



LETTER OF RECOMMENDATION

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

The purpose of this Letter of Recommendation (LOR) is to describe the Multi-Agency Technical Team's (MATT) recommended technical solution and improvement sequence/schedule to address the October 2013 Memorandum of Understanding (MOU), which was written to establish an inter-agency collaboration for the development of a coordinated set of infrastructure improvements that efficiently and effectively integrates the drainage needs of the following projects:

1. CDOT's I-70 East Project from Brighton Boulevard to Colorado Boulevard
2. RTD's North Metro Rail Line
3. CCD's North Denver Cornerstone Collaborative (NDCC)

The MOU defined two teams to accomplish this collaborative approach: The Management Oversight Team (MOT) and the Technical Working Team (TWT). However, as time progressed the title of the Technical Working Team (TWT) was changed to Multi-Agency Technical Team (MATT). The guiding principle of the TWT, or MATT, is as follows:

"The TWT will recommend a technical solution and improvement sequence/schedule. The intent is to develop a plan that meets the goals stated above for the best engineering perspective, which includes consideration of cost, timing, and performance, but does not include consideration of division of financial responsibility between agencies."

The MATT team conducted a series of working technical meetings from October 2013 through February 2014, where hydrology for the off-site tributary drainage basins was established and agreed upon. Hydrology developed by the MATT team was documented in two technical memorandums: *I-70 PCL Montclair Drainage Basin Hydrologic Analysis* and *I-70 PCL Park Hill Drainage Basin Hydrologic Analysis*, both dated August 1st, 2014.

During the second half of 2014, CDOT and CCD conducted additional meetings to coordinate and develop potential drainage alternatives for both the I-70 PCL project and CCD's Open Channel Concept. The result of these meetings was the development of a recommended technical solution—aka Combined Drainage System—for the MATT team to review and recommend.

All projects must comply with the City's Storm Drainage Design & Technical Criteria Manual and Colorado Drainage Law. The minimum design standard is a 5-year storm system and no adverse impact to private properties during the 100-year event. The trench area of CDOT's I-70 PCL project is a sump and must be design with a drainage system to handle the 100-year event.

Recommended Technical Solution

The recommended technical solution is a **Combined Drainage System** that addresses off-site drainage for the 100-year design flows from both the Montclair and Park Hill drainage basins.

(Refer to attached exhibit “*Figure 1 CCD I-70 PCL Alternative Drainage Concept*”).

The stormwater collection/detention/conveyance systems proposed for each basin are as follows:

Montclair Drainage Basin - This combined drainage system will collect, detain and convey to the South Platte River, the MATT agreed upon 100-year stormwater flows south of I-70.

- An open channel/detention/storm sewer component running east/west along East 39th Avenue
- Storm sewer/detention pond components generally along the south side of the proposed I-70 preliminarily identified preferred alternative, referred to as the Partial Covered Lowered (PCL) Alternative. This second system will handle the runoff from the local tributary area between 40th Avenue/Smith Road and I-70.
- Additionally, a Storm sewer from the low point of the above described PCL alternative that will convey the stormwater that falls within the I-70 corridor to the S. Platte River

Park Hill Basin - This combined drainage system will collect, detain and convey to the existing storm sewer facilities near Colorado Boulevard and 48th Avenue, the MATT agreed upon 100-year stormwater flows south of I-70.

- Provide and formalize through agreement adequate inadvertent detention for the existing flows with a north-south outfall along Dahlia Street connecting to existing storm sewer facilities within 48th Avenue.
- A detention pond at the southeast corner of Colorado Boulevard interchange and a cross culvert under I-70 East of Colorado Boulevard.

This Combined Drainage System will handle the off-site stormwater runoff from both the Montclair and Park Hill drainage basins. It is noted that the design discussed in this memorandum is at a conceptual design level. Additional detailed hydraulic design is necessary to finalize the recommended improvements. The MATT Team agrees to work together to optimize and value engineer the final combined drainage system design. It is anticipated that pipe sizes and proposed improvements will be modified as a result of this process.

A brief description of the drainage concept for each reach of the proposed Combined Drainage System is provided below.

Reach 1

Reach 1 will serve as the primary outfall for the Montclair basin to the South Platte River through Globeville Landing Park. In 2014, Denver completed the High Street Outfall Phase 1 project, which consisted of two 96-inch tunneled pipes under UPRR. Reach 1 proposes at least one additional, and possibly two additional tunneled pipes of similar diameter to adequately convey the 100-year system under the tracks. Further downstream, Reach 1 proposes a 100-year pipe system and/or open channel to convey the flows from the tracks to the River. The final layout and configuration of Reach 1 requires additional engineering, but will be determined in a manner that best achieves full stormwater conveyance along with considerations to water quality, connectivity and surrounding developments, including but not limited to, Pepsi, The Denver Coliseum & Globeville Landing Park. Figure 1 depicts a combined pipe/open channel concept, however it should be noted that more extensive design may favor alternative alignments along this reach.

