



CITY OF COMMERCE CITY DRAINAGE IMPACT FEE STUDY



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TABLE OF CONTENTS

1.0 INTRODUCTION	1
1.1 Background and Purpose	1
1.2 Existing Fees.....	1
1.3 General Project Scope	2
2.0 DATA SOURCES	2
3.0 INITIAL DATA EVALUATION.....	3
3.1 Subject Area Boundaries.....	3
3.2 Capital & Maintenance Need Sources.....	4
3.3 Estimate of total Capital & Maintenance Costs	5
3.4 Estimate of Existing Development	6
3.5 Estimate of remaining Developable Land.....	6
4.0 DRAINAGE IMPACT FEE ONLY.....	8
5.0 DRAINAGE IMPACT FEE PLUS ANNUAL STORMWATER FEE.....	10
6.0 ANNUAL MAINTENANCE FEES.....	14
7.0 ADDITIONAL CONSIDERATIONS.....	14
8.0 CONCLUSIONS.....	15
9.0 REFERENCES.....	16
APPENDIX A MASTER PLANNING COSTS	1
APPENDIX B COST ESCALATION CALCULATIONS	1

LIST OF TABLES

Table 1. Data Sources.....	3
Table 2. Capital and Maintenance Need Overview	6
Table 3. Impervious Values for Commerce City Zoning Designations.....	7
Table 4. Existing and Future Development Overview	7
Table 5. Drainage Impact Fee Only for New Impervious Area	8
Table 6. Drainage Impact Fee Only	9
Table 7. Proposed Drainage Impact Fee Only for New Impervious Area	9
Table 8. Representative Drainage Impact Fee Only	10
Table 9. Fee Allocation by Area Delineation	11
Table 10. Drainage Impact Fee per New Impervious Area using an Additional Annual Fee	12
Table 11. Annual Stormwater Fee per Impervious Area	13
Table 12. Representative Drainage Impact Fee with Annual Stormwater Fee	13



Table 13. Annual Maintenance Fee per Impervious Area 14

LIST OF FIGURES

Figure 1. Vicinity Map 4

1.0 INTRODUCTION

1.1 BACKGROUND AND PURPOSE

The City of Commerce City (City) is a mixed residential and industrial municipality in Adams County, Colorado. The City's population was 62,418 at the 2020 United States Census (census), a 35.95% increase since the 2010 census. Rapid development has increased the impervious area within the City boundaries. Increased impervious area prevents rainfall from infiltrating into the ground as it did historically and results in increases in stormwater runoff from developed parcels. Even with detention requirements, development is creating an increased volume of runoff which is degrading stream systems. Increased runoff often requires increasing the capacity of downstream infrastructure such as channels, culverts, and bridges to protect life and property from damage. However, the City has not collected a sufficient drainage impact fee or a stormwater utility fee that would adequately fund the required stormwater infrastructure or maintain the existing stormwater infrastructure within the City.

The primary objective of this study is to develop options for a drainage impact fee to help fund the planned drainage improvements required to mitigate the increased stormwater runoff caused by new development. The drainage impact fee would be collected when properties develop or redevelop. A secondary objective is to develop options for an annual stormwater utility fee that would be collected from developed properties to help fund the planned drainage improvements required to mitigate the increased runoff caused by all developed properties. Adding an annual stormwater utility fee, in addition to a drainage impact fee would spread the responsibility to mitigate increased runoff more equitably. Both drainage impact fees and annual stormwater utility fees are used by several municipalities in the Denver Metro area. A final objective is to develop an annual maintenance fee that would be used to maintain stormwater infrastructure once it is constructed.

1.2 EXISTING FEES

The City currently has a limited drainage impact fee, applied only to a few watersheds, that was last updated in 2011. This impact fee is assessed on all new development within the Third Creek, Second Creek, Buffalo Run Tributary, and Direct Flow Area 0053 watersheds. The fee varies by watershed, ranging from \$1,445 per acre in the Third Creek watershed to \$3,055 per acre in the Direct Flow Area 0053 watershed. The fee is per acre of total parcel area, not per acre of added imperviousness. It is assessed at the time of development and is intended to fund the cost of drainage improvements required within each individual watershed.

The impact fees currently being used were based in part on the recommended improvements included in older and now outdated drainageway master plans. A master plan, typically known as a Major Drainageway Plan (MDP), is a detailed study of a watershed, or drainage basin, typically funded, reviewed, and accepted by the Mile High Flood District (MHFD) and the local sponsor, in this case Commerce City. Master plans contain a strategy and work plan that identifies stormwater and flood risk management projects for construction, guides new land development projects on regional drainage and flood control needs, and provides help with the identification and acquisition of rights-of-way for future capital improvements and areas for preservation. Several MDPs within with City have recently been updated or are currently being updated.

1.3 GENERAL PROJECT SCOPE

This study provides an estimate of the total current stormwater capital needs within the City based on the most current master planning documents and other reports listed in Section 2.0. This study also provides an estimate of the total remaining developable area within the City based on each parcel's zoning. This remaining developable area is used to calculate the drainage impact fee. Finally, this study estimates the current developed area within the City based on imperviousness shapefiles provided by the Denver Regional Council of Governments (DRCOG). Capital needs, developed area, and remaining developable area is used in various calculations to provide three fee options: a) a drainage impact only fee (to be assessed if there is not also an annual fee), b) a drainage impact fee in combination with an annual stormwater fee, and c) an annual maintenance fee. The data is also grouped and evaluated using three possible scenarios for the drainage impact only fee.

1. City-Wide: The total City-wide capital need is evenly divided by the total remaining developable area within the City.
2. Basin-Specific: The capital need is determined separately for the Irondale Gulch, First Creek, Second Creek, Third Creek, and Direct Flow Area (DFA) 0053/Henderson Creek watersheds. Capital need outside these basins is not accounted for in this scenario.
3. Northern Infrastructure General Improvements District (NIGID): Capital need is determined within the NIGID and will be divided by the developable area within the NIGID.

Similar evaluations are provided for the drainage impact fee in combination with an annual stormwater fee and the annual maintenance fee.

2.0 DATA SOURCES

Several data sources were used to calculate the fees recommended in this study. The data used to complete this study, the source of the data, and the use of each data source are presented in Table 1. Note that several of the MDPs and other documents on which the impact fee is based are outdated, with several being over a decade old. However, at the time of this report, they are the best planning information available on which to base proposed impact fees. It is important to note that the proposed fees are only an estimate, and actual need may increase or decrease based on changes in proposed development or drainage solutions.

It should also be noted that the cost several bridge or culvert replacement projects recommended by the MDPs will be funded by the City's Roadway Impact Fee if the bridge or culvert crossing is at a roadway that needs to be widened. At the City's request, these crossing costs are not included in the total capital need calculated for this report.

Table 1. Data Sources

Source	Document or Data	Use
MHFD	Second Creek MDP – Alternative Analysis Third Creek MDP – Conceptual Design Henderson Creek MDP – Alternative Analysis Draft First Creek, Irondale Gulch, and DFA 0055 OSP – Alternative Report Lower First Creek and Direct Flow Area 0055 Second Creek and DFA 0053 OSP	Estimate of capital and/or maintenance needs
MHFD	Basin delineation	Basin-specific calculations
City	Parcel data including zoning and area	Estimate of potential remaining development area
City	NIGID boundary shapefile	Area-specific calculations
City	<i>Commerce City Final Draft Stormwater Funding Study</i> , prepared by Amec, dated March 8, 2011 Existing impact fee map Stormwater Utility Ordinance #1896	For information only
DRCOG (via the City)	Building roofprints & paved areas including sidewalks, parking areas, and driveways as GIS shapefiles	Existing impervious area calculations
CDOT	2021 Colorado Construction Index (CCI)	Inflation and escalation values

3.0 INITIAL DATA EVALUATION

3.1 SUBJECT AREA BOUNDARIES

The City requested that the capital needs and resulting fee be evaluated three ways, The City boundary and the NIGID boundary were provided by the City as GIS shapefiles. The watershed boundaries available and required for capital needs and fee evaluation were the Irondale Gulch, First Creek, Second Creek, Third Creek, and Direct Flow Area (DFA) 0053/Henderson Creek watersheds. The individual watershed delineations were extracted from the MHFD map viewer and updated to match the most recent master plan delineations. The Henderson Creek watershed was not included in the MHFD map viewer, so the watershed boundary was extracted from the Henderson Creek MDP. First Creek, Second Creek, and Irondale Gulch watershed boundaries were all updated based on recent master plan delineations. The Third Creek watershed delineation was provided by MHFD during the Second Creek MDP and was then altered to match the updated Second Creek watershed. Direct Flow Area 0053 was altered to match the MHFD map viewer data, the updated First Creek watershed, and the Henderson Creek watershed. A small area west of the Henderson Creek watershed was initially part of the First Creek watershed, however, this area is assumed to be part of DFA 0053 based on updated delineations. Delineations of the subject area boundaries are shown in Figure 1.

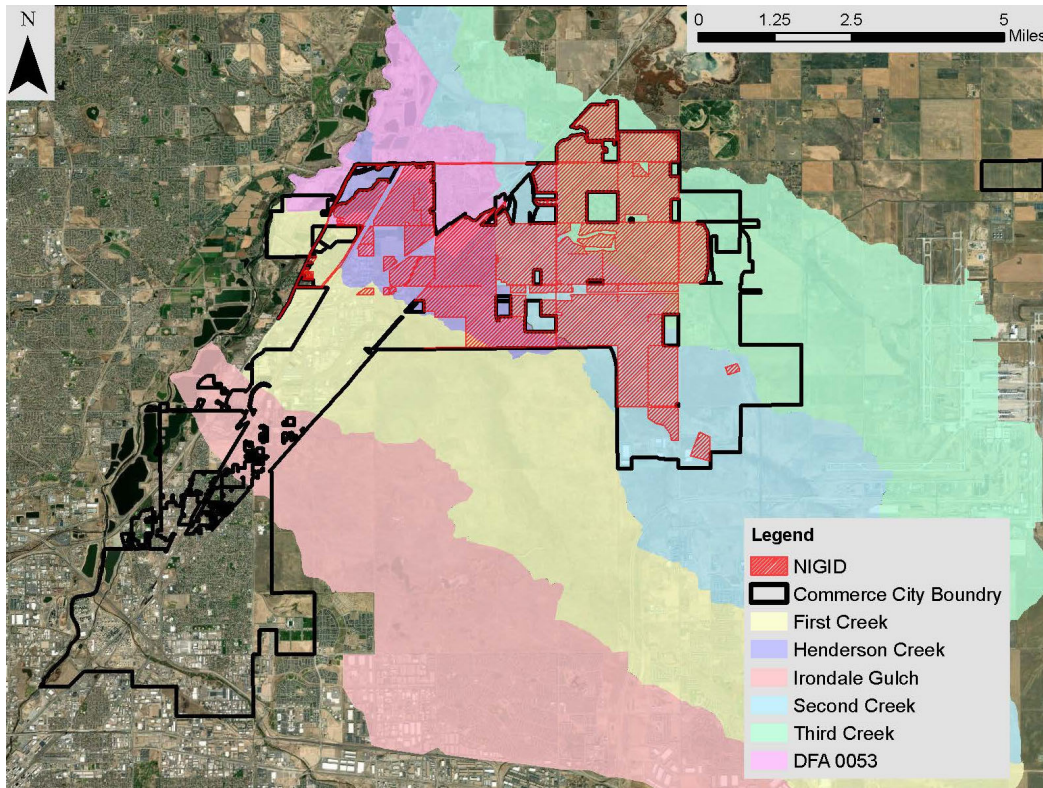


Figure 1. Vicinity Map

3.2 CAPITAL & MAINTENANCE NEED SOURCES

Capital needs for stormwater infrastructure was estimated using information from masterplans and reports for the watersheds within the City from the following documents:

1. Second Creek Major Drainageway Plan Alternatives Analysis (Phases 1-3) (RESPEC, January 2019)
2. Conceptual Design Third Creek (Matrix Design Group, November 2018)
3. Henderson Creek Major Drainageway Plan Alternative Draft Analysis Report (RESPEC, July 2021)
4. Irondale Gulch Outfall Systems Plan Conceptual Design Report (Moser & Associates Engineering, September 2011)
5. Irondale Gulch Stormwater Implementation Plan (RESPEC, December 2019)
6. Lower First Creek and Direct Flow Area 0055 Major Drainageway Planning Preliminary Design and Final Report (Turner Collie & Braden Inc., May 2002)
7. Second Creek (Downstream of DIA) and DFA 0053 Watersheds Outfall Systems Planning Update Preliminary Design Report (Kiowa Engineering Corporation, August 2004).

A more detailed accounting of the development of the capital and maintenance need is in Appendix A.

3.3 ESTIMATE OF TOTAL CAPITAL & MAINTENANCE COSTS

The total capital and maintenance costs were determined based on information in MDPs and other reports completed for the City. As shown in Figure 1, the limits of the watersheds passing through the City extend beyond City limits. Only the stormwater infrastructure planned within City limits was included in the estimate of capital and maintenance costs. Costs developed in each planning document were developed in different years, resulting in difference in unit prices. Planned capital and maintenance costs were assigned the date listed on the report from which they were taken. All costs were then escalated to 2021 first quarter (Q1) costs using the Cumulative Fisher Ideal Index (index) from the Colorado Construction Cost Index Report (CCI) published by CDOT each year.

