Technical Memorandum 2.6

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Platte River Basin Water Plan

Technical Memorandum 2.6

SUBJECT:	Platte River Basin Water Plan Section 2.6 – Water Use from Storage
PREPARED BY:	Trihydro Corporation
DATE:	June 14, 2005
PURPOSE:	The Platte River Basin Plan is a planning tool developed for the Wyoming Water Development Office. It presents estimated current and estimated future uses of water in Wyoming's Platte River Basin. The Plan is not used to determine compliance with or administration of state law, federal law, court decrees, interstate compacts, or interstate agreements.

2.6 WATER USE FROM STORAGE

2.6.1 Introduction

All reservoirs in Wyoming's Platte River Basin that have been permitted by the Wyoming State Engineer's Office (SEO) have been identified, except, in accordance with the provisions of the Scope of Service for this Basin Plan, for reservoirs with multiple uses including stock uses. The reservoirs are owned by various entities ranging from the U.S. Bureau of Reclamation (USBR) to private individuals. Based on consultations with the Wyoming Water Development Commission (WWDC) and the Wyoming State Engineer's Office (SEO), reservoirs having permitted capacities less than 50 acre-feet were eliminated from this assessment. Information regarding reservoirs with permitted capacities greater than 50 acre-feet but less than 1,000 acre-feet has been tabulated. More in-depth information has been provided for reservoirs having capacities greater than 1,000 acre-feet, for reservoirs having some particular significance to the study regardless of permitted capacity, and for federally owned reservoirs.

Information regarding Basin reservoirs has been gathered from various sources. The USBR provided data and information for the federal reservoirs. For reservoirs with capacities greater than 1,000 acre-feet, available permits and drawings were copied at the Wyoming State Engineer's Office (SEO). Data were also gathered from the district hydrographers in each subbasin.

The Platte River Basin includes seven major federal reservoirs, which are owned and operated by the USBR, within its boundaries. The reservoirs were built during various federal projects. These projects include the North Platte Project in Wyoming and Nebraska, the Kendrick Project in Wyoming, and the Kortes and Glendo Units of the Pick-Sloan Missouri Basin Program (PSMBP) in Wyoming and Nebraska. These reservoirs are operated for irrigation, hydroelectric power production, and municipal and industrial water supply.

2.6.2 Terms and Definitions

Discussion of reservoirs includes use of a variety of terms that may not be familiar to the reader. A list of pertinent terms and definitions is included here to help the reader better understand this discussion. Definitions were obtained from the U.S. Bureau of Reclamation glossary unless otherwise noted.

Abutment – The part of the valley wall against which the dam is constructed; defined in terms of left abutment and right abutment when looking downstream.

Active capacity – The variable reservoir storage capacity normally usable for storage and regulated discharge of reservoir inflows to meet established reservoir operating requirements.

Arch dam – A concrete or masonry dam which is curved upstream in plan in order to transmit the major part of the water load to the abutments and to keep the concrete dam materials in a state of compression.

Arch dam with gravity type section – An arch dam which is only slightly thinner than a gravity dam.

Auxiliary spillway – A "backup" spillway, usually located in a saddle or depression in the reservoir rim at a point not near the dam which leads to a natural or excavated waterway, which permits the release of excess flood flow that exceeds the capacity of the service spillway. A means of controlling the rate of discharge via an auxiliary spillway is seldom furnished. The invert or flow line of an auxiliary spillway is typically set at the maximum water surface elevation for a 100-year flood or some other specific flood frequency. The auxiliary spillway is therefore a safety feature that is utilized infrequently. An auxiliary spillway may also be operated in the event of structural damage or erosion to the service spillway.

Earth dam (earthfill dam) – An embankment dam in which more than 50 percent of the total volume is formed of compacted earth material generally smaller than three-inch size. Seepage through the dam is controlled by the designed use of upstream blankets and/or internal cores constructed using compacted soil of very low permeability.

Emergency gate – A standby or auxiliary gate used when the normal means of controlling reservoir discharge are not available. The emergency gate is the first gate in a series of reservoir outlet flow controls structures and typically remains open while downstream gates or valves are operating.

Fixed wheel gate – A fixed wheel gate consists of a flat, rectangular, structural-steel gate leaf made up of a skin plate, beams, and girders mounted on steel wheels to carry the hydraulic load from the gate leaf to tracks embedded in the concrete on either side of the fluid way. A fixed wheel gate has wheels or rollers mounted on the end posts of the gate. The wheels bear against rails fixed in side grooves or gate guides. The gates are installed in spillways to be used to regulate reservoir releases when reservoir water levels are relatively low and are also used as emergency discharge control gates when reservoir water levels are high.

Flood control capacity – Flood control capacity is reservoir storage capacity that has been assigned for the sole purpose of regulating flood inflows in order to reduce potential downstream flood damage.

Forebay – A forebay is a small reservoir or pond located at the head of a penstock of a hydroelectric powerplant, which is used to store water in relatively small quantities to care for variations in the load which occur over short periods of time usually not exceeding several hours (American Public Health Association et al., 1981).

Freeboard – Freeboard is the vertical distance between a water surface and an adjacent dam or embankment crest.

Fuse plug spillway – A form of auxiliary reservoir spillway consisting of a low embankment designed to be overtopped and washed away during an exceptionally large flood, thereby protecting the dam during such an event.

Gravity dam – A gravity dam is a dam constructed of concrete and/or masonry which relies on its weight and internal strength for stability. Gravity dams are generally used where the available foundation is rock and materials to construct an earthen dam are not available in proper quality and/or quantity.

Head – Head is the differential water pressure that causes flow in a fluid system and is usually expressed in terms of the “feet of head.” Water flows from higher head to lower head.

Headwaters – Headwaters are the source waters or upper portions of a stream or the water located upstream of a dam or hydroelectric powerplant.

Intake structure – An intake structure is the upstream or inlet portion of a reservoir outlet works, including trash racks and/or fish screens to keep debris from entering and clogging the outlet works.

Invert elevation – The invert elevation is the base elevation or flow line elevation of a water conveyance channel.

Maximum water surface (maximum pool) – The maximum water surface or pool of a reservoir is the highest acceptable water surface elevation based on all factors affecting the safety of the dam. The maximum water surface or pool is the highest water surface elevation resulting from a computed routing of the reservoir inflow design flood through the reservoir under established operating criteria. This surface elevation is also the top of the reservoir surcharge capacity.

Morning glory spillway – A circular or glory hole form of a drop inlet spillway. Usually free standing in the reservoir and so called because of its resemblance to the morning glory flower.

Needle valve – A needle valve is any of a family of valves which regulate flow through the use of a needle moving into and out of an orifice. Movement of the needle regulates flow through the valve and effects valve closure. Needle movement is accomplished by varying the water pressure in counterbalancing chambers within the valve cylinder and needle or by an electric-motor-driven operator supplying the force to move the needle. Needle valves are intended to operate at the downstream end of a reservoir outlet pipe under free discharge conditions and to regulate high-velocity discharge flows under very high heads or pressures.

Normal water surface – The normal water surface of a reservoir is the highest normal water surface elevation of the reservoir. The normal water surface elevation is usually the water surface elevation to which the reservoir may rise under normal operating conditions, not including reservoir flood control storage capacity.

Ogee crest – An ogee crest is a specially shaped concrete spillway crest that represents the lower profile or curve of a jet of water flowing over a sharp-crested weir.

Outlet works – Reservoir outlet works are a combination of structures and equipment required for the normal, safe operation and control of water released from a reservoir to serve various purposes, i.e. regulate streamflow and quality; release floodwater; and provide irrigation, municipal, and/or industrial water.

Penstock – A penstock is a pipeline or conduit that is designed to convey water under pressure from a forebay or reservoir to power-producing hydroelectric turbines.

Powerhouse – The powerhouse is the main structure of a water-generated or hydroelectric powerplant, housing the generating units and associated control equipment.

Regulating gate – A regulating gate is a gate used to regulate the rate of flow of water through a dam outlet works or spillway.

Ring-follower gate – A ring-follower gate is a water flow regulating gate consisting of a rectangular leaf with a round opening equal in diameter to that of the conduit or pipe to which the ring-follower gate is attached; a ring-follower gate is moved to regulate flow through the adjacent pipe.

Ring seal gate – A ring seal gate is a water flow regulating gate in which sealing is accomplished by a moveable seal.

Service spillway (primary spillway) – The service or primary spillway is a structure located on or adjacent to a dam over or through which surplus or floodwaters which cannot be contained in the allotted storage space are passed. The spillway would include the intake and/or control structure, discharge channel, terminal structure, and entrance and outlet channels. A spillway is designed to provide releases from a reservoir to prevent significant damage to either the dam or its appurtenant structures.

Spillway – A structure that passes normal and/or flood flows in a manner that protects the structural integrity of the dam. If the rate of flow is controlled by mechanical means such as gates, a spillway is considered a controlled spillway. If the geometry of the spillway is the only flow control component of the spillway, it is considered an uncontrolled spillway.

Supplemental irrigation service land – Irrigable land now receiving, or to receive, an additional or reregulated supply of water through facilities constructed by or to be constructed by the U.S. Bureau of Reclamation (USBR).

Surcharge storage capacity – Reservoir surcharge storage capacity is available water storage capacity above the established or normal reservoir water surface elevation; reservoir surcharge storage capacity is typically utilized to store and control release of atypically high inflows, thereby controlling downstream flooding.

Tailwater – Tailwater is the water in the natural stream immediately downstream from a dam. The elevation of tailwater varies with the rate of water discharge from the reservoir. Tailwater is measured as the average depth of water downstream of a dam, expressed in inches or feet.

Wicket gate – In hydropower applications, a wicket gate pivots open around the periphery of an electricity-generating turbine to allow water to enter.

2.6.3 Federal North Platte River Water Projects in Wyoming

Table 2.6.1 contains a summary of information regarding federal North Platte River water projects in Wyoming. Platte River Basin Federal reservoirs are shown on Figure 2.6.1.

Table 2.6.1 Summary - federal water projects in the Platte River Basin of Wyoming

Federal Project	Entity
North Platte Project	Pathfinder Dam and Reservoir
	Guernsey Dam and Powerplant
	Whalen Diversion Dam
Kendrick Project	Seminoe Dam and Reservoir
	Alcova Dam and Reservoir
Kortes Unit of the Pick-Sloan Missouri Basin Program	Kortes Dam, Reservoir and Powerplant
Glendo Unit of the Pick-Sloan Missouri Basin Program	Glendo Dam, Reservoir and Powerplant
	Fremont Canyon Powerplant
	Gray Reef Dam and Reservoir
Source: United States Bureau of Reclamation.	

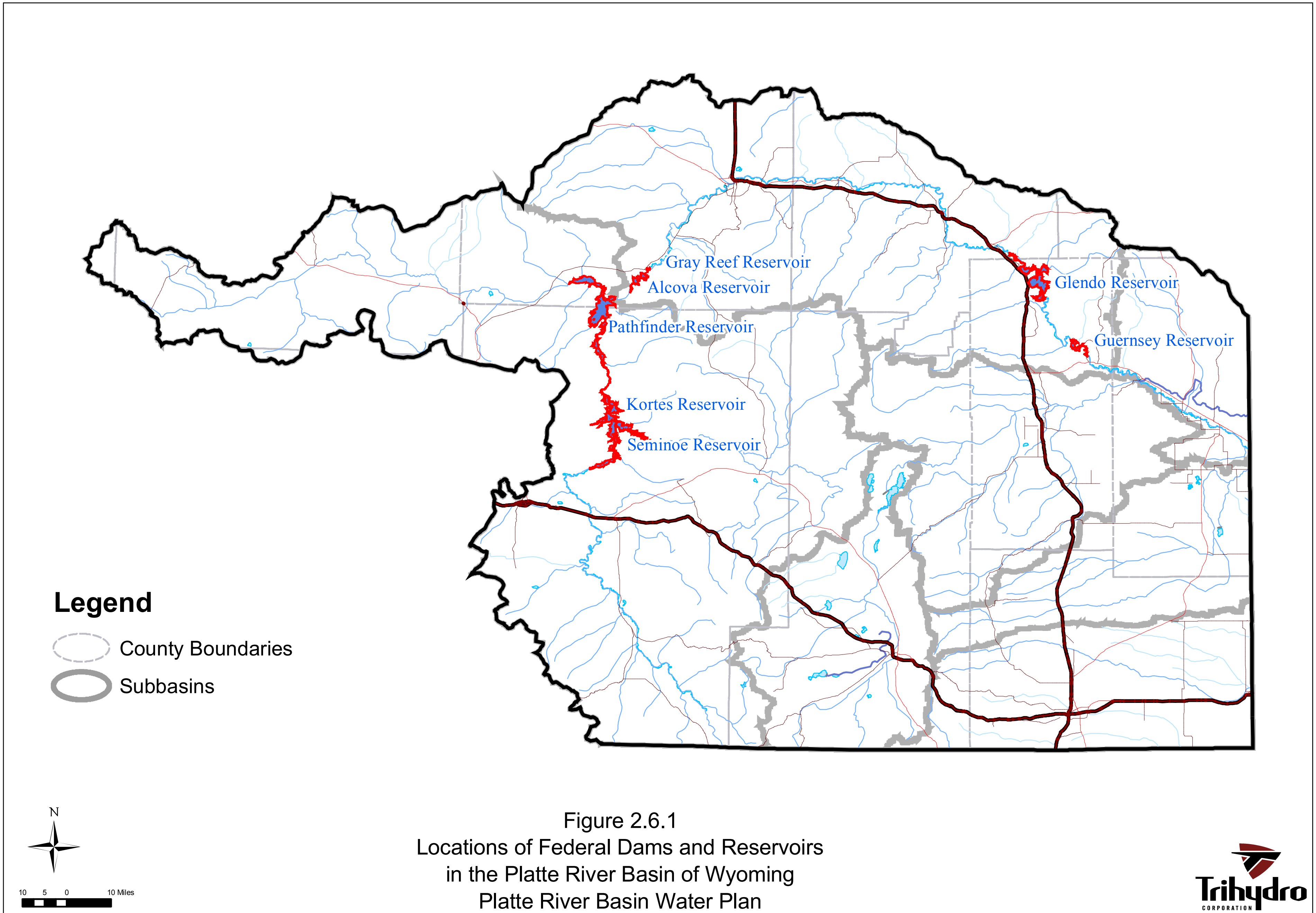


Figure 2.6.1
Locations of Federal Dams and Reservoirs
in the Platte River Basin of Wyoming
Platte River Basin Water Plan

2.6.3.1 North Platte Project

The major purpose of the North Platte Project is storing and providing water for agricultural irrigation. Lands irrigated by water from the North Platte Project extend 111 miles along the North Platte River Valley from Guernsey, Wyoming to Bridgeport, Nebraska. The project provides full service irrigation for approximately 226,000 acres within four irrigation districts: Pathfinder Irrigation District, Goshen Irrigation District, Gering – Fort Laramie Irrigation District, and Northport Irrigation District. The Goshen Irrigation District is located in Wyoming, while the Pathfinder, Gering – Fort Laramie, and Northport Irrigation Districts are located in Nebraska. Supplemental irrigation service is also provided to a combined area of about 109,000 acres within nine water-user entities, including Lingle Water Users, Hill, Rock Ranch, Gering, Farmers, Central, Chimney Rock, Browns Creek, and Beerline Irrigation Districts.

Facilities included within the North Platte Project are Pathfinder Dam and Reservoir; Guernsey Dam, Reservoir, and Powerplant; Whalen Diversion Dam; Fort Laramie Canal; Interstate Canal and Reservoir System; and Northport Canal.

2.6.3.2 Kendrick Project

The Kendrick Project stores the waters of the North Platte River for irrigation use and electric power generation. The project includes storage at Seminoe Reservoir and diversion of irrigation water at Alcova Dam to project agricultural lands via the Casper Canal. The Kendrick Project includes approximately 24,000 acres of irrigable project lands in the North Platte River basin between Alcova and Casper, Wyoming.

2.6.3.3 Kortes Unit of the Pick-Sloan Missouri Basin Program

The Kortes Unit consists of Kortes Dam, Reservoir, and Powerplant and is located in the Black Canyon of the North Platte River. These facilities are located in central Wyoming approximately two miles below Seminoe Dam within the Kendrick Project. The Kortes Unit was the first unit for which construction was initiated by the U.S. Bureau of Reclamation (USBR) in 1946 under the Pick-Sloan Missouri Basin Program. The primary purpose of the Kortes Unit is to provide hydroelectric power. No irrigation benefits are associated with this project (Simonds, 1996).

Water released from Seminoe Dam passes through the Kortes turbines on its way to Pathfinder Reservoir. The Kortes turbines generate 36 megawatts of electrical power, which is distributed by a transmission system owned by the federal government to localities in the Great Plains area.

2.6.3.4 Glendo Unit of the Pick-Sloan Missouri Basin Program

The Glendo Unit is comprised of Glendo Dam, Reservoir, and Powerplant; Fremont Canyon Powerplant; and Gray Reef Dam and Reservoir. The Glendo Unit provides supplemental irrigation water to 37,251 acres in Wyoming and Nebraska. Glendo Reservoir provides 40,000 acre-feet of water annually for beneficial use in Wyoming and Nebraska. The Glendo Unit project was authorized on July 16, 1954. Construction of Gray Reef Dam and Reservoir was authorized separately by Public Law 85-695 (72 Stat.687), approved August 20, 1958. (USBR, glendo1.html).

The Glendo Unit includes two powerplants, Glendo Powerplant and Fremont Canyon Powerplant, which have a combined generating capacity of 104.8 megawatts. These two powerplants provide electrical power to Wyoming, Colorado, and Nebraska.

Glendo Reservoir provides capacity to regulate stream flow below Alcova Dam. By providing flow regulation, water releases can be made year-round, and valuable water resources are more fully utilized. Also, more constant North Platte River water levels are maintained in the non-irrigation season (October 1 through April 30), improving the water quality in the river. (USBR, glendo1.html).

2.6.4 Federal North Platte River Reservoirs in Wyoming

Federal reservoirs, in order of occurrence on the North Platte River in Wyoming from upstream to downstream are:

- Seminoe Reservoir,
- Kortes Reservoir,
- Pathfinder Reservoir,
- Alcova Reservoir,
- Gray Reef Reservoir,
- Glendo Reservoir, and
- Guernsey Reservoir.

Table 2.6.2 contains a summary of information regarding the locations of these reservoirs.

Table 2.6.3 contains a summary of information regarding storage capacities of federal reservoirs on the North Platte River in Wyoming.

Table 2.6.2 Summary - locations of federal reservoirs on the North Platte River in Wyoming

Permit number	Reservoir name	Subbasin	Township	Range	Section	Qtr qtr	Nearest city	County
P4552R	Seminoe Reservoir	Above Pathfinder	25N	84W	8	NWNE	Rawlins	Carbon
P5580R	Kortes Reservoir	Above Pathfinder	26N	84W	34	SWSW	Rawlins	Carbon
P609R	Pathfinder Reservoir	Above Pathfinder	29N	84W	24	NWNW	Rawlins	Carbon
P4630R	Alcova Reservoir	Pathfinder to Guernsey	30N	83W	24	SESE	Casper	Natrona
P6489R	Gray Reef Reservoir	Pathfinder to Guernsey	30N	82W	18	NESE	Casper	Natrona
P5998R	Glendo Reservoir	Pathfinder to Guernsey	29N	68W	24	NENE	Glendo	Platte
P3905R	Guernsey Reservoir	Pathfinder to Guernsey	27N	66W	27	NENW	Guernsey	Platte

Source: Wyoming State Engineer's Office, United States Bureau of Reclamation.

Table 2.6.3 Summary - storage capacities of federal reservoirs on the North Platte River in Wyoming

Permit number	Reservoir name	Total capacity SEO tab book (acre-feet)	Outlet capacity (cubic feet per second)	Spillway capacity (cubic feet per second)	Hydro-electric generating plant	Power capacity (megawatts)	Powerplant release SEO tab book (cubic feet per second)
P4552R	Seminoe Reservoir	1,026,360	3,000	48,500	Seminoe Powerplant	45	1,990
P5580R	Kortes Reservoir	4,640	No information available	50,000	Kortes Powerplant	36	2,850
P609R	Pathfinder Reservoir	1,070,000	2,928 (left abutment) + 50-450 (30" flow gate)	33,940	Fremont Canyon Powerplant	48	2,320
P4630R	Alcova Reservoir	184,295	2,950	55,000	Alcova Powerplant	36	3,800
P6489R	Gray Reef Reservoir	Afterbay to re-regulate Alcova Powerplant releases	No information available	20,000	No information available	No information available	No information available
P5998R	Glendo Reservoir	800,000	13,000	No information available	Glendo Powerplant	38	3,340
P3905R	Guernsey Reservoir	71,040	No information available	No information available	Guernsey Powerplant	6.4	1,100

Source: Wyoming State Engineer's Office, United States Bureau of Reclamation.

2.6.4.1 Seminoe Dam and Reservoir

Background and History

The main irrigation water storage facility for the Kendrick Project, Seminoe Dam and Reservoir, is located on the North Platte River upstream of Pathfinder Reservoir. Construction of Seminoe Dam was completed in 1939.

Description

Seminoe Reservoir has a total permitted storage capacity of 1,026,360 acre-feet as shown in the Wyoming State Engineer's tab book. The dam has a structural height of 295 feet and is a concrete-arch structure. The primary spillway at Seminoe Dam consists of "a short trapezoidal approach channel leading from the reservoir to the inlet structure, a transitional chute, and a 30-foot diameter concrete lined tunnel through the right abutment with a cut-and-cover conduit section at the downstream portal" (USBR, 1991). Three electric motor-operated 14-foot by 50-foot fixed wheel gates control discharge through the primary spillway. The maximum discharge rate of the Seminoe Dam primary spillway is 48,500 cubic feet per second (USBR, 1991). A photograph of Seminoe Dam is included on Figure 2.6.2.

Figure 2.6.2
Seminoe Dam
Source: USBR

The Seminoe Dam contains two 60-inch jet flow valves that provide a low level river outlet with a flow capacity of 3,420 cubic feet per second (cfs). The outlets are located to “the left of centerline of the dam” (USBR, 2003).

Power Generation

Seminoe Powerplant is located at the downstream base of Seminoe Dam. The powerplant outlets “include three 120-inch diameter steel penstocks passing through the dam” (USBR, 1991). Each penstock also includes a 102-inch ring seal gate. Water flow through the penstocks is generally controlled by turbine wicket gates, while the ring seal gates are fully open. Water is released from the reservoir through penstocks at the Seminoe Powerplant or over a controlled spillway and outlet tunnel. The powerplant has a full release capacity of 4,050 cubic feet per second. Three electrical generating units with a total capacity of 51 megawatts are housed in the powerplant. The plant was up-graded in the mid-1970s to its present capacity of 51 megawatts.

Table 2.6.4 summarizes historic Seminoe Reservoir storage volumes.

Table 2.6.5 summarizes historic Seminoe Reservoir evaporation losses.

Table 2.6.6 summarizes historic Seminoe Reservoir discharges.

Table 2.6.4 Summary - historic Seminoe Reservoir storage volumes (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Mean	Max day	Date of max day
1981	840,357	778,210	703,377	604,066	548,858	501,406	461,661	512,109	600,072	596,365	577,860	549,972	606,193	872,259	1-Oct
1982	522,393	462,741	392,915	320,287	278,168	225,675	185,048	337,603	658,281	854,069	873,698	869,923	498,400	876,158	15-Sep
1983	839,485	794,759	721,790	626,701	555,693	512,109	536,838	736,532	1,039,376	971,419	952,949	904,922	766,048	1,055,564	9-Jul
1984	885,463	863,839	834,089	786,779	786,779	648,323	636,392	919,085	956,234	983,622	954,301	930,392	843,001	988,576	2-Aug
1985	919,648	898,643	868,309	852,299	852,299	817,550	842,098	902,326	905,656	901,402	838,605	808,198	865,937	936,080	13-Jun
1986	780,173	738,877	699,012	634,024	634,024	518,826	489,065	657,561	956,809	869,557	827,851	810,231	713,535	957,196	29-Jun
1987	796,422	782,313	735,274	674,068	674,168	646,906	723,324	832,174	835,993	772,805	702,016	660,139	732,410	858,846	17-Jun
1988	624,361	588,482	545,154	472,885	472,885	398,214	510,583	687,391	872,791	849,999	811,758	773,294	629,824	876,756	3-Jul
1989	736,526	694,077	608,078	518,707	518,707	451,814	465,340	505,106	553,819	543,924	514,220	488,161	543,387	772,152	1-Oct
1990	468,826	455,968	410,459	386,244	386,244	371,875	357,568	355,786	510,349	533,195	460,365	432,886	426,761	539,882	27-Jul
1991	419,547	410,756	396,569	361,059	361,059	347,402	337,599	441,807	645,777	584,186	479,861	439,721	433,973	646,059	29-Jun
1992	419,245	413,041	405,135	388,235	388,235	394,930	411,848	449,271	424,704	351,710	299,745	276,134	384,573	458,430	4-Jun
1993	257,753	247,948	236,117	227,629	227,629	242,015	301,494	548,731	782,642	750,572	697,922	608,884	421,863	796,422	8-Jul
1994	614,007	614,007	597,022	574,138	574,138	563,469	597,022	702,317	657,561	536,227	410,756	346,790	563,566	714,130	5-Jun
1995	332,128	319,288	310,101	297,923	297,923	308,642	295,166	403,274	872,431	976,123	889,832	836,167	511,478	988,570	23-Jul
1996	822,516	822,688	805,325	784,292	784,292	660,139	628,074	781,324	885,638	906,769	864,903	816,525	792,607	909,369	22-Jul
1997	793,583	781,818	745,337	707,902	707,902	640,859	611,576	785,944	967,307	901,218	881,823	895,510	782,096	977,894	25-Jun
1998	902,141	896,796	876,576	855,652	855,652	766,952	690,951	777,710	942,950	941,229	918,517	864,546	856,009	965,356	11-Jul
1999	853,882	802,124	757,281	735,743	735,743	674,314	720,401	843,498	968,869	955,454	835,319	911,230	821,992	969,065	1-Jul
2000	887,277	867,586	846,129	830,616	830,616	743,599	753,601	914,774	980,259	931,333	862,940	829,060	853,828	980,456	28-Jun

Source: United States Bureau of Reclamation

Table 2.6.5 Summary - historic Seminoe Reservoir evaporation losses (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	Max day	Date of max day
1981	4,969	2,844	1,697	1,590	1,777	2,638	4,190	3,065	6,935	7,441	6,363	4,798	48,307	677	20-Feb
1982	3,042	2,663	1,975	1,214	788	1,392	1,828	2,098	4,843	8,825	9,008	4,726	42,402	731	7-Dec
1983	6,465	1,857	776	804	1,002	1,739	1,823	3,717	7,554	10,845	9,425	7,126	50,133	676	2-Jul
1984	6,306	2,922	914	1,059	735	1,179	2,514	6,852	8,779	9,474	8,320	5,576	53,630	1,001	14-Nov
1985	3,276	3,035	1,084	881	728	2,578	5,540	8,365	10,039	10,086	9,752	5,569	60,933	805	30-Nov
1986	4,489	1,567	711	1,338	1,292	3,319	3,515	4,620	8,725	10,394	8,666	5,449	54,085	1,073	5-Jul
1987	2,938	1,851	1,186	1,187	1,584	1,619	5,464	5,442	9,126	8,379	7,158	5,128	61,062	681	13-Jun
1988	3,843	1,592	715	562	765	457	3,451	4,477	8,646	9,855	9,219	6,068	49,650	488	20-Oct
1989	4,566	2,218	994	1,436	548	1,859	3,420	4,118	5,098	6,976	5,521	3,577	40,331	980	31-Jan
1990	3,542	1,797	485	1,040	943	1,400	2,140	2,469	4,990	5,433	5,322	3,137	32,698	1,066	30-Nov
1991	3,271	1,433	372	1,078	959	1,460	1,897	2,977	8,256	7,740	5,762	3,324	38,529	1,012	1-Jun
1992	3,118	565	854	689	1,140	1,642	3,739	3,781	4,062	4,396	3,675	2,874	30,535	552	29-Feb
1993	1,788	1,156	642	309	276	918	1,297	3,761	5,135	8,647	6,177	4,950	35,056	753	20-Sep
1994	2,845	985	496	1,239	471	2,174	4,181	6,491	7,793	6,218	4,936	3,104	40,933	668	15-Mar
1995	1,598	1,591	784	497	316	1,138	1,240	1,230	6,295	9,500	9,081	4,867	38,137	1,301	29-Nov
1996	3,478	2,152	1,285	2,413	2,504	1,547	2,759	4,661	7,993	8,283	8,145	5,240	50,460	2,523	31-Oct
1997	2,797	1,388	1,329	980	970	3,533	3,390	4,861	7,956	9,469	7,500	5,811	49,984	2,197	29-Oct
1998	2,318	691	998	943	1,310	1,418	3,801	6,467	6,485	8,985	7,379	6,397	47,192	1,184	23-Apr
1999	3,258	3,771	1,692	1,431	1,205	4,092	3,602	7,179	8,485	12,110	10,309	5,454	61,588	3,566	30-Mar
2000	4,631	3,434	2,661	1,722	1,148	2,088	3,962	6,835	8,887	11,022	10,045	6,314	62,749	2,799	30-Nov

Source: United States Bureau of Reclamation

Table 2.6.6 Summary - historic Seminoe Reservoir discharges (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	Max discharge (cfs)	Date of max discharge
1981	51,398	81,439	102,686	123,180	78,220	79,837	76,655	41,088	31,833	36,696	32,386	35,566	770,983	2,897	23-Jan
1982	50,969	79,265	89,629	91,188	68,073	93,051	100,247	46,253	38,166	40,512	42,908	41,643	781,904	2,014	10-Jan
1983	74,454	84,914	107,937	126,460	100,288	107,881	95,585	55,256	419,474	475,946	120,252	66,307	1,834,754	16,173	30-Jun
1984	63,344	61,773	65,395	85,468	108,363	118,247	150,399	366,853	486,960	182,733	117,380	67,539	1,874,454	13,054	7-Jun
1985	61,611	61,208	63,463	48,294	42,732	79,674	134,362	234,742	204,780	72,617	86,106	44,408	1,133,996	5,062	20-May
1986	67,874	76,411	79,817	99,739	117,485	161,270	225,082	145,382	213,064	254,221	84,859	46,019	1,571,225	6,652	10-Jul
1987	68,342	67,601	79,855	84,407	76,296	36,970	29,601	32,192	49,970	84,135	87,148	53,724	750,240	2,192	31-Jan
1988	52,463	60,180	66,224	93,168	72,770	76,885	61,985	72,161	63,495	63,481	49,123	44,521	776,456	2,256	30-Jan
1989	49,123	59,946	110,344	106,171	97,934	65,236	64,961	37,571	33,178	32,104	47,909	37,061	741,539	2,180	29-Dec
1990	31,559	30,169	60,869	42,754	28,177	50,862	90,224	76,877	34,739	38,898	89,718	39,084	613,930	2,047	30-Aug
1991	31,632	31,507	32,573	49,535	38,362	33,439	63,685	63,810	40,080	103,275	125,407	50,291	663,598	2,706	14-Jul
1992	32,188	30,371	30,863	30,492	27,846	29,560	37,144	53,768	103,934	114,829	65,427	31,597	588,018	2,674	28-Jul
1993	32,460	31,573	32,801	32,846	28,869	32,063	31,182	49,170	122,475	142,217	147,378	50,725	733,759	2,751	27-Jul
1994	32,577	31,123	50,333	50,612	46,322	51,511	58,961	90,317	130,846	137,500	135,158	66,561	881,820	2,774	10-Aug
1995	32,021	31,121	32,380	32,089	28,838	32,295	47,804	56,273	77,964	193,133	128,235	71,591	763,744	3,466	26-Jul
1996	46,181	44,580	45,556	46,304	86,700	126,081	189,610	189,818	234,050	58,602	62,045	55,932	1,185,459	5,312	13-Jun
1997	43,244	49,517	64,467	67,638	67,549	134,214	144,976	179,336	309,253	154,116	72,805	47,522	1,334,636	6,725	15-Jun
1998	43,474	47,919	52,264	52,409	47,215	157,819	158,549	100,042	86,414	116,600	64,729	66,986	994,419	3,309	25-Mar
1999	50,015	95,574	68,495	53,187	59,457	97,966	51,223	137,314	289,291	125,453	53,215	41,645	1,122,833	5,215	9-Jun
2000	43,369	41,645	43,095	43,091	61,704	98,384	87,187	50,985	49,529	64,532	70,911	41,125	695,558	2,001	1-Jun

Source: United States Bureau of Reclamation

2.6.4.2 Kortes Dam and Reservoir

Background and History

Kortes Dam, Reservoir, and Powerplant are part of the Kortes Unit of the U.S. Bureau of Reclamation (USBR) Pick-Sloan Missouri Basin Project. The dam, reservoir, and powerplant are located in a 1,000-foot deep gorge, Black Canyon, approximately two miles downstream of Seminoe Dam. Construction of Kortes Dam was initiated in 1946 and finished in 1951.

Congress passed Senate Bill 2553 in the late 1960s which authorized modification of the operation of Kortes Dam and Powerplant. This legislation requires a minimum 500 cubic feet per second flow rate in the North Platte River between Kortes Reservoir and the normal headwaters of Pathfinder Reservoir, which is located downstream of Kortes Reservoir. This minimum flow allows for preservation of a famous sport fishery in a reach of the North Platte River below Kortes Reservoir commonly referred to as the “Miracle Mile.”

Description

Kortes Dam is a concrete gravity structure which has a maximum height of 244 feet, a dam length of 193 feet, and a dam crest width of 24 feet. Kortes Reservoir provides a total permitted storage capacity of 4,640 acre-feet as per the Wyoming State Engineer’s Office tab book. An uncontrolled emergency spillway tunnel on the right abutment of the reservoir has a discharge capacity of approximately 50,000 cubic feet per second. The spillway tunnel has a diameter of 30 feet, and it is 527 feet long. The site of Kortes Dam was chosen to provide approximately 200 to 300 feet of elevation difference or “head” between the upstream Seminoe Powerplant tailwater and the downstream Pathfinder Reservoir high water surface elevation. A photograph of Kortes Dam and Powerplant is shown on Figure 2.6.3.

Figure 2.6.3
Kortes Dam and Powerplant
Source: USBR

Power Generation

Kortes Reservoir serves as the forebay to Kortes Powerplant. To maximize hydropower production, reservoir storage is maintained at or near capacity (Simonds, 1996). Kortes Powerplant consists of three electrical generating units. Due to an anticipated shortage within the region, the generators at Kortes Powerplant were put into operation before the dam was complete. Water is supplied to the generators via three 108-inch diameter steel penstocks running through the dam (Simonds, 1996). The powerplant has a water release capability of approximately 3,000 cubic feet per second and a total electricity generating capacity of 36 megawatts. After release from Seminoe Dam, water passes through Kortes Reservoir and Powerplant turbines to generate power on its way to Pathfinder Reservoir. Power produced by the Kortes Powerplant is marketed by the Western Area Power Administration (WAPA) to cities within a 15-state region in the western and central U.S.

Table 2.6.7 summarizes historic Kortes Reservoir storage volumes.

Table 2.6.8 summarizes historic Kortes Reservoir evaporation losses.

Table 2.6.9 summarizes historic Kortes Reservoir discharges.

Table 2.6.7 Summary - historic Kortes Reservoir storage volumes (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Mean	Max day	Date of max day
1981	4,683	4,630	4,626	4,600	4,624	4,636	4,628	4,543	4,335	4,700	4,638	4,416	4,588	4,872	2-Oct
1982	4,504	4,539	4,585	4,557	4,650	4,587	4,524	4,445	4,548	4,512	4,488	4,571	4,543	4,712	14-Dec
1983	4,585	4,650	4,682	4,622	4,483	4,733	4,270	4,563	5,603	4,935	4,663	4,457	4,687	5,708	29-Jun
1984	4,593	4,252	4,630	4,585	4,559	4,306	4,302	5,404	5,243	4,511	4,565	4,600	4,629	5,499	6-Jun
1985	4,579	4,491	4,511	4,551	4,487	4,544	4,569	5,043	4,519	4,605	4,581	4,599	4,590	5,135	18-Jun
1986	4,559	4,536	4,625	4,630	4,673	4,355	5,015	4,523	5,103	4,531	4,504	4,548	4,634	5,173	8-Jul
1987	4,523	4,577	4,540	4,579	4,515	4,634	4,585	4,567	4,595	4,607	4,595	4,457	4,565	4,731	7-Nov
1988	4,531	4,564	4,511	4,569	4,658	4,666	4,605	4,536	4,599	4,630	4,561	4,592	4,585	4,737	25-Feb
1989	4,658	4,666	4,499	4,632	4,678	4,687	4,593	4,694	4,678	4,673	4,590	4,692	4,645	4,712	2-Aug
1990	4,712	4,702	4,663	4,640	4,701	4,684	4,654	4,694	4,664	4,615	4,511	4,697	4,661	4,719	22-Dec
1991	4,670	4,698	4,700	4,699	4,658	4,659	4,663	4,589	4,599	4,696	4,685	4,664	4,657	4,772	10-May
1992	4,638	4,694	4,650	4,693	4,670	4,705	4,691	4,699	4,415	4,633	4,459	4,679	4,636	4,717	15-Oct
1993	4,689	4,675	4,668	4,690	4,662	4,700	4,684	4,650	4,699	4,548	4,616	4,702	4,665	4,729	20-Jun
1994	4,710	4,696	4,694	4,653	4,666	4,625	4,703	4,469	4,618	4,697	4,695	4,671	4,658	4,728	1-Nov
1995	4,699	4,675	4,698	4,669	4,690	4,684	4,675	4,696	4,700	4,574	4,606	4,585	4,671	4,856	8-Jul
1996	4,653	4,690	4,699	4,708	4,699	4,681	4,618	4,985	4,619	4,705	4,701	4,694	4,704	5,066	13-Jun
1997	4,684	4,666	4,703	4,714	4,685	4,694	4,569	4,799	5,014	4,690	4,666	4,458	4,695	5,149	14-Jun
1998	4,468	4,719	4,685	4,699	4,665	4,852	4,704	4,565	4,643	4,673	4,723	4,699	4,682	4,898	22-Mar
1999	4,693	4,661	4,677	4,700	4,694	4,666	4,617	5,018	4,921	4,693	4,699	4,694	4,728	5,091	2-Jun
2000	4,703	4,695	4,680	4,719	4,719	4,704	4,366	4,713	4,699	4,705	4,674	4,708	4,696	4,830	6-Mar
Source: United States Bureau of Reclamation															

Table 2.6.8 Summary - historic Kortes Reservoir evaporation losses (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	Max day	Date of max day
1981	20	12	5	6	8	20	30	21	41	44	39	30	276	4	31-Jan
1982	21	19	13	9	4	16	24	23	33	42	36	19	259	5	7-Dec
1983	19	6	0	1	3	10	12	21	31	49	41	34	227	3	21-Jun
1984	22	11	0	1	0	2	13	36	44	38	31	25	223	4	14-Nov
1985	15	8	1	0	0	14	24	39	47	45	43	26	262	3	30-Nov
1986	21	7	1	5	6	19	26	30	42	49	38	28	272	5	31-Jan
1987	12	5	3	3	4	7	25	27	38	41	38	31	234	3	31-Jan
1988	22	8	0	0	3	0	26	27	41	46	42	26	241	3	20-Oct
1989	25	10	3	7	1	13	26	31	39	45	39	24	263	7	31-Jan
1990	27	11	1	6	6	10	20	23	40	36	35	25	240	8	30-Nov
1991	23	10	0	7	6	11	16	26	52	47	36	27	261	8	1-Jun
1992	27	2	4	3	7	12	27	28	31	39	34	30	244	5	29-Feb
1993	20	9	5	1	1	8	12	32	29	46	34	30	227	6	25-Mar
1994	14	3	0	5	0	12	19	36	44	35	35	27	230	4	31-Jan
1995	14	13	5	2	1	9	10	7	35	39	38	21	194	13	29-Nov
1996	13	7	3	9	10	6	13	28	36	34	31	27	217	13	29-Apr
1997	11	4	4	2	3	18	17	24	36	40	32	26	217	11	29-Oct
1998	0	0	2	1	4	4	13	32	28	40	28	28	180	6	23-Apr
1999	7	15	6	4	4	20	5	36	39	52	46	25	259	20	30-Mar
2000	24	13	9	5	3	8	12	34	37	48	44	28	265	13	30-Nov
Source: United Stated Bureau of Reclamation															

Table 2.6.9 Summary - historic Kortes Reservoir discharges (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	Max discharge (cfs)	Date of max discharge
1981	51,564	81,485	102,684	123,211	78,188	79,803	76,631	41,151	31,995	36,288	32,406	35,774	771,182	2,822	23-Jan
1982	50,858	79,210	89,572	91,208	67,978	93,098	100,290	46,304	38,031	40,504	42,893	41,540	781,486	2,036	10-Jan
1983	74,416	84,839	107,911	126,524	100,425	107,623	96,026	54,948	418,399	476,563	120,484	66,480	1,834,637	16,225	30-Jun
1984	63,181	62,100	65,018	85,517	108,385	118,497	150,393	365,935	487,277	183,423	117,283	67,434	1,874,444	13,059	7-Jun
1985	61,613	61,287	63,439	48,256	42,797	79,603	134,317	234,228	205,256	72,486	86,087	44,360	1,133,728	5,061	20-May
1986	67,886	76,423	79,728	99,725	117,437	161,574	224,398	145,843	212,444	254,745	84,843	45,945	1,570,990	6,651	10-Jul
1987	68,356	67,537	79,888	84,365	76,356	36,845	29,627	32,182	49,912	84,083	87,122	53,831	750,105	2,182	31-Jan
1988	52,364	60,135	66,276	93,104	72,668	76,871	62,015	72,206	63,392	63,402	49,144	44,463	776,041	2,314	29-Jan
1989	49,035	59,925	110,507	106,028	97,892	65,209	65,032	37,438	33,156	32,065	47,952	36,934	741,174	2,124	29-Dec
1990	31,507	30,171	60,906	42,768	28,110	50,870	90,240	76,814	34,727	38,914	89,792	38,874	613,692	2,024	30-Aug
1991	31,632	31,573	32,469	49,533	38,404	33,427	63,660	63,856	40,017	103,133	125,375	50,285	663,364	2,662	14-Jul
1992	32,186	30,307	30,904	30,450	27,866	29,510	37,133	53,730	104,186	114,573	65,564	31,347	587,756	2,655	28-Jul
1993	32,426	31,581	32,805	32,828	28,895	32,017	31,184	49,166	122,396	142,324	147,277	50,604	733,504	2,738	2-Aug
1994	32,553	31,137	50,331	50,644	46,308	51,537	58,869	90,516	130,653	137,387	135,126	66,555	881,615	2,731	10-Aug
1995	31,978	31,131	32,352	32,118	28,824	32,297	47,804	56,243	77,925	193,210	128,166	71,488	763,535	3,470	25-Jul
1996	46,199	44,539	45,544	46,280	86,698	126,093	189,663	189,420	234,383	58,487	62,017	55,910	1,185,233	5,304	13-Jun
1997	43,238	49,531	64,431	67,624	67,577	134,188	145,083	179,080	308,995	154,397	72,799	47,700	1,334,644	6,724	15-Jun
1998	43,464	47,671	52,296	52,395	47,242	157,628	158,686	100,052	86,404	116,529	64,647	66,980	993,995	3,308	25-Mar
1999	50,015	95,591	68,475	53,161	59,460	97,978	51,265	136,877	289,347	125,629	53,167	41,621	1,122,587	5,214	9-Jun
2000	43,337	41,637	43,101	43,049	61,702	98,394	87,247	50,872	49,507	64,475	70,901	41,066	695,288	2,002	1-Jun

Source: United States Bureau of Reclamation

2.6.4.3 Pathfinder Dam and Reservoir

Background and History

Located approximately 47 miles southwest of Casper, Pathfinder Dam was built as part of the North Platte Project. The dam was one of the first dams built under the Federal 1902 Reclamation Act. Pathfinder Dam is an arch dam with a gravity-type section and has a maximum height of 214 feet. The Pathfinder Dam is listed as a Wyoming Historic Civil Engineering Landmark as well as in the National Register of Historic Places (USBR, 2003). Pathfinder Reservoir has a total permitted storage capacity of 1,070,000 acre-feet as shown in the Wyoming State Engineer's Office tab book.

Construction of Pathfinder Dam began in 1905. In December 1905, contractors started constructing a temporary dam to divert the North Platte River while the permanent dam was put in place. In January 1906, excavation was initiated for the foundation of the dam. In March 1906, construction was put on hold due the river rising and flooding the dam site, pushing foundation construction to August 15, 1906 (Autobee, 1996). Construction of the dam was completed in 1909.

Pathfinder Dam was erected from 60,210 cubic yards of masonry and 55,000 barrels of cement. The masonry and cement were hauled by freight teams from Casper, a 45-mile trip. Freight teams ranged "from a sheep wagon drawn by two horses and a mule carrying 24 sacks of cement to a 22-horse team drawing five wagons coupled together hauling 327 sacks weighing 31,000 pounds" (Autobee, 1996).

Description

Once Pathfinder Dam was complete, the diversion tunnel used during construction was operated as a service outlet. The finished structure has two main outlets – one on each abutment. The two main outlets consist of a north, or left abutment, outlet that is 480 feet long and a south, or right abutment, outlet that is 360 feet long. The right abutment outlet associated with the original outlet works was plugged in 1958 when the Fremont Canyon power conduit was constructed. The left outlet works includes two 60-inch jet flow gates which provide a total discharge capacity of 2,928 cubic feet per second (cfs) at water surface elevation 5850.1 feet. An additional 30-inch jet flow gate outlet in the left abutment has a controlled discharge capacity that can be varied from 50 to 450 cfs.

Pathfinder's emergency spillway is an uncontrolled, flat-crested weir. If the reservoir water surface elevation at any time exceeds maximum water surface elevation 5850.1, water discharges via the emergency spillway. The spillway is located approximately 400 feet from the north side of the canyon and is 650 feet wide. The principal spillway can convey water at a flow rate of 33,940 cubic feet per second at water surface elevation 5858.1 (USBR, wy01296.htm). The spillway also has 12-foot high guide walls. Water is released at varying and controlled rates from Pathfinder Reservoir during both the irrigation and non-irrigation seasons. During the irrigation season, water is released as required to meet the needs of the North Platte Project. Figure 2.6.4 provides a photograph of Pathfinder Dam.

Figure 2.6.4
Pathfinder Dam
Source: USBR

Power Generation

Completed on June 3, 1960, Fremont Canyon Powerplant is located in a North Platte River canyon below Pathfinder Dam. Depending upon the reservoir water surface elevation, as much as 2,900 cubic feet per second (cfs) can be released through the Fremont Canyon power conduit and discharged from the Fremont Canyon turbines at the powerplant three miles downstream of Pathfinder Dam. The powerplant intake conduit is located approximately 35 miles southwest of Casper, Wyoming, and is three miles long and 18 feet wide (Autobee, 1996). The conduit is controlled by a 14-foot by 18-foot fixed wheel gate located downstream of the conduit inlet. The powerplant intake works consists of two penstocks leading to the powerplant in Fremont Canyon, near the upper end of Alcova Reservoir.

Reservoir Operations

In addition to providing storage and release of water for irrigation and hydroelectric power generation, Pathfinder Reservoir is used for recreation and flood control. Recreational activities at the reservoir include fishing and boating. The reservoir contains cutthroat, rainbow, and brown trout. With a surcharge storage capacity of 188,493 acre-feet, the reservoir has prevented $8.7 million in flood damage since its construction (USBR, 2003).

Table 2.6.10 summarizes historic Pathfinder Reservoir storage volumes.

Table 2.6.11 summarizes historic Pathfinder Reservoir evaporation losses.

Table 2.6.12 summarizes historic Pathfinder Reservoir discharges.

Table 2.6.10 Summary - historic Pathfinder Reservoir storage volumes (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Mean	Max day	Date of max day
1981	551,654	584,405	632,006	701,213	733,738	782,776	801,670	762,432	706,963	610,756	473,110	378,778	643,292	803,910	27-Apr
1982	369,890	408,891	456,003	505,765	536,046	582,104	612,409	568,805	581,960	520,202	437,503	387,647	497,269	612,559	1-May
1983	436,950	476,830	546,248	629,547	695,214	776,543	877,651	842,033	1,067,018	1,039,874	898,784	842,420	760,759	1,083,755	7-Jul
1984	859,615	868,669	882,241	920,877	974,873	947,500	900,203	1,055,177	1,062,901	976,378	918,201	881,842	937,373	1,080,740	14-Jun
1985	884,437	880,644	894,932	894,324	886,443	883,838	875,455	930,793	988,632	871,036	720,667	601,677	859,407	996,002	25-Jun
1986	618,539	645,470	672,748	718,097	780,783	839,700	974,821	992,485	1,044,765	1,005,760	905,226	846,291	837,057	1,050,851	15-Jul
1987	856,050	822,623	847,263	880,597	909,514	925,559	938,655	922,665	871,632	799,441	724,969	721,869	851,736	948,505	13-May
1988	736,600	746,614	745,913	786,842	821,100	875,210	902,579	924,938	868,856	725,314	579,224	494,239	767,536	927,422	3-Jun
1989	508,641	509,148	564,597	622,325	687,322	728,598	706,365	625,216	541,389	420,553	301,105	271,635	540,575	734,680	12-Apr
1990	297,681	295,737	328,054	340,501	343,915	365,199	416,276	439,398	396,705	321,912	230,795	227,610	333,649	440,292	30-May
1991	246,843	249,902	250,116	269,973	286,635	289,327	282,241	306,792	336,935	336,491	322,341	281,930	288,294	340,411	18-Aug
1992	306,709	300,859	302,006	305,136	310,879	319,170	311,214	293,080	277,438	251,548	237,524	182,604	283,181	320,196	29-Mar
1993	203,307	204,684	203,620	204,433	208,280	217,763	211,023	225,255	297,356	288,930	294,286	305,549	238,707	307,207	28-Sep
1994	328,403	329,974	355,628	380,829	406,276	436,947	457,135	450,582	420,553	340,054	245,428	221,189	364,417	470,730	11-May
1995	254,208	240,025	244,651	254,497	264,663	285,374	291,719	367,958	477,297	654,607	643,905	640,160	382,422	644,844	16-Aug
1996	678,122	685,012	704,678	723,934	783,349	849,795	928,666	952,718	980,185	869,648	780,966	771,673	809,062	982,551	15-Jun
1997	785,002	808,805	831,802	861,944	889,022	905,023	922,252	956,308	1,007,947	896,289	859,779	857,815	881,832	1,010,137	26-Jun
1998	878,599	895,682	919,983	946,824	971,399	995,739	982,551	971,186	963,303	936,360	842,797	760,494	922,076	996,390	2-Apr
1999	780,966	840,474	869,847	889,022	916,690	973,537	995,305	993,352	1,009,699	978,037	920,396	897,301	922,052	1,011,892	26-Jun
2000	918,130	926,387	928,873	935,943	960,543	994,870	994,653	993,135	923,904	777,676	652,715	610,429	884,772	997,259	3-Jun

Source: United States Bureau of Reclamation

Table 2.6.11 Summary - historic Pathfinder Reservoir evaporation losses (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	Max day	Date of max day
1981	3,787	2,304	1,630	1,843	2,421	3,957	7,025	6,446	11,162	9,859	7,475	5,984	63,893	929	20-Feb
1982	2,433	2,276	2,130	1,782	1,356	2,737	4,550	5,242	8,060	9,634	7,379	3,875	51,454	811	4-Jun
1983	2,046	1,265	612	823	1,271	2,511	3,008	5,916	8,699	12,689	11,950	9,207	59,997	755	19-Jul
1984	5,759	3,226	1,038	1,265	968	1,701	3,776	9,222	10,555	12,531	12,191	7,403	69,635	1,110	14-Nov
1985	3,500	3,258	1,207	981	840	2,990	6,408	9,690	11,609	12,216	12,041	6,562	71,302	874	30-Nov
1986	4,023	1,482	753	1,616	1,763	5,097	6,084	9,212	12,391	13,692	11,839	7,040	74,992	1,114	31-Jan
1987	3,523	2,133	1,430	1,586	2,264	2,402	7,717	8,974	12,601	12,230	9,884	7,368	72,112	820	28-Jul
1988	4,888	2,076	996	868	1,396	910	6,683	8,492	13,788	13,257	10,548	5,717	69,619	707	18-Jul
1989	3,589	1,831	958	1,779	808	3,036	5,548	8,847	8,556	9,196	5,897	3,118	53,163	1,326	23-Mar
1990	2,475	1,360	397	987	923	1,407	2,393	4,543	6,859	5,720	4,359	3,029	34,452	806	30-Nov
1991	2,241	1,036	279	841	851	1,358	1,696	3,053	4,920	5,588	5,115	2,902	29,880	608	28-Feb
1992	2,454	469	711	594	1,021	1,467	3,177	3,194	3,524	3,801	3,670	2,529	26,611	494	29-Feb
1993	1,483	1,025	600	281	275	905	1,072	2,385	2,708	4,024	3,750	2,931	21,439	471	25-Mar
1994	1,599	629	341	931	379	1,887	2,908	5,398	6,474	5,861	4,182	2,737	33,326	577	15-Mar
1995	1,423	1,347	659	447	312	1,095	1,243	1,348	4,032	7,320	8,900	6,123	34,249	1,094	29-Nov
1996	3,168	2,061	1,269	2,502	2,891	2,025	4,094	7,135	11,423	11,493	10,250	6,311	64,622	3,364	29-Apr
1997	3,080	1,567	1,597	1,247	1,318	5,113	5,199	7,153	9,804	11,245	8,734	6,535	62,592	2,577	27-Mar
1998	2,490	754	1,122	1,105	1,596	1,869	5,368	10,226	8,789	11,260	9,609	7,990	62,178	1,695	23-Apr
1999	3,109	4,297	2,077	1,821	1,609	5,989	3,752	8,707	11,005	13,894	12,236	6,598	75,094	5,230	30-Mar
2000	5,735	3,961	3,147	2,062	1,416	2,841	5,459	9,288	10,507	11,960	9,416	6,194	71,986	3,236	30-Nov

Source: United States Bureau of Reclamation

Table 2.6.12 Summary - historic Pathfinder Reservoir discharges (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	Max discharge (cfs)	Date of max discharge
1981	70,195	54,426	56,977	50,763	45,554	35,911	60,720	85,448	89,395	134,590	176,713	130,661	991,355	3,205	22-Aug
1982	61,759	46,290	46,502	45,082	42,615	53,833	78,284	113,964	51,880	109,309	127,837	91,589	868,945	2,898	25-Jul
1983	32,577	43,864	42,928	42,889	37,289	36,480	52,381	157,797	231,410	496,322	267,570	117,759	1,559,266	8,687	2-Jul
1984	45,195	56,233	57,457	53,355	50,805	155,821	215,514	258,121	494,850	281,213	171,519	100,578	1,940,662	9,504	9-Jun
1985	62,110	68,690	52,056	56,019	55,359	92,269	164,051	191,708	146,358	184,988	231,832	170,130	1,475,572	6,847	30-Apr
1986	57,300	51,584	53,566	54,403	55,442	101,514	99,199	166,467	216,385	295,724	185,010	104,501	1,441,095	5,955	15-Jul
1987	64,637	100,005	54,169	52,620	51,630	33,604	52,596	57,271	106,084	157,135	162,411	52,110	944,269	3,415	21-Jul
1988	63,835	48,597	59,032	55,313	41,290	34,994	51,227	58,677	113,213	200,406	195,773	130,671	1,026,028	3,631	31-Aug
1989	34,374	57,537	53,970	49,797	38,430	31,295	92,932	126,379	121,416	155,379	168,575	66,234	996,317	4,740	29-Aug
1990	6,349	31,745	33,066	33,560	27,824	36,613	52,056	61,603	81,584	115,503	190,094	43,902	713,901	3,948	22-Aug
1991	11,219	32,194	30,908	33,634	28,003	38,561	84,660	68,110	44,126	112,510	146,696	96,419	727,039	3,190	28-Aug
1992	9,584	69,527	34,009	31,839	29,641	33,763	53,205	78,117	128,093	150,583	79,656	85,496	753,511	3,203	23-Jul
1993	11,228	32,061	31,857	32,099	27,251	31,325	52,532	63,039	82,100	155,972	148,846	40,919	709,228	2,862	11-Aug
1994	14,065	34,856	31,898	32,975	26,765	30,720	54,268	113,645	160,245	213,558	234,046	94,764	1,041,804	4,005	13-Aug
1995	2,202	40,840	30,744	30,145	28,272	31,722	53,100	34,947	33,929	58,499	104,559	76,048	525,005	2,453	1-Sep
1996	6,190	41,423	30,105	32,545	28,961	63,215	123,025	180,766	217,993	161,554	146,392	61,636	1,093,805	4,876	14-Jun
1997	29,570	30,073	42,942	44,400	45,965	128,154	140,223	190,372	305,603	266,309	110,116	49,321	1,383,049	5,386	27-Jun
1998	22,235	34,725	35,774	35,034	33,892	148,086	193,178	132,065	111,612	153,374	163,674	151,440	1,215,088	3,615	16-Apr
1999	44,928	40,967	42,768	42,615	41,050	51,267	55,055	196,879	319,571	163,987	112,372	68,848	1,180,306	5,512	26-Jun
2000	28,824	41,944	46,933	45,410	50,807	79,418	102,212	78,540	127,337	209,006	195,624	86,729	1,092,784	3,679	1-Aug

Source: United States Bureau of Reclamation

2.6.4.4 Alcova Dam and Reservoir

Background and History

Alcova Dam and Reservoir are part of the Kendrick Project. The dam, located approximately 10 miles downstream of Pathfinder Dam, serves as a diversion for Casper Canal, which conveys irrigation water to Kendrick Project irrigators. Completed in 1938, the reservoir has a storage capacity of 184,295 acre-feet at a maximum water surface elevation of 5500.0, of which only the top 30,600 acre-feet is active capacity available for Kendrick Project irrigation.

Description

The Alcova Reservoir emergency spillway has a discharge capacity of 55,000 cubic feet per second at a reservoir water surface elevation of 5500.0 feet. The emergency spillway, located in the left abutment, is a concrete-lined open channel regulated by three 25-foot by 40-foot gates. The reservoir is operated within two-foot water surface elevation ranges during summer and winter. The summer operating range is 10 feet above the winter operating range. The high summer operating range is maintained to provide adequate head on the Casper Canal and to assist with recreational use. During the winter, the lower level reduces the potential for ice damage to the Casper Canal gate and to recreational boat docks. Figure 2.6.5 contains a photograph of Alcova Dam.

Figure 2.6.5
Alcova Dam
Source: USBR

Power Generation

Alcova Reservoir serves as a forebay for the Alcova Powerplant. Alcova Powerplant was authorized for construction on August 22, 1950, under the Federal Reclamation Act of 1939 and was completed in 1955. The powerplant consists of two electrical generating units with a capacity of 36 megawatts. The powerplant has a full water release capacity estimated at 4,100 cubic feet per second. Water from Alcova Reservoir is released for downstream irrigation use through the powerplant or over a controlled Alcova Dam spillway.

Table 2.6.13 summarizes historic Alcova Reservoir storage volumes.

Table 2.6.14 summarizes historic Alcova Reservoir evaporation losses.

Table 2.6.15 summarizes historic Alcova Reservoir discharges.

Table 2.6.13 Summary - historic Alcova Reservoir storage volumes (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Mean	Max day	Date of max day
1981	156,448	154,316	154,697	150,963	152,646	159,396	177,567	181,001	178,198	179,558	179,096	178,659	166,879	181,805	9-Jul
1982	157,736	155,525	156,064	154,070	154,517	162,791	178,732	180,561	180,756	180,047	179,411	179,169	168,282	186,438	27-May
1983	154,383	156,199	155,973	155,391	156,109	163,580	178,440	179,096	175,562	177,955	179,387	179,583	167,638	181,906	12-Jun
1984	155,996	155,637	154,405	156,041	156,832	153,823	164,994	178,538	179,705	179,047	178,586	176,599	165,850	181,612	22-May
1985	157,239	155,480	155,973	157,126	156,403	155,212	181,123	179,558	180,132	178,938	178,889	177,264	167,778	181,771	11-Aug
1986	140,766	140,407	140,238	138,763	147,919	180,303	180,791	177,312	180,132	180,425	181,232	176,780	163,756	181,746	25-Jul
1987	153,914	149,295	147,354	152,579	156,088	156,088	181,648	180,132	179,888	179,888	181,624	177,336	166,320	183,098	14-Jun
1988	153,847	148,748	154,160	156,764	156,425	156,628	181,134	177,119	178,816	181,673	179,937	179,181	167,036	181,722	5-Sep
1989	155,638	157,328	155,301	154,898	156,043	156,515	175,935	179,206	180,278	179,912	179,717	179,400	167,518	181,992	7-Aug
1990	151,870	151,428	151,781	151,406	150,876	157,125	179,620	178,962	179,279	180,254	181,158	179,620	166,115	181,943	17-May
1991	156,786	156,110	155,436	156,178	156,290	164,131	178,889	179,133	179,084	181,648	181,722	180,327	168,811	181,845	30-Aug
1992	151,870	154,786	155,526	155,953	156,561	157,985	179,888	178,938	178,573	179,620	179,060	180,743	167,459	181,796	15-Sep
1993	156,854	155,863	156,335	156,065	155,998	155,953	178,987	180,743	179,668	181,403	181,036	180,791	168,308	181,894	15-Aug
1994	156,268	156,358	155,279	155,773	155,548	155,054	178,889	180,474	179,937	180,547	181,477	177,506	167,759	181,526	1-Sep
1995	146,356	156,493	155,638	155,010	155,211	156,133	178,403	179,717	181,183	179,595	178,330	178,258	166,694	181,575	13-Jun
1996	144,888	156,200	155,122	156,786	156,403	156,741	180,400	179,522	180,474	180,181	180,963	180,645	167,360	181,722	15-May
1997	167,185	154,898	154,539	155,863	158,098	157,057	180,743	180,376	181,379	181,428	180,791	180,327	169,390	181,771	24-Apr
1998	155,391	156,020	156,335	155,908	157,690	159,326	178,743	180,596	180,963	179,571	181,036	177,821	168,283	181,796	14-Aug
1999	157,193	156,718	156,583	155,840	157,826	162,351	179,133	179,206	181,330	179,985	180,694	179,644	168,875	181,330	30-Jun
2000	156,696	156,515	156,876	156,065	156,178	156,922	179,790	180,840	180,010	180,791	180,254	179,961	168,408	181,722	18-Sep

Source: United States Bureau of Reclamation

Table 2.6.14 Summary - historic Alcova Reservoir evaporation losses (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	Max day	Date of max day
1981	656	364	235	242	305	504	903	862	1,545	1,517	1,364	1,365	9,862	119	20-Feb
1982	587	516	427	309	225	444	738	883	1,391	1,696	1,491	901	9,608	156	7-Dec
1983	460	238	97	115	167	321	386	771	1,033	1,340	1,367	1,147	7,442	80	19-Jul
1984	686	359	105	129	93	171	412	1,084	1,124	1,380	1,410	893	7,846	125	14-Nov
1985	403	359	125	99	84	333	739	1,170	1,333	1,420	1,589	997	8,651	98	30-Nov
1986	592	204	96	197	210	636	727	1,033	1,388	1,492	1,362	866	8,803	137	31-Jan
1987	417	244	154	167	244	258	885	1,051	1,520	1,551	1,337	1,041	8,869	107	28-Jul
1988	667	239	179	98	156	94	773	1,026	1,651	1,747	1,623	1,071	9,324	97	9-Aug
1989	667	321	169	275	121	407	753	1,338	1,471	1,847	1,514	993	9,876	185	31-Jan
1990	754	379	115	252	234	346	563	1,000	1,562	1,480	1,421	1,078	9,184	220	30-Nov
1991	755	330	93	267	254	391	525	922	1,360	1,543	1,417	865	8,722	173	28-Feb
1992	711	134	203	170	283	396	911	928	1,099	1,265	1,256	1,009	8,365	133	29-Feb
1993	570	374	220	114	102	318	396	880	902	1,230	1,148	872	7,126	162	25-Mar
1994	441	174	93	225	93	399	627	1,126	1,417	1,454	1,291	998	8,338	121	15-Mar
1995	454	441	224	146	102	326	383	375	916	1,267	1,392	962	6,988	354	29-Nov
1996	436	289	179	337	366	246	486	839	1,302	1,355	1,325	851	8,011	396	29-Apr
1997	401	196	196	153	156	576	609	837	1,105	1,306	1,079	813	7,427	311	29-Oct
1998	289	94	132	128	177	204	600	1,158	1,017	1,303	1,162	1,048	7,312	191	23-Apr
1999	400	512	245	213	186	651	427	979	1,230	1,564	1,419	797	8,623	561	30-Mar
2000	663	439	350	232	160	304	608	1,043	1,203	1,495	1,359	996	8,852	352	30-Nov

Source: United States Bureau of Reclamation

Table 2.6.15 Summary - historic Alcova Reservoir discharges (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	Max discharge (cfs)	Date of max discharge
1981	91,795	54,506	56,319	54,256	43,565	28,665	41,647	72,746	74,541	111,176	160,391	120,052	909,658	3,051	19-Aug
1982	82,094	47,982	45,537	46,760	41,948	45,114	61,603	102,365	34,316	91,573	108,266	84,381	791,939	2,298	18-May
1983	56,910	41,841	43,061	43,355	36,407	28,689	37,129	153,761	221,274	475,202	246,684	105,116	1,489,428	8,127	11-Jul
1984	68,077	56,233	58,576	51,592	49,740	158,658	203,927	241,254	471,844	261,431	149,835	92,214	1,863,380	8,871	10-Jun
1985	81,068	70,086	51,439	54,768	56,001	93,130	136,848	180,387	123,878	162,637	211,932	162,250	1,384,423	4,009	20-Aug
1986	93,209	51,739	53,641	55,680	46,078	68,491	97,987	160,981	192,571	271,730	162,740	100,742	1,355,590	5,634	17-Jul
1987	87,086	104,380	55,954	47,228	47,875	33,340	26,154	45,300	87,705	135,096	140,981	50,805	861,906	2,700	16-Aug
1988	59,659	53,457	53,498	52,608	41,470	34,693	25,932	50,884	85,456	170,721	176,684	123,102	928,163	3,246	7-Sep
1989	57,205	55,565	55,823	49,924	37,150	30,399	72,754	104,499	102,010	131,117	151,503	57,973	905,923	4,504	26-Aug
1990	33,122	31,803	32,596	33,681	28,122	30,012	28,939	50,628	59,381	92,936	173,421	33,505	628,146	3,568	19-Aug
1991	33,299	32,543	31,484	32,622	27,634	30,323	69,374	63,148	31,194	85,158	127,704	87,221	651,703	2,910	24-Aug
1992	37,329	36,476	33,062	31,240	28,754	31,942	30,387	56,013	113,641	132,492	62,878	73,634	667,849	2,608	22-Jul
1993	34,538	32,684	31,162	32,257	27,207	31,043	29,105	56,604	72,133	132,760	132,676	32,335	644,505	3,052	15-Jul
1994	38,134	34,592	32,888	32,235	26,850	30,760	29,804	91,458	141,925	191,982	217,890	89,488	958,007	3,780	24-Aug
1995	31,543	29,960	31,377	30,627	27,969	30,474	30,446	33,263	30,012	45,745	81,287	65,758	468,460	1,865	18-Aug
1996	39,648	29,821	31,004	30,541	28,979	62,628	98,571	170,011	201,279	138,323	125,835	52,810	1,009,450	4,394	14-Jun
1997	42,629	42,173	43,107	42,928	43,567	128,614	115,930	180,434	290,757	245,691	96,202	37,855	1,309,886	5,339	20-Jun
1998	46,879	34,003	35,326	35,326	31,930	146,249	173,161	113,147	99,410	135,644	147,636	142,856	1,141,565	3,058	14-Mar
1999	54,157	40,927	42,659	43,142	38,878	46,084	37,849	189,031	301,670	145,238	82,682	61,232	1,104,547	5,292	26-Jun
2000	51,106	41,679	46,217	45,991	50,533	78,365	78,738	62,967	112,514	186,877	178,383	78,260	1,011,630	3,285	13-Jul

Source: United States Bureau of Reclamation

2.6.4.5 Gray Reef Dam and Reservoir

Background and History

Gray Reef Dam and Reservoir are located approximately 27 miles southwest of Casper and two miles downstream of Alcova Dam. The dam and reservoir are part of the U.S. Bureau of Reclamation (USBR) Glendo Unit, Oregon Trail Division, Pick-Sloan Missouri Basin Program. The reservoir regulates widely fluctuating water releases from Alcova Powerplant.

Description

Gray Reef Reservoir has a surface area of 182 acres at the maximum water surface elevation of 5332.0 feet and a total capacity of 1,798 acre-feet. The reservoir is an afterbay to re-regulate releases from the Alcova Powerplant.

Gray Reef Dam, completed in 1961, is a three-zoned rock and earth fill structure. The structural height of the dam is 36 feet, while the embankment height is 30 feet. The dam crest length is 650 feet. Gray Reef Dam is an earth fill structure with no outlet works. A concrete chute spillway is located near the center of the dam. The spillway is controlled by two radial gates and has a discharge capacity of 20,000 cubic feet per second.

The Congressional authorization for construction of the dam requires a minimum flow of 330 cubic feet per second (cfs) to pass Gray Reef Dam (Purcell, 2000). The mandate was included in the Congressional authorization for construction of the dam. While the required minimum Gray Reef Reservoir release is 300 cfs, the U.S. Bureau of Reclamation's (USBR) target Gray Reef Reservoir minimum release is 500 cfs, subject to hydrological conditions.

To scour the gravel beds by removing sediment and thereby improve fish spawning habitat below Gray Reef Dam, the U.S. Bureau of Reclamation (USBR) and the Wyoming Game and Fish Department (WGF) have been managing reservoir discharge rates to apply flushing flows since 1998. This entails varying flows each day from 500 cubic feet per second to 4,000 cubic feet per second for specified periods during the spring and late fall. Early data indicate that the fishery below the dam has been enhanced as a result of this process (Purcell, 2000). A photograph of Gray Reef Dam is shown on Figure 2.6.6.

Table 2.6.16 summarizes historic Gray Reef Reservoir storage volumes.

Table 2.6.17 summarizes historic Gray Reef Reservoir evaporation losses.

Table 2.6.18 summarizes historic Gray Reef Reservoir discharges.

Figure 2.6.6
Gray Reef Dam
Source: USBR

Table 2.6.16 Summary - historic Gray Reef Reservoir storage volumes (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Mean	Max day	Date of max day
1981	1,536	1,347	1,065	1,071	1,505	1,414	1,229	1,387	1,173	1,229	872	1,366	1,266	1,702	22-Jul
1982	1,363	1,326	1,332	1,314	1,314	1,404	1,103	1,360	1,492	1,420	1,410	1,232	1,339	1,813	2-Mar
1983	1,538	1,399	1,621	1,411	1,281	1,289	1,368	1,202	1,576	1,189	1,291	1,456	1,385	1,776	23-Oct
1984	1,145	1,389	1,128	1,639	1,441	1,119	939	1,428	1,359	1,396	1,589	1,383	1,329	1,972	13-Jun
1985	1,392	1,561	1,546	1,562	1,425	1,366	1,127	1,526	1,486	1,317	1,335	1,421	1,422	1,695	20-Oct
1986	1,485	1,483	1,576	1,165	1,571	1,084	1,369	1,582	1,009	1,538	1,266	933	1,338	1,744	12-Mar
1987	1,259	1,121	1,334	1,450	1,436	1,617	1,325	1,407	1,404	1,347	1,533	996	1,352	1,793	23-Jun
1988	1,001	1,401	1,046	1,470	1,447	1,413	1,363	1,148	1,296	1,198	1,149	1,520	1,288	1,623	23-Sep
1989	1,515	1,469	1,291	1,520	1,337	1,438	1,494	1,013	1,448	1,242	850	1,354	1,331	1,658	22-May
1990	1,146	1,402	1,396	1,399	1,571	1,571	1,140	1,252	1,543	1,444	1,469	1,458	1,399	1,697	1-Apr
1991	1,153	1,502	1,369	1,505	1,377	1,253	1,204	1,665	1,343	1,272	1,559	1,494	1,391	1,712	15-Aug
1992	1,634	1,456	1,494	1,194	1,073	1,110	1,084	1,416	1,075	1,549	1,470	1,469	1,335	1,712	18-May
1993	1,453	1,422	1,470	1,470	1,466	1,328	1,157	1,530	683	1,513	1,341	1,074	1,326	1,780	16-Sep
1994	1,090	1,142	1,063	1,419	1,298	1,233	1,181	1,505	1,480	1,458	1,496	1,066	1,286	1,660	25-Dec
1995	1,408	1,275	1,195	1,090	1,203	967	1,044	1,175	1,343	666	1,413	1,187	1,164	1,646	10-Aug
1996	1,234	1,259	1,455	1,224	1,410	1,118	1,453	1,535	1,324	1,629	154	118	1,159	1,775	15-Oct
1997	118	1,287	1,319	1,243	1,043	1,517	903	1,561	1,475	1,439	1,463	1,556	1,244	1,773	8-Jun
1998	1,544	1,337	1,282	1,237	1,386	1,459	1,341	847	861	1,270	1,210	1,133	1,242	1,719	11-Mar
1999	1,424	1,365	973	1,024	1,773	1,501	1,292	1,522	1,305	1,253	1,596	1,020	1,337	1,798	10-Sep
2000	1,334	1,302	1,377	1,278	1,795	1,530	1,191	1,599	1,533	1,604	1,559	1,631	1,478	1,800	28-Feb

Source: United States Bureau of Reclamation

Table 2.6.17. Summary - historic Gray Reef Reservoir evaporation losses (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	Max day	Date of max day
1981	38	20	11	9	15	32	53	52	86	92	80	81	569	7	20-Feb
1982	39	31	22	13	12	27	43	53	89	99	113	54	595	28	18-Aug
1983	25	14	1	2	5	18	18	38	63	78	81	67	410	5	21-Jun
1984	43	20	1	3	1	3	22	59	63	81	86	55	437	8	14-Nov
1985	22	21	4	1	0	19	45	73	81	83	96	59	504	7	30-Nov
1986	38	8	3	8	11	38	44	63	74	88	79	52	506	8	31-Jan
1987	26	12	4	5	14	16	54	65	93	93	77	60	519	6	28-Jul
1988	42	14	6	1	5	0	47	60	94	108	98	65	540	6	18-Jul
1989	42	16	6	13	3	22	47	84	89	113	89	61	585	13	31-Jan
1990	42	20	2	11	12	20	35	61	97	91	86	67	544	15	30-Nov
1991	49	18	0	13	12	24	30	58	79	95	89	55	522	12	28-Feb
1992	47	3	8	5	11	21	46	53	67	81	76	65	483	7	29-Feb
1993	40	22	9	2	1	14	20	52	51	69	70	45	695	10	25-Mar
1994	25	5	0	9	1	19	33	65	83	87	79	62	468	7	31-Jan
1995	24	22	8	3	1	13	15	19	52	73	79	56	365	22	29-Nov
1996	22	13	6	14	20	9	22	47	88	86	36	9	372	22	29-Apr
1997	4	7	7	4	5	36	41	54	75	83	69	52	437	21	27-Mar
1998	29	0	2	2	5	8	48	68	61	73	66	54	416	12	23-Apr
1999	34	28	8	7	6	37	33	63	75	101	91	45	528	37	30-Mar
2000	43	22	16	9	6	16	45	63	77	102	92	65	556	22	30-Nov
Source: United States Bureau of Reclamation															

Table 2.6.24 Summary - historic Guernsey Reservoir discharges (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	Max discharge (cfs)	Date of max discharge
1981	19,099	353	186	123	111	175	7,872	28,318	192,972	296,884	267,622	166,806	980,521	5,569	27-Jun
1982	13,339	208	159	432	383	153	32,783	114,054	24,787	294,819	291,229	167,544	939,890	5,591	19-Jul
1983	3,806	309	369	462	476	430	77,157	172,060	322,526	551,133	556,324	386,178	2,071,232	10,280	20-Jul
1984	5,752	2,674	1,480	3,273	34,744	193,434	221,532	306,621	497,234	413,484	393,275	244,092	2,317,595	9,943	1-Jul
1985	27,537	3,328	2,761	1,567	8,501	105,207	48,220	183,995	217,981	325,749	307,724	187,898	1,420,469	5,900	25-Jun
1986	21,136	242	115	117	212	25,833	142,881	213,423	230,563	446,690	314,235	203,671	1,599,118	8,528	8-Jul
1987	71,088	68,824	13,878	569	307	367	73,747	87,947	120,169	307,045	249,342	142,828	1,136,112	5,163	1-Aug
1988	1,228	182	173	200	268	369	54,188	112,566	142,907	305,752	291,794	161,925	1,071,553	5,290	5-Jul
1989	13,029	331	133	167	186	411	31,142	108,569	131,802	312,571	263,224	86,007	947,574	5,638	7-Jul
1990	131	119	123	107	111	190	19,995	476	84,030	303,830	244,324	77,572	731,008	5,752	6-Jul
1991	13,016	121	97	131	101	123	15,295	25,033	127,799	298,786	286,443	157,902	924,847	5,282	7-Jul
1992	5,234	175	123	111	91	355	32,604	15,302	32,440	262,046	285,185	119,246	752,914	4,939	11-Aug
1993	514	149	254	236	276	409	24,202	151,438	45,249	293,758	262,183	146,323	924,990	5,436	13-Jul
1994	5,865	123	331	329	502	605	10,897	154,576	175,273	292,241	280,348	147,652	1,068,742	5,525	4-Jul
1995	7,119	196	292	367	498	454	11,115	85,202	210,660	257,155	300,288	187,533	1,060,879	5,525	29-May
1996	10,782	256	355	567	524	436	47,476	199,934	253,896	317,296	296,198	151,083	1,278,803	5,436	3-Jul
1997	5,197	278	341	551	653	26,577	185,173	270,528	292,502	347,431	260,218	173,103	1,562,551	6,416	28-Jul
1998	619	248	426	653	906	147,921	195,973	127,198	118,253	313,841	293,391	181,091	1,380,520	5,370	2-Jul
1999	10,623	355	458	698	839	797	92,555	274,516	294,615	423,947	288,218	128,499	1,516,122	8,315	9-Jul
2000	540	303	234	440	621	641	55,781	160,495	206,168	306,579	302,118	163,281	1,197,201	5,304	12-Jul

Source: United States Bureau of Reclamation

2.6.4.6 Glendo Dam and Reservoir

Background and History

The Glendo Dam, Reservoir, and Powerplant are a part of the U.S. Bureau of Reclamation (USBR) Glendo Unit of the Pick-Sloan Missouri Basin Project. The reservoir furnishes up to a maximum of 40,000 acre-feet of storage water annually for use in Wyoming and Nebraska. Glendo Powerplant provides electrical power to Wyoming, Colorado, and Nebraska. The Glendo Unit also provides flood control, fish and wildlife enhancement, recreation, sediment retention, and pollution abatement.

Glendo Reservoir is operated in conformance with the 1953 U.S. Supreme Court order modifying and supplementing the North Platte River Decree of 1945. The North Platte River Decree was modified again in 2001 by order of the U. S. Supreme Court. The 2001 Modified Decree provides that:

> The operation of Glendo Reservoir shall not affect the regime of the natural flow of the North Platte River except that not more than 40,000 acre feet of the natural flow of the North Platte River and its tributaries which cannot be stored in upstream reservoirs under the provisions of this Modified Decree may be stored in Glendo Reservoir during any water year for disposition by the United States under contracts, in addition to evaporation losses on such storage, and further, the amount of water that may be held in storage at any one time for disposition by the United States under contracts, including carryover storage, shall never exceed 100,000 acre feet. Such storage water shall be disposed of in accordance with contracts executed or to be hereafter executed, in compliance with federal law, and may be used for any beneficial purpose in Nebraska within the Platte River basin to the extent of 25,000 acre feet annually and for any beneficial purpose in Wyoming within the Platte River Basin to the extent of 15,000 acre feet annually. (Supreme Court of the United States, 2001)

Description

Glendo Dam and Powerplant are the newest of Wyoming's North Platte River federal reservoirs. Construction began in 1954 and was finished in 1958. Three miles of Chicago, Burlington and Quincy Railroad track and four miles of state highway U.S. 87 were relocated to construct Glendo Reservoir. Glendo Dam is a zoned, earth fill structure, 190 feet high, with a crest length of 2,096 feet. When initially constructed, the design of Glendo Dam and Powerplant had no provisions to release water at low flow rates. To address this, the U.S. Bureau of Reclamation (USBR) obtained federal funding in the amount of $1.3 million to construct a three-foot diameter low flow outlet works through the right abutment of the dam. The low flow outlet, completed in 1992, provides a continuous release of approximately 25 cubic feet per second (cfs) in the North Platte River below Glendo Dam. A check dam was also constructed to produce wetlands below Glendo Dam (Purcell, 2000).

Glendo Reservoir has a total storage capacity of 795,196 acre-feet at a maximum water surface elevation of 4653.0. Included in this capacity are 271,917 acre-feet of flood control; 100,000 acre-feet irrigation pool; 20,090 acre-feet evaporation pool; 63,148 acre-feet power pool; and 334,247 acre-feet re-regulation space. Space is also provided in the reservoir for storing 115,000 acre-feet of sediment, which is the estimated 100-year sediment accumulation. Through 2003, Glendo Reservoir has prevented $68 million in flood damage (USBR, 2003).

The reinforced concrete Glendo Dam emergency spillway has an ogee crest. In addition to the spillway, the reservoir has an outlet works system that includes an intake structure with a trash rack, the tunnel and conduit mentioned above, a 21-foot surge tank, and a 16 ½-foot by 21-foot fixed wheel gate. Three regulating gates and three emergency gates control outlet works discharge. Restrictions in place for the outlet works due to potential damage limit the maximum discharge to 6,600 cubic feet per second (cfs) at water surface elevation 4635.0 feet and above. In combination with the turbine releases, a maximum discharge rate of 10,000 cfs is specified at water surface elevations 4635 and above. In 1992, a new low flow outlet works was installed. Figure 2.6.7 provides a photograph of Glendo Dam.

Figure 2.6.7
Glendo Dam
Source: USBR

Power Generation

Glendo Powerplant consists of two generating units with a combined capacity of 38 megawatts. Water at a flow rate of approximately 3,400 cubic feet per second can be released through the powerplant when all generating units are operating at capacity and the reservoir water surface is at an elevation of 4635 feet. Glendo Powerplant is operated on a seasonal basis during the release of irrigation flows. Available power in the North Platte River Basin has increased by approximately 500 million kilowatt-hours annually since the Glendo Unit power generation facilities (Glendo and Fremont Canyon Powerplants) were constructed.

Table 2.6.19 summarizes historic Glendo Reservoir storage volumes.

Table 2.6.20 summarizes historic Glendo Reservoir evaporation losses.

Table 2.6.21 summarizes historic Glendo Reservoir discharges.

