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PRELIMINARY DRAINAGE REPORT
BUILDINGS 5 AND 6
EASTPARK 70 SUBDIVISION FILING NO. 6

City of Aurora
06/21/2019

JN: DEN17-0094

Prepared for:

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Jessica Johns, PE No. 51226

Approved For One Year From This Date

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_____ _____
City Engineer **Date**

_____ _____
Water Department **Date**

CERTIFICATION

I hereby certify that this Preliminary Drainage Report for Buildings 5, 6 & 7 at Eastpark 70 Subdivision Filing No. 4 was prepared by me (or under my direct supervision) in accordance with the provisions of the City of Aurora Storm Drainage Criteria Manual for the owners thereof.

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Jessica Johns, PE Date
State of Colorado Registration No. 51226

TABLE OF CONTENTS

APPENDICES

INTRODUCTION

A. Site Location

The site is located in the northeast ¼ of Section 34, Township 3 South, Range 66 West of the 6th Principal Meridian, City of Aurora, county of Adams, State of Colorado. The site is located south of Union Pacific railroad and half of a mile to the east of Tower Road. The site includes two separate lots with proposed buildings called out as Building 5 and Building 6. Building 5 site is bounded by E. 22nd Avenue to the north and Building 6 to the east (Building 6). Building 6 site is bounded by E. 22nd Avenue to the north, Himalaya Road to the east, and Building 5 to the west. Refer to Appendix A for the site location on the vicinity map.

B. Proposed Development

The site at Buildings 5 & 6 generally slopes to the west at approximately 3-4% with a 4:1 slope on the south and east side of the site. The soils within the site at Buildings 5 & 6 are comprised of Ascalon- Platner association (approximately 7.7%) and Truckton loamy sand (approximately 92.3%) according to the Web Soil Survey by the National Resources Conservation Service (NRCS).

The Ascalon-Platner association is categorized as soil type B-C (60% B type and 40% C type soils). Type B soils are described as having a moderately high to high infiltration rate and type C soils are described as having moderately low to moderately high infiltration rate. The Truckton loamy sand is categorized as soil type A. Type A soils are described as having high infiltration rate. Refer to Appendix B for more detailed information on the physical soils properties of the site.

The approved Eastpark 70 Subdivision Filing No. 1 Final Drainage Report prepared by Martin/Martin Inc. hereby referred to as the Master Drainage Report for the area has taken these conditions and overall plan and detention of this area was designed using more conservative weighted C values for type C soils.

The proposed site at Buildings 5 & 6 is approximately 14.35 acres.

Buildings 5 & 6 site proposed development includes re-grading of the site and construction of new industrial use buildings, parking lot, and landscape areas. On-site storm sewer will be constructed to convey runoff to the existing storm sewer system located adjacent to the site which conveys runoff to the regional detention pond located within Tract A of the subdivision.

Buildings 5 & 6 site is approximately 14.35 acres and is currently 2% impervious. The proposed redevelopment of the site will increase the imperviousness to approximately 72%, as calculated per the Aurora Storm Drainage Design and Technical Criteria (Aurora SDDTC).

The Master Drainage Report allowed for average imperviousness of tributary areas of 80%. Recent development of Eastpark 70 Subdivision Filing No. 3 had an imperviousness of 59% Combined imperviousness of Eastpark 70 Subdivision Filing No. 3 and Filing No. 4 will have a total percent imperviousness of 79%, including the Building 7 site which is part of Filing 5 and therefore a separate drainage report.

These properties may be occupied by separate tenants or sold to separate entities in the future. As such, stormlines that convey runoff between the properties have been bounded by proposed 16’ drainage easements. Storm laterals conveying runoff between the properties are public.

No variances from the criteria are being requested.

HISTORIC DRAINAGE

A. Overall Basin Description

As outlined in the Eastpark 70 Subdivision Filing No. 1 Final Drainage Report (Master Report) the Eastpark 70 subdivision drains westerly to an existing detention pond which releases to an existing 8' by 5' box culvert located in 22nd Place, which is tributary to Sand Creek. The proposed site lies within drainage basin C as outlined in the Master Report Drainage Plan.

