians.

Alterations

1997: None described.

2014: The only part of the road network that serves the Leavenworth National Fish Hatchery designated as a contributing resource is that portion confined to the island between the Diversion Canal and Icicle Creek. The more heavily used sections are maintained and repaired regularly. The paved sections are in relatively good condition. The more lightly used sections that originally served the spawning sheds and Structures #3 and # 4 consist largely of crushed rock and hard-packed dirt. Chain-link and wood post-and-beam fencing line the road in places.

BUILDING EVALUATION

Character-Defining Features

The hatchery road network reflected the importance of vehicles in the maintenance and operations of the facility. Because of the distance between the central hatchery complex and the various control structures and spawning grounds of Icicle Creek, the road network served the important function of speeding travel between the manually controlled radial gates that managed water flow, the groundwater pumps, and the spawning areas. Specific character-defining features include:

- design (layout)/route
- materials (asphalt, crushed rock, and dirt)
- width and alignment

Historic Integrity

Aspect	Excellent	Good	Fair	Poor	Description
Location	☒	☐	☐	☐	Original location.
Design	☐	☒	☐	☐	Retains essential design elements including layout and grade. Some sections of the road no longer maintained.
Setting	☐	☒	☐	☐	Still functioning part of national fish hatchery within relatively rural surroundings; diminished by reduction in use associated with the elimination of Icicle Creek as holding and spawning area.
Materials	☐	☒	☐	☐	Material replacements have been in kind, except for some sections that are no longer maintained. Unoriginal fencing lines road in some places.
Workmanship	☐	☒	☐	☐	Reflects basic road construction methods of the twentieth century, such as graded and mechanically poured asphalt.
Feeling	☐	☒	☐	☐	Because of setting and retention of many design and material elements, feeling associated with original hatchery building design is still strong; diminished slightly by elimination of Icicle Creek as holding and spawning area and new trail network on island, unoriginal fencing.
Association	☒	☐	☐	☐	Retains strong association through continued function as maintenance road serving the hatchery.

DESIGN AND MAINTENANCE RECOMMENDATIONS

Current Condition

The main sections of the road appear in good to fair condition aside from a few isolated potholes and surface cracks. Some road edges have minor deterioration and close vegetative growth; other sections have crushed rock and hard-packed dirt.

Typical surface patch (2014).

Hard packed dirt section (2014).

Maintenance and Design Priorities

1. Preservation of existing asphalt sections.
2. Preservation of route that originally served structures and spawning sheds.

ADDITIONAL PHOTOS AND DRAWINGS

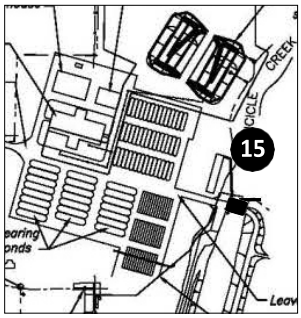
Maintenance road, view south (2014).

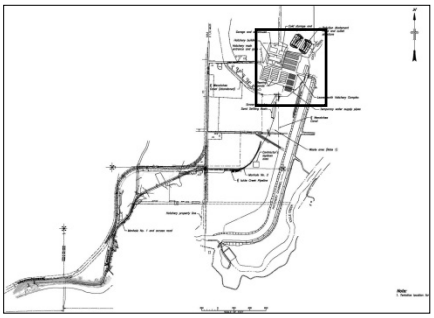
Maintenance road, showing transition to gravel and hard-packed dirt (2014).

Maintenance road, showing transition from newer to older pavement (2014).

Maintenance road, showing unmaintained section of road to former spawning shed area (2014).

Diversion Canal Bridge Resource 15





GENERAL PROPERTY INFORMATION

Construction Completed 1940

Location 12790 Fish Hatchery Road, main hatchery complex

ARCHITECTURAL INFORMATION

Architectural Description

The single lane, pony truss, steel bridge spans the outfall structure on the Icicle Creek Diversion Canal. The bridge is in good condition.

Alterations

1997: None described.

2014: This bridge appears in largely original condition, except for installation of chain-link fencing inside trusses, removal of original guard rails, and replacement of asphalt on deck.

BUILDING EVALUATION

Character-Defining Features

Hatchery records indicate that the bridge over the Diversion Canal was constructed in 1940, but it lacks a manufacturer's plate that identifies the designer, year of completion, or manufacturer. The riveted, Warren pony truss with alternating verticals was a relatively common design for shorter spans in the first half of the twentieth century (Delaware DOT 2000:84). The Iowa State Highway Commission, for example, adopted a standardized Warren pony-truss bridge for spans between 35 feet and 100 feet in 1913 (Kelley 1914). The Diversion Canal Bridge was likely a standard design ordered from one of the many fabricators supplying bridges to the various highway and railroad bridge projects underway in the late 1930s. Specific character-defining features for this bridge type include:

- truss configuration (Warren pony-truss with alternating verticals)
- connection type (rivets, gusset plates)
- materials (steel and wood)
- structural design and components (steel floor beams, timber stringers, steel cross bracing; angle irons, channel beams, riveted plate connections)
- bearing and shoe type
- deck (concrete topped with asphalt)

