



LOT 2, BLOCK 1, RISING STAR SUBDIVISION, FILING NO. 2

TO BE KNOWN AS: GRANIT POINT
CITY OF AURORA, COUNTY OF ADAMS, STATE OF COLORADO
SITUATED IN THE SW $\frac{1}{4}$ OF SECTION 22, TOWNSHIP 4 SOUTH
RANGE 67 WEST OF THE 6TH PRINCIPAL MERIDIAN

PRELIMINARY DRAINAGE REPORT

ESC JN: **1396.2**

Original Report Date: **November 1, 2019**

Revision (1):

Prepared for:

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APPROVED FOR ONE YEAR FROM THIS DATE

City Engineer

Date

Water Department

Date

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THIS DOCUMENT WAS PRINTED TWO-SIDED.



DEVELOPER AND ENGINEER'S CERTIFICATIONS

Engineer's Certification

I hereby certify that this report for the preliminary drainage design of **LOT 2, BLOCK 1, RISING STAR SUBDIVISION, FILING NO. 2** was prepared by me (or under my direct supervision) in accordance with the provisions of the [City of Aurora](#) for the owners thereof. I understand that the [City of Aurora](#) does not and will not assume liability for drainage facilities designed by others.

Seal:

David R. Addor
Registered Professional Engineer
State of Colorado No. 20686

Property Owner's Certificate

Granit Pointe Estates, LLC (represented by [Daniel Schmid](#) as president thereof) hereby certify that the drainage facilities will be constructed according to the design presented in this **REPORT**. We understand that the [City of Aurora](#) does not and will not assume liability for drainage facilities designed or reviewed by our engineer. We also understand that the [City of Aurora](#) relies on the representations of others to establish that drainage facilities are designed and built in compliance with applicable guidelines, standards or specifications. Review by the [City of Aurora](#) can therefore in no way limit or diminish any liability which we or any other party may have with respect to the design or construction of such facilities.

Signature

By: Mr. Daniel Schmid

As: President

Of: **Granit Pointe Estates, LLV**

Date: _____

A. INTRODUCTION

1. Location

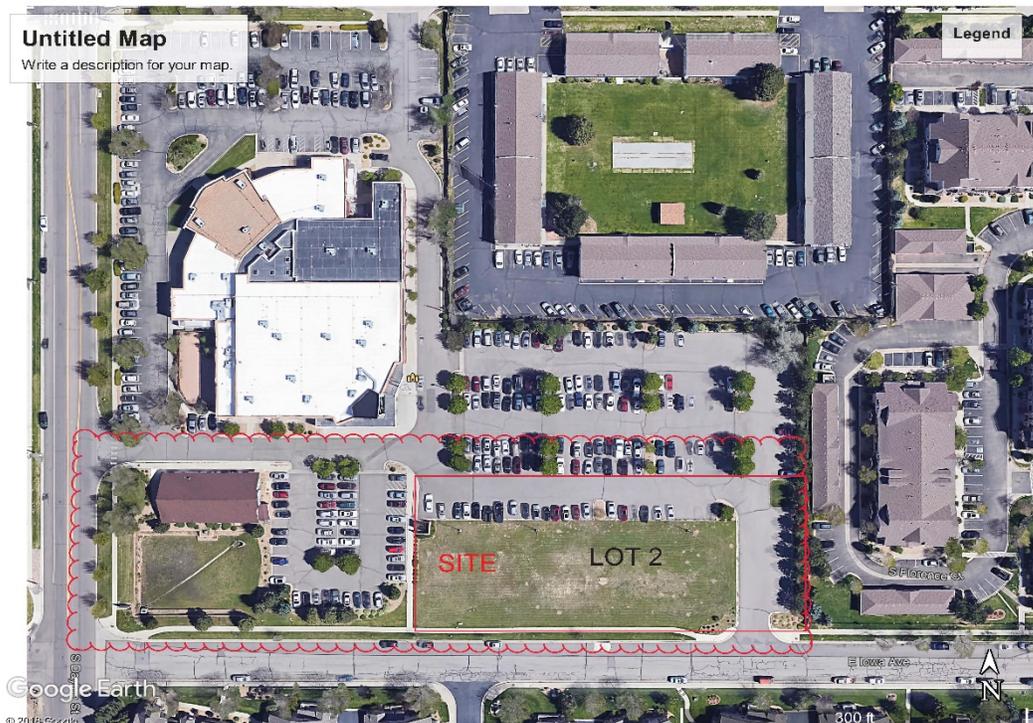
- a. Adjacent streets, subdivision name, lot and block, site plan name (if any)

The proposed project is a 1.18± acre site located on the north side of E. Iowa Avenue in the Woutheast Quarter of Section 22, Township 4 South, Range 67 West of the 6th Principal Meridian (City of Aurora, County of Arapahoe, State of Colorado). It will be the Granit Pointe Site Plan.

It is further defined as Lot2, Block 1, Rising Star Subdivision Filing No. 2.

However, this drainage report will treat this new development as a redevelopment of the entire Rising Star Subdivision. The total site contains 4.28 acres.

- b. Vicinity map



- c. Surrounding developments

The subject property is bounded on the north by the existing Rising Star Baptist Church that lies on Lot 1 of this subdivision. To the north of the parking for the church is a multifamily apartment complex zoned R-4. To the east is another multifamily apartment complex zoned R-3 and to the south across E. Iowa Avenue is a multifamily townhome complex zoned R-3. Dayton Street lies along the west boundary of this subdivision with residential property lying in the unincorporated Arapahoe County.

2. Proposed Development

- a. Property description - soils, topography, hydrologic soil groups, etc.

Lot 2 is currently partially undeveloped and consists of a grassed open area that slopes to the northwest at very mild grades with a drive aisle and parking area along the east and north side of the property. The drive and parking areas will remain with some modifications and the proposed building will be sited within the current open area.

As part of the redevelopment, Portions of Lot 1 will also be redeveloped. An existing parking area to the west of Lot 2 will be removed with much of this area becoming open space and the existing detention pond for the subdivision located at the southwest corner of the overall property will be removed and the parking moved to



this area. An existing building in this area will also be removed to make room for the reconfigured parking and open space. Approximately 1.0 acre of Lot 1 will be included in the redevelopment of the south portion of this overall property.

According to the Natural Resources Conservation Service: Web Soil Survey, the subject property consists of TrC: Truckton loamy sand, 1 to 5 percent slopes, which is an "A" hydrologic soil (soils having a high infiltration rate with low runoff potential when thoroughly wet).

- b. Type of development: Use, proposed density, composite percent of impervious area

The proposed use for Lot 2 is a 5-story multifamily building with surrounding walks, patios and open space. With the changes to the parking and open space areas to the west on Lot 1, a total of about 2.2 acres will be redeveloped.

The drainage basin for this redevelopment covers about 4.28 acres with the existing church and parking areas to the north as part of the drainage area. For this overall drainage basin, the composite coefficient of runoff will be 78.7%.

- c. Requested variances from this Storm Drainage and Technical Criteria Manual, which may include exemption requests for stormwater detention or the use of stormwater BMPs onsite.

There are no variances from the City of Aurora: Storm Drainage & Technical Criteria Manual necessary for this development.

B. HISTORIC DRAINAGE

1. Overall Basin Description

- a. Off-site basins

There are two limited off-site basins from the property to the northeast side of the church site, Lot 33, Paula-Dora Subdivision, 2nd Filing. These are basins OS-1 and OS-2. In the Final Drainage Report for Rising Star Baptist Church it was noted that water quality would be added to the detention facility for these two basins. A total of 819 cu. Ft. of additional water quality volume was called for and will be included in the water quality portion of the proposed detention facility.

- b. Major drainage ways including whether there are FEMA regulated floodplains

The subject property does not have any major drainageways impacting it and is not subject to any FEMA regulated floodways or floodplains (area of reduced flood risk due to levee) as shown on Flood Insurance Rate Map Panel 178 of 725 (Map Number 08005C0178K, Last Revised December 17, 2010). A "Firmette" is provided in the Appendices of this REPORT.

