



DENVER
PUBLIC WORKS

Montclair Creek Drainage Feasibility Evaluation

June 30, 2014

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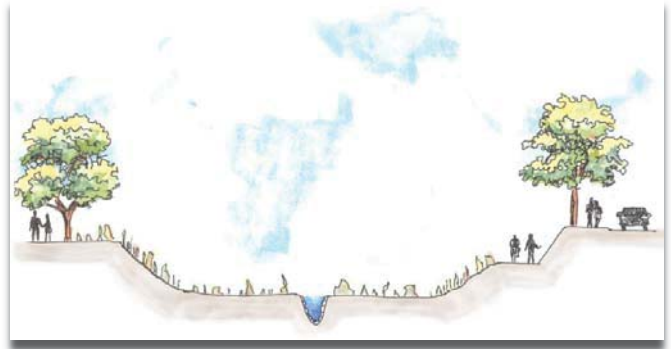
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SECTION 1 | SUMMARY

The Colorado Department of Transportation (CDOT) is proposing to lower a portion of I-70 near Brighton Boulevard to Colorado Boulevard; known as the 1-70 Partially Covered Lowering (PCL) project. As part of the project, CDOT proposes to build a 100-year storm pipe system to protect this depressed section of highway from stormwater flows.



A portion of the PCL is located within the Montclair Basin. At about 9.5 square miles, it is the largest drainage basin in Denver. The basin hydrology contributing to the PCL during a 100-year storm event has recently been modeled, and it was determined that there is about 4,700 cubic feet per second (cfs) of flow that will need to be captured to protect the lowering. In an effort to minimize flood risks, protect public safety, reduce property damage, provide environmental benefits, and leverage funding from CDOT, the City and County of Denver (CCD) has investigated alternatives to the 100-year pipe system CDOT is proposing which includes an open channel option.

As witnessed in the 2013 September floods, existing open channels handled this major storm event better than the storm pipe systems. Reasons for this include:

1. An open channel typically has the capacity to handle more flow than it is designed for by about 1-foot. This is called freeboard in the drainage community. In addition the flat bank areas along side of the channel can act as a second tier freeboard area that can increase the channel's ability to handle flow. If a closed (pipe) system is exceeded, the system becomes pressurized and could cause bubbling from inlets or in even geysers from manholes that overflow into the roadway and potentially cause closures.
2. During a major 100-year storm event debris becomes more prevalent and pipe systems are more prone to clogging at the inlets. In addition these larger storms are often accompanied by hail that could knock down leaves and tree branches. An open channel by design can better handle debris.

The open channel option meets a number of other CCD goals and initiatives including improved water quality through the use of green infrastructure, increased multi-modal transportation options, and enhanced redevelopment opportunities. The CDOT pipe alternative provides no additional benefits other than protection of the PCL project.

This report summarizes the proposed options, how they were evaluated, and how this collaborative work effort concluded that Option A for Reach 1, 2, 3, & 4 best meets the goals for this planning effort. This scenario is shown in Exhibit 2 in Appendix "A." Due to the schedule constraints in order to leverage funding from CDOT, it is apparent that Option A for Reach 2 cannot be completed, but it does seem that CCD can complete a scenario where CCD implements Option A for Reach 1, 3, & 4, and Option B for Reach 2. This is shown in Exhibit 4 in Appendix "A".

This coordinated work effort involved a partnership with the following supporting internal and external agencies:

<p>Colorado Department of Transportation Urban Drainage & Flood Control District Colorado Department of Public Health & Environment</p> <p>North Denver Cornerstone Collaboration PW Wastewater Capital Projects Management Department of Environmental Health Real Estate Office of Economic Development</p>	<p>Community Planning & Development PW Policy, Planning, & Sustainability PW Transportation Projects Management</p> <p>Parks & Recreation City Attorney’s Office Traffic Engineering Services Office of Sustainability Wastewater Operations</p>
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1.1| GOALS & RISKS

Our cross-departmental teams identified the following goals and risks to evaluate our options to protect the I-70 PCL project:

Goals (0-no goals met to 5-meets goals)	Risks (0- high risk to 5-low risk)
Technical Feasibility	Constructability
Meets Drainage Criteria	Design Conflicts
Flood Control Benefit Area	Environmental Mitigation
Water Quality	CCD Liability
Ecologically Promoting	Maintenance
Recreational Amenity & Aesthetically Pleasing	
CPD Comprehensive Plans	
Economic Development	
Mobility: Vehicular, Bicycle, and Pedestrian	

Based on the goals and risks, the alternative options were rated from a scale of 0 to 5. It was determined that Option A was rated the highest for Reaches 1, 2, 3 & 4. Below is a description of each goal and risk in terms of the criteria used to evaluate the options. The evaluation matrix is located in Appendix “B.” For further explanation of how each option was rated, and who rated them, please see Appendix “C.” In addition, Appendix “D” details these goals and risks by each department.

TECHNICAL FEASIBILITY- GOAL

Wastewater Capital Projects Management took the lead on rating the options based on this goal. For the purposes of this evaluation, the “Technical Feasibility” goal was rated based on the level of certainty into an engineered solution for each option. So if the option had 100% designed construction documents, then this goal was rated a 5. If the technical team, due to the short time constraint of this evaluation, was only able to determine that it was physically possible to create a functional gravity driven drainage conveyance system for that option, then the rating was about a 3. Technical Feasibility is not dependent on schedule, cost or design conflicts. It was assumed that with enough

time and money then the defined engineered solution could be implemented to execute these options. Once a selected project is defined, further in-depth investigation and analysis will need to be performed in order to understand the resources needed in order to successfully implement the selected project/s.

MEETS DRAINAGE CRITERIA- GOAL

Wastewater Capital Projects Management took the lead on rating the options based on this goal. Meets Drainage Criteria goal was rated by how well an option meets the guidelines contained within the following plans & manuals:

June 2010 Storm Drainage Master Plan

Urban Drainage & Flood Control District Drainage Criteria Manual

City & County of Denver Drainage Criteria manual

Capital Improvement Project as defined in the April 15, 2013 *Public Works Catalysts for Capital Project-Prioritization Process for 2014-2019 Capital Improvement Program (CIP)*.

FLOOD CONTROL BENEFIT AREA - GOAL

Wastewater Capital Projects Management took the lead on rating the options based on this goal. One of the goals for creating alternative options to protect CDOT's I-70 PCL project is to increase the area that would benefit from a 100-year flood protection system. With the support from our technical team, it was determined that the Montclair Creek improvements combined with CDOT's I-70 PCL reduced pipe system would offer 100-year storm protection for roughly 110 Acres of the Globeville and Elyria Swansea neighborhood. Most of this area is owned by the Union Pacific Railroad (UPRR). The flood control benefit area does not change in Reach 2 between an open channel and a detention pond.

WATER QUALITY - GOAL

Department of Environmental Health took the lead on rating the options based on this goal. The water quality goal was used to rate each option on how well the option could treat common storm water contaminants such as nutrients, sediment, metals, oils and grease, and bacteria. In general pipe systems do not improve the quality of water, and therefore were ranked 0. In ponds, linear water quality BMPs and open channels there are opportunities to plant species that would uptake contaminants, and so those options were rated higher for their ability to improve water quality in the area.

ECOLOGICALLY PROMOTING - GOAL

Department of Environmental Health took the lead on rating the options based on this goal. The ecologically promoting goal was used to rank the options on how well each option benefited habitat by improving water quality and providing a wildlife movement corridor. The better an option potentially could promote ecology, the higher the option was rated.

RECREATIONAL AMENITY AND AESTHETICALLY PLEASING - GOAL

Parks & Recreation took the lead on rating the options based on this goal. Recreational Amenity and Aesthetically Pleasing were grouped as one goal since they are so intimately related to each other. If there was an opportunity for an option to be aesthetically pleasing then it was assumed that this would add a recreational benefit to the option. For the purposes of this goal, a pipe option was rated 0 since there are no opportunities to achieve both aesthetic

improvements and therefore no recreational benefit either. The more opportunities for an option to have both recreational benefit and aesthetically pleasing features, the higher the option was rated.

CPD COMPREHENSIVE PLANS - GOAL

Community Planning and Development (CPD) took the lead on rating the options based on this goal. This goal was used to evaluate the options based on how well they fit into the following established CPD Plans:

1. Comprehensive Plan 2000
2. Blueprint Denver
3. 39th & Blake Station Area Plan
4. River North Neighborhood Plan
5. Elyria-Swansea Neighborhood Planning Process (includes 40th Colorado Station area)

The more an option was consistent with plan goals and recommendations from documents listed above, the higher the option was rated. See Exhibit D-1 for an overlay of some of the options with the proposed land uses.

ECONOMIC BENEFITS - GOAL

Office of Economic Development took the lead on rating the options based on this goal. An extensive explanation of this goal is located in Appendix “D” of this document. The economic benefits of each of the options were based on the following sub categories:

Feasible to Relocate is the ability for how feasible it is to relocate businesses in properties that need to be acquired to implement each option. The more feasible the land is to relocate, the higher the option was rated.

Redevelopment Potential is defined as how much potential the implementation of an option improves the redevelopment surrounding the area of the implemented option. The more potential there is to redevelop the surrounding area, the higher the option was rated.

Fiscal Impact is defined as how the City and County of Denver would benefit positively from tax revenue increases by implementing these options. The greater an option would have a positive fiscal impact, the higher the option was rated.

MOBILITY - GOAL

Public Works Policy & Planning took the lead on rating the options based on this goal. Improving vehicular, bicycle, and pedestrian mobility is an overall goal for the city. Each of the options was evaluated on how well they improved these modes of transportation. The better an option improved mobility the higher it was rated.

CONSTRUCTABILITY - RISK

Wastewater Capital Projects Management- Construction took the lead on rating the options based on this risk. Using this risk, each of the options was evaluated on how complicated or difficult construction would be to implement these options. Below is a list of the assumptions:

1. All land has been acquired
2. All agreements are signed and finalized
3. All contracts are in place
4. All designs are complete and feasible

Option C for Reach 2, 3, & 4 are planned to be exclusively constructed by CDOT, and the City and County of Denver would not take on the risk of constructing these options, therefore these options were not evaluated against this risk. The more complicated or difficult it would be to construct an option the lower it was rated.

DESIGN CONFLICTS - RISK

Wastewater Capital Projects Management took the lead on rating the options based on this risk. Using this risk, each of the options was rated on the potential for an option to encounter utility conflicts, buried buildings, or extensive materials management during construction. The greater the risk of potential design conflicts, the lower an option was rated.

ENVIRONMENTAL MITIGATION - RISK

Department of Environmental Health took the lead on rating the options based on this risk. Using this risk, each of the options was rated on the potential for an option to encounter environmental contaminants that would require extensive materials management during construction. The greater the potential risk of need to mitigate for an environmental contaminant, the lower an option was rated.

CCD LIABILITY - RISK

The City Attorney's Office took the lead on rating the options based on this risk. Using this risk, each of the options was rated on the City and County of Denver's liability associated with contractual obligations that would be required to meet CDOT's needs, specifications and schedule, the liability of having to mitigate for environmental contamination after acquiring additional land that is needed to implement an option, and liability associated materials management during the construction of an option. The greater the risk, the lower an option was rated.

MAINTENANCE & OPERATIONS - RISK

Wastewater Maintenance and Operations took the lead on rating the options based on this risk. It was concluded that all of the options were feasible to maintain. Currently Wastewater Maintenance and Operations is programmed to maintain a large spectrum of storm pipe related infrastructure. The less equipped or harder it was for the Wastewater Maintenance and Operations to maintain an option, the lower the option was rated.

SECTION 2| OPTIONS CONSIDERED

At one point during the feasibility evaluation of the options, the team considered a CCD pipe option for Reach 2 that ran north on York and then west towards the future CDOT ponds. This system would function as *the* drainage solution if the City and County of Denver were to independently implement Option A for both Reach 3 & 4. After a rough technical feasibility check, it was determined that there could be other drainage solutions that better followed existing and historic drainage patterns to the north. This would allow the BNSF Market Lead area in Reach 4 to be filled to make at-grade street connections. The Community Planning and Development managed 40th & Colorado Station Area Study will define independent local drainage solution alternatives to be able to in-fill the market lead property (as shown on Exhibit D-1 in Appendix “D”) to create at-grade street connections in the northern portion of Reach 4.

The following subsections describe the options that were considered to improve public safety by providing additional flood protection to CDOT’s I-70 PCL project. Refer to Appendix “A” for the exhibits visually represent CDOT’s proposed system and the options described in the following subsections.

2.1| MONTCLAIR CREEK-REACH 1

REACH 1 OPTION A- OPEN CHANNEL

In concept, Reach 1 Option A is a 1,500 linear foot open channel that would span from the South Platte River in Globeville Landing Park (900 E 45th Ave & 801 E 45th Ave) through City & County of Denver properties including 1300 E 44th Ave & The Denver Coliseum (4600 Humbolt St.), and up to McFarland Dr. as shown in Exhibit 2 & 5 in Appendix “A”. The CDOT storm pipe system would tie into this open channel from the proposed CDOT surge ponds at 1500 E 46th Ave.



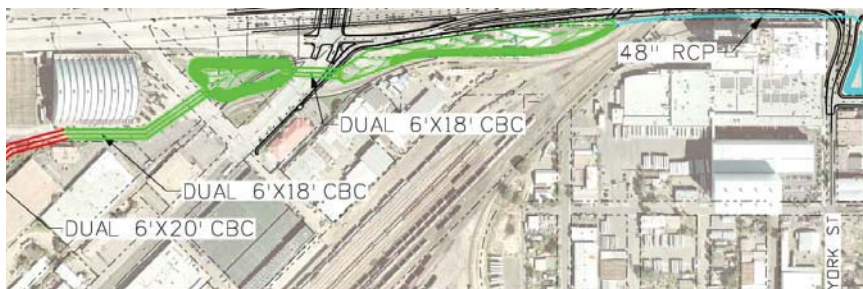
This concept open channel could range from 200-foot to 300-foot wide and designed to carry the 100-year storm event, which is approximately 4,700 cfs. The width of the channel is dependent on a number of factors that will be determined in the concept phase of this project through the PW Planning National Western Complex Master Plan Study. For example, if the channel has tight bends then the width would increase. Depending on the elevation the open channel outfalls into the South Platte River the channel could widen due to the decrease in slope, which increases the need for a wider channel.

year storm event flow of 4,700 cfs if High Street Outfall Phase II is built fully to the South Platte River. This is just the storage volume required, but it cannot be used to quantify how much excavation will be necessary for the pond, or how large of a foot print CCD would need for a 100-year storm event pond. Wastewater Capital Projects Management is currently working on a preliminary concept design of a pond that will be aesthetically pleasing, and a true community benefit to the surrounding neighborhood. Additionally, further study is necessary in order to determine what properties within these blocks are truly feasible to acquire.

This option can be independent of any storm infrastructure being built within Reach 1 if we were to construct a 600 Ac-ft Pond.

In order to allow us time to go through the National Western Complex (NWC) Master Plan Study and the UDFCD Montclair Outfall Systems Plan (OSP), and CDOT to go through their public Environment Impact Study process, CCD could acquire as much land to build the entire 100-year detention pond as we possibly could, and in the short term build a 5-year pond that fulfills CCD's commitment to provide 5-year storm event protection to RTD's new light rail in 40th Street. CCD would then leverage a significant amount of CDOT dollars to purchase this land and expand the 5-year storm event pond to a 100-year storm event pond to provide better flood control protection to CDOT's I-70 PCL project. Over time CCD would implement the Montclair OSP which in concept would identify other detention pond areas upstream in the basin which would allow CCD to reduce the size of the 100-year storm event pond or get rid of it completely to redevelop into what most likely would be multi-family housing.

REACH 2 OPTION C- CDOT PIPE



As shown in Exhibit 1 & 6 in Appendix “A”, Reach 2 Option C is CDOT’s proposed pipe and throttling pond 100-year storm event system.

2.3| MONTCLAIR CREEK-REACH 3

REACH 3 OPTION A- GREEN STREET WITH CCD PIPE



As shown in Exhibit 2 and 7 in Appendix “A”, Reach 3 Option A consists of constructing 2,840 linear feet of a small water quality channel with inlets that tie the treated water into the proposed 18’x6’ @ 0.2% box pipe, which would convey approximately 1,200 cfs that contributes from a pipe in Reach 4 that intercepts the 400 cfs that flows through the existing RTD 10’x4’ box pipe near Smith Road and

Monroe Street south of the Mana Pro building. The drainage for these street improvements could be provided by the execution of Reach 1 & 2 or by building new storm infrastructure to follow existing and historic drainage patterns to the north.

In addition to the linear water quality and drainage infrastructure a new 39th Avenue green street will be constructed that would connect 39th Avenue from York Street to Steele Street within the Burlington Northern Rail Road Co. property located at 2300 E 38th Ave, which is a part of the Market Lead properties as shown on Exhibit 13. This would require a minimum of an 80-foot Right-Of-Way width.

REACH 3 OPTION B- OPEN CHANNEL



As shown in Exhibit 3 and 7 in Appendix “A”, Reach 3 Option B consists of constructing 2,840 linear of open channel that is approximately 75’ wide within the Burlington Northern Rail Road Co. (BNSF RR) located at 2300 E 38th Ave, which is a part of the Market Lead properties as shown on Exhibit 13. This open channel would convey approximately 1,200 cfs that contributes from a pipe in Reach 4 that intercepts the 400 cfs that flows through the existing RTD 10’x4’ box pipe near Smith Road and Monroe Street south of the Mana Pro building.

There would not be any room for a typical section of street if a 75’ wide open channel is built within the approximate 100’ wide BNSF RR Market Lead property. If drainage within Reach 3 were built as an open channel then it would be dependent on building either a pond in Reach 2 or an open channel in Reach 1 & 2. The execution of this option would require a bridge to be constructed at York Street.

REACH 3 OPTION C- CDOT PIPE



As shown in Exhibit 1 & 7 in Appendix “A”, Reach 3 Option C is CDOT’s proposed pipes and throttling pond 100-year storm event system.

2.4| MONTCLAIR CREEK-REACH 4

REACH 4 OPTION A- GREEN STREET WITH CCD PIPE



As shown in Exhibit 2 and 8 in Appendix “A”, Reach 4 Option A consists of constructing 3,020 linear feet of a 13’x 6’ RCBC @ 0.2% from 42nd Avenue to 39th Avenue and a 18’x 6’ RCBC @ 0.2% from 39th & Monroe to 39th & Steele. This box pipe would intercept the 400 cfs that flows through the existing RTD 10’ x 4’ box pipe near Smith Road and Monroe Street south of the Mana Pro building.

An alternative Underground Detention at 42nd and Monroe could reduce the 13’x6’ RCBC to a 60” RCP from 42nd Avenue to 39th Avenue Reduce Storm. It could also reduce the 18’x6’ RCBC to a 11’x6’ RCBC from 39th & Monroe to 39th & Steele.

By constructing this storm infrastructure, CCD would be able to fill in the BNSF RR Market Lead properties (Exhibit 13) located at 3801 Adams St, 3800 Madison St., 3895 Cook St. , 3905 E 48th Ave, 3900 Madison St, 3500 E 40th Ave,

4001 Monroe St., and 4201 Monroe St. to allow for at grade street connections to be constructed. These are listed below

1. Construct 39th Avenue between Steele & Jackson as a Concrete Paved Green Street (60’ ROW)
2. Construct approximately 230 LF of at grade street connection for 42nd Avenue (60’ ROW)
3. Construct approximately 230 LF of at grade street connection for 41st Avenue (60’ ROW)
4. Lower approximately 700 LF of 40th Avenue (60’ ROW)
5. Reconstruction approximately 650 LF of Madison (60’ ROW)
6. New construction of approximately 1,100 LF of Monroe (60’ ROW)

The drainage for these improvements could be provided by the execution of Reach 1, 2, & 3 or by building new storm infrastructure to the follow existing and historic drainage patterns to the north.

REACH 4 OPTION B- CDOT PIPE



As shown in Exhibit 1 & 8 in Appendix “A”, Reach 4 Option B is CDOT’s proposed pipe and trap channels to convey the 100-year storm event system.

SECTION 3| KEY FINDINGS

The following is a summary of the key goals that were accomplished with a rating of 4 or 5 for each option for the Montclair Creek Drainage projects. See Appendix “B” for the evaluation matrix, which reports the results of the evaluation of the options and Appendix “C” for the identity of the individual that rated the goal or risk and an explanation for each rating.

