WESTCREEK AT WOLF RANCH SUBDIVISION
MASTER DEVELOPMENT DRAINAGE REPORT
&
FINAL DRAINAGE REPORT
For
WESTCREEK AT WOLF RANCH SUBDIVISION FILINGS 6, 7, 8, 9, 10, 11 and 12
And
Research Parkway at Wolf Ranch Filings 1, 2 and 3

July, 2004

Prepared for:

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

Prepared by:

Rockwell Consulting, Inc.
1955 N. Union Boulevard, Suite 200
Colorado Springs, CO 80909
(719) 475-2575

Project# 03-010

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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.

9/7/04

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: _____ 9/2/04
Ralph Braden DATE

TITLE: Vice President, Norwood Limited, Inc.

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.

_____ Sept 14 2004
CITY ENGINEER 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 Filings 6 through 12 and Research Parkway at Wolf Ranch Filings 1 through 3. These filings are located east of the Powers Boulevard and Research Parkway intersection within Colorado Springs, CO (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.

9. "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, prepared by Rockwell Minchow Consultants, Inc., dated September, 2003.

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 southwest quarter of Section 31, Township 13 South, Range 65 West of the 6th P.M. The site is bound on the west by residential development, on the south by residential development and vacant county land, and on the north and east by future development within the Wolf Ranch Master Plan area. Tributary 4 of Cottonwood Creek extends in a northerly direction along the east side of the subject filings.

Well-established native grasses exist throughout the proposed development. The topography generally slopes from north to south. Previous filings of the Westcreek Development are currently under construction southwest of these proposed filings.

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/Bernal Series (Soil 85), and the Truckton Series (Soil 97). All these soils are classified as Hydrologic Group "A" soils. However, since bedrock is known to exists just below the surface 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 and #08041c0529 F, dated March 17, 1997, no portion of the Westcreek at Wolf Ranch Filings 6 through 12 or Research Parkway Filings 1 through 3 property lies within a designated 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 3 historical drainage basins which include a sizable amount of area upstream of the subject filings.

Historic Basin H-1 consists of 84.0 acres and extends from the southwest corner of the proposed subject filings to a point approximately 5,500 feet to the north. Runoff rates of 42.8 cubic feet per second (cfs) during the 5 year storm and 136.1 cfs during the 100 year storm are generated from this basin. These flows historically have reached the area which is currently being developed as Westcreek Filings 1 and 5. These flows cross what is now Westcreek Filings 1 through 5 and enter directly into Cottonwood Creek.

Basin H-2 consists of an additional 187 acres that extends from the southern property line of Wolf Ranch all the way to Old Ranch Road. Historic runoff rates of Q_5 = 89.8 cfs and Q_{100} = 294.5 cfs are generated from this basin. These flows historically have exited the Wolf Ranch property and entered the Goetsch property within an existing swale.

A third historic basin, Basin H-3, consists of approximately 120 acres and generates runoff rates of 61.2 cfs during the 5 year storm and 189 cfs during the 100 year storm. Like the flows from Basin H-2, these flows enter the Goetsch property within a natural swale.

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.

Basin OS-1 consists of approximately 23.7 acres north of Research Parkway and east of future Cross Creek Drive. At this time, the exact development of this area is unknown. However, it is master plan as residential development. Therefore, general drainage patterns were assumed for this area. As stated in the original Westcreek Filings 1 through 5 report, runoff generated from this area will be conveyed to the northeast corner of Research Parkway and Cross Creek Drive. A 42" RCP has previously been extended to this corner to convey the flows generated from Basin OS-1. The 42" RCP will convey the anticipated runoff rates of Q_5 = 63.1 cfs and Q_{100} = 132.9 cfs generated from Basin OS-1. Portions of the 42" RCP extending southerly from this intersection has been constructed with previous Westcreek filings.

Developed Basin 1 consists of a small portion of Research Parkway at the northeast corner of Research and Cross Creek Drive. The runoff rates of 1.5 cfs during the 5 year storm and 2.9 cfs during the 100 year storm generated from this basin will flow westerly in Research and then northerly within future Cross Creek Drive. These flows will be collected within a future inlet just north of Research Parkway and be conveyed westerly within the 24" RCP located along the north side of Research Parkway. As stated in the Westcreek Phase I report, these two inlets collect a total of 14.8 cfs during the 5 year storm and 31.2 cfs during the 100 year storm.

Basin 2 is located at the southeast corner of Research Parkway and Cross Creek Drive. Runoff rates of Q_5 = 1.5 cfs and Q_{100} = 2.6 cfs generated from this basin will also flow westerly within Research Parkway and then southerly within Cross Creek Drive. These flows reach an existing inlet located approximately 900 feet south of Research along the east side of Cross Creek.

Approximately 0.56 acres along the north side of Research Parkway comprises Basin 3. The runoff rates of 1.8 cfs and 3.6 cfs generated from this basin during the 5 year and 100 year storms, respectively, flow easterly within Research Parkway to a proposed 6' sump inlet.

Additional flows reach this same inlet from Basin 4. Basin 4 consists of approximately 2.71 acres along the north side of Research Parkway and the west half of the roadway extending northerly from Research Parkway. Flow rates of Q_5 = 7.3 cfs and Q_{100} = 12.4 cfs generated from this basin approach the 6' sump inlet from the east. A 24" RCP will convey the flows collected from Basins 3 and 4 southerly across Research Parkway (Q_5 = 9.1 cfs and Q_{100} = 16.0 cfs).

Basin 5 is located along the south side of Research Parkway just south of Basin 3. Runoff rates of 1.1 cfs during the 5 year storm and 2.3 cfs during the 100 year storm flow easterly within Research Parkway to a proposed 6' sump inlet.

Runoff rates of Q_5 = 2.4 cfs and Q_{100} = 4.7 cfs reach this same sump inlet from Basin 6 located directly east of Basin 5. The proposed 6' sump inlet will collect a total of 3.5 cfs during the 5 year storm and 7.0 cfs during the 100 year storm.

Total runoff rates of 11.7 cfs during the 5 year storm and 20.2 cfs during the 100 year storm are generated from Basins 3, 4, 5 and 6 (Design Point #1). A 24" RCP will convey these flows southerly within Calvert Creek Drive.

Basin 7A consists of a proposed landscape area along the south side of Research Parkway and the north half of Prima Lane. A 6' sump inlet will be installed along the north side of Prima Lane at Calvert Creek to collect the flow rates of 3.6 cfs and 8.3 cfs generated during the 5 and 100 year storms, respectively. A 24" RCP will convey these flows southerly within Calvert Creek.

Basin 7B is located just south of Basin 7 and consists of residential lots along the south side of Prima Lane and along the west side of Calvert Creek. This 0.84 acre basin generates runoff rates of Q_5 = 3.0 cfs and Q_{100} = 6.2 cfs. These flows continue southerly within the west side of Calvert Creek Drive. (This basin is basically the same as Basin III presented in the Westcreek Filing No. 1 through 5 Final Drainage Report.) An existing 20' inlet located at the northwest corner of Calvert Creek Drive and Old River Drive will collect 2.6 during the 5 year storm and 4.7 during the 100 year storm. The remaining flows of 0.4 and 1.5 cfs bypassing this inlet during the 5 and 100 year storms, will continue southerly as street flow within the west half of Calvert Drive. These flows were anticipated in the Westcreek Filing 1 through 5 Final Drainage Report.

Basins 8 and 9, as presented in this report, are basically the same as Basin II presented in the Westcreek Filing 1 through 5 Final Drainage Report. Basin 8 generates runoff rates of 4.2 cfs during the 5 year storm and 8.8 cfs during the 100 year storm. These runoff rates flows southerly within Calvert Creek to Old River Drive.

Runoff rates of Q_5 = 7.1 cfs and Q_{100} = 15.1 cfs are generated from the 2.19 acre Basin 9. These flows also reach the Calvert Creek Drive and Old River Drive intersection. A 20' on-grade inlet along the south side of Old River along the east side of Calvert Creek Drive will collect 7.8 cfs during the 5 year storm and 14.4 cfs during the 100 year storm. The bypass flows of Q_5 = 3.5 cfs and Q_{100} = 9.5 cfs are consistent with the bypass flows anticipated in the Filing 1 through 5 report.

Approximately 1.34 acres along the south side of Old River Drive comprises Basin 10. The runoff rates of 4.5 cfs and 9.6 cfs generated from this basin during the 5 year and 100 year storms, respectively, sheet flow to the south into Westcreek Filing No. 5. These flows were anticipated in the Westcreek Filing No. 1 through 5 drainage report.

Basin 11 consists of the west half of Tutt Boulevard between Research Parkway and Stoney Creek Drive. This 0.85 acre basin generates runoff rates of Q_5 = 3.1 cfs and Q_{100} = 5.8 cfs. These runoff rates flow southeasterly within Tutt Boulevard and then turn south into Stoney Creek Drive. These flows were also accounted for in the Westcreek Filing 1 through 5 Final Drainage Report.

The eastern half of Tutt Drive from Research Parkway to its termination at the Westcreek boundary comprises Basin 12. This 3.71 acre basin generates runoff rates of 11.2 cfs during the 5 year storm and 23.3 cfs during the 100 year storm. These flows will discharge directly into the existing swale along the west side of the Goetsch's property. These flows are less than the historic flows reaching this same point considering the upstream developed flows reaching this swale are detained within the proposed Westcreek detention pond.

Basin 13 consists of 1.18 acres along the north side of Research Parkway and east side of Tutt Boulevard. Runoff rates of 3.3 cfs during the 5 year storm and 6.8 cfs during the 100 year storm reach a proposed 20' sump inlet to be constructed along the north side of Research Parkway. Research Parkway at a minimum slope of 0.6% has a 5 year street capacity of 13.3 cfs per side.

Additional flows generated from Basin 14 will reach this same 20' sump inlet from the east. The flow rates approaching this inlet from the east will be 12.1 cfs during the 5 year storm and 22.4 cfs during the 100 year storm. The proposed 20' sump inlet along the north side of Research Parkway will collect total flows of Q_5 = 15.4 cfs and Q_{100} = 29.2 cfs from Basin 13 and 14. (The flows from Basins OS-2 and OS-3 will be conveyed within future pipes connecting to the proposed 54" RCP. These future pipes will be constructed at the time Basins OS-2 and OS-3 are developed.)

Additional flows will enter this inlet via a 54" RCP to be stubbed northerly to collect the combined flows from Basins OS-2 and OS-3. Basin OS-2 consists of 19.96 acres northeast of the Research Parkway and Tutt Boulevard intersection. Runoff rates of Q_5 = 53.1 cfs and Q_{100} = 111.8 cfs are anticipated to be developed from Basin OS-2. The 54" RCP will be extended north approximately 4 feet from Research Parkway as part of the Research street construction. This will be the outfall system for additional residential development north of Research which is anticipated to be developed in 2005 or 2006.

Basin OS-3, consisting of 14.46 acres directly southeast of Basin OS-2, generates an additional 40.5 cfs during the 5 year storm and 84.4 cfs during the 100 year storm. The total flow reaching the proposed 54" RCP extending from the inlet are Q_5 = 93.6 cfs and Q_{100} = 196.2 cfs.

Total runoff rates from Basins 13, 14, OS-1 and OS-2 of 106.2 cfs and 216.3 cfs reach Design Point #2 during the 5 year and 100 year storms, respectively.

Basin 15 is located along the south side of Research Parkway just east of Tutt Boulevard. This 0.41 acre basin generates runoff rates of 1.5 cfs and 2.8 cfs during the 5 year and 100 year storms, respectively. These flows will reach a proposed 8' sump inlet located approximately 250 east of Tutt Boulevard along the south side of Research Parkway.

Additional flow rates of 5.8 cfs during the 5 year storm and 11.5 cfs during the 100 year storm will reach this same 8' sump inlet from Basin 16.

The total flows at Design Point #3 will be 112.0 during the 5 year storm and 229.4 cfs during the 100 year storm. A 54" RCP will convey these flows southerly to the proposed 8' inlet within Basins 17 and 18.

Basin 17 consists of a landscape area just south of Research Parkway and generates runoff rates of 1.3 cfs during the 5 year storm and 2.9 cfs during the 100 year storm. These flows will continue easterly along the north side of Kent Creek Drive to Cornet Drive as street flow reaching a proposed 8' sump inlet.

Additional area of landscape areas south of Research north of Kent Creek Drive comprise Basin 18. This 1.39 acre basin generates additional flows of Q_5 = 2.8 cfs and Q_{100} = 3.7 cfs. These flows approach the Kent Creek Drive and Cornet Drive intersection from the east. An 8' sump inlet will collect the total flow rates of Q_5 = 4.1 cfs and Q_{100} = 6.6 cfs generated from Basins 17 and 18.

Basin 19 consists of the residential lots along the south side of Kent Creek Drive and on both sides of Cornet Drive. Runoff rates of 7.7 cfs and 16.2 cfs generated from this basin during the 5 year and 100 year storms, respectively flow south in Cornet Drive. These flows then turn east on Stoney Creek Drive and reach a proposed 15' sump inlet along the north side of Stoney Creek.

Basin 20 is located southwest of the Research Parkway and Wolf Center Drive. This 1.10 acre basin generates runoff rates of 3.6 cfs during the 5 year storm and 7.4 cfs during the 100 year storm. The flows from this basin travel south on Wolf Center Drive and then west along the north side of Stoney Creek Drive.