2. Drainage Patterns Through Property

Lot 2 grades generally to the north and west with the drainage collected in the parking area to the north and on the west side. The existing parking lot is drained by storm inlets and sewer lines discharging into the detention pond located at the southwest corner of the Rising Star property. The pond discharges through a control structure into the storm sewer in E. Iowa Avenue.

3. Outfalls Downstream from Property

This property lies in the upper reaches of a side tributary area to Westerly Creek. The pond outfall into the storm sewer flows into the storm sewer system in S. Dayton Street. This system flow to the north and follows a very circuitous route to eventually flow into the Westerly Creek Dam pond.

C. DESIGN CRITERIA

1. List References

- a. Existing drainage reports for surrounding properties



Final Drainage Report, Rising Star Baptist Church (COA Project ID 204189 2003-3066 12B, last dated 07/27/2004).

b. Manuals

City of Aurora, "Storm Drainage Design & Technical Criteria", latest edition

Urban Drainage & Flood Control District, "Criteria Manual: Volumes 1-3", latest edition

c. City Master Plan and floodplain studies

Storm Drainage Planning Upper Westerly Creek Outfall System by Simons, Li & Associates, Inc. dated March, 1982.

Flood Hazard Area Delineation, Westerly Creek (Upstream of Westerly Creek Dam Outlet) by CH2M, dated April, 2017.

2. Hydrologic Criteria

a. Rainfall source and P1 identified

The source for rainfall data is per equation 5.5, section 5.22, Chapter 5 of the City of Aurora "Storm Drainage Design and Technical Criteria". One-hour rainfall depth was taken NOAA Atlas 14, Volume 8, Version 2, 2-yr, 1-hr 0.86", and 100-yr, 1-hr 2.36".

b. Calculation method

Rational Method. The rational method was used to calculate runoff from the proposed development since it is less than 160 acres.

The following formula was used to determine the runoff values:

$$Q_n = C_n i_n A$$

Where Q_n = Storm runoff, cubic feet per second (CFS) (n' storm frequency interval)

C_n = Runoff coefficient (n' storm frequency interval)

i_n = Storm intensity, inches per hour (n' storm frequency interval)

A = Drainage area, acres

c. Detention volume computation method

Detention volume was calculated based on the formula as contained in the Storm Drainage Planning Study by Simons, Li & Associates. That report provided formulas for the minimum storage volumes and maximum release rates within the Upper Westerly Creek Outfall basin.

Detention volume and release rates were also calculated with the Urban Drainage and Flood Control District, Detention Design Work Book, UD-Detention, Version 3.7.

d. Design frequencies

Design frequencies are given in the City of Aurora "Storm Drainage Design and Technical Criteria", Section 3.30 Minor and Major Storms. The design storm frequency for the minor storm is two (2) years and the design storm frequency for the major storm is one hundred (100) years.

3. Hydraulic Criteria

a. Reference sources other than USDCM

See Reference section of this report for a full listing of all reference materials. The above mentioned design frequencies will be used to evaluate all drainage features.

b. Water surface profile method

None used.



c. Major drainageways

The site lies within the Upper Westerly Creek drainage basin.

D. DRAINAGE PLAN

1. General Concept

a. Conveyance of off-site drainage; proposed downstream outfall

Two off-site basins are accounted for. The drainage from these basins are collected in the onsite storm sewer system and carried into the detention facility.

b. Coordination with surrounding developments

Development of this site will have little impact to the surrounding property. The existing drainage pattern will be maintained.

c. Detention ponding/water quality BMP plan, identify ownership/maintenance responsibilities

This redevelopment will utilize a StormTech underground chamber detention facility. The system will be located at the southwest corner of the property. This pond will control for the EURV and the 100-year detention.

The system will be owned and maintained by the owner of the property.

2. Specific Details

a. Discuss each basin or sub-basin including land use and minor and major storm flow patterns through the basin. When there is a minor storm sewer system available/proposed it must be considered plugged for the major storm. Therefore, the report must present the minor and major flow routing.

The site is divided into 7 drainage basins with 2 offsite basins tributary to the site. Offsite Basin OS-1 containing 0.24 acres is part of the Paula Dora Subdivision to the north of the existing parking lot on the east side of the church. This basin drains across the property lone flowing to the south with the drainage being collected at the existing 10-foot type R inlet in the parking island at Design Point 1. Flow will be 0.57 cfs and 1.70 cfs respectively for the 2-year and 100-year storms.

Basin A containing 1.61 acres consists of the existing east side parking lot as well as portions of the redeveloped areas of Lot 2. The south tier of parking will be modified with the patios and landscaping along the north side of the proposed building. The drive aisle that enters the site from E. Iowa Avenue will be narrowed slightly but the drainage will continue to flow to the north as part of Basin A. All this drainage will continue to be collected at the inlet at Design Point 1. Basin A will add 3.09 cfs and 9.14 cfs for the two design storms for a combined total flow of 3.60 cfs and 10.67 cfs. Should this inlet fail to collect all of this drainage, the water will pond to a maximum depth of about 7 inches before it will begin to spill over the high point in the paving to the southwest.

Offsite Basin OS-2 containing 0.21 acres is another basin lying within the Paula Dora Subdivision. This basin will drain to the west into the drive along the east side of the church. Drainage will be collected in a 5-foot type R inlet at Design Point 2. It will combine with the drainage within Basin B for a total flow of 0.73 cfs and 2.17 cfs for the respective storms. Basin B contains 0.13 acre and is primarily the east side drive with the landscape strip along the property line. The storm sewer from this inlet connects with the storm sewer from Basin A and will be conveyed to the detention facility. Should this inlet fail, the drainage will pond to a little less than 6 inches before it overflows the high point in the drive and will be collected at Design Point 1.

Basin C containing 1.78 acres is the large central basin consisting of much of the existing church roof drainage along with the reconfigured open space area and new parking at the southwest corner of the site. Grading will direct all this drainage to a 10-foot type R inlet located in the new row of parking to the south of the church at Design Point 3. Flows will be 3.17 cfs and 9.61 cfs respectively. The overflow route will be over a high point in the drive to the west will discharge to the west with an initial depth of 12 inches at the inlet.

Basin D containing 0.30 acres is an area of the site at the southwest corner of the church will some open play area, parking, drives and a small portion of the church roof. It is similar to Basin E from the Final Drainage for the Rising Star Baptist Church. Drainage flow across the entrance drive from S. Dayton Street and is collected



in an existing 5-foot type R inlet located at the inside curb return of the drive entrance. Drainage will simply release out into Dayton Street if the inlet capacity is exceeded. Flows will be 0.60 cfs and 1.79 cfs respectively.

Basin E containing 0.19 acres is the peripheral basin along E. Iowa Avenue. This basin drains directly into the street, designated as Design Point 5. Flows will be 0.22 cfs and 0.67 cfs respectively. Basin F containing 0.06 acres is a similar basin along the S. Dayton Street frontage discharging to Design Point 6. Flows will be 0.05 cfs and 0.17 cfs respectively.

Two other basins existing on site. One is the ramp area for the drive down to the underground parking under the proposed building. This basin contains 0.06 acres and the drainage will be collected in a trench grate at the entrance to the garage. Flows will be 0.15 cfs and 0.43 cfs respectively. This drainage will be combined with the floor drains in the parking garage and will be discharge through a sand/oil interceptor into the sanitary sewer system. The storm sewer system in this area is too shallow to allow for this system to be connected.

The other basin is the Roof area of the building, 0.21 acres. This drainage will be collected and piped into the storm sewer system that connects to the detention facility. Flows will be 0.49 cfs and 1.51 cfs respectively.

b. Detention pond location and outfall.

The detention facility is located at the southwest corner of the property. The discharge storm sewer from the existing surface detention pond will be used to release the new pond into E. Iowa Avenue.

For this underground system, the lowest surface inlet is the existing 5-foot type R inlet at the south side of the drive entrance into the site along S. Dayton Street. The pond will release out of this inlet should the StormTech chambers become filled and the release structure at the southwest corner of the system fail to release sufficient flow.

c. Solutions to problems encountered.

