

## **SECTION 17 - OPINION OF PROBABLE CONSTRUCTION COSTS**

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### **17.1 General**

The RJH Team developed an OPPC based on the preliminary design concepts presented in this report. This OPPC is considered a Class 3 estimate as defined by the ASTM E2516-11. This class designation is used when the design is between 10 percent and 40 percent complete. The reliability of a Class 3 estimate according to ASTM is between minus 15 to plus 20 percent. Costs are presented in April 2022 dollars.

Cost opinions were developed by estimating quantities of elements of the work based on the preliminary-level design drawings and unit costs were developed from the following sources:

- Published and non-published bid price data for similar work.
- Manufacturer's, suppliers', and contractor's budgetary price quotes.
- Our internal database, previous experience, and judgement.
- R.S. Means Heavy Construction Cost Data for 2021.

The "Base Construction Subtotal" (BCS) is the sum of costs of the work items currently defined. The "Direct Construction Subtotal" (DCS) is the BCS plus construction contingencies. For Preliminary Design a contingency allowance of 25 percent of the BCS was used to account for unit price and quantity variations, variable market conditions, and uncertainty at this phase of design. This percentage will likely decrease as the Project is better defined in subsequent stages of design. Other Project costs that are required to implement the Project are included as a percent of the BCS as follows:

- Design Engineering: 9 percent of the BCS.
- Construction Engineering and Management: 12 percent of the BCS.
- CLOMR/LOMR Engineering and Fees: 2 Percent of BCS.
- Environmental Permitting: 1 Percent of BCS.

A summary of the OPPC is presented in Table 17.1 and supporting information is presented in Appendix I.

**TABLE 17.1  
 OPPC SUMMARY**

<b>Category</b>	<b>Cost</b>
General Items	\$9,606,000
General Earthwork	\$4,730,000
Embankment Dam	\$2,424,000
Spillway	\$11,213,000
Instrumentation	\$178,000
Barrier Wall	\$1,404,000
Outlet Works	\$3,935,000
Site Drainage	\$375,000
US 36 Multi-Use Trail	\$181,000
Bonds and Insurance	\$510,000
<b>BCS</b>	<b>\$34,556,000</b>
Contingencies (25 percent)	\$8,511,000
<b>DCS</b>	<b>\$43,067,000</b>
Other Costs	\$7,948,000
<b>OPPC</b>	<b>\$51,015,000</b>

The OPPC is based on professional opinions and may change as more design details are developed. Actual costs will be affected by several factors beyond current control, such as supply and demand for the types of construction required at the time of bidding, the Project vicinity, change in material supplier costs, changes in labor rates, competitiveness of contractors and suppliers, availability of qualified bidding contractors, changes in applicable regulatory requirements, change in economic conditions, and changes in design standards. Conditions and factors arising as the Project proceeds from development through bidding and construction may result in construction costs that differ significantly from the estimate provided in this Report.

**17.2 Basis of Cost Opinion**

Design concepts and considerations are discussed in Sections 4 through 16. Additional considerations used to develop the OPPC are as follows:

- Stripping and stockpiling topsoil will consist of removing the top six inches of existing topsoil.
- Demolition of existing CU Boulder South facilities will include the demolition of fencing, concrete pavement, a maintenance building, and tennis courts. Some items

associated with the demolition of the maintenance building are unknown, such as if the building contains asbestos, and costs associated with unknown items were not included.

- Erosion and sediment control will consist of a silt fence extending along the limits of site disturbance.
- Ecological restoration will include mitigating impacts to wetlands at a ratio of 2.5:1. For each acre of wetlands impacted by the Project, 2.5 acres of ecological restoration will occur. Costs for additional ecological restoration beyond what is required for wetland mitigation are not included. Some of the calculated wetland impacts are located in areas of temporary disturbance and it is possible that impacts to these wetlands could be reduced.
- The cost for imported fill includes cost of placing fill from off-site excavations and the material, loading, and hauling costs. An off-site fill source has not yet been identified, so we considered a 10-mile haul cycle for the imported earthfill materials.
- Temporary signage and traffic control for the US36 multi-use path consists of detour signage placed every 500 feet along the detour as well as at each intersection. Two barricades will also be placed at each end of the detour. The construction period is assumed to be 18 months and temporary signage will be inspected daily by traffic control personnel during the construction period.

