
NATIONAL WESTERN CENTER



Infrastructure Master Plan

January 2015

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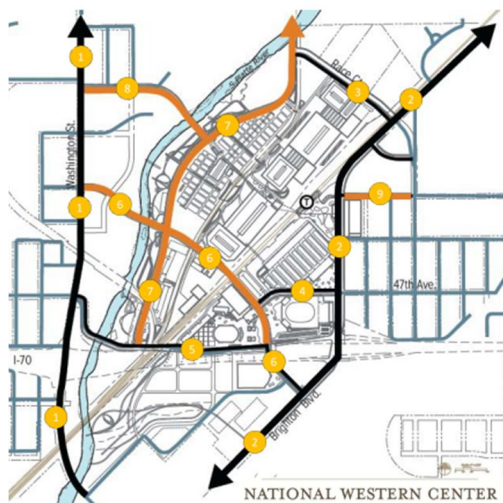
Section 1: Executive Summary

The new National Western Center will revitalize a large area of the city by being an active destination; by connecting neighborhoods to one another; by bringing life back to the river; and by becoming a new kind of district that celebrates the best of our natural, cultural and agricultural history and future. When we think of the site area today we think of industry, trucks and trains - but in the future we will experience a vibrant event district unified with a natural setting.



The National Western Stock Show has been held on this site for over 100 years. Originally this was a location that offered river, rail, roadway, and trail access, making it a good place to meet, exchange knowledge, do business, hold, support, and transport livestock and horses, and put on a great event for the community. Those same attributes - water and access to the region - led to the development of major heavy industry on the site all based on rail travel. With the popularity of the automobile and the development of an improved

water distribution system, the original asset of the site, the South Platte River, became forgotten. Now it is time for the National Western Center to revitalize itself by starting with river revitalization. This means an expanded corridor of natural habitats, expanded public access, improved water quality, and more room for the river to breathe.



The Master Plan emphasizes connections, connections of people to people, people to river, and city to nature. The land along the river will be expanded into a wider corridor that will be linked into the Globeville and Elyria/Swansea neighborhoods through new street, pedestrian, bike and green connections. These new connections will support neighbors, visitors, vendors, event competitors, and employees 365 days a year with access to residences, amenities and the venues of the National Western Center itself. The Master Plan also includes a range of public plazas and connections that will support daily activity, special events, and gathering and staging during the Stock Show and other events. Each sector of the Center has its own public

space or spaces, providing relief from the large scale of buildings that make up the center and also provide room for people to gather and access events as a whole during the Stock Show or to utilize and enjoy during events throughout the rest of the year.

The design of these spaces will build on and express the idea that the Center is a place about both the past and the future. Western heritage will be a recurring theme in materials, details and symbols that are used in the design - but this will not be a place that is about the past. At its core the National Western Center is about the future of our western heritage and the many ways in which nature, culture, and agriculture continue to develop and change with new technologies, methods, and ever-increasing international relationships and opportunities. The design of the Center should also be of the present, using the latest in sustainable technologies and materials not of the Old West, but of the New West.

This Improvement Master Plan (IMP) document addresses the general trunk infrastructure that will be required as part of the overall redevelopment. Due to the nature of this master plan, infrastructure sizing and capacity will need to be readdressed in future phases of planning and design. The IMP follows the programming and layout of the National Western Center Master Plan. Guiding principles for the design of the infrastructure that were implemented in this document include:

- Provide connectivity through the site for pedestrians, bicycles, and vehicles, providing access to neighborhoods, the river, and transit.
- Promote sustainable design for the site and do not be prescriptive with recommendations understanding the standards and technologies will change.
- Provide infrastructure that supports the development as programmed.
- Incorporate existing key infrastructure into the plan.

Transportation

Transportation is key to moving people to, through and around the project. Understanding and planning how vehicles, pedestrians, and bicycles interact with the river, the neighborhoods and the proposed plan provides a framework plan that establishes how these connections are made. It is also important to understand the transportation operation and requirements of an entertainment complex.



An important part of the NWC plan is access to the North Metro Rail Line (NMRL) and the proposed station near Brighton Boulevard and 49th Avenue. Access to the commuter rail line provides access to Denver Union Station to the south and 124th Avenue to the north. Design has currently started on the project with opening slated for 2018.

The proposed transportation system is also about reestablishing connections to the river and the Elyria Swansea and Globeville Neighborhoods. Recommendations for roadway improvements include the following:

- 46th Avenue – Enhancing the existing connection between Brighton Boulevard to Washington Street.

- Race Court – Redevelopment of the existing street to include expanded vehicular lanes for truck and trailer turn movement and facilities for bicycles and pedestrians.
- Bettie Cram Drive –A new street connecting Brighton Boulevard to Washington Street.
- National Western Drive – Provides north-south connectivity from 46th Avenue to Franklin Street as well as access to the South Platte River.
- Brighton Boulevard north of I-70 –Provides north and south connectivity from the River North Neighborhood south of I-70 to the site.
- Washington Street – Is not included in the IMP. Preliminary cross sections have been identified in the Globeville Neighborhood Plan and further design will be investigated in additional detail in the future.
- All roadways will emphasize pedestrian and bicycle connections through the site and to regional trails.

Water Distribution System

Improvements to the potable water system will need to be made internal to the site to provide necessary service to the new facilities. Connections will be made to the existing system located in Brighton Boulevard, Washington Street, 46th Avenue and Race Court. The proposed internal system will consist of 8-inch and 12-inch lines, with 6-inch to 8-inch service / fire loops constructed around the major buildings. All proposed water lines will need to be designed and constructed to meet the requirements of Denver Water and must meet all fire code as adapted by the City and County of Denver.

Wastewater Collection System

The site is served by two major sanitary sewer interceptors, the Metro Wastewater Reclamation District (MWRD) Delgany interceptor on the west side of the site and the 54-inch Denver Wastewater Management Division interceptor on the north side of the site. Connections to either interceptor will need to be limited and should occur at existing connection locations.

A proposed system will be required to convey existing flows from the Elyria Swansea neighborhood through the site as well as collect flows from proposed buildings. It is anticipated that the size of the proposed sanitary sewer will vary from 8-inch to 12-inch. All proposed sanitary sewer will be conveyed via gravity flow to the interceptor connection points.

Opportunities to look at graywater reuse for the project should be investigated as regulations within CDPHE continue to change to allow for reuse.

Drainage

Proximity to the South Platte River and the lower reach of the Montclair Basin creates a responsibility to properly convey and treat storm water runoff from the site prior to discharging into the river. Expectations are that the Colorado Department of Transportation I-70 East project and related drainage works will intercept the major event south of I-70, and drastically reduce the flows tributary to the site as compared to the anticipated flows in the CCD 2010 Drainage Master Plan. The City and County of Denver and Urban Drainage and Flood Control (UDFCD) are currently working on an update to the CCD Drainage Master Plan and Outfall System Plan (OSP) for the Montclair Basin. Layout of the major

drainage outfall through the middle of the site and Race Court are based on the preliminary submittal of the Montclair Basin OSP.

Due to the proximity of the site to the South Platte River the site will not be required to provide 100-year detention, but the Excess Urban Runoff Volume (EURV) will need to be accounted for on the project. Since 100-year detention is not required a major storm conveyance will be required for the basin. Grading of the site will generally follow existing patterns, conveying flow from the southeast to the northwest. Internal to the site, the 100-year storm should be conveyed to the river, and offsite basins from the Elyria Swansea neighborhood will be conveyed through the proposed major outfalls as well as overland via Race Court.

Drainage Water Quality

The project will need to provide water quality treatment of storm water runoff in accordance with the water quality criteria in effect at the time of development. Currently, water quality is envisioned to be provided through the EURV standards as required by UDFCD. Implementation of a complete system for treatment of the runoff, including both end of pipe treatment as well as decentralized low impact development (LID) techniques should be utilized. We understand that technology and methods for implementation for water quality treatment will continue to evolve throughout the design and construction of the project so suggestions in this document are general and not prescriptive. As design continues to move forward the treatment of the storm water should be reevaluated.

Denver-USACE Feasibility Study

The City of Denver and the US Army Corps of Engineers (USACE) have partnered to develop a river plan for the north areas of the South Platte River through the River North, Globeville and Elyria neighborhoods. As part of the future habitat restoration and floodplain mitigation projects, the USACE will look for opportunities to enhance visibility and access. The study is developing alternatives for the area that will be reviewed in the spring of 2015, with the final study completed in 2017.

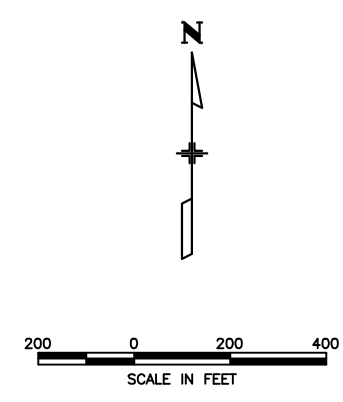
Section 2: Proposed Development

2.0 Proposed Uses

The National Western Center redevelopment transforms the existing National Western Complex into a year round entertainment complex that is true to the roots of the stock show and Denver's western heritage. The proposed development includes a number of large buildings that will be used all year for entertainment. The following buildings and uses are proposed for the site:

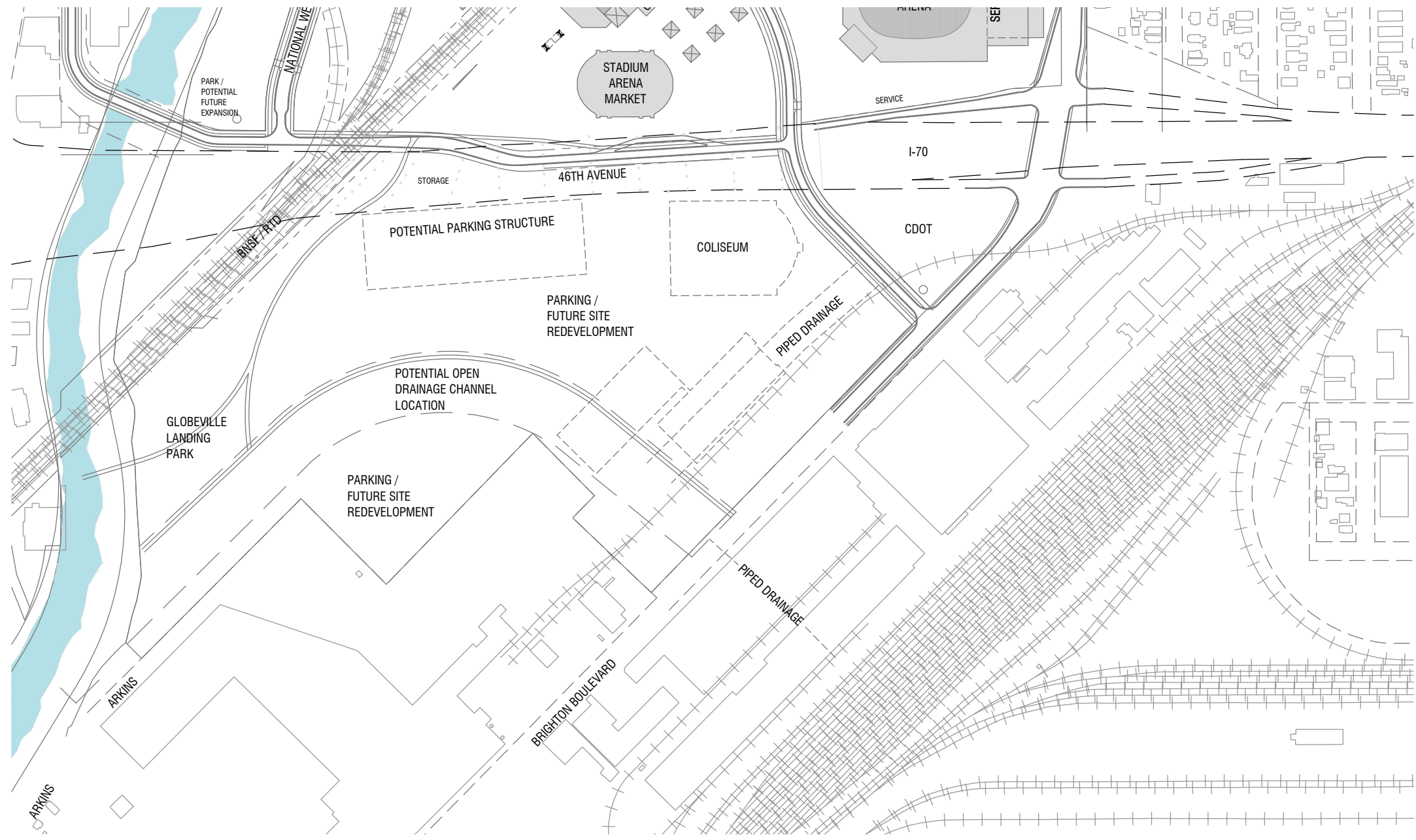
- New Arena
- Trade Show / Exposition Hall
- 1909 Stadium Arena (existing building to remain)
- Colorado State University Center facility
- Equestrian Center
- Livestock Hall, Livestock Stadium Arena and Stockyards/Event Pavilion
- Livestock Exchange Area
- Maintenance Facilities
- Colorado State University River Education Center

See Figure 1.1 for the proposed site plan and building uses.



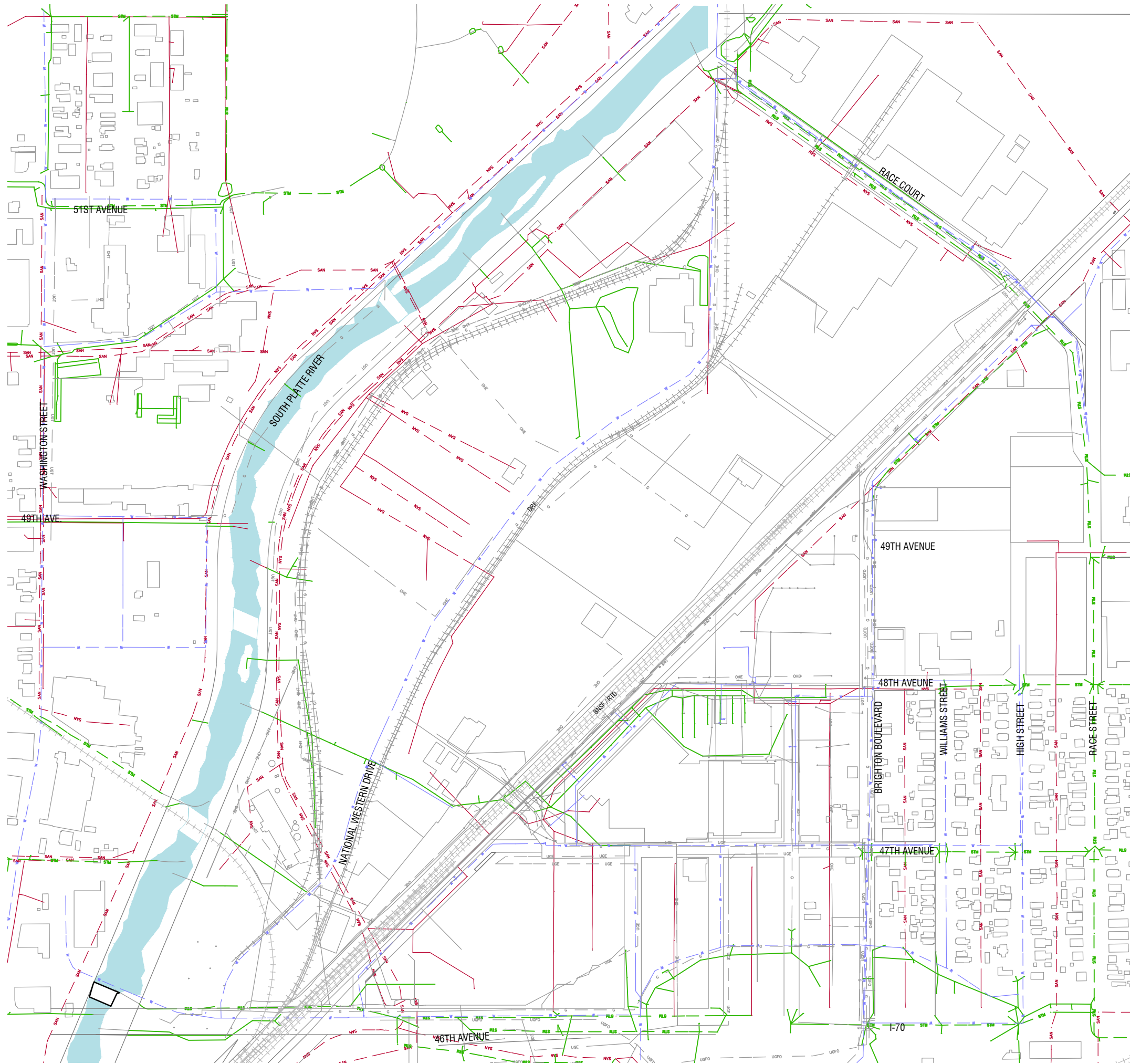
NWC OVERALL PLAN EXHIBIT
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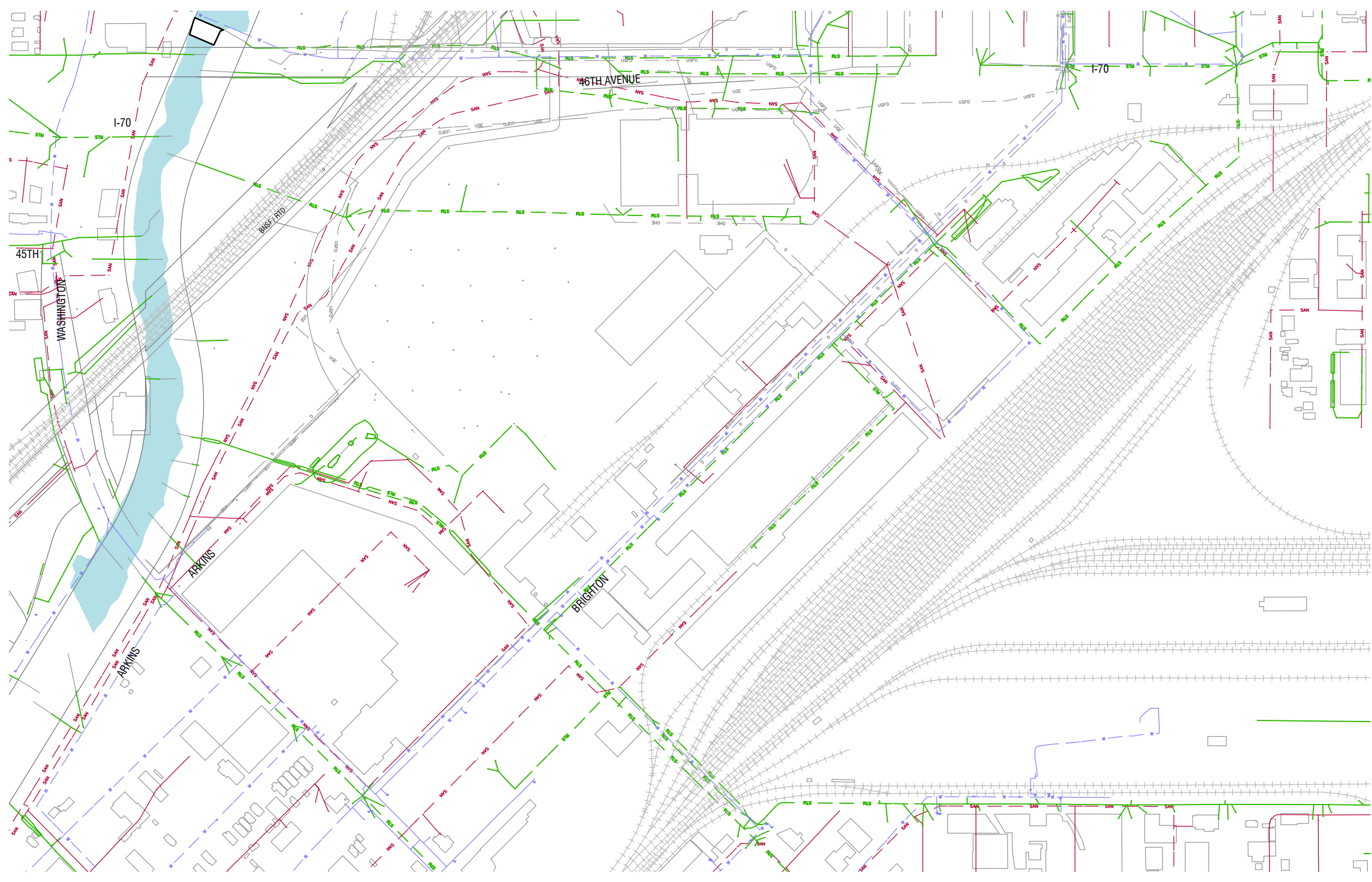
LEGEND	
	EXISTING WATER MAIN
	EXISTING STORM SEWER
	EXISTING SANITARY SEWER



NOTE:
 1. ALL EXISTING UTILITIES ARE SHOW PER GIS INFORMATION.

NWC EXISTING UTILITY EXHIBIT *FOR INFORMATION ONLY*





LEGEND	
	EXISTING WATER MAIN
	EXISTING STORM SEWER
	EXISTING SANITARY SEWER



NWC EXISTING UTILITY EXHIBIT
FOR INFORMATION ONLY

NOTE:
 1. ALL EXISTING UTILITIES ARE SHOW PER GIS INFORMATION.



Section 3: Transportation

3.0 Introduction

Transportation is key to moving people to, through and around the project. Understanding and planning how vehicles, pedestrians, and bicycles interact with the river, the neighborhoods and the proposed plan provides a framework plan that establishes how these connections are made. It is also important to understand the transportation operation and requirements of an entrapment complex.

An important part of the NWC plan is access to the North Metro Rail Line (NMRL) and the proposed station near Brighton Boulevard and 49th Avenue. Access to the commuter rail line provides access to Union Station to the south and 124th Avenue to the north. Design has currently started on the project with opening slated for 2018.

An internal road network was developed as part of the master plan with the goal of providing connectivity. Traffic demands and roadway capacity were not addressed in this phase of the IMP.

3.1 Existing Transportation System

Roadways

The project site is bounded by Brighton Boulevard to the east, Washington Street to the west, 46th Avenue and the Interstate 70 viaduct to the south and Race Court on the north. Regionally the site is served by I-70 with access to the interstate provided at the Brighton Boulevard Interchange.

The site is separated into two distinct sections by the BNSF rail line which travels northeast through the site. Southeast of the rail line access is provided to the site from Brighton Boulevard, 44th Street and 46th Avenue. Internal roads allow traffic to access and circulate through the site to access the existing buildings and parking lots. The section which lies northwest of the rail is bifurcated by National Western Drive which travels north from the intersection with 46th Avenue to Race Court, where it becomes Franklin Street. National Western Drive provides access to the existing buildings and cattle ties. There are three existing connections that provide access from the southeast side to the northwest, 46th Avenue, the Marion underpass, as well as Race Court, with only the Marion underpass truly internal to the site.