The system's total capacity is roughly 2,700 cubic feet per second, including the existing 120-inch Brick pipe in 40th Street. This assumes no bypass flow and the full collection and conveyance of the 100-year flow. The 100-year sizing of the Reach 1 system listed above and shown in Figure 1 is

dependent on the amount of stormwater detention achieved in the upstream Reach 2. In the configuration shown, a detention volume of 188 acre-feet is required in Reach 2. Concepts with more conveyance would reduce/reconfigure this volume.

Reach 2

Reach 2 will collect the surface runoff from the Montclair basin, generally, along 39th Avenue and convey it west to Reach 1. An open channel with an approximate top width of 155 feet is proposed along 40th Street and the south side of 39th Avenue from Blake Street to Race Street. The channel connects regional detention pond between 40th and 39th Avenues from Race Street to Columbine Street. The pond will be bisected by York Street, where a culvert or bridge will be provided as a hydraulic connection. It is anticipated that the proposed channel and pond will hydraulically act as a single facility, allowing water to back-up and flow from one to the other sharing detention volume and conveyance. A total of 188 acre-feet detention volume is required in conjunction with the outfall sizing proposed in Reach 1.

To collect runoff from Montclair's tributary drainage basin north of 39th Avenue east of Clayton Street, an approximate 96" extension of the existing 40th Avenue storm drain is proposed. The pipe will extend along 40th Avenue from York Street to Clayton Street, then turn north in Clayton to 42nd Avenue. This system will not connect to the proposed detention facility, but will instead convey water to Reach 1 utilizing the existing storm drain in 40th Avenue constructed by RTD as a part of the EAGLE project.

Reach 3

Reach 3 extends along 39th Avenue from York Street to Jackson Street utilizing the east-west portion of the old Market Lead to provide a collection and conveyance system for the westernmost portion of the Montclair basin, connecting to the proposed detention ponds in Reach 2.

A phased approach is anticipated along this stretch. Full stormwater conveyance can initially be achieved with a 48-foot top-width trapezoidal conveyance channel as shown in Figure 1. However, the old Market Lead corridor doubles as a meaningful opportunity for increased connectivity and water quality by implementing a Green Street along this stretch, not shown. To construct a Green Street however, the drainage channel would need to be filled and replaced with an underground system to convey runoff to the detention ponds in Reach 2.

From Steele Street to Jackson Street, reconstruction of the existing 39th Avenue roadway section is needed to provide a formal drainage system including curbs, gutters, inlets, and an approximate 84" storm drain. Reconstruction of the roadway section is required in order to collect surface runoff from the tributary basin to the southeast.

Reach 4

Reach 4 addresses stormwater runoff that reaches the north-south portion of the Market Lead Corridor between 42nd Avenue and Monroe Street. The majority of the runoff that currently drains to the Market Lead will be intercepted by the systems proposed in Reaches 3 and 5. However, a small tributary area roughly bound by Monroe Street, Colorado Boulevard, the UPRR, and 39th Avenue will remain. Most of this area is already served by the new RTD East Corridor Colorado Station site detention pond. To address the remaining nuisance flows that will continue to reach the Market Lead, the culvert under the UPRR will initially be constricted allowing the impoundment of water in the Market Lead trench. Outflows to the north will be very minimal and not have a significant impact on I-70.

Reach 5

Reach 5 addresses stormwater runoff from the Park Hill drainage basin. Inadvertent detention currently exists along the north edge of the golf course, however, to provide full 100-year protection, an inundation easement is proposed for a larger, regional detention pond at this location. Approximately 105 acre-feet of detention volume will be required to reduce the 100 yr flow rates to at or below 400 cubic feet per second.

To achieve the full amount of detention volume in the inundation easement, improvements like a berm (or wall) in a “U” shape around the west-north-east boundary of the site and/or site grading within the inundation easement, will be necessary. The berm concept around the edge of the property will be designed to have minimal disruption to the golf course.

An outlet structure, outfall pipe and construction of Park Hill Phase V's 84-inch storm drain will be required to adequately drainage the pond after a major event.

A new collection system constructed along Smith Road collects and conveys the remaining portion of runoff that naturally bypasses the golf course to the east. It is estimated that the proposed pipe in Smith Road extending from Dahlia to Forest Street will be a 12'x10' RCBC discharging into the proposed detention pond. This new collection system is expected to include the construction of significant street inlet capacity.

I-70 Corridor

It should be noted that CDOT does not commit to any alternative currently being evaluated in the I-70 East NEPA process, including the PCL Alternative. A final determination regarding the designation of a preferred alternative will not be made until the completion of the NEPA process with the completion of a Final Environmental Impact Statement (FEIS) and the issuance of a Record of Decision (ROD).

