Widefield Community Park-Crews Gulch Regional Trail Project

Drainage Memo

El Paso County, Colorado

October 20, 2022

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Design Engineer's Statement:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

Veronica Cid, P.E. #53988 — Date: 1/12/2023

Owner/Developer's Statement:

I, the owner/developer have read and will comply with all of the requirements specified in this drainage report and plan.

Joshua Palmer, P.E.
County Engineer / ECM Administrator — Date: 1/12/23

El Paso County:

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

Joshua Palmer, P.E.
County Engineer / ECM Administrator — Date: 1/12/23

Conditions:

b. General Location

The Crews Gulch Regional Trail is a El Paso County trail system within the Widefield Community Park, which is owned and maintained by the El Paso County Parks Department. The project site is a portion of the existing Crews Gulch Regional Trail system that is located between Quebec Street and Widefield Blvd., approximately 1,100 liner feet in length. To the east is the single-family residential area that bordering the Community Park and to the west is the Crews Gulch, an irrigation ditch. At the south end, the trail crosses the Crews Gulch via the existing double 36" HDPE culverts. There is also a Tier III internal park trail that is located west of the Crews Gulch which also intersects the Crews Regional Trail at the south end of the project, see the attached Exhibit 1- Project Location Map.

c. Description of Property
   1. The project area is a portion of the existing trail system that is currently covered with crushed fine limestone material, between Quebec Street and Widefield Blvd. approximately 1,100 lf.
   2. Ground Cover: the surrounding area is grown with cottonwood trees and low-density ground cover on both sides of the existing trail system.
   3. General topography: Crews Gulch which is located in the middle of the park is running in the north-south direction. The site generally drains east and west toward Crews Gulch, in a very gradual slope.
   4. Major drainage way: The Crews Gulch is the only major drainage way within the project site.
   5. Irrigation Facility: Crews Gulch is served as an irrigation ditch.
   6. Utilities and Other encumbrance: The project site contain no known utility and other encumbrances.

d. Major Basin Description
   1. The project is located within the Big Johnson Reservoir/Crews Gulch Drainage Basin Planning Study, prepared by Kiowa Engineering Corporation, 1991, see attached Exhibit 2.

e. Sub-Basin Description
   1. Historic drainage patterns: The entire park drains either east or west toward the Crews Gulch. The project area sheet flows westerly across the low-density ground cover area into the Crews Gulch.
   2. Offsite drainage flow patterns:

A. For the portion of trail that is located east of the Crews Gulch, the onsite and offsite drainage sheet flows in its existing westerly drainage pattern over the trail into Crews Gulch.
B. For the portion of trail that is located west of the Crews Gulch, both onsite and offsite drainage flows in its existing easterly pattern over the trail into Crews Gulch.

f. Drainage Design Criteria
1. Although the project is within the Big Johnson-Crews Gulch Drainage Basin study area, the project has no adverse affect to the drainage study area.
2. Previous drainage studies are not applicable for the scope of work within the Crews Gulch Regional Trail Project.

g. Four Step Process

The Four Step process has been implemented as follows in eh planning of this project

1. Employ Runoff Reduction Practices: The existing trail surface is currently a compacted crushed fine limestone surface with an runoff coefficient of 0.85. The proposed surface of the trail will be concrete with an runoff coefficient of 0.9. The increase in runoff is insignificant.
2. Stabilized Drainageway: Ripraps will be added to both the inlet and outlet sides of the existing 12" CMP and double 36" HDPE culverts.
3. Provide Water Quality Capture Volume (WQCV): Runoff from the trail corridor is minimal and any runoff produces will be sheet flow through the vegetated area (approximately 20' wide) before it enters to the gulch. Water quality is not applicable for the project.
4. Consider Need for Industrial and Commercial BMP's: Not applicable for this project.

h. Hydrologic Criteria
1. For the trail on the east side of the Crews Gulch, the construction of the concrete surface trail on top of the existing well compacted crushed fine limestone surface trail, the increase to runoff is negligible. Construction of this trail also cause minimal to none disturbance to the surrounding area. Hydrologic analysis is not applicable for this area.

