CHERRY CREEK BASIN WATER QUALITY AUTHORITY

2025-2034 CAPITAL IMPROVEMENT PROGRAM SUPPORTING DATA

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2025-2034 CAPITAL IMPROVEMENT PROGRAM

This document presents the details of the 2025-2034 Capital Improvement Program (2025-2034 CIP), as reviewed by the Board with the 2025 funding included in the Budget that is adopted by the Board, and it includes the following information.

Table 1 – Summary of Potential Pollutant Reduction Facilities, Revision for 2025-2034 CIP.

This table lists all the Pollutant Reduction Facilities (PRFs) that have been considered for implementation by the Authority since 2000 and shows their status. The "blue" font represents completed projects, the "green" font represents projects that are included in the 2025-2034 CIP, and projects in "black" font have been considered but haven't been included in the CIP.

Prior to 2010, Cherry Creek Reservoir was under a total maximum annual load (TMAL) limitation for phosphorus. Since PRFs originally focused on reduction of phosphorus loads discharged into the reservoir, Table 1 was developed to provide a brief summary of the design basis, projected loads and treatment, estimated PRF costs, and costs per pound of phosphorus immobilized. Currently there is no TMAL; instead, the control strategy identified in Regulation No. 72 is to minimize nutrient (phosphorus and nitrogen) concentrations. Therefore, PRFs are still evaluated, in part, on their costs per pound of phosphorus for consistency between all potential PRFs. Additional information on how PRFs are evaluated, particularly stream reclamation projects, is presented in the Authority's report dated June 17, 2011, titled *Stream Reclamation Water Quality Benefit Evaluation Interim Status Report*.

For 2025-2034 CIP, fourteen previously completed or active projects (see blue text) were selected based on the best available accounting information on total project costs of design, construction, and permit clearance; increased from the 10 identified projects in 2024. Other information such as stream length and project participation were adjusted based on best available information, with the source included in comments which can be viewed in of the spreadsheet itself. The Stream Reclamation O&M costs were adjusted to be similar cost baseline of $6,000 per mile with a minimum of $1,000 for projects within Cherry Creek State Park (higher cost accounts for higher public use in the park) and $2,000 per mile with of minimum of $1,000 for remaining stream reclamation projects. The original project information was retained, and the updated and revised project information was delineated by adding an asterisk (*) in the project designation and both were highlighted to facilitate comparison between the two.

Table 2 – Summary of Recommended Pollutant Reduction Facilities 2024 – 2033 CIP

This table lists the PRFs that are in the current 10-year CIP with more detail provided for the projects in the current budget year. Since the Authority partners with other governmental agencies to design and construct some of the PRFs, the Authority's portion of total project costs is also shown. The total cost is included along with the Authority's portion. Previous funding contributed by the Authority is deducted from the Authority's portion to get the Residual PRF Costs for the Authority, the Residual PRF Costs for the Authority are then budgeted through the 10-year CIP, since most projects take several years from concept through construction.

Some highlights of the projects included in the 2025 Budget are described below.

The East Shade Shelter Shoreline Stabilization Phase III (CCB-17.5.1) project includes funding of $671,000 for construction by 53 Corporation (selected contractor) and additional construction oversight scope and fee by RESPEC (consultant). The estimated actual costs for design and construction (including contingency) total $439,000. Colorado Parks and Wildlife is estimated to reimburse CCBWQA for shared costs totaling $133,000, resulting in an excess of budget anticipated for this project of $365.000.

The Tower Loop Shoreline Stabilization Phase II (CCB-17.7) project has been moved back to final design in 2032 and construction in 2033 based on value engineering effort done in 2023. The actual costs and schedule will need to be monitored and evaluated with future CIP updates.

The Cherry Creek Stream Reclamation at Arapahoe Rd., reaches 3 and 4 (CCB-5.14C) project includes CCBWQA's funding at 16% (not the typical 25% partner project) to match or be below the average of $1,268 per pound of phosphorus immobilized from Table 3. Project costs and participation may be better defined through the upcoming design and evaluated further with future CIP updates.

The Cherry Creek – Reservoir to Lake View Drive (CCB-5.16A) project includes two lines of funding, one for design and a separate line item for construction.

- In 2025, $775,000 will be included for design of the project with an additional estimated expenditure in 2026 of $978,000 to complete through final design. CCBWQA has currently funded the design of the project 100%.
- CCBWQA has budgeted $1 million will be included for construction in 2025. CCBWQA estimates a cost sharing of 20% for construction.

The Cherry Creek reaches 2 &3 CCSP (CCB-5.16B, C) line includes CCBWQA funding starting in 2028 with an estimated cost for an alternative analysis and conceptual design progressing from the previously completed stream assessment in 2020.

The Piney Creek Reaches 1 to 2 (CCB-6.5) project includes CCBWQA's funding at 23% (not the typical 25% partner project) to match or be below the average of $1,268 per pound of phosphorus immobilized from Table 3. Project costs and participation may be better defined through upcoming design and evaluated further with future CIP updates.

The Piney Creek Reaches 4 to 5 (CCB-6.6) project includes CCBWQA's funding at 23% (not the typical 25% partner project) to match or be below the average of $1,268 per pound of phosphorus immobilized from Table 3. Project costs and participation may be better defined through upcoming design and evaluated further with future CIP updates.

The Lone Tree Creek in CCSP downstream of Pond, CCBWQA only (CCB-21.1) project includes CCBWQA funding of 100%. The amount included in the 2025 budget is $50,000 and will include observation and monitoring from staff and planning for future improvements and/or minor maintenance or signage for the area.

The Lone Tree Creek in CCSP upstream of Pond, Centennial Trail Portion (CCB-21.3) project is done in conjunction with Centennial Trail Project. CCBWQA's funding is at 25% (not the typical 100% for projects within CCSP) and is for the stream reclamation portion of the larger trail project. The trail portion advanced the stream reclamation portion ahead of its water quality priority, limiting the funds available for the project. CCBWQA's Board has previously taken action to confirm the $112k commitment to Centennial so it has been included in the 2025 Budget. This amount was previously included in the 2024 Budget, however project delays have moved the project start into 2025.

CCBWQA's funding on Happy Canyon Creek at Jordan Rd/ (CCB-22.1) is at 25% and continues the funding that was previously requested by SEMSWA.

New in 2025 is CCBWQA's funding on retrofits for SEMSWA Regional Water Quality Ponds W6/W7 along Jordan Road at a cost share of 25% with SEMSWA.

CCBWQA's funding on PRF Preservation, Acquisition, Lease of Land or Water is budgeted for $100k and CCBWQA's percentage is not known as no project and costs have been identified.

