WESTCREEK AT WOLF RANCH SUBDIVISION
MASTER DEVELOPMENT DRAINAGE REPORT
&
FINAL DRAINAGE REPORT
For
WESTCREEK AT WOLF RANCH SUBDIVISION FILINGS 1, 2, 3 4 and 5

September, 2003

Prepared for:

Development Management, Inc.
4065 Sinton Road, Suite 200
Colorado Springs, CO 80907
(719) 593-2600

Prepared by:

Rockwell-Minchow Consultants, Inc.
1873 Austin Bluffs Parkway
Colorado Springs, CO 80918
(719) 475-2575

Project# 02-032

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May, 2003

DRAINAGE PLAN STATEMENTS

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 City of Colorado Springs for drainage reports, and said drainage report is in conformity with the 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.

Kent D Rockwell P.E.

Kent D. Rockwell, P.E.

KDR
9/23/03

DEVELOPER'S STATEMENT

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

Westcreek at Wolf Ranch, LLC

BY: _____ 9/9/07

Ralph Braden DATE

TITLE:

ADDRESS: 4065 Sinton Road, Suite 200
Colorado Springs, CO 80907

CITY OF COLORADO SPRINGS

Filed in accordance with Section 15-3-906 of the code of the City of Colorado Springs, 1980, as amended.

Tim Mitchell for

CITY ENGINEER

Oct 7 2003

DATE

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PURPOSE

The purpose of this report is to identify the existing and proposed runoff patterns and drainage facilities required for the proposed Westcreek at Wolf Ranch Subdivision which is located southeast of the Research Boulevard and Powers Boulevard intersection (See Figure 1).

SUMMARY OF DATA

The sources of information used in the development of this study are listed below:

1. City of Colorado Springs and El Paso County "Drainage Criteria Manual", October 1987, revised November 1991.

2. Soil Survey for El Paso County, Colorado, U.S. Department of Agriculture, Soil Conservation Service, June 1980.

3. "Flood Insurance Studies for Colorado Springs and El Paso County, Colorado", prepared by the Federal Emergency Management Agency (FEMA), 1985.

4. "Cottonwood Creek Drainage Basin Planning Study" by URS Consultants, Inc., August 1995.

5. "Cottonwood Creek Prudent Line Study" by Ayres & Associates, 1996.

6. "Preliminary/Final Drainage Report for Power Boulevard (Research Parkway to Woodmen Road" by JR Engineering, July, 2000.

7. "Preliminary/Final Drainage Report for Research Parkway (Scarborough Drive to Powers Blvd.) including Research Parkway Subdivision Filing No. 6, by JR Engineering, April, 2000.

8. "Master Development Drainage Plan for Wolf Ranch, Colorado Springs, Colorado," prepared by Ayres Associates, March, 2001.

GENERAL LOCATION AND DESCRIPTION

The Westcreek at Wolf Ranch Development Project is located within the northeastern portion of the City of Colorado Springs, El Paso County, Colorado. (see Vicinity Map - Figure 1). The site is within the southeast quarter of Section 36, Township 12 South, Range 66 West and in the northeast quarter of Section 1, Township 13 South, Range 66 West of the 6th P.M. The site is bound on the west by Powers Boulevard, on the north by future residential development and the extension of Research Parkway, on the south by Cottonwood Creek, and on the east by undeveloped county property.

Well-established native grasses exist throughout the proposed development. The topography generally slopes from north to south toward Cottonwood Creek. Powers Boulevard has recently been constructed along the westerly side of the proposed Westcreek Development. The roadway construction included a large storm sewer system along the east side of Powers Boulevard. This system, constructed to collect flows from the proposed Westcreek Development, discharges into Cottonwood Creek downstream of the Powers Boulevard/Cottonwood Creek bridge.

SOILS

According to the Soil Survey of El Paso County Area, Colorado, prepared by the U.S. Department of Agriculture Soil Conservation Service, the soils underlying the Westcreek Development fall under the Blakeland Series (Soil 8), the Stapleton Series (Soil 83), the Stapleton/Bernal Series (Soil 85), and the Truckton Series (Soil 97). All these soils are classified as Hydrologic Group "A" soils, except for the Bernal part of Soil 83 which is a Hydrologic Group "D" soil. Since the majority of the site is underlain by Soil type 83, Hydrologic Group "D" soils were used to determine runoff coefficients.

CLIMATE

This area of El Paso County can be described as the foothills, with total precipitation amounts typical of a semi-arid region. Winters are generally cold and dry, and summers relatively warm and dry. Precipitation ranges from 12 to 14 inches per year, with the majority of this moisture occurring in the spring and summer in the form of rainfall. Thunderstorms are common during the summer months.

FLOODPLAIN STATEMENT

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) #08041C0528 F, dated March 17, 1997, no portion of the Westcreek at Wolf Ranch property lies within a designated 100 year floodplain, except the extreme southerly end of the property. However, all proposed development lies north of the 100 year floodplain.

DRAINAGE CRITERIA

The current City of Colorado Springs/El Paso County Drainage Criteria was utilized in this report. Peak runoff quantities were determined using the Rational Method for both the 5 year and 100 year storms, as required for drainage basins less than 100 acres.

HISTORIC DRAINAGE BASIN DESCRIPTIONS

A brief description of each historic drainage basin for the site is provided in this section of the report. A summary of peak historic runoff for the basins is depicted on the Historic Drainage Plan (Exhibit 1) provided in the appendix. The site has been divided into 5 historical drainage basins.

The historic drainage patterns of this site have been altered due to the construction of Powers Boulevard. The purpose of this historical analysis is to provide a basis of comparison between historical flow quantities entering adjacent site versus developed flows entering adjacent properties. For this development, the historic versus development comparison only applies to Basin D, since outfalls from all the other basins are into existing storm sewer pipes, into Cottonwood Creek or into the Powers Boulevard right-of-way.

Historic Basin A consists of the northwest corner of the proposed development. This 5.01 acre site generates runoff rates of 2.8 cubic feet per second (cfs) during the 5 year storm and 5.9 cfs during the 100 year storm. These flows currently reach the southeast corner of Research Parkway and Powers Boulevard and enter historic Basin B.

Basin B is also located toward the northwest corner of the proposed development. Runoff rates of $Q_5 = 6.5$ cfs and $Q_{100} = 14.1$ cfs are generated from this 9.23 acre basin. The combined runoff from Basins A and B continue southerly within the existing swale along the east side of Powers Boulevard. An existing area inlet located within this swale collects a portion of the flows generated from Basins A and B. The remaining flows continue southerly within the existing roadside swale east of Powers Boulevard.

The majority of the proposed development is within historic Basin C. This 52.39 acre basin generates runoff rates of 22.3 cfs during the 5 year storm and 50.3 cfs during the 100 year storm. The majority of these flows also reach the roadside swale along the east side of Powers Boulevard.

As stated above, a series of storm sewer pipes were constructed along the east side of Powers Boulevard as part of the roadway construction. The storm sewer system included a 30" RCP extension into Basin B, a 66" RCP extension into historic Basin C and a 36" RCP extension into Basin E. The 66" RCP is the only pipe which is currently accessible from the surface. This 66" pipe collects a portion of the flows generated from Basin C.

Basin D, located along the eastern property line of the proposed Westcreek development, generates runoff rates of $Q_5 = 7.8$ cfs and $Q_{100} = 16.5$ cfs. These flows currently sheet flow to the east onto the adjacent property.

The southern tip of the Westcreek development comprises Basin E. Runoff rates of 8.1 cfs and 17.0 cfs are generated from this 13.47 acre basin. These flows also reach the roadside swale along the east side of Powers Boulevard and discharge directly into Cottonwood Creek.

DEVELOPED DRAINAGE BASIN DESCRIPTIONS

A brief description of each developed drainage basin for the site is provided in this section of the report. A summary of peak-developed runoff for the basins is depicted on the Developed Drainage Plan provided in the appendix. All proposed drainage facilities are approximate in size and may vary with actual layout and design.

Within the single-family residential development, side lot line swales will be created on the downstream lots to convey flows from the upstream lots and into the street. Swales will be constructed by the homebuilders and maintained by the homeowner to limit concentrated flows and to disperse the flows as much as possible. Lot Drainage Plans will be prepared for the residential lots as they are developed and platted.

Individual lot drainage is the responsibility of the lot owner/builder.

According to the Wolf Ranch Master Development Drainage Plan (MDDP), runoff reaches the Westcreek development from future Research Parkway and areas upstream of Research Parkway within the future Wolf Ranch development. The Wolf Ranch MDDP anticipated runoff rates of approximately $Q_{100} = 163$ cfs reaching the southern property line of Wolf Ranch and entering the Westcreek development. The JR Engineering report for Powers Boulevard indicated 175 cfs would enter the Westcreek development from areas upstream of Research Parkway, eventually reaching the storm sewer system along the east side of Powers Boulevard.

Therefore, as part of the Westcreek drainage analysis, flows were analyzed for areas outside of the actual Westcreek Filings 1 through 5 subdivisions to determine an equivalent area which generates approximately 175 cfs. Basins OS-5 through OS-9 generate a 100 year storm runoff rate of 164.6 cfs. Therefore, these basins were selected as off-site areas which can discharge to the "Westcreek" system.

The following is a developed basin-by-basin description of drainage patterns and runoff quantities affecting the proposed Westcreek development. Several of these basins describe areas outside of the Westcreek development. These are included to anticipate future development and to describe anticipated drainage patterns .

Basin OS-1 consists of approximately 12.90 acres northeast of the Powers Boulevard and Research Parkway intersection. This area generates runoff rates of 47.6 cfs during the 5 year storm and 95.2 cfs during the 100 year storm. The existing 42" CMP will be replaced with a 42" RCP and stubbed into basin OS-1. When Basin OS-1 is developed, a junction box will constructed at the end of the 42" RCP and additional storm sewer systems will be extended northerly to collect flows from future development. Thes flows will then enter the existing 54" RCP which will convey the flows westerly within Research Parkway.