Trolley from downtown delivers visitors to the 1913 Stock Show

The existing roadway sections are as follows:

- Brighton Boulevard
 - Traffic- 2-lanes north of 47th Avenue
 - Traffic -4-lanes south of 47th Avenue
 - Pedestrian – No facilities

- Bicycle – No facilities
- Washington Street
 - Traffic – 2 lanes
 - Pedestrian – limited sidewalk
 - Bicycle- No facilities
- National Western Drive
 - Traffic- 2 lane
 - Pedestrian – No facilities
 - Bicycle – No facilities
- 46th Avenue
 - Traffic- 3 lane, 2 westbound
 - Pedestrian – Attached walk on the north side of roadway
 - Bicycle – No designated facilities
- 47th Avenue / Marion
 - Traffic- 2 lane
 - Pedestrian – walks on both sides of portion of the roadway
 - Bicycle – No designated facilities
- Race Court
 - Traffic- 2 lane
 - Pedestrian – attached walk on south side of roadway
 - Bicycle – No facilities

Pedestrian and Bicycle Facilities

Pedestrian and bicycle access is very limited to the existing site. The surrounding area is industrial and there are limited sidewalk facilities along the major roadway connections to the site. The major north south connection, Brighton Boulevard has no sidewalks and limited curb and gutter, and is not pedestrian friendly. Race Court and 46th Avenue have pedestrian facilities but due to the lack of continuity, connections to residential areas and limited safety features they are rarely traveled.

Bicycle facilities are also very limited in the project area. There are no on street facilities that are designated for bikes. However, per the CCD Bike Map route D-13 does cross the site at 47th Avenue and crosses to the Globeville neighborhood via 46th Avenue.

Regionally the South Platte River trail travels down the west side of the river, but there is limited or no existing access from the existing site.

Transit

RTD provides local transit to the site near the Brighton Boulevard and 47th Avenue intersection. Route 48 serves the site and provides access to the 72nd Park-n-Ride as well as access to Broadway Station. There is a strong need to provide a circulator bus/shuttle system at NWCC. This system would provide additional access to the NWCC during larger events to help reduce the need for additional onsite parking. This service would connect outlying parking lots and transit to NWCC. Space for circulator drop off and pick up is locate along 46th Avenue, just south of the stadium mass market.

3.2 Design Criteria

At this phase of the IMP travel demands and roadway capacities have not been modeled or analyzed. Future phases of design should follow the requirements of the City and County of Denver.

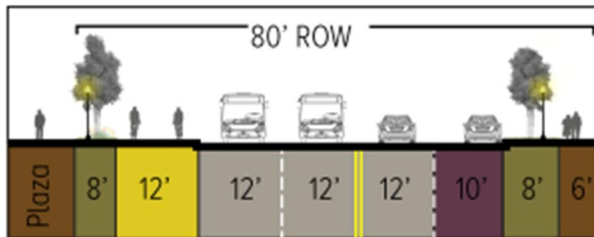
3.3 Proposed Transportation System Layout

Roadways

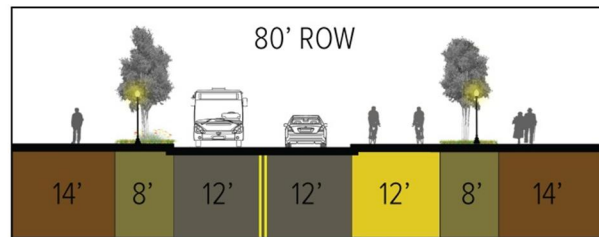
The layout of the roadway system was determined with the goal of connecting the site to regional infrastructure (I-70), connecting the Globeville and Elyria Swansea neighborhoods and providing access to downtown via Brighton Boulevard as well as providing circulation and access to the buildings and uses internal to the site. Within this corridor there are major transportation investments planned. At the time of this IMP the Colorado Department of Transportation is planning on moving forward with the lowering of East I-70 from Brighton Boulevard to Colorado Boulevard. The City and County of Denver is currently designing improvements to Brighton Boulevard from Broadway north adjacent to the project site. There are also plans in the future to improve Washington Street. All of these improvements will greatly increase the ability to effectively access the site.

Internally to the site there are proposed improvements to the following roadways

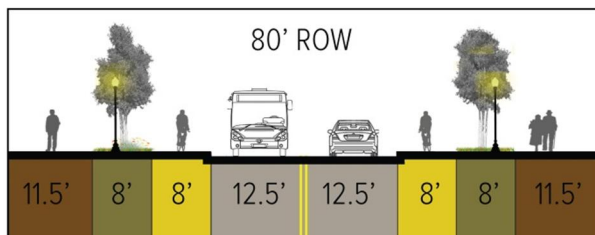
Brighton Boulevard



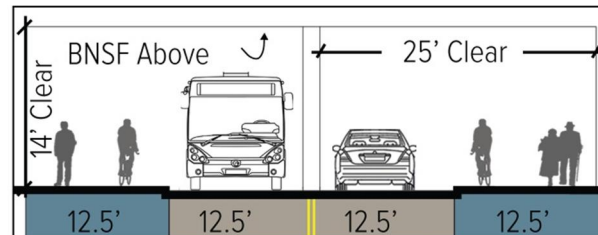
47th Avenue



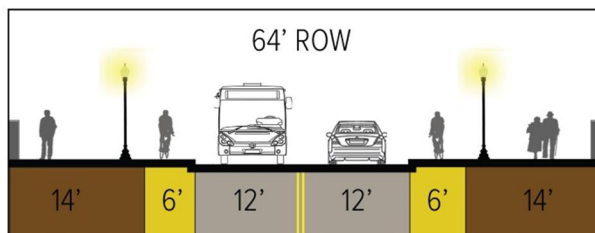
Bettie Cram Drive



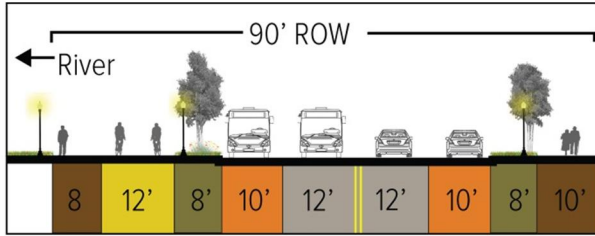
Bettie Cram Drive (BNSF Underpass)



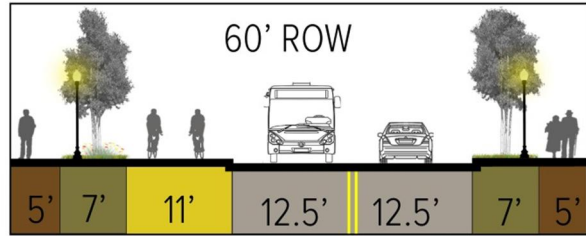
Bettie Cram Drive Bridge



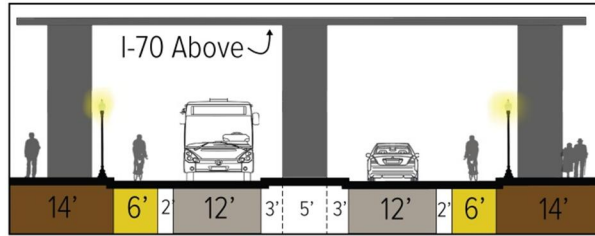
National Western Drive (46th Ave to 51st Ave)



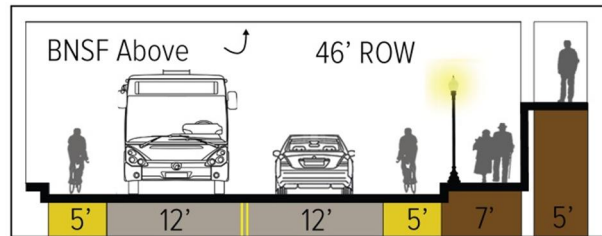
National Western Drive (51st Ave to Franklin)



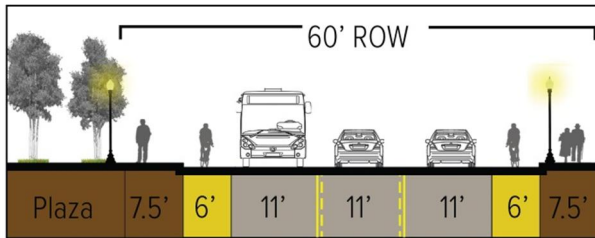
46th Avenue



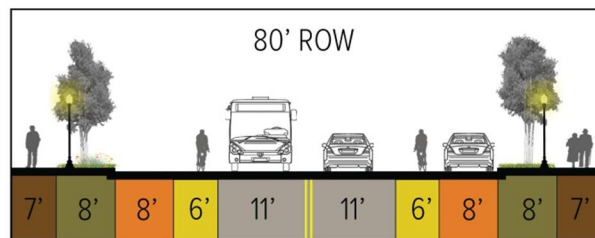
46th Avenue (BNSF Underpass)



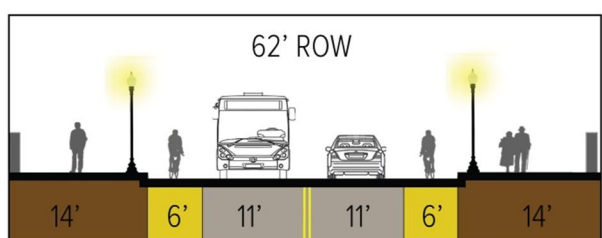
Race Court



51st Avenue



51st Avenue Bridge



Pedestrian and Bicycle Facilities

One of the critical elements of the transportation plan is to reconnect the adjacent neighborhoods and connectivity to regional trails. Improvements to the pedestrian and bicycle facilities are critical to accomplishing these goals as well as meeting the intent of Denver Moves. As shown in the previous section all of the roadway improvements include creating detached pedestrian zones as well as designated bicycle facilities. Included in the improvements are connections to the existing South Platte River trail system as well as connections to the planned Brighton Boulevard protected bike lane.

An additional non-street bicycle and pedestrian connection will be provided as an elevated walkway between National Western Drive and the new RTD Commuter Rail station and Brighton Boulevard. This elevated connection will have direct access bicycle ramps at each end and vertical connections via stairs and elevators at regular intervals along its length. The walkway will vary in width between 15-foot minimum and 20-foot. This connection is not intended to be covered.

Transit

An important part of the NWC plan is access to the RTD North Metro Rail Line (NMRL) and the proposed station near Brighton Boulevard and 49th Avenue. The commuter rail line provides access to Denver Union Station to the south and 124th Avenue to the north. The RTD station will consist of (2) 16-foot wide side platforms capable of holding a 4-car train. The station will have a short section of double track at the platforms and then taper to single track both north and south of the station. The station also provides 40 spaces of surface parking. Design has currently started on the project with opening slated for 2018.

3.4 Conclusions

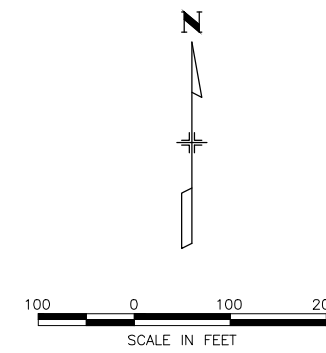
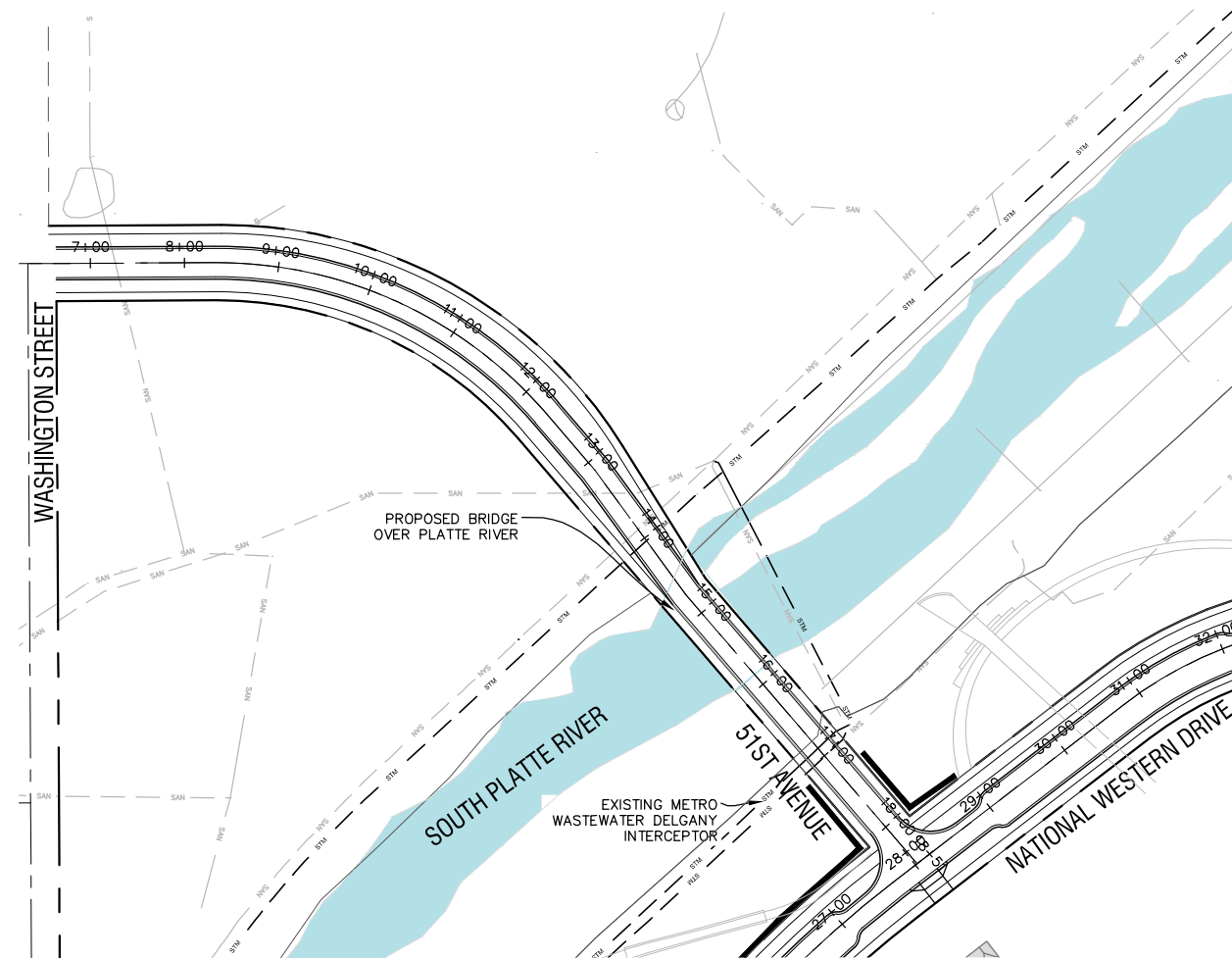
Preliminary and Final Design

Preliminary and Final Design of the transportation system must be in accordance with the City and County of Denver standards and related criteria and regional travel models. The system will need to be designed in phases based on the build out of the overall NWC. Some temporary connections and facilities may be needed to accomplish the phasing.

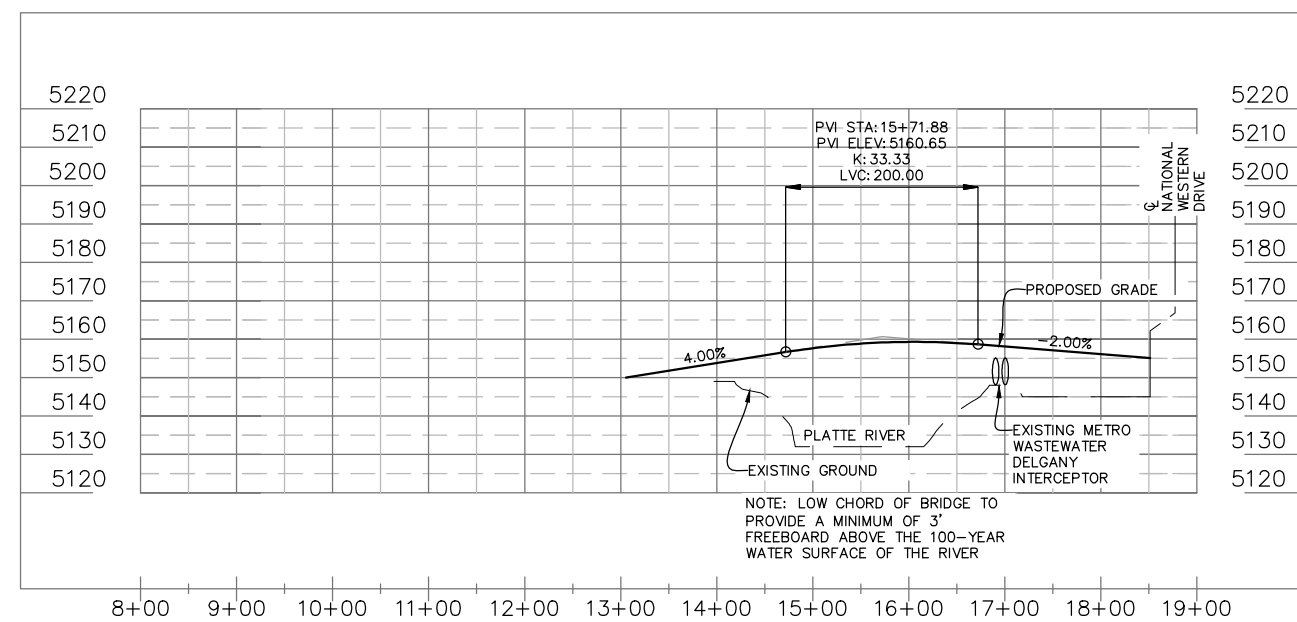
Summary

With the redevelopment of the National Western Center there is a unique opportunity to remove barriers that have hindered or limited connectivity both to and through the site. Internal circulation within the site is critical to the operations of the project at full build out and is vital to the experience of its users.

It is anticipated that the project will be phased and construction of the roadway system will need to follow the phasing of the project. As a result, interim connections should be made with consideration of pedestrian and bicycle connections during the design process.

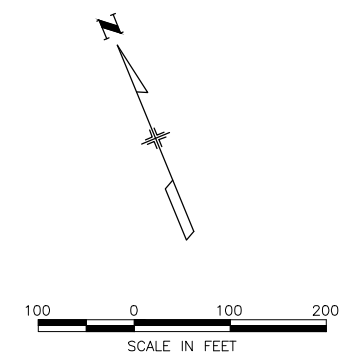
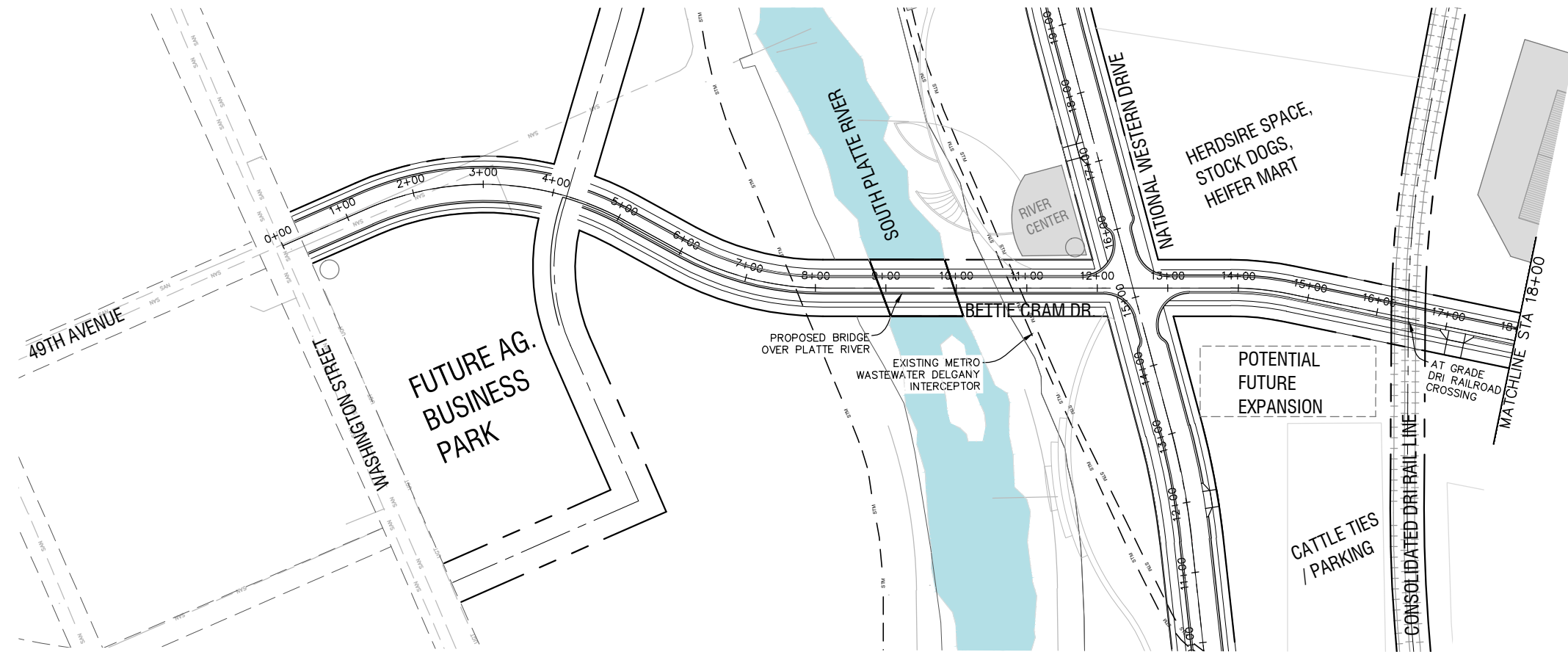