The drainage improvements required to protect the proposed I-70 PCL section with the above discussed drainage facilities in place are summarized below. The attached Exhibit B shows the proposed I-70 drainage system and associated watershed.

- **Reach 1 to York Street:** The storm drain system designed to protect I-70 is located in 46th Avenue beginning at Pond 6. The proposed storm drain conveys flow to the west through Pond 7 (24 ac-ft) and Pond 7a (23 ac-ft) and discharges into Reach 1 (discussed above). Reach 1 conveys the combined flow into the South Platte River. This section of proposed storm drain ranges in size from a 7'x6' RCBC to a 12'x4' RCBC.
- **York Street to Colorado Boulevard:** The drainage system required to protect this stretch of I-70 in located in 46th Avenue and starts at the Market/Lead low point approximately 1200 feet to the west of Colorado Boulevard. The proposed storm drain conveys the flow impacting 46th Avenue to the west into Pond 6 located at York Street. This storm drain system ranges in size from a 60" RCP to a 12'x4'RCBC.
- **Colorado Boulevard Interchange:** The drainage improvements proposed at the Colorado Boulevard include detention ponds located in the south east quadrant of the intersection and a 10'x6' RCBC culvert that drains to the north under I-70 into another proposed detention pond that discharges into the existing CCD storm drain.

North Metro Corridor

A potential exists for partnership between the redevelopment of the National Western Center (NWC) and the construction of the North Metro Corridor for interim drainage improvements prior to the completion of the Combined Drainage System, which would result in efficiencies for the NWC and minimize “throwaway” infrastructure for the North Metro Corridor. The evaluation of this potential partnership is ongoing.

Proposed Timelines

Combined Drainage System—NEPA clearance and preliminary design through 2015, construction commencing early 2016.

CDOT I-70 PCL—NEPA clearance into early 2016, procurement commencing in 2015 and completed in early to mid 2016, and construction commencing in late 2016 or early 2017.

North Metro Rail—Design and early construction commenced, earthwork to be completed in the area of the NWC in 2016.

NWC—Concept design completed in early 2015, construction and redevelopment planned for 2017.

Recommendation Benefits

The recommended technical solution of a combined drainage system would provide benefits for I-70, the local community, NWC, RTD's EAGLE and North Metro Lines and the Montclair/Park Hill watersheds. Below are some of the potential benefits:

- A more robust drainage system for I-70, utilizing two drainage systems in the Montclair Basin potentially providing a higher factor of safety
- Additional 100-year storm protection for the area located between the two drainage systems (40th Avenue/Smith Road to I-70)
- Enhanced water quality improvements (open channel, green streets, detention/ water quality ponds)
- Provide drainage amenity to promote ecological enhancement and economic development
- Potential recreational amenities for the community
- Improved mobility/connectivity (vehicular, bicycle, pedestrian)
- Provides a usable outfall connection for future upstream flood control improvements in both the Montclair and Park Hill watersheds
- Increased drainage protection (100 year) for the North Metro Corridor, EAGLE and NWC.
- Potential cost savings to the North Metro Corridor and NWC depending on timing of the Combined Drainage Solution
- Ability to create a multi-agency partnership which provides a common solution that benefits all, inclusive of the public

Concurrence with Findings/Recommendations of the MATT:

Colorado Department of Transportation (CDOT)

By: _____

Joshua Laipply, CDOT Chief Engineer

Dated: _____

Regional Transportation District (RTD)

By: _____

Rick Clarke, Assistant General Manager, Capital Programs

Dated: _____

City and County of Denver (CCD)