Basins OS-2, OS-3 and OS-4 all describe portions of the Research Parkway right-of-way or portions of Powers Boulevard. Prior to the construction of the Powers Boulevard/Research Parkway interchange, runoff from these three basins will continue southerly within the swale along the east side of Powers Boulevard. After the construction of the interchange, these three basins will be collected within roadside area inlets and piped northerly to the existing 54" RCP within Research Parkway.

Additional flows from off-site Basins OS-10, 11 and 12 will also reach the existing 54" RCP. These basin basically comprise areas along Research Parkway, and along Cross Creek Drive north of Research Parkway. Basin OS-10 consists of the north half of Research Parkway between Powers Boulevard and Cross Creek Drive. This basin generates runoff rates of 8.8 cfs during the 5 year storm and 18.7 cfs during the 100 year storm. These flows will reach a proposed 8', sump inlet at the northeast corner of Powers Boulevard and Research Parkway.

Basins OS-11, located along the west side of Cross Creek Drive north of Research Parkway generates runoff rates of $Q_5 = 6.1$ cfs and $Q_{100} = 12.9$ cfs. A proposed 5' sump inlet located just north of Research Parkway, will collect these flows.

Likewise, runoff rates of $Q_5 = 8.7$ cfs and $Q_{100} = 18.3$ cfs are generated from Basin OS-12 which is located along the east side of Cross Creek Drive. An additional 5' sump inlet will collect these flows. A 24" RCP will convey the combined runoff rates of $Q_5 = 14.8$ cfs and $Q_{100} = 31.2$ cfs from Basin OS-11 and OS-12 westerly within Research Parkway. These flows along with the flows from Basin OS-10 will discharge into the existing 54" RCP. Once the interchange is constructed, the total runoff reaching the 54" RCP at Design Point OS-DP #1 will be 84.7 cfs during the 5 year storm and 185.0 cfs during the 100 year storm.

Basin OS-5 is located north of Research Parkway. As stated above, previous drainage reports and storm sewer designs anticipated some flow from the north side of Research Parkway would be collected and conveyed through the existing storm sewer system along the east side of Powers Boulevard. Runoff rates of 68.3 cfs during the 5 year storm and 143.9 cfs during the 100 year storm are generated from this 26 acre basin. A 42" RCP will be extended to a point just northeast of the Research Parkway and Cross Creek Drive intersection to convey the flows from Basin OS-5.

Runoff from Basins OS-6 and OS-7 reach a low point in Research Parkway approximately 100' east of the Research Parkway and Cross Creek Drive intersection. A 8' sump inlet will collect total flow rates of Q_5 = 7.9 cfs and Q_{100} = 15.9 cfs generated from these two basins.

A 4' sump inlet along the south side of Research Parkway will collect runoff rates of 3.5 cfs during the 5 year storm and 6.9 cfs during the 100 year storm generated from Basins OS-8 and OS-9. A 24" RCP will convey all the flow from Basins OS-6 through OS-9 to Design Point OS-DP#2 and then southerly within Calvert Creek Drive. The flows will then turn west of Old River Drive within a 30" RCP connecting with the pipe flows within Cross Creek Drive.

Basin I, consisting of 2.44 acres along the west side of Stoney Creek Drive, generates runoff rates of 7.6 cfs during the 5 year storm and 16.2 cfs during the 100 year storm. A 15' on-grade inlet will collect runoff rates of 4.7 cfs during the 5 year storm and 7.5 cfs during the 100 year storm. The remaining flows will entire Basin VI as street flow.

Basin II is located along northeast of the Calvert Creek and Old River Drive intersection. This 4.42 acre basin generates runoff rates of Q_5 = 12.1 cfs and Q_{100} = 27.7 cfs. A 20' on-grade inlet will be installed just south of this intersection to collect runoff rates of 8.6 cfs during the 5 year storm and 16.4 cfs during the 100 year storm. Runoff rates of 3.8 cfs during the 5 year storm and 11.3 cfs during the 100 year storm will bypass this inlet and enter Basin IV as street flow.

Approximately 2.1 acres just southeast of the Cross Creek Drive and Research Parkway intersection comprises Basin III. Runoff rates of 6.0 cfs during the 5 year storm and 13.8 cfs during the 100 year storm generated from this basin flow southeasterly within Calvert Creek Drive. A 20' inlet located at the northwest corner of Calvert Creek and Old River Drive will collect 4.7 cfs during the 5 year storm and 9.3 cfs during the 100 year storm. Runoff rates of 1.3 cfs and 4.5 cfs will bypass this inlet and enter Basin IV as street flow.

A 30" RCP will convey the collected flow rates of Q_5 = 23.5 cfs and Q_{100} = 46.4 cfs from Basins OS-6 through OS-9 and Basins II and III westerly from the Calvert Creek Drive and Old River Drive intersection. These flows will combine with the flows being piped from Basin OS-5 at the intersection of Cross Creek Drive and Old River Drive. The total pipe flows at that intersection are 91.6 cfs during the 5 year storm and 190.3 cfs during the 100 year storm. A 48" RCP will convey these flows easterly in Cross Creek Drive.

Basin IV, located along Calvert Creek Drive between Old River Drive and Stoney Creek Drive, generates runoff rates of 11.2 cfs during the 5 year storm and 23.9 cfs during the 100 year storm. Additional flows bypassing inlets within Basins II and III will combine with these flows and reach a 20' inlet just east of the Stoney Creek Drive and Calvert Creek Drive intersection. This 20' inlet will collect 10.7 cfs during the 5 year storm and 20.1 cfs during the 100 year storm. Total collected flows of Q_5 = 15.4 cfs and Q_{100} = 27.6 cfs from Basins I and IV will be piped southerly within a 24" RCP. Flows bypassing the inlet within Basin IV will enter Basin VI as street flow.

Basin V is located along the north side of Cross Creek Drive and generates runoff rates of 11.4 cfs during the 5 year storm and 24.8 cfs during the 100 year storm. These flows reach a 20' sump inlet located at the Coyote Creek Drive and Cross Creek Drive intersection. Additional flows reach this same inlet from Basins VI and VII.

Runoff rates of 5.3 cfs and 11.3 cfs are generated from the 1.66 acre Basin VI. Additional flows of 5.6 cfs and 19.6 cfs bypassing the Basin IV inlet and 2.9 cfs and 8.7 cfs bypassing the Basin I inlet combine with the flows generated from Basin VI. Total street flows of Q_5 = 13.8 cfs and Q_{100} = 39.6 cfs reach the northwest corner of the Stoney Creek Drive and Cross Creek Drive intersection. This inlet will collect 8.6 cfs during the 5 year storm and 16.3 cfs during the 100 year storm. A 30" RCP will convey all the collected flows (Q_5 = 24.0 cfs and Q_{100} = 43.9 cfs) from Basins I, IV and VI westerly within Cross Creek Drive. Flows bypassing this inlet will enter Basin VII as street flows.

Basin VII generates an additional 5.2 cfs during the 5 year storm and 11.4 cfs during the 100 year storm. Including the flows bypassing the Basin VI inlet, runoff rates of Q_5 = 10.4 cfs and Q_{100} = 34.7 cfs will reach the 20' sump inlet at the Coyote Creek Drive and Cross Creek Drive intersection from the east.

Cross Creek Drive has a 5 year street capacity of 13.8 cfs per side; therefore, the total 5 year storm flows will be collected by this sump inlet. However, as the street grade reaches the sump condition the centerline of Cross Creek Drive will be inundated and flows will cross the centerline of the street and continue southerly within Coyote Creek Drive. Approximately 35 cfs will overtop the centerline of Cross Creek Drive and continue southerly within Coyote Creek during the 100 year storm. These flows will be split between Basins IX and X (17.5 cfs per side of Coyote Creek Drive).

Basin VIII is located along the easterly property line of Westcreek and generates runoff rates of 3.5 cfs during the 5 year storm and 7.0 cfs during the 100 year storm. These flows will sheet flow to the east entering the property east of Westcreek. This is less than the historic flows leaving historic Basin D. In fact, The total flows exiting the Westcreek site from Basins VIII and XXIV are less than historic Basin D.

Basin IX is located south of Cross Creek Drive and east of Coyote Creek Drive. This 2.69 acre basin generates runoff rates of 7.3 cfs and 16.1 cfs during the 5 year and 100 year storms, respectively. As stated above, an additional 35 cfs enters Coyote Creek during the 100 year storm. The total 100 year street flows within Coyote Creek just south of Cross Creek Drive will be 75.5 cfs. Coyote Creek Drive at a slope of 2% has a 5 year street capacity of 13.8 cfs/side and a 100 year street capacity of 166 cfs. A 20' inlet will be installed at the south end of Basin IX to collect runoff rates of 5.5 cfs during the 5 year storm and 19.5 cfs during the 100 year storm. Runoff rates bypassing this inlet will enter Basin X as street flow.

Basin X consists of 4.29 acres along the west side of Coyote Creek Drive and generates runoff rates of Q_5 = 11.7 cfs and Q_{100} = 24.4 cfs. Including the flows bypassing the upstream inlets, the street flows within Basin X are 13.5 cfs during the 5 year storm and 56.0 cfs during the 100 year storm. A 15' inlet will be installed at the south end of Basin X at the Winding Passage Drive and Coyote Creek Drive intersection. This inlet will collect 8.2 cfs during the 5 year storm and 18.2 cfs during the 100 year storm. Runoff rates of Q_5 = 5.3 cfs and Q_{100} = 37.8 cfs will bypass this inlet and enter Basin XXVIII as street flows.