To escalate a planned cost in a document dated 2012 Q1 or later, the 2021 Q1 CCI index (1.4408) was divided by the CCI index of the year and quarter the report was dated. For example, in the Third Creek MDP, the CCI index for 2018 Q4 of 1.0785 was used. Dividing 1.4408 by 1.0785 yields a multiplier of 1.3359. MDP costs were multiplied by 1.3359 to determine 2021 Q1 costs. This was done for costs in all seven masterplans and the Fairfax report. It must be noted that the 2021 Q1 CCI has an index value of 1.0000 for 2012 Q1. Costs in documents older than 2012 first had to be escalated to the 2012 Q1 index using the CCI for 2012 Q4. The resulting costs were then escalated from 2012 Q1 to 2021 Q1. Appendix B provides additional details on the cost escalation process.

The specific items included in MDP capital costs vary from document to document. It was not in the scope of this study to evaluate how comprehensive the planned costs are in each document or to add costs for items that may not have been included. Capital costs include the construction of stormwater infrastructure such as storm drainage systems, open channels, detention ponds, bridges, and drop structures. Capital costs also include items such as stormwater management during construction, engineering fees, legal and administrative fees, construction management, and contingency.

While annual maintenance costs are often included in MDPs, the Lower First Creek and DFA 0055 MDP did not include annual maintenance costs. Annual maintenance costs for these watersheds were estimated using the average ratio of maintenance costs to capital costs from the Second Creek, Third Creek, Henderson Creek, and Irondale Gulch MDPs. The resulting average ratio of maintenance to capital costs was 0.35%. Maintenance costs cover cleaning and repair of hydraulic structures, detention and water quality facilities, culverts, and channels. Table 2 shows estimated capital and maintenance cost for each area evaluated.

The NIGID combines parts of the DFA 0053, DFA 0055, First Creek, Henderson Creek, Second Creek, and Third Creek watersheds. To calculate the total capital and maintenance need for the NIGID, costs estimated for work within the City within each of these watersheds were assigned to the NIGID based on the percentage of each watershed within the City that is within the NIGID boundary. For example, if the Second Creek watershed within the City has an area of 100 acres, and the area of the Second Creek watershed within the NIGID is 80 acres, the total cost for the Second Creek watershed was multiplied by 80% to calculate costs within the NIGID. This calculation was completed for each watershed within the NIGID, resulting in the total capital and maintenance need assumed for the NIGID.

It should also be noted that the cost several bridge or culvert replacement projects recommended by the MDPs will be funded by the City's Roadway Impact Fee if the bridge or culvert crossing is at a roadway that needs to be widened. These crossing costs are not included in the total capital need shown in Table 2.

Table 2. Capital and Maintenance Need Overview

Area	Basin	Total Capital Need ¹	Annual O&M ¹
City	Commerce City	\$308,486,514	\$1,057,909
Basin Specific	Henderson Creek	\$51,197,288	\$140,276
	Irondale Gulch	\$23,624,258	\$167,732
	First Creek ²	\$90,043,483	\$293,378
	Second Creek	\$98,675,248	\$259,785
	Third Creek	\$34,287,837	\$32,368
	DFA 0053	\$10,658,398	\$37,304
NIGID ³	NIGID	\$140,664,799	\$351,623

¹ Costs are in 2021 Q1 dollars.

² Direct Flow Area 0055 now resides within the First Creek Watershed.

³ NIGID costs have not been updated to reflect projects covered by the roadway impact fee.

3.4 ESTIMATE OF EXISTING DEVELOPMENT

Existing impervious area was calculated in ArcGIS using parcel data and impervious surface data provided by the City. Impervious surfaces evaluated include building roofprints, driveways, and parking areas that intersect zoned parcels within the City limits. Existing imperviousness of each parcel was also calculated by dividing the area of impervious surfaces within a parcel by the total parcel area. Existing imperviousness of each parcel was used to determine how much of the parcel could be developed in the future.

3.5 ESTIMATE OF REMAINING DEVELOPABLE LAND

This study considered remaining developable land to be parcels that have no existing impervious area or parcels that have a percent imperviousness less than that defined by the MHFD for each City zoning code. Table 3 below shows zoning codes used by the City and the corresponding MHFD land use category and estimated imperviousness. Table 3 was developed by RESPEC, in conjunction with the MHFD, for the First Creek MDP.

For example, if a parcel is zoned I-3, it is assumed that parcel will be 90% impervious when fully built out. If the existing imperviousness calculated in Section 3.4 for this parcel is less than 90%, it is assumed this parcel will develop to 90% imperviousness in the future. For each parcel with an imperviousness less than the assumed full build out value in Table 3, the amount of new impervious area that could be added was calculated.

Table 3. Impervious Values for Commerce City Zoning Designations

Commerce City Zoning Code	MHFD Equivalent	Full Build Out Percent Imperviousness
AG	Greenbelts, Agriculture	2
R-1	Residential (0.25 – 0.75 acres)	30
R-2	Residential (0.25 – 0.75 acres)	30
R-3	Residential (0.25 acres or less)	45
R-4	Residential (0.25 acres or less)	45
I-1	Industrial – Light	80
I-2	Industrial – Medium	85
I-3	Industrial – Heavy	90
I-1S	Industrial – Light	80
C-1	Business – Suburban	75
C-2	Business – Suburban/Downtown	85
C-3	Business – Downtown	95
PUD	Residential (0.75 – 2.5 acres)	55
MHP	Residential (0.25 acres or less)	45
RU	Residential (0.25 – 0.75 acres)	20

Table 4 shows the total parcel area evaluated, existing impervious area within these parcels, additional developable (future impervious) area within these parcels, and the percent of land still developable in each area designation. The total parcel area evaluated did not include parcels zoned AG or RMA as they are not expected to develop.

Table 4. Existing and Future Development Overview

Area	Basin	Total Parcel Area (Acres)	Existing Impervious Area (acres)	Developable (Future Impervious) Area (acres)	Percent Developable
City	Commerce City	22646	3345	10846	47
Basin Specific	Henderson Creek	3481	223	1896	54
	Irondale Gulch	744	146	435	58
	First Creek	3026	877	1335	44
	Second Creek	6280	355	3081	50
	Third Creek	6779	111	3720	55
	DFA 0053	307	37	133	43
NIGID	NIGID	10157	602	5018	49

4.0 DRAINAGE IMPACT FEE ONLY

After receiving comment from the City, this option is the preferred option. Whether the fee is assessed on a City-wide basis or varies by drainage basin is to be determined. The drainage impact fee only option was developed as one funding mechanism by which the City will be able to fund its planned stormwater capital improvement projects. The drainage impact fee would be assessed at the time of development. In this funding option, no existing development would be assessed a stormwater fee of any kind. The proposed drainage impact fee is a fee per area of added imperviousness. It was developed by dividing the total capital need by the total area of remaining developable land (assumed to be future impervious area). Each area delineation identified in Section 1.3 was evaluated separately. Table 5 shows the resulting drainage impact fee per acre of new impervious area. The proposed impact fees per area in Table 5 only apply to new impervious area and not to the entire parcel area. This is different than how the current impact fee is assessed. The drainage impact fee would need to be adjusted annually to account for cost escalation.

Table 5. Drainage Impact Fee Only for New Impervious Area

Area	Basin	Total Capital Need ¹	Developable Area (acres)	Drainage Impact Fee /Acre ²	Drainage Impact Fee /SF ²
City	Commerce City	\$308,486,514	10846	\$28,442	\$0.65
Basin Specific	Henderson Creek	\$51,197,288	1896	\$27,003	\$0.62
	Irondale Gulch	\$23,624,258	435	\$54,309	\$1.25
	First Creek ³	\$90,043,483	1335	\$67,448	\$1.55
	Second Creek	\$98,675,248	3081	\$32,027	\$0.74
	Third Creek	\$34,287,837	3720	\$9,217	\$0.21
	DFA 0053	\$10,658,398	133	\$80,138	\$1.84
NIGID ⁴	NIGID	\$140,664,799	5018	\$28,032	\$0.64

¹ Costs are in 2021 Q1 dollars and fee is assessed on new impervious area only.

² Current fees are per parcel area, regardless of impervious area added.

³ Direct Flow Area 0055 now resides within the First Creek Watershed.

⁴ NIGID costs have not been updated to reflect projects covered by the roadway impact fee.

Table 6 shows current and proposed impact fees for the three watersheds for which a current impact fee is assessed. The current fee is assessed on the full area of the parcel, not on added imperviousness; the proposed fee is based on added impervious area. This makes comparison difficult. However, a 0.20-acre residential parcel in the Third Creek watershed is expected to be approximately 45% impervious. The current impact fee would be only \$289, while the proposed fee would be \$830.

Table 6. Drainage Impact Fee Only

Basin	Current Impact Fee/ Parcel Acreage	Proposed Drainage Impact Fee/ Impervious Acre
Second Creek	\$1,700	\$32,027
Third Creek	\$1,445	\$9,217
Buffalo Run	\$2,132	N/A, part of Third Creek
DFA 0053	\$3,055	\$80,138

Table 7 is a revision of Table 5 that combines basin DFA 0053 with the Henderson Creek basin due to its small size and immediately adjacent location.

Table 7. Proposed Drainage Impact Fee Only for New Impervious Area

Area	Basin	Total Capital Need ¹	Drainage Impact Fee /SF
City	Commerce City	\$308,486,514	\$0.65
Basin Specific	Henderson Creek ²	\$ 61,855,686	\$0.70
	Irondale Gulch	\$23,624,258	\$1.25
	First Creek ³	\$90,043,483	\$1.55
	Second Creek	\$98,675,248	\$0.74
	Third Creek ⁵	\$34,287,837	\$0.21
NIGID ⁴	NIGID	\$140,664,799	\$0.64

¹ Costs are in 2021 Q1 dollars and fee is assessed on new impervious area only.

² Direct Flow Area 0053 now resides within the Henderson Creek Watershed.

³ Direct Flow Area 0055 now resides within the First Creek Watershed.

⁴ NIGID costs have not been updated to reflect projects covered by the roadway impact fee.

⁵ Buffalo Run Tributary Basin now resides within the Third Creek Watershed.

Representative examples of the proposed drainage impact fee for undeveloped parcels are provided in Table 8. Full development in accordance with Table 3 is assumed for each example fee.

Table 8. Representative Drainage Impact Fee Only

Basin	Address/Parcel Number	Land Use	Developable Area (acres)	Drainage Impact Fee by Basin-Specific Assessment	Drainage Impact Fee by City-wide Assessment
Henderson	12998 E 108 th Pl	Res	0.09	\$2,653	\$2,463
Third Creek	12227 Telluride St	Res	0.07	\$640	\$1,982
First Creek	172114000018	Com	11.26	\$461,218	\$323,834
Henderson	11750 E 104 th Ave	Com	2.13	\$65,030	\$61,314
First Creek	9303 Alton Ct	Ind	9.4	\$634,669	\$266,152
Irondale	8000 E 83 rd Ave	Ind	3.86	\$210,177	\$109,292

5.0 DRAINAGE IMPACT FEE PLUS ANNUAL STORMWATER FEE

The drainage impact fee plus annual stormwater fee funding option was developed so the City could secure funding for planned stormwater capital improvement projects from both existing and new development. This option has the advantage of more equitably allocating the cost of new stormwater infrastructure. Properties that have already added impervious area to the City, causing increased runoff and the need for new stormwater infrastructure, will have the opportunity to fund those needed improvements alongside new development as it occurs. This option also has the advantages of limiting the burden on new development that comes with the impact fee only option as well as providing some immediate funding from the areas of the City that have already developed. The drainage impact fee would not negate the assessment of the annual stormwater fee on newly developed parcels.

The total capital need in each area delineation would be paid in part by the drainage impact fee and in part by the annual stormwater fee. How much of the total capital need is covered by each fee is determined by how much development has already occurred in each area delineation. For example, the Third Creek basin is only 2% developed, and an additional 55% of Third Creek is anticipated to be developed in the future. Approximately 3.5% ($2/(2+55)$) of the total capital need in Third Creek would be funded by the annual stormwater fee. The drainage impact fee would fund the remaining 96.5% ($55/(2+55)$) of the total capital need. Table 9 shows how the two types of fees would be allocated.

Table 9. Fee Allocation by Area Delineation

Area	Basin	Total Capital Need ¹	Percent Developed	Percent Developable	Annual Stormwater Fee Portion	Drainage Impact Fee Portion
City ³	Commerce City	\$347,811,896	15	47	\$84,148,039	\$263,663,857
Basin Specific	Henderson	\$51,197,288	6	54	\$5,119,729	\$46,077,559
	Irondale	\$23,624,258	20	58	\$6,057,502	\$17,566,756
	First Creek ⁴	\$54,902,302	29	44	\$21,810,504	\$33,091,798
	Second Creek	\$98,675,248	6	49	\$10,764,573	\$87,910,675
	Third Creek	\$34,287,837	2	55	\$1,203,082	\$33,084,755
	DFA 0053	\$10,658,398	12	43	\$2,325,469	\$8,332,929
NIGID ⁵	NIGID	\$140,664,799	6	49	\$15,345,251	\$125,319,548

¹ Costs are in 2021 Q1 dollars and fee is assessed on new impervious area only.

² Current fees are per parcel area, regardless of impervious area added.

³ Includes costs for projects in Sand Creek MDP, Fairfax Outfall, Second Creek Tributaries, and Direct Flow Area 0055, that are not included in other basin specific totals.

⁴ Direct Flow Area 0055 now resides within the First Creek Watershed.

⁵ NIGID fee has not been updated to reflect projects covered by the roadway impact fee.

Table 10 shows the drainage impact fee that would result in the drainage impact fee plus annual stormwater fee funding option.

