ANDERSON CONSULTING ENGINEERS, INC.
Civil • Water Resources • Environmental

March 8, 2006

Mr. Bert Leautaud
City of Greeley
Public Works Department
1001 Ninth Avenue
Greeley, CO 80631

RE: City of Greeley Comprehensive Drainage Plan – Country Club Basin
(ACE Project No. COCOG05)

Dear Bert:

Anderson Consulting Engineers, Inc. (ACE) is pleased to inform you that we have completed the analyses, design, plan preparation and documentation associated with the update of the comprehensive drainage plan for the Country Club Basin. In addition we have completed all revisions to the report and project notebook pursuant to City review comments and our final in-house review. Please find enclosed two copies of the Final Report and one copy of the Project Notebook for the Country Club Basin Comprehensive Drainage Plan.

It has been our pleasure working with you in the completion of this study. If you have any questions or comments concerning any aspect of this project, please do not hesitate to contact us.

Sincerely,
ANDERSON CONSULTING ENGINEERS, INC.

Gregory J. Koch, P.E.
Vice President

Brian L. Van Zanten, P.E.
Project Engineer II

GJK/BLV/vla

Enclosures

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CITY OF GREELEY
COMPREHENSIVE DRAINAGE PLAN

COUNTRY CLUB BASIN
FINAL REPORT

Prepared for:

City of Greeley
Public Works Department
1001 Ninth Avenue
Greeley, CO 80631

Prepared by:

Anderson Consulting Engineers, Inc.
772 Whalers Way, Suite 200
Fort Collins, CO 80525
(ACE Project No. COCOG05)

March 8, 2006

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I. INTRODUCTION

The City of Greeley is a rapidly growing community that previously recognized the need for adequate storm drainage facilities, as exemplified by the completion of the Comprehensive Drainage Plan in 1974. With the development that occurred in and around Greeley in the 23 years following completion of the 1974 Comprehensive Drainage Plan, the Comp Plan was updated in 1997 for five of the City's major drainage basins, including the Country Club Basin (Comprehensive Drainage Plan, City of Greeley, Country Club Basin, Lidstone and Anderson, Inc., November 1996). The City of Greeley has continued to experience significant growth over the past eight years since completion of the 1997 Comp Plan.

It has become increasingly important that the 1997 Comp Plan be updated, due to the construction of numerous drainage improvements and additional development within the Country Club Basin. Drainage improvements within the basin, constructed since 1997 include the following:

(a) improvements to the Country Club West Pond Outfall Channel south of 10th Street between 50th Avenue and 49th Avenue;

(b) the addition of the 60-inch RCP under 10th Street near 49th Avenue;

(c) construction of the 49th Avenue Storm Sewer improvements from 10th Street and 49th Avenue to Allen Park;

(d) installation of the box culverts beneath 4th Street at Epple Park;

(e) channel improvements to the Larson Ditch, including the installation of the box culverts beneath B Street;

(f) construction of the Eagleview detention and drainage system including the South Eagleview Detention Pond, the North Eagleview Drainage Channel, the Eagleview Side Channel Weir, the South Eagleview Detention Pond Outflow Spillway, the box culverts beneath F Street, and the North Eagleview Detention Pond; and

(g) improvements to the existing spill structure on the Greeley No. 3 Ditch at F Street east of 59th Avenue.

With the implementation of this large number of drainage improvements, the facilities proposed in the 1997 Comp Plan were re-evaluated and updated.

In support of these needs, the City contracted with Anderson Consulting Engineers, Inc. (ACE) to update the Comp Plan for the Country Club Basin, as well as the other basins that were the subject of the 1997 study. This report documents the results of the Comp Plan efforts associated with the Country Club Basin.

1.1 Project Goals and Objectives

The goal of the 1997 Comprehensive Drainage Plan was to update the 1974 Comp Plan and develop a planning document to be utilized as a tool for making decisions related to stormwater management within the City of Greeley. Completion of the 1997 Comp Plan for the Country Club Basin involved the development of a planning document that met the following objectives:

(a) identify long-term capital improvements and rehabilitation measures for the existing drainage system;

(b) provide a tool for implementation of future improvements associated with new developments within the urban growth boundary;

(c) provide a basis for prioritizing and scheduling required improvements (implementation plan);

(d) provide the flexibility to implement improvements that afford flood protection while being cost effective; and

(e) address environmental, water quality, and recreational and other open space and drainage corridor planning issues.

Sensitivity to these objectives was an important consideration during the preparation of the 1997 Comp Plan; however, the primary focus of the planning efforts was the reduction of both existing and potential future flood hazards within the City of Greeley.

The objectives of the current study are commensurate with those identified for the 1997 Comp Plan. The goals of the current study are to update the previous Comp Plan to reflect existing conditions based on recent improvements, to re-evaluate the proposed improvements outlined in the 1997 Comp Plan that have not been built in context of the most recent hydrologic analyses, and update them if necessary. All objectives were important in the current Comp Plan update; however, the primary focus of the Comprehensive Drainage Plan remains the reduction of existing and potential future flood damages and hazards within the City of Greeley in the most economical manner.

1.2 Scope of Work

The scope of work associated with the current Comp Plan update included the following tasks:

1. Review of Existing Information and Field Reconnaissance. Existing information pertinent to the current study was reviewed and evaluated with respect to identifying data and parameters that were needed for completing the current analyses and modeling effort. This information included the following: (a) the 1997 Comp Plan for the Country Club Basin, including all background data and modeling information; (b) all development that has occurred within the Country Club Basin since the completion of the previous Comp Plan, including final 100-year discharge release rates for all pertinent on-site detention facilities; (c) design and as-built information regarding the improvements prepared for the Country Club West Outfall Channel and the 10th Street culvert crossing by the Colorado Department of Transportation (CDOT); (d) design information regarding the improvements prepared for the 49th Avenue Storm Sewer by the City of Greeley; (e) design information regarding the improvements prepared for the box culverts downstream of Epple Park at 4th Street by the City of Greeley; (f) design information regarding improvements associated with the Larson Ditch and South Eagleview Detention Pond by RG Consulting Engineers, Inc.; (g) design and as-built information regarding improvements associated with the North Eagleview Drainage Channel by Burnett Consulting Engineers, Ltd.; (h) design and as-built information regarding improvements prepared for the Greeley No. 3 Ditch F Street Diversion by Drexel, Barrell & Co.; and (i) available GIS data within the basin including existing structures, topography, roads, railroads, water features, soils, zoning, storm sewers, and sanitary sewers.

   Field reconnaissance efforts included the following: (a) verification and determination of existing drainage facilities; and (b) site visits to locations of recent improvements.

2. Update of Existing, Future, and Proposed Condition Hydrologic Models. The hydrologic models associated with the existing development/existing facilities, future development/existing facilities, and future development/Comp Plan facilities condition developed as part of the 1997 Comp Plan were updated to include drainage improvements in the basin that have been implemented since 1997. This included the following six items: (a) incorporation of six new detention facilities with a single or combined pond volume of approximately four acre-feet or greater, as well as the re-delineation of subbasins as they relate to the detention facilities; (b) inclusion of channel improvements to the Country Club West Outfall Channel along 10th Street; (c) addition of the 49th Avenue Storm Sewer improvements; (d) integration of improvements related to the upper and lower Epple Park Ponds; (e) addition of the North Eagleview Drainage Channel improvements; and (f) incorporation of improvements related to the Eagleview Side Channel Weir located on the Greeley No. 3 Ditch. A comparison of current existing condition discharges to those estimated from the 1997 Comp Plan was completed in order to evaluate discharge changes along the Country Club Basin major drainageway.

3. Revisions to Drainage Improvement Plan. The drainage improvement plan considered potential revisions to the 1997 Comp Plan, based on revised discharges obtained from the updated hydrologic models.

4. Engineering Analyses of the Drainage Improvement Plan. Based on the selected level of protection determined from the 1997 Comp Plan, hydrologic and hydraulic design parameters for all proposed improvements were evaluated, with all components associated with the previously proposed improvements modified to accommodate current hydraulic conditions.

5. Preparation of the Plan of Storm Drainage Improvements. Hydraulic design parameters were finalized and final hydrologic modeling of the drainage improvement plan was completed. The revised plan of improvements for the Country Club Basin was completed, including revised estimates of capital improvement costs.

6. Final Report Documenting the Updated Country Club Basin Comp Plan. The results of the Plan efforts are summarized in this report as well as in the accompanying Project Notebook.

1.3 Mapping and Surveying

The primary mapping utilized for this Comp Plan update was obtained from the City of Greeley GIS department. It is the same 2-foot contour mapping utilized for the 1997 Comp Plan. This mapping was previously digitized from 1987 and 1992 aerial flight line data. A triangulated irregular network (TIN) was generated from a 50-foot point grid and break lines provided by Arnold Analytical Services. The North American Datum of 1927 (NAD27) was used for horizontal control, while the National Geodetic Vertical Datum of 1929 (NGVD29) was used for vertical control in preparing the mapping. A 2-foot contour map was specifically generated to facilitate completion of the Comp Plan for the Country Club Basin. It should be noted that the contour mapping has recently been converted by the City of Greeley in an effort to keep up with the most current and accurate datum standards. The NAD27 horizontal datum has been converted to the North American Datum 1983 (NAD83) High Accuracy Reference Network (HARN) under the State Plane Coordination System Projection and the Colorado North Zone. The NGVD29 vertical datum has been converted to the geodetic North American Vertical Datum of 1988 (NAVD88). However, as this Comp Plan had largely been completed prior to the datum conversion, no datum adjustments were made and the original NAD27 and NGVD29 datums were maintained for this study.

No additional survey information was collected for the current Comp Plan. Field survey data collected by King Surveyors, Inc. of Windsor, Colorado for the 1997 Comp Plan is included in Section 1.1 of the Project Notebook.

1.4 Previous Studies

Many previous studies related to drainage within the Country Club Basin were collected and reviewed during the completion of the 1997 Comp Plan project. The Country Club Basin was not specifically analyzed as part of the 1974 Comprehensive Drainage Plan (CDP); however, the Greeley Public Works Department completed the Greeley Country Club Basin Drainage Study in 1987. The 1987 Report developed alternative drainage improvements along with cost estimates for the major drainageway within the basin.

In addition to the 1997 Comp Plan and the documents referenced in that report, the current study utilized numerous drainage reports associated with previous and on-going developments, as well as specific design information related to the improvements recently implemented to the Country Club West Outfall Channel, the 10th Street crossing, the 49th Avenue Storm Sewer addition, the 4th Street crossing at Epple Park, the Larson Ditch and Eagleview Detention Pond improvements, the North Eagleview Channel Improvements, and the Eagleview Side Channel Weir. All drainage report information as it relates to the current study is provided in Section 3.2 of the accompanying Project Notebook.

II. BASIN CHARACTERISTICS

2.1 Location and Description

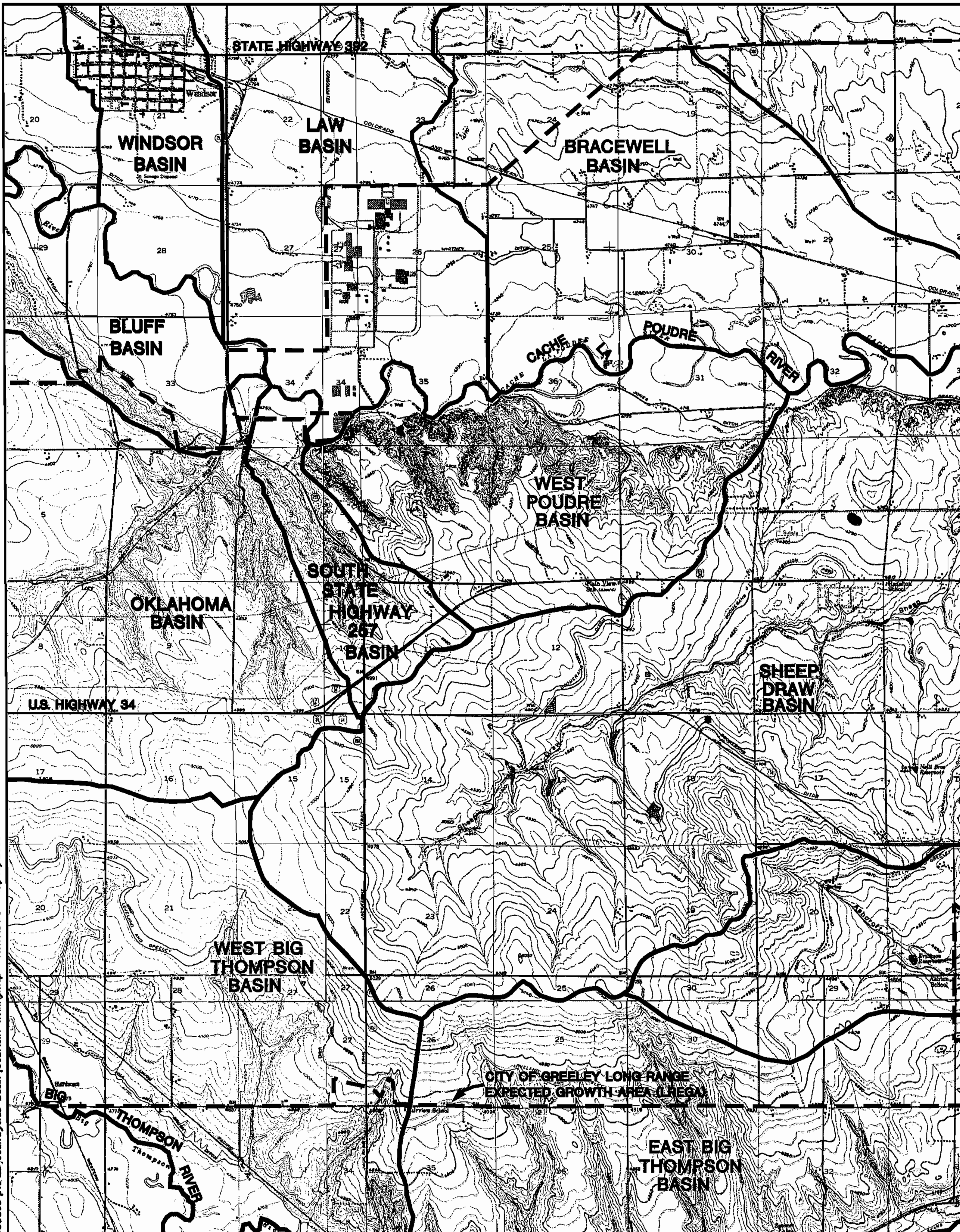
The Country Club Basin is located near the western portion of the existing urbanized area within the City of Greeley. The Cache La Poudre River on the north, 35th Avenue on the east, 22nd Street on the south, and 59th Avenue on the west define the approximate basin limits. The drainage basin boundaries are delineated on the vicinity map in Figure 2.1.

The Country Club Basin drainage area is estimated to be 2,055 acres. The Greeley No. 3 Ditch divides the basin between F Street and B Street, with 1,304 acres located south of the ditch and 751 acres situated between the ditch and the Cache La Poudre River. Ninety-four percent of the basin area south of the ditch has been developed, while virtually none of the land north of the ditch is developed. As a point of reference, 85 percent of the area south of the ditch was developed upon completion of the 1997 Comp Plan; similar to existing conditions, none of the land north of the ditch was developed at that time. Approximately 73 acres south of the ditch and 730 acres north of the ditch are under Weld County jurisdiction, and have not been annexed by the City of Greeley. The entire Country Club Basin, however, lies within the City of Greeley's Long Range Expected Growth Area (LREGA) limits, which represents the expected twenty-year growth area boundary.

The majority of the development in the basin consists of low to medium density single- and multi-family residential housing. Land use in the basin also includes commercial development along West 10th Street, two parks, development associated with the Greeley Country Club Golf Course, and a substantial portion of the Aims Community College campus near West 20th Street. The majority of the undeveloped land within the basin is presently owned by Weld County.

2.2 Drainage Features

In the southern half of the Country Club Basin (specifically south of 4th Street), three detention facilities serve as major drainage features that are utilized to significantly reduce the peak discharges occurring along the major drainageway. Specifically, these facilities include: (1) the Aims Community College (ACC) Detention Pond; (2) the Country Club West Detention Pond; and (3) the Allen Park Detention Pond. Additional detention along West 10th Street from commercial developments as well as detention located in the Country Club West Subdivision also serve to reduce peak discharges contributing to the major drainageway. The North Eagleview Detention Pond provides significant detention along the major drainageway in the northern portion of the Country Club Basin. Major detention facilities north of 4th Street but not located along the major drainageway include the Weber West Western Detention Pond and the Weber West Eastern Detention Pond.


STATE HIGHWAY 392
Windsor
WINDSOR BASIN
LAW BASIN
BRACEWELL BASIN
BLUFF BASIN
CACHE LA POUDRE RIVER
WEST POUDRE BASIN
SOUTH STATE HIGHWAY 257 BASIN
OKLAHOMA BASIN
U.S. HIGHWAY 34
SHEEP DRAW BASIN
WEST BIG THOMPSON BASIN
CITY OF GREELEY LONG RANGE EXPECTED GROWTH AREA (LREGA)
BIG THOMPSON RIVER
EAST BIG THOMPSON BASIN

In addition to the major drainageway and outfall system, two irrigation ditches traverse the Country Club Basin. These include the West Grapevine Ditch and the Greeley No. 3 Ditch. The West Grapevine Ditch traverses the southern portion of the basin, crossing West 16th Street Lane and heading southeast toward the Aims Community College campus. The ditch conveys irrigation and minor stormwater flows within the basin, but offers limited value as a drainage feature that will convey major stormwater runoff out of the basin. The Greeley No. 3 Ditch conveys flow (irrigation and captured stormwater) in a southeasterly direction between F Street and B Street in the northern half of the basin. Presently, a majority of the stormwater emanating from the southern portion of the basin is conveyed over the Greeley No. 3 Ditch via the flume constructed as part of the South Eagleview Pond Outflow Spillway. Some of the stormwater flows that drain into the Greeley No. 3 Ditch are significantly reduced prior to entering the ditch due to detention provided by the Weber West Detention Ponds; three subbasins directly north of the two ponds also contribute undetained runoff to the ditch. Stormwater runoff captured by the Greeley No. 3 Ditch is conveyed eastward to the Eagleview Side Channel Weir directly north of the South Eagleview Detention Pond. At this location, flows are diverted over the side channel weir and combine with outflows from the South Eagleview Detention Pond. During a majority of the flood events (up to and including a 100-year return period), the Greeley No. 3 Ditch serves as a significant drainage boundary within the basin. The ditch directs all of the storm runoff generated within the basin and conveys those flows east to the Eagleview Side Channel Weir.

The Cache La Poudre River represents the northern boundary of the Country Club Basin. The river receives all the stormwater runoff that is generated within the basin. The 100-year floodplain associated with the Cache La Poudre River (updated by the U.S. Army Corps of Engineers in 2003) encompasses nearly 60 percent (443 acres) of the basin drainage area between the Greeley No. 3 Ditch and the river.

The drainage features along with the 100-year floodplain are presented on the basin boundary map shown on Sheet B-1.

2.3 Description of the Major Drainageway

In general, stormwater runoff generated within the Country Club Basin flows in a northerly direction toward the Cache La Poudre River. Runoff originates south of 20th Street and is directed through the Aims Community College (ACC) campus, ultimately collecting in the ACC Detention Pond at the north end of the campus. The outfall from the ACC Detention Pond directs flows to the Country Club West Detention Pond via a swale and storm sewer. Releases from the Country Club West Detention Pond are directed north along 50th Avenue and east along 10th Street via a concrete channel, and north beneath 49th Avenue via two storm sewers to the Allen Park Detention Pond, shown in Figure 2.2. Flows are routed north from the Allen Park

Detention Pond along 47th Avenue and then northeast through Epple Park via an open channel to the Upper Epple Park Detention Pond. The Upper Epple Park Detention Pond releases flows into the Lower Epple Park Detention Pond, depicted in Figure 2.3. This pond collects additional stormwater runoff from adjacent development and releases the runoff north across 4th Street into the Larson Ditch. The ditch directs flows into the South Eagleview Detention Pond, where releases from the pond are flumed over the Greeley No. 3 Ditch.

Figure 2.2 Allen Park Detention Pond.

In addition to the releases from the South Eagleview Detention Pond, the North Eagleview Drainage Channel receives runoff north of the Greeley No. 3 Ditch and routes the combined flow under F Street and into the North Eagleview Detention Pond. Flows are released at the northeast corner of the pond beneath the Colorado and Southern Railroad, where a portion of the flows appear to be captured by a drainage ditch. The ditch routes the flows east beneath 35th Avenue into the Grapevine Basin 35th Avenue Outfall Channel. Higher flows overtop the ditch and are conveyed overland into a large gravel pit. Both the outfall channel and the pond spill into the Cache la Poudre River.

The Country Club Basin is also served by two secondary drainage paths located in the northwestern portion of the basin. Flows exceeding the capacity of 4th Street west of 47th Avenue are conveyed northward by the local streets and commingle with the storm runoff generated within the Weber West residential development. Two detention ponds are located adjacent to the Greeley No. 3 Ditch at the north end of the residential development. Flows reaching the Weber West Western Detention Pond (located at the north end of 50th Avenue Court) are released into the ditch and conveyed to the east. Similarly, storm flows collected in the Weber

Figure 2.3 Lower Epple Park Detention Pond.

West Eastern Detention Pond (located at the north end of 47th Avenue Court) are released into the ditch and conveyed to the east. Depending on the storm event, flows within the ditch spill at the Eagleview Side Channel Weir and are commingled with flumed releases from the South Eagleview Detention Pond. The major drainageway and pertinent hydraulic structures are graphically portrayed on Sheet B-1.

III. INVENTORY OF EXISTING FACILITIES

Substantial improvements had been made to the drainage facilities within the Country Club Basin along the major drainageway at the time the 1997 Comp Plan was completed. Many more drainage improvements have been implemented since 1997. Much of this work has been accomplished in response to development within the basin and to recommendations made in the 1997 Comp Plan. Currently detention ponds, road crossings, storm sewers, conveyance channels, and overflow weirs comprise the network of drainage facilities that provide flood relief during major storm events. As part of the 1997 Comp Plan, an inventory of the existing facilities along the major drainageway was conducted. The inventory and evaluation of each facility involved: (a) field reconnaissance to document location, condition and additional data requirements; (b) review of available design and as-built drawings; (c) collection of site-specific survey data; and (d) evaluation of the hydraulic capacity. Table 3.1 summarizes the results of the inventory and evaluation of existing facilities completed for the 1997 Comp Plan. New information included in the table, prepared as part of the current study, includes improvements to the Country Club West Outfall Channel, the additional crossing structure at 10th Street, the additional 49th Avenue Storm Sewer, the improved crossing structure at 4th Street, improvements to the Larson Ditch, the crossing at B Street, the South Eagleview Detention Pond (including the outflow spillway), the North Eagleview Drainage Channel, the crossing at F Street, and the North Eagleview Detention Pond. Specific information related to these facilities is provided in the following paragraphs. More detailed data and photographic documentation associated with the facilities are provided in Sections 1.2 and 6, respectively, of the Project Notebook.

The current study included a comprehensive inventory of storm drainage facilities constructed in conjunction with recent development (since completion of the 1997 Comp Plan). Improvements constructed as part of the South Eagleview Detention Pond (specifically the Eagleview Side Channel Weir) and improvements to the existing F Street Spill Structure, both located on the Greeley No. 3 Ditch, were also evaluated.

3.1 Detention Facilities

The following documentation of existing detention facilities was provided in the 1997 Comp Plan, with discharge, storage volume, and overtopping depth values updated for the current Comp Plan, along with any new facilities. The main detention facilities along the major drainageway are located in the following areas: (a) the northern end of the Aims Community College campus; (b) the Country Club West Subdivision; (c) along the embankment south of 10th Street and west of 49th Avenue; (d) Allen Park; (e) Epple Park; (f) between B Street and the Greeley No. 3 Ditch; and (g) between F Street and the Colorado and Southern Railroad. Five additional detention facilities, all of which are located south of 4th Street, also significantly

reduce contributing flows to the major drainageway. Two other detention facilities, located adjacent to and directly south of the Greeley No. 3 Ditch, significantly reduce contributing flows to the ditch. A summary of the location, condition, and capacity of each major detention facility is included in Table 3.1.

Aims Community College (ACC) Detention Pond. This detention pond is located near the northern edge of the ACC Campus, just south of the Country Club West Subdivision. The pond is a dry pond with a maximum stormwater detention volume of 6.4 acre-feet prior to overtopping. The outlet facilities consist of two 22"H x 36"W arch CMPs with a combined discharge capacity of 60 cfs prior to exceeding the top of the pond embankment. A low section in the road along the north embankment of the pond allows runoff to spill from the pond into the open swale to the north. The swale ultimately conveys stormwater runoff into the Country Club West Detention Pond. The existing condition analyses of the 100-year storm event predict the maximum release from the pond will be 163 cfs. Overtopping of the roadway occurs at a maximum depth of approximately 0.3 feet with a width of 320 feet.

Country Club West Detention Pond. The Country Club West Detention Pond lies between 50th Avenue and 51st Avenue, 12th Street Drive and 11th Street. The pond maintains a wetland area, supporting cattails, bushes, and small trees. The maximum stormwater detention volume of the pond is 28.4 acre-feet prior to overtopping the emergency spillway located along the north end of the pond. A 24-inch RCP outlet pipe, restricted by an 18-inch diameter orifice plate, conveys releases into a short concrete-lined channel located along 50th Avenue south of 10th Street. The maximum capacity of the outlet pipe prior to overtopping the emergency spillway is approximately 22 cfs. During the existing condition 100-year storm event, the maximum discharge will be approximately 22 cfs, all of which is conveyed through the outlet pipe.

10th Street and 49th Avenue. Inadvertent detention exists along the south side of 10th Street just west of 49th Avenue at the terminus to the Country Club West Outfall Channel. The maximum storage volume at this location is approximately 7.5 acre-feet prior to encroaching onto 10th Street. An additional culvert crossing at this location installed as part of the CDOT improvements along 10th Street has increased the total pipe capacity to 347 cfs prior to overtopping. The existing condition analyses for the 100-year storm indicate the maximum discharge passing beneath 10th Street will be 295 cfs, all of which is conveyed through the two culverts.

Allen Park Detention Pond. The Allen Park Detention Pond is situated in the Westmoor West Subdivision, between 47th Avenue and 49th Avenue, West 9th Street Road and West 9th Street. A portion of the detention area, which lies below the crest of the outlet spillway, maintains a permanent pool elevation while the remaining storage area serves a dual function as a playground and open-space park. The maximum stormwater detention volume, above the permanent pool, prior to overtopping the embankment is approximately 30.1 acre-feet. The

Table 3.1 Inventory of Existing Drainage Facilities.

Facility Name and/or Type	Location [EPA SWMM ID]	Condition	Maximum Storage Volume (acre-feet)	Maximum Discharge Capacity[1] (cfs)
MAJOR DRAINAGEWAY				
Aims Community College (ACC) Detention Pond	North end of ACC Campus [303]	Poor - deposition in outlet pipes	6.4	60
ACC Detention Pond Outfall Swale	From ACC Detention Pond to 13th Street [204]	Good	N/A	318
ACC Detention Pond Outfall	From 13th Street to Country Club West Pond [N/A]	Good	N/A	41[2]
Country Club West Detention Pond	South of 50th Avenue and 11th Street Road Intersection [304]	Good	28.4[3] 43.9[4]	22[3] 226[4]
50th Avenue Arch CMPs	Intersection of 50th Avenue and 10th Street [N/A]	Good – inlet and outlet improved in 2002	N/A	69
Country Club West Outfall Channel	Along 10th Street between 50th Avenue and 49th Avenue [206]	Good - concrete-lined channel built in 2002	N/A	298
10th Street and 49th Avenue	South of 10th Street, west of 49th Avenue [306]	Good – additional crossing added in 2002	7.5	347
49th Avenue Storm Sewer(s)	From 10th Street and 49th Avenue to Allen Park Detention Pond [210]	Good - additional storm sewer added in 2001	N/A	172[5]
Allen Park Detention Pond	Intersection of 47th Avenue and 9th Street [310]	Good	3.2[3] 30.1[4]	0[3] 325[4]
47th Avenue Storm Sewer	From Allen Park Detention Pond to Epple Park/Dove Creek Channel [211]	Good	N/A	141[2]
Epple Park/Dove Creek Channel	From 47th Avenue Storm Sewer outfall to Epple Park Upper Pond [215]	Good	N/A	1,069
Upper Epple Park Pond	Intersection of 4th Street and 43rd Avenue [315]	Good	10.4[3] 13.6[7]	125[3] 220[7]
Lower Epple Park Pond	Downstream of Upper Epple Park Pond [317]	Good – outlet replaced in 2002	2.0	765
Larson Ditch	From 4th Street to B Street [221]	Good	N/A	1,649
B Street Box Culverts	Crossing under B Street south of South Eagleview Detention Pond [N/A]	Good	N/A	925
South Eagleview Detention Pond	Between B Street and the Greeley No. 3 Ditch [321]	Good - outlet improvements made in 2003	13.2	755
North Eagleview Drainage Channel	From South Eagleview Detention Pond to F Street [225]	Good - constructed in 2003	N/A	1,627

[1] Prior to flooding or street overtopping.
[2] Pipe full flow capacity.
[3] At invert of spillway.
[4] Including spillway discharge and surcharged storage capacity.
[5] Pipe full flow capacity reduced due to tailwater.
[6] Capacity obtained from BCE, Ltd. report.
[7] Including spillway discharge and surcharged storage capacity prior to spilling over north embankment.

Table 3.1 Inventory of Existing Drainage Facilities (Continued).

Facility Name and/or Type	Location [EPA SWMM ID]	Condition	Maximum Storage Volume (acre-feet)	Maximum Discharge Capacity[1] (cfs)
F Street Box Culverts	Crossing under F Street south of North Eagleview Detention Pond [N/A]	Good - constructed in 2003	N/A	1,100
North Eagleview Detention Pond	Between F Street and the Colorado and Southern Railroad [327]	Good - constructed in 2003	173.3	244
Colorado and Southern Railroad Bridge	Crossing under the Colorado and Southern Railroad north of the North Eagleview Detention Pond [N/A]	Good	N/A	500[6]
OTHER FACILITIES				
Weber West Western Detention Pond	North End of 50th Avenue Court [319]	Good	13.4[3] 23.1[4]	16[3] 100[4]
Weber West Eastern Detention Pond	North End of 47th Avenue Court [320]	Good	9.3[3] 12.8[4]	9[3] 88[4]
F Street Spill Structure	Along left bank of Greeley No. 3 Ditch approximately 900 feet upstream of F Street Bridge [N/A]	Good - improved in 2003	N/A	1,143
Eagleview Side Channel Weir	Along left bank of Greeley No. 3 Ditch directly upstream of South Eagleview Detention Pond outflow spillway [34]	Good - constructed in 2003	N/A	535

[1] Prior to flooding or street overtopping.
[2] Pipe full flow capacity.
[3] At invert of spillway.
[4] Including spillway discharge and surcharged storage capacity.
[5] Pipe full flow capacity reduced due to tailwater.
[6] Capacity obtained from BCE, Ltd. report.
[7] Including spillway discharge and surcharged storage capacity prior to spilling over north embankment.

concrete spillway at the east end of the pond has a trapezoidal shape and acts as a weir, controlling the discharge from the pond. A large rectangular grated inlet at the downstream end of the spillway crest diverts a portion of the releases into a 60-inch CMP storm sewer that runs north along 47th Avenue. The outfall pipe has a maximum capacity of approximately 141 cfs; the concrete spillway can pass approximately 325 cfs prior to overtopping the eastern embankment. The existing condition analysis of the 100-year storm event predicts the maximum release from the pond will be 231 cfs. Flows not intercepted by the grated inlet will spill from the pond onto 47th Avenue and be conveyed north toward Epple Park.

Epple Park Detention Ponds. Two detention ponds are located in Epple Park adjacent to the south side of 4th Street, immediately west of 43rd Avenue. The upper pond is separated from the lower pond by an earthen embankment and a 50-foot wide concrete spillway. A 48-inch CMP (previously gated at its upstream end; according to City of Greeley staff, the gate has recently been removed) connects the upper pond to the lower pond through the embankment. The past intended operation of the vertical slide gate on the CMP is unknown. The upper pond has a maximum storage capacity of 10.4 acre-feet and can pass approximately 125 cfs through

the 48-inch CMP prior to spilling over the concrete spillway. The northern pond embankment, according to survey data taken for the 1997 Comp Plan, appears to be slightly lower than the top of the 2-foot high concrete spillway. As a result, a portion of the flows discharging from the upper pond will spill onto 4th Street before reaching the maximum capacity of the concrete spillway. The maximum storage capacity and discharge through the spillway prior to overtopping the north embankment are 13.6 acre-feet and 220 cfs, respectively.

The maximum storage capacity of the lower pond before overtopping onto 4th Street is approximately 2.0 acre-feet. Twin 8'W x 4'H RCBs with a combined capacity of approximately 765 cfs serve as the outlet from the lower pond, with discharges directed north across 4th Street into the Larson Ditch. Outflows in excess of the outlet capacity spill across 4th Street and also spill into the Larson Ditch. Existing condition peak discharges from the upper and lower ponds during the 100-year storm event will be approximately 520 cfs and 595 cfs, respectively. Therefore, the outlet capacity of the lower pond is not exceeded during the 100-year storm; however, flows for this same storm event have the potential to overtop the northern embankment of the upper pond and spill onto 4th Street. As previously mentioned, survey data from the 1997 Comp Plan of the berm surrounding the upper pond indicated ground elevations that are lower than the maximum height of the spillway, thereby allowing flows to spill onto 4th Street prior to reaching the maximum capacity of the spillway. When this occurs, flows will either be directed north onto 43rd Avenue Court or travel east along 4th Street and overtop the street into Larson Ditch.

South Eagleview Detention Pond. The South Eagleview Detention Pond is located in the Eagleview Subdivision, at the north end of the Larson Ditch between B Street and the Greeley No. 3 Ditch. It was constructed after the completion of the 1997 Comp Plan. The pond maintains a permanent pool elevation, supporting nominal wetlands and other vegetation. The maximum stormwater detention volume above the permanent pool elevation (referenced to the crest of the outflow spillway) prior to overtopping the outflow spillway retaining walls is approximately 13.2 acre-feet. This corresponds to an elevation range between 4694 and 4696.7 feet, NGVD29. The outflow spillway (equipped with vertical side retaining walls and a cellular concrete mattress along the spillway bed) at the north end of the pond allows flows to be flumed over the Greeley No. 3 Ditch. The detention pond outflows commingle with flows that overtop the left bank of the ditch via the Eagleview Side Channel Weir. South Eagleview Detention Pond flows from both of these sources are directed into the North Eagleview Drainage Channel. The maximum capacity of the spillway prior to overtopping the retaining walls is estimated to be 755 cfs. During the existing condition 100-year storm event, the maximum discharge from the pond will be approximately 683 cfs.

North Eagleview Detention Pond. The North Eagleview Detention Pond is located at the downstream end of the North Eagleview Drainage Channel, between F Street and the Colorado

and Southern Railroad west of 35th Avenue. It was also constructed after the completion of the 1997 Comp Plan. The pond also maintains a permanent pool, with a future reclamation plan intending to allow single-family residential housing to be built around the pond perimeter. The pond was designed with a concrete weir outflow spillway at the northeast corner of the pond, set to the permanent pool elevation. The outflow spillway crest is set five feet below the top of the pond embankment. The maximum stormwater detention volume and discharge prior to overtopping the embankment are 173.3 acre-feet and 244 cfs, respectively. All flows are directed north through a bridge underneath the Colorado and Southern Railroad. The existing condition analyses of the 100-year storm event predict the maximum release from the pond will be 133 cfs.

Weber West Ponds. Two additional major detention ponds, both of which are not located on the major drainageway, are situated in the Weber West Subdivision west of 47th Avenue and directly south of the Greeley No. 3 Ditch. The Weber West Western Detention Pond is located at the north end of 50th Avenue Court. The pond has a maximum stormwater detention volume of 13.4 acre-feet, referenced to the crest of the emergency spillway at the northwest corner of the pond. A 15-inch RCP conveys lower flows north into the Greeley No. 3 Ditch; the capacity of the outlet pipe prior to spilling over the emergency spillway is approximately 16 cfs. The emergency spillway crest is located 2.5 feet below the embankment crest; the maximum combined discharge capacity of the outlet pipe and emergency spillway prior to overtopping the embankment is 100 cfs, corresponding to a maximum storage volume of 23.1 acre-feet. The existing condition analyses of the 100-year storm event predict the maximum release from the pond will be 24 cfs, of which approximately 7 cfs will spill through the emergency spillway.

The Weber West Eastern Detention Pond is located at the northern end of 47th Avenue Court. The pond has a maximum stormwater detention volume of 9.3 acre-feet prior to overtopping its spillway, and a total of 12.8 acre-feet prior to overtopping the northern pond embankment. The outlet facilities consist of a 15-inch CMP along with a trapezoidal spillway located approximately two feet below the embankment crest which convey releases into the Greeley No. 3 Ditch. The maximum discharge capacity of the outlet pipe prior to overtopping the spillway is 9 cfs; the maximum combined discharge capacity of the outlet pipe and emergency spillway prior to overtopping the embankment is 88 cfs. During the existing condition 100-year storm event, the maximum discharge from the pond will be approximately 58 cfs, of which approximately 49 cfs will spill through the emergency spillway.