Additional flows from Basin 21 combine with flows from Basin 20 at the intersection of Stoney Creek Drive and Comet Lane. Basin 21 generates runoff rates of 3.9 cfs and 8.4 cfs during the 5 year and 100 year storms, respectively. The combined flows of Q_5 = 7.5 cfs and Q_{100} = 15.8 cfs continue as street flow along the north side of Stoney Creek Drive entering Basin 22.

Basin 22 is located along the north side of Stoney Creek Drive west of Comet Lane. Additional flow rates of Q_5 = 5.6 cfs and Q_{100} = 12.2 cfs will enter the north side of Stoney Creek and combine with the flows from Basins 20 and 21. Total flow rates of 13.1 cfs during the 5 year storm and 28.0 cfs reach the low point in Stoney Creek Drive just east of Cornet Drive. The combined flows from Basins 20, 21, and 22 reach the 15' sump inlet along with the flows from Basin 19. A 30" RCP will cross Stoney Creek Drive to the inlet on the south side of Stoney Creek Drive.

Basin 23 consists of residential lots along the south side of Stoney Creek Drive and generates runoff rates of Q_5 = 3.8 cfs and Q_{100} = 8.0 cfs. These flows continue westerly within the south side of Stoney Creek Drive as street flow, reaching the low point in Stoney Creek. An 8' sump inlet will collect these flows.

Additional flows reach this same low point from Basin 24. Flow rates of 1.1 cfs and 2.2 cfs are generated from Basin 24 during the 5 year and 100 year storms, respectively.

Total flows of Q_5 = 136.9 cfs and Q_{100} = 281.3 cfs reach Design Point #4 from Basins OS-2, OS-3, and Basins 13 through 24. A 54" RCP will convey these flows southerly to the proposed detention pond.

Basin 25 is located along the east side of the Wolf Center Drive and north of Research Parkway. This 2.72 acre basin generates runoff rates of 8.4 cfs and 15.2 cfs during the 100 year storm. These flows reach a low point in Research Parkway approximately 200' east of Wolf Center Drive. A 8' sump inlet will be installed at this point to collect the flows from Basin 25 and Basin 26.

Basin 26 consists of the area along the north side of Research Parkway from this low point to Wolf Lake Drive Runoff rates of Q_5 = 10.8 cfs and Q_{100} = 20.3 cfs generated from this basin will flow westerly within Research Parkway to the proposed 8' sump inlet. Research Parkway at a minimum slope of 0.6% has a 5 year street capacity of 13.3 cfs per side.

Basin OS-4 is located to the north of Basin 25 and 26 and consists of future residential development. Runoff rates of 106.9 cfs and 222.3 cfs are anticipated from this basin. A 48" RCP will be stubbed into this basin from the sump inlet within Basins 25 and 26 to convey these flows. A 48" RCP will convey the combined flows from Basin OS-4, 25 and 26 across Research Parkway.

Basin 27 is located along the south side of Research Parkway just east of Wolf Center Drive. This 0.45 acre basin generates runoff rates of 1.6 cfs during the 5 year storm and 3.2 cfs during the 100 year storm. These flows will travel easterly along the south side of Research Parkway to a proposed 8' sump inlet.

Runoff rates of Q_5 = 6.0 cfs and Q_{100} = 11.4 cfs generated from Basin 28 reach this same 8' sump inlet from the east. The total combined flows of Q_5 = 133.6 cfs and Q_{100} = 272.2 cfs from Basins OS-4, 25, 26, 27 and 28 will flow southerly within a 48" RCP to Design Point #5.

Basins 29 and 30 consists of landscape areas and the north half of Greenbrook Lane. Basin 29 generates runoff rates of Q_5 = 1.3 cfs and Q_{100} = 2.9 cfs. Runoff rates of 2.0 cfs and 4.6 cfs are generated from Basin 30 during the 5 year and 100 year storms, respectively. A 8' sump inlet will collect these flows at the intersection of Greenbrook Drive and Rory Creek Street. A 48" RCP will convey these flows plus the flows from Design Point #5 southerly within Rory Creek Street.

The area just southwest of the Greenbrook Drive and Rory Creek Drive comprises Basin 31. This 1.53 acre basin generates runoff rates of 4.8 cfs during the 5 year storm and 10.2 cfs during the 100 year storm. These flows travel southerly within the west side of Rory Creek Street and combine with flows generated from Basin 32.

Basin 32 is located along the west side of Rory Creek Street and generates additional runoff rates of Q_5 = 7.9 cfs and Q_{100} = 16.0 cfs. These flows reach the Rory Creek and Stoney Creek Drive intersection where they combine with the flows generated from Basin 31. Combined flow rates of 12.7 cfs during the 5 year storm and 26.2 cfs during the 100 year storm continue southerly within the west side of Rory Creek Street as street flow. Rory Creek Street at a minimum slope of 1.5% has a 5 year street capacity of 13.8 cfs per side. The centerline of the street will overtop during the 100 year storm resulting in 16.6 cfs per side of street.

A 10' on-grade inlet will be constructed along the west side of Rory Creek Street just south of Stoney Creek Drive to collect a portion of these flows. Approximately 5.7 cfs will be collected by this inlet during the 5 year storm and 7.2 cfs during the 100 year storm. Flow rates of Q_5 = 7.0 cfs and Q_{100} = 12.2 cfs bypassing this inlet will continue southerly within the west side of Rory Creek Street and enter Basin 34 as street flow.

Basin 33 is located just northeast of the Stoney Creek Drive and Rory Creek Street intersection. This 1.79 acre basin generates runoff rates of 6.0 cfs during the 5 year storm and 12.7 cfs during the 100 year storm. As stated above, Rory Creek Street at a minimum slope 1.5 % has a 5 year street capacity of 13.8 cfs. A 10' on-grade will be constructed along the east side of Rory Creek at the south end of Basin 33. This inlet will collect 3.7 cfs and 5.7 cfs during the 5 year and 100 year storms, respectively. Flow rates of Q_5 = 2.3 cfs and Q_{100} = 7.0 cfs will bypass this inlet and enter Basin 35. The centerline of Rory just south of Inlet 33 will overtop during the 100 year storm.

Runoff rates of 2.8 cfs during the 5 year storm and 5.8 cfs during the 100 year storm are generated from Basin 34. Including the bypass flows from the 10' inlet at the south side of Basin 32, total street flows of Q_5 = 9.8 cfs and Q_{100} = 26.9 cfs travel southerly within the west side of Rory Creek Street reaching the northwest of Rory Creek Street and Abbey Pond Drive. This includes the overtopping of the Rory Creek Street centerline.

Basin 35 consists of an additional 3.56 acres of residential development along the east side of Rory Creek Street between Stoney Creek Drive and Abbey Poind Drive. Runoff rates of 10.0 cfs and 21.4 cfs are generated from this basin during the 5 year and 100 year storms, respectively. Total flows of Q_5 = 12.3 cfs and Q_{100} = 26.9 cfs, including the bypass flows from the inlet at the south end of Basin 33, reach the northeast corner of the Abbey Pond Drive and Rory Creek Street intersection from the north (additional flow reach this inlet from Basin 46).

The centerline of Rory Creek Street will overtop during the 100 year storm; therefore, runoff rates of 26.9 cfs per side will flow southerly to the proposed sump inlets at the south end of Basins 34 and 35. A 10' sump inlet will be installed just north of Abbey Pond Drive along the west side of Rory Creek Street. This inlet will collect 9.8 cfs during the 5 year storm and 26.9 cfs during the 100 year storm.

An additional 10' sump inlet will be installed along the east side of Rory Creek Drive approximately 100' north of Abbey Pond Drive to collect a portion of these flows. Runoff rates of Q_5 = 16.3 cfs and Q_{100} = 31.5 cfs will be collected by this inlet including the bypass from Basin 46.

Total flow rates of 155.1 cfs during the 5 year storm and 323.6 cfs will reach Design Point #6 during the 5 year and 100 year storms, respectively.

Basin 36 consists of 8.42 acres of future residential development along the east side of Wolf Lake Drive and north of Research Parkway. Runoff rates of 22.6 cfs and 45.8 cfs are generated from this basin during the 5 year and 100 year storms, respectively. These flows will continue easterly within the north side of Research Parkway to the proposed low point at the east end of this basin. Research Parkway at a minimum slope of 2% and a 5 year street capacity of 24.2 cfs per side has the capacity to convey these flows. Eventually, these flows will reach proposed inlets along the north side of Research Parkway which will discharge to the future Wolf Creek detention pond to be constructed along the north side of Research. In the meantime, these flows will reach Wolf Creek as surface flows.

Basin 37 is located along the south side of Research Parkway east of Wolf Lake Center. This 1.31 acre basin generates flows of Q_5 = 4.5 cfs and Q_{100} = 8.7 cfs. These flows will also flow easterly within Research Parkway reaching a future low point in Research at Wolf Creek.

Approximately 4.46 acres along the east side of Country Creek Drive comprises Basin 38. Runoff rates of 10.9 cfs and 23.1 cfs are generated from this basin during the 5 year and 100 year storms. These flows are conveyed southerly within the east side of Country Creek Drive to the south end of the basin. Country Creek Drive at a minimum slope of 3.0% has a 5 year street capacity of 19.5 cfs per side. Therefore, Country Creek Drive has the capacity to convey these flows to the intersection of Country Creek Drive and Abbey Pond Drive. A 10' sump inlet will be located at the east side of this intersection to collect these flows and the flows from Basin 38-A.

Basin 38-A consists of 0.78 acres at the southeast corner of Country Creek Trail and Abbey Pond Lane. Runoff rates of Q_5 = 2.6 cfs and Q_{100} = 5.7 cfs generated from Basin 38-A will reach the 10' sump inlet along the east side of Country Creek Trail. The combined flows from Basin 38 and 38-A of 13.5 cfs during the 5 year storm and 28.8 cfs during the 100 year storm will be conveyed westerly within a 24" RCP.

The area along the south side of Country Creek Trail from the cul-de-sac to Box Canyon Road comprises Basin 39. Runoff rates of 3.2 cfs and 6.6 cfs generated from this basin during the 5 year and 100 year storms, flow southerly with the west side of Country Creek Trail reaching the northwest corner of the Country Creek Trail and Box Canyon Road intersection.

Basin 40, consisting of 2.43 acres along the north side of Box Canyon Road, generates runoff rates of Q_5 = 8.2 cfs and Q_{100} = 16.9 cfs. Total combined flows of 11.4 cfs during the 5 year storm and 23.5 cfs during the 100 year storm generated from Basin 39 and 40 continue southerly as street flow within the west side of Country Creek Trail and enter Basin 41.

Country Creek Trail at a slope of 2.5% has a 5 year street capacity of 17.8 cfs per side.

The area along the west side of Country Creek Trail between Box Canyon Road and Abbey Pond Lane comprises Basin 41. This 0.89 acre basin generates runoff rates of Q_5 = 3.1 cfs and Q_{100} = 6.4 cfs. Total street flows of 14.5 cfs during the 5 year storm and 29.9 cfs during the 100 year storm from Basins 39, 40 and 41 reach the northwest corner of the Country Creek Trail and Abbey Pond Land intersection. A 15' on-grade inlet will be constructed at the south end of Basin 41 to collect a portion of these flows. This inlet will collect 8.1 cfs during the 5 year storm and 11.3 cfs during the 100 year storm.. Runoff rates of Q_5 = 6.4 cfs and Q_{100} = 15.2 cfs will bypass this inlet and enter Basin 42 as street flow.

Basin 42 consists of 0.58 acres along the north side of Abbey Pond Lane and generates runoff rates of 2.0 cfs and 4.2 cfs during the 5 year and 100 year storms, respectively. These flows combine with the bypass flows from Basin 41 and reach a 15' sump inlet just east of the Abbey Pond Lane and Wolf Lake Drive intersection. A total of Q_5 = 8.4 cfs and Q_{100} = 19.4 cfs will reach this sump inlet from the east. Additional flows reach this sump inlet from Basin 45.

Runoff from Basins 43 and 44 reach a 6' sump inlet along the south side of Abbey Pond Lane just east of Wolf Lake Drive. This 6' sump inlet will collect the runoff rates of Q_5 = 4.9 cfs and Q_{100} = 10.3 cfs generated from Basin 43 and Q_5 = 0.4 cfs and Q_{100} = 0.7 cfs generated from Basin 44.

Basin 45 is located along the east side of Wolf Lake Drive between Box Canyon Road and Abbey Pond Lane. This 2.60 acre basin generates runoff rates of 8.0 cfs during the 5 year storm and 17.1 cfs during the 100 year storm. As stated above, these flows reach the proposed 15' sump inlet located along the north side of Abbey Pond Lane just east of Wolf Lake Drive.

The flows from Basins 38 through 45 reach Design Point #7. A 36" RCP will convey flow rates of Q_5 = 36.9 cfs and Q_{100} = 74.9 westerly along with the flows collected within the 10' sump inlet at the Country Creek Trail and Abbey Pond Drive intersection.