Approximately 3.12 acres along the east side of Winding Passage Drive comprises Basin XI. This basin generates runoff rates of 8.5 cfs during the 5 year storm and 18.5 cfs during the 100 year storm. These flows reach the low point of Basins XI and XII.

Additional flow rates of Q_5 = 4.6 cfs and Q_{100} = 9.1 cfs reach this same low point from Basin XII. A 8' sump inlet will be installed at this point to collect the flows from Basins XI and XII. These flows will be pipe to Design Point #2 via a 30" RCP.

The total flows at Design Point #2 are 152.7 cfs during the 5 year storm and 319.9 cfs during the 100 year storm. During the 100 year storm approximately 37.8 cfs will not be collected by upstream inlets, resulting in a 100 year storm rate of 282.1 cfs reaching Design Point #2. The compares to 304 cfs calculated as part of the JR Engineering Drainage Report for Powers Boulevard at this point.

Basin XIII consists of 12.41 acres just southeast of the Powers Boulevard and Research Parkway intersection. Runoff rates of 28.7 cfs and 61.6 cfs are generated from this basin during the 5 year and 100 year storms, respectively. A 30" RCP will be constructed into this basin from Design Point #3 where a 30" RCP is currently stubbed out from the existing system in Powers Boulevard. This pipe will be able to convey developed flows from Basin XIII in the future.

Basin XIV consists 2.75 acres of a future park along the east side of Powers Boulevard. This basin generates runoff rates 2.7 cfs during the 5 year storm and 9.6 cfs during the 100 year storm. The combined flows of Q_5 = 27.0 cfs and Q_{100} = 67.2 cfs from Basins XIII and XIV reach Design Point #3. This compares to 53 cfs presented in the JR Engineering report. However, the existing 30" RCP has a capacity of 88 cfs.

Basin XV consists of the swale along the east side of Powers just south of Research Parkway. This 2.74 acre basin generates runoff rates of 3.6 cfs during the 5 year storm and 12.2 cfs during the 100 year storm. Prior to the construction of the Powers Boulevard and Research Parkway intersection, flows from Basins OS-2 through OS-4 will combine with the flows from Basin XV and continue southerly within the swale along the east side of Powers. These flows reach an existing area inlet along the east side of Powes Boulevard approximately 1,300 feet south of Research Parkway.

The combined flows from Basins XIII, XIV, XV and Basins OS-2, OS-3 and OS-4 reach Design Point #4. The total flows at Design Point # 4 are Q_5 = 40.5 cfs and Q_{100} = 95.7 cfs. An additional 11 cfs during the 5 year storm and 22 cfs during the 100 year storm reach this point from the west side of Powers Boulevard. Therefore, the total flows at this point are 51.5 and 117.7 during the 5 year and 100 year storms. The JR Engineering report for Powers Boulevard anticipated runoff rates of 111 cfs during the 100 year storm at this point. The existing 42" RCP conveying these flows has a capacity of 176.5 cfs.

The total flow from Design Point #2 and #4 reach Design Point #5. The total flows at that point are Q_5 = 159.2 cfs and Q_{100} = 376.4 cfs. Including the flows from the west side of Powers Boulevard, the flows increase to Q_5 = 170.2 cfs and Q_{100} = 398.4 cfs. This compares to JR Engineering's anticipated 100 year storm flows of 387 cfs at this point. These flows will be conveyed southerly within the existing 72" RCP which has a normal flow capacity of 780 cfs.

An area just east of the proposed landscape berm along the east side of Powers comprises Basin XVI. This 2.31 acre basin consisting of both residential lots and landscaping generates runoff rates of 4.0 cfs during the 5 year storm and 9.8 cfs during the 100 year storm. Runoff from this basin will flow southerly within a grass swale to the southern portion of the site. These flows will be collected the Winding Passage cul-de-sac.

Basin XVII consists of the roadside swale along the east side of Powers Boulevard and generates runoff rates of Q_5 = 6.1 cfs and Q_{100} = 17.9 cfs. These flows also reach the southwest corner of the proposed Westcreek development within the roadside swale. These flows will discharge directly to Cottonwwod Creek.

Basin XXV-A is located along the east side of Winding Passage Drive between Jacks Fork Drive and James Creek Drive. This basin generates runoff rates of $Q_5 = 8.4$ cfs and $Q_{100} = 17.7$ cfs. Runoff rates of 5.0 cfs and 23.7 cfs bypassing the inlet within Basin XXIII-B combine with these flows. Total flow rates of 13.4 cfs and 25.8 cfs during the 5 year and 100 year storms, respectively, reach the south end of Basin XXV-A. This inlet will collect 7.7 cfs during the 5 year storm and 11.1 cfs during the 100 year storm. Runoff rates of 5.7 cfs during the 5 year storm and 14.7 cfs during the 100 year storm will bypass this inlet and continue into Basin XXV-B.

Approximately 2.57 acres along the east side of James Creek Drive comprise Basin XXVI. Runoff rates of $Q_5 = 7.6$ cfs and $Q_{100} = 16.2$ cfs are generated directly from this basin. A 15' inlet will be installed at the south end of this basin. During the 100 year storm, runoff within Basin XXVIII and upstream areas will overtop the centerline of James Creek Drive, resulting in 100 year storm rates of 36.0 at the Basin XXVI inlet. This inlet will collect 7.2 cfs during the 5 year storm and 12.7 cfs during the 100 year storm. Runoff bypassing this inlet will reach the proposed inlet within Basin XXVIII.

Basin XXVII is situated along the western side of Winding Passage Drive and generates runoff rates of 4.8 cfs during the 5 year storm and 10.2 cfs during the 100 year storm. A 15' inlet, located at the southern end of this basin, collects runoff rates of 3.4 cfs and 11.1 cfs during the 5 year and 100 year storms, respectively. The remaining flows of 1.4 cfs during the 5 year storm and 14.7 cfs during the 100 year storm will enter Basin XXIX as street flows.

Basin XXVIII, consisting of 3.83 acres along the west side of James Creek Drive, generates runoff rates of $Q_5 = 8.8$ cfs and $Q_{100} = 18.1$ cfs. Additional flows bypassing the Basin X inlet and Inlet XXVI ($Q_5 = 8.0$ cfs and $Q_{100} = 41.3$ cfs) will also be conveyed through Basin XXVIII. Total street flows of 16.8 cfs during the 5 year storm and 59.4 cfs during the 100 year storm will approach the proposed 15' inlet at the south end of Basin XXVIII. This inlet will collect flows of 9.6 cfs and 17.7 cfs during the 5 year and 100 year storms, respectively. The remaining flows of 10.2 cfs during the 5 year storm and 41.7 cfs during the 100 year storm will continue onto Basin XXIX as street flow.

Runoff rates of $Q_5 = 4.9$ cfs and $Q_{100} = 10.0$ cfs are generated from the 1.51 acre Basin XXIX which is located along the west side of Winding Passage Drive. Additional flows bypassing the inlets within Basins XXVII and XXVIII will combine with the flows generated from Basin XXIX. Flows of 16.9 cfs during the 5 year storm and 47.5 cfs during the 100 year storm will approach the proposed inlet within Basin XXIX. During the 100 year storm, the combined 100 year flows will be split on both sides of Winding Passage Drive. The inlet will collect runoff rates of 7.3 cfs and 12.9 cfs during the 5 year and 100 year storms, respectively. Runoff rates of 9.6 cfs and 34.6 cfs will bypass this inlet and continue to the proposed 20' sump inlet located within the Winding Passage Drive cul-de-sac.

The area along the east side of Winding Passage Drive between James Creek Drive comprises Basin XXV-B. This 2.14 acre basin generates runoff rates of $Q_5 = 6.4$ cfs and $Q_{100} = 13.9$ cfs. Total flows of 12.1 cfs during the 5 year storm and 47.5 cfs during the 100 year storm will approach the proposed 20' inlet at the south end of Basin XXV-B. Runoff rates of $Q_5 = 4.5$ cfs and $Q_{100} = 30.3$ cfs will bypass this inlet and continue to the proposed 20' sump inlet located within the Winding Passage Drive cul-de-sac. The sump inlet will collect total flows of 14.1 cfs during the 5 year storm and 64.9 cfs during the 100 year storm.

Basin XXX consists of the rear portion of the lots just south of the cul-de-sac and generates runoff rates of $Q_5 = 2.0$ cfs and $Q_{100} = 4.4$ cfs. These flows will discharge directly into Cottonwood Creek as sheet flow.

Basin XXXI consists of 2.75 acres along the east side of the proposed Westcreek development. A swale will be installed along the eastern property line to collect runoff rates of $Q_5 = 3.4$ cfs and $Q_{100} = 11.6$ cfs generated from this basin. This swale will discharge directly into Cottonwood Creek.

Total runoff rates of $Q_5 = 108.2$ cfs and $Q_{100} = 234.3$ cfs reach Design Point #6. The existing 36" RCP has a capacity of approximately 95 cfs. Therefore, the flows from the two inlets within Basin XXIX and the flows from Basin XVI will be directed to the existing 36" RCP ($Q_5 = 25.4$ cfs and $Q_{100} = 87.6$ cfs). The remaining flows collected within the upstream inlets including the inlet at the south end of Basin XXV-B will be piped directly to Cottonwood Creek within a 42" RCP.

Design Point #7 describes all the flows from the Westcreek Development. The total runoff rates reaching Design Point # 7 are $Q_5 = 225.7$ cfs and $Q_{100} = 563.4$ cfs. Subtracting out the 153 cfs which will be conveyed in the proposed 42" RCP, the 100 year storm flows reaching the existing 72" RCP will be approximately 410 plus approximately 35 from the west side of Powers for a total flow of 445 cfs. The JR report anticipated runoff rates of approximately 452 cfs at this same point.