By: _____

Jose M. Cornejo, Executive Director of Public Works

Dated: _____



CONFIDENTIAL **FIGURE 1** **DRAFT**

CCD I-70 PCL

ALTERNATIVE DRAINAGE CONCEPT

PROPOSED 100-YEAR SYSTEM

MONTCLAIR AND PARK HILL BASINS

Technical Memorandum 2014-12-22

Detention/Conveyance/WQ

Backbone Drainage System

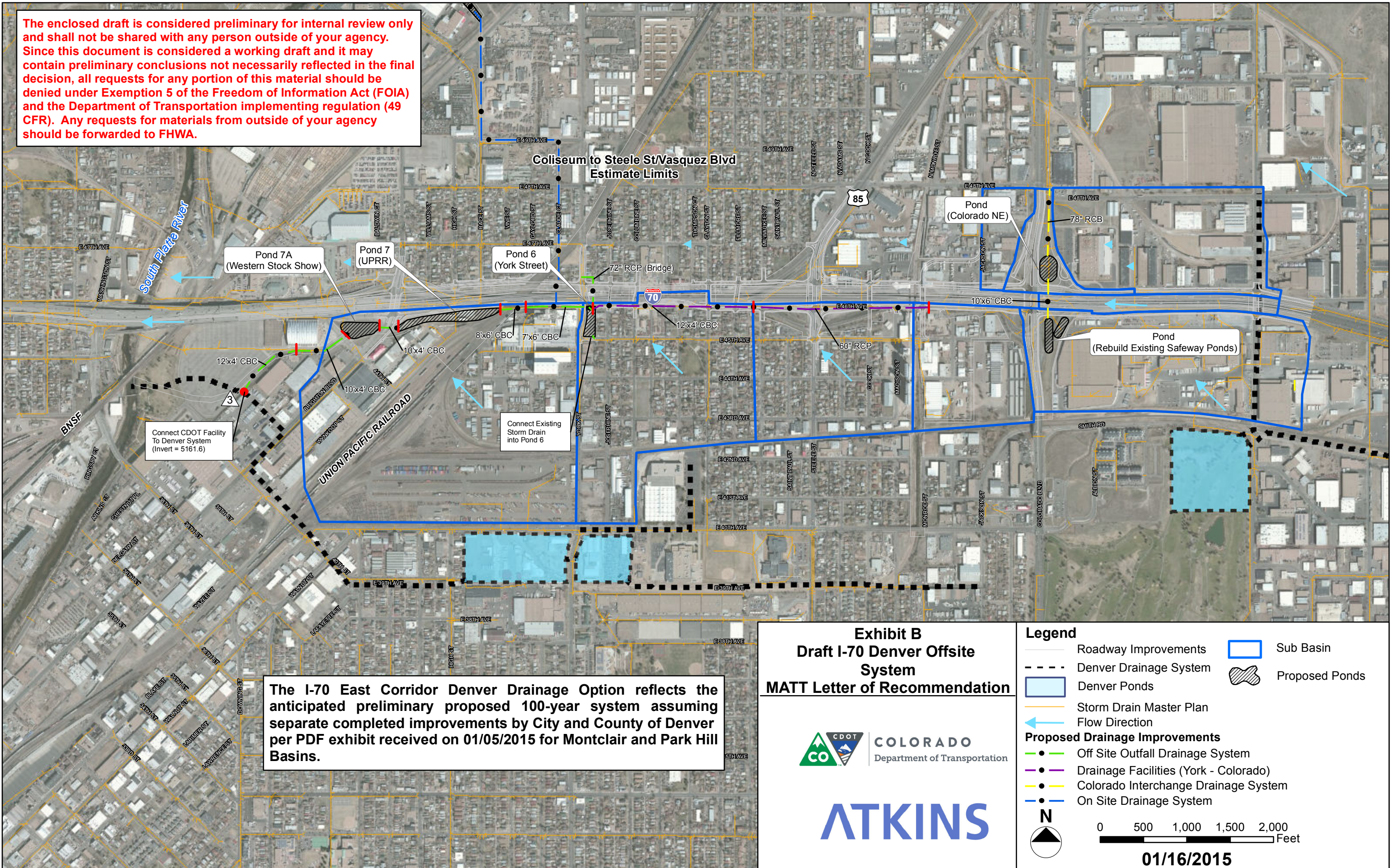
Existing Storm Drains	Proposed Drainage System
Horiz. Diam. 0 - 18 in.	Proposed Pipes
Horiz. Diam. 18 - 30 in.	Proposed Detention
Horiz. Diam. 30 - 48 in.	Proposed Open Channel
Horiz. Diam. 48 - 60 in.	Proposed Green Street
Horiz. Diam. >60 in.	Proposed Bridge

0 500 1,000 Feet

DENVER PUBLIC WORKS **Enginuity**

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The enclosed draft is considered preliminary for internal review only and shall not be shared with any person outside of your agency. Since this document is considered a working draft and it may contain preliminary conclusions not necessarily reflected in the final decision, all requests for any portion of this material should be denied under Exemption 5 of the Freedom of Information Act (FOIA) and the Department of Transportation implementing regulation (49 CFR). Any requests for materials from outside of your agency should be forwarded to FHWA.



The I-70 East Corridor Denver Drainage Option reflects the anticipated preliminary proposed 100-year system assuming separate completed improvements by City and County of Denver per PDF exhibit received on 01/05/2015 for Montclair and Park Hill Basins.

Exhibit B
Draft I-70 Denver Offsite System
MATT Letter of Recommendation



Legend

- Roadway Improvements
- - - Denver Drainage System
- Denver Ponds
- Storm Drain Master Plan
- ← Flow Direction
- Proposed Drainage Improvements
 - Off Site Outfall Drainage System
 - Drainage Facilities (York - Colorado)
 - Colorado Interchange Drainage System
 - On Site Drainage System
- Sub Basin
- ▨ Proposed Ponds

N

0 500 1,000 1,500 2,000 Feet

01/16/2015