3.1| MONTCLAIR CREEK-REACH 1

REACH 1 OPTION A- OPEN CHANNEL- RATED 66

1. Technically Feasible
2. Meets Drainage Criteria
3. Additional Area that receives Flood Control Benefit: 110 Acres
4. Ecologically Promoting
5. Recreational Amenity & Aesthetically Pleasing
6. Economic Benefits- Feasible to Relocate
7. Improved Bike & Pedestrian Mobility to The Denver Coliseum

REACH 1 OPTION B- WCPM 5-YEAR PIPE & CDOT 100-YEAR PIPE- RATED 43

1. Technically Feasible
2. Large Flood Control Benefit Area
3. Economic Benefits- Feasible to Relocate
4. Economic Benefits- Redevelopment Potential
5. Economic Benefits- Fiscal Impact

3.2| MONTCLAIR CREEK-REACH 2

REACH 2 OPTION A- OPEN CHANNEL- RATED 56

1. Meets Drainage Criteria
2. Additional Area that receives Flood Control Benefit: 110 Acres
3. Ecologically Promoting
4. CPD Master Plans
5. Recreational Amenity & Aesthetically Pleasing
6. Improved Bike & Pedestrian Mobility to The Denver Coliseum

REACH 2 OPTION B- DETENTION POND- RATED 53

1. Technically Feasible
2. Meets Drainage Criteria
3. Additional Area that receives Flood Control Benefit: 110 Acres
4. Ecologically Promoting
5. CPD Master Plans
6. Recreational Amenity & Aesthetically Pleasing

7. Improved Bike & Pedestrian Mobility

REACH 2 OPTION C- CDOT PIPE-RATED 34

1. Technically Feasible
2. Economic Benefits- Redevelopment Potential
3. Economic Benefits- Fiscal Impact

3.3| MONTCLAIR CREEK-REACH 3

REACH 3 OPTION A- GREEN STREET WITH CCD PIPE-RATED 64

1. Water Quality
2. CPD Master Plans
3. Economic Benefits- Feasible to Relocate
4. Economic Benefits- Redevelopment Potential
5. Economic Benefits- Fiscal Impact
6. Improved Vehicular, Bike & Pedestrian Mobility

REACH 3 OPTION B- OPEN CHANNEL-RATED 60

1. Technically Feasible
2. Economic Benefits- Feasible to Relocate
3. Economic Benefits- Redevelopment Potential
4. Economic Benefits- Fiscal Impact

REACH 3 OPTION C- CDOT PIPE-RATED 34

1. Technically Feasible
2. Economic Benefits- Feasible to Relocate
3. Economic Benefits- Redevelopment Potential
4. Economic Benefits- Fiscal Impact

3.4| MONTCLAIR CREEK-REACH 4

REACH 4 OPTION A- GREEN STREET WITH CCD PIPE-RATED 60

1. Water Quality
2. CPD Master Plans
3. Improved Vehicular, Bike & Pedestrian Mobility

REACH 4 OPTION B- CDOT PIPE-RATED 33

1. Technically Feasible
2. Economic Benefits- Feasible to Relocate
3. Economic Benefits- Redevelopment Potential
4. Economic Benefits- Fiscal Impact

SECTION 4| CRITICAL ISSUES

Below is a summary of the critical issues for the Montclair Creek projects.

SECTION 4.1| ALL REACHES OF MONTCLAIR CREEK

- 1. CDOT's I-70 Partially Covered Lowering (PCL) Project Manager, Keith Stefanik has confirmed from his management team that CDOT cannot include any of the Montclair Creek open channel projects in their design/build contract for the I-70 PCL project.** To amend their Environmental Impact Study (EIS) to include an open channel option is such a large change in scope that they would have to start their NEPA EIS process essentially all over again. It has taken them two years to get to the point of where they are ready to submit their supplemental package, and they are unwilling to jeopardize their progress on the EIS for the I-70 PCL.
- 2. NEPA requirements will activate if we use federal funding.** If any of the Montclair Creek projects have to undergo a NEPA process, we understand from CDOT's NEPA Project Manager, Kirk Webb, that this process would take a minimum of 2 to 3 years. Based on the I-70 PCL schedule, these projects are not a viable option for the City and County of Denver to pursue. It is understood if we are able to secure non-Federal funding for these project, then we would not have to undergo this NEPA process.
- 3. Intergovernmental Agreements with CDOT.** These agreements could take from 6 months to a year to finalize.
- 4. National Western Complex Master Plan schedule is impacted by PW EMT decision to implement Reach 1.** Reach 1 of Montclair Creek is within The Denver Coliseum property which is part of the NWC Master Plan. The current schedule for the NWC begins concept master plan design in June of 2014, and will need to have a decision from PW EMT by mid-June in order to successfully meet the Master Plan's tight schedule.

SECTION 4.2| MONTCLAIR CREEK REACH 1

- 1. Need to build Reach 1 by March 2016 due to RTD Commitment to provide 5-year storm protection conveyance to the South Platte River.** We have committed to RTD that we will construct a fully operational 5-year storm conveyance system that can carry approximately 1,000 cfs by the time they run a train on their FasTracks commuter rail line east of the UPRR rail yard, which is east of The Denver Coliseum. We anticipate that to be March of 2016, and we intended High Street Outfall Phase II to fulfill this commitment to RTD. CCD would either need to provide a temporary drainage conveyance solution at the end of High Street Phase IIA which is also known as the 40th Ave. Outfall, and ends at McFarland on the southern edge of The Denver Coliseum (see Exhibit 2) or be able to complete Montclair Creek Reach 1 by March of 2016 through the UDFCD contract procurement process. We have begun initial conversations with UDFCD, and they are very interested in managing some of the Montclair Creek drainage projects through a partnership with WCPM and CDOT.
- 2. Coordination with the National Parks Service for improvements in Globeville Landing Park.** Any improvement within the Globeville Landing Park, east of The Denver Coliseum, will need to be approved from the National Parks System. This could be a 4 to 6 month process.

- 3. Hazardous Substance Response Fund (HSRF) could be utilized to reimburse CCD for environmental mitigation to remove landfill and heavy metals on The Denver Coliseum site only if we were to construct an open channel.** DEH is currently working on securing the ability to access HSRF reimbursement in order to remediate the landfill material and heavy metals on The Denver Coliseum site. HSRF funding may be accessed to remediate Superfund-site contamination deemed to pose an exposure hazard in a reasonably expected land use. DEH has met with CDPHE and EPA, and the negotiations are in favor of the clean up. However, DEH indicated that we undergo more risk the longer we wait to act on remediation.

As mentioned above, High Street Outfall Phase II has a critical deadline of being fully operational to carry the 5-year storm event of 1,000 cfs by March of 2016 for the RTD FasTracks project. If we are able to include the landfill as part of their remediation, DEH is currently supportive of developing a strategy to expedite the process to fully remediate the area underneath drainage infrastructure that is built to meet our obligation to provide 5-year storm protection conveyance for RTD. This could even be an area as wide as a channel that would convey 5,000 cfs such as Montclair Creek Reach 1.

- 4. National Western Complex Master Plan schedule is impacted by PW EMT decision to implement Reach 1.** Reach 1 of Montclair Creek is within The Denver Coliseum property which is part of the NWC Master Plan. The current schedule for the NWC begins concept master plan design in June of 2014, and will need to have a decision from PW EMT by mid-June in order to successfully meet the Master Plan's tight schedule.

SECTION 5| COLLABORATIVE WORK EFFORT CONTACTS

PROJECT TEAM CONTACT LIST					
Name	Agency	Position	Phone	Email	Project Role
Sarah Anderson	CCD PW Planning	Project Manager	720.865.2670	sarah.anderson@denvergov.org	Project Planner- Water Quality & Public
Jessica Brody	City Attorney's Office	Asst. City Attorney	720.913.3267	jessica.brody@denvergov.org	Legal Risk Assessment
Janice Finch	CCD PW Planning	Principal Planner	720. 865.3163	janice.finch@denvergov.org	Funding Identification
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SECTION 6| REFERENCES

1. August 2013 *Urban Storm Drainage Criteria Manual*.
2. January 2006 *City and County of Denver Storm Drainage Design & technical Criteria Manual*.
3. June 2009 *City and County of Denver Storm Drainage Master Plan*.
4. April 15, 2013 *Public Works Catalysts for Capital Project-Prioritization Process for 2014-2019 Capital Improvement Program (CIP)*.
5. September 2010 *City & County of Denver Aesthetically Enhance Detention and Water Quality Ponds*

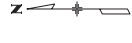
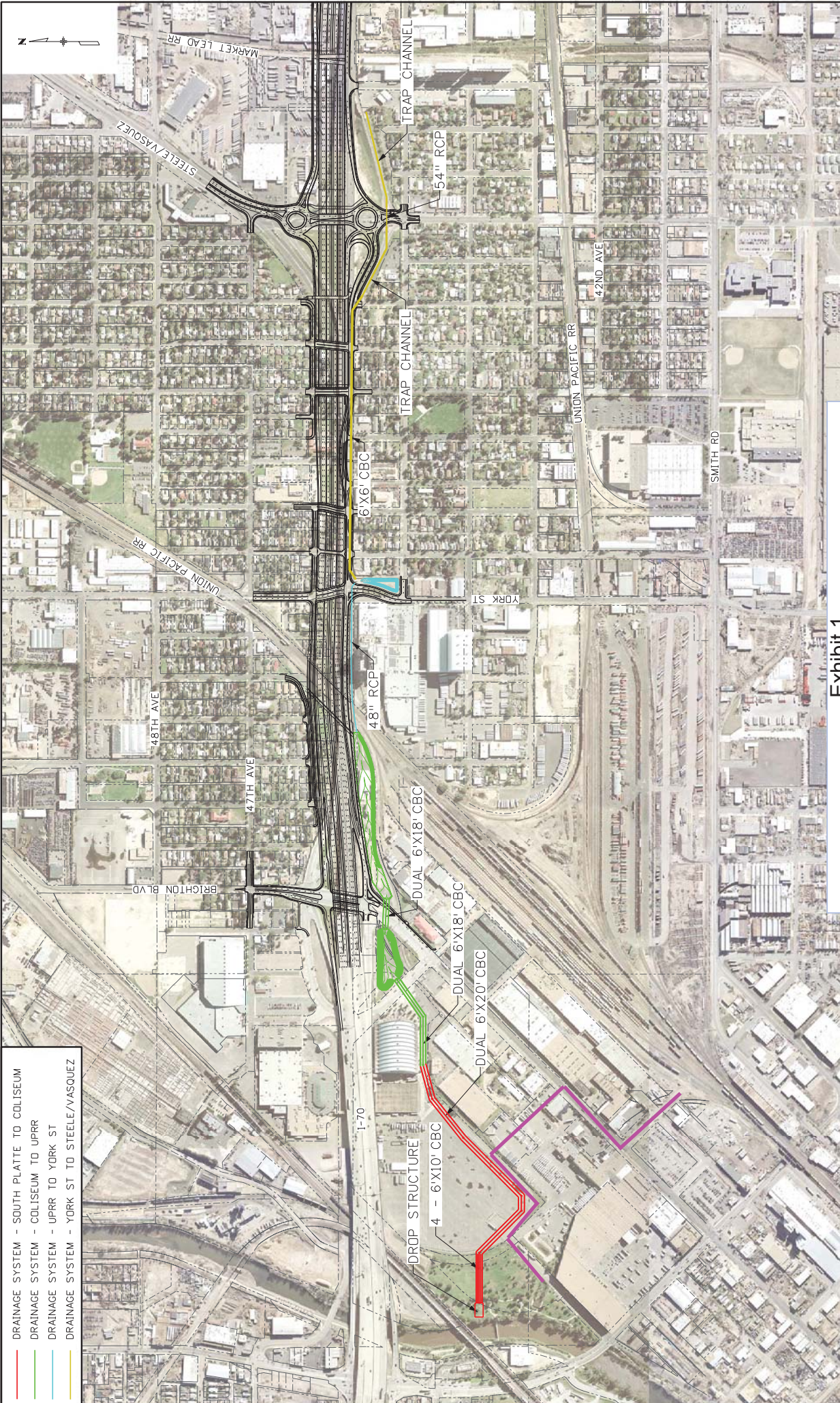
Montclair Creek Drainage

APPENDIX A

EXHIBITS



- DRAINAGE SYSTEM - SOUTH PLATTE TO COLISEUM
- DRAINAGE SYSTEM - COLISEUM TO UPRR
- DRAINAGE SYSTEM - UPRR TO YORK ST
- DRAINAGE SYSTEM - YORK ST TO STEELE/VASQUEZ



DRAFT
CONCEPTUAL
CONCEPT

GRAPHIC SCALE
(IN FEET)

ATKINS
MAY 12, 2014

Exhibit 1
CDOT Proposed I-70 PCL 100-yr Drainage System

PCL EIS
OFFSITE DRAINAGE SYSTEM
CDD007360

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Exhibit 2
Scenario 1- Option A for Reach 1, 2, 3, & 4



Exhibit 3
 Scenario 2- Option A for Reach 1 & 4
 Option B for Reach 2 & 3

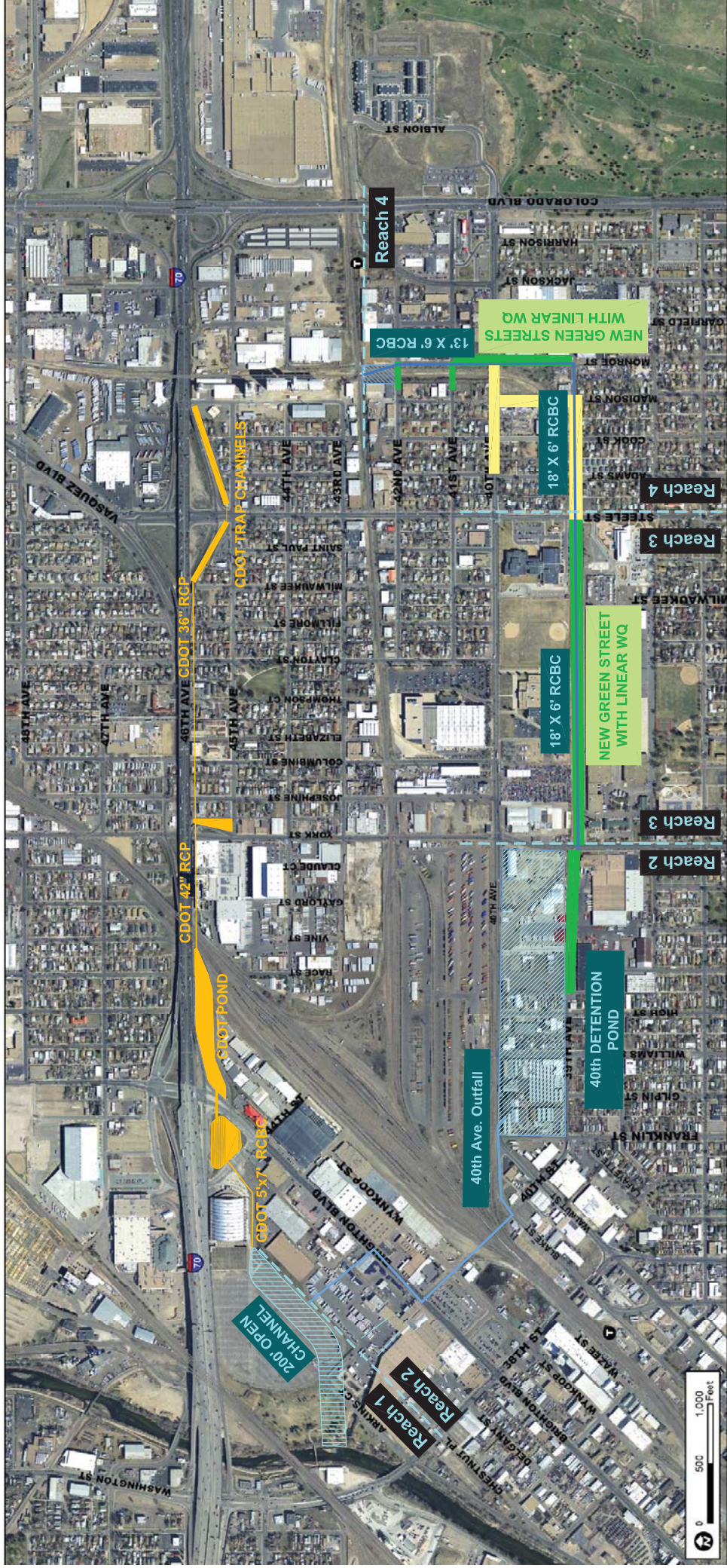
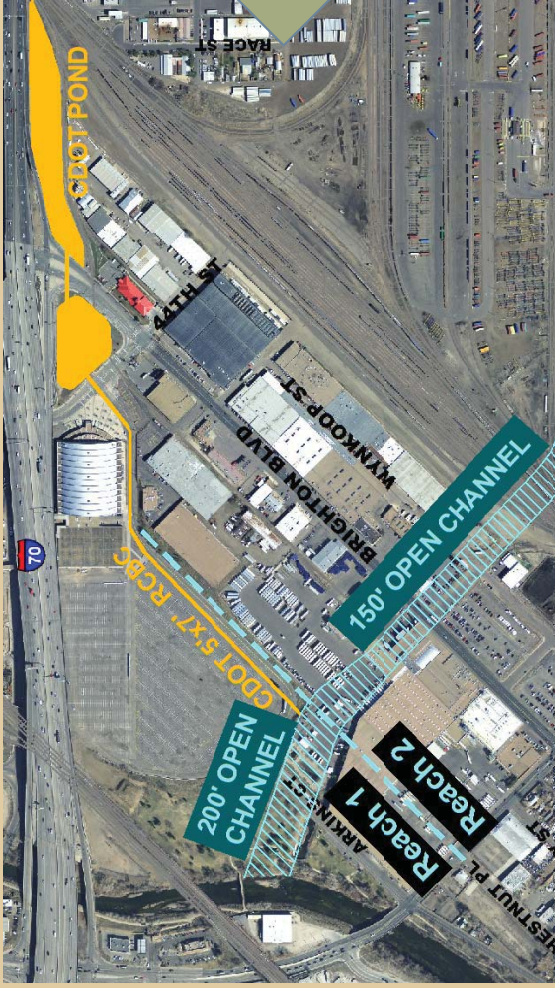
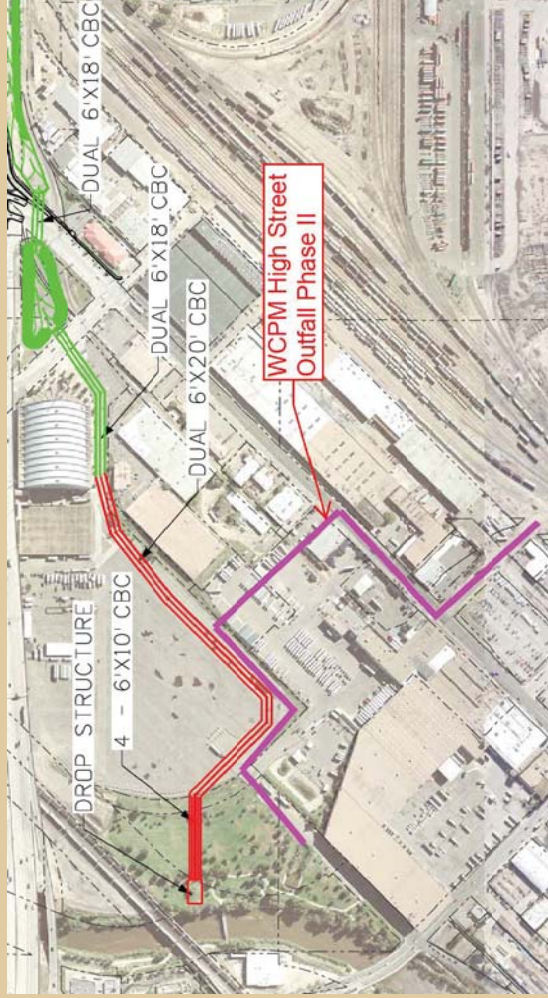


Exhibit 4
 Scenario 3- Option A for Reach 1, 3, & 4
 Option B for Reach 2



Reach 1 Option A-Open Channel

- 200' wide recreational open channel
- High Street Outfall Phase II could be replaced by this channel through The Denver Coliseum
- Parking needs of the NWC & The Denver Coliseum is a high priority
- CDOT's Reduced 5'x7' Box Pipe Would Tie into the Channel
- High Street Outfall Phase II/A ties into Open Channel or is replaced by Open Channel in Reach 2
- Bridge Needed at McFarland



Reach 1 Option B- Pipe

- WCPM builds High Street Outfall Phase II completely
- CDOT Builds Box Pipe

Exhibit 5
Montclair Creek: Summary of Options for Reach 1



Reach 2 Option A- Open Channel

- Open Channel 150' wide from McFarland to York
- Would need to have open channel in Reach 1 from South Platte River to McFarland
- Potential New construction of 39th from High to York
- Potentially 7 Bridges Needed For: McFarland, Brighton, UPRR, 40th, Williams, High, Coke Plant Driveway

Reach 2 Option B- Detention Pond

- 400 Ac-ft 100-year Detention Pond
- The land could be filled in and the remaining land not used for the open channel would be sold to potential developers
- Potential New construction of 39th from High to York

Reach 2 Option C- CDOT Pipe

- CDOT Pipe and Detention Pond System



Exhibit 6
Montclair Creek: Summary of Options for Reach 2



Reach 3 Option A- Green Street w. Steele

- 18'x6' RCBC @ 0.2% along 39th between York and Steele
- The drainage for these improvements could be provided by the execution of Reach 1 & 2 or by building new storm infrastructure to the following existing and historic drainage patterns to the north.
- Potential New construction of 39th from High to York
- Potentially 7 Bridges Needed For:
 - McFarland, Brighton, UPRR, 40th, Williams, High, Coke Plant Driveway



Reach 3 Option B- Open Channel

- Open Channel that is approximately 75' wide
- There is no room for a typical section of street if a 75' wide open channel is built
- Dependent on the execution of Reach 1 & 2
- Bridge at York



Reach 3 Option C- CDOT Pipe

- CDOT Pipe and Detention Pond System

Exhibit 7
Montclair Creek: Summary of Options for Reach 3

Reach 4 Option A- Green Street with CCD Pipe

- 13'x6' RCBC @ 0.2% along Monroe from 42nd Avenue to 39th Avenue
- 18'x6' RCBC @ 0.2% along 39th from Monroe to Steele
- Alternative Underground Detention at 42nd and Monroe to Reduce Storm Detention from a 13'x6' RCBC to a 60" RCP from 42nd Avenue to 39th Avenue
- Reduce Storm, and from a 18'x6' RCBC to a 14'x6' RCBC from 39th & Monroe to 39th & Steele
- Fill in the Market Lead BNSF Abandoned Rail Yard
- Construct 39th Avenue between Steele & Jackson as a Concrete Paved Green Street
- Construct approximately 230 LF of at grade street connection for 42nd Avenue
- Construct approximately 230 LF of at grade street connection for 41st Avenue
- Construct approximately 1,050 LF of Monroe between 41st and 39th
- Lower approximately 700 LF of 40th Avenue
- Reconstruction approximately 650 LF of Madison
- New construction of approximately 1,100 LF of Monroe
- Linear Water Quality
- The drainage for these improvements could be provided by the execution of Reach 1, 2, & 3 or by building new storm infrastructure to the follow existing and historic drainage patterns to the north.