EROSION CONTROL

Erosion control measures will be installed per the approved grading/erosion control plans.

DRAINAGE, BRIDGE AND POND FEES

Westcreek at Wolf Ranch Subdivision is within the Cottonwood Creek Drainage Basin. The 2003 Drainage, Bridge and Pond Fees are listed below for the five proposed filings.

FILING NO. 1 – Westcreek Filing No. 1 consists of a total of 14.525 acres with 0.179 acres of the total being open space. Therefore, fees will be paid on 14.346 acres.

DRAINAGE FEE ($8,002/Acre Total)

	Acres	$/Acre	Total Fee
Capital Improvements Portion	14.346	$5,882.00	$84,383.17
Land Portion	14.346	$ 1,705.00	$24,459.93
Cash Portion	14.346	$ 415.00	$5,953.59
BRIDGE FEES	14.346	$ 676.00	$9,697.90
			$124,494.59

FILING NO. 2 - Westcreek Filing No. 2 consists of a total of 13.533 acres. Fees will be paid on 13.533 acres.

DRAINAGE FEE ($8,002/Acre Total)

	Acres	$/Acre	Total Fee
Capital Improvements Portion	13.533	$5,882.00	$79,601.11
Land Portion	13.533	$ 1,705.00	$23,073.77
Cash Portion	13.533	$ 415.00	$5,616.20
BRIDGE FEES	13.533	$ 676.00	$9,148.31
			$117,439.39

FILING NO. 3 – Westcreek Filing No. 3 consists of a total of 8.339 acres with 0.390 acres of the total being open space. Therefore, fees will be paid on 7.949 acres.

DRAINAGE FEE ($8,002/Acre Total)

	Acres	$/Acre	Total Fee
Capital Improvements Portion	7.949	$5,882.00	$46,756.02
Land Portion	7.949	$ 1,705.00	$13,553.05
Cash Portion	7.949	$ 415.00	$3,298.84
BRIDGE FEES	7.949	$ 676.00	$5,373.52
			$68,981.43

DRAINAGE FACILTIES (Public Non Reimbursable)

The following drainage facilities will be required for the 5 filings of the Westcreek at Wolf Ranch Subdivision. All these facilities are public non-reimbursable drainage facilities.

FILING 1

ITEM	QUANTITY		UNIT PRICE	EXTENDED COST
8' D-10-R Inlets	1	Ea.	$2,500.00	$ 2,500.00
15' D-10-R Inlets	1	Ea.	$5,400.00	$ 5,400.00
20' D-10-R Inlets	1	Ea.	$6,000.00	$ 6,000.00
18" RCP	30	L.F.	$29.00	$ 870.00
24" RCP	930	L.F.	$37.00	$ 34,410.00
30" RCP	379	L.F.	$44.00	$ 16,676.00
42" RCP	650	L.F.	$61.00	$ 39,650.00
48" RCP	539	L.F.	$75.00	$ 40,425.00
54" RCP	412	L.F.	$102.00	$ 42,024.00
Type I Manhole	2	Ea.	$4,200.00	$ 8,400.00
Type 2 Manhole	1	Ea.	$2,200.00	$ 2,200.00
			Sub-Total	$ 198,555.00
			15% Eng. & Contingency	$ 29,783.25
			Grand Total	$ 228,338.25

FILING 2

ITEM	QUANTITY		UNIT PRICE	EXTENDED COST
15' D-10-R Inlets	6	Ea.	$5,400.00	$ 32,400.00
20' D-10-R Inlets	1	Ea.	$6,000.00	$ 6,000.00
18" RCP	156	L.F.	$29.00	$ 4,524.00
24" RCP	552	L.F.	$37.00	$ 20,424.00
30" RCP	370	L.F.	$44.00	$ 16,280.00
42" RCP	114	L.F.	$61.00	$ 6,954.00
Type 2 Manhole	2	Ea.	$2,200.00	$ 4,400.00
Type I Manhole	1	Ea.	$4,200.00	$ 4,200.00
			Sub-Total	$ 95,182.00
			15% Eng. & Contingency	$ 14,277.30
			Grand Total	$ 109,459.30

FILING 3

ITEM	QUANTITY		UNIT PRICE	EXTENDED COST
8' D-10-R Inlets	1	Ea.	$2,500.00	$ 2,500.00
15' D-10-R Inlets	1	Ea.	$5,400.00	$ 5,400.00
20' D-10-R Inlets	1	Ea.	$6,000.00	$ 6,000.00
18" RCP	50	L.F.	$29.00	$ 1,450.00
30" RCP	253	L.F.	$44.00	$ 11,132.00
54" RCP	908	L.F.	$102.00	$ 92,616.00
60" RCP	52	L.F.	$127.00	$ 6,604.00
Type I Manhole	2	Ea.	$4,200.00	$ 8,400.00
			Sub-Total	$ 134,102.00
			15% Eng. & Contingency	$ 20,115.30
			Grand Total	$ 154,217.30

FILING 4

ITEM	QUANTITY		UNIT PRICE	EXTENDED COST
15' D-10-R Inlets	5	Ea.	$5,400.00	$ 27,000.00
20' D-10-R Inlets	2	Ea.	$6,000.00	$ 12,000.00
18" RCP	54	L.F.	$29.00	$ 1,566.00
24" RCP	963	L.F.	$37.00	$ 35,631.00
36" RCP	31	L.F.	$56.00	$ 1,736.00
42" RCP	1,276	L.F.	$61.00	$ 77,836.00
Rip Rap Outfall	1	L.S.	$9,000.00	$ 9,000.00
Type I Manhole	1	Ea.	$4,200.00	$ 4,200.00
			Sub-Total	$ 168,969.00
			15% Eng. & Contingency	$ 25,345.35
			Grand Total	$ 194,314.35

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: A
AREA: 5.01
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Historic	5.01	0.25	0.30	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	5.01	S		100%

COMPOSITE: C5= 0.25 C100= 0.30

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	1000	3.2		34.24		32.23
Tc Total:				34.24		32.23

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
2.2 in/hr	3.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
2.8 cfs	5.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: B
AREA: 9.23
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Historic	9.23	0.25	0.30	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	9.23			100%

COMPOSITE: C5= 0.25 C100= 0.30

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	587	5.8		21.56		20.29
Tc Total:				21.56		20.29

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
2.8 in/hr	5.1 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
6.5 cfs	14.1 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: C
AREA: 52.39
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
HISTORIC	52.39	0.25	0.30	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	52.39			100%

COMPOSITE: C5= 0.25 C100= 0.30

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	1000	3.2		34.24		32.23
Swale	1090	2.4	1.1	16.52	1.3	13.97
Tc Total:				50.76		46.20

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
1.7 in/hr	3.2 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
22.3 cfs	50.3 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: D
AREA: 8.86
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Historic	8.86	0.25	0.30	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	8.86	S		100%

COMPOSITE: C5= 0.25 C100= 0.30

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	300	7		14.49		13.63
Tc Total:				14.49		13.63

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
3.5 in/hr	6.2 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
7.8 cfs	16.5 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: E
AREA: 13.47
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Historic	13.47	0.25	0.30	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	13.47	S		100%

COMPOSITE: C5= 0.25 C100= 0.30

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	1000	5		29.55		27.81
Swale	530	2.3	1.1	8.0	1.3	8.0
Tc Total:				29.55		27.81

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
2.4 in/hr	4.2 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
8.1 cfs	17.0 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: I
AREA: 2.44
SOIL TYPE: C&D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.96	0.70	0.80	80.33%
Street	0.48	0.90	0.90	19.67%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	2.44			100%

COMPOSITE: C5= 0.74 C100= 0.82

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	300	4		8.20		6.15
Street	200	4	4	0.83	4.2	0.79
Tc Total:				9.03		6.94

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.2 in/hr	8.1 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
7.6 cfs	16.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: II
AREA: 4.42
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	4.25	0.70	0.80	96.15%
Landscaping	0.17	0.35	0.60	3.85%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	4.42			100%

COMPOSITE: C5= 0.69 C100= 0.79

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	80	4		7.94		5.29
Street	400	2	2.8	2.38	3	2.22
Tc Total:				10.32		7.51

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.0 in/hr	7.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
12.1 cfs	27.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: III
AREA: 2.1
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.64	0.70	0.80	78.10%
Street	0.17	0.90	0.90	8.10%
Landscaping	0.29	0.35	0.60	13.81%
	0	0.00	0.00	0.00%
	2.10			100%

COMPOSITE: C5= 0.67 C100= 0.78

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	60	6		6.01		4.01
Street	350	1.5	2.5	2.33	2.7	2.16
Tc Total:				8.35		6.17

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.3 in/hr	8.4 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
6.0 cfs	13.8 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: IV
AREA: 3.56
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	3.56	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	3.56			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	150	4		5.80		4.35
Street	300	2	2.8	1.79	3	1.67
Tc Total:				7.58		6.02

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.5	8.4 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
11.2 cfs	23.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: V
AREA: 3.98
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	3.98	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	3.98			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	150	3		6.38		cfs
Street	700	3	3.5	3.33	3.7	3.15
Tc Total:				9.71		3.15

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.1 in/hr	7.8 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
11.4 cfs	24.8 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: VI
AREA: 1.66
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.66	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	1.66			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	120	3		5.70		4.28
Street	400	3	3.5	1.90	3.7	1.80
Tc Total:				7.61		6.08

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.6 in/hr	8.5 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
5.3 cfs	11.3 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: VII
AREA: 1.62
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.62	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	1.62			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	100	3		5.21		3.90
Street	300	1.5	2.5	2.00	2.7	1.85
Tc Total:				7.21		5.76

