

REVISED JULY 1976

JENSEN UNIT

CENTRAL UTAH PROJECT DEFINITE PLAN REPORT

DECEMBER 1975

APPENDIX A

DESIGNS & ESTIMATES
OPERATION & MAINTENANCE
PLAN FORMULATION



DEPARTMENT OF THE INTERIOR
THOMAS S. KLEPPE, SECRETARY

Bureau of Reclamation
Gilbert G. Stamm, Commissioner



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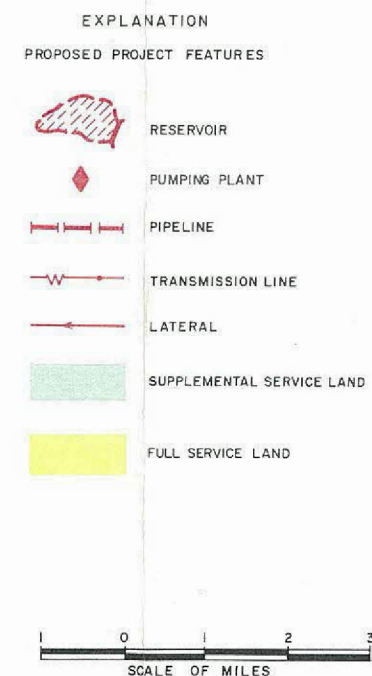
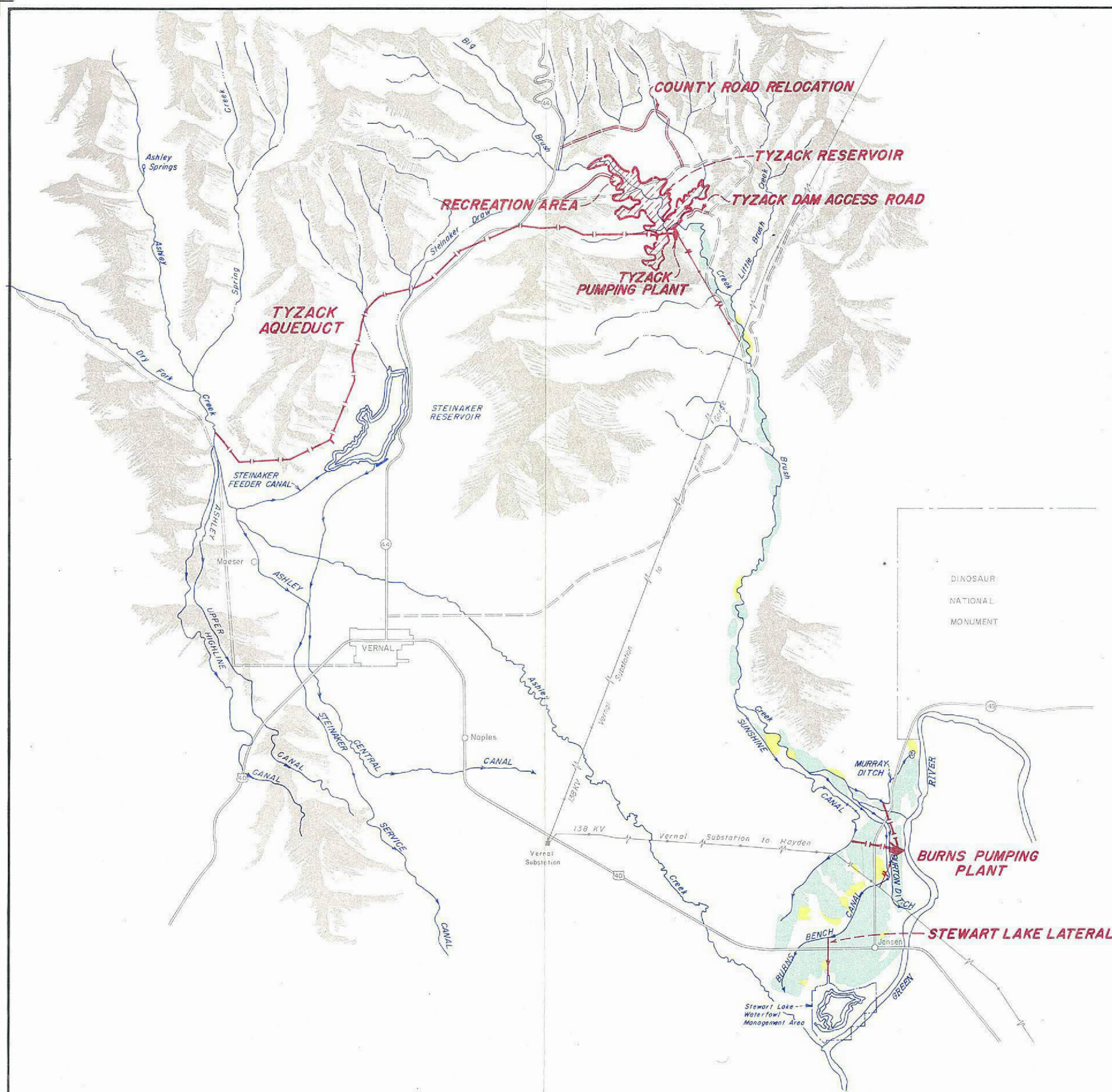
BUREAU OF RECLAMATION

GILBERT G. STAMM, COMMISSIONER

Upper Colorado Region

David L. Crandall, Regional Director





UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL UTAH PROJECT
JENSEN UNIT-UTAH

GENERAL MAP

SEPTEMBER-1975

SUMMARY SHEETS

Jensen Unit

LOCATION

Uintah County, northeastern Utah, in Uinta Basin of Upper Colorado River Basin.

AUTHORIZATION

Initial Phase of the Central Utah Project, including Jensen Unit, authorized as a participating project of the Colorado River Storage Project by act of April 11, 1956 (70 Stat. 105).

PLAN OF DEVELOPMENT

The Jensen Unit will provide municipal and industrial water to augment existing supplies throughout the project area and water for irrigation in the vicinity of Jensen. It also will benefit fish and wildlife, recreation, and flood control.

The main project feature will be Tyzack Reservoir to be constructed on Big Brush Creek. Project water will be pumped from the reservoir to Ashley Creek by the Tyzack Pumping Plant and Aqueduct and exchanged with Ashley Spring for municipal and industrial use. Tyzack Reservoir operation will be coordinated with operation of Steinaker Reservoir of the Vernal Unit to avoid winter operation of the Tyzack Aqueduct. Treatment and distribution of the municipal and industrial water will be the responsibility of the water users.

Storage water to be used for irrigation below Tyzack Reservoir will be released from the reservoir to Big Brush Creek and conveyed in the Brush Creek channel to points of diversion. The project Burns Pumping Plant will pump water from Green River for the irrigation of lands near Jensen and for municipal and industrial purposes by exchange with water from Big Brush Creek. The irrigation water, whether supplied from the reservoir or the pumping plant, will be distributed by existing canals. Only minor extensions of existing irrigation distribution facilities will be required and these will be provided by the water users. Project drainage will be provided as necessary. Power for operation of the project pumping plants will be obtained from the Colorado River Storage Project system.

Specific recreational facilities will be provided at Tyzack Reservoir. Measures for fish and wildlife will include a fishery pool in Tyzack Reservoir and rehabilitation of public lands as big game range to compensate for range lands that will be inundated by the reservoir. Also improvements will be made in the methods of water deliveries to the Stewart Lake Waterfowl Management Area, permitting improved operation of the area.

SUMMARY SHEETS (Continued)

IRRIGATION SERVICE AREA (acres)

Full service land	440
Supplemental service land	<u>3,640</u>
Total	4,080

WATER SUPPLY (average annual acre-feet)

Project increases in supply	
Municipal and industrial use	18,000
Irrigation	<u>4,600</u>
Total	22,600

Depletion of Colorado River	15,000
---------------------------------------	--------

Increases in salinity concentration

at Imperial Dam (mg/l)

From stream depletion.	1.5
From increase in salt load1

COSTS

Construction costs (January 1975 prices, except as noted)

Tyzack Dam and Reservoir	\$18,455,000
Tyzack Pumping Plant and discharge line (aqueduct)	<u>1/9,420,000</u>
Burns Pumping Plant and discharge lines.	3,290,000
Drains	774,000
Tyzack Pumping Plant switchyard.	<u>2/121,000</u>
Burns Pumping Plant switchyard	65,000
Facilities to connect with Colorado River Storage	
Project power system	121,000
Transmission line to Tyzack Pumping Plant.	97,000
Transmission line to Burns Pumping Plant	93,000
Recreational facilities.	757,000
Fish and wildlife development.	43,000
Permanent operating facilities	<u>27,000</u>
Total	33,263,000

Annual operation, maintenance, and replacement

costs (1972-74 prices).	177,000
---------------------------------	---------

1/ Entire cost at July 1975 prices except \$6,000 for acquisition of land and land rights which was estimated at January 1975 prices.

2/ At July 1975 prices.

SUMMARY SHEETS (Continued)

COST ALLOCATIONS (\$1,000)

	Construction costs	Reimbursable interest during construction (5.116 percent)	Annual operation, maintenance, and replace- ment costs
Reimbursable costs			
Municipal and industrial water	\$25,668	\$2,338	\$120
Irrigation	4,933		6
Recreation			48
Subtotal	<u>30,601</u>	<u>2,338</u>	<u>174</u>
Nonreimbursable costs			
Fish and wildlife			
Enhancement	596		1
Mitigation	20		
Recreation	757		
Flood control	609		2
Highway improvement	680		
Subtotal	<u>2,662</u>		<u>3</u>
Total	<u>33,263</u>	<u>2,338</u>	<u>177</u>

REPAYMENT OF REIMBURSABLE COSTS (50-year repayment period)

Municipal and industrial water			
Prepayment ^{1/}	58		
Water users	16,903	1,543	120
Ad valorem tax revenue	8,707	795	
Subtotal	<u>25,668</u>	<u>2,338</u>	<u>120</u>
Irrigation			
Prepayment ^{1/}	11		
Water users	750		6
Apportioned revenues from Colo- rado River Storage Project	4,172		
Subtotal	<u>4,933</u>		<u>6</u>
Recreation (State of Utah)			<u>48</u>
Total	<u>30,601</u>	<u>2,338</u>	<u>174</u>

^{1/} Includes payments made for investigation from Colorado River Development Fund and funds contributed by State of Utah.

SUMMARY SHEETS (Continued)

MUNICIPAL AND INDUSTRIAL WATER CONSTRUCTION COSTS AND REPAYMENT^{1/}

Item	Initial use	Deferred costs or sub-sequent construction ^{2/}		Total
	Block 1 (6,000 acre-feet)	Block 2 (6,000 acre-feet)	Block 3 (6,000 acre-feet)	(18,000 acre-feet)
Tyzack Reservoir	\$4,565,000	\$4,566,000	\$4,566,000	\$13,697,000
Tyzack Pumping Plant and related facilities	10,546,000			10,546,000
Burns Pumping Plant and related facilities		2,363,000	1,323,000	3,686,000
Permanent operating facilities		19,000		19,000
Total	15,111,000	6,948,000	5,889,000	27,948,000
Annual payment (50 years)	842,600	387,400	328,400	1,558,400

^{1/} Costs shown include \$2,338,000 in reimbursable interest during construction but exclude \$58,000 in prepayments.

^{2/} "Subsequent construction" refers only to Burns Pumping Plant and related facilities.

SUMMARY SHEETS (Continued)

BENEFIT-COST ANALYSIS

(100-year period of analysis at 3.25 percent interest)

	<u>Direct</u>	<u>Indirect and public</u>	<u>Total</u>
Average annual benefits			
Municipal and industrial water	\$2,055,000		\$2,055,000
Irrigation	166,000	\$17,000	183,000
Fish and wildlife	24,000		24,000
Recreation	88,000		88,000
Flood control	24,000		24,000
Total	2,357,000	17,000	2,374,000
	<u>Direct effects</u>	<u>Indirect effects</u>	<u>Total</u>
Negative externalities			
Concentrating effects of stream depletion	\$282,000	\$63,000	\$345,000
Increase in salt load	18,800	4,200	23,000
Average annual equivalent costs.			1,371,000
Benefit-cost ratios			
Without externalities			
Ratio of total benefits to costs			1.73:1
Ratio of direct benefits to costs.			1.72:1
With negative externalities from increased salt load			
Ratio of total benefits to costs			1.71:1
Ratio of direct benefits to costs.			1.70:1

PROJECT FEATURES

Tyzack Reservoir	
Capacity (acre-feet)	
Active	24,000
Inactive and dead.	2,000
Total	26,000
Surcharge.	7,600
Normal water surface area (acres)	520
Tyzack Dam	
Height above streambed (feet)	145
Crest length (feet)	1,640
Volume of dam (cubic yards)	2,030,000
Tyzack Pumping Plant	
Maximum operating head (feet)	587
Design diversion capacity (second-feet)	46
Tyzack Discharge Line (aqueduct)	
Capacity (second-feet).	46
Length (miles).	11.8
Burns Pumping Plant	
Maximum static head at average flow of river (feet)	52 to 195
Design diversion capacity (second-feet)	97.4

Appendixes to the Jensen Unit, Central Utah Project, have been prepared in four volumes with the data grouped as follows.

APPENDIX A
DESIGNS AND ESTIMATES
PLAN FORMULATION

APPENDIX B
WATER SUPPLY

APPENDIX C
PROJECT LANDS
DRAINAGE
GROUND WATER

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DESIGNS AND ESTIMATES

CHAPTER I

GENERAL DESCRIPTION

Introduction

This appendix is a presentation of the findings and results of the designs and estimates investigations for the project features of the Jensen Unit, Central Utah Project. The features were investigated as to their suitability for meeting the water requirements of collection, storage, and distribution within the project boundaries. Feasibility designs and estimates have been made for all project features.

Location and Accessibility

The Jensen Unit of the Central Utah Project is located in the eastern section of Uintah County in northeastern Utah. The principal communities situated within the unit boundaries include Vernal, Naples, and Jensen.

U.S. Highway 40, a major east-west transcontinental route, passes through the southern portion of the unit. Provo, Utah, and Craig, Colo., are terminals on branch lines of the Denver and Rio Grande Western Railroad. Vernal is located about 160 miles east of Provo and approximately 128 miles west of Craig.

The area is well served with a network of hard-surfaced or graded and graveled State and county roads with minor extensions being required to reach the respective features of the unit. Construction of 3.3 miles of relocated county road and 0.8 mile of access road will provide access for operation and maintenance of Tyzack Dam and for construction and operation and maintenance of the pumping plant (see Drawing No. 450-418-149) on page 65. These roads will be gravel surfaced. It may be desirable for the Bureau of Reclamation to contract with Uintah County for construction of the relocated county road. A gravel-surfaced road about 300 feet long will be built to provide for construction, operation, and maintenance of the Burns Pumping Plant.

The Heber-Vernal area is served by two trucking firms which will be utilized for deliveries to Vernal, Utah, the town nearest the construction sites having loading and storage facilities. These firms are the Uintah Freightways and Link Trucking Company.

Power for operation of the pumping plants of the Jensen Unit will be obtained from the 138-kilovolt transmission lines of the Colorado River Storage Project. Transmission lines of 138 kilovolts will be

constructed from the existing lines to each of the pumping plants with step-down transformers at the pumping plant substations. The rate schedule for power is estimated to be \$1.32 per kilowatt-month plus \$0.004 per kilowatt-hour for pumping.

Construction Program

Tyzack Dam and Reservoir of the Jensen Unit will require about 4 years for construction. Tyzack Pumping Plant and Discharge Line and Burns Pumping Plant and Discharge Lines will each require approximately 2 to 3 years for completion. Project drains will be constructed in the Burns Bench area so that the drains will be completed when project water is first made available.

Control schedules for storage, delivery, recreation, and fish and wildlife facilities of the Jensen Unit on pages 3 and 4 show the estimated construction schedule using project costs based on January or July 1975 prices.

Construction Costs

Basic cost estimates for the features of the Jensen Unit were made during the period of April 1968 to September 1975 and priced or indexed to January or July 1975. The April 1968 to September 1975 estimates are shown beginning on page 37.

LEGEND: Types of Activity
Preconstruction
and Other Work Construction

LINE NO.	PROGRAM ITEM	QUANTITY	ESTIMATED TOTAL	TOTAL TO JUNE 30, 1975	FISCAL YEARS												BALANCE TO COMPLETE	LINE NO.																				
					1976		TRANS. QTR.	1977		1978		1979		1980		1981			1982		1983		1984															
					J	A	S	O	N	D	J	F	M	A	M	J			J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15																								
1	PROGRAM GOALS														1																							
2	Irrigation Service Land-Full	440 AC							440 Ac.						2																							
3	Irrigation Service Land-Supplemental	3640 Ac.							3640 Ac.						3																							
4	Municipal and Industrial	18,000 A.F.								6,000 A.F.				6,000 A.F.	4																							
5	Power Development	None													5																							
6															6																							
7	CONSTRUCTION PROGRAM 01.01														7																							
8	Tyzack Dam and Reservoir	26,000AF	1/18,455,000	1,001,203	300,000	1,735,000	6,537,000	6,147,000	2,734,797	Initial Storage					8																							
9	03.01 Tyzack Pumping Plant & Discharge Line (Aqueduct) 46 cfs	4500 hp 11.8 mi	9,420,000	292,606			86,000	3,400,000	3,800,000	1,841,394	Initial Water Service			Initial Water Service	9																							
10	03.02 Burns Pumping Plant and Discharge Line - 97.4 cfs	2245 hp 2.0 mi	3,290,000	238,204								210,000	900,000	652,000	1,289,796	10																						
11	07.01 Drains	6.1 mi	774,000	47,135			64,000	317,000	345,865							11																						
12	13.01 Tyzack Pumping Plant Switchyard	138 Kv 5,000 Kva	121,000					4,000	22,000	95,000						12																						
13	13.02 Burns Pumping Plant Switchyard	138 Kv 2,500 Kva	65,000									4,000	50,000	11,000		13																						
14	13.03 Facilities to Connect with Colorado River Storage Project System	138 KV	121,000						25,000	36,000				25,000	35,000	14																						
15	13.04 Transmission Line to Tyzack Pumping Plant	2.3 mi. 138 Kv	97,000					2,000	70,000	25,000						15																						
16	13.05 Transmission Line to Burns Pumping Plant	1.1 138 Kv	93,000									2,000	70,000	21,000		16																						
17	15.01 Permanent Operating Facilities		27,000												27,000	17																						
18	G.L. 115.01 Service Facilities, Depreciation and Salvage				50,000	75,000	20,000	-50,000	-60,000	-35,000						18																						
19																19																						
20	TOTAL CONSTRUCTION & PROJECT COST		32,463,000	1,579,148	350,000	1,810,000	6,707,000	9,820,000	6,937,662	1,962,394		216,000	1,045,000	746,000	1,289,796	20																						
21																21																						
22	Consolidated Expenditures and Credits		-20,000 ^{2/}	-42,178	-50						20,944					1,284	22																					
23																23																						
24	Total Expenditures		32,443,000	1,536,970	349,950	1,810,000	6,707,000	9,820,000	6,937,662	1,962,394	20,944	216,000	1,045,000	746,000	1,291,080	24																						
25	TOTAL OBLIGATIONS		32,443,000	1,536,970	349,950	1,810,000	6,707,000	9,820,000	6,937,662	1,962,394	20,944	216,000	1,045,000	746,000	1,291,080	25																						

NOTES: Estimated costs based on January & July 1975 prices.
1/ Includes \$680,000 for incremental cost of constructing county road to current standards over costs of replacing road in kind.
2/ Includes-\$65,000 from nonreimbursable Colorado River Development Fund and-\$4,000 from Reclamation Fund expended prior to project authorization and-\$49,000 in nonappropriation costs, property transfers, and miscellaneous costs.