3.2 Road/Ditch/Railroad Crossings

There are five road crossings, one ditch crossing, and one railroad crossing over the major drainageway; two of the road crossings and the ditch crossing have already been discussed in Section 3.1 (10th Street at 49th Avenue, Allen Park at 4th Street, and the South Eagleview

Detention Pond at the Greeley No. 3 Ditch). Descriptions of the varying channel types along the drainageway may be found in Section 3.4. The five road crossings are culverts, the ditch crossing is a flume, and the railroad crossing is a bridge. The capacity of each crossing was calculated using the Federal Highway Administration's (FHWA) culvert analysis program HY-8 or was obtained from design report information provided by the City of Greeley. Table 3.1 includes a summary of the location, condition, and hydraulic capacity of each crossing structure. A brief description of the three remaining road crossings and the railroad crossing is provided in the following paragraphs.

50th Avenue Culverts. This crossing incorporates twin 27"H x 43"W arch CMPs and is located along the Country Club West Outfall Channel at 50th Avenue south of 10th Street. The depth of flow in the channel at which roadway overtopping occurs is approximately 2.9 feet. The capacity of the culverts prior to overtopping the roadway was determined to be 69 cfs. The 100-year existing condition discharge in the channel at 10th Street and 50th Avenue is estimated to be 135 cfs.

B Street Culverts. This culvert crossing (built in conjunction with the South Eagleview Detention Pond) consists of triple 8'W x 4'H RCBs, and is located at the downstream end of the Larson Ditch immediately south of the South Eagleview Detention Pond. The depth of flow in the ditch prior to overtopping the roadway is approximately 6.3 feet. The capacity of the culverts prior to overtopping the roadway was determined to be 925 cfs. During the existing condition 100-year event, the discharge in the channel was estimated to be 582 cfs.

F Street Culverts. This culvert crossing (built in conjunction with the North Eagleview Drainage Channel improvements) is comprised of triple 10'W x 4'H RCBs. It is located at the downstream end of the North Eagleview Drainage Channel (described in Section 3.4) at F Street. The depth of flow in the outfall channel at which road overtopping occurs is approximately 5.9 feet. The capacity of the culverts prior to overtopping the roadway was calculated to be 1,100 cfs. The 100-year existing condition discharge in the drainage channel at F Street was estimated to be 977 cfs.

Colorado and Southern Railroad Bridge. This bridge opening, according to Burnett Consulting Engineers, Ltd. (BCE), is approximately 25 feet wide and 4 feet high, and is located downstream of the North Eagleview Detention Pond at the Colorado and Southern Railroad. The BCE report outlining the North Eagleview Drainage Channel improvements states that the opening was determined to have a capacity of approximately 500 cfs. The 100-year existing condition discharge from the North Eagleview Detention Pond at the Colorado and Southern Railroad was estimated to be 133 cfs.

3.3 Storm Sewers

The principal storm sewers, as inventoried in the 1997 Country Club Basin Comp Plan, included the following: (a) ACC Detention Pond Outfall; (b) 49th Avenue Storm Sewer(s); and (c) 47th Avenue Storm Sewer. Table 3.1 summarizes the location, condition, and hydraulic capacity of each storm sewer.

ACC Detention Pond Outfall. This storm sewer originates at the downstream end of the ACC Detention Pond Outfall Swale (discussed in Section 3.4) and extends north from 13th Street to the Country Club West Detention Pond. The storm sewer is approximately 550 feet in length and, except for a small portion of twin 24-inch ribbed plastic pipes crossing 13th Street, consists of a 30-inch RCP. The storm sewer has a maximum capacity of 41 cfs. Flows in excess of 41 cfs will overtop the headwall and pond along 13th Street, ultimately spilling north along 50th Avenue or between houses along the north side of 13th Street and into the Country Club West Detention Pond.

49th Avenue Storm Sewer(s). The 49th Avenue Storm Sewer system begins at the south side of 10th Street west of 49th Avenue and extends north into Allen Park. The first storm sewer is a 60-inch CMP that crosses 10th Street and connects to a 54-inch RCP on the north side of the road. The 54-inch RCP parallels 49th Avenue until it crosses 49th Avenue immediately south of 9th Street Road, where it continues to the northeast into Allen Park. Near the intersection of 49th Avenue and 9th Street Road, the 54-inch RCP transitions to a 54-inch CMP that continues through the park to a large underground concrete junction box. The total length of the storm sewer is approximately 970 feet.

The second storm sewer, constructed since the 1997 Comp Plan, is a 60-inch RCP that also crosses 10th Street. It is parallel to the first storm sewer and also connects to a 54-inch RCP on the north side of the road. The 54-inch RCP runs beneath 49th Avenue until it intersects the first 54-inch RCP south of 9th Street Road. The two storm sewers are temporarily joined at this location by a 7'W x 5'H RCB. The second 54-inch RCP continues north along 49th Avenue from this point to 9th Street Road, and then angles through the park parallel to the first storm sewer and terminates at the same underground concrete junction box. The total length of the second storm sewer is approximately 1,040 feet. An 18-inch CMP serves as the outlet for the junction box, ultimately discharging into the Allen Park Detention Pond. Flows that exceed the capacity of the 18-inch CMP discharge through the grated lid and travel overland into the pond. The maximum combined capacity of the two storm sewers was estimated to be 172 cfs.

47th Avenue Storm Sewer. The 47th Avenue Storm Sewer extends from the outlet of the Allen Park Detention Pond (9th Street and 47th Avenue) north to approximately 7th Street, where it discharges into the Epple Park/Dove Creek Channel (described in Section 3.4). The storm

sewer is approximately 690 feet in length and consists of a 60-inch CMP. The storm sewer has a maximum capacity of approximately 141 cfs.

3.4 Open Channels

Four open channels in the Country Club Basin were inventoried for the 1997 Comp Plan; one additional channel has been constructed since the completion of that plan. A description of each is presented below. In addition, the location, condition, and hydraulic capacity of each channel are summarized in Table 3.1.

ACC Detention Pond Outfall Swale. This swale receives flow from the ACC Detention Pond and directs it into the ACC Detention Pond Outfall at 13th Street. The trapezoidal channel is approximately 600 feet in length, maintains a 5-foot bottom width, 4H:1V side slopes, 2.5-foot depth, and a bed slope of 2.4 percent. The bankfull capacity of the channel is estimated to be 318 cfs.

Country Club West Outfall Channel. This channel extends from the 50th Avenue Culverts to the upstream end of the 49th Avenue Storm Sewer system. The channel was recently reconstructed by CDOT in 2002 as part of the overall highway improvement plan along U.S. Highway 34 (10th Street within the Greeley city limits). The rectangular concrete channel maintains a length of approximately 820 feet, 8-foot width, 4-foot depth, and a bed slope of 0.4 percent. The bankfull capacity of the channel is approximately 298 cfs.

Epple Park/Dove Creek Channel. The 47th Avenue Storm Sewer discharges into the Epple Park/Dove Creek Channel; the channel extends from 7th Street and 47th Avenue to the upstream end of the upper Epple Park Detention Pond at 4th Street and 46th Avenue. The channel had undergone improvements at the time the 1997 Comp Plan had been completed. Dimensions of the channel include a length of 1,300 feet, overall width of 44 feet, overall depth of 5 feet, and a bed slope of 1.4 percent. The channel is compound in nature; the low-flow portion of the channel is lined with riprap and consists of a bottom width of 2 feet, side slopes of 1.5H:1V, and a depth of 2 feet. The overflow channel is grass-lined and has a bottom width of 14 feet, side slopes of 4H:1V, and a depth of 3 feet. The bankfull capacity of the channel was estimated to be 1,069 cfs.

Larson Ditch Outfall Channel. The Larson Ditch Outfall Channel extends from the lower Epple Park Detention Pond at 4th Street to the South Eagleview Detention Pond at B Street. As part of the construction improvements associated with the South Eagleview Detention Pond, the ditch was improved after the 1997 Comp Plan in the vicinity of B Street with the installation of three 8'W x 4'H RCBs, the removal of one drop structure upstream of B Street, and the addition of four drop structures (three at the B Street crossing, and one approximately 360 feet upstream

of B Street) that vary between 0.9 and 2.0 feet in height. Channel dimensions include a length of 2,300 feet, an irregular cross section with a bottom width of approximately 15 feet, average depth of 7.5 feet, side slopes ranging from 3H:1V to 4H:1V, and an average bed slope of 1.1 percent. The bankfull capacity of the channel was estimated to be 1,649 cfs.

North Eagleview Drainage Channel. The South Eagleview Pond Outflow Spillway marks the beginning of this drainage channel, which extends north along the western edge of the Stoneybrook Subdivision to the North Eagleview Detention Pond at F Street. The channel was constructed as part of the improvements associated with the Eagleview Side Channel Weir, the South Eagleview Pond Outflow Spillway, the F Street crossing, and the North Eagleview Detention Pond. The trapezoidal channel has a length of approximately 1,900 feet, bottom width of 24 feet, average depth of 5.0 feet, side slopes of 4H:1V, and a bed slope of 0.6 percent. Two drop structures (average drop of 2.6 feet) have also been incorporated into the channel design. The bankfull capacity of the channel was determined to be 1,627 cfs.

3.5 Overflow Weirs

Two overflow (side channel) weirs are found in the Country Club Basin, both along the left bank of the Greeley No. 3 Ditch. The first weir, at the F Street spill structure, existed at the time the 1997 Comp Plan was completed, and was modified based on recommended improvements from that plan. The second weir has been constructed in conjunction with the North Eagleview Drainage Channel. A description of each is provided below. In addition, the location, condition, and hydraulic capacity of each overflow weir is summarized in Table 3.1.

F Street Spill Structure. The F Street Spill Structure was in place at the time the 1997 Comp Plan was completed. It is located in the northwestern corner of the basin, specifically north of F Street and east of 59th Avenue. The weir is intended to spill excess stormwater flows to the Cache la Poudre River that have entered the ditch, primarily from the Sheep Draw Basin. Improvements to the structure include replacement of the old manual gated facility with an automated overshot gate calibrated to maintain a discharge in the ditch of 110 cfs, spilling all excess flows north to the river. A concrete side channel weir was also constructed, extending upstream along the left bank of the ditch to accommodate additional spills. The overall width of the structure is approximately 40 feet, with a single 12-foot wide overshot gate controlled by automated means and four 7-foot wide concrete lateral weirs extending upstream from the gate. The maximum depth of flow prior to overtopping the left bank of the ditch within the gated section is 7.8 feet, while the maximum depth within the concrete weir section is approximately 2.8 feet. The maximum combined spill capacity of the gate and weir section is 1,143 cfs.

Eagleview Side Channel Weir. This overflow weir was constructed in conjunction with the North Eagleview Drainage Channel improvements. It is located along the left bank of the ditch immediately upstream of the South Eagleview Detention Pond Outflow Spillway. An in-line 12'W x 3'H RCB within the ditch (reduced to 9 feet in width by an orifice plate), located directly beneath the outflow spillway and downstream of the weir, forces excess ditch flows over the weir. Weir spills combine with flows from the detention pond outflow spillway and are directed into the North Eagleview Drainage Channel. The weir is 80 feet in length, approximately 4 feet in height, and has a downstream slope of 2.5 percent. The maximum capacity of the weir prior to overtopping the west vertical retaining wall is estimated to be 535 cfs.

IV. HYDROLOGIC ANALYSES AND MODELING

4.1 Formulation of the Hydrologic Model

The primary objectives of the current hydrologic analyses and modeling efforts were to: (a) update the hydrologic model for the Country Club Basin to include development and drainage improvements that have been implemented since the completion of the 1997 Comp Plan; and (b) revise peak discharge and hydrograph data from the 1997 Comp Plan at various locations throughout the Country Club Basin. This information, combined with the capacity of the existing drainage facilities, provided insight to existing and future flooding problems, allowed comparison with discharges estimated as part of the 1997 Comp Plan, and assisted in the identification of potential revisions to previously proposed improvements. Hydrologic analyses were conducted for the 2-, 5-, 10-, 50-, and 100-year return periods, as well as the simulation of three modeling scenarios: (a) Existing Condition – existing development with existing facilities; (b) Future Condition – future development with existing facilities; and (c) Proposed Condition – future development with proposed improvements.

4.1.1 Model Description

The modeling approach chosen to simulate the runoff generated within and routed through the Country Club Basin was similar to that used by the 1997 Comp Plan. This approach involves the application of two computer models: the Colorado Urban Hydrograph Procedure (CUHP) and the EPA Stormwater Management Model (SWMM). The CUHP model is a hydrologic simulation program developed in 1982 (updated in May 2002) for the Urban Drainage and Flood Control District (UDFCD); it is used to generate storm runoff hydrographs for basin subcatchments. The program requires input of physical subbasin parameters such as area, slope, percent of impervious surfaces, etc., as well as the 1-hour depth for the design storm associated with each return period, from which a 2-hour design storm distribution is computed for each storm event. The methodology used in developing the design storm is outlined in the Urban Storm Drainage Criteria Manual (USDCM, Volume I, 1978, updated 2001) and in the Storm Drainage Design Criteria (SDDC) and Construction Specifications Manual (City of Greeley, Colorado, Volume II, May 2002). Storm hydrographs were generated by the CUHP model for the 2-, 5-, 10-, 50-, and 100-year return periods; these hydrographs were in turn entered into the transport block of the EPA SWMM model. A description of the program written to convert the CUHP hydrographs into EPA SWMM inflow hydrographs as well as a copy of the

program itself is provided in Section 3.4 of the Project Notebook. Documentation describing the CUHP input parameters is provided in Section 2.2 of the Project Notebook.

The EPA SWMM model, originally developed in 1969 (updated in June 2003) by the Environmental Protection Agency, is a hydrologic model consisting of four computational blocks: the runoff block, transport block, extended transport block, and storage/treatment block. Each block can be used to route both stormwater flows and pollutants through a drainage basin to evaluate both quantity and quality issues. For purposes of this study, hydrologic analyses and modeling for the Country Club Basin utilized the stormwater quantity aspects of the transport block to develop routed flood hydrographs at various locations throughout the basin. The hydrographs generated from CUHP were routed through the drainage network simulated by the EPA SWMM model transport block, which in turn depicts the actual network of storm sewers, detention ponds, and open channels existing within the basin. Documentation describing the EPA SWMM input parameters is provided in Section 3.5 of the Project Notebook.

4.1.2 Network Development

The stormflow routing network incorporated into the EPA SWMM transport block is a numerical model of the basin drainage network, representing each of the drainage subbasins and facilities along the major drainageway. The first step in forming the network was to conceptualize and develop a schematic linking the drainage subbasins to the drainage facilities along the major drainageway. Identification of each drainage facility is based on information compiled from the following: (a) previous field reconnaissance and surveying efforts; (b) design and as-built plan sets; and (c) drainage reports from land development projects implemented since the 1997 Comp Plan. EPA SWMM refers to facilities incorporated into the modeling network as: conveyance elements (conduits and open channels), subcatchments (or subbasins), storage units (detention ponds, or features that provide significant flow attenuation), flow dividers (diversions), and manholes (nodes or design points). Subbasin delineations were accomplished through the use of the City's 2-foot contour topographic mapping and from drainage reports obtained from the City of Greeley (identified in Section 3.2 of the Project Notebook). Drainage network schematics were developed for the three identified scenarios: (a) Existing Condition; (b) Future Condition; and (c) Proposed Condition.

A numbering scheme was developed for integration into the modeling network to facilitate identification of each type of drainage element; this numbering convention is presented below.

1 – 99	Subbasin runoff hydrographs (from CUHP) and inflow hydrographs (from HEC-RAS unsteady flow analyses)
200 – 299	Conveyance elements (storm sewers, open channels, and streets)
300 – 399	Existing detention facilities
400 – 499	Nodes (flow combination or design points)
500 – 599	Overflow conveyance elements (used in conjunction with capacity-limited storm sewer conveyance elements; typically streets or swales)
600 – 699	Flow diversions (typically used to separate surface and sub-surface flows)
700 – 799	Nodes (used in conjunction with flow diversions)
900 – 999	Nodes (collection points at the Greeley No. 3 Ditch; used to create a hydrologic disconnect at the ditch due to HEC-RAS unsteady flow analyses)

It should be noted that the numbering scheme for existing detention facilities (300 – 399) releasing flows from fully-developed sites did not change when the Future or Proposed Conditions models were created; for example, if Detention Pond No. 303 existed in the Existing Condition model, it was retained for all Future and Proposed Condition models.

4.2 Rainfall Design Storms

The rainfall design storms used in the hydrologic analysis of the Country Club Basin were prepared as part of the 1997 Comp Plan, based on information presented in the Precipitation Frequency Atlas of the Western United States, NOAA Atlas 2, Volume III, Colorado (1973). One-hour rainfall values for the City of Greeley were obtained from the NOAA Atlas and used to develop a two-hour design storm. The two-hour storms developed for each return period are presented in the SDDC Manual. Further documentation and details regarding the development of the design storms can also be found in the SDDC Manual and in Section 2.2 of the Project Notebook.

4.3 Hydrologic Subbasin Modeling Parameters

Hydrologic modeling of the Country Club Basin involved the determination of several hydrologic parameters associated with each subbasin. These parameters are summarized in the following paragraphs.

4.3.1 Subbasin Delineation and Basin Characteristics

The Country Club Basin was subdivided into smaller subbasins, ranging in size from approximately 10 acres to nearly 248 acres. The need for relatively detailed hydrologic information at specific points within the basin resulted in this wide range of subbasin drainage areas. The subbasins delineated for the 1997 Comp Plan were largely retained; only minor modifications were made to subbasins south of the Greeley No. 3 Ditch in areas where development had occurred since 1997. Subbasin delineation was based on several considerations, including the location of drainage facilities, road crossings, and potential flooding problems; however, the main reason for further subdivision of the basin was to accurately reflect development that has occurred over the past eight years in the basin since the completion of the 1997 Comp Plan.

The subbasin delineation for the Country Club Basin is presented on Sheet A-1, provided in Appendix A of this report. The hydrologic model representation of the system of subbasins and conveyance elements is shown on Sheets A-2, A-3 and A-4; these are the schematic diagrams for the three hydrologic scenarios analyzed for this study. It is noted that the subbasin delineations are identical for all three scenarios. The 2-foot topographic mapping developed as part of the 1997 Comp Plan for the Country Club Basin was used to determine geometric subbasin characteristics and hydrologic parameters. These parameters included subbasin area, basin length (distance from downstream design point along the flow path to the high point in the subbasin), distance to basin centroid, and basin slope.

4.3.2 Land Use

Land use in the Country Club Basin has not changed significantly from that documented in the 1997 Comp Plan, due to over 85 percent of the basin south of the Greeley No. 3 Ditch already having been developed at the time of that study. The majority of land use in the Country Club Basin consists of single- and multi-family residential developments, commercial

development located along West 10th Street, the Greeley Country Club south of 10th Street along 47th Avenue, and a portion of the Aims Community College campus near West 20th Street.

GIS mapping, consisting of numerous data layers, was provided by the City of Greeley for use during the current study. In part, this mapping displays existing development as well as miscellaneous pavement and road information. Additional developments and drainage improvements (including those under design review, approved for construction, or already constructed as of July 16, 2003) were also provided by the City of Greeley. In addition, the City provided land use zoning mapping (as of October 2003), with designation classes indicating the type of land use within the basin. A land use map of the Country Club Basin is provided on Sheet C-1, in Appendix C of this report.

Using a combination of the GIS data, zoning information, and development information, impervious percentages were calculated for both Existing and Future Conditions by: (a) assessing the GIS information within each subbasin; (b) assigning a zoning class most closely matching the land use; and (c) matching the zoning classes to land use and percent impervious values published in the USDCM (1978, Volume II, updated 2001). It should be noted that after investigation of percent impervious values for the Downtown and North Greeley Basin Comp Plan Update (Anderson Consulting Engineers, Inc., January 2005), it was determined that impervious percentages from the original USDCM (not the updated 2001 values) were more representative of land use conditions in the Greeley area. The updated values were found to be conservatively high for the City of Greeley; therefore, the original values determined for the 1997 Comp Plan were retained. Backup documentation for the calculation of existing and future percent impervious values is provided in Section 2.1 of the Project Notebook.

4.3.3 Soils, Infiltration, and Depression Storage

Soils information for the Country Club Basin was obtained from GIS data provided by the City of Greeley; these data were based on the Soil Survey of Weld County, Southern Part, Colorado (1980), published by the Soil Conservation Service. The soil types specified in the associated GIS attribute tables include soil codes and names. This information was correlated to the Soil Survey of Weld County, where each soil code/name is classified into four hydrologic soil groups. The four groups classify the soils according to infiltration rates, ranging from Type A representing well-drained soils to Type D representing poorly-drained soils. The soil types represented within the Country Club Basin are predominantly classified as relatively well-drained soils in the Type B hydrologic soils group. Soils mapping pertinent to the Country Club Basin is provided on Sheet C-2, in Appendix C of this report. It is noted that in the 1997 Comp Plan, one area of soils near the north end of the basin and a small area near the southern portion

of the basin were assumed to be part of hydrologic soils group A, when the actual classification is hydrologic soils group D; this situation was corrected in the current study.

The UDFCD analyzed rainfall/runoff data for each of the hydrologic soil groups and established recommended values for infiltration rates and decay coefficients for use with CUHP. The infiltration parameters recommended for each of the soil groups are summarized in Table 4.1. For subbasins containing more than one soil group classification, the coverage of each soil group was determined, measured, and an area-weighted average calculated.

Table 4.1 Infiltration Parameters for SCS Hydrologic Soil Groups.

SCS Hydrologic Soil Group	Infiltration (in/hr)		Horton's Decay Coefficient
	Initial	Final	
A	5.0	1.0	0.0007
B	4.5	0.6	0.0018
C	3.0	0.5	0.0018
D	3.0	0.5	0.0018

Surface depression storage losses and abstractions (rainfall intercepted by trees, bushes, and other vegetation) play an important role in the hydrologic cycle and the determination of rainfall available for runoff. The CUHP method requires estimation of these losses for both impervious and pervious areas to facilitate the calculation of the effective rainfall for each storm event. Values for surface depression storage and interception losses were selected in accordance with the values presented in the USDCM. Backup documentation related to the soil infiltration parameters and depression storage losses is provided in Section 2.1 of the Project Notebook.

4.3.4 Time of Concentration

The subbasin time of concentration represents the final hydrologic parameter needed to complete the CUHP model. The procedure for determining the time of concentration is outlined in the USDCM. Depending on subbasin area, this parameter is only required for subbasins less than 90 acres. Specifying the time of concentration for these smaller, urbanized subbasins allows the hydrograph peaks to be computed and displayed in the output using both the CUHP method and the Rational Formula for comparison purposes only; however, the default subbasin peak discharge calculation uses the CUHP method. Documentation related to the calculation of subbasin time of concentration values may be found in the Project Notebook in Section 2.1.

4.4 Conveyance Modeling Parameters

Several hydraulic modeling parameters are required by the EPA SWMM model to simulate the routing of storm flows through storm sewers, open channels, and street sections. The parameters required by the model to simulate the routing of stormwater through storm sewers are listed below:

1. Pipe diameter or maximum allowable depth prior to surcharging
2. Pipe length
3. Invert slope
4. Manning's *n*
5. Number of modeled elements

For the modeling of open channels and street sections, the hydraulic parameters required by the EPA SWMM model are as follows:

1. Maximum allowable channel depth prior to surcharging
2. Bottom width of channel or channel cross section bank width
3. Channel side slopes (_x_H:1V)
4. Invert slope
5. Channel length
6. Manning's *n*
7. Number of modeled elements

A summary of all conveyance element parameters defined in the hydrologic models is provided in Section 3.1 of the Project Notebook.

4.5 Special Modeling Features

In addition to the basic channel routing functions incorporated in the hydrologic model for the Country Club Basin, special modeling functions were required in order to simulate complicated drainage situations in specific areas of the basin. The EPA SWMM model includes the capability to simulate detention storage facilities, flow diversions, imported flows to a basin (also referred to as inflow hydrographs), and exported flows out of a basin. For the Country Club Basin modeling efforts, all of the above features were utilized.

4.5.1 Detention Storage

The detention facilities simulated in the hydrologic models and evaluated in conjunction with this Comp Plan update included the following: (a) the utilization of individual on-site detention ponds, or multiple on-site ponds represented as a single pond, associated with commercial or residential development, totaling seven ponds for the Country Club Basin; and (b) the use of eight existing on-line regional detention ponds, with all eight located on the major drainageway. Detailed information concerning all of the regional ponds is provided in Section 3.1 of this report. As seen in the 1997 Comp Plan, due to the relatively large number of drainage facilities specifically located within Subbasin 31 (south of 10th Street and immediately west of 54th Avenue), detention ponds linked to commercial development were recognized as draining to the same location and therefore combined to reduce the total number of modeled elements. Detention facilities simulated in the hydrologic models were generally limited to those facilities that were effective in reducing peak runoff rates associated with, at a minimum, the 2-year storm event; extremely small, isolated detention ponds were generally not included in the overall basin hydrologic modeling efforts.

Storage-discharge relationships were derived for each of the seven development-based detention ponds included in the hydrologic models, with four ponds retained from the Existing Condition model prepared for the 1997 Comp Plan. The remaining three ponds constructed after 1997 were defined based on the associated design drawings for each pond. All drainage-related development information was obtained from the City of Greeley. In each case, storage values that define the volume of stormwater detained in each pond were defined by manual iteration using the EPA SWMM model in order to accommodate either the combining of storage volumes from more than one pond, differences in hydrologic modeling techniques between the drainage studies and this Comp Plan analysis, or both. Discharge rates for the pond rating curves were set based on maximum release rates defined in the associated drainage reports. Five of the eight on-line detention ponds were largely retained in their entirety from the 1997 Comp Plan, with changes made to two of the facilities due to new design information; the remaining three ponds were either part of drainage improvements or were constructed since the completion of the previous Comp Plan.

Each of the fifteen detention ponds in the EPA SWMM model was delineated in such a way so as to fall into one of the two following release rate categories: (a) a single detention pond serving an entire subbasin or regional area as designated in the accompanying drainage report or design plan set; or (b) two or more detention ponds consolidated into one pond, serving an entire subbasin, as designated by their respective drainage reports, with tributary off-site flows from within the subbasin included in the overall subbasin release rate.

The fifteen detention facilities considered to be effective for more than just the most frequently occurring storms were incorporated into the hydrologic model based on the storage-discharge relationship developed for each detention pond. The hydrologic model utilized these pond characteristics to evaluate the ponds' response to a range of storm events, including determination of the maximum volume of stormwater detained in each pond and the corresponding peak discharge released from each pond for the subject storm events. Documentation of the storage-discharge rating curves developed for each of the seven development-based ponds as well as the eight on-line regional detention ponds is included in Section 3.2 of the Project Notebook.

4.5.2 Diversions

Diversions, referred to as flow dividers by the EPA SWMM model, were used in the hydrologic model to accommodate the following three split flow conditions: (1) a pipe with an overflow channel (i.e, when a pipe reaches its full flow capacity, the remaining flows in excess of this amount are diverted to a surface conveyance element); (2) a major drainage basin transfer (see Section 4.5.4 on Exported Flows from the Basin); and (3) a capacity-limited surface conveyance element (i.e., when a surface conveyance element reaches its full flow capacity, the remaining flows in excess of this amount are diverted to another surface conveyance element).

For the first split flow condition, the maximum capacity of the pipe prior to diversion is required as input to the model. Flows are routed through the main conveyance element until its capacity is exceeded. Once exceeded, the excess flows are diverted to a surface conveyance element designated in the flow divider configuration. The storm sewer capacity is calculated and input into the flow divider table. In order to more accurately define flow diversions in the Existing Condition hydrologic models, particularly for frequently occurring storms, one pipe with overflow conveyance element diversion, which is located along the major drainageway, was included in the hydrologic models.

The second split flow condition will be described in Section 4.5.4. It is based on a portion of subbasin runoff entering the Grapevine Basin from the Country Club Basin via an open channel on the Aims Community College campus, which traverses both basins. This accounts for one flow diversion within the Country Club Basin.

For the third split flow condition, similar to the first split flow condition, the maximum capacity of the surface conveyance element (i.e, typically a road-side swale) prior to diversion is required as input to the model. Flows are routed through the surface conveyance element until its capacity is exceeded. Once exceeded, the excess flows are diverted to another surface conveyance element, as designated in the flow divider configuration. The surface conveyance

element capacity is calculated and input into the flow divider table. In order to more accurately define flow diversions in the Existing Condition hydrologic models, particularly for frequently occurring storms, two surface conveyance element diversions were included in the hydrologic models.

4.5.3 Imported Flows to the Basin/Inflow Hydrographs

The Country Club Basin has incorporated a significant number of improvements since completion of the 1997 Comp Plan. One of those improvements includes the construction of the South Eagleview Detention Pond (previously discussed in Section 3.1). The pond was originally designed in the 1997 Comp Plan to detain 100-year flows from the Eagleview and Pheasant Run Subdivisions and release the attenuated flows back into the Larson Ditch immediately upstream of the Greeley No. 3 Ditch. The commingled flows were then proposed to pass over the Greeley No. 3 Ditch via an overpass flume into a large regional detention facility immediately north of the ditch. The proposed detention pond would then release flows into a drainage channel and direct them north beneath F Street and the Colorado and Southern Railroad to an existing gravel pit pond. The improvements were modified from the 1997 Comp Plan by diverting the Larson Ditch into the South Eagleview Detention Pond, along with detaining the Eagleview and Pheasant Run Subdivisions. Flows are still released out of the pond via an outflow spillway over the Greeley No. 3 Ditch; however, flows are now directed into a drainage channel and routed north beneath F Street into a large regional detention pond (North Eagleview Detention Pond) between F Street and the Colorado and Southern Railroad. The drainage channel and North Eagleview Detention Pond improvements also incorporated the proposed side channel weir along the left bank of the ditch (discussed in Section 3.5). The weir is intended to spill excess stormwater from the ditch into the drainage channel.

The South Eagleview Detention Pond was simulated as part of the Country Club Basin hydrologic model, which combines the major drainageway flows and the Greeley No. 3 Ditch spill over the weir and directs them into the drainage channel. The ditch spill was input as an inflow hydrograph (No. 34) into the hydrologic model. The commingled flows are then routed north toward F Street and into the North Eagleview Detention Pond, where spills from that pond are directed under the Colorado and Southern Railroad. It was also determined from the unsteady flow modeling of the Greeley No. 3 Ditch (discussed in Section 4.6) that the ditch was spilling at the improved F Street Spill Structure; however, the spills at this structure are directed immediately to the Poudre River, and were not considered for input into the hydrologic model.

In order to accurately integrate spills from the Greeley No. 3 Ditch into the hydrologic model, the model was internally disconnected at the ditch and separated into upper and lower

basins. The ditch spill at the South Eagleview Detention Pond was incorporated as an inflow hydrograph into the lower portion of the basin. Runoff hydrographs from the hydrologic model representing the upper basin were incorporated into the hydraulic model of the ditch as inflow hydrographs. The HEC-RAS model of the ditch was executed in the unsteady flow mode using inflow hydrographs from all five basins for all return periods and scenarios analyzed for this study. Included in this model were lateral weirs that were defined along the entire left (downslope) bank of the canal, including the Eagleview Side Channel Weir.

Lateral spill hydrographs from the weirs were defined based on the unsteady flow analyses. Documentation summarizing both inflow and outflow hydrographs as well as all unsteady hydraulic modeling of the Greeley No. 3 Ditch may be found in the "City of Greeley, Comprehensive Drainage Plan, Greeley No. 3 Ditch Final Summary Hydraulics Report," Anderson Consulting Engineers, Inc., March 2006.

4.5.4 Exported Flows from the Basin

Near the southern tip of the Country Club Basin, on the Aims Community College Campus, a channel adjacent to one of the east-west campus access roads conveys stormwater runoff across the basin boundary into the Grapevine Basin. Hydraulic analyses of the channel indicate that its capacity is approximately 18 cfs. Flows that exceed the capacity of the road-side channel overtop the crown of the road and continue north along the major drainageway within the Country Club Basin. Therefore, a maximum of 18 cfs is exported to the Grapevine Basin. In the EPA SWMM model, a flow divider function is used in the drainage network to simulate this diversion. It should be noted that in order to simplify the procedures for modeling the diversion hydrograph in the Grapevine Basin, Country Club Subbasin No. 1 (i.e., the subbasin contributing runoff to the channel) was modeled as Grapevine Subbasin No. 3. The flow divider function in the Grapevine model conversely exports flows in excess of 18 cfs out of the Grapevine Basin and into the Country Club Basin.

4.6 Hydraulic Modeling of the Greeley No. 3 Ditch

The determination of spills from the Greeley No. 3 Ditch was seen as an important part of the overall hydrologic modeling not only for the Country Club Basin, but also for the 28th Avenue and Grapevine Basins. At the request of the City of Greeley, the hydraulic (HEC-2) model for the Greeley No. 3 Ditch that was prepared for the 1997 Comp Plan was converted to HEC-RAS Version 3.1.2. The reach beginning at the downstream terminus of the original model

(east of 1st Avenue) and continuing upstream nearly to the Clarkson Spill Structure (west of 23rd Avenue) was recently converted for the Downtown and North Greeley Basin HEC-RAS analyses (Anderson Consulting Engineers, Inc., January 2005). The remainder of the ditch (from the Clarkson Spill Structure up to the headgate at the Cache la Poudre River) was converted to HEC-RAS for analyses related to the Country Club, Grapevine, and 28th Avenue Basins; these two reaches were then connected, producing a single hydraulic model for the entire ditch. For purposes of analyses related to all three basins, it was assumed that only normal irrigation flows (70 cfs) would enter the Greeley No. 3 Ditch from the Poudre River.

Modeling parameters for bridges and culverts were modified to accommodate improved modeling techniques available in HEC-RAS; however, these modifications were based on geometric information gathered for the 1997 Comp Plan. The ditch was not resurveyed as part of the current study; consequently, inherent in this analysis is the assumption that the previously defined cross sectional data for the ditch provides a reasonably accurate hydraulic representation of existing conditions. The exception to the use of previously defined geometric ditch data is the incorporation of the left (downslope) ditch bank spill structures constructed since completion of the 1997 Comp Plan. Ditch bank data were modified in the hydraulic model based on design drawings/modifications of four spill structures.

Lateral weirs were defined along the entire length of the left (downslope) bank through the basin; these weirs include the controlled spill structures. Where bank improvements have not been implemented, lateral weirs were defined based on top of left bank elevations provided in the original HEC-2 model.

Uniform lateral inflow hydrographs and point inflow hydrographs, for all storm events and scenarios analyzed for this study, were defined as boundary conditions for the ditch based on the results of the hydrologic modeling of the upper portions of the five major basins contributing flow to the ditch.

The unsteady flow analyses were conducted and the resulting spill hydrographs defined and incorporated into the hydrologic models for the lower portion of the basin as inflow hydrographs at the appropriate locations along the downslope side of the ditch. It is noted that the unsteady flow analyses were conducted, and inflow hydrographs to the basin due to ditch spills determined, for the Existing and Proposed Conditions only. The Future Condition described in Section 4.8 simply represents an intermediate step between Existing and Proposed Conditions. Consequently, in order to simplify the modeling associated with this study, the Existing Condition inflow hydrographs to the basin north of the Greeley No. 3 Ditch (corresponding to spills from the ditch) were also used in the Future Condition hydrologic model.

4.7 Summary of the Existing Condition Hydrologic Analyses

4.7.1 Definition of the Existing Condition Scenario

The definition of the Existing Condition scenario includes all development that presently exists or was approved for construction as of July 16, 2003. All basin development after this date is considered under the Future and Proposed Condition analyses. Table 4.2 presents a summary of all subbasin hydrologic modeling parameters developed for the Existing Condition analyses. All hydrologic subbasin parameters, conveyance parameters, and special modeling features associated with the Existing Condition scenario are defined in Sections 4.3, 4.4, and 4.5, respectively, of this report. CUHP input files for each return period are provided in Section 2.2 of the Project Notebook; EPA SWMM input files for the 10- and 100-year return periods are included in Section 3.5 of the Project Notebook.

4.7.2 Storm Drainage Criteria

The drainage criteria prepared as part of the 1997 Comp Plan were utilized to identify potential problems along the major drainageway. In general, violations related to the criteria were specifically noted where road crossings were exceeded by maximum allowable overtopping depths, or ponded water surface elevations within detention facilities overtopped pond embankments during specified storm events. A summary of existing drainage problems within the basin is provided in Section 4.7.4 of this report.