Table 10. Drainage Impact Fee per New Impervious Area using an Additional Annual Fee

Area	Basin	Drainage Impact Fee Portion ¹	Developable Area (acres)	Total Impact Fee/Acre ²
City ³	Commerce City	\$263,663,857	10846	\$24,310
Basin Specific	Henderson Creek	\$46,077,559	1896	\$24,303
	Irondale Gulch	\$17,566,756	435	\$40,383
	First Creek ⁴	\$33,091,798	1335	\$24,788
	Second Creek	\$87,910,675	3081	\$28,533
	Third Creek	\$33,084,755	3720	\$8,894
	DFA 0053	\$8,332,929	133	\$62,654
NIGID ⁵	NIGID	\$125,319,548	5018	\$24,974

¹ Costs are in 2021 Q1 dollars.

² Fee is assessed on new acres of impervious area only.

³ Includes costs for projects in Sand Creek MDP, Fairfax Outfall, Second Creek Tributaries, and Direct Flow Area 0055, that are not included in other basin specific totals.

⁴ Direct Flow Area 0055 now resides within the First Creek Watershed.

⁵ NIGID fee has not been updated to reflect projects covered by the roadway impact fee.

Table 11 shows the annual stormwater fee that would result in the drainage impact fee plus annual stormwater fee funding option. This fee would be assessed on developed properties on an annual basis. Note that the annual cost per acre per year in the last column assumed the total cost was divided over 50 years. The annual fee would have to be adjusted for escalation annually.

Table 11. Annual Stormwater Fee per Impervious Area

Area	Basin	Annual Stormwater Fee Portion ¹	Developed Area (acres)	Total Fee/Acre ²	Total Fee/Acre/Year ^{2,3}
City ⁴	Commerce City	\$84,148,039	3345	\$25,156	\$503
Basin Specific	Henderson Creek	\$5,119,729	223	\$22,958	\$459
	Irondale Gulch	\$6,057,502	146	\$41,490	\$830
	First Creek ⁵	\$21,810,504	877	\$24,869	\$497
	Second Creek	\$10,764,573	355	\$30,323	\$606
	Third Creek	\$1,203,082	111	\$10,839	\$217
	DFA 0053	\$2,325,469	37	\$62,851	\$1,257
NIGID ⁶	NIGID	\$15,345,251	602	\$25,490	\$510

¹ Costs are in 2021 Q1 dollars.

² Fee is assessed on new acres of impervious area only.

³ Fee per year is simply the total fee per acre divided by a 50-year time frame. Annual fee is in 2021 Q1 dollars.

⁴ Includes costs for projects in Sand Creek MDP, Fairfax Outfall, Second Creek Tributaries, and Direct Flow Area 0055, that are not included in other basin specific totals.

⁵ Direct Flow Area 0055 now resides within the First Creek Watershed.

⁶ NIGID fee has not been updated to reflect projects covered by the roadway impact fee.

Table 12 below provides representative drainage impact and annual stormwater fees for the same properties shown in Table 7 but with the addition of an annual stormwater fee.

Table 12. Representative Drainage Impact Fee with Annual Stormwater Fee

Basin	Address	Parcel Area (acres)	Zoning Code	Developable Area (acres)	Proposed Drainage Impact Fee	Proposed Annual Fee
Henderson	12998 E 108 th Pl.	0.157	PUD	0.087	\$2,114	\$39.95
Irondale	8000 E 83 RD AVE	4.8	I-1	3.86	\$155,880	\$3,203.01
First Creek	9303 Alton Ct	10.4	I-3	9.4	\$233,006	\$4,675.46
Second Creek	16253 E. 100 th Way	0.14	PUD	0.076	\$2,169	\$46.09
Third Creek	12227 Telluride St.	0.126	PUD	0.07	\$623	\$15.17
DFA 0053	11250 Florence St.	0.018	PUD	0.01	\$627	\$12.57
NIGID ¹	10449 Worchester Dr.	0.15	PUD	0.085	\$2,123	\$43.33

¹ NIGID fee has not been updated to reflect projects covered by the roadway impact fee.

6.0 ANNUAL MAINTENANCE FEES

The MDPs included anticipated operations and maintenance need as well as capital need. Regardless of whether new infrastructure is completed, the need to maintain and repair existing stormwater infrastructure is ongoing. This fee would be applied to all parcels, regardless of existing or future impervious area, and would be based on total parcel area. The operation and maintenance need for each area delineation is divided by the total acreage of each area delineation to calculate the fee per parcel area shown in Table 12. The total parcel area in Table 13 is from Table 4.

Table 13. Annual Maintenance Fee per Impervious Area

Area	Basin	Annual Maintenance Need ¹	Total Parcel Area (acres)	Total Fee/ Acre ²
City ³	Commerce City	\$1,057,909	22646	\$46.72
Basin Specific	Henderson Creek	\$140,276	3481	\$40.30
	Irondale Gulch	\$157,996	744	\$212.36
	First Creek ⁴	\$293,378	3026	\$96.95
	Second Creek	\$259,785	6280	\$41.37
	Third Creek	\$32,368	6779	\$4.77
	DFA 0053	\$37,304	307	\$121.51
NIGID	NIGID	\$351,623	10157	\$34.62

¹ Costs are in 2021 Q1 dollars and would need to be escalated annually.

² Fee is assessed on total parcel area, regardless of imperviousness or stage of development.

³ Includes costs for projects in Sand Creek MDP, Fairfax Outfall, Second Creek Tributaries, and Direct Flow Area 0055, that are not included in other basin specific totals.

⁴ Direct Flow Area 0055 now resides within the First Creek Watershed.

7.0 ADDITIONAL CONSIDERATIONS

This study does not account for the benefit a development provides when on site or regional detention is included in the development. The City may wish to reevaluate drainage impact fees for parcels that provide a significant amount of detention or complete a planned regional detention basin. For developments using on-site detention that does not treat additional area, the impact fee may be reduced only slightly. For developments implementing planned regional detention, some of the developer's costs may be reimbursed using impact fee funding.

The City may also wish to evaluate how implementing low impact development (LID) concepts may justify a partially reduced drainage impact or annual stormwater fees. Using LID concepts will minimize directly connected impervious areas (MDCIA), resulting in more onsite infiltration and less total site runoff. The burden on stormwater infrastructure will not be significantly reduced by using LID concepts on any given parcel, but used City-wide, it can have a larger impact.

8.0 CONCLUSIONS

The City is in dire need of funding to construct the planned stormwater capital improvements projects recommended by MDPs completed for watersheds within the City limits. As the population of Commerce City continues rapid growth, stormwater runoff will drastically increase with the potential for extreme damage if facilities are not constructed to accommodate these higher flows. Rapid growth may also result in the property acquisitions required for critical detention facilities becoming more expensive or simply unavailable in the near term. The fee options developed by this study and presented in this report offer options for the City to consider to be able to secure this funding. How the City ultimately secures funding may vary from what this report recommends, but the scale of the capital need is apparent.

9.0 REFERENCES

Colorado Construction Cost Index Report: Calendar Year 2021 First Quarter, Colorado Department of Transportation, March 2021.

Colorado Construction Cost Index Report: Calendar Year 2012 First Quarter, Colorado Department of Transportation, June 2012.

Colorado Construction Cost Index Report: Calendar Year 2006 Fourth Quarter, Colorado Department of Transportation, December 2006.

Fairfax Park Outfall Improvements: Hydraulic Analysis, Sellards & Grigg, Inc., July 2006.

RESPEC Inc. Memo to Mile High Flood District. 5 February 2021. Subject: *First Creek MDP and FHAD: Baseline Hydrology Memorandum*.

Henderson Creek Major Drainageway Plan: Alternatives Report (Draft), RESPEC Inc., July 2021.

Irondale Gulch Outfall System Plan: Conceptual Design Report, Moser & Associates Engineering, September 2011.

Irondale Gulch Stormwater Implementation Plan, RESPEC Inc., December 2019.

Lower First Creek and Direct Flow Area 0055 Major Drainageway Planning: Preliminary Design and Final Report, RESPEC Inc., May 2002.

Sand Creek Major Drainageway Planning South Platte River to East Corporate Boundary of Aurora, Colorado: Development of Preliminary Plan – Phase, Simons, Li & Associates, Inc., January 1984.

Second Creek (Downstream of DIA) and DFA 0053 Watersheds Outfall Systems Planning Study Update: Preliminary Design Report, Kiowa Engineering Corporation, August 2004.

Second Creek Major Drainage Plan: Alternative Analysis (Phases 1 – 3), RESPEC Inc., January 2019.

Stormwater Utility Ordinance (1896), Chapter 10.

Commerce City Stormwater Funding Study: Final Draft, AMEC, March 2011.

Third Creek Master Drainageway Plan: Conceptual Design, Matrix Design Group, November 2018.



APPENDIX A

MASTER PLANNING COSTS



All cost shown below were extracted from reports. The values shown are not escalated to 2021 costs, those values are shown in Appendix B.

Second Creek MDP – Alternative Analysis

The Second Creek MDP Alternatives report, produced by RESPEC Inc., dated January 2019, suggested alternative 3a with a total capital cost of \$98,552,384 for Commerce City stormwater improvement projects (found on page 5-35 of the report). The majority of the cost was for two detention ponds located on or near Second Creek's mainstem within Commerce City. Other cost included land acquisitions and new or updated crossings such as bridges and culverts, which also included new roadway design costs. Additionally, a majority of the channel requires improvements such as widening and defining embankments. However, after conversation with Commerce City, RESPEC was informed that the Chambers Road roadway project's cost will be covered by the Roadway Impact Fee. Therefore, the MDP cost was updated to \$87,511,960. Engineering, mobilization, stormwater management, legal/administrative, construction management, and contingency cost were also considered at the standard percentages of 15%, 5%, 5%, 5%, 10%, and 25%, respectively, of the sub-total capital cost.

Maintenance cost considered detention pond and channel maintenance which includes weed removal, sediment removal, and mowing. These cost were determined using a per acre rate. Additionally, hydraulic structures such as detention pond outlets require debris removal and structural repairs. The overall maintenance cost reported in the MDP was \$231,801.

For further cost breakdown, review Appendix F of the Second Creek MDP – Alternative Analysis report.

Third Creek MDP – Conceptual Design

The Third Creek MDP Conceptual Design report, produced by Matrix Design Group, dated November 2018, determined \$39,759,418 of stormwater improvement capital cost for Commerce City (page ES-5 of the report). A majority of the cost was attributed to the removal and installation of culverts along the mainstem of Third Creek. Additional cost includes roadway improvements, re-vegetation of the floodplain, and channel and embankment improvements. However, after conversation with Commerce City, RESPEC was informed that several roadway projects' cost will be covered by a Roadway Impact Fee. Therefore, the MDP cost was updated to \$25,655,903. Other capital improvement cost considered were dewatering of the channel, traffic control and utility coordination/relocation. Engineering, mobilization, stormwater management, legal/administrative, construction management, and contingency cost were also considered at the standard percentages of 15%, 5%, 5%, 5%, 10%, and 25%, respectively, of the sub-total capital cost.

Maintenance costs consider channel upkeep which includes sediment, debris, and weed removal as well as erosion control. Other maintenance costs were in relation to structures such as culverts and drop structures, which require structural repairs and debris removal. The overall maintenance cost stated in the MDP was \$24,229.

For further cost breakdown, review Tables 6-5c, 6-6a, and 6-7b of the Third Creek MDP Conceptual Design report.

Henderson Creek MDP – Alternative Analysis

The Henderson Creek MDP Alternatives Analysis, produced by RESPEC Inc, dated December 2021, evaluated a capital cost of \$51,197,288 for Commerce City stormwater improvements projects based on the recommended alternative. Several improvement cost contributed to the overall capital cost, with the largest portion being the five recommended detention ponds. Additional costs were related to the removal and installation of crossings, boring, land acquisitions, and channel improvements. Engineering, mobilization, stormwater management, legal/administrative, construction management, and contingency cost were also considered at the standard 15%, 5%, 5%, 5%, 10%, and 25%, respectively, of the sub-total capital cost.

Maintenance cost considered detention pond and channel maintenance which includes weed removal, sediment removal, and mowing. These cost were determined using a per acre rate. Additionally, hydraulic structures such as detention pond outlets requires debris removal and structural repairs. The overall maintenance cost determined in the MDP was \$140,276.

For further cost breakdown, review Appendix F of the Henderson Creek MDP – Alternative Analysis report.

Irondale Gulch – Conceptual Design

The Irondale Gulch OSP Conceptual Design Report, prepared by Moser and Associates, dated September 2011 determined that \$24,469,186 (Table 8.2 – 2) in improvement cost for Commerce City in the Irondale Gulch watershed. The highest cost was attributed to the multiple detention ponds recommended in the Irondale Gulch watershed. Other improvement cost included multiple drop structures, multiple stormwater pipes including a 60" pipe that ran over 8000 feet, and the implementation of manholes. Engineering, mobilization, stormwater management, legal/administrative, construction management, and contingency cost were also considered at the standard 15%, 5%, 5%, 5%, 10%, and 25%, respectively, of the sub-total capital cost.

In 2019, the Irondale Gulch Stormwater Implementation Plan, prepared by RESPEC, updated the assessment on the Irondale Gulch watershed. The report determined that \$2 million should be removed from 2011 capital cost due to the data collected in the Implementation Plan. Therefore, the new capital cost for Irondale Gulch for Commerce City was \$22,469,186. Additionally, the implementation plan also noted that different detention pond locations were likely to be chosen. Based on a conversation with Kurt Patrick with RESPEC and up-to-date information on the Rosemary Improvement project, five different pond locations were to be selected including one recently purchased by Commerce City, shown below in Figure A1. Hence, the \$7,731,900 in land acquisition costs were removed from the capital cost assessed to Commerce City resulting in an updated \$14,628,376 in total stormwater improvement costs.