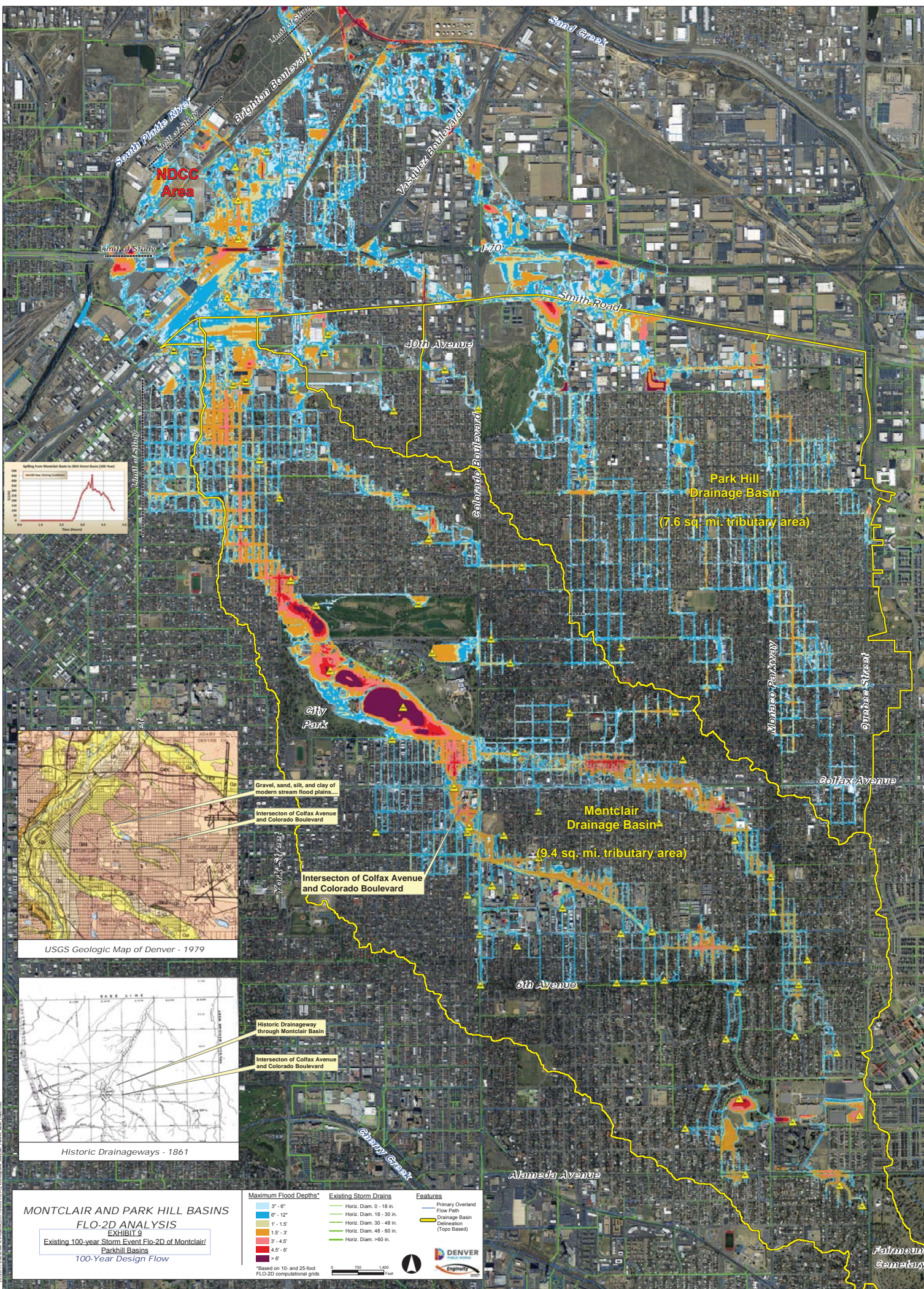
Reach 4 Option B- CDOT Pipe

- CDOT Pipe and Detention Pond System



Exhibit 8

Montclair Creek: Summary of Options for Reach 4

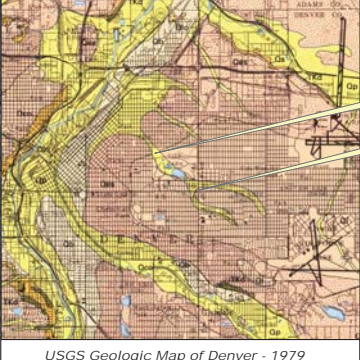


NDCC Area

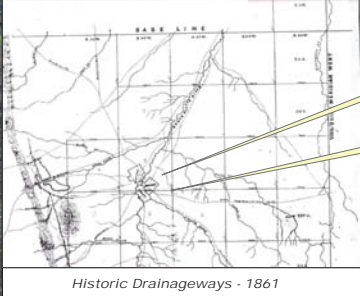
Park Hill Drainage Basin
(7.6 sq. mi. tributary area)

Montclair Drainage Basin
(9.4 sq. mi. tributary area)

Intersection of Colfax Avenue and Colorado Boulevard



USGS Geologic Map of Denver - 1979



Historic Drainage Map - 1861

Gravel, sand, silt, and clay of modern stream flood plains...
Intersection of Colfax Avenue and Colorado Boulevard

Historic Drainage Pathway through Montclair Basin
Intersection of Colfax Avenue and Colorado Boulevard

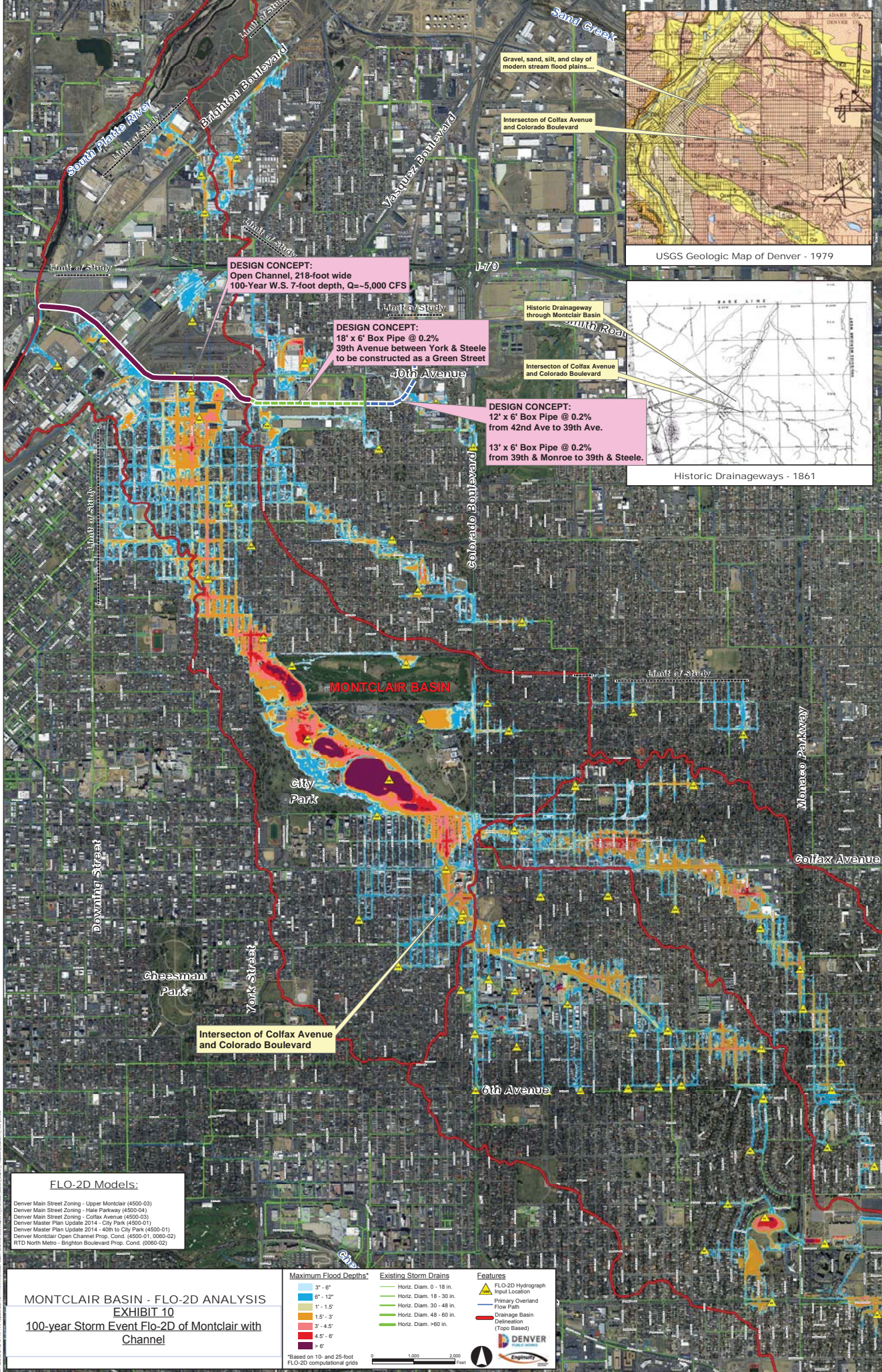
MONTCLAIR AND PARK HILL BASINS
FLO-2D ANALYSIS
EXHIBIT 9
Existing 100-year Storm Event Flo-2D of Montclair/
Parkhill Basins
100-Year Design Flow

Maximum Flood Depths*	Existing Storm Drains	Features
3" - 6"	Horiz. Diam. 0 - 18 in.	Primary Overland
6" - 12"	Horiz. Diam. 18 - 30 in.	Flow Path
1' - 1.5'	Horiz. Diam. 30 - 48 in.	Drainage Basin
1.5' - 3'	Horiz. Diam. 48 - 60 in.	Delineation
3' - 4.5'	Horiz. Diam. >60 in.	Delineation (Top Based)
4.5' - 6'		
> 6'		

*Based on 10- and 25-foot FLO-2D computational grids



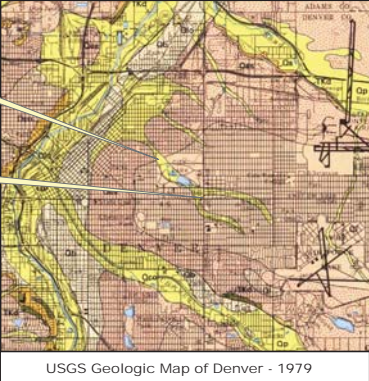
Fellmoun Cemetery



DESIGN CONCEPT:
Open Channel, 218-foot wide
100-Year W.S. 7-foot depth, Q=-5,000 CFS

DESIGN CONCEPT:
18' x 6' Box Pipe @ 0.2%
39th Avenue between York & Steele
to be constructed as a Green Street

DESIGN CONCEPT:
12' x 6' Box Pipe @ 0.2%
from 42nd Ave to 39th Ave.
13' x 6' Box Pipe @ 0.2%
from 39th & Monroe to 39th & Steele.



FLO-2D Models:

- Denver Main Street Zoning - Upper Montclair (4500-03)
- Denver Main Street Zoning - Hill Parkway (4500-04)
- Denver Main Street Zoning - Colfax Avenue (4500-03)
- Denver Master Plan Update 2014 - City Park (4500-01)
- Denver Master Plan Update 2014 - 40th to City Park (4500-01)
- Denver Montclair Open Channel Prop. Cond. (4500-01, 0060-02)
- RTD North Metro - Brighton Boulevard Prop. Cond. (0060-02)

MONTCLAIR BASIN - FLO-2D ANALYSIS
EXHIBIT 10
100-year Storm Event FLO-2D of Montclair with Channel

Maximum Flood Depths*	Existing Storm Drains	Features
3" - 6"	Horiz. Diam. 0 - 18 in.	FLO-2D Hydrograph
6" - 12"	Horiz. Diam. 18 - 30 in.	Input Location
1' - 1.5'	Horiz. Diam. 30 - 48 in.	Primary Overland Flow Path
1.5' - 3'	Horiz. Diam. 48 - 60 in.	Drainage Basin Delineation (Topo Based)
3' - 4.5'	Horiz. Diam. >60 in.	
4.5' - 6'		
> 6'		

*Based on 10- and 25-foot FLO-2D computational grids

Exhibit 11 100-year Storm Event Flo-2D of Montclair Existing vs. Channel

Maximum Flood Depths*	Existing Storm Drains	Features
3" - 6"	Horiz. Diam. 0 - 18 in.	FLO-2D Hydrograph
6" - 12"	Horiz. Diam. 18 - 30 in.	Input Location
1' - 1.5'	Horiz. Diam. 30 - 48 in.	Primary Overland
1.5' - 3'	Horiz. Diam. 48 - 60 in.	Flow Path
3' - 4.5'	Horiz. Diam. >60 in.	
4.5' - 6'		
6' - 8'		

