NPS Form 10-900
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United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES REGISTRATION FORM

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in *How to Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name: Leavenworth National Fish Hatchery.
other names:

2. Location

street & number 12790 Fish Hatchery Road (1.5 mi. south of Leavenworth).
not for publication ☐
city/town Leavenworth
vicinity ☒

state Washington code WA county Chelan code 007 zip code 98826

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1986, as amended, I hereby certify that this ☒ nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ☒ meets ☐ does not meet the National Register Criteria. I recommend that this property be considered significant ☐ nationally ☒ statewide ☐ locally. (☐ See continuation sheet for additional comments.)

12/9/97
Signature of certifying official Date

U.S. Fish and Wildlife Service, Region 1
State or Federal agency and bureau

In my opinion, the property ☑ meets ☐ does not meet the National Register criteria. (☐ See continuation sheet for additional comments.)

Acting SHPO 2.25.98
Signature of commenting or other official Date

Washington State SHPO
State or Federal agency and bureau

4. National Park Service Certification

I, hereby certify that this property is: ✓ Signature of the Keeper Date of Action

☒ entered in the National Register
☐ See continuation sheet. 7/27/98
☐ determined eligible for the National Register
☐ See continuation sheet.
☐ determined not eligible for the National Register.
☐ removed from the National Register.
☐ other (explain): _____

5. Classification

Ownership of Property
(Check as many boxes as apply)

- ☐ private
- ☐ public-local
- ☐ public-state
- ☒ public-federal

Category of Property
(Check only one box)

- ☐ building(s)
- ☒ district
- ☐ site
- ☐ structure
- ☐ object

Number of Resources within Property
(Do not include previously listed resources in the count.)

Contributing	Noncontributing
7 buildings	8 buildings
61 structures	65 structures

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing)

N/A

Number of contributing resources previously listed in the National Register

N/A

6. Function or Use

Historic Functions
(Enter categories from instructions)

GOVERNMENT/ Fish Hatchery

Current Functions
(Enter categories from instructions)

Same

7. Description

Architectural Classification
(Enter categories from instructions)

OTHER / Bureau of Reclamation

Materials
(Enter categories from instructions)

foundation	Concrete
walls	Concrete
roof	Altered, metal

7. NARRATIVE DESCRIPTION

The Leavenworth National Fish Hatchery (NFH) was constructed between 1939 and 1941 by the Bureau of Reclamation, Denver, Colorado office. The building design and plans were developed especially for the site and utilized innovative fish-culture technology and architectural elements for a classical facade to the industrial-level fish production operation. In 1941, it was the largest hatchery in the world. The hatchery's mandated purpose is for rearing Pacific Salmon species and steelhead trout to replace the natural populations reduced by the construction of Grand Coulee dam on the Columbia River.

Leavenworth NFH is situated in the heart of north-central Washington; tucked into the eastern slopes of the Northern Cascade Mountains. The hatchery encompasses about 158 acres on a low terrace adjacent to Icicle Creek, a tributary to the Wenatchee River, approximately 30 miles above its confluence with the Columbia River and near the town of Leavenworth, Washington (Map 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. Icicle Creek, as it flows near the hatchery, is a wide, usually shallow stream, with exaggerated meanders.

Leavenworth NFH reflects the full ensemble of fish culture technology as it was envisioned in 1939. Rearing fish is a complex operation requiring egg collection stations, rearing ponds, a steady water supply, and a hatchery building, garage, cold storage plant, and housing. Sixty-eight buildings and structures reflect the original design specifications of the hatchery. Leavenworth NFH retains excellent integrity of location, design, setting, materials, workmanship, feeling, and association that conveys its function as a large scale fish rearing station for Columbia River salmon.

HATCHERY RESOURCES

In 1936, plans for the Leavenworth hatchery were initiated by a survey along the tributary streams of the Columbia River in search of suitable hatchery locations. Hanford Thayer was on the survey team that recommended the Leavenworth location "because of the natural S-curve meander necessary for spawning ponds and the large terrace that would easily accommodate the large rearing ponds and hatchery buildings needed for the extensive fish-culture operation" (Hanford Thayer, personal communication 1996).

Construction of the facility began in the summer of 1939. Changes and delays in the work schedule caused the contractors to work at a frantic pace through the fall in order to finalize the rearing station in time to serve as an incubation area for eggs ready to hatch in December. If unsuccessful in completing the hatchery, an entire years worth of salmon, several million fish, would be lost. This herculean effort required seven contractors operating simultaneously digging canals and rearing ponds, installing pipes, and constructing dams, roads, the hatchery building, garage, and refrigeration plant. The main hatchery complex was completed in the summer of 1940 and the residences completed in the spring of 1941.

The primary features constructed during the 1939-1941 period include the *Hatchery Building*, *Shop/Garage*, *Cold Storage Building*, *Spawning Sheds*, *Icicle Creek ponds, Wells, Water Screen Chamber*, *Icicle Creek Diversion Canal*, *Snow Lake Tunnel*, *Foster-Lucas ponds, Steel-truss Bridge and roads*, *Water Intake Building*, and *Residences.* The following narrative describes the contributing and non-contributing resources of the hatchery complex within the context of the various processes associated with fish-culture (Table 1; Maps 2 and 3). The contributing resources are assigned a number that corresponds with information presented in Table 1.

Hatchery Operations. The three primary hatchery buildings (hatchery/office, cold storage, and garage/shop) were constructed between 1939 and 1940 and are important to the function of Leavenworth as a state-of-the-art hatchery. The design and size of the buildings was based on the number and types of fish to be reared. Biologist estimated the massive scale for Leavenworth based on the abundant native salmon runs in the upper Columbia River, that would be blocked by Grand Coulee dam. The three buildings have been altered to some extent, but are dominant features in the hatchery complex and are contributing resources.

Leavenworth NFH was designed by a team of engineers and biologists, including Hanford Thayer from the Bureau of Fisheries' (U.S. Fish and Wildlife), Bureau of Reclamation's hatchery engineering expert, John Mayhall, F.A. Banks, Chief of Engineering and Sterling Hill, project engineer, and L. E. Mayhall from the Washington State Fisheries office. Thayer and John Mayhall worked on the initial plan and surveyed Leavenworth in 1936-1937. The two men also surveyed the locations for the Entiat and Winthrop hatcheries, and inspected sites in Canada (Hanford Thayer, personal communication 1996). During 1938 plans were developed for the ponds and hatchery buildings, outlining their fish-rearing capacity requirements. As an engineer on the project, Thayer outlined specifications for the buildings, "except for the columns on the front of the hatchery building, that was the work of an architect not an engineer" (Hanford Thayer, personal communication 1996).

Hatchery building (Resource - 8): 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 clipped gable ends, 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 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: The front offices and public area have been remodeled to include restrooms and a gift shop. The second floor of the front wing was converted from storage into offices. The rear gable has also received modifications. 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. 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.

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. 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: 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.

Garage/Shop (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. 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. Windows are intact on the south and east walls. 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 (*WDW* August 29,1939:9). The interior is intact. Across the front half 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 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: 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. 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.

Fish Culture: Life Cycle of the Hatchery Fish. Specialty buildings and structures are required for the many tasks associated with fish culture. The hatchery cycle begins when adult salmon return to Icicle Creek to spawn. The adults are collected at the Icicle Creek canal dam and maintained in the adult rearing pond. Eggs are collected and fertilized at the spawning shed, then the eggs are transferred to trays in the hatchery building. The live embryo is observed as an eye in the yolk sac in about 30 days. The eggs hatch in about 50 days as yolk sac fry and are transferred to troughs in the hatchery building. In the early spring the small fish, also called fingerlings, are moved outside to the rearing ponds or raceways. Depending on the species of fish, some may spend another year in the ponds gaining weight and maturing to the smolt stage. Smoltification is an important step, a transformation that allows the fish to survive in saltwater (Mighetto and Ebel 1994:12-13). Each species supplies its own parameters for the methods and types of structures required.

Icicle Creek Ponds (3) (Resource - 5): In the original design of Leavenworth a series of ponds were developed in Icicle Creek. A meander channel of Icicle Creek more than a mile in length was "selected as offering conditions as near natural as it was possible to secure. This area is being divided into three ponds by construction of dams Nos. 3, 4, and 5. . .The dams raise the water level 4 to 5 feet, and water is introduced at low velocity through diffusion gratings in the floor of the head of each pond" (Grand Coulee Project Report 1939:254). Construction of the holding ponds was awarded to Norris Bros. of Burlington, Washington. This contract included dams Nos. 3, 4, and 5 across the Icicle Creek, the holding pond spawning facilities, and spawning sheds (Grand Coulee Report 1939:254).

The three ponds were separated by a steel frame rack and gate with a series of screens that rotated to allow fish to proceed up stream. The screens were controlled either by hand or by an electric motor. Elevator towers, constructed at each pond, were used to lift spawned steelhead up out of the creek and slide them into a hatchery truck, for release back into the Wenatchee or Columbia Rivers.

"Eight special tank trucks were designed and built under U.S. Bureau of Reclamation specifications . . . they contain a 1,000 gallon tank with a 4' x 6' hatch in the top for loading the fish, and a door at the rear for dumping" (Grand Coulee Project Report 1939:245, 249). The temperature of the water was regulated by placing ice in a bin near the front of the tank. Hauling of adult fish trapped at Rock Island was started May 1, 1939. The average capacity of each truck was 200 Blueback salmon, or 50 Chinook salmon, or 100 Steelhead trout (Grand Coulee Project Report 1939:249).

The three "natural" ponds were only used for about five years because of several critical flaws. Except for the most northerly pond which has been used occasionally as an adult holding pond through the years. The number and variety of fish hauled to the holding ponds along with the native returns clogged the stream and made egg collecting difficult. Loss to predators was extremely high in the shallow ponds, while the sluggish stream flow and high temperatures in the summer caused unhealthy conditions.

Alterations: The towers and gates have been dismantled although the metal railing and screens are still visible. Dam #4 is used as a walkway to the middle of the creek as part of an interpretive loop trail. Of the three ponds, the northern-most, formed by dams #4 and #5, was used for the longest period, retains the best integrity, and is a contributing feature of the hatchery (Resource - 5). This pond also had an associated spawning shed for the longest period of time.

Spawning Sheds: Three spawning sheds, also referred to as egg collecting stations, were built alongside the three "natural ponds". All of the wood frame sheds were constructed following a similar design: a rectangular plan, 32 x 43 ft, with a low-pitched, side gable roof. The walls were clad with drop siding attached to stud wall framing and the roof was covered with composition shingles. Architectural details included corner boards, overhanging eaves, vents in the gable ends, and a wooden sliding double door on the south wall. The building was open, facing the creek to allow easy access to the fish. At the rear of the building was a concrete pen for carcasses. An enclosed room served as a storage area for the trays, buckets, and equipment needed for egg collecting. Fish were seined into a concrete trough beside the building, then moved into the building where the eggs were removed.

Alterations: Although only used for a short time, the spawning shed is an essential link to the first years of hatchery operation. The spawning sheds were unique to Leavenworth. The northern-most shed was the most intact until it collapsed during an unusually severe winter storm in 1997. Unfortunately, there is no longer a standing representative of this resource type. The concrete footprints remain for each of the buildings.

Trays and Troughs: Once the eggs and sperm are combined, they are placed in incubation or hatching trays for about four months. Hatching trays are located inside the Hatchery Building and come in a variety of shapes and sizes. Maintaining a flow of clean water at a constant temperature is the biggest challenge during the egg stage. Newly hatched fry are moved to troughs and are nourished by their yolk sak until December

when the hatchery staff begin feeding them. By about March the fish have reached the fingerling stage and are moved to outside rearing ponds.

Originally the hatchery building contained 288 concrete, deep tray type incubation troughs. The troughs are arranged in the interior of the hatchery building in four groups with central aisle-ways lengthwise and crosswise. Troughs are grouped in pairs and back-to-back, a standing water pipe connects the two tee-faucets that feed each individual trough. The troughs are set on 6 in. concrete pedestals and are about 13 ft long and 16 ½ in. wide. Notches for baffles are spaced about every foot along the troughs' interior. Screens or plates slide into the notches for dividing the troughs into smaller segments (Bureau of Reclamation Plan #222-D-4253 and #222-D-4086, 1939).

Alterations: Approximately 75 percent of the concrete troughs at Leavenworth have been replaced with deeper fiberglass troughs. The newer troughs utilize the original plumbing fixtures and water system. Overall the design and function of the hatchery building is very close to the original. The interior design elements contribute to the significance of the hatchery building, but the trays and troughs are not individually contributing resources.

Foster-Lucas ponds: 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 (*WDW* 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 at a hatchery in Quilcene, Washington.

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: In 1979 the easternmost bank of eight 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 40 smaller F-L 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, spilling water and fish beneath the ponds. Of the large F-L ponds the western-most bank was used the longest, and one pond has been converted into an interpretive station for viewing fish.

The two remaining western-most banks of large F-L ponds (15) that are located south of the hatchery building and the three banks of small F-L ponds (40) that are located to the east of the hatchery building, are fairly intact, and are considered to be contributing resources (Resources - 6, 7).

Raceways: Three banks of 15-single lane, 8 x 80 ft and one bank of 14-single lane, 10 x 100 ft, gravity feed, concrete raceways replace two banks of the large Foster-Lucas ponds. The 8 x 80 ft raceways were installed in 1979 and the 10 x 100 ft raceways were constructed in 1998. Water can be recycled through the raceways and sediment can be cleaned from the flat-bottomed units relatively easily. The drains are modern and supply good connections with underground pipes. The narrow raceways appear to provide the best environment for raising fish with the least amount of disease caused by stagnant water or unclean conditions. The newer raceways provide an interesting dichotomy with the large, ovals of the Foster-Lucas Ponds and supply a link with the continuing technological advances in fish-culture. However, the raceways are less than 50-years old and are non-contributing resources.

Adult Holding Pond: An adult holding pond was constructed in 1979, just north of the canal spillway with a fish ladder for access. Adjacent to the pond is a sheltered work area. The gable-roof shelter is open-sided, with a stainless steel sink and work table for measuring and cutting the fish during spawning. One wall is enclosed with T-1-11 siding for weather protection. A wooden observation deck, is above the pond and work area. Visitors are provided a clear view of the spawning activities. The adult holding pond and shelter are less than 50-years old and are non-contributing resources.

Water Supply. The water used to operate the Leavenworth Hatchery is supplied by an integrated system of surface creek water, a reservoir lake, and seven wells.

Icicle Creek Water Intake: A low weir type dam on Icicle Creek feeds the intake pipe, that brings the primary flow of water to the hatchery. The intake structure is about 2 miles upstream from the hatchery complex and was constructed in 1939 by Norris Bros. Construction. "The pipe line required 4,462 feet of 24-inch and 1,262 feet of 28-inch continuous wood-stave pipe, plus diversion dam and headworks. The diversion dam (No. 1) is a low weir overflow of rubble concrete. The headworks or intake is 110 feet below the dam and connected to it by means of an open channel. The intake and trashrack structure is enclosed in a suitable house, which may be heated in order to insure freedom from ice trouble" (Grand Coulee Project Report 1939:265, 267).

The "suitable house" is actually a concrete-walled chamber, topped by a wood frame, gable roof building. This rectangular building is clad with drop siding. Windows are positioned on the east, west, and south walls. All windows are multi-pane, fixed frame in a wood sash. The interior is open and unfinished, with a series of cat-walks and ladders leading to the valves.

Alterations: The wood-stave pipe was replaced with a concrete lined pipe in 1965 and the diversion dam was raised two feet and modified to allow a greater flow into the intake pipe (Leavenworth Station Plan 1986:16). The intake building has been modified over the years. The water intake building, dam, and pipe are outside the main hatchery, have been altered over the years, and are non-contributing elements.

Icicle Creek Diversion Canal (Resource 1): The canal is a 4,000-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 dam are located at the downstream end, a second dam 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 dam. The canal was constructed during

the summer of 1939 under a Norris contract which was sub-let to J. A. Terteling & Sons of Boise, Idaho. "The excavation is carried on day and night, with four shifts of men" (*Wenatchee Daily World (WDW)*: August 29, 1939:9).

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

Wenatchee Canal: Built in 1939, this canal diverted water from the Wenatchee River southward for about two miles to Icicle Creek and the hatchery. This canal was not successful because the water was too warm by the time it reached the hatchery.

Alterations: The canal route has been altered and the original ditch filled. The canal is not a contributing feature of the hatchery.

Snow Lake Reservoir and Tunnel: 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 was established at Nada Lake for 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 was 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.

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: 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 conceived 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 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 (Resource - 2).

Wells: Wells supply a steady water source at a constant temperature. This is especially necessary in the winter when freezing temperatures restrict Icicle Creek. However, well water must be mixed with creek water to match the "natural" water constituents because fish are imprinted and return to the water that they are raised in. Well water also is too high in nitrogen to be used directly by the hatchery. The well water is treated in an aerator to strip the nitrogen from the water.

Wells have been developed as needed by the hatchery; seven are currently in use. Well #1 was excavated late in 1939 and well #2 was excavated in 1940, Well #3 in 1958, and Wells #4, #5, #6 and #7 were completed in 1979 (Leavenworth Station Plan 1986:24). The first two wells were drilled 95 ft deep. "In the fall of 1940, pump houses were built over the two "Peerless" multiple-stage, vertical-shaft, deep-well turbine pumps" (Grand Coulee Project Report 1940:207). Wells #8 and #9 are test wells that are not in use.

Alterations: Wells #2 and #3 have been re-drilled near their original location. The newer wells were excavated because of siltation problems (William Thorson, Personal Communication 1996). Only well #1 is still in use in its original location and is a contributing resource (Resource - 3).

Water Manipulation: A variety of buildings are designed for the purpose of maintaining a constant water flow with a standard temperature and consistent oxygen levels.

1939 Screen Chamber: 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 through which water is directed 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 is directed into the hatchery water system. The building is in fair condition, has not been altered, and continues to serve an important function. The 1939 screen chamber is a contributing resource (Resource - 4).

1978 Screen Chamber: A second screen chamber was built in 1978 and is a metal frame, gable roof building clad with T-1-11 siding. The newer screen chamber has a concrete vault base and second floor platform for the equipment. The new screen chamber is a non-contributing resource.

Aerator: The aerator structure was built in 1950 and is "used to remove the excess nitrogen from the water pumped from the two deep wells in order to render it suitable for fish culture work" (Annual Report 1955:19). The structure "is a concrete box (6' 11/2" wide and 15' 2" long, and 6' 7" in height) with wooden top and screens through which water is forced under pressure. The device is connected into the pump hatchery supply pipeline" (Annual Report 1955:19). The aerator serves an important function by stripping nitrogen from the well water, but it was not part of the "as-built" plan of the hatchery and is less than 50 years old. The aerator is a non-contributing resource.

Sand Settling Basin: A steel frame, metal clad, gable roof building was constructed in 1994. The building's interior is devoted to a large open concrete pond. Water entering the pond slows down, loses energy allowing sediments to drop out. This new building is a non-contributing resource.

Pipes, Valves, and Pumps: The underlying structure of the hatchery is connected by various water pipes and valve connections. Many of the original pipes are still in use, while others have deteriorated and are no longer in service. Pipes transport water to the hatchery buildings, ponds, and raceways. Three main valve connections control water from the river, recycle water between ponds, and divert water to the adult holding pond. The hatchery is designed with a gravity feed system. The pipes, valves, and pumps are buried or enclosed by structures and are non-contributing resources.

Other Resources

Residences: 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 (*WDW* 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-D-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: 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 (Resources 11, 12, 13).

Dormitory: An unfinished, two-story building, located on the property was used as a dormitory during the construction phase of the hatchery and for many years afterwards. A crew of carpenters were borrowed from Grand Coulee Dam to finish the building in 1939 (Grand Coulee Project Report 1939:269). The dormitory was a log and shingle, gable roof design with cobble stone pier foundation and steps. The building was sold and moved off the hatchery property in the 1950s.

Roads, bridges: 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. The single lane, pony truss, steel bridge spans the outfall structure on the Icicle Creek Diversion Canal. The bridge is in good condition. The roads on the island (formed by the canal) and the bridge are contributing resources (Resources 14, 15).

Other Resources: A wide variety of buildings and structures have been constructed at Leavenworth, especially in the 1970s and 1980s. Modular housing replaced one of the houses, at the eastern end of the row. A modular classroom was installed for the environmental education program developed at the hatchery. The classroom is located near the entrance of the hatchery complex, west of the hatchery building. Storage buildings, pump houses, a fire house, a valve house, drain lines, pipe lines, a pollution abatement facility, lift pump, outdoor theater stage, and an interpretive trail are all part of the current hatchery landscape.

INTEGRITY

Leavenworth's significance is derived from the ensemble of features that convey a strong association with the theme of fish culture. The primary features of a fish hatchery are defined by the necessary functions of the operations. Hatcheries are similar to small industrial complexes. The central hatchery building (indoor rearing capacity), support facilities (food preparation, storage, garage), water control structures, rearing ponds or raceways, and residences all serve the basic industrial goal of rearing fish. The overall plan is based on these functional requirements and natural landscape characteristics.

Each of the 68 resources, listed on Table 1, are contributing elements of Leavenworth NFH because they were built between 1939 and 1941 and are related to the original function and design of the hatchery for the Columbia Basin Restoration project's requirements for artificial fish propagation. These resources reflect the "as-built" design of the massive hatchery project and retain excellent integrity of location, setting, design, workmanship, feeling, association, and materials.