2. For the area west of the gulch, runoff from a small portion of Widefield Blvd. drains over the existing crushed fine trail via a 7'wide and 8" deep swale. The project will place a 7'by6' wooden bridge over the existing swale, see attached plan. This will allow the runoff following the existing drainage pattern to the gulch. The construction of the bridge will not alter drainage patterns. Hydrologic and Hydraulic calculations are as shown on Exhibit 3. From the calculations, the tributary area that contribute runoff to the bridge is about 15,560 sf, see Exhibit 4 for the drainage basin map. The flow generated from Widefield Blvd. at the bridge croosing is calculated to

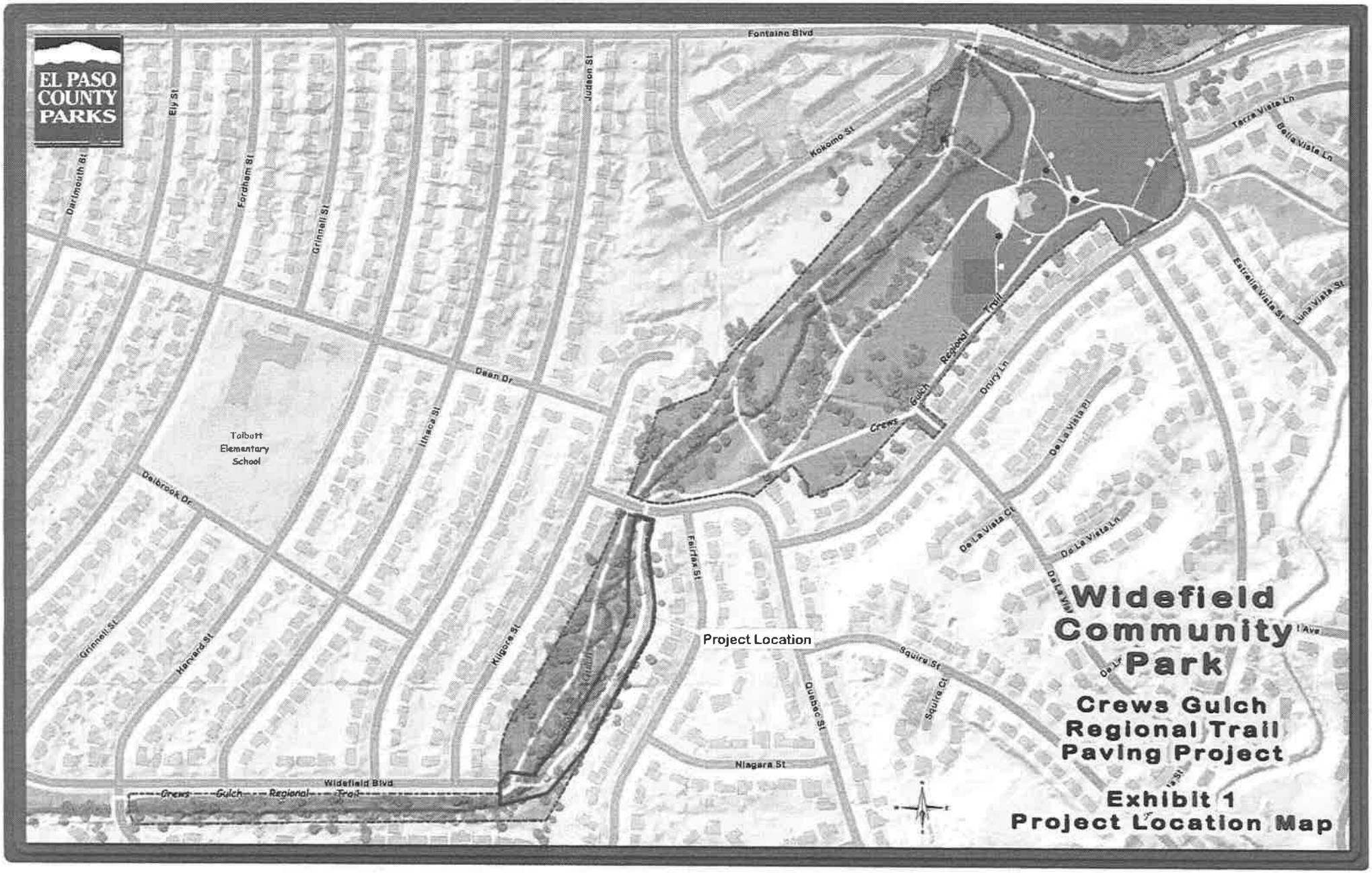
be Q(5) at 0.5 cfs and Q (100) at 0.9 CFS. A trapezoidal open channel under the bridge has a discharge capacity of 17.26 CFS. The trapezoidal open channel is proving to be able to handle the 100-year storm. Therefore, placing the bridge at the location proposed does not affect any existing discharge.

