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 National Register Bulletin, How to Complete the National Register of Historic Places Registration Form. 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 certification comments, entries, and narrative items on continuation sheets if needed (NPS Form 10-900a).

1. Name of Property

   historic name  Central Oregon Canal Historic District (Ward Road – Gosney Road Segment)
   other names/site number  N/A
   Name of Multiple Property Listing  Carey and Reclamation Acts irrigation Projects in Oregon, 1901-1978
   (Enter "N/A" if property is not part of a multiple property listing)

2. Location

   street & number  Roughly bounded by Bear Creek Rd. to the north, Gosney Rd. to the
   east, Somerset Dr. to the south, and Ward Rd. to the west
   city or town  Unincorporated Deschutes County
   state  Oregon  code OR  county Deschutes  code 017  zip code 97701

3. State/Federal Agency Certification

   As the designated authority under the National Historic Preservation Act, as amended,
   I hereby certify that this X 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 X meets ___ does not meet the National Register Criteria. I recommend that this property be considered significant at the following level(s) of significance: ___ national ___ statewide X local
   Applicable National Register Criteria: X A ___ B ___ C ___ D

   Christine Curnow
   Oregon State Historic Preservation Officer
   Date 1/17/19

   In my opinion, the property ___ meets ___ does not meet the National Register criteria.
   Signature of commenting official  Date

4. National Park Service Certification

   I hereby certify that this property is:
   ___ entered in the National Register
   ___ determined eligible for the National Register
   ___ determined not eligible for the National Register
   ___ removed from the National Register
   ___ other (explain:)

   Signature of the Keeper  Date of Action
Central Oregon Canal Historic District  
Deschutes Co., OR  

5. Classification

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<th>Ownership of Property</th>
<th>Category of Property</th>
<th>Number of Resources within Property</th>
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<td>object</td>
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</tr>
</tbody>
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Number of contributing resources previously listed in the National Register

0

6. Function or Use

Historic Functions
AGRICULTURE/SUBSISTENCE
Irrigation facility

Current Functions
AGRICULTURE/SUBSISTENCE
Irrigation facility

7. Description

Architectural Classification
NO STYLE

Materials
foundation: N/A
wails: N/A
roof: N/A
other: EARTH
STONE, basalt
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County and State

Narrative Description

(Describe the historic and current physical appearance and condition of the property. Describe contributing and non-contributing resources if applicable. Begin with a summary paragraph that briefly describes the general characteristics of the property, such as its location, type, style, method of construction, setting, size, and significant features. Indicate whether the property has historic integrity.)

Summary Paragraph

The nominated property is a segment of the Central Oregon Canal (COC), located in the Upper Deschutes River Basin, near the center of Oregon, in Deschutes and Crook Counties (Figures 1 and 8). The historic district begins 7.75 miles east of the diversion point and ¾ mile east of the Bend city limits in Deschutes County. The district is 3.4 miles long, crossing rural land between the Ward Road Bridge on the western edge and the Gosney Road Bridge on the eastern edge. In the historic district, the canal ranges in width from 34’ to 78’, averaging around 50’, and its depth varies from 1’ to 9’, averaging around 4’ deep, depending on the amount of volcanic lava flows encountered, the terrain, and slope. The canal was built in irregular profiles, often wider and shallower than it was designed, in order to reduce expensive rock blasting and excavation.¹

The canal through the historic district carries nearly the full amount of water diverted from the Deschutes River, 530 cubic feet per second during the irrigation season, April through October.² The elevation of the canal on the western historic district boundary is 3,658 feet and water gradually drops about 15 feet per mile in the district, which is average for the entire canal. The historic district has unique rocky terrain, rolling hills and sudden drops in elevation mixed with flat stretches, over lava tubes. It runs through the southwest quarter through the northeast quarter of Township 18 South, Range 12 East, Section 1, W. M. (T18S, R12E, Section1), from the northwest quarter to the southeast quarter of T18S, R13E, Section 6, through the southwest quarter of Section 5 and ends in the center of the north half of Section 8 (Figures 15-20). The historic district encompasses 50’ on either side of the canal centerline to create a 100’ corridor that includes the whole of the easement held by COID, and all the contributing resources. Most of the property owners in the district, where parcels range from 1 acre to 90 acres in size, maintain appurtenant water rights and use irrigation water (Figures 4a-4f). Much of the historic setting, including cultivated farms, a full range of irrigation system components, irrigation ponds and native vegetation, remains. The nominated canal, with its winding, character-defining, rocky, uneven canal bed and irregular slopes, cuts, and tall embankments is historic contributing. The historic design and materials, tool marks, and blasting drill holes are evident and tell the narrative of its construction through solid basalt rock flows that were blasted apart and moved with horse teams. The historic district has a high degree of all aspects of integrity. The 28 contributing structures include the historic main canal, a 215’-long concrete chute across a sink hole, 11 turnouts/headgates and associated headwalls (including Stearns Waste, a set of three headgates sharing a single headwall and counted as one resource), and 15 drops. The single contributing site is the remains of a 305’-long wooden flume (archaeological site 35DS3033, see appended site form). The 10 non-contributing elements within the nominated area include eight non-historic turnouts to ditches (outside the period of significance), a historic-period one-lane wooden bridge (outside the agricultural irrigation context), and a historic-period corrugated metal pipe that delivers water across the canal to a farm ditch (associated with the irrigation of a specific farm, and therefore outside the canal system, per the MPD) (Figure 5). This nomination conforms to the general registration requirements and the description and classification of structures in the linear water distribution system of man-made water conduit and conveyance structures, as set out in the MPD, Carey and Reclamation Acts irrigation Projects in Oregon, 1901-1978, listed in 2017.

¹ Dubuis, John, Report to Desert Land Board on Central Oregon Project, 1914, p. 5.
² Oregon Department of Water Resources, 2016 averages
Central Oregon Canal Historic District
Name of Property

Looking south to irrigation water delivered to a hay farm in the center of Alfalfa by the Central Oregon Canal.  

LOCATION, GEOGRAPHY AND GEOLOGY OF THE CENTRAL OREGON CANAL

Location
The Central Oregon Canal (COC) is in Deschutes and Crook Counties, Oregon. The canal is in the Upper Deschutes River Basin, near the center of the state, east of the Cascade Mountain Range (Figure 1). The main canal is 47 miles long. It traverses the plateau east of the Deschutes River, south of the Crooked River, west of the Dry River, and north of the National Newberry Volcano Monument. It begins within the city of Bend at the diversion gate in the Deschutes River. The canal runs from the Deschutes River, its source of water, through the southern urban portion of Bend, population 82,000⁴, flowing east of the city limits through progressively sparsely populated rural lands toward the Badlands Wilderness Area. From there, it abruptly turns north and heads to the unincorporated communities of Alfalfa and Powell Butte (population 1,768)⁵, where orchard grass and alfalfa hay are primary crops, and then flows northwest toward the Crooked River. The canal ends at several large ponds, just south of the Crooked River Gorge.

Alfalfa and Powell Butte
Alfalfa is about 16 miles east of Bend and consists of irrigated pastures and livestock ranches, one historic convenience store and a community hall in a converted school. Alfalfa does not have a census tract and has fewer than 1,000 residents. The irrigated farms and ranches along the main COC and laterals in Alfalfa are like an oasis surrounded by thousands of acres of uncultivated dry scrub lands with sparse juniper trees and sagebrush in public ownership (Figure 22). Reynolds Pond, a public recreation pond, and Zell Pond, both in Alfalfa, are filled by water from the ⁴-Lateral of the COC.

Powell Butte is on OR 126, 8.3 miles east of Redmond, 11.2 miles west of Prineville, and 24.9 miles northeast of Bend. Powell Butte (population 1,768), has a US Post Office, two churches, a gas station/convenience store, a school with 186 students in kindergarten through eighth grade, and a new community center and fire station.⁶ Northwest of Powell Butte, the canal fills Houston Lake and Little Houston Lake near its terminus.

Most residents in Powell Butte and Alfalfa do not earn their primary income from farming and they commute to jobs in Prineville, Redmond, and Bend. Modern small-lot, rural-residential housing developments with and without irrigation rights take advantage of beautiful views of the Cascade Mountains from the western slopes of Powell Buttes. On the flatter land, many residents are hobby and commercial farmers, with horses and other

³ Patricia Kliever photograph, May 21, 2017.
⁵ www.bestplaces.net/zip-code/oregon/powell_butte/97753
livestock in irrigated pastures.\textsuperscript{7} Substantial irrigated hay and cattle ranches of more than 40 acres in size are interspersed with uncultivated public land.

The Cascade Mountain Range and Precipitation
The Cascade Range blocks rainclouds coming from the west. Therefore, the high desert area receives a relatively sparse average of ten inches of precipitation annually, including 15 inches of snow.\textsuperscript{8} The western side of the mountain range is lush with diverse vegetation and populous timber lands. On the eastern side, the rich flora quickly changes to an arid plateau.\textsuperscript{9} The country east of the Cascades presents a series of broad plains and mesas covered with lava of various ages, from some that outpour as recently as 7,000 year ago to the ancient flows whose surface has largely changed into soil.\textsuperscript{10}

Geography Facilitates the Gravity-Flow Irrigation System
The 180,000 acres east of the Deschutes River in Deschutes County is ideally suited for a gravity-flow irrigation system because of its relatively flat terrain with a gradual downward slope to the north and east, a 30-feet drop per mile.\textsuperscript{11} The Deschutes River water conveyed by the COC flows north and then east across the high desert plateau toward the east-to-west flowing Crooked River next to Powell Buttes. The Deschutes River\textsuperscript{12} drains the eastern slope of the Cascades from a point a few miles north of Craler Lake National Park, northward to the Columbia River. The Deschutes Basin is roughly 75 miles long and 30 miles wide, with an elevation that ranges from above 3,000’ to 5,000’. The lands in Central Oregon slope down from the mountain range toward the south-to-north flowing Deschutes River. From the river, the land slopes to the east another 701 feet east across the high plateau to Powell Buttes. It slopes down 600 feet across the plateau from south to the north, where it meets the Crooked River. The Crooked River flows west from the rural Paulina area through Prineville and Smith Rock State Park to the confluence with Deschutes River. The Deschutes River flows north to join the east-to-west flowing Columbia River. In Bend, the mountainous ponderosa pine forest transitions into high desert, characterized by arid land, volcanic soils, sparse grasses, evergreen juniper trees, sagebrush, rabbitbrush, bitterbrush, bunch grass, and bear grass.

Climate in Bend and Crops Grown with Irrigation Water
The Deschutes Soil and Water Conservation District writes, “Deschutes County has a wide range of growing seasons because of elevation differences. Frost can happen at any time during the short growing season. Climate definitely limits crop production.” Bend receives between 8” and 14” of precipitation annually on average.\textsuperscript{13} “Hay and pasture have always been the main irrigated crops and are the foundation of the livestock industry, with 35,000 to 40,000 acres of hay and grass grown annually for at least the last 30 years.” Deschutes County, being in zones 4-5, all plants that are rated zones 6-10 must be grown in heated greenhouses.\textsuperscript{14} Hay is essential winter feed for livestock.

\textsuperscript{7} Oregon State Extension Service, Deschutes County Office.
\textsuperscript{8} Weather.com
\textsuperscript{10} Newell, Frederick Haynes, Irrigation In the United States, (New York: Thomas Y. Crowell, 1902), 350-51. Newell became the first Director in 1907 when the Reclamation Service broke away from the U.S. Geological Survey (USGS) to become a separate agency under the Department of the Interior. Among many activities and accomplishments, he was a hydraulic engineer and an expert on irrigation for the Eleventh and Twelfth United States Census.
\textsuperscript{11} COID Website, May 2017
\textsuperscript{12} McArthur, Lewis L., Oregon Geographic Names, (Portland: Western Imprints, Fifth Edition, Revised & Enlarged, ‘982), 218-19. Lewis and Clark discovered the Deschutes River on October 22, 1805; however, on the return journey the explorers called it Clarks River, presumably for William Clark. In the fur trading period, the stream was known as Riviere des Chutes or Riviere aux Chutes, meaning River of the Falls. The trappers applied their name because the river flowed into the Columbia near the falls of that river and not because of any falls on the Deschutes itself.
\textsuperscript{13} Deschutes Soil and Water Conservation District, Deschutes County Rural Living Handbook, 2011, pages 3 and 4.
\textsuperscript{14} Ibid, page 5
\textsuperscript{15} Deschutes County office of the Oregon State University Extension Service.
Central Oregon Canal Historic District  
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The COC irrigates 25,257 acres and drops an average of 15 feet per mile, for its 47-mile length.\textsuperscript{16} It begins inside the Bend city limits along the eastern bank of the Deschutes River in south-central Bend. The ‘A’ Lateral branches off the main canal in Bend and carries water to water users north through the entire length of the city and northeast of the city limits. The lateral and associated ditches irrigate both urban lots in town and rural land outside of Bend. The main canal stays south of Pilot Butte and flows east of Bend to the Dry River at the western base of Bear Creek Butte and Powell Buttes. Powell Buttes, elevation of about 5100\textsuperscript{'} frames the east side of the farming area. The buttes between Redmond and Prineville are named "Powell Buttes" while the unincorporated community is called "Powell Butte". The rural agricultural acreage served by the canal and its laterals are clustered near the canal in three relatively distinct areas: between Bend and Alfalfa, between Alfalfa and the community of Powell Butte and in the irrigated gentle hills northwest of Powell Butte (Figures 1, 22, and 23).

Geology

The canal is made of native rock and soil. The land crossed by the canal near Bend is very rocky and presents the challenges of many volcanic lava tubes and caverns that must be bridged. Land north of US Highway 20 and east of Gosney Road has progressively less rock. The Deschutes Soil and Water Conservation District states in Deschutes County Rural Living Handbook, a Resource for Country Living and Land Stewardship, "In Deschutes County, geology includes basalt bedrock, pumice rock, volcanic ash, glacial deposits, and materials deposited by water. Most soils occur over basalt bedrock with a mantle of sandy pumice volcanic ash. Due to the volcanic ash, the soils tend to be fragile and are susceptible to wind and water erosion when not adequately protected. Soils are composed of clay, silt, and sand."\textsuperscript{17}

The Oregon State Engineer, John Dubuis, described the character of the soil in the 1914 report to the Oregon Desert Land Board as "disintegrated volcanic rock intermixed with volcanic ash, sandy, and silty loam.\textsuperscript{18} "Dykes of cooled lava, caves and pumiceous deposits occur here and there over the project.\textsuperscript{19}

In Geology of Oregon, Elizabeth and William Orr and Ewart Baldwin explain: "The Deschutes-Columbia River Plateau is predominantly a volcanic province...Geologic events in the Deschutes-Columbia province took place on a grand scale. Immense outpourings of lavas during the Miocene created one of the largest flood basalt provinces in the world, second only to the Deccan Plateau in India.\textsuperscript{20} Volcanoes erupted particularly near Bend and southward. From volcanoes near Bend and perhaps from local vents elsewhere, very liquid olivine-basalt lava flowed great distances northward and in places spilled into the valleys of the Crooked and Deschutes River. This basalt covered most of the area in Deschutes County east of the Deschutes River.\textsuperscript{21}

The Deschutes River is the Source of Water for Irrigation.

The water for the COC is diverted from the Deschutes River at elevation 3,758\textsuperscript{'} near the southern city limits of Bend in Township 18 South, Range 11 East, Section 13 W.M. (T18S, R11E, Section 13). The diversion point was about four miles south of the historic downtown and five miles west of the historic district when it was constructed. The 252-mile long Deschutes River is a major tributary of the Columbia River. The Deschutes River flows north from Little Lava Lake in southern Deschutes County, about 23 miles southwest of Bend, to the Columbia River, near Biggs Junction. Over-allocation of the river water has been a constant problem for

\textsuperscript{16} COID Website and interview with COID staff, 2001 and 2017.
\textsuperscript{17} Deschutes Soil and Water Conservation District, Deschutes County Rural Living Handbook, 2011, page 16.
\textsuperscript{18} John Dubuis, Report to Desert Land Board, 1914, p 9.
\textsuperscript{19} Ibid.
\textsuperscript{20} Orr, Elizabeth L. and William N., and Ewart M. Baldwin, Geology of Oregon, (Dubuque: Kendall/Hunt, Fourth Edition, 1992), 121; William N. Orr, Professor Emeritus of Geology at University of Oregon, director of the Condon Collection, and Elizabeth L. Orr, collections manager of the Condon Collection at the Museum of Natural and Cultural History at the University of Oregon. Both received PhDs in Geology. In Memorial to Ewart M. Baldwin, University of Oregon, Department of Geology. Ewart M. Baldwin received a PhD in Geology and was Professor of the Department of Geological Sciences at the University of Oregon from 1947-1980.
the past 115 years, requiring several rounds of litigation followed by cooperation among the irrigation districts and water right holders, and construction of federal water storage reservoirs to augment seasonal flows.

Important sources of supplemental water for irrigation are the Crane Prairie Reservoir (42 miles southwest of Bend) and the Wickiup Reservoir, (60 miles southwest of Bend), both located west of La Pine in southern Deschutes County. The source of the Deschutes River is 8.4 miles west of Crane Prairie Reservoir. The Deschutes River flows in and out of each reservoir. When full, Crane Prairie Reservoir, built in 1922 and rebuilt by the Bureau of Reclamation in 1940, covers an area of seven square miles.  Construction began on the Wickiup Reservoir in 1938 as a Civilian Conservation Corp Project and it was completed in 1949. It is the second largest reservoir in Oregon and it holds 53,300 acre-feet of water and covers 4,940 acres. Water from the reservoirs is stored during the fall and winter and is released to augment flows in the Deschutes River and to meet water allocations during irrigation season, including water for the COC.

![Central Oregon Canal](image)

**DESCRIPTION OF THE CENTRAL OREGON CANAL**

The diversion gate at the Deschutes River is southern Bend is in its historic location but was rebuilt in 2001 to include a fish screen to prevent fish from entering the canal. Nearby, some of the diverted water flows through the Siphon Power Plant, built in 1989, that produces 5.5 megawatts of power that COID sells to Pacific Power. The irrigation water is conveyed by a non-historic pipe that replaced the original 1903 wooden flume for the first 6261 feet of the irrigation system. It then continues into an 11’ diameter, 3000’ long pipe that was installed in March 2018. The canal winds with the relatively flat rocky terrain in a northeasterly direction for about seven miles inside Bend City limits, going through densely-developed residential, commercial, and industrial areas where it provides water to urban users with water rights.

At the eastern Bend city limits, the canal flows through small-acreage hobby farms with pastures for the first two miles, then through hills and larger parcels that are partially cultivated or are scrub land. East of Gosney Road, many parcels of rocky scrub land that are each over 80 acres in size and managed by the BLM are interspersed with privately-owned parcels that are generally between 10 and 40 acres, with portions under cultivation and irrigation. This pattern of dry native vegetation on rocky, unirrigated federal land, interspersed with irrigated private land, continues to the end of the canal system.

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23 Robert Autobee, Deschutes Project, Bureau of Reclamation, 1996, pages 1-12
The COC turns north 16 miles east of Bend where it encounters the sandy prehistoric riverbed and volcanic rock formations of the Oregon Badlands Wilderness Area, owned by the federal government and managed by the Bureau of Land Management (BLM). From there, it follows the Dry River Canyon and enters the Alfalfa area, which appears to be an irrigated oasis in the desert. It continues north into Crook County to the community of Powell Butte. There, it winds through hilly land to its terminus northwest of Houston Lake and Little Houston Lake. The main canal ends at a large pond at T14S, R14 E, Section 26, on SW Lark Meadow Lane near Lark Gardens Cattle Ranch.

![View from the center of the Alfalfa Community looking north from Alfalfa Market Road toward Powell Buttes.](image)

Powell Butte, just south of the Crooked River and Dry River, elevation 3057' (Figures 1, 7 and 8). The elevation at the diversion point is 3758' and is 3057' on Lark Meadow Lane. The canal drops about 701' in elevation to its end. It drops 736' to its low point near the ditch serving Houston Lake at elevation 3022', allowing the water to flow entirely by gravity.

Unlike the COC in the historic district, the COC west of Ward Road has some piping, intermittent low berms; a flatter, shallower bed; and it has a more consistent profile as it flows through flatter terrain. The COC east of the district is more consistent, flatter, and progressively smaller and has sparse rock once it arrives at Alfalfa. Berms and rip rap are rare east of Dodds Road.

**DESCRIPTION OF THE CENTRAL OREGON CANAL HISTORIC DISTRICT (WARD ROAD – GOSNEY ROAD SEGMENT)**

**Historic District Boundary and Dimensions**
The Central Oregon Canal Historic District (Ward Road – Gosney Road Segment) (COCHD) is about 7.75 miles northeast of the canal’s diversion point at the Deschutes River. It is located 0.75 mile from the eastern Bend City limit line in Deschutes County. The nominated area in the historic district includes the length of the Central Oregon Canal within the west half and the northeast quarter of Township 18 South, Range 12 East, Section 1, W.M.; the northwest quarter and east half of Section 6 and the southwest quarter of Section 5 and the northwest quarter of Section 8 of Township 18 South, Range 13 East, W.M. (Figures 2, 3, 11, 12 and 14a-c). The COC Historic District begins at the Ward Road Bridge. Its western boundary is the eastern edge of the Deschutes County right-of-way for Ward Road, as it crosses the canal. Ward Road runs north-south along the western section line of T18S, R12W Section 1. The historic district ends at the Gosney Road Bridge. Its eastern boundary is the western edge of the Deschutes County right-of-way for Gosney Road, as it crosses the canal. Gosney Road generally follows the north-south midsection line through Sections 5 and 8 of T18S, R13E.
Central Oregon Canal Historic District
Name of Property

The northern and southern boundaries of the historic district are lines drawn 50' on either side of the centerline of the COC, establishing a 100'-wide corridor that includes the extent of the original and current canal easement held by COID. The 100' total width of this historic district includes the main canal and its embankment and all associated irrigation features that are necessary to deliver the irrigation water to the patrons, direct it out of the canal to waste land in an emergency, and to store it in adjacent irrigation ponds. The nominated segment of the canal is approximately 18,013' (3.4-miles) long, as measured down the centerline of the canal. The nominated district includes just over 41 acres.

The nominated segment meets the MPD requirements for the methodology that determined the boundaries of the historic district. The 3.4 mile length is of sufficient length to encompass a complex segment of irrigation system components. The MPD describes the typical system. It says:

“In their entirety, Oregon’s irrigation projects consist of complex systems that can span up to several hundred miles and often comprise thousands of individual resources... They are typically far-flung, spanning multiple political jurisdictions (i.e., crossing state, county, and/or municipal boundaries) and management jurisdictions (…), and their size and extent make it difficult to view a system in its entirety on the ground. It is also common for different parts of an irrigation system to possess highly varying levels of integrity. A nominated property, therefore, is not required and should not be expected to contain all of the property types and subtypes summarized in this section or the entirety of an irrigation system and would only need to contain a concentration of resources sufficient to convey its historical significance.”

The components (resources) of the irrigation system in the historic district include the 3.4-mile long main canal with its high level of all aspects of integrity, a 215'-long concrete tapered chute and stilling pond, remnants of a 305'-long wooden flume (archaeological site form, 35DS3033, Figure 32), turnouts (headgates) and associated headwalls, pipes and weirs to three laterals and 16 turnouts to irrigation ditches, two metal catwalks across the canal with associated metal checks, other crude rock or asphaltic concrete checks that are not visible when the water is flowing, a corrugated metal pipe that delivers water across the canal to a ditch, and a set of three emergency water discharge gates and associated concrete headwalls and corrugated metal pipes (Figure 5). The nominated segment contains a concentration of resources in a highly functioning irrigation system segment that is sufficient to convey its historical function and significance. The canal is delivering water to users surrounding the segment and for 36 miles downstream and to 25,257 acres through its delivery system. One can understand the purpose, function and history of the irrigation water delivery system by observing the resources in the nominated segment. The group of resources together convey historical significance as a coordinated irrigation system. In the context of this nomination, the MPD uses the term “property” to mean “nominated segment.” The MPD states:

“A property nominated to the National Register under this Multiple Property Documentation may comprise all or part of the conveyance system of an irrigation project. In most cases, a nominated property is likely to be a historic district consisting of a dam, canal, or lateral/ditch as its "principal resource" with other resources from the three property types categories as contributing elements. The extent of a property and the quantity of resources that it contains will depend on the property’s integrity and its ability to convey its historical significance.”

The MPD describes setting the boundaries of an historic district:

“Because of the systemic nature of irrigation facilities, it is anticipated that most properties associated with irrigation projects will be nominated for National Register listing as a historic district. To qualify as a historic district, such a property (whether an entire irrigation project or a representative portion) must contain a significant concentration or linkage of resources united..."
historically by plan, function, or physical development. This collection of resources should exist as a significant, distinguishable entity, although its component parts need not possess individual importance. These elements would be considered the historic district’s contributing resources. As contributing resources, they must have been constructed together or within a defined period of significance and must relate to one or more of the historic contexts associated with the irrigation project. As many property subtypes identified in this section are generally perceived as "secondary" contributing elements of a larger system and not as a principal resource, the classification of a property associated with an irrigation project as a historic district provides an appropriate level of recognition for many such resource types. \(^\text{31}\)

"Contributing resources should always retain association with a principal resource (such as a main canal or lateral) that represents the historical significance of the property. The inclusion of a principal resource is required if the historic district consists of only part of an irrigation project. The type, size, or length of the principal resource and the number of contributing resources (i.e., both principal and secondary) included in such a nomination may vary, as long as the resources together sufficiently represent the historical significance for which the historic district is nominated. For example, a short length of canal or lateral could serve as a nominated historic district’s principal resource and would be considered of sufficient length, if the historic district also included other principal or secondary resources, such as the segments of one or more laterals, headgates, check structures, or other appurtenant features, that together adequately represented an irrigation project’s function and historical significance. The inclusion of a longer canal or lateral segment would be necessary, if few contributing resources were present in the nominated historic district, and more were needed to represent these qualities. \(^\text{32}\)

The nominated segment meets these guidelines and is of sufficient length to include six of the eight types of water conduit/conveyance structures listed in the MPD: the primary or principal resource – the main canal, and secondary resources including laterals/ditches, drops, pipes/pipelines, flumes (visible, represented archaeologically), chutes/raceways, and drains. It does not include two types of structures: a tunnel or a siphon. It does include many flow control devices: headgate or turnouts, check structures, a wasteway, weirs, and weir boxes. \(^\text{32}\)

Roads and Bridges around the Historic District
The historic district is about a third of a mile south of US Highway 20. Ward Road is a two-lane paved county road on the west side of the historic district. The Ward Road right-of-way and the non-historic bridge over the canal at Ward Road are not included in the historic district. Gosney Road is a two-lane paved county road on the east side of the historic district. The Gosney Road right-of-way and the non-historic bridge over the canal at Gosney Road are not included in the historic district. Both the Gosney Road Bridge and the Ward Road Bridge over the COC were built in 1968. Bear Creek Road is about a tenth of a mile north of the district and is a two-lane paved road that was the original primary east-west road from Bend to Powell Butte and Prineville in the historic period. Teal Road, which extends south toward the historic district, but ends in a turnaround before entering the nominated area, is a one-lane dirt road.

Elevation and Water Flow in the Historic District
Because the water in the canal flows by gravity, drops in elevation are important to move the water and were a factor in determining the necessary placement and size of the canal. Slow-moving water is caused by flatter terrain. The canal is generally narrower in fast-moving places, due to larger drops in elevation. The elevation at the west end of the district is 3,658 feet above sea level. The elevation at the east end of the district is 3,608 feet. \(^\text{33}\) The water in the canal drops 50 feet as it flows through the historic district, matching the average 15-foot

\(^{30}\) Carey and Reclamation Acts Irrigation Projects in Oregon, 1901-1978 MPD, page F-35
\(^{31}\) Carey and Reclamation Acts Irrigation Projects in Oregon, 1901-1978 MPD, page F-35
\(^{32}\) Carey and Reclamation Acts Irrigation Projects in Oregon, 1901-1978 MPD, page F-32
\(^{33}\) Google Earth, 2017.
drop in elevation per mile for the entire canal. The canal in the district carries nearly the full amount of water, 530 cubic feet per second, diverted from the Deschutes River, with only the 'A' Lateral being upstream. The 'A' Lateral diverts a small volume of water away from the main canal before it reaches the historic district. The canal in the historic district has no straight-aways and is characterized by a significantly winding canal bed that flows just 2.5 miles east, as the crow flies, during its 3.4-mile length. It curves north toward Bear Creek Road for nearly a half mile and then curves southeast for a mile toward Gosney Road.

Rocky Canal Bed and Tall Embankments in the Historic District
A distinctive feature of this segment of the COC is that it winds through gently rolling hills that are along the southern edge of the plateau that is irrigated by the COC. Because it is uphill, the land immediately next to the canal on its southern side is irrigated by water from a canal further south, the Arnold Canal, a component of the Arnold Irrigation District. The water passing into the nominated segment of the COC irrigates land north and east of the segment. The CCC in the historic district is the typical trapezoidal shape found in the first half of the canal, but its interior side slopes display an unusually variable shape, undulating and varying in width from steep, near-vertical edges to gradually sloped 15' wide sides, at the toes, the point where the side slope meets the canal bed.

The rocks in the COC vary greatly in size from football-sized field stone, to 2' to 3' wide riprap, to immovable boulders, to basaltic lava flows that cover the entire base of the canal and extend beyond the edges of it. The surveyors staked the canal route on the edge of a hillside, keeping it as high as they could, resulting in the need for unusually tall berms on the downhill slope that are the tallest on the entire canal. Flumes bridged a 305'-long low point and a 215'-long lava tube. Today, the historic challenges and methodology of construction, which will be further described in Section 8 of this nomination, are easily observed in the character and appearance of the canal. Rock fractured by picks and blasting, and high places where soil was scooped out by Fresno scrapers as it was needed to form embankments are visible in the district. Character-defining features include the uneven bed and highly irregular width, depth, slopes, and cuts, and intermittent embankments. Intermittent, extensive, impervious lava flows form the bed in about a fourth of the length of the district. Much of the bed holds pools of standing water when the canal is not in active flow, providing habitat for water plants, young fish and crawfish.

The widths between the sides of the canal at daylight, where the top of the water meets the sides, is typically 45-60 feet, but varies from 33.8 to 76.1 feet. The bed is also undulating and irregular in depth, varying from 1.3' to over 9' at the deepest points. The bed is far from flat. Typically, low points are in depressions where rock was blasted out, while high points are at the tops of lava flows or large rocks left in place during construction.

Looking southeast across lava flows and loose rock that was moved by the flow of water in the canal bed.  

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34 Elevations taken from Google Earth and Figure 6.
35 Photo by Patricia Kliever taken on October 31, 2017.
Central Oregon Canal Historic District
Name of Property

Deschutes Co., OR
County and State

Riprap was placed haphazardly on the flatter inside slopes of the canal bed, typically on the outside turns, to prevent erosion. Fifty rocks with 2.25” diameter drill holes that were used to place blasting power to blast the solid rock were noted in the canal during the survey of the historic district. Excess 3-4’ wide rocks that were not needed to construct the embankment are piled and scattered in the fields, near the uphill side of the COC. Smaller blasted rock was left scattered across the canal bed where some has moved into piles due to the force of the water over time. The riprap varies in size from 6” to 36” in width, and much of it appears to have fractured, unnatural faces showing the extent of the blasting and picks breaking it up in 1905 and again when it was widened in 1907 and 1914.

The COC in the historic district is on the northern edge of rolling hills. Bear Creek Road, visible below the district, is on flat terrain. The elevation rises 100’ in a half mile to the south, at the intersection of Ward and Stevens Roads. It rises another 100’ to Rickard Road. The elevation rises 4,000 feet in the next 23 miles south of the historic district to Paulina Peak in the Newberry Crater. Being at the very northern edge of the hills, the bench under the COC in the historic district slopes down from south to north and from west to east.

Most of the canal in the historic district follows a diagonal slope, therefore, the canal was cut into the land on the high side and intermittent embankment were created on the low side, up to 12’ tall by 27’ wide, to hold the water in the canal. They form most of the northern side of the canal and form both sides of the canal near the eastern end of the district.

The historic district begins in flatter terrain at Ward Road, and the berms are not necessary for the first 100’. Both sides are cut into the generally flat terrain at that point which is consistent with the canal in flatter land west of the district for several miles. But, as the canal runs east of Ward Road, the terrain drops off on the northern edge, and berms become progressively taller to form the northern side of the canal. For most of the length of the canal in the historic district, the canal bed was formed by crews cutting the south side and dragging the excavated materials to the north side to form the embankments. The north berm varies in width from 14’ to 27’ wide, with shorter berms being narrower and the taller berms being wider. The median berm width is 18’. In several locations in the district, the canal crosses flatter areas and is not on a diagonal slope. In those places both sides of the canal were cut into the existing terrain and are representative of the typical sections of most of the COC. The top of the embankment on the outside edge is smooth and solid, showing the compaction of layers of rock and soil that was done to make the canal strong enough to hold swiftly-flowing water. The outside edge of the embankment is not covered with rock or riprap. Native plants grow sparsely on the embankment and there is little erosion, and orchard grass covers some of it that is watered by irrigation sprinkler overspray (Photos 6, 20).

Ditch-Rider Road
The ditch rider road is an associated feature that generally parallels the canal and is used by the ditch rider/patrolman to check on the condition of the canal, to adjust headgates to laterals and ditches, and to make repairs. Since motorized vehicles have been used by irrigation district staff for their inspections and maintenance, parallel tire tracks reduce vegetation where trucks are driven along the canal. An approximately 12’ wide strip on the northern embankment and through the native terrain running the full length of the canal in the historic district has parallel tire tracks through sparse native vegetation. The ditch rider road is intermittently improved with red or brown crushed cinder rock to reduce the growth of native and invasive plants. Green metal gates at each end of the historic district control vehicular access along the ditch rider road and canal from Ward Road and Gosney Road and discourage unauthorized entry. The parcels of land underlying the ditch rider road, embankments and canal are owned in fee by 43 private and 2 public parties. One gate is next to the Ward Road Bridge and the other is 0.1 mile west of Gosney Road. Two more green metal gates along northern fence lines allow the COID staff to access the ditch rider road from Bear Creek Road at Laterals ‘B’ and ‘C’.

56 List of property owners provided by the Oregon SHPO, August 2017.
Looking northeast from ditch rider road to the 'B-1' Lateral and irrigated horse pasture on Allan S. Boss's farm.  

Parcels in the Historic District, Subdivisions and Ranches

The western one-fourth of the historic district is in rural residential subdivisions. The lots in various development phases of the Dobbin Acres subdivision on the northern side of the canal were platted since 1972 and extend to the centerline of the canal. Most of the 1.5 to 3.5 acre lots have appurtenant irrigation water rights served by two headgates on the COC. The terrain drops down from the canal to the flat Dobbin Road. The berm forming the northern side of the canal is higher than the roofs of houses below it. Residents can't see the canal on the hill behind them. Agricultural fencing runs along the berm to contain horses, goats, and sheep. One undeveloped parcel bordering the canal has native vegetation of juniper trees, bitterbrush, and sagebrush.

South of the centerline of the canal on the western third of the district are various phases of the Arrowhead Acres subdivision, originally platted in 1966. The 1- to 7-acre lots with irrigation water rights are served by the Arnold Irrigation District. Somerset subdivision was originally carved from a 121-acre ranch in 1976, resulting in lots of around 3 acres in size. Most of the lots in Arrowhead Acres and Somerset extend to the centerline of the canal. Some of the unfenced lots have lawn running up to the water’s edge. Others have undeveloped scrub land or livestock fencing and pasture next to the canal.

At the non-contributing one-lane wooden Bear Creek Ranch Bridge that crosses the canal, the setting changes abruptly from hobby farms and rural residential subdivisions to ranches and large parcels for the eastern three-fourths of the historic district. Generally, houses and barns are set well away from the canal and are not visible from it. Most of the parcels have water rights and are partially irrigated, as they were in the historic period. The cultivated parcels are primarily used for pasture for goats, cattle, llamas, and horses. Two publicly-owned parcels consist of undeveloped Juniper and sage scrub land.

The nominated segment comprising the historic district bisects 43 parcels in private ownership that vary in size from 1.13 acre to 51.09 acres and two other larger parcels that are in public ownership. Some parties own more than one parcel. A 79.60-acre parcel is owned by Bend Park & Recreation District and is used for outdoor recreation and pedestrian and bike trails. A 40-acre parcel of native vegetation is owned by the COID for an emergency reservoir. In summary, twenty-five parcels that are crossed by the canal, mostly on the west quarter of the district, are less than three acres in size. Five parcels are between 3 and 10 acres in size. Eight parcels are between 11 and 20 acres in size. Five parcels are between 21 and 40 acres and two parcels are between 50 and 80 acres in size. Most of the properties extend to the centerline of the canal, except for some lots, such as the Turner’s 15-acre parcel, the Grund’s 51.09-acre parcel, and the Bend Metro Park & Recreation District’s 79.60-acre parcel, which occur on both sides of the canal. The recorded easements in the deeds allow COID, a quasi-municipal organization of irrigation water users, to operate and maintain the canal for irrigation purposes

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37 Photo by Patricia Kiewer, May 26, 2017.
36 Memorandum to Deschutes County, 2014, from Law Office of Bruce W. White, based on Deschutes County deeds for each property in the district at the Deschutes County Clerk’s office.
Historic Setting
Throughout the eastern three-fourths of the historic district, most of historic setting retains integrity. The land was settled between 1910 and 1937. None of the original 40-acre parcels was completely cleared or cultivated due to surface rock, rock outcroppings, or lack of appurtenant water rights (Figures 11, 12 and 14a-c). Water rights were awarded only for the portion of each parcel that could be irrigated and cultivated. Some of the non-farmable parcels were not included in Segregation List 6 (Figures 9 and 10). Some of the uncultivated land adjacent to the district is not farmable due to poor shallow volcanic soils and lava flows near the surface and the hilly terrain. Section 8 will describe the settlers and which parcels were cultivated, and which were never sold (Figures 14-20). The cultivated and irrigated parcels are used today for vegetable gardens and pastures for horses, sheep, goats and cattle, and a fruit orchard. The historic irrigation ponds and ditches remain and continue to be used.

The COC in the historic district in winter, through uncultivated, flat, scrub land in public ownership. There are cuts into the terrain on both sides, resulting in no berms, and standing water. Photo looking east.\textsuperscript{39}

\textbf{METHODOLOGY USED to INVENTORY and DATE STRUCTURES}

The preparers of this nomination acquired extensive first-hand knowledge of the entire COC and the historic district. The team includes a historic preservation planner, a retired USGS hydrologist, and a registered civil engineer along with a dozen long-term owners who have day-to day observations and use the canal and its infrastructure in the district, dating back 50 years. Loretta Hadley is the granddaughter of an original homesteader, Dragan Mirich, and is the current owner of 16 acres of pasture that formerly was the Paul S. Hackett Turkey Ranch. She and the others shared photos of the canal and use of the land for the past 100 years.

The team walked beside the canal along the ditch-rider road for five miles at the inception of the project, surveying it between 27\textsuperscript{th} Street in Bend on the west to beyond Gosney Road on the east to determine the boundaries of the proposed historic district. Aerial photos were consulted for the next 2.25 miles and the team hiked five miles of the canal in the flat terrain east of the historic district between just south of Highway 20 to Dodds Road and Walker Road. The 'I' Lateral was hiked from its diversion gate near Dodds Road along Reynolds Pond and Zell Pond to Alfalfa Market Road. The entire 47 miles was observed and photographed twice from the Deschutes River to the Crooked River by driving along it where that was possible and photographing it at all road overpasses and viewpoints. The nominated (but not listed) segment at Brasada Ranch was walked and photographed twice. Files at Bowman Museum in Prineville, the Deschutes County Historical Museum in Bend, the Oregon State Archives, historical government reports and national register nominations were researched.

\textsuperscript{39} Photo taken in eastern half of the historic district by Patricia Kliever, March 3, 2017.
Once the historic district boundaries were set, the professional team surveyed and photographed the district a half a dozen times in all seasons, including four times while the water was flowing in it and twice when it was not. Inspections of the canal, the irrigation infrastructure and all structures within the historic district were carefully made and noted. Observations were recorded of surrounding land uses, irrigation laterals, ditches, property and pasture fences, seasonal crops, irrigation ponds, barns, and livestock. Lateral 'B' and 'C' were followed to their ends.

Two meetings were held with the of the Bend Park & Recreation District’s Executive Director, Don Horton and other park district planning staff to discuss year-around public parking and public access to the historic district, including developing trails from possible parking areas and access points on Ward Road and Gosney Road through the 80-acre parks parcel within the historic district.

Field Survey of the Canal in the Historic District
To determine the character-defining features of the canal in the historic district and to survey all structures, exacting and systematic fieldwork was undertaken on April 3, 2017, using methodology previously used by the professionals to survey historic linear resources. The same survey methodology was used for the nomination of the Pilot Butte Canal Historic District (Yeoman Road-Cooley Road Segment) (PBCHD), listed on the National Register of Historic Places on Feb. 6, 2016.

During the survey, two members of the team walked in the canal bed and five members walked beside it, three on the north side and two on the south side, for the entire length of the historic district. The crew measured and recorded the altitude, latitude, and longitude at data collection points in 300-foot intervals. Each of the 71 data collection points was identified by a section ID number and its corresponding GPS coordinate. Using the Garmin GPS location, the elevation of the northern edge of the canal was recorded in the table. At each data collection point, the team also measured and recorded the shape and size of the canal, the width of the north berm, the width of the canal at daylight (top of water line), the width at the canal bed between the toes at the bottom of the canal, the width of each interior side slope, the vertical and horizontal positions of the low and high points in the highly uneven bed, the depth at the north toe and south toe, and the location of each headgate and structure. Unusual features were also noted, such as stacked rock on a side slope at three sharp turns. All associated structures were noted. The historic features that display construction methods, such as rocks retaining drill holes, were photographed. Alterations were noted. Photos of the canal were taken at each data collection point. The table of some of the data collected at the 71 data collection points is presented as Figure 21.

In addition to the measurements entered in the data table presented as Figure 21, the surveyors determined the overall characteristics, such as the canal's irregular trapezoidal shape. The top width of the canal at daylight and the position and width between the north and south toes define the irregular trapezoidal shape. The top width of the canal at daylight ranges from 34' to 78', averaging around 50'. The interior angle of the canal, measured between the toes, ranges from sheer vertical such as at section 167 where it is only .5 feet deep, to a slope of 19.5 feet horizontal from the edge of the canal at a depth of 9 feet, at section 138. The depth of the canal varies from 1' to 9', averaging around 4' deep. The canal was built in irregular profiles and various depths. The north berm varies in width from 14' to 27', with shorter berms being narrower and the taller berms being wider. The median berm width is 18'. At points in which north berms were observed, they were measured, and they varied from 1' to 12' tall.