The primary problem was the lack of space for an above ground detention facility. The new open space created by this plan wants to be usable, accessible space for use by both the new residents as well as for use by church members. Utilizing the efficiency of the StormTech system allows the site to better function for the users while providing significant detention and water quality enhancement.

d. Discuss the proposed permanent BMPs.

Water quality will be provided in the detention facility in the separator rows.

e. Phasing of construction and provisions for drainage during phasing.

It is the intent of the developer to construct all improvements associated with this project in a single phase.

f. Discuss open channel concepts, whether they preserve an undisturbed cross-section or are an improved channel.

Not applicable.

g. Discuss stabilization requirements for any roadside ditches.

Not applicable.

h. Discuss how the requirements set forth in the approved Outfall Systems Plan have been met, if applicable.

The Upper Westerly Creek Outfall System Planning Study by Simons, Li & Associates restricted the release from this site and established a minimum detention requirement. This plan meets these requirements.

i. Any other information deemed necessary to the project.

The proposed grading is shown on the Drainage and Grading Plan.

E. CONCLUSIONS

1. Compliance with Standards

The drainage for this site complies with all City of Aurora Standards.



2. Summary of Concept

a. Degree of protection to existing site

The proposed site will be protected from drainage related damage during both the initial and major storm events. Runoff will continue similar to the existing church site; will be captured and detained on-site; and will be released in a controlled manner at the existing discharge location.

b. Measures taken to provide adequate on-site drainage and enhancement to stormwater quality

On-site drainage has been controlled in the existing and proposed storm sewer system. Stormwater quality has been addressed for the overall site within the proposed stormwater management detention facility.

c. Effect of proposed development on adjacent, upstream, and downstream sites under both existing and future buildout conditions

There are no indications that this proposed development will have an adverse impact to either existing or future buildout conditions adjacent to, upstream of, or downstream of the subject property.

F. LIST OF REFERENCES

"[Storm Drainage Design and Technical Criteria](#)", City of Aurora, Colorado. Revised October 2010.

"[Urban Storm Drainage Criteria Manual - Volumes 1, 2, and 3](#)", Urban Drainage and Flood Control District, Denver, Colorado. Published June 2016, latest edition.

"[Soil Map – Adams County, Colorado](#)", United States Department of Agriculture, Natural Resources Conservation Service, Web Soil Survey v2.2.

"[Flood Insurance Rate Map](#)", Federal Emergency Management Agency: National Flood Insurance Program, Map Number 08005C0178K, Last Revised December 17, 2010.

"Storm Drainage Planning Upper Westerly Creek Outfall System", Simons, Li & Associates, Inc., March, 1982.



APPENDIX A

HYDROLOGIC COMPUTATIONS



DRAINAGE BASIN (DEVELOPMENT CONDITIONS)

Project: **Granit Pointe**
 Location: 1598 S. Dayton Street

Basin Designation: **Overall Basin** Developed
 Basin Area: **186,630** Sq. Ft. **4.2844** Acres
 Design Point: **1**

Composite Coefficient of Runoff: Hydrologic Soil Group: A

Surface	Area	% of Site	C ₂ value	C ₅ value	C ₁₀ value	C ₁₀₀ value	Imp.
Drives & Walks	5,990	3.21%	0.87	0.87	0.88	0.89	0.96
Asphalt Pavement	97,305	52.14%	0.87	0.88	0.90	0.93	1.00
Roof	47,930	25.68%	0.80	0.85	0.90	0.90	0.90
Landscaping	35,405	18.97%	0.10	0.11	0.13	0.15	0.02

Figures are from Table 1, City of Aurora Storm Drainage Design & Technical Criteria
 Formula: (% of Site)(C Value)+(% of Site)(C Value)+(% of Site)(C Value) = CC

- C₂: **0.71**
- C₅: **0.73**
- C₁₀: **0.75**
- C₁₀₀: **0.77**

Developed Basin Imperviousness:

I= **78.7** %

DRAINAGE BASIN (DEVELOPMENT CONDITIONS)

Project: **Granit Pointe**

Location: 1598 S. Dayton Street

Basin Designation: **OS-1** Developed
 Basin Area: **10,550** Sq. Ft. **0.2422** Acres
 Design Point: **O1**

Composite Coefficient of Runoff: Hydrologic Soil Group: A

Surface	Area	% of Site	C ₂ value	C ₅ value	C ₁₀ value	C ₁₀₀ value	Imp.
Drives & Walks	-	0.00%	0.87	0.87	0.88	0.89	0.96
Asphalt Pavement	7,070	67.01%	0.87	0.88	0.90	0.93	1.00
Roof	2,845	26.97%	0.80	0.85	0.90	0.90	0.90
Landscaping	635	6.02%	0.10	0.11	0.13	0.15	0.02

Figures are from Table 6-5 of the Urban Storm Drainage Criteria Manual

Formula: (% of Site)(C Value)+(% of Site)(C Value)+(% of Site)(C Value) = CC

C₂: **0.80**
 C₅: **0.83**
 C₁₀: **0.85**
 C₁₀₀: **0.87**

Developed Basin Imperviousness:

I= **91.4** %



DRAINAGE BASIN (DEVELOPMENT CONDITIONS)

Project: **Granit Pointe**
 Location: 1598 S. Dayton Street

Basin Designation: **OS-2** Developed
 Basin Area: **9,160** Sq. Ft. **0.2103** Acres
 Design Point: **O2**

Composite Coefficient of Runoff: Hydrologic Soil Group: A

Surface	Area	% of Site	C ₂ value	C ₅ value	C ₁₀ value	C ₁₀₀ value	Imp.
Drives & Walks	-	0.00%	0.87	0.87	0.88	0.89	0.96
Asphalt Pavement	6,140	67.03%	0.87	0.88	0.90	0.93	1.00
Roof	2,470	26.97%	0.80	0.85	0.90	0.90	0.90
Landscaping	550	6.00%	0.10	0.11	0.13	0.15	0.02

Figures are from Table 6-5 of the Urban Storm Drainage Criteria Manual
 Formula: (% of Site)(C Value)+(% of Site)(C Value)+(% of Site)(C Value) = CC

- C₂: **0.80**
- C₅: **0.83**
- C₁₀: **0.85**
- C₁₀₀: **0.88**

Developed Basin Imperviousness:

I= **91.4** %



DRAINAGE BASIN (DEVELOPMENT CONDITIONS)

Project: **Granit Pointe**
 Location: 1598 S. Dayton Street

Basin Designation: **A** Developed
 Basin Area: **70,010** Sq. Ft. **1.6072** Acres
 Design Point: **1**

Composite Coefficient of Runoff: Hydrologic Soil Group: **A**

Surface	Area	% of Site	C ₂ value	C ₅ value	C ₁₀ value	C ₁₀₀ value	Imp.
Drives & Walks	1,970	2.81%	0.87	0.87	0.88	0.89	0.96
Asphalt Pavement	55,750	79.63%	0.87	0.88	0.90	0.93	1.00
Roof	-	0.00%	0.80	0.85	0.90	0.90	0.90
Landscaping	12,290	17.55%	0.10	0.11	0.13	0.15	0.02

Figures are from Table 6-5 of the Urban Storm Drainage Criteria Manual
 Formula: (% of Site)(C Value)+(% of Site)(C Value)+(% of Site)(C Value) = CC

- C₂: **0.73**
- C₅: **0.74**
- C₁₀: **0.76**
- C₁₀₀: **0.79**

Developed Basin Imperviousness:

I= **82.7** %

DRAINAGE BASIN (DEVELOPMENT CONDITIONS)

Project: **Granit Pointe**

Location: 1598 S. Dayton Street

Basin Designation: Developed
 Basin Area: Sq. Ft. Acres
 Design Point:

Composite Coefficient of Runoff: Hydrologic Soil Group: A

Surface	Area	% of Site	C ₂ value	C ₅ value	C ₁₀ value	C ₁₀₀ value	Imp.
Drives & Walks	-	0.00%	0.87	0.87	0.88	0.89	0.96
Asphalt Pavement	3,790	65.91%	0.87	0.88	0.90	0.93	1.00
Roof	-	0.00%	0.80	0.85	0.90	0.90	0.90
Landscaping	1,960	34.09%	0.10	0.11	0.13	0.15	0.02