**APPENDIX I**

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**COST OPINION INFORMATION**

**Bid Schedule**  
**South Boulder Creek Regional Detention Concept Design**  
**April 2022**

Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Extension
<b>General Items</b>					
1	Mobilization, Demobilization & Preparatory Work	1	Lump Sum	\$ 1,620,000.00	\$ 1,620,000.00
2	Diversion and Control of Surface Water	1	Lump Sum	\$ 35,000.00	\$ 35,000.00
3	Dewatering	1	Lump Sum	\$ 1,100,000.00	\$ 1,100,000.00
4	Stripping and Stockpiling Topsoil	70,000	Cubic Yard	\$ 4.00	\$ 280,000.00
5	Clearing and Grubbing	1	Lump Sum	\$ 150,000.00	\$ 150,000.00
6	Demolition and Disposal	1	Lump Sum	\$ 300,000.00	\$ 300,000.00
7	Sediment and Erosion Control	1	Lump Sum	\$ 260,000.00	\$ 260,000.00
8	Temporary Site Security & Fencing	1	Lump Sum	\$ 100,000.00	\$ 100,000.00
9	Permanent Fencing	1	Lump Sum	\$ 25,000.00	\$ 25,000.00
10	Reclamation	100	Acre	\$ 3,800.00	\$ 380,000.00
11	Ecological Restoration	25	Acre	\$ 140,000.00	\$ 3,500,000.00
12	Outlet Works Discharge Structure Access Improvements	1	Lump Sum	\$ 1,000,000.00	\$ 1,000,000.00
13	Spillway Access Road	1	Lump Sum	\$ 65,000.00	\$ 65,000.00
14	All Other Items of Work (2.5%)	1	Lump Sum	\$ 791,000.00	\$ 791,000.00
<b>General Earthwork</b>					
15	Embankment Excavation	64,500	Cubic Yard	\$ 6.00	\$ 387,000.00
16	Excavating and Stockpiling of CU Levee	85,000	Cubic Yard	\$ 6.00	\$ 510,000.00
17	Excavating Detention Basin and Shaping Slopes	120,000	Cubic Yard	\$ 7.00	\$ 840,000.00
18	Placing Detention Excavation Fill	40,000	Cubic Yard	\$ 7.00	\$ 280,000.00
19	Furnishing and Placing CU Earthfill - Import	70,000	Cubic Yard	\$ 25.00	\$ 1,750,000.00
20	Furnishing and Placing CU Earthfill - From Excavations	80,000	Cubic Yard	\$ 7.00	\$ 560,000.00
21	Aggregate Surfacing for CU Earthfill	4,050	Cubic Yard	\$ 55.00	\$ 222,750.00
22	Asphalt Paving for CU Earthfill	10,000	Square Yard	\$ 18.00	\$ 180,000.00
<b>Embankment Dam</b>					
23	Foundation Preparation	41,000	Square Yards	\$ -	\$ -
24	Furnishing and Placing Embankment Core	13,500	Cubic Yard	\$ 15.00	\$ 202,500.00
25	Furnishing and Placing Embankment Fill	135,000	Cubic Yard	\$ 7.00	\$ 945,000.00
26	Furnishing and Placing Filter Sand	9,500	Cubic Yard	\$ 85.00	\$ 807,500.00
27	Furnishing and Placing Drain Gravel	1,100	Cubic Yard	\$ 90.00	\$ 99,000.00
28	Furnishing and Installing 8-inch PVC Drain Pipe	2,405	Linear Feet	\$ 100.00	\$ 240,500.00
29	Furnishing and Placing Aggregate Surfacing	960	Cubic Yard	\$ 55.00	\$ 52,800.00
30	Furnishing and Placing Upstream Erosion Control Blanket	17,000	Square Yards	\$ 4.50	\$ 76,500.00
<b>Spillway</b>					
31	Excavation to Working Platform	28,000	Cubic Yard	\$ 5.00	\$ 140,000.00
32	Secant Pile Wall	14,000	Vertical Linear Feet	\$ 500.00	\$ 7,000,000.00
33	Pile Cap	1,200	Cubic Yard	\$ 500.00	\$ 600,000.00
34	Spillway Wall Reinforced Concrete	1,520	Cubic Yard	\$ 1,000.00	\$ 1,520,000.00
35	Backfill Above Working Platform	26,100	Cubic Yard	\$ 7.00	\$ 182,700.00
36	Spillway Apron Reinforced Concrete	1,050	Cubic Yard	\$ 450.00	\$ 472,500.00