Approximately 2.63 acres along the west side of Wolf Lake Drive comprises Basin 46. Runoff rates of 8.7 cfs and 18.7 cfs flow southerly within the west side of Wolf Lake Drive and then westerly within the north side of Abbey Pond Lane reaching the northeast corner of Abbey Pond Drive and Wolf Creek Drive intersection.

A 10' on-grade inlet will be installed at the west end of Basin 46. This inlet will collect 4.7 cfs during the 5 year storm and 7.2 cfs during the 100 year storm. Flow rates of 4.0 cfs and 11.5 cfs will bypass this inlet and flow to the sump inlet at the south end of Basin 35, as stated above.

Flow rates of 197.6 cfs during the 5 year storm and 411.7 cfs during the 100 year storm reach Design Point #8. These flows will be conveyed westerly within a 60" RCP.

Basin 47 consists of 1.07 acres along the south side of Abbey Pond Lane between Wolf Lake Drive and the Abbey Pond Lane cul-de-sac. Runoff rates of 3.6 cfs during the 5 year storm and 7.6 cfs during the 100 year storm reaches the Abbey Pond Lane intersection as street flows. A 6' sump inlet located at the end of the cul-de-sac will collect these flows.

Runoff rates of Q_5 = 5.9 cfs and Q_{100} = 12.7 cfs generated from Basin 48 will flow westerly within the north side of Abbey Pond Lane to the Abbey Pond Lane cul-de-sac. These flows will also reach the proposed 6' sump inlet within the Abbey Pond Lane cul-de-sac.

The total flows from Basins OS-4 and 25 through 48 will be conveyed to the proposed detention pond just west of the Abbey Pond Lane cul-de-sac (Design Point #9). The total flows entering the pond at this point are 204.1 cfs and 429.7 cfs during the 5 year and 100 year storms.

Basin 49 consists of the rear portion of the lots south of Abbey Pond Lane. Runoff rates of 7.6 cfs during the 5 year storm and 16.7 cfs during the 100 year storm will discharge to the south onto the Goetsch property. These flows are less than the historic flows exiting the site at this location considering the proposed pond.

Basin 50 consists of the proposed detention pond and the rear portion of several lots along the south side of Stoney Creek Drive. Runoff rates of Q_5 = 16.2 cfs and Q_{100} = 37.5 cfs are generated from Basin 50.

Total developed runoff rates of Q_5 = 366.3 cfs and Q_{100} = 733.0 cfs are tributary to the outfall swales along the south side of the Westcreek II development including developed flows from Basins 12 and 49. Comparing these total flows to historic flow rates of 151 cfs during the 5 year storm and 483.5 cfs during the 100 year storm generated from Basin H-2 and H-3 means approximately 215 cfs during the 5 year storm and 289.5 cfs during the 100 year storm must be detained.

Once this final drainage report is reviewed and generally accepted by the City of Colorado Springs, a more detailed HEC analysis will be performed to determine the exact size of pond required. This will be done as part of the final design. Water quality features will also be part of the final design of this pond.

Design Note: The outfall pipes from the north side of Research extending southerly through the proposed Westcreek Filings were sized based on the SCS Methodology. The initial systems serving the smaller drainage basins were sized based on the Rational Methodology.

EROSION CONTROL

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

WATER QUALITY

The proposed detention pond will include water quality measures. These measures have been presented as presented as part of Kiowa Engineering's final detention pond design.

DRAINAGE, BRIDGE AND POND FEES

Westcreek at Wolf Ranch Subdivision is within the Cottonwood Creek Drainage Basin. The 2004 Drainage, Bridge and Pond Fees are listed below.

Drainage facilities within Westcreek Filings 6 through 12 and Research Parkway Filings 1 through 3 are all part of the overall Wolf Ranch Drainage system presented in the Wolf Ranch Master Development Drainage Plan. Therefore, public drainage facilities will be constructed in lieu of paying fees.

However, there are still on-going discussions regarding the possibility of excluding Wolf Ranch from the Cottonwood Creek Drainage Basin.

WESTCREEK FILING No. 6 DRAINAGE FEE ($8,530/Acre Total)

	Area	$/Acre	Total Fee
Capital Improvements Portion	8.636	$6,313.00	$54,519.07
Land Portion	8.636	$ 1,790.00	$15,458.44
Cash Portion	8.636	$ 427.00	$3,687.57
BRIDGE FEES	8.636	$ 696.00	$6,010.66
			$79,675.74

WESTCREEK FILING No. 7 DRAINAGE FEE ($8,530/Acre Total)

	Area	$/Acre	Total Fee
Capital Improvements Portion	7.475	$6,313.00	$47,189.68
Land Portion	7.475	$ 1,790.00	$13,380.25
Cash Portion	7.475	$ 427.00	$3,191.83
BRIDGE FEES	7.475	$ 696.00	$5,202.60
			$68,964.36

WESTCREEK FILING No. 8 DRAINAGE FEE ($8,530/Acre Total)

	Area	$/Acre	Total Fee
Capital Improvements Portion	6.148	$6,313.00	$38,812.32
Land Portion	6.148	$ 1,790.00	$11,004.92
Cash Portion	6.148	$ 427.00	$2,625.20
BRIDGE FEES	6.148	$ 696.00	$4,279.01
			$56,721.45

WESTCREEK FILING No. 9 DRAINAGE FEE ($8,530/Acre Total)

	Area	$/Acre	Total Fee
Capital Improvements Portion	5.853	$6,313.00	$36,949.99
Land Portion	5.853	$ 1,790.00	$10,476.87
Cash Portion	5.853	$ 427.00	$2,499.23
BRIDGE FEES	5.853	$ 696.00	$4,073.69
			$53,999.78

WESTCREEK FILING No. 10 DRAINAGE FEE ($8,530/Acre Total)

	Area	$/Acre	Total Fee
Capital Improvements Portion	18.497	$6,313.00	$116,771.56
Land Portion	18.497	$ 1,790.00	$33,109.63
Cash Portion	18.497	$ 427.00	$7,898.22
BRIDGE FEES	18.497	$ 696.00	$12,873.91
			$170,653.32

WESTCREEK FILING No. 11 DRAINAGE FEE ($8,530/Acre Total)

	Area	$/Acre	Total Fee
Capital Improvements Portion	4.797	$6,313.00	$30,283.46
Land Portion	4.797	$ 1,790.00	$8,586.63
Cash Portion	4.797	$ 427.00	$2,048.32
BRIDGE FEES	4.797	$ 696.00	$3,338.71
			$44,257.12

WESTCREEK FILING No. 12 DRAINAGE FEE ($8,530/Acre Total)

	Area	$/Acre	Total Fee
Capital Improvements Portion	10.070	$6,313.00	$63,571.91
Land Portion	10.070	$ 1,790.00	$18,025.30
Cash Portion	10.070	$ 427.00	$4,299.89
BRIDGE FEES	10.070	$ 696.00	$7,008.72
			$92,905.82

RESEARCH PARKWAY FILING No. 1 DRAINAGE FEE ($8,530/Acre Total)

	Area	$/Acre	Total Fee
Capital Improvements Portion	4.045	$6,313.00	$25,536.09
Land Portion	4.045	$ 1,790.00	$7,240.55
Cash Portion	4.045	$ 427.00	$1,727.22
BRIDGE FEES	4.045	$ 696.00	$2,815.32
			$37,319.18

RESEARCH PARKWAY FILING No. 2 DRAINAGE FEE ($8,530/Acre Total)

	Area	$/Acre	Total Fee
Capital Improvements Portion	5.149	$6,313.00	$32,505.64
Land Portion	5.149	$ 1,790.00	$9,216.71
Cash Portion	5.149	$ 427.00	$2,198.62
BRIDGE FEES	5.149	$ 696.00	$3,583.70
			$47,504.67

RESEARCH PARKWAY FILING No. 3 DRAINAGE FEE ($8,530/Acre Total)

	Area	$/Acre	Total Fee
Capital Improvements Portion	4.544	$6,313.00	$28,686.27
Land Portion	4.544	$ 1,790.00	$8,133.76
Cash Portion	4.544	$ 427.00	$1,940.29
BRIDGE FEES	4.544	$ 696.00	$3,162.62
			$41,922.94

DRAINAGE FACILTIES (Public Non Reimbursable)

The following drainage facilities will be required for the various Research Parkway and Westcreek at Wolf Ranch Subdivisions. All these facilities are public non-reimbursable drainage facilities except for the Detention Pond facilities which are public reimbursable items. In addition, the pond land cost is a reimbursable item.

RESEARCH FILING 1 (Non-Reimbursable)

ITEM	QUANTITY		UNIT PRICE	EXTENDED COST
6' D-10-R Inlets	3	Ea.	$2,300.00	$ 6,900.00
24" RCP	148	L.F.	$37.00	$ 5,476.00
			Sub-Total	$ 12,376.00
10% Engineering and Contingency				$ 1,237.60
			Grand Total	$ 13,613.60

RESEARCH FILING 2 (Non-Reimbursable)

ITEM	QUANTITY		UNIT PRICE	EXTENDED COST
8' D-10-R Inlets	1	Ea.	$2,500.00	$ 2,500.00
20' D-10-R Inlets	1	Ea.	$6,000.00	$ 6,000.00
54" RCP	184	L.F.	$110.00	$ 20,240.00
54" RCP FES	1	Ea.	$1,200.00	$ 1,200.00
			Sub-Total	$ 29,940.00
10% Engineering and Contingency				$ 2,994.00
			Grand Total	$ 32,934.00

RESEARCH FILING 3 (Non-Reimbursable)

ITEM	QUANTITY		UNIT PRICE	EXTENDED COST
8' D-10-R Inlets	2	Ea.	$2,500.00	$ 5,000.00
54" RCP	214	L.F.	$110.00	$ 23,540.00
54" RCP FES	1	Ea.	$1,200.00	$ 1,200.00
			Sub-Total	$ 29,740.00
10% Engineering and Contingency				$ 2,974.00
			Grand Total	$ 32,714.00

WESTCREEK FILING 6 (Non-Reimbursable)

ITEM	QUANTITY		UNIT PRICE	EXTENDED COST
6' D-10-R Inlets	1	Ea.	$2,300.00	$ 2,300.00
24" RCP	352	L.F.	$37.00	$ 13,024.00
Type I Manhole	2	Ea.	$4,200.00	$ 8,400.00
			Sub-Total	$ 23,724.00
10% Engineering and Contingency				$ 2,372.40
			Grand Total	$ 26,096.40

WESTCREEK FILING 7 (Non-Reimbursable)

ITEM	QUANTITY		UNIT PRICE	EXTENDED COST
8' D-10-R Inlets	2	Ea.	$2,500.00	$ 5,000.00
15' D-10-R Inlets	1	Ea.	$5,400.00	$ 5,400.00
30" RCP	28	L.F.	$44.00	$ 1,232.00
54" RCP	778	L.F.	$110.00	$ 85,580.00
Type I Manhole	2	Ea.	$4,200.00	$ 8,400.00
			Sub-Total	$ 105,612.00
10% Engineering and Contingency				$ 10,561.20
			Grand Total	$ 116,173.20

WESTCREEK FILING 7 (Reimbursable Drainage (Pond) Facilities)

ITEM	QUANTITY		UNIT PRICE	EXTENDED COST
Detention Pond Grading/Seeding/Etc.	1	L.S.	$200,000.00	$200,000.00
Outfall Structures	2	Ea.	$9,000.00	$ 18,000.00
36" RCP	70	L.F.	$56.00	$ 3,920.00
42" RCP	70	L.F.	$68.00	$ 4,760.00
54" RCP FES	1	Ea.	$1,200.00	$ 1,200.00
60" RCP FES	1	Ea.	$1,300.00	$ 1,300.00
Rip Rap Outfall	4	L.S.	$3,500.00	$ 14,000.00
			Sub-Total	$ 243,180.00
10% Engineering and Contingency				$ 24,318.00
			Grand Total	$ 267,498.00

WESTCREEK FILING 7 (Reimbursable Land)

ITEM	QUANTITY		UNIT PRICE	EXTENDED COST
Detention Pond Land	5	Ac	$42,137.00	$210,685.00
			Sub-Total	$ 210,685.00
10% Engineering and Contingency				$ 21,068.5
			Grand Total	$ 231,753.50

WESTCREEK FILING 9 (Non-Reimbursable)

ITEM	QUANTITY		UNIT PRICE	EXTENDED COST
10' D-10-R Inlets	2	Ea.	$4,000.00	$ 8,000.00
30" RCP	38	L.F.	$44.00	$ 1,672.00
54" RCP	627	L.F.	$110.00	$ 68,970.00
	2	Ea.	$4,200.00	$ 8,400.00
			Sub-Total	$ 87,042.00
10% Engineering and Contingency				$ 8,704.20
			Grand Total	$ 95,746.20

WESTCREEK FILING 10 (Non-Reimbursable)

ITEM	QUANTITY		UNIT PRICE	EXTENDED COST
6' D-10-R Inlets	1	Ea.	$2,300.00	$ 2,300.00
10' D-10-R Inlets	3	Ea.	$4,000.00	$ 12,000.00
24" RCP	38	L.F.	$37.00	$ 1,406.00
30" RCP	50	L.F.	$44.00	$ 2,200.00
36" RCP	334	L.F.	$56.00	$ 18,704.00
54" RCP	184	L.F.	$102.00	$ 20,240.00
60" RCP	352	L.F.	$127.00	$ 42,240.00
Type 1 Manhole	3	Ea.	$4,200.00	$ 12,600.00
			Sub-Total	$ 117,790.00
10% Engineering and Contingency				$ 11,779.00
			Grand Total	$ 129,569.00