All other projects listed in the CIP were coordinated with project partners and adjusted based on input and direction received. Further evaluation and adjustments will likely be needed in future CIP updates when projects get closer to the current budget year.

2025 Operations and Maintenance Budget

The projects and costs from 2024 Annual Inspection of PRFs at CCSP Task Memorandum by RG and Associates were included in 2025 Budget.

Table 3 – Summary of 14 Completed Pollutant Reduction Facilities for Consideration in 2025 – 2034 CIP

From Table 2, the fourteen completed projects with the updated and revised project information, delineated by adding an asterisk (*) in the project designation, were adjusted to 2024 costs using ENR's Building Cost Index. Four (4) additional projects were added to the list to provide a closer evaluation and comparison of 2024 costs; these projects included:

- *Dove Creek Ph I – Otero to Chambers Road (Construction Completed 2023)*
- *Dove Creek Ph II – Chambers to Pond D-1 (Construction Completed 2024)*
- *Cherry Creek at Scott Ave (Construction Bid/Began in Fall 2024)*
- *Cherry Creek at Dransfeldt (Construction Bid/Began Spring 2024)*

Three (3) unit costs were developed for the stream reclamation cost per mile and the cost per pound of phosphorus immobilized (without or with cost sharing from

partners). Figure 1 shows the stream reclamation cost per mile and Figure 2 shows the cost per pound of phosphorus immobilized (without or with cost sharing from partners).

Summary statistics are included at the bottom of Table 2 of CIP and below. The mean of $5,071 per pound of phosphorus (without cost sharing) or $1,268 per pound of phosphorus (with cost sharing of 75% partner participation and 25% CCBWQA participation) were used to evaluate projects included in the 10-year CIP (see green text) in Table 1. When the calculated cost per pound of phosphorus exceeded these means then a more detailed method was used to calculate it, delineated with a pound sign (#) in the project designation, or CCBWQA's participation was adjusted down to get the cost per pound in alignment with the mean. As the projects move forward and more detailed costs and engineering information is available the projects that were adjusted can be further evaluated, to see whether additional funding from CCBWQA is warranted, and updated as needed in future CIPs.

Statistic	Stream Reclamation Cost per mile	$/pound of phosphorus (w/o cost sharing)	$/pound of phosphorus (w/ CCBWQA participation at historical limit of 25%)
Minimum =	$ 3,145	$ 1,890	$ 472
Maximum =	$ 17,708	$ 10,566	$ 2,641
Mean =	$ 8,460	$ 5,071	$ 1,268
Median =	$ 7,491	$ 4,485	$ 1,121
Standard Deviation =	$ 4,234	$ 2,523	$ 631

TABLE 1 - SUMMARY OF POTENTIAL POLLUTANT REDUCTION FACILITIES
REVISIONS FOR 2025 - 2034CIP

Date: October 11, 2024
Color Code: Blue: Project Completed
Green: Planned for design/construction within 10-year CIP (see Table 2)
* Project updated based on best available information. Projects have best accounting information that includes total project costs of design, construction, construction management, and permit clearance. Other information such as stream length was adjusted based on information noted in comments on spreadsheet. O&M costs were adjusted to be similar cost baseline. Projects that were bid/constructed in phases, were separated into those phases to facilitate adjustment to 2023 costs on PRFs for WQ Analysis.
\# Site specific analysis used for project to support CCBWQA's funding level
Projects Currently in Construction 2024
Projects Completed in 2024