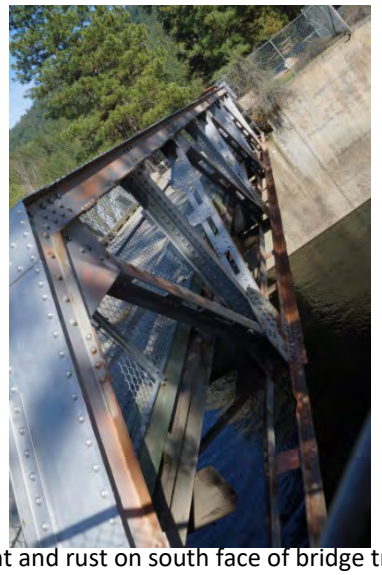
Historic Integrity

Aspect	Excellent	Good	Fair	Poor	Description
Location	☒	☐	☐	☐	Original location.
Design	☒	☐	☐	☐	Retains essential design elements, including original truss configuration, bracing, bearings, and connections. Diminished only by removal of original bridge guards and addition of chain-link fencing.
Setting	☒	☐	☐	☐	Still functioning part of hatchery road system; relatively rural surroundings.
Materials	☐	☒	☐	☐	Retains essential original materials, except for asphalt over decking, timber guards, and chain-link fencing added to inside of trusses.
Workmanship	☒	☐	☐	☐	Reflects bridge construction methods of the twentieth century, including riveted connections, shop-rolled structural components, dimension-cut lumber, and field assembly.
Feeling	☐	☒	☐	☐	Because of setting and retention of many design and material elements, feeling associated with original hatchery is still strong; diminished slightly by contemporary chain-link fencing.
Association	☒	☐	☐	☐	Retains strong association through continued function as bridge over Diversion Canal to support hatchery operations.

DESIGN AND MAINTENANCE RECOMMENDATIONS

Current Condition

The Diversion Canal Bridge appears in generally good condition. Areas of concern include minor deflections in lower chord members, and the lack of paint on the south face of the bridge.



Lack of paint and rust on south face of bridge truss (2014).

Deflection in lower chord member (2014).

Maintenance and Design Priorities

1. Preservation of bridge structure and materials.
2. Rust removal, treatment and paint to inhibit rust.
3. If lower chord member requires replacement, specify replacement in-kind.

References

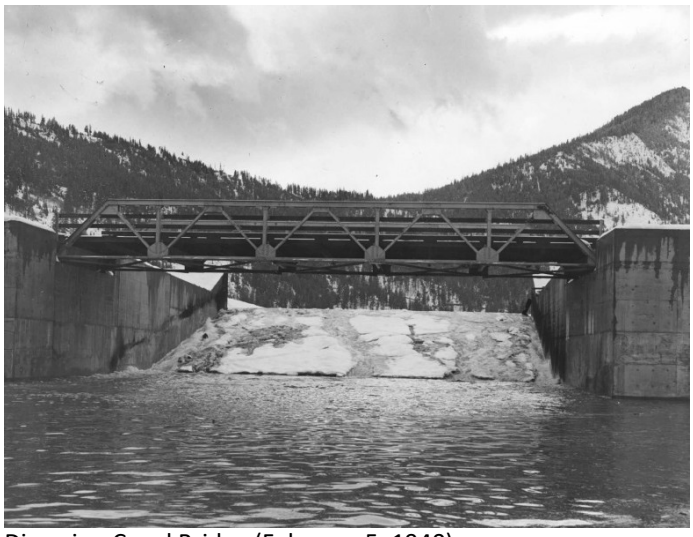
Delaware Department of Transportation (DOT). “Truss Bridges.” 2000. Electronic document, http://www.deldot.gov/archaeology/historic_pres/delaware_bridge_book/pdf/truss.pdf.

Kelley, E. F. “Steel Bridge Standards of the Iowa Highway Commission.” *Engineering Record* 70, no. 24 (December 12, 1914):631–632.

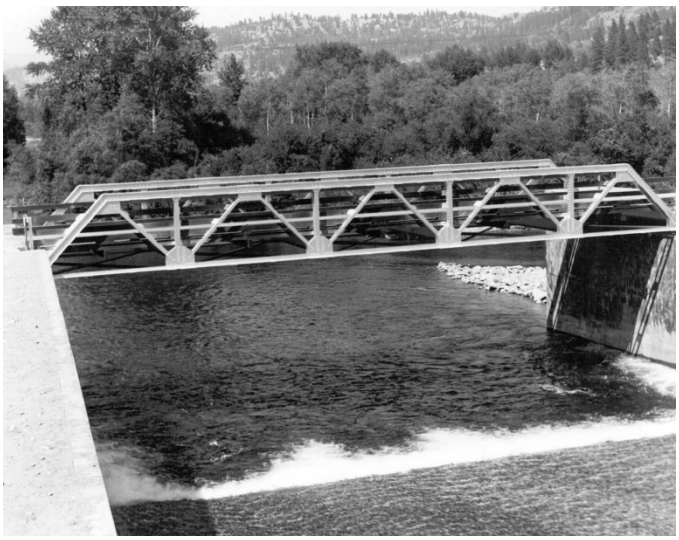
ADDITIONAL PHOTOS AND DRAWINGS

Diversion Canal Bridge (February 5, 1940).
Source: USFWS

Diversion Canal Bridge (February 5, 1940).
Source: USFWS



Diversion Canal Bridge (February 5, 1940).
Source: USFWS



Diversion Canal Bridge (July 2, 1940).
Source: USFWS

Diversion Canal Bridge, view east (2014).

Diversion Canal Bridge, deck detail, view northwest (2014)

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Diversion Canal Bridge, view north (2014).