

**PRELIMINARY DRAINAGE REPORT**

**PORTEOS PA-9A SUBDIVISION FILING No. 1, LOT 1**  
AURORA, COLORADO

**PREPARED FOR:**

NICK'S INVESTMENTS, LLC  
6180 S. OAK HILL WAY  
AURORA, CO 80016  
CONTACT: MOHINDER SANDHU  
PHONE: 303.895.1639

**PREPARED BY:**

**THE DIMENSION GROUP**  
5600 SOUTH QUEBEC STREET, STE. 205B  
GREENWOOD VILLAGE, CO 80111  
PH. 303.536.3180  
CONTACT: JOEL TOMPKINS, PE, CPESC  
JTOMPKINS@DIMENSIONGROUP.COM

**Approved One Year From This Date**

_____	
_____	_____
City Engineer	Date
_____	_____
Water Department	Date

JULY 26, 2023

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ADVISORY NOTE: PRELIMINARY DRAINAGE REPORT APPROVAL IS REQUIRED PRIOR TO CIVIL PLAN APPROVAL.

## **I. INTRODUCTION**

*Porteos Framework Development Plan (FDP)* encompasses an area of approximately 1,272 acres just south of Denver International Airport; being between East 56<sup>th</sup> and 68<sup>th</sup> Avenues north-to-south and Harvest Road and Valley Head Street east-to-west. Planning Area 9A is a sub-area therein that has been designated for multi-use / commercial development. Improvement plans, public and private, for the overall FDP are an on-going process. At the time of this report preparation the infrastructure approval for *Porteos PA-9A & PA-9C – Civil Construction Plans (PA-9A CDs)*, a combined package prepared by the overall developer's consultants, has been through four rounds of review and is believed to be at or near approval. The proposed development of Nick's Convenience is a part thereof and is predicated on those approvals.

The objective of this report is to demonstrate the development of the Porteos PA-9A Subdivision Filing No. 1, Lot 1 as Nick's Convenience will be in conformance with the *Porteos PA-9A & PA-9C Preliminary Drainage Report (EDN: 223112)* which was approved by the City of Aurora on May 5, 2023.

### **A. LOCATION**

Porteos PA-9A is an 11.5 acre sub-area within the FDP at the southeast corner of East 64<sup>th</sup> Avenue and Jackson Gap Street. Further, it is situated in the Northwest 1/4 of Section 8, Township 3 South, Range 65 West of the 6<sup>th</sup> Principal Meridian, City of Aurora, Adams County, Colorado. Nick's Investments has purchased the 1.638 acres at the hard-corner of the aforementioned intersection. At this time the land is un-platted, though it is expected to be subdivided as a part of the approval process being initiated. Access to the parcel will be via private drives proposed as a part of the PA-9A CDs; no new public infrastructure is anticipated.

### **B. SURROUNDING DEVELOPMENTS**

Nick's Convenience will, ultimately, be surrounded by mixed-use / commercial development; to the east and south it is bordered by further parcels within the Porteos PA-9A FDP delineation. North of the 64<sup>th</sup> Avenue ROW is mixed-use / commercially designated Porteos Planning Area 3. Similarly, to the west of the Jackson Gap ROW is the like designated Porteos Planning Area 8B1. Finally, Porteos Planning Area 2B, also mixed-use / commercial, sites in the hard northwest corner of the 64<sup>th</sup> and Jackson Gap intersection. Currently all those immediate areas remain open space, though considerable overlot grading has occurred within PA-3. Public utilities exist in the surrounding rights-of-way and are being extended into PA-9A as a part of the PA-9A CDs and being constructed by Velocity Metropolitan District No. 1 (Metro District) upon approval of the authorities having jurisdiction.

**C. VICINITY MAP**



**II. PROPOSED DEVELOPMENT**

**A. PROPERTY DESCRIPTION**

The 1.638 acre parcel now owned by Nick's Investments is gently sloping (2.8 to 3.2 percent) open space with a predominantly northeast to southwest down-gradient. At least partial sections of both 64<sup>th</sup> Avenue and Jackson Gap exist and isolate the site from direct flow, either run-on or -off, from the north or west. There also exists on-site, closest to the intersection, a temporary sedimentation pond which, we assume, provided for mitigation during the construction of 64<sup>th</sup> Avenue as it currently has no significant contributing area. The PA-9A CDs will cause improvement of private access drives on the east and south property boundaries and the proposed overlot grading will create a 2.8 percent down-gradient, northwest to southeast. Vegetation on-site consists of native grasses established after previous grading exercises. There are no significant geological features on-site.

Hydrologic soil data was taken from maps created by the NRCS Web Soil Survey and shows the Nick's Convenience project site is composed of Group C soils. The NRCS Web Soil Survey is included in the Appendices.

Site topography used for the analysis was obtained from ACP DIA 1287 Investors, LLC who is, through the Metro District, responsible for interim construction that will deliver the site to Nick's Investments in the underlying condition demonstrated on the Preliminary Drainage Plan. Topographic information is in the NAVD88 Vertical Datum.

## **B. TYPE OF DEVELOPMENT**

This report in particular proposes the development of a 6,000 square foot convenience store with self-service fueling facilities; 8 multi-product dispensers under a canopy and a single high-speed diesel dispenser east thereof. As is typical of such a development the property will be variously improved with building, asphalt and concrete hardscaping, and programmed landscaping. Percent impervious and resultant C-values for analysis are excerpted from the City of Aurora Storm Drainage Design and Technical Criteria manual.

## **C. VARIANCE**

There are no requests for variance anticipated at this preliminary stage of the analysis.

# **III. HISTORIC DRAINAGE**

In the historic condition the property appears to have contributed sheet flow, only, to Gopher Gulch to the south. Gopher Gulch is a tributary of Second Creek which, in turn, is a tributary to the South Platte River. The current configuration of Gopher Gulch, a relatively recent improvement, sits approximately 1000' south of the site. The Gopher Gulch and Second Creek confluence is approximately 2.7 miles northwest of the site and the Second Creek to South Platte River confluence another 8.4 miles beyond in the same general direction.

## **A. OVERALL BASIN DESCRIPTION**

Nick's Convenience and Porteos PA-9A remains tributary to Gopher Gulch in the interim and final improvement conditions.

### **1. OFF-SITE BASINS**

Existing curb and gutter confined sections of 64<sup>th</sup> Avenue and Jackson Gap Street largely isolate the subject parcel from off-site contributions. A small area of open space south of 64<sup>th</sup> Avenue and northeast of the site lies up-gradient to the parcel and contributes runoff as sheet flow thereto. With the completion of overlot grading and the private access road construction by the Metro District that will be cut-off and there will be no further off-site contributions.

### **2. MAJOR DRAINAGE WAYS**

As mentioned, the site is and will remain tributary to Gopher Gulch (EDN #216082).

## **B. DRAINAGE PATTERNS THROUGH THE PROPERTY**

Runoff from the Nick's Convenience parcel discharges overland as sheet flow up until interception at the Jackson Gap right-of-way or being captured in a shallow swale parallel thereto and directed south to the same receiving body.

## **C. OUTFALLS DOWNSTREAM OF PROPERTY**

Flows to Jackson Gap are, currently, picked up in a curb inlet and directed to Gopher Gulch through piping under an adjacent, unpaved maintenance road. An area inlet in the aforementioned swale confluences with that same drain system. As mentioned previously, once entering the Gopher Gulch storm runoff from the site continues downstream to the Second Creek and, eventually, the South Platte River.

# **IV. DESIGN CRITERIA**

## **A. LIST OF REFERENCES**

This drainage report has been prepared in conformance with the provisions of the City of Aurora *Storm Drainage Design and Technical Criteria* (SDDTC) and, where referenced therein, the Mile High Flood District *Urban Storm Drainage Criteria Manuals* (USDCM) Volumes 1, 2, & 3.

The analysis and design within the *Preliminary Drainage Report – Porteos PA-9A & PA-9C* (HCI Engineering, May 25, 2023, EDN 223112), hereinafter referred to as the GDR, is the guiding drainage report document informing and providing for the proposed development of Nick's Convenience. Further references are provided in Section VII, below.

## **B. HYDROLOGIC CRITERIA**

### 1. RAINFALL

The Aurora SDDTC references the USDCM Volume 1 for estimation of the 1-hour rainfall depths for the various analyzed events. In turn, Volume 1 references the NOAA Atlas 14 document, which is available online. For the Porteos 9A area final intensities were read as 0.98 inches for the 2-year, 1-hour event and 2.60 cfs for the 100-year event. Full precipitation frequency data for the parcel, as reported by the NOAA online service, is excerpted from the GDR and included in the Appendices.

### 2. CALCULATION METHOD

Peak flow rates for the proposed stormwater infrastructure were developed using the Rational Method to establish flows at design points. The project consists of urban catchments of 90 acres or less and the Rational Method is the most applicable calculation method to determine peak flows for this analysis. Thus, calculations were

made using the Rational Method as described in the SDDTC, Section 5.20. Forms, results, and supporting information provided in the included Appendices.

The Rational Method formula is:

$$Q = CIA$$

where,

Q = the peak rate of runoff (CFS)

C = Runoff Coefficient (unitless)

I = average intensity of rainfall for a duration equal to the time of concentration, tc (inches/hour)

The intensity (I, in/hour) is determined as:

$$I = \frac{28.5P_1}{(10 + T_c)^{0.786}}$$

where,

I = rainfall intensity (inches per hour)

P<sub>1</sub> = 1-hour point rainfall depth (inches), NOAA Atlas 14

T<sub>c</sub> = time of concentration (minutes)

Composite runoff coefficients were calculated based upon Table 1 of the COA SDDTC and the National Resource Conservation Service Web Soil Survey documentation of hydrologic soil grouping.

### 3. WATER QUALITY VOLUME COMPUTATION METHOD

The GDR utilized the Full Spectrum Detention Method for determining water quality capture volume and excess urban runoff volume requirements for the subject parcel. Detention is provided in a regional facility, off-site Pond GG1 (EDN #221342). The proposed development, constructed as outlined in this report, will remain in compliance with the assumptions of the GDR and no additional facilities are proposed.

### 4. RUNOFF REDUCTION BASINS

At the time of preparation of this report no reduction factors are considered, nor are they likely to be determined beneficial to the scope and extent of the envisioned development.

### 5. DESIGN FREQUENCIES

Per the SDDTCM Section 3.31, the 2-year storm event can be used as the minor and the 100-year storm event as the major storm design frequencies appropriate for residential, business, and industrial land uses.

### **C. HYDROLOGIC CRITERIA**

The SDDTCM and the USDCM will be used as the guidelines for the analysis and design provided in the final drainage report. No detailed analysis or design of inlets or structures is provided in this preliminary report. Estimates used herein are informed by:

#### 1. STREET, CULVERTS, & SWALES

No public rights-of-way are expected to be created or affected by the development of Nick's Convenience. Culverts and swales are not anticipated as a part of the development.

#### 2. EMERGENCY OVERFLOW

The development of Nick's Convenience does not anticipate stormwater storage facilities and an emergency overflow analysis is not a part of this report.

## **V. DRAINAGE PLAN**

### **A. GENERAL CONCEPT**

Excess rainfall on-site will sheet flow to curb and gutter, intercepted by intermittent inlets, and routed to the off-site pond facilities through an on- and off-site underground drainage system. On-site surface inlets and storm drains will, ultimately, be sized for the 2-year event in a non-surge flow regime but provide for full capture and conveyance of the major, 100-year event.

#### 1. OFFSITE DRAINAGE

The completion of the private drives on the south and east property lines by the Metro District will isolate Nick's Convenience from any off-site flow contributions.

#### 2. COORDINATION WITH SURROUNDING DEVELOPMENTS

The development of Nick's Convenience is dependent on obligated improvements by the Metro District, including stormwater conveyance and mitigation provisions.

### **B. SPECIFIC DETAILS**

The 1.638 acres of Nick's Convenience parcel is divided into 6 sub-basins in the GDR; N7, N8, N9, N10, UD-1, and UD-2. The same nomenclature is retained in this preliminary drainage report, though two of those basins, N7 and N9, have been subdivided into A and B portions for further hydrologic and hydraulic considerations. All pertinent GDR basin delineations (drainage plan) and detailed analysis are included in the appendices of this report.

## 1. BASIN DESCRIPTIONS

The proposed basins and their relationship with the parent basin within the GDR are detailed as:

### Basins N7A & N7B

In the GDR Basin 7 is the significant SW portion of the subject parcel. For this PDR the equivalent basin is outlined as 7A, the building area, and 7B, the remaining commercial area west of the proposed grading divide. Basin 7A accounts for 6,000 s.f. (0.14 acre) of building, runoff from which is anticipated to be picked up in downspouts. Final collection, conveyance, and discharging of downspout runoff needs to be coordinated with the development of Architectural plans, yet advanced beyond preliminary elevations provided with the initial Site Plan submittal. The remaining 0.62 acres of N7B is area contributing out the south access point as anticipated by the GDR. N7B is tributary to the inlet at **design point 6**. N7A is considered at this location, too, which would reflect the case of downspout 'splash' to the surface at the front of the building. Likely there will be a combination of splash and/or underground routing that will be flushed out by the FDR in conjunction with additional architecture plan development.

### Basin N8

Is the delineation of the access drive along the south property line that is being constructed by the Metro District and is tributary to their proposed curb inlet at **design point 6**. The delineation of the included 0.10 acres in this PDR reflects better understanding of final improvements and the necessity to re-route the sidewalk connections at the crosspan.

### Basin N9A & N9B

In the GDR Basin 9 is the significant NE portion of the parcel. For this PDR the equivalent basin is split out as a 0.20 acre Basin 9A and a 0.24 acre basin 9B. Grading from the south access road to the building, providing for the intervening dispenser area and ADA requirements, did not allow the area of 9A to be elevated adequately to discharge runoff through the east side access point. Thus, a low point inlet in parking lot east of the building is needed to collect runoff and, ultimately, route to the GDR inlet at **design point 8**. The remainder 0.24 acres of Basin 9B will be collected at a low point curb inlet at the southeast end of the hardscape. Piped runoff from Basin 9A will enter the inlet box and combine with the surface runoff from 9B before discharging through a pipe connection to the GDR inlet at **dp8**.

### Basin N10

Is the delineation of the access drive along the east property line that is being constructed by the Metro District and is tributary to their proposed curb inlet at **design point 8**. The delineation of the included 0.16 acres in this PDR reflects better

understanding of final improvements and the necessity to re-route the sidewalk connections at the crosspan.

#### Basin UD-1

The GDR anticipated 0.07 acres of landscaping adjacent to 64<sup>th</sup> Avenue as remaining directly tributary thereto upon build-out of this commercial parcel. With the development of Nick's Convenience the actual bypass area will be reduced to 0.04 acres though it will require collection of runoff from the sidewalk at the rear face of the building. That will be affected by a strip drain placed at the back of walk and tied to the inlet in N9A.

#### Basin UD-2

The GDR further anticipated 0.15 acres of landscaping adjacent to Jackson Gap as remaining tributary thereto. With Nick's development that area will come in at 0.13 acres without special provisions necessary to capture non-landscape portions.

Full basin runoff analysis is tabulated in the included Appendices.

### **C. POND FACILITY DESIGN DETAILS**

As previously indicated, there are no pond facilities anticipated with the development of Nick's Convenience. This site will utilize existing regional facilities for detention (Pond GG1, EDN 221342) and a proposed water quality facility (Master Developer, Pond PA-9A, RSN 1707374) for stormwater mitigation and treatment requirements. The applicant understands re-certification may be required. If pond certificate, and executed I&M plan, or drainage easements do not exist, they will be required prior to civil plan approval.

