

Flume Construction Recommendation

To: Parties to the CSKT-MT Compact

From: CSKT-MT Compact Implementation Technical Team (CITT)

Date: January 17, 2019

Re: Funding recommendation for construction of hydraulic structures (flumes) for water measurement at selected canal locations on the Flathead Indian Irrigation Project (FIIP)

Summary: The CITT continues to promote an expansion and improvement to the existing FIIP-area water measurement network, pursuant the CITT *10-year Workplan for Water Measurement* approved on May 24, 2016. This flume construction recommendation is based on updated feasibility and construction cost information presented in the 2018 DOWL Engineering final *Design of Hydraulic Structures for Irrigation Water Measurement Alternatives Analysis Summary Report* and the corresponding final individual engineering design packages for each site, all of which were produced as a deliverable from Task Order 3.0: *Contract Design of Ratable Hydraulic Structures for Canal Water Measurement on the FIIP* approved by the Parties and implemented in 2018.

Background: Hydraulic structures, specifically long-throated flumes, are planned for construction at ten canal headworks locations on the Flathead Indian Irrigation Project (FIIP). The structures are primarily intended for accurate water measurement at River Diversion Allowance locations identified in the CSKT-Montana Water Rights Compact. Hydraulic structures have larger up-front costs, but with their long service life and accurate measurement capabilities, reduce long-term measurement costs when labor costs are considered.

Each of the structures has been designed by a qualified engineering firm, including the hydraulic design components and construction and bid specification documents. The structures are proposed to be built over a period of years, considering the construction window needs to occur outside of the canal operational period, typically April 15 through September 15 of each year.

The Engineers Estimate of Probable Construction Cost (2018 cost basis) is included for each location, totaling \$435,539. Additional costs to this table, for material testing and contract administration and oversight are estimated to be \$75,754, bringing the total cost for the construction and contract administration to \$511,293 for all 10 flumes.

Recommendation: The CITT Recommends the Parties fund an amount not to exceed \$ 511,293 for the construction and oversight for all the 10 viable flumes set forth in DOWL Engineering's 2018 *Contract Design of Ratable Hydraulic Structures for Canal Water Measurement on the FIIP* (summarized in the attached table).

Schedule: The initial plan for construction for 2019 includes the Ronan B Canal, the Jocko E Canal at Agency Creek, and the Jocko N Canal at East Finley Creek. Total costs for these three locations are \$ 142,906. Additional locations may be proposed for 2019 based on experience gained with the three identified installations.



Design of Hydraulic Structures for Irrigation Water Measurement

Flathead Indian Irrigation Project

Final Engineer's Estimate of Probable Construction Cost (2018 cost basis)