RECOMMENDED: _____ (Date)
(Operating Office Head)
RECOMMENDED: _____ (Date)
(Regional Director)
RECOMMENDED: _____ (Date)
(Chief, Div. of P C & F)
APPROVED: _____ (Date)
(Commissioner)
REVISED: _____ (Date)

SHEET 2 OF 3 SHEETS

PP-2 (8-75) UNITED STATES
DEPARTMENT OF THE INTERIOR
Bureau of Reclamation
CONTROL SCHEDULE
CENTRAL UTAH PROJECT-JENSEN UNIT
UPPER COLORADO RIVER BASIN FUND
(Section 5 of Colorado River Storage Project Act)
Utah Activities Dec. 3, 1975 UC
OFFICE DATE REGION

☐ GENERAL INVESTIGATIONS ☐ LOAN PROGRAM
☒ CONSTRUCTION ☐ OTHER

Preconstruction and Other Work

Construction

LINE NO.	PROGRAM ITEM	QUANTITY	ESTIMATED TOTAL	TOTAL TO JUNE 30, 1975	FISCAL YEARS												BALANCE TO COMPLETE	LINE NO.								
					1976		TRANS. QTR. JULY 1976 - SEPT 1976	1977		1978		1979		1980		1981			1982		1983		1984			
					J	A		S	O	N	D	J	F	M	A	M			J	J	A	S	O	N	D	J
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15											
1	PROGRAM GOALS															1										
2	Irrigation Service Land-Full	440 Ac							440 Ac							2										
3	Irrigation Service Land-Supplemental	3640 Ac							3640 Ac							3										
4	Municipal and Industrial	18,000 AF								6,000 AF				6,000 AF	6,000 AF	4										
5	Recreation Capacity	412 PAOT							412 PAOT							5										
6	Water Fowl Area	100 Ac							100 Ac							6										
7	Big Game Range	500 Ac							500 Ac							7										
8																8										
9	CONSTRUCTION PROGRAM															9										
10	Tyzack Dam and Reservoir	26,000 AF	1/18,455,000	1,001,203	300,000	1,735,000	6,537,000	6,147,000	2,734,797	Initial Storage						10										
11	Tyzack Pumping Plant and Discharge Line-46.0 cfs	4,500 hp. 11.8 mi.	9,699,000	292,606			86,000	3,406,000	3,917,000	1,997,394	Initial Water Service		Initial Water Service			11										
12	Burns Pumping Plant and Discharge Line-97.4 cfs	2,245 hp. 2.0 mi.	3,508,000	238,204								216,000	1,045,000	719,000	1,289,796	12										
13	Drains	6.1 mi.	774,000	47,135			64,000	317,000	345,865							13										
14	Permanent Operating Facilities		27,000											27,000		14										
15	Recreational Facilities	Camping Boating	757,000	22,529	5,000	5,000	15,000	300,000	409,471							15										
16	Fish and Wildlife Facilities		43,000					20,000				23,000				16										
17	Service facilities, depreciation, and Salvage				50,000	75,000	20,000	-50,000	-60,000	-35,000						17										
18																18										
19	TOTAL CONSTRUCTION & PROJECT COST		33,263,000	1,601,677	355,000	1,815,000	6,722,000	10,140,000	7,347,133	1,962,394		239,000	1,045,000	746,000	1,289,796	19										
20																20										
21	Consolidated expenditures and credits		-20,000 ^{2/}	-42,178	-50						20,944				1,284	21										
22																22										
23	TOTAL EXPENDITURES		33,243,000	1,559,499	354,950	1,815,000	6,722,000	10,140,000	7,347,133	1,962,394	20,944	239,000	1,045,000	746,000	1,291,080	23										
24																24										
25	TOTAL OBLIGATIONS		33,243,000	1,559,499	354,950	1,815,000	6,722,000	10,140,000	7,347,133	1,962,394	20,944	239,000	1,045,000	746,000	1,291,080	25										

1/ Includes \$680,000 for incremental cost of constructing county road to current standards over costs of replacing road in kind.

2/ Includes -\$65,000 from nonreimbursable Colorado River Development Fund and -\$4,000 from Reclamation Fund expended prior to project authorization and \$49,000 in nonappropriation costs, property transfers, and miscellaneous costs.

RECOMMENDED: _____ (Operating Office Head) _____ (Date)

RECOMMENDED: _____ (Regional Director) _____ (Date)

RECOMMENDED: _____ (Chief, Div. of P C & F) _____ (Date)

APPROVED: _____ (Commissioner) _____ (Date)

REVISED: _____ (Date) SHEET 1 OF 3 SHEETS

PF-2 (6-75)

UNITED STATES
DEPARTMENT OF THE INTERIOR
Bureau of Reclamation
CONTROL SCHEDULE
CENTRAL UTAH PROJECT
JENSEN UNIT

<u>Utah Activities</u> OFFICE	<u>Dec. 3, 1975</u> DATE	<u>UC</u> REGION
----------------------------------	-----------------------------	---------------------

☐ GENERAL INVESTIGATIONS ☐ LOAN PROGRAM
☐ CONSTRUCTION ☐ OTHER

Construction

[illegible]

NOTES: Estimated costs based on January 1975 prices.

RECOMMENDED: _____
(Operating Office Head) (Date)

RECOMMENDED: _____
(Regional Director) (Date)

RECOMMENDED: _____
(Chief, Div. of P C & F) (Date)

APPROVED: _____
(Commissioner) (Date)

REVISED: _____

SHEET 3 OF 3 SHEETS

PF-2 (6-75)

UNITED STATES
DEPARTMENT OF THE INTERIOR
Bureau of Reclamation

CONTROL SCHEDULE

CENTRAL UTAH PROJECT-JENSEN UNIT
RECREATION, FISH, AND WILDLIFE FACILITIES
(Section 8 of Colorado River Storage Project Act)

<u>Utah Activities</u>	<u>Dec. 3, 1975</u>	<u>UC</u>
OFFICE	DATE	REGION

☐ GENERAL INVESTIGATIONS
☒ CONSTRUCTION

☐ LOAN PROGRAM
☐ OTHER

CHAPTER II

STORAGE FEATURE

Tyzack Dam and Reservoir

Tyzack Dam and Reservoir will provide storage of spring runoff from Big Brush Creek. Releases will be through the outlet works to the stream or to the Tyzack Pumping Plant as required for supplemental irrigation water and 18,000 acre-feet of municipal and industrial water. The Tyzack Pumping Plant will pump water to Ashley Creek. All or part of this water will then be exchanged for Ashley Spring water which will be used for municipal and industrial purposes near Vernal, Utah. Downstream releases through Tyzack Dam will be for supplemental irrigation of 3,640 acres and full service irrigation of 440 acres of land along Big Brush Creek, Brush Creek, and in the vicinity of Jensen, Utah. The reservoir will have a total capacity of 26,000 acre-feet with a surface area of 521 acres and a water surface elevation of 5,608.2 feet at top of active joint-use capacity. A water surface elevation of 5,528.5 feet provides 2,000 acre-feet of dead and inactive capacity to be used for 100-year sediment deposition of 580 acre-feet, fishery, recreation, and to decrease pumping head. The active capacity of 24,000 acre-feet will be used for project irrigation, municipal and industrial uses, and flood control.

Clearing of the reservoir site will involve removal of willows, scattered cottonwood, scattered pine, scattered juniper, sagebrush, barbed wire fence, powerline (2-wire), and farm buildings.

Location and accessibility

The Tyzack Dam site is located on Big Brush Creek, a tributary of Brush Creek which is a tributary of the Green River, about 10 miles to the northeast of Vernal, Utah. The dam site is accessible from Vernal over 9.7 miles of Utah Highway 44, 2.2 miles of graded dirt county road, and 1.1 miles of existing farm road.

Power will be made available to the Tyzack Pumping Plant by interconnection with the 138-kilovolt Flaming Gorge to Vernal transmission line of the Colorado River Storage Project system. Telephone service is available from the Mountain States Telephone and Telegraph Company.

Road construction and relocation

An unsurfaced county road presently traverses the reservoir site and about 1 mile will be inundated when the reservoir is filled. This road will be relocated 1 to 1.5 miles north of its present alignment and will be 20 feet wide with 4-foot shoulders, 6-inch gravel surface, and will

be 3.3 miles in length. When finished, it will provide access to the area served by the reservoir as well as to the east shore. Present traffic is estimated to be fewer than 50 vehicles per day. Those from Vernal would travel about 1.4 miles further, while those from Flaming Gorge would travel 0.7 mile less than at present. Another 0.8 mile of new road will be constructed from an existing county road east of the reservoir to the base of the dam and pumping plant for operation and maintenance purposes. This road will be 20 feet wide with 6-inch gravel surfacing for two-way traffic.

Rights-of-way

Rights-of-way for the dam and reservoir will consist of 230 acres of State land, 480 acres of private land, and 1,780 acres of Reclamation-withdrawn lands. The 480 acres of private land to be acquired include one 2-acre farmstead, 63 acres of irrigated crop land, 40 acres of irrigated pasture, 141 acres of grazing land, and 234 acres of hillside grazing land. The rights-of-way required for relocation of the existing county road will be 15 acres of privately owned hillside grazing land with the remainder being Reclamation-withdrawn lands. The rights-of-way for the access road will be within the reservoir right-of-way.

Geology

In the Tyzack Reservoir Basin, Big Brush Creek flows south across the strike of colorful, upwarped, exposed sedimentary beds. The stream then makes an abrupt right angle turn to the left and flows along the strike of the Frontier Member of the Mancos Shale for a distance of 1,500 feet. The stream then makes a second right angle turn to the right cutting through massive sandstone ledges across the strike of the beds in a southerly direction. The axis of the dam is located at the narrows where the stream cuts through these ledges.

In the narrows there are stream channel deposits of silt, sand, and gravel varying in depths to 26 feet. Bedrock under these stream channel deposits is shale, siltstone, and sandstone of the Frontier Member of the Mancos Shale. Underlying the Frontier Member is the Mowry Shale Member of the Mancos Shale.

The right abutment consists of shale, sandstone, siltstone, and abundant carbonaceous layers of the upper member of the Mancos Shale and the upper and middle units of the Frontier Member of the Mancos Shale.

The left abutment consists of sandstone, sandy limestone, and shale. The sandstone and sandy limestone are of the middle and lower units of the Frontier Member of the Mancos Shale. The shale, containing some bentonitic clay, is of the Mowry Shale Member of the Mancos Formation.

A moderate to fairly extensive grout program will be required to seal the abutment rock and insure maximum safety of the feature.

Geologically, the reservoir basin should provide an excellent water-holding facility. The reservoir rim is generally not steep.

Seismic activity has been infrequent and of low magnitude. The area is in the Coast and Geodetic Survey seismic risk zone 1. This zone includes those areas where earthquake occurrence is least probable.

Construction materials

Ample quantities of suitable pervious and impervious embankment materials have been located within a mile of the dam site. About half of these materials may be obtained from the reservoir basin, with the remainder to be obtained from outside the reservoir basin. Pervious material for a drainage blanket will be obtained from a Government-owned source. Additional exploration for materials will be done during preconstruction. Excellent quality riprap can be obtained from the limestone quarry used for Steinaker Dam riprap. The quarry is about 15 miles hauling distance from the dam site.

The nearest Bureau of Reclamation approved concrete aggregate deposits are located along the Green River near Jensen, Utah, about 28 miles hauling distance.

Steel mills and pipe plants are located near Orem, Utah, about 170 miles hauling distance from the site. Concrete pipe is manufactured at Pleasant Grove, Utah, 5 miles north of Orem. Lumber and native timber are available from lumber yards or sawmills in Vernal, Utah.

Design procedure

The Tyzack Dam (see Drawing No. 450-D-7, revised October 1, 1974) was designed and cost estimates were prepared in the Office of the Director of Design and Construction, Engineering and Research Center, Denver, Colo. Cost estimates for land and rights, relocations of existing property, clearing lands, and access roads were prepared in the Office of Utah Activities and reviewed in other divisions of the Upper Colorado Regional Office, Salt Lake City, Utah.

Dam

The proposed Tyzack Dam will be a rolled, earthfill structure. The dam will have a height above streambed of 145 feet. Its crest will be 1,640 feet long and 30 feet wide. A cutoff trench with a maximum base width of 75 feet and $1\frac{1}{2}$:1 side slopes will be excavated into bedrock, a depth of approximately 20 to 40 feet below streambed. A grout curtain will be provided. A drain near the downstream toe of the dam will extend up both abutments. The embankment of the dam will be zoned material with the impervious zone making up the major portion of the dam cross section.

A semipervious zone consisting of silt, sand, gravel, and cobbles will overlay the downstream zone 1 materials. The embankment will contain approximately 2,030,000 cubic yards of materials. The upstream face of the dam will have a 3:1 slope and will be covered with riprap 3 feet thick from crest elevation 5,628 down to a berm 20 feet wide at elevation 5,525. From the berm to the toe, the face will have a 3:1 slope. The downstream face will have a slope of $2\frac{1}{2}$:1 from the dam crest elevation to a 20-foot-wide access road near the toe of the dam. From the road to the toe of the dam at approximate elevation 5,480, the slope will be $2\frac{1}{2}$:1.

Spillway

A 25-foot open chute spillway will be located on the left abutment and will have an ogee crest at elevation 5,608.2. At maximum reservoir water surface elevation 5,621.5 the spillway will have a capacity of 4,550 second-feet and the reservoir a surcharge of 7,600 acre-feet. The spillway and outlet works discharge will provide protection against an inflow design flood having a peak of 18,500 second-feet and a 2-day volume of 12,300 acre-feet.

Measuring devices

A reservoir gage to determine the active content in Tyzack Reservoir will be installed in the gate control house at the dam. A permanent-type measuring station with a rating section and continuous recorder will be provided to measure releases from the outlet works. Its capability will range from 10 second-feet to the capacity of the outlet works. Rating of the spillway and provision of a staff gage will be adequate to measure spills.

The existing U.S. Geological Survey gaging station in the reservoir area will not be needed following construction of Tyzack Reservoir.

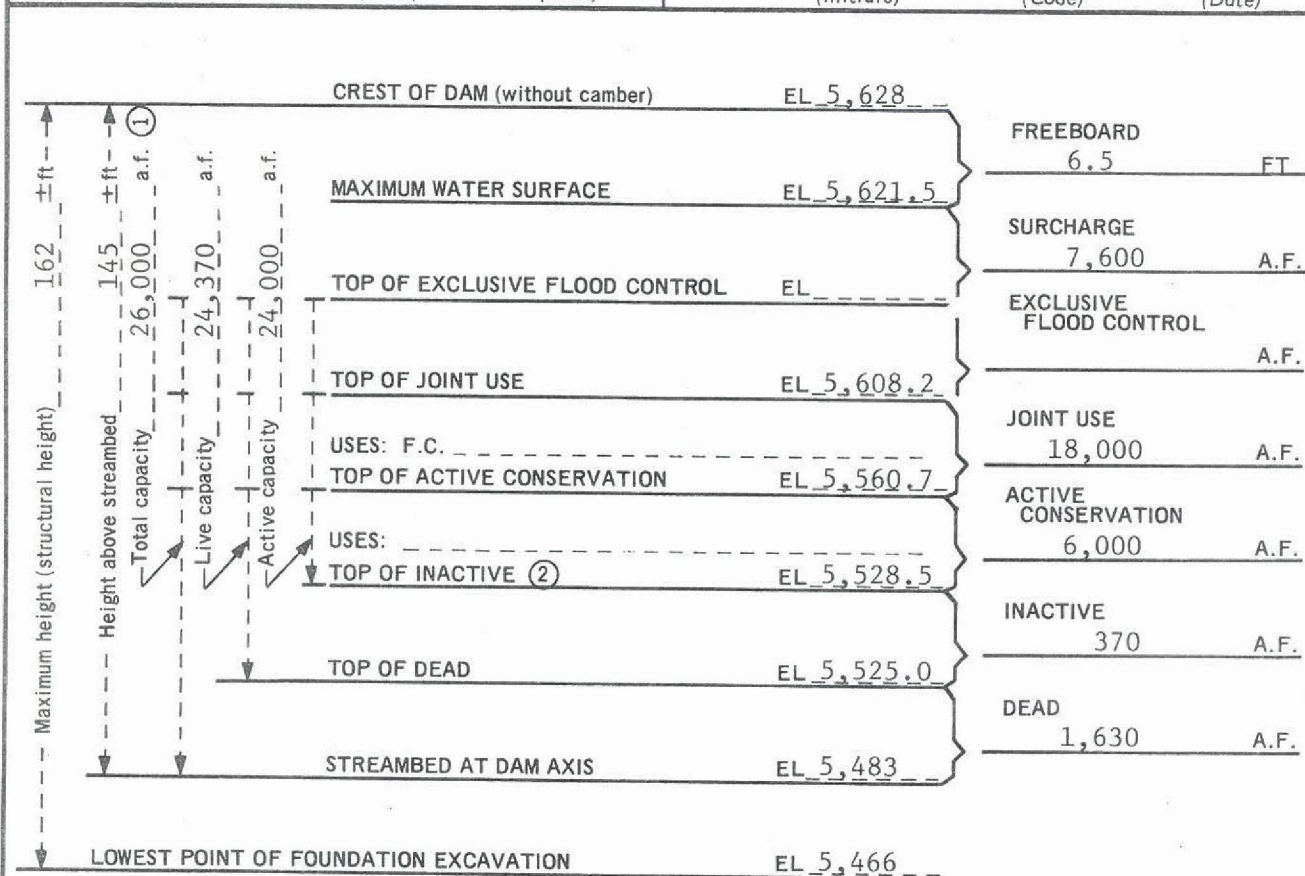
Remote indicators

In accordance with the Chief Engineer's letter dated August 1, 1967, consideration has been given to the use of automatic and remote controls and indicators for water storage and conveyance systems within the Jensen Unit. Assuming the operator will visit the Tyzack Dam periodically, remote indicators will be installed in the gate control house to provide the following information: (1) reservoir water surface elevation and (2) streamflow below the dam.