## **VI. CONCLUSIONS**

### **A. COMPLIANCE WITH STANDARDS**

The Nick's Convenience Preliminary Drainage Report has been prepared in general conformance with the City of Aurora SDDTC and, where referenced, the Mile High Flood District USDCM. It is also in general conformance with the stipulations included in the Preliminary Drainage Report for Porteos PA-9A & PA-9C.

### **B. SUFFICIENCY OF CONCEPT**

It is our anticipation that adherence to the guidelines preliminary established herein will allow for development without undo detriment to surrounding properties or the public at large.

## VII. REFERENCES

- City of Aurora *Storm Drainage Design and Technical Criteria*, City of Aurora, Revised October 2010.
- *Urban Storm Drainage Criteria Manual*, Volumes 1,2,3, prepared by Mile High Flood Control District, April 2018.
- Final Drainage Report for Porteos PA-9A & PA-9C, HCI Engineering, Dated May 25, 2023.
- Preliminary Drainage Report for Porteos PA-9A & PA-9C, HCI Engineering, Dated April 21, 2023 (EDN 223112).
- Web Soil Survey,  
<https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>, United States
- Department of Agriculture – Natural Resources Conservation Service, August 21, 2017.
- FIRM, Flood Insurance Rate Map, Arapahoe County, Colorado, Map Numbers 08001C0655J and 08001C0665J, Federal Emergency Management Agency, February 17, 2017.
- National Oceanic and Atmospheric Administration (NOAA) 2013, NOAA Atlas 14: Precipitation Frequency Atlas of the United States, Federal online access.

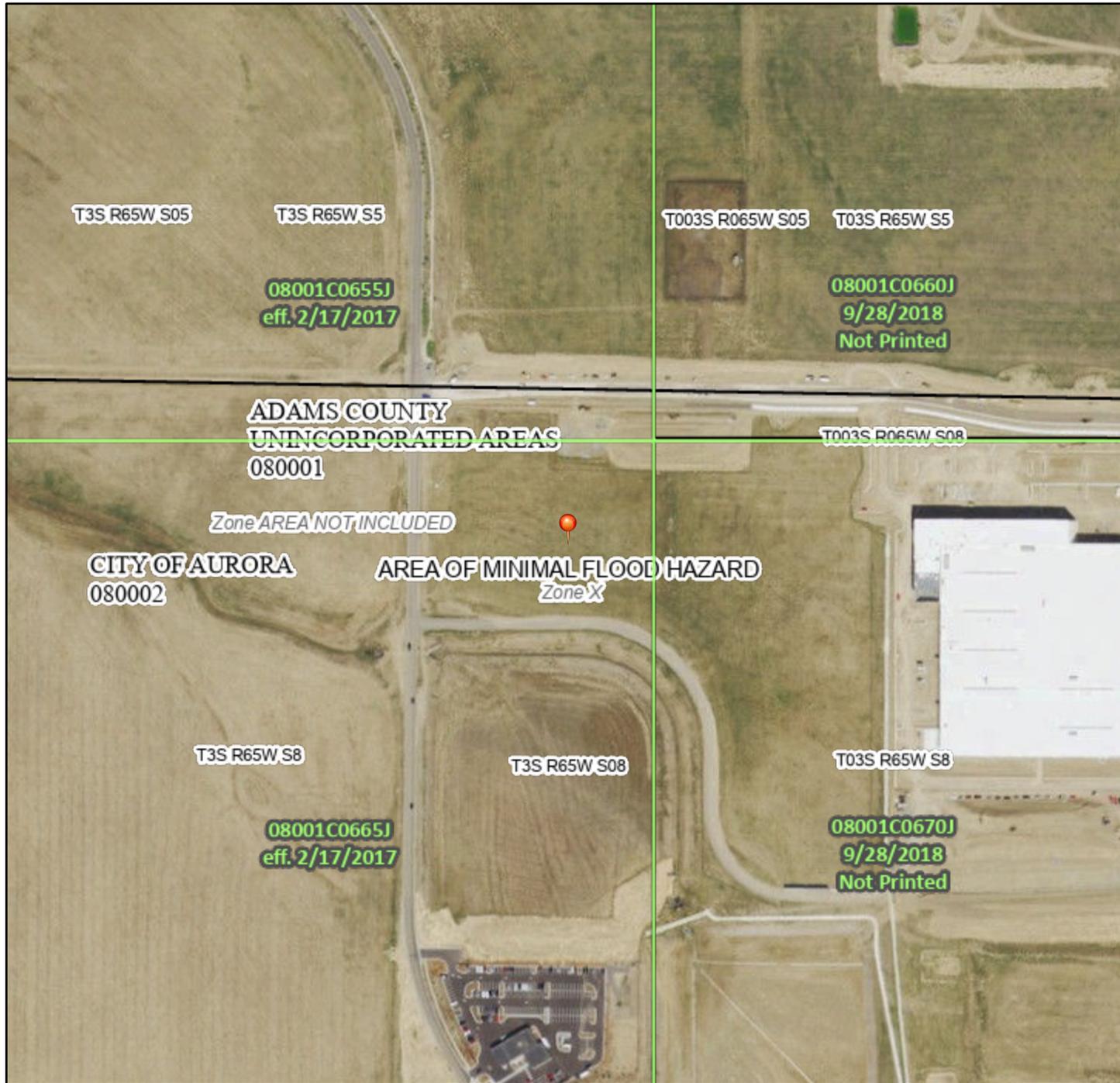
# **APPENDIX A**

## CONTEXT MAPS

# National Flood Hazard Layer FIRMMette



104°41'37"W 39°48'56"N



## Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>
		With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
		Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
		Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
		Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
		Area with Flood Risk due to Levee <i>Zone D</i>

OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
		Area of Undetermined Flood Hazard <i>Zone D</i>

GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall

OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study

OTHER FEATURES		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature

MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **6/28/2023 at 12:58 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



1:6,000 104°40'59"W 39°48'29"N

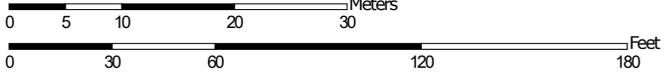
Basemap Imagery Source: USGS National Map 2023

Soil Map—Adams County Area, Parts of Adams and Denver Counties, Colorado  
(Nick's Convenience)



Soil Map may not be valid at this scale.

Map Scale: 1:667 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

### Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

### Water Features



Streams and Canals

### Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

### Background



Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Adams County Area, Parts of Adams and Denver Counties, Colorado

Survey Area Data: Version 19, Sep 1, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 9, 2021—Jun 12, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

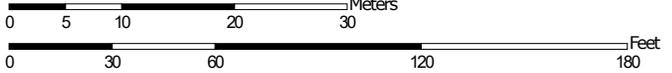
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
WmB	Weld loam, 1 to 3 percent slopes	1.7	100.0%
<b>Totals for Area of Interest</b>		<b>1.7</b>	<b>100.0%</b>

Hydrologic Soil Group—Adams County Area, Parts of Adams and Denver Counties, Colorado  
(Nick's Convenience)



Soil Map may not be valid at this scale.

Map Scale: 1:667 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

#### Soil Rating Polygons

 A  
 A/D  
 B  
 B/D  
 C  
 C/D  
 D  
 Not rated or not available

#### Soil Rating Lines

 A  
 A/D  
 B  
 B/D  
 C  
 C/D  
 D  
 Not rated or not available

#### Soil Rating Points

 A  
 A/D  
 B  
 B/D

 C  
 C/D  
 D  
 Not rated or not available

### Water Features

 Streams and Canals

### Transportation

 Rails  
 Interstate Highways  
 US Routes  
 Major Roads  
 Local Roads

### Background

 Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

**Warning:** Soil Map may not be valid at this scale.

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 Coordinate System: Web Mercator (EPSG:3857)

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Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 9, 2021—Jun 12, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
WmB	Weld loam, 1 to 3 percent slopes	C	1.7	100.0%
<b>Totals for Area of Interest</b>			<b>1.7</b>	<b>100.0%</b>

### Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

### Rating Options

*Aggregation Method: Dominant Condition*

*Component Percent Cutoff: None Specified*

## **APPENDIX B**

HYDROLOGIC CALCULATIONS

REVIEW CHECKLIST

**NICK'S CONVENIENCE**  
**PRELIMINARY DRAINAGE REPORT**  
 AURORA, CO

**COEFFICIENTS (DDTC TABLE 1)**

	Impervious			
	2-Year	5-Year	100-Year	Percent
Concrete Drive & Walk	0.87	0.87	0.89	96
Commercial	0.60	0.65	0.80	85
Streets, Paved	0.87	0.88	0.93	100
Roofs	0.80	0.85	0.90	90
Lawns, Clay Soil (2-7%)	0.18	0.19	0.22	5

<b>COMPOSITE 'C' FACTORS (DEVELOPED)</b>									
LOCATION:						DATE: 7/10/2023			
BASIN DESIGNATION						COMPOSITE C FACTOR			PERCENT IMPERVIOUS
	CONC.	PAVED	ROOFS	LAWNS	TOTAL	2YR	5 YR	100 YR	
N7A			0.14		0.14	0.80	0.85	0.90	90.0
N7B	0.14	0.30	0.10	0.09	0.62	0.60	0.65	0.80	84.4
N8	0.03	0.07		0.00	0.10	0.87	0.87	0.89	96.2
N9A	0.04	0.09		0.07	0.20	0.49	0.53	0.65	64.1
N9B	0.05	0.17		0.03	0.24	0.72	0.77	0.86	87.9
N10	0.03	0.10		0.03	0.16	0.60	0.65	0.80	83.3
UD-1	0.00			0.04	0.04	0.18	0.19	0.22	5.0
UD-2	0.00			0.13	0.13	0.18	0.19	0.22	5.0

**NICK'S CONVENIENCE  
PRELIMINARY DRAINAGE REPORT  
AURORA, CO**

TIME OF CONCENTRATION (DEVELOPED)														REMARKS	
LOCATION: NICK'S CONVENIENCE				PRELIMINARY DRAINAGE REPORT				BY: JDT				DATE: 7/10/2023		FORMULAS:	
SUB-BASIN DATA			INIT./OVERLAND TIME (T <sub>i</sub> )			TRAVEL TIME (T <sub>t</sub> )					TOTAL	T <sub>c</sub> Check (Urbanized Basins)		FINAL T <sub>c</sub>	* T <sub>i</sub> = [0.395 (1.1-C <sub>s</sub> )L <sup>1/2</sup> ] / S <sup>1/3</sup> ** V=KS <sup>0.5</sup>
DESIGNATION	C <sub>s</sub>	AREA (AC)	LENGTH (FT)	SLOPE %	T <sub>i</sub> (Min.)*	K	LENGTH (FT)	SLOPE %	VEL. (FPS)**	T <sub>t</sub> (Min.)	T <sub>i</sub> +T <sub>t</sub> (Min.)	LGTH. (FT)	T <sub>c</sub> = (L/180) + 10	(minutes)	
N7B	0.65	0.62	140	1.8	8.2	20	45	4.0	4.00	0.2	8.3	185.0	11.0	8.3	
N9B	0.77	0.24	125	1.9	5.5	20	65	0.8	1.73	0.6	6.2	190.0	11.1	6.2	

**NICK'S CONVENIENCE**  
**PRELIMINARY DRAINAGE REPORT**

AURORA, CO

**STORM DRAINAGE SYSTEM DESIGN**  
**(RATIONAL METHOD PROCEDURE)**  
**DESIGN STORM: 2-YEAR DEVELOPED**

DESIGN POINT	DIRECT RUNOFF							TOTAL PEAK RUNOFF					REMARKS
	SUB-BASIN	AREA (AC)	COEFF. (C)	T <sub>c</sub> (Min.)	C*A	I (in./hr.)	Q (cfs)	Sum Area	T <sub>c</sub> (min)	I (in./hr.)	Sum C*A	Total Q (cfs)	
	N7A	0.14	0.80	5.0	0.11	2.88	0.32						Roof flows to private drive at south.
	N7B	0.62	0.60	8.3	0.37	2.46	0.92						Parking and access area flows to private drive at south.
	N8	0.10	0.87	5.0	0.08	2.88	0.24						Private drive generated flows.
6								0.86	8.3	2.46	0.57	1.39	Gutter flow to Inlet
	N9A	0.20	0.49	5.0	0.10	2.88	0.29						Surface flow to area inlet.
	N9B	0.24	0.72	6.2	0.18	2.72	0.48						Surface flow to curb inlet.
N9B								0.45	6.2	2.72	0.27	0.75	Total flow accumulation in inlet box.
	N10	0.16	0.60	5.0	0.10	2.88	0.28						Private drive generated flows.
8								0.61	6.2	2.72	0.37	1.01	Gutter flow to Inlet
	UD-1	0.04	0.18	5.0	0.01	2.88	0.02						To the 64th Avenue ROW (< GDR anticipation)
	UD-2	0.13	0.18	5.0	0.02	2.88	0.07						To the Jackson Gap ROW (< GDR anticipation)
8A												2.50	Total Lot 1 Accumulated Runoff (< GDR Accumulation of 2.73 cfs)

**NICK'S CONVENIENCE**  
**PRELIMINARY DRAINAGE REPORT**  
 AURORA, CO

**STORM DRAINAGE SYSTEM DESIGN**  
**(RATIONAL METHOD PROCEDURE)**  
**DESIGN STORM: 100-YEAR DEVELOPED**

DESIGN POINT	DIRECT RUNOFF							TOTAL PEAK RUNOFF					REMARKS
	SUB-BASIN	AREA (AC)	COEFF. (C)	TC (MIN)	C*A	I (IN/HR)	Q (CFS)	SUM AREA	TC (MIN)	I (IN/HR)	SUM C*A	TOTAL Q (CFS)	
	N7A	0.14	0.90	5.0	0.12	8.51	1.05						Roof flows to private drive at south.
	N7B	0.62	0.80	8.3	0.50	7.27	3.60						Parking and access area flows to private drive at south.
	N8	0.10	0.89	5.0	0.09	8.51	0.74						Private drive generated flows.
6								0.86	8.3	7.27	0.71	5.13	Gutter flow to Inlet
	N9A	0.20	0.65	5.0	0.13	8.51	1.12						Surface flow to area inlet.
	N9B	0.24	0.86	6.2	0.21	8.03	1.69						Surface flow to curb inlet.
N9B								0.45	6.2	8.03	0.34	2.74	Total flow accumulation in inlet box.
	N10	0.16	0.80	5.0	0.13	8.51	1.11						Private drive generated flows.
8								0.61	6.2	8.03	0.47	3.78	Gutter flow to Inlet
	UD-1	0.04	0.22	5.0	0.01	8.51	0.08						To the 64th Avenue ROW (< GDR anticipation)
	UD-2	0.13	0.22	5.0	0.03	8.51	0.25						To the Jackson Gap ROW (< GDR anticipation)
8A												9.25	Total Lot 1 Accumulated Runoff (< GDR Accumulation of 10.32 cfs)

Planning and Engineering  
 15151 E. Alameda Parkway, Suite 3600  
 Aurora, Colorado 80012

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### Preliminary Drainage Report (PDR) Review Checklist

**Checklist to be filled out by License Civil Engineer in the State of Colorado as the Engineer of Record (EOR). Checklist shall be uploaded separately with the drainage report and included in the appendix the drainage report.** Checklist shall be used as a guidance document only and shall not be considered comprehensive for submittal requirements. Please ensure reference of the most recent Storm Drainage and Technical Criteria Manual.

