CITY OF GREELEY
COMPREHENSIVE DRAINAGE PLAN

SHEEP DRAW BASIN
FINAL REPORT

Prepared for:

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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 has 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 Sheep Draw Basin (Comprehensive Drainage Plan, City of Greeley, Sheep Draw Basin, Lidstone and Anderson, Inc., October 1997, revised February 1999). 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 for Sheep Draw be updated for a number of reasons, including the following two primary factors: (a) significant development has occurred within the Sheep Draw Basin since completing the 1997 Comp Plan, thereby necessitating an update of the hydrologic model for the basin; and (b) due to recent development along the Sheep Draw corridor (including grading within the floodplain) and the enlargement of several bridges and culverts along the main channel, coupled with continued development pressure, it became important to prepare an updated 100-year floodplain map along with defining a 1-foot floodway for Sheep Draw.

In support of these needs, the City of Greeley contracted with Anderson Consulting Engineers, Inc. (ACE) to update the Comp Plan for the Sheep Draw Basin, as well as the other basins that were the subject of the 1997 study. This report specifically identifies the results of the Comp Plan efforts associated with the Sheep Draw 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 Sheep Draw 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 drainage 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 along Sheep Draw within the City of Greeley.

The objectives of the current study are commensurate with those identified for the 1997 Comp Plan; however, the specific goals of the current study are to:

(a) update the previous Comp Plan to reflect existing condition hydrology based on recent development and, based on the revised hydrologic model for existing conditions, modify both the future and proposed condition hydrologic models;

(b) update hydraulic analyses along the main Sheep Draw channel to more accurately define the 100-year floodplain, as well as to define the 1-foot floodway; and

(c) perform several alternative analyses including a detailed evaluation of utilizing regional versus on-site detention in the basin, and an evaluation of the issues surrounding construction of both on-site detention ponds and pedestrian bridges within the Sheep Draw 100-year floodplain.

All objectives were important in the current Comp Plan update; however, the primary focus of this Comprehensive Drainage Plan remains the reduction of existing and potential future flood damages and hazards along the main Sheep Draw channel 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 Sheep Draw Basin, including all background data and modeling information; (b) all development that

has occurred within the Sheep Draw 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, as-built, and proposed information regarding Sheep Draw crossing facilities, including the 10th Street bridge and pedestrian bridge, the 83rd Avenue bridge, and the culvert additions at both 95th Avenue (Weld County Road 25) and the U.S. Highway 34 Bypass; and (d) available GIS data within the basin, including but not limited to 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, including those associated with recent development; (b) site visits to locations of recent improvements along the main Sheep Draw channel; and (c) a general basin-wide evaluation of changes since the 1997 Comp Plan.

2. Surveying of Existing Facilities. Field survey data was collected by the City of Greeley at the following Sheep Draw crossings: the 10th Street bridge, the bike path just south of the 10th Street bridge, and at 71st Avenue. Surveying efforts were limited to centerline of road shots for the development of a road overtopping profile, a channel cross section at the upstream face of each structure, and physical measurements (eg., bridge deck thickness) of each structure. The information was used to update the Sheep Draw hydraulic model as well as provide a basis for comparison of the information to the TIN used in development of the model. King Surveyors, Inc. of Windsor, Colorado collected additional field survey data for the 1997 Comp Plan, including main stem and off-line structure information to update both the hydrologic and hydraulic models.

3. 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 incorporation of all new detention facilities with either a combined pond volume or a single pond volume of approximately two acre-feet or greater. For the future development/Comp Plan facilities condition, the task included the incorporation of all previously anticipated on-site detention facilities to represent the staged release of developed condition runoff from the 10-year and 100-year storm events at 5-year and 100-year historical runoff rates, respectively. A comparison of current existing condition discharges to those estimated for the 1997 Comp Plan was completed in order to evaluate discharges changes along Sheep Draw.

4. Update of the Sheep Draw Hydraulic Model and Floodplain Map. The previous hydraulic model was converted from HEC-2 to a steady flow HEC-RAS model. The model was updated to reflect new geometry from the following two sources: (a) recent grading activities associated with development and structure improvement along Sheep Draw since the 1997 Comp Plan analysis (generally 1-foot contour mapping); and (b) the City of Greeley's 2-foot contour mapping, last updated in 1992, but not used in preparing the 1997 model. Crossing structure modifications included the 10th Street Bridge and

pedestrian bridge (construction completed by CDOT in January 2000), the proposed 83rd Avenue Bridge (constructed by Weld County during the winter of 2004-05), and the 95th Avenue (Weld County Road 25)/U.S. Highway 34 Bypass culvert additions (construction completed by CDOT in November 1999). The 100-year, existing development/existing facilities discharge profile was tabulated along the main stem of Sheep Draw, hydraulic conditions were analyzed, and the floodplain was mapped on the best available detailed topographic information. A one-foot rise floodway was also computed and mapped, and 100-year graphical flood profiles were prepared.

5. Evaluation of the Proposed Leisure Center Regional Detention Pond. An evaluation of a proposed regional detention pond along the north side of Sheep Draw adjacent to the City of Greeley's Leisure Center site was conducted in the context of the hydrologic model for the entire basin. The analysis considered the potential operation of the pond, possible implications with regard to on-site detention requirements upstream of this location, and potential stability issues with respect to the Sheep Draw channel.

6. Evaluation of Regional Detention versus On-Site Detention. Subbasin 18 from the 1997 Comp Plan was chosen as a test case for a detailed evaluation of regional detention versus on-site detention in the Sheep Draw Basin. Potential drainage facility requirements in the subbasin, including detention and conveyance elements, were conducted for both regional and on-site scenarios. Hydrologic models were prepared to assist in the evaluation of both conditions. Drainage facilities were hydraulically designed at a level of detail necessary to support the preparation of conceptual cost estimates. For the regional detention scenario, the analyses and capital improvement cost estimates were completed for two alternatives: a dry detention pond and a wet detention pond. A comparison of the on-site detention and two regional detention scenarios was completed.

7. Evaluation of the Construction of On-Site Detention Ponds Within the 100-Year Sheep Draw Floodplain. An evaluation of on-site detention ponds located within the 100-year Sheep Draw floodplain was conducted in an effort to ascertain the efficacy of allowing the construction of future ponds in the floodplain. Consideration of local hydraulic conditions, effectiveness of the detention ponds in the context of local versus regional hydrologic response within the basin, and potential erosion issues within the Sheep Draw channel were evaluated.

8. Evaluation of Site Grading or the Construction of Improvements Within the 100-Year Sheep Draw Floodplain. In response to trail development pressure, including the probable need for numerous crossings of Sheep Draw, analyses were conducted in an attempt to simplify future trail crossing design and analyses. This evaluation was conducted in the context of the City's no-rise criteria, which will be commensurate with the Federal Emergency Management Agency (FEMA) no-rise criteria for the one-foot floodway once the floodway is adopted along Sheep Draw. Based on this evaluation, specific recommendations were made with respect to footbridge crossings over Sheep Draw.

9. Final Report Documenting the Updated Sheep Draw 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 the current Comp Plan update was obtained from the City of Greeley GIS department. This 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 mass points (100-foot grid spacing) 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 (NGVD) was used for vertical control, for development of the mapping. A 2-foot contour map was specifically generated to facilitate completion of the Comp Plan for Sheep Draw Basin.

Specifically with respect to preparing floodplain mapping for Sheep Draw, detailed existing, design, and/or as-built topography associated with individual developments or improvement projects was used. These mapping sources are listed and described in more detail in Section 5.2 of Chapter 5 pertaining to the hydraulic analyses related to Sheep Draw. In addition, the City of Greeley provided specific survey data at three crossings of Sheep Draw, including 10th Street, the 10th Street pedestrian bridge, and 71st Avenue. All survey data collected by the City of Greeley in November 2004 is included in Section 1.1 of the Project Notebook. Field survey data collected by King Surveyors, Inc. of Windsor, Colorado for the 1997 Comp Plan is included in Section 1.2 of the Project Notebook.

1.4 Previous Studies

Previous studies related to stormwater management within the Sheep Draw Basin were collected and reviewed during the completion of the 1997 Comp Plan project. Although a comprehensive hydrologic analysis was not completed for this basin as part of the 1974 Comp Plan, a special study of the Sheep Draw Basin was conducted by the U.S. Army Corps of Engineers (USACE) in October 1981. The USACE study involved a hydrologic and hydraulic analysis of the basin that resulted in the delineation of the 100-year floodplain along Sheep Draw. Pertinent hydraulic data and modeling documentation (HEC-2) from the USACE study were reviewed and utilized during the hydraulic evaluation of existing crossing structures and the development of corridor plans as part of the 1997 Comp Plan. The 1997 Comp Plan also included modifications to the USACE HEC-2 modeling efforts in order to reflect intervening

improvements to the bridge crossings and peak discharge data generated during that master planning study.

Several other drainage studies associated with development within the basin were also collected for the 1997 Comp Plan. These reports included: (a) "Allison Farm 2nd Filing – Final Drainage Report", (Nelson Engineers, October 1994); (b) "Industrial Site, Business Highway U.S. 34 and 71st Avenue, Greeley, Colorado – Preliminary Drainage Report", (CH2M Hill, Inc., June 1981); (c) "EFTC Addition – Site Drainage Report, Dundee Avenue, Greeley, Colorado", (KLH Engineering Group, August 1994); and (d) "Drainage Report – Tech Center at Boomerang Run", (Norton, Underwood and Lamb, Inc., June 1990). The information gathered from these reports, including the available design drawings and specifications, was evaluated and utilized during the completion of the 1997 Comp Plan effort.

In addition to the 1997 Comp Plan and the documents referenced in that report, the current study utilized numerous drainage reports and local topographic information associated with recent development in the basin. Topographic references are provided in Section 5.2 of this report, while all drainage reports are identified in Section 8.2 of the Project Notebook.

II. BASIN CHARACTERISTICS

2.1 Location and Description

The Sheep Draw Basin is located in one of the more rapidly growing areas within the City of Greeley. The basin limits are approximately defined by the Cache La Poudre River on the north, 59th Avenue on the east, Weld County Road 54 on the south, and State Highway 257 on the west. The drainage basin boundaries are delineated on the vicinity map in Figure 2.1.

The total drainage area encompassed within the Sheep Draw Drainage Basin is 11,381 acres, of which approximately 34 percent is developed; as a point of reference, the basin was approximately 5 percent developed in 1996. Primary land use within the basin is agricultural, which comprises about 7,300 acres. Significant development has occurred in the eastern half of the basin (from approximately 95th Avenue to 59th Avenue), while the western half of the basin (from approximately Weld County Road 19 to 95th Avenue) has remained largely undeveloped, with the exception of local commercial and residential development immediately east of the U.S. Highway 34 Business/Bypass interchange. Of the area that is developed, the land use consists of low, medium, and high-density residential housing developments (approximately 3,170 acres), industrial/commercial districts (approximately 780 acres), parks and golf courses, and schools. Also, an effort is being made to preserve an open space/wildlife habitat corridor along the main Sheep Draw channel, with approximately 125 acres set aside for this purpose to date. In addition, approximately 3,680 acres of the basin remain under Weld County jurisdiction and have not been annexed by the City of Greeley; however, the entire Sheep Draw Basin lies within the City of Greeley's Long Range Expected Growth Area (LREGA) limits, which represent the expected twenty-year growth area boundary.