51ST AVENUE - PLAN AND PROFILE AT PLATTE RIVER

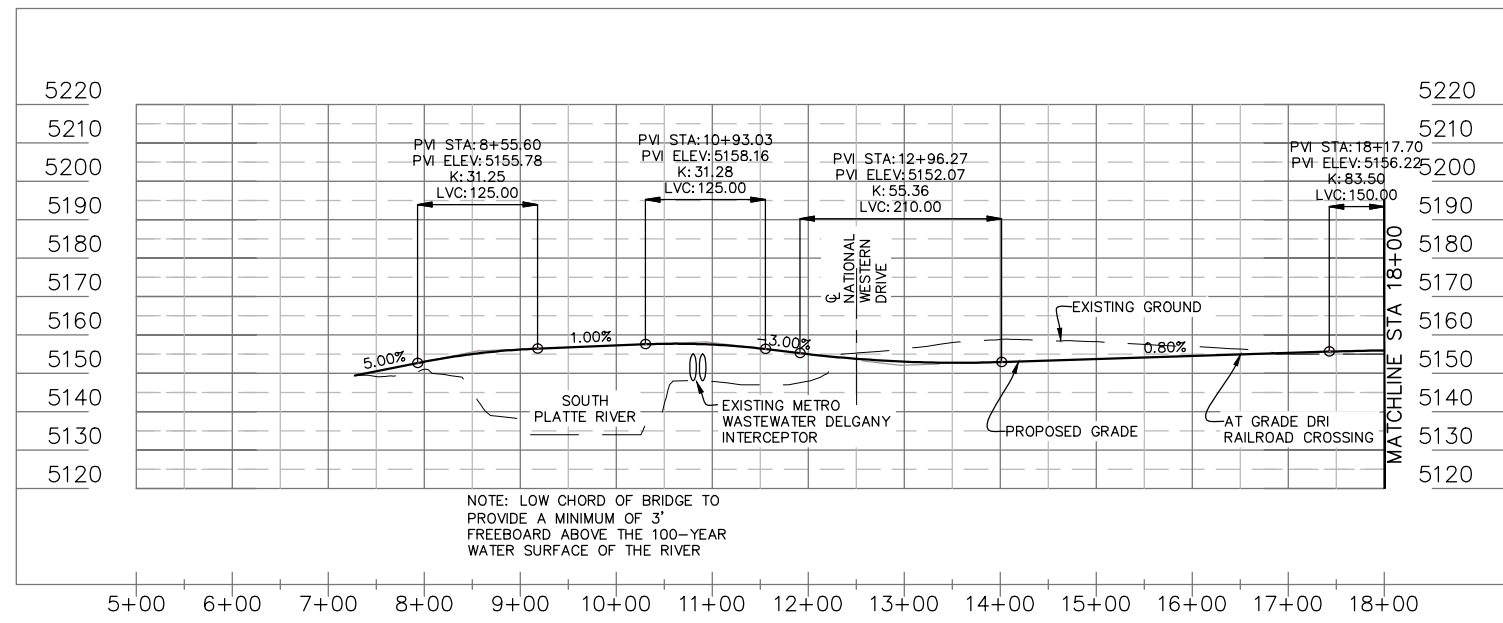


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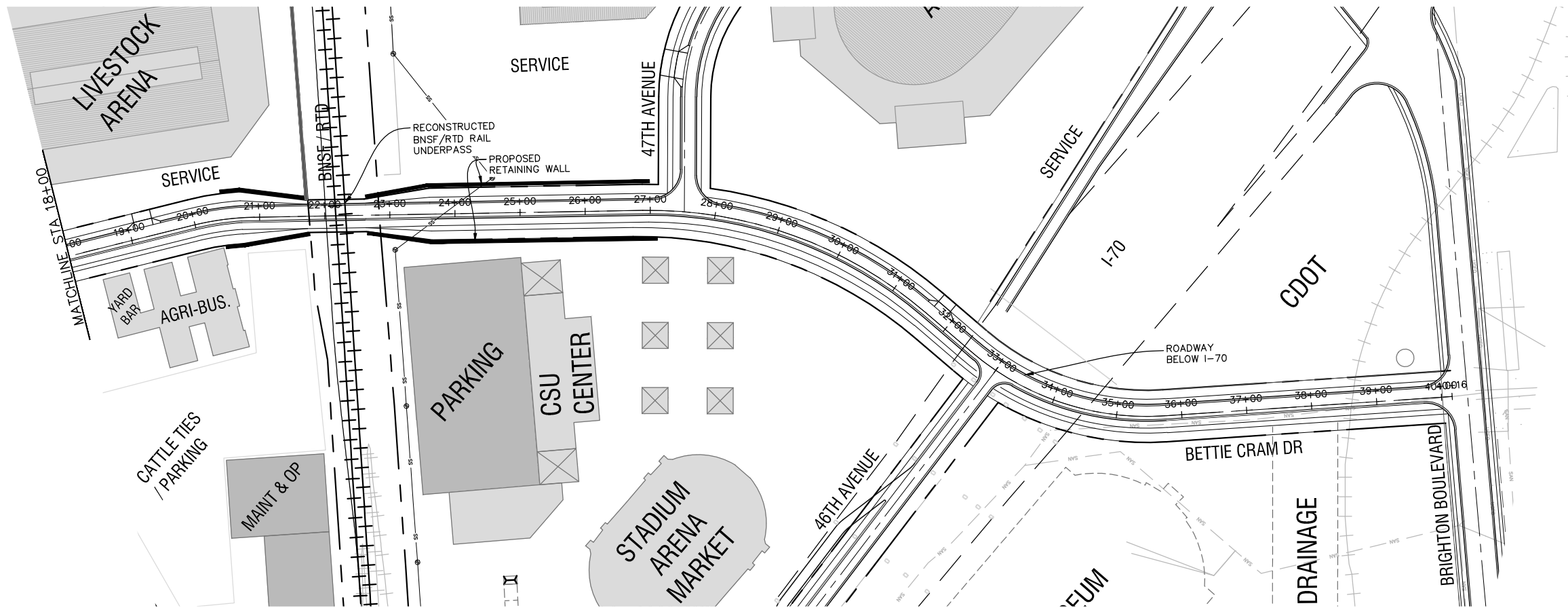


BETTIE CRAM DRIVE - PLAN AND PROFILE 1

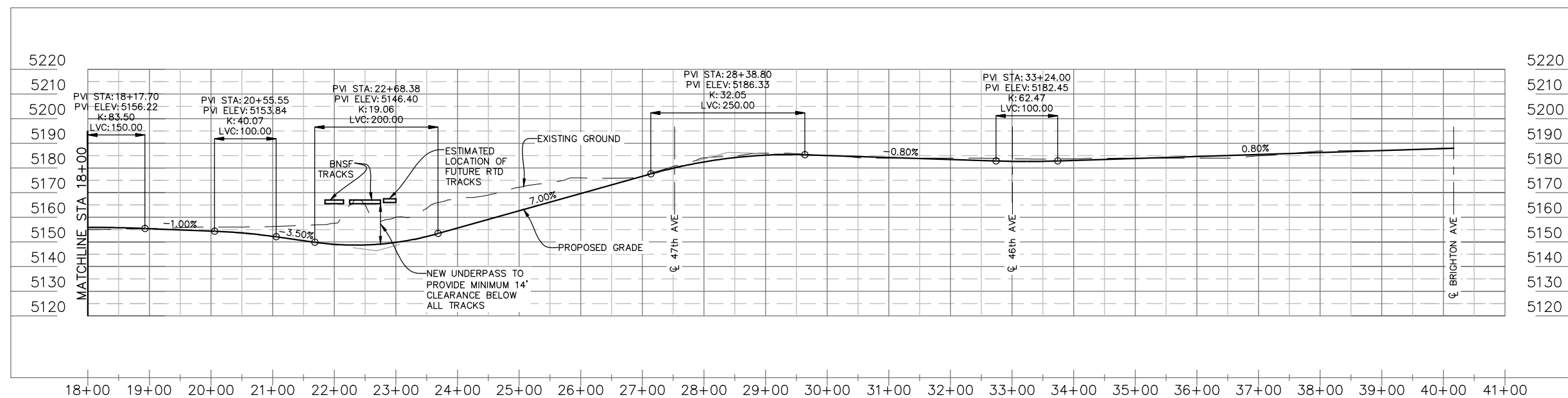


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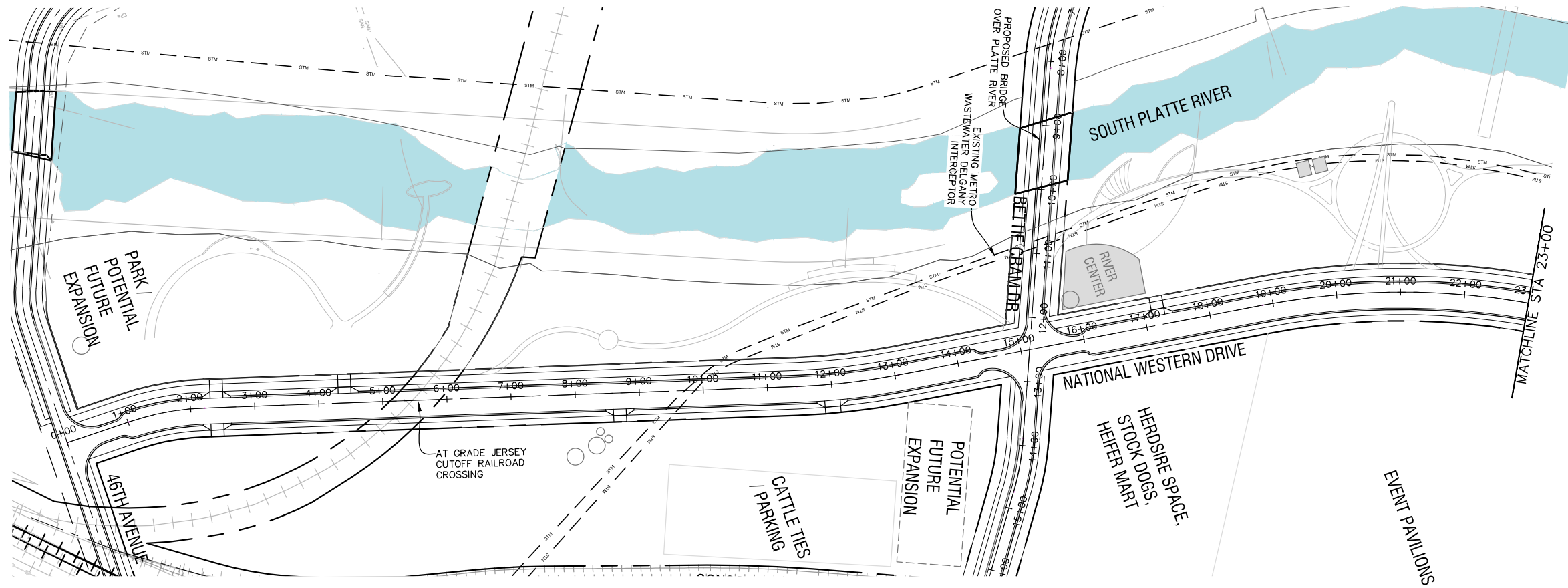


BETTIE CRAM DRIVE - PLAN AND PROFILE 2

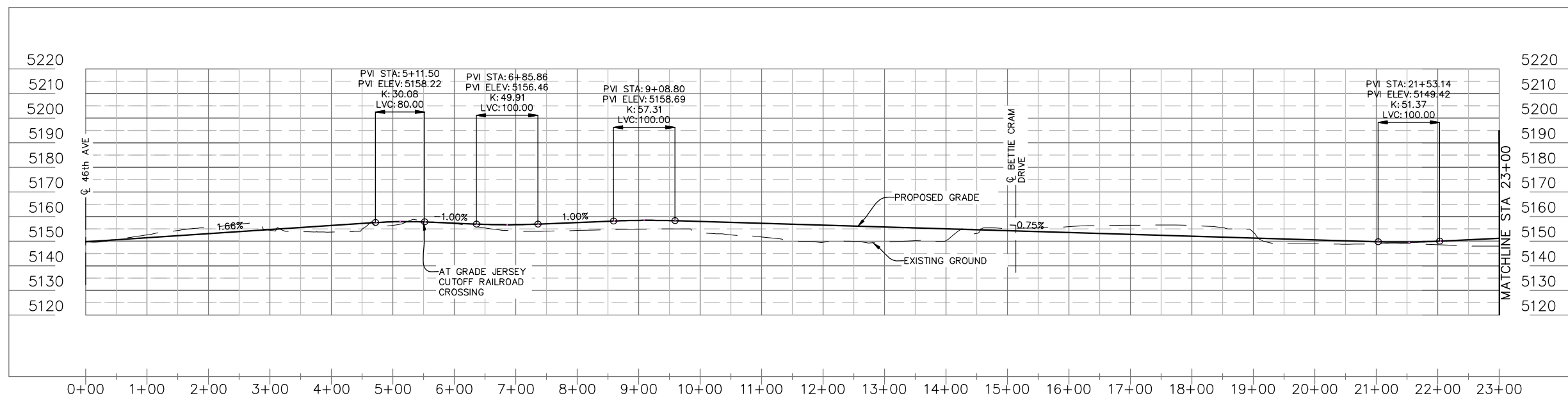


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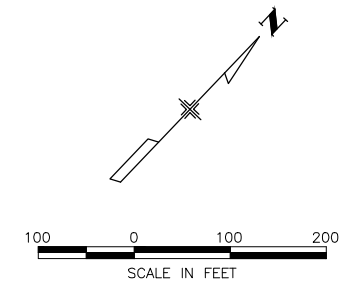
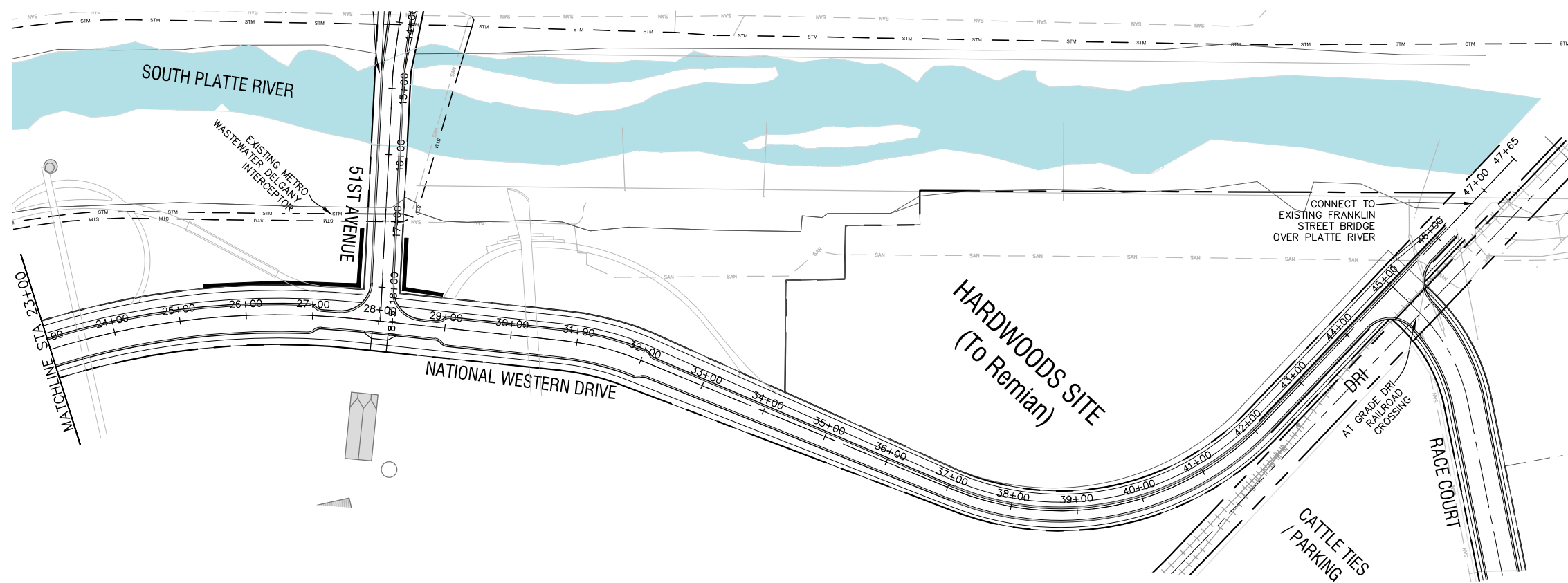


NATIONAL WESTERN DRIVE - PLAN AND PROFILE 1

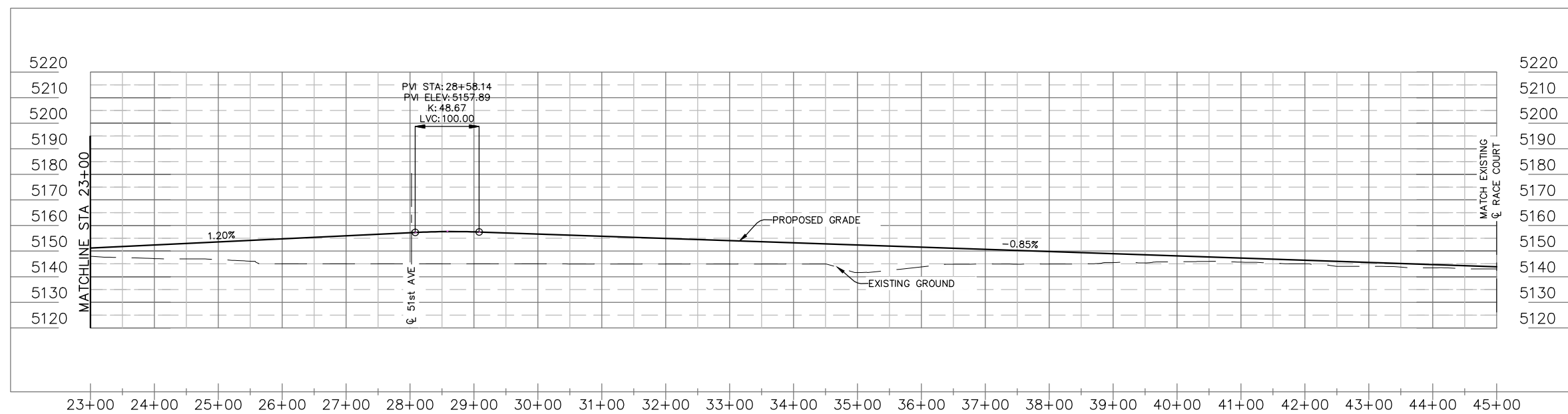


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NATIONAL WESTERN DRIVE - PLAN AND PROFILE 2



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Section 4: Water Supply and Distribution System

4.0 Introduction

This section describes the improvements for the water distribution system for the National Western Center to service the development based on the projected uses. Due to the preliminary nature of the planned uses within the site and meetings with Denver Water this plan does not model the demands for the site. Water lines are proposed to be located in the proposed streets to complete and connect the existing distribution systems through the project site. There will also need to be additional fire loops around the large buildings within the site.

4.1 Existing Water Distribution Facilities

The Water Improvement Plan represents the existing water distribution system within the project area. The existing water system bordering the project includes:

- South - 12-inch, 16-inch and 20-inch (from east to west) in 46th Avenue
- North – 12 and 36-inch (Conduit 83) in Race Court
- East - 12-inch in Brighton Boulevard
- West – 8-inch, 10-inch and 36-inch (Conduit No. 88) inch in Washington Street

Internal to the site the existing water system provides water to the existing buildings. Southeast of the BNSF rail line there is an 8 and 12-inch loop through 47th to 48th Avenue that provides service to the existing buildings as well as providing fire protection. West of the rail there is a 12-inch line which tees into the 16-inch line in 46th Avenue and follows National Western Drive where it becomes an 8-inch line serving the existing buildings and then connects back to the 12-inch distribution line in Race Court.

4.2 Design Criteria

All design of the new water distribution system are required to be in accordance with the latest version of the Denver Water Board Engineering Standards.

4.3 Proposed Distribution System Layout

The design team met with Denver Water to determine if there were any planned water system upgrades within the project limits or adjacent to the project. At this time, Denver Water has no upgrades planned within the project area or surrounding areas, and therefore, none have been included in this plan. The entire site lies within the same hydraulic zone, and no pressure regulating valves are anticipated in the proposed system. All new distribution lines will be located to match the proposed roadway alignments and site layout in order to provide the necessary pressure and flows to the proposed buildings. All existing water lines within the project limits, which are undersized or in conflict with the proposed improvements, will be removed or abandoned per Denver Water Standards.

Based on the anticipated demands at the time of this IMP, the proposed water distribution network is envisioned to include the following:

- Main Extensions
 - National Western Drive: 46th Avenue to Race Court – 12-inch

- Bettie Cram Drive: 46th Avenue to Washington Street – 12-inch
- 47th Avenue: Brighton Blvd to Bettie Cram Drive – 8-inch
- Fire Loops and Building Service line extensions
 - Equestrian Center – 6 to 8-inch
 - Livestock Center– 6 to 8-inch
 - Trade Show/Exhibition Hall – 6-inch
 - New Arena – 6-inch
 - 1909 Stadium Arena – 6-inch

Fire Protection

The City and County of Denver will continue to provide fire protection service for the National Western Center. All fire protection for the site will need to meet the requirements of the International Fire Code as amended. Specific locations of fire hydrants will be located as part of the detailed engineering design for the project. Locations of fire hydrants will be approved by the Denver Fire Department and fire hydrants will be consistent with the most current Denver Water Standards. Automatic sprinkler systems will be installed in most if not all of the buildings on the site.

4.4 Water Conservation

Per the National Western Center Sustainability and Regeneration Framework and Goals the following goals have been established for the site:

- Create a “net zero” District for water use.
- Use no potable water for landscaping.

A water balance study will need to be done to determine the baseline rainfall and groundwater use to frame the water use goals. Once the water balance study is complete a plan can be established for the project to meet the regeneration goals.

4.5 Conclusions

Final Design

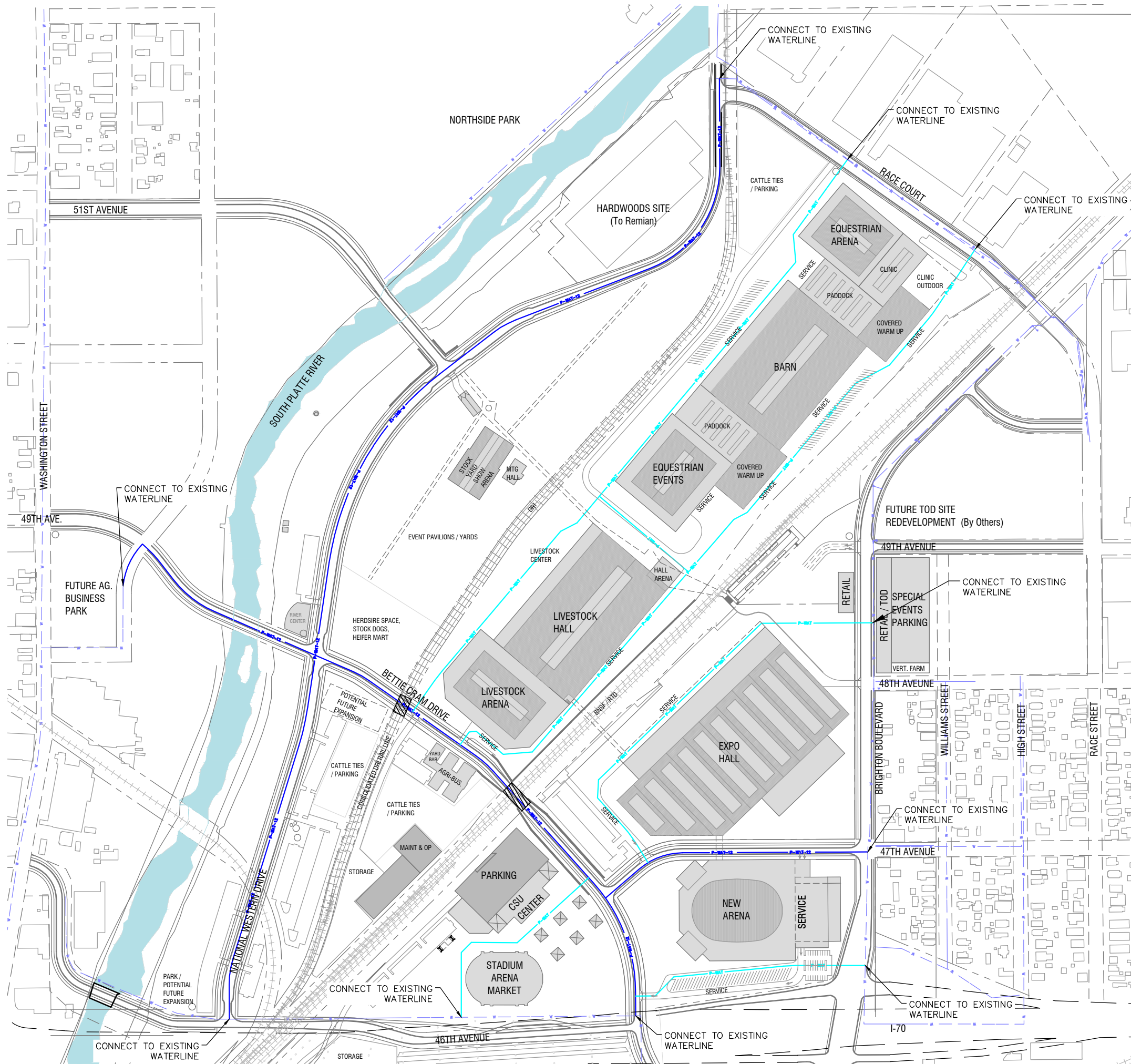
Final design of the water distribution system must be in accordance with Denver Water Board Engineering Standards and related criteria as well as all applicable International Fire Code that has been adopted by the City and County of Denver. All proposed mains will be required to be located in City and County of Denver right-of-way or easements dedicated to Denver Water per applicable standards.