Table 2.6.19 Summary - historic Glendo Reservoir storage volumes (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Mean	Max day	Date of max day
1981	190,606	258,232	324,354	386,283	436,720	472,739	479,346	541,741	416,196	240,914	107,523	79,352	327,834	543,679	1-Jun
1982	173,819	232,691	281,588	330,694	383,091	433,549	438,842	472,513	502,848	335,960	119,571	89,146	316,193	514,034	27-Jun
1983	163,331	219,809	266,040	325,218	372,594	432,285	476,715	702,914	709,163	640,018	349,800	120,935	398,235	741,463	14-Jun
1984	210,679	281,588	342,615	416,708	425,486	404,738	439,162	568,504	544,974	407,758	170,443	60,365	356,085	596,018	23-May
1985	142,827	225,675	287,319	351,338	379,249	380,015	485,698	481,070	381,647	218,101	104,921	93,672	294,294	501,887	6-May
1986	202,624	261,855	325,477	396,766	459,148	498,894	513,789	514,403	559,411	420,822	233,754	147,587	377,878	584,866	22-Jun
1987	190,919	269,108	333,496	391,645	461,899	517,733	516,868	494,496	459,697	468,493	149,934	108,286	346,881	532,144	13-May
1988	178,853	246,366	302,214	364,168	419,791	458,271	479,002	482,223	401,037	235,533	98,159	89,676	312,941	490,018	23-May
1989	157,202	220,907	277,964	335,872	381,455	425,902	435,979	429,556	394,298	208,349	64,091	98,558	285,844	463,669	14-Jun
1990	144,809	187,371	224,703	268,186	304,700	350,704	348,085	412,521	393,767	166,149	89,828	77,271	246,508	431,760	12-Jun
1991	155,981	158,457	193,247	234,394	276,945	314,094	352,880	508,047	511,093	295,563	124,620	94,061	264,949	557,555	7-Jun
1992	138,020	186,691	227,697	267,112	305,781	350,342	347,005	368,363	444,717	301,635	75,774	74,670	257,317	448,268	28-Jun
1993	121,666	161,324	200,867	246,440	283,888	339,855	390,178	379,728	479,002	314,094	186,815	121,163	268,752	488,145	27-Jun
1994	172,766	214,169	257,782	297,033	331,306	376,862	422,269	354,336	314,856	196,616	116,203	99,600	262,817	422,269	30-Apr
1995	144,146	190,543	230,925	265,429	306,698	349,077	373,161	565,950	580,052	395,284	159,335	82,765	303,614	606,236	14-Jun
1996	142,776	195,850	241,131	281,114	326,863	401,037	503,932	543,032	511,949	330,519	161,046	101,421	311,723	544,974	3-Jun
1997	157,747	214,776	268,263	326,950	384,346	493,195	499,132	518,723	552,938	460,026	321,598	235,747	369,453	572,421	9-Jul
1998	290,616	335,167	375,531	421,649	458,929	461,899	483,378	478,315	460,687	276,398	132,878	124,063	358,293	500,927	16-Jun
1999	233,825	306,031	358,815	415,070	461,899	516,497	538,781	564,476	608,099	370,427	148,210	130,471	387,717	618,080	23-Jun
2000	189,108	236,532	287,400	338,258	392,823	474,666	527,089	518,104	417,939	286,359	152,948	104,173	327,117	527,719	29-Apr
Source: United States Bureau of Reclamation															

Table 2.6.20 Summary - historic Glendo Reservoir evaporation losses (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	Max day	Date of max day
1981	1,133	910	692	763	870	1,830	4,333	3,900	7,366	5,540	2,843	2,107	32,287	479	3-Sep
1982	944	896	806	512	1,107	2,536	3,667	4,252	5,301	6,421	3,809	1,249	31,500	429	5-Jul
1983	835	538	365	818	1,030	1,256	1,990	4,451	7,327	10,323	8,141	3,132	40,206	549	18-Jul
1984	998	624	504	847	1,002	1,286	1,916	5,817	6,984	6,638	4,901	1,507	33,024	454	30-Jun
1985	625	717	629	397	392	1,826	3,376	6,393	6,399	5,923	3,252	1,504	31,433	364	17-Jun
1986	1,044	412	428	848	909	2,492	2,422	5,103	7,725	6,781	5,123	1,769	35,056	502	8-Jun
1987															
1988	1,283	582	856	472	711	1,994	3,843	6,015	8,589	6,472	3,583	1,599	35,999	521	5-Jun
1989	1,180	944	404	2,089	457	1,258	3,302	4,751	5,730	6,996	2,648	1,522	30,621	997	31-Jan
1990	1,239	839	258	909	933	2,272	3,350	3,750	5,995	4,409	2,329	1,596	27,879	394	7-Jun
1991	993	962	632	419	906	1,432	2,147	3,831	5,607	5,760	3,240	1,577	27,506	331	12-May
1992	1,152	361	441	512	927	2,037	2,495	3,251	3,823	4,098	2,831	1,194	23,122	371	21-Feb
1993	619	558	498	279	402	971	2,368	3,581	3,146	5,147	3,275	1,384	22,228	456	23-Aug
1994	888	422	368	562	719	1,963	2,767	4,094	4,296	3,535	2,771	1,394	23,779	579	19-Apr
1995	771	412	367	762	652	1,242	1,201	2,003	5,020	5,121	3,576	1,060	22,187	930	30-Mar
1996	749	496	577	537	906	780	1,787	4,960	5,459	5,225	3,502	1,298	26,276	1,407	29-Apr
1997	867	238	677	713	702	2,285	2,695	4,543	5,834	6,971	3,605	2,179	31,309	1,555	28-Mar
1998	1,918	735	507	490	394	1,092	3,072	4,485	4,154	4,871	2,644	1,397	25,759	1,576	28-Apr
1999	954	763	695	391	1,001	2,010	2,227	4,201	7,300	7,222	3,975	1,398	32,137	1,585	30-Mar
2000	1,173	884	412	667	770	1,517	2,952	4,529	5,410	5,483	3,949	1,949	29,695	1,139	30-Mar

Source: United States Bureau of Reclamation

Table 2.6.21 Summary - historic Glendo Reservoir discharges (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	Max discharge (cfs)	Date of max discharge
1981	659	579	601	637	623	680	30,228	34,657	185,351	278,892	277,636	149,453	959,996	7,475	1-Aug
1982	1,230	676	137	139	115	242	54,341	113,224	25,043	264,240	324,700	133,769	917,857	7,150	8-Aug
1983	607	444	184	143	155	173	74,313	128,688	307,918	531,911	544,786	353,431	1,942,752	10,060	26-Aug
1984	446	438	599	173	60,504	193,216	212,319	287,625	494,928	405,642	396,248	208,663	2,260,800	10,214	30-Jun
1985	18,232	972	863	666	39,297	104,311	45,253	183,626	220,768	313,621	312,516	180,280	1,420,403	7,037	26-Jul
1986	764	571	718	649	684	42,296	148,802	204,569	199,626	411,001	346,889	198,805	1,555,375	8,488	30-Jun
1987	59,695	50,384	2,527	553	545	25,468	86,586	86,678	122,608	309,993	248,580	100,407	1,094,025	7,632	26-Jul
1988	474	595	567	696	664	18,789	63,519	111,995	152,178	311,109	292,350	147,031	1,099,968	7,676	26-Jul
1989	436	526	450	367	478	1,696	55,801	105,433	129,935	301,505	273,148	56,146	925,922	7,610	1-Aug
1990	635	60	63	147	123	220	47,627	958	85,269	291,933	247,000	55,212	729,247	7,820	31-Jul
1991	5,018	61	101	91	105	141	40,584	10,951	106,003	294,839	282,099	126,244	866,237	7,410	28-Jul
1992	99	79	129	81	83	347	46,659	23,946	31,194	269,098	298,540	77,816	748,072	7,350	26-Jul
1993	1,137	629	781	835	599	1,198	28,257	152,842	32,811	292,286	262,742	111,211	885,328	7,667	28-Jul
1994	2,029	1,789	1,928	1,997	1,823	1,789	13,966	168,296	175,985	293,338	289,063	124,040	1,076,043	7,540	25-Jul
1995	6,732	1,833	1,775	2,095	1,615	1,964	12,837	68,251	163,704	243,245	309,433	156,276	969,759	7,688	1-Aug
1996	4,022	1,632	1,948	1,934	1,670	1,587	48,530	196,516	249,060	317,256	292,316	117,146	1,233,618	7,498	27-Jul
1997	3,372	1,622	1,763	1,745	1,404	37,311	178,735	264,478	279,503	344,271	258,849	131,726	1,504,780	8,164	25-Jul
1998	2,747	1,738	1,920	2,099	8,342	153,554	184,869	127,622	119,778	310,391	292,358	154,506	1,359,925	7,646	28-Jul
1999	1,882	1,609	2,079	1,906	1,585	10,979	92,545	248,580	292,251	397,438	308,450	88,268	1,447,571	8,208	8-Jul
2000	1,587	1,648	1,652	1,847	1,609	2,083	69,820	142,828	204,543	303,927	304,977	134,618	1,171,139	7,795	26-Jul
Source: United States Bureau of Reclamation															

2.6.4.7 Guernsey Dam and Reservoir

Background and History

Construction of Guernsey Dam and Powerplant was approved as part of the U.S. Bureau of Reclamation (USBR) North Platte Project on April 30, 1925. The dam is located approximately 25 miles below Glendo Dam and approximately 95 miles southeast of Casper. With a structural height of 135 feet, Guernsey Dam is utilized to meet varying downstream irrigation demands. The original capacity of the reservoir was 73,810 acre-feet. Due to silt deposition over the years, the original capacity has been reduced to roughly 45,612 acre-feet. The north spillway, with a discharge capacity of 50,000 cubic feet per second at a reservoir water surface elevation of 4,420 feet, is utilized to release water for irrigation use and to supplement maximum Guernsey Powerplant releases. A photograph of Guernsey Dam is included on Figure 2.6.8.

Figure 2.6.8
Guernsey Dam
Source: USBR

Power Generation

Guernsey Powerplant is located on the southwest river bank below the dam. Construction of the powerplant began in 1925 and was completed in 1928. The powerplant has two 3.2-megawatt electrical generating units and a total water release capacity of approximately 1,340 cubic feet per second. The electric power generated at the plant is supplied to the North Platte Project area by four substations and about 160 miles of transmission lines. Guernsey Powerplant is operated on a seasonal basis during the release of irrigation flows to satisfy downstream irrigation demand on the North Platte River in Wyoming and Nebraska.

Reservoir Operations

Silt runs have been performed at Guernsey Reservoir since 1936. This is the “Bureau’s practice of reducing water releases from Glendo Reservoir to lower the level of Guernsey Reservoir so that deposited sediments are flushed from Guernsey reservoir” (USBR, 1983). The silt-laden water flushed from Guernsey Reservoir is diverted into downstream irrigation canals, resulting in decreased canal seepage loss and increased canal bank stability. This practice also helps maintain Guernsey Reservoir water storage capacity.

The silt runs are required by contract with the Goshen, Gering-Fort Laramie, and Pathfinder Irrigation Districts. Under the terms of the current contract, the Districts are provided a continuous seven-day silt run each year without charge and have the option to extend the silt run up to 20 days by payment of a system adjustment charge associated with foregone power generation at the Guernsey Powerplant. During the silt run, power generation at the Guernsey Powerplant is suspended “due to inadequate head and the increased sediment loads drawn through the powerplant turbines” (USBR, 1983).

Table 2.6.22 summarizes historic Guernsey Reservoir storage volumes.

Table 2.6.23 summarizes historic Guernsey Reservoir evaporation losses.

Table 2.6.24 summarizes historic Guernsey Reservoir discharges.

Table 2.6.22 Summary - historic Guernsey Reservoir storage volumes (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Mean	Max day	Date of max day
1981	2,290	4,167	5,776	7,464	8,929	10,452	32,437	41,348	35,237	15,801	28,216	15,427	17,295	41,348	31-May
1982	6,065	7,827	8,801	9,530	10,209	10,874	29,228	33,304	33,093	616	35,077	1,686	15,526	36,993	20-Aug
1983	1,129	3,369	5,169	7,176	8,631	13,204	30,058	31,241	38,142	35,943	26,624	1,666	16,863	39,192	27-Jul
1984	0	0	2,112	1,542	26,336	26,240	30,565	37,213	32,904	25,272	31,344	3,322	18,071	38,498	16-May
1985	0	0	0	1,316	32,548	31,902	31,076	31,097	33,834	23,950	29,715	22,485	19,827	35,271	21-Mar
1986	3,313	4,522	6,113	10,084	12,311	29,957	44,855	44,572	35,163	2,480	32,841	32,862	21,589	47,140	10-Jun
1987	20,289	6,235	3	2,365	4,600	30,464	42,912	40,729	38,075	34,647	37,169	526	21,501	44,926	10-Apr
1988	1,958	3,974	5,781	75,550	9,231	28,675	40,683	41,437	39,214	38,053	29,916	13,827	21,692	42,334	21-May
1989	3,460	5,189	7,074	8,739	10,149	12,399	40,479	39,057	32,820	20,677	26,125	568	17,228	41,689	27-Apr
1990	2,925	4,078	5,143	6,212	7,142	8,525	35,055	36,883	31,695	23,474	29,836	11,165	16,844	37,345	10-Jun
1991	4,504	5,927	6,684	8,041	9,119	10,040	33,898	35,142	41,116	37,257	34,861	6,823	19,451	44,079	22-Jun
1992	4,594	6,572	8,641	10,280	11,747	13,547	36,566	35,943	32,589	34,197	39,214	2,576	18,872	41,873	26-Aug
1993	4,841	6,548	8,153	9,488	10,615	14,621	24,747	35,466	34,604	34,926	35,034	6,151	18,766	44,313	20-Jun
1994	4,510	8,266	11,507	14,566	17,110	19,771	21,867	35,596	35,012	33,537	31,509	3,048	19,692	35,965	21-Jun
1995	5,471	8,438	11,107	13,586	15,748	17,947	19,115	38,186	37,632	23,130	35,683	9,551	19,633	42,057	28-May
1996	6,098	10,716	14,845	18,231	21,277	25,103	31,488	36,686	36,117	35,055	33,009	3,899	22,710	37,765	3-Jun
1997	4,445	8,209	11,723	15,043	17,947	28,695	31,015	35,098	36,030	31,839	35,617		21,306	37,081	13-Aug
1998	5,688	9,530	12,829	15,851	24,300	31,302	32,297	34,111	34,689	31,632	33,452	13,165	23,237	69,030	22-May
1999	6,831	11,200	14,344	17,294	19,376	29,856	37,235	33,834	69,292	9,139	33,009		20,701	40,388	4-May
2000	4,219	7,427	10,502	13,244	15,939	18,614	35,965	35,900	35,077	29,353	30,749	10,160	20,596	38,744	22-May

Source: United States Bureau of Reclamation

Table 2.6.23 Summary - historic Guernsey Reservoir evaporation losses (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	Max	Date
1981	126	58	49	58	72	166	557	720	1,310	438	1,030	705	5,289	80	16-Aug
1982	137	98	99	61	123	266	598	873	895	609	892	562	5,213	141	20-Aug
1983	13	38	33	73	99	141	370	609	813	1,125	798	596	4,708	51	24-Jun
1984	1	0	5	22	150	239	378	954	964	619	1,050	505	4,887	69	29-Feb
1985	35	0	0	0	50	395	633	1,026	1,238	606	1,078	720	5,781	77	23-Jun
1986	114	36	39	80	100	372	452	853	1,118	949	781	530	5,424	125	8-Jun
1987	252	83	15	11	41	150	801	890	1,237	597	1,049	582	5,708	74	18-Jun
1988	38	40	69	37	63	284	757	1,089	1,510	663	1,198	715	6,463	72	7-Jun
1989	129	93	43	228	45	139	660	1,006	1,140	564	1,122	446	5,615	111	31-Jan
1990	80	80	32	92	96	240	692	1,183	1,669	524	1,114	559	6,361	77	8-Aug
1991	168	132	85	53	115	181	436	777	1,046	652	1,007	621	5,273	71	8-Jul
1992	132	50	59	65	125	299	471	803	778	430	761	287	4,260	53	21-Feb
1993	80	81	72	34	49	146	421	509	677	468	788	456	3,781	60	12-Apr
1994	57	57	47	100	132	343	430	954	1,184	487	856	471	5,118	100	19-Apr
1995	100	62	51	132	123	222	207	501	895	474	928	510	4,205	162	30-Mar
1996	105	82	113	113	175	145	307	724	990	513	948	485	4,700	239	29-Apr
1997	63	32	94	123	120	382	408	764	936	503	916	489	4,830	263	28-Mar
1998	98	80	59	79	61	191	572	942	937	434	903	714	5,070	289	28-Apr
1999	92	98	106	66	152	312	452	658	995	531	1,144	455	5,061	252	30-Mar
2000	80	109	49	93	125	221	483	925	1,036	622	1,032	623	5,398	161	30-Mar

Source: United States Bureau of Reclamation

Table 2.6.24 Summary - historic Guernsey Reservoir discharges (acre-feet)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	Max discharge (cfs)	Date of max discharge
1981	19,099	353	186	123	111	175	7,872	28,318	192,972	296,884	267,622	166,806	980,521	5,569	27-Jun
1982	13,339	208	159	432	383	153	32,783	114,054	24,787	294,819	291,229	167,544	939,890	5,591	19-Jul
1983	3,806	309	369	462	476	430	77,157	172,060	322,526	551,133	556,324	386,178	2,071,232	10,280	20-Jul
1984	5,752	2,674	1,480	3,273	34,744	193,434	221,532	306,621	497,234	413,484	393,275	244,092	2,317,595	9,943	1-Jul
1985	27,537	3,328	2,761	1,567	8,501	105,207	48,220	183,995	217,981	325,749	307,724	187,898	1,420,469	5,900	25-Jun
1986	21,136	242	115	117	212	25,833	142,881	213,423	230,563	446,690	314,235	203,671	1,599,118	8,528	8-Jul
1987	71,088	68,824	13,878	569	307	367	73,747	87,947	120,169	307,045	249,342	142,828	1,136,112	5,163	1-Aug
1988	1,228	182	173	200	268	369	54,188	112,566	142,907	305,752	291,794	161,925	1,071,553	5,290	5-Jul
1989	13,029	331	133	167	186	411	31,142	108,569	131,802	312,571	263,224	86,007	947,574	5,638	7-Jul
1990	131	119	123	107	111	190	19,995	476	84,030	303,830	244,324	77,572	731,008	5,752	6-Jul
1991	13,016	121	97	131	101	123	15,295	25,033	127,799	298,786	286,443	157,902	924,847	5,282	7-Jul
1992	5,234	175	123	111	91	355	32,604	15,302	32,440	262,046	285,185	119,246	752,914	4,939	11-Aug
1993	514	149	254	236	276	409	24,202	151,438	45,249	293,758	262,183	146,323	924,990	5,436	13-Jul
1994	5,865	123	331	329	502	605	10,897	154,576	175,273	292,241	280,348	147,652	1,068,742	5,525	4-Jul
1995	7,119	196	292	367	498	454	11,115	85,202	210,660	257,155	300,288	187,533	1,060,879	5,525	29-May
1996	10,782	256	355	567	524	436	47,476	199,934	253,896	317,296	296,198	151,083	1,278,803	5,436	3-Jul
1997	5,197	278	341	551	653	26,577	185,173	270,528	292,502	347,431	260,218	173,103	1,562,551	6,416	28-Jul
1998	619	248	426	653	906	147,921	195,973	127,198	118,253	313,841	293,391	181,091	1,380,520	5,370	2-Jul
1999	10,623	355	458	698	839	797	92,555	274,516	294,615	423,947	288,218	128,499	1,516,122	8,315	9-Jul
2000	540	303	234	440	621	641	55,781	160,495	206,168	306,579	302,118	163,281	1,197,201	5,304	12-Jul

Source: United States Bureau of Reclamation

2.6.4.8 Summary – Federal Reservoir Operations

The USBR System

The seven federal North Platte River reservoirs in Wyoming that are described above and the four off-stream Inland Lakes near Scottsbluff, Nebraska, are monitored and, in most cases, operated as a system by the U.S. Bureau of Reclamation (USBR) office in Mills, Wyoming. This section is intended to provide an overview of how these individual structures are interrelated and are operated as a system. Operation and management of this system is supported by the use of a Programmable Master Supervisory Control, a computerized water accounting process, Hydromet station data, data from control crest measurement weirs at stream flow gauging stations, SNOTEL station data, and a snowmelt runoff forecasting procedure. (USBR, WY2000-2001).

Hydromet stations are automated hydrologic and meteorologic monitoring stations that remotely collect field data and transmit the data via satellite to receiving stations. USBR operates Hydromet stations along the North Platte River in Wyoming at Alcova Reservoir, Glendo Reservoir, Gray Reef Reservoir (two stations), Guernsey Reservoir, Kortes Reservoir, Pathfinder Reservoir, and Seminoe Reservoir. USBR Hydromet data, which are available on the Internet, include current reservoir storage volumes in acre-feet, average historical reservoir storage volumes in acre-feet, daily reservoir evaporation in acre-feet, mean computed reservoir inflows in cubic feet per second, daily mean reservoir discharges in cubic feet per second, and mean daily flows at river gauges located near the reservoirs. This Hydromet information is “integrated with other sources of information to provide streamflow forecasting and current runoff conditions for river and reservoir operations.” (USBR, Hydromet)

SNOTEL (SNOwpack TELemetry) data are provided to the USBR by remote sensors that are installed, operated, and maintained by the Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture. This system is designed to automatically “collect snowpack and related climatic data in the Western United States and Alaska.” SNOTEL “provides reliable and efficiently collected data needed to produce water supply forecasts and to support resource management activities. . . .” Standard SNOTEL sites measure air temperature, precipitation, snow water content, and snow depth. Enhanced SNOTEL sites measure several additional parameters (NRCS, undated). SNOTEL sites are located at various sites in the Snowy Range and Sierra Madre Range mountains above the North Platte River

USBR Annual Operations Plan (AOP)

The U.S. Bureau of Reclamation (USBR) prepares a North Platte River Basin operations summary for each water year, including a projected operating plan for the upcoming water year. These reports are available on the Internet at the address shown in the references section of this technical memorandum. The most recent publicly available annual USBR North Platte River operations report is for water year 2004, with estimated operations for water year 2005. Some key components of the USBR Water Year 2004 Summary of Actual Operations and Water Year 2005 Annual Operating Plans are summarized below.

System Planning and Control:

North Platte River storage, power generation, and water delivery facilities are operated for irrigation, hydroelectric power production, municipal water supply, and industrial water supply. System facilities also provide year-round river flow along specified reaches of the river as well as flood control, recreation, and fish and wildlife preservation. The System is operated as an "integrated system" to "obtain optimum benefits from the individual projects," and system operation is planned and coordinated at the USBR Wyoming Area Office in Mills, Wyoming. System management requires coordination among the USBR, the U.S. Department of Energy, and "many other local, state, and Federal agencies." The USBR contends that proper utilization of System water is "achieved only through careful budgeting of the anticipated water supply," and the end-product of this budgeting process is the Annual Operating Plan (AOP). Each AOP:

- considers water management on a water year basis, October 1 through September 30;
- describes System operations during the current water year and proposes System operations for the following water year;
- is prepared, reviewed, and presented to the public early in each water year;
- includes assessment of "probable," "reasonable maximum," and "reasonable minimum" water supply conditions and requirements for the coming water year; and
- is revised monthly during each water year based on USBR computer modeling.

System Operations – Water Year 2004:

This section of the USBR 2004-2005 AOP assesses and summarizes information regarding major System structures and gains to North Platte River flow along specified reaches of the river. The Water Year 2004 AOP includes descriptions and summaries, beginning upstream and proceeding downstream on the North Platte River, of:

- Seminoe Reservoir inflow;
- Seminoe Reservoir storage and releases;
- Kortes Reservoir storage and releases;
- gains to the North Platte River from Kortes Dam to Pathfinder Dam;
- Pathfinder Dam storage and releases;
- Alcova and Gray Reef Reservoirs storage and releases;
- gains to the North Platte River from Alcova Dam to Glendo Reservoir;
- Glendo Reservoir storage and releases;
- gains to the North Platte River from Glendo Dam to Guernsey Reservoir, and
- Guernsey Reservoir storage and releases.

Photographs of these structures are included in Figures 2.6.2 through 2.6.8 of this technical memorandum. Figure 2.6.1 contains a map showing the locations of these System structures.

This portion of the AOP also includes summaries of current water year precipitation, water allocations, water ownership, flood benefits, and electrical power generation.

Proposed Operations – Water Year 2005:

This section of the USBR 2004-2005 AOP summarizes proposed System operation for water year 2005. Operation of Seminoe Reservoir, Pathfinder Reservoir, Alcova Reservoir, Gray Reef

Reservoir, Glendo and Guernsey Reservoirs, and System water ownership are assessed in terms of "probable 2005 conditions," "reasonable minimum 2005 conditions," and "reasonable maximum 2005 conditions."

In addition to discussion of current water year System operations and proposed System operations for the following water year, each AOP contains a glossary, tables, and figures that summarize and illustrate AOP data.

USBR System Water Accounting

Development of a "system of water accounting" for North Platte River water was required to implement the 1945 North Platte Decree. Beginning in 1946, "Natural Flow and Ownership Meetings" (NFO Meetings), attended by representatives of the States of Nebraska and Wyoming and the U.S. Bureau of Reclamation (USBR), were held on an "approximately" annual basis. The purpose of these meetings has been to provide for "continuous, open dialogue between the parties to the Decree concerning the full range of Decree accounting, administration, and compliance issues." Significant North Platte River water management and accounting concepts that evolved during NFO Meetings have included:

- Storage Ownership Accounting Procedure (Part A), and
- Natural Flow Accounting Procedure (Part B). (Brendecke et al., 2000, pp. 3-1 and 3-11)

NFO Meetings were typically held in March or April and focused on review of previous annual North Platte River Ownership and Natural Flow Accounting Procedures "with a view to making any changes or adjustments that were believed to be desirable or necessary for the upcoming runoff and irrigation season." (Brendecke et al., 2000, p. 3-3). NFO Meetings typically addressed three major topics, including:

- North Platte River Decree (1945) compliance,
- Mainstem reservoirs and North Platte River flow management, and
- other pertinent issues. (Brendecke et al., 2000, p. 3-3)

The principal product of each NFO Meeting was issuance of formal North Platte River Ownership and Natural Flow Accounting Procedures – the water "Accounting Procedures" for the coming irrigation season. Actual river flow accounting is completed "after the fact" and because "stipulated values" are used for some accounting parameters rather than "observed values," North Platte River accounting procedures are "detailed and complex." (Brendecke et al., 2000, p. 3-12)

The Modified Decree formalized the annual process of adopting and negotiating these procedures. The North Platte River Ownership and Natural Flow Accounting Procedures are now discussed and approved by the North Platte Decree Committee at their semiannual spring meeting, which usually occurs in April. An example set of procedures can be found as Exhibit 2 to Appendix G to the Final Settlement Stipulation in Nebraska v. Wyoming, No. 108 Orig., 534 U.S. 40 (2001).

2.6.5 Major Reservoirs with Capacities Greater than or Equal to 1,000 Acre-feet

This section describes Platte River Basin reservoirs which have Wyoming State Engineer's Office (SEO) permitted capacities of 1,000 acre-feet or more, or which are particularly significant water storage structures, regardless of permitted storage capacity. The detail with which each reservoir is described is based on the availability of information regarding that reservoir. Following the descriptions are tables, separated by subbasin, containing reservoir permit information. If available, figures scanned from publicly available SEO permit documents illustrating reservoir, dam, spillway, and outlet details are presented. Area capacity tables from SEO permit documents are also included as shown on SEO permit drawings.

2.6.5.1 Major Reservoirs in the Above Pathfinder Subbasin

The locations of major reservoirs located in the Above Pathfinder Dam subbasin are shown on Figure 2.6.9.

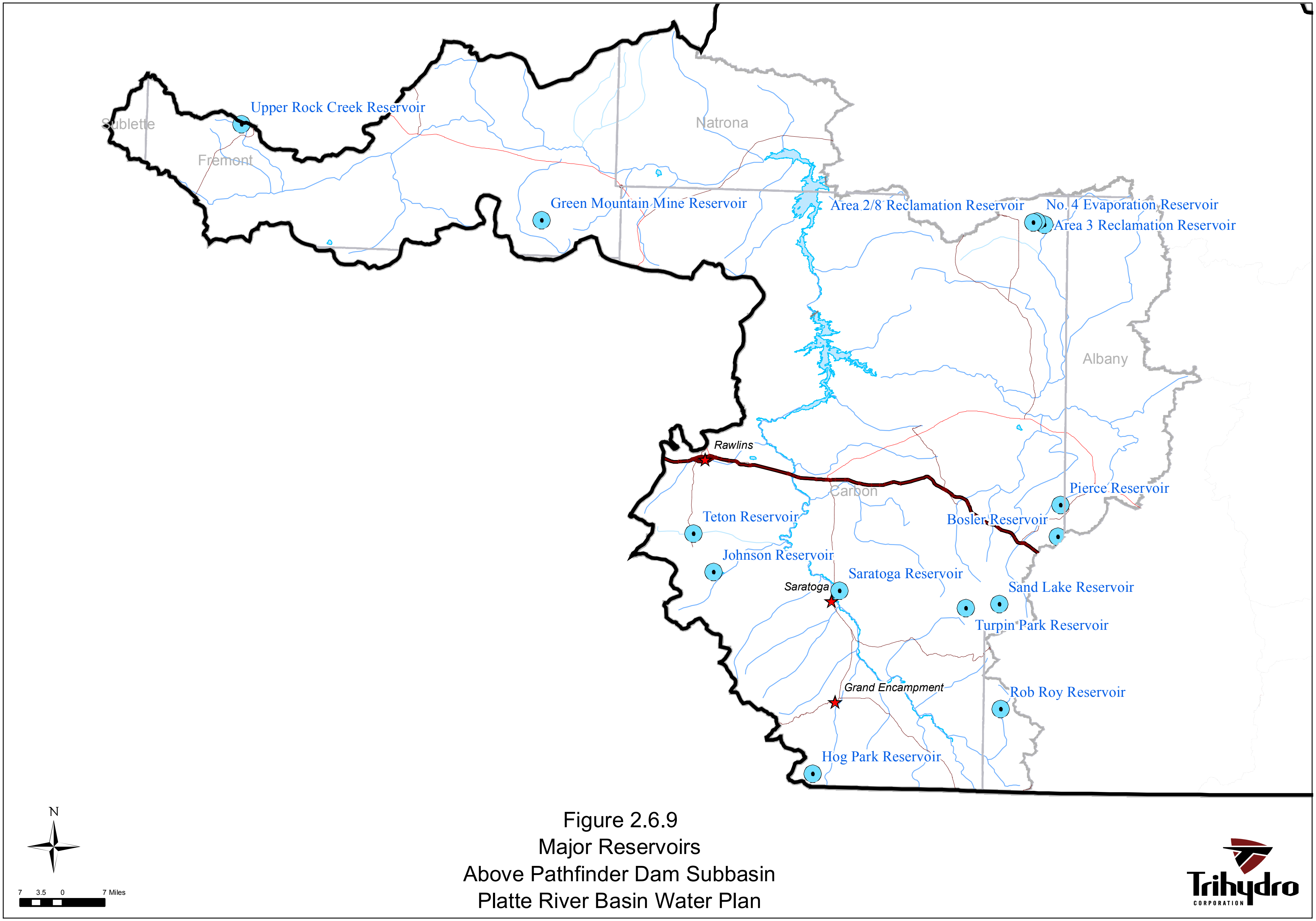


Figure 2.6.9
Major Reservoirs
Above Pathfinder Dam Subbasin
Platte River Basin Water Plan

Trihydro CORPORATION

Rob Roy Reservoir

Owned and operated by the City of Cheyenne Board of Public Utilities (BOPU), Rob Roy Reservoir is located in the Medicine Bow National Forest west of Laramie, Wyoming, and has a total available capacity of 35,433.92 acre-feet. Permitted for municipal use, industrial use, irrigation, and fish propagation, the reservoir is located in the channel of Douglas Creek. The dam crest elevation is 9,480 feet, and the crest width is 30 feet.

The dam has an overflow emergency spillway crest elevation of 9,420 feet. A morning glory spillway serves as the primary reservoir outlet, with a crest elevation of 9,481 feet. The reservoir has an ogee crest spillway with an invert elevation of 9,470 feet. The spillway width varies from 15 feet, 6 inches to 15 feet, 1¼ inches.

Rob Roy Reservoir is part of the City of Cheyenne's exchange system built to exercise its water right from the Little Snake River. By means of exchange, the City diverts water from the Little Snake River across the Continental Divide through Hog Park Creek and Reservoir and the Encampment River for delivery to the North Platte River as replacement for water diverted by the City from Douglas Creek, which is also a tributary to the North Platte River. The diverted water from Douglas Creek is transported from Rob Roy Reservoir and Lake Owen across the Laramie Valley via the Lake Owen to Middle Crow Creek Pipeline. Once the water is transported across the Laramie Valley, it is stored in Granite Springs and Crystal Lake Reservoirs for municipal use by the City of Cheyenne.

The Cheyenne Board of Public Utilities currently has an agreement with the U.S. Bureau of Reclamation (USBR) to store up to 10,000 acre-feet of water from excess Hog Park Reservoir releases in vacant space in the USBR's Seminoe Reservoir. This stored water can then be exchanged for North Platte River River diversions from Douglas Creek, allowing the City to more fully utilize both its Little Snake River and Douglas Creek water when Hog Park Reservoir releases to the North Platte River are less than the City's use of Douglas Creek water.

Table 2.6.25 summarizes historic Rob Roy Reservoir storage volumes.

Table 2.6.26 provides the Wyoming State Engineer's Office (SEO) permit area capacity table for Rob Roy Reservoir.

Figures 2.6.10 through 2.6.15 show details of Rob Roy Dam.

Table 2.6.25 Summary - historic Rob Roy Reservoir storage volumes

SEO permits: P6536R, P6888R, P8444R											
Capacity (acre-feet): 35,433.92											
End of month storage (acre-feet)											
Month	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Oct	26,671	26,313	31,647	28,896	32,933	30,878	33,179	33,902	33,902	28,160	30,057
Nov	26,502	25,863	29,349	28,033	32,671	29,696	31,274	32,163	29,306	27,545	29,498
Dec	25,706	25,446	27,603	27,395	32,432	27,799	29,462	31,609	29,052	27,297	29,214
Jan	25,355	25,022	26,156	26,723	31,543	26,339	27,968	31,274	28,627	26,645	28,174
Feb	24,833	23,973	25,407	26,071	29,285	25,159	26,612	30,517	27,955	26,423	27,492
Mar	24,308	23,104	25,146	25,355	25,628	23,973	25,133	29,243	26,541	25,935	26,313
Apr	24,009	22,949	25,667	24,428	22,973	22,763	24,530	27,160	25,218	25,622	26,130
May	31,083	30,283	34,249	25,426	31,994	30,043	32,517	30,043	34,149	34,680	27,271
Jun	30,913	34,510	35,011	35,172	35,751	35,476	36,135	35,834	33,972	35,180	25,572
Jul	30,234	34,287	33,348	35,501	34,949	35,188	35,476	34,580	32,032	33,664	23,230
Aug	28,981	33,525	31,671	34,803	33,433	34,772	34,964	32,763	30,213	31,817	21,202
Sep	27,551	32,602	29,972	33,710	31,786	34,233	34,580	31,161	28,953	30,368	20,185
Source: 1992 - 2002 Wyoming State Engineer's Office Annual Hydrographer's Reports											

Table 2.6.26 Wyoming State Engineer's Office (SEO) permit area capacity table - Rob Roy Reservoir

2nd Enlargement Rob Roy Reservoir					
Reservoir elevation (feet)	Area (acres)	Average area (acres)	Incremental capacity (acre-feet)	Accumulated capacity (acre-feet)	
9340	0.00			0.00	Permit No. 6536R 5,489.20 acre-feet
		1.660	8.30		
9345	3.32			8.30	
		6.045	30.23		
9350	8.77			38.53	
		12.975	64.88		
9355	17.18			103.41	
		23.520	117.60		
9360	29.86			221.01	
		36.405	182.03		
9365	42.95			403.04	
		50.150	250.75		
9370	57.35			653.79	
		64.370	321.85		
9375	71.39			975.64	
		79.030	395.15		
9380	86.67			1370.79	
		95.675	478.38		
9385	104.68			1849.17	
		115.935	579.68		
9390	127.19			2428.85	
		139.100	695.50		
9395	151.01			3124.35	
		168.100	840.50		
9400	185.19			3964.85	
		200.450	1002.25		
9405	215.70			4967.10	
		222.170	522.10		
9407.35	228.64			5489.20	
		236.270	626.11		Permit No. 6888R 3,405.21 acre-feet
9410	243.90			6115.31	
		260.370	1301.85		
9415	276.84			7417.16	
		295.450	1477.25		
9420	314.06			8894.41	

Table 2.6.26 Wyoming State Engineer's Office (SEO) permit area capacity table - Rob Roy Reservoir (cont)

2nd Enlargement Rob Roy Reservoir					
Reservoir elevation (feet)	Area (acres)	Average area (acres)	Incremental capacity (acre-feet)	Accumulated capacity (acre-feet)	
		327.965	1639.83		Permit No. 8444R 26,539.51 acre-feet
9425	341.87			10534.24	
		361.385	1806.93		
9430	380.90			12341.17	
		402.940	2014.70		
9435	424.98			14355.87	
		446.375	2231.88		
9440	467.77			16587.75	
		494.305	2471.53		
9445	520.84			19059.28	
		546.645	2733.23		
9450	572.45			21792.51	
		598.990	2994.95		
9455	625.53			24787.46	
		651.790	3258.95		
9460	678.05			28046.41	
		707.895	3539.48		
9465	737.74			31585.89	
		769.605	3848.03		
9470	801.47			35433.92	
		834.530	4172.65		
9475	867.59			39606.57	
		885.66	2656.98		
9478	903.73			42263.55	

Summary		
Purpose	**Elevation**	**Capacity**
Dead storage	9340 - 9370	653.79
Existing active storage	9370 - 9420	8,240.62
New active storage	9420 - 9470	26,539.51
New flood storage	9470 - 9478	6,829.63
Total	**9340 - 9478**	**42,263.55**
Source: Wyoming State Engineer's Office Permit No. 8444R drawings.		

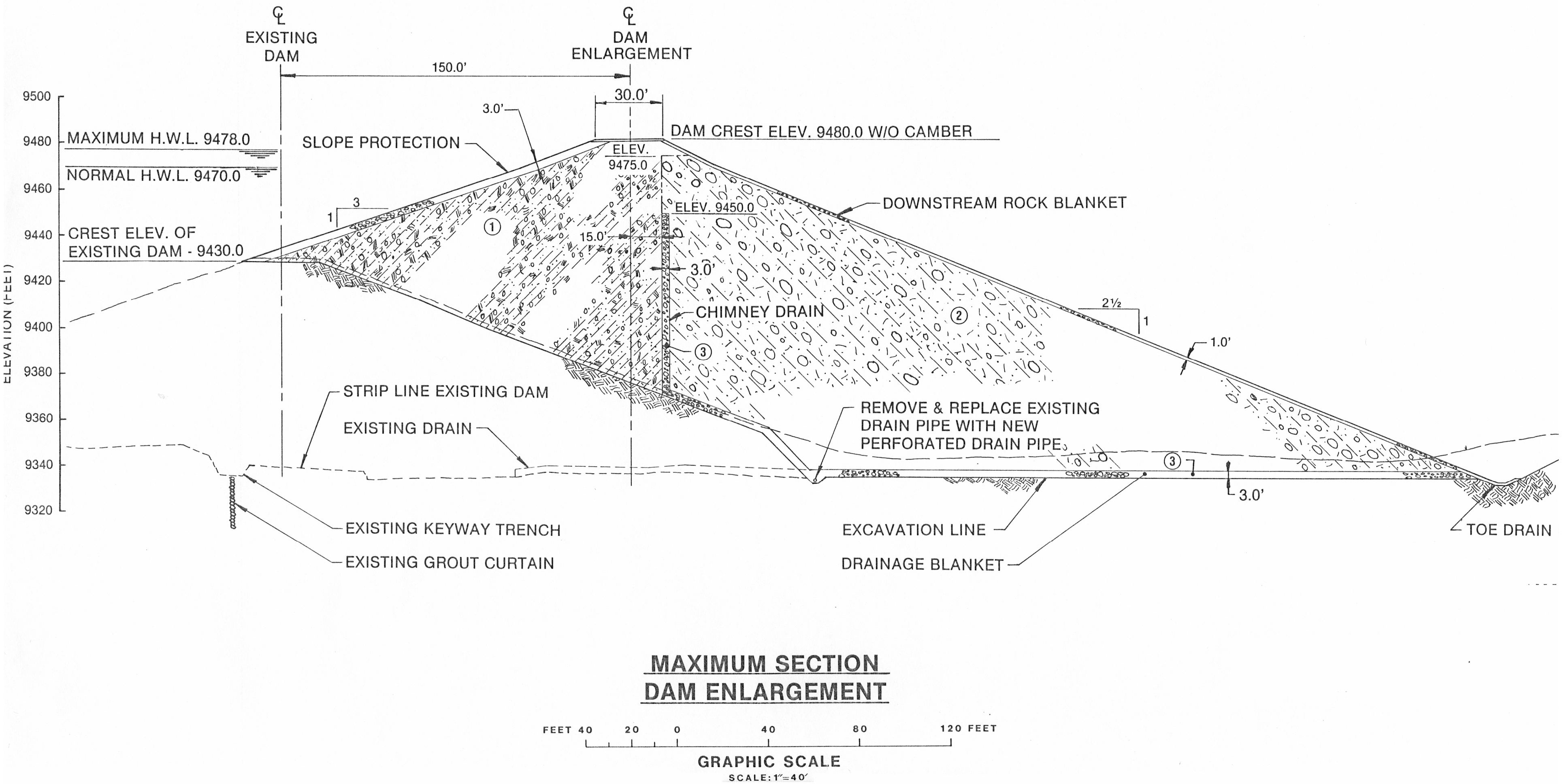


Figure 2.6.10

Wyoming State Engineer's Office (SEO) permit application dam cross-section – Rob Roy Reservoir

Source: SEO permit drawing

Title: Map to Accompany Application for 2nd Enlargement Rob Roy Reservoir

Permit No.(s): 8444 Res. (6536 Res. & 6888 Res.)

Filing Date: June 1982

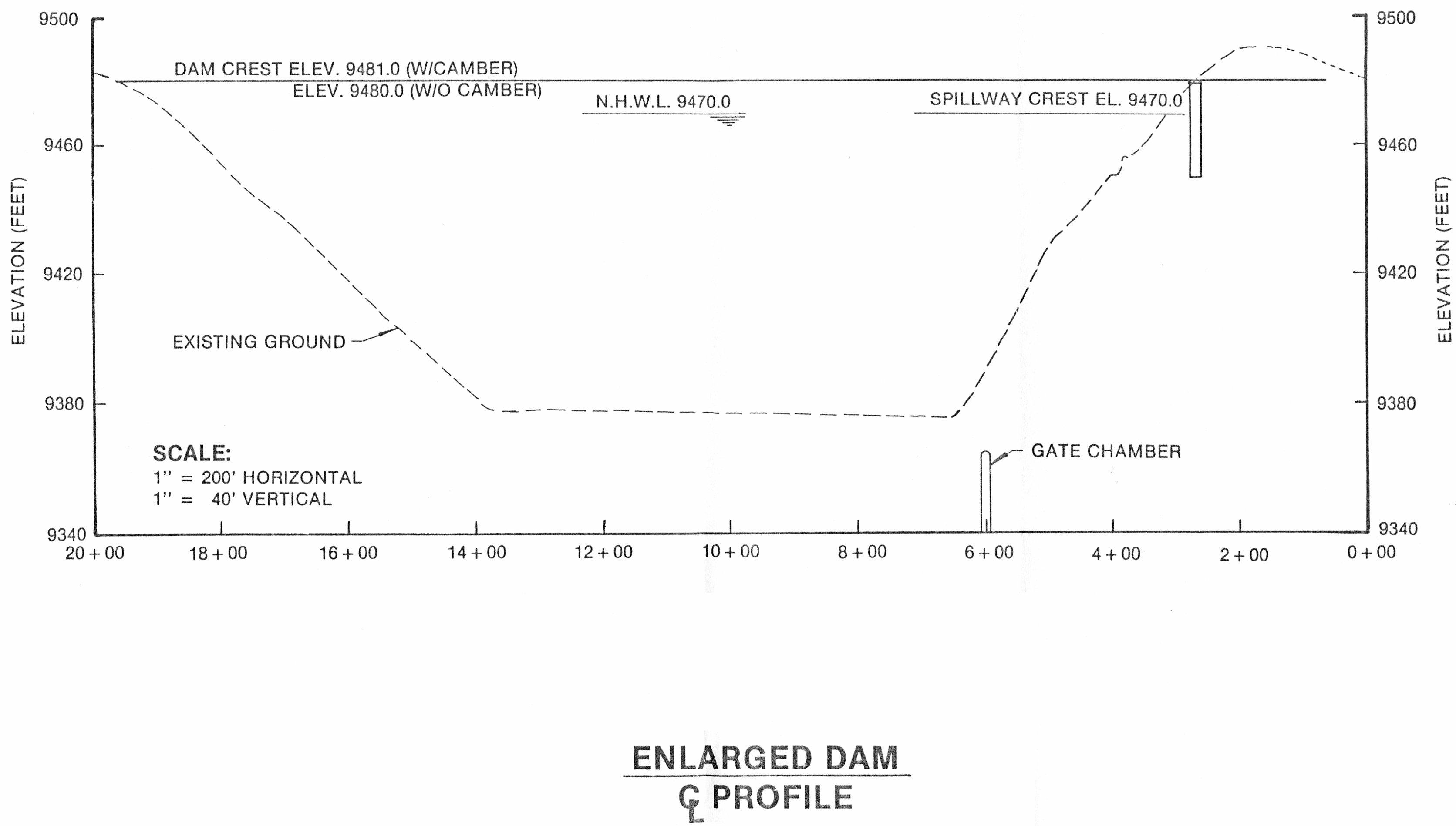


Figure 2.6.11
Wyoming State Engineer's Office (SEO) permit application dam profile – Rob Roy Reservoir
Source: SEO permit drawing
Title: Map to Accompany Application for 2nd Enlargement Rob Roy Reservoir
Permit No.(s): 8444 Res. (6536 Res. & 6888 Res.)
Filing Date: June 1982

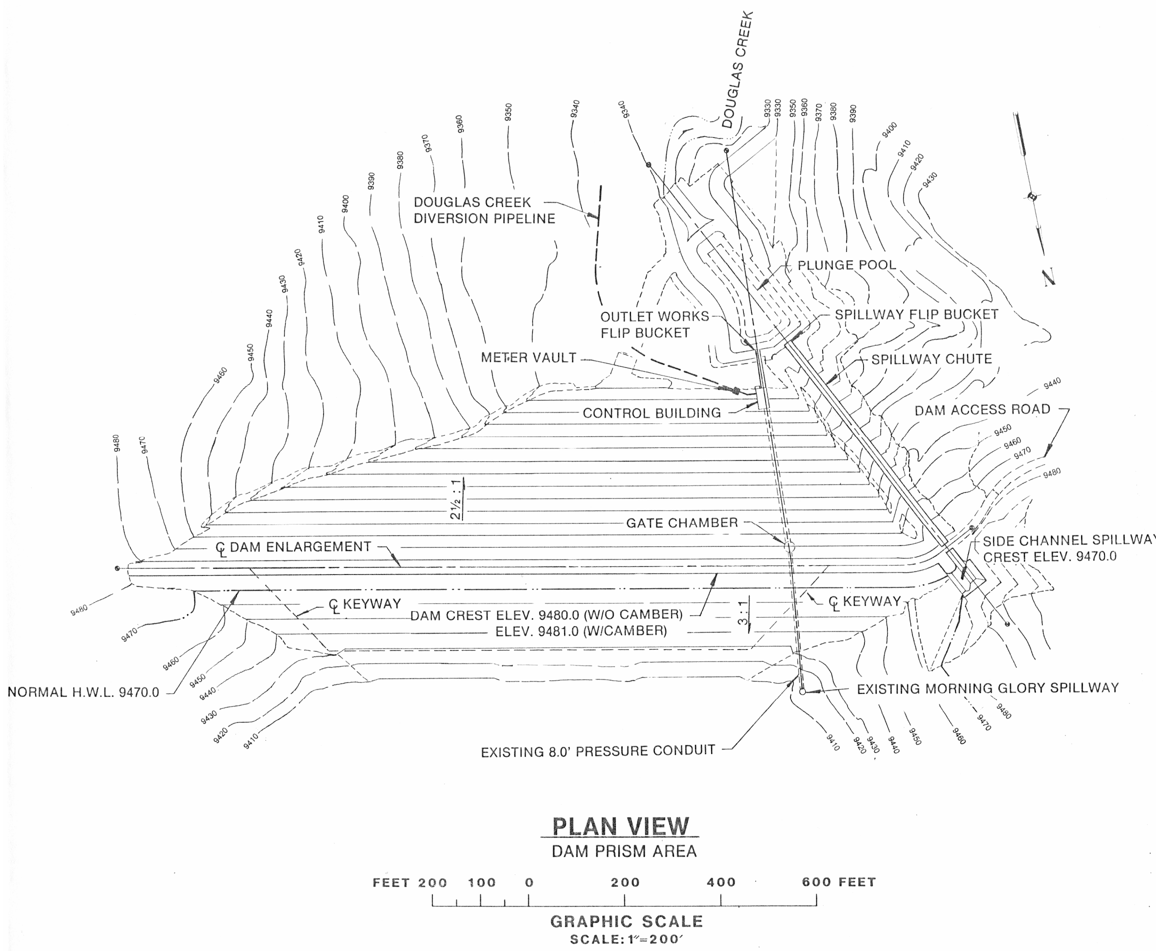


Figure 2.6.12
Wyoming State Engineer's Office (SEO) permit application dam plan view – Rob Roy Reservoir
Source: SEO permit drawing
Title: Map to Accompany Application for 2nd Enlargement Rob Roy Reservoir
Permit No.(s): 8444 Res. (6536 Res. & 6888 Res.)
Filing Date: June 1982

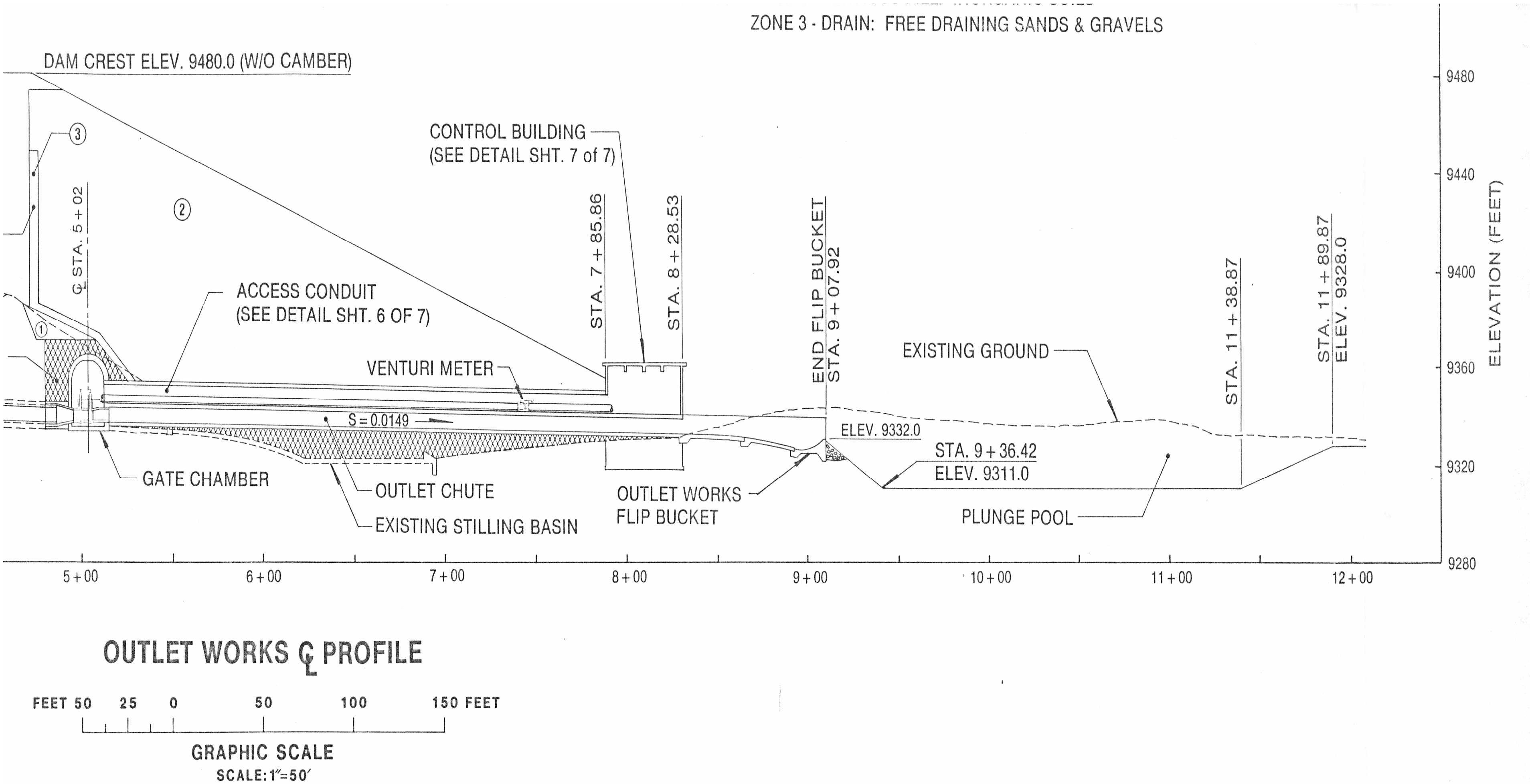


Figure 2.6.13

Wyoming State Engineer's Office (SEO) permit application dam outlet works profile – Rob Roy Reservoir

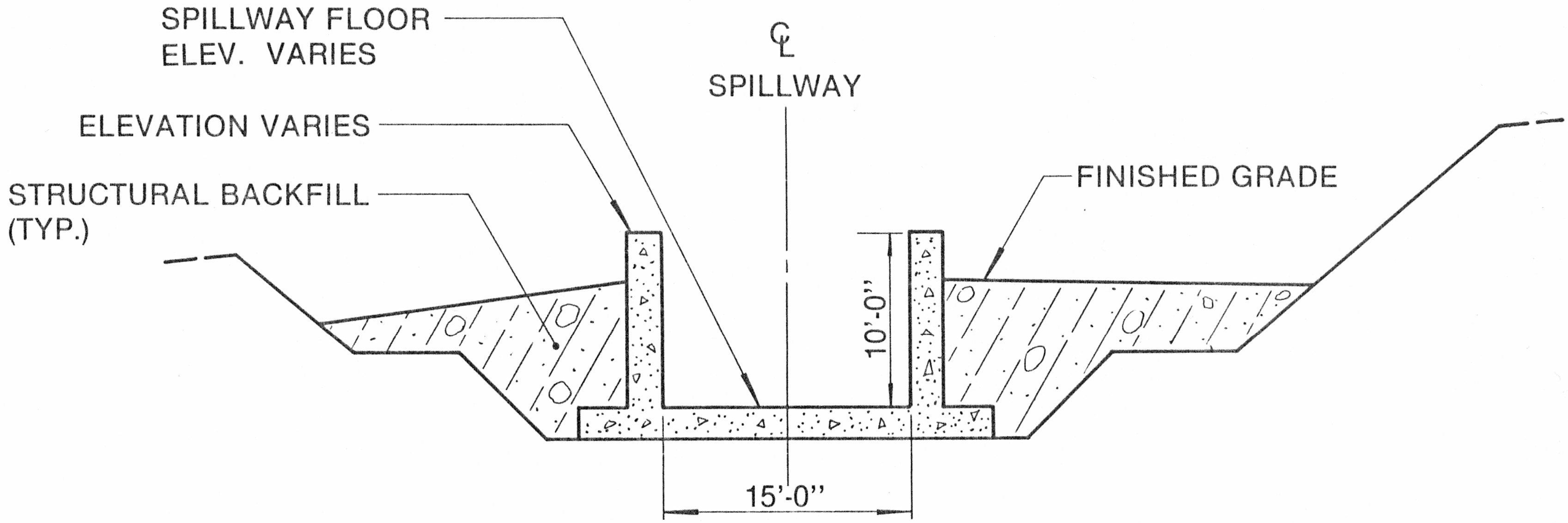
Source: SEO permit drawing

Title: Map to Accompany Application for 2nd Enlargement Rob Roy Reservoir

Permit No.(s): 8444 Res. (6536 Res. & 6888 Res.)

Filing Date: June 1982

Trihydro



SPILLWAY CHUTE DETAIL

NOT TO SCALE

Figure 2.6.14
Wyoming State Engineer's Office (SEO) permit application spillway chute detail – Rob Roy Reservoir
Source: SEO permit drawing
Title: Map to Accompany Application for 2nd Enlargement Rob Roy Reservoir
Permit No.(s): 8444 Res. (6536 Res. & 6888 Res.)
Filing Date: June 1982

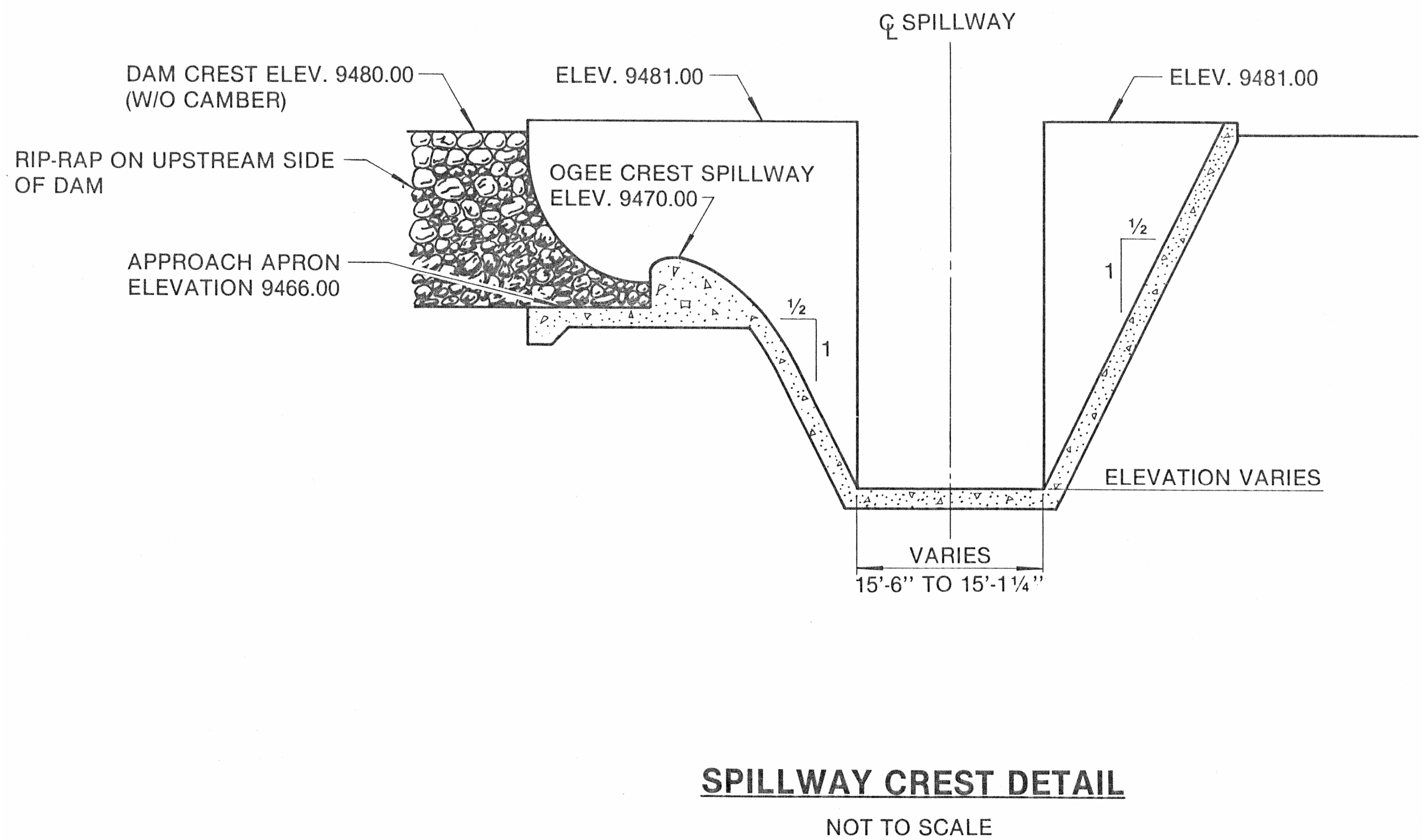


Figure 2.6.15

Wyoming State Engineer's Office (SEO) permit application dam spillway crest detail – Rob Roy Reservoir

Source: SEO permit drawing

Title: Map to Accompany Application for 2nd Enlargement Rob Roy Reservoir

Permit No.(s): 8444 Res. (6536 Res. & 6888 Res.)

Filing Date: June 1982

Hog Park Reservoir

Hog Park Reservoir is located in the channel of Hog Park Creek in the Sierra Madre Mountains of south central Wyoming. The reservoir, which is located east of the Continental Divide, is primarily filled by water diverted from the North Fork Little Snake River and tributaries through the Little Snake Diversion Pipeline and Tunnel. Water from this reservoir is appropriated for erosion control, fish culture, flood control, industrial use, municipal use, and irrigation. It is also used as a source of replacement water discharged to the North Platte River in exchange for water diverted below Rob Roy Reservoir on Douglas Creek for the City of Cheyenne Board of Public Utilities municipal, industrial, and irrigation uses.

Hog Park Dam is an earth fill dam with a reinforced concrete pipe outlet and a rock spillway. The available capacity of the reservoir is 22,656.22 acre-feet.

Table 2.6.27 summarizes historic Hog Park Reservoir storage volumes.

Table 2.6.28 provides the Wyoming State Engineer's Office (SEO) permit area capacity table for Hog Park Reservoir.

Figure 2.6.16 provides the Wyoming State Engineer's Office (SEO) permit application Hog Park Reservoir dam cross section.

Figure 2.6.17 provides the Wyoming State Engineer's Office (SEO) permit application Hog Park Reservoir dam profile.

Figure 2.6.18 provides the Wyoming State Engineer's Office (SEO) permit application Hog Park Reservoir spillway detail.

Table 2.6.27 Summary - historic Hog Park Reservoir storage volumes

SEO permits: P7235R, P8455R											
Capacity (acre-feet): 22,656.22											
End of month storage (acre-feet)											
Month	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Oct	14,673	18,276	18,924	19,181	17,616	18,809	18,705	19,594	19,594	18,972	19,275
Nov	13,832	17,538	16,845	17,737	17,163	17,580	16,490	18,129	17,914	18,228	18,448
Dec	12,925	16,671	14,717	16,119	16,840	15,173	14,633	17,266	17,407	17,496	17,867
Jan	12,466	14,347	13,256	14,607	16,393	13,102	13,793	16,691	16,965	16,879	17,062
Feb	11,986	13,128	12,470	13,106	14,624	11,051	13,150	15,230	16,220	16,341	16,389
Mar	11,407	11,922	12,090	11,487	12,038	9,663	12,182	13,172	13,766	15,644	15,716
Apr	11,758	8,609	12,705	10,490	11,886	9,082	11,115	13,005	12,058	14,250	15,860
May	20,730	10,843	21,393	11,611	15,552	13,850	16,533	18,009	18,752	18,778	2,236
Jun	21,720	22,006	22,754	20,427	22,895	22,102	22,687	22,256	22,767	22,828	22,365
Jul	20,749	22,108	21,730	19,720	22,342	21,622	22,622	22,228	21,747	21,850	21,445
Aug	19,976	20,827	20,884	19,003	20,793	20,427	21,593	20,444	20,747	21,130	20,536
Sep	19,144	19,793	19,987	18,338	19,772	19,579	20,467	19,490	19,725	20,227	19,772
Source: 1992 - 2002 Wyoming State Engineer's Office Annual Hydrographer's Reports.											

Table 2.6.28 Wyoming State Engineer's Office (SEO) permit area capacity table - Hog Park Reservoir

Elevation (feet)	Area (acres)	Average area (acres)	Incremental capacity (acre-feet)	Accumulated capacity (acre-feet)	
8345	0.00			0.00	Permit No. 7235R 2,972.30 acre-feet
		0.85	4.25		
8350	1.69			4.25	
		3.20	16.00		
8355	4.72			20.25	
		8.04	40.20		
8360	11.37			60.45	
		14.25	71.25		
8365	17.14			131.70	
		21.10	105.50		
8370	25.07			237.20	
		30.90	154.80		
8375	36.85			392.00	
		46.26	231.30		
8380	55.68			623.30	
		66.32	331.60		
8385	76.96			954.90	
		86.90	434.50		
8390	96.84			1389.40	
		111.10	555.50		
8395	125.35			1944.90	
		139.72	698.60		
8400	154.09			2643.50	
		164.44	328.80		
8402	174.78			2972.30	

Table 2.6.28 Wyoming State Engineer's Office (SEO) permit area capacity table - Hog Park Reservoir (cont)

Elevation (feet)	Area (acres)	Average area (acres)	Incremental capacity (acre-feet)	Accumulated capacity (acre-feet)	
		183.34	550.02		Permit No. 8455R 19,683.92 acre-feet
8405	191.91			3522.32	
		208.54	1042.70		
8410	225.17			4565.02	
		243.95	1219.75		
8415	262.73			5784.77	
		280.81	1404.05		
8420	298.90			7188.82	
		319.08	1595.40		
8425	339.26			8784.22	
		359.05	1795.25		
8430	378.84			10579.47	
		399.66	1998.30		
8435	420.48			12577.77	
		440.12	2200.60		
8440	459.76			14778.37	
		480.68	2403.40		
8445	501.60			17181.77	
		523.34	2616.70		
8450	545.09			19798.47	
		571.55	2857.75		
8455	598.02			22656.22	
		613.42	2331.00		
8458.8	628.82			24987.22	

Summary

Purpose	Elevations	Capacity
Dead storage	8345-8355	20.25
Existing active storage	8355-8402	2,952.05
New active storage	8402-8455	19,683.92
Surcharge flood storage	8455-8458.8	2,331.00

Source: Wyoming State Engineer's Office Permit No. 8455R drawings.

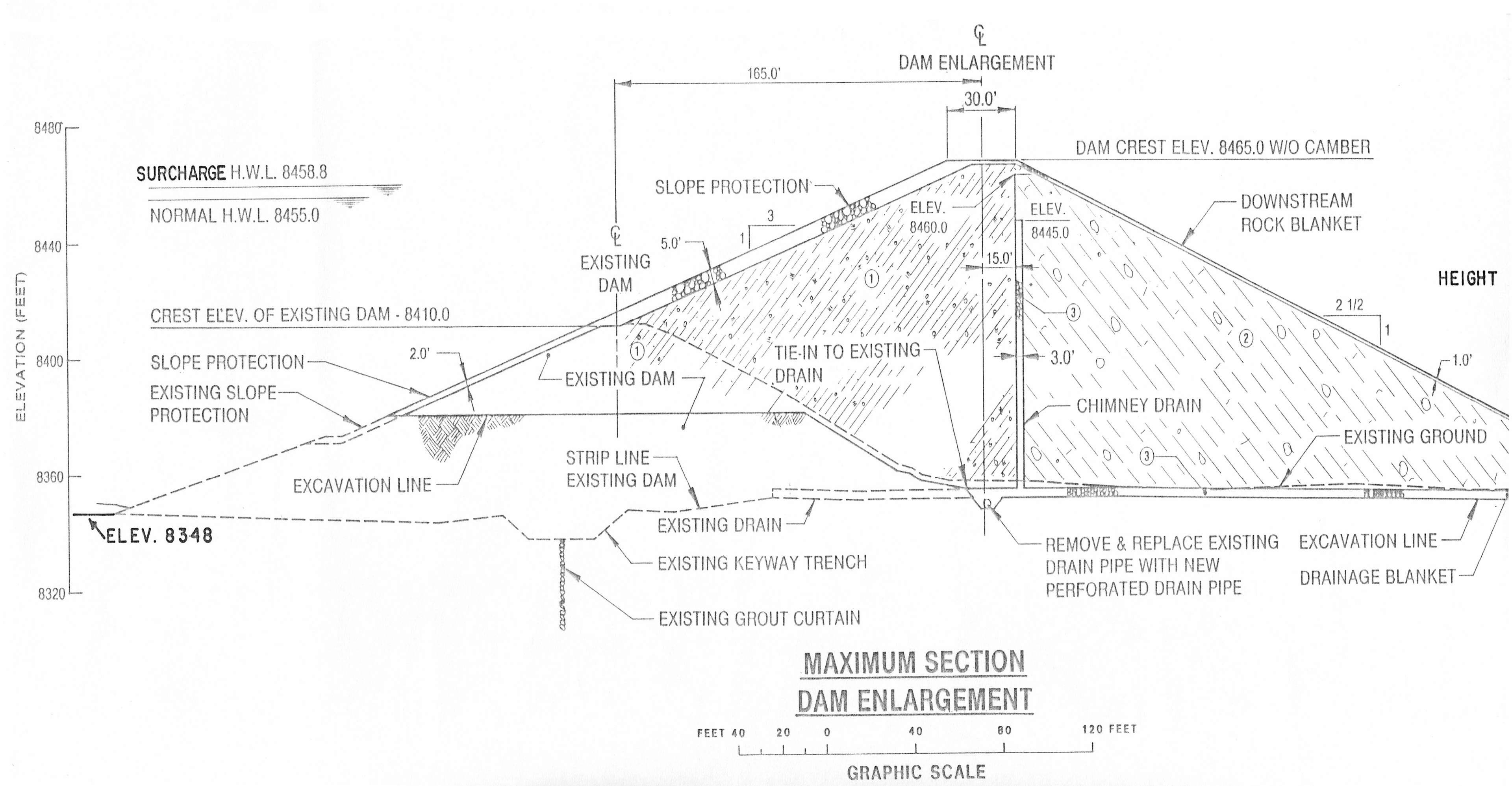


Figure 2.6.16
Wyoming State Engineer's Office (SEO) permit application dam cross section – Hog Park Reservoir
Source: SEO permit drawing
Title: Substitute Map to Accompany Substitute Application for T.F. No.23 4/188 Enlargement Hog Park Reservoir
Permit No.(s): 7235 Res.
Filing Date: May 1982

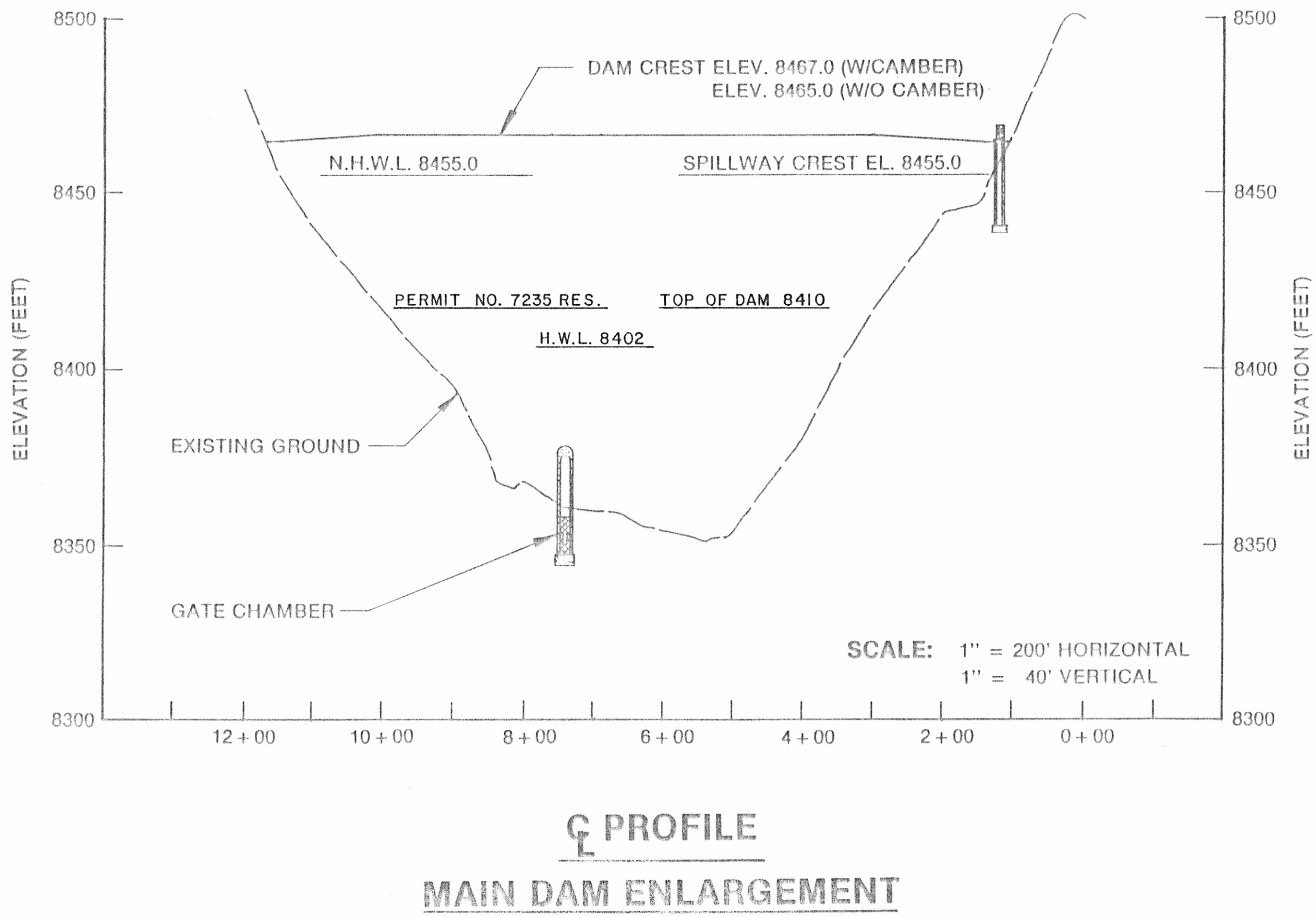


Figure 2.6.17

Wyoming State Engineer's Office (SEO) permit application dam profile – Hog Park Reservoir

Source: SEO permit drawing

Title: Substitute Map to Accompany Substitute Application for T.F. No.23 4/188 Enlargement Hog Park Reservoir

Permit No.(s): 7235 Res.

Filing Date: May 1982

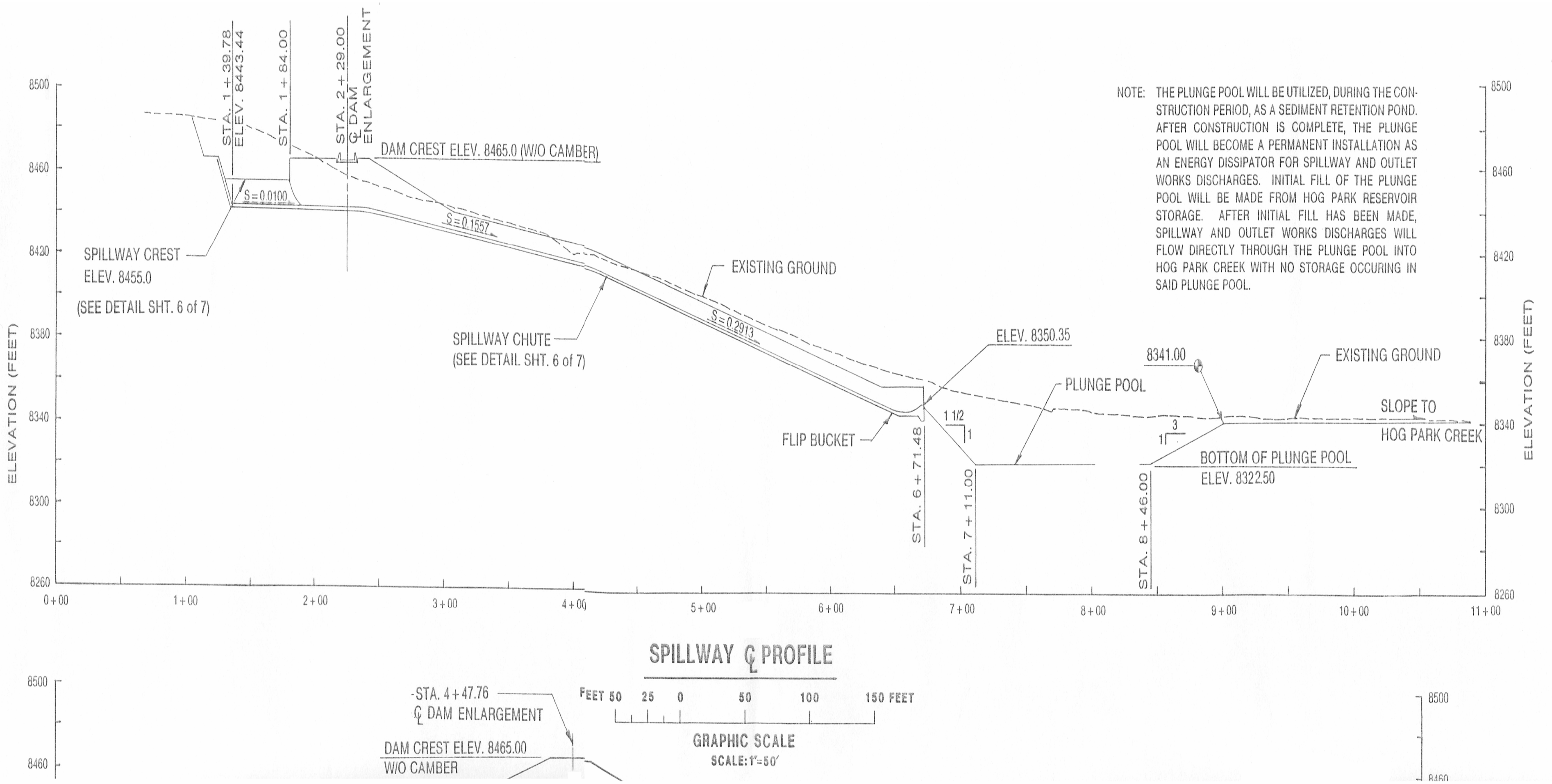


Figure 2.6.18

Wyoming State Engineer's Office (SEO) permit application spillway detail – Hog Park Reservoir

Source: SEO permit drawing

Title: Substitute Map to Accompany Substitute Application for T.F. No.23 4/188 Enlargement Hog Park Reservoir

Permit No.(s): 7235 Res.

Filing Date: May 1982

Figure 2.6.19 provides the Wyoming State Engineer’s Office (SEO) permit application Hog Park Reservoir outlet works detail.

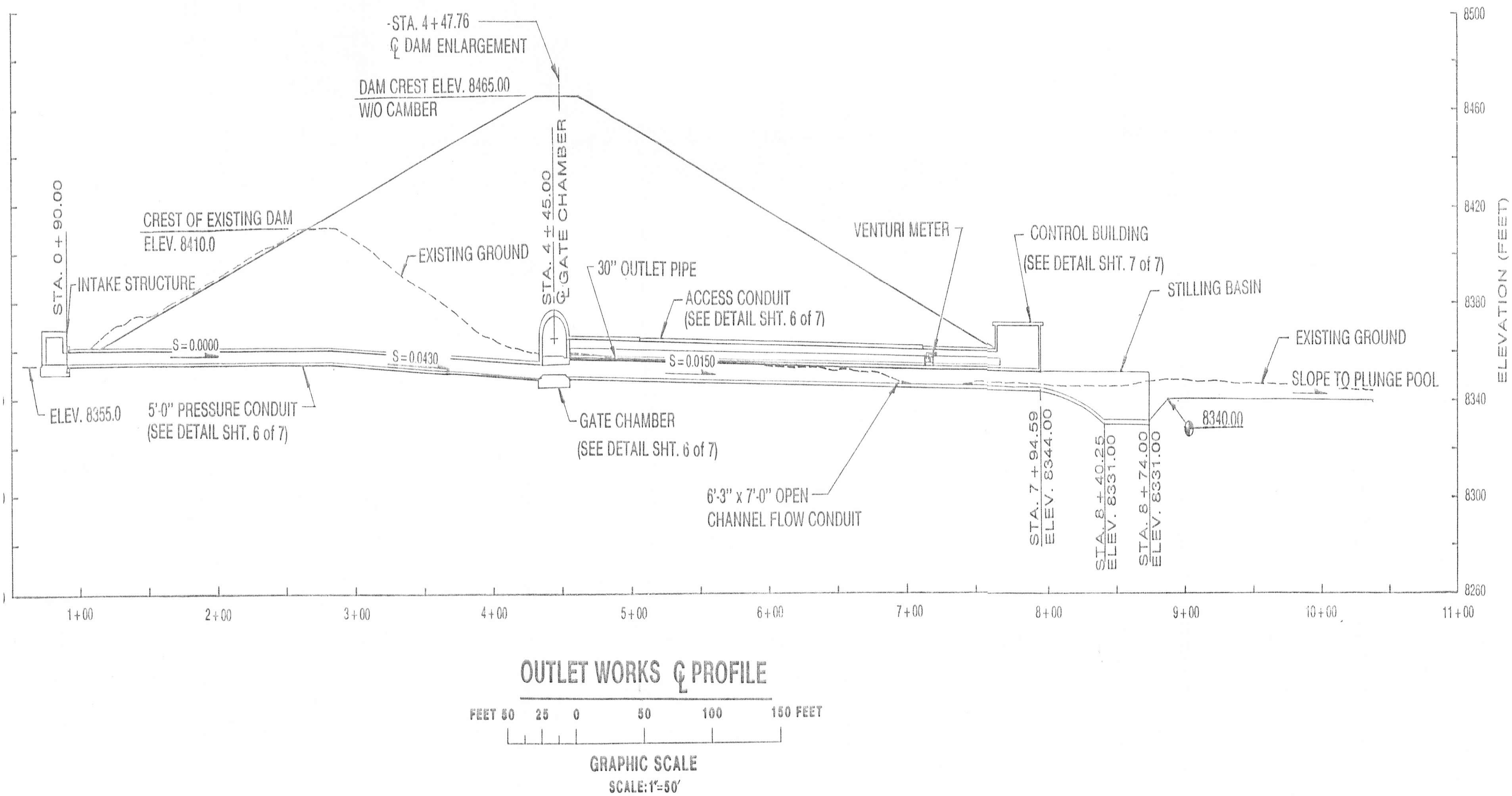


Figure 2.6.19

Wyoming State Engineer's Office (SEO) permit application outlet works detail – Hog Park Reservoir

Source: SEO permit drawing

Title: Substitute Map to Accompany Substitute Application for T.F. No.23 4/188 Enlargement Hog Park Reservoir

Permit No.(s): 7235 Res.

Filing Date: May 1982

Area 2/8 Reclamation Reservoir

Area 2/8 Reclamation Reservoir is used for wildlife and stock purposes. The reservoir is owned by Pathfinder Mines Corporation and has a priority date of 11/21/1991. The sources of supply for the reservoir are provided under Wyoming State Engineer's Office (SEO) Permit No. U.W. 86834, Area 2/8 Reclamation Reservoir Well, and limited surface runoff from Moss Agate Draw and other minor reclamation drainages. The reservoir has a capacity of 13,213.8 acre-feet.

Table 2.6.29 provides the Wyoming State Engineer's Office (SEO) permit area capacity table for the Area 2/8 Reclamation Reservoir.

Table 2.6.29 Wyoming State Engineer's Office (SEO permit) area capacity table - Area 2/8 Reclamation Reservoir (cont)

		Average	Δ Capacity	Σ Capacity
Contour	Area	(acre)	(acre-feet)	(acre-feet)
6675	0.00			
		0.30	1.52	1.52
6680	0.61			
		0.99	4.94	6.46
6685	1.37			
		1.82	9.09	15.55
6690	2.27			
		2.90	14.52	30.07
6695	3.54			
		4.39	21.96	52.03
6700	5.24			
		5.64	28.19	80.22
6705	6.04			
		6.47	32.37	112.59
6710	6.91			
		7.45	37.27	149.86
6715	8.00			
		8.61	43.05	192.91
6720	9.22			
		9.83	49.16	242.07
6725	10.44			
		11.02	55.11	297.18
6730	11.60			
		12.19	60.97	358.15
6735	12.78			
		13.52	67.59	425.74
6740	14.26			
		15.03	75.16	500.91
6745	15.81			
		16.66	83.30	584.21
6750	17.51			
		18.02	90.10	674.31
6755	18.53			
		19.20	95.98	770.30
6760	19.86			
		20.60	103.00	873.30
6765	21.34			
		22.06	110.32	983.62
6770	22.79			
		23.58	117.89	1,101.52
6775	24.36			
		25.12	125.58	1,227.09
6780	25.87			
		26.72	133.62	1,360.71

Table 2.6.29 Wyoming State Engineer's Office (SEO permit) area capacity table - Area 2/8 Reclamation Reservoir (cont)

		Average	Δ Capacity	Σ Capacity
Contour	Area	(acre)	(acre-feet)	(acre-feet)
6785	27.58			
		28.39	141.96	1,502.67
6790	29.20			
		30.00	150.02	1,652.69
6795	30.81			
		31.58	157.88	1,810.57
6800	32.35			
		32.91	164.56	1,975.13
6805	33.48			
		34.15	170.77	2,145.90
6810	34.83			
		35.49	177.43	2,323.34
6815	36.14			
		36.79	183.94	2,507.28
6820	37.44			
		38.00	190.01	2,697.29
6825	38.57			
		39.39	196.94	2,894.23
6830	40.21			
		41.07	205.33	3,099.56
6835	41.92			
		42.80	213.99	3,313.55
6840	43.67			
		44.51	222.53	3,536.08
6845	45.34			
		46.23	231.14	3,767.22
6850	47.12			
		48.46	242.31	4,009.53
6855	49.81			
		51.41	257.07	4,266.60
6860	53.02			
		54.64	273.21	4,539.81
6865	56.26			
		57.83	289.16	4,828.97
6870	59.40			
		60.90	304.49	5,133.46
6875	62.39			
		64.11	320.53	5,453.99
6880	65.82			
		67.72	338.58	5,792.57
6885	69.61			
		71.37	356.85	6,149.42
6890	73.13			
		74.92	374.61	6,524.02

Table 2.6.29 Wyoming State Engineer's Office (SEO permit) area capacity table - Area 2/8 Reclamation Reservoir (cont)

		Average	Δ Capacity	Σ Capacity
Contour	Area	(acre)	(acre-feet)	(acre-feet)
6895	76.72			
		78.44	392.20	6,916.22
6900	80.16			
		81.80	409.00	7,325.22
6905	83.44			
		85.33	426.64	7,751.86
6910	87.22			
		89.22	446.10	8,197.96
6915	91.22			
		93.05	465.25	8,663.21
6920	94.88			
		96.76	483.81	9,147.03
6925	98.65			
		100.25	501.25	9,648.28
6930	101.86			
		103.72	518.59	10,166.87
6935	105.58			
		107.69	538.45	10,705.31
6940	109.80			
		112.11	560.56	11,265.87
6945	114.42			
		116.97	584.83	11,850.70
6950	119.51			
		124.57	622.85	12,473.55
6955	129.63			
		134.59	740.21	13,213.80
6960.5	139.54			
			Total available capacity:	**13,213.80**
Source: Wyoming State Engineer's Office Permit No. 9695R drawings.				