Proj. Designation	Project Title	Status	Description	Design Basis				Projected Loads				Projected Treatment			Cost Estimate (1000$)								Unit Cost ($/pound)		Note
			PRF Type	Quantity	Unit	Rate	Volume	Rate	Total		Source	Removal	lbs		Capital	Land Acquisition	Water	Capital Replace[9]	O&M	Annual Cost	CCBWQA	CCBWQA	w/o cost	w/cost sharing	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)		(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
CCR-1	Reservoir Destratification (mixing)	Officially start-up April 2008	Use inlake mixing to minimize algae	369	sq mi	n/a	n/a	n/a	n/a		n/a		810	lbs/season	$ 968				$ 28	$ 80	100%	$ 968.00	$ 99	$ 99	
CCB-1	CCSP Wetlands	Prelim design prepared in 2003	Restore 60 Acres of wetlands in	369	sq mi	3.5 cfs avg	1415 af/210	0.35	mg/l	1050	lbs/yr	Base flow		600	lbs/season	$ 1,928	$ -	$ -	$ -	$ 19	$ 123	100%	$ 1,928.00	$ 204	$ 204	18
CCB-5.2	Arapahoe/Douglas County Line Stream Stabilization	Project completed w/o Authority participation	Local stream stabilization	0.51	mi			100	lbs/mi	51	lbs/yr	Storm Flow	90%	46	lbs/year	$ 1,062	$ -	$ -	$ -	$ 1	$ 58	0%	$ -	$ 1,258	$ -	2
CCB-5.3	Cottonwood Bridge Stream Stabilization	Project completed by Parker w/o Authority	Local stream stabilization	0.51	mi			100	lbs/mi	51	lbs/yr	Storm Flow	90%	46	lbs/year	$ 436	$ -	$ -	$ -	$ 2	$ 25	0%	$ -	$ 551	$ -	2
CCB-5.5	Stroh Road Stream Stabilization	Project completed by Parker w/o Authority	Stream stabilization	0.95	mi			100	lbs/mi	95	lbs/yr	Storm Flow	90%	85	lbs/year	$ 218	$ -	$ -	$ -	$ 1	$ 13	0%	$ -	$ 149	$ -	2
CCB-5.7*	Cherry Creek Stream Stabilization at Eco-Park (SEMSWA)	IGA w/SEMSWA for design in 2010 and	Local stream stabilization	0.92	mi			100	lbs/mi	92	lbs/yr	Storm Flow	90%	83	lbs/year	$ 4,756	$ -	$ -	$ -	$ 2	$ 257	19%	$ 905.00	$ 3,106	$ 591	2, 3, 7
CCB-5.9.1	Cherry Creek Stream Stabilization at 12-Mile Park (CCSP) - Phase I	Design completed in 2011 for Phase I.	Local stream stabilization	0.09	mi			100	lbs/mi	9	lbs/yr	Storm Flow	90%	9	lbs/year	$ 296	$ -	$ -	$ -	$ 1	$ 17	100%	$ 296.20	$ 1,979	$ 1,979	2, 20
CCB-5.9.2	Cherry Creek Stream Stabilization at 12-Mile Park (CCSP) - Phase II	Design completed in 2013 for Phase II.	Local stream stabilization	0.47	mi			100	lbs/mi	47	lbs/yr	Storm Flow	90%	43	lbs/year	$ 1,429	$ -	$ -	$ -	$ 1	$ 78	100%	$ 1,429.00	$ 1,820	$ 1,820	2, 20
CCB-5.10	Cherry Creek Stream Stabilization at PJCOS (Vermillion Creek,	Design completed by PJMD. Authority is funding	Local stream stabilization	0.97	mi			100	lbs/mi	97	lbs/yr	Storm Flow	90%	87	lbs/year	$ 3,017	$ -	$ -	$ -	$ 2	$ 164	21%	$ 642.90	$ 1,882	$ 401	2, 3
CCB-5.11*	Cherry Creek Stream Stabilization at Norton Farms (Parker)	Conceptual design by UDFCD identified priority 3	Local stream stabilization	0.47	mi			100	lbs/mi	47	lbs/yr	Storm Flow	90%	43	lbs/year	$ 1,103	$ -	$ -	$ -	$ 1	$ 60	23%	$ 255.00	$ 1,410	$ 326	2, 3
CCB-5.12	Cherry Creek Stream Stabilization at Pine Lane	Project completed by Parker w/o Authority	Local stream stabilization	0.28	mi			100	lbs/mi	28	lbs/yr	Storm Flow	90%	26	lbs/year	$ 500	$ -	$ -	$ -	$ 1	$ 28	0%	$ -	$ 1,087	$ -	
CCB-5.14	Cherry Creek Stream Reclamation - CCSP to Eco Park (Ph II to V)	IGA w/SEMSWA for design in 2010	Local stream stabilization	2.08	mi			100	lbs/mi	208	lbs/yr	Storm Flow	90%	188	lbs/year	$ 10,200	$ -	$ -	$ -	$ 1	$ 547	25%	$ 2,499.00	$ 2,920	$ 715	
CCB-5.14B	Cherry Creek Stream Reclamation - Valley Country Club	Projects with UDFCD, SEMSWA, and Aurora.	Local stream stabilization	0.38	mi			100	lbs/mi	38	lbs/yr	Storm Flow	90%	34	lbs/year	$ 2,284	$ -	$ -	$ -	$ 1	$ 123	21%	$ 484.00	$ 3,607	$ 764	2, 3
CCB-5.15*	Cherry Creek Stream Reclamation at Country Meadows (Hess Rd)	Project by Town of Parker and Douglas County	Local stream stabilization	0.80	mi			100	lbs/mi	80	lbs/yr	Storm Flow	90%	72	lbs/year	$ 2,788	$ -	$ -	$ -	$ 2	$ 151	25%	$ 695.00	$ 2,114	$ 527	2, 3, 7
CCB-5.16	Cherry Creek Stream Reclamation - 12 Mile Phase III	Project w/in CCSP identified as Reach 1 in Project	Local stream stabilization	0.01	mi			100	lbs/mi	1	lbs/yr	Storm Flow	90%	1	lbs/year	$ 300	$ -	$ -	$ -	$ 3	$ 19	100%	$ 300.00	$ 37,299	$ 37,299	2, 20
CCB-5.17.1A*	Cherry Creek Stream Reclamation at KOA	Preliminary design completed 2019, Extension	Local stream stabilization	0.38	mi			100	lbs/mi	38	lbs/yr	Storm Flow	90%	34	lbs/year	$ 1,806	$ -	$ -	$ -	$ 1	$ 98	18%	$ 333.00	$ 2,868	$ 529	2, 3, 7
CCB-5.17.1B	Cherry Creek Stream Reclamation at Dransfeldt	Design in 2021, Construction in 2023	Local stream stabilization	0.45	mi			100	lbs/mi	45	lbs/yr	Storm Flow	90%	41	lbs/year	$ 8,049	$ -	$ -	$ -	$ 1	$ 432	10%	$ 837.00	$ 10,566	$ 1,099	2, 3
CCB-5.17.2	Cherry Creek Stream Reclamation U/S Scott Road	Project requested by Douglas County and UDFCD	Local stream stabilization	0.81	mi			100	lbs/mi	81	lbs/yr	Storm Flow	90%	73	lbs/year	$ 5,477	$ -	$ -	$ -	$ 1	$ 294	24%	$ 1,309.00	$ 1,325	$ 317	2, 3
CCB-6.1	Piney Creek Stream Stabilization - Project 1	Authority funded $118,000 Arapahoe County in	Restore 5200 lf upstream of Parker	22.90	sq mi	n/a	n/a	100	lbs/mi	100	lbs/yr	Storm Flow	90%	90	lbs/year	$ 997	$ -	$ -	$ -	$ 10	$ 63	13%	$ 130.00	$ 705	$ 92	2, 3
CCB-6.2	Piney Creek Stream Stabilization - Project 2 U/S Buckley Rd	Project completed w/o Authority participation	Reclaim 1700 lf upstream of Buckley	0.32	mi			100	lbs/mi	32	lbs/mi	Storm Flow	90%	29	lbs/year	$ 998	$ -	$ -	$ -	$ 1	$ 54	12%	$ 120.00	$ 1,880	$ 226	2, 3
CCB-6.4A *	Piney Creek Stream Reclamation - Reach 7	Request from UDFCD in 2014	Local stream stabilization	0.44	mi			100	lbs/mi	44	lbs/mi	Storm Flow	90%	40	lbs/year	$ 3,765	$ -	$ -	$ -	$ 1	$ 203	14%	$ 512.00	$ 5,082	$ 691	2, 3, 7
CCB-6.4B.1 *	Piney Creek Stream Reclamation - Reach 6 upstream of Caley	Request from UDFCD in 2014	Local stream stabilization	0.30	mi			100	lbs/mi	30	lbs/yr	Storm Flow	90%	27	lbs/year	$ 2,896	$ -	$ -	$ -	$ 1	$ 156	14%	$ 394.00	$ 5,726	$ 779	2, 3, 7
CCB-6.4B.2 *	Piney Creek Stream Reclamation - Reach 6 Phase 2	Request from UDFCD in 2014	Local stream stabilization	0.49	mi			100	lbs/mi	49	lbs/yr	Storm Flow	90%	44	lbs/year	$ 2,659	$ -	$ -	$ -	$ 1	$ 143	14%	$ 361.00	$ 3,262	$ 443	2, 3, 7
CCB-7.1	McMurdo Gulch Reclamation (Castle Rock)	Project completed in 2011	Stream Reclamation	2.84	mi			100	lbs/mi	284	lbs/yr	Storm Flow	90%	256	lbs/year	$ 1,470	$ -	$ -	$ -	$ 28	$ 107	43%	$ 630.00	$ 419	$ 180	
CCB-7.2 *	McMurdo Gulch Reclamation (Castle Rock) 19/20 Project	Design in 2019, Construction in 2020	Stream Reclamation	0.38	mi			100	lbs/mi	38	lbs/yr	Storm Flow	90%	34	lbs/year	$ 1,156	$ -	$ -	$ -	$ 1	$ 63	25%	$ 289.00	$ 1,846	$ 462	2, 3, 7
CCB-7.3 *	McMurdo Gulch Reclamation (Castle Rock) 20/21/22 Project	Design in 2020, Construction 2021	Stream Reclamation	0.70	mi			100	lbs/mi	70	lbs/yr	Storm Flow	90%	63	lbs/year	$ 1,940	$ -	$ -	$ -	$ 1	$ 105	24%	$ 466.00	$ 1,664	$ 400	2, 3, 7
CCB-12	Bowtie Property PRF	Purchase completed 2003	Stabilize confluence (Ph I) and	22	sq mi	2-year flood	300 af	500	mg/l/ton	85	lbs/yr	base flow	70% pond	235	lbs/year	$ 826	$ 300	$ 63	$ 1.8	$ 6	$ 70	100%	$ 826.00	$ 299	$ 299	2
CCB-13.1	Cottonwood/Peoria Wetlands Pond	Completed 2003. Restorative maintenance required	Joint funded project with UDFCD,	8.30	sq mi							base and	measured	363	lbs/year	$ 1,636	$ -	$ -	$ -	$ 5	$ 93	12%	$ 196.00	$ 255	$ 31	2
CCB-13.2	Cottonwood Stream Reclamation in CCSP	Phase I completed in 2004. Phase II completed	11,600 lf of stream reclamation from	2.20	mi			100	lbs/mi	220	lbs/yr	base and	see	730	lbs/year	$ 2,200	$ -	$ -	$ -	$ 55	$ 173	100%	$ 2,200.00	$ 237	$ 237	2
CCB-13.3	Cottonwood Creek Stream Stabilization at Easter Avenue	Authority contributed $338,000 for construction in	2,600 lf of stream reclamation from	0.49	mi			100	lbs/mi	49	lbs/yr	Storm Flow	90%	44	lbs/year	$ 1,350	$ -	$ -	$ -	$ 1	$ 73	25%	$ 338.00	$ 1,655	$ 414	2
CCB-13.4	Peoria Trib B/Airport East and West Pond (Outfall C-1)	Cottonwood Creek Master Planned Improvements.	Combined existing detention ponds	0.35	sq mi			400	lbs/sq mi	140	lbs/yr	Base and	40%	56	lbs/yr	$ 523	$ -	$ -	$ -	$ -	$ 28	25%	$ 131.00	$ 500	$ 125	
CCB-17.2	Reservoir Shoreline Stabilization	Scheduled for construction beginning in 2012	CCSP Recreation sites: Mountain,											54	lbs/yr	$ 1,131	$ -	$ -	$ -	$ 5	$ 66	100%	$ 1,131.00	$ 1,215	$ 1,215	1, 16
CCB-17.3	West Boat Ramp Parking Lot WQ Improvements	Final design completed in 2012	Provide water quality treatment of	3.43	ac prkg					3	lbs/yr	parking lot	70%	2	lbs/yr	$ 330	$ -	$ -	$ -	$ 1	$ 19	100%	$ 330.30	$ 8,903	$ 8,903	1
CCB-17.4	East Boat Ramp Shoreline Stabilization Phase II	Identified during 2012 annual PRF inspection	105 lf of bank stabilization	105	lf	0.1 cy/yr/ft		0.14	lbs/lf	14.7	lbs/yr	bank erosion	80%	12	lbs/yr	$ 91	$ -	$ -	$ -	$ 2	$ 7	100%	$ 91.00	$ 585	$ 585	1, 16
CCB-17.5	East Shade Shelter Shoreline Stabilization Phase II	Identified during 2012 annual PRF inspection	20 lf of bank stabilization	20	lf	0.1 cy/yr/ft		0.14	lbs/lf	2.8	lbs/yr	bank erosion	80%	2	lbs/yr	$ 18	$ -	$ -	$ -	$ -	$ 1	100%	$ 18.00	$ 431	$ 431	1, 16
CCB-20.1	Detention Pond Retrofit Program - McMurdo Gulch	Phase 1 - McMurdo Gulch	Modify existing ponds to meet current	1	Each			0.40	lbs/Trib Acre	0.4	lbs/yr	Residential		9	lbs/pond/yr	$ 60	$ -	$ -	$ -	$ 0	$ 4	100%	$ 60.00	$ 396	$ 396	1, 17
CCB-22 .2*	Happy Canyon Creek Upstream of I-25 (MHFD)	Requested in 2020	3000 lf of stream reclamation	0.57	mi			100	lbs/mi	57	lbs/yr	Storm Flow	90%	51	lbs/year	$ 4,021	$ -	$ -	$ -	$ 1	$ 216	9%	$ 362.00	$ 4,232	$ 381	2, 3, 7
CCB-23.1	Dove Creek Otero Avenue Chambers - Phase I (SEMSWA)	Requested in 2020	1400 lf of stream reclamation	0.27	mi			100	lbs/mi	27	lbs/yr	Storm Flow	90%	24	lbs/year	$ 2,800	$ -	$ -	$ -	$ 1	$ 151	9%	$ 238.00	$ 6,328	$ 538	2, 3
CCB-23.2	Dove Creek Chambers to Pond D-1 - Phase II (SEMSWA)	Requested in 2020	1300 lf of stream reclamation	0.25	mi			100	lbs/mi	25	lbs/yr	Storm Flow	90%	22	lbs/year	$ 2,641	$ -	$ -	$ -	$ 1	$ 142	20%	$ 540.00	$ 6,431	$ 1,315	2, 3