Summary

With the redevelopment of the National Western Center there will need to be a complete internal distribution system constructed. It is anticipated at this time that there will not be any upgrades required to the existing system adjacent to the project. As the project moves to final design additional coordination will be required with Denver Water.

It is anticipated that the project will be phased and construction of the water lines will need to follow the phasing of the project. The water system will need to be constructed to provide service to the buildings and the proposed uses. As a result of phased construction, it is anticipated that interim

connections will need to be made to the existing system to provide necessary water service for certain phases of development.



LEGEND

- EXISTING WATER MAIN
- PROPOSED 12" WATER MAIN
- PROPOSED SERVICE AND FIRE HYDRANT LOOP
- RAIL CROSSING

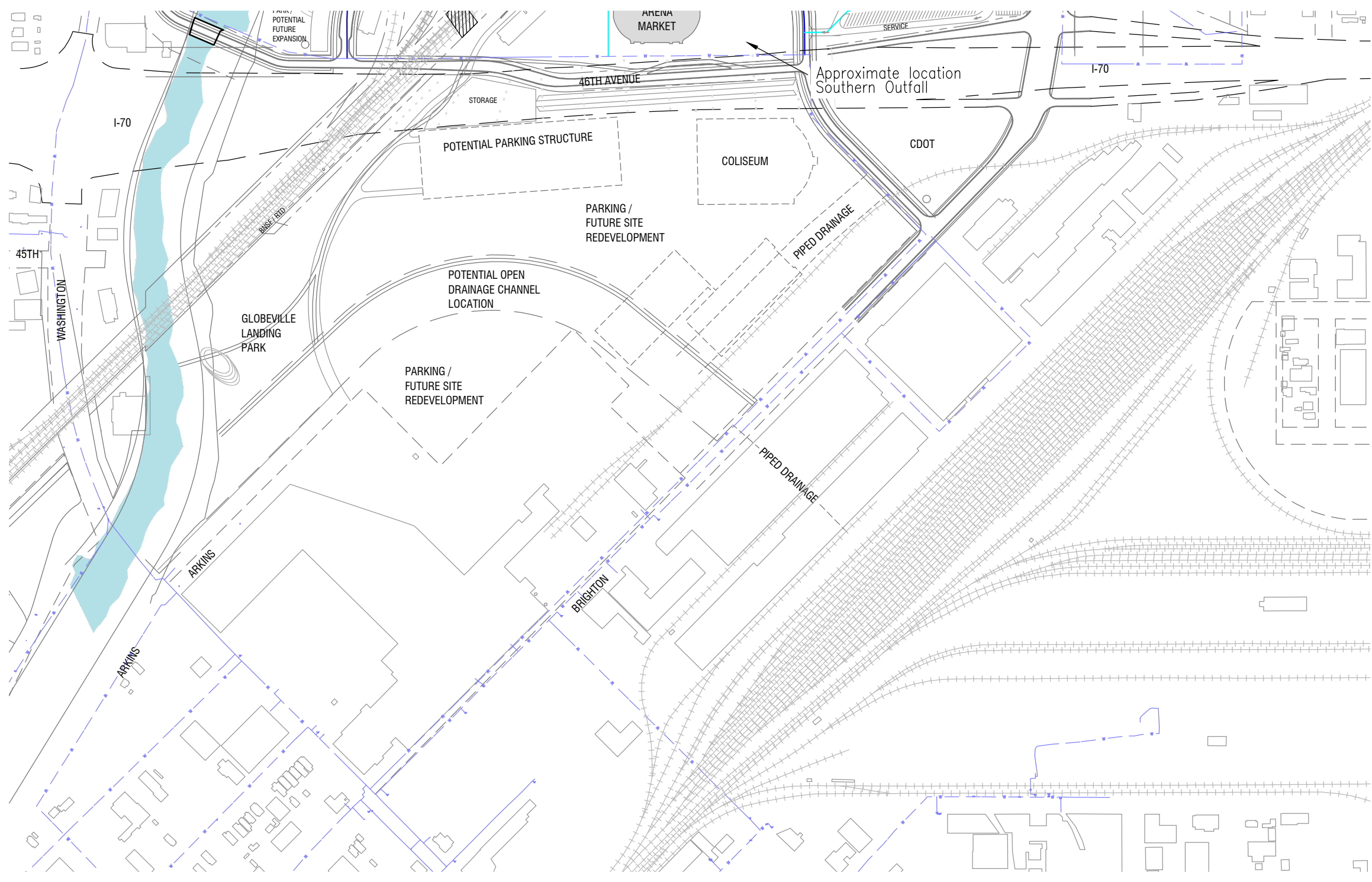


NWC WATER MAIN IMPROVEMENT EXHIBIT

FOR INFORMATION ONLY

- NOTE:**
1. ALL EXISTING UTILITIES ARE SHOW PER GIS INFORMATION.
 2. FIRE HYDRANTS NOT SHOWN.





LEGEND

- EXISTING WATER MAIN
- PROPOSED 12" WATER MAIN
- PROPOSED SERVICE AND FIRE HYDRANT LOOP
- RAIL CROSSING



NWC WATER MAIN IMPROVEMENT EXHIBIT

**FOR INFORMATION ONLY*

- NOTE:**
1. ALL EXISTING UTILITIES ARE SHOW PER GIS INFORMATION.
 2. FIRE HYDRANTS NOT SHOWN.
 3. PROPOSED SYSTEM TO BE DETERMINED BY FUTURE DEVELOPMENT.



Section 5: Wastewater Collection System

5.0 Introduction

This section describes the improvements for the wastewater collection system for the National Western Center to service the proposed development based on the project uses. Proposed sanitary sewer lines will be located to collect flows from the proposed buildings within the site as well as convey wastewater through the site from the Elyria neighborhood.

All wastewater flows will be treated by Metro Wastewater Reclamation District (MWRD). The flows will be conveyed to MWRD Delgany Interceptor on the west side of the site adjacent to the South Platte River.

5.1 Existing Wastewater Collection System

The Sanitary Sewer Plan represents the existing sanitary sewer collection system within the project area. There are two major trunk lines that serve the site and surrounding neighborhoods. MWRD owns and maintains the Delgany Interceptor that runs along the east side of the South Platte River. The Interceptor includes two large parallel pipes, the Delgany Common and the Delgany Interceptor. One pipe is 72-inch fiberglass reinforced polymer (FRP) and the other one is 78" reinforced concrete (RCP) pipe which collect wastewater from the majority of the metro area and convey the flows to the Metro Treatment Plant to the north of the project site. The interceptor pipes travel above ground through the site for nearly 2000 feet along the east bank of the river before entering a double 66-inch RCP siphon which transfers the wastewater beneath the South Platte River to the north bank where it connects with the 90" Denver Central Interceptor. There is also a Denver Wastewater Management Department (DWMD) interceptor ranging in size from a 54-inch to 60-inch line which collects wastewater from the existing neighborhoods to the east and flows southwesterly down Brighton Avenue for a short section before turning north and following the south side of the Riverside Cemetery to reach the east bank of South Platter River. It then flows along the east side of the river, to the south to reach the Delgany Interceptor siphon.



Internal to the site there are a number of smaller systems that collect wastewater from the existing buildings as well as an 8-inch line in 48th Avenue that collects flows from the Elyria neighborhood. These smaller internal lines connect to the Delgany and the DWMD interceptor.

See the Overall Site Plan for the proposed site plan and building uses.

5.2 Design Criteria

Since the total use building square footage of the buildings are not planned at this stage of the plan, flow and peak flow calculations will need to be completed to determine the final size of the internal collection system when more definitive building sizes and uses are known. All design will need to comply with the latest Denver Wastewater Management Divisions standards.

5.3 Proposed Collection System Layout

The proposed system has been laid out for the two distinct basins on the site, a basin east of the BNSF / RTD tracks and the basin to the west between the tracks and the river. East of the tracks the collection system will intercept flows from Williams and High Streets in the Elyria neighborhood at the intersection of Brighton Blvd and 48th Avenue. The flow will be conveyed to the west to the proposed upgraded collection system east of the NMRL. In addition service lines will be constructed to collect flows from development south of Bettie Cram Drive. The sewer will collect wastewater from the following buildings:

- Trade Show/Exposition Hall
- New Arena
- CSU Center and
- 1909 Stadium Arena

The flow will be conveyed to the Delgany Interceptor east of the BNSF rail lines and north of I-70. It is anticipated that any connection to the interceptor will be at existing connection points.

Flows from the basin west of the BNSF / RTD tracks will be collected by a new system which will follow the proposed Bettie Cram Drive and National Western Drive. The collection system will connect to the existing 54-inch DWMD interceptor just upstream of the existing Delgany siphon. Proposed buildings that will be served by this system are:

- Maintenance Building
- Livestock Exchange Building (existing building)
- Livestock Stadium Arena
- Livestock Hall
- Meeting Hall (existing building)
- Stockyard Show and Auction Arenas
- Portions of the Equestrian Center

Remaining portions of the Equestrian Center will be served by the existing sanitary sewer in Race Court. The existing Race Court system is a 12-inch vitrified clay pipe. If the pipe is determined to be in poor condition, it should be replaced.

5.4 Graywater Reuse

At the time that this report was written the Water Quality Control Division of the Colorado Department of Health and Environment (CDPHE) is investigating the reuse of graywater. Under HB13-1044:

Graywater Control Regulation No. 86, CDPHE is investigating the potential use of graywater, as the regulation continues to move forward reuse should be investigated for the site.

5.5 Conclusions

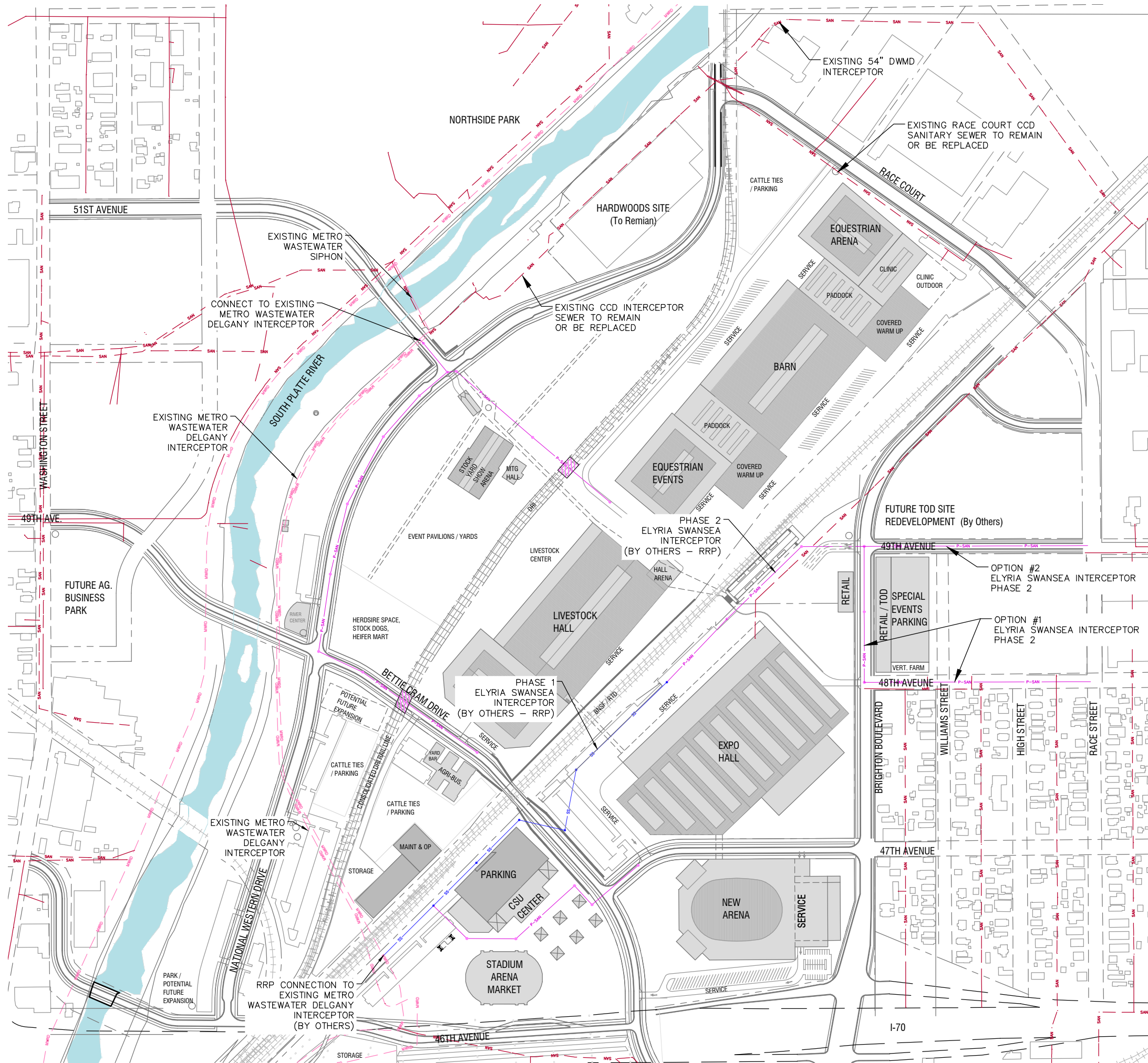
Final Design

Final design of the wastewater collection system must be in accordance with the City and County of Denver Wastewater Management Division Engineering Standards and related criteria. All proposed lines will be required to be located in City and County of Denver right-of-way or easements dedicated to the City in accordance with CCD standards.

Summary

With the redevelopment of the National Western Center there will need to be a complete internal sanitary sewer collection system constructed. It is anticipated at this time that there will not be any upgrades required to the existing system adjacent to the project. As the project moves to final design additional coordination will be required with the City and County of Denver.

It is anticipated that the project will be phased and construction of the wastewater system will need to follow the phasing of the project. The wastewater system will need to be constructed to provide service to the buildings. As a result of phased construction, it is anticipated that interim connections to the existing system may be necessary to provide interim service prior to completion of the entire collection system.



LEGEND

- SAN --- SAN EXISTING SANITARY SEWER
- MWD EXISTING MWRD INTERCEPTOR
- P-SAN PROPOSED SANITARY SEWER
- SS PROPOSED SANITARY SEWER BY OTHERS - RRP
- RAIL CROSSING

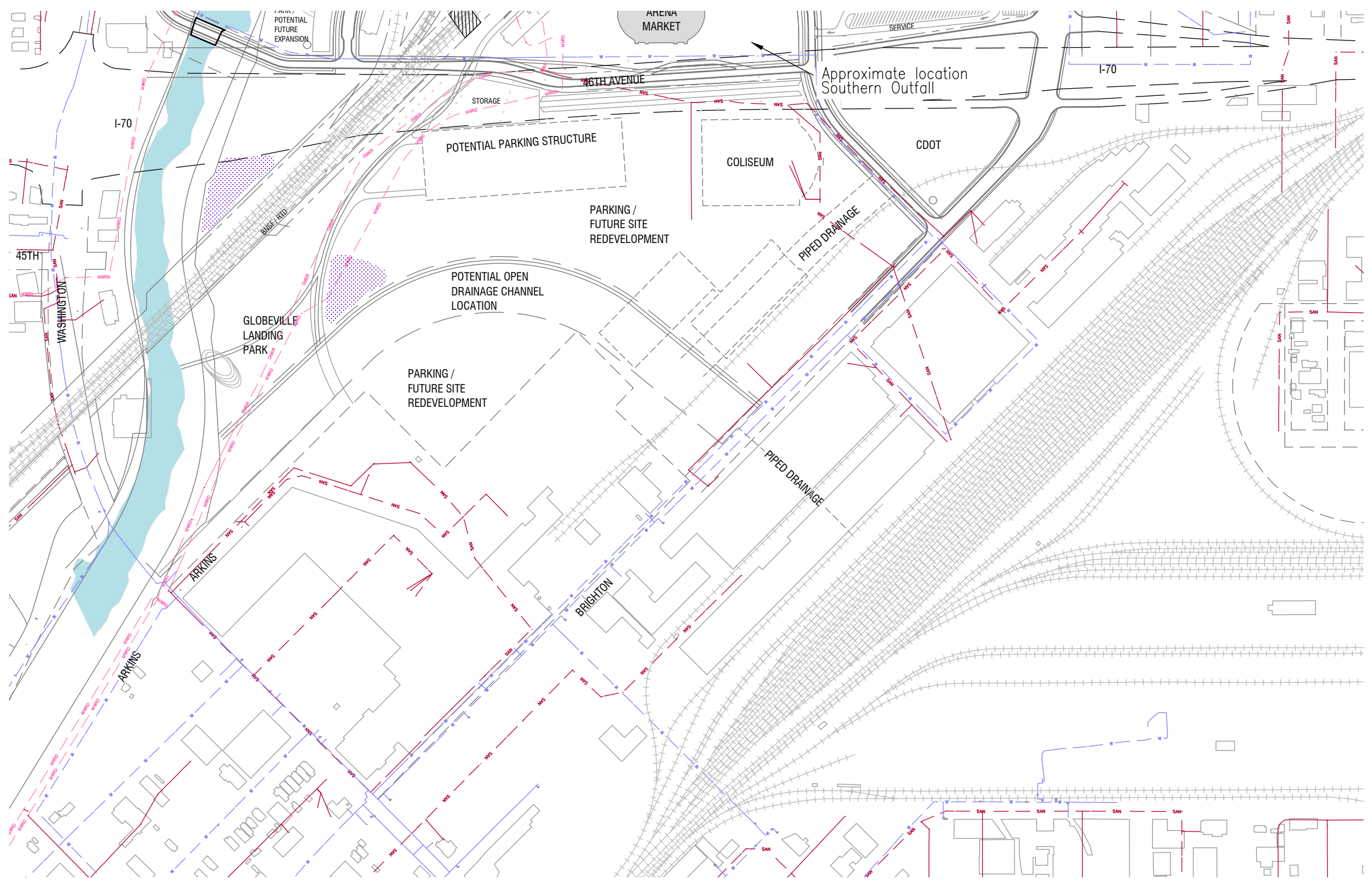


NWC SANITARY SEWER IMPROVEMENT EXHIBIT

FOR INFORMATION ONLY

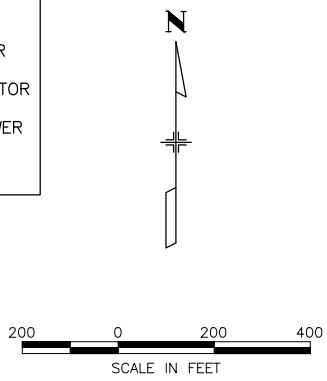
NOTE:
1. ALL EXISTING UTILITIES ARE SHOW PER GIS INFORMATION.





LEGEND

- --- EXISTING SANITARY SEWER
- --- EXISTING MWRD INTERCEPTOR
- --- PROPOSED SANITARY SEWER
- RAIL CROSSING



NWC SANITARY SEWER IMPROVEMENT EXHIBIT

FOR INFORMATION ONLY

- NOTE:**
1. ALL EXISTING UTILITIES ARE SHOW PER GIS INFORMATION.
 2. PROPOSED SYSTEM TO BE DETERMINED BY FUTURE DEVELOPMENT.



Section 6: Drainage

6.0 Introduction

Drainage is critical at the National Western Center as the site is at the downstream end of the largest drainage basin in the City and County of Denver. Currently the potential for flooding at the site is very high. The City has plans to mitigate the flooding potential to the site through planned drainage projects upstream of the project site, south of Interstate 70. With CDOT's planned lowering of the I-70 viaduct to below grade, the flows currently entering the site from the south and east will be cut off and need to be addressed prior to relocation of I-70. Currently there are two options to convey the 100-year event south of I-70 to the South Platte River to prevent this runoff from inundating the proposed lowering of I-70. The first are improvements that CDOT would make as part of the construction of I-70. The second is a system planned by the City and County of Denver that would intercept the flows along 40th Avenue and convey them to the river. For this IMP, it is assumed that these improvements will be in place prior to the start of construction of the National Western Center, and the site will only need to consider offsite flows from north of I-70. If improvements to I-70 are delayed, the storm drainage at NWC will need to be reevaluated.

6.1 Background

Studies

The City has studied the area at a Master Plan level through the City and County of Denver Storm Drainage Master Plan (September 2014). At the time of this master plan it was not known that the I-70 project would occur so the flow patterns and volumes as presented in this master plan are no longer valid considering the previously discussed planned drainage improvements south of I-70.

UDFCD is currently working on revising the Montclair Basin OSP. As this documents progresses and eventually approved, updates will need to be made to the assumptions in this IMP.

Site Drainage Criteria

Urban redevelopment projects require a comprehensive evaluation of the onsite and offsite drainage and integration with the other site infrastructure. Key principles for the site drainage of the project are:

- Provide a major storm conveyance system from the Elyria Swansea neighborhood to the South Platte River as well as major storm conveyance from the site to the river.
- Based on the program and space limitations of the site, 100-year detention volume will be difficult to provide, but should be investigated as part of final design. With the proximity of the site to the South Platte River, Denver may grant a variance for the 100-year detention for the site.
- Excess Urban Runoff Volume (EURV) will be required for the project. This will provide water quality treatment and release storm events near historic levels.
- Develop an integrated water quality treatment methodology for the site. Include end of pipe treatment as well as decentralized site specific Low Impact Development (LID) strategies.

- Treatment of water quality should be in conformance with the current CCD Water Quality Master Plan. An update to this plan is currently under review. Once approved, the updated plan and findings should be incorporated into the drainage and water quality improvements to improve the health of the river.