Area 3 Reclamation Reservoir

Area 3 Reclamation Reservoir is located at the Shirley Basin Mine and is owned by Pathfinder Mines Corporation. The reservoir is a large, excavated, and abandoned uranium mine pit that has a capacity of 5,350.93 acre-feet. Water from the reservoir is used for livestock and wildlife watering. Located in the drainage of Spring Creek, the reservoir is filled by groundwater from the Wind River geologic formation under Wyoming State Engineer's Office (SEO) Permit No. U.W. 51774, Final Reclamation Reservoir #1 Well. The reservoir does not have an outlet.

Table 2.6.30 provides the Wyoming State Engineer's Office (SEO) permit area capacity table for the Area 3 Reclamation Reservoir.

Table 2.6.30 Wyoming State Engineer's Office (SEO) permit area capacity table - Area 3 Reclamation Reservoir

		Average	Δ Capacity	Σ Capacity
Contour	**Area**	**(acre)**	**(acre-feet)**	**(acre-feet)**
6725	0.00			
		0.02	0.10	0.10
6730	0.04			
		0.09	0.44	0.54
6735	0.14			
		0.23	1.16	1.70
6740	0.33			
		0.46	2.30	4.00
6745	0.60			
		0.73	3.64	7.65
6750	0.86			
		1.01	5.03	12.68
6755	1.15			
		1.36	6.82	19.49
6760	1.57			
		1.82	9.08	28.57
6765	2.06			
		2.27	11.35	39.91
6770	2.48			
		2.72	13.58	53.49
6775	2.95			
		3.19	15.97	69.46
6780	3.44			
		3.76	18.80	88.27
6785	4.08			
		4.37	21.86	110.13
6790	4.67			
		4.97	24.83	134.96
6795	5.26			
		5.53	27.64	162.60
6800	5.79			
		6.15	30.73	193.33
6805	6.50			
		6.91	34.56	227.89
6810	7.32			
		7.77	38.85	266.74
6815	8.22			
		8.62	43.08	309.82
6820	9.02			
		9.43	47.15	356.97
6825	9.84			
		10.50	52.52	409.49
6830	11.17			
		11.93	59.64	469.13

Table 2.6.30 Wyoming State Engineer's Office (SEO) permit area capacity table - Area 3 Reclamation Reservoir (cont)

Contour	Area	Average (acre)	Δ Capacity (acre-feet)	Σ Capacity (acre-feet)
6835	12.69			
		13.48	67.40	536.53
6840	14.27			
		14.92	74.60	611.13
6845	15.57			
		16.21	81.06	692.19
6850	16.86			
		17.61	88.04	780.23
6855	18.36			
		19.30	96.48	876.71
6860	20.23			
		21.22	106.08	982.79
6865	22.20			
		23.26	116.30	1,099.09
6870	24.32			
		25.45	127.27	1,226.36
6875	26.59			
		27.35	136.74	1,363.10
6880	28.11			
		29.10	145.48	1,508.58
6885	30.08			
		31.07	155.35	1,663.93
6890	32.06			
		33.11	165.53	1,829.46
6895	34.15			
		35.12	175.58	2,005.04
6900	36.08			
		36.95	184.77	2,189.81
6905	37.83			
		38.75	193.76	2,383.57
6910	39.68			
		40.75	203.77	2,587.34
6915	41.83			
		43.02	215.08	2,802.42
6920	44.20			
		45.35	226.75	3,029.17
6925	46.50			
		47.24	236.18	3,265.35
6930	47.97			
		48.78	243.92	3,509.27
6935	49.60			
		50.40	251.98	3,761.25
6940	51.20			
		52.07	260.36	4,021.61

Table 2.6.30 Wyoming State Engineer's Office (SEO) permit area capacity table - Area 3 Reclamation Reservoir (cont)

Contour	Area	Average (acre)	Δ Capacity (acre-feet)	Σ Capacity (acre-feet)
6945	52.95			
		54.06	270.32	4,291.93
6950	55.18			
		56.56	282.79	4,574.72
6955	57.93			
		59.42	297.10	4,871.82
6960	60.91			
		61.65	170.08	5,041.90
6962.7	62.39			
		63.02	144.94	5,183.22
6965	63.65			
		64.51	167.73	5,350.93
6967.6	65.36			
			Total available capacity:	**5,350.93**
Source: Wyoming State Engineer's Office Permit No. 9696R drawin				

No. 4 Evaporation Reservoir

Also located in the Shirley Basin Mine and owned by Pathfinder Mines Corporation, the No. 4 Evaporation Reservoir has a capacity of 3,913.3 acre-feet. The reservoir is permitted for the evaporation of plant effluent (pollution control). The reservoir is located in the channel of Mine Creek and is permitted to be filled through the plant effluent discharge line under Wyoming State Engineer's Office (SEO) Permit No. U.W. 21801.

The plant discharges radioactive effluent, thereby placing the reservoir under the jurisdiction of the U.S. Nuclear Regulatory Commission (NRC). It is assumed this plant is no longer active. The reservoir operates with a required three-foot minimum freeboard. Because of the presence of radioactive material, discharge from the reservoir is prohibited by the NRC. The reservoir has been designed to contain local runoff and does not have an outlet works or spillway.

Table 2.6.31 provides the No. 4 Evaporation Reservoir area capacity table that is shown on the Wyoming State Engineer's (SEO) permit application for this reservoir.

Figures 2.6.20 and 2.6.21 provide a reservoir cross section and profile, both scanned from the Wyoming State Engineer's (SEO) permit map for No. 4 Evaporation Reservoir.

Table 2.6.31 Wyoming State Engineer's Office (SEO) permit area capacity table - No. 4 Evaporation Reservoir

		Average	Capacity
Contour	**Area**	**(acre)**	**(acre-feet)**
7055	0.0		
		3.0	14.8
7060	5.9		
		10.7	53.5
7065	1,504.0		
		22.4	112.0
7070	29.4		
		37.3	186.5
7075	45.2		
		54.6	273.0
7080	64.0		
		74.4	372.0
7085	84.8		
		95.9	479.5
7090	106.9		
		117.6	588.0
7095	128.3		
		137.9	689.5
7100	147.4		
		158.8	794.0
7105	170.2		
		175.3	350.5
7107	180.3		
Total available capacity:			**3913.3**
Source: Wyoming State Engineer's Office Permit No. 7677R drawings.			

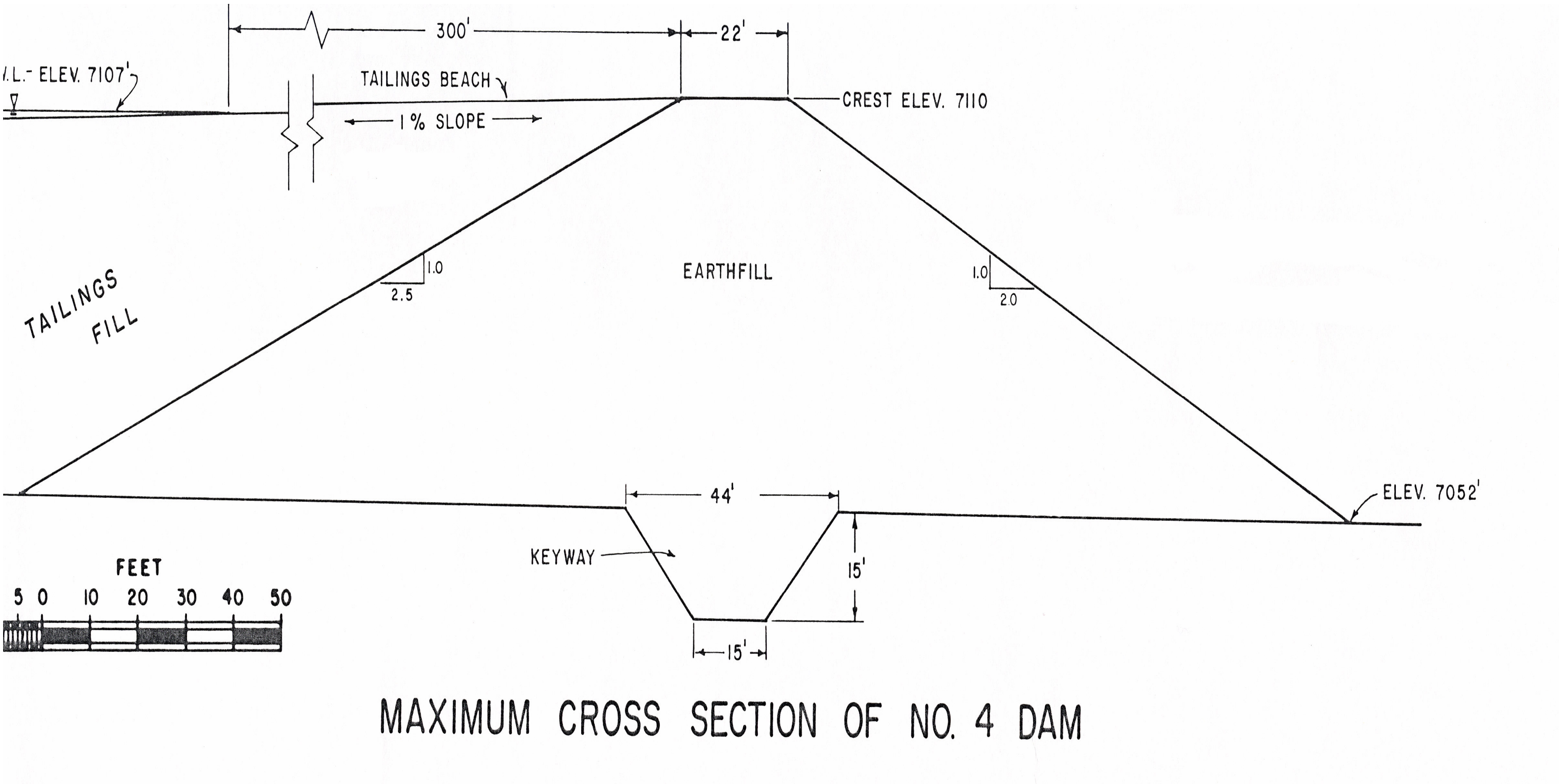


Figure 2.6.20

Wyoming State Engineer's Office (SEO) permit application reservoir cross-section – No. 4 Evaporation Reservoir

Source: SEO permit drawing

Title: Map to Accompany Applications for: No.5 Evaporation Reservoir, No. 4 Evaporation Reservoir, Fresh Water Reservoir, Russell Reservoir, Archer Reservoir, Pasha Reservoir, Johnson Reservoir

Permit No.(s): 7676 Res., 7677 Res., 7678 Res., 7679 Res., 7680 Res., 7681 Res., 7682 Res.

Filing Date: Unknown

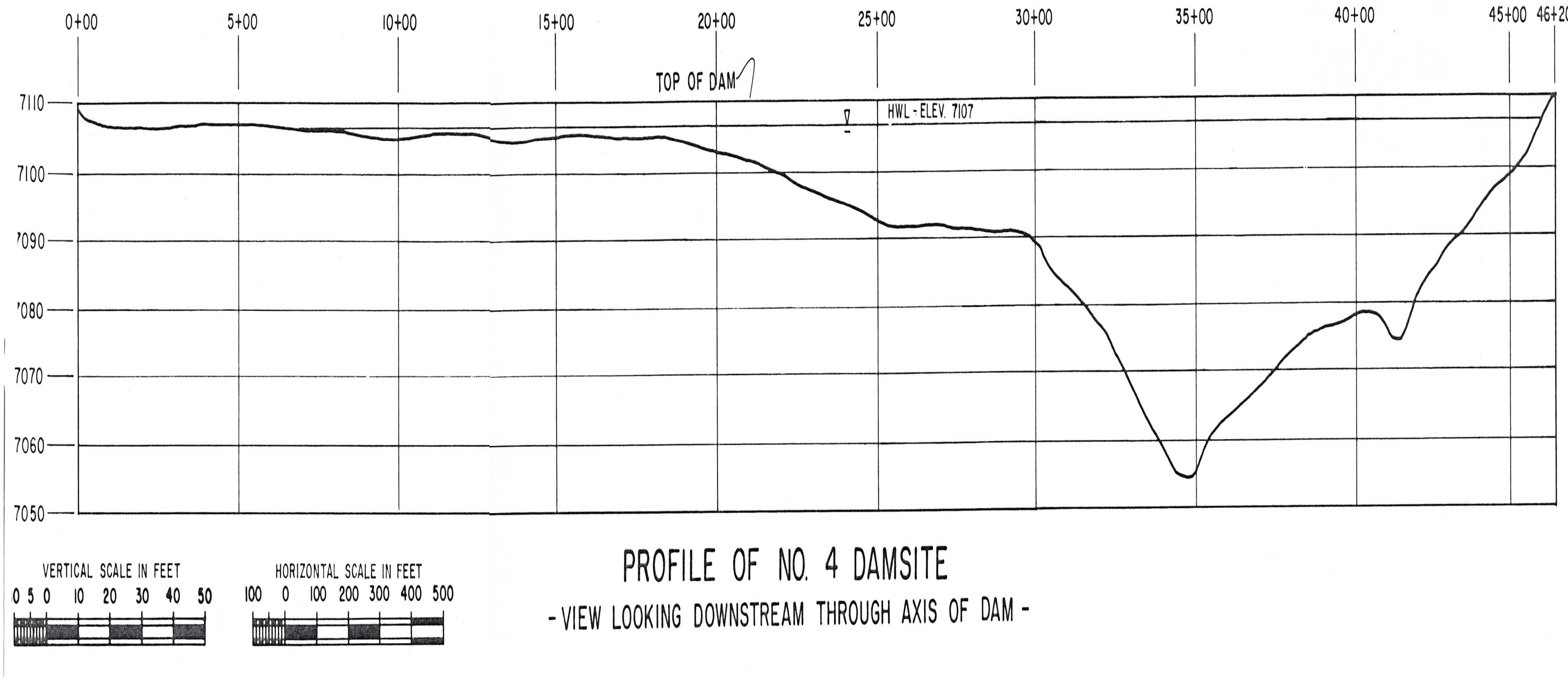


Figure 2.6.21

Wyoming State Engineer's Office (SEO) permit application dam profile – No. 4 Evaporation Reservoir

Source: SEO permit drawing

Title: Map to Accompany Applications for: No.5 Evaporation Reservoir, No. 4 Evaporation Reservoir, Fresh Water Reservoir, Russell Reservoir, Archer Reservoir, Pasha Reservoir, Johnson Reservoir

Permit No.(s): 7676 Res., 7677 Res., 7678 Res., 7679 Res., 7680 Res., 7681 Res., 7682 Res.

Filing Date: Unknown

Johnson Reservoir

Johnson Reservoir is located in a natural basin and is filled by discharges from Johnson Ditch No. 1 and Johnson Ditch No. 2. Water from the reservoir is permitted for irrigation use. The reservoir has an available capacity of 3,818.17 acre-feet.

Pierce Reservoir

Constructed in 1912, Pierce Reservoir is used for irrigation, stock, and domestic purposes. The reservoir is located in a natural basin and has a permitted capacity of 3,205.7 acre-feet. The reservoir is permitted to be filled through the Pierce Enlargement of the 7L Ditch.

Upper Rock Creek Reservoir

The Upper Rock Creek Reservoir is located in Fremont County, Wyoming. The reservoir is filled by Rock Creek, which is a tributary of the Sweetwater River tributary North Platte River. Rock Creek that provides water for this reservoir should not be confused with Rock Creek that flows northward through and northeastward from the Medicine Bow National Forest in eastern Carbon County. The water from the reservoir is used for industrial purposes for the beneficiation of iron ore.

As shown on the Wyoming State Engineer's Office (SEO) permit application for this reservoir, the surface area of the reservoir is 67.6 acres at a high-water line of 8320.0 feet, and the total available capacity of the reservoir and its enlargement is 2,799.8 acre-feet. The reservoir dam has a crest length of 20 feet.

The Upper Rock Creek Reservoir has a spillway and an overflow ditch. The reservoir overflow ditch is permitted to carry the overflow from the spillway of the reservoir around the plant to Slate Creek to prevent flooding of the mine and avoid pumping of the bypassed flow into a tailings basin.

Table 2.6.32 provides the Upper Rock Creek Reservoir area capacity table that is shown on the Wyoming State Engineer's (SEO) permit application for this reservoir.

Table 2.6.32 Wyoming State Engineer's Office (SEO) permit area capacity table - Upper Rock Creek Reservoir

		Average	Capacity
Contour	**Area**	**(acre)**	**(acre-feet)**
8252	11.4		
		13.9	69.5
8257	16.5		
		17.9	89.5
8262	19.4		
		22.7	113.5
8267	26.1		
		28.5	142.5
8272	30.9		
		33.2	166.0
8277	35.5		
		37.0	185.0
8282	38.5		
		40.4	202.0
8287	42.5		
		44.1	220.5
8292	45.8		
		47.8	239.0
8297	49.8		
		50.0	30.0
8297.6	50.2		
Total capacity under Permit No. 6394 Res.			**1457.5**
Capacity Under This Proposed Enlargement - Permit No. 6497R			
8297.6	50.2		
		51.4	123.3
8300	52.6		
		54.7	273.5
8305	56.9		
		59.0	295.0
8310	61.2		
		63.0	315.0
8310	64.9		
		67.1	335.0
8320	69.3		
Total capacity under this enlargement			**1342.3 Acre-Feet**
Total available capacity:			**2799.8 Acre-Feet**
Source: Wyoming State Engineer's Office Permit No. 6497R drawings.			

Figure 2.6.22 shows the Wyoming State Engineer’s Office (SEO) permit application Upper Rock Creek Reservoir cross section.

Figure 2.6.23 shows the Wyoming State Engineer’s Office (SEO) permit application Upper Rock Creek Reservoir profile.

Figure 2.6.24 shows the Wyoming State Engineer’s Office (SEO) permit application Bosler Reservoir cross section and profile.

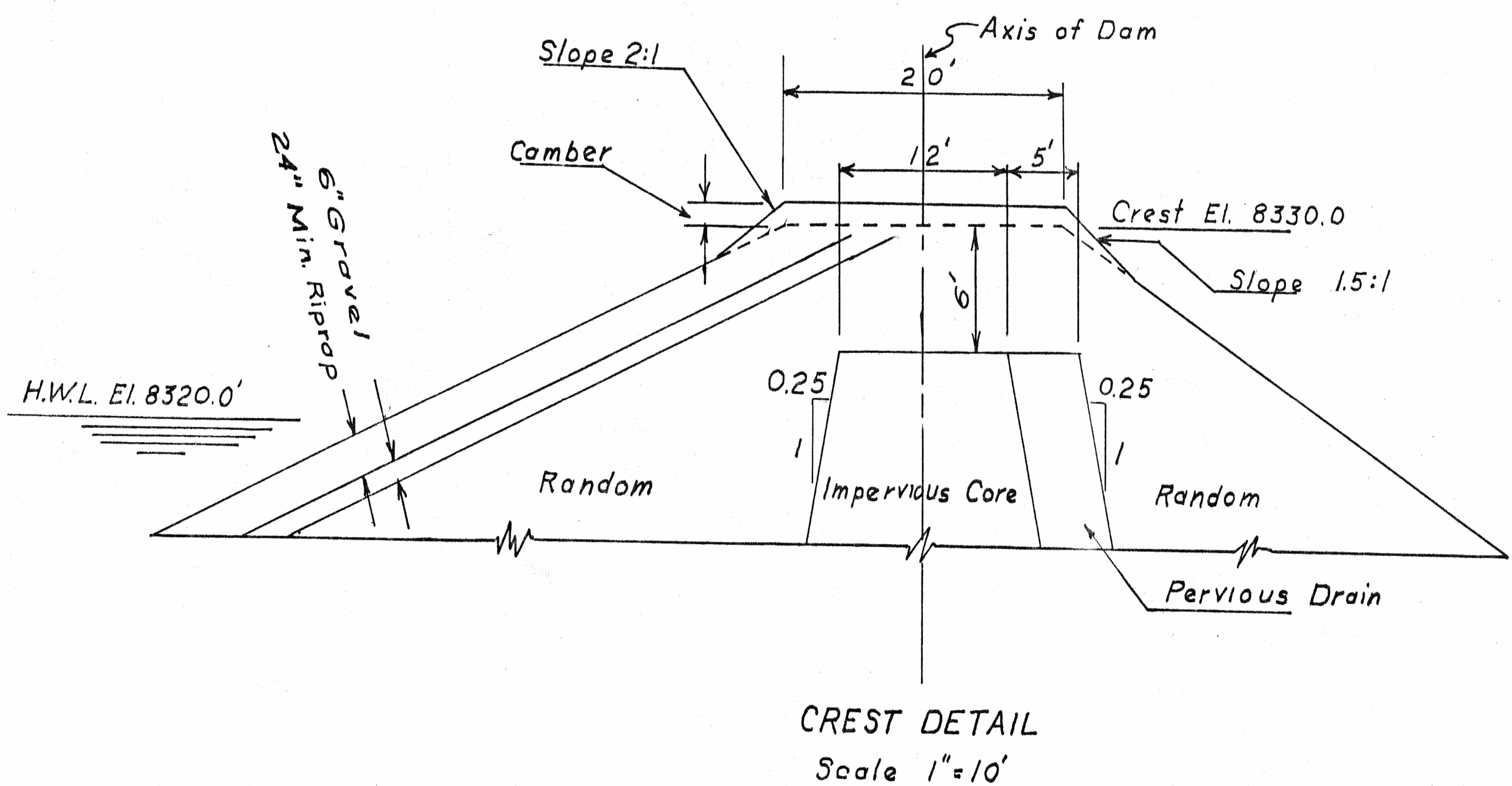


Figure 2.6.22
Wyoming State Engineer's Office (SEO) permit application cross section- Upper Rock Creek Reservoir
Source: SEO permit drawing
Title: Map to Accompany Application for Enlargement of Upper Rock Creek Reservoir
Permit No.(s): 6497 Res.
Filing Date: December 30, 1959

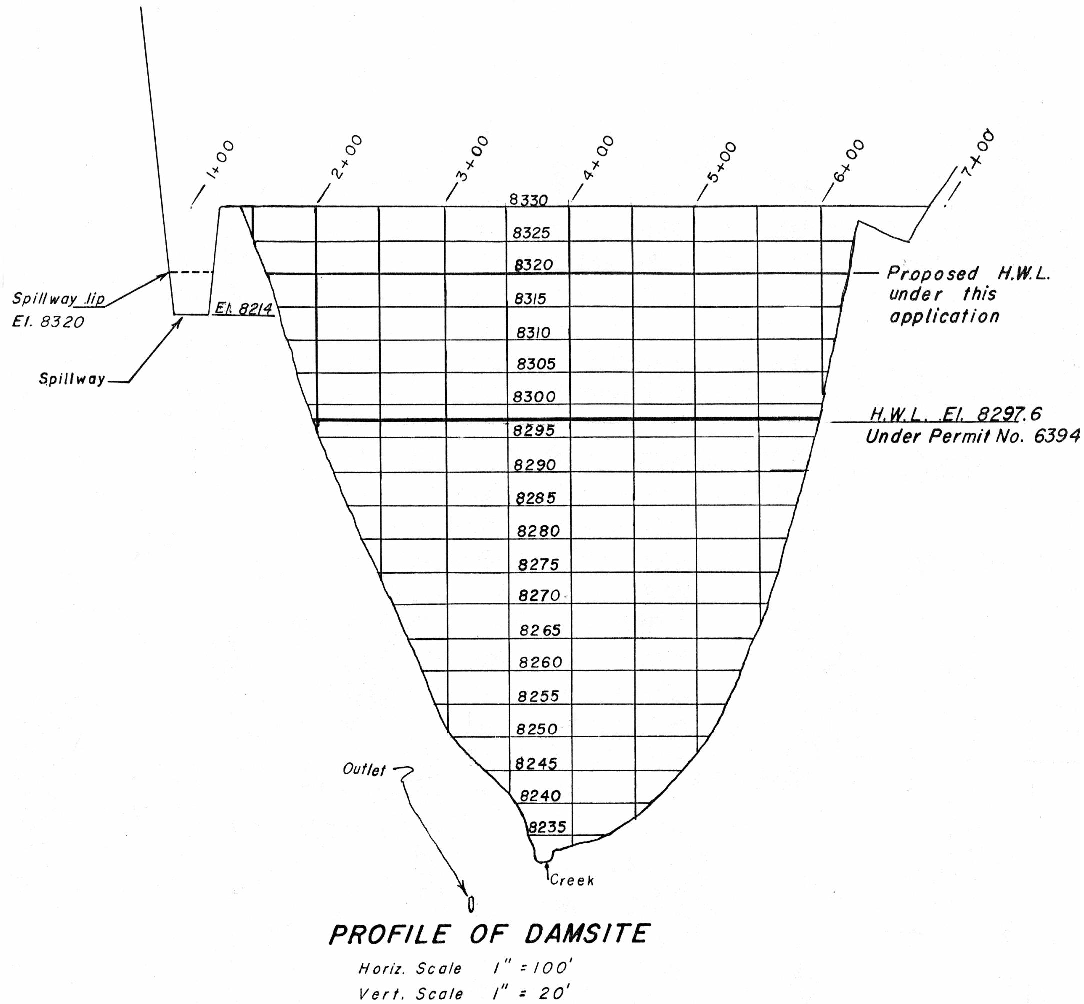


Figure 2.6.23

Wyoming State Engineer's Office (SEO) permit application profile – Upper Rock Creek Reservoir

Source: SEO permit drawing

Title: Map to Accompany Application for Enlargement of Upper Rock Creek Reservoir

Permit No.(s): 6497 Res.

Filing Date: December 30, 1959

Bosler Reservoir

Bosler Reservoir has a permitted available capacity of 1,964.52 acre-feet. The reservoir is used for fish propagation, stock watering, and recreation purposes. The reservoir is located in the channel of Bosler Slough and receives runoff from a drainage area of 3,200 acres.

Table 2.6.33 provides the Bosler Reservoir area capacity table that is shown on the Wyoming State Engineer's (SEO) permit application for this reservoir.

Table 2.6.33 Wyoming State Engineer's Office (SEO) permit area capacity table - Bosler Reservoir

Contour	Area	Average (acre)	Capacity (acre-feet)
82.7	167		
		183.5	495
85.4	200		
		218	720
88.7	236		
		244	390
90.3	252		
		254.15	148.69
90.885	256.3		
		261.15	212.83
91.7	266.0		
		Total available capacity:	**1966.52**
Source: Wyoming State Engineer's Office Permit No. 8211R drawings.			

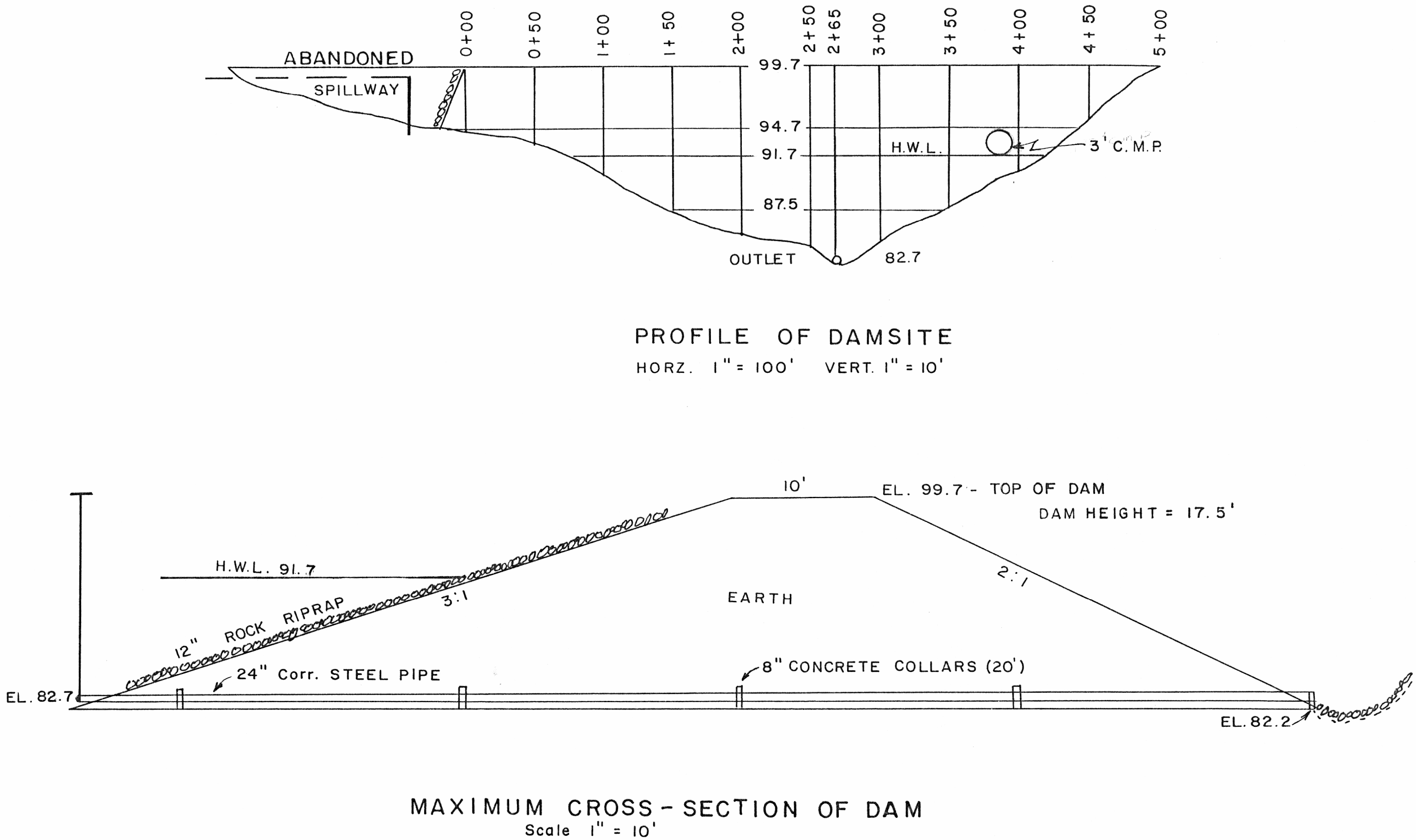


Figure 2.6.24
Wyoming State Engineer's Office (SEO) permit application cross section and profile – Bosler Reservoir
Source: SEO permit drawing
Title: Map to Accompany Application for the Enlargement Bosler Reservoir
Permit No.(s): 8211 Res. (6083 Res.)
Filing Date: March 13, 1981

Saratoga Reservoir

Water stored in the Saratoga Reservoir is permitted by the Wyoming State Engineer's Office (SEO) for municipal, recreational, stock watering, and fish culture uses. The permitted capacity of the reservoir is 1,559.40 acre-feet. The reservoir is filled through the Enlargement of the Saratoga Supply Ditch, which receives water from the North Platte River.

SEO permit application documents show a 16-foot crest width for the Saratoga Reservoir dam. The outlet is shown to consist of a 24-inch diameter corrugated metal pipe, and the spillway is shown to consist of a 36-inch by 48-inch corrugated metal pipe.

Table 2.6.34 provides the Saratoga Reservoir area capacity table that is shown on the Wyoming State Engineer's (SEO) permit application for this reservoir.

Table 2.6.34 Wyoming State Engineer's Office (SEO) permit area capacity table - Saratoga Reservoir

			Capacity			
Contour	**Area (A.)**	**Ave. A.**	**acre-feet**			
103	277.4					
		249.63	748.89	Enlarged Capacity		
100	221.85					
100	174.14					
		112.77	563.85			
95	51.41					
					Existing	
					Capacity	
100	47.71				810.51 acre-feet	
		35.60	178.00			
95	23.48					
		18.07	68.66*			
91.2	12.66					
		Total:	**1559.40**			
*Dead Storage						
Source: Wyoming State Engineer's Office Permit No. 7297R drawings.						

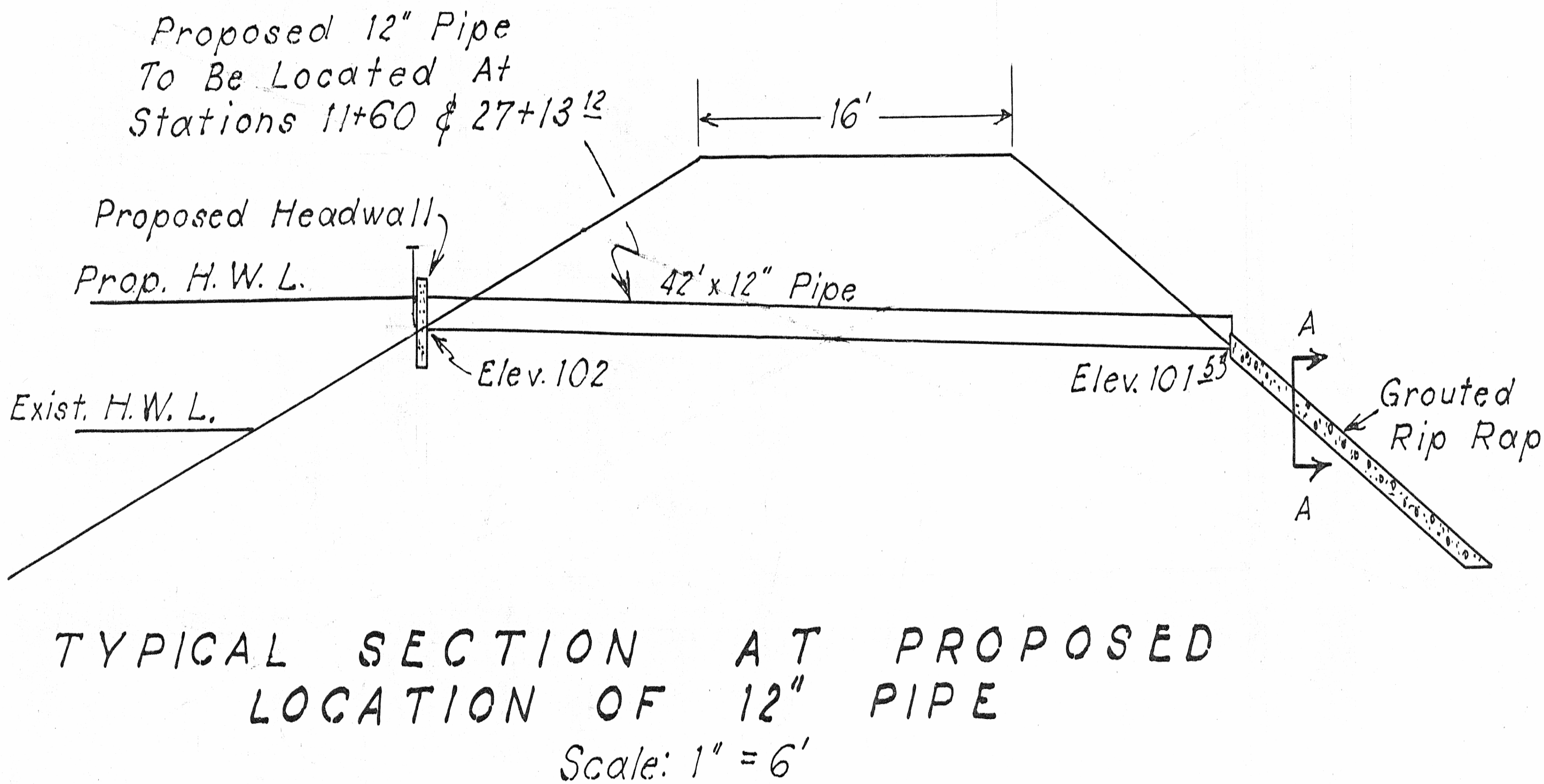


Figure 2.6.25

Wyoming State Engineer's Office (SEO) permit application profile – Saratoga Reservoir

Source: SEO permit drawing

Title: Map to Accompany Application for Saratoga Ditch Enlargement and Saratoga Reservoir Enlargement

Permit No.(s): 6354 Enl., 7297 Res.

Filing Date: August 26, 1970

Figure 2.6.26 shows the Wyoming State Engineer’s Office (SEO) permit application Saratoga Reservoir spillway cross section.

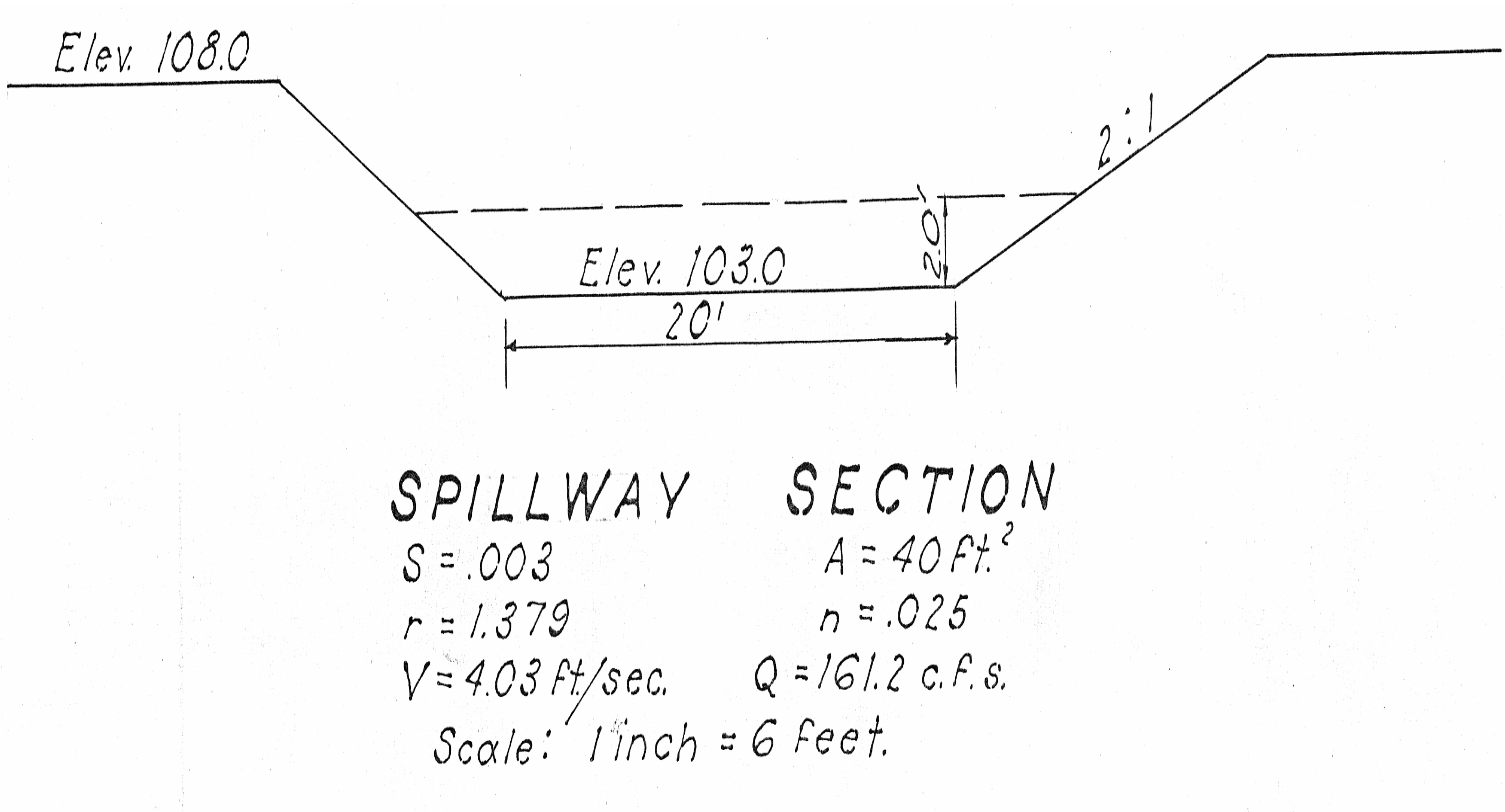


Figure 2.6.26
Wyoming State Engineer's Office (SEO) permit application spillway cross section – Saratoga Reservoir
Source: SEO permit drawing
Title: Map to Accompany Application for Saratoga Ditch Enlargement and Saratoga Reservoir Enlargement
Permit No.(s): 6354 Enl., 7297 Res.
Filing Date: August 26, 1970

Green Mountain Mine Reservoir

Green Mountain Mine Reservoir has a total permitted capacity of 1,382 acre-feet. The water in the reservoir is permitted for wildlife preservation and is an off-channel reservoir located in the McDraw drainage. The reservoir is located in Fremont County.

Table 2.6.35 provides the Green Mountain Mine Reservoir area capacity table that is shown on the Wyoming State Engineer's (SEO) permit application for this reservoir.

Table 2.7.35 Wyoming State Engineer's Office (SEO) permit area capacity table - Green Mountain Mine Reservoir

		Average	Capacity		
Contour	**Area**	**(acre)**	**(acre-feet)**		
7500	24				Inactive capacity Wildlife preserve 1,382 acre-feet
		24.6	246.0		
7510	25.2				
		26.0	260.0		
7520	26.8				
		27.6	276.0		
7530	28.4				
		29.2	292.0		
7540	30.0				
		30.8	308.0		
7550	31.6				
		Total capacity:	**1382.0 acre-feet**		
Source: Wyoming State Engineer's Office Permit No. 7863R drawing.					

Turpin Park Reservoir

Turpin Park Reservoir is located in the channel of Turpin Creek. Permitted by the Wyoming State Engineer's Office (SEO) for irrigation and stock purposes, Turpin Park Reservoir has an available permitted capacity of 1,316.94 acre-feet and a permitted surface area at the reservoir high-water line of 99.28 acres.

Teton Reservoir

Teton Reservoir is permitted for erosion control, recreation, and flood detention. The reservoir has a permitted capacity of 1,298.70 acre-feet. Located in the channel of Little Sage Creek, the reservoir has a dam crest elevation of 7,028 feet. The reservoir outlet pipe is a 36-inch diameter welded steel pipe. The spillway has a width of 150 feet and a permitted discharge capacity of 1,986.6 cubic feet per second.

Table 2.6.36 provides the Teton Reservoir area capacity table that is shown on the Wyoming State Engineer's (SEO) permit application for this reservoir.

Table 2.6.36 Wyoming State Engineer's Office (SEO) permit area capacity table - Teton Reservoir

			Capacity	
Contour	Area	Average	acre feet	Remarks
6998	0.00			
		3.23	6.46	
7000	6.45			
		11.13	22.26	
7002	15.81			
		20.10	40.20	
7004	24.39			Erosion Control
		28.77	57.54	(Silt Retention)
7006	33.14			126.46 AC. FT.
		36.97	73.94	
7008	40.79			
		46.57	93.14	
7010	52.34			
		57.37	114.74	
7012	62.29			
		66.81	133.62	
7014	71.33			
		76.73	153.46	Recreation
7016	82.12			568.90 AC. FT.
		86.86	173.72	
7018	91.60			
		96.70	193.40	
7020	101.79			
		106.95	213.90	
7022	112.10			
		112.70	22.54	Flood Detention
7022.2	113.30			603.56 AC. FT.
		Total available capacity:	**1,298.92**	

Source: Wyoming State Engineer's Office Permit No. 6837R drawings.

Figure 2.6.27 provides the Wyoming State Engineer’s Office (SEO) permit application Teton Reservoir cross section.

Figure 2.6.28 provides the Wyoming State Engineer’s Office (SEO) permit application Teton Reservoir dam profile.

Figure 2.6.29 provides the Wyoming State Engineer’s Office (SEO) permit application Teton Reservoir spillway cross section.

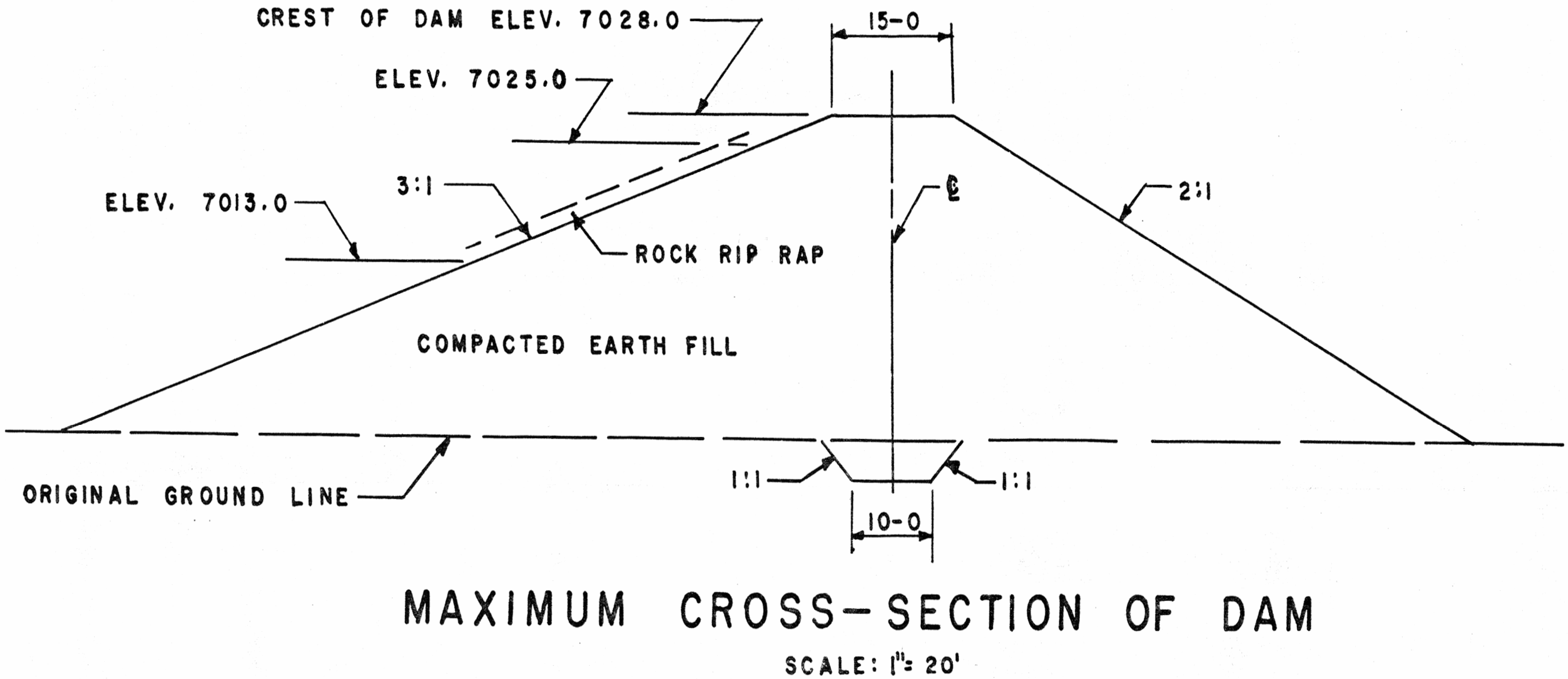


Figure 2.6.27
Wyoming State Engineer's Office (SEO) permit application cross section – Teton Reservoir
Source: SEO permit drawing
Title: Map to Accompany Application for Teton Reservoir
Permit No.(s): 6837 Res.
Filing Date: May 19, 1966

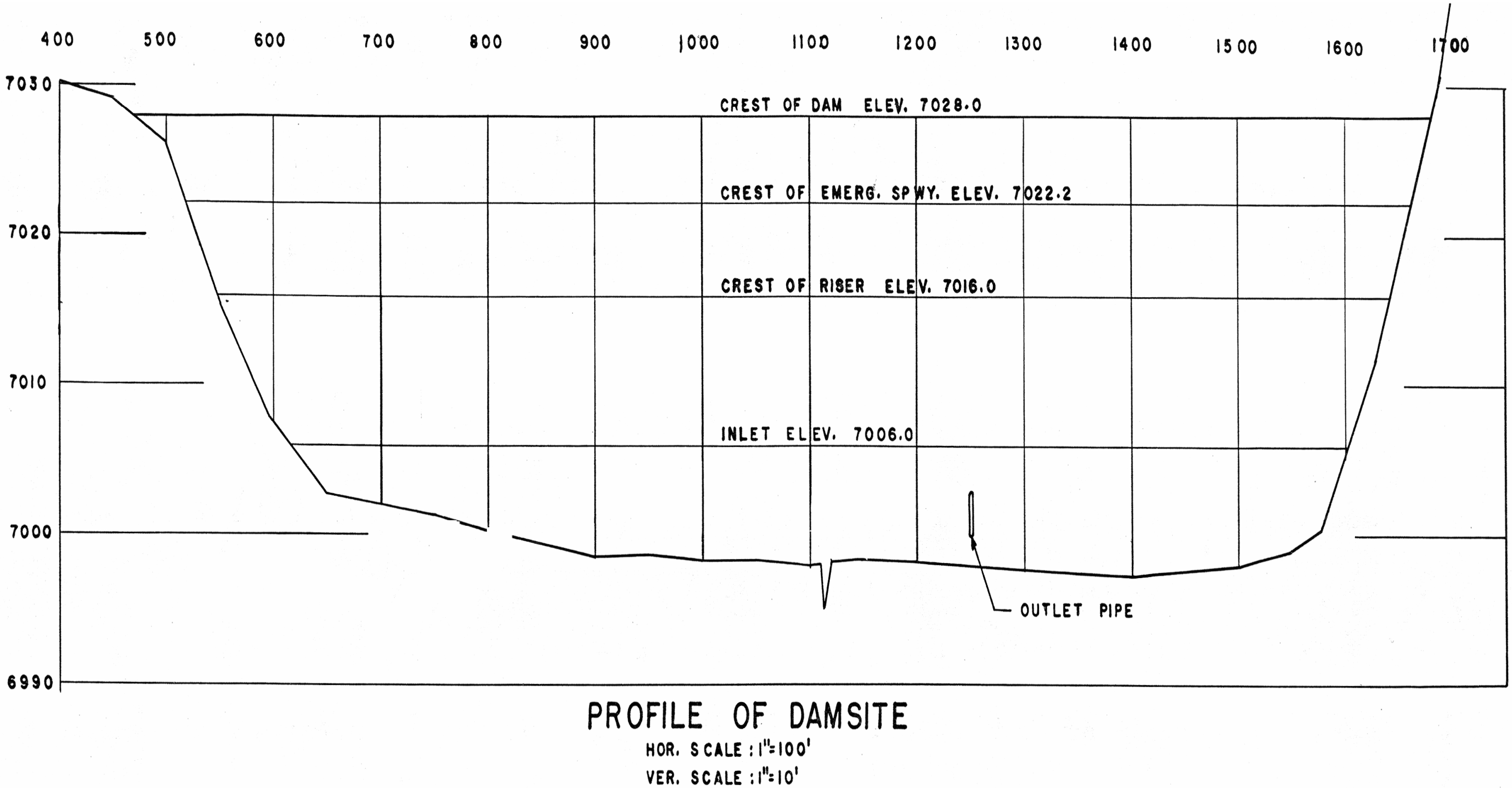


Figure 2.6.28

Wyoming State Engineer's Office (SEO) permit application dam profile – Teton Reservoir

Source: SEO permit drawing

Title: Map to Accompany Application for Teton Reservoir

Permit No.(s): 6837 Res.

Filing Date: May 19, 1966

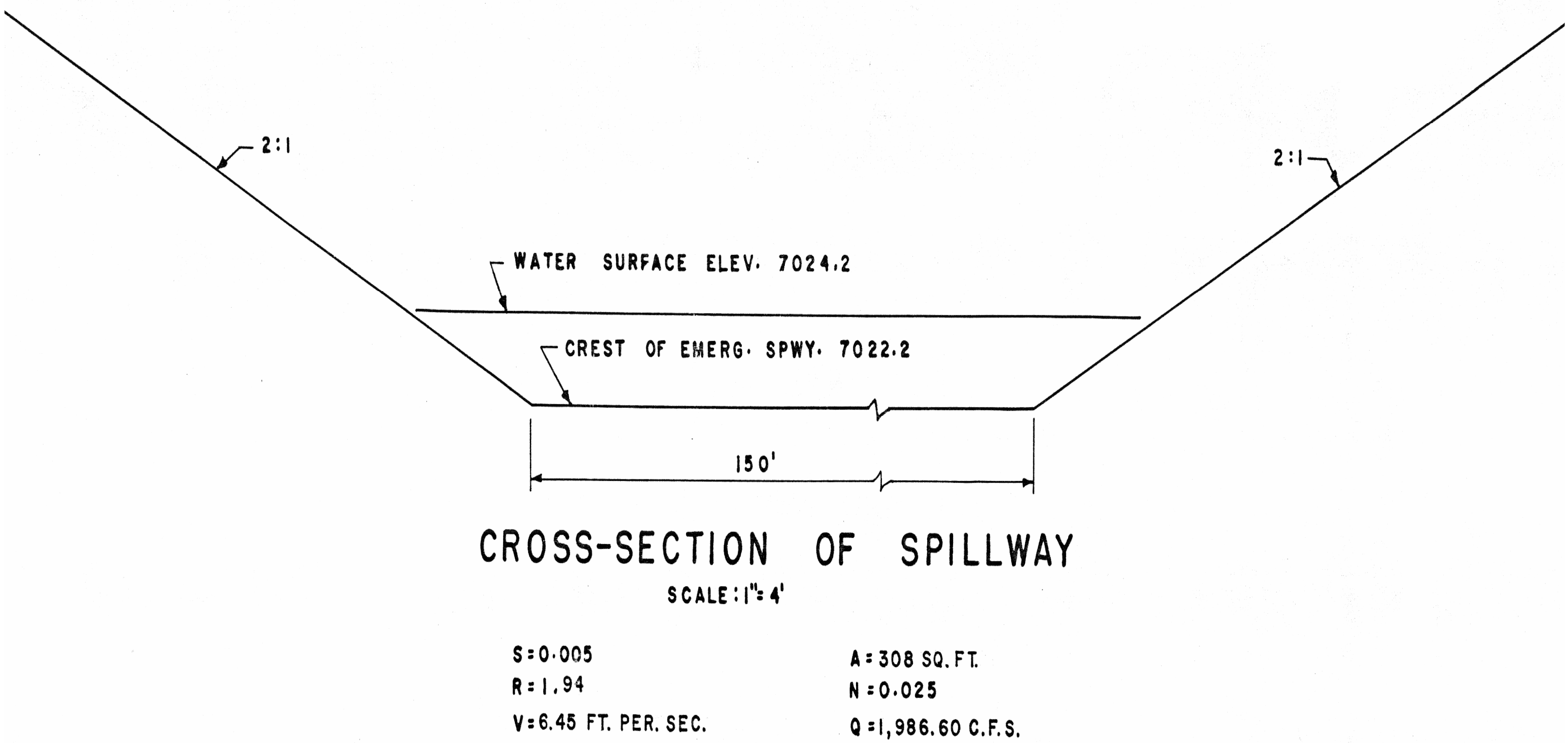


Figure 2.6.29
Wyoming State Engineer's Office (SEO) permit application spillway cross section – Teton Reservoir
Source: SEO permit drawing
Title: Map to Accompany Application for Teton Reservoir
Permit No.(s): 6837 Res.
Filing Date: May 19, 1966

Table 2.6.37 Summary - locations of major reservoirs in the Above Pathfinder subbasin

Structure number	Permit number	Reservoir name	Township	Range	Section	Qtr qtr	Nearest city	County
1	P6536R	Rob Roy Reservoir	14	79	9	SENE	Encampment	Albany
	P6888R	Rob Roy Reservoir, Enl.	14	79	9	SENE	Encampment	Albany
	P8444R	Rob Roy Reservoir, 2nd Enl.	14	79	9	SENE	Encampment	Albany
2	P7235R	Hog Park Reservoir	12	84	5	SWSE	Encampment	Carbon
	P8455	Hog Park Reservoir, Enlargement	12	84	5	SWSE	Encampment	Carbon
3	P9695R	Area 2/8 Reclamation Reservoir	28	78	28	SWSW	Shirley Basin	Carbon
4	P8459R	Area 3 Reclamation	28	78	26	SWSE	Shirley Basin	Carbon
	P9696R	Area 3 Reclamation Reservoir, Enl.	28	78	26	SWSE	Shirley Basin	Carbon
5	P7677R	No. 4 Evaporation Reservoir	28	78	27	SENW	Shirley Basin	Carbon
6	P2787R	Johnson Reservoir	18	87	21	SESE	Rawlins	Carbon
7	P634R	Pierce Reservoir	20	77	19	NESE	Rock River	Carbon
	P2407R	Pierce Reservoir, Enl.	20	77	19	NESE	Rock River	Carbon
8	P6394R	Upper Rock Creek Reservoir	30	100	27	NWNE	none in basin	Fremont
	P6497R	Upper Rock Creek Reservoir, 1st Enl.	30	100	27	NWNE	none in basin	Fremont
9	P6083R	Bosler Reservoir	19	77	18	SESW	Rock River	Carbon
	P8211R	Bosler Reservoir, Enl.	19	77	18	SESW	Rock River	Carbon
10	P5706R	Saratoga Reservoir	17	84	1	SENE	Saratoga	Carbon
	P7297R	Saratoga Reservoir, Enl.	17	84	1	SENE	Saratoga	Carbon
11	P7863R	Green Mountain Mine Reservoir	27	92	2	NENE	none in basin	Fremont
12	P6155R	Turpin Park Reservoir	17	80	16	SESE	Saratoga	Carbon
13	P6837R	Teton Reservoir	19	88	24	NESW	Rawlins	Carbon
14	P6136R	Sand Lake Reservoir	17	79	16	NWNE	Saratoga	Carbon

Source: Wyoming State Engineer's Office.

Table 2.6.38 Summary - permitted capacities of major reservoirs in the Above Pathfinder subbasin

Structure number	Permit number	Reservoir name	Active capacity acre-feet	Inactive capacity acre-feet	Enlargement capacity acre-feet	Total capacity acre-feet
1	P6536R	Rob Roy Reservoir				5,489.20
	P6888R	Rob Roy Reservoir, Enl.	8,240.62	653.79	3,405.21	8,894.41
	P8444R	Rob Roy Reservoir, 2nd Enl.	34,780.13	653.79	26,539.51	35,433.92
2	P7235R	Hog Park Reservoir				2,972.30
	P8455R	Hog Park Reservoir, Enlargement			19,683.92	22,656.22
3	P9695R	Area 2/8 Reclamation Reservoir		13,213.80		13,213.80
4	P8459R	Area 3 Reclamation		5,041.93		5,041.93
	P9696R	Area 3 Reclamation Reservoir, Enl.		5,350.93	309.00	5,350.93
5	P7677R	No. 4 Evaporation Reservoir		3,913.30		3,913.30
6	P2787R	Johnson Reservoir				3,818.17
7	P634R	Pierce Reservoir				
	P2407R	Pierce Reservoir, Enl.				
8	P6394R	Upper Rock Creek Reservoir				1,457.50
	P6497R	Upper Rock Creek Reservoir, 1st Enl.			1,342.30	2,799.80
9	P6083R	Bosler Reservoir				1,753.69
	P8211R	Bosler Reservoir, Enl.			212.83	1,966.52
10	P5706R	Saratoga Reservoir		68.66		810.51
	P7297R	Saratoga Reservoir, Enl.		68.66	748.89	1,559.40
11	P7863R	Green Mountain Mine Reservoir		1,382.00		1,382.00
12	P6155R	Turpin Park Reservoir				
13	P6837R	Teton Reservoir				1,298.70
14	P6136R	Sand Lake Reservoir				

Source: Wyoming State Engineer's Office.

Table 2.6.39 Summary - permitted beneficial uses of major reservoirs in the Above Pathfinder subbasin

Structure number	Permit number	Reservoir name	Applicant name	Priority date	Source	Use
1	P6536R	Rob Roy Reservoir	Cities of Laramie and Cheyenne	6/2/1955	Douglas Creek	Municipal, industrial, irrigation
	P6888R	Rob Roy Reservoir, Enl.	of Laramie, WY	1/4/1967	Douglas Creek	
	P8444R	Rob Roy Reservoir, 2nd Enl.	City of Cheyenne, Board of Public Utilities	4/16/1979	Douglas Creek	
2	P7235R	Hog Park Reservoir	City of Cheyenne	8/26/1964	Hog Park Creek	Industrial, irrigation, municipal, erosion, fish propagation, flood control
	P8455R	Hog Park Reservoir, Enlargement	City of Cheyenne	6/11/1979	Little Snake River	Industrial, irrigation, municipal
3	P9695R	Area 2/8 Reclamation Reservoir	Pathfinder Mines Corporation	11/21/1991	Moss Agate Draw	Wildlife, stock
4	P8459R	Area 3 Reclamation	Pathfinder Mines Corporation	10/27/1981	Spring Creek drainage	Livestock, wildlife watering
	P9696R	Reservoir, Enl.	Pathfinder Mines Corporation	11/21/1991		
5	P7677R	No. 4 Evaporation Reservoir	Pathfinder Mines Corporation	7/28/1975	Mine Creek	Evaporation of plant effluent
6	P2787R	Johnson Reservoir	LLC	12/26/1914	Creek	Irrigation
7	P634R	Pierce Reservoir	Rock Creek Conservation Company	2/20/1905	Dry Creek	Irrigation, stock, domestic
	P2407R	Pierce Reservoir, Enl.		10/14/1912	Rock Creek	
8	P6394R	Upper Rock Creek Reservoir	VA Resources, LLC	11/19/1956	Rock Creek	Industrial, domestic, municipal, railroad, power development
	P6497R	Upper Rock Creek Reservoir, 1st Enl.	VA Resources, LLC	7/18/1958	Rock Creek	
9	P6083R	Bosler Reservoir	Wheatland Irrigation District (as successor to N Cross Ranch, Inc., original appropriator)	11/30/1953	Bosler Slough	Recreation, fish propagation, stock
	P8211R	Bosler Reservoir, Enl.	Wheatland Irrigation District	4/18/1979	Bosler Slough	
10	P5706R	Saratoga Reservoir	Town of Saratoga and Wyoming Game and Fish Commission	3/27/1950	North Platte River	Municipal, stock, recreation, fish propagation
	P7297R	Saratoga Reservoir, Enl.		10/3/1957	North Platte River	Recreation
11	P7863R	Reservoir	Kennecott Uranium Company	1/10/1977	McDraw	Wildlife preserve
12	P6155R	Turpin Park Reservoir	Kimball, Inc. d/b/a TA Ranch, Johnson's A Bar One Ranch, and Basin Ranch Co.	3/23/1937	Turpin Creek	Irrigation, stock
13	P6837R	Teton Reservoir	Bureau of Land Management	3/24/1966	Little Sage Creek	Erosion control, recreation, flood detention
14	P6136R	Sand Lake Reservoir	Wheatland Irrigation District	4/29/1954	Deep Creek	Irrigation, stock, domestic, industrial

Source: Wyoming State Engineer's Office.

Table 2.6.40 Summary - outlet works descriptions for major reservoirs in the Above Pathfinder subbasin

Structure number	Permit number	Reservoir name	Outlet works description
1	P6536R	Rob Roy Reservoir	Outlet material is rock.
	P6888R	Rob Roy Reservoir, Enl.	Outlet material is rock.
	P8444R	Rob Roy Reservoir, 2nd Enl.	Existing 42-inch diameter outlet pipe. Has a gate chamber which is 4-foot by 4-foot high. Outlet works includes a pressure gate and a 30-inch diameter steel outlet pipe to the control building.
2	P7235R	Hog Park Reservoir	
	P8455R	Hog Park Reservoir, Enlargement	
3	P9695R	Area 2/8 Reclamation Reservoir	
4	P8459R	Area 3 Reclamation	
	P9696R	Area 3 Reclamation Reservoir, Enl.	
5	P7677R	No. 4 Evaporation Reservoir	
6	P2787R	Johnson Reservoir	
7	P634R	Pierce Reservoir	
	P2407R	Pierce Reservoir, Enl.	3-foot diameter steel pipe laid on concrete base with cut-off wall of concrete.
8	P6394R	Upper Rock Creek Reservoir	The formation at the outlet consists of granite.
	P6497R	Upper Rock Creek Reservoir, 1st Enl.	The formation at the outlet consists of granite and schist with small and scattered
9	P6083R	Bosler Reservoir	
	P8211R	Bosler Reservoir, Enl.	
10	P5706R	Saratoga Reservoir	Outlet material is earth.
	P7297R	Saratoga Reservoir, Enl.	Outlet material is earth.
11	P7863R	Green Mountain Mine Reservoir	
12	P6155R	Turpin Park Reservoir	is also a reinforced concrete outlet structure. Outlet material is earth.
13	P6837R	Teton Reservoir	Outlet material is clay loam.
14	P6136R	Sand Lake Reservoir	rock.

Source: Wyoming State Engineer's Office.

Table 2.6.41 Summary - emergency spillway descriptions for major reservoirs in the Above Pathfinder subbasin

Structure number	Permit number	Reservoir name	Spillway description
1	P6536R	Rob Roy Reservoir	
	P6888R	Rob Roy Reservoir, Enl.	
	P8444R	Rob Roy Reservoir, 2nd Enl.	Spillway has an ogee crest elevation of 9,470 feet. The spillway chute is 15-feet wide by 10-feet high.
2	P7235R	Hog Park Reservoir	
	P8455R	Hog Park Reservoir, Enlargement	
3	P9695R	Area 2/8 Reclamation Reservoir	
4	P8459R	Area 3 Reclamation	
	P9696R	Area 3 Reclamation Reservoir, Enl.	
5	P7677R	No. 4 Evaporation Reservoir	Since discharge of effluent is prohibited, No. 4 Evaporation Reservoir has been designed to contain runoff in lieu of a spillway.
6	P2787R	Johnson Reservoir	
7	P634R	Pierce Reservoir	
	P2407R	Pierce Reservoir, Enl.	Spillway has a 100-foot top width, 94-foot bottom width and a 3-foot depth. The side slopes are 1:1 in earth.
8	P6394R	Upper Rock Creek Reservoir	
	P6497R	Upper Rock Creek Reservoir, 1st Enl.	Width of spillway ranges from 18-feet to 26-feet. Depth ranges from 8-feet to 9.5-feet. Flow ranges from 600 to 2200 cubic feet per second. The hydraulic properties vary due to the backwater curve when the emergency sluice gate is open.
9	P8211R	Bosler Reservoir, Enl.	
	P6083R	Bosler Reservoir	
10	P5706R	Saratoga Reservoir	The spillway is 20-feet wide with 2:1 side slopes and a maximum flow rate of 161.2 cubic feet per second.
	P7297R	Saratoga Reservoir, Enl.	A 36-inch by 48-inch corrugated metal pipe replaced the old spillway. The outlet pipe is a 24-inch corrugated metal pipe.
11	P7863R	Green Mountain Mine Reservoir	
12	P6155R	Turpin Park Reservoir	The spillway has a width of 30-feet with 2:1 side slopes and a flow of 950 cubic feet per second.
13	P6837R	Teton Reservoir	The spillway has a water surface elevation of 7,024.2 feet. The crest of the emergency spillway way is at elevation 7,022.2 feet. The flow rate through the spillway is 1,986.60 cubic feet per second.
14	P6136R	Sand Lake Reservoir	

Source: Wyoming State Engineer's Office.

2.6.5.2 Major Reservoirs in the Pathfinder to Guernsey Subbasin

The locations of major reservoirs in the Pathfinder to Guernsey Reservoir are shown on Figure 2.6.30.

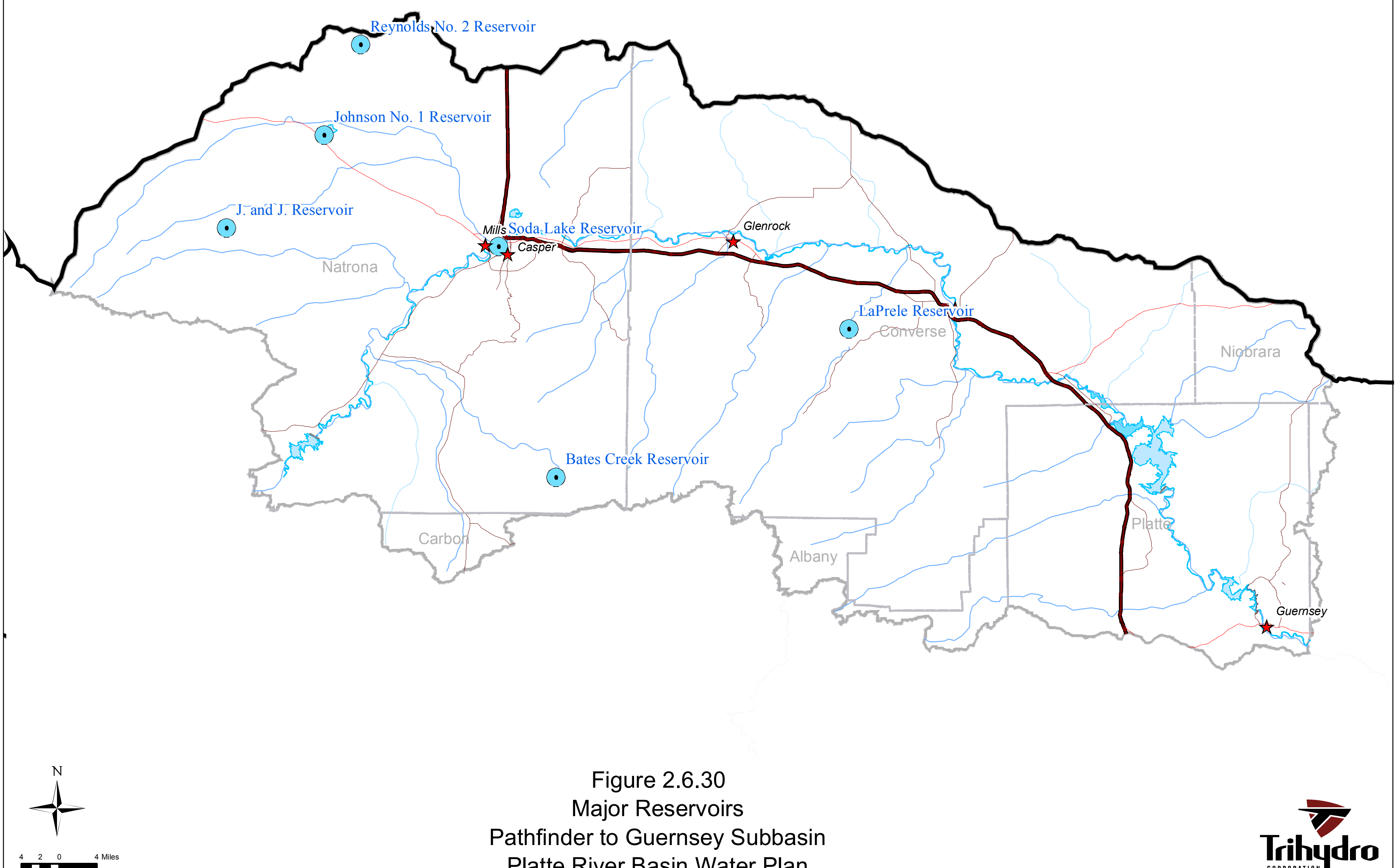


Figure 2.6.30
Major Reservoirs
Pathfinder to Guernsey Subbasin
Platte River Basin Water Plan

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LaPrele Reservoir

LaPrele Reservoir is owned by the LaPrele Irrigation District. The reservoir is located in the channel of LaPrele Creek and has an adjudicated capacity of 20,000 acre-feet. The permitted uses of the reservoir are irrigation, domestic, and industrial. The reservoir outlet consists of three 3-foot diameter pipes. The spillway is 50 feet wide.

Table 2.6.42 provides a summary of LaPrele Reservoir monthly releases obtained from annual hydrographer's reports.

Table 2.6.42 Summary - historic LaPrele Reservoir end of month storage and monthly releases

End of month storage (recorded randomly and intermittently during the month - table shows last of several monthly values, acre-feet)											
Month	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Oct	4,962	1,158	--	1,586	8,584	4,736	10,870	5,768	8,049	7,870	5768
Nov	--	1,329	--	1,699	10,464	--	11,275	8,940	8,227	--	5768
Dec	5,767	1,699	--	1,925	11,275	6,619	11,680	9,654	8,584	--	6,306
Jan	--	2,038	--	2,300	12,373	7,244	11,680	10,464	9,297	9,297	6,932
Feb	--	--	--	2,745	12,604	8,940	12,373	--	9,654	9,654	7,244
Mar	7,244	3,456	--	3,081	13,528	11,275	15,036	12,373	10,464	10,464	7,557
Apr	8,226	7,870	--	3,081	18,955	18,074	18,368	19,542	16,083	16,343	7,870
May	3,456	18,368	--	19,542	19,542	19,542	13,990	--	19,542	17,193	7,557
Jun	1,925	18,954	--	--	15,560	19,542	12,604	19,542	17,780	14,773	2,151
Jul	2,038	16,082	--	16,606	13,066	14,513	6,306	16,083	11,680	10,059	636
Aug	1,699	8,584	--	10,870	6,619	11,275	4,736	9,297	8,227	6,619	485
Sep	1,244	6,618	--	8,227	4,736	10,870	4,510	7,870	7,557	5,768	390
Carryover	1,244	6,618			4,736	10,870	4,510	7,870	7,557	5,768	--
Monthly release (acre-feet)											
Month	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Mar	0	0	--	--	0	--	0	0	0	0	0
Apr	0	0	--	--	0	--	0	0	0	0	267
May	4,770	0	--	--	0	--	4,738	0	0	1,175	313
Jun	1,531	1,176	--	--	3,982	--	1,386	0	1,762	2,420	5407
Jul	339	2,872	--	--	2,494	5,029	6,298	3,459	6,100	4,714	1563
Aug	226	7,498	--	--	6,447	3,238	1,570	6,786	3,453	3,753	103
Sep	455	1,966	--	--	1,883	405	226	1,427	670	538	95
Source: 1992 - 2002 Wyoming State Engineer's Office Annual Hydrographer's Reports.											

Johnson No. 1 Reservoir

Permitted for stock, domestic, and engine purposes, Johnson No. 1 Reservoir has an adjudicated capacity of 11,865 acre-feet. The reservoir is filled via Middle Fork Casper Creek and Supply No. 2 Ditch and via Tie Bridge Gulch through Supply No. 1 Ditch.

Figure 2.6.31 provides the Wyoming State Engineer's Office (SEO) permit application Johnson No. 1 Reservoir dam cross section.

Figure 2.6.32 provides the Wyoming State Engineer's Office (SEO) permit application Johnson No. 1 Reservoir dam profile.

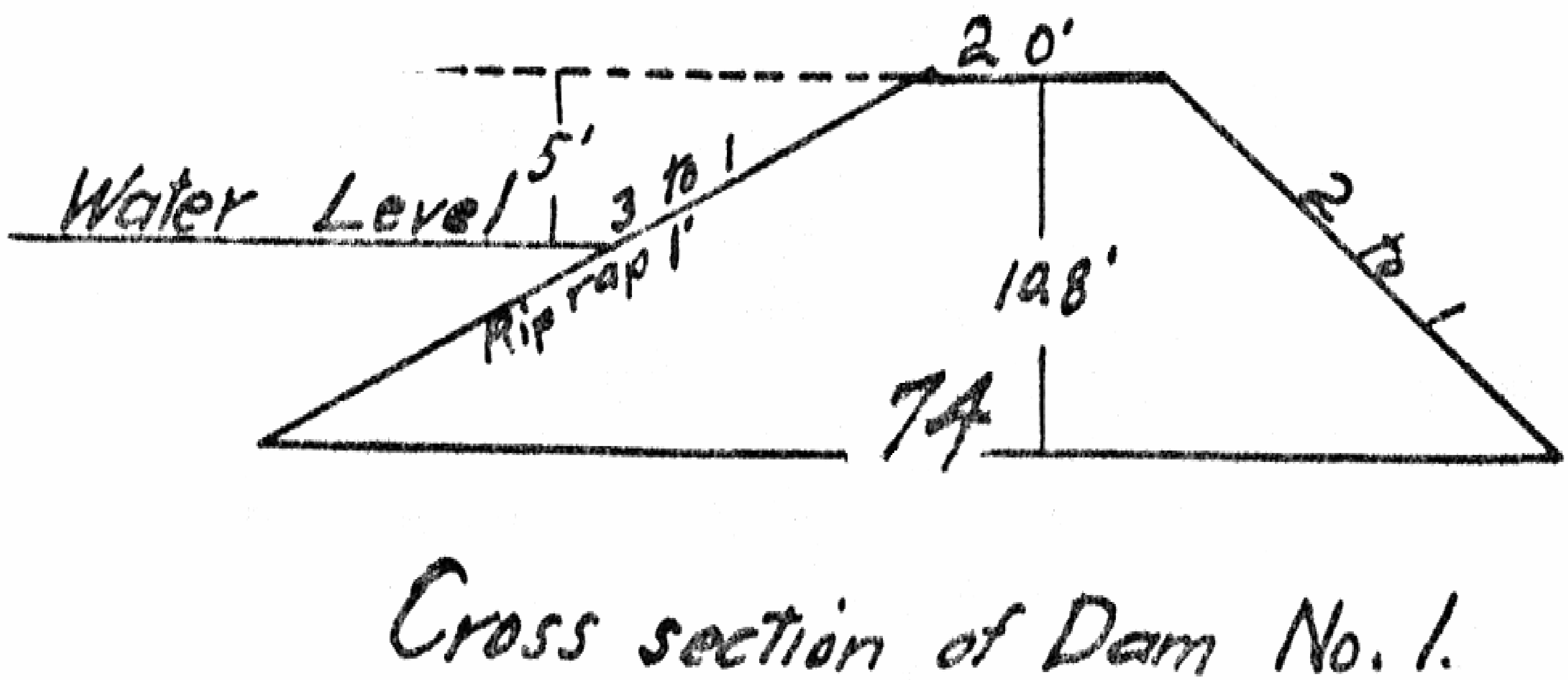


Figure 2.6.31
Wyoming State Engineer's Office (SEO) permit application cross section – Johnson No.1 Reservoir
Source: SEO permit drawing
Title: Map of Reservoir No.1 Johnson Land and Irrigation Company
Permit No.(s): 1708 Res.
Filing Date: Unknown

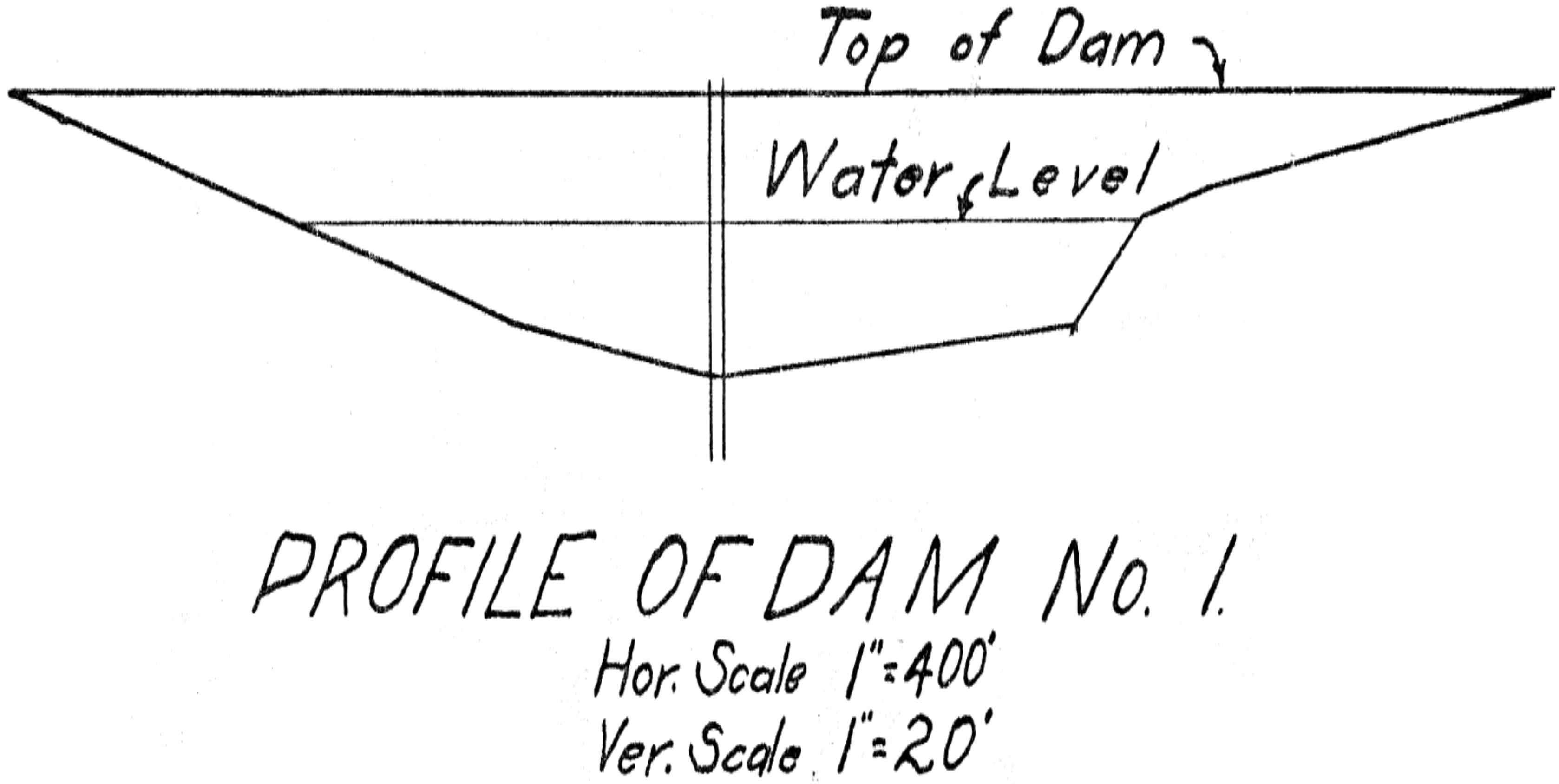


Figure 2.6.32
Wyoming State Engineer's Office (SEO) permit application dam profile – Johnson No. 1 Reservoir
Source: SEO permit drawing
Title: Map of Reservoir No.1 Johnson Land and Irrigation Company
Permit No.(s): 1708 Res.
Filing Date: Unknown

Soda Lake Reservoir

Soda Lake is located in Natrona County and is owned by Amoco Oil Company. The reservoir is adjudicated for industrial pollution control and remediation and has an adjudicated capacity of 8,815 acre-feet. The reservoir holds waste process water containing chemicals and/or oil to prevent pollution of the North Platte River. The structure is used as a retention structure, so no water leaves the reservoir.

Table 2.6.43 provides the Wyoming State Engineer's Office (SEO) permit application Soda Lake Reservoir area capacity table.

Table 2.6.43 Wyoming State Engineer's Office (SEO) permit application area capacity table - Soda Lake Reservoir

Contour	Area	Average	Capacity in acre-feet
		62.5	125
5170	125		
		152	760
5175	182		
		257	1,285
5180	332		
		511	2,555
5185	689		
		818	4,090
5190	947		
		Total available capacity:	**8,815 acre-feet**
Source: Wyoming State Engineer's Office Permit No. 6279R drawings.			

Figure 2.6.33 provides the Wyoming State Engineer's Office (SEO) permit application Soda Lake Reservoir dam cross section.