Figures are from Table 6-5 of the Urban Storm Drainage Criteria Manual

Formula: (% of Site)(C Value)+(% of Site)(C Value)+(% of Site)(C Value) = CC

C₂: **0.61**
 C₅: **0.62**
 C₁₀: **0.64**
 C₁₀₀: **0.66**

Developed Basin Imperviousness:

I= **66.6** %



DRAINAGE BASIN (DEVELOPMENT CONDITIONS)

Project: **Granit Pointe**
 Location: 1598 S. Dayton Street

Basin Designation: **C** Developed
 Basin Area: **75,875** Sq. Ft. **1.7419** Acres
 Design Point: **3**

Composite Coefficient of Runoff: Hydrologic Soil Group: A

Surface	Area	% of Site	C ₂ value	C ₅ value	C ₁₀ value	C ₁₀₀ value	Imp.
Drives & Walks	4,660	6.14%	0.87	0.87	0.88	0.89	0.96
Asphalt Pavement	27,160	35.80%	0.87	0.88	0.90	0.93	1.00
Roof	25,270	33.30%	0.80	0.85	0.90	0.90	0.90
Landscaping	18,785	24.76%	0.10	0.11	0.13	0.15	0.02

Figures are from Table 6-5 of the Urban Storm Drainage Criteria Manual

Formula: (% of Site)(C Value)+(% of Site)(C Value)+(% of Site)(C Value) = CC

- C₂: **0.66**
- C₅: **0.68**
- C₁₀: **0.71**
- C₁₀₀: **0.72**

Developed Basin Imperviousness:

I= **72.2** %

DRAINAGE BASIN (DEVELOPMENT CONDITIONS)

Project: **Granit Pointe**

Location: 1598 S. Dayton Street

Basin Designation: Developed

Basin Area: Sq. Ft. Acres

Design Point:

Composite Coefficient of Runoff: Hydrologic Soil Group: A

Surface	Area	% of Site	C ₂ value	C ₅ value	C ₁₀ value	C ₁₀₀ value	Imp.
Drives & Walks	820	6.27%	0.87	0.87	0.88	0.89	0.96
Asphalt Pavement	7,600	58.08%	0.87	0.88	0.90	0.93	1.00
Roof	1,660	12.69%	0.80	0.85	0.90	0.90	0.90
Landscaping	3,005	22.97%	0.10	0.11	0.13	0.15	0.02

Figures are from Table 6-5 of the Urban Storm Drainage Criteria Manual

Formula: (% of Site)(C Value)+(% of Site)(C Value)+(% of Site)(C Value) = CC

C₂: **0.68**

C₅: **0.70**

C₁₀: **0.72**

C₁₀₀: **0.74**

Developed Basin Imperviousness:

I= **76.0** %



DRAINAGE BASIN (DEVELOPMENT CONDITIONS)

Project: **Granit Pointe**
 Location: 1598 S. Dayton Street

Basin Designation: Developed
 Basin Area: Sq. Ft. 0.1917 Acres
 Design Point:

Composite Coefficient of Runoff: Hydrologic Soil Group: A

Surface	Area	% of Site	C ₂ value	C ₅ value	C ₁₀ value	C ₁₀₀ value	Imp.
Drives & Walks	2,800	33.53%	0.87	0.87	0.88	0.89	0.96
Asphalt Pavement	400	4.79%	0.87	0.88	0.90	0.93	1.00
Roof	-	0.00%	0.80	0.85	0.90	0.90	0.90
Landscaping	5,150	61.68%	0.10	0.11	0.13	0.15	0.02

Figures are from Table 6-5 of the Urban Storm Drainage Criteria Manual
 Formula: (% of Site)(C Value)+(% of Site)(C Value)+(% of Site)(C Value) = CC

- C₂: 0.40
- C₅: 0.40
- C₁₀: 0.42
- C₁₀₀: 0.44

Developed Basin Imperviousness:

I= 38.2 %



DRAINAGE BASIN (DEVELOPMENT CONDITIONS)

Project: **Granit Pointe**
 Location: 1598 S. Dayton Street

Basin Designation: Developed
 Basin Area: Sq. Ft. 0.0611 Acres
 Design Point:

Composite Coefficient of Runoff: Hydrologic Soil Group: A

Surface	Area	% of Site	C ₂ value	C ₅ value	C ₁₀ value	C ₁₀₀ value	Imp.
Drives & Walks	700	26.32%	0.87	0.87	0.88	0.89	0.96
Asphalt Pavement		0.00%	0.87	0.88	0.90	0.93	1.00
Roof	-	0.00%	0.80	0.85	0.90	0.90	0.90
Landscaping	1,960	73.68%	0.10	0.11	0.13	0.15	0.02

Figures are from Table 6-5 of the Urban Storm Drainage Criteria Manual
 Formula: (% of Site)(C Value)+(% of Site)(C Value)+(% of Site)(C Value) = CC

- C₂: 0.30
- C₅: 0.31
- C₁₀: 0.33
- C₁₀₀: 0.34

Developed Basin Imperviousness:

I= 26.7 %



DRAINAGE BASIN (DEVELOPMENT CONDITIONS)

Project: **Granit Pointe**
 Location: 1598 S. Dayton Street

Basin Designation: **Ramp** Developed
 Basin Area: **4,270** Sq. Ft. **0.0980** Acres
 Design Point: **7**

Composite Coefficient of Runoff: Hydrologic Soil Group: A

Surface	Area	% of Site	C ₂ value	C ₅ value	C ₁₀ value	C ₁₀₀ value	Imp.
Drives & Walks	3,715	87.00%	0.87	0.87	0.88	0.89	0.96
Asphalt Pavement		0.00%	0.87	0.88	0.90	0.93	1.00
Roof	-	0.00%	0.80	0.85	0.90	0.90	0.90
Landscaping	555	13.00%	0.10	0.11	0.13	0.15	0.02

Figures are from Table 6-5 of the Urban Storm Drainage Criteria Manual
 Formula: (% of Site)(C Value)+(% of Site)(C Value)+(% of Site)(C Value) = CC

- C₂: **0.77**
- C₅: **0.77**
- C₁₀: **0.78**
- C₁₀₀: **0.79**

Developed Basin Imperviousness:

I= **83.8** %



TIME OF CONCENTRATION (T_c): DEVELOPED CONDITIONS

Project: **Granit Pointe**
 Location: 1598 S. Dayton Street

Land Surface	Conveyance Coefficient, C _v *
Heavy Meadow	2.5
Tillage/Field	8
Short Pasture	7
Nearly Bare Ground	10
Grassed Waterway	15
Paved Area	20

NRCS Hydrologic Soil Grp: **A**

* Values taken from Urban Drainage and Flood Control District "Drainage Criteria Manual Volume 1"

Basin	Area	Overland Sheet Flow		Shallow Concentrated Flow			CK			FINAL		
		Length	Slope	Length	Slope	Cv	C5	Ti ¹	Tt ²	Tt ³	Tc	Tc
A	1.61	100	2.0%	320	1.6%	20	0.74	5.1	2.1	11.8	7.2	7.2
C	1.78	75	2.0%	70	2.0%	7	0.68	5.2	1.2	10.4	6.4	6.4

Note: All other basins assumed to have minimum 5 minute time of concentration

$${}^1T_i = (0.395 * (1.1 - C_5) * L^{0.50}) / S^{0.33} \text{ (Eq. RO-3)}$$

$${}^2T_t = L / (C_v * S_w^{0.50}) * (1/60) \text{ (Eq. RO-4)}$$

$${}^3T_t = (L/180) + 10 \text{ (Eq. RO-5)}$$

Max Length of Overland Sheet Flow: 500'



STANDARD FORM SF-2: STORM DRAINAGE SYSTEM DESIGN (RATIONAL METHOD)