6.2 Design Criteria

Drainage improvements to the site will be required to follow the City and County of Denver and Urban Drainage and Flood Control District standards. Improvements within the river will require coordination with the US Army Corp of Engineers and Federal Emergency Management Agency (FEMA). A Conditional Letter of Map Revision (CLOMR) and final Letter of Map Revision (LOMR) will be required at location where there are crossings of the river or improvements to the river itself.

6.3 Major Drainage Basins

Major Drainage and Floodways

The Project is located within CCD Storm Drainage Master Plan (September 2014) I-70 & York Basin (0060-02). The project area ultimately flows to the west and outfalls directly to the South Platte River. The site will need to convey the runoff from a portion of the Swansea neighborhood through the site to the River.

A portion of the Project is located within a FEMA regulated floodplain based on the Flood Insurance Rate Map (FIRM) Number 0800460086H, last revised November 20, 2013. See the end of this section for a copy of the FIRM.



This image shows one possible improvement along the South Platte River as part of the NWC Master Plan.

Drainage Characteristics

The existing basin is collected by multiple inlets and is conveyed to the South Platte River. The developed runoff will be treated by a variety of proposed water quality facilities and EURV detention ponds. Detailed descriptions of the proposed major basins can be found in Section 6.4.

6.4 Drainage Sub Basins

Historic Drainage Patterns

The project is located in a portion of Basin 0060-02 in the City and County of Denver Drainage Master Plan. A portion of the basin flows to existing storm sewer in Brighton Boulevard and Race Court which discharges to the South Platte River at the Franklin Street bridge. The area located at the Denver Hardwoods building is to remain. It currently discharges directly to the South Platte River and will not be significantly modified with this Project. There are approximately 33 acres in the center of the basin which outfalls to the South Platte River, just south of the Denver Hardwoods building. Another existing outfall to the South Platte River within the basin is located adjacent to the Metro Wastewater Delgany Interceptor siphon. The majority of the drainage from the existing Stock Show buildings is conveyed by an existing 54-inch pipe to the South Platte River at the MacDonald Farm building. The area to the southwest of the Stock Show building and beneath I-70 is collected by a series of inlets and conveyed by an existing 48-inch storm sewer system along 46th Avenue, which outfalls to the South Platte River just north of I-70. The area south of I-70 is conveyed by an existing 48-inch storm system near the Denver Coliseum and outfalls to the South Platte River just south of I-70.

Onsite and Offsite Basins

The Master Plan for the Project splits the developed area into three main onsite basins, and one offsite basin. Basin 1 includes the majority of the site. It is approximately 122 acres and is bordered by Race Court on the north side, Brighton Boulevard on the east, and Betty Cram Drive/47th Avenue on the south. Basin 2 is approximately 60 acres, just south of Basin 1, and includes the remainder of the Project that is north of I-70. Basin 3 includes the entire portion of the Project area located south of I-70. The offsite basin which has been studied (Basin O-1) includes the portion of the Denver Storm Drainage Master Plan Basin 040 east of Brighton Boulevard and north of I-70.

Table 1. Sub-Basin Summary

Basin ID	Area	Imp (%)	C(2)	C(5)	C(10)	C(100)
B1	122	90%	0.73	0.75	0.77	0.83
B2	60	90%	0.73	0.75	0.77	0.83
B3	51	90%	0.73	0.75	0.77	0.83
O-1	110	60%	0.41	0.46	0.51	0.63

6.5 Hydrology

Design Rainfall

The hydrologic criteria to be used during the final drainage design of this project will be in compliance with UDFCD and CCD, which includes the one-hour precipitation values, as shown in Table 2.

Table 2. One-Hour Precipitation Values

Storm Event (years)	2	5	10	100
Rainfall Depth (inches)	0.95	1.34	1.55	2.57

Source: CCD Storm Criteria Table 5.1

Hydrologic Soil Group

The hydrologic soil group assumed for the initial Master Plan and the analysis within this report was type C soil. A soils and geotechnical report will need to be completed with subsequent phases for the Project for a more detailed analysis of the soil types throughout the Project.

Detention Discharge and Storage Calculation Method

Due to the proximity of the Project to the South Platte River, the overall approach to detention is to provide the Excess Urban Runoff Volume (EURV) for the developed area. While this method does not provide 100-year detention, it provides a more accurate historic discharge rate for regularly occurring storm events. Because the runoff from larger events will reach the South Platte River ahead of the peak flows for the South Platte River basin, it is more advantageous to provide historic release rates for the smaller events, and allow the larger events to enter the river without 100-year detention.



The area between the South Platte River and the proposed National Western Drive will be used for recreation and water quality

Table 3 below shows the required EURV for each of the onsite basins. Each basin should provide the full EURV at the end of the outfall pipe, prior to discharging into the South Platte River. In addition to the required volume for the Project, it is planned that Basin 1 will provide additional volume to assist in treating a portion of the offsite upstream basin. This volume should be maximized in the final design to provide as much volume for treatment as possible for the residential area to the east of Brighton Boulevard before it reaches the River. Based on how much storage volume is able to be provided, the flows upstream of the ponds will need to be diverted. Only the amount of flow treated by the ponds will be allowed to enter the facilities, while the remaining flows will have to bypass to the South Platte River.

Table 3. Detention Pond Summary

POND	Tributary Area (ac)	Required EURV (ac-ft)
Basin 1	122	11.1
Basin 2	60	5.5
Basin 3	51	4.6
TOTAL	244	22.1

Design Storm Recurrence Intervals

The storm sewer system will be designed to accommodate multiple storm events. Because of the need for the runoff to be safely conveyed across the railroad tracks to the South Platte River, the main outfall systems will be sized to convey the 100-year event.

It is recommended that the final design maximize the conveyance of the 100-year storm down Race Court in order to reduce the size of any new pipes crossing the BNSF and North Metro rails within the Project limits.

6.6 Water Quality Best Management Practices

Design Procedures for Water Quality

Water quality for the Project will be provided for all new improvements through an integrated approach. This will be accomplished using both end of pipe treatment with ponds designed to provide EURV treatment, as well as site specific treatments throughout the different areas of the Project. See below for site specific water quality treatment facilities.

Based on the preliminary findings of the City and County of Denver Water Quality Master Plan, high levels of sediment, nutrients, and bacteria are the biggest concerns in the basin. Approximately 135 acres of the 1,955 acre Elyria / Swansea basin is treated. With this in mind, final solutions to treat runoff at the project site should also maximize treatment of offsite basins.

Permanent BMPs

Where possible within the site, decentralized water quality treatment methods should be provided. However, due to the co-mingling of treated and untreated water within the storm sewer system, the

end of pipe EURV ponds are recommended as described above. During the final design, it may be determined that the end of pipe EURV sizes may be reduced based on the different treatments provided upstream. A separate treated water outfall should also be considered where possible to prevent the co-mingling with untreated water and allowing for a larger portion of the off-site basin to be treated within the EURV ponds.

The site specific local water quality treatment should consist of facilities such as, but not limited to:

- Blue Roofs and Green Roofs

Possible for all new structures on site, but requires a structural design to accommodate the additional weight loading. Because of the potential cost impact to the building, blue and green roofs should mainly be considered where there is not space within the adjacent area to accommodate other types of facilities.



Recommended Use:

- Roof tops
- Limited / unknown pollutant removal

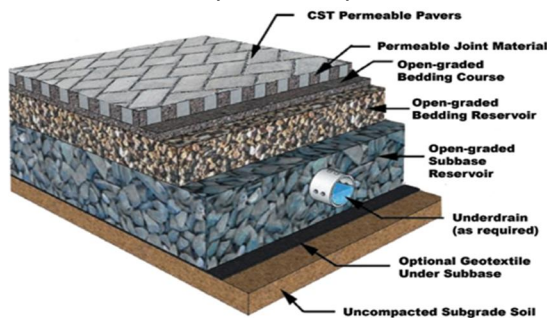
- Permeable Pavers

Permeable pavers are an effective way to provide filtration of runoff in areas that are to be exclusively hardscape. There are many plaza and parking areas within the master plan which should be considered for use of permeable pavers.

REMOVAL EFFICIENCY	
Pollutant	Efficiency
Sediments / Solids	Very Good
Nutrients	Good
Total Metals	Good
Bacteria	Unknown

Recommended Use:

- Parking stalls in lots
- On-street parking
- Plaza areas
- Streetscape hardscape areas



Bioretention

Bioretention should be used in many locations throughout the site. This includes both porous landscape detention areas (PLDs), as well as sand filters. Bioretention is effective in areas such as landscape buffers, parking lot islands, streetscape amenity zones, and other open pervious areas. While both PLDs and sand filters limit the options for vegetation, they are effective ways to provide filtration of runoff in areas of all sizes.

Recommended Use:

- Parking Lot Islands
- Landscape Buffers
- Passive Open Space

- Bio-swales and Grass Buffers

In areas where grass swales are possible for above ground conveyance of runoff, bio-swales should be considered. Bioswales promote infiltration during smaller events and also filtration during larger runoffs. Grass buffers should be used at all locations where runoff flows from impervious areas to the drainage system.

Recommended Use:

- Landscape Buffers
- Open Space
- Roadway swales
- Roof drain discharge points

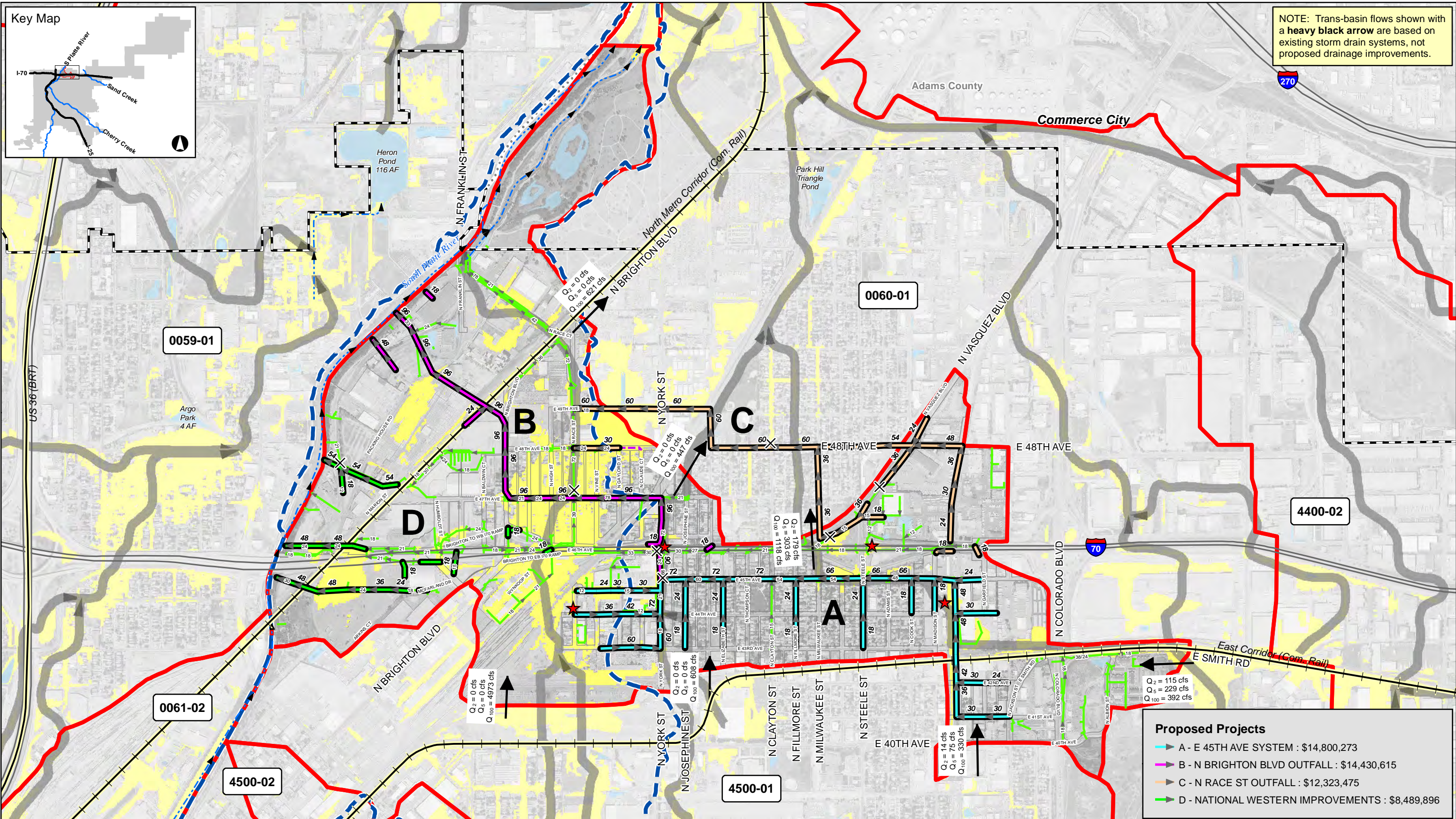
REMOVAL EFFICIENCY	
Pollutant	Efficiency
Sediments / Solids	Very Good
Nutrients	Moderate
Total Metals	Good
Bacteria	Moderate



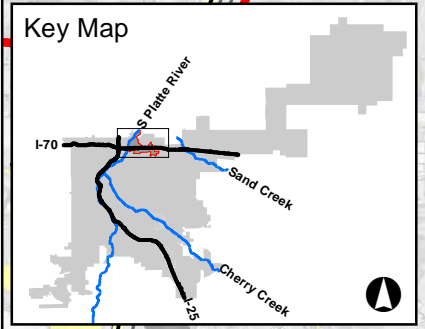
REMOVAL EFFICIENCY	
Pollutant	Efficiency
Sediments / Solids	Good
Nutrients	Moderate
Total Metals	Good
Bacteria	Poor



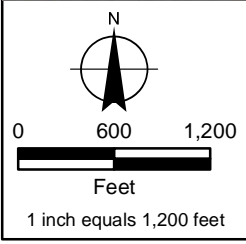
A map and table is provided in the Appendix which provides recommended areas for these different water quality facility options. The exact locations and types of treatment will be detailed in the preliminary and final design of the site plans and should make every effort to provide the appropriate treatment for the expected pollutants in each drainage sub-basin.



NOTE: Trans-basin flows shown with a heavy black arrow are based on existing storm drain systems, not proposed drainage improvements.



Proposed Projects	
	A - E 45TH AVE SYSTEM : \$14,800,273
	B - N BRIGHTON BLVD OUTFALL : \$14,430,615
	C - N RACE ST OUTFALL : \$12,323,475
	D - NATIONAL WESTERN IMPROVEMENTS : \$8,489,896



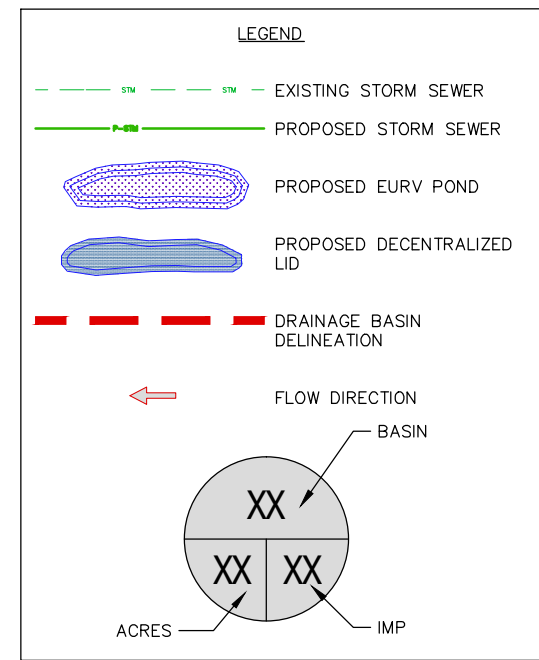
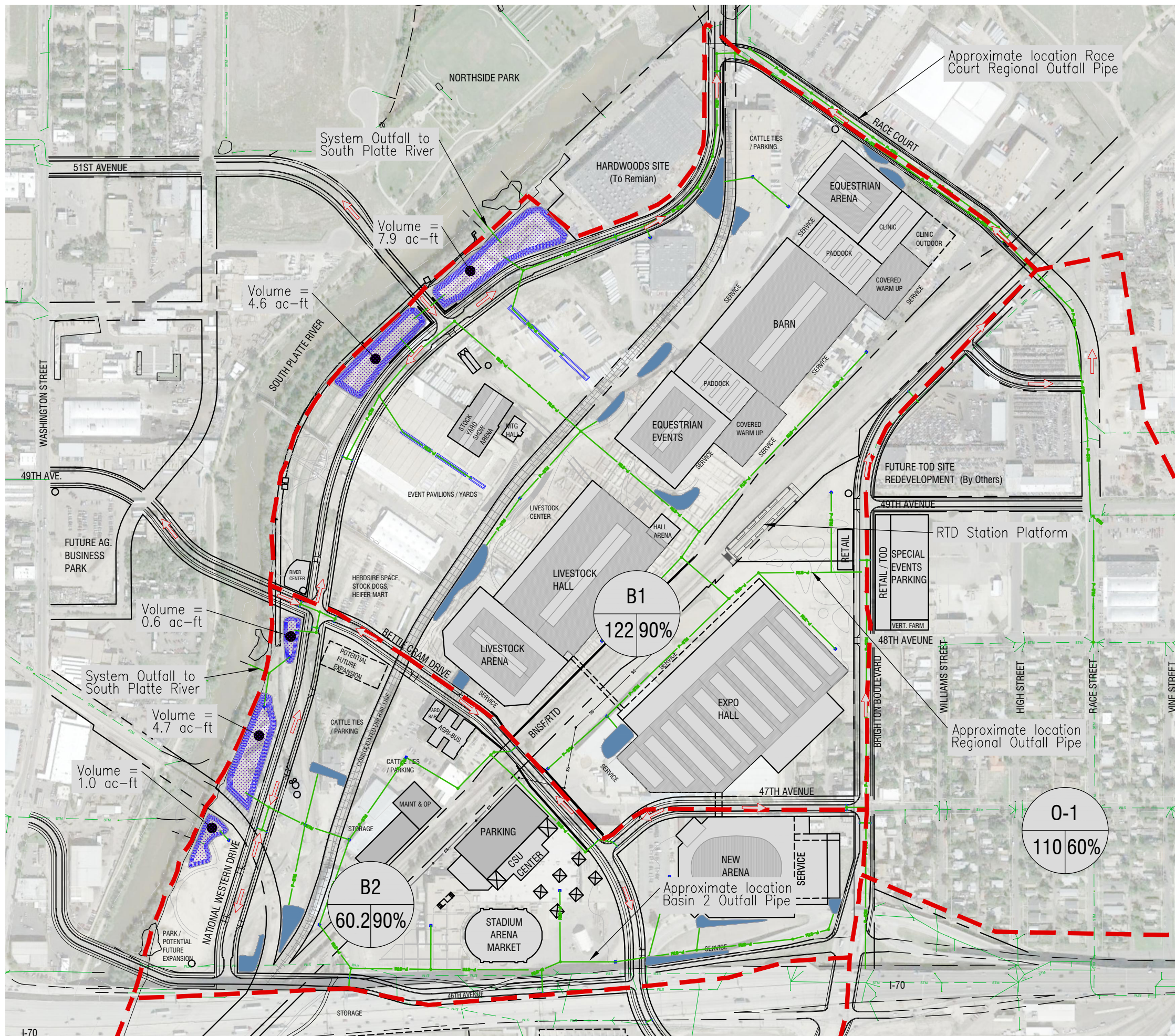
For Detailed Hydrology
See Technical Appendix
and Work Map

Legend					
	Collection System Boundary		Proposed Storm Pipe		Existing Storm Pipe
	Topographic Basin Boundary		UDFCD Study Recommendations		Proposed Detention Basin
	Thalweg		Proposed Pipe Disconnect		Existing Basin
			Significant Flooding Location		Potential Inundation Area
			Existing Transit Line		Planned Transit Line
	City and County Boundary		Other Municipalities		Other Counties

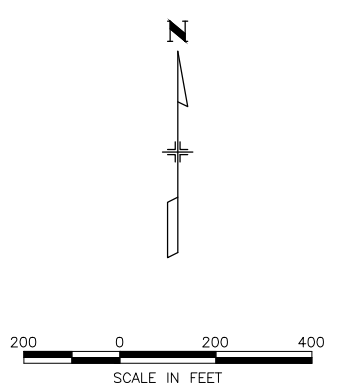
Basin 0060-02 I-70 & York

Denver Storm Drainage Master Plan

FILE: G:\gis_projects\DenverDrainage_2014\data\apps\Mapbook\2014_SDMP_Mapbook.mxd, 8/19/2014, chris_martin



BASIN	AREA	IMP	INFO	REQ. EURV
B1	122.0	90%		11.1 ac-ft
B2	60.2	90%		5.5 ac-ft

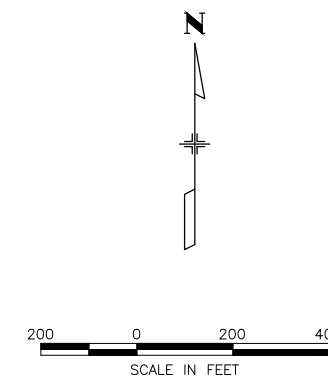
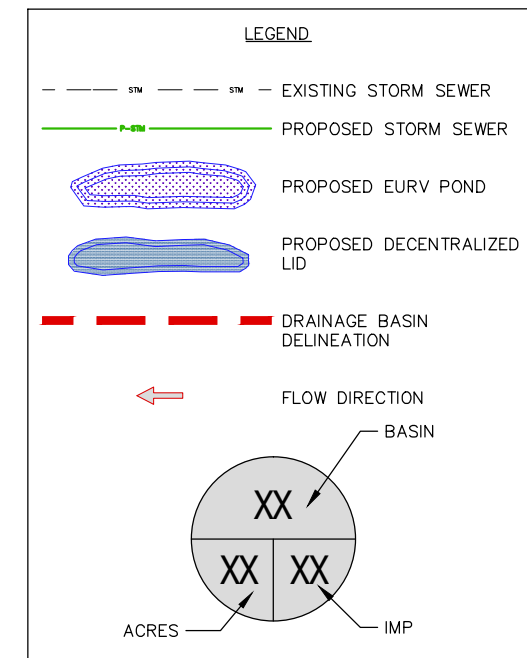
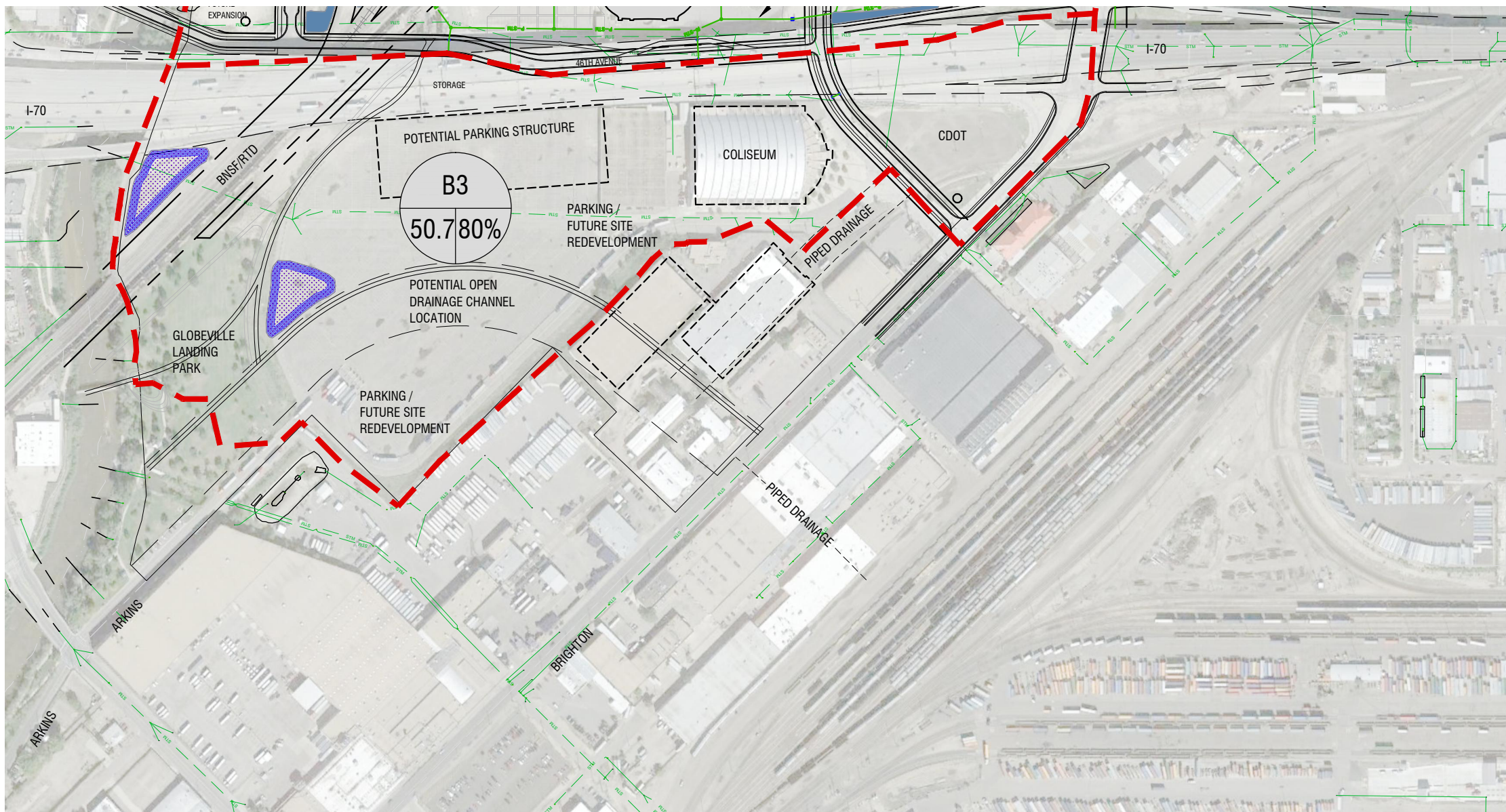


- NOTE:
- VOLUMES SHOWN ARE APPROXIMATE.
 - ALL EXISTING UTILITIES ARE SHOW PER GIS INFORMATION.
 - SEE MONTCLAIR OSP FOR OUTFALL & PIPE SIZING.
 - STORM SEWER INTERNAL TO THE SITE WILL CONVEY THE 100-YR EVENT.