4.7.3 Hydrologic Modeling Results for the Existing Condition

Based on the Existing Condition analyses of the Country Club Basin, some facilities lack the capacity to safely convey flows arising from the 100-year design storm and, consequently, create potential flooding problems within the basin. The basin map and a schematic diagram of the hydrologic model representing the drainage network for the Existing Condition is provided on Sheet A-2 in Appendix A of this report. A summary of peak discharges resulting from the hydrologic modeling effort is provided in Table 4.3 for selected locations within the basin. A graphical representation of the discharge profiles along the major drainageway is also provided in Figure 4.1. Flood hydrographs at selected locations throughout the basin are presented in Appendix D of this report. Summary output from the EPA SWMM models of the Existing Condition analyses are also provided in Appendix D and in Section 3.6 of the Project Notebook.

Table 4.2 Hydrologic Subbasin Parameters for the Existing Condition.

Subbasin No.	Basin Area (acres)	Basin Length (ft)	Distance to Basin Centroid (ft)	Average Basin Slope (ft/ft)	Time of Conc. (minutes)	Percent Imperv. (%)	Depression Storage (inches)		Infiltration Rates (in/hr)		Horton's Decay Rate
							Pervious	Imperv.	Initial	Final	
1	25.7	1500	600	0.012	18.0	45.6	0.40	0.10	4.5	0.6	0.0018
2	31.9	1200	600	0.012	17.0	24.4	0.40	0.10	4.5	0.6	0.0018
3	33.0	1600	600	0.025	19.0	41.4	0.40	0.10	4.5	0.6	0.0018
4	114.7	2500	1100	0.028	N/A	31.2	0.40	0.10	4.5	0.6	0.0018
5	31.4	1700	850	0.025	19.0	50.0	0.40	0.10	4.5	0.6	0.0018
6	21.9	1400	600	0.031	18.0	36.0	0.40	0.10	4.5	0.6	0.0018
7	95.5	3000	1400	0.022	N/A	12.1	0.40	0.10	4.5	0.6	0.0016
8	58.9	2000	800	0.030	21.0	12.1	0.40	0.10	4.6	0.7	0.0016
9	34.9	1900	900	0.031	21.0	42.0	0.40	0.10	4.5	0.6	0.0017
10	85.6	3300	1650	0.018	28.0	37.1	0.40	0.10	4.5	0.6	0.0017
11	9.9	1000	500	0.038	15.0	45.6	0.40	0.10	4.5	0.6	0.0018
12	23.0	1400	700	0.036	18.0	48.0	0.40	0.10	4.5	0.6	0.0018
13	22.0	2600	1200	0.028	24.0	43.2	0.40	0.10	4.5	0.6	0.0018
14	66.1	2100	840	0.024	22.0	42.0	0.40	0.10	4.5	0.6	0.0018
15	22.5	3200	1600	0.011	28.0	10.7	0.40	0.10	4.5	0.6	0.0018
16	63.4	2500	1100	0.028	24.0	41.5	0.40	0.10	4.5	0.6	0.0018
17	57.0	2600	1300	0.018	24.0	45.7	0.40	0.10	4.5	0.6	0.0018
19	87.6	2700	1100	0.019	25.0	39.0	0.40	0.10	4.5	0.6	0.0018
20	88.2	3000	1500	0.019	27.0	38.9	0.40	0.10	4.5	0.6	0.0017
21	178.9	2800	1400	0.013	N/A	37.8	0.40	0.10	4.5	0.6	0.0018
22	19.5	600	300	0.050	13.0	2.0	0.40	0.10	4.8	0.9	0.0009
23	21.2	400	200	0.075	12.0	2.0	0.40	0.10	4.8	0.9	0.0010
24	129.5	3000	1800	0.003	N/A	2.0	0.40	0.10	3.3	0.5	0.0017
25	109.4	1700	600	0.008	N/A	2.0	0.40	0.10	3.4	0.5	0.0018
26	44.9	2600	1000	0.002	24.0	5.7	0.40	0.10	2.9	0.5	0.0017
27	141.0	6000	2700	0.002	N/A	52.5	0.40	0.10	3.0	0.5	0.0018
28	78.6	1600	800	0.006	19.0	8.2	0.40	0.10	2.7	0.5	0.0016
29	247.9	3000	1500	0.003	N/A	35.0	0.40	0.10	2.9	0.5	0.0017
30	26.7	1300	600	0.031	17.0	39.3	0.40	0.10	4.5	0.6	0.0018
31	24.7	1400	800	0.023	15.0	77.0	0.40	0.10	4.6	0.7	0.0016
32	33.1	700	300	0.055	14.0	2.0	0.40	0.10	4.8	0.9	0.0008
33	26.0	1100	700	0.045	10.0	74.1	0.40	0.10	4.5	0.6	0.0018

A description of the program written to summarize the EPA SWMM output as well as a copy of the program itself is provided in Section 3.4. All input and output files for both CUHP and EPA SWMM are provided electronically in Section 7 of the Project Notebook.

4.7.4 Summary of Existing Drainage Problems

Specific problem areas identified during the hydrologic modeling efforts associated with the 1997 Comp Plan were re-evaluated as part of the current study in order to re-define the magnitude of the flooding problems. Many flooding problems associated with existing facilities located along the major drainageway can be directly attributable to: (a) revisions in the rainfall-intensity-duration curves that were completed in conjunction with changes to the drainage criteria manual associated with the 1997 Comp Plan; and (b) previous facility design standards that are not compatible with current design standards. A brief summary of the major problem areas noted during the 1997 Comp Plan and the current study is presented in the following paragraphs. This summary is generally limited to those locations along the major drainageway.

ACC Detention Pond. Approximately 163 cfs will be discharged from the ACC Detention Pond during the 100-year event at the north end of the pond embankment near the twin arch CMP outfall pipes. Flows overtop the portion of College Drive that runs along the north pond embankment. The maximum overtopping depth will be approximately 0.3 feet, with an overtopping width of approximately 320 feet. Based on the results from the 1997 Comp Plan, the original design plans for the pond did not anticipate any overtopping; consequently, adequate erosion protection along the downstream side of the road embankment was not provided.

13th Street. The 100-year peak discharge at 13th Street was determined to be 165 cfs. The ACC Detention Pond outfall, which is a 30-inch RCP that carries flows from 13th Street to the Country Club West Detention Pond, has a maximum capacity of 41 cfs; therefore, up to 124 cfs could spill onto 13th Street during the 100-year event. These overflows have the potential to pond along 13th Street, overtop the curb to the north, and spill between houses; alternatively, these overflows could spill north along 50th Avenue, with all pond releases ultimately being directed into the Country Club West Detention Pond.

50th Avenue and 10th Street. The capacity of the twin 27"H x 43"W arch CMPs is exceeded for all events greater than flows associated with the 10-year storm. The capacity of the pipes prior to street overtopping is approximately 69 cfs, which will be exceeded by 66 cfs during the 100-year storm. This discharge corresponds to an overtopping depth of 0.5 feet.

Table 4.3 Summary of Selected Peak Discharges for the Existing Condition Scenario.

Location	EPA SWMM Element	Drainage Area (acres)	Distance above the Confluence with the Poudre River (1,000 feet)	Peak Discharge (cfs)				
				2-yr	5-yr	10-yr	50-yr	100-yr
20th Street	1	26	22.3	19	35	46	85	99
Inflow to ACC Detention Pond	403	91	20.0	29	72	104	232	277
Outflow from ACC Detention Pond	303	91	19.8	0	12	23	96	163
Inflow to Country Club West Detention Pond	404	232	18.6	59	131	179	357	424
Outflow from Country Club West Detention Pond	304	232	17.7	6	11	14	20	22
50th Avenue at 10th Street	405	288	16.8	30	51	66	118	135
Inflow to 10th Street and 49th Avenue	406	406	16.1	51	110	148	314	374
Outflow from 10th Street and 49th Avenue	306	406	16.0	51	104	139	268	295
Inflow to Allen Park Detention Pond	410	526	14.9	90	183	242	453	518
Outflow from Allen Park Detention Pond	310	526	13.8	10	30	51	166	231
47th Avenue at 9th Street (surface flows only)	703	621	13.6	0	0	0	83	163
47th Avenue at 6th Street (Epple Park/Dove Creek Channel)	415	732	12.4	71	132	176	353	421
Inflow to Upper Epple Park Detention Pond	416	818	11.6	103	202	273	559	651
Outflow from Upper Epple Park Detention Pond	315	818	10.7	63	95	116	402	520
Inflow to Lower Epple Park Detention Pond	417	875	10.6	88	132	160	457	595
Outflow from Lower Epple Park Detention Pond (4th Street)	317	875	10.5	88	132	160	455	595
B Street	221	875	8.1	83	128	153	444	582
Inflow to South Eagleview Detention Pond	421	1,054	8.0	154	291	372	697	815
Outflow from South Eagleview Detention Pond (Greeley No. 3 Ditch)	321	1,054	7.6	125	222	284	556	683
F Street	425	1,163	5.4	123	253	334	774	977
Inflow to North Eagleview Detention Pond	427	1,304	5.3	184	377	492	1,059	1,313
Outflow from North Eagleview Detention Pond (Colorado and Southern Railroad)	327	1,304	3.2	0	12	25	87	133
Cache La Poudre River	429	1,552	0	112	255	330	624	729
Inflow to Weber West Western Detention Pond	419	111	[a]	49	105	141	291	348
Outflow from Weber West Western Detention Pond	319	111	[a]	8	11	13	18	23
Inflow to Weber West Eastern Detention Pond	420	133	[a]	45	89	116	233	280
Outflow from Weber West Eastern Detention Pond	320	133	[a]	4	5	7	28	58
Eagleview Side Channel Weir	34	N/A	[b]	0	0	0	94	155

[a] Located on secondary drainage path.

[b] Spills from the Greeley No. 3 Ditch.

Figure 4.1 Discharge Profiles for the Existing Condition.

47th Avenue and 9th Street. Discharge releases in excess of flows associated with the 10-year event from the Allen Park Detention Pond commingle with flows from the Greeley Country Club and Wal-mart site, combining to exceed the maximum capacity of the 47th Avenue Storm Sewer. The maximum surcharged capacity of the storm sewer is approximately 153 cfs; the 100-year discharge at this location is estimated to be 316 cfs. Excess flows have the potential to spill out of the grated concrete box connecting the Allen Park/Wal-mart site storm sewers, spilling north along 47th Avenue toward the Epple Park/Dove Creek Channel.

Upper Epple Park Detention Pond. The combined capacity of the 48-inch CMP outlet and the 50-foot wide concrete spillway prior to overtopping the north embankment is estimated to be 220 cfs. The pond will release 520 cfs during the 100-year event, with the north embankment being overtopped by approximately 0.7 feet over a width of 105 feet. Flows have the potential to spill onto 4th Street and either be directed north onto 43rd Avenue Court or pond along 4th Street, overtopping the curb into the Larson Ditch.

During the completion of the existing condition analysis, potential flooding problems were also noted in areas adjacent to the major drainageway. In most cases, flooding will be caused by the concentration of storm runoff at locations where outfall facilities do not exist or are inadequate to convey the runoff. Only one location was especially noteworthy with respect to potential flooding problems. Southwest of the intersection of 47th Avenue and 4th Street, stormwater runoff from the development west of 47th Avenue is conveyed to existing inlets and storm sewers in the vicinity of 47th Avenue Court and 6th Street. The 100-year peak discharge conveyed to this location is estimated to be 278 cfs. The existing drainage facilities (30-inch storm sewer) lack the capacity to efficiently remove these storm flows from the streets. Consequently, flooding of the adjacent residences will occur as stormwater runoff is conveyed in an easterly direction through the residential lots, across 47th Avenue Court and 47th Avenue into Epple Park.

It should be noted that the potential for flooding could occur at almost any location throughout the basin. The previous discussion highlighted general locations along the major drainageway; it is not intended to be a comprehensive summary of basin-wide flooding problems. The aforementioned information should be used as a starting point along with more accurate data and analyses if the precise determination of flooding extents and damages is required throughout the basin.

4.8 Summary of the Future Condition Hydrologic Analyses

4.8.1 Definition of the Future Condition Scenario

The hydrologic model representing the Future Condition scenario was prepared by modifying the Existing Condition model to incorporate all potential future development, based

on current zoning and land use for the Country Club Basin. The model simulated all existing detention ponds utilized in the Existing Condition model. Future development, according to City of Greeley drainage criteria, is generally required to provide on-site detention limiting releases to the 5-year Existing Condition runoff during the 100-year design storm. For areas outside the existing city limits but within the City's Long Range Expected Growth Area (LREGA), it was assumed that future development would be required to provide on-site detention limiting releases to the 100-year Existing Condition runoff during the 100-year storm. This latter requirement specifically pertains to those areas north of roughly C Street and the Greeley No. 3 Ditch, outside the city limits.

Modifications to the overland flow lengths and time of concentration were made to reflect potential urbanization of the basin. Table 4.4 presents hydrologic modeling parameters defined for the Future Condition analyses. All hydrologic subbasin parameters, conveyance parameters, and special modeling features associated with the Future Condition scenario are defined in Sections 4.3, 4.4, and 4.5, respectively, of this report. CUHP input files for each return period are provided in Section 2.2 of the Project Notebook; EPA SWMM input files for the 10- and 100-year return periods are included in Section 3.5.

No detention ponds or flow diversions were added or modified for the Future Condition hydrologic model. As noted in Section 4.6, the inflow hydrograph to the basin (due to the spill at the Eagleview Side Channel Weir from the Greeley No. 3 Ditch) used in the Future Condition model was identical to the one used in the Existing Condition model. It is recognized that assuming the Existing Condition inflow hydrograph is applicable to the Future Condition may result in slightly under-estimated peak discharges north of the No. 3 Ditch. However, City Staff concurred that this was an acceptable compromise in order to simplify the analyses for the Future Condition, since this condition simply represents an intermediate step between Existing and Proposed Conditions. Exported flows to the Grapevine Basin (see Section 4.5.4) also remained the same in the Future Condition.

4.8.2 Hydrologic Modeling Results for the Future Condition

Approximately ninety-four percent of the Country Club Basin south of the Greeley No. 3 Ditch has been developed, while virtually none of the basin north of the Greeley No. 3 Ditch has been developed. On-site detention was not simulated for the three remaining undeveloped subbasins south of the Greeley No. 3 Ditch due to the fact that they are in Weld County (which generally does not enforce on-site detention) and have not been assigned a specific zoning classification. As a result, runoff entering the Greeley No. 3 Ditch slightly increased for all return periods. Of the thirty-two delineated subbasins in the Country Club Basin, four subbasins (7, 22, 23, and 32) were revised to represent Future Conditions based on the proposed zoning.

Table 4.4 Hydrologic Subbasin Parameters for the Future Condition.

Subbasin No.	Basin Area (acres)	Basin Length (ft)	Distance to Basin Centroid (ft)	Average Basin Slope (ft/ft)	Time of Conc. (minutes)	Percent Imperv. (%)	Depression Storage (inches)		Infiltration Rates (in/hr)		Horton's Decay Rate
							Pervious	Imperv.	Initial	Final	
1	25.7	1500	600	0.012	18.0	45.6	0.40	0.10	4.5	0.6	0.0018
2	31.9	1200	600	0.012	17.0	24.4	0.40	0.10	4.5	0.6	0.0018
3	33.0	1600	600	0.025	19.0	41.4	0.40	0.10	4.5	0.6	0.0018
4	114.7	2500	1100	0.028	N/A	31.2	0.40	0.10	4.5	0.6	0.0018
5	31.4	1700	850	0.025	19.0	50.0	0.40	0.10	4.5	0.6	0.0018
6	21.9	1400	600	0.031	18.0	36.0	0.40	0.10	4.5	0.6	0.0018
7	95.5	3000	1400	0.022	N/A	15.8	0.40	0.10	4.5	0.6	0.0016
8	58.9	2000	800	0.030	21.0	12.1	0.40	0.10	4.6	0.7	0.0016
9	34.9	1900	900	0.031	21.0	42.0	0.40	0.10	4.5	0.6	0.0017
10	85.6	3300	1650	0.018	28.0	37.1	0.40	0.10	4.5	0.6	0.0017
11	9.9	1000	500	0.038	15.0	45.6	0.40	0.10	4.5	0.6	0.0018
12	23.0	1400	700	0.036	18.0	48.0	0.40	0.10	4.5	0.6	0.0018
13	22.0	2600	1200	0.028	24.0	43.2	0.40	0.10	4.5	0.6	0.0018
14	66.1	2100	840	0.024	22.0	42.0	0.40	0.10	4.5	0.6	0.0018
15	22.5	3200	1600	0.011	28.0	10.7	0.40	0.10	4.5	0.6	0.0018
16	63.4	2500	1100	0.028	24.0	41.5	0.40	0.10	4.5	0.6	0.0018
17	57.0	2600	1300	0.018	24.0	45.7	0.40	0.10	4.5	0.6	0.0018
19	87.6	2700	1100	0.019	25.0	39.0	0.40	0.10	4.5	0.6	0.0018
20	88.2	3000	1500	0.019	27.0	38.9	0.40	0.10	4.5	0.6	0.0017
21	178.9	2800	1400	0.013	N/A	37.8	0.40	0.10	4.5	0.6	0.0018
22	19.5	700	300	0.050	14.0	13.0	0.40	0.10	4.8	0.9	0.0009
23	21.2	500	200	0.075	13.0	13.0	0.40	0.10	4.8	0.9	0.0010
24	129.5	3000	1800	0.003	N/A	2.0	0.40	0.10	3.3	0.5	0.0017
25	109.4	1700	600	0.008	N/A	2.0	0.40	0.10	3.4	0.5	0.0018
26	44.9	2600	1000	0.002	24.0	5.7	0.40	0.10	2.9	0.5	0.0017
27	141.0	6000	2700	0.002	N/A	52.5	0.40	0.10	3.0	0.5	0.0018
28	78.6	1600	800	0.006	19.0	8.2	0.40	0.10	2.7	0.5	0.0016
29	247.9	3000	1500	0.003	N/A	35.0	0.40	0.10	2.9	0.5	0.0017
30	26.7	1300	600	0.031	17.0	39.3	0.40	0.10	4.5	0.6	0.0018
31	24.7	1400	800	0.023	15.0	77.0	0.40	0.10	4.6	0.7	0.0016
32	33.1	800	300	0.055	14.0	13.0	0.40	0.10	4.8	0.9	0.0008
33	26.0	1100	700	0.045	10.0	74.1	0.40	0.10	4.5	0.6	0.0018

The basin map and a schematic diagram of the hydrologic model representing the drainage network for the Future Condition is provided on Sheet A-3 in Appendix A of this report. A summary of peak discharges resulting from the Future Condition hydrologic modeling effort is provided in Table 4.5 for selected locations within the basin. A graphical representation of the discharge profile along the major drainageway is also provided in Figure 4.2. Flood hydrographs at selected locations throughout the basin are presented in Appendix D of this report. Summary output from the EPA SWMM models representing the Future Condition analyses are also provided in Appendix D and in Section 3.6 of the Project Notebook. A description of the program written to summarize the EPA SWMM output as well as a copy of the program itself is provided in Section 3.4. All input and output files for both CUHP and EPA SWMM are provided electronically in Section 7 of the Project Notebook.

The Existing Condition flooding problems described in Section 4.7.4 will continue to persist due the basin being nearly completely developed in the Existing Condition. Overall, the magnitude of Future Condition flooding problems is generally the same as for Existing Conditions due to similar peak discharges. It is noted that the discharges cited in Table 4.5 for areas north of the Greeley No. 3 Ditch may be slightly lower than the actual flows due to the use of the Existing Condition inflow hydrograph from the ditch.

Table 4.5 Summary of Selected Peak Discharges for the Future Condition Scenario.

Location	EPA SWMM Element	Drainage Area (acres)	Distance above the Confluence with the Poudre River (1,000 feet)	Peak Discharge (cfs)				
				2-yr	5-yr	10-yr	50-yr	100-yr
20th Street	1	26	22.3	19	35	46	85	99
Inflow to ACC Detention Pond	403	91	20.0	29	72	104	232	277
Outflow from ACC Detention Pond	303	91	19.8	0	12	23	96	163
Inflow to Country Club West Detention Pond	404	232	18.6	59	131	179	357	424
Outflow from Country Club West Detention Pond	304	232	17.7	6	11	14	20	22
50th Avenue at 10th Street	405	288	16.8	30	51	66	118	135
Inflow to 10th Street and 49th Avenue	406	406	16.1	55	117	156	329	391
Outflow from 10th Street and 49th Avenue	306	406	16.0	55	110	146	274	302
Inflow to Allen Park Detention Pond	410	526	14.9	94	189	247	463	523
Outflow from Allen Park Detention Pond	310	526	13.8	10	32	53	172	236
47th Avenue at 9th Street (surface flows only)	703	621	13.6	0	0	0	89	169
47th Avenue at 6th Street (Epple Park/Dove Creek Channel)	415	732	12.4	71	132	176	354	426
Inflow to Upper Epple Park Detention Pond	416	818	11.6	103	202	273	560	651
Outflow from Upper Epple Park Detention Pond	315	818	10.7	63	95	116	407	524
Inflow to Lower Epple Park Detention Pond	417	875	10.6	88	132	160	461	599
Outflow from Lower Epple Park Detention Pond (4th Street)	317	875	10.5	88	132	160	459	598
B Street	221	875	8.1	83	128	153	448	585
Inflow to South Eagleview Detention Pond	421	1,054	8.0	154	291	372	697	815
Outflow from South Eagleview Detention Pond (Greeley No. 3 Ditch)	321	1,054	7.6	125	222	284	556	685
F Street	425	1,163	5.4	123	253	334	774	977
Inflow to North Eagleview Detention Pond	427	1,304	5.3	184	377	492	1,059	1,313
Outflow from North Eagleview Detention Pond (Colorado and Southern Railroad)	327	1,304	3.2	0	12	26	88	134
Cache La Poudre River	429	1,552	0	112	255	330	624	729
Inflow to Weber West Western Detention Pond	419	111	[a]	49	105	141	291	348
Outflow from Weber West Western Detention Pond	319	111	[a]	8	11	13	18	23
Inflow to Weber West Eastern Detention Pond	420	133	[a]	45	89	116	233	280
Outflow from Weber West Eastern Detention Pond	320	133	[a]	4	5	7	28	58
Eagleview Side Channel Weir	34	N/A	[b]	0	0	0	94	155

[a] Located on secondary drainage path.

[b] Spills from the Greeley No. 3 Ditch.

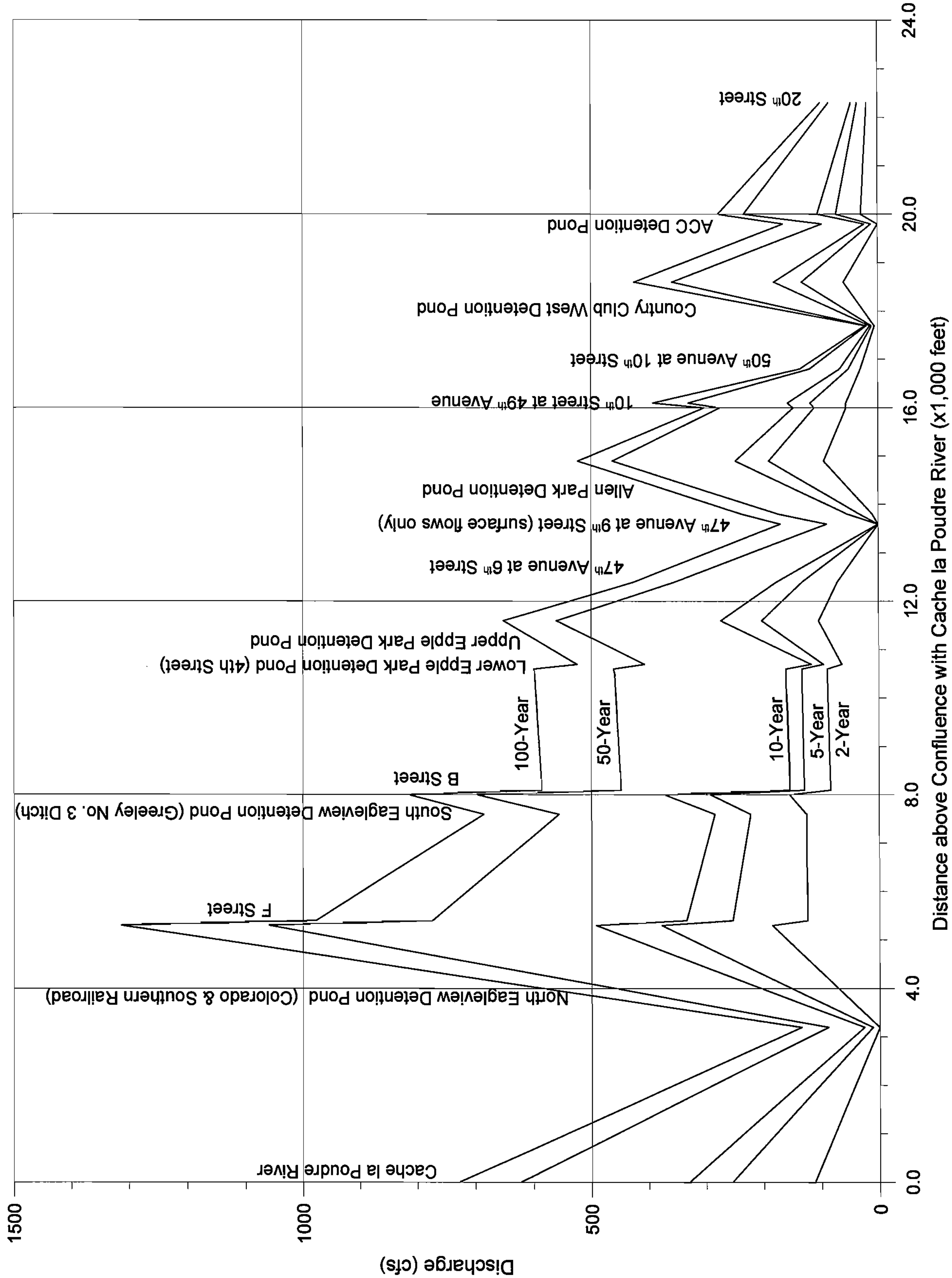


Figure 4.2 Discharge Profiles for the Future Condition.

V. RECOMMENDED PLAN OF DRAINAGE IMPROVEMENTS

The 1997 Comp Plan included an alternative evaluation that considered a wide array of drainage improvements for the Country Club Basin, including the following: regional detention, existing detention pond improvements, major storm sewer additions, Greeley No. 3 Ditch modifications, channel improvements, water quality enhancements, and the replacement of several channel-crossing structures. Of these recommendations, specific drainage-related improvements that have been implemented since 1997 include the following: (a) completion of improvements to the Country Club West Pond Outfall Channel; (b) addition of the 60-inch RCP under 10th Street near 49th Avenue; (c) construction of the 49th Avenue Storm Sewer improvements from 10th Street and 49th Avenue to Allen Park; (d) installation of the box culverts beneath 4th Street at Epple Park; (e) channel improvements to the Larson Ditch, including the installation of the box cuvlerts beneath B Street; (f) construction of the South Eagleview Detention Pond; (g) construction of the North Eagleview Drainage Channel (including the Eagleview Side Channel Weir, South Eagleview Detention Pond Outflow Spillway, the box culverts beneath F Street, and the North Eagleview Detention Pond); and (h) improvements to the existing spill structure on the Greeley No. 3 Ditch at F Street east of 59th Avenue. The City's implementation of these improvements has significantly reduced flood hazards in many areas of the basin along the major drainageway. The potential for flooding, however, in a few specific locations along the major drainageway remains an issue. This study focused primarily on refining the previously recommended plan of improvements, including upgrading conceptual cost estimates.

5.1 Formulation of the Drainage Improvement Plan

In the context of the revised hydrologic and hydraulic modeling for the basin, as well as drainage improvements that have been implemented since completion of the previous Comp Plan, revisions to the drainage improvement plan are identified in this report. In addition, construction cost estimates associated with the proposed improvements have been updated to reflect the escalation of construction costs since 1997.

On-site detention that limits releases to the 5-year existing condition discharge will continue to be required within the limits of the City of Greeley. The use of existing as well as recently constructed on-line regional detention facilities along the major drainageway will continue to be an important factor in reducing 100-year discharges. Details associated with the overall drainage plan are provided in the following sections.

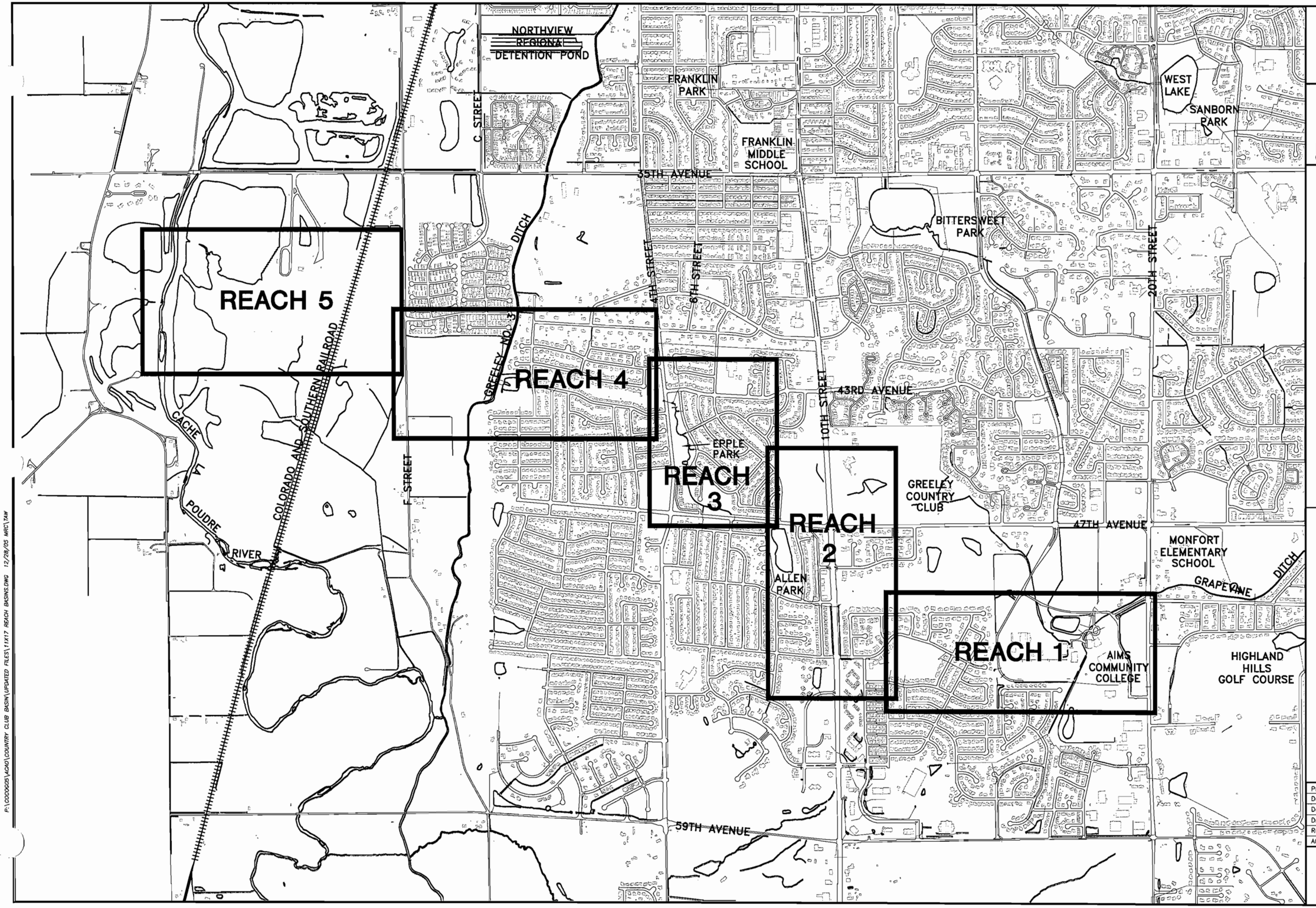
5.2 Drainage Criteria

Where appropriate, preliminary design of the proposed drainage facilities was completed in accordance with the criteria presented in the City of Greeley Storm Drainage Criteria Manual (Greeley Public Works Department, May 2002). The City's drainage criteria manual reflects local standards and procedures and is consistent with the information presented in the Urban Storm Drainage Criteria Manual prepared by the Denver Regional Council of Governments.

5.3 Major Storm Drainage Improvements

The major storm drainage improvement plan for the Country Club Basin, as adapted from the 1997 Comp Plan, consists of three components. Most of the drainage improvements recommended as part of the 1997 Comp Plan have been constructed; one new component has been added, while the remaining two components have been carried over from the 1997 Comp Plan. Plan and profile drawings that provide detailed configuration information for the recently constructed major storm drainage improvements implemented since the 1997 Comp Plan as well as proposed improvements are included in Figures 5.1 through 5.6. The improvements have been sized for this study based on 100-year flows associated with the Proposed Condition scenario as defined in Section 5.6 of this report. Analyses related to the proposed improvements are provided in Section 4 of the Project Notebook.

1. ***13th Street.*** The 13th Street crossing (i.e, the beginning of the ACC Detention Pond Outfall) currently has a capacity of 41 cfs, which corresponds to less than the flow associated with the 50-year Proposed Condition storm event. The 1997 Comp Plan did not call for any improvements at this crossing; however, as the crossing lies along the major drainageway, it was considered for potential improvements as part of the current study. The installation of a 48-inch RCP from 13th Street to the Country Club West Detention Pond would eliminate overtopping at this crossing. The elimination of overtopping at this crossing was seen as important due to the fact that flows exceeding the capacity of the existing 30-inch RCP have the potential to pond along 13th Street, overtop the curb to the north, and inundate homes between 13th Street and the Country Club West Detention Pond. The required structure size would need to be confirmed by a detailed analysis completed as part of final design of this crossing.