**\*\*\*Submittal shall be held if all applicable items are not included\*\*\***

**Preliminary Drainage Report will be limited to three (3) reviews, additional review fees will apply to the fourth (4<sup>th</sup>) review.**

Subdivision Name: \_\_\_\_\_

Engineering Co.: \_\_\_\_\_ Phone: \_\_\_\_\_

Engineer (EOR) Name: \_\_\_\_\_ Email: \_\_\_\_\_

Owner Company: \_\_\_\_\_ Phone: \_\_\_\_\_

Contact Name: \_\_\_\_\_ Email: \_\_\_\_\_

<b>Please note that the following items are not to be included on the Preliminary Drainage submittal:</b>		
Sizing of orifices or restrictor plates for WQCV, EURV or 100 year flood events		
Water surface profiles with RAS modeling		
Storm drain sizing		
Temporary erosion control measures (permanent only shown schematically)		
<b>Check HERE if a Master Drainage Plan has been reviewed and approved in the last twelve (12) months. Preliminary Drainage Plan shall be in conformance to Master Drainage Plan. Provide EDN # pending</b>	<input type="checkbox"/>	
	<b>Included</b>	<b>N/A</b>
<b>Drainage Planning Process</b>		

1	Drainage kick-off meeting (to discuss general concepts and identify significant issues related to the drainage concepts and shall be limited to one (1) hour) scheduled and held with MHFD and City Drainage staff (and any other relevant municipalities) prior to submittal of Preliminary Drainage. Required for all sites with MEP facilities, stream management corridors (identified on MHFD website), regional ponds, major outfalls, basins > 130 acres prior to submittal of Preliminary Drainage Report and Plan. Applicant shall include meeting minutes, that have been reviewed by all attendees, from this meeting in the appendix. Please note, per Colorado Revised Statutes 32-11- 221(1), these improvements require MHFD approval.	<input type="checkbox"/>	<input type="checkbox"/>
2	Drainage Plan matches Planning Site plan (site layout, easements, etc.).	<input type="checkbox"/>	
	<b>Referrals</b>		
3	Identify and confirm referrals to all relevant outside agencies have been made (CDOT, DEN/DIA (drainage and utilities), MHFD, CCBA, E-470, easement holders, etc.). Please include copy of transmittal(s) to required agencies. (implementation date TBD)	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Format and General Items</b>		
3	Drainage Plan matches Site Plan and plat (Site layout, easements, etc.).	<input type="checkbox"/>	<input type="checkbox"/>
4	Drainage design for adjacent roadways included. ( <i>Confirm with site plan what roads are being improved. Drainage Report should include drainage design for all roadways being improved even if roadway construction is deferred</i> )	<input type="checkbox"/>	<input type="checkbox"/>
5	Project Phasing Shown ( <i>If project is to be phased, then phasing must be described in PDR report text and shown on plan. Hydrologic analysis of different phases may be required and multiple plan sheets may be needed.</i> )	<input type="checkbox"/>	<input type="checkbox"/>
6	All drainage design should conform to City of Aurora Storm Drainage Design & Technical Criteria (COA SDDTC).	<input type="checkbox"/>	
	<b>Report</b>		
7	COA approval block on report cover.	<input type="checkbox"/>	
8	Formal Subdivision name on report cover.	<input type="checkbox"/>	<input type="checkbox"/>
9	Required report outline/Table Of Contents/content followed (SDDTC Sect 2.30).	<input type="checkbox"/>	
10	Advisory note that PDR approval is required prior to Civil Plan Approval.	<input type="checkbox"/>	
11	Variances - All requested variances must be numerically listed with justifications in section A.2.c of the Report. If no variances,	<input type="checkbox"/>	<input type="checkbox"/>

	state “None.” All variances require supervisor level approval and will require additional review time.		
12	Discuss effects of proposed development on adjacent, upstream and downstream sites under both existing and future buildout condition.	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Preliminary Drainage Plan</b>		
13	Drainage Plan uploaded as separate full-size dwg.	<input type="checkbox"/>	
14	COA approval block on drainage plan first sheet.	<input type="checkbox"/>	
15	No copyright notes on plan.	<input type="checkbox"/>	
16	Legend.	<input type="checkbox"/>	
17	Formal Subdivision name in title block of drainage plan.	<input type="checkbox"/>	<input type="checkbox"/>
18	Minimum scale 1”=50’ for single family. 1”=30’ for multi-family and commercial. When drainage plan is on more than one sheet an <i>overview sheet showing entire site shall be provided.</i>	<input type="checkbox"/>	<input type="checkbox"/>
19	General Notes required on plan (not comprehensive – see drainage specs): 1. City of Aurora review is only for general conformance (see Section SDDTC Section 2.22KJ). 2. Ref COA NAVD88 benchmark. 3. Design recurrence interval (minor or major) for storm pipe infrastructure. 4. State storm infrastructure is private or public.	<input type="checkbox"/>	<input type="checkbox"/>
20	Contours two feet (2’) maximum, fifty feet (50’) min beyond property line and shown for all off-site tributary areas. Offsite tributary areas may be shown on a separate 11x17 in report.	<input type="checkbox"/>	<input type="checkbox"/>
21	Building FFE’s shown (commercial and multi-family).	<input type="checkbox"/>	<input type="checkbox"/>
22	Floodplain, floodway, FEMA panel #, effective date and BFE’s shown.	<input type="checkbox"/>	<input type="checkbox"/>
23	Retaining wall(s) locations (only) shown. Preliminary section with maximum height, any footer or geotechnical reinforcing shown and property line or ROW line shown.	<input type="checkbox"/>	<input type="checkbox"/>
24	Drainage basin boundaries, flow arrows and design points shown. Offsite basins may be shown on separate plans in report.	<input type="checkbox"/>	<input type="checkbox"/>
25	Emergency overflow arrow(s) shown with location and direction, for ponds, sump inlets etc. Unique flow direction arrow used for emergency overflow and noted in legend.	<input type="checkbox"/>	<input type="checkbox"/>
26	Table of flows, C values and percent impervious for individual basins and design points shown on plans.	<input type="checkbox"/>	<input type="checkbox"/>
26	Existing drainage facilities shown/labeled with size and COA Engineering Drawing Number (EDN).	<input type="checkbox"/>	<input type="checkbox"/>
27	Proposed drainage facilities shown/labeled with asset type (no sizing of pipes/inlets).	<input type="checkbox"/>	<input type="checkbox"/>

28	Existing and proposed easements and tracks for drainage functions only and as described in the City specifications and clearly shown.	<input type="checkbox"/>	<input type="checkbox"/>
29	All detention ponds shown/labeled with ponding limits, volumes and elevations for WQCV, EURV (or 10 year) and 100 year as appropriate and allowable release rates.	<input type="checkbox"/>	<input type="checkbox"/>
30	Cross sections for all swales, channels and critical emergency flow paths (show geometry, 100 year flow depth, Q100, freeboard).	<input type="checkbox"/>	<input type="checkbox"/>
31	Prelim plan and profile for all channels. WS profile not required but do show utilities, culverts, grade controls, bank protection.	<input type="checkbox"/>	<input type="checkbox"/>
32	Drafting standards – reference Sections 2.00 – 3.03 of Roadway Design Manual.	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Previous Studies and Master Plans</b>		
33	All sources for previous relevant drainage studies are reviewed and intent of each incorporated. <i>(Reports/studies can be found for regional drainage studies, previous site studies, and adjacent site development drainage plans on the <a href="#">MHFD website</a> and <a href="#">City's document website</a>.)</i> Include a label on plan with City EDN number where applicable.	<input type="checkbox"/>	<input type="checkbox"/>
	<b><u>Hydrologic Analysis</u></b>		
	<b>Basin Delineations</b>		
35	Basin boundaries correspond to proposed topography.	<input type="checkbox"/>	<input type="checkbox"/>
36	All off-site tributary areas delineated/evaluated <i>Properties must continue to accept historically tributary flows unless a variance approved by staff (may require additional review time).</i>	<input type="checkbox"/>	<input type="checkbox"/>
37	Offsite emergency flows perpetuated through site.	<input type="checkbox"/>	<input type="checkbox"/>
38	Water Quality and Detention are required for all on-site areas unless a variance approved by staff <i>(may require additional review time)</i> .	<input type="checkbox"/>	<input type="checkbox"/>
39	Design points shown on plan.	<input type="checkbox"/>	
	<b>Rainfall/Design Events</b>		
40	Point Rainfall Depth per COA Criteria <i>Rational Method and CUHP rainfall per NOAA Atlas 14.</i>	<input type="checkbox"/>	<input type="checkbox"/>
41	Urban Center or Transit Oriented District (TOD) 100 year design capacity is required of all storm conveyance systems, see COA SDDTC for limitations on street flow depth.	<input type="checkbox"/>	<input type="checkbox"/>
42	City Center Zone (five (5) year minor event).	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Rational Method (only for &lt;= 90 acres)</b>		

43	NRCS soils data map included with site boundaries delineated. Imperviousness and C values reflect correct hydrologic soil group per City Criteria.	<input type="checkbox"/>	<input type="checkbox"/>
44	Imperviousness and C Values in compliance with Master Drainage Plan (if applicable) and reflect Planning Department site plan.	<input type="checkbox"/>	<input type="checkbox"/>
45	Time of concentration (Tc) calcs utilize COA SDDTC methods (COA Tc methods consistent with MHFD).	<input type="checkbox"/>	<input type="checkbox"/>
46	Confirm Weighted C and percent impervious, Tc, Intensity, peak flows.	<input type="checkbox"/>	<input type="checkbox"/>
47	Confirm routed/accumulated flows at critical locations (ponds, storm inlets, etc.) including design points.	<input type="checkbox"/>	<input type="checkbox"/>
	<b>CUHP</b> (See MHFD published criteria for items not yet published in COA SDDTC)		
48	Depression loss values correspond to COA Criteria.	<input type="checkbox"/>	<input type="checkbox"/>
49	Infiltration method parameters correspond to COA Criteria.	<input type="checkbox"/>	<input type="checkbox"/>
50	Impervious calculations reflect City percent impervious values.	<input type="checkbox"/>	<input type="checkbox"/>
51	Confirm Directly Connected Impervious Area (DCIA) Level is accurate <i>0 unless distributed LID measures utilized throughout watershed. For example, providing ponds, rain gardens, or other approved water quality BMP's sized for the subdivision or large portions of it does not justify DCIA Level &gt; 0.</i>	<input type="checkbox"/>	<input type="checkbox"/>
52	Confirm basin areas, percent Impervious and WQCV portion of pond is 100% impervious.	<input type="checkbox"/>	<input type="checkbox"/>
	<b>SWMM</b>		
53	Link-node diagram included, and DP's shown on plan.	<input type="checkbox"/>	<input type="checkbox"/>
54	Pond storage rating curves match plan/calcs.	<input type="checkbox"/>	<input type="checkbox"/>
55	Pond discharge rating curves match calcs.	<input type="checkbox"/>	<input type="checkbox"/>
56	Confirm CUHP output hydrographs input to correct nodes and link node connectivity and continuity error not significant.	<input type="checkbox"/>	<input type="checkbox"/>
	<b><u>Hydraulic Analysis</u></b>		
	<b>Special Considerations</b>		
57	If site is tributary to Norfolk or City Center Ponds, and utilizing these regional detention facilities for detention, additional fees are required (see published fee schedule). NOTE: Water quality still required on site.	<input type="checkbox"/>	<input type="checkbox"/>
58	If site is tributary to Aurora Reservoir, special water quality conditions exist. Please refer to specification manual.	<input type="checkbox"/>	<input type="checkbox"/>

	<b>New (or Modified) Ponds</b>		
59	Applicable detention and EURV/water quality requirements are met.	<input type="checkbox"/>	<input type="checkbox"/>
60	Volumes per UD-Detention or CUHP/SWMM.	<input type="checkbox"/>	<input type="checkbox"/>
61	Proposed ponds do not classify as a jurisdictional dam(s) designation. City will require the applicant to provide a letter of determination (from the State Engineers Office) when the proposed pond is within 0.5' of jurisdictional height as defined by State Engineers Office. Additional review time may be required.	<input type="checkbox"/>	<input type="checkbox"/>
62	Elevation of top of embankment is a minimum of one foot (1') above the water surface elevation over the emergency weir when the weir is conveying the maximum design or emergency flow.	<input type="checkbox"/>	<input type="checkbox"/>
63	Adjacent FFE's are a minimum of one foot (1') above pond emergency overflow water surface elevation.	<input type="checkbox"/>	<input type="checkbox"/>
64	Total drainage area and percent impervious for each pond correctly computed. <i>(Reminder: check criteria manual for requirements for off-site tributary areas Water Quality is required for entire tributary area to the Water Quality Facility. Detention/EURV for offsite areas may be permitted to pass through, discuss with COA prior to submittal.)</i>	<input type="checkbox"/>	<input type="checkbox"/>
65	Pond release rates, volumes and 100 year water surface elevation per COA criteria and clearly shown on Drainage Plan.	<input type="checkbox"/>	<input type="checkbox"/>
66	All Ponds, underground detention and WQ devices are contained in "Drainage Easements" (easement shall include additional four feet (4") from the perimeter of underground detention and WQ devices ). Access to these from ROW is to be shown as a City "Access Easement" (note this is not a public access easement).	<input type="checkbox"/>	<input type="checkbox"/>
67	Access provided to forebays and outlet structure (top and bottom)in compliance with COA Specs.	<input type="checkbox"/>	<input type="checkbox"/>
68	Pond berm slopes are maximum 4:1.	<input type="checkbox"/>	<input type="checkbox"/>
69	<p>Pond emergency spillway flows and direction clearly shown on plan.</p> <ul style="list-style-type: none"> <li>• Existing historic flow patterns shall be maintained. If discharging to an adjacent developed property - demonstrate one foot (1') of freeboard to all existing structure Finish Floor Elevations.</li> <li>• If emergency spillway flows are maintained on-site until reaching major watershed creek, ensure flows will not negatively impact properties along the flow path.</li> <li>• All emergency spillway flow paths on site shall be in a drainage easement until reaching major watershed creek or ROW.</li> <li>• All emergency overflows which discharge onto other undeveloped sites shall include a note on the plans indicating the owner shall perpetuate the flows.</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>

70	If pond is within 10,000 feet of any airport and within five (5) miles of DIA/DEN, applicant to confirm drain time requirements and incorporate in pond design (i.e. Denver International Airport, forty (40) hour max drain time and no exposed micropool required).	<input type="checkbox"/>	<input type="checkbox"/>
71	Permanent erosion control shown schematically on PDR Plan.	<input type="checkbox"/>	<input type="checkbox"/>
<b>Use of Existing Ponds</b>			
72	Provide the following callout note: <i>“Applicant understands re-certification may be required. If pond certificate, an executed I&amp;M plan, or drainage easements do not exist, they will be required prior to Civil Plan approval.”</i>	<input type="checkbox"/>	<input type="checkbox"/>
73	If pond is being expanded or changed due to tributary area change, percent impervious increase or some other aspect of the pond is being changed, then City will require that pond be brought up to current design standards (freeboard, EURV, access, easement dedications, etc.).	<input type="checkbox"/>	<input type="checkbox"/>
<b>Specialty Water Quality Devices and Measures</b>			
74	Subsurface, proprietary water quality devices only allowed with authorization from Aurora Water. Will not be allowed in greenfield development or to increase development density. If allowed, proprietary WQ device must achieve requirements set forth in the City criteria manual. Maintenance access that does not require traffic control must be provided.	<input type="checkbox"/>	<input type="checkbox"/>
75	Water quality measures including rain gardens, grass swales, Etc. shall be designed per City criteria and design spreadsheets (MHFD) or equivalent included.	<input type="checkbox"/>	<input type="checkbox"/>
<b>Streets/Alleys</b>			
76	Included street capacity calcs for public and private streets, drives and alleys.	<input type="checkbox"/>	<input type="checkbox"/>
77	Inlets shown upstream of curb returns where two (2) streets sloping down to an intersection per Aurora Roadway Manual.	<input type="checkbox"/>	<input type="checkbox"/>
78	Cross Pans – refer to latest version of Roadway Design Manual. Cross Pans are not allowed across collector or arterial roadways, nor are they allowed on roadways with storm sewer systems.”	<input type="checkbox"/>	<input type="checkbox"/>
79	When a street or alley with a steep grade ends at a T intersection, evaluate and mitigate flooding potential for properties at the end of that intersection including one foot (1’) of freeboard for FFE and no inundation of garages for the 100 year event. See Drainage Criteria Manual for details.	<input type="checkbox"/>	<input type="checkbox"/>
<b>Storm Drainage System</b>			