NWC OVERALL DRAINAGE BASIN EXHIBIT

FOR INFORMATION ONLY





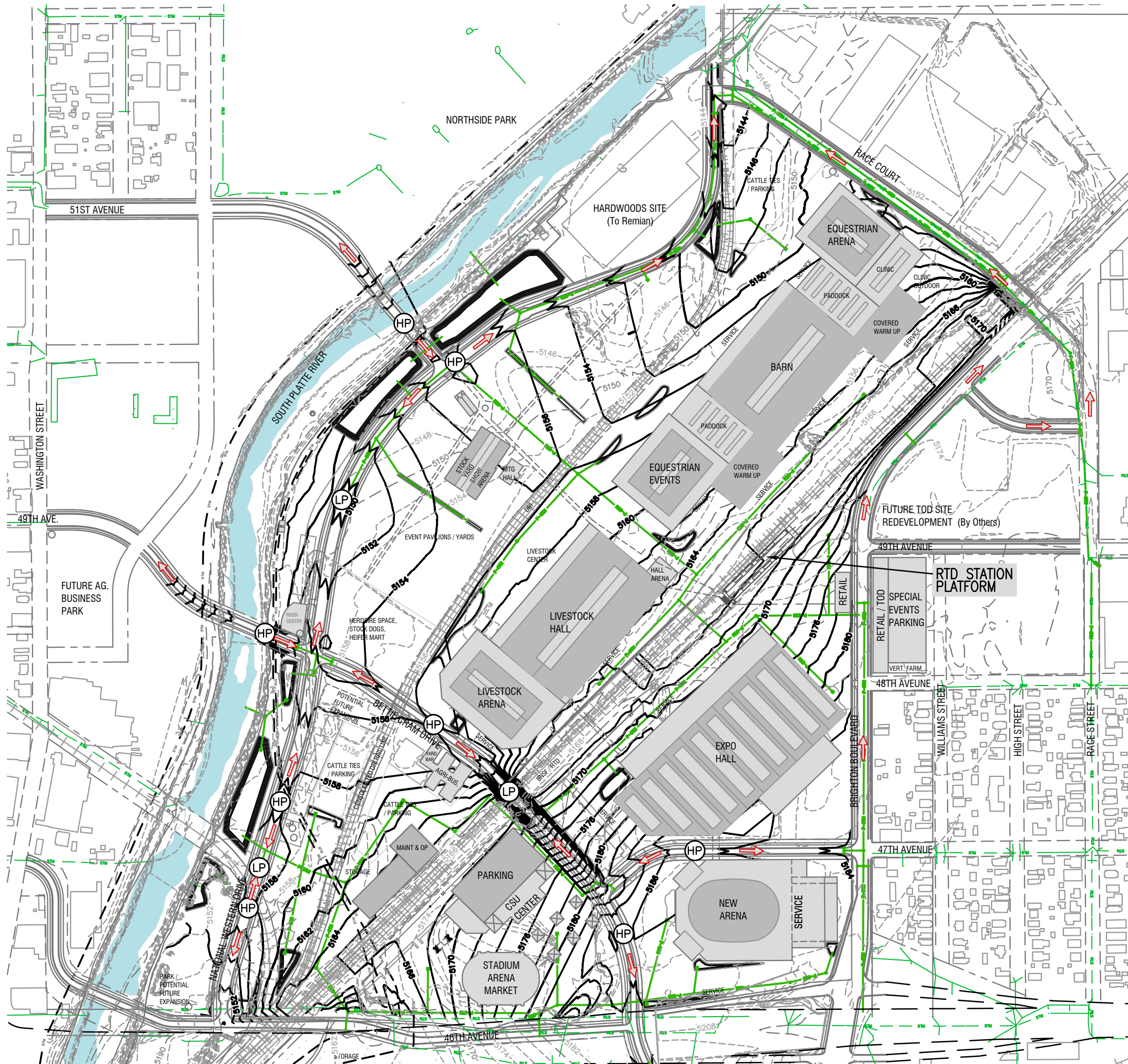
BASIN	AREA	IMP	INFO	REQ. EURV
B3	50.7	80%		4.1 ac-ft

NOTE:

1. VOLUMES SHOWN ARE APPROXIMATE.
2. ALL EXISTING UTILITIES ARE SHOW PER GIS INFORMATION.
3. SEE MONTCLAIR OSP FOR OUTFALL & PIPE SIZING.
4. PROPOSED FUTURE DEVELOPMENT TO DETERMINE STORM SEWER SYSTEM LAYOUT.

**NWC OVERALL DRAINAGE BASIN EXHIBIT
*FOR INFORMATION ONLY***





LEGEND

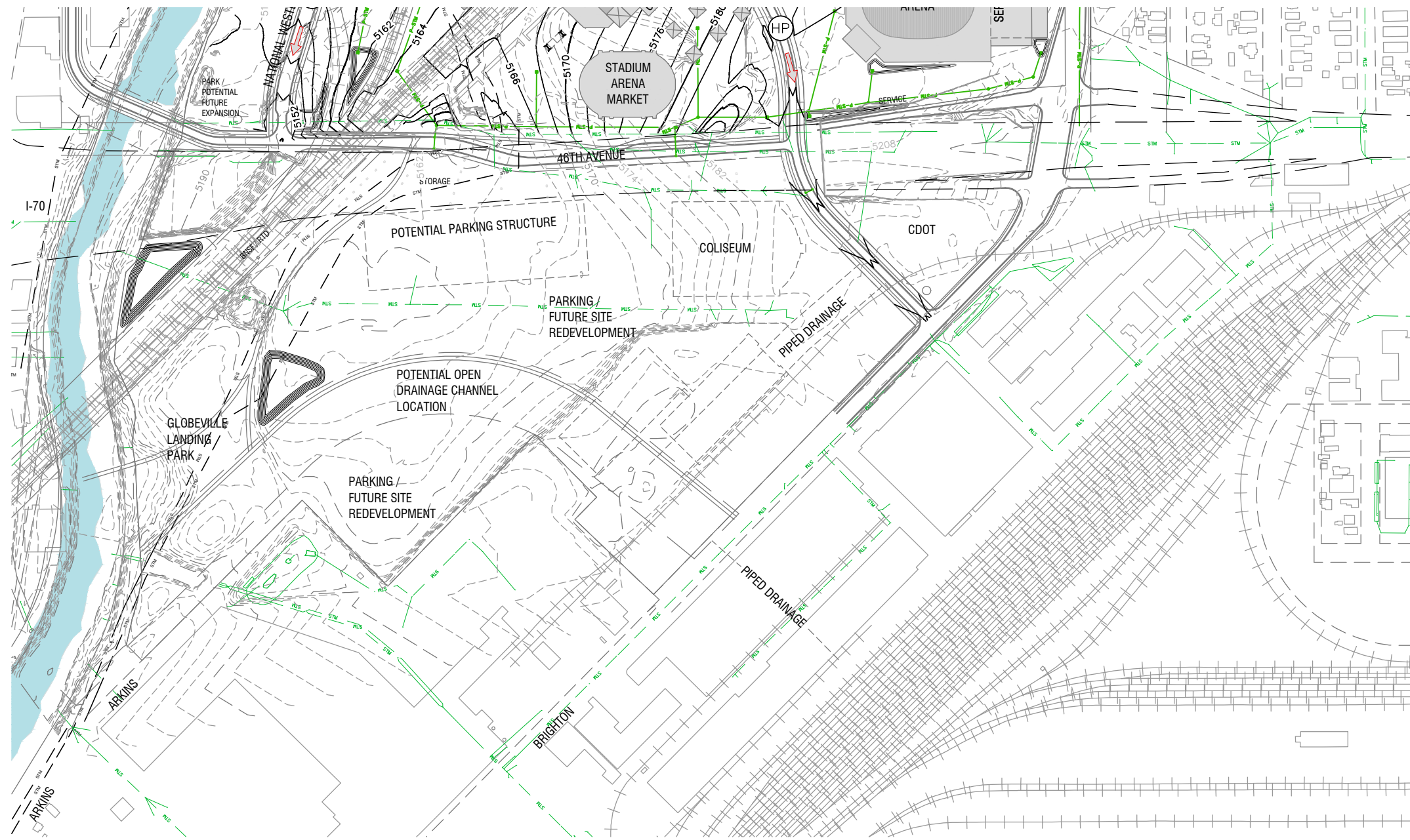
--- 5300 ---	EXISTING MAJOR CONTOUR
--- 5300 ---	EXISTING MINOR CONTOUR
— 5300 —	PROPOSED MAJOR CONTOUR
— 5300 —	PROPOSED MINOR CONTOUR
(HP)	HIGH POINT
(LP)	LOW POINT
←	FLOW DIRECTION



- NOTE:**
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 2. PROPOSED CONTOURS ARE SHOWN FOR INFORMATION ONLY.

NWC OVERALL GRADING PLAN EXHIBIT
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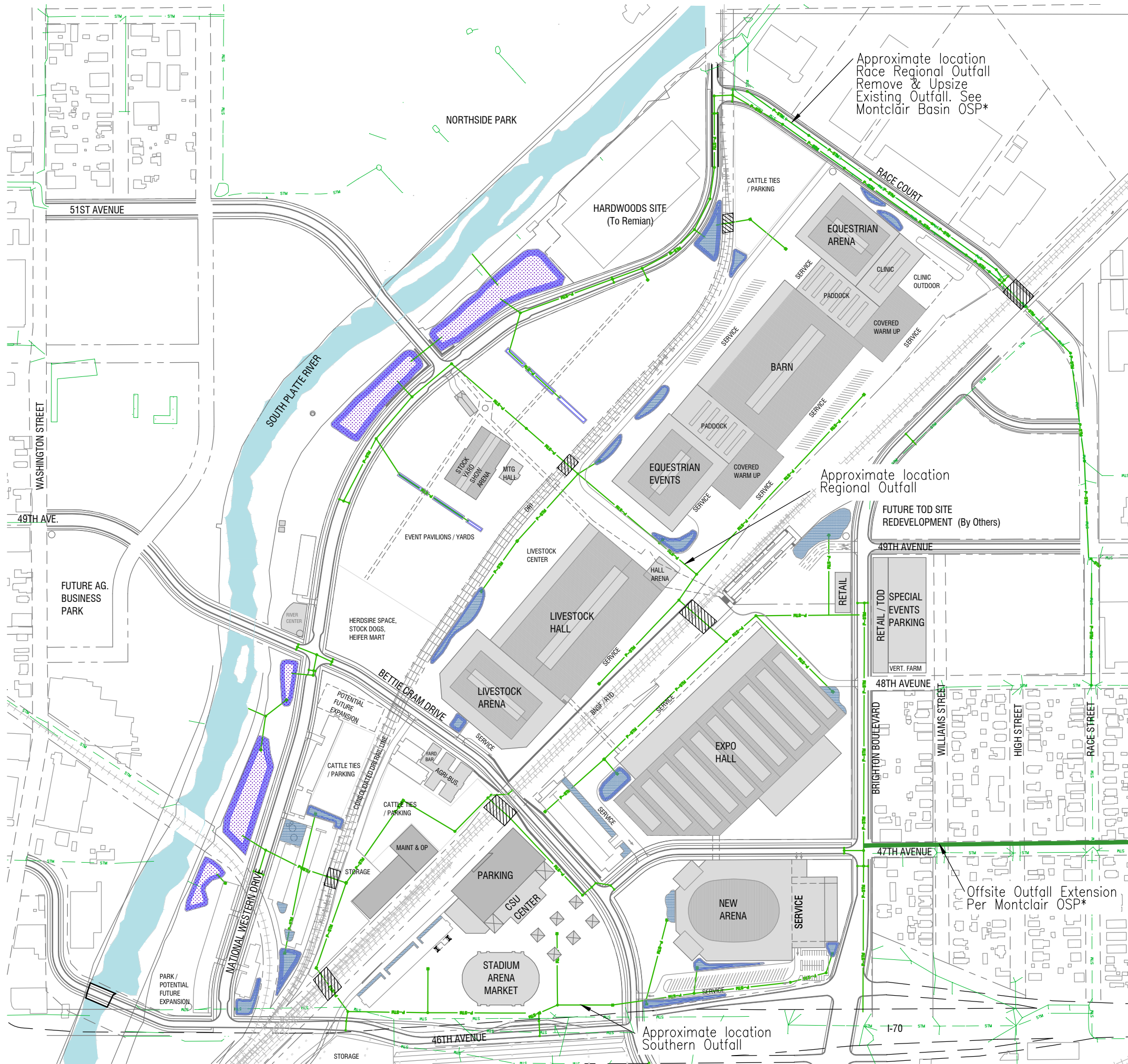


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⊙ HP	HIGH POINT
⊙ LP	LOW POINT
←	FLOW DIRECTION

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LEGEND

- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- PROPOSED EURV POND
- POTENTIAL DECENTRALIZED LID
- RAIL CROSSING

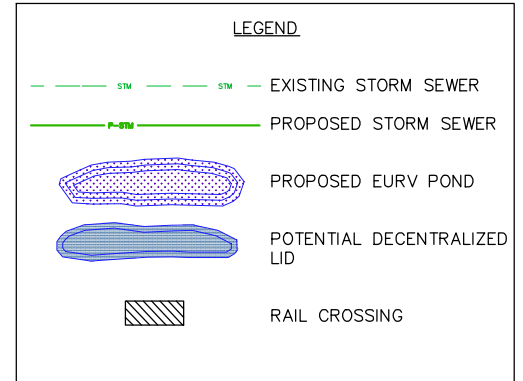
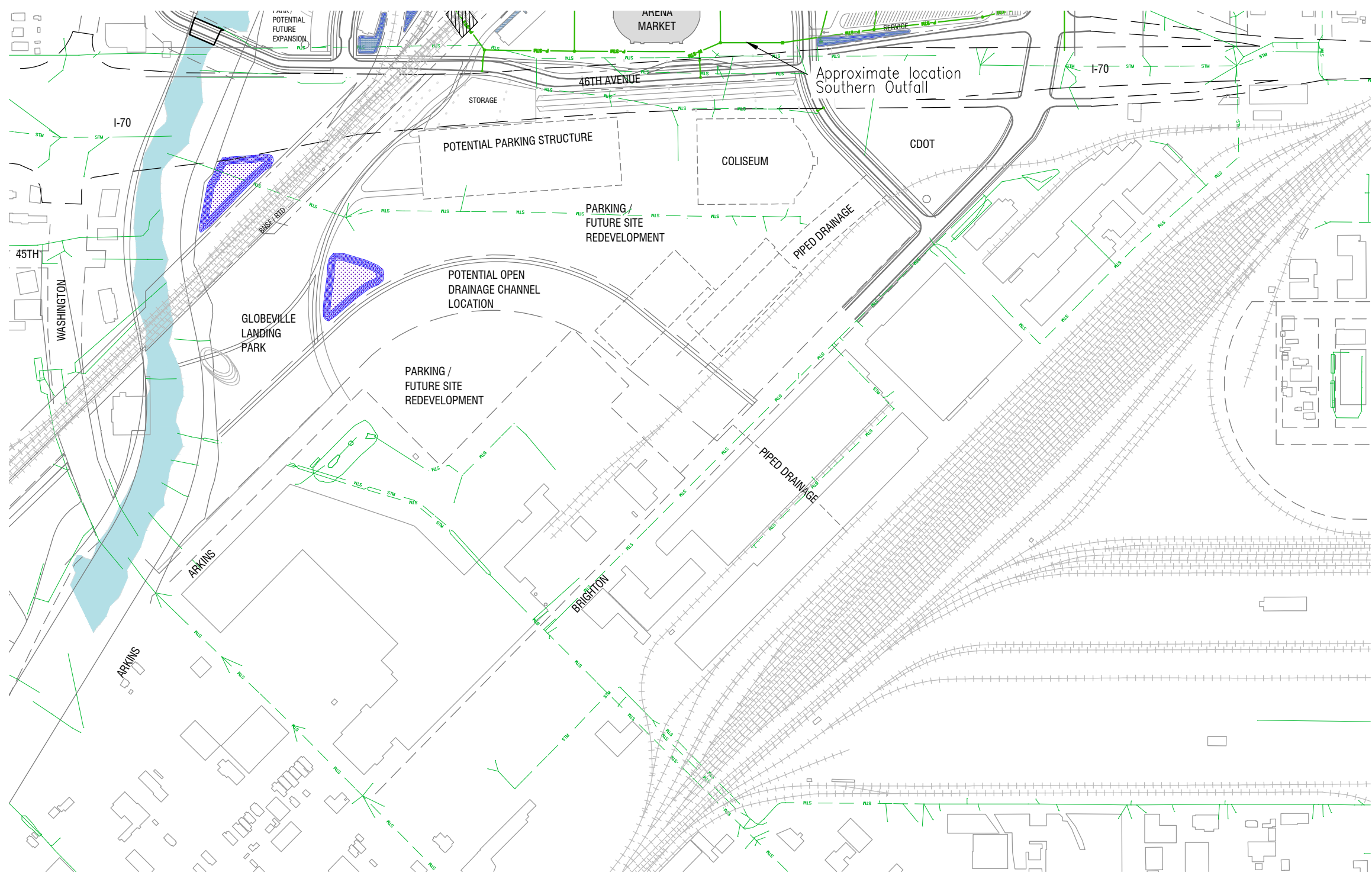


NWC DRAINAGE IMPROVEMENT EXHIBIT

FOR INFORMATION ONLY

- NOTE:**
1. ALL EXISTING UTILITIES ARE SHOWN PER GIS INFORMATION.
 2. MONTCLAIR OSP HAS NOT BEEN APPROVED AS OF IMP SUBMITTAL DATE.



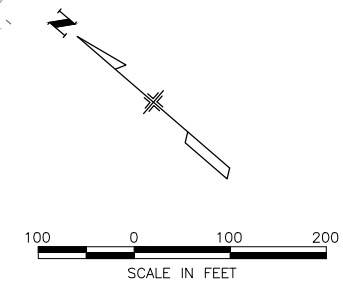
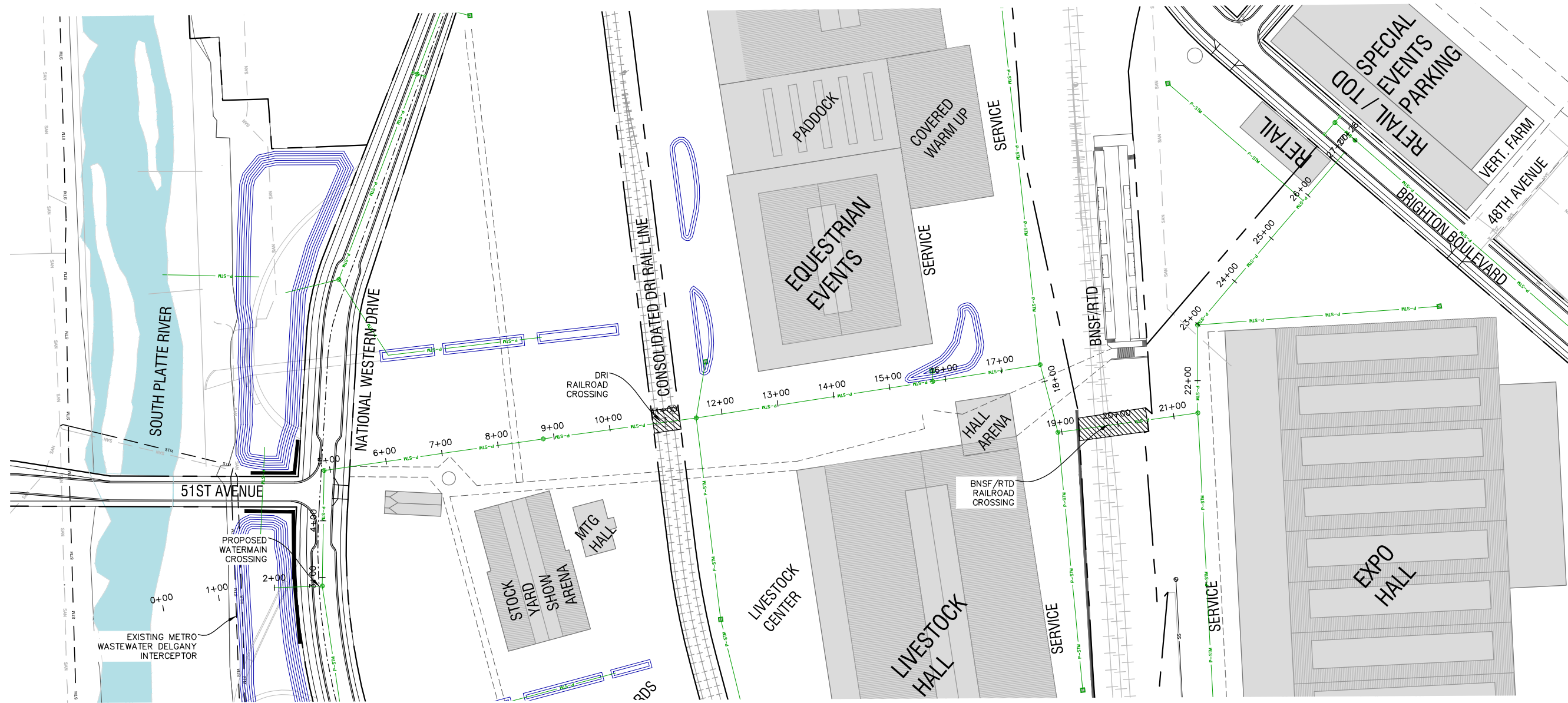


NWC DRAINAGE IMPROVEMENT EXHIBIT

FOR INFORMATION ONLY

- NOTE:**
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 2. MONTCLAIR OSP HAS NOT BEEN APPROVED AS OF IMP SUBMITTAL DATE.
 3. PROPOSED SYSTEM TO BE DETERMINED BY FUTURE DEVELOPMENT.