*Based on 10- and 25-foot FLO-2D computational grids

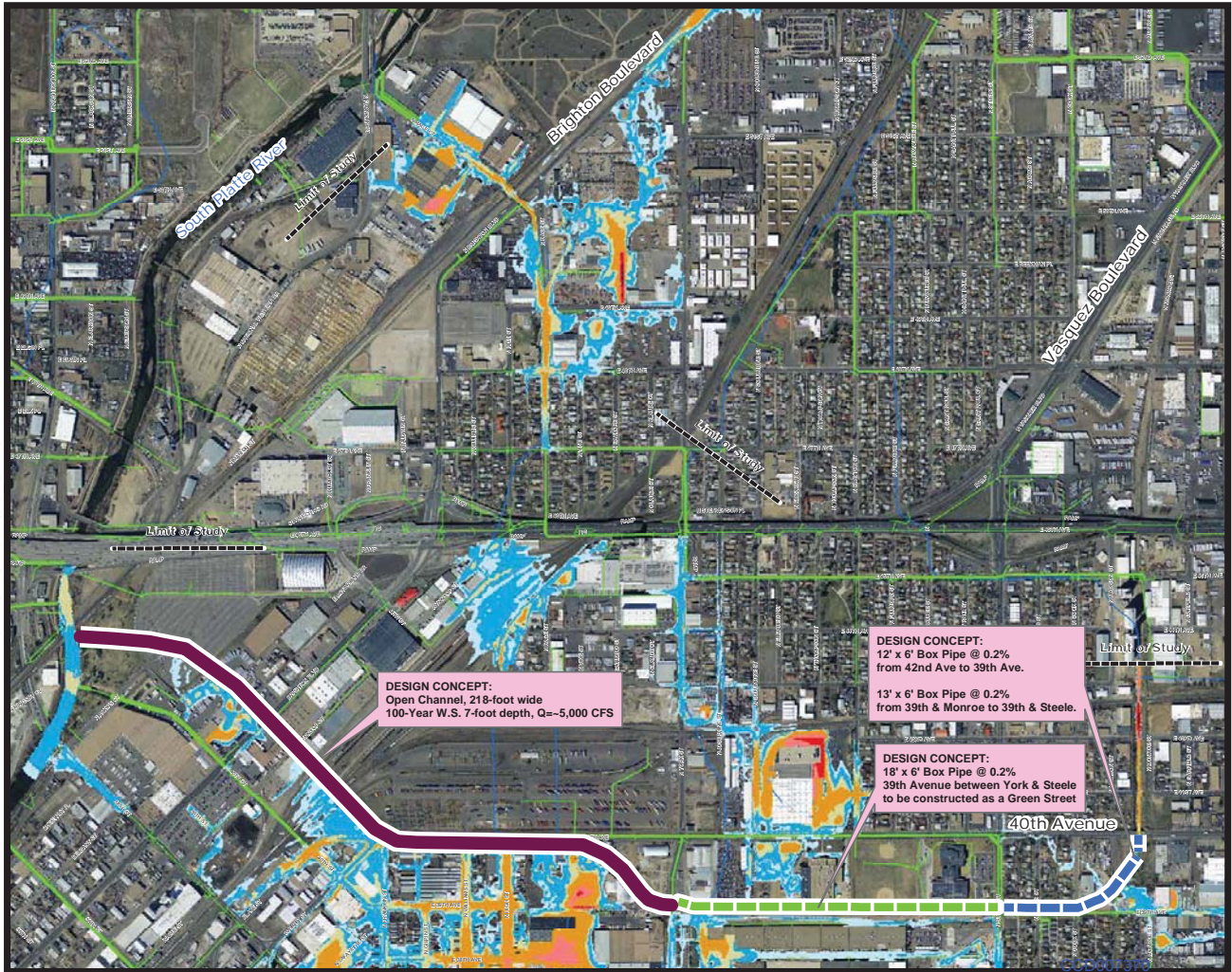
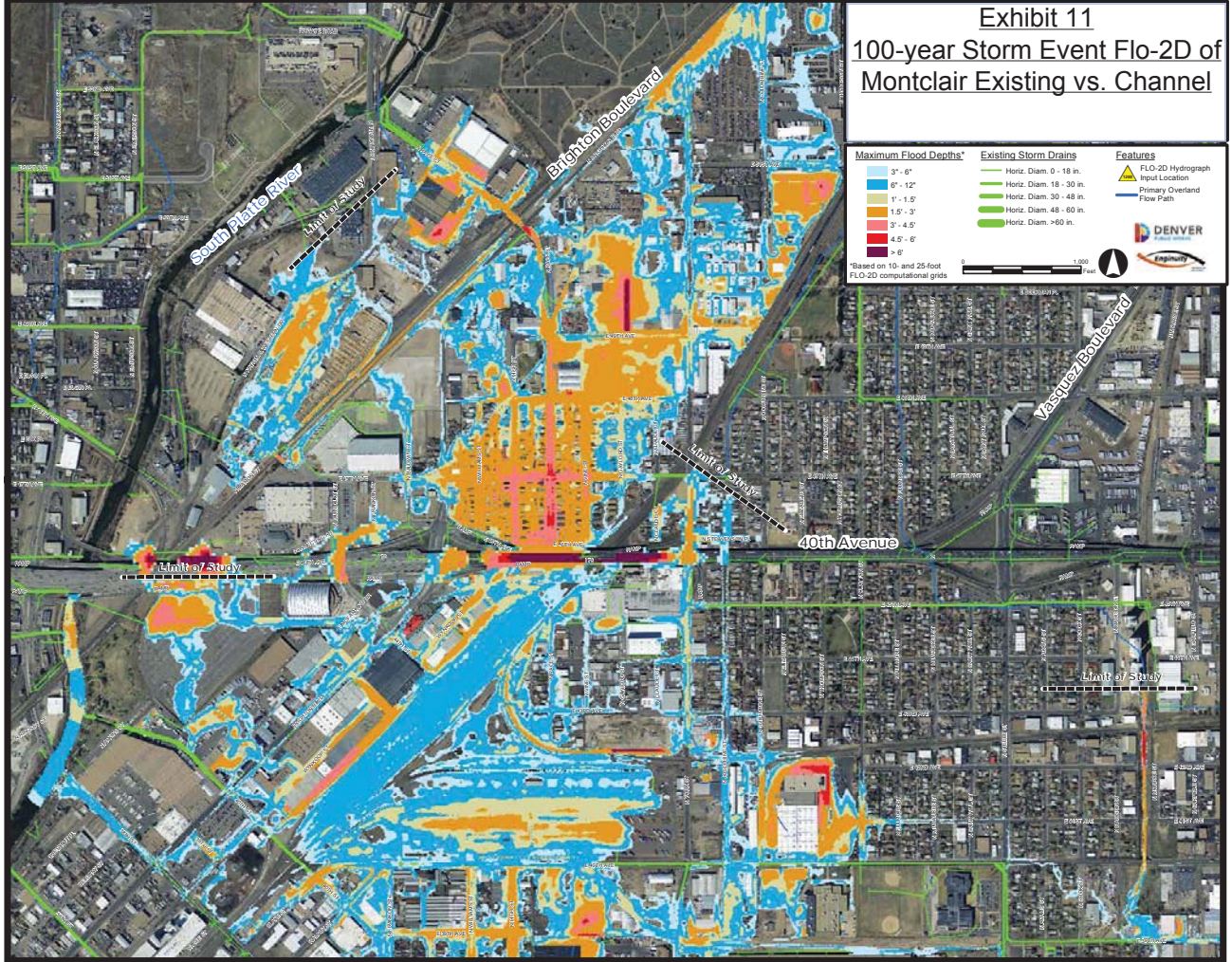
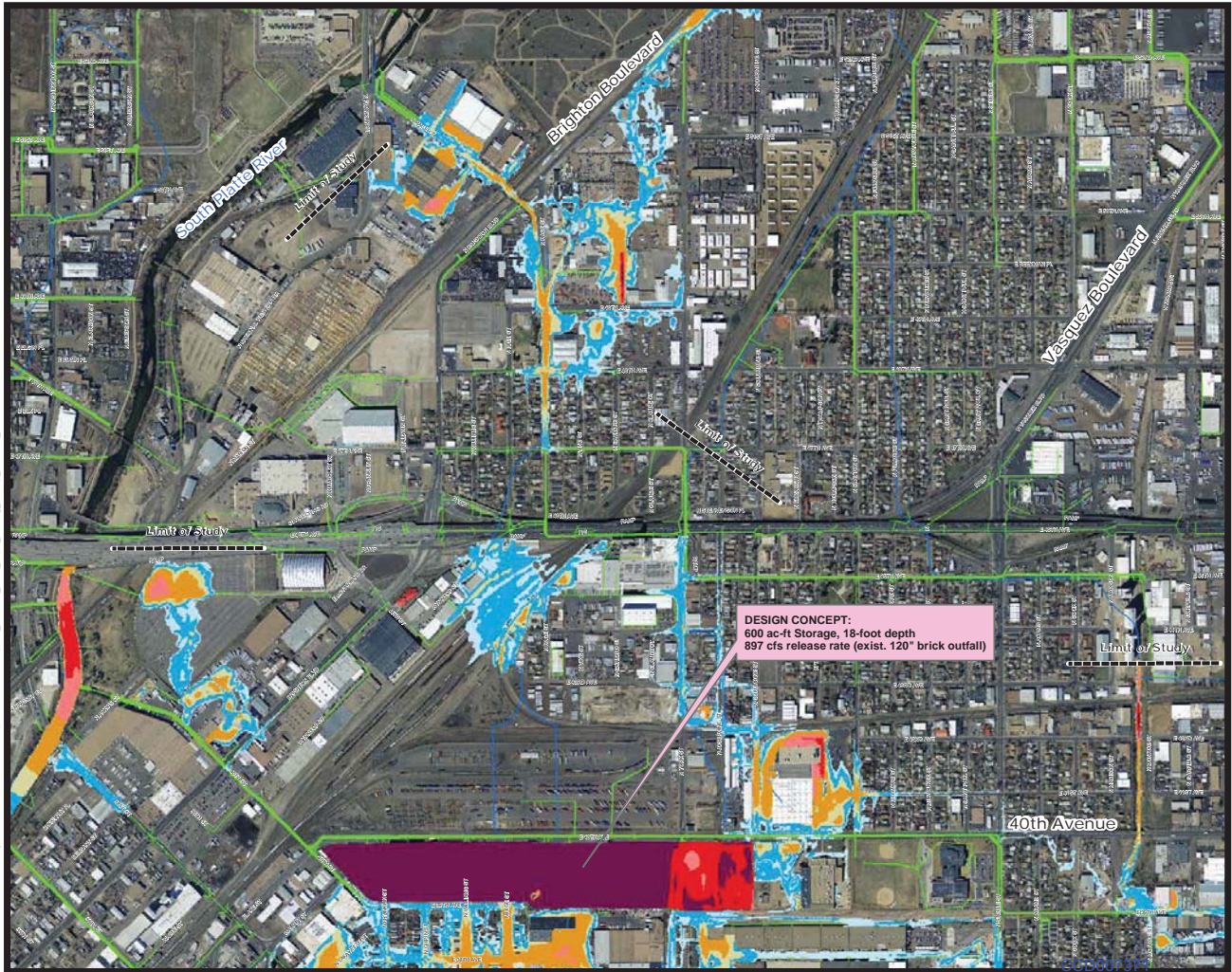
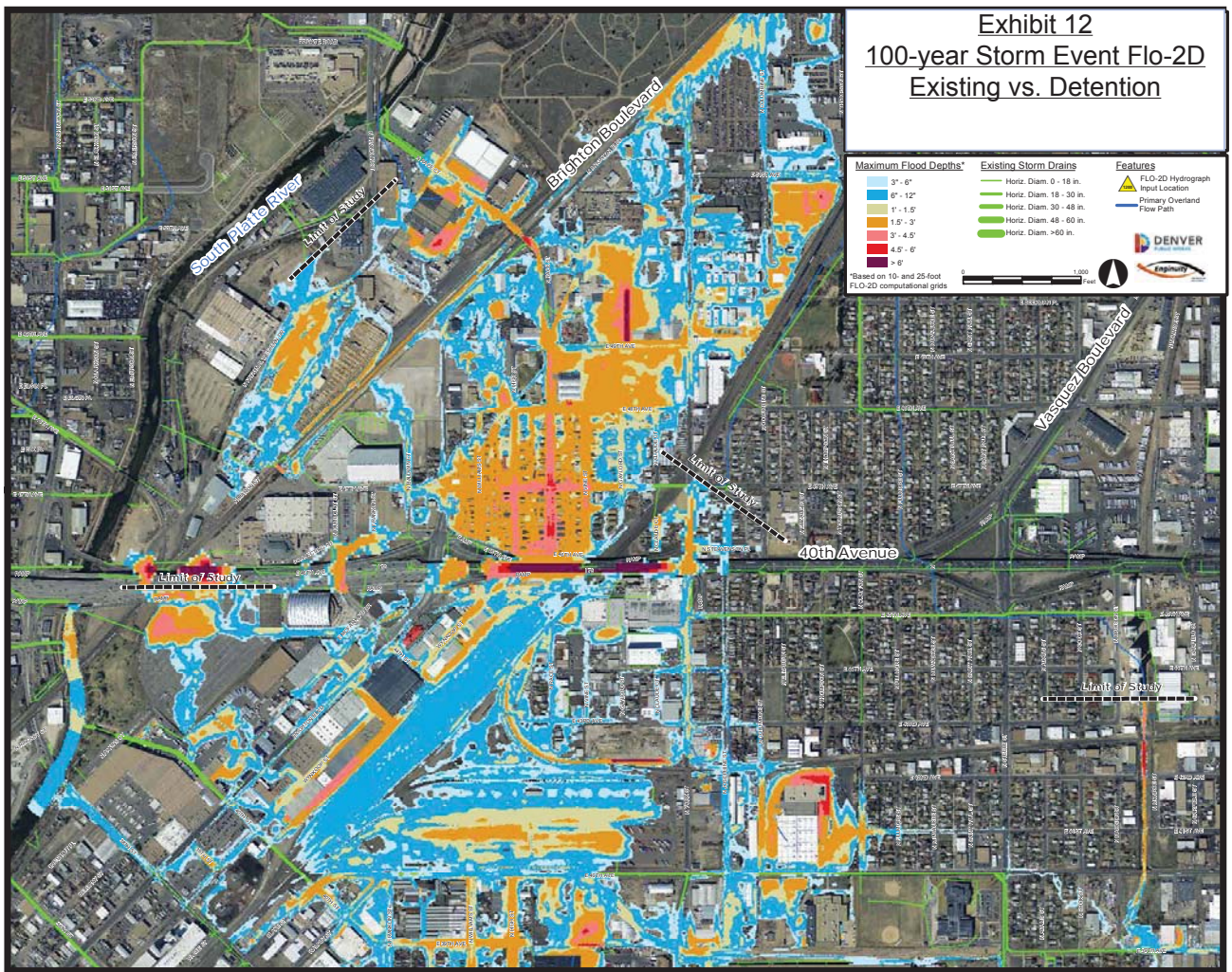


Exhibit 12 100-year Storm Event Flo-2D Existing vs. Detention

Maximum Flood Depths*	Existing Storm Drains	Features
3" - 6"	Horiz. Diam. 0 - 18 in.	FLO-2D Hydrograph
6" - 12"	Horiz. Diam. 18 - 30 in.	Input Location
1' - 1.5'	Horiz. Diam. 30 - 48 in.	Primary Overland Flow Path
1.5' - 3'	Horiz. Diam. 48 - 60 in.	
3' - 4.5'	Horiz. Diam. >60 in.	
4.5' - 6'		
6' - 8'		

*Based on 10- and 25-foot FLO-2D computational grids



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Montclair Creek Drainage

APPENDIX B

EVALUATION MATRIX



Montclair Creek Drainage Evaluation Matrix

Planning Principles and Goals (0= not meeting goals to 5=fully meeting goals)	Reach 1		Reach 2		Reach 3		Reach 4			
	Option A Open Channel	Option B WCFM Pipe & CCDOT Pipe System	Option A Open Channel	Option B Interim 40th Detention	Option C CCDOT Pipe System	Option A Green Street w/ CCD Pipe	Option B Open Channel	Option C CCDOT Pipe System	Option A Green Street w/ CCD Pipe1	Option B CCDOT Pipe System
Technical Feasibility 0-technically unverified 5-technically verified	4	5	3	4	4	3	3	4	3	4
Meets Drainage Criteria 0-Open Channel 0-Pipe (Does Not)	5	0	5	3	0	3	5	0	3	0
Flood Control Benefit Area 0-Larger Impacted Area S. of I-70 0-No Impact or minimal	5	4	5	5	4	3	3	3	3	3
Water Quality 0-large impact to improving WQ 0-no impact on improving WQ	4	1	4	3	2	3	4	1	3	1
Ecologically Promoting 0-large impact to improving Ecology 0-no impact on improving Ecology	4	0	4	3	1	2	4	1	1	1
Recreational Amenity & Aesthetically Pleasing 0-More of a recreational & aesthetic benefit 0-no recreational or aesthetic benefits	4	0	4	1	0	2	4	0	2	0
CPD Comprehensive Plans 0-Supports new development and mobility 0-No plan implementation support	3	3	3	4	0	4	1	0	5	0
Economic Benefits 0- Feasible to Relocate (0- Easy, Low cost, 0- Difficult, Costly)	5	5	1	0	3	5	4	5	2	4
Redevelopment Potential (0-High, 0-Low)	3	4	3	2	5	4	3	5	3	5
Fiscal Impact (0-Positive, 0-Negative)	3	4	1	1	5	4	3	5	3	5
Vehicular	1	0	3	3	0	5	0	0	5	0
Bicycle	5	0	5	4	0	5	4	0	5	0
Pedestrian	5	0	5	4	0	5	4	0	5	0

Risks (0= high risk to 5=low risk)	Reach 1		Reach 2		Reach 3		Reach 4			
	Option A Open Channel	Option B WCFM Pipe & CCDOT Pipe System	Option A Open Channel	Option B Interim 40th Detention	Option C CCDOT Pipe System	Option A Green Street w/ CCD Pipe	Option B Open Channel	Option C CCDOT Pipe System	Option A Green Street w/ CCD Pipe1	Option B CCDOT Pipe System
Constructability 0- high risk or difficulty 4- known risk 5- low risk	2	3	1	3	NA	3	4	NA	3	NA
Design Conflicts 0- high risk of design conflicts 5- lower risk or design conflicts	2	NA	1	4	NA	4	4	NA	4	NA
Environmental Mitigation 0- high risk (unknown) 4- known risk 5- low risk	4	4	2	2	NA	3	3	NA	4	NA
CCD Liability 0- high risk to 5- low risk	4	5	3	3	5	4	4	5	4	5
Maintenance 0- unable to maintain 1- difficult to maintain 5- programmed to maintain	3	5	3	4	5	2	3	5	2	5
TOTALS	66	43	56	53	34	64	60	34	60	33

Notes:
1. The pipe could be reduced by constructing an underground detention vault

Montclair Creek Drainage

APPENDIX C

EVALUATION MATRIX RATING EXPLANATION



TECHNICAL FEASIBILITY - GOAL: Rating Explanation

Selena Klosowski & Jason Renneker- Wastewater Capital Projects Mangement

RATING CRITERIA: (0) technically unverified - (5) technically verified

		Rating	Explanation
Reach 1	Option A Open Channel	4	Due to the High Street Outfall Phase II project there has been extensive due diligence done throughout The Denver Coliseum area. At one point during the project design of High Street Outfall Phase II, an open channel was proposed.
	Option B WCPM Pipe & CDOT Pipe System	5	The WCPM pipe is the High Street Outfall Phase II project, which has been fully designed through The Denver Coliseum site down to the South Platte River. Due to the thorough investigation, it was assumed that the same design features could be used for the CDOT pipe system which is 2- 20' x 6' through The Denver Coliseum, and 4- 10'x6' pipe system through the Globeville Landing Park
Reach 2	Option A Open Channel	1	After consulting with an outside contractor that has experience with UPRR, it seems that it would be near to impossible to negotiate placing an open channel underneath multiple UPRR lines due to the liability issues. If there is some type of environmental spill instead of it draining towards the sump in the TOFC site, it would go directly into the river
	Option B Interim 40th Detention	4	It seems after a quick analysis a detention pond can be constructed to reduce the amount of water that is draining towards the proposed I-70 PCL project. It will need to be aesthetically please, and may be filled in after 10-15 years from the time that it is put into place if there are other detention ponds that are built as part of the implementation of the Montclair OSP. The Montclair OSP has not yet provided the recommendations but once it does this option can be further investigated.
	Option C CDOT Pipe System	5	It is assumed that CDOT has proposed a technically feasible alternative for their I-70 PCL project.
Reach 3	Option A Green Street w/ CCD Pipe	3	There are many unknowns about this property, so it is rated a 3.
	Option B Open Channel	3	There are many unknowns about this property, so it is rated a 3.
	Option C CDOT Pipe System	5	It is assumed that CDOT has proposed a technically feasible alternative for their I-70 PCL project.
Reach 4	Option A Green Street w/ CCD Pipe1	3	There are many unknowns about this property, so it is rated a 3.
	Option B CDOT Pipe System	5	It is assumed that CDOT has proposed a technically feasible alternative for their I-70 PCL project.

DRAINAGE CRITERIA - GOALS: Rating Explanation

Selena Klosowski & Jason Renneker- Wastewater Capital Projects Mangement

RATING CRITERIA:

(0) - Does not Meet Recommendations in Drainage Criteria Manuals -

(5) Does meet Recommendations in Drainage Criteria Manuals

		Rating	Explanation
Reach 1	Option A Open Channel	5	UDFCD & CCD Criteria manuals recommend open channel vs. pipe for 100-year storm event or major flood events, so an open channel is rated a 5.
	Option B WCPM Pipe & CDOT Pipe System	0	UDFCD & CCD Criteria manuals recommend open channel vs. pipe for 100-year storm event or major flood events, so a pipe option does not meet this recommendation
Reach 2	Option A Open Channel	5	UDFCD & CCD Criteria manuals recommend open channel vs. pipe for 100-year storm event or major flood events, so an open channel is rated a 5.
	Option B Interim 40th Detention	3	UDFCD & CCD Criteria manuals recommend open channel vs. pipe for 100-year storm event or major flood events. Since a detention pond offers better protection than a pipe system, but not as much as an open channel a pond was rated a 3
	Option C CDOT Pipe System	0	UDFCD & CCD Criteria manuals recommend open channel vs. pipe for 100-year storm event or major flood events, so a pipe option does not meet this recommendation
Reach 3	Option A Green Street w/ CCD Pipe	3	UDFCD & CCD Criteria manuals recommend open channel vs. pipe for 100-year storm event or major flood events. If the green street has a linear water quality ditch then there would be better flood control protection than just a pipe system.
	Option B Open Channel	5	UDFCD & CCD Criteria manuals recommend open channel vs. pipe for 100-year storm event or major flood events, so an open channel is rated a 5.
	Option C CDOT Pipe System	0	UDFCD & CCD Criteria manuals recommend open channel vs. pipe for 100-year storm event or major flood events, so a pipe option does not meet this recommendation
Reach 4	Option A Green Street w/ CCD Pipe1	3	UDFCD & CCD Criteria manuals recommend open channel vs. pipe for 100-year storm event or major flood events. If the green street has a linear water quality ditch then there would be better flood control protection than just a pipe system.
	Option B CDOT Pipe System	0	UDFCD & CCD Criteria manuals recommend open channel vs. pipe for 100-year storm event or major flood events, so a pipe option does not meet this recommendation

FLOOD CONTROL BENEFIT AREA - GOALS: Rating Explanation

Selena Klosowski & Jason Renneker- Wastewater Capital Projects Mangement

RATING CRITERIA: (0) -No Impact or minimal - (5) Larger Impacted Area S. of I-70

		Rating	Explanation
Reach 1	Option A Open Channel	5	The I-70 PCL project offers flood control protection to approximately 110 Acres within the CCD. There is an additional 107 Acres of land that benefits from the open channel system.
	Option B WCPM Pipe & CDOT Pipe System	4	The I-70 PCL project offers flood control protection to approximately 110 Acres within the CCD.
Reach 2	Option A Open Channel	5	The I-70 PCL project offers flood control protection to approximately 110 Acres within the CCD. There is an additional 107 Acres of land that benefits from the open channel system.
	Option B Interim 40th Detention	5	The I-70 PCL project offers flood control protection to approximately 110 Acres within the CCD. There is an additional 107 Acres of land that benefits from the detention pond
	Option C CDOT Pipe System	4	The I-70 PCL project offers flood control protection to approximately 110 Acres within the CCD.
Reach 3	Option A Green Street w/ CCD Pipe	3	There is local benefit from any drainage in this reach, however during the 100-year storm event the area downstream of this reach remains relatively dry
	Option B Open Channel	3	There is local benefit from any drainage in this reach, however during the 100-year storm event the area downstream of this reach remains relatively dry
	Option C CDOT Pipe System	3	There is local benefit from any drainage in this reach, however during the 100-year storm event the area downstream of this reach remains relatively dry
Reach 4	Option A Green Street w/ CCD Pipe1	3	There is local benefit from any drainage in this reach, however during the 100-year storm event the area downstream of this reach remains relatively dry
	Option B CDOT Pipe System	3	There is local benefit from any drainage in this reach, however during the 100-year storm event the area downstream of this reach remains relatively dry