Proj. Designation	Project Title	Status	Description	Design Basis				Projected Loads				Projected Treatment			Cost Estimate (1000$)								Unit Cost ($/Mile)	Unit Cost ($/pound)		Note
			PRF Type	Quantity	Unit	Rate	Volume	Rate	Total		Source	Removal	lbs Removed		Capital from 2024 to 2034	Total Project Cost	Design in 2024 $	Capital in 2023 $	Land	Water	Capital	O&M	Annual Cost	CCBWQA	CCBWQA	w/o cost sharing	w/cost sharing	w/o cost	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)		(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(28)
CCB-5.14C	Cherry Creek at Arapahoe Rd.	Projects with UDFCD, SEMSWA, and Aurora. Phases started in 2010.	Local stream stabilization (L = 5167 ft on Cherry Creek)	0.98	mi			100	lbs/mi	98	lbs/yr	Storm Flow	90%	88	lbs/year	$ 5,287	$ 10,600	$ 1,590	$ 9,010	$ -	$ -	$ -	$ 2.00	$ 570	16%	$1,665	$ 6,462	$ 1,015	$ 10,816	2, 3, 7
CCB-5.16A	Cherry Creek Reach 1- Reservoir to Lake View Road	Project w/in CCSP	Local stream stabilization (L =5150 ft.)	0.98	mi									3700	lbs/year[25]	$ 2,614	$ 16,910	$ 2,537	$ 14,374	$ -	$ -	$ -	$ 6.00	$ 912	20%	$3,382	$ 246	$ 49	$ 17,337	2, 6, 10,12
CCB-6.5	Piney Creek Reaches 1 to 2 (Parker Road to Cherry Creek)	Requested in 2020	2900 lf of stream reclamation	0.55	mi			100	lbs/mi	55	lbs/mi	Storm Flow	90%	49	lbs/year	$ 2,350	$ 4,060	$ 609	$ 3,451	$ -	$ -	$ -	$ 1.00	$ 219	23%	$930	$ 4,421	$ 1,013	$ 7,392	2, 3, 7
CCB-6.6	Piney Creek Reaches 4 to 5 (South of Orchard Road)	Requested in 2020	3800 lf of stream reclamation	0.72	mi			100	lbs/mi	72	lbs/mi	Storm Flow	90%	65	lbs/year	$ 3,000	$ 5,320	$ 798	$ 4,522	$ -	$ -	$ -	$ 2.00	$ 287	23%	$1,220	$ 4,431	$ 1,016	$ 7,392	2, 3, 7
CCB-7.4	McMurdo Gulch Reclamation (Castle Rock) Priority 3	Design in 2022- 2023, Construction in 2024	Stream Reclamation (L = 6,550 lf)	1.24	mi			100	lbs/mi	124	lbs/yr	Storm Flow	90%	112	lbs/year	$ 3,298	$ 5,162	$ 774	$ 4,388	$ -	$ -	$ -	$ 2.00	$ 279	25%	$1,292	$ 1,878	$ 470	$ 4,161	2, 3, 7
CCB-17.5.1	East Shade Shelter Shoreline Stabilization Phase III	Identified during 2014 annual PRF inspection	400 lf of bank stabilization	400	lf	0.1 cy/yr/ft		0.14	lbs/lf	56.0	lbs/yr	bank erosion	80%	44.8	lbs/yr	$ 776	$ 960	$ 184	$ 791	$ -	$ -	$ -	$ 1.00	$ 52	86%	$827	$ 1,170	$ 1,008	NA	1, 16, 22
CCB-21.1	Lone Tree Creek in CCSP downstream of Pond (CCBWQA Only)	Identified in 2014. Request from Arapahoe County Open Space	500 lf of stream reclamation from CCSP Boundary to Cottonwood Creek	0.09	mi			100	lbs/mi	9	lbs/yr	Storm Flow	90%	9	lbs/yr	$ 50	$ 50	$ 8	$ 43	$ -	$ -	$ -	$ 6.00	$ 9	100%	$50	$ 1,018.32	$ 1,018	$ 528	2, 3, 6
CCB-21.3	Lone Tree Creek in CCSP upstream of Pond (Centennial Trail Portion)	Request from Centennial for Participation in Stream Reclamation portion of Trail Project.	710 lf of stream reclamation between CCSP Boundary and Windmill Creek	0.13	mi			100	lbs/mi	13	lbs/yr	Storm Flow	90%	12	lbs/yr	$ 448	$ 448	$ -	$ 448	$ -	$ -	$ -	$ 6.00	$ 30	25%	$112	$ 2,479.08	$ 620	$ 3,332	2, 3, 6
CCB-22.1	Happy Canyon Creek at Jordan Road (SEMSWA)	Requested in 2020	2,500 lf of stream reclamation, project extended another 2000 feet in 2022	0.85	mi			100	lbs/mi	85	lbs/yr	Storm Flow	90%	77	lbs/year	$ 3,010	$ 4,423	$ 663	$ 3,760	$ -	$ -	$ -	$ 2.00	$ 239	23%	$1,031	$ 3,115	$ 726	$ 5,190	2, 3, 7
CCB - 20.2	Water Quality Pond W6/W7 Retrofit Project	Requested in 2024, Construction Ready 2025	WQ Pond Retrofit	NA			15	1.33	1.0(lb P/ton) x 1.33(ton/cy)	20	lbs/yr		50%	10	lbs/year	$ 400	$ 400		$ 400	$ -	$ -	$ -	$ 2.50	$ 24	25%	$100	$ 2,399	$ 600	NA	23,24