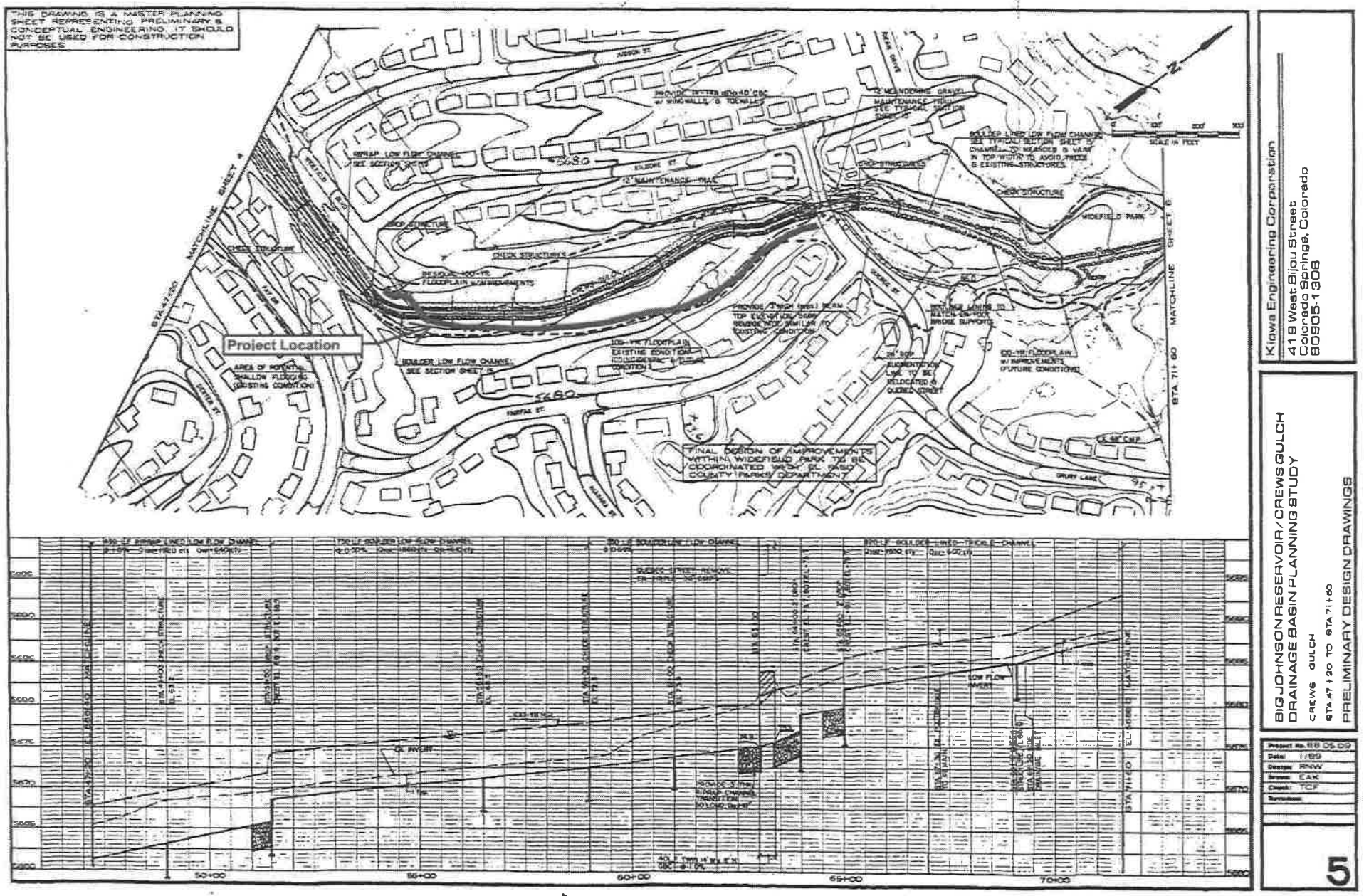
i. Drainage Facility Design-General Concept
The construction of the project will not alter drainage runoff rates within or offsite of the project area. This is not applicable for the project.

