REZONING (Zoning Map Amendment)

Application submittals must include all documents on this checklist as well as this page. Please use the reference guide (pg. 2) included in this packet for more information on each submittal item.

All submittals shall include one (1) hard copy of all documents and one (1) electronic copy with all documents combined in a single PDF. For hard copies, each document shall be labeled or tabbed with the corresponding checklist number.

☐ 1. Development Application Form (pg. 4)
☐ 2. Application Fees (see table)
☐ 3. Written Explanation of the Project
☐ 4. Site Plan Showing Proposed Development, including:
   a. Proposed Building Envelope
   b. Parking Areas
   c. Site Access
   d. Landscape Areas
☐ 5. Trip Generation Letter
☐ 6. Preliminary Drainage Analysis
☐ 7. Neighborhood Meeting Summary
☐ 8. Proof of Ownership (warranty deed or title policy)
☐ 9. Proof of Water and Sewer Services
☐ 10. Legal Description
☐ 11. Certificate of Taxes Paid
☐ 12. Certificate of Notice to Mineral Estate Owners/and Lessees (pg. 6)
☐ 13. Certificate of Surface Development (pg. 7)

<table>
<thead>
<tr>
<th>Fee Type</th>
<th>Amount</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>$1,500</td>
<td>With application submittal</td>
</tr>
<tr>
<td>Tri-County Health *made payable to Tri County Health</td>
<td>$55 (with public utilities), $110 (with individual septic system)</td>
<td>With application submittal</td>
</tr>
</tbody>
</table>
Application Type:

- Conceptual Review
- Preliminary PUD
- Temporary Use
- Subdivision, Preliminary
- Final PUD
- Variance
- Subdivision, Final
- Rezone
- Conditional Use
- Plat Correction/ Vacation
- Special Use
- Other: 

PROJECT NAME: 5200 Wyandot triplex

APPLICANT

Name(s): Regan Foster
Address: 5200 Wyandot St.
City, State, Zip: Denver, CO 80221
2nd Phone #: Email: Reganfoster@gmail.com

OWNER

Name(s): Regan Foster
Address: 5200 Wyandot St.
City, State, Zip: Denver, CO 80221
2nd Phone #: Email: Reganfoster@gmail.com

TECHNICAL REPRESENTATIVE (Consultant, Engineer, Surveyor, Architect, etc.)

Name: Joe Simmons
Address: 99 S Logan St.
City, State, Zip: Denver, CO 80209
2nd Phone #: Email: Jsimmons@blueystudio.com
DESCRIPTION OF SITE

Address: 5200 Wyandot St.

City, State, Zip: Denver, CO 80221

Area (acres or square feet): 10,080

Tax Assessor Parcel Number: 0182516222007

Existing Zoning: R1

Existing Land Use: residential

Proposed Land Use: R3-subdivide

Have you attended a Conceptual Review? YES ☒ NO ☐

If Yes, please list PRE#: PRE2019-00086

I hereby certify that I am making this application as owner of the above described property or acting under the authority of the owner (attached authorization, if not owner). I am familiar with all pertinent requirements, procedures, and fees of the County. I understand that the Application Review Fee is non-refundable. All statements made on this form and additional application materials are true to the best of my knowledge and belief.

Name: Regina Foster Date: 5-8-19

Owner's Printed Name

Name:

Owner's Signature
Written Explanation for 5200 Wyandot st. Rezoning

Regan and Elizabeth Foster are wanting to rezone their 5200 Wyandot lot to R-3 to match the surrounding zoning so they can build a triplex in the north side of their lot. There are no final architectural plans at this point for review with full descriptions of buildout but there is a basic site plan provided which lays out a conceptual idea that meets the building setbacks, frontage and access. Provided is a site plan, proof of ownership, property taxes are current and will be paid prior to final rezoning, proof of access for water, electric and sewer. As of now we do not have a definitive plan for final build out but are in the beginning stages of rezoning.
March 15, 2019

Joseph E. Simmons, AIA
Architect
BlueSky Studio
99 S. Logan St.
Denver, CO 80209

Re: Traffic Analysis
52\textsuperscript{nd} Ave. and Wyandot, Adams County, CO

Dear Mr. Simmons:

Pursuant to your request, I have reviewed the trip generation occasioned by your development of three townhomes on the east side of Wyandot St. north of 52\textsuperscript{nd} Ave, in unincorporated Adams County. The graphic shows the location of the project and the adjacent streets and intersections.

52\textsuperscript{nd} Ave. is a two-lane minor arterial that connects to Zuni St. on the west and Vallejo St to the east. It is posted at 30 mph. It currently carries approximately 4,000 ADT per the 2015 DRCOG Focus Model Assigned Volumes. The 2040 DRCOG Focus Model Assigned Volumes indicates no growth and stabilization at 4,000 ADT. Wyandot is an unmarked two-lane local residential street. The intersection is two-way stop sign controlled.

Trip generation rates and values for the proposed use are found in the ITE Trip Generation Manual, 10\textsuperscript{th} Edition, Land Use Code 220. The chart provides the trip generation for the average daily and the AM and PM peak hours.

<table>
<thead>
<tr>
<th>ITE Code</th>
<th>Land Use</th>
<th>Unit</th>
<th>Quantity</th>
<th>ADT</th>
<th>AM</th>
<th>In</th>
<th>Out</th>
<th>Total</th>
<th>PM</th>
<th>In</th>
<th>Out</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>220</td>
<td>Townhomes</td>
<td>Units</td>
<td>3</td>
<td>7.32</td>
<td>0.11</td>
<td>0</td>
<td>0.35</td>
<td>0.36</td>
<td>0.35</td>
<td>0.21</td>
<td>0.21</td>
<td>0.42</td>
</tr>
</tbody>
</table>

Total Trips 22

0 0 1 1 1 1 2
Under the Adams County Traffic Impact Study Guidelines, when the daily trip generation is more the 20 vehicles per day, a traffic impact study is required. However, in this case the AM and PM peak hour trip generation are too small at one trip and one trip out in the PM peak hour to have any measurable level of service impact on the adjacent roadways and intersections. Consequently, relief from the traffic impact study requirement is requested.

ATC appreciates the opportunity to be of service. Please call if you have any questions. We can be reached at 303-703-9112.

Respectfully submitted,

Aldridge Transportation Consultants, LLC

John M.W. Aldridge, P.E.
Principal

ATC is professional service firm specializing in traffic engineering and transportation planning. ATC’s principal, John M.W. Aldridge, is a Colorado licensed professional engineer. In the past 20 years, ATC has prepared over 1,000 traffic impact studies, designed over 100 traffic signals, and has provided expert witness testimony on engineering design and access issues on multi-million-dollar interchange and highway projects in Kansas and Colorado.
PHASE 1 DRAINAGE REPORT
FOR
Wyandot Townhomes
5200 Wyandot
Adams County, CO

ACE Project 19-28301

May 1, 2019

Prepared by: Arrow Civil Engineers
2629 E. Geddes Avenue
Centennial, CO 80122
303-329-9004

Susan P. Mizuno, P.E.
Project Manager
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ARROW CIVIL ENGINEERS
GENERAL LOCATION AND DESCRIPTION

LOCATION

The Wyandot Townhomes consists of a parcel of land located in the southwest quarter of the northwest quarter of Section 16, Township 3 South, Range 68 West of the 6th Principle Meridian, County of Adams, Colorado. This drainage report analyzes the drainage impacts of redeveloping the lot/parcel and provides an explanation of how storm drainage and water quality will be provided for.