COUNTRY CLUB BASIN

PROPOSED DRAINAGE IMPROVEMENTS

INDEX SHEET

Anderson Consulting Engineers, Inc
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Project No.	COCOG05
Date:	07/08/04
Design:	BLV/BAS
Drawn:	MRC/TAW
Revisions:	12/21/05
ACADFILE:	11x17 REACH BASINS

FIGURE 5.1

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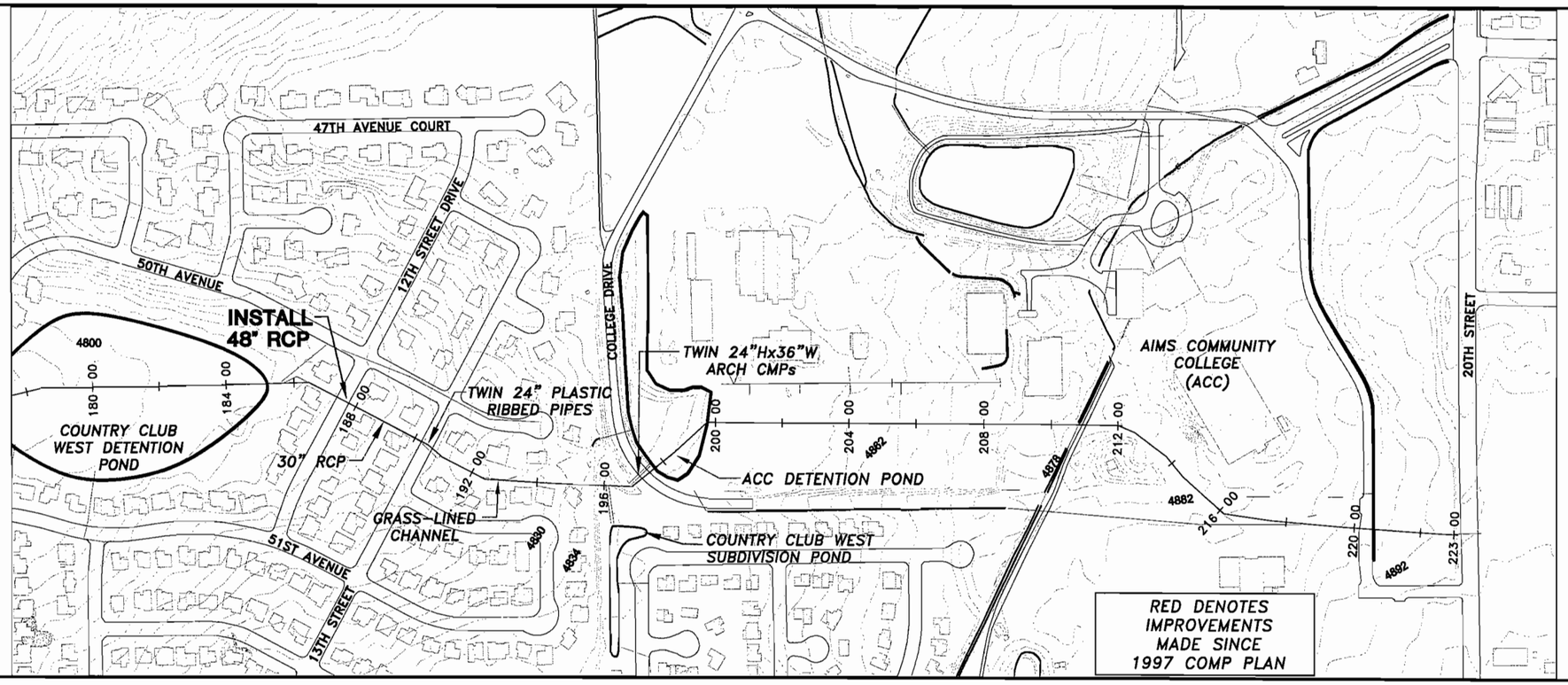

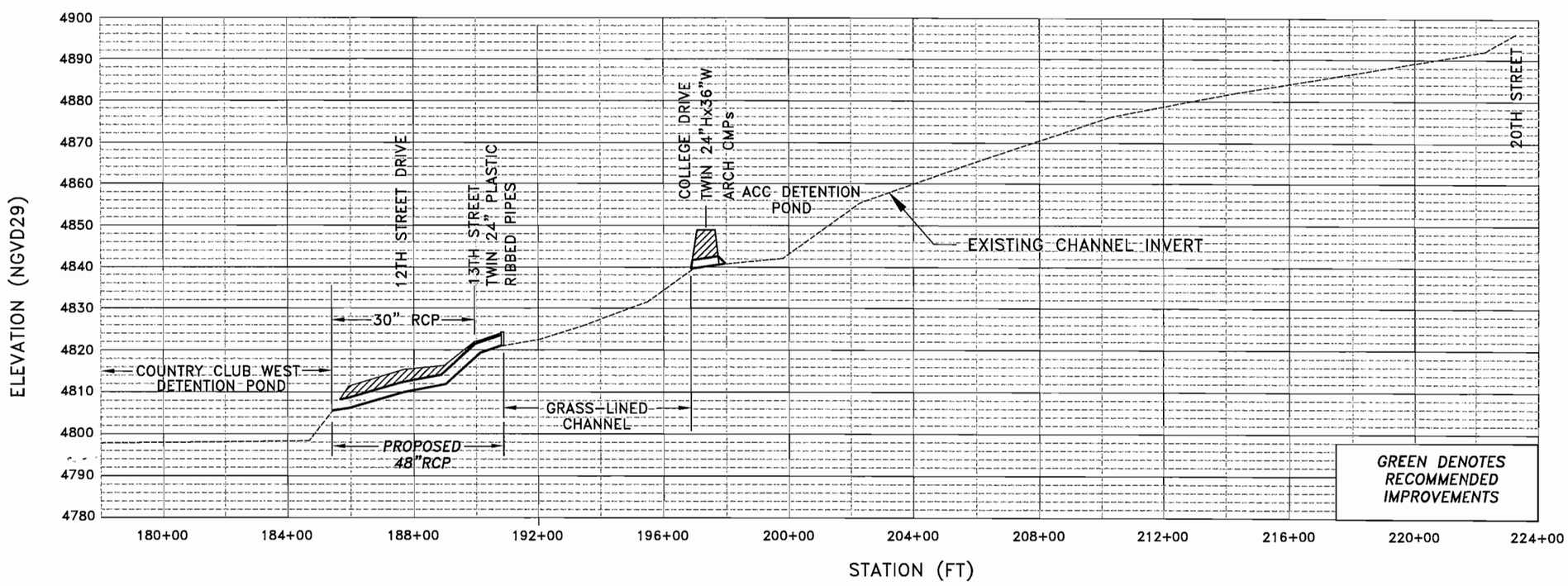

City of Greeley

SCALE:
HORIZONTAL 1"=400'
VERTICAL 1"=30'

COUNTRY CLUB BASIN
PROPOSED DRAINAGE IMPROVEMENTS
REACH 1

Anderson Consulting Engineers, Inc
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Project No.	COCOG05
Date:	07/08/04
Design:	BLV/BAS
Drawn:	MRC/TAW
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FIGURE 5.2

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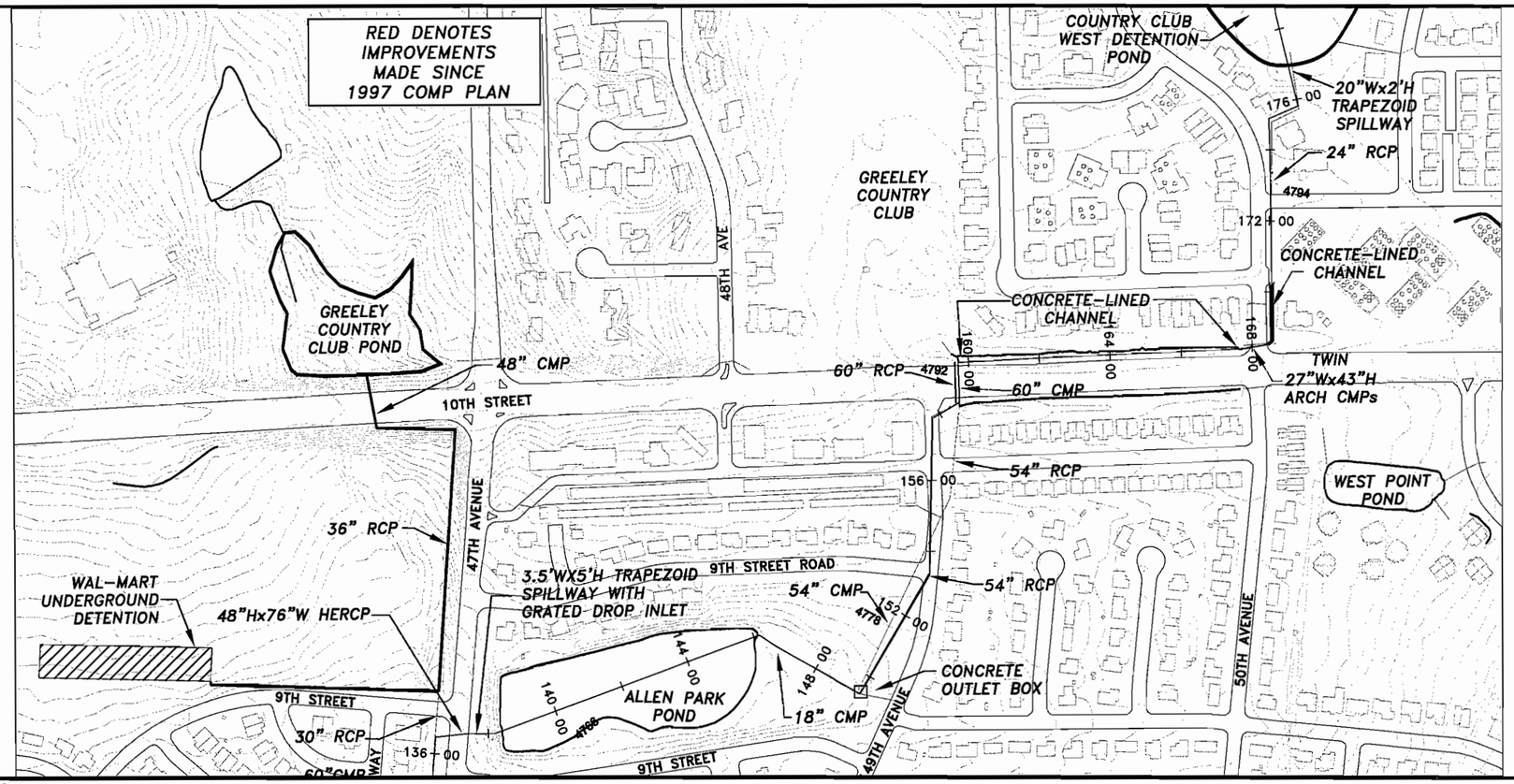

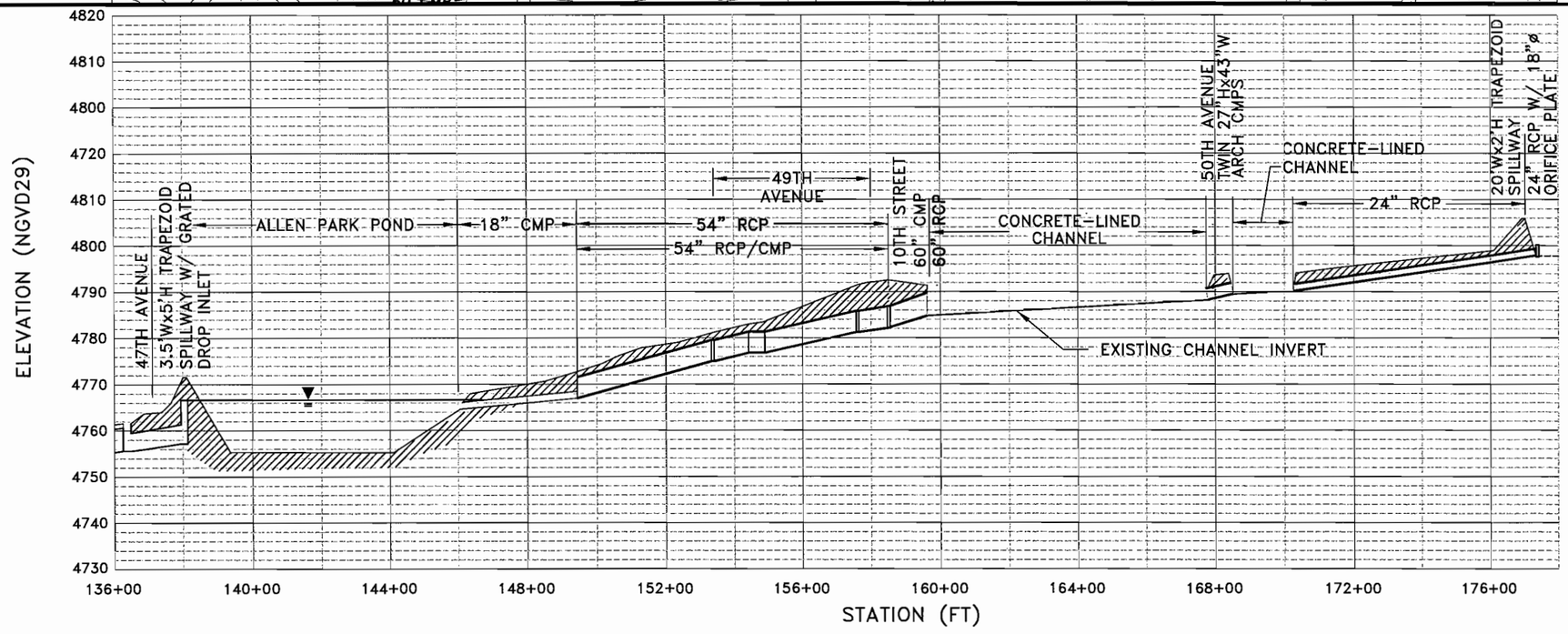

City of Greeley

N

SCALE:
HORIZONTAL 1"=400'
VERTICAL 1"=30'

COUNTRY CLUB BASIN
PROPOSED DRAINAGE IMPROVEMENTS
REACH 2

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Project No.	COCOG05
Date:	07/08/04
Design:	BLV/BAS
Drawn:	MRC/TAW
Revisions:	12/21/05
ACADFILE:	11x17 REACH BASINS

FIGURE 5.3

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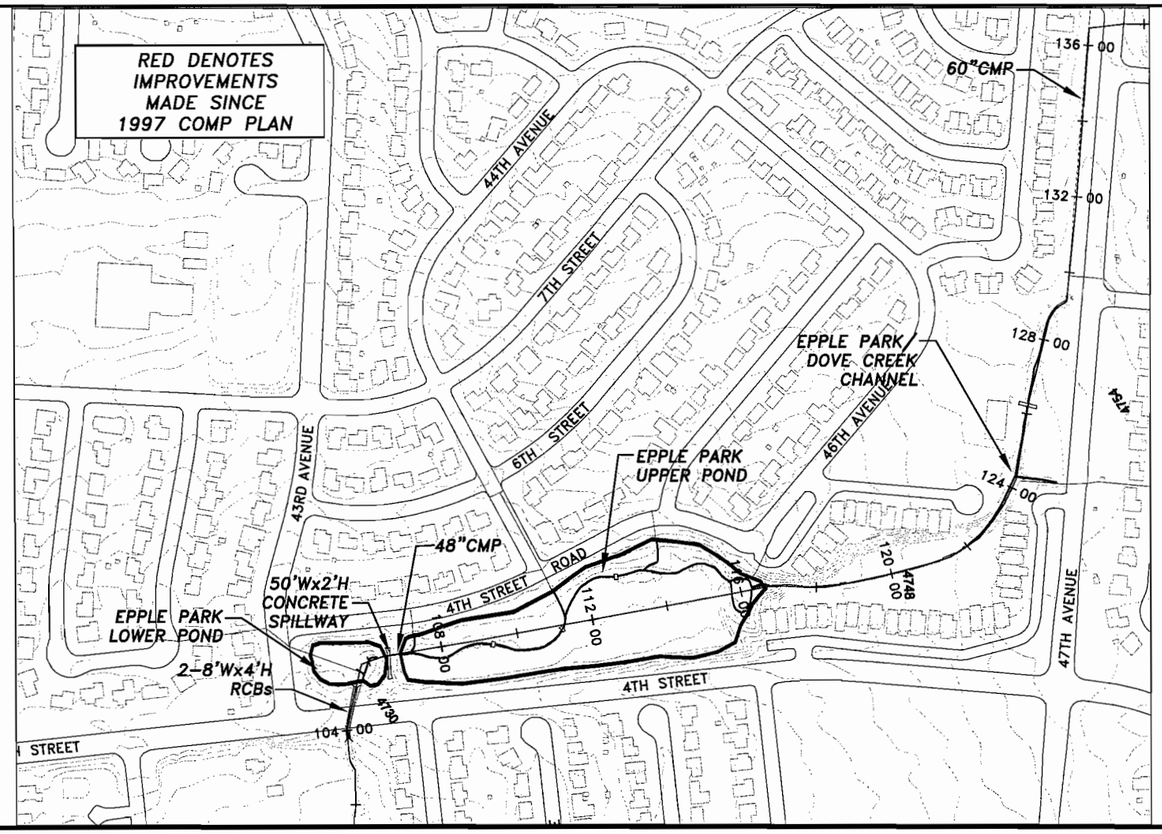

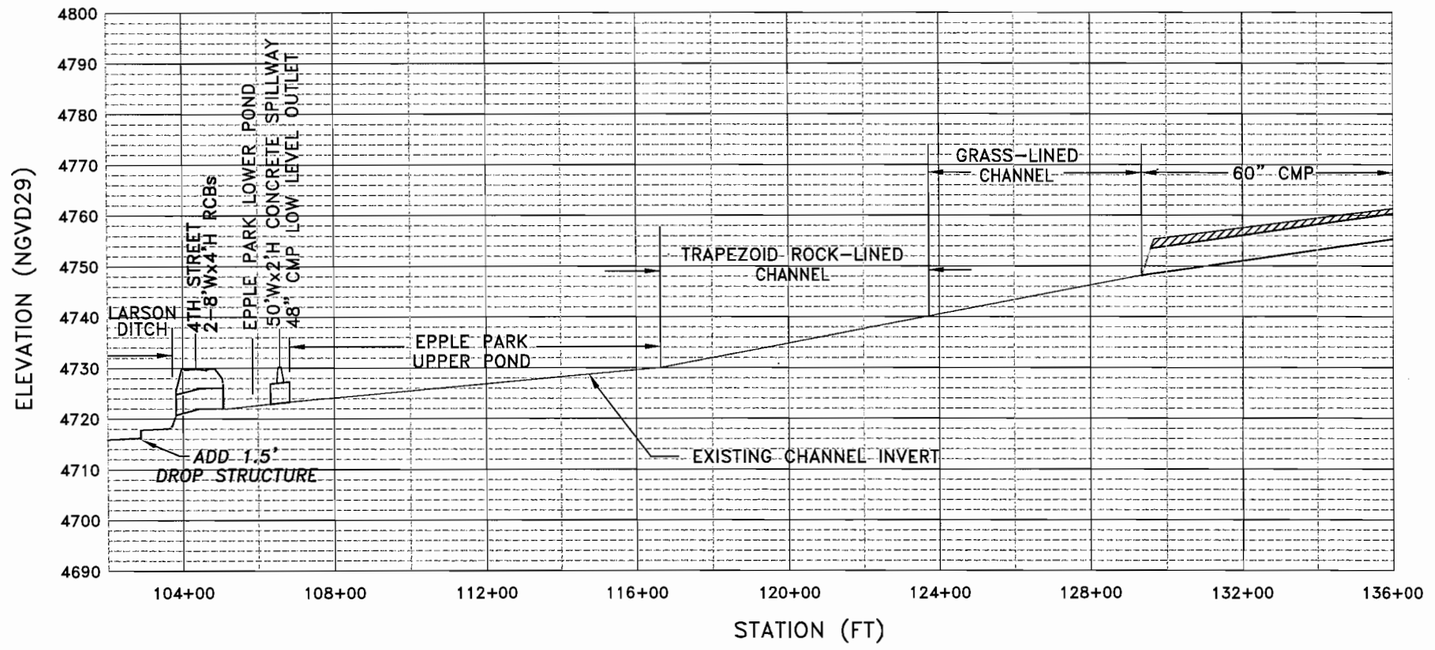

City of Greeley

SCALE:
HORIZONTAL 1"=400'
VERTICAL 1"=30'

COUNTRY CLUB BASIN
PROPOSED DRAINAGE IMPROVEMENTS
REACH 3

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Project No.	COCOG05
Date:	07/08/04
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Drawn:	MRC/TAW
Revisions:	12/21/05
ACADFILE:	11x17 REACH BASINS

FIGURE 5.4

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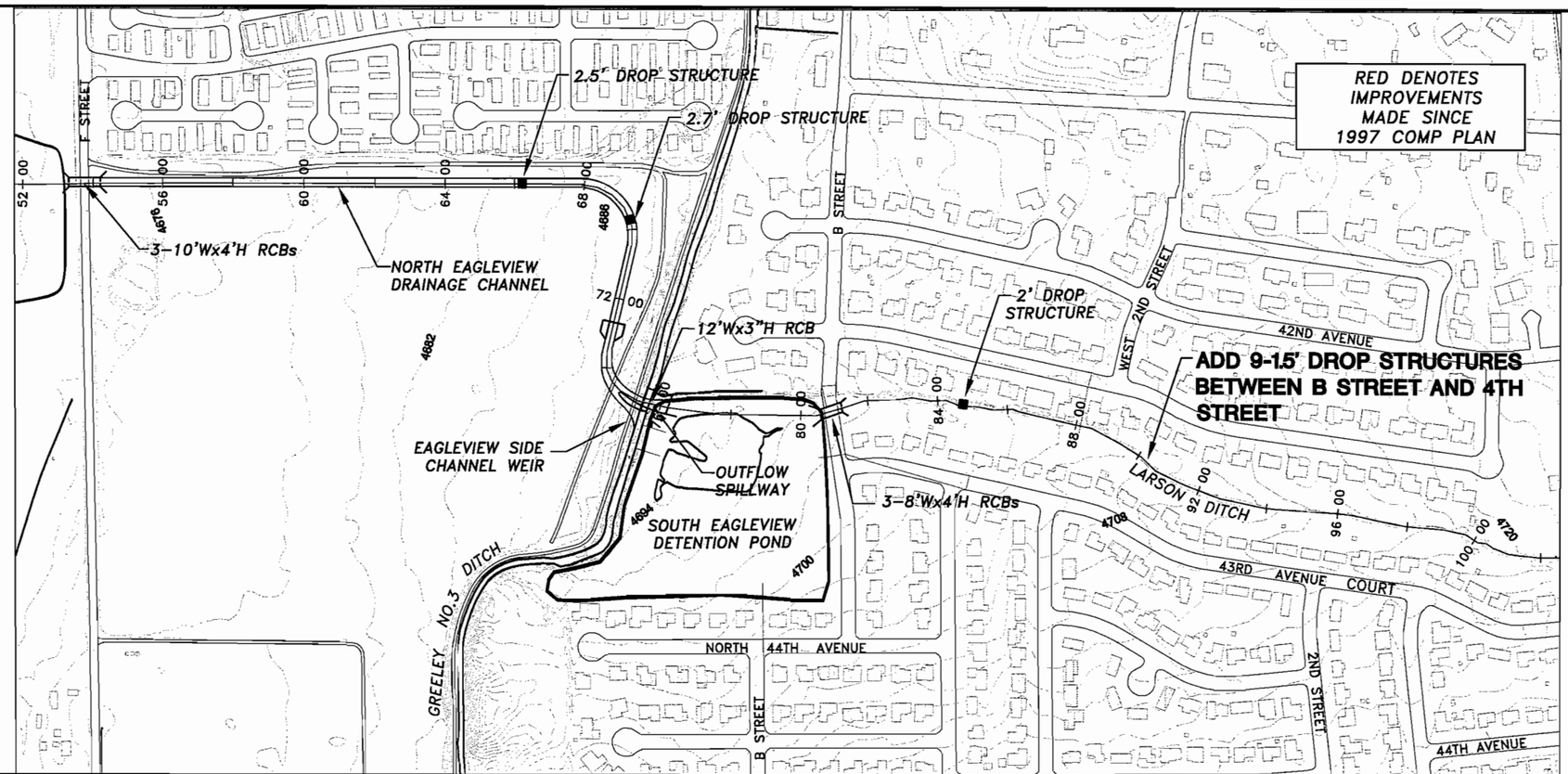

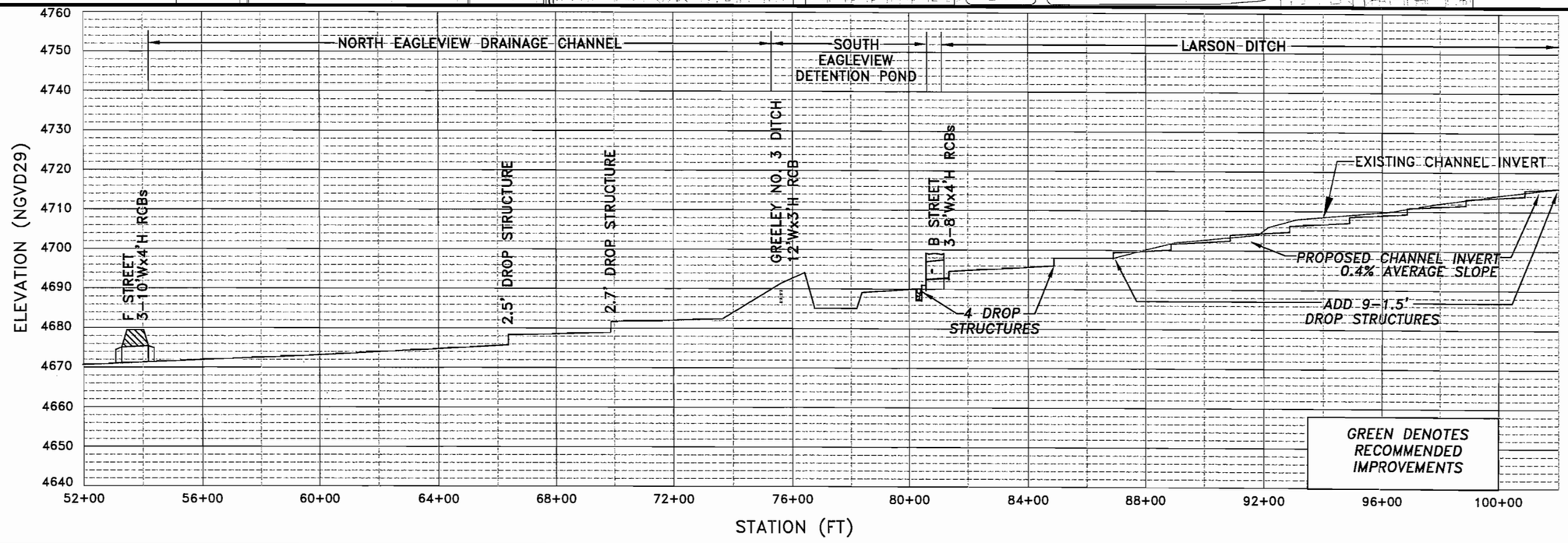

SCALE:
HORIZONTAL 1"=400'
VERTICAL 1"=30'

COUNTRY CLUB BASIN
PROPOSED DRAINAGE IMPROVEMENTS
REACH 4

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Project No.	COCOG05
Date:	07/08/04
Design:	BLV/BAS
Drawn:	MRC/TAW
Revisions:	12/21/05
ACADFILE:	11x17 REACH BASINS

FIGURE 5.5

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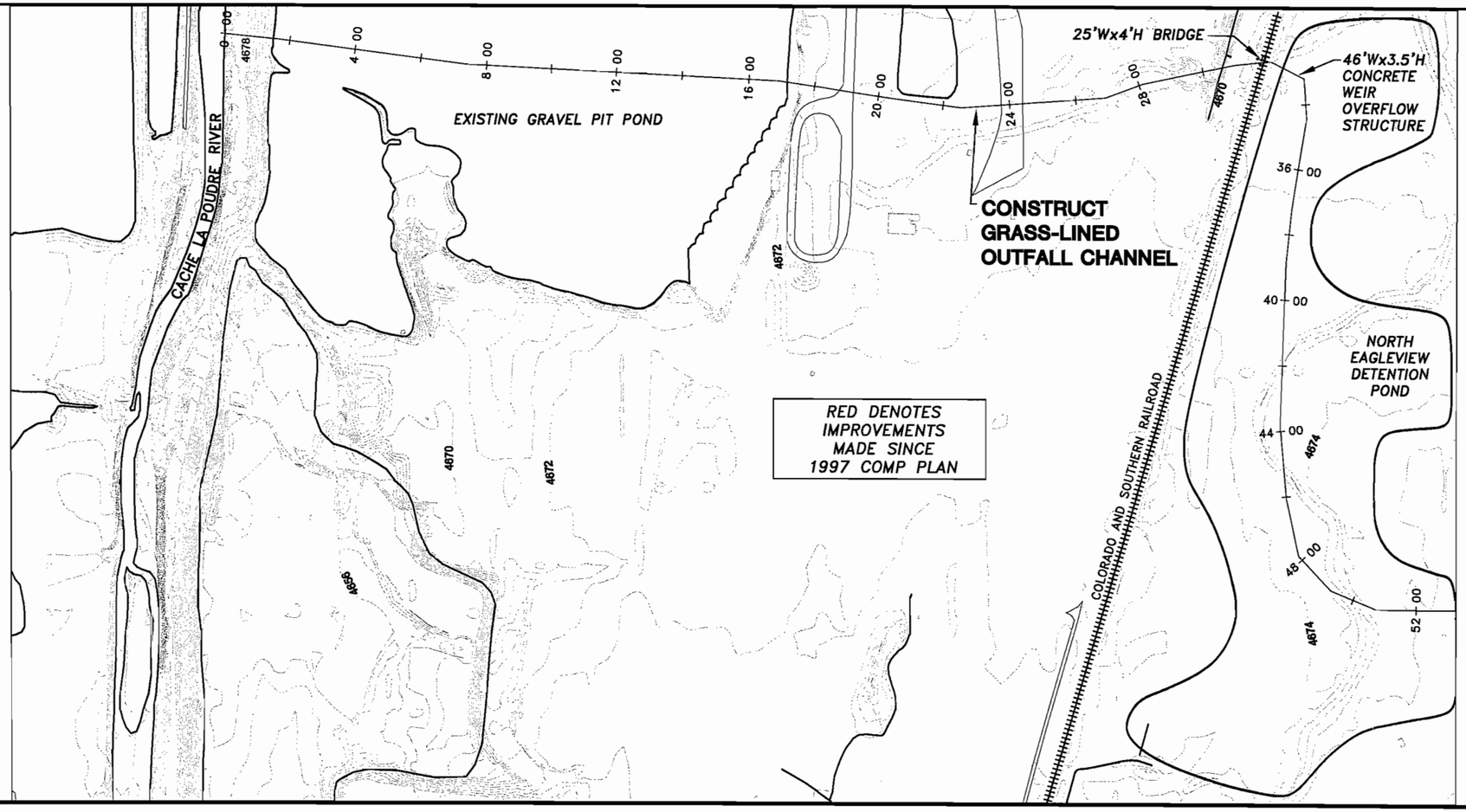

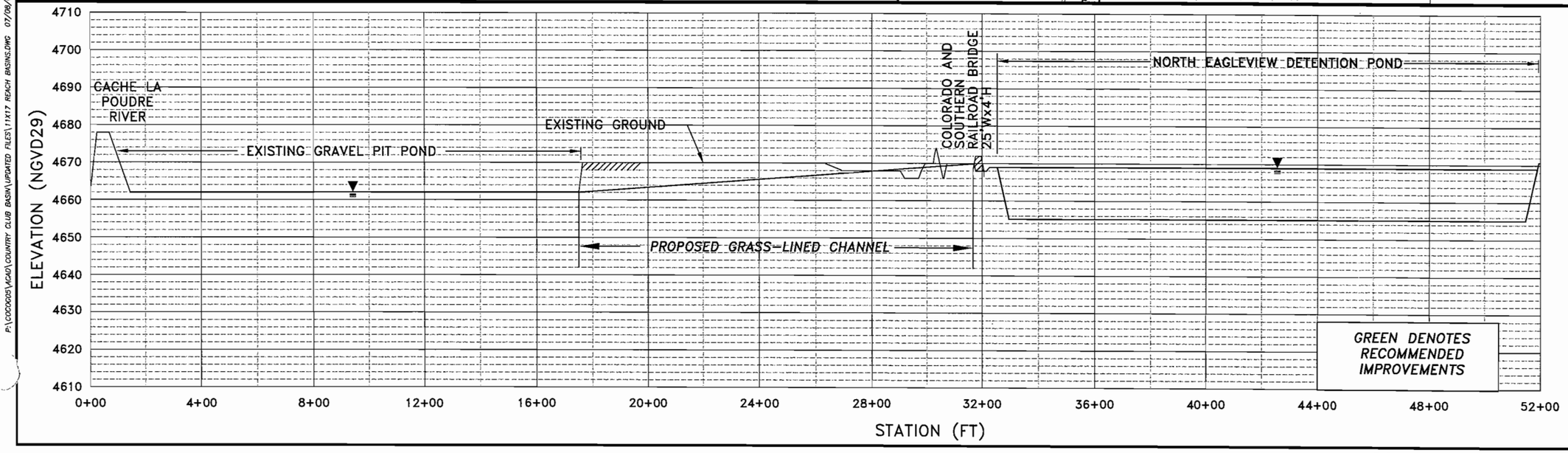

City of Greeley

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VERTICAL 1"=30'

COUNTRY CLUB BASIN
PROPOSED DRAINAGE IMPROVEMENTS
REACH 5

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Project No.	COCOG05
Date:	10/11/04
Design:	BLV/BAS
Drawn:	MRC/TAW
Revisions:	12/21/05
ACADFILE:	11x17 REACH BASINS

FIGURE 5.6

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2. ***Larson Ditch.*** The reach of the Larson Ditch between 4th Street and B Street has adequate capacity to pass the 100-year Proposed Condition discharge. However, as was noted in the 1997 Comp Plan, erosion of the channel bed was evident at several locations along the ditch due to the relatively steep slope (average of approximately 1.1 percent). As part of the improvements associated with the South Eagleview Detention Pond, one existing 1-foot drop structure approximately 290 feet upstream of B Street was removed from the channel. Four new drop structures, ranging in height from 0.9 feet to 2.0 feet, were installed (three at the B Street crossing, and one approximately 360 feet upstream of B Street). The 1997 Comp Plan called for the installation of eleven 1.5-foot drop structures for a total drop of 16.5 feet along the channel between 4th Street and B Street. The revised improvement calls for the installation of nine 1.5-foot drop structures (for a total drop of 13.5 feet) spaced every 200 feet, and a bed slope in between each drop of 0.004 ft/ft. The drop structures will minimize erosion potential by stabilizing the channel.

3. ***North Eagleview Detention Pond Outfall Channel.*** The 1997 Comp Plan called for the construction of a channel from the Colorado and Southern Railroad crossing to the existing gravel pit pond located immediately south of the Cache la Poudre River and west of 35th Avenue. The channel is intended to complete the downstream end of the major drainageway. Modifications were made to the channel dimensions due to a reduction in the 100-year Proposed Condition discharge from the 1997 Comp Plan Proposed Condition discharge. The channel design will incorporate the following: grass-lining, a bottom width of 8 feet, side slopes of 4H:1V, bed slope of 0.006 ft/ft, and a design depth of 3 feet. In this configuration the channel would provide approximately 1-foot of freeboard. Currently, a drainage ditch exists parallel to the north side of the Colorado and Southern Railroad; the alignment is from the northwest to the southeast. The drainage ditch has the potential to intercept a large portion of the flows spilling from the North Eagleview Detention Pond after the flows have passed beneath the Colorado and Southern Railroad. The Boyd Freeman Ditch Improvements (Anderson Consulting Engineers, Inc., August 2005) for the City of Greeley Water and Sewer Department depict the potential use of the drainage ditch for the conveyance of flows for water augmentation purposes. However, after discussions with ACE staff, it was determined that the future use of the drainage ditch may not be needed for augmentation purposes. Consequently, it appears the drainage ditch may be abandoned and the channel improvements that are required for stormwater conveyance purposes, as proposed in Figure 5.6, can likely be constructed.

5.4 Conceptual Construction Cost Estimates

Estimates of potential construction costs were prepared for all of the improvements proposed as part of the 1997 Comp Plan. These costs were updated for the current Comp Plan to reflect changes to the proposed facilities and escalation of construction and land acquisition costs since 1997. Where necessary for the current study, data used to develop unit costs were obtained from bid tabulations, quotations from various suppliers and manufacturers, and information supplied by local contractors and various municipal utility departments. Total estimated costs for the projects have been divided into the following categories: (a) actual construction of drainage improvements; (b) land acquisition; and (c) engineering and project management fees.

Actual construction costs are defined as those costs associated with the labor and materials needed to implement the drainage improvements. Considering that the facilities associated with the recommended plan of improvements have only been designed at a conceptual level as part of this study, a construction contingency of 35 percent was added to each project based on the initial cost estimate. Land acquisition costs include the cost to purchase land and associated structures in order to facilitate the construction and maintenance of the proposed improvements. The final cost category, engineering and project management fees, was based on the sum of the initial construction cost estimate and the construction contingency. For all projects, this cost was estimated using a factor of 20 percent. The sum of the three cost categories determined the total project cost. A summary of the estimated cost to construct the three proposed projects for the Country Club Basin is provided in Table 5.1.

Table 5.1 Summary of Conceptual Construction Cost Estimates.

Description	Construction Cost [a]	Property Acquisition	Engineering and Project Management	Total Cost
13th Street	$288,000	$0[b]	$58,000	$346,000
Larson Ditch	$96,000	$0[b]	$19,000	$115,000
North Eagleview Detention Pond Outfall Channel	$84,000	$18,000	$17,000	$119,000
Total Project Costs				**$580,000**

[a] Includes initial estimate and 35 percent contingency.

[b] It is assumed that existing easements are adequate for constructing this improvement.

For the proposed ***13th Street*** improvements, estimated construction costs were based on current unit cost data for the major elements associated with the required culvert at this location. For the ***Larson Ditch*** and the ***North Eagleview Detention Pond Outfall Channel***, the 1997 cost estimate was converted from 1997 to 2004 dollars based on a cumulative increase of 27 percent in the Construction Cost Index (CCI) computed by the Engineering News Record (ENR). Detailed information used in the preparation of the construction cost estimates for all projects is included in Section 5 of the Project Notebook.

5.5 Implementation Plan

In order to promote the construction of the drainage improvements as funding becomes available, implementation priorities were established and an implementation plan developed during the completion of the 1997 Comp Plan. The implementation and phasing of the drainage improvements continue to be dependent on several factors. The following factors, originally established from the 1997 Comp Plan, were utilized to establish the priority of implementation for the improvements.

- Health and safety hazards to the public and vehicular traffic were considered the highest priority.
- Areas likely to incur the most flood damages were considered to be the next highest priority.
- Construction phasing of adjacent improvements was considered. For example, improving a culvert crossing may significantly reduce flood damage upstream of the crossing; however, the downstream channel must be improved in conjunction with the roadway crossing to prevent an increase in flood damages on the downstream property.

Recommended implementation priorities for projects in the Country Club Basin have been prepared and are presented in Table 5.2. It is recommended that a proactive approach be taken to facilitate the administration of the implementation plan and the construction of the improvements. Obstacles that hinder the implementation of the plan are frequently encountered; in many instances these obstacles should be addressed or considered as early as conceivably possible in the planning process. Consequently, administration of the plan should provide immediate consideration of: (a) acquisition of the property, easements and rights-of-way necessary to construct the improvements; and (b) identification of potential utility conflicts that will require resolution prior to construction of the improvements.

Table 5.2 Implementation Plan.

Implementation Priority	Description	Total Cost
1	13th Street	$346,000
2	Larson Ditch	$115,000
3	North Eagleview Detention Pond Outfall Channel	$119,000

5.6 Hydrologic Analysis of the Recommended Plan of Drainage Improvements

Hydrologic impacts of the recommended plan of drainage improvements were evaluated using a methodology similar to that used for the Existing Condition, as discussed in Chapter 4. Consistent with the terminology used in Chapter 4, the scenario associated with the recommended plan of improvements is identified as the Proposed Condition, which includes future development with the drainage improvements proposed in this report.