2.2 Drainage Features

Within this basin, the Sheep Draw channel is the most predominant drainage feature, traversing the central portion of the basin in a northeasterly direction. Several minor tributaries exist within the watershed to collect and convey stormwater runoff into Sheep Draw. Numerous local arterials, county roads, state and federal highways cross Sheep Draw and its tributaries. Except for several recently enlarged structures, these road crossings tend to constrict the channel and create the potential for detention, flooding of adjacent property, and the overtopping of roadways during major thunderstorm events. In the upper portion of the basin, four irrigation reservoirs serve to partially detain stormwater conveyed to the reservoirs from Sheep Draw and its tributaries.

The Cache La Poudre River, which defines the northern boundary of the basin, represents the second notable drainage feature. The river receives all the stormwater runoff that is generated within the watershed. The 100-year floodplain associated with the Cache La Poudre River (updated by the U.S. Army Corps of Engineers in 2003) encompasses approximately 3 percent (303 acres) of the Sheep Draw Basin.

Two irrigation ditches, the Boomerang Ditch and the Greeley No. 3 Ditch, also traverse the Sheep Draw Basin. These ditches convey irrigation flows within the basin, but offer limited value as drainage features that convey stormwater runoff out of the basin. Due to the magnitude of the stormwater flows generated upstream of these irrigation ditches during moderate to large storm events, they do not necessarily represent drainage boundaries within the basin. These drainage features along with the limits of the 100-year floodplain associated with the Cache La Poudre River (updated by the U.S. Army Corps of Engineers in 2003) are presented on the existing drainage facilities map provided on Sheet B-1 in Appendix B of this report.

2.3 Description of the Major Drainageway

The Sheep Draw Basin consists of a rapidly developing watershed with a well-defined major drainage channel. Several minor tributaries that convey runoff into Sheep Draw also exist within the basin. In general, stormwater runoff generated within the basin flows into Sheep Draw and is conveyed in a northeasterly direction toward the Cache La Poudre River.

The main flow path originates west of State Highway 257, and south of the U.S. Highway 34 Bypass. At the crossing of State Highway 257, runoff is detained behind the road embankment that incorporates a crossing structure consisting of a 24-inch RCP. East of State Highway 257, stormwater runoff collected by Sheep Draw is conveyed into an existing irrigation reservoir. The irrigation reservoir also captures runoff that is carried by three minor tributaries located within the upper Sheep Draw Basin. Runoff detained by the reservoir is released into Sheep Draw and flows in a northeasterly direction toward the intersection of 95th Avenue (Weld County Road 25) and the U.S. Highway 34 Bypass. In 1999, these two crossings were improved concurrently with the addition of a reinforced concrete box culvert (RCB) at each location. A 6'W x 6'H RCB was added to supplement the existing 14'W x 6'H RCB at the U.S. Highway 34 Bypass, and a 6'W x 7'H RCB was added to supplement the existing 14'W x 7'HW RCB at 95th Avenue. These culverts are utilized to cross both roadways as Sheep Draw continues to the northeast.

Immediately south of the U.S. Highway 34 Bypass, along the west side of 95th Avenue, an off-line irrigation reservoir detains stormwater collected by a major tributary to Sheep Draw. Runoff released from the irrigation reservoir is conveyed beneath the 95th Avenue/U.S. Highway

34 Bypass intersection via a 66-inch RCP and ultimately into Sheep Draw immediately east (downstream) of 95th Avenue. Stormwater runoff is conveyed from this intersection in a northeasterly direction toward 83rd Avenue. The bridge crossing at 83rd Avenue (replaced by Weld County in the winter of 2004-05) provides conveyance for stormwater flows within Sheep Draw. Two minor tributaries (one each on the left and right bank) contribute runoff to the flows within Sheep Draw between 95th Avenue and 83rd Avenue.

As Sheep Draw continues to the east, one major right bank tributary collects runoff and flows into the major drainage channel. Downstream of this confluence, stormwater is conveyed within the major drainage channel and beneath bridge crossings at 71st Avenue and 10th Street. In 2000, the crossing at 10th Street was replaced and enlarged; immediately upstream of this crossing a pedestrian bridge was added over the Sheep Draw low flow channel.

At 10th Street, the alignment of Sheep Draw turns to the north, with flows being directed ultimately toward the Cache La Poudre River. Between 10th Street and the river, Sheep Draw conveys stormwater runoff beneath bridges located at 4th Street and C Street. Finally, Sheep Draw crosses the Greeley No. 3 Ditch before flowing into the Cache La Poudre River. At the Greeley No. 3 Ditch, a diversion structure is utilized to capture stormwater in the ditch and either convey water within the ditch section or into the Sheep Draw channel. Due to the limited capacity of the Greeley No. 3 Ditch, the magnitude of the potential stormwater inflows, and the hydraulic inefficiency of the existing diversion structure, most runoff captured by the ditch overtops the northern bank and is ultimately conveyed toward the river. Figure 2.2 illustrates the diversion structure at the confluence of Sheep Draw and the Greeley No. 3 Ditch.

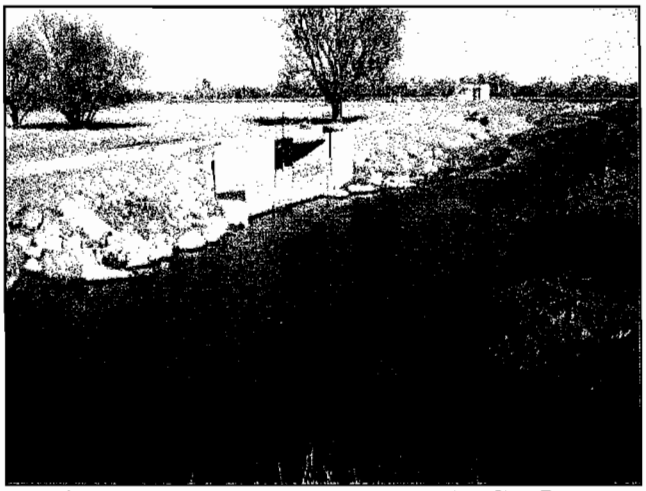

Figure 2.2 Diversion Structure at the Confluence of Sheep Draw and the Greeley No. 3 Ditch.

From the upper basin to the confluence with the Cache La Poudre River, the Sheep Draw channel varies from a broad, poorly-defined to a relatively well-defined, low flow channel with distinctive floodplain terraces. Minor erosion of the channel is evident at several locations; this erosion is frequently associated with livestock watering and access. In general, active erosion of the channel bed and banks is not prevalent throughout the basin; however, it is evident from 2003 aerial photographs of the Sheep Draw Basin that a reach of the low flow channel between 10th Street and 4th Street was cut off, apparently due to the large storm event that occurred in June 1997.

The Sheep Draw channel and floodplain are heavily encroached with vegetation. The vegetative species vary from rangeland grasses and shrubs to willows and large deciduous trees, intermingled with dense stands of wetland grasses and shrubs. The existing wetlands within Sheep Draw appear to be confined within the 100-year floodplain. An example of vegetation along Sheep Draw, in this case east of 71st Avenue, is shown in Figure 2.3.

Figure 2.3 Wetland and Riparian Vegetation along Sheep Draw East of 71st Avenue.

Sheet B-1 in Appendix B of this report presents a map showing the location of the major drainageway and major crossing structures within the basin, along with the location of the major tributaries of Sheep Draw. A detailed description of the existing detention facilities/reservoirs, including major road crossings, is provided in Chapter 3.

III. INVENTORY OF EXISTING FACILITIES

Local and regional detention ponds, storm sewers, and conveyance channels comprise the network of drainage facilities that provide flood relief during the minor storm events within the Sheep Draw Basin. Existing storm drainage facilities within the basin are largely associated with the extensive development that has occurred since the completion of the 1997 Comp Plan. Most developments within the Sheep Draw Basin are required to provide detention as set forth by the 1997 Comp Plan; based on investigation conducted as part of the current study, most have generally followed those guidelines. Due to the significant land development that has occurred within the basin since the completion of the 1997 Comp Plan, structures within the basin and along Sheep Draw that were investigated for the current Comp Plan include local and regional detention provided by associated developments as well as new, improved, and proposed road crossings.

The previous (1997 Comp Plan) inventory of flood control facilities was supplemented by the inventory of new facilities conducted for the current study. All existing facilities inventoried in the 1997 Comp Plan were retained for modeling purposes in the current Comp Plan, and modified as necessary. Photographic documentation of all facilities inventoried for the 1997 Comp Plan is provided in Section 7 of the Project Notebook; additional photos taken during recent field reconnaissance efforts are also provided. New facilities added since the 1997 Comp Plan were also inventoried and evaluated. The inventory and evaluation of the new facilities involved the following: (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 hydraulic capacity. Specific information related to the new facilities is provided in the following paragraphs.

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 the major drainageway, few detention facilities exist that provide effective reduction of peak discharges during minor and major storm events. The detention facilities that do exist along the major drainageway are not related to land development and can be classified as either: (a) irrigation reservoirs with detention storage capacity above the spillway elevation; or (b) detention storage created by roadway embankments. Several additional irrigation reservoirs were also identified within the basin. Those irrigation reservoirs/detention facilities that tend to reduce the peak discharges in Sheep Draw were specifically investigated.

Minor detention facilities also exist within the Sheep Draw Basin. These minor facilities provide for a reduction in peak flows locally but offer no significant reduction of peak flows along the major drainageway. Consequently, they were not specifically evaluated during the 1997 Comp Plan effort. A summary of the location, condition, and capacity of the major detention facilities within the basin is included in Table 3.1.

Table 3.1 Inventory of Existing Drainage Facilities.

