

Correct formal subdiv name required. Plat says "Gateway East at Tower Subdivision Filing No 2"

1st Review

Kimley-Horn Comment
Responses
Shelby Madrid, PE

CHANGE MADE

GATEWAY PARK V EAST SUBDIVISION FILING NO. 2 PRELIMINARY DRAINAGE REPORT

Project:
Building 26
Aurora, Colorado

Advisory Note: Approval of
this PDR is required before
approval of the Civil Plans.

NOTED

Client:
Pauls Corporation, LLC
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Denver, CO 80206
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(303) 371-9000

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February 28, 2019

APPROVED FOR ONE YEAR FROM THIS DATE	
City Engineer	Date
Water Department	Date

The site is currently undeveloped and with slopes that generally drain southwest and northeast towards Sand Creek Pond D and Bolling Drive Tributary respectively. The existing grades are mild with grades between 1% and 10%.

There are no known requested variances from the Criteria at this time.

HISTORIC DRAINAGE

Overall Sub-Basin Description

The proposed development lies entirely within the Gateway East at Tower Subdivision Filing No. 2. The northern portion of the site falls within the Irondale Gulch Basin, draining to Bolling Drive Tributary and the southern portion falls within the Montebello Basin, tributary to the existing Sand Creek Regional Detention Pond D and ultimately the Highline Canal. The existing slopes generally drain southwest and northeast towards Sand Creek Pond D and Bolling Drive Tributary respectively. Minimal offsite flows from the east enter the property. Some local flows on-site will be directed towards existing infrastructure within Biscay Street and East 38th Avenue. The existing infrastructure is not anticipated to be significantly impacted by this development.

The site is shown on Flood Insurance Rate Map (FIRM) 08005C0044K. The site is shown to be in Zone X on FIRM. Areas determined to be outside the 0.2% annual chance floodplain. A copy of the FIRM is included in Appendix A.

Drainage Patterns Through Property

The existing site runoff is split roughly along the major basin line and flows either north or south. Stormwater flowing north is captured by the existing Bolling Drive Tributary channel along the north property line. Stormwater flowing south is captured in the Regional Detention Pond D adjacent to the southern property line. All site flows are currently conveyed by overland flow.

CHANGE MADE

The design of Regional Detention Pond D was previously approved with the Final Drainage Report for the Gateway East at Tower **35.1** division Filing No. 1, COA #207185. The proposed development is within the ~~31.5~~ **35.1**-acre sub-basin SC-19. Sub-basin SC-19 is tributary to Pond D and was designed to have an overall imperviousness of 87%. The proposed project imperviousness is 72%, thus the project is compliant with the master drainage study for the area.

Outfalls Downstream from Property

The southern portion of the Project will outfall directly to the existing Pond D that provides 100-year detention and water quality as designed and constructed under COA #207185. The northern portion of the Project will outfall directly to the Bolling Drive Tributary.

DESIGN CRITERIA

The Project will be designed in accordance with "City of Aurora, Storm Drainage Criteria," revised October 2010 (The "Criteria") and the "Urban Drainage and Flood

On-Site Basins

Basin A is composed of drive isles. The 100-year and gutter to Design Point A. The 100-year flow depth

Basin B is composed of along the south end of overland flows via curb and concrete rundown to Design

Basin C is composed of

100-year storm event flows will discharge via overland flow and curb and gutter to Design Point C and will then be conveyed via a rip-rap rundown to Pond D. The 100-year flow depths will not exceed the building finished floor elevations.

Basin D is made up of the private access drive and sidewalk at the southwest corner of the site. Stormwater on the west side

Basin E1 is located anticipated to similar to the

Basin E2 is located anticipated to north to a proposed Tributary.

Basin F is made up of the private access drive on the north portion of the site. Runoff from this basin is conveyed via curb and gutter to a proposed curb inlet. Stormwater is conveyed via storm sewer north to Bolling Drive Tributary.

Basin G is made up of vacant land and sparse native landscape. Runoff from this basin flows north following existing drainage patterns toward Bolling Drive Tributary.

Basin H is located within the Bolling Tributary Channel and made up of sparse native landscape. Stormwater runoff from this basin flows west via the Bolling Tributary Channel to the culvert entrance under the private access drive.

Basin J is made up of the private access drive on the north side of the property line connecting East 38th Avenue to the property. Runoff from this basin is conveyed via curb and gutter to a proposed curb inlet.

Basins R1-R14 consist of roof drainage basins that collect stormwater from the roof of the proposed building. The stormwater from basins R1-R7 is collected in an internal storm sewer system and is conveyed to downspouts along the western wall of the building. The stormwater from basins R8-R14 is collected in an internal storm sewer system and is conveyed to downspouts along the eastern wall of the building.