For the Proposed Condition, subbasin delineations and hydrologic parameters were not modified from those defined for the Future Condition analysis described in Section 4.3. As a result, the Future Condition CUHP analysis documented in Section 2.2 of the Project Notebook applies to the Proposed Condition. Hydraulic conveyance modeling parameters defined for the Existing Condition were modified to reflect the recommended plan of improvements. This included the modification of one channel conveyance element. A summary of all conveyance element parameters defined for the Proposed Condition is provided in Section 3.1 of the Project Notebook.

With respect to special modeling features, no detention ponds or diversions were added or modified for the Proposed Condition hydrologic model. The inflow hydrograph from the Eagleview Side Channel Weir was modified to reflect the updated spill from the unsteady flow hydraulic analyses of the Greeley No. 3 Ditch for the Proposed Condition. Exported flows to the Grapevine Basin also remained the same in the Proposed Condition. The basin map and a schematic diagram of the hydrologic model representing the drainage network for the Proposed Condition is provided on Sheet A-4 in Appendix A of this report.

A summary of peak discharges along the major drainageway resulting from the Proposed Condition hydrologic modeling effort is provided in Table 5.3. EPA SWMM input files for the 10- and 100-year return period events are included in Section 3.5 of the Project Notebook; summary output for all return periods are included in Appendix D of this report and Section 3.6 of the Project Notebook. A description of the program written to summarize the EPA SWMM output as well as a copy of the program itself is provided in Section 3.4. All input and output

files for EPA SWMM are provided electronically in Section 7 of the Project Notebook. Figure 5.7 presents discharge profiles along the major drainageway that graphically portray the hydrologic results of the Proposed Condition modeling effort. In addition, selected flood hydrographs associated with the Proposed Condition are presented in Appendix D of this report.

The results of the proposed condition analysis along the major drainageway indicate that College Drive at the north end of the ACC Detention Pond will continue to be overtopped during the 100-year Proposed Condition event; however, the depth of overtopping (approximately 0.3 feet) is within acceptable overtopping limits for a local street (1.5 feet at the gutter flow line) as defined by City of Greeley storm drainage design criteria. Similarly, 50th Avenue at 10th Street will continue to be overtopped by approximately 0.5 feet; 50th Avenue is also classified as a local street and the overtopping depth appears to be within acceptable limits. Overtopping at 13th Street will be eliminated. Flows that exceed the capacity of the 47th Avenue Storm Sewer will continue to spill out of the grated concrete box onto 47th Avenue near 9th Street; however, the street has the capacity to carry the excess flows within specified drainage criteria for a minor arterial. The northern embankment of the Upper Epple Park Detention Pond will continue to be overtopped; similar to the spills along 47th Avenue, however, the capacity of 4th Street to carry the excess flows is also within drainage criteria for a minor arterial. Proposed Condition flows for the 100-year event at F Street will be reduced due to a lower spill at the Eagleview Side Channel Weir; similarly, the release out of the North Eagleview Detention Pond will also be reduced. The reduction in the spill at the Eagleview Side Channel Weir appears to be largely attributable to the elimination of inflows into the Greeley No. 3 Ditch west of 35th Avenue during the 100-year Proposed Condition event for the Grapevine Basin.

In general, the proposed improvements appear to have reduced flooding in many areas of the basin, specifically along the major drainageway. The proposed improvements are not intended to solve all the flooding problems within the basin. In short, structures that are not elevated above curb level and those with basements that have ingress and egress access at relatively low levels may continue to experience flooding on a relatively frequent basis at any location along the major drainageway.

Table 5.3 Summary of Selected Peak Discharges for the Proposed Condition Scenario.

Location	EPA SWMM Element	Drainage Area (acres)	Distance above the Confluence with the Poudre River (1,000 feet)	Peak Discharge (cfs)				
				2-yr	5-yr	10-yr	50-yr	100-yr
20th Street	1	26	22.3	19	35	46	85	99
Inflow to ACC Detention Pond	403	91	20.0	29	72	104	232	277
Outflow from ACC Detention Pond	303	91	19.8	0	12	23	96	163
Inflow to Country Club West Detention Pond	404	232	18.6	59	131	179	357	424
Outflow from Country Club West Detention Pond	304	232	17.7	6	11	14	20	22
50th Avenue at 10th Street	405	288	16.8	30	51	66	118	135
Inflow to 10th Street and 49th Avenue	406	406	16.1	55	117	156	329	391
Outflow from 10th Street and 49th Avenue	306	406	16.0	55	110	146	274	302
Inflow to Allen Park Detention Pond	410	526	14.9	94	189	247	463	523
Outflow from Allen Park Detention Pond	310	526	13.8	10	32	53	172	236
47th Avenue at 9th Street (surface flows only)	703	621	13.6	0	0	0	89	169
47th Avenue at 6th Street (Epple Park/Dove Creek Channel)	415	732	12.4	71	132	176	354	426
Inflow to Upper Epple Park Detention Pond	416	818	11.6	103	202	273	560	651
Outflow from Upper Epple Park Detention Pond	315	818	10.7	63	95	116	407	524
Inflow to Lower Epple Park Detention Pond	417	875	10.6	88	132	160	461	599
Outflow from Lower Epple Park Detention Pond (4th Street)	317	875	10.5	88	132	160	459	598
B Street	221	875	8.1	83	128	153	448	585
Inflow to South Eagleview Detention Pond	421	1,054	8.0	154	291	372	697	815
Outflow from South Eagleview Detention Pond (Greeley No. 3 Ditch)	321	1,054	7.6	125	222	284	556	685
F Street	425	1,163	5.4	123	253	334	712	836
Inflow to North Eagleview Detention Pond	427	1,304	5.3	184	377	492	999	1,188
Outflow from North Eagleview Detention Pond (Colorado and Southern Railroad)	327	1,304	3.2	0	12	26	83	124
Cache La Poudre River	429	1,552	0	112	255	330	624	729
Inflow to Weber West Western Detention Pond	419	111	[a]	49	105	141	291	348
Outflow from Weber West Western Detention Pond	319	111	[a]	8	11	13	18	23
Inflow to Weber West Eastern Detention Pond	420	133	[a]	45	89	116	233	280
Outflow from Weber West Eastern Detention Pond	320	133	[a]	4	5	7	28	58
Eagleview Side Channel Weir	34	N/A	[b]	0	0	0	25	69

[a] Located on secondary drainage path.

[b] Spills from the Greeley No. 3 Ditch.

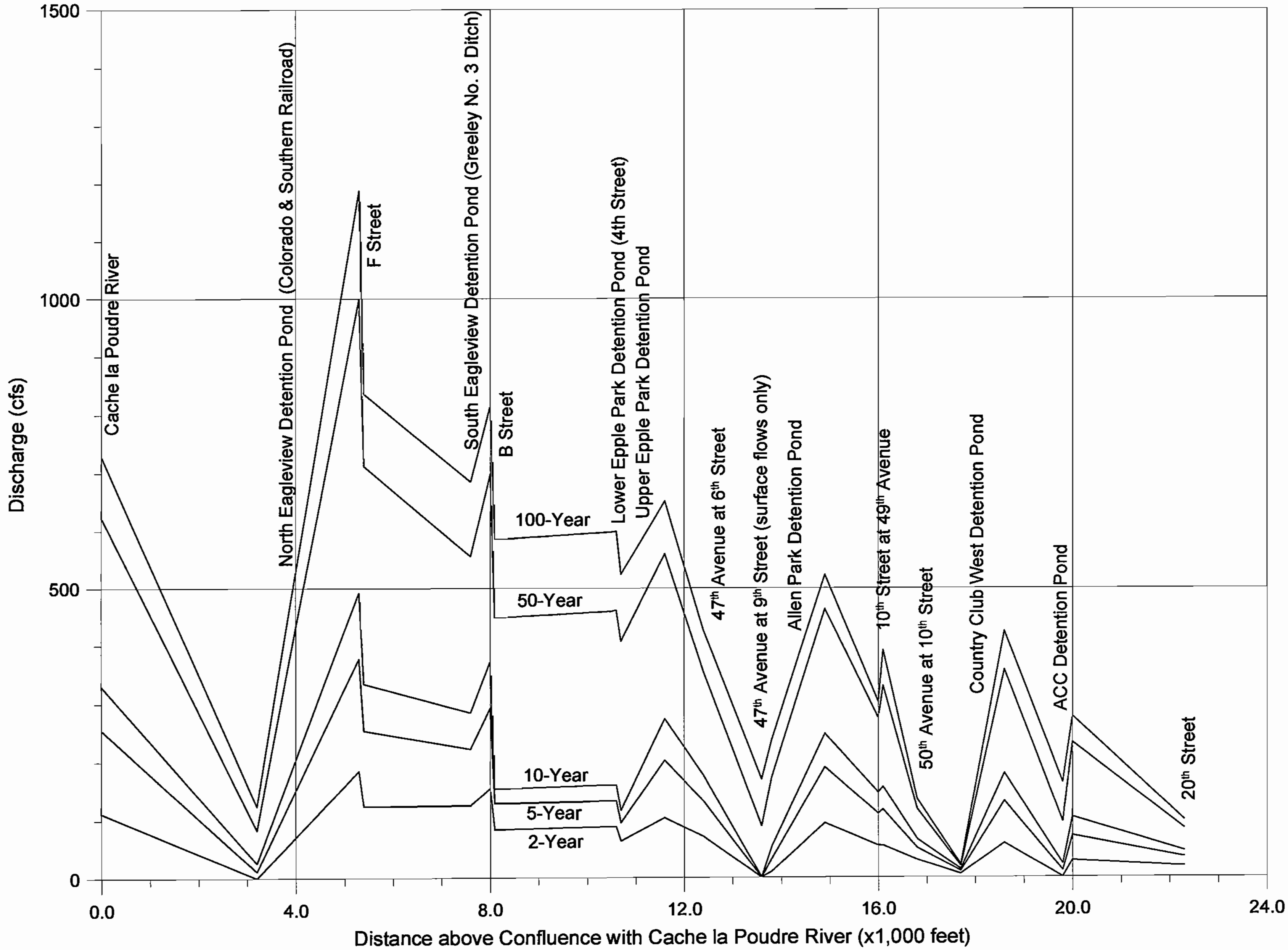

Figure 5.7 Discharge Profiles for the Proposed Condition.

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EXISTING CONDITION
(EXISTING DEVELOPMENT WITH EXISTING FACILITIES)

COUNTRY CLUB BASIN
FILENAME: CCB002EC.SUM
EXISTING CONDITION WITH EXISTING FACILITIES
EPA SWMM SUMMARY OUTPUT FILE
2-YEAR EVENT

SUMMARY OF EPA SWMM ANALYSIS
(See detailed output for more information)

City of Greeley Comprehensive Drainage Plan Update - ACE Inc.
Country Club Basin - Existing Conditions - 2-Year Storm

SUB-BASIN INFLOWS

MO/DA/YR HR:MIN:SEC STEP	1	2	3	4	5	6	7	8	9	10
AVERAGE FLOW.....	1.853	1.015	2.198	5.391	2.582	1.119	1.345	0.721	2.353	4.981
STANDARD DEVIATION OF FLOW.....	0.486	0.282	0.563	1.454	0.659	0.313	0.312	0.211	0.586	1.155
MAXIMUM FLOW.....	18.960	9.560	21.760	59.050	25.440	11.560	9.583	7.234	21.740	40.111
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	3.95E+04	2.16E+04	4.68E+04	1.15E+05	5.50E+04	2.38E+04	2.87E+04	1.54E+04	5.01E+04	1.06E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	19	20	21
AVERAGE FLOW.....	0.626	1.771	1.508	4.476	0.207	4.224	4.234	5.442	5.452	10.721
STANDARD DEVIATION OF FLOW.....	0.194	0.463	0.357	1.113	0.070	1.018	1.014	1.312	1.272	2.740
MAXIMUM FLOW.....	6.890	18.000	11.819	41.690	2.247	36.480	36.226	46.990	44.705	106.660
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.33E+04	3.77E+04	3.21E+04	9.53E+04	4.40E+03	9.00E+04	9.02E+04	1.16E+05	1.16E+05	2.28E+05

MO/DA/YR HR:MIN:SEC STEP	22	23	24	25	26	27	28	29	30	31
AVERAGE FLOW.....	0.000	0.000	0.075	0.173	0.306	12.783	0.824	14.392	1.663	3.270
STANDARD DEVIATION OF FLOW.....	0.000	0.000	0.035	0.074	0.100	2.466	0.243	3.245	0.432	0.865
MAXIMUM FLOW.....	0.000	0.000	1.420	2.962	3.299	74.970	8.349	112.116	16.710	36.180
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	0.00E+00	0.00E+00	1.60E+03	3.68E+03	6.51E+03	2.72E+05	1.76E+04	3.07E+05	3.54E+04	6.96E+04

MO/DA/YR HR:MIN:SEC STEP	32	33	34
AVERAGE FLOW.....	0.000	3.278	0.000
STANDARD DEVIATION OF FLOW.....	0.000	0.871	0.000
MAXIMUM FLOW.....	0.000	36.450	0.000
MINIMUM FLOW.....	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	0.00E+00	6.98E+04	0.00E+00

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	202	602	700	701	400	203	403	303	330	430
AVERAGE FLOW.....	1.856	1.856	1.856	0.000	1.856	1.015	3.213	0.000	0.490	0.490
STANDARD DEVIATION OF FLOW.....	0.465	0.465	0.465	0.000	0.465	0.278	0.821	0.000	0.018	0.018
MAXIMUM FLOW.....	17.278	17.278	17.278	0.000	17.278	9.323	29.013	0.000	0.614	0.614
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	3.95E+04	3.95E+04	3.95E+04	7.15E-05	3.95E+04	2.16E+04	6.84E+04	0.00E+00	1.04E+04	1.04E+04

MO/DA/YR HR:MIN:SEC STEP	204	404	304	331	405	206	406	306	309	409
AVERAGE FLOW.....	0.473	5.864	4.997	1.111	8.690	8.610	11.074	11.072	0.746	11.818
STANDARD DEVIATION OF FLOW.....	0.022	1.439	0.166	0.040	0.672	0.672	1.257	1.254	0.028	1.247
MAXIMUM FLOW.....	0.606	59.050	6.249	1.406	30.218	30.257	50.389	51.273	0.945	51.613
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.01E+04	1.25E+05	1.06E+05	2.37E+04	1.85E+05	1.83E+05	2.36E+05	2.36E+05	1.59E+04	2.52E+05

MO/DA/YR HR:MIN:SEC STEP	210	410	310	308	333	433	411	616	702	703
AVERAGE FLOW.....	11.780	16.761	6.936	0.721	1.737	2.458	10.020	10.020	10.020	0.000
STANDARD DEVIATION OF FLOW.....	1.246	2.374	0.394	0.189	0.067	0.200	0.297	0.297	0.297	0.000
MAXIMUM FLOW.....	49.937	90.048	9.628	5.835	2.360	7.519	12.731	12.731	12.731	0.000
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.51E+05	3.57E+05	1.48E+05	1.54E+04	3.70E+04	5.24E+04	2.13E+05	2.13E+05	2.13E+05	1.14E-03

MO/DA/YR HR:MIN:SEC STEP	211	511	612	704	705	213	613	706	707	214
AVERAGE FLOW.....	9.945	0.000	1.771	1.712	0.059	1.719	3.227	3.227	0.000	3.228
STANDARD DEVIATION OF FLOW.....	0.317	0.000	0.463	0.435	0.046	0.416	0.760	0.760	0.000	0.742
MAXIMUM FLOW.....	12.562	0.000	18.000	15.000	3.000	13.957	24.418	24.418	0.000	23.814
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.12E+05	1.14E-03	3.77E+04	3.65E+04	1.27E+03	3.66E+04	6.87E+04	6.87E+04	7.15E-05	6.88E+04

MO/DA/YR HR:MIN:SEC STEP	414	415	215	416	315	417	317	221	421	321
AVERAGE FLOW.....	7.704	17.650	17.509	21.940	21.937	26.171	26.168	25.937	36.658	36.334
STANDARD DEVIATION OF FLOW.....	1.764	1.824	1.811	2.798	2.285	3.080	3.080	3.048	5.037	4.612
MAXIMUM FLOW.....	59.255	71.144	69.477	102.601	62.772	87.203	87.954	83.427	153.883	124.657
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.64E+05	3.76E+05	3.73E+05	4.67E+05	4.67E+05	5.57E+05	5.57E+05	5.52E+05	7.81E+05	7.74E+05

MO/DA/YR HR:MIN:SEC STEP	225	220	420	320	425	427	327	229	429	219
AVERAGE FLOW.....	35.827	0.000	5.452	2.914	36.000	48.784	0.000	0.000	14.392	0.086
STANDARD DEVIATION OF FLOW.....	4.568	0.000	1.272	0.100	4.579	6.748	0.000	0.000	3.245	0.040
MAXIMUM FLOW.....	123.002	0.000	44.705	3.607	123.002	184.424	0.000	0.000	112.116	1.874
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

COUNTRY CLUB BASIN
FILENAME: CCB005EC.SUM
EXISTING CONDITION WITH EXISTING FACILITIES
EPA SWMM SUMMARY OUTPUT FILE
5-YEAR EVENT

SUMMARY OF EPA SWMM ANALYSIS
(See detailed output for more information)

City of Greeley Comprehensive Drainage Plan Update - ACE Inc.
Country Club Basin - Existing Conditions - 5-Year Storm

SUB-BASIN INFLOWS

MO/DA/YR HR:MIN:SEC STEP	1	2	3	4	5	6	7	8	9	10
AVERAGE FLOW.....	3.346	2.641	4.063	11.339	4.514	2.380	4.805	2.535	4.312	9.554
STANDARD DEVIATION OF FLOW.....	0.890	0.684	1.073	3.158	1.165	0.630	1.101	0.696	1.094	2.276
MAXIMUM FLOW.....	35.190	23.800	41.950	131.390	45.250	23.870	35.867	25.187	40.700	81.664
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	7.13E+04	5.63E+04	8.65E+04	2.42E+05	9.62E+04	5.07E+04	1.02E+05	5.40E+04	9.18E+04	2.03E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	19	20	21
AVERAGE FLOW.....	1.303	3.147	2.787	8.260	1.227	7.818	7.595	10.321	10.234	20.569
STANDARD DEVIATION OF FLOW.....	0.353	0.831	0.667	2.107	0.311	1.935	1.856	2.563	2.453	5.443
MAXIMUM FLOW.....	12.870	32.690	22.737	78.640	9.957	71.359	68.219	94.920	89.133	210.300
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.77E+04	6.70E+04	5.94E+04	1.76E+05	2.61E+04	1.67E+05	1.62E+05	2.20E+05	2.18E+05	4.38E+05

MO/DA/YR HR:MIN:SEC STEP	22	23	24	25	26	27	28	29	30	31
AVERAGE FLOW.....	0.000	0.000	7.032	6.168	2.892	22.930	5.410	31.057	3.164	4.978
STANDARD DEVIATION OF FLOW.....	0.000	0.000	1.167	1.796	0.815	4.500	1.503	7.237	0.840	1.293
MAXIMUM FLOW.....	0.000	0.000	32.460	66.246	28.410	137.540	53.452	254.762	33.250	54.140
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	0.00E+00	0.00E+00	1.50E+05	1.31E+05	6.16E+04	4.88E+05	1.15E+05	6.62E+05	6.74E+04	1.06E+05

MO/DA/YR HR:MIN:SEC STEP	32	33	34
AVERAGE FLOW.....	0.000	5.109	0.000
STANDARD DEVIATION OF FLOW.....	0.000	1.343	0.000
MAXIMUM FLOW.....	0.000	56.530	0.000
MINIMUM FLOW.....	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	0.00E+00	1.09E+05	0.00E+00

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	202	602	700	701	400	203	403	303	330	430
AVERAGE FLOW.....	3.353	3.353	2.771	0.581	2.771	3.222	7.285	3.056	0.934	3.991
STANDARD DEVIATION OF FLOW.....	0.860	0.860	0.626	0.302	0.626	0.918	1.932	0.471	0.035	0.486
MAXIMUM FLOW.....	33.332	33.332	18.000	15.332	18.000	37.307	71.511	11.524	1.162	12.588
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	7.14E+04	7.14E+04	5.90E+04	1.24E+04	5.90E+04	6.86E+04	1.55E+05	6.51E+04	1.99E+04	8.50E+04

MO/DA/YR HR:MIN:SEC STEP	204	404	304	331	405	206	406	306	309	409
AVERAGE FLOW.....	3.957	15.296	9.114	1.691	15.320	15.197	22.383	22.378	1.369	23.747
STANDARD DEVIATION OF FLOW.....	0.486	3.135	0.303	0.061	1.099	1.102	2.756	2.735	0.052	2.723
MAXIMUM FLOW.....	12.571	131.393	11.263	2.130	51.211	52.030	110.174	103.791	1.723	104.631
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	8.43E+04	3.26E+05	1.94E+05	3.60E+04	3.26E+05	3.24E+05	4.77E+05	4.77E+05	2.92E+04	5.06E+05

MO/DA/YR HR:MIN:SEC STEP	210	410	310	308	333	433	411	616	702	703
AVERAGE FLOW.....	23.689	33.243	19.541	2.535	2.709	5.244	26.088	26.088	26.088	0.000
STANDARD DEVIATION OF FLOW.....	2.723	4.940	1.001	0.623	0.105	0.636	1.096	1.096	1.096	0.000
MAXIMUM FLOW.....	105.104	182.772	30.351	19.263	3.656	21.884	40.211	40.211	40.211	0.000
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	5.05E+05	7.08E+05	4.16E+05	5.40E+04	5.77E+04	1.12E+05	5.56E+05	5.56E+05	5.56E+05	1.14E-03

MO/DA/YR HR:MIN:SEC STEP	211	511	612	704	705	213	613	706	707	214
AVERAGE FLOW.....	25.963	0.000	3.147	2.414	0.734	2.425	5.212	5.212	0.000	5.215
STANDARD DEVIATION OF FLOW.....	1.123	0.000	0.831	0.540	0.362	0.523	1.170	1.170	0.000	1.147
MAXIMUM FLOW.....	40.159	0.000	32.690	15.000	17.690	14.912	35.926	35.926	0.000	33.647
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	5.53E+05	1.14E-03	6.70E+04	5.14E+04	1.56E+04	5.17E+04	1.11E+05	1.11E+05	1.75E-07	1.11E+05

MO/DA/YR HR:MIN:SEC STEP	414	415	215	416	315	417	317	221	421	321
AVERAGE FLOW.....	13.475	39.438	39.163	48.207	48.071	55.666	55.656	55.160	75.729	75.040
STANDARD DEVIATION OF FLOW.....	3.105	3.620	3.608	5.607	3.651	4.730	4.731	4.723	8.415	7.595
MAXIMUM FLOW.....	104.655	132.124	130.973	202.334	94.707	132.144	131.723	128.338	291.058	222.373
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.87E+05	8.40E+05	8.34E+05	1.03E+06	1.02E+06	1.19E+06	1.19E+06	1.17E+06	1.61E+06	1.60E+06

MO/DA/YR HR:MIN:SEC STEP	225	220	420	320	425	427	327	229	429	219
AVERAGE FLOW.....	74.193	0.000	10.234	4.437	80.360	103.290	5.898	4.991	36.049	0.787
STANDARD DEVIATION OF FLOW.....	7.566	0.000	2.453	0.152	8.468	12.647	0.591	0.583	6.945	0.311
MAXIMUM FLOW.....	219.654	0.000	89.133	5.405	252.794	376.982	11.948	11.682	254.762	13.240
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

COUNTRY CLUB BASIN
FILENAME: CCB010EC.SUM
EXISTING CONDITION WITH EXISTING FACILITIES
EPA SWMM SUMMARY OUTPUT FILE
10-YEAR EVENT

SUMMARY OF EPA SWMM ANALYSIS
(See detailed output for more information)

City of Greeley Comprehensive Drainage Plan Update - ACE Inc.
Country Club Basin - Existing Conditions - 10-Year Storm

SUB-BASIN INFLOWS

MO/DA/YR HR:MIN:SEC STEP	1	2	3	4	5	6	7	8	9	10
AVERAGE FLOW.....	4.423	3.915	5.447	15.934	5.859	3.275	8.159	4.296	5.761	13.015
STANDARD DEVIATION OF FLOW.....	1.153	0.972	1.411	4.322	1.490	0.844	1.771	1.139	1.435	3.042
MAXIMUM FLOW.....	46.130	33.420	55.840	178.580	58.960	32.000	54.921	40.085	54.390	106.419
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	9.42E+04	8.34E+04	1.16E+05	3.39E+05	1.25E+05	6.98E+04	1.74E+05	9.15E+04	1.23E+05	2.77E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	19	20	21
AVERAGE FLOW.....	1.800	4.129	3.721	11.026	2.097	10.431	10.008	13.937	13.821	27.885
STANDARD DEVIATION OF FLOW.....	0.455	1.068	0.872	2.765	0.498	2.547	2.406	3.401	3.258	7.249
MAXIMUM FLOW.....	16.730	42.590	29.290	105.870	14.954	92.880	86.542	123.770	115.519	287.840
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	3.83E+04	8.80E+04	7.93E+04	2.35E+05	4.47E+04	2.22E+05	2.13E+05	2.97E+05	2.94E+05	5.94E+05

MO/DA/YR HR:MIN:SEC STEP	22	23	24	25	26	27	28	29	30	31
AVERAGE FLOW.....	0.000	0.089	12.280	10.611	4.772	29.473	8.726	42.246	4.258	6.065
STANDARD DEVIATION OF FLOW.....	0.000	0.047	1.930	2.814	1.228	5.662	2.230	9.513	1.113	1.556
MAXIMUM FLOW.....	0.000	2.075	50.310	97.765	40.677	170.150	75.600	330.419	44.180	65.400
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	0.00E+00	1.89E+03	2.62E+05	2.26E+05	1.02E+05	6.28E+05	1.86E+05	9.00E+05	9.07E+04	1.29E+05

MO/DA/YR HR:MIN:SEC STEP	32	33	34
AVERAGE FLOW.....	0.000	6.289	0.000
STANDARD DEVIATION OF FLOW.....	0.000	1.626	0.000
MAXIMUM FLOW.....	0.000	68.740	0.000
MINIMUM FLOW.....	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	0.00E+00	1.34E+05	0.00E+00

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	202	602	700	701	400	203	403	303	330	430
AVERAGE FLOW.....	4.431	4.431	3.265	1.166	3.265	5.081	10.529	6.296	1.256	7.552
STANDARD DEVIATION OF FLOW.....	1.121	1.121	0.680	0.545	0.680	1.424	2.757	0.956	0.047	0.973
MAXIMUM FLOW.....	44.172	44.172	18.000	26.172	18.000	54.879	104.040	23.295	1.565	24.685
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	9.44E+04	9.44E+04	6.95E+04	2.48E+04	6.95E+04	1.08E+05	2.24E+05	1.34E+05	2.67E+04	1.61E+05

MO/DA/YR HR:MIN:SEC STEP	204	404	304	331	405	206	406	306	309	409
AVERAGE FLOW.....	7.510	23.444	11.746	2.057	19.663	19.510	30.945	30.938	1.825	32.763
STANDARD DEVIATION OF FLOW.....	0.971	4.435	0.379	0.074	1.367	1.371	3.882	3.835	0.070	3.818
MAXIMUM FLOW.....	24.641	178.590	13.620	2.597	65.899	64.276	148.024	139.139	2.296	140.239
MINIMUM FLOW.....	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.60E+05	4.99E+05	2.50E+05	4.38E+04	4.19E+05	4.16E+05	6.59E+05	6.59E+05	3.89E+04	6.98E+05

MO/DA/YR HR:MIN:SEC STEP	210	410	310	308	333	433	411	616	702	703
AVERAGE FLOW.....	32.689	45.705	29.881	4.296	3.329	7.625	39.306	39.306	39.306	0.000
STANDARD DEVIATION OF FLOW.....	3.818	6.775	1.744	1.022	0.129	1.033	2.081	2.081	2.081	0.000
MAXIMUM FLOW.....	141.118	241.631	51.313	31.550	4.506	34.715	66.503	66.503	66.503	0.000
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	6.96E+05	9.74E+05	6.36E+05	9.15E+04	7.09E+04	1.62E+05	8.37E+05	8.37E+05	8.37E+05	3.43E-03

MO/DA/YR HR:MIN:SEC STEP	211	511	612	704	705	213	613	706	707	214
AVERAGE FLOW.....	39.158	0.000	4.129	2.837	1.292	2.849	6.570	6.570	0.000	6.573
STANDARD DEVIATION OF FLOW.....	2.108	0.000	1.068	0.586	0.584	0.571	1.413	1.413	0.000	1.384
MAXIMUM FLOW.....	66.461	0.000	42.590	15.000	27.590	15.128	42.545	42.545	0.000	38.513
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	8.34E+05	3.43E-03	8.80E+04	6.04E+04	2.75E+04	6.07E+04	1.40E+05	1.40E+05	5.72E-04	1.40E+05

MO/DA/YR HR:MIN:SEC STEP	414	415	215	416	315	417	317	221	421	321
AVERAGE FLOW.....	17.599	56.757	56.429	68.956	68.700	78.708	78.695	78.061	105.946	105.067
STANDARD DEVIATION OF FLOW.....	3.953	5.146	5.134	7.777	4.339	5.460	5.462	5.476	10.257	9.142
MAXIMUM FLOW.....	134.214	175.961	172.747	273.251	115.527	159.401	160.294	152.560	371.617	284.403
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.000
FLOW VOLUME (CUBIC FEET).....	3.75E+05	1.21E+06	1.20E+06	1.47E+06	1.46E+06	1.68E+06	1.68E+06	1.66E+06	2.26E+06	2.24E+06

MO/DA/YR HR:MIN:SEC STEP	225	220	420	320	425	427	327	229	429	219
AVERAGE FLOW.....	104.066	0.000	13.821	5.491	114.677	144.149	14.490	12.851	55.097	1.367
STANDARD DEVIATION OF FLOW.....	9.124	0.000	3.258	0.191	10.708	16.022	1.227	1.253	8.757	0.517
MAXIMUM FLOW.....	281.165	0.000	115.519	6.676	333.938	491.769	25.542	25.333	330.419	21.222
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000

COUNTRY CLUB BASIN
FILENAME: CCB050EC.SUM
EXISTING CONDITION WITH EXISTING FACILITIES
EPA SWMM SUMMARY OUTPUT FILE
50-YEAR EVENT

SUMMARY OF EPA SWMM ANALYSIS
(See detailed output for more information)

City of Greeley Comprehensive Drainage Plan Update - ACE Inc.
Country Club Basin - Existing Conditions - 50-Year Storm

SUB-BASIN INFLOWS

MO/DA/YR HR:MIN:SEC STEP	1	2	3	4	5	6	7	8	9	10
AVERAGE FLOW.....	7.938	8.391	10.073	31.769	10.274	6.317	21.585	12.457	10.674	25.004
STANDARD DEVIATION OF FLOW.....	2.222	2.200	2.794	9.225	2.794	1.741	4.844	3.310	2.868	6.294
MAXIMUM FLOW.....	85.237	71.874	106.004	357.147	106.959	62.623	142.240	108.804	105.062	213.503
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.69E+05	1.79E+05	2.15E+05	6.77E+05	2.19E+05	1.35E+05	4.60E+05	2.65E+05	2.27E+05	5.33E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	19	20	21
AVERAGE FLOW.....	3.247	7.305	6.826	20.266	5.463	19.250	17.941	26.153	26.180	52.744
STANDARD DEVIATION OF FLOW.....	0.881	2.028	1.709	5.454	1.298	5.041	4.637	6.847	6.647	14.698
MAXIMUM FLOW.....	30.844	77.713	55.883	203.274	37.174	179.792	163.440	243.831	228.281	569.401
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	6.92E+04	1.56E+05	1.45E+05	4.32E+05	1.16E+05	4.10E+05	3.82E+05	5.57E+05	5.58E+05	1.12E+06

MO/DA/YR HR:MIN:SEC STEP	22	23	24	25	26	27	28	29	30	31
AVERAGE FLOW.....	2.119	2.551	30.239	25.776	11.043	49.160	19.620	76.842	8.008	9.446
STANDARD DEVIATION OF FLOW.....	0.605	0.735	4.823	6.959	2.900	10.075	5.182	18.472	2.238	2.565
MAXIMUM FLOW.....	20.509	24.923	126.117	231.219	93.127	303.195	169.905	623.766	84.343	103.981
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	4.51E+04	5.43E+04	6.44E+05	5.49E+05	2.35E+05	1.05E+06	4.18E+05	1.64E+06	1.71E+05	2.01E+05

MO/DA/YR HR:MIN:SEC STEP	32	33	34
AVERAGE FLOW.....	3.085	9.827	11.970
STANDARD DEVIATION OF FLOW.....	0.950	2.689	2.857
MAXIMUM FLOW.....	34.556	109.363	93.330
MINIMUM FLOW.....	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	6.57E+04	2.09E+05	2.55E+05

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	202	602	700	701	400	203	403	303	330	430
AVERAGE FLOW.....	7.939	7.939	3.825	4.114	3.825	12.505	22.578	18.331	2.356	20.687
STANDARD DEVIATION OF FLOW.....	2.178	2.178	0.770	1.569	0.770	3.642	6.310	2.946	0.093	2.976
MAXIMUM FLOW.....	82.311	82.311	18.000	64.311	18.000	135.155	231.770	95.552	2.940	98.114
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.69E+05	1.69E+05	8.15E+04	8.76E+04	8.15E+04	2.66E+05	4.81E+05	3.90E+05	5.02E+04	4.41E+05

MO/DA/YR HR:MIN:SEC STEP	204	404	304	331	405	206	406	306	309	409
AVERAGE FLOW.....	20.623	52.392	17.417	3.210	30.900	30.698	58.599	58.589	3.609	62.198
STANDARD DEVIATION OF FLOW.....	2.964	10.131	0.606	0.122	2.591	2.590	8.961	8.575	0.186	8.568
MAXIMUM FLOW.....	95.299	357.214	19.868	4.044	117.770	114.191	314.207	267.686	7.028	270.364
MINIMUM FLOW.....	0.000	0.057	0.002	0.000	0.025	0.000	0.014	0.013	0.000	0.013
FLOW VOLUME (CUBIC FEET).....	4.39E+05	1.12E+06	3.71E+05	6.84E+04	6.58E+05	6.54E+05	1.25E+06	1.25E+06	7.69E+04	1.32E+06

MO/DA/YR HR:MIN:SEC STEP	210	410	310	308	333	433	411	616	702	703
AVERAGE FLOW.....	62.094	87.098	67.890	12.457	5.209	17.666	88.803	88.803	80.044	8.759
STANDARD DEVIATION OF FLOW.....	8.569	14.534	5.685	2.935	0.214	2.978	7.629	7.629	5.766	2.538
MAXIMUM FLOW.....	270.364	453.044	166.466	77.943	7.053	83.864	236.109	236.109	153.000	83.109
MINIMUM FLOW.....	0.000	0.028	0.000	0.000	0.000	0.001	0.009	0.009	0.009	0.000
FLOW VOLUME (CUBIC FEET).....	1.32E+06	1.86E+06	1.45E+06	2.65E+05	1.11E+05	3.76E+05	1.89E+06	1.89E+06	1.70E+06	1.87E+05

MO/DA/YR HR:MIN:SEC STEP	211	511	612	704	705	213	613	706	707	214
AVERAGE FLOW.....	79.843	8.759	7.305	3.283	4.022	3.287	10.114	9.558	0.556	9.558
STANDARD DEVIATION OF FLOW.....	5.791	2.526	2.028	0.654	1.523	0.641	2.294	2.103	0.300	2.061
MAXIMUM FLOW.....	154.240	80.865	77.713	15.000	62.713	14.999	70.101	56.000	14.101	55.757
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.70E+06	1.87E+05	1.56E+05	6.99E+04	8.57E+04	7.00E+04	2.15E+05	2.04E+05	1.18E+04	2.04E+05

MO/DA/YR HR:MIN:SEC STEP	414	415	215	416	315	417	317	221	421	321
AVERAGE FLOW.....	29.824	118.425	117.971	142.684	141.149	159.090	159.062	157.582	210.325	208.206
STANDARD DEVIATION OF FLOW.....	7.224	12.642	12.628	17.844	12.073	13.872	13.868	13.877	22.049	20.367
MAXIMUM FLOW.....	241.556	353.008	351.462	558.998	402.468	457.163	454.890	443.930	697.467	555.523
MINIMUM FLOW.....	0.000	0.034	0.003	0.032	0.031	0.056	0.052	0.000	0.082	0.014
FLOW VOLUME (CUBIC FEET).....	6.35E+05	2.52E+06	2.51E+06	3.04E+06	3.01E+06	3.39E+06	3.39E+06	3.36E+06	4.48E+06	4.43E+06

MO/DA/YR HR:MIN:SEC STEP	225	220	420	320	425	427	327	229	429	219
AVERAGE FLOW.....	218.316	0.648	26.828	11.491	244.092	293.252	57.977	53.876	130.718	4.070
STANDARD DEVIATION OF FLOW.....	22.816	0.254	6.841	0.830	26.781	36.188	3.978	4.201	15.761	1.402
MAXIMUM FLOW.....	629.518	10.845	233.351	28.047	773.642	1058.707	87.195	86.996	623.766	52.930
MINIMUM FLOW.....	0.000	0.000	0.000	0.001	0.000	0.012	0.000	0.000	0.048	0.000