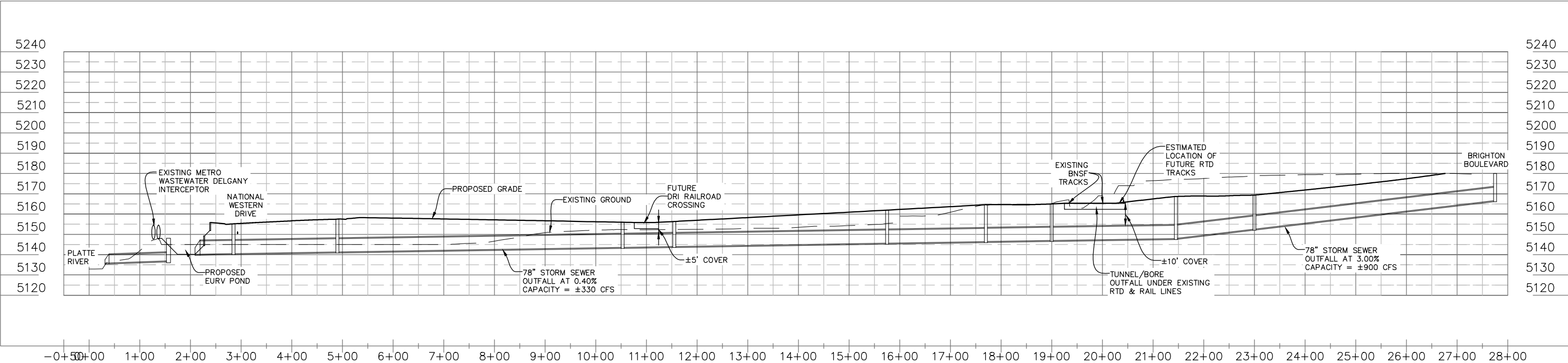




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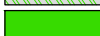

***FOR
INFORMATION
ONLY***

STORM SEWER OUTFALL - PLAN AND PROFILE



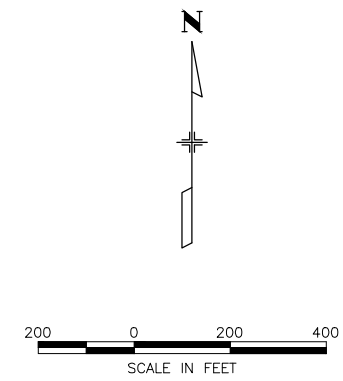


LEGEND

-  LOW IMPACT DEVELOPMENT
-  BIOSWALE
-  EURV POND
-  PERMEABLE PAVERS
-  GREEN ROOF
-  GREEN STREET
-  PROPOSED STORM SEWER

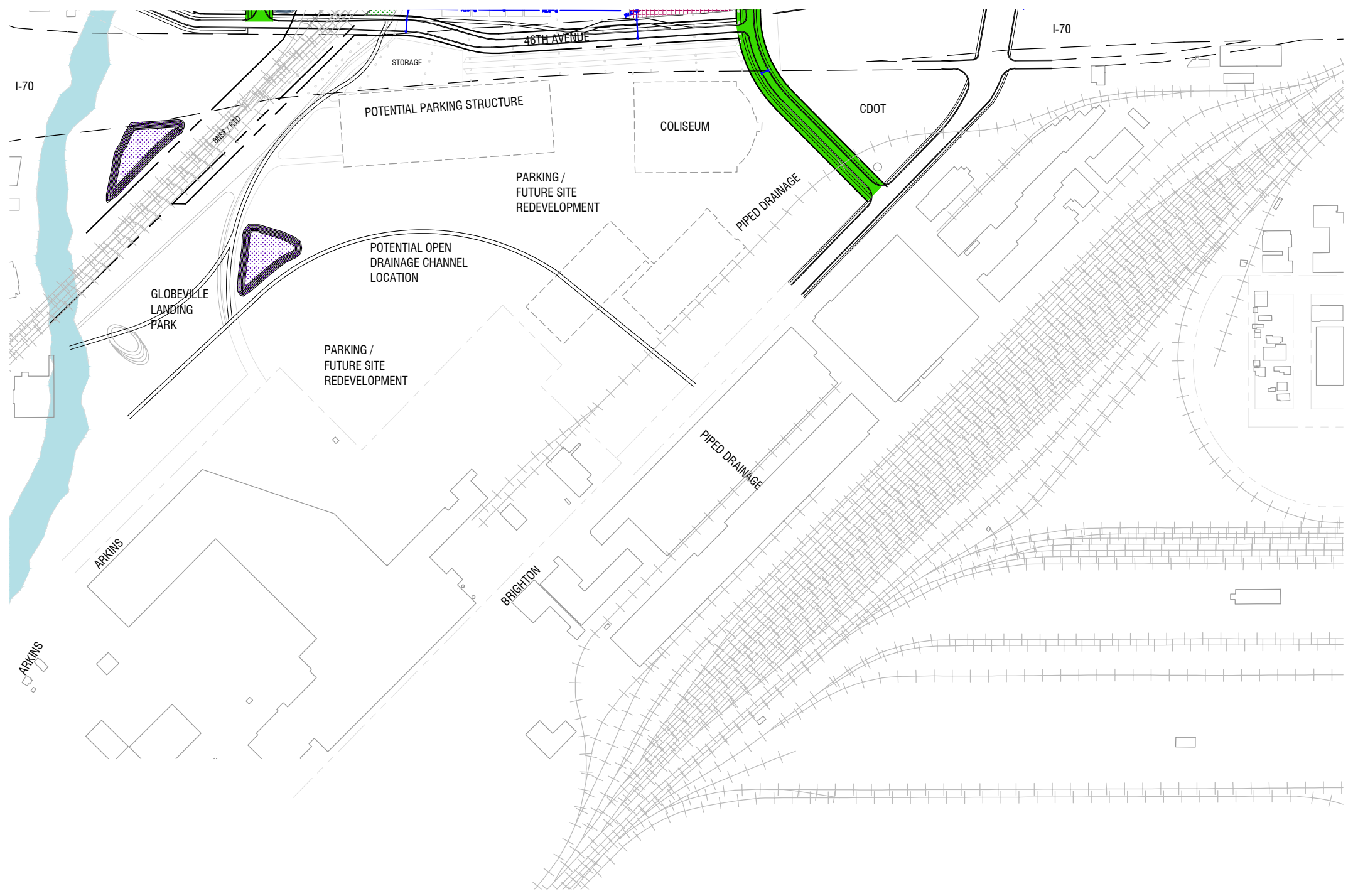
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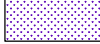




1. ALL PROPOSED AREAS BASED ON BEST AVAILABLE INFORMATION AT TIME OF MASTER PLAN PREPARATION. ALL FINAL WATER QUALITY FACILITY LOCATIONS TO BE DETERMINED DURING DESIGN PHASES BASED ON CONSTRAINTS OF FINAL SITE PLANS.
2. POTENTIAL FOR GREEN ROOFS USE TO BE EVALUATED FOR ALL NEW BUILDINGS.
3. NATIONAL WESTERN DRIVE AND BETTIE CRAM DRIVE ARE PLANNED TO BE GREEN STREETS.

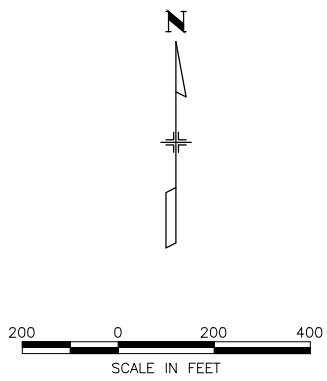


**NWC WATER QUALITY EXHIBIT
*FOR INFORMATION ONLY***





- LEGEND**
-  LOW IMPACT DEVELOPMENT
 -  BIOSWALE
 -  EURV POND
 -  PERMEABLE PAVERS
 -  GREEN ROOF
 -  GREEN STREET
 -  PROPOSED STORM SEWER



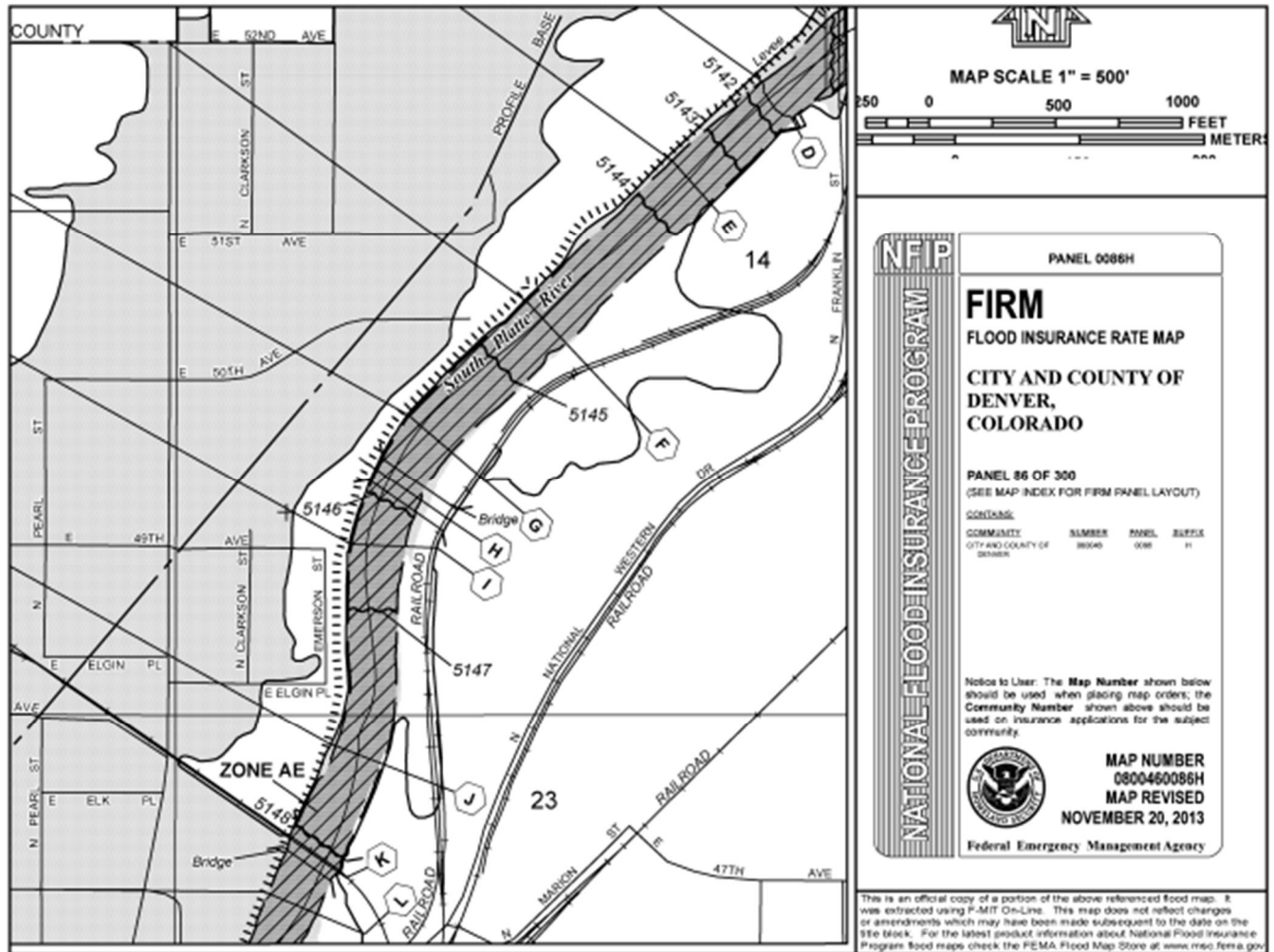
- NOTES:**
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**NWC WATER QUALITY EXHIBIT
*FOR INFORMATION ONLY***

- NOTES**
1. PROPOSED DECENTRALIZED WATER QUALITY TO BE DETERMINED BY FUTURE DEVELOPMENT.



Exhibit: Flood Insurance Rate Map



Section 7: Dry Utility Systems

7.0 Introduction

This section describes the improvements for the dry utility systems to service the proposed development for National Western Center; including conceptual layout for gas, electric, fiber optics and telephone. Included in the section includes proposed planned facility upgrades and possible relocations determined during meetings with each dry utility company within the project area. Dry utilities demands were not modeled for the conceptual level of design. See the existing dry utility exhibit and proposed dry utility exhibits for additional information.

7.1 Gas Distribution Facilities

Existing Gas Distribution Facilities - Xcel Energy

The existing gas mains border the project area along Brighton Boulevard, Race Court, the Consolidated DRI Rail Line, and 46th Avenue in addition to a main interior to the site, along the existing National Western Drive. Existing buildings west of the rail line are serviced by this line and the line in the Consolidated DRI Rail Line. The existing National Western Stock Show facilities are serviced by mains in East 47th Avenue and Baldwin Court that branch from the main in Brighton Boulevard. The Denver Coliseum and existing buildings south of I-70 are serviced by lines connected to the main running along Brighton Boulevard.

Proposed Gas Facilities - Xcel Energy

Our team met with Xcel Energy to determine if there are any planned upgrades within the project area. Xcel Energy has no upgrades planned adjacent to or within the project area and the existing gas lines have adequate capacity to service this project. All gas mains within this project area will need to be removed and replaced into new street right-of-ways or easements. The existing gas main along the Consolidated DRI Rail Line will need to be relocated to be within the right-of-way for the new National Western Drive alignment. Once new gas lines are installed, service would be switched over prior to removal of existing abandoned lines. New service lines will need to be determined once buildings are designed. Existing Xcel easements will need to be abandoned and new easements created for new feeder lines as the project is redeveloped. Gas meters will be needed at each service line into buildings.

7.2 Electrical Distribution Facilities

Existing Electrical Distribution Facilities - Xcel Energy

Electrical distribution for this area is supplied through an existing underground line in Brighton Boulevard, south of I-70, and another in the Consolidated DRI Rail Line, south of Race Court. The majority of the existing electrical primary and service lines within this project area are overhead.

Proposed Electrical - Xcel Energy

Our team met with Xcel Energy to determine if there are any planned improvements within the project area. While there are no planned upgrades, the existing system is currently at its maximum capacity. Electrical services for this project and adjacent electrical needs will require the addition of an electrical substation and distribution loop. The Substation requires a four to five acre site and approximately five years to be ready for use. Xcel Energy proposed a location at the northeast corner of the site on the east side of Brighton Boulevard. The proposed electrical loop will utilize the existing underground line

along Brighton Boulevard from 46th Avenue to Race Court; continue underground northwest along Race Court, south along proposed National Western Drive, east in East 46th Avenue, north in proposed Bettie Cram Drive, and east along East 47th Avenue to complete the loop at Brighton Boulevard. Additional underground electrical lines should be considered along the BNSF/RTD right-of-way where an existing overhead electrical service line exists. This new line would supply electrical feeder lines to new buildings along the BNSF/RTD right-of-way. All electrical service and feeder lines within the National Western Center project boundary should be removed, and replaced with underground lines. Once new underground electrical lines are installed, service would be switched over prior to removal of existing abandoned lines. Size and locations for transformers and service lines to buildings need to be determined by the electrical engineer during design of new facilities. Existing easements for removed lines will need to be abandoned and new easements created for all new feeder lines and transformer locations.

7.3 Fiber Optic Facilities

Existing Fiber Optic

Existing fiber optic facilities are found along Brighton Boulevard, the BNSF Railroad right-of-way, and I-70.

Existing Fiber Optic - AT&T

The existing AT&T fiber optic line is a 4-inch main multi-cell duct embedded in concrete slurry for Long Distance Facilities. This line runs from downtown Denver, northwest along Blake Street with Level 3 facilities, to 36th Street. The line turns southeast going one block northeast to Walnut Street, which turns left and goes northwest to 38th Street. The line travels northwest at 38th Street and Walnut Street and runs to Brighton Boulevard. At Brighton Boulevard, the 4-inch line heads to the northeast and runs up Brighton Boulevard running along the east side until Brighton Boulevard curves to northeast where the line crosses over to the north side of Brighton Boulevard. There is an existing manhole access at I-70 and Brighton Boulevard and another in Brighton Boulevard south of Race Court.

Existing Fiber Optic - Century Link

Existing Century Link fiber optic lines currently run along Race Court, Brighton Boulevard, and interior to the site from East 47th Avenue northwest to 49th Avenue extended. All existing lines are within roadway right-of-ways with manhole access in numerous locations. An existing cross box for service distribution is located on the north side of East 47th Avenue at Humbolt Street. The cross box is above ground with approximate dimensions of 5-feet long by 3-feet wide by 4-feet tall. The older service lines may be encased with concrete slurry, and the line crossing the BNSF railway is in cast iron pipe.

Existing Fiber Optic - Colorado Department of Transportation (CDOT)

Existing CDOT fiber optic lines run along the I-70 corridor and the underside of the existing I-70 viaduct bridge within the Zayo Group main line, which has approximately six different utility company fiber optic lines. CDOT fiber optic lines should not impact National Western Center Master Plan.

Existing Fiber Optic – Comcast

Comcast currently has no existing fiber optics or coax within the master plan area. Any neighborhood housing areas within the master plan that will be removed may have Comcast coax lines needing to be removed.

Existing Fiber Optic - Denver Traffic

Existing fiber optic lines run underground along Brighton Boulevard between 44th Street and 46th Street, then from the intersection of Brighton Boulevard and 38th Street west to Washington Street, and loops back to 46th Street. There is an overhead line that runs along the I-70 route with the CDOT line from Washington Street, east to Brighton Boulevard. At intersections, there are overhead lines to the street light signals. All lines run within the street R.O.W.s along the backside of curbs or in sidewalks. At each traffic intersection, the lines go to 'Rut Enclosures' for routing to the overhead lines with traffic signals. Underground lines typically share the trench with Xcel Energy conduit lines for luminaries along the street (street lights). Pull Boxes are 17" by 31" by 24" deep, which are spaced every 500-feet for the 3" PVC, Schedule 80, conduit bored underground. There is also an existing larger enclosure, 'Express Closure', located at the 44th Street and Brighton intersection, for main splices and tie-ins of existing lines.

Existing Fiber Optic - Level 3 Communications

Currently, there are no conflicts involving Level 3 fiber optic lines and network. The existing services are located along the BNSF Railroad R.O.W.

Existing Fiber Optic - MCI/Verizon

There are no conflicts with existing MCI - Verizon fiber optic lines within the National Western Center Master Plan area.

Existing Fiber Optic - TW Telecom

There are no conflicts with existing TW Telecom fiber optic lines within the National Western Center Master Plan. The existing TW Telecom service lines run along Brighton Boulevard.

Existing Fiber Optic - Zayo Group

Existing Zayo Group backbone fiber optic main line runs along the BNSF railroad right-of-way. A Zayo Group service line splice at manhole (labeled SPRINT) is located at I-70 and East 47th Avenue, from which the underground line jogs west to the National Western Drive and North to approximately 48th Avenue to a hand-hole access; then from an overhead line to the northwest to a Sprint cell tower. The depth of the underground fiber optic service line varies from 48-inches to 160-inches below grade.

Proposed Fiber Optics

As shown in the proposed Dry Utility Exhibit represents the proposed improvements to the fiber optic facilities found within and adjacent to this project area. Our team met with each of the utility companies providing fiber optic utilities to determine if there are any planned upgrades within the project area.

Proposed Fiber Optic - AT&T

There are no planned facility upgrades or expansion of the main multi-cell duct line at this time. It is not anticipated that this project will impact AT&T's fiber optic facilities.

Proposed Fiber Optic - Century Link

There are currently no planned upgrades or need for expansion. In order to determine specific line layout and sizing Century Link will need square footage and building occupant usage. Note that the Owner will be responsible for running access lines from main service lines to each building. Within each building, the Owner must provide a non-com backboard with an adjacent 110V duplex (dedicated preferred, but not required) for Century Link distribution of services to building areas with backboards usually placed within a telephone room/closet. As long as the services are done with fiber optics, underground connections can be made for feeder lines from the service line to buildings. Any services done with copper lines, above ground pedestals are required.

Proposed Fiber Optic – CDOT

The construction for I-70 corridor improvements is expected to begin by late 2016 or early 2017. The proposed I-70 improvement as shown in the Draft Environmental Impact Statement (DEIS) includes widening and adding traffic lanes from Tower Road to approximately Colorado Boulevard. Between Colorado Boulevard and Brighton Boulevard the additional capacity will be added and the roadway will be lowered below grade and covered. Based on the DEIS this section of I-70 is planned to be lowered 30 to 40 feet below grade. CDOT is planning to include new fiber optic lines during the I-70 improvements. There are different options being considered to accomplish this which consist of; a new contract with Zayo Group to run lines within their main service line, install their own CDOT fiber optic line, or have the selected general contractor be responsible for the new fiber optic line. These improvements will affect all dry utilities for the National Western Center Master Plan crossing the I-70 corridor.