Dating the Structures, Laterals, and Ditches
The intensive level historic resources survey of the COCHD consisted of a series of six field inventories and inspections of the irrigation infrastructure, ditches, laterals, and irrigation ponds as well as any structure within the 100-foot wide historic district and adjacent to it. Recorind consisted of inspecting the integrity of each identified resource, establishing its estimated construction date, collecting basic information about its design and construction, photographing each item, and evaluating integrity.
Construction dates were determined using a combination of research materials, including primary source materials such as original construction drawings on file at the Oregon State Archives in Salem and the COID office in Redmond (useful for identifying structures that were part of the original 1905 construction), Oregon State Engineer's reports and maps created for the Desert Land Board (useful for identifying structures built before 1924), historic maps from 1909 and from the period 1911 to 1950 at Bowman Museum in Prineville and the Deschutes County Museum in Bend and two sets of aerial photos post-dating the end of the Period of Significance (a 1943 set flown by the US Army and a 1951 set flown by the US Dept. of Agriculture) showing the structures, ditches and laterals in place at that time. Additional sources of dating information included the records of water rights cases at the Deschutes County Circuit Court, newspaper articles about the irrigation system's planning, development and promotion appearing in each issue of the Bend Bulletin (between 1903 and 1921), detailed state engineer reports from 1905 to 1921, and other documents at the Oregon State archives all provided information about the nominated segment's and associated laterals' and ditches' construction and widening, dimensions, water loss and flow data. These sources recorded data by the location of headgates and bridges, thereby helping to date them. The historical records provide data on when structures were built, when water rights were awarded, and when the resulting delivery ditches were constructed by the settlers. This was supplemented by the analysis of historic and contemporary maps, which provided side-by-side comparisons of changes over time and showed the development of laterals and ditches. For instance, the 1943 US Army aerial photo shows an early bridge across the canal just east of Ward Road called the Bradetch Bridge, the Bear Creek Ranch Bridge, Burt's Bridge across Burt Chute, and two catwalks and the metal pipe crossing the canal. The 1962 USGS Bend Airport, Oregon quadrangle map shows four bridges or catwalks across the canal in the district, including the three that are currently in those locations and the fourth one that crossed the canal at Burt Chute but has since been removed.

In addition to the above listed sources, the dates of headgates, Stearns Waste, Burt Chute, Bear Creek Ranch Bridge, and the remnants of Flume #2 (archaeological site 35DS3033, Figure 32) were determined through a combination of five sources: 1) construction dates of the canal and the 'B', 'B-1', and 'C' Laterals, 2) an examination of historic equipment catalogs and web sites for irrigation equipment for manufacturer information on the structures; 3) discussions with an irrigation district ditch rider; and 4) oral tradition gleaned from property owners who use the structures, and who, in many cases, asked for the gates to be improved and remembered when they were installed. Dates that were carved into concrete, such as the series of gates set in concrete at the Stearns Waste, or painted on metal, were also used.

**CONTRIBUTING AND NON-CONTRIBUTING STRUCTURES IN THE HISTORIC DISTRICT**

There are 39 individual resources in the historic district. One is the primary structure (canal), 37 are secondary structures, and one is an archaeological site. Of these individual resources, 29 are contributing to the nominated district and 10 are non-contributing. The primary historic structure is the historic-contributing main canal itself. Secondary contributing resources include the tapered concrete Burt Chute that bridged a sinkhole, and the remains of at least 49 wooden pilings and one beam of an original 1905 wooden flume called Flume #2 (included in this nomination as archaeological site 35DS3033, a contributing feature to the nominated district). Additionally, there are 18 hard-screw-operated slide-paddle turnouts or headgates to ditches and laterals. Each headgate that diverts water to enter ditches, sub-laterals and laterals, which may or may not be attached headwalls, or may be in a shared headwall, and associated pipes and weirs is counted as one structure, except for the set of three gates at Stearns Waste which work in tandem with one another. Some headgates were in use during the period of significance and are classified as contributing, while others that are essential to the operation of the canal but have been constructed since 1937 are non-contributing. The historic corrugated metal pipe set on historic concrete piers delivers irrigation water across the canal and is non-contributing. The historic wooden Bear Creek Ranch Bridge set on historic concrete piers is a transportation structure and is therefore non-contributing. Two metal catwalks, the checks across the canal and the associated turnout or headgates on the south side are counted as single structures. Both sets of catwalks are visible on the 1943 aerial photos. Stearns Waste, a 1933 set of three headgates to pipes leading to a 40-acre
reservoir that are set in one headwall and the associated catwalk and check are counted as one contributing structure (Figure 5).

The Carey and Reclamation Acts irrigation Projects in Oregon, 1901-1978 MPD
The MPD under which this historic district is being nominated contains assumptions and direction for classifying the irrigation infrastructure. The applicable instructions are referenced:

"Materials — A property should retain the materials with which it was built. For some property types, the partial in-kind replacement or repair of materials does not necessarily constitute a loss of integrity. Replacement with non-original or modern materials may be acceptable if the materials are compatible, meaning they sufficiently replicate or resemble the original materials. As with integrity of design, repairs to water conduits/conveyances and the in-kind replacement of the deteriorated components of flow control and measuring devices do not constitute a loss of integrity, if the resource’s materials are replaced in-kind or are compatible. Integrity considerations specific to certain property types are outlined in the appropriate description sections below."40

<table>
<thead>
<tr>
<th>Name of Structure</th>
<th>Photo of Structure</th>
<th>Historic Contributing</th>
<th>Non-Contributing</th>
<th>Date of Original Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRIMARY RESOURCE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main Canal</td>
<td></td>
<td></td>
<td>X</td>
<td>1905</td>
</tr>
<tr>
<td>Includes associated</td>
<td></td>
<td></td>
<td></td>
<td>Widened 1913-14</td>
</tr>
<tr>
<td>embankments on either side</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and the ditch rider road</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>on north side. *</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SECONDARY RESOURCES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrugated pipe</td>
<td></td>
<td>X</td>
<td>Accessory Structure (part of farm field delivery, not considered a part of the irrigation system, per MPD)</td>
<td>Ca 1921</td>
</tr>
<tr>
<td>Pipe set on mortared</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>rock piers, that conveys</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>water from a ditch on one</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>side of the canal to the</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ditch on the other side</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>where it serves three</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>properties.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

40 Carey and Reclamation Acts irrigation Projects in Oregon, 1901-1978 MPD, page F-37
## Central Oregon Canal Historic District

Name of Property: Bear Creek Ranch Bridge on concrete piers.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Date</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bear Creek Ranch Bridge</td>
<td>on concrete piers.</td>
<td></td>
<td>Ca 1928</td>
</tr>
<tr>
<td>Burt Chute and Stilling Pond</td>
<td>Also known as “Sinkhole Crossing near B. Lateral”</td>
<td></td>
<td>Ca 1911 Drawn on a 1911 map by the Oregon State Engineer.</td>
</tr>
<tr>
<td>Flume #2 (site)</td>
<td>Wooden Flume Remains (Archaeological Site# 35DS3033, Figure 32)</td>
<td></td>
<td>1905</td>
</tr>
</tbody>
</table>

### TURNOUTS also known as HEADGATES to Ditches and Laterals

Listed in geographical order, from west to east⁴¹

<table>
<thead>
<tr>
<th>Headgate 1</th>
<th>Labeled COC 8. North side of the canal.</th>
<th>1905</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headgate 2</td>
<td>No headwall Labeled COC 9. North side of the canal.</td>
<td>1905</td>
</tr>
</tbody>
</table>

⁴¹ Headgates are numbered to correspond with the numbers provided on Map (Figure 5a), indicating the location of each.
<table>
<thead>
<tr>
<th>Headgate 3</th>
<th>Labeled COC 10.</th>
<th>X</th>
<th>1905</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No headwall.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>North side of the canal. *</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Headgate 4</th>
<th>Associated metal weirs and catwalk, concrete headwall. Gate is on the south side of canal and leads to ditch that flows into metal pipe.</th>
<th>X</th>
<th>1905-1930</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Labeled COC 11.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Headgate 5</th>
<th>Labeled COC 12.</th>
<th>X</th>
<th>1905-1914</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>North side of the canal.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Headgate 6</th>
<th>Associated crude concrete weir over rocks.</th>
<th>X</th>
<th>1905-1914</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Labeled COC 13.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No headwall.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>North side of the canal. *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headgate 7</td>
<td>Concrete headwall.</td>
<td>Labeled ‘B’ Lateral.</td>
<td>North side of the canal. *</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------------</td>
<td>---------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Headgate 8</td>
<td>Non-historic concrete headwall with wings.</td>
<td>Labeled ‘B-1’ Lateral.</td>
<td>North side of the canal. *</td>
</tr>
<tr>
<td>Headgate 9</td>
<td>In concrete distribution box next to ditch rider road at ‘B-1’ Lateral.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headgate 10</td>
<td>Non-historic concrete, angled headwall.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headgate 12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Associated crude concrete and metal weir.</td>
<td></td>
<td>X</td>
<td>1905</td>
</tr>
<tr>
<td>Shares headwall with Headgate 13.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labeled 'C' Lateral.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North side of the canal. *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headgate 13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associated concrete and metal weir.</td>
<td></td>
<td>X</td>
<td>1914</td>
</tr>
<tr>
<td>Shares headwall with Headgate 12.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labeled COC 15.</td>
<td></td>
<td></td>
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<tr>
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<td></td>
<td></td>
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<tr>
<td>Headgate 14</td>
<td></td>
<td></td>
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<tr>
<td>Non-historic, angled, concrete headwall.</td>
<td></td>
<td>X</td>
<td>Ca 1940</td>
</tr>
<tr>
<td>South side of canal. *</td>
<td></td>
<td>(outside the Period of Significance)</td>
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<tr>
<td>Headgate 15</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Non-historic concrete headwall with wings.</td>
<td></td>
<td>X</td>
<td>Ca 1960</td>
</tr>
<tr>
<td>Labeled COC 16.</td>
<td></td>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Headgates 16, 17, 18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associated metal and wood catwalk.</td>
<td></td>
<td>X</td>
<td>1933</td>
</tr>
<tr>
<td>Shared concrete headwall.</td>
<td></td>
<td>Updated in 1988</td>
<td></td>
</tr>
<tr>
<td>South side of canal.</td>
<td></td>
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</table>
## Central Oregon Canal Historic District

### Name of Property: Headgate 19
- Non-historic concrete headwall with wings.
- Labeled COC 17.
- North side of the canal.

### County and State: Deschutes Co., OR

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### Name of Property: Headgate 20
- Non-historic concrete headwall.
- Labeled COC 18.
- North side of the canal.

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### Name of Property: Headgate 21
- Newest gate, non-historic concrete headwall with wings and weir box.
- South side of canal.

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### DROPS

**All drops were constructed in 1905**

See Map (Figure 5b), and Construction Drawings (Figures 25a-25e)

Listed in geographical order, from west to east

<table>
<thead>
<tr>
<th>Name</th>
<th>Photo During Irrigation Season</th>
<th>Photo After Irrigation Season**</th>
<th>Contributing Classification</th>
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</table>

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42 Photos of drops and waterfalls taken by Patricia Kliwer on August 15, 2018.
43 The numbers provided here correspond to those that appear on Map Figure 5b, indicating the location of each drop.
<table>
<thead>
<tr>
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</thead>
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<td>(23)</td>
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<td>(24)</td>
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<td>(25)</td>
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<tr>
<td>Drop (26)</td>
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<td>-----------</td>
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<td>----------</td>
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<td>Drop (35)</td>
<td>No Photo Available</td>
</tr>
<tr>
<td>Drop (36)</td>
<td>Contributing</td>
</tr>
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</table>

**Totals**
- Contributing – 29
- Non-contributing – 10
- Total resources – 39

- * Photos taken on December 7, 2017 by Patricia Kliwer.
- ** Photos taken on November 15, 2018 by Patricia Kliwer

**DESCRIPTION OF EACH STRUCTURE/SITE**
Central Oregon Canal Historic District

Historic Contributing Main Canal

The principal historic contributing structure is the main canal. This segment of the canal was constructed in 1905 and enlarged in 1907 and 1913. In 1913, the section between mile posts 7.5 and 11 was enlarged. The historic district generally includes mile posts 7-10. Mile post 10 is just east of Gosney Road. The Crook County Journal newspaper reported on April 13, 1905 that the first 12 miles of the canal east of the Deschutes River were completed.45 (Figures 25a-e and 28-31).

Comparing the canal today with historic topographic maps, descriptions and aerial photos of the area revealed that the canal in the historic district has survived nearly intact since it was last enlarged in 1913.46 It is in the same location and its route has not been altered and its width remains the same. One point in the canal bed has undergone a non-historic alteration. Historically, an island that was annually planted with flowers by the property owner, was in rapids about fifty feet upstream of the Bear Creek Ranch Bridge. COID crews removed the canal about 8 years ago. The work inadvertently exposed a lava tube that sucked in all the water from the canal along with adjacent rocks, earth and fences. The cavern took weeks to fill with dozens of truckloads of rock and concrete.46 Upstream rocks have rolled with the force of the water to cover the repair, and its location is not visible.

The canal retains its impressive historic open, trapezoidal shape, dimensions and characteristics. It is characterized by the volcanic rock flows, native materials, rocky bed and sides, and its hurried hand-hewn workmanship. These remain significant elements giving a unique character to this stretch of the canal. Water flowing over especially rocky areas creates rapids (Figures 2, 27a, 27b). Intermittently, water churns, cives, and splashes over and around large rocks and rock flows. The rough, rocky characteristics of the canal and terrain are conveyed in a strong expression of the aesthetic quality of the canal. The appearance and sounds of the water in the canal during irrigation season indicate the nature of the canal bed. Water is smooth and quiet where projecting rock is minimal, or the canal is deep, while rapids and the sound of moving water indicate dense, large rocks below, a shallow area or a sudden drop in elevation.

Engineers measured the drops in elevation, roughness, and other factors of friction, as well as the size and shape of a channel, all of which were known to contribute to either a faster velocity of water in a canal or a slower one. Known as the value of 'n', Manning's Roughness Coefficient, the 1914 state engineer's report on the Deschutes Project to the Desert Land Board commented on the rocky stretch of the canal in the district: "The values of 'n' on the main canal are found to be much larger than in the original plans, the reason being that the construction left the canal with a very rough rock bottom. On the COC in the historic district, the values of 'n' are like that of the natural water channels and are the highest in the length of the canal.47 The canal bed retains its historic roughness. The roughness of the rock bed is obvious for the entire length of the canal in the district, except for in Burt Chute, and is a character-defining feature.

The date that the 350'-long wooden flume at the east end of the historic district was removed is unknown, but historic aerial photos indicate it was replaced with embankments before 1942. COID purchased the 40 acres nearby that is called the COID District Reservoir in 1932. It was the source of materials to make replacement embankments. It is therefore likely that the tall berms or embankments on either side of the canal in this location were constructed after 1932, and before 1937. The "new" embankments were constructed with compacted native rock and soil scraped from the COID land on the south side of the canal, using methodology from the historic period. They have the same appearance as the other original embankments and have haphazardly-placed rock as riprap on the interior side slopes of the canal. The force of the water has moved riprap and rock annually.48

45 Crook County Journal Newspaper, April 1905, page 1.
46 Bend Bulletin, Friday, May 13, 1904, "Water on Desert", Bend, OR
48 Id., pages 16-19.
49 Interviews with Robert Stephen and Cynthia Gibson.
Non-Contributing Bear Creek Ranch Bridge
The settlers in the area of Lateral B accessed their properties from Bear Creek Road, on the north side of the district. To reach both sides of 40-acre to 160-acre parcels that were crossed by the canal, bridges were necessary. In the historic period three wooden bridges were in use in the district. The oldest was just east of the Ward Road Bridge and was on the Bradetich Ranch. A second bridge was the Burt Bridge across Burt Chute. All three bridges are visible on the 1943 aerial photos in Figures 26a and 26b.

Bear Creek Ranch Bridge, the third bridge, is the only remaining bridge. It is in the northwest quarter of T18S, R12E, Section 1. It was built around 1928 by the property owner, Mike Dragosavac, and neighbors, including Dragan Mirich. The 1943 aerial photos and a 1962 USGS Quadrangle map show a dirt road connected Torkelson Road to the location of the current one-lane bridge. The 65'-long and 10'-wide bridge is constructed of rough-sawn 10" by 10" lumber spanning metal "i" beams set on three historic concrete piers. Planking of 4" by 12" wood provides the level driving deck. In 1990, the current owners, Suzanne and Gary Grund, replaced 43 of the original 57 rotting 4' x 12' fir decking planks with pressure treated lumber, in kind. The new planks are attached to the spans by bolts, while the historic decking is attached with 12" nails. One of the steel beams is historic, but two steel 'i' beams were installed in 1990 to add strength. The bridge does not have any side rails. A non-historic 1" diameter white plastic water pipe is suspended from brackets along the western edge of the bridge, giving the bridge a false wavy appearance. The bridge is not part of the irrigation system and is a transportation structure, and, therefore, is a non-contributing structure in the historic district.

Historic Contributing Burt Chute and Pond
Burt Chute was also called the "Sinkhole X-ing near the B Lateral" by the COID. It is an historic concrete structure that conveys water across a lava tube. The chute and the associated pond are shown at this location on a 1911 map of the irrigation system drawn by the State Engineer. The poured concrete structure is near the middle of the historic district in the northwest quarter of T18S, R13E, Section 6. It has vertical sides of a consistent 4.8' height. It can be used to measure volume of flow. It tapers in width like a funnel and is sloped downgrade from west to east at its open end at the pond. The 215'-long structure channels a high velocity of water flow and is self-cleaning. The canal is 45' wide on the western edge of the chute where water enters the chute. The chute tapers to 13.5' wide where it drops water into the pond. The water line is at 2.8' in the chute. The chute forcefully empties into an approximately 120' wide, oval-shaped pond on its eastern side. The pond stills the waters, dispersing the high energy and velocity of water shooting out of the flume.

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49 Photo by Patricia Kliwer, April 3, 2017.
50 Interview with Gary and Suzanne Grund, March 2, 2017.
51 Map by Charles E. Strickland of T18S, R12E, redrawn in March 1949 from original May 1, 1911 and Feb. 10, 1928 maps.
Central Oregon Canal Historic District 
Name of Property

According to Richard Torkelson\textsuperscript{52}, Burt Chute was constructed to bridge a cavern or lava tube that would not hold water when the canal was built. It has the same appearance today as when he fished in the canal regularly with his brothers in the 1940s.\textsuperscript{53} The pond remains full of water and fish year-round, regardless of whether the irrigation water is flowing. Until the fish screen was installed at the diversion point at the Deschutes River in 2001, this was a popular private fishing hole for neighbors. It used to be teeming with fish. Neighbors could catch fish in a net as they came down the chute. The Burt Chute is a historic-contributing structure in the historic district. The chute was referred to as “Burt Chute” because it was next to the bridge that accessed Amy and Philip C. Burt’s 160-acres in Township 18, Range 13, Section 6 that they gradually purchased between 1909 and 1921\textsuperscript{54} (Figure 14a). Downstream of the pond, the canal narrows to 55’ wide and 5’ deep.

The Deschutes Irrigation and Power Company constructed a bridge over the narrow portion of Burt Chute when it was built, to allow the ditch rider to access both sides of the chute and canal and for settlers to use. According to many interviews with families that have been in the area for fifty years, the bridge was fascinating and somewhat frightening. It looked very similar to the Bear Creek Ranch Bridge, with a wooden single-lane wooden deck and no sides. It was strong enough for farm trucks to cross. People used to ride horses to it, and watch the water rushing under them. A well-known story is that the bridge was removed after 1960 when a young lady’s horse was spooked by the current and it leaped off the bridge, while she landed hard in the concrete chute. Swiftly flowing water swept her into the pond. She was able to swim out, bruised and shaken up. Many neighbors heard about the incident and wondered who was responsible for the safety and condition of the bridge, the property owner or CID, so it was removed. It is indicated on the USGS 1962 quad map.\textsuperscript{55}

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{photo1.jpg}
\caption{Photo looking east toward Burt Chute.\textsuperscript{55}}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{photo2.jpg}
\caption{Photo by Patricia Kleeer, March 3, 2017.}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{photo3.jpg}
\caption{Interview with Richard Torkelson on June 16, 2017.}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{photo4.jpg}
\caption{Interview with property owner David Turner, May 26, 2017. The Turners have owned the property since 1998. 1910 Federal census for Crook County, OR.}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{photo5.jpg}
\caption{Interview with Lynn Schilling Johnson.}
\end{figure}

\textsuperscript{52} Richard Torkelson was the youngest of nine children born to Bert Torkelson, who settled on Bear Creek Road at the corner of Torkelson Road near Burt Chute in 1908. Richard Torkelson grew up near the historic district.

\textsuperscript{53} Interview with Richard Torkelson on June 16, 2017.

\textsuperscript{54} Interview with property owner David Turner, May 26, 2017. The Turners have owned the property since 1998. 1910 Federal census for Crook County, OR.

\textsuperscript{55} Photo by Patricia Kleeer, March 3, 2017.

\textsuperscript{56} Interview with Lynn Schilling Johnson.
Burt Chute discharges water into a wide stilling pond. Photographer looking east.57

Historic Contributing Wooden Flume Remains of Flume #2 (Archaeological Site# 35DS3033)
The 1911 state engineers map and other historic maps and evidence in the canal, indicate that a significant wooden flume was at a low point in the canal and was about 350’-long and 12’ wide.56 The original 1905 chief engineer’s plans for the canal indicate the flume and include a plan for it (Figure 25e). The remains are not visible during the irrigation season, as they are under water, but they are visible in the off season. A series of deteriorating lumber is partially buried in year-around standing water and silt. The remaining posts formed the piers and one cross beam formed part of a wooden flume that bridged the lowest point in the canal in the historic district. Forty-nine 10’ x 10” piers remain, mostly arranged in rows of seven across the width of the canal. The remaining piers from east to west cover 305’ Some 12’ lumber used in cross beams framing the flume remains in place, covered by water and partially covered with silt. The flume is at the eastern end of the historic district on the Diane and Robert Stephen property, in T 18S, R13 E, Section 8. The flume is indicated on historic maps drawn in 1911 and 1928. The flume is not present on the 1943 aerial photos, Figures 26a and 26b, and had been replaced with embankments on both sides by that time. The wooden flume leaked and required constant maintenance. According to page 5 of the 1914 report to the Oregon Desert Land Board by John Dubuis, wooden flumes were expected to be replaced every 15-20 years. Flume #2 was likely replaced with a set of the tallest earthen berms (embankments) in the historic district between 1933 and 1937.

Six rows of seven vertical posts have rotted off, but the bottom portions remain in place. Several nails that are about 12” long with heads that are roughly 0.75” wide were found at this location in the canal bed. It is expected that over time, the wood will continue to rot away. The historic flume was between Teal Road and Gosney Road. The rocks and soil now forming the berms were scraped from the COID reservoir property.59 The berms were recently sealed with Bentonite clay. The wooden flume remains represent a historic contributing site within the bed of the canal.

57 Photo by Patricia Kliwer, May 26, 2017
56 State Engineer Charles Strickland map on file at the Deschutes County Circuit Court in case record of water rights adjudication.
59 Interviews with COID ditch rider Jim Hollander and Robert Stephen.
60 Photos by Patricia Kliwer, April 13, 2017.
Looking down into the bed of the canal at a crossbeam nearly covered with silt. It is made of three boards, arranged in a box pattern and attached with nails.  

Non-Contributing Irrigation Pipe across the Canal Resting on Concrete and Rock Piers
A historic-period non-contributing, approximately 6"-diameter, corrugated steel pipe spans the canal near the property line between the Walden and Grund parcels, just upstream from the Bear Creek Ranch Bridge. The pipe and concrete piers were constructed and installed around 1921 to serve settlers on the north side of the canal. The corroded and dripping pipe rests on metal brackets set into three worn historic piers. The pier in the center of the canal is made of worn concrete. Two other piers, one on each side of the canal, are made of large rocks cemented together. Water enters the pipe from a 1' wide by 1' deep open ditch on the south side and flows north across the canal to the ditch running toward Bear Creek Road, alongside the Judith Hanson property. The water is coming from the Bear Creek Ranch ditch that begins at Headgate #4. The pipe is visible on 1943 aerial photos in Figures 26a and 26b. While the pipe belongs to the Period of Significance, it is contextually related to the farm property to which the pipe delivers water, rather than that of the whole of the irrigation system, per the MPD.

Looking northwest to a metal irrigation water delivery pipe supported on three historic rock piers.  

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01 Photo by Patricia Kliewer, April 3, 2017.
02 Photo by Patricia Kliewer, November 7, 2017.
Irrigation water flows north into the pipe, from an open ditch and crosses the canal. Looking north.\textsuperscript{63}

Historic Contributing Turnouts or Headgates to a Sub-Lateral and 8 Ditches
There are 11 contributing headgates and 8 non-contributing headgates. All of them are the same hand-operated screwgate style. The gates are operated by turning the metal handwheels at the top of the metal structures above water level. The wheels operate metal threaded screw lift rod assemblies that open and close by moving the metal slide gates across metal pipes in the water. The gates to the laterals are three times larger in diameter than the gates to ditches. The hand-operated wheels turn the threaded screw lift rod assemblies that slide the metal paddles in the water upward to expose the metal pipe that runs under the berms toward the laterals. The handwheels are turned the other way to lower the paddle to cover the pipe to decrease or end water flow. Only the handwheels and tops of rods are visible when water is flowing.\textsuperscript{64}

Historic Contributing Replacement Structures at Stearns Waste
A historic contributing Stearns Waste group of structures is at the southern end of Teal Road. They include a historic catwalk crossing the canal. The present 45'10"-long and 22"-wide catwalk was installed about 1933 to allow the ditch rider to rapidly access the three wastegates on the south side of the canal in an emergency. The headgates are the same style as all 21 headgates in the historic district. They are hand operated by metal wheel controls, threaded screw lift rod assemblies and metal slides across corrugated steel pipes. The set of three 40" diameter pipes in a shared board-formed, poured concrete headwall with a flat face and wingwalls were installed in 1988 to replace the original 1833 set on the south side of the canal to allow COID staff to drain the canal in an emergency. The set of three large pipes convey water downhill through corrugated metal pipes under the 20' wide and 19' deep south berm to a drainage ditch on COID land. The pipes allow the ditch rider to divert the water from the canal into the low portions of COID's 40 acre "reservoir" and a portion of the 11.3 acres to the east owned by Diane and Robert Stephen.

Stearns Waste is named for Sidney Summer Stearns (1856-1923), a well-known cattle rancher. In 1920 Stearns purchased the original settler's, Norman Weyand, 40-acre parcel in a Central Oregon Irrigation Company mortgage lien foreclosure proceeding. He was the highest bidder of $2,673.58 at an auction at the courthouse door. Stearns widow, Francis Stearns, sold the 40 acres of scrub land to COID in 1932. COID has used it as an emergency reservoir since then\textsuperscript{65} (Figures 14a, 18, 19, and 20). Typically, Steams Waste is used to drain the canal when the canal is damaged downstream, and water is flooding out of the canal bed, or when

\textsuperscript{63} Photo by Patricia Kliewer, November 7, 2017.
\textsuperscript{64} According to the MPD, "To be considered contributing properties, flow control and measuring devices must exhibit sufficient integrity to successfully express the historical role and function of their property type within the overall nominated property. The in-kind replacement or reconstruction of component parts for the purposes of repair and regular maintenance should not necessarily be considered a loss of integrity, and a resource does not need to remain in its original use. Headgates, for example, do not need to retain all five of their basic components in original condition (i.e. headwall, stem, paddle or slide, frame, and handle) to be considered contributing resources. The reconstruction of a headgate's metal frame or the in-kind replacement of paddles, slides, or stems due to deterioration is an expected maintenance activity and should not constitute a loss of integrity. In contrast, a headgate would lose integrity if its original headwall or its metal gate structure were completely removed or replaced." Carey and Reclamation Acts Irrigation Projects in Oregon, 1901-1978 MPD, page F-64.
\textsuperscript{65} Deschutes County Deeds, Metzger Maps, interview with Richard Torkelson and interview with ditch rider Jim Hollandar.
ice dams during winter stock runs back up the water, causing it to overflow the canal banks. Although the intake gate at the Deschutes River is closed as soon as possible in an emergency, it takes a full day after the intake is closed to empty the canal, if the waste gates are not opened. The tremendous volume of water conveyed by the canal can quickly flood personal property and roads. A series of waste gates are spaced along the canal and are used to safely and quickly drain the canal downstream.

The current Stearns Waste structures replaced a set of three historic headgates, installed around 1933, in the same location. The historic gates were similar metal wheel controls, threaded screw lift rod assemblies and metal slides across corrugated steel pipe, but they were smaller in diameter than the current gates that replaced them. They are an important part of the entire 47-mile long main canal. While they were installed in 1988 to replace the earlier set of three gates in the same location, they meet the MPD’s criteria to classify replacement structures in kind as contributing.

Looking south at Stearns Waste, three headgates and pipes to a reservoir on the south side of canal.  

The headgates at Stearns Waste can discharge water from the canal to COID scrub land in an emergency.  

**Contributing Catwalk, Weir and Headgate to the Bear Creek Ranch Ditch**

Another historic green metal catwalk with handrails and a wood plank deck spans the canal between the Bonneville Power Administration’s overhead transmission lines and the Bear Creek Ranch Bridge. It is 67’10”-long and 22”-wide and is adjacent to the headgate on the south side of the canal that opens to divert water from the main canal into the irrigation ditch that flows to the 51.09-acre Bear Creek Ranch. The ditch flows into the corrugated metal pipe previously described that conveys the water across the canal to three patrons on the north side of the canal. It is listed in Table 1 as Headgate #4. The catwalk, concrete and metal diversion weirs, and concrete headwall were installed before 1927. The headgate, weirs, headwall and catwalk are counted as one structure. The historic wooden headwall behind the headgate was replaced in the 1960s with a bcard-

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66 Ibid.  
67 Photo by Patricia Kliewer looking south into Bend Park & Recreation Department property on April 3, 2017.
formed concrete headwall. Board formed concrete and metal weirs that partially span the canal raise the water level to divert water into the open headgate. The headgate to the ditch is historic and is operated by the metal wheel control, threaded screw lift rod assembly and a metal slide across a corrugated steel pipe. The catwalk and ditch served by the headgate are visible on the 1943 aerial photos in Figure 26a and 26b.

Catwalk, weirs, and headgate to Bear Creek Ranch ditch, looking northeast.  

Three Historic Contributing Turnouts or Headgates to Laterals
Three metal headgates to two laterals and a sub-lateral are 1905 historic contributing structures. They are listed in Table 1 as Headgates #s 7, 8 and 12. The historic contributing headgates to the historic 'B', 'B-1' and 'C' Laterals are attached to circa 1960, poured-in-place, board-formed, concrete headwalls that replaced wooden headwalls. They allow irrigation water to enter 1.5' diameter corrugated steel pipes that dump water into laterals on the north side of the ditch rider road to convey water north for several miles, branching out into smaller ditches. The 'B' Lateral crosses under Bear Creek Road and US Highway 20 and continues north to the intersection of Nelson Road and the Powell Butte Highway. It serves the Bend Airport and some farms around it.

Screw assembly to operate the headgate to the 'B' Lateral looking east.  

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68 Photo by Patricia Kliwer, May 26, 2017.
69 Photo taken on April 3, 2017 by Patricia Kliwer.
Central Oregon Canal Historic District
Name of Property

Water flows under the north berm in a metal pipe to the ‘B’ Lateral, looking north toward Bear Creek Road.\(^70\)

Old headgates to ‘C’ Lateral and a ditch named COC 15 in a shared non-historic board-formed, concrete headwall with wings, looking north from center of canal bed.\(^71\)

‘C’ Lateral looking north from the canal is crossed by a pedestrian catwalk. A solar panel is on the pole.\(^72\)

The 1905 historic ‘C’ Lateral crosses under Bear Creek Road, US Highway 20, Alfalfa Market Road, McGrath Road and Stenkamp Road to serve small farms. It ends at a large pond and wetlands covering several acres near Terry Drive. The wheels and lift rod assemblies are historic, while the concrete headwalls replaced the original wooden headwalls about 60 years ago. It is likely that the original pipes were wood and, as they collapsed, were replaced with metal pipes, likely in the 1930s, therefore within the period of significance.

\(^70\) Photo taken on May 26, 2017 by Patricia Kliever.
\(^71\) Photo by Patricia Kliever, April 3, 2017
\(^72\) Ibid
Central Oregon Canal Historic District  
Name of Property

In addition to the two historic headgates to the 'B', 'B-1' and 'C' Laterals, there are seven historic headgates to ditches in the historic district that were installed to serve settlers during the period of significance. The ditches were indicated on maps drawn during the historic period. They all have screw assemblies, described for the 'B', 'B-1' and 'C' Laterals, with smaller 6" diameter pipes. Unlike the gates to the laterals, the metal slides or paddles are attached to the pipes, but some are not attached to a headwall. One has remnants of the original wood headwall. The slides allow water to flow into the metal pipes that run under the sides of the canal to the diversion boxes or directly into ditches. Some ditches are less than 50' long and run into irrigation ponds beside the canal, while others branch out to serve many patrons (Photos 5 and 20). It is the property owner's responsibility to maintain ditches beyond COID's points of diversion. The following photos are of three of the seven historic headgates to ditches.

A historic headgate (Headgate #5 in Table 1) to a ditch set in a rock headwall.  

Historic lift gate assembly (Headgate #6 in Table 1) with no headwall and crude concrete check that has been built up over time.

73 Photo by Patricia Kliever, April 3, 2017.
74 Photo by Patricia Kliever taken on October 31, 2017, looking south.
Sections of wood sit in the rocks at the base of this historic headgate. There is no headwall. In Table 1 it is Headgate #2.\textsuperscript{76}

Looking north from the center of the canal bed to historic headgate, COC 8/9, near Ward Road.\textsuperscript{76} The handmade reinforcing-bar cage keeps rocks out of the pipe. It is attached to a worn concrete headwall. The pipe serves two ditches that branch out from a weir box north of the berm (Headgate #1 in Table 1).

Non-Historic Ditches
Eight non-contributing headgates to ditches are in the district. All of them were constructed after 1940 (outside the period of significance), as parcels were divided, and new owners needed more water. Although the wheel/screw lift assemblies are similar in design and function to the historic headgates, they are all attached to smooth, poured-in-place concrete headwalls. The newest gate (Headgate #21 in Table 1) was installed near Gosney Road in the last 15 years when a property owner south of the canal purchased water rights from COID. It is pictured below.

Looking south to newest headgate that delivers water through a pipe to a weir box and delivery pipe

\textsuperscript{76} Photo by Patricia Kliever, taken looking southeast on October 31, 2017.
\textsuperscript{78} Photo taken by Patricia Kliever on April 3, 2017.
on the south side of the canal to serve a new patron, just southwest of the Gosney Road Bridge.\textsuperscript{77}

The other non-historic gates are like the gates pictured below.

A non-historic headgate, centered on the headwall, with wing walls angled into the canal (Headgate #11 in Table 1).\textsuperscript{78}

Looking north to a non-historic headgate (Headgate #20 in Table 1) that is caged with reinforcing bars to prevent rocks from clogging it.\textsuperscript{79}

**Historic Contributing Drops**

Fifteen drops add character to the canal in the historic district, but also account for the majority of the change in elevation as it drops 50 feet in the three miles in the historic district. Photos of each of the drops that average about three feet tall are in the preceding table. They date from the original construction and widenings, 1905-1913. They are significant historic contributing features in the historic district and are described in the MPD.\textsuperscript{80} They were planned in the 1905 drawings by Chief Engineer Charles Redfield as seen in Figures 25a-25c. The drops are functional elements in the canal. The drops accommodated the existing rough terrain and helped minimize excavation along the profile of the canal and the profile split the difference between the two sides of the canal. Most of the drops are a minimal 2 to 3', while others change elevation as great as seven feet in elevation change. The largest drop is at Bear Creek Bridge (Figures 25a and 25b). Smaller drops have minimal effect on the flow of water in the canal while the larger drops cause significant turbulence as the water flows from flatter upstream grades through the steep drops and into flatter canal grades downstream. The steep drops increase the flow velocity while the turbulence releases energy until the flow becomes more uniform downstream.

**Summary of Alterations in the Historic District**

\textsuperscript{77} Photo by Patricia Kliwer, taken looking southeast on April 13, 2017.
\textsuperscript{78} ibid
\textsuperscript{79} ibid
\textsuperscript{80} MPD, page F-49.
Central Oregon Canal Historic District

One major alteration to the main canal has occurred since it was completed in 1913. A pair of berms replaced the historic wooden flume at the east end of the canal during the historic period. A recent minor alteration to the canal bed was when COID removed a small rock island just west of the Bear Creek Ranch Bridge. The repair is not apparent and is covered with rock that regularly washes down the canal. The Stearns Waste, a set of three water discharge gates and associated headwall were reconstructed in 1988 near Teal Road to replace a smaller historic headwall and set of three smaller screw-type headgates at the same location. About three undated rock checks in the canal bed and concrete crudely-spread over rocks just downstream of some headgates to facilitate the diversion of water into them are not visible when the canal is flowing, and they are unobtrusive and partially covered with rock and silt when the canal is dry. They replaced historic wooden checks at the same location that raised the water level to facilitate it's being diverted into gates. Eight headgates and concrete headwalls for a sub-lateral and some ditches are non-historic, but they are similar to the historic gates and operate in the same way. There are few alterations in the district, leaving the integrity at the highest level, given its 3.4-mile length and large scale.

CONCLUSION and INTEGRITY

The COCHD has an exceptional degree of integrity and is a good example of a Carey Act canal in Central Oregon. Its location has not been altered over time, and it continues to display the distinctive characteristics of the historic period canal construction, an irregular, open, trapezoidal-shaped canal, made with tightly compacted local rock and soil by horse teams, hand tools and custom-designed steam drills. It represents the function and appearance of the water conveyance system, during the historic period. The district is of sufficient length to portray the purpose, the construction challenges, materials, techniques, and methodology of construction. The headgates and pipes to 16 ditches, two laterals and one sub-lateral, and over a dozen irrigation ponds that serve irrigated and cultivated land next to the canal, illustrate how the canal functions to provide irrigation water to those with water rights. It also demonstrates the differences between land with and without appurtenant water rights.

The headwall and gates at Stearns Waste are only 30 years old, but they replaced similar historic structures at the same location. Stearns Waste is an example of how the irrigation district staff deals with emergencies that can develop if water goes out of its banks downstream. Burt Chute and the remains of the historic wooden flume are reminders of the substantial challenges posed by lava tubes and sudden drops in elevation along a canal that flowed by gravity and could not go around obstacles. The wooden flumes were leaky and required constant maintenance. All the historic wooden flumes that were on the main canal, including three flumes in the two miles east of the historic district, have been replaced with metal pipes or embankments. Burt Chute and the piers for the Bear Creek Ranch Bridge were formed by hand with concrete mixed on site. Workmen had to break up and remove massive amounts of rock, bridge caverns with wood and concrete flumes and build huge 12-foot tall embankments. The high degree of integrity of setting, location, design, materials, feeling, association, workmanship of the historic district differentiate it from the remainder of the COC. The canal in the historic district is the only unaltered stretch that conveys the full volume of water (530 cfs) and displays evidence of all the practical solutions to the unique historic construction challenges in 1905, 1907 and 1913, and includes 27 sets of irrigation system structures.

The canal in the district has a distinctive lack of uniformity, an undulating bed, irregular side slopes, heavily riprapped or stacked rock embankments, cuts, 15 sudden drops and rapids caused by large rocks left in the bed as it drops 50 feet in elevation. The challenging rock, use of native materials, and practical, problem-solving methodology, resulted in the stretch looking and sounding like a river flowing naturally. The berms on the edge of the hills on the downhill side are distinctive and show the difficult labor the teams and men went to place the canal at the necessary elevation, so the system would flow for the entire length that was planned. It reains the feeling and association with the surveyors who determined its exacting route, so it could flow entirely by gravity.

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and serve all the settlers and patrons. The canal varies greatly in width and depth, reflecting the engineers who calculated its necessary volume so that it would carry the water needed to irrigate future farms for the length of the canal, the superintendents and supervisors who adapted plans to meet conditions encountered in the field, specialists who blasted tons of rock with specialized mining equipment ordered the previous year to speed up work on the Pilot Butte Canal (PBC), and the hundreds of laborers with horse teams who dug, scraped, and moved thousands of loads of rock and soil, while trying to meet construction deadlines that were set in contracts between the canal developers and the State of Oregon.

The district has the widest variation of terrain and style and the tallest berms on the canal. The variations demonstrate that a narrow and deep canal with fast volume in a sloped area can carry as much water as a wide, shallow canal with a slower flow in flatter terrain. The tremendous variations in the district as seen in the survey data show that the main canal in the nominated district displays all the designs and methodology found throughout the entire canal: irregular winding rocky portions with large built-up embankments on the downhill side; portions with vertical sides and others with sloping rip-rapped and stacked rock sides; smooth and sandy level portions; portions with two cuts and no embankments; portions with and without a ditch rider roac atop the embankments; portions with short embankments used to discard the materials taken from the bed; portions that were blasted and portions that were scraped.
United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900
OMB No. 1024-0018
(Expires 5/31/2022)

Central Oregon Canal Historic District
Name of Property

Deschutes Co., OR
County and State

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.)

X 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.)

EXPLORATION AND SETTLEMENT
AGRICULTURE

Period of Significance
1905 – 1937

Significant Dates
1905: Canal completed in Historic District
1908: Central Oregon Canal completed to Powell Butte
1914: Flow increased in system to serve Powell Butte due to new North Dam and North Canal
1921: Water right holders become Central Oregon Irrigation District (COID)
1937: Deeds to unsold land in Segregation
        List 6 are returned to Federal Government

Significant Person
(Complete only if Criterion B is marked above.)
N/A

Cultural Affiliation (if applicable)
N/A

Architect/Builder
Wiest, Levi David, Civil Engineer, Oct. 1901 – Feb. 1904
Kelley, John G., Hydraulic Engineer, Feb. 1904 – June 1904
Redfield, Charles Monteith, Irrigation Engineer, April 1904-1921
Central Oregon Canal Historic District

Period of Significance (justification)

The period of significance for the COCHD begins with the 1905 construction of the main canal and associated irrigation water delivery system structures in the historic district. Settlers began purchasing land in the historic district in 1909. The canal was widened, and turnouts/headgates, laterals and ditches were constructed as land was sold to settlers. The period of significance ends on June 30, 1937, when the State of Oregon returned to the federal government deeds to eight unsold 40-acre parcels that are in and adjacent to the historic district. Charles H. Martin, Governor, on behalf of the State Reclamation Commission, relinquished and re-conveyed the deeds to 8,629 acres of unsold land in Deschutes County that had been in Segregation Lists 6 and 19, to the United States of America. (The two Segregations included 84,707 acres.) By 1937, settlers had purchased all the irrigable and farmable land along the entire canal, and agriculture and settlement were established in the area.

Criteria Considerations (explanation, if necessary)

N/A

Statement of Significance Summary Paragraph (Provide a summary paragraph that includes level of significance, applicable criteria, justification for the period of significance, and applicable criteria considerations).