Facility Name and/or Type	Location [EPA SWMM ID]	Condition	100-Year Storage Volume (acre-feet)	Maximum Discharge Capacity[1] (cfs)
Highway 257 Detention Pond	West of Highway 257 Road Crossing [301]	fair, small culvert outlet	46.2	0[2] 165
Irrigation Reservoir #1	Southwest of US 34 Bypass and 95th Avenue Intersection [304]	fair, no principal spillway	27.6[4]	0[2] 1,597[3]
Irrigation Reservoir #2	Southwest of US 34 Bypass and 95th Avenue Intersection [309]	fair, no principal spillway	10.7[4]	0[2] 218[3]
Irrigation Reservoir #3	East of 95th Avenue, South of US 34 Bypass [313]	fair, no principal spillway	25.3[4]	0[2] 471[3]
95th Avenue Detention Pond	Adjacent to 95th Avenue, South of US 34 Bypass [312]	fair, small culvert outlet	11.7	0[2] 557[3]
Irrigation Reservoir #4	Downstream of 95th Avenue Detention Pond [311]	fair, six small culvert outlets	24.3	163[2] 591[3]
US Highway 34 Bypass Culverts	West of 95th Avenue Intersection [508]	fair, partial sediment blockage	NA	2,080
95th Avenue Culverts	North of US 34 Bypass Intersection [509]	fair, partial sediment blockage	NA	2,425
83rd Avenue Bridge	North of 20th Street [123]	fair, vegetation encroachment	NA	5,495
71st Avenue Bridge	South of 10th Street [134]	fair, vegetation encroachment	NA	1,070
10th Street Bridge	Between 59th Avenue and 71st Avenue [525]	good	NA	9,900
4th Street Bridge	Between 59th Avenue and 71st Avenue [529]	good	NA	9,020
C Street Bridge	West of 59th Avenue [533]	fair, limited capacity	NA	615
95th Avenue Culvert	95th Avenue and US 34 Bypass Intersection [311]	fair, partial sediment blockage	NA	350
Irrigation Reservoir #5	Southwest of 4th Street and 59th Avenue Intersection [N/A]	fair, no principal spillway	2.1[4]	0[2] 74[3]
Greeley No. 3 Ditch	Traverses Northern Portion of Basin [N/A]	fair	NA	100

[1] Maximum discharge capacity prior to flooding or street overtopping.
[2] Discharge when water surface is at invert of emergency spillway.
[3] Combined outlet and spillway discharge with surcharged storage capacity.
[4] For existing reservoirs with no principal outlet, maximum storage measured from crest of emergency spillway to 100-year water surface elevation.

State Highway 257 Detention Pond. This detention pond is located at the western limits of the basin immediately west of State Highway 257. The roadway embankment associated with State Highway 257 is elevated approximately 5.5 feet above the invert of the 24-inch RCP that drains the detention area. The outlet pipe was assumed to be blocked with debris for the purposes of the 1997 Comp Plan effort. The volume provided behind the roadway embankment prior to overtopping is 41.6 acre-feet; full retention is provided for the 10-year existing conditions event. The 100-year existing conditions discharge is 165 cfs, which corresponds to a storage volume of 46.2 acre-feet and an overtopping depth of approximately 0.4 feet.

Irrigation Reservoir #1. This detention facility is an existing irrigation reservoir located on Sheep Draw approximately one mile southwest of the intersection of the U.S. Highway 34 Bypass and 95th Avenue. The reservoir has additional detention storage capacity above the normal water surface; storm flows are evacuated through an earthen spillway in the embankment. For the purposes of the 1997 Comp Plan effort, the initial water surface was assumed to be at the elevation of the spillway crest. The 100-year existing conditions discharge through the spillway is 1,597 cfs, which corresponds to a storage volume of 27.6 acre-feet and a depth of approximately 2.7 feet above the spillway crest.

Irrigation Reservoir #2. This detention pond is an existing irrigation reservoir located on a tributary to Sheep Draw approximately 3,000 feet west of 95th Avenue and immediately north of the Boomerang Ditch. The pond has additional detention storage capacity above the normal water surface; storm flows are released through a concrete-lined spillway. For the purposes of the 1997 Comp Plan effort, the initial water surface was assumed to be at the elevation of the spillway crest. The 100-year existing conditions discharge through the spillway is 218 cfs, which corresponds to a storage volume of 10.7 acre-feet and a depth of approximately 2.6 feet above the spillway crest.

Irrigation Reservoir #3. This existing irrigation reservoir is located east of 95th Avenue immediately downstream of the Boomerang Ditch on a tributary to Sheep Draw. The pond has additional detention storage capacity above the normal water surface; storm flows are released through an asphalt-lined spillway. Assuming the initial water surface corresponds to the elevation of the spillway crest, the 100-year existing conditions discharge through the spillway is 471 cfs. During the 100-year event, this corresponds to a storage volume of 25.3 acre-feet and a depth of approximately 2.5 feet above the spillway crest.

95th Avenue (Weld County Road 25) Detention Pond. This detention facility is located downstream of Irrigation Reservoir #3 and immediately east of 95th Avenue. The roadway embankment associated with 95th Avenue is elevated approximately 7.5 feet above the invert of the 24-inch CMP, which conveys flows under the roadway. The outlet pipe was assumed to be blocked with debris for the purposes of the 1997 Comp Plan effort. The volume provided behind the roadway embankment prior to overtopping is 8.6 acre-feet; full retention is provided for the

5-year existing conditions event. The 100-year existing conditions discharge is 557 cfs, which corresponds to a storage volume of 11.7 acre-feet and an overtopping depth of approximately 1.0 foot.

Irrigation Reservoir #4. This existing irrigation reservoir is located on a tributary to Sheep Draw downstream of the 95th Avenue Detention Pond and west of 95th Avenue. The reservoir has additional detention storage capacity above the normal water surface. Storm runoff captured by the reservoir is released through six 24-inch RCP's; additional discharge beyond the capacity of the RCP's will overtop the reservoir embankment. For the purposes of the 1997 Comp Plan effort, the normal water surface was assumed to be the invert elevation of the six RCP's. Approximately 21.7 acre-feet of volume is stored in the reservoir prior to overtopping the dam embankment in the vicinity of the outlet pipes. The 100-year existing conditions discharge from the reservoir is 591 cfs, of which 163 cfs is conveyed through the pipes. The 100-year storage volume is 24.3 acre-feet, which corresponds to a ponding depth of approximately 4.2 feet above the invert of the outlet pipes and an overtopping depth of approximately 0.8 feet above the reservoir embankment.

Irrigation Reservoir #5. This facility is an existing irrigation reservoir located on a tributary to Sheep Draw southwest of the intersection of 4th Street and 59th Avenue. The pond has additional detention storage capacity above the normal water surface; storm flows are released through an earthen spillway in the pond embankment. Due to the Pumpkin Ridge development immediately west and downstream of the reservoir, it was assumed that all reservoir releases would be further detained by the most downstream on-site detention pond provided by the development, with the reservoir being included in the subbasin, and the on-site ponds controlling the overall subbasin release rate. Therefore, 100-year discharges, storage volumes, and overtopping depths were not computed for the current Comp Plan Update; however, they are provided from the 1997 Comp Plan. Assuming the normal water surface rests at the elevation of the spillway crest, the 100-year existing conditions discharge through the spillway is 74 cfs, which corresponds to a storage volume of 2.1 acre-feet and a depth of approximately 1.0 foot above the invert of the spillway.

3.2 Major Road Crossings

There are seven major road crossings on the main stem of Sheep Draw, and one off-line crossing on a major tributary to Sheep Draw. The lower five crossings are bridges over Sheep Draw; the remaining two crossings are reinforced box culverts. The capacity of each crossing was calculated using the HEC-RAS River Analysis System program, using the bridge/culvert analysis routines. Table 3.1 includes a summary of the location, condition, and hydraulic

capacity of each crossing structure. A brief description of each road crossing is provided in the following paragraphs.

C Street Bridge. This bridge incorporates an opening that is approximately 20 feet wide and 6.5 feet in height. The depth of flow in the channel at which roadway overtopping occurs is approximately 7.3 feet. The capacity of the bridge prior to overtopping the roadway was calculated to be 615 cfs. The 100-year existing condition discharge in Sheep Draw at C Street is 4,595 cfs.

4th Street Bridge. This crossing structure is a two-span bridge that includes an 18-inch wide pier within the channel of Sheep Draw. The bridge opening is approximately 107 feet wide and 10.6 feet high. The depth of flow in the channel at which roadway overtopping occurs for this structure was determined to be 12.6 feet. The capacity of the bridge prior to overtopping the roadway was estimated to be 9,020 cfs. The 100-year existing condition discharge in Sheep Draw at 4th Street is 4,502 cfs.

10th Street Bridge. This crossing structure was replaced in 2000. It incorporates an opening approximately 108 feet wide and 12.3 feet in height. The depth of flow in the channel at which roadway overtopping occurs is approximately 16.7 feet. The capacity of the bridge prior to overtopping the roadway was calculated to be 9,900 cfs. The 100-year existing condition discharge in Sheep Draw at 10th Street is 4,425 cfs.

71st Avenue Bridge. This single span bridge has an opening that is approximately 40 feet wide and 7.0 feet in height. The depth of flow in the channel at which roadway overtopping occurs is approximately 9.4 feet. The capacity of the bridge prior to overtopping the roadway was determined to be 1,070 cfs. The 100-year existing condition discharge in Sheep Draw at 71st Avenue is 3,756 cfs.

83rd Avenue Bridge. This crossing structure was replaced by Weld County in the winter of 2004-05. It consists of a two-span bridge that includes a 36-inch wide pier within the Sheep Draw channel. The bridge opening is approximately 70 feet wide and 13.4 feet in height. The depth of flow in the channel associated with overtopping the roadway is approximately 15.2 feet. The capacity of the bridge prior to overtopping the roadway was calculated to be 5,495 cfs. The 100-year existing condition discharge in Sheep Draw at 83rd Avenue is 3,464 cfs.

95th Avenue (Weld County Road 25) Culverts. This crossing structure was modified in 1999 to include the addition of a 7'H x 6'W reinforced concrete box culvert (RCB) to the existing 7'H x 14'W RCB. At this location, roadway overtopping occurs at a depth of approximately 14.5 feet from the invert of the culverts. The capacity of the culverts prior to overtopping is 2,425 cfs. The 100-year existing condition discharge in Sheep Draw at 95th Avenue is 2,585 cfs.

U.S. Highway 34 Bypass Culverts. Similar to 95th Avenue, this crossing structure was modified in 1999 to include the addition of a 6'H x 6'W RCB to the existing 6'H x 14'W RCB. The overtopping flow depth for this crossing is approximately 15.3 feet measured from the culvert inverts. The capacity of the culverts prior to overtopping is 2,080 cfs. The 100-year existing condition discharge in Sheep Draw at the U.S. Highway 34 Bypass is 2,498 cfs.

Tributary Crossing of U.S. Highway 34 Bypass/95th Avenue Intersection. A major tributary crosses the intersection of 95th Avenue and the U.S. Highway 34 Bypass immediately upstream of Sheep Draw. The crossing structure consists of a 66-inch RCP. The depth of flow in the channel associated with overtopping the roadway is approximately 13.6 feet. The capacity of the culvert prior to overtopping is 350 cfs. The 100-year existing condition discharge at this location is estimated to be 591 cfs.

Within the basin, road crossings of several additional tributaries to Sheep Draw also exist. These tributaries convey significant storm flows that may require crossing structures capable of passing the 100-year existing condition discharge. Neither the 1997 nor the current Comp Plan effort inventoried or explicitly identified these road crossings. It is noted, however, that several of these crossing structures provide inadequate capacity to convey runoff generated during relatively minor storm events and experience sedimentation problems. As land development continues to occur within the basin, these structures should be more closely inventoried and evaluated.

It should be noted that a severe storm event occurred within the Sheep Draw Basin on June 13, 1997. This event generated runoff that was reported to be in excess of the 100-year flood discharge. During the flood event, several bridges and crossing structures were overtopped, including the bridges at 71st Avenue and 83rd Avenue. The overtopping of these bridge structures was largely related to the magnitude of the storm event coupled with the partial clogging of the bridge opening by debris mobilized by the storm.