The site is located within the boundaries of Adams County, Colorado. The site is located along the east side of Wyandot Street, north of 52nd Ave. The site area is a part of the South Platte River Basin, as delineated in the City and County of Denver Storm Drainage Master Plan, dated September 2014 (Basin 0059-01). The South Platte River passes southwest to northeast approximately 2 miles to the east of the site boundary. Other than poorly defined roadside ditches, there are no apparent storm drainage facilities near the site.

The site is bordered on the south by a relatively new single family residence. To the west of the site across Wyandot is new construction on what appears to have been vacant land. A single family residence borders along the north and an old church building, which is now fenced off, and vacant land immediately north of the church building borders along the east.

DESCRIPTION OF PROPERTY

The site consists of 0.23 acres more or less. A site topographic survey was not available. Based on USGS quadrangle mapping, the site generally slopes to the east by southeast at 3.1 percent. The site is currently vacant ground covered in native grass, weeds and some trees. A soils investigation was not available. Based on the NRCS website, the soil maps indicate the soils here are “stoneham loam”, 3 to 5 percent slopes. These soils are consistent with the characteristics of hydrologic “Type C/D” soils and were utilized for runoff and detention determination.

As indicated above, this site lies in the South Platte River Basin, which flows from southwest to northeast approximately 2 miles to the east. This site lies near a natural ridge line separating the South Platte River Basin from the Clear Creek Basin to the north. There is no existing FEMA regulatory floodplain near this site. See enclosed FIRM map.

Development of the site will consist of subdividing the 0.23 acres into three lots. A single 0.07 acre lot bordered by two 0.08 acre lots on either side. Three new townhomes are proposed with footprints of approximately 1334 square feet each. Access to the each unit will be off of Wyandot Street. The site will be landscaped and driveways for each unit. Water, sewer and drainage improvements will all be part of the site improvements, including site water quality and detention facilities along the east side of the parcel.

There are no irrigation facilities within this development area.

Project 19-23801

May 1, 2019

ARROW CIVIL ENGINEERS
FIGURE 1
LOCATION MAP
MAJOR BASIN DESCRIPTION

The site lies within the South Platte River drainage basin. The basin has been recently delineated as a part of the City and County of Denver Storm Drainage Master Plan, dated September 2014. The site is located approximately 2 miles from the river itself and borders along the natural ridgeline separating the South Platte River from the Clear Creek drainage basin. The South Platte River basin is located on the FEMA Flood Insurance Rate Map for Adams County, Colorado, Map Number 08001C0592H, effective revised date March 5, 2017. This map indicates the site is not located in a 100-year flood zone. Refer to the pertinent mapping included in the Appendix.

SUB-BASIN DESCRIPTION

As indicated above, no site specific topographic mapping was available. Consequently USGS quadrangle mapping was utilized and indicates the existing drainage pattern for the site is west to east by southeast. A steep drop-off, covered in native vegetation, occurs along the east property line.

There is no apparent offsite flow onto the site. Flow from the adjacent site to the north appears to be diverted east and west along the property line to Wyandot.
REGULATIONS

This analysis, design, and report have been completed in conformance with the Adams County Storm Drainage Design and Stormwater Quality Regulations Manual (ASDDSQR), dated August 15, 2017. Where referenced by the, the Urban Drainage & Flood Control District’s Urban Storm Drainage Criteria Manual (UDCM) was used.

DEVELOPMENT CRITERIA REFERENCE AND CONSTRAINTS

The site drainage system was developed based on the County’s storm drainage criteria. That criteria requires site detention storage for all sites being developed and/or redeveloped. The proposed drainage improvements include a water quality control feature and storm water detention.

HYDROLOGICAL CRITERIA

Design rainfall data was obtained from Table 9.3 of the ASDDSQR.

Design storm recurrence intervals for this project as specified in the ASDDSQR, Table 9.2 as follows:

- Initial: 5 Year
- Major: 100 Year

The site basin is less than 160 acres in area; consequently the Rational Method has been used for runoff calculations. UDCM spreadsheets have been used to compute runoff.

HYDRAULIC CRITERIA

UD&FCD spreadsheets are used to evaluate water quality, and detention sizing requirements and allowable release, and storm sewer capacities.
GENERAL

The drainage plan involves surface to an on-site storm detention facility with a discharge controlled release back to the natural drainage pattern. The site has no apparent offsite contributing flows.

All roof runoff will be routed to the east side of the buildings and will discharge directly onto landscaped areas along the east side of the buildings. Drainage from the landscaping and roofed areas of the site will sheet flow to the east directly to the detention pond where an outlet structure is designed to control the release rate from the site. The WQCV, 5- and 100-year flows will be controlled at the outlet structure to maintain the required release rates from the site and discharge to a level spreader along the east property line. The level spreader will discharge directly to the east of the site as it does historically. The only uncontrolled areas from the site will be from the frontage area along Wyandot, which consists of landscaping and the three individual single drives and sidewalk to each unit.

SPECIFIC DETAILS

Additional analysis has been provided in the Appendix to support the development of this parcel.

With the exception of the 1800 square feet fronting Wyandot, the site will be graded to intercept all the developed area. The portion of the site discharging undetained to Wyandot is not significant. 0.04 acres with a release rate of 0.07 and 0.22 cfs for the 5- and 100-year storms, respectively.

Detention storage volume for the WQCV, the 5-year and 100-year storms is provided in an on-site detention facility. Basins D1 discharges into the detention pond, located along the east property line of the site. Runoff from the site will be conveyed by surface sheet flow to the site detention facility. Within the site, the storm drainage system will be privately owned and maintained and is designed to intercept the major runoff. The enclosed Drainage Exhibit, in the rear of this report, details the drainage facility design for this site.

Site detention storage and water quality control is required and will be provided along the east property line of the site. Developed runoff will follow the historic drainage pattern of a west to east flow and outfall through a proposed level spreader located along the east property line of the site. Basin D-1 drains the easterly 0.19 acres of the site. The composite site imperviousness for Basin D-1 is approximately 44 percent. Flow will be intercepted directly by the detention pond. The developed flows from this basin are 0.28 and 0.87 cfs for the 5- and 100-year flows, respectively.
The detention pond is sized based on the simplified methodology as outlined in the ASDSQR. The water quality control volume (WQCV), the 5-year detention volume, and the 100-year detention volume were determined based on the anticipated development of the site. The developed drainage plan directs runoff from approximately 0.19 acres to the detention facility. As indicated above, the remaining volume for the 0.04 acres along the Wyandot frontage is uncontrolled. The total volumes for each runoff capture volume are 191, 453, and 836 cubic feet, respectively. The depth of ponding will be determined in the final drainage study. One foot of ponding depth will be provided above the 100-year emergency overflow. The WQCV will be controlled by way of an orifice plate on the front of the outlet structure. The 5- and 100-year flows will be controlled by an orifice plate in front of each respective outlet within the outlet structure. Trash racks will be provided for all release points. Flow from the site detention pond will be limited to 0.03 and 0.19 cubic feet per second (cfs) for the 5- and 100-year storms, respectively. All flow will be released to the east along the property line in a level spreader. Emergency overflow will be provided at the pond by way of a weir and spillway graded into the crest and embankment. Overflow will be conveyed to the east as it does now.