80	If connecting to an existing storm sewer pipe, at the point of connection, call out the offsite flow rate projected for the receiving storm sewer system and reference the name and date of the study. If no previous study exists, analysis showing adequate capacity must be performed by Applicant and provided with PDR.	<input type="checkbox"/>	<input type="checkbox"/>
81	Sump inlets identified and emergency overflow shown on plan (with emergency flow arrows) and confirm one foot (1') minimum freeboard from 100 year WSEL to building FFE's (existing and new). Report shall include associated verbiage and calculations.	<input type="checkbox"/>	<input type="checkbox"/>
82	Emergency overflows shall not discharge onto adjacent sites unless extreme condition exists (to be included in Variance list and approved by Engineering Services Manager). If allowed, applicant must include a note on the plans that clearly indicates that the adjacent property owner shall perpetuate the flows.	<input type="checkbox"/>	<input type="checkbox"/>
83	Easements, tracts and/or license agreements identified on preliminary drainage plan. Note: All easements and license agreement shall be executed prior to civil plan approval.	<input type="checkbox"/>	<input type="checkbox"/>
84	All storm lines and inlets labeled as public or private to identify maintenance obligations, subject to review by Aurora Water.	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Culverts</b>		
85	Sized (100 year capacity, twenty-four inch (24") minimum diameter or box minimum height six feet (6') if width > eight feet (8')), shown and labeled if under public roads.	<input type="checkbox"/>	<input type="checkbox"/>
86	Emergency overflow provided per criteria (one foot (1') freeboard to FFEs) and labeled with WSEL.	<input type="checkbox"/>	<input type="checkbox"/>
87	Maintenance access provided both u/s and d/s of culverts with twenty foot (20') minimum access around all riprap, headwalls and wingwalls at the outlet.	<input type="checkbox"/>	<input type="checkbox"/>
88	Easements, tracts and/or license agreements identified on preliminary drainage plan. Note: All easements and license agreements shall be executed prior to civil plan approval.	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Channels</b>		
89	Regional Channels shall be designed for MEP (for maintenance eligibility) per MHFD.	<input type="checkbox"/>	<input type="checkbox"/>
89	COA criteria for slope, velocity, Side slope freeboard one foot (1'), etc. are met.	<input type="checkbox"/>	<input type="checkbox"/>
90	Preliminary plan, profiles, and typical section with normal depth calculations shown on plan along with drops, bank protection and utilities.	<input type="checkbox"/>	<input type="checkbox"/>
91	Channels within DEN/DIA drain time zone may not be allowed to have any adverse slope sections and require special plant palette. DEN/DIA review required.	<input type="checkbox"/>	<input type="checkbox"/>

92	Permanent erosion control shown schematically (note: FDR and civils shall provide design for permanent erosion control).	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Outfalls</b>		
93	Proposed outfall corresponds to any previously proposed/planned location (MDP for larger site, previous subdivision drainage reports, etc.) Include report reference label next to outfall.	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Floodplains</b>		
94	Floodplain limits, BFE's and FEMA map panel # and effective date shown on plan if within three hundred feet (300') limits of grading or construction.	<input type="checkbox"/>	<input type="checkbox"/>
95	<p>"Best available information" 100 year floodplains (BAIF) including floodway and Base Flood Elevations must be clearly identified.</p> <ul style="list-style-type: none"> <li>Sources to determine BAIF sources include COA website (effective FIRM's and LOMR's), MHFD website for recent FHADs, and FEMA Map Service Center (Preliminary status maps) Engineer is encouraged to contact City Floodplain Administrator to confirm source of BAIF.</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
96	Add this callout note to any work planned within the floodplain <i>"Applicant understands that construction or grading in 100 year Floodplain requires Floodplain Development Permit which must be obtained prior to grading or construction can commence."</i>	<input type="checkbox"/>	<input type="checkbox"/>
97	For new development, no portion of residential lots can be shown within an existing floodplain. Minor portions of commercial/industrial lots may be allowed in existing floodplain if they meet the non-residential BFE requirements, Floodplain Administrator approval required and additional review times may apply.	<input type="checkbox"/>	<input type="checkbox"/>
98	Residential Lowest Floor Elevation (LFE)'s are two feet (2') minimum above Base Flood Elevation (BFE).	<input type="checkbox"/>	<input type="checkbox"/>
99	Non-residential LFE's are one foot (1') minimum above BFE.	<input type="checkbox"/>	<input type="checkbox"/>
100	Setback requirement per latest version of the Storm Drainage Criteria manual. Consider any applicable fluvial hazard boundary studies and adjust corridor to account for potential stream corridor movement. Identify location and reference study name/date on plan.	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Swales</b>		
101	swales must be constructed per drainage criteria manual for minimum slopes, underdrain, and/or lining requirements.	<input type="checkbox"/>	<input type="checkbox"/>
102	Easements, tracts and/or license agreements identified for public infrastructure per criteria. Note: all dedications and/or signed agreements required as part of the plat approval or prior to CD approval.	<input type="checkbox"/>	<input type="checkbox"/>

103	Top of Swales for offsite drainage (not lot drainage) shall be a minimum of two feet (2') from the property line to avoid disturbance by fencing	<input type="checkbox"/>	<input type="checkbox"/>
-----	--	--------------------------	--------------------------

I hereby certify that the information provided above is complete and accurate.

\_\_\_\_\_  
 Engineer of Record Printed Name

\_\_\_\_\_  
 Signature

\_\_\_\_\_  
 Date

\_\_\_\_\_  
 Engineer of Record Title

# **APPENDIX C**

EXCERPTS

**TABLE 1** (continued)

**RUNOFF COEFFICIENTS AND PERCENTS IMPERVIOUS**

LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	FREQUENCY			
		2	5	10	100
<u>Streets:</u>					
Paved	100	.87	.88	.90	.93
Gravel	40	.15	.25	.35	.65
<u>Concrete Drive and Walks</u>	96	.87	.87	.88	.89
<u>Roofs</u>	90	.80	.85	.90	.90
<u>Lawns, Sandy Soil (A and B Soils):</u>	2				
2% Slope		.05	.06	.08	.10
2-7% Slope		.10	.11	.13	.15
>7% Slope		.15	.16	.18	.20
<u>Lawns, Clay Soil (C and D Soils):</u>	5				
2% Slope		.13	.14	.15	.17
2-7% Slope		.18	.19	.20	.22
>7% Slope		.25	.27	.30	.35

NOTE: These Rational Formula coefficients may not be valid for large basins

(\*)See Figures *RO-3 through RO-5* of USDCM Volume 1 for percent impervious.

(\*\*)Up to 5 units per acre. Single-family with more than 5 units per acre, use values for multi-unit/detached

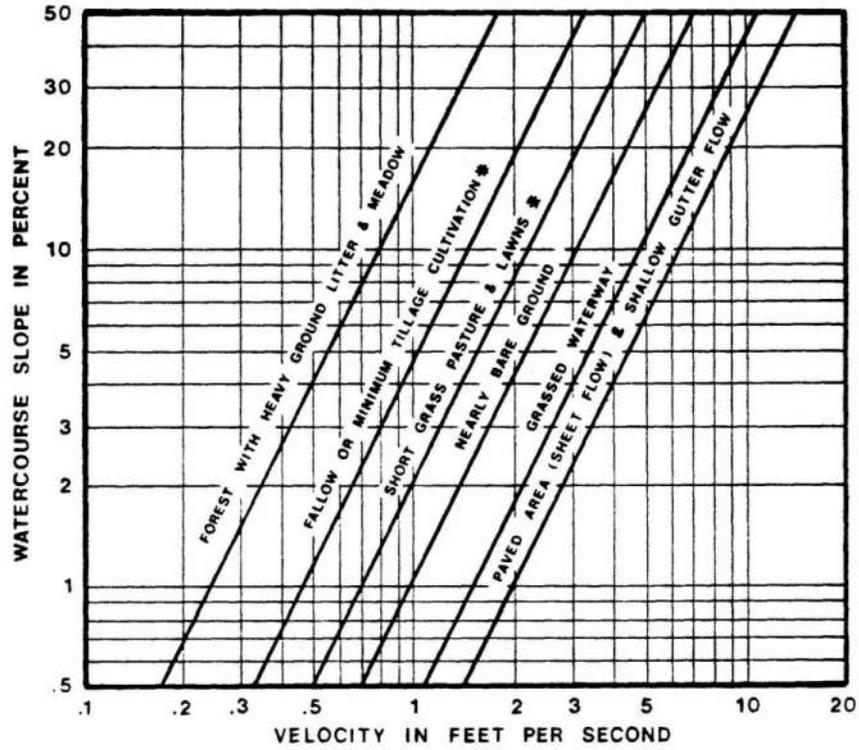


Figure RO-1—Estimate of Average Overland Flow Velocity for Use With the Rational Formula

FIGURE 1

# HCI ENGINEERING

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## Porteos PA-9A & PA-9C

### PRELIMINARY DRAINAGE REPORT

**Owner:**

ACP DIA 1287 Investors, LLC  
Bill Wichterman  
4350 East Shea Boulevard #100  
Phoenix, AZ 85028  
PH: 602-494-7800

**Engineer Contact(s):**

HCI Engineering  
Cole C. Haberer, P.E.  
621 Southpark Dr., Suite 1600  
Littleton, CO 80120  
PH: 303-979-3900  
FX: 303-278-7814

**FACSIMILE**

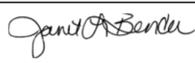
This electronic plan is a facsimile  
of the signed and sealed PDF set.

 04/21/2023  
T. Garrett Goodlin, PE 56865

4/21/2023

Estimated Project Dates:

Project Start Date: 6/1/2023    Project Completion Date: 12/1/2023

<b>Approved For One Year From This Date</b>	
05/05/2023	
DAM GGS 	05/04/2023
Water Department	Date

## 2. Proposed Development

### a. *Property Description*

Soil Classifications for The Site are reported by N.R.C.S. as consisting of Type C soil for 100% of The Site (WmB – Weld Loam, WuE – Wiley-Adena Renohill complex). Refer to Appendix C for the included ‘N.R.C.S. Websoil Survey Report’.

The General Existing Site Topographic Conditions for The Site are itemized in Table 2 below:

Description	Result	Location of Occurrence
Highest Elevation	5412	Northeast corner of The Site
Lowest Elevation	5386	Invert of Existing Gopher Gulch Box Culvert
Steepest Slope	25%	Perimeter landscape
Average Slope	2- 5%	Most of The Site

According to the FEMA Flood Insurance Rate Map: Community-Panel No. 08001C0655J, Effective February 17, 2017, The Site is located in Zone X unshaded. These are areas of 0.2% annual chance of flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

### b. *Type of Development*

The Porteos P9-9A and P9-9C properties are proposed to be developed as a mixture of commercial/retail zones, office/mixed use zones due to its close proximity to Denver International Airport. No residential uses will be permitted.

The Site currently consists of undeveloped land. Improvements will include overlot grading, utility infrastructure, shared drive access roads with sidewalks and a new Water Quality Pond in PA-9A. The developed tributary area to this pond is 9.14 acres. A shared Water Quality Pond in PA-9C is being proposed and designed by others under a separate report. Both ponds will be constructed prior to any on-site paving.

The existing and developed Site percent impervious values of the areas are listed in Table 1 below:

ONSITE	% Impervious
Existing	5.00% (13.32 acres)
Proposed	78.58% (13.32 acres)

c. *Requested Variances*

i) SDDTC section 3.61 requires on-site detention for all developments. **Regional detention is provided for both sites in regional pond GG1 (EDN#221342).** A variance is requested to allow detention being provided off-site.

ii) A variance is requested for proposed pond PA-9A to lessen the required WQCV drainage time such that the entire pond can drain within 40 hours for the design storm to comply with FAA regulations.

iii) A variance is requested to allow the use of NOAA rainfall values in lieu of figures RA1-RA6 currently used in the SDDTC Manual (9-2010) section 5.22.

## B. HISTORIC DRAINAGE

### 1. Overall Basin Description

a. *Off-site Basins*

A portion of the undeveloped property to the east of PA-9A flows through this property in the historic condition. A portion of the property to the east of PA-9C flows through this property in the historic condition.

b. *Major Drainage Ways*

There is a drainage channel (Gopher Gulch) between PA-9A and PA-9C that was previously constructed (EDN #216082).

### 2. Drainage Patterns Through Property

In its current condition, runoff produced by PA-9A and PA-9C generally sheet flows to Gopher Gulch in between the two properties, with some minor perimeter areas flowing directly to the Jackson Gap Street Right-of-Way and E. 64<sup>th</sup> Avenue Right-of Way.

### 3. Outfalls Downstream from Property

After being directed to Gopher Gulch (EDN #216082) flows are then directed to the west under Jackson Gap Street through an existing 8'x8' Concrete Box Culvert. From there flows are routed northwest to an existing Regional Detention Pond GG1 (EDN #221342). Flows are released from the detention pond and routed to Second Creek, which is a tributary of the South Platte River.

## C. DESIGN CRITERIA

### 1. References

- Urban Drainage and Flood Control District Drainage Criteria Manual (Volume 1, 2 & 3), by Mile High Flood District, revised 2021.
- City of Aurora Storm Drainage Design and Technical Criteria, by City of Aurora.
- Federal Emergency Management Agency Flood Insurance Rate Map, Community-Panel Number 08001C0655J, dated February 17, 2017.

## 2. Hydrological Criteria

### a. *Rainfall Source*

The rainfall intensities given in the NOAA Point Precipitation Frequency Estimates are as follows:

**TABLE 3**  
**1-HOUR POINT RAINFALL VALUES FOR CITY OF AURORA (INCHES)**

2-YR	100-YR
0.98	2.60

The weighted runoff coefficients were used from Table 1 of the City of Aurora Storm Drainage Design and Technical Criteria (COA SDDTC). Hydrologic calculations are provided in Appendix A of this report.

### b. *Calculation Method*

Due to the size of this site, the rational method was used to determine the runoff for the 2-yr and 100-yr storm events. Impervious coefficients were determined for the tributary basin based on land use. Time of concentrations were calculated by combining the initial time or overland flow time with the concentrated travel time. The one-hour rainfall and time of concentrations were used to calculate rainfall intensities. Detailed runoff calculations are provided in Appendix A of this report.

### c. *Water Quality Volume Computation Method*

The Full Spectrum Detention Method was used to determine Water Quality Capture Volume and Excess Urban Runoff Volume requirements for the property. Regional detention is provided for the site in Pond GG1 (EDN #221342). Refer to Operations and Maintenance Plan in the Appendix. Pond certification will be required prior to on-site paving. The outlet structure of pond PA-9A will be designed to store the WQCV and EURV. The 100-year storm will be directly passed through the box overflow and discharged to Gopher Gulch through a proposed culvert.