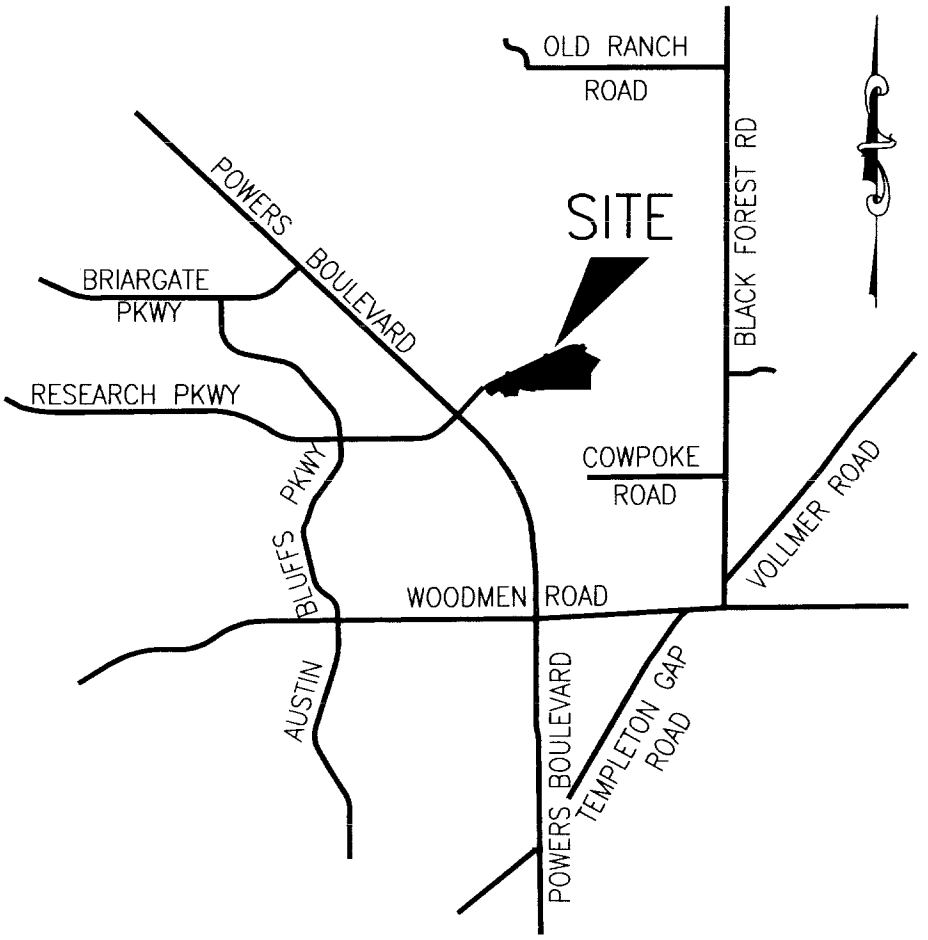
WESTCREEK FILING 11 (Non-Reimbursable)

ITEM	QUANTITY		UNIT PRICE	EXTENDED COST
8' D-10-R Inlets	1	Ea.	$2,500.00	$ 2,500.00
54" RCP	292	L.F.	$110.00	$ 32,120.00
			Sub-Total	$ 34,620.00
10% Engineering and Contingency				$ 3,462.00
			Grand Total	$ 38,082.00

WESTCREEK FILING 12 (Non-Reimbursable)

ITEM	QUANTITY		UNIT PRICE	EXTENDED COST
6' D-10-R Inlets	1	Ea.	$2,300.00	$ 2,300.00
10' D-10-R Inlets	1	Ea.	$4,000.00	$ 4,000.00
15' D-10-R Inlets	2	Ea.	$5,400.00	$ 10,800.00
18" RCP	100	L.F.	$29.00	$ 2,900.00
24" RCP	256	L.F.	$37.00	$ 9,472.00
36" RCP	44	L.F.	$56.00	$ 2,464.00
Type 1 Manhole	2	Ea.	$4,200.00	$ 8,400.00
			Sub-Total	$ 40,336.00
10% Engineering and Contingency				$ 4,033.60
			Grand Total	$ 44,369.60

APPENDIX



Vicinity Map

NOT TO SCALE

FIGURE 1

FILE: 03010DP2.DWG
DATE: 12/23/03

JOB NO. 03-010

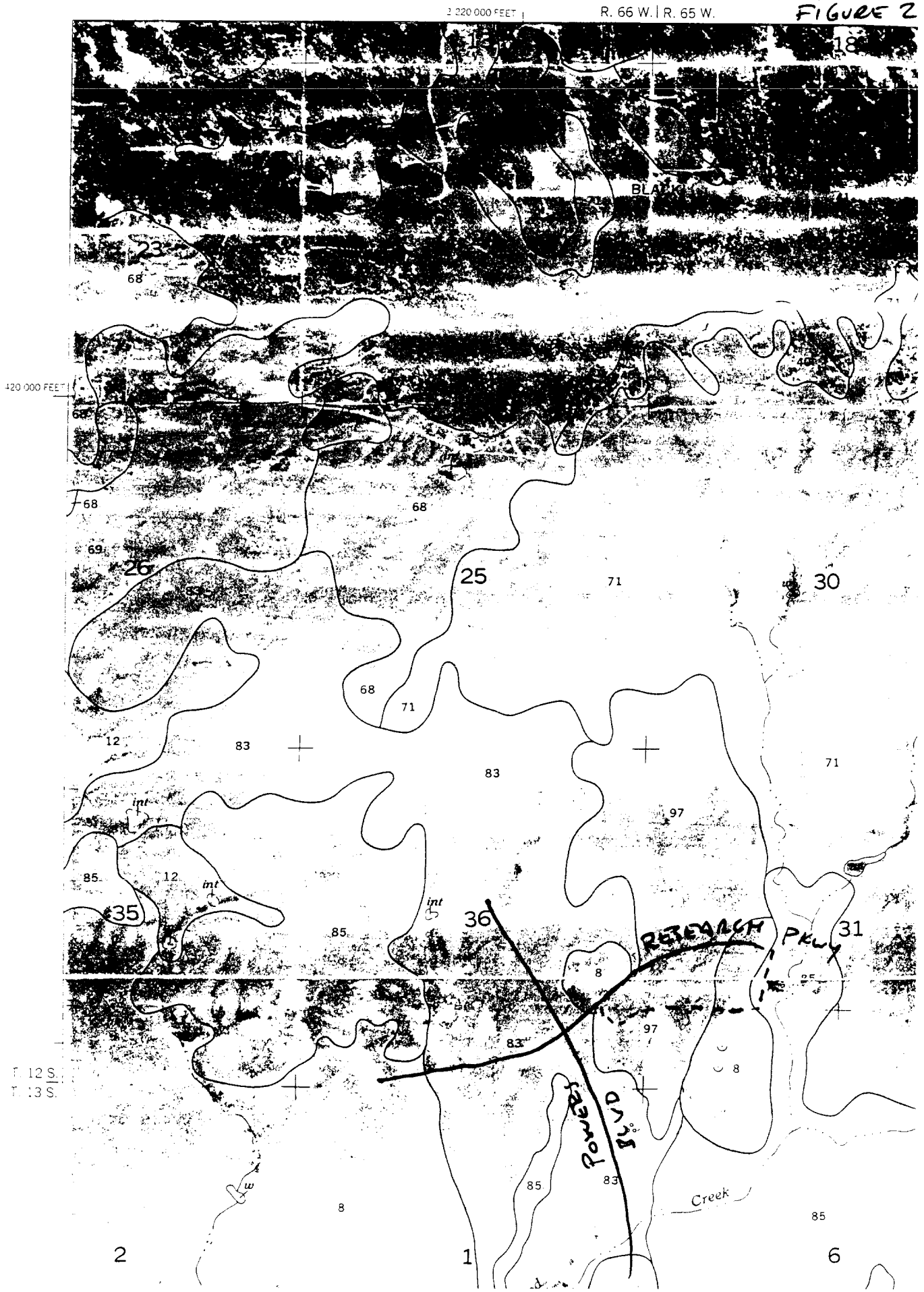
ROCKWELL MINCHOW CONSULTANTS, INC.
ENGINEERING · SURVEYING
1955 N. UNION BLVD., SUITE 200
COLORADO SPRINGS, CO 80909
(719) 475-2575 · FAX (719) 475-9223

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

1" = 2000'

NORTH

FIGURE 2



HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: H-1
AREA: 84.00
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Pasture	84	0.30	0.45	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	84.00			100%

COMPOSITE: C5= 0.30 C100= 0.45

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	1000	3.3		31.90		25.92
Swale	4000	3.3	4.3	15.50	5.7	11.70
Tc Total:				47.41		37.62

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

I5	**I100**
1.7 in/hr	3.6 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
42.8 cfs	136.1 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: H-2
AREA: 187.00
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Pasture	187	0.30	0.45	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	187.00			100%

COMPOSITE: C5= 0.30 C100= 0.45

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	1000	9		22.91		18.61
Swale	8500	3.4	5	28.33	6.8	20.83
Tc Total:				51.24		39.45

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

I5	**I100**
1.6 in/hr	3.5 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
89.8 cfs	294.5 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: H-3
AREA: 120.00
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Pasture	120	0.30	0.45	100.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	120.00			100%

COMPOSITE: C5= 0.30 C100= 0.45

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	1000	4		29.94		24.33
Swale	5000	3.3	4.6	18.12	6.1	13.66
Tc Total:				48.06		37.99

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

I5	**I100**
1.7 in/hr	3.5 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
61.2 cfs	189.0 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 1
AREA: 0.41
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	0.31	0.90	0.90	75.61%
Landscaping	0.10	0.30	0.45	24.39%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0.41			100%

COMPOSITE: C5= 0.75 C100= 0.79

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	30	5		4.82		3.91
Street	130	1.5	2.6	0.83	2.8	0.77
Tc Total:				5.65		4.69

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

I5	**I100**
5.0 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
1.5 cfs	2.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 2
AREA: 0.35
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	0.29	0.90	0.90	82.86%
Landscaping	0.06	0.30	0.45	17.14%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0.35			100%

COMPOSITE: C5= 0.80 C100= 0.82

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	15	5		3.41		2.77
Street	130	1.5	2.6	0.83	2.8	0.77
Tc Total:				4.24		3.54

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**
1.5 cfs	2.6 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 3
AREA: 0.56
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	0.32	0.90	0.90	57.14%
Landscaping	0.24	0.30	0.45	42.86%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0.56			100%

COMPOSITE: C5= 0.64 C100= 0.71

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	90	16		5.68		4.62
Tc Total:				5.68		4.62

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

I5	**I100**
5.0 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
1.8 cfs	3.6 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 4
AREA: 2.71
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	1.60	0.90	0.90	59.04%
Landscaping	1.11	0.30	0.45	40.96%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	2.71			100%

COMPOSITE: C5= 0.65 C100= 0.72

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	30	5		4.82		3.91
Street	1800	3	3.4	8.82	3.6	8.33
Tc Total:				13.64		12.25

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

I5	**I100**
4.1 in/hr	6.4 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
7.3 cfs	12.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 5
AREA: 0.34
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	0.28	0.70	0.80	82.35%
Landscaping	0.06	0.30	0.45	17.65%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0.34			100%

COMPOSITE: C5= 0.63 C100= 0.74

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	15	5		3.41		2.77
Street	200	1.5	2.6	1.28	2.8	1.19
Tc Total:				4.69		3.96

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**
1.1 cfs	2.3 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 6
AREA: 0.74
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	0.49	0.90	0.90	66.22%
Landscaping	0.25	0.30	0.45	33.78%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0.74			100%

COMPOSITE: C5= 0.70 C100= 0.75

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	30	5		4.82		3.91
Street	350	1.5	2.6	2.24	2.8	2.08
Tc Total:				7.06		6.00

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**
2.4 cfs	4.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 7A
AREA: 1.65
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Landscaping	1.29	0.30	0.45	78.18%
Streets	0.36	0.90	0.90	21.82%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	1.65			100%

COMPOSITE: C5= 0.43 C100= 0.55

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	50	16		3.54		3.54
Street	480	1.7	2.7	2.96	2.9	2.76
Tc Total:				6.51		6.30

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

I5	**I100**
5.1 in/hr	9.2 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
3.6 cfs	8.3 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 7B
AREA: 0.84
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	0.84	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%
	0.84			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	50	16		2.12		2.12
Street	480	1.7	2.7	2.96	2.9	2.76
Tc Total:				5.08		4.88

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

I5	**I100**
5.1 in/hr	9.2 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
3.0 cfs	6.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 8
AREA: 1.23
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.23	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%
	1.23			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	5		3.11		2.33
Street	570	2.8	3.2	2.97	3.4	2.79
Tc Total:				6.08		5.13

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

I5	**I100**
4.9 in/hr	8.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
4.2 cfs	8.8 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 9
AREA: 2.19
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	2.19	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%
	2.19			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	200	5		6.22		4.66
Street	300	3.33	3.7	1.35	3.9	1.28
Tc Total:				7.57		5.95