The COCHD is significant at the local level under Criterion A, in the areas of Exploration and Settlement and Agriculture, with a Period of Significance of 1905 (initial construction) to 1937 (end of land sales along the nominated segment). The historic district meets the general and specific registration requirements set forth in the Multiple Property Documentation, Carey Act and Reclamation Acts Irrigation Projects in Oregon 1901-1978, Oregon (NRIS No. MC 100001302). It represents the extensive, ambitious open canal system that conveyed water by gravity between the Deschutes River in Bend and the Powell Butte area. It brought about widespread change in the arid region. The COC delivered irrigation water to 25,257 acres that enabled profitable agriculture and brought a surge of settlers to the area. It substantially affected settlement, agricultural production, population growth, and the commercial and economic development of Alfalfa, Powell Butte and Bend. The downstream cities, particularly Alfalfa and Powell Butte, significantly benefited from the construction of this segment of canal, as without the segment the towns would not exist as the canal was integral to the settlement and growth of those communities. The for-profit development company’s successful, nationwide, private, marketing campaign attracted thousands of settlers to the arid high desert and resulted in the sale of most of the land in their segregations. The historic district is a segment of the COC, one of two canals developed by the Central Oregon Project that was the largest and most successful Carey Act irrigation and settlement project in the Northwest. The nominated segment was constructed, and land around it was sold, as a for-profit commercial enterprise by the Deschutes Irrigation and Power Company, under contracts with the State of Oregon under the Carey Desert Land Act. It is directly associated with the provision of irrigation and development of agricultural output of all areas downstream of the nominated segment. The contract between the company and the State required the developers to reclaim the land by delivering irrigation water to the highest point on each parcel that had a water right. The nominated segment is a representative portion of the main canal with a concentration of secondary structures that adequately represent the irrigation project’s function and historical significance. The segment was difficult, time consuming to build due to the extraordinarily difficult volcanic terrain and was crucial for the entire canal to allow adequate water to flow to the remaining 35 miles of the 47-mile-long canal. Building of this difficult segment was overcome not through novel engineering, but through a combination of large amounts of man and horse power and the deployment of a variety of typical approaches, including blasting, scraping, digging, and fluming, all of which had to be completed within a limited period set by contract with the State of Oregon. Due to the difficulty and short timeframe, this portion of the canal was originally underbuilt, and the segment was a bottleneck on the canal until 1914 and had to be relieved by expansion twice during the period of significance.

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Central Oregon Canal Historic District
Name of Property

Narrative Statement of Significance (Provide at least one paragraph for each area of significance.)

Built in 1905, the COCHD is significant at the local level under Criterion A, in the areas of Exploration and Settlement and Agriculture. The segment of the canal meets all the general and specific registration requirements detailed in the Multiple Property Documentation, Carey Act and Reclamation Acts Irrigation Projects in Oregon 1901-1978, Oregon. The segment is in its original location, is of sufficient length, and displays a high-degree of historic integrity that clearly communicates its purpose and function to convey irrigated water downstream to Alfalfa and Powell Butte.

CENTRAL OREGON CANAL HISTORIC DISTRICT MEETS REGISTRATION REQUIREMENTS IN MPD

The COCHD is nominated under the Multiple Property Document Carey and Reclamation Acts Irrigation Projects in Oregon, 1901-1978 (MPD) for local significance under National Register Criterion A in the areas of Agriculture and Settlement and Exploration. The COCHD meets all the registration requirements set forth in the Multiple Property Document relevant to historic districts composed of a principal resource and accompanying appurtenant secondary resources.

COCHD as Historic District

The COCHD is classified under the MPD as a Historic District, meeting the MPD’s definition of such resources; within the larger COC, the segment represents a significant, distinguishable entity comprising a primary conveyance feature (COC), and a number of secondary conveyance features (lateral/ditches, flume [present, in ruin], chutes/drops) and flow control devices (headgates, wastewater) features that together illustrate both the unique character of the canal in this area, and the features and function of the water delivery system of which the canal is central. The adequacy of the length of the nominated segment is determined by two factors: the relative importance of the principal resource (canal), and the number of secondary features present. The COCHD centers on the COC, one of two canals that form the Central Oregon Project, and considered to be of central significance to the overall system. The nominated area includes a variety of secondary elements, including both secondary conveyance features and flow control systems, fully sufficient to illustrate the function and operation of the larger canal system. Beyond this, at 3.4 miles in length, the COCHD is the longest segment of irrigation canal yet nominated in the State of Oregon. The National Register-listed PBCHD, by comparison, measures 1.4 miles in length, and the Pilot Butte Canal: Downtown Redmond Segment Historic District, also listed, measures 1.3 miles in length.

Registration Criteria

Per the requirements of the MPD, the COCHD represents a segment of the larger COC, nominated under National Register Criterion A at the local level with significance in the areas of Agriculture and Exploration/Settlement. The COCHD belongs to the historic context “Carey Desert Land Act Projects in Oregon, 1901-1950,” being constructed directly as a result of the Carey Act implementation in Oregon (see pp. 48-92). It is directly associated with the provision of irrigation and development of agricultural output of all areas downstream of the nominated segment, by virtue of it’s crossing of a very difficult area of volcanic terrain, without the construction of which the canal could not have extended to the east. Relatedly, the provision of the irrigation waters to these areas resulted in the "substantial impact of Oregon’s landscape," resulting in the settlement of the farming communities of Alfalfa and Powell Butte (see pp. 92-95), and converting once arid, marginal lands into the highly productive agricultural lands they are today.

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63 See page F-35 of the Carey and Reclamation Acts Irrigation Projects in Oregon, 1901-1978 [MPD].
64 See MPD, p. F-35.
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Registration Requirements

The COCHD meets the General Registration Requirements applicable to all properties nominated under the MPD. The district represents a significant segment of the COC, a portion of the Central Oregon Project, which is a Carey Act project, entirely located within the State of Oregon, and which provided the historical and physical data that informed the development of the MPD, and is therefore exempt from the requirement of a detailed, separate context appended to the MPD; the property is defined as a historic district possessing one or more defined property types; the COCHD belongs to a defined Period of Significance (see p. 38) within the Carey Act-related historic context, and retains sufficient integrity to convey its significance (see pp. 35-36), with particular note to the aspects of "setting," of which topography is the central element (as it relates to significance), and "workmanship," to which the many instances of rocks exhibiting blasting holes within the district attest.

The nominated segment represents the single most challenging element of the canal to construct, due to the extraordinarily difficult volcanic terrain, was the portion of the canal that took the longest to construct, and was overcome not through novel engineering, but through a combination of dogged determination, application of large amounts of man and horse power, and deployment of a variety of typical approaches, including blasting, scraping, digging, and fluming, all of which had to be completed within a limited period of time set by contract with the State of Oregon. Because of the extreme difficulty and short timeframe, this portion of the canal was originally underbuilt, representing a bottleneck that had to be relieved by expansion twice during the period of significance.

In sum, the COCHD meets or exceeds all relevant registration requirements set forth in the MPD, exhibiting high integrity, a clear ability to convey its historical association and significance, and drawing significance beyond and in addition that conveyed to the larger system of which it is a part.

INTRODUCTION TO THE CENTRAL OREGON PROJECT

Overview

Construction of the PBC and the COC and the sale of land around them were the facets of the Central Oregon Project that changed the history of Central Oregon. The Deschutes country was relatively unknown and unsettled when the irrigation project began as a fortune-making idea in 1900. The Pilot Butte Development Company meticulously explored, surveyed, and mapped the plateau in the high desert east of the Deschutes River and south of the Crooked River to determine opportunities for a vast irrigation system. It considered the potential for income to investors by reclaiming and selling the land that could be irrigated. By providing the primary means of watering the arid land for agriculture and by bringing in a vast amount of capital, the Pilot Butte Development Company (1900-1904) and its successors, the Deschutes Irrigation and Power Company (1904-October 1910) and the Central Oregon Irrigation Company (October 1910-1921), constructed Central Oregon Project with private funding under an agreement with the State of Oregon under the Carey Act. The irrigation project was the largest irrigation project in the Northwest, irrigating 140,714 acres.
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Photo taken in early 1905 of laborers and their tent camp along the Bend stretch of the Central Oregon Canal.\(^88\) The nominated segment of the COC was blasted out of rock that covered lava tubes and caverns that became apparent when the surface rock was removed. It was a critical stretch that was the most time consuming and physically challenging to construct and required a huge investment of men and horse teams. Work on the nominated segment of canal began in November 1904 when crews begin to clear the route for the first 10 miles with horse teams. On February 10, 1905, the company moved men and horse teams from the PBC to augment the crews on the COC.\(^89\) The March 10, 1905, Bend Bulletin reported that 400 men and 250 horse teams were working between six and ten miles from the river (the historic district is between miles 7.5 and 11.5) and the canal was being excavated and rock work was going well. The Bend Bulletin on July 14, 1905, said, "Several leaks have developed along the Central Oregon work, where rock was shattered by blasting, opening crevices to subterranean chambers. These are generally stopped by paddling and tamping." Crews had been working on the same two miles of canal in the hills and rock for nine months and were still 12 miles east of Bend. The huge crews were aided by having the specialized rock drilling equipment purchased for the rocky portion of the PBC to speed the process of blasting rock and steam shovels to scoop up broken rock and load it in wagons.

While most of the gradually-narrowing canal traverses a relatively flat plateau with little rock, this stretch is the hilliest, rockiest and most uneven and has lava tubes and sudden drops in elevations that were bridged by Burt Chute and a wooden flume. It took a year to complete the segment. But, to meet demanding construction schedules, set by the State with a shortage of laborers, it was under-sized. That resulted in its being a bottleneck in the system, and it was therefore widened twice, in 1907 and 1914, to allow the delivery of adequate water to settlers in Powell Butte. The accomplishment of moving tons of rock, building the 305'-long wooden flume, the 215'-foot-long concrete Burt Chute and constructing miles of huge embankments on the downhill sides, exemplifies private enterprise and laborers overcoming the challenges presented by the region's geology. It reflects the construction methods and materials used throughout the irrigation system. It took an extraordinary amount of private capital, exceptional expertise in the utilization of technology, and enormous labor and horse-power to build the canal through the district. Farmable land in the historic district was sold to settlers by the development companies under a contract with the State of Oregon under the Carey Act, beginning in 1909. By 1937, settlement of irrigable and farmable land in the district was complete; some poor land with no water rights remained in public ownership.

Summary of Financial Considerations
The project was a successful, for-profit, commercial enterprise under the Carey Act. It brought significant private investments from Central and Eastern United States capitalists and railroad men. The project was

\(^88\) Photo from Deschutes County Historical Society Collection.
\(^89\) "To Crooked River," (The Bend Bulletin, February 3, 1905), 1. Indicates COC just started at this time, with the breaking up of ground; "Canal Is Finished," (The Bend Bulletin, February 17, 1905), 1. This article indicates work completed to the Crooked River on February 10; Brogan, Phil F., "The Watering of the Wilderness," (The Bend Bulletin, February 4, 1931), n.p. Brogan states February 9 as the completion date.
directly related to the founding of Bend, Redmond, and Centrallo (later called Deschutes Junction), and the settlement and economic enhancement of Alfalfa and Powell Butte. The companies aggressively marketed the project and attracted settlers from across the United States and other countries to buy the reclaimed land, and establish new churches, schools, homes, ranches, farms, and businesses. The private funds were used to build the irrigation system that was worth $3 million when it was transferred to users as the COD in 1921. By linking the investment in the irrigation company with corporate goals to attract business owners and farmers; sell the irrigated land; expand the agricultural sector; plat and develop Bend and Redmond, and the town of Centrallo between them; and to deliver water to the far corners of the plain; the project transformed the central Oregon high desert. Investment capital flowed into the region from the irrigation company as the canal system was built, bringing value to the lands, and flowed back to the company as settlers purchased lands and bought water. Investment flowed to the purchasers of city lots as the company invested in businesses, buildings, and urban infrastructure and as products and services were bought and sold. The region experienced new economic opportunities, population growth, and prosperity. In addition, development of these communities led ongoing economic expansion, which brought the local area into the greater economy of Oregon and the Pacific Northwest.

The Central Oregon Project

Michael Hall wrote in his book, *Irrigation Development in Oregon’s Upper Deschutes River Basin, 1871-1957, A Historic Context Statement,* “From 1878 to 1902, irrigation expansion became a critical issue in the West. Eastern speculators and the region’s residents reclaimed large portions of the ‘Great American Desert’ to create an economic base to foster settlement. Almost none of the hundreds of irrigation companies formed with eastern capital in the 1870s and 1880s survived beyond 10 years. Their failures resulted from not understanding that expansion of agricultural development required storage reservoirs and sophisticated dams and canals.”

One successful for-profit project funded with eastern capital was the Central Oregon Project. It included the construction of the 47-mile long COC, the 22-mile long PBC, the 1-mile North Canal, and the North Dam (sometimes later referred to as the North Canal Dam) on the Deschutes River. The canals it built were not sophisticated structures, but were adequate, and it did unexpectedly need a large, expensive dam. However, the investment in the project covered the cost of the unanticipated structures.

The Central Oregon Project began with Alexander Drake’s vision of a vast irrigation system on the high desert plateau, east of the Deschutes River, in 1900. Most settlers had received water by 1914 when the COC reached Powell Butte. In 1921, the for-profit Central Oregon Irrigation Company’s operation and maintenance responsibilities plus the assets were transferred to the water users as a district. The project ended in 1937, when the deeds to 8,829 acres of unsold land in Deschutes County that had been in Segregation Lists 6 and 19 were returned to the federal government. On June 30, 1937, Charles H. Martin, Governor, on behalf of the State Reclamation Commission, relinquished and re-conveyed the deeds to 8,829 acres of unsold land in Deschutes County that had been in Segregation Lists 6 and 19, to the United States of America (the two Segregations included 84,707 acres).

Until 1912, the two large canals shared a diversion point at the Deschutes River as well as the first few miles of huge wooden flume that crossed over a volcanic rock flow. The PBC was finished in February 1905, just after the COC was begun. In 1912, the PBC was split from the COC and diverted water from the Deschutes River at the new North Dam in Bend. The PBC runs north through Bend and Redmond and serves Terrebonne and then turns east for the last five miles to its terminus at the Crooked River near Smith Rock State Park. The company did not expect to need the dam that allowed the PBC to have its own diversion gate off the river and the North Canal and splitting the two canals increased the cost of the project.

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Crew building the shared diversion structure at the Deschutes River for the two canals, ca. 1903.\(^{31}\)

State Engineer John Dubuis and local civil engineer Levi. D. Wiest designed the North Dam and North Canal and Charles M. Redfield managed their construction. They were built to solve water volume shortages on the two canals, especially in Alfalfa and Powell Butte. The HAER: OR-61-C states, "The North Canal Dam and diversion canals constitute one of the most historically significant irrigation engineering complexes in Central Oregon. The complex is associated with important developments in agriculture as well as with locally prominent investors and pioneer irrigation companies in the Bend area. The North Canal Dam (1912) is the largest dam on the Deschutes River in the Bend area and is the oldest dam built for irrigation. When constructed, the 33-foot high 200-foot wide concrete arch dam was a significant engineering feat. The canal was the primary influence in the founding of Redmond and contributed to the growth and stability of other communities in the area."\(^{92}\)

Today, the COC continues to divert water at its original 1903 diversion point at the Deschutes River at the southern end of Bend and runs east to the Dry River, then north through Alfalfa and Powell Butte, then circles northwest toward the Crooked River and Smith Rock State Park, ending near the terminus of the PBC. The two canals frame the high desert plateau with the Deschutes River on the west, the Crooked River on the north, the Dry River and Powell Buttes on the east and the Newberry Crater National Monument on the south. The plateau is more than 30 miles in each direction and consists of 900 square miles. The irrigation system was to serve about half of it, 227,383 acres, that had potential to be cultivated.\(^{93}\) Thousands of acres are unfarmable because they are covered with thin topsoil over rock or have large amounts of rock outcroppings or are not irrigable. The amount of land sold to settlers, cultivated and irrigated by the system amounted to 139,000 acres in November 1913. The COC is the larger of the two canals in width, length and volume of water conveyed and it took the longest to construct (Figures 1, 7 and 8).

Alexander Drake
Alexander Drake saw the opportunity to develop a vast irrigation system when he visited the area in 1900 (Figure 24). Thirteen years later, the Central Oregon Irrigation Company manager described what Drake saw. "The land slopes gently from the Deschutes River and consists of plain and slightly rolling country. It falls toward the north at the rate of about 30 feet per mile. It will be readily seen that these features present ideal conditions for an irrigation system."\(^{94}\) The highest elevation is at the diversion gate at the Deschutes River at the southwest corner of the plateau. The lowest point is at the Crooked River, an altitude difference of 701', near the northeast corner of the plateau. The Pilot Butte Development Company hired surveyors and engineers to explore the area and to create a detailed topographic map of the plateau in 10-foot contours, to map out the canals and delivery systems to serve the purchasers of irrigable and saleable land. It was necessary to locate the canals along the highest contours possible to have the water flow gradually downhill.

\(^{91}\) Photo from Deschutes County Historical Museum Collection.
\(^{92}\) HAER: OR-61-C, p. 1.
\(^{93}\) Bend Bulletin Newspaper, July 30, 1913, pp. 1, 21, 22.
\(^{94}\) ibid.
but remain high enough to fill laterals and ditches. "By reason of the light rainfall, the lands of this part of the country, like the greater portion of the lands west of the Rocky Mountains, are classed as 'arid' and for many years it was generally supposed that they were almost worthless, but it is found that when supplied with additional moisture - by irrigation - they are among the most fertile of any on earth, and they produce crops of such abundance as to almost: unbelievable." The company describes the "disintegrated lava and volcanic ash" soil as rich and "practically inexhaustible."

Drake made four filings for water rights on November 5, 1900. Planning, surveying, engineering, and financing, along with trips by horse-drawn wagon to Salem and eastern states to form coalitions with state and federal politicians began right away. The State of Oregon approved its Carey Act enabling legislation on February 28, 1901. The Pilot Butte Development Company entered into a contract with the State of Oregon on May 31, 1902 to reclaim 84,707.74 acres under the Carey Act. By 1903, the diversion point and the canals were under construction. The two canals shared an immense wooden flume at the diversion structure at the eastern bank of the Deschutes River south of Bend until they split in 1912. The flume was enlarged and repaired several times, but it was always inadequate. In 1909, while the flume at the diversion point was shared, the incomplete COC was furnishing water to 56,000 acres. In 1912, a new dam and connecting canal, the North Canal, were completed at the north end of Bend to serve only the PBC. The Intake for the COC remained in the original location.

The PBC was built first and was largely completed on February 10, 1905. The PBC was built with hard labor by men and horse teams that worked well in areas with little volcanic rock. But specialized construction equipment was ordered at the end of 1904 to more efficiently blast through the challenging solid basalt lava rock flows in the Bend area and move thousands of tons of rock. That specialized equipment and the techniques learned by constructing the PBC were applied to the more extensive project, the COC. Crews that worked on the last five miles of the PBC and the new equipment they were using were brought to Bend in February 1905 to join the crew already working on the COC south of Bend near the flume.

During 1905, the COC was constructed through the historic district. By 1907, the COC was 28 miles long and reached the community of Alfalfa and the Dry River. In 1908, the canal was 45-miles long and was completed to the Powell Butte community, but it did not irrigate the entire area that was required to be irrigated by the company’s contract with the state and promised to the settlers, due to bottlenecks in the system. In 1912, the PBC’s intake was moved to the North Dam and the intake with COC was no longer shared. The laterals on the COC were nearing completion and water flow in the main canal and laterals was increased. But the water volume was still inadequate. In 1913, the main canal through the rock east of Bend, including in the nominated historic district, was determined to be too small and it was enlarged again the following year. Most of Powell Butte was finally served in 1914, although settlers complained about the volume until the new COID addressed the problems after 1921.

The COC, this mighty 47-mile long canal, today serves the southern and eastern half of the high desert plateau. The main canal’s completion in 1908 and the delivery system’s completion in 1914 spearheaded the settlement of southern and eastern Bend and continued the settlement in the older communities of Alfalfa and Powell Butte. This construction and operation changed the history and appearance of these communities more than any other event. Water flow through the canal initiated the development of agriculture on a large scale in the Deschutes Country.

The Central Oregon Project was the second contract in Oregon under the Carey Act. The Pilot Butte Development Company (1900-1904) and its successors, the Deschutes Irrigation and Power Company (1904-October 1910), and the Central Oregon Irrigation Company (1910-1921) were successful because they used experienced financiers, encouraged colleagues to plan and construct the railroad from the Columbia River Gorge to Bend in 1911 that further facilitated the influx of settlers and goods, and implemented an aggressive national advertising campaign. They had offices in Prineville and Portland and actively participated in an
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agricultural experimental farm and sponsored competitions among the settlers to learn about the possibilities of growing crops and raising livestock in the high desert. They formed political coalitions with the Governor, the Oregon Land Board and other politicians. They brought in experienced civil engineers and construction supervisors to find solutions to the challenges presented by the construction of the canals. Their local leadership and practical experience on similar projects, such as founding towns and railroad building, also contributed to the project's success and the settlement of Central Oregon. The PBC's history and its significance and impact on Central Oregon and the associated founding and development of the cities of Bend and Redmond was documented in the PBCID nomination that was listed on the National Register of Historic Places in 2016. Both canals, along with the North Canal, and North Dam, were one project and together are integral to the success of the Central Oregon Project.


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SIGNIFICANCE OF THE NOMINATED SEGMENT OF THE CENTRAL OREGON CANAL

Significance of the Nominated Segment
The 3.4-mile long nominated historic district was a critical and difficult section of the canal to construct. It needed to be enlarged in 1907 and in 1914 to allow the irrigation company to fulfill its contract and deliver water necessary to flow to the end of the irrigation system at Powell Butte. Even though the segment took nearly a year to originally construct, crews did only the minimum excavation each time they worked on the segment, because it was expensive and time consuming to blast through the rock and build the huge berms that were necessary on the downhill edge of the sloped terrain and to build flumes across low points and caverns. The rock in the nominated district presented a great construction challenge and reflects the historic construction techniques used. Because of the toughness of the terrain and the exceeding difficulty in removing the volcanic rocks, characteristics of the district reflect the type of terrain and the construction methods which prevailed there. It took an extraordinary amount of capital, exceptional expertise in the utilization of technology, and enormous man and horse-power to build the canal in this location, three times. It was the only stretch that had to be enlarged.

Today, the 1904-1914 labor on the COC is easily recognized and observed in the nominated stretch. The district includes nearly all the portion of the now 47-mile-long canal that is on the side of a slope. The terrain before and after the district is relatively flat. It is distinctive for the tall berms in rolling terrain. The canal bed is the widest and deepest in the system. The immense accomplishment of constructing this section exemplifies how ditch crews overcame the challenge presented by the region's geology. It required great tenacity, ingenuity, technology, labor and money. There were delays caused by a 500' collapse in the intake flume in 1905 that took laborers away from the work of constructing the canal in the historic district. Also, in 1905, laborers left their canal construction positions in this location to work instead on the Columbia Southern irrigation project that offered better wages. The canal was built too small in this location and had to be widened twice, because the company pushed the crews too hard due to the desire to meet state deadlines, and to move on to the east where the project was less difficult, and to show more progress to the state inspectors.
The qualities of design, materials, and workmanship reflected by the flowing water are extraordinary. Other than the Powell Butte Siphon made with a redwood pipe which was designed and supervised two years later by Chief Engineer Charles M. Redfield, and constructed by a contractor, all the canal was built the same way as this portion in the historic district. The greatest challenges were encountered in the historic district. As they moved east, the crews encountered less rock and flatter terrain, and the canal became smaller and easier and therefore faster to construct. The COC at this location is an assemblage of man-made and natural features joined together that illustrate the 1905-1937 construction and settlement experience.

**PURPOSE OF THE WATER DELIVERED BY THE CENTRAL OREGON CANAL**

For 112 years, under the 1900 water right to the Pilot Butte Development Company, the COC has delivered irrigation water from the Deschutes River to reclaim (irrigate) arid land between Bend and Powell Butte and around the compact community of Alfalfa. The canal flows continuously for six months during the irrigation season, generally April 15 to October 15, depending on the weather, plus a stock runs a few days every five to six weeks during the late fall, winter, and early spring. Typically, flows vary by the amount of irrigation water needed by farmers due to the weather, the snowpack on the Cascade Mountains to the west, and the stage of crop development.

Water conveyed by the COC has a variety of beneficial uses. It irrigates residential, industrial, and commercial landscaping in urban areas and crops in the rural areas, such as potatoes, onions, and horticultural plants. Primary crops are hay for baled animal feed and grass pastures for livestock. The canal provides water to the Bend Airport, urban trailer parks, urban residences, hobby farms north and east of Bend, commercial farms and cattle ranches, recreational ponds and reservoirs, wildlife habitat ponds, a golf course, and residential landscaping. Pastures from 0.5 to 80 acres in size for goats, sheep, horses, lambs, alpacas, and cattle dot the landscape. It fills cisterns and stock ponds and irrigates school lawns and play fields. This canal is distinctive in the high desert in that it fills many large public and private recreational ponds and lakes, in addition to the usual irrigation ponds. Also, several parcels have multiple irrigation ponds and many of the irrigation ponds cover more than an acre.

**THE DESCHUTES RIVER and UPPER DESCHUTES REGION'S POTENTIAL**

**Post Frontier Period, 1883-1917**

Schwantes says that, "During the years bracketed by the completion of the Northern Pacific Railroad in 1883 and the U.S. entry in the First World War in 1917, the Pacific Northwest moved inexorably into a post frontier world ... The generation of men and women who came to the West in covered wagons ... passed from the scene. They had committed to building a new society in the wilderness: those who followed them were also builders — of cities, transcontinental railroad lines, [and] irrigation works ..." These 'builders', Eastern capitalists, had accumulated wealth from investments in railroads, oil and gas, lumber, banking, and other enterprises. They sought to further amass capital, and, at the turn of the century, the Deschutes Country offered the last region in the nation with seemingly unlimited resources for those first to exploit its water, land, and timber.

Portland *Oregonian* editor Harvey W. Scott observed similar changes occurring in Oregon as those described by Schwantes. Scott wrote about changes taking place over the entire Northwest. In 1901, Scott told an audience, "Under operation of forces that press upon us from contact with the world at large, and under the law of our own internal development, we are moving rapidly away from old conditions. Pioneer life is now but a memory; it will soon be but a legend."

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The U.S. Department of the Interior in 1890 reported the irrigation potential of the Deschutes River and the adjacent lands: "It appears not improbable ... that a great irrigating system can be profitably constructed along this river. There seems to be no question as to the permanence of the water supply, the fertility of the land when irrigated, and the favorable character of the climate." The report's author, Frederick H. Newell, would become chief engineer of the U.S. Reclamation Service upon its creation in 1902, and its first director in 1907.99

F.F. Henshaw, John H. Lewis and E.J. McCaustland were three outstanding engineers who served in state and federal roles in which they conducted research on the Deschutes River that aided agencies in managing its waters over the first two decades of the twentieth century. Their research a century ago pointed out the river's irrigation and power potential:

"In several respects [the] Deschutes River is unique among rivers of the United States. Its natural flow is remarkably constant; its headwaters afford reservoir sites sufficiently large and so distributed that the total flow of the river may be utilized both for irrigation and for power; the irrigable lands in the valley, aggregating 300,000 to 500,000 acres, are so situated on a plateau in the upper part of the basin that the total flow of the upper river and its principal tributaries may be utilized for irrigation; and below the irrigable area the river flows in a deep canyon having a fair slope and affording excellent opportunities for power development, a reliable water supply being assured by the return water from the irrigated areas above and by the lower tributaries of the river. The future of this exceptional combination of abundant water supply, large area of irrigable land, and great water powers will transform the Deschutes Valley into a region whose agricultural importance will be enhanced by the many hydroelectric plants that will furnish power for local use or for transmission to distant power markets."100

At the turn of the twentieth century, Central Oregon, known then as the Deschutes Country, was the most remote region in the nation. It presented opportunities to capitalize on the Deschutes River, promising lands for agriculture, and timber from immense pine forests. Americans and new immigrants had been spurred westward by visions of productive farmlands, riches of gold, and vast stands of timber. A major factor in westward expansion was the building of transcontinental railroads. By 1900, Portland, Oregon, Seattle and Tacoma, Washington, were served by the railroads, and trunk and other lines linked smaller communities to the social and economic fabric of the nation.101 The Deschutes Country, however, was not connected by rail to the rest of the nation.

George Palmer Putnam, of New York publishing house G.P. Putnam's Sons, In the Oregon Country, "The map of Oregon had long shown a huge area without a single railroad crossing it. This rail-less land was Central Oregon, the largest territory in the United States without transportation."102 In 1900, the Columbia Southern


101 Culp, Edwin D., Early Oregon Days, (Caldwell, Idaho, The Caxton Printers, 1987), 107. Culp writes, "In 1883 the Northern Pacific Railroad reached Portland by using the Oregon Railway and Navigation (OR&N) tracks from Wallula Junction to Portland, a line that followed the south side of the Columbia River. At Portland, the NP had previously built its own right-of-way to Tacoma and Seattle. In 1887 the NP again reached Tacoma and Seattle, this time by continuing its track-laying program entirely in Washington Territory. The OR&N was soon to become property of the Union Pacific (UP), a line that would be competitive with the NP."

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railroad arrived in the small city of Shaniko, sixty-nine miles south of Biggs, Oregon, on the Columbia River. Shaniko became the connection point between the Deschutes Country and the outside world. It was a twelve to fourteen hour and an eighty-mile trip from Shaniko by stage to Prineville. From Prineville, the trip was several more hours to the Bend area. Urling C. Coe, M.D., one of Bend’s first doctors, described the land he first saw in January 1905. “This vast unfenced area ... was the largest area in the United States without a railroad, and the last frontier of the thrilling and romantic Old West.”

The Carey Act and the Settlement of the West
“Large-scale settlement of irrigated lands in the twentieth century marked the final phase of a process that began when immigrants first traveled west along the trail to Oregon,” according to Carlos Arnaldo Schwantes. In his comprehensive history of the region, The Pacific Northwest: An Interpretive History, he writes that “[b]y the turn of the century, people who still dream of acquiring a farm from Uncle Sam placed their faith in the power of irrigation to transform the region’s countless parched acres into desert gardens.”

The new approach to encourage settlement of the West was for the federal government to cede up to a million acres of land to each of the ten arid states, if they caused the land to be irrigated, settled, and cultivated. The Carey Desert Land Act of 1894 (Carey Act) was the process by which the federal government, acting through the State, agreed to make available up to 160 acres of arid land to a settler who made application for such a tract, settled upon it, and improved at least one-eighth of it into irrigated acreage. The state was responsible to the Secretary of the Interior to have a map and a plan thoroughly sufficient to irrigate and reclaim the designated land to raise ordinary crops, and to bring about the settlement and cultivation of the lands.

Oregon accepted the Carey Act process with enabling legislation on February 28, 1901. The legislation made it State policy that Oregon’s arid land should be reclaimed and settled. The State was to rely completely upon private development corporations to bring about reclamation and settlement of the arid lands. At the end of 1904, twenty-three Carey Act segregations (potential project areas) had been created by the State under the Carey Act, but only four of the twenty-three had been approved by the Secretary of the Interior. Three of these four Oregon irrigation projects were in the Deschutes Country. The three projects were the Pilot Butte Development Company, the Three Sisters Irrigation Company, and the Deschutes Reclamation & Irrigation Company.

Irrigation in the Deschutes Country had begun before the turn of the century and ventures were of two types. One was the cooperative organizations of land owners established to irrigate their farms and ranches. The second was the companies organized as private, for-profit investment enterprises. Local cooperatives included

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103 Due, John F. and Giles French. Rails to the Mid-Columbia Wheatlands: The Columbia Southern and Great Southern Railroads and the Development of Sherman and Wasco Counties, Oregon, (Washington: University Press of America, 1979), 43-52. The railroad arrived in Shaniko, “an artificial creation of the railway,” on March 7, 1900. Elmer Elm (E.E.) Lyle was the person who got the project underway in 1887, and was its president from 1889-1906.
107 Ibid. 348. Winch cites Oregon Session Laws for 1901, 376; Seventh Biennial Report of the Desert Land Board (1925), 40-46. In order to administer the act in Oregon, legislation created the State Land Board, which consisted of the Governor, the Secretary of State, and the State Treasurer. In 1909 the State of Oregon created the Desert Land Board to oversee the duties relative to the Carey Act conducted previously by the State Land Board. The State Engineer was appointed secretary to the Board. See also: Teela, Ray Palmer, The Economics of Land Reclamation in the United States, (Chicago & New York: A.W. Shaw, 1927), 67-69, 152-158.
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the Squaw Creek Irrigation Company (now called the Three Sisters Irrigation District) and the Deschutes Reclamation and Irrigation Company. The two cooperatives were formed before Oregon adopted the Carey Act, and were characterized by little or no capital investment and minimal engineering. The Deschutes Reclamation and Irrigation Company (later known as the Swalley Irrigation District) was a cooperative formed in 1899. Land was selected under the Desert Land Act. Promoters encouraged settlers to acquire an interest by doing an equal amount of work or by purchasing rights from the company. Settlers did much of the work on the canals and ditches, although laborers were occasionally hired as money was available. They had completed a segregation of 1,280 acres by 1913. Water was diverted to the Swalley Canal at the North Dam. The Squaw Creek Irrigation Company was a cooperative venture between neighboring farms formed in 1895 and used/uses water from Wychus Creek (formerly Squaw Creek), not the Deschutes River.

The canal companies formed as commercial investment enterprises under the Carey Act were generally larger in scope than the cooperative ventures. Local commercial projects included a project in the Tumalo Creek area, the Arnold Irrigation Company, and two organizations which came under the management of the Deschutes Irrigation and Power Company: The Pilot Butte Development Company and the Oregon Irrigation Company.

In 1902, Congress enacted the Reclamation Act, providing for the construction of irrigation works by the federal government with the proceeds from the sale of public lands. Due to the water in the river being overallocated, in 1913, the state indefinitely withdrew the Deschutes River from further appropriation until a study could be completed in 1935-37.

THE PILOT BUTTE DEVELOPMENT CO. BEGINS THE CENTRAL OREGON PROJECT

A.M. Drake Arrives on the Deschutes River, 1900
Alexander McClurg (A.M.) Drake, along with his wife Florence W. Drake and hired hand Charles J. Cotter, travelling in their covered wagon to visit friends, arrived in the area that became Bend in June 1900. Cotter served as the couple’s guide, cook and general handy man. That year, William H. Staats sold the land along the river that included the future townsite of Bend to Drake for $4,000. In the fall of that year, construction of the couple’s vacation home, a rustic log home, built and decorated in the style of a mountain hunting lodge, was started on the east bank of the Deschutes River in what would become the western edge of Bend.
Florence Drake decorated the house with Asian carpets and concrete landscape lanterns, purchased during a trip to Asia, and portraits of local Native Americans that she painted.

Alexander M. Drake, Visionary and President of the Pilot Butte Development Company

Alexander Drake was a wealthy Minneapolis, Minnesota, capitalist who had been interested with his father in railroad and land business. He was "nurtured in the philosophy of development." His father, Elias Franklin Drake, was a banker and built railroads in the mid-to-late 1800s in Ohio, Indiana, Minnesota, and in other areas of the central part of the nation, including the first ten miles of railroad in Minnesota, which became a section of the Great Northern Railway. While building railroads, the Drake Company founded several towns, including St. James and Worthington, Minnesota. Elias Drake served three terms in the Ohio House of Representatives, one term in the Minnesota Senate, and retired as president from the St. Paul & Sioux City Railroad in 1880. He and James J. Hill, who built the Oregon Trunk Railroad to Bend in 1911, had lived a few blocks from one another in St. Paul, Minnesota. A.M. Drake learned to form partnerships with those in power and wealth and build coalitions with those of influence.

Florence and Alexander Drake's log lodge and outbuildings on Garden Row on the Deschutes River, c. 1904


116 Photograph: Deschutes County Historical Society, unknown date.
119 Millett, Larry, E-mail to Michael Hall, (April 16, 2014). Miller, an author of several books on the history of architecture in Minnesota, indicated Elias F. Drake's 1866 residence on Lafayette Road was about six blocks from Hill's 1878 home on Canada Street in the Lowertown neighborhood. In 1891 Hill moved to a much larger new residence about a mile-and-a-half from Drake's place. Though, it is not entirely clear how long Drake lived at the Lafayette address, one city directory indicates he was still living there in 1879, so he and Hill were indeed neighbors at one point.
120 Undated photograph: Deschutes County Historical Society.
Alexander Drake’s plans for irrigation development and the incorporation and settlement of Bend, Oregon, were born out of significant Eastern wealth and the lure of late nineteenth century capitalism, fueled by the rich promises of the Deschutes River. Drake understood the opportunities before him, including irrigation development and settlement of cities. He encouraged his family's railroad partners and associates to extend a railroad to the area, and to buying, sell, and develop land for business and agricultural purposes.

**Drake Incorporates the Pilot Butte Development Company and Files for Water Rights, 1900**

Alexander Drake, his wife, and Charles J. Cotter incorporated the Pilot Butte Development Company (PBD Co.) on October 29, 1900, to divert the waters of the Deschutes River and to conduct the water through dams, canals, flumes, ditches, pipes, and siphons to distribute and convey it for irrigation, mining, milling, domestic, manufacturing, navigation, lumbering, power or other purposes, and to supply water to municipal corporations or individuals, for public or private use. Days later, on October 31, 1900, he initiated the filing process for water rights. His water rights were under the doctrine of 'appropriation'.

Irrigation economist Ray Palmer Teele, M.A., explained the meaning of the term: "Under this doctrine anyone who will put water to a 'beneficial use' may take or 'appropriate' it, and the right to continue to take it exists so long as the use continues, provided such use does not conflict with use by one who made an earlier appropriation from the same source." There was a race to file for water rights on the Deschutes and Drake had posted notices on the river and filed documents with the state. His other plans included building a city, a lumber mill, an electrical power-generating plant, a general store, and a school house. Drake had regularly been on the Deschutes River and climbed up buttes that gave him an overlook of the terrain. He saw the possibilities of irrigating the huge area east of the Deschutes River, over 2,376 square miles, north across the Crooked River to Trout Creek near the Warm Springs Reservation, east beyond the Dry River and Powell Buttes toward Prineville, and south to the buttes in what is now Newberry Crater National Monument (Figure 24). The area he was contemplating irrigating and bringing a railroad into was 36 miles wide by 66 miles long north to south. He examined the river and land that sloped at an average of 30' per mile and saw the possibilities. He hired L. D. Wiest of Portland as his civil engineer and he hired survey crews to begin surveys three months before Oregon adopted the provisions of the Carey Act (Feb. 1901).

**1902 Reclamation Contract between the State of Oregon and the Pilot Butte Development Company**

On May 31, 1902, the PBD Co. entered into a contract with the State of Oregon to reclaim the land in Segregation List No. 6, comprising 84,707.74 acres under the Carey Act (Figures 9, 10, 13). Two canals would be constructed: The PBC and the COC, to convey water to an area approximately 30 miles wide by 30 miles tall. Ownership of the land was transferred from the federal government to the state of Oregon. It would be sold to the settlers by agents of the PBD Co., in accordance to the location, amount of rock on the land, and the cultivation that was possible. An annual water delivery assessment was also agreed to. The PBD Co. held liens on the acreage sold and was reimbursed by the State when the irrigation water was delivered to the settler. The State would issue patents to the land to the settlers when it was sold by the PBS Co. and their agents, for terms approved by the state, and when it was settled and irrigated. The company had beer

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121 Crook County, Oregon, *The Pilot Butte Development Company Articles of Incorporation*, (vol. 1, page 78, Crook County Clerk, Prineville, Oregon, October 29, 1860).


125 Russell, Israel Cook, *Preliminary Report on the Geology and Water Resources of Central Oregon*, Bulletin No. 252, (U.S. Geological Survey, Department of the Interior, Washington: Government Printing Office, 1905), 94. Russell reported that Drake has had "detailed surveys" made to take water from the Deschutes River at Benham Falls and to conduct it to the "rich lands lying west of Culver, ...as...part of an extensive and apparently well-matured plan for the irrigation of a vast extent of now unproductive land in the west-central part of Crook County."

engaged with the State to secure the agreement for approximately a year, according to the State Engineer.\footnote{127} Levi D. Wiest was appointed to make the required surveys, and J.C.S. Taber was hired as selecting agent. It was the largest Carey Act contract entered by the State at the time, to be conducted over a period of ten years, with ten percent of the project being completed each year. Construction deadlines were set and construction of the first canal, the shorter PEC, was on a fast timetable.

The cost of construction and the amount of the lien was fixed at $848,557, the amount estimated by the PBD Co. that was needed to build two main canals and a water distribution system, which was about $10 per acre. After an examination made in the field, the State Engineer reported to the State Land Board, "the land is irrigable and the soil is good except for lava dykes 'cutting it up' and there is no alkali; the water supply in the 'Big Des Chutes' is ample for complete reclamation, and the dimensions of the proposed canals are sufficient; the general plan of irrigation is feasible and the work proposed, when executed, should reclaim the land; the estimate of cost is not too high, but the estimate for maintenance is too high."\footnote{128}

L.D. Wiest, Engineer, 1900-07\footnote{130}
For thousands of years, one of the greatest engineering challenges has been to bring water to where it is needed, whether to irrigate crops, provide for cities, or to create shipping lanes. Civil engineer Levi D. Wiest was hired by Drake in the fall of 1900 and stayed with the PBD Co. until 1907. He had entered the classical course at Pennsylvania College in 1879 and began to study land surveying. From 1881 to 1883 he pursued courses in drafting and civil engineering at the University of Michigan. By 1884 he was a transit man on a locating party for the Gulf, Colorado and Santa Fe Railroad in Texas. Wiest was employed in the engineering department of the Union Pacific Railway in Nebraska and the Missouri Pacific Railway, working different survey instrument positions. He was a typographer and field draughtsman on locating parties and held positions on the construction crew. He spent ten months in auditing. Next, in Wyoming in 1889, he located approximately 200 miles of canals, laterals, and ditches, which were all built. Arriving in Portland, Oregon, in December that year, he made a survey for the Chehalis, Washington water system and afterward entered the auditing department for the Oregon Washington Railroad and Navigation Company, a system of the Union Pacific. He
transferred to a locating party in Idaho for the Oregon Short Line and later to a construction party in Oregon where he worked to reconstruct the main line of the Union Pacific through the Columbia River Gorge.

On October 1, 1900, Wiest began work in Bend for A. M. Drake, serving as the chief engineer of the Pilot Butte Development Company (PBD Co.) until 1904. From the time of the company's early organization, he supervised crews who made all the surveys of the canal routes and land examinations required under the Carey Act for segregation and for construction purposes. He was the vice-president of the PBD Co., and his duties went beyond canal work to securing land and water rights and similar matters. He surveyed and drew the plans for the Bend townsite plat; designed and erected buildings for the company; designed the PBD Co. sawmill; designed Bend's first water system; and designed Bend's power dam. When the Deschutes Irrigation and Power Company took over operations of the canals in February 1904, CC Hutchinson brought his civil engineer, Joseph G. Kelley with him. Wiest was replaced as Chief Engineer for canal construction in April 1904 by Kelley, a hydraulic engineer, formerly with the US Army Corps of Engineers. Wiest continued as his assistant and as assistant project manager and worked on other projects for the firm. Wiest became active in the new city of Bend and served as a school board member. Kelley resigned after two months of work in June of 1904, due to a disagreement with management, and returned to Portland.132

Charles M. Redfield
Also, in April of 1904, the irrigation company hired a third civil engineer, Charles Monteith Redfield. Redfield took over as the Chief Engineer for the irrigation company in 1904 and served in that role until shortly after COID took over the irrigation system in 1921. He was born in Lebanon, Oregon, in April 1871. He grew up in Albany, Oregon, where his father, Francis Myron Redfield, owned a grocery store. He graduated from the Albany Collegiate Institute in Linn County, Oregon, and attended an engineering school in San Francisco, California, for one year. He worked for the Corvallis & Eastern Railroad owned by Andrew B. Hammond and financed by Henry Huntington and Thomas Hubbard. For that company, he surveyed a railroad route from Detroit, Oregon, over "Hogg Pass" (Santiam Pass) and across eastern Oregon to Idaho. Although the railroad was not extended beyond the lumber mills near Detroit, in 1907 the railroad and surveys were sold to the Southern Pacific Railroad for a huge profit. Redfield spent three years with an engineering party in South America. He next worked as an engineer in Morro, Sherman County, Oregon, by 1900. He married Mary Lydia Jeanne Fitzmaurice from Ireland in Moro in 1901. In 1903 Redfield worked for the Union Pacific Railroad in Omaha, Nebraska.133 The family moved to Bend in April 1904 where Charles Redfield began work for the Deschutes Irrigation and Power Company, which had recently taken over the Central Oregon Project. In two months, he was promoted to Chief Engineer, a position he held for 17 years. He finished the PBC, began and completed the COC, designed the Powell Butte Siphon, supervised the construction of the North Dam and North Canal and enlarged the wooden flume at the intake for the Pilot Butte and Central Oregon canals.