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.6 in/hr	8.8 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
5.2 cfs	11.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: VIII
AREA: 0.97
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	0.97	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0.97			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	150	6.7		4.89		3.67
Tc Total:				4.89		3.67

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
5.2 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
3.5 cfs	7.0 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: IX
AREA: 2.69
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	2.69	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	2.69			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	300	4		8.20		6.15
Street	360	2	2.8	2.14	3	2.00
Swale	50	4	1.6	0.52	1.8	0.46
Tc Total:				10.86		8.61

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
3.9 in/hr	7.5 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
7.3 cfs	16.1 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: X
AREA: 4.29
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	4.29	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	4.29			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	100	3		5.21		3.90
Street	1170	2.5	3.2	6.09	3.4	5.74
Tc Total:				11.30		9.64

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
3.9 in/hr	7.1 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
11.7 cfs	24.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XI
AREA: 3.12
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	3.12	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	3.12			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	140	4		5.60		4.20
Street	840	2	2.8	5.00	3	4.67
Tc Total:				10.60		8.87

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
3.9 in/hr	7.4 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
8.5 cfs	18.5 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XII
AREA: 1.27
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.27	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	1.27			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	190	10		4.82		3.62
Street	35	2	2.8	0.21	3	0.19
Tc Total:				5.03		3.81

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
5.2 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
4.6 cfs	9.1 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XIII
AREA: 12.41
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	12.41	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	12.41			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	300	3		9.02		6.76
Street	670	2	2.8	3.99	3	3.72
Swale	230	3	1.1	3.48	1.3	2.95
Tc Total:				16.49		13.43

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
3.3 in/hr	6.2 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
28.7 cfs	61.6 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XIV
AREA: 2.75
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Future Park	2.75	0.35	0.60	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	2.75			100%

COMPOSITE: C5= 0.35 C100= 0.60

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	300	1.5		21.25		14.17
Swale	50	1.5	0.9	0.93	1.1	0.76
Tc Total:				22.18		14.92

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
2.8 in/hr	5.8 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
2.7 cfs	9.6 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XV
AREA: 2.74
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Landscaping	2.74	0.35	0.60	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	2.74	S		100%

COMPOSITE: C5= 0.35 C100= 0.60

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	50	2.5		7.33		4.89
Swale	650	2.8	2.5	4.33	2.7	4.01
Tc Total:				11.66		8.90

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
3.8 in/hr	7.4 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
3.6 cfs	12.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XVI
AREA: 2.31
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Future Residential	1.18	0.70	0.80	60.20%
Landscaping	0.78	0.35	0.60	39.80%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	1.96	S		100%

COMPOSITE: C5= 0.56 C100= 0.72

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	300	2.5		12.91		9.09
Swale	560	2.5	1.1	8.48	1.3	7.18
Tc Total:				21.39		16.27

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
3.1 in/hr	5.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
4.0 cfs	9.8 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XVII
AREA: 8.28
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	8.28	0.35	0.60	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	8.28	S		100%

COMPOSITE: C5= 0.35 C100= 0.60

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	300	2.5		17.95		11.97
Swale	2000	2.5	1.1	30.30	1.3	25.64
Tc Total:				48.26		37.61

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
2.1 in/hr	3.6 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
6.1 cfs	17.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XVIII
AREA: 4.11
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	4.11	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	4.11			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	180	4		6.35		4.76
Street	1080	2.5	3.2	5.63	3.4	5.29
Tc Total:				11.98		10.06

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
3.8 in/hr	7.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
10.9 cfs	23.0 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XIX
AREA: 5.93
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	5.93	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	5.93			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	160	4		5.99		4.49
Street	1080	2.5	3.2	5.63	3.4	5.29
Tc Total:				11.61		9.79

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
3.9 in/hr	7.1 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
16.2 cfs	33.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XX
AREA: 1.19
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.19	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	1.19			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	150	3		6.38		4.78
Street	300	2	2.8	1.79	3	1.67
Tc Total:				8.16		6.45

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.4 in/hr	8.4 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
3.7 cfs	8.0 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XXI
AREA: 2.84
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	2.84	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	2.84			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	100	3		5.21		3.90
Street	600	1.7	2.6	3.85	2.8	3.57
Tc Total:				9.05		7.48

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.3 in/hr	7.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
8.5 cfs	17.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XXII-A
AREA: 1.9
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.9	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	1.90			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	220	4		7.02		5.27
Street	400	3	3.4	1.96	3.6	1.85
Tc Total:				8.98		7.12

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.3 in/hr	8.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
5.7 cfs	12.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XXII-B
AREA: 0.4
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	0.4	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0.40			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	100	3		5.21		3.90
Street	200	2	2.8	1.19	3	1.11
Tc Total:				6.40		5.02

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.8 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
1.3 cfs	2.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XXIII
AREA: 3.36
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	3.36	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	3.36			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	200	4		6.69		5.02
Street	800	2.5	3.2	4.17	3.4	3.92
Tc Total:				10.86		8.94

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
3.9 in/hr	7.3 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
9.2 cfs	19.6 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XXIV
AREA: 0.15
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	0.15	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0.15			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	30	3		2.85		2.14
Tc Total:				2.85		2.14

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
5.2 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
0.5 cfs	1.1 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XXV-A
AREA: 2.66
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	4.8	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	4.80			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	150	4		5.80		4.35
Street	450	3	3.3	2.27	3.5	2.14
Tc Total:				8.07		6.49

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.5 in/hr	8.3 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
8.4 cfs	17.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XXV-B
AREA: 2.14
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	4.8	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	4.80			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	150	4		5.80		4.35
Street	550	3	3.3	2.78	3.5	2.62
Tc Total:				8.58		6.97

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.3 in/hr	8.1 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
6.4 cfs	13.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XXVI
AREA: 2.57
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	2.57	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	2.57			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	200	4		6.69		5.02
Street	350	1.5	2.4	2.43	2.6	2.24
Tc Total:				9.13		7.26

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.2 in/hr	7.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
7.6 cfs	16.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XXVII
AREA: 1.39
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.39	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	1.39			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	50	3		3.68		2.76
Street	500	3.6	3.8	2.19	4	2.08
Tc Total:				5.87		4.84

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.9 in/hr	9.2 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
4.8 cfs	10.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XXVIII
AREA: 3.83
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	4.05	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	4.05			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	200	4		6.69		5.02
Street	1700	2	2.8	10.12	3	9.44
Tc Total:				16.81		14.47

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
3.3 in/hr	5.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
8.8 cfs	18.1 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XXIX
AREA: 1.51
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.51	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	1.51	S		100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	100	4		4.73		3.55
Street	450	2.5	3.2	2.34	3.4	2.21
Tc Total:				7.08		5.76

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.6 in/hr	8.3 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
4.9 cfs	10.0 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XXX
AREA: 0.62
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Future Residential	0.62	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0.62			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	180	3		6.98		5.24
Tc Total:				6.98		5.24

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.7 in/hr	8.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
2.0 cfs	4.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: XXXI
AREA: 2.75
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Open Space	2.75	0.35	0.60	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	2.75			100%

COMPOSITE: C5= 0.35 C100= 0.60

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	50	4		6.28		4.18
Swale	1200	2.8	2.5	8.00	2.7	7.41
Tc Total:				14.28		11.59

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
3.5 in/hr	6.7 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
3.4 cfs	11.1 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: OS-1
AREA: 12.90
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Commerical	12.90	0.90	0.90	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	12.90			100%

COMPOSITE: C5= 0.90 C100= 0.90

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	30	2		6.11		4.07
Street	300	3	3.4	1.47	3.6	1.39
Pipe	1200	3	12	1.67	14	1.43
Tc Total:				9.25		6.89

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.1 in/hr	8.2 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
47.6 cfs	95.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: OS-2
AREA: 3.32
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Landscaping	2.49	0.35	0.60	75.00%
Street	0.83	0.90	0.90	25.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	3.32			100%

COMPOSITE: C5= 0.49 C100= 0.68

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	15	2		3.53		2.45
Swale	800	3.8	3.9	3.42	4.1	3.25
Tc Total:				6.95		5.70

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.7 in/hr	8.6 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
7.6 cfs	19.3 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: OS-3
AREA: 2.46
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Landscaping	2.01	0.35	0.60	81.71%
Streets	0.45	0.90	0.90	18.29%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	2.46			100%

COMPOSITE: C5= 0.45 C100= 0.65

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	15	2		3.74		2.56
Street	450	2	2.8	2.68	3	2.50
Tc Total:				6.42		5.06

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.5 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
5.0 cfs	14.5 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: OS-4
AREA: 1.2
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	1.2	0.90	0.90	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	1.20			100%

COMPOSITE: C5= 0.90 C100= 0.90

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Street	700	1.2	2	5.83	2.2	5.30
Tc Total:				5.83		5.30

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
5.2 in/hr	8.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
5.6 cfs	9.6 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: OS-5
AREA: 25.69
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Future Residential	25.69	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	25.69			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	150	3		6.38		4.78
Street	1200	3.3	3.8	5.26	4	5.00
Tc Total:				11.64		9.78

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
3.8 in/hr	7.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
68.3 cfs	143.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: OS-6
AREA: 2.37
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Landscaping	0.97	0.35	0.60	40.93%
Street	1.4	0.90	0.90	59.07%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	2.37			100%

COMPOSITE: C5= 0.67 C100= 0.78

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	30	5		2.56		1.94
Street	1800	3	3.4	8.82	3.6	8.33
Tc Total:				11.38		10.28

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
3.9 in/hr	7.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
6.2 cfs	12.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: OS-7
AREA: 0.4
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Landscaping	0.04	0.25	0.36	10.00%
Street	0.36	0.90	0.90	90.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0.40			100%