Runoff from the uncontrolled areas of the site, Basin D-2, will flow directly to Wyandot Street. This basin, comprises all the area that is uncontrolled and is approximately 46 percent impervious. As described above, runoff from basin D-2 drains 0.04 acres of site frontage. The developed flows from D-2 are 0.07 cfs and 0.22 cfs for the 5- and 100-year flows, respectively. These flows are considered insignificant, therefore, this area will not adversely impact the surrounding areas.

This site development is in compliance with current requirements and the developed site flows will be consistent with the existing/historic flows. Therefore, the site development will not have an adverse impact on downstream properties or facilities.

EROSION and SEDIMENTATION CONTROL

As indicated above, the site soils were assumed to consist primarily of clay soils. These soils are characterized by moderately low to moderately high runoff rates and the erosion hazard is slight to moderate, respectively.

A construction phase activities storm water management plan is required and will be addressed in a separate report. Permanent erosion and water quality control will be provided by means of the detention and water quality control facility, grass buffer strips, and buried riprap placed at the emergency overflow to the existing drainageway.

Methodologies included herein are consistent with ASDSQR. Erosion and sediment control measures are shown on the Grading Erosion and Sediment Control (GESC) Plan.
CONCLUSIONS

Development of this site will comply with the Adams County Storm Drainage Design and Stormwater Quality Regulations and with the USDCM. Erosion and sedimentation control as well as water quality control have been addressed herein and will be provided. This report formulates a storm water management system, which provides the detention storage required to control developed peak flows for the WQCV, the 5-year, and the 100-year frequency rainfall. Flows carried by the proposed storm sewer system described herein have been controlled to the development requirements and are consistent with the existing rates. In the event of system failure (plugging), existing surface drainage patterns are maintained and safe emergency overflow is provided for and as surface flow back to the historic release location. Consequently, the drainage system of the developed site does not appear to adversely affect off-site/downstream areas.
REFERENCES

   Urban Drainage & Flood Control District

2. Adams County Storm Drainage Design and Stormwater Quality Regulations, dated August 15, 2017
Table 9.1—Level of Storm Drainage Study

<table>
<thead>
<tr>
<th>Type of Application</th>
<th>Expected Increase in Impervious Area</th>
<th>Level of Storm Drainage Study (SDS) &amp; Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial/Industrial Building Permits,</td>
<td>3,000-10,000 square feet</td>
<td>Level 2 – SDS</td>
</tr>
<tr>
<td>Apartment/Condominium/Town home Complexes</td>
<td>&gt;10,000 square feet</td>
<td>Level 3 – SDS</td>
</tr>
<tr>
<td>Residential Plats and/or Planned Unit Developments</td>
<td>500-3,000 square feet</td>
<td>Level 1 – SDS</td>
</tr>
<tr>
<td></td>
<td>3,000-10,000 square feet</td>
<td>Level 2 – SDS</td>
</tr>
<tr>
<td></td>
<td>&gt;10,000 square feet</td>
<td>Level 3 – SDS</td>
</tr>
<tr>
<td>All Other Plats and/or Planned Unit Developments</td>
<td>3,000-10,000 square feet</td>
<td>Level 2 – SDS</td>
</tr>
<tr>
<td></td>
<td>&gt;10,000 square feet</td>
<td>Level 3 – SDS</td>
</tr>
<tr>
<td>Multi-year build out developments</td>
<td>N/A</td>
<td>Develop a Master SDS for the full build out and updated prior to each filing.</td>
</tr>
<tr>
<td>Change-in-materials Application</td>
<td>500-3,000 square feet</td>
<td>Level 1 – SDS</td>
</tr>
<tr>
<td></td>
<td>3,000-10,000 square feet</td>
<td>Level 2 – SDS</td>
</tr>
<tr>
<td></td>
<td>&gt;10,000 square feet</td>
<td>Level 3 – SDS</td>
</tr>
</tbody>
</table>

The County may impose an SDS (also referred to as a Grading and Drainage Plan) for any type of application if it is determined the new drainage will have significant impacts on adjacent properties.

The County may grant administrative relief from the criteria, if the nature of the work applied for meets the intent of these standards and specifications. Such relief shall be based upon technical justification, sealed by a Colorado Registered Professional Engineer, submitted with the SDS. Such relief may not include installation of post-construction BMPs as required under Section 9-04 Post-construction Run-off Regulations.

9-01-03 POLICIES AND GENERAL REQUIREMENTS

9-01-03-01 SPACE PLANNING

Stormwater drainage facilities serve conveyance, water quality and storage functions for management of stormwater. When a channel is planned as a conveyance feature, an outlet as well as downstream storage structure is required. Therefore, during the review process and prior to approval, the County will require the submission of all appropriate information to insure:

1) Adequate space is properly allocated for drainage facilities,
2) There are no conflicts with other land uses that result in downstream water damage or impairment of runoff from upstream properties,
3) There is no impairment with the functionality of other urban systems.
build-out in order to properly site and size detention/retention areas and conveyance systems.

Different levels of onsite analysis may be required depending on the size of project or as directed by the County. Refer to the Appendices for a copy of the Application Package for analysis requirements.

9-01-04-01-02  OFFSITE FLOW ANALYSIS

The analysis of offsite runoff is dependent on regional drainage characteristics (whether or not the tributary offsite area lies within a major drainage basin) and the existing/proposed land use and topographic features. If an existing Storm Drainage Master Plan is available for the region being developed, the engineer shall use this as a baseline document (prior approval from the County on the Master Plan is required) and update it with proposed information. However, should no offsite information be available for fully developed flows (5-, 10- and 100-year), the engineer must perform a regional analysis to insure the proposed development does not change historic runoff values, cause downstream damage, or adversely impact adjacent properties.

Different levels of offsite analysis may be required depending on the size of project or as directed by the County. Refer to the Appendices for a copy of the Application Package for analysis requirements.

9-01-04-02  STORM RETURN PERIOD

The minor and major storm return period shall not be less than those found in Table 9.2 for all vital drainage structures or critical points of surface water flow.

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Return Period (Yrs) for Minor Drainage Systems</th>
<th>Return Period (Yrs) for Major Drainage Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential-Urban</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>Residential-Rural</td>
<td>10(^a)</td>
<td>100</td>
</tr>
<tr>
<td>Commercial</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>Industrial</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>Open Space</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>School</td>
<td>5</td>
<td>100</td>
</tr>
</tbody>
</table>

\(^a\) All roadside ditches and culverts shall be sized to carry the 10-year peak runoff.

9-01-04-03  RAINFALL

Presented in this Section are guidelines for the development of rainfall data to be used in preparing a hydrological analysis (storm runoff) for a proposed development within the County.
The rainfall intensity information published by the National Oceanic and Atmospheric Administration (NOAA) in the “Precipitation-Frequency Atlas of the Western United States” was used to develop incremental rainfall distributions presented in Table 9.5. The incremental rainfall distributions presented in this table are based on procedures developed by the UDFCD. However, refinements have been made to closely match conditions within the County.

**9-01-04-04 TIME-INTENSITY-FREQUENCY CURVES**

A time-intensity-frequency curve was developed for the County by using one-hour point rainfall values (see Table 9.3) and factors for durations of less than one hour (see Table 9.4); both obtained from the NOAA Atlas. The outcomes of this distribution are point values that were then converted to intensities and plotted as Figure 9.1. Rainfall data from the Urban Drainage and Flood Control District (UDFCD) may be used as an alternative (see UDFCD Criteria Manual).