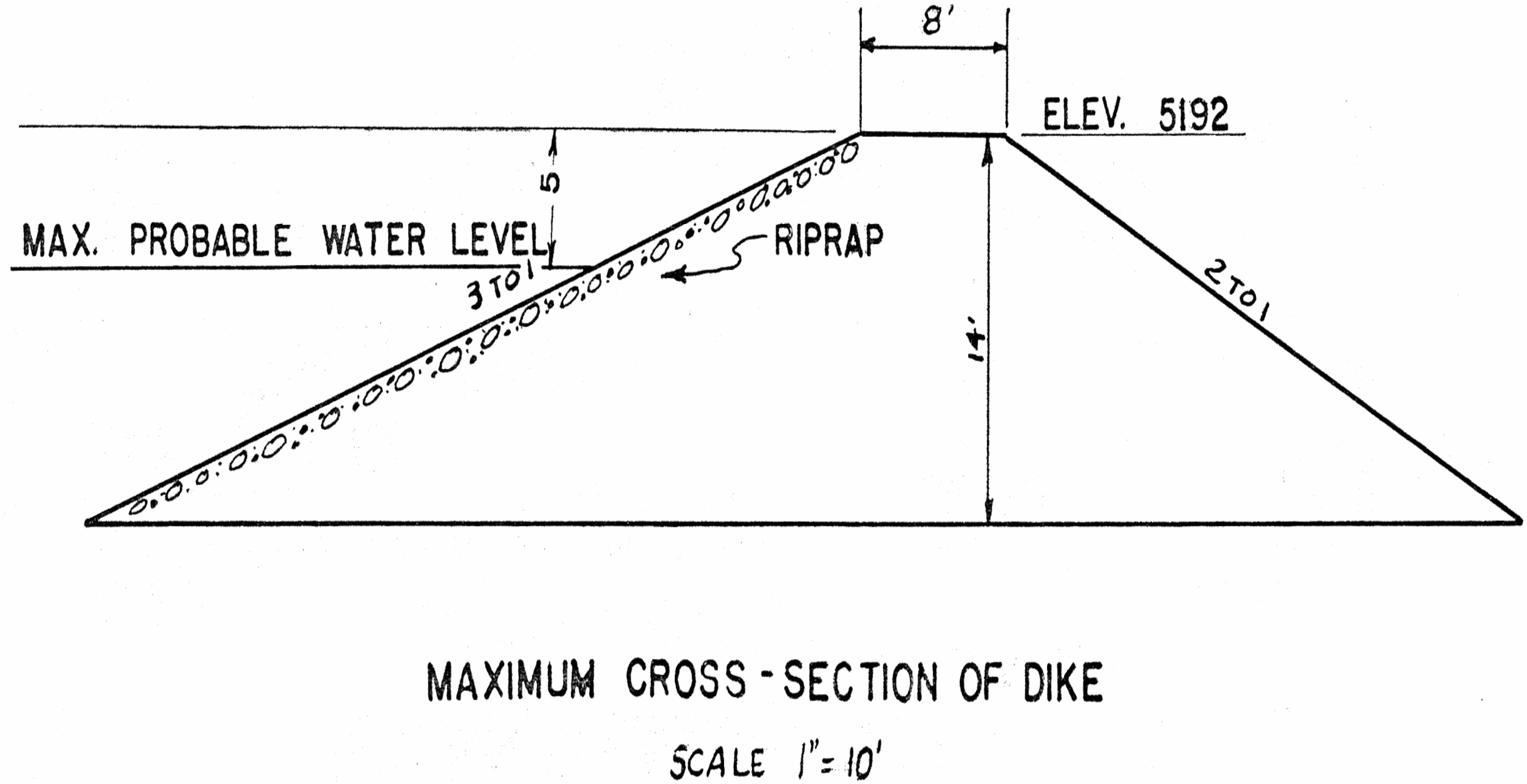


Figure 2.6.33
Wyoming State Engineer's Office (SEO) permit application cross section – Soda Lake Reservoir
Source: SEO permit drawing
Title: Map to Accompany Application for Soda Lake Reservoir
Permit No.(s): 6279 Res.
Filing Date: February 8, 1956

Bates Creek Reservoir

Permitted for irrigation use, Bates Creek Reservoir has a permitted capacity of 4,717 acre-feet. The reservoir is located in the channel of the Dry Fork Bates Creek, which is an ephemeral stream. The reservoir also receives a supply from Bates Creek through the Bates Creek Reservoir Co. Inlet Ditch. The dam outlet consists of a 24-inch diameter concrete pipe, and the spillway is 200 feet wide.

Table 2.6.44 provides the Wyoming State Engineer's Office (SEO) permit application Bates Creek Reservoir area capacity table.

Table 2.6.44 Wyoming State Engineer's Office (SEO) permit application area capacity table - Bates Creek Reservoir Enlargement

Elevation (assumed)	Area in acres	Acre-feet	Acre-feet
6982	2		
		2	2
83	2		
		2.5	4.5
84	3		
		3.5	8
85	4		
		4.5	12.5
86	5		
		10	22.5
87	15		
		23	45.5
88	31		
		50	95.5
89	69		
		96.5	192
90	124		
		156	348
91	188		
		219	567
92	250		
		288.5	855.5
93	327		
		359	1214.5
94	391		
		458	1672
95	525		
		586.5	2259
96	648		
		706.5	2965.5
97	765		
		820	3785.5
98	875		
		932	4717.5
99	989		
		Under this enlargement:	**1605 acre-feet**
Source: Wyoming State Engineer's Office Permit No. 5144R drawings.			

Figure 2.6.34 provides the Wyoming State Engineer's Office (SEO) permit application Bates Creek Reservoir dam cross section.

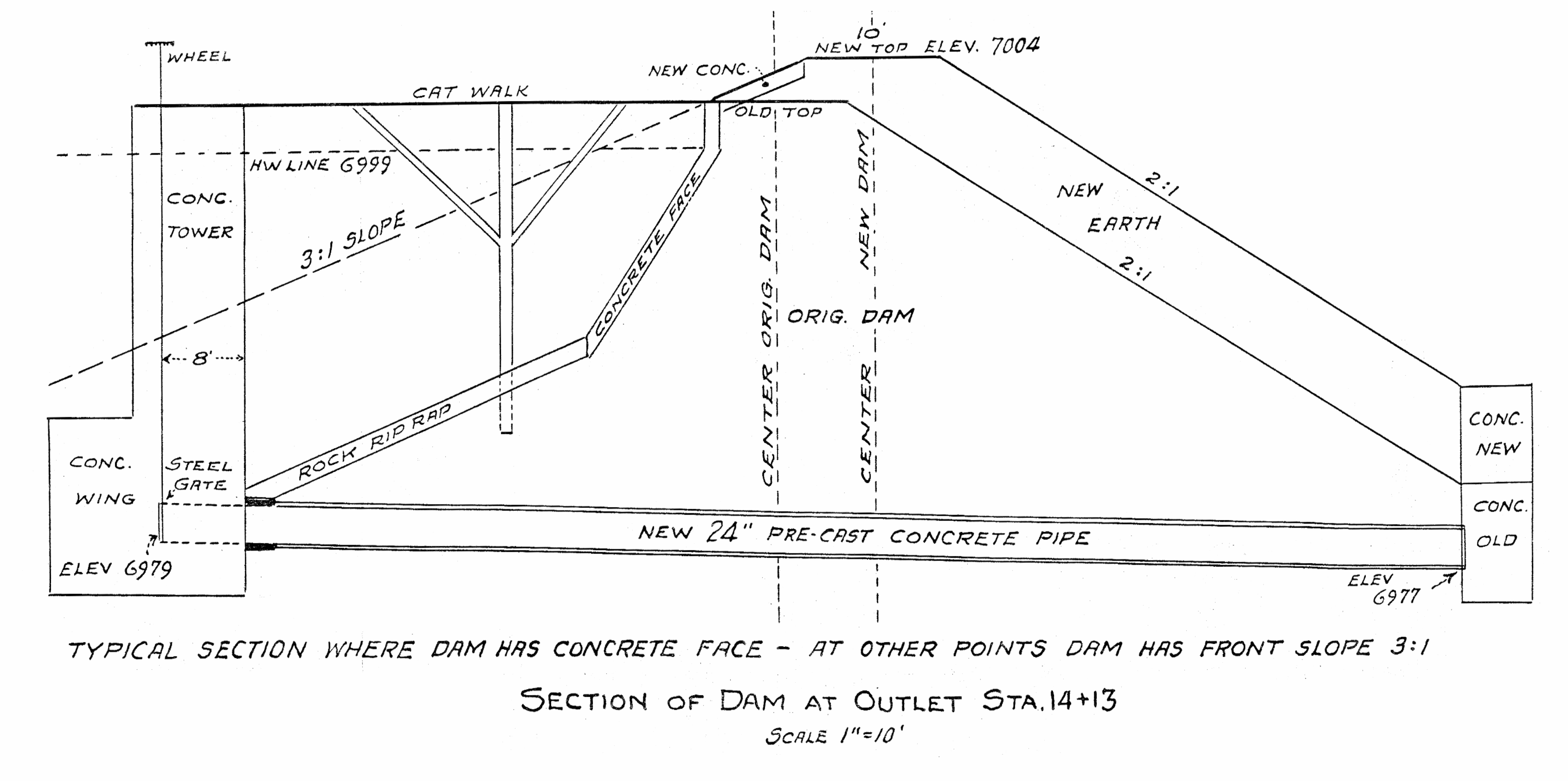


Figure 2.6.34

Wyoming State Engineer's Office (SEO) permit application cross section – Bates Creek Reservoir

Source: SEO permit drawing

Title: Map to Accompany Application for Enlargement of Bates Creek Reservoir and Inlet Ditch

Permit No.(s): 5209 Enl., 5144 Res.

Filing Date: October 20, 1939

J. and J. Reservoir

J. and J. Reservoir is located in Natrona County and is permitted for irrigation. This reservoir has a permitted capacity of 1,423.1 acre-feet. The reservoir is filled through the J. and J. Supply Ditch Canal. The reservoir spillway is 152 feet wide.

Table 2.6.45 provides the Wyoming State Engineer's Office (SEO) permit application J. and J. Reservoir area capacity table.

Table 2.6.45 Wyoming State Engineer's Office (SEO) permit application area capacity table - J. and J. Reservoir

Contour	Area	Average	Acre-feet
0	9.30		
		19.95	99.70
5	30.60		
		42.45	212.20
10	54.30		
		81.45	401.20
15	108.60		
		140.80	704.00
20	173.00		
		Total:	**1423 acre-feet**
Source: Wyoming State Engineer's Office Permit No. 5199R drawings.			

Figure 2.6.35 provides the Wyoming State Engineer's Office (SEO) permit application J. and J. Reservoir dam cross section and profile.

Figure 2.6.36 provides the Wyoming State Engineer's Office (SEO) permit application J. and J. Reservoir spillway cross section.

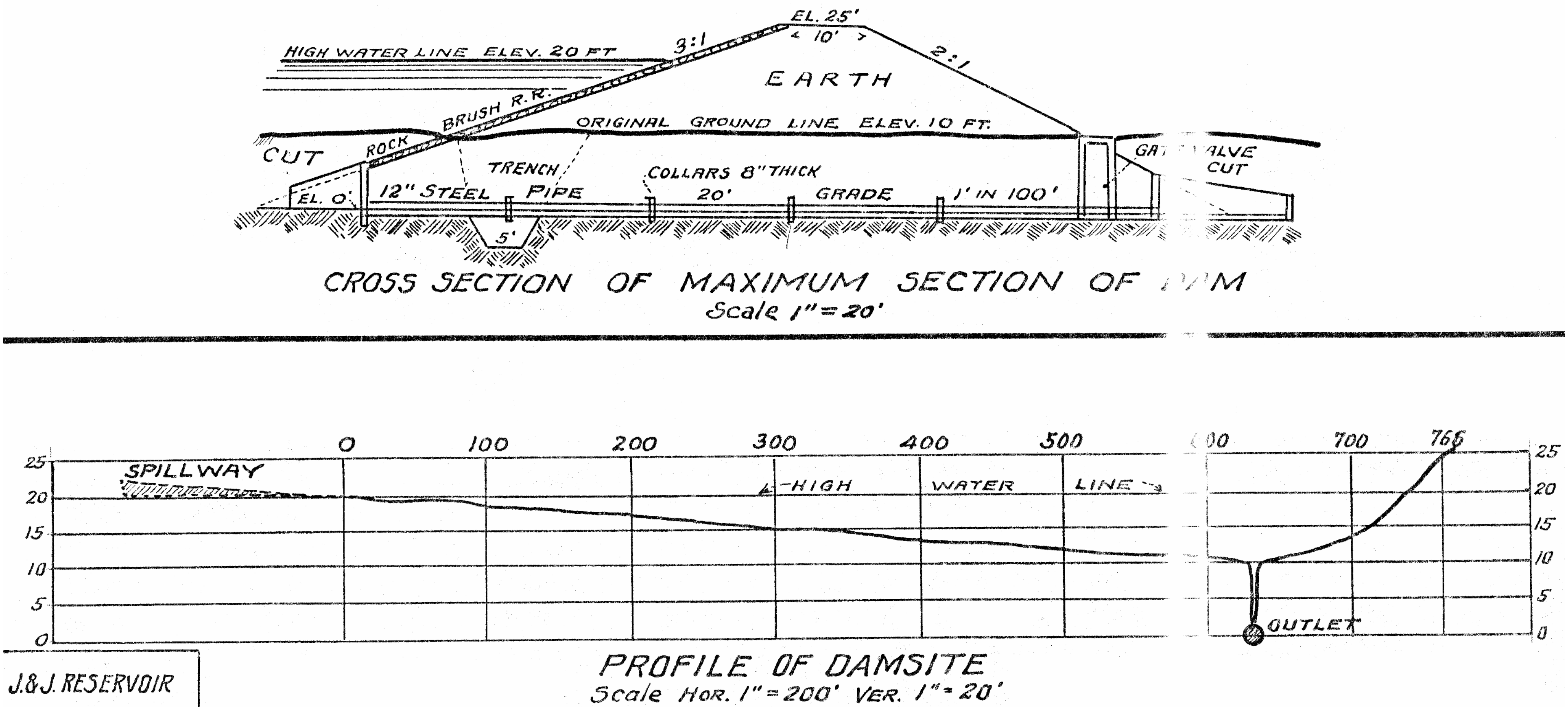


Figure 2.6.35

Wyoming State Engineer's Office (SEO) permit application cross section and dam profile – J. and J. Reservoir

Source: SEO permit drawing

Title: Map to Accompany Application for J. and J. Reservoir and Supply and Outlet Ditches

Permit No.(s): 5199 Res., 19273, 19274

Filing Date: November 25, 1939

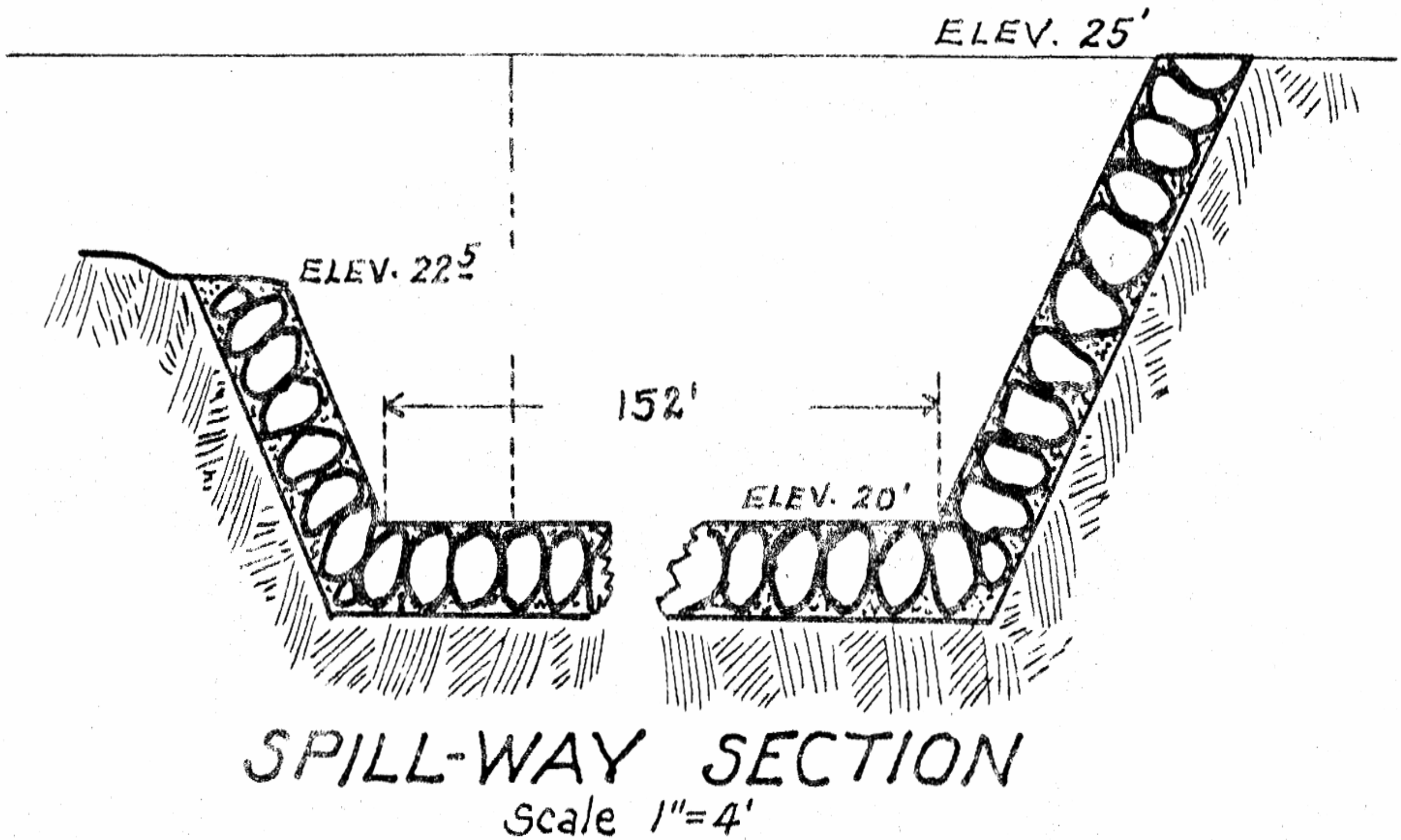


Figure 2.6.36
Wyoming State Engineer's Office (SEO) permit application spillway cross section – J. and J. Reservoir
Source: SEO permit drawing
Title: Map to Accompany Application for J. and J. Reservoir and Supply and Outlet Ditches
Permit No.(s): 5199 Res., 19273, 19274
Filing Date: November 25, 1939

Reynolds No. 2 Reservoir

Reynolds No. 2 Reservoir is permitted for irrigation and stock water. The total permitted reservoir capacity is 1,008 acre-feet, and the reservoir surface area is 168 acres. The dam has two 6-inch diameter iron pipe outlets. Two spillways are located at the reservoir, one at each end of the dam, and each is 50 feet wide.

Tables 2.6.46 through 2.6.50 provide an overview of the Wyoming State Engineer's Office (SEO) permit application information for major reservoirs in the Above Pathfinder subbasin.

Table 2.6.46 Summary - locations of major reservoirs in the Pathfinder to Guernsey subbasin

Structure number	Permit number	Reservoir name	Township	Range	Section	Qtr qtr	Nearest city	County
1	P728R	LaPrele Reservoir	32	73	21	SESW	Douglas	Converse
	P1581R	LaPrele Reservoir, Enl.	32	73	21	SESW	Douglas	Converse
2	P1708R	Johnson No. 1 Reservoir	35	82	7	SWSE	Casper	Natrona
3	P6279R	Soda Lake Reservoir	34	79	22	SESE	Casper	Natrona
4	P549R	Bates Creek Reservoir	29	78	17	NENW	Casper	Natrona
	P5144R	Bates Creek Reservoir, Enl.	29	78	17	NENW	Casper	Natrona
5	P5199R	J. and J. Reservoir	33	84	4	NENW	Casper	Natrona
6	P1067R	Reynolds No. 2 Reservoir	37	82	26	NENE	none in basin	Natrona

Source: Wyoming State Engineer's Office.

Table 2.6.47 Summary - permitted capacities of major reservoirs in the Pathfinder to Guernsey subbasin

Structure number	Permit number	Reservoir name	Active capacity acre-feet	Inactive capacity acre-feet	Enlargement capacity acre-feet	Total capacity acre-feet
1	P728R	LaPrele Reservoir				15,106.0
	P1581R	LaPrele Reservoir, Enl.			4,894.0	20,000.0
2	P1708R	Johnson No. 1 Reservoir				11,865.0
3	P6279R	Soda Lake Reservoir				8,815.0
4	P549R	Bates Creek Reservoir				3,112.0
	P5144R	Bates Creek Reservoir, Enl.			1,605.0	4,717.0
5	P5199R	J. and J. Reservoir				1,423.1
6	P1067R	Reynolds No. 2 Reservoir				1,008.0
Source: Wyoming State Engineer's Office.						

Table 2.6.48 Summary - permitted beneficial uses of major reservoirs in the Pathfinder to Guernsey subbasin

Structure number	Permit number	Reservoir name	Applicant name	Priority date	Source	Use
1	P728R	LaPrele Reservoir	LaPrele Irrigation District	9/21/1905	LaPrele Creek	Irrigation, domestic, industrial
	P1581R	LaPrele Reservoir, Enl.	LaPrele Irrigation District	7/7/1909	LaPrele Creek	
2	P1708R	Johnson No. 1 Reservoir	Chicago, Burlington & Quincy Railroad Company	10/11/1909	Middle Fork Casper Creek	Stock, domestic, engine purposes
3	P6279R	Soda Lake Reservoir	Amoco Oil Company	1/20/1956	North Platte River	Industrial, pollution control, and remediation
4	P549R	Bates Creek Reservoir	Bates Creek Reservoir Company	2/16/1904	Dry Fork Bates Creek	Irrigation
	P5144R	Bates Creek Reservoir, Enl.	Bates Creek Reservoir Company	9/29/1939		Irrigation
5	P5199R	J. and J. Reservoir	Laurence L. Jemson/James B. Grieve/Diamond Ring Company	10/19/1939	Poison Spider Creek	Irrigation
6	P1067R	Reynolds No. 2 Reservoir	George & Cora B. Reynolds	6/27/1907	Shalerock Draw	Stock, irrigation

Source: Wyoming State Engineer's Office.

Table 2.6.49 Summary - outlet works descriptions for major reservoirs in the Pathfinder to Guernsey subbasin

Structure number	Permit number	Reservoir name	Outlet works description
1	P728R	LaPrele Reservoir	The outlet consists of three 3-foot pipes. The outlet material is sandstone and limestone.
	P1581R	LaPrele Reservoir, Enl.	The outlet consists of four steel gates 5-feet in diameter. The outlet material is solid granite.
2	P1708R	Johnson No. 1 Reservoir	The outlet is either a concrete-lined tunnel 5.82-feet by 4.5-feet inside or a cut and concrete outlet under Dam No. 2, which is a 4-foot by 8-foot concrete conduit. The outlet material is clay earth and shale.
3	P6279R	Soda Lake Reservoir	
4	P549R	Bates Creek Reservoir	The outlet pipe is a 24-inch precast concrete pipe. The outlet material is earth.
	P5144R	Bates Creek Reservoir, Enl.	
5	P5199R	J. and J. Reservoir	The outlet material is good soil.
6	P1067R	Reynolds No. 2 Reservoir	The outlet consists of two 6-inch iron pipes with valves. The outlet material is loam with clay subsoil.

Source: Wyoming State Engineer's Office.

Table 2.6.50 Summary - emergency spillway descriptions for major reservoirs in the Pathfinder to Guernsey subbasin

Structure number	Permit number	Reservoir name	Spillway description
1	P728R	LaPrele Reservoir	The spillway is 100-feet long by 3-feet deep through solid rock.
	P1581R	LaPrele Reservoir, Enl.	The spillway is composed of five sections, each 4-feet high by 17-feet wide. The total width of the spillway is 85-feet.
2	P1708R	Johnson No. 1 Reservoir	The spillway is a natural spillway 300-feet wide.
3	P6279R	Soda Lake Reservoir	
4	P5144R	Bates Creek Reservoir, Enl.	
	P549R	Bates Creek Reservoir	
5	P5199R	J. and J. Reservoir	The spillway is 152-feet wide on bottom, surrounded by rock.
6	P1067R	Reynolds No. 2 Reservoir	The spillway is composed of two spillways - one at each end of the dam. The spillways were excavated from the solid earth and are 50-feet wide on the bottom.

Source: Wyoming State Engineer's Office.

2.6.5.3 Major Reservoirs in the Guernsey to State Line Subbasin

The locations of major reservoirs in the Guernsey to State Line subbasin are shown on Figure 2.6.37.

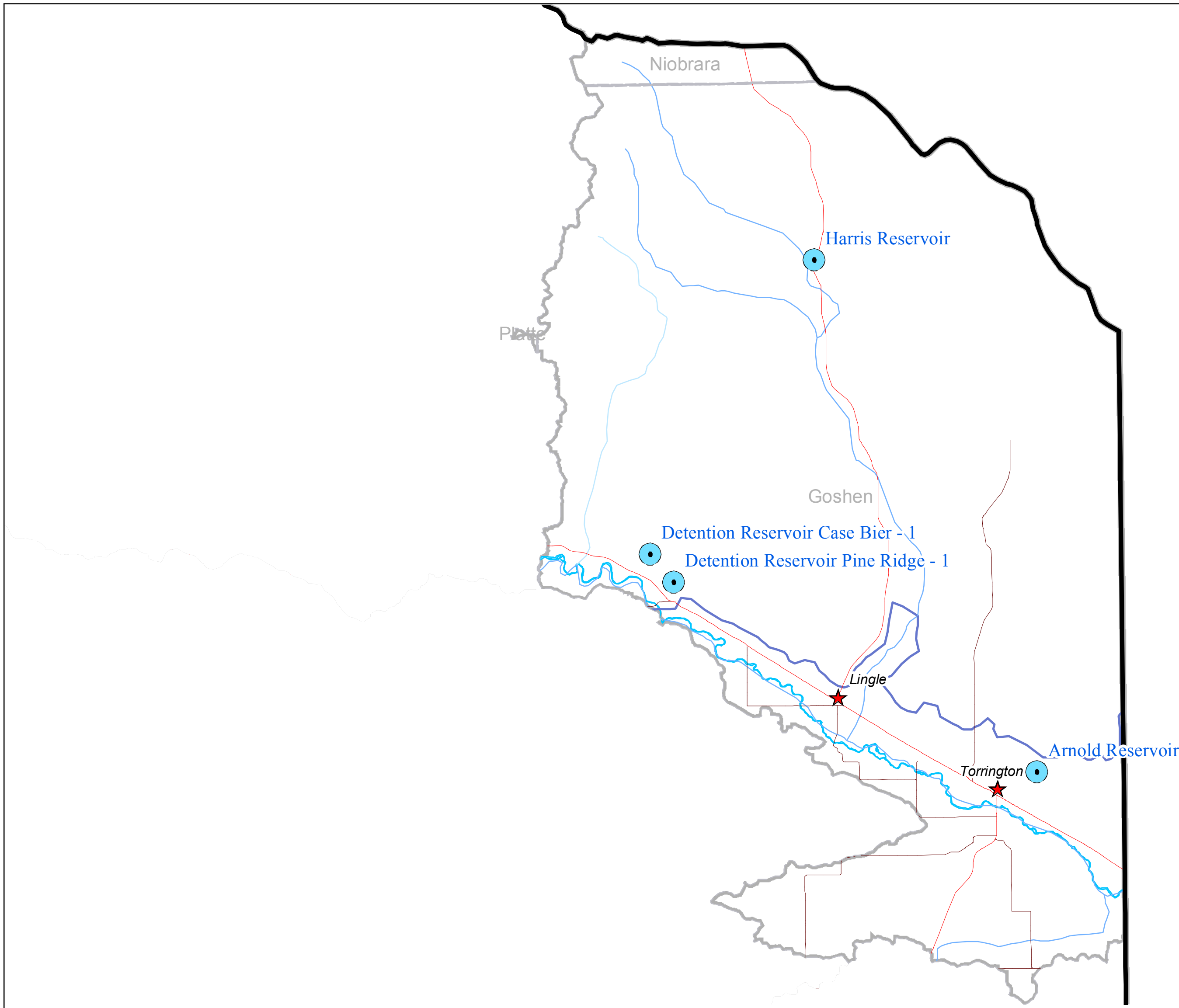


Figure 2.6.37
Major Reservoirs
Guernsey to State Line Subbasin
Platte River Basin Water Plan

Trihydro CORPORATION

Detention Reservoir Pine Ridge – 1

The Detention Reservoir Pine Ridge – 1 is permitted for flood control purposes only. The reservoir is located in the channel of Eaton Draw and has a permitted capacity of 2,207.72 acre-feet. The reservoir has an emergency spillway at invert elevation 4,325 feet.

Table 2.6.51 provides the Wyoming State Engineer's Office (SEO) permit application Detention Reservoir Pine Ridge – 1 Reservoir area capacity table.

Table 2.6.51 Wyoming State Engineer's Office (SEO) permit application area capacity table - Detention Reservoir Pine Ridge - 1

Elev.	Area - acres	Acre-Feet	Total
4281	0	0	0
4293	4.82	28.92	28.92
4294	5.22	5.02	33.94
4302	34.09	157.24	191.18
4308	49.33	250.26	441.44
4308.5	54.9	26.06	467.5
4310	71.48	94.78	562.28
4318	113.57	740.2	1302.48
4325	145.07	905.24	2207.72
4326	149.6	147.34	2355.06
4332	213.51	1089.33	3444.39
Source: Wyoming State Engineer's Office Permit No. 6423R drawings.			

Figure 2.6.38 provides the Wyoming State Engineer's Office (SEO) permit application Detention Reservoir Pine Ridge – 1 dam cross section.

Figure 2.6.39 provides the Wyoming State Engineer's Office (SEO) permit application Detention Reservoir Pine Ridge – 1 Reservoir spillway profile.

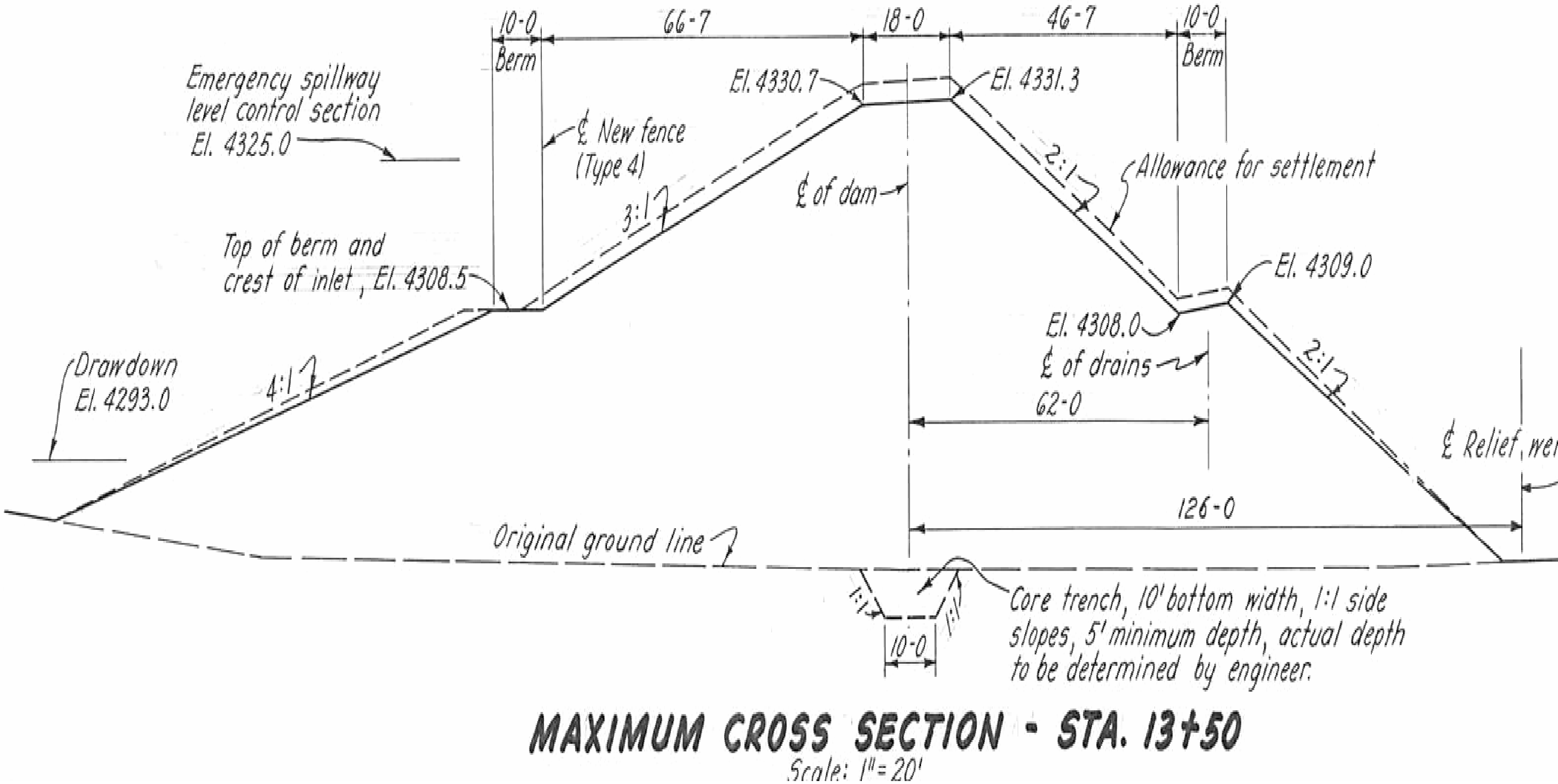


Figure 2.6.38

Wyoming State Engineer's Office (SEO) permit application cross section – Detention Reservoir Pine Ridge – 1 Reservoir

Source: SEO permit drawing

Title: Detention Dam PR-1; Pine Ridge – Case Bier Watershed

Permit No.(s): 6423 Res.

Filing Date: April 29, 1958

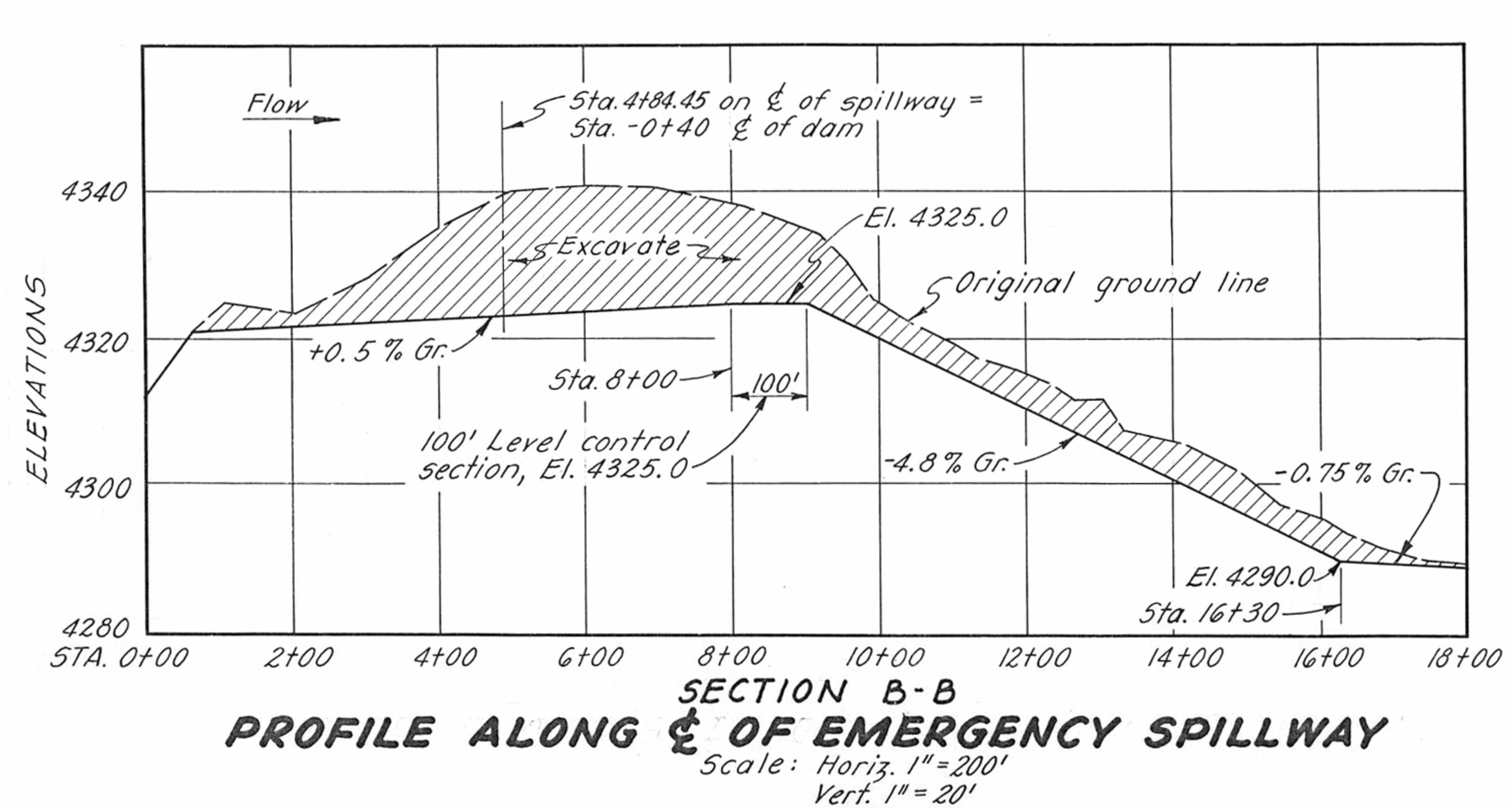


Figure 2.6.39

Wyoming State Engineer's Office (SEO) permit application spillway profile – Detention Reservoir Pine Ridge – 1 Reservoir

Source: SEO permit drawing

Title: Detention Dam PR-1; Pine Ridge – Case Bier Watershed

Permit No.(s): 6423 Res.

Filing Date: April 29, 1958

Detention Reservoir Case Bier – 1

Flood control is the only use permitted for the Detention Reservoir Case Bier – 1. Located in Goshen County, the reservoir is north of Fort Laramie, Wyoming. The earthfill dam has a permitted capacity of 1,458.88 acre-feet and is filled by the Case Bier Draw. The emergency spillway has a crest width of 350 feet and an invert elevation of 4,342 feet.

Table 2.6.52 provides the Wyoming State Engineer's Office (SEO) permit application Detention Case Bier – 1 Reservoir area capacity table.

Table 2.6.52 Wyoming State Engineer's Office (SEO) permit application area capacity table - Detention Reservoir Case Bier - 1

			Accum.
Elev.	Area - acres	Acre-feet	acre-feet
4294	0	0	0
4303	3.42	15.39	15.39
4305	5.46	8.88	24.27
4311	11.57	51.09	75.36
4319	21.71	133.12	208.48
4323.3	33.87	119.50	327.98
4324	35.85	24.40	352.38
4330	51.8	262.95	615.33
4335	65.09	292.22	907.55
4338	76.81	212.85	1120.40
4342	92.43	338.48	1458.88
4343	96.34	94.39	1553.27
4346	119.61	323.93	1877.2
4349	142.88	393.74	2270.94
Source: Wyoming State Engineer's Office Permit No. 6422R drawings.			

Figure 2.6.40 provides the Wyoming State Engineer's Office (SEO) permit application Detention Reservoir Case Bier – 1 dam cross section.

Figure 2.6.41 provides the Wyoming State Engineer's Office (SEO) permit application Detention Reservoir Case Bier – 1 dam profile.

Figure 2.6.42 provides the Wyoming State Engineer's Office (SEO) permit application Detention Reservoir Case Bier – 1 Reservoir spillway profile.

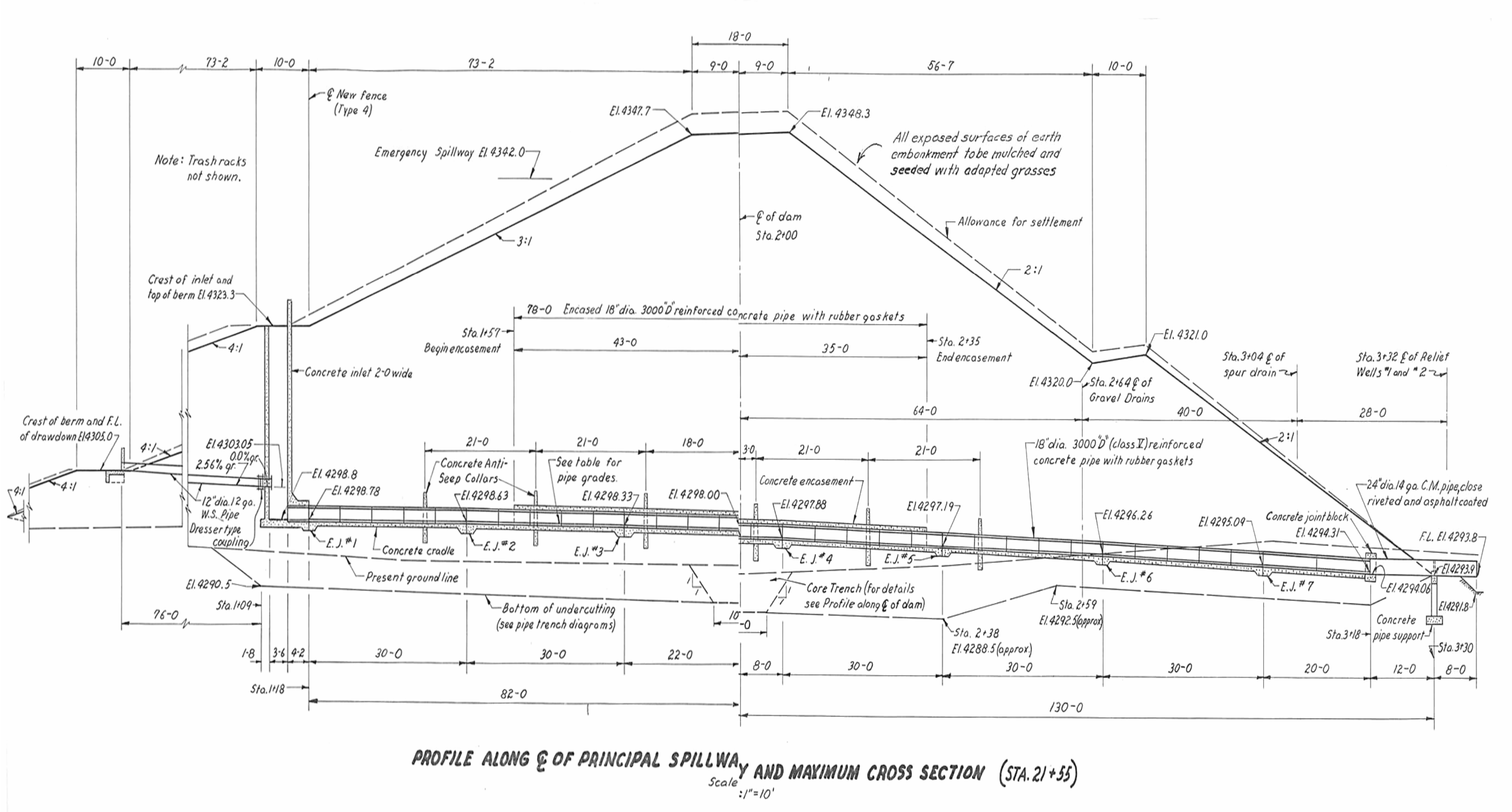


Figure 2.6.40

Wyoming State Engineer's Office (SEO) permit application cross section– Detention Reservoir Case Bier – 1 Reservoir

Source: SEO permit drawing

Title: Detention Dam CB-1; Pine Ridge – Case Bier Watershed

Permit No.(s): 6422 Res.

Filing Date: April 29, 1958

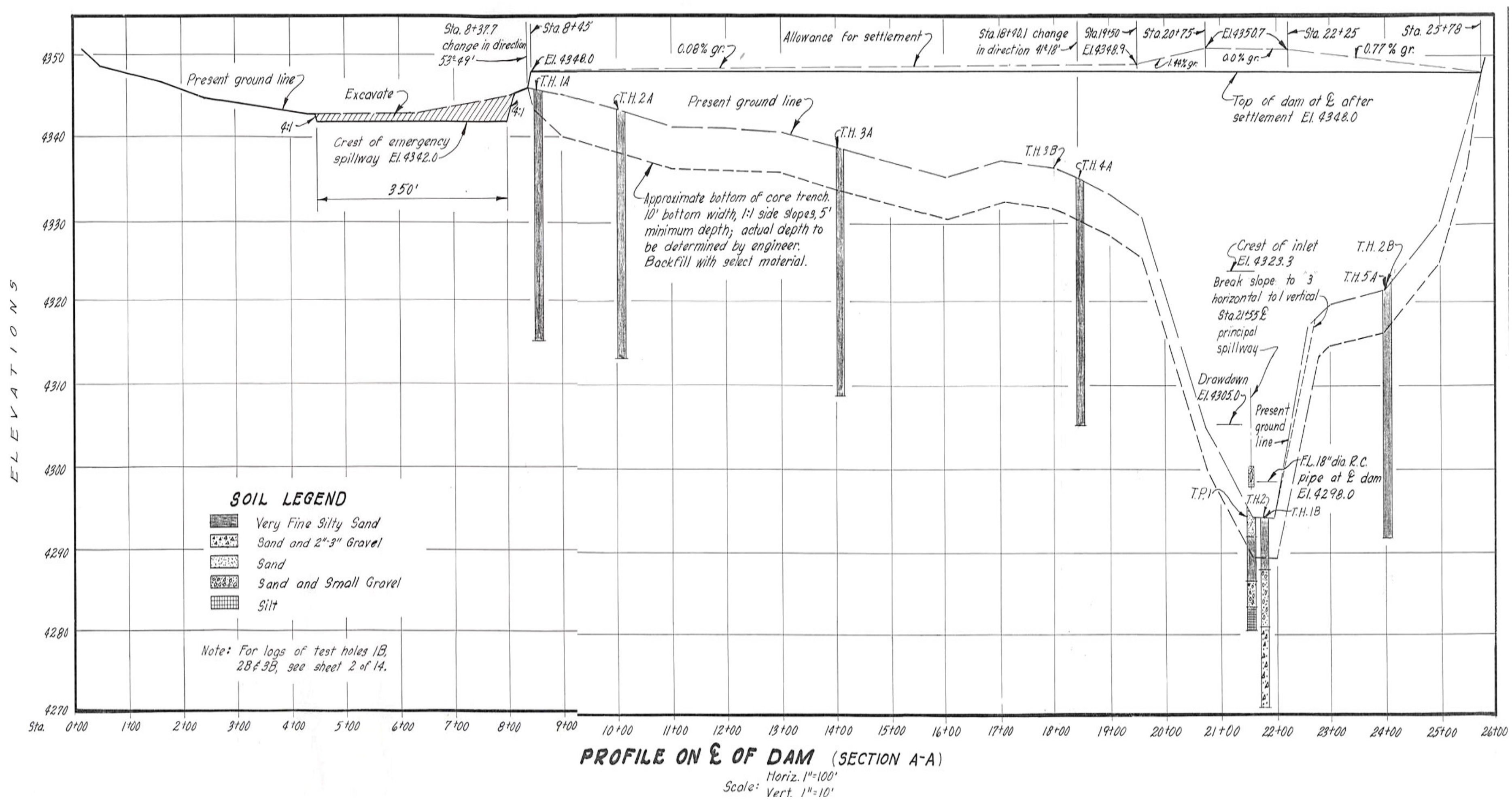


Figure 2.6.41

Wyoming State Engineer's Office (SEO) permit application dam profile– Detention Reservoir Case Bier – 1 Reservoir

Source: SEO permit drawing

Title: Detention Dam CB-1; Pine Ridge – Case Bier Watershed

Permit No.(s): 6422 Res.

Filing Date: April 29, 1958

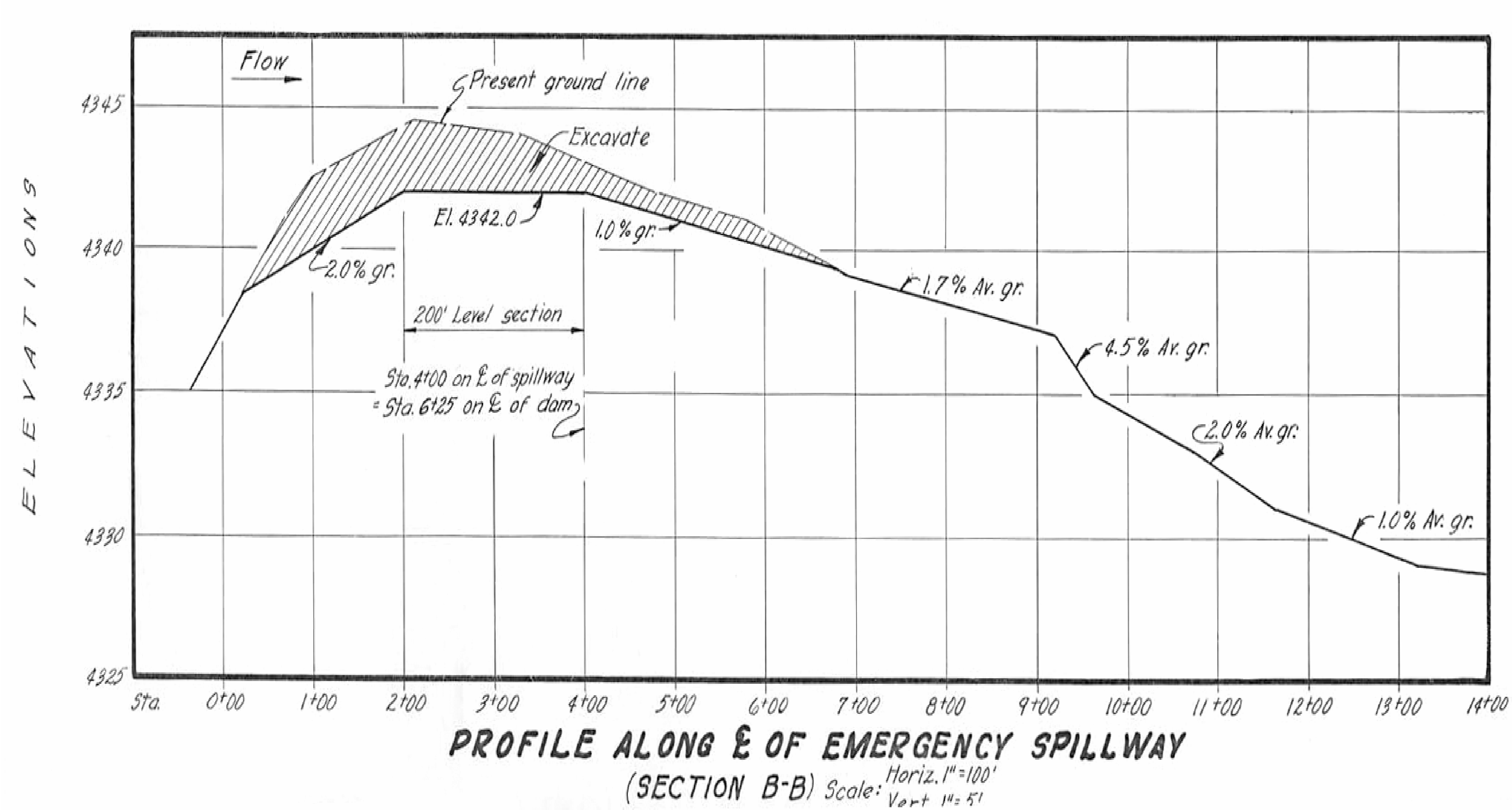


Figure 2.6.42

Wyoming State Engineer's Office (SEO) permit application spillway profile– Detention Reservoir Case Bier – 1 Reservoir

Source: SEO permit drawing

Title: Detention Dam CB-1; Pine Ridge – Case Bier Watershed

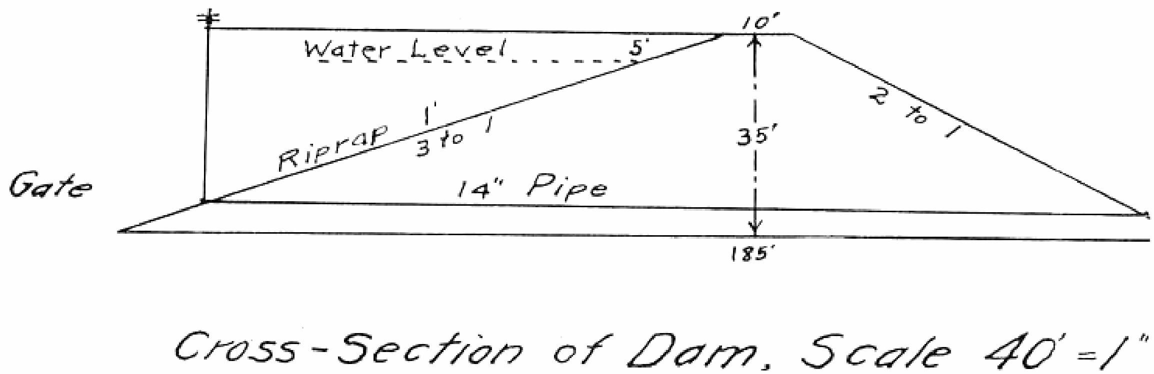
Permit No.(s): 6422 Res.

Filing Date: April 29, 1958

Harris Reservoir

Harris Reservoir is an earthfill dam permitted for irrigation, power, and stock uses. The reservoir is located in the channel of J M Creek and has a permitted capacity of 1,305.85 acre-feet. The J M Creek source of supply for Harris Reservoir is supplemented by water from Rawhide Creek through the Harris No. 2 Ditch. Harris Reservoir has an area of 93.8 acres with a maximum depth of 30 feet. The outlet consists of a 14-inch pipe. The reservoir has two spillways, one of which is 200 feet wide and the other of which is 100 feet wide.

Figure 2.6.43 provides the Wyoming State Engineer's Office (SEO) permit application Harris Reservoir dam cross section and profile.



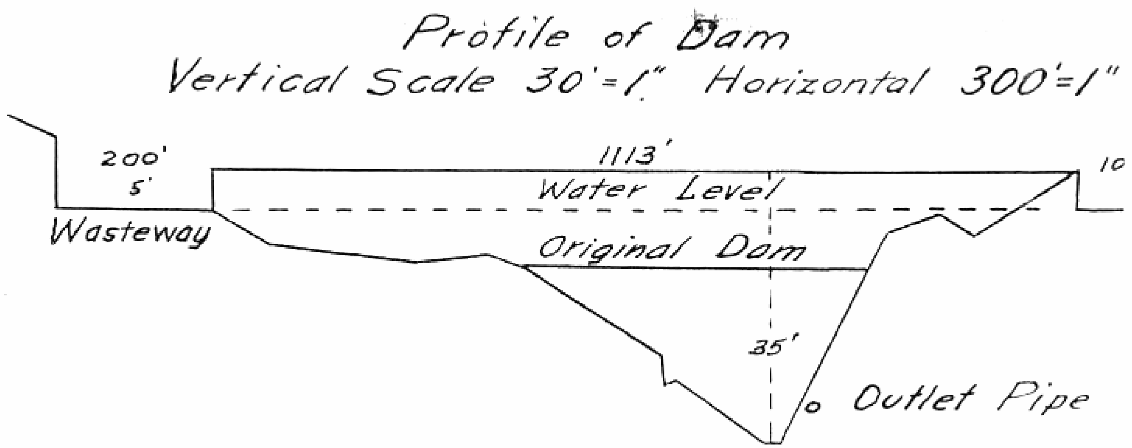


Figure 2.6.43
Wyoming State Engineer's Office (SEO) permit application cross section and dam profile – Harris Reservoir
Source: SEO permit drawing
Title: Map of Harris Reservoir
Permit No.(s): -
Filing Date: Unknown

Arnold Reservoir

Arnold Reservoir is located in the channel of Arnold Drain and is permitted for flood control. The area of the reservoir at its high-water line is 226.9 acres, and the permitted capacity is 1,134.45 acre-feet. The dam is an earthfill dam, and the slopes of the dam have vegetation planted to prevent erosion. The invert of the emergency spillway is located at elevation 4,174 feet, and the emergency spillway is 300 feet in width. The emergency spillway has a permitted discharge capacity of 884 cubic feet per second.

Table 2.6.53 provides the Wyoming State Engineer's Office (SEO) permit application Arnold Reservoir area capacity table.

Table 2.6.53 Wyoming State Engineer's Office (SEO) permit application area capacity table - Arnold Reservoir Enlargement

Elevation	Area	Ave. area	Volume	Capacity			
4152	0						
		0.6	1.8	1.8			
4155	1.2						
		5.65	28.25	30.05			
4160	10.1						
		22.2	111.0	141.05			
4165	34.3						
		68.0	340.0	481.05			
4170	101.7						
		134.4	288.95	770.00	←	Present Capacity	
4172.15	167.1					Permit #4594R	
		197	364.45	1134.45	←	Enlarged Capacity	
4174	226.9						
		301.0	1505.0	2639.45	←	Capacity to top of	
4179	375.1					dam	
				364.45	←	Enlargement of this	
						application	
Source: Wyoming State Engineer's Office Permit No. 6879R drawings.							

Figure 2.6.44 provides the Wyoming State Engineer's Office (SEO) permit application Arnold Reservoir dam cross section.

Figure 2.6.45 provides the Wyoming State Engineer's Office (SEO) permit application Arnold Reservoir dam profile and emergency spillway cross section.

Tables 2.6.54 through 2.6.58 provide an overview of the Wyoming State Engineer's Office (SEO) permit application information for major reservoirs in the Guernsey to State Line subbasin.

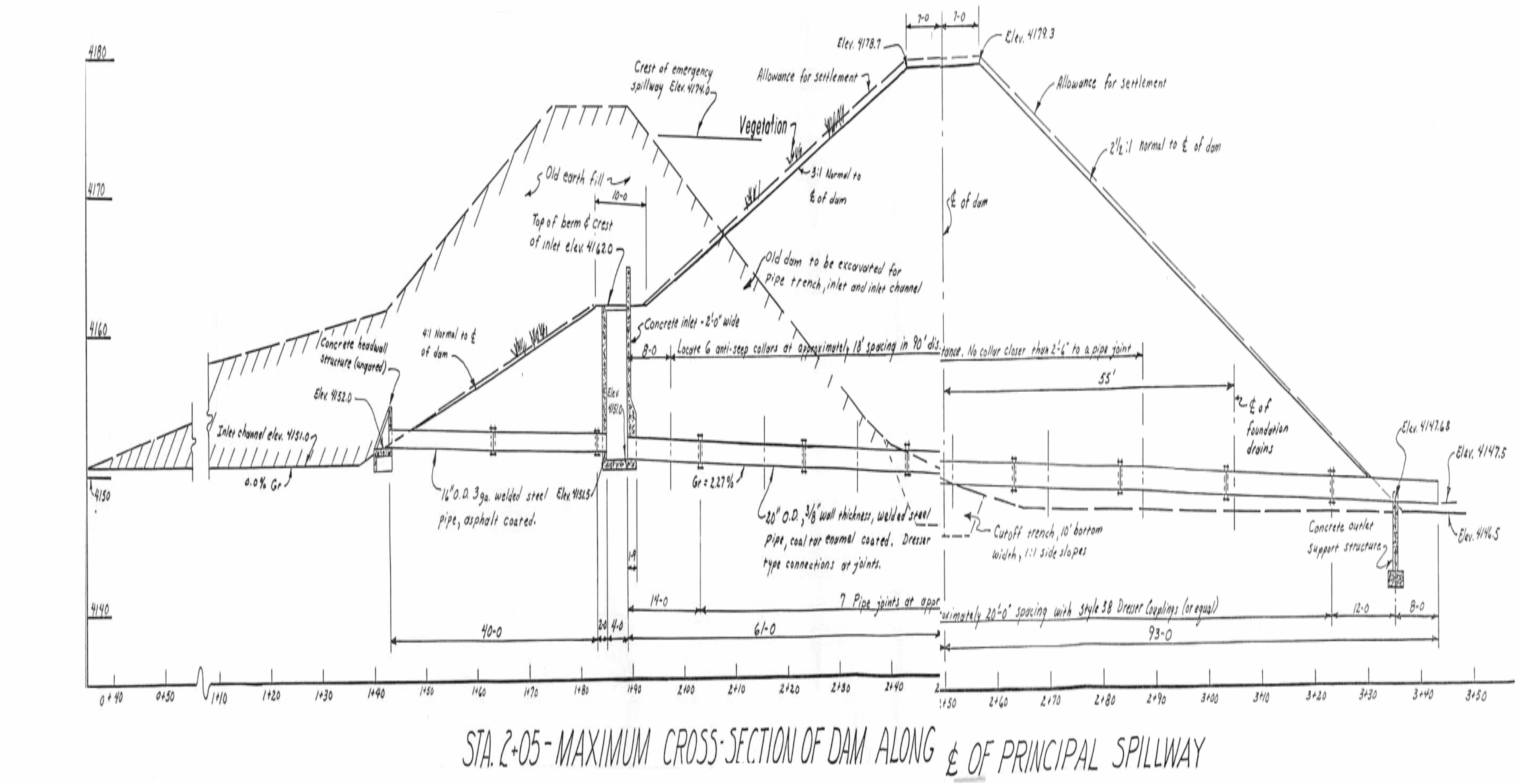


Figure 2.6.44

Wyoming State Engineer's Office (SEO) permit application cross section– Arnold Reservoir

Source: SEO permit drawing

Title: Arnold Res Enlargement for Flood Protection Only; Map to Accompany Plans and Application for Arnold Drain Watershed P.L. 566 Watershed Protection Project Applicant: Arnold Drainage District

Permit No.(s): 6879 Res., 6880 Res., 6881 Res., 6882 Res.

Filing Date: July 6, 1967

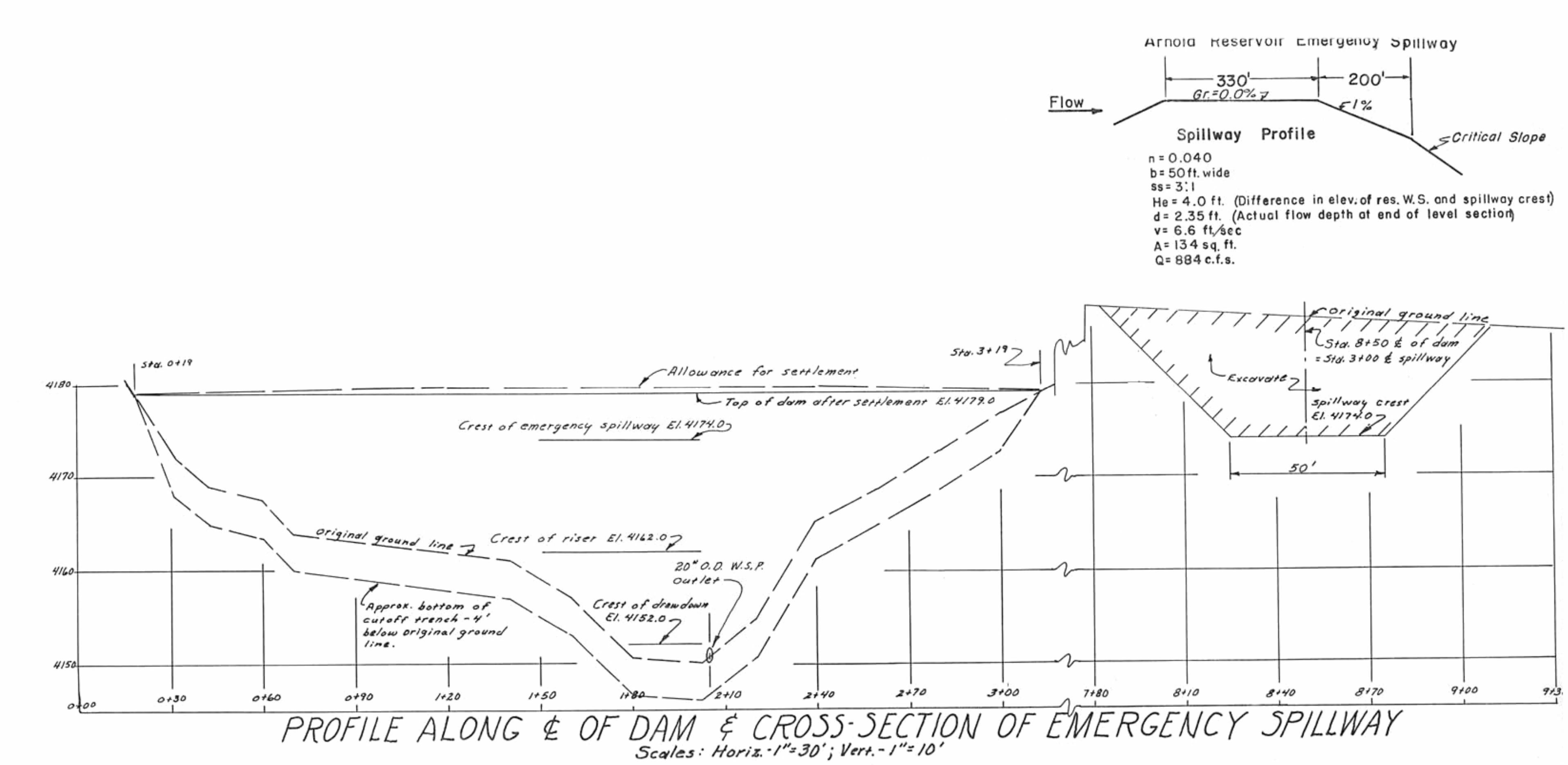


Figure 2.6.45

Wyoming State Engineer's Office (SEO) permit application dam profile and emergency spillway cross section– Arnold Reservoir

Source: SEO permit drawing

Title: Arnold Res Enlargement for Flood Protection Only; Map to Accompany Plans and Application for Arnold Drain Watershed P.L. 566 Watershed Protection Project Applicant: Arnold Drainage District

Permit No.(s): 6879 Res., 6880 Res., 6881 Res., 6882 Res.

Filing Date: July 6, 1967

Table 2.6.54 Summary - locations of major reservoirs in the Guernsey to State Line subbasin

Structure number	Permit number	Reservoir name	Township	Range	Section	Qtr qtr	Nearest city	County
1	P6423R	Detention Reservoir Pine Ridge - 1	26	64	14	SWNW	Fort Laramie	Goshen
2	P6422R	Detention Reservoir Case Bier - 1	26	64	4	SESE	Fort Laramie	Goshen
3	P1310R	Harris Reservoir	29	63	24	SWNE	Glendo	Goshen
	P2110R	Harris Reservoir, Enl.	29	63	24	SWNE	Glendo	Goshen
4	P4594R	Arnold Reservoir	24	61	1	NESW	Torrington	Goshen
	P6879R	Arnold Reservoir, Enl.	24	61	1	NESW	Torrington	Goshen
Source: Wyoming State Engineer's Office.								

Table 2.6.55 Summary - permitted capacities of major reservoirs in the Guernsey to State Line subbasin						
Structure number	**Permit number**	**Reservoir name**	**Active capacity acre-feet**	**Inactive capacity acre-feet**	**Enlargement capacity acre-feet**	**Total capacity acre-feet**
1	P6423R	Detention Reservoir Pine Ridge - 1				2,207.72
2	P6422R	Detention Reservoir Case Bier - 1				1,458.88
3	P1310R	Harris Reservoir				292.81
	P2110R	Harris Reservoir, Enl.			1,013.04	1,305.85
4	P4594R	Arnold Reservoir				770.00
	P6879R	Arnold Reservoir, Enl.			364.45	1,134.45
Source: Wyoming State Engineer's Office						

Table 2.6.56 Summary - permitted beneficial uses of major reservoirs in the Guernsey to State Line subbasin

Structure number	Permit number	Reservoir name	Applicant name	Priority date	Source	Use
1	P6423R	Detention Reservoir Pine Ridge - 1	Town of Fort Laramie	4/24/1958	Eaton Draw	Flood control
2	P6422R	Detention Reservoir Case Bier - 1	Town of Fort Laramie	4/24/1958	Case Bier Draw	Flood control
3	P1310R	Harris Reservoir	Silas Harris	6/17/1908	J M Creek	Stock, irrigation
	P2110R	Harris Reservoir, Enl.	Silas Harris	4/8/1911	J M Creek	Power, stock, irrigation
4	P4594R	Arnold Reservoir	Arnold Drainage District	8/7/1934	Arnold Drain	Flood control
	P6879R	Arnold Reservoir, Enl.	Arnold Drainage District	7/1/1963	Arnold Drain	Flood control
Source: Wyoming State Engineer's Office.						

Table 2.6.57 Summary - outlet works descriptions for major reservoirs in the Guernsey to State Line subbasin

Structure number	Permit number	Reservoir name	Outlet works description
1	P6423R	Detention Reservoir Pine Ridge - 1	The outlet canal has a bottom width of 8-feet, a depth of 2.8-feet and a side slope of 3:1. The flow through the outlet canal is 90.5 cubic feet per second. Outlet material is sandy silt.
2	P6422R	Detention Reservoir Case Bier - 1	The outlet pipe is an 18-inch diamter 3000 "D" (Class V) reinforced concrete pipe. The outlet material is sandy silt.
3	P1310R	Harris Reservoir	The outlet pipe is 8-inches in diameter. The outlet material is earth.
	P2110R	Harris Reservoir, Enl.	The outlet pipe is 14-inches in diameter. The outlet material is sandy silt.
4	P4594R	Arnold Reservoir	The outlet material is concrete structures.
	P6879R	Arnold Reservoir, Enl.	The outlet pipe is 20-inches (O.D.) with a 3/8-inch wall thickness, welded steel pipe and coal tar enamel coated. There are Dresser type connections at joints. All outlet works are ungated. There is no permanent storage other than channel potholes. The outlet material is silty sand.

Source: Wyoming State Engineer's Office.

Table 2.6.58 Summary - emergency spillway descriptions for major reservoirs in the Guernsey to State Line subbasin

Structure number	Permit number	Reservoir name	Spillway description
1	P6423R	Detention Reservoir Pine Ridge - 1	The crest of the emergency spillway is at elevation 4325.0 feet at 905.24 acre-feet of storage.
2	P6422R	Detention Reservoir Case Bier - 1	The crest of the emergency spillway is at elevation 4342.0 feet at 338.48 acre-feet of storage.
3	P1310R	Harris Reservoir	The spillway is 175-feet wide.
	P2110R	Harris Reservoir, Enl.	The spillway is composed of two spillways - one which is 200-feet wide and one that is 100-feet wide.
4	P4594R	Arnold Reservoir	
	P6879R	Arnold Reservoir, Enl.	
Source: Wyoming State Engineer's Office.			

2.7.5.4 Major Reservoirs in the Upper Laramie Subbasin

The locations of major reservoirs in the Upper Laramie subbasin are shown on Figure 2.6.46.

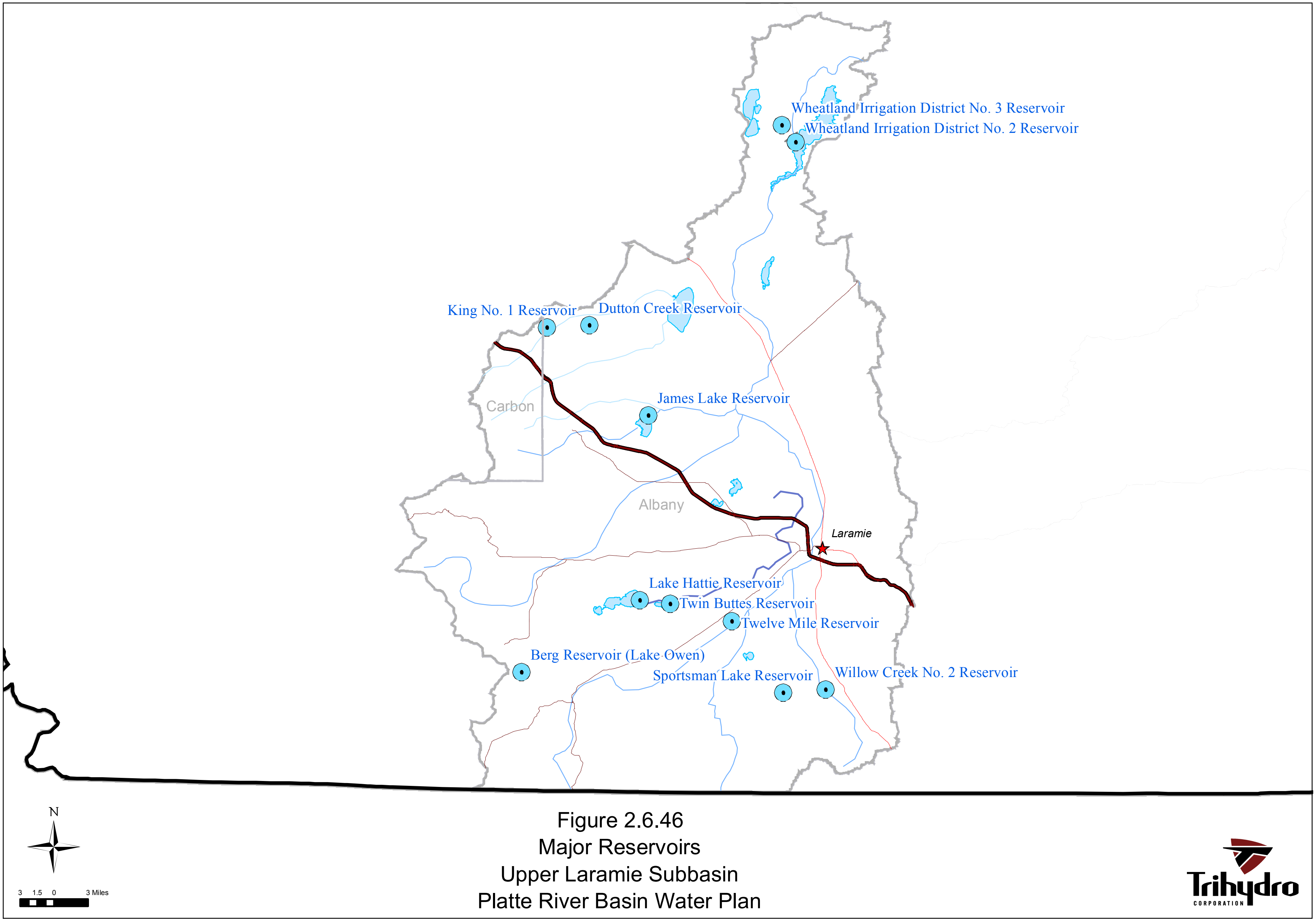


Figure 2.6.46
Major Reservoirs
Upper Laramie Subbasin
Platte River Basin Water Plan

Trihydro
CORPORATION

Wyoming Development Co. No. 2 Reservoir (Wheatland Irrigation District No. 2 Reservoir)

Wyoming Development Company No. 2 Reservoir is more commonly referred to as Wheatland Irrigation District No. 2 Reservoir. This large irrigation reservoir has a permitted storage capacity of 98,934.00 acre-feet and a January 29, 1898 priority date. The dam has a 3H:1V upstream face slope and a 2H:1V downstream face slope. The upstream dam face is armored with 18 inches of riprap and gravel. About 1,200 linear feet of steel sheet piling has been installed along the upstream toe of the dam along the highest portion of the dam. The dam outlet works consists of a masonry drop inlet near the upstream toe of the dam and a masonry discharge tunnel through the dam.

Table 2.6.59 provides a summary of Wheatland Irrigation District No. 2 Reservoir monthly releases obtained from annual hydrographer's reports.

Table 2.6.59 Summary - historic Wheatland Irrigation District No. 2 Reservoir monthly releases

SEO permit: P1724D											
Capacity (acre-feet): 98,934 acre-feet											
End of month storage (acre-feet)											
Month	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***
Oct	28,400	15,400	51,900	16,100	54,300	38,700	57,400	75,100	63,400	28,100	--
Nov	30,500	16,600	56,100	16,500	59,600	44,200	62,600	73,700	63,800	30,300	--
Dec	32,800	18,000	59,800	17,700	62,700	47,100	63,400	65,900	64,600	32,000	--
Jan	33,800	19,800	62,400	19,300	63,500	50,900	62,600	61,900	66,000	34,000	--
Feb	36,100	21,800	65,300	22,700	63,500	54,700	62,900	60,900	68,700	36,100	--
Mar	43,100	30,000	73,700	24,800	66,300	62,300	70,100	66,200	73,300	43,500	--
Apr	45,300	38,800	77,400	25,000	59,700	70,300	79,400	74,700	76,900	52,100	--
May	41,000	44,300	77,200	30,000	59,800	59,900	71,700	82,500	78,400	60,500	22,000
Jun	42,900	93,800	59,800	97,400	88,500	82,800	94,100	92,000	71,300	55,400	21,500
Jul	37,300	76,600	40,700	88,200	70,700	62,900	81,600	84,900	45,800	44,400	12,400
Aug	20,800	56,500	20,100	62,300	44,700	60,300	76,800	73,500	27,400	22,800	12,100
Sep	16,000	48,200	16,200	50,700	37,000	51,800	72,000	64,100	25,600	18,500	11,200
Average monthly release rates (acre-feet)											
Month	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Apr	23.6	--	386.0	0.0	269.2	281.7	67.4	59.5	0.0	0.0	0
May	7,452.2	5,428.0	11,012.4	0.0	16,260.7	18,198.6	22,433.4	8,090.7	10,293.8	3,667.5	4,772
Jun	5,236.4	591.3	18,734.2	0.0	6,995.8	9,415.1	6,486.0	23,147.4	18,045.9	14,566.8	3,186
Jul	10,566.9	21,568.6	18,719.1	11,898.8	25,884.7	25,204.3	20,735.5	16,927.2	25,000.0	10,720.5	3,146
Aug	17,990.3	20,061.1	19,870.7	25,719.7	25,015.9	8,951.7	9,510.9	12,847.1	16,121.9	20,324.9	0
Sep	5,184.7	9,290.7	2,653.3	11,711.4	6,875.8	13,106.8	3,468.7	8,233.5	826.2	4,199.5	0
* The Manometer and/or Sutron 8210 were not working this water season correctly.											
Source: 1992 - 2002 Wyoming State Engineer's Office Annual Hydrographer's Reports.											

Figures 2.6.47 and 2.6.48 show the dam section and outlet works and a partial dam profile of Wyoming Development Company No. 2 Reservoir (Wheatland No. 2 Reservoir).

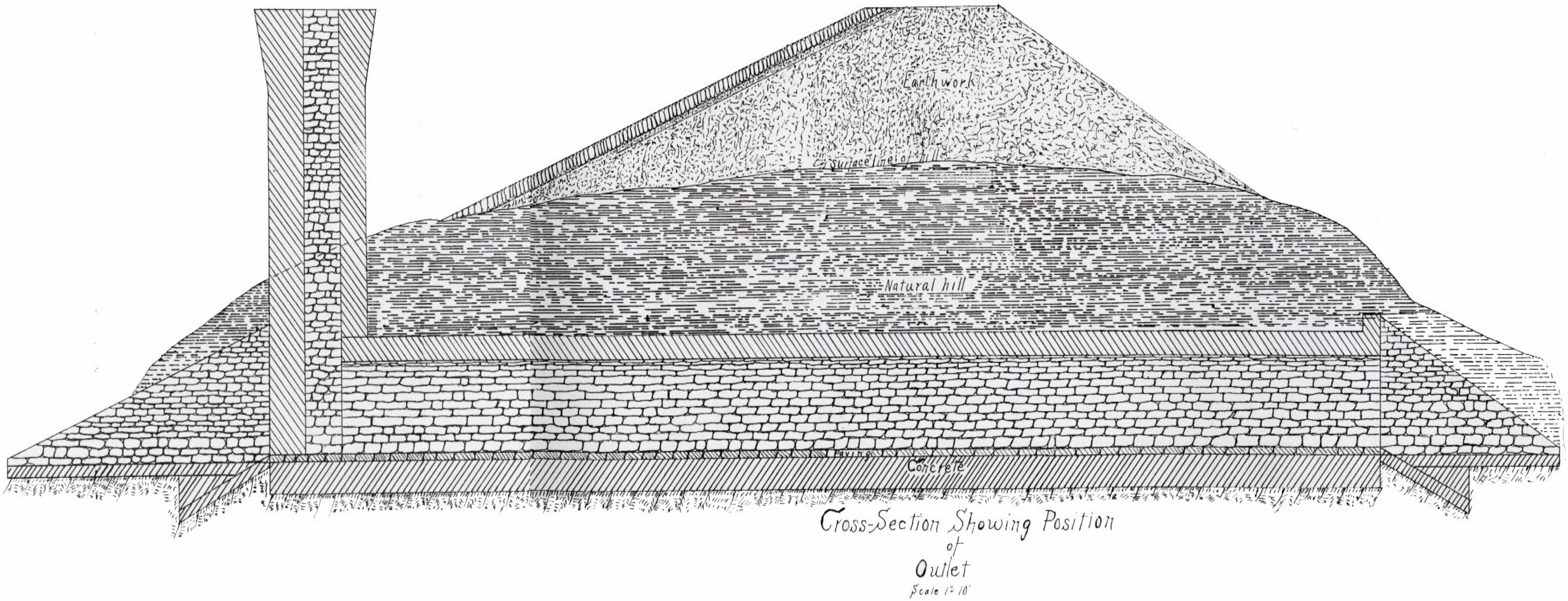


Figure 2.6.47
Wyoming State Engineer's Office (SEO) permit application dam section with outlet works – Wyoming Development Company No. 2 Reservoir (Wheatland No. 2 Reservoir)
Source: SEO permit drawing
Title: Cross-Section Showing Position of Outlet
Permit No.(s): 1724
Filing Date: unknown

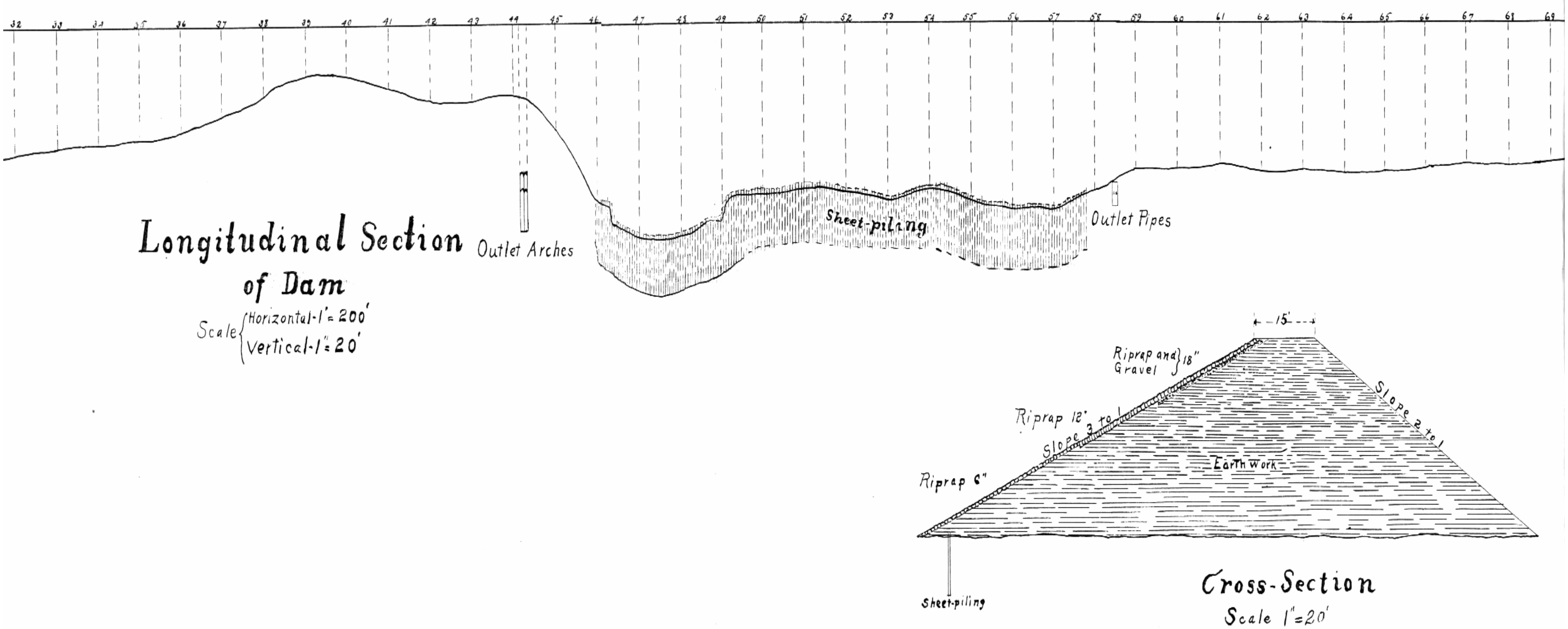


Figure 2.6.48

Wyoming State Engineer's Office (SEO) permit application partial dam profile – Wyoming Development Company No. 2 Reservoir (Wheatland No. 2 Reservoir)

Source: SEO permit drawing

Title: Longitudinal Section of Dam and Cross-Section

Permit No.(s): 1724

Filing Date: unknown

Wheatland Irrigation District No. 3 Reservoir

Wheatland Irrigation District No. 3 Reservoir is located in Albany County, Wyoming. The reservoir is permitted for irrigation and stock uses. The reservoir is located in the basin adjoining the Laramie River, west of Wyoming Development Company No. 2 Reservoir (Wheatland Irrigation District No. 2 Reservoir). The reservoir has a permitted capacity of 71,318.80 acre-feet.