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

I5	**I100**
4.6 in/hr	8.6 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
7.1 cfs	15.1 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 10
AREA: 1.34
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.34	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%
	1.34			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	5		6.22		4.66
Tc Total:				6.22		4.66

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**
4.5 cfs	9.6 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 11
AREA: 0.85
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	0.66	0.90	0.90	77.65%
Landscaping	0.19	0.30	0.45	22.35%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0.85			100%

COMPOSITE: C5= 0.77 C100= 0.80

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	15	2		4.61		3.75
Street	450	2.8	3.2	2.34	3.4	2.21
Tc Total:				6.95		5.95

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**
3.1 cfs	5.8 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 12
AREA: 3.71
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	2.72	0.70	0.80	73.32%
Street	0.99	0.90	0.90	26.68%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	3.71			100%

COMPOSITE: C5= 0.75 C100= 0.83

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	200	3		7.36		5.52
Street	450	1.8	2.7	2.78	2.9	2.59
Tc Total:				10.14		8.11

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

I5	**I100**
4.0 in/hr	7.6 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
11.2 cfs	23.3 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 13
AREA: 1.18
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	0.5	0.90	0.90	42.37%
Landscaping	0.68	0.30	0.45	57.63%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	1.18			100%

COMPOSITE: C5= 0.55 C100= 0.64

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	30	5		3.29		2.77
Street	700	3	3.4	3.43	3.6	3.24
Tc Total:				6.72		6.01

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

I5	**I100**
5.0 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
3.3 cfs	6.8 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 14
AREA: 4.22
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	3.22	0.90	0.90	75.94%
Landscaping	1.02	0.30	0.45	24.06%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	4.24			100%

COMPOSITE: C5= 0.76 C100= 0.79

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	30	5		4.82		3.91
Street	1500	3	3.4	7.35	3.6	6.94
Tc Total:				12.17		10.86

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

I5	**I100**
3.8 in/hr	6.7 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
12.1 cfs	22.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 15
AREA: 0.41
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	0.29	0.90	0.90	70.73%
Landscaping	0.12	0.30	0.45	29.27%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0.41			100%

COMPOSITE: C5= 0.72 C100= 0.77

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	25	5		4.40		3.57
Street	170	1.5	2.6	1.09	2.8	1.01
Tc Total:				5.49		4.59

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

I5	**I100**
5.1 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
1.5 cfs	2.8 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 16
AREA: 1.86
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	1.23	0.90	0.90	66.13%
Landscaping	0.63	0.30	0.45	33.87%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	1.86			100%

COMPOSITE: C5= 0.70 C100= 0.75

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	30	5		2.43		2.12
Street	850	2	2.8	5.06	3	4.72
Tc Total:				7.49		6.84

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**
5.8 cfs	11.5 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 17
AREA: 0.59
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	0.15	0.90	0.90	25.42%
Landscaping	0.44	0.30	0.45	74.58%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0.59			100%

COMPOSITE: C5= 0.45 C100= 0.56

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	50	10		4.95		4.02
Street	300	2.7	3.2	1.56	3.4	1.47
Tc Total:				6.51		5.49

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

I5	**I100**
4.8 in/hr	8.7 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
1.3 cfs	2.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 18
AREA: 1.39
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	0.33	0.90	0.90	23.74%
Landscaping	1.06	0.30	0.45	76.26%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	1.39			100%

COMPOSITE: C5= 0.44 C100= 0.56

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	50	16		4.24		3.44
Street	650	2.5	3.2	3.39	3.4	3.19
Tc Total:				7.62		6.63

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

I5	**I100**
4.6 in/hr	4.8 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
2.8 cfs	3.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 19
AREA: 2.56
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	2.56	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%
	2.56			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	50	3		3.68		2.76
Street	850	2	2.8	5.06	3	4.72
Tc Total:				8.74		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**
7.7 cfs	16.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 20
AREA: 1.10
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	0.95	0.70	0.80	86.36%
Street	0.15	0.90	0.90	13.64%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	1.10			100%

COMPOSITE: C5= 0.73 C100= 0.81

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	50	10		4.95		4.02
Street	500	2.4	3.1	2.69	3.3	2.53
Tc Total:				7.64		6.55

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**
3.6 cfs	7.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 21
AREA: 1.17
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.17	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%
	1.17			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	130	3		5.94		4.45
Street	150	3.3	3.7	0.68	3.9	0.64
Tc Total:				6.61		5.09

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**
3.9 cfs	8.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 22
AREA: 1.83
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.83	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%
	1.83			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
Street	300	4	4	1.25	4.2	1.19
Tc Total:				8.23		6.43

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

I5	**I100**
4.4 in/hr	8.3 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
5.6 cfs	12.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 23
AREA: 1.13
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.13	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%
	1.13			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	600	3.7	3.8	2.63	4	2.50
Tc Total:				6.31		5.26

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

I5	**I100**
4.8 in/hr	8.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
3.8 cfs	8.0 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 24
AREA: 0.30
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	0.3	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%
	0.30			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	170	2	2.8	1.01	3	0.94
Tc Total:				4.69		3.71

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**
1.1 cfs	2.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 25
AREA: 2.72
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	2.31	0.90	0.90	84.93%
Landscaping	0.41	0.30	0.45	15.07%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	2.72			100%

COMPOSITE: C5= 0.81 C100= 0.83

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	30	5		4.82		3.91
Street	1500	3	3.4	7.35	3.6	6.94
Tc Total:				12.17		10.86

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

I5	**I100**
3.8 in/hr	6.7 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
8.4 cfs	15.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 26
AREA: 3.69
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	3.14	0.90	0.90	85.09%
Landscaping	0.55	0.30	0.45	14.91%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	3.69			100%

COMPOSITE: C5= 0.81 C100= 0.83

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	30	5		4.82		3.91
Street	1650	2.7	3.3	8.33	3.5	7.86
Tc Total:				13.15		11.77

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**
10.8 cfs	20.3 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 27
AREA: 0.45
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	0.33	0.90	0.90	73.33%
Landscaping	0.12	0.30	0.45	26.67%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0.45			100%

COMPOSITE: C5= 0.74 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		4.82		3.91
Street	180	1.5	2.6	1.15	2.8	1.07
Tc Total:				5.97		4.99

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

I5	**I100**
4.9 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
1.6 cfs	3.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 28
AREA: 1.66
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	1.38	0.90	0.90	83.13%
Landscaping	0.28	0.30	0.45	16.87%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	1.66			100%

COMPOSITE: C5= 0.80 C100= 0.82

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	20	5		3.93		3.20
Street	750	2.7	3.3	3.79	3.5	3.57
Tc Total:				7.72		6.77

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**
6.0 cfs	11.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 29
AREA: 0.59
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	0.15	0.90	0.90	25.42%
Landscaping	0.44	0.30	0.45	74.58%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0.59			100%

COMPOSITE: C5= 0.45 C100= 0.56

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	50	10		4.95		4.02
Street	300	2.7	3.2	1.56	3.4	1.47
Tc Total:				6.51		5.49

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

I5	**I100**
4.8 in/hr	8.7 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
1.3 cfs	2.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 30
AREA: 0.90
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	0.23	0.90	0.90	25.56%
Landscaping	0.67	0.30	0.45	74.44%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0.90			100%

COMPOSITE: C5= 0.45 C100= 0.57

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	50	16		4.24		3.44
Street	400	4	4.2	1.59	4.4	1.52
Tc Total:				5.82		4.96

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

I5	**I100**
5.0 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
2.0 cfs	4.6 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 31
AREA: 1.53
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.53	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%
	1.53			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	80	3		4.66		3.49
Street	550	2	2.8	3.27	3	3.06
Tc Total:				7.93		6.55

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**
4.8 cfs	10.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 32
AREA: 2.22
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	2.22	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%
	2.22			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	30	25		1.42		1.06
Street	600	1.7	2.6	3.85	2.8	3.57
Tc Total:				5.26		4.63

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

I5	**I100**
5.1 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
7.9 cfs	16.0 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 33
AREA: 1.79
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.79	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%
	1.79			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	600	3.7	3.8	2.63	4	2.50
Tc Total:				6.31		5.26

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

I5	**I100**
4.8 in/hr	8.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
6.0 cfs	12.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 34
AREA: 0.80
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	0.8	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%
	0.80			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	40	3		3.29		2.47
Street	400	2	2.8	2.38	3	2.22
Tc Total:				5.67		4.69

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

I5	**I100**
5.0 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
2.8 cfs	5.8 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 35
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	180	3		6.98		5.24
Street	550	2	2.8	3.27	3	3.06
Tc Total:				10.26		8.29

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

I5	**I100**
4.0 in/hr	7.5 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
10.0 cfs	21.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 36
AREA: 8.42
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	6.67	0.70	0.80	79.22%
Street	1	0.90	0.90	11.88%
Landscaping	0.75	0.30	0.40	8.91%
	0	0.00	0.00	0.00%
	8.42			100%

COMPOSITE: C5= 0.69 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		4.82		4.22
Street	1300	3	3.4	6.37	3.6	6.02
Tc Total:				11.19		10.23

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**
22.6 cfs	45.8 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 37
AREA: 1.31
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Street	0.94	0.90	0.90	71.76%
Landscaping	0.37	0.30	0.45	28.24%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	1.31			100%

COMPOSITE: C5= 0.73 C100= 0.77

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	30	5		4.82		3.91
Street	500	4	4	2.08	4.2	1.98
Tc Total:				6.90		5.90

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**
4.5 cfs	8.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 38
AREA: 4.46
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	3.85	0.70	0.80	86.32%
Landscaping	0.61	0.30	0.45	13.68%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	4.46			100%

COMPOSITE: C5= 0.65 C100= 0.75

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	50	3		7.36		5.98
Street	1000	3	3.5	4.76	3.7	4.50
Tc Total:				12.12		10.49

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

I5	**I100**
3.8 in/hr	6.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
10.9 cfs	23.1 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 38-A
AREA: 0.78
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	0.78	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%
	0.78			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	150	1.5	2.6	0.96	2.8	0.89
Tc Total:				6.17		4.80

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

I5	**I100**
4.8 in/hr	9.2 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
2.6 cfs	5.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 39
AREA: 0.91
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	0.91	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%
	0.91			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	400	3	3.5	1.90	3.7	1.80
Tc Total:				5.59		4.56

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

I5	**I100**
5.0 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
3.2 cfs	6.6 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 40
AREA: 2.43
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	2.43	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%
	2.43			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	550	2.2	3	3.06	3.2	2.86
Tc Total:				6.74		5.63

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

I5	**I100**
4.8 in/hr	8.7 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
8.2 cfs	16.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 41
AREA: 0.89
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	0.89	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%
	0.89			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	400	2.5	3.2	2.08	3.4	1.96
Tc Total:				5.76		4.72

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

I5	**I100**
5.0 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
3.1 cfs	6.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 42
AREA: 0.58
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	0.58	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%
	0.58			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	5		6.22		4.66
Tc Total:				6.22		4.66

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

I5	**I100**
4.9 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
2.0 cfs	4.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 43
AREA: 1.43
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.43	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%
	1.43			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	5		6.22		4.66
Tc Total:				6.22		4.66

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

I5	**I100**
4.9 in/hr	9.0 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
4.9 cfs	10.3 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 44
AREA: 0.10
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	0.1	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%
	0.10			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**
0.4 cfs	0.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 45
AREA: 2.60
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	2.6	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%
	2.60			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	500	3.6	3.8	2.19	4	2.08
Tc Total:				8.57		6.86

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

I5	**I100**
4.4 in/hr	8.2 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
8.0 cfs	17.1 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 46
AREA: 2.63
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	2.63	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%
	2.63			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	40	3		3.29		2.47
Street	850	3.3	3.7	3.83	3.9	3.63
Tc Total:				7.12		6.10

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**
8.7 cfs	18.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 47
AREA: 1.07
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.07	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%
	1.07			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	40	3		3.29		2.47
Street	450	1.5	2.6	2.88	2.8	2.68
Tc Total:				6.18		5.15

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

I5	**I100**
4.8 in/hr	8.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
3.6 cfs	7.6 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 48
AREA: 1.87
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.87	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%
	1.87			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	200	1.5	2.6	1.28	2.8	1.19
Tc Total:				7.66		5.97

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**
5.9 cfs	12.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 49
AREA: 3.05
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	1.38	0.70	0.80	45.25%
Landscaping	1.67	0.30	0.45	54.75%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	3.05			100%

COMPOSITE: C5= 0.48 C100= 0.61

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
Tc Total:				3.68		2.76

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**
7.6 cfs	16.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: 50
AREA: 7.70
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	2	0.70	0.80	25.97%
Landscaping	5.7	0.30	0.45	74.03%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	7.70			100%

COMPOSITE: C5= 0.40 C100= 0.54

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
Tc Total:				3.68		2.76

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**
16.2 cfs	37.5 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: OS-1
AREA: 23.74
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Future Residential	23.74	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%
	23.74			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**
63.1 cfs	132.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: OS-2
AREA: 19.96
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	17.51	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%
	17.51			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**
53.1 cfs	111.8 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: OS-3
AREA: 14.46
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	14.46	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%
	14.46			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	1000	3.3	3.8	4.39	4	4.17
Tc Total:				10.76		8.95