<table>
<thead>
<tr>
<th>Table 9.3—One-Hour Point Rainfall (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Year</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>1.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 9.4—Factors for Durations of Less than One Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration (minutes)</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>Ratio to 1-hour depth</td>
</tr>
</tbody>
</table>
conditions. It is believed these equations provide consistent and effective approaches to sizing onsite detention facilities. For basins larger than 90 acres, the CUHP computer model may be used to more accurately represent site conditions.

9-01-11-02 VOLUME ESTIMATES (COMPUTER AIDED METHOD)

Using a computer aided hydrology/hydraulics model the engineer can develop hydrographs that route flows to and away from the proposed detention facility. The routed or inflow hydrograph will represent the total volume of runoff from that particular rain event(s) while the outflow hydrograph represents the maximum allowable release rate permitted in Table 9.16. From this volume information plus the required freeboard, the design of the proposed facility may be performed. Using this method, the typical basin and outlet are designed from a detailed comparison of existing and proposed topographic information and downstream conditions. Although the County has helped to fund the UDPOND model for the design of detention and subscribes to its use, it recognizes many different computer models are available for this type of design. It will be the responsibility of the engineer to document and justify their use and the input and output parameters. These parameters and a detailed discussion on the method used for this design will be submitted as part of the Storm Drainage Study. The computer model must be approved by the County prior to review.

9-01-11-02 MAXIMUM ALLOWABLE RELEASE RATE

The maximum allowable release rates for the corresponding storm events (5 and 100-year) are as presented in Table 9.16.

<table>
<thead>
<tr>
<th>Control Frequency</th>
<th>Dominant Soil Group</th>
<th>C &amp; D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>5-year</td>
<td>0.07</td>
<td>0.13</td>
</tr>
<tr>
<td>100-year</td>
<td>0.50</td>
<td>0.85</td>
</tr>
</tbody>
</table>

When using the empirical formula or a composite CUHP method, the predominate soil group for the total basin area contributing runoff to the detention facility will be used in determining the allowable release rate. However, when designing a facility using another type of computer aided model, the engineer shall select the soil group that best represents the surface characteristics of each sub-basin. The selected soil group(s) will be submitted as part of the Storm Drainage Study. In the event that the local drainage system lacks capacity to accommodate the 5-year release rate, a smaller release rate may be required by the County.
### Map Unit Legend

<table>
<thead>
<tr>
<th>Map Unit Symbol</th>
<th>Map Unit Name</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>SID</td>
<td>Stoneham loam, 3 to 5 percent slopes</td>
<td>0.3</td>
<td>100.0%</td>
</tr>
<tr>
<td><strong>Totals for Area of Interest</strong></td>
<td></td>
<td><strong>0.3</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>
Map Unit Description

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named, soils that are similar to the named components, and some minor components that differ in use and management from the major soils.

Most of the soils similar to the major components have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrastling, or similar, components. They may or may not be mentioned in a particular map unit description. Some minor components, however, have properties and behavior characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.
Soils that have profiles that are almost alike make up a soil series. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. Soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into soil phases. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A complex consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An association is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An undifferentiated group is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include miscellaneous areas. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Additional information about the map units described in this report is available in other soil reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the soil reports define some of the properties included in the map unit descriptions.

Adams County Area, Parts of Adams and Denver Counties, Colorado

StD—Stoneham loam, 3 to 5 percent slopes

Map Unit Setting
National map unit symbol: 2x0j1
Elevation: 3,500 to 6,500 feet
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 115 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition
Stoneham and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the map unit.

Description of Stoneham

Setting
Landform: Interfluvies, low hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvial and/or eolian tertiary aged pediment

Typical profile
Ap - 0 to 4 inches: loam
Bt - 4 to 9 inches: clay loam
Btk - 9 to 13 inches: clay loam
Bk1 - 13 to 18 inches: loam
Bk2 - 18 to 34 inches: loam
C - 34 to 80 inches: loam

Properties and qualities
Slope: 3 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 12 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.1 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 0.5
Available water storage in profile: High (about 9.1 inches)

Interpretive groups
Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: C
Ecological site: Loamy Plains (R067BY002CO)
Hydric soil rating: No
Minor Components

**Weld**

- **Percent of map unit:** 5 percent
- **Landform:** Interfluves
- **Landform position (two-dimensional):** Summit
- **Landform position (three-dimensional):** Interfluve
- **Down-slope shape:** Linear
- **Across-slope shape:** Linear
- **Ecological site:** Loamy Plains (R067BY002CO)
- **Hydric soil rating:** No

**Kimst**

- **Percent of map unit:** 5 percent
- **Landform:** Interfluves, low hills
- **Landform position (two-dimensional):** Shoulder, backslope
- **Landform position (three-dimensional):** Side slope
- **Down-slope shape:** Convex
- **Across-slope shape:** Convex
- **Ecological site:** Loamy Plains (R067BY002CO)
- **Hydric soil rating:** No

**Satanta**

- **Percent of map unit:** 5 percent
- **Landform:** Interfluves
- **Landform position (two-dimensional):** Summit
- **Landform position (three-dimensional):** Interfluve
- **Down-slope shape:** Linear
- **Across-slope shape:** Linear
- **Ecological site:** Loamy Plains (R067BY002CO)
- **Hydric soil rating:** No

**Data Source Information**

- **Soil Survey Area:** Adams County Area, Parts of Adams and Denver Counties, Colorado
- **Survey Area Data:** Version 15, Sep 13, 2018
## Weighted Imperviousness

### WYANDOT TOWNHOMES

### Weighted Imperviousness

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Area (ac)</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SITE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pavement</td>
<td>0.00</td>
<td>100%</td>
</tr>
<tr>
<td>Gravel Pavement</td>
<td>0.00</td>
<td>40%</td>
</tr>
<tr>
<td>Roof</td>
<td>0.09</td>
<td>90%</td>
</tr>
<tr>
<td>Concri/walks</td>
<td>0.02</td>
<td>90%</td>
</tr>
<tr>
<td>Pervious</td>
<td>0.12</td>
<td>2%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>0.23</td>
<td>44%</td>
</tr>
</tbody>
</table>

### Weighted Imperviousness

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Area (ac)</th>
<th>I</th>
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<tbody>
<tr>
<td><strong>BASIN 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pavement</td>
<td>0.00</td>
<td>100%</td>
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<tr>
<td>Gravel Pavement</td>
<td>0.00</td>
<td>40%</td>
</tr>
<tr>
<td>Roof</td>
<td>0.09</td>
<td>90%</td>
</tr>
<tr>
<td>Concri/walks</td>
<td>0.00</td>
<td>90%</td>
</tr>
<tr>
<td>Pervious</td>
<td>0.10</td>
<td>2%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>0.19</td>
<td>44%</td>
</tr>
</tbody>
</table>

### Weighted Imperviousness

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Area (ac)</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BASIN 2</strong></td>
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</tr>
<tr>
<td>Pavement</td>
<td>0.00</td>
<td>100%</td>
</tr>
<tr>
<td>Gravel Pavement</td>
<td>0.00</td>
<td>40%</td>
</tr>
<tr>
<td>Roof</td>
<td>0.00</td>
<td>90%</td>
</tr>
<tr>
<td>Concri/walks</td>
<td>0.02</td>
<td>90%</td>
</tr>
<tr>
<td>Pervious</td>
<td>0.02</td>
<td>2%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>0.04</td>
<td>46%</td>
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</table>
CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: Wyandot Townhomes
Catchment ID: H-1