The aerator building, raceways, adult holding pond, and settling basin building serve important functions to the changing technology of fish culture but are unrelated to the original hatchery design and are thus non-contributing resources. Currently there are about 73 buildings and structures determined to be non-contributing. The number of non-contributing resources fluctuates somewhat because of changes in program needs.

Table 1. Leavenworth NFH Contributing Resources.

Hatchery Resources	Building/Structure		Date Constructed	Condition	Resource #
Water Supply	Icicle Creek Diversion Canal	(1)	1939	Good	**1**
	Snow Lake tunnel and valve unit	(1)	1939	Good	**2**
	Well, #1	(1)	1940	Fair	**3**
Water Manipulation	Screen Chamber	(1)	1939	Fair	**4**
Fish Culture	Icicle Creek Pond	(1)	1939	Poor	**5**
	Foster-Lucas Ponds (Large)	(15)	1939	Fair/Poor	**6**
	Foster-Lucas Ponds (Small)	(40)	1939	Fair/Poor	**7**
Operations	Hatchery	(1)	1939	Good	**8**
	Garage	(1)	1940	Good	**9**
	Cold Storage	(1)	1940	Good	**10**
Other	Residences	(3)	1941	Fair	**11, 12, 13**
	Bridge (steel-truss)	(1)	1939	Good	**14**
	Road (island)	(1)	1939	Good	**15**
TOTAL RESOURCES		**68**			

8. Statement of Significance

Applicable National Register Criteria

(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

- ☒ **A** Property is associated with events that have made a significant contribution to the broad patterns of our history.
- ☐ **B** Property is associated with the lives of persons significant in our past.
- ☒ **C** Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- ☐ **D** Property has yielded, or is likely to yield, information important in prehistory or history.

Areas of Significance

(Enter categories from instructions)

Conservation/Fish Restoration

Architecture

Period of Significance

1939-1941

Criteria Considerations

(Mark "x" in all the boxes that apply.)

Property is:

- ☐ **A** owned by a religious institution or used for religious purposes.
- ☐ **B** removed from its original location
- ☐ **C** a birthplace or grave.
- ☐ **D** a cemetery.
- ☐ **E** a reconstructed building, object, or structure.
- ☐ **F** a commemorative property.
- ☐ **G** less than 50 years of age or achieved significance within the past 50 years.

Significant Dates

A: 1939-1941
C: 1939-1941

Significant Person

(Complete if Criterion B is marked above)

N/A

Cultural Affiliation

N/A

Architect/Builder

Bureau of Reclamation Office, Denver, Colorado

8. STATEMENT OF SIGNIFICANCE

Leavenworth National Fish Hatchery is clearly linked with the Pacific Northwest's nascent conservation ethic and 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. The 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 could then be transplanted in streams below the Grand Coulee Dam where they might establish new spawning grounds. Several promoters of the project felt that it would only take about three years to complete the re-programming of salmon, to spawn in new streams and recover from the effects of Grand Coulee Dam. The hatchery program was viewed as essential for the continuity of the economically important salmon fisheries.

> . . . no precedents serve as guides in the solution of the problems, for never before has there been a serious attempt to pass large numbers of migrating fish over obstructions of this size . . . at the Grand Coulee, man is erecting an insurmountable barrier . . . There is no practicable means of transporting fish over or around a structure of such gigantic proportions . . . Such is the challenge which the development of the Columbia river for power and irrigation has presented to conservationists. As always when man changes the face of nature, a serious problem of protecting the wildlife is created . . . we have tried to foresee the difficulties and avert their destructive effects. We believe that the problem has been solved successfully, and that the famed Columbia River salmon will be saved (*WDW* June 20, 1936:1,12).

Yet, methods of artificially rearing huge numbers of salmon, transporting them to new streams, and re-programming their homing instincts were beyond the experience of most biologists or engineers in the 1930s. The plans 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.

Leavenworth's three main hatchery buildings, the Icicle Creek spawning pond, the Icicle Creek diversion canal, the Foster-Lucas ponds, the residences, and the Snow Lake tunnel are tangible links to the important historic events surrounding the Grand Coulee Dam project and Columbia River fish restoration project. These 68 resources constructed between 1939 and 1941, as identified in Table 1, are eligible under Criteria A and C and retain excellent integrity of location, setting, design, feeling, association, materials, and workmanship.

Criterion A: The themes of twentieth century conservationism and fish restoration are represented by the Leavenworth National Fish Hatchery. Leavenworth 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 Grand Coulee Dam, Columbia Basin Project.

The hatchery was constructed by the Bureau of Reclamation to mitigate the barrier presented by Grand Coulee Dam to the Columbia River's native fish runs. The emerging conservationist ethic of the western states had focused primarily on water pollution issues. The resolve to maintain the unique native fish runs developed from this political platform as an important trend that defines the Pacific Northwest and Washington State.

Funding for the hatchery was obtained after a protracted political struggle. The Leavenworth National Fish Hatchery is an important link to the events that coalesced to recognize the value in saving one of nature's most incredible migratory species.

The hatchery was constructed between 1939 and 1941. Operation began in 1940 with adults captured at Rock Island Dam, on the Columbia River, and transported to the three spawning ponds constructed in the Icicle Creek meander. The eggs collected in May were raised in the new hatchery and Foster-Lucas ponds, then released as smolts in 1941.

The Depression of the 1930s provides a context for the events that preceded construction of the hatchery. Hydroelectric development of the Columbia River was promoted by President Franklin D. Roosevelt, who appropriated funds in 1933 for Bonneville and Grand Coulee dams. The President's plan was for 10 hydroelectric facilities to harness the energy of the "vast water power [that] can be of incalculable value to this whole section of the country. It means cheap manufacturing production and economy and comfort on the farm and in the household" (Rittmann 1987:15).

Bonneville Dam was constructed by the U.S. Army Corps of Engineers as a low structure (72 ft high) to produce power, control navigation, and regulate the river flows. Plans for Bonneville Dam included fishways and fish ladders. The height of the dam also meant that fish that did not go through the fish ladder to circumnavigate the dam could flow over its spillway and survive to continue their migration (Rittmann 1987:18). In contrast, Grand Coulee Dam, constructed by the Bureau of Reclamation to supply water for power and irrigation, was a high dam. "The dam's height is equivalent to a fifty story building. . . the Bureau of Reclamation made no provisions for fish ladders or a spillway at Grand Coulee Dam" (Rittmann 1987:17-18). The size and height of the dam made engineering a fish ladder prohibitively expensive and "permanently prevented salmon and steelhead from returning anywhere further upriver to spawn, thus eradicating the salmon and steelhead runs above the dam" (Rittmann 1987:19).

The Columbia River fish restoration project developed from the realization that a valuable natural resource was about to be destroyed. Federal and state agencies responded to the crisis working together to formulate a mitigation plan. The grand scale of the hatchery building, the massive fish rearing ponds, and the size of the complex as a whole suggested to the public that their concerns were being addressed. Leavenworth, built as the largest fish hatchery in the world, was clearly designed to inspire confidence, that the government could build the largest dam in the world and control the native fish runs. Of course, the issues surrounding salmon survival are more complex than a single hatchery program can address; restoring the northwest salmon fisheries continues to be a compelling issue in the Pacific Northwest.

Criterion C: Plans for Leavenworth National Fish Hatchery reveal the grandiose vision for the fish propagation facility. "A main hatchery nearly as large as a city block on a site approximately one-half mile wide and one mile long with more than 70 acres of ponds to spawn and care for 66,000,000 salmon annually are included in the recommendation to the Bureau and approved by the United States Department of Fisheries, State Department of Fisheries and State Game Department" (*WDW* June 16, 1937:1). The huge cost of "two million six hundred thousand dollars was estimated for completing the North Central Washington upper Columbia River salmon conservation project . . . the world's largest fish conservation and propagation project" (Jett 1938:1).

The exaggerated design of the massive two-story, side-gable hatchery building with its formal columned facade is architecturally unusual for a hatchery building. The intact ensemble of early hatchery features identified at Leavenworth provides a rare view of fish culture technology as formulated in 1939-1941. Leavenworth NFH is one of the few hatcheries in the northwest where the initial methods of fish rearing are still observable. Although many of the fish rearing techniques built at Leavenworth were found to be inferior to current methods, the experiments in pond designs and production methods conducted at Leavenworth contributed to fish rearing strategies.

The hatchery facilities and overall plan retain excellent composition at Leavenworth, especially when compared to other hatcheries in Washington where the original ponds have been replaced and many of the primary buildings altered. The natural Icicle Creek ponds and Foster-Lucas rearing ponds are unique to the overall design of Leavenworth. Use of the Foster-Lucas ponds was limited to Leavenworth, Entiat, and Winthrop hatcheries in the northwest. The Leavenworth hatchery building retains its original steel sash windows and formal two story columned entrance. The garage and cold storage buildings also retain their original windows and interior arrangement. All of the other hatchery complexes of comparable age have been critically modified by the removal of buildings or replacement of original materials.

Historic Context for Leavenworth National Fish Hatchery

An Inexhaustible Supply of Salmon

The abundance of salmon in the Columbia River amazed early explorers of the Pacific Northwest. Lewis and Clark noted more than 100 fishing camps operated by the various groups of Native Americans from the Wenatchee River to the mouth of the Columbia River (Mighetto and Ebel 1994:14; Netboy 1980). The anadromous fish supplied a steady food source and trade commodity for the Indians. The importance of salmon to the native populations is also found in their religious ceremonies and rituals. Treaties negotiated in the 1850s, with tribes along the Columbia, included guarantees for using their traditional fishing stations. A visitor to the Wenatchee River in July 1882 described a village of about 200 people, "representing some forty families. He saw hundreds of dressed salmon which had been caught in a weir stretching across the river...the camp was composed of Wenachi, Kittitas, Columbia, and others" (Scheurerman 1982 in Mullan et al. 1992:G256). The village location was at the confluence of Icicle Creek with the Wenatchee River, the present-day location of the town of Leavenworth and about 1.5 mi. north of Leavenworth NFH. "Where Icicle Creek joins the Wenatchee River in Leavenworth, the highest meander and lowest gradient (0.03%) of both streams occur, making them ideal for fishing weirs" (Mullan et al. 1992:G-257). The target of the mid-summer fisheries were probably the spring chinook and sockeye salmon, based on their spawning cycle. Other species harvested by Indians can only be inferred (Mullan et al. 1992:G-258).

Changes in the fisheries because of natural events such as floods, droughts, or fire may have caused seasonal fluctuations in the various salmon species collected by the tribes. Large scale shifts in the runs began in the mid-nineteenth century.

Euroamerican settlers, arriving in the Pacific Northwest in the mid-nineteenth century, viewed the anadromous fish as an inexhaustible economic resource. Harvesting and canning the salmon runs of the Columbia River was initiated in the 1870s. Spectacular profits drew the attention of the canning industry and by 1883, more than 50 canneries were operating (Mighetto and Ebel 1994:18-19). Methods for collecting huge numbers of fish included gill nets, traps, seines, and fishwheels. Fishwheels were especially efficient tools for collecting astounding numbers of fish and hastened the decline in salmon populations (Netboy 1980).

Other, less tangible reasons for the declining fish runs can be attributed to obstructions in the rivers and pollution due to decades of mining, grazing, agriculture, and logging practices. Mining and logging increased sediments in the streams covering gravel spawning beds. Agricultural practices included pesticides, unscreened canals that stranded fish in fields, and small dams that blocked access to the smaller, spawning streams (Mighetto and Ebel 1994:30-31; Rittmann 1987). The Wenatchee River was partially blocked by a mill dam at Leavenworth in 1904 and Dryden Dam was constructed in 1908 without an effective fish ladder. "The Wenatchee watershed contained 23 dams and 58 irrigation diversions by 1937-42" (Mullan et al. 1992:H284).

Scientific research of the salmon was limited in the 1930s. There was no sound biological information about their life cycle, where they spawned, or how long they lived at sea. How and why salmon returned to streams to spawn also was not understood (Netboy 1980:43-51). The declining populations caused many biologists to regard artificially rearing salmon stock as critical to their survival. But, hatchery-raised fish were only

marginally successful, and many hatcheries were constructed in the wrong locations or used the wrong methods for rearing and release (Mighetto and Ebel 1994:38-39). The first federally operated hatcheries were constructed in Washington at Little White Salmon in 1887, Spring Creek in 1901, and Quilcene in 1909. Early hatcheries on the Wenatchee River included one on Chiwaukum Creek in 1899 that was moved to Leavenworth in 1903, and abandoned in 1931 (Mullan et al. 1992:H284).

Columbia Basin Development

In 1930 the Rock Island Dam had been constructed and in 1933 Grand Coulee and Bonneville dams were under construction. As the dams on the Columbia River 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 the Grand Coulee.

The fish propagation program was also tied to a newly emerging attitude toward pollution. It was recognized in 1937 that pollution and chemicals from mills, mines, factories, and irrigation canals with pesticides caused hazardous conditions for juvenile salmon attempting to return downstream to the ocean. "Fisheries Commissioner Frank Bell blamed dams, stream pollution and unscreened irrigation ditches today for depletion of Columbia river salmon runs during the past 26 years. . . . a survey on the Washington side of the Columbia showed nearly 400 dams had been constructed on tributary streams (*WDW* July 7, 1937:10). Conservationists were beginning to make progress toward the elimination of pollution in the Columbia River by enacting stream protection laws in Oregon (*WDW* May 3, 1937:1). Funds from the Works Progress Administration also were appropriated to build screens for irrigation diversion canals to keep salmon from swimming up and dying in the fields or in the warm canal water (Mighetto and Ebel 1994:62-64).

With construction underway on the Grand Coulee Dam, commercial fisherman, sportsmen, and biologists began to predict dire consequences associated with blocking the native fish runs. 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 Grand Coulee Dam, Columbia Basin Project.

Specific fishery objectives that were established for Leavenworth:

> 1) to bring, by stream rehabilitation and supplemental planting, the fish populations in the 677 miles of tributary streams between Grand Coulee Dam and Rock Island Dam, up to figures commensurate with the earlier undisturbed conditions and with the natural food supply in the streams.
>
> 2) to produce in addition, by the combination of artificial spawning, feeding, rearing and planting in these streams, a supplemental downstream migration equivalent to that normally produced by the 1,245 miles of streams and tributaries above the Grand Coulee Dam.

The original set of plans for Leavenworth were drawn during the summer of 1937 and served as the basis for study and recommendations for the final 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. "Mayhall and Thayer have been working quietly on the basic plans for more than a year, they drafted recommendations for the size and type of conservation projects, and have been working on the revised hatchery plan" (*WDW* October 20, 1938).

The final design of Leavenworth and the other stations was hinged on the funding level established by Secretary of Interior Harold Ickes, who determined "how far the Bureau of Reclamation needs to go in the construction of a fish hatchery, rearing and holding ponds and other devices" (*WDW* November 22, 1938:9). As late as the fall of 1938 plans were still not confirmed for the construction of a hatchery. Continued studies led by F. A. Banks, Bureau of Reclamation Chief Engineer did not seem to solve the controversy.

While the Secretary of the Interior was making up his mind, bids were already being awarded for construction of the Leavenworth hatchery in October 1938, "Bids for Leavenworth's fish hatchery excavation--which includes re-routing a river and digging a series of miniature lakes, expected to cost $300,000 or more" (*WDW* October 20, 1938). "Despite the late start, local bureau officials were confident that the Leavenworth project will be ready to handle fish by April's spring salmon runs, the deadline named by Frank T. Bell, United States commissioner of fisheries"(*WDW* October 20, 1938). Funding for Leavenworth was finally approved and construction began in the fall of 1939. Restoring stream habitat to support native fish populations also was part of the mitigation plan, but it was never fully implemented.

Leavenworth National Fish Hatchery

The following discussion is primarily based on interviews with Hanford Thayer, engineer on the Leavenworth project, along with Thayer's diaries, newspaper articles, Bureau of Reclamation construction reports, and photographs. Of primary interest for this study was Thayer's position with the Bureau of Fisheries. Between 1936 and 1943, Thayer was responsible for drafting engineering plans for special purpose buildings and hatcheries throughout the Pacific Northwest region.

Thayer began his career working for the Bureau of Fisheries in 1932, at Yellowstone under the direction of Fred Foster. He married Foster's daughter and moved to Seattle in 1935 to join Foster in the new regional office of the Bureau of Fisheries. Thayer was assigned to work on the Bureau of Reclamation's hatchery project from 1936 until September 1939 when he was promoted to the position of Superintendent of Construction, Western Region of the Bureau of Fisheries. Thayer held this position until 1943 when he was transferred to the Corps of Engineers for war duty, and served as the environmental engineer on the Manhattan Project. Thayer continued with the Corps of Engineers until 1967. Thayer has received many awards for distinguished service as an engineer during his long career, especially for his work on the Manhattan Project. The author gratefully acknowledges Hanford's contributions to this study.

Thayer and John Mayhall surveyed the site for the Leavenworth hatchery in 1936. The two men also identified the locations for the Entiat and Winthrop hatcheries. The wide terrace along Icicle Creek, approximately 1.5 mi. from the town of Leavenworth, was an orchard prior to the hatchery's construction. The site was chosen because of the natural meanders and wide flat terrace.

After locating the site, Thayer began drafting designs for the hatchery complex based on the fish rearing capacity requirements stipulated by the biologist. Studies of the numbers and types of salmon passing the Grand Coulee dam site were reviewed and fish counting stations were set up at Bonneville and Rock Island Dams, to try and determine the species of salmon native to the four tributary rivers being studied for possible fish hatchery sites. The rearing capacity was established to mitigate for the loss of habitat inundated or blocked by the dams. Estimations for the capacity requirements clearly indicated the massive proportions necessary at Leavenworth.

Plans for the hatchery site were sent to the U.S. Bureau of Reclamation's Denver office, where the final designs were prepared in detail. Field supervision of the project was the responsibility of the Bureau of Reclamation's Louis B. Ackerman and Sterling Hill. Ackerman, working from the Grand Coulee project office relied on "field engineers" such as Thayer to review the contractors work. Plans were also shipped between Denver and Grand Coulee during construction, when design changes required alterations of the blueprints. These modifications occurred rapidly. Thayer recalled the effort his office made developing plans for each of the hatchery buildings and overall site plan and that their field designs were closely followed (Hanford Thayer, personal communication 1997).

Evidence of the design modifications that occurred during construction are illustrated by the differences between the plan books published in May and August and the final "as-built" appearance. The hatchery buildings and ponds were shown in several different configurations. For instance, the May 22,1939 plan book contains a map depicting the two support buildings on the east side of the hatchery building, and the Foster-Lucas ponds running east-west, with both small and large ponds in front of the building. Then, in a plan book printed just three months later, August 22, 1939, the specifications show the current alignment of buildings and ponds. In all of the 1939 plan books the residences were depicted in a straight row facing west onto the main highway. Yet, when the specifications were released a year later, in August 1940, the current curved alignment above the hatchery had been chosen.

As envisioned in 1937:

> the center of Leavenworth project buildings will be the big concrete and steel truss type hatchery building 162 feet wide and 308 feet long. A warehouse and fish food canning, drying, freezing and cold storage buildings will be built around it with complete automobile and truck garages, a shop and not less than 10 cottages to house the permanent project maintenance personnel. A dormitory to hold 12 seasonal workers and with quarters for visiting officials is planned together with a superintendent's house, office space, public reception rooms, outside lavatory facilities, drying and lunch and locker rooms. The big hatchery building will contain troughs for salmon eggs and newly hatched fish as follows: 96 deep tray troughs for eyeing and hatching, each 30 feet long; 48 standard picking troughs, each 30 feet long; and 768 standard hatchery troughs, each 15 feet long (*WDW* June 16, 1937:1, 4).

Cost projections may have influenced the final "as-built" hatchery complex. The size of the hatchery building, cold storage, and garage buildings are all smaller than initially 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 was never built. The dormitory was a rough log building.

An early version of the Icicle Creek ponds included two additional "parallel holding ponds 200 feet wide and 2000 feet long . . . Salmon will enter these directly from the river and lie therein until ripe enough to migrate to the upper end to be seined and spawned" (*WDW* June 16, 1937:1, 4). The two parallel holding ponds were never constructed.

Proportions of the Foster-Lucas rearing ponds also were trimmed from the size and number first suggested. The plans released to the local press included, "100 concrete primary rearing ponds, 20 by 100 feet. Near them will be 110 natural type secondary rearing ponds 60 by 200 feet. Newly hatched fry will be reared in the primary ponds for the first half of the rearing period and transferred to the larger or secondary ponds for final rearing" (*WDW* June 16, 1937:4). 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. Discussions regarding natural vs. concrete rearing ponds must have been intense during the final planning stages. The concrete pond proponents apparently won out, because the 110 natural-type ponds were never constructed.

Construction of the Rock Island fish traps occurred just prior to construction at Leavenworth. Special trucks were designed for hauling fish from the Rock Island dam to the various hatcheries. Because the variety of fish to be reared by the hatcheries was limited to the economically important salmon runs, it was critical for the hatcheries to have an adequate supply of adults to provide the eggs. By early May, "nearly 6,000 chinooks and steelheads have been hauled" (*WDW* July 19, 1939:1). With adult salmon arriving at Rock Island fish traps, pressure to complete Leavenworth intensified.

In the fall of 1939, Icicle Creek was the scene of a massive construction project 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.