Project: **Granit Pointe**
 Location: 1598 S. Dayton Street

1-hr Rainfall: **0.86**
 Design Storm: **2 yr**

(1)	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
	DESIGN POINT	AREA DESIGN	AREA (AC)	RUNOFF COEFF	t _c (MIN)	C · A (AC)	I IN / HR	Q (CFS)	t _c (MIN)	SUM C · A (AC)	I IN / HR	Q (CFS)	SLOPE (%)	STREET FLOW(CFS)	DESIGN FLOW(CFS)	SLOPE (%)	PIPE SIZE	LENGTH (FT)	VELOCITY (FPS)	t _t (MIN)	
	OS1	OS-1	0.24	0.80	5.0	0.19	2.92	0.57													
	1.0	A	1.61	0.73	7.2	1.18	2.62	3.09													
									7.2	1.38	2.62	3.60									to inlet
	OS2	OS-2	0.21	0.80	5.0	0.17	2.92	0.49													
	2	B	0.13	0.61	5.0	0.08	2.92	0.23													
									5.0	0.25	2.92	0.73									to inlet
									7.2	1.63	2.62	4.26			4.26	0.33	30	180	3.7	0.8	
	3	C	1.74	0.66	6.4	1.14	2.72	3.10													to inlet
									8.0	2.77	2.52	6.99									to detention
	4	D	0.30	0.68	5.0	0.21	2.92	0.60													to inlet
		ROOF	0.21	0.80	5.0	0.17	2.92	0.49	8.0	3.14	2.52	7.93									total to detention
	5	E	0.19	0.40	5.0	0.08	2.92	0.22													to Iowa
	6	F	0.06	0.30	5.0	0.02	2.92	0.05													To Dayton
	7	Ramp	0.10	0.77	5.0	0.08	2.92	0.22													Garage drainage



STANDARD FORM SF-2: STORM DRAINAGE SYSTEM DESIGN (RATIONAL METHOD)

Project: **Granit Pointe**
 Location: 1598 S. Dayton Street

1-hr Rainfall: **2.36**
 Design Storm: **100 yr**

	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS	
	DESIGN POINT	AREA DESIGN	AREA (AC)	RUNOFF COEFF	t _c (MIN)	C · A (AC)	I IN / HR	Q (CFS)	t _c (MIN)	SUM C · A (AC)	I IN / HR	Q (CFS)	SLOPE (%)	STREET FLOW(CFS)	DESIGN FLOW(CFS)	SLOPE (%)	PIPE SIZE	LENGTH (FT)	VELOCITY (FPS)		t _t (MIN)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
	OS1	OS-1	0.24	0.87	5.0	0.21	8.00	1.70													
	1.0	A	1.61	0.79	7.2	1.27	7.18	9.14													to inlet
									7.2	1.48	7.18	10.67									
	OS2	OS-2	0.21	0.88	5.0	0.18	8.00	1.47													
	2	B	0.13	0.66	5.0	0.09	8.00	0.70													
									5.0	0.27	8.00	2.17									to inlet
									7.2	1.76	7.18	12.62			12.62	0.33	30	180	3.7	0.8	storm sewer
	3	C	1.74	0.72	6.4	1.26	7.46	9.41													to inlet
									8.0	3.02	6.93	20.91									to detention
	4	D	0.30	0.74	5.0	0.22	8.00	1.79													to inlet
		ROOF	0.21	0.90	5.0	0.19	8.00	1.51													
									8.0	3.43	6.93	23.77									total to detention
	5	E	0.19	0.44	5.0	0.08	8.00	0.67	60	0.08	2.39	0.20									to Iowa
	6	F	0.06	0.34	5.0	0.02	8.00	0.17	60	0.02	2.39	0.05									to Dayton
	7	Ramp	0.10	0.79	5.0	0.08	8.00	0.62													Garage Drairage



NOAA Atlas 14, Volume 8, Version 2
Location name: Denver, Colorado, USA*
Latitude: 39.6878°, Longitude: -104.8736°
Elevation: 5508.49 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 & aerials](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.221 (0.177-0.278)	0.272 (0.217-0.343)	0.363 (0.288-0.457)	0.444 (0.351-0.563)	0.566 (0.436-0.752)	0.668 (0.500-0.895)	0.776 (0.561-1.07)	0.892 (0.618-1.26)	1.06 (0.704-1.53)	1.19 (0.768-1.73)
10-min	0.324 (0.259-0.407)	0.399 (0.318-0.502)	0.531 (0.422-0.670)	0.650 (0.514-0.824)	0.829 (0.638-1.10)	0.978 (0.732-1.31)	1.14 (0.822-1.56)	1.31 (0.906-1.84)	1.55 (1.03-2.24)	1.74 (1.13-2.54)
15-min	0.395 (0.315-0.497)	0.486 (0.388-0.612)	0.648 (0.515-0.817)	0.793 (0.627-1.00)	1.01 (0.778-1.34)	1.19 (0.893-1.60)	1.39 (1.00-1.90)	1.59 (1.10-2.24)	1.89 (1.26-2.73)	2.12 (1.37-3.09)
30-min	0.557 (0.444-0.699)	0.684 (0.545-0.860)	0.907 (0.721-1.14)	1.11 (0.875-1.40)	1.40 (1.08-1.86)	1.65 (1.24-2.21)	1.91 (1.38-2.62)	2.19 (1.52-3.08)	2.59 (1.72-3.73)	2.90 (1.87-4.22)
60-min	0.707 (0.564-0.888)	0.856 (0.682-1.08)	1.12 (0.891-1.41)	1.36 (1.08-1.73)	1.73 (1.33-2.30)	2.03 (1.53-2.73)	2.36 (1.71-3.24)	2.72 (1.88-3.83)	3.22 (2.14-4.65)	3.63 (2.34-5.28)
2-hr	0.857 (0.689-1.07)	1.03 (0.825-1.28)	1.34 (1.07-1.67)	1.62 (1.29-2.03)	2.05 (1.60-2.71)	2.42 (1.83-3.22)	2.81 (2.05-3.83)	3.24 (2.27-4.52)	3.85 (2.59-5.51)	4.35 (2.83-6.26)
3-hr	0.945 (0.763-1.17)	1.12 (0.906-1.39)	1.45 (1.17-1.80)	1.75 (1.40-2.19)	2.22 (1.74-2.92)	2.62 (1.99-3.47)	3.05 (2.24-4.13)	3.52 (2.48-4.88)	4.19 (2.84-5.97)	4.74 (3.11-6.79)
6-hr	1.13 (0.916-1.38)	1.34 (1.09-1.64)	1.72 (1.39-2.12)	2.07 (1.67-2.56)	2.61 (2.05-3.39)	3.06 (2.35-4.01)	3.55 (2.63-4.76)	4.08 (2.90-5.61)	4.85 (3.31-6.82)	5.46 (3.61-7.74)
12-hr	1.36 (1.12-1.66)	1.63 (1.34-1.99)	2.11 (1.73-2.58)	2.54 (2.06-3.11)	3.16 (2.50-4.05)	3.68 (2.84-4.75)	4.22 (3.15-5.58)	4.80 (3.43-6.50)	5.62 (3.86-7.80)	6.26 (4.18-8.77)
24-hr	1.65 (1.36-1.99)	1.98 (1.63-2.38)	2.53 (2.08-3.07)	3.02 (2.47-3.66)	3.71 (2.95-4.68)	4.28 (3.32-5.45)	4.86 (3.64-6.34)	5.48 (3.94-7.32)	6.32 (4.38-8.66)	6.99 (4.71-9.69)
2-day	1.95 (1.63-2.34)	2.30 (1.92-2.75)	2.89 (2.40-3.47)	3.41 (2.81-4.10)	4.14 (3.32-5.17)	4.74 (3.70-5.97)	5.35 (4.05-6.90)	6.00 (4.36-7.93)	6.89 (4.82-9.33)	7.59 (5.16-10.4)
3-day	2.09 (1.75-2.48)	2.48 (2.07-2.95)	3.12 (2.60-3.72)	3.68 (3.05-4.40)	4.46 (3.59-5.52)	5.09 (4.00-6.37)	5.73 (4.36-7.34)	6.40 (4.67-8.40)	7.31 (5.14-9.83)	8.02 (5.49-10.9)
4-day	2.19 (1.84-2.60)	2.61 (2.19-3.09)	3.30 (2.76-3.92)	3.89 (3.23-4.64)	4.71 (3.80-5.80)	5.37 (4.23-6.68)	6.03 (4.60-7.68)	6.72 (4.92-8.76)	7.65 (5.39-10.2)	8.37 (5.75-11.3)
7-day	2.52 (2.13-2.96)	2.96 (2.50-3.49)	3.70 (3.12-4.36)	4.33 (3.62-5.12)	5.20 (4.22-6.35)	5.90 (4.68-7.28)	6.60 (5.07-8.33)	7.33 (5.41-9.47)	8.31 (5.90-11.0)	9.07 (6.28-12.2)
10-day	2.83 (2.40-3.31)	3.28 (2.78-3.84)	4.03 (3.41-4.73)	4.67 (3.92-5.50)	5.56 (4.54-6.75)	6.27 (5.00-7.71)	7.00 (5.40-8.78)	7.75 (5.74-9.96)	8.76 (6.26-11.5)	9.55 (6.64-12.7)
20-day	3.71 (3.17-4.30)	4.19 (3.58-4.86)	4.99 (4.25-5.80)	5.66 (4.80-6.61)	6.61 (5.44-7.93)	7.35 (5.92-8.93)	8.11 (6.32-10.1)	8.89 (6.65-11.3)	9.94 (7.17-12.9)	10.8 (7.56-14.2)
30-day	4.39 (3.78-5.06)	4.95 (4.26-5.71)	5.87 (5.03-6.78)	6.62 (5.64-7.69)	7.67 (6.33-9.12)	8.47 (6.84-10.2)	9.28 (7.26-11.4)	10.1 (7.59-12.7)	11.2 (8.10-14.4)	12.0 (8.49-15.7)
45-day	5.22 (4.51-5.98)	5.93 (5.12-6.81)	7.08 (6.09-8.14)	8.01 (6.86-9.24)	9.25 (7.65-10.9)	10.2 (8.24-12.2)	11.1 (8.70-13.5)	12.0 (9.04-14.9)	13.1 (9.55-16.8)	14.0 (9.93-18.2)
60-day	5.89 (5.11-6.72)	6.78 (5.88-7.75)	8.19 (7.07-9.38)	9.30 (8.00-10.7)	10.8 (8.91-12.6)	11.8 (9.61-14.0)	12.9 (10.1-15.6)	13.8 (10.5-17.1)	15.0 (11.0-19.1)	15.9 (11.4-20.6)