COUNTRY CLUB BASIN
FILENAME: CCB100EC.SUM
EXISTING CONDITION WITH EXISTING FACILITIES
EPA SWMM SUMMARY OUTPUT FILE
100-YEAR EVENT

SUMMARY OF EPA SWMM ANALYSIS
(See detailed output for more information)

City of Greeley Comprehensive Drainage Plan Update - ACE Inc.
Country Club Basin - Existing Conditions - 100-Year Storm

SUB-BASIN INFLOWS

MO/DA/YR HR:MIN:SEC STEP	1	2	3	4	5	6	7	8	9	10
AVERAGE FLOW.....	9.340	10.248	11.902	38.242	12.010	7.529	27.225	15.996	12.639	29.836
STANDARD DEVIATION OF FLOW.....	2.642	2.688	3.342	11.110	3.312	2.096	6.086	4.193	3.438	7.595
MAXIMUM FLOW.....	99.181	85.475	123.750	423.733	123.338	73.703	175.340	133.277	122.367	252.968
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.99E+05	2.18E+05	2.54E+05	8.15E+05	2.56E+05	1.60E+05	5.80E+05	3.41E+05	2.69E+05	6.36E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	19	20	21
AVERAGE FLOW.....	3.830	8.565	8.065	23.938	6.886	22.776	21.097	31.063	31.142	62.758
STANDARD DEVIATION OF FLOW.....	1.049	2.407	2.048	6.522	1.621	6.036	5.529	8.219	8.002	17.625
MAXIMUM FLOW.....	36.019	90.154	65.534	235.196	44.971	207.854	190.773	283.109	270.411	660.954
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	8.16E+04	1.82E+05	1.72E+05	5.10E+05	1.47E+05	4.85E+05	4.49E+05	6.62E+05	6.63E+05	1.34E+06

MO/DA/YR HR:MIN:SEC STEP	22	23	24	25	26	27	28	29	30	31
AVERAGE FLOW.....	3.302	3.881	37.929	32.282	13.717	56.846	24.232	90.795	9.514	10.738
STANDARD DEVIATION OF FLOW.....	0.894	1.058	6.041	8.621	3.575	11.882	6.368	22.098	2.680	2.969
MAXIMUM FLOW.....	28.369	33.683	154.732	279.358	111.707	353.283	203.517	728.759	99.080	119.582
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	7.03E+04	8.27E+04	8.08E+05	6.88E+05	2.92E+05	1.21E+06	5.16E+05	1.93E+06	2.03E+05	2.29E+05

MO/DA/YR HR:MIN:SEC STEP	32	33	34
AVERAGE FLOW.....	4.844	11.177	24.723
STANDARD DEVIATION OF FLOW.....	1.409	3.112	5.526
MAXIMUM FLOW.....	48.347	125.496	154.292
MINIMUM FLOW.....	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.03E+05	2.38E+05	5.27E+05

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	202	602	700	701	400	203	403	303	330	430
AVERAGE FLOW.....	9.343	9.343	3.858	5.485	3.858	15.733	27.635	23.387	2.801	26.189
STANDARD DEVIATION OF FLOW.....	2.597	2.597	0.786	1.970	0.786	4.527	7.734	4.427	0.112	4.453
MAXIMUM FLOW.....	96.410	96.410	18.000	78.410	18.000	162.451	276.961	162.591	3.500	165.450
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.99E+05	1.99E+05	8.22E+04	1.17E+05	8.22E+04	3.35E+05	5.89E+05	4.98E+05	5.97E+04	5.58E+05

MO/DA/YR HR:MIN:SEC STEP	204	404	304	331	405	206	406	306	309	409
AVERAGE FLOW.....	26.118	64.359	18.894	3.655	34.559	34.345	69.098	69.086	5.553	74.638
STANDARD DEVIATION OF FLOW.....	4.418	13.025	0.660	0.140	3.095	3.092	11.017	10.352	0.711	10.708
MAXIMUM FLOW.....	166.164	423.812	21.539	4.600	135.162	132.649	374.099	295.019	28.363	299.281
MINIMUM FLOW.....	0.000	0.031	0.001	0.000	0.014	0.000	0.007	0.007	0.000	0.007
FLOW VOLUME (CUBIC FEET).....	5.56E+05	1.37E+06	4.02E+05	7.78E+04	7.36E+05	7.32E+05	1.47E+06	1.47E+06	1.18E+05	1.59E+06

MO/DA/YR HR:MIN:SEC STEP	210	410	310	308	333	433	411	616	702	703
AVERAGE FLOW.....	74.529	104.365	84.414	15.996	5.934	21.930	110.173	110.173	87.119	23.054
STANDARD DEVIATION OF FLOW.....	10.709	17.729	7.912	3.601	0.248	3.666	10.569	10.569	5.925	5.709
MAXIMUM FLOW.....	298.863	517.501	230.593	87.890	8.099	95.087	316.245	316.245	153.000	163.245
MINIMUM FLOW.....	0.000	0.016	0.000	0.000	0.000	0.000	0.005	0.005	0.005	0.000
FLOW VOLUME (CUBIC FEET).....	1.59E+06	2.22E+06	1.80E+06	3.41E+05	1.26E+05	4.67E+05	2.35E+06	2.35E+06	1.86E+06	4.91E+05

MO/DA/YR HR:MIN:SEC STEP	211	511	612	704	705	213	613	706	707	214
AVERAGE FLOW.....	86.904	23.054	8.565	3.284	5.282	3.291	11.357	10.144	1.213	10.144
STANDARD DEVIATION OF FLOW.....	5.953	5.698	2.407	0.665	1.886	0.651	2.638	2.245	0.555	2.200
MAXIMUM FLOW.....	154.925	163.173	90.154	15.000	75.154	15.155	79.940	56.000	23.940	55.993
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.85E+06	4.91E+05	1.82E+05	6.99E+04	1.12E+05	7.01E+04	2.42E+05	2.16E+05	2.58E+04	2.16E+05

MO/DA/YR HR:MIN:SEC STEP	414	415	215	416	315	417	317	221	421	321
AVERAGE FLOW.....	34.082	144.040	143.553	173.216	170.561	191.658	191.626	189.949	252.708	250.294
STANDARD DEVIATION OF FLOW.....	8.405	15.970	15.955	22.056	16.600	18.892	18.874	18.832	28.122	26.240
MAXIMUM FLOW.....	278.122	421.026	420.551	650.708	520.260	595.318	595.023	582.083	815.420	683.067
MINIMUM FLOW.....	0.000	0.019	0.001	0.017	0.017	0.030	0.028	0.000	0.045	0.008
FLOW VOLUME (CUBIC FEET).....	7.26E+05	3.07E+06	3.06E+06	3.69E+06	3.63E+06	4.08E+06	4.08E+06	4.05E+06	5.38E+06	5.33E+06

MO/DA/YR HR:MIN:SEC STEP	225	220	420	320	425	427	327	229	429	219
AVERAGE FLOW.....	273.003	1.329	32.471	16.847	305.285	362.131	92.437	87.082	177.877	5.339
STANDARD DEVIATION OF FLOW.....	31.273	0.483	8.386	1.868	36.111	47.056	6.164	6.550	17.899	1.761
MAXIMUM FLOW.....	816.501	18.855	279.540	57.875	977.226	1313.323	132.860	132.661	728.759	65.226
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.026	0.000

FUTURE CONDITION
(FUTURE DEVELOPMENT WITH EXISTING FACILITIES)

COUNTRY CLUB BASIN
FILENAME: CCB002FC.SUM
FUTURE CONDITION WITH EXISTING FACILITIES
EPA SWMM SUMMARY OUTPUT FILE
2-YEAR EVENT

SUMMARY OF EPA SWMM ANALYSIS
(See detailed output for more information)

City of Greeley Comprehensive Drainage Plan Update - ACE Inc.
Country Club Basin - Future Conditions - 2-Year Storm

SUB-BASIN INFLOWS

MO/DA/YR HR:MIN:SEC STEP	1	2	3	4	5	6	7	8	9	10
AVERAGE FLOW.....	1.853	1.015	2.198	5.391	2.582	1.119	1.885	0.721	2.353	4.981
STANDARD DEVIATION OF FLOW.....	0.486	0.282	0.563	1.454	0.659	0.313	0.435	0.211	0.586	1.155
MAXIMUM FLOW.....	18.960	9.560	21.760	59.050	25.440	11.560	13.672	7.234	21.740	40.111
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	3.95E+04	2.16E+04	4.68E+04	1.15E+05	5.50E+04	2.38E+04	4.02E+04	1.54E+04	5.01E+04	1.06E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	19	20	21
AVERAGE FLOW.....	0.626	1.771	1.508	4.476	0.207	4.224	4.234	5.442	5.452	10.721
STANDARD DEVIATION OF FLOW.....	0.194	0.463	0.357	1.113	0.070	1.018	1.014	1.312	1.272	2.740
MAXIMUM FLOW.....	6.890	18.000	11.819	41.690	2.247	36.480	36.226	46.990	44.705	106.660
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.33E+04	3.77E+04	3.21E+04	9.53E+04	4.40E+03	9.00E+04	9.02E+04	1.16E+05	1.16E+05	2.28E+05

MO/DA/YR HR:MIN:SEC STEP	22	23	24	25	26	27	28	29	30	31
AVERAGE FLOW.....	0.057	0.090	0.075	0.173	0.306	12.783	0.824	14.392	1.663	3.270
STANDARD DEVIATION OF FLOW.....	0.031	0.043	0.035	0.074	0.100	2.466	0.243	3.245	0.432	0.865
MAXIMUM FLOW.....	1.460	1.750	1.420	2.962	3.299	74.970	8.349	112.116	16.710	36.180
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.21E+03	1.91E+03	1.60E+03	3.68E+03	6.51E+03	2.72E+05	1.76E+04	3.07E+05	3.54E+04	6.96E+04

MO/DA/YR HR:MIN:SEC STEP	32	33	34
AVERAGE FLOW.....	0.178	3.278	0.000
STANDARD DEVIATION OF FLOW.....	0.068	0.871	0.000
MAXIMUM FLOW.....	2.540	36.450	0.000
MINIMUM FLOW.....	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	3.78E+03	6.98E+04	0.00E+00

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	202	602	700	701	400	203	403	303	330	430
AVERAGE FLOW.....	1.856	1.856	1.856	0.000	1.856	1.015	3.213	0.000	0.490	0.490
STANDARD DEVIATION OF FLOW.....	0.465	0.465	0.465	0.000	0.465	0.278	0.821	0.000	0.018	0.018
MAXIMUM FLOW.....	17.278	17.278	17.278	0.000	17.278	9.323	29.013	0.000	0.614	0.614
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	3.95E+04	3.95E+04	3.95E+04	7.15E-05	3.95E+04	2.16E+04	6.84E+04	0.00E+00	1.04E+04	1.04E+04

MO/DA/YR HR:MIN:SEC STEP	204	404	304	331	405	206	406	306	309	409
AVERAGE FLOW.....	0.473	5.864	4.997	1.111	8.690	8.610	11.615	11.612	0.746	12.358
STANDARD DEVIATION OF FLOW.....	0.022	1.439	0.166	0.040	0.672	0.672	1.380	1.376	0.028	1.369
MAXIMUM FLOW.....	0.606	59.050	6.249	1.406	30.218	30.257	54.477	55.419	0.945	55.759
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.01E+04	1.25E+05	1.06E+05	2.37E+04	1.85E+05	1.83E+05	2.47E+05	2.47E+05	1.59E+04	2.63E+05

MO/DA/YR HR:MIN:SEC STEP	210	410	310	308	333	433	411	616	702	703
AVERAGE FLOW.....	12.320	17.301	7.390	0.721	1.737	2.458	10.473	10.473	10.473	0.000
STANDARD DEVIATION OF FLOW.....	1.368	2.497	0.412	0.189	0.067	0.200	0.315	0.315	0.315	0.000
MAXIMUM FLOW.....	54.213	94.325	10.391	5.835	2.360	7.519	12.731	12.731	12.731	0.000
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.62E+05	3.69E+05	1.57E+05	1.54E+04	3.70E+04	5.24E+04	2.23E+05	2.23E+05	2.23E+05	1.72E-03

MO/DA/YR HR:MIN:SEC STEP	211	511	612	704	705	213	613	706	707	214
AVERAGE FLOW.....	10.398	0.000	1.771	1.712	0.059	1.719	3.227	3.227	0.000	3.228
STANDARD DEVIATION OF FLOW.....	0.336	0.000	0.463	0.435	0.046	0.416	0.760	0.760	0.000	0.742
MAXIMUM FLOW.....	12.720	0.000	18.000	15.000	3.000	13.957	24.418	24.418	0.000	23.814
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.21E+05	1.72E-03	3.77E+04	3.65E+04	1.27E+03	3.66E+04	6.87E+04	6.87E+04	7.15E-05	6.88E+04

MO/DA/YR HR:MIN:SEC STEP	414	415	215	416	315	417	317	221	421	321
AVERAGE FLOW.....	7.704	18.102	17.958	22.389	22.387	26.621	26.616	26.381	37.102	36.769
STANDARD DEVIATION OF FLOW.....	1.764	1.820	1.808	2.791	2.281	3.071	3.071	3.041	5.023	4.598
MAXIMUM FLOW.....	59.255	71.144	69.477	102.601	62.799	87.203	87.954	83.427	153.883	124.657
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.64E+05	3.86E+05	3.83E+05	4.77E+05	4.77E+05	5.67E+05	5.67E+05	5.62E+05	7.90E+05	7.83E+05

MO/DA/YR HR:MIN:SEC STEP	225	220	420	320	425	427	327	229	429	219
AVERAGE FLOW.....	36.253	0.000	5.452	2.914	36.426	49.209	0.000	0.000	14.392	0.086
STANDARD DEVIATION OF FLOW.....	4.556	0.000	1.272	0.100	4.566	6.732	0.000	0.000	3.245	0.040
MAXIMUM FLOW.....	123.002	0.000	44.705	3.607	123.002	184.424	0.000	0.000	112.116	1.874
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

COUNTRY CLUB BASIN
FILENAME: CCB005FC.SUM
FUTURE CONDITION WITH EXISTING FACILITIES
EPA SWMM SUMMARY OUTPUT FILE
5-YEAR EVENT

SUMMARY OF EPA SWMM ANALYSIS
(See detailed output for more information)

City of Greeley Comprehensive Drainage Plan Update - ACE Inc.
Country Club Basin - Future Conditions - 5-Year Storm

SUB-BASIN INFLOWS

MO/DA/YR HR:MIN:SEC STEP	1	2	3	4	5	6	7	8	9	10
AVERAGE FLOW.....	3.346	2.641	4.063	11.339	4.514	2.380	5.605	2.535	4.312	9.554
STANDARD DEVIATION OF FLOW.....	0.890	0.684	1.073	3.158	1.165	0.630	1.290	0.696	1.094	2.276
MAXIMUM FLOW.....	35.190	23.800	41.950	131.390	45.250	23.870	42.877	25.187	40.700	81.664
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	7.13E+04	5.63E+04	8.65E+04	2.42E+05	9.62E+04	5.07E+04	1.19E+05	5.40E+04	9.18E+04	2.03E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	19	20	21
AVERAGE FLOW.....	1.303	3.147	2.787	8.260	1.227	7.818	7.595	10.321	10.234	20.569
STANDARD DEVIATION OF FLOW.....	0.353	0.831	0.667	2.107	0.311	1.935	1.856	2.563	2.453	5.443
MAXIMUM FLOW.....	12.870	32.690	22.737	78.640	9.957	71.359	68.219	94.920	89.133	210.300
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.77E+04	6.70E+04	5.94E+04	1.76E+05	2.61E+04	1.67E+05	1.62E+05	2.20E+05	2.18E+05	4.38E+05

MO/DA/YR HR:MIN:SEC STEP	22	23	24	25	26	27	28	29	30	31
AVERAGE FLOW.....	0.350	0.430	7.032	6.168	2.892	22.930	5.410	31.057	3.164	4.978
STANDARD DEVIATION OF FLOW.....	0.099	0.117	1.167	1.796	0.815	4.500	1.503	7.237	0.840	1.293
MAXIMUM FLOW.....	3.180	3.710	32.460	66.246	28.410	137.540	53.452	254.762	33.250	54.140
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	7.45E+03	9.16E+03	1.50E+05	1.31E+05	6.16E+04	4.88E+05	1.15E+05	6.62E+05	6.74E+04	1.06E+05

MO/DA/YR HR:MIN:SEC STEP	32	33	34
AVERAGE FLOW.....	0.578	5.109	0.000
STANDARD DEVIATION OF FLOW.....	0.164	1.343	0.000
MAXIMUM FLOW.....	5.710	56.530	0.000
MINIMUM FLOW.....	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.23E+04	1.09E+05	0.00E+00

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	202	602	700	701	400	203	403	303	330	430
AVERAGE FLOW.....	3.353	3.353	2.771	0.581	2.771	3.222	7.285	3.056	0.934	3.991
STANDARD DEVIATION OF FLOW.....	0.860	0.860	0.626	0.302	0.626	0.918	1.932	0.471	0.035	0.486
MAXIMUM FLOW.....	33.332	33.332	18.000	15.332	18.000	37.307	71.511	11.524	1.162	12.588
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	7.14E+04	7.14E+04	5.90E+04	1.24E+04	5.90E+04	6.86E+04	1.55E+05	6.51E+04	1.99E+04	8.50E+04

MO/DA/YR HR:MIN:SEC STEP	204	404	304	331	405	206	406	306	309	409
AVERAGE FLOW.....	3.957	15.296	9.114	1.691	15.320	15.197	23.182	23.177	1.369	24.546
STANDARD DEVIATION OF FLOW.....	0.486	3.135	0.303	0.061	1.099	1.102	2.950	2.927	0.052	2.914
MAXIMUM FLOW.....	12.571	131.393	11.263	2.130	51.211	52.030	117.184	110.335	1.723	111.174
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	8.43E+04	3.26E+05	1.94E+05	3.60E+04	3.26E+05	3.24E+05	4.94E+05	4.94E+05	2.92E+04	5.23E+05

MO/DA/YR HR:MIN:SEC STEP	210	410	310	308	333	433	411	616	702	703
AVERAGE FLOW.....	24.489	34.042	20.266	2.535	2.709	5.244	26.812	26.812	26.812	0.000
STANDARD DEVIATION OF FLOW.....	2.913	5.133	1.055	0.623	0.105	0.636	1.158	1.158	1.158	0.000
MAXIMUM FLOW.....	111.896	189.492	32.043	19.263	3.656	21.884	41.229	41.229	41.229	0.000
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	5.22E+05	7.25E+05	4.32E+05	5.40E+04	5.77E+04	1.12E+05	5.71E+05	5.71E+05	5.71E+05	2.29E-03

MO/DA/YR HR:MIN:SEC STEP	211	511	612	704	705	213	613	706	707	214
AVERAGE FLOW.....	26.687	0.000	3.147	2.414	0.734	2.425	5.212	5.212	0.000	5.215
STANDARD DEVIATION OF FLOW.....	1.184	0.000	0.831	0.540	0.362	0.523	1.170	1.170	0.000	1.147
MAXIMUM FLOW.....	41.152	0.000	32.690	15.000	17.690	14.912	35.926	35.926	0.000	33.647
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	5.68E+05	2.29E-03	6.70E+04	5.14E+04	1.56E+04	5.17E+04	1.11E+05	1.11E+05	1.75E-07	1.11E+05

MO/DA/YR HR:MIN:SEC STEP	414	415	215	416	315	417	317	221	421	321
AVERAGE FLOW.....	13.475	40.162	39.885	48.930	48.789	56.384	56.374	55.873	76.442	75.745
STANDARD DEVIATION OF FLOW.....	3.105	3.645	3.633	5.622	3.663	4.726	4.727	4.721	8.391	7.571
MAXIMUM FLOW.....	104.655	132.124	131.120	202.334	94.930	132.150	131.723	128.345	291.058	222.375
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.87E+05	8.55E+05	8.50E+05	1.04E+06	1.04E+06	1.20E+06	1.20E+06	1.19E+06	1.63E+06	1.61E+06

MO/DA/YR HR:MIN:SEC STEP	225	220	420	320	425	427	327	229	429	219
AVERAGE FLOW.....	74.892	0.000	10.234	4.437	81.059	103.989	6.007	5.086	36.143	0.787
STANDARD DEVIATION OF FLOW.....	7.544	0.000	2.453	0.152	8.441	12.614	0.603	0.595	6.939	0.311
MAXIMUM FLOW.....	219.656	0.000	89.133	5.405	252.796	376.982	12.196	11.931	254.762	13.240
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

COUNTRY CLUB BASIN
FILENAME: CCB010FC.SUM
FUTURE CONDITION WITH EXISTING FACILITIES
EPA SWMM SUMMARY OUTPUT FILE
10-YEAR EVENT

SUMMARY OF EPA SWMM ANALYSIS
(See detailed output for more information)

City of Greeley Comprehensive Drainage Plan Update - ACE Inc.
Country Club Basin - Future Conditions - 10-Year Storm

SUB-BASIN INFLOWS

MO/DA/YR HR:MIN:SEC STEP	1	2	3	4	5	6	7	8	9	10
AVERAGE FLOW.....	4.423	3.915	5.447	15.934	5.859	3.275	9.038	4.296	5.761	13.015
STANDARD DEVIATION OF FLOW.....	1.153	0.972	1.411	4.322	1.490	0.844	1.989	1.139	1.435	3.042
MAXIMUM FLOW.....	46.130	33.420	55.840	178.580	58.960	32.000	63.268	40.085	54.390	106.419
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	9.42E+04	8.34E+04	1.16E+05	3.39E+05	1.25E+05	6.98E+04	1.93E+05	9.15E+04	1.23E+05	2.77E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	19	20	21
AVERAGE FLOW.....	1.800	4.129	3.721	11.026	2.097	10.431	10.008	13.937	13.821	27.885
STANDARD DEVIATION OF FLOW.....	0.455	1.068	0.872	2.765	0.498	2.547	2.406	3.401	3.258	7.249
MAXIMUM FLOW.....	16.730	42.590	29.290	105.870	14.954	92.880	86.542	123.770	115.519	287.840
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	3.83E+04	8.80E+04	7.93E+04	2.35E+05	4.47E+04	2.22E+05	2.13E+05	2.97E+05	2.94E+05	5.94E+05

MO/DA/YR HR:MIN:SEC STEP	22	23	24	25	26	27	28	29	30	31
AVERAGE FLOW.....	0.567	0.735	12.280	10.611	4.772	29.473	8.726	42.246	4.258	6.065
STANDARD DEVIATION OF FLOW.....	0.140	0.184	1.930	2.814	1.228	5.662	2.230	9.513	1.113	1.556
MAXIMUM FLOW.....	4.230	5.750	50.310	97.765	40.677	170.150	75.600	330.419	44.180	65.400
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.21E+04	1.57E+04	2.62E+05	2.26E+05	1.02E+05	6.28E+05	1.86E+05	9.00E+05	9.07E+04	1.29E+05

MO/DA/YR HR:MIN:SEC STEP	32	33	34
AVERAGE FLOW.....	0.851	6.289	0.000
STANDARD DEVIATION OF FLOW.....	0.229	1.626	0.000
MAXIMUM FLOW.....	7.700	68.740	0.000
MINIMUM FLOW.....	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.81E+04	1.34E+05	0.00E+00

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	202	602	700	701	400	203	403	303	330	430
AVERAGE FLOW.....	4.431	4.431	3.265	1.166	3.265	5.081	10.529	6.296	1.256	7.552
STANDARD DEVIATION OF FLOW.....	1.121	1.121	0.680	0.545	0.680	1.424	2.757	0.956	0.047	0.973
MAXIMUM FLOW.....	44.172	44.172	18.000	26.172	18.000	54.879	104.040	23.295	1.565	24.685
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	9.44E+04	9.44E+04	6.95E+04	2.48E+04	6.95E+04	1.08E+05	2.24E+05	1.34E+05	2.67E+04	1.61E+05

MO/DA/YR HR:MIN:SEC STEP	204	404	304	331	405	206	406	306	309	409
AVERAGE FLOW.....	7.510	23.444	11.746	2.057	19.663	19.510	31.824	31.817	1.825	33.642
STANDARD DEVIATION OF FLOW.....	0.971	4.435	0.379	0.074	1.367	1.371	4.110	4.049	0.070	4.032
MAXIMUM FLOW.....	24.641	178.590	13.620	2.597	65.899	64.276	156.370	145.980	2.296	147.080
MINIMUM FLOW.....	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.60E+05	4.99E+05	2.50E+05	4.38E+04	4.19E+05	4.16E+05	6.78E+05	6.78E+05	3.89E+04	7.17E+05

MO/DA/YR HR:MIN:SEC STEP	210	410	310	308	333	433	411	616	702	703
AVERAGE FLOW.....	33.569	46.584	30.714	4.296	3.329	7.625	40.139	40.139	40.139	0.000
STANDARD DEVIATION OF FLOW.....	4.032	6.992	1.814	1.022	0.129	1.033	2.164	2.164	2.164	0.000
MAXIMUM FLOW.....	147.599	247.409	53.261	31.550	4.506	34.715	68.760	68.760	68.760	0.000
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	7.15E+05	9.92E+05	6.54E+05	9.15E+04	7.09E+04	1.62E+05	8.55E+05	8.55E+05	8.55E+05	1.72E-03

MO/DA/YR HR:MIN:SEC STEP	211	511	612	704	705	213	613	706	707	214
AVERAGE FLOW.....	39.990	0.000	4.129	2.837	1.292	2.849	6.570	6.570	0.000	6.573
STANDARD DEVIATION OF FLOW.....	2.190	0.000	1.068	0.586	0.584	0.571	1.413	1.413	0.000	1.384
MAXIMUM FLOW.....	68.723	0.000	42.590	15.000	27.590	15.128	42.545	42.545	0.000	38.513
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	8.52E+05	1.72E-03	8.80E+04	6.04E+04	2.75E+04	6.07E+04	1.40E+05	1.40E+05	5.72E-04	1.40E+05

MO/DA/YR HR:MIN:SEC STEP	414	415	215	416	315	417	317	221	421	321
AVERAGE FLOW.....	17.599	57.589	57.260	69.787	69.528	79.536	79.523	78.886	106.771	105.887
STANDARD DEVIATION OF FLOW.....	3.953	5.197	5.186	7.815	4.350	5.452	5.454	5.470	10.225	9.110
MAXIMUM FLOW.....	134.214	176.276	173.214	273.384	116.139	159.407	160.308	152.577	371.617	284.408
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.000
FLOW VOLUME (CUBIC FEET).....	3.75E+05	1.23E+06	1.22E+06	1.49E+06	1.48E+06	1.69E+06	1.69E+06	1.68E+06	2.27E+06	2.26E+06

MO/DA/YR HR:MIN:SEC STEP	225	220	420	320	425	427	327	229	429	219
AVERAGE FLOW.....	104.881	0.000	13.821	5.491	115.492	144.964	14.599	12.951	55.196	1.367
STANDARD DEVIATION OF FLOW.....	9.094	0.000	3.258	0.191	10.671	15.980	1.238	1.265	8.751	0.517
MAXIMUM FLOW.....	281.171	0.000	115.519	6.676	333.940	491.769	25.839	25.659	330.419	21.222
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000

COUNTRY CLUB BASIN
FILENAME: CCB050FC.SUM
FUTURE CONDITION WITH EXISTING FACILITIES
EPA SWMM SUMMARY OUTPUT FILE
50-YEAR EVENT

SUMMARY OF EPA SWMM ANALYSIS
(See detailed output for more information)

City of Greeley Comprehensive Drainage Plan Update - ACE Inc.
Country Club Basin - Future Conditions - 50-Year Storm

SUB-BASIN INFLOWS

MO/DA/YR HR:MIN:SEC STEP	1	2	3	4	5	6	7	8	9	10
AVERAGE FLOW.....	7.938	8.391	10.073	31.769	10.274	6.317	22.442	12.457	10.674	25.004
STANDARD DEVIATION OF FLOW.....	2.222	2.200	2.794	9.225	2.794	1.741	5.170	3.310	2.868	6.294
MAXIMUM FLOW.....	85.237	71.874	106.004	357.147	106.959	62.623	155.950	108.804	105.062	213.503
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.69E+05	1.79E+05	2.15E+05	6.77E+05	2.19E+05	1.35E+05	4.78E+05	2.65E+05	2.27E+05	5.33E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	19	20	21
AVERAGE FLOW.....	3.247	7.305	6.826	20.266	5.463	19.250	17.941	26.153	26.180	52.744
STANDARD DEVIATION OF FLOW.....	0.881	2.028	1.709	5.454	1.298	5.041	4.637	6.847	6.647	14.698
MAXIMUM FLOW.....	30.844	77.713	55.883	203.274	37.174	179.792	163.440	243.831	228.281	569.401
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	6.92E+04	1.56E+05	1.45E+05	4.32E+05	1.16E+05	4.10E+05	3.82E+05	5.57E+05	5.58E+05	1.12E+06

MO/DA/YR HR:MIN:SEC STEP	22	23	24	25	26	27	28	29	30	31
AVERAGE FLOW.....	2.829	3.329	30.239	25.776	11.043	49.160	19.620	76.842	8.008	9.446
STANDARD DEVIATION OF FLOW.....	0.697	0.824	4.823	6.959	2.900	10.075	5.182	18.472	2.238	2.565
MAXIMUM FLOW.....	20.934	25.097	126.117	231.219	93.127	303.195	169.905	623.766	84.343	103.981
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	6.03E+04	7.09E+04	6.44E+05	5.49E+05	2.35E+05	1.05E+06	4.18E+05	1.64E+06	1.71E+05	2.01E+05

MO/DA/YR HR:MIN:SEC STEP	32	33	34
AVERAGE FLOW.....	4.157	9.827	11.970
STANDARD DEVIATION OF FLOW.....	1.125	2.689	2.857
MAXIMUM FLOW.....	37.684	109.363	93.330
MINIMUM FLOW.....	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	8.86E+04	2.09E+05	2.55E+05

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	202	602	700	701	400	203	403	303	330	430
AVERAGE FLOW.....	7.939	7.939	3.825	4.114	3.825	12.505	22.578	18.331	2.356	20.687
STANDARD DEVIATION OF FLOW.....	2.178	2.178	0.770	1.569	0.770	3.642	6.310	2.946	0.093	2.976
MAXIMUM FLOW.....	82.311	82.311	18.000	64.311	18.000	135.155	231.770	95.552	2.940	98.114
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.69E+05	1.69E+05	8.15E+04	8.76E+04	8.15E+04	2.66E+05	4.81E+05	3.90E+05	5.02E+04	4.41E+05

MO/DA/YR HR:MIN:SEC STEP	204	404	304	331	405	206	406	306	309	409
AVERAGE FLOW.....	20.623	52.392	17.417	3.210	30.900	30.698	59.456	59.446	3.609	63.055
STANDARD DEVIATION OF FLOW.....	2.964	10.131	0.606	0.122	2.591	2.590	9.321	8.877	0.186	8.867
MAXIMUM FLOW.....	95.299	357.214	19.868	4.044	117.770	114.191	328.598	273.967	7.028	276.646
MINIMUM FLOW.....	0.000	0.057	0.002	0.000	0.025	0.000	0.016	0.015	0.000	0.015
FLOW VOLUME (CUBIC FEET).....	4.39E+05	1.12E+06	3.71E+05	6.84E+04	6.58E+05	6.54E+05	1.27E+06	1.27E+06	7.69E+04	1.34E+06

MO/DA/YR HR:MIN:SEC STEP	210	410	310	308	333	433	411	616	702	703
AVERAGE FLOW.....	62.951	87.955	68.748	12.457	5.209	17.666	89.661	89.661	80.134	9.527
STANDARD DEVIATION OF FLOW.....	8.868	14.844	5.835	2.935	0.214	2.978	7.808	7.808	5.778	2.730
MAXIMUM FLOW.....	277.176	462.925	171.550	77.943	7.053	83.864	241.643	241.643	153.000	88.643
MINIMUM FLOW.....	0.000	0.028	0.000	0.000	0.000	0.001	0.009	0.009	0.009	0.000
FLOW VOLUME (CUBIC FEET).....	1.34E+06	1.87E+06	1.46E+06	2.65E+05	1.11E+05	3.76E+05	1.91E+06	1.91E+06	1.71E+06	2.03E+05

MO/DA/YR HR:MIN:SEC STEP	211	511	612	704	705	213	613	706	707	214
AVERAGE FLOW.....	79.932	9.527	7.305	3.283	4.022	3.287	10.114	9.558	0.556	9.558
STANDARD DEVIATION OF FLOW.....	5.803	2.718	2.028	0.654	1.523	0.641	2.294	2.103	0.300	2.061
MAXIMUM FLOW.....	154.047	86.622	77.713	15.000	62.713	14.999	70.101	56.000	14.101	55.757
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.70E+06	2.03E+05	1.56E+05	6.99E+04	8.57E+04	7.00E+04	2.15E+05	2.04E+05	1.18E+04	2.04E+05

MO/DA/YR HR:MIN:SEC STEP	414	415	215	416	315	417	317	221	421	321
AVERAGE FLOW.....	29.824	119.283	118.829	143.542	142.005	159.946	159.918	158.437	211.181	209.061
STANDARD DEVIATION OF FLOW.....	7.224	12.798	12.784	17.978	12.243	14.029	14.026	14.032	22.142	20.467
MAXIMUM FLOW.....	241.556	353.663	352.467	559.537	406.939	461.066	458.581	447.591	697.468	555.527
MINIMUM FLOW.....	0.000	0.034	0.003	0.032	0.031	0.056	0.052	0.000	0.082	0.014
FLOW VOLUME (CUBIC FEET).....	6.35E+05	2.54E+06	2.53E+06	3.06E+06	3.02E+06	3.41E+06	3.41E+06	3.37E+06	4.50E+06	4.45E+06

MO/DA/YR HR:MIN:SEC STEP	225	220	420	320	425	427	327	229	429	219
AVERAGE FLOW.....	219.173	0.648	26.828	11.491	244.949	294.109	58.381	54.265	131.107	4.070
STANDARD DEVIATION OF FLOW.....	22.913	0.254	6.841	0.830	26.857	36.252	4.010	4.235	15.743	1.402
MAXIMUM FLOW.....	629.529	10.845	233.351	28.047	773.648	1058.714	87.742	87.592	623.766	52.930
MINIMUM FLOW.....	0.000	0.000	0.000	0.001	0.000	0.012	0.000	0.000	0.048	0.000

COUNTRY CLUB BASIN
FILENAME: CCB100FC.SUM
FUTURE CONDITION WITH EXISTING FACILITIES
EPA SWMM SUMMARY OUTPUT FILE
100-YEAR EVENT

SUMMARY OF EPA SWMM ANALYSIS
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Country Club Basin - Future Conditions - 100-Year Storm

SUB-BASIN INFLOWS

MO/DA/YR HR:MIN:SEC STEP	1	2	3	4	5	6	7	8	9	10
AVERAGE FLOW.....	9.340	10.248	11.902	38.242	12.010	7.529	28.044	15.996	12.639	29.836
STANDARD DEVIATION OF FLOW.....	2.642	2.688	3.342	11.110	3.312	2.096	6.452	4.193	3.438	7.595
MAXIMUM FLOW.....	99.181	85.475	123.750	423.733	123.338	73.703	188.822	133.277	122.367	252.968
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.99E+05	2.18E+05	2.54E+05	8.15E+05	2.56E+05	1.60E+05	5.97E+05	3.41E+05	2.69E+05	6.36E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	19	20	21
AVERAGE FLOW.....	3.830	8.565	8.065	23.938	6.886	22.776	21.097	31.063	31.142	62.758
STANDARD DEVIATION OF FLOW.....	1.049	2.407	2.048	6.522	1.621	6.036	5.529	8.219	8.002	17.625
MAXIMUM FLOW.....	36.019	90.154	65.534	235.196	44.971	207.854	190.773	283.109	270.411	660.954
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	8.16E+04	1.82E+05	1.72E+05	5.10E+05	1.47E+05	4.85E+05	4.49E+05	6.62E+05	6.63E+05	1.34E+06

MO/DA/YR HR:MIN:SEC STEP	22	23	24	25	26	27	28	29	30	31
AVERAGE FLOW.....	4.049	4.673	37.929	32.282	13.717	56.846	24.232	90.795	9.514	10.738
STANDARD DEVIATION OF FLOW.....	0.968	1.128	6.041	8.621	3.575	11.882	6.368	22.098	2.680	2.969
MAXIMUM FLOW.....	27.610	32.591	154.732	279.358	111.707	353.283	203.517	728.759	99.080	119.582
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	8.63E+04	9.95E+04	8.08E+05	6.88E+05	2.92E+05	1.21E+06	5.16E+05	1.93E+06	2.03E+05	2.29E+05

MO/DA/YR HR:MIN:SEC STEP	32	33	34
AVERAGE FLOW.....	5.926	11.177	24.723
STANDARD DEVIATION OF FLOW.....	1.563	3.112	5.526
MAXIMUM FLOW.....	49.931	125.496	154.292
MINIMUM FLOW.....	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.26E+05	2.38E+05	5.27E+05