Fish Propagation Strategies: Contributions from Leavenworth

Information for this section was greatly enhanced by Cliff Dickeson, retired hatchery manager and Bill Thorson, deputy hatchery manager. They contributed their knowledge of fish rearing technology and Leavenworth's history of experiments with the author. 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. His memories of the hatchery operation when it was newly built were extremely valuable.

Theories of fish culture were based on limited biological data in the 1930s and during the planning of Leavenworth a dichotomy developed. Conflicts between natural and artificial methodologies along with the size and type of ponds, and the length of rearing time for fish in an artificial setting were topics widely debated. 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).

The adult holding ponds constructed in Icicle Creek at Leavenworth, were built to satisfy the immediate need for a place to maintain adults prior to harvesting the eggs. Because funding for Leavenworth was allocated from the Grand Coulee Dam budget, money was often slow to arrive. 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. Using Icicle Creek, a series of three ponds were built. The Icicle Creek ponds with the electrically controlled, rotating metal racks, and elevator towers were an innovative, technologically-advanced solution for the immediate need of an adult holding pond. The ponds served a vital need; providing an area for Columbia River salmon to mature and supply enough eggs for the Leavenworth hatchery to begin production in the winter of 1939-1940. Three spawning sheds were built adjacent to the ponds to serve as covered egg collecting stations.

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. Water temperature is critical for spawning fish and for eggs to hatch. The wide variety of species transported to the ponds also led to problems with diseases. And, the shallow holding ponds created an especially attractive captive food source for predators. The Icicle Creek ponds were only used for a few years. According to Thayer, the natural ponds were never envisioned to be anything more than holding ponds for adult salmon prior to spawning. The eggs collected were for rearing in the hatchery.

The concrete rearing ponds constructed at Leavenworth also were experimental. Construction of 30 large and 40 small Foster-Lucas 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 Foster-Lucas 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 circular-type pond (Burrows and Chenowith 1955:23,28).

Once the eggs were collected and fertilized, raising fish also had many uncertainties. Understanding 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. Early on, the fish were fed a diet "of 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 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. Unfortunately, entire populations of hatchery fish were decimated by diseases introduced in the food (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).

Over the years production of fish species has changed to meet mitigation requirements and stream conditions. Production of rainbow trout was initiated in mid-1940. Shortly after, sockeye salmon, chinook salmon, and steelhead trout were started from the eggs taken during 1941. The sockeye production was discontinued in the late 1960s because of low benefit-to-cost ratios and severe disease problems. Coho salmon also were reared until the late 1960s (Station Profile 1990:67). During the 1970s cooperative agreements with the Washington State Department of Game established programs to supply juveniles to restock depleted areas of the state, such as Mount Rainier National Park and the Colville Indian Reservation. Kokanee eggs were incubated for the U.S. Department of Game for Palmer Lake in Okanagan County (Annual Report:Leavenworth 1969:3).

Today, Leavenworth focuses on spring chinook salmon and summer steelhead runs in the Wenatchee and Columbia river systems. Approximately 1.7 million spring chinook salmon smolts and 100,000 steelhead trout smolts are produced annually. The majority of the spring chinook salmon and steelhead trout are released directly into Icicle Creek, to enhance sport, commercial, and Native American fisheries (Station Profile 1990:68). The spring chinook are more successful today, than other species, because water levels are high enough to support migration and spawning. Whereas, the historically more abundant summer chinook runs, that spawn in the early fall compete with irrigation needs and are thus more likely to be effected by low water levels (Mullan et al. 1992).

Research continues on the types of diseases that effect artificially reared salmon and steelhead. Prevention of diseases and rearing healthy fish stock to replenish the native runs are the hatchery's goals. The hatchery system is only one part of the complex struggle to maintain the Columbia River salmon. Dams, pollution, water levels, water temperature, predators, introduction of competing exotic species, loss of habitat, and obstructions that block passage to spawning grounds all contribute to the difficulties of salmon survival. Hatchery reared stock provide only part of the solution. The struggle to maintain and restore the remnant salmon runs continues to be a hotly debated issue.

The Bureau of Reclamation operated Leavenworth until 1945, when the U.S. Fish and Wildlife Service obtained operating funds directly from Congress for the operation of the facility. In 1949, the full jurisdiction, custody, and responsibility was transferred to the U.S. Fish and Wildlife Service. Hatchery supervisors assigned to Leavenworth include: Joe Kemmerich, 1940-1945; Alfred A. Gentry, 1945-1946; Edward M. Tuttle, 1946-1950; Elmer C. Wood, 1950-1951; Alfred C. Gastineau 1951-1963; Fred W. Bitle, 1963-1970; Henry F. Hosking, 1971-1974; Clifford W. Dickeson, 1974-1975; Ralph P. Malsam, 1975-1988; and Gregory A. Pratschner, 1988-currently.

Comparisons with Other USFWS Hatcheries in Region 1

There are currently 17 hatcheries operated by the U.S. Fish and Wildlife Service in Region 1, along with four Fish Health Centers, seven Fisheries Assistance Offices (including two that are already counted as hatcheries), one Technology Center, and four River Coordinators (Station Profile 1990). Hatcheries are usually located where there were large native fish populations that have been depleted because of man-made structures, pollution, harvesting, irrigation, or changes in the stream flow. Fish propagation varies to address these issues by manipulating spawning, hatching, and rearing juvenile species, then transporting the fish to appropriate locations for release. The primary benefactors of fish propagation are the tribes, sport fisheries, and commercial fisheries. Tribal interests have been codified in the last 20 years with several pieces of legislation that support their requirements for subsistence fishery production.

Hatchery development can be divided into three temporal categories: 1887-1909; 1930-1942; and 1960s-1970s. The earliest hatchery dates from 1887 (Little White Salmon, Washington), two others date to the first years of the twentieth century and relate to the same authorizing statute (24 Stat. 523, March 3, 1887); Spring Creek in 1901 and Quilcene in 1909, both in Washington. The statute provided funding "for establishment of a Salmon hatchery upon the Columbia River, its tributaries or branches" (Station Profile 1990:69). These early hatcheries were in response to the declining salmon runs that were decimated by the Columbia River cannery operations.

The massive dam construction projects during the 1930s spurred the infusion of federal monies into the Pacific Northwest. Mitigative measures to ensure fish runs were sponsored by the Mitchell Act of 1938 and the Columbia Basin Project. Three hatcheries directly related to the Columbia Basin Project were constructed in the first few years of the 1940s, Leavenworth (1939-1941), Entiat (1940-1941), and Winthrop (1941-1942), all are located in Washington. Others built in the late 1930s and early 1940s include Carson, Washington (1937), Coleman, California (1942), and Hagerman, Idaho (1931-1933).

Recent hatchery construction is, for the most part, linked to mitigating the effects of large hydroelectric dams and include Kooski, Idaho (1966), Eagle Creek, Oregon (1956), Warm Springs, Oregon (1966), Makah, Washington (1976), Willard, Washington (1960s), and Quinault, Washington (1968). A hatchery at Lahontan, Nevada was established in 1964-1967, and the additional facility at Marble Bluff was built in 1976.

For this comparison of property types only the Depression-era hatcheries are reviewed. The primary features of a fish hatchery are defined by the necessary functions of the operation. The hatchery complex includes the hatchery building (indoor rearing capacity), support facilities (food preparation, storage, garage), water control structures, rearing ponds or raceways, residences, and the overall design. The hatcheries follow a similar plan based on function and the natural landscape. Hatcheries are usually located on a low terrace adjacent to a water source. The main complex buildings are usually sturdy and unadorned. Residences and water pumps are usually located on slightly higher ground. The residences provide security when they are sited to overlook the complex.

Entiat, Washington: Entiat is a small hatchery with a one-story, rectangular hatchery building that includes 16 of the original concrete troughs and 52 fiberglass circular tanks. The hatchery building was modified in 1959, 1986, and in 1990 when the original steel sash windows were removed and replaced with thermal glass, aluminum sash windows. Entiat originally had eight large- and eight small-Foster-Lucas ponds, all of which have been replaced with raceways. Three of the original five residences are present, but all have been modified with vinyl siding and new windows (Entiat Station Plan 1986; Speulda 1996a). The 1940 screen chamber was demolished, but the valve building is in good condition and continues to be used. Overall the hatchery plan is similar to Leavenworth with the main hatchery building providing centralized services, surrounded by rearing ponds with the residences on the slightly higher terrace. Elements of the 1940 hatchery have been altered and overall the buildings retain poor integrity of materials.

Winthrop, Washington: The Winthrop hatchery building is a one-story, rectangular building containing 32 concrete troughs, 46 fiberglass tanks, and 8 vertical tray incubators. The hatchery building was extensively altered in 1990 when the steel sash windows were replaced with aluminum double pane windows and the facade of the building was covered with T-1-11 siding. A covered board walk was added to the front entry (Annual Report: Winthrop 1990:10). Two banks of eight small Foster-Lucas ponds are present, although they have been altered. The original large Foster-Lucas ponds have been altered or replaced with raceways. A predator cover has been constructed over the newer raceways. The hatchery has a small shop building. The valve building is still in service, but the screen house was removed. Only three of the original five residences remain, although they have been significantly altered with vinyl siding and new windows (Speulda 1996b; Winthrop Station Plan 1985). Each of the primary features at Winthrop have been altered. Yet, the overall hatchery plan is intact; the central hatchery building is flanked by rearing ponds and the residences are situated on a higher terrace overlooking the complex.

Carson, Washington: The Carson complex was built on the Wind River to accomodate fall chinook salmon and trout. The facility was constructed in 1937 by the Civilian Conservation Corps (CCC), stationed on Wind River. Because a natural barrier (Shippard Falls) blocked any returning chinook salmon, a fish ladder was built around the falls in 1955. "The hatchery was rebuilt as part of the Columbia River Fishery Development Program (Mitchell Act) in an attempt to establish a spring chinook run in the Wind River. . . There has been extensive use of Carson in the Leavenworth, Winthrop, and Entiat spring chinook programs" (Station Profile 1990:45).

Three residences and the hatchery building remain from the 1930s complex. The houses have been altered several times in the last 30 years. The original siding was replaced with asbestos shingles in the 1950s, the roofs have been changed to metal. More recently the asbestos shingles have been removed and the buildings have been resided with vinyl siding. Many of the wooden sash windows have been replaced. The interiors have been modified, but still retain cabinetry and details of the CCC construction. The house design is based on Bureau of Reclamation house plans, rather than a true CCC-rustic style. Detached garages are still sided with asbestos shingles. The hatchery building also has been altered. The rearing units were simply dirt ponds in various shapes and sizes. In the 1950s, several more buildings were added and three sets of raceways were installed to replace the dirt ponds. An adult holding pond and egg collecting station have also been added to accommodate the returning runs (Bruce McLeod, personal communication 1997).

Coleman, California: The Coleman facility was built in 1942, as part of the Central Valley Project. The hatchery was established under the provisions of the Emergency Relief Appropriation Act of 1935 and the First Deficiency Appropriation Act, Fiscal Year 1936. The River and Harbor Act of 1937 reauthorized the project for construction (Station Profile 1990:47). The hatchery rears fall chinook, late fall chinook, and steelhead in the Sacramento River and preserves runs threatened by the Shasta Dam.

Coleman NFH is a large operation, similar in scale to Leavenworth NFH, but has been updated and substantially modified. The original design included concrete raceways, residences, a hatchery building, a cold storage facility, and shop buildings. In 1965 new raceways were installed within the same footprint of the original units and housing was added to the complex. The original hatchery building, cold storage building, and shops have been updated with new windows, doors, and in some cases, siding, but are still in use. The residences dating from the 1940s have all been demolished, but were very similar to the design used at Leavenworth, Entiat, and Winthrop. The overall plan of Coleman has been altered by the addition of new housing and auxiliary buildings.

Hagerman, Idaho: The Hagerman station was authorized by 46 Stat, 371 on May 21, 1930 and was established in 1932 on the Snake River. Fish production began in 1933. The primary goal of the hatchery was the production of rainbow trout for stocking in Idaho, eastern Oregon, and northern Nevada. In the late 1970s the hatchery became part of the Lower Snake River Fish and Wildlife Compensation Plan; which was authorized by the Water Resources Development Act of 1976, Public Law 94-587. This plan was designed to mitigate for fish and wildlife losses caused by construction of four dams on the lower Snake River. For its part in the

Compensation Plan, the hatchery's primary production goal was changed from rainbow trout to steelhead trout. The U.S. Fish and Wildlife Service entered into an agreement with the U.S. Army Corps of Engineers and Idaho Department of Fish and Game to annually rear 340,000 pounds of summer steelhead trout at 4 to 5 fish per pound at Hagerman NFH. To implement the new production goals, the hatchery was rebuilt and expanded, at a cost of $7.0 million, by the Corps of Engineers. The expanded facility was completed in 1984.

The original plan of the hatchery has been severely altered. A natural lake was initially used as a rearing pond, but this has been filled. The hatchery was built on the site of a farm and the hatchery utilized several buildings including the house and barn until the mid-1950s when the facility was expanded. Residences were constructed in 1951. The 1980s construction plan dramatically modified the original hatchery design. The extensive remodeling required the filling of one bank of ponds upon which the new office-visitor center was built and demolition of rearing ponds in order to construct three banks of raceways. Currently, there are 102 raceway units. Other major facilities include two hatchery-rearing buildings with a total of 66 rearing tanks, an administration-visitor facility building; a shop/garage, four residences, and three storage buildings.

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1938 Leavenworth Hatchery May Not Be Rushed, November 22, 1938, pg 9.
1939 Fish Trapping to Start Immediately, April 19, 1939, pg. 1.
1939 Salmon: Traps Catch Them, Trucks Haul Them -- Contractor Ready to Start on Hatchery -- Lake Tunnel in 2,340 ft., July 19, 1939, pg. 1.
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.

Personal Communication
Dickeson, Clifford, Interview on site with author, May 8, 1996.
McCleary, Rocky, Interview on site with author, May 8, 1996.
McLeod, Bruce, Telephone interview with author, January 28, 1997.
Thayer, Hanford, Telephone interview, with author December 17, 1996 and
personal interview at residence on Whidby Island, March 25-26, 1997.
Thorson, William, Interview on site with author, May 8, 1996, and phone interviews 1996-1997.

Previous documentation on file (NPS):

- ☐ preliminary determination of individual listing (36 CFR 67) has been requested.
- ☐ previously listed in the National Register of Historic Places,_____
- ☐ previously determined eligible by the National Register
- ☐ designated a National Historic Landmark
- ☐ recorded by Historic American Buildings Survey
- ☐ recorded by Historic American Engineering

Primary location of additional data:

- ☐ State historic preservation office
- ☐ Other state agency
- ☒ Federal agency
- ☐ Local government
- ☐ University
- ☐ Other

Name of repository:
USFWS, Region 1, Cultural Resources Office
20555 SW Gerda Lane, Sherwood, OR 97140; and
Leavenworth NFH, 12790 Fish Hatchery Road,
Leavenworth, WA 98826

10. Geographical Data

Acreage of Property

The Leavenworth National Fish Hatchery site encompasses 157.99 acres, primarily within the SE 1/4 of Section 23 and the N-½ of Section 26, Township 24 North, Range 17 East. A small portion of the original Icicle Creek meander containing the remains of the spawning sheds and ponds is in the SW 1/4 of Section 24, Township 24 North, Range 17 East. The Intake dam and structure is located in the center of Section 27, Township 24 North, Range 17 East. The Snow Lake reservoir includes about 705.5 acres in Sections 16 and 17, Township 23 North, Range 17 East.

The area nominated encompasses the terrace containing the residences, the hatchery building complex and rearing ponds, the canal, the Icicle Creek spawning ponds, well #1, and the screen chamber within a 78-acre parcel. The Snow Lake tunnel entrance is also included in the nomination, the portal is 9 x 7 x 10 feet.

UTM References

The following UTM references define the outline of the 78-acre parcel:

Zone	Easting	Northing	
10	674950	5269790	A
10	674920	5269680	B
10	674720	5269680	C
10	674960	5269480	D
10	674960	5268760	E
10	674700	5268680	F
10	674700	5268620	G
10	674900	5268450	H
10	675150	5268630	I
10	675500	5269240	J
10	675640	5269390	K
10	675600	5269620	L
10	675220	5269720	M

The Snow Lake Tunnel entrance is defined by a single reference point:

Zone	Easting	Northing
10	670460	5261675

Verbal Boundary Description

(Describe the boundaries of the property on a continuation sheet.)

The area nominated begins at a property corner near the northwestern corner of the Garage building, this is UTM reference point A. Then proceeding due south to the entrance driveway (B); then west to the western corner of the entrance driveway and first residential lot (C); then southeast along the residential road, toward the screen house (D); then south to the curve in the canal (E); then west to the beginning point of the canal and the hatchery property boundary (F); then south across the canal to the Icicle Creek Diversion Dam #2 (G); then southeast to the southern point of the Icicle Creek meander, following the hatchery property boundary (H); then northeast along the creek, along the property boundary (I); then northwest to dam #4 at the property boundary (J); then northeast to the eastern point of the Icicle Creek meander along the property boundary (K); then north to a property corner (L); then west to a point below the spillway and fish ladder (M); then slightly northwest to the point of beginning (A). This parcel encompasses approximately 78 acres.

The Snow Lake tunnel entrance is a discontiguous feature and is identified only by its UTM reference.

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)

The area encompassed within the 78 acre parcel contains the 15 primary features identified in this documentation including the terrace containing the residences, the hatchery building complex and rearing ponds, the canal, the Icicle Creek spawning ponds, well #1, and the screen chamber. The boundary does not include the entire hatchery property. The boundary is developed to include the length of the Icicle Creek Diversion Canal and the Icicle Creek ponds. Where possible, the boundary follows the actual property boundary, but does not include property outside of the hatchery boundary. The Snow Lake tunnel entrance containing the valve and pipe is a unique feature of the Leavenworth Hatchery and is included as a separate unit. The Snow Lake tunnel entrance is a portal about 9 x 7 x 10 feet.

11. Form Prepared By

name/title Lou Ann Speulda, Historian/Historical Archaeologist
Organization U.S. Fish and Wildlife Service date December 3, 1997
street & number 20555 SW Gerda Lane telephone (503) 625-4377
city or town Sherwood state OR zip code 97140

Addltional Documentation
Submit the following items with the completed form:

Maps

1 USGS Leavenworth, Washington, 7.5' Quadrangle Map indicating Property Location. (8x10 copy attached, full map enclosed)
2 USGS Blewett, Washington 7.5' Quadrangle Map indicating Snow Lake Tunnel Location. (8x10 copy attached, full map enclosed)
3 Leavenworth NFH Site Plan with Contributing Resources 1, 3-15.

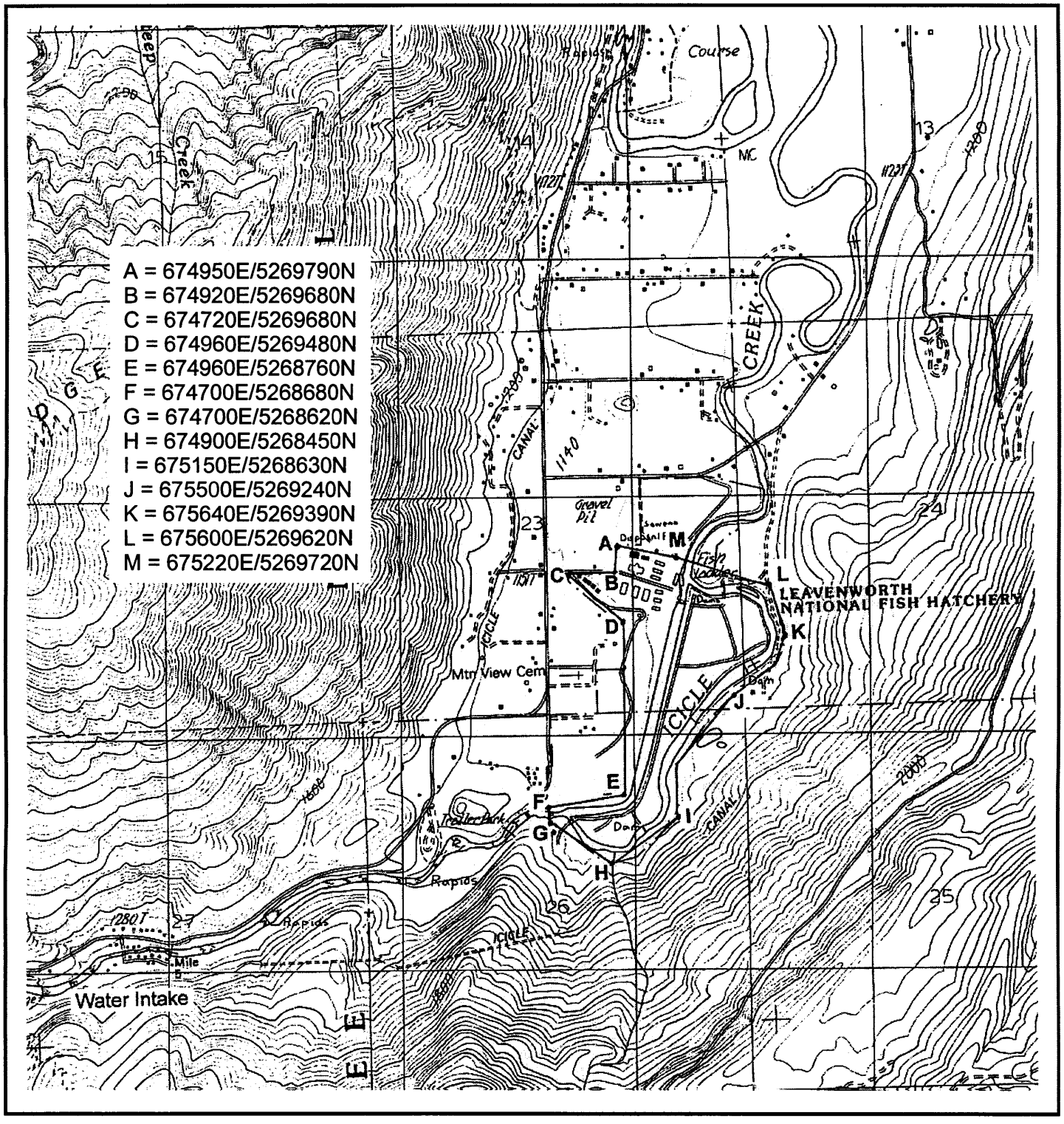
Photographs

1 Leavenworth NFH, hatchery building, view to north, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
2 Leavenworth NFH, hatchery building, east elevation, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
3 Leavenworth NFH, hatchery building, view to west, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
4 Leavenworth NFH, hatchery building, rear office wing, north elevatio, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
5 Leavenworth NFH, Cold Storage and Garage, south elevation, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
6 Leavenworth NFH, Cold Storage and Garage, north elevation,Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
7 Leavenworth NFH, Cold Storage, south and east elevations,Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
8 Leavenworth NFH, Cold Storage, west elevation, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
9 Leavenworth NFH, Garage, south and east elevations, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
10 Leavenworth NFH, Garage, north elevation, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
11 Leavenworth NFH, Garage, west elevation, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
12 Leavenworth NFH, Foster-Lucas Pond, view to east, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
13 Leavenworth NFH, Foster-Lucas Pond, interior screens, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
14 Leavenworth NFH, Foster-Lucas Ponds, interior, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.