I. Catchment Hydrologic Data

Catchment ID = H1
Area = 0.23 Acres
Percent Imperviousness = 20.00%
NRCS Soil Type = C, A, B, C, or D

II. Rainfall Information

Design Storm Return Period, Tr = 5 years
C1 = 28.00
C2 = 10.00
C3 = 0.786
P1 = 1.42 inches

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.16
Override Runoff Coefficient, C = (enter an override C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.16
Override 5-yr. Runoff Coefficient, C = (enter an override C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration

<table>
<thead>
<tr>
<th>NRCS Land Type</th>
<th>Heavy Meadow</th>
<th>Tillage/Field</th>
<th>Short Pasture/Lawns</th>
<th>Nearly Bare Ground</th>
<th>Grasped Swales/Waterways</th>
<th>Paved Areas &amp; Shallow Paved Swales (Sheet Flow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conveyance</td>
<td>2.5</td>
<td>5</td>
<td>7</td>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>

Calculations:

<table>
<thead>
<tr>
<th>Reach ID</th>
<th>Slope</th>
<th>Length L</th>
<th>5-yr Runoff Coeff</th>
<th>NRCS Conveyorance</th>
<th>Flow Velocity V</th>
<th>Flow Time T</th>
<th>Flow Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overland</td>
<td>0.0310</td>
<td>112</td>
<td>0.16</td>
<td>N/A</td>
<td>0.15</td>
<td>12.32</td>
<td></td>
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<tr>
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<tr>
<td>Sum</td>
<td>112</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Computed Tc = 12.32
Regional Tc = 10.62
User-Entered Tc = 10.62

IV. Peak Runoff Prediction

Rainfall Intensity at Computed Tc, I = 3.52 inch/hr
Peak Flowrate, Qp = 0.13 cfs
Rainfall Intensity at Regional Tc, I = 3.75 inch/hr
Peak Flowrate, Qp = 0.14 cfs
Rainfall Intensity at User-Defined Tc, I = 3.75 inch/hr
Peak Flowrate, Qp = 0.14 cfs

H1.5yr:UD-Rational v1.02a, Tc and PeakQ 4/12/2019, 11:43 AM
**CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD**

**Project Title:** Wyandot Townhomes  
**Catchment ID:** H-1

I. **Catchment Hydrologic Data**

- Catchment ID = H1  
- Area = 0.23 Acres  
- Percent Imperviousness = 20.00%  
- NRCS Soil Type = C, A, B, C, or D

II. **Rainfall Information**

\[ I \text{ (in/hr)} = C_1 \times P_1 \times (C_2 + T_d) \times C_3 \]

- Design Storm Return Period, \( T_r = 100 \text{ years} \) (input return period for design storm)  
- \( C_1 = 26.50 \) (input the value of \( C_1 \))  
- \( C_2 = 10.00 \) (input the value of \( C_2 \))  
- \( C_3 = 0.786 \) (input the value of \( C_3 \))  
- \( P_1 = 2.71 \text{ inches} \) (input one-hr precipitation—see Sheet "Design Info")

III. **Analysis of Flow Time (Time of Concentration) for a Catchment**

- Runoff Coefficient, \( C = 0.51 \)
- Override Runoff Coefficient, \( C = \) (enter an override \( C \) value if desired, or leave blank to accept calculated \( C \))
- 5-yr. Runoff Coefficient, \( C-5 = 0.16 \)
- Override 5-yr. Runoff Coefficient, \( C = \) (enter an override \( C-5 \) value if desired, or leave blank to accept calculated \( C-5 \)).

Illustration

![Flow Diagram](image)

<table>
<thead>
<tr>
<th>NRCS Land Type</th>
<th>Heavy</th>
<th>Meadow</th>
<th>Tillage/ Field</th>
<th>Short Pasture/ Lawns</th>
<th>Nearly Bare Ground</th>
<th>Grassed Swales/ Waterways</th>
<th>Paved Areas &amp; Shallow Paved Swales (Sheet Flow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conveyance</td>
<td>2.5</td>
<td>5</td>
<td>7</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

Calculations:

<table>
<thead>
<tr>
<th>Reach ID</th>
<th>Slope S</th>
<th>Length L</th>
<th>5-yr Runoff Coeff</th>
<th>C-5</th>
<th>NRCS Conveyance</th>
<th>Flow Velocity V</th>
<th>Flow Time T</th>
<th>Flow</th>
<th>Computed Tc</th>
<th>Regional Tc</th>
<th>User-Entered Tc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overland</td>
<td>0.0310</td>
<td>112</td>
<td>0.18</td>
<td>n/a</td>
<td>0.15</td>
<td>12.32</td>
<td></td>
<td>12.32</td>
<td></td>
<td>10.62</td>
<td>10.62</td>
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<td></td>
</tr>
</tbody>
</table>

IV. **Peak Runoff Prediction**

- Rainfall Intensity at Computed Tc, \( I = 5.73 \text{ inch/hr} \)  
- Rainfall Intensity at Regional Tc, \( I = 7.16 \text{ inch/hr} \)  
- Rainfall Intensity at User-Defined Tc, \( I = 7.16 \text{ inch/hr} \)

Peak Flowrate, \( Q_p = 0.76 \text{ cfs} \)  
Peak Flowrate, \( Q_p = 0.84 \text{ cfs} \)  
Peak Flowrate, \( Q_p = 0.84 \text{ cfs} \)
# Calculation of a Peak Runoff Using Rational Method

**Project Title:** Wyandot Townhomes  
**Catchment ID:** D-1

## I. Catchment Hydrologic Data

| Catchment ID | D1  
|---|---|
| Area | 0.19 Acres  
| Percent Imperviousness | 44.00%  
| NRCS Soil Type | C, A, B, C, or D

## II. Rainfall Information

\[ I \text{ (inche/hr)} = C1 \times P1 \times (C2 + Td)^{C3} \]

- Design Storm Return Period, \( T_r \) = 5 years  
- \( C1 = 28.50 \)  
- \( C2 = 10.00 \)  
- \( C3 = 0.786 \)  
- \( P1 = 1.42 \) inches  

## III. Analysis of Flow Time (Time of Concentration) for a Catchment

- Runoff Coefficient, \( C \) = 0.37  
- Overide Runoff Coefficient, \( C \) = (enter an override value if desired, or leave blank to accept calculated \( C \))  
- 5-yr. Runoff Coefficient, \( C-5 \) = 0.37  
- Overide 5-yr. Runoff Coefficient, \( C \) = (enter an override \( C-5 \) value if desired, or leave blank to accept calculated \( C-5 \))

### Illustration

![Diagram of flow through catchment](image)

### NRCS Land Use Table

<table>
<thead>
<tr>
<th>NRCS Land Type</th>
<th>Heavy Meadow</th>
<th>Tillage/Field</th>
<th>Short Pasture/Lawns</th>
<th>Neary Bare Ground</th>
<th>Grassed Swales/Wetlands</th>
<th>Paved Areas &amp; Shallow Paved Swales (Sheet Flow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conveyance</td>
<td>2.5</td>
<td>5</td>
<td>7</td>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>

### Calculations:

<table>
<thead>
<tr>
<th>Reach ID</th>
<th>Slope</th>
<th>Length</th>
<th>5-yr Runoff Coeff</th>
<th>NRCS Conveyance</th>
<th>Flow Velocity</th>
<th>Flow Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overland</td>
<td>0.0310</td>
<td>92</td>
<td>0.37</td>
<td>0.18</td>
<td>8.73</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>Sum</td>
<td>92</td>
</tr>
</tbody>
</table>

\[
\text{Computed } T_c = 8.73 \
\text{Regional } T_c = 10.51 \
\text{User-Entered } T_c = 8.73
\]