The required volumes for the Water Quality Pond were calculated using the MHFD-Detention Version 4.06 (July 2022) spreadsheet. Based on the proposed conditions, assuming 85% impervious for commercial areas, the new Water Quality Pond will require a WQCV of 0.231 ac-ft., with a release rate of approximately 0.15 CFS. The pond will require an EURV of 0.668 ac-ft., with a release rate of approximately 3.17 CFS. These release rates were computed using the MHFD-Detention v4.06 spreadsheet – Outlet Design Page - which is included for information on in Appendix B. The release rate will comply with FAA regulations, and the pond will completely drain in less than 40 hours.

### d. *Design Frequencies*

Runoff was calculated for the 2-year and 100-year storm events. Detention was calculated for the Water Quality Capture Volume and Excess Urban Runoff Volume.

## 3. Hydraulic Criteria

### a. *References*

- o The City of Aurora Storm Drainage Design and Technical Criteria, dated October 11, 2010.

- Urban Drainage and Flood Control District Drainage Criteria Manual (Volume 1, 2 & 3), by Mile High Flood District, revised 2021.
- b. *Design Storm Frequencies*  
The outlet structure will be evaluated for the WQCV and 10-year storm, with the 100-year storm event being directly passed through the overflow weir. All other storm pipe and inlet capacities will be evaluated using the 2-year and 100-year storms.
  - c. *Water Surface Profile Method*  
Pipe sizing will be calculated using Hydraflow Express, and UDSEWER, 2009.
  - d. *Major Drainage Ways*  
Gopher Gulch (EDN #216082) is located between PA-9A & PA-9C. Improvements will be proposed near the western most point of EDN #216082, prior to flows entering the culvert crossing beneath Jackson Gap Street.

## **D. DRAINAGE PLAN**

### **1. General Concept**

- a. *Conveyance of off-site drainage; proposed downstream outfall*  
There are four direct tributary off-site basins, and one basin evaluated during an emergency storm event. Two of these basins include a portion of the undeveloped property to the east of PA-9A. One basin includes the east half street section of the shared access between PA-9C and the property to the east. These basins will be used to size one of the proposed inlets, and downstream storm pipes as applicable. Flows generated by this project will be directed to Gopher Gulch, preserving historic drainage patterns.
- b. *Coordination with surrounding developments.*  
The engineer of the property to the east of PA-9C is designing a shared Water Quality Pond. This new pond will assume that PA-9C maintains a maximum 85 percent impervious ground cover, which has been followed as a part of this report's design.
- c. *Detention, Water Quality BMP Plan*  
On-site Water Quality and EURV is provided in the proposed onsite Water Quality Pond, located at the south side of PA-9A. Water Quality and EURV is only being provided for PA-9A under this report. The outlet structure of the pond will be designed to pass the 100-year storm directly through the box overflow weir. The 10-year and 100-year storms will discharge undetained to Gopher Gulch.

A separate Water Quality Pond is being proposed by others for PA-9C. This pond has been designed to treat the 9.46 acre basin, with a percent impervious of 85%, which will provide WQCV and EURV for all of PA-9C (RSN 1652491). See included plan sheets in Appendix C. The design percent impervious for the area being designed under this report is 83.68%, 2.32% below the allowable value. This pond will be constructed prior to any paving taking place within PA-9C in order to treat any impervious surfaces for water quality and EURV. The intent of pond PA-9C is to provide storage volume for only

the WQCV and EURV. Storms above the EURV are expected to be diverted through a Diversion Structure and discharged directly into Gopher Gulch.

## 2. Specific Details

### a. Sub Basins

PA-9A and PA-9C are being treated as separate basins for the evaluation of WQCV. The basins are 8.76 acres and 4.18 acres respectively. Runoff produced by these basins will be routed to their respective Water Quality Pond's through sheet flow, curb and gutter and new storm infrastructure. This new infrastructure consists of new curb inlets with associated pipes. Further Sub Basins (N1 – N19, S1 – S6, UD-1 – UD-3, C1 and OS-1 – OS-5) have been delineated to provide accurate sizing data for the proposed private drives, storm pipes and inlets, as well as two existing inlets.

**Sub-Basin N1** consists of the south half of Private Street North A and is tributary to Inlet N1 at Design Point 1A. The basin has an impervious value of 100%. The 2-year and 100-year runoff rates are 0.14 CFS and 0.45 CFS respectively. This basin is tributary to WQ Pond PA-9A.

**Sub-Basin N2** consists of proposed development area and is tributary to Private Street North A and Inlet N3 at Design Point 1. The basin is assumed to be fully developed in the future with an overall impervious value of 85%. The 2-year and 100-year runoff rates are 2.00 CFS and 7.89 CFS respectively. This basin is tributary to WQ Pond PA-9A.

**Sub-Basin N3** consists of the north half of Private Street North A and is tributary to Inlet N3 at Design Point 3A. The basin has an impervious value of 100%. The 2-year and 100-year runoff rates are 0.17 CFS and 0.52 CFS respectively. This basin is tributary to WQ Pond PA-9A.

**Sub-Basin N4** consists of proposed development and is tributary Private Street North B and Inlet N5 at Design Point 3. The basin has an impervious value of 85%. The 2-year and 100-year runoff rates are 1.79 CFS and 7.05 CFS respectively. This basin is tributary to WQ Pond PA-9A.

**Sub-Basin N5** consists of the east half of Private Street North B and is tributary to Inlet N5 at Design Point 3. The basin has an impervious value of 100%. The 2-year and 100-year runoff rates are 0.28 CFS and 0.88 CFS respectively. This basin is tributary to WQ Pond PA-9A.

**Sub-Basin N6** consists of the south half of Private Street North C and a portion of landscape to the south. This basin is tributary to Inlet N6 at Design Point 6A. The basin has an impervious value of 46.1%. The 2-year and 100-year runoff rates are 0.23 CFS and 0.74 CFS respectively. This basin is tributary to WQ Pond PA-9A.

**Sub-Basin N7** consists of proposed development and is tributary Private Street North C and Inlet N8 at Design Point 4. The basin has an impervious value of 85%. The 2-year and 100-year runoff rates are 0.90 CFS and 3.54 CFS respectively. This basin is tributary to WQ Pond PA-9A.

**Sub-Basin N8** consists of the north half of Private Street North C and is tributary to Inlet N8 at Design Point 4. The basin has an impervious value of 100%. The 2-year and 100-year runoff rates are 0.23 CFS and 0.74 CFS respectively. This basin is tributary to WQ Pond PA-9A.

**Sub-Basin N9** consists of proposed development and is tributary Private Street North B and Inlet N10 at Design Point 6. The basin has an impervious value of 85%. The 2-year and 100-year runoff rates are 1.19 CFS and 4.68 CFS respectively. This basin is tributary to WQ Pond PA-9A.

**Sub-Basin N10** consists of the west half of Private Street North B and is tributary to Inlet N10 at Design Point 6. The basin has an impervious value of 100%. The 2-year and 100-year runoff rates are 0.30 CFS and 0.96 CFS respectively. This basin is tributary to WQ Pond PA-9A.

**Sub-Basin N11** consists of the south half of Private Street North E and a portion of landscape to the south. This basin is tributary to Inlet N11 at Design Point 11A. The basin has an impervious value of 63.1%. The 2-year and 100-year runoff rates are 0.40 CFS and 1.54 CFS respectively. This basin is tributary to WQ Pond PA-9A.

**Sub-Basin N12** consists of proposed development and is tributary Private Street North E and Inlet N13 at Design Point 9. The basin has an impervious value of 85%. The 2-year and 100-year runoff rates are 1.96 CFS and 7.70 CFS respectively. This basin is tributary to WQ Pond PA-9A.

**Sub-Basin N13** consists of the west half of Private Street North D and the north half of Private Street North E and is tributary to Inlet N13 at Design Point 9. The basin has an impervious value of 100%. The 2-year and 100-year runoff rates are 0.55 CFS and 1.73 CFS respectively. This basin is tributary to WQ Pond PA-9A.

**Sub-Basin N14** consists of proposed development and is tributary Private Street North D at Inlet N15 at Design Point 11. The basin has an impervious value of 85%. The 2-year and 100-year runoff rates are 0.47 CFS and 1.83 CFS respectively. This basin is tributary to WQ Pond PA-9A.

**Sub-Basin N15** consists of the east half of Private Street North D and is tributary to Inlet N15 at Design Point 11. The basin has an impervious value of 100%. The 2-year and 100-year runoff rates are 0.21 CFS and 0.65 CFS respectively. This basin is tributary to WQ Pond PA-9A.

**Sub-Basin N16** consists of proposed development and is directly tributary to WQ Pond PA-9A at Design Point 18A. The basin has an impervious value of 85%. The 2-year and 100-year runoff rates are 3.28 CFS and 12.90 CFS respectively. This basin is tributary to WQ Pond PA-9A.

**Sub-Basin N17** consists of proposed drainage easement and includes the area for WQ Pond PA-9A and the tributary landscape swale. The basin has an impervious value of 57.6%. The 2-year and 100-year runoff rates are 1.34 CFS and 4.31 CFS respectively.

**Sub-Basin UD-1** consists of perimeter landscape north of Sub Basin N9 that will sheet flow directly to the E. 64<sup>th</sup> Ave. ROW. This basin has been delineated in order to verify that the existing inlet at the southeast corner of the intersection of E. 64<sup>th</sup> Ave. and Jackson Gap St. has capacity for these added flows. The basin has an impervious value of 5%. The 2-year and 100-year runoff rates are 0.03 CFS & 0.12 CFS respectively. The Porteos Filing No., 1 Construction Plans and Final Drainage Report (EDN# 214020) designed and constructed this inlet (Inlet 64-2). An analysis of these additional flows has been made and no negative impacts to street depths, storm sewer HGLs or the inlet capacity is expected. See Appendix C, sheet 25 The existing inlet will direct flows directly to Gopher Gulch (EDN #214020).

**Sub-Basin UD-2** consists of perimeter landscape west of Sub Basin N7 that will sheet flow directly to the Jackson Gap Street ROW. This basin has been delineated in order to verify that the existing inlet near the Gopher Gulch culvert has capacity for these added flows. The basin has an impervious value of 5%. The 2-year and 100-year runoff rates are 0.08 CFS & 0.28 CFS respectively. The Porteos Filing No., 1 Construction Plans and Final Drainage Report (EDN# 214020) designed and constructed this inlet (Inlet JG-11). An analysis of these additional flows has been made and no negative impacts to street depths, storm sewer HGLs or the inlet capacity is expected. See Appendix C, sheet 31 The existing inlet will direct flows directly to Gopher Gulch (EDN #214020).

**Sub-Basin UD-3** consists of perimeter landscape west of Sub Basin N12 that will sheet flow directly to the Jackson Gap Street ROW. This basin has been delineated in order to verify that the existing inlet near the Gopher Gulch culvert has capacity for these added flows. The basin has an impervious value of 5%. The 2-year and 100-year runoff rates are 0.07 CFS & 0.26 CFS respectively. The Porteos Filing No., 1 Construction Plans and Final Drainage Report (EDN# 214020) designed and constructed this inlet (Inlet JG-11). An analysis of these additional flows has been made and no negative impacts to street depths, storm sewer HGLs or the inlet capacity is expected. See Appendix C, sheet 31 The existing inlet will direct flows directly to Gopher Gulch (EDN #214020).

#### **Advisory Comment for Sub-Basins UD-1, UD-2 and UD-3**

No untreated flows from impervious surfaces will be permitted to be released to the existing, adjacent public streets during civil submittals without being treated for WQ. This will require revisions to this PDR. If future developers of these lots decide to pave or build within these basins, these flows must be routed to the onsite WQ ponds. PDR revisions will be required to account for the hydrologic changes.

**Sub-Basin S1** consists of Private Street South C and is tributary to Inlet S1 at Design Point 15. The basin has an impervious value of 100.0%. The 2-year and 100-year runoff rates are 0.34 CFS and 1.07 CFS respectively. This basin is tributary to WQ Pond PA-9C.

**Sub-Basin S2** consists of proposed development and is tributary Private Street South A and B at Inlet S3 at Design Point 16. The basin has an impervious value of 85%. The 2-year and 100-year runoff rates are 4.40 CFS and 17.32 CFS respectively. This basin is tributary to WQ Pond PA-9C.

**Sub-Basin S3** consists of Private Street South B and the south half of Private Street South A and is tributary to Inlet S3 at Design Point 16. The basin has an impervious

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Project: Porteos 9  
Project Number: 22\_21  
Date: 4/18/2023

DIRECT RUNOFF 2-YR STORM (ULTIMATE)						
Area Design	Area (ac)	Runoff Coeff	tc (min)	C x A (AC)	Intensity (I) in/hr	Q (cfs)
N1	0.06	0.87	5.00	0.05	2.88	0.14
N2	1.16	0.60	5.00	0.70	2.88	2.00
N3	0.07	0.87	5.00	0.06	2.88	0.17
N4	1.03	0.60	5.00	0.62	2.88	1.79
N5	0.11	0.87	5.00	0.10	2.88	0.28
N6	0.17	0.48	5.00	0.08	2.88	0.23
N7	0.52	0.60	5.00	0.31	2.88	0.90
N8	0.09	0.87	5.00	0.08	2.88	0.23
N9	0.69	0.60	5.00	0.41	2.88	1.19
N10	0.12	0.87	5.00	0.11	2.88	0.30
N11	0.29	0.49	5.70	0.14	2.78	0.40
N12	1.16	0.60	5.45	0.69	2.82	1.96
N13	0.22	0.87	5.00	0.19	2.88	0.55
N14	0.27	0.60	5.00	0.16	2.88	0.47
N15	0.08	0.87	5.00	0.07	2.88	0.21
N16	1.93	0.60	5.35	1.16	2.83	3.28
N17	0.83	0.56	5.00	0.46	2.88	1.34
S1	0.14	0.87	5.00	0.12	2.88	0.34
S2	2.67	0.60	5.94	1.60	2.75	4.40
S3	0.29	0.87	5.00	0.26	2.88	0.74
S4	0.12	0.87	5.00	0.10	2.88	0.30
S5	0.34	0.34	7.11	0.12	2.60	0.30
S6	0.62	0.60	5.00	0.37	2.88	1.07
UD-1	0.07	0.18	5.00	0.01	2.88	0.03
UD-2	0.15	0.18	5.00	0.03	2.88	0.08
UD-3	0.14	0.18	5.00	0.02	2.88	0.07
OS-1	0.10	0.18	7.14	0.02	2.60	0.05
OS-2	0.75	0.18	14.08	0.13	1.99	0.27
OS-3	0.08	0.87	5.00	0.07	2.88	0.21
OS-4	0.34	0.51	5.00	0.17	2.88	0.50
OS-5	0.05	0.51	5.00	0.02	2.88	0.07
<b>HISTORIC</b>						
HISTORIC	13.32	0.18	35.58	2.40	1.20	2.89
<b>TOTAL PROPOSED</b>						
TOTAL PROPOSED	13.32	0.60	13.35	8.02	2.04	16.33

### 1-Hour Rainfall Depths for Design Storms

Design Storm	2-Year	100-Year
Depth (in)	0.85	2.51

Per NOAA Point Precipitation Frequency Estimates

$$I = \frac{28.5 P_1}{(10 + T_c)^{0.786}}$$

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A division of  
HABERER CARPENTRY INC.