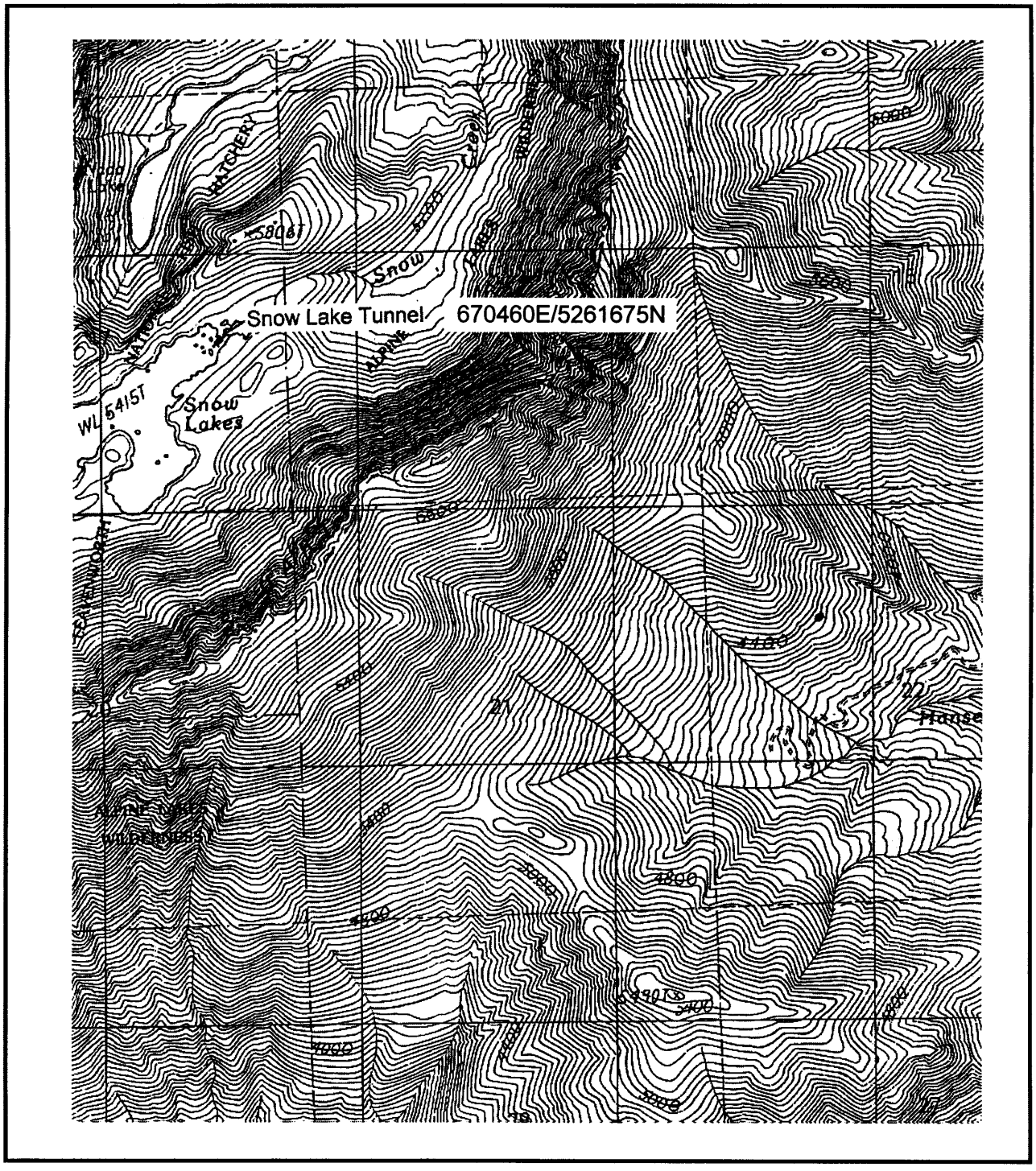
15 Leavenworth NFH, Large Foster-Lucas Ponds, drain, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
16 Leavenworth NFH, Screen chamber, view to northwest, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
17 Leavenworth NFH, Screen chamber, interior, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
18 Leavenworth NFH, Residences, view to southeast, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
19 Leavenworth NFH, Residences, rear elevations, view to northwest, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.

Additional Items

20 Aerial View of Leavenworth Valley prior to hatchery, ca. 1938, view to north, courtesy Bureau of Reclamation National Archives, Denver, Colorado (No. 2089).
21 Birdseye view of Leavenworth NFH, ca. 1941, view to north.
22 Aerial view of Leavenworth NFH, ca. 1945, view to north.
23 Leavenworth NFH, Construction of Large Foster-Lucas ponds, ca. 1940, view to northwest, courtesy Bureau of Reclamation National Archives, Denver, Colorado (No. 2075).
24 Leavenworth NFH, ca. 1942, view to northeast, courtesy North Central Washington Museum, Wenatchee (#86-157-25).
25 Drawing: Hatchery Building, Front Elevation and End Elevation, on-file Leavenworth NFH.
26 Drawing: Hatchery Building, Longitudinal Section and Cross Section, on-file Leavenworth NFH.
27 Drawing: Trough Details, on-file Leavenworth NFH.
28 Drawing: Cold Storage, Elevations, on-file Leavenworth NFH.
29 Drawing: Cold Storage, Interior Floor Plan, on-file Leavenworth NFH.
30 Drawing: Garage, Elevations, on-file Leavenworth NFH.
31 Drawing: Garage, Interior Floor Plan, on-file Leavenworth NFH.
32 Drawing: Residence, Type 4, Elevations, on-file Leavenworth NFH.
33 Drawing: Residence, Type 4, Interior Floor Plan, on-file Leavenworth NFH.
34 Drawing: Foster-Lucas Pond Plan, on-file Leavenworth NFH.
35 Snow Lake Tunnel, photograph ca. 1939, courtesy Bureau of Reclamation National Archives, Denver, Colorado (C.B. 4079).
36 Drawing: Icicle Creek Diversion Dam, No. 2, on-file Leavenworth NFH.
37 Drawing: Icicle Creek Spawning Shed Plan, on-file Leavenworth NFH.
38 Icicle Creek Spawning Shed, summer 1996 (collapsed 1997), view to north, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
39 Hatchery interior, *Seattle Post Intelligencer*, Sunday, May 26, 1940:9c.
40 Intake Structure, view to east, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
41 Icicle Creek Fish Control Dam, converted to footpath, view to southeast, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
42 Icicle Creek with Fish Control Dams, view to east, Speulda 1996, USFWS, Region 1, CRT, Sherwood, Oregon.
43 Construction of Dam #4 and Spawning Shed, Bureau of Reclamation National Archives, Denver, Colorado (No. 2081).

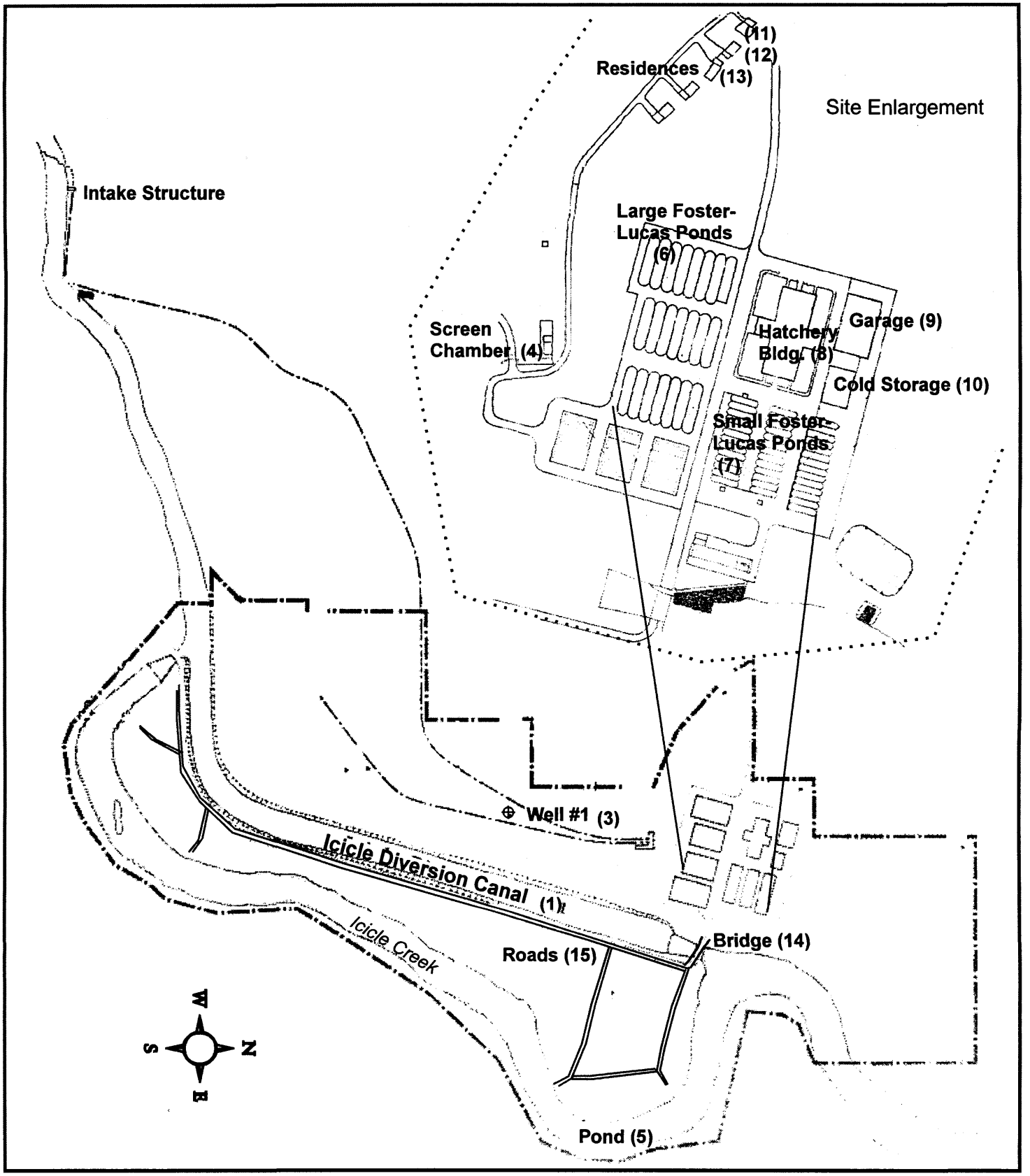


Leavenworth National Fish Hatchery Nomination Boundary Location. Map #1
Leavenworth USGS Quadrangle Map 7.5'.



Leavenworth National Fish Hatchery Nomination
Snow Lake Tunnel Boundary Location
Contributing Resource - 2.
Blewett USGS Quadrangle Map 7.5'.

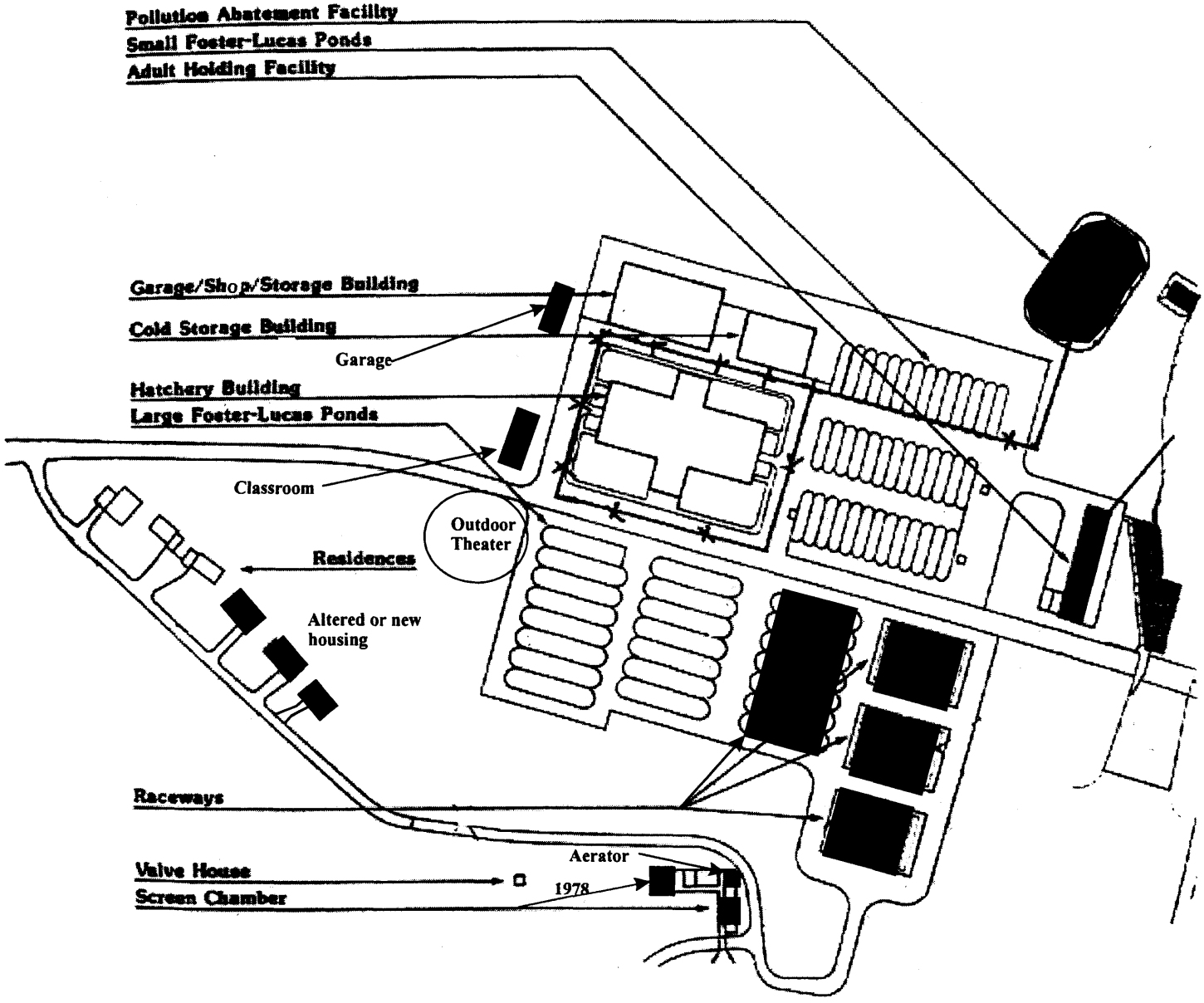
Map #2



Leavenworth National Fish Hatchery
Chelan County, Washington
Contributing Resources 1, 3-15.
Map adapted from Station Profile, on-file, Leavenworth NFH.

Map #3

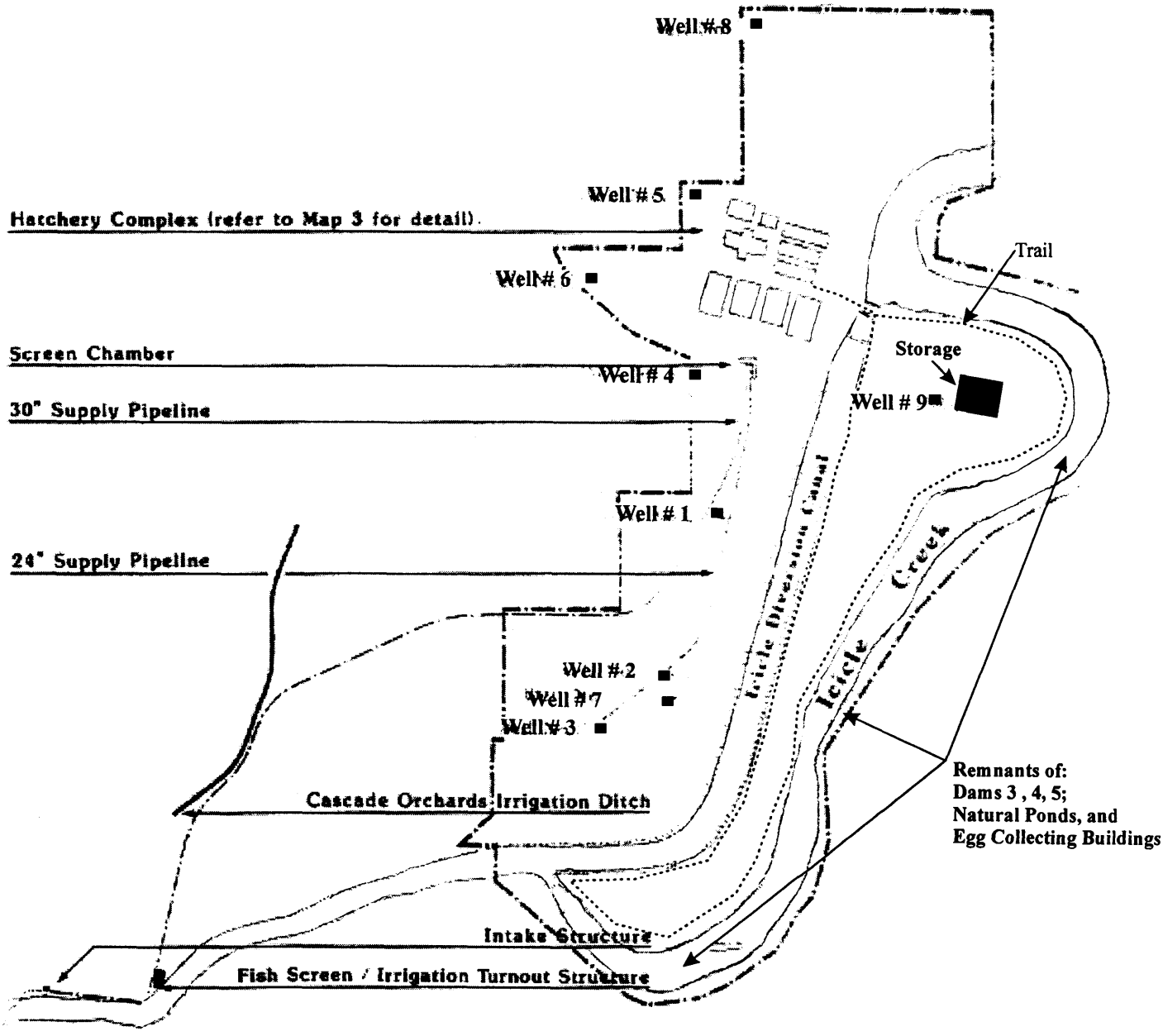
Existing Facilities



Leavenworth

National Fish Hatcher

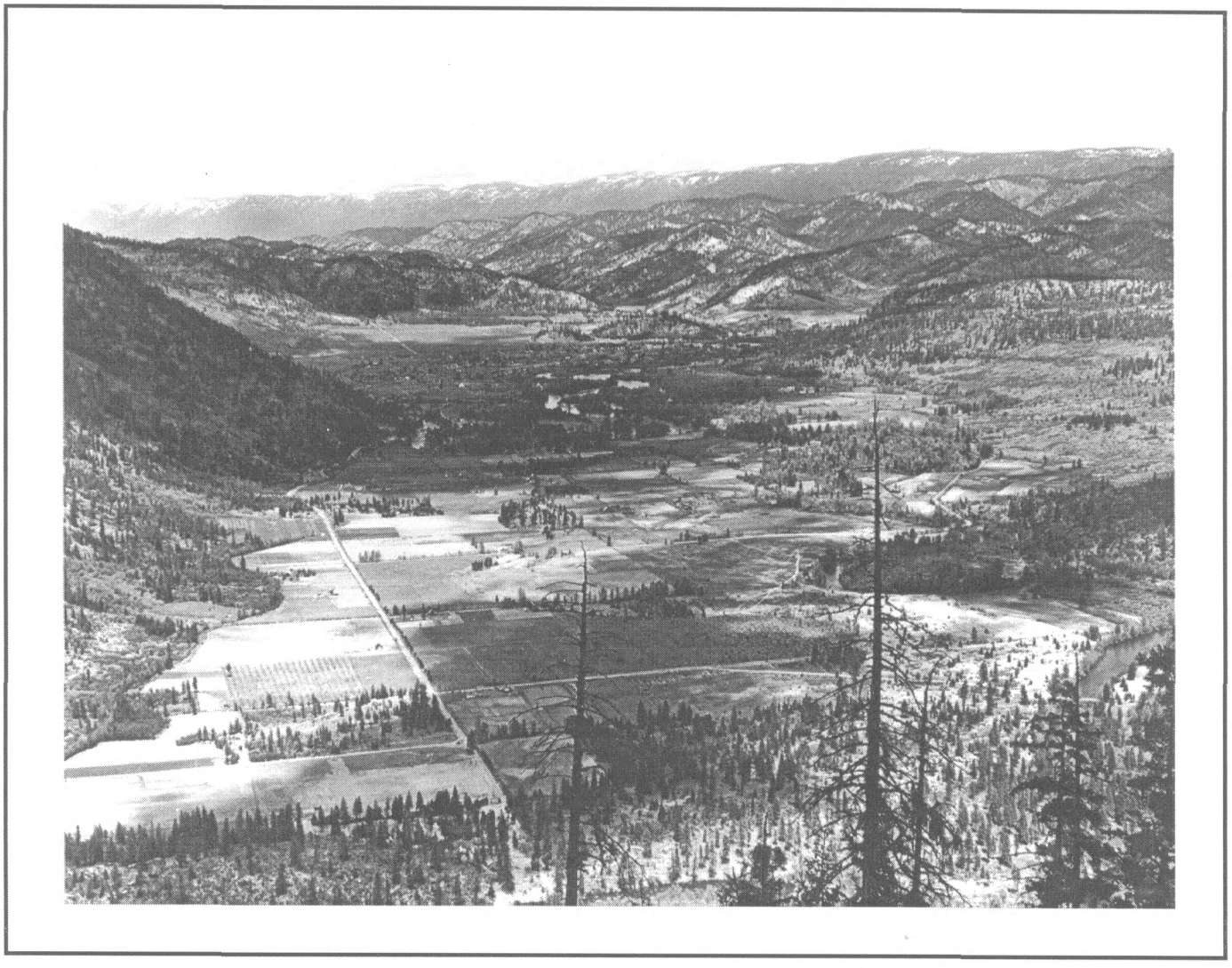
Note: Refer to Map 2 for location of Intake Structure and Wells