A telephone or other form of voice communication will be installed at the gate control house at Tyzack Dam so the operator can readily contact other personnel as necessary or desirable.

RESERVOIR CAPACITY ALLOCATIONS

TYPE OF DAM	Earthfill	REGION	UC	STATE	Utah
OPERATED BY	U.S. Bureau of Reclamation	Tyzack			
CREST LENGTH	1,640 FT; CREST WIDTH 30 FT	Tyzack			
VOLUME OF DAM	2,030,000 CU YD	Central Utah			
CONSTRUCTION PERIOD	4 years	Jensen			
STREAM	Big Brush Creek	Preconstruction			
RES AREA	521 ACRES AT EL 5,608.2	STATUS OF DAM			
ORIGINATED BY:	APPROVED BY:				
(Initials) (Code) (Date)	(Initials) (Code) (Date)				



- ① Includes _____ a.f. allowance for _____ year sediment deposition between streambed and El _____, of which _____ a.f. is above El _____.
- ② Established by _____

REFERENCES AND COMMENTS:

Feasibility Design Drawing 450-D-7, Revised 10/1/74
Area-capacity tables dated 5-3-72

Outlet works

The outlet works will consist of an intake structure; a 6-foot 6-inch-diameter, 375-foot-long, circular tunnel; a gate chamber housing a 3-foot 6-inch by 3-foot 6-inch-high pressure emergency slide gate; a 45-inch-diameter, 280-foot-long steel pipe supported beside a walkway inside a 7-foot 9-inch-diameter, 250-foot-long horseshoe conduit; and a control house for two 2-foot 3-inch by 2-foot 3-inch-high pressure regulating gates. The capacity of the outlet works will be approximately 320 second-feet at top of inactive storage pool elevation 5,528.5 and 550 second-feet at maximum water surface elevation 5,621.5. An outlet near the downstream end of the outlet works will accommodate flow to Tyzack Pumping Plant.

References

Feasibility Design Data, Tyzack Dam and Reservoir, No. D&E 202, Central Utah Project, Utah, December 1967.

Tyzack Dam, Tailwater Study, Feasibility Design Data, Jensen Unit, Central Utah Project, Utah, Central Utah Projects Office, Provo, Utah, May 1967.

Supplements to the Tailwater Studies for Tyzack Dam and Ratliff Diversion Dam, Jensen Unit, Central Utah Project, Central Utah Projects Office, Provo, Utah, December 1967.

Sedimentation Study for Ratliff Diversion and Tyzack Dam Sites, Central Utah Project, Utah, Division of River Control, Region 4, Salt Lake City, Utah, March 20, 1967.

Preliminary Geology of the Tyzack Dam Site, Jensen Project, Utah, November 1945.

Inflow Design Flood Study, Tyzack Dam Site and Ratliff Diversion Dam Site, Jensen Unit, Central Utah Project, Region 4, August 1967.

Feasibility Materials Report of the Tyzack Dam, No. GM-99, Jensen Unit, Central Utah Project, Utah, December 1967.

Degradation Study for Feasibility Design Purposes, Tyzack Dam and Ratliff Diversion Dam, Jensen Unit, Central Utah Project, June 1967.

Jensen Unit Hydrologic Data, Central Utah Project, Central Utah Projects Office, January 1968.

Draft Geologic Report, Tyzack Dam and Reservoir Sites, G-283, Jensen Unit, Central Utah Project, March 1973.

CHAPTER III

PUMPING PLANTS AND DISCHARGE LINES

Tyzack Pumping Plant and Discharge Line (Aqueduct)

The Tyzack Pumping Plant will be located near the downstream end of the outlet works of Tyzack Dam. The pumped water will flow through the Tyzack Pumping Plant Discharge Line (Tyzack Aqueduct) to Ashley Creek and Steinaker Reservoir. The project water will be released to Ashley Creek in exchange for Ashley Spring water for municipal and industrial use in the Vernal, Utah, area. Top of inactive capacity and top of joint-use capacity for the Tyzack Reservoir will be at elevations 5,528.5 and 5,608.2, respectively.

The average annual amount of water pumped will be 18,000 acre-feet. The monthly distribution of this water is as follows.

	Percent of <u>annual</u>	Amount (1,000 <u>acre-feet</u>)
October	11.7	2.1
November	11.6	2.1
December		
January		
February		
March	11.7	2.1
April	7.8	1.4
May	10.5	1.9
June	11.6	2.1
July	11.7	2.1
August	11.7	2.1
September	11.7	2.1
Total	100.0	18.0

Large quantities of pumping in October, November, and March are necessary to allow shutdown of the pumping plant during the winter months of December, January, and February. This demand pattern will require only minor regulation at Steinaker Reservoir.

Continuous recording flow meters will be installed at the turnouts to measure the amount of water being pumped. A bifurcation structure to accommodate 46 second-feet for the pumping plant will be installed as part of the outlet works for Tyzack Dam. The pumping plant will be semi-automatic, being equipped with protective shutdown devices but requiring manual starts. The gate tender at Tyzack Dam will regulate and maintain the pumping plant during periodic visits to the dam and pumping

plant. Remote indicators will be installed in the gate control house of Tyzack Dam to show the amount of water being pumped.

The pumping plant (see plan view Drawing No. 450-D-7, revised October 1, 1974) will have a total design capacity of 46 second-feet and an average pumping head of 461 feet. The capacity of Tyzack Pumping Plant was determined by increasing the maximum mean monthly average of 35 second-feet by 30 percent for peaking requirements and adding 5 percent to compensate for decreased capacity due to wear as the pumps become older. There will be two 1,500-horsepower pumps rated at 16.1 second-feet each and two 750-horsepower pumps rated at 8.05 second-feet each to provide for this wear. Housing for the pumps will not be required.

The pumping plant discharge line (aqueduct) (see Drawing No. 450-418-149) will be approximately 11.8 miles in length and will be comprised of 3,920 feet of 27-inch-diameter, 2,995 feet of 30-inch-diameter, 45,390 feet of 33-inch-diameter, and 10,200 feet of 39-inch-diameter pipe. Profile Drawing No. 450-418-150 shows the ground profile of this aqueduct marked to designate the pipe location by size and design head. The discharge line will follow an intermittent streambed westerly; cross through a ridge where a 34-foot-diameter, 40-foot-tall regulating tank will be located; continue on to intersect the alignment of U.S. Highway 44; then approximately follow the highway southeasterly 2 miles; turn west around some hogbacks; and continue southerly on the west side of Steinaker Reservoir. Near the west arm of Steinaker Reservoir it will turn westerly up another intermittent drainage; cross the bench south of the Ashley Substation; descend to the Ashley Creek Valley; and turn northwesterly to Ashley Creek. The pumping plant will require construction of approximately 2.3 miles of 138-kilovolt transmission line from the interconnection with the Flaming Gorge-Vernal transmission line of the Colorado River Storage Project system.

Rights-of-way

No additional rights-of-way will be required for Tyzack Pumping Plant since it will be located on lands required in the construction of Tyzack Dam. A right-of-way easement will be acquired for construction of a powerline to the pumping plant over 7 acres of privately owned land.

Tyzack Pumping Plant Discharge Line will be on vacant public lands except for 32 acres of private grazing land.

Clearing costs are considered to be negligible.

Construction of the pumping plant and discharge line will not require the relocation of any existing facilities or utilities. The discharge line, however, crosses a 4-inch-diameter pipeline of the Utah Gas Service Company at station 169+00. The gas pipeline is about elevation 5,987 and the ground surface about elevation 5,992.

Geology and construction materials

The Tyzack Pumping Plant site is on the valley floor of the Big Brush Creek on a base of Mancos shale dipping 30° to the south.

Easily excavatable, gravelly slope wash and loose to fairly well compacted streamflow deposits of silty to clayey fine sand and small gravels 15 to 25 feet thick overlie the eroded upper member of the Mancos Shale along the valley floor at the pumping plant site. The stream deposits and the Mancos shale beds contain gypsum. Sulphate-resistant cement is advised.

Either the stream deposits or the Mancos shale bedrock would provide a good to excellent foundation for a static structure.

The aqueduct line will encounter common excavation in the Big Brush Creek stream deposits and in the residual clay and alluvial materials overlying the soft to medium-hard bedrock along the shale strike valleys. Soft to medium-hard rock excavation would be encountered through the up-turned sandstone and shale formations. The shale and sandstone bedrock and the clayey overburden materials will adequately support the buried pipeline. Bedding for the pipeline will be required where rock excavation is encountered. The shales and the alluvial deposits along the line contain gypsum. Sulphate-resistant cement is advised.

Conditions along the discharge line are favorable to construction.

Backfill materials will be obtained from the trench excavation. Steel and concrete pipe are manufactured and are available in the Provo, Utah, area.

Burns Pumping Plant and Discharge Lines

The Burns Pumping Plant will be located on the right bank of the Green River (see Drawing Nos. 450-D-3 and 450-418-74) about 2½ miles upstream from Jensen, Utah. The plant will contain 14 pumping units and have a total design capacity of 97.4 second-feet. The rated capacity will be 115.8 second-feet and will include allowance for wear. Four discharge lines will be located between the pumping plant and existing irrigation canals. The Burton Ditch, Burns Bench Canal, and Sunshine Canal Discharge Lines will be located parallel to each other in the same pipe trench. The Murray Ditch Discharge Line will be located in a separate trench.

The discharge lines will terminate at the four separate unlined canals. Data pertaining to pumping units, discharge lines, and canals are tabulated on the following page.

Item	Burns Bench Canal			Sunshine Canal			Burton Ditch			Murray Ditch			Total
Unit number	1	2	3 & 4	5	6	7 & 8	9	10	11	12	13	14	
Design Q (second-feet)	3.5	7.1	14.2	3.0	6.0	12.0	2.0	3.8	7.6	1.8	3.4	6.8	
Design horsepower	60	125	250	100	250	450	20	40	75	25	50	100	
Total design Q (second-feet)		39.0			33.0			13.4			12.0		97.4
Design horsepower		685			1,250			135			175		2,245
Design pumping head		90			195			52			70		
Pipe diameter (inches)		36			33			21			24		
Length discharge line (feet)		1,550			4,950			1,350			2,750		
Design water surface elevation at outlet end of discharge line (feet above m.s.l.)		4,807.7			4,896.0			4,765.0			4,783.6		
Water surface elevation of Green River at average flow (4,000 second-feet)		4,727.8			4,727.8			4,727.8			4,727.8		
Elevation difference		79.9			168.2			37.2			55.8		
Acreage served		1,592			1,304			371			427		

Discharge line capacities are based on Standard Criteria for Determination of Irrigation Distribution System Capacities approved by the Chief Development Engineer, December 18, 1961, and revised in accordance with the Acting Chief Engineer's letter dated July 10, 1967. These capacities include 15 percent conveyance loss.

The maximum flood flow recorded at the Green River near Jensen, Utah, gage on June 16, 1957, amounted to 36,500 second-feet. Estimated 100-year flood based on annual peak flow is 50,000 second-feet.

	<u>Minimum</u>	<u>Maximum</u>	<u>Average</u>
Green River flow in second-feet during pumping season	500	50,000	4,000
Water surface elevation	4,725.0	4,736.8	4,727.8

The water will be used for irrigation and will not require treatment. The irrigation demand of the lower Brush Creek area is 13,300 acre-feet per year of which an average of 9,700 acre-feet will be pumped from Green River. The remaining demand will be supplied by water spilled from Tyzack Reservoir. The monthly distribution of the water to be pumped will be as follows.

Monthly distribution of water to be pumped
(1,000 acre-feet)

Month	Murray	Burton	Sunshine	Burns	Total
April	0.1	0.1	0.1	0.2	0.5
May	.1	.1	.5	.6	1.3
June	.2	.2	.5	.7	1.6
July	.4	.4	.9	1.6	3.3
August	.3	.3	.8	1.2	2.6
September	.1	.1	.1	.1	.4
October					
Total	1.2	1.2	2.9	4.4	9.7

The Burns Pumping Plant, by an agreement with the Utah Division of Wildlife Resources, will pump an additional 230 acre-feet of nonproject water annually to the Stewart Lake Waterfowl Management Area. The water will be conveyed to the area by Burns Bench Canal and a 5-second-foot ditch during nonpeak demand periods.

The plan of the discharge line is shown on Drawing No. 450-418-74. The intake channel will be excavated to the bottom of the Green River with bottom elevations and typical section as shown on Drawing No. 450-D-3.

The closure of Flaming Gorge Dam was made in November 1962. U.S. Geological Survey records of sediment samples taken of Green River near Jensen, Utah, for water years 1963 to 1966 are available.

A 138-kilovolt transmission line will be constructed to the Burns Pumping Plant from the interconnection with the 138-kilovolt Vernal-Rangely transmission line of the Colorado River Storage Project system, a distance of about 1.1 miles.

The Burns Pumping Plant will be an automatic unit equipped with protective shutdown devices and automatic restarting features. An alarm system will be installed in the conservancy district office to indicate when the plant has shut down. This office will be in Vernal, Utah, about 15 miles away and will use commercial telephone facilities for the alarm signal. Some form of voice communication will be installed at the pumping plant, along with remote indicators to show the amount of water pumped to each canal.

Continuous recording flow meters will be installed on each unit to enable the operator, who would visit Burns Pumping Plant periodically, to keep a log indicating the amount of water being pumped to each canal. Parshall flumes will be constructed on each canal just downstream from the discharge line outlets. These flumes will be able to measure from 10 to 100 percent of the design flow of the discharge line.

The pumps will have open housing and a chain link fence will encircle the area for safety purposes.

The water-lubricated pump bearings will be connected to a clear water source. A shallow well 20 feet deep near the plant will furnish ample clear water for this purpose.

Location and accessibility

The structure site can be reached from Vernal, Utah, over 13 miles of two-lane, hard-surfaced U.S. Highway 40 east to Jensen, Utah, north on 2 miles of hard-surfaced State Highway 149, and east 0.6 mile on a graded and graveled farm road. A gravel-surfaced access road about 300 feet long will be required at the site.

Utilities

Electric power is furnished to the Jensen area by the Moon Lake Electric Association. Powerlines near the pumping plant site transmit single-phase, 7.2-kilovolt power. Three-phase power is available at a substation adjacent to a 69-kilovolt transmission line about 4 miles southwest of the site. At Vernal, Utah, about 7 miles to the west, the Moon Lake Electric Association's system ties in with the transmission line from the Flaming Gorge hydroelectric plant, thereby adding to the reliability of power.

The Utah Gas Service Company, a subsidiary of El Paso Natural Gas Company, furnishes natural gas to the construction area. The main line of the El Paso Natural Gas Company, between New Mexico and the Northwest, crosses the Green River about 1,700 feet upstream from the pumping plant site, and a 1 $\frac{1}{4}$ -inch distribution line of the Utah Gas Service Company crosses through the site to an existing pumping plant.

Rights-of-way

Rights-of-way for Burns Pumping Plant and Discharge Lines are summarized as follows.

Irrigated farm land	6 acres
River bottom	2 acres
Irrigated pasture	2 acres
Steep hillside	1 acre
Farmstead	1 acre

The transmission line to the pumping plant will require right-of-way easement to include 4 acres of privately owned land.

Clearing required will be negligible. Construction of the pumping plant and discharge lines will not require the relocation of any existing facilities or utilities except for a 1 $\frac{1}{4}$ -inch-diameter natural gas pipeline which will be relocated at a minimal cost, since it will no longer be needed once the Burns Pumping Plant is in operation.

Geology and construction materials

Overburden soils at the pumping plant site are predominantly stream-fill materials. They consist of sand, gravel, and cobbles which vary from fairly clean to very clayey. Most of the materials contain some moderately plastic clay lenses. The gravel overburden material is fairly well compacted and has adequate bearing strength to support the structure. The materials are generally permeable and are presently saturated below about 10 feet. These materials will provide a good foundation for the structure.

Clay lenses are generally small and scattered and occur most abundantly near the shale overburden contact.

Bedrock at the site is from 19 to 21 feet below the ground surface. It is flat lying, part of the Mancos Shale formation, and consists of dark gray clay shale which air slakes and weathers easily at the surface to a sticky, moderately plastic clay. The bedrock surface, which appears somewhat irregular with ridges and old channels, is about the same elevation as the bottom of Green River.

All of the bedrock and overburden materials of this area contain alkali salts. Type 5 cement will be required in all concrete structures.

Denver laboratory tested and approved sources of concrete aggregate are located nearby in Green River terrace deposits, 1 to 4 miles' hauling distance from the pumping plant site. The deposits are owned by the Intermountain Concrete Company at Vernal, Utah. Backfill materials for the pipe trenches will be available from the required excavation.

Riprap may be obtained from the more massive limestone beds of the Park City formation exposed at the phosphate mine about 12 miles north of Vernal, Utah, over paved State Highway 44. Excellent quality riprap material can be obtained from the Mississippian limestone quarry used for Steinaker Dam, located along Little Brush Creek about 37 miles' hauling distance along paved highways from the site.

Design Procedure

The Tyzack and Burns Pumping Plants and Discharge Lines were designed in the Office of the Director of Design and Construction, Engineering and Research Center, Denver. Cost estimates for lands and rights, relocation of existing property, clearing lands, and access roads were prepared in the Office of Utah Activities and reviewed in other divisions of the Upper Colorado Regional Office.

References

Tyzack Pumping Plant and Discharge Line, Jensen Unit, No. D&E 203, Central Utah Project, Central Utah Projects Office, Provo, Utah, January 1968.