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

I5	**I100**
4.0 in/hr	7.3 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
40.5 cfs	84.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: OS-4
AREA: 39.14
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Residential	39.14	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%
	39.14			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	1100	3.3	3.8	4.82	4	4.58
Tc Total:				11.20		9.36

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**
106.9 cfs	222.3 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: Design Point #1
AREA: 4.35
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Basin 3	0.56	0.64	0.71	12.87%
Basin 4	2.71	0.65	0.72	62.30%
Basin 5	0.34	0.63	0.74	7.82%
Basin 6	0.74	0.70	0.75	17.01%
	4.35			100%

COMPOSITE: C5= 0.66 C100= 0.73

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	30	5		4.82		3.91
Street	1800	3	3.4	8.82	3.6	8.33
Tc Total:				13.64		12.25

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

I5	**I100**
4.1 in/hr	6.4 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
11.7 cfs	20.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: Design Point #2
AREA: 39.82
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Basin 13	1.18	0.55	0.64	2.96%
Basin 14	4.22	0.76	0.79	10.60%
Basin OS-2	19.96	0.70	0.80	50.13%
Basin OS-3	14.46	0.70	0.75	36.31%
	39.82			100%

COMPOSITE: C5= 0.70 C100= 0.78

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**
106.2 cfs	216.3 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: Design Point #3
AREA: 42.09
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Design Pt #2	39.82	0.70	0.78	94.61%
Basin 15	0.41	0.72	0.77	0.97%
Basin 16	1.86	0.70	0.75	4.42%
	0	0.00	0.00	0.00%
	42.09			100%

COMPOSITE: C5= 0.70 C100= 0.78

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**
112.0 cfs	229.4 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: Design Point #4
AREA: 52.16
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Design Pt #3	42.09	0.70	0.78	80.69%
Basin 17	0.59	0.45	0.56	1.13%
Basin 18	1.39	0.44	0.56	2.66%
Basin 19	2.56	0.70	0.80	4.91%
Basin 20	1.1	0.73	0.81	2.11%
Basin 21	1.17	0.70	0.80	2.24%
Basin 22	1.83	0.70	0.80	3.51%
Basin 23	1.13	0.70	0.80	2.17%
Basin 24	0.3	0.70	0.00	0.58%
	52.16			100%

COMPOSITE: C5= 0.69 C100= 0.77

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
Pipe Flow	350	3	12	0.49	15	0.39
Tc Total:				12.12		10.17

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
136.9 cfs	281.3 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: Design Point #5
AREA: 47.66
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Basin OS-4	39.14	0.70	0.80	82.12%
Basin 25	2.72	0.81	0.83	5.71%
Basin 26	3.69	0.81	0.83	7.74%
Basin 27	0.45	0.74	0.78	0.94%
Basin 28	1.66	0.80	0.82	3.48%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	47.66			100%

COMPOSITE: C5= 0.72 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	1100	3.3	3.8	4.82	4	4.58
Pipe Flow	350	3	12	0.49	15	0.39
Tc Total:				11.69		9.75

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
133.6 cfs	272.2 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: Design Point #6
AREA: 59.05
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
DP #5	47.66	0.72	0.80	80.71%
Basin 29	0.59	0.45	0.56	1.00%
Basin 30	0.9	0.45	0.57	1.52%
Basin 31	1.53	0.70	0.80	2.59%
Basin 32	2.22	0.70	0.80	3.76%
Basin 33	1.79	0.70	0.80	3.03%
Basin 34	0.8	0.70	0.80	1.35%
Basin 35	3.56	0.70	0.80	6.03%
	0	0.00	0.00	0.00%
	59.05			100%

COMPOSITE: C5= 0.71 C100= 0.79

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	1100	3.3	3.8	4.82	4	4.58
Pipe Flow	1200	3	12	1.67	15	1.33
Tc Total:				12.87		10.70

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

I5	**I100**
3.7 in/hr	6.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
155.1 cfs	323.6 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: Design Point #7
AREA: 14.18
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Basin 38	4.46	0.65	0.75	31.45%
Basin 38-A	0.78	0.70	0.80	5.50%
Basin 39	0.91	0.70	0.80	6.42%
Basin 40	2.43	0.70	0.80	17.14%
Basin 41	0.89	0.70	0.80	6.28%
Basin 42	0.58	0.70	0.80	4.09%
Basin 43	1.43	0.70	0.80	10.08%
Basin 44	0.1	0.70	0.80	0.71%
Basin 45	2.6	0.70	0.70	18.34%
	14.18			100%

COMPOSITE: C5= 0.68 C100= 0.77

TIME OF CONCENTRATION: Tc In Minutes:

Travel Type	L	s %	v5 (fps)	Tc (5 year)	v100 (fps)	Tc (100 year)
Overland	50	3		7.36		5.98
Street	1000	3	3.5	4.76	3.7	4.50
Tc Total:				12.12		10.49

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

I5	**I100**
3.8 in/hr	6.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
36.9 cfs	74.9 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: Design Point #8
AREA: 75.86
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Design Pt #6	59.05	0.71	0.79	77.84%
Design Pt #7	14.18	0.68	0.77	18.69%
Basin 46	2.63	0.70	0.80	3.47%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	75.86			100%

COMPOSITE: C5= 0.70 C100= 0.79

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	1100	3.3	3.8	4.82	4	4.58
Pipe Flow	1200	3	12	1.67	15	1.33
Tc Total:				12.87		10.70

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

I5	**I100**
3.7 in/hr	6.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	**Q100**
197.6 cfs	411.7 cfs

HYDROLOGY

RATIONAL METHODOLOGY

PROJECT: Westcreek Phase II

BASIN: Design Point #9
AREA: 78.80
SOIL TYPE: C & D

RUNOFF COEFFICIENT, C

ZONE/DEVELOPMENT TYPE	AREA	C5	C100	% AREA
Design Pt #8	75.86	0.70	0.79	96.27%
Basin 47	1.07	0.70	0.80	1.36%
Basin 48	1.87	0.70	0.80	2.37%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	0	0.00	0.00	0.00%
	78.80			100%

COMPOSITE: C5= 0.70 C100= 0.79

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	1100	3.3	3.8	4.82	4	4.58
Pipe Flow	1200	3	12	1.67	15	1.33
Tc Total:				12.87		10.70

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

I5	I100
3.7 in/hr	6.9 in/hr

PEAK FLOW: Q-CIA in cfs

Q5	Q100
204.1 cfs	429.7 cfs

Westcreek Phase II

Sump Inlet BASIN 5 & 6

		5 YEAR	100 YEAR		
APPROACH FLOWS (worse case)		2.4	4.7	s(x)=	0.02
	d =	0.27	0.35	s(l)=	0.002
				n=	0.016
TOTAL FLOWS		3.5	7.0		
				L=	6
	d(max)=	0.09	0.28		

Westcreek II

INLET BASIN 9

Q5 =	11.3	Q100 =	23.9
SL =	0.024	SO =	0.02

5 YEAR		100 YEAR	
T	15.19	T	20.11
FW	2.03	FW	2.15
L1	23.8	L1	33.2
L2	14.3	L2	20.0
L3	51.0	L3	71.2

Li =	20.00		
5 YR Q =	11.3	100 YR Q	23.9
5 YR Qi =	7.8	100 YR Qi	14.4
5 YR Qfb =	3.5	100 YR Qfb	9.5

5 YEAR	
Li < L2	Li > L2
9.50	7.77

100 YEAR	
Li < L2	Li > L2
14.4	14.38

Westcreek Phase II

Sump Inlet BASIN 13 & 14

		5 YEAR	100 YEAR		
APPROACH FLOWS (worse case)		12.1	22.4	s(x)=	0.02
	d =	0.50	0.63	s(l)=	0.002
				n=	0.016
TOTAL FLOWS		15.4	29.2		
				L=	20
	d(max)=	0.30	0.47		

Westcreek Phase II

Sump Inlet BASIN 17 & 18

		5 YEAR	100 YEAR		
APPROACH FLOWS (worse case)		2.8	3.7	s(x)=	0.02
	d =	0.29	0.32	s(l)=	0.002
				n=	0.016
TOTAL FLOWS		4.1	6.6		
				L=	8
	d(max)=	0.09	0.17		

Westcreek Phase II

Sump Inlet BASIN 19, 20, 21, 22 & 23

		5 YEAR	100 YEAR		
APPROACH FLOWS (worse case)		13.1	28.0	s(x)=	0.02
	d =	0.51	0.68	s(l)=	0.002
				n=	0.016
TOTAL FLOWS		20.8	44.2		
				L=	15
	d(max)=	0.50	0.79		

Westcreek Phase II

Sump Inlet BASIN 23 & 24

		5 YEAR	100 YEAR		
APPROACH FLOWS (worse case)		3.8	8	s(x)=	0.02
	d =	0.32	0.43	s(l)=	0.002
				n=	0.016
TOTAL FLOWS		4.9	10.2		
				L=	8
	d(max)=	0.14	0.30		

Westcreek Phase II

Sump Inlet BASIN 25 & 26

		5 YEAR	100 YEAR		
APPROACH FLOWS (worse case)		10.8	20.3	s(x)=	0.02
	d =	0.48	0.60	s(l)=	0.002
				n=	0.016
TOTAL FLOWS		19.2	35.5		
				L=	8
	d(max)=	0.65	0.90		

Westcreek Phase II

Sump Inlet BASIN 27 & 28

		5 YEAR	100 YEAR		
APPROACH FLOWS (worse case)		6.0	11.4	s(x)=	0.02
	d =	0.38	0.49	s(l)=	0.002
				n=	0.016
TOTAL FLOWS		7.6	14.6		
				L=	8
	d(max)=	0.26	0.43		

Westcreek Phase II

Sump Inlet BASIN 29 & 30

		5 YEAR	100 YEAR		
APPROACH FLOWS (worse case)		2.0	4.6	s(x)=	0.02
	d =	0.25	0.35	s(l)=	0.002
				n=	0.016
TOTAL FLOWS		3.3	7.5		
				L=	8
	d(max)=	0.05	0.20		

Westcreek II

INLET BASIN 31 & 32

Q5 =	12.7	Q100 =	16.6
SL =	0.016	SO =	0.02

5 YEAR		100 YEAR	
T	17.12	T	18.93
FW	1.70	FW	1.73
L1	22.4	L1	25.2
L2	13.5	L2	15.2
L3	48.0	L3	54.1

Li =	10.00		
5 YR Q =	12.7	100 YR Q	16.6
5 YR Qi =	5.7	100 YR Qi	6.6
5 YR Qfb =	7.0	100 YR Qfb	10.0

5 YEAR	
Li < L2	Li > L2
5.67	6.78

100 YEAR	
Li < L2	Li > L2
6.6	8.45

Westcreek II

INLET BASIN 33

Q5 =	6.0	Q100 =	12.7	
SL =	0.016	SO =	0.02	

5 YEAR		100 YEAR	
T	12.92	T	17.12
FW	1.61	FW	1.70
L1	16.0	L1	22.4
L2	9.6	L2	13.5
L3	34.3	L3	48.0

Li =	10.00			
5 YR Q =	6.0		100 YR Q	12.7
5 YR Qi =	3.7		100 YR Qi	5.7
5 YR Qfb =	2.3		100 YR Qfb	7.0

5 YEAR	
Li < L2	Li > L2
3.74	3.66

100 YEAR	
Li < L2	Li > L2
5.7	6.78

Westcreek Phase II

Sump Inlet BASIN 34

		5 YEAR	100 YEAR		
APPROACH FLOWS (worse case)		9.8	26.9	s(x)=	0.02
	d =	0.46	0.67	s(l)=	0.002
				n=	0.016
TOTAL FLOWS		9.8	32.3		
				L=	10
	d(max)=	0.30	0.88		

Westcreek Phase II

Sump Inlet BASIN 34

		5 YEAR	100 YEAR		
APPROACH FLOWS (worse case)		9.8	26.9	s(x)=	0.02
	d =	0.46	0.67	s(l)=	0.002
				n=	0.016
TOTAL FLOWS		9.8	32.7		
				L=	10
	d(max)=	0.30	0.89		

Westcreek Phase II

Sump Inlet BASIN 35

		5 YEAR	100 YEAR		
APPROACH FLOWS (worse case)		12.3	26.9	s(x)=	0.02
	d =	0.50	0.67	s(l)=	0.002
				n=	0.016
TOTAL FLOWS		16.3	32.7		
				L=	10
	d(max)=	0.50	0.89		

Westcreek Phase II

Sump Inlet BASIN 38

		5 YEAR	100 YEAR		
APPROACH FLOWS (worse case)		10.9	26.5	s(x)=	0.02
	d =	0.48	0.67	s(l)=	0.002
				n=	0.016
TOTAL FLOWS		13.5	28.8		
				L=	10
	d(max)=	0.42	0.80		

Westcreek II

INLET BASIN 41

Q5 =	14.5	Q100 =	26.5	
SL =	0.025	SO =	0.02	

5 YEAR			100 YEAR		
T	16.55		T	20.75	
FW	2.11		FW	2.20	
L1	26.9		L1	35.2	
L2	16.2		L2	21.1	
L3	57.6		L3	75.4	
Li =		15.00			
5 YR Q =		14.5	100 YR Q		26.5
5 YR Qi =		8.1	100 YR Qi		11.3
5 YR Qfb =		6.4	100 YR Qfb		15.2