## IV. Peak Runoff Prediction

- Rainfall Intensity at Computed \( T_c \), \( I \) = 4.04 inch/hr  
- Rainfall Intensity at Regional \( T_c \), \( I \) = 3.77 inch/hr  
- Rainfall Intensity at User-Defined \( T_c \), \( I \) = 4.04 inch/hr

- Peak Flowrate, \( Q_p \) = 0.26 cfs

---

D1.5yr.UD-Rational v1.02a, Tc and PeakQ  
4/12/2019, 11:41 AM
CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

I. Catchment Hydrologic Data

<table>
<thead>
<tr>
<th>Catchment ID</th>
<th>Wyandot Townhomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>D-1</td>
</tr>
<tr>
<td>Area</td>
<td>0.19 Acres</td>
</tr>
<tr>
<td>Percent Imperviousness</td>
<td>44.00 %</td>
</tr>
<tr>
<td>NRCS Soil Type</td>
<td>C, A, B, C, or D</td>
</tr>
</tbody>
</table>

II. Rainfall Information

<table>
<thead>
<tr>
<th>Equation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>( I ) (inches/hr) = ( C_1 \times P_1 \times (C_2 + T_d)^C_3 )</td>
<td></td>
</tr>
<tr>
<td>Design Storm Return Period, ( T_r )</td>
<td>100 years</td>
</tr>
<tr>
<td>( C_1 )</td>
<td>26.50</td>
</tr>
<tr>
<td>( C_2 )</td>
<td>10.00</td>
</tr>
<tr>
<td>( C_3 )</td>
<td>0.786</td>
</tr>
<tr>
<td>( P_1 )</td>
<td>2.71 inches</td>
</tr>
</tbody>
</table>

III. Analysis of Flow Time (Time of Concentration) for a Catchment

| Runoff Coefficient, \( C \) | 0.59 |
| Override Runoff Coefficient, \( C \) | (enter an override \( C \) value if desired, or leave blank to accept calculated \( C \)) |
| 5-yr. Runoff Coefficient, \( C-5 \) | 0.37 |
| Override 5-yr. Runoff Coefficient, \( C \) | (enter an override \( C-5 \) value if desired, or leave blank to accept calculated \( C-5 \)) |

Illustration

Legend:
- Beginnings
- Flow Direction
- Catchment Boundary

<table>
<thead>
<tr>
<th>NRCS Land Type</th>
<th>Heavy Meadow</th>
<th>Tillage Field</th>
<th>Short Pasture/Lawns</th>
<th>Nearly Bare Ground</th>
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<tbody>
<tr>
<td>Conveyance</td>
<td>2.5</td>
<td>5</td>
<td>7</td>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>

Calculations:

<table>
<thead>
<tr>
<th>Reach ID</th>
<th>Slope</th>
<th>Length</th>
<th>5-yr Runoff Coeff</th>
<th>NRCS Conveyance</th>
<th>Flow Velocity</th>
<th>Flow Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overland</td>
<td>( \frac{ft}{in} )</td>
<td>( \frac{ft}{in} )</td>
<td>5-yr Coeff</td>
<td>C-5</td>
<td>output</td>
<td>input</td>
</tr>
<tr>
<td>1</td>
<td>0.0310</td>
<td>92</td>
<td>0.37</td>
<td>N/A</td>
<td>0.18</td>
<td>6.73</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
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</tr>
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<tr>
<td>Sum</td>
<td></td>
<td>92</td>
<td></td>
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</tr>
</tbody>
</table>

Computed \( T_c \) = 6.73
Regional \( T_c \) = 10.61
User-Entered \( T_c \) = 8.73

IV. Peak Runoff Prediction

<table>
<thead>
<tr>
<th>Rainfall Intensity at Computed ( T_c ), ( I_c )</th>
<th>7.72 inch/hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Flowrate, ( Q_p ) at Computed ( T_c )</td>
<td>0.87 cfs</td>
</tr>
<tr>
<td>Rainfall Intensity at Regional ( T_c ), ( I_r )</td>
<td>7.19 inch/hr</td>
</tr>
<tr>
<td>Peak Flowrate, ( Q_p ) at Regional ( T_c )</td>
<td>0.81 cfs</td>
</tr>
<tr>
<td>Rainfall Intensity at User-Defined ( T_c ), ( I_u )</td>
<td>7.72 inch/hr</td>
</tr>
<tr>
<td>Peak Flowrate, ( Q_p ) at User-Defined ( T_c )</td>
<td>0.87 cfs</td>
</tr>
</tbody>
</table>
**CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD**

**Project Title:** Wyandot Townhomes  
**Catchment ID:** D-2

I. Catchment Hydrologic Data

<table>
<thead>
<tr>
<th>Catchment ID</th>
<th>Area</th>
<th>Percent Imperviousness</th>
<th>NRCS Soil Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>D2</td>
<td>0.04</td>
<td>46.00%</td>
<td>C, A, B, C, or D</td>
</tr>
</tbody>
</table>

II. Rainfall Information

\[
I (\text{in} / \text{hr}) = C_1 * P_1 (C_2 + T_d)^C_3
\]

Design Storm Return Period, \( T_r = \) 5 years  
\( C_1 = 28.50 \)  
\( C_2 = 10.00 \)  
\( C_3 = 0.786 \)  
\( P_1 = 1.42 \) inches  
(input return period for design storm)  
(input the value of \( C_1 \))  
(input the value of \( C_2 \))  
(input the value of \( C_3 \))  
(input one-hr precipitation, see Sheet "Design Info")

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, \( C = 0.38 \)  
Override Runoff Coefficient, \( C = \) (enter an override \( C \) value if desired, or leave blank to accept calculated \( C \).)  
5-yr. Runoff Coefficient, \( C_{-5} = 0.38 \)  
Override 5-yr. Runoff Coefficient, \( C_{-5} = \) (enter an override \( C_{-5} \) value if desired, or leave blank to accept calculated \( C_{-5} \).)

**Illustration**

**Legend**
- \( \bigcirc \) Beginning
- \( \rightarrow \) Flow Direction
- \( \leftarrow \) Catchment Boundary

<table>
<thead>
<tr>
<th>NRCS Land Type</th>
<th>Heavy Meadow</th>
<th>Tillage Field</th>
<th>Short Pasture/ Lawns</th>
<th>Nearly Bare Ground</th>
<th>Grassed Swales/ Waterways</th>
<th>Paved Areas &amp; Shallow Paved Swales (Sheet Flow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conveyance</td>
<td>2.5</td>
<td>5</td>
<td>7</td>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>

**Calculations:**

<table>
<thead>
<tr>
<th>Reach ID</th>
<th>Slope S</th>
<th>Length L</th>
<th>5-yr Runoff Coeff</th>
<th>NRCS Conveyance</th>
<th>Flow Velocity</th>
<th>Flow Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ft tlf</td>
<td>ft input</td>
<td>C-5 output</td>
<td>input</td>
<td>V fps output</td>
<td>T minutes</td>
</tr>
<tr>
<td>Overland</td>
<td>0.38</td>
<td>N/A</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
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<td></td>
<td></td>
<td></td>
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</tr>
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<tr>
<td>Sum</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Computed Tc = 0.00**  
**Regional Tc = 10.00**  
**User-Entered Tc = 5.00**