¹ 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

Detention Pond

Granit Pointe

From Storm Drainage Planning Report by Simons, Li & Associates

Minimum Storage Volume:

	V=	(94.6I-78)A		
	I=	78.71	%	
	A=	4.28	Ac	
	V=	31568	cu. Ft.	25,178 cu. Ft. from UD-Detention
	WQCV=	4966	Cu. Ft.	UD-Detention
		819	cu. Ft.	Off-site Basins From FD for Rising Star
	Total Pond V=	37353	cu. Ft.	34,804 cu. Ft. from UD-Detention w 1/2 EURV

Allowable Release Rate

	100-yr=	0.88A ^{0.68}	
	A=	4.28	Ac
	100-yr=	2.37	cfs
	Basin E & F release=	0.25	cfs undetained
	Adjusted 100-yr=	2.12	cfs

APPENDIX B



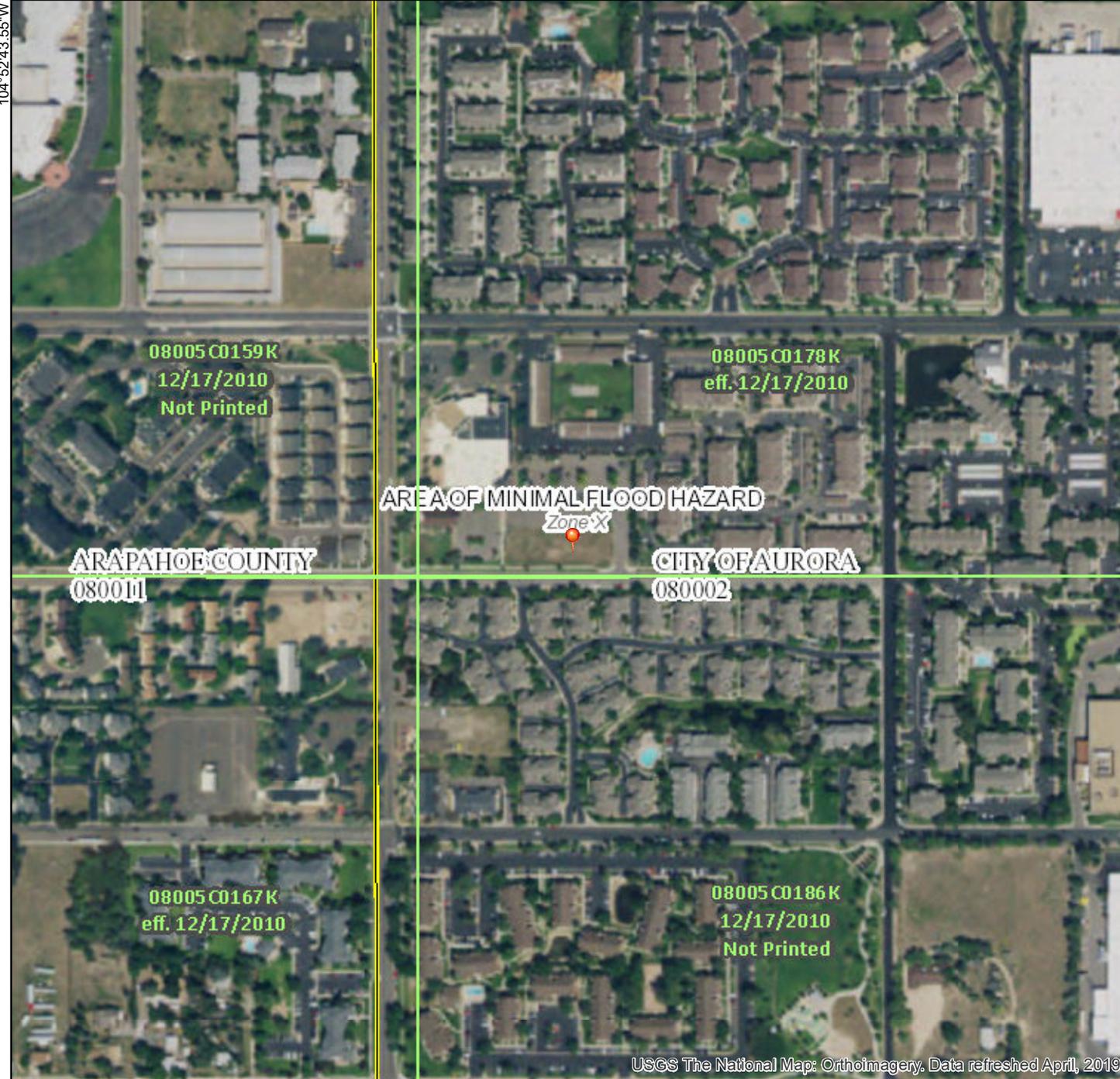
APPENDIX C

MAP POCKET (FIRM, SOILS, PLANS)

National Flood Hazard Layer FIRMette



39°41'29.77"N



104°52'43.55"W

Legend

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

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		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 Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D

OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		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
		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.