Water is taken from the Wheatland Irrigation District No. 2 Reservoir via the Reservoir Canal and Intake-Outlet Canal to fill the Wheatland Irrigation District No. 3 Reservoir. The water flow from Wheatland Irrigation District No. 2 Reservoir to Wheatland Irrigation District No. 3 Reservoir has a maximum rate of 2,118 cubic feet per second, which reduces as the Wheatland Irrigation District No. 3 Reservoir inflow rate reaches 100 cubic feet per second. Water can be released from the No. 3 Reservoir at a maximum discharge rate of 600 cubic feet per second via the Outlet Canal. After the water flows through the No. 2 Reservoir Outlet Canal, it discharges into the Laramie River and then into the Wheatland Irrigation District distribution system.

Table 2.6.60 provides a summary of Wheatland Irrigation District No. 3 Reservoir monthly releases obtained from annual hydrographer's reports.

Table 2.6.60 Summary - historic Wheatland Irrigation District No. 3 Reservoir monthly releases

SEO permit: P4978R											
Inactive capacity: 23,889 acre-feet											
Active capacity: 47,429.8 ac-ft											
Total capacity: 71,318.8 acre-feet											
Total capacity with surcharge: 100,270.60 acre-feet											
End of month storage (acre-feet)											
Month	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002***
Oct	dead stge	dead stge	5,410	dead stge	23,800	40,000	53,600	38,200	49,600	--	--
Nov	--	--	--	--	--	--	--	--	--	--	--
Dec	--	--	--	--	--	--	--	46,500	--	--	--
Jan	--	--	--	--	--	--	59,100	60,000	--	--	--
Feb	--	--	--	--	--	--	66,100	65,200	--	--	--
Mar	--	--	--	--	--	--	69,100	70,000	--	--	--
Apr	--	7,500	--	--	41,000	37,500	69,100	70,000	58,000	--	--
May	dead stge	--	--	--	45,000	--	69,100	70,800	57,800	40,000	--
Jun	--	--	--	--	42,500	71,319	69,100	81,000	--	--	--
Jul	dead stge	--	--	25,600	44,300	64,400	67,800	64,800	--	37,900	--
Aug	--	--	--	24,200	43,000	57,700	50,200	50,800	55,500	32,100	--
Sep	dead stge	5,410	dead stge	--	40,300	52,900	38,200	--	40,600	28,700	--
Average monthly release rates (acre-feet)											
Month	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Apr	--	--	--	--	--	0.0	0.0	0.0	0.0	0.0	0.0
May	--	--	--	--	--	0.0	2.0	0.0	0.0	0.0	0.0
Jun	--	--	--	--	--	0.0	541.9	9.9	0.0	0.0	0.0
Jul	--	--	--	--	--	3,836.1	5,351.9	12,322.1	0.0	4,676.3	0.0
Aug	--	--	--	--	--	7,192.0	10,387.6	13,453.5	7,453.8	3,036.7	0.0
Sep	--	--	--	--	--	17.9	11,364.7	3.2	7,966.3	372.4	0.0
Note: not all readings are at the end of the month											
*It is estimated that 23,000 A/F (acre-feet of) in dead storage (was available) at the end of WY2002											
Source: 1992 - 2002 Wyoming State Engineer's Office Annual Hydrographer's Reports.											

Table 2.6.61 provides the Wyoming State Engineer's Office (SEO) permit application Wheatland Irrigation District No. 3 Reservoir area capacity table.

Figures 2.6.49 through 2.6.51 provide the Wyoming State Engineer's Office (SEO) permit application Wheatland Irrigation District No. 3 Reservoir cross sections and profiles.

Table 2.6.61 Wyoming State Engineer's Office (SEO) permit application area capacity table - Wheatland Irrigation District No. 3 Reservoir

	Active storage	Inactive storage areas					Active storage calculations					
Contour	Areas	Area "A"	Area "B"	Area "C"	Area "D"	Area "E"	Average	Capacity	Acc. cap.			
elevation	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acre-feet)	(acre-feet)			
6957	7,254.10								26,208.8			
							6,791.6	13,583.2			SURCHARGE	
6955	6,329.10								12,625.6		CAPACITY	
			TOTAL ACTIVE				6,012.2	12,625.6			26,208.8 acre-feet	
6952.9	4792.2*(SEE NOTE 3)		**CAPACITY**			903.1			47,429.8			
			47,429.8 A.F.				4,341.3	12,589.8				
6950	3,890.40					322.7			34,840.0			
							3,432.6	17,163.0				
6945	2,974.80					30.6			17,677.0			
							2,918.1	2,334.4			ACTIVE	
6944.2	2,607.60				253.7	N.A.			15,342.6		CAPACITY	
							2,480.2	10,416.6			47,429.8 acre-feet	
6940	2,352.70				129.8	2.4			4,926.0		IRRIGATION	
						Use of	2,269.6	4,539.1			&	
6938	653.80		1,405.0	127.6	N.A.	**this cell**			386.9		STOCK	
						is flood	644.8	386.9				
6937.4	635.90		N.A.	N.A.	N.A.	**surcharge**			0.0			
						only						
6935		569.8	1228.3	78.2	51.50							
						WHEATLAND IRRIGATION DISTRICT						
6930		444.1	937.2	27.0	10.2	**NO. 3 RESERVOIR**						
6925		285.5	377.7			Total Active Capacity		47,429.8 acre-feet				
						Inactive Capacity, Cells						
6920		160.2	102.5			A, B, C, & D		23,889.0 acre-feet				
						Inactive Surcharge						
6915		75.4	8.8	**TOTAL**		Capacity, Cell E		2,743.2 acre-feet				
			INACTIVE CAPACITY			Active Surcharge Capacity		26,208.6 acre-feet				
6910		22.1		**23,889.0 A.F.**								
						Total capacity		**100,270.6 acre-feet**				
6907		0.0										

AREA "A" I.A. storage 7,774.7 acre-feet

AREA "B" I.A. storage 14, 129.7 acre-feet

"C" I.A. 571.7 acre-feet

"D" I.A. STO. 1,412.9 acre-feet

"E" I.A. 2,743.2 acre-feet

NOTE 1:

THE ABOVE CAPACITY TABLE IS CHANGED FROM THAT SUGGESTED IN THE STATE ENGINEER'S REGULATIONS AND INSTRUCTIONS MANUAL BECAUSE OF THE NECESSITY TO SHOW INACTIVE STORAGE IN 5 SEPARATE AREAS AT DIFFERING ELEVATIONS. THE CONTOUR ELEVATION SEQUENCE IS REVERSED TO MORE CLEARLY SHOW THE ORDER IN WHICH THE SEPARATE AREAS ARE FILLED. CAPACITY FOR BOTTOM CONTOUR INTERVAL IN EACH CELL CALCULATED AS TOP AREA X DEPTH/3. CAPACITY FOR ALL OTHER CONTOUR INTERVALS CALCULATED USING AVERAGE AREA X CONTOUR INTERVAL.

NOTE 2:

NO. 3 RESERVOIR IS AN OFF CHANNEL RESERVOIR WITH 5 AREAS OF INACTIVE STORAGE AS SHOWN ON THE ACCOMPANYING MAP AND RESERVOIR CAPACITY TABLE. THE RESERVOIR IS FILLED BY CONVEYING WATER FROM WHEATLAND IRRIGATION DISTRICT NO. 2 RESERVOIR THROUGH THE RESERVOIR CANAL AND THE INTAKE-OUTLET CANAL AT A MAXIMUM RATE OF 2118 C.F.S. WHICH GRADUALLY REDUCES TO LESS THAN 100 C.F.S. AS THE RESERVOIR FILLS. WATER IS WITHDRAWN FROM NO. 3 RESERVOIR THROUGH THE INTAKE-OUTLET CANAL TO THE OUTLET GATES LOCATED IN THE NE1/4NE1/4 OF SECTION 26, TOWNSHIP 22 NORTH, RANGE 74 WEST OF THE 6TH P.M., ALBANY COUNTY, WYOMING. THE RELEASE OF WATER FROM NO. 3 RESERVOIR IS CONTROLLED BY ADJUSTMENT OF THE GATES AT THE OUTLET STRUCTURE AND LIMITED BY THE DESIGN (U.S. DEPT. OF AGRI. S.C.S.) OF THE OUTLET CANAL TO A MAXIMUM DISCHARGE RATE OF 600 C.F.S. WATER FLOWS THROUGH THE OUTLET CANAL TO THE LARAMIE RIVER THEN INTO THE WHEATLAND IRRIGATION DISTRICT DISTRIBUTION SYSTEM.

NOTE 3*:

THE AREA AT ELEVATION 6952.9 IS 4792.2 ACREAS IN AREAS "A", "B", "C", AND "D", AND 903.1 ACREAS IN AREA "E". ALL STORAGE ABOVE ELEVATION 6952.9 AND ALL STORAGE IN AREA "E" BELOW ELEVATION 6952.9 IS FOR FLOOD SURCHARGE PURPOSES ONLY AND NOT INCLUDED IN THE ACTIVE CONTENTS OF PERMIT NO. 4978 RES. THE REASONS FOR SUCH LIMITATION ARE THAT THERE IS NO CONTROL ON THE OUTLET IN DAM NO. 3 AND IT WOULD BE REQUIRED TO IMPROVE DAM NO. 2 IN ORDER TO PROVIDE PERMANENT STORAGE ABOVE ELEVATION 6,952.9.

Source: Wyoming State Engineer's Office Permit No. 4978R drawings.

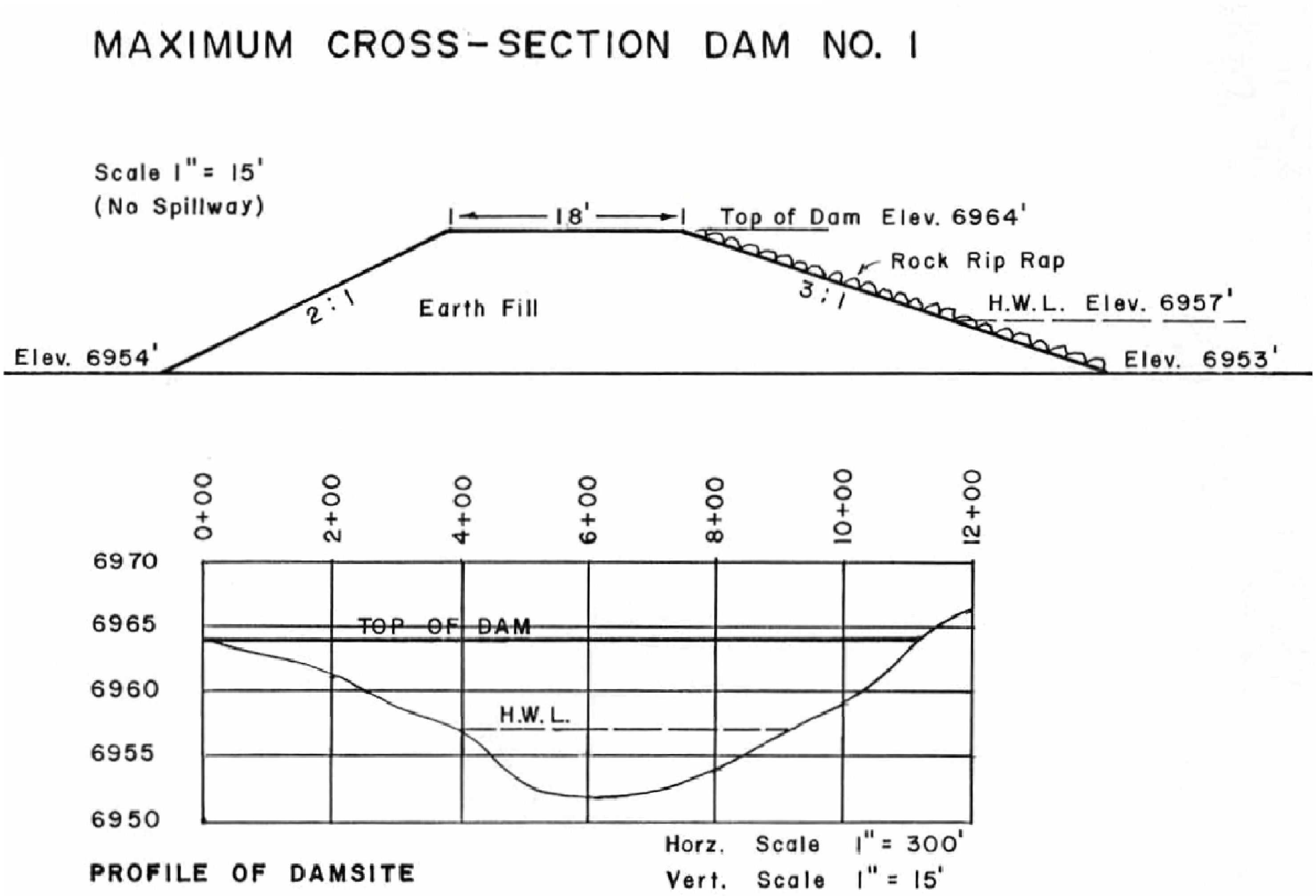


Figure 2.6.49

Wyoming State Engineer's Office (SEO) permit application cross section and dam profile – Wheatland Irrigation district No.3 Reservoir – Dam No.1

Source: SEO permit drawing

Title: Map to Accompany Petition to State Engineer and Amended Map for Wheatland Irrigation District No. 3 Reservoir

Permit No.(s): 4978 Res.

Filing Date: June 28, 1987

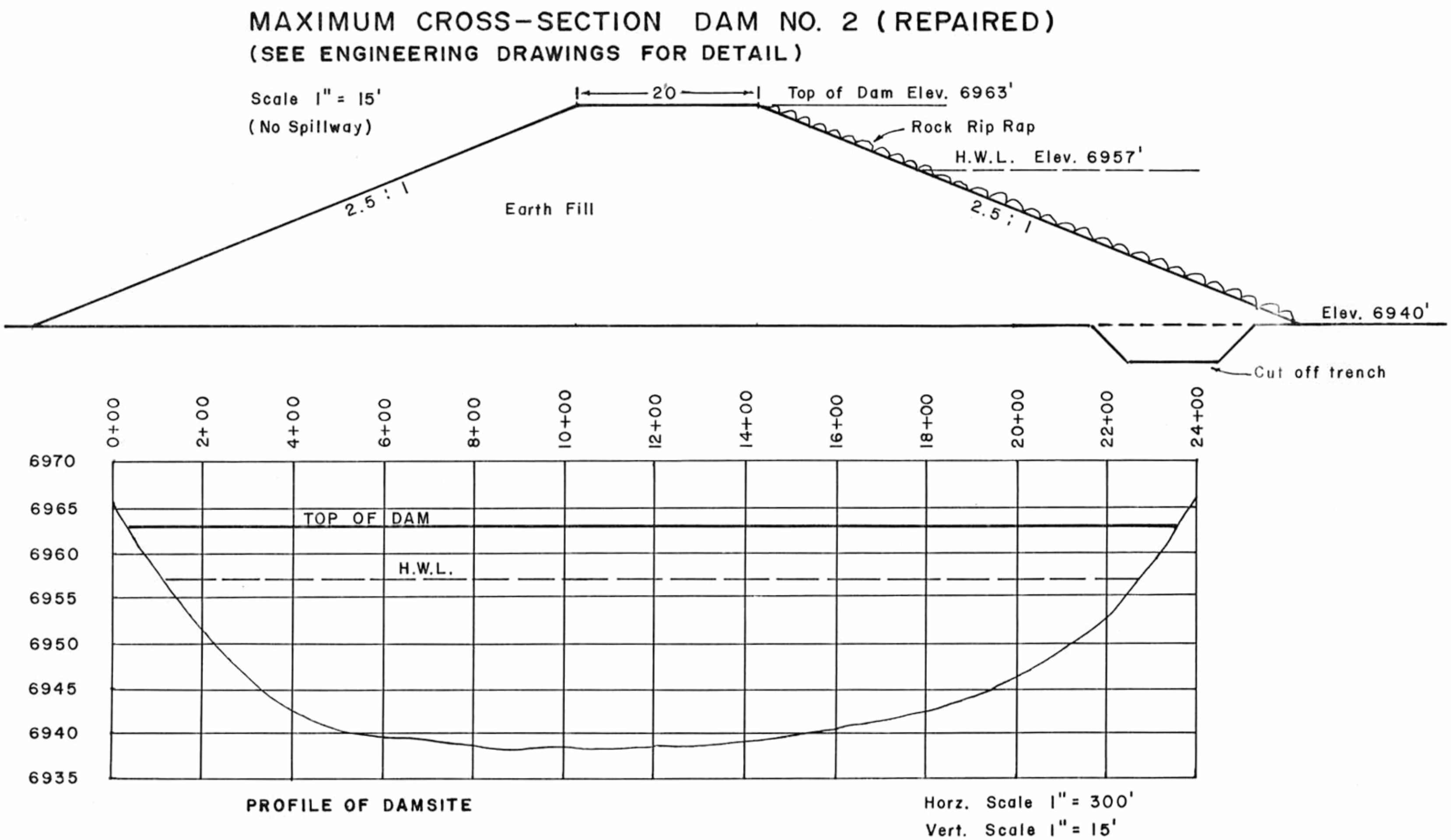


Figure 2.6.50

Wyoming State Engineer's Office (SEO) permit application cross section and dam profile – Wheatland Irrigation district No.3 Reservoir – Dam No.2

Source: SEO permit drawing

Title: Map to Accompany Petition to State Engineer and Amended Map for Wheatland Irrigation District No. 3 Reservoir

Permit No.(s): 4978 Res.

Filing Date: June 28, 1987

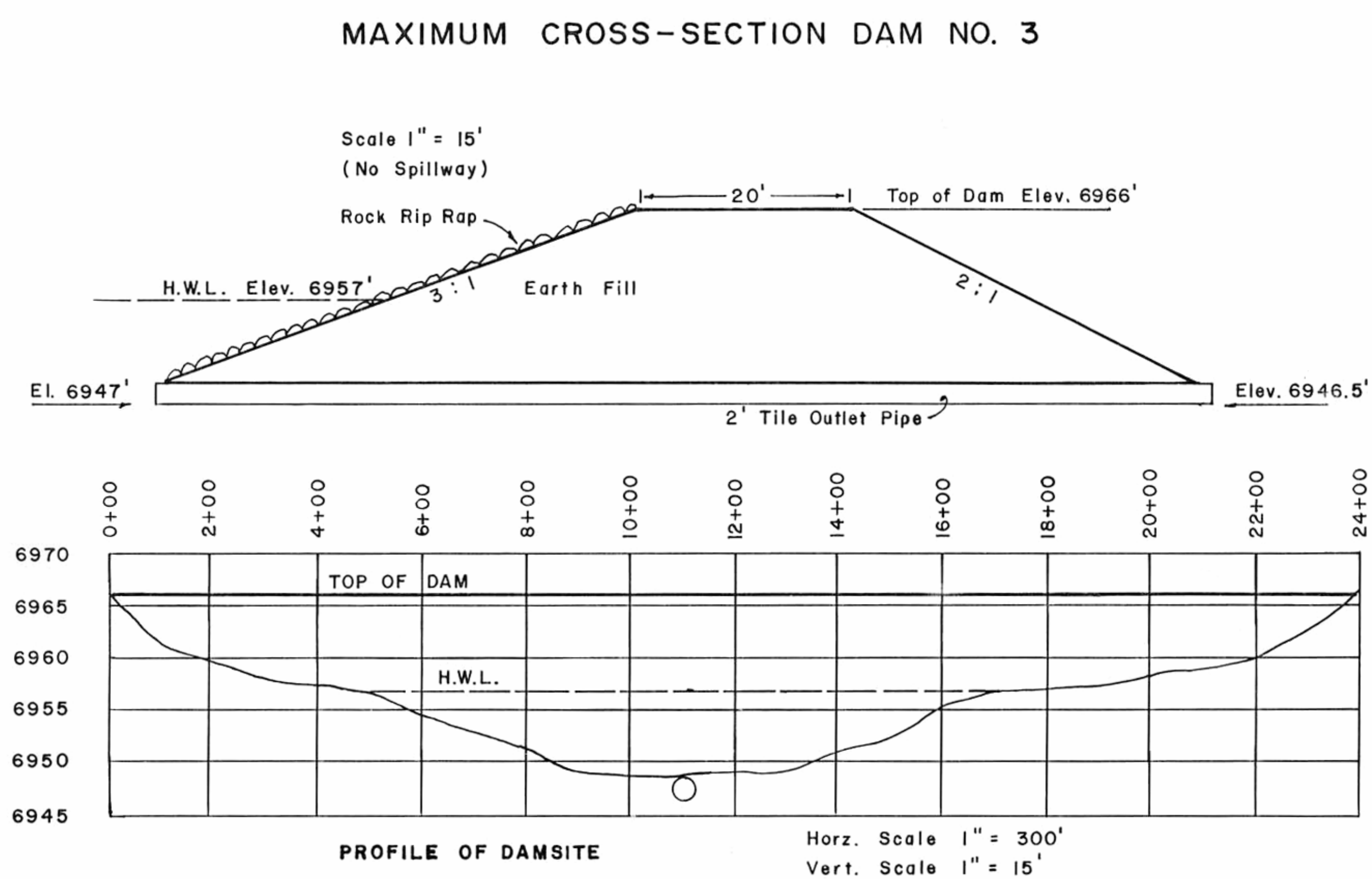


Figure 2.6.51

Wyoming State Engineer's Office (SEO) permit application cross section and dam profile – Wheatland Irrigation district No.3 Reservoir – Dam No.3

Source: SEO permit drawing

Title: Map to Accompany Petition to State Engineer and Amended Map for Wheatland Irrigation District No. 3 Reservoir

Permit No.(s): 4978 Res.

Filing Date: June 28, 1987

Lake Hattie Reservoir

Located in Albany County, Lake Hattie Reservoir is about 15 miles west of Laramie. The original purpose of the reservoir was to provide irrigation storage for water drawn from both the Big and Little Laramie Rivers. Water is released from Lake Hattie Reservoir into Hattie Canal No. 1 through large control gates and outlet pipes (WWC, 2003).

Lake Hattie has a permitted capacity of 65,260 acre-feet. The reservoir is permitted for irrigation, municipal use, industrial use, fish propagation, flood control, power, and domestic use. Lake Hattie is supplied by the Lake Hattie Supply Canals Nos. 1 and 2, which have a carrying capacity of 1,500 and 700 cubic feet per second, respectively. Lake Hattie Supply Canal No. 1 water comes from the Laramie River, while Supply Canal No. 2 comes from the Little Laramie River. Lake Hattie is used for hold-over irrigation water storage, and the quantity of water held over in the reservoir varies from year to year.

Significant sediment deposition has occurred in the southeastern corner of the lake, where reservoir outlet pipes and control gates are located. Due to this sediment buildup, the outlet control gates cannot currently be opened (WWC, 2003).

Inflow from the Laramie River into Lake Hattie varies from year to year. Senior water rights result in very little inflow into Lake Hattie during dry years. This reservoir also loses about three vertical feet per year of storage water to evaporation (WWC, 2003).

Table 2.6.62 provides a summary of Lake Hattie monthly storage data obtained from annual hydrographer's reports.

Table 2.6.62 Summary - historic Lake Hattie monthly storage

SEO permits: P1372R, P9250R											
Capacity: 28,426 acre-feet + 36,834 acre-feet = 65,260 acre-feet											
Monthly storage (recorded randomly and intermittently during the month - table shows single monthly value or last of several monthly values, acre-feet)											
Month	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Oct	dead stge	dead stge	14,000	dead stge	38,600	--	69,200	--	7,100	58,800	--
Nov	--	--	--	--	--	--	--	--	70,800	--	44,700
Dec	--	--	--	--	--	--	--	--	--	--	--
Jan	--	--	--	--	--	--	--	--	--	--	--
Feb	--	--	--	--	--	--	67,200	--	--	--	--
Mar	--	--	--	--	--	--	--	--	--	--	--
Apr	--	16,500	12,800	--	36,800	51,200	66,900	59,300	68,500	--	43,300
May	--	--	--	--	43,600	--	65,800	--	--	56,600	--
Jun	dead stge	--	--	10,400	57,300	69,500	--	80,000	67,900	--	34,500
Jul	--	--	--	42,000	57,800	66,900	65,800	77,300	64,300	58,200	--
Aug	--	--	--	--	--	--	64,100	--	--	--	--
Sep	dead stge	14,000	dead stge	--	53,400	64,800	63,000	72,900	59,700	--	--
Note: no inflow/outflow during 1992											
Source: 1992 - 2002 Wyoming State Engineer's Office Annual Hydrographer's Reports.											

James Lake Reservoir

James Lake is permitted for irrigation use. The reservoir is located in the channel of Seven Mile Creek and also receives water from Mill Creek through the James Lake Supply Canal-Mill Creek Diversion. This reservoir also receives water from the Little Laramie River through the Bellamy Ditch at a rate not to exceed 95.0 cubic feet per second (cfs). There is no dam associated with this reservoir.

Table 2.6.63 provides a summary of James Lake Reservoir monthly storage data obtained from annual hydrographer's reports.

Table 2.6.63 Summary - historic James Lake Reservoir monthly storage

SEO permit: P1279R											
Capacity (acre-feet): 8,990											
Supply source: Bellamy Ditch; maximum delivery capacity = 95 cubic feet per second											
End of month storage (acre-feet)											
Month	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Oct	dry		78		--	--	--	--	--	--	--
Nov	--		--		--	--	--	--	--	--	--
Dec	--		--		--	--	--	--	--	--	--
Jan	--		--		--	--	--	--	--	--	--
Feb	--		--		--	--	--	--	--	--	--
Mar	dry		--	dry	--	--	--	--	--	--	--
Apr	--		--		--	--	--	--	--	--	--
May	dry		--		--	--	--	--	--	--	--
Jun	--		--	1,390	--	--	--	--	--	--	--
Jul	dry		dry		--	--	--	--	--	--	--
Aug	dry		--		--	--	--	--	--	--	--
Sep	dry		dry	580	--	--	--	--	--	--	--
Source: 1992 - 2002 Wyoming State Engineer's Office Annual Hydrographer's Reports.											

Twin Buttes Reservoir

Twin Buttes Reservoir is located in Albany County, Wyoming. The reservoir is permitted for both fish propagation and recreation uses. A portion of the water stored in Twin Buttes Reservoir is a result of a change in point of storage of 300 acre-feet annually from Lake Hattie Reservoir. Located in the channel of Mortensen Draw, Twin Buttes Reservoir has a total permitted capacity of 3,912.3 acre-feet, of which 936.9 acre-feet is live storage and 2,975.4 acre-feet is dead storage. The maximum high-water surface elevation for the reservoir is 7,250 feet.

Table 2.6.64 provides the Wyoming State Engineer's Office (SEO) permit application Twin Buttes Reservoir area capacity table.

Table 2.6.64 Wyoming State Engineer's Office (SEO) permit application area capacity table - Twin Buttes Reservoir

Total available active storage capacity			
Contour	**Acres**	**Avg.**	**Capacity**
7250	333.80		
		312.3	936.90
7247	290.70		
		Total active storage capacity	936.9 acre-feet
Total unavailable dead storage capacity			
7247	290.70		
		269.2	538.40
7245	247.60		
		221.6	797.80
7241.4	195.70		
		186.2	260.70
7240	176.60		
		133.6	668.00
7235	90.60		
		75.3	376.50
7230	59.90		
		47.4	237.00
7225	34.90		
		19.4	97.00
7220	3.90		
		Total dead storage capacity	2975.4 acre-feet
		Total capacity	**3912.3 acre-feet**
Source: Wyoming State Engineer's Office Permit No. 7435R drawings.			

Figure 2.6.52 provides the Wyoming State Engineer’s Office (SEO) permit application Twin Buttes Reservoir dam and spillway cross section.

Figure 2.6.53 provides the Wyoming State Engineer’s Office (SEO) permit application Twin Buttes Reservoir dam profile.

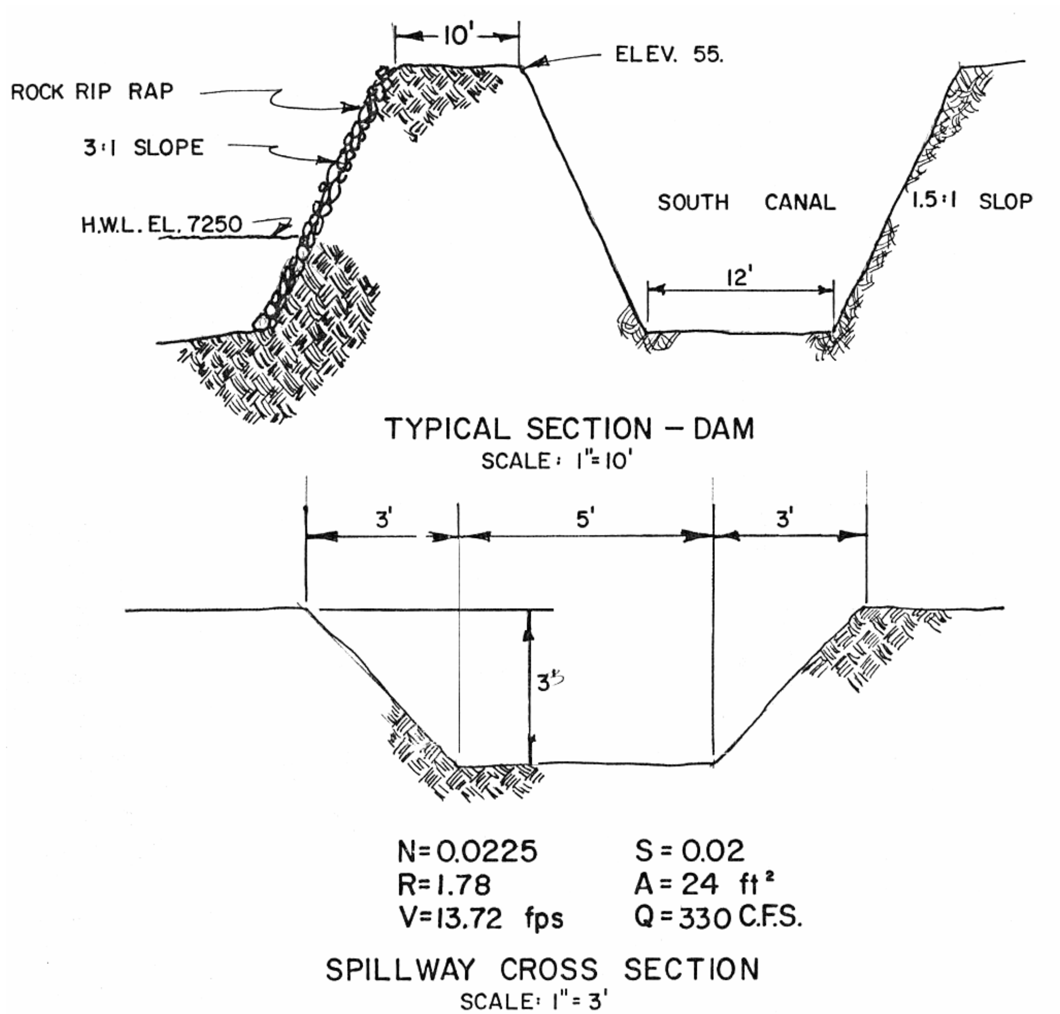


Figure 2.6.52

Wyoming State Engineer's Office (SEO) permit application dam and spillway cross section – Twin Buttes Reservoir

Source: SEO permit drawing

Title: Map to Accompany Application for Twin Buttes Reservoir

Permit No.(s): 7435 Res.

Filing Date: Unknown

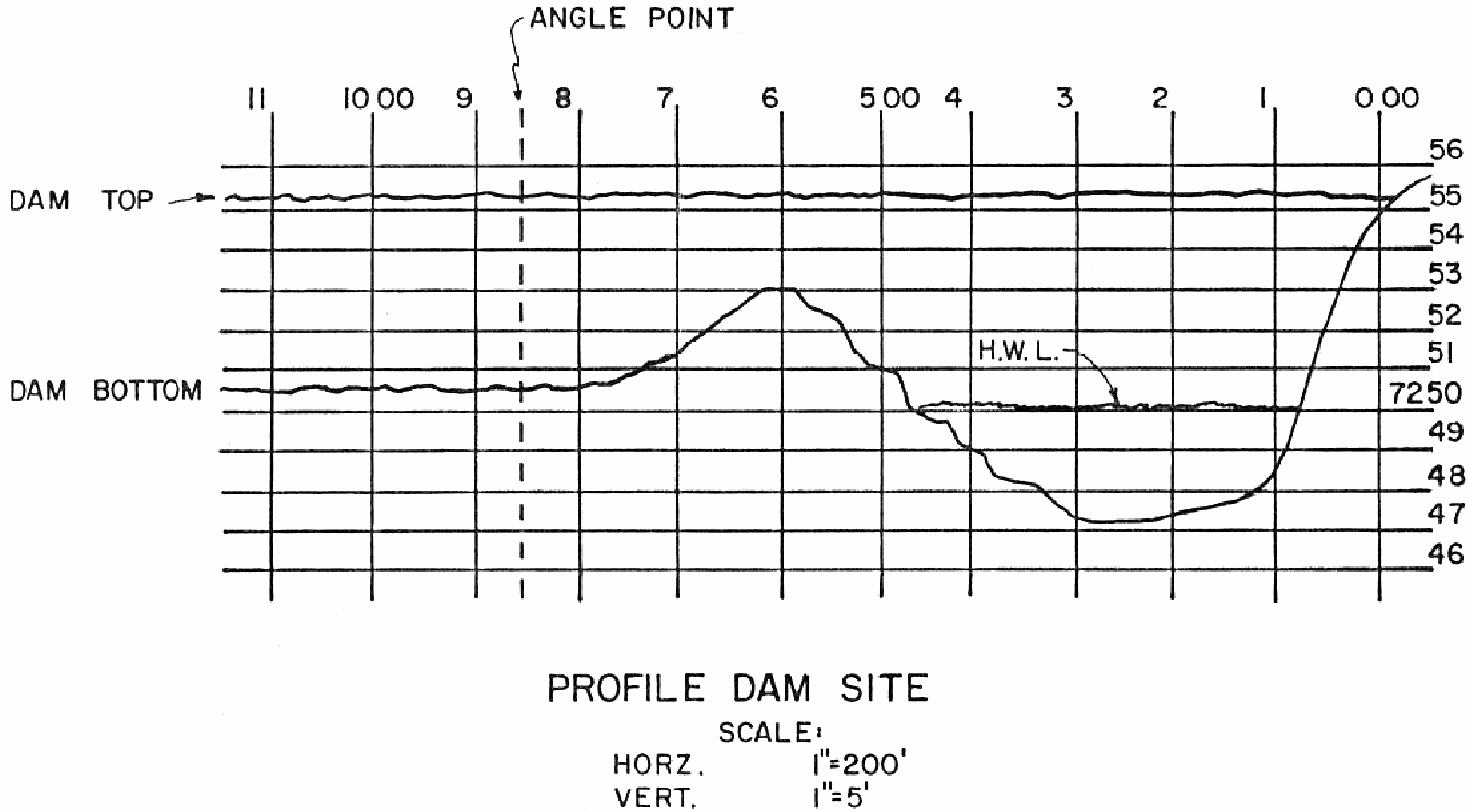


Figure 2.6.53
Wyoming State Engineer's Office (SEO) permit application dam profile– Twin Buttes Reservoir
Source: SEO permit drawing
Title: Map to Accompany Application for Twin Buttes Reservoir
Permit No.(s): 7435 Res.
Filing Date: Unknown

Twelve Mile Reservoir

Twelve Mile Reservoir is permitted for irrigation, domestic use, transportation, power, mechanic, manufacturing, mining, milling, quarrying, and for any and all beneficial uses. The reservoir is filled through the enlargement of the Pioneer Canal and the enlargement of the Lake Hattie Supply Canals No. 1 and No. 2. The permitted capacity of the reservoir is 3,420.5 acre-feet, and the reservoir surface area at the high-water line is 206 acres. The dam is an earthfill structure with brush riprap to prevent erosion.

Table 2.6.65 provides the Wyoming State Engineer's Office (SEO) permit application Twelve Mile Reservoir area capacity table.

Table 2.6.65 Wyoming State Engineer's Office (SEO) permit application area capacity table - Twelve Mile Reservoir

Contour	Area	Avg. Area	Depth	Volume	Capacity
7185	87.00				
		97	5.00	485	485
7190	107.00				
		118.5	5.00	592.5	1077.5
7195	130.00				
		143	5.00	715	1792.5
7200	156.00				
		167	4.00	668	2460.5
7204	178.00				
		192	5.00	960	3420.5
7209	206.00				
Feet	Acres	Acres	Feet	Acre-feet	Acre-feet
Source: Wyoming State Engineer's Office Permit No. 4156R drawings.					

Figure 2.6.54 provides the Wyoming State Engineer's Office (SEO) permit application Twelve Mile Reservoir dam cross section.

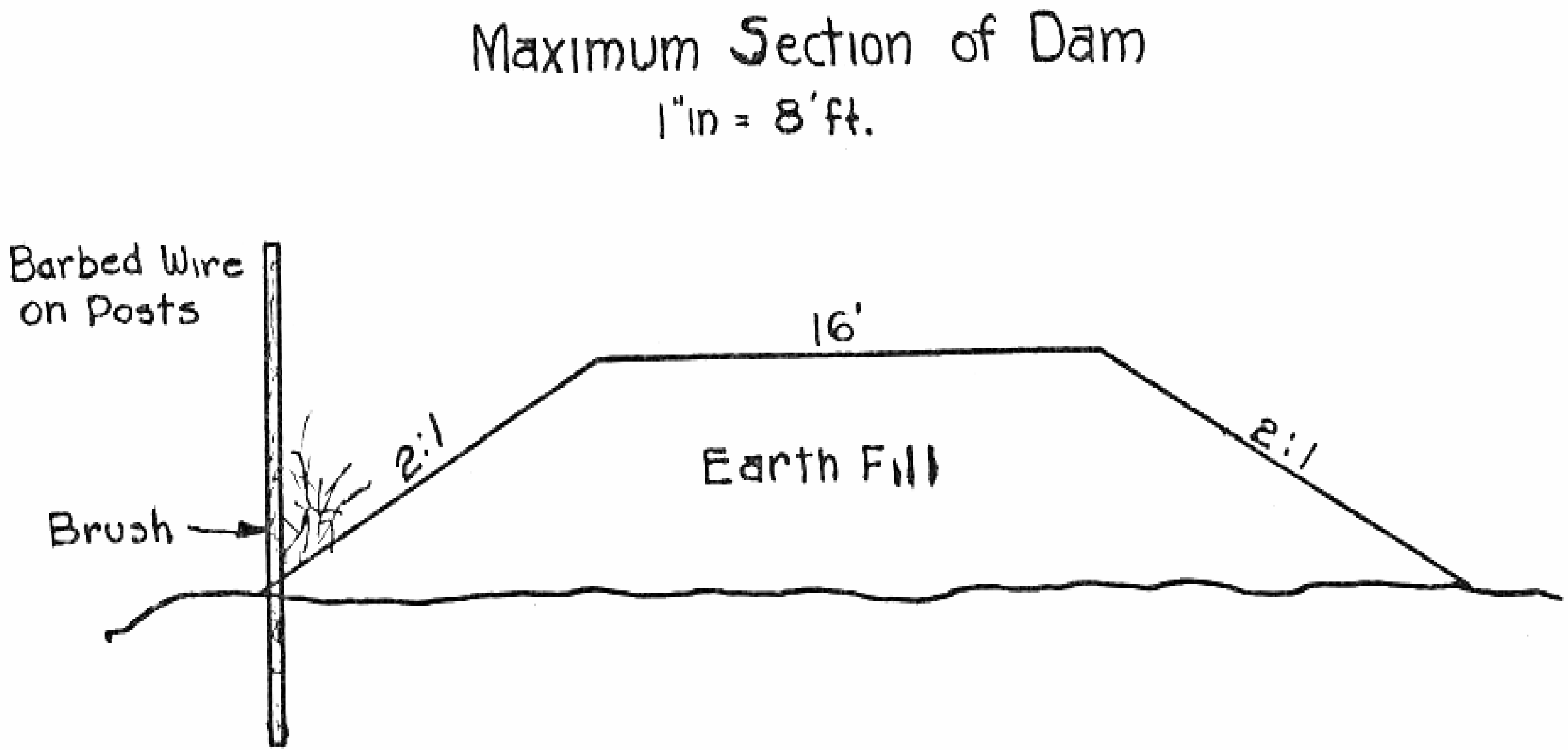


Figure 2.6.54
Wyoming State Engineer's Office (SEO) permit application cross section- Twelve Mile Reservoir
Source: SEO permit drawing
Title: Map to Accompany Petition for Twelve Mile Reservoir
Permit No.(s): 4156 Res.
Filing Date: May 14, 1936

Dutton Creek Reservoir

Dutton Creek Reservoir is located near Rock River, Wyoming, in Albany County. The reservoir is used for irrigation and stock watering and also receives water from Rock Creek through the Enlargement of the Canon Ditch. Dutton Creek Reservoir has a permitted capacity of 2,566 acre-feet and a surface area at the reservoir high-water line of 290 acres. The outlet is an 18-inch cast iron pipe, and a shut-off valve is located at the downstream end of the outlet pipe. The reservoir spillway is 200 feet wide.

King No. 1 Reservoir

King No. 1 Reservoir has a surface area of 230.2 acres at the reservoir high-water line and a permitted capacity of 2,216 acre-feet. This reservoir also receives water from Rock Creek through the Enlargement of the Canon Ditch and from One Mile Creek through the Enlargement of the Canon Ditch. The dam crest width is 20 feet. In 1977, plans for renovation of the dam outlet works were approved. A 30-inch corrugated metal pipe (CMP) outlet replaced an existing 24-inch outlet pipe.

Sportsman Lake Reservoir

Sportsman Lake is a natural reservoir with a permitted capacity of 1,459 acre-feet. The reservoir is supplied through the Sportsman Lake supply ditch, which has a carrying capacity of 86 cubic feet per second. Sportsman Lake discharges water through an open cut ditch.

Table 2.6.66 provides the Wyoming State Engineer’s Office (SEO) permit application Sportsman Lake Reservoir area capacity table.

Table 2.6.66 Wyoming State Engineer's Office (SEO) permit application area capacity table - Sportsman Lake Reservoir

Contour	Area (acres)	Average area	Capacity (acre-feet)
100	160.00		
		173	865.00
105	186.00		
		198	594.00
108	210.00		
		Total capacity	**1,459**

Source: Wyoming State Engineer's Office Permit No. 5641R drawings.

Figure 2.6.55 provides the Wyoming State Engineer's Office (SEO) permit application Sportsman Lake Reservoir outlet design.

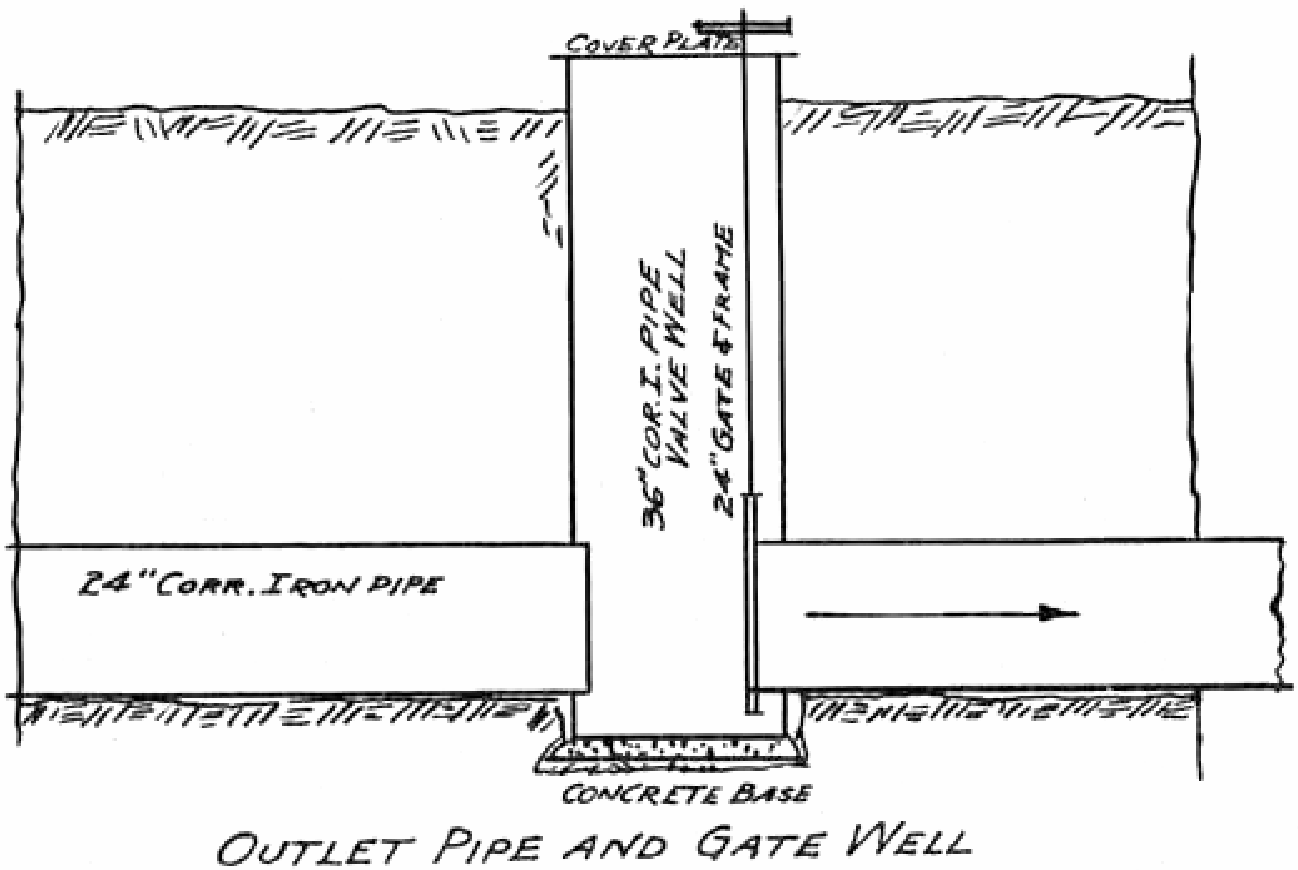


Figure 2.6.55
Wyoming State Engineer's Office (SEO) permit application outlet design – Sportsman Lake Reservoir
Source: SEO permit drawing
Title: Map to Accompany Applications for Sportsman Lake Reservoir and Supply Ditch
Permit No.(s): 5641 Res., 20183
Filing Date: December 17, 1948

Willow Creek Reservoir

Willow Creek Reservoir is located on the channel of Willow Creek. The permitted uses for the Willow Creek Reservoir are irrigation, stock use, and domestic use. The permitted capacity of the reservoir is 473.71 acre-feet, and the dam has a crest width of 12 feet. Total reservoir capacity at the emergency spillway invert elevation is 1,505.24 acre-feet.

Table 2.6.67 provides the Wyoming State Engineer's Office (SEO) permit application Willow Creek Reservoir area capacity table.

Table 2.6.67 Wyoming State Engineer's Office (SEO) permit application area capacity table - Willow Creek Reservoir and Willow Creek Reservoir No. 2

Willow Creek Reservoir

		Contour	Area	Average	Capacity		
		92	41.83				
				50.07	200.28		
		96	58.32				
				68.02	272.08		
		100	77.73				
		Total available capacity			**472.36**		

Source: Wyoming State Engineer's Office Permit No. 5620R drawings.

Willow Creek Reservoir No. 2

		Contour	Area (acres)	Average	Capacity (acre-feet)		
		7385.50	0.00				
				0.26	0.65		
		7388.00	0.52			Inactive storage 10.02 acre-feet - this application	
				1.42	2.84		
		7390.00	2.32				
				2.84	6.53		
		7392.30	3.35				
				4.78	12.91	Appropriations transferred to this site (761 Res & 5620 Res)	
Res permit No. 761 Res. 284.27 acre-feet		7395.00	6.20				
				14.88	74.40		
		7400.00	23.56				
				33.22	166.10		
		7405.00	42.88			Active storage 756.63 acre-feet (irrigation)	
				44.09	30.86		
		7405.70	45.30				
				58.44	251.29		
Res Permit No. 5620 Res 472.36 acre-feet		7410.00	71.58				
				76.23	221.07		
		7412.90	80.88				
				88.35	185.54		
		7415.00	95.81			This application 463.69 acre-feet - irrigation	
				103.02	2,778.15		
		7417.70	110.22				
		Total available capacity			1,230.34		
				119.52	274.90	Flood control 274.90 acre-feet - this site	
		7420.00	128.81				
		Total flood control			274.90		

Source: Wyoming State Engineer's Office Permit No. 8026R drawings.

Figures 2.6.56 and 2.6.57 provide the Wyoming State Engineer's Office (SEO) permit application Willow Creek No. 2 Reservoir cross sections of the main dam and Dike No. 1, the larger of two secondary dams.

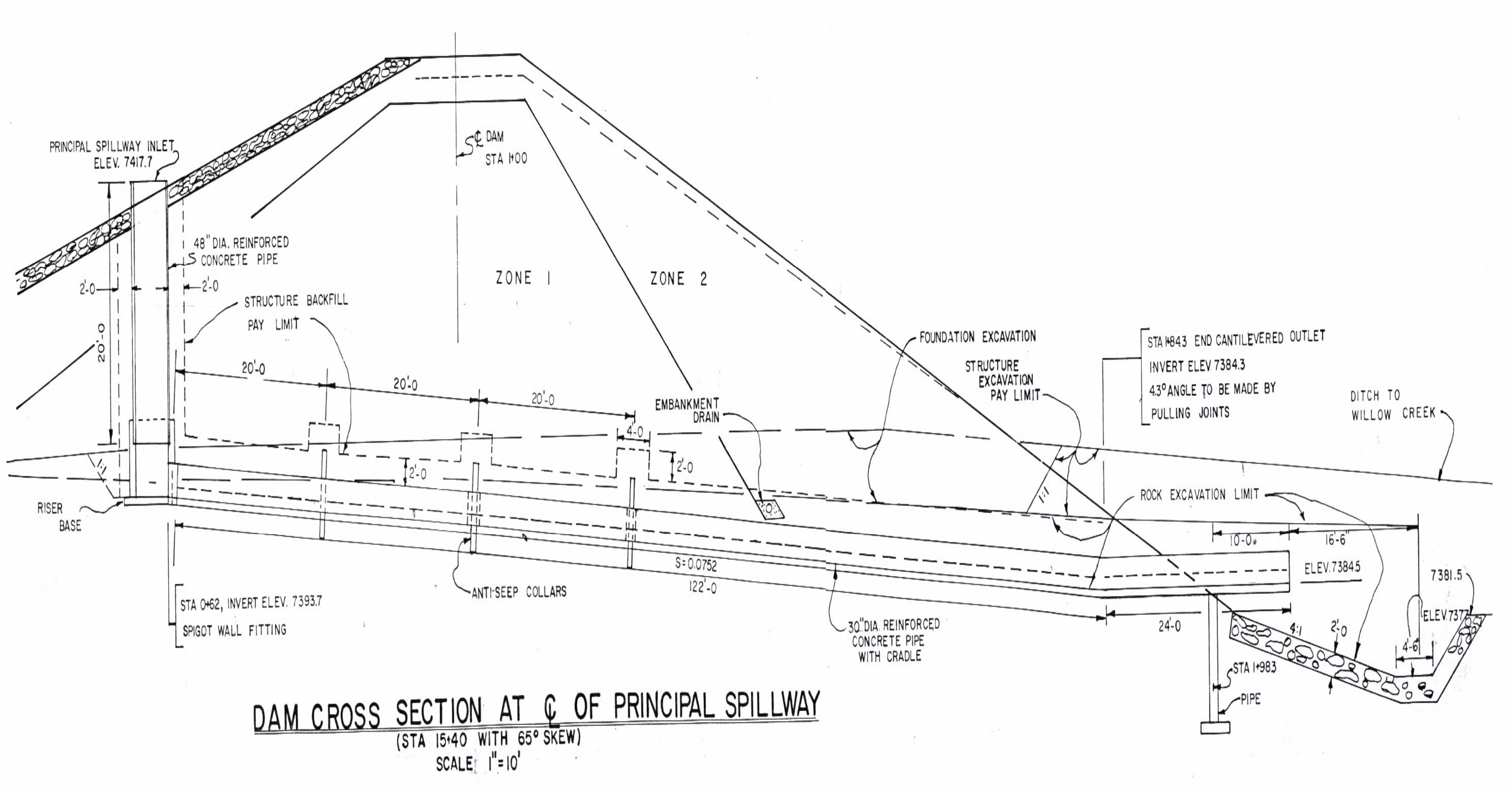


Figure 2.6.56

Wyoming State Engineer's Office (SEO) permit application main dam cross section – Willow Creek No. 2 Reservoir

Source: SEO permit drawing

Title: Map to Accompany Application for Willow Creek No. 2 Reservoir

Permit No.(s): 8026 Res.

Filing Date: April 26, 1979

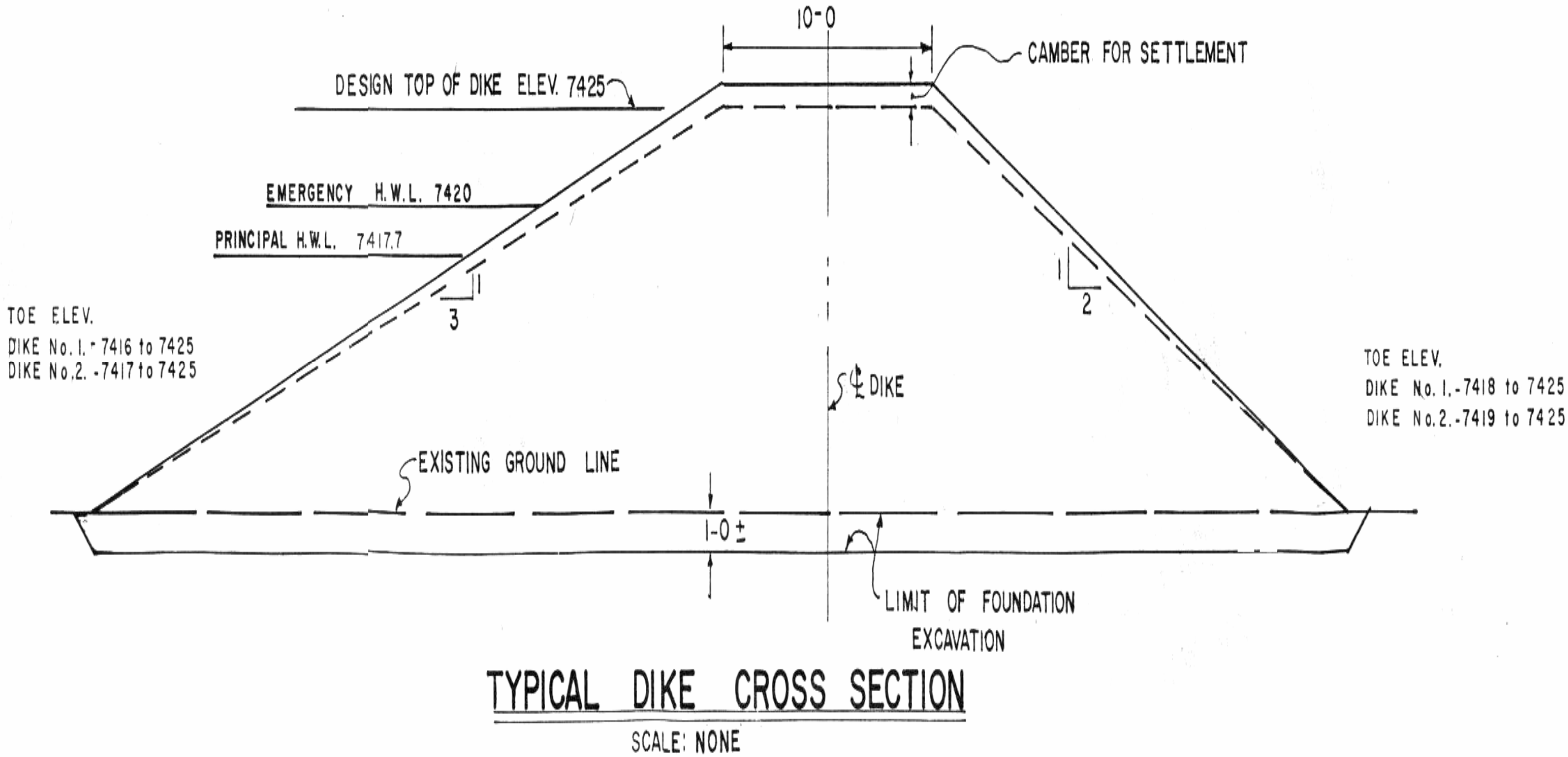


Figure 2.6.57
Wyoming State Engineer's Office (SEO) permit application dike (second dam) cross section – Willow Creek No. 2 Reservoir
Source: SEO permit drawing
Title: Map to Accompany Application for Willow Creek No. 2 Reservoir
Permit No.(s): 8026 Res.
Filing Date: April 26, 1979

Berg Reservoir (Lake Owen)

Berg Reservoir, also known as Lake Owen, has a permitted storage capacity of 750.68 acre-feet. This reservoir is included in this section due to the fact that it is an essential component of the City of Cheyenne municipal water supply system. Berg Reservoir is filled through the Douglas Creek Diversion Pipeline and is used for municipal, industrial, and irrigation purposes.

Table 2.6.68 provides a summary of Berg Reservoir (Lake Owen) monthly inflow from Rob Roy Reservoir data obtained from annual hydrographer's reports.

Table 2.6.68 Summary - historic Berg Reservoir (Lake Owen) monthly inflow from Rob Roy Reservoir (acre-feet)

Month	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Oct	186	1,069	605	862	504	675	451	373	303	563	624
Nov	180	246	153	546	99	385	159	106	314	594	510
Dec	164	248	114	578	93	443	155	125	393	542	452
Jan	184	369	685	589	93	462	136	507	399	478	682
Feb	255	1,076	543	503	75	443	112	438	431	354	987
Mar	114	867	225	615	93	258	124	371	413	536	1,152
Apr	53	135	186	954	499	52	22	721	282	504	498
May	1,021	191	623	220	100	293	0	199	1,638	138	1,889
Jun	1,783	20	1,227	47	1,149	197	230	53	1,636	370	2,102
Jul	1,380	1,073	1,466	0	1,356	780	212	373	1,893	1,446	2,363
Aug	1,178	702	1,456	670	1,337	584	337	632	1,687	1,753	2,012
Sep	1,108	610	1,396	796	1,131	375	450	488	1,230	1,293	925

Source: 1992 - 2002 Wyoming State Engineer's Office Annual Hydrographer's Reports.

Table 2.6.69 provides the Wyoming State Engineer's Office (SEO) permit application Berg Reservoir (Lake Owen) area capacity table.

Figure 2.6.58 provides the Wyoming State Engineer's Office (SEO) permit application Berg Reservoir (Lake Owen) dam cross section.

Figure 2.6.59 provides the Wyoming State Engineer's Office (SEO) permit application Berg Reservoir (Lake Owen) dam profile.

Figure 2.6.60 provides the Wyoming State Engineer's Office (SEO) permit application Berg Reservoir (Lake Owen) spillway cross section.

Tables 2.6.70 through 2.6.74 provide an overview of the Wyoming State Engineer's Office (SEO) permit application information for major reservoirs in the Upper Laramie subbasin.

Table 2.6.69 Wyoming State Engineer's Office (SEO) permit application area capacity table - Berg Reservoir (Lake Owen)

Contour	Area in acres	Area avg.	Capacity acre ft.	Accum. cap. acre ft.
8948	92.08			
		97.09	194.17	194.17
8950	102.09			
		111.3	556.51	750.68
8955	120.51			
Source: Wyoming State Engineer's Office Permit No. 6537R drawings.				

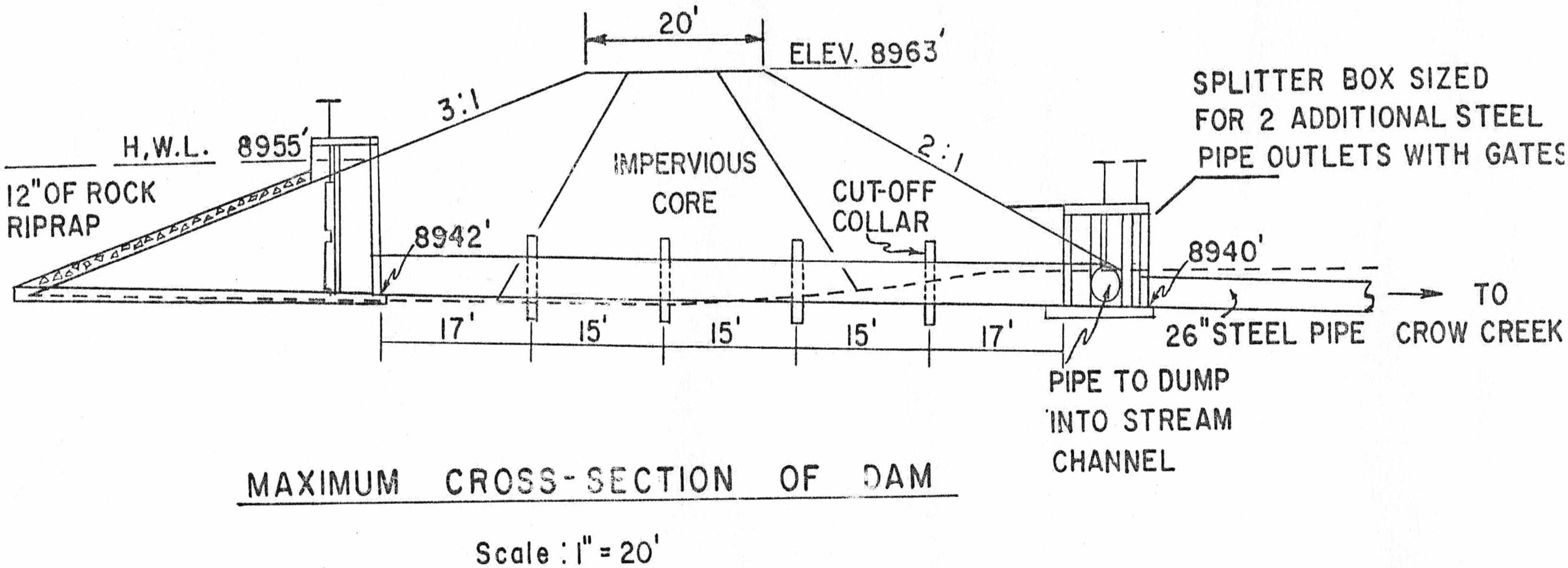


Figure 2.6.58

Wyoming State Engineer's Office (SEO) permit application dam cross section – Berg Reservoir (Lake Owen)

Source: SEO permit drawing

Title: Map to Accompany Applications for Berg Reservoir

Permit No.(s): 6537 Res.

Filing Date: May 2, 1961

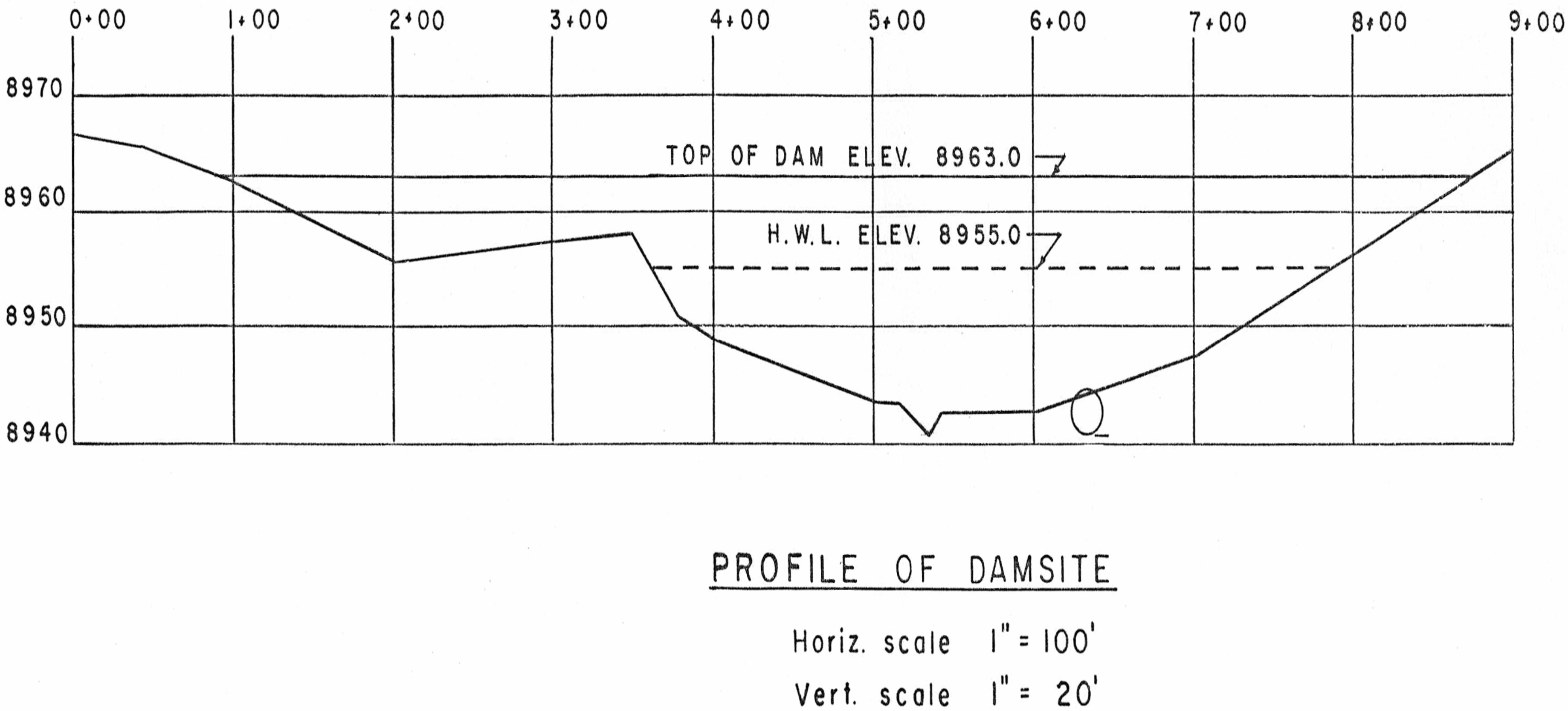


Figure 2.6.59
Wyoming State Engineer's Office (SEO) permit application dam profile – Berg Reservoir (Lake Owen)
Source: SEO permit drawing
Title: Map to Accompany Applications for Berg Reservoir
Permit No.(s): 6537 Res.
Filing Date: May 2, 1961

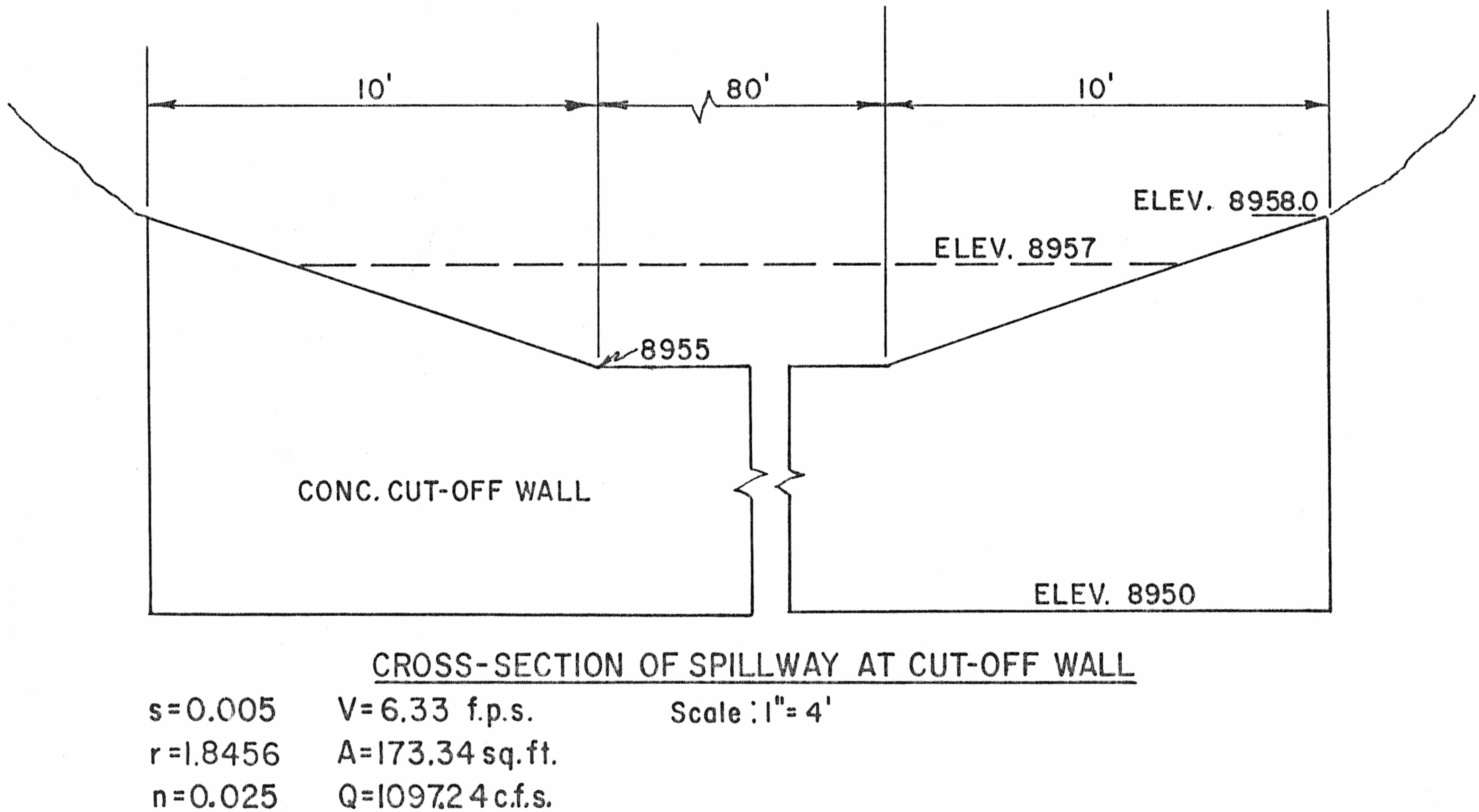


Figure 2.6.60
Wyoming State Engineer's Office (SEO) permit application spillway cross section – Berg Reservoir (Lake Owen)
Source: SEO permit drawing
Title: Map to Accompany Applications for Berg Reservoir
Permit No.(s): 6537 Res.
Filing Date: May 2, 1961

Trihydro

Table 2.6.70 Summary - locations of major reservoirs in the Upper Laramie subbasin

Structure number	Permit number	Reservoir name	Township	Range	Section	Qtr qtr	Nearest city	County
1	P1724D	Wyoming Development Company No. 2 Reservoir (Wheatland No. 2)	22	73	31	NWSW	Rock River	Albany
2	P4978R	Wheatland Irrigation District No. 3 Reservoir	22	74	26	NENE	Rock River	Albany
3	P1372R	Lake Hattie Reservoir	15	76	26	NWSW	Laramie	Albany
	P9250R	Lake Hattie Reservoir, Enl.	15	76	26	NWSW	Laramie	Albany
4	P1279R	James Lake Reservoir	17	76	2	NENE	Laramie	Albany
5	P7435R	Twin Buttes Reservoir	15	75	30	NESE	Laramie	Albany
6	P4156R	Twelve Mile Reservoir	14	74	6	NENW	Laramie	Albany
7	P528R	Dutton Creek Reservoir	19	77	25	NWNE	Rock River	Albany
	P1215R	Dutton Creek Reservoir, Enl.	19	77	25	NWNE	Rock River	Albany
	P2375R	Dutton Creek Reservoir, 2nd Enl.	19	77	25	NWNE	Rock River	Albany
8	P3617R	King No. 1 Reservoir	19	77	29	SENE	Rock River	Albany
9	P5641R	Sportsman Lake Reservoir	13	74	2	SENE	Laramie	Albany
10	P761R	Willow Creek Reservoir (as changed to Willow Creek No. 2 Reservoir)	13	73	4	NENW	Cheyenne	Albany
	P5620R	Willow Creek Reservoir, 1st Enl. (as changed to Willow Creek No. 2 Reservoir)	13	73	4	NENW	Cheyenne	Albany
	P8026R	Willow Creek No. 2 Reservoir	13	73	4	NENW	Cheyenne	Albany
11	P6537R	Berg (Lake Owen) Reservoir	14	78	25	SESE	Cheyenne	Albany

Source: Wyoming State Engineer's Office.

Table 2.6.71 Summary - permitted capacities of major reservoirs in the Upper Laramie subbasin

Structure number	Permit number	Reservoir name	Active capacity acre-feet	Inactive capacity acre-feet	Enlargement capacity acre-feet	Total capacity acre-feet
1	P1724D	Wyoming Development Company No. 2 Reservoir (Wheatland No. 2)				98,934.00
2	P4978R	Reservoir	47,429.80	23,889.00		71,318.80
3	P1372R	Lake Hattie Reservoir				28,426.00
	P9250R	Lake Hattie Reservoir, Enl.			36,834.00	65,260.00
4	P1279R	James Lake Reservoir				8,990.00
5	P7435R	Twin Buttes Reservoir	936.90	2,975.40		3,912.30
6	P4156R	Twelve Mile Reservoir				3,420.50
7	P528R	Dutton Creek Reservoir				
	P1215R	Dutton Creek Reservoir, Enl.				
	P2375R	Dutton Creek Reservoir, 2nd Enl.				
8	P3617R	King No. 1 Reservoir				
9	P5641R	Sportsman Lake Reservoir				1,459.00
10	P761R	Willow Creek Reservoir (as changed to Willow Creek No. 2 Reservoir)				284.27
	P5620R	Willow Creek Reservoir, 1st Enl. (as changed to Willow Creek No. 2 Reservoir)			472.36	756.63
	P8026R	Willow Creek No. 2 Reservoir				473.71
11	P6537R	Berg (Lake Owen) Reservoir				750.68

Source: Wyoming State Engineer's Office.

Table 2.6.72 Summary - permitted beneficial uses of major reservoirs in the Upper Laramie subbasin

Structure number	Permit number	Reservoir name	Applicant name	Priority date	Source	Use
1	P1724D	Wyoming Development Company No. 2 Reservoir (Wheatland No. 2)	Wyoming Development Company	1/29/1898	Laramie River	Irrigation, domestic
2	P4978R	Wheatland Irrigation District No. 3 Reservoir	Wheatland Irrigation District	5/31/1929	Laramie River	Irrigation, stock
3	P1372R	Lake Hattie Reservoir	Laramie Water Company	5/11/1908	Laramie River	Irrigation
	P9250R	Lake Hattie Reservoir, Enl.	Pioneer Canal/Lake Hattie Irrigation District	5/1/1986	Laramie River and Little Laramie River	Irrigation, municipal, industrial, fish propagation, flood control, power, domestic
4	P1279R	James Lake Reservoir	Harris Ranch and Frank Bosler	3/27/1908	Little Laramie River	Irrigation
5	P7435R	Twin Buttes Reservoir	Wyoming Game and Fish Commission	2/3/1972	Mortensen Draw	Fish propagation, recreation
6	P4156R	Twelve Mile Reservoir	Monolith Portland Midwest Company	1/31/1929	Laramie River	Irrigation
7	P528R	Dutton Creek Reservoir	Wheatland Irrigation District	7/1/1904	Dutton Creek	Irrigation
	P1215R	Dutton Creek Reservoir, Enl.	Wheatland Irrigation District	2/17/1908	Dutton Creek	Irrigation, stock
	P2375R	Dutton Creek Reservoir, 2nd Enl.	Wheatland Irrigation District	8/2/1912	Dutton Creek	Irrigation, stock
8	P3617R	King No. 1 Reservoir	Herbert King, et al	2/7/1920	Seepage Creek	Irrigation
9	P5641R	Sportsman Lake Reservoir	Monaghan Farms, Inc.	10/12/1948	Five Mile Creek	Irrigation, Stock
10	P761R	Willow Creek Reservoir (as changed to Willow Creek No. 2 Reservoir)	Monaghan Farms, Inc.	10/17/1905	Willow Creek	Stock, irrigation
	P5620R	Willow Creek Reservoir, 1st Enl. (as changed to Willow Creek No. 2 Reservoir)	Monaghan Farms, Inc.	9/15/1947	Willow Creek	Irrigation, stock, domestic
	P8026R	Willow Creek No. 2 Reservoir	Monaghan Farms, Inc.	8/2/1978	Willow Creek	Irrigation
11	P6537R	Berg (Lake Owen) Reservoir	City of Cheyenne Board of Public Utilities	5/8/1956	Douglas Creek	Industrial, irrigation, municipal
Source: Wyoming State Engineer's Office.						

Table 2.6.73 Summary - outlet works descriptions for major reservoirs in the Upper Laramie subbasin

Structure number	Permit number	Reservoir name	Outlet works description
1	P1724R	Wyoming Development Company No. 2 Reservoir (Wheatland No. 2)	SEO permit drawings of this dam show an approximately 34 foot high by 4 foot inside dimeter masonry drop inlet and an approximately 7 foot diameter masonry outlet tunnel lying on a concrete foundation.
2	P4978R	Wheatland Irrigation District No. 3 Reservoir	The outlet canal has side slopes of 1.5:1, a bottom width of 20-feet, a depth of 4.1-feet and a flow rate of 603 cubic feet per second. The intake-outlet canal has side slopes of 1.5:1, a bottom width of 40-feet, a depth of 20-feet and a flow rate of 7,756 cubic feet per second. There are three gates at each outlet structure, which are 4-feet wide by 6-feet high. The flow rate is 189.29 cubic feet per second over a sharp crested weir. The total capacity for the three gates with the water level at the top of the gates is 567.9 cubic feet per second.
3	P1372R	Lake Hattie Reservoir	
	P9250R	Lake Hattie Reservoir, Enl.	
4	P1279R	James Lake Reservoir	The outlet is through a canal 200-feet wide on the bottom and a water depth of 4-feet. The outlet material is a very fine gravel with considerable silt.
5	P7435R	Twin Buttes Reservoir	The outlet consists of two 48-inch corrugated metal pipes with stop log gates. The outlet material is alluvial soils.
6	P4156R	Twelve Mile Reservoir	discharges when the reservoir is half full at 26 second-feet. The outlet material is earth.
7	P528R	Dutton Creek Reservoir	
	P1215R	Dutton Creek Reservoir, Enl.	The outlet consists of an 18-inch cast iron pipe with a shut-off valve on the lower end.
	P2375R	Dutton Creek Reservoir, 2nd Enl.	The outlet consists of one 18-inch cast iron pipe with a shut-off valve on the lower end.
8	P3617R	King No. 1 Reservoir	inch by 78-inch galvanized metal cutoff collars. The outlet material is earth.
9	P5641R	Sportsman Lake Reservoir	The outlet channel has a bottom width of 6-feet, a water depth of 2-feet and side slopes of 1:1. The outlet pipie is a 24-inch corrugated iron pipie through a 36-inch corrugated iron pipe valve well with 24-inch gate and frame. The outlet material is earth.
10	P8026R	Willow Creek No. 2 Reservoir	The outlet works or "principal spillway" of Willow Creek Reservoir No. 2 consists of a 48 inch diameter vertical reinforced concrete pipe drop inlet discharging to a 30 inch diameter reinforced concrete discharge pipe that extends through the dam to a riprap-lined basin located at the downstream toe of the dam. The 30 inch diameter discharge pipe lies on a concrete foundation and steel anti-seep collars are located at 20 foot intervals along the pipe. The dam also includes a second "drawdown outlet" consisting of a 16 inch diameter reinforced concrete discharge pipe.
	P5620R	Willow Creek Reservoir, 1st Enl. (as changed to Willow Creek No. 2 Reservoir)	
	P761R	Willow Creek Reservoir (as changed to Willow Creek No. 2 Reservoir)	
11	P6537R	Berg (Lake Owen) Reservoir	The outlet works consists of a gated outlet discharging through the dam via a pipe to a splitter box located at the downstream reservoir toe; two gated pipes at the splitter box discharge to the adjacent stream channel and to the pipeline to Crow Creek, respectively.

Source: Wyoming State Engineer's Office.

Table 2.6.74 Summary - emergency spillway descriptions for major reservoirs in the Upper Laramie subbasin

Structure number	Permit number	Reservoir name	Spillway description
1	P1724D	Wyoming Development Company No. 2 Reservoir (Wheatland No. 2)	Existing Wyoming State Engineer's Office permit drawings for this reservoir do not show an open-channel emergency spillway. The dam profile shown on permit drawings shows both "outlet arches" and "outlet pipes."
2	P4978R	Wheatland Irrigation District No. 3 Reservoir	There are no spillways at any of the three dams that comprise Wheatland Irrigation District No. 3 Reservoir.
3	P1372R	Lake Hattie Reservoir	The spillway is a natural spillway with a small amount of concrete work.
	P9250R	Lake Hattie Reservoir, Enl.	
4	P1279R	James Lake Reservoir	
5	P7435R	Twin Buttes Reservoir	The spillway is at elevation 7250 feet. The spillway has a bottom width of 5-feet and a depth of 3-feet. The flow rate is 330 cubic feet per second.
6	P4156R	Twelve Mile Reservoir	
7	P528R	Dutton Creek Reservoir	
	P1215R	Dutton Creek Reservoir, Enl.	The spillway is 150-feet wide.
	P2375R	Dutton Creek Reservoir, 2nd Enl.	The spillway is 800-feet wide on the bottom and has a depth of 9-feet.
8	P3617R	King No. 1 Reservoir	The spillway weir has 1:1 side slopes, a crest width of 4-feet and 25-feet of coursed masonry.
9	P5641R	Sportsman Lake Reservoir	
10	P761R	Willow Creek Reservoir (as changed to Willow Creek No. 2 Reservoir)	
	P5620R	Willow Creek Reservoir, 1st Enl. (as changed to Willow Creek No. 2 Reservoir)	
	P8026R	Willow Creek No. 2 Reservoir	Willow Creek No. 2 Reservoir has both a north and south emergency spillway, or Emergency Spillways No. 1 and No. 2, respectively. Both emergency spillways are open-channel flow structures with 2H:1V side slopes. The north or No. 1 structure has a 100 foot base width, and the south or No. 2 structure has a 200 foot base width.
11	P6537R	Berg (Lake Owen) Reservoir	At the cut-off wall, the spillway has a design capacity of 1,097.2 cubic feet per second. The bottom width of the spillway is 80 feet.

Source: Wyoming State Engineer's Office

2.6.5.5 Major Reservoirs in the Lower Laramie Subbasin

The locations of major reservoirs in the Lower Laramie subbasin are shown on Figure 2.6.61.

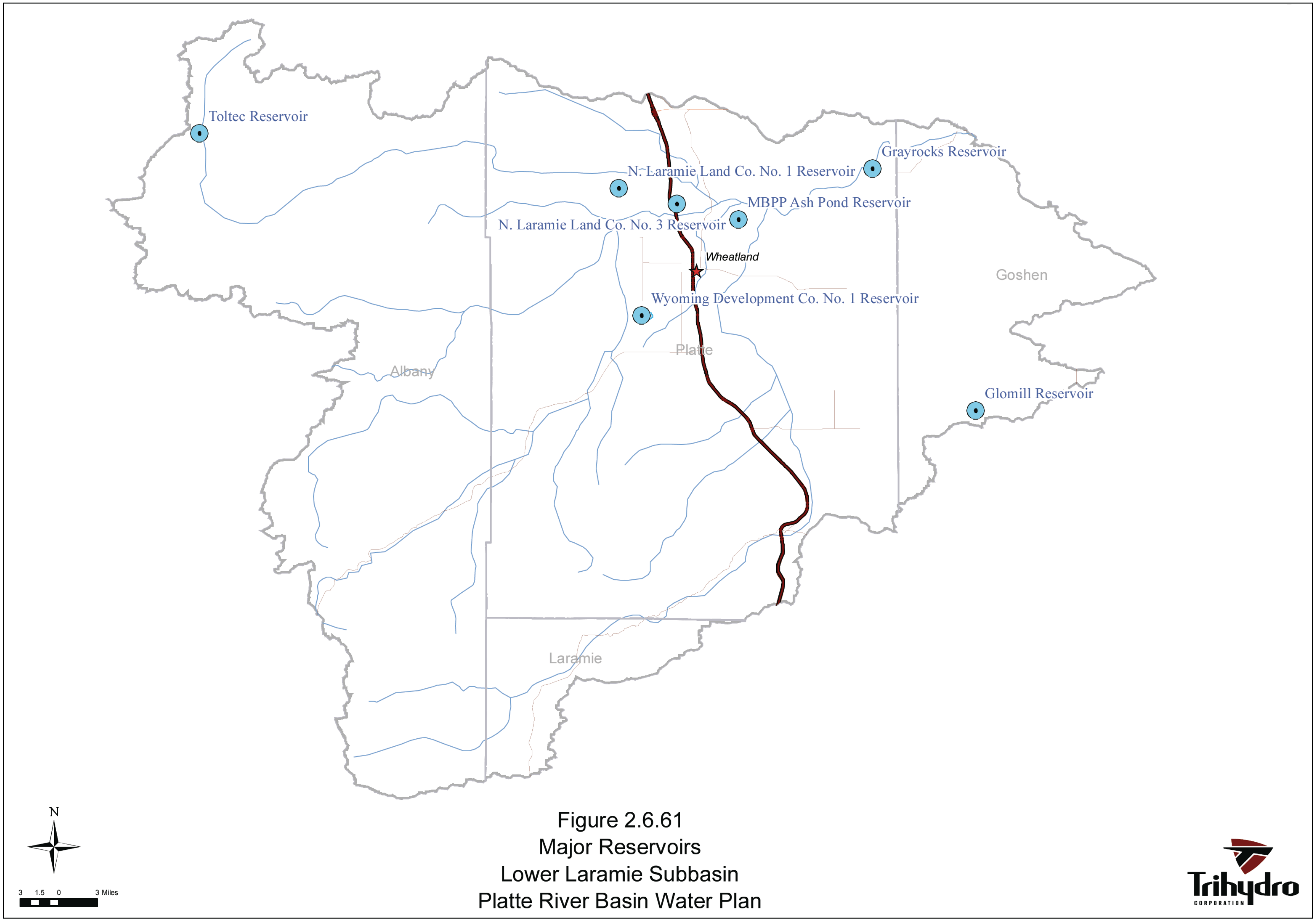


Figure 2.6.61
Major Reservoirs
Lower Laramie Subbasin
Platte River Basin Water Plan

Trihydro CORPORATION

Grayrocks Reservoir

Located near Wheatland, Wyoming, in Platte County, Grayrocks Reservoir is a zoned earthfill structure with a permitted capacity of 104,109.6 acre-feet. The reservoir is located on the channel of the Laramie River and is permitted for fish propagation, irrigation, wildlife, industrial, and recreational uses. The dam is 94 feet high with a crest length of 2,555 feet. The upstream embankment slope is 3:1, and the downstream embankment slope is 2.5:1. The upstream slope is also protected by riprap.