3.3 Open Channels

Other than the Sheep Draw channel, the Greeley No. 3 Ditch was the only open channel considered during the inventory of existing drainage facilities within the Sheep Draw Basin. Other irrigation ditches, such as the Boomerang Ditch, were discussed previously. These ditches typically offer limited value as drainage features that capture and convey stormwater in a controlled manner.

The Greeley No. 3 Ditch traverses the northern portion of the basin in an easterly direction from the diversion headgate on the Cache La Poudre River to the crossing structure at 59th Avenue. Through the basin, the Greeley No. 3 Ditch can be described as a trapezoidal

channel with a bottom width ranging from 15 feet to 20 feet, sideslopes of 0.5H:1V, an average depth of 5 feet to 6 feet, and an average slope equal to 0.09 percent. With the exception of two locations, the average capacity exceeds 220 cfs and frequently exceeds 300 cfs. Normal irrigation flows in the No. 3 Ditch during the spring and summer months are likely to range between 70 to 75 cfs through the basin; consequently, supplemental capacity is available to evacuate stormwater runoff during relatively frequent events. However, during storm events equivalent to and greater than a 2-year storm, the ditch capacity is likely to be exceeded with stormwater runoff spilling over both ditch banks at several locations within the basin.

IV. HYDROLOGIC ANALYSES AND MODELING

4.1 Formulation of the Hydrologic Model

The primary objective of the hydrologic analyses and modeling efforts was to update the hydrologic model for the Sheep Draw Basin to include development and drainage improvements that have been implemented since the completion of the 1997 Comp Plan. This facilitated the preparation of an updated existing condition discharge profile along Sheep Draw and the mapping of an updated 100-year floodplain for Sheep Draw. 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 used for the current study followed that utilized for the 1997 Comp Plan, which involved 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 hydrographs for a number of basin subcatchments. The program requires input of physical subbasin parameters such as area, slope, etc., as well as the detailed design storm hyetograph defined by rainfall depths in 5-minute increments for a 3-hour duration. The methodology used in developing the design storm is outlined in the Urban Storm Drainage Criteria Manual (USDCM, 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 8.4 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 as well as quality issues. For purposes of this study, hydrologic analyses and modeling for the Sheep Draw Basin utilized the water quantity aspects of the transport block to develop flood hydrographs at various locations throughout the basin. The hydrographs generated from CUHP were routed through the drainage network simulated by the 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 8.5 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 is to 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 previous field reconnaissance and surveying efforts, as well as drainage reports from already built or approved developments 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, previously collected survey data, and detailed 1-foot contour mapping from drainage reports obtained from the City of Greeley, as identified in Section 8.2 of the Project Notebook. Drainage network schematics were developed for the three scenarios previously discussed: (a) existing conditions with existing facilities; (b) future development conditions with existing facilities; and (c) future development conditions with proposed improvements.

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)
100 – 199	Conveyance elements (storm sewers and open channels)
200 – 299	Nodes (subbasin runoff concentration points)
300 – 399	Existing detention facilities

400 – 499	Future development detention facilities
500 – 599	Nodes (flow combination or design points)
600 – 699	Surface flow diversions

It should be noted that the numbering scheme for the existing detention facilities (300 – 399) did not change when the future development conditions with proposed improvements models were created. For example, if a detention facility existed in the existing conditions with existing facilities model, the numbering scheme remained the same for all future conditions with proposed improvements models (i.e., a pond with a 301 label in the existing conditions kept that same label for the future conditions, even though that pond may have been re-sized for the future condition).

4.2 Rainfall Design Storms

The rainfall design storms used in the hydrologic analysis of the Sheep Draw 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). The one-hour rainfall values obtained for the City of Greeley from the NOAA Atlas were used to develop a three-hour design storm hyetograph, using incremental rainfall depths for each five-minute time period. The three-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 Sheep Draw Basin involved the determination of several hydrologic parameters associated with each subbasin. These parameters are summarized in the following paragraphs. Table 4.1 presents a summary of all hydrologic modeling parameters developed for the existing condition analyses.

Table 4.1 Hydrologic Subbasin Parameters for the Existing Condition.

Subbasin No.	Basin Area (acres)	Basin Length (ft)	Distance to Basin Centroid (ft)	Average Basin Slope	Time of Conc. (minutes)	Percent Imperv. (%)	Depression Storage (inches)		Infiltration Rates (in/hr)		Horton's Decay Rate
							Pervious	Imperv.	Initial	Final	
1	453.9	4600	3100	0.016	N/A	2.0	0.40	0.10	3.2	0.5	0.0018
2	427.1	7100	3800	0.014	N/A	2.0	0.40	0.10	3.7	0.5	0.0018
3	487.8	6900	3800	0.015	N/A	6.2	0.40	0.10	4.1	0.6	0.0018
4	421.6	8200	4700	0.012	N/A	2.5	0.40	0.10	4.1	0.6	0.0018
5	114.1	3800	2400	0.028	N/A	2.0	0.40	0.10	4.5	0.6	0.0018
6	66.1	3900	2200	0.018	32	52.4	0.35	0.10	4.5	0.6	0.0018
7	72.9	2500	900	0.025	24	54.0	0.35	0.10	4.5	0.6	0.0018
8	574.8	9500	4900	0.014	N/A	2.4	0.40	0.10	4.0	0.6	0.0018
9	384.9	10000	4900	0.017	N/A	2.8	0.40	0.10	3.9	0.6	0.0018
10	317.6	5400	2800	0.015	N/A	2.0	0.40	0.10	4.3	0.6	0.0018
11	124.2	5000	2900	0.026	N/A	5.9	0.40	0.10	4.4	0.6	0.0017
12	115.8	2900	1600	0.019	N/A	2.0	0.40	0.10	4.4	0.6	0.0017
13	592.5	5900	3100	0.023	N/A	2.8	0.40	0.10	4.4	0.6	0.0017
14	208.8	5600	3400	0.027	N/A	2.0	0.40	0.10	4.5	0.6	0.0018
15	102.3	3100	1700	0.025	N/A	2.0	0.40	0.10	4.5	0.6	0.0018
16	163.7	4300	2000	0.021	N/A	50.7	0.35	0.10	4.5	0.6	0.0018
17	74.7	3400	1200	0.027	29	37.2	0.35	0.10	4.5	0.6	0.0018
18	108.4	3600	1400	0.023	N/A	44.1	0.35	0.10	4.4	0.6	0.0018
19	42.0	3100	1500	0.028	27	42.3	0.35	0.10	4.5	0.6	0.0018
20	138.9	3400	1500	0.024	N/A	2.0	0.40	0.10	4.4	0.6	0.0018
21	221.0	5400	2700	0.019	N/A	2.7	0.40	0.10	4.4	0.6	0.0018
22	38.2	1500	600	0.028	18	29.4	0.35	0.10	4.5	0.6	0.0018
23	350.4	4800	2800	0.017	N/A	2.0	0.40	0.10	4.5	0.6	0.0018
24	90.9	2100	1200	0.036	N/A	32.1	0.35	0.10	4.4	0.6	0.0018
25	32.1	1800	1000	0.030	20	4.2	0.40	0.10	4.5	0.6	0.0018
26	39.8	3000	1000	0.026	27	16.2	0.35	0.10	4.5	0.6	0.0018
27	162.1	3900	1800	0.035	N/A	6.1	0.40	0.10	4.5	0.6	0.0018
28	62.8	1200	800	0.045	17	2.0	0.40	0.10	4.4	0.6	0.0018
29	36.4	2400	1200	0.027	23	37.0	0.35	0.10	4.1	0.6	0.0018
30	111.7	2700	1400	0.027	N/A	2.7	0.40	0.10	4.4	0.6	0.0018
31	15.3	1200	700	0.110	17	5.2	0.40	0.10	4.5	0.6	0.0018
32	60.7	1700	900	0.040	19	35.7	0.35	0.10	4.5	0.6	0.0018
33	373.6	6900	3600	0.032	N/A	3.1	0.40	0.10	4.5	0.6	0.0017
34	113.2	2600	1000	0.032	N/A	11.3	0.35	0.10	4.4	0.6	0.0018
35	115.3	2800	1600	0.026	N/A	4.2	0.38	0.10	4.4	0.6	0.0018
36	76.6	2200	1600	0.033	22	40.1	0.35	0.10	4.5	0.6	0.0018
37	141.0	2900	1700	0.021	N/A	35.6	0.35	0.10	4.4	0.6	0.0018
38	76.9	2200	900	0.028	22	3.8	0.40	0.10	4.5	0.6	0.0018
39	365.3	6300	2400	0.028	N/A	29.0	0.37	0.10	4.2	0.6	0.0018
40	74.0	3500	1000	0.028	29	53.1	0.35	0.10	4.5	0.6	0.0018

Table 4.1 Hydrologic Subbasin Parameters for the Existing Condition (Continued).

Subbasin No.	Basin Area (acres)	Basin Length (ft)	Distance to Basin Centroid (ft)	Average Basin Slope	Time of Conc. (minutes)	Percent Imperv. (%)	Depression Storage (inches)		Infiltration Rates (in/hr)		Horton's Decay Rate
							Pervious	Imperv.	Initial	Final	
41	107.4	3900	2100	0.030	N/A	15.7	0.35	0.10	4.2	0.6	0.0018
42	70.6	2100	900	0.034	22	33.3	0.35	0.10	4.5	0.6	0.0018
43	77.9	3000	900	0.026	27	44.0	0.35	0.10	4.5	0.6	0.0018
44	17.9	1100	300	0.035	16	31.7	0.35	0.10	4.5	0.6	0.0018
45	9.4	1800	900	0.100	20	2.0	0.40	0.10	4.0	0.6	0.0018
46	58.0	2400	900	0.025	23	47.7	0.35	0.10	4.5	0.6	0.0018
47	57.8	3100	1700	0.022	27	5.2	0.35	0.10	4.5	0.6	0.0018
48	36.5	1700	600	0.032	19	8.1	0.40	0.10	4.1	0.6	0.0018
49	162.9	3500	600	0.052	N/A	17.7	0.38	0.10	4.4	0.6	0.0018
50	223.6	5400	2400	0.028	N/A	22.7	0.35	0.10	4.3	0.6	0.0018
51	356.0	6100	1800	0.027	N/A	30.3	0.35	0.10	4.4	0.6	0.0018
52	37.3	2100	1200	0.048	20	57.4	0.35	0.10	4.8	0.8	0.0012
53	371.9	3600	2200	0.013	N/A	2.3	0.40	0.10	4.4	0.6	0.0018
54	493.8	7600	3600	0.015	N/A	5.0	0.38	0.10	4.3	0.6	0.0018
55	71.8	3600	1700	0.015	30	9.6	0.35	0.10	4.5	0.6	0.0018
56	73.2	2800	1500	0.018	26	3.8	0.40	0.10	4.5	0.6	0.0018
57	112.5	3800	2100	0.028	N/A	31.7	0.35	0.10	4.5	0.6	0.0018
58	165.3	2900	900	0.035	N/A	32.5	0.35	0.10	4.5	0.6	0.0018
59	48.5	1300	600	0.057	17	58.6	0.35	0.10	4.8	0.8	0.0012
60	61.0	2100	800	0.048	22	36.7	0.35	0.10	4.7	0.7	0.0014
61	17.6	1200	900	0.026	15	80.0	0.35	0.10	4.5	0.6	0.0018
62	63.3	3600	2400	0.028	30	24.8	0.35	0.10	4.5	0.6	0.0018
63	26.1	1500	600	0.027	18	40.0	0.35	0.10	4.7	0.7	0.0014
64	66.5	3000	1700	0.030	27	17.8	0.38	0.10	4.7	0.8	0.0013
65	33.4	2100	900	0.038	22	30.2	0.36	0.10	4.3	0.8	0.0011
66	57.7	1500	700	0.045	18	10.6	0.37	0.10	4.9	0.9	0.0009
67	47.8	1900	700	0.027	21	26.6	0.39	0.10	4.5	0.6	0.0018
68	21.3	1400	700	0.025	18	8.9	0.40	0.10	4.5	0.6	0.0018
69	107.1	2700	1200	0.025	N/A	38.3	0.35	0.10	4.5	0.6	0.0018
70	72.4	3600	1500	0.022	30	4.2	0.38	0.10	4.2	0.7	0.0015
71	82.0	1800	600	0.022	20	36.2	0.35	0.10	4.5	0.6	0.0018
72	106.1	2200	900	0.030	N/A	26.7	0.36	0.10	4.6	0.6	0.0017
73	179.2	3900	1800	0.024	N/A	42.8	0.35	0.10	4.5	0.6	0.0017
74	38.4	1500	800	0.012	18	3.6	0.40	0.10	3.9	0.6	0.0017
75	298.9	2200	1200	0.003	N/A	5.3	0.40	0.10	3.0	0.5	0.0017