Bid Item	Unit Price	Hillside Ditch at headworks		Jocko E Canal at Agency Creek		Jocko E Canal at Finley Creek		Jocko N Canal at East Finley Creek		Jocko Upper J Canal at Agency Creek		Lower Jocko S Canal at Jocko River		Mission 6C Canal at Mission Creek		Mission H Canal at Mission Creek		Ronan B Canal at Mud Creek		Revais R Canal at Revais Creek	
		Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price
Mobilization and Preparatory Work (10%)	10%	1	\$ 4,900	1	\$ 3,300	1	\$ 2,100	1	\$ 2,200	1	\$ 2,100	1	\$ 2,900	1	\$ 2,900	1	\$ 4,300	1	\$ 4,200	1	\$ 3,500
Demolition and Disposal of Existing Structures (EA)	\$ 1,000.00		\$ -	1	\$ 1,000		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -	2	\$ 2,000		\$ -
Cast-in-Place Concrete (CY)	\$ 1,450.00	26	\$ 37,700	19	\$ 27,550	12	\$ 17,400	13	\$ 18,850	12	\$ 17,400	18	\$ 26,100	14	\$ 20,300	27	\$ 39,150	25	\$ 36,250	17	\$ 24,650
Anti-Fouling Paint (SF)	\$ 5.00	95	\$ 475		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -	80	\$ 400	85	\$ 425	70	\$ 350
Embankment Fill (CY)	\$ 24.00	289	\$ 6,936	43	\$ 1,032		\$ -		\$ -		\$ -		\$ -	206	\$ 4,944		\$ -		\$ -	267	\$ 6,408
Riprap (CY)	\$ 100.00	13	\$ 1,300	10	\$ 1,000	7	\$ 700	9	\$ 900	9	\$ 900	9	\$ 900	8	\$ 800	11	\$ 1,100	11	\$ 1,100	10	\$ 1,000
Operated Excavator (HR)	\$ 150.00	8	\$ 1,200	8	\$ 1,200	8	\$ 1,200	8	\$ 1,200	8	\$ 1,200	8	\$ 1,200	8	\$ 1,200	8	\$ 1,200	8	\$ 1,200	8	\$ 1,200
Operated Dump Truck (HR)	\$ 100.00	8	\$ 800	8	\$ 800	8	\$ 800	8	\$ 800	8	\$ 800	8	\$ 800	8	\$ 800	8	\$ 800	8	\$ 800	8	\$ 800
Subtotal			\$ 53,311		\$ 35,882		\$ 22,200		\$ 23,950		\$ 22,400		\$ 31,900		\$ 30,944		\$ 46,950		\$ 45,975		\$ 37,908
Contingency (10%) ⑤	10%		\$ 5,331		\$ 3,588		\$ 2,220		\$ 2,395		\$ 2,240		\$ 3,190		\$ 3,094		\$ 4,695		\$ 4,598		\$ 3,791
Unlisted Items		①	\$ 2,000		\$ -		\$ -	③	\$ -		\$ -		\$ -		\$ -	①	\$ 2,000		\$ -	④	\$ 8,000
Flow Monitoring and Telemetry Equipment ⑥			\$ 600		\$ 600		\$ 600		\$ 600		\$ 600		\$ 7,017		\$ 7,017		\$ 600		\$ 600		\$ 8,000
Indian Preference Contracting Fee (3%) ②	3%		\$ 1,837		\$ 1,202		\$ 751		\$ 808		\$ 757		\$ 1,263		\$ 1,232		\$ 1,627		\$ 1,535		\$ 1,731
Total			\$ 63,079		\$ 41,272		\$ 25,771		\$ 27,753		\$ 25,997		\$ 43,370		\$ 42,287		\$ 55,872		\$ 52,708		\$ 59,430
TOTAL OF ALL SITES																					\$437,539

Notes:

- ① Includes added cost for increased depth of structural foundation fill which may not be adequately accounted for within the concrete unit cost for sites with fine-grained soils (Hillside Ditch and Mission H Canal) where increased foundation fill is included in the design.
- ② Indian preference contracting fees are estimated based on the indicated percentage of the sum of subtotal of bid items, contingency, and unlisted items. Note that contracting fees will not be included in the individual construction contracts.
- ③ Costs to add a second gate or adjust the fish screen to allow the site to convey the fully design flow are not included.
- ④ Revais R design has not yet been finalized pending high water level survey in the spring of 2019. Includes added cost for replacing the road crossing culvert (if found to be required through final design).
- ⑤ Contingency is included due to expected variation in bid prices and due to the fact that the actual year of construction for each of the flumes may vary.
- ⑥ The cost of new flow monitoring and telemetry equipment is \$7,017. New equipment is only needed at the Jocko Lower S and Mission 6C sites. The existing equipment and stilling wells will be reused at the remaining sites; cost for these sites is assumed to be 4 hours of excavator time.

Total Costs including material testing and unlisted contingencies

Cost Items	Hillside Ditch at Headworks	Jocko E Canal at Agency Creek	Jocko E Canal at Finley Creek	Jocko N Canal at East Finley Creek	Jocko Upper J Canal at Agency Creek	Lower Jocko S Canal at Jocko River	Mission 6C Canal at Mission Creek	Mission H Canal at Mission Creek	Ronan B Canal at Mud Creek	Revais R Canal at Revais Creek
Final Engineers Estimate of Cost	\$ 63,079	\$ 41,272	\$ 25,771	\$ 27,753	\$ 25,997	\$ 43,370	\$ 42,287	\$ 55,872	\$ 52,708	\$ 59,430
OWNER Material Testing Costs	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000
Contingency ^a	\$ 6,307.90	\$ 4,127.20	\$ 2,577.10	\$ 2,775.30	\$ 2,599.70	\$ 4,337.00	\$ 4,228.70	\$ 5,587.20	\$ 5,270.80	\$ 5,943.00
Total	\$ 72,386.90	\$ 48,399.20	\$ 31,348.10	\$ 33,528.30	\$ 31,596.70	\$ 50,707.00	\$ 49,515.70	\$ 64,459.20	\$ 60,978.80	\$ 68,373.00
Total for all Sites										\$ 511,292.90

^a contingency 10% of Engineers Estimate of Cost