COMPOSITE: C5= 0.84 C100= 0.85

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	15	5		1.13		1.08
Street	200	1	2	1.67	2.2	1.52
Tc Total:				2.80		2.60

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
5.2 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
1.7 cfs	3.0 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: OS-8
AREA: 0.64
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Landscaping	0.24	0.35	0.60	37.50%
Street	0.4	0.90	0.90	62.50%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0.64			100%

COMPOSITE: C5= 0.69 C100= 0.79

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	15	2		2.34		1.80
Street	500	2.5	3.2	2.60	3.4	2.45
Tc Total:				4.94		4.25

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
5.2 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
2.3 cfs	4.5 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: OS-9
AREA: 0.34
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Landscaping	0.13	0.35	0.60	38.24%
Street	0.21	0.90	0.90	61.76%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0.34			100%

COMPOSITE: C5= 0.69 C100= 0.79

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	15	5		1.75		1.34
Street	200	1	2	1.67	2.2	1.52
Tc Total:				3.41		2.86

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
5.2 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
1.2 cfs	2.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: OS-10
AREA: 2.92
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Landscaping	1.24	0.35	0.60	42.47%
Street	1.68	0.90	0.90	57.53%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	2.92			100%

COMPOSITE: C5= 0.67 C100= 0.77

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	100	4		5.13		3.87
Street	700	4	4	2.92	4.2	2.78
Tc Total:				8.05		6.65

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.5 in/hr	8.3 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
8.8 cfs	18.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: OS-11
AREA: 2.00
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Landscaping	0.80	0.35	0.60	40.00%
Street	1.20	0.90	0.90	60.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	2.00			100%

COMPOSITE: C5= 0.68 C100= 0.78

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	30	3		2.99		2.28
Street	900	2.5	3.2	4.69	3.4	4.41
Tc Total:				7.68		6.69

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.5 in/hr	8.3 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
6.1 cfs	12.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: OS-12
AREA: 2.83
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Landscaping	1.13	0.35	0.60	39.93%
Street	1.70	0.90	0.90	60.07%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	2.83			100%

COMPOSITE: C5= 0.68 C100= 0.78

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	30	3		2.99		2.28
Street	900	2.5	3.2	4.69	3.4	4.41
Tc Total:				7.68		6.69

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.5 in/hr	8.3 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
8.7 cfs	18.3 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: OS-DP 1 (BASINS OS-1 - OS-4; OS-10;OS-11 & OS-12)
AREA: 27.63
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Commercial	12.9	0.90	0.90	46.69%
Landscaping	7.67	0.35	0.60	27.76%
Street	7.06	0.90	0.90	25.55%
	0	0.00	0.00	0.00%
	27.63			100%

COMPOSITE: C5= 0.75 C100= 0.82

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	30	2		6.11		4.07
Street	300	3	3.4	1.47	3.6	1.39
Pipe	1200	3	12	1.67	14	1.43
Tc Total:				9.25		6.89

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.1 in/hr	8.2 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
84.7 cfs	185.0 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: OS-DP 3 (BASINS OS-5 - OS-9)
AREA: 29.44
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
OS-DP 2	3.75	0.70	0.79	12.74%
0S-5	25.69	0.70	0.80	87.26%
	0	0.00	0.00	0.00%
	29.44			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	150	3		6.38		4.78
Street	1200	3.3	3.8	5.26	4	5.00
Tc Total:				11.64		9.78

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
3.8 in/hr	7.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
78.3 cfs	164.6 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: DP 1 (BASINS I - VII & OS DP#3)
AREA: 49.22
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	18.67	0.70	0.80	37.93%
Landscaping	0.46	0.35	0.60	0.93%
Street	0.65	0.90	0.90	1.32%
OS-DP#3	29.44	0.70	0.80	59.81%
	49.22			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	150	3		6.39		4.79
Street	1200	3.3	3.8	5.26	4	5.00
Pipe Flow	1100	3	16	1.15	18	1.02
Tc Total:				12.79		10.81

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
3.7 in/hr	6.8 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
127.4 cfs	267.6 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: DP2 (DP1 + BASINS IX-XII)
AREA: 60.59
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
DP#1	49.22	0.70	0.80	81.23%
BASINS IX through XII	11.37	0.70	0.80	18.77%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	60.59			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	150	3		6.38	cfs	
Street	1200	3.3	3.8	5.26	4	5.00
Pipe Flow	1800	3	16	1.88	18	1.67
Tc Total:				13.51		6.67

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
3.6 in/hr	6.6 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
152.7 cfs	319.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: DP5 (DP#2 & DP#4)
AREA: 85.47
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
DP#2	60.59	0.70	0.80	70.89%
DP#4	24.88	0.58	0.66	29.11%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	85.47			100%

COMPOSITE: C5= 0.67 C100= 0.76

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	300	1.5		21.25		14.17
Swale	50	1.5	0.9	0.93	1.1	0.76
Tc Total:				22.18		14.92

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
2.8 in/hr	5.8 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
159.2 cfs	376.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: DP6
AREA: 34.45
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	34.45	0.70	0.80	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	34.45			100%

COMPOSITE: C5= 0.70 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	100	3		5.21		3.90
Pipe Flow	2200	3	15	2.44	17	2.16
Tc Total:				7.65		6.06

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
4.5 in/hr	8.5 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
108.5 cfs	234.3 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: WEST CREEK AT WOLF RANCH

BASIN: DP7
AREA: 133.26
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
DP#5	85.47	0.67	0.76	64.14%
DP#6	34.45	0.68	0.79	25.85%
XXXI	2.75	0.35	0.6	2.06%
XVII	8.28	0.35	0.60	6.21%
XVI	2.31	0.00	0.00	1.73%
	133.26			100%

COMPOSITE: C5= 0.63 C100= 0.73

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	300	1.5		21.25		14.17
Swale	50	1.5	0.9	0.93	1.1	0.76
Pipe Flow	1300	3	15	1.44	17	1.27
Tc Total:				23.62		16.20

Intensity, I (inches/hr) from Fig 5-1

I5	**I100**
2.7 in/hr	5.8 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
225.7 cfs	563.4 cfs

100 YEAR STREET CAPACITY (TYPE S & L4)

$$Q = \frac{1.486}{n}(A)\left(\frac{A}{P}\right)^{2/3}(S)^{1/2}$$

½ STREET SECTION

ASPALT AREA
$A = 12.29$
$P = 16.17$
$n = 0.016$

CONCRETE AREA
$A = 1.9$
$P = 2.68$
$n = 0.013$

SOD
$A = 3.12$
$P = 12.51$
$n = 0.035$

TOTAL AREA = 17.31

$$Q = \frac{1.486}{0.016}(12.29)\left(\frac{12.29}{16.17}\right)^{2/3} S^{1/2} + \frac{1.486}{0.013}(1.9)\left(\frac{1.9}{2.68}\right)^{2/3} S^{1/2} + \frac{1.486}{0.035}(3.12)\left(\frac{3.12}{12.51}\right)^{2/3} S^{1/2}$$

$$= 950\,S^{1/2} + 172\,S^{1/2} + 52\,S^{1/2}$$

$$Q_{CAP} = 1174\,S^{1/2} / 5.05$$

Q 1% = 117 cfs

Q 2% = 166 cfs

Q 3% = 203 cfs

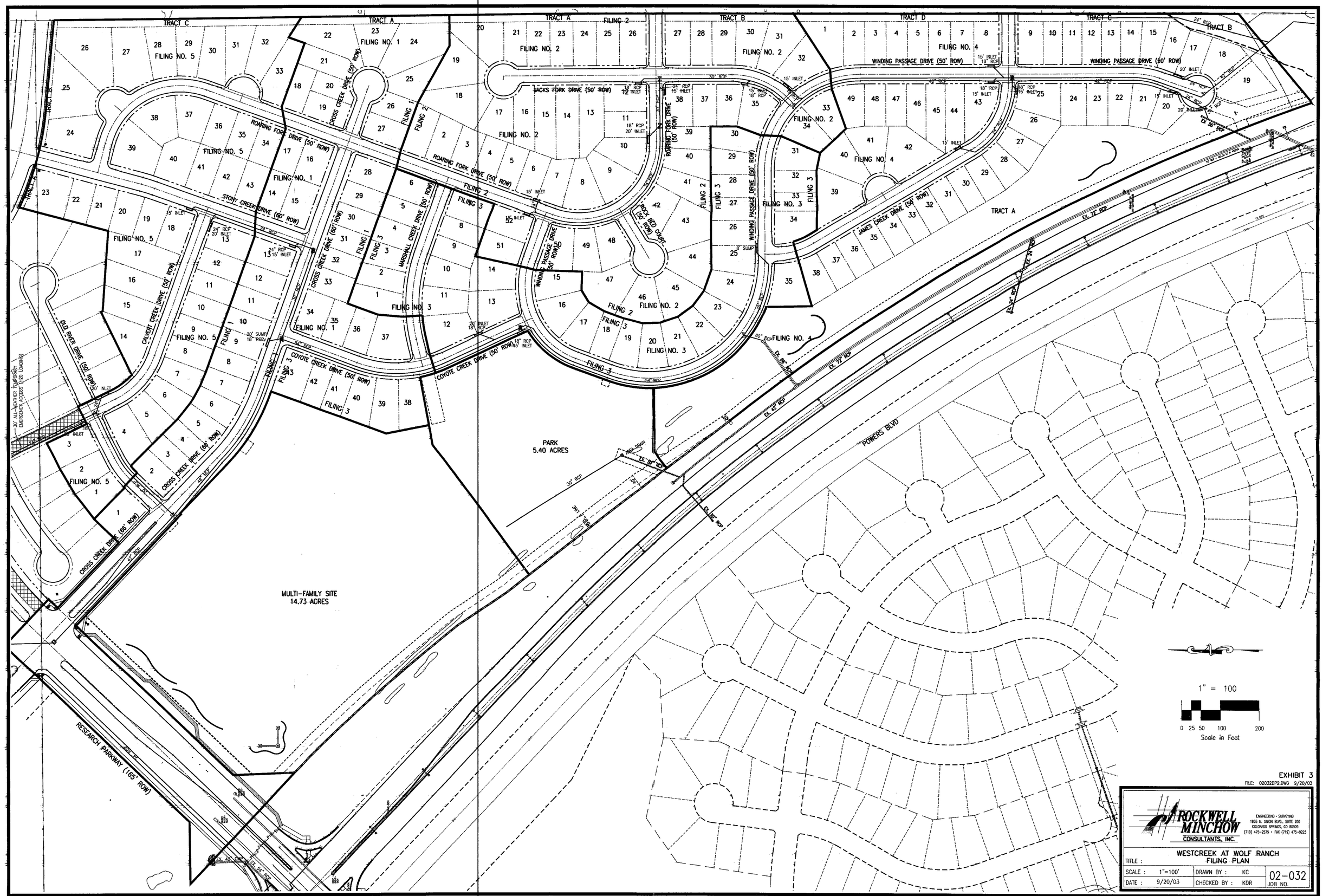


EXHIBIT 3

FILE: 02032DP2.DWG 9/20/03

ROCKWELL MINCHOW CONSULTANTS, INC.