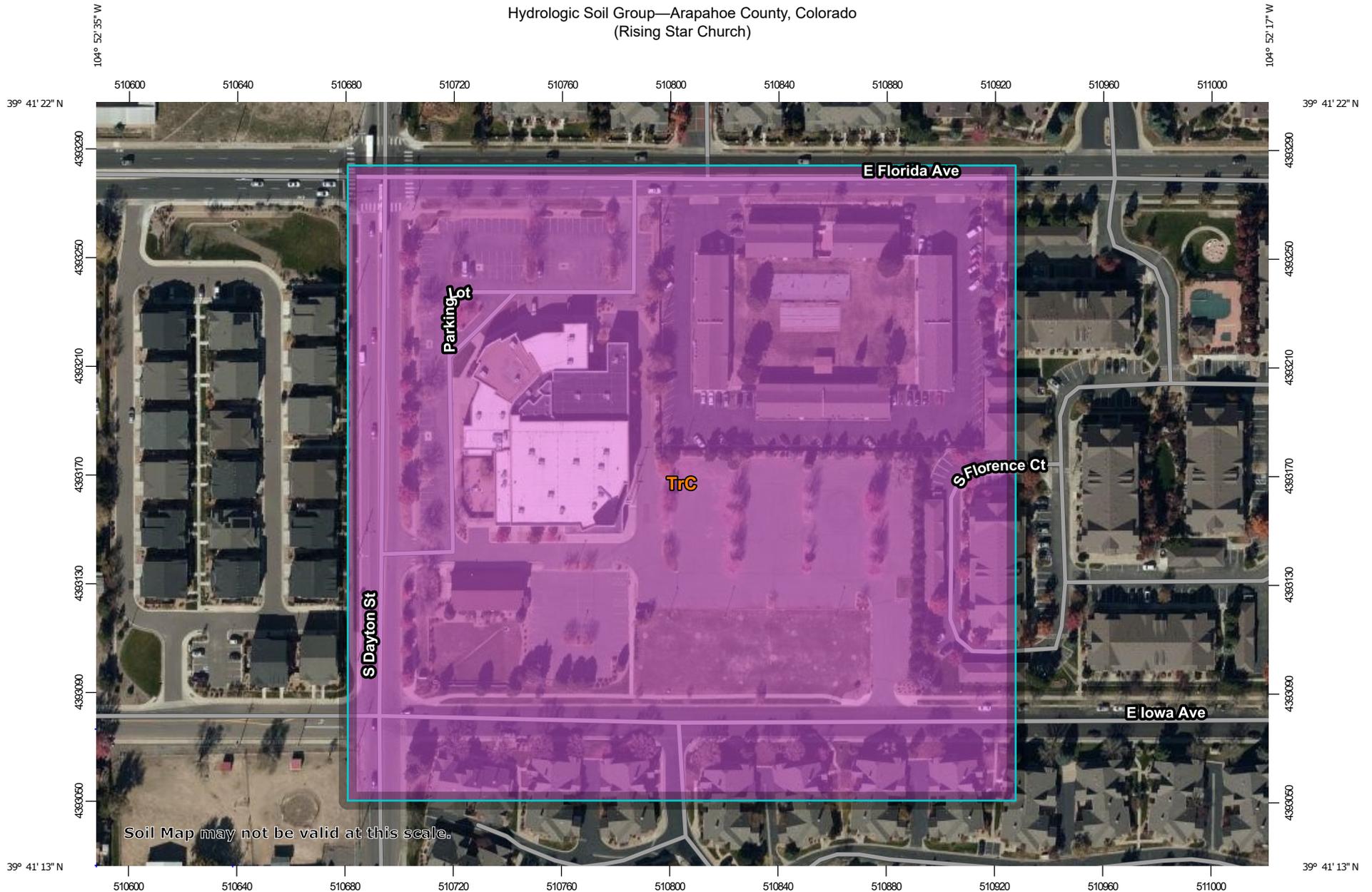
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **11/19/2019 at 11:12:16 AM** 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.



Hydrologic Soil Group—Arapahoe County, Colorado
(Rising Star Church)



Soil Map may not be valid at this scale.

Map Scale: 1:1,980 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.

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: Arapahoe County, Colorado
 Survey Area Data: Version 15, Sep 12, 2019

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

Date(s) aerial images were photographed: Oct 20, 2018—Oct 26, 2018

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
TrC	Truckton loamy sand, 1 to 5 percent slopes	A	14.3	100.0%
Totals for Area of Interest			14.3	100.0%

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

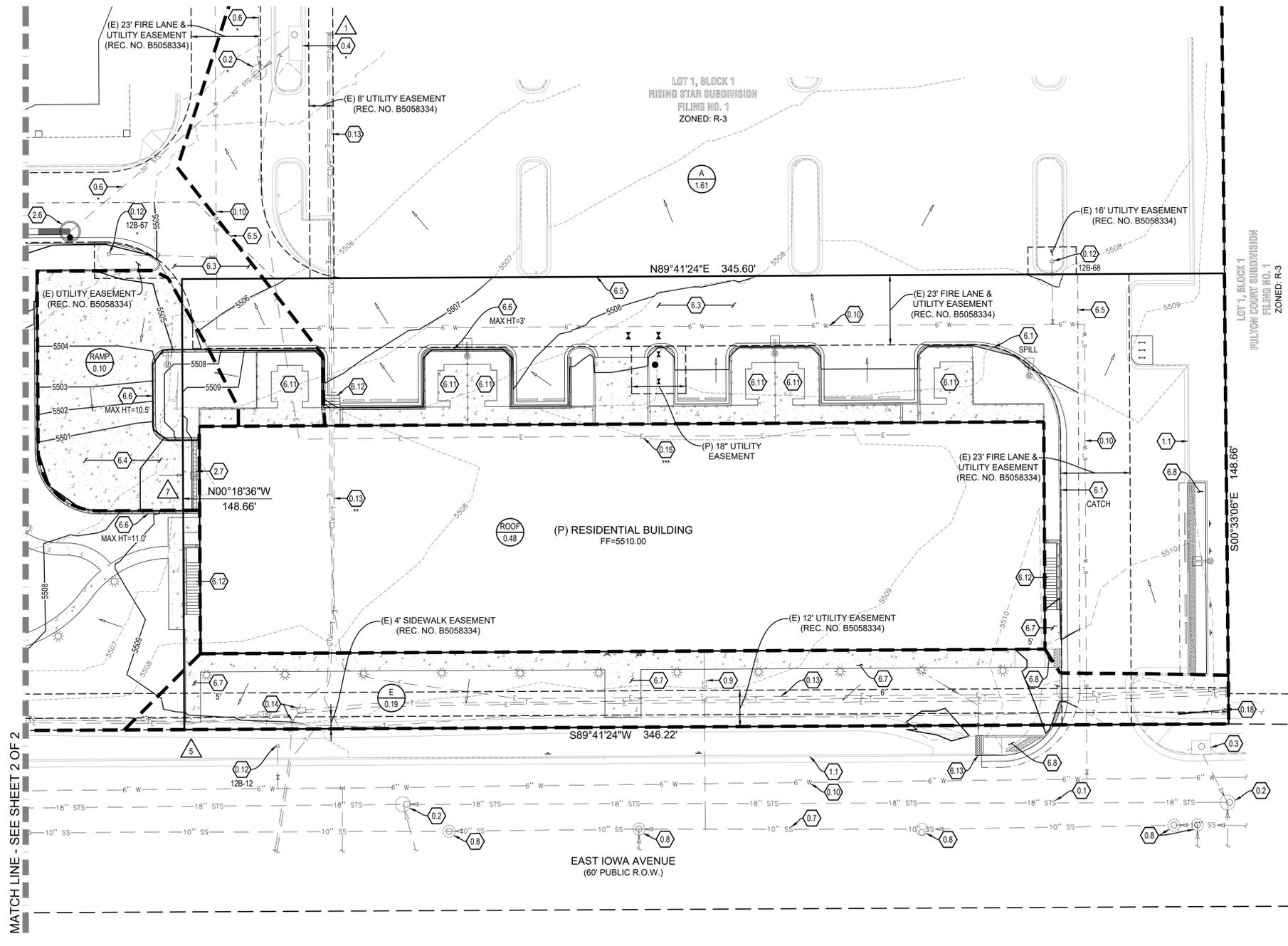
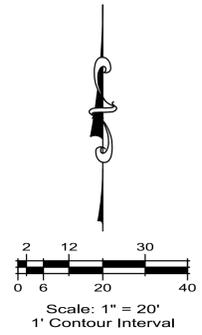