WATER QUALITY - GOAL: Rating Explanation

Jon Novick & Al Polonsky- Department of Environmental Health

RATING CRITERIA:

(5) large impact to improving WQ - (0) no impact on improving WQ (See Criteria Details Attached)

		Rating	Explanation
Reach 1	Option A Open Channel	4	Beneficial to habitat, water quality, and water quantity provides connectivity to other habitat, and creates a buffer zone to non-point prevent pollutants from reaching surface water. Allows for infiltration to and recharge from ground water.
	Option B WCPM Pipe & CDOT Pipe System	1	Beneficial for nutrients, sediment, metals, and oil and grease. There are some CDOT ponds proposed for Reach 1.
Reach 2	Option A Open Channel	4	Beneficial to habitat, water quality, and water quantity provides connectivity to other habitat, and creates a buffer zone to non-point prevent pollutants from reaching surface water. Allows for infiltration to and recharge from ground water.
	Option B Interim 40th Detention	3	Beneficial for nutrients, sediment, metals, and oil and grease.
	Option C CDOT Pipe System	2	Beneficial for nutrients, sediment, metals, and oil and grease. There are some CDOT ponds proposed for Reach 2.
Reach 3	Option A Green Street w/ CCD Pipe	3	Beneficial for nutrients, sediment, metals, and oil and grease. Would down-grade if % green street coverage is limited
	Option B Open Channel	4	Beneficial for nutrients, sediment, metals, and oil and grease.
	Option C CDOT Pipe System	1	Beneficial for nutrients, sediment, metals, and oil and grease. There is one CDOT pond proposed in Reach 3
Reach 4	Option A Green Street w/ CCD Pipe1	3	Beneficial for nutrients, sediment, metals, and oil and grease. Would down-grade if % green street coverage is limited
	Option B CDOT Pipe System	1	Beneficial for nutrients, sediment, metals, and oil and grease. There is one CDOT pond proposed in Reach 4

WATER QUALITY - RATING CRITERIA

Rating	Description
5	Would provide improvement for all pollutant classes
4	Would provide improvement for four to five pollutant classes
3	Would provide improvement for three pollutant classes
2	Would provide improvement for two pollutant classes
1	Would provide improvement for one pollutant class
0	No benefit to water quality

WATER QUALITY - CRITERIA

Pollutant Classes	wetlands	backwater	bank overflow	bank stability	UV exposure	geomorphic	Other
Bacteria - UV, wetlands (riparian, overflow), bioengineered soil	X				X		bioeng-soil
Nutrients - wetlands (riparian, overflow)	X	X	X	X			
Dissolved oxygen, etc. - riffles, cascading drops, low flow channel						X	
Sediment - bank stability; wetlands - settling, backwater, bank overflow		X	X	X		X	
Metals - wetlands, settling, backwater, bank overflow storage (wetlands)	X	X	X	X			
Oil & Grease- wetlands, settling, backwater, bank overflow storage (wetlands)	X	X	X	X	X		

ECOLOGICALLY PROMOTING - GOAL: Rating Explanation

Jon Novick & Al Polonsky- Department of Environmental Health

RATING CRITERIA:

(0) no impact on improving Ecology - (5) large impact to improving Ecology (See Criteria Details Attached)

		Rating	Explanation
Reach 1	Option A Open Channel	4	Beneficial to habitat, water quality, and water quantity provides connectivity to other habitat, and creates a buffer zone to non-point prevent pollutants from reaching surface water. Allows for infiltration to and recharge from ground water.
	Option B WCPM Pipe & CDOT Pipe System	0	No impact to improving Ecology
Reach 2	Option A Open Channel	4	Beneficial to habitat, water quality, and water quantity provides connectivity to other habitat, and creates a buffer zone to non-point prevent pollutants from reaching surface water. Allows for infiltration to and recharge from ground water.
	Option B Interim 40th Detention	3	Some benefit. Potential for habitat to be created within and around detention pond and for a buffer zone to be created to prevent non-point source pollution from entering surface water. Provides benefits to water quality and quantity (through recharge to and discharge from ground water).
	Option C CDOT Pipe System	1	Very little benefit. Habitat connectivity, buffer, geomorphic (-); WQ (CDOT ponds), low flow (+). There are some CDOT ponds proposed for Reach 2.
Reach 3	Option A Green Street w/ CCD Pipe	2	Prevents degradation of water quality and protects downstream habitat.
	Option B Open Channel	4	Beneficial to habitat, water quality, and water quantity provides connectivity to other habitat, and creates a buffer zone to non-point prevent pollutants from reaching surface water. Allows for infiltration to and recharge from ground water.
	Option C CDOT Pipe System	1	Very little benefit. Habitat connectivity, buffer, geomorphic (-); WQ (CDOT ponds), low flow (+). There are some CDOT ponds proposed for Reach 3.
Reach 4	Option A Green Street w/ CCD Pipe1	1	Prevents degradation of water quality and protects downstream habitat.
	Option B CDOT Pipe System	1	Very little benefit. Habitat connectivity, buffer, geomorphic (-); WQ (CDOT ponds), low flow (+). There are some CDOT ponds proposed for Reach 4.

ECOLOGICALLY PROMOTING - RATING CRITERIA

Rating	Description
5	Improvements include all of the specified criteria. Significant ecological benefit.
4	Improvements include five of the specified criteria.
3	Improvements include four of the specified criteria. Beneficial to ecological conditions but still not ideal.
2	Improvements include three of the specified criteria. Some ecological benefit.
1	Improvements include two of the specified criteria. Minimal ecological benefit.
0	No ecological benefits, project does not meet minimum requirements to improve ecology of area.

ECOLOGICALLY PROMOTING - CRITERIA

a	Habitat	<p>Varied in stream habitat - riffles and glides, refugia; not just sand, but also more stable substrate such as cobble</p> <p>Mixed species and canopy height with native riparian and upland plantings create shading over waterways and habitat for birds and other beneficial species</p> <p>Allows for upstream migration of fish</p>
b	Connectivity	Connected to other green spaces to create wildlife movement corridor
c	Buffer	Incorporate buffer to maximum extent possible between water body and hardscape so as to enhance habitat integrity (minimize bank erosion, provide quality space for wildlife)
d	Low Flow condition	Minimizes stagnation to the extent possible with functional low flow channel (maintains at least a minimal flow through drought periods)
e	Water Quality	In stream and riparian features help mitigate variety of potential water quality contaminant types (i.e., sediment, nutrients, bacteria, metals)
f	Geomorphology	<p>Allows for natural migration of channel or contains meanders at regular intervals to mitigate erosion during high flows and create diverse instream habitat -</p> <p>includes areas where erosion and deposition of sediment can occur</p>

CPD Comprehensive Plans: Rating Explanation

Tim Watkins- Community Planning & Development

(5) Supports new development and mobility - (0) No Plan Implementation Support

		Rating	Explanation
Reach 1	Option A Open Channel	3	Supports infill development in reach 2 by conveying up-basin flows to the river; also helps to protect coliseum site from flooding although some development / site use potential is lost. The channel also provides bike / ped access to the river trail system from the NWC.
	Option B WCPM Pipe & CDOT Pipe System	3	Supports infill development in reach 2 by conveying up-basin flows to the river; also helps to protect coliseum site from flooding, although some site use potential is lost.
Reach 2	Option A Open Channel	3	May support some redevelopment along Brighton Boulevard; potential for tunnel bike / ped access from River North to 38th & Blake transit; Infill development is possible between Franklin and Steele, especially with a new 39th Avenue from High Street to Steele.
	Option B Interim 40th Detention	4	Provides a buffer between heavy industrial to the north and residential to the south; potential for future master planning and mixed use development near 38th & Blake. A new 39th green street improves access and area mobility.
	Option C CDOT Pipe System	0	No Plan Implementation Support
Reach 3	Option A Green Street w/ CCD Pipe	4	A new street along 39th Ave provides access to underutilized property and encourages reuse / redevelopment, and improves area mobility. Also conveys water from reach 4 where redevelopment / infill potential is within walking distance of transit.
	Option B Open Channel	0	An open channel without an access road conveys water from reach 4, but does not improve access to an underutilized property with infill / redevelopment potential. Area mobility and access is not further improved. No Plan Implementation Support
	Option C CDOT Pipe System	0	No Plan Implementation Support
Reach 4	Option A Green Street w/ CCD Pipe1	5	New streets with green infrastructure and storm pipe conveyance introduce new developable land with street frontage within close proximity to future rail transit
	Option B CDOT Pipe System	0	No Plan Implementation Support

REC AMENITY & ASTHETICALLY PLEASING - GOAL: Rating Explanation

David Marquardt- Parks & Recreation

RATING CRITERIA: (0) No Recreational or Aesthetic Benefits - (5) More of a recreational and aesthetic benefit

		Rating	Explanation
Reach 1	Option A Open Channel	4	An open channel offers recreational amenity and this is also intended to be aesthetically pleasing.
	Option B WCPM Pipe & CDOT Pipe System	0	A pipe does not offer any recreational or aesthetic benefits
Reach 2	Option A Open Channel	4	An open channel offers recreational amenity and this is also intended to be aesthetically pleasing.
	Option B Interim 40th Detention	1	A detention pond that is primarily flood control will not offer too much recreational benefit, but may offer some aesthetic features.
	Option C CDOT Pipe System	0	A pipe does not offer any recreational or aesthetic benefits
Reach 3	Option A Green Street w/ CCD Pipe	2	A green street may offer some recreational trail and can be aesthetically pleasing.
	Option B Open Channel	4	An open channel offers recreational amenity and this is also intended to be aesthetically pleasing.
	Option C CDOT Pipe System	0	A pipe does not offer any recreational or aesthetic benefits
Reach 4	Option A Green Street w/ CCD Pipe1	2	A green street may offer some recreational trail and can be aesthetically pleasing.
	Option B CDOT Pipe System	0	A pipe does not offer any recreational or aesthetic benefits

ECONOMIC BENEFITS¹ - Goal: Rating Explanation

FEASIBILITY TO RELOCATE

Jeff Romine- Office of Economic Development

RATING CRITERIA: (0) difficult/costly - (5) easy/low cost

		Rating	Explanation
Reach 1	Option A Open Channel	5	No relocation is anticipated from this option
	Option B WCPM Pipe & CDOT Pipe System	5	No relocation is anticipated from this option
Reach 2	Option A Open Channel	1	Significant relocation will be required, include both residents and businesses.
	Option B Interim 40th Detention	0	This option requires a large scale relocation of residences and businesses from this area. Replacement development will occur in after the interim period.
	Option C CDOT Pipe System	3	Some relocation is expected and the scale of required relocations will be determined based on construction and pipeline inflow/maintenance access.
Reach 3	Option A Green Street w/ CCD Pipe	5	No relocation is anticipated from this option
	Option B Open Channel	4	Depending on channel widths, some private land may be required or have changed property access
	Option C CDOT Pipe System	5	No relocation is anticipated from this option
Reach 4	Option A Green Street w/ CCD Pipe1	2	Depending on the associated requirements for land in the alignments, some relocations may be required. The costs and economics of this property (and the operating businesses) would suggest relocations in to "like cost" locations will be difficult.
	Option B CDOT Pipe System	4	No relocation is anticipated from this option

¹ These ratings were based in part with reference to the Denver's 3 Year Strategic Economic Development Plan, JumpStart 2014 (OED's annual work program), information on current redevelopment project, and discussions with various local businesses and developers of area projects

ECONOMIC BENEFITS¹ - Goal: Rating Explanation

REDEVELOPMENT POTENTIAL

Jeff Romine- Office of Economic Development

RATING CRITERIA: (0) low redevelopment potential - (5) high redevelopment potential

		Rating	Explanation
Reach 1	Option A Open Channel	3	Location is strong. Site has direct access to park and riverway, but is hidden and access to light rail station and other development is partially limited. This land is part of the NWSS master planning process.
	Option B WCPM Pipe & CDOT Pipe System	4	Same as above, with the pipe system approach providing more available land for development - thus a larger scale project.
Reach 2	Option A Open Channel	3	This area has a stronger and higher redevelopment potential, with new development projects already underway. The likely area of redevelopment will stretch to York, south of 40th. Depending on the alignment of the channel, a portion of the land will be lost for redevelopment (and access may be limited from the 40th).
	Option B Interim 40th Detention	2	This option forestalls most redevelopment in the immediate area for the interim period, but provides a long term business and resident development option. So my rating is 0 to 1 in the interim period, and then rises to 3 to 4 (thus a single average score of 2).
	Option C CDOT Pipe System	5	This option provides the strongest potential for redevelopment, resulting from both the public investment in the mass transit (east line and the 38th station) and the removal of the local storm water flooding conditions.
Reach 3	Option A Green Street w/ CCD Pipe	4	Improves the access to adjacent property, however does not create additional redevelopment land area.
	Option B Open Channel	3	The open channel in this reach does not restrict redevelopment on the adjacent property, but does continue the limited access conditions in the property.
	Option C CDOT Pipe System	5	Allows the adjacent property the greatest degree of flexibility for redevelopment of their property.
Reach 4	Option A Green Street w/ CCD Pipe1	3	Improves area access, and includes potential redevelopment land for adjacent property owners.
	Option B CDOT Pipe System	5	Creates the largest amount of redevelopment land area, within the former "market lead" property.

ECONOMIC BENEFITS¹ - Goal: Rating Explanation

FISCAL IMPACT²

Jeff Romine- Office of Economic Development

RATING CRITERIA: (0) negative fiscal impact - (5) positive fiscal impact

		Rating	Explanation
Reach 1	Option A Open Channel	3	The increased redevelopment will likely be primarily residential in this area; but currently no development is the impacted land.
	Option B WCPM Pipe & CDOT Pipe System	4	Larger scale project may include commercial uses with the development.
Reach 2	Option A Open Channel	1	Lowered from the current tax revenues (primarily real and business personal property and some use tax), due to the displaced businesses and residential properties
	Option B Interim 40th Detention	1	Lowered from the current tax revenues (primarily real and business personal property and some use tax), due to the displaced businesses and residential properties
	Option C CDOT Pipe System	5	Expected to increase as a result of the project improvement (as well as the 38th St Station TOD), resulting increased development - as well as positive impacts on private investment due to the reduction of storm water flood impacts.
Reach 3	Option A Green Street w/ CCD Pipe	4	Improved street and property access, resulting in increased redevelopment opportunities (both by scale and uses).
	Option B Open Channel	3	Each option (of the 3 options in this Reach Area) is anticipated to be fiscally positive due to the anticipated reductions in storm impacts. The degree of fiscal impact (increased tax revenues) results from the various levels of adjacent property access and scale of redevelopment (due to increased developable property area).
	Option C CDOT Pipe System	5	Creates the largest redevelopment area, due to the potential increased land area and localized modal access.
Reach 4	Option A Green Street w/ CCD Pipe1	3	Expecting slightly positive fiscal impact, depending on the alignments and characteristics of the street.
	Option B CDOT Pipe System	5	Expected to increase as a result of the project improvement (as well as the Colorado Station TOD and nearby redevelopment), resulting increased development - as well as positive impacts on private investment due to the reduction of storm water flood impacts.

1 These ratings were based in part with reference to the Denver's 3 Year Strategic Economic Development Plan, JumpStart 2014 (OED's annual work program), information on current redevelopment project, and discussions with various local businesses and developers of area projects

2 The rough fiscal impact takes into account Denver's tax structure, likely redevelopment uses, potential actual development scale (based on current market activity), and development/market patterns.

MOBILITY - Goal: Rating Explanation

VEHICULAR

Emily Silverman- Public Works Planning

RATING CRITERIA: (0) Does not promote mobility - (5) Large impact to improving mobility

		Rating	Explanation
Reach 1	Option A Open Channel	1	This does not promote vehicular mobility
	Option B WCPM Pipe & CDOT Pipe System	0	This does not promote vehicular mobility
Reach 2	Option A Open Channel	3	If a road is constructed to connect 39th, then there are some vehicular mobility improvements
	Option B Interim 40th Detention	3	If a road is constructed to connect 39th, then there are some vehicular mobility improvements
	Option C CDOT Pipe System	0	This does not promote vehicular mobility
Reach 3	Option A Green Street w/ CCD Pipe	5	The connection of 39th between York and Steele greatly improves vehicular mobility
	Option B Open Channel	0	This does not promote vehicular mobility
	Option C CDOT Pipe System	0	This does not promote vehicular mobility
Reach 4	Option A Green Street w/ CCD Pipe1	5	The connection of 39th between Steele & Monroe, the new construction of 42nd, 41st, and Monroe all greatly improve vehicular mobility by offering connectivity.
	Option B CDOT Pipe System	0	This does not promote vehicular mobility

MOBILITY - Goal: Rating Explanation

BICYCLE

Emily Snyder- Public Works Planning

RATING CRITERIA: (0) no opportunity for bicycle facility - (5) provides new bicycle facility connection

		Rating	Explanation
Reach 1	Option A Open Channel	5	Would provide a new multi-use trail connection facilitating bicycle and pedestrian travel.
	Option B WCPM Pipe & CDOT Pipe System	0	No benefit.
Reach 2	Option A Open Channel	5	Would provide a new multi-use trail connection facilitating bicycle and pedestrian travel.
	Option B Interim 40th Detention	4	Would provide new bicycle pathway; however, user experience next to detention basin may be diminished based on the design of such facility.
	Option C CDOT Pipe System	0	No benefit.
Reach 3	Option A Green Street w/ CCD Pipe	5	Would provide new bicycle lanes on 39th that would act as an alternative E-W corridor, so bicycles would not have to share 40th with large trucks.
	Option B Open Channel	4	Would provide a new multi-use trail connection; however, could be uncomfortable at night because of limited vehicular and land use activity.
	Option C CDOT Pipe System	0	No benefit.
Reach 4	Option A Green Street w/ CCD Pipe1	5	Creates a new street for N/S bicycle travel to enter into the 40th/Colorado station from the west. Provides an at-grade intersection crossing improvements.
	Option B CDOT Pipe System	0	No benefit.

MOBILITY - Goal: Rating Explanation

PEDESTRIAN

Emily Silverman- Public Works Planning

RATING CRITERIA: (0) no pedestrian improvements - (5) creates new pedestrian facilities/pathways

		Rating	Explanation
Reach 1	Option A Open Channel	5	Would provide a new multi-use trail connection facilitating bicycle and pedestrian travel.
	Option B WCPM Pipe & CDOT Pipe System	0	No benefit.
Reach 2	Option A Open Channel	5	Would provide a new multi-use trail connection facilitating bicycle and pedestrian travel.
	Option B Interim 40th Detention	4	Would provide new bicycle pathway; however, user experience next to detention basin may be diminished based on the design of such facility.
	Option C CDOT Pipe System	0	No benefit.
Reach 3	Option A Green Street w/ CCD Pipe	5	Would provide new sidewalk connections in the Clayton neighborhood. It would also create a more comfortable pedestrian experience from a personal safety perspective because of increased activity in the corridor. Also separates all modes.
	Option B Open Channel	4	Would provide a new multi-use trail connection; however, could be uncomfortable at night because of limited vehicular and land use activity.
	Option C CDOT Pipe System	0	No benefit.
Reach 4	Option A Green Street w/ CCD Pipe1	5	Would provide new sidewalk connections to the 40th/Colorado Station, and the "green street" aspect would contribute to an increased quality of pedestrian experience.
	Option B CDOT Pipe System	0	No benefit.