Proj.	Project Title	Status	Description	Design Basis				Projected Loads				Projected Treatment			Cost Estimate								Unit Cost		Note
			PRF Type	Quantity	Unit	Rate	Volume	Rate	Total		Source	Removal	lbs		Capital	Land Acquisition	Water	Capital Replace[9]	O&M	Annual Cost	CCBWQA	CCBWQA	w/o cost	w/cost sharing	
(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)		(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
The projects listed below are older and will likely need to be further evaluated and have costs updated in with future CIP efforts.																									
CCB-8	Limestone Filter Enhancement	Specific project not identified	Construct limestone filter bed	1.0	sq mi	n/a	10.7	427	lbs/sq mi	427	lbs/yr	Base and	20%	85	lbs/year/mi[2]	$ 943		$ -	$ 595	$ 1	$ 83	43%	$ 405.49	$ 977	$ 420	
CCB-11	Advanced Water Treatment Plant	Conceptual design prepared	Construct 2 MGD AWT plant on	3	cfs	2-MGD	2260	0.21	mg/l	1272	lbs/yr	Base flow	90%	1145	lbs/year	$ 4,593	unknown	unknown		$ 69		100%	$ 4,593.00	$ -	$ -	11
CCB-17.4.1	East Boat Ramp Shoreline Stabilization Phase III	Identified during 2012 annual PRF inspection	400 lf of bank stabilization	400	lf	0.1 cy/yr/ft		0.14	lbs/lf	56.0	lbs/yr	bank erosion	80%	44.8	lbs/yr	$ 350	$ -	$ -	$ -	$ 4	$ 23	100%	$ 350.00	$ 508	$ 508	1, 16
CCB-17.6	West Shade Shelter Shoreline Stabilization PRF[14]	Identified initially in 2006. UCD Student Project	1,400 lf of bank stabilization	1400	lf	0.1 cy/yr/ft		0.14	lbs/lf	196.0	lbs/yr	bank erosion	80%	179	lbs/yr	$ 704	$ -	$ -	$ -	$ 2	$ 40	65%	$ 457.60	$ 222	$ 144	21, 22
CCB-17.8	Dixon Grove Shoreline Stabilization Phase II	Identified during 2019 annual PRF inspection	200 lf of bank stabilization	200	lf	0.1 cy/yr/ft		0.14	lbs/lf	28.0	lbs/yr	bank erosion	80%	22.4	lbs/yr	$ 235	$ -	$ -	$ -	$ 1	$ 14	100%	$ 235.00	$ 607	$ 607	1, 16, 22
CCB-18	OWTS Sewer Service	No action to date	Provide Sewer Service for OWTS			To Be Determined		To Be Determined				To Be Determined				To Be Determined						100%	$ -	To Be Determined		1
CCB-19	Non-point Pollutant Management	No action to date	Assist agricultural contributors to			To Be Determined		To Be Determined				To Be Determined			$ 100	$ -	$ -	$ -	$ -	$ 5	100%	$ 100.00	To Be Determined		1