4.3.1 Subbasin Delineation and Basin Characteristics

Sheep Draw Basin was subdivided into smaller subbasins ranging in size from approximately 9 acres to nearly 600 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 in areas where there are currently no major drainage facilities or significant development; this primarily includes areas south and west of the U.S. Highway 34 Bypass and 71st Avenue, respectively, as well as in the northwest portion of the basin. 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 due to the intense development that has occurred over the past seven years in the basin since the completion of the 1997 Comp Plan.

The subbasin delineation for Sheep Draw 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, 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 for the Sheep Draw Basin and 1-foot topographic mapping for developments within the basin were 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 at the time the 1997 Comp Plan was completed was primarily agricultural. Significant growth has occurred in the basin since that time, with the eastern half experiencing considerable residential development, and a mixture of commercial and residential development along the U.S. Highway 34 Bypass in the western half. Some of the more prominent residential developments include the Mountain Vista Subdivision Filings between 71st and 83rd Avenues, immediately north of 20th Street, as well as the Pumpkin Ridge Subdivision located between 4th and 10th Streets, immediately west of 59th Avenue. The West Greeley Tech Center and the Promontory Commercial/Residential site, both immediately east of the U.S. Highway 34 Business/Bypass interchange, are the two major developments actively under construction in the west half of the basin at this time.

GIS mapping, consisting of numerous 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 (including those approved for construction as of November 7, 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 Sheep Draw Basin is provided on Sheet C-1, in Appendix C of this report. Using a combination of the GIS data and development information, impervious percentages were calculated for existing 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 recent Downtown and North Greeley Basin Comp Plan Update, 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. For future development conditions, all hydrologic modeling commensurate with the 1997 Comp Plan assumed a land use associated with medium density residential housing (45% imperviousness). This assumption was also applied to those areas within the Sheep Draw Basin not currently included in the Greeley City limits, but under the jurisdiction of the Weld County government. 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 Sheep Draw Basin was obtained from GIS data provided by the City; 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 the 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 Sheep Draw Basin are predominantly classified as relatively well-drained soils in the Type B hydrologic soils group. Soils mapping pertinent to the Sheep Draw Basin is provided on Sheet C-2, in Appendix C of this report. It should be noted that in the 1997 Comp Plan, one area of soils near the upper (southwestern) end of the basin was assumed to be entirely hydrologic soils group C. After further investigation, the actual classification is hydrologic soils

group B and C, with a majority of the soil type within soil group B. Similarly, two areas of soils (one in the south-central portion of the basin; one in the northwest corner of the basin) were assumed to be entirely hydrologic soils group A. Further investigation revealed the actual classification being soil groupings A and D, with a majority of the soil type within soil group D. This situation was corrected in the current Comp Plan Update.

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 4.2. 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 4.2 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 water 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, the 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 Hydraulic Conveyance Modeling Parameters

Several hydraulic modeling parameters are required by the EPA SWMM model to simulate the routing of storm flows through storm sewers and open channels. 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*

For the modeling of open channels, 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*

A summary of all conveyance element parameters defined in the hydrologic models is provided in Section 8.1 of the Project Notebook.

4.5 Special Modeling Features

In addition to the basic channel routing functions incorporated in the hydrologic model for the Sheep Draw 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,

and exported flows out of a basin. For the Sheep Draw Basin modeling efforts, detention storage facilities and flow diversions 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 detention ponds, or multiple on-site ponds represented as a single pond, associated with commercial or residential development, totaling 34 for the entire Sheep Draw Basin; (b) the use of four existing irrigation reservoirs; and (c) the use of two existing inadvertent detention storage areas located upstream of State Highway 257 and 95th Avenue. Detailed information concerning the four reservoirs and the two inadvertent storage locations was previously provided in Section 8.1 of this report. Due to the large number of drainage facilities within the basin, detention ponds linked to commercial or residential development located within the same subbasin and generally draining to the same location were often combined to reduce the total number of modeled elements. The 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.

Storage-discharge relationships were derived for each of the 34 development-based detention ponds included in the hydrologic models. All drainage development information was obtained from the City of Greeley. In each case, storage values that define the volume of stormwater detained in each pond was 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. Four of the five existing irrigation reservoirs and the two existing storage locations were retained in their entirety from the 1997 Comp Plan. It should be noted that Irrigation Reservoir No. 5 (located immediately southwest of the intersection of 4th Street and 59th Avenue) was embedded in Subbasin No. 58 of the updated Comp Plan hydrologic model without identifying detention capabilities, as all releases from this reservoir are routed into one of two on-site detention ponds which control the overall subbasin release rate.

Each of the 34 detention ponds in the EPA SWMM model was delineated in such a way so as to fall into one of the three following release rate categories: (a) a single detention pond serving an entire subbasin as designated in the accompanying drainage report; (b) two or more detention ponds consolidated into one pond serving an entire subbasin, as designated by their

respective drainage reports; or (c) a single detention pond, or two or more detention ponds consolidated into one pond, serving an entire subbasin, with tributary off-site flows from within the subbasin included in the overall subbasin release rate. In the situation where tributary off-site flows upstream of the subbasin were present, those flows were combined with the pond releases to determine the entire discharge at that location.

The 34 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 the ponds' storage-discharge rating curve 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 34 development-based ponds, the four irrigation reservoirs, and the two inadvertent detention locations is included in Section 8.2 of the Project Notebook.

4.5.2 Diversions

One flow diversion (referred to as a flow divider by the EPA SWMM model) was modeled in the Sheep Draw Basin. Subbasin No. 65 encompasses the Poudre River Ranch Subdivision, located immediately south of the Greeley No. 3 Ditch and west of Weld County Road 29. The Phase I and PUD 1A reports for this development indicate a maximum flow diversion of 18.2 cfs into the ditch, with all flows in excess of this value being routed to the Poudre River. Diversion No. 665 reflects this diversion into the Greeley No. 3 Ditch; backup information concerning this diversion is provided in Section 8.3 of the Project Notebook.

4.6 Summary of the Existing Condition Hydrologic Analyses

4.6.1 Definition of the Existing Development/Existing Facilities Scenario

The definition of existing conditions includes all development that presently exists or was approved for construction prior to November 7, 2003. All basin development after this date is considered under the future condition analyses. All hydrologic subbasin parameters, hydraulic conveyance parameters, and special modeling features associated with the existing condition/existing facilities scenario are defined in Sections 2.1, 8.1, 8.2 and 8.3 of the Project Notebook. 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 8.5 of the Project Notebook.

4.6.2 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 exceeded maximum allowable overtopping depths or detention facilities overtopped the pond embankments during the storm events. A summary of existing drainage problems within the basin is provided in Section 4.6.4 of this report. For Comp Plan modeling purposes, the maximum capacity or storage volume of existing facilities assumed encroachment into the freeboard limits associated with channels or detention facilities.

4.6.3 Hydrologic Modeling Results for the Existing Condition

Based on the existing development with existing drainage facilities analyses of the Sheep Draw Basin, several facilities, structures or streets lack the capacity to safely convey flows arising from the 100-year design storm and, consequently, create potential flooding problems within the basin. The results of the hydrologic modeling for each subbasin and a summary of peak discharges at specific locations along Sheep Draw are provided in Tables 4.3 and 4.4, respectively. A graphical representation of the discharge profile along Sheep Draw 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 provided in Appendix D of this report and in Section 8.6 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 8.4 of the Project Notebook.

4.6.4 Summary of Existing Drainage Problems

During the 100-year flood event, storm water runoff typically exceeds the capacity of the natural channel. The limits of flooding identified in the previous floodplain analysis of Sheep Draw, conducted as part of the 1997 Comp Plan, were updated as part of the current study as documented in Chaper V. Flooding along Sheep Draw has been exacerbated where a road crossing exists or an existing reservoir is located. In addition, the crossing structure of the

Table 4.3 Summary of Subbasin Peak Discharges for the Existing Condition.

Subbasin No.	EPA SWMM Node ID	Drainage Area (acres)	Peak Discharge (cfs) for the Given Return Period				
			2-Year	5-Year	10-Year	50-Year	100-Year
1	301[1]	453.9	0	0	0	38	165
2	202	427.1	3	70	119	317	410
3	203	487.8	11	70	126	359	466
4	204	421.6	2	39	80	242	323
5	205	114.1	0	17	34	111	140
6	306[5]	66.1	7	13	17	28	35
7	307[5]	72.9	1	1	1	2	3
8	208	574.8	3	54	110	330	441
9	309[3]	384.9	1	24	51	154	218
10	210	317.6	1	41	84	263	339
11	311[4]	124.2	1	6	35	265	591
12	312[2]	115.8	0	0	61	354	557
13	313[3]	592.5	2	27	69	303	471
14	214	208.8	0	25	51	165	214
15	215	102.3	0	19	36	118	147
16	316[5]	163.7	19	35	46	80	100
17	317[5]	74.7	3	6	9	16	20
18	318[5]	108.4	4	7	9	15	19
19	319[5]	42.0	8	15	20	37	47
20	220	138.9	0	28	53	169	211
21	221	221.0	2	29	59	184	236
22	322[5]	38.2	1	2	4	7	9
23	223	350.4	2	48	97	314	403
24	324[5]	90.9	12	25	35	72	91
25	225	32.1	0	9	17	52	65
26	326[6]	39.8	3	8	13	30	40
27	227	162.1	6	37	65	195	242
28	228	62.8	0	19	37	113	140
29	329[5]	36.4	6	12	17	33	41
30	230	111.7	2	25	48	150	186
31	231	15.3	0	4	7	22	27
32	332[5]	60.7	2	4	6	11	14
33	233	373.6	3	43	89	297	384
34	234	113.2	13	56	83	207	250
35	235	115.3	3	30	51	149	184
36	336[6]	76.6	8	15	20	37	46
37	337[5]	141.0	4	8	11	21	26
38	238	76.9	3	25	46	139	171
39	339[5]	365.3	45	103	147	305	391
40	340[6]	74.0	66	136	187	375	476
41	341[5]	107.4	1	3	4	10	12

Table 4.3 Summary of Subbasin Peak Discharges for the Existing Condition (Continued).