j. Drainage Facility Design Details
There is no drainage facility associated with this project, therefore, not applicable.

k. Other Governmental Agency Requirements
The project needs to comply with the El Paso County Erosion and Stormwater Quality Control Permit (ESQCP). No other permits required.

l. Drawing Contents:
Exhibit 1-Project Location Map
Exhibit 2-Big Johnson-Crews Gulch
Exhibit 3-Hydrologic and Hydraulic Calculations
Exhibit 4-Drainage Basin Map
Exhibit 5-Site Plan


EL PASO COUNTY PARKS
Fontaine Blvd
Judson St
Kokomo St
Terra Vista Ln
Bella Vista Ln
Estrella Vista St
Luna Vista St
Ely St
Dartmouth St
Fordham St
Grinnell St
Dean Dr
Talbott Elementary School
Ithaca St
Delbrook Dr
Crews Gulch Regional Trail
Drury Ln
De La Vista Pl
De La Vista Ct
De La Vista Ln
Fairfax St
Project Location
Grinnell St
Harvard St
Kilgore St
Squire St
Squire Ct
Quivas St
Niagara St
Widefield Blvd
Crews Gulch Regional Trail
Widefield Community Park
Crews Gulch Regional Trail Paving Project
Exhibit 1
Project Location Map



Kiowa Engineering Corporation
418 West Bijou Street
Colorado Springs, Colorado
80905-1308

BIG JOHNSON RESERVOIR / CREWS GULCH
DRAINAGE BASIN PLANNING STUDY

CREWS GULCH
STA 47+20 TO STA 71+60

PRELIMINARY DESIGN DRAWINGS

Project No. 88 05 09
Date: 1/89
Design: RNW
Drawn: EAK
Check: TCF
Revision:

5

Exhibit 2

Widefield Community Park
- Crews Gulch Regional Trail Project

Hydrologic Calculations:

$A = 15,560$ SF

$L = 180'$

$\Delta_{elev} = 3'$

$\text{Slope} = \frac{3'}{180'} = 1.67\%$

$$\text{Weighted } C = \frac{(481)(1)+(3371)(0.90)+(11,708)(0.25)}{15,560}$$

$$= 0.41$$

$i_{(5)} = 3.39$ $\quad$ $i_{(100)} = 6.02$

$$Q_{(5)} = CIA$$
$$= (0.41)(3.39)\left(\frac{15,560}{43,560}\right)$$
$$= 0.5 \text{ CFS}$$

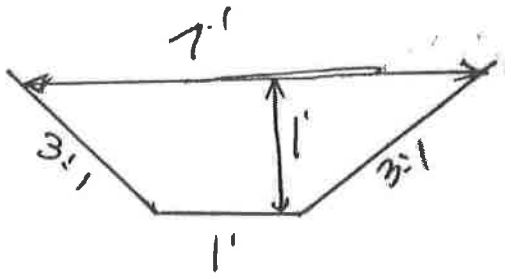
$$Q_{(100)} = CIA$$
$$= (0.41)(6.02)\left(\frac{15,560}{43,560}\right)$$
$$= 0.9 \text{ CFS}$$

Hydraulic Calculations (at the bridge crossing):

A trapezoidal open channel

Top Width = 7'

Bottom Width = 1'