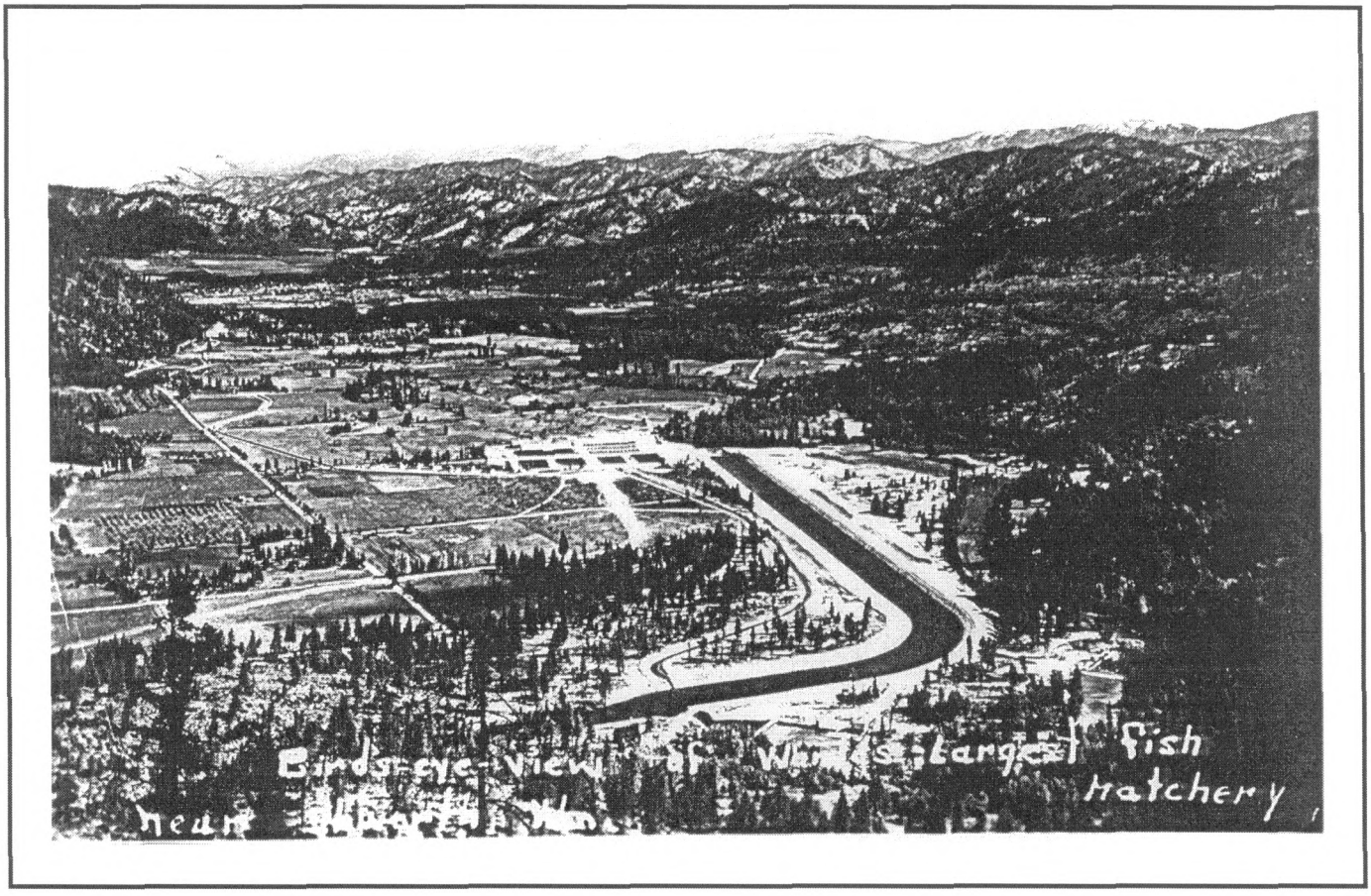
1" = 800'-0"

Leavenworth

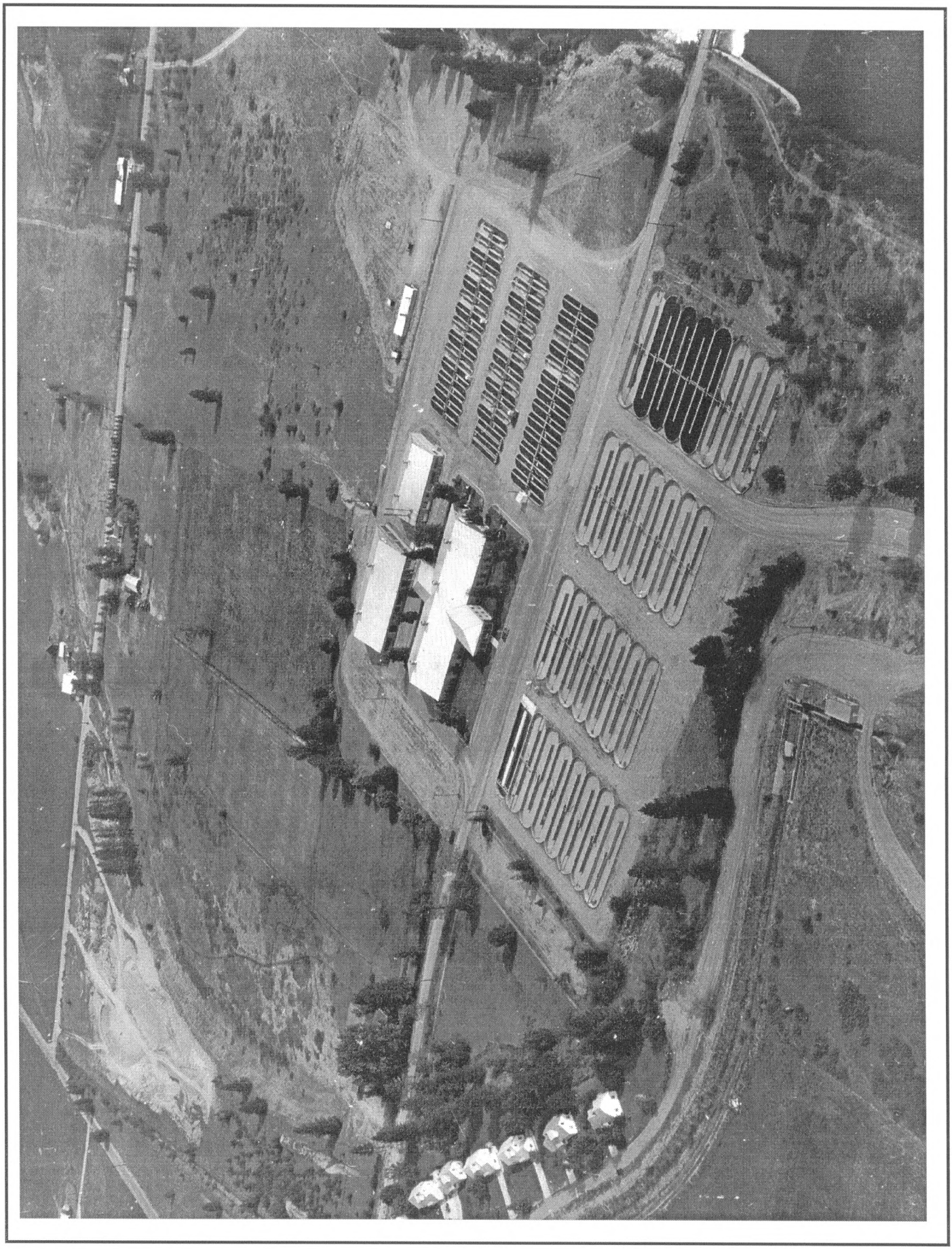
National Fish Hatchery



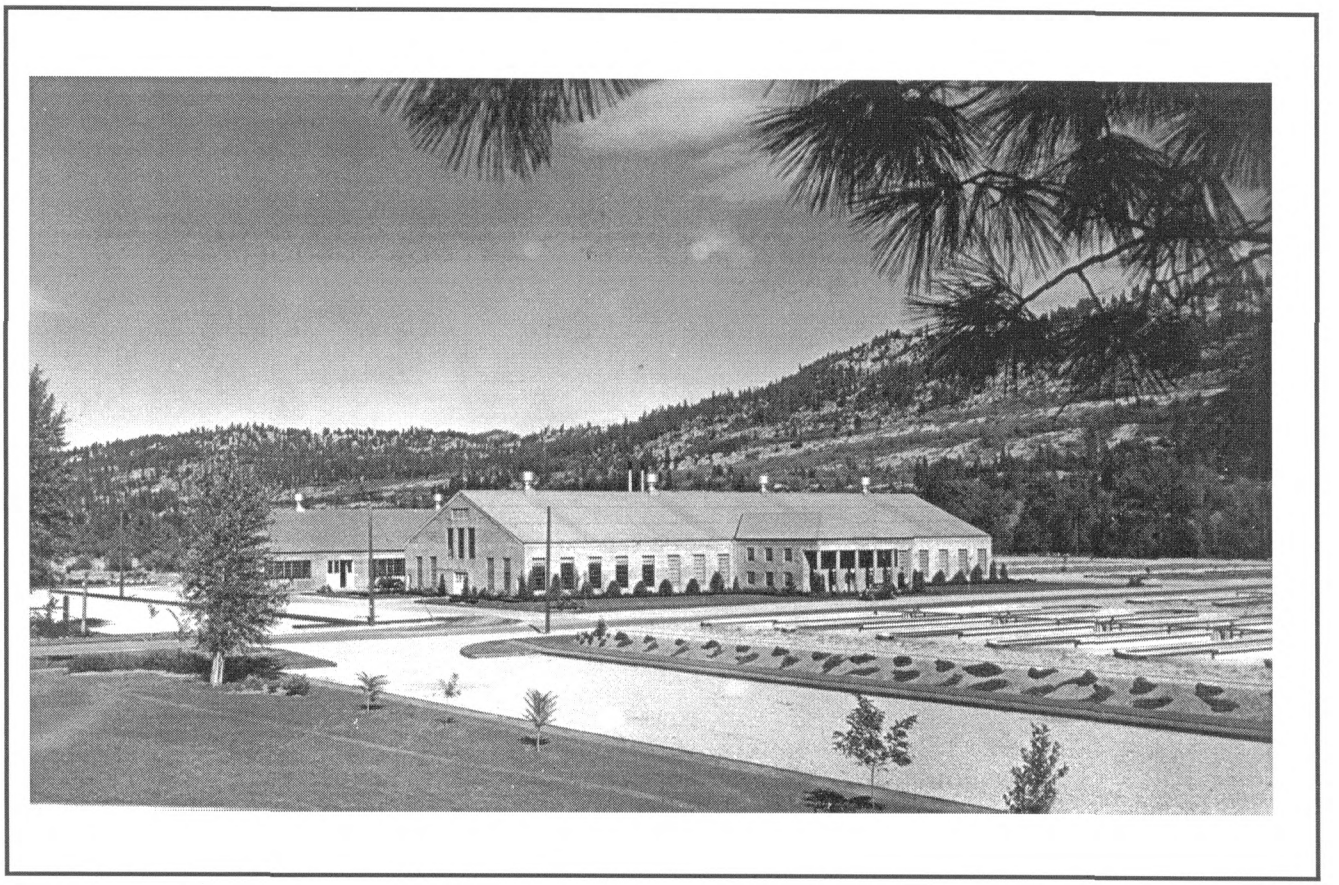
Leavenworth National Fish Hatchery #20
Chelan County, Washington
Aerial View of Leavenworth Valley prior to hatchery, ca. 1938, view to N.
Bureau of Reclamation National Archives, Denver, Colorado (no. 2089).



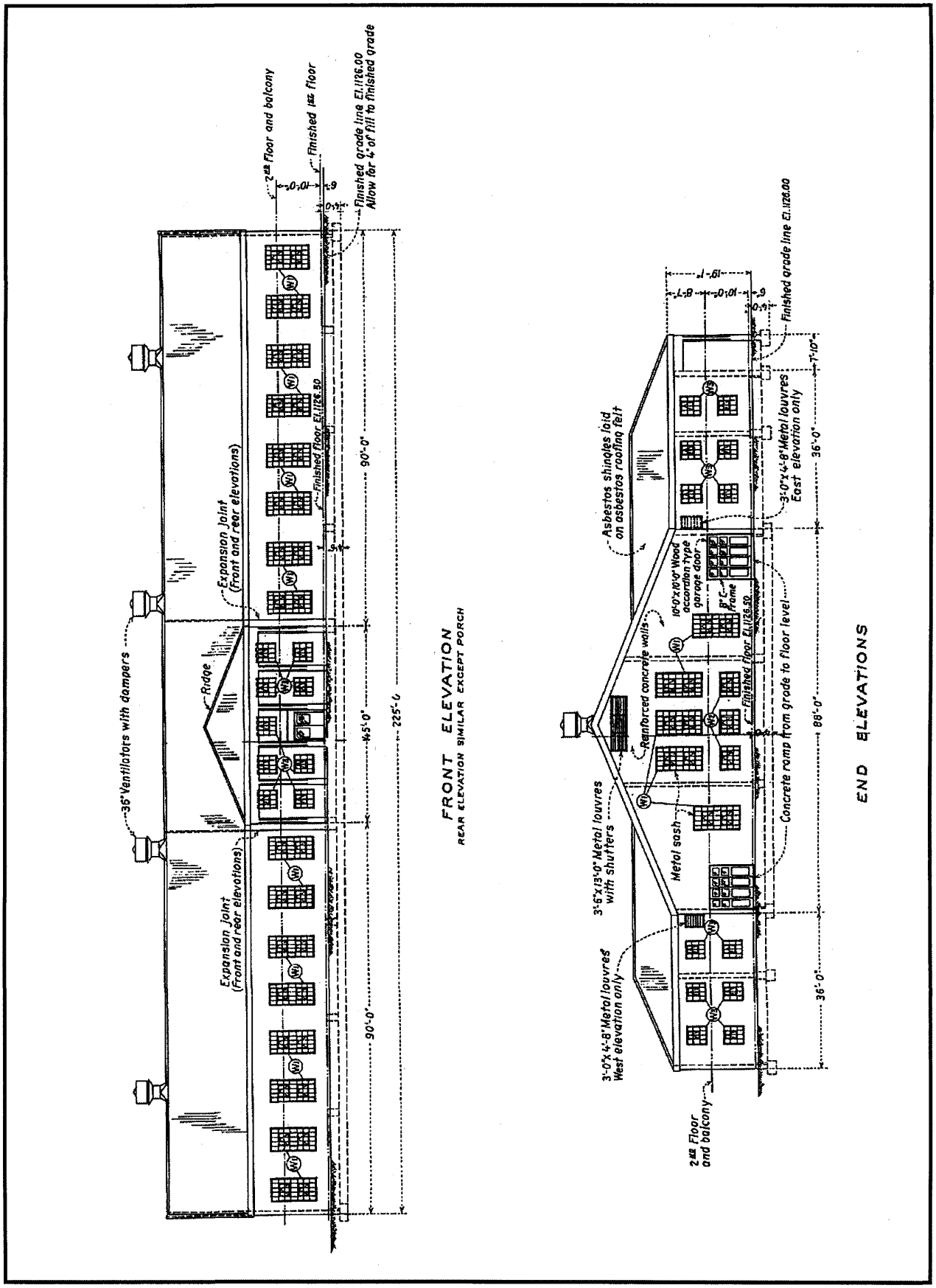
Leavenworth National Fish Hatchery #21
Chelan County, Washington
Birdseye View of Leavenworth NFH, ca. 1941, view to N.
On-file Leavenworth NFH, Leavenworth, Washington.



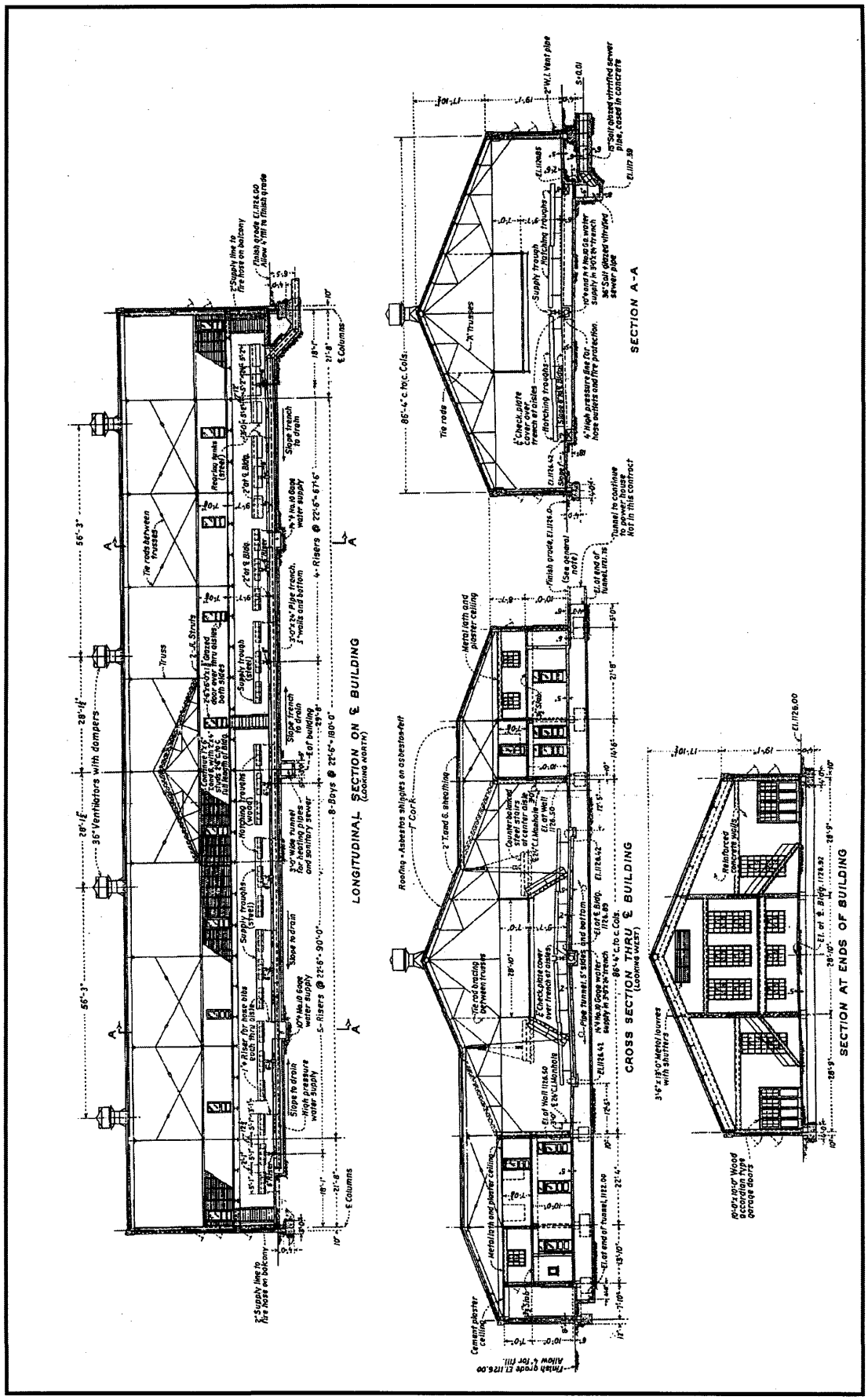
Leavenworth National Fish Hatchery #22
Chelan County, Washington
Aerial View of Leavenworth NFH, ca. 1945, view to N.
On-file Leavenworth NFH, Leavenworth, Washington.