These are both large basins and in signif storm events over 7 ac of bldg roof will be added. There is no storm sewer and statement here is that 100yr flow depths will not exceed bldg FFE:

- City recommends 1 ft freeboard for FFE's above emergency (Q100 condition). Please discuss how much freeboard will be provided.
- Per COA criteria, 100yr flow depth in drive isles is 1.5' max and 1.0' in parking areas. Please confirm you will meet this and acknowledge these criteria in the text. Given that surface conveyance appears to be the basic concept of your drainage plan, please include one or more worst-case calcs showing these depths will not be exceeded.

Noted, the proposed truck court cross-sections with the 100-year flow depths have been included in Appendix D of this report.

Since the building truck docks are elevated 4ft above the adjacent pavement, there is on average 3.5ft of freeboard provided from the 100-year flow depth to the FFE.

Per the sections included in appendix D, the maximum flow depth in the drive isles on the east and west side of the building is 0.49ft.

The maximum depth of flow in the drive isle at the riprap rundown to the pond is 1.18ft.

Basin descriptions revised to include discussion.

Basin E1 - Exis topo is difficult to read on plan but it appears:

- 1) Proposed re-grading of this basin would change runoff patterns from your site onto the adjacent site, concentrating flows at one location. If changing discharge patterns onto adjacent private property, acceptance ltr needed.
- 2) Prev design 207185 & MDP 206161 assume this area is trib to Pond D. Proposed grading would direct flows north instead?

proposed grading for Basin E1 has been removed from the plans. for the purposes of this report, runoff from this basin will follow the existing drainage patterns until the lot is developed at a future date. The developed runoff from basin E has been included in the gutter pan 100-year calculations within Basin C.

Stormwater from trickle rain events and snow melt will be collected by underground storm sewer and conveyed via pipe to existing Pond D. During the 100-year storm event, flows will overtop the building downspouts and surface flow via gutter pans to design points A & C and ultimately to Pond D.

Basins OS1, OS2, OS3, and OS4 are off-site basins along the eastern property line. These basins are made up of sparse native landscaping. Runoff flows westerly on-site and is collected in the proposed curb and gutter and inlets on-site.

Table 1 – Basin Summary						
DESIGN POINT	DRAIN BASIN	AREA Ac	Basin Coefficients		Direct Flows	
			C ₂ CFS	C ₁₀₀ CFS	Q ₂ CFS	Q ₁₀₀ CFS
On-Site Basins						
A	A	7.62	0.66	0.71	9.8	28.4
B	B	0.64	0.86	0.92	1.8	5.3
C	C	4.29	0.75	0.79	6.3	18.0
D	D	0.08	0.87	0.92	0.2	0.7
E1	E1	7.47	0.65	0.75	11.0	34.6
E2	E2	2.78	0.65	0.75	4.4	13.7
F	F	1.39	0.77	0.82	2.6	7.6
G	G	2.53	0.10	0.15	0.6	2.3
H	H	0.76	0.10	0.15	0.2	0.9
J	J	0.04	0.87	0.93	0.1	0.3
R1	R1	0.73	0.80	0.90	1.6	5.0
R2	R2	0.50	0.80	0.90	1.1	3.5
R3	R3	0.49	0.80	0.90	1.1	3.4
R4	R4	0.50	0.80	0.90	1.1	3.5
R5	R5	0.51	0.80	0.90	1.2	3.5
R6	R6	0.51	0.80	0.90	1.1	3.5
R7	R7	0.48	0.80	0.90	1.1	3.3
R8	R8	0.73	0.80	0.90	1.6	5.0
R9	R9	0.50	0.80	0.90	1.1	3.5
R10	R10	0.49	0.80	0.90	1.1	3.4
R11	R11	0.50	0.80	0.90	1.1	3.5
R12	R12	0.51	0.80	0.90	1.2	3.5
R13	R13	0.51	0.80	0.90	1.1	3.5
R14	R14	0.48	0.80	0.90	1.1	3.3
Off-Site Basins						
OS1	OS1	1.23	0.10	0.15	0.4	8.5
OS2	OS2	0.17	0.10	0.15	0.1	4.5
OS3	OS3	0.22	0.10	0.15	0.1	4.5
OS4	statement added to the first paragraph of the <u>proposed</u>					

Add short text section addressing the Bolling Drive culvert that you will build. Sizing not required for this PD but please do state that HEC-RAS or other backwater model will be used to size this and confirm no adverse impact to upstream portions of Bolling Drive Trib channel. Also state that COA criteria for culvert emergency overflow capacities will be met since, though not a public road, it is a regional channel immediately adj to a public road and blockage of this culvert could impact public infrastructure and other private property.

Water Quality and Detention Summary

Existing Regional Detention Pond D was approved under COA #207185 to provide 100-year detention volume of 22.7 acre-feet and water quality capture volume of 1.62ac-ft. Pond D was constructed prior to COA# 207185 and then modified to include water quality at the time of approval. Pond D has a 100-year water surface elevation of 5420.84. The Project has been designed such that in the event of a 100-year storm event, the ponds will not back into the site and inundate the truck drive aisles more than 18" per the Criteria. Additionally, overland flow routes have been depicted on the Preliminary Drainage Map. The site is located on the east side of the site, with a route from north to south, and discharges to the south.