Subbasin No.	EPA SWMM Node ID	Drainage Area (acres)	Peak Discharge (cfs) for the Given Return Period				
			2-Year	5-Year	10-Year	50-Year	100-Year
42	342[5]	70.6	2	5	7	13	17
43	343[5]	77.9	12	23	31	57	72
44	344[6]	17.9	65	137	192	374	475
45	245	9.4	0	3	5	14	17
46	346[5]	58.0	2	4	6	10	12
47	247	57.8	3	24	38	105	127
48	248	36.5	3	13	22	60	73
49	249	162.9	39	112	169	394	479
50	350[6]	223.6	24	60	91	189	245
51	351[5]	356.0	15	34	48	93	118
52	352[5]	37.3	0	1	1	1	2
53	253	371.9	3	63	124	390	496
54	254	493.8	9	69	125	359	464
55	255	71.8	7	33	50	130	156
56	256	73.2	2	23	43	131	162
57	357[5]	112.5	10	22	31	60	77
58	358[7]	165.3	40	87	115	243	295
59	359[6]	48.5	7	11	14	26	32
60	360[5]	61.0	2	4	6	11	14
61	261	17.6	24	37	44	69	79
62	362[5]	63.3	6	15	22	48	62
63	363[5]	26.1	0	1	1	1	2
64	264	66.5	10	20	33	107	134
65	265	33.4	11	19	27	66	81
66	266	57.7	3	7	10	60	81
67	367[5]	47.8	6	14	20	44	57
68	268	21.3	1	6	11	31	38
69	369[5]	107.1	18	36	48	97	121
70	270	72.4	2	14	33	115	143
71	371[5]	82.0	17	35	47	96	118
72	372[5]	106.1	6	15	22	46	59
73	373[6]	179.2	5	10	13	23	28
74	274	38.4	0	12	22	65	80
75	275	298.9	11	101	153	392	475

[1] Peak discharge data from subbasin is attenuated by existing detention storage behind State Highway 257.
[2] Peak discharge data reflects runoff from Subbasin No's. 12 and 13 attenuated by existing detention storage behind 95th Avenue.
[3] Peak discharge data from subbasin is attenuated by existing irrigation reservoir.
[4] Peak discharge data reflects runoff from Subbasin No's. 11, 12, and 13 attenuated by existing irrigation reservoir.
[5] Peak discharge data from subbasin is attenuated by on-site detention pond(s) linked to development.
[6] Peak discharge data from subbasin reflects off-site runoff (detained or un-detained) and on-site runoff attenuated by on-site detention pond(s) linked to development.
[7] Peak discharge data from subbasin reflects detained off-site runoff and on-site runoff attenuated by: (1) on-site detention ponds linked to development; and (2) an existing irrigation reservoir.

Table 4.4 Summary of Existing Condition Peak Discharges along Sheep Draw.

Location	EPA SWMM Element	Drainage Area (acres)	Distance above Confluence with Poudre River (1,000 feet)	Peak Discharge (cfs) for the Given Return Period				
				2-yr	5-yr	10-yr	50-yr	100-yr
State Highway 257 (Inflow)	201	454	43.1	4	109	175	454	571
State Highway 257 (Outflow)	301	454	43.0	0	0	0	38	165
Upstream Limit of Hydraulic Model along Sheep Draw	501	1,369	39.7	13	138	243	675	872
Irrigation Reservoir No. 1 (Inflow)	542	2,431	35.4	23	232	434	1,223	1,638
Irrigation Reservoir No. 1 (Outflow)	304	2,431	34.9	12	163	390	1,174	1,597
Irrigation Reservoir No. 4 (Outflow)	311	833	29.9	1	6	35	265	591
U.S. Highway 34 Bypass	508	3,629	29.9	37	254	570	1,633	2,498 [1]
95th Avenue (Upstream)	509	3,876	29.2	41	263	590	1,691	2,585 [1]
95th Avenue (Downstream)	510	4,917	29.0	41	277	627	1,893	3,055
83rd Avenue	123	5,887	22.6	52	326	728	2,191	3,464
71st Avenue	134	7,110	15.8	66	374	812	2,427	3,756
10th Street	525	8,727	11.6	160	588	1,085	2,977	4,425
4th Street	529	9,236	7.9	185	628	1,134	3,055	4,502
C Street	533	9,810	3.0	214	683	1,200	3,156	4,596
Greeley No. 3 Ditch	537	10,085	1.4	224	699	1,221	3,212	4,673
Outfall to Cache La Poudre River	174	10,085	0.0	221	683	1,217	3,194	4,632
Basins 53 and 54 Outfall to Cache La Poudre River	526	866	NA	9	113	225	702	923

[1] Discharge includes additional 241 cfs from Irrigation Reservoir No. 4 outflow (EPA SWMM Element No. 311) not able to pass through 66" RCP at the U.S. Highway 34 Bypass.

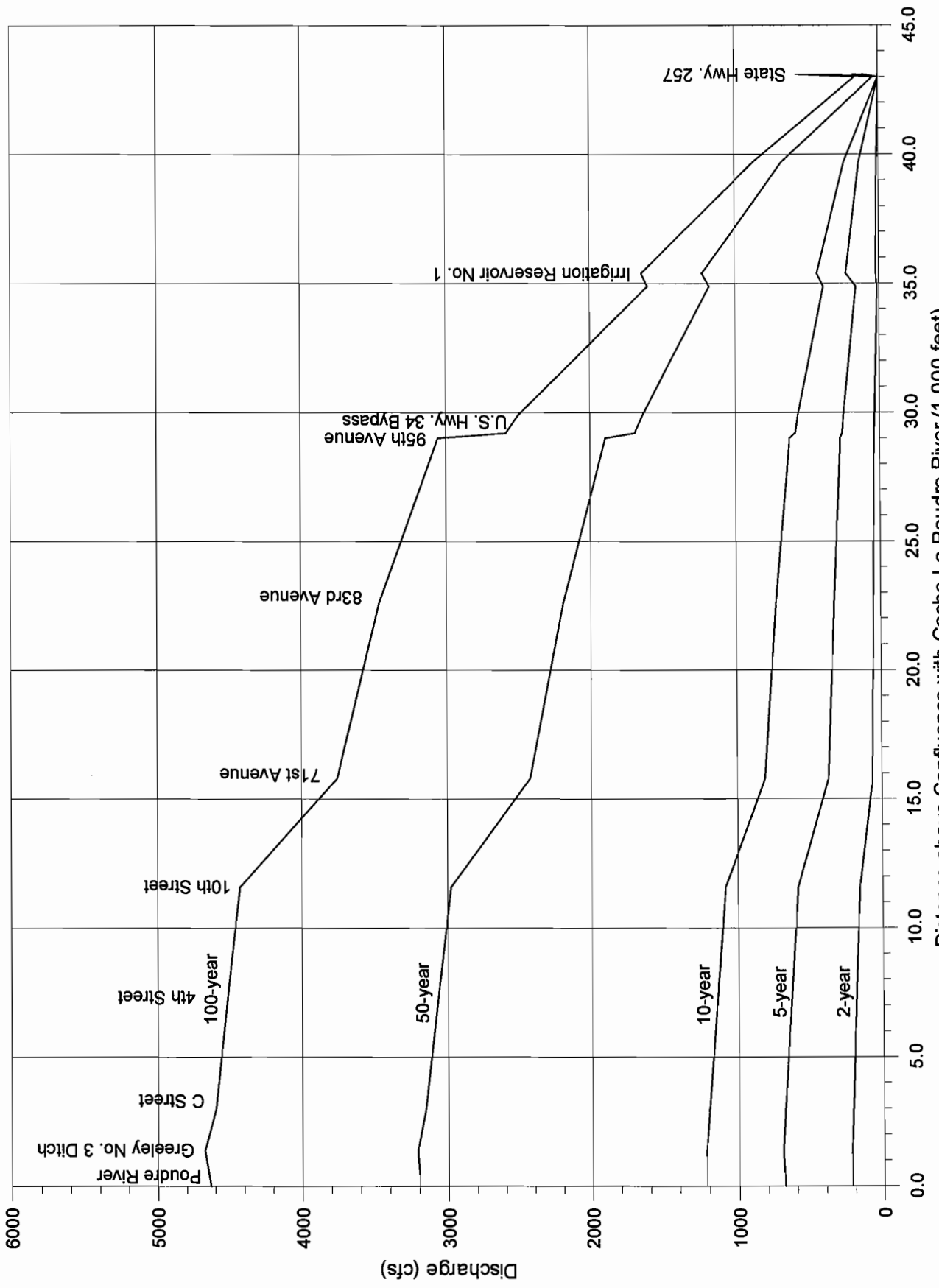

Figure 4.1 Discharge Profiles along Sheep Draw, Existing Condition.

Greeley No. 3 Ditch and the capability of the ditch to capture flows from the adjacent subbasins tend to increase the potential flooding problems within the lower Sheep Draw Basin. However, this area is also subject to flooding during the 100-year event along the Poudre River. It is also recognized that potential flooding problems will likely occur along several of the major tributaries to Sheep Draw, especially at the road crossings where undersized culvert and sediment accumulation limits the capacity of the crossing structures to convey stormwater runoff. 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 limited, however, to those locations along the major drainageway of Sheep Draw.

Greeley No. 3 Ditch and Crossing Structure. The 100-year peak discharge in Sheep Draw at the Greeley No. 3 Ditch is estimated to be 4,673 cfs. This flow greatly exceeds the capacity of the existing crossing structure. The stormwater runoff that is captured by the ditch will flow in an easterly direction and will ultimately overflow both the north and south ditch banks. The capacity of the existing ditch channel is restricted to 100 cfs at two locations within the Sheep Draw Basin; consequently, limited capacity exists for the diversion of stormwater runoff captured by the ditch. In addition, the capacity of the Sheep Draw channel is greatly exceeded by the magnitude of the 100-year peak discharge. These circumstances result in an extensive floodplain in the vicinity of the Greeley No. 3 Ditch. Although it is unlikely that major improvements will reduce the flooding from the 100-year discharge, an improved crossing structure could significantly reduce the flooding associated with the more frequent flooding events.