Grayrocks Reservoir has both a principal spillway or outlet works and an emergency spillway. The principal spillway is constructed of reinforced concrete and has a discharge capacity of 13,500 cubic feet per second at the maximum high-water surface elevation of 4,415 feet. The principal spillway or outlet works is located close to the right abutment of the dam. This principal spillway's location was chosen to reduce foundation subsidence under the spillway. From the principal spillway, water discharges directly into the Laramie River (J.T. Banner & Associates, 1975). The emergency spillway is an unlined fuse plug structure with a discharge capacity of 131,000 cubic feet per second at the maximum reservoir high-water line.

Table 2.6.75 provides a summary of Grayrocks Reservoir end-of-month storage and monthly inflow from annual hydrographer's reports.

Table 2.6.75 Summary - historic Grayrocks Reservoir end-of-month storage and monthly inflow

SEO permit: P7649R											
Dead storage: 2,558.1 acre-feet											
Active storage: 101,551.5 acre-feet											
Total capacity: 104,109.60 acre-feet											
Max high water line (HWL) elevation: 4415											
Normal HWL elevation: 4405											
End of month storage (acre-feet)											
Month	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Oct	81,835	69,037	76,600	73,373	102,400	92,504	89,481	93,106	100,596	88,506	88,831
Nov	83,084	67,634	78,800	72,493	105,900	93,869	91,449	95,797	102,001	88,506	88,181
Dec	84,658	67,073	80,600	72,786	105,900	95,576	94,783	97,838	104,109	89,805	88,181
Jan	86,570	67,915	8,300	73,666	104,800	97,624	97,149	99,907	105,183	91,781	87,857
Feb	88,181	69,037	84,700	74,253	104,800	99,672	98,873	101,650	105,541	93,438	87,857
Mar	98,455	72,199	89,200	74,840	105,500	91,821	102,704	103,055	105,541	94,783	89,156
Apr	89,156	73,960	90,100	72,786	105,500	96,259	104,825	105,541	108,054	99,562	89,156
May	85,933	76,939	91,100	92,443	105,500	95,917	105,541	104,825	105,541	104,109	86,251
Jun	82,460	80,898	88,800	107,690	104,100	95,576	104,109	102,353	103,055	102,353	82,460
Jul	81,210	79,368	85,900	105,541	100,900	93,187	100,596	102,704	98,183	99,907	76,339
Aug	76,939	78,114	80,300	101,650	96,800	92,163	97,838	99,907	92,433	94,107	71,332
Sep	72,493	75,440	75,100	99,217	93,100	89,831	94,107	99,217	89,805	90,130	66,512
Average monthly outflow (acre-feet)											
Month	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Oct	2,513.1	2,475.4	2,542.8	2,622.2	2,520.8	2,251.3	2,862.2	2,652.0	2,777.0	2,779.0	2,862
Nov	2,384.2	2,546.8	2,376.2	2,616.2	4,198.5	2,449.6	2,614.3	2,527.0	2,741.0	2,618.0	2,678
Dec	2,453.6	2,411.9	2,584.5	2,511.1	7,391.7	2,586.5	2,733.3	3,203.0	3,120.0	2,852.0	2,795
Jan	2,406.0	2,342.5	2,566.6	2,665.8	9,022.9	3,310.5	2,927.6	2,805.0	4,316.0	2,705.0	2,830
Feb	2,376.2	2,237.4	2,394.1	2,392.1	8,543.9	2,614.3	2,356.4	2,602.0	5,524.0	2,620.0	2,469
Mar	2,602.4	2,449.6	2,616.2	2,433.8	8,378.3	15,933.5	2,673.8	2,805.0	6,048.0	2,805.0	2,769
Apr	3,171.6	2,812.6	3,245.0	3,381.9	10,885.4	3,502.9	3,711.1	4,221.0	8,902.0	3,253.0	3,265
May	3,120.0	8,810.7	3,794.4	10,443.1	8,338.2	4,919.1	3,213.3	32,008.0	23,741.0	11,919.0	3,259
Jun	2,919.7	9,723.1	2,394.1	69,553.4	4,756.6	10,048.4	2,564.7	22,265.0	4,868.0	4,046.0	2,793
Jul	3,036.7	2,536.9	2,568.6	19,936.2	2,509.9	2,810.6	2,733.3	5,219.0	2,850.0	3,713.0	3,076
Aug	2,483.3	2,675.7	2,737.2	3,830.1	2,951.1	3,407.7	2,757.1	2,985.0	2,928.0	2,767.0	2,630
Sep	2,404.0	2,770.9	2,388.1	2,901.9	2,405.6	2,667.8	2,596.4	5,131.0	2,763.0	2,670.0	2,487
Note: 1993 readings not all on last day of the month											
Source: 1992 - 2002 Wyoming State Engineer's Office Annual Hydrographer's Reports.											

Table 2.6.76 provides the Wyoming State Engineer’s Office (SEO) permit application Grayrocks Reservoir area capacity table.

Figure 2.6.62 provides the Wyoming State Engineer’s Office (SEO) permit application Grayrocks Reservoir dam cross section.

Figure 2.6.63 provides the Wyoming State Engineer’s Office (SEO) permit application Grayrocks Reservoir dam profile.

Table 2.6.76 Wyoming State Engineer's Office (SEO) permit application area capacity table - Grayrocks Reservoir

Elevation	Area (acres)	Average End - Area (acres)	Capacity (acre-feet)	Accumulated Capacity (acre-feet)				
4325	0.0			0				
		1.2	6.0					
4330	2.4			6.0			INACTIVE	
		9.7	48.5				CAPACITY =	
4335	17.0			54.5			2558.1 acre-feet	
		48.9	244.5				RECREATION	
4340	80.7			299.0				
		137.1	685.5					
4345	193.5			984.5				
		342.1	1573.6					
4349.6	490.8			2558.1				
		611.0	3299.4					
4355	731.1			5857.5				
		818.2	4091.0					
4360	905.2			9948.5				
		987.0	4935.0					
4365	1068.9			14883.5				
		1201.9	6009.5					
4370	1335.0			20893.0			ACTIVE	
		1531.9	7659.5				CAPACITY =	
4375	1728.9			28552.5			101,551.5 acre-feet	
		1851.4	9257.0				INDUSTRIAL	
4380	1973.0			37809.5				
		2132.7	10663.5					
4385	2291.6			48473.0				
		2468.2	12341.0					
4390	2644.7			60814.0				
		2805.4	14027.0					
4395	2966.1			74841.0				
		3123.0	15615.0					
4400	3279.9			90456.0				
		3413.5	13653.6					
4404	3547.0			104109.6	M.H.W.L			
		3580.4	3580.4					
4405	3613.7			107690.0			FLOOD	
		3751.9	18759.5				CAPACITY =	
4410	3890.2			126449.5			42,658.40	
		4063.7	20318.5				acre-feet	
4415	4237.2			146768.0	M.H.W.L			
Total capacity 4325 - 4415 feet			**14678.0 acre-feet**					
SUMMARY								
Capacity		Elevations		Acre-Feet				
Inactive Capacity		4325 - 4349.6		2558.1				
Active Capacity		4349.6 - 4404		101,551.50				
Flood Storage		4404 - 4415		42658.4				
Total		**4325 - 4415**		**146,768**				
Source: Wyoming State Engineer's Office Permit No. 7649R drawings.								

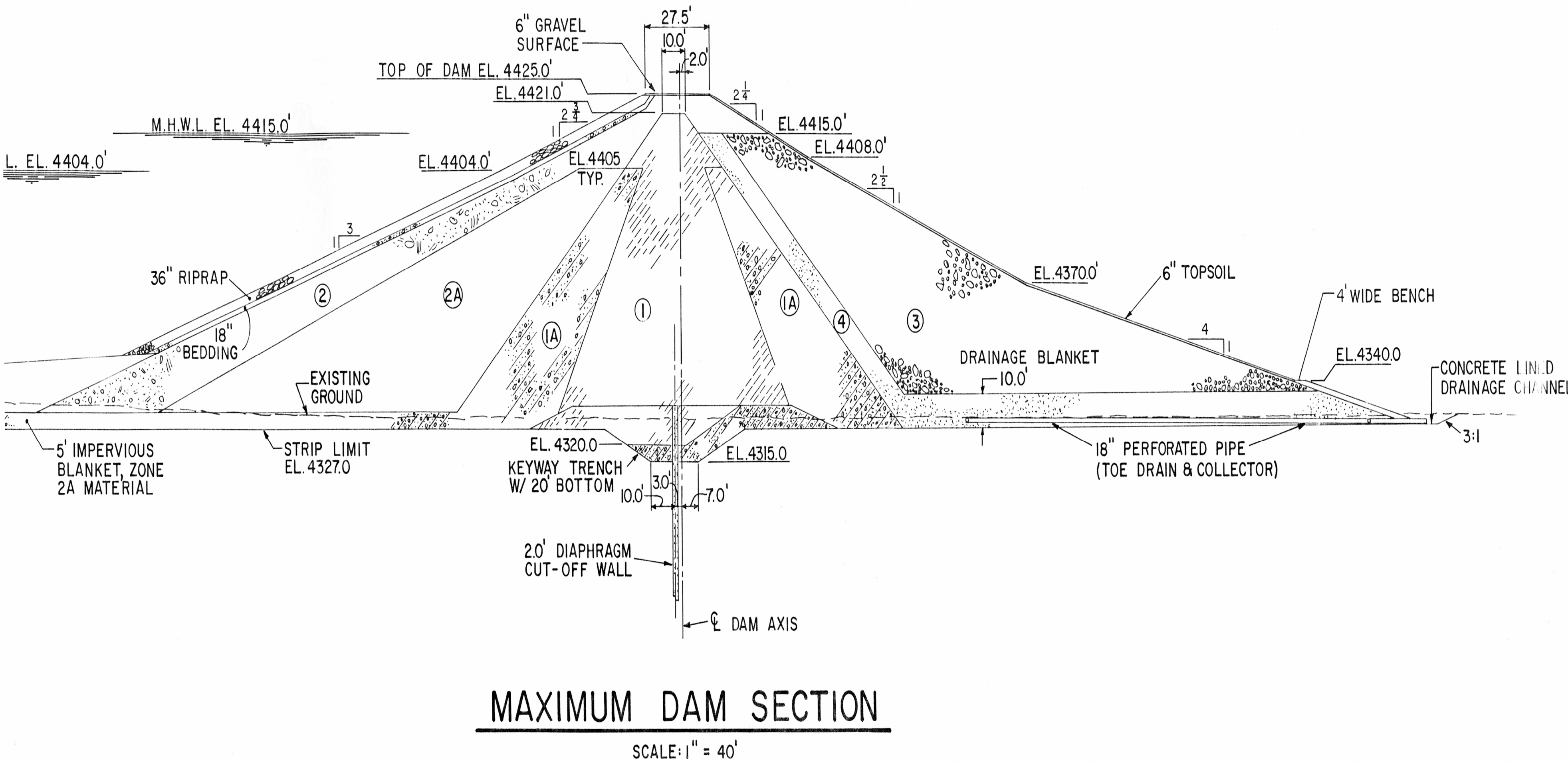


Figure 2.6.62
Wyoming State Engineer's Office (SEO) permit application dam cross section – Grayrocks Reservoir
Source: SEO permit drawing
Title: Amended Map for Grayrocks Reservoir
Permit No.(s): 7649 Res.
Filing Date: Unknown

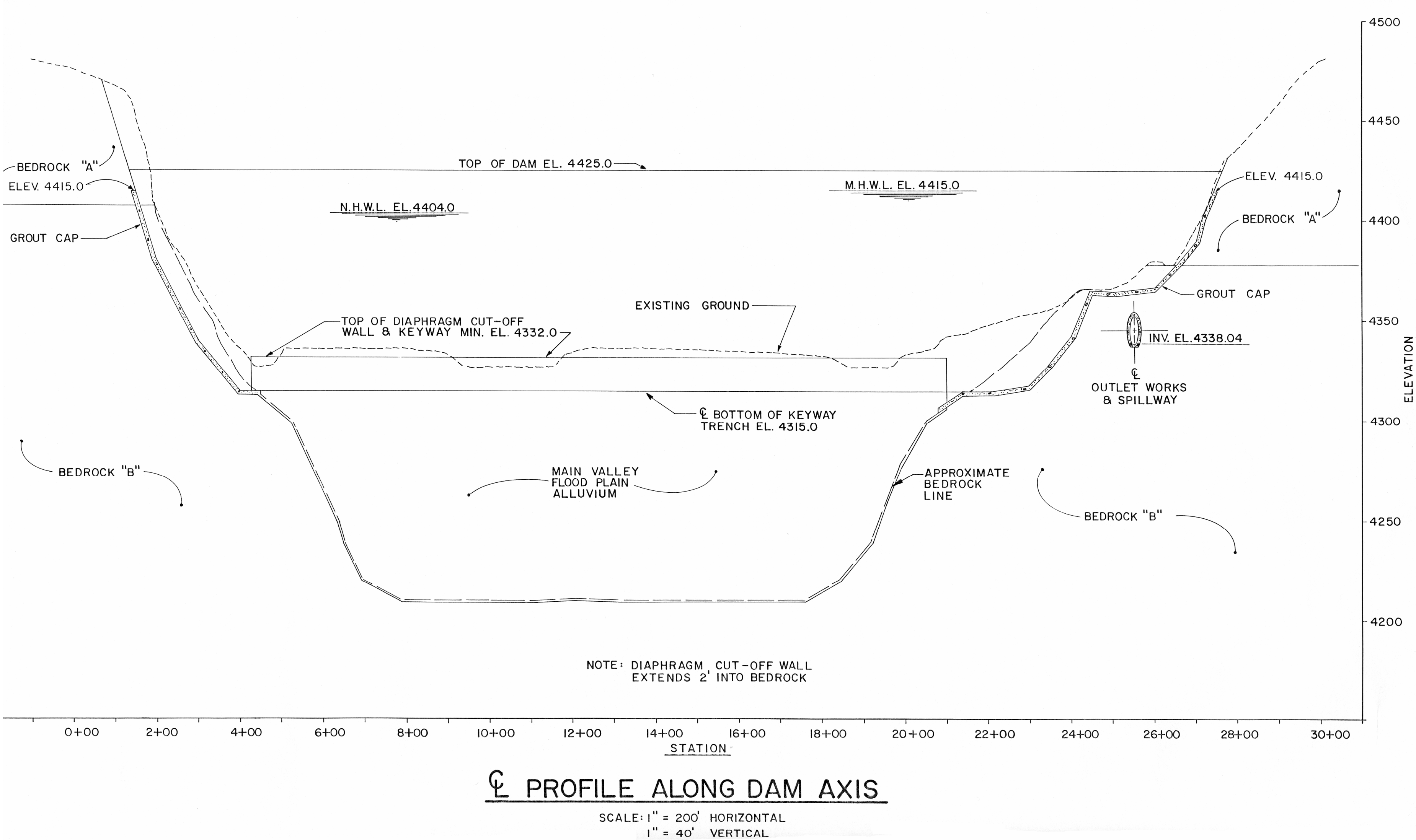


Figure 2.6.63

Wyoming State Engineer's Office (SEO) permit application dam profile – Grayrocks Reservoir

Source: SEO permit drawing

Title: Amended Map for Grayrocks Reservoir

Permit No.(s): 7649 Res.

Filing Date: Unknown

Wyoming Development Company No. 1 Reservoir

Permitted for irrigation, stock, and domestic use, the Wyoming Development Company No. 1 Reservoir and its enlargements have a permitted capacity of 9,369.75 acre-feet. The reservoir is filled through the Enlargement of the Wyoming Development Company No. 1 and No. 3 Canals, which have a carrying capacity of 500 and 1,500 cubic feet per second, respectively.

North Laramie Land Company No. 3 Reservoir

The North Laramie Land Company No. 3 Reservoir is used for recreation and fish propagation. The reservoir is located in a natural basin. The No. 3 Reservoir is filled by the North Laramie Land Company Canal. The No. 3 Reservoir outlet is through an 18-inch cast iron pipe. The spillway crest width ranges from 600 feet to 1,000 feet.

Table 2.6.77 provides a summary of North Laramie Land Company No. 3 Reservoir monthly storage volumes obtained from annual hydrographer's reports.

Table 2.6.77 Summary - historic North Laramie Land Company No. 3 Reservoir monthly storage

SEO permit: P1517R											
Capacity (acre-feet): 3,064.89											
Ownership: Wyoming Game and Fish Commission											
Monthly storage (recorded randomly and intermittently during the month - table shows single monthly value or last of several monthly values, acre-feet)											
Month	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Oct	--	550	1,910	dry	dry	dry	0	--	59	135	60
Nov	--	--	--	dry	dry	dry	--	--	--	--	--
Dec	--	--	1,440	dry	dry	dry	--	--	--	--	--
Jan	--	--	--	dry	dry	dry	--	--	--	--	--
Feb	--	--	360	dry	dry	dry	--	--	--	--	--
Mar	--	--	--	dry	dry	dry	--	--	--	--	--
Apr	--	340	--	dry	dry	dry	--	--	--	--	--
May	--	1,910	--	dry	dry	dry	--	115	--	--	--
Jun	--	2,559	--	dry	dry	dry	6	--	--	--	--
Jul	--	2,310	--	dry	dry	dry	3	--	--	120	dry
Aug	--	--	--	dry	dry	dry	--	--	--	--	--
Sep	--	1,910	dry	dry	dry	dry	dry	82	157	60	dry
*Values typically not from last day of the month											
Source: 1992 - 2002 Wyoming State Engineer's Office Annual Hydrographer's Reports.											

Toltec Reservoir

Toltec Reservoir is located on the channel of the North Laramie River. This reservoir is permitted for irrigation, recreation, and stock water. The total permitted capacity of the reservoir is 2,945 acre-feet, and the surface area of the reservoir at the high-water elevation is 227.68 acres. The dam is an earthfill structure with a concrete core, with the upstream face of the dam protected by rock riprap.

Table 2.6.78 provides a summary of Toltec Reservoir monthly storage volumes obtained from annual hydrographer's reports.

Table 2.6.78 Summary - historic Toltec Reservoir monthly storage

SEO permit: P7252R											
Total capacity (acre-feet): 2,945											
Monthly storage (recorded randomly and intermittently during the month - table shows single monthly value or last of several monthly values, acre-feet)											
Month	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Oct	2,478	--	1,780	--	--	--	--	--	--	1,760	--
Nov	--	--	--	--	--	--	--	--	--	--	--
Dec	2,347	--	--	--	--	--	--	--	--	--	--
Jan	--	--	--	--	--	--	--	--	--	--	--
Feb	--	--	--	--	--	--	--	--	--	--	--
Mar	2,535	--	--	1,260	--	--	--	--	--	--	--
Apr	2,553	2,945	2,460	1,290	2945**	2,650	2,700	Spilling	Spilling	3/4 full	est. 1/2 full
May	1,972	2,945	2,630	2,945	2945**	Spilling	--	Spilling	Spilling	--	--
Jun	947	2,945	1,480	--	--	Spilling	--	Spilling	Spilling	--	--
Jul	653	2,480	710	2,945	2,380	--	2,880	--	--	1/2 full	Inact. Stor.
Aug	928	2,270	800	--	1,690	2,350	1,780	Spilling	--	--	Inact. Stor.
Sep	956	1,780	620	2,250	--	1,680	--	2,110	--	--	--
*1993 values not all from last day of the month											
**Spilling											
Source: 1992 - 2002 Wyoming State Engineer's Office Annual Hydrographer's Reports.											

Table 2.6.79 provides the Wyoming State Engineer's Office (SEO) permit application Toltec Reservoir area capacity table.

Figure 2.6.64 provides the Wyoming State Engineer's Office (SEO) permit application Toltec Reservoir dam cross section.

Figure 2.6.65 provides the Wyoming State Engineer's Office (SEO) permit application Toltec Reservoir dam profile and maximum dam cross section

Table 2.6.79 Wyoming State Engineer's Office (SEO) permit application area capacity table - Toltec Reservoir

Contour	Area	Average	Capacity
	(acres)		(acres feet)
116	228.7		
		222.8	222.8
115	216.9		
		187.7	938.3
110	158.4		
		134.3	671.6
105	110.3		
		89.0	445.0
100	67.7		
		63.3	126.6
98	58.9		
Excavation between 98 - 116			20.7
Available for irrigation, recreation & stock			2425.0
98	58.9		
		52.3	156.8
95	45.7		
		36.0	180.1
90	26.4		
		19.2	95.9
85	12.0		
		8.7	43.5
80	5.4		
		3.4	16.8
*75	1.3		
Excavation below 98			26.9
Avaliable for stockwater & recreation			520.0
Total reservoir capacity			**2945.0**

*Note: Immediate silting to the 75.0' elevation is anticipated. Therefore the capacity below this elevation in not included in this table.

Source: Wyoming State Engineer's Office Permit No. 7252R drawings.

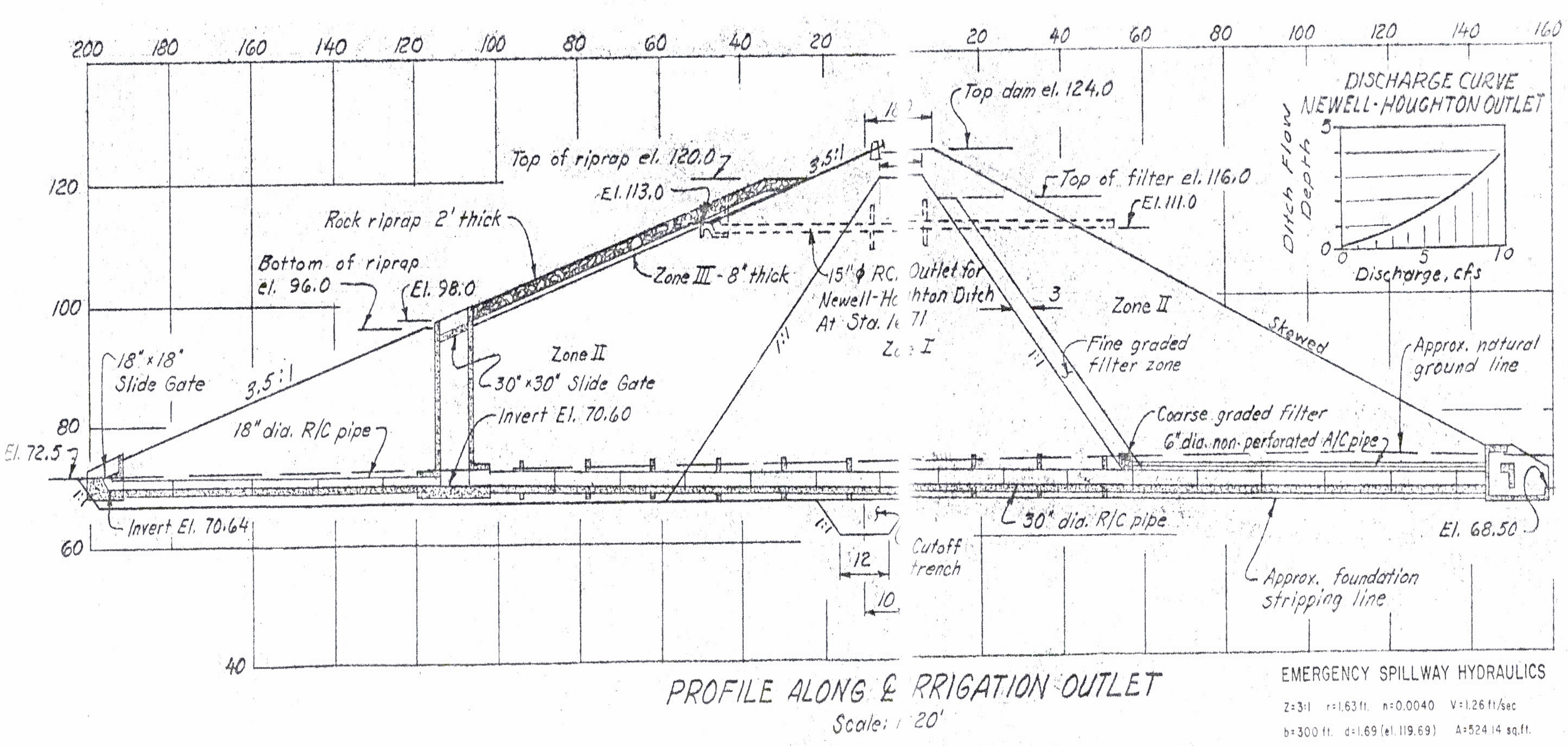


Figure 2.6.64

Wyoming State Engineer's Office (SEO) permit application dam cross section – Toltec Reservoir

Source: SEO permit drawing

Title: Map to Accompany Petition to Submit Amended Plans for Toltec Reservoir

Permit No.(s): 7252 Res.

Filing Date: April 6, 1984

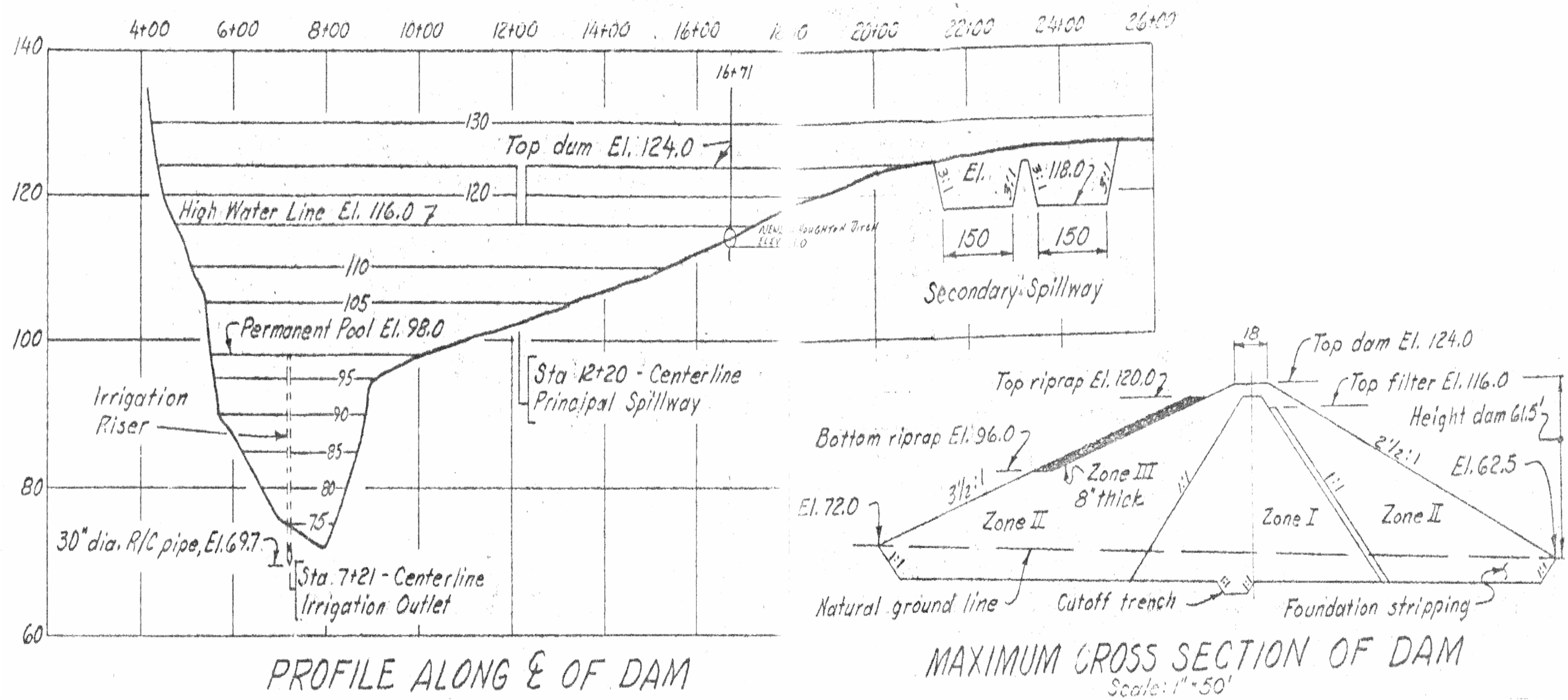


Figure 2.6.65

Wyoming State Engineer's Office (SEO) permit application dam profile and maximum dam cross section – Toltec Reservoir

Source: SEO permit drawing

Title: Map to Accompany Petition to Submit Amended Plans for Toltec Reservoir

Permit No.(s): 7252 Res.

Filing Date: April 6, 1984

MBPP Ash Pond

The MBPP Ash Pond is permitted solely for pollution control purposes by the Basin Electric Power Cooperative in Platte County. The reservoir consists of three cells, in which the total permitted capacity is 2,111.1 acre-feet. Located in the Seepage Water Hole Draw, the reservoir is filled through a pipeline from the Laramie River Power Station.

Table 2.6.80 provides the Wyoming State Engineer's Office (SEO) permit application MBPP Ash Pond Reservoir area capacity table.

Table 2.6.80 Wyoming State Engineer's Office (SEO) permit application area capacity table - MBPP Ash Pond Reservoir

	Elevation	Area (acres)	Average end area (acres)	Capacity (acre-feet)	Accumulated capacity (acre-feet)	
	Northeast Cell					
Bottom	4540.0	10.0				
			10.4	52.0	52.0	
	4545.0	10.8				
			11.4	57.0	109.0	
	4550.0	12.0				
			12.5	62.3	171.3	
	4555.0	12.9				TOTAL STORAGE (ACTIVE)
			13.5	67.5	238.8	POLLUTION CONTROL
	4560.0	14.1				2111.1 ACRE-FEET
			14.6	43.8	282.6	
Max H.W.L.	4563.0	15.1				
	Northwest Cell					
Bottom	4540.0	22.8				
			23.5	117.3	117.3	
	4545.0	24.1				
			24.9	124.5	241.8	
	4550.0	25.7				
			26.4	132.0	373.8	
	4555.0	27.1				
			28.0	139.8	513.5	
	4560.0	28.8				
			29.5	88.5	602.0	
Max H.W.L.	4563.0	30.2				
	South Cell					
Bottom	4565.0	48.0				
			49.1	245.3	245.3	
	4570.0	50.1				
			51.3	256.5	501.8	
	4575.0	52.5				
			53.8	268.8	770.5	
	4580.0	55.0				
			56.2	281.0	1051.5	
	4585.0	57.4				
			58.4	175.1	1226.6	
Max H.W.L.	4588.0	59.3				
				Total capacity	**2111.1**	
Source: Wyoming State Engineer's Office Permit No. 7810R drawings.						

Figure 2.6.66 provides the Wyoming State Engineer's Office (SEO) permit application MBPP Ash Pond Reservoir outlet works drawing.

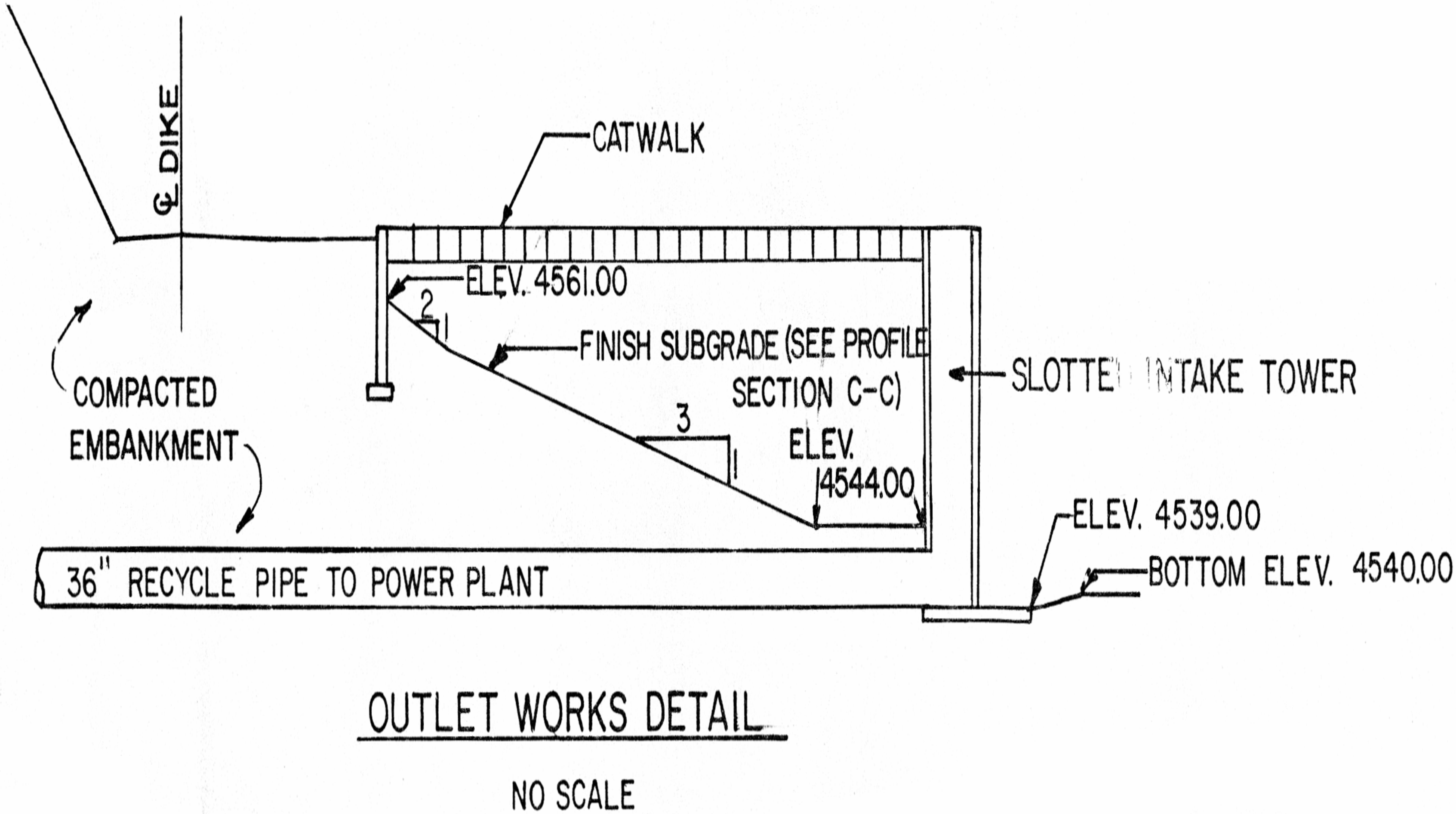


Figure 2.6.66
Wyoming State Engineer's Office (SEO) permit application outlet works drawing – MBPP Ash Pond Reservoir
Source: SEO permit drawing
Title: Map to Accompany Application for MBPP Ash Pond Reservoir
Permit No.(s): 7810 Res.
Filing Date: October 5, 1977

North Laramie Land Company No. 1 Reservoir

The North Laramie Land Company No. 1 Reservoir is permitted for irrigation, stock, and domestic purposes. The reservoir is located in a draw and a swale that are connected by an open channel. The reservoir is filled through the North Laramie Land Company Canal and discharges to the North Laramie Land Company No. 2 Reservoir. The dam outlet is a 24-inch cast iron pipe.

Table 2.6.81 provides a summary of North Laramie Land Company No. 1 Reservoir monthly storage volumes obtained from annual hydrographer's reports.

Table 2.6.81 Summary - historic North Laramie Land Company No. 1 Reservoir monthly storage

SEO permit: P1515R											
Capacity (acre-feet): 1,909.60											
Monthly storage (recorded randomly and intermittently during the month - table shows single monthly value or last of several monthly values, acre-feet)											
Month	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Oct		dry	dry	dry	--	90	220	--	510	485	500
Nov		--	--	--	--	--	--	--	--	--	--
Dec		--	--	--	--	--	--	--	--	--	--
Jan		--	--	--	--	--	--	--	--	--	--
Feb		--	--	--	--	--	--	--	--	--	--
Mar		--	--	--	--	--	--	--	--	--	--
Apr		--	--	--	--	--	--	--	--	--	--
May		1,150	250	--	1,910	--	--	1,810	--	--	420
Jun		1,240	540	1,650	--	1,730	1,900	--	--	--	--
Jul		--	--	1,430	750	--	1,650	--	--	1,210	--
Aug		--	dry	--	--	--	--	--	1,150	--	--
Sep		dry	dry	dry	--	220	--	580	--	620	110
*Values typically not from last day of the month											
Source: 1992 - 2002 Wyoming State Engineer's Office Annual Hydrographer's Reports.											

Glomill Reservoir

Located in a natural basin, Glomill Reservoir is permitted for irrigation purposes. The total permitted capacity of the reservoir is 1,296.4 acre-feet. Filled by the Glomill Ditch, the reservoir has a surface area at the high-water elevation of 259.6 acres. Glomill Reservoir has both an east and a west spillway, each of which is 200 feet wide. The physical characteristics of the east and west spillways are identical, and combined spillway discharge capacity is 3,962 cubic feet per second.

Table 2.6.82 provides the Wyoming State Engineer's Office (SEO) permit application Glomill Reservoir area capacity table.

Table 2.6.82 Wyoming State Engineer's office (SEO) permit application area capacity table - Glomill Reservoir

			Capacity					
Contour	**Area**	**Av. area**	**ac. ft.**					
97.9	259.6				Active Storage for			
		243.2	486.4		irrigation under accompanying			
95.9	226.8				application for Enlargement.			
		180.0	810.0		Active Storage for irrigation as			
91.4	133.2				adjudicated under Permit No. 1989R.			
		82.5	217.1					
88.8	33.8							
		21.1	42.2		Inactive Storage			
86.8	8.4							
		4.2	5.46					
85.5	0.0							
		Total capacity	**1561.16**					
Source: Wyoming State Engineer's Office Permit No. 7670R drawings.								

Figure 2.6.67 provides the Wyoming State Engineer's Office (SEO) permit application Glomill Reservoir dam and outlet works cross sections.

Figure 2.6.68 provides the Wyoming State Engineer's Office (SEO) permit application Glomill Reservoir dam profile.

Tables 2.6.83 through 2.6.87 provide an overview of the Wyoming State Engineer's Office (SEO) permit application information for major reservoirs in the Lower Laramie subbasin.

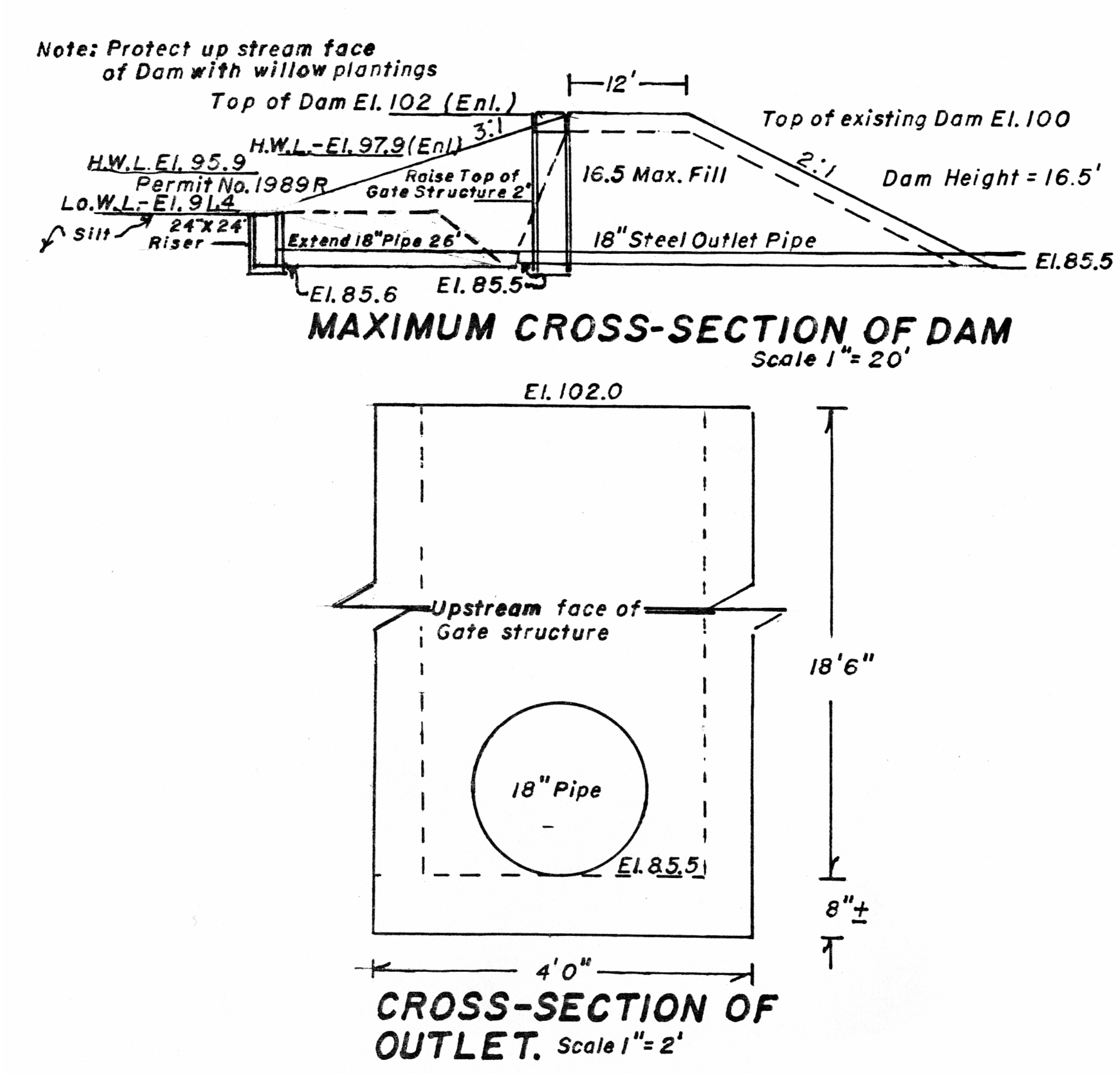


Figure 2.6.67

Wyoming State Engineer's Office (SEO) permit application dam and outlet works cross section – Glomill Reservoir

Source: SEO permit drawing

Title: Map to Accompany Application for Enlargement of Glomill Reservoir and Enl. Glomill Ditch

Permit No.(s): 6554 Enl., 7670 Res.

Filing Date: July 22, 1975

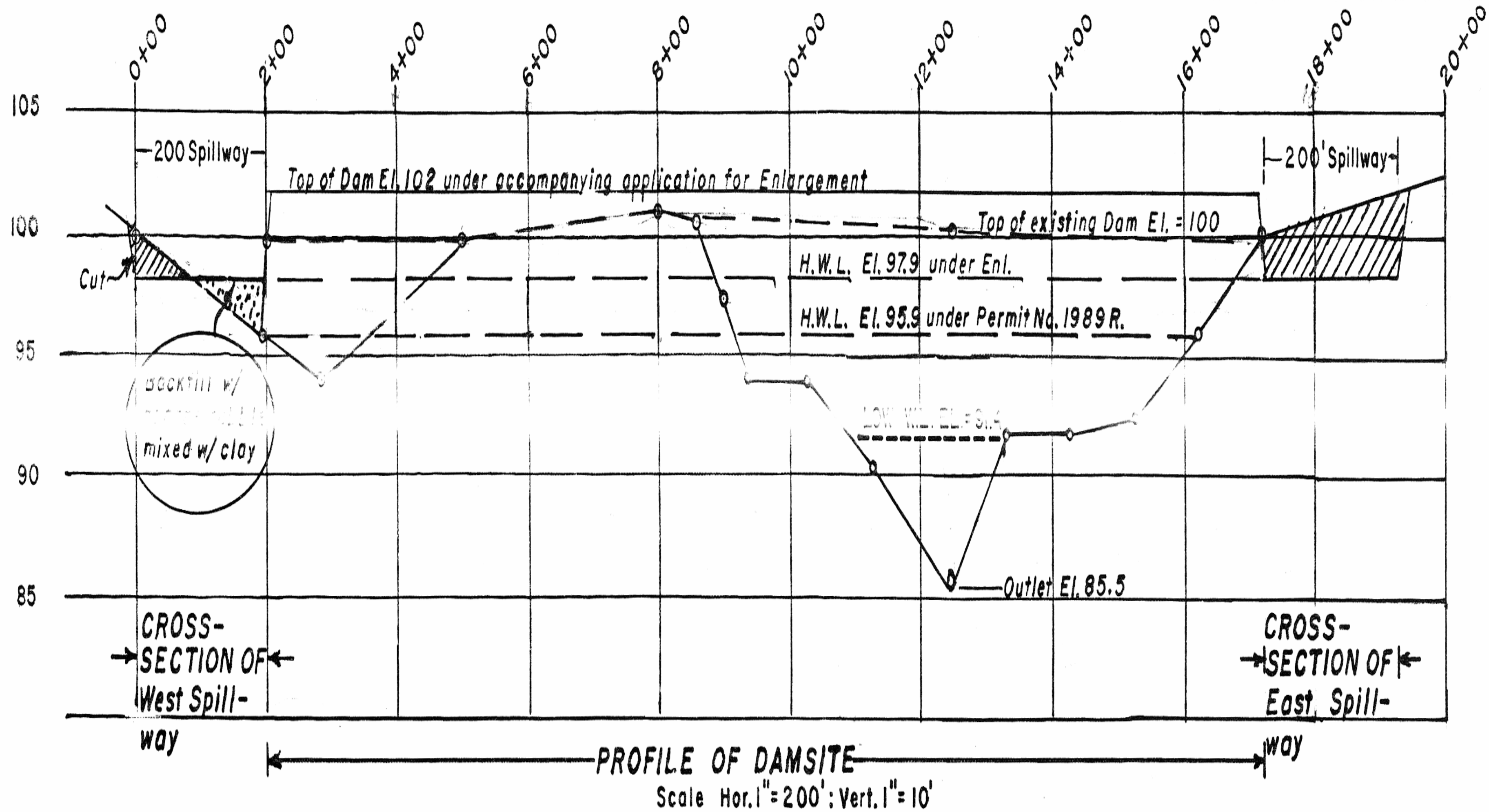


Figure 2.6.68

Wyoming State Engineer's Office (SEO) permit application dam profile – Glomill Reservoir

Source: SEO permit drawing

Title: Map to Accompany Application for Enlargement of Glomill Reservoir and Enl. Glomill Ditch

Permit No.(s): 6554 Enl., 7670 Res.

Filing Date: July 22, 1975

Table 2.6.83 Summary - locations of major reservoirs in the Lower Laramie subbasin

Structure number	Permit number	Reservoir name	Township	Range	Section	Qtr qtr	Nearest city	County
1	P7649R	Grayrocks Reservoir	25	65	5	NWSW	Wheatland	Platte
2	P79R	Wyoming Development Company No. 1 Reservoir	23	68	6	NENE	Wheatland	Platte
	P5387R	Wyoming Development Company No. 1 Reservoir, Enlargement	23	68	6	NENE	Wheatland	Platte
	P6470R	Wyoming Development Company No. 1 Reservoir, 2nd Enl.	23	68	6	NENE	Wheatland	Platte
3	P1515R	North Laramie Land Co. No. 1 Reservoir	25	69	13	NENW	Wheatland	Platte
4	P1517R	North Laramie Land Co. No. 3 Reservoir	25	68	22	SENE	Wheatland	Platte
5	P7252R	Toltec Reservoir	26	74	21	SWSE	none in basin	Albany
6	P7810R	MBPP Ash Pond Reservoir	25	67	28	NWSE	Wheatland	Platte
7	P1989R	Glomill Reservoir	22	64	10	NWSW	Torrington	Goshen
	P7670R	Glomill Reservoir, Enlargement of the	22	64	10	NWSW	Torrington	Goshen

Source: Wyoming State Engineer's Office.

Table 2.6.84 Summary - permitted capacities of major reservoirs in the Lower Laramie subbasin

Structure number	Permit number	Reservoir name	Active capacity acre-feet	Inactive capacity acre-feet	Enlargement capacity acre-feet	Total capacity acre-feet
1	P7649R	Grayrocks Reservoir	101,551.50	2,558.10		104,109.60
2	P79R	Wyoming Development Company No. 1 Reservoir				5,360.00
	P5387R	Wyoming Development Company No. 1 Reservoir, Enlargement			1,795.75	7,155.75
	P6470R	Wyoming Development Company No. 1 Reservoir, 2nd Enl.			2,214.00	9,369.75
3	P1515R	North Laramie Land Co. No. 1 Reservoir				1,909.60
4	P1517R	North Laramie Land Co. No. 3 Reservoir				3,064.89
5	P7252R	Toltec Reservoir				2,945.00
6	P7810R	MBPP Ash Pond Reservoir				2,111.10
7	P1989R	Glomill Reservoir	810.00			810.00
	P7670R	Glomill Reservoir, Enlargement of the			486.40	1,296.40

Source: Wyoming State Engineer's Office.

Table 2.6.85 Summary - permitted beneficial uses of major reservoirs in the Lower Laramie subbasin

Structure number	Permit number	Reservoir name	Applicant name	Priority date	Source	Use
1	P7649R	Grayrocks Reservoir	Basin Electric Power Cooperative	4/24/1973	Laramie River	Industrial, fish propagation, wildlife, irrigation, recreation
2	P79R	Wyoming Development Company No. 1 Reservoir	Wheatland Irrigation District	3/00/1897	Sybille Creek	Irrigation
	P5387R	Wyoming Development Company No. 1 Reservoir, Enlargement	Wheatland Irrigation District	8/18/1938	Sybille Creek and Laramie River	Irrigation
	P6470R	Wyoming Development Company Reservoir No. 1, 2nd Enl.	Wheatland Irrigation District	7/10/1958	Sybille Creek and Laramie River	Irrigation, stock, domestic
3	P1515R	N. Laramie Land Co. No. 1 Reservoir	North Laramie Land Company	5/1/1909	North Laramie River	Irrigation, stock, domestic
4	P1517R	N. Laramie Land Co. No. 3 Reservoir	Wyoming Game and Fish Department	5/1/1909	North Laramie River	Recreation, fish propagation
5	P7252R	Toltec Reservoir	Toltec Watershed Improvement District	3/27/1967	North Laramie River	Recreation, stock, irrigation
6	P7810R	MBPP Ash Pond Reservoir	Basin Electric Power Cooperative	11/16/1976	Seepage Water Hole Draw	Pollution control
7	P1989R	Glomill Reservoir	Enoch Baumgardner, Alvin Garrelts, and Donald Nelson	11/17/1910	Box Elder Creek	Irrigation
	P7670R	Glomill Reservoir, Enlargement of the	Gloria and Don A. Nelson; H.A. Garrelts and Son, Inc.	3/11/1975	Box Elder Creek	Irrigation

Source: Wyoming State Engineer's Office.

Table 2.6.86 Summary - outlet works descriptions for major reservoirs in the Lower Laramie subbasin

Structure number	Permit number	Reservoir name	Outlet works description
1	P7649R	Grayrocks Reservoir	The Grayrocks Reservoir outlet works consists of two components: a pre-cast concrete vertical intake structure which discharges via an 8 foot diameter pressure tunnel, and a "morning glory" drop inlet spillway that discharges via a 14 foot horseshoe tunnel. The 8 foot diameter pressure tunnel discharges into the 14 foot horseshoe tunnel at a gate chamber.
2	P79R	Wyoming Development Company No. 1 Reservoir	
	P5387R	Wyoming Development Company No. 1 Reservoir, Enlargement	The formation at the outlet consists of earth.
	P6470R	Wyoming Development Company No. 1 Reservoir, 2nd Enl.	The formation at the outlet consists of sandstone.
3	P1515R	N. Laramie Land Co. No. 1 Reservoir	The outlet is through 2 feet of cast iron pipe.
4	P1517R	N. Laramie Land Co. No. 3 Reservoir	The outlet is through an 18-inch cast iron pipe laid in a trench and backfilled.
5	P7252R	Toltec Reservoir	Toltec Reservoir has a low-level and a high-level outlet works. The low level outlet works inlet is located at the upstream toe of the dam, is about 300 feet long, and consists of 15 inch diameter concrete pipe with concrete seepage collars at about 20 foot intervals along the upstream 65 percent or 70 percent of its total length. The high level outlet works inlet is on the upstream dam face 26 feet above the low level outlet works inlet. The high level outlet works consists of about 145 feet of 27 inch diameter concrete pipe with concrete seepage collars at 25 foot intervals along its length.
6	P7810R	MBPP Ash Pond Reservoir	The MBPP Ash Pond Reservoir outlet works consists of a slotted vertical intake tower which discharges via a 36 inch diameter pipe which recycles water back to the Laramie River Station Powerplant.
7	P1989R	Glomill Reservoir	The outlet is an 18-inch concrete pipe.
	P7670R	Glomill Reservoir, Enlargement of the	
Source: Wyoming State Engineer's Office.			

Table 2.6.87 Summary - emergency spillway descriptions for major reservoirs in the Lower Laramie subbasin

Structure number	Permit number	Reservoir name	Spillway description
1	P7649R	Grayrocks Reservoir	The Grayrocks Reservoir emergency spillway is cut into native topography near the right dam abutment. Spillway discharge is controlled by a concrete structure containing six (6) 32 foot wide radial gates.
2	P79R	Wyoming Development Company No. 1 Reservoir	
	P5387R	Wyoming Development Company No. 1 Reservoir, Enlargement	
	P6470R	Wyoming Development Company Reservoir No. 1, 2nd Enl.	
3	P1515R	N. Laramie Land Co. No. 1 Reservoir	The spillway is over a natural prairie surface of slight grade and 600 feet wide, which is increased to 1300 feet before the crest of the dam is reached.
4	P1517R	N. Laramie Land Co. No. 3 Reservoir	The wasteway is over unbroken prairie of slight grade. The width of the spillway is 600 feet and increases to 1,000 feet before the crest of the dam is reached.
5	P7252R	Toltec Reservoir	Toltec Reservoir has an open channel emergency spillway located near the left dam abutment. This structure is concrete-lined, has an 80 foot base width, and a design 4.5 foot flow depth. The design spillway discharge rate at design flow depth is 4,448.90 cfs. The reservoir also has a secondary open channel spillway located near the right dam abutment. The spillway has a 300 foot base width, is not concrete-lined, and has a 0.5 foot design flow depth which corresponds to a 218.8 cfs discharge rate.
6	P7810R	MBPP Ash Pond Reservoir	The MBPP Ash Pond Reservoir does not have an emergency spillway
7	P1989R	Glomill Reservoir	Glomill Reservoir has two identical emergency spillways, an East Spillway and a West Spillway. Each spillway is an open channel structure with a 200 foot base width, a slope of 0.001 ft/ft, and a design discharge rate of 1,981 cubic feet per second at a 3 foot flow depth.
	P7670R	Glomill Reservoir, Enlargement of the	
Source: Wyoming State Engineer's Office.			

2.6.5.6. Major Reservoirs in the Horse Creek Subbasin

The locations of major reservoirs in the Horse Creek subbasin are shown on Figure 2.6.69.

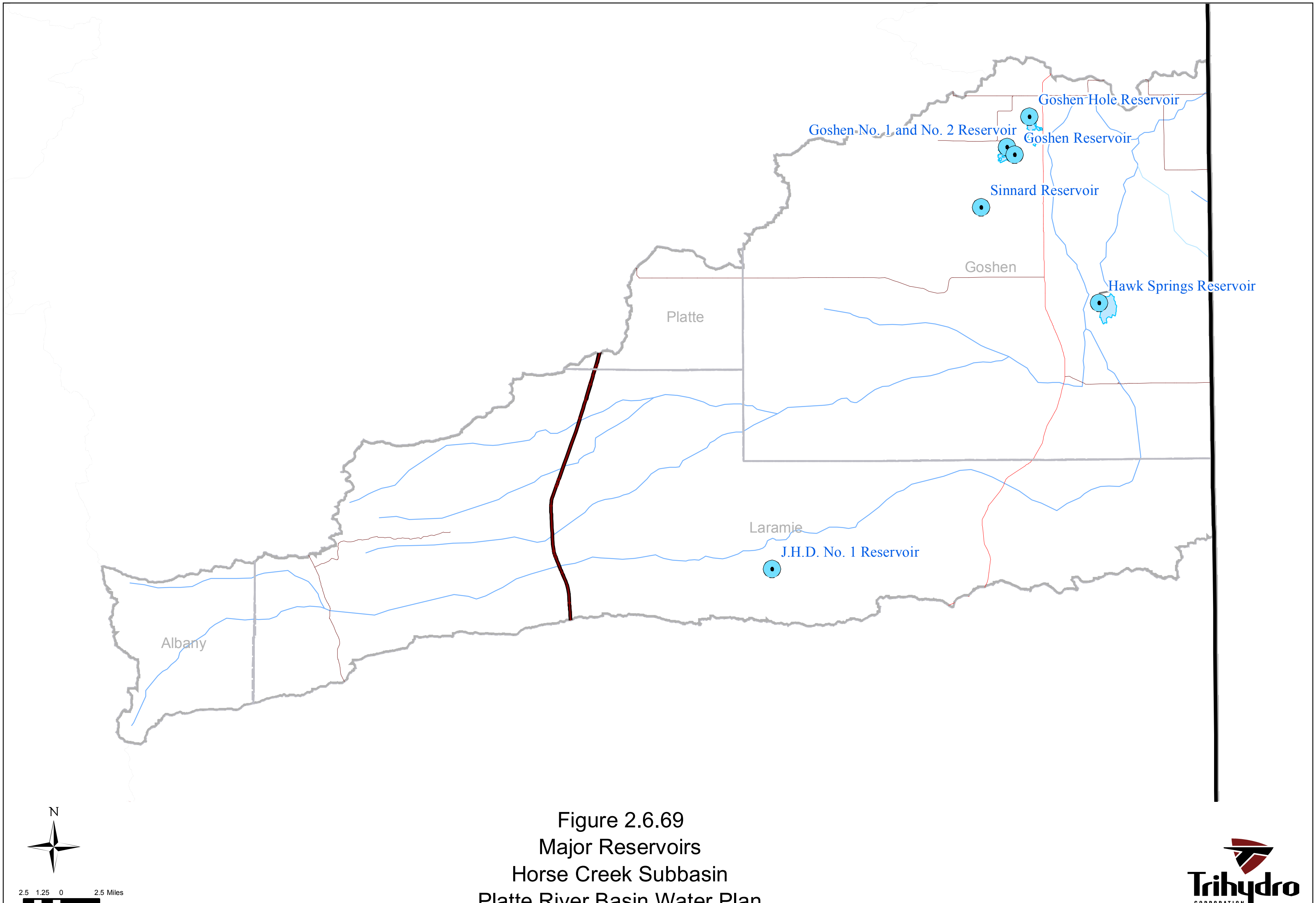


Figure 2.6.69
Major Reservoirs
Horse Creek Subbasin
Platte River Basin Water Plan

Hawk Springs Reservoir

Hawk Springs Reservoir is the primary storage reservoir for the Horse Creek Conservation District. Located southeast of the town of Hawk Springs, storage water is released from Hawk Springs Reservoir into the Hawk Springs Canal and travels approximately 13 miles to the Sinnard Reservoir. In 1985, improvements were made to the Hawk Springs Reservoir and canal.

The Hawk Springs Reservoir consists of one main earthfill dam and three small dikes. The reservoir is an off-stream reservoir with a drainage area of approximately 15 square miles. The Hawk Springs Reservoir does not have a spillway. The main dam contains two separate outlet works. One outlet has a discharge capacity of 210 cubic feet per second and releases to the Hawk Springs Ditch for distribution throughout the irrigation district, and the second outlet has a capacity of 8.57 cubic feet per second and is a water right held by Lincoln Land Company.

Table 2.6.88 provides a summary of Hawk Springs Reservoir end-of-year storage volumes obtained from annual hydrographer's reports.

Table 2.6.88 Summary - historic Hawk Springs Reservoir end-of-year storage

End of year storage (acre-feet)										
1992	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
2,180	6,800	3,018	5,294	5,523	7,790	2,763	6,379	1,888	2,800	--
Source: 1992 - 2002 Wyoming State Engineer's Office Annual Hydrographer's Reports										

Goshen Hole Reservoir (Springer Reservoir)

Permitted for irrigation purposes, Goshen Hole Reservoir, which is also known as Springer Reservoir, has a permitted capacity of 4,961.19 acre-feet. Heavy rock riprap and hay bales protect the upstream face of the dam from erosion. The reservoir is filled through the Enlargement of the Goshen Hole Supply Canal.

Table 2.6.89 provides a summary of Goshen Hole Reservoir end-of-year storage volumes obtained from annual hydrographer's reports.

Table 2.6.89 Summary - historic Goshen Hole Reservoir (Springer Reservoir) end-of-year storage

End of year storage (acre-feet)										
1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
695	2,469	798	1,195	1,149	2,151	587	2,043	524	494	--
Source: 1992 - 2002 Wyoming State Engineer's Office Annual Hydrographer's Reports.										

J. H. D. No. 1 Reservoir

The J. H. D. No. 1 Reservoir has a permitted capacity of 2,040.85 acre-feet. The reservoir is filled by a supply ditch. The dam outlet works consist of one 10-inch diameter cast iron pipe that discharges into the "Overflow Pond" and a second 10-inch diameter cast iron pipe that discharges into the "irrigation ditch".

Figure 2.6.70 provides the Wyoming State Engineer's Office (SEO) permit application J. H. D. No. 1 Reservoir dam cross section and profile.

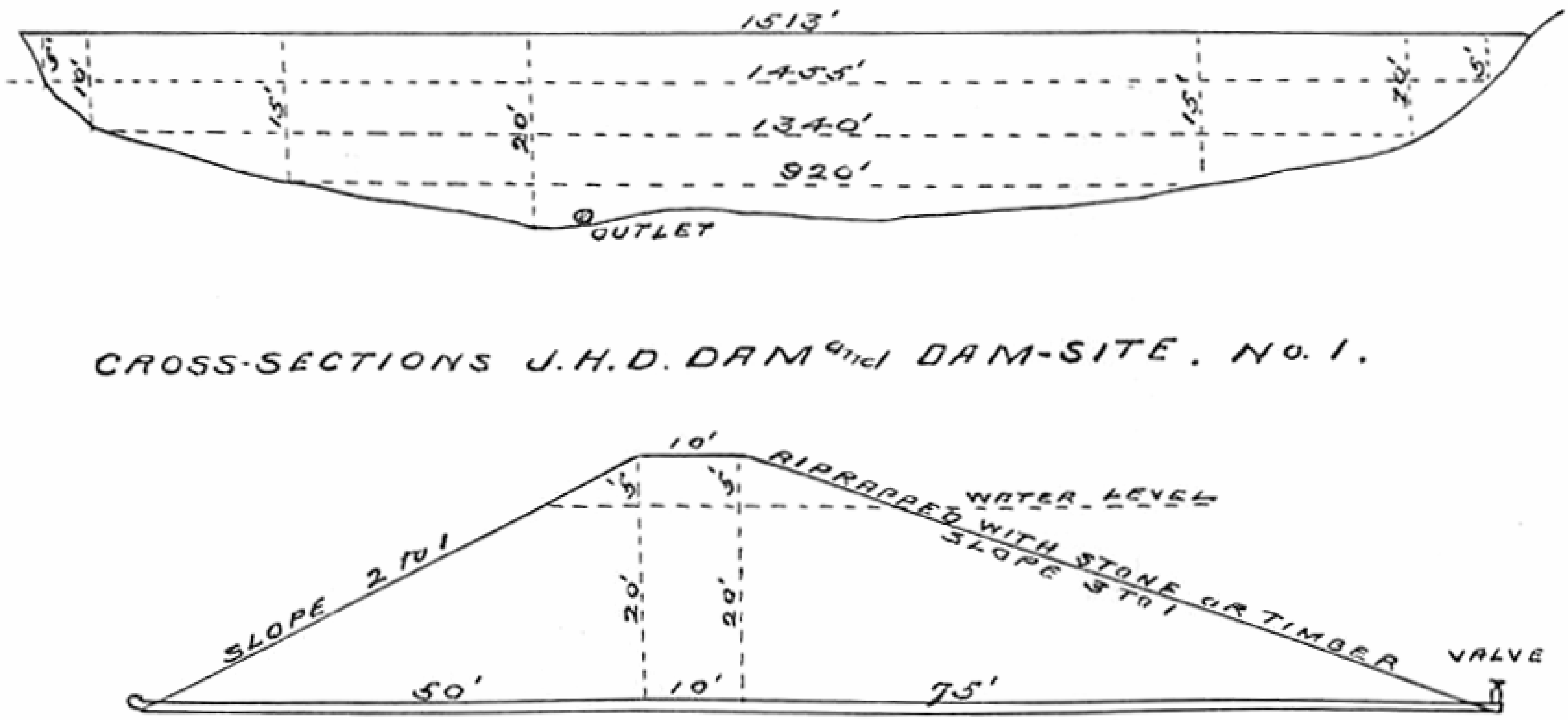


Figure 2.6.70

Wyoming State Engineer's Office (SEO) permit application dam cross section and profile – J.H.D. No.1 Reservoir

Source: SEO permit drawing

Title: Supply Ditch and JHD Reservoir Sites No.1 and 2

Permit No.(s): 939 Res., 940 Res., 941 Res.

Filing Date: Unknown

Goshen Reservoir

The Goshen Reservoir is permitted for irrigation purposes. The reservoir is filled through a supply canal and has a permitted capacity of 765.60 acre-feet. The dam outlet is a 24-inch diameter iron pipe. The reservoir also has a natural spillway, which is 100 feet wide.

Goshen No. 1 and No. 2 Reservoirs (Bump-Sullivan Reservoir)

Also known as Bump-Sullivan Reservoir, Goshen No. 1 and No. 2 Reservoirs are two earthfill dams with a drainage area of approximately six square miles. The reservoirs are filled via the Goshen Ditch, which has a discharge capacity of 50 cubic feet per second. The reservoirs have a permitted capacity of 1,929 acre-feet. Permitted uses for the reservoir include irrigation, stock, and domestic uses.

A grassed fuse-type emergency spillway approximately 30 feet wide is located between the two dams. The outlet works has a discharge capacity of 10 cubic feet per second and discharges water into the Bump-Sullivan Ditch.

Table 2.6.90 provides a summary of Goshen No. 1 and No. 2 Reservoirs (Bump-Sullivan Reservoir) end-of-year storage volumes obtained from annual hydrographer's reports.

Table 2.6.90 Summary - historic Goshen No. 1 and No. 2 Reservoirs (Bump-Sullivan Reservoir) end-of-year storage

End of year storage (acre-feet)										
1992	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
937	1,479	668	775	1,150	1,022	673	829	0	0	--
Source: 1992 - 2002 Wyoming State Engineer's Office Annual Hydrographer's Reports.										

Figure 2.6.71 provides the Wyoming State Engineer's Office (SEO) permit application Enl. Goshen Reservoirs No. One and Two dam profiles and cross section.

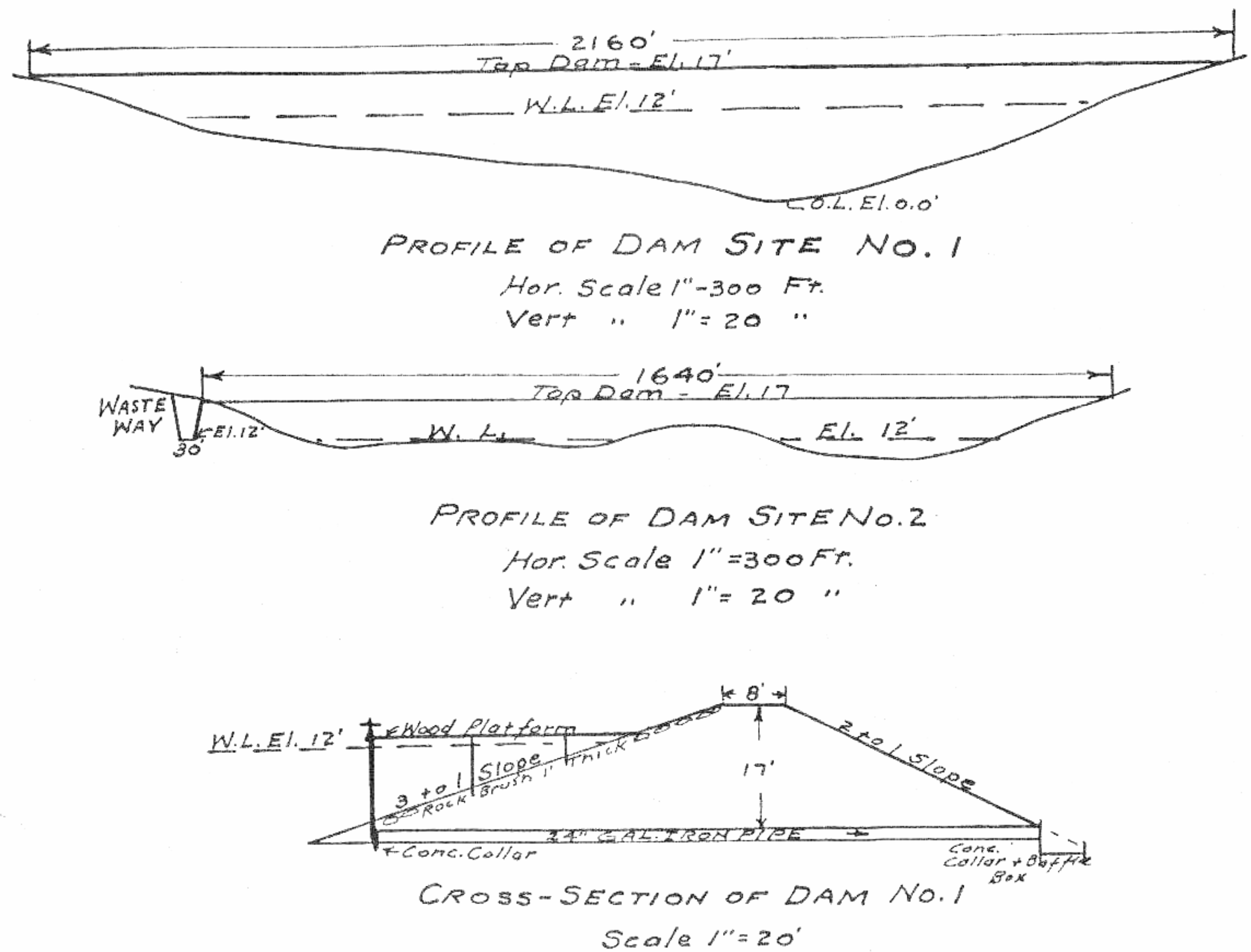


Figure 2.6.71

Wyoming State Engineer's Office (SEO) permit application dam profiles (2) and Dam No. 1 cross section – Enlargement Goshen Reservoirs No. 1 and 2

Source: SEO permit drawing

Title: Map to Accompany Application for Amendment of Permit No. 3517 Res. Enl. Goshen Reservoirs No. One and Two

Permit No.(s): Amended 3517 Res.

Filing Date: September 15, 1936

Sinnard Reservoir

Constructed in the 1920's and located on Sinnard Draw tributary Horse Creek, Sinnard Reservoir is located roughly 7.6 miles upstream of the confluence of Sinnard Draw and Horse Creek. The reservoir is located in Goshen County and is approximately one mile north and four miles west of the town of Hawk Springs. The Horse Creek Conservation District (HCCD) both owns and operates the reservoir and dam. Sinnard Reservoir is considered an off-channel reservoir since the Hawk Springs Canal is the main source of reservoir water supply (Banner, 1993).

Sinnard Dam is an earthfill structure with a drainage area of approximately eight square miles. The dam has a crest width of 12 feet and a crest length of 1,350 feet. An open channel emergency spillway approximately 300 feet wide is located around the left abutment of the dam. Hawk Springs Reservoir provides a major portion of the storage inflow to Sinnard Reservoir. The permitted capacity of Sinnard Reservoir is 1,358.31 acre-feet.

Sinnard Reservoir's primary use is as a re-regulation facility. During times when irrigation demand is very high, the Hawk Springs Canal does not have enough capacity to support irrigation demand. Sinnard Reservoir stores water and then releases the water to "satisfy the shortfall from the Canal" (Banner, 1993). Lands within the HCCD along the north side of Lone Tree Creek are served by water released from Sinnard Reservoir into Sinnard Ditch. Throughout most of the irrigation season, "Sinnard Reservoir provides a buffer in the HCCD canal system which allows relatively constant releases to be maintained from Hawk Springs Reservoir" (Banner, 1993).

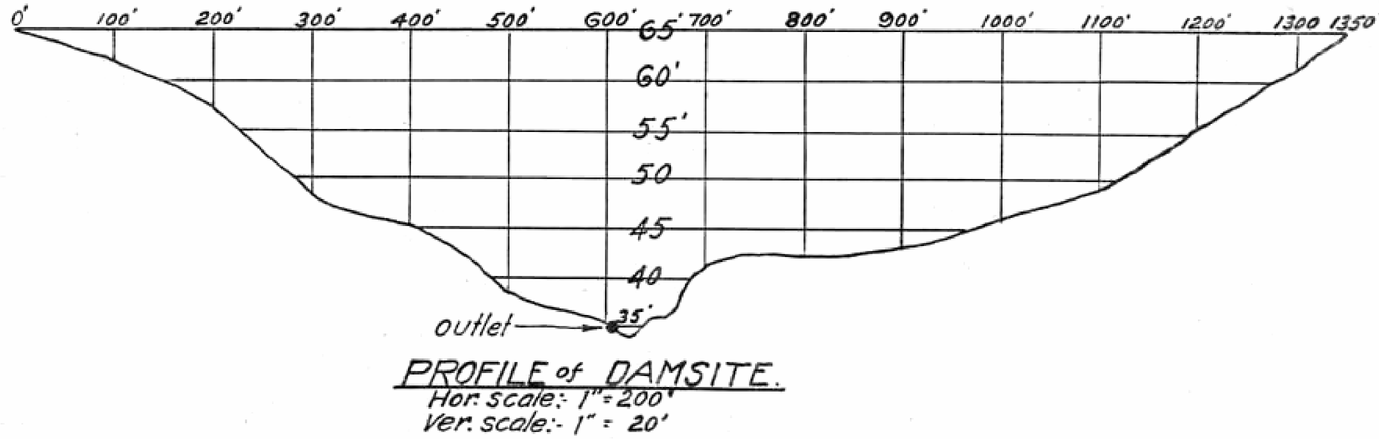
Table 2.6.91 provides the Wyoming State Engineer's Office (SEO) permit application Sinnard Reservoir area capacity table.

Table 2.6.91 Wyoming State Engineer's Office (SEO) permit application area capacity table - Sinnard Reservoir

			Capacity
Contour	Area	Average	acre-feet
35	13.8		
		26.3	131.5
40	38.8		
		56.9	284.5
45	75.0		
		93.6	468.0
50	112.2		
		131.1	655.5
55	150.0		
		Total available capacity	**1539.5**
Source: Wyoming State Engineer's Office Permit No. 3605R drawings.			

Figure 2.6.72 provides the Wyoming State Engineer's Office (SEO) permit application Sinnard Reservoir dam cross section and profile.

Tables 2.6.92 through 2.6.96 provide an overview of the Wyoming State Engineer's Office (SEO) permit application information for major reservoirs in the Horse Creek subbasin.



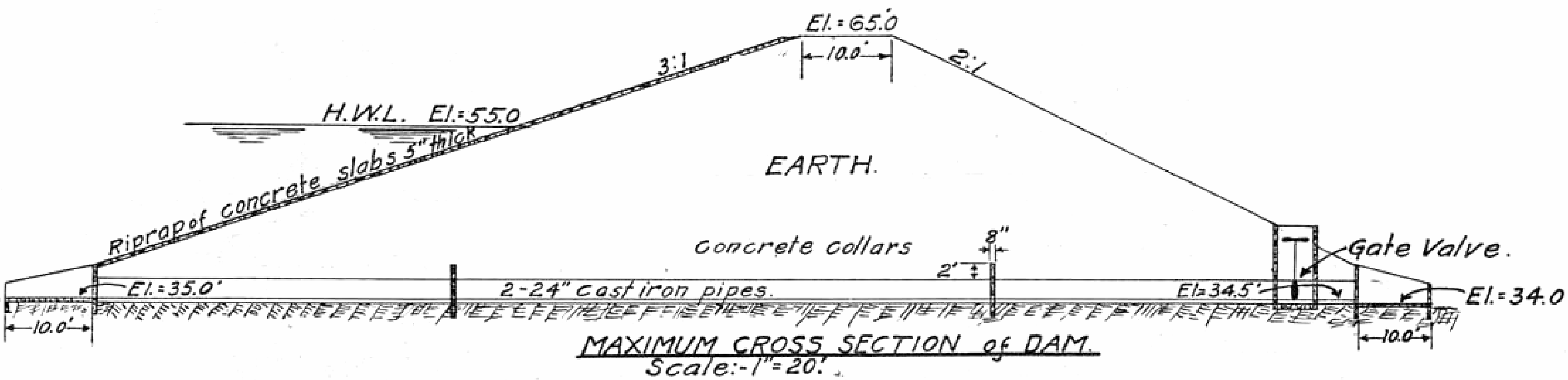


Figure 2.6.72

Wyoming State Engineer's Office (SEO) permit application dam cross section and profile – Sinnard Reservoir

Source: SEO permit drawing

Title: Map to Accompany Application for Sinnard Reservoir

Permit No.(s): 3605 Res.

Filing Date: March 17, 1920

Table 2.6.92 Summary - locations of major reservoirs in the Horse Creek subbasin

Structure number	Permit number	Reservoir name	Township	Range	Section	Qtr qtr	Nearest city	County
1	P1307R	Hawk Springs Reservoir	20	61	9	NWSE	La Grange	Goshen
	P2568R	Hawk Springs Reservoir, Enlargement	20	61	9	NWSE	La Grange	Goshen
2	P349R	Goshen Hole Reservoir	22	62	11	SWNW	Torrington	Goshen
	P4425R	Goshen Hole Reservoir, Enlargement	22	62	11	SWNW	Torrington	Goshen
3	P941R	J.H.D. No. 1 Reservoir	17	65	11	NENE	La Grange	Laramie
4	P2140R	Goshen Reservoir	22	62	22	SWSW	La Grange	Goshen
	P2716R P3517R	Goshen Nos. 1 and 2 Reservoir and Enlargement	22	62	22	SWSW	La Grange	Goshen
5	P3605R	Sinnard Reservoir	21	62	7	SENE	La Grange	Goshen

Source: Wyoming State Engineer's Office.

Table 2.6.93 Summary - permitted capacities of major reservoirs in the Horse Creek subbasin

Structure number	Permit number	Reservoir name	Active capacity acre-feet	Inactive capacity acre-feet	Enlargement capacity acre-feet	Total capacity acre-feet
1	P1307R	Hawk Springs Reservoir				15,718.00
	P2568R	Hawk Springs Reservoir, Enlargement			1,017.00	16,735.00
2	P349R	Goshen Hole Reservoir				3,327.24
	P4425R	Goshen Hole Reservoir, Enlargement			1,633.95	4,961.19
3	P941R	J.H.D. No. 1 Reservoir				2,040.85
4	P2140R	Goshen Reservoir				765.60
	P3517R	Goshen Nos. 1 and 2 Reservoir, Enlargement			287.40	1,929.00
5	P2716R	Goshen No. 2 Reservoir				876.00
6	P3605R	Sinnard Reservoir				1,358.31

Source: Wyoming State Engineer's Office.

Table 2.6.94 Summary - permitted beneficial uses of major reservoirs in the Horse Creek subbasin

Structure number	Permit number	Reservoir name	Applicant name	Priority date	Source	Use
1	P1307R	Hawk Springs Reservoir	Horse Creek Conservation District and State of Wyoming, Department of Economic Planning and Development	5/25/1908	Hawk Springs and Bear Creek	Irrigation, recreation, stock, domestic
	P2568R	Hawk Springs Reservoir, Enlargement	Horse Creek Conservation District	10/13/1913		Irrigation
2	P349R	Goshen Hole Reservoir	Henry M. Springer, et.al.	11/5/1902	Horse Creek	Irrigation
	P4425R	Goshen Hole Reservoir, Enlargement	Odessa M. Dearing, et.al.	6/7/1930	Horse Creek	Irrigation
3	P941R	J.H.D. No. 1 Reservoir	Warren Livestock Company	10/19/1906	Horse Creek	Irrigation
4	P2140R	Goshen Reservoir	Goshen Ditch Company	5/22/1911	Horse Creek	Irrigation
	P3517R	Goshen Nos. 1 and 2 Reservoir, Enlargement	Goshen Ditch Company	1/8/1919	Horse Creek	Irrigation, stock, domestic
5	P2716R	Goshen No. 2 Reservoir	Goshen Ditch Company	7/16/1914	Horse Creek	Irrigation
6	P3605R	Sinnard Reservoir	Horse Creek Conservation District	2/11/1920	Sinnard Draw	Domestic, irrigation

Source: Wyoming State Engineer's Office.

Table 2.6.95 Summary - outlet works descriptions for major reservoirs in the Horse Creek subbasin

Structure number	Permit number	Reservoir name	Outlet works description
1	P1307R	Hawk Springs Reservoir	
	P2568R	Hawk Springs Reservoir, Enlargement	Outlet material is earth, clay and rock
2	P349R	Goshen Hole Reservoir	
	P4425R	Goshen Hole Reservoir, Enlargement	Outlet material is sandy loam
3	P941R	J.H.D. No. 1 Reservoir	The outlet consists of a 10-inch cast iron pipe into the "Overflow Pond" at the draw and a 10-inch cast iron pipe through the dike into the "irrigation ditch."
4	P2140R	Goshen Reservoir	The outlet is an iron pipe 24-inches in diameter. The outlet material is earth.
	P3517R	Goshen Nos. 1 and 2 Reservoir, Enlargement	Outlet material is heavy, sandy loam.
5	P2716R	Goshen No. 2 Reservoir	The outlet is cut into Goshen Reservoir No. 1.
6	P3605R	Sinnard Reservoir	The outlet consists of two 24-inch cast iron pipes. The outlet material is sandy loam earth.
Source: Wyoming State Engineer's Office.			

Table 2.6.96 Summary - emergency spillway descriptions for major reservoirs in the Horse Creek subbasin

Structure number	Permit number	Reservoir name	Spillway description
1	P1307R	Hawk Springs Reservoir	
	P2568R	Hawk Springs Reservoir, Enlargement	
2	P349R	Goshen Hole Reservoir	
	P4425R	Goshen Hole Reservoir, Enlargement	
3	P941R	J.H.D. #1 Reservoir	A natural depression at the 20-foot level over a ledge of outcropping and rock into a secondary gulch, which is 300-feet wide.
4	P2140R	Goshen Reservoir	100-feet wide natural spillway
	P3517R	Goshen Nos. 1 and 2 Reservoir, Enlargement	
5	P2716R	Goshen No. 2 Reservoir	
6	P3605R	Sinnard Reservoir	
Source: Wyoming State Engineer's Office.			

2.6.5.7 Major Reservoirs in the South Platte Subbasin

The locations of major reservoirs in the South Platte subbasin are shown on Figure 2.6.73.