Project: Porteos 9  
Project Number: 22\_21  
Date: 4/18/2023

DIRECT RUNOFF 100-YR STORM (ULTIMATE)						
Area Design	Area (ac)	Runoff Coeff	tc (min)	C x A (AC)	Intensity (I) in/hr	Q (cfs)
N1	0.06	0.93	5.00	0.05	8.51	0.45
N2	1.16	0.80	5.00	0.93	8.51	7.89
N3	0.07	0.93	5.00	0.06	8.51	0.52
N4	1.03	0.80	5.00	0.83	8.51	7.05
N5	0.11	0.93	5.00	0.10	8.51	0.88
N6	0.17	0.53	5.00	0.09	8.51	0.74
N7	0.52	0.80	5.00	0.42	8.51	3.54
N8	0.09	0.93	5.00	0.09	8.51	0.74
N9	0.69	0.80	5.00	0.55	8.51	4.68
N10	0.12	0.93	5.00	0.11	8.51	0.96
N11	0.29	0.64	5.70	0.19	8.22	1.54
N12	1.16	0.80	5.45	0.93	8.32	7.70
N13	0.22	0.93	5.00	0.20	8.51	1.73
N14	0.27	0.80	5.00	0.22	8.51	1.83
N15	0.08	0.93	5.00	0.08	8.51	0.65
N16	1.93	0.80	5.35	1.54	8.36	12.90
N17	0.83	0.61	5.00	0.51	8.51	4.31
S1	0.14	0.93	5.00	0.13	8.51	1.07
S2	2.67	0.80	5.94	2.13	8.11	17.32
S3	0.29	0.93	5.00	0.27	8.51	2.33
S4	0.12	0.93	5.00	0.11	8.51	0.95
S5	0.34	0.44	7.11	0.15	7.68	1.16
S6	0.62	0.80	5.00	0.50	8.51	4.23
UD-1	0.07	0.22	5.00	0.01	8.51	0.12
UD-2	0.15	0.22	5.00	0.03	8.51	0.28
UD-3	0.14	0.22	5.00	0.03	8.51	0.26
OS-1	0.10	0.22	7.14	0.02	7.67	0.17
OS-2	0.75	0.22	14.08	0.16	5.87	0.97
OS-3	0.08	0.93	5.00	0.08	8.51	0.66
OS-4	0.34	0.56	5.00	0.19	8.51	1.63
OS-5	0.05	0.93	5.00	0.04	8.51	0.38
HISTORIC	13.32	0.22	35.58	2.93	3.55	10.42
TOTAL PROPOSED	13.32	0.77	13.35	10.25	6.01	61.64

1-Hour Rainfall Depths for Design Storms

Design Storm  
Depth (in)

2-Year	100-Year
0.85	2.51

Per UDFCDDCM - Figure RA-1 & RA-6

$$I = \frac{28.5 P_1}{(10 + T_c)^{0.786}}$$

# HCI ENGINEERING

A division of  
HABERER CARPENTRY INC.

Project: Porteos 9  
Project Number: 22\_21  
Date: 4/18/2023

DIRECT RUNOFF SUMMARY (ULTIMATE)								
Area Design	Area (Acres)	% Imp.	Time of Concentration	Runoff Coefficient		Direct Basin Runoff		DESIGN POINT
				C2	C100	Q2 (cfs)	Q100 (cfs)	
N1	0.06	100.0%	5.00	0.87	0.93	0.14	0.45	1A
N2	1.16	85.0%	5.00	0.60	0.80	2.00	7.89	2A
N3	0.07	100.0%	5.00	0.87	0.93	0.17	0.52	3A
N4	1.03	85.0%	5.00	0.60	0.80	1.79	7.05	4A
N5	0.11	100.0%	5.00	0.87	0.93	0.28	0.88	5A
N6	0.17	46.1%	5.00	0.48	0.53	0.23	0.74	6A
N7	0.52	85.0%	5.00	0.60	0.80	0.90	3.54	7A
N8	0.09	100.0%	5.00	0.87	0.93	0.23	0.74	8A
N9	0.69	85.0%	5.00	0.60	0.80	1.19	4.68	9A
N10	0.12	100.0%	5.00	0.87	0.93	0.30	0.96	10A
N11	0.29	63.1%	5.70	0.49	0.64	0.40	1.54	11A
N12	1.16	85.0%	5.45	0.60	0.80	1.96	7.70	12A
N13	0.22	100.0%	5.00	0.87	0.93	0.55	1.73	13A
N14	0.27	85.0%	5.00	0.60	0.80	0.47	1.83	14A
N15	0.08	100.0%	5.00	0.87	0.93	0.21	0.65	15A
N16	1.93	85.0%	5.35	0.60	0.80	3.28	12.90	16A
N17	0.83	57.6%	5.00	0.56	0.61	1.34	4.31	16A
S1	0.14	100.0%	5.00	0.87	0.93	0.34	1.07	1B
S2	2.67	85.0%	5.94	0.60	0.80	4.40	17.32	2B
S3	0.29	100.0%	5.00	0.87	0.93	0.74	2.33	3B
S4	0.12	100.0%	5.00	0.87	0.93	0.30	0.95	4B
S5	0.34	35.3%	7.11	0.34	0.44	0.30	1.16	5B
S6	0.62	85.0%	5.00	0.60	0.80	1.07	4.23	6B
UD-1	0.07	5.0%	5.00	0.18	0.22	0.03	0.12	U1
UD-2	0.15	5.0%	5.00	0.18	0.22	0.08	0.28	U2
UD-3	0.14	5.0%	5.00	0.18	0.22	0.07	0.26	U3
OS-1	0.10	5.0%	7.14	0.18	0.22	0.05	0.17	O1
OS-2	0.75	5.0%	14.08	0.18	0.22	0.27	0.97	O2
OS-3	0.08	100.0%	5.00	0.87	0.93	0.21	0.66	O3
OS-4	0.34	50.9%	5.00	0.51	0.56	0.50	1.63	O4
OS-5	0.05	100.0%	5.00	0.51	0.93	0.07	0.38	O5
HISTORIC	13.32	5.0%	35.58	0.18	0.22	2.89	10.42	
TOTAL PROPOSED	13.32	80.4%	13.35	0.60	0.77	16.33	61.64	

ROUTED RUNOFF SUMMARY (ULTIMATE)			
Design Point	Tributary Basins	Routed Runoff	
		Q2 (cfs)	Q100 (cfs)
1	OS-1, N2-N3	2.22	8.59
2	OS-1, N1-N3	2.36	9.03
3	N4, N5	2.07	7.93
4	N7-N8	1.13	4.28
5	N6 -N8	1.36	5.02
6	N9-N10	1.49	5.64
7	N6-N10	2.85	10.65
8	OS-1,N1-N10	7.28	27.62
9	N12-N13	2.50	9.43
10	N11-N13	2.90	10.97
11	N14-N15	0.67	2.48
12	N11-N15	3.57	13.45
13	OS-1, N1-N15	10.85	41.07
14	OS-1, OS-2, N1-N17	15.73	59.25
15	OS-3, S1	0.55	1.73
16	OS-4, S2-S3	5.64	21.28
17	OS-3 - OS-4, S1-S3	6.19	23.01
18	OS-3 - OS-4, S1-S4	6.49	23.96



**NOAA Atlas 14, Volume 8, Version 2**  
**Location name: Aurora, Colorado, USA\***  
**Latitude: 39.8111°, Longitude: -104.6889°**  
**Elevation: 5394.44 ft\*\***  
 \* source: ESRI Maps  
 \*\* source: USGS



**POINT PRECIPITATION FREQUENCY ESTIMATES**

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

[PF\\_tabular](#) | [PF\\_graphical](#) | [Maps & aerals](#)

**PF tabular**

<b>PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)<sup>1</sup></b>										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.228 (0.182-0.287)	0.281 (0.224-0.354)	0.377 (0.300-0.476)	0.466 (0.368-0.590)	0.601 (0.465-0.803)	0.716 (0.538-0.964)	0.840 (0.609-1.16)	0.976 (0.677-1.38)	1.17 (0.779-1.69)	1.33 (0.856-1.93)
10-min	0.334 (0.267-0.421)	0.412 (0.328-0.518)	0.552 (0.439-0.697)	0.682 (0.539-0.864)	0.880 (0.680-1.18)	1.05 (0.787-1.41)	1.23 (0.891-1.69)	1.43 (0.991-2.01)	1.71 (1.14-2.47)	1.94 (1.25-2.82)
15-min	0.408 (0.325-0.513)	0.502 (0.400-0.632)	0.673 (0.535-0.850)	0.832 (0.657-1.05)	1.07 (0.830-1.43)	1.28 (0.960-1.72)	1.50 (1.09-2.06)	1.74 (1.21-2.46)	2.09 (1.39-3.02)	2.37 (1.53-3.44)
30-min	0.561 (0.448-0.706)	0.688 (0.548-0.866)	0.918 (0.730-1.16)	1.13 (0.894-1.43)	1.46 (1.13-1.95)	1.74 (1.30-2.34)	2.04 (1.48-2.80)	2.36 (1.64-3.33)	2.83 (1.89-4.09)	3.21 (2.08-4.67)
60-min	0.695 (0.555-0.874)	0.849 (0.677-1.07)	1.13 (0.898-1.43)	1.39 (1.10-1.76)	1.79 (1.39-2.40)	2.14 (1.61-2.88)	2.51 (1.82-3.45)	2.92 (2.03-4.11)	3.50 (2.33-5.06)	3.98 (2.57-5.77)
2-hr	0.828 (0.666-1.03)	1.01 (0.811-1.26)	1.34 (1.07-1.68)	1.65 (1.32-2.08)	2.13 (1.66-2.83)	2.54 (1.92-3.39)	2.98 (2.18-4.07)	3.47 (2.43-4.85)	4.17 (2.80-5.97)	4.74 (3.09-6.81)
3-hr	0.904 (0.730-1.12)	1.10 (0.886-1.37)	1.46 (1.17-1.81)	1.79 (1.43-2.24)	2.30 (1.80-3.04)	2.74 (2.09-3.64)	3.22 (2.36-4.37)	3.74 (2.63-5.20)	4.49 (3.04-6.39)	5.11 (3.34-7.30)
6-hr	1.08 (0.878-1.33)	1.30 (1.06-1.60)	1.70 (1.37-2.10)	2.07 (1.67-2.57)	2.64 (2.08-3.44)	3.13 (2.40-4.11)	3.65 (2.70-4.91)	4.23 (3.00-5.81)	5.05 (3.44-7.12)	5.72 (3.78-8.10)
12-hr	1.33 (1.09-1.62)	1.58 (1.29-1.93)	2.03 (1.66-2.49)	2.44 (1.98-3.01)	3.07 (2.43-3.95)	3.60 (2.77-4.67)	4.16 (3.10-5.52)	4.77 (3.41-6.49)	5.64 (3.88-7.85)	6.35 (4.23-8.89)
24-hr	1.61 (1.33-1.94)	1.91 (1.57-2.32)	2.44 (2.00-2.96)	2.90 (2.37-3.54)	3.59 (2.85-4.55)	4.14 (3.21-5.31)	4.73 (3.55-6.20)	5.36 (3.85-7.18)	6.23 (4.31-8.56)	6.92 (4.65-9.60)
2-day	1.87 (1.55-2.24)	2.23 (1.85-2.68)	2.85 (2.36-3.43)	3.37 (2.77-4.07)	4.11 (3.28-5.13)	4.69 (3.66-5.93)	5.29 (3.99-6.83)	5.91 (4.28-7.82)	6.76 (4.71-9.16)	7.41 (5.03-10.2)
3-day	2.04 (1.70-2.43)	2.41 (2.01-2.88)	3.04 (2.52-3.64)	3.57 (2.95-4.29)	4.32 (3.46-5.36)	4.92 (3.85-6.18)	5.53 (4.19-7.10)	6.17 (4.49-8.11)	7.03 (4.93-9.47)	7.70 (5.26-10.5)
4-day	2.17 (1.82-2.58)	2.54 (2.13-3.03)	3.17 (2.64-3.79)	3.71 (3.08-4.45)	4.47 (3.60-5.54)	5.08 (4.00-6.36)	5.71 (4.34-7.30)	6.36 (4.64-8.33)	7.25 (5.10-9.73)	7.94 (5.44-10.8)
7-day	2.47 (2.08-2.92)	2.87 (2.42-3.40)	3.54 (2.97-4.20)	4.12 (3.43-4.89)	4.92 (3.98-6.04)	5.56 (4.40-6.90)	6.21 (4.75-7.87)	6.89 (5.07-8.94)	7.81 (5.53-10.4)	8.52 (5.88-11.5)
10-day	2.73 (2.31-3.21)	3.16 (2.67-3.72)	3.88 (3.27-4.58)	4.48 (3.75-5.31)	5.33 (4.32-6.49)	5.99 (4.75-7.38)	6.66 (5.11-8.39)	7.35 (5.43-9.48)	8.28 (5.89-10.9)	8.99 (6.24-12.0)
20-day	3.51 (2.99-4.09)	4.01 (3.41-4.68)	4.83 (4.10-5.65)	5.51 (4.65-6.47)	6.45 (5.27-7.76)	7.17 (5.73-8.74)	7.89 (6.11-9.82)	8.62 (6.42-11.0)	9.59 (6.88-12.5)	10.3 (7.23-13.7)
30-day	4.14 (3.54-4.80)	4.71 (4.03-5.47)	5.64 (4.80-6.56)	6.40 (5.42-7.47)	7.43 (6.09-8.88)	8.22 (6.60-9.94)	9.00 (7.00-11.1)	9.78 (7.31-12.4)	10.8 (7.78-14.0)	11.5 (8.14-15.2)
45-day	4.89 (4.20-5.64)	5.58 (4.79-6.44)	6.68 (5.72-7.73)	7.57 (6.44-8.79)	8.76 (7.20-10.4)	9.65 (7.78-11.6)	10.5 (8.21-12.9)	11.4 (8.54-14.3)	12.5 (9.03-16.0)	13.3 (9.40-17.4)
60-day	5.51 (4.75-6.33)	6.31 (5.44-7.26)	7.58 (6.51-8.74)	8.60 (7.35-9.96)	9.95 (8.20-11.7)	10.9 (8.85-13.1)	11.9 (9.32-14.5)	12.8 (9.67-16.0)	14.0 (10.2-17.9)	14.9 (10.6-19.4)