Jensen Unit Hydrologic Data, Central Utah Project, Central Utah Projects Office, Provo, Utah, January 1968.

Feasibility Geology and Materials Report, Tyzack Aqueduct and Pumping Plant, Jensen Unit, Central Utah Project, Utah, No. GM-100, Central Utah Projects Office, Provo, Utah, April 1, 1968.

DESIGNS AND ESTIMATES

PUMPING PLANTS AND DISCHARGE LINES

Tyzack Aqueduct Cross Drainage, Feasibility Design, Jensen Unit, Central Utah Project, Central Utah Projects Office, Provo, Utah, August 1967.

Supplement to Tyzack Aqueduct Cross Drainage Report (dated August 1967), Feasibility Design, Jensen Unit, Central Utah Project, Central Utah Projects Office, Provo, Utah, December 6, 1967.

Sedimentation Study for Ratliff Diversion and Tyzack Dam Sites, Central Utah Project, Utah, Division of River Control, Region 4, Salt Lake City, Utah, March 20, 1967.

Burns Pumping Plant and Discharge Lines, Jensen Unit, No. D&E 201, Central Utah Project, Central Utah Projects Office, Utah, Jensen Unit, December 1967.

Feasibility Geologic Report: Jensen Pumping Plant Site - Jensen Unit, G-217, Region 4, Salt Lake City, Utah, May 1965.

Burns Bench Tailwater Study, Feasibility Design Data, Jensen Unit, Central Utah Project, July 1967.

Feasibility Geology and Materials Report for the Burns Pumping Plant, Discharge Lines, and Canal Rehabilitation, GM-98, Jensen Unit, Central Utah Project, Utah, November 1967.

Memorandum from: W.M. Borland, To: Chief, Hydrology Branch, Subject: Travel Notes on Central Utah Project--Jensen Unit, May 22, 1967, dated July 14, 1967.

Memorandum to Region 4 Files, From: Jerold F. Lazenby, Subject: Estimate of 100-year Peak Discharge at Burns Bench Pumping Plant Site on the Green River--Uintah Unit, Central Utah Project, Utah, January 12, 1968.

CHAPTER IV

DRAINS

Of the 4,080 acres of irrigable land in the Jensen Unit, about 700 acres of supplemental service land and about 10 acres of full service land will require project drainage. No farm drainage will be required. The drainage plan will consist of 1.4 miles of open outlet drains and 4.7 miles of closed lateral drains. There is a need at the present time for a drainage system in the Jensen area. It is therefore recommended that construction of the drainage system proceed concurrently with other project features rather than being deferred until all other features are completed.

A more detailed discussion of the drainage system appears in the Drainage Appendix to the Definite Plan Report.

Personnel of the Office of Utah Activities estimated the cost of construction of these drains. The estimates were approved by the Drainage and Ground Water Branches of the Regional and Denver offices.

CHAPTER V

FISH, WILDLIFE, AND RECREATION FACILITIES

Fishery

Tyzack Reservoir will have an inactive and dead storage of 2,000 acre-feet. This will provide a minimum pool for fish.

Waterfowl Area

Stewart Lake Waterfowl Management Area, shown on Drawing No. 450-418-101, will benefit from the Jensen Unit features. Delivery of water from the project drains and canals will replace supplies presently obtained from Ashley Creek for which there is no assured water right. A lateral from one of the existing canals to the management area will be required. Since water from the unit will be delivered at a higher elevation, about 100 acres of additional marsh land will be developed. Water management for the entire area will be improved.

Wildlife

Tyzack Reservoir and appurtenant facilities will cause a loss of about 500 acres of deer winter range and other wildlife habitat. This loss will be mitigated by the improvement of a similar amount of range in a nearby area. The present recommendations are to partially remove the juniper-pinon cover on adjacent public lands by two-way chaining. The lands will then be reseeded to grasses and browse plants.

Recreation and Camp Site Facilities

Facilities planned for recreation will include those for camping, hiking, boating, and picnicking. The facilities will be located as shown on Drawing No. 450-400-77. Access to the campground site will be by a new 2-mile, two-way, 22-foot-wide asphalt surfaced road. The campground will include 52 camping units, 6 picnic units, and 4 group camping units. Two comfort stations with sewage-holding tanks will be located within easy access from all camping areas and the boating area.

The boating area will consist of a boat ramp with a concrete section 40 feet wide and 370 feet long and a gravel section 20 feet wide extending another 330 feet into the reservoir. Boat trailer parking will be provided near the boat ramp for 45 units. Adjacent to this parking area will be a fish cleaning station.

The recreational development will also include water, electricity, garbage pickup, and trails providing access to surrounding scenic areas.

References

Comprehensive Design of Tyzack Recreational Area, prepared for National Park Service by Call Engineering, Inc., Salt Lake City, Utah, October 1972.

CHAPTER VI

GENERAL PROPERTY FACILITIES

Construction Facilities

The main government construction office will be located in Duchesne, Utah, at the government camp presently being used in construction of features of the Bonneville Unit of the Central Utah Project. A field office including laboratory facilities, warehouse, and shops will be provided in or near Vernal, Utah. During the development period the facilities will be used for operation and maintenance purposes.

Operation and Maintenance Headquarters

Headquarters for the Jensen Unit operation will be located in or near Vernal, Utah, and would include a garage and office. Vehicles and other minor equipment will be provided.

The availability of housing in the Vernal area will be sufficient to meet requirements of Bureau of Reclamation construction personnel.

Vernal, Utah, has a population of about 6,200 as of January 1, 1975. It has culinary water and sewage disposal systems. Electric power is furnished to Vernal by the Moon Lake Electric Association. Telephone service is provided by the Mountain States Telephone and Telegraph Company and natural gas by the Utah Gas Service Company.

CHAPTER VII

OPERATION, MAINTENANCE, AND REPLACEMENTS

General Description

The Jensen Unit will develop about 22,600 acre-feet of water for irrigation and municipal and industrial purposes. A supplemental water supply will be provided for about 3,640 acres of presently irrigated land and a full supply for about 440 acres of new land. About 333 acres of 6W land do not qualify for project water but will continue to receive irrigation water under existing rights. About 18,000 acre-feet of water will be provided for municipal and industrial uses. The service area is located generally along the Green River east of Vernal, Utah, and is within the boundaries of both the Uintah Water Conservancy District and the Central Utah Water Conservancy District.

The major features of the Jensen Unit will be the Burns Pumping Plant and Discharge Lines and Tyzack Dam, Reservoir, Pumping Plant, and Discharge Line (aqueduct). The Burns Pumping Plant will have a design capacity of 97.4 second-feet. An average of approximately 9,700 acre-feet of water will be pumped annually from the Green River. Discharge lines will extend from the Burns Pumping Plant to each of the four existing canals in the Jensen area.

Tyzack Dam will be constructed on Big Brush Creek. The reservoir will have a total capacity of 26,000 acre-feet of which 24,000 acre-feet will be active and joint use. It will store early spring runoff and surplus flows of Big Brush Creek for subsequent irrigation, flood control, and municipal and industrial use.

The Tyzack Pumping Plant will have a rated capacity of 46 second-feet and will lift an average of approximately 18,000 acre-feet of water annually over the divide to the west. The average pump lift will be about 400 feet and the average dynamic head about 460 feet. The pumped water will flow in the 11.8-mile-long Tyzack Aqueduct (discharge line) from the Tyzack Pumping Plant to Ashley Creek.

Existing canals will be used for the distribution of the project irrigation water. Following is a list of the canals and ditches in the Jensen Unit area which are operated by canal companies.

<u>Canal</u>	<u>Irrigable acres served</u>
Sunshine	1,300
Murray	330
Burns Bench	1,530
Burton	210

In addition, ditches belonging to individual owners divert water out of Brush Creek to serve 710 irrigable acres, making a total of 4,080 irrigable acres served.

It is assumed for this estimate that existing canal companies will continue to operate and maintain their own distribution facilities.

Conservancy District

The Central Utah Water Conservancy District was organized to contract with the United States for the construction, operation, and maintenance of the Central Utah Project. The Uintah Water Conservancy District was organized to act as the repayment entity and to operate and maintain the Vernal Unit. For this estimate, it is assumed the Uintah Water Conservancy District will operate and maintain facilities of the Jensen Unit for the Central Utah Water Conservancy District.

That portion of the administrative costs incurred by the Uintah Water Conservancy District in the administration of the Jensen Unit is included in the administrative expense items.

Personnel

A superintendent will direct all operations and maintenance of the Jensen and the Vernal Units and will be responsible to the Board of Directors of the Uintah Water Conservancy District. The superintendent will be employed on an annual basis, and seasonal common labor and skilled labor will be employed as required. The superintendent's salary will be prorated between the two units. The Uintah Water Conservancy District will maintain such water, financial, and clerical records as may be needed. This cost is reflected in the estimate under "Secretary-Treasurer (part time)." The superintendent will make all releases from the reservoir and operate the pumping plants.

Equipment

The project will own a pickup truck and some miscellaneous equipment, including one fixed short-wave radio station and three mobile units. Since the irrigation companies will continue to operate the existing canal system, it is not anticipated that other equipment will be owned. The pickup and miscellaneous equipment will be furnished to the water users initially by the government and will not exceed a cost of \$27,000. Miscellaneous heavy equipment will be rented with operator, fuel, and repairs furnished as part of the rental cost. The superintendent will supervise maintenance work at the dam, most of which will be done in the off-irrigation season.

Materials and Supplies

Materials and supplies required for project use can be obtained in Vernal. This community is located about 15 miles southwest from the Tyzack Dam and about 15 miles northwest from the Burns Pumping Plant. Truck lines deliver freight daily to Vernal.

Operation and Maintenance Headquarters

The superintendent will live in the Vernal-Jensen area and no residence will be provided. Office, warehouse, and garage space will be rented locally.

Replacement Reserve

A replacement reserve fund will be provided for replacement of short-wave radio and portions of the pumping plants. The annual cost of establishing this fund is included as part of this estimate. Replacement of all other project features will be taken care of as a part of the regular maintenance program.

Pumping Plant Energy Costs

For this estimate the energy cost was averaged at 6.24 mills per kilowatt-hour at Tyzack Pumping Plant and 7.38 mills at Burns Pumping Plant. These costs were derived using 4 mills per kilowatt-hour and \$1.32 per kilowatt-month from Colorado River Storage Project rate schedule UC-F1, however, with the demand charge computed monthly only on the power used.

Emergency Operation and Maintenance Fund

An emergency operation and maintenance fund in the amount of \$40,000 should be provided and maintained by the district to assure continued operation of the project works. This fund may be accumulated during the project development period and deposited in a separate account. When money is used from this fund, it is suggested that the district establish a rate of annual replacement until the fund is fully replaced.

Estimate of Annual Operation, Maintenance,
and Replacement Costs

(Based on average of prices prevailing during 1972, 1973, and 1974.)

\$ 1.76/kw month

4.1 M.16

$$\$83,600 \div 18,000 = \$4.64$$

$$\$106,350 \div 18,000 = \$5.91$$

Sid 6/10/80 9:00 AM

Pumping Plants

Energy costs	\$83,600
Transmission	2900
0 & M	<u>5600</u>
	127,400
	128,000

$$\frac{83,600}{18,000} = 4.64$$

$$\frac{106,350}{18,000} = 5.91$$

Total 1741 O&M \$7⁰⁰

10/80 Total M&I O&M 10⁰⁰ / AF
Energy 6⁰⁰ / AF

Summary of operation, maintenance, and
replacement costs of basic features

Item	Annual operation, maintenance, and replace- ment costs (with pumping)
Personnel	\$17,700
Equipment	7,800
Materials and supplies	3,700
Administration	3,600
Replacement	2,500
Special items	
Pumping plants	
Energy costs	83,600
Transmission	2,900
Operation and maintenance	5,600
Estimated total ^{1/}	127,400
Rounded	128,000

^{1/} Operation, maintenance, and replacement cost allocations:

Tyzack Dam	\$20,000
Tyzack Aqueduct	2,000
Tyzack Pumping Plant	83,000
Burns Pumping Plant	23,000

In addition to the foregoing annual costs pertaining to the basic features of the unit, administrative costs involving forecasting, data collection, and administration of flood control operations have been estimated at \$1,000 annually.

Annual operation, maintenance, and replacement costs pertaining to recreational facilities have been estimated at \$48,000 annually, as explained on page 30.

Summary of the total estimated annual project
operation, maintenance, and replacement costs

Item	Annual operation, maintenance, and replace- ment costs (with pumping)
Reclamation facilities	\$128,000
Recreation facilities, National Park Service	48,000
Administrative costs (forecasting, etc.)	1,000
Total	177,000

DESIGNS AND ESTIMATES

OPERATION, MAINTENANCE, AND REPLACEMENTS

Detailed operation, maintenance, and
replacement cost estimates

Cost with pumping

Personnel

Superintendent (annual) ^{1/}	\$11,600	Part time	\$5,300
Secretary-Treasurer (annual) ^{1/}	6,300	Part time	2,600
Common labor (1,600 hours at \$3.31)			5,300
Skilled labor (850 hours at \$5.32)			4,500
Subtotal personnel			17,700

Equipment

Pickup (14,500 miles at \$0.16)			2,300
1½-ton truck (1,800 miles at \$0.32)			600
Miscellaneous heavy equipment (160 hours at \$24)			3,900
Short-wave radio			
One fixed station			400
Three mobile stations			600
Subtotal equipment			7,800

Materials and supplies (lump sum)

3,700

Replacement

Tyzack Pumping Plant

Estimated field cost of pump and prime mover (\$170,000 x 0.00467)			800
--	--	--	-----

Burns Pumping Plant

Estimated field cost of pump and prime mover (\$330,000 x 0.00467)			1,500
--	--	--	-------

Short-wave radio equipment (lump sum)

200

Subtotal replacements

2,500

Transmission line cost

Tyzack Pumping Plant (2.3 miles at \$235)			550
---	--	--	-----

Burns Pumping Plant (1.1 miles at \$235)

300

Administrative expenses (15 percent +)

150

Subtotal transmission line cost

1,000

CRSP system connection costs attributable to Jensen Unit

Tyzack Pumping Plant (5,000 kva at \$0.22+)			1,100
---	--	--	-------

Burns Pumping Plant (2,500 kva at \$0.22+)

550

Administrative expense (15 percent +)

250

Subtotal substation cost

1,900

^{1/} Annual salary of superintendent and Secretary-Treasurer pro-rated to Jensen Unit and to another unit.

DESIGNS AND ESTIMATES

OPERATION, MAINTENANCE, AND REPLACEMENTS

Name of pump	Energy cost					Demand cost (\$1.32/kilowatt-month)	Cost per pumping plant
	Acre-feet	Average pumping head	Efficiency (percent)	Kilowatt-hours	Energy cost per pump at 4 mills	Seasonal demand (kilowatt-month)	
Tyzack Pumping Plant	18,000	461.0	73	11,650,000	46,600	19,727	26,040
Burns Pumping Plant							1/\$72,640
Burns Bench Pump ^{2/}	4,400	86.5	68	573,700	2,300	1,282	1,690
Sunshine Pump	2,900	168.8	70	716,400	2,870	1,850	2,440
Burton Pump	1,200	40.6	62	80,600	320	275	360
Murray Pump	1,200	57.6	63	112,400	450	385	500
Total Burns Plant				1,483,100	5,940	3,792	5,000
Subtotal energy cost							10,940
Rounded							83,580
							83,600

^{1/} Based on pumping 18,000 acre-feet annually. By utilizing spills of Steinkner Reservoir, pumping could be reduced to about 15,800 acre-feet annually at a savings of about \$5,700 in energy costs annually.

^{2/} Does not include 230 acre-feet supplied to Stewart Lake for a cost of \$120 for 30,000 kilowatt-hours. Cost to be paid by Utah Division of Wildlife Resources.

DESIGNS AND ESTIMATES

OPERATION, MAINTENANCE, AND REPLACEMENTS

Detailed operation, maintenance, and replacement cost estimates			
Name		Column 1 operation cost	Column 2 maintenance cost
Tyzack Pumping Plant		\$200	\$2,700
Burns Pumping Plant		400	2,300
Burns Bench Pump	(120)		(830)
Sunshine Pump	(140)		(860)
Burton Pump	(70)		(210)
Murray Pump	(80)		(400)
Total		600	5,000
Subtotal columns 1 and 2			
Administrative expense			\$5,600
Board member fees and mileage (7 members)			\$800
Legal expense			600
Auditing expense			300
Office rent			1,100
Miscellaneous office expense			500
Utilities			300
Subtotal administrative		3,600	
Estimated total (with pumping)			127,400
Rounded			128,000

Information and Criteria Used in
Preparing this Estimate of Cost

The operation and maintenance costs for Tyzack and Burns Pumping Plants were estimated by using the publication, Pumping Plant Operation and Maintenance Costs, 1965, by John M. Eyer, assuming "unattended operation" which is considered appropriate in this case. It is assumed that a superintendent will make five trips weekly to Tyzack Dam and to the Tyzack and Burns Pumping Plants and the turnout to Ashley Creek. The Tyzack and Burns areas can be visited in one 60-mile round trip with an additional 6-mile round trip to the Ashley Creek turnout. Mileage for the pickup is figured on this basis, plus some miscellaneous travel.

Minor repairs to the dam, its appurtenances, and the pumping plants are anticipated. Skilled and common labor with a 1½-ton truck have been included in the estimate to make these repairs.

The estimate of \$48,000 a year for recreation consists of \$28,000 for annual operation and maintenance (the average equivalent value for 100 years at 3¼ percent--corresponding to 56,000 recreation days a year) and \$20,000 for annual replacement cost (based on a 20-year life of

facilities and 3¼ percent). The derivation of these values is explained in more detail on page 22 of the Financial and Economic Analyses Appendix.

Existing canal companies will continue to operate and maintain their own distribution facilities.

Equipment required for operation and maintenance purposes	
One pickup truck	\$5,400
Short-wave radio (1 fixed station and 3 mobile units)	10,400
Miscellaneous office furniture and office equipment (lump sum)	4,000
Miscellaneous shop and small construc- tion equipment	7,200
Total cost	27,000

References

Design drawings

The following design drawings were prepared by the Engineering and Research Center and projects office for the Definite Plan Report. Some of these drawings appear in this appendix (see table of contents in front of this appendix). The drawing numbers preceded by an asterisk apply to former sites and are included for information only.