C Street Bridge. This bridge structure lacks the capacity to convey the 100-year peak discharge of 4,596 cfs at this location. Ponding created by the bridge and associated road embankment increases the flooding potential of properties located upstream of the crossing. The capacity of the existing structure was estimated to be 615 cfs prior to overtopping the roadway.

71st Avenue Bridge. The 100-year existing condition discharge in Sheep Draw at 71st Avenue is 3,756 cfs. This compares to a bridge capacity, prior to overtopping the roadway, of 1,070 cfs. Approximately 2 feet of additional ponding occurs upstream of the crossing and is directly attributable to the existing bridge structure. Improvements to the structure would reduce the limits of flooding upstream of the crossing.

95th Avenue (Weld County Road 25) Culverts/U.S. Highway 34 Bypass Culverts. The crossings at this location on Sheep Draw are located in close proximity to each other. Recent improvements to these two crossings by the Colorado Department of Transportation were significantly smaller than was recommended by the 1997 Comp Plan. Consequently, both sets of culverts lack the capacity to convey the 100-year peak discharge. For 95th Avenue, the 100-year peak discharge is 2,585 cfs compared to a combined culvert capacity of 2,425 cfs. Similarly, the 100-year peak discharge at the U.S. Highway 34 Bypass crossing is 2,500 cfs, compared to a

combined culvert capacity of 2,080 cfs. At both locations, the limited capacity of the culverts creates a channel ponding depth of nearly 15 feet upstream of 95th Avenue (overtopping depth of approximately 0.5 feet) and 16 feet upstream of the U.S. Highway 34 Bypass (overtopping depth of approximately 0.7 feet). Consequently, these crossings contribute to the flooding upstream of both crossing structures, as well as overtopping of a U.S. Highway and a road that will ultimately be a major arterial.

Tributary Crossing of 95th Avenue (Weld County Road 25). This tributary is served by a 66-inch RCP that passes directly under the intersection of 95th Avenue and the U.S. Highway 34 Bypass, east of the main Sheep Draw crossing of the highway, confluencing with Sheep Draw immediately downstream of 95th Avenue. The capacity of this tributary crossing further exacerbates the flooding associated with the crossings of Sheep Draw with 95th Avenue and the U.S. Highway 34 Bypass. The capacity of this structure is estimated to be 350 cfs prior to roadway overtopping. This compares to a directly tributary 100-year peak discharge of 591 cfs. More important, however, is the ponding created by the culvert. The 241 cfs that exceeds the capacity of the culvert commingles with flows along the Sheep Draw main stem, thereby increasing overtopping depths for both the U.S. Highway 34 Bypass and 95th Avenue.

State Highway 257 Detention Pond. Due to the size of the culvert outlet, overtopping of the roadway occurs for all events greater than the 10-year storm with a maximum overtopping depth of 0.4 feet for the 100-year storm event. Improvements to this culvert outlet would be required to reduce potential flooding upstream of the road embankment and to eliminate the overtopping of the roadway.

95th Avenue (Weld County Road 25) Detention Pond. At this location, full retention of the runoff volume associated with the 5-year storm event is provided. Overtopping of the roadway occurs for all events greater than the 5-year storm with a maximum overtopping depth of 1.0 foot for the 100-year storm event. To reduce overtopping of the roadway and upstream flooding, improvements to the culvert outlet would be required.

4.7 Summary of the Future Condition Hydrologic Analyses

4.7.1 Definition of the Future Development/Existing Facilities Scenario

The hydrologic model representing future development with existing facilities was prepared by modifying the existing development/existing facilities model to incorporate all potential future development for the Sheep Draw Basin. The model simulated all existing detention ponds utilized in the existing condition model. In previous Comp Plan efforts, the generation of future condition hydrology was based on the projected land use as defined by the

zoning and land use map. However, per direction of the Public Works Department, all undeveloped areas within the Sheep Draw Basin for the 1997 Comp Plan (and extended to the current Comp Plan) were assumed to be medium density residential housing developments. In addition, on-site detention was not assumed for the future condition model; the modeling of on-site detention was reserved for the proposed condition model documented in Section 7.8 of this report. Results of the future condition model were utilized to develop and evaluate alternative drainage improvement strategies for detention within the basin. Modifications to the overland flow lengths, overland flow slope and time of concentration were made to reflect potential urbanization of the basin. Table 4.5 presents hydrologic modeling parameters defined for the future condition analyses. 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 8.5. All other hydrologic subbasin parameters, hydraulic conveyance parameters, and special modeling features associated with the future condition scenario are defined in Sections 2.1, 8.1, 8.2 and 8.3 of the Project Notebook.

4.7.2 Hydrologic Modeling Results for the Future Condition

The future condition model generated significantly higher peak flows than the existing condition model; an expected result given that only 34 percent of the basin is currently developed. A summary of peak discharges resulting from the future condition hydrologic modeling effort is provided in Tables 4.6 and 4.7 for each subbasin and for selected locations along Sheep Draw, respectively. Summary output from the EPA SWMM models of the future condition analyses are provided in Appendix D of this report and in Section 8.6 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 8.4 of the Project Notebook. Figure 4.2 presents flood profiles along Sheep Draw that graphically portray the hydrologic results of the future condition model. Flood hydrographs associated with the future condition at selected locations are presented in Appendix D of this report.

In general, flood problems presently existing within the basin would be significantly exacerbated with future development, especially given the future condition modeling assumption of no on-site detention within the basin. With respect to the road crossings previously identified in Section 4.6.4 of this report, the C Street Bridge would be overtopped during the 2-year flood event. The 10-year flood event and 50-year flood would overtop the road crossings at the U.S. Highway 34 Bypass and 95th Avenue, respectively. The road would be overtopped at the 71st Avenue crossing during the 5-year event. In addition to the road crossings, flooding would be greatly increased in the lower basin, especially in the vicinity of the Greeley No. 3 Ditch

Table 4.5 Hydrologic Subbasin Parameters for the Future Condition.

Subbasin No.	Basin Area (acres)	Basin Length (ft)	Distance to Basin Centroid (ft)	Average Basin Slope	Time of Conc. (minutes)	Percent Imperv. (%)	Depression Storage (inches)		Infiltration Rates (in/hr)		Horton's Decay Rate
							Pervious	Imperv.	Initial	Final	
1	453.9	4900	3100	0.016	N/A	45.0	0.35	0.10	3.2	0.5	0.0018
2	427.1	7400	3800	0.014	N/A	45.0	0.35	0.10	3.7	0.5	0.0018
3	487.8	7200	3800	0.015	N/A	47.3	0.35	0.10	4.1	0.6	0.0018
4	421.6	8500	4700	0.012	N/A	45.3	0.35	0.10	4.1	0.6	0.0018
5	114.1	4100	2400	0.028	N/A	45.0	0.35	0.10	4.5	0.6	0.0018
6	66.1	3900	2200	0.018	32	52.4	0.35	0.10	4.5	0.6	0.0018
7	72.9	2500	900	0.025	24	54.0	0.35	0.10	4.5	0.6	0.0018
8	574.8	9800	4900	0.014	N/A	45.2	0.35	0.10	4.0	0.6	0.0018
9	384.9	10300	4900	0.017	N/A	45.5	0.35	0.10	3.9	0.6	0.0018
10	317.6	5700	2800	0.015	N/A	45.0	0.35	0.10	4.3	0.6	0.0018
11	124.2	5300	2900	0.026	N/A	47.2	0.35	0.10	4.4	0.6	0.0017
12	115.8	3200	1600	0.019	N/A	45.0	0.35	0.10	4.4	0.6	0.0017
13	592.5	6200	3100	0.023	N/A	45.5	0.35	0.10	4.4	0.6	0.0017
14	208.8	5900	3400	0.027	N/A	45.0	0.35	0.10	4.5	0.6	0.0018
15	102.3	3400	1700	0.025	N/A	45.0	0.35	0.10	4.5	0.6	0.0018
16	163.7	4300	2000	0.021	N/A	50.7	0.35	0.10	4.5	0.6	0.0018
17	74.7	3400	1200	0.027	29	37.2	0.35	0.10	4.5	0.6	0.0018
18	108.4	3600	1400	0.023	N/A	44.1	0.35	0.10	4.4	0.6	0.0018
19	42.0	3100	1500	0.028	27	42.3	0.35	0.10	4.5	0.6	0.0018
20	138.9	3700	1500	0.024	N/A	45.0	0.35	0.10	4.4	0.6	0.0018
21	221.0	5700	2700	0.019	N/A	45.4	0.35	0.10	4.4	0.6	0.0018
22	38.2	1500	600	0.028	18	29.4	0.35	0.10	4.5	0.6	0.0018
23	350.4	5100	2800	0.017	N/A	45.0	0.35	0.10	4.5	0.6	0.0018
24	90.9	2100	1200	0.036	N/A	32.1	0.35	0.10	4.4	0.6	0.0018
25	32.1	2100	1000	0.030	22	45.0	0.35	0.10	4.5	0.6	0.0018
26	39.8	3000	1000	0.026	27	43.1	0.35	0.10	4.5	0.6	0.0018
27	162.1	4200	1800	0.035	N/A	46.5	0.35	0.10	4.5	0.6	0.0018
28	62.8	1500	800	0.045	18	45.0	0.35	0.10	4.4	0.6	0.0018
29	36.4	2400	1200	0.027	23	37.0	0.35	0.10	4.1	0.6	0.0018
30	111.7	3000	1400	0.027	N/A	45.2	0.35	0.10	4.4	0.6	0.0018
31	15.3	1200	700	0.110	17	5.2	0.40	0.10	4.5	0.6	0.0018
32	60.7	1700	900	0.040	19	35.7	0.35	0.10	4.5	0.6	0.0018
33	373.6	7200	3600	0.032	N/A	45.1	0.35	0.10	4.5	0.6	0.0017
34	113.2	2600	1000	0.032	N/A	23.6	0.35	0.10	4.4	0.6	0.0018
35	115.3	3100	1600	0.026	N/A	45.3	0.35	0.10	4.4	0.6	0.0018
36	76.6	2200	1600	0.033	22	40.1	0.35	0.10	4.5	0.6	0.0018
37	141.0	2900	1700	0.021	N/A	35.6	0.35	0.10	4.4	0.6	0.0018
38	76.9	2500	900	0.028	24	45.2	0.35	0.10	4.5	0.6	0.0018
39	365.3	6300	2400	0.028	N/A	39.8	0.35	0.10	4.2	0.6	0.0018
40	74.0	3500	1000	0.028	29	53.1	0.35	0.10	4.5	0.6	0.0018

Table 4.5 Hydrologic Subbasin Parameters for the Future Condition (Continued).