With the up-to-date information about the locations of each detention pond, a quick assessment of the 2021 land acquisition cost was completed. Land property values were collected from the Adams County website. Table A1 summarizes the land acquisition costs. An additional \$500,000 was added to each 2021 actual value listed, due to Commerce City paying an additional \$600,000 for land recently purchase for a pond within the Irondale Gulch (Number 7 in Figure A1). The additional \$3,771,119 was added to the escalated 2021 cost shown in Table B2 of Appendix B. Note, these land acquisition values are an estimation and could easily change.

Maintenance cost considered detention pond and channel maintenance which includes weed removal, sediment removal, and mowing. These cost were charged on a per acre rate. Additionally, hydraulic structures such as detention pond outlets requires debris removal and structural repairs. The overall maintenance cost determined in the OSP was \$116,416.

Table A1. 2021 Land Acquisition Cost for Irondale Gulch Detention Pond Properties

Map #	Property Owner	URL about Ownership	2021 Actual Value	Estimate Land Acquisition Cost for Commerce City
1	NIKAIDO DAVID T LIVING TRUST 6701 E 80TH AVE	https://gisapp.adcogov.org/QuickSearch/doreport.aspx?pid=0172129405001	\$622,460	\$1,122,460
2	UNION PACIFIC RAILROAD COMPANY C/O PROPERTY TAX DEPARTMENT	https://gisapp.adcogov.org/quicksearch/doreport.aspx?pid=0172129106007	No longer to be purchased	-
3	SOUTH ADAMS COUNTY WATER AND SANITATION DISTRICT	-	No longer to be purchased	-
4	UNION PACIFIC RAILROAD COMPANY C/O PROPERTY TAX DEPT	-	No longer to be purchased	-
5	SOUTH ADAMS COUNTY WATER AND SANITATION DISTRICT	https://gisapp.adcogov.org/quicksearch/doreport.aspx?pid=0172128300143	\$28,783	\$528,783
6	QUEBEC HOLDINGS LLC	-	No longer to be purchased	-
7	LOYA PROPERTIES LLC	https://gisapp.adcogov.org/quicksearch/doreport.aspx?pid=0172128210016	\$433,745	\$1,100,000*
8	AGAZIO FRANK S AND AGAZIO JULIA R	https://gisapp.adcogov.org/quicksearch/doreport.aspx?pid=0172128202002	\$707,154	\$1,207,154
9	GALLEGOS ADAM	-	No longer to be purchased	-
10	GUTIERREZ MONICA	https://gisapp.adcogov.org/quicksearch/doreport.aspx?pid=0172128101005	\$412,722	\$912,722
Total 2021 Estimated Land Acquisition Cost				\$3,771,119

*Property recently purchased by Commerce City for approximately \$600,000 more than listed land value. Not included in 2021 estimated land acquisition cost.

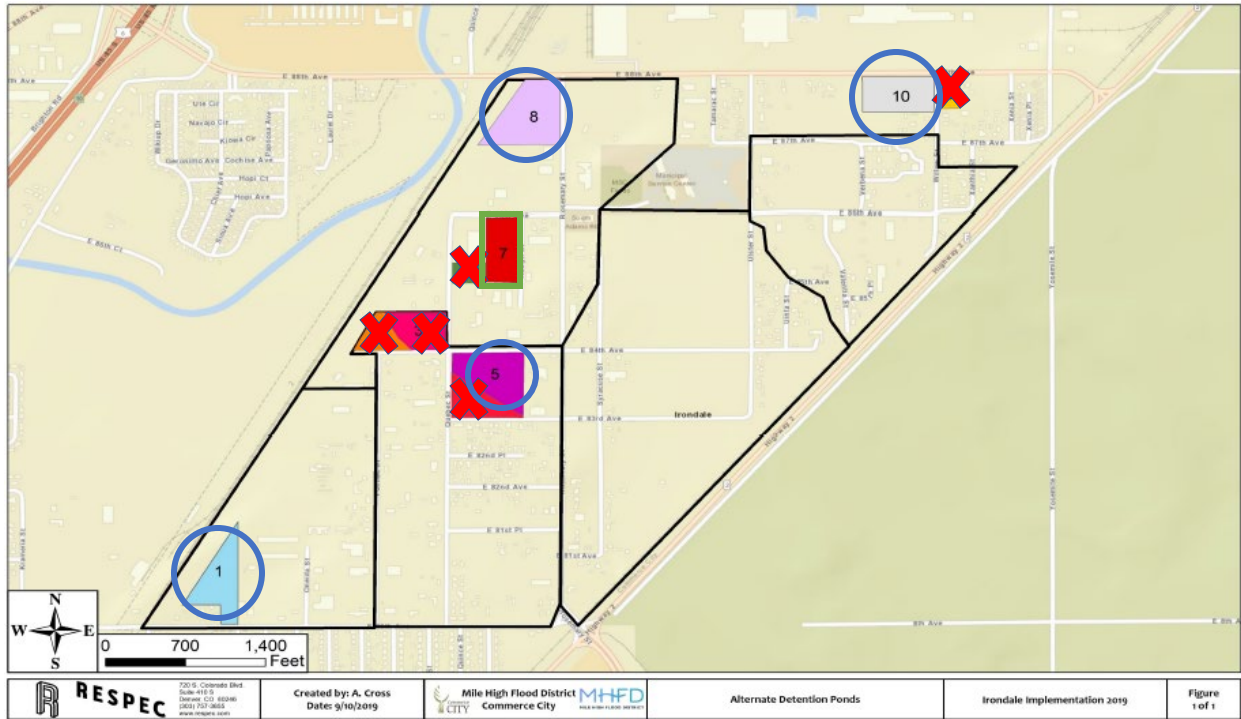


Figure A1. Map extracted from Irondale Gulch Stormwater Implementation Plan for possible detention pond locations within Irondale Gulch. Red X mark pond locations no longer under consideration based on up-to-date information regarding the Rosemary Improvement project. Green squares represents properties recently purchased by Commerce City. Blue circles represent properties expected to be purchased by Commerce City in the near future.

Sand Creek MDP – Alternative Analysis

The Sand Creek MDP Alternative Analysis report, produced by Simons, Li, and Associates Inc., dated January 1984, determined that the total stormwater improvement cost to Commerce City would be \$3,284,670 (Table 8 of report). The improvement costs were broken down into four stages of constructions. Each stage focuses on a specific crossing or drop structure within the main channel of Sand Creek. Additional costs were considered such as engineering and contingency at 25% the construction cost and legal/administrative at 5% the construction cost.

Maintenance costs were not calculated in the Sand Creek MDP. Therefore, RESPEC determined that an average percent of maintenance cost over the capital cost from the Second Creek MDP, Third Creek MDP, Henderson Creek MDP, and Irondale Gulch OSP would aid in producing an estimated maintenance cost. Table A2 summarizes the average percentage was 0.35%. Therefore, the Sand Creek maintenance cost were calculated to be \$11,340 ($\$3,284,670 \times 0.35\% = \$11,340$).

Table A2. Average Maintenance Cost Per Capital Cost Percentage

Reach	Maintenance Cost	Capital Cost	Maintenance Cost/Capital Cost (%)
Second Creek	\$230,395	\$98,552,384	0.23%
Third Creek	\$24,229	\$39,759,418	0.06%
Henderson Creek	\$140,276	\$47,345,159	0.30%
Irondale Gulch	\$116,416	\$14,737,286	0.79%
Average			0.35%

Lower First Creek and Direct Flow Area 0055 MDP – Preliminary Design and Final Report

Lower First Creek and Direct Flow Area (DFA) 0055 MDP, prepared by Turner Collie and Braden Consulting Engineers, dated May 2002, determined Commerce City total capital stormwater improvement costs would be \$34,818,233 (Table VI-4 of report). The Maul Reservoir detention pond would be the main driver in improvement cost for First Creek. Additional costs were contributed to crossing installation, mainly at the O'Brian Canal and Burlington Ditch as well as channel improvements along the mainstem. After further analysis of the MDP report, RESPEC determined several key details. For instance, since 2002 Commerce City has accommodated a majority of the land in the First Creek watershed and therefore, Commerce City will be responsible for more projects. Additionally, Commerce City informed RESPEC that Burlington Ditch and First Creek no longer cross one another, and 96th Ave crossing will be paid for by the Roadway Impact Fee. Therefore, the First Creek MDP was updated to \$22,495,012. Furthermore, DFA 0055 (now part of First Creek's watershed based on updated hydrology) had several updates to tributaries' channels and crossings. RESPEC determined that the MDP project cost for Commerce City for DFA 0055 was \$14,439,487. Contingencies, Engineering services, legal/admin fees, and utility relocation were all charged at 25%,10%, 10%, and 2%, respectively, of the total drainageway improvement construction costs.

Maintenance costs were calculated similar the Sand Creek MDP maintenance costs. The total capital cost was multiplied by 0.35% (average in Table A2), which resulted in maintenance cost of \$120,205.

Second Creek and DFA 0053 OSP – Alternative Analysis

Second Creek (Downstream of DIA) and DFA 0053 Watersheds OSP Preliminary Design Report, prepared by Kiowa Engineering Corporation, dated August 2004 determined that \$92,142,505 in stormwater improvement projects. However, this was for all improvement projects; these costs were not specific to Commerce City and considered projects related to the mainstem of Second Creek. Therefore, to only consider Commerce City specific projects and to not double count Second Creek masterplan cost, RESPEC determined specific tributaries' costs that reside in Commerce City. Based on the city boundary limits, the following tributaries were selected: Reed Run, Drew Draw, Peachleaf Run, Gramma Gulch, and Sandbar Run. The total capital improvement costs for the aforementioned tributaries were \$8,914,631 (Table ES-1 and ES-2). Improvement costs were contributed to updating or installing crossings at various canals and roads, channel and floodplain improvements, several water quality basins installations, and developing check structures. Additionally, utility relocation was 5% of the construction cost, and engineering and contingencies fees were assumed to be 35% of construction cost plus utility relocation.

For stormwater improvement costs only attributed to Direct Flow Area 0053 within Commerce City. In Appendix F of the MDP report, commentary sheets 40, 41, and 42 were reviewed to determine the specific improvement costs associated with Locust Run and Reign Creek specifically in Commerce City based on the city boundary. Therefore, only the costs of a 100-yr channel creation, a drop structure, a box culvert under the O'Brian Canal, and a maintenance trail were relevant for Commerce City improvement projects. Similar, Commerce City improvement projects from Reign Creek were those listed on commentary sheet 42, such as the implementing Detention 332. RESPEC determined that the improvement cost for Commerce City would be \$4,367,045. Included in the overall cost were two fees, utility relocation at 5% of the construction cost, and engineering and contingencies fees at 35% of construction cost plus utility relocation.

Maintenance costs were calculated similar the Sand Creek MDP maintenance costs. The total capital cost was multiplied by 0.35% (average value in Table A2), which resulted in maintenance cost of \$31,201 and \$15,285 for Second Creek Tributaries and DFA 0053, respectively.

For further cost breakdown, review Appendix F of the Second Creek (Downstream of DIA) and DFA 0053 Watersheds OSP Preliminary Design Report.

Fairfax Outfall – Hydraulic Analysis

The Fairfax Park Outfall Improvement Hydraulic Analysis report, prepared by Sellards and Grigg Inc., dated July 2006 determined \$2,751,122 of stormwater improvement project costs for Commerce City. Several costs were considered, such as mobilization, dewatering, sediment control, removing pipes, replacing asphalt, and boring for a new 72" pipe. Additionally, contingency cost was 15% of the construction cost and an engineering cost was 10% of the overall project's cost.

Maintenance costs were calculated similar to the Sand Creek MDP maintenance costs. The total capital cost was multiplied by 0.35% (average value in Table A2), which resulted in maintenance cost of \$9,498.

For further cost breakdown, review page 21 of the Fairfax Park Outfall Improvement Hydraulic Analysis report.