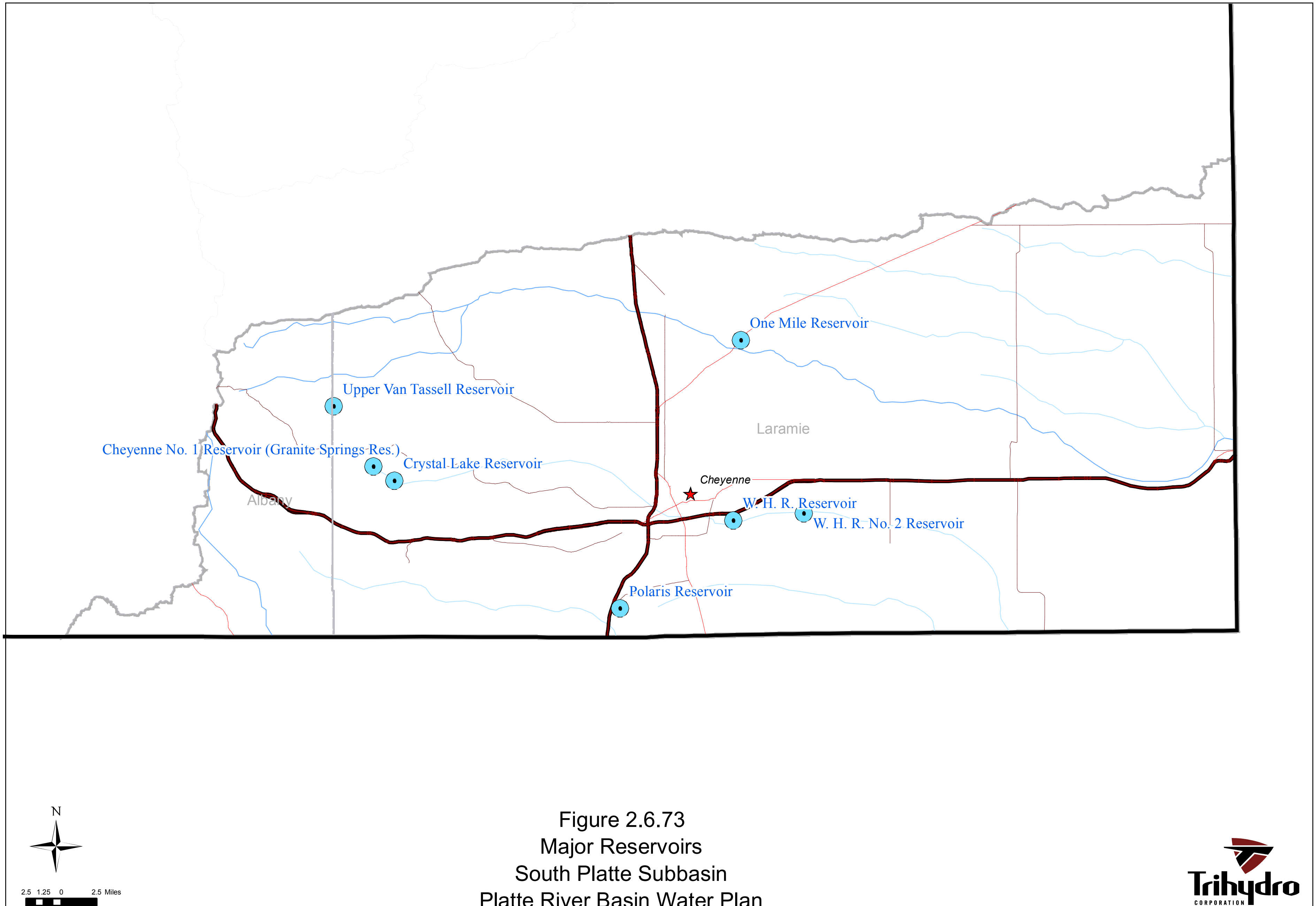


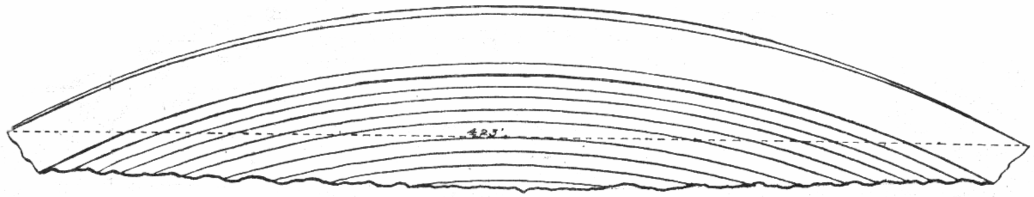
Figure 2.6.73
Major Reservoirs
South Platte Subbasin
Platte River Basin Water Plan

Trihydro CORPORATION

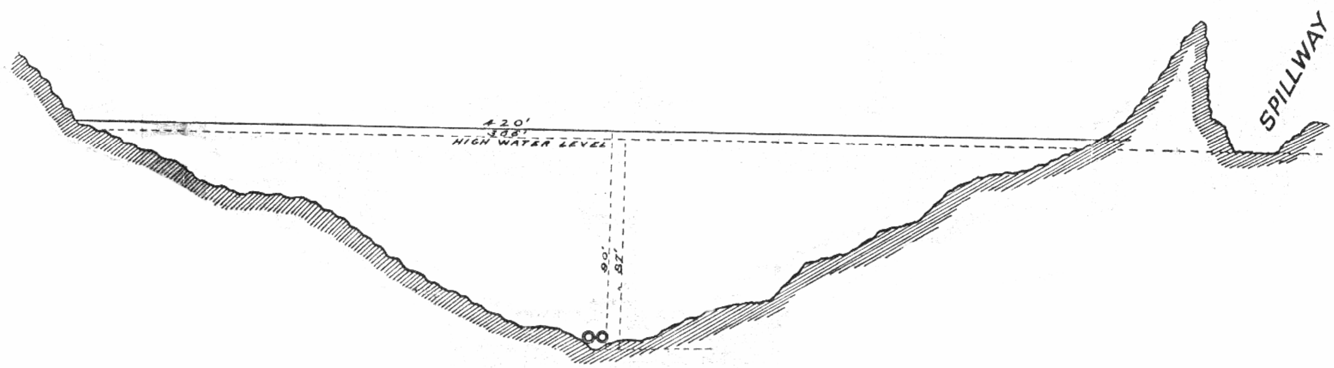
Granite Springs Reservoir

Granite Springs Reservoir is located at elevation 7,210 on Middle Crow Creek in Laramie County. This reservoir has an ajudicated capacity of 7,367 acre-feet, or about 12 percent of total City of Cheyenne municipal surface water storage capacity. Granite Springs Reservoir is one of four reservoirs, including Rob Roy Reservoir, Lake Owen, and Crystal Lake Reservoir, that comprise the raw, or untreated, surface water storage system for the City of Cheyenne municipal water supply. The reservoir stores surface water received by both Stage I and Stage II pipelines from Douglas Creek via Lake Owen in the Medicine Bow Range west of Laramie. In addition to serving as a municipal water storage reservoir, Granite Springs Reservoir is an “active recreational site, with boating, fishing, and camping” (Ogle et al., 1999).

Figures 2.6.74 and 2.6.75 show the Wyoming State Engineer’s Office (SEO) permit application for Granite Springs Reservoir including the dam plan, profile, and cross section.



PLAN OF DAM.



FACE OF DAM

Figure 2.6.74
Wyoming State Engineer's Office (SEO) permit application dam plan and profile – Cheyenne No. 2 Reservoir (Granite Springs Reservoir)
Source: SEO permit drawing
Title: none
Permit No.(s): 3546, 261 Res.
Filing Date: Unknown

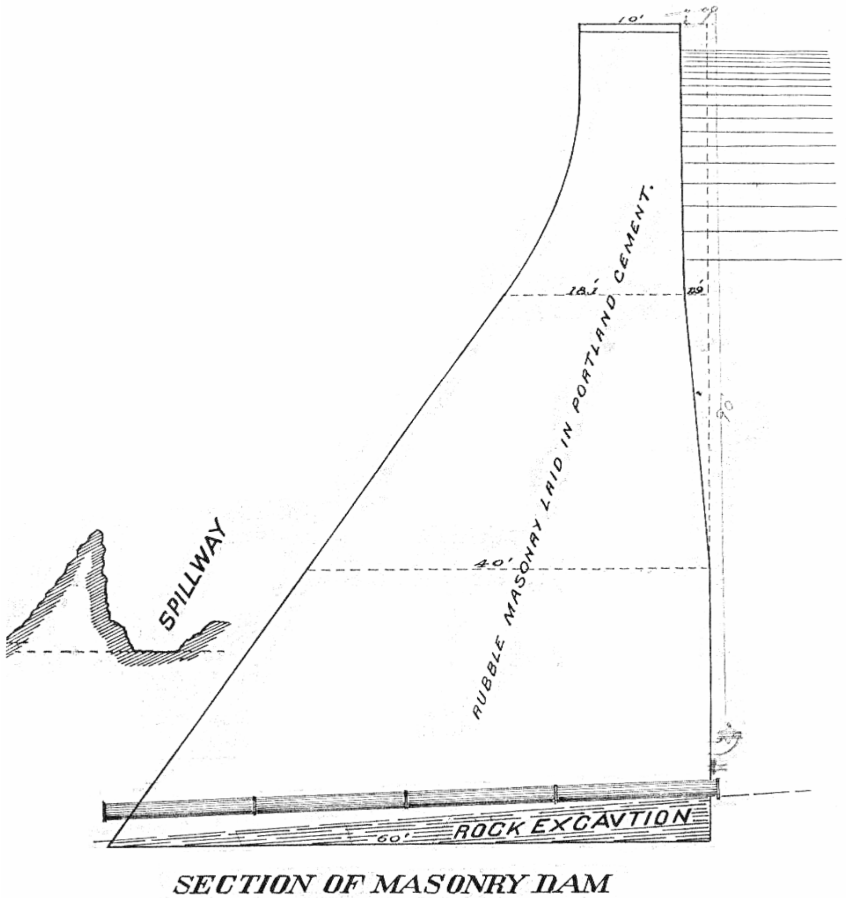


Figure 2.6.75
Wyoming State Engineer's Office (SEO) permit application dam section – Cheyenne No. 2 Reservoir (Granite Springs Reservoir)
Source: SEO permit drawing
Title: none
Permit No.(s): 3546, 261 Res.
Filing Date: Unknown

Crystal Lake Reservoir

Crystal Lake Reservoir is also located on Middle Crow Creek in Laramie County. The adjudicated capacity of this reservoir is 3,618 acre-feet, or about 8 percent of total City of Cheyenne municipal surface water storage capacity. Crystal Lake Reservoir is located at elevation 6,969 a short distance downstream of Cheyenne No. 2 Reservoir and receives water by pipeline and channel flow from Cheyenne No. 2 Reservoir. From Crystal Lake Reservoir, water is conveyed eastward to the City of Cheyenne municipal water treatment facility located west of Cheyenne. Like Cheyenne No. 2 Reservoir, Crystal Lake Reservoir is a popular recreational destination for boating, fishing, and camping (Ogle et al., 1999).

Table 2.6.97 provides the Wyoming State Engineer's Office (SEO) permit application Crystal Lake Reservoir area capacity table.

Table 2.6.97 Wyoming State Engineer's Office (SEO) permit application area capacity table - Crystal Lake Reservoir

Contour	Area	Average	Capacity
6888	0.0		
		2.9	8.70
6891	5.8		
		12.05	120.50
6901	18.3		
		27.35	273.50
6911	36.4		
		43.95	439.50
6921	51.5		
		61.90	619.00
6931	72.3		
		80.90	809.00
6941	89.5		
		100.5	1005.00
6951	111.5		
		123.75	1237.50
6961	136.0		
Total available capacity			**4512.7**
Proposed increase in capacity			**894.7 acre-feet**

Source: Wyoming State Engineer's Office Permit No. 3684R drawings.

Figures 2.6.76, 2.6.77, and 2.6.78 provide Wyoming State Engineer's Office (SEO) permit application Crystal Lake Reservoir dam plan, profile, and cross section.

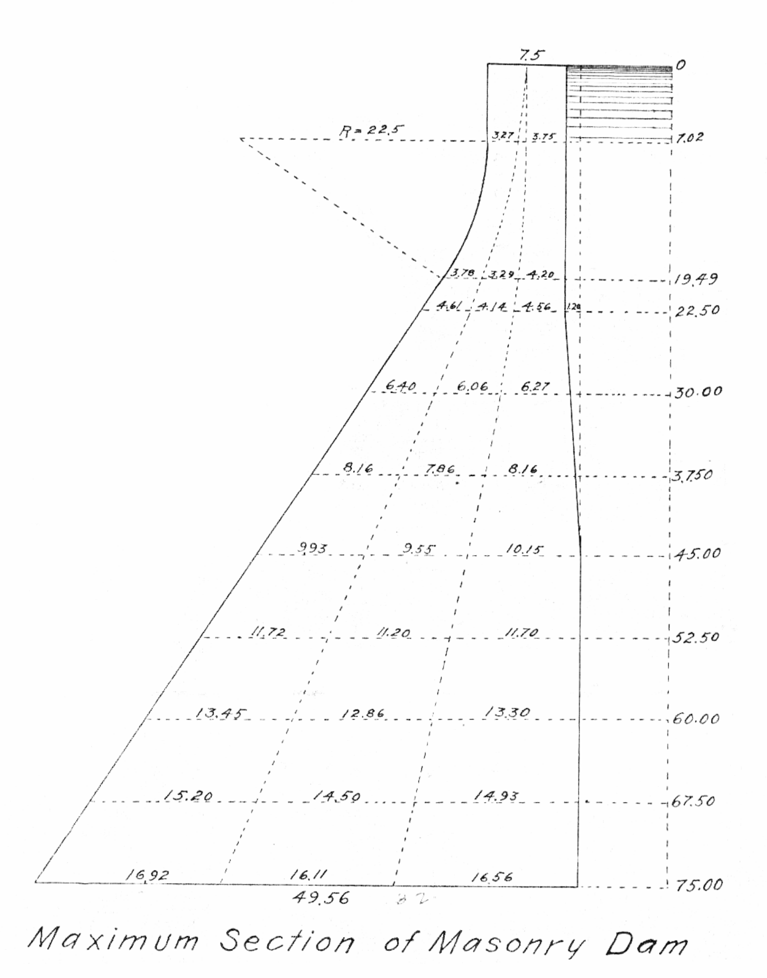


Figure 2.6.76

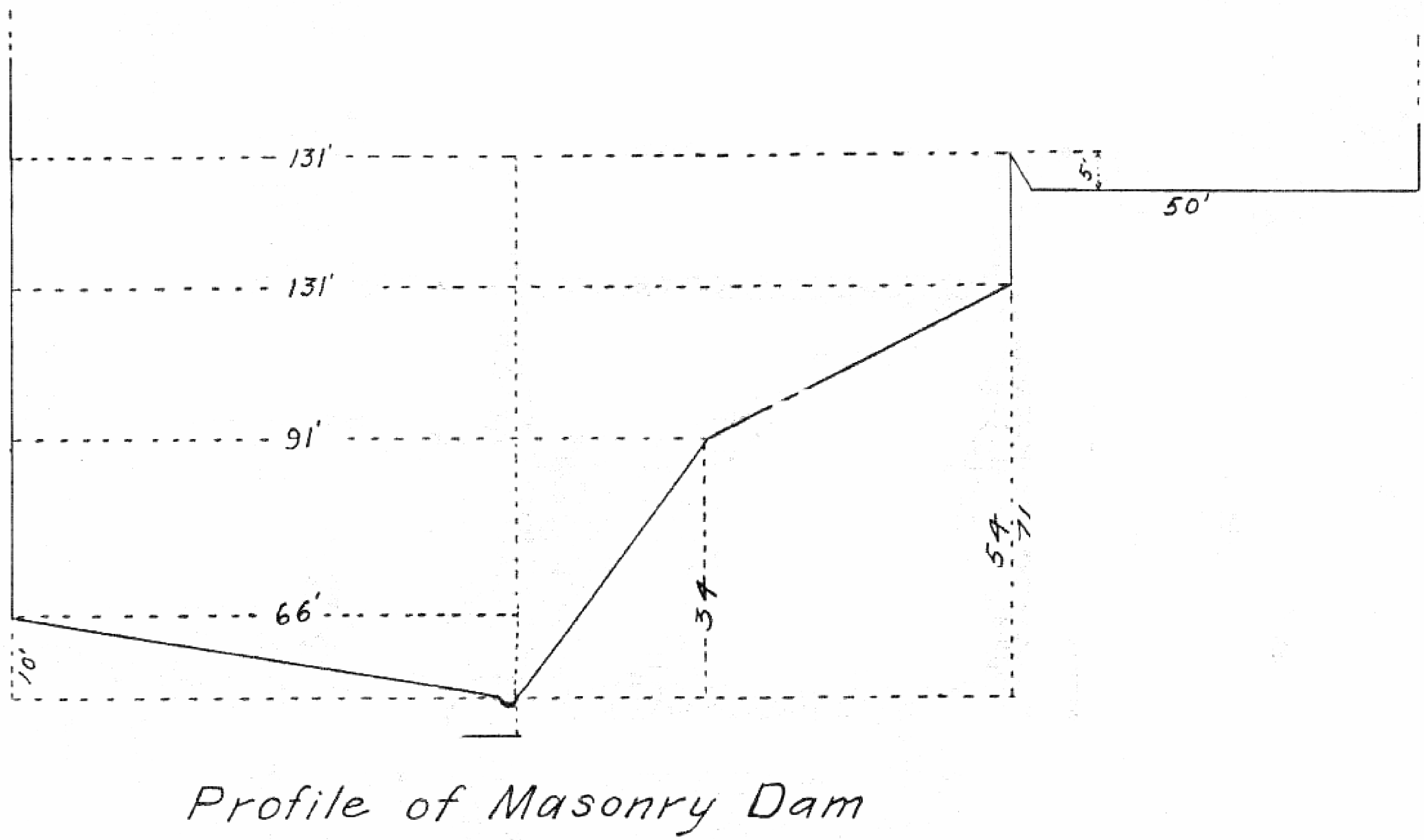
Wyoming State Engineer's Office (SEO) permit application masonry dam section – Crystal Lake Reservoir

Source: SEO permit drawing

Title: Map of Crystal Lake Reservoir

Permit No.(s): 1317 Res.

Filing Date: Unknown



c

Figure 2.6.77

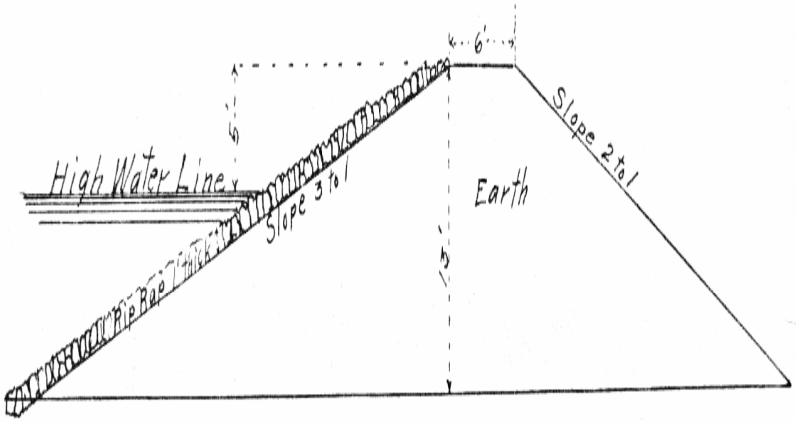
Wyoming State Engineer's Office (SEO) permit application masonry dam profile – Crystal Lake Reservoir

Source: SEO permit drawing

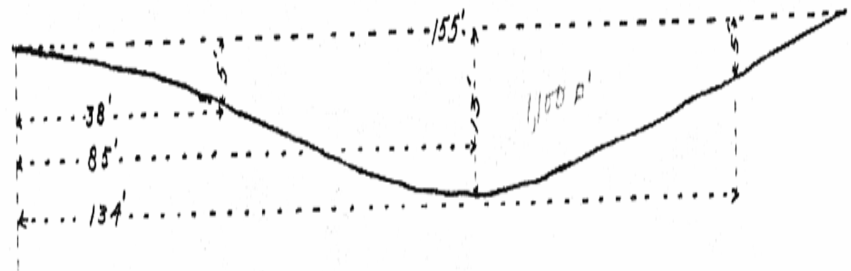
Title: Map of Crystal Lake Reservoir

Permit No.(s): 1317 Res.

Filing Date: Unknown



Maximum Section of Earthen Dam



Profile of Earthen Dam

Figure 2.6.78
Wyoming State Engineer's Office (SEO) permit application earthen dam section and profile – Crystal Lake Reservoir
Source: SEO permit drawing
Title: Map of Crystal Lake Reservoir
Permit No.(s): 1317 Res.
Filing Date: Unknown

One Mile Reservoir

One Mile Reservoir receives its water through the North Lodge Pole Ditch. The reservoir is permitted for irrigation use. One Mile Reservoir has a permitted capacity of 2,247.16 acre-feet. The dam outlets consist of four valved cast iron pipes. Three of the pipes are 8 inches in diameter, and one is 10 inches in diameter. The reservoir does not have a spillway.

Upper Van Tassell Reservoir

Upper Van Tassell Reservoir is located on the channel of North Crow Creek. The reservoir is filled through the North and South Forks of North Crow Creek and has a permitted capacity of 1,867.90 acre-feet. The spillway crest is 200 feet wide and has an invert elevation of 7577.33 feet.

Table 2.6.98 provides the Wyoming State Engineer's Office (SEO) permit application Upper Van Tassell Reservoir area capacity table.

Table 2.6.98 Wyoming State Engineer's Office (SEO) permit application area capacity table - Upper Van Tassell Reservoir

			Capacity
Contour	Area	Average	acre-feet
0	0.03		
		0.17	0.85
5	0.31		
		2.41	12.05
10	4.51		
		7.11	35.55
15	9.7		
		12.58	62.90
20	15.46		
		18.67	93.35
25	21.87		
		24.72	123.60
30	27.57		
		29.37	146.85
35	31.17		
		33.06	165.30
40	34.94		
		36.60	183.00
45	38.26		
		39.51	197.55
50	40.75		
		44.63	223.15
55	48.51		
		51.90	259.50
60	55.28		
		59.42	297.10
65	63.55		
		66.84	334.20
70	70.13		
		81.99	600.99
77.33	93.84		
		Total available capacity	**2735.94**
Source: Wyoming State Engineer's Office Permit No. 4152R drawings			

Figure 2.6.79 provides the Wyoming State Engineer's Office (SEO) permit application Upper Van Tassell Reservoir dam cross section.

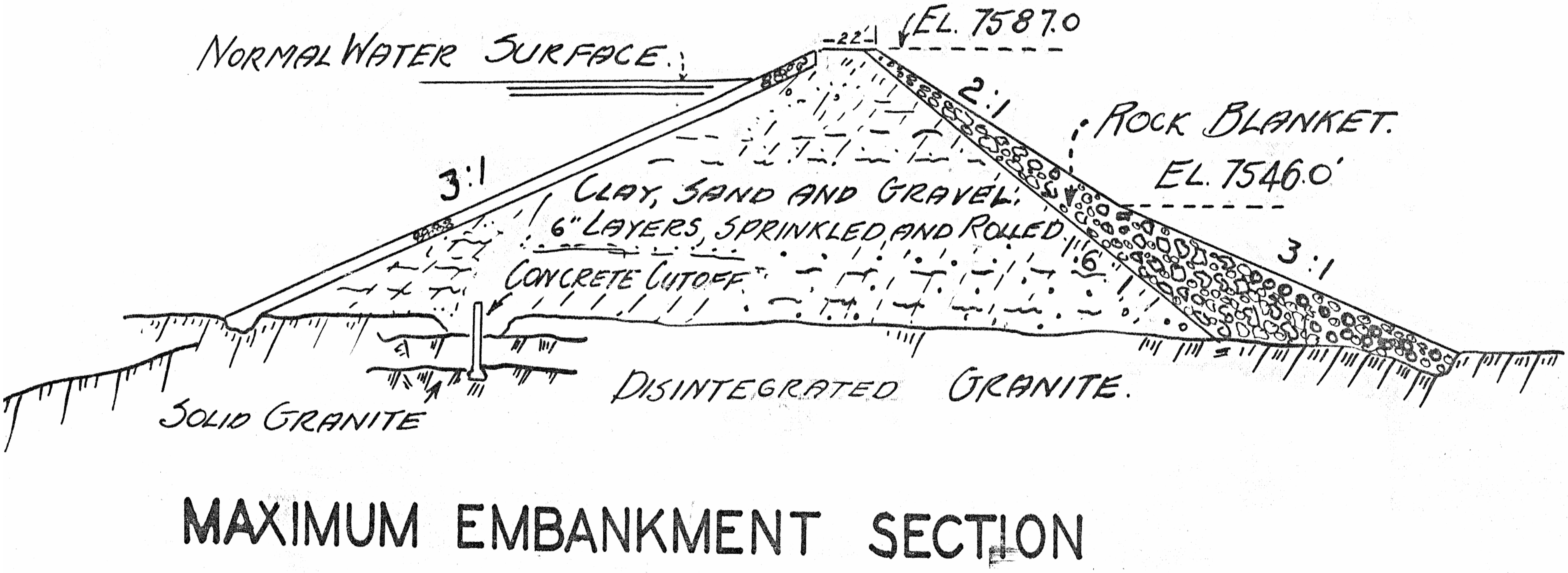


Figure 2.6.79
Wyoming State Engineer's Office (SEO) permit application dam cross section – Upper Van Tassell Reservoir
Source: SEO permit drawing
Title: Map to Accompany Application for Upper Van Tassell Reservoir
Permit No.(s): 4152 Res.
Filing Date: September 30, 1931

W. H. R. No. 2 Reservoir

W. H. R. No. 2 Reservoir has a permitted capacity of 877.35 acre-feet. The reservoir is located on the channel of Crow Creek. The reservoir has both an emergency spillway and a principal spillway. The principal spillway has a discharge capacity of 1,021 cubic feet per second, and the emergency spillway has a discharge capacity of 9,918 cubic feet per second.

Table 2.6.99 provides the Wyoming State Engineer's Office (SEO) permit application W.H.R. No. 2 Reservoir area capacity table.

Table 2.6.99 Wyoming State Engineer's Office (SEO) permit application area capacity table - W. H. R. No. 2 Reservoir

Contour	Area	Average	Acre Feet
4977	0.1		
			0.25
4978	0.4		
			0.75
4979	1.1		
			1.60
4980	2.1		
			2.55
4981	3.0		
			3.60
4982	4.2		
			4.80
4983	5.4		
			6.05
4984	6.7		
			7.50
4985	8.3		
			9.70
4986	11.1		
			12.65
4987	14.2		
			16.90
4988	19.6		
			21.80
4989	24.0		
			26.15
4990	28.3		
			29.85
4991	31.4		
			34.05
4992	36.7		
			41.40
4993	46.1		
			50.55
4994	55.0		
			61.20
4995	67.4		
			73.10
4996	78.8		
			82.35
4997	85.9		
			92.50
4998	99.1		
			103.65
4999	108.2		
			111.70
5000	115.2		
			82.70
5000.7	121.0		
		Total capacity	**877.35**
		Capacity - Permit 4032 Res.	794.65 acre-feet
		Capacity - This Enl.	82.7 acre-feet

Source: Wyoming State Engineer's Office Permit No. 4640R drawings.

W. H. R. Reservoir

Permitted for irrigation and stock uses, W. H. R. Reservoir has an available capacity of 878.04 acre-feet. The dam is an earthfill structure. The reservoir is located on the channel of Crow Creek in Laramie County. The crest of the dam is at elevation 5,025 feet, and the spillway is at invert elevation 5,019 feet.

Table 2.6.100 provides the Wyoming State Engineer's Office (SEO) permit application W. H. R. Reservoir area capacity table.

Table 2.6.100 Wyoming State Engineer's office (SEO) permit application area capacity table - W. H. R. Reservoir

Contour	Area	Average
5000	0.00	
		0.30
5001	0.52	
		0.76
5002	1.00	
		2.56
5003	4.12	
		6.80
5004	9.48	
		11.86
5005	14.24	
		16.32
5006	18.40	
		21.18
5007	23.96	
		27.76
5008	31.56	
		35.58
5009	39.50	
		43.06
5010	46.52	
		48.82
5011	51.12	
		56.96
5012	62.80	
		66.10
5013	69.40	
		74.16
5014	78.92	
		82.10
5015	85.28	
		87.72
5016	90.16	
		92.25
5017	94.35	
		203.75
5019	109.40	
	Total	**878.04 acre-feet**
Source: Wyoming State Engineer's Office Permit No. 4402R drawings.		

Figure 2.6.80 provides the Wyoming State Engineer's Office (SEO) permit application W. H. R. Reservoir dam cross section.

Figure 2.6.81 provides the Wyoming State Engineer's Office (SEO) permit application W. H. R. Reservoir dam profile.

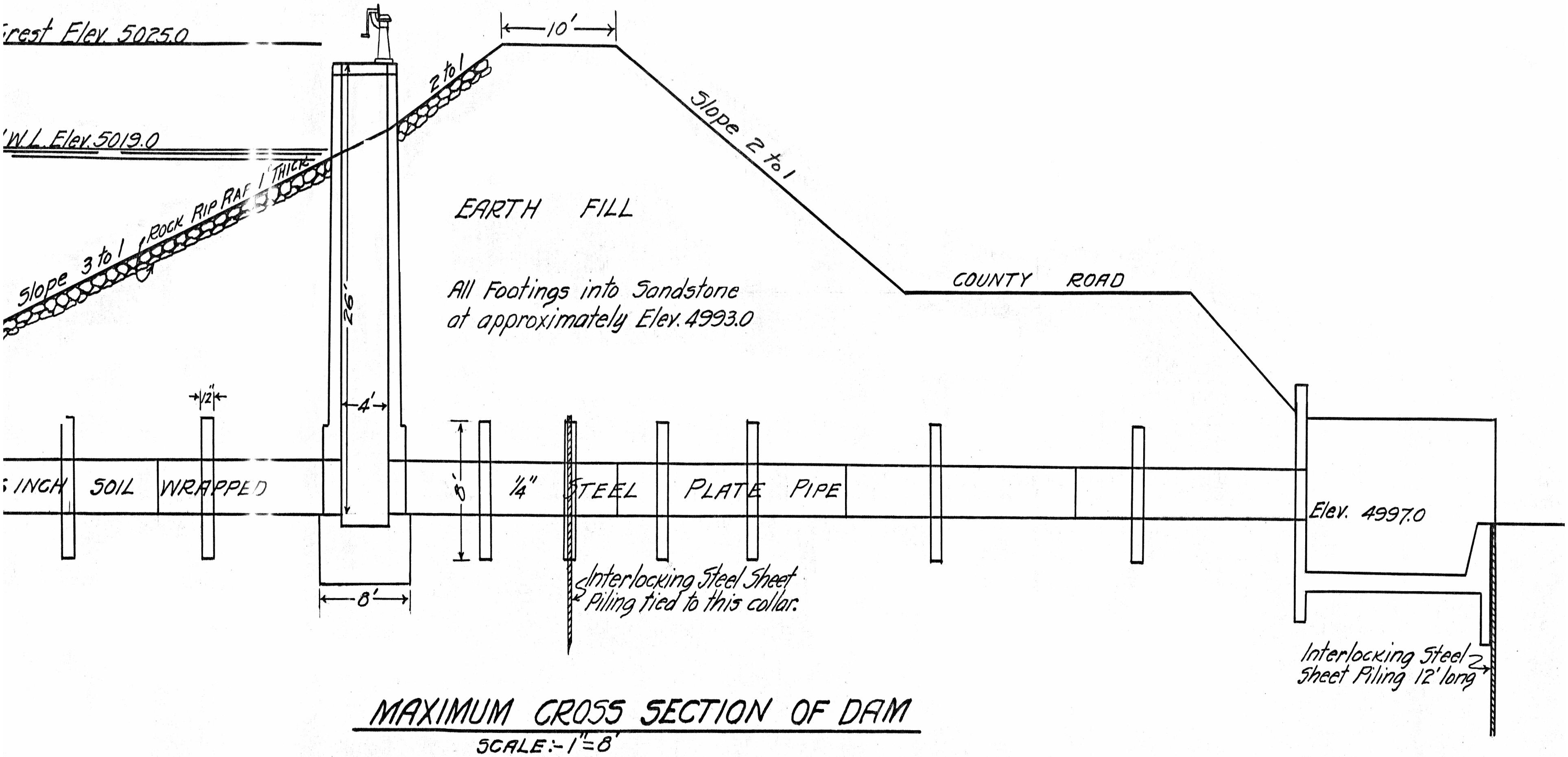


Figure 2.6.80

Wyoming State Engineer's Office (SEO) permit application dam cross section – W.H.R. Reservoir

Source: SEO permit drawing

Title: Map to Accompany Application for Enlargement W.H.R. Reservoir

Permit No.(s): 4402 Res.

Filing Date: February 15, 1930

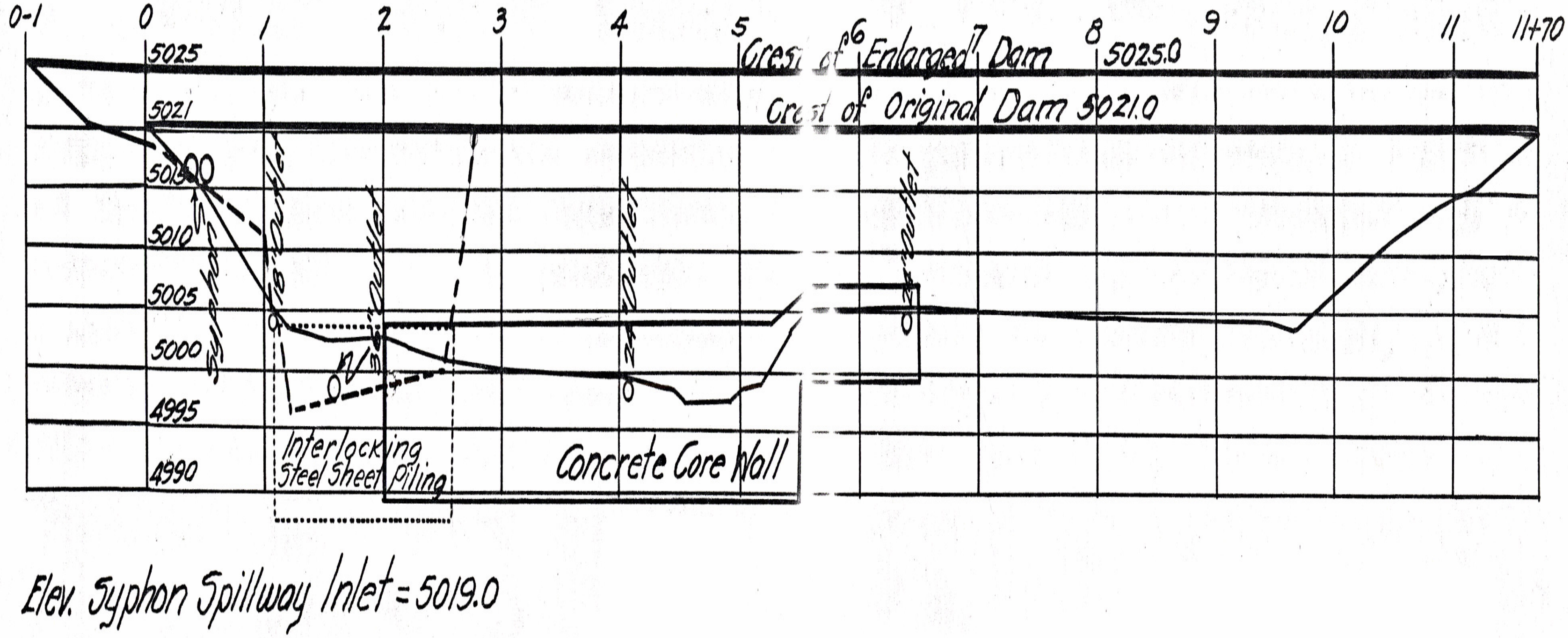


Figure 2.6.81
Wyoming State Engineer's Office (SEO) permit application dam profile – W.H.R. Reservoir
Source: SEO permit drawing
Title: Map to Accompany Application for Enlargement W.H.R. Reservoir
Permit No.(s): 4402 Res.
Filing Date: February 15, 1930

Polaris Reservoir

Polaris Reservoir has a permitted capacity of 1,047.62 acre-feet and is used for irrigation purposes. The reservoir is filled by the Lone Tree "I" ditch. The dam outlet consists of an 8-inch diameter cast iron pipe.

Figure 2.6.82 provides the Wyoming State Engineer's Office (SEO) permit application Polaris Reservoir dam profile.

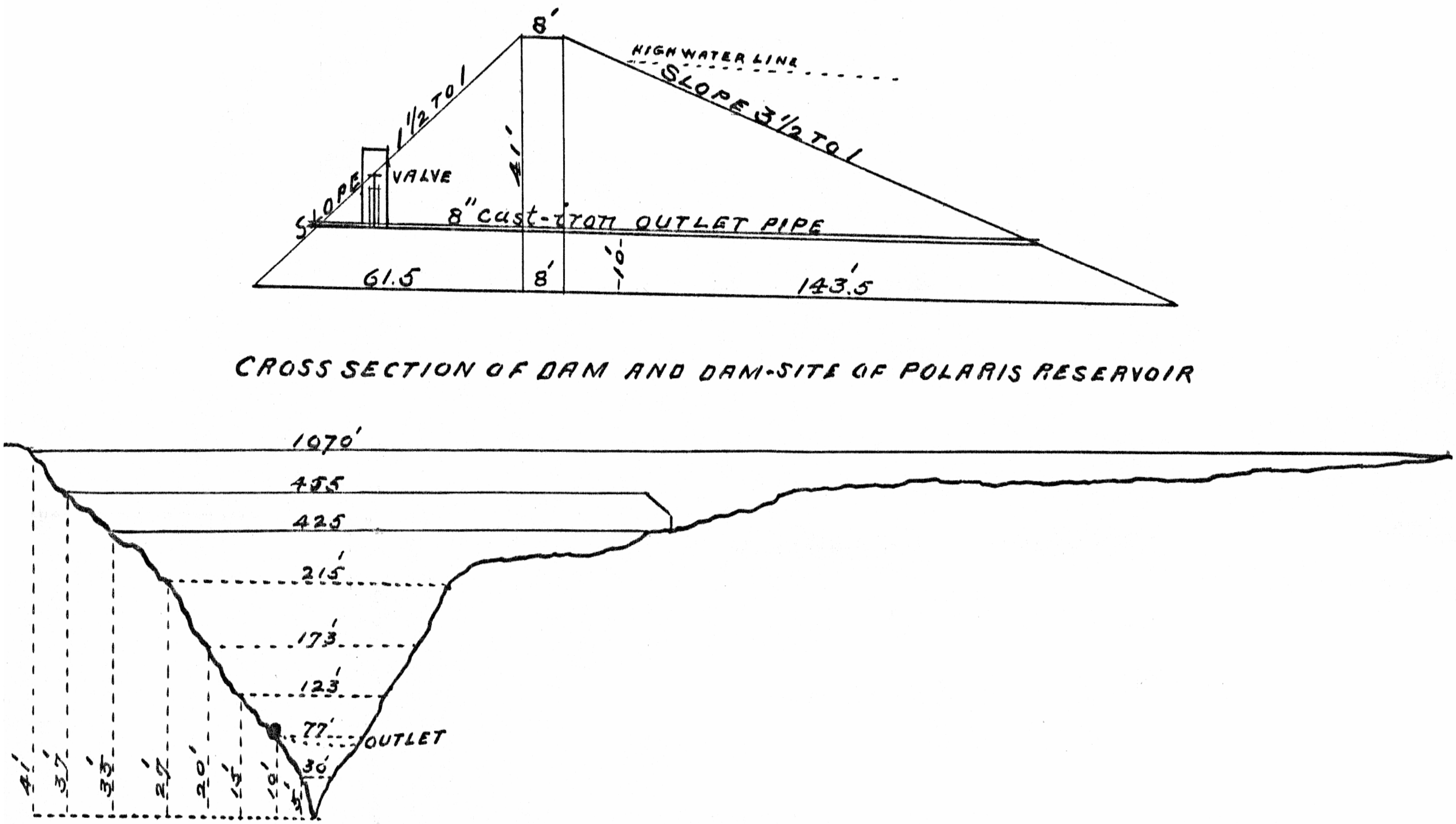


Figure 2.6.82

Wyoming State Engineer's Office (SEO) permit application dam cross section and profile – Polaris Reservoir

Source: SEO permit drawing

Title: Enlargement of Polaris and 7XL Reservoirs

Permit No.(s): 1475 Res., 1476 Res.

Filing Date: Unknown

Tables 2.6.101 through 2.6.105 provide an overview of the Wyoming State Engineer’s Office (SEO) permit application information for major reservoirs in the South Platte subbasin.

Table 2.6.101 Summary - locations of major reservoirs in the South Platte subbasin

Structure number	Permit number	Reservoir name	Township	Range	Section	Qtr qtr	Nearest city	County
1	P261R	Cheyenne No. 2 Reservoir (Granite Springs Reservoir)	14	70	22	NENW	Cheyenne	Laramie
2	P1317R	Crystal Lake Reservoir	14	70	26	NENE	Cheyenne	Laramie
	P3684R	Crystal Lake Reservoir, Enl.	14	70	26	NENE	Cheyenne	Laramie
3	P928R	One Mile Reservoir	15	66	1	NENW	Cheyenne/Burns	Laramie
	P1060R	One Mile Reservoir,Enl.	15	66	1	NENW	Cheyenne/Burns	Laramie
4	P4152R	Upper Van Tassell Reservoir	15	70	30	SWSE	Cheyenne	Laramie
5	P3984R	W.H.R. Reservoir	13	66	2	SESE	Cheyenne	Laramie
	P4402R	W.H.R. Reservoir, Enl.	13	66	2	SESE	Cheyenne	Laramie
6	P4032R	W.H.R. No. 2 Reservoir	13	65	3	SENE	Burns/Pinedale	Laramie
	P4640R	W.H.R. No. 2 Reservoir, 1st Enl.	13	65	3	SENE	Burns/Pinedale	Laramie
7	P994R	Polaris Reservoir	12	67	9	NENE	Cheyenne	Laramie
	P1476R	Polaris Reservoir	12	67	9	NENE	Cheyenne	Laramie

Source: Wyoming State Engineer's Office.

Table 2.6.102 Summary - permitted capacities of major reservoirs in the South Platte Subbasin

Structure number	Permit number	Reservoir name	Active capacity acre-feet	Inactive capacity acre-feet	Enlargement capacity acre-feet	Total capacity acre-feet
1	P261R	Cheyenne No. 2 Reservoir (Granite Springs Reservoir)				7,367.00
2	P1317R	Crystal Lake Reservoir				3,618.00
	P3684R	Crystal Lake Reservoir, Enl.			894.70	4,512.70
3	P928R	One Mile Reservoir				127.16
	P1060R	One Mile Reservoir,Enl.			2,120.00	2,247.16
4	P4152R	Upper Van Tassell Reservoir				1,867.90
5	P3984R	W.H.R. Reservoir				674.29
	P4402R	W.H.R. Reservoir, Enl.			203.75	878.04
6	P4032R	W.H.R. No. 2 Reservoir				794.65
	P4640R	W.H.R. No. 2 Reservoir, 1st Enl.			82.70	877.35
7	P994R	Polaris Reservoir				440.00
	P1476R	Polaris Reservoir			607.62	1,047.62
Source: Wyoming State Engineer's Office.						

Table 2.6.103 Summary - permitted beneficial uses of major reservoirs in the South Platte subbasin

Structure number	Permit number	Reservoir name	Applicant name	Priority date	Source	Use
1	P261R	Cheyenne No. 2 Reservoir (Granite Springs Reservoir)	City of Cheyenne	11/9/1901	Middle Crow Creek	Municipal
2	P1317R	Crystal Lake Reservoir	City of Cheyenne	10/10/1906	Middle Crow Creek	Power, municipal
	P3684R	Crystal Lake Reservoir, Enl.	City of Cheyenne	1/31/1921	Middle Crow Creek	Railroad, irrigation, domestic
3	P928R	One Mile Reservoir	Warren Live Stock Company	10/5/1906	Lodge Pole Creek	Irrigation
	P1060R	One Mile Reservoir,Enl.	Warren Live Stock Company	6/8/1907	Lodge Pole Creek	Irrigation
4	P4152R	Upper Van Tassell Reservoir	City of Cheyenne	10/24/1912	North Crow Creek	Municipal
5	P3984R	W.H.R. Reservoir	Wyoming Hereford Ranch	9/25/1924	Crow Creek	Irrigation
	P4402R	W.H.R. Reservoir, Enl.	Wyoming Hereford Ranch	10/8/1929	Crow Creek	Irrigation, stock
6	P4032R	W.H.R. No. 2 Reservoir	Red Baldy Ranch	12/11/1925	Crow Creek	Irrigation, stock, domestic
	P4640R	W.H.R. No. 2 Reservoir, 1st Enl.	Red Baldy Ranch	2/10/1936	Crow Creek	Irrigation, stock, domestic
7	P994R	Polaris Reservoir	Warren Live Stock Company	12/22/1906	Lone Tree Creek	Irrigation
	P1476R	Polaris Reservoir	Warren Live Stock Company	3/30/1909	Lone Tree Creek	Irrigation

Source: Wyoming State Engineer's Office.

Table 2.6.104 Summary - outlet works descriptions for major reservoirs in the South Platte subbasin

Structure number	Permit number	Reservoir name	Outlet works description
1	P261R	Cheyenne No. 2 Reservoir (Granite Springs Reservoir)	The existing permit drawing for Granite Springs Reservoir shows, on the masonry dam section and "face of dam" profile, 2 apparently gated and ungated outlet pipes.
2	P1317R	Crystal Lake Reservoir	The outlet is one 24-inch cast iron pipe. The outlet material is granite.
	P3684R	Crystal Lake Reservoir, Enl.	Outlet material is solid rock.
3	P928R	One Mile Reservoir	The outlet is two 10-inch iron pipes.
	P1060R	One Mile Reservoir,Enl.	The outlet consists of four cast iron pipes (3 8-inch and one 10-inch) provided with suitable outlet valves. The outlet material is prairie soil.
4	P4152R	Upper Van Tassell Reservoir	The Upper Van Tassell Reservoir outlet works is approximately 642 feet long. The structure inlet consists of a headwall with a steel grate. Approximately the upstream 500 feet of the outlet works is a 5 foot by 7 foot unlined tunnel, and the downstream 142 feet of the outlet works consists of two 20 inch diameter riveted steel pipes within a 5 foot diameter tunnel. A valve is located at the upstream and downstream end of each 20 inch outlet pipe.
5	P3984R	W.H.R. Reservoir	
	P4402R	W.H.R. Reservoir, Enl.	The outlet is a 36-inch soil wrapped steel plate pipe with 12 inch thick by 8 feet seepage collars located at approximately 12 foot intervals along the outlet pipe. A manually controlled gate provides the ability to manipulate outlet works discharge rates.
6	P4032R	W.H.R. No. 2 Reservoir	The outlet is an 8-foot diameter pipe. The outlet has a capacity of 240 cubic feet per second.
	P4640R	W.H.R. No. 2 Reservoir, 1st Enl.	The outlet works consists of four outlet pipes, including an 18 inch diameter pipe, a 36 inch diameter outlet pipe, and two 24 inch diameter outlet pipes.
7	P994R	Polaris Reservoir	The outlet is 10-feet above the steepest point at the dam and is an 8-inch cast iron pipe. The outlet material is prairie soil.
	P1476R	Polaris Reservoir	The outlet is an 8-inch cast iron pipe with a standard water works valve. The outlet material is earth.

Source: Wyoming State Engineer's Office.

Table 2.6.105 Summary - emergency spillway descriptions for major reservoirs in the South Platte subbasin

Structure number	Permit number	Reservoir name	Spillway description
1	P261R	Cheyenne No. 2 Reservoir (Granite Springs Reservoir)	The permit drawing for this reservoir shows, on the "face of dam" profile, an open channel emergency spillway of unknown base width.
2	P1317R	Crystal Lake Reservoir	The spillway is 50 feet wide, 5 feet deep, and constructed through solid rock.
	P3684R	Crystal Lake Reservoir, Enl.	
3	P928R	One Mile Reservoir	The spillway is comprised of two separate spillways. One is located at the north end of the dam and is 200-feet wide and the other is a natural spillway which is also 200-feet wide.
	P1060R	One Mile Reservoir,Enl.	
4	P4152R	Upper Van Tassell Reservoir	The Upper Van Tassell Reservoir emergency spillway is an open channel flow structure located near the left dam abutment. The spillway has an approximately 200 foot base width at elevation 7570. A concrete weir "spillway crest" at elevation 7577.33 is located across the spillway near the downstream end of the spillway.
5	P3984R	W.H.R. Reservoir	
	P4402R	W.H.R. Reservoir, Enl.	The W.H.R. Reservoir Enl. Permit drawing shows, near the right dam abutment, what appears to be an open channel emergency spillway at crest elevatin 5019, six feet below enlarged dam crest elevation 5025.
6	P4032R	W.H.R. No. 2 Reservoir	The W.H.R. Reservoir No. 2 emergency spillway is a concrete structure having a 140 foot base width that is located at the left dam abutment.
	P4640R	W.H.R. No. 2 Reservoir, 1st Enl.	The spillway consists of a drop inlet pipe principal spillway in which the drop inlet is a 10-foot diameter corrugated metal pipe with concrete cutoff collars. The principal spillway has a capacity of 1,021 cubic feet per second and the emergency spillway has a capacity of 9,918 cubic feet per second.
7	P994R	Polaris Reservoir	Spillway near the east end of the dam. The spillway is 150 feet wide.
	P1476R	Polaris Reservoir	Spillway not necessary.

Source: Wyoming State Engineer's Office.

<u>2.6.6 Reservoirs with Permitted Capacities between 50 Acre-feet and 999 Acre-feet</u>

The following tables provide tabulated data collected from the Wyoming State Engineer's Office regarding reservoirs with permitted capacities between 50 and 999 acre-feet. These reservoirs are considered "small reservoirs" for the purposes of this report. The tables are organized by subbasin.

Table 2.6.106 contains a summary of information regarding small reservoirs in the Above Pathfinder subbasin.

Table 2.6.106 Summary - Wyoming State Engineer's Office (SEO) data - small reservoirs in the Above Pathfinder subbasin

Permit no.	Reservoir name	Applicant name	Township	Range	Section	Qtr/qtr	Source	Capacity (acre-feet)
P9442R	2R Recalmation Reservoir	Pathfinder Mines Corporation	32	90	0		Dry Coyote Creek	987
P539R	North Spring Creek Reservoir	J.S. Stanley, T.W. Stanley	14	86	4	SWNE	North Spring Creek	571
P6065R	North Spring Creek Lake Reservoir, First Enlargement of the	Cynthia Kelleye O'Neill Trust No. 1	14	86	4	SWNE	North Spring Creek	243
P7355R	White Reservoir	Lonesome Fox Corporation	19	78	4	SWNE	Medicine Bow River	744
P1026R	Bucklin Reservoir	Norman Bucklin	28	88	18	SESW	Whiskey Creek	435
P1967R	Bucklin Reservoir, Enlargement	Sun Land and Cattle Company	28	88	18	SESW	Whiskey Creek	285
P7676R	No. 5 Evaporation Reservoir	Pathfinder Mines Corporation	28	78	27	SWNE	Mine Creek	719
P1726R	Cow Creek Lake Reservoir	Saratoga Alfalfa Farms & Cattle Company	14	85	17	SESE	Cow Creek	303
P3960R	Cow Creek Lake Reservoir, Enlargement of	Myrtle E. Igo	14	85	17	SESE	Cow Creek	220
P5486R	Cow Creek Lake Reservoir, Second Enlargement of	Silver Spur Land and Cattle Company	14	85	17	SESE	Cow Creek	127
P8016R	Atlantic Rim Reservoir	City of Rawlins	20	88	14	NWNE	Sage Creek (28-19-85)	645
P6271R	Rawlins Reservoir	City of Rawlins, Wyoming	17	88	26	SENW	Sage Creek (28-19-85)	624
P2040R	Sage Creek Reservoir	Celia A. McManis	18	86	2	SENE	Sage Creek (28-19-85)	606
P729R	Kindt Reservoir	J. Burton Tuttle	19	86	28	SESW	Miller Creek	597
P2508R	South Spring Creek Lake Reservoir	Donald L. and Susan M. Hanson	14	86	2	--	South Spring Creek	570
P700R	J. Frank Walker Reservoir	Sullivan Land Company (successor to Ed Anderson, original appropriator)	26	78	28	SENW	Bates Hole Draw	562
P1052R	Horn & Meason Reservoir	George B. Storer**Deborah Chastain	17	83	27	SESW	Cedar Creek	336
P2414R	Horn & Meason Reservoir, Enlargement of the	George B. Storer**Deborah Chastain	17	83	27	SESW	Cedar Creek	222
P7550R	Pine Cone No. 1 Reservoir	Frances H. White and Clifford B. White	20	78	33	NENE	Pine Creek	430
P7551R	Pine Cone No. 2 Reservoir	Frances H. White and Clifford B. White	20	78	33	NWSE	Jack Daniels Draw	121
P8393R	McIntosh Pit Reservoir	William & Jennifer McIntosh	28	92	32	SENE	McIntosh Draw	537
P240R	Gunst Reservoir	Aloysius Gunst	14	83	24	NENE	Dufunny Creek	80
P1552R	Gunst Reservoir, Enlargement	Fotios E. Romios**Andronios E. Roumeliotis	14	83	24	NENE	Dufunny Creek	113
P3260R	Gunst Reservoir, First Enlargement of	Elva E. Gunst	14	83	24	NENE	Dufunny Creek	311
P7714R	McIntosh No. 1 Reservoir	U.S. Energy/ Crested Corporation	28	92	29	SENE	Sheehan Springs Draw	481
P474R	Kinney Reservoir	E.C. Kinney	21	82	24	SESW	Dana Springs	480
P6085R	Verplanke Reservoir	Charles L. Vyvey and Emma Vyvey	14	82	30	NENW	Billy Creek	225
P518R	Ver Plancke Reservoir	Peter Verplacke	14	82	30	NENW	Billy Creek	241
P10780R	Little Sage Diversion	The Overland Trail Cattle Company,LLC	19	86	29	NWSW	Little Sage Creek	182
P7140R	Little Sage Creek Reservoir	USDI, Bureau of Land Management	19	88	22	NWSW	Little Sage Creek	272
P461R	Horne Reservoir	Horne Bros.	21	77	4	SWNE	Foote Creek	75
P6130R	Horne Reservoir, First Enlargement	Horne Bros. Ranch, Inc.	21	77	4	SWNE	Foote Creek	378
P768R	Haines Reservoir	Saratoga Land and Investment Company	17	84	30	SESE	North Spring Creek	392
P4121R	Anderson Reservoir	Andrew Anderson Jr.	15	84	21	NWNE	Teddy Creek	170
P4449R	Anderson Reservoir, First Enlargement of	Andrew Anderson	15	84	21	NWNE	Otto Creek	74
P4449R	Anderson Reservoir, First Enlargement of	Andrew Anderson	15	84	21	NWNE	Otto Creek	117
P4108R	Bucklin No. 2 Reservoir	Norman D. Bucklin	28	88	19	SENW	Whiskey Creek	361
P3941R	Pearl Reservoir	Claud W. Thompson	14	83	11	NESW	Indian Creek	336

Table 2.6.106 Summary - Wyoming State Engineer's Office (SEO) data - small reservoirs in the Above Pathfinder subbasin (cont)

Permit no.	Reservoir name	Applicant name	Township	Range	Section	Qtr/qtr	Source	Capacity (acre-feet)
P7473R	Schoen Lake Reservoir	A Bar One Ranch	20	80	8	NWSE	Mill Creek	317
P5530R	Buck Draw Reservoir	Seaverson Livestock Company	16	85	6	NWNE	Buck Draw	195
P6079R	Buck Draw Reservoir, Needham Enlargement of the	Volusia Locations, Inc.	16	85	6	NWNE	Reservoir Draw	120
P1467R	Speyerer Reservoir	Lena Speyerer	28	89	6	NESW	Willow Creek (16-29-89)	312
P8721R	Dump Settling Reservoir	Petrotomics Company	27	78	8	NENW	Petrotomics #2 Draw	308
P3859R	Wiant Reservoir, First Enlargement of	Aurilla F. Condict, Maysel C. Beales, Winthrop C. Condict, and Alden R. Condict	16	80	11	SESE	South Brush Creek	51
P2202R	Wiant Reservoir	Winthrop Condict	16	80	11	SESE	South Brush Creek	246
P960R	Robert Cardwell No. 2 Reservoir	Robert Cardwell	28	83	31	NESE	Dry Gulch	283
P4644R	Finley Reservoir	M. G. Finley	17	83	24	NWNW	Spring Creek	102
P7450R	Finley Reservoir, Second Enlargement of the	John Lunt	17	83	24	NWNW	Spring Creek	174
P7275R	Spring Lake Reservoir	A Bar A, Inc.	13	81	22	SESE	Spring Creek	256
P6133R	Rochelle Reservoir	City of Rawlins	17	87	20	SWNW	Sage Creek (28-19-85)	255
P5819R	Irene Reservoir	Irene Brothers, Inc.	27	83	24	NWNW	Dry Creek or North Fork Sage Creek	251
P3763R	Silver Lake Reservoir	Charles T. Fait & Mayme J. Aydelott	14	85	18	NESE	Silver Lake Brook	236
P403R	Rigby's Reservoir, Enlargement of	Mason Rigby	29	92	27	SESE	Crook's Creek	112
P82R	The Rigby Reservoir	N. H. Brown	29	92	27	SESE	Crook's Creek	112
P7353R	Lake George Reservoir	George B. Storer	17	83	18	SWNE	Cadwell Slough	221
P2569R	Johnson Reservoir	Morgan L. Johnston	20	85	8	NENW	Smith Gulch	220
P5816R	Toothaker Reservoir	Edward F. Munroe, et al.	14	82	16	NWNW	Beaver Creek	215
P2134R	Ryan Bros. Lake Reservoir	Edwin E. Ryan and Cecil A. Ryan (as ordered by the District Court, Second Judicial District, by Judgement entered June 8, 1956)	16	80	14	SESW	North Twin Lake	214
P2807R	Dome Rock Reservoir, First Enlargement of	Emil Jammerman	30	90	30	NWSE	Sage Hen Creek	110
P453R	Dome Rock Reservoir	E. Jamirman	30	90	30	NWSE	Sage Hen Creek	93
P3519R	Keystone Reservoir	D. M. Foreman** Saratoga Alfalfa Farms & Cattle Company	16	80	23	NWNW	South Twin Lakes Creek	199
P3364R	Grinnell Reservoir	Sullivan Land Company (successor to Ed Anderson, original appropriator)	26	81	15	NWNW	Grinnell Creek	196
P5824R	Good No. 1 Reservoir	Arnold Good	17	86	15	NWSW	Beaver Creek	191
P3286R	Lordier Reservoir	Amy H. Lordier	14	83	4	SENW	Cherokee Creek	109
P3466R	Lordier Reservoir, First Enlargement of the	Edwin Anderson	14	83	4	SENW	Cherokee Creek	75
P3739R	Johnston No. 2 Reservoir	The Overland Trail Cattle Company	20	85	30	NWSW	Iron Springs Gulch	180
P783D	Jack Creek Reservoir	Louis Seaverson	16	86	12	NENW	Jack Creek	98
P2595R	Jack Creek Reservoir, Enlargement of	Louis Seaverson**William Shomber	16	86	12	NENW	Jack Creek	81
P2437R	Nickerson Reservoir	Anna L. Nickerson	27	76	30	SWSW	Dry Creek	178
P5475R	Low Reservoir	Hulda Seaverson, Reynold A. Seaverson, Oswald I. Seaverson, Lester Seaverson and Myrtle Seaverson Breitenstein	17	86	31	NWSW	Low Creek	168
P5820R	Annis Reservoir	Oscar T. Annis	29	85	28	SENE	Arkansas Creek	166
P7717R	G. H. Reservoir	Norman Palm	23	83	25	NESW	Middle Ditch Draw	165
P6252R	Rouse Stockwater Reservoir	J. E. Rouse	14	82	6	NENE	Beaver Creek or Big Beaver Creek	163

Table 2.6.106 Summary - Wyoming State Engineer's Office (SEO) data - small reservoirs in the Above Pathfinder subbasin (cont)

Permit no.	Reservoir name	Applicant name	Township	Range	Section	Qtr/qtr	Source	Capacity (acre-feet)
P5952R	Meer Reservoir	Mark J. Meer & Son	27	81	3	NESW	Spring or North Sage Creek or North Fork Sage Creek	163
P8464R	Final Reclamation No. 17 Reservoir	Palm Livestock Company	22	82	5	NWNW	Final Draw	158
P7862R	Jenson Reservoir	Kennecott Uranium Company	27	92	11	SWNW	Antelope Creek	157
P2825R	Berry No. 2 Reservoir	I.L. Ambler	22	77	4	SWSE	Beery Springs	153
P1572R	Home Reservoir	Alexancer Gillespie	23	75	36	SWSW	Boswell Springs Creek	151
P990R	Point of Rock Reservoir	Sullivan Land Company (successor to Ed Anderson, original appropriator)	26	80	15	NESE	Cottonwood Creek	145
P3907R	Crane Reservoir	W. L. Crane	29	89	27	NWNW	Dry Draw	144
P5802R	Lace Reservoir	Max L. Krueger and Aliene W. Krueger	19	77	3	SWNW	Coal Bank Creek	143
P1120R	Greyhound Reservoir	Martha Widner (as successor to George A. Campbell, the original appropriator)	20	83	26	SWNW	Rattlesnake Creek	142
P5508R	Shell Creek Reservoir	Archie Sanford	31	84	26	NENW	Shell Creek	130
P6076R	Summit Reservoir, 1st Enlargement of the	Ralph H. Platt	13	82	3	SWNW	Little Beaver Creek	58
P804R	Summit Reservoir	Casteel & Hunter Co.	13	82	3	SWNW	Little Beaver Creek	71
P646R	McFadden No. 3 Reservoir	Wheatland Irrigation District (as successor to N Cross Ranch, Inc., original appropriator)	19	77	18	NWSW	Bosler Slough	40
P6082R	McFadden No. 3 Reservoir, Enlargement of	Wheatland Irrigation District (as successor to N Cross Ranch, Inc., original appropriator)	19	77	18	NWSW	Bosler Slough	86
P4726R	Corpening Reservoir	W. C. Large	17	80	34	SESE	Brush Creek	123
P1162R	Sederlin Reservoir	Louis Sederlin	19	81	1	SWNE	Fish Creek	120
P991R	Mule Creek Reservoir	Luella M. Cole	26	75	1	SWSW	Mule Creek	116
P7678R	Fresh Water Reservoir	Pathfinder Mines Corporation	28	78	27	NWSW	Tilley Creek	116
P703R	Joe "D" Reservoir	J. M. Durbin**L. M. Colman	21	76	32	SENW	Fieland Creek	114
P621R	Goetz Reservoir	Anthony J. Goetz	26	81	1	SWSE	Muddy Creek	112
P692R	Cardwell Reservoir	Henry Cardwell	28	84	13	NESE	Little Canyon Creek	112
P3944R	Daniel F. Hudson Reservoir	W. Richard Scarlett	31	93	2	SWSW	East Long's Creek	112
P1597R	Beery Reservoir	I. L. Ambler	22	77	3	NWSE	Beery Springs	111
P2672R	Dry Gulch Reservoir	Henry Cole Cardwell	28	83	20	NENW	Dry Gulch	111
P9743R	East Basin Reservoir	Petrotomics Company	27	78	4	NWSE	East Basin Draw	110
P748R	Cardwell Reservoir	Sullivan Land Company (successor to Ed Anderson, original appropriator)	26	81	23	NESE	Hill Creek	107
P5293R	Willow Springs Reservoir	Mrs. S. W. Johnson Estate**Otto Lembcke**Wyoming Board of Land Commissioners**August Hermberg	20	79	22	NWNW	Willow Springs Creek	105
P3773R	Marlow Reservoir	B. F. Marlow	22	76	20	NWNE	Draw	103
P6141R	Chace No. 1 Reservoir	Loree B. Chace	22	79	18	NESW	Carbon Dry Creek	94
P823R	Hannah Mahoney No. 1 Reservoir	John Mahoney	26	88	8	SWNE	Muddy Creek	92
P239R	Three Mile Reservoir	Fred Stocks	28	77	36	NESW	Three Mile Creek	90
P5989R	Coal Bank Reservoir	Double K Ranch, Inc.	20	76	30	SESW	Coal Bank Creek	88
P5904R	Irene No. 2 Reservoir	Irene Brothers, Inc.	27	83	33	NWNW	Indian Creek	87

Table 2.6.106 Summary - Wyoming State Engineer's Office (SEO) data - small reservoirs in the Above Pathfinder subbasin (cont)

Permit no.	Reservoir name	Applicant name	Township	Range	Section	Qtr/qtr	Source	Capacity (acre-feet)
P4612R	Seaverson Reservoir	Oswald I. Seaverson	18	85	36	SWSE	McPhail Creek	40
P5531R	Seaverson Reservoir, Enlargement of	Oswald I. Seaverson	18	85	36	SWSE	McPhail Creek	43
P5242R	Antelope Reservoir	Pearl Bartlett, Garland P. Bartlett & Betty Pearl Bartlett	16	85	18	SWNE	North Spring Creek	82
P3990R	Sucker Lakes Reservoir	W. C. Condict	16	80	23	SWSE	North French Creek	81
P730R	Stephenson Reservoir	William Stephenson	22	82	23	SWNE	Big Ditch Creek	78
P7661R	A. M. C. No. 1 Storage and Regulatory Reservoir	Arch Mineral Corporation	22	83	16	NESE	Benita Draw	76
P11207R	A.M.C. No. 1 Storage and Regulatory Reservoir (P7661R), Enl. (Enl.. A.M.C. No. 1 Storage and Regulatory Reservoir (P7661R)	Seminoe No. 1 Arch of Wyoming, LLC** USDI, Bureau of Land Management	22	83	16	NESE	Benita Draw	
P1767R	Cherokee Trail Reservoir	Pearl Alameda	14	83	22	NWNE	Indian Creek	75
P824R	Hannah Mahoney No. 2 Reservoir	Ferris Mountain Ranch Inc., P.O. Box 459, Rawlins, WY 82301	26	89	2	NWNE	Muddy Creek	74
P3444R	Spurlock Reservoir	R. H. Nichols**H.R. Lathrop**Charles E. Spurlock	27	85	26	SWNW	DeWeese Creek	74
P7442R	Bob Sport-Fishing Reservoir	Robert J. Wagoner	17	86	31	NESE	Low Creek	71
P1R	Brownlee Reservoir	John Brownlee	14	83	9	SENE	Cotton Creek	70
P3966R	Araster Lake Reservoir	W. C. Condict	16	80	9	SESE	Araster Lake	70
P6809R	Water Valley Fish and Recreation	Water Valley Ranch, Incorporated	14	84	36	SESW	Soldier Creek	68
P1873R	Grieves Reservoir	John T. Grieves	28	90	26	SENW	Willow Creek (16-29-89)	66
P6002R	Indian Creek Reservoir	Leonard A. & Martha Sanford**Wyoming Board of Land Commissioners	27	83	16	SENE	Indian Creek	65
P4581R	Hanna Reservoir	Union Pacific Water Company	22	82	36	NESW	Rattlesnake Creek	62
P5597R	Antelope Reservoir	Richards Bros., Inc.	26	79	1	SWSW	Antelope Draw	62
P4109R	Bucklin No. 3 Reservoir	Norman D. Bucklin	28	89	24	SESE	Whiskey Creek	62
P2678R	Cherokee Reservoir	Jordan & Lynch	21	88	11	NENE	Cherokee Creek	61
P5301R	Swan No. 108-W Reservoir	Schmale Brothers	21	75	33	NWSE	Mizer Creek	61
P3826R	Thompson Reservoir	Claud W. Thompson	14	83	11	NENW	Rye Gulch	60
P5481R	Long Pond Reservoir	A. F. Good	17	86	15	SWNE	Beaver Creek	59
P7625R	Grazing No. 1 Stock Reservoir	Platte County Sheep Grazing Association	25	75	8	SWNW	South Fork Rogers Creek	57
P5254R	Slough Creek Reservoir	USA Department of Interior	29	93	24	NENW	Slough Creek	57
P8465R	Final Reclamation No. 16 Reservoir	Palm Livestock Company	22	82	5	SWNE	West DEQ Draw	54
P9987R	White Wetlands Reservoir	Tim White; Wyoming Game and Fish Department	18	84	25	NESW	Lake Creek Lake Outlet Channel	51
P3853R	Dickerson Reservoir	James Dickerson	19	82	4	NWSW	Hat Creek	51

Source: Wyoming State Engineer's Office.

Table 2.6.107 contains a summary of information regarding small reservoirs in the Pathfinder to Guernsey subbasin.

Table 2.6.108 contains a summary of information regarding small reservoirs in the Guernsey to State Line subbasin.

Table 2.6.109 contains a summary of information regarding small reservoirs in the Upper Laramie subbasin.

Table 2.6.110 contains a summary of information regarding small reservoirs in the Lower Laramie subbasin.

Table 2.6.107 Summary - Wyoming State Engineer's Office (SEO) data - small reservoirs in the Pathfinder To Guernsey subbasin

Permit no.	Reservoir name	Applicant name	Township	Range	Section	Qtr/qtr	Source	Capacity (acre-feet)
P6648R	G-K Reservoir	William E. Reeves and Preston W. Kesecker	36	81	19	SWNW	North Casper Creek	987
P6059R	Little Boxelder No. 1 Reservoir	Green Valley Sheep Co.	33	74	36	NESW	Little Boxelder Creek	20
P6134R	Little Boxelder No. 1 Reservoir, 1st Enlargement of the	Green Valley Sheep Co.	33	74	36	NESW	Little Boxelder Creek	395
P7396R	Little Boxelder No. 1 Reservoir, Second Enlargement	Green Valley Corporation	33	74	36	NESW	Little Boxelder Creek	474
P6785R	Gerry Nicolaysen #1 Reservoir	Cole Creek Sheep Company, Gerry Nicolaysen, President	36	76	30	NWSW	Cole Creek or Coal Creek	548
P6786R	Gerry Nicolaysen No. 1 Reservoir, Enlargement	Cole Creek Sheep Company	36	76	30	NWSW	Cole Creek or Coal Creek	209
P5522R	Saddleback Reservoir	C. J. Saul and Merle B. Saul	30	72	25	SWNW	Freeman Draw	650
P11148R	Twin Bridge Reservoir	Jim Price	31	82	25	NENW	North Platte River	568
P6782R	Chamberlain No. 1 Reservoir	Douglas Reservoirs Water Users Association	32	73	5	NENW	LaPrele Creek	505
P2230R	Lee's Reservoir	Rasmus Lee	32	82	13	SWSW	Poison Spring Creek	498
P259R	Number One Reservoir	Nicholas N. Schriener	35	82	33	NWSE	South Fork Casper Creek	466
P919R	O'Brien Reservoir	Diller O'Brian	31	81	8	NWSE	Bates Creek	455
P1029R	Shriner Reservoir	Nicholas H. Shriner	34	82	4	SWNW	South Fork Casper Creek	440
P1638R	Roseberry Reservoir No. 2	John Roseberry **Frank Roseberry	36	82	15	NWNE	Shed Draw	390
P5395R	Davidson Reservoir	Robert J. Davidson	34	86	1	SESW	North Branch Middle Casper Creek	358
P2141R	Hansine Reservoir	Henry Schnoor	31	80	32	SWSE	Stinking Creek	336
P145R	Nicolaysen Reservoir	P. C. Nicolaysen	33	78	22	NWSW	Dry Muddy Creek	330
P2022R	Clark Reservoir	James M. Clark	32	71	23	NESW	Clark Spring Draw or Buckcamp Gulch	316
P5509R	Twiford Reservoir	Twiford Land and Livestock Company	28	68	11	SESE	North Bear Creek	285
P1361R	Bucknum Reservoir	C. K. Bucknum	35	82	22	NWNW	Tie Bridge Gulch	270
P5516R	Daly Reservoir	Paul Jacques	35	81	12	NESW	Middle Fork Casper Creek	259
P1494R	Adams Reservoir	Margaret Adams	34	83	26	SENE	South Fork Casper Creek	195
P1768R	Adams Reservoir, Enlargement of the	Margaret Adams **Augusta Adams	34	83	26	NENE	South Fork Casper Creek	50
P2584R	No. 2 Reservoir	Douglas Securities Company	34	73	25	NENE	Sage Creek (12-33-73)	234
P6981R	Wintermote No. 1 Reservoir	Lester Wintermote	32	69	15	NWNE	Shawnee Creek	232
P4412R	Gillespie Reservoir	H. A. Gillespie	33	69	33	SWSW	West Fork Shawnee Creek	222
P6158R	A & P No. 1 Reservoir	Richard L. Peterson	33	75	12	SESW	Dry Creek	214
P4469R	Dry Muddy Reservoir	P. C. Nicolaysen	33	78	14	SENE	Dry Muddy Creek	213
P304R	Mary Steed Reservoir	Mary Steed	33	78	13	NESE	Goose Creek	210
P2780R	Mt. Home No. 1 Reservoir	Mt. Home Sheep Company	33	76	18	SWNE	Alkali Creek	202
P5760R	Bressler Reservoir	Harold D. Bressler	35	81	25	SENW	South Fork Casper Creek	201
P1059R	J. E. Higgins No. 1 Reservoir	Anne E. Devine Estate	33	75	23	SENW	Dry Creek	50
P1689R	J.E. Higgins No. 1 Reservoir, Enlargement of	Anne E. Devine Estate	33	75	23	SENW	Dry Creek	141
P4575R	Warner Reservoir	Helen M. Warner	33	72	34	SENE	North Five Mile Creek	151

Table 2.6.107 Summary - Wyoming State Engineer's Office (SEO) data - small reservoirs in the Pathfinder To Guernsey subbasin (cont)

Permit no.	Reservoir name	Applicant name	Township	Range	Section	Qtr/qtr	Source	Capacity (acre-feet)
P5804R	1st Enlargement of the Warner Reservoir	George W. Warner and Helen M. Warner	33	72	34	SENE	North Five Mile Creek	32
P1249R	Wagner Reservoir	Thomas Steed	33	77	31	SWSW	Clear Fork Muddy Creek	182
P5602R	Indian No. 1 Reservoir	Lisle E. Pexton	29	72	25	SENE	Indian Creek	79
P5970R	Indian No. 1 Reservoir, First Enlargement of the	Lisle E. Pexton	29	72	25	SENE	Indian Creek	101
P315R	Nicolaysen No. 2 Reservoir	P. C. Nicolaysen	33	78	14	SESW	Dry Muddy Creek	175
P5701R	Cabin Creek Reservoir	Dumbbell Ranch Company	32	85	17	SWNW	Poison Spider Creek	174
P7379R	Reese No. 5 Reservoir	Lester C. Wintermote	32	68	6	SWSW	East Fork of Shawnee Creek	171
P5724R	Runden No. 1 Reservoir	T. Lee Reno	32	71	15	SENW	Dry Creek or Reno Draw	166
P1214R	Schnoor Reservoir	Henry Schnoor	31	80	20	SWSW	Stinking Creek	165
P1792R	McDonald & Arnold No. 1 Reservoir	George D. McDonald **George H. Arnold	32	77	18	NWNW	Muddy Creek (34-77)	163
P2204R	Blue Bank Reservoir	Martha Irwin	34	82	34	SWSE	Blue Bank Draw	162
P2496R	Haygood Reservoir	A. W. Haygood	31	82	24	SENE	Bolton Creek	156
P7691R	Boerner Reservoir	Henry Boerner	32	73	3		Alkali Creek	153
P5562R	McComb Reservoir	Laura Allen McComb	28	67	22	SENW	Saw Mill Creek	149
P2205R	Slate Hill Reservoir	Charles Irwin	34	82	32	SENE	Poison Spider Creek	146
P933R	Oral Reservoir	George W. Johnson **Oral Johnson	33	82	14	NENW	Poison Spider Creek	145
P491R	Froehner Reservoir	Adolph Froehner	28	80	21	NESE	Stinking Creek	144
P143R	John Moran Reservoir	John Moran	30	69	31	NESE	Elkhorn Creek	144
P7635R	Cardine-Keith Reservoir	Walter Keith and G. Joseph Cardine	31	77	6	NWNW	Skeen (Skein) Creek	143
P2837R	Poison Spider Reservoir	A.H. Cobb	33	83	16	NESW	Poison Spider Creek	142
P40R	Wagner and Bayer Reservoir	Henry Bayer	33	77	30	SENE	Goose Creek	78
P1250R	Wagner & Bayer Reservoir, Enlargement	Thomas Steed	33	77	30	SENE	Goose Creek	60
P2363R	Wilson No. 1 Reservoir	Laura J. Wilson	30	68	13	SESE	Willow Creek	133
P1762R	Hermine Reservoir	Henry & Hermine Schnoor	31	80	33	SWSW	Bates Creek	132
P5291R	Lulu Reservoir	Lula Valentine	35	76	29	NENE	Lone Tree Creek	125
P5571R	East Side Reservoir No. Three	LaPrele Irrigation District	32	72	5	SENW	Five Mile Creek	117
P1637R	Roseberry Reservoir No. 1	John Roseberry **Frank Roseberry	37	82	35	SWSW	North Casper Creek	117
P6119R	Spring Creek No. 1 Reservoir	Gordon M. Fizthugh	30	70	10	SENW	North Platte River	114
P5915R	Smith Stock-Water Reservoir	Robert C. Smith	35	76	7	SENE	Smith Draw	113
P6706R	Pexton No. 1 Reservoir	Charles E. Pexton	28	72	16	SWSW	Reid Creek	112
P2583R	No. 1 Reservoir	Douglas Securities Company	34	72	19	SWSW	Sage Creek (12-33-73)	112
P153R	Clark Reservoir	D. L. Clark	31	81	16	SWNW	Bates Creek	106
P164R	Gazlay Reservoir	Bernice Gazlay	33	78	25	NWNW	Reservoir Creek	104

Table 2.6.107 Summary - Wyoming State Engineer's Office (SEO) data - small reservoirs in the Pathfinder To Guernsey subbasin (cont)

Permit no.	Reservoir name	Applicant name	Township	Range	Section	Qtr/qtr	Source	Capacity (acre-feet)
P6596R	Antelope No. 1 Reservoir	Art C. Sims	33	71	35	SENE	North Antelope Creek	102
P6172R	Muddy No. 1 Reservoir	E. Leonard Reese	30	67	6	SWNE	Muddy Creek (30-68)	100
P6071R	Douglas Fishing Lake No. 1 Reservoir	Wyoming Game and Fish	32	72	10	NESW	Six Mile Creek	100
P8053R	Pratt Park Reservoir	City of Casper	33	79	14	NENW	Sage Creek (2-33-79)	100
P5908R	Sage Creek (Casper City) Reservoir, First Enlargment of	City of Casper	33	79	27	SENW	Sage Creek (2-33-79)	100
P205R	White Brothers No. 1 Reservoir	Ed S. White	31	80	4	NWSW	Little Red Creek or Red Creek	96
P5811R	Rissler Reservoir	Edna B. Rissler	31	77	6	SWNE	Rissler Draw	96
P5514R	Guernsey Fish Pond Reservoir	Town of Guernsey	26	66	2	NWSE	Springs	88
P5923R	Lamb Upper Reservoir	Lawrence P. Lamb	32	77	0	--	Brushy Draw	88
P6094R	Trail No. 1 Reservoir	Woodrow Brow	30	71	17	NESW	Trail Creek	86
P5407R	Sand Creek Reservoir	Herman Werner	35	74	21	SWNW	North Platte River	80
P9114R	Haywire No. 1 Reservoir	Haywire No. 1 Stock Reservoir	34	73	32	SENW	Dry Fork Sand Creek	78
P4067R	Wenzinger Reservoir	Emilie M. Wenzinger	35	73	31	NWSE	Wenzinger Draw	75
P3630R	Cambell Reservoir	Glendo Cattle Company	30	67	31	NESW	Cottonwood Creek	74
P1248R	Abney Reservoir No. 1	James M. Abney	33	74	36	SWNE	Little Boxelder Creek	72
P879R	Casper City Reservoir	City of Casper	33	79	27	SENW	Elkhorn Creek	71
P633R	Chas. Smith Reservoir	Maud M. Smyth	31	75	2	SESE	Windy Ridge Creek	70
P1066R	9 H. 6 No. 2 Reservoir	Eva J. Hemingway	37	81	34	NWNE	East Fork Hemingway Draw	70
P5805R	Warner No. 2 Reservoir	George W. Warner and Helen M. Warner	33	72	35	SWNW	North Five Mile Creek	69
P5557R	Carroll No. 2 Reservoir	Homer R. Lathrop	33	78	6	SESW	Elkhorn Creek	68
P323R	Duhling Reservoir	H.G. Duhling	33	79	24	NWSE	East Fork Elkhorn Creek	16
P5599R	Duhling Reservoir, Enlarged	William E. Pratt	33	79	24	NWSE	East Fork Elkhorn Creek	51
P6294R	Darlington No. 1 Reservoir	W. W. Whitaker	30	72	27	NWSE	LaBonte Creek	66
P6841R	West Side Reservoir No. 1	Douglas Reservoir Water Users	33	73	33	NWSW	Buck Draw	64
P1085R	J. E. Higgins Reservoir No. 2	John E. Higgins	33	75	27	NENE	Dry Creek	62
P5704R	East Reservoir	Lula Valentine	35	76	21	NESE	East Fork Lone Tree Creek	62
P5568R	West Side Reservoir No. Four	Orsa D. Ferguson	33	73	20	SESE	LaPrele Creek	61
P114R	Cannon Dale Reservoir No. 2	W. H. Thayer	32	75	2	NWNW	Hunton Creek	60
P7323R	Lake Reservoir	Cole Creek Sheep Company	35	77	14	SWSE	Cole Creek or Coal Creek	60
P2112R	Bakken-Esmay Reservoir	Albert G. Sims	32	71	1	SWNE	South Antelope Creek	59
P1187R	Broom Creek Reservoir	A. J. Covington	29	65	6	NWSE	Broom Creek	58
P6168R	Fred Dilts No. 4 Reservoir	Fred Dilts	29	71	26	SWSW	North or Little Horse Shoe Creek	58
P5705R	West Reservoir	Lula Valentine	35	76	21	NWSE	West Fork Lone Tree Creek	58
P5767R	Cook Reservoir	WM. H. & Barbara A. Cross	29	81	21	NESE	Bolton Creek	56

Table 2.6.107 Summary - Wyoming State Engineer's Office (SEO) data - small reservoirs in the Pathfinder To Guernsey subbasin (cont)

Permit no.	Reservoir name	Applicant name	Township	Range	Section	Qtr/qtr	Source	Capacity (acre-feet)
P4591R	Peterson Reservoir	Mathew H. George	30	72	6	NENE	Muddy Wagon Hound Creek	55
P7553R	Basin Reservoir	James A. and Susan A. Willox	30	72	0	--	Basin Draw	55
P158R	Miller Reservoir	W. G. Miller	33	78	30	SESW	Elkhorn Creek	54
P4647R	Guernsey Fish Rearing Station Reservoir	Wyoming Game and Fish	26	66	2	NWNW	North Platte River	53
P6518R	Bentley Reservoir	Frances Bentley	33	78	17	NESW	Claud Creek	53
P5924R	Lamb Lower Reservoir	Lawrence P. Lamb	32	77	0	--	Brushy Draw	52
P5556R	Carroll No. 1 Reservoir	Homer R. Lathrop	33	78	7	SENW	Elkhorn Creek	52
P7601R	Elsie Reservoir	Minna L. Cross	31	74	14	NESE	Moss Agate Creek	51
P5570R	East Side Reservoir No. Two	LaPrele Irrigation District	32	72	8	NENE	Rudd Draw	51
P3225R	Black No. 2 Reservoir	Harriet Black	30	69	14	NESW	Elkhorn Creek	50

Source: Wyoming State Engineer's Office.