Buildings 5 and 6 are located within Basin B of Master Drainage Report. Runoff from Basin C is tributary to Regional Detention Pond "A" which has been designed and sized to provide detention and water quality for the tributary basins. Per Master drainage report Basin C was anticipated to have runoff coefficients of 0.72 and 0.82 for the 2-year and 100-year events, respectively. The storm facilities in the road and the detention pond was sized and built using these C values.

According to the Flood Insurance Rate map for Adams County the site for Buildings 5 and 6 is located outside of the flood hazard zone. The area of the site is designated as an area located outside of the 0.2% annual chance floodplain. Please refer to National Flood insurance Map number 08005C0182K and excerpt image of 08005C0044K Panel, obtained from FEMA National Flood Hazard website, provided in Appendix A.

B. Drainage Patterns Through Property

Buildings 5 & 6 site runoff currently drains overland to adjacent curb and gutter which conveys runoff to existing storm inlets. Developed flows will be conveyed to the existing storm sewer system via sheet flow, curb & gutter, and an onsite storm sewer system which will connect to the existing system at design points as outlined in the Master Report.

C. Outfalls Downstream from Property

Runoff from the site at Buildings 5 & 6 enters the existing storm sewer system which conveys runoff to the existing regional detention pond located south of Smith Road and west of Ensenada Street. Runoff is released from the pond to an existing box culvert in 22nd Place which conveys runoff to Sand Creek.

The regional detention pond (Pond A), described in the Final Drainage Report by Martin/Martin, Inc., was as-built certified by Martin/Martin Inc. January 11, 2006. The regional pond is owned and maintained by the City of Aurora and serves as Regional Detention and Water Quality Facility for all Eastpark 70 developed runoff. The pond is designed to provide water quality capture volume of 5.50 acre-feet at elevation 5443.00 and 100-year storage of 31.63 acre feet at elevation 5449.80. Since the 100-year runoff rates for the proposed site are not increased over those calculated in the Final Drainage Report by Martin/Martin Inc., no upsizing to the existing storm sewer system or regional detention pond are required.

DESIGN CRITERIA

A. References

The City of Aurora Storm Drainage Design and Technical Criteria (SDDTC), Rev. Oct 2010, and the Urban Drainage and Flood Control District Urban Storm Drainage (UDFCD) Criteria Manual Volumes 1, 2, and 3 (USDCM) were followed for hydrologic and hydraulic criteria in the drainage design for the site. The Eastpark 70 Subdivision Filing No. 1 Final Drainage Report prepared by Martin/Martin, Inc. will be followed for all allowable release rates.

B. Hydrologic Criteria

In accordance with the Aurora SDDTC and Master Report, the minor storm for the proposed development type is evaluated as the 2-year storm, and the major storm is evaluated as the 100-year storm. The design storms have been evaluated with 1-hour point rainfall depths of 0.97 inches for a 2- year storm and 2.62 inches for a 100-year storm, in accordance with USDCM Volume 1 Figure 5-1 and 5-6, respectively. Please refer to Appendix B to see the respective figures. These 1 hour point rainfall depths were used with equation 5-3 in USDCM Volume 1 in order to determine rainfall intensity for hydrologic calculations.

The peak discharge for the site was calculated using the following Rational Method formula:

$$Q=CIA$$

Where: Q = peak discharge (cfs)

C = runoff coefficient from Approved Master Drainage Report I = rainfall intensity (inches/hour)
A = drainage area (acres)

See Appendix A for Rational Method Flow Calculations.

The weighted C values were based on the Type A and B soils on-site:

		C-Values Based on Frequency (yrs)			
% Imp		2 Year	5 Year	10 Year	100 Year
ASPHALT	100%	0.87	0.88	0.90	0.93
CONCRETE	96%	0.87	0.87	0.88	0.89
ROOF	90%	0.80	0.85	0.90	0.90
LANDSCAPE	2%	0.05	0.06	0.08	0.10

C. Hydraulic Criteria

Hydraulic calculations for the anticipated onsite drainage patterns will be performed in accordance with SDDTC and

USDCM criteria. Onsite storm conveyance infrastructure shall be designed to convey runoff from 2-year and 100-year storm events in accordance with the SDDTC criteria in final drainage studies for the site.

DRAINAGE PLAN

A. General Concept

The site has been graded such that runoff flows will be conveyed generally towards storm sewer in the existing roads. Runoff will ultimately be conveyed to the existing regional pond which provides water quality and detention for the site.