APPENDIX B

COST ESCALATION CALCULATIONS

Colorado Construction Cost Index Tabulations: Quarterly Data

Year	Quarter	Earthwork		Hot Mix Asphalt		Concrete Pavement*		Structural Concrete		Reinforcing Steel		Fisher Ideal Index	
		Price (\$/CY)	Qty (CY)	Price (\$/TON)	Qty (TON)	Price (\$/SY)	Qty (SY)	Price (\$/CY)	Qty (CY)	Price (\$/LB)	Qty (LB)	Relative	Cumulative
2012	Q1	9.32	295,331.00	83.52	611,829.00	29.47	459,695.83	433.44	7,636.00	0.88	1,956,874.00	1.0000	
2012	Q2	10.61	367,636.10	82.65	328,357.21	31.18	264,194.31	472.96	5,910.00	0.97	833,101.00	1.0190	1.0190
2012	Q3	11.92	212,117.00	90.76	59,799.23	34.76	107,643.81	487.93	2,388.20	1.04	485,586.00	1.0995	1.1204
2012	Q4	9.49	246,805.00	102.24	146,197.04	n/a**	n/a**	527.68	1,772.00	0.94	310,307.00	1.0344	1.1589
2013	Q1	8.08	659,125.00	76.07	393,759.56	31.81	549,580.81	487.00	9,019.00	0.87	1,929,721.00	0.8044	0.9322
2013	Q2	12.75	316,498.00	84.37	501,946.32	52.18	60,482.78	427.09	6,857.00	0.91	1,048,761.00	1.2121	1.1300
2013	Q3	8.72	419,967.00	85.00	147,064.84	35.57	170,833.67	372.83	9,917.00	0.77	2,350,291.00	0.8947	1.0110
2013	Q4	10.00	75,520.00	80.78	198,528.45	42.64	92,749.00	309.40	1,752.00	0.85	486,791.00	1.0086	1.0197
2014	Q1	20.16	99,605.00	92.28	433,692.17	76.84	57,552.78	476.21	3,265.00	0.98	629,246.00	1.2581	1.2829
2014	Q2	12.88	610,731.00	88.13	548,253.70	34.34	302,520.17	517.01	8,249.90	0.90	1,468,195.00	0.8421	1.0803
2014	Q3	13.30	708,794.00	100.07	102,680.99	52.39	147,911.17	592.26	16,294.30	1.01	2,949,114.00	1.1740	1.2683
2014	Q4	10.73	695,288.00	113.42	141,154.23	46.12	156,635.11	549.86	6,657.10	1.03	948,029.00	0.9591	1.2164
2015	Q1	16.60	301,494.80	83.80	736,968.84	34.36	311,378.67	744.81	1,994.30	1.66	368,665.00	0.8798	1.0702
2015	Q2	15.12	167,066.00	94.22	311,989.59	46.36	219,498.00	577.73	1,119.00	1.64	205,245.00	1.1391	1.2190
2015	Q3	20.32	40,649.00	98.61	89,024.05	75.70	12,880.78	739.20	706.90	1.33	86,854.00	1.1536	1.4063
2015	Q4	12.16	309,414.10	81.21	66,957.40	47.46	128,174.06	598.73	3,702.00	1.42	366,651.00	0.7434	1.0454
2016	Q1	12.27	939,477.00	84.03	1,078,315.35	39.18	243,518.78	617.10	6,507.71	1.02	1,627,487.00	0.9767	1.0211
2016	Q2	31.34	14,104.00	110.17	118,434.28	104.99	1,936.89	1,028.57	126.00	2.79	12,189.00	1.4571	1.4878
2016	Q3	10.66	503,305.00	83.55	286,987.61	52.59	275,462.06	606.80	1,952.80	0.94	331,788.70	0.6500	0.9671
2016	Q4	18.00	81,788.00	106.93	108,909.09	47.97	51,601.89	978.88	300.80	2.28	18,840.00	1.2318	1.1913
2017	Q1	24.99	110,497.40	82.20	480,758.14	36.08	60,069.44	1,138.99	67.00	2.17	26,054.00	0.8105	0.9655
2017	Q2	11.28	153,010.00	88.48	302,427.67	36.44	147,787.36	592.94	2,168.00	1.06	416,630.00	0.9916	0.9574
2017	Q3	27.34	51,552.00	115.01	19,675.64	97.88	2,088.89	629.83	2,292.00	1.15	346,069.00	1.4673	1.4048
2017	Q4	16.17	23,686.00	95.90	152,110.33	72.95	2,823.00	1,068.73	263.00	2.32	24,850.00	0.9449	1.3274
2018	Q1	13.97	163,772.00	90.91	302,427.23	92.58	7,834.00	862.30	1,167.00	1.39	206,568.00	0.9415	1.2497
2018	Q2	15.58	47,167.00	110.11	42,157.74	n/a**	n/a**	809.61	887.00	1.54	139,494.00	1.1643	1.4551
2018	Q3	15.69	77,482.00	107.51	38,587.91	60.91	11,825.11	711.51	5,097.00	1.07	1,480,110.00	0.8995	1.3088
2018	Q4	16.51	174,175.00	89.89	594,326.44	35.97	974,214.00	674.59	2,017.00	1.29	213,561.00	0.8238	1.0785
2019	Q1	12.73	545,088.00	101.34	491,723.60	53.33	197,389.61	840.94	4,426.90	1.40	871,380.00	1.1848	1.2778
2019	Q2	26.64	55,197.00	119.73	116,528.65	79.43	13,611.17	479.34	8,463.00	1.05	1,230,972.00	1.1236	1.4357
2019	Q3	n/a**	n/a**	n/a**	n/a**	104.00	4,074.22	n/a**	n/a**	n/a**	n/a**	1.0100	1.4501
2019	Q4	16.30	207,333.00	95.42	275,273.38	43.76	41,068.89	798.39	468.00	1.39	149,577.00	0.8508	1.2337
2020	Q1	20.76	456,146.00	93.02	867,587.63	62.82	53,818.89	805.97	4,026.00	1.22	820,456.00	1.0204	1.2589
2020	Q2	9.86	764,455.00	104.16	156,927.56	51.27	177,038.39	809.92	1,804.90	1.43	363,737.00	0.9156	1.1527
2020	Q3	18.41	38,940.00	119.00	26,251.98	46.08	108,008.22	874.51	829.50	1.35	142,067.00	1.1208	1.2920
2020	Q4	7.97	236,919.00	103.21	204,957.94	118.13	129.78	663.99	1,372.40	1.50	170,603.00	1.1677	1.5087
2021	Q1	29.41	70,042.00	86.42	717,198.89	75.43	38,520.44	776.10	1,205.40	1.44	193,123.00	0.9550	1.4408

Weighted average prices and quantities are calculated after outliers (< 5% and > 95%) are removed in the preceding 7 years for a given quarter

* Concrete Pavement is normalized to 9 inches thick.

** Assuming same price and quantity as previous quarter for index calculations, due to insufficient data of this sub group

Figure B1. CCI Index Table for 2021 Quarter 1, ending March 2021. The cumulative Fisher Ideal Index values were used to determine escalation values are marked by red squares. For full CCI index report from Colorado Department of Transportation visit: <https://www.codot.gov/business/eema/assets/2021/2021-q1-cci.pdf>

Colorado Highway Construction Cost Index Graph and Tabulations (1987 Base Year)

YEAR	QTR.	Earthwork		Asph. Pavement		Concrete Pavement		Surfacing Index	Structural Concrete		Reinforcing Steel		Structural Steel		Structural Index	Composite Index
		Bid Price	Index	Bid Price	Index	Bid Price	Index		Bid Price	Index	Bid Price	Index	Bid Price	Index		
1987	1987	\$2.47	100.0	\$23.17	100.0	\$13.36	100.0	100.0	\$217.32	100.0	\$0.41	100.0	\$0.85	100.0	100.0	100.0
1988	1988	\$2.92	118.1	\$23.88	103.0	\$13.84	103.6	103.1	\$195.02	89.7	\$0.45	110.7	\$0.89	104.1	96.7	103.7
1989	1989	\$2.57	103.9	\$23.67	102.2	\$11.65	87.2	100.6	\$199.41	91.8	\$0.40	97.8	\$0.88	103.5	95.3	99.6
1990	1990	\$2.78	112.5	\$23.98	103.5	\$15.09	113.0	104.5	\$190.86	87.8	\$0.37	90.8	\$0.99	116.0	94.1	102.7
1991	1991	\$3.31	133.8	\$26.25	113.3	\$16.03	120.0	114.0	\$195.43	89.9	\$0.38	93.1	\$0.89	104.4	93.5	111.2
1992	1992	\$2.77	112.3	\$26.20	113.1	\$23.82	178.3	119.8	\$216.87	99.8	\$0.36	87.9	\$0.71	82.8	94.0	110.7
1993	1993	\$3.25	131.4	\$27.74	119.7	\$16.75	125.4	121.3	\$212.43	97.7	\$0.37	90.1	\$0.79	93.0	95.3	114.7
1994	1994	\$3.56	144.2	\$28.40	122.6	\$18.78	140.6	124.4	\$219.94	101.2	\$0.37	89.7	\$0.67	78.8	94.4	118.8
1995	1995	\$3.41	138.1	\$30.25	130.5	\$17.82	133.4	130.8	\$211.29	97.2	\$0.39	94.0	\$0.90	105.5	98.3	122.3
1996	1996	\$4.46	180.5	\$32.73	141.3	\$19.22	143.9	141.5	\$265.98	122.4	\$0.43	105.1	\$1.09	128.5	120.2	141.7
1997	1997	\$4.24	171.7	\$32.92	142.1	\$21.39	160.1	143.9	\$246.29	113.3	\$0.45	110.8	\$1.01	117.9	113.8	139.6
1998	1998	\$4.89	198.0	\$35.72	154.2	\$26.54	198.7	158.7	\$283.01	130.2	\$0.50	122.0	(\$1.00)	-1.0	128.2	158.1
1999	1999	\$4.94	199.8	\$35.23	152.0	\$22.78	170.5	153.9	\$310.56	142.9	\$0.54	132.0	\$1.41	165.3	145.3	159.2
2000	2000	\$5.25	212.6	\$40.02	173.0	\$20.56	153.9	170.8	\$346.82	159.6	\$0.47	115.2	\$1.18	138.8	146.8	170.7
2001	2001	\$4.19	169.5	\$38.67	167.4	\$17.45	130.6	163.2	\$303.22	139.5	\$0.50	120.9	\$1.29	151.5	138.4	156.8
2002	2002	\$3.74	151.2	\$37.99	164.7	\$24.81	185.7	166.2	\$285.35	131.3	\$0.50	121.3	\$0.78	91.9	121.4	150.1
2003	2003	\$4.42	178.9	\$38.23	165.7	\$20.91	156.6	164.1	\$289.44	133.2	\$0.55	133.4	\$0.72	84.7	123.4	154.4
2004	04Q3	\$4.38	177.1	\$43.33	188.0	\$27.59	206.5	189.0	\$350.71	161.4	\$0.91	221.3	\$2.70	316.3	204.4	191.6
2005	05AV	\$12.90	522.0	\$44.17	191.8	\$30.69	229.8	194.7	\$508.77	234.1	\$0.96	232.9	\$1.01	118.4	210.4	255.2
2006	06AV	\$7.54	305.1	\$59.61	258.4	\$33.79	253.0	256.8	\$430.27	198.0	\$0.92	223.5	\$2.62	306.9	225.1	255.5
2007	07Q3	\$10.32	417.6	\$81.60	352.9	\$28.59	214.0	338.0	\$588.03	270.6	\$1.06	258.9	\$2.00	234.4	261.0	328.3
2007	07Q4	\$17.76	719.0	\$103.64	448.2	\$98.13	734.6	476.8	\$563.39	259.3	\$1.02	249.2	\$5.90	691.1	345.1	478.4
2007	07AV	\$7.18	290.5	\$66.58	287.9	\$37.76	282.7	286.9	\$546.29	251.4	\$1.01	245.7	\$1.40	163.6	232.4	271.1
2008	08AV	\$9.04	365.7	\$69.72	302.2	\$29.93	224.1	293.0	\$467.51	215.1	\$1.05	255.8	\$1.65	193.6	218.6	283.0
2009	09Q3	\$6.11	247.5	\$62.94	272.0	\$31.44	235.4	267.9	\$450.29	207.2	\$0.90	218.9	\$1.77	207.8	209.6	246.8
2009	09Q4	\$6.13	248.1	\$77.79	336.4	\$38.79	290.4	331.1	\$352.16	162.1	\$0.54	132.7	\$3.50	410.2	206.8	279.5
2009	09Q2	\$7.91	320.1	\$65.25	282.2	\$37.17	278.3	281.3	\$379.98	174.9	\$0.70	169.7	\$3.46	405.9	220.8	269.7
2009	09Q1	\$5.87	237.5	\$67.74	292.9	\$78.51	587.7	322.7	\$425.40	195.8	\$0.85	207.2	\$1.55	181.7	195.1	269.8
2009	09AV	\$6.63	268.3	\$66.49	287.5	\$44.12	330.2	291.4	\$399.34	183.8	\$0.75	183.8	\$1.58	185.5	184.1	255.1
2010	10Q3	\$9.30	376.3	\$59.49	257.1	\$48.22	361.0	267.4	\$428.29	197.1	\$0.91	222.9	\$0.00	0.0	203.3	270.8
2010	10Q4	\$8.52	344.7	\$64.69	279.6	\$32.63	244.3	275.6	\$395.91	182.2	\$0.76	186.3	\$0.00	0.0	183.2	264.5
2010	Q1AV	\$7.86	318.3	\$61.92	267.9	\$29.19	218.5	262.2	\$430.84	198.3	\$0.78	190.6	\$2.27	266.4	210.6	256.2
2011	11Q1	\$7.17	290.4	\$69.28	300.9	\$28.75	215.2	290.4	\$365.40	168.2	\$0.76	186.5	\$1.55	181.7	174.4	255.4
2011	11Q2	\$7.37	298.2	\$69.89	302.2	\$41.46	310.3	302.5	\$419.00	192.8	\$0.83	203.2	\$0.00	0.0	195.3	274.3
2011	11Q3	\$9.51	385.0	\$78.57	340.0	\$27.00	202.1	325.0	\$408.18	187.8	\$0.93	226.6	\$0.00	0.0	197.2	303.2
2011	11Q4	\$6.67	270.0	\$74.69	323.1	\$56.69	424.4	332.8	\$444.85	204.7	\$0.87	212.2	\$1.75	205.6	206.3	284.0
2012	12Q1	\$9.47	383.3	\$77.18	334.4	\$29.60	221.6	321.6	\$366.06	168.5	\$0.89	216.0	\$1.00	117.2	167.2	285.6

Figure B2. CCI Index Table for 2012 Quarter 1, ending March 2012. Quarter 1 of 2012 set the point in which the CCI index was recalibrated to 1.000 as shown above in Figure B1. Composite index values were used to determine escalation values are marked by red squares. For masterplans cost older than 1987 (Sand Creek MDP 1984), the oldest known index of 1987 was used. For full CCI index report from Colorado Department of Transportation visit: <https://www.codot.gov/business/eema/assets/2012/2012Q1CCI.pdf>