Additionally, per the Final Drainage Report, Filing No. 1, it was calculated that basin SC-19, which the project falls within, shall be no greater than 87% impervious. The site is currently 72% impervious, therefore no additional detention or water quality treatment is required for this project. Relevant excerpts from the Final Drainage Report have been included in **Appendix C**.

Add info on Bolling Drive Tributary and Silverado II since northern portion of your site drains to it. Silverado II is a regional detention pond which provides WQ and detention so no det or WQ is required for northern portion of site if imperviousness assumption for Silverado II is met (what was that value - pond is outside COA so City does not have plans for it).

paragraph added to this section of the report elaborating on the detention provided for the northern portion of the site.

STORMWATER QUALITY CONTROL PLAN

A Stormwater Management Plan will be prepared and submitted under a separate cover for all temporary construction BMPs for the Project.

CONCLUSIONS

Compliance with Standards

The project is compliant with City of Aurora criteria for storm drainage design. City of Aurora Storm Drainage Design and Technical Criteria ("Criteria") and the Urban Drainage Flood Control District Urban Storm Drainage Criteria Manual Volumes 1, 2, and 3 ("Manual") have been utilized in the design of the storm sewer system as well as Best Management Practices. The onsite storm sewer will be designed for the 100-year storm event. The roof drains are designed to convey snow melt and trickle rain events.

Summary of Drainage Concept

The project flows are collected by private roof drains, storm inlets and curb and gutter. The ultimate outfall of these facilities is into Sand Creek Regional Detention Pond D that will release flows at rates required by the Criteria. The concepts, as described herein, should provide adequate protection to both on-site and off-site properties for the full development of the property. The calculations provided allow for the maximum build-out of all on-site properties while still providing sufficient detention and water quality treatment.

**Gateway Park V East
Building 26**

RUNOFF CALCULATIONS

Design Storm 100 Year												
BASIN INFORMATION				DIRECT RUNOFF				TOTAL RUNOFF				REMARKS
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	
On-Site Basins												
A	A	7.62	0.71	19.3	5.40	5.27	28.4	19.3	9.59	5.27	50.6	Basins A, B, C, OS1 & OS2
B	B	0.64	0.92	5.0	0.59	8.92	5.3					
C	C	4.29	0.79	19.1	3.40	5.30	18.0					
D	D	0.08	0.92	5.0	0.07	8.92	0.7					
E1	E1	7.47	0.75	14.1	5.63	6.15	34.6					
E2	E2	2.78	0.75	12.2	2.09	6.55	13.7					
F	F	1.39	0.82	11.8	1.14	6.65	7.6	11.8	1.17	6.65	7.8	Basins F & OS3
G	G	2.53	0.15	13.9	0.38	6.19	2.3					
H	H	0.76	0.15	7.6	0.11	7.88	0.9	14.1	9.50	6.15	58.4	Basins E, F, G, H, OS3, OS4
J	J	0.04	0.93	5.0	0.04	8.92	0.3					
R1	R1	0.73	0.90	8.2	0.65	7.66	5.0					
R2	R2	0.50	0.90	8.2	0.45	7.66	3.5					
R3	R3	0.49	0.90	8.2	0.44	7.66	3.4	8.2	1.70	7.77	13.2	
R4	R4	0.50	0.90	8.2	0.45	7.66	3.5					
R5	R5	0.51	0.90	8.2	0.46	7.66	3.5	8.2	0.91	7.77	7.1	
R6	R6	0.51	0.90	8.2	0.46	7.66	3.5	8.2	1.37	7.77	10.6	
R7	R7	0.48	0.90	8.2	0.43	7.66	3.3					
R8	R8	0.73	0.90	8.2	0.65	7.66	5.0			Per rpt text, roof drains overtop to basins for events greater than "trickle" so R bas should be added to A-C for assessment depths in drives.		
R9	R9	0.50	0.90	8.2	0.45	7.66	3.5					
R10	R10	0.49	0.90	8.2	0.44	7.66	3.4					
R11	R11	0.50	0.90	8.2	0.45	7.66	3.5					Calculations revised to include the drainage in Basins A and C for the pan calculations.
R12	R12	0.51	0.90	8.2	0.46	7.66	3.5					
R13	R13	0.51	0.90	8.2	0.46	7.66	3.5					
R14	R14	0.48	0.90	8.2	0.43	7.66	3.3					
Off-Site Basins												
OS1	OS1	1.23	0.15	6.9	0.18	8.12	8.5					
OS2	OS2	0.17	0.15	6.9	0.03	8.12	4.5					
OS3	OS3	0.22	0.15	5.6	0.03	8.65	4.5					
OS4	OS4	0.73	0.15	6.5	0.11	8.28	4.9					

Per rpt text, roof drains overtop to basins A and C for events greater than "trickle" so R basin flows should be added to A-C for assessment of flows/ depths in drives.

Calculations revised to include the roof drainage in Basins A and C for the gutter pan calculations.