131 Family history indicates he saw an advertisement in the Portland Oregonian placed by Drake and traveled to Prineville, the Crook County seat, to meet him, then visited what would become Bend, and accepted the position. Beginning about 1907, West was the Arnold Irrigation system engineer for about fifteen years. During 1908-1910, he surveyed a canal for the Suttle Lake Improvement District. From 1923-1927, he surveyed for a railroad between Bend and Sisters for logging purposes. He served as school board director for at least seven years in the school's formative years. He was involved in a number of other enterprises.
133 Telephone interview with his grandson, Charles Morris Redfield, Mill Valley, CA. 2017.
The Redfield's were community leaders. At the end of 1904, Charles M. Redfield was elected to a position on the new Bend City Council for the newly incorporated town and was sworn in along with the first mayor, A. L. Goodwillie, on January 10, 1905, during the city's first city council meeting. He was a founding member of the Bend Masonic Lodge # 139 on June 17, 1909. The lodge purchased the Drake's home in 1909, when the Drakes moved to Pasadena, California. The Drake house served as the organization's office and meeting location until 1952. Mrs. Redfield was a founding member of the Redmond Presbyterian Church in 1906 and the Women's Guild at the Holy Trinity Episcopal Church in Bend in 1908.

After getting his office and records in order, Redfield left the newly-formed COID in 1921. He became a consulting engineer and worked on projects for many of the local irrigation districts. In 1923, he surveyed and measured the main canal and all the laterals for the Deschutes Reclamation and Irrigation Company to determine their capacity. He was the first superintendent of the Bend Water Department on April 1, 1926, when the city purchased the water system from the Bend Water, Light & Power Company. With W.E. Guerin and A.L. Goodwillie had incorporated the Bend Light, Water and Power Company in 1905. The firm purchased the PBC Co.'s rights to construct and maintain electric lines, gas, water, and other public utilities of the city. The city water system was in operation by July 1905. After the pioneer irrigation engineer had resided in the Central Oregon country for 25 years, he died on a trip to Emmett, Idaho, on March 22, 1929, at age 57.

**Pilot Butte Development Company (PBD Co.) Plans and Building the Flume, 1903**

The joint PBC and COC headgate on the Deschutes River, referenced in a local newspaper in February 1903, and in the 'Becker Report', indicated engagement of the company with the State Land Board in the period before their Carey Act contract was signed. The report suggests that the headgate was built by early 1903. The article indicates some excavation and clearing of rock along the flume right-of-way had been done.

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134. 1901 photo from the Redfield Family Collection, courtesy of Ann Gallagher, Denver Colorado.

138. I.C.S. Staff, *Dams—Irrigation*, (Scranton: International Textbook Company, 1906), 38. This source was a college textbook for engineering students with an emphasis on mathematical equations; it is used here for its definition. For additional information on the subject, see Davis, Arthur Powell, D.Sc. and Herbert M. Wilson, C.E., *Irrigation Engineering*, (New York: John Wiley & Sons, Seventh Edition, 1919), 247-262, Chapter XIV, "Canal Structures." Davis was formerly Director and Chief Engineer, U.S. Reclamation Service. Wilson was formerly Chief Engineer and Irrigation Engineer, U.S. Geological Survey.
139. "Desert Will Be Irrigated," *(DesChutes Echo, February 21, 1903)*. 1. The article states, "The headgates of the proposed canal are near here"; Working on the Flume Line, *The Bend Bulletin August 28, 1903* (Becker Report); Becker, *A Report on the Central Oregon Irrigation District*, October 19, 1924, 138, 141. In the spring and summer of 1901 lands were examined and surveyed and a plan of reclamation was prepared for submission to the State Land Board. September 11, 1901, PBD Co. made an application to the State Land Board for a preliminary contract covering the land included in what was later designated as Carey Act Segregation List.
Central Oregon Canal Historic District
Deschutes Co., OR

Name of Property
County and State

"two years before." It is possible that Wiest was ready to begin the headgates even before the contract was signed between the PBD Co. and the State, as plans were moving forward in spring and summer of 1901, as suggested by Becker's 1924 report.

The plans of the PBD Co. in July 1903, were to build the irrigation canal from the headgate at a point on the Deschutes River about three miles upstream from (south of) the future City of Bend. For about a mile-and-a-quarter below the headgate, an enclosed wooden flume would carry the water over nearly solid rock and some caverns (lava tubes). Wiest designed a lumber mill to be assembled near the flume to produce the massive amount of lumber needed for its construction. That lumber would need to be planed and dried to reduce the chance of warping. It was thought that designing the flume was not considered difficult and would be the same as done for other canals in the West and in the region, but this assumption turned out to be a costly mistake that led to Wiest's replacement by Kelley and Redfield. No canal work was to be performed until the flume at the intake was completed, as it was necessary to bring water in the canal to the men and horses at the construction camps, as they moved north and east away from the river. At first, work progressed rapidly and economically. At the end of July 1903, six men were clearing right-of-way for the flume through the river's canyon. Trees near the flume were cut away and a space 25' wide underneath was cleared of all combustible matter. Laborers were gradually added to the crew as the construction got underway.

The PBD Co. lumber mill began operation at intervals as the machinery was tested and adjusted to expeditiously produce lumber in August 1903. The firm began to saw and pile the estimated 700,000 board feet of lumber that would be required for the flume. The flume would follow the general line of the Deschutes River Canyon, cutting across chasms on wooden trestles as high as 25'. With the lumber mill at the lower end of the flume, a false flume bottom was to be laid from the mill site to the headgates, which would serve as a roadway for the transportation of materials for the building of the flume. As portions of the flume were completed, workmen would move back down the roadway toward the mill, thus preventing the marring or soiling of the finished flume.

1904 view to the northeast of stacked lumber, the clearing through the pine forest, and the shared wooden flume. 1.5 miles from the intake of the Central Oregon Project the flume split into the PBC on the left (north) and the COC on the south.

No. 6.

140 Etcheverry, B.A., Irrigation Practice and Engineering: Volume II, Conveyance of Water, (New York: McGraw Hill, First Edition, 1915), 198. According to Etcheverry, Head of the Department of Irrigation, University of California, in 1915, "A flume may be either a bench flume, supported on a shelf or cut in the side hill, or may be an elevated flume for the conveyance of water over a depression or drainage channel. In steep side-hill work the uphill side of the flume may be supported on a narrow shelf and the downhill side held up by posts or other form of substructure. These support structures were generally referred to as trestles."


142 "Local Events of the Week," (The Bend Bulletin, August 21, 1903), 3; "Local Events of the Week," (The Bend Bulletin, July 24, 1903), 3. A 45-horse-power engine provided the mill's power. Two loggers had delivered 200,000 board feet of timber, one-third of their contract.

143 1904 Deschutes County Historical Society Photo.
The work on the flume was expected to be done in November 1903, but the crews were behind schedule. At the end of October nearly 1000' of trestle for the flume was completed and the working floor was being laid from the mill up toward the headgates; work was proceeding at 200' to 400' per day. Only half of the flume was completed by the first week of December. Thereafter, four wagon loads of scrapers and a breaking plow arrived. But low wages resulted in a smaller than desirable workforce. Difficult working conditions and winter weather precluded canal work, though some blasting was completed at the intake. In February 1904, the flume was reported to be 1.5 miles in length, with trestle supports set 8' apart set on solid rock. It was to be finished by March; however, work toward completion did not occur. No further significant work by Drake's PBD Co. was conducted at that time.

Another assumption proved inaccurate: building the canal in an open channel for twenty miles below the flume, beyond the distance, natural channels would be followed, and the canal water would "wash its own way" through the light volcanic soil. The remaining canal work, it was said, would "amount to little more than leading the water along the surveyed course." The company expected to deliver water to the Bend townsite before the end of the year.

James H. Drake and James G. and Arthur L. Goodwillie of Chicago Visit the Deschutes, 1903

As early as 1891, A.M. Drake sat on the board of directors of the Chicago, St. Paul & Kansas City Railway Company. Just a decade later, in November of 1903, Colonel James H. Drake, and James G. Goodwillie and his son Arthur L. Goodwillie, all of Chicago, spent ten days with Drake and his wife on the banks of the Deschutes. Colonel Drake was a cousin to A.M. Drake. The Colonel was formerly the land commissioner of the St. Paul & Sioux City Railroad (the same railroad as Elias Drake was president) and its assistant manager, but more recently had been a Chicagoan, and for twenty-five years had been a member of the Chicago Board of Trade. Elias F. Drake died in 1892, leaving the Colonel as the elder family member and confidant that had been associated with him. James H. Drake had experience acquiring congressional land grants and in supervising engineering and construction, finance and other matters. He was not a Board
of Trade commission member, nor did he represent a bank, brokerage house or any other type of firm. He was an independent speculator-investor. He held substantial wealth and understood sizeable investments.\textsuperscript{152}

James G. Goodwillie was for thirty years engaged in extensive lumber manufacturing as Goodwillie & Goodwillie at Wausau, Wisconsin, and then was a member of Goodwillie Bros. in Chicago. His firm had built wooden boxes since 1873 and was the oldest manufacturer of boxes in the United States, with plants in several cities.\textsuperscript{153} His son, A. L. Goodwillie, had recently graduated from the prestigious Williams College in 1901 and then worked for a large banking concern in Chicago.\textsuperscript{154}

Alexander Drake took his guests for a tour of the Deschutes River area, and to view the PBD Co.'s irrigation works and the lands to be irrigated. They rode in a wagon along the proposed route of the PBC to Forked Horn Butte near the future city of Redmond to see the broad area to be served by the canal and to gain an understanding of the Deschutes country.\textsuperscript{155} Before leaving the area, Colonel Drake commented on what they had discovered during their visit:

"This country is a revelation to us. Nobody can get an adequate conception of this section by reading about it. It is an empire and I am fairly astonished at the display of native resource and possibilities of development that I observe here. Here I find actually present, and in a form to appeal to any business judgment, such native wealth and much opportunity for using it that I am surprised and gratified beyond expression."\textsuperscript{156}

Alexander and Florence Drake accompanied the group to Portland, where they took the train to the Midwest. They were absent from the Deschutes Country for about two months.\textsuperscript{157} Returning in January 1904, Drake announced "that important plans had been made for the watering of the wilderness, the development of Bend and the colonization of the Deschutes Country. He had been as far east as Chicago 'to lay plans for immigration' and to attend to other business connected with his irrigation enterprises."\textsuperscript{158}

**Contesting Irrigation Companies: PBD Co. and Oregon Irrigation Company, 1900-1903**

A.M. Drake and Charles C. Hutchinson, president of the Oregon Irrigation Company (OIC), were early irrigation development partners, then competitors, in the Deschutes Country, which provided the impetus for a contentious relationship. "Inevitably there was competition," wrote historians Keith and Donna Clark in "Pioneers of Deschutes Country," High & Mighty: Select Sketches about the Deschutes Country.\textsuperscript{159} Describing


\textsuperscript{153} "A Revelation to Chicagoans," (The Bend Bulletin, November 6, 1903), 6; Leonard, John William, The Book of Chicagoans, (1911, vol. 2), 273. It appears the Wausau firm was called Goodwillie & Goodwillie, 1873-1890, and the Chicago firm, 1890 to at least 1911 (the publication date of this book), called Goodwillie Bros. Another plant was in Manistique, Michigan.

\textsuperscript{154} A. L. Goodwillie Is Dead At 67, "(Lynchburg News, Lynchburg, Virginia, January 15, 1946), n.p. The obituary says, "He was attracted to the West from his native Chicago by the potentialities of a huge irrigation plan. With a friend, he purchased large tracts of land in the area. When only twenty-three he was named mayor of the town he founded, and received nation-wide recognition as the youngest 'town father' in the country; Family Search, "Arthur Lawson Goodwillie," (Individual Record, Pedigree Resource File); "First Mayor Dies in Virginia," (The Bend Bulletin, January 22, 1946), 1.

\textsuperscript{155} "A Revelation to Chicagoans," (The Bend Bulletin, November 6, 1903), 6; "Why It Is Called Forked Horn Butte," The Redmond Spokesman, December 14, 1911), 2. According to the local story, "In the early days a homesteader went hunting on the butte and killed a forked horn deer, and ever since that time in speaking of the locality it has been designated as "Forked Horn Butte."


\textsuperscript{157} Vaughan, Thomas, ed., Keith and Donna Clark, "Pioneers of Deschutes Country," High & Mighty: Select Sketches about the Deschutes Country, (Portland: Oregon Historical Society, 1981). This text was researched and written by those who lived or had
the Drake-Hutchinson contest, they say:

"Hutchinson was on the Deschutes with engineers making surveys and water filings two years before Drake appeared in 1900. Since Hutchinson needed capital, in 1899 he wrote to Drake at Spokane, representing to him the potential profits in irrigation development near Bend. Drake came, assessed the prospect and asked for Hutchinson’s proposal. He was offered half of the company stock, with agreement that he be president and manager, conditional on his supplying needed capital. Drake agreed to the terms and paid for surveys. About two months afterwards, Drake informed Hutchinson that he saw no reason for partnership in the venture, in effect elbowing Hutchinson aside." 160

The two companies then proceeded to make new water filings on the upper Deschutes River, in two instances side by side. Hutchinson protested to the General Land Office, which dismissed it. Secretary of the Interior Hitchcock affirmed the decision and recognized the legitimacy of the PBD Co.’s claim. 101

In early December, 1903, Hutchinson returned to revisit the Deschutes Country after being gone “for a year or more,” with W.E. Guerin and H.D. Turney, of New York, who represented capitalists favorable to investment in irrigation development. 162 A January 20, 1904 letter to the State Land Board, composed of the Oregon Governor, Secretary of State and the Treasurer, from Hutchinson indicated his plans to move forward on a number of matters that conflicted with the PBD Co.’s plans, which Drake had previously protested in a letter to the State Land Board. Hutchinson’s plan to build a dam across the Deschutes River was a threat to the PBD Co., as it could divert needed water away from the intake for the Pilot Butte and Central Oregon canals that was under construction downstream from the proposed dam. Hutchinson pointed out to the land board that the applicable law allowed a dam located on private land to be built. 163 The letter further indicated that his Oregon Irrigation Company had complied with all of the requisites for a contract for reclamation. 164 The letter refuted Drake’s responses, pointing out that the land board’s own engineer had made an examination of the feasibility of the plan, and that the Oregon Irrigation Company would demonstrate to the satisfaction of the land board its

lived, in Deschutes country or were otherwise particularly familiar with its characteristics and the history surrounding it. Keith Clark’s involvement with Oregon Historical Quarterly and the Oregon Historical Society Press spanned many years. Besides contributing to High and Mighty, he authored Redmond: Where the Desert Blooms, he co-edited with his wife, Donna, Daring Donald McKay, or The Last War Trail of the Modocs, and was a contributor to the Oregon Historical Quarterly, and served for many years on the OHC Editorial Advisory Board. With Lowell Tiller, he co-authored Terrible Trail: The Meek Cutoff, 1845. Clark also served as president of the Deschutes County Historical Society and on the Deschutes County Historical Landmarks Commission. He taught history at Central Oregon Community College; “Keith Clark Obituary,” Oregon Historical Quarterly, 2002, High Beam Research, (November 15, 2014); Oregon History Project, (November 15, 2014).


102 Ibid.; Becker, Frank R., A Report on the Central Oregon Irrigation District, 1924, “Report: Duty of Water,” 1-2. Becker summarized Hutchinson’s plans. The Oregon Irrigation Company had been incorporated November 14, 1899, by C.C. Hutchinson and others, and made application to the board in 1901 for a contract to reclaim lands in Central Oregon. The application was protested by A.M. Drake. On January 21, 1902, upon request of the Oregon Irrigation Company, all papers and maps previously filed with the board were withdrawn and returned to the company. On December 22, 1903, the Oregon Irrigation Company made a second application for a contract to reclaim lands in Central Oregon. This application was also protested by Drake. The lands included were designated as Segregation List No. 19, an area of 56,006.90 acres.

103 "Hutchinson Again Here: Brings New Yorkers to Look Over His Irrigation Project," (The Bend Bulletin, December 4, 1903), 3. The report said: "The result of their inspection was not made known before the party left for Portland Wednesday, but there was more or less talk about starting operations on a large scale in the spring [of 1904]."

financial ability to conduct the project.¹⁶⁵ The plans called for, among other actions, irrigating northeast from a diversion point, similar to Drake’s plan.¹⁶⁶

The PBD Co. had another setback on January 30, 1904, when the saw mill producing lumber for flumes and other irrigation structures and buildings, burned. The mill had competed cutting rough lumber for the flume, but the lumber had not been planed. The mill crew saved the planer; however, the sawmill proper was “totally ruined and the engine was subjected to a great heat and many parts were ruined.”¹⁶⁷

Also in January, 1904, Hutchinson, who had “done no actual construction work,”¹⁶⁸ brought Eastern capitalists and a civil engineer, Joseph Kelley, into the area for nearly a week.¹⁶⁹ The state engineer also arrived then to inspect the progress made by the PBD Co. and to estimate the value of its work.¹⁷⁰ Drake’s contract with the state was for work over ten years, calling for at least ten percent of the project to be done each year, or about $85,000 of construction to be conducted by the end of a year, beginning six months after signing the contract of May 31, 1902. By December 1903, a year-and-a-half had passed; Drake’s deadline to produce 10% of the project had passed. If another company with a feasible plan and the financial ability to conduct the project was available, an unfavorable report on the extent of the PBD Co.’s construction by the state engineer to the State Land Board could result in Drake being out of compliance in his contract with the state and being compelled to sell out. By mid-February, Hutchinson and his capitalists were meeting with the State Land Board to take advantage of the situation.¹⁷¹

THE DESCHUTES IRRIGATION & POWER COMPANY TAKES OVER THE DELAYED PROJECT

Deschutes Irrigation & Power Company Buys Out PBD Co. and Oregon Irrigation Company in 1904

A timely consolidation and takeover of the rivals seemed like the best option. In an action, the Oregonian called “the most important step which has yet been taken in the work of reclaiming the vast empire of interior Oregon,”¹⁷² the Deschutes Irrigation and Power Company (D. I. & P. Co.) incorporated and representatives went before the State Land Board to announce they had bought out both the rights of the PBD Co. and the Oregon Irrigation Company in mid-February 1904. The D. I. & P. Co. was capitalized at $2,500,000. The State Land Board was informed that the PBD Co.’s rights and contract were bought out at $70,000; the rights of the Oregon Irrigation Company, owned by C.C. Hutchinson, were obtained at about half that amount. Drake’s buyout price indicates he did not meet the $85,000 objective (10% of the project’s value) set in the contract with the state.

“We will have water running in our flumes inside of sixty days,” boasted W.E. Guerin, Sr. “Inside of four months, and possibly in three months, we will have water on 25,000 acres of desert land.”¹⁷³ Guerin was no

¹⁶⁵ Ibid.
¹⁶⁶ Ibid.
¹⁶⁷ "Two Fires: Sawmill Bums Here, Pilot Butte Development Company’s Mill Destroyed Last Saturday Afternoon — Will Not Be Rebuilt,” (The DesChutes Echo, February 6, 1904), 1. "Lumber to Build: Pilot Butte Mill Is Now In Full Operation,” (The Bend Bulletin, May 13, 1905), 1. Rebuilding the mill to plane (finish) the flume lumber would take over four months.
¹⁶⁸ "To Open Empire: Big Irrigation Companies in Combine,” (Morning Oregonian, February 16, 1904), 10. Hutchinson had made a number of surveys.
¹⁶⁹ "Work to Begin Soon: The Oregon Irrigation Company Making Its Final Arrangements,” (The DesChutes Echo, January 30, 1904), 1. Capitalists included Guerin, Turney, and Elliot. The engineer was J.G. Kelley, who would become the D. I. & P. Co.’s chief engineer.
¹⁷⁰ "State Engineer in Town," (The DesChutes Echo, January 30, 1904), 1. E.A. Hammond was the new State Engineer.
¹⁷¹ "Work Will Soon Begin: Oregon Irrigation Company Completing Arrangements with State Land Board,” (The DesChutes Echo, February 13, 1904), 1. Capitalists included Turney, Guerin, Johnston, and Elliott. One or more provided letters from “Governor Herrick of Ohio and from a number of strong Eastern banks.”
¹⁷² "To Open Empire: Big Irrigation Companies in Combine,” (Morning Oregonian, February 16, 1904), 10.
stranger to challenging projects. He built the Palmer cut-off on the Northern Pacific Railroad as president of the Seattle and San Francisco Railroad & Navigation Company, bringing the mainline into Seattle, and sold its rights to the Northern Pacific. His promises that day stemmed from a career of successfully satisfying both railroad investors and government regulators. There was a message to investors in the 25,000-acre figure promised in three or four months: Lands would be irrigated in the time promised; irrigated lands would be selling soon; ten percent of the company's $2,500,000 capitalization (investment), $250,000, equaling one-third of the contract price with the state, would be returned to the company soon, and the return on their investment was safe and forthcoming. The promise was also made to potential settlers that the lands would be ready for farming soon. The State Land Board, consisting of the governor and the state's three other top elected officials, would have requested specific goals and a well-defined timeline. It had been understood that negotiations were pending for consolidation of the two enterprises and that the land board expressed satisfaction in the news, as it felt a contest between the two companies of certain water rights had resulted in not much progress being made, and that the irrigation work in the Deschutes Country should be undertaken under one management. The primary components of the transaction were completed by mid-March. The principal backers of the new enterprise were "understood to command unlimited means and intend to push the work to completion as rapidly as possible." They were largely interested in railroads and the oil and gas fields of Ohio and Indiana. In addition to W.E. Guerin, Sr., of New York, the capitalists included J.O. Johnston and H.D. Turney, both of Columbus, Ohio. Johnston was general manager of the Columbus Gas Light and Heating Company, Columbus. Turney held investments in oil and gas and had operations in New York City. Portland stockholders included Harvey W. Scott, editor of The Oregonian, and J. Frank Watson.

E.B. Holmes, all of Portland, "The Pilot Butte Development Co. to Deschutes Irrigation & Power Co.," (Filed) March 14, 1904, vol. 2, pp. 149-152, (Deschutes County Clerk's Office, Bend, Oregon [Crook County Clerk's Office, vol. 12, p. 189]). Date of March 14, 1904, and sum of $648,567.00 are indicated in document: "The Deschutes Echo, (Deschutes Echo, February 20, 1904), 1.

"Feeling In the East," (The Deschutes Echo, May 14, 1904), 1.

Figures are as follows: 25,000 acres x an average of $10 per acre = $250,000, i.e. 10 percent of the capitalization; $250,000 / $648,567 (contract price) = 33.9 percent, i.e. 1/3 of the contract price would returned to the company immediately; therefore, the remaining irrigation development would occur rapidly, and afterward profit would be realized. See following footnote for further explanation.

"Concerning Water Rights," (The Deschutes Echo, (June 25, 1904), 1. "State View of Irrigation: What Official Biennial Report to the Legislature Says," (The Bend Bulletin, January 27, 1905), 4. This article indicates the price fixed ranged from $2.50 per acre for tracts wholly unfit for cultivation to $14.75 per acre for tracts all tillable and irrigable, the average being the amount fixed in the contract between the state and the company of $10 per acre.

Research at the Oregon State Archives did not identify any minutes or other documents associated with the February 1904, announcement which could illuminate these matters.

"Water in Sixty Days: Deschutes Irrigation Company Buys Out Others," (The Sunday Oregonian, February 14, 1904), 6

United States Circuit Court of Appeals for the Ninth Circuit, Frank R. Shinn and Louis G. Addison, and Frank R. Shinn and Louis G. Addison as a Committee for Certain Bondholders, Complainants Appellees, vs. The Deschutes Irrigation and Power Company, a corporation, A.F. Biles, Howard Contract Company, a corporation, Merchants Savings and Trust Company, formerly Merchants Investments and Trust Company, an Oregon corporation, Respondents Appellants vs. R.S. Howard, Jr., Receiver of the Title Guarantee & Trust Company, Interlocutor Appellant vs. Alexander M. Drake and Pilot Butte Development Company, Intervenors Appellants, No. 1915, 15. The 1915 circuit court decision indicates that on February 12, 1904, a "contract between A.M. Drake and Turney, Johnston and Guerin for rights of the Pilot Butte Development Co." was executed. The same day, "Assignment of Drake Contract by Turney and others to The Deschutes Irrigation & Power Company" was concluded. Also, that same day, "Assignment of rights of Oregon irrigation Co. to The Deschutes Irrigation & Power Co., viz., its capital stock" was affected. On March 14, 1904, "Conveyance by Pilot Butte Development Co. to The Deschutes Irrigation & Power Co., of rights of way, etc." was finalized. The same day, "Assignment of Contract with State Land Board by Pilot Butte Development Co. to The Deschutes Irrigation & Power Co." was completed.

"To Open Empire: Big Irrigation Companies in Combine," (Morning Oregonian, February 16, 1904, Portland, OR), 10.

"Proceedings of the Ohio Gas Light Association," (Columbus: Speer & Glenn, 1904), 661. Proceedings include seventeenth annual meeting of 1901, eighteenth annual meeting of 1902, and nineteenth annual meeting of 1903. Index of association members includes Johnston, John O., General Manager; The Columbus Gas Light and Heating Company, Columbus, Ohio. Elected to membership March 21, 1900.

ibid., 667. Proceedings include seventeenth annual meeting of 1901, eighteenth annual meeting of 1902, and nineteenth annual meeting of 1903. Index of association members includes Turney, Henry D., Director and Member of Association's Executive Committee, Columbus, Ohio. President of Gas Lighting and Heating Company, 80 Broadway, New York, NY. Elected to membership March 21, 1900. Natural Gas Journal, (vol. 5, July 1911), 39. (Google Book). In or about 1911, Henry D. Turney was the president of Columbia Gas & Fuel Company in Columbus, with 29,000 customers.
J.O. Johnston, Vice President and General Manager, D. I. & P. Co.

J.O. Johnston drew from his experience in the oil and gas industry in Ohio to develop the specifications for the steam-powered drills and to devise a system to use them effectively. He was not a college-trained geologist or engineer. However, his practical geological knowledge, understanding of engineering, and, importantly, his acumen out in the field made a significant difference in the successful outcome of the Central Oregon Project. His background in natural gas field development did not provide experience with lava as it is found in the Deschutes Country, but he had a respected, proven record of success working under unique geological conditions. His drilling experience proved itself useful to the project, too, in the difficult, elemental rock of the Deschutes-Columbia plateau, as he determined the use of steam-powered drilling was imperative in the rock near Bend. According to the 1890 Geological Survey of Ohio, J.O. Johnston is credited with the discovery of the most important gas field in Ohio, up to that time. The Thurston field was "by far the largest and most important yet found established on the new gas rock." It comprised parts of four townships. "The discovery of the field is due, more than to any one person, to Mr. J.O. Johnston, Superintendent of the Central Ohio Natural Gas Company, an operator in the eastern field and also practically acquainted with the new oil field of northern Ohio," said the report.

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183 The Deschutes Irrigation and Power Company at Bend, (The Pacific Homestead, Salem, OR., November 10, 1904), 70; "Local Notes," (The Deschutes Ector, February 27, 1904), 3. Named to the board of directors were H.D. Turney, J.O. Johnston, R.F. Guerin (a son of W.E.), Harvey W. Scott, E.E. Lyle, J.F. Watson and C.C. Hutchinson. Officers elected were H.D. Turney, president; J.O. Johnston, vice-president and general manager; and R.F. Guerin, secretary and treasurer.


185 Shaver, F.A., et al., An Illustrated History of Central Oregon, (Spokane: Western History Publishing, 1905), 804. Shaver indicates W.E. Guerin, Jr. was a prominent banker and leading businessman of Bend, Crook County, matriculated in Cornell University, from which he graduated with honors. Admitted to the Ohio bar in 1893, he was elected to the state legislator of the seventy-fifth assembly of that state.

186 Untitled, (The Bend Bulletin, April 29, 1904), 4. Indicates Drake was still the owner of the Townsite; "To Open Empire: Big Irrigation Companies in Combine," (Pianimorionian, February 16, 1904), 10; Pilot Butte Development Company, Plat of Bend, Filed June 7, 1904. The townsite plat was not filed until almost four months after this announcement.

187 Orton, Edward, State Geologist, Geological Survey of Ohio, (Columbus: The Westcot Co., State Printers, 1890), 241-42. For example, in Ohio, while engaged in the work of exploration, Johnston studied the axes of the anticlines and other factors to determine the points to drill natural gas wells.

188 Ibid. A company was soon formed in Columbus in which abundant capital, energy, and business sagacity were joined. The well was drilled deep into the Clinton limestone. As a result, a large nearly contiguous territory was held by his company. In 1890, the Columbus city council granted a franchise that brought gas-powered lights and heat, with 45,000 customers, and fuel to numerous large industrial users: Waples, David A., The Natural Gas Industry in Appalachia: A History of the First Discovery to the Tapping of the Marcellus Shale, (Jefferson, North Carolina: McFarland & Co., Second Edition, 2012), 110. According to the author: "In 1888, the Thurston gas field was discovered between Lancaster, Fairfield County, and Newark, Licking County. The following year, gas from the Clinton sand wells drilled at Newark was used in the town, and a ten-inch line was laid to the capital at Columbus in Franklin County."
Central Oregon Canal Historic District
Name of Property

Deschutes Co., OR
County and State

J.O. Johnston

Plans for Settlement and Agricultural Development
At the time of the D. I. & P. Co. transaction, on February 14, 1904, the Portland Oregonian summarized the benefits of the project and pronounced the significance of settlement and agricultural development in the Deschutes country:

"It means that 250,000 acres which are now non-productive will eventually be made to sustain a population of several thousand persons, and the building of one or more thriving towns. It means a large addition to Oregon's crop production, and the extension of Portland's commercial territory. More than all it means a practical demonstration of what the investment of capital in irrigation projects can do for a large portion of the state which is now practically worthless by reason of its arid character. It is an opening wedge which will be followed by the construction of many other irrigation systems and the reclamation of much of Oregon's domain. A thoroughly organized immigration bureau will be organized, and a large amount of money will be spent in advertising the lands throughout the United States and Canada."

The company's inducements, including the price per acre, which was much lower than elsewhere, was expected to result in heavy immigration. The company was operating its own stage line to and from Shaniko, 82 miles to the north by way of Prineville on a rough, dirt road, to bring in people who were interested in purchasing land in the segregation. Prineville was the Crook County seat and the largest city in Central Oregon. It was platted in 1877. Shaniko was the terminus of the Columbia Southern Railway, which entered Central Oregon from Biggs on the Columbia River in 1900. General Manager J. O. Johnston stated, "Our purpose is to employ immigration agents, if necessary, to find settlers for the land thus reclaimed. We will form colonies when we can and induce individual settlers to come. We will lose no time in putting that arid land into condition to raise alfalfa and other crops." 

The D. I. & P. Co. followed the Carey Act process relative to the Pilot Butte Development Company's Segregation List No. 6. In May 14, 1904 DesChutes Echo article, the company explained that the segregation had placed a lien upon all lands in it, covering the cost of bringing water through its system to each 40-acre tract, amounting to an average lien of $10 per acre. The State Land Board apportioned the total amount of the lien on each 40-acre tract according to its agricultural value. The cost of bringing water to the land was estimated by both the state engineer and the company engineer. A 40-acre tract with 40 irrigable acres cost the settler/farmer $590.00, the lien the company held on it, or $14.75 per acre. A price was placed

189 Photo from the Progressive Men of Northern Ohio, 1906.
190 "To Open Empire: Big Irrigation Companies in Combine," (Morning Oregonian, February 16, 1904), 10. The new company would "offer lands varying from $5 to $15 per acre, guaranteeing water rights," and "irrigated lands elsewhere which offer no greater advantages are selling as high as $300 per acre."
on each 40-acre tract, depending upon the number of irrigable acres in each. Not all the land was farmable or irrigable. When the amount of the lien was paid, the purchaser secured release of the lien and a perpetual water right. When the purchaser presented the release of the lien to the State Land Board, it issued a deed or patent to the land to the purchaser. The new property owner paid $1 per year per acre for the perpetual water right. In the example of 40 irrigable acres, this amounted to $40 per year. As costs to construct the system increased over time and unexpected challenges arose, the irrigation companies re-negotiated the contract with the state periodically to allow them to sell the land for higher prices.

1904, WORK PROGRESSES ON THE CONSTRUCTION OF THE PILOT BUTTE AND CENTRAL OREGON CANALS

Equipment, Supplies, Workforce and Teams Buildup, 1904
The Central Oregon Project was summarized in 1904. “Expert engineers have pronounced the headgate of this project the finest in the United States,” said the Morning Oregonian of February 16, 1904. “The diversion works are in a deep canyon among immense rocks, which afford admirable protection to the permanence of the intake, which leads to a heavy rock cut 20’ in depth to the head of the flume, where the surplus water will be turned back into the river.” “Water was diverted from the river to the east bank of the Deschutes River about three miles above Drake’s home.

On April 1, 1904, the D. I. & P. Co. officially took active charge of all irrigation work on the Central Oregon Project. The company needed to assemble resources before the flume could be finished and excavation for the PBC could begin on a large scale. Key personnel were hired. Joseph G. Kelley, a hydraulic engineer formerly with the U.S. Army Corps of Engineers, became superintendent of the PBC construction, succeeding Wiest, who became his assistant. Charles M. Redfield joined them. Soon Redfield supervised the building of the COC and became chief engineer for the D. I. & P. Co. The purchasing agent was to buy more teams of horses and outfits, and to make large purchases of equipment, supplies, and foodstuffs in Prineville. Great amounts of meat and vegetables were required by the construction crews and were provided by suppliers bringing wagon loads of vegetables from Haystack, Oregon, forty miles away. Hay for the horses, food for the men, and water for both were constantly required. A timekeeper and paymaster were employed, and the firm’s entire auditing department was brought from Portland. Hundreds of laborers and teamsters along with their horses and wagons were hired. Boarding for crews was arranged until tents and other camp facilities and supplies arrived.

Teams of horses were in demand to pull scrapers and transport rock and construction materials. Wiest traveled over the Cascades Mountains to the Willamette Valley to buy horses. Others rounded up wild horses on the high desert and broke them for work. At one point in 1904, before the new company was to

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1902 - “Feeling In the East,” (The DesChutes Echo, May 14, 1904), 1.
103 - “To Open Empire: Big Irrigation Companies in Combine,” (Morning Oregonian, February 16, 1904, Portland, OR), i, 10.
105 - “Local Notes,” (The DesChutes Echo, February 27, 1904), 3; “Local Notes,” (The DesChutes Echo, March 5, 1904), 1.
106 - “Local Notes,” (The DesChutes Echo, May 14, 1904), 3.
107 - “Work on the Canal,” (The Bend Bulletin, April 15, 1904), 1; “Local Notes,” (The DesChutes Echo, April 9, 1904), 1.
108 - “Local Notes,” (The DesChutes Echo, May 6, 1904), 3.
109 - “Local Notes,” (The DesChutes Echo, July 8, 1904), 5; “To Open Empire: Big Irrigation Companies in Combine,” (Morning Oregonian, February 16, 1904, Portland, OR), 10.
110 - “Local Notes,” (The DesChutes Echo, April 9, 1904), 1.
111 - “Irrigation Activities,” (The DesChutes Echo, March 12, 1904), 1.
112 - “Local Notes,” (The DesChutes Echo, March 28, 1904).
113 - “When the Russo-Japanese War broke out in February 1904, demand for cavalry horses by the Japanese rendered the horse market very costly, making the PBC construction more expensive. Seventy-five tons of high-grade hay was purchased for the company stables in March; “Local Notes,” (The DesChutes Echo, May 14, 1904), 3. In May, as hay prices reached exorbitant prices and was almost unobtainable, construction costs grew.
commence work, seventy-eight wild horses were captured and 'broken' for scraper teams. In half-a-day, a range horse was 'broken' for pulling scrapers and further training came in the regular course of its work. Three men were employed to break horses.  

"Head Gates," Deschutes Irrigation & Power Company
Postcard of diversion point on the Deschutes River, ca. 1904

A vast amount of resources was hauled by horse teams pulling loaded wagons from the railroad terminus at Shaniko. The treacherous trip took at least two days and could take much longer to pull heavy wagons loaded with equipment to the project site. Nielsen, et al., the region's pioneer road historians, describe one leg of the Shaniko-Prineville-Bend route: "Most freight outfits consisted of three wagons pulled by eight-to-twelve horses. At the base of Hunter Grade, the last wagon had to be dropped. After the first two wagons were pulled to the top, the horses had to return to the bottom to pull up the third wagon." Loads coming into the project area aggregated nearly 50,000 pounds (25 tons) each.

There was infrastructure to build including bridges, camps, and structures. The Deschutes Lumber Company increased its production to serve the project's timber and lumber needs while Drake rebuilt his PBD Co. Lumbermill. Bridges were built across the canals where the county roads and canals would intersect. The company built an office, a club house, stables, a blacksmith shop, a granary, a warehouse, a powder house, a cook house, a mess hall, a barn, buildings at its experimental farm, and a residence for management.

Progression of Work, 1904
After the D. I. & P. Co. took over the project, the joint flume to serve both canals near the intake was successfully tested in March 1904, having been upgraded to the satisfaction of the new owners. It was not until early April when snow was off the ground and the ground had thawed out that canal construction

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204 "Breaking Wild Horses," (The Bend Bulletin, October 7, 1904), 1; "More Horses for Ditch Work," (The Bend Bulletin, September 30, 1904), 1. Horses were purchased when they were available. During spring, one-hundred tons of hay was stacked at the Forest ranch on the Crooked River, but high water made it impossible to cross the river and bring the fodder to the horses.

205 1904 postcard from the Bowman Museum Collection.

206 Nielsen, Lawrence E., Doug Newman, and George Mccart, Pioneer Roads in Central Oregon, (Bend: Maverick Publications, 1985), 99-100. A road up Hunter Grade was necessary because Hay Creek runs through a spectacular, impassable gorge; "Local Notes," (The DesChutes Echo, March 5, 1904), 3. Any precipitation, from early fall to late spring, resulted in "veritable seas of mud" that presented additional difficulties on the road; "Local Notes," (The DesChutes Echo, May 6, 1904), 3.

207 "To Enlarge Flume," (The Bend Bulletin, August 12, 1904), 1. Freighters were bringing in loads from across the state; "Local Notes," (The DesChutes Echo, April 9, 1904), 1. J.O. Johnston, vice-president and general manager, purchased the first automobile to make an appearance in Crook County to facilitate his business travel.


209 "Local Notes," (The DesChutes Echo, March 19, 1904), 3; "Local Notes," (The DesChutes Echo, April 2, 1904), 3.

210 "Local Notes," (The DesChutes Echo, April 16, 1904), 3; "Work on the Canal," (The Bend Bulletin, April 15, 1904), 1.

211 More Than $100,000," (The Bend Bulletin, January 6, 1905), 1.

212 Irrigation Activities," (The DesChutes Echo, March 12, 1904), 1. It is possible that the D. I. & P. Co. decided to make upgrades to the flume they acquired.
began. 14. Fourteen survey crews were sent to the field in advance of the actual canal construction. The survey crews drew exacting 10-foot contours around the route selected earlier for the main canal and along land in Segregation List 6, and set stakes for the route, so construction teams would know where to locate the canals, laterals, and service ditches. The entire system would flow by gravity. The canals needed to be higher in elevation than the laterals, while the laterals needed to be higher than the ditches to the settlers’ land.

Construction began in earnest on the PBC. "The excavation of the canal "down to Wiest’s homestead [west of Bend] is nearly completed," a later report said. 15. However, water did not arrive through the approximately three miles of open canal to Wiest’s property until June 3, 1904. The Bend Bulletin recognized "this diversion of water from the PBC is historic because it mark[ed] the first actual use of it on the soil to produce crops." Thus, the company had achieved the first part of what it promised to the State Land Board in February. It had water running in its flume from the headgates at the river up to the future townsitie of Bend, irrigating Wiest’s forty acres. But it did not have water on 25,000 acres, the second promise made in February. That acreage was north between their position in June 1904 and the Crooked River Canyon. The stretch in the PBCHD, at miles 6 to 7.5, was nearly solid rock, with twists and turns, and had to be completed before water could flow past it into the northern half of the canal, where other crews were progressing quickly.

During the summer of 1904, work was progressing slower than expected and more laborers were needed. In mid-August a report from Eugene, Oregon, indicated that at the completion of sewer construction contracts, the city would release several men for work on the PBC. The superintendent went to Eugene to hire laborers. 16. Nearing the end of September, the company had about 200 men and 100 horse teams at work and was trying to double the force as soon as possible. About 50 Italian laborers were brought in for the upper PBC and more were expected to come. Twenty Americans were clearing the right-of-way for the PBC. More than 100 men were at the lower construction camp in the rock. Two surveying and engineering parties were still in the field making topographical examinations and contour maps of the country. The company bought 50 horse teams to put on the canal work. Scrapers and a great quantity of food and general supplies were being received by railroad at Shaniko. The company was pushing the freighters to bring in more.

More Problems on the Headgate and Shared Flume

It became apparent that the Oregonian newspaper’s February 16, 1904 exuberant praise for the engineering on the headgate had been premature. The headgate and flume system was not able to carry enough water for the two canals it was to serve. Even if all the water was diverted for the PBC, it would be underserved. The intake and flume must be significantly enlarged. In early October at the headgate a force of rock men was blasting out a new intake, engineers and surveyors were taking levels and guiding workmen, and the flume was being enlarged to carry water in the COE that would soon be under way. In all, about 350 men and 100 horse teams were employed by the company at various places along the canal. 17. Near the end of October the headgates were closed, bringing to a standstill water service to the future Bend townsitie, and the work of enlarging the channel through this stretch was expected to take two weeks. The capacity of the 6,680’ flume near the headgate was more than tripled. It was carrying only 80 cubic feet per second (cfs) for the PEC. 18. It originally was 5’3” wide and 3’9” deep. (Today the PBC carries 400 cfs.) Therefore, the flume was enlarged to

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214 Work on the Canal," (The Bend Bulletin, April 15, 1904), 1.
216 “Local Notes," (The Deschutes Echo, March 5, 1904), 3.
217 “To Enlarge Flume," (The Bend Bulletin, August 12, 1904), 1.
218 “Pushing the Work," (The Bend Bulletin, September 23, 1904), 1. C.M. Redfield was the new chief engineer; “C.M. Redfield Dies Suddenly,” (The Bend Bulletin, March 19, 1924), 1. Article indicates Redfield had come to work for the company in April 1904, apparently taking over the chief engineer position in early June 1904, when J.G. Kelly resigned.
220 “Dig’s Ditch Bigger,” (The Bend Bulletin, October 21, 1904), 1. The canal was enlarged to carry 250 cubic feet per second rather than 80 cfs. New calculations had concluded more water was needed than the PBD Co. had initially determined.
Central Oregon Canal Historic District

Name of Property

Deschutes Co., OR

County and State

16' wide by 5' tall. Ten feet were added to the flume's width and a foot to its depth, increasing its carrying capacity to 650 cubic feet per second, enough to irrigate 85,000 acres, it was thought at the time.