Subbasin No.	Basin Area (acres)	Basin Length (ft)	Distance to Basin Centroid (ft)	Average Basin Slope	Time of Conc. (minutes)	Percent Imperv. (%)	Depression Storage (inches)		Infiltration Rates (in/hr)		Horton's Decay Rate
							Pervious	Imperv.	Initial	Final	
41	107.4	3900	2100	0.030	N/A	15.7	0.35	0.10	4.2	0.6	0.0018
42	70.6	2100	900	0.034	22	33.3	0.35	0.10	4.5	0.6	0.0018
43	77.9	3000	900	0.026	27	44.0	0.35	0.10	4.5	0.6	0.0018
44	17.9	1100	300	0.035	16	31.7	0.35	0.10	4.5	0.6	0.0018
45	9.4	1800	900	0.100	20	2.0	0.40	0.10	4.0	0.6	0.0018
46	58.0	2400	900	0.025	23	47.7	0.35	0.10	4.5	0.6	0.0018
47	57.8	3100	1700	0.022	27	5.2	0.35	0.10	4.5	0.6	0.0018
48	36.5	2000	600	0.032	21	47.6	0.35	0.10	4.1	0.6	0.0018
49	162.9	3500	600	0.052	N/A	50.8	0.35	0.10	4.4	0.6	0.0018
50	223.6	5400	2400	0.028	N/A	49.2	0.35	0.10	4.3	0.6	0.0018
51	356.0	6100	1800	0.027	N/A	30.3	0.35	0.10	4.4	0.6	0.0018
52	37.3	2100	1200	0.048	20	57.4	0.35	0.10	4.8	0.8	0.0012
53	371.9	3900	2200	0.013	N/A	45.2	0.35	0.10	4.4	0.6	0.0018
54	493.8	7900	3600	0.015	N/A	39.0	0.35	0.10	4.3	0.6	0.0018
55	71.8	3900	1700	0.015	32	31.9	0.35	0.10	4.5	0.6	0.0018
56	73.2	3100	1500	0.018	27	45.9	0.35	0.10	4.5	0.6	0.0018
57	112.5	3800	2100	0.028	N/A	31.7	0.35	0.10	4.5	0.6	0.0018
58	165.3	2900	900	0.035	N/A	43.9	0.35	0.10	4.5	0.6	0.0018
59	48.5	1300	600	0.057	17	58.6	0.35	0.10	4.8	0.8	0.0012
60	61.0	2100	800	0.048	22	36.7	0.35	0.10	4.7	0.7	0.0014
61	17.6	1200	900	0.026	15	80.0	0.35	0.10	4.5	0.6	0.0018
62	63.3	3600	2400	0.028	30	24.8	0.35	0.10	4.5	0.6	0.0018
63	26.1	1500	600	0.027	18	40.0	0.35	0.10	4.7	0.7	0.0014
64	66.5	3000	1700	0.030	27	38.1	0.35	0.10	4.7	0.8	0.0013
65	33.4	2100	900	0.038	22	30.2	0.35	0.10	4.3	0.8	0.0011
66	57.7	1500	700	0.045	18	20.9	0.35	0.10	4.9	0.9	0.0009
67	47.8	2200	700	0.027	22	58.8	0.35	0.10	4.5	0.6	0.0018
68	21.3	1700	700	0.025	19	48.9	0.35	0.10	4.5	0.6	0.0018
69	107.1	2700	1200	0.025	N/A	38.3	0.35	0.10	4.5	0.6	0.0018
70	72.4	3600	1500	0.022	30	35.4	0.35	0.10	4.2	0.7	0.0015
71	82.0	1800	600	0.022	20	36.2	0.35	0.10	4.5	0.6	0.0018
72	106.1	2200	900	0.030	N/A	31.9	0.35	0.10	4.6	0.6	0.0017
73	179.2	3900	1800	0.024	N/A	42.8	0.35	0.10	4.5	0.6	0.0017
74	38.4	1800	800	0.012	20	45.6	0.35	0.10	3.9	0.6	0.0017
75	298.9	2500	1200	0.003	N/A	46.8	0.35	0.10	3.0	0.5	0.0017

Table 4.6 Summary of Subbasin Peak Discharges for the Future Condition.

Subbasin No.	EPA SWMM Node ID	Drainage Area (acres)	Peak Discharge (cfs) for the Given Return Period				
			2-Year	5-Year	10-Year	50-Year	100-Year
1	301[1]	453.9	0	0	17	345	689
2	202	427.1	201	401	508	946	1096
3	203	487.8	253	477	607	1138	1324
4	204	421.6	172	328	419	797	937
5	205	114.1	67	128	163	310	362
6	306[5]	66.1	7	13	17	28	35
7	307[5]	72.9	1	1	1	2	3
8	208	574.8	231	445	569	1,080	1,264
9	309[3]	384.9	77	163	221	567	737
10	210	317.6	167	318	414	780	900
11	311[4]	124.2	53	123	287	1,027	1,376
12	312[2]	115.8	94	253	400	952	1,201
13	313[3]	592.5	100	219	346	831	1,031
14	214	208.8	108	205	265	504	583
15	215	102.3	68	129	171	325	374
16	316[5]	163.7	19	35	46	80	100
17	317[5]	74.7	3	6	9	16	20
18	318[5]	108.4	4	7	9	15	18
19	319[5]	42.0	8	15	20	37	47
20	220	138.9	95	181	240	454	522
21	221	221.0	121	230	297	559	648
22	322[5]	38.2	1	2	4	7	9
23	223	350.4	199	377	488	924	1,072
24	324[5]	90.9	12	25	35	72	91
25	225	32.1	18	34	45	86	99
26	326[6]	39.8	2	4	8	30	42
27	227	162.1	114	213	282	533	610
28	228	62.8	43	82	108	202	234
29	329[5]	36.4	6	12	17	33	41
30	230	111.7	80	153	201	374	434
31	231	15.3	0	4	7	22	27
32	332[5]	60.7	2	4	6	11	14
33	233	373.6	190	357	460	885	1,031
34	234	113.2	35	90	128	278	331
35	235	115.3	81	154	203	382	440
36	336[6]	76.6	8	15	20	37	46
37	337[5]	141.0	4	8	11	20	26
38	238	76.9	45	85	108	207	240
39	339[5]	365.3	71	142	189	370	680
40	340[6]	74.0	92	177	233	446	766
41	341[5]	107.4	1	3	4	10	12

Table 4.6 Summary of Subbasin Peak Discharges for the Future Condition (Continued).

Subbasin No.	EPA SWMM Node ID	Drainage Area (acres)	Peak Discharge (cfs) for the Given Return Period				
			2-Year	5-Year	10-Year	50-Year	100-Year
42	342[5]	70.6	2	5	7	13	17
43	343[5]	77.9	12	23	31	57	72
44	344[6]	17.9	88	173	232	432	764
45	245	9.4	0	3	5	14	17
46	346[5]	58.0	2	4	6	10	12
47	247	57.8	3	24	38	105	127
48	248	36.5	23	44	57	106	121
49	249	162.9	199	359	486	940	1,044
50	350[6]	223.6	44	89	121	224	590
51	351[5]	356.0	15	34	48	93	118
52	352[5]	37.3	0	1	1	1	2
53	253	371.9	229	440	561	1,049	1,232
54	254	493.8	177	358	470	939	1,097
55	255	71.8	24	52	70	145	171
56	256	73.2	41	77	98	185	216
57	357[5]	112.5	10	22	31	60	77
58	358[7]	165.3	56	106	136	266	465
59	359[6]	48.5	7	11	14	25	32
60	360[5]	61.0	2	4	6	11	14
61	261	17.6	24	37	44	69	79
62	362[5]	63.3	6	15	22	48	62
63	363[5]	26.1	0	1	1	1	2
64	264	66.5	26	44	62	137	165
65	265	33.4	11	19	27	66	81
66	266	57.7	9	18	24	79	102
67	367[5]	47.8	1	2	11	87	128
68	268	21.3	14	26	34	63	73
69	369[5]	107.1	18	36	48	97	121
70	270	72.4	27	52	70	149	177
71	371[5]	82.0	17	35	47	96	118
72	372[5]	106.1	4	9	13	32	92
73	373[6]	179.2	5	10	13	23	28
74	274	38.4	24	46	61	113	131
75	275	298.9	213	425	550	995	1,123

[1] Peak discharge data from subbasin is attenuated by existing detention storage behind State Highway 257.
[2] Peak discharge data reflects runoff from Subbasin No's. 12 and 13 attenuated by existing detention storage behind 95th Avenue.
[3] Peak discharge data from subbasin is attenuated by existing irrigation reservoir.
[4] Peak discharge data reflects runoff from Subbasin No's. 11, 12, and 13 attenuated by existing irrigation reservoir.
[5] Peak discharge data from subbasin is attenuated by on-site detention pond(s) linked to development.
[6] Peak discharge data from subbasin reflects off-site runoff (detained or un-detained) and on-site runoff attenuated by on-site detention pond(s) linked to development.
[7] Peak discharge data from subbasin reflects detained off-site runoff and on-site runoff attenuated by: (1) on-site detention ponds linked to development; and (2) an existing irrigation reservoir.

Table 4.7 Summary of Future Condition Peak Discharges along Sheep Draw.

Location	EPA SWMM Element	Drainage Area (acres)	Distance above Confluence with Poudre River (1,000 feet)	Peak Discharge (cfs) for the Given Return Period				
				2-yr	5-yr	10-yr	50-yr	100-yr
State Highway 257 (Inflow)	201	454	43.1	266	541	686	1,239	1,423
State Highway 257 (Outflow)	301	454	43.0	0	0	17	345	689
Upstream Limit of Hydraulic Model along Sheep Draw	501	1,369	39.7	454	878	1,115	2,084	2,420
Irrigation Reservoir No. 1 (Inflow)	542	2,431	35.4	772	1,468	1,897	3,703	4,393
Irrigation Reservoir No. 1 (Outflow)	304	2,431	34.9	578	1,315	1,725	3,764	4,348
Irrigation Reservoir No. 4 (Outflow)	311	833	29.9	53	123	287	1,027	1,376
U.S. Highway 34 Bypass	508	3,629	29.9	742	1,598	2,127	4,574	6720 [1]
95th Avenue (Upstream)	509	3,876	29.2	759	1,639	2,188	4,673	6878 [1]
95th Avenue (Downstream)	510	4,917	29.0	804	1,773	2,403	5,906	7,498
83rd Avenue	123	5,887	22.6	876	1,913	2,693	6,237	8,172
71st Avenue	134	7,110	15.8	948	2,016	2,863	6,395	8,441
10th Street	525	8,727	11.6	1,079	2,260	3,216	7,049	9,126
4th Street	529	9,236	7.9	1,089	2,301	3,256	7,093	9,159
C Street	533	9,810	3.0	1,107	2,325	3,296	7,091	9,223
Greeley No. 3 Ditch	537	10,085	1.4	1,108	2,324	3,308	7,114	9,275
Outfall to Cache La Poudre River	174	10,085	0.0	1,097	2,298	3,269	6,943	9,141
Basins 53 and 54 Outfall to Cache La Poudre River	526	866	*	346	701	909	1,811	2,142

[1] Discharge includes additional 241 cfs from Irrigation Reservoir No. 4 outflow (EPA SWMM Element No. 311) not able to pass through 66" RCP.