5 YEAR	
Li < L2	Li > L2
8.09	8.46

100 YEAR	
Li < L2	Li > L2
11.3	13.89

Westcreek Phase II

Sump Inlet BASIN 42 & 45

		5 YEAR	100 YEAR		
APPROACH FLOWS (worse case)		8.4	14.8	s(x)=	0.02
	d =	0.43	0.54	s(l)=	0.002
				n=	0.016
TOTAL FLOWS		16.4	23.8		
				L=	15
	d(max)=	0.40	0.47		

Westcreek Phase II

Sump Inlet BASIN 43 & 44

		5 YEAR	100 YEAR		
APPROACH FLOWS (worse case)		4.9	14.8	s(x)=	0.02
	d =	0.35	0.54	s(l)=	0.002
				n=	0.016
TOTAL FLOWS		5.3	23.8		
				L=	6
	d(max)=	0.20	0.75		

Westcreek II

INLET BASIN 46

Q5 =	8.7	Q100 =	18.7	
SL =	0.015	SO =	0.02	

5 YEAR

T	15.04
FW	1.61
L1	18.6
L2	11.2
L3	39.8

Li = 10.00

5 YR Q = 8.7

5 YR Qi = 4.7

5 YR Qfb = 4.0

100 YEAR

T	20.04
FW	1.69
L1	26.1
L2	15.7
L3	56.0

100 YR Q 18.7

100 YR Qi 7.2

100 YR Qfb 11.5

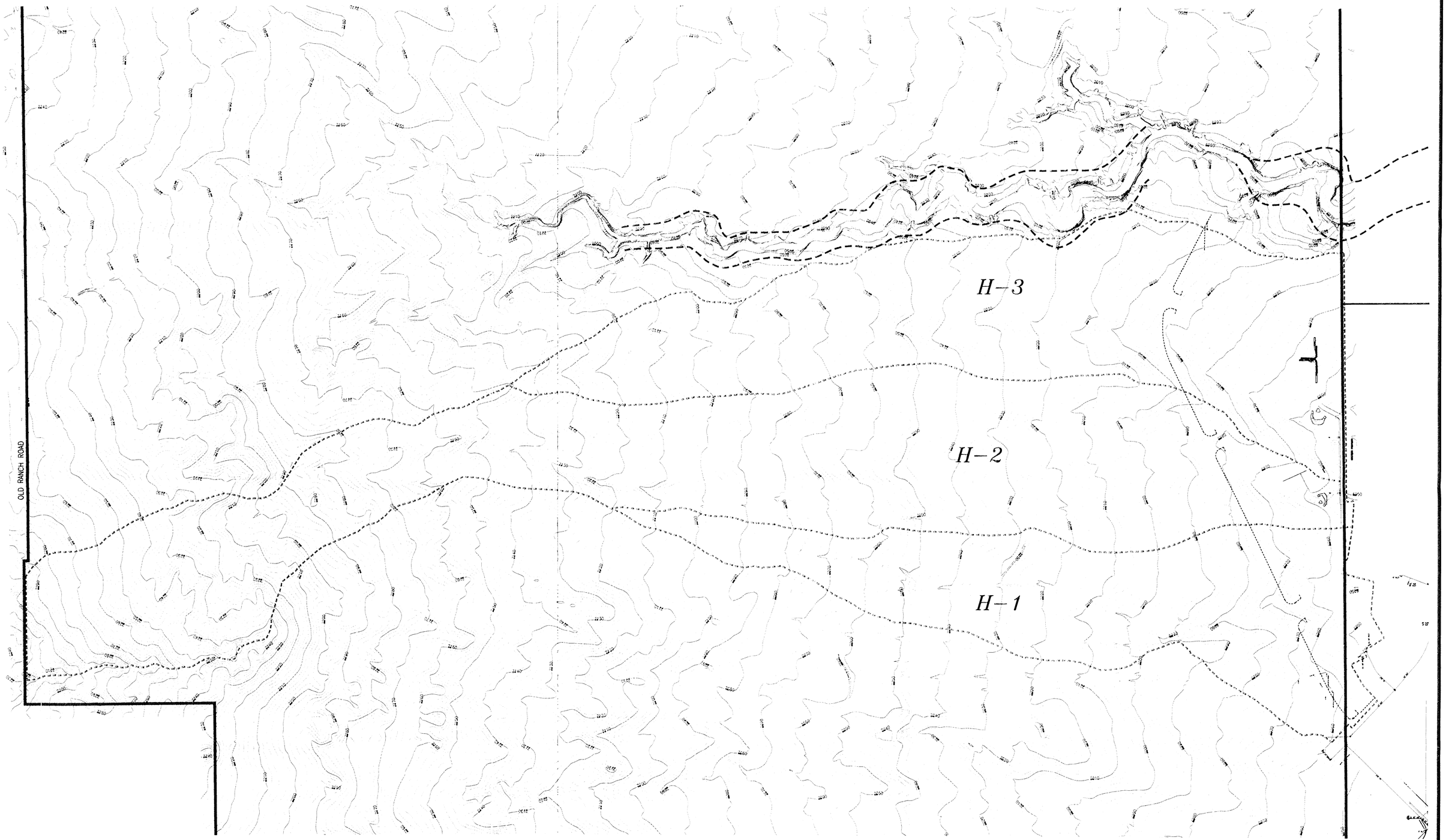
5 YEAR	
Li < L2	Li > L2
4.68	5.01

100 YEAR	
Li < L2	Li > L2
7.2	9.39

Westcreek Phase II

Sump Inlet BASIN 47,48

		5 YEAR	100 YEAR		
APPROACH FLOWS (worse case)		5.9	12.7	s(x)=	0.02
	d =	0.38	0.51	s(l)=	0.002
				n=	0.016
TOTAL FLOWS		9.5	20.3		
				L=	6
	d(max)=	0.39	0.76		



1" = 300'

0 150 300 600

Scale in Feet

HISTORIC DRAINAGE BASIN TABLE

BASIN	AREA (Ac.)	Q_5 (CFS)	Q_{100} (CFS)
H–1	84.00	42.8	136.1
H–2	187.00	89.8	294.5
H–3	120.00	61.2	189.0

EXHIBIT 1

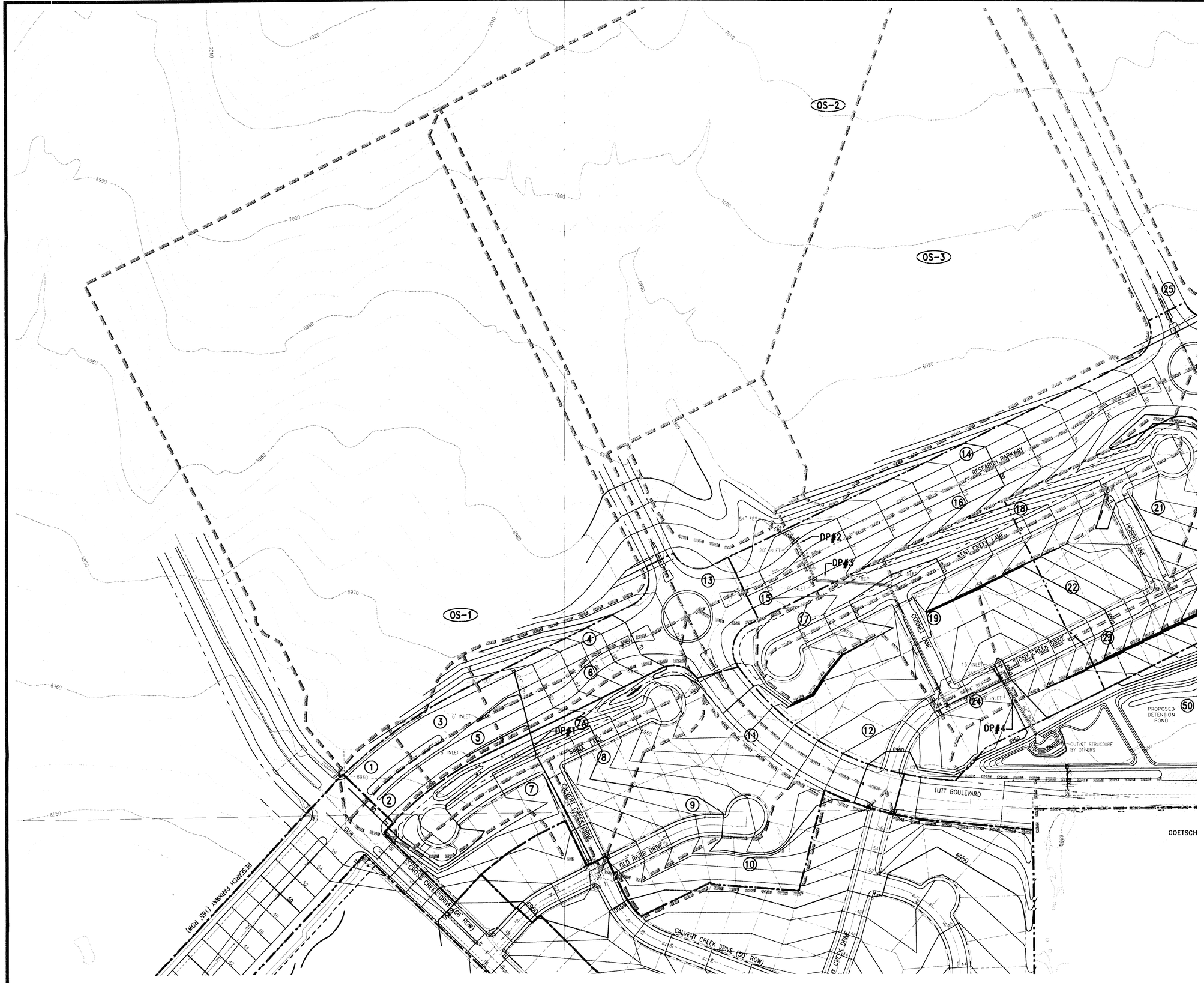
FILE: 03010DP2.DWG 9/3/04

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

TITLE : WESTCREEK II AT WOLF RANCH
HISTORIC DRAINAGE PLAN

SCALE : 1"=300' | DRAWN BY : KC | 03-010 JOB NO.

DATE : 9/3/04 | CHECKED BY : KDR



DEVELOPED DRAINAGE BASIN SUMMARY TABLE

BASIN	AREA (Ac)	Q_5 (cfs)	Q_{100} (cfs)
1	0.41	1.5	2.9
2	0.35	1.5	2.6
3	0.56	1.8	3.6
4	2.71	7.3	12.4
5	0.34	1.1	2.3
6	0.74	2.4	4.7
7A	1.65	3.6	8.3
7B	0.84	3.0	6.2
8	1.23	4.2	8.8
9	2.19	7.1	15.1
10	1.34	4.5	9.6
11	0.85	3.1	5.8
12	3.71	11.2	23.3
13	1.18	3.3	6.8
14	4.22	12.1	22.4
15	0.41	1.5	2.8
16	1.86	5.8	11.5
17	0.59	1.3	2.9
18	1.39	2.8	5.7
19	2.56	7.7	16.2
20	1.10	3.6	7.4
21	1.17	3.9	8.4
22	1.83	5.6	12.2
23	1.13	3.8	8.0
24	0.30	1.1	2.2
25	2.72	8.4	15.2
26	3.69	10.8	20.3
27	0.45	1.6	3.2
28	1.66	6.0	11.4
29	0.59	1.3	2.9
30	0.90	2.0	4.6
31	1.53	4.8	10.2
32	2.22	7.9	16.0
33	1.79	6.0	12.7
34	0.80	2.8	5.8
35	3.56	10.0	21.4
36	8.42	22.6	45.8
37	1.31	4.5	8.7
38	4.46	10.9	23.1
38-A	0.78	2.6	5.7
39	0.91	3.2	6.6
40	2.43	8.2	16.9
41	0.89	3.1	6.4
42	0.58	2.0	4.2
43	1.43	4.9	10.3
44	0.10	0.4	0.7
45	2.60	8.0	17.1
46	2.63	8.7	18.7
47	1.07	3.6	7.6
48	1.87	5.9	12.7
49	3.05	7.6	16.7
50	7.70	16.2	37.5
OS-1	23.74	63.1	132.9
OS-2	17.51	46.6	98.1
OS-3	14.46	40.5	84.4
OS-4	39.14	106.9	222.3

DESIGN POINT SUMMARY TABLE

BASIN	AREA (Ac)	Q_5 (cfs)	Q_{100} (cfs)
DP#1	4.35	11.7	20.2
DP#2	39.82	106.2	216.3
DP#3	42.09	112.0	229.4
DP#4	52.16	136.9	281.3
DP#5	47.66	133.6	272.2
DP#6	59.05	155.1	323.6
DP#7	14.18	36.9	74.9
DP#8	75.86	197.6	411.7
DP#9	78.80	204.1	429.7
DP#10	145.42	366.3	773.0

LEGEND

- EXISTING 2' CONTOUR
- EXISTING 10' CONTOUR (6410)
- PROPOSED 2' CONTOUR
- PROPOSED 10' CONTOUR (6410)

1" = 100'

0 25 50 100 200

Scale in Feet

EXHIBIT 2
SHEET 1 OF 3
FILE: 030100P2.DWG 9/3/04

ROCKWELL CONSULTING, Inc.
ENGINEERING • SURVEYING
1955 N. UNION BLVD., SUITE 250
COLORADO SPRINGS, CO 80909
(719) 475-2575 • FAX (719) 475-2223

TITLE : WESTCREEK II AT WOLF RANCH
DRAINAGE PLAN

SCALE :	1"=100'	DRAWN BY :	KC
DATE :	9/3/04	CHECKED BY :	KDR

JOB NO. 03-010

OS-2

OS-3

OS-4

DP#2

DP#3

DP#4

DP#5

DP#6

DP#7

DP#8

DP#9

DP#10

PROPOSED DETENTION POND

OUTLET STRUCTURE BY OTHERS

OUTLET STRUCTURE BY OTHERS

GOETSCH PROPERTY

RESEARCH PARKWAY

WOLF CREEK DRIVE

GREENBROOK LANE

KENT CREEK LANE

HOBBY LANE

CORNET LANE

STONY CREEK DRIVE

TUTT BOULEVARD

WOLF CREEK KNOLL

WOLF LAKE DRIVE

ABBEY POND LANE

BOX CANYON ROAD

COUNTRY CREEK TRAIL

1" = 100'

0 25 50 100 200

Scale in Feet

EXHIBIT 2
SHEET 2 OF 3
FILE: 030100P2.DWG 9/3/04

ROCKWELL CONSULTING, Inc.