A part of the miscalculation in sizing the flume and canals was due to the 'surprising tenacity of the soil.' The additional excavation that was expected to be done naturally by the water when it was sent through the channel failed. It was anticipated during construction that after the laborers and horse teams shaped the canal bed, the water would be let into the canals and it would cut the channel deeper, but that did not turn out to be the case. The water flowed over the dry soil and did not move it. "The land holds up against it and must be dug away with scrapers, demolishing pretty effectively the old bugbear that the Deschutes soil is so light and loose that it will not even give direction to streams of water."²²¹ The unexpected excessive loss of water through rocks, caverns and fissures in the canal beds, the roughness of the rocky canal bed in the stretches near Bend and the inconsistent shapes, width and depth of the canals, also contributed to the problems in accurately sizing the structures.

1923 photo of men standing in the enlarged Central Oregon canal flume.²²²

John Dubuis, in the "Report to the Desert Land Board on Central Oregon Project" wrote, "Canals have been built wider and more shallow than proper, to avoid rock excavation. Where natural depressions were used, the water has been allowed to spread over large areas. Since the loss of water is to a certain degree directly proportional to the wetted area, some of the excess loss is the natural result of this excess area."²²³ He was saying that the canals were built to be much wider and shallower than they were designed to be, and that the larger surface in the beds resulted in more seepage.

During two weeks in October 160 men on the PBC were moved south from the end of the canal to two camps at the southern rocky half to enlarge the canal so it could convey 250 cubic feet per second for the spring 1905 irrigation season. Construction of the COC had just begun 'with a heavy force of men'²²⁴ at the end of the intake flume. The COC was to convey 400 cubic feet per second from the enlarged flume as it headed east toward Powell Butte. (It conveys 530 cfs today.)

The Bend area was the most difficult terrain of the entire irrigation system. Rock outcroppings and nearly solid rock below the thin layer of soil and unexpected lava tubes were encountered in the first third of the PBC and the first ten miles of the COC, where the canals needed to convey the full amount of water and be wide and deep. Those conditions and the rolling terrain caused a challenge for both water volume calculations and construction. The company discovered that it would be more time consuming than anticipated to construct the canals though the rock and would require blasting as well as digging and scraping.

²²¹ The Bend Bulletin, October 21, 1904, 1, "Digs Ditch Bigger."
²²² 1923 photo from the Deschutes County Historical Society Collection.
²²³ Dubuis, John, Report to Desert Land Board on Central Oregon Project, 1914, 5.
²²⁴ Ibid
At this time, late in 1904, winter approached at 3,600' above sea level at the foot of the Cascades. The company feared that snow, ice, and freezing temperatures could quickly halt all construction on both canals until spring. The February 1904 promises of the D. I. & P. Co. to have water on thousands of acres of desert land would soon be a year old. Being behind in its schedule, and the smaller half of the PBC farther north completed, the company quickly had to meet the challenge posed by the geological conditions presented in the rocky stretch in the PBCHD and prove to investors, the State Land Board, and to potential settlers that they were committed to completing the canal in time for spring farming in the Deschutes country. J.O. Johnson knew he would meet ten miles of the same rock near Bend on the COC. A new approach to the rock was necessary.

Construction Utilizes Technology, Man-and Horse-Power, 1904-05
Fortunately, the D. I. & P. Co. was able to take advantage of a propitious period in the history of irrigation and land development technology. A revolution in horse-drawn earth moving came in 1883. John Porteus, a Fresno Township blacksmith, invented the Fresno scraper. “The device was a metal scoop with unique steel runners, pulled by two to four draft animals. Like the skip scraper, the teamster controlled the depth of cut from behind. However, the Fresno could be skidded along for reasonable distances and dumped on a controlled basis. Porteus’ invention was an impressive improvement over the skip.”

By using these scrapers with the ability to haul material over a short distance and to control the dump, the company was able to not only excavate loose canal material, but was also able to build canal embankments where they wanted them, and to the specifications they needed them to be by systematic dumping.

John H. Lienhard, PhD, Professor Emeritus of Mechanical Engineering and History at the University of Houston explains the operation of the Fresno, a designated Historic Mechanical Engineering Landmark:

“Porteus’ C-shaped scraper had a blade along the bottom. It scooped as it was pulled along. [Different from all predecessors], this machine rode on runners and could be tilted. An operator walking behind it could change the angle. When it was full, he tilted it back and let it slide on the runners. He could dump as he passed over low spots and smooth out terrain. He could vary the angle of attack to match the [cut required].”

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225 Ibid. ‘Slip’ and ‘skip’ are interchangeable terms, referring to the same type of equipment.
226 1904 photograph courtesy of the Deschutes County Historical Society.
227 University of Houston, “No. 353: The Fresno Scraper,” Engines of Our Ingenuity, (Accessed March 27, 2015); University of Houston, “Dr. John L. Lienhard,” Engines of Our Ingenuity, (Accessed March 27, 2015). Lienhard received BS and MS degrees from Oregon State and the University of Washington, his PhD from the University of California at Berkeley, and holds two honorary doctorates; San Joaquin County Historical Society and Museum, “Designating the Fresno Scraper as an Engineering Landmark,” (Accessed March 27, 2015). On March 26, 2011, in a ceremony at the Museum the American Society of Mechanical Engineers (ASME) designated the Fresno Scraper as a Historic Mechanical Engineering Landmark. The society noted the Fresno was used throughout the world, including in the construction of the Panama Canal, and was the forerunner of virtually all earthmoving implements.
Mechanical engineers Davis and Wilson wrote that the Fresno scraper can be used for hauls of any distance, but it is not very advantageous for long hauls. It is also suitable for making ditches, dikes, and any other scraper work where the haul is not great enough to require wheels.²²⁹

However, the most significant utilization of technology, steam-powered drilling, was used in the excavation of the most difficult basalt rock, beginning in November 1904. General Manager J.O. Johnston understood the difficulty deep lava flows would present to construction and had commented on it in February 1904: "That lava bed is very rough, requiring expensive work in cutting out rock."²³⁰ Typically, steel miners’ drills were pounded with sledge hammers to drill holes for blasting charges. After a blast was detonated, teams of men and horses with Fresno scrapers, along with men and shovels, excavated shattered rock to bring the canal to grade.²³¹ Being familiar with building railroads and drilling for gas, the D. I. & P. Co. invested in the best equipment for the job to be done to make the work more efficient and timely. J.O. Johnston stated, "We have paid cash and a lot of it, for everything as we went along, and we expect to continue this course in the future until every detail of the reclamation work is completed."²³²

By the turn of the twentieth century, steam power propelled eighty percent of the factories in the nation. It was portable and allowed regulation of the power that was generated.²³³ The D. I. & P. Co. purchased two portable steam boilers, "specially made for the work of this company in the Bend section "and shipped from Columbus, Ohio" to provide power for operating rock drills. One boiler was twenty horsepower and drove four drills. The other was six horsepower and drove one. Together, they could bore 400’ per day in the hard, demanding strata of lava, where typically it would take three men to bore 18’ to 20’ per day. The drills were ‘worked’ by steam direct from the boiler, the steam serving the same purpose as compressed air in another kind of drilling.

²³¹ Coe, Ulfing C., Frontier Doctor, 13-14. Coe describes injuries from rock and dynamite and medical attention he provided.
²³² "Cheap Land Gives Start to Redmond," (The Redmond Spokesman, August 21, 1902), 2. Article suggests there were some ‘slips,’ another type of excavation equipment. Indications are this was not the case in the nominated section; Davis, Arthur Powell, D.Sc., and Herbert M. Wilson, C.E. Irrigation Engineering, 233. The authors indicate the Fresno scraper is the most satisfactory in handling tough earth too heavy to be handled by other types of scrapers; “D. I. & P. Co. Is Here to Stay,” (Crook County Journal, April 9, 1906), 1.
contrivance' noted the report. "Monster Drills at Work," headlined the *East Oregonian*. "Power will be generated for driving four drills into lava rock. The two boilers with their big steel drills will do more work in a day than 300 men."

Before these machines were brought into operation, General Manager J.O. Johnston calculated that a "force of 388 rock men would be required to do the necessary work." The impossibility of getting such a force led Johnston to devise this method of drilling powder holes in the rock. Hand drilling was used where there was little drilling to be done, but the big ledges were 'bored by the steam-powered drills.' The report indicated the shipment filled an entire railroad car and was hauled by freighters from Shaniko in multiple wagon loads to the work site, taking several days to get all the equipment delivered.

The procedure to form the two canals was more than just blasting, scraping, and dumping repetitively. Canal banks were carefully built in successive layers of compacted rock and soil and kept as level as practicable. The travel over the canal banks during construction was performed in a manner to distribute the compacting effect of the horses and scrappers to the best advantage possible. In the fall of 1904, 400-500 men and 215 horse teams were working on the two canals. It is estimated that 215 teams moved 214,500 loads with almost 1,000 loads per team over approximately 25 straight days of work. This would have amounted to 40 loads per day per team/scrapper, or five per hour over an eight-hour day. Hundreds of men used shovels and laid riprap by hand.

Completion of the Pilot Butte Canal

It was pivotal to have the steam-powered drills to excavate lava flows. Otherwise, the timely completion of the entire PBC would have been jeopardized. The D. I. & P. Co., nor any other company, could have assembled and fed a force of 388 rock men estimated to be needed to do the necessary work by hand. Additionally, it was crucial to amass a very substantial workforce and several hundred horse teams. The PBCIA was the 'make or break' part of the project on which the future of the D. I. & P. Co., the cities of Bend and Redmond, and the agricultural potential of the Deschutes Country rested. Failure in the project management and excavation of this key piece would have effectively terminated all the broader, more extensive plans for the settlement and agricultural development of the Deschutes Country. The D. I. & P. Co. did have an extraordinary amount of capital, exceptional expertise in the utilization of technology, and enormous man- and horse-power to find a successful methodology for dealing with the rock plus meeting schedules and deadlines set by the State.

On February 10, 1905, the challenges had been met, work was finally done, and water could flow in the PBC to its terminus just south of the Crooked River for the 1905 irrigation season. The water was let into the PBC on March 5, 1905. The Bend Bulletin reported the company's investment in the previous Twelve months as $500,000, equivalent to over $12 million in 2017 dollars. The construction of laterals branching off the PBC, bringing water to farmers, began in April 1905.

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234 "To Drill by Steam," (*The Bend Bulletin*, November 18, 1904), 1.
236 "To Drill by Steam," (*The Bend Bulletin*, November 18, 1904), 1.
237 Davis, Arthur Powell, D.Sc. and Herbert M. Wilson, C.E., *Irrigation Engineering*, 557. Specifications for constructing embankments in this Civil Engineer's book indicates layers were generally not to exceed 12" in thickness.
238 "Pay Back to Old Figures: Men Don't Like It and Many of Them Quit," (*The Bend Bulletin*, March 17, 1905), 1. Figures are based on numbers from the article indicating that as the result of the reduction in pay about 200 men and 125 teams left the canal work in the first week of March, leaving about 200 men and 90 teams on the work.
239 Steam drills arrived just after the first week of November. Assuming all team/scrapper work began by Friday, November 11, 1904, and concluded on or about December 5, 1904, provides twenty-five days; 214,500 loads / 215 teams/scrapers × 997.67 loads per team. 997.67 loads per team / 25 days = 89.975 loads per day, per team/scrapper. Or, 40 loads per day over an 8-hr. day = 5 loads per hour for each team/scrapper; Oregon State Archives, Desert Land Board Reclamation Records, Deschutes Irrigation & Power Co., no. 37-43, box 15, folder 10. Letter, J.O. Johnston, vice president and general manager, Deschutes Irrigation & Power Company, Columbus, Ohio, December 5, 1904, to G.G. Brown, Clerk, State Land Board, Salem, Oregon. General Manager Johnston indicates 400-500 men had been at work; *The Bend Bulletin*, March 5, 1905.
240 "Hundreds at Work," (*The Bend Bulletin*, March 10, 1905), 1. Article indicates water turned into canal on March 5, 1905.
1904-1914, CENTRAL OREGON CANAL DESIGN AND CONSTRUCTION, FLUME COLLAPSE

Progression of Work on the Central Oregon Canal

On September 4, 1904, a Bend Bulletin article said, "Work is being pushed rapidly on the right-of-way of the new canal south of town, five miles of which has already been cleared." The October 7, 1904 The Bend Bulletin reported that 350 men and 100 horse teams are living in tented camps and are employed by the construction work of the D. I. & P. Co., finishing the middle rocky portion of the PBC, enlarging the southern end of the PBC, enlarging the wooden intake flume, blasting rock in the intake, and constructing the COC. The article says, "...the COC will be fed 400 cubic feet a second from the enlarged flume. The first plan was to feed the COC from a flume to be taken out at Lava Island, five miles above the Pilot Butte intake. But the plan was recently modified so that the one enlarged flume supplied the two canals. The COC now starts at the foot of the flume and keeps to the higher ground. For a mile or so, it stays beside the PBC, but when it gets out past the rim rock, it bears to the east and will extend out to Powell Buttes." The October 21, 1904 The Bend Bulletin said, "Work on the COC is pushed with a heavy force of men near the foot of the flume. That work will not in any way be slackened for the enlargement of the Pilot Butte Canal." In November 1904, crews and horse teams were moved from the PBC project to start clearing the first ten miles of the route for the COC, below the wooden intake flume, while the fall weather lasted.

On January 13, 1905, the front-page article in The Bend Bulletin exclaimed that the COC will run in the old Dry River bed. It said, "The well-marked old river channel reaching across Central Oregon half way between Bend and Prineville will again carry a volume of sparkling water next summer. For the first time since man has known this country, the 'old river bed' will be a veritable river, big enough for steamboats." The writer went on to say that the canal will be completed for 30 miles to the river bed by May. "Trout will take the place of sand lizards," the writer exclaimed.

On Feb. 3, 1905, The Bend Bulletin reported that the ground is torn up for six miles from the flume for the COC. Work was continuing the flume. The crews and equipment were stationed along the first 10 miles of the COC route and it was being constructed. Crews were aided by having the specialized rock drilling equipment ordered by J.O. Johnson to speed the process of blasting rock and steam shovels to scoop up broken rock and load it in wagons. On February 10, 1905, the company moved men and horse teams from the PBC to work on the COC.

On February 17, 1905, the headline exclaimed that the work on the PBC was finished to the Crooked River. "This will add about 125 men and 40 horse teams to the COC work, which is at mile 10." (This point is at the eastern end of the nominated historic district.) "The transferred camp will take up work on the COC at a point about 10 miles east of Bend, as soon as the retiring frosts will permit canal excavation. That will put a force of about 300 men and 200 teams, to say nothing of machine drills, road machines, and patent excavators, on the one big canal and it will carry water to the old river bed early in the spring."

On March 10, 1905, the crews included 400 men and 250 horse teams. Two more miles were being excavated and the rock work was going well with the energy of the crew and the specialized equipment. But there were more setbacks. A huge sink hole opened on the canal near the intake flume at the river and was challenging to...
plug. The next week the newspaper extolled all the new settlers between Bend and Powell Butte, who were arriving due to the PBC’s completion, the COC’s construction, and the company’s advertising campaign.

In early April, 500 feet of the newly enlarged wooden flume at the diversion point at the river collapsed. Lumber was in short supply. Because the water had to be shut off to the two canals again, the construction camps had to be temporarily moved into town, so the men and horses could have water to drink and use for domestic purposes. Within a month, the flume was repaired. Water flowed for the irrigation season through the PBC and out 10 miles on the COC, so the crews could resume work there. The crews were reduced when many workmen quit and went to the Columbia Southern ditch work that was offering higher wages.

The Bend Bulletin on July 14, 1905 said, “Several leaks have developed along the Central Oregon work, where rock was shattered by blasting, opening crevices to subterranean chambers. These are generally stopped by paddling and tamping.” It was expected that the repaired and enlarged flume could carry 1,000 cubic feet per second of water instead of the 650 cubic feet per second that was estimated. In August 1905, the D. I. & P. Co. raised wages again to $2.25. Due to the work force being reduced, crews were still 12 miles east of Bend.

On March 9, 1906, the D. I. & P. Co. announced that F. C. Rowley, who has been superintendent of the company’s work in the field, since it commenced operations, had resigned. Chief Engineer, C. M. Redfield, took on the additional duties as general manager to succeed J. O. Johnson who was in ill health. J. C. Lewis would become superintendent of construction. F. S. Stanley of Portland was the company’s secretary and treasurer.

On December 21, 1906, the company described the vicinity of the nominated historic district on the front page of The Bend Bulletin. It said, “A drive east of Bend a few miles on the Bear Creek Road will emphasize very clearly the fact that the Bend country is gradually developing and that the sagebrush and juniper must give way to fields of grain and fruitful orchards. Many new settlers are moving onto land purchased by them, houses, barns, and fences are being built, and the land is being cleared and plowed.”

J. O. Johnson died in Columbus, Ohio the week of April 26, 1907. It was reported, “Mr. Johnson had unlimited faith in the future of the upper Deschutes valley. He himself had invested in and developed a large ranch of 1,280 acres 18 miles east of Bend, and during his last visit to this place he told a Bulletin representative that this valley would someday be a marvelous producer of farm products, fruit, etc., and that it would occupy the same position to Portland as the fertile Mohawk Valley does to New York City.” The canal was completed as far as Alfalfa when he passed away.

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245 Steam shovel loads rock into a horse-drawn wagon.

In May 1907, the settlers were complaining that the main canal near Powell Butte was not under construction yet. The company was complaining about the cost to construct the project. Thousands of acres around Dodds
Road, the Dry River, Alfalfa and Powell Butte were not salable. The State Land Board agreed to raise the selling price of the D.I. & P. Co. land from an average of $10 per acre to an average of $25 per acre, with a maximum price of $40 per acre. Formerly, sales were from $1.50 to $25 per acre. The company also agreed to turn the company over to the settlers in 10 years.

The materials for the 60-inch diameter inverted stave pipe to cross the Dry River between the growing communities of Alfalfa and Powell Butte were ordered in June 1907. In October, the 85 tons of materials arrived by freighters and work to assemble the trestle and pipe commenced. In January 1908, assembling the stave pipe on trestles was completed and water run through it for the first time, connecting the completed section of canal on each side. In 1907, the rocky portion of the canal in the nominated historic district was enlarged the first time to allow a greater flow to reach farms in Powell Butte.

In April of 1908, Roscoe Howard of Tacoma, Washington, took over management of the D.I. & P. Co. from F.S. Stanley of Portland. Howard was quoted in an April 10, 1908 article in The Bend Bulletin, "I consider the matter of first importance is to complete the canal and laterals now under construction in the Powell Butte neighborhood to supply the settlers in that vicinity with water. That work will be pushed with all due dispatch. By mid-June, the canal was delivering water for 28 miles, including to some settlers in Powell Butte. In December, the company was saying that, if the weather would hold up, the canal could deliver water to the settlers for the entire 45 miles in the next year.

In January 1909, the company was irrigating 84,000 acres with both canals. On February 3, 1909, a letter from a settler in Powell Butte was printed in the Bend Bulletin newspaper that slush ice filled the COC so full that the water ran over the frozen banks and flooded the old river bed, washed out some of the furrow laterals, and washed mud into some of the cisterns. By the 1909 irrigation season, most of the settlers had water and the 45 miles of the COC were constructed. Other improvements and laterals and ditches continued to be built through the next five years.

The D.I. & P. Co. was reorganized as the Central Oregon Irrigation Company in 1910. In November of that year The Bend Bulletin reported that "Oregon's greatest irrigation enterprise is actively and firmly on its feet again." The Canal is Completed

In 1912, the North Dam was completed by the company. From a new diversion point and headgate at the new dam, a new 1.4 mile long "U" shaped channel, called the North Canal, was constructed in flat terrain to connect the river to the existing PBC at approximately milepost 8 of the Pilot Butte system. The new dam, the new

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246 McGuffie, J.G., Secretary, Central Oregon Irrigation, Letter to Fred F. Henshaw, Federal Power Commission Board of Engineers, April 23, 1921. McGuffie wrote that during the 1907-1910 period, the D.I. & P. Co. "proceeded actively in the reclamation of lands embraced in Segregation List No. 6, but the bond holders became restive and litigation arose which resulted in the foreclosure of the bond holders [into receivership] and a reorganization of the affairs of the company, and a transfer of all contract rights of the [D.I. & P. Co.] to the Central Oregon Irrigation Company, a corporation, which ... continued in the construction and management of the system from November, 1910"; "D.I. & P. Co. To Reorganize: Change in Irrigation Co. Effected This Week," (The Redmond Spokesman, November 9, 1910), 1. The Central Oregon Irrigation Company filed its articles of incorporation, October 16, 1910, with a capital stock of $1.5 million. The directorate was Frederick F. Stanley, A.F. Biles, Jesse Stearns, and others representing New York and Columbus interests.

247 "Troubles Over," (The Bend Bulletin, November 2, 1910), 1. Other interests included I.N. Farmum of New York, representing J.G. White & Co.; and L.G. Addison, of Columbus, representing the Ohio bondholders. Roscoe Howard was manager and C.W. Redfield chief engineer. For the new firm, Stanley was president, Biles was vice-president, and Stearns was secretary-treasurer.

248 Federal Power Commission, Report to the Federal Power Commission on Uses of the Deschutes River, Oregon, (Washington, D.C.: Printing Office, 1922), 76. The water for the PBC system thus remained in the Deschutes River rather than being diverted where it had been since 1904-05, and passed down the river where it was then diverted through the North Canal and into the PBC, above the nominated section. The PBC system continued to irrigate the same historic lands north of the nominated section, Hadlow, Robert W., Cultural Resources Specialist, Findings of Effect on Bend's Historic Irrigation Canals, Bend Parkway, The Dallas-California Highway, U.S. 97, Deschutes County, (Salem: Oregon Department of Transportation, Environmental Section, June 1962), 4. The North Canal became generally known as the North/Pilot Butte Canal. The portion of the PBC which had come through the Townsite was terminated about 1.5 miles north of the Bend Townsite.
Central Oregon Canal Historic District

Name of Property

Deschutes Co., OR

County and State

diversion point and the new North Canal were built at the prompting of the city council who wanted more flow in the river within the city limits and to correct deficiencies of water volumes in the intake flume south of Bend and in both the Pilot Butte and Central Oregon canals.

COID employee fills an underground cavern in the Central Oregon Canal near Dodds Road, two miles east of the historic district.  

In 1914, after the North Canal Dam and the North Canal were completed and more water was diverted from the Deschutes River at separate diversion points for each canal, deficiencies in capacity on the main COC were again identified by the engineers inspecting the project for the Desert Land Board. The Central Oregon Irrigation Company, which took over from the D. I. & P. Co. in 1910, continued to use Chief Engineer C. M. Redfield. Redfield calculated that moving the intake for the Pilot Butte Canal north to the new dam and having the original intake and flume only serve the COC would solve the inadequate volume on the COC. Settlers at Powell Butte were complaining loudly to the County Court and to the state Desert Land Board that, even after the North Dam and the North Canal were diverting and conveying more water to the PBC, the COC was not delivering the contracted amount of water to some settlers and, therefore, crops were not growing adequately.

The 1912 North Dam on the Deschutes River, photographer looking east.

Redfield measured seepage losses at nearly 40% on the total length of the COC, instead of the 30% anticipated by Wiest in 1904. Canal enlargement work was again undertaken in 1913 and 1914. The portion of the canal in the nominated historic district was enlarged a second time to allow a greater flow in laterals to reach farms at the end of the canal. In addition to enlarging some portions of the canal, Oregon State irrigation system inspector John Dubuis wrote in 1915 that there was a greater loss of water to seepage than expected.

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\textsuperscript{249} Undated Deschutes County Historical Society photo.

\textsuperscript{250} Photo by Patricia Kliwer, March 2015.
He reported that the numerous drops on the canal have not been properly constructed and the water can tumble down over the rock as best it can between the canal grade lines. Dubuis wrote that the canal does not have the planned 1.5' clearance and is anything but smooth and consistent. As described in Section 7, the engineers found that the value of "n" (roughness of the canal bed) in the COC in the nominated historic district at milepost 7 was 0.036 and at milepost 8 was 0.038, with a note, "Channel rough: rock bottom." Smoother sections to the east had values around 0.025.\textsuperscript{251} All of these problems are evident in the historic district. In 1915, the COC irrigated 25,573 acres, not counting high lands, waste or rocky lands, and the rights-of-way for the canal itself. In 1914, the COC was diverting 440 cubic feet per second (cfs) at the river. Today it diverts 530 cubic feet per second. A cubic foot per second equals 448.83 gallons per minute, so the flow is now 237,880 gallons per minute.

**DESIGN AND CONSTRUCTION TECHNIQUES USED ON THE CENTRAL OREGON CANAL**

Like other engineers who preceded them in the high desert, Levi D. Wiest, Joseph G. Kelley, and Charles M. Redfield designed an open canal system with a consistent trapezoidal shape and gently angled side slopes to provide carrying capacity to adequately irrigate the land to be sold or homesteaded. They calculated the canal sizes necessary to convey enough water to distribute to the settlers, accounting for expected losses from seepage into the soil, evaporation, and "carry water" needs to irrigate the 84,707 acres in Segregation List # 6.\textsuperscript{252} The canal was designed for 'safe capacity,' which is the maximum amount of water that the canal can carry without causing the velocity of flow to become so great as to cause serious erosion of the bottom and sides.\textsuperscript{253} Safe capacity also leaves sufficient clearance between the top of the water surface and the top of the banks to prevent ill effects of wave action, rise and fall of the water surface due to the regulation of the headgates and the wearing down of the banks by weathering and trampling of cattle. The design gave a 1.5 to 2-foot clearance between the top of the moving water and the top of the banks. As mentioned previously, another factor in their designs was the expected average roughness of the canal. The greater the roughness, the greater friction it causes, and the velocity reduces. The canals near the headgate were the largest because the canals carried the full amount of water diverted there. The designs showed a consistent shape with flat beds 4' deep by 40' wide for the PBC and 4' deep by 60' wide for the COC, to prevent extensive digging while providing capacity. Seepage losses were expected to be 30%, but they were measured at near 40% by John Dubuis in 1914. Evaporation losses were measured at less than 1%.\textsuperscript{254}

**Design and Size of the Central Oregon Canal and 'A' and 'B' Laterals**

Except for the wooden flume at the intake, concrete or wooden flumes bridging low spots and caverns, concrete and wooden bridges over roads, and the wooden pipe at the Powell Butte Siphon, only native materials found in place were used in canal construction. In the nominated historic district, Charles M. Redfield oversaw survey crews and located the COC and headgates for two laterals, while ditches were located later as settlers arrived, but were mainly in place by 1912.

Laterals are assigned consecutive letter names, with the lateral closest to the river source being 'A'. The 'A' Lateral diverted enough water to irrigate 5,292 acres in Bend and to the north and east side of Bend to Butler Market Road. At the beginning of the nominated historic district, in 1914, at Ward Road, the canal volume was 355 cfs. In the nominated historic district, the headgate to Lateral 'B' is on the north side of the canal and it irrigates 1,319 acres. The 'B' Lateral slightly reduced the volume in the main canal to 356 cfs. The headgate for the 'C' Lateral is also on the north side of the canal in the nominated historic district and it irrigated 2,498 acres to the north. The flow at the end of the district at Gosney Road was 286 cfs. As water is delivered to its users through laterals and ditches, it carries less water and becomes successively smaller. An average of 4' deep

\textsuperscript{251} Ibid., 19.
\textsuperscript{252} The Deschutes Irrigation and Power Company, Cross Sections of Pilot Butte Canals and Laterals, Levi Wiest, Oregon State Archives.
\textsuperscript{253} Dubuis, John, Report to Desert Land Board on Central Oregon Project, 1915, State Printing Department, 1915.
\textsuperscript{254} Oregon State Engineer, United States Department of the Interior, Bureau of Reclamation, "Deschutes Project", December 1914, UC Berkley Library, 110.
and about 50' wide canal at full capacity would carry the necessary amount of water in the district. But to have a minimum of excavation while providing capacity, the canal shows great variability in width, depth, and shape (Figure 21).

**Building Techniques in the Canal in the Historic District**

After the canal route was surveyed and contours of the land were drawn, the selected route was marked. Clear and grub crews cleared the route of juniper, pine trees, and shrubs like sagebrush and bitterbrush with hand saws. Horse teams pulled out stumps by dragging stout chains draped around the shrubs' bases, pulling them out, roots and all. Next, the volcanic topsoil and loose rocks were moved with hand shovels and horse-pulled Fresno scrapers to create the bed and form the embankments. Where the rocks and volcanic rock flows were only inches below the surface rock was blasted into movable sizes. The rock was drilled with 2.25" diameter drills. Blasting powder was poured into the holes and exploded to break rock into smaller pieces that could be removed. The solid rock layer was up to 100' deep, so when the top layer was removed, solid rock below that layer remained in the bed.

Soil and rocks that were dug and blasted out of the canal bed, called 'spoil', were used to build embankments or placed irregularly as riprap on the insides of the banks and in the canal bed to fill in fissures (Photos 1 to 20). To build embankments, as each half foot of rock and soil was piled in successive layers on the downhill edge of the canal bed, the materials were flattened in layers, called 'lifts.' This layering and flattening process continued with progressively narrowing layers until the desired embankments were tall and dense enough to hold the water in the canal. Jagged 12" to 36" rock riprap haphazardly lined the steeper and taller embankments and the deeply cut sides so that the desired slopes will hold up to the erosive action of the water. The resulting embankments served two purposes: to hold the water in the canal and to dispose of the soil and rock that had to be removed from the canal bed.

Because the level compaction of lifts made a secure, flat-topped structure, a horseback rider known as the ditch rider and employed by the irrigation company, inspected the canal and checked on appropriate water withdrawals while riding on the embankments. In the nominated historic district, a somewhat consistent 12'-wide ditch rider road is along the north side of the canal, next to cut sides and on top of embankments. Embankments are not along the entire canal in the historic district, nor are they on both sides of the canal. In two locations, including just east of Ward Road and just east of the Bear Creek Ranch Bridge, the route selected for the canal was not on a diagonal slope. In those places, there is no embankment on either side and the canal was cut into the existing terrain and the spoils removed to use in berm building elsewhere. Being on the side of a hill, most of the canal in the historic district follows a diagonal northerly slope, where the canal was cut into the land on the high side and an embankment was created on the low side to even out the sides. However, between Teal Road and Gosney Road, the terrain drops off suddenly, and unusually high berms (12' tall and 20' wide) are on both sides of the canal. There is evidence that a 350-feet-long wooden flume formerly spanned this portion of the canal. Some parts of the canal in the historic district have rip rap and some do not. Thousands of feet of the sloped canal walls east of Bear Creek Ranch Bridge are covered with silt and the rip rap is not apparent. In three places in the historic district, the crews carefully stacked rectangular rock on one side, making a nearly vertical rock wall (Photos 9 and 19.).

Because of the geologic conditions presented and the technologies employed, unique characteristics were carved into the nominated Historic District. The seven people who surveyed the canal on April 3, 2017 for this nomination located nearly fifty 2.25" drill holes in rocks left in the canal bed, used as riprap and discarded near the canal. Sixteen were photographed. Evidence of steam-powered drills, of blasting, and of men with horse-drawn Fresno scrapers and steam shovels are strikingly present in the canal's exceedingly rugged, irregular bed. Tons of unnaturally-sharply-angled breakage of ancient horizontally laid lava is present. Tons of basalt boulders strewed in the bed remain as remnants of the work. A large island sat midstream just above the Bear Creek Ranch Bridge as an artifact of the labor of hundreds of men pushed to keep an ambitious schedule until they could do no more.

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255 Interview with Kenneth Lowe, son of homesteaders, 20220 Sturgeon Road, Bend, February 2014.
Central Oregon Canal Historic District

While some of the basalt rock flows made the bed impervious and nearly watertight, others had cracks that led to caves and underground channels that caused water losses. These holes were filled with rock and soil and concrete was used as needed. The canal has silted in and small stones and rocks have filled holes making it more impervious to seepage as it has aged. The location of the COCHD takes full advantage of natural water courses and draws and was described by some of the settlers as 'a chain of ponds.' The rockier, less impervious portions of the canal still look like a chain of ponds today where they hold pools of water with crayfish and trout long after the irrigation season is finished.

The COCHD displays dozens of 2.25" holes drilled for explosives.

Attempting to dig into rock to carefully follow the engineer’s plans and build a canal with a smooth bed and equal trapezoidal sides was abandoned and instead crews settled on a practical technique that exactly followed the carefully marked route to keep the necessary elevation, but resulted in an irregular canal that differed greatly from the plans, but usually functioned to carry the necessary volume of water. Where the laborers were slowed by solid rock, they made the canal shallower and wider with more inconsistent side slopes than the plans called for. But a problem arose when the unavoidable rough bottom differed so much from the original plans that the friction inadvertently reduced the capacity of the canal. This and other issues resulted this stretch being widened twice, in 1907 and 1914.

THE CENTRAL OREGON PROJECT AND THE FOUNDING OF THE CITY OF BEND

Founding the new towns of Bend and Redmond, developing infrastructure, utilities like electric power service and basic businesses such as banks, and aggressively attracting ministers, settlers, businesspeople, tradesmen and farmers by selling thousands of acres of land in city lots and in 40 to 160-acre parcels a short time was the key to the financial success of the irrigation project. The development companies were involved in every aspect of the new towns, Bend and Redmond, making them prosperous and desirable as soon as possible.

Early Bend, 1900-1904

Brogan’s East of the Cascades describes the area along the Deschutes River as the Alexander M. Drakes arrived in early June 1900: “The Cascade peaks to the west were white and beautiful above green skirts of pine, fir, and hemlock. ... There were no signs of life along the sweeping bend of the river ... Upstream a short distance, the W.H. Staats ranch was hidden in timber around a curve in the river. Still farther upstream ... was the ... Farewell Bend Ranch. To the north, within sight of the stream, were other small ranch houses, little more than cabins, most of them with histories dating to the early eighties (1880s) and most of them abandoned.”

268 Ibid
267 Dubuis Report to Desert Land Board on the Central Oregon Project, 28.
266 Patricia Kliewer photograph April 3, 2017, Photographer looking north.
269 Brogan, Phil F., East of the Cascades, (Binford and Mort, Portland, OR., 1964), 181.
Central Oregon Canal Historic District
Name of Property: 

Deschutes Co., OR
County and State: OR

Before the PBC and the COC were built, the area was a small, remote frontier site about 25 miles southwest of Prineville, the Crook County seat. It was in the Deschutes River canyon at one of the few places where in pioneer days it was easy to get a wagon down to the water's edge and ford the stream. Moreover, this site along the Deschutes River was the most accessible of these places, and the point where a canyon was not in evidence. It was at a pronounced double bend in the river, which afforded a good place to camp, beginning in the days of the emigrants, but how early is not known. "The place began to be known as Farewell Bend, and the name was appropriate irrespective of the destination of the traveler, north, south, east or west," according to Oregon Geographic Names. 260

In November 1904, the PBD Co. was clearing the pine trees out of Minnesota and Bond streets in the newly-platted townsite. The Bend Bulletin described the work. "A powerful capstan, chains, a team of horses and an axe are the instruments of this work, and they make a clean job of it, pulling over great pine four feet in diameter without difficulty, after the surface roots are cut." 261 Vandevent indicated that he had seen the area change "from a few little log cabins to the present town of Bend ... I've seen the whole country change from what you might say was a wilderness, but a very beautiful wilderness ...." 262

Settlement of Bend, 1904-05
A.L. Goodwillie 263 was the Secretary of the PBD Co., signing the Plat of Bend with Drake on May 31, 1904 264 two-and-a-half months after Drake's sale of the firm's irrigation contract and rights to the D. I. & P. Co. filed in Crook County on March 14, 1904. He became a partner with Drake in the PBD Co. sometime just after the two-family get-together in Bend and Portland. In addition to eastern capital, Goodwillie brought youthful energy, leadership, in addition to organizational and public relations skills.

The D. I. & P. Co. finished the first four miles of the PBC and delivered water to the land close to the townsite in June 1904, so that by December, as the town incorporated, real estate prices were increasing. 265 At this time, the PBD Co.'s business associated with settlement of the townsite went well. Streets, blocks, and lots were delineated; townsite land was cleared; lots were sold, and the town was developed in various ways. 266 Goodwillie and Drake rebuilt the flour mill downtown following the January 1904 fire and it was back into 'full operation' in May, with forty employees. 267 The PBD Co. offered an impressive selection of home-building materials. 268 Drake had incorporated the Bend Mercantile Company in 1903 to also provide to the settlers building products and a wide variety of other merchandise needed, and constructed a building in which to retail

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260 McArthur, Lewis A., "Oregon Geographic Names," (Oregon Historical Quarterly, vol. 27, 1926), 138-39; McArthur, Lewis A., "Oregon Geographic Names: II; Additions Since 1944," (Oregon Historical Quarterly, vol. 47, 1946), 64-65. The various 'Bend' post offices are discussed. The Bend post office was established January 18, 1886, with John Sisemore postmaster. On March 7, 1904, a new Bend post office was established near the site of the Pilot Butte Inn (built in 1917).

261 "Local Bits," (The Bend Bulletin, November 11, 1904), 5.

262 "Ranch on the River," (The Central Oregon Answer Book, Bend: The Bend Bulletin, March 27, 1994), 17. Taken from a transcription of an interview with W.H. ('Billy') Vandevent conducted in 1953 by KBNB radio's Kessler Cannon as part of Bend's 50th anniversary celebration.

263 National Register of Historic Places, Goodwillie-Allen-Rademacher House, Bend, Deschutes, Oregon, NRIS 0700493.

264 Arthur Lawson Goodwillie is a Significant Person (Criterion B). Areas of Significance recognized by the National Register in which he contributed include Community Planning and Development, Commerce, Communications, Education, Industry, Politics/Government, and Social History.

265 Pilot Butte Development Company, Plat of Bend, Filed June 7, 1904. Document signed by Drake and Goodwillie on May 31, 1904.

266 "Real Estate Is Up; Paid $450 and Sold for $900," (The Bend Bulletin, December 8, 1904), 1.

267 "Week's Sales of Lots," (The Bend Bulletin, July 8, 1904), 5. This week the PBD Co. sold seven lots in Bend.

268 "Lumber to Build," (The Bend Bulletin, May 13, 1905), 1; "Notes of the Builders," (The Bend Bulletin, April 29, 1904), 2; A "saloon outfit arriving from the railroad" in April 1904 was machinery to rebuild the mill; "Local Bits," (The Bend Bulletin, March 17, 1905), 5.

them in 1904. In 1909, he was treasurer of the newly formed Bend Board of Trade. He built a dam and power plant just north of the townsite, bringing electricity to the city on November 1, 1910.

As the PBC was being completed, the company could focus on advertising the land for sale and attracting settlers to the area. The townsite was due to be incorporated, ordinances were written, and a network of dirt streets was in place. Goodwillie was named as the chief petitioner for the incorporation of the City of Bend. On December 19, 1904, an election was held, overwhelmingly deciding in favor of the matter of incorporation, and electing Goodwillie as the city's first mayor and the Chief Engineer Charles M. Redfield as a city councilor. “BEND IS NOW A CITY” announced The Bend Bulletin on January 6, 1905. More than $100,000 in building construction had been invested in the city in the previous year. This included $10,025 by the PBD Co. and $11,000 by the D. I. & P. Co.

The first city council meetings were held in the office of the PBD Co., beginning on January 10, 1905. Initial matters concerned making the city respectable and attractive to settlers, potential new business owners, and professionals. Doctor Urling C. Coe, M.D., observed in his memoirs, Frontier Doctor, “The irrigation company had a number of (canal) construction camps within a short distance of town where hundreds of men were employed at high wages. [These camps were for the OCC construction close to Bend.] There were eight saloons with open gambling.” The Bend Bulletin summarized the first ordinance. “The most important ordinance was that fixing the license of retail liquor saloons at $500 per year, none to be granted for a less period than a year. A bond of $1,000 was required of the licensee.” Only five saloons were in operation by March 1905. A contract was also let for the building of a jail.

To provide for the infrastructure needs of settlers including banking, utilities, and communication, A.L. Goodwillie founded and invested in several other firms. W.E. Guerin, Jr., was a partner or officer with him in these. With Guerin, he incorporated the Central Oregon Banking & Trust Company. By early February 1905,
two franchise ordinances were passed by the city council: one for the water, light and power company and a second for the telephone company.\textsuperscript{281} With Guerin and another partner, Goodwill incorporated the Bend Light, Water and Power Company. The firm purchased the PBC Co.'s rights to construct and maintain electric lines, gas, water, and other public utilities of the city. The city water system was in operation by July 1905.\textsuperscript{282}

To connect settlers with the greater region, Goodwill and partners incorporated the Deschutes Telephone Company, the city's first telephone company that began by running a line to Prineville. On August 17, 1904, the first voice communication was carried from just outside of Prineville to Bend over the thirty-mile long line that was also used for telegraph messages.\textsuperscript{283}

\textit{An Illustrated History of Central Oregon} captured the period succinctly, stating, "In 1905, the City of Bend marked a new era in the development of Central Oregon, and it is a fine example of what can be accomplished when energy and capital unite in the development of vast resources."\textsuperscript{284}

\textbf{Governor Impressed with Settlement, June 1906}

The Deschutes' Settlers Association welcomed in June 1906 Oregon Governor Chamberlain, who as head of the State Land Board had visited Bend in 1904 and had returned in that role. With him were the entire land board and some other state officials, including future governor Oswald West, then State Land Agent. Chamberlain was "well pleased with the work of the D. I. & P. Co." He said its canals and entire reclamation works showed the marks of permanency," said the newspaper. He was "impressed ... to the greatest degree ... [by] the remarkable development of this region during the past two years. At that time, he had ... found a few scattering cottages along the river and two or three buildings at the townsite. Now he was entertained in a prosperous little city with well laid streets, beautiful lawns, a fine gravity water pressure system and a new public-school building suitable to a city many times the size and age of Bend. Where before he found barren desert wastes now, he could count prosperous ranches by the score."\textsuperscript{285}

\textbf{Bend Area Population Increases with Pilot Butte and Central Oregon Canals, 1900-1920}

Bend's population showed growth as the canals were constructed and, in the years, after they were built. Approximately 312 people lived in what became Deschutes County in 1900, 21 in the Bend Precinct. Canal construction brought the town's population to 400 or 500 people by 1905. Thereafter, both the city and the adjacent areas grew as settlement occurred and farming developed. The U.S. Department of Interior reported on Bend and the adjacent areas in 1913: "The result of this [irrigation] development is reflected in a gradually increasing population, that of the entire [area] being estimated at 4,000, which is distributed among four towns as follows: Terrebonne, 75; Redmond, 800; Deschutes, 50; Bend, 1,500."\textsuperscript{286}

\textbf{Bend Tax Assessment Grows, 1905-1913}

\textsuperscript{281} "Franchise Ordinances Pass," \textit{(The Bend Bulletin}, February 3, 1905), 1.