BASIS FOR ANALYSIS:

(A) Unit cost of phosphorus removal based on annualized cost of completed project over 35 years at 4% interest rate. CRF = 0.053577

(B) All projects identified provide for additional phosphorus immobilization beyond minimum requirements, unless noted otherwise.

2024 CIP NOTES:

1. Assumed that augmentation for consumptive use not required
2. Augmentation for naturally established wetlands not required (assumption)
3. Phosphorus Estimated based on Interim Stream Reclamation Paper
4. See 2020 Cattail Harvesting Pilot Project Memo. Phosphorus estimated based on SEMSWA 2020 Data.
5. Pond updates to bring up to current standards and to facilitate maintenance. No phosphorus calculation provided, since ponds already exist.
6. Updated O&M Cost to $6k per mile (increased cost to account for higher public use for projects in CCSP)with a minimum of $1k.
7. Updated O&M Cost to $2k per mile with a minimum of $1k
8. Water costs at $ 6,500 per acre foot
9. Present worth of capital replacement
10. Benefit listed in Muller's Cherry Creek Stream and Water Quality Assessment, Reservoir to State Park Boundary, November 2022
11. Land acquisition and water augmentation not defined. CWSD/ACWWA JWPP project influenced scope of project.
12. Total Phosphorus loading derived from laboratory sediment samples & Stantec Geomorphic Study BANCS analysis.
16. Benefit approximated based on other shoreline projects and estimates
17. Loads and performance based on calculations for 3 McMurdo Gulch ponds.
19. Approach was shifted to focus on stream reclamation (CCB-5.14) and reduction of sediment and nutrient sources from erosion.
20. Joint project with CCSP. Integrate design with Dog Park uses and improvements.
21. Phosphorus: Shoreline 177 lbs/yr + Parking Lot 2 lbs/yr =179 lbs/yr
22. Updated O&M Cost to $2k per 1000' with a minimum of $1k
23. Phosphorus removal from forebay (Associated with Pond Retrofit Assessment) is assumed that total volume of sediment has average phosphorus content of 1.0lb/ton of sediment with 1.33 tons/cy of sediment. Removal is estimated to be once annually with a cleanout at 50% volume accumulation in the pond
24. Assume cost to O&M cost for sediment removal is $150/CY (Assume 3 x multiplyer for haul off and disposal fee)

REFERENCES

1. Muller Eng 2003. *Feasibility Evaluation for Cherry Creek State Park Wetlands Project*
2. Muller Eng 2003. *Feasibility Evaluation for Cottonwood Creek Stream Stabilization Project*
3. AMEC 2005. *Draft Feasibility Report Cherry Creek Reservoir Destratification*
4. AMEC 2006. *Recommendations for Prepurchase of Jamor Equipment for Cherry Creek Reservoir Destratification Project.*
5. Tetra Tech August 2006. *Phosphorus Estimates in Cherry Creek and Cost for Removal via Sediment Trap.*
6 WERF 2000. *Phosphorus Credit Trading in the Cherry Creek Basin: An Innovative Approach to Achieving Water Quality Benefits.*
7. Ruzzo, WP September 5, 2003. Cherry Creek Corridor Master Plan-*Estimate of Phosphorus Reduction from Stream Reclamation*
8. Ruzzo, W. P. September 21, 2006. *Cottonwood Creek Reclamation - Water Rights Augmentation Requirements.*
9. TetraTech December 2006. *Design of Cherry Creek Sediment Basin and Stream Stabilization.*
10. Brown and Caldwell Feb 2007. *Shop Creek Wetlands Pollutant Reduction Facility Wetland Assessment*
11. PBSJ October 2006. *Draft McMurdo Gulch Major Drainageway Master Plan*
12. Brown and Caldwell 2010. *Cherry Creek Stream Reclamation at Shop Creek Trail.*
13. CCBWQA TAC June 16, 2011. *Stream Reclamation Water Quality Benefit Evaluation Interim Status Report*
14. Ruzzo Memo, September 4, 2013, *West Shade Shelter Shoreline Stabilization PRF - Water Quality Analysis.*