CONSTRUCTABILITY - RISK: Rating Explanation

David Shaw- Wastewater Capital Projects Management- Construction

RATING CRITERIA: (0) high risk or difficulty - (4) known risk - (5) low risk

		Rating	Explanation
Reach 1	Option A Open Channel	2	Site located in the Vasquez Blvd./Interstate 70 Superfund site operable units 1 and 2 and in historic landfill. Known and Unknown contamination risks including asbestos. Complex construction coordination with coliseum and Pepsi
	Option B WCPM Pipe & CDOT Pipe System	3	Site located in the Vasquez Blvd./Interstate 70 Superfund site operable units 1 and 2 and in historic landfill. Known and Unknown contamination Risk including asbestos. Smaller Excavation Footprint lowers risk by one rating point
Reach 2	Option A Open Channel	1	Site located in the Vasquez Blvd./Interstate 70 Superfund site operable units 1 and 2 and in historic landfill. Known and Unknown contamination risks. Regulatory Risk coordinating construction with Union Pacific Railroad and Pepsi
	Option B Interim 40th Detention	3	Site clearing will dictate building demolition and cleanup of any industrial contamination left from on site manufacturing. Large scale utility relocations, and soil transport and processing including Asbestos mitigation justify rating
	Option C CDOT Pipe System	NA	This option will exclusively be constructed by CDOT, and the City and County of Denver would not take on the risk of constructing these options, so this option was not evaluated against this risk.
Reach 3	Option A Green Street w/ CCD Pipe	3	Unknown environmental conditions pose moderate risks to construction. Street Construction may require ground stabilization and conditioning. Existing Utilities may require full length relocation
	Option B Open Channel	4	Unknown environmental conditions pose moderate risks to construction. Soil Transport and Excavation easier due to no existing structures. Existing Utilities may require full length relocation
	Option C CDOT Pipe System	NA	This option will exclusively be constructed by CDOT, and the City and County of Denver would not take on the risk of constructing these options, so this option was not evaluated against this risk.
Reach 4	Option A Green Street w/ CCD Pipe1	3	Unknown environmental conditions pose moderate risks to construction. Street Construction may require ground stabilization and conditioning. Tight in street construction access and existing residential properties increase construction complexity
	Option B CDOT Pipe System	NA	This option will exclusively be constructed by CDOT, and the City and County of Denver would not take on the risk of constructing these options, so this option was not evaluated against this risk.

DESIGN CONFLICTS - RISK: Rating Explanation

Selena Klosowski & Jason Renneker- Wastewater Capital Projects Management

RATING CRITERIA: (0) high risk of design conflicts - (5) lower risk of design conflicts

		Rating	Explanation
Reach 1	Option A Open Channel	2	There are many unknowns of building an open channel through The Denver Coliseum area, and Globeville Landing Park. There is a large Metro Wastewater main that will be a large point of conflict for the design of this channel.
	Option B WCPM Pipe & CDOT Pipe System	NA	No design conflicts were assessed for this option since it was assumed that these are already resolved.
Reach 2	Option A Open Channel	1	After consulting with an outside contractor that has experience with UPRR, it seems that it would be near to impossible to negotiate placing an open channel underneath multiple UPRR lines due to the liability issues. If there is some type of environmental spill instead of it draining towards the sump in the TOFC site, it would go directly into the river
	Option B Interim 40th Detention	4	After a preliminary glance, there does not seem to be any major utility conflicts in this reach to build a detention pond.
	Option C CDOT Pipe System	NA	No design conflicts were assessed for this option since it was assumed that these are already resolved.
Reach 3	Option A Green Street w/ CCD Pipe	4	After a preliminary glance, there does not seem to be any major utility conflicts in this reach to build a pipe and green street.
	Option B Open Channel	4	After a preliminary glance, there does not seem to be any major utility conflicts in this reach to build an open channel
	Option C CDOT Pipe System	NA	No design conflicts were assessed for this option since it was assumed that these are already resolved.
Reach 4	Option A Green Street w/ CCD Pipe1	4	After a preliminary glance, there does not seem to be any major utility conflicts in this reach to build a pipe and green street.
	Option B CDOT Pipe System	NA	No design conflicts were assessed for this option since it was assumed that these are already resolved.

ENVIRONMENTAL MITIGATION - RISKS: Rating Explanation

David Erickson- Department of Environmental Health

RATING CRITERIA: (0) high risk/unknown - (4) known risk - (5) low risk

		Rating	Explanation
Reach 1	Option A Open Channel	4	Environmental concerns within Reach 1 are well characterized therefore the environmental mitigation was rated 4 as a known risk. Environmental concerns within Reach 1 include: Landfill debris; Asbestos containing materials (ACMs); Heavy metals in soil; low concentration of Chlorinated solvents in groundwater.
	Option B WCPM Pipe & CDOT Pipe System	4	Environmental concerns within Reach 1 are well characterized therefore the environmental mitigation was rated 4 as a known risk. Environmental concerns within Reach 1 include: Landfill debris; Asbestos containing materials (ACMs); Heavy metals in soil; low concentration of Chlorinated solvents in groundwater.
Reach 2	Option A Open Channel	2	Heightened risk due to limited environmental information available along portions of Reach 2. Based on known land uses and available information environmental concerns can be surmised as follows: Soil containing elevated concentrations of petroleum hydrocarbons, polynuclear aromatic hydrocarbons (PAHs) and metals in soil likely will be encountered where historical and current railroad operations have impacted soil. ; From Franklin Street east to York Street environmental concerns would likely include buried building debris, ACMs and possible and isolated areas of petroleum hydrocarbons.; The source of the petroleum hydrocarbons is the historical presence of leaking underground storage tanks (LUSTs) near East 40 th Avenue.
	Option B Interim 40th Detention	2	Heightened risk due to limited environmental information available along portions of Reach 2. Based on known land uses and available information environmental concerns can be surmised as follows: Soil containing elevated concentrations of petroleum hydrocarbons, polynuclear aromatic hydrocarbons (PAHs) and metals in soil likely will be encountered where historical and current railroad operations have impacted soil. ; From Franklin Street east to York Street environmental concerns would likely include buried building debris, ACMs and possible and isolated areas of petroleum hydrocarbons.; The source of the petroleum hydrocarbons is the historical presence of leaking underground storage tanks (LUSTs) near East 40 th Avenue.
	Option C CDOT Pipe System	NA	There are no environmental risks that CCD would need to address for CDOT's pipe system.
Reach 3	Option A Green Street w/ CCD Pipe	3	The nature and extent of contamination along Reach 3 is not well known therefore assigned a 3 rating for environmental mitigations indicating slightly heightened risk. The limited environmental data available for Reach 3 include: From York Street east to Steele Street environmental concerns would likely include buried refuse, building debris, ACMs and possible and isolated areas of petroleum hydrocarbons. ; Buried refuse may exist in a former fill area located near the intersection of East 39 th Ave and York Street. ; The source of the petroleum hydrocarbons is the historical presence of leaking underground storage tanks (LUSTs) near East 39 th Avenue.
	Option B Open Channel	3	The nature and extent of contamination along Reach 3 is not well known therefore assigned a 3 rating for environmental mitigations indicating slightly heightened risk. The limited environmental data available for Reach 3 include: From York Street east to Steele Street environmental concerns would likely include buried refuse, building debris, ACMs and possible and isolated areas of petroleum hydrocarbons. ; Buried refuse may exist in a former fill area located near the intersection of East 39 th Ave and York Street. ; The source of the petroleum hydrocarbons is the historical presence of leaking underground storage tanks (LUSTs) near East 39 th Avenue.
	Option C CDOT Pipe System	NA	There are no environmental risks that CCD would need to address for CDOT's pipe system.
Reach 4	Option A Green Street w/ CCD Pipe1	4	It is expected that soil contamination will be encountered less frequently in this reach than in other reaches; and therefore was assigned a relatively high rating of 4. Much of Reach 4 consists of former railroad right of way and environmental concerns include: Soil containing buried refuse may be encountered near the intersection of East 39 th Avenue and Monroe Street. A former fill area exists near this intersection and would be the source of the buried refuse. ; Elevated concentrations of PAHs and metals may exist in soil as a result of the former use of the reach as an active rail line.
	Option B CDOT Pipe System	NA	There are no environmental risks that CCD would need to address for CDOT's pipe system.

CCD LIABILITY - RISKS: Rating Explanation

Jessica Brody- City Attorney's Office

RATING CRITERIA: (0) high risk - (5) low risk

		Rating	Explanation
Reach 1	Option A Open Channel	4	There will need to be contractual responsibilities to ensure that the work for this is designed and performed to meet CDOT's needs, specifications and timeliness, there are less environmental risks on this site since there has been a thorough investigation of the project area.
	Option B WCPM Pipe & CDOT Pipe System	5	There is no assumed risk since CDOT will be assuming all the risk for providing 100-year storm event protection for their I-70 PCL project.
Reach 2	Option A Open Channel	3	There will need to be contractual responsibilities to ensure that the work for this is designed and performed to meet CDOT's needs, specifications and timeliness, there are more environmental risks on this site since there has not been a thorough investigation of the project area.
	Option B Interim 40th Detention	3	There will need to be contractual responsibilities to ensure that the work for this is designed and performed to meet CDOT's needs, specifications and timeliness, there are more environmental risks on this site since there has not been a thorough investigation of the project area.
	Option C CDOT Pipe System	5	There is no assumed risk since CDOT will be assuming all the risk for providing 100-year storm event protection for their I-70 PCL project.
Reach 3	Option A Green Street w/ CCD Pipe	4	There will need to be contractual responsibilities to ensure that the work for this is designed and performed to meet CDOT's needs, specifications and timeliness, according to DEH there is limited environmental risks on this property
	Option B Open Channel	4	There will need to be contractual responsibilities to ensure that the work for this is designed and performed to meet CDOT's needs, specifications and timeliness, according to DEH there is limited environmental risks on this property
	Option C CDOT Pipe System	5	There is no assumed risk since CDOT will be assuming all the risk for providing 100-year storm event protection for their I-70 PCL project.
Reach 4	Option A Green Street w/ CCD Pipe1	4	There will need to be contractual responsibilities to ensure that the work for this is designed and performed to meet CDOT's needs, specifications and timeliness, according to DEH there is limited environmental risks on this property
	Option B CDOT Pipe System	5	There is no assumed risk since CDOT will be assuming all the risk for providing 100-year storm event protection for their I-70 PCL project.

MAINTENANCE - RISK: Rating Explanation

Saeed Farahmandi- Wastewater Management Division - Operations

RATING CRITERIA: (0) unable to maintain - (4) difficult to maintain - (5) programmed to maintain

		Rating	Explanation
Reach 1	Option A Open Channel	3	An open channel is more difficult to maintain than a detention pond and even more difficult than a storm pipe system. WMD Ops is fully programmed to maintain pipes.
	Option B WCPM Pipe & CDOT Pipe System	5	WMD Ops is fully programmed to maintain pipes.
Reach 2	Option A Open Channel	3	An open channel is more difficult to maintain than a detention pond and even more difficult than a storm pipe system. WMD Ops is fully programmed to maintain pipes.
	Option B Interim 40th Detention	4	WMD Ops is currently equipped to maintain detention ponds.
	Option C CDOT Pipe System	5	CDOT will be maintaining this pipe system.
Reach 3	Option A Green Street w/ CCD Pipe	2	WMD Ops is fully programmed to maintain pipes, however they are not equipped to maintain the water quality BMP's that may go along with a new green street concept.
	Option B Open Channel	3	An open channel is more difficult to maintain than a detention pond and even more difficult than a storm pipe system. WMD Ops is fully programmed to maintain pipes.
	Option C CDOT Pipe System	5	CDOT will be maintaining this pipe system.
Reach 4	Option A Green Street w/ CCD Pipe1	2	WMD Ops is fully programmed to maintain pipes, however they are not equipped to maintain the water quality BMP's that may go along with a new green street concept.
	Option B CDOT Pipe System	5	CDOT will be maintaining this pipe system.

Montclair Creek Drainage

APPENDIX D

SUPPLEMENTAL DETAIL FOR GOALS & RISKS BY DEPARTMENT



Montclair Creek Drainage

APPENDIX D

SUPPLEMENTAL DETAIL FOR GOALS & RISKS BY DEPARTMENT



SUPPLEMENTAL DETAIL FOR GOALS & RISKS BY DEPARTMENT

The following subsections describe the planning principles, goals, and risks that were used to evaluate the Montclair Creek drainage alternative options. The subsections are organized by each partnering department or agency that took the lead on the investigation of the goal or risk to clearly identify our resource for the evaluation.

WASTEWATER CAPITAL PROJECTS MANAGEMENT -

SELENA KLOSOWSKI & JASON RENNEKER, AND DAVID SHAW

TECHNICAL FEASIBILITY- GOAL

All of the options for Reach 1, 2, 3, and 4 have had some level of pre-concept technical feasibility analysis to confirm their ability to be implemented.

The rating assigned for this goal is based on the technical team's certainty of the pre-concept technical feasibility analysis. The feasibility analysis did not consider the resources it would take to implement these options. The analysis was purely based on if there could be a defined engineered solution to execute these options. Once a selected project is defined, further in-depth investigation and analysis will need to be performed in order to understand the resources needed in order to successfully implement the selected project/s.

The City and County of Denver on-call consultant, Enginuity was utilized as a technical advisor to perform rough pre-concept level analysis for some of the options. The following summarizes their findings.

REACH 2 OPTION 2-INTERIM 40TH DETENTION POND

An Urban Drainage Storm Water Management Model (UD SWMM) model was run to determine the required size of the 100-year detention pond. The model indicated that a 600-Ac-ft pond would sufficiently detain the 100-year storm event so that just the existing 120-inch storm sewer system in 40th Avenue could be utilized as the outfall. If WCPM were to complete High Street Outfall Phase II, then the detention pond can be reduced to 400 Ac-ft. Since this pond would be temporary, the pond would be sized for detention only.

The technical team also looked at the impact of possible improvements to Ferril Lake at City Park in order to reduce the size required of the Interim 40th Detention Pond. Based on UD SWMM results, the detention pond could be reduced by roughly by a 1:1 ratio to the additional detention gained at Ferril Lake. So, if you add 50 ac-ft at Ferril, you need about 50 less ac-ft at the Interim 40th Detention Pond.

Wastewater Capital Projects Management has explored the concept of the 40th Detention Pond to remain a permanent feature with added formal recreational elements, such as soccer fields. After discussions with Parks & Recreation - Planning, it was determined that open space is better determined through traditional master plan study that looks into surrounding land use, gains stakeholder support from city council, the public and business owners. If we were to try to wedge a formal open space into the 40th Detention Pond, we would need to acquire more land, and we would need to provide more than 400-Ac-ft of storage to accommodate for trails, berms, and water quality volume. Rather than letting the hydrology dictate the location of formal open space, it would be better to study the area through UDFCD's Montclair Outfall Study Plan to determine opportunities for combined drainage/open space areas that were more appropriate. UDFCD's Montclair OSP would begin in the summer of 2014 and should be concluded by the end of 2014.

The OSP would follow UDFCD typical protocol to assess appropriate land use for combining detention with recreation, and go through a public process to gain stakeholder support.

MULTI AGENCY TECHNICAL TEAM

The Multi Agency Technical Team (MATT) began in fall of 2013, and their collaborative work has concluded that the Montclair Basin design flow rates should be about 5000 cfs at the downstream most point of a 100-year storm event system that would protect the I-70 Partially Covered Lowering (PCL) project as shown on Exhibit 1. This has drastically lowered from the Master Plan level flow rates previously published as 7000 cfs.

The Multi Agency Technical Team (MATT) was chartered after preliminary drainage design was completed by CDOT and RTD for their I-70 Partially Covered Lowering and RTD Fastrack projects, respectively. These projects are located within the Montclair Basin, and there was a general presumption that the previously published master plan flow rates could potentially be overly conservative from a design stand point. The MATT scope of work was to perform a technical review of the previous Montclair basin hydrologic analysis and modify the modeling, if necessary, in order to provide C-DOT with a mutually agreed upon off-site 100-year design flow rate for the I-70 PCL project.

The MATT was comprised of the following agencies:

- Urban Drainage and Flood Control District (UDFCD)
- Colorado Department of Transportation (CDOT)
- City and County of Denver (CCD)
- Regional Transportation District (RTD)

INADVERTANT DETENTION

Through the MATT modeling analysis, it was determined that there are inadvertent detention areas within the Montclair Basin that reduced the 100-year basin flow rate. These inadvertent detention areas were located within Parks & Recreation managed properties. Through a Memorandum of Understanding between Public Works and Parks & Recreation 36 Ac-ft of storage is formally reserved as detention at Duck Pond in City Park, and 41.8 Ac-ft of storage is formally reserved as detention in a sump area in the City Park Golf Course. This totals to 77.8 Ac-ft of additional detention we can account for when modeling storm events for the Montclair Basin.

MEETS DRAINAGE CRITERIA - GOAL

The Montclair Creek Drainage projects meets criteria established in the June 2010 Storm Drainage Master Plan, the Urban Drainage & Flood Control District Drainage Criteria Manual, and the City & County of Denver Drainage Criteria manual:

- Maximize level of public safety and property protection
- Maximize opportunities for water quality enhancement
- Support and be compatible with current capital improvement program for drainage and other Public Works programs.

There are two projects identified in the Storm Drainage Master Plan, National Western Complex project & 40th Outfall that could partially be fulfilled by implementing Reach1 of Montclair Creek. These projects are located in the following the I-70 & York (0060-02) basin and the Montclair basin (4500-01)

- Encourage and enable development participation
- Provide flexibility in phasing
- Provide multi-means and multi-use facilities to the maximum extent possible, and

The Montclair Creek Drainage projects successfully meets the criteria to define it as a Capital Improvement Project as defined in the April 15, 2013 *Public Works Catalysts for Capital Project-Prioritization Process for 2014-2019 Capital Improvement Program (CIP)*.

FLOOD CONTROL BENEFIT AREA - GOAL

With the support from our technical team, we determined that the Montclair Creek improvements would offer 100-year storm protection for and additional 107 Acres of the Globeville & Elyria Swansea neighborhood. The CDOT I-70 PCL project would offer flood protection for probably more than a 100-year storm event for about 193 Acres north of I-70's proposed PCL project. In total CCD and CDOT would offer at least the 100-year storm event protection for up to 400 Acres of the Globeville & Elyria Swansea neighborhood, which does includes a portion of the North Denver Cornerstone Collaborative area and all of the National Western Complex Master Plan study area.

DESIGN CONFLICTS - RISK

The rating shown in the evaluation matrix for each of the options for Reach 1, 2, 3, & 4 were based on potential utilities that could be a resolvable conflict for design.

CONSTRUCTABILITY – RISK

LIST OF ASSUMPTIONS:

1. All land has been acquired
2. All agreements are signed and finalized
3. All contracts are in place
4. All designs are complete and feasible

RISKS FOR ALL OPTIONS FOR ALL REACHES

- There are unknown materials that will need to be managed during construction of the project. These are typically directly tied to the environmental risks which are detailed in Section 2.7.
- With the large scale of excavation for this project there is a greater risk of encountering an obstruction such as, but not limited to, buried trolley tracks, partially buried buildings, and graves.

REACH 1

Reach 1 Extends from the South Platte River east to the southeastern edge of the Coliseum parking lot.

Reach 1 Option 1 Open Channel-Rating 2

- There are potential operational needs of the Denver Coliseum that will need to be addressed by phasing the construction, or providing a temporary parking solution.

Reach 1 Option 2 WCPM Pipe: High Street Outfall Phase II & separate CDOT pipe -Rating 3

- WCPM High Street Outfall Phase II storm pipe outfall has had many years of investigation along its specific alignment. Due to the environmental risks of constructing in a landfill area, the project constructability was rated a 3.

REACH 2

Reach 2 extends from the southeastern edge of the Coliseum parking lot east to Franklin Street.

Reach 2 Option 1 Open Channel-Rating 1

- The construction of this option would require the City and County of Denver to work within a Union Pacific Rail Road (UPRR) property. This is the primary reason why this option received a rating of 1. There are difficulties in constructing within railroad properties such as needing to accommodate for railroad traffic, which slows down construction.

Reach 2, Option 2, Interim 40th Detention-Rating 4

- There will be demolition of buildings required to construct the interim detention pond
- Detention Ponds are, in comparison to an open channel, are less site restrictive and are usually less difficult to construct. Therefore this option was rated a 4.

REACH 3

Reach 3 extends from York street east along 39th Avenue to Steele Street.

Reach 3, Option 1, Green Street with Pipe-Rating 3

- This was rated a 3 because of the desired roadway improvements, and the linear water quality element that is a part of this option.

Reach 3, Option 2, Open Channel-Rating 4

- This was rated a 4 because relative to a pipe with a linear water quality, and 75-foot wide channel is less difficult to construct.

REACH 4

Reach 4, Option 1, Green Street with Pipe-Rating 3

- This was rated a 3 because of the desired roadway improvements, and the linear water quality element that is a part of this option.

WATER QUALITY- GOAL

Green infrastructure on a large-scale refers to a network of open spaces, wetlands, floodplains, and greenways that provide a number of environmental, economic, and social benefits. The Montclair Creek Drainage Project and open channel concept provides an opportunity to use green infrastructure as a sustainable solution for a number of challenges that exist in the Montclair basin.