\textsuperscript{282} Crook County, Oregon, \textit{Articles of Incorporation of the Bend Water Light and Power Company}, (Crook County Clerk, Prineville, Oregon, November 11, 1904); The other partner was George C. Steiermann, an attorney; "Water Franchise," \textit{(The Bend Bulletin}, February 10, 1905), 1; "Water, Light and Power Company," \textit{(The Bend Bulletin}, November 11, 1904), 4; Shaver, F.A., et al., \textit{An Illustrated History of Central Oregon}, (Spokane: Western History Publishing, 1905), 729; "Water Pipes Arriving," \textit{(The Bend Bulletin}, April 14, 1905), 1. A crew of 25 workers installed the water system from the river up to Wall Street and along Wall Street to nearby Oregon Avenue.

\textsuperscript{283} "Hello, Prineville," \textit{(The Bend Bulletin}, August 19, 1904), 1. Guerin was president. Goodwill was vice-president, secretary and treasurer. Gerald Grosbeck was managing partner; Crook County, Oregon, \textit{Articles of Incorporation of the Deschutes Telephone Company}, (Crook County Clerk, Prineville, Oregon, July 18, 1904). Incorporating with Goodwill were P.L. Tomkins and George C. Steiermann; "Companies Merged," \textit{(The Bend Bulletin}, May 10, 1907), 1. In May 1907, the telephone company merged with the State Central Telephone Company at Prineville to become The Pioneer Telegraph and Telephone Company.


\textsuperscript{285} "Gala Day at Bend: State Land Board Present at Farmer's Institute," \textit{(The Bend Bulletin}, June 22, 1906), 1. The newspaper summarized Chamberlain's remarks. Chamberlain was governor 1903-05, then an Oregon Senator 1909-21. Oswald West served as governor 1911-1915. Approximately 1,500 trout were barbecued for 500-600 attendees. Speakers included A.M. Drake; Jesse Stearns, a prominent stockholder in the D.I. & P. Co.; H.F. Jones, president of the D.I. & P. Settler's Association at Redmond; Mayor Goodwill; John Lewis, state engineer; and Dr. J.C. Coe speaking about using pure water and avoiding pollution of the Deschutes.

\textsuperscript{286} Oregon Cooperative Work, U.S. Department of the Interior, Reclamation Service, \textit{Deschutes River Projects, Bulletin No. 1}, (Washington: Government Printing Office, 1914), 4. Deschutes refers to a town just outside of Bend, used by the irrigation company, and not the 1902 plat of Deschutes adjacent to the City of Bend.
The increased property tax assessments for the City of Bend resulted from irrigation development, settlement, and farming in the region. From 1905 to the 1910-1911 period, the assessed value of the City of Bend quadrupled as the Central Oregon Project provided irrigation water for settlers who earned income from farm and ranch products and, subsequently, sought products, services, and supplies from city manufacturers, service businesses, and merchants. In 1905, Bend property tax assessments totaled $50,005. In 1913, they had leaped to $358,820. If the approximately $200,000 assessed against the D. I. & P. Co and exempted by the supreme court was included in the 1910 figure, it would be nearly an eight-fold (800 percent) increase in assessed value of property in the City of Bend from 1905.

Bend School System Swells Following Pilot Butte Canal and Central Oregon Canal, 1904-1913
Water was flowing in the PBC in the 1905 irrigation system. Water also flowed in the COC as it was constructed, beginning in the fall of 1904, to provide water to the hundreds of men and horses working in the desert on construction crews. The COC was completed in 1914.

The school system quickly grew during the construction of the canals and the subsequent settlement of the area. A.L. Goodwillie, L.D. West and James M. Lawrence, of the federal land office, were the Bend School District's Board of Directors, beginning in August 1904. There were 47 students at the beginning of the 1904-05 school year; in 1905, there were 102. By November 1908 there were over 200 students. Student enrollment increased from 344 in 1910, to 377 in 1911, to 487 by December 1912. Opening day for school in September 1919, saw 1,015 students register, an increase of 200 over opening day of 1918, partially attributed to the opening of the two great sawmills, the Brooks-Scanlon and Shevlin-Hixon Lumber Mills. Registered students totaled 1,408 on opening day in 1920.

Railroad Officials Visit Bend
In April, 1905, the D. I. & P. Co. had finished the PBC and was working on the COC “when it came to the conclusion that rail transportation was essential to the settlement of the lands.” Drake used his family connections with owners and developers of railroads and returned to Bend in late May with news that the entire region wanted to hear: “From what I am able to learn, east and west, Bend’s chances for a railroad are very good.” Mayor Goodwillie appointed a committee of aldermen and citizens, including Drake, to receive a party of railroad officials soon to visit Bend. The officials arrived shortly thereafter to look over the locality and examine its resources and possibilities of development. The group visited the canals and the company's agricultural experimental farm just out of Bend. They had travelled from Shaniko in the “big automobile of the Central Oregon Transportation Company,” a subsidiary of the D. I. & P. Co., which served as a stage line for the firm in its irrigation development and settlement businesses.
Central Oregon Canal Historic District

The railroad delegation expressed surprise over the advancement the area had made in the last few years. Industrial agent Judson was enthusiastic: "The country has grown faster than there was reason to expect and there is no room for doubt that it will make a great deal of business for a railroad." Professor French, of the University of Idaho, said, "I know of no better locality for the development of the sugar beet industry." General Manager O'Brien remarked, "I am greatly surprised and gratified at what I have seen. The extent and richness of this region is beyond anything I have been led to believe. Of course, you will have a railroad here, you must have it." A week later O'Brien said, "When I see people putting hundreds of thousands of dollars into reclamation work in the Bend section, I think they must know what they are doing and that practical results will follow."

INVESTORS PROMOTE AND CAPITALIZE ON CENTRAL OREGON PROJECT

William G. Robbins, PhD, Emeritus distinguished Professor of History at Oregon State University, in his environmental history of Oregon, *Landscapes of Promise*, described the promoters and investors of the period: "Those who promoted development in the Oregon country were epic poets of sorts, harbingers of change, visionaries whose imaginations knew few restraints other than those dictated by the most obvious limits of technology and natural obstacles." The Deschutes County was quite successful in its marketing efforts. Author and former Tumalo Irrigation District director Martin T. Winch in "Tumalo — Thirsty Land," his seminal, six-part series on the Tumalo Irrigation District, published in the *Oregon Historical Quarterly*, said: "In 1902 the Deschutes Valley was reported to be 'the best advertised district today in the United States.'" Successful Promotional Efforts of A.M. Drake

Promotional efforts for settlement were ongoing as Drake used his extensive business and family connections and friendships to politicians, government officials, regional and national newspapers, bankers and financiers, and railroad tycoons "to lay plans for immigration." His early promotional efforts were primarily through local and state newspapers and in working with others, such as with A.L. Goodwillie in incorporating the City of Bend, and subsequently with the Bend Board of Trade. The Board put the Central Oregon Project in the headlines and involved community business members in promotion and development. His work was essentially

& N.); J.P. O'Brien, general manager for the Harriman railway lines in Oregon, Washington, and Northern Idaho; R.R. Miller, freight agent of the same; R.C. Judson, industrial agent of the same; G.W. Boschke, chief engineer of the same; E.E. Lytle, president of the Columbia Southern railway (an O. R. & N. branch); H.P French, president of the University of Idaho; and Fred S. Stanley, secretary of the D. I. & P. Co.

296 "Direct Stageline," (*The Bend Bulletin*, July 8, 1904), 1. By July, the firm had two big automobiles running stage between Bend and Shaniko for both passengers and express, with mail to be added by September. The route was to make stops between Bend and Shaniko as well as travel south to Paisley, Silver Lake, and Summer Lake; "Biggest Automobile in the United States Was Built in Portland," (*The Sunday Oregonian*, March 12, 1905), pt. III, 22. A.E. Hammond, former chief engineer of the Columbia Southern Railway and former State Engineer, was the president of the transportation company; "Direct to the Railroad: Starting of the Automobile Service," (*The Bend Bulletin*, April 4, 1905), 1.

297 "Train to Come Soon: That's What Railroad Delegation Says," (*The Bend Bulletin*, June 30, 1905), 1. Regarding sugar beets, the professor added, "The soil is right, and the climate is favorable. A family can make a good living on a farm raising sugar beets."

298 "Two Steps to Bend," (*The Bend Bulletin*, July 7, 1905), 1. A week later reports indicated that the Oregon Railroad and Navigation Company was "in the field with the assurance of an extension of the Columbia Southern from Shaniko." O'Brien stated his plans, "I believe that conditions at the present time warrant building to the Agency Plains [near Madras]. ... And by the time the railroad is completed to Madras, I expect conditions to be such that I can recommend an immediate advancement from there to Bend."


behind the scenes, seemingly his forte. Sadie Niswonger of Powell Butte and later Bend, who knew Drake well, called him “an organizer” in a 1953 interview.\textsuperscript{301}

Shortly after forming the Bend Board of Trade in 1909, Drake secured space in two publications with large circulations, the Portland Chamber of Commerce Bulletin and the Pacific Homestead, for an article describing the advantages of the Bend country for the home seeker, farmer, manufacturer and investor, referring to water power, excellent farm lands, raw materials, business opportunities, and good schools. A small portion read, “Today all eyes are directed toward Central Oregon. The railroads are about to give transportation to the greatest and richest undeveloped area in the West. Now indeed watch Central Oregon grow, for the development of this country in the next three years will surpass anything hitherto seen even in the wonderful Northwest.” The article promptly received responses, indicating the growing interest in the prosperity of the Deschutes country following the completion of the PBC in 1905 and the COC in 1908. The Board received forty-five letters in the first week following the article, with fifteen referring specifically to the article in the Pacific Homestead.\textsuperscript{302}

Drake’s ability to quickly sell his irrigation company to the D. I. & P. Co. indicated experienced investors understood the canal’s long-term financial opportunity. In addition, he played a crucial part in getting the railroad officials to visit the Deschutes country and made a calculated assessment of its economic potential. At the time of the officials’ visit with Mayor Goodwillie’s committee in June 1906, which included Drake, Frederick S. Stanley was present and Secretary of the D. I. & P. Co. He eventually invested several million dollars in the irrigation company. Moreover, he leveraged other investments in lumber, banking, and railroads, and his political connections as former chairman of the committee on railroads and transportation in the Oregon House of Representatives, to promote and grow his investment in the region.\textsuperscript{303} He remained with the Central Oregon Irrigation Company until 1921. Goodwillie, Drake’s PBD Co. partner, disposed of “his holdings in Bend on a rising market” in 1907, including his stock in the PBD Co. to Drake, resigned as mayor and returned to Chicago with his wife who was expecting their first child.\textsuperscript{304} He continued to own property and visited Bend many times, saying his years in Bend were the happiest in his life.

D. I. & P. Co. Promotions
The D. I. & P. Co. was a polished public relations organization for its period of history and its area of the nation, with the marketing and publishing experience of eastern businessmen. Moreover, the Central Oregon Project was a good irrigation system, embraced by suitable land for farming and ranching, and the ownership knew it. In April 1904, the company had issued a well written and illustrated booklet describing the Deschutes Country and its irrigation work. It described in detail the character of the soil, source of water supply and the prices that products raised on the lands were bringing. Ten thousand copies were printed and distributed to regions from where new settlers were likely to originate.\textsuperscript{305} Months before the project was completed, settlers had applied for

\textsuperscript{301} Deschutes Country Yesteryear, “Interview; Sadie Niswonger,” (no. 16, summer 1995), 469. Transcription of interview of Mrs. C.P (Sadie) Niswonger by Kessler Cannon, KBND, 1953. The Niswongers came to Powell Butte in the fall of 1907 and moved to Bend in the fall of 1909. Drake asked the Niswongers to release four lots on the railroad right-of-way, presenting them with a lot at 44 Irving and had the band hall moved to that lot for them to live in until they built a house.

\textsuperscript{302} Board of Trade Work Valuable,” (The Bend Bulletin, October 27, 1909), 1.

\textsuperscript{303} Dunaway, David C., State Archivist, Oregon State Library, Members of the Legislature State of Oregon 1860-1949, (Oregon State Archives, Bulletin No 2, publication no. 14, 1949), 32. Frederick S. Stanley had served in the Oregon House of Representatives from Union County in 1897, 1898, and 1899. In 1899, he was the chairman of the committee on railroads and transportation; Gaston, Joseph, Portland, Oregon: Its History and Its Builders, (Chicago—Portland: S.J. Clarke, 1911, vol. 2), 58-59. Stanley, originally from Wisconsin, organized the Grand Reside Lumber Company at Perry and the Stanley-Smith Lumber Company at Hood River. In 1904, he organized the First National Bank of Hood River with headquarters in Portland. He was president of the Railway Exchange. Source indicates Stanley’s work with the irrigation company would be an investment of four million dollars; “Right of Way Is Now Approved,” (The Bend Bulletin, July 21, 1909), 1. Stanley had been vice-president of the D. I. & P. Co. as early as July, 1906, and had been doing whatever he could to resolve conflicts with the Hariman railroad operations where there were surveys in areas of the Central Oregon Railroad Company’s line, which was being operated under the management of the irrigation company.


\textsuperscript{305} Advertising the Country,” (The Deschutes Echo, April 16, 1904), 1.
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1.845 acres by September 30, 1904. The Morning Oregonian said in early 1911, “Central Oregon is well styled the ‘most-talked-of territory in the West’ ... and the heart in geographical position and economic possibility.” Indeed, a newspaper advertisement found even before the canal was completed invited prospective settlers:

FREE LAND IN OREGON. In the richest grain, fruit and stock section in the world.

Thousands of acres of land at actual cost of irrigation. Deed direct from State of Oregon.

WRITE TO-DAY. BOOKLET and MAP FREE. Deschutes Irrigation and Power Company, 610-11-12 McKay Building, Portland, Oregon.

The D. I. & P. Co. opened real estate offices in Portland and Prineville. Promotional efforts were not historically unique to the D. I. & P. Co., nor were such efforts unique to irrigation development companies. The railroads were among the first and best to develop the marketing of government lands long before the Carey Act was enacted. Not only were corporations involved in these efforts, many cities and towns, through commercial clubs, made efforts to encourage settlers to ‘buy now’, and even individual land owners sought to encourage settlers to purchase from them, as ‘the railroad will soon be passing by’.

Schwantzes observed, “All had a common desire to attract settlers and investors in order to promote economic growth and guarantee a prosperous future.” Promotion was not limited to printed materials. Elaborate displays at fairs and expositions promoted the irrigated land for sale. In 1908, a representative of the Oregon Commission of the Alaska-Yukon-Pacific Exposition, to be held in Seattle, visited Bend to prepare an exhibit for the event. He took three photographs of the shared headgates and photographs of a field of clover and a large vegetable garden grown on irrigated land. These were made into stereopticon views 10’ or 20’ square and were to be used to illustrate lectures given at the exposition. Commitments from settlers to send a variety of farm products were obtained.

The Promotional Campaign of the Great Northern Railroad

Nothing quite compared, however, to the promotional campaign by the Great Northern Railroad once the Deschutes Country had developed and ‘built-up’ the area’s population and infrastructure and had established financial institutions and communication technology of sufficient scale to bring the region into the economic lifeblood of the nation. The Great Northern Railroad’s objective was “the thorough advertising and colonization of Central Oregon.” The railroad joined with New York publishing house G. P. Putnam’s Sons, with its actual son, George Palmer Putnam, whose writings on Central Oregon had already appeared at intervals in the Oregonian. Besides a bulletin to be published with Putnam’s stories and photographs to advertise Central Oregon, the railroad had collected farm products to be placed on exhibit in St. Paul, Philadelphia, Boston, and other locations. Putnam moved to Bend and had a house with a basement theater built on State Street (See

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306 State of Oregon, Report of State Land Board Relative to Desert Lands, Granted the State Under the “Carey Act” for the Period Commencing October 1, 1922, and Ending September 30, 1904, to the Twenty-Third Legislative Assembly [Regular Session], (Salem, Oregon, 1905), 11.

307 “Railroads Will Open Great Inland Empire: Crook County,” (The Morning Oregonian, February 4, 1911 j42.

308 Advertise, (Oregon Daily Journal, July 11, 1904), 16.

309 Davis, H.L., Honey in the Horn, (New York: Avon, 1935, 1962), 330-363. This practice was so ingrained in Central Oregonians and others, it became a part of the narrative of this 1936 Pulitzer Prize-winning novel by a native Oregonian who lived in Wasco County near the Deschutes River during his teenage years. Set in the homesteading years of 1905-08, it follows the characters from the Oregon coast to the Willamette Valley and, finally, to Central Oregon, where many were expecting “old E.H. Harriman” to soon build a railroad. Mr. Pringle, of “Pringleville, the Gateway too [sic] Eastern Oregon, [offered] Home Sites on Easy Terms, Industrial Locations Free. Parties interested were invited to lay their cases before the J.B. Pringle Real Estate Company, whose offices adjoined the hotel dining-room” (p. 346).


312 "A National Bank," (The Bend Bulletin, August 7, 1908), 1. The Central Oregon Banking & Trust Company was dissolved, and an institution known as the First National Bank of Bend, Oregon took its place.

313 "Great Northern Begins Extensive Campaign to Advertise Central Oregon," (The Bend Bulletin, February 16, 1910), 1. The railroad had already begun advertising in Montana and Washington.
the Drake Park Neighborhood Historic District nomination). Schwantes noted, "The transcontinental railroads spent fortunes to advertise the [Pacific Northwest] to prospective tourists and settlers."

The Promotional Campaign of the Southern Pacific and the Oregon Railroad & Navigation Company
The Southern Pacific and the Oregon Railroad & Navigation Company in 1910 co-published and widely distributed a 35-page promotional pamphlet: the Central Oregon Irrigation Project called, Redmond Now. The railroad companies hoped to attract settlers to increase the passengers and commodities on their rail lines. The Oregon Historical Society wrote that the pamphlets stated, "Everything points to Redmond as a commercial center. Merchants, professional men, manufacturers, home-seekers should investigate Redmond now, before the railroad [the Oregon Trunk Railway] is completed, before values enhance greatly, before the big opportunities are all taken."

Railroads published a series of Redmond Now publications, promoting settlement in the Redmond area.

Joshua Binus studied the historic context of the Redmond Now publications for the Oregon Historical Society in 2005. He wrote, "Redmond was platted for development in 1906 and by 1910 was populated by more than 200 people. By the time the "Redmond Now" pamphlet was being distributed, the town already had a school, two banks, telephone service, a library, jail, lumber and brickyards, saloons, laundry, and many other small businesses. In 1911, the development of a small hydropower plant at the nearby Cline Falls provided electricity to the town, and a year later Redmond's residents supported the construction of a municipal water system. Until 1915, Redmond rivaled Bend as the commercial center of central Oregon, but that year two large lumber companies decided to locate mills in Bend. The two mills operated by the Shevin-Hixon and Brooks-Scanlon companies led to a population boom in Bend. The fast-growing community and economy of Bend quickly eclipsed Redmond's slower growth, and in 1916, when the two communities competed for the location of the county seat, Redmond lost out to its larger neighbor."

The Bend Company Sells Property in Bend
The Bend Company, a new, robust firm, was incorporated in March 1911, to capitalize on the growth relative to the successful settlement brought about by the two canals, particularly the establishment of the City of Bend and the increasing farm population with growing families. The Bend Bulletin summarized the mega-transaction: "3,000 acres of timber lands, 2,000 acres of agricultural lands, 1,400 acres adjacent to town, 1,300 platted lots, the Pilot Butte Development Company sawmill, the power and lighting plants, city water system, and various water power and irrigation rights."

The properties of the PBD Co., the Bend Townsite Co., and the Bend Water, Light & Power Co., as well as valuable water power sites on the Deschutes River, all primarily held by A.M. Drake, had been sold to a syndicate of Eastern lumbermen, and Dayton, Ohio, and Oregon capitalists.

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315 Oregon Historical Society photo.
317 "New Company Formed," (The Bend Bulletin, March 29, 1911), 1. Incorporators were J.M. Lawrence, Franklin T. Griffith, and Clyde M. McKay. The firm was capitalized at $360,000.
318 "Town of Bend Been Bought," (The Redmond Spokesman, March 9, 1911), 1. Drake held the greater part of the interest in these before the transaction, with Frank Robertson of Portland having an interest in the Bend Townsite Co. and the Bend, Water, Light & Power Co.; "Townsite Changes Hands: New Company Takes Over Holdings of Drake and Robertson, Including All the Properties At Bend," (The Bend Bulletin, March 8, 1911), 1; "Townsite Deal Goes Through," (The Bend Bulletin, March 3, 1911), 1.
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The Bend Company was immediately busy marketing real estate, selling at least 35 lots of business and residential properties in the first two weeks after completing the transaction. The conditions in Bend could not be more favorable for making investments in business property than they are today. There is not a town in the State of Oregon, nor is there one in the entire West where the resources and conditions are such as to make certain a city of the size Bend is sure to be,” said a 1913 advertisement. Of those properties purchased, The Bend Company sold 46% of the Bend Townsite lots; 41% of Park Addition lots; 31% of North Addition lots; and 73% of Center Addition lots, or an overall average of 59% of the lots in these four neighborhoods of Bend by March 31, 1916. The firm controlled all the actual business lots and nearly all the intermediate lots that could be developed into business lots. It donated lots for churches.

The Railroad Arrives in Redmond and Bend in 1911

The development of the canals directly resulted in the arrival of railroads in the region. Bend’s first mayor, Arthur Goodwillie’s committee was successful in showing the railroad officials the richness of the Deschutes Country between 1905 and 1907. The economic stimulus and population growth which followed the completion of the Central Oregon Project could not be overlooked. ‘Railroad Day’ was put on as a promotion of the area by The Bend Company, and was celebrated in Bend on October 5, 1911, with a crowd of 1,500 to 2,000 people and distinguished dignitaries. The Oregon Trunk’s James J. Hill swept into Bend and drove the golden spike at the Bend depot marking the completion of the route. Hill’s speech that day was one of great promotion of the area. He had that day seen “the vegetables and grains and grasses, the products of the soil that reflect the power and the natural wealth of the soil. And, there is no mistake about it,” he said, “it can be done because it has been done.” The fruit, vegetable, and grain exhibit that day in the middle of Oregon Avenue between Wall and Bond streets reportedly “was an eye-opener not only to the visitors but to a majority of the Bend people themselves.” His representative, John I. Springer, had been in the region and set in motion a number of matters two years earlier, and had met with Drake and other members of the Bend Board of Trade. Hill’s operations had been advertising the lands in the area for some time by the time the railroad arrived. The railroad provided the avenue for settlers in greater number to arrive and for irrigated farm products, livestock, lumber, and other products to travel to regional and national markets.

THE CENTRAL OREGON PROJECT AND THE CITY OF REDMOND

Settlement of Redmond, 1905-1911

In the Pacific Northwest, Schwantes points out, “when irrigation opened new lands to settlement, cities, and towns typically spearheaded agricultural development of the surrounding countryside and formed local markets for farmers.” The D. I. & P. Co.’s Supplemental Articles of Incorporation provided: “To establish colonies,

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Various Deeds, see Bibliography.

319 “Townsite Chiefs Start Work,” (The Bend Bulletin, April 15, 1191), 1. The spokesman for the firm said the new company will inaugurate a vigorous publicity campaign. It is the intention to issue much advertising matter and to keep Bend in the public eye;

320 “Buyers Busy: Local Lots Are Selling Rapidly,” (The Bend Bulletin, April 26, 1911), 1. A list of buyers and lots is provided.


322 “Notes,” The Bend Company, Price, Waterhouse & Co., March 31, 1916; “Bend Townsite Changes Hands: New Company Takes Over Holdings of Drake and Raymond, Including All the Properties At Bend,” (The Bend Bulletin, March 8, 1911), 1. Among the holdings affected by the transfer included portions of the Bend Townsite, and Center, Park, and North Additions. Figures are the percentage that had been sold by March 31, 1916, of the total number of properties transferred from Drake’s holdings to The Bend Company.


324 Ibid., 8.


326 “Hills Interested in Deschutes County,” (The Bend Bulletin, October 6, 1909), 1.

327 “At Last,” (The Bend Bulletin, August 28, 1908), 4. The Bend Bulletin opined on the matter several years before, saying “There will be a top-notch market for every pound of hay, grain, vegetables, butter, and eggs that the country can produce.”

cities, villages, and towns, including the layout of said towns into lots and blocks and dedicating the streets and alleys of the same to public use. The company developed a plan to establish a town near the north end of the PBC in the area to be irrigated and then formed the Redmond Townsite Company. In May of 1905, as water flowed in the PBC and was delivered to settlers, engineers began surveying and staking out the town, and crews of laborers cleared streets and lots for the Townsite of Redmond in May 1905, beginning with 20 acres, with a total of 320 acres set aside. The PBD Co. platted the new town shortly thereafter.

Redmond was located on the PBC and was named for Frank T. and Josephine Redmond, husband and wife, who had left school teaching positions in North Dakota, settling in Wasco, Oregon, for a short time. At the end of the school year in 1904, they set up their homestead tent amid the sagebrush and junipers on land to be served by the PBC. According to Brogan, "The Redmonds, records indicate, were the first purchasers of Carey Act land in Central Oregon." For two years, they hauled water from the Deschutes River several miles away, later building a farmhouse and outbuildings, bordered on one side by the PBC and, in 1911, on the other side by the railroad. The Redmonds exhibited the greatest number of farm products at the first (1906) and second Potato Show sponsored by the D. I. & P. Co. However, their toughest competition came from the company’s experimental farm. The city incorporated on July 6, 1910.

Challenges of Early Settlers near Redmond

Challenges of the early settlers were described by noted local author and historian Keith Clark in Redmond: Where the Desert Blooms: "Settlers who came to Redmond came there to farm, to improve the land, to subsist from it, or sell it for a profit. The circumstances of water made land prices higher, but the certainty of some sort of harvest was worth the gamble. When the land was acquired in its pristine state of sagebrush, juniper, and lava rock, it had to be tamed. The sagebrush and the junipers were little hindrance to pioneers whose 'athers and grandfathers had cut their way west from the eastern seaboard. The rocks were something else... Farmers built stone boats, heavy sleds upon which the rocks picked painfully from the land could be dragged to a disposal point. Some rocks defied removal, and since there was obviously no soil under them, they were left intact. Sans rocks, the sandy acres must then be leveled and made ready for planting... All [of] this with horse and hand power from dawn to dusk." Rocks moved toward the surface with plowing and the freeze/thaw cycle of winter and had to be removed every year.

Reflecting on Redmond's Settlement

A February 9, 1911, Redmond Spokesman article reflected the city's settlement, growth, and optimism, counting a variety of business and social opportunities in the city:

"Redmond has a garage, two banks, two doctors, one bakery, a brickyard, four lawyers, three saloons, two dentists, two railroads, one tailor shop, a skating rink, novelty works, two feed stores, a public library, a reading circle, two newspapers, two drugstores, one harness shop, two barbershops, three restaurants, two transfer lines, one hand laundry,

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329 "Townsite of Redmond," (The Bend Bulletin, May 5, 1905), 1. B.S. Cook & Co. was the realty firm; Cook was an irrigation company engineer. Location was about four miles east of Cline Falls in section sixteen, township fifteen south, range 13 east.
Authors cite a September 21, 1933, Redmond Spokesman article, "D. I. & P. Headquarters to be Located at Redmond," (The Redmond Spokesman, September 13, 1910). 1. The company announced, at that time, it would move its headquarters from Bend to Redmond; Ward, Elizabeth, Redmond; Rose of the Desert, (Redmond: Midstate Printing, June 1975), 2-3. Ward writes that Redmond got its name from a conversation Mr. Redmond had with two D. I. & P. Co engineers, Charles M. Redfield and B. S. Cook. The engineers suggested the name 'Redmond'; "Waterworks Plant: Plans Drawn for System at Redmond," (The Bend Bulletin, June 28, 1907), 1. By the summer of 1907, D. I. & P. Co. engineer C.M. Redfield had drawn up plans for a waterworks system for Redmond.
332 Clark, Keith, Redmond: Where the Desert Blooms, (Portland: Western Imprints, 1985), 8-9. Clark's qualifications as historian and author are presented above in earlier material.
Central Oregon Canal Historic District
Name of Property
Deschutes Co., OR
County and State

a city water plant, two lumber yards, one jewelry store, a fire department, a basketball team, two photographers, one millinery store, two meat markets, two bowling alleys, one furniture store, a social dancing club, a woodworking plant, two hardware stores, three blacksmith shops, an electric light system, two large general stores, five real estate agencies, four confectionary stores, a central telephone office, five church organizations, two billiard pool halls, a brass band and orchestra, a passenger and express line, two large sale and feed stables, four fraternal organizations, one cleaning and pressing establishment, ladies auxiliary to the Commercial Club, a public school to the tenth grade, the largest department store in Central Oregon, a Commercial Club with a membership of over 100, [and] two hotels.\textsuperscript{333}

In an April 23, 1921, letter to Fred Henshaw of the Federal Power Commission Board of Engineers, from J.G. McGuffie, Secretary and Counsel for the Central Oregon Irrigation Company, a successor of the D. I. & P. Co., McGuffie observed "the thrifty town of Redmond with its banks and mercantile establishments is wholly dependent upon the agricultural community surrounding it, which is the result of irrigation" [emphasis added].\textsuperscript{334}

Powell Butte is 8 miles east of Redmond and 25 miles northeast of Bend. The development of Redmond provided shopping and services much closer than in Bend for the settlers in Powell Butte.

THE RESULT of IRRIGATION: FARMING and AGRICULTURE IN THE DESCHUTES COUNTRY

D. I. & P. Co.'s Experimental Farm, June 1905

Reclaiming the arid land was a goal of the project. The company knew that most people coming to buy land and try farming on the high desert in volcanic soil did not have any experience in the conditions found there. Another factor in the success of the Central Oregon Project was the company's research and a series of news articles and booklets dispensing information to settlers about which crops could be successful in the high desert and about the best methods to distribute the irrigation water to the crops. The D. I. & P. Co. established an 'experimental farm' on 100 acres just outside Bend to demonstrate what its lands could produce, as part of its promotional campaign to attract settlers to visit and buy the segregated lands. It showed positive results after a year of operation. The land was cleared and leveled, the soil was prepared and seeded, and then ditches brought water on to it, and cultivation began. Water was introduced at every part of the farm and was applied in numerous ways to a variety of crops under various conditions. Careful records of the results were kept. Grain was subjected to irrigation by different plans. Beets had the water carefully measured out to them. Data from various measurements were used as a basis for calculating how much water a farm might need for certain crops under various circumstances and conditions. The products were tried on the market and they were 'snapped up in a hurry. No man has ever [eaten] more delicious vegetables than come from the farm,' a reporter noted. A wide variety of experiments were conducted with multiple crops grown together. There were fields of oats and vetch, oats and peas, and the three were sown separately. There were dry-land crops and wet-land crops. After one year of development the experimental farm was a success.\textsuperscript{335} Competitions were held to bring in the private experiences of farmers in Alfalfa and Powell Butte and the results were published in the newspapers.

\textsuperscript{333} "What We Have in the Hub City," (Redmond Spokesman, February 9, 1911), sec. 2, 1; Oregon Cooperative Work, U.S. Department of the Interior, Reclamation Service, Deschutes River Projects, Bulletin No. 1, (Washington: Government Printing Office, 1914), 4. The federal government reported Redmond with a population of 800 in its 1914 bulletin. Terrebonne, just five miles north, had 76 residents.

\textsuperscript{334} McGuffie, J. G., Secretary, Central Oregon Irrigation, Letter to Fred F. Henshaw, Federal Power Commission Board of Engineers, April 23, 1921.

\textsuperscript{335} "Change of a Year: Transformation at the Experiment Farm of the D. I. & P. Co.—Crops in Excellent Condition," (The Bend Bulletin, June 16, 1905), 1; "Our Land and Water: Experiments to Learn Behavior," (The Bend Bulletin, April 7, 1905), 1.
The following two photographs show promotional photographs of farming methods being tested at the Deschutes Irrigation & Power Company's Experimental Farm were aggressively published across the country. The first one appears to be in summer; the second one appears to be near harvest time.

Furrow irrigation on D. I. & P. Co.'s Experimental Farm. 1910

Early Farming Success
Near Bend, the ranch of Dr. C.E. Coons, in 1906, portended the success other farmers would have. All over the segregation various crops were "showing a most gratifying growth." Coons' forty-acre tract was "proving a veritable garden spot - an example of where water makes the desert bloom as the rose; a promise of what the future will bring to the upper Deschutes valley," said a report in mid-summer. His tomatoes were 10" high with broad tops and had a healthy appearance. Squash vines showed remarkable growth. Sweet corn planted two months earlier were 12" to 18" tall. String beans showed not a patch of frost and promised a high yield. Four-thousand cabbages were heading and soon to be on their way to market. Lettuce was impressive with leaves 8" to 10" long and from 6" to 8" wide. It was very crisp and tender. Potatoes planted in mid-April were already providing the doctor's family with a plentiful supply. Grains were doing well, too, with rye more than 6' high. Strawberries, gooseberries and raspberries were all growing beyond expectations and already producing fruit. The article noted, "Ranches all through this region are making remarkable showings this year, and the doctor's success is no exception."

Despite the challenges, numerous farming success stories are associated with the Central Oregon Project. The Morning Oregonian observed, "Upon this land, whose soil is of rich volcanic ash, practically all the products of the temperate zone can be raised advantageously." Rasmus Petersen, a Danish immigrant, came to settle and farm between Bend and Redmond in 1905, initially earning wages by working to construct the PBC. He was inspired by an article written for a Portland newspaper by Governor Chamberlain after his visit to the area, beginning "If I were a young man, I would acquire an irrigable tract of land in Central Oregon." Petersen's story of arduous, backbreaking homesteading work in the ubiquitous lava rock, and subsequently developing an extremely successful irrigated farm is well documented. He acquired 200 acres by homesteading under the Carey Act and successfully grew wheat and oats, alfalfa, potatoes, and other crops, becoming financially successful. A September 30, 1915, article on local farms and ranches in the Redmond Spokesman described Petersen's farm as follows: "Rasmus Petersen ranch: Fine corn and oats and 200-ton

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338 "Railroads Will Open Great Inland Empire: Crook County," (The Morning Oregonian, February 4, 1911), 42.
crop of alfalfa from 85 acres. He also very successfully raised dairy cows and other livestock under the irrigation system.

Petersen was among farmers in the area in 1925 that cooperated with the county agriculturist to test different strains of Deschutes Netted Gem, a variety of Russet Burbank potato that had been developed in the area. A program overseen by the federal government began as early as 1904 with a letter from the Honorable Elwood Mead, chief of the irrigation and drainage investigation of the U.S. Department of Agriculture, indicating plans to establish an agricultural experiment station relative to the PBC to "conduct a scientific and practical study of the soil under sound farming operations." The Agricultural College conducted a demonstration farm near Redmond in 1912, growing crops used for livestock feed. The average yield of clover and alfalfa was a little over three tons per acre. Corn yielded sixteen tons of fodder, rutebagas twenty-five tons, mangels (a type of beet used for forage for cattle, chickens, swine and sheep) twenty tons, field peas three tons of hay per acre, spring barley sixty to seventy bushels per acre, spring oats fifty bushels per acre, and potatoes yielded ninety to 245 bushels per acre. The report noted, "This shows something of the possibilities of this [area], where the best modern methods are employed."

**Deschutes Country Average Parcel Size, Crop Report and Farm Census, 1915**

A census of crops, stock and people was made in a report on the Central Oregon Project to the Desert Land Board in 1915. It included 645 farms with an average size of 48 acres, and an average size of small farms of 42 acres. The total irrigable acres reported on were 30,692. The types of crops and their acreage were as follows: Alfalfa, 7,351; clover, 2,250; grain, 6,004; potatoes, 757; orchard, 222; garden, 612; miscellaneous, 525; and total acres in crop, 17,719. The stock census found the following: beef cattle, 1,209; dairy cows, 1,004; horses, 1,174; swine, 5,589; and sheep, 443. Total rural population found in the study was 1,368, not including population in towns and cities.

Markets existed in the cities, in the small towns, and within the farming communities. Settlers also had truck gardens, saddle horses, horse team to pull farm equipment, hogs, goats, chickens and a milk cow for their own use or to share with neighbors.

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341 The program was through the Oregon Agricultural College. It later became Oregon State University's Extension Service.
343 "Will Try Our Land," *The Bend Bulletin*, September 30, 1904, 1. Mead indicated work would be conducted under his direction for three years. A federal irrigation expert was to select acreage where conditions are best suited to demonstrating the powers of [the] soil and climate and showing the best method of treatment. This station would conduct a scientific and practical study of the soil under sound farming operations. Director Withycombe of the Oregon Agricultural College was interested and planned to "follow the work with careful attention." Mead was based out of Cheyenne, Wyoming, and was in charge of directing irrigation studies across the West. Withycombe, of the Oregon Agricultural College, now Oregon State University, became Oregon's fifteenth governor, 1915-1919; "Valley Project to Refine Great Basin Resources," *The Register-Guard*, July 31, 1938, sec. 1, 5. By 1935, Elwood Mead was referred to as the "foremost authority in America on irrigation." Lake Mead behind Hoover Dam was named after him.
344 State Engineer, [Presumed to be John Lewis], *Deschutes Project: Oregon Cooperative Work*, (Department of the Interior, U.S. Reclamation Service, Portland, 1914), 123-24. These crops were primarily for dairy herd and hog raising feed. Water used was considerably less than that generally assumed to be needed in the area. The experimental station remains in Central Oregon today.
345 Dubois, John, Field Inspector, *Report to Desert Land Board on Central Oregon Project*, (Salem: State Printing Department, 1915), 47.
Bountiful Crops and Livestock in Deschutes Country, 1913
Harvest levels of all crops in 1913 were extremely high, as was production of livestock across the Deschutes Country. Farming was being increasingly diversified. Both clover and alfalfa hay products attained high levels. Big root crop yields were reported. It was said to be "probably the best all-round year they had." Potatoes yielded as much as 400 bushels per acre. The largest yield of hay was four tons per acre. The variety of vegetables raised in the area had steadily grown in volume not simply with gardens, but in acres of parsnip, carrot, rutabaga, artichoke, cabbage, and pea. In addition to crops, cattle were being raised in increasing numbers as the dairy industry grew. The hog population was growing fast, and swine raising was popular at Powell Butte. Lesser quality livestock were replaced by the best breeds of beef, dairy and pork. The region was viewed as "on the eve of doing great things in producing butter and allied products and pork."  

Settlers Organize to Market Farm Product, 1919-21
By 1919, the Deschutes County Farm Bureau had organized various settler communities for buying and selling hay. Alfalfa hay was one of the most profitable products to grow. The Oregon Cooperative Hay Growers for the Deschutes Valley was organized in Redmond in December 1921. Forty-one growers represented the farms near Bend, Redmond, Deschutes, Terrebonne, Alfalfa and Powell Butte. That year, the cooperative farmed over 1,000 acres of alfalfa, and sold 1,500 tons of hay. A policy of selling only certified product was adopted. All hay shipped out was identified with a tag: "Oregon Cooperative Hay Growers' Deschutes Valley Hay." Primary markets were the Atlantic seaboard and California. 

Farming Acreage Summary 1913, 1922, and 1931
The U.S. Department of Interior reported in 1913 that the PBC was "serving water to 25,000 acres of irrigable land, of which 16,800 acres were actually in crop." A 1915 report to the Desert Land Board showed that of the 21,348 irrigable acres of land in 1914, under the PBC system, 18,913 acres, or 89% percent were sold. By then, the PBC had 30.1 miles of main canal and 175.08 miles of laterals. The Federal Power Commission's 1922 report stated that 19,163 acres were sold under the PBC, with 1,542 acres unsold.

346 Redmond Now, 1910
347 "Crops This Year Are Bountiful," (The Bend Bulletin, October 22, 1913), 1.
348 "Farm Meeting Held At Pleasant Ridge," (The Bend Bulletin, February 27, 1919), 6.
351 Dubuis, John, Field Inspector, Report to Desert Land Board on Central Oregon Project, (Salem: State Printing Department, 1915), 9, 18. Report submitted for publishing on December 1, 1914. Irrigable acres see p. 9. Of the total irrigable acres in 1914, under the COC, 25,573 acres were sold, or 69%, suggesting the PBC system was more successful in creating farms. The COC has 44.15 miles of main canal and 187.51 miles of laterals.
Central Oregon Canal Historic District  
Name of Property

The COC had 45 miles of main canal and 11 laterals and was serving 26,400 acres.\textsuperscript{352} There were 27,208 acres sold under the COC system and 9,170 acres unsold.\textsuperscript{353} The engineer reports showed that there was 'a material shortage of capacity in the main canal' and enlargement efforts were begun and undertaken as funds were available.

Polk's Deschutes County Directory for 1924-25 stated, "We have ... 1,000 farms producing alfalfa, potatoes, grain and other farm crops suitable to our soil and climate."\textsuperscript{354} The Bend Chamber of Commerce reported, "The number of farms in Deschutes County increased twenty-three percent from 1925 to 1930, according to United States census figures, exceeded by only three counties in the State of Oregon, and the value of farmlands and buildings increased eighteen-and-a-half percent, exceeded, again, by only three counties in the state. These Deschutes County increases were all in irrigated sections."\textsuperscript{356}

Author and historian Phil Brogan's research a decade later (1931) summarized the work that had been accomplished by both canals during the period: "Actual construction started in 1903 and up until 1921 approximately 600 miles of canals and laterals had been built and 45,371 acres of land reclaimed for irrigation."\textsuperscript{356}

END OF THE COMMERCIAL ENTERPRISE UNDER THE CAREY ACT  
SETTLERS BECOME THE CENTRAL OREGON IRRIGATION DISTRICT, 1921

To complete the June 17, 1907 requirement of the State Desert Land Board to turn the D. I. & P. Co. over to the settlers within 10 years, a proposal arose in 1915 that the Central Oregon Irrigation settlers begin to form a district.\textsuperscript{357} At that time, irrigation economist Ray Palmer Teele, M.A., wrote in his 1915 book, "Few large Carey Act enterprises have reached the stage of being turned over to the purchasers of water rights."\textsuperscript{356} A district, it was proposed, could be perfected by the settlers themselves without any great difficulty. Specifically, it noted: "After the district has been organized, arrangements can be made with the Central Oregon Irrigation Company to acquire all its water rights, construction works, contracts with the State, and all the liens on unsold reclaimed lands within the limits of the Pilot Butte and Central Oregon canals. It is to the best interests of all those who now own land under the system and who have acquired water rights there to formulate some feasible plan of reorganization. It is also evident that the Central Oregon Irrigation Company has certain rights which cannot be eliminated or overlooked. It would seem also that the best interests of the neighboring towns, as well as the settlers on the project would be best protected by the management of all matters pertaining to the project by the settlers and farmers themselves, as would be the case under the district idea."\textsuperscript{359}

A date for the vote to form an irrigation district was set by the Desert Land Board. The vote was in favor of forming a district to take over and operate the irrigation system in lieu of a Water Users Association, as had been provided for in the company's contract with the State of June 17, 1907.\textsuperscript{360} Following the settlers' formation
of the district, various issues ensued with the irrigation company. Ending a long engagement between the settlers and the company, Judge John McCourt, Multnomah County Circuit Court, Portland handed down a decree. The effect of the Final Decree, known as the Dietrich Decree, was to turn over the ownership and operation of the irrigation system to the settlers organized as the COID. It transferred water rights, irrigation canals, and other assets roughly valued at $3,000,000 to the COID. The settlers who had water rights had become a district. The 20 years of the project as a commercial enterprise under the Carey Act came to an end.