CHERRY CREEK BASIN WATER QUALITY AUTHORITY

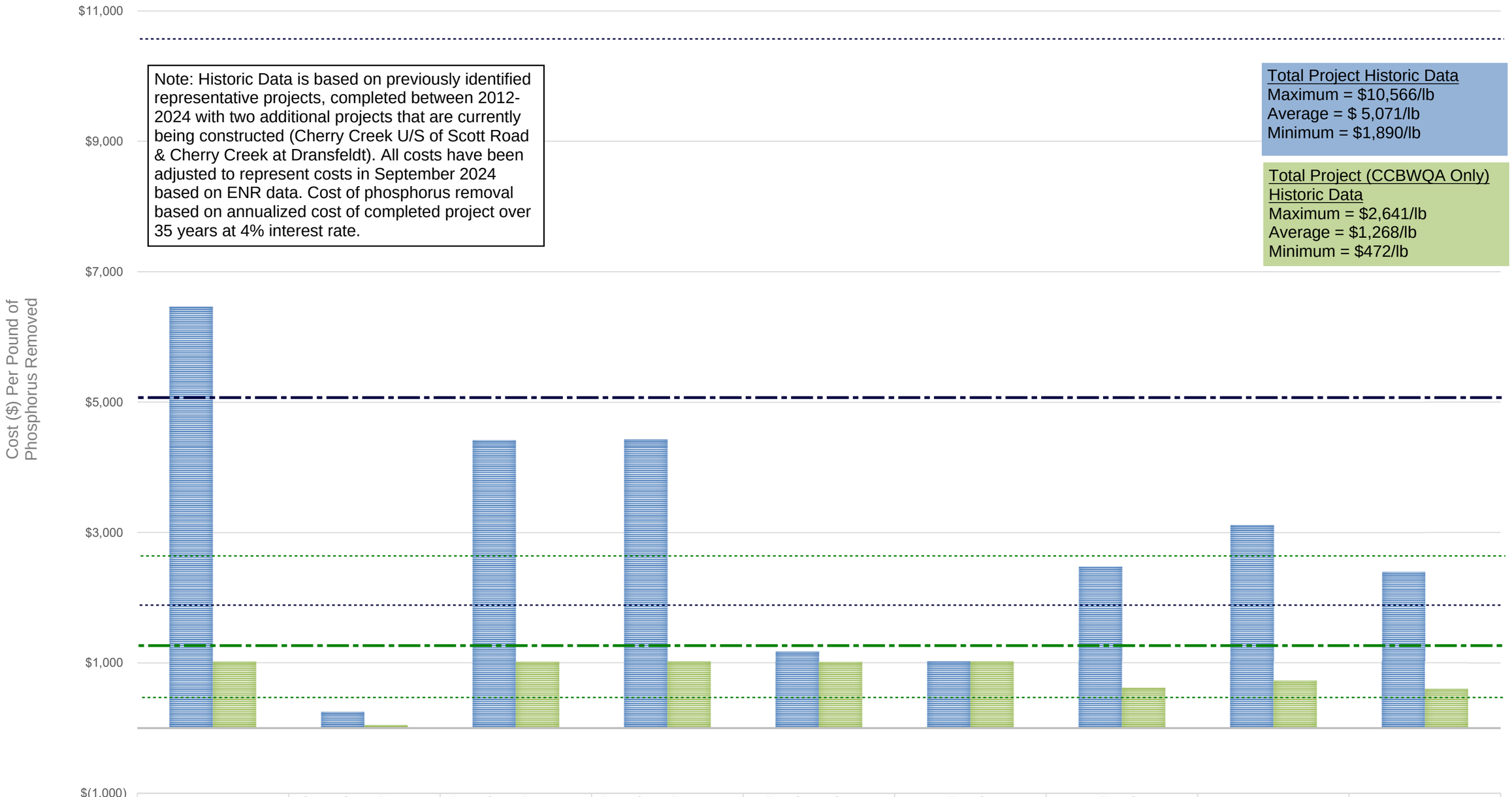
TABLE 2 - SUMMARY OF RECOMMENDED POLLUTANT REDUCTION FACILITIES

2025 - 2034 BUDGET PROJECTIONS (1000$)

Color Code: First year in 10-year CIP

	October 3, 2024				Residual	Proposed 2025 Budget				Proposed 2026	Proposed 2027	Proposed 2028	Proposed 2029	Proposed 2030	Proposed 2031	Proposed 2032	Proposed 2033	Proposed 2034	2025-2034
Project	Project Title	Total	Authority	Authority Portion		Design	Capital	Land	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total
Budget Category - General																			
Budget Category - Reservoir Projects																			
CCB-17.5.1	East Shade Shelter Shoreline Stabilization Phase III	$ 960	$ 827	86%	***$ 28***	$ -	$ 671	$ -	***$ 671***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 671***
CCB-17.7	Tower Loop Shoreline Stabilization Phase II	$ 1,035	$ 1,035	100%		$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 155***	***$ 880***	***$ 1,035***
Budget Category - Stream Reclamation Projects																			***$ -***
CCB-5.4	Cherry Creek Stream Reclamation at Main Street (Parker)	$ 5,600	$ 1,280	23%		$ -	$ -	$ -	***$ -***		***$ -***	***$ 700***	***$ 580***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 1,280***
CCB-5.6	Cherry Creek Stream Stabilization at Lincoln Avenue (Parker)	$ 3,290	$ 755	23%		$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 411***	***$ 344***	***$ -***	***$ -***	***$ 755***
CCB-5.14C	Cherry Creek Stream Reclamation at Arapahoe Rd. - Valley	$ 10,600	$ 1,655	16%		$ -	$ 200	$ -	***$ 200***	***$ 200***	***$ 200***	***$ 200***	***$ 200***	***$ 169***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 1,169***
CCB-5.16A	Cherry Creek - Reservoir to Lake View Drive Alternatives Analysis	$ 438	$ 438	100%			$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***
CCB-5.16A	Cherry Creek Reach 1 - Design	$ 16,910	$ 3,382	20%	***$ 41***	$ 775	$ -	$ -	***$ 775***	***$ 978***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 1,753***
CCB-5.16A	Cherry Creek Reach 1 - Construction	See Above	See Above	See Above		$ -	$ 1,000	$ -	***$ 1,000***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 1,000***
CCB-5.16 B, C	Cherry Creek Reaches 2 & 3	$ 30,488	$ 6,097	20%		$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ 200***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 200***
CCB-6.5	Piney Creek - Cherry Creek to Parker Road, Reaches 1 to 2	$ 4,060	$ 930	23%		$ 25	$ -	$ -	***$ 25***	***$ 75***	***$ 250***	***$ 225***	***$ 225***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 800***
CCB-6.6	Piney Creek south of Orchard Rd., Reaches 4 to 5 (SEMSWA)	$ 5,320	$ 1,220	23%		$ 150	$ -	$ -	***$ 150***	***$ 235***	***$ 250***	***$ 250***	***$ 260***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 1,145***
CCB-13.5.4	Cottonwood Creek and Tributary C (IWSD)	$ 2,496	$ 624	25%		$ -	$ -	$ -	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 624***	***$ -***	***$ -***	***$ -***	***$ 624***
CCB-21.1	Lone Tree Creek in CCSP downstream of Pond (CCBWQA Only)	$ 600	$ 600	100%		$ -	$ 50	$ -	***$ 50***		***$ -***	***$ -***	***$ 120***	***$ 480***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 650***
CCB-21.3	Lone Tree Creek in CCSP upstream of Pond (Centennial Trail	$ 448	$ 112	25%		$ -	$ 112	$ -	***$ 112***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 112***
CCB-22.1	Happy Canyon Creek at Jordan Road (SEMSWA)	$ 6,300	$ 1,445	23%		$ 300	$ -	$ -	***$ 300***	***$ 300***	***$ 200***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 800***
Budget Category - PRF Water Quality/Wetland Ponds																			
CCB - 20.2	Water Quality Pond W6/W7 Retrofit Project	$ 400	$ 100	25%		$ -	$ 100	$ -	***$ 100***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ 100***
Budget Category - PRF Preservation, Acquisition, Lease																			***$ -***
CCB-16	PRF Preservation, Acquisition, Lease of Land or Water	$ 1,000	$ 1,000	100%		$ -	$ 100	$ -	***$ 100***	***$ 100***	***$ 100***	***$ 100***	***$ 100***	***$ 100***	***$ 100***	***$ 100***	***$ 100***	***$ 100***	***$ 1,000***
	SUB-TOTALS								***$ 3,483***	***$ 1,888***	***$ 1,000***	***$ 1,475***	***$ 1,685***	***$ 749***	***$ 1,135***	***$ 444***	***$ 255***	***$ 980***	***$ 13,094***