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	202	602	700	701	400	203	403	303	330	430
AVERAGE FLOW.....	9.343	9.343	3.858	5.485	3.858	15.733	27.635	23.387	2.801	26.189
STANDARD DEVIATION OF FLOW.....	2.597	2.597	0.786	1.970	0.786	4.527	7.734	4.427	0.112	4.453
MAXIMUM FLOW.....	96.410	96.410	18.000	78.410	18.000	162.451	276.961	162.591	3.500	165.450
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.99E+05	1.99E+05	8.22E+04	1.17E+05	8.22E+04	3.35E+05	5.89E+05	4.98E+05	5.97E+04	5.58E+05

MO/DA/YR HR:MIN:SEC STEP	204	404	304	331	405	206	406	306	309	409
AVERAGE FLOW.....	26.118	64.359	18.894	3.655	34.559	34.345	69.917	69.905	5.553	75.458
STANDARD DEVIATION OF FLOW.....	4.418	13.025	0.660	0.140	3.095	3.092	11.427	10.658	0.711	11.013
MAXIMUM FLOW.....	166.164	423.812	21.539	4.600	135.162	132.649	390.749	302.136	28.363	305.728
MINIMUM FLOW.....	0.000	0.031	0.001	0.000	0.014	0.000	0.009	0.008	0.000	0.008
FLOW VOLUME (CUBIC FEET).....	5.56E+05	1.37E+06	4.02E+05	7.78E+04	7.36E+05	7.32E+05	1.49E+06	1.49E+06	1.18E+05	1.61E+06

MO/DA/YR HR:MIN:SEC STEP	210	410	310	308	333	433	411	616	702	703
AVERAGE FLOW.....	75.348	105.184	85.237	15.996	5.934	21.930	110.997	110.997	87.073	23.924
STANDARD DEVIATION OF FLOW.....	11.013	18.037	8.079	3.601	0.248	3.666	10.759	10.759	5.926	5.910
MAXIMUM FLOW.....	306.012	523.441	236.125	87.890	8.099	95.087	321.666	321.666	153.000	168.666
MINIMUM FLOW.....	0.000	0.016	0.000	0.000	0.000	0.000	0.005	0.005	0.005	0.000
FLOW VOLUME (CUBIC FEET).....	1.60E+06	2.24E+06	1.82E+06	3.41E+05	1.26E+05	4.67E+05	2.36E+06	2.36E+06	1.85E+06	5.10E+05

MO/DA/YR HR:MIN:SEC STEP	211	511	612	704	705	213	613	706	707	214
AVERAGE FLOW.....	86.857	23.924	8.565	3.284	5.282	3.291	11.357	10.144	1.213	10.144
STANDARD DEVIATION OF FLOW.....	5.954	5.899	2.407	0.665	1.886	0.651	2.638	2.245	0.555	2.200
MAXIMUM FLOW.....	154.868	168.778	90.154	15.000	75.154	15.155	79.940	56.000	23.940	55.993
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.85E+06	5.10E+05	1.82E+05	6.99E+04	1.12E+05	7.01E+04	2.42E+05	2.16E+05	2.58E+04	2.16E+05

MO/DA/YR HR:MIN:SEC STEP	414	415	215	416	315	417	317	221	421	321
AVERAGE FLOW.....	34.082	144.864	144.376	174.039	171.395	192.491	192.460	190.785	253.543	251.133
STANDARD DEVIATION OF FLOW.....	8.405	16.140	16.125	22.204	16.777	19.056	19.039	18.996	28.226	26.349
MAXIMUM FLOW.....	278.122	425.680	424.952	651.206	523.744	598.802	598.293	585.373	815.420	684.559
MINIMUM FLOW.....	0.000	0.019	0.001	0.017	0.017	0.030	0.028	0.000	0.045	0.008
FLOW VOLUME (CUBIC FEET).....	7.26E+05	3.09E+06	3.08E+06	3.71E+06	3.65E+06	4.10E+06	4.10E+06	4.06E+06	5.40E+06	5.35E+06

MO/DA/YR HR:MIN:SEC STEP	225	220	420	320	425	427	327	229	429	219
AVERAGE FLOW.....	273.843	1.329	32.471	16.847	306.125	362.971	92.864	87.495	178.290	5.339
STANDARD DEVIATION OF FLOW.....	31.375	0.483	8.386	1.868	36.194	47.125	6.196	6.584	17.882	1.761
MAXIMUM FLOW.....	817.269	18.855	279.540	57.875	977.235	1313.333	133.551	133.362	728.759	65.226

PROPOSED CONDITION
(FUTURE DEVELOPMENT WITH PROPOSED FACILITIES)

COUNTRY CLUB BASIN
FILENAME: CCB002PC.SUM
FUTURE CONDITION WITH PROPOSED FACILITIES
EPA SWMM SUMMARY OUTPUT FILE
2-YEAR EVENT

SUMMARY OF EPA SWMM ANALYSIS
(See detailed output for more information)

City of Greeley Comprehensive Drainage Plan Update - ACE Inc.
Country Club Basin - Proposed Conditions - 2-Year Storm

SUB-BASIN INFLOWS

MO/DA/YR HR:MIN:SEC STEP	1	2	3	4	5	6	7	8	9	10
AVERAGE FLOW.....	1.853	1.015	2.198	5.391	2.582	1.119	1.885	0.721	2.353	4.981
STANDARD DEVIATION OF FLOW.....	0.486	0.282	0.563	1.454	0.659	0.313	0.435	0.211	0.586	1.155
MAXIMUM FLOW.....	18.960	9.560	21.760	59.050	25.440	11.560	13.672	7.234	21.740	40.111
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	3.95E+04	2.16E+04	4.68E+04	1.15E+05	5.50E+04	2.38E+04	4.02E+04	1.54E+04	5.01E+04	1.06E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	19	20	21
AVERAGE FLOW.....	0.626	1.771	1.508	4.476	0.207	4.224	4.234	5.442	5.452	10.721
STANDARD DEVIATION OF FLOW.....	0.194	0.463	0.357	1.113	0.070	1.018	1.014	1.312	1.272	2.740
MAXIMUM FLOW.....	6.890	18.000	11.819	41.690	2.247	36.480	36.226	46.990	44.705	106.660
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.33E+04	3.77E+04	3.21E+04	9.53E+04	4.40E+03	9.00E+04	9.02E+04	1.16E+05	1.16E+05	2.28E+05

MO/DA/YR HR:MIN:SEC STEP	22	23	24	25	26	27	28	29	30	31
AVERAGE FLOW.....	0.057	0.090	0.075	0.173	0.306	12.783	0.824	14.392	1.663	3.270
STANDARD DEVIATION OF FLOW.....	0.031	0.043	0.035	0.074	0.100	2.466	0.243	3.245	0.432	0.865
MAXIMUM FLOW.....	1.460	1.750	1.420	2.962	3.299	74.970	8.349	112.116	16.710	36.180
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.21E+03	1.91E+03	1.60E+03	3.68E+03	6.51E+03	2.72E+05	1.76E+04	3.07E+05	3.54E+04	6.96E+04

MO/DA/YR HR:MIN:SEC STEP	32	33	34
AVERAGE FLOW.....	0.178	3.278	0.000
STANDARD DEVIATION OF FLOW.....	0.068	0.871	0.000
MAXIMUM FLOW.....	2.540	36.450	0.000
MINIMUM FLOW.....	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	3.78E+03	6.98E+04	0.00E+00

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	202	602	700	701	400	203	403	303	330	430
AVERAGE FLOW.....	1.856	1.856	1.856	0.000	1.856	1.015	3.213	0.000	0.490	0.490
STANDARD DEVIATION OF FLOW.....	0.465	0.465	0.465	0.000	0.465	0.278	0.821	0.000	0.018	0.018
MAXIMUM FLOW.....	17.278	17.278	17.278	0.000	17.278	9.323	29.013	0.000	0.614	0.614
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	3.95E+04	3.95E+04	3.95E+04	7.15E-05	3.95E+04	2.16E+04	6.84E+04	0.00E+00	1.04E+04	1.04E+04

MO/DA/YR HR:MIN:SEC STEP	204	404	304	331	405	206	406	306	309	409
AVERAGE FLOW.....	0.473	5.864	4.997	1.111	8.690	8.610	11.615	11.612	0.746	12.358
STANDARD DEVIATION OF FLOW.....	0.022	1.439	0.166	0.040	0.672	0.672	1.380	1.376	0.028	1.369
MAXIMUM FLOW.....	0.606	59.050	6.249	1.406	30.218	30.257	54.477	55.419	0.945	55.759
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.01E+04	1.25E+05	1.06E+05	2.37E+04	1.85E+05	1.83E+05	2.47E+05	2.47E+05	1.59E+04	2.63E+05

MO/DA/YR HR:MIN:SEC STEP	210	410	310	308	333	433	411	616	702	703
AVERAGE FLOW.....	12.320	17.301	7.390	0.721	1.737	2.458	10.473	10.473	10.473	0.000
STANDARD DEVIATION OF FLOW.....	1.368	2.497	0.412	0.189	0.067	0.200	0.315	0.315	0.315	0.000
MAXIMUM FLOW.....	54.213	94.325	10.391	5.835	2.360	7.519	12.731	12.731	12.731	0.000
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.62E+05	3.69E+05	1.57E+05	1.54E+04	3.70E+04	5.24E+04	2.23E+05	2.23E+05	2.23E+05	1.72E-03

MO/DA/YR HR:MIN:SEC STEP	211	511	612	704	705	213	613	706	707	214
AVERAGE FLOW.....	10.398	0.000	1.771	1.712	0.059	1.719	3.227	3.227	0.000	3.228
STANDARD DEVIATION OF FLOW.....	0.336	0.000	0.463	0.435	0.046	0.416	0.760	0.760	0.000	0.742
MAXIMUM FLOW.....	12.720	0.000	18.000	15.000	3.000	13.957	24.418	24.418	0.000	23.814
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.21E+05	1.72E-03	3.77E+04	3.65E+04	1.27E+03	3.66E+04	6.87E+04	6.87E+04	7.15E-05	6.88E+04

MO/DA/YR HR:MIN:SEC STEP	414	415	215	416	315	417	317	221	421	321
AVERAGE FLOW.....	7.704	18.102	17.958	22.389	22.387	26.621	26.616	26.381	37.102	36.769
STANDARD DEVIATION OF FLOW.....	1.764	1.820	1.808	2.791	2.281	3.071	3.071	3.041	5.023	4.598
MAXIMUM FLOW.....	59.255	71.144	69.477	102.601	62.799	87.203	87.954	83.427	153.883	124.657
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.64E+05	3.86E+05	3.83E+05	4.77E+05	4.77E+05	5.67E+05	5.67E+05	5.62E+05	7.90E+05	7.83E+05

MO/DA/YR HR:MIN:SEC STEP	225	220	420	320	425	427	327	229	429	219
AVERAGE FLOW.....	36.253	0.000	5.452	2.914	36.426	49.209	0.000	0.000	14.392	0.086
STANDARD DEVIATION OF FLOW.....	4.556	0.000	1.272	0.100	4.566	6.732	0.000	0.000	3.245	0.040
MAXIMUM FLOW.....	123.002	0.000	44.705	3.607	123.002	184.424	0.000	0.000	112.116	1.874
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

COUNTRY CLUB BASIN
FILENAME: CCB005PC.SUM
FUTURE CONDITION WITH PROPOSED FACILITIES
EPA SWMM SUMMARY OUTPUT FILE
5-YEAR EVENT

SUMMARY OF EPA SWMM ANALYSIS
(See detailed output for more information)

City of Greeley Comprehensive Drainage Plan Update - ACE Inc.
Country Club Basin - Proposed Conditions - 5-Year Storm

SUB-BASIN INFLOWS

MO/DA/YR HR:MIN:SEC STEP	1	2	3	4	5	6	7	8	9	10
AVERAGE FLOW.....	3.346	2.641	4.063	11.339	4.514	2.380	5.605	2.535	4.312	9.554
STANDARD DEVIATION OF FLOW.....	0.890	0.684	1.073	3.158	1.165	0.630	1.290	0.696	1.094	2.276
MAXIMUM FLOW.....	35.190	23.800	41.950	131.390	45.250	23.870	42.877	25.187	40.700	81.664
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	7.13E+04	5.63E+04	8.65E+04	2.42E+05	9.62E+04	5.07E+04	1.19E+05	5.40E+04	9.18E+04	2.03E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	19	20	21
AVERAGE FLOW.....	1.303	3.147	2.787	8.260	1.227	7.818	7.595	10.321	10.234	20.569
STANDARD DEVIATION OF FLOW.....	0.353	0.831	0.667	2.107	0.311	1.935	1.856	2.563	2.453	5.443
MAXIMUM FLOW.....	12.870	32.690	22.737	78.640	9.957	71.359	68.219	94.920	89.133	210.300
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.77E+04	6.70E+04	5.94E+04	1.76E+05	2.61E+04	1.67E+05	1.62E+05	2.20E+05	2.18E+05	4.38E+05

MO/DA/YR HR:MIN:SEC STEP	22	23	24	25	26	27	28	29	30	31
AVERAGE FLOW.....	0.350	0.430	7.032	6.168	2.892	22.930	5.410	31.057	3.164	4.978
STANDARD DEVIATION OF FLOW.....	0.099	0.117	1.167	1.796	0.815	4.500	1.503	7.237	0.840	1.293
MAXIMUM FLOW.....	3.180	3.710	32.460	66.246	28.410	137.540	53.452	254.762	33.250	54.140
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	7.45E+03	9.16E+03	1.50E+05	1.31E+05	6.16E+04	4.88E+05	1.15E+05	6.62E+05	6.74E+04	1.06E+05

MO/DA/YR HR:MIN:SEC STEP	32	33	34
AVERAGE FLOW.....	0.578	5.109	0.000
STANDARD DEVIATION OF FLOW.....	0.164	1.343	0.000
MAXIMUM FLOW.....	5.710	56.530	0.000
MINIMUM FLOW.....	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.23E+04	1.09E+05	0.00E+00

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	202	602	700	701	400	203	403	303	330	430
AVERAGE FLOW.....	3.353	3.353	2.771	0.581	2.771	3.222	7.285	3.056	0.934	3.991
STANDARD DEVIATION OF FLOW.....	0.860	0.860	0.626	0.302	0.626	0.918	1.932	0.471	0.035	0.486
MAXIMUM FLOW.....	33.332	33.332	18.000	15.332	18.000	37.307	71.511	11.524	1.162	12.588
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	7.14E+04	7.14E+04	5.90E+04	1.24E+04	5.90E+04	6.86E+04	1.55E+05	6.51E+04	1.99E+04	8.50E+04

MO/DA/YR HR:MIN:SEC STEP	204	404	304	331	405	206	406	306	309	409
AVERAGE FLOW.....	3.957	15.296	9.114	1.691	15.320	15.197	23.182	23.177	1.369	24.546
STANDARD DEVIATION OF FLOW.....	0.486	3.135	0.303	0.061	1.099	1.102	2.950	2.927	0.052	2.914
MAXIMUM FLOW.....	12.571	131.393	11.263	2.130	51.211	52.030	117.184	110.335	1.723	111.174
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	8.43E+04	3.26E+05	1.94E+05	3.60E+04	3.26E+05	3.24E+05	4.94E+05	4.94E+05	2.92E+04	5.23E+05

MO/DA/YR HR:MIN:SEC STEP	210	410	310	308	333	433	411	616	702	703
AVERAGE FLOW.....	24.489	34.042	20.266	2.535	2.709	5.244	26.812	26.812	26.812	0.000
STANDARD DEVIATION OF FLOW.....	2.913	5.133	1.055	0.623	0.105	0.636	1.158	1.158	1.158	0.000
MAXIMUM FLOW.....	111.896	189.492	32.043	19.263	3.656	21.884	41.229	41.229	41.229	0.000
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	5.22E+05	7.25E+05	4.32E+05	5.40E+04	5.77E+04	1.12E+05	5.71E+05	5.71E+05	5.71E+05	2.29E-03

MO/DA/YR HR:MIN:SEC STEP	211	511	612	704	705	213	613	706	707	214
AVERAGE FLOW.....	26.687	0.000	3.147	2.414	0.734	2.425	5.212	5.212	0.000	5.215
STANDARD DEVIATION OF FLOW.....	1.184	0.000	0.831	0.540	0.362	0.523	1.170	1.170	0.000	1.147
MAXIMUM FLOW.....	41.152	0.000	32.690	15.000	17.690	14.912	35.926	35.926	0.000	33.647
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	5.68E+05	2.29E-03	6.70E+04	5.14E+04	1.56E+04	5.17E+04	1.11E+05	1.11E+05	1.75E-07	1.11E+05

MO/DA/YR HR:MIN:SEC STEP	414	415	215	416	315	417	317	221	421	321
AVERAGE FLOW.....	13.475	40.162	39.885	48.930	48.789	56.384	56.374	55.873	76.442	75.745
STANDARD DEVIATION OF FLOW.....	3.105	3.645	3.633	5.622	3.663	4.726	4.727	4.721	8.391	7.571
MAXIMUM FLOW.....	104.655	132.124	131.120	202.334	94.930	132.150	131.723	128.345	291.058	222.375
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.87E+05	8.55E+05	8.50E+05	1.04E+06	1.04E+06	1.20E+06	1.20E+06	1.19E+06	1.63E+06	1.61E+06

MO/DA/YR HR:MIN:SEC STEP	225	220	420	320	425	427	327	229	429	219
AVERAGE FLOW.....	74.892	0.000	10.234	4.437	81.059	103.989	6.007	5.628	36.686	0.787
STANDARD DEVIATION OF FLOW.....	7.544	0.000	2.453	0.152	8.441	12.614	0.603	0.608	6.906	0.311
MAXIMUM FLOW.....	219.656	0.000	89.133	5.405	252.796	376.982	12.196	12.116	254.762	13.240
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

COUNTRY CLUB BASIN
FILENAME: CCB010PC.SUM
FUTURE CONDITION WITH PROPOSED FACILITIES
EPA SWMM SUMMARY OUTPUT FILE
10-YEAR EVENT

SUMMARY OF EPA SWMM ANALYSIS
(See detailed output for more information)

City of Greeley Comprehensive Drainage Plan Update - ACE Inc.
Country Club Basin - Proposed Conditions - 10-Year Storm

SUB-BASIN INFLOWS

MO/DA/YR HR:MIN:SEC STEP	1	2	3	4	5	6	7	8	9	10
AVERAGE FLOW.....	4.423	3.915	5.447	15.934	5.859	3.275	9.038	4.296	5.761	13.015
STANDARD DEVIATION OF FLOW.....	1.153	0.972	1.411	4.322	1.490	0.844	1.989	1.139	1.435	3.042
MAXIMUM FLOW.....	46.130	33.420	55.840	178.580	58.960	32.000	63.268	40.085	54.390	106.419
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	9.42E+04	8.34E+04	1.16E+05	3.39E+05	1.25E+05	6.98E+04	1.93E+05	9.15E+04	1.23E+05	2.77E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	19	20	21
AVERAGE FLOW.....	1.800	4.129	3.721	11.026	2.097	10.431	10.008	13.937	13.821	27.885
STANDARD DEVIATION OF FLOW.....	0.455	1.068	0.872	2.765	0.498	2.547	2.406	3.401	3.258	7.249
MAXIMUM FLOW.....	16.730	42.590	29.290	105.870	14.954	92.880	86.542	123.770	115.519	287.840
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	3.83E+04	8.80E+04	7.93E+04	2.35E+05	4.47E+04	2.22E+05	2.13E+05	2.97E+05	2.94E+05	5.94E+05

MO/DA/YR HR:MIN:SEC STEP	22	23	24	25	26	27	28	29	30	31
AVERAGE FLOW.....	0.567	0.735	12.280	10.611	4.772	29.473	8.726	42.246	4.258	6.065
STANDARD DEVIATION OF FLOW.....	0.140	0.184	1.930	2.814	1.228	5.662	2.230	9.513	1.113	1.556
MAXIMUM FLOW.....	4.230	5.750	50.310	97.765	40.677	170.150	75.600	330.419	44.180	65.400
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.21E+04	1.57E+04	2.62E+05	2.26E+05	1.02E+05	6.28E+05	1.86E+05	9.00E+05	9.07E+04	1.29E+05

MO/DA/YR HR:MIN:SEC STEP	32	33	34
AVERAGE FLOW.....	0.851	6.289	0.000
STANDARD DEVIATION OF FLOW.....	0.229	1.626	0.000
MAXIMUM FLOW.....	7.700	68.740	0.000
MINIMUM FLOW.....	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.81E+04	1.34E+05	0.00E+00

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	202	602	700	701	400	203	403	303	330	430
AVERAGE FLOW.....	4.431	4.431	3.265	1.166	3.265	5.081	10.529	6.296	1.256	7.552
STANDARD DEVIATION OF FLOW.....	1.121	1.121	0.680	0.545	0.680	1.424	2.757	0.956	0.047	0.973
MAXIMUM FLOW.....	44.172	44.172	18.000	26.172	18.000	54.879	104.040	23.295	1.565	24.685
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	9.44E+04	9.44E+04	6.95E+04	2.48E+04	6.95E+04	1.08E+05	2.24E+05	1.34E+05	2.67E+04	1.61E+05

MO/DA/YR HR:MIN:SEC STEP	204	404	304	331	405	206	406	306	309	409
AVERAGE FLOW.....	7.510	23.444	11.746	2.057	19.663	19.510	31.824	31.817	1.825	33.642
STANDARD DEVIATION OF FLOW.....	0.971	4.435	0.379	0.074	1.367	1.371	4.110	4.049	0.070	4.032
MAXIMUM FLOW.....	24.641	178.590	13.620	2.597	65.899	64.276	156.370	145.980	2.296	147.080
MINIMUM FLOW.....	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.60E+05	4.99E+05	2.50E+05	4.38E+04	4.19E+05	4.16E+05	6.78E+05	6.78E+05	3.89E+04	7.17E+05

MO/DA/YR HR:MIN:SEC STEP	210	410	310	308	333	433	411	616	702	703
AVERAGE FLOW.....	33.569	46.584	30.714	4.296	3.329	7.625	40.139	40.139	40.139	0.000
STANDARD DEVIATION OF FLOW.....	4.032	6.992	1.814	1.022	0.129	1.033	2.164	2.164	2.164	0.000
MAXIMUM FLOW.....	147.599	247.409	53.261	31.550	4.506	34.715	68.760	68.760	68.760	0.000
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	7.15E+05	9.92E+05	6.54E+05	9.15E+04	7.09E+04	1.62E+05	8.55E+05	8.55E+05	8.55E+05	1.72E-03

MO/DA/YR HR:MIN:SEC STEP	211	511	612	704	705	213	613	706	707	214
AVERAGE FLOW.....	39.990	0.000	4.129	2.837	1.292	2.849	6.570	6.570	0.000	6.573
STANDARD DEVIATION OF FLOW.....	2.190	0.000	1.068	0.586	0.584	0.571	1.413	1.413	0.000	1.384
MAXIMUM FLOW.....	68.723	0.000	42.590	15.000	27.590	15.128	42.545	42.545	0.000	38.513
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	8.52E+05	1.72E-03	8.80E+04	6.04E+04	2.75E+04	6.07E+04	1.40E+05	1.40E+05	5.72E-04	1.40E+05

MO/DA/YR HR:MIN:SEC STEP	414	415	215	416	315	417	317	221	421	321
AVERAGE FLOW.....	17.599	57.589	57.260	69.787	69.528	79.536	79.523	78.886	106.771	105.887
STANDARD DEVIATION OF FLOW.....	3.953	5.197	5.186	7.815	4.350	5.452	5.454	5.470	10.225	9.110
MAXIMUM FLOW.....	134.214	176.276	173.214	273.384	116.139	159.407	160.308	152.577	371.617	284.408
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.000
FLOW VOLUME (CUBIC FEET).....	3.75E+05	1.23E+06	1.22E+06	1.49E+06	1.48E+06	1.69E+06	1.69E+06	1.68E+06	2.27E+06	2.26E+06

MO/DA/YR HR:MIN:SEC STEP	225	220	420	320	425	427	327	229	429	219
AVERAGE FLOW.....	104.881	0.000	13.821	5.491	115.492	144.964	14.599	13.955	56.200	1.367
STANDARD DEVIATION OF FLOW.....	9.094	0.000	3.258	0.191	10.671	15.980	1.238	1.261	8.700	0.517
MAXIMUM FLOW.....	281.171	0.000	115.519	6.676	333.940	491.769	25.839	25.820	330.419	21.222
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000

COUNTRY CLUB BASIN
FILENAME: CCB050PC.SUM
FUTURE CONDITION WITH PROPOSED FACILITIES
EPA SWMM SUMMARY OUTPUT FILE
50-YEAR EVENT

SUMMARY OF EPA SWMM ANALYSIS
(See detailed output for more information)

City of Greeley Comprehensive Drainage Plan Update - ACE Inc.
Country Club Basin - Proposed Conditions - 50-Year Storm

SUB-BASIN INFLOWS

MO/DA/YR HR:MIN:SEC STEP	1	2	3	4	5	6	7	8	9	10
AVERAGE FLOW.....	7.938	8.391	10.073	31.769	10.274	6.317	22.442	12.457	10.674	25.004
STANDARD DEVIATION OF FLOW.....	2.222	2.200	2.794	9.225	2.794	1.741	5.170	3.310	2.868	6.294
MAXIMUM FLOW.....	85.237	71.874	106.004	357.147	106.959	62.623	155.950	108.804	105.062	213.503
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.69E+05	1.79E+05	2.15E+05	6.77E+05	2.19E+05	1.35E+05	4.78E+05	2.65E+05	2.27E+05	5.33E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	19	20	21
AVERAGE FLOW.....	3.247	7.305	6.826	20.266	5.463	19.250	17.941	26.153	26.180	52.744
STANDARD DEVIATION OF FLOW.....	0.881	2.028	1.709	5.454	1.298	5.041	4.637	6.847	6.647	14.698
MAXIMUM FLOW.....	30.844	77.713	55.883	203.274	37.174	179.792	163.440	243.831	228.281	569.401
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	6.92E+04	1.56E+05	1.45E+05	4.32E+05	1.16E+05	4.10E+05	3.82E+05	5.57E+05	5.58E+05	1.12E+06

MO/DA/YR HR:MIN:SEC STEP	22	23	24	25	26	27	28	29	30	31
AVERAGE FLOW.....	2.829	3.329	30.239	25.776	11.043	49.160	19.620	76.842	8.008	9.446
STANDARD DEVIATION OF FLOW.....	0.697	0.824	4.823	6.959	2.900	10.075	5.182	18.472	2.238	2.565
MAXIMUM FLOW.....	20.934	25.097	126.117	231.219	93.127	303.195	169.905	623.766	84.343	103.981
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	6.03E+04	7.09E+04	6.44E+05	5.49E+05	2.35E+05	1.05E+06	4.18E+05	1.64E+06	1.71E+05	2.01E+05

MO/DA/YR HR:MIN:SEC STEP	32	33	34
AVERAGE FLOW.....	4.157	9.827	4.376
STANDARD DEVIATION OF FLOW.....	1.125	2.689	0.926
MAXIMUM FLOW.....	37.684	109.363	25.390
MINIMUM FLOW.....	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	8.86E+04	2.09E+05	9.32E+04

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	202	602	700	701	400	203	403	303	330	430
AVERAGE FLOW.....	7.939	7.939	3.825	4.114	3.825	12.505	22.578	18.331	2.356	20.687
STANDARD DEVIATION OF FLOW.....	2.178	2.178	0.770	1.569	0.770	3.642	6.310	2.946	0.093	2.976
MAXIMUM FLOW.....	82.311	82.311	18.000	64.311	18.000	135.155	231.770	95.552	2.940	98.114
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.69E+05	1.69E+05	8.15E+04	8.76E+04	8.15E+04	2.66E+05	4.81E+05	3.90E+05	5.02E+04	4.41E+05

MO/DA/YR HR:MIN:SEC STEP	204	404	304	331	405	206	406	306	309	409
AVERAGE FLOW.....	20.623	52.392	17.417	3.210	30.900	30.698	59.456	59.446	3.609	63.055
STANDARD DEVIATION OF FLOW.....	2.964	10.131	0.606	0.122	2.591	2.590	9.321	8.877	0.186	8.867
MAXIMUM FLOW.....	95.299	357.214	19.868	4.044	117.770	114.191	328.598	273.967	7.028	276.646
MINIMUM FLOW.....	0.000	0.057	0.002	0.000	0.025	0.000	0.016	0.015	0.000	0.015
FLOW VOLUME (CUBIC FEET).....	4.39E+05	1.12E+06	3.71E+05	6.84E+04	6.58E+05	6.54E+05	1.27E+06	1.27E+06	7.69E+04	1.34E+06

MO/DA/YR HR:MIN:SEC STEP	210	410	310	308	333	433	411	616	702	703
AVERAGE FLOW.....	62.951	87.955	68.748	12.457	5.209	17.666	89.661	89.661	80.134	9.527
STANDARD DEVIATION OF FLOW.....	8.868	14.844	5.835	2.935	0.214	2.978	7.808	7.808	5.778	2.730
MAXIMUM FLOW.....	277.176	462.925	171.550	77.943	7.053	83.864	241.643	241.643	153.000	88.643
MINIMUM FLOW.....	0.000	0.028	0.000	0.000	0.000	0.001	0.009	0.009	0.009	0.000
FLOW VOLUME (CUBIC FEET).....	1.34E+06	1.87E+06	1.46E+06	2.65E+05	1.11E+05	3.76E+05	1.91E+06	1.91E+06	1.71E+06	2.03E+05

MO/DA/YR HR:MIN:SEC STEP	211	511	612	704	705	213	613	706	707	214
AVERAGE FLOW.....	79.932	9.527	7.305	3.283	4.022	3.287	10.114	9.558	0.556	9.558
STANDARD DEVIATION OF FLOW.....	5.803	2.718	2.028	0.654	1.523	0.641	2.294	2.103	0.300	2.061
MAXIMUM FLOW.....	154.047	86.622	77.713	15.000	62.713	14.999	70.101	56.000	14.101	55.757
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.70E+06	2.03E+05	1.56E+05	6.99E+04	8.57E+04	7.00E+04	2.15E+05	2.04E+05	1.18E+04	2.04E+05

MO/DA/YR HR:MIN:SEC STEP	414	415	215	416	315	417	317	221	421	321
AVERAGE FLOW.....	29.824	119.283	118.829	143.542	142.005	159.946	159.918	158.437	211.181	209.061
STANDARD DEVIATION OF FLOW.....	7.224	12.798	12.784	17.978	12.243	14.029	14.026	14.032	22.142	20.467
MAXIMUM FLOW.....	241.556	353.663	352.467	559.537	406.939	461.066	458.581	447.591	697.468	555.527
MINIMUM FLOW.....	0.000	0.034	0.003	0.032	0.031	0.056	0.052	0.000	0.082	0.014
FLOW VOLUME (CUBIC FEET).....	6.35E+05	2.54E+06	2.53E+06	3.06E+06	3.02E+06	3.41E+06	3.41E+06	3.37E+06	4.50E+06	4.45E+06

MO/DA/YR HR:MIN:SEC STEP	225	220	420	320	425	427	327	229	429	219
AVERAGE FLOW.....	211.587	0.648	26.828	11.491	237.363	286.523	54.533	53.038	129.880	4.070
STANDARD DEVIATION OF FLOW.....	21.134	0.254	6.841	0.830	25.031	34.399	3.781	3.880	15.860	1.402
MAXIMUM FLOW.....	552.616	10.845	233.351	28.047	711.915	998.567	83.270	83.249	623.766	52.930
MINIMUM FLOW.....	0.000	0.000	0.000	0.001	0.000	0.012	0.000	0.000	0.048	0.000

COUNTRY CLUB BASIN
FILENAME: CCB100PC.SUM
FUTURE CONDITION WITH PROPOSED FACILITIES
EPA SWMM SUMMARY OUTPUT FILE
100-YEAR EVENT

SUMMARY OF EPA SWMM ANALYSIS
(See detailed output for more information)

City of Greeley Comprehensive Drainage Plan Update - ACE Inc.
Country Club Basin - Proposed Conditions - 100-Year Storm

SUB-BASIN INFLOWS

MO/DA/YR HR:MIN:SEC STEP	1	2	3	4	5	6	7	8	9	10
AVERAGE FLOW.....	9.340	10.248	11.902	38.242	12.010	7.529	28.044	15.996	12.639	29.836
STANDARD DEVIATION OF FLOW.....	2.642	2.688	3.342	11.110	3.312	2.096	6.452	4.193	3.438	7.595
MAXIMUM FLOW.....	99.181	85.475	123.750	423.733	123.338	73.703	188.822	133.277	122.367	252.968
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.99E+05	2.18E+05	2.54E+05	8.15E+05	2.56E+05	1.60E+05	5.97E+05	3.41E+05	2.69E+05	6.36E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	19	20	21
AVERAGE FLOW.....	3.830	8.565	8.065	23.938	6.886	22.776	21.097	31.063	31.142	62.758
STANDARD DEVIATION OF FLOW.....	1.049	2.407	2.048	6.522	1.621	6.036	5.529	8.219	8.002	17.625
MAXIMUM FLOW.....	36.019	90.154	65.534	235.196	44.971	207.854	190.773	283.109	270.411	660.954
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	8.16E+04	1.82E+05	1.72E+05	5.10E+05	1.47E+05	4.85E+05	4.49E+05	6.62E+05	6.63E+05	1.34E+06

MO/DA/YR HR:MIN:SEC STEP	22	23	24	25	26	27	28	29	30	31
AVERAGE FLOW.....	4.049	4.673	37.929	32.282	13.717	56.846	24.232	90.795	9.514	10.738
STANDARD DEVIATION OF FLOW.....	0.968	1.128	6.041	8.621	3.575	11.882	6.368	22.098	2.680	2.969
MAXIMUM FLOW.....	27.610	32.591	154.732	279.358	111.707	353.283	203.517	728.759	99.080	119.582
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	8.63E+04	9.95E+04	8.08E+05	6.88E+05	2.92E+05	1.21E+06	5.16E+05	1.93E+06	2.03E+05	2.29E+05

MO/DA/YR HR:MIN:SEC STEP	32	33	34
AVERAGE FLOW.....	5.926	11.177	11.755
STANDARD DEVIATION OF FLOW.....	1.563	3.112	2.543
MAXIMUM FLOW.....	49.931	125.496	68.390
MINIMUM FLOW.....	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.26E+05	2.38E+05	2.50E+05

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	202	602	700	701	400	203	403	303	330	430
AVERAGE FLOW.....	9.343	9.343	3.858	5.485	3.858	15.733	27.635	23.387	2.801	26.189
STANDARD DEVIATION OF FLOW.....	2.597	2.597	0.786	1.970	0.786	4.527	7.734	4.427	0.112	4.453
MAXIMUM FLOW.....	96.410	96.410	18.000	78.410	18.000	162.451	276.961	162.591	3.500	165.450
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.99E+05	1.99E+05	8.22E+04	1.17E+05	8.22E+04	3.35E+05	5.89E+05	4.98E+05	5.97E+04	5.58E+05

MO/DA/YR HR:MIN:SEC STEP	204	404	304	331	405	206	406	306	309	409
AVERAGE FLOW.....	26.118	64.359	18.894	3.655	34.559	34.345	69.917	69.905	5.553	75.458
STANDARD DEVIATION OF FLOW.....	4.418	13.025	0.660	0.140	3.095	3.092	11.427	10.658	0.711	11.013
MAXIMUM FLOW.....	166.164	423.812	21.539	4.600	135.162	132.649	390.749	302.136	28.363	305.728
MINIMUM FLOW.....	0.000	0.031	0.001	0.000	0.014	0.000	0.009	0.008	0.000	0.008
FLOW VOLUME (CUBIC FEET).....	5.56E+05	1.37E+06	4.02E+05	7.78E+04	7.36E+05	7.32E+05	1.49E+06	1.49E+06	1.18E+05	1.61E+06

MO/DA/YR HR:MIN:SEC STEP	210	410	310	308	333	433	411	616	702	703
AVERAGE FLOW.....	75.348	105.184	85.237	15.996	5.934	21.930	110.997	110.997	87.073	23.924
STANDARD DEVIATION OF FLOW.....	11.013	18.037	8.079	3.601	0.248	3.666	10.759	10.759	5.926	5.910
MAXIMUM FLOW.....	306.012	523.441	236.125	87.890	8.099	95.087	321.666	321.666	153.000	168.666
MINIMUM FLOW.....	0.000	0.016	0.000	0.000	0.000	0.000	0.005	0.005	0.005	0.000
FLOW VOLUME (CUBIC FEET).....	1.60E+06	2.24E+06	1.82E+06	3.41E+05	1.26E+05	4.67E+05	2.36E+06	2.36E+06	1.85E+06	5.10E+05