ENGINEERING • SURVEYING
1955 N. UNION BLVD., SUITE 200
COLORADO SPRINGS, CO 80909
(719) 475-2575 • FAX (719) 475-9223

TITLE : WESTCREEK AT WOLF RANCH FILING PLAN

SCALE :	1"=100'	DRAWN BY : KC	02-032
DATE :	9/20/03	CHECKED BY : KDR	JOB NO.

HISTORIC DRAINAGE BASIN TABLE

BASIN	AREA (Ac.)	Q_5 (CFS)	Q_{100} (CFS)
A	5.01	2.8	5.9
B	9.23	6.5	14.1
C	52.39	22.3	50.3
D	8.86	7.8	16.5
E	13.47	8.1	17.0

EXHIBIT 1

FILE: 02032DP2.DWG 9/20/03

ROCKWELL MINCHOW CONSULTANTS, INC.
ENGINEERING • SURVEYING
1955 N. UNION BLVD., SUITE 200
COLORADO SPRINGS, CO 80909
(719) 475-2575 • FAX (719) 475-9223

TITLE : WESTCREEK AT WOLF RANCH HISTORIC DRAINAGE PLAN

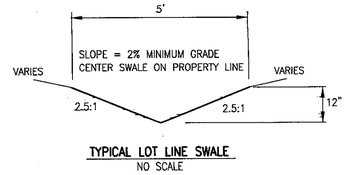
SCALE :	1"=100'	DRAWN BY :	KC	02-032 JOB NO.
DATE :	9/20/03	CHECKED BY :	KDR	

DEVELOPED DRAINAGE BASIN TABLE

BASIN	AREA (Ac.)	Q_5 (CFS)	Q_{100} (CFS)
OS-1	12.90	47.6	95.2
OS-2	3.32	7.6	19.3
OS-3	2.46	5.0	14.5
OS-4	1020	5.6	9.6
OS-5	25.69	68.3	143.9
OS-6	2.37	6.2	12.9
OS-7	0.40	1.7	3.0
OS-8	0.64	2.3	4.5
OS-9	0.34	1.2	2.4
OS-10	2.92	8.8	18.7
OS-11	2.00	6.1	12.9
OS-12	2.83	8.7	18.3
I	2.44	7.6	16.2
II	4.42	12.1	27.7
III	2.10	6.0	13.8
IV	3.56	11.2	23.9
V	3.98	11.4	24.8
VI	1.66	5.3	11.3
VII	1.62	5.2	11.4
VIII	0.97	3.5	7.0
IX	2.69	7.3	16.1
X	4.29	11.7	24.4
XI	3.12	8.5	18.5
XII	1.27	4.6	9.1
XIII	12.41	28.7	61.6
XIV	2.75	2.7	9.6
XV	2.74	3.6	12.2
XVI	2.31	4.0	9.8
XVII	8.28	6.1	17.9
XVIII	4.11	10.9	23.0
XIX	5.93	16.2	33.7
XX	1.19	3.7	8.0
XXI	2.84	8.5	17.9
XXII-A	1.90	5.7	12.2
XXII-B	0.40	1.3	2.9
XXIII	3.36	9.2	19.6
XXIV	0.15	0.5	1.1
XXV-A	2.66	8.4	17.7
XXV-B	2.14	6.4	13.9
XXVI	2.57	7.6	16.2
XXVII	1.39	4.8	10.2
XXVIII	3.83	8.8	18.1
XXIX	1.51	4.9	10.0
XXX	0.62	2.0	4.4
XXXI	2.75	3.4	11.1

DESIGN POINT TABLE

BASIN	AREA (Ac.)	Q_5 (CFS)	Q_{100} (CFS)
DP#1	49.22	127.4	257.6
DP#2	60.59	152.7	319.9
DP#3	15.16	27.0	67.2
DP#4	24.88	40.5	95.7
DP#5	85.47	159.2	376.4
DP#6	34.45	89.2	205.7
DP#7	133.25	225.7	563.4
OS-DP#1	27.63	84.7	185.0
OS-DP#2	3.75	10.2	20.7
OS-DP#3	29.44	78.3	164.6



TYPICAL LOT LINE SWALE
NO SCALE

1" = 100'

0 25 50 100 200
Scale in Feet

EXHIBIT 2

SHEET 1 OF 3

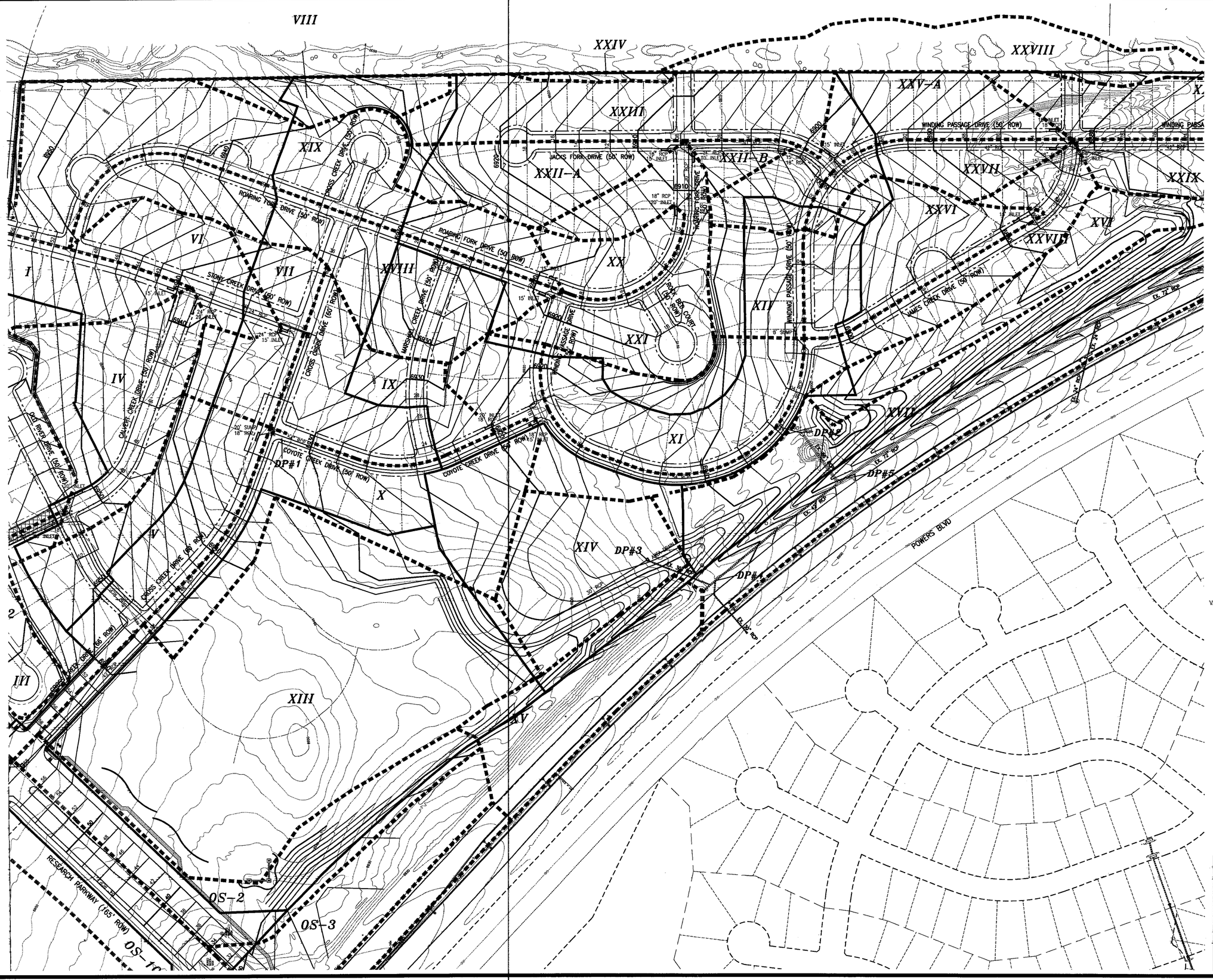
FILE: 02032DP2.DWG 9/20/03

ROCKWELL MINCHOW CONSULTANTS, INC.

ENGINEERING • SURVEYING
1955 N. UNION BLVD., SUITE 200
COLORADO SPRINGS, CO 80909
(719) 475-2575 • FAX (719) 475-9223

TITLE : WESTCREEK AT WOLF RANCH
DEVELOPED DRAINAGE PLAN

SCALE :	1"=100'	DRAWN BY : KC	02-032
DATE :	9/20/03	CHECKED BY : KDR	JOB NO.