IV. Peak Runoff Prediction

Rainfall Intensity at Computed Tc, \( I = \) inch/hr  
Rainfall Intensity at Regional Tc, \( I = \) inch/hr  
Rainfall Intensity at User-Defined Tc, \( I = 4.82 \) inch/hr  
Peak Flowrate, \( Q_p = \) cfs  
Peak Flowrate, \( Q_p = \) cfs  
Peak Flowrate, \( Q_p = 0.07 \) cfs

---

D2.5yr:UD-Rational v1.02a, Tc and PeakQ  
4/12/2019, 11:42 AM
CALCULATION OF A PEAK RUNOFF USING RATIONAL METHOD

Project Title: Wysandot Townhomes
Catchment ID: D-2

I. Catchment Hydrologic Data

Catchment ID = D2
Area = 0.04 Acres
Percent Imperviousness = 46.00%
NRCS Soil Type = C, A, B, C, or D

II. Rainfall Information

Design Storm Return Period, Tr = 100 years (input return period for design storm)
C1 = 28.50 (input the value of C1)
C2 = 10.00 (input the value of C2)
C3 = 0.786 (input the value of C3)
P1 = 2.71 inches (input one-hr precipitation—see Sheet “Design info”)

III. Analysis of Flow Time (Time of Concentration) for a Catchment

Runoff Coefficient, C = 0.59
Override Runoff Coefficient, C = (enter an override C value if desired, or leave blank to accept calculated C.)
5-yr. Runoff Coefficient, C-5 = 0.38
Override 5-yr. Runoff Coefficient, C = (enter an override C-5 value if desired, or leave blank to accept calculated C-5.)

Illustration

<table>
<thead>
<tr>
<th>NRCS Land Type</th>
<th>Heavy Meadow</th>
<th>Tillage Field</th>
<th>Short Pasture/Lawns</th>
<th>Nearly Bare Ground</th>
<th>Grasped Swales/Waterways</th>
<th>Paved Areas &amp; Shallow Paved Swales (Sheet Flow)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conveyance</td>
<td>2.5</td>
<td>5</td>
<td>7</td>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>

Calculations:
Reach ID | Slope (°) | Length (ft) | 5-yr Runoff Coefficient C-5 | NRCS Conveyance (in) | Flow Velocity (fps) | Flow Time (minutes) |
---|---------|----------|-----------------------------|---------------------|-----------------|-------------------|
1    |         |          |                             |                     |                 |                   |
2    |         |          |                             |                     |                 |                   |
3    |         |          |                             |                     |                 |                   |
4    |         |          |                             |                     |                 |                   |
5    |         |          |                             |                     |                 |                   |

<table>
<thead>
<tr>
<th>Overland</th>
<th>0.38</th>
<th>N/A</th>
<th>0.00</th>
<th>0.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Computed Tc = 0.00
Regional Tc = 10.00
User-Entered Tc = 5.00

IV. Peak Runoff Prediction

Rainfall Intensity at Computed Tc, I = inch/hr
Rainfall Intensity at Regional Tc, I = inch/hr
Rainfall Intensity at User-Defined Tc, I = 9.19 inch/hr
Peak Flowrate, Qp = cfs
Peak Flowrate, Qp = cfs
Peak Flowrate, Qp = 0.22 cfs

D2.100yr.UD-Rational v1.02a, Tc and PeakQ
4/12/2019, 11:42 AM
# Water Quality Capture Volume (WQCV)

**Wyandot Townhomes**

## Detention Pond

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tributary Area's Imperviousness Ratio (l = i_a / 100)</td>
<td>(i_a = 44%)</td>
</tr>
<tr>
<td>i =</td>
<td>0.44</td>
</tr>
<tr>
<td>Contributing Watershed Area (Area)</td>
<td>Area = 0.23 acres</td>
</tr>
<tr>
<td><strong>Water Quality Capture Volume (WQCV)</strong></td>
<td></td>
</tr>
<tr>
<td>((WQCV = a*(0.91<em>i^3 - 1.19</em>i^2 + 0.78*i)))</td>
<td>(WQCV = 0.19) watershed inches</td>
</tr>
<tr>
<td>Where (a = 1.0) for 40 hour drain time</td>
<td></td>
</tr>
<tr>
<td>WQCV Volume: (Vol = (WQCV/12)<em>Area</em>43560)</td>
<td>(Vol = 169) cubic feet</td>
</tr>
<tr>
<td>Design Volume: (Vol = (WQCV/12)<em>Area</em>43560*1.2)</td>
<td>(Vol = 191) cubic feet</td>
</tr>
</tbody>
</table>

**Note:** Water Quality Capture Volume calculations are based on Urban Drainage Flood Control District Manual, Volume 3.
<table>
<thead>
<tr>
<th>Fr</th>
<th>18.5</th>
<th>34.0</th>
<th>69.5</th>
<th>262</th>
<th>191</th>
<th>0.1</th>
<th>0.01</th>
<th>0.00</th>
<th>K 180</th>
<th>0.032</th>
<th>0.078</th>
<th>0.004</th>
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<th>0.004</th>
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</thead>
<tbody>
<tr>
<td>(yr)</td>
<td>(yr)</td>
<td>V 100</td>
<td>V 100</td>
<td>WCGV</td>
<td>WCGV</td>
<td>(ac ft)</td>
<td>(ac ft)</td>
<td>(ac ft)</td>
<td>(ac ft)</td>
<td>(ac ft)</td>
<td>(ac ft)</td>
<td>(ac ft)</td>
<td>(ac ft)</td>
<td></td>
</tr>
<tr>
<td>Total Volume Required</td>
<td>V 100</td>
<td>WCGV</td>
<td>WCGV</td>
<td>WCGV</td>
<td>WCGV</td>
<td>V 100</td>
<td>V 100</td>
<td>V 100</td>
<td>V 100</td>
<td>V 100</td>
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<td>V 100</td>
<td>V 100</td>
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<tr>
<td>Pond</td>
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<td>44</td>
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<td>19</td>
<td>44</td>
<td>19</td>
<td>44</td>
<td>19</td>
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</table>

The detention volume:

Detention Pond Calculations (Empirical Formula V = KA)

WYANDOT TOWNHOMES
## WYANDOT TOWNHOMES
Detention Pond Stage-Storage Calculations

### 4:1 SIDE SLOPES

<table>
<thead>
<tr>
<th>Stage (ft)</th>
<th>Area (sf)</th>
<th>Volume (cf)</th>
<th>Total Vol (cf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>0</td>
<td>0</td>
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</tr>
<tr>
<td>1.00</td>
<td>180</td>
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<td>60</td>
</tr>
<tr>
<td>2.00</td>
<td>970</td>
<td>323</td>
<td>383</td>
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<tr>
<td>3.00</td>
<td>1730</td>
<td>1332</td>
<td>1715</td>
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<tr>
<td>4.00</td>
<td>2620</td>
<td>2160</td>
<td>3875</td>
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</table>
Karen Frazzini, 5241 Wyandot 720-460-7990

Pam Garcia 5281 Wyandot 7-413-5897

Rene & Sharon Lish 5290 Wyandot St

Paul & Rae Santore 5260 Vallejo Way 303-433-6472

Concerns with traffic, parking, snow removal.

Steve & Lisa Chacon 5250 Vallejo Way

Concerns with possible increase of property taxes, traffic, parking & snow removal.