MO/DA/YR HR:MIN:SEC STEP	211	511	612	704	705	213	613	706	707	214
AVERAGE FLOW.....	86.857	23.924	8.565	3.284	5.282	3.291	11.357	10.144	1.213	10.144
STANDARD DEVIATION OF FLOW.....	5.954	5.899	2.407	0.665	1.886	0.651	2.638	2.245	0.555	2.200
MAXIMUM FLOW.....	154.868	168.778	90.154	15.000	75.154	15.155	79.940	56.000	23.940	55.993
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.85E+06	5.10E+05	1.82E+05	6.99E+04	1.12E+05	7.01E+04	2.42E+05	2.16E+05	2.58E+04	2.16E+05

MO/DA/YR HR:MIN:SEC STEP	414	415	215	416	315	417	317	221	421	321
AVERAGE FLOW.....	34.082	144.864	144.376	174.039	171.395	192.491	192.460	190.785	253.543	251.133
STANDARD DEVIATION OF FLOW.....	8.405	16.140	16.125	22.204	16.777	19.056	19.039	18.996	28.226	26.349
MAXIMUM FLOW.....	278.122	425.680	424.952	651.206	523.744	598.802	598.293	585.373	815.420	684.559
MINIMUM FLOW.....	0.000	0.019	0.001	0.017	0.017	0.030	0.028	0.000	0.045	0.008
FLOW VOLUME (CUBIC FEET).....	7.26E+05	3.09E+06	3.08E+06	3.71E+06	3.65E+06	4.10E+06	4.10E+06	4.06E+06	5.40E+06	5.35E+06

MO/DA/YR HR:MIN:SEC STEP	225	220	420	320	425	427	327	229	429	219
AVERAGE FLOW.....	260.876	1.329	32.471	16.847	293.158	350.004	85.807	83.871	174.666	5.339
STANDARD DEVIATION OF FLOW.....	28.452	0.483	8.386	1.868	33.060	43.858	5.823	5.982	18.109	1.761
MAXIMUM FLOW.....	750.361	18.855	279.540	57.875	836.225	1188.054	124.322	124.311	728.759	65.226
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.026	0.000
FLOW VOLUME (CUBIC FEET).....	5.56E+06	2.83E+04	6.92E+05	3.59E+05	6.24E+06	7.46E+06	1.83E+06	1.79E+06	3.72E+06	1.14E+05

FLOOD HYDROGRAPHS

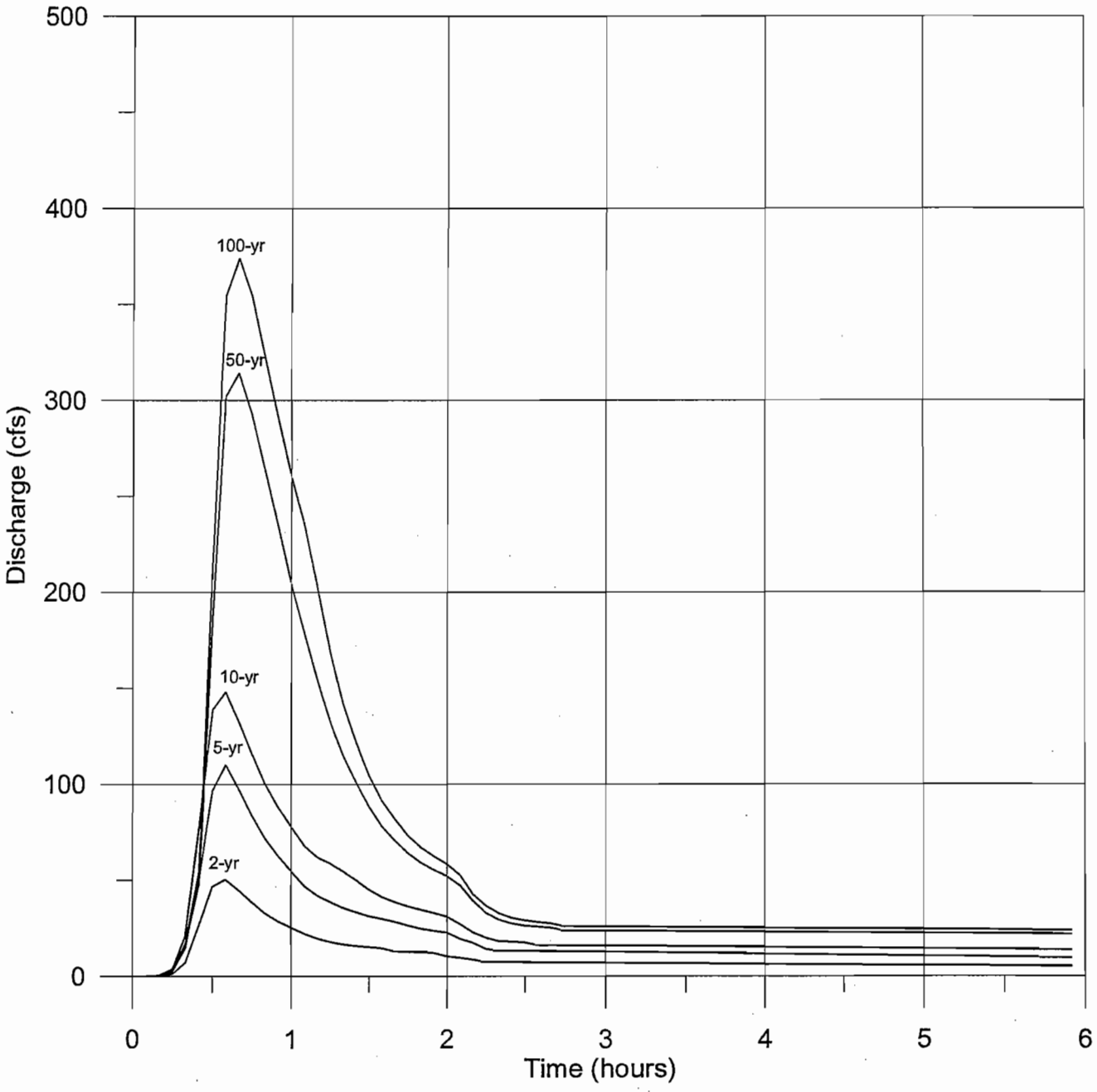

Figure D.1 Flood Hydrographs, South of 10th Street at 49th Avenue
Existing Condition (EPA SWMM Node 406)

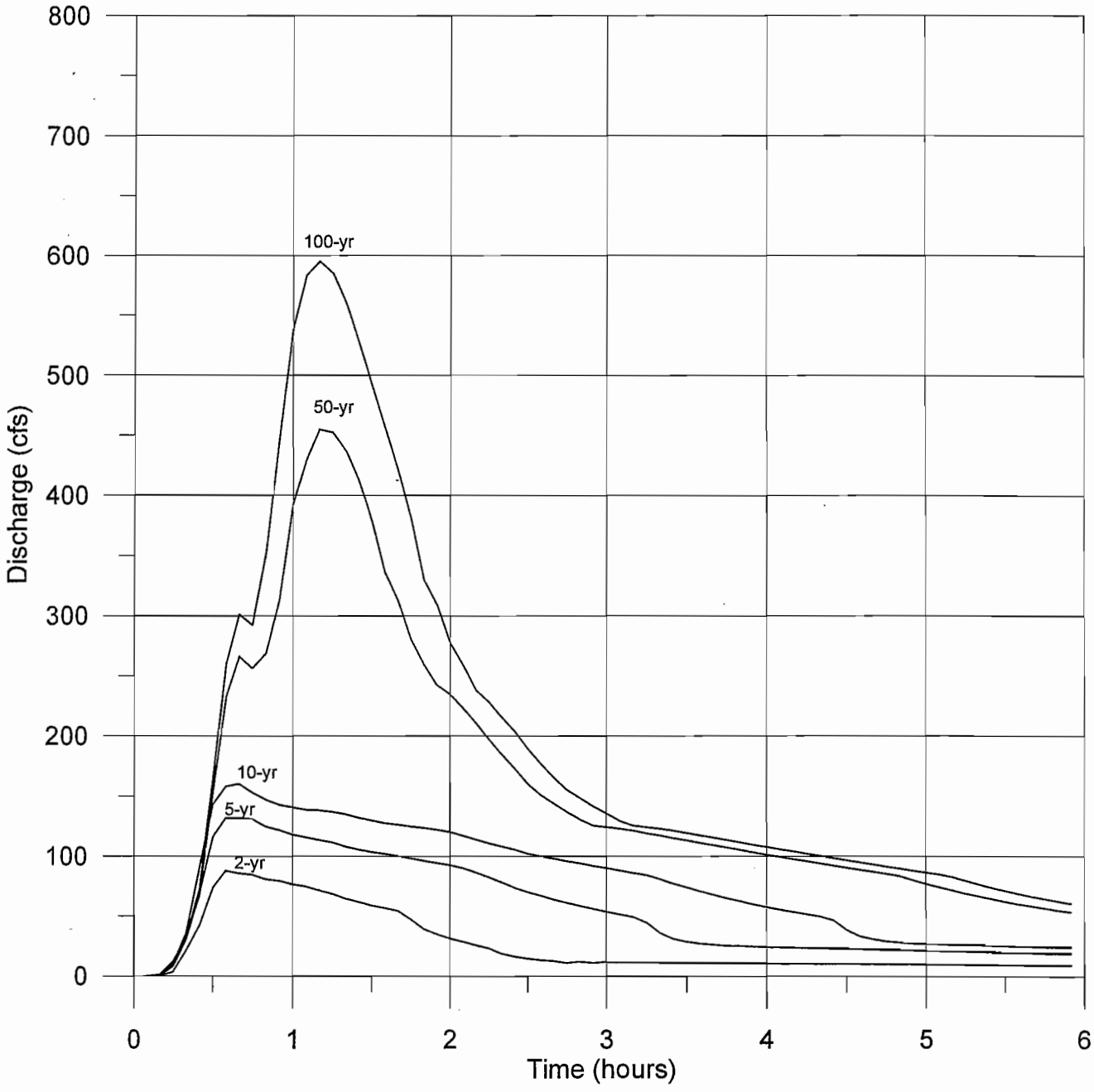

Figure D.2 Flood Hydrographs, Outflow from Epple Park at 4th Street
Existing Condition (EPA SWMM Node 317)

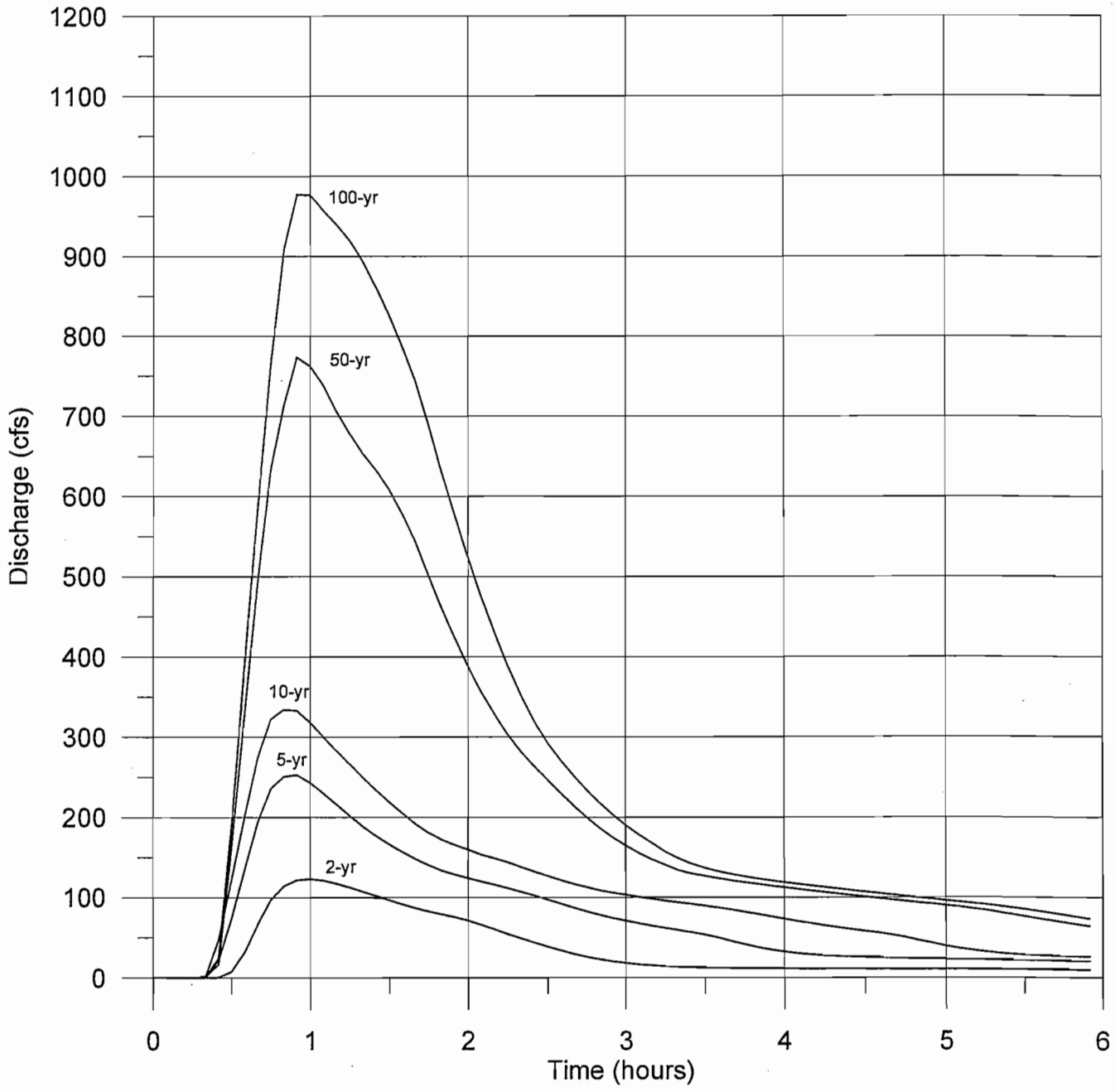

Figure D.3 Flood Hydrographs at F Street
Existing Condition (EPA SWMM Node 425)

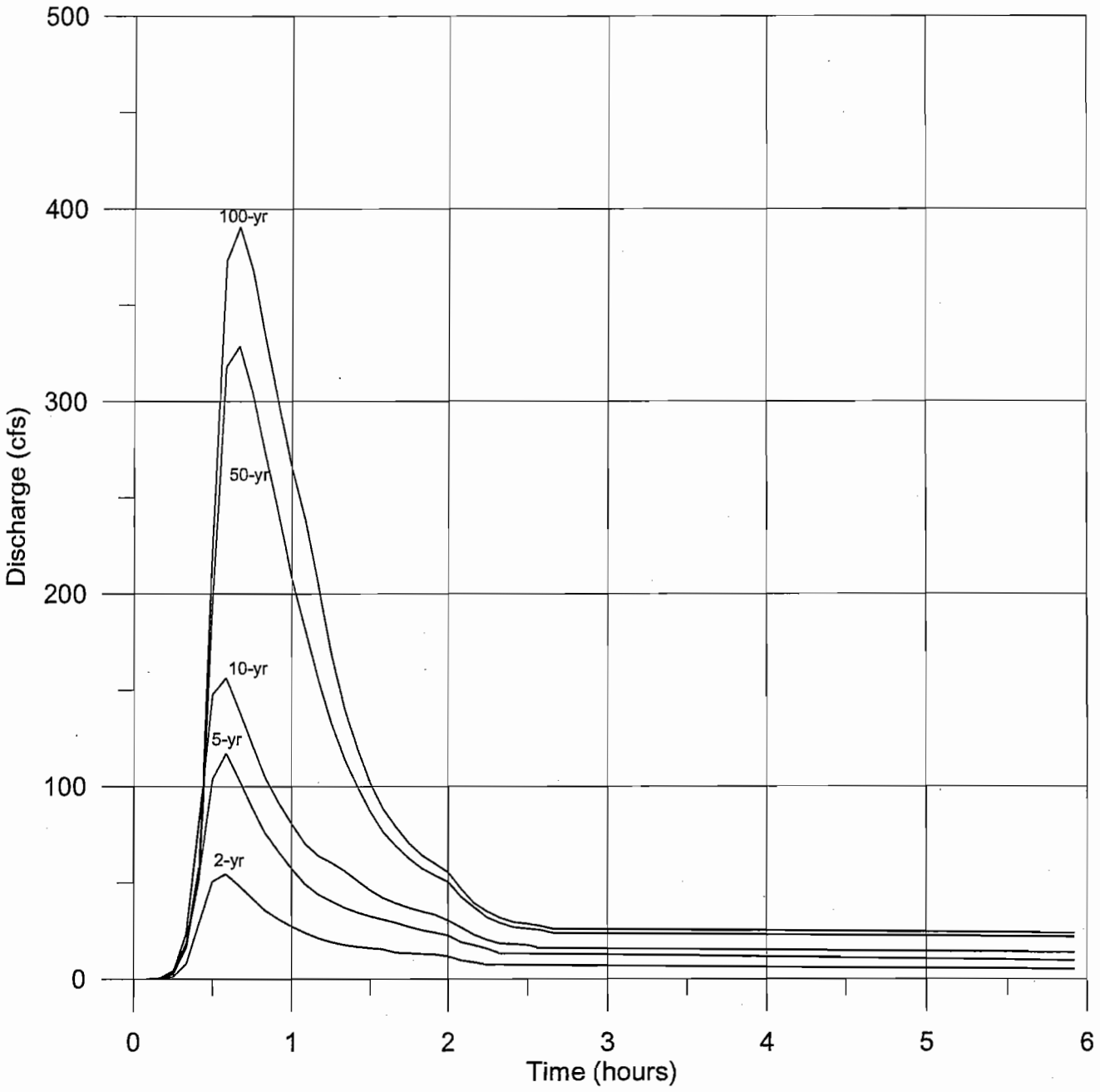

Figure D.4 Flood Hydrographs, South of 10th Street at 49th Avenue
Future Condition (EPA SWMM Node 406)

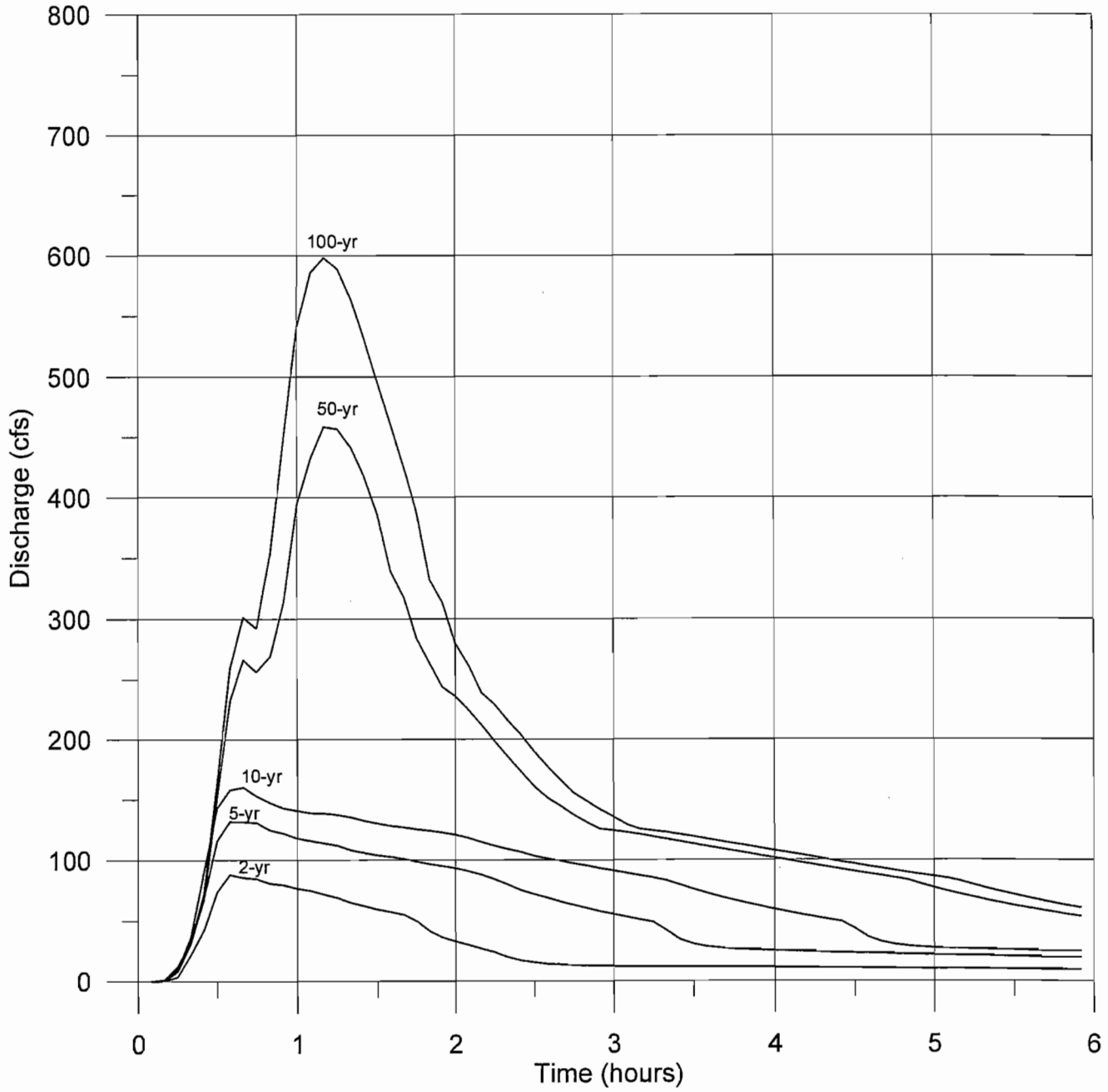

Figure D.5 Flood Hydrographs, Outflow from Epple Park at 4th Street
Future Condition (EPA SWMM Node 317)

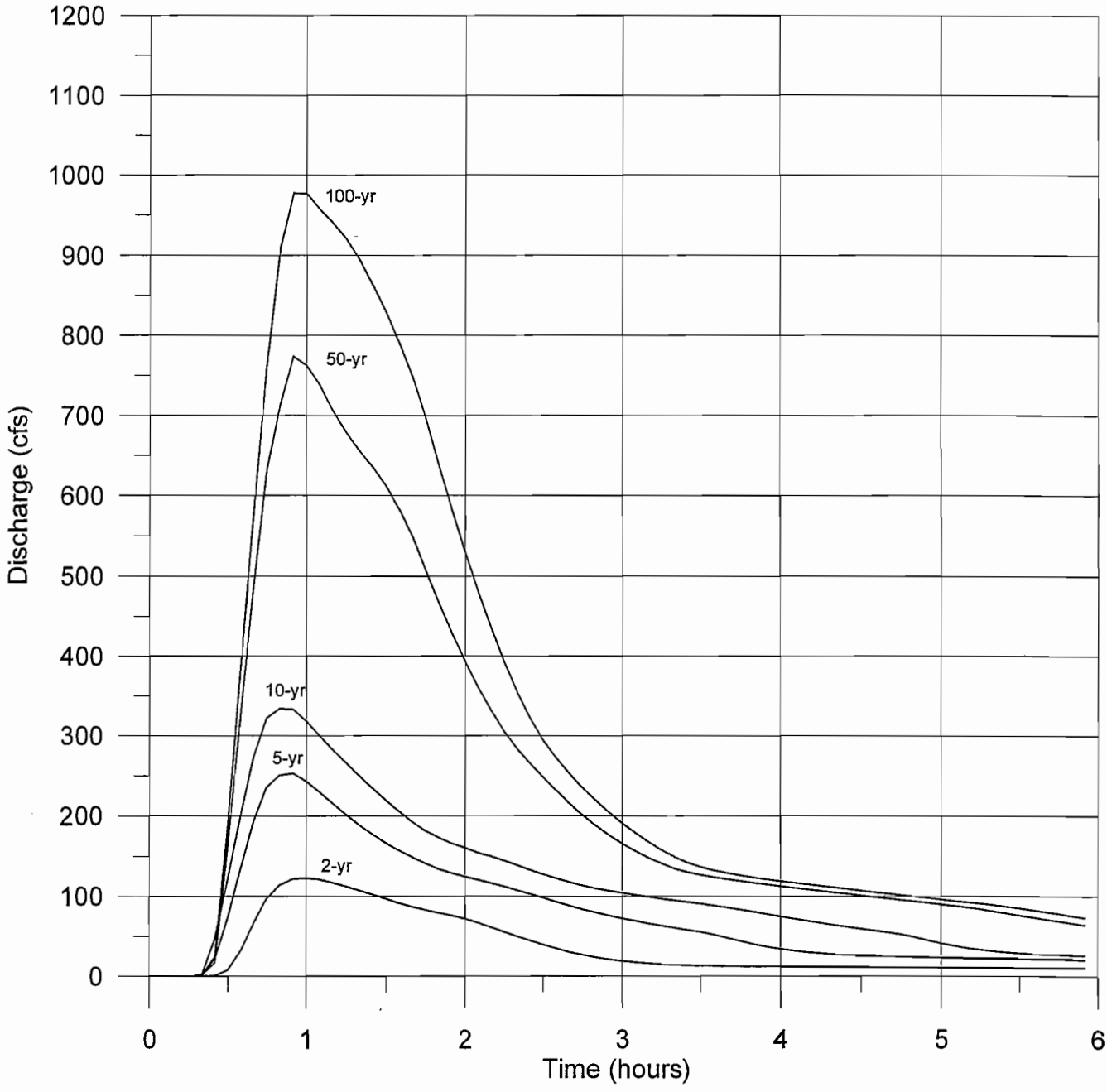

Figure D.6 Flood Hydrographs at F Street
Future Condition (EPA SWMM Node 425)

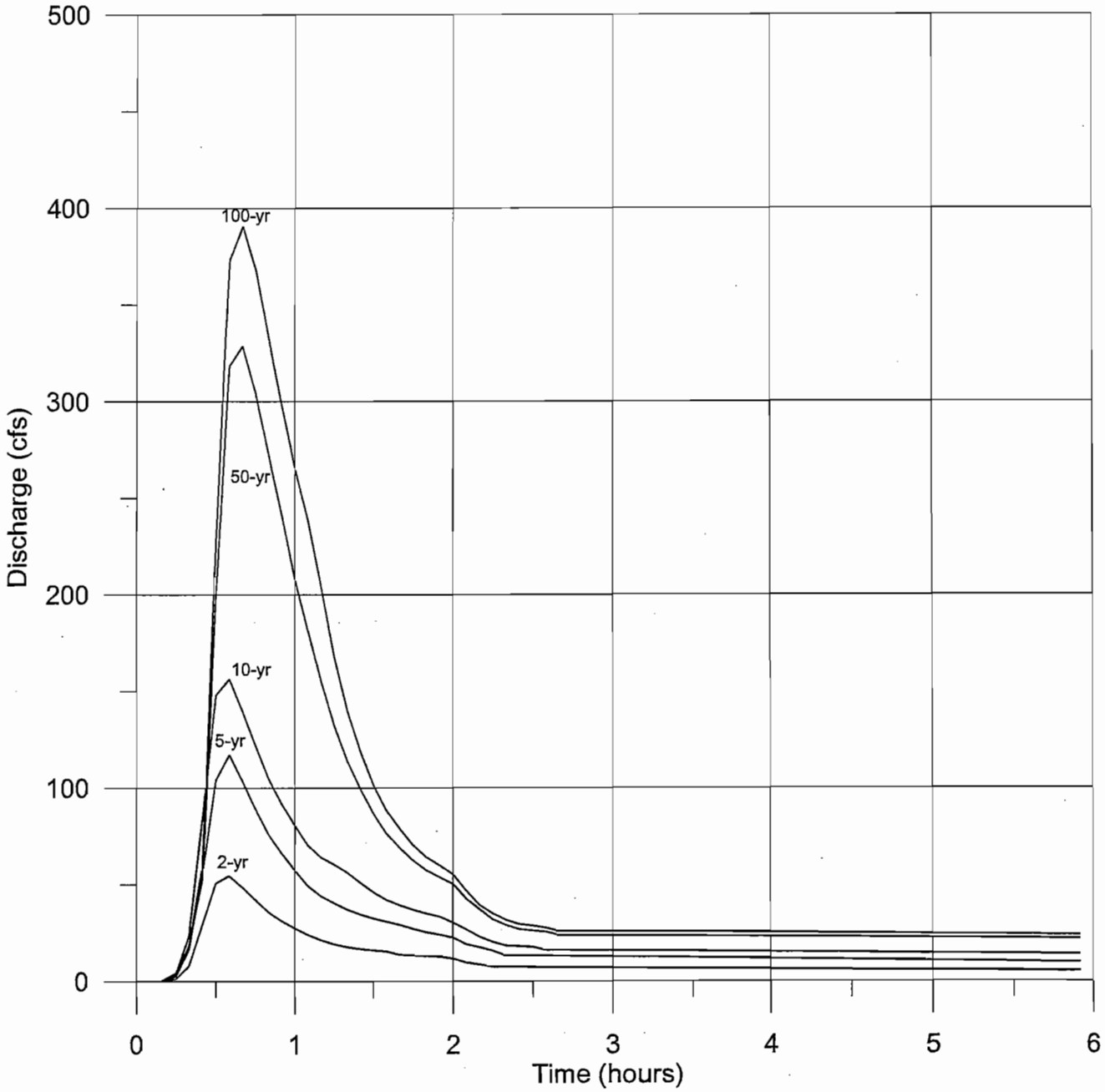

Figure D.7 Flood Hydrographs, South of 10th Street at 49th Avenue
Proposed Condition (EPA SWMM Node 406)

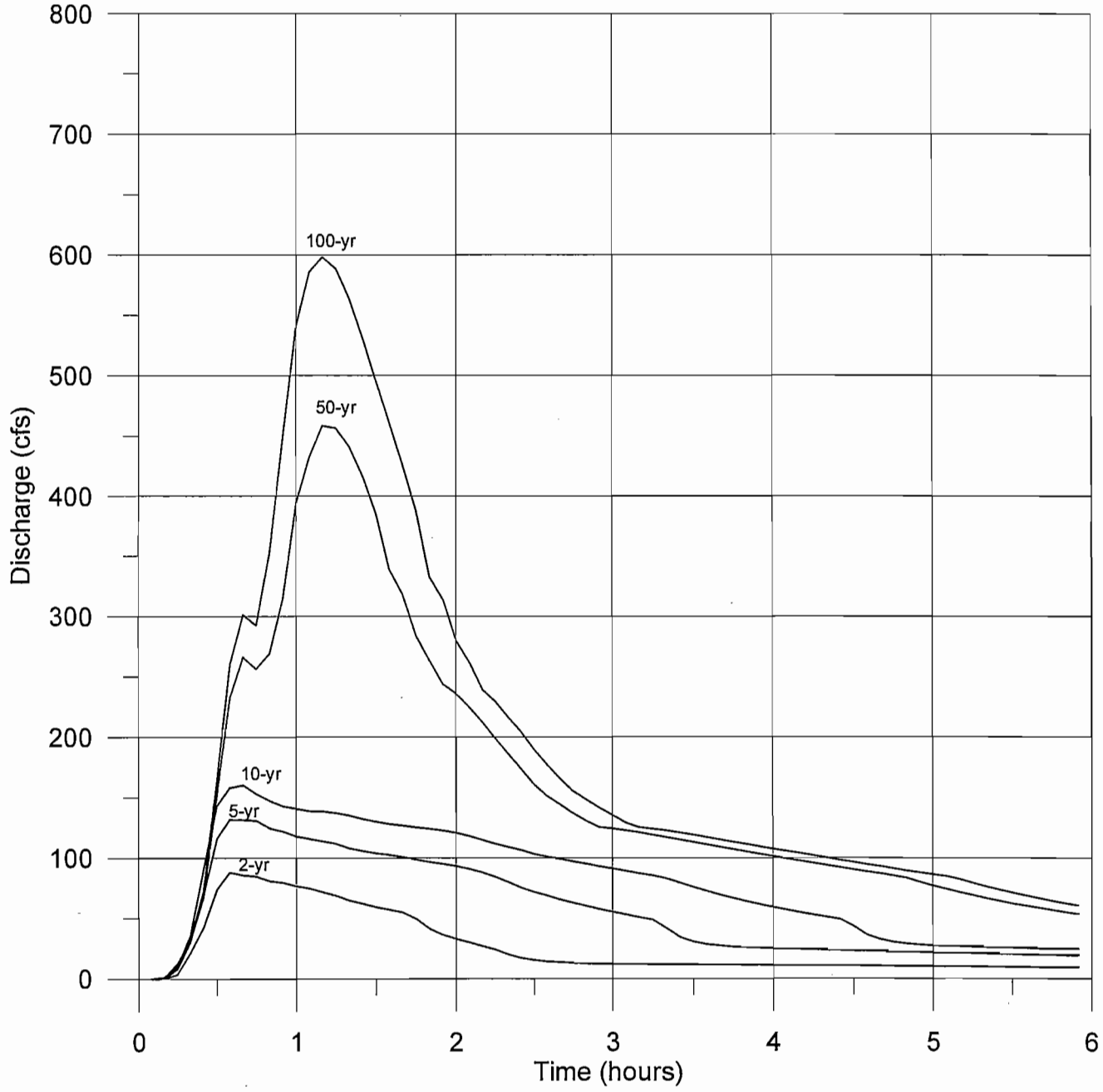

Figure D.8 Flood Hydrographs, Outflow from Epple Park at 4th Street
Proposed Condition (EPA SWMM Node 317)

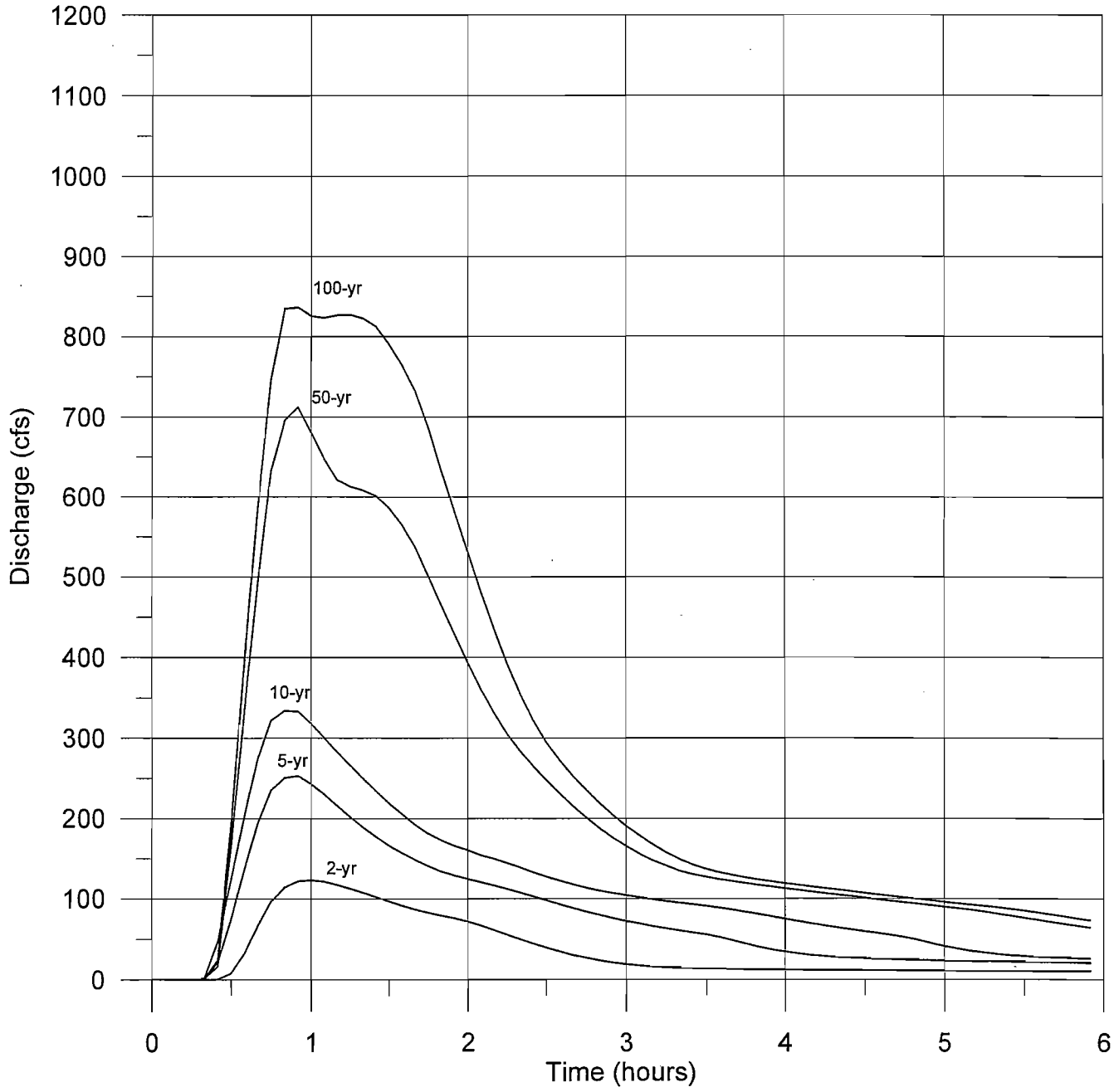

Figure D.9 Flood Hydrographs at F Street
Proposed Condition (EPA SWMM Node 425)