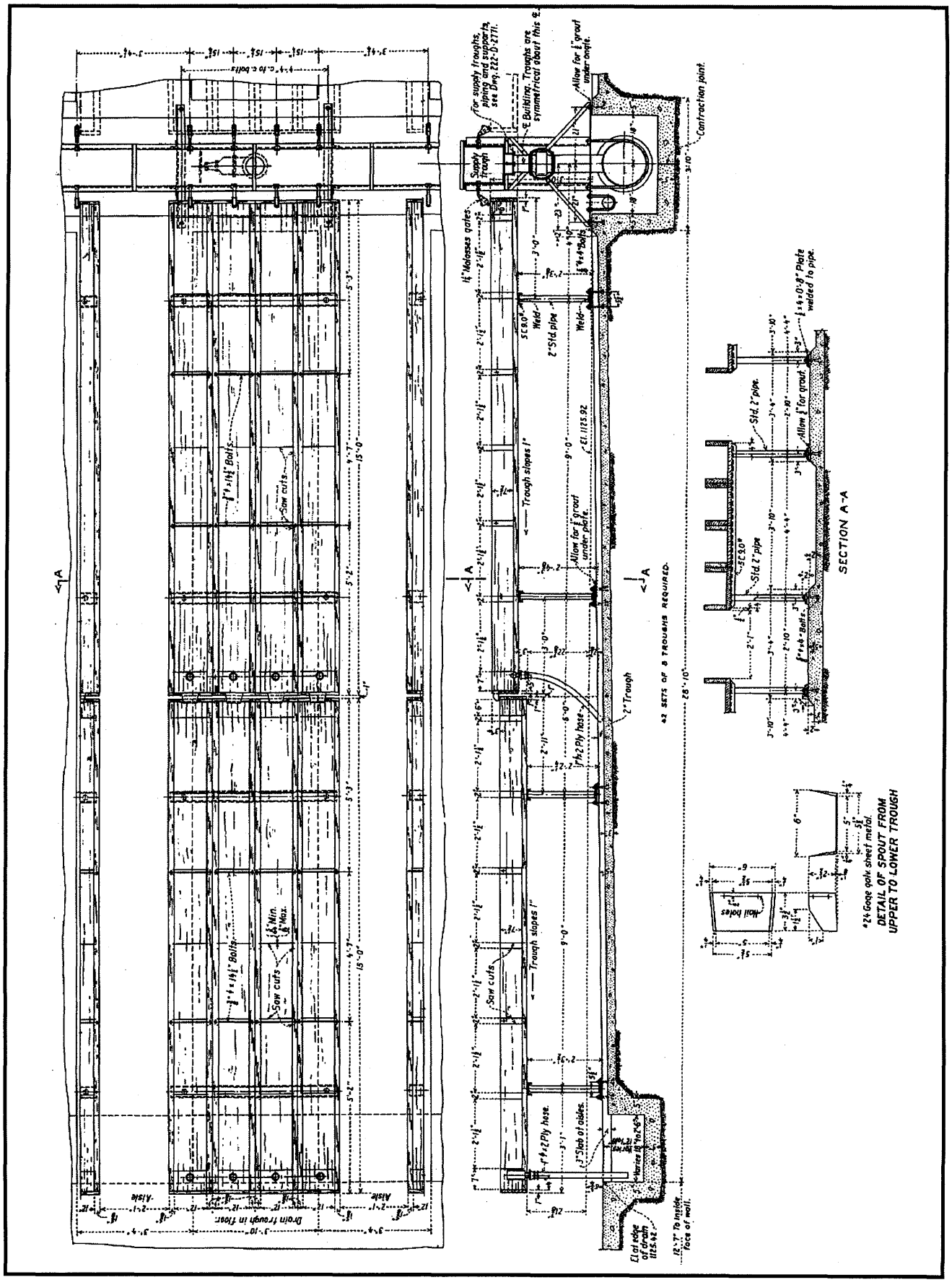
Leavenworth National Fish Hatchery #24
Chelan County, Washington
Leavenworth NFH, ca. 1942, view to NE.
North Central Washington Museum, Wenatchee, Washington (#86-157-25).



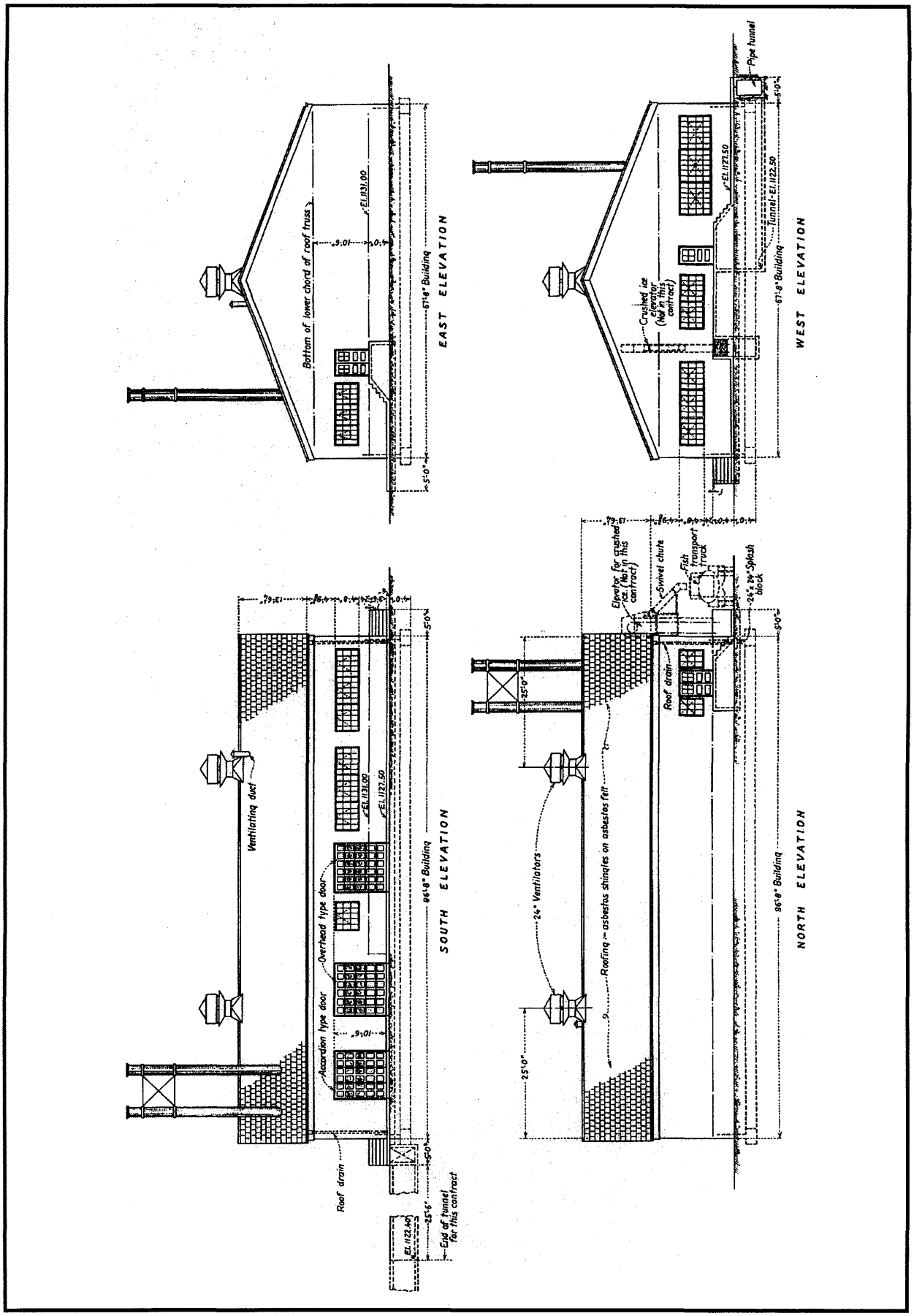
Leavenworth National Fish Hatchery: Contributing Resource - 8 #25
Chelan County, Washington
Drawing: Hatchery Building, Front Elevation and End Elevations.
On-file Leavenworth NFH, Leavenworth, Washington



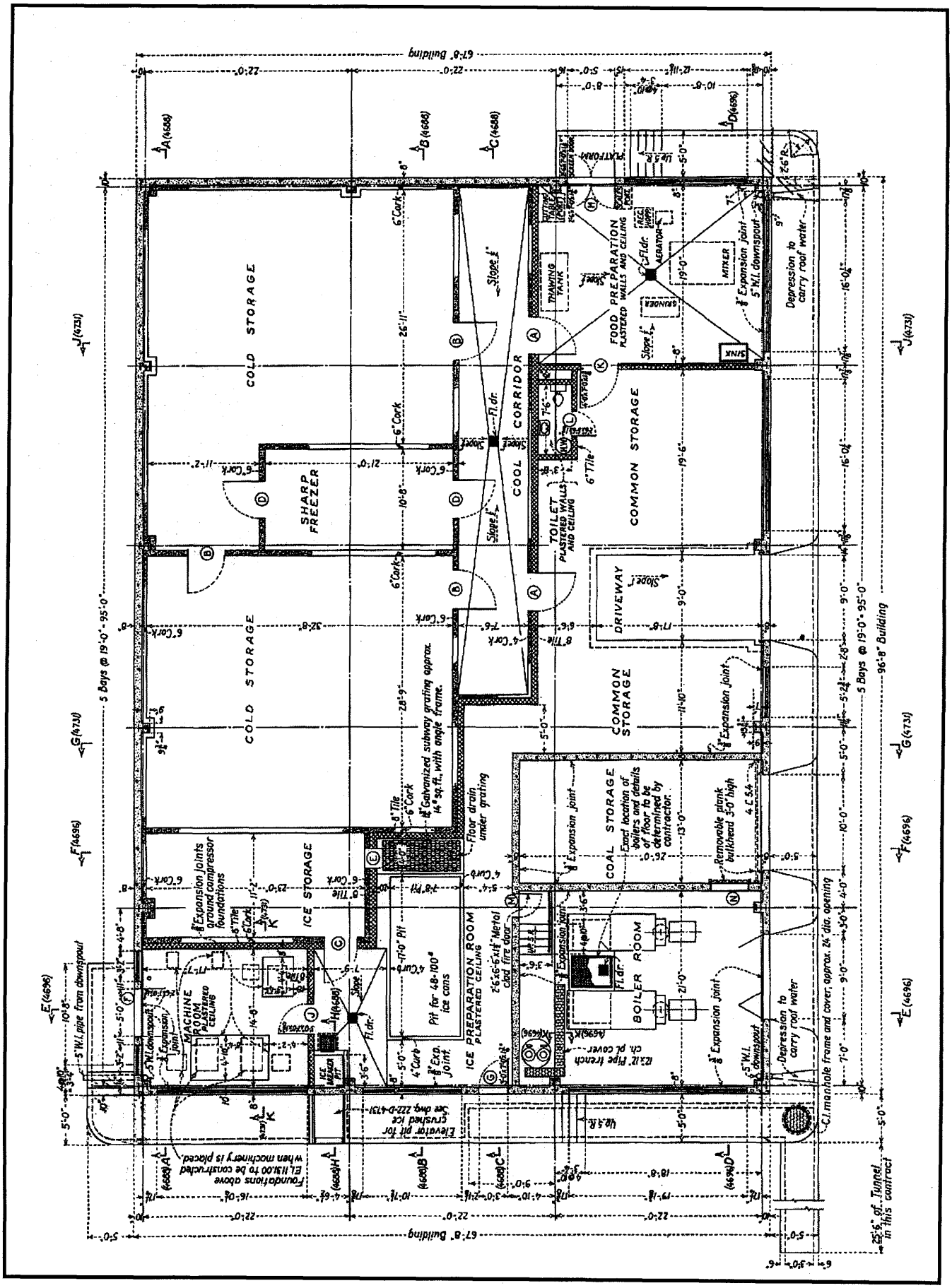
Leavenworth National Fish Hatchery: Contributing Resource - 8 #26
Chelan County, Washington
Drawing: Hatchery Building, Longitudinal Section and Cross Section.
On-file Leavenworth NFH, Leavenworth, Washington



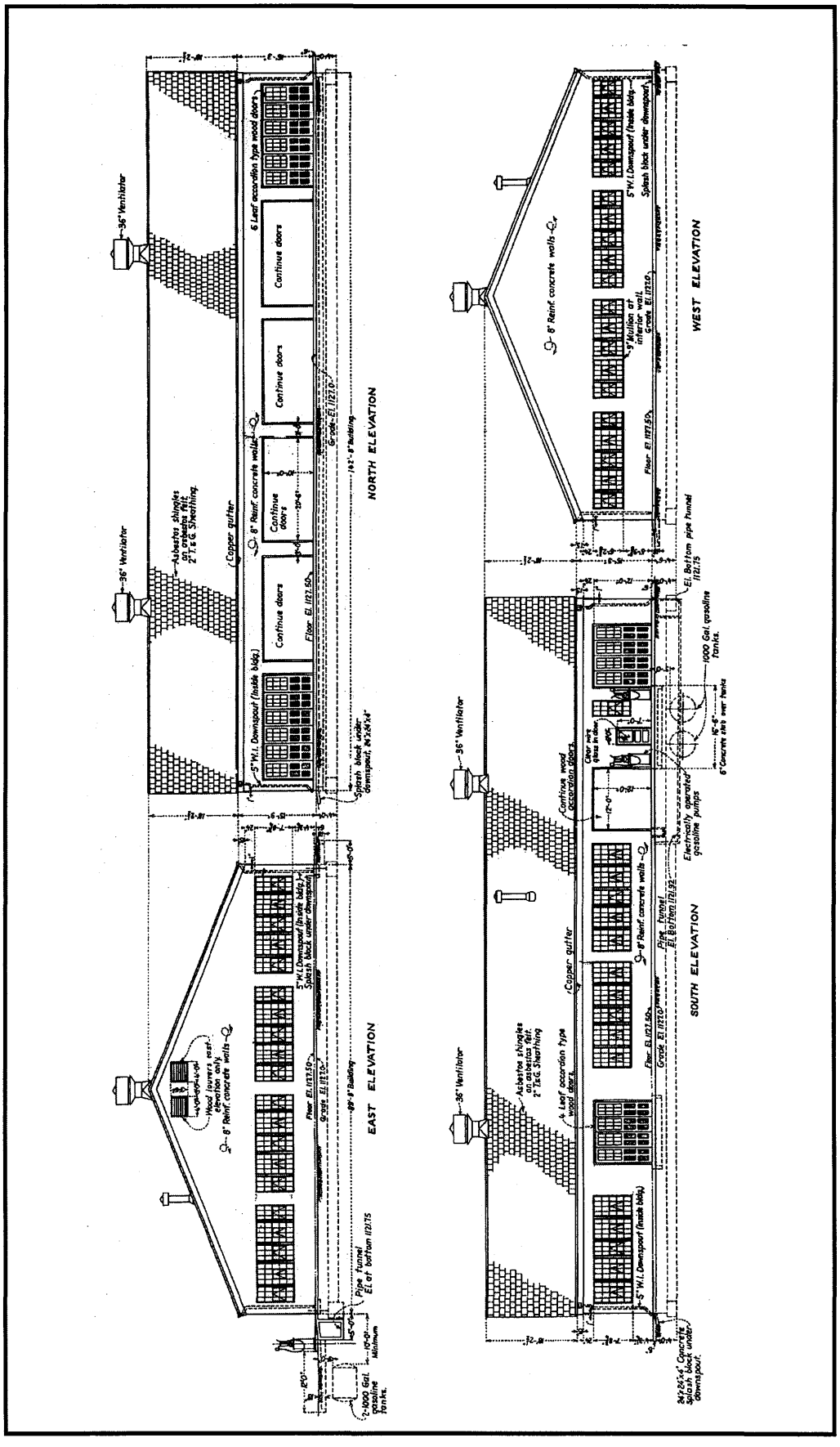
Leavenworth National Fish Hatchery: #27
Chelan County, Washington
Drawing: Trough Details.
On-file Leavenworth NFH, Leavenworth, Washington



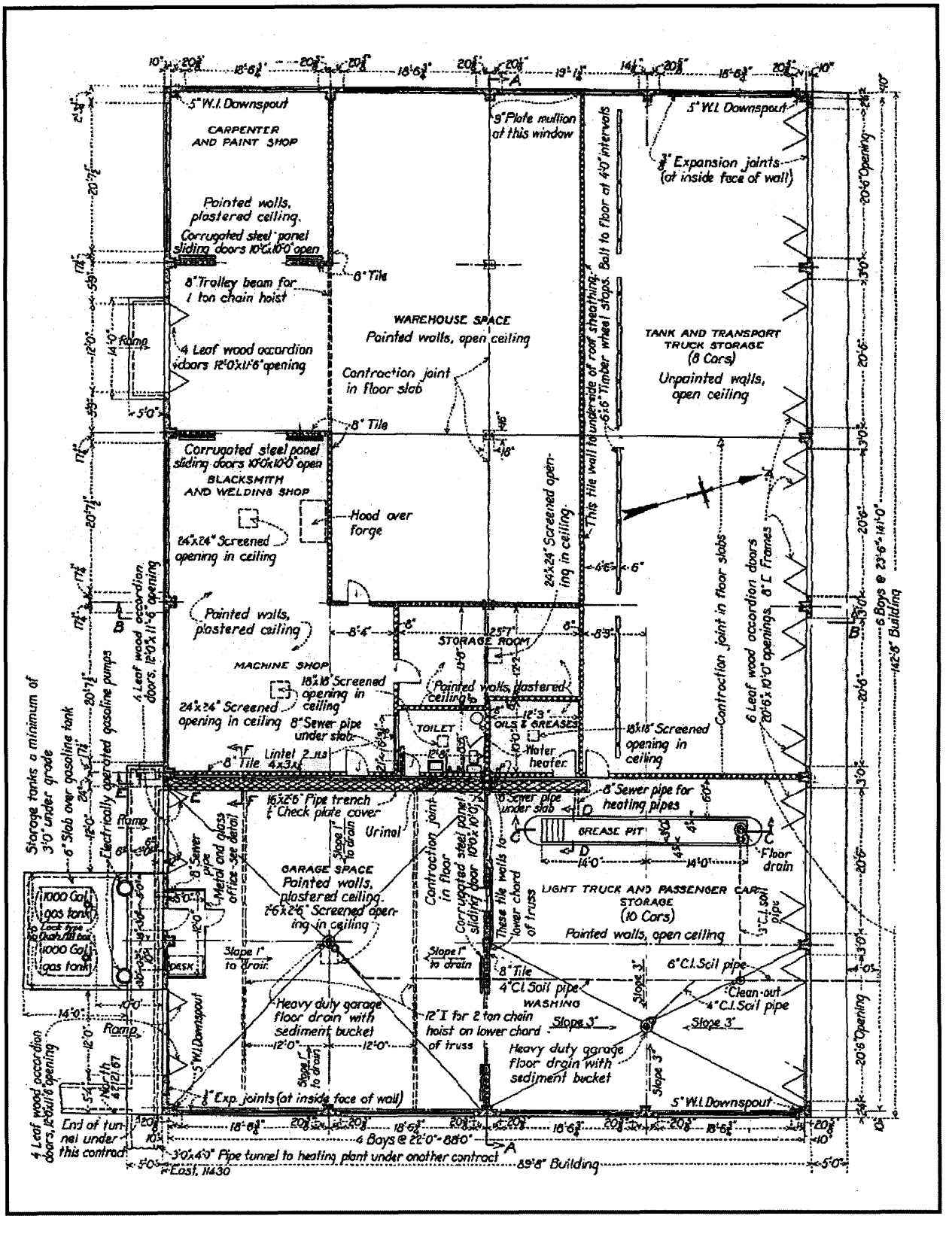
Leavenworth National Fish Hatchery: Contributing Resource - 10 #28
Chelan County, Washington
Drawing: Cold Storage Building, Elevations.
On-file Leavenworth NFH, Leavenworth, Washington