Cross sectional Area = 4 ft^2

Wetted Perimeter = 7.32 ft

Slope = 1.7% = 0.017

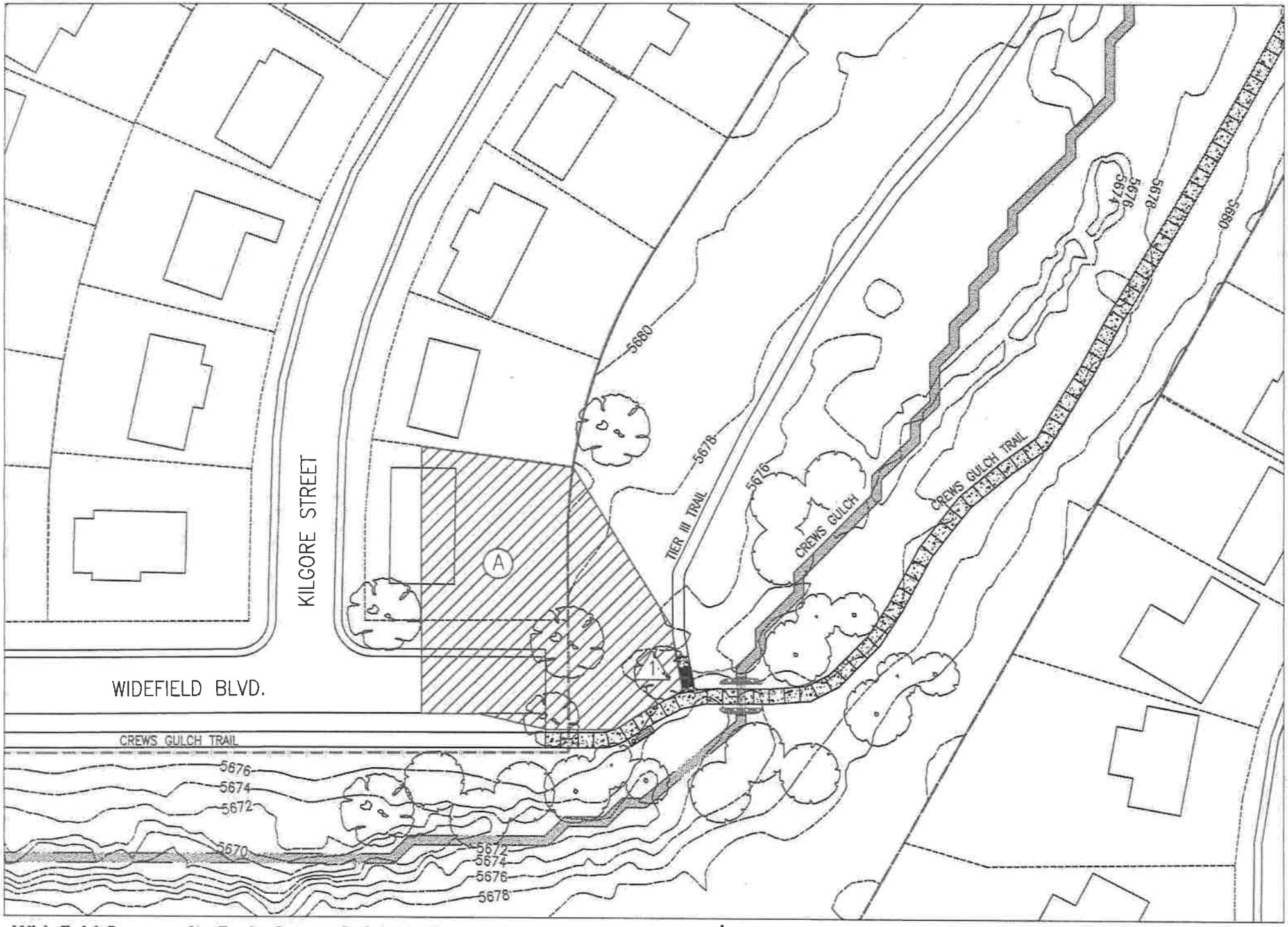
hydraulic Radius = 0.546

Manning Coff n = 0.03 (riprap)

$$Q_{vol} = \frac{1.49 A R^{2/3} S^{1/2}}{0.03}$$

$$= 17.26 \text{ CFS}$$

Exhibit 3



Widefield Community Park- Crews Gulch Trail Project
Drainage Basin Map

SCALE: 1" = 20'-0" NORTH

Exhibit 4