Proposed Fiber Optic – Comcast

Comcast would like to discuss with Xcel Energy the possibility of a shared trenching for extending Comcast fiber optics with Xcel Energy electrical underground lines including crossing new bridges and across I-70 corridor, as design moves forward the design team will need to help facilitate these discussions. The proposed new lines would go east on East 49th Avenue, across the new bridge over the Platte River, to East 47th Avenue along the proposed Bette Cram Drive, and east to the Brighton Boulevard. The Comcast line in Brighton Boulevard would extend from the existing Data Center, at 44th Street and Brighton Boulevard, and north to Race Court.

Proposed Fiber Optic - Denver Traffic

There are currently no planned upgrades to Denver Traffic fiber optic facilities, but new extensions and lines are required in response to this project. The new lines must loop for proper service functions. The proposed new loop extends from the existing intersection of East 47th Avenue and Brighton Boulevard north to Race Court. At the intersection of Race Court and Brighton Boulevard, new lines go west to National Western Drive, and then south to East 46th Avenue. The line then runs east to 44th Street, turns southeast and continues to Brighton Boulevard, completing the loop.

Potentially new traffic signals may be required at the following intersections:

- 47th Avenue and Brighton Boulevard
- 48th Avenue and Brighton Boulevard

- 49th Avenue and Brighton Boulevard
- Brighton Boulevard and Race Court
- Race Court and National Western Drive
- National Western Drive and 50th Avenue
- National Western Drive and 49th Avenue
- National Western Drive and 46th Avenue
- 46th Avenue and 44th Street
- 44th Street and 47th Avenue

As design progresses a traffic study will need to be completed to determine the need for signals at the intersections internal to the site.

Proposed Fiber Optic - Level 3 Communications

There are no planned facility upgrades or expansion at this time. It is not anticipated that this project will impact Level 3's fiber optic facilities. If any improvements occur along Brighton Boulevard, then there could be potential revisions to the vertical alignment of the line.

Proposed Fiber Optic - MCI – Verizon

Currently, there are no future plans to extend lines in the project area, unless an order for MCI – Verizon services is requested by property owners.

Proposed Fiber Optic - TW Telecom

There are no planned facility upgrades or expansion at this time. It is not anticipated that this project will impact TW Telecom's fiber optic facilities.

Proposed Fiber Optic - Zayo Group

There are no planned facility upgrades to Zayo Group's facilities at this time. Any grade changes and/or road profile changes may require relocation of manhole access, lines and hand hole access at I-70 and 47th Avenue and along National Western Drive. Relocation would require coordination of other utilities, including water and sewer lines for calculated required depths and separation of lines. New lines require fiber optics installed for continued services prior to abandoning old lines. Fiber optics from existing lines would be salvaged with the existing conduits abandoned in place.

The current proposed National Western Center Master Plan shows detention/retention ponds where an existing Sprint cell tower is possibly located. This would require the cell tower to be relocated, or a required reconfiguration of the detention/retention pond layout. An estimate of approximately Fifty thousand dollars (\$50,000) would be needed to relocate the entire line in the National Western Drive from the manhole at I-70 and 47th Avenue to the hand hole at 48th Avenue and remove the overhead line to run an underground line from the hand hole to the Sprint cell tower. In addition, approximately Ten thousand dollars (\$10,000) would be needed to switch over services from existing fiber optics to newly located fiber optics and splice into services.

7.4 Telephone Facilities

Existing Telephone Lines Century Link

Overhead telephone lines along National Western Drive and Consolidated DRI Rail Line and throughout the project area servicing the buildings.

Proposed Telephone Lines Century Link

All of the existing overhead telephone lines within the project area will be removed and replaced by underground lines to servicing the proposed building. Existing easements will need to be abandoned and new easements provided for the new lines.

7.5 Design Criteria

All design of the new dry utility systems are required to be in accordance with the latest version of the building codes for the City and County of Denver, and based on the National Electrical Code, NFPA code, and Public Works Rules & Regulations for Standard Right-of-Way Cross Section and Utility Locations.

Century Link requires using Century Link Structural Specifications form RG 29-0160, 08-2011.

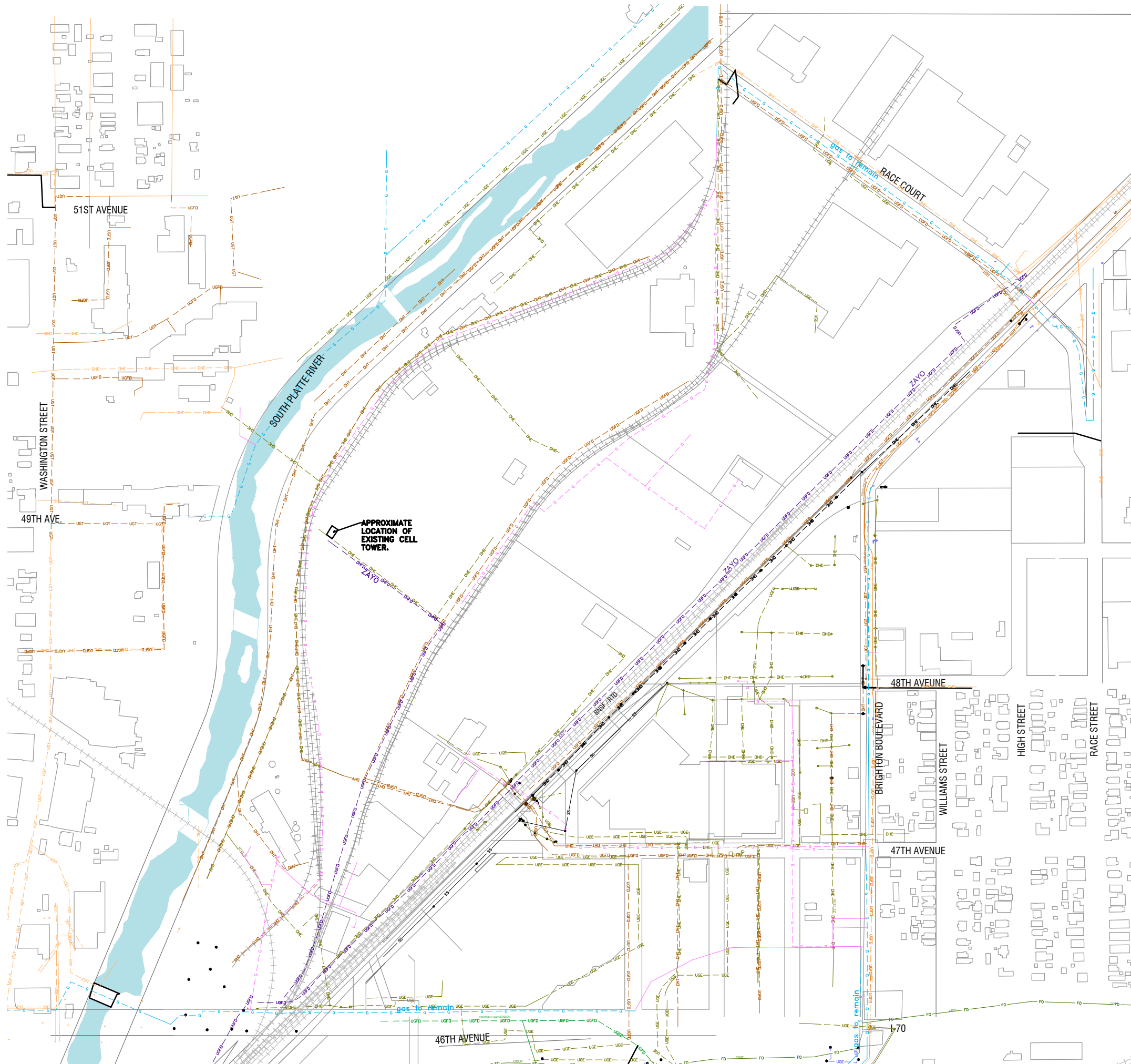
Denver Traffic requires following their City & County of Denver Traffic Engineering Services Standard Drawing Documents, dated January 12, 2012; and using document titled All-Dielectric Loose Tube Fiber Optic Cable Product Specifications, City of Denver, dated March 2006.

7.6 Conclusion

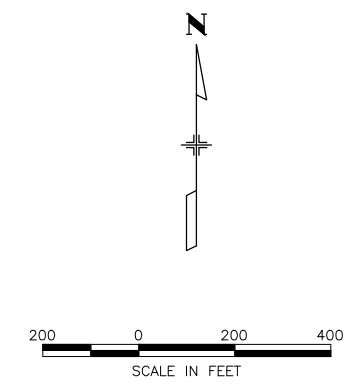
Summary

The dry utility exhibits illustrate the existing facilities within the project boundary that are to be removed, to remain, and new main line facilities required to support this project. The proposed key improvements consist of:

- An electrical main service line loop
- Dedicating 4 to 5 acres for new electrical substation requiring five years for completion.
- Realignment of the gas main along the National Western Drive.
- Providing Denver Traffic a fiber optic service line loop.
- The relocation of the Sprint cell tower.



LEGEND	
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	XCEL OVERHEAD
	ZAYO UNDERGROUND FO
	AT&T UNDERGROUND FO
	CDDT FIBER OPTICS
	CENTURY LINK OVERHEAD TELE.
	CENTURY LINK UG
	CENTURY LINK UG FO
	CENTURY LINK/VERIZON
	UNDERGROUND ELEC. PER COLISEUM PLANS
	XCEL UNDERGROUND GAS



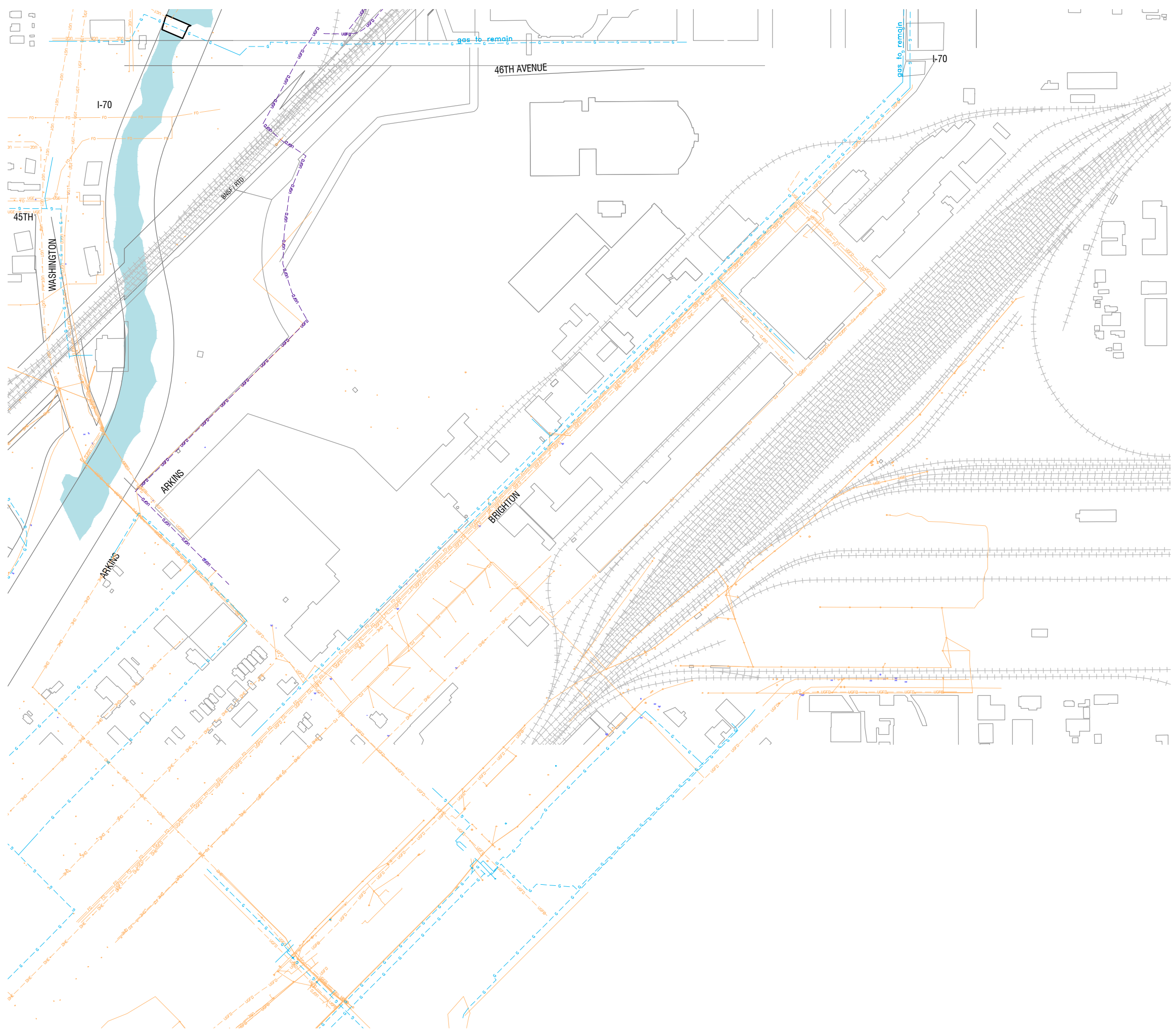
APPROXIMATE LOCATION OF EXISTING CELL TOWER.

NOTE:
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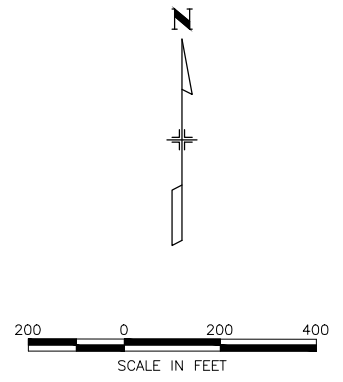
NWC EXISTING DRY UTILITY EXHIBIT

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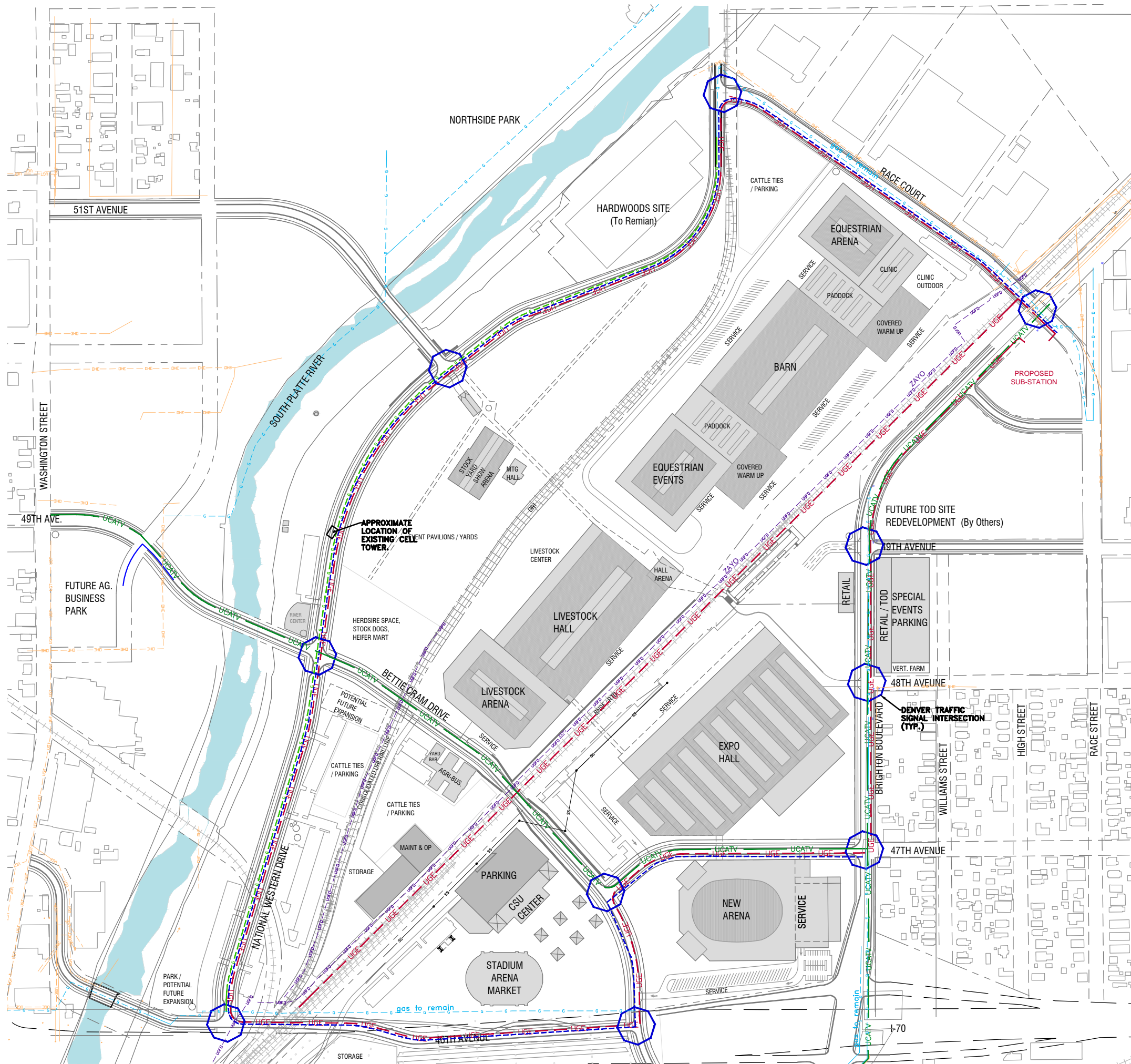
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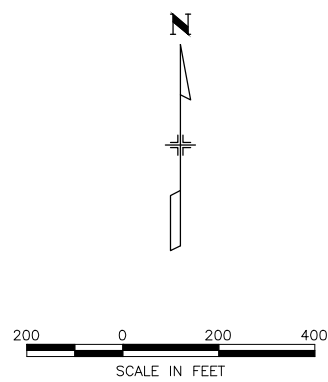
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NWC EXISTING DRY UTILITY EXHIBIT
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	AT&T UNDERGROUND FD
	CDOT FIBER OPTICS
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	CENTURY LINK UG FD
	CENTURY LINK/VERIZON
	UNDERGROUND ELEC. PER COLISEUM PLANS
	XCEL UNDERGROUND GAS
	PROP. UG COMCAST
	PROP. DENVER TRAFFIC FD
	PROP. XCEL ENERGY UG
	PROP. XCEL ENERGY UG

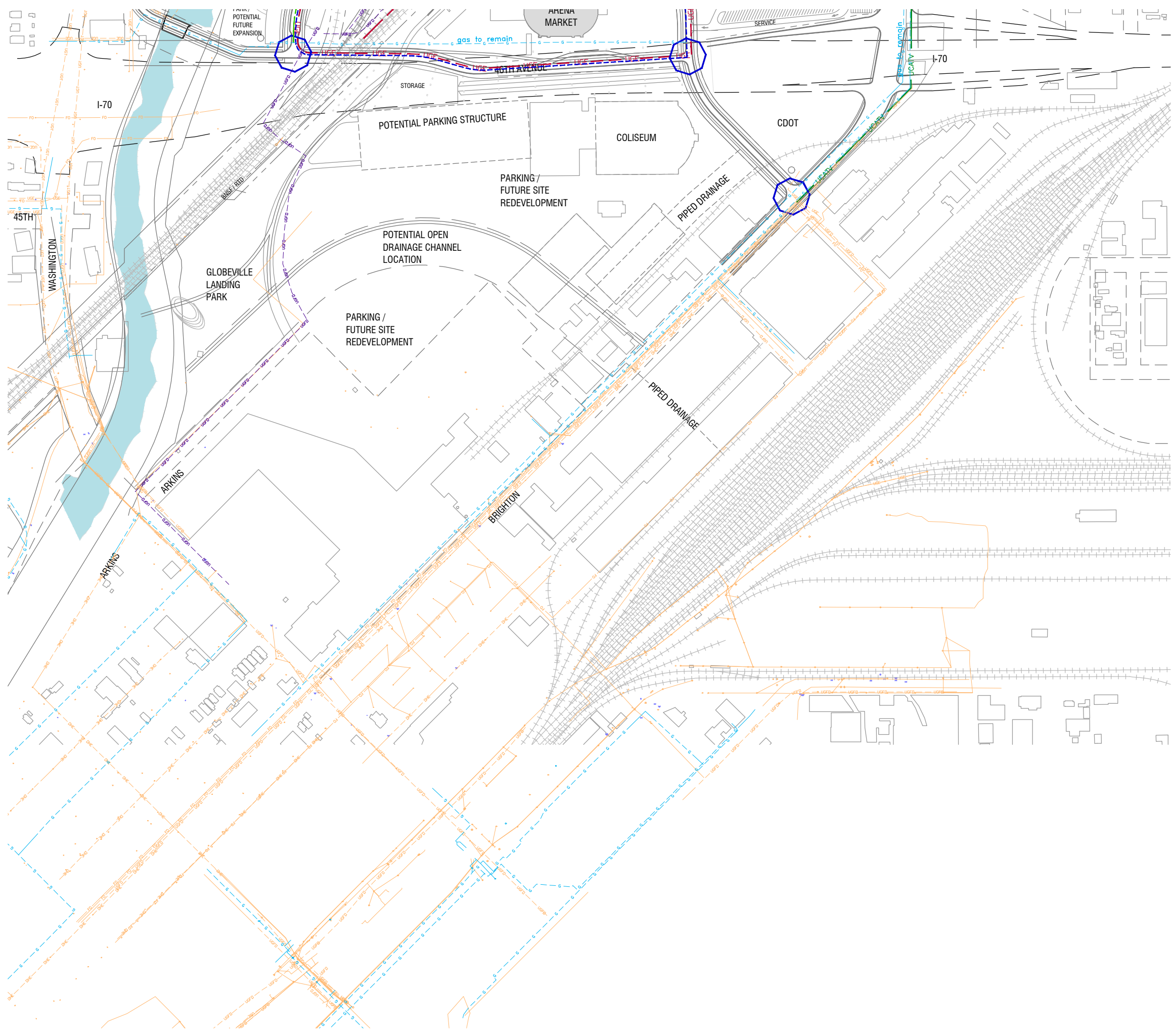


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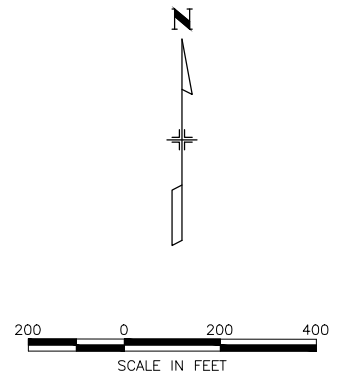
NWC DRY UTILITY IMPROVEMENT EXHIBIT

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LEGEND	
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	XCEL OVERHEAD
	ZAYD UNDERGROUND FD
	AT&T UNDERGROUND FD
	CDOT FIBER OPTICS
	CENTURY LINK OVERHEAD TELE.
	CENTURY LINK UG
	CENTURY LINK UG FD
	CENTURY LINK/VERIZON
	UNDERGROUND ELEC. PER COLISEUM PLANS
	XCEL UNDERGROUND GAS
	UCATV
	PROP. UG CDMAST
	PROP. DENVER TRAFFIC FD
	PROP. XCEL ENERGY UG
	PROP. XCEL ENERGY UG



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