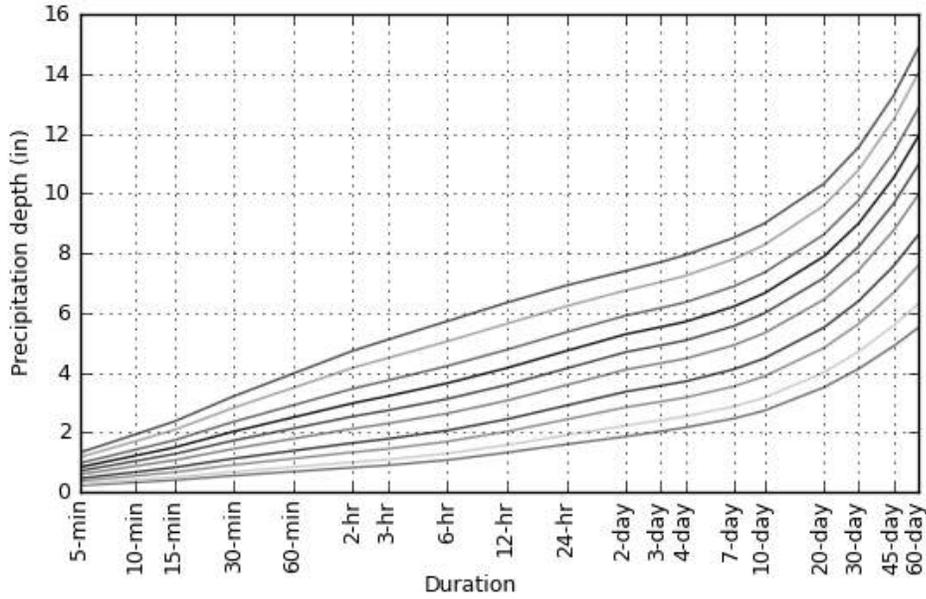
<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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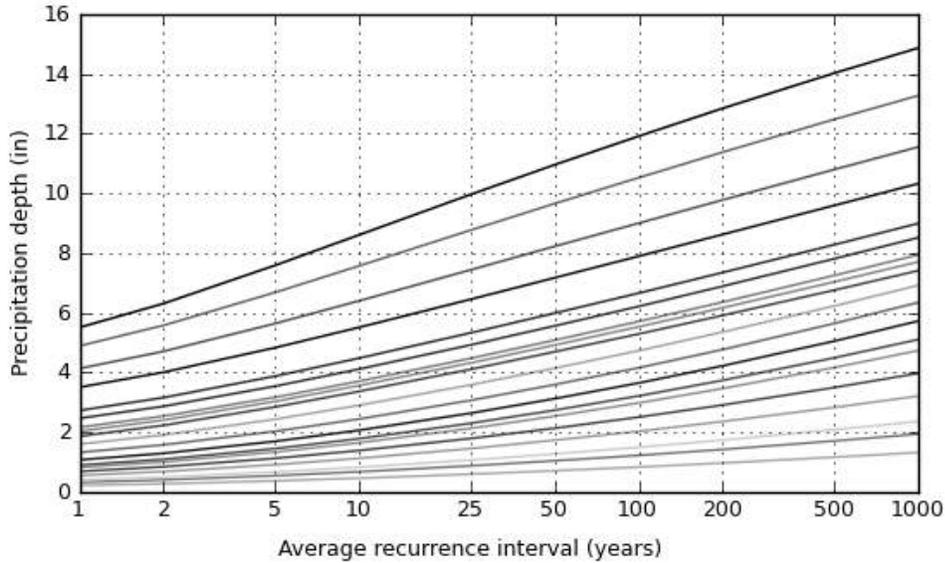
**PF graphical**

### PDS-based depth-duration-frequency (DDF) curves

Latitude: 39.8111°, Longitude: -104.6889°



Average recurrence interval (years)
1
2
5
10
25
50
100
200
500
1000

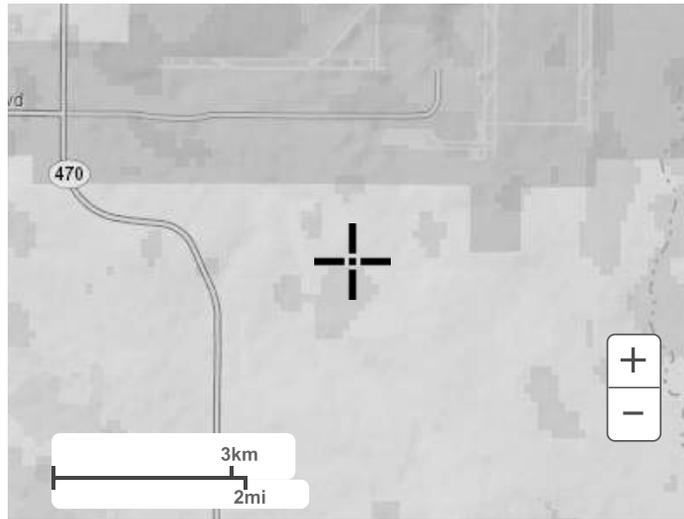


Duration	
5-min	2-day
10-min	3-day
15-min	4-day
30-min	7-day
60-min	10-day
2-hr	20-day
3-hr	30-day
6-hr	45-day
12-hr	60-day
24-hr	

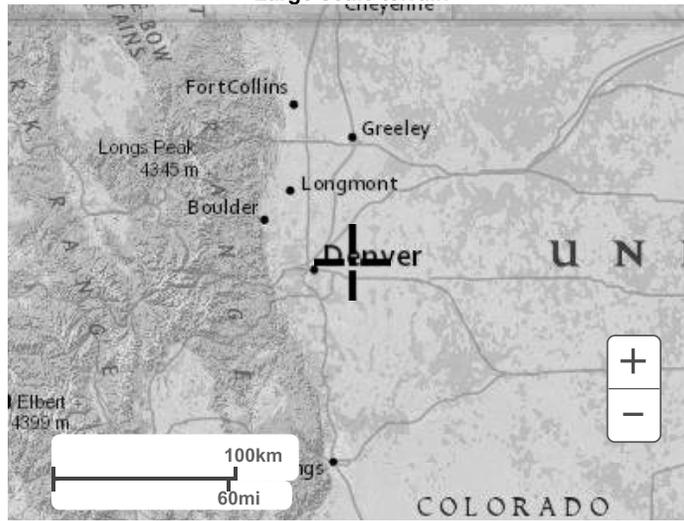
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## Maps & aerials

Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

1  
223112

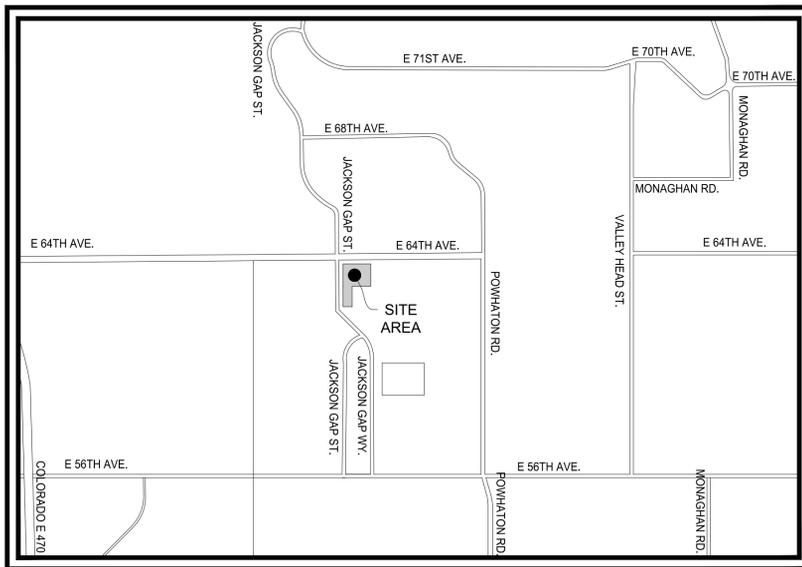
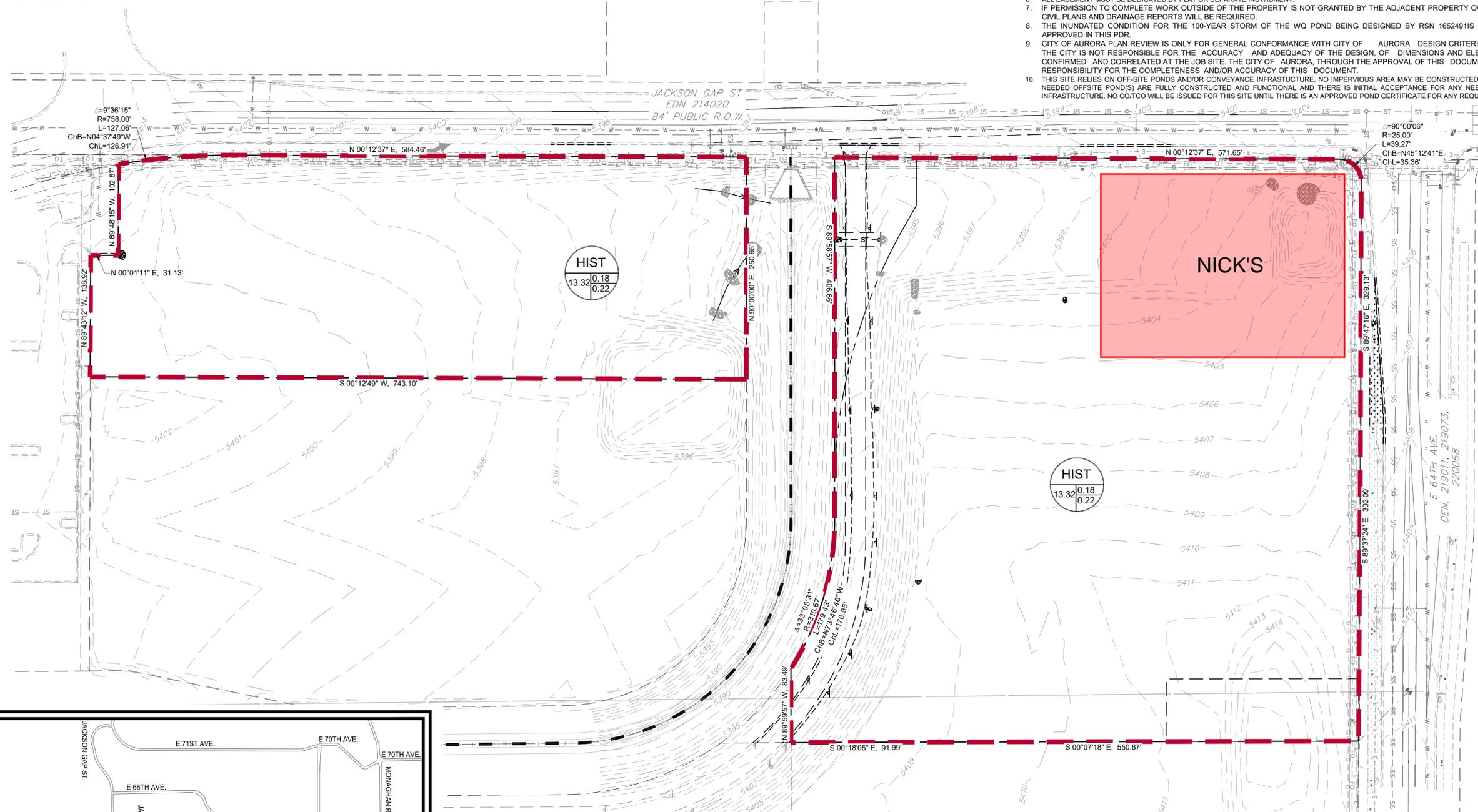
**BENCHMARK:**  
 NATIONAL GEODETIC SURVEY (NGS) DESIGNATION "LYNNE", PID "DH9171", - A STAINLESS STEEL ROD IN A 5" LOGO BOX LOCATED BETWEEN THE NORTHERN EDGE OF PAVEMENT AND THE NORTHERN RIGHT-OF-WAY LINE OF EAST 68TH AVENUE APPROXIMATELY 1,500' EAST OF THE CENTERLINE OF JACKSON GAP STREET. ELEVATION: 5406.21 FEET (NAVD 1988 DATUM). THE CONTOURS SHOWN HEREON ARE AT ONE (1) FOOT INTERVALS. COA ID NUMBER: 3S5605SW002

# PORTEOS PA-9A & PA-9C PRELIMINARY DRAINAGE PLAN

SITUATED IN THE NORTH 1/2 OF SECTION 8, TOWNSHIP 3 SOUTH, RANGE 65 WEST OF THE 6TH P. M., CITY OF AURORA, COUNTY OF ADAMS, STATE OF COLORADO

**TYPICAL NOTES:**

1. WATER QUALITY PONDS TO BE CONSTRUCTED PRIOR TO ANY ON SITE PAVING.
2. THIS SITE DESIGN RELIES ON ADJACENT INFRASTRUCTURE AND GRADING THAT IS CURRENTLY UNDER REVIEW AND NOT CURRENTLY CONSTRUCTED. IF THE ADJACENT SITE IS NOT UNDER CONSTRUCTION AT THE TIME OF CONSTRUCTION OF THIS SITE, REVISIONS TO CIVIL PLANS WILL BE REQUIRED.
3. ALL FFE MUST BE 1' ABOVE THE ADJACENT EMERGENCY AND 100 YEAR WATER SURFACE ELEVATIONS AND GARAGES MUST NOT BE INUNDATED.
4. ALL PROPOSED STORM SEWER IS PRIVATE AND WILL MAINTAINED BY THE METRO DISTRICT.
5. STORM SEWER HAS BEEN SIZED FOR THE 100-YEAR EVENT.
6. ALL EASEMENT MUST BE DEDICATED BY PLAT OR SEPARATE INSTRUMENT.
7. IF PERMISSION TO COMPLETE WORK OUTSIDE OF THE PROPERTY IS NOT GRANTED BY THE ADJACENT PROPERTY OWNERS, REVISIONS TO THE CIVIL PLANS AND DRAINAGE REPORTS WILL BE REQUIRED.
8. THE INUNDATED CONDITION FOR THE 100-YEAR STORM OF THE WQ POND BEING DESIGNED BY RSN 1652491S NOT BEING REVIEWED OR APPROVED IN THIS PDR.
9. CITY OF AURORA PLAN REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH CITY OF AURORA DESIGN CRITERIA AND THE CITY CODE. THE CITY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, OF DIMENSIONS AND ELEVATIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE. THE CITY OF AURORA, THROUGH THE APPROVAL OF THIS DOCUMENT, ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.
10. THIS SITE RELIES ON OFF-SITE PONDS AND/OR CONVEYANCE INFRASTRUCTURE. NO IMPERVIOUS AREA MAY BE CONSTRUCTED WITHIN THIS SITE UNTIL THE NEEDED OFFSITE POND(S) ARE FULLY CONSTRUCTED AND FUNCTIONAL AND THERE IS INITIAL ACCEPTANCE FOR ANY NEEDED OFF-SITE CONVEYANCE INFRASTRUCTURE. NO CO/CO WILL BE ISSUED FOR THIS SITE UNTIL THERE IS AN APPROVED POND CERTIFICATE FOR ANY REQUIRED OFFSITE POND(S).



VICINITY MAP  
 SCALE 1" = 2000'

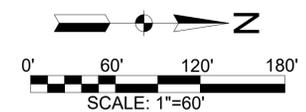
DIRECT RUNOFF SUMMARY (ULTIMATE)						
Area Design	Area (Acres)	% Imp.	Time of Concentration	Runoff Coefficient C2	C100	DESIGN POINT
HISTORIC	13.32	5.0%	35.58	0.18	0.22	2.89 10.42
TOTAL PROPOSED	13.32	80.5%	13.34	0.60	0.77	16.36 61.73

**NOTES:**  
 ONE FOOT OF FREEBOARD WILL BE PROVIDED AT A MINIMUM FROM EACH EMERGENCY OVERFLOW SCENARIO IDENTIFIED FROM THE 100 YEAR EMERGENCY OVERFLOW WATER SURFACE ELEVATION AND THE FINISHED FLOOR ELEVATION /TOP OF FOUNDATION OF ANY NEARBY STRUCTURE.

**DRAINAGE LEGEND**

- DESIGN NODE
- DRAINAGE BASIN: B3-6 (AREA: 2.8 AC)
- OVERFLOW ARROW
- APPROX. HISTORIC THALWEG
- MINOR BASIN BOUNDARY
- MAJOR BASIN BOUNDARY

Any proposed sizing of storm infrastructure is preliminary and not approved with this Preliminary Drainage Report.



Approved For One Year From This Date  
 05/05/2023  
 Water Department Date

A DIVISION OF  
 HABERER CARPENTRY INC.  
 621 SOUTHPARK DR., SUITE 1000  
 LITTLETON CO, 80120  
 PHONE: (303) 979-3900  
 INFO@HABERERGROUP.COM

**FACSIMILIE**  
 This electronic plan is a facsimile of the signed and sealed PDF set.  
 T. Garrett Goodlin, PE 56865

Know what's below.  
 Call before you dig.  
  