ENGINEERING • SURVEYING
1155 N. UNION BLVD., SUITE 200
COLORADO SPRINGS, CO 80909
(719) 475-2575 • FAX (719) 475-8133

TITLE :	WESTCREEK II AT WOLF RANCH DRAINAGE PLAN		
SCALE : 1"=100'	DRAWN BY : KC		03-010
DATE : 9/3/04	CHECKED BY : KDR		JOB NO.

OS-2

OS-3

OS-4

DP#2

DP#3

DP#5

RESEARCH PARKWAY

KENT CREEK LANE

HOBBIT LANE

CORNET LANE

WOLF CREEK DRIVE

GREEN BROOK LANE

ROCKY CREEK STREET

WOLF LAKE DRIVE

BOX CANYON ROAD

COUNTY ROAD

1" = 100'

0 25 50 100 200

Scale in Feet

EXHIBIT 2
SHEET 3 OF 3
FILE: 03010DP2.DWG 9/3/04

ROCKWELL CONSULTING, Inc.

ENGINEERING • SURVEYING
1955 N. UNION BLVD., SUITE 200
COLORADO SPRINGS, CO 80909
(719) 475-2575 • FAX (719) 475-2213

TITLE : WESTCREEK II AT WOLF RANCH
DRAINAGE PLAN

SCALE : 1"=100'
DRAWN BY : KC
DATE : 9/3/04
CHECKED BY : KDR
JOB NO. 03-010

FILING NO. 1
FILING NO. 6
FILING NO. 2
FILING NO. 8
FILING NO. 7
FILING NO. 3
FILING NO. 11
FILING NO. 9
FILING NO. 10
FILING NO. 12
TRACT A
TRACT B
TRACT C
PRIMA LANE
CALVERT CREEK DRIVE
CROSS CREEK DRIVE (66' ROW)
OLD RIVER DRIVE
RESEARCH PARKWAY
KENT CREEK LANE
HOBBIT LANE
CORNET LANE
STONY CREEK DRIVE
WOLF CREEK DRIVE
GREENBROOK LANE
BOX CANYON ROAD
WOLF LAKE DRIVE
COUNTRY CREEK TRAIL
ABBEY POND LANE
TUTT BOULEVARD
PROPOSED DETENTION POND TRACT A
OUTLET STRUCTURE BY OTHERS
GOETSCH PROPERTY
MATCHLINE SEE THIS SHEET
54" FES
8" INLET
6" INLET
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1" = 100
0 25 50 100 200
Scale in Feet
EXHIBIT 3
FILE: 03010EP2.DWG 9/3/04
ROCKWELL CONSULTING, Inc.
ENGINEERING + SURVEYING
1955 N. UNION BLVD., SUITE 250
COLORADO SPRINGS, CO 80909
(719) 475-2575 • FAX (719) 475-2213
TITLE : WESTCREEK II AT WOLF RANCH
FILING PLAN
SCALE : 1"=100'
DRAWN BY : KC
DATE : 9/3/04
CHECKED BY : KDR
03-010
JOB NO.

DESIGN POINT DISCHARGE SUMMARY w/DETENTION			
DESIGN POINT	AREA(sm)	Q_5 (cfs)	Q_{100} (cfs)
A1	0.06	3	32
A3	0.38	87	326
A4	0.09	39	133
A5 (IN)	0.77	279	979
A5 (OUT)	0.77	68	157
A6	0.54	220	715
A7	0.21	118	362
A	0.78	69	158
A9	0.12	51	170
B	0.04	60	122
C3	0.05	33	100
C	0.16	104	314
D2 (IN)	0.10	49	160
D2 (OUT)	0.10	5	54
E5	0.13	85	241
E2 (IN)	0.18	116	336
E2 (OUT)	0.18	8	97

DESIGN POINT DISCHARGE SUMMARY w/DETENTION			
DESIGN POINT	AREA(sm)	Q_5 (cfs)	Q_{100} (cfs)
F9	0.21	20	157
F10	0.06	6	48
F11	0.14	13	102
F12	0.43	24	236
F13	0.05	2	30
F14	0.25	45	210
F18 (IN)	0.80	72	572
F18 (OUT)	0.80	29	147
F19 (IN)	0.37	61	349
F19 (OUT)	0.37	21	91
F23	0.05	16	69
F24	0.14	55	203
F25	0.34	67	306
F27	1.24	55	245
F30	0.50	124	515
F28 (IN)	2.02	185	813
F28 (OUT)	2.02	85	462
F	2.09	86	475

DESIGN POINT DISCHARGE SUMMARY w/DETENTION			
DESIGN POINT	AREA(sm)	Q_5 (cfs)	Q_{100} (cfs)
G3	0.29	57	278
G (IN)	0.45	57	278
G (OUT)	0.45	34	111

DETENTION BASIN E/D DATA

Q_5 IN = 165 cfs
Q_5 OUT = 13 cfs
VOL_5 = 5.9 AC-FT
VOL_{100} = 14.8 AC-FT
WS_5 = 55.2
WS_{100} = 57.8
Q_{100} IN = 496 cfs
Q_{100} OUT = 151 cfs (1)

(1) TOTAL OUTFLOW. OUTFLOW TO BE CONTROLLED TO EXISTING LEVELS AT DP E2 & DP D2

DETENTION BASIN DB18 DATA

Q_5 IN = 72 cfs
Q_5 OUT = 29 cfs
VOL_5 = 2.5 AC-FT
VOL_{100} = 12.0 AC-FT
WS_5 = 7142.8
WS_{100} = 7146.9
Q_{100} IN = 572 cfs
Q_{100} OUT = 147 cfs

DETENTION BASIN DB19 DATA

Q_5 IN = 61 cfs
Q_5 OUT = 21 cfs
VOL_5 = 1.7 AC-FT
VOL_{100} = 9.5 AC-FT
WS_5 = 7142.5
WS_{100} = 7145.6
Q_{100} IN = 349 cfs
Q_{100} OUT = 91 cfs

DETENTION BASIN DB28 DATA

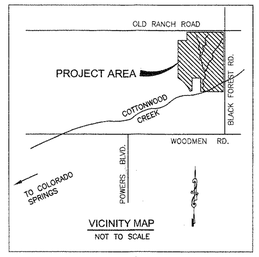
Q_5 IN = 185 cfs
Q_5 OUT = 85 cfs
VOL_5 = 6.7 AC-FT
VOL_{100} = 24.8 AC-FT
WS_5 = 6971.6
WS_{100} = 6976.6
Q_{100} IN = 813 cfs
Q_{100} OUT = 462 cfs

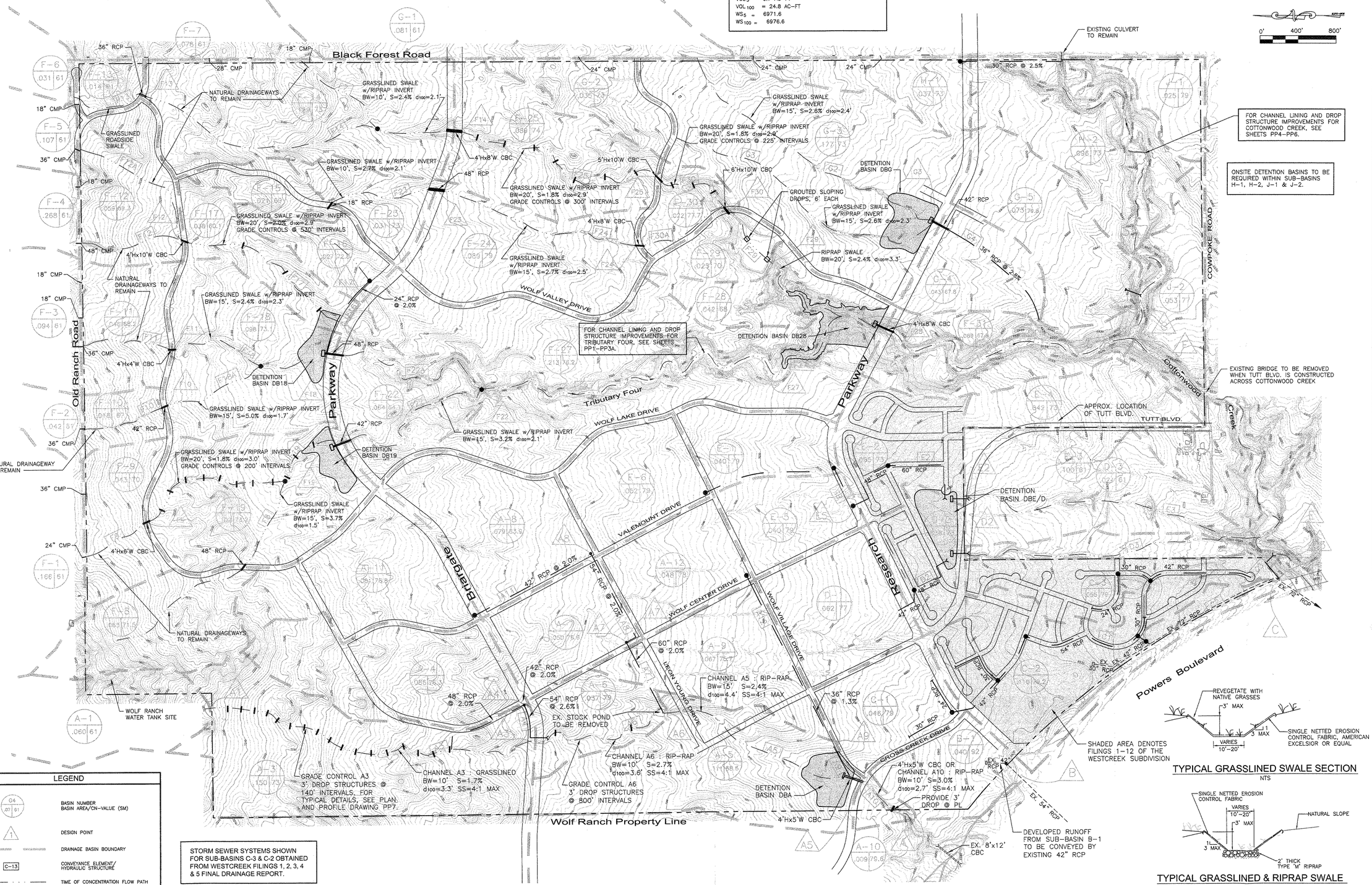
DETENTION BASIN A DATA

Q_5 IN = 279 cfs
Q_5 OUT = 68 cfs
VOL_5 = 8.4 AC-FT
VOL_{100} = 36.0 AC-FT
WS_5 = 3.1
WS_{100} = 7.1
Q_{100} IN = 979 cfs
Q_{100} OUT = 157 cfs

DETENTION BASIN G DATA

Q_5 IN = 57 cfs
Q_5 OUT = 34 cfs
VOL_5 = 4.2 AC-FT
VOL_{100} = 7.0 AC-FT
WS_5 = 4.1
WS_{100} = 7.0
Q_{100} IN = 278 cfs
Q_{100} OUT = 111 cfs





LEGEND

- BASIN NUMBER / BASIN AREA/CN–VALUE (SM)
- DESIGN POINT
- DRAINAGE BASIN BOUNDARY
- C–13 CONVEYANCE ELEMENT/ HYDRAULIC STRUCTURE
- TIME OF CONCENTRATION FLOW PATH

TYPICAL GRASSLINED SWALE SECTION
NTS

TYPICAL GRASSLINED & RIPRAP SWALE
NTS

Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado
80904 - 4208
(719) 630-7342

WOLF RANCH
MASTER DEVELOPMENT DRAINAGE PLAN
PROPOSED FACILITIES
COLORADO SPRINGS, COLORADO

Project No.:	03094
Date:	03/09/2004
Design:	RNW
Drawn:	JLN
Check:	RNW
Revisions:	

Fig. 6