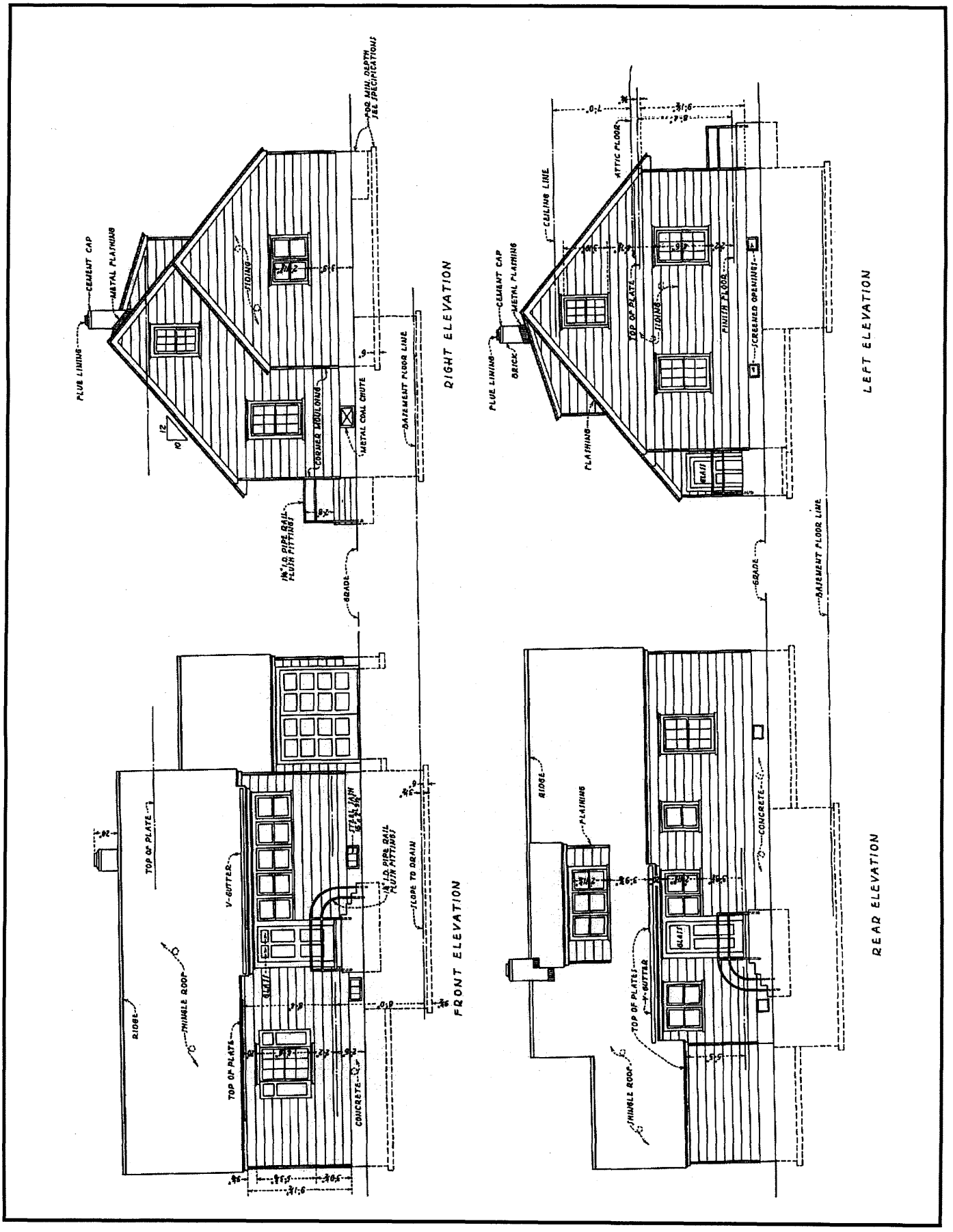
Leavenworth National Fish Hatchery: Contributing Resource - 10 #29
Chelan County, Washington
Drawing: Cold Storage Building, Interior Floor Plan.
On-file Leavenworth NFH, Leavenworth, Washington



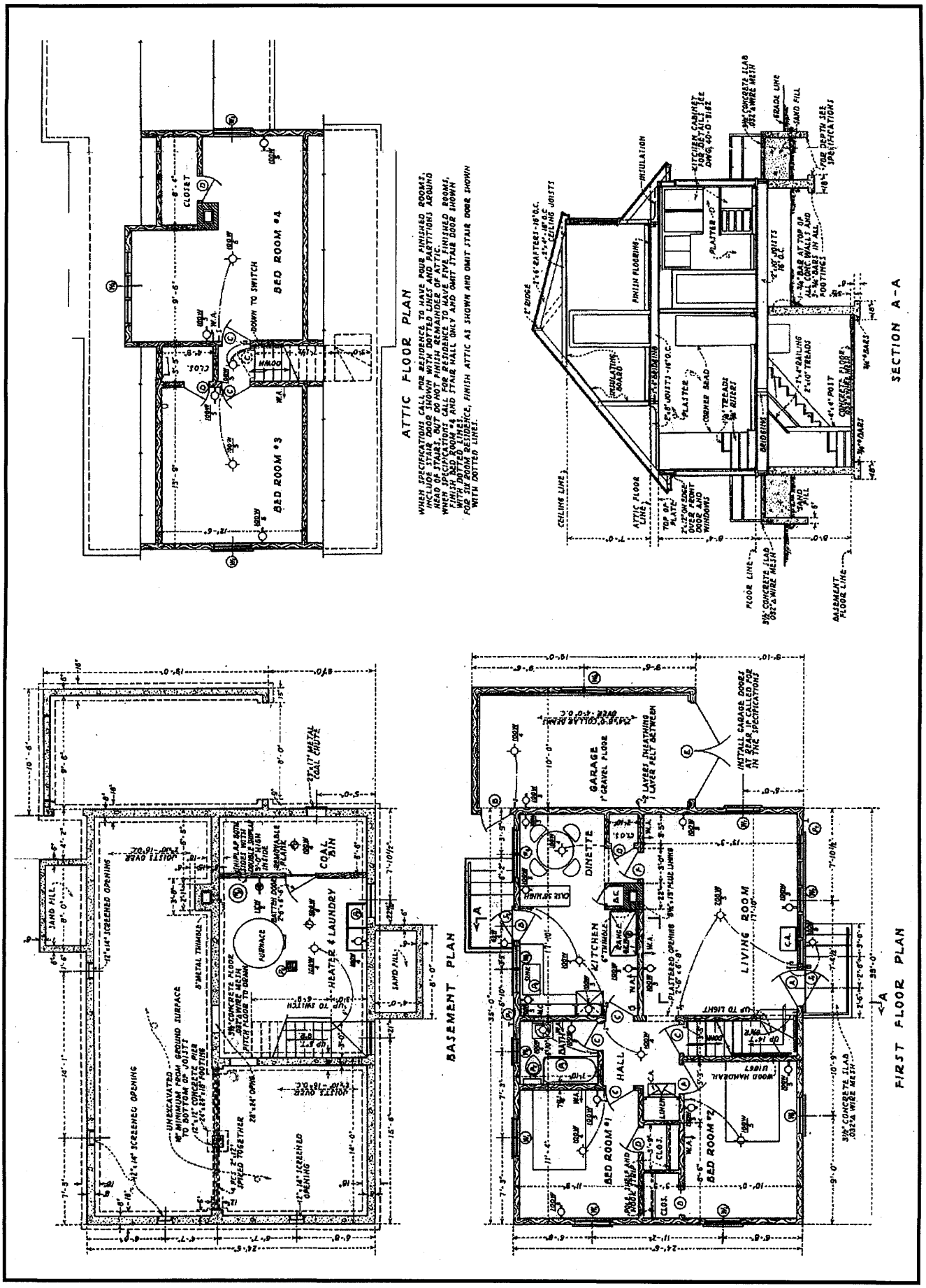
Leavenworth National Fish Hatchery: Contributing Resource - 9 #30
Chelan County, Washington
Drawing: Garage Building, Elevations.
On-file Leavenworth NFH, Leavenworth, Washington



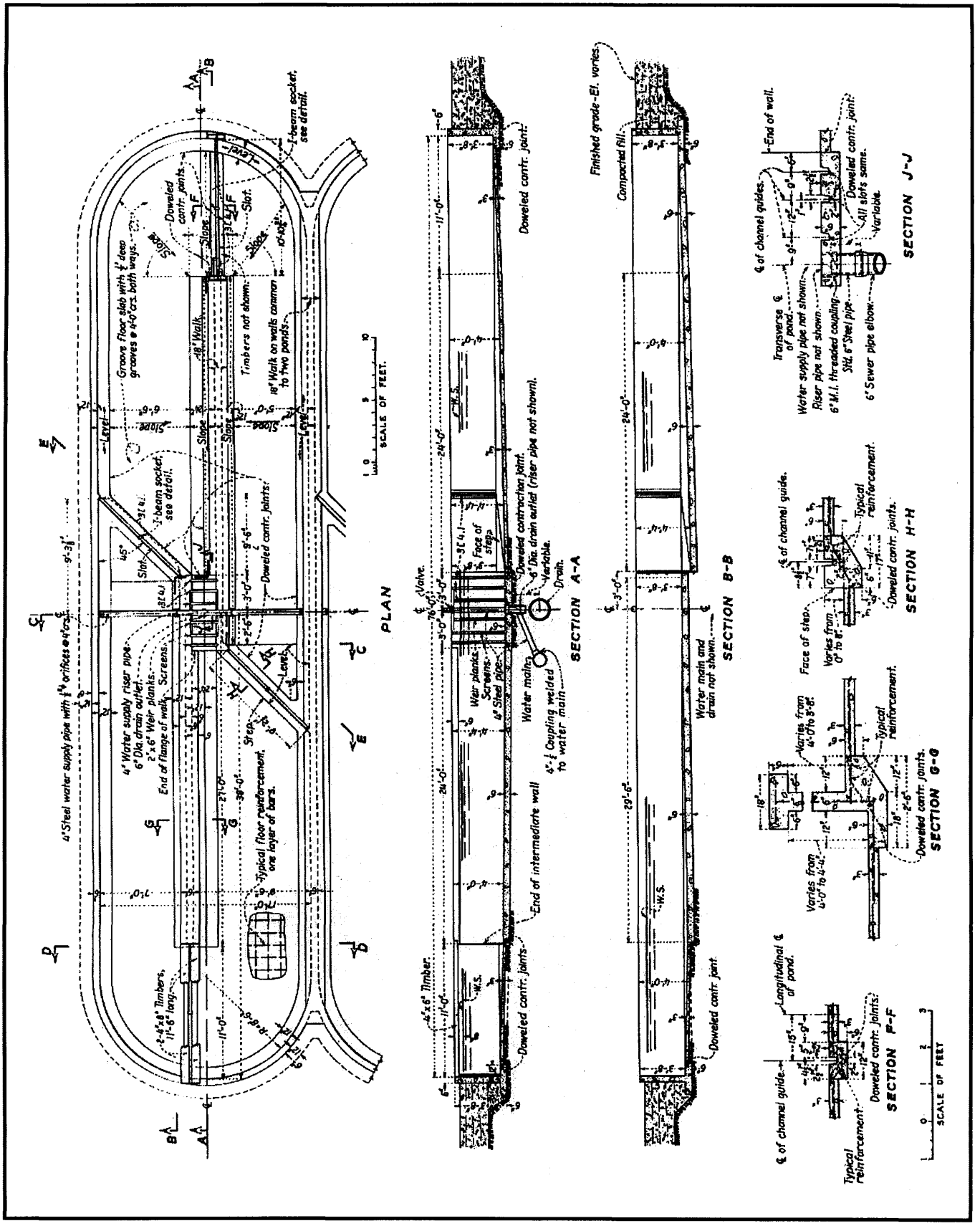
Leavenworth National Fish Hatchery:Contributing Resource - 9 #31
Chelan County, Washington
Drawing: Garage, Interior Floor Plan.
On-file, Leavenworth NFH, Leavenworth, Washington.



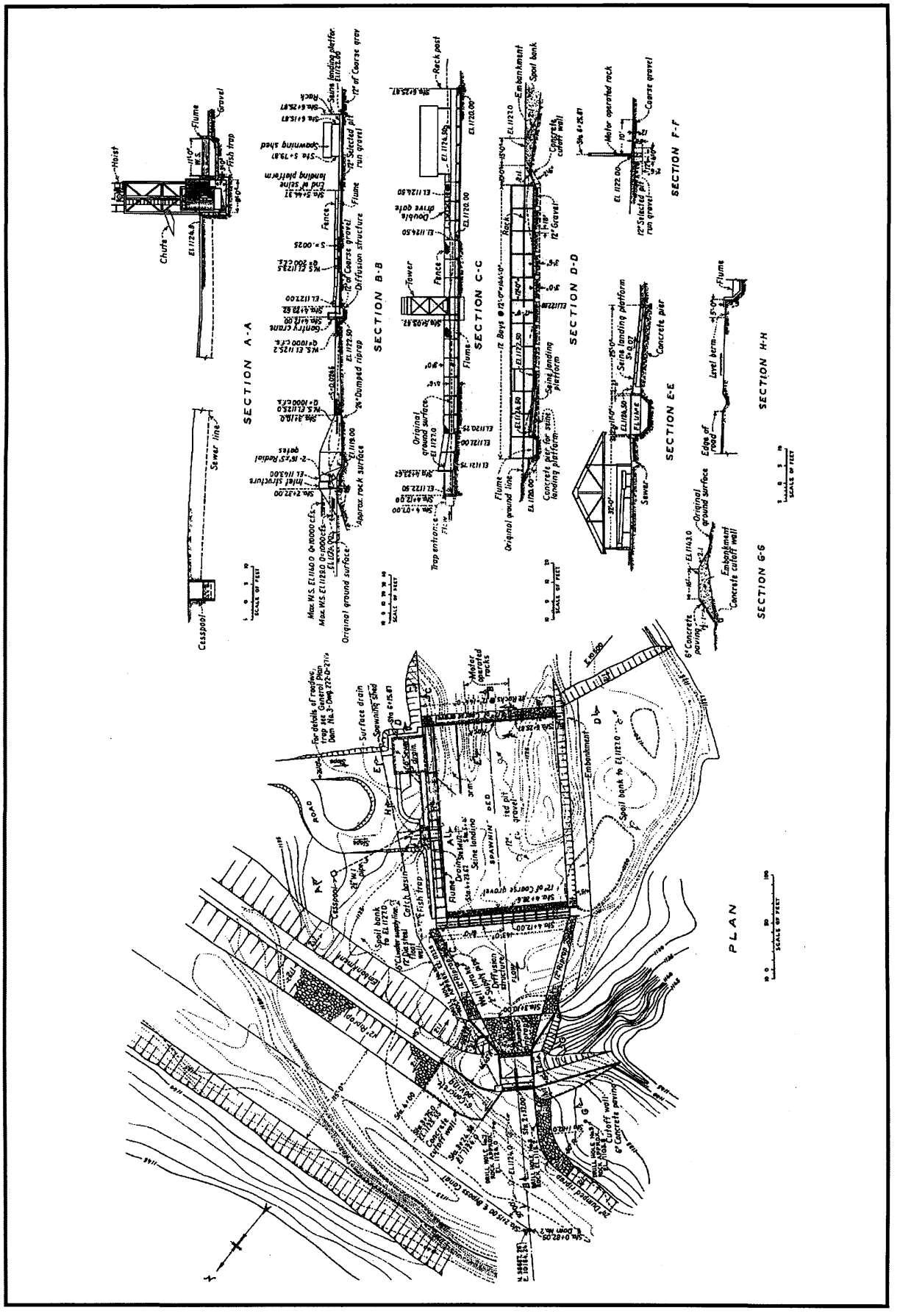
Leavenworth National Fish Hatchery: Contributing Resource - 11, 12, 13 #32
Chelan County, Washington
Drawing: Residence, Type 4, Elevations.
On-file Leavenworth NFH, Leavenworth, Washington.



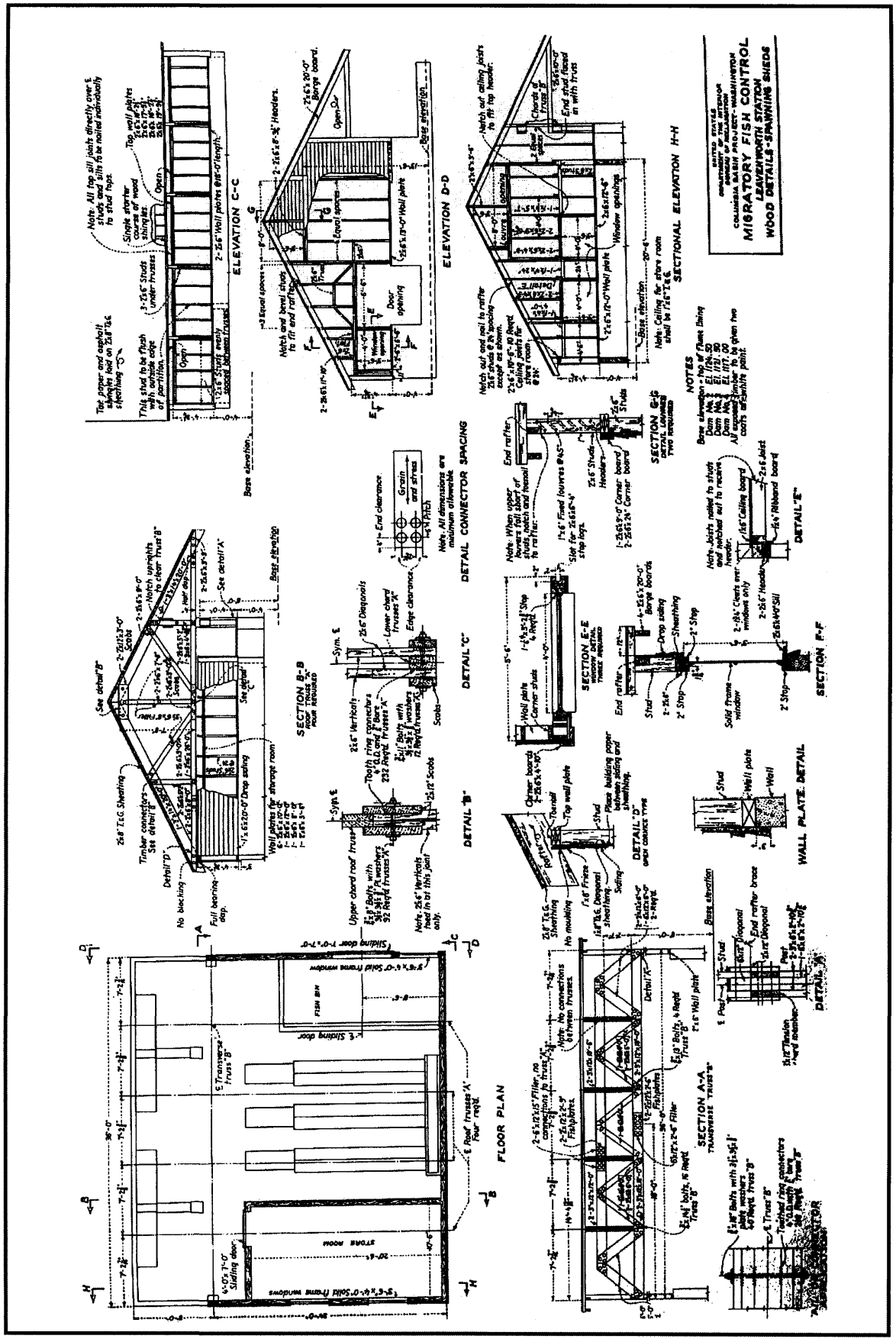
Leavenworth National Fish Hatchery: Contributing Resource - 11, 12, 13 #33
Chelan County, Washington
Drawing: Residence, Bureau of Reclamation Type 4, Interior Floor Plan.
On-file, Leavenworth NFH, Leavenworth, Washington.



Leavenworth National Fish Hatchery: Contributing Resource - 6, 7 #34
Chelan County, Washington
Drawing: Foster-Lucas Pond Plan.
On-file, Leavenworth NFH, Leavenworth, Washington.