YEAR	QTR.	Earthwork		Asph. Pavement		Concrete Pavement		Surfacing	Structural Concrete		Reinforcing Steel		Structural Steel		Structural	Composite
		Bid Price	Index	Bid Price	Index	Bid Price	Index		Index	Bid Price	Index	Bid Price	Index	Bid Price		
1987	1987	\$2.47	100.0	\$23.17	100.0	\$13.36	100.0	100.0	\$217.32	100.0	\$0.41	100.0	\$0.85	100.0	100.0	100.0
1988	1988	\$2.92	118.1	\$23.88	103.0	\$13.84	103.6	103.1	\$195.02	89.7	\$0.45	110.7	\$0.89	104.1	96.7	103.7
1989	1989	\$2.57	103.9	\$23.67	102.2	\$11.65	87.2	100.6	\$199.41	91.8	\$0.40	97.8	\$0.88	103.5	95.3	99.6
1990	1990	\$2.78	112.5	\$23.98	103.5	\$15.09	113.0	104.5	\$190.86	87.8	\$0.37	90.8	\$0.99	116.0	94.1	102.7
1991	1991	\$3.31	133.8	\$26.25	113.3	\$16.03	120.0	114.0	\$195.43	89.9	\$0.38	93.1	\$0.89	104.4	93.5	111.2
1992	1992	\$2.77	112.3	\$26.20	113.1	\$23.82	178.3	119.8	\$216.87	99.8	\$0.36	87.9	\$0.71	82.8	94.0	110.7
1993	1993	\$3.25	131.4	\$27.74	119.7	\$16.75	125.4	121.3	\$212.43	97.7	\$0.37	90.1	\$0.79	93.0	95.3	114.7
1994	1994	\$3.56	144.2	\$28.40	122.6	\$18.78	140.6	124.4	\$219.94	101.2	\$0.37	89.7	\$0.67	78.8	94.4	118.8
1995	1995	\$3.41	138.1	\$30.25	130.5	\$17.82	133.4	130.8	\$211.29	97.2	\$0.39	94.0	\$0.90	105.5	98.3	122.3
1996	1996	\$4.46	180.5	\$32.73	141.3	\$19.22	143.9	141.5	\$265.98	122.4	\$0.43	105.1	\$1.09	128.5	120.2	141.7
1997	1997	\$4.24	171.7	\$32.92	142.1	\$21.39	160.1	143.9	\$246.29	113.3	\$0.45	110.8	\$1.01	117.9	113.8	139.6
1998	1998	\$4.89	198.0	\$35.72	154.2	\$26.54	198.7	158.7	\$283.01	130.2	\$0.50	122.0	(\$1.00)	-1.0	128.2	158.1
1999	1999	\$4.94	199.8	\$35.23	152.0	\$22.78	170.5	153.9	\$310.56	142.9	\$0.54	132.0	\$1.41	165.3	145.3	159.2
2000	2000	\$5.25	212.6	\$40.02	173.0	\$20.56	153.9	170.8	\$346.82	159.6	\$0.47	115.2	\$1.18	138.8	146.8	170.7
2001	2001	\$4.19	169.5	\$38.67	167.4	\$17.45	130.6	163.2	\$303.22	139.5	\$0.50	120.9	\$1.29	151.5	138.4	156.8
2002	02Q1	\$6.25	252.9	\$37.53	163.1	\$31.12	233.0	169.3	\$293.38	135.0	\$0.53	129.6	\$0.00	0.0	133.7	175.4
2002	02Q2	\$5.69	230.3	\$39.67	171.5	\$28.33	212.1	175.4	\$294.41	135.5	\$0.50	121.3	\$0.70	82.4	121.9	168.6
2002	02Q3	\$4.42	178.8	\$34.98	151.4	\$25.51	190.9	155.1	\$299.12	137.7	\$0.49	120.5	\$2.11	247.3	156.6	159.6
2002	02Q4	\$2.31	93.3	\$38.71	167.5	\$21.26	159.2	166.2	\$257.37	118.4	\$0.49	120.7	\$0.81	95.0	114.1	138.1
2002	02AV	\$3.74	151.2	\$37.99	164.7	\$24.81	185.7	166.2	\$285.35	131.3	\$0.50	121.3	\$0.78	91.9	121.4	150.1
2003	03Q1	\$4.23	171.2	\$36.48	158.2	\$24.92	186.6	160.4	\$283.25	130.4	\$0.57	137.9	\$0.00	0.0	132.2	155.2
2003	03Q2	\$10.00	404.8	\$40.35	174.9	\$43.68	327.0	189.9	\$327.84	150.9	\$0.62	151.9	\$0.31	36.3	127.8	183.2
2003	03Q3	\$4.64	187.9	\$41.05	177.5	\$18.89	141.4	173.5	\$336.84	155.0	\$0.58	140.5	\$1.05	123.1	145.7	167.6
2003	03Q4	\$3.85	155.7	\$40.10	173.5	\$19.51	146.1	170.3	\$267.39	123.1	\$0.51	125.0	\$0.00	0.0	123.5	155.7
2003	03AV	\$4.42	178.9	\$38.23	165.7	\$20.91	156.6	164.1	\$289.44	133.2	\$0.55	133.4	\$0.72	84.7	123.4	154.4
2004	04Q1	\$3.94	159.7	\$36.03	156.1	\$31.13	233.0	163.5	\$297.69	137.0	\$0.71	172.4	\$1.78	208.9	158.4	161.3
2004	04Q2	\$5.84	236.6	\$35.97	155.9	\$28.42	212.8	161.2	\$297.92	137.1	\$0.78	190.1	\$1.13	132.9	146.5	169.6
2004	04Q3	\$4.38	177.1	\$43.33	188.0	\$27.59	206.5	189.0	\$350.71	161.4	\$0.91	221.3	\$2.70	316.3	204.4	191.6
2004	04Q4	\$7.39	298.9	\$41.45	179.2	\$40.01	299.5	191.3	\$305.55	140.6	\$0.74	179.9	\$0.00	0.0	150.1	200.3
2004	04AV	\$4.60	186.1	\$37.43	162.1	\$28.96	216.8	167.2	\$323.50	148.9	\$0.83	202.7	\$1.26	147.6	159.0	168.0
2005	05Q1	\$9.43	381.7	\$41.99	182.3	\$60.10	449.9	208.8	\$443.32	204.0	\$0.91	222.2	\$1.10	128.9	192.2	233.3
2005	05Q2	\$16.07	650.5	\$44.19	192.4	\$28.54	213.6	193.1	\$540.39	248.7	\$0.98	240.0	\$0.00	0.0	246.6	289.8
2005	05Q3	\$9.74	394.2	\$57.71	249.5	\$34.29	256.7	249.9	\$491.90	226.4	\$0.97	237.3	\$3.50	410.2	265.9	279.3
2005	05Q4	\$12.52	506.9	\$52.73	228.4	\$56.18	420.5	247.4	\$407.63	187.6	\$0.81	198.2	\$0.97	113.7	174.6	269.7
2005	05AV	\$12.90	522.0	\$44.17	191.8	\$30.69	229.8	194.7	\$508.77	234.1	\$0.96	232.9	\$1.01	118.4	210.4	255.2
2006	06Q1	\$11.48	464.6	\$54.99	238.8	\$47.80	357.8	249.7	\$566.84	260.9	\$1.22	296.5	\$0.00	0.0	269.5	293.8
2006	06Q2	\$10.68	432.4	\$58.85	255.1	\$28.40	212.6	249.7	\$426.20	196.1	\$1.11	271.4	\$1.93	226.1	216.8	270.9
2006	06Q3	\$7.03	284.7	\$74.90	323.5	\$26.79	200.6	310.6	\$439.17	202.1	\$0.91	222.3	\$0.00	0.0	207.0	279.4
2006	06Q4	\$6.20	251.1	\$67.40	291.4	\$45.03	337.1	295.6	\$387.04	178.1	\$0.79	191.9	\$5.70	667.6	280.3	283.4
2006	06AV	\$7.54	305.1	\$59.61	258.4	\$33.79	253.0	256.8	\$430.27	198.0	\$0.92	223.5	\$2.62	306.9	225.1	255.5

Figure B3. CCI Index Table for 2006 Quarter, ending December 2006. Composite index values were used to determine escalation values are marked by red squares. The composite index value selected were compared to the first quarter 2012 value to recalibrate the index for 2021 cost calculations. For full CCI index report from Colorado Department of Transportation visit: <https://www.codot.gov/business/eema/assets/2006/2006q4CCI.pdf>

CCI Index Cost Equation for Cost Between 2012 – 2021

Example – Third Creek Conceptual Design MDP (2018, Quarter 4)

$$2021 \text{ Escalated Cost} = \frac{CCI \text{ 2021, Quarter 1}}{CCI \text{ Report Year, Quarter}} * \text{Capital Cost of Report} = \frac{CCI \text{ 2021, Q1}}{CCI \text{ 2018, Q4}} * \text{Capital Cost of Third Creek MDP} = \frac{1.4408}{1.0785} * 39,759,418 = \$53,115,781$$

CCI Index Cost Equation for Cost Between 1987 – 2012

Example – Lower First Creek and Direct Flow Area 0055 MDP (2004, Quarter 2)

$$2012 \text{ Escalated Cost} = \frac{CCI \text{ 2012, Quarter 1}}{CCI \text{ Report Year, Quarter}} * \text{Capital Cost of Report} = \frac{CCI \text{ 2012, Q1}}{CCI \text{ 2004, Q2}} * \text{Capital Cost of First Creek MDP} = \frac{285.6}{191.6} * 13,281,676 = \$19,797,738$$

Then repeat calculation to update to 2012 Cost to 2021 Cost

$$2021 \text{ Escalated Cost} = \frac{CCI \text{ 2021, Quarter 1}}{CCI \text{ 2012, Quarter 1}} * \text{Capital Cost of Report} = \frac{CCI \text{ 2021, Q1}}{CCI \text{ 2012, Q1}} * 2012 \text{ Escalated Capital Cost of First Creek MDP} = \frac{1.4408}{1.0000} * \$19,797,738 = \$28,524,581$$

Table B1. Masterplan and Report Calculated 2021 Capital and Maintenance Cost Updated Based on CCI Index Escalations

Masterplan/Report Name	Report Month-Year	Total Report Capital Cost for Commerce City*	Total Report Annual Operating and Maintenance	CCI 2012, Quarter 1 CCI Report Year, Quarter	Capital Cost 2012	Annual Operating and Maintenance 2012	CCI 2021, Quarter 1 CCI Report Year, Quarter or CCI 2012, Quarter 1	Capital Cost 2021**	Annual Operating and Maintenance 2021**
Second Creek Major Drainage Plan - Alternatives Analysis	Jan-19	\$87,511,960	\$230,395	-	-	-	1.1276	\$98,675,248	\$259,785
Conceptual Design Third Creek MDP	Nov-18	\$25,665,903	\$24,229	-	-	-	1.3359	\$34,287,837	\$32,368
Henderson Creek MDP - Alternative Analysis (RESPEC Draft)	Jul-21	\$51,197,176	\$140,276	-	-	-	1.0000	\$51,197,288	\$140,276
Irondale Gulch OSP - Conceptual Design Report ^{1,3}	Sep-11	\$14,628,376	\$116,416	0.9420	\$13,779,247	\$109,658	1.4408	\$23,624,258	\$157,996
Sand Creek MDP ^{2,3,4}	Jan-84	\$3,284,670	\$11,340	2.8560	\$9,381,018	\$32,387	1.4408	\$13,516,170	\$46,663
Lower First Creek and Direct Flow Area 0055 MDP (First Creek Only) ^{2,3}	May-02	\$22,495,012	\$120,205	1.6940	\$38,105,429	\$203,621	1.4408	\$54,902,302	\$293,378
Lower First Creek and Direct Flow Area 0055 MDP (DFA 0055 Only) ^{2,3}	May-02	\$14,439,487		1.6940	\$26,687,460		1.4408	\$35,141,181	
Second Creek (Downstream of DIA) and DFA 0053 OSP (Only Considering Second Creek Tributaries) ^{2,3,5}	Aug-04	\$8,914,631	\$31,201	1.6839	\$15,100,942	\$52,853	1.4408	\$21,757,437	\$76,151
Second Creek (Downstream of DIA) and DFA 0053 OSP (Only Considering DFA 0053) ^{2,3,5}	Aug-04	4,367,045	\$15,285	1.6839	\$7,397,556	\$25,891	1.4408	\$10,658,398	\$37,304
Fairfax Outfall ^{2,3}	Jul-06	\$2,751,122	\$9,498	1.0222	\$2,812,170	\$9,709	1.4408	\$4,051,775	\$13,988
TOTAL		\$235,255,282	\$698,845					\$347,811,896	\$1,057,909

1 - Irondale Gulch cost was updated based on the Irondale Gulch Stormwater Implementation Plan (RESPEC, 2019)

2 - Reports conducted before 2010 did not include annual operating and maintenance (O&M) cost. Therefore, the average percent of O&M cost compared to the capital cost of the Irondale Gulch Henderson Creek MDP, Third Creek MDP, and Second Creek MDP were considered (0.35%).