<u>Drawing Number</u>	<u>Title</u>
450-D-3	Burns Pumping Plant
*450-D-4	Tyzack Pumping Plant
*450-D-5	Tyzack Dam
450-D-6	Tyzack Aqueduct
450-D-7	Tyzack Dam
450-418-71	Jensen Unit area (general map)
450-418-24	Tyzack Dam and Aqueduct (general map)
*450PT-418-76 through 82 and 95	Tyzack Dam site topography (8 sheets)
450-436-31 and 32	Tyzack Reservoir topography

DESIGNS AND ESTIMATES

OPERATION, MAINTENANCE, AND REPLACEMENTS

<u>Drawing number</u>	<u>Title</u>
450-418-58	Tyzack Dam, Brush Creek-Little Brush Creek area, general geology and riprap location
450-418-62	Tyzack Dam, embankment borrow areas, location of test pits and auger holes
*450-418-48	Tyzack Aqueduct (location map)
450-418-50	Tyzack Aqueduct, Pumping Plant, and Discharge Line topography
T-140 through 142	Tyzack Aqueduct Discharge Line cross sections (3 sheets)
450-418-51 through 53	Tyzack Aqueduct, Discharge Line plan, and profile (3 sheets)
450-436-1 through 5	Tyzack Dam (lower site) (5 sheets)
450PT-418-59, 63, 64, 65, 67, 68, 72, and 74	Tyzack Aqueduct, topography (8 sheets)
450-418-28 and 43 through 46	Tyzack Aqueduct, free-flow pipeline, plan and profile (5 sheets)
*450-418-63	Tyzack Pumping Plant, location of drill holes and test pits
*450-418-64 through 66	Tyzack Aqueduct, location of test pits, drill, and auger holes (3 sheets)
450-418-40	Burns Pumping Plant and Discharge Lines (general map)
450-418-41	Burns Pumping Plant, intake channel, and Burns Bench Canal, Burton Ditch, and Sunshine Canal Discharge Lines (plan and profile)
450-418-42	Burns Pumping Plant, Murray Ditch Discharge Line (plan and profile)
450PT-418-35 through 38	Green River pumping development, topography (4 sheets)
450-418-47	Burns Pumping Plant and Discharge Lines, location of test pits (geology map)

DESIGNS AND ESTIMATES

OPERATION, MAINTENANCE, AND REPLACEMENTS

<u>Drawing number</u>	<u>Title</u>
450-418-74	Burns Pumping Plant area (general map) feasibility design drawing
*450-418-70	Tyzack Aqueduct, profile, feasibility design drawing
*450-418-75	Tyzack Dam area (general map) feasibility design drawing
450-400-77	Tyzack Dam and Reservoir, recreation facilities
450-418-101	Stewart Lake Waterfowl Management Area
450-418-102	Tyzack Dam site, geologic sections A-A', B-B', C-C', and D-D'
450-418-103	Tyzack Reservoir geology
450-418-104	Tyzack Dam site (geologic map)
450-418-149	Tyzack Aqueduct (location map) feasibility design drawing
450-418-150	Tyzack Aqueduct to Ashley Creek, profile feasibility design drawing

PROPERTY CLASS	IDENTIFIED PROPERTY	PLANT ACCOUNT	DESCRIPTION	FIELD COST -FROM CCE	DATE OF CCE INDEX	COST INDEX		COST FACTOR	FIELD COST	TOTAL FIELD COST	OTHER COST	TOTAL COST	TOTAL COST
						CC-E	Present						
1			2	3	4	5		6	7	8	9	10	11
			JENSEN UNIT - CENTRAL UTAH PROJECT										
			TOTAL PROJECT COST										32,463,000
01			RESERVOIRS AND DAMS										18,455,000
	01		TYZACK DAM AND RESERVOIR							12,946,000	5,509,000	18,455,000	
		100	LAND AND RIGHTS	180,000	1-75			1.00	180,000				
		110	RELOCATION OF EXISTING PROPERTY	430,000	4-68	1.04	1.77	1.702	732,000				
		120	CLEARING LANDS	7,000	4-68	1.04	1.84	1.769	12,000				
		140	ROADS AND BRIDGES	89,000	4-68	1.04	1.77	1.702	151,000				
		151	DAMS						11,871,000				
			Dam Structure	6,600,000	1-73	1.36	1.75	1.287	(8,494,000)				
			Spillway	1,300,000	1-73	1.45	1.90	1.310	(1,703,000)				
			Outlet Works	1,300,000	1-73	1.53	1.97	1.288	(1,674,000)				
		001	DISTRIBUTIVE COST										
		.91	FACILITATING SERVICES								(72,000)		
		.92	INVESTIGATIONS								(2,284,000)		
		.93	Designs and Specifications								(1,087,000)		
		.94	Construction Supervision								(2,066,000)		
03			PUMPING AND PUMPING-GENERATING PLANTS										12,710,000
	01		TYZACK PUMPING PLANT AND DISCHARGE LINE							6,336,000	3,084,000	9,420,000	
		100	LANDS AND RIGHTS	6,000	1-75			1.00	6,000				
		130	STRUCTURES AND IMPROVEMENTS	130,000	7-75			1.00	130,000				
		152	WATERWAYS	5,900,000	7-75			1.00	5,900,000				
		160	PUMPS AND PRIME MOVERS	170,000	7-75			1.00	170,000				
		170	ACCESSORY ELECTRIC EQUIPMENT	130,000	7-75			1.00	130,000				
		001	DISTRIBUTIVE COST										
		.91	FACILITATING SERVICES								(43,000)		
		.92	INVESTIGATIONS								(1,277,000)		
		.93	Designs and Specifications								(608,000)		
		.94	Construction Supervision								(1,156,000)		
	02		BURNS PUMPING PLANT							2,209,000	1,081,000	3,290,000	
		100	LAND AND RIGHTS	10,000	1-74	2.16	2.36	1.093	11,000				
		110	RELOCATION OF EXISTING PROPERTY	2,000	4-68	1.04	1.77	1.702	3,000				
		130	STRUCTURES AND IMPROVEMENTS	290,000	4-68	1.03	1.81	1.757	510,000				
		152	WATERWAYS										
			Inlet Channel	15,000	4-68	1.03	1.81	1.757	26,000				
			Pumping Plant Items	52,000	4-68	1.04	1.91	1.837	96,000				
			Fish Screen Structures	48,000	4-68	1.03	1.81	1.757	84,000				
			Burns Bench Discharge Line	117,000	4-68	1.03	1.71	1.660	194,000				
			Sunshine Canal Discharge Line	290,000	4-68	1.03	1.71	1.660	481,000				
			Burton Ditch Discharge Line	56,000	4-68	1.03	1.71	1.660	93,000				
			Murray Ditch Discharge Line	130,000	4-68	1.03	1.71	1.660	216,000				

CONSTRUCTION COST ESTIMATE INDEXED TO PRESENT

PROJECT CENTRAL UTAH - JENSEN UNIT
Date of Estimate September 2, 1975
Date of Present Index January and July 1975

Sheet 3 of 27

PROPERTY CLASS	IDENTIFIED PROPERTY	PLANT ACCOUNT	DESCRIPTION	FIELD COST -FROM CCE	DATE OF CCE INDEX	COST INDEX		COST FACTOR	FIELD COST	TOTAL FIELD COST	OTHER COST	TOTAL COST	TOTAL COST
						CC-E	Present		Plant Account	Identified Property		Identified Property	Property Class
1			2	3	4	5		6	7	8	9	10	11
			JENSEN UNIT-CENTRAL UTAH PROJECT (Cont'd)										
03			PUMPING AND PUMPING GENERATING PLANTS (Cont'd)										
	02		BURNS PUMPING PLANT (Cont'd)										
		140	ROADS AND BRIDGES	1,000	4-68	1.04	1.77	1.702	2,000				
		160	PUMPS AND PRIME MOVERS	180,000	4-68	1.05	1.92	1.829	329,000				
		170	ACCESSORY ELECTRIC EQUIPMENT	90,000	4-68	1.04	1.90	1.827	164,000				
		001	DISTRIBUTIVE COST										
		.91	FACILITATING SERVICES								(21,000)		
		.92	INVESTIGATIONS								(445,000)		
		.93	Designs and Specifications								(212,000)		
		.94	Construction Supervision								(403,000)		
07			DRAINS										
			JENSEN AREA DRAINS	384,000	10-72	1.33	1.79	1.346	517,000	517,000	257,000	774,000	774,000
		001	DISTRIBUTIVE COST										
		.91	FACILITATING SERVICES								(4,000)		
		.92	INVESTIGATIONS								(106,000)		
		.93	Designs and Specifications								(51,000)		
		.94	Construction Supervision								(96,000)		
13			TRANSMISSION LINES, SWITCHYARDS AND SUBSTATIONS										
	01		TYZACK PUMPING PLANT SWITCHYARD							80,000	41,000	121,000	497,000
		130	STRUCTURES AND IMPROVEMENTS (Included in account 03.01.130)										
		175	STATION EQUIPMENT ELECTRIC	80,000	7-75			1.00	80,000				
		001	DISTRIBUTIVE COST										
		.91	FACILITATING SERVICES								(1,000)		
		.92	INVESTIGATIONS								(17,000)		
		.93	Designs and Specifications								(8,000)		
		.94	Construction Supervision								(15,000)		

Sheet 4 of 27

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Sheet 5 of 27

[illegible]

[illegible]

TYZACK DAM

INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 6, PART 152
OF THE RECLAMATION INSTRUCTIONS

CONSTRUCTION COST ESTIMATE
RESERVOIRS AND DAMS

OFFICE PREPARED BY:
Utah Activities, U.C. Region
Provo, Utah

PROJECT CENTRAL UTAH - JENSEN UNIT

Date of Estimate August 19, 1975

Prices as of January 1975

Property designation 01.01.100

Sheet 7 of 27

PROPERTY CLASS	IDENTIFIED PROPERTY	PLANT ACCOUNT	PAY ITEM	DESCRIPTION	QUANTITY	UNIT	LABOR AND MATERIALS BY CONTRACTOR		LABOR AND MATERIALS BY GOVERNMENT		FIELD COST	TOTAL FIELD COST	OTHER COSTS	TOTAL COST
							Unit Price	Amount	Unit Price	Amount	Plant Account	Identified Property	Identified Property	Identified Property
01				RESERVOIRS AND DAMS										
	01			TYZACK DAM								9,906,000		
				Earthfill dam 145 feet high, crest elevation 5628 feet. Located on Brush Creek approximately 10 miles northeast from Vernal in Uintah County, Utah. Open Chute spillway capacity 4,500 cfs. Outlet work capacity 550 cfs.										
		100		LAND AND RIGHTS								180,000		
				Acquisition of right-of-way and improvements for reservoir, dam, dike and road relocation										
				(1) Tyzack Dam and Reservoir										
			1	Acquisition of farmstead land	2	ac.	2,000	4,000						
			2	Acquisition of irrigation cropland	63	ac.	550	34,650						
			3	Acquisition of irrigation pasture	40	ac.	350	14,000						
			4	Acquisition of bottom grazing land	141	ac.	200	28,200						
			5	Acquisition of upland grazing land	234	ac.	100	23,400						
			6	Acquisition of State Land	230	ac.	100	23,000						
			7	Severance to remaining ranch at Naples	Lump Sum	LS	LS	7,000						
			8	Acquisition of improvements	Lump Sum	LS	LS	8,000						
				Subtotal				142,250			142,250			
				Contingencies (25%+)				35,750			35,750			
				Field Cost 01.01.100 (1)				178,000			178,000			
				(2) Road Relocation										
				Relocation of 3.30 miles of graded road										
			1	Acquisition of right-of-way	15	ac.	100	1,500			1,500			
				Contingencies (25%+)				500			500			
				Field Cost 01.01.100 (2)				2,000			2,000			
				Field Cost 01.01.100							180,000			
											40			

OFFICE PREPARED BY:
Utah Activities, U.C. Region
Provo, Utah

PROJECT CENTRAL UTAH - JENSEN UNIT

Date of Estimate March 21, 1974

Prices as of April 1968

Property designation 01,01 110,120 Sheet 8 of 27

INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 6, PART 152
OF THE RECLAMATION INSTRUCTIONS

41

TYZACK DAM AND RESERVOIR
CONSTRUCTION COST ESTIMATE
Feasibility Estimate

OFFICE PREPARED BY:
Office of Design and Construction
E&R Center 01.01. 151

PROJECT CENTRAL UTAH-JENSEN UNIT
Date of Estimate December 1, 1974
Prices as of January 1973

INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 6, PART 152
OF THE RECLAMATION INSTRUCTIONS

Sheet 10 of 27

PROPERTY CLASS	IDENTIFIED PROPERTY	PLANT ACCOUNT	PAY ITEM	DESCRIPTION	QUANTITY	UNIT	LABOR AND MATERIALS BY CONTRACTOR		LABOR AND MATERIALS BY GOVERNMENT		FIELD COST	TOTAL FIELD COST	OTHER COSTS	TOTAL COST
							Unit Price	Amount	Unit Price	Amount	Plant Account	Identified Property	Identified Property	Identified Property
1				2	3		4	5	6	7	8	9		
01	01			RESERVOIRS AND DAMS										
				TYZACK DAM - Earthfill dam located on Big Brush Creek, Crest elevation 5628. Spillway uncontrolled chute, maximum capacity 4,550 cfs., outlet works, tunnel, 550 cfs at w.s.elev. 5621.5										
		151		Dams								9,200,000		
				(1) Dam Structure										
			1	Diversions and care of river during construction and unwatering foundation	Lump Sum	ls	ls	200,000						
			2	Excavation, stripping borrow areas	100,000	cy	0.80	80,000						
			3	Excavation, common, dam embankment foundation	160,000	cy	2.50	400,000						
			4	Excavation, rock, grout cap	722	cy	40.00	28,880						
			5	Excavation, earthfill, in borrow pits and transportation to dam embankment	1,910,000	cy	0.95	1,814,500						
			6	Excavation, sand, gravel, and cobbles, in borrow pits and transportation to dam embankment	370,000	cy	1.05	388,500						
			7	Riprap on upstream slope of dam embankment	60,000	cy	10.00	600,000						
			8	Bedding under riprap on dam embankment	30,000	cy	5.25	157,500						
			9	Earthfill in dam embankment	1,525,000	cy	0.35	533,750						
			10	Sand, gravel, and cobblefill in dam embankment	335,000	cy	0.30	100,500						
			11	Processed sand and gravel in downstream blanket	80,000	cy	6.00	480,000						
			12	Specially compacted earthfill	2,800	cy	6.00	16,800						
			13	Mobilization and demobilization for grouting dam foundation	Lump Sum	ls	ls	10,000						
				Drilling and grouting holes in the following stages:										
			14	0 to 30 feet	4,920	lf	4.00	19,680						
			15	30 to 60 feet	2,460	lf	4.25	10,455						
			16	60 to 110 feet	2,050	lf	4.50	9,225						
			17	Grout pipe and fittings	3,600	lb	1.40	5,040						
			18	Hookups to grout holes	164	ea	30.00	4,920						
			19	Pressure grouting	9,400	sk	3.50	32,900						
			20	Concrete in grout cap	722	cy	50.00	36,100						
			21	Cement for concrete	4,100	cwt	2.15	8,015						
			22	Cement for grouting	9,400	sk	2.40	22,560						
				Sewer pipe toe drains in the following size:										
			23	8-inch	680	lf	7.50	5,100						
			24	12-inch	850	lf	10.00	8,500						
			25	Allowance for unlisted items	Lump Sum	ls	ls	426,275						
				Subtotal				5,400,000			5,400,000			
				Contingencies (20%)				1,200,000			1,200,000			
				Field Cost - Dam Structure				6,600,000			6,600,000			
											43			

TYZACK DAM
CONSTRUCTION COST ESTIMATE
Feasibility Estimate

OFFICE PREPARED BY:
Office of Design and
Construction
E&R Center 01.01.151

PROJECT CENTRAL UTAH - JENSEN UNIT

Date of Estimate December 1, 1974

Prices as of January 1973

Sheet 11 of 27

INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 6, PART 152
OF THE RECLAMATION INSTRUCTIONS

PROPERTY CLASS	IDENTIFIED PROPERTY	PLANT ACCOUNT	PAY ITEM	DESCRIPTION	QUANTITY	UNIT	LABOR AND MATERIALS BY CONTRACTOR		LABOR AND MATERIALS BY GOVERNMENT		FIELD COST	TOTAL FIELD COST	OTHER COSTS	TOTAL COST
							Unit Price	Amount	Unit Price	Amount	Plant Account	Identified Property	Identified Property	Identified Property
01	01	151		TYZACK DAM (Continued)										
				Dams (Continued)										
				(2) Spillway										
			26	Excavation, open cut, all classes	57,000	cy	3.50	199,500						
			27	Pervious backfill	9,500	cy	7.00	66,500						
			28	Special compaction	1,000	cy	6.00	6,000						
			29	Drilling holes for anchor bars and grouting in place	4,100	lf	4.50	18,450						
			30	Drains, 6-inch	1,300	lf	7.00	9,100						
			31	Concrete in floors	2,410	cy	60.00	144,600						
			32	Concrete in walls	2,075	cy	120.00	249,000						
			33	Concrete in bridge	30	cy	160.00	4,800						
			34	Cement	25,500	cwt	2.20	56,100						
			35	Reinforcement	700,000	lb	0.22	154,000						
			36	Riprap	4,000	cy	11.00	44,000						
			37	Bedding for riprap	2,000	cy	6.00	12,000						
			38	Chain link fence - 8 foot	1,120	lf	10.00	11,200						
			39	Gravel blanket	800	cy	10.00	8,000						
			40	Allowance for unlisted items	Lump Sum	ls	1s	116,750						
				Subtotal				1,100,000				1,100,000		
				Contingencies (20%)				200,000				200,000		
				Field Cost - Spillway				1,300,000				1,300,000		
				(3) Outlet Works										
			41	Excavation, open cut, all classes	36,000	cy	3.00	108,000						
			42	Excavation, tunnel	2,100	cy	75.00	157,500						
			43	Mortar protective coating	2,100	sy	4.50	9,450						
			44	Pervious backfill	3,000	cy	7.00	21,000						
			45	Special compaction	680	cy	6.00	4,080						
			46	Riprap	550	cy	11.00	6,050						
			47	Bedding for riprap	275	cy	6.00	1,650						
			48	Drilling grout holes	1,660	lf	4.00	6,640						
			49	Drilling drainage holes	450	lf	6.50	2,925						
			50	Pressure grouting	1,660	cf	3.50	5,810						
			51	Tunnel supports	61,000	lb	0.45	27,450						
			52	Drilling holes for anchor bars and grouting in place	260	lf	4.50	1,170						
			53	Concrete protective coating	360	sy	8.00	2,880						
			54	Drains 6-inch	220	lf	7.00	1,540						
			55	Cement	15,300	cwt	2.20	33,660						
			56	Reinforcement	367,000	lb	0.22	80,740						
			57	Concrete in 4' - 0" diameter conduit	56	cy	270.00	15,120						
			58	Concrete in intake structure	155	cy	145.00	22,475						
			59	Concrete in 6' - 6" diameter conduit	120	cy	190.00	22,800						

INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 6, PART 152
OF THE RECLAMATION INSTRUCTIONS

THE RECLAMATION INSTRUCTIONS														
PROPERTY CLASS	IDENTIFIED PROPERTY	PLANT ACCOUNT	PAY ITEM	DESCRIPTION	QUANTITY	UNIT	LABOR AND MATERIALS BY CONTRACTOR		LABOR AND MATERIALS BY GOVERNMENT		FIELD COST	TOTAL FIELD COST	OTHER COSTS	TOTAL COST
							Unit Price	Amount	Unit Price	Amount	Plant Account	Identified Property	Identified Property	Identified Property
1				2	3		4		5		6	7	8	9
01	01	151		TYZACK DAM (Continued)										
				Dams (Continued)										
				(3) Outlet Works (Continued)										
			60	Concrete in tunnel lining	920	cy	130.00	119,600						
			61	Concrete in gate chamber (first stage)	210	cy	80.00	16,800						
			62	Concrete in gate chamber (second stage)	52	cy	160.00	8,320						
			63	Concrete in channel lining	80	cy	70.00	5,600						
			64	Concrete in stilling basin	690	cy	100.00	69,000						
			65	Concrete in control structure anchor block	110	cy	75.00	8,250						
			66	Concrete in access and control houses	40	cy	160.00	6,400						
			67	Chain link fence, 8 foot	230	lf	10.00	2,300						
			68	One 48" x 48" slide gate	3,750	lb	1.30	4,875						
			69	Trashracks - 200 ft.	9,000	lb	0.80	7,200						
			70	One flat bulkhead seat	375	lb	6.00	2,250						
			71	One 3' - 6" x 3'6" high pressure emergency gate, hoist, and transitions	29,000	lb	2.00	58,000						
			72	Two 2'-3"x2'-3" high pressure reg. gates, and hoists	14,000	lb	2.50	35,000						
			73	Controls for high pressure gates	2,000	lb	6.00	12,000						
			74	Steel outlet pipe, wye, and transitions	42,500	lb	1.00	42,500						
			75	Steel pipe, 12-inch diameter	825	lb	1.30	1,073						
			76	Steel pipe, 24-inch diameter	3,200	lb	1.15	3,680						
			77	Gate valve, one 24-inch	3,100	lb	0.90	2,790						
			78	Gate valve, one 12-inch	720	lb	0.90	648						
			79	Jet-flow gate, one 10-inch	950	lb	4.50	4,275						
			80	Ventilation system	1,800	lb	4.00	7,200						
			81	Flowmeter, one 45-inch	1,485	lb	3.50	5,198						
			82	Flowmeter, instruments	Lump Sum	ls	ls	2,000						
			83	Flowmeter, 12-inch diameter	500	lb	2.50	1,250						
			84	Flowmeter instruments	Lump Sum	ls	ls	2,000						
			85	Reservoir level gage - piping	1,600	lb	5.00	8,000						
			86	Servomanometer and recorder	Lump Sum	ls	ls	9,000						
			87	One set stoplogs, 12" span, head 15'	10,500	lb	1.00	10,500						
			88	Stoplog seats and guides	1,300	lb	1.35	1,625						
			89	Stoplog lifting frame	700	lb	1.50	1,050						
			90	Telemetering equipment	Lump Sum	ls	ls	10,000						
			91	Allowance for unlisted items	Lump Sum	ls	ls	100,677						
				Subtotal				1,100,000			1,100,000			
				Contingencies (20%)				200,000			200,000			
				Field Cost - Outlet Works				1,300,000			1,300,000			
				Field Cost - 01.01.151				9,200,000			9,200,000			

TYZACK PUMPING PLANT AND DISCHARGE LINE
CONSTRUCTION COST ESTIMATE
Feasibility Estimate

OFFICE PREPARED BY:
Office of Design
and Construction
E & R Center

PROJECT CENTRAL UTAH
Date of Estimate July 29, 1975
Prices as of July 1975

INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 6, PART 152
OF THE RECLAMATION INSTRUCTIONS

Sheet 13 of 27

PROPERTY CLASS	IDENTIFIED PROPERTY	PLANT ACCOUNT	PAY ITEM	DESCRIPTION	QUANTITY	UNIT	LABOR AND MATERIALS BY CONTRACTOR		LABOR AND MATERIALS BY GOVERNMENT		FIELD COST	TOTAL FIELD COST	OTHER COSTS	TOTAL COST
							Unit Price	Amount	Unit Price	Amount	Plant Account	Identified Property	Identified Property	Identified Property
1				2	3			4		5	6	7	8	9
03				PUMPING AND PUMPING-GENERATING PLANTS										
	01			TYZACK PUMPING PLANT AND DISCHARGE LINE -								6,336,000		
				Outdoor plant, pumps from Tyzack Dam outlet works, 46-cfs at 587 feet of head, 4 electric motor-driven units, discharge line extends to Station 630+00										
		100		Land and Rights - Aquisition of Right-of-Way and improvements							6,000			
			1	Acquisition of grazing land	32	ac	130	4,000						
			2	Acquisition of improvements	Lump Sum	LS	LS	1,000						
				Subtotal				5,000						
				Contingencies (20%)				1,000						
				Field Cost 03.01.100				6,000						
		130		Structures and Improvements							130,000			
			1	Excavation, common, including stripping	3,500	cy	3.75	13,125						
			2	Backfill	130	cy	3.00	390						
			3	Compacting backfill	130	cy	5.00	650						
			4	Embankment	600	cy	1.40	840						
			5	Compacting embankment	600	cy	1.70	1,020						
			6	Gravel surfacing, 4-5 inches thick, including sterilization	1,700	cy	2.00	3,400						
			7	Concrete	280	cy	150.00	42,000						
			8	Cement	11,600	cwt	3.00	4,800						
			9	Reinforcement	43,000	lb	0.50	21,500						
			10	Fencing, including gates	390	lf	13.00	5,070						
			11	Sunshade for motor control equipment	Lump Sum	ls	ls	2,000						
			12	Lighting and miscellaneous items	Lump Sum	ls	ls	15,205						
				Subtotal				110,000						
				Contingencies (20%)				20,000						
				Field Cost - 03.01.130				130,000						
		152		Waterways							5,900,000			
			1	Excavation for pipe trench	106,000	cy	2.40	254,400						
			2	Backfill in pipe trench	86,500	cy	1.20	103,800						
			3	Compacting backfill in pipe trench	4,400	cy	4.00	17,600						
			4	Excavation for structures	100	cy	5.00	500						
			5	Concrete in structures	145	cy	150.00	21,750						
			6	Concrete in pipe trenches	520	cy	120.00	62,400						
			7	Cement	3,740	cwt	3.00	11,220						
											46			

TYZACK PUMPING PLANT AND DISCHARGE LINE
CONSTRUCTION COST ESTIMATE
Feasibility Estimate

OFFICE PREPARED BY:
Office of Design
and Construction
E & R Center

PROJECT CENTRAL UTAH
Date of Estimate July 29, 1975
Prices as of July 1975

INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 6, PART 152
OF THE RECLAMATION INSTRUCTIONS

Sheet 14 of 27

PROPERTY CLASS	IDENTIFIED PROPERTY	PLANT ACCOUNT	PAY ITEM	DESCRIPTION	QUANTITY	UNIT	LABOR AND MATERIALS BY CONTRACTOR		LABOR AND MATERIALS BY GOVERNMENT		FIELD COST	TOTAL FIELD COST	OTHER COSTS	TOTAL COST
							Unit Price	Amount	Unit Price	Amount	Plant Account	Identified Property	Identified Property	Identified Property
1				2	3		4		5		6	7	8	9
03	01	152		TYZACK PUMPING PLANT AND DISCHARGE LINE (continued) Waterways (continued)										
			8	Reinforcement	42,300	lb	0.50	21,150						
			9	Steel manifolds	45,000	lb	2.75	123,750						
			10	3500 Ft ³ air chamber w/compressor, piping, valves	70,000	lb	1.75	122,500						
			11	One 24" and one 18" 150 psi motor operated butterfly valve	2,100	lb	5.50	11,550						
			12	34' diameter x 40' high steel tank	56,000	lb	1.20	67,200						
			13	Concrete base (incl. cement and reinf.)	40	cy	160.00	6,400						
			14	24" flowtube	1,500	lb	1.20	67,200						
			15	Instruments for 24" flowtube	Lump sum	ls	1s	3,000						
			16	18" flowtube	1,000	lb	4.25	4,250						
			17	Instruments for 18" flowtube	Lump sum	ls	1s	3,000						
			18	24" Sleeve-type valve	8,700	lb	5.50	47,850						
			19	18" Sleeve-type valve	4,500	lb	6.00	27,000						
				Furnishing and laying pipe designated by symbols as follows:										
			20	27A350	3,920	1f	39.00	152,280						
			21	30A300	2,995	1f	45.00	134,775						
			22	33A100	3,800	1f	41.00	155,800						
			23	33A125	3,000	1f	42.00	126,000						
			24	33A150	1,000	1f	43.00	43,000						
			25	33A200	1,100	1f	49.00	53,900						
			26	33A250	1,200	1f	51.00	61,200						
			27	33A300	3,490	1f	52.00	181,480						
			28	33A350	2,300	1f	53.00	121,900						
			29	33A400	5,100	1f	54.00	275,400						
			30	33A450	15,050	1f	57.00	857,850						
			31	33A500	8,600	1f	60.00	516,000						
			32	33A550	750	1f	64.00	48,000						
			33	39A100	400	1f	52.00	20,800						
			34	39A200	300	1f	63.00	18,900						
			35	39A250	700	1f	65.00	45,500						
			36	39A300	1,000	1f	66.00	66,000						
			37	39A350	1,050	1f	67.00	70,350						
			38	39A400	650	1f	69.00	44,850						
			39	39A450	850	1f	74.00	62,900						
			40	39A500	1,750	1f	78.00	136,500						
			41	39A550	500	1f	81.00	40,500						
			42	39A600	800	1f	83.00	66,400						
			43	39A750	200	1f	100.00	20,000						
			44	39A850	2,000	1f	110.00	220,000						
			45	Allowance for unlisted items	Lump sum	ls	1s	429,275						
				Subtotal				4,900,000						
				Contingencies (20%)				1,000,000						
				Field Cost				5,900,000			47			

PROJECT CENTRAL UTAH
Date of Estimate July 29, 1975
Prices as of July 1975

INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 6, PART 152
OF THE RECLAMATION INSTRUCTIONS

Sheet 15 of 27

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BURNS PUMPING PLANT

CONSTRUCTION COST ESTIMATE

PROJECT CENTRAL UTAH - JENSEN UNIT

OFFICE PREPARED BY: Date of Estimate December 1, 1974
Office of Design & Constr. Prices as of April 1968
E & R Center

INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 6, PART 152
OF THE RECLAMATION INSTRUCTIONS

Feasibility Estimate

Property designation 03.02.130, 152

Sheet 17 of 27

PROPERTY CLASS	IDENTIFIED PROPERTY	PLANT ACCOUNT	PAY ITEM	DESCRIPTION	QUANTITY	UNIT	LABOR AND MATERIALS BY CONTRACTOR		LABOR AND MATERIALS BY GOVERNMENT		FIELD COST	TOTAL FIELD COST	OTHER COSTS	TOTAL COST
							Unit Price	Amount	Unit Price	Amount	Plant Account	Identified Property	Identified Property	Identified Property
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
03	02			PUMPING AND PUMPING-GENERATING PLANTS (Continued)										
				BURNS PUMPING PLANT (Continued)										
		130.		Structures and Improvements								290,000		
			1	Unwatering	Lump Sum	ls	ls	40,000						
			2	Excavation, common (above yard)	700	cy	1.50	1,050						
			3	Excavation, common (structural)	7,500	cy	2.50	18,750						
			4	Backfill	4,000	cy	1.00	4,000						
			5	Compacting backfill	4,000	cy	3.00	12,000						
			6	Compacted gravel fill	450	cy	8.00	3,600						
			7	Concrete	1,100	cy	85.00	93,500						
			8	Cement	1,650	bb1	7.00	11,550						
			9	Reinforcement	165,000	lb	0.18	29,700						
			10	Gravel surfacing, 4-inch thick, including sterilization	1,600	sy	1.25	2,000						
			11	Fencing, including gates	650	lf	6.50	4,225						
			12	Miscellaneous metalwork	8,250	lb	0.90	7,425						
			13	Lighting and miscellaneous items	Lump Sum	ls	ls	17,000						
				Subtotal				244,800			244,800			
				Contingencies (20%+)				45,200			45,200			
				Field Cost 03.02.130				290,000			290,000			
		152		Waterways								708,000		
				(1) Inlet Channel										
			1	Excavation, common	3,000	cy	1.50	4,500						
			2	Riprap	500	cy	11.00	5,500						
			3	Gravel bedding, 6-inch	150	cy	8.00	1,200						
			4	Allowance for unlisted items	Lump Sum	ls	ls	1,000						
				Subtotal				12,200			12,200			
				Contingencies (20%+)				2,800			2,800			
				Field Cost Inlet Channel				15,000			15,000			
				(2) Pumping Plant Items										
			5	Trashracks	54,400	lb	0.45	24,480						
			6	Valve operating system	7,500	lb	2.00	15,000						
			7	Allowance for unlisted items	Lump Sum	ls	ls	4,000						
				Subtotal				43,480			43,480			
				Contingencies (20%)				8,520			8,520			
				Field Cost Pumping Plant Items				52,000			52,000			
											50			

BURNS PUMPING PLANT

INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 5, PART 152
OF THE RECLAMATION INSTRUCTIONS

CONSTRUCTION COST ESTIMATE

FEASIBILITY ESTIMATE

PROJECT CENTRAL UTAH - JENSEN UNIT

OFFICE PREPARED BY: Date of Estimate December 1, 1974
Office of Design & Constr. Prices as of April 1968
E & R Center

Property designation 03.02.152

Sheet 18 of 27

PROPERTY CLASS	IDENTIFIED PROPERTY	PLANT ACCOUNT	PAY ITEM	DESCRIPTION	QUANTITY	UNIT	LABOR AND MATERIALS BY CONTRACTOR		LABOR AND MATERIALS BY GOVERNMENT		FIELD COST	TOTAL FIELD COST	OTHER COSTS	TOTAL COST
							Unit Price	Amount	Unit Price	Amount	Plant Account	Identified Property	Identified Property	Identified Property
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
03	02	152		PUMPING AND PUMPING-GENERATING PLANTS (Continued)										
				BURNS PUMPING PLANT (Continued)										
				Waterways (Continued)										
				(3) Fish Screen Structure										
			8	Structural Steel	12,000	lb	0.60	7,200						
			9	Fish screens, eight each	16,400	lb	1.00	16,400						
			10	Lifting frame	350	lb	0.80	280						
			11	Fish screen guides	12,000	lb	0.80	9,600						
			12	Crane for handling fish screens, 1½ ton	1,800	lb	1.50	2,700						
			13	Allowance for unlisted items	Lump Sum	1s	1s	4,000						
				Subtotal				40,180			40,180			
				Contingencies (20%)				7,820			7,820			
				Field Cost Fish Screen Structure				48,000			48,000			
				(4) Burns Bench Discharge Line										
			14	Excavation, common	6,000	cy	1.00	6,000						
			15	Excavation, structural	80	cy	2.50	200						
			16	Backfill	5,400	cy	0.75	4,050						
			17	Compacting backfill	300	cy	3.00	900						
			18	Coarse gravel	12	cy	10.00	120						
			19	Manifold	7,500	lb	1.10	8,250						
			20	Concrete	30	cy	110.00	3,300						
			21	Cement	43	bb1	7.00	301						
			22	Reinforcement	2,850	lb	0.18	513						
			23	Miscellaneous metal work	18	lb	0.90	16						
				Precast concrete pressure pipe designated by the following symbols:										
			24	36B25	40	1f	22.70	908						
			25	36A50	90	1f	22.10	1,989						
			26	36B75	130	1f	23.80	3,094						
			27	36A100	240	1f	23.90	5,736						
			28	36A125	1,050	1f	24.90	26,145						
			29	Two 16-inch, 150-lb. standard, flanged cone valves with hydraulic cylinder operators	7,900	lb	2.15	16,985						
			30	One 12-inch, 150-lb. standard, flanged cone valve with hydraulic cylinder operator	2,520	lb	2.30	5,796						
			31	One 10-inch, 150-lb. standard, flanged cone valve with hydraulic cylinder operator	1,580	lb	2.80	4,424						
			32	Allowance for unlisted items	Lump Sum	1s	1s	9,000						
				Subtotal				97,727			97,727			
				Contingencies (20%)				19,273			19,273			
				Field Cost Burns Bench Discharge Line				117,000			117,000			
											51			

BURNS PUMPING PLANT

INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 6, PART 152
OF THE RECLAMATION INSTRUCTIONS

CONSTRUCTION COST ESTIMATE

FEASIBILITY ESTIMATE

PROJECT CENTRAL UTAH - SJENSEN UNIT

OFFICE PREPARED BY: Date of Estimate December 1, 1974
Office of Design & Constr. Prices as of April, 1968