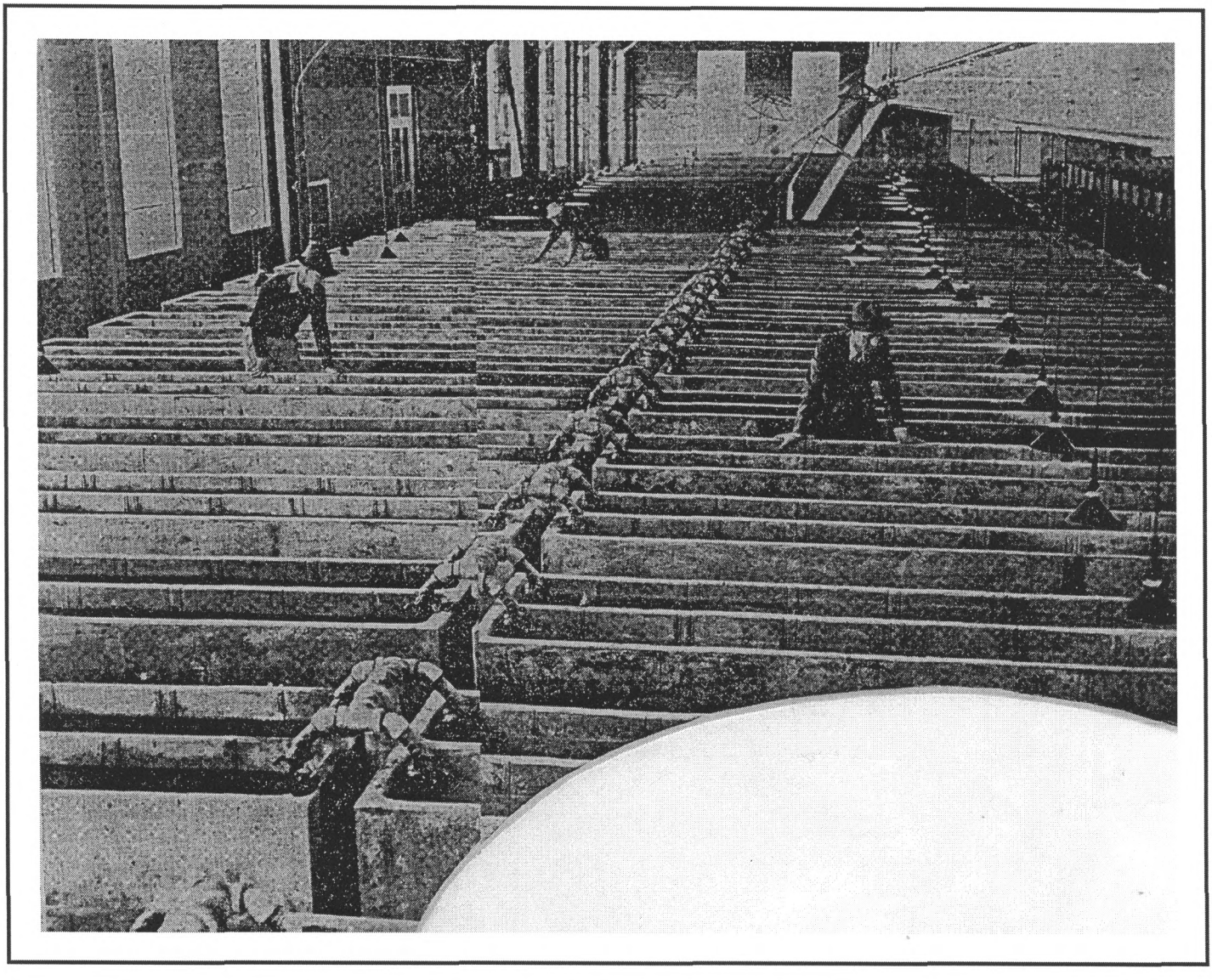


Leavenworth National Fish Hatchery: Contributing Resource - 1, 5 #36
Chelan County, Washington
Drawing: Icicle Creek Diversion Dam, No. 2.
On-file, Leavenworth NFH, Leavenworth, Washington.

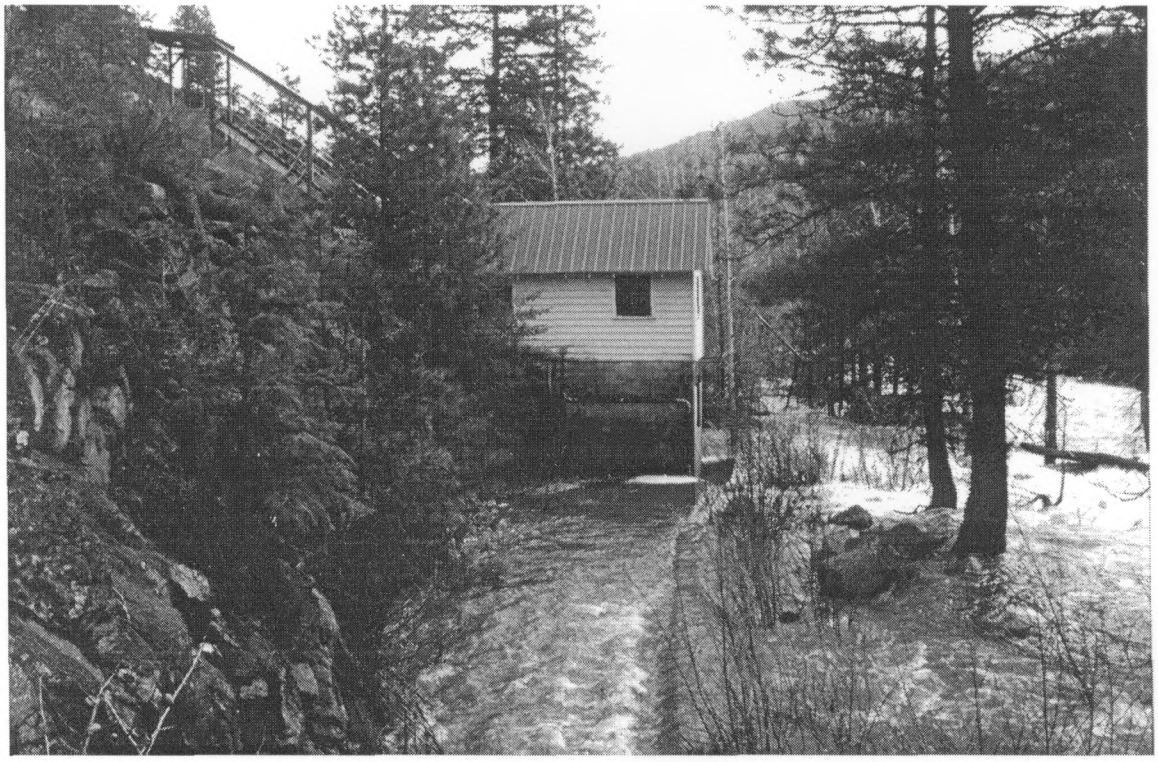


Leavenworth National Fish Hatchery #37
Chelan County, Washington
Drawing: Icicle Creek Spawning Shed plans.
On-file, Leavenworth NFH, Leavenworth, Washington.

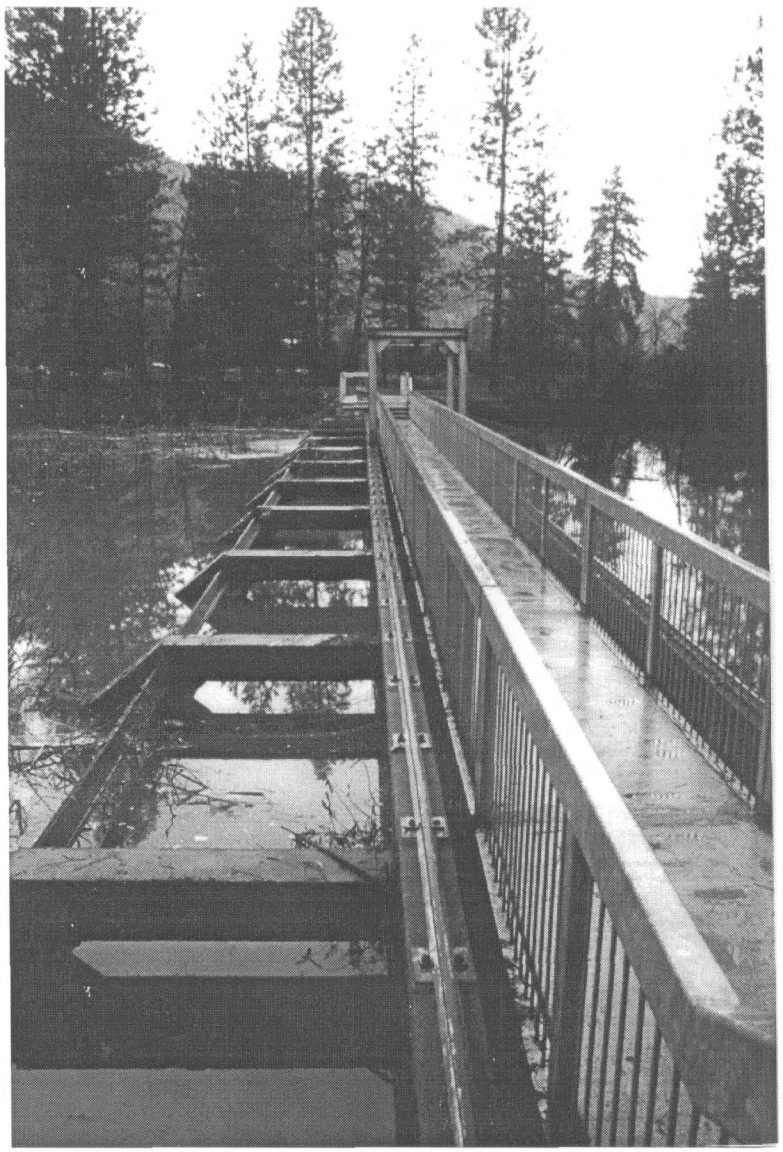
Leavenworth National Fish Hatchery #38
Chelan County, Washington
Icicle Creek Spawning Shed, summer 1996 (collapsed 1997), view to north.
Speulda 1996
USFWS, Region 1, CRT, Sherwood, Oregon.



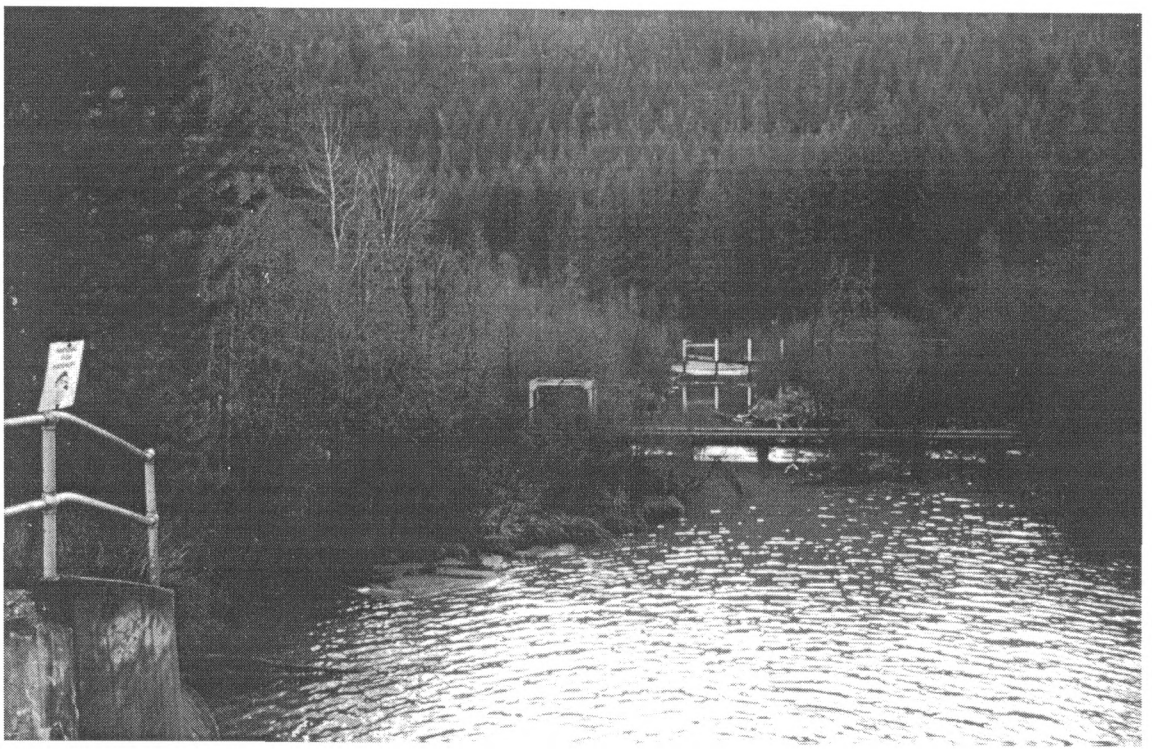
Leavenworth National Fish Hatchery #39
Chelan County, Washington
Hatchery Interior.
Seattle Post Intelligencer, Sunday, May 26, 1940.



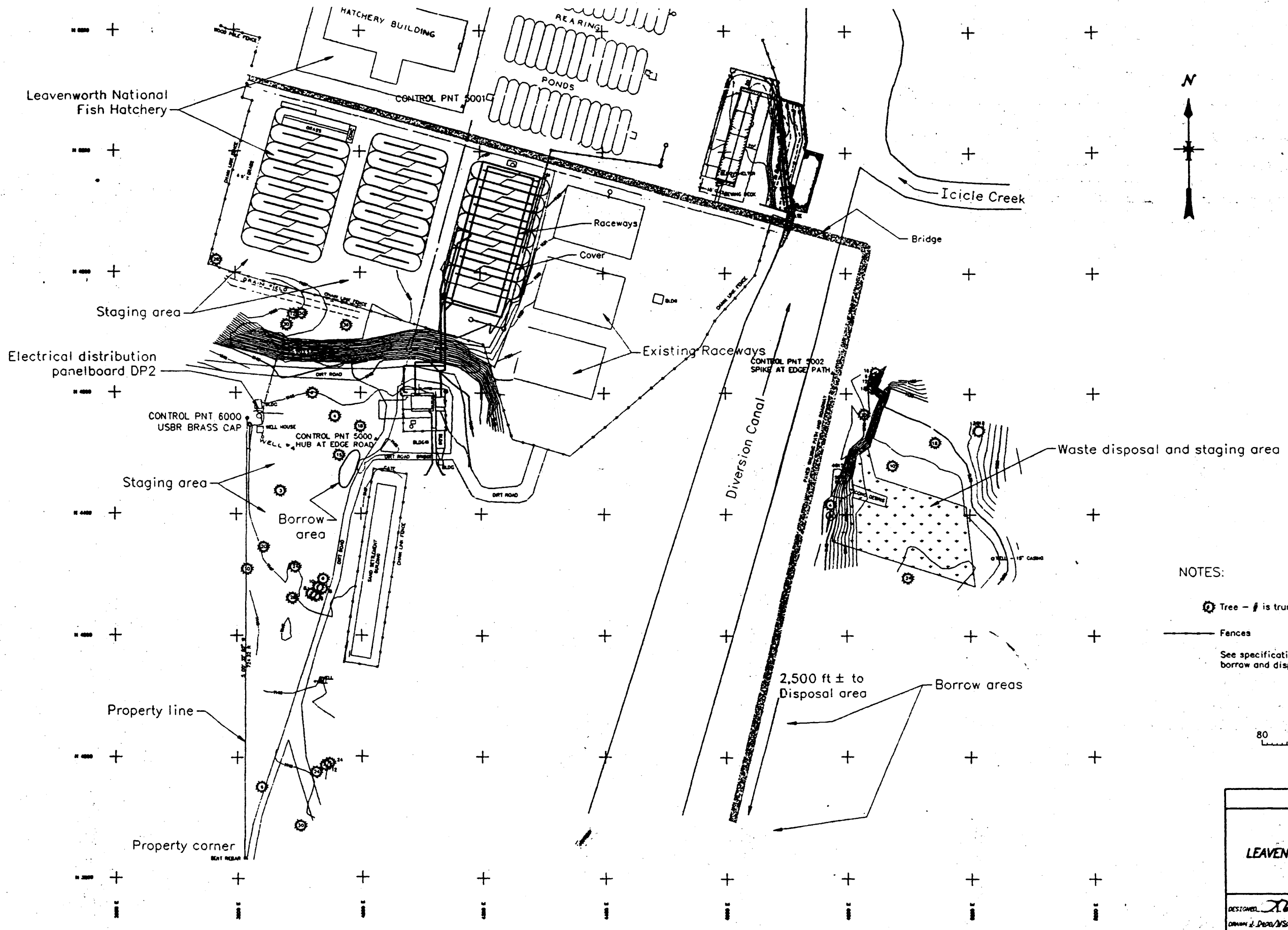
Leavenworth National Fish Hatchery #40
Chelan County, Washington
Intake Structure on Icicle Creek, view to east.
Speulda 1996
USFWS, Region 1, CRT, Sherwood, Oregon.



Leavenworth National Fish Hatchery #41
Chelan County, Washington
Icicle Creek Fish Control Dam, converted to footpath, view to southeast.
Speulda 1996
USFWS, Region 1, CRT, Sherwood, Oregon.



Leavenworth National Fish Hatchery #42
Chelan County, Washington
Icicle Creek with Fish Control Dams, ciew to east.
Speulda 1996
USFWS, Region 1, CRT, Sherwood, Oregon.



NOTES:

Tree – # is trunk diameter in inches

Fences

See specifications for description of borrow and disposal areas.

PLAN

80 0 80 160 240

SCALE OF FEET

ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

COLUMBIA BASIN PROJECT – WASHINGTON

LEAVENWORTH NATIONAL FISH HATCHERY

RACEWAYS AND COVER

GENERAL SITE PLAN

DESIGNED JDD CHECKED

DRAWN J. DeDO/M.Salas TECH. APPROVAL

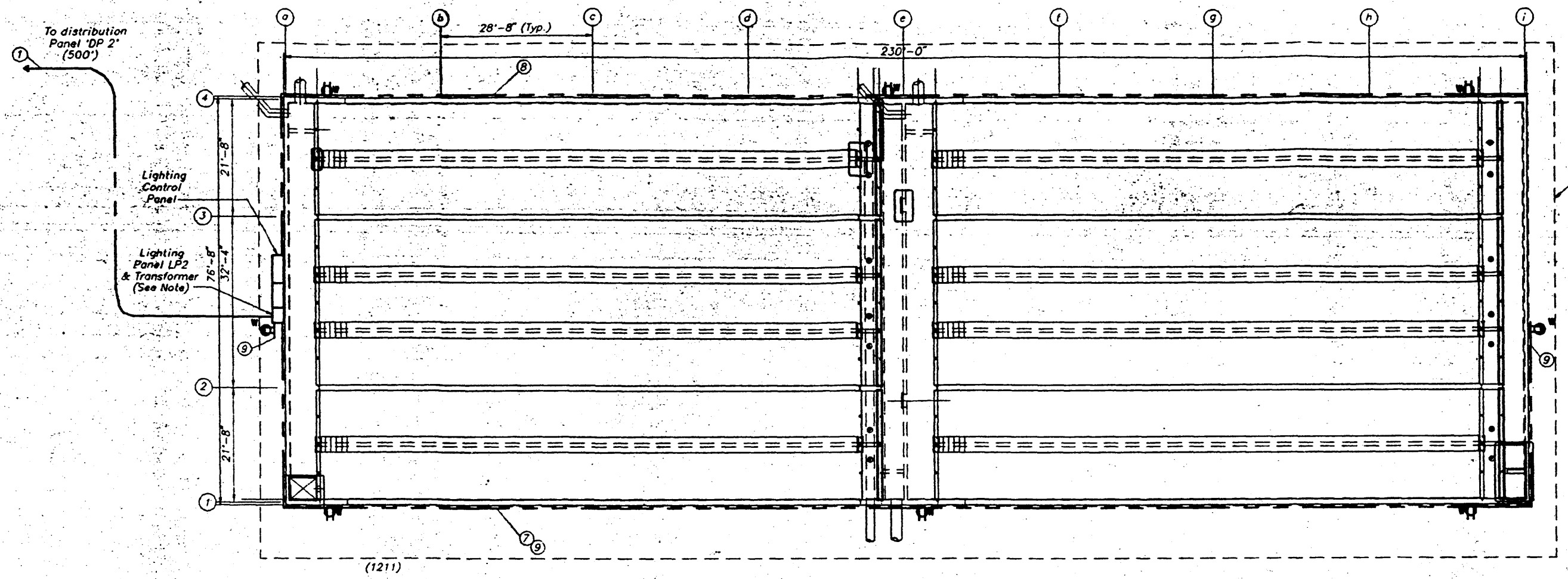
ACTING PROGRAM MANAGER

CADD SYSTEM AUTOCAD BOISE, IDAHO

CADD FILENAME LEAVEN.DWG

DATE AND TIME PLOTTED 15 AUGUST 1988

222-100-



CONDUIT NO.	CABLE	CONDUIT SIZE	CONDUIT ROUTE FROM	CONDUIT ROUTE TO	REMARKS
1	3-1C-No 3	2	DP2	LP2	GRS/PVC
2	12-1C-No 12	2	LP2	Lighting Control Panel	GRS
3	3-1C-No 12	3/4	LCP	Lighting	(-1224) GRS
4	3-1C-No 12	3/4	LCP	Lighting	(-1224) GRS
5	3-1C-No 12	3/4	LCP	Lighting	(-1224) GRS
6	3-1C-No 12	3/4	LCP	Lighting	(-1224) GRS
7	3-1C-No 12	3/4	LP2	Receptacles	GRS/PVC
8	3-1C-No 12	3/4	LP2	Receptacles	GRS/PVC
9	2-1C-No 3 1-1C-No 6	1 1/4	LP2	Sleeve Receptacles	GRS/PVC
10	4-1C-No 12	3/4	LCP	Switches	GRS (2 circuits each conduit)

CONDUIT & CABLE SCHEDULE

SYMBOLS

- 240 – Volt Sleeve Receptacle with Weatherproof Cover.
- GFCI Duplex Receptacle with Weatherproof Cover.

Note:

1. Locate lighting panel on building center line with panel top flush with top of wall.
2. Buried conduit to be PVC schedule 40. Transition to GRS conduit above ground.

ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA BASIN PROJECT – WASHINGTON
LEAVENWORTH NATIONAL FISH HATCHERY
RACEWAYS AND COVER
ELECTRICAL INSTALLATION
CONDUIT PLAN & SCHEDULE

DESIGNED B.Miller CHECKED B.Miller
DRAWN L.Lievre TECH. APPROVAL [illegible] PROGRAM MANAGER

CADD SYSTEM	CADD FILENAME	DATE AND TIME PLOTTED
AutoCAD Rel. 13 c4p BOISE, IDAHO	C1123.DWG MAY 1997	JULY 16, 1997 08:07

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