Roof drainage shall be conveyed via sheet flow and roof drains into the proposed on-site storm sewer system, which will convey runoff to the adjacent storm sewer system. Runoff from the parking and drives shall be conveyed to proposed inlets and the on-site storm sewer system the site via sheet flow and curb & gutter.

Developed flows will be conveyed to the existing storm sewer system via sheet flow, curb & gutter, and an onsite storm sewer system which will connect to the existing system at design points as outlined in the Master Report.

Proposed storm system will be designed to convey the future developed flows from the neighboring site to the east. Storm system will be extended to the boundary for future tie into the storm system.

B. Specific Details

All basins on the site have been designated with Basin ID Labels. The onsite basins have been divided into two main basins (one basin per building) and are labelled Basin 5 and Basin 6. Reference the drainage maps in the back of the report for the basin delineations and locations. Refer to Appendix B & C for hydrologic calculations regarding each of these basins.

Below see the detailed description of drainage flows for each major basin:

Basin 5 & 6:

Basin 5 and Basin 6 consists of sub-basins A5 through I5 and A6 through K6. The site at full build out will be 9.06 acres and will have a weighted imperviousness of 72%. Basin 5 covers the southeastern portion of the site and consists of roof, asphalt parking, concrete loading bays, concrete walkways, and landscaping. Runoff from this basin shall drain to proposed storm inlets via sheetflow and curb and gutter and tie into the existing storm manhole in East 22nd Avenue and outfall into the Regional Detention Pond located west of the proposed site. Developed runoff at this design point is approximately 18.32 cfs which conforms to the design flow at design points 2E and 3E as described in the Final Drainage Report for Eastpark 70 Subdivision Filing No. 1 by Martin/ Martin. In the event sump inlets become plugged runoff will flow south to E. 22nd Ave. and ultimately be conveyed to the regional detention pond via existing curb and gutter and storm sewer.

CONCLUSIONS

A. Compliance with Standards

This drainage report has been prepared in conformity with the City of Aurora Storm Drainage Design and Technical

Criteria (SDDTC), Rev. Oct 2010, and the Urban Drainage and Flood Control District

B. Summary of Concept

The proposed drainage facilities shall safely and effectively convey design storm events to an existing, adequate outfall. During construction, temporary best management practices shall be employed by the contractor in accordance with an approved erosion control plan. After construction, water quality treatment for the proposed site will be provided in the existing water quality/detention pond.

C. Results

The total site imperviousness for Buildings 5 and 6 site will be 72%. The site composite C value for the 100 year storm will be 0.73. The expected 100 Year C value in the Master storm drainage plan was 0.82 and all subsequent storm system within the Master Report was designed using this value.

Runoff from proposed Basins 5 & 6 combine and corresponds to design points 2E and 3E of the Master Drainage Report. Design points 2E and 3E have an allocated 2-Yr. Flow of 30.33 cfs which is greater than the proposed runoff of 18.32 cfs therefore no improvements to the storm sewer within E. 22nd Ave. is anticipated.

	FROM MASTER DRAINAGE REPORT	PROPOSED
BUILDING 5&6 TOTAL 100-YR WEIGHTED IMPERVIOUSNESS COEFFICIENT	0.82	0.73
BUILDING 5&6 TOTAL 100-YR TOTAL ROUTED RUNOFF (CFS)	30.33	18.32

REFERENCES

1. *Urban Storm Drainage Criteria Manual, volumes 1, 2, and 3*, Urban Drainage and Flood Control District, June 2001, with updates to January 2016.
2. *Natural Resources Conservation Center Web Soil Survey*, United States Department of Agriculture, site visited April, 2017.
3. *Aurora Storm Drainage Design and Technical Criteria,* City of Aurora, CO, accessed on www.AuroraGov.org on April, 2017.
4. *Eastpark 70 Subdivision Filing No. 1 Final Drainage Report,* January 12, 2005, Prepared By Martin/Martin Inc. (EDN 205021)
5. Federal Emergency Management Agency (FEMA), *Arapahoe County Flood Hazard Mapping*, Version 2.3.2.2, Source Citation: 08005C_08005C_STUDY1, msc.fema.gov 24 August, 2015.
6. *Final Drainage Report Eastpark 70 Subdivision Filing No. 2 Building 1 & 4,* November 12, 2005, Prepared by Jansen Strawn Consulting Engineers. (EDN215119FD1)