E & R Center

Property Designation 03.02.152

Sheet 19 of 27

PROPERTY CLASS	IDENTIFIED PROPERTY	PLANT ACCOUNT	PAY ITEM	DESCRIPTION	QUANTITY	UNIT	LABOR AND MATERIALS BY CONTRACTOR		LABOR AND MATERIALS BY GOVERNMENT		FIELD COST	TOTAL FIELD COST	OTHER COSTS	TOTAL COST
							Unit Price	Amount	Unit Price	Amount	Plant Account	Identified Property	Identified Property	Identified Property
03	02	152		PUMPING AND PUMPING-GENERATING PLANTS (Continued)										
				BURNS PUMPING PLANT (Continued)										
				Waterways (Continued)										
				(5) Sunshine Canal Discharge Line										
			33	Excavation, common	21,500	cy	1.00	21,500						
			34	Excavation, structural	70	cy	2.50	175						
			35	Backfill	19,700	cy	0.75	14,775						
			36	Compacting backfill	1,620	cy	3.00	4,860						
			37	Coarse gravel	20	cy	10.00	200						
			38	Manifold	10,000	lb	1.10	11,000						
			39	Steel air chamber	3,700	lb	0.70	2,590						
			40	Concrete	61	cy	110.00	6,710						
			41	Cement	95	bb1	7.00	665						
			42	Reinforcement	6,100	lb	0.18	1,098						
			43	Miscellaneous metal work	35	lb	0.90	32						
				Precast concrete pressure pipe designated by the following symbols:										
			44	33A25	110	1f	19.30	2,123						
			45	33A50	210	1f	19.70	4,137						
			46	33A75	230	1f	20.20	4,646						
			47	33A100	270	1f	21.30	5,751						
			48	33A125	270	1f	22.10	5,967						
			49	33A150	1,020	1f	24.00	24,480						
			50	33A175	850	1f	25.90	22,015						
			51	33B175	160	1f	25.90	4,144						
			52	33B200	140	1f	25.90	3,626						
			53	33D200	210	1f	65.00	13,650						
			54	33B225	130	1f	25.90	3,367						
			55	33A250	1,350	1f	25.90	34,965						
			56	Two 16-inch, 150-lb. standard, flanged cone valves with hydraulic cylinder operators	7,900	lb	2.15	16,985						
			57	One 12-inch, 150-lb. standard, flanged cone valve with hydraulic cylinder operator	2,520	lb	2.30	5,796						
			58	One 10-inch, 150-lb. standard, flanged cone valve with hydraulic cylinder operator	1,580	lb	2.80	4,424						
			59	Allowance for unlisted items	Lump Sum	1s	1s	22,000						
				Subtotal				241,681			241,681			
				Contingencies (20%)				48,319			48,319			
				Field Cost Sunshine Canal Discharge Line				290,000			290,000			
			60	(6) Burton Ditch Discharge Line										
			60	Excavation, common	3,250	cy	1.00	3,250						
			61	Excavation, structural	10	cy	2.50	25						
			62	Backfill	3,050	cy	0.75	2,288						
			63	Compacting backfill	120	cy	3.00	360						

BURNS PUMPING PLANT

INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 6, PART 152
OF THE RECLAMATION INSTRUCTIONS

CONSTRUCTION COST ESTIMATE

FEASIBILITY ESTIMATE

OFFICE PREPARED BY
Office office Design & Constr.
E & R Center

PROJECT CENTRAL UTAH - JENSEN UNIT

Date of Estimate December 1, 1974

Prices as of April 1968

Property designation 03.02.152

Sheet 20 of

PROPERTY CLASS	IDENTIFIED PROPERTY	PLANT ACCOUNT	PAY ITEM	DESCRIPTION	QUANTITY	UNIT	LABOR AND MATERIALS BY CONTRACTOR		LABOR AND MATERIALS BY GOVERNMENT		FIELD COST	TOTAL FIELD COST	OTHER COSTS	TOTAL COST
							Unit Price	Amount	Unit Price	Amount	Plant Account	Identified Property	Identified Property	Identified Property
103	02	152		PUMPING AND PUMPING-GENERATING PLANTS (Continued)										
				BURNS PUMPING PLANT (Continued)										
				Waterways (Continued)										
				(6) Burton Ditch Discharge Line (Continued)										
			64	Coarse gravel	8	cy	10.00	80						
			65	Manifold	3,000	lb	1.10	3,300						
			66	Concrete	14	cy	110.00	1,540						
			67	Cement	21	bb1	7.00	147						
			68	Reinforcement	1,310	lb	0.18	236						
				Precast concrete pressure pipe designated by the following symbols:										
			69	21A25	140	1f	11.60	1,624						
			70	21A50	460	1f	11.80	5,428						
			71	21A75	750	1f	12.00	9,000						
			72	One 14-inch, 150-lb. standard, flanged cone valve with hydraulic cylinder operator	3,400	1b	2.15	7,310						
			73	One 10-inch, 150-lb. standard, flanged cone valve with hydraulic cylinder operator	1,580	1b	2.80	4,424						
			74	One 8-inch, 150-lb. standard, flanged cone valve with hydraulic cylinder operator	1,125	1b	3.40	3,825						
			75	Allowance for unlisted items	Lump Sum	1s	1s	4,000						
				Subtotal				46,837			46,837			
				Contingencies (20%)				9,163			9,163			
				Field Cost Burton Ditch Discharge Line				56,000			56,000			
				(7) Murray Ditch Discharge Line										
			76	Excavation, common	21,500	cy	1.00	21,500						
			77	Excavation, structural	10	cy	2.50	25						
			78	Backfill	21,000	cy	0.75	15,750						
			79	Compacting backfill	400	cy	3.00	1,200						
			80	Coarse gravel	8	cy	10.00	80						
			81	Manifold	3,000	lb	1.10	3,300						
			82	Concrete	15	cy	110.00	1,650						
			83	Cement	23	bb1	7.00	161						
			84	Reinforcement	1,410	lb	0.18	254						
				Precast concrete pressure pipe designated by the following symbols:										
			85	24A25	40	1f	13.40	536						
			86	24A50	180	1f	13.70	2,466						
			87	24B50	50	1f	14.10	705						
			88	24A75	310	1f	14.00	4,340						
			89	24B100	1,410	1f	14.60	20,586						
			90	24C100	190	1f	15.00	2,850						
			91	24D100	570	1f	15.50	8,835						
											53			

BURNS PUMPING PLANT

INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 6, PART 152
OF THE RECLAMATION INSTRUCTIONS

CONSTRUCTION COST ESTIMATE

FEASIBILITY ESTIMATE

PROJECT CENTRAL UTAH - JENSEN UNIT

OFFICE PREPARED BY: Date of Estimate December 1, 1974
Office of Design & Construction as of April 1968
E & R Center

Property designation 03.02.152, 154, 160.

Sheet 21 of 27

PROPERTY CLASS	IDENTIFIED PROPERTY	PLANT ACCOUNT	PAY ITEM	DESCRIPTION	QUANTITY	UNIT	LABOR AND MATERIALS BY CONTRACTOR		LABOR AND MATERIALS BY GOVERNMENT		FIELD COST	TOTAL FIELD COST	OTHER COSTS	TOTAL COST
							Unit Price	Amount	Unit Price	Amount	Plant Account	Identified Property	Identified Property	Identified Property
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
03	02	152		PUMPING AND PUMPING-GENERATING PLANTS (Continued) BURNS PUMPING PLANT (Continued) Waterways (Continued)										
			92	One 14-inch, 150-lb. standard, flanged cone valve with hydraulic cylinder operator	3,400	1b	2.15	7,310						
			93	One 10-inch, 150-lb. standard, flanged cone valve with hydraulic cylinder operator	1,580	1b	2.80	4,424						
			94	One 8-inch, 150-lb. standard, flanged cone valve with hydraulic cylinder operator	1,125	1b	3.40	3,825						
			95	Allowance for unlisted items	Lump Sum	1s	1s	10,000						
				Subtotal				109,797			109,797			
				Contingencies (20%)				20,203			20,203			
				Field Cost Murray Ditch Discharge Line				130,000			130,000			
				Field Cost 03.02.152				708,000			708,000			
		154		ROADS AND BRIDGES										
			1	Construction of graded and graveled access road 300 feet long	Lump Sum	1s	1s	800			800		1,000	
				Contingencies (25%+)				200			200			
				Field Cost 03.01.154				1,000			1,000			
		160		PUMPS AND PRIME MOVERS										
				(1) Burns Line										
			1	Two 16.6 cfs (14.2 cfs design) at 90 feet total head, vertical, deep well turbine pumps with 250-hp, 900-rpm, electric motors	17,800	1b	1.60	28,480						
			2	One 8.3 cfs (7.1 cfs design) at 90 feet total head, vertical, deepwell turbine pump, with 125-hp, 1,200-rpm, electric motor	6,750	1b	1.60	10,800						
			3	One 4.1 cfs (3.5 cfs design) at 90 feet total head, as above, with 60 hp, 1800-rpm electric motor	3,570	1b	1.60	5,712						
				Subtotal				44,992			44,992			
				Contingencies (15%)				7,008			7,008			
				Field Cost Burns Line				52,000			52,000			
				(2) Sunshine Line										
			4	Two 14.4 cfs (12 cfs design) at 195 feet total head, vertical column, deepwell turbine pumps with 450-hp, 1,200 rpm, electric motors	30,000	1b	1.55	46,500						
											54			

BURNS PUMPING PLANT

INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 6, PART 152
OF THE RECLAMATION INSTRUCTIONS

CONSTRUCTION COST ESTIMATE

FEASIBILITY ESTIMATE

OFFICE PREPARED BY:
Office of Design & Construction
E & R Center

PROJECT CENTRAL UTAH - JENSEN UNIT

Date of Estimate December 1, 1974

Prices as of April 1968

Property designation 03.02.160

Sheet 22 of 27

PROPERTY CLASS	IDENTIFIED PROPERTY	PLANT ACCOUNT	PAY ITEM	DESCRIPTION	QUANTITY	UNIT	LABOR AND MATERIALS BY CONTRACTOR		LABOR AND MATERIALS BY GOVERNMENT		FIELD COST	TOTAL FIELD COST	OTHER COSTS	TOTAL COST
							Unit Price	Amount	Unit Price	Amount	Plant Account	Identified Property	Identified Property	Identified Property
03	02	160		PUMPING AND PUMPING-GENERATING PLANTS (Continued) BURNS PUMPING PLANT (Continued) Pumps and Prime Movers (Continued) (2) Sunshine Line (Continued)										
			5	One 7.2 cfs (6 cfs design) at 195 feet total head, vertical column, deepwell turbine pump with 250-hp 1,200-rpm electric motor	9,200	lb	1.60	14,720						
			6	One 3.6 cfs (3 cfs design) at 195 feet total head, vertical column, deepwell turbine pump, with 100-hp 1,800 rpm, electric motor	4,400	lb;	1.00	7,040						
				Subtotal				68,260			68,260			
				Contingencies (15%)				12,740			12,740			
				Field Cost--Sunshine Line				81,000			81,000			
			7	(3) Burton Line One 8.82 cfs (7.6 cfs design) at 52 feet total head, vertical column, deepwell turbine pump with 75-hp, 900-rpm electric motor	7,450	lb	1.60	11,920						
			8	One 4.41 cfs (3.8 cfs design) at 52 feet total head, vertical column, deepwell turbine pump with 40-hp, 1,200-rpm electric motor	3,450	lb	1.60	5,520						
			9	One 2.32 cfs (2.0 cfs design) at 52 feet total head, vertical column, deepwell turbine pump with 20-hp, 1,800 rpm electric motor	1,925	lb	1.60	3,080						
				Subtotal				20,520			20,520			
				Contingencies (15%)				3,480			3,480			
				Field Cost--Burton Line				24,000			24,000			
											55			

BURNS PUMPING PLANT

CONSTRUCTION COST ESTIMATE

FEASIBILITY ESTIMATE

INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 6, PART 132
OF THE RECLAMATION INSTRUCTIONS

OFFICE PREPARED BY: Office of Design & Construction
E & R Center

PROJECT CENTRAL UTAH - JENSEN UNIT

Date of Estimate December 1, 1974

Prices as of April 1968

Property Designation 03.02.160,170

Sheet 23 of 24

PROPERTY CLASS	IDENTIFIED PROPERTY	PLANT ACCOUNT	PAY ITEM	DESCRIPTION	QUANTITY	UNIT	LABOR AND MATERIALS BY CONTRACTOR		LABOR AND MATERIALS BY GOVERNMENT		FIELD COST	TOTAL FIELD COST	OTHER COSTS	TOTAL COST
							Unit Price	Amount	Unit Price	Amount	Plant Account	Identified Property	Identified Property	Identified Property
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
03	02	160		PUMPING AND PUMPING-GENERATING PLANTS (Continued) BURNS PUMPING PLANT (Continued) Pumps and Prime Movers (Continued)										
			10	(4) Murray Line One 8.5 cfs (6.8 cfs design) at 70 feet total head, vertical deepwell turbine pump with 100-hp, 1,200 rpm electric motor	6,800	lb	1.60	10,880						
			11	One 4.25 cfs (3.4 cfs design) at 70 feet total head, vertical, deepwell turbine pump with 50-hp, 1,800-rpm electric motor	3,240	lb	1.60	5,184						
			12	One 2.25 cfs (1.8 cfs design) at 70 feet total head, vertical, deepwell turbine pump with 25-hp, 1,800-rpm electric motor	2,260	lb	1.60	3,616						
				Subtotal				19,680			19,680			
				Contingencies (15%)				3,320			3,320			
				Field Cost--Murray Line				23,000			23,000			
				Field Cost--03.02.160				180,000			180,000			
		170		Accessory Electric Equipment (Curve estimate includes contingencies.)				90,000				90,000		

DRAINS

CONSTRUCTION COST ESTIMATE

INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 6, PART 152
OF THE RECLAMATION INSTRUCTIONS

OFFICE PREPARED BY:
Utah Activities, U.C. Region
Provo, Utah

PROJECT CENTRAL UTAH - JENSEN UNIT
Date of Estimate December 1, 1974
Prices as of October 1972

Property designation 07.01.152 Sheet 24 of 27

PROPERTY CLASS	IDENTIFIED PROPERTY	PLANT ACCOUNT	PAY ITEM	DESCRIPTION	QUANTITY	UNIT	LABOR AND MATERIALS BY CONTRACTOR		LABOR AND MATERIALS BY GOVERNMENT		FIELD COST	TOTAL FIELD COST	OTHER COSTS	TOTAL COST
							Unit Price	Amount	Unit Price	Amount	Plant Account	Identified Property	Identified Property	Identified Property
07				DRAINS										
	01			JENSEN AREA DRAINS								384,000		
				Project drainage for approximately 710 acres of drainage deficient lands										
		152		WATERWAYS										
			1	Drains, open outlet	1.4	Mi	50,400	70,560						
			2	Drains, closed lateral	4.7	Mi	50,400	236,880						
				Subtotal				307,440			307,440			
				Contingencies (25%+)				76,560			76,560			
				Field Cost 07.01.152				384,000			384,000			

CONSTRUCTION COST ESTIMATE

OFFICE PREPARED BY:
UC Region
Lake City, Utah

Date of Estimate December 1, 1974

Prices as of April 1968 and October 1974

Property designation 13.01.175, 13.02.175, 13.03.175

Sheet 25 of 27

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Transmissions Lines, Switchyards and Substations

CONSTRUCTION COST ESTIMATE
FEASIBILITY ESTIMATE

PROJECT CENTRAL UTAH - JENSEN UNIT

OFFICE PREPARED BY: UC Region, SLC
Date of Estimate August 19, 1975
Prices as of October 1974 and January 1975

INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 6, PART 152
OF THE RECLAMATION INSTRUCTIONS

Property designation-13.04.100, 182 & 183

13.05.100, 182 & 183

Sheet 26 of 27

PROPERTY CLASS	IDENTIFIED PROPERTY	PLANT ACCOUNT	PAY ITEM	DESCRIPTION	QUANTITY	UNIT	LABOR AND MATERIALS BY CONTRACTOR		LABOR AND MATERIALS BY GOVERNMENT		FIELD COST	TOTAL FIELD COST	OTHER COSTS	TOTAL COST
							Unit Price	Amount	Unit Price	Amount	Plant Account	Identified Property	Identified Property	Identified Property
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
13				TRANSMISSION LINES, SWITCHYARDS AND SUBSTATIONS (Cont'd)										
	04			TRANSMISSION LINE (138 kv) to TYZACK PUMPING PLANT								65,000		
		100	1	Land and Rights										
			1	Easement for right-of-way	7	ac	60	420			400			
				Contingencies (25%+)				580			580			
				Field Cost 13.04.100				1,000			1,000			
		182&183	1	Poles, Fixtures, Overhead Conductors and Devices										
			1	Construction of 138 kv Transmission Line (2.3 mi)	Lump Sum	LS	LS	51,000			51,000			
				Contingencies (25%+)				13,000			13,000			
				Field Cost 13.04. 182 & 183				64,000			64,000			
	05			TRANSMISSION LINE (138 kv) to BURNS PUMPING PLANT								62,000		
		100	1	Lands and Rights										
			1	Easement for right-of-way	4	ac	400	1,600			1,600			
				Contingencies (25%+)				400			400			
				Field Cost 13.05.100				2,000			2,000			
		182&183	1	Poles, Fixtures, Overhead Conductors and Devices										
			1	Construction of 138 kv transmission line (1.1 mi.)	Lump Sum	LS	LS	48,000			48,000			
				Contingencies (25%+)				12,000			12,000			
				Field Cost 13.05.182 & 183				60,000			60,000			
											59			

PERMANENT OPERATING FACILITIES

INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 6, PART 152
OF THE RECLAMATION INSTRUCTIONS

CONSTRUCTION COST ESTIMATE

GENERAL PROPERTY

OFFICE PREPARED BY:
Utah Activities, U.C. Region
Provo, Utah

PROJECT CENTRAL UTAH - TENSEN UNIT

Date of Estimate **December 1, 1974**

Prices as of April 1968

Property designation 15.01.199. Sheet 27 of 27

PROPERTY CLASS	IDENTIFIED PROPERTY	PLANT ACCOUNT	PAY ITEM	DESCRIPTION	QUANTITY	UNIT	LABOR AND MATERIALS BY CONTRACTOR		LABOR AND MATERIALS BY GOVERNMENT		FIELD COST	TOTAL FIELD COST	OTHER COSTS	TOTAL COST
							Unit Price	Amount	Unit Price	Amount	Plant Account	Identified Property	Identified Property	Identified Property
15				GENERAL PROPERTY										15,000
	01			PERMANENT OPERATING FACILITIES								15,000		
		199		Office furniture and equipment) Transportation Equipment) Tools, shop and garage equipment) Communication equipment)							15,000			

	Previous Estimate	Prices as of
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INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 6, PART 152
OF THE RECLAMATION INSTRUCTIONS.