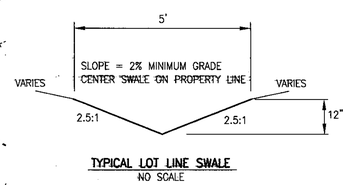


DEVELOPED DRAINAGE BASIN TABLE

BASIN	AREA (Ac.)	Q_5 (CFS)	Q_{100} (CFS)
OS-1	12.90	47.6	95.2
OS-2	3.32	7.6	19.3
OS-3	2.46	5.0	14.5
OS-4	1020	5.6	9.6
OS-5	25.69	68.3	143.9
OS-6	2.37	6.2	12.9
OS-7	0.40	1.7	3.0
OS-8	0.64	2.3	4.5
OS-9	0.34	1.2	2.4
OS-10	2.92	8.8	18.7
OS-11	2.00	6.1	12.9
OS-12	2.83	8.7	18.3
I	2.44	7.6	16.2
II	4.42	12.1	27.7
III	2.10	6.0	13.8
IV	3.56	11.2	23.9
V	3.98	11.4	24.8
VI	1.66	5.3	11.3
VII	1.62	5.2	11.4
VIII	0.97	3.5	7.0
IX	2.69	7.3	16.1
X	4.29	11.7	24.4
XI	3.12	8.5	18.5
XII	1.27	4.6	9.1
XIII	12.41	28.7	61.6
XIV	2.75	7.7	9.6
XV	2.74	3.6	12.2
XVI	2.31	4.0	9.8
XVII	8.28	6.1	17.9
XVIII	4.11	10.9	23.0
XIX	5.93	16.2	33.7
XX	1.19	3.7	8.0
XXI	2.84	8.5	17.9
XXII-A	1.90	5.7	12.2
XXII-B	0.40	1.3	2.9
XXIII	3.36	9.2	19.6
XXIV	0.15	0.5	1.1
XXV-A	2.66	8.4	17.7
XXV-B	2.14	6.4	13.9
XXVI	2.57	7.6	16.2
XXVII	1.39	4.8	10.2
XXVIII	3.83	8.8	18.1
XXIX	1.51	4.9	10.0
XXX	0.62	2.0	4.4
XXXI	2.75	3.4	11.1

DESIGN POINT TABLE

BASIN	AREA (Ac.)	Q_5 (CFS)	Q_{100} (CFS)
DP#1	49.22	127.4	267.6
DP#2	60.59	152.7	319.9
DP#3	15.16	27.0	67.2
DP#4	24.88	40.5	95.7
DP#5	85.47	159.2	376.4
DP#6	34.45	89.2	206.7
DP#7	133.26	225.7	563.4
OS-DP#1	27.63	84.7	185.0
OS-DP#2	3.75	10.2	20.7
OS-DP#3	29.44	78.3	164.6



TYPICAL LOT LINE SWALE
NO SCALE

1" = 100'

0 25 50 100 200
Scale in Feet

EXHIBIT 2
SHEET 2 OF 3
FILE: 02032DP2.DWG 9/20/03

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ENGINEERING • SURVEYING
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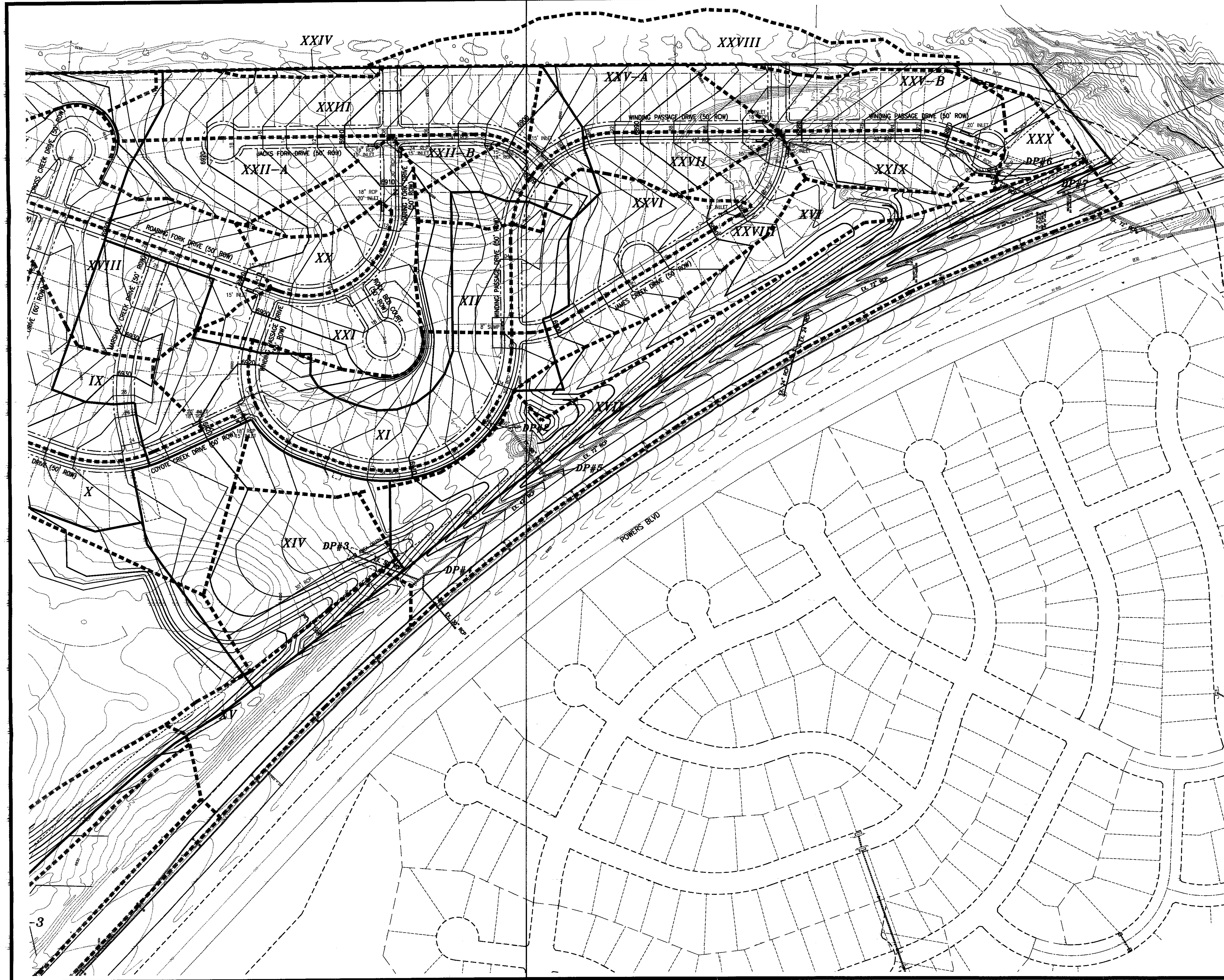
COLORADO SPRINGS, CO 80909
(719) 475-2575 • FAX (719) 475-9223

TITLE : WESTCREEK AT WOLF RANCH
DEVELOPED DRAINAGE PLAN

SCALE : 1"=100'	DRAWN BY : KC	02-032
DATE : 9/20/03	CHECKED BY : KDR	JOB NO.



DEVELOPED DRAINAGE BASIN TABLE

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IV	3.56	11.2	23.9
V	3.98	11.4	24.8
VI	1.66	5.3	11.3
VII	1.62	5.2	11.4
VIII	0.97	3.5	7.0
IX	2.69	7.3	16.1
X	4.29	11.7	24.4
XI	3.12	8.5	18.5
XII	1.27	4.6	9.1
XIII	12.41	28.7	61.6
XIV	2.75	2.7	9.6
XV	2.74	3.6	12.2
XVI	2.31	4.0	9.8
XVII	8.28	6.1	17.9
XVIII	4.11	10.9	23.0
XIX	5.93	16.2	33.7
XX	1.19	3.7	8.0
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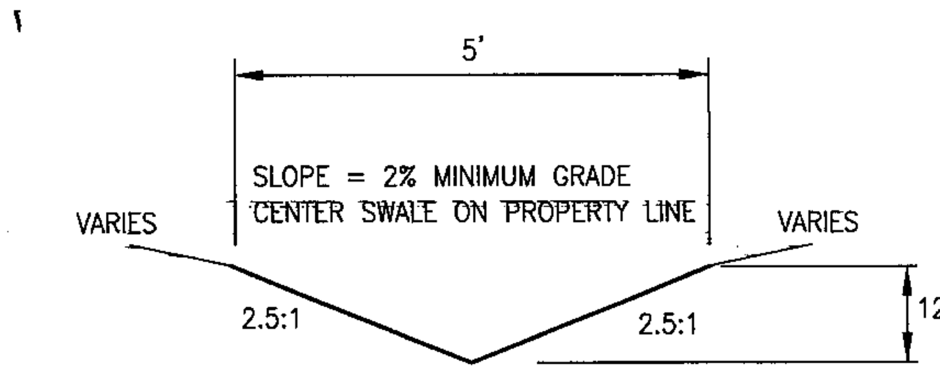

TYPICAL LOT LINE SWALE
NO SCALE

1" = 100'

0 25 50 100 200
Scale in Feet

SHEET 3 OF 3

EXHIBIT 2
FILE: 02032DP2.DWG 9/20/03

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TITLE : WESTCREEK AT WOLF RANCH DEVELOPED DRAINAGE PLAN				
SCALE :	1"=100'	DRAWN BY :	KC	02-032 JOB NO.
DATE :	9/20/03	CHECKED BY :	KDR	