37	Soil Bentonite/Secant Wall Tie-in	2	Each	\$ 50,000.00	\$ 100,000.00
38	Groundwater Drain Excavation	2,400	Cubic Yard	\$ 9.50	\$ 22,800.00
39	Groundwater Drain Filter Gravel	2,350	Cubic Yard	\$ 110.00	\$ 258,500.00
40	Groundwater Drain Backfill Plug	16	Each	\$ 1,500.00	\$ 24,000.00
41	Groundwater Drain 10-inch PVC Slotted Pipe	3,600	Linear Feet	\$ 105.00	\$ 378,000.00
42	Groundwater Drain 10-inch PVC Solid Pipe	700	Linear Feet	\$ 100.00	\$ 70,000.00
43	Groundwater Drain Connector Pipe	8	Each	\$ 2,600.00	\$ 20,800.00
44	Groundwater Drain 6-foot-diameter Manhole	22	Each	\$ 12,000.00	\$ 264,000.00
45	Groundwater Drain Flow Regulation Gate	16	Each	\$ 10,000.00	\$ 160,000.00
<b>Instrumentation</b>					
46	Piezometers	10	Each	\$ 7,000.00	\$ 70,000.00
47	Structure Monitoring Points	9	Each	\$ 2,000.00	\$ 18,000.00
48	Weir Boxes	5	Each	\$ 18,000.00	\$ 90,000.00
<b>Barrier Wall</b>					
49	Mobilization	1	Lump Sum	\$ 200,000.00	\$ 200,000.00
50	Mix Design	1	Lump Sum	\$ 20,000.00	\$ 20,000.00
51	Barrier Wall Working Platform	40,000	Square Foot	\$ 1.00	\$ 40,000.00
52	Soil-Bentonite Wall - Embankment Station 28+02 to 57+00	45,000	Vertical Square Foot	\$ 11.00	\$ 495,000.00
53	Soil-Bentonite Wall - Detention Pond	59,000	Vertical Square Foot	\$ 11.00	\$ 649,000.00
<b>Outlet Works</b>					
54	Tunneling Mobilization and Demobilization	1	Lump Sum	\$ 120,000.00	\$ 120,000.00
55	Furnish and Install Casing Pipe and Conduit in Excavated Tunnel	235	Linear Foot	\$ 4,500.00	\$ 1,057,500.00
56	Tunneling Launch Shaft	1	Lump Sum	\$ 180,000.00	\$ 180,000.00
57	Tunneling Recovery Shaft	1	Lump Sum	\$ 100,000.00	\$ 100,000.00
58	Furnish and Install Reinforced Concrete Encased Conduit	465	Linear Foot	\$ 4,500.00	\$ 2,092,500.00
59	Intake Structure Reinforced Concrete	1	Lump Sum	\$ 80,000.00	\$ 80,000.00
60	Outlet Structure Reinforced Concrete	1	Lump Sum	\$ 175,000.00	\$ 175,000.00
61	Furnishing and Installing Trastracks	11	Lump Sum	\$ 124,000.00	\$ 124,000.00
62	Furnishing and Placing Riprap Bedding	11	Cubic Yard	\$ 75.00	\$ 825.00
63	Furnishing and Placing Riprap	32	Cubic Yard	\$ 160.00	\$ 5,120.00
<b>Site Drainage</b>					
64	Furnishing and Installing Spillway Drainage Penetrations	5	Each	\$ 65,000.00	\$ 325,000.00
65	Dry Creek Reinforced Concrete Outlet Basin	1	Lump Sum	\$ 50,000.00	\$ 50,000.00
<b>US 36 Multi-Use Trail</b>					
66	Temporary Signage and Traffic Control	1	Lump Sum	\$ 115,000.00	\$ 115,000.00
67	Trail Concrete Paving	3,700	Square Foot	\$ 15.00	\$ 55,500.00
68	Permanent Trail Signage and Markings	1	Lump Sum	\$ 10,000.00	\$ 10,000.00
Bonds and Insurance					\$510,679
<b>Base Construction Subtotal (BCS)</b>					<b>\$34,555,974</b>
Contingencies (25% of BCS)					\$8,511,324
<b>Direct Construction Subtotal (DCS)</b>					<b>\$43,067,298</b>
Design Engineering (9% of BCS)					
CLOMR/LOMR (1% of BCS)					\$3,110,038
Construction Engineering and Management (12% of BCS)					\$345,560
Permitting (1% of BCS)					\$4,146,717
<b>Opinion of Probable Project Cost (OPPC)</b>					<b>\$51,015,172</b>

**Notes**

1. Costs are in April 2022 Dollars (ENR CCI factor of 12898.96)
2. Costs for real estate and easements are not included.