The more obvious benefits of the open channel include managing the quantity and quality of storm water runoff. As witnessed in the September 2013 floods, natural conveyance systems (green infrastructure) handle flood waters much more efficiently than pipes and culverts, thereby reducing threats to life and property damage. The open channel and associated water quality facilities will increase water quality treatment in a basin where less than 7% of runoff is treated prior to entering the South Platte River.

The open channel concept will embody a number of new water quality goals and initiatives including the use of more innovative and adaptive stormwater management techniques, as well as minimizing the need for new piped outfalls to the river.

But the benefits of green infrastructure and the open channel concept go far beyond those associated with just managing stormwater and include:

- Beautification of a community that is industrial in nature
- Creating multi-modal options by adding bike & pedestrian trails close to a transit station
- Improving public health
- Increasing resiliency to climate change
- Improving air quality and reducing the urban heat island effect
- Connecting people to natural processes
- Leveraging limited capital dollars through a public-private partnership

PARKS & RECREATION- DAVID MARQUARDT

A holistic and above-ground approach to flood control can integrate elements such as trail connectivity, access nodes to places of interest like the S. Platte River, water quality, wildlife habitat, vegetation communities, and any logical and compatible recreation opportunities. The open channel could collectively address goals identified in the CCD Storm Drainage Master Plan, Water Quality Management Plans, and UDFCD Rehabilitation Plans. These goals are for the open channel to be:

- Aesthetically Pleasing
- Recreation Amenity
- Ecologically Promoting

AESTHETICALLLY PLEASING- GOAL

Some of the following is directly quoted from CCD's guide for Aesthetically Enhanced Detention and Water Quality Ponds.

“Aesthetically enhanced storm drainage facilities add to property value and their positive visual appearance improves the quality of life in our community. People are drawn to water and the natural environment.

Instead of focusing on the minimum technical design criteria for meeting these requirements, [the City and County of Denver] encourages the opportunity to create [water features] that will help create more livable, sustainable, and valuable developments. These enhanced facilities will offer residents opportunities to observe nature, engage in recreation, or simply enjoy the view.”

RECREATIONAL AMENITY GOAL

The channel may have design features that provide recreational amenities, which can unify neighborhood design and any portions of a park and trail system.

Park and open space can be considered as a part of any open channel, but may not work if land configurations are long and narrow, or tucked behind buildings and other obscure areas where visibility is low and crime potential is high. Careful consideration to available acreage, space configurations, and access are critical components to consider when looking at integrating open space into any open-channel alternatives.

ECOLOGICALLY PROMOTING GOAL

A riparian vegetation buffer adjacent to the low-flow channel will enhance water quality and existing wildlife habitat. These improvements would promote ecology to improve the overall health of the stream.

Parks & Recreation is partnering with UDFCD to manage vegetation for the creation of Healthy Riparian and Stream Based Systems, such as Goldsmith Gulch. UDFCD has shared the following with local communities and city council members across the City and County of Denver:

What makes a Healthy Ecosystem?:

- Native grasses, shrubs, and trees
- Dense ground cover with limited exposed soil
- Minimal weeds
- Variety of vegetation species
- Absence of Trash

Why Are Healthy Riparian and Stream Ecosystems Important to Our Community?

- Improve water quality by filtering out pollutants like road oils and fertilizers
- Reduce soil erosion and damage to our bridges, properties, and parks during rain storms
- Protect wildlife habitat and wildlife movement corridors linking other habitats
- Enhance our recreation and outdoor experiences along multifunction trail corridors
- Provide us with educational opportunities

COMMUNITY PLANNING & DEVELOPMENT- TIM WATKINS

Community Planning & Development actively participated in the coordinated work effort. See Exhibit D-1 and D-2 for reference to land use, access and mobility as they relate to the options for the Montclair Creek Drainage projects.

CPD COMPREHENSIVE PLANS-GOAL

The following community benefits may be achieved by implementing the Montclair Creek drainage projects:

40TH & COLORADO STATION AREA

- Improved East/West connectivity at 41st and 42nd Ave over the Market Lead channel for all modes of transportation
 - Would provide better access to the 40th station area for existing residential area to the west
- Improved North/South connectivity along the Monroe Street alignment
- Up to 5.5 acres of new land for transit oriented redevelopment, green infrastructure, and park amenity site(s).

STEELE / VASQUEZ INTERCHANGE

- Reduction of I-70 PCL trap channels near the Steele / Vasquez Interchange would allow for more infill development and potentially bring more services to the Swansea neighborhood.

EMPLOYMENT / LIGHT INDUSTRIAL CORRIDOR BETWEEN STEELE AND YORK / FRANKLIN

- An open channel coupled with a pathway and a new street along 39th Ave would improve access to existing commercial properties, Denver Human Services and Bruce Randolph School. This new street access and visibility from the public realm could encourage business growth and greatly improve economic vitality and competitiveness of existing businesses.
- A new street along 39th Ave would parallel 40th avenue and help to disperse traffic and reduce the growing demand on 40th Ave. This indirectly supports TOD development at 40th & Colorado by keeping the volumes on 40th avenue at manageable levels to for a pedestrian-friendly environment.

MONTCLAIR CREEK REACH 2 (OPTION 1)

- An open channel through Brighton Boulevard would create redevelopment / land conversion opportunities from current industrial uses to mixed used development, and encourage investment in reconstructing Brighton Boulevard as a new gateway corridor to Denver.
- Although some industrial jobs and tax revenues would be lost by converting employment / industrial land to mixed use development, opportunities for relocating these businesses in Denver could be explored.

MONTCLAIR CREEK REACH 1 (OPTION 1)

An open channel along the edge of the Coliseum site could serve as an amenity for the development. New buildings could cantilever over the channel with windows, patios and secondary entrances oriented to a green space amenity.

REGIONAL WQ/DETENTION BETWEEN FRANKLIN AND YORK (REACH 2 OPTION 4)

If the open channel is not feasible through the UP tracks and Brighton Boulevard, a detention basin along 40th Avenue between Franklin and York could also reserve some area for redevelopment within walking distance of the 38th and Blake station area. The section fronting York could be reserved for replacement of Coca Cola parking and

loading, with some limited commercial services at the corners of 39th and 40th Avenues. A new 39th street connection could also be introduced between York and Franklin to improve area connectivity and reduce traffic volumes on York Street and 40th Streets.

The large detention area would separate existing heavy industrial uses to the north from residential uses to the south.

Pedestrian Connectivity (Option 1 for Reach 1 & 2)

An open channel with a pathway could attract more cycling for recreation and commuting, and walking / jogging. However, long tunnel conditions under wide streets (such as Brighton) or rail corridors must be well lit and ideally be surrounded by active uses for more frequent use and perceived safety by cyclists and pedestrians. Tunnels tend to be avoided by pedestrians and cyclists for real or perceived safety concerns, especially in evening / darker daylight hours.

PW POLICY, PLANNING & SUSTAINIBLITY- EMILY SILVERMAN AND EMILY SNYDER

MOBILITY - GOAL

The following mobility benefits may be achieved by implementing the Montclair Creek drainage projects:

IMPROVED 39TH STREET (SOME OPTIONS OF REACH 2 AND 3)

- A new 39th Street with vehicular access would more options for through and local traffic. This could function as a collector street, compared to the arterial of 40th Avenue.
- Denver Moves identifies 39th Ave for bicycle lanes and an off-street path along the Market Lead section for an calls for 39th Avenue to have on-street bicycle lanes. A new through-way with a bicycle facility that prioritizes bicycles, such as a multi-use path or bicycle lanes, could give bicyclists a more-protected option in addition to 40th Avenue.
- New businesses might come in with a new street, linking land use and transportation.
- On-street sidewalks, combined with a multi-use path adjacent to the street, would give pedestrians many options on how to experience this new area, providing safe and comfortable spaces to walk.
- Additional north-south connections to the potential 39th street, such as Clayton, could be further examined to further increase mobility and access in the neighborhood.

40TH AND COLORADO STATION AREA (REACH 4)

Reestablishing the grid streets would more allow for the construction of more local streets, which improve the access and the mobility for the neighborhood and relieve pressure on 40th Avenue. The following grid streets could be connected:

- Monroe Street between 39th Avenue and 41st Avenue
- 41st Avenue between Madison Street and Monroe Street
- 42nd Avenue between Madison Street and Monroe Street

Lowering 40th would help with connectivity and open up possibilities for Monroe

- There may be an opportunity to lower the profile of 40th over the Market Lead now that trains are no longer operating on the tracks, improving the offset in grade between the roadway and adjacent properties. As part of the lower profile, a box culvert of similar magnitude as the new box under the UPRR mainline may be able to be constructed instead of a bridge at 40th Avenue

Opportunities to improve bicycle and pedestrian connectivity

- Any opportunities to connect the grid benefit bicyclists and pedestrians by giving more options on how to access the station and neighborhoods.
 - ▶ In the station area, there could be on-street bike lanes along 39th Avenue, 40th Avenue, Jackson Street and/or Monroe Street. Jackson Street is already identified as a route for north/south bike lanes because the existing signal at 40th Avenue/Jackson Street will facilitate bike crossing movements. Design of a new Monroe Street route should incorporate a bicycle boulevard facility to provide another alternative to access the station from 39th Street. This should include an enhanced, at-grade intersection crossing of 40th Avenue.

DEPARTMENT OF ENVIRONMENTAL HEALTH- DAVID ERICKSON

The Department of Environmental Health (DEH) is currently negotiating with the Environmental Protection Agency (EPA) and Colorado Department of Public Health & Environment (CDPHE) to obtain a Removal Action that would allow for remediation along the channel alignment through the Denver Coliseum parking lot. This will allow DEH to access the Hazardous Substance Response Fund (HSRF) for reimbursement of clean-up costs. This resource is available to us only if we change the existing commercial/industrial land use of the capped parking lot. The open channel design would be considered recreational, and associated remedial costs would be eligible for reimbursement.

Potential Design Elements to Consider:

- Offline water quality ponds would greatly enhance Water Quality objectives and add to already high ecology attributes of open channel.
- Research the possibility of tying into the River Vision Plans for Globeville Landing
- Consider how the 40th- Franklin, and 40th-York detention ponds could be utilized as wetlands for additional Water Quality and Ecological functional improvements.
- Minimize mosquito habitat by limiting storage to less than 7 days, incorporating design elements that allow for easy annual removal of above ground vegetation, and maximize water movement without a significant reduction in water quality treatment.

ENVIRONMENTAL MITIGATION - RISK

REACH 1: OPTION - OPEN CHANNEL AND OPTION 2-WCPM PIPE AND CDOT PIPE SYSTEM

Description: Reach 1 extends from the South Platte River east to the southeastern edge of The Denver Coliseum property line.

Rating - 4: Environmental concerns within Reach 1 are well characterized therefore the environmental mitigation was rated 4 as a known risk.

Environmental concerns within Reach 1 include:

- Landfill Debris
- Asbestos Containing Materials (ACMs)
- Heavy Metals in Soil
- Low concentrations of Chlorinated Solvents in Groundwater.

REACH 2, OPTION 1-OPEN CHANNEL, OPTION 2- CCD PIPE AND OPTION 4-INTERIM 40TH DETENTION

Description: Reach 2 extends from the southeastern edge of The Denver Coliseum parking lot east to Franklin Street.

Rating - 2: Only limited environmental information is available along portions of Reach 2, therefore we assigned a 2 rating for environmental mitigations to indicate a heightened risk.

Based on known land uses and available information environmental concerns can be surmised as follows:

- Soil containing elevated concentrations of petroleum hydrocarbons, polynuclear aromatic hydrocarbons (PAHs) and metals in soil likely will be encountered where historical and current railroad operations have impacted soil.
- From Franklin Street east to York Street environmental concerns would likely include buried building debris, ACMs and possible and isolated areas of petroleum hydrocarbons.
- The source of the petroleum hydrocarbons is the historical presence of leaking underground storage tanks (LUSTs) near East 40th Avenue.

REACH 3: OPTION 1-GREET STREET W/ CCD PIPE AND OPTIONS 2-OPEN CHANNEL

Description: Reach 3 extends from York street east along 39th Avenue to Steele Street.

Rating - 3: The nature and extent of contamination along Reach 3 is not well known therefore assigned a 3 rating for environmental mitigations indicating slightly heightened risk.

The limited environmental data available for Reach 3 include:

- From York Street east to Steele Street environmental concerns would likely include buried refuse, building debris, ACMs and possible and isolated areas of petroleum hydrocarbons.
- Buried refuse may exist in a former fill area located near the intersection of East 39th Ave and York Street.
- The source of the petroleum hydrocarbons is the historical presence of leaking underground storage tanks (LUSTs) near East 39th Avenue.

REACH 4: OPTION 1- GREEN STREET WITH CCD PIPE.

Description: Reach 4 extends east from Steele Street along 39th Avenue before turning north at Monroe Street.

Mitigation Rating – 4: It is expected that soil contamination will be encountered less frequently in this reach than in other reaches; and therefore was assigned a relatively high rating of 4.

Much of Reach 4 consists of former railroad right of way and environmental concerns include:

- Soil containing buried refuse may be encountered near the intersection of East 39th Avenue and Monroe Street. A former fill area exists near this intersection and would be the source of the buried refuse.
- Elevated concentrations of PAHs and metals may exist in soil as a result of the former use of the reach as an active rail line.

CCD LIABILITY - RISK

CONTRACTUAL OBLIGATION - CDOT

To the extent that the City is performing work in furtherance of CDOT's I-70 project, the City will likely have contractual responsibilities to ensure that the work is designed and performed to meet CDOT's needs, specifications and timeliness requirements.

OWNERSHIP RISK – ENVIRONMENTAL –

If the City acquires land for the drainage project that happens to be impacted by environmental conditions, the City could potentially acquire responsibility, and liability, for managing and/or remediating the environmental conditions. Depending on the nature, extent, and severity of the environmental conditions, the City could take certain steps to mitigate the risk, such as performing Phase I site investigations and, as warranted, Phase II investigations.

MATERIALS MANAGEMENT –

If the City encounters environmentally-impacted material in constructing the drainage projects, such material will have to be managed and disposed of in accordance with state and federal laws, which can add cost and complexity to the project, depending on the nature and extent of the contamination.

MAINTENANCE & OPERATIONS - RISK

After coordination with the Wastewater Maintenance and Operations it was concluded that all of the options were feasible to maintain. Currently the Wastewater Maintenance and Operations is programmed to maintain a large spectrum of storm pipe related infrastructure.

With the recent shift to restore waterways which has been led by the water resources and environmental community, it may be appropriate for the City and County of Denver to begin to think about adding a multi-agency channel and stream maintenance program.

The Montclair Creel Drainage project provides a number of core benefits to residents and businesses in the impact area, including increased environmental protection (from storm impacts and other conditions), improved transportation access, community amenities (such as potential recreation and park improvements), and removal of cost factors and risks (insurance, repair and business disruption). These benefits will be secured by stakeholders and residents in the immediate and surrounding areas, no matter which approach is used to address long-term storm water issues.

This section addresses the more direct potential economic benefits and risks associated with this project; specifically, the impacts on operating businesses and existing owned and rental housing and opportunity for increased investment and redevelopment in this area (Denver neighborhoods including Globeville, Elyria Swansea, Cole and Clayton).

ECONOMIC BENEFITS-GOAL

This area has experienced decades of disinvestment, and currently has a high level of concentrated poverty (estimated to be about 35%) and a high rate of unemployment about 15%. On most family and economic indicators these neighborhoods are some of the most distressed in the City and County of Denver. (Note the other two high parts of the city are Sun Valley and the immediate areas to the west and south and west-central neighborhoods of the city.)

A recent visit in the project area revealed both deteriorating infrastructure and deferred private and public maintenance. At the same time, this immediate area is at the heart of several of the largest and most significant public infrastructure improvements investments (RTD's FasTracks east line and the I70 east improvements).

Just to the southwest of this area, one of Denver's strongest redevelopment areas (Brighton Blvd and River North) has experienced doubling and tripling of property values, well over \$200 million of near term private development investments, and new public infrastructure investments. To the east of the impact area, new development is underway and planned to occur in the near future. In short, this area has potential to be a focus of private investment for redevelopment and new construction in the intermediate future (10-15 years).

Due to the property ownership patterns in the area, the redevelopment will occur in a pattern similar to Brighton Blvd. and River North – with some property consolidation and existing assembly and production facilities redeveloped to mixed use. Already in the area, a couple of former industrial properties have been rehabbed to residential or work lofts.

Two key economic anchors in the area are PepsiCo and Coca-cola bottling operations. Together they employ over 1,000 persons – and serve as major sources for B2B business activity and opportunities, as well as businesses serving these employees. On the north side of the impact area, GenTech and AT&T are other major businesses in the area. GenTech is a home-grown international business, which remains on a fast growth pace – and an important part of the city's global economic focus.

In summary, the project impact area has several strong businesses providing thousands of job opportunities for Denver and area residents, contributing to the city's economic and fiscal well being through significant tax payments and social and community contributions. The housing stock reflects the resident families' resources and earnings, and will likely experience redevelopment pressure in the coming decade. The potential for redevelopment and investment is quite high, with some building adaptive reuse and in most cases, demolition and new construction. And potential tax revenue loss (e.g. Real Property, BPPT, Sales/Use Tax) from relocation of some businesses from

this area will be easily offset from the increased values and density resulting in new commercial development and businesses.

OED is committed to working closely with various businesses to minimize any potential project impacts while supporting the Montclair Creek Drainage project as it will further the opportunities for an environment to encourage business, development, and residential investment. Further, from this analysis, OED recognizes two real distinct opportunities areas for commercial and commercial/residential development. OED is committed to working with Public Works, Finance, and our other City partners on the opportunities within this area.

The following provides a Reach by Reach analysis, for market potential and opportunities.

REACH 1 (PLATTE RIVER TO NWSS EAST PARKING LOT LINE):

- No relocation issues, as this is an open parking lot.
- Redevelopment opportunities exist, and are tied to the NWSS area planning process.
 - Business development opportunities, primarily due to the visibility of the site from I-70 (east lanes) and reasonable access to I-70 (full cycle stoplight access to both Brighton and 38th). Would expect technical office, R&D, fabrication, and other similar businesses.
 - Residential development opportunity exists, through likely affordable and/or workforce-priced housing. River and park adjacent, but on the back side of the Pepsi Bottling plant – also a non-direct six block walk to transit.

REACH 2 (NWSS LOT TO YORK/39TH):

- Significant potential relocation issues, both business and housing (often low/moderate income households)
 - Key is to alignment and project design. Open Channel may be workable under Pepsi parking and truck distribution areas, rail mainline, and either south side of 40th or north side of 39th (or an alignment evolving from the north to the south in the block length from Franklin to York).
 - OED is working on a significant potential redevelopment – just to the southwest of this area.
 - Most of the businesses are likely to be relocated, either due to this project or in the next decade due to likely increasing value and redevelopment pressures. The difficulty in this relocation is many of the businesses either own the property (at a low basis cost) or are paying low lease rates.
- Redevelopment opportunities are very high in this area (east of the railroad mainline) – likely 5-10 years
 - Existing redevelopment interest and plans have just reached this area.
 - At the same, several successful businesses have already established themselves in this area (and invested in their buildings).
 - Expected business development would be concentrated in light assembly, R&D, clean production, and either back office or entrepreneurial firms.
 - Multi-family residential, ranging from row houses to multi-story buildings, is very likely in this area due to the close proximity to the 38th (east line) Station and lower land prices.

REACH 3 (YORK TO STEELE ALONG 39TH):

- No anticipated relocation issues for either approach (open channel or pipe), if the Market Lead ROW is obtained.
- The redevelopment potential is strong on the south side and mixed on the north side of the ROW. However, the market for redevelopment is low in the short/mid term in this area – needing the investment to come either the 8-10 blocks from either the west (more likely) or the east.
 - OED formerly had property interests on the south side facility. None of the four major owners would likely be the redevelopment agent in this property, but each recognizes the longer term

value of the property is through redevelopment. Thus businesses in these buildings will remain 2-5 year lease tenants. Anticipated redevelopment 10-15 years or more.