3 - The CCI index was recalibrated to 1.0000 in 2012. For reports before 2012, cost were initially adjusted to 2012 cost using older CCI index reports and then readjusted to 2021 costs using the 2021 CCI index

4 - Reports older than 1987 used the last known CCI index value of 100.0 (Quarter 1 of 1987)

5 - Second Creek (Downstream of DIA) and DFA 0053 OSP does not include cost associated with the main steam of Second Creek to ensure that cost were not double counted

*Cost reported are those only assessed to Commerce City

**CCI Index was utilized to updated masterplan costs to estimated 2021 costs, by dividing the CCI index of 2021 by the MDP/OSP year's CCI index or the CCI of 2012 Quarter 1 (1.000) based on the report month and year

Table B2. Second Creek MDP Project Breakdown

Reach	Project	2021 Total Cost ¹	Notes
3	North Detention Pond (Vic. O'Brian Canal Crossing)	\$48,902,465	Implementing North Pond located near the Second Creek O'Brian Canal crossing.
3	Chambers Rd. Bridge Replacement ²	\$12,448,773	Replace existing bridge at Chambers Road with an approximately 180 feet wide bridge; the road embankment will need to be raised approximately 5 feet near the bridge. Included in the costs is removing existing pavement and raising and replacing roadway, sidewalk, and gutters (cost defined by engineer).
3	13900 LF Channel Improvements BNSF Railroad to Chambers Rd	\$6,072,133	Create approximately 1000 feet wide channel along the entire reach; stream restoration/channel improvement to promote a low maintenance stream (cost defined by engineer).
4	17800 LF Channel Improvements Chambers Rd to 96th Ave	\$6,387,562	Create approximately 1000 feet wide channel along the entire reach; Approximately 9100 ft of stream restoration/channel improvement to promote a low maintenance stream (cost defined by engineer).
5	Parcel K Offline Detention Pond (Vic. Buckley Rd and 88th Ave)	\$11,723,710	Implementing Parcel K offline detention located near 88th Ave. Includes additional cost for seeding.
5	18300 LF Channel Improvements 96th Ave to Tower Rd	\$11,882,676	Create approximately 1000 feet wide channel along the entire reach; stream restoration/channel improvement to promote a low maintenance stream (cost defined by engineer). Includes additional cost for seeding and excavation.
5	88th Ave Bridge Replacement	\$7,316,247	Replace existing 22.7' x 7.8' CBC at E. 88th Ave. with an approximately 160 feet wide bridge; the road embankment will need to be raised approximately 5 feet near the bridge. Included in cost are removing existing pavement and raising and replacing roadway, sidewalk, and gutters. Cost defined by engineer
6	11000 LF Channel Improvements Tower Rd to City Boundary Limits	\$5,188,896	Create an approximately 1,000 feet wide stream management corridor along the entirety of Reach 6; Approximately 5,700 feet of stream restoration/channel improvements to promote a low maintenance stream (cost defined by engineer).
6	Remove Blackmore Dam from Second Creek floodplain	\$1,201,559	Excavate and remove approximately 42,000 CY from the historic Blackmore Dam embankment to allow for lateral migration of the stream channel
		\$98,675,248	

1: Subtotal Additional Capital Improvement Cost and Subtotal Other Cost were calculated by a weighted cost ratio distribution. Where the subtotal overall calculated cost shown in the MDP was multiplied by the ratio of the project cost over the overall reach project cost. The MDP cost was adjusted to a 2021 estimated cost using the CCI Index.

2: Cost covered in Roadway Impact Fee

Notes:

- Data collected from Second Creek MDP using the recommended plan Detention Alternative 3a
- Second Creek projects are listed downstream to upstream, with reach 3 being the farthest downstream in Commerce City boundary limits

Table B3. Third Creek MDP Project Breakdown

Reach	Project	2021 Total Cost ¹	Notes
4	Increase Culvert/Crossing Capacity at Cameron Drive	\$4,211,533	4 -12'X4' at Cameron Drive for bankful and 7 -12'X4' for floodplain opening. Includes cost for removing existing culverts (Table I-2 in the Third Creek MDP) ² and roadwork cost for Cameron Drive (Table I-4 of Third Creek MDP) ² .
4	Build Burlington Ditch Crossing	\$5,672,396	Burlington Ditch crossing with 16 - 8'X3'. Also includes the cost of a drop structure for 100-year undercrossing. Includes cost for removing existing culverts (Table I-2 in the Third Creek MDP) ² .
4	5700 LF Channel Improvements Cameron Dr. to Burlington Ditch	\$1,330,374	Channel and embankment improvements which includes excavation (no haul), seeding and reclamation, and 6-in riprap. Excavation cost determined by engineers.
5	Increase Culvert/Crossing Capacity at Buckley Rd ³	\$4,967,135	4 -12'X4' to be placed at Buckley Rd for bankful and 8 -12'X4' for floodplain opening. Includes of the cost for removing existing culverts (Table I-2 in the Third Creek MDP) ² and roadwork cost for Buckley Rd (Table I-4 of Third Creek MDP) ² .
5	O'Brian Canal Crossing	\$10,374,380	O'Brian Canal crossing with 14 - 8'X3'. Also includes the cost of a drop structure for 100-year undercrossing. Includes cost for removing existing culverts (Table I-2 in the Third Creek MDP) ² .
5	3500 LF Channel Improvements the Burlington Ditch to the O'Brian Canal	\$1,881,960	Channel and embankment improvements which includes excavation (no haul), seeding and reclamation, and 6-in riprap. Excavation cost determined by engineers.
6	Culvert/Crossing at Himalaya Rd ³	\$3,645,566	1 -12'X4' to be placed at Himalaya Rd for bankful and 7 -12'X4' for floodplain opening. Includes roadwork cost for the future Himalaya Rd (Table I-4 of Third Creek MDP) ² .
6	Increase Culvert/Crossing Capacity at Tower Rd ³	\$10,215,242	4 -12'X4' to be placed at Tower Rd. for bankful and 13 -12'X4' for floodplain opening. Includes of the cost for removing existing culverts (Table I-2 in the Third Creek MDP) ² and roadwork cost for Cameron Drive (Table I-4 of Third Creek MDP) ² .
6	11200 LF Channel Improvements the O'Brian Canal to Himalaya Rd	\$10,817,193	Channel and embankment improvements which includes excavation (no haul), seeding and reclamation, and 6-in riprap. Excavation cost determined by engineers.
		\$34,287,837	

1: Subtotal Additional Capital Improvement Cost and Subtotal Other Cost were calculated by a weighted cost ratio distribution. Where the subtotal overall calculated cost shown in the MDP was multiplied by the ratio of the project cost over the overall reach project cost. The MDP cost was adjusted to a 2021 estimated cost using the CCI Index.

2: Culvert removal and Pavement cost were determined using tables I-2 and I-4, respectfully, from the Third Creek MDP report.

3: Cost covered in Roadway Impact Fee

Notes:

- Data collected from Third Creek MDP: Conceptual Design report

- Projects are listed from downstream to upstream (reach 4 is the farthest downstream reach in Commerce City).

Table B4. Henderson Creek MDP Project Breakdown

Reach	Project	2021 Total Cost ¹	Notes
Hend 6B	1525 LF New Channel Brighton Rd to 120th Pkwy	\$340,659	No channel currently exists after the 120th Pkwy crossing. Will create major issues if not competed because significant flow is expected at this location
Hend 6B	New Bridge at Brighton Rd	\$3,185,112	With the channel path being changed, a new crossing will need to be created to allow for water to outfall into the South Platte. Cost includes developing the deck and removing existing pavements. Placing new bridge cost was estimated by engineers
Hend 6	Havana St - US 85 Crossing and Stormwater Pipe	\$11,260,137	Included the cost of the crossing of Havana St to US 85, which required removing existing pipes, boring, and adding manholes.
Hend 6	US 85 Pond (Vic. Highway US 85)	\$14,854,145	Pond needed to reduce peak flows before crossing.
Hend 5	2310 LF Increased Channel Capacity Havana St (US 85 Pond) to 112th Way	\$724,847	Channel is slightly undersized for the 100-year event.
Hend 5	Increase Culvert/Crossing Capacity at 112th Way	\$1,025,221	Crossings are undersized for the 100-year event. Cost also includes the removal of existing culverts.
Rag 3	Pond 839 (Vic. 112th Ave)	\$570,362	The pond exists but an outlet structure needs to be added. A culvert for the crossing at 112th Ave will need to be removed and a new one implemented.
Rag 3	Increase Culvert/Crossing Capacity at 111th Ave	\$409,147	Crossing at 111th Ave is currently undersized. The existing culvert will need to be removed as well
Rag 3	Increase Culvert/Crossing Capacity at River Oaks Way	\$486,034	Crossing at River Oaks Way is currently undersized. The existing culvert will need to be removed as well
Hend 3	Pond 834 (Vic. I-76)	\$6,531,804	Detention pond which includes outlet structure cost. This pond's land will need to be acquired.
Hend 2	1500 LF Increased Channel Capacity O'Brian Canal Crossing to Highway 2	\$537,590	No channel exists between Highway 2 and the O'Brian Crossing. The land will also need to be purchased. Land acquisition cost was \$435600/acre
Rag 2	Triangle Pond and D/S Crossing (Vic. I-76)	\$9,445,859	Triangle Pond needs to be added to reduce peak flows. Included in the cost is the boring for the outlet pipe
Rag 2	O'Brian Canal Crossing ²	\$306,194	Adding 8' X 4' Crossing for the O'Brian Canal crossing. The cost is associated to the Aberdeen development, but was noted as a priority project by RESPEC
Rag 2	1375 LF Increased Channel Capacity Peoria Pkwy to Highway 2	\$1,520,176	No channel exists between Highway 2 and the Peoria Pkwy crossing. Land will need to be acquired.
		\$51,197,288	

1: Subtotal Additional Capital Improvement Cost and Subtotal Other Cost were calculated by a weighted cost ratio distribution. Where the subtotal overall calculated cost shown in the MDP was multiplied by the ratio of the project cost over the overall reach project cost. The MDP cost was adjusted to a 2021 estimated cost using the CCI Index.

2: The O'Brian Canal crossing is anticipated to be constructed by the Aberdeen development; however, this project is considered a priority and will be considered in this assessment.

Notes:

- Data collected from updated Henderson Creek MDP - Alternatives, using the recommend alternative 3. Commerce City overall cost was adjusted to \$51,013,826
- Henderson Creek projects are listed downstream to upstream (Henderson 6B is the farthest downstream reach)
- Henderson Creek MDP includes both Ragweed Draw and Henderson Creek

Table B5. Irondale Gulch OSP Project Breakdown

Reach	Project	2021 Total Cost ^{1,2}	Notes
1	1647 LF Irondale Gulch Outfall into South Platte River	\$3,820,12	A 10'X3' CBC will be used to outfall Irondale Gulch into the South Platte River. Also included is the Box base manhole, asphalt resurfacing, roadway embankments, and signing and striping (all cost additional cost defined by engineer).
2	8184 LF of Irondale Gulch Storm Trunk Line Under 88th Ave (Hwy 2 to Brighton Rd) ⁴	\$8,885,218	8184 LF of 60" RCP under 88th Ave from Hwy 2 to Brighton Rd. Included is the cost of Jacked 60-inch RCP Labor and Installation and 2 box base manholes. Also included was asphalt resurfacing (note that some of this cost could go towards other projects, but a majority of the asphalt will be need for 88th Ave).
2	Detention Pond 8950 (Vic. South of 88th Ave just East of Ulster St) ³	\$2,183,783	<p>According to the RESPEC Memo on Irondale Gulch, Pond 8961 was removed from the necessary cost, which is why 2 million dollars were removed from the initial cost estimate during the fee study.</p> <p>Therefore only 5 ponds are proposed in this reach and cost were not simply broken down for each pond, the overall cost was split evenly for each pond after subtracting the 2 million associated with Pond 8961. This includes 2021 land acquisition cost, which are directly added to 2021 estimated cost. The following items/tasks were contributed to the detention ponds: conveyance piping, flared-end sections, manholes, sloping drop structures, channel excavation, pond excavation, seeding, outlet work, and maintenance trail.</p>
2	ORG Detention Pond 8953 (Vic. 88th Ave and Rosemary St.) ³	\$2,183,783	
2	ALT Detention Pond 8953 (Vic. 86th Ave and Roslyn St) ^{3,4}	\$2,183,783	
2	ALT Detention Pond 8955 (Vic. 84th Ave and between Quebec St. and Rosemary St.) ^{3,4}	\$2,183,783	
2	Detention Pond 8957 (Vic. Southwest of Oneida St and Union Pacific Railroad) ³	\$2,183,783	
		\$23,624,258	

1: Subtotal Additional Capital Improvement Cost and Subtotal Other Cost were calculated by a weighted cost ratio distribution. Where the subtotal overall calculated cost shown in the MDP was multiplied by the ratio of the project cost over the overall reach project cost. The MDP cost was adjusted to a 2021 estimated cost using the CCI Index.

2: Land acquisition cost were determined by RESPEC based on 2021 cost. Therefore, land acquisition costs were added to the 2021 Total Cost.

3: Detention Pond cost were determined by a summation of the total cost of the 6 detention ponds and then equally divided. However, according to the Irondale Gulch Stormwater Implementation Plan (RESPEC, 2019) Pond 8961 was removed and therefore 2 million dollars was removed from the total detention cost the was equally divided among the remaining 5 ponds.

4: Marks projects currently in design.

Notes:

- Data collected from Irondale Gulch OSP - Conceptual Design. Additional information collected from Irondale Gulch Stormwater Implementation Plan (RESPEC, 2019)

- Irondale Gulch projects are listed from downstream to upstream (Reach 1 is the farthest downstream).