 CALL 811 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

**PORTEOS PA-9A & PA-9C**  
 PRELIMINARY DRAINAGE PLAN  
 CITY OF AURORA, COUNTY OF ADAMS  
 STATE OF COLORADO

**REVISIONS:**

No.	Date	Description
1	08.22.22	Sub 1
2	10.24.22	Sub 2
3	01.18.23	Sub 3
4	02.17.23	Sub 4
5	03.27.23	Sub 5

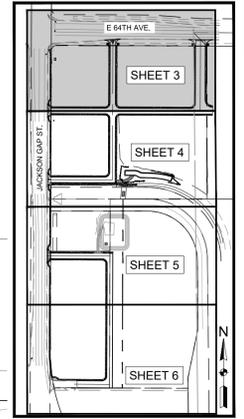
Project No: HCI 22\_21  
 Drawn By: OA / ZKA  
 Checked By: TGG  
 Date Issued: 4/18/2023  
 Sheet Name: EXIST CONDITION DRAINAGE PLAN  
 Sheet Number:

FILENAME: U:\HCI Engineering Projects\2022\22\_21 - Porteos Airport\CAD\Plans\PRELIMINARY DRAINAGE\22\_21-DRAINAGE PLAN - EX.dwg PLOTDATE: 2023-04-18

BENCHMARK:  
 NATIONAL GEODETIC SURVEY (NGS) DESIGNATION "LYNNE", PID "DH9171", - A STAINLESS  
 STEEL ROD IN A 5" LOGO BOX LOCATED BETWEEN THE NORTHERN EDGE OF PAVEMENT  
 AND THE NORTHERN RIGHT-OF-WAY LINE OF EAST 68TH AVENUE  
 APPROXIMATELY 1,500' EAST OF THE CENTERLINE OF JACKSON GAP STREET.  
 ELEVATION: 5406.21 FEET (NAVD 1988 DATUM). THE CONTOURS SHOWN HEREON  
 ARE AT ONE (1) FOOT INTERVALS.

# PORTEOS PA-9A & PA-9C PRELIMINARY DRAINAGE PLAN

SITUATED IN THE NORTH 1/2 OF SECTION 8, TOWNSHIP 3 SOUTH, RANGE 65 WEST OF  
 THE 6TH P. M., CITY OF AURORA, COUNTY OF ADAMS, STATE OF COLORADO



**HCI**  
**ENGINEERING**

A DIVISION OF  
 HABERER CARPENTRY INC.  
 821 SOUTHPARK DR., SUITE 1000  
 LITTLETON CO, 80120  
 PHONE: (303) 979-3900  
 INFO@HABERERGROUP.COM

FACSIMILIE  
 This electronic plan is a facsimile  
 of the signed and sealed PDF  
 set.

*Garrett Goodlin* 04/19/2023  
 T. Garrett Goodlin, PE 56865

Know what's below.  
 Call before you dig.

**811**

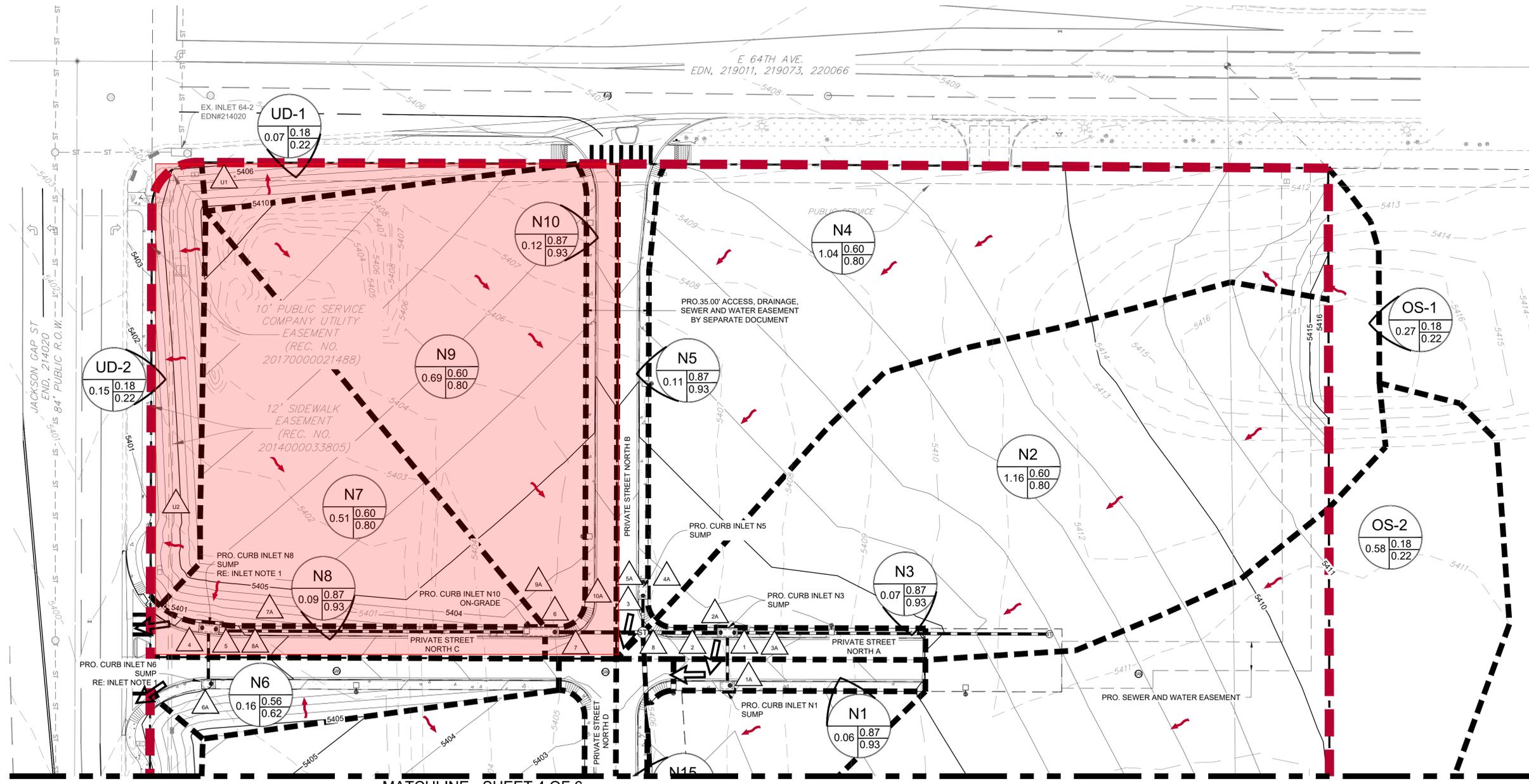
CALL 811 2-BUSINESS DAYS IN  
 ADVANCE BEFORE YOU DIG,  
 GRADE, OR EXCAVATE FOR THE  
 MARKING OF UNDERGROUND  
 MEMBER UTILITIES.

## PORTEOS PA-9A & PA-9C PRELIMINARY DRAINAGE PLAN CITY OF AURORA, COUNTY OF ADAMS STATE OF COLORADO

REVISIONS:

No.	Date:	Description:
1	08.22.22	Sub 1
2	10.24.22	Sub 2
3	01.18.23	Sub 3
4	02.17.23	Sub 4
5	03.27.23	Sub 5

Project No: HCI 22\_21  
 Drawn By: OA / ZKA  
 Checked By: TGG  
 Date Issued: 4/18/2023  
 Sheet Name:  
 PA-9A - NORTH  
 Sheet Number:



**DIRECT RUNOFF SUMMARY (ULTIMATE)**

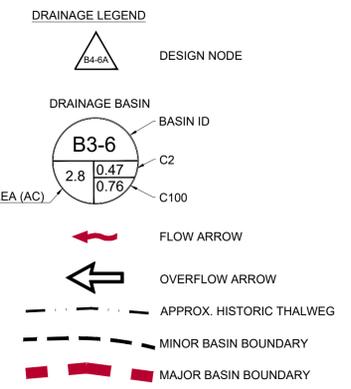
Area Design	Area (Acres)	% Imp.	Time of Concentration	Runoff Coefficient C2	C100	Direct Basin Runoff Q2 (cfs)	Q100 (cfs)	DESIGN POINT
N1	0.06	100.0%	5.00	0.87	0.93	0.14	0.45	1A
N2	1.16	85.0%	5.00	0.60	0.80	2.00	7.89	2A
N3	0.07	100.0%	5.00	0.87	0.93	0.17	0.52	3A
N4	1.04	85.0%	5.00	0.60	0.80	1.80	7.08	4A
N5	0.11	100.0%	5.00	0.87	0.93	0.27	0.85	5A
N6	0.16	58.0%	5.00	0.56	0.62	0.26	0.85	6A
N7	0.52	85.0%	5.00	0.60	0.80	0.91	3.57	7A
N8	0.09	100.0%	5.00	0.87	0.93	0.22	0.70	8A
N9	0.69	85.0%	5.00	0.60	0.80	1.19	4.68	9A
N10	0.12	100.0%	5.00	0.87	0.93	0.30	0.95	10A
N11	0.29	63.1%	5.70	0.49	0.64	0.40	1.54	11A
N12	1.16	85.0%	5.45	0.60	0.80	1.96	7.70	12A
N13	0.22	100.0%	5.00	0.87	0.93	0.55	1.73	13A
N14	0.27	85.0%	5.00	0.60	0.80	0.47	1.83	14A
N15	0.08	100.0%	5.00	0.87	0.93	0.21	0.65	15A
N16	1.93	85.0%	5.35	0.60	0.80	3.28	12.90	16A
N17	0.83	57.6%	5.00	0.56	0.61	1.34	4.31	16A
UD-1	0.07	5.0%	5.00	0.18	0.22	0.03	0.12	U1
UD-2	0.15	5.0%	5.00	0.18	0.22	0.08	0.28	U2
UD-3	0.14	5.0%	5.00	0.18	0.22	0.07	0.26	U3
OS-1	0.10	5.0%	7.14	0.18	0.22	0.05	0.17	O1
OS-2	0.75	5.0%	14.08	0.18	0.22	0.27	0.97	O2
HISTORIC	13.32	5.0%	35.58	0.18	0.22	2.89	10.42	
TOTAL PROPOSED	13.32	80.5%	13.34	0.60	0.77	16.36	61.73	

MATCHLINE - SHEET 4 OF 6

**INLET NOTES:**  
 1. INLET WILL BE SIZED FOR 100% CAPTURE, INCLUDING CLOGGING FACTORS.

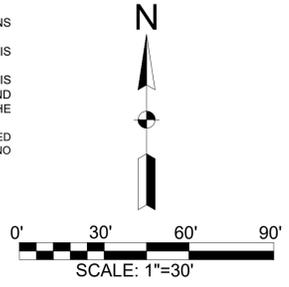
**ROUTED RUNOFF SUMMARY (ULTIMATE)**

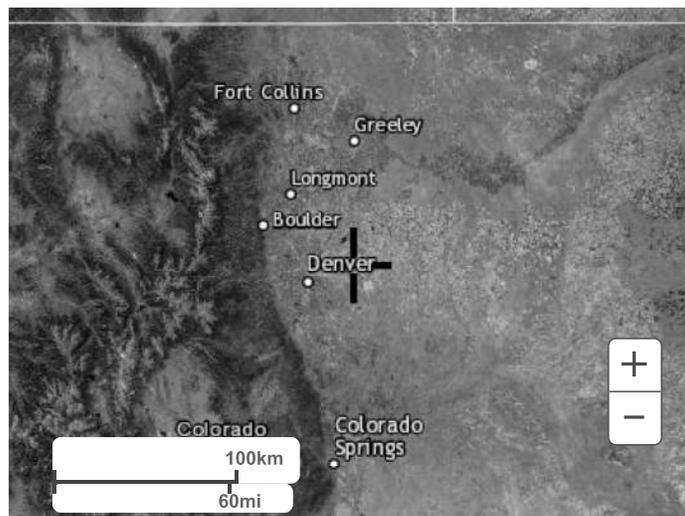
Design Point	Tributary Basins	Routed Runoff Q2 (cfs)	Q100 (cfs)
1	OS-1, N2-N3	2.22	8.59
2	OS-1, N1-N3	2.36	9.03
3	N4, N5	2.07	7.93
4	N7-N8	1.13	4.27
5	N6-N8	1.39	5.12
6	N9-N10	1.49	5.63
7	N6-N10	2.88	10.76
8	OS-1, N1-N10	7.31	27.72
9	N12-N13	2.50	9.43
10	N11-N13	2.90	10.97
11	N14-N15	0.67	2.48
12	N11-N15	3.57	13.45
13	OS-1, N1-N15	10.88	41.17
14	OS-1, OS-2, N1-N17	15.76	59.35



**TYPICAL NOTES:**

1. WATER QUALITY PONDS TO BE CONSTRUCTED PRIOR TO ANY ON SITE PAVING.
2. THIS SITE DESIGN RELIES ON ADJACENT INFRASTRUCTURE AND GRADING THAT IS CURRENTLY UNDER REVIEW AND NOT CURRENTLY CONSTRUCTED. IF THE ADJACENT SITE IS NOT UNDER CONSTRUCTION AT THE TIME OF CONSTRUCTION OF THIS SITE, REVISIONS TO CIVIL PLANS WILL BE REQUIRED.
3. ALL FFE MUST BE 1' ABOVE THE ADJACENT EMERGENCY AND 100 YEAR WATER SURFACE ELEVATIONS AND GARAGES MUST NOT BE INUNDATED.
4. ALL PROPOSED STORM SEWER IS PRIVATE AND WILL MAINTAINED BY THE METRO DISTRICT.
5. STORM SEWER HAS BEEN SIZED FOR THE 100-YEAR EVENT.
6. ALL EASEMENT MUST BE DEDICATED BY PLAT OR SEPARATE INSTRUMENT.
7. IF PERMISSION TO COMPLETE WORK OUTSIDE OF THE PROPERTY IS NOT GRANTED BY THE ADJACENT PROPERTY OWNERS, REVISIONS TO THE CIVIL PLANS AND DRAINAGE REPORTS WILL BE REQUIRED.
8. THE INUNDATED CONDITION FOR THE 100-YEAR STORM OF THE WQ POND BEING DESIGNED BY RSN 1652491S NOT BEING REVIEWED OR APPROVED IN THIS PDR.
9. CITY OF AURORA PLAN REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH CITY OF AURORA DESIGN CRITERIA AND THE CITY CODE. THE CITY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, OF DIMENSIONS AND ELEVATIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE. THE CITY OF AURORA, THROUGH THE APPROVAL OF THIS DOCUMENT, ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.
10. THIS SITE RELIES ON OFF-SITE PONDS AND/OR CONVEYANCE INFRASTRUCTURE. NO IMPERVIOUS AREA MAY BE CONSTRUCTED WITHIN THIS SITE UNTIL THE NEEDED OFFSITE POND(S) ARE FULLY CONSTRUCTED AND FUNCTIONAL AND THERE IS INITIAL ACCEPTANCE FOR ANY NEEDED OFF-SITE CONVEYANCE INFRASTRUCTURE. NO CO/CO WILL BE ISSUED FOR THIS SITE UNTIL THERE IS AN APPROVED POND CERTIFICATE FOR ANY REQUIRED OFFSITE POND(S).





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[US Department of Commerce](#)  
[National Oceanic and Atmospheric Administration](#)  
[National Weather Service](#)  
[National Water Center](#)  
1325 East West Highway  
Silver Spring, MD 20910  
Questions?: [HDSC.Questions@noaa.gov](mailto:HDSC.Questions@noaa.gov)

[Disclaimer](#)

## **APPENDIX D**

### DRAINAGE PLAN