OFFICE PREPARED BY:
Utah Activities, U.C. Region
Provo, Utah

Date of Estimate August 19, 1975
Prices as of January, 1975

Sheet 1 of 3

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CONSTRUCTION COST ESTIMATE

INSTRUCTIONS FOR USE OF THIS FORM
ARE CONTAINED IN CHAPTER 6, PART 152
OF THE RECLAMATION INSTRUCTIONS

OFFICE PREPARED BY:
JUC Region
Salt Lake City, Utah

PROJECT CENTRAL UTAH--JENSEN UNIT

Date of Estimate August 13, 1975

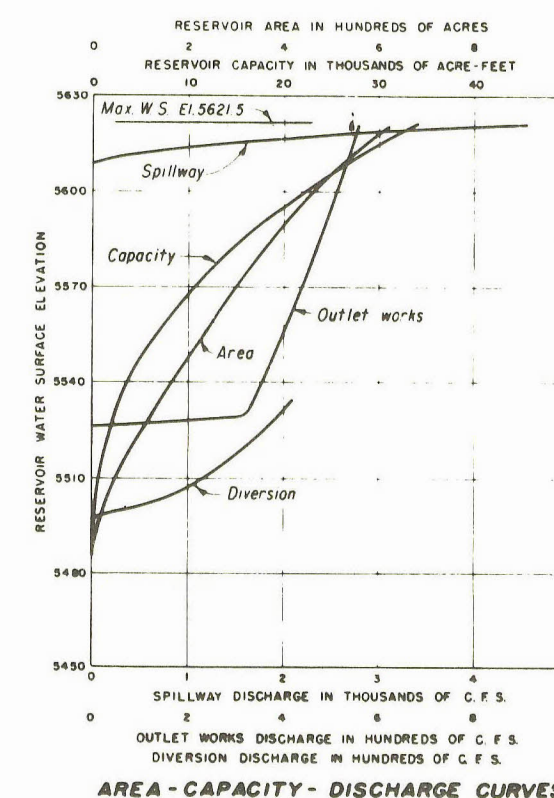
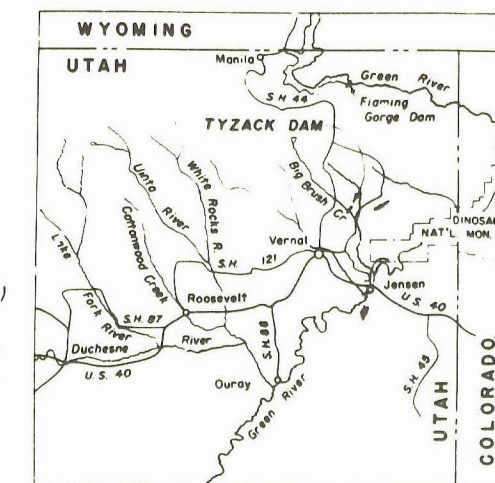
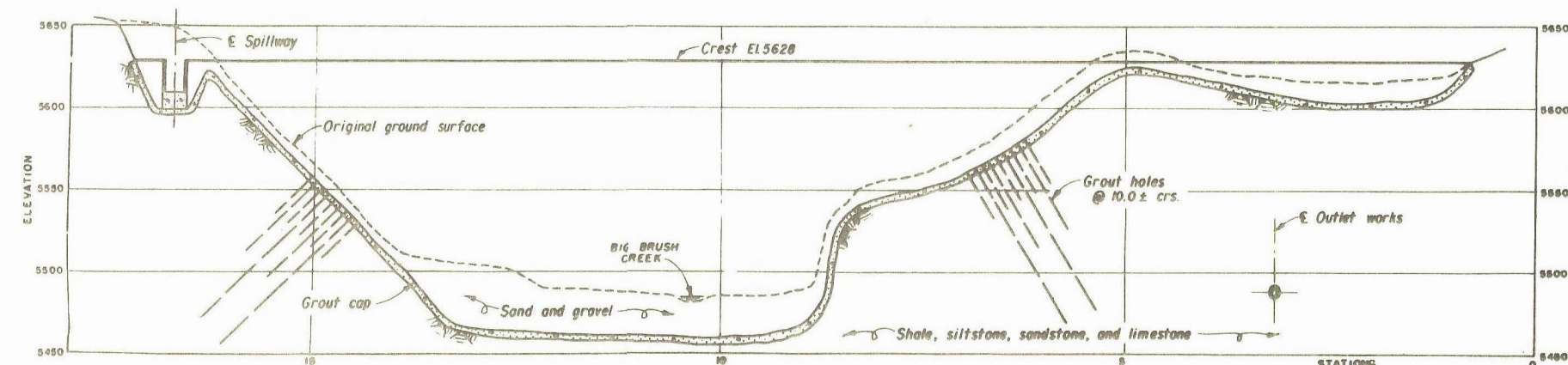
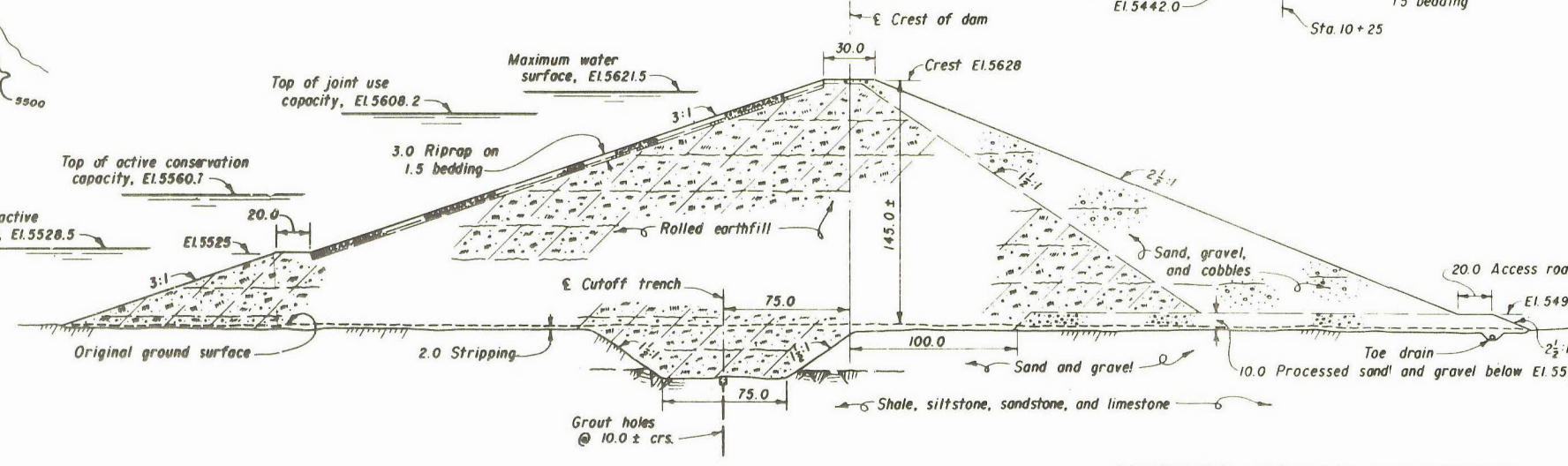
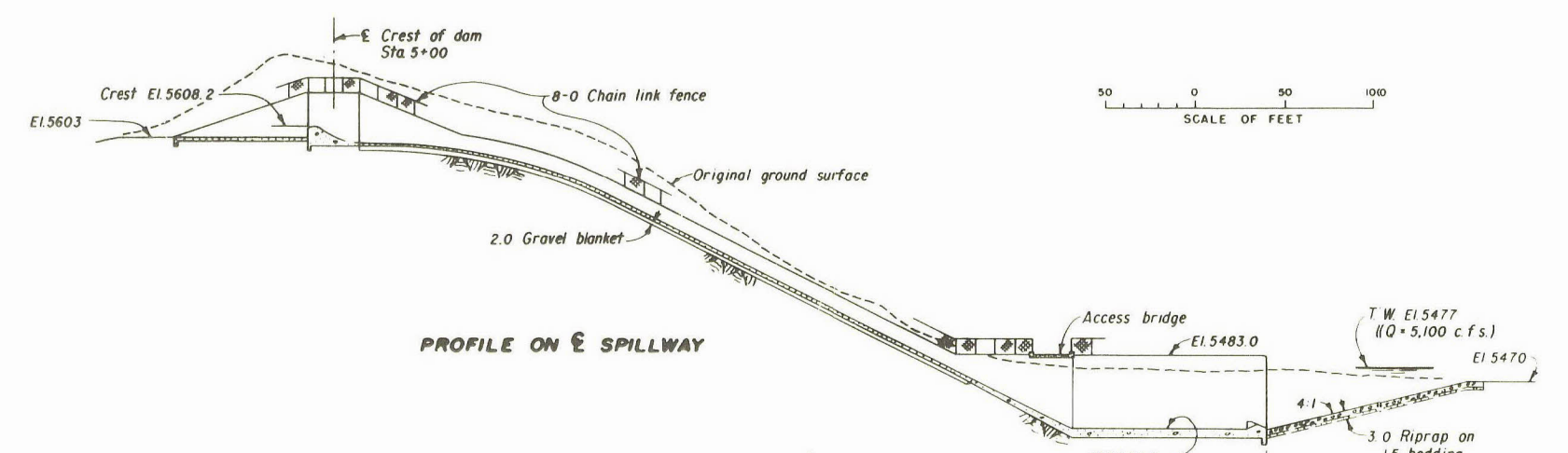
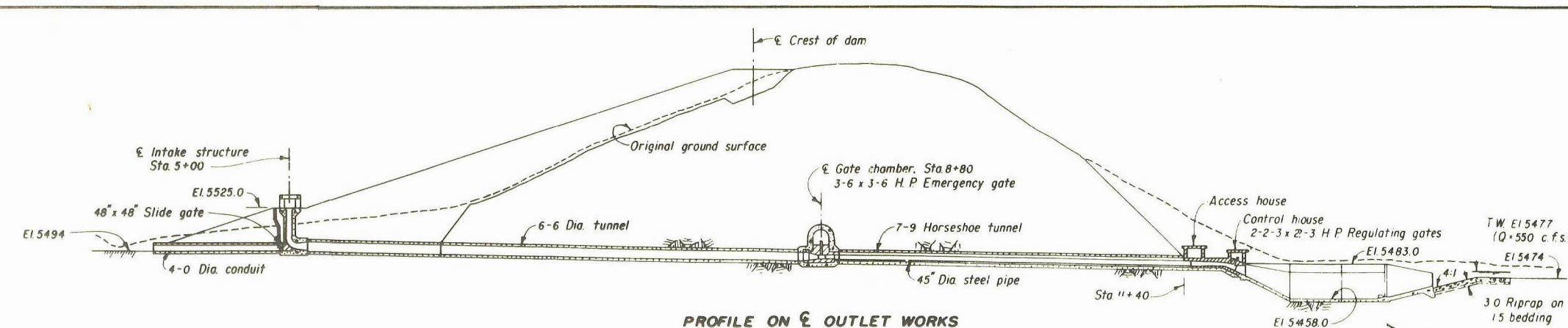
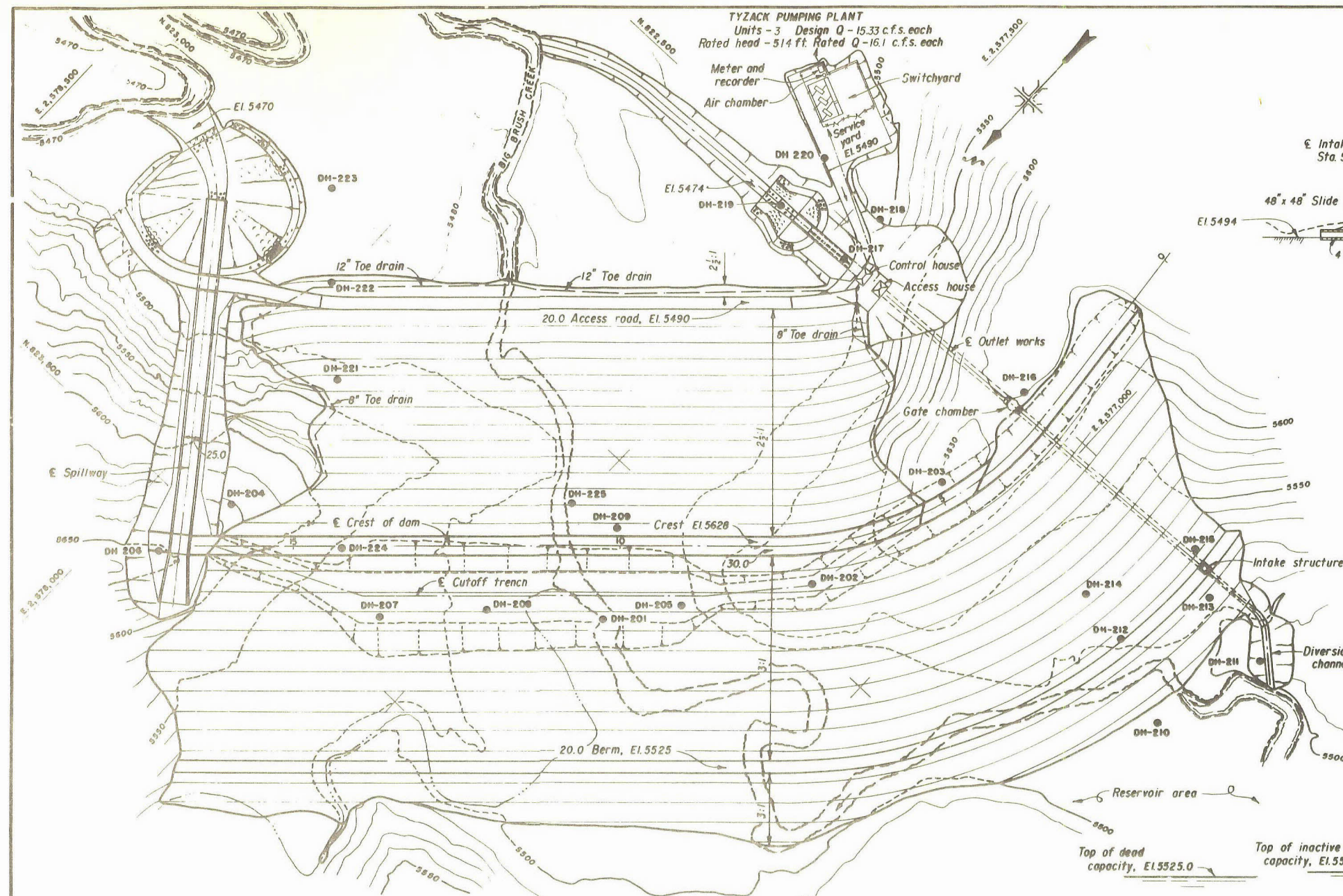
Prices as of October 1972 and April 1973

15.02.130.20

15.03.130.20

Sheet 3 of 3

PROPERTY CLASS	IDENTIFIED PROPERTY	PLANT ACCOUNT	PAY ITEM	DESCRIPTION	QUANTITY	UNIT	LABOR AND MATERIALS BY CONTRACTOR		LABOR AND MATERIALS BY GOVERNMENT		15.04.152 FIELD COST	TOTAL FIELD COST	OTHER COSTS	TOTAL COST
							Unit Price	Amount	Unit Price	Amount	Plant Account	Identified Property	Identified Property	Identified Property
1				2	3			4		5	6	7	8	9
				JENSEN UNIT--FISH, WILDLIFE, AND RECREATIONAL FACILITIES										
15				FISH, WILDLIFE, AND RECREATIONAL FACILITIES										
	02	130.20		TYZACK RESERVOIR RECREATION FACILITIES								434,000		
				These facilities include access road, trails, 52 camp units, 6 picnic areas, 4 group camp areas, boat ramp, water, electric, and sanitary facilities										
			1	Access Road	Lump Sum		LS	127,367						
			2	Recreation Facilities	Lump Sum		LS	137,175						
			3	Water System	Lump Sum		LS	44,690						
			4	Sewer System	Lump Sum		LS	4,000						
			5	Electrical System	Lump Sum		LS	32,313						
			6	Solid waste disposal	Lump Sum		LS	1,000						
				Subtotal				346,545			346,545			
				Contingencies (25 percent +)				87,455			87,455			
				Field Cost				434,000			434,000			
	03	130.20		BIG GAME RANGE REHABILITATION--This would include selective clearing of 500 acres of public lands and reseeding to grasses and browse.								12,000		
			1	Clearing and reseeding	500	Ac.	19.90	9,950						
				Subtotal				9,950			9,950			
				Contingencies (20 percent +)				2,050			2,050			
				Field Cost				12,000			12,000			
	04	152		ADDITIONAL WATER SUPPLY TO STEWART LAKE--Delivery of water to the Stewart Lake Waterfowl Management Area from a new lateral and return flow from unit drains.								13,000		
			1	Stewart Lake Lateral	Lump Sum		LS	11,000						
				Subtotal				11,000			11,000			
				Contingencies (20 percent +)				2,000			2,000			
				Field Cost				13,000			13,000			
											63			



RESERVOIR CAPACITY ALLOCATIONS

PURPOSE	ELEVATIONS	CAPACITY ACRE- FEET
Joint use	5560.7 to 5608.2	18,000
Active conservation	5528.5 to 5560.7	6,000
Inactive	5525.0 to 5528.5	370
Dead	Streambed to 5525.0	1,630
Total reservoir capacity		26,000

A surcharge of 7,600 a.f. (Max. W.S. El. 5621.5) in combination with a spillway discharge of 4,550 c.f.s. and a river outlet discharge of 550 c.f.s. is provided to protect against the inflow design flood which has a peak of 18,500 c.f.s. and a 2-day volume of 12,300 a.f.

10-1-74	ENLARGED TYZACK PUMPING PLANT
0-1-74	ADDED TYZACK PUMPING PLANT
10-2-74	
ALWAYS THINK SAFETY	
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION CENTRAL UTAH PROJECT JENSEN UNIT - UTAH	
TYZACK DAM AXIS "C"	
FEASIBILITY DESIGN DRAWING	
DESIGNED BY: <i>[Signature]</i>	SUBMITTED BY: <i>[Signature]</i>
DRAWN BY: <i>[Signature]</i>	RECOMMENDED BY: <i>[Signature]</i>
CHECKED BY: <i>[Signature]</i>	APPROVED BY: <i>[Signature]</i>
DENVER, COLORADO, APRIL 8, 1973	

450-D-7