Table 2.6.108 Summary - Wyoming State Engineer's Office (SEO) data - small reservoirs in the Guernsey to State Line subbasin

Permit number	Reservoir name	Applicant name	Township	Range	Section	Qtr Qtr	Source	Capacity (acre-feet)
P1227R	Horse Camp Reservoir	H. B. Cunningham	26	60	10	SWSE	Sheep Creek	726
P465R	Katzer No. 2 Reservoir	Fred Katzer	23	60	16	SESW	Horse Creek	520
P428R	Katzer Reservoir	Fred Katzer	23	60	17	NESW	Katzer Drain	455
P330R	Springer Reservoir	Dora Russell	23	61	22	SWNW	Katzer Drain	244
P614R	Katzer No. 3 Reservoir	Fred Katzer	23	60	19	NWSW	Horse Creek	221
P1470R	Knott Reservoir	Mrs. Dora Knott	27	63	29	SWNW	Dickerson Draw	212
P1228R	Walsh Reservoir	Gertrude A. Mason	26	64	5	NENW	Molly's Fork	200
P1015R	John B. Carl Reservoir	John B. Carl	29	63	36	NWSW	Muskrat Creek	90
P1692R	Patrick Red Cloud No. 1 Reservoir	Ed L. Patrick	28	62	32	SWNW	Rawhide Creek	77
P5558R	Damrow Reservoir	Fred A. & Vera M. Damrow	28	64	4	NWSE	Roosevelt Creek	69
P5932R	Red Cloud No. 1 Reservoir	Red Cloud Cattle Company, Inc.	29	62	28	SWNE	Red Cloud Slough	61
P7453R	Skinner Reservoir	Jess Skinner	27	63	32	SWNE	Eaton Draw	57
P6569R	Carpenter No. 1 Reservoir	G. Willard Carpenter	26	60	15	NENW	George Draw	56
P6546R	Detention Dike B-3	London Flats-Bovee Drainage District	25	63	7	SWNE	Bovee Draw	53

Source: Wyoming State Engineer's Office.

Table 2.6.109 Summary - Wyoming State Engineer's Office (SEO) data - small reservoirs in the Upper Laramie subbasin

Permit number	Reservoir name	Applicant name	Township	Range	Section	Qtr Qtr	Source	Capacity (acre-feet)
P1312R	Carrol Lake Reservoir	Howard R. Ingham	17	74	30	SWSE	Little Laramie River	587
P5520R	Cavender Reservoir	William Homer Cavender	19	76	1	SESE	Cooper Creek	539
P3547R	Rainey Reservoir	Wheatland Irrigation District	19	76	9	NESE	Dutton Creek	537
P5610R	Lone Tree Reservoir,,Enlargement of the	Ralph Klink	13	74	15	SESW	Five Mile Creek	320
P5084R	Lone Tree Reservoir	Pitchfork Land and Cattle Company	13	74	15	SESW	Five Mile Creek	128
P6831R	Meeboer Lake Reservoir	Wyoming Game and Fish Department	14	75	4	SWNE	Laramie River	322
P3932R	Cavender Reservoir	W. H. Cavender	19	76	35	SESW	Cooper Creek	316
P2425R	Gillespie Reservoir	A.S. Gillespie	20	74	12	SWSW	Drainage into Lake Ione	256
P7259R	Seepage Lake Reservoir	USDI Fish & Wildlife Service	14	75	5	NESW	Meeboer Draw	247
P5967R	Flat Lake	Joe Miller	19	76	27	SENE	Section 34 Draw	241
P2050R	Cooper Reservoir	Gregory T. Van Meter	18	76	4	NWNE	Cooper Creek	232
P2725R	Harney Creek Reservoir	John W. Leazenby	14	73	27	SWNE	Harney Creek	194
P4536R	Alsop Lake Reservoir	Patrick Gallagher	16	75	3	NENE	Little Laramie River	188
P2587R	McGibbon Farm Reservoir	Ralph Klink and Irma Klink Bell	14	73	32	SWSE	Five Mile Creek	180
P3442R	Columbus Reservoir	Davis & Thomas	15	73	31	SESW	Harney Creek	168
P1004R	Table Mountain No. 1 Reservoir	L. J. Porter **J.E. Porter **Carrie Porter	15	77	2	SESE	Little Laramie River	164
P2679R	Hundred Springs Reservoir	John W. Leazenly	14	73	21	NWNE	Springs	160
P1647R	Pascoe No. 2 Reservoir	Paul Pascoe	18	73	29	SWNE	Frolic Canon	156
P5617R	Soda Lake Draw No. 1 Reservoir	Norval D. Johnson	14	75	3	SENE	Meeboer Draw	153
P1694R	Chris Klein Reservoir	Chris Klein	15	73	22	SWNE	Soldier Creek	147
P2484R	Seepage Reservoir	Wheatland Irrigation District	19	78	36	NWSW	Drover Gulch	146
P3789R	Millbrook No. 2 Reservoir	George J. Forbes and Marian J. Forbes	16	76	29	SWSE	Little Laramie River	142
P405R	Rice Reservoir	Mrs. Diana Brown	13	75	26	NWNW	Alkali Creek	137
P772R	Lone Tree No. 2 Reservoir	John Goetz Livestock Company	13	75	13	NWSW	Sand Creek	124
P771R	Lone Tree No. 1 Reservoir	John Goetz Livestock Company	13	75	13	SENW	Sand Creek	112
P6700R	Weaver Reservoir	Adrian F. Weaver, Jr.	13	72	5	SWSW	Harney Creek	22
P7449R	Weaver Reservoir,,Enlargement of	Pat Harnden	13	72	5	SWSW	Harney Creek	79
P2285R	Laramie Ice Ponds Reservoir	Union Pacific Railroad Company	15	73	5	SWNE	Laramie River	100
P1005R	Table Mountain No. 2 Reservoir	L. J. Porter **J.E. Porter **Carrie Porter	15	77	12	NWSW	Little Laramie River	96
P5631R	Harman Reservoir	USDI Fish & Wildlife Service	14	75	3	NESW	Richard Draw	87
P6711R	Kennedy #1 Reservoir	W. H. Kennedy	23	72	18	SWSE	Dodge Creek	83
P1011R	Lost Creek Reservoir	Thomas & Hellen McGill	23	73	13	SWNW	Lost Creek	81
P2538R	Herrick No. 1 Reservoir	D.O. Herrick	16	76	14	NWNE	Little Laramie River	72
P1605R	Walla No. 2 Reservoir	Monaghan Farms, Inc. Colorado Coproation	14	73	20	SESE	Five Mile Creek	71

Table 2.6.109 Summary - Wyoming State Engineer's Office (SEO) data - small reservoirs in the Upper Laramie subbasin (cont)

Permit number	Reservoir name	Applicant name	Township	Range	Section	Qtr Qtr	Source	Capacity (acre-feet)
P6238R	Old Smuggler Reservoir	Frank C. Bosler	16	73	3	SENE	Dee Draw	69
P4133R	Woodhouse Reservoir	Norman E. Strom and Florence H. Strom	15	73	15	NENE	Pope Springs Draw	66
P1932R	Lime Creek Reservoir	Eva L. Dodge	23	74	24	NWNE	Lime Creek	64
P4127R	Osterman Lake Reservoir	Pioneer Canal Company	15	75	33	NENW	Laramie River	62
P810R	Harris Reservoir	A. L. Hall **Anniie Hall	17	75	14	SESE	Little Laramie River	62
P5711R	Glade No. 2 Reservoir	Duer, Jr. and Genevieve C. Wagner	23	73	35	SWSW	Glade Creek	53

Source: Wyoming State Engineer's Office.

Table 2.6.110 Summary - Wyoming State Engineer's Office (SEO) data - small reservoirs in the Lower Laramie subbasin

Permit number	Reservoir name	Applicant name	Township	Range	Section	Qtr Qtr	Source	Capacity (acre-feet)
P6990R	A-3 Reservoir	Angell Draw Drainage District	24	62	7	SWNE	Angell Draw	762
P6545R	Detention Dam B-2	London Flats-Bovee Drainage District	25	63	7	SWSW	Bovee Draw	640
P6550R	Bar M No. 2 Reservoir	Johnston Fuel Liners, Incorporated	26	73	8	NWSW	Bar M Creek	197
P6828R	Bar M No. 2 Res,,Enlargement	Johnston Fuel Liners, Incorporated	26	73	8	NWSW	Bar M Creek	195
P6645R	Bar M. No. 2 Reservoir,Enlargement of the	Johnston Fuel Liners, Incorporated	26	73	8	NWSW	Bar M Creek	139
P6171R	Bell Reservoir	John H. Bell	19	71	36	NWSE	Middle Chugwater Creek	214
P8983R	Bell Reservoir,, Enlargement of the	John Bell Iron Mountain Ranch Company	19	71	36	NWSE	Middle Chugwater Creek	265
P1800R	Lowica Reservoir	Louis C. Todd	25	68	2	SWSW	Fish Creek	405
P326R	No. 3 Reservoir	F. P. Lewis	25	69	28	SESE	Collins Cutoff Creek	342
P6548R	H-2 Detention Dam	London Flats-Bovee Drainage District	25	63	20	NWSW	Habig Draw	99
P6547R	H-1 Detention Dam	London Flats-Bovee Drainage District	25	63	30	NWSW	Habig Draw	235
P5591R	Bell and Scranton No. 1 Reservoir	John S. Bell and Genevieve Bell	27	74	22	NESW	Soldier Spring	315
P6343R	Bell & Scranton No. 1 Reservoir,,First Enlargement	John S. Bell	27	74	22	NESW	Soldier Creek	130
P7190R	Bell & Scranton No. 1 Reservoir,,Second Enlargement of	John Kafka	27	74	22	NESW	Soldier Creek	181
P6194R	Jordan No. 1 Reservoir	Effie L. and Lawrence W. Jordan	19	70	13	NESE	Chugwater Creek	295
P2294R	Christiansen No. 2 Reservoir	Christian Christiansen	21	70	8	SENE	South Sybille Creek	274
P6896R	Kafka No. 1 Reservoir	John Kafka	26	74	4	NENE	North Laramie River	262
P4451R	Rock Lake Reservoir	Wheatland Irrigation District	23	68	8	NENE	Sybille Creek	250
P1793R	Wheeler and Carmichael Reservoir	H.E. Wheeler **W.B. Carmichael	25	69	27	SWSE	Dry Laramie River	250
P5578R	Gilbert No. 1 Reservoir	Gilbert W. Small	21	70	11	SWNW	Mule Creek	219
P7609R	Garrelts No. 2 Reservoir	H. A. Garrelts	22	64	15	SWNW	Garrelts Draw	205
P1449R	Bagley Bros. Reservoir	Nathan Bagley	22	68	12	NENE	Antelope Creek	15
P5307R	Bagley Bros. Reservoir,,Enlargement of	C.H. Nelson	22	68	12	NENE	Antelope Creek	201
P7719R	MBPP Storm Runoff Retention Reservoir	Basin Electric Power Cooperative	25	67	27	NWNE	Seepage Water Hole Draw	176
P1069R	Iron Mountain Reservoir	Mary Shaffer	19	71	10	SESE	South Sybille Creek	168
P5676R	Miller No. 2 Reservoir	Charles A. Miller	20	69	19	SENE	North Chugwater Creek	52
P5751R	Miller No. 2 Reservoir,,First Enlargement of the	Charles A. Miller	20	69	19	SENE	North Chugwater Creek	96
P5954R	Richard No. 1 Reservoir	Diamond Ranch Inc.	21	68	33	SENE	Richeau Creek	19
P6762R	Richard No. 1 Reservoir,,Enlargement	Hugh McDonald	21	68	33	SENE	Richeau Creek	118
P2889R	Newell Reservoir	Kenneth Atkinson (as successor to Felix Atkinson, original appropriator)	26	74	25	NWSE	Cottonwood Creek	90
P7186R	Newell Reservoir, Enlargement of	Kenneth Atkinson (as successor to Felix Atkinson, original appropriator)	26	74	25	NWSE	Cottonwood Creek	40
P6839R	Double L Reservoir	Hugh C. McDonald Estate	21	68	23	SESW	Richeau Creek	130

Table 2.6.110 Summary - Wyoming State Engineer's Office (SEO) data - small reservoirs in the Lower Laramie subbasin (cont)

Permit number	Reservoir name	Applicant name	Township	Range	Section	Qtr Qtr	Source	Capacity (acre-feet)
P5710R	Morrison No. 2 Reservoir	Edward and Doris Wedemeyer	20	69	22	SENW	North Chugwater Creek	35
P7573R	Morrison No. 2 Reservoir,, Enlargement of the	Edward Wedemeyer	20	69	22	SENW	North Chugwater Creek	94
P490R	Sandercock Reservoir	Hattie A. Sandercock	25	64	6	NENE	Deer Creek	127
P7253R	O Bar O No. 3 Reservoir	Dean Prosser	24	69	1	SESW	Gray's Run	117
P5670R	Hugh McDonald Reservoir	Hugh McDonald	20	68	19	NWSE	North Chugwater Creek	117
P1791R	Roath Reservoir	A. J. Roath	24	67	32	SESE	Chugwater Creek	112
P6871R	Murriel Lake Reservoir	Roy M. Hitt	24	68	2	SESW	Murriel Lake	103
P258R	J. N. Mertz Reservoir	J. N. Mertz	24	70	24	SWSW	Spring	100
P987R	Grant #2 Reservoir (Kirby Irrigation Cos #1)	Robert M. Grant	22	68	25	SWSW	North Richard Creek	98
P6886R	Chug Springs Reservoir	Johnston Fuel Liners, Incorporated	23	67	4	SWSW	Chugspring Creek (Chugwater Springs Creek)	97
P379R	Phelps Reservoir	William W. Phelps	22	70	10	SESW	McMurry Creek	60
P1660R	Phelps Reservoir,,Enlarge	William Phelps	22	70	10	SESW	McMurry Creek	36
P6292R	Johnson Reservoir	Wyoming Game and Fish	21	71	20	SENE	Little Creek	95
P5718R	Sid No. 1 Reservoir	W. Sidney Sturgeon	24	73	35	NWNW	North Fork Duck Creek	93
P5864R	Duck Creek No. 1 Reservoir	W. Sidney Sturgeon	24	73	28	SWSW	Duck Creek	30
P7324R	Duck Creek No. 1 Reservoir,,Enlargement No. 1 of	John W. Burns	24	73	28	SWSW	Duck Creek	63
P6686R	Canon No. 5 Reservoir	Donald O. and Tamara R. Willis	19	71	4	SENW	Timber Canon Creek	91
P216R	Robert Grant Reservoir	Duncan Grant	22	68	34	NWSW	North Richard Creek	90
P5645R	Bell & Scranton No. 2 Reservoir	John S. Bell and Genevieve Bell	27	73	17	NWNW	Eggelston Creek	89
P604R	Mertz No. 2 Reservoir	J. N. Mertz	24	70	24	SENW	Laramie River	87
P6784R	Bar M. No. 3 Reservoir	Johnston Fuel Liners, Inc.	26	74	12	NENW	North Fork Bar M Creek (Unnamed Creek or North Branc	82
P6062R	Bar M No. 1 Reservoir	Associated Enterprises, Incorporated	26	74	14	NWNW	North Fork Bar M Creek (Unnamed Creek or North Bra	12
P6551R	Bar M No. 1 Reservoir,,Enlargement of the	Associated Enterprises, Incorporated	26	74	14	NWNW	North Fork Bar M Creek (Unnamed Creek or North Bra	69
P6710R	Ella Reservoir	Marie Scherrer	19	72	10	SWSE	Middle Sybille Creek	80
P5600R	Eshom Reservoir,,First Enlargement of	Eshom Brothers	23	69	7	NESW	Cooney Creek	79
P1882R	Long Gulch Reservoir	Mrs. Tincy V. Knott	24	64	19	NWNW	Long Gulch	78
P2590R	Naffziger Reservoir	Emma E. Naffziger	25	69	30	NWNW	Dugout Creek	78
P1879R	Grant Creek Reservoir	Raymond Henke **William C. Edwards	21	71	36	NWNW	Grant Creek	78
P6905R	Twenty Mile No. 1 Reservoir	Murl J. Robbins and Donald J. Robbins and State Board of Land Commissioners	25	74	33	SWNE	Twenty-Mile Creek	78
P7452R	Utter Reservoir	J. Emerson Utter	24	69	12	NWNE	Gray's Run	76

Table 2.6.110 Summary - Wyoming State Engineer's Office (SEO) data - small reservoirs in the Lower Laramie subbasin (cont)

Permit number	Reservoir name	Applicant name	Township	Range	Section	Qtr Qtr	Source	Capacity (acre-feet)
P8551R	Berdine Stock Reservoir	Flying X Ranch	22	72	28	SENE	South Blue Grass Creek (22-22-72)	11
P9509R	Berdine Stock Reservoir,, Enlargement of the	Flying X Ranch	22	72	28	SENE	South Blue Grass Creek (22-22-72)	62
P5419R	Sandercock No. 3 Reservoir	Mollie Sandercock **C.M. Sandercock **W.M.M. Sandercock	25	64	6	SWSW	Deer Creek	71
P5533R	Mary A. Bohnke Reservoir,,Enlargement of	William Galligar	24	70	28	NWSE	Paradise Creek	69
P6911R	Pinto Ethyl No. 1 Reservoir	Murl J. Robbins and Donald J. Robbins and State Board of Land Commissioners	25	74	36	SENW	Pinto Creek	69
P6066R	Phillips No. 1 Reservoir	John S. Bell and Genevieve Bell	27	74	26	NENW	Phillips Draw	69
P1477R	Eugenia R. Hall Reservoir	Eugenia R. Hall	25	69	28	NESW	Collins Cutoff Creek	67
P5675R	Sturgeon No. 1 Reservoir	William Sturgeon	25	72	35	SWSE	Spring	65
P9572R	Hanchett Reservoir	Flying X Ranch	22	72	28	NENE	South Blue Grass Creek (22-22-72)	55
P9187R	Burns M. G. Reservoir	John Burns	23	73	2	NENW	Duck Creek	55
P335R	Parker No. 1 Reservoir	G.W. Parker	26	72	25	NENW	Snow Water (Gulch)	55
P2267R	Ryff & Klassert Reservoir	G. Ryff **John Klassert	22	68	22	NENW	Hunton Creek	53
P6464R	Canon No. 4 Reservoir	Donald O. and Tamara R. Willis	20	71	34	SESW	Timber Canon Creek	51
P5376R	Clay No. 1 Reservoir	Diamond Ranch	20	70	23	NWNE	Mule Creek	51
P5714R	Sturgeon No. 3 Reservoir	Robert J. Sturgeon	25	73	33	SWNE	Antelope Creek (28-25-73)	51
P7465R	Loren Ramsey Fish Reservoir	Loren L. and Violet I. Ramsey	26	68	18	NENE	Mud Springs Branch	50

Source: Wyoming State Engineer's Office.

Table 2.6.111 contains a summary of information regarding small reservoirs in the Horse Creek subbasin.

Table 2.6.112 contains a summary of information regarding small reservoirs in the South Platte subbasin.

Table 2.6.111 Summary - Wyoming State Engineer's Office (SEO) data - small reservoirs in the Horse Creek subbasin

Permit number	Reservoir name	Applicant name	Township	Range	Section	Qtr Qtr	Source	Capacity (acre-feet)
P316R	Hughes Reservoir	Thomas S. Hughes	21	62	2	NWNE	Horse Creek	456
P1415R	66 Pastures Reservoir	Lincoln Land Company	20	60	31	SWNE	Horse Creek	335
P17R	Storage Reservoir (Peters #1 Reservoir)	W. S. Peters	22	60	3	SESW	Horse Creek	255
P1030R	Carey Company No. 1 Reservoir	Carey Company	17	66	5	SWSW	Horse Creek	170
P5259R	Howery Reservoir	Gerald L. Howery	21	62	20	SESE	McGinnis Draw	157
P7444R	Michael Reservoir	Russell Michael **Mrs. Russell Michael **Earl Michael **Mrs. Earl Michael	22	61	11	SENW	Horse Creek	155
P2180R	Drummond No. 2 Reservoir	George H. and Carol R. Marlatt	22	62	11	SWNW	Drummond Seepage Springs	151
P6676R	Table Mountain No. 1 Reservoir	Wyoming Game and Fish Commission	22	61	24	NWSW	Dry Creek	145
P2774R	Greasewood Reservoir	A. Holderman **W.C. McConnell **W.M.F. Randolph	22	62	17	SENW	Greasewood Draw	143
P4732R	McMillen Reservoir No. 2	Frank McMillen	21	61	27	NESW	Dry Creek	107
P6273R	McMillen No. 2 Reservoir,Enlargement of the	Ruth E. McMillen	21	61	27	NWSW	Dry Creek	36
P7671R	Hirsig No. 3 Reservoir	State of Wyoming, Board of Land Commissioners and Hirsig Ranch, Inc.	19	68	31	NWSW	Branch North Bear Creek	142
P329R	Little Willow Reservoir	Francis T. Hughs, Earl Michael and Olive Michael, purchasers under contract (successors to Isaac N. Hughs, original owner)	22	62	24	SESE	Horse Creek	108
P4477R	McLaughlin No. 2 Reservoir	John Whitaker Ranch Company	17	70	9	NESE	North Fork Horse Creek	97
P2187R	Dunn Reservoir	Dwight J. Poage	22	62	35	NWSE	Sinnard Draw	90
P5691R	Marlatt Reservoir	Helen Smith Marlatt and Glen L. Marlatt	22	62	11	SWNW	Marlatt Spring	80
P7534R	Table Mountain Reservoir No. 6	Wyoming Game and Fish **USDI BLM Casper District	22	61	24	SWNE	Dry Creek	76
P1149R	Moore Reservoir	Thomas T. Moore	18	65	24	SWSW	Cat Tail Creek	72
P6395R	Springer Wildlife Management Unit Reservoir	Wyoming Game and Fish Commission	22	62	22	SENE	Maple Draw	69
P6080R	McMillen Reservoir No. 3	Genevieve McMillen	21	61	27	NENW	Dry Creek	68
P5948R	Brown No. 1 Reservoir	Eunice K. Stiles	17	72	25	NWNW	Twenty-five Creek	68
P7520R	Brown No. 1 Reservoir	C. H. Brown Company, Inc.	22	62	13	NESW	Horse Creek	66
P7321R	Table Mountain Reservoir No. 5	Wyoming Game and Fish Commission	22	61	13	SESE	Seep Creek	64
P83R	R.P. Allen No. 1 Reservoir	Annie Allan	18	69	1	NENE	North Bear Creek (North Forks)	33
P7665R	R. P. Allen No. 1 Reservoir,, Hirsig Enlargement of the	Hirsig Ranch, Inc.	18	69	1	NENE	North Bear Creek (North Forks)	26
P7696R	Cash's Home Reservoir	Federated Mutual Insurance Company	17	72	14	SWNW	North Fork Horse Creek	59
P5925R	Donahue Reservoir	C. C. Donahue	18	63	26	SWSE	Little Horse Creek	56

Source: Wyoming State Engineer's Office.

Table 2.6.112 Summary - Wyoming State Engineer's Office (SEO) data - small reservoirs in the South Platte subbasin

Permit number	Reservoir name	Applicant name	Township	Range	Section	Qtr Qtr	Source	Capacity (acre-feet)
T684	Gleason Reservoirs No. 1,2 & 3 - No. 1	Warren Livestock Company and Mary Adell Warren	12	67	4	SWNW	Lone Tree Creek	118
T684	Gleason Reservoirs No. 1,2 & 3 - No. 2	Warren Livestock Company and Mary Adell Warren	12	67	5	SENE	Lone Tree Creek	118
T684	Gleason Reservoirs No. 1,2 & 3 - No. 3	Warren Livestock Company and Mary Adell Warren	12	67	9	NWNE	Lone Tree Creek	118
P1474R	Gleason #2 Reservoir, Enlargement	Mary Adell Warren (as successor to Warren Livestock Company, the original appropriator)	12	67	4	NWSW	Lone Tree Creek	160
P993R	Spotswood #2 Reservoir	Warren Livestock Company	12	67	17	NWSW	Duck Creek	336
P1258R	Beaver Dam Reservoir	J. J. Terrell	13	63	14	NWNE	Crow Creek	300
P7286R	Ullman No. 1 Reservoir	Wyoming Hereford Ranch	13	64	6	SWNE	Crow Creek	289
P1071R	Fred Hersig Reservoir	Fred Hersig	14	68	24	NWSW	Spring Creek	240
P7134R	G-W Reservoir	Gross and Wilkinson Ranch and State Board of Land Comissioners.	15	62	36	NWNW	Spring Creek	220
P6644R	Williams No. 2 Reservoir	Richard C. Williams	13	72	10	SWNW	Dale Creek	175
P1475R	7 X L Reservoir	Warren Live Stock Company	12	67	16	SWSE	Lone Tree Creek	157
P2037R	Mackley Reservoir	Herford Farms Company	12	62	13	SENE	Crow Creek	149
P8615R	Carey Detention Reservoir	City of Cheyenne	14	66	29	NENE	Dry Creek	131
P6961R	Williams No. 3 Reservoir	Richard C. Williams	14	72	14	SENW	Dale Creek	131
P9614R	Sutherland Reservoir	John Sutherland	13	70	12	SWNE	South Fork South Crow Creek	116
P10182R	Sutherland Reservoir (P9614R), Enlargement of	John Eldon Sutherland **Sutherland Brothers Ranch	13	70	12	SWNE	South Fork South Crow Creek	23
P7043R	Gardner Reservoir	Myles Gardner and Ruth E. Gardner	13	60	30	NWSW	Spring Creek	114
P9288R	Henderson Drain Detention Reservoir	Wyoming Department of Transportation	13	66	3	NENE	Henderson Drain	101
P1741R	Clear Creek Reservoir	Swan Ranch, LLC	13	67	15	NWNW	Clear Creek	69
P4059R	Campstool Reservoir	Wyoming Hereford Ranch	13	64	4	SESW	Crow Creek	66
P39R	Thomas Reservoir No. 2	Charles L. Louth	14	62	4	SESE	Lodge Pole Creek	10
P6224R	Thomas Reservoir No. 2, First Enlargement	Charles L. Louth	14	62	4	SESE	Lodge Pole Creek	53
P6891R	Culek Reservoir	John J. Culek	13	60	29	SESE	Culek Draw	54

Source: Wyoming State Engineer's Office.

2.6.7 Reservoir Evaporation

Evaporation from reservoirs is considered a consumptive use of water. Evaporation losses were calculated for all reservoirs with permitted capacities greater than or equal to 1,000 acre-feet, and for which adequate information was available. Evaporation loss data for the federal reservoirs were obtained from the U.S. Bureau of Reclamation (USBR) as shown in the above tables and will not be included in this section. To compute evaporation losses, an annual lake evaporation map in *Development of an Evaporation Map for the State of Wyoming for Purposes of Estimating Evaporation and Evapotranspiration* (Lewis, 1978) was used along with annual precipitation data obtained from the High Plains Regional Climate Center (HPRCC) in Lincoln, Nebraska. Precipitation data were averaged by month for the years 1972-2002. Reservoir surface areas that served as the basis for calculating evaporation are those shown on Wyoming State Engineer's Office (SEO) permit documents as the surface areas at reservoir high-water lines or elevations.

Once evaporation depth for each reservoir was calculated, in units of inches, using the annual lake evaporation map, evaporation depth was multiplied by the factors in *Development of an Evaporation Map for the State of Wyoming for Purposes of Estimating Evaporation and Evapotranspiration* (Lewis, 1978). Monthly precipitation for each reservoir was estimated by determining the nearest weather station to the reservoir and using precipitation data for the selected weather station as obtained from the High Plains Regional Climate Center. To determine net evaporation, evaporation minus precipitation was multiplied by the high-water line surface area of each reservoir.

The following tables provide evaporation estimates for reservoirs within each of the Platte River Basin subbasins.

2.6.7.1. Above Pathfinder Subbasin

Tables 2.6.113 through 2.6.126 provide evaporation estimates for the Rob Roy, Hog Park, Area 2/8 Reclamation, Area 3 Reclamation, No. 4 Evaporation, Johnson, Pierce, Upper Rock Creek, Bosler, Saratoga, Green Mountain Mine, Turpin Park, Teton, and Sand Lake Reservoirs (respectively).

Table 2.6.113 Rob Roy Reservoir monthly and annual evaporation estimate

Lewis annual evaporation (inches)	52											
Reservoir surface area (acres)[1]	801.5											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.40	1.30	2.03	4.16	5.98	6.81	8.89	8.11	5.98	3.95	2.03	1.35
Average monthly precipitation (inches)[4]	0.49	0.48	0.75	0.98	1.57	0.91	1.21	0.92	0.87	0.99	0.69	0.44
Net monthly evaporation (inches)	0.91	0.82	1.28	3.18	4.41	5.9	7.68	7.19	5.11	2.96	1.34	0.91
Total net monthly evaporation (acre-feet)	**61**	**55**	**85**	**212**	**295**	**394**	**513**	**480**	**341**	**198**	**89**	**61**
Total net annual evaporation (acre-feet)	**2784**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Saratoga 1 SSE weather station

Table 2.6.114 Hog Park Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	52											
Reservoir surface area (acres)[1]	598											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.40	1.30	2.03	4.16	5.98	6.81	8.89	8.11	5.98	3.95	2.03	1.35
Average monthly precipitation (inches)[4]	0.49	0.48	0.75	0.98	1.57	0.91	1.21	0.92	0.87	0.99	0.69	0.44
Net monthly evaporation (inches)	0.91	0.82	1.28	3.18	4.41	5.9	7.68	7.19	5.11	2.96	1.34	0.91
Total net monthly evaporation (acre-feet)	**45**	**41**	**64**	**158**	**220**	**294**	**383**	**358**	**255**	**148**	**67**	**45**
Total net annual evaporation (acre-feet)	**2078**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Saratoga 1 SSE weather station

Table 2.6.115 Area 2/8 Reclamation Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	47											
Reservoir surface area (acres)[1]	139.5											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.27	1.18	1.83	3.76	5.41	6.16	8.04	7.33	5.41	3.57	1.83	1.22
Average monthly precipitation (inches)[4]	0.5	0.58	0.74	1.24	1.57	1.07	1.16	1	1.01	0.92	0.53	0.52
Net monthly evaporation (inches)	0.77	0.6	1.09	2.52	3.84	5.09	6.88	6.33	4.4	2.65	1.3	0.7
Total net monthly evaporation (acre-feet)	**9**	**7**	**13**	**29**	**45**	**59**	**80**	**74**	**51**	**31**	**15**	**8**
Total net annual evaporation (acre-feet)	**421**											
Notes:												
1. Area of the high water line (HWL) of the reservoir taken from SEO permits.												
2. From Table VIII, Lewis.												
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution												
4. Average monthly precipitation, inches, for the period 1972-2002 at the Medicine Bow weather station												

Table 2.6.116 Area 3 Reclamation Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	47											
Reservoir surface area (acres)[1]	65.36											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.27	1.18	1.83	3.76	5.41	6.16	8.04	7.33	5.41	3.57	1.83	1.22
Average monthly precipitation (inches)[4]	0.50	0.58	0.74	1.24	1.57	1.07	1.16	1.00	1.01	0.92	0.53	0.52
Net monthly evaporation (inches)	0.77	0.60	1.09	2.52	3.84	5.09	6.88	6.33	4.40	2.65	1.30	0.70
Total net monthly evaporation (acre-feet)	**4**	**3**	**6**	**14**	**21**	**28**	**37**	**34**	**24**	**14**	**7**	**4**
Total net annual evaporation (acre-feet)	**196**											
Notes:												
1. Area of the high water line (HWL) of the reservoir taken from SEO permits.												
2. From Table VIII, Lewis.												
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution												
4. Average monthly precipitation, inches, for the period 1972-2002 at the Medicine Bow weather station												

Table 2.6.117 No. 4 Evaporation Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	47											
Reservoir surface area (acres)[1]	180.3											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.27	1.18	1.83	3.76	5.41	6.16	8.04	7.33	5.41	3.57	1.83	1.22
Average monthly precipitation (inches)[4]	0.50	0.58	0.74	1.24	1.57	1.07	1.16	1.00	1.01	0.92	0.53	0.52
Net monthly evaporation (inches)	0.77	0.6	1.09	2.52	3.84	5.09	6.88	6.33	4.4	2.65	1.3	0.7
Total net monthly evaporation (acre-feet)	**12**	**9**	**16**	**38**	**58**	**76**	**103**	**95**	**66**	**40**	**20**	**11**
Total net annual evaporation (acre-feet)	**544**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Medicine Bow weather station

Table 2.6.118 Johnson Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	51											
Reservoir surface area (acres)[1]	350.8											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.38	1.28	1.99	4.08	5.87	6.68	8.72	7.96	5.87	3.88	1.99	1.33
Average monthly precipitation (inches)[4]	0.49	0.48	0.75	0.98	1.57	0.91	1.21	0.92	0.87	0.99	0.69	0.44
Net monthly evaporation (inches)	0.89	0.80	1.24	3.10	4.30	5.77	7.51	7.04	5.00	2.89	1.30	0.89
Total net monthly evaporation (acre-feet)	**26**	**23**	**36**	**91**	**126**	**169**	**220**	**206**	**146**	**84**	**38**	**26**
Total net annual evaporation (acre-feet)	**1191**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Saratoga 1 SSE weather station

Table 2.6.119 Pierce Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	50											
Reservoir surface area (acres)[1]	199.4											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.35	1.25	1.95	4.00	5.75	6.55	8.55	7.80	5.75	3.80	1.95	1.30
Average monthly precipitation (inches)[4]	0.49	0.48	0.75	0.98	1.57	0.91	1.21	0.92	0.87	0.99	0.69	0.44
Net monthly evaporation (inches)	0.86	0.77	1.2	3.02	4.18	5.64	7.34	6.88	4.88	2.81	1.26	0.86
Total net monthly evaporation (acre-feet)	**14**	**13**	**20**	**50**	**69**	**94**	**122**	**114**	**81**	**47**	**21**	**14**
Total net annual evaporation (acre-feet)	**659**											

Notes:
1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Saratoga 1 SSE weather station

Table 2.6.120 Upper Rock Creek Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	40											
Reservoir surface area (acres)[1]	67.6											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.08	1.00	1.56	3.20	4.60	5.24	6.84	6.24	4.60	3.04	1.56	1.04
Average monthly precipitation (inches)[4]	0.40	0.47	0.94	1.33	1.96	0.95	1.09	0.64	0.89	0.97	0.89	0.48
Net monthly evaporation (inches)	0.68	0.53	0.62	1.87	2.64	4.29	5.75	5.60	3.71	2.07	0.67	0.56
Total net monthly evaporation (acre-feet)	**4**	**3**	**3**	**11**	**15**	**24**	**32**	**32**	**21**	**12**	**4**	**3**
Total net annual evaporation (acre-feet)	**164**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Muddy Gap weather station

Table 2.6.121 Bosler Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	50											
Reservoir surface area (acres)[1]	266											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.35	1.25	1.95	4.00	5.75	6.55	8.55	7.80	5.75	3.80	1.95	1.30
Average monthly precipitation (inches)[4]	0.49	0.48	0.75	0.98	1.57	0.91	1.21	0.92	0.87	0.99	0.69	0.44
Net monthly evaporation (inches)	0.86	0.77	1.20	3.02	4.18	5.64	7.34	6.88	4.88	2.81	1.26	0.86
Total net monthly evaporation (acre-feet)	**19**	**17**	**27**	**67**	**93**	**125**	**163**	**153**	**108**	**62**	**28**	**19**
Total net annual evaporation (acre-feet)	**881**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Saratoga 1 SSE weather station

Table 2.6.122 Saratoga Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	51											
Reservoir surface area (acres)[1]	277.4											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.38	1.28	1.99	4.08	5.87	6.68	8.72	7.96	5.87	3.88	1.99	1.33
Average monthly precipitation (inches)[4]	0.49	0.48	0.75	0.98	1.57	0.91	1.21	0.92	0.87	0.99	0.69	0.44
Net monthly evaporation (inches)	0.89	0.80	1.24	3.10	4.30	5.77	7.51	7.04	5.00	2.89	1.30	0.89
Total net monthly evaporation (acre-feet)	**21**	**18**	**29**	**72**	**99**	**133**	**174**	**163**	**116**	**67**	**30**	**21**
Total net annual evaporation (acre-feet)	**943**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Saratoga 1 SSE weather station

Table 2.6.123 Green Mountain Mine Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	42											
Reservoir surface area (acres)[1]	31.6											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.13	1.05	1.64	3.36	4.83	5.50	7.18	6.55	4.83	3.19	1.64	1.09
Average monthly precipitation (inches)[4]	0.40	0.47	0.94	1.33	1.96	0.95	1.09	0.64	0.89	0.97	0.89	0.48
Net monthly evaporation (inches)	0.73	0.58	0.70	2.03	2.87	4.55	6.09	5.91	3.94	2.22	0.75	0.61
Total net monthly evaporation (acre-feet)	**2**	**2**	**2**	**5**	**8**	**12**	**16**	**16**	**10**	**6**	**2**	**2**
Total net annual evaporation (acre-feet)	**83**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Muddy Gap weather station

Table 2.6.124 Turpin Park Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	51											
Reservoir surface area (acres)[1]	99.28											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.38	1.28	1.99	4.08	5.87	6.68	8.72	7.96	5.87	3.88	1.99	1.33
Average monthly precipitation (inches)[4]	0.49	0.48	0.75	0.98	1.57	0.91	1.21	0.92	0.87	0.99	0.69	0.44
Net monthly evaporation (inches)	0.89	0.80	1.24	3.10	4.30	5.77	7.51	7.04	5.00	2.89	1.30	0.89
Total net monthly evaporation (acre-feet)	**7**	**7**	**10**	**26**	**36**	**48**	**62**	**58**	**41**	**24**	**11**	**7**
Total net annual evaporation (acre-feet)	**337**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Saratoga 1 SSE weather station

Table 2.6.125 Teton Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	50											
Reservoir surface area (acres)[1]	113.3											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.35	1.25	1.95	4.00	5.75	6.55	8.55	7.80	5.75	3.80	1.95	1.30
Average monthly precipitation (inches)[4]	0.49	0.48	0.75	0.98	1.57	0.91	1.21	0.92	0.87	0.99	0.69	0.44
Net monthly evaporation (inches)	0.86	0.77	1.2	3.02	4.18	5.64	7.34	6.88	4.88	2.81	1.26	0.86
Total net monthly evaporation (acre-feet)	**8**	**7**	**11**	**29**	**39**	**53**	**69**	**65**	**46**	**27**	**12**	**8**
Total net annual evaporation (acre-feet)	**374**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Saratoga 1 SSE weather station

Table 2.6.126 Sand Lake Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	51											
Reservoir surface area (acres)[1]	91.6											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.38	1.28	1.99	4.08	5.87	6.68	8.72	7.96	5.87	3.88	1.99	1.33
Average monthly precipitation (inches)[4]	0.49	0.48	0.75	0.98	1.57	0.91	1.21	0.92	0.87	0.99	0.69	0.44
Net monthly evaporation (inches)	0.89	0.8	1.24	3.1	4.3	5.77	7.51	7.04	5	2.89	1.3	0.89
Total net monthly evaporation (acre-feet)	**7**	**6**	**9**	**24**	**33**	**44**	**57**	**54**	**38**	**22**	**10**	**7**
Total net annual evaporation (acre-feet)	**311**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Saratoga 1 SSE weather station

Table 2.6.127 provides a summary of evaporation estimates for major Above Pathfinder subbasin reservoirs.

Table 2.6.127 Summary - major reservoir evaporation estimates - Above Pathfinder subbasin

	Total net monthly evaporation (acre-feet)												Total net annual
Reservoir	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	evaporation (acre-feet)
Rob Roy Reservoir	61	55	85	212	295	394	513	480	341	198	89	61	2,784
Hog Park Reservoir	45	41	64	158	220	294	383	358	255	148	67	45	2,078
Area 2/8 Reclamation Reservoir	9	7	13	29	45	59	80	74	51	31	15	8	421
Area 3 Reclamation Reservoir	4	3	6	14	21	28	37	34	24	14	7	4	196
No. 4 Evaporation Reservoir	12	9	16	38	58	76	103	95	66	40	20	11	544
Johnson Reservoir	26	23	36	91	126	169	220	206	146	84	38	26	1,191
Pierce Reservoir	14	13	20	50	69	94	122	114	81	47	21	14	659
Upper Rock Creek Reservoir	4	3	3	11	15	24	32	32	21	12	4	3	164
Bosler Reservoir	19	17	27	67	93	125	163	153	108	62	28	19	881
Saratoga Reservoir	21	18	29	72	99	133	174	163	116	67	30	21	943
Green Mountain Mine Reservoir	2	2	2	5	8	12	16	16	10	6	2	2	83
Turpin Park Reservoir	7	7	10	26	36	48	62	58	41	24	11	7	337
Teton Reservoir	8	7	11	29	39	53	69	65	46	27	12	8	374
Sand Lake Reservoir	7	6	9	24	33	44	57	54	38	22	10	7	311

2.6.7.2 Pathfinder to Guernsey Subbasin

Tables 2.6.128 through 2.6.133 provide evaporation estimates for the LaPrele, Johnson No. 1, Soda Lake, Bates Creek, J. and J., and Reynolds No. 2 Reservoirs (respectively).

Table 2.6.128 LaPrele Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	47											
Reservoir surface area (acres)[1]	728											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.27	1.18	1.83	3.76	5.41	6.16	8.04	7.33	5.41	3.57	1.83	1.22
Average monthly precipitation (inches)[4]	0.78	0.85	0.89	2.89	2.66	1.29	1.57	0.92	1.75	1.94	0.54	0.36
Net monthly evaporation (inches)	0.49	0.33	0.94	0.87	2.75	4.87	6.47	6.41	3.66	1.63	1.29	0.86
Total net monthly evaporation (acre-feet)	**30**	**20**	**57**	**53**	**167**	**295**	**393**	**389**	**222**	**99**	**78**	**52**
Total net annual evaporation (acre-feet)	**1855**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Douglas/Douglas 1 SE weather stations

Table 2.6.129 Johnson No. 1 Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	46											
Reservoir surface area (acres)[1]	700											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.24	1.15	1.79	3.68	5.29	6.03	7.87	7.18	5.29	3.50	1.79	1.20
Average monthly precipitation (inches)[4]	0.57	0.61	0.86	1.42	2.18	1.40	1.31	0.73	1.00	1.08	0.79	0.61
Net monthly evaporation (inches)	0.67	0.54	0.93	2.26	3.11	4.63	6.56	6.45	4.29	2.42	1.00	0.59
Total net monthly evaporation (acre-feet)	**39**	**32**	**54**	**132**	**181**	**270**	**383**	**376**	**250**	**141**	**58**	**34**
Total net annual evaporation (acre-feet)	**1950**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Casper WSO AP weather station

Table 2.6.130 Soda Lake Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	47											
Reservoir surface area (acres)[1]	947											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.27	1.18	1.83	3.76	5.41	6.16	8.04	7.33	5.41	3.57	1.83	1.22
Average monthly precipitation (inches)[4]	0.57	0.61	0.86	1.42	2.18	1.40	1.31	0.73	1.00	1.08	0.79	0.61
Net monthly evaporation (inches)	0.70	0.57	0.97	2.34	3.23	4.76	6.73	6.60	4.41	2.49	1.04	0.61
Total net monthly evaporation (acre-feet)	**55**	**45**	**77**	**185**	**255**	**376**	**531**	**521**	**348**	**197**	**82**	**48**
Total net annual evaporation (acre-feet)	**2720**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Casper WSO AP weather station

Table 2.6.131 Bates Creek Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	47											
Reservoir surface area (acres)[1]	989											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.27	1.18	1.83	3.76	5.41	6.16	8.04	7.33	5.41	3.57	1.83	1.22
Average monthly precipitation (inches)[4]	0.31	0.48	0.72	1.72	2.18	1.41	1.20	0.71	1.09	1.12	0.72	0.33
Net monthly evaporation (inches)	0.96	0.70	1.11	2.04	3.23	4.75	6.84	6.62	4.32	2.45	1.11	0.89
Total net monthly evaporation (acre-feet)	**79**	**58**	**91**	**168**	**266**	**391**	**564**	**546**	**356**	**202**	**91**	**73**
Total net annual evaporation (acre-feet)	**2885**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Glenrock 5 ESE weather station

Table 2.6.132 J. and J. Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	46											
Reservoir surface area (acres)[1]	173											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.24	1.15	1.79	3.68	5.29	6.03	7.87	7.18	5.29	3.50	1.79	1.20
Average monthly precipitation (inches)[4]	0.57	0.61	0.86	1.42	2.18	1.40	1.31	0.73	1.00	1.08	0.79	0.61
Net monthly evaporation (inches)	0.67	0.54	0.93	2.26	3.11	4.63	6.56	6.45	4.29	2.42	1.00	0.59
Total net monthly evaporation (acre-feet)	**10**	**8**	**13**	**33**	**45**	**67**	**95**	**93**	**62**	**35**	**14**	**9**
Total net annual evaporation (acre-feet)	**484**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Casper WSO AP weather station

Table 2.6.133 Reynolds No. 2 Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	46											
Reservoir surface area (acres)[1]	168											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.24	1.15	1.79	3.68	5.29	6.03	7.87	7.18	5.29	3.50	1.79	1.20
Average monthly precipitation (inches)[4]	0.57	0.61	0.86	1.42	2.18	1.40	1.31	0.73	1.00	1.08	0.79	0.61
Net monthly evaporation (inches)	0.67	0.54	0.93	2.26	3.11	4.63	6.56	6.45	4.29	2.42	1.00	0.59
Total net monthly evaporation (acre-feet)	**9**	**8**	**13**	**32**	**44**	**65**	**92**	**90**	**60**	**34**	**14**	**8**
Total net annual evaporation (acre-feet)	**469**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Saratoga 1 SSE weather station

Table 2.6.134 provides a summary of evaporation estimates for major Pathfinder to Guernsey subbasin reservoirs.

Table 2.6.134 Summary - major reservoir evaporation estimates - Pathfinder to Guernsey subbasin

	Total net monthly evaporation (acre-feet)												Total net annual
Reservoir	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	evaporation (acre-feet)
LaPrele Reservoir	30	20	57	53	167	295	393	389	222	99	78	52	1,855
Johnson No. 1 Reservoir	39	32	54	132	181	270	383	376	250	141	58	34	1,950
Soda Lake Reservoir	55	45	77	185	255	376	531	521	348	197	82	48	2,720
Bates Creek Reservoir	79	58	91	168	266	391	564	546	356	202	91	73	2,885
J. and J. Reservoir	10	8	13	33	45	67	95	93	62	35	14	9	484
Reynolds No. 2 Reservoir	9	8	13	32	44	65	92	90	60	34	14	8	469

2.6.7.3 Guernsey to State Line Subbasin

Tables 2.6.135 through 2.6.138 provide evaporation estimates for the Detention Reservoir Pine Ridge – 1, Detention Reservoir Case Bier – 1, Harris Reservoir, and Arnold Reservoir (respectively).

Table 2.6.135 Detention Reservoir Pine Ridge - 1 monthly evaporation estimate

Lewis annual evaporation (inches)	44											
Reservoir surface area (acres)[1]	145.1											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.19	1.10	1.72	3.52	5.06	5.76	7.52	6.86	5.06	3.34	1.72	1.14
Average monthly precipitation (inches)[4]	0.31	0.38	0.68	1.58	2.32	2.09	1.79	1.25	1.27	0.95	0.55	0.36
Net monthly evaporation (inches)	0.88	0.72	1.04	1.94	2.74	3.67	5.73	5.61	3.79	2.39	1.17	0.78
Total net monthly evaporation (acre-feet)	**11**	**9**	**13**	**23**	**33**	**44**	**69**	**68**	**46**	**29**	**14**	**9**
Total net annual evaporation (acre-feet)	**368**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Torrington Experimental Farm weather station

Table 2.6.136 Detention Reservoir Case Bier - 1 monthly evaporation estimate

Lewis annual evaporation (inches)	44											
Reservoir surface area (acres)[1]	92.43											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.19	1.10	1.72	3.52	5.06	5.76	7.52	6.86	5.06	3.34	1.72	1.14
Average monthly precipitation (inches)[4]	0.31	0.38	0.68	1.58	2.32	2.09	1.79	1.25	1.27	0.95	0.55	0.36
Net monthly evaporation (inches)	0.88	0.72	1.04	1.94	2.74	3.67	5.73	5.61	3.79	2.39	1.17	0.78
Total net monthly evaporation (acre-feet)	**7**	**6**	**8**	**15**	**21**	**28**	**44**	**43**	**29**	**18**	**9**	**6**
Total net annual evaporation (acre-feet)	**234**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Torrington Experimental Farm weather station

Table 2.6.137 Harris Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	43											
Reservoir surface area (acres)[1]	93.8											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.16	1.08	1.68	3.44	4.95	5.63	7.35	6.71	4.95	3.27	1.68	1.12
Average monthly precipitation (inches)[4]	0.31	0.38	0.68	1.58	2.32	2.09	1.79	1.25	1.27	0.95	0.55	0.36
Net monthly evaporation (inches)	0.85	0.70	1.00	1.86	2.63	3.54	5.56	5.46	3.68	2.32	1.13	0.76
Total net monthly evaporation (acre-feet)	**7**	**5**	**8**	**15**	**21**	**28**	**43**	**43**	**29**	**18**	**9**	**6**
Total net annual evaporation (acre-feet)	**232**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Torrington Experimental Farm weather station

Table 2.6.138 Arnold Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	43											
Reservoir surface area (acres)[1]	226.9											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.16	1.08	1.68	3.44	4.95	5.63	7.35	6.71	4.95	3.27	1.68	1.12
Average monthly precipitation (inches)[4]	0.31	0.38	0.68	1.58	2.32	2.09	1.79	1.25	1.27	0.95	0.55	0.36
Net monthly evaporation (inches)	0.85	0.70	1.00	1.86	2.63	3.54	5.56	5.46	3.68	2.32	1.13	0.76
Total net monthly evaporation (acre-feet)	**16**	**13**	**19**	**35**	**50**	**67**	**105**	**103**	**70**	**44**	**21**	**14**
Total net annual evaporation (acre-feet)	**557**											
Notes:												
1. Area of the high water line (HWL) of the reservoir taken from SEO permits.												
2. From Table VIII, Lewis.												
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution												
4. Average monthly precipitation, inches, for the period 1972-2002 at the Saratoga 1 SSE weather station												

Table 2.6.139 provides a summary of evaporation estimates for major Guernsey to State Line subbasin reservoirs.

Table 2.6.139 Summary - major reservoir evaporation estimates - Guernsey to State Line subbasin

	Total net monthly evaporation (acre-feet)												Total net annual
Reservoir	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	evaporation (acre-feet)
Detention Reservoir Pine Ridge - 1	11	9	13	23	33	44	69	68	46	29	14	9	368
Detention Reservoir Case Bier - 1	7	6	8	15	21	28	44	43	29	18	9	6	234
Harris Reservoir	7	5	8	15	21	28	43	43	29	18	9	6	232
Arnold Reservoir	16	13	19	35	50	67	105	103	70	44	21	14	557

2.6.7.4 Upper Laramie Subbasin

Tables 2.6.140 through 2.6.149 provide evaporation estimates for the Lake Hattie, James Lake, Twin Buttes, Twelve Mile, Dutton Creek, King No. 1, Willow Creek No. 2, and Berg Reservoirs (respectively).

Table 2.6.140 Wheatland Irrigation District No. 3 Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	48											
Reservoir surface area (acres)[1]	4792											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.30	1.20	1.87	3.84	5.52	6.29	8.21	7.49	5.52	3.65	1.87	1.25
Average monthly precipitation (inches)[4]	0.36	0.4	0.78	1.04	1.66	1.29	1.53	1.2	0.96	0.81	0.66	0.45
Net monthly evaporation (inches)	0.94	0.8	1.09	2.8	3.86	5	6.68	6.29	4.56	2.84	1.21	0.8
Total net monthly evaporation (acre-feet)	**375**	**319**	**435**	**1118**	**1541**	**1997**	**2668**	**2512**	**1821**	**1134**	**483**	**319**
Total net annual evaporation (acre-feet)		**14722**										

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Laramie FAA Airport weather station

Table 2.6.141 Lake Hattie Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	51											
Reservoir surface area (acres)[1]	3032											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.38	1.28	1.99	4.08	5.87	6.68	8.72	7.96	5.87	3.88	1.99	1.33
Average monthly precipitation (inches)[4]	0.36	0.40	0.78	1.04	1.66	1.29	1.53	1.20	0.96	0.81	0.66	0.45
Net monthly evaporation (inches)	1.02	0.88	1.21	3.04	4.21	5.39	7.19	6.76	4.91	3.07	1.33	0.88
Total net monthly evaporation (acre-feet)	**258**	**222**	**306**	**768**	**1064**	**1362**	**1817**	**1708**	**1241**	**776**	**336**	**222**
Total net annual evaporation (acre-feet)		**10080**										

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Laramie FAA Airport weather station

Table 2.6.142 James Lake Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	50											
Reservoir surface area (acres)[1]	1370											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.35	1.25	1.95	4.00	5.75	6.55	8.55	7.80	5.75	3.80	1.95	1.30
Average monthly precipitation (inches)[4]	0.96	0.89	0.92	1.21	1.52	1.18	1.74	1.18	1.16	0.85	1.09	0.95
Net monthly evaporation (inches)	0.39	0.36	1.03	2.79	4.23	5.37	6.81	6.62	4.59	2.95	0.86	0.35
Total net monthly evaporation (acre-feet)	**45**	**41**	**118**	**319**	**483**	**613**	**777**	**756**	**524**	**337**	**98**	**40**
Total net annual evaporation (acre-feet)	**4151**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Centennial 1 N weather station

Table 2.6.143 Twin Buttes Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	51											
Reservoir surface area (acres)[1]	333.8											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.38	1.28	1.99	4.08	5.87	6.68	8.72	7.96	5.87	3.88	1.99	1.33
Average monthly precipitation (inches)[4]	0.36	0.40	0.78	1.04	1.66	1.29	1.53	1.20	0.96	0.81	0.66	0.45
Net monthly evaporation (inches)	1.02	0.88	1.21	3.04	4.21	5.39	7.19	6.76	4.91	3.07	1.33	0.88
Total net monthly evaporation (acre-feet)	**28**	**24**	**34**	**85**	**117**	**150**	**200**	**188**	**137**	**85**	**37**	**24**
Total net annual evaporation (acre-feet)	**1109**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Laramie FAA Airport weather station

Table 2.6.144 Twelve Mile Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	50											
Reservoir surface area (acres)[1]	206											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.35	1.25	1.95	4.00	5.75	6.55	8.55	7.80	5.75	3.80	1.95	1.30
Average monthly precipitation (inches)[4]	0.36	0.40	0.78	1.04	1.66	1.29	1.53	1.20	0.96	0.81	0.66	0.45
Net monthly evaporation (inches)	0.99	0.85	1.17	2.96	4.09	5.26	7.02	6.60	4.79	2.99	1.29	0.85
Total net monthly evaporation (acre-feet)	**17**	**15**	**20**	**51**	**70**	**90**	**121**	**113**	**82**	**51**	**22**	**15**
Total net annual evaporation (acre-feet)	**667**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Laramie FAA Airport weather station

Table 2.6.145 Dutton Creek Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	50											
Reservoir surface area (acres)[1]	290											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.35	1.25	1.95	4.00	5.75	6.55	8.55	7.80	5.75	3.80	1.95	1.30
Average monthly precipitation (inches)[4]	0.96	0.89	0.92	1.21	1.52	1.18	1.74	1.18	1.16	0.85	1.09	0.95
Net monthly evaporation (inches)	0.39	0.36	1.03	2.79	4.23	5.37	6.81	6.62	4.59	2.95	0.86	0.35
Total net monthly evaporation (acre-feet)	**9**	**9**	**25**	**67**	**102**	**130**	**165**	**160**	**111**	**71**	**21**	**8**
Total net annual evaporation (acre-feet)	**878**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Centennial 1 N weather station

Table 2.6.146 King No. 1 Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	50											
Reservoir surface area (acres)[1]	230.2											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.35	1.25	1.95	4.00	5.75	6.55	8.55	7.80	5.75	3.80	1.95	1.30
Average monthly precipitation (inches)[4]	0.96	0.89	0.92	1.21	1.52	1.18	1.74	1.18	1.16	0.85	1.09	0.95
Net monthly evaporation (inches)	0.39	0.36	1.03	2.79	4.23	5.37	6.81	6.62	4.59	2.95	0.86	0.35
Total net monthly evaporation (acre-feet)	**7**	**7**	**20**	**54**	**81**	**103**	**131**	**127**	**88**	**57**	**16**	**7**
Total net annual evaporation (acre-feet)	**698**											

Notes:
1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Centennial 1 N weather station

Table 2.6.147 Sportsman Lake Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	50											
Reservoir surface area (acres)[1]	210											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.35	1.25	1.95	4.00	5.75	6.55	8.55	7.80	5.75	3.80	1.95	1.30
Average monthly precipitation (inches)[4]	0.36	0.40	0.78	1.04	1.66	1.29	1.53	1.20	0.96	0.81	0.66	0.45
Net monthly evaporation (inches)	0.99	0.85	1.17	2.96	4.09	5.26	7.02	6.60	4.79	2.99	1.29	0.85
Total net monthly evaporation (acre-feet)	**17**	**15**	**20**	**52**	**72**	**92**	**123**	**116**	**84**	**52**	**23**	**15**
Total net annual evaporation (acre-feet)	**681**											

Notes:
1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972 - 2002 at the Laramie FAA Airport weather station

Table 2.6.148 Willow Creek No. 2 Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	50											
Reservoir surface area (acres)[1]	473.7											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.35	1.25	1.95	4.00	5.75	6.55	8.55	7.80	5.75	3.80	1.95	1.30
Average monthly precipitation (inches)[4]	0.36	0.40	0.78	1.04	1.66	1.29	1.53	1.20	0.96	0.81	0.66	0.45
Net monthly evaporation (inches)	0.99	0.85	1.17	2.96	4.09	5.26	7.02	6.60	4.79	2.99	1.29	0.85
Total net monthly evaporation (acre-feet)	**39**	**34**	**46**	**117**	**161**	**208**	**277**	**261**	**189**	**118**	**51**	**34**
Total net annual evaporation (acre-feet)	**1535**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Laramie FAA Airport weather station

Table 2.6.149 Berg Reservoir (Lake Owen) monthly evaporation estimate

Lewis annual evaporation (inches)	51											
Reservoir surface area (acres)[1]	120.5											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.38	1.28	1.99	4.08	5.87	6.68	8.72	7.96	5.87	3.88	1.99	1.33
Average monthly precipitation (inches)[4]	0.96	0.89	0.92	1.21	1.52	1.18	1.74	1.18	1.16	0.85	1.09	0.95
Net monthly evaporation (inches)	0.42	0.39	1.07	2.87	4.35	5.50	6.98	6.78	4.71	3.03	0.90	0.38
Total net monthly evaporation (acre-feet)	**4**	**4**	**11**	**29**	**44**	**55**	**70**	**68**	**47**	**30**	**9**	**4**
Total net annual evaporation (acre-feet)	**375**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Centennial 1 N weather station

Table 2.6.150 provides a summary of evaporation estimates for major Upper Laramie subbasin reservoirs.

Table 2.6.150 Summary - major reservoir evaporation estimates - Upper Laramie subbasin

	Total net monthly evaporation (acre-feet)												Total net annual
Reservoir	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**evaporation (acre-feet)**
Wheatland Irrigation District No. 3 Reservoir	375	319	435	1118	1541	1997	2668	2512	1821	1134	483	319	14722
Lake Hattie Reservoir	258	222	306	768	1064	1362	1817	1708	1241	776	336	222	10080
James Lake Reservoir	45	41	118	319	483	613	777	756	524	337	98	40	4151
Twin Buttes Reservoir	28	24	34	85	117	150	200	188	137	85	37	24	1109
Twelve Mile Reservoir	17	15	20	51	70	90	121	113	82	51	22	15	667
Dutton Creek Reservoir	9	9	25	67	102	130	165	160	111	71	21	8	878
King No. 1 Reservoir	7	7	20	54	81	103	131	127	88	57	16	7	698
Sportsman Lake Reservoir	17	15	20	52	72	92	123	116	84	52	23	15	681
Willow Creek No. 2 Reservoir	39	34	46	117	161	208	277	261	189	118	51	34	1535
Berg Reservoir (Lake Owen)	4	4	11	29	44	55	70	68	47	30	9	4	375

Note: Evaporation was not calculated for Wheatland Irrigation District No. 2 Reservoir due to surface area information not being available on permit drawings.

2.6.7.5 Lower Laramie Subbasin

Tables 2.6.151 through 2.6.158 provide evaporation estimates for the Grayrocks Reservoir; Reservoir No. 1, 2nd Enl.; North Laramie Land Co. No. 3 Reservoir; Toltec Reservoir; MBPP Ash Pond; North Laramie Land Co. No. 1 Reservoir; North Laramie Land Co. No. 2 Reservoir; and Glomill Reservoir (respectively).

Table 2.6.151 Grayrocks Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	45											
Reservoir surface area (acres)[1]	3547											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.22	1.13	1.76	3.60	5.18	5.90	7.70	7.02	5.18	3.42	1.76	1.17
Average monthly precipitation (inches)[4]	0.24	0.30	0.62	1.37	2.18	1.91	1.89	1.27	1.24	0.90	0.53	0.27
Net monthly evaporation (inches)	0.98	0.83	1.14	2.23	3.00	3.99	5.81	5.75	3.94	2.52	1.23	0.90
Total net monthly evaporation (acre-feet)	**290**	**245**	**337**	**659**	**887**	**1179**	**1717**	**1700**	**1165**	**745**	**364**	**266**
Total net annual evaporation (acre-feet)	**9554**											
Notes:												
1. Area of the high water line (HWL) of the reservoir taken from SEO permits.												
2. From Table VIII, Lewis.												
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution												
4. Average monthly precipitation, inches, for the period 1972-2002 at the Wheatland 4 N weather station												

Table 2.6.152 Reservoir No. 1, 2nd Enl. (Enlargement of Wyoming Development Company #1) monthly evaporation estimate

Lewis annual evaporation (inches)	46											
Reservoir surface area (acres)[1]	424											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.24	1.15	1.79	3.68	5.29	6.03	7.87	7.18	5.29	3.50	1.79	1.20
Average monthly precipitation (inches)[4]	0.24	0.30	0.62	1.37	2.18	1.91	1.89	1.27	1.24	0.90	0.53	0.27
Net monthly evaporation (inches)	1.00	0.85	1.17	2.31	3.11	4.12	5.98	5.91	4.05	2.60	1.26	0.93
Total net monthly evaporation (acre-feet)	**35**	**30**	**41**	**82**	**110**	**146**	**211**	**209**	**143**	**92**	**45**	**33**
Total net annual evaporation (acre-feet)	**1177**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Wheatland 4 N weather station

Table 2.6.153 North Laramie Land Co. No. 3 Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	46											
Reservoir surface area (acres)[1]	179.9											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.24	1.15	1.79	3.68	5.29	6.03	7.87	7.18	5.29	3.50	1.79	1.20
Average monthly precipitation (inches)[4]	0.24	0.30	0.62	1.37	2.18	1.91	1.89	1.27	1.24	0.90	0.53	0.27
Net monthly evaporation (inches)	1.00	0.85	1.17	2.31	3.11	4.12	5.98	5.91	4.05	2.60	1.26	0.93
Total net monthly evaporation (acre-feet)	**15**	**13**	**18**	**35**	**47**	**62**	**90**	**89**	**61**	**39**	**19**	**14**
Total net annual evaporation (acre-feet)	**502**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Wheatland 4 N weather station

Table 2.6.154 Toltec Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	47											
Reservoir surface area (acres)[1]	227.7											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.27	1.18	1.83	3.76	5.41	6.16	8.04	7.33	5.41	3.57	1.83	1.22
Average monthly precipitation (inches)[4]	0.50	0.58	0.74	1.24	1.57	1.07	1.16	1.00	1.01	0.92	0.53	0.52
Net monthly evaporation (inches)	0.77	0.60	1.09	2.52	3.84	5.09	6.88	6.33	4.40	2.65	1.30	0.70
Total net monthly evaporation (acre-feet)	**15**	**11**	**21**	**48**	**73**	**97**	**131**	**120**	**83**	**50**	**25**	**13**
Total net annual evaporation (acre-feet)	**687**											

Notes:
1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Medicine Bow weather station

Table 2.6.155 MBPP Ash Pond monthly evaporation estimate

Lewis annual evaporation (inches)	45											
Reservoir surface area (acres)[1]	104.6											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.22	1.13	1.76	3.60	5.18	5.90	7.70	7.02	5.18	3.42	1.76	1.17
Average monthly precipitation (inches)[4]	0.24	0.30	0.62	1.37	2.18	1.91	1.89	1.27	1.24	0.90	0.53	0.27
Net monthly evaporation (inches)	0.98	0.83	1.14	2.23	3.00	3.99	5.81	5.75	3.94	2.52	1.23	0.90
Total net monthly evaporation (acre-feet)	**9**	**7**	**10**	**19**	**26**	**35**	**51**	**50**	**34**	**22**	**11**	**8**
Total net annual evaporation (acre-feet)	**282**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Wheatland 4 N weather station

Table 2.6.156 North Laramie Land Co. No. 1 Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	46											
Reservoir surface area (acres)[1]	164.1											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.24	1.15	1.79	3.68	5.29	6.03	7.87	7.18	5.29	3.50	1.79	1.20
Average monthly precipitation (inches)[4]	0.24	0.30	0.62	1.37	2.18	1.91	1.89	1.27	1.24	0.90	0.53	0.27
Net monthly evaporation (inches)	1.00	0.85	1.17	2.31	3.11	4.12	5.98	5.91	4.05	2.60	1.26	0.93
Total net monthly evaporation (acre-feet)	**14**	**12**	**16**	**32**	**43**	**56**	**82**	**81**	**55**	**36**	**17**	**13**
Total net annual evaporation (acre-feet)	**457**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Wheatland 4 N weather station

Table 2.6.157 North Laramie Land Co. No. 2 Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	46											
Reservoir surface area (acres)[1]	100											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.24	1.15	1.79	3.68	5.29	6.03	7.87	7.18	5.29	3.50	1.79	1.20
Average monthly precipitation (inches)[4]	0.24	0.30	0.62	1.37	2.18	1.91	1.89	1.27	1.24	0.90	0.53	0.27
Net monthly evaporation (inches)	1.00	0.85	1.17	2.31	3.11	4.12	5.98	5.91	4.05	2.60	1.26	0.93
Total net monthly evaporation (acre-feet)	**8**	**7**	**10**	**19**	**26**	**34**	**50**	**49**	**34**	**22**	**11**	**8**
Total net annual evaporation (acre-feet)	**278**											

Notes:
1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Wheatland 4 N weather station

Table 2.6.158 Glomill Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	45											
Reservoir surface area (acres)[1]	259.6											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.22	1.13	1.76	3.60	5.18	5.90	7.70	7.02	5.18	3.42	1.76	1.17
Average monthly precipitation (inches)[4]	0.24	0.30	0.62	1.37	2.18	1.91	1.89	1.27	1.24	0.90	0.53	0.27
Net monthly evaporation (inches)	0.98	0.83	1.14	2.23	3.00	3.99	5.81	5.75	3.94	2.52	1.23	0.90
Total net monthly evaporation (acre-feet)	**21**	**18**	**25**	**48**	**65**	**86**	**126**	**124**	**85**	**55**	**27**	**19**
Total net annual evaporation (acre-feet)	**699**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Wheatland 4 N weather station

Table 2.6.159 provides a summary of evaporation estimates for major Lower Laramie subbasin reservoirs.

Table 2.6.159 Summary - major reservoir evaporation estimates - Lower Laramie subbasin

Reservoir	Total net monthly evaporation (acre-feet) Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total net annual evaporation (acre-feet)
Grayrocks Reservoir	290	245	337	659	887	1179	1717	1700	1165	745	364	266	9,554
(Enlargement of Wyoming	35	30	41	82	110	146	211	209	143	92	45	33	1,177
Reservoir	15	13	18	35	47	62	90	89	61	39	19	14	502
Toltec Reservoir	15	11	21	48	73	97	131	120	83	50	25	13	687
MBPP Ash Pond	9	7	10	19	26	35	51	50	34	22	11	8	282
Reservoir	14	12	16	32	43	56	82	81	55	36	17	13	457
Glomill Reservoir	21	18	25	48	65	86	126	124	85	55	27	19	699

2.6.7.6 Horse Creek Subbasin

Tables 2.6.160 through 2.6.164 provide evaporation estimates for the Hawk Springs Reservoir, Goshen Hole Reservoir, J. H. D. #1 Reservoir, Goshen Nos. 1 and 2 Reservoir (Enlargement), and Sinnard Reservoir (respectively).

Table 2.6.160 Hawk Springs Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	44											
Reservoir surface area (acres)[1]	1328											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.19	1.10	1.72	3.52	5.06	5.76	7.52	6.86	5.06	3.34	1.72	1.14
Average monthly precipitation (inches)[4]	0.51	0.52	1.27	1.82	2.61	2.20	2.11	1.47	1.35	1.12	0.83	0.68
Net monthly evaporation (inches)	0.68	0.58	0.45	1.70	2.45	3.56	5.41	5.39	3.71	2.22	0.89	0.46
Total net monthly evaporation (acre-feet)	**75**	**64**	**50**	**188**	**271**	**394**	**599**	**597**	**411**	**246**	**99**	**51**
Total net annual evaporation (acre-feet)	**3045**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the LaGrange weather station

Table 2.6.161 Goshen Hole Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	44											
Reservoir surface area (acres)[1]	787											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.19	1.10	1.72	3.52	5.06	5.76	7.52	6.86	5.06	3.34	1.72	1.14
Average monthly precipitation (inches)[4]	0.51	0.52	1.27	1.82	2.61	2.20	2.11	1.47	1.35	1.12	0.83	0.68
Net monthly evaporation (inches)	0.68	0.58	0.45	1.70	2.45	3.56	5.41	5.39	3.71	2.22	0.89	0.46
Total net monthly evaporation (acre-feet)	**45**	**38**	**30**	**111**	**161**	**233**	**355**	**353**	**243**	**146**	**58**	**30**
Total net annual evaporation (acre-feet)	**1803**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the LaGrange weather station

Table 2.6.162 J. H. D. #1 Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	46											
Reservoir surface area (acres)[1]	245											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.24	1.15	1.79	3.68	5.29	6.03	7.87	7.18	5.29	3.5	1.79	1.2
Average monthly precipitation (inches)[4]	0.51	0.52	1.27	1.82	2.61	2.2	2.11	1.47	1.35	1.12	0.83	0.68
Net monthly evaporation (inches)	0.73	0.63	0.52	1.86	2.68	3.83	5.76	5.71	3.94	2.38	0.96	0.52
Total net monthly evaporation (acre-feet)	**15**	**13**	**11**	**38**	**55**	**78**	**118**	**117**	**80**	**49**	**20**	**11**
Total net annual evaporation (acre-feet)	**605**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the LaGrange weather station

Table 2.6.163 Goshen Nos. 1 and 2 Reservoir (Enlargement) monthly evaporation estimate

Lewis annual evaporation (inches)	44											
Reservoir surface area (acres)[1]	405											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.19	1.10	1.72	3.52	5.06	5.76	7.52	6.86	5.06	3.34	1.72	1.14
Average monthly precipitation (inches)[4]	0.51	0.52	1.27	1.82	2.61	2.20	2.11	1.47	1.35	1.12	0.83	0.68
Net monthly evaporation (inches)	0.68	0.58	0.45	1.70	2.45	3.56	5.41	5.39	3.71	2.22	0.89	0.46
Total net monthly evaporation (acre-feet)	**23**	**20**	**15**	**57**	**83**	**120**	**183**	**182**	**125**	**75**	**30**	**16**
Total net annual evaporation (acre-feet)	**929**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the LaGrange weather station

Table 2.6.164 Sinnard Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	44											
Average monthly precipitation (inches)4	150											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.19	1.10	1.72	3.52	5.06	5.76	7.52	6.86	5.06	3.34	1.72	1.14
Average monthly precipitation (inches)[4]	0.51	0.52	1.27	1.82	2.61	2.20	2.11	1.47	1.35	1.12	0.83	0.68
Net monthly evaporation (inches)	0.68	0.58	0.45	1.70	2.45	3.56	5.41	5.39	3.71	2.22	0.89	0.46
Total net monthly evaporation (acre-feet)	**9**	**7**	**6**	**21**	**31**	**45**	**68**	**67**	**46**	**28**	**11**	**6**
Total net annual evaporation (acre-feet)	**345**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the LaGrange weather station

Table 2.6.165 provides a summary of evaporation estimates for major Horse Creek subbasin reservoirs.

Table 2.6.165 Summary - major reservoir evaporation estimates - Horse Creek subbasin

	Total net monthly evaporation (acre-feet)												Total net annual
Reservoir	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	evaporation (acre-feet)
Hawk Springs Reservoir	75	64	50	188	271	394	599	597	411	246	99	51	3,045
Goshen Hole Reservoir	45	38	30	111	161	233	355	353	243	146	58	30	1,803
J. H. D. #1 Reservoir	15	13	11	38	55	78	118	117	80	49	20	11	605
Goshen Nos. 1 and 2 Reservoir	23	20	15	57	83	120	183	182	125	75	30	16	929
Sinnard Reservoir	9	7	6	21	31	45	68	67	46	28	11	6	345

2.6.7.7 South Platte Subbasin

Tables 2.6.166 through 2.6.172 provide evaporation estimates for the Cheyenne No. 1 (Granite Springs), Crystal Lake, One Mile, Upper Van Tassell, W. H. R. No. 2, W. H. R., and Polaris Reservoirs (respectively).

Table 2.6.166 Cheyenne No. 2 (Granite Springs) Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	48											
Reservoir surface area (acres)[1]	190											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.30	1.20	1.87	3.84	5.52	6.29	8.21	7.49	5.52	3.65	1.87	1.25
Average monthly precipitation (inches)[4]	0.44	0.43	1.03	1.51	2.42	2.09	2.28	1.81	1.42	0.74	0.64	0.45
Net monthly evaporation (inches)	0.86	0.77	0.84	2.33	3.10	4.20	5.93	5.68	4.10	2.91	1.23	0.80
Total net monthly evaporation (acre-feet)	**14**	**12**	**13**	**37**	**49**	**67**	**94**	**90**	**65**	**46**	**19**	**13**
Total net annual evaporation (acre-feet)	**519**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Cheyenne WSFO AP weather station

Table 2.6.167 Crystal Lake Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	48											
Reservoir surface area (acres)[1]	136											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.30	1.20	1.87	3.84	5.52	6.29	8.21	7.49	5.52	3.65	1.87	1.25
Average monthly precipitation (inches)[4]	0.44	0.43	1.03	1.51	2.42	2.09	2.28	1.81	1.42	0.74	0.64	0.45
Net monthly evaporation (inches)	0.86	0.77	0.84	2.33	3.10	4.20	5.93	5.68	4.10	2.91	1.23	0.80
Total net monthly evaporation (acre-feet)	**10**	**9**	**10**	**26**	**35**	**48**	**67**	**64**	**46**	**33**	**14**	**9**
Total net annual evaporation (acre-feet)	**371**											

Notes:
1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Cheyenne WSFO AP weather station

Table 2.6.168 One Mile Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	46											
Reservoir surface area (acres)[1]	212											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.24	1.15	1.79	3.68	5.29	6.03	7.87	7.18	5.29	3.50	1.79	1.20
Average monthly precipitation (inches)[4]	0.44	0.43	1.03	1.51	2.42	2.09	2.28	1.81	1.42	0.74	0.64	0.45
Net monthly evaporation (inches)	0.80	0.72	0.76	2.17	2.87	3.94	5.59	5.37	3.87	2.76	1.15	0.75
Total net monthly evaporation (acre-feet)	**14**	**13**	**13**	**38**	**51**	**70**	**99**	**95**	**68**	**49**	**20**	**13**
Total net annual evaporation (acre-feet)	**543**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Cheyenne WSFO AP weather station

Table 2.6.169 Upper Van Tassell Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	48											
Reservoir surface area (acres)[1]	93.84											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.30	1.20	1.87	3.84	5.52	6.29	8.21	7.49	5.52	3.65	1.87	1.25
Average monthly precipitation (inches)[4]	0.44	0.43	1.03	1.51	2.42	2.09	2.28	1.81	1.42	0.74	0.64	0.45
Net monthly evaporation (inches)	0.86	0.77	0.84	2.33	3.10	4.20	5.93	5.68	4.10	2.91	1.23	0.80
Total net monthly evaporation (acre-feet)	**7**	**6**	**7**	**18**	**24**	**33**	**46**	**44**	**32**	**23**	**10**	**6**
Total net annual evaporation (acre-feet)	**256**											

Notes:
1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Cheyenne WSFO AP weather station

Table 2.6.170 W. H. R. No. 2 Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	47											
Reservoir surface area (acres)[1]	121											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.27	1.18	1.83	3.76	5.41	6.16	8.04	7.33	5.41	3.57	1.83	1.22
Average monthly precipitation (inches)[4]	0.44	0.43	1.03	1.51	2.42	2.09	2.28	1.81	1.42	0.74	0.64	0.45
Net monthly evaporation (inches)	0.83	0.75	0.8	2.25	2.99	4.07	5.76	5.52	3.99	2.83	1.19	0.77
Total net monthly evaporation (acre-feet)	**8**	**8**	**8**	**23**	**30**	**41**	**58**	**56**	**40**	**29**	**12**	**8**
Total net annual evaporation (acre-feet)	**321**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Cheyenne WSFO AP weather station

Table 2.6.171 W. H. R. Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	47											
Reservoir surface area (acres)[1]	109.4											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.27	1.18	1.83	3.76	5.41	6.16	8.04	7.33	5.41	3.57	1.83	1.22
Average monthly precipitation (inches)[4]	0.44	0.43	1.03	1.51	2.42	2.09	2.28	1.81	1.42	0.74	0.64	0.45
Net monthly evaporation (inches)	0.83	0.75	0.80	2.25	2.99	4.07	5.76	5.52	3.99	2.83	1.19	0.77
Total net monthly evaporation (acre-feet)	**8**	**7**	**7**	**21**	**27**	**37**	**53**	**50**	**36**	**26**	**11**	**7**
Total net annual evaporation (acre-feet)	**290**											

Notes:
1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Cheyenne WSFO AP weather station

Table 2.6.172 Polaris Reservoir monthly evaporation estimate

Lewis annual evaporation (inches)	47											
Reservoir surface area (acres)[1]	57											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Monthly evaporation distribution[2]	0.027	0.025	0.039	0.08	0.115	0.131	0.171	0.156	0.115	0.076	0.039	0.026
Gross monthly evaporation (inches)[3]	1.27	1.18	1.83	3.76	5.41	6.16	8.04	7.33	5.41	3.57	1.83	1.22
Average monthly precipitation (inches)[4]	0.44	0.43	1.03	1.51	2.42	2.09	2.28	1.81	1.42	0.74	0.64	0.45
Net monthly evaporation (inches)	0.83	0.75	0.80	2.25	2.99	4.07	5.76	5.52	3.99	2.83	1.19	0.77
Total net monthly evaporation (acre-feet)	**4**	**4**	**4**	**11**	**14**	**19**	**27**	**26**	**19**	**13**	**6**	**4**
Total net annual evaporation (acre-feet)	**151**											

Notes:

1. Area of the high water line (HWL) of the reservoir taken from SEO permits.
2. From Table VIII, Lewis.
3. Equals the product of Lewis annual evaporation (inches) and annual evaporation distribution
4. Average monthly precipitation, inches, for the period 1972-2002 at the Saratoga 1 SSE weather station

Table 2.6.173 provides a summary of evaporation estimates for major South Platte subbasin reservoirs.

Table 2.6.173 Summary - major reservoir evaporation estimates - South Platte subbasin

	Total net monthly evaporation (acre-feet)												Total net annual
Reservoir	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	evaporation (acre-feet)
Cheyenne No. 1 (Granite Springs) Reservoir	14	12	13	37	49	67	94	90	65	46	19	13	519
Crystal Lake Reservoir	10	9	10	26	35	48	67	64	46	33	14	9	371
One Mile Reservoir	14	13	13	38	51	70	99	95	68	49	20	13	543
Upper Van Tassell Reservoir	7	6	7	18	24	33	46	44	32	23	10	6	256
W. H. R. No. 2 Reservoir	8	8	8	23	30	41	58	56	40	29	12	8	321
W. H. R. Reservoir	8	7	7	21	27	37	53	50	36	26	11	7	290
Polaris Reservoir	4	4	4	11	14	19	27	26	19	13	6	4	151

2.6.8 References

American Public Health Association, American Society of Civil Engineers, American Water Works Association, and Water Pollution Control Federation. 1981. *Glossary Water and Wastewater Control Engineering*, 3rd Ed..

Autobee, Robert. 1996. *North Platte Project*, 2nd Draft. U.S. Dept. of the Interior, Bureau of Reclamation History Program, Denver, Colorado. Research on Historic Reclamation Projects. http://www.usbr.gov/dataweb/html/noplatte.html.

Banner, J.T. & Associates, Inc. 1975 *Engineering Feasibility Report on the Grayrocks Dam and Reservoir*.

Banner Associates, Inc. 1993. *Sinnard Reservoir Rehabilitation Project*. 1993. Level II Feasibility Study. Executive Summary.

Brendecke, Charles, B. Hinckley, R Mathisen, and John Shields. 2000. *Implementation and Administration of the 1945 North Platte Decree.* The Wyoming Attorney General's Office.

Lewis, L.E. 1978. *Development of an Evaporation Map for the State of Wyoming for Purposes of Estimating Evaporation and Evapotranspiration*. M. S. Thesis, University of Wyoming, Department of Civil and Architectural Engineering.

Lowham, H.W. 1988. *Streamflows in Wyoming*. U.S. Geological Survey Water Resources Investigations Report 88-4045. Prepared in cooperation with the U.S. Bureau of Land Management and the Wyoming Highway Department.

Natural Resources Conservation Service (NRCS). Undated. SNOTEL (SNOwpack TELemetry). http://www.wcc.nrcs.usda.gov/snotel/SNOTEL-brochure.pdf.

Ogle, K.M., D.A. Peterson, B. Spillman, and R. Padilla. 1999. *Water Quality of Rob Roy Reservoir and Lake Owen, Albany County, and Granite Springs and Crystal Lake Reservoirs, Laramie County, Wyoming, 1997-98*. U.S. Geological Survey Water Resources Investigations Report 99-4420. Prepared in cooperation with the Cheyenne Board of Public Utilities.

Purcell, M.K. 2000. *Changes in Environmental Policy, (1940-1998)*.

Simonds, S.J. 1996. *The Kortes Unit, Oregon Trail Division, Pick-Sloan Missouri Basin Program*", 2nd Draft. U.S. Bureau of Reclamation History Program, Denver, Colorado. Research on Historic Reclamation Projects. http://www.usbr.gov/dataweb/html/kortes2a.html.

Supreme Court [of the United States]. 1922 (and 1953 amendments). *State of Wyo. v. State of Colo., 259 U.S. 419* Court Opinion [Laramie River Decree].

Supreme Court [of the United States]. 1945. *Nebraska v. Wyoming, 325 U.S. 589, 665* [North Platte Decree].

Supreme Court. 2001. Exhibit A – "Procedures For Calculating Consumptive Use of Irrigation Water Above Guernsey Reservoir, Wyoming" to Exhibit 6 – "Procedure for Consumptive Use Accounting" to Appendix G – "North Platte Decree Committee Charter" to the Final

Settlement Stipulation in State of Nebraska v. State of Wyoming. No. 108. Supreme Court of the United States.

U.S. Dept. of the Interior, Bureau of Reclamation. *Special Report on the North Platte Project – Rehabilitation and Betterment Program Investigations*. 1983. Wyoming – Nebraska.

U.S. Dept. of the Interior, Bureau of Reclamation. 1991. *Seminoe Dam, Special Report*. Kendrick Project, Wyoming.

U.S. Dept. of the Interior, Bureau of Reclamation. Undated. *1999-2000 Annual Operating Plan for the North Platte River Basin (WY2000-2001)*. http://www.usbr.gov/gp/aop/np/99intro.htm.

U.S. Dept. of the Interior, Bureau of Reclamation, Great Plains Region. *Annual Operating Plans*. North Platte River Area Water Year 2002 – Summary of Actual Operations and Water Year 2003 – Annual Operating Plans.

U.S. Dept. of the Interior, Bureau of Reclamation. Undated. *North Platte River Basin Water Year 2004 Summary of Actual Operations and Water Year 2005 Annual Operating Plans*. http://www.usbr.gov/gp/aop/np/0405/toc.cfm.

U.S. Dept. of the Interior, Bureau of Reclamation. *The Glendo Unit, Oregon Trail Division, Pick-Sloan Missouri Basin Program*. http://www.usbr.gov/dataweb/html/glendo1.html.

U.S. Dept. of the Interior, Bureau of Reclamation. *Glossary*. http://www.usbr.gov/main/library/glossary/.

U.S. Dept. of the Interior, Bureau of Reclamation. Undated. *Welcome to the HYDROMET Data System – Program Information*. http://www.usbr.gov.gp/hydromet/index.cfm and, for Pathfinder Dam, http://www.usbr.gov/gp/hydromet/patr.cfm.

U.S. Dept. of the Interior, Bureau of Reclamation. *Pathfinder Dam*. http://www.usbr.gov/dataweb/dams/wy01296.htm.

WWC Engineering. 2003. *Final Report Lake Hattie Outlet Works Level II Study*. Prepared for the Wyoming Water Development Commission.