Neighborhood Meeting sign in sheet
WARRANTY DEED

THIS DEED, made this 7th day of November, 2014, between Ann Mariah Brown of the County of Adams and State of Colorado, grantor(s), and Regan Foster and Elizabeth Foster whose legal address is of the County of Adams and State of Colorado, grantees:

WITNESS, that the grantor(s), for and in consideration of the sum of TWO HUNDRED TWENTY THOUSAND AND 00/100 DOLLARS ($220,000.00), the receipt and sufficiency of which is hereby acknowledged, has granted, bargained, sold and conveyed, and by these presents does grant, bargain, sell, convey and confirm unto the grantees, their heirs and assigns forever, JOINTS TENANTS, all the real property, together with improvements, if any, situate, lying and being in the County of Adams and State of Colorado, described as follows:

Plot 5, Except the North 93.75 Feet, Robbins Subdivision, County of Adams, State of Colorado.

also known by street and number as: 5200 Wyandot Street, Denver, CO 80221

TOGETHER with all and singular the hereditaments and appurtenances thereunto belonging, or in anywise appertaining, and the reversion and reversionary, remainder and remaindermen, rents, issues and profits thereof, and all the estate, right, title, interest, claim and demand whatsoever of the grantor(s), either in law or equity, of, in and to the above bargained premises, with the hereditaments and appurtenances;

TO HAVE AND TO HOLD the said premises above bargained and described, with the appurtenances, unto the grantees, their heirs and assigns forever. The grantor(s), for himself, his heirs, and personal representatives, does covenant, grant, bargain and agree to and with the grantees, their heirs and assigns, that at the time of the enexecuting and delivering of these presents, he is well seized of the premises above conveyed, has good, sure, perfect, absolute and indefeasible estate of inheritance, in law, in fee simple, and has good right, full power and lawful authority to grant, bargain, sell and convey the same in manner and form as aforesaid, and that the same are free and clear from all former and other grants, bargains, sales, liens, taxes, assessments, encumbrances and restrictions of whatever kind or nature soever, except general taxes for the current year and subsequent years, and except easements, covenants, conditions, restrictions, reservations, and rights of way of record, if any.

The singular number shall include the plural, the plural the singular, and the use of any gender shall be applicable to all genders.

IN WITNESS WHEREOF, the grantor has executed this deed on the date set forth above.

[Signature]

Ann Mariah Brown

State of Colorado

County Of Arapahoe

The foregoing instrument was acknowledged before me this November 7, 2014, by Ann Mariah Brown.

My Commission expires: 1/1/2015

Witness my hand and official seal.

Notary Public
DENVER WATER

1-11-19

Adams County
C/O Lynette Baumgartner
4430 S Adams County Parkway
Brighton, CO 80601

RE: 5200 Wyandot St, Denver, CO 80221

Dear Adams County

Denver Water has been asked to determine whether the property described on the attached layout is located within a Distributor's service area and eligible to receive water service. This letter verifies that the property is located within Berkeley Water District Distributor service area. This property is eligible to receive water. Any project located on the property will be subject to compliance with Denver Water's Operating Rules, Regulations, Engineering Standards and applicable charges. Prior to proceeding with the project, verify with Berkeley Water District to determine Distributor's ability to serve, rules and regulations affecting service and an additional applicable charges. Please check the fire requirements for the proposed development with the Fire Prevention Bureau and the availability of fire flow from existing mains with the Distributor's Hydraulics Department or with Denver Water's Hydraulics Department.

If you have questions, or you would like to schedule a meeting to discuss the proposed project, please contact Denver Water Sales Administration at 303-628-6100 (Option 2).

Sincerely,

Jackson Marshall
Sales Administration
---------- Forwarded message ----------

From: Patrick Roberts <patrickroberts@bwsd.com>
Date: Fri, Oct 19, 2018 at 1:43 PM
Subject: BWSD - Regan Foster - Service for new duplex project - 52nd and Wyandot
To: Berkeley Water District <berkeleywaterdistrict.com>
Cc: Jim Landry <jlandry@agentre.com>

Sharon,

After looking at the existing conditions, the 52nd and Zuni extension, please find our preliminary comments regarding service for Regan Foster’s new duplex planned for sanitary sewer service. As we have not seen a site layout, it is a bit up in the air on how he plans to subdivide the property, so we used conservative distances on the options.

Extension from 52nd and Zuni option – Attached sheet

- The new termination manhole completed by 52nd and Zuni development is 4.89 feet deep. With an extension to get the new manhole 10’ into the northern section of the new duplex, a rough estimation of LF from Google Earth/52nd and Zuni plan puts the extension at approximately 130 LF. Setting the grade of the new pipe at .75% (same as 52nd and Zuni project) with appropriate drops through the manhole, the proposed depth of the manhole to service the northern duplex would be approximately 3.51 feet. This type of depth would be a concern for service if any basements are planned for the new duplexes. Possible private ejector lift stations would be needed for the new duplexes.

- Securing of a 20’ easement from 52nd and Zuni development to bring the existing 20’ easement to the Wyandot R.O.W. would also need to
occur. It currently ends 10' east of the termination manhole.

Sanitary Sewer Service and Easement – Google Earth image attached
  • The other option is to receive a service line easement to run both services for the duplex along the west side of the Bakery, Confectionery, Tobacco Workers and Grain Millers Local #26 property to the east of Regan's property. Regan would not be able to keep it on his existing property as the garage he placed would not allow the services to run to the extension within 52nd Avenue.
  • It appears from the depth of the mainline extension that Regan installed for his southern property, there may be enough depth (approximately 8 ft) to secure appropriate fall (2% recommended) for connection. This would need to be verified.

Overall, either option would require the securement of an easement. The sanitary sewer service easement option may be the less costly option for service for the new planned duplex as it doesn't include manholes and may not have the depth concerns that the 52nd and Zuni project would have. Until receiving the subdivided and plans for the proposed duplex, this is the best information we can provide.

Thanks,

Patrick Roberts, PE CCM
Project Engineer
5200 Wyandot Legal description:

Adams County Parcel Identification Number: 0182516222007

Plot 5, except the north 93.75 feet, Robbins Subdivision, County of Adams, State of Colorado.
The amount of taxes due on this page are based on last year's property value assessments. For current year values visit the Adams County Assessor's site.

Summary

Account Id: R0104995
Parcel Number: 01825162221007
 Owners: FOSTER REGAN AND
Address: 5200 WYANDOT ST
DENVER, CO 80221-1405
Site Address: 5200 WYANDOT ST
Legal: SUB ROBBINS SUBD DESC: PLCT 5 EXC N 93/75 FT

Inquiry

As Of: 00/03/2019
Payment Type: First

Total Due: $0.00

Value

<table>
<thead>
<tr>
<th>Area Id</th>
<th>Mill Levy</th>
<th>Actual</th>
<th>Assessed</th>
</tr>
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<tbody>
<tr>
<td>RES IMPRV LAND - 1112</td>
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<td>4,900</td>
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</tr>
<tr>
<td>SINGLE FAMILY RES - 1212</td>
<td>432,662</td>
<td>31,150</td>
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</tr>
<tr>
<td>Total Value</td>
<td>500,662</td>
<td>36,050</td>
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<tr>
<td>Taxes</td>
<td>$4,445.00</td>
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</table>

DUE DATES:
First Half Payment Due February 28
Second Half Payment Due June 15
OR
Full Payment Due April 30