LEGEND

—CTV— (E) ELECTRICAL LINE	⊠ (E) COMMUNICATIONS VAULT
—E— (E) ELECTRICAL LINE	⊞ (E) ELECTRICAL BOX
—FO— (E) FIBER-OPTIC LINE	⊞ (E) ELECTRICAL METER
—G— (E) GAS LINE	⊞ (E) ELECTRIC VAULT
—SS— (E) SANITARY SEWER LINE	⊞ (E) GAS METER
—STS— (E) STORM SEWER LINE	⊞ (E) LIGHT POLE (DIRECTIONAL)
—T— (E) TELEPHONE LINE	⊞ (E) WATER VALVE
—W— (E) WATER LINE	→ DRAINAGE FLOW ARROW
---5500--- (E) CONTOUR LINE	↖ (P) EMERGENCY OVERTFLOW
---5500--- (P) CONTOUR LINE	⊠ DESIGN POINT
— BASIN LINE	⊠ BASIN DESIGNATION
⊠ (E) AIR CONDITIONER UNIT	⊠ BASIN AREA IN ACRES
○ (E) MANHOLE	
□ (E) COMMUNICATIONS PEDESTAL	

SUMMARY RUNOFF TABLE

D.P.	BASIN	I (%)	C ₂	C ₁₀₀	Q ₂ (CFS)	Q ₁₀₀ (CFS)
OS1	OS-1	91.4	0.80	0.87	0.57	1.70
1	A	82.7	0.73	0.79	3.09/3.60	9.14/10.67
OS2	OS-2	91.4	0.80	0.87	0.49	1.47
2	B	66.6	0.61	0.66	0.70/2.17	0.23/0.73
3	C	72.2	0.66	0.72	3.10	9.41
4	D	76.0	0.68	0.74	0.60	1.79
	ROOF	90.0	0.80	0.90	0.49	1.51
5	E	38.2	0.40	0.44	0.22	0.67
6	F	26.7	0.30	0.34	0.05	0.17
7	RAMP	83.8	0.77	0.79	0.22	0.62



PRELIMINARY DRAINAGE PLAN KEYNOTE LEGEND:

- | # | ITEM DESCRIPTION |
|---------------------------|---|
| EXISTING ITEMS (E) | |
| 0.1 | (E) 18" STORM SEWER LINE |
| 0.2 | (E) STORM MANHOLE |
| 0.3 | (E) 5' TYPE R STORM INLET |
| 0.4 | (E) 10' TYPE R STORM INLET |
| 0.5 | (E) DETENTION POND OUTFALL TO BE UTILIZED FOR NEW POND |
| 0.6 | (E) STORM SEWER LINE |
| 0.7 | (E) 10" SANITARY SEWER LINE |
| 0.8 | (E) SANITARY MANHOLE |
| 0.9 | (E) SANITARY SERVICE STUB TO BE UTILIZED FOR NEW BUILDING |
| 0.10 | (E) 6" WATER LINE |
| 0.11 | (E) 16" WATER LINE |
| 0.12 | (E) FIRE HYDRANT |
| 0.13 | (E) ELECTRICAL AND COMMUNICATION LINES |
| 0.14 | (E) COMMUNICATION VAULT AND PEDESTAL |
| 0.15 | (E) ELECTRICAL LINES |
| 0.16 | (E) COMMUNICATION LINE |
| 0.17 | (E) TRANSFORMER |
| 0.18 | (E) UTILITY POLE W/ GUY WIRE |
| 1.1 | (E) CURB & GUTTER |
| 1.2 | (E) DRAINAGE CHASE |
| 1.3 | (E) ROOF DRAIN SPLASH BLOCK |
| PROPOSED ITEMS (P) | |
| 2.1 | (P) STORM MANHOLE OUTLET STRUCTURE (PRIVATE) |
| 2.2 | (P) UNDERGROUND DETENTION SYSTEM AND WATER QUALITY ISOLATOR CHAMBER (PRIVATE) |
| 2.3 | (P) 36" NYLOPLAST DRAIN BASIN (PRIVATE) |
| 2.4 | (P) STORM SEWER LINE (PRIVATE) |
| 2.5 | (P) STORM INLET (PRIVATE) |
| 2.6 | (P) STORM MANHOLE (PRIVATE) |
| 2.7 | (P) STORM TRENCH DRAIN (PRIVATE) |
| 6.1 | (P) CURB & GUTTER |
| 6.2 | (P) CONCRETE PAN |
| 6.3 | (P) ASPHALT PAVEMENT |
| 6.4 | (P) CONCRETE PAVEMENT |
| 6.5 | (P) SAWCUT LINE |
| 6.6 | (P) CONCRETE RETAINING WALL WITH RAILING |
| 6.7 | (P) CONCRETE WALK |
| 6.8 | (P) ACCESSIBLE RAMP |
| 6.9 | (P) GAZEBO |
| 6.10 | (P) TRASH ENCLOSURE FOR CHURCH |
| 6.11 | (P) PRIVATE UNIT PATIO WITH RAILING |
| 6.12 | (P) STEPS |
| 6.13 | (P) SIDEWALK CHASE, COA STD S3 |
| * | TO REMAIN |
| ** | TO BE RELOCATED |
| *** | TO BE REMOVED |

GENERAL NOTES:

- 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.
- ENSURE THAT THE PROVISIONS OF CRS 67-92-602, AS AMENDED BY SENATE BILL 15-212, REGARDING NOTIFICATION OF DOWNSTREAM WATER RIGHTS HOLDERS ARE UPHELD.
- ALL STORM SEWER IS SIZED FOR THE 100-YR EVENT, UNLESS OTHERWISE NOTED.
- PIPE BEDDING SHALL BE IN ACCORDANCE WITH CITY OF AURORA'S SPECIFICATIONS.
- THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION, SIZE, NUMBER, AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON MEASUREMENTS TAKEN IN THE FIELD AND RECORDS OF THE VARIOUS UTILITY COMPANIES. THIS INFORMATION IS NOT TO BE RELIED ON TO BE COMPLETE OR EXACT. THE CONTRACTOR MUST CALL THE LOCAL UTILITY LOCATION CENTER AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION TO REQUEST UTILITIES BE LOCATED AND MARKED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE RELOCATION OF ANY EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THIS PLAN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING IMPROVEMENTS AND UTILITIES AND SHALL REPAIR ANY DAMAGE AT HIS EXPENSE.
- ALL CONSTRUCTION OR CONSTRUCTION STAKING FOR THIS PROJECT SHALL BE DONE PER THE SIGNED AND APPROVED CIVIL CONSTRUCTION PLANS. ENGINEERING SERVICE COMPANY IS NOT LIABLE FOR ANY DISCREPANCIES BETWEEN ANY BID SET AND/OR BUILDING SET AND THE APPROVED CIVIL CONSTRUCTION PLANS.
- ALL PROPOSED UTILITY LINES AND DRAINAGE/GRADING PATTERNS SHOWN HEREON IS PRELIMINARY AND SHALL NOT RELIED UPON FOR CONSTRUCTION.

BENCHMARK:

CITY OF AURORA BM #456722SE001
 3" DIAMETER BRASS CAP (STAMPED COA BM 2-70) ON THE N.E. COR. OF CONC. C.O. INLET STRUCTURE ON THE NORTH SIDE OF E. JEWELL AVE. AT THE N.E. COR. OF E. JEWELL AVE. AND S. DAYTON ST.
 ELEVATION: 5527.986 FEET (NAVD 1988 DATUM).

APPROVED FOR ONE YEAR FROM THIS DATE

City Engineer	Date
Water Department	Date

PRELIMINARY DRAINAGE PLAN
 GRANIT POINTE ESTATES
 LOT 2, BLOCK 1, RISING STAR SUBDIVISION FILING NO. 2 THE 6TH P.M.
 CITY OF AURORA, COUNTY OF ADAMS, STATE OF COLORADO

GRANIT POINTE ESTATES, LLC
 610 DNAC PROJECT CONSULTANTS (SK), INC.
 174 WOODBURN CRESCENT
 AURORA, CO 80014
 PHONE: (303) 745-4872
 ATTN: DANIEL SCHMID

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 engineering@esvc.com

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Date: 12/23/2019
 No.: INITIAL PRELIMINARY DRAINAGE PLAN SUBMITTAL
 Description: 1

Prepared Under The Direct Supervision Of:
FOR REVIEW ONLY
 NOT FOR CONSTRUCTION

Sheet No.: **1 OF 2**