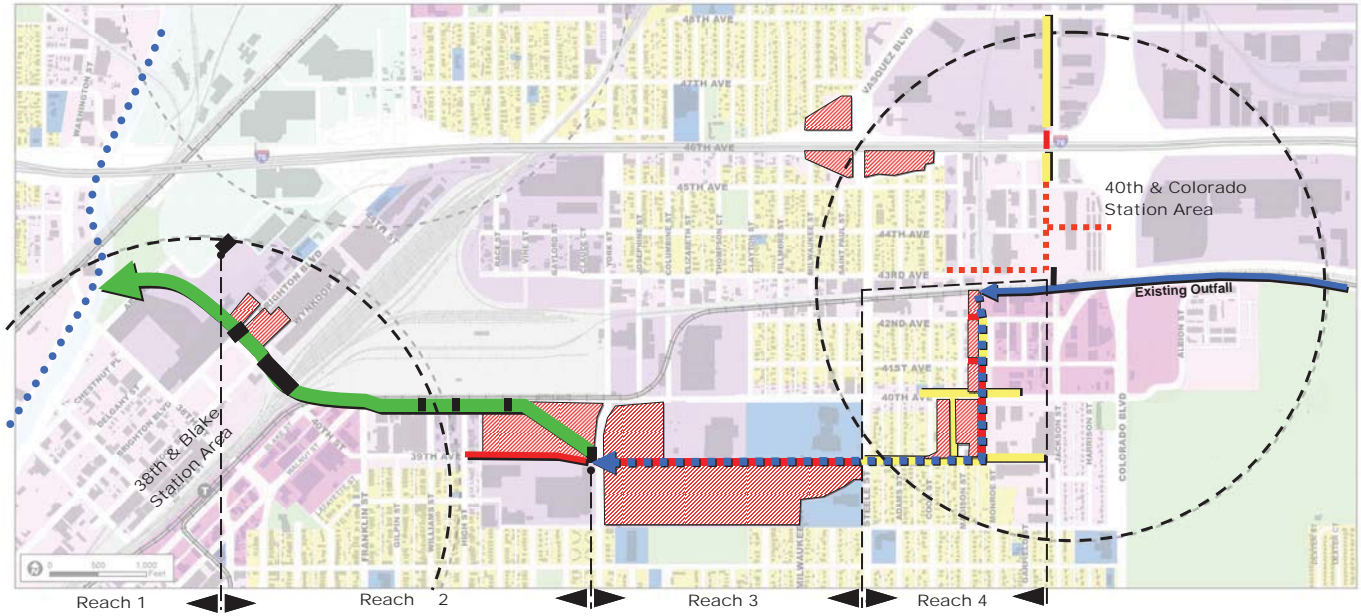
- North side redevelopment is mixed due to the school dominating the property in the area and the existing successful businesses located here. Likely one or two properties could be redeveloped in the next 5-10 years, but likely of a similar level of use and density of surrounding successful businesses.

REACH 4 (STEELE TO MONROE AND MONROE NORTH):

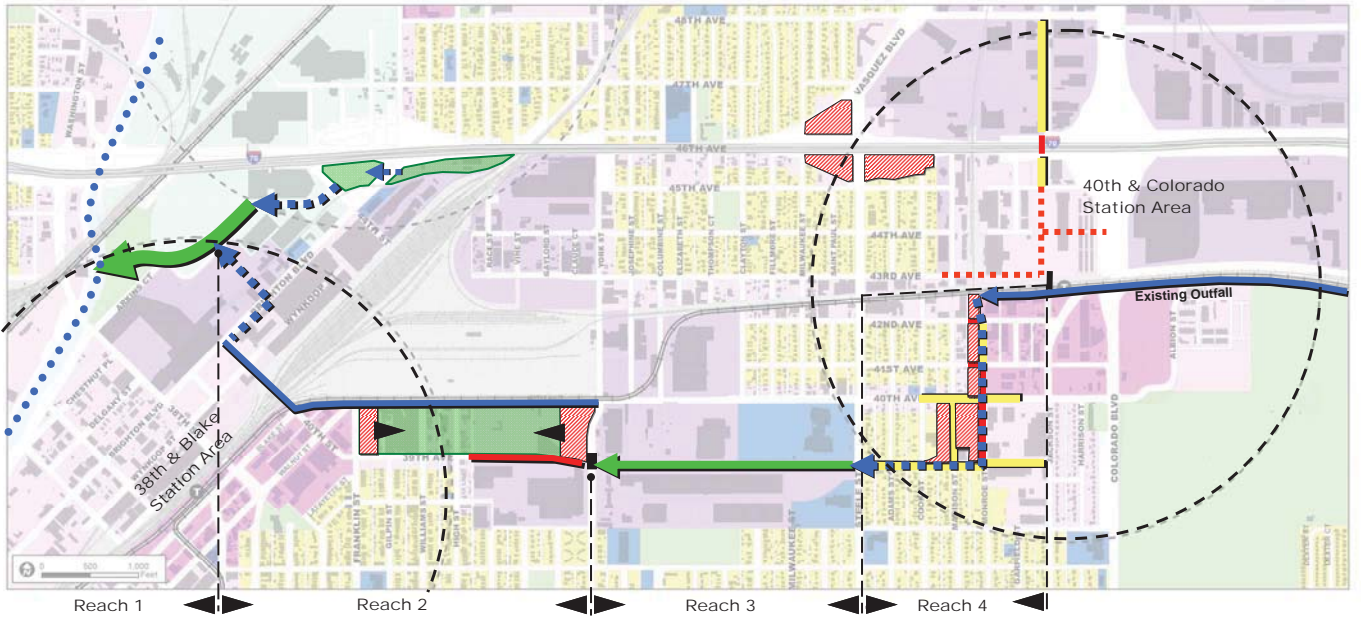
- Limited anticipated relocation issues for either approach (open channel or pipe), if the Market Lead ROW is obtained. Given the conditions and uses, the property values would be reasonable.
 - A couple of businesses may be impacted, either due to building, parking lot or staging areas property loss.
 - Approach (pipe or open channel) may impact the level of relocation and ROW takes required.
- The redevelopment potential is strong along in this area, through primarily along the Monroe ROW with the Market Lead.
 - Area is a low/moderate income residential neighborhood, made up of primarily single family homes. Limited opportunities for MF residential – due to existing conditions, restrictions on potential properties, existing (historic) environmental issues, and current and future housing (affordable and market-rate) projects and opportunities two blocks east on Colorado Blvd (south of Smith Road).
 - Open Channel approach may not be a selling point in this area, due to the long-lasting “open trench” of the Market Lead.
 - Best opportunity for redevelopment and increased investment is through improvements in the commercial buildings through new and expanded businesses and through new commercial development.
 - Due to the proximity of I-70, exiting education resources, limited supply for light assembly and logics properties and buildings - and recognizing both the high rate of unemployment and high level of poverty of the existing residents – this area presents a real opportunity to develop an urban in-fill commercial area focused on middle-skill, middle wage job opportunities.

EXHIBIT D-1
Scenario 1 & 2 with CPD Land Use

Scenario 1.



Scenario 2.



- | | | | |
|--|--------------------------|--|---|
| | Existing Drainage Pipes | | Potential Redevelopment Areas |
| | Proposed Drainage Pipes | | Current / Future Employment Areas |
| | Proposed Open Channel | | Future Transit Oriented Development Areas |
| | Street Reconstruction | | Future Mixed Use Areas |
| | New Street Construction | | Residential Areas |
| | New Bridges | | Public Uses |
| | Proposed Detention Areas | | |

Montclair Creek Drainage

APPENDIX E

OFFICE OF SUSTAINABILITY STATEMENT OF OPINION



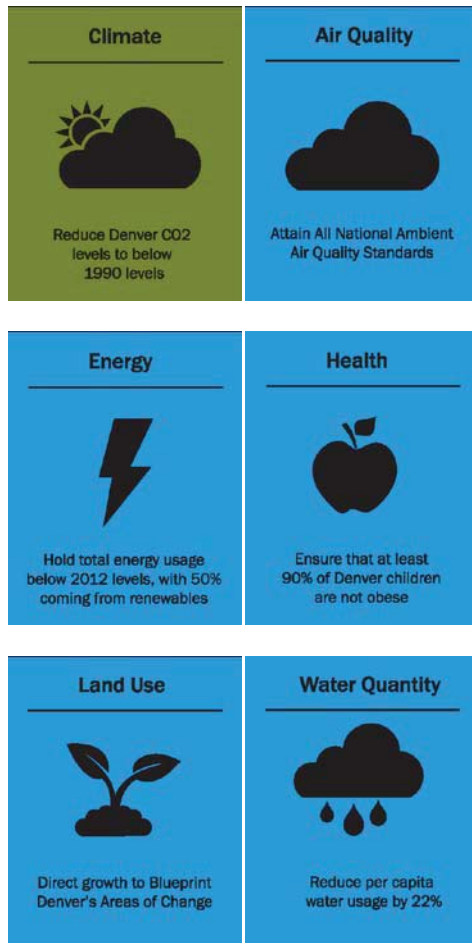
OFFICE OF SUSTAINABILITY

Coordination with the Office of Sustainability has indicated that there are some overlaps between their 2020 Sustainability Goals, and the goals that are listed in the evaluation matrix. These overlapping goals are discussed below.

2020 SUSTAINABILITY - GOAL

In Executive Order 123, Mayor Michael B. Hancock directed the (Mayor's) Office of Sustainability to establish sustainability goals for the city. After robust outreach efforts to residents, business leaders, nonprofits, and city agencies, the Office developed 2020 Sustainability Goals that provide a roadmap to secure our basic resources for the long term.

The 2020 Sustainability Goals focus on 12 resource areas and set goals for the City and County of Denver as well as the community at-large. The Montclair Creek Open Channel project would promote a number of these goals, including: air quality, climate, energy, health, land use, and water quality. A piped system would not contribute to help accomplish any of the goals.



Air Quality, Climate, Energy

As shown on Exhibit 2 in Appendix "A", the Montclair Creek drainage project includes connectivity improvements that support mobility options other than vehicular, particularly biking and walking. Reductions in vehicle use have a corresponding decrease in energy consumption and greenhouse gas emissions while improving air quality.

Health

By creating roadway and pedestrian connections for E. 39th Avenue adjacent to the Bruce Randolph School, we are providing an opportunity for children to walk or bike to school.

Land Use

As shown on Exhibit 2 in Appendix "A", the Montclair Creek drainage project includes connectivity improvements that would improve direct growth to Blueprint Denver's Areas of Change.

Water Quality

The Montclair Creek Open Channel will improve the water quality of the storm water that is contributing to the South Platte River. The City's vision is that all creeks and rivers will be swimmable and fishable.

In addition to contributing to the 2020 Sustainability Goals, the Montclair Creek Open Channel project is consistent with Executive Order 123, Chapter 7 – Water Quality, which states:

7.1 An integrated approach to stormwater management is critical in improving overall water quality. Such an approach entails the following:

7.1.1 Planning, design and construction of strategic water quality systems will provide flexible, innovative and adaptable pollutant removal to the maximum extent practicable for site specific and regional conditions.

7.1.2 Storm water quality facilities will be attractive and functional, support public safety, environmental health, and serve as a public amenity.

It is the opinion of the Office of Sustainability that the Montclair Creek Open Channel project contributes to this directive by removing pollutants from runoff, and could provide an attractive amenity while supporting public safety and providing an ecological resource. If coupled with a trail, the Montclair Creek Open Channel could also be a public asset, increasing multi-modal (pedestrian and bicycle) connectivity through the city.

The project would also provide other sustainability benefits not captured within the goals, but that are consistent with sustainable development principles and well outlined in the sections that follow by other agencies.

Montclair Creek Drainage

APPENDIX F

COMMENT LETTERS FOR MONTCLAIR CREEK DRAINAGE



May 28, 2014

Selena Klosowski
Wastewater Capital Projects Management
2000 W. 3rd Ave.
Denver, CO 80223

Re: Montclair Channel Feasibility ERA Comments

Dear Selena:

The Engineering, Regulatory & Analytics (ERA) team has reviewed your May 22nd, 2014, draft feasibility study for the Montclair Channel project, located east of the South Platte River generally along 40th Avenue. General team comments are as follows:

1. We are in favor of an open channel wherever feasible.
2. The alignment at the South Platte River (SPR) confluence should be between 90 degrees and tangential with the SPR flow, not adverse to SPR flow as shown.
3. The SPR floodplain model will need to be updated and a CLOMR, floodplain permit, and a LOMR may be required. There may be three or more new outfalls and we recommend that the floodplain update be coordinated between projects. SPR hydrology needs to be verified to ensure that increased flows do not adversely impact downstream infrastructure.
4. It is the City's choice whether to delineate the Montclair Channel floodplain and add it to the FIRM for insurance purposes. This does allow the City to regulate the floodplain.
5. Additional freeboard is recommended to allow for increased basin imperviousness and increased future runoff.
6. The study references the 5-year design storm for RTD and the 100-year design storm for CDOT but does not explicitly identify the design storm for the Montclair Channel beyond the opening paragraphs of Section 1. We recommend clarifying all flowrates referenced in the study.
7. Much of the hydrologic data is missing in the study, Exhibit 6 is missing, other exhibits appear to be mistitled, and there are numerous typographic and grammatical errors in the study.
8. We recommend numbering and lettering the options, such as 1a and 1b, for clarity.
9. The study lacks the detail required for a broad audience. If a broad audience is required then additional exhibits should be provided with the master plan basins, the Market Lead, Ferril Lake, I-70, light rail, NWS, and other features referenced in the study depicted.
10. Are there drainage complaints that can be eliminated?
11. LID is currently allowed by the drainage criteria as a consideration in the four step process for a variance, but it does not by itself meet the water quality capture volume criteria. The proposal may not be in compliance with the drainage criteria.
12. Water quality features other than the linear 39th Avenue feature are not apparent. Water quality ponds are desired, and required by criteria without a variance. Section 2.7 conflicts with section 2.2.
13. What percentage of the Montclair basin will be treated for water quality post-project?
14. 0.2% seems too flat to provide 2 fps in low flow periods.
15. A base flow is necessary to support riparian habitat.

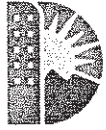
16. It is not clear if construction of an open channel is feasible in contaminated ground. The extent of contaminants onto adjoining private properties and/or in groundwater base flow is unknown.
17. It is not clear if fee simple or easement acquisition is proposed.
18. The detention alternative(s) are confusing with interim, informal, and formal detention mentioned. It appears that there are two or more possible interim/permanent detention alternatives. Only one, the 40th Avenue detention, is depicted on an exhibit, and these alternatives need to be clarified.
19. Underground detention may not be desirable if construction cost, maintenance cost, and physical design constraints are considered.
20. In section 2.5, Downing is not between Franklin and York and the reference to a parking structure fronting Downing is not understood.
21. The existing outfall depicted on Exhibit 1 crossing Colorado Blvd at 43rd Avenue is not shown in GIS.
22. The agreements required for funding, design, and construction should be identified.
23. Land acquisition and construction cost estimates should be included.
24. A benefit-cost analysis should be included. The analysis should include the loss of "Current/Future Employment Areas" and/or "Future Mixed Use Areas" to "Proposed Detention Areas".
25. It appears that 10% or less of the required funding may be in place and additional funding sources should be identified along with the timing of the funding.
26. A critical path schedule should be included.

Please contact Steve Forvilly at 720-913-4533 or steven.forvilly@denvergov.org if you have any questions.

Sincerely,



Joseph Cordts, P.E.
Engineering Manager
Engineering, Regulatory & Analytics (ERA)



DENVER
THE MILE HIGH CITY

Denver Environmental Health Department

Doug Linkhart, Manager

200 W. 14th Avenue, Suite 300

Denver, CO 80204-2732

PHONE: 720-865-5484

FAX: 720-865-5531

www.denvergov.org/health-environment

June 20, 2014

Selena Klosowski
Wastewater Capital Projects Management
2000 W. 3rd Ave.
Denver, CO 80223

Dear Selena:

Denver Environmental Health has reviewed the draft Montclair Creek Drainage Feasibility Evaluation, received on June 17, 2014. Thanks for the opportunity to review.

We have the following comments:

- This project has the potential to improve drainage and flood control in the area, increase life/safety, increase connectivity, provide access for walking and biking, increase habitat, improve water quality, act as a community amenity, improve neighborhood aesthetics, reduce environmental contamination in areas, and provide economic benefits. We appreciate that analyses to date have considered these factors. We prefer open channel construction and/or modifications to conventional piping that maximizes these factors where-ever possible.
- It is important to have a detail drawing or schematic, and or design criteria that explain requirements for the green street segments. For the green street portions to be successful and preferred over an open channel, the green street must provide water quality treatment, must be aesthetically pleasing for neighborhood residents, must be walkable and bikeable, must provide connectivity between neighborhoods, and must be relatively easily maintained. There is a wide range of opinions regarding what would be considered a green street, some of which would be acceptable and some of which would not.
- The narrative describes Reach 1 Option A as extending through CCOD properties, yet the plan views show the channel extending onto property outside of current CCOD property. DEH has significant concerns regarding feasibility if this is the case.
 - a) CCoD would need to acquire property from Pepsi (the asphalt paved areas south and southeast of the Globeville Landing Park) that is currently within the boundaries of the VB/I70 OU2 Superfund site. DEH strongly recommends that the City not acquire this property and the unforeseen liabilities that underlie this property.
 - b) This option likely would not be reimbursable under the HSRF structure if needed construction were not within the current Superfund site; therefore, DEH would not be able to contribute the associated environmental cleanup funding as previously discussed.
- Reach 2 (Options A and B) show an environmental costs of \$1,000,000 that may have been arbitrarily included. DEH recommends that further analysis of this cost estimate be undertaken in order to provide a more appropriate estimate. EQ would be willing to assist in this endeavor.

- On June 17, we discussed several factors that are perceived to make the option of piping between McFarland and Franklin more favorable over open channel. These include the concern regarding being able to timely construct to meet other project construction needs, and potential safety concerns if a larger box culvert were built that could allow biking/walking along the channel. It would be helpful to have a plan view that showed alternate biking/pedestrian routes that could connect the other reaches. Would the connectivity be at the new 38th Street Bridge?
- It would also be helpful to explore the feasibility of improved lighting with a larger box culvert, and or the distance needed to be enclosed as compared to other covered or enclosed portions of area bike paths.
- On June 17th, there was some discussion regarding the potential to initially pipe the portion between McFarland and Franklin due to time concerns, with some modifications and/or reconstruction in the future to install an option that maximized other goals. It would be helpful to have further narrative and/or discussion that explained how that might occur, and under what circumstances.
- Please make pagination consistent and label attachments for ease of reference.
- Reach 1 will be within the Globeville neighborhood. Was the Globeville Neighborhood Plan process (not yet completed) considered?
- Is there a goal for percent water quality treatment provided by the various options? It would be helpful to have an estimate of treatment provided for each option in each reach, and the extent to which this contributes to treatment goals.
- Page 5 states that “This option can be independent of any storm infrastructure being built within Reach 1 if we were to construct a 600 acre-foot pond.” Is it correct to assume that calculations show this would provide sufficient capacity to retain a 100 year flood, without an outlet for flow to reach the river? How does this relate to water law requirements not to detain water beyond 72 hours?
- Page 5. It would be helpful to have a more complete description of Reach 2 Option C.
- Page 5, Reach 3, Option A. It would be helpful to have a detail or other conceptual schematic of the “small water quality channel with inlets that tie the treated water into the proposed 12’ x 6’ @ 0.2% box pipe...”, and what is intended by a “green street”, in order to better understand treatment potential, and potential to provide other desired features, such as visual desirability, habitat, green space, walkability, etc.
- Page 5, Reach 3, Option A and B. The narrative regarding flow to be conveyed “1,200 cfs that contributes from a pipe in Reach 4 that intercepts the 400 cfs” and “drainage for these street improvements” is confusing. We infer that construction of a street is desired. If so, it would be clearer if this is stated explicitly, with a brief narrative explaining why the street is desirable. Our assumption is the reasoning is similar to that stated on page 6.
- Page 5, Reach 3, Option B. It’s not clear why an open channel would require different stormwater management in Reach 1 and 2, than that described in Option A.
- It would be helpful if section 3 were presented with a brief narrative comparing and contrasting alternatives.
- Page 9. Section 4.2, item 3. Some statements are not quite accurate. Please remove the sentence that says “Typically these funds are used for remediating heavy metals” and reword as follows: HSRF funding may be accessed to remediate Superfund-site contamination deemed to pose an exposure hazard in a reasonably expected land use.

Thank you for consideration of our comments. If you have any questions, please contact me at 720-865-5458.

A handwritten signature in black ink, appearing to read 'Celia VanDerLoop', written over the printed name.

Celia VanDerLoop
Director, Environmental Quality Division