Table B6. First Creek MDP Project Breakdown

Sheet Number	Project	Total Cost 2021 ¹	Notes
3	2800 LF Channel Improvements (Vic. Brighton Rd.)	\$890,579	Update the channel size which includes a grass-lined channel, low flow channel improvements, right of way acquisition, cutting and filling earthwork, and riprap for channel.
3	Replace Brighton Rd Culverts	\$950,035	Improvements for 7- 10'X6' RCBC under Brighton Rd with outfall riprap.
4a	2237.5 LF Channel Improvements (Vic. East of Highway US 85) ²	\$1,999,469	Update the channel size which includes a grass-lined channel, low flow channel improvements, right of way acquisition, native seeding, cutting and filling earthwork, 2 drop structures, and riprap for channel.
4a	Replace Highway US 85 Culverts ²	\$2,296,157	Improvements for 7- 10'X5' CBC under US 85 with outfall riprap.
4a	Replace Union Pacific Railroad Culverts ²	\$487,933	Improvements for 7- 10'X5' CBC under UPRR (Railroad) with outfall riprap.
4a	Replace 104th Culverts ²	\$1,693,416	Improvements for 7- 10'X5' CBC under 104th Ave with outfall riprap.
5	1132.24 LF Channel Improvements (Vic. West of I-76) ²	\$1,495,243	Update the channel size which includes a grass-lined channel, low flow channel improvements, right of way acquisition, native seeding, cutting and filling earthwork, 1 drop structure, and riprap for channel.
5	Replace I-76 Culverts ²	\$4,104,381	Improvements for 7- 10'X5' CBC under I-76 with outfall riprap.
6	2800 LF Channel Improvements (Vic. I-76 to Burlington Ditch)	\$4,051,283	Update the channel size which includes a grass-lined channel, low flow channel improvements, right of way acquisition, native seeding, cutting and filling earthwork, 2 drop structures, and riprap for channel.
6	Replace Havana St. Culverts	\$1,749,923	Improvements for 7- 10'X5' CBC under Havana St with outfall riprap. This road is now considered Joliet St.
6	Burlington Ditch Crossing ³	\$100,457	54" RCP siphon to force Burlington Ditch under First Creek. Based on updated aerial imagery, First Creek no longer crosses the Burlington Ditch.
7	2800 LF Channel Improvements (Vic. Highway 2)	\$5,632,366	Update the channel size which includes a grass-lined channel, low flow channel improvements, right of way acquisition, native seeding, cutting and filling earthwork, 4 drop structures, and riprap for channel.
7	Replace Highway 2 Bridge	\$2,009,138	Require a 140 ft X 40 ft bridge to be implemented at Highway 2.
7	O'Brian Canal Crossing	\$1,007,798	5 - 96" RCP siphon to force the O'Brian Canal under First Creek
8 & 9	Maul Reservoir Detention Pond (Vic. North of 96th Ave)	\$25,739,938	Maul Reservoir detention pond. Included are the earthwork (cut and fill), riprap for low flow channel and outfall, right of way, the culverts for the outlet structure, concrete work for inlet and outlet, and armoring for the dam.
9	Replace 96th Ave Culverts ⁴	\$1,341,817	8 - 10'X6' CBC for First Creek to pass under 96th Ave with outfall riprap.
3 thru 9 (not including 4)	Multipurpose Trail next to First Creek	\$794,643	Putting multipurpose trail along First Creek for the entire channel. Stations are 38+00 to 66+00, 10+00 to 32+37.50 (from 4a sheet), 110+67.76 to 122+00, 122+00 to 150+00, 150+00 to 178+00
		\$54,902,302	

1: Legal, admin, engineering, utility adjustments and contingencies are 47% of project cost. The MDP cost was adjusted to a 2021 estimated cost using the CCI Index.

2: Projects recommended as top priority but can be completed in phases.

3: Based on updated aerial imagery, First Creek no longer crosses the Burlington Ditch, therefore, this cost does not need to be considered.

4: Covered in Roadway Impact Fee

Notes:

- Based on 2002 First Creek Masterplan. First Creek projects are listed downstream to upstream (South Platte River outfall is the farthest downstream point).

- In 2002, Adams County owned various land within the First Creek reach. Based on 2021 Commerce City boundary limits, the entire First Creek watershed downstream of the Rocky Mountain Arsenal resides within Commerce City.

- The O'Brian Canal is currently redirecting First Creek, therefore, limiting the impact of First Creek downstream of the O'Brian Canal crossing.

Table B7. Direct Flow Area 0055 MDP Project Breakdown

Sheet Number	Project	Total Cost 2021 ¹	Notes
10	2800 LF Channel Improvements (Vic. Highway US 85)	\$1,864,659	Update the channel's size which includes a grass-lined channel, right of way acquisition, native seeding, cutting, and filling earthwork.
10	Implement 104th Ave Crossing	\$1,456,266	7 - 10'X6' and 1 - 5'X6' CBC implemented under 104th Ave with outfall riprap.
10	Implement US 85 Crossing	\$2,320,016	7 - 10'X6' and 1 - 5'X6' CBC implemented under US85 with outfall riprap.
11	2800 LF Rolla Tributary Channel Improvements (Vic. South of I-76)	\$1,799,168	Update the channel size which includes a grass-lined channel, right of way acquisition, native seeding, cutting, and filling earthwork.
11	Implement I-76 Crossing	\$4,853,682	7 - 10'X6' and 1 - 5'X6' CBC implemented under I-76 with outfall riprap.
11	Implement Rolla Tributary Union Pacific Railroad Crossing	\$504,078	5 - 10'X3' CBC implemented under Union Pacific Railroad with outfall riprap.
12	2247 LF Rolla Tributary Channel Improvements (Vic. North of 96th Ave)	\$1,658,784	Update the channel size which includes a grass-lined channel, right of way acquisition, native seeding, cutting, 3 drop structures, and filling earthwork.
12	Implement Rolla Tributary Union Pacific Railroad Crossing	\$200,555	3 - 10'X5' CBC implemented under Union Pacific Railroad with outfall riprap.
12	Implement 96th Ave Crossing	\$228,755	3 - 10'X5' CBC implemented under 96th Ave with outfall riprap.
13	2800 LF Arsenal North Tributary Channel Improvements (Vic. South of I-76)	\$1,313,653	Update the channel size which includes a grass-lined channel, right of way acquisition, native seeding, cutting, and filling earthwork. Outfall riprap at the Birch Tributary outfall and for the slope change at 27+75.
13	Implement Arsenal North Tributary Union Pacific Railroad Crossing	\$653,687	3 - 10'X6' CBC implemented under Union Pacific Railroad with outfall riprap.
14 ²	2800 LF Arsenal North Tributary Channel Improvements (Vic. West of Burlington Ditch)	\$2,450,682	Update the channel size which includes a grass-lined channel, low flow channel improvements, right of way acquisition, native seeding, cutting, and filling earthwork, and riprap for channel.
14 ²	Implement Arsenal North Tributary Burlington Ditch Crossing ³	\$100,457	54" RCP siphon to force Burlington Ditch under Arsenal North Tributary. Based on updated aerial imagery, Arsenal North Tributary no longer crosses the Burlington Ditch.
15 ²	2400 LF Arsenal North Tributary Channel Improvements (Vic. West of Highway 2)	\$1,416,464	Update the channel size which includes a grass-lined channel, low flow channel improvements, right of way acquisition, native seeding, cutting earthwork, drop structures, and riprap for channel.
15 ²	Implement Arsenal North Tributary Havana St. Crossing	\$414,833	2 - 10'X5' and 1 - 5'X5' CBC implemented under Havana St for Arsenal North Tributary.
15 ²	Implement Arsenal North Tributary O'Brian Canal Crossing	\$1,007,798	5 - 96" RCP siphon to force the O'Brian Canal under Arsenal North Tributary.

17	1600 LF Elm Tributary Channel Improvements (Vic. East of O'Brian Canal)	\$379,153	Update the channel size, just includes cut earthwork and a drop structure.
18	1550 LF Elm Tributary Channel Improvements (Vic. 96th Ave)	\$415,138	Update the channel size, just includes cut and fill earthwork and a drop structure.
18	Implement Elm Tributary Highway 2 and BNSF Railroad Crossing	\$388,912	1 - 10'X5' CBC implemented under Hwy 2 and BSNR Railroad for Elm Tributary with outfall riprap.
19	2800 LF Union Pacific Tributary Channel Improvements (Vic. East of Union Pacific Railroad)	\$3,812,912	Update the channel size which includes a grass-lined channel, low flow channel improvements, right of way acquisition, native seeding, cutting earthwork, a drop structure, and riprap for channel and outfall into Birch Tributary.
19	Implement Union Pacific Tributary Union Pacific Railroad Crossing	\$232,845	5 - 10'X3' CBC implemented under UP Railroad for Union Pacific Tributary with outfall riprap.
20	1034 LF Union Pacific Tributary Channel Improvements (Vic. 96th Ave)	\$1,326,799	Update the channel size which includes a grass-lined channel, low flow channel improvements, right of way acquisition, native seeding, cutting earthwork, a drop structure and riprap for channel.
20	Implement Union Pacific Tributary 96th Ave Crossing	\$337,428	1 - 10'X5' and 1 - 5'X5' CBC implemented under 96th Ave for Union Pacific Tributary with outfall riprap.
21 ²	1897 LF Maul Reservoir Tributary Channel Improvements (Vic. North of 96th Ave)	\$2,792,235	Update the channel size which includes a grass-lined channel, low flow channel improvements, right of way acquisition, native seeding, cutting, and filling earthwork, 5 drop structures, and riprap for channel.
21 ²	Implement Maul Reservoir Tributary 96th Ave Crossing	\$326,485	3 - 10'X4' CBC implemented under 96th Ave for Maul Reservoir Tributary with outfall riprap.
23 ²	2198 LF Wolpert Tributary Channel Improvements (Vic. North of 112th Ave)	\$1,244,883	Update the channel size which includes a grass-lined channel, low flow channel improvements, right of way acquisition, native seeding, cutting earthwork, and riprap for channel and outfall.
10 thru 21 and 23	Implement Multipurpose Trail next to Direct Flow Area 0055 and Tributaries	\$1,741,312	Building a multipurpose trail along entire DFA 0055 and correlating tributaries
		\$35,141,181	

1: Legal, admin, engineering, utility adjustments and contingencies are 47% of project cost. The MDP cost was adjusted to a 2021 estimated cost using the CCI Index.

2: In some cases, the sum of construction cost for each sheet was not equivalent to the value listed in the MDP

3: Based on updated aerial imagery, First Creek Tributaries (DFA 0055) no longer crosses the Burlington Ditch, therefore, this cost does not need to be considered.

Notes:

- Based on 2002 First Creek Masterplan. Direct Flow Area 0055 project are listed from downstream to upstream for each specific tributary

- In 2002, Adams County owned various land within the Direct Flow Area 0055. Based on 2021 Commerce City boundary limits, a majority of the Direct Flow Area 0055 watershed downstream of the Rocky Mountain Arsenal resides within Commerce City.

Table B8. Direct Flow Area 0053 MDP Project Breakdown

Reach	Project	Total Cost 2021 ³	Notes
Locust Run (DFA 0053) ¹	1943 LF Channel Improvements Burlington Ditch to Highway 2	\$2,347,362	A channel from Burlington Ditch to Highway 2 will be created to convey the 100-yr event, along with 2 drop structures. A maintenance trail cost for channel and culvert maintenance is included. Land will be acquired for this project.
Locust Run (DFA 0053) ¹	Locust Run Culvert/Crossing at Burlington Ditch	\$187,442	A 4'X8' box culvert is needed at the Burlington Ditch crossing for Locust Run.
Locust Run (DFA 0053) ¹	Locust Run Culvert/Crossing at I-76	\$290,607	A 4'X8' box culvert is needed at the I-76 crossing for Locust Run.
Locust Run (DFA 0053) ¹	Locust Run Culvert/Crossing at O'Brian Canal and Highway 2	\$685,003	Twin 3'X5' & 3'X4' box culvert is needed at the O'Brian Canal and Highway 2 crossing for Locust Run
Reign Creek (DFA 0053) ²	3694 LF Channel Improvements 120th Ave to 114th Ave	\$1,810,143	Improvements to the 100-yr channel with a drop structure is needed. Land will be acquired for this project.
Reign Creek (DFA 0053) ²	Increase Reign Creek Culvert/Crossing Capacity at 116th Court	\$36,534	Increase culvert capacity to hold 10-year flow due to being a local street. Need to replace both ends of streets (loops around). Twin 36" RCP for both crossings locations.
Reign Creek (DFA 0053) ²	Increase Reign Creek Culvert/Crossing Capacity at 115th Ave	\$18,267	Increase culvert capacity to hold 10-year flow due to being a local street. Twin 36" RCP.
Reign Creek (DFA 0053) ²	Detention 332 (Vic. I-76)	\$4,399,802	Cost of detention facility 332 and WQ basin. Includes 18" RCP which will be part of the outlet structure at I-76 (described in Sheet 41 & 42 of MDP report) and watertight manhole lids. Land will be acquired for this project.
Reign Creek (DFA 0053) ²	2300 LF Reign Creek Channel Improvements I-76 to O'Brian Canal	\$883,239	Improvements to the 100-yr channel are required for this 2300 LF channel. Maintenance trail added to cost of channel.
		\$10,658,398	

1: Locust Run extends in Commerce City from Burlington Ditch until just east side of Highway 2.

2: Reign Creek extends in Commerce City from 120th Ave to the O'Brian Canal Crossing. Most downstream portion of Reign Creek now drain south towards Henderson Creek.

3: Utility relocation is 5% of construction cost and contingencies is 35% of construction plus utility. The MDP cost was adjusted to a 2021 estimated cost using the CCI Index.

Notes:

- Based on Second Creek (Downstream of DIA) and DFA 0053 Watersheds Outfall Systems Planning Study Update. Direct Flow Area 0053 projects are listed downstream to upstream.
- Land acquisition costs are from 2004 and may not be accurately represented during the inflation calculations.