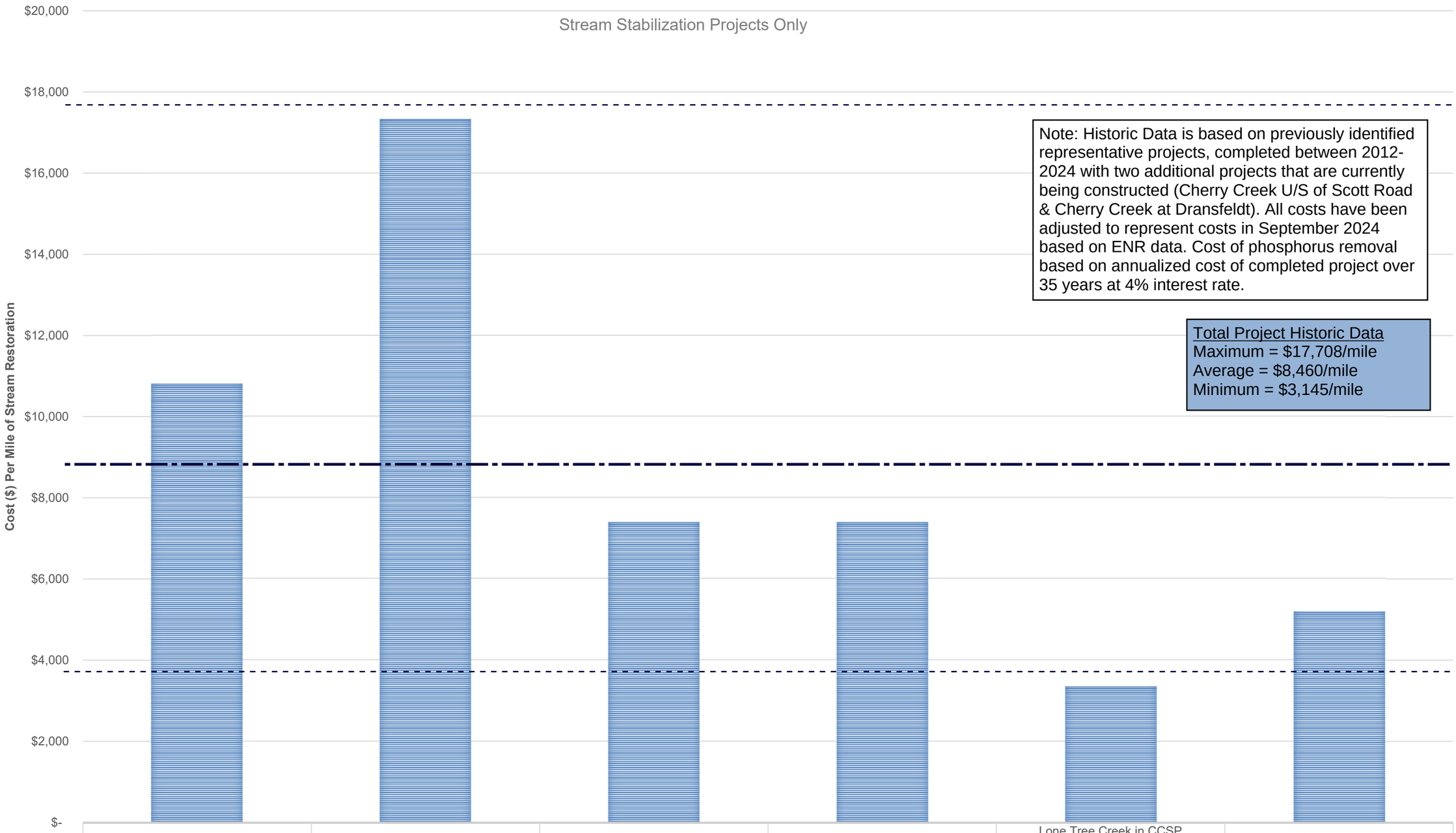
COST $/LB PHOSPHORUS IMMOBILIZATION FOR 2025 CIP PROJECTS



	Cherry Creek at Arapahoe Rd.	Cherry Creek Reach 1- Reservoir to Lake View Road	Piney Creek Reaches 1 to 2 (Parker Road to Cherry Creek)	Piney Creek Reaches 4 to 5 (South of Orchard Road)	East Shade Shelter Shoreline Stabilization Phase III	Lone Tree Creek in CCSP downstream of Pond (CCBWQA Only)	Lone Tree Creek in CCSP upstream of Pond (Centennial Trail Portion)	Happy Canyon Creek at Jordan Road (SEMSWA)	Water Quality Pond W6/W7 Retrofit Project
Total Project Cost	$6,462	$246	$4,421	$4,431	$1,170	$1,018.32	$2,479.08	$3,115	$2,399
CCBWQA Cost Only	$1,015	$49	$1,013	$1,016	$1,008	$1,018	$620	$726	$600

COST $/MILE FOR 2025 CIP PROJECTS

Stream Stabilization Projects Only



Note: Historic Data is based on previously identified representative projects, completed between 2012-2024 with two additional projects that are currently being constructed (Cherry Creek U/S of Scott Road & Cherry Creek at Dransfeldt). All costs have been adjusted to represent costs in September 2024 based on ENR data. Cost of phosphorus removal based on annualized cost of completed project over 35 years at 4% interest rate.

Total Project Historic Data
Maximum = $17,708/mile
Average = $8,460/mile
Minimum = $3,145/mile

	Cherry Creek at Arapahoe Rd.	Cherry Creek Reach 1- Reservoir to Lake View Road	Piney Creek Reaches 1 to 2 (Parker Road to Cherry Creek)	Piney Creek Reaches 4 to 5 (South of Orchard Road)	Lone Tree Creek in CCSP downstream of Pond (CCBWQA Only)	Lone Tree Creek in CCSP upstream of Pond (Centennial Trail Portion)
Total Project Cost	$10,816	$17,337	$7,392	$7,392	$3,332	$5,190