THE CENTRAL OREGON CANAL SERVES THE COMMUNITY OF ALFALFA

The COC was integral to the settlement and growth of the Alfalfa Community. According to the Deschutes County Clerk's records, the first deeds in the sections around T17S, R 14E, Section 23 were recorded the year that the canal construction began, in 1905. Alfalfa is a small farming community in Deschutes County. It is located about 15 miles east of Bend and on the northern edge of the Oregon Badlands Wilderness Area. It is about halfway between Bend and Prineville (Figure 1). Alfalfa was named for the alfalfa forage crop commonly grown in the area. Irrigation water arrived in 1908 and settlement came with it. The Alfalfa post office was established on January 29, 1912. The Alfalfa community and agricultural area is known as an irrigated oasis in the desert. The community is surrounded by dry scrub lands that are primarily in county, state or federal ownership (Figure 22). Cattle and sheep ranches and stables for horses are common there. Parcels were generally 40 acres, but by 1918, the Johnson Ranch was 1000 acres.

The first one-room school, called the Guerin School, was constructed in 1908. Steve Lent, Crook County historian, wrote, "The completion of the Central Oregon Irrigation Canal opened up the area to major irrigated farming. Prior to the arrival of irrigation, the plains were dryland farmed and homesteads were scattered across the landscape. The community region continues to be a highly productive farming and ranching zone." Zell Pond, named for Benjamin F. Zell, a setter who was murdered by a farmand, and Reynolds Pond, named for William H. Reynolds, a settler from Iowa, are fed by the 'L' Lateral of the COC, and are popular local recreational areas. Shumway Lake is served by the 'J' Lateral and is now part of Brasada Ranch Rescr and is north of Alfalfa.

Completion of construction. Approval of the newly formed COID was formally given by the Desert Land Board on February 26, 1918; "Change in D. I. & P. Co.," (The Bend Bulletin, March 15, 1907), 1. In March, 1907, Ohio owners had disposed of their interests in the D. I. & P. Co. to other owners who then owned all the stock. Soon thereafter a new Agreement was signed between the State and the owners of the irrigation company who were J. Edwin Sawhill and John Steidil of the Deschutes Country, and Edward A. Baldwin, Frederick S. Stanley and Jesse Stearns of Portland. Johnston and Turney were among the Ohio sellers; "The Deschutes Irrigation & Power Co. to State Land Board, The Amended and Supplemental Agreement," [Filed] August 7, 1908, vol. 5, 150-67. Under he date of June 7, 1907, a new Agreement (contract) was entered into between the D. I. & P. Co. and the State Land Board embracing the remainder of the land in Segregation List No. 6, not under contract with the settlers, and the land in Segregation List No. 19, comprising some 56,000 acres gross, and lying in the bend of the 'horseshoe' formed by the Pilot Butte and Central Oregon canals. (Segregation List No. 19 was the C.C. Hutchinson's Oregon Irrigation Company segregation that the D.I. & P. Co. had acquired in the 1904 buyout.)

Brogan, Phil F., "The Watering of the Wilderness," (The Bend Bulletin, March 20, 1931), n.p. Legally, the case was "Dietrich vs. the Central Oregon Irrigation Company"; Brogan, Phil F., "The Watering of the Wilderness," (The Bend Bulletin, March 21, 1931), n.p. The statement issued by the district board of directors, who were John A. Riggs, C.H. Hardy and J.G. McGuffie, said, "On July 9, 1921, a decree was entered in the circuit court of Multnomah County, Oregon, in the district's suit against the Central Oregon Irrigation Company, commanding the company to turn the irrigation system over to the settlers on the first day of August 1921. By this decree the district and the holders of contracts upon the segregation receive a prior right for water for the amount provided in the decree over any rights of the company, and the relative rights of the company and the district are very clearly established." Officially transferring to the COID, the title to the water rights and system of the Central Oregon Irrigation Company, the company's deed to the settlers was received in Redmond on the morning of August 1, 1921. The transfer of the management of the company to the district did not involve any difficulties, for at the special meeting of the district directors in Redmond on August 2nd George W. Kanoff, superintendent for the company, was secured as manager of the new district; "C.O.I. President Takes Bride," (The Redmond Spokesman, September 23, 1921), 1. Frederick S. Stanley was president of the irrigation company at this time.

Lent, Steve, Central Oregon Place Names, Volume III, Deschutes County, 1, 2.
The Central Oregon Canal serves the community of Powell Butte

Powell Butte is an unincorporated ranching community in Crook County with a population of 1,768. It is adjacent to Prineville, which was platted in 1877, and is the Crook County seat and the main shopping and governmental center for Powell Butte. The Powell Butte community is centered around T16S, R14E, Section 23, at the base of Powell Buttes. Powell Butte is located a half hour’s drive northeast of Bend, nine miles southwest of Prineville and eight miles east of Redmond. The post office at Powell Butte was established on March 12, 1909. The area was dry farmed prior to 1908 and water had to be hauled from springs near the base of Powell Buttes for domestic use, orchards and livestock. The first school there was LaFollette School, established in 1893.

The irrigation companies did not establish the community of Powell Butte. Settlement in Powell Butte began twenty years previously, in the 1880s, because of its proximity to the Crook County seat in Prineville and partly because the area has deeper soil and less rock than other areas. The Central Oregon Project facilitated widespread irrigation of crops and attracted more people to the community. Some of the land in Segregation List #6 was in the Powell Butte area and the irrigation companies were required to provide water to the purchasers of the land they sold. Providing enough water in the canal and laterals to reach settlers at the end of the line proved to be exceedingly expensive and challenging. In August 1905, the original shared flume at the south diversion point had been enlarged again and could convey 650 cubic feet per second for both the PBC and the COC. It was figured that it took one cubic foot per second for each 160 acres to be irrigated. The first six miles of the COC were constructed at the time. It was thought that there would be enough water in the COC system to serve 96,000 acres, including Alfalfa and Powell Butte. But there were concerns about the capacity at the original intake at the river and the City of Bend was pressuring the D. I. & P. Co. to move the intake to the north side of town so that more water would flow through town during irrigation season. The project’s chief engineer, Redfield, thought he had found a solution to both problems by moving the intake for the PBC and separating the two systems.

In September 1907, surveyors were north of Bend locating the best place for the proposed North Dam and diversion point. The dam would be 39' tall and 313' wide. Water would be delivered to the PBC by a proposed 1.41-mile-long North Canal. Redfield’s plan was to disconnect the PBC from the eight miles of canal located between the original diversion point and the eastern end of the new North Canal. As conceived that year, the dam would also divert water for the Powell Butte area and it would be conveyed by a new 28-mile canal that would run northeast to Powell Butte, bypassing the COC entirely. But his idea was found to be too expensive, and it was decided to water Powell Butte with increased flows in the COC, when the PBC had its own diversion point at the North Dam. The dam and the North Canal were completed for $220,000 and connected to the PBC in 1912.

364 Undated photo in Bowman Museum Collection, Prineville, Oregon.
Work on the COC with large crews of men and horse teams continued while Redfield planned the new dam and connecting canal. Teams completed the canal to Alfalfa in 1907. In the fall of 1907, the crews were north of Alfalfa in the old Dry River bed. Plans were to build a large flume and a stave pipe to cross the Dry River north of Alfalfa. A camp composed of 35 men and 18 horse teams installed the trestle and redwood pipe. The parts for the pipe were made to order to Redfield's specifications by the Douglas Fir National Pipe Company of Olympia, Washington. The pipe was 1,620' long and 56" in diameter. The canal and pipe carried enough water to irrigate 12,000 acres. The trestle and pipe were completed in January 1908 for a total cost of $10,000.

Ca. 1908 photo of the dry terrain at Powell Butte with water flowing in the Central Oregon Canal.

While the structure was being constructed, crews were also working on the canal north of the siphon to Powell Butte. When the siphon was completed, the water was emptied from the pipe into an open irrigation canal 16' wide and 4' deep. During the 1908 irrigation season, water was flowing in the COC for 45 miles across the high desert, from the Deschutes River to Powell Buttes. Lateral construction continued, and the system was enlarged in some locations through 1914. By 1908 the main canal was completed.

Little Houston Lake and Houston Lake are about four miles north of Powell Butte and five miles west of Prineville. The 1908 irrigation ditches filled an old lakebed that was dry most of the year, creating an extensive wetland. The lakes are named for Sallie and John Thomas 'Tom' Houston, who came west from North Carolina in 1885. He was a sheep and cattle rancher and allowed friends to hunt ducks at his lakes.

Crook County historian Steve Lent wrote, "Powell Butte has developed into one of the premier farming areas of Central Oregon, with mint, hay, and potatoes being the main crops"(Figure 1 and 23).

SETTLEMENT AND FARMING IN THE NOMINATED CENTRAL OREGON CANAL HISTORIC DISTRICT
The historic district is just south of Bear Creek Road and is between Ward Road on the west and Gosney Road on the east. Bear Creek Road was an old wagon road that was the main arterial road connecting Farewell Bend (the name of the community called Bend before it was platted in 1904 and incorporated in 1905) to the then county seat, Prineville, and the Bear Creek region of Crook County. It was the only through-road east of Farewell Bend at the time that the Central Oregon Project was initiated. Gosney Road was constructed in 1920 by Deschutes County and named for property owner Glen R. Gosney, who petitioned for the road. Ward

365 Crook County Journal, Prineville, OR, July 14, 1910, 1.
366 Photo in Bowman Museum Collection, Prineville, Oregon.
367 Lent, Steve, Central Oregon Place Names, Volume 1, Crook County, 157.
369 Lent, Steve, Central Oregon Place Names, Volume 1, Crook County, 251-254.
390 Lent, Steve, Central Oregon Place Names Volume III Deschutes County, 12, 13.
Central Oregon Canal Historic District

Name of Property

Road is named for Arthur Ward, another property owner who petitioned for the road in 1921. The 1928 irrigation maps show bridges over the COC at Ward Road and Gosney Road (Figures 11, 12). Access to the farms was good and Bend was only 5 miles away when the canal was planned. Due to the phenomenal city growth, it was only 1.5 to 2.0 miles away during the historic period.

Weekly, the local *Bend Bulletin* newspaper reported on a few visitors staying in hotels or looking for land. A typical article would be like the following: May 5, 1909, page 5, "Philip C. Burt of Battle Creek Michigan, has been spending the past week in Bend. Mr. Burt is looking over the section with a view to investing in land.

Settlers in the historic district included five women and people from Austria, Australia, Yugoslavia, Norway, England, and at least eight states. Typical of the thousands of settlers in the area, a minority of settlers along the canal in the district, such as dairy farmers Philip Burt and the Bradetich Brothers, became long-term, successful farmers. Most settlers supplemented the farm income by holding other occupations, because productivity of the land was marginal. Others were not successful farming in the rocky, volcanic soil in the high desert with its short growing season and harsh winters and sold their land. Others lost their land through COID, tax or mortgage foreclosures, often in the 1920s and 1930s. One settler in the district rebought their land when finances improved.

Water Rights on Parcels around the Historic District

The main canal in the COCHD passes through four Sections: T18S, R12 E, Section 1; T18S, R13 E, Section 5; T18S, R13 E, Section 6; and T18S, R13 E, Section 8 (Figure 3). Each section contains approximately a square mile, 640 acres of land. Some of the land was offered for sale with appurtenant water rights (Figures 11 and 12). The section with the highest percentage of irrigation rights was in T18S, R12 E, Section 1: 59%. T18S, R13 E, Section 6 had 29% of the land with appurtenant irrigation rights. T18S, R13 E, Section 5 had only 12% of its land with irrigation rights. T18S, R13 E, Section 8 offered less than 1% of its land with irrigation rights. All the irrigation rights on the downhill (north) side of the canal are for water delivered by the COC. Some of the water on the high side (south) is delivered by the Arnold Canal in the Arnold Irrigation District.

<table>
<thead>
<tr>
<th>Location by Section</th>
<th>Acres with Water Rights</th>
<th>Percent of Land with Appurtenant Water Rights</th>
</tr>
</thead>
<tbody>
<tr>
<td>T18S, R12 E, Section 1</td>
<td>378.0</td>
<td>59%</td>
</tr>
<tr>
<td>T18S, R13 E, Section 5</td>
<td>76.5</td>
<td>12%</td>
</tr>
<tr>
<td>T18S, R13 E, Section 6</td>
<td>190.5</td>
<td>29%</td>
</tr>
<tr>
<td>T18S, R13 E, Section 8</td>
<td>57.3</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

Settlers Purchase Land in the Historic District

The point of developing the irrigation system was to make a profit for the investors by selling reclaimed land to settlers under the Carey Act contract with the State. If all went well, and it did for the most part, the income from property sales would exceed the expenditures needed to construct the dam and canals, build urban infrastructure, run the experimental farm, hold local promotional events, and promote the project nationally. To be financially successful and meet the terms of the contract with the State of Oregon, the companies had to attract settlers and provide irrigation water to the highest point on their land. The success of the settlers was important to balance the equation.

Access to the area from Prineville and Bend was on Bear Creek Road and was very good, and its location was close to Bend. But, due to the hills, slopes, and rock, the land south of Bear Creek Road between Ward Road

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370 Lent, Steve, *Central Oregon Place Names* Volume III Deschutes County, 101, 300.
and Gosney Road was not the best in the area and was settled after better land was taken up. The best land was purchased in 40 to 160-acre parcels, while the canal was under construction. Poorer land was settled last or not at all. Land on flat terrain with water rights and sparse, loose rock and deeper soils was the most valuable. Taller juniper trees and denser vegetation often signaled deeper soil but created more work to clear the land.

Figures 14a., 14b., and 14c. Illustrate the size and location of the original parcels and original owners (settlers) in the four sections crossed by the COCHD. Of the 640 acres in T18S, R12 E, Section 1, with 59% of the land having water rights, all the deeds of sales were recorded after COID was formed, between 1921 and 1954. Original owners included Dragan Wuyo Mirich with 280 acres, George and John Bradetic with 160 acres, Lilla I. Ford with 120 acres, and Mike Dragosavac with 80 acres.

Of the 640 acres in T18S, R13 E, Section 5, with only 12% of the land with water rights, a deed to the 120 unsold acres in Segregation List # 6 was returned in 1937 by Oregon State to the federal government. The remainder of the land was sold between 1913 and 1922. Original owners included Dora McNaught, R. A. Puet, John O’Donnell, and Theodore E. Olson, each with 80- acre parcels; and William P. Erickson and partner John Pinoniemi, Oscar J. Erickson, Esther Cockheran, Charles Durand, and Ivan R. Knotts, each with 40-acre parcels.

Of the 640 acres in T18S, R13 E, Section 6, with 29% of the land with water rights, 120 acres were returned in 1937 by Oregon State to the federal government. The remainder of the land was sold between 1910 and 1951. Dragan Wuyo Mirich bought 160 acres. Philip C. Burt bought 160 acres. J. S. Smythe bought 80 acres. W. F. McNaught, Elizabeth Dixon, and Felix G. Allen each bought 40-acre parcels.

Of the 640 acres in T18S, R13 E, Section 8, with 0.8% of the acreage with water rights, 160 acres were returned in 1937 by Oregon State to the federal government. The remainder of the land was sold to private parties between 1910 and 1924. Quinton W. Hungate and Ada Hanson Stowell each bought 160-acre parcels. Ben Alsup bought 120 acres. Norman Wygand bought 40 acres.

Of the 24 owners in the four sections, Dragan Wuyo Mirich owned the most land, with a total of 440 acres. When Lilla I. Ford sold her 20 acres to John Bradetic in 1927, the Bradetic bothers then owned 380 acres. Five women (20% of the owners) were original settlers of the parcels. Esther Cockheran, Beth Dixon, Lilla Ford, Dora McNaught, and Ada Hanson Stowell owned a total of 440 acres.

To determine the effect of the promotional efforts, using the federal census for 1900, 1910, and 1920, it was determined where many of the owners were living before they settled on the land in the historic district. They came from many countries and states. Some examples are Mike Dragosavac from Austria, Oscar Erickson from Norway, George and John Bradetic from Austria, Esther Cockheran from England, Ada Hanson Stowell from Australia, Dragan Mirich from Yugoslavia, Beth Dixon from Pennsylvania, William F. McNaught from Iowa, Dora McNaught from Washington, R. A. Puet from North Carolina, Ben Alsup from Iowa, Amy and Philip Burt from Illinois, Ivan Knots born in Oregon, and John S. Smythe from Ohio.

Many of the settlers were farmers, but many held other occupations. Dragan Mirich was a well-known stonemason in Bend, who built the railroad overpass across Third Street in Bend, the tunnels between Reid School, Bend High School and the Amateur Athletic Club for the shared steam heating system, the 1930 rock Bradetic house and the stone milk house in 1935, and other stone buildings in Bend. Ben Alsup was a civil engineer who designed roads. Ivan Knots was a lumber handler in a saw mill.

After working in a Portland lumber camp, John and George Bradetic worked on the vexed Tumalo Project dam. Then they worked in 1816 at the Shevlin-Hixon Company Lumber Mill. In 1919, they purchased their first 160-acre parcel in the historic district. They grew potatoes and started the first Grade A dairy in Central Oregon with cows they purchased from a dairy in Weiser, Idaho. They also raised swine. 371

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1932 photo of the 1926 Bradetch dairy barn, pastures and the 8-bedroom 1930 house built by Dragan Mirich.³⁷²

The State Land Board had established the rule that within three years from the date of filing on the land claims, the settlers were required to cultivate 1/8 of the irrigable acres and live on the land for at least 90 days. Or, the settler could choose to cultivate ¼ of the irrigable acres, build a house containing not less than 200 square feet of floor space and reside on the land for a period of not less than seven days.³⁷³

Crops in the Historic District
In addition to the Bradetch Dairy, some of the other settlers were successful. The owners who were the most successful and stayed the longest had land with appurtenant water rights. Others grew dry crops, such as wheat and rye, on un-irrigated land. Irrigated crops included orchard hay, apple trees, potatoes, and alfalfa. Many of the families raised milk cows, swine and chickens and sold milk, butter, meat, and eggs to stores in Bend and to other settlers. Most grew half-acre vegetable gardens for personal use. Raising honeybees was popular and honey was sold. Settlers helped one another in many ways and shared equipment and livestock.

Subsequent Owners T18S, R12 E, Section 1
In 1935, five parties owned land in T18S, R12 E, Section 1: George and John Bradetch with the 320 acres in the west half where their dairy and house were located, Dragan Mirich with 200 acres, Livola Barnes with 40 acres, Mike and Denny Vadick with 40 acres, and the US government with 40 acres (Figure 15).

In 1944, the land ownership in that section stayed the same as it was in 1935 (Figure 16).

In 1972, there were no original owners in this section. Twelve owners owned smaller parcels and Arrowhead Acres had been platted into a rural subdivision. C. W. Rickabaugh was the largest landowner and had purchased Mirich's 200 acres. Charles Boardman had purchased part of the Bradetch land along with P. Dinsmore, Ralph W. Boese, James Turner, Pete Lorch, and Jerome A. Scott. John L. Williams, Hobart Starr, the Unitarian Universalist Church of Portland, and Thomas Wallace owned land on the eastern half of the section (Figure 17).

³⁷² Photo is in the Patricia Kliever personal collection, Bend, Oregon. Photo looking south toward canal.
Undated photo of Dragan Mirich, the owner of the most land in the historic district.  

Subsequent Owners T18S, R13 E, Section 5
In 1935, in T18S, R13 E, Section 5, three original owners still owned land. Charles Durand owned 40 acres, and Margaret H. O'Donnell (widow of John O'Donnell) owned 80 acres. Robert A. Puett owned 120 acres. Other owners included the US government with 120 acres; the COID with 120 acres, L. Aulman with 80 acres, G. H. Hart with 40 acres, and Bert Torkelson with 40 acres (Figure 18). Richard Torkelson told of his father Bert Torkelson, who owned land in T18S, R13E, Section 5, giving a good milk cow to a neighboring family that was not making enough money from the land to feed their children. Torkelson Road is named for his family.

In 1944, the ownership in this section had changed somewhat. The Great Depression was hard on the settlers. The County had taken ownership of the O'Donnell land. The Federal Land Bank had taken over the Puett Ranch. Durand's land was taken over by COID. COID owned 160 acres in this section. Hart had sold ten acres to G. E. Lepps (Figure 19).

By 1972, in Section 5, the owners were all different. Wallace Crawford owned 360 acres. Deschutes County owned 120 acres. Clarence Cavin owned 45 acres and W. A. Van Hise owned 75 acres. Ben Sebrill owned 40 acres (Figure 20).

Subsequent Owners T18S, R13 E, Section 6
In 1935 in T18S, R13 E, Section 6, Phillip Clifford Burt was the only original owner who still owned land, 40 acres. His wife, Amy A. Burt owned 40 acres. The United States owned more acres, 280 acres. The County owned 80 acres. George Rastovich of Yugoslavia owned 120 acres. F. Wheeler and Paul S. Hackett each owned 40 acres (Figure 18). Ida and Paul Hackett raised about 200 turkeys for a time on their 40 acres.

In 1944, Amy A. Burt owned 80 acres. George Rastovich owned 120 acres. The United States owned 240 acres and the COID owned 60 acres. The State owned 40 acres. Monie Zink and Laura E. Newlands each owned a 40-acre parcel (Figure 19).

By 1972, Danny Rastovich owned 120 acres. C. W. Rickabaugh owned 160 acres. The US owned 120 acres. COID owned 40 acres. H. A. Starr; E. R. Fraser, Eldon J. White, and Hallie E. Hamilton each owned 40-acre parcels. J. F. Schilling owned 30 acres and Greg Hunt owned 10 acres (Figure 20).

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374 Undated Deschutes Historical Society Photo.
376 His wife Ida Hackett was from Russia. Interview with their grandson, Paul Hackett in Bend, September 2017.
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The 100-year old Amy and Phillip Burt Barn. The canal is about 150 yards to the south (right).

The Burts were successful farmers, owning the land until Amy's death in 1964 and Phillip's death in 1966. Their land had water rights for all but the portion near Bear Creek Road that was covered by rock outcroppings. Philip Burt planted apple trees and raised cows. An interesting article on page one of the April 30, 1910 *The Bend Bulletin* tells about the need to keep explosives used to clear rocks and stumps out of the reach of cows. "Escapes Horrible Disaster, Non-Explosive Curious Cow Tries Dynamite Diet Without Harm". "Last Sabbath morn an appalling accident almost disturbed the serenity of the home of Mr. and Mrs. Philip Burt, settlers on a 'forty' five miles east of town. "Tudy' their prize cow, in a fit of excessive curiosity, mistook a box of dynamite for a new breakfast food. Laboring under the not unnatural delusion, the bovine investigator started to assimilate the contents of said box at the rate of five sticks a minute or thereabout. Just then, however, the danger fraught was ended by the appearance of the cow's owner; it is said, however, that in view of the character of Tudy's repast he was exceedingly gentle in his remonstrance with her, failing entirely to apply the stick he had brought for the purpose."

Another of Burt's cows made news all over the state including in newspapers in Portland, Heppner and Independence, Oregon. An article on December 12, 1919 in the *Independence Enterprise* said, "Bend. One of the most famous dairy cows in the state changed hands Wednesday when Pricilla, heavy milk producing Holstein, was sold by Phillip Burt to D. A. Slaughter of Deschutes. Pricilla produced 26,000 pounds of milk last year, has a one-day record of 106 pounds of milk and a 15-day record of 63 pounds of butter fat."

**Subsequent Owners T18S, R13 E, Section 8**
Of the 640 acres in T18S, R13 E, Section 8, in 1935, the section with less than 1% of the land awarded water rights, no private parties owned any land in 1935. Deschutes County owned 440 acres. The US owned 160 acres. The Central Oregon Irrigation Company had foreclosed on Wygand’s 40 acres and owned them (Figure 18). As described in Section 7, Wygand’s 40 acres were sold by the company to Sidney S. Stearns, a well-known cattle rancher in 1926, through a Central Oregon Irrigation Company mortgage lien foreclosure proceeding. He was the highest bidder of $2,673.58 at an auction at the courthouse door. Stearns widow, Francis Stearns, sold the 40 acres of scrub land to the COI District in 1932 for the COID reservoir.

In 1944, Section 8 had one private owner. R. D. and Ada Stowell had purchased 160 acres from the County. She had been an original settler in this section, lost her land, and re-purchased it. The County owned 280 acres. The US owned 160 acres. COID owned 40 acres (Figure 19).

By 1972, the US owned 120 acres while all the remaining acreage had been sold to private parties. E. R. Perkins and others owned 210 acres. Russell Bryant owned 120 acres. Loren B. Holzhouser and others owned 100 acres. COID still owned 40 acres. A. D. Smith owned about 20 acres and James Crowell owned about 30 acres.378 (Figure 20).

377 Photo by Patricia Kiewl, November 1, 2017, looking northwest.
378 All deeds are from the Deschutes County Clerk, Bend, OR
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Farming in the rocky sections of the High Desert was difficult and nearly impossible without irrigation water. At each point in time, from 1905 to 1972, increasingly more land in the district was in government ownership and was reverting to scrub land. Even successful settlers, such as Phillip Burt, had sold most of his unirrigated land prior to 1944, and was farming part of a 40-acre parcel near Bear Creek Road.

Today, the four 640-acre sections contain some irrigated farms and a large amount of land that was never cleared or cultivated or that has reverted from dry farming to native vegetation, including a 79.60-acre parcel owned by the Bend Park & Recreation District and several parcels owned by COID. Most of Bradeticich's land is now subdivided into rural residential lots. Some of Mirich's land is being farmed by the Suzanne and Gary Grund family (51.08 acres) and Tony Licitra (58.96 acres). Looking at the aerial photo of current conditions, it is apparent that the entire western third of the land around the COC in the historic district is now subdivided into rural residential lots of primarily 1 to 3-acres, including some hobby farms with personal livestock and small irrigated pastures. The middle third of the CO Canal in the historic district has entirely scrub land south of the canal and hobby farms and scrub land on the north side of the canal. The eastern third of the CO Canal in the historic district has entirely scrub lands on the south and only one irrigated farm to the north, at the corner with Gosney Road (Figure 2).

Conclusion of Settlement in the Historic District
Due to the thin topsoil and rock in the district being undesirable for farming, no settlers purchased land along the canal in the district when it was being constructed. The presence of the canal did attract settlers to some, but not all, of the land along the canal in the historic district, because most of it did not have water rights. Rural residential development on 1 to 3-acre lots with water rights occurred between Ward Road and the Bear Creek Ranch Bridge, in 1/4th of the district, primarily between 1965 and 1975. However, most of the historic setting, with its farms, rolling hills, rock outcroppings, and native juniper and sagebrush vegetation that was present in 1921 near and alongside the canal on the eastern 3/4ths of the district, remains. The historic district uniquely demonstrates the power of the canal and irrigation water to attract settlers, and the progression of settlement from large to smaller parcels over the past 100 years. The largest parcels along the district's length have never been irrigated or developed, and historic vegetation was never cleared. The nominated stretch uniquely displays both the historic setting at the time the canal was constructed and the use of the irrigation water for beneficial uses and agriculture. The small irrigated hobby farms and larger commercial farms today with irrigation ponds and irrigated pasture for livestock represent the purpose of the canal: to attract settlers and farmers to Deschutes County by supplying irrigation water to the arid land. The area is accessible to the public, especially along the 80-acre parcel owned by Bend Park & Recreation District. Its interpretation can be achieved in an attractive, well-organized fashion without crowding or overwhelming the resource itself.

THE CENTRAL OREGON CANAL DELIVERS WATER TO MANY LAKES AND PONDS
In addition to the hundreds of irrigation water storage ponds on private property, a unique feature of this canal is the number of large, engineered reservoirs and recreational lakes and ponds that are filled by the water diverted from the Deschutes River and conveyed by the COC. The 6-acre Mayfield Pond is in the BLM Mayfield Pond Recreational Area, four miles northeast of the historic district and north of Alfalfa Market Road in T 17 S, R 13 W, Section 23. Camping and fishing are popular activities there. Just 1 mile south of the Alfalfa Store, on the 'I' Lateral, is the 12-acre Reynolds Pond on BLM land in T17S, R14E, Section 35. A 0.75-mile pedestrian trail circles the shoreline. Non-motorized boats and fishing are the main activities there.

Further east on the 'I' Lateral is Zell Pond. Zell Pond is 7.7 acres in size and is partly on BLM and partly on private land in T17S, R14 E, Section 25. An above-grade-piped stretch of the 'I' Lateral of the COC forms a berm to hold water in Zell Pond. Near the Dry River was the 11.7-acre Shumway Lake in T16S. R14E, Sections 28 and 33, on private property. It has been re-created for the Brasada Ranch Resort. Near the terminus of the canal between O'Neil Hwy and Hwy 126, and northeast of Powell Butte, is Houston Lake (sometimes spelled Huston Lake), located on private property. At an elevation of 3,022, just south of a slough,
Central Oregon Canal Historic District

Houston Lake and Little Houston Lake are natural lakes that occupy low points in the area. They were dry most of the year, until irrigation ditches supplied water to them in 1914. Other lakes filled by water from the canal are unnamed. The ponds and lakes on BLM land were created to provide wildlife habitat for fish and wildlife as well as recreational opportunities for the public.\textsuperscript{379} The 'C' Lateral that begins in the historic district runs north of Highway 20 and Alfalfa Market Road and ends in another large, unnamed pond and wetlands at Terry Drive, near Stenkamp Road, near the Bend Airport.

The 'D' Lateral, just east of the historic district, conveys water to the 6-acre Mayfield Pond at the Mayfield Pond Recreation Area north of Alfalfa Market Road near Bend. Photo taken looking east.\textsuperscript{380}

Reynolds Pond, a public recreational pond covering 12 acres on land managed by the BLM, is filled with water from the 'I' Lateral of the Central Oregon Canal. Photographer looking east.\textsuperscript{381}

Zell Pond is 7.7 acres and is partly on BLM property near Alfalfa. It is also filled from the 'I' Lateral. Photographer looking southeast toward Bear Paw Butte.\textsuperscript{382}

\textsuperscript{379} Interview with BLM staff at Prineville BLM office, May 19, 2017.
\textsuperscript{380} Patricia Kliewer photograph, May 21, 2017.
\textsuperscript{381} Patricia Kliewer photo, taken on April 4, 2017.
\textsuperscript{382} Patricia Kliewer Photograph, August 16, 2016.
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Shumway Lake, now on Brasada Ranch Resort, is filled with water from the ‘J’ Lateral of the Central Oregon Canal. Photographer looking east.  

Ditch from the Central Oregon Canal enters the private Little Houston Lake on Houston Lake Road near Powell Butte. Photographer looking south  

Water flows through a gate from the Central Oregon Canal to a cattle ranch, with Houston Lake in the background. Photographer looking southwest.  

CONCLUSION OF CENTRAL OREGON PROJECT

364 ibid
385 Patricia Kliwer Photograph May 21, 2017.
In 1921, when the assets of the Central Oregon irrigation Company were transferred to the water users formed as the COID, the water rights, irrigation canals and other assets were valued at $3 million. Between 1903 and 1921, approximately 600 miles of canals and laterals had been built for both the PBC and COC systems. The North Canal Dam, the PBC, the COC and the North Canal had been completed. The irrigation companies had founded the towns of Bend, Redmond, and Deschutes (platted as Centrallo in 1911 along the railroad about half way between Bend and Redmond) and facilitated the rapid growth of Alfalfa and Powell Butte and rural Deschutes County, which was carved from Crook County in 1916. The irrigation system had transformed the appearance of the high plateau on the east side of the Deschutes River. The developer's connections resulted in James J. Hill completing the railroad from the Columbia River to Bend in October 1911. The arrival of the railroad, in turn, facilitated the development of the huge timber industry in Central Oregon and brought in settlers and goods and allowed a nationwide market for timber and agricultural products.

In 1922, the Federal Power Commission summarized the accomplishment of providing irrigation to 57,089 acres of land in a report on the Central Oregon Project. By any standards, the Central Oregon Project was successful and has transformed the high desert plateau and brought settlement and agriculture to the towns that he founded and the surrounding area that likely exceeded Alexander Drake's 1900 vision.

Table 3: Irrigable Acres in 1922 under the Central Oregon Project by Canal System

<table>
<thead>
<tr>
<th>IRRIGABLE ACRES BY CANAL SYSTEM, 1922</th>
<th>SOLD IRRIGABLE ACRES</th>
<th>UNSOLD IRRIGABLE ACRES</th>
<th>TOTAL IRRIGABLE ACRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>COC</td>
<td>27,208</td>
<td>9,170</td>
<td>36,378</td>
</tr>
<tr>
<td>North Canal/PBC</td>
<td>19,169</td>
<td>1,542</td>
<td>20,711</td>
</tr>
<tr>
<td>TOTAL</td>
<td>46,377</td>
<td>10,712</td>
<td>57,089</td>
</tr>
</tbody>
</table>

CHARACTER OF OTHER SEGMENTS OF THE CENTRAL OREGON CANAL

The historic district includes 3.4 miles of the 47-mile-long COC. The historic district begins at mile 7.75. This portion of Section 7 compares the canal in the historic district to the other 43.5 miles of the main canal. As was stated previously, the COC follows the highest trajectory possible in the natural terrain of the high desert plateau. It is about 80' wide and 4' deep in the Bend area and narrows and gets shallower as it delivers water to laterals, sub-laterals and ditch. The 'L' Lateral diverts nearly a fourth of the remaining flow of the main canal at the southern end of Alfalfa, after which the main canal is visibly smaller. It is 2' wide and 3' deep as it conveys water to the last pond and through black plastic pipe toward the Crooked River, its terminus (Figures 6, 7, 8, 13, 22 and 23).

For the most part, the canal flows over a plateau that gradually slopes down 701' toward the northeast. However, it winds through low hills on the southwestern edge in the historic district and again on the north edge of the plateau when it flows downhill from Powell Buttes toward the Crooked River. As will be described more fully in Section 8, the first step in its construction was surveyors marking the route of the canal and the distribution system of laterals so that water could flow downhill by gravity from the main canal to the high points of each 40 to 160-acre parcel of land in Segregation List # 6 that would be sold to settlers by the project's promoters. The property owners were responsible for digging and maintaining ditches from the laterals to irrigate their land.

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388 Google Earth 2014 web site.
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Most of the flumes and large ponds along the canal are indicated on the historic USGS Quadrangle maps. None of the original wooden flumes nor the Powell Butte Siphon remains a part of the main canal. Some wooden flumes remain on laterals and ditches, such as along Torkelson Road. The setting of the canal has changed dramatically over the last 100 years, which was its purpose: to attract settlement and agriculture to the arid west. Between 1904-1914, the canal was entirely located in rural lands, when it was constructed. Now, it traverses seven miles through a dense urban area within the city of Bend. Parcel sizes continue to drop from the historic 43-acre average to a 6-12-acre average today. Originally, the water was diverted from the river into a 1.5-mile long wooden flume that was supported by wooden trestles. Next, it flowed in an open canal and an occasional flume for most of its length to Alfalfa, where it flowed through the redwood pipe of the Powell Butte Siphon. From there to its end, it was open.

Today, the first 6,261 feet of the COC are piped (where it was in a wooden flume). The non-historic pipe empties into a constrained and altered open canal with repaired native rock rip-rapped sloping sides and a rocky bed in an urban density housing development. That stretch is scheduled for piping. The canal flows under the four-lane Bend Parkway through a concrete underpass and enters the Bend commercial/retail area.

The 20-year old, four-lane Bend Parkway crosses over the Central Oregon Canal in Bend, just south of Reed Market Road. Photographer looking west.\(^{389}\)

As it enters the Bend commercial district next to the Bend Parkway, the canal generally runs along the northern edge of a gentle slope, has a cut in the earth on the south side and a 7'-tall berm to hold the water in on the north side. The beds are nearly solid rock flows, and many rocky locations hold water year around. Generally being 40' to 80' wide and 2' to 8' deep, the canal flows through urban commercial, industrial, and residential subdivisions and is piped under urban roads and streets. Next, the canal winds through the commercial area along Third Street (US Business Hwy 97) in Bend, where it is wide and shallow. Motels back up to its banks, and shopping centers are beside it. The 'A' Lateral delivers water north for six miles to urban residences and commercial users, a trailer park, and an industrial park, and then turns to the northeast crossing the city limits and irrigates small hobby farms of ½ acre to 20 acres northeast of the city, in an area that is urbanizing. The 'A' lateral ends in two ponds near Butler Market Road and Hamehook Road.

\(^{389}\) Patricia Kliwer photo, October 23, 2015, after irrigation season.
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The Fred Meyer Shopping Center at Third Street is on the south side of the Central Oregon Canal. The shallow canal bed is cut on the south side (right) and is bermmed on the north side. Looking southeast. 390

Reed Market Road is a primary east-west road in Bend, running between the Deschutes River and 27th Street, near the eastern city limits. Reed Market Road parallels the canal though new three-story multi-family and two-story single-family residential subdivisions and an industrial park between Third Street and 15th Street. The canal is heavily constrained by the urban development and has been altered to facilitate roads and bridge construction.

Looking east, Reed Market Road parallels the shallow, rock-strewn canal. It is spanned by a 2015 bridge to the industrial park along American Lane. 391

At the north end of the industrial park, the wide and shallow canal flows under the historic Union Pacific Railroad Bridge

The Union Pacific Railroad tracks cross the canal west of 15th Street, between the industrial park an urban residential area of southeast Bend. The canal remains wide and shallow with crude, inconsistent rock scattered on the sides and a rocky bed. 392

390 Patricia Kliewer photo, October 23, 2015.
391 Ibid
392 Patricia Kliewer photo, October 23, 2015.
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East of the railroad, a series of urban-density, single-family housing developments have surrounded the canal, and lots extend beneath it. A well-maintained 10'-12' wide graveled pedestrian trail was put in by the Bend Metro Park & Recreation District alongside the canal under an agreement with COID, and with the property owners' permission. The canal is surrounded by homes on 1/5 acre or smaller lots in the eastern portion of Bend. In this stretch, there are many concrete repairs and alterations to the canal embankments and bed. Locked green metal pipe gates operated by COID prevent other vehicles from driving on the path. There are many points where the canal was cut from nearly level terrain and there is no berm. Lawns and other residential landscaping extend to the edge of the water. The canal next passes through a large mobile home park on the west side of 27th Street.

Urban housing developments surround the altered shallow canal with no berms near Ferguson between 15th and 27th Streets. The graveled pedestrian trail follows the canal through the neighborhood.393

East of 27th Street, the canal is bordered by the graveled urban pedestrian trail and is walled on the north side of the trail with wooden privacy fences along the canal easement, installed by the developer of the modern, urban density residential subdivision. For the ½ mile between the urban subdivision and Ward Road, scrub land, uncultivated land and some residences on two-to-five-acre lots are scattered over the area. Most of the segment passes through scrub land of sagebrush and bitterbrush. The largest parcel west of Ward Road is the unirrigated 20 acres owned by the Eastern Cascades Model Railroad Club, which houses an extensive indoor model railroad system and a mile of outdoor track in 1:8 scale. Rideable electric, gas and steam trains run on the outdoor track, which is continuously being extended and improved for the club members. An open house each fall is a popular event, where adults and children wait in long lines to ride the trains repeatedly. The remaining rural residential lots in the area west of the district are under 5 acres, and most are not irrigated. One irrigation pond is in the area. Some business development in metal buildings is visible from the canal. Only two parcels in the area are irrigated and cultivated for hay production: a 5-acre parcel off Thunder Road and a 10-acre parcel at the end of Modoc Road. Neither is visible from the canal. A paved two-lane county road, Stevens Road, is adjacent to the canal. The canal bed in that area is composed of solid rock flows and blasted rock, and the sides are low and without berms or riprap. The canal is wide and shallow. When it reaches the Ward Road Bridge, the canal has dropped 100' since leaving the river.
East of 27th Street, the canal is bordered on the north by privacy fencing and a public pedestrian trail along an urban single-family residential development. The canal is wide and flat with no berms. Facing east.394

The historic district begins at the eastern edge of the Ward Road Bridge right-of-way, 0.75 miles east of the Bend city limits and continues for 3.4 miles through the low hills. It is deeper and has a berm on the downhill side, and often on both sides. It was described in detail previously. The canal winds through irrigated rural residential subdivisions, hobby farms with livestock and pasture, large commercial farms and ranches and public scrub lands. Parcels get progressively larger as the water flows east. Twelve ditches fill over a dozen irrigation ponds and irrigate pastures and crops on both sides of the canal. The historic district uniquely portrays the progression of settlement in the county, from 40-160-acre parcels in the historic period, to 20-40-acre parcels in the 1940s and to the subdivisions with 1-5-to 3-acre parcels in the 1960s and 1970s. It also shows the results of applying irrigation water on arid farmable land and displays the scrub land with rock outcroppings that remains where land was not farmable and did not have or retain irrigation rights.

As the water flows under the Gosney Road Bridge, it enters a narrower 'U'-shaped stretch with a berm on the downhill side and a cut on the northern side, along the reminder of the hilly terrain. The bed has small rocks solidly covering it. No lava flows are apparent. The canal passes through large farms, scrub lands in public ownership, and 10-acre rural subdivisions, mostly without irrigation rights. It has an inconsistent cut on its south side with sparse rock scattered along the inside slope and a silted embankment covering any rip-rap on the north side. The ditch rider road continues on the north edge of the canal, with locked non-historic green metal pipe gates across it where it meets roads. About a quarter mile east of Gosney Road, one of the last wooden flumes bridged a difficult stretch of canal, but it has been removed and replaced with berms. The 'D' Lateral diverts water north in this area, delivering water north of Highway 20 and under the Alfalfa Market Road to the BLM's Mayfield Pond and Recreation Area. It then drops the last few feet down to the flat plateau near Gribbling Road at elevation 3600, where it transitions to long, straight, and more level, segments.

East of the Gosney Road Bridge as the “U” shaped canal leaves the historic district on the remainder of the sloped area.396 As it nears US Highway 20, it enters nearly flat terrain, straightens, widens and becomes shallower, with sparse rock rip-rap and lower berms on the downhill side.

295 Patricia Kliwer photo, October 23, 2015.
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Central Oregon Canal on flat terrain at its intersection with US Highway 20, between Harmony Lane and Gribbling Road. Photographer looking southwest.

Where it reaches the flat plateau and crosses under US Highway 20, the elevation is 3551. The canal has dropped 207 feet since it began at the Deschutes River. North of US Highway 20, the land has fewer rock outcroppings and surface rock, but has more unirrigated large parcels of scrub land in public and private ownership. The canal begins a stretch of consistent width and depth for the next ten miles. The canal bed has less rock. Being shallower, the sides do not have much riprap. Most of the dry land has never been in private ownership, has native vegetation, and is not irrigated or cultivated. Scattered irrigated lands are close to the main roads and the main canal. As the ‘G’ and ‘H’ Laterals branch off, the canal gets smaller. In the agricultural area and cattle ranches southwest of Alfalfa, it is more consistent in shape and riprap is nearly nonexistent. Many private bridges to cattle ranches cross the canal.

Water flows out of the main canal just west of Dodds Road to fill an unnamed reservoir with wetlands on scrub land. Photographer looking south.

The canal crosses under Dodds Road at elevation 3434 and flows north along irrigated cattle and horse ranches with large irrigation ponds. At the northern end of the road, it turns east into dry public scrub land managed by the BLM near its intersection with Walker Road. The large ‘I’ Lateral splits off at elevation 3405 and significantly reduces the size of the main canal. The ‘I’ Lateral to southeastern Alfalfa parallels the canal for a distance, then continues to run east, while the main canal turns north. The ‘I’ Lateral fills many ponds and wetlands, including Reynolds Pond and Zell Pond, and provides water for hay ranches east and south of Alfalfa, irrigated by circular pivot sprinkler systems.

396  Patricia Klewer photo, August 16, 2016.
397  Ibid
The 'I' Lateral branches off the main canal on public land near the intersection of Dodds Road and Walker Road, significantly reducing the flow in the main canal. Photographer looking south.  

The 'I' Lateral is on the south (right) and the main Central Oregon Canal is on the north, left. Looking east.  

One of a series of three large unnamed ponds with wetlands next to the canal southwest of Alfalfa. The community of Alfalfa is on the far side of the pond and the Powell Buttes are in the distance, looking north.  

The narrower main COC leaves ponds and scrub land and flows under Walker Road in Alfalfa at elevation 3368, having dropped 390 feet since it left the Deschutes River. It is close to the Alfalfa Store and gas station at this point. It enters a more intense agricultural area, with irrigated hay farms and cattle and horse ranches in the center of the community of Alfalfa. A significant amount of water is distributed to grow pasture, Timothy hay, orchard grass and alfalfa. In Alfalfa, the canal becomes nearly straight, stays west of the Dry River canyon, and has no visible rock or berms, with the canal crossing farmland land and filling big irrigation ponds.

388 Patricia Kliever photo, August 17, 2016.
389 Ibid
400 Photo by Patricia Kliever, August 17, 2016.
Central Oregon Canal Historic District

Name of Property

and extensive wetlands.

Looking north in Alfalfa from the Alfalfa Market Road Bridge, elevation 3361, at 25890 Alfalfa Market Road, where the straight, shallow canal flows between horse ranches.

North of Alfalfa, the canal flows toward Powell Buttes, looming directly north of Alfalfa, leaving private irrigated land, and enters a long stretch of dry public scrub land. It flows in a shallow canal through dry, unfarmable land along the western edge of the Dry River Canyon.

The canal flows through dry sagebrush and small juniper trees along the western edge of the Dry River Canyon between Alfalfa and Powell Butte. Looking southeast from the canal embankment.

Above the Brasada Ranch Resort and Equestrian Center in the Dry River Canyon, which formerly was Shumway Ranch, the canal enters a non-historic steel pipe called the Powell Butte Siphon which drops down into the bottom of the Dry River Canyon and crosses under Johnson Ranch Road. The 20-year-old steel pipe is buried beside the road in the County right-of-way and follows the road north past the entrance to the resort golf course and visitor center until it climbs the eastern edge of the canyon, crosses Shumway Road, and dumps into an open canal once more. Brasada Ranch Resort, a re-created Shumway Pond, the Golf Course and Equestrian Center are irrigated with water delivered by the 'J' Lateral.

Photo by Patricia Kilewer, August 17, 2016.
Photo by Patricia Kilewer, May 22, 2017.
The water forcefully rushes out of the Powell Butte Siphon pipe on the eastern ridge of the Dry River and enters a dispersion pond at elevation 3229 and begins its northerly route toward Powell Butte. Looking north.  

In the community of Powell Butte, the 30' wide and 2' deep canal is consistent in width and depth and runs in gentle curves or in straight lines as it flows north and east through irrigated farmland on the western and northern edges of the Powell Buttes. It has either no berms on flat stretches or short, inconspicuous berms on the downhill side of gentle slopes. Irrigated grasses grow up to the water's edge. Rock is sparse. Most parcels are 10 to 160 acres and are irrigated and in pasture, although there are some rural residential subdivisions and 1-acre lots. Horse and cattle ranches are common, as are sheep and goat herds. A ditch rider road parallels the canal on the west/north side. In Powell Butte, a large volume of water is split off to the laterals. 

The Central Oregon Canal in Powell Butte serves productive cattle and horse ranches and hay farms. Looking north from the Powell Butte Highway Bridge.

The canal quickly flows toward the east, a quarter mile south of the Powell Butte Post Office, the Powell Butte Country Store and Gas Station, the Powell Butte Christian Church and Powell Butte Community Charter School. It turns north and crosses Ochoco Highway # 126 at elevation 3223, having dropped 535 feet from the Deschutes River. It flows north through wetlands and pastures, east of the Powell Butte School. It is now eight miles east of Redmond and eleven miles west of Prineville. In a nearly straight line, it flows north in a grass-lined dirt channel about 13' wide and 3' deep. Many driveways cross it with home-made wooden bridges. No rock is visible in the canal and both sides have no berms or ditch rider roads. In this short stretch between Highway 126 and Houston Lake Road, the canal drops 126 feet in elevation.

403 Photo by Patricia Kliever, May 22, 2017.
404 Photo by Patricia Kliever, May 22, 2017.
North of the community of Powell Butte, the canal rapidly drops in elevation and is about 13' wide and flows under many wooden bridges for driveways.

Near Houston Lake Road, the canal stays as high as it can in elevation while winding west through the gentle hills. The ditches deliver the water in both north and south directions to large wetlands, irrigated fields and to the low points at Little Houston Lake and Houston Lake. The main canal divides just west of NW Serrano Lane in Powell Butte, and water runs down the hill in a 12" diameter black corrugated black plastic pipe to irrigation ponds and ditches on Lark Gardens Cattle Ranch. The western portion of the main canal continues northwest to ditches and irrigates other ranches, finally dumping into a large unnamed pond in T14S, R14E, Section 26. Dry River, the O'Neil Highway and the Crooked River are within a mile of the terminus of the canal. A 12" diameter black corrugated plastic pipe is often dry, but occasionally delivers some water to the Crooked River. The canal has dropped 701 feet since its diversion from the Deschutes River.

The canal is about 8 inches deep and 48 inches wide where it splits into two ditches at Serrano Lane and Lark Gardens Cattle Ranch, northwest of Powell Butte. Photo looking west from 1570 NW Serrano Lane.

Looking north down Serrano Lane to the end of the ditch conveying water from the canal in the irrigated Lark Gardens Cattle Ranch.  

Photo by Patricia Kliwer, May 22, 2017.
COMPARISON OF THE CENTRAL OREGON CANAL HISTORIC DISTRICT (WARD ROAD – GOSNEY ROAD SEGMENT) WITH THE BRASADA RANCH SEGMENT

Photo looking southwest from the stilling pond on the east bank of the Dry River, across the site of the Powell Butte Siphon, stave pipe and trestle. Some remains of the historic flume outlet structure are in the foreground. 406

In 2017, the National Park Service determined that the Brasada Ranch Segment of the COC was eligible for listing on the National Register of Historic Places. The segment is in the Dry River Canyon between Alfalfa and Powell Buttes, at Township 16 South, Range 14 East, Section 28. Brasada Ranch is a private, 1,800-acre, gated, golf community and resort with nearly 1,000 residential lots (with more phases being planned), an 18-hole golf course, a restaurant and overnight lodging. This is the site of the historic Powell Butte Siphon that included the impressive wood stave pipe, previously described in this nomination, and which was designed by Deschutes Irrigation and Power Company’s project engineer Charles M. Redfield (the Brasada Segment nomination inaccurately attributed it to Levi Wiest).

The DI&P Co. canal construction crews completed the open canal to Alfalfa in 1907. In the fall of that year, the crews were north of Alfalfa: the spot that they needed to cross the 65-foot-deep Dry River canyon. The crews built an intake structure at the top of the west bank of the river gorge that would funnel water from the 20-foot wide open canal into a 5-foot diameter wooden pipe. Water dropped into the wire-wrapped redwood pipe, called a stave pipe. The stave pipe transported the water down the west side of the canyon wall, across the dry river bed, and up the east side of the canyon, using the principal of a siphon. There, the water dumped into an elevated wooden flume that was mounted on a wooden trestle. The flume transported the water for the short distance to the outlet structure and then into a small stilling pond. The pond was at the newly constructed section of open canal that delivered water north to Powell Butte, on the east side of the Dry River. The structures allowed the irrigation company to connect the two open canal segments, one on either side of the Dry River that were already constructed, both north and south of the location.

The parts for the siphon pipe were made to Redfield’s specifications by the Douglas Fir National Pipe Company of Olympia, Washington. The pipe was 1,620’ long and 56” in diameter. 407 The canal and pipe carried enough water to irrigate 12,000 acres. A camp composed of 35 men and 18 horse teams installed the trestle and redwood pipe. The pipe was partially buried across the river bed. While the intake structure, the trestle and flume, and other structures were being constructed, and the pipe was being assembled, crews were also working on the canal north of the siphon to Powell Butte. When the siphon was completed, the water was flowing for the first time into the open 16’ wide and 4’ deep irrigation canal that was heading to Powell Butte. The trestle and pipe were completed in January 1908 for a total cost of $10,000. During the 1908 irrigation season, water was flowing in the COC for 45 miles across the high desert, from the Deschutes River to Powell Butte. By 1908 the main canal was completed. A bottleneck had been identified in the Ward Road to Gosney Road segment, which was enlarged. Lateral construction continued, and the system was enlarged in some

406 Photo by Patricia Kliwer, taken on December 10, 2017.
407 Crook County Journal, Prineville, OR, July 14, 1910, 1.
locations, including a second time at the Ward Road to Gosney Road segment, through 1914. Both the Brasada Ranch site and the Ward Road to Gosney Road segment display how the irrigation company met unique geologic and geographic challenges to build the canal to Powell Butte.

CID replaced the aging historic structures at the Powell Butte Siphon in 1978. The modern intake structure is concrete, with power driven gates. The steel siphon pipe is not visible because it is completely buried along Alpaca Road, a paved two-lane county road that traverses the center of the river bed. The unused wooden trestle was disassembled in 1993-1994. Re-usable lumber was stacked northeast of the stilling pond. Today, part of the trestle lumber is adaptively re-used as a golf cart path to bridge a low spot between holes on the Brasada golf course. It creates a dramatic entrance to the resort, as the entry road passes under it. A few deteriorating concrete and wood remain of the historic structures are all that is left on the site.

The intake structure with a trash rack to keep debris out of the steel pipe that crosses the Dry River bed. The wastewater spillway gate is on left. Photo shows recent major alterations to the canal bed and side slope. 408

The area at Brasada Ranch that was found to be eligible for listing also included a 600' length of functioning, open, historic canal south of the intake structure, on the west bank of the Dry River. However, CID recently bulldozed the canal bed and eastern embankment, deepening it and removing the riprap and other historic features. The non-contributing headgate and headwall to the 'J' Lateral that formerly served the Shumway Ranch and now serves the resort, remains in its historic location in this stretch, but was significantly upgraded and altered in 1978 and is non-contributing. One would have to see historic photos of the Powell Butte Siphon and learn about it to imagine it crossing the Dry River. The remains of the other structures and the stretch of open canal are secluded and inaccessible to the public. Brasada Ranch is entirely private property.

In contrast to the historic site at Brasada Ranch, the nominated stretch of the canal is an exemplary 3.4-mile-long living stretch of the historic canal with very few alterations and many intriguing components. The public will be welcome to the 80-acre public Bend Park & Recreation District property that is traversed by the canal in the nominated historic district. While the open canal segments at Brasada Ranch are heavily altered and it is primarily the site of the siphon that was removed forty years ago, the canal in the historic district continues to function as it has for the past 110 years. The canal there holds more than twice as much water as the Brasada Ranch segment and is much larger, up to 78' wide, than the 16'-22' wide by 4' deep canal at Brasada Ranch. The historic district has 21 functioning headgates, with many being historic contributing, that lead to three laterals and 14 ditches that serve rural patrons up to five miles away.

The historic district displays the progression of settlement, from a parcel of 80 acres to parcels of 1 ac-e. Nearly three-fourths of the canal in the historic district passes through rural farms with irrigated land that was sold to settlers by the canal developers. It also includes some unirrigated and unfarmable scrub lands that did not have water rights and were not included in Segregation List 6. The same lava tubes, caverns, hills and dips that made the land undesirable for farming and difficult to irrigate by gravity, resulted in the segment being

408 Photo by Patricia Kliever, taken on May 22, 2017.
labor-intensive to build. In contrast, the Brasada Ranch segment was formerly in the Shumway livestock ranch but is now in a residential golf course community and resort. The Shumway Pond is now rebuilt and is smaller and surrounded by homes. The canal in the nominated historic district continues to function for agriculture. A dozen irrigation ponds are adjacent to it, as are many irrigated pastures for livestock, displaying the agricultural use of the water. The historic canal itself with its tall berms and extensive rock left in the bed, dozens of drill holes, and Burt Chute display how the construction company met challenges and the techniques they used between 1905 and 1914. One can see and feel the full power of the mighty canal that changed the appearance and history of the high desert, east of the Deschutes River and south of the Crooked River, and that brought thousands of settlers from all over the world.
9. Major Bibliographical References

Bibliography (Cite the books, articles, and other sources used in preparing this form.)

Books


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Central Oregon Canal Historic District


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Central Oregon Canal Historic District

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Wiest, Levi D. Biography from Deschutes Pioneers Gazette, Deschutes County Historical Society, and Wiest

Deeds


Central Oregon Canal Historic District
Name of Property


Deschutes County Clerk, Bend, Oregon, various property deeds.

Family Sources. Compiled by Pat Kliewer. Bend, Oregon. 2014

Interviews by Preparer

Ann Gallagher, June 23, 2017, Denver, Colorado (Charles Monteith Redfield)
Linda Gelbrich, May 22, 2017, Corvallis, OR (Mirich Family)
Jason Gillam, November 1, 2017, Bend, OR (Philip Burt Ranch)
Linda Gilliland, April 5, 2017, Bend, OR (Bradetich Family)
Mac Goeltz, May 26, 2017, Bend, OR (Bradetich Family and buildings constructed by Dragan Mirich)
Suzanne Grund, March 2, 2017, Bend, OR (Rickabaugh Family)
Gary Grund, April 3, 2017, Bend, OR (Farming, historic structures and early residents)
Paul and Olivia Hackett, September 27, 2017, Tepic, Mexico (Ida and Paul Hackett Family)
Loretta Ann Hadley, October 31, 2017, Bend, OR (Dragan Mirich)
Jim Hollander, November 2, 1017, Bend, OR (COID Ditchride)
Carla and Gregory Hunt, October 31, 2017, Bend, OR (Historic structures)
Lynn Schilling Johnson, November 1, 2017, (Paul S. Hackett Turkey Ranch and Burt’s Bridge.)
Dan Rastovich, April 5, 2017 Bend, OR (Rastovich Family)
Charles Morris Redfield, June 28, 2017, Mill Valley, CA (Charles Monteith Redfield)
Robert Stephen, October 31, 2017, Bend, OR (Wooden Flume, Stearns Wasteway)
Richard Torkelson, June 10, 2017, Bend, OR (Burt Chute, bridges, roads, and Torkelson Family)
David Turner, May 26, 2017, Bend, OR (Burt Chute)

Contributors

Suzanne and Gary Grund, long-time COC property owners.
Michael Hall, Historic Preservation Consultant and author, Madras, OR.
Judy Hanson, COC property owner.
Tor Hanson, Deschutes County, OR, historian.
Vanessa Ivey, Deschutes County Historical Museum, Bend, OR, staff.
Don Kliewer, P.E., Civil Engineer, Bend, OR.
Steve Lent, Bowman Museum, Prineville, OR, staff.
Tony Licitra, long-time COC property owners.
Linda Ocelletto, Ocelletto Communications, Bend, OR.
Jeff Perreault, retired USGS hydrologist, Bend, OR.
Janice and David Turner, long-time COC property owners.
Jenna and Noah Walden, COC property owners.
Aleta Warren, long-time PBC property owner.
Central Oregon Canal Historic District
Name of Property

Previous documentation on file (NPS):

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

Primary location of additional data:

- State Historic Preservation Office
- Other State agency
- Federal agency
- Local government
- University
- Other

Name of repository(ies):

Historic Resources Survey Number (if assigned): N/A
Central Oregon Canal Historic District

Name of Property

Deschutes Co., OR
County and State

10. Geographical Data

Acreage of Property: 41.35 acres
(Do not include previously listed resource acreage; enter "Less than one" if the acreage is .99 or less)

Latitude/Longitude Coordinates
Datum if other than WGS84: N/A
(enter coordinates to 6 decimal places)

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Verbal Boundary Description (Describe the boundaries of the property.)
The nominated area in the historic district includes the segment of the COC within the west half and the northeast quarter of Township 18 South, Range 12 East, Section 1, W.M.; the north half and southeast quarter of Section 6 and the southwest quarter of Section 5 and the northwest quarter of Section 8 of Township 18 South, Range 13 East, W.M. Its western boundary is the eastern edge of the Deschutes County right-of-way for Ward Road. Ward Road runs north-south along the western section line of T18S, R12W Section 1. The historic district's eastern boundary is the western edge of the Deschutes County right-of-way for Gosney Road. Gosney Road generally follows the north-south midsection line through Sections 5 and 8 of T18S, R13E. The northern and southern boundaries are lines drawn 500' on either side of the centerline of the COC, establishing a 100'-wide corridor. The district includes the canal, historic-contributing features and its historic setting within the 100-foot corridor. The district excludes outdoor lighting, private fences and other structures within the nominated corridor that are not related to the operation of the COC and not noted in Section 7 of this document (Figures 2-5).

Boundary Justification (Explain why the boundaries were selected.)
The boundaries of the COCHD were determined in accordance with the Carey and Reclamation Acts Irrigation Projects in Oregon, 1901-1978 MPD, through which the property is nominated. In addition to referring to the National Register Bulletin #21 (NRB), "Defining Boundaries for National Register Properties," the MPD further elaborates on how to determine the boundaries of historic districts nominated through that cover document (pp. F-33 to F-35). The MPD and NRB provide that the boundary should be drawn to embrace the distribution of intact resources that reflect the historical significance of the nominated resource. Secondly, historic and legal boundaries may be used when these include the significant resource and its associated features. Finally, in areas where the natural or cultural features or the legal boundaries do not provide a suitable boundary, the boundary may be drawn such that it includes the full extent of the eligible property, and a reasonable immediate setting, such that the boundary provides "reasonable limits" to the nominated area. The MPD acknowledges that in some cases, a combination of these factors may be used to form suitable boundaries.

For historic districts comprising segments of canal and related secondary elements, the MPD indicates that the nominated area should be based (in part) on the density of secondary features. In cases where there are few secondary features, a longer segment of the principal feature should be nominated. By contrast, if there are many secondary elements present, a shorter segment of the principal feature may be sufficient. The COCHD

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410 MPD, p. F-34.
meets both intentions, through its inclusion of many secondary features, as well as representing the longest segment of irrigation canal nominated in the State of Oregon to date, twice the length of the next longest National Register-listed segment (PBCHD).

The COCHD boundaries are determined through a combination of factors that embrace the extent of the canal and its appurtenant secondary features that relate to the historical significance derived from the uniquely difficult terrain through which the canal had to pass in order to deliver water to lands beyond this volcanic, rocky terrain. On the east, the boundary is set at the 1968 Gosney Road Bridge that crosses over the canal, just overt water-level. This boundary is appropriate, in that beyond this point, the canal very quickly enters into soils that did not require the intensive effort to clear and was constructed much more quickly and easily. As a result, the character of the canal changes to a distinctly "U" shape (distinct from the trapezoidal profile found within the nominated district) that, while retaining historic integrity, does not reflect the significant difficulty encountered during the construction of the nominated area. Because this change in character occurs very close to Gosney Road but is not readily evident when the canal is fully watered, the Gosney Road Bridge was selected as a reasonable point at which to draw the boundary, and includes the contributing elements related to the significance of the nominated area. Similarly, the western boundary of the district is at a 1968 two-lane concrete bridge, the Ward Road Bridge, built outside of the period of significance. West of the bridge, the canal flows through nearly flat terrain in an increasingly urbanizing environment with a substantially altered setting with wooden privacy fences, vinyl decorative fences, and wide public pedestrian and bike trails within 50 feet of the centerline of the canal, representing a substantial break in the continuity of the historic canal and historic setting. It is a segment of canal that has only two headgates, and two residential sized irrigation ponds and no commercial agriculture. Because the canal crosses many property boundaries on a continuous right-of-way, and none are evident to the observer, no legal boundary was found to be suitable. In consideration of these factors, and the clear visibility of the bridge even when the canal is fully watered, the Ward Road Bridge is a reasonable boundary.

Because the canal varies significantly in width across the length of the nominated area, and in order to embrace the several related secondary elements that branch off of the canal (such as the heads of laterals and ditches that emerge from headgates along the canal), and that provide important contextual resources for the interpretation of the canal system, the width of the nominated segment is reasonably set at 50 feet in both directions from the centerline of the canal, for a total, continuous width of 100 feet, conforming to the extent of the original and current easement held by COID. The boundary of the COCHD includes the entirety of the nominated stretch of the COC itself and associated structures that are necessary to convey and deliver irrigation water to patrons, including turnouts, headwalls, pipes, a flume, a chute, drops, catwalks, wasteway, and embankments. It includes the immediate historic setting within the '100' corridor as described above. The wide variation in the canal's width in this stretch precludes a tighter boundary; however, the selected 100' corridor includes the canal itself and most of the associated historic features and structures necessary for the irrigation system to convey water to its patrons.

The district boundaries selected include a stretch of the canal that is sufficient in length to include the various slopes and flat terrain that the canal passes through during its 47 mile-length. In the district, there are flat areas in which the canal was scraped out after cuts were made in the earth or both sides of the bed, sloping areas that required a cut on the high side and a berm of various heights on the low side, and areas of exceptional drops in the terrain that originally needed to be spanned by a wooden flume that was later replaced by the tallest berms on the irrigation system to allow the water to flow at the desired elevation. The district boundaries include the typical elements of an irrigation system: the historic canal, two laterals, one sub-lateral, headwalls, pipes, catwalks, a chute, falls, a flume (remains, see archaeological site form 35DS3033, Figure 32), embankments and 16 ditches. It includes many headgates to regulate water flow to the laterals and ditches that serve the patrons nearby and miles away from the canal, and a wooden bridge dating to within the period of significance (though non-contributing due to a lack of direct relationship to the historic context) typical of those built by settlers to bridge the canal. The setting of the historic canal within the historic district boundaries includes a variety of sizes of parcels. A stretch of the canal in the district passes through nearly 80 acres of
Central Oregon Canal Historic District
Name of Property

Land in public ownership with native vegetation, remaining uncultivated and undeveloped, as it was when the
channel was constructed. It also includes 12 large parcels of irrigated and cultivated land that have associated
irrigation ponds and water rights. Five parcels are between 30 and 51 acres, three parcels between 20 and 30
acres, and five parcels between 10 and 20 acres. There are three irrigated hobby farms with sheep, goats,
horse and cattle in the pastures beside the canal.

11. Form Prepared By

name/title Patricia A. Klieuer, MPA, Historic Preservation Planner date June 27, 2017
organization Klieuer Engineering and Associates telephone (541) 617-0805
street & number 60465 Sunridge Drive, Bend, OR 97702 email pklieuer@hotmail.com
city or town Bend state OR zip code 97702

Additional Documentation
Submit the following items with the completed form:

- Regional Location Map
- Local Location Map
- Tax Lot Map
- Site Plan
- Floor Plans (As Applicable)
- Photo Location Map (Include for historic districts and properties having large acreage or numerous resources. Key all photographs to
  this map and insert immediately after the photo log and before the list of figures)
Central Oregon Canal Historic District

Name of Property: Central Oregon Canal Historic District (Ward Road to Gosney Road Segment)

City or Vicinity: Bend

County: Deschutes

State: OR

Photographer: Patricia A. Kliwer

Date Photographed: April 3, 2017

Description of Photograph(s) and number include description of view indicating direction of camera:

Photo 1 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0001)
Looking west to the Ward Road Bridge on the western boundary of the historic district. Canal is 68' wide at this point and 5' deep with a cut south side and a low berm on the north side.

Photo 2 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0002)
Looking west toward west end of historic district, with Cascade Mountain peaks in the distance.

Photo 3 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0003)
Looking north across irrigated land from top of tall berm along north side of canal.

Photo 4 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0004)
Looking east with a tall berm with rip-rap on the north side in a deep, narrow portion of the canal that holds water year around.

Photo 5 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0005)
Looking north from top of berm into shared delivery gate and irrigation pond, with PVC pipe and electric pump coming out of pond.

Photo 6 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0006)
Property owners walk on ditch rider truck wheel tracks on grass covered north berm along canal under Bonneville Power Administration power transmission poles crossing over the canal.

Photo 7 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0007)
Looking east from the Bear Creek Ranch Bridge, cut on the south side and berm on north side.

Photo 8 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0008)
Heavily silted canal bed holds water year around, looking east.

Photo 9 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0009)
Stacked rock on the bermed north side of canal near middle of the historic district.
Central Oregon Canal Historic District

Photos Continued

Photo 10 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0010)
Looking east from canal bed with a cut on the south side and tall berm on the north side.

Photo 11 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0011)
Looking west in Burt Chute with ditch rider road on right side.

Photo 12 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0012)
Looking west into the drop from Burt Chute into pond.

Photo 13 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0013)
Looking east in shallow, wide canal bed with cuts on both sides in area of scrub land.

Photo 14 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0014)
Shallow canal bed with cuts on both sides, looking east through scrub land.

Photo 15 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0015)
Looking south at a pentagon-shaped drill hole for blasting rock in the canal bed.

Photo 16 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0016)
Looking east at lava flows in canal bed.

Photo 17 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0017)
Looking east near Teal Road with lava flows in bed.

Photo 18 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0018)
Uneven canal bed with cut sides through scrub land, looking west.

Photo 19 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0019)
Carefully stacked rock on steep south side slope, looking east.

Photo 20 of 20: (OR_DeschutesCounty_CentralOregonCanalHistoricDistrict_0020)
Looking east to Gosney Road Bridge at east end of historic district. Tall berms are on both sides, north side is silted. Canal is 59’ wide and 5.5’ deep.
## National Register of Historic Places Continuation Sheet

### Section number: Additional Documentation: Page: 140

#### List of Figures

(Resize, compact, and paste images of maps and historic documents in this section. Place captions, with figure numbers above each image. Orient maps so that north is at the top of the page, all documents should be inserted with the top toward the top of the page.)

**Figure 1:** General Location Map.

**Figure 2:** Local Location Map.

**Figure 3:** USGS Quadrangle Map of Historic District.

**Figure 4. a-f:** Tax Lot Maps with Boundary of Historic District Indicated with Heavy Black Lines.

**Figure 5a:** Map Showing Location of Structures in the Historic District.

**Figure 5b:** Map Showing Location of Drops in Elevation in the Historic District.

**Figure 6a:** Map, 1924, by Frank Becker, Oregon State Engineer, depicting Central Oregon from the Columbia River to Crater Lake and showing rivers and canals.

**Figure 6b:** Township Map, 1924 by Frank Becker, Oregon State Engineer, depicting the Central Oregon Canal and the other canals in the vicinity of Powell Butte, Bend, Redmond, Tumalo and Terrebonne. It also shows the Crooked River and Deschutes River.

**Figure 7:** Topographic Map of Eight Irrigation Districts in Upper Deschutes River Basin: Arnold, Central Oregon, Lone Pine, North Unit, Ochoco, Swalley, Three Sisters, and Tumalo Irrigation Districts. COID Service Area Map.

**Figure 8:** Map showing the COID Service Area.

**Figure 9:** Map of Carey Act Segregation List in T18S, R12 E, Section 1.

**Figure 10:** Map of Carey Act Segregation List in T18S, R13E, Sections 5, 6, and 8.

**Figure 11:** Map of water rights in T18S, R12E, Section 1.

**Figure 12:** Map of water rights in T18S, R13E, Sections 5, 6 and 8.

**Figure 13:** Map of Irrigated Lands for Sale under Contracts with the United States and the State of Oregon in the Bend District, Deschutes Valley, Central Oregon, July 7, 1909.

**Figure 14a-c:** Original Property owners in T18S, R12E, Sec.1 and T18S, R13E, Sections 5, 6 and 8.

**Figure 15:** Map dated 1835, Metzker’s Atlas of Deschutes County, T18S, R12E, showing Section 1.

**Figure 16:** Map dated 1844, Metzker’s Atlas of Deschutes County, T18S, R12E, showing Section 1.

**Figure 17:** Map dated 1872, Metzker’s Atlas of Deschutes County, T18S, R12E, showing Section 1.

**Figure 18:** Map dated 1935, Metzker’s Atlas of Deschutes County, T18S, R13E, showing Sections 5, 6, 8.

**Figure 19:** Map dated 1944, Metzker’s Atlas of Deschutes County, T18S, R13E, showing Sections 5, 6, 8.

**Figure 20:** Map dated 1972, Metzker’s Atlas of Deschutes County, T18S, R13E, showing Sections 5, 6, 8.

**Figure 21:** 300-foot interval study of COCHD, April 3, 2017

**Figure 22:** Google earth Photo of community of Alfalfa

**Figure 23:** Google earth Photo of community of Powell Butte
**Central Oregon Canal Historic District**
Name of Property: Deschutes Co., OR
County and State: Carey and Reclamation Acts Irrigation Projects in Oregon, 1901-1978
Name of multiple listing (if applicable):

<table>
<thead>
<tr>
<th>Section number</th>
<th>Additional Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 24:</td>
<td>Concept Map drawn for Alexander Drake in 1900 of possible irrigation systems and a railroad on the east side of the Deschutes River between Lava Butte on the south and Trout Creek on the north.</td>
</tr>
<tr>
<td>Figure 25a:</td>
<td>1905 Construction Drawing, existing profile of terrain, estimate of rock to be removed, and proposed water line at mile post 7 and showing plans for drop at Bear Creek Bridge.</td>
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<tr>
<td>Figure 25b:</td>
<td>1905 Construction Drawing, existing profile of terrain, estimate of rock to be removed, and proposed water line at mile post 7.5 and showing plans for Lateral B.</td>
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<td>Figure 25c:</td>
<td>1905 Construction Drawing and estimate of rock to be removed at mile post 8 and showing plans for and diversion for Lateral C.</td>
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<td>Figure 25d:</td>
<td>1905 Construction Drawing and estimate of rock to be removed at mile post 8-9, showing drops and profile of canal.</td>
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<tr>
<td>Figure 25e:</td>
<td>1905 Construction Drawing and estimate of rock to be removed around Flume No. 2, just west of mile post 10.</td>
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<tr>
<td>Figure 26a:</td>
<td>1943 Aerial Photo labeled 11-L11-200, US Army.</td>
</tr>
<tr>
<td>Figure 26b:</td>
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</tr>
<tr>
<td>Figure 27a:</td>
<td>1951 Aerial Photo by U.S. Department of Agriculture, Production and Administration.</td>
</tr>
<tr>
<td>Figure 27b:</td>
<td>1951 Aerial Photo by U.S. Department of Agriculture, Production and Administration.</td>
</tr>
<tr>
<td>Figure 28:</td>
<td>1914 Partial Blueprint with Chalk Drawing of the COC showing Lateral A and Mile Posts 7, 8 and 9 within the Historic District.</td>
</tr>
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<td>Figure 29:</td>
<td>Ca. 1909 Drawing of Canal Capacities.</td>
</tr>
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<td>Figure 30:</td>
<td>May 10, 1913 Partial Blueprint with Colored Ink of the COC and Laterals A, B and C.</td>
</tr>
<tr>
<td>Figure 31:</td>
<td>Ca. 1910 Cross Section Drawings for the COC at Mile Post 10, at the eastern portion of the historic district. Drawings attributed to C. M. Redfield.</td>
</tr>
</tbody>
</table>
FIGURE 1: General Location Map. Red box indicates the location of the COCHD, yellow path within box indicates path of COC.
FIGURE 2: Local Location Map, 2016 Aerial photograph and tax lots. Coordinates are as follows:
NW: Lat. 44.050970; Long. -121.243548
NE: Lat. 44.050970; Long. -121.193444
SE: Lat. 44.034928; Long. -121.193444
SW: Lat. 44.034928; Long. -121.243548
FIGURE 4a: Tax Lot Map 181201A0, Deschutes County Assessor, 2017. The historic district boundary is drawn for representational purposes. Not to scale.
FIGURE 4b: Tax Lot Map 181201B, Deschutes County Assessor, 2017. The historic district boundary is drawn for representational purposes. Not to scale.
**FIGURE 4c:** Tax Lot Map 181201C0, Deschutes County Assessor, 2017. The historic district boundary is drawn for representational purposes. Not to scale.
FIGURE 4d: Tax Lot Map 181205, Deschutes County Assessor, 2017. The historic district boundary is drawn for representational purposes. Not to scale.
FIGURE 4e: Tax Lot Map 181206, Deschutes County Assessor, 2017. The historic district boundary is drawn for representational purposes. Not to scale.
FIGURE 4f: Tax Lot Map 18'120800, Deschutes County Assessor, 2017. The historic district boundary is drawn for representational purposes. Not to scale.
FIGURE 5a: Map Showing Locations of Structures in Historic District.
FIGURE 5b: Map Showing Location of Drops in Elevation in the Historic District (numbers correspond to those in Table 1).
FIGURE 6a: 1924 Map by Frank Becker, Oregon State Engineer, depicting Central Oregon from the Columbia River to Crater Lake and showing rivers and the PBC and others in the area.
FIGURE 6b: Township Map, 1924, by Frank Becker, Oregon State Engineer, depicting the COC and the other canals in the vicinity of Powell Butte, Bend, Redmond, Tumalo and Terrebonne. It also shows the Crooked River and Deschutes River.

Source of Topographic Map: Deschutes Basin Board of Control (DBBC), 2010.
FIGURE 8: COID Service Area Map

Source: COID
FIGURE 9: Deschutes County Clerk's Map of T18S, R 12E, showing properties included in Carey Act Segregation List #6 and List #20. "X" indicates COID.
FIGURE 10: Deschutes County Clerk's Map of T18S, R 13E, showing properties included in Carey Act Segregation List #6. "X" indicates COID.
FIGURE 11: A portion of the "Adjudication Survey of Lands Allowed an Inchoate Water Right", Feb 10, 1928. Township 18 S, R 12 E, Section 1 and the east half of Section 2. Bear Creek Road is at the northern edge and Ward Road is along the section line between Sections 1 and 2, with a bridge crossing the COC. The road heading north at the upper right edge is Torkelson Road. The numbers indicate the water right acreage in each quarter section. Ditches and laterals are indicated with dotted lines.
FIGURE 12: A portion of the "Adjudication Survey of Lands Allowed an Inchoate Water Right", Feb 10, 1928 for Township 13 S, R 13 E, Sections 5, 6, 7 and 8. Gosney Road runs north-south through the middle of Section 5 is, with a bridge crossing the COC. The numbers indicate the water right acreage in each quarter section. Ditches and laterals are indicated with dotted lines. Buri Chute is in the center of Section 6.
FIGURE 14a: Original Property Owners in Township 18 South, Range 12 East, Section 1 and Township 18 South, Range 13 East, Section 6. Includes Dates of Purchase and Parcel Size. Blue line indicates location of the COC.

<table>
<thead>
<tr>
<th>Township 18 South, Range 12 East, Section 1</th>
<th>Township 18 South, Range 13 East, Section 6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oregon to George and John Bradeticich</strong></td>
<td><strong>Oregon to Philip C. Burt</strong></td>
</tr>
<tr>
<td>160 Acres</td>
<td>40 Acres</td>
</tr>
<tr>
<td>1922-1951</td>
<td>1934</td>
</tr>
<tr>
<td><strong>COID to Dragan Mirich</strong></td>
<td><strong>COID to W. F. McNaught</strong></td>
</tr>
<tr>
<td>40 Acres 1928-1921</td>
<td>40 Acres 1917</td>
</tr>
<tr>
<td><strong>USA to Mike Dragosavac</strong></td>
<td><strong>Oregon to Esther Dixon</strong></td>
</tr>
<tr>
<td><strong>USA to Dragan Mirich</strong></td>
<td>40 Acres 1923</td>
</tr>
<tr>
<td>40 A 1951</td>
<td><strong>Oregon to Felix G. Allen</strong></td>
</tr>
<tr>
<td><strong>USA to Lilla Ford</strong></td>
<td>40 Acres 1909</td>
</tr>
<tr>
<td>5/28/1918</td>
<td><strong>Oregon to J. S. Smythe</strong></td>
</tr>
<tr>
<td>Sold to 3 other owners John Bradeticich</td>
<td>80 Acres 1910</td>
</tr>
<tr>
<td>1927-1948</td>
<td><strong>USA</strong></td>
</tr>
<tr>
<td>120 Acres</td>
<td>1937</td>
</tr>
<tr>
<td><strong>USA to Dragan Mirich</strong></td>
<td><strong>USA to Mike Dragosavac</strong></td>
</tr>
<tr>
<td>80 Acres 1954</td>
<td>40 Acres 1921</td>
</tr>
<tr>
<td>1954</td>
<td><strong>USA</strong></td>
</tr>
</tbody>
</table>

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411 Deschutes County Clerk's records.
FIGURE 14b: Original Property Owners in Township 18, Range 13, Section 5. Includes Dates of Purchase and Parcel Size. Blue line indicates location of the COC.

<table>
<thead>
<tr>
<th>Township 18, Range 13, Section 5</th>
<th>Oregon to William P. Erickson and John Pinioniemi 40 Acres 1914</th>
<th>Oregon to Theodore E. Olson 40 Acres 1913</th>
<th>Oregon to Theodore E. Olson 40 Acres 1918</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oregon to John O'Donnell 80 Acres 1910</td>
<td>Oregon to Ivan R. Knotts 40 Acres 1910</td>
<td>State Reclamation Commission to USA 120 Acres 1937</td>
</tr>
<tr>
<td></td>
<td>Oregon to Esther Cckerhan 40 Acres 1913</td>
<td>Oregon to R. A. Puett 80 Acres 1922</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oregon to Charles Durand 40 Acres 1913</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

412 ibid
FIGURE 14c: Original Property Owners in Township 18, Range 13, Section 8. Includes Dates of Purchase and Parcel Size. Blue Line Indicates Location of the COC.\textsuperscript{413}

\textsuperscript{413} Deschutes County Clerk's Deeds.
FIGURE 15: Map dated 1935, Metsker's Atlas of Deschutes County, 16 square miles including T 18 S, R 12 E Section 1, indicating property ownership.
FIGURE 16: Map dated 1944, Metsker's Atlas of Deschutes County, 16 square miles including T 18 S, R 12 E Section 1, indicating property ownership.
FIGURE 17: Map dated 1972, Metsker's Atlas of Deschutes County, 16 square miles including T 18 S, R 12 E Section 1, indicating property ownership.
FIGURE 18: Map dated 1935, Metsker's Atlas of Deschutes County, 16 square miles, including T 18 S, R 13 E Sections 5, 6, and 8, indicating property ownership.\footnote{Handwriting is by the Deschutes County Clerk over time. Numbers are the school districts.}
FIGURE 19: Map dated 1944, Metsker’s Atlas of Deschutes County, 16 square miles, including T 18 S, R 13 E Sections 5, 6, and 8, indicating property ownership.
FIGURE 20: Map dated 1972, Metsker's Atlas of Deschutes County, 16 square miles, including T 18 S, R 13 E Sections 5, 6, and 8, indicating property ownership.\textsuperscript{415}

\textsuperscript{415} Arnold Market Loop Road is now named Gosney Road.
FIGURE 22: Aerial Photo of Alfalfa Community, 2015 Imagery, 2017 Google earth
FIGURE 23: Aerial Photo of Powell Butte Community, 2015 Imagery, 2017 Google earth
FIGURE 24: Concept Map drawn for Alexander Drake in 1900 of the possible irrigation systems and a railroad on the east side of the Deschutes River, covering an area 36 miles wide by 66 miles long between Lava Butte on the south and Trout Creek on the north.\textsuperscript{cdxvi}
FIGURE 25a: 1905 Construction Drawing, existing profile of terrain, estimate of rock to be removed, and proposed water line at mile post 7 and showing plans for drops at Bear Creek Bridge. The Deschutes Irrigation & Power Co. Progress of Work COC, Chief Engineer's Office, Bend, Oregon, March 31, 1905. (COID Collection, Redmond, OR)
FIGURE 25b: 1905 Construction Drawing, existing profile of terrain, estimate of rock to be removed, and proposed water line at mile post 7.5 and showing plans for Lateral B. The Deschutes Irrigation & Power Co. Progress of Work COC, Chief Engineer's Office, Bend, Oregon, March 31, 1905. (COID Collection, Redmond, OR)
FIGURE 25c: 1905 Construction Drawing and estimate of rock to be Removed at mile post 8 and showing plans for and diversion for Lateral C. The Deschutes Irrigation & Power Co. Progress of Work COC, Chief Engineer's Office, Bend, Oregon, March 31, 1905 (COID Collection, Redmond, OR).
FIGURE 25d: 1905 Construction Drawing and estimate of rock to be removed at mile post 8-9, showing drops and profile of canal. The Deschutes Irrigation & Power Co. Progress of Work COC, Chief Engineer’s Office, Bend, Oregon, March 31, 1905. (COID Collection, Redmond, OR)
FIGURE 25e: 1905 Construction Drawing and estimate of rock to be removed around Flume No. 2, just west of mile post 10. The Deschutes Irrigation & Power Co. Progress of Work COC, Chief Engineer's Office, Bend, Oregon, March 31, 1905. (COID Collection, Redmond, OR)
FIGURE 26a: 1943 Aerial Photo labeled 11-L11-200, US Army. Photo taken on October 8, 1943. (Deschutes National Forest Service Administration, Bend, OR, Collection)
FIGURE 26b: 1943 Aerial Photo labeled 12-L11-200, US Army. Photo taken on October 8, 1943. (Deschutes National Forest Service Administration, Bend, OR, Collection)

Photo shows from left to right, Ward Road Bridge, Gate COC 8, Bradetich Dairy Bridge, Gates COC 9 and 10, catwalk at Gate COC 11, metal pipe across canal, Bear Creek Ranch Bridge. Burt Chute and Settling Pond and Pioneer Bridge across Burt Chute; Gates COC 12 and 13, B Lateral, B-1 Lateral, C Lateral and Stearns Waste with catwalk.

FIGURE 27a: 1951 Aerial Photo by U.S. Department of Agriculture, Production and Administration. Photo taken on July 30, 1951, Bay-7H-1. Photo shows Bear Creek Bridge, Burt Chute, Burt Bridge,
Burt Pond, Whitewater from drops and rapids, catwalk at Headgate #4, laterals and ditches. (Deschutes County Surveyor's Office Collection.)
FIGURE 28: 1914 Partial Blueprint with Chalk Drawing of the COC showing Lateral A and Mile Posts 7, 8 and 9 within the Historic District. The Drawing is by John DuBois, inspector for the State of Oregon Desert Land Board. (Desert Land Board Reclamation Records Collection of the Oregon State Archives.)
FIGURE 29: Ca 1909 Drawing Entitled, "Capacities shown in white on COC were compiled by C. M. Redfield, Chief Engineer Deschutes Irrigation and Power Company. Capacities shown in black were compiled by H. K. Donnelly, Field assistant to State Engineer." Red ink shows the laterals. Drawing was in preparation for widening the canal in this location. (Desert Land Board Reclamation Records Collection of the Oregon State Archives.)
FIGURE 30: May 10, 1913 Partial Blueprint with Colored Ink of the COC and Laterals A, B and C. (Desert Land Board Reclamation Records Collection of the Oregon State Archives.)
FIGURE 31: Ca 1910 Cross Section Drawings for the COC at Mile Post 10, at the Eastern Portion of the Historic District. Drawings attributed to C. M. Redfield. See Figure 26. (Desert Land Board Reclamation Records Collection of the Oregon State Archives.)
United States Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet

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FIGURE 32: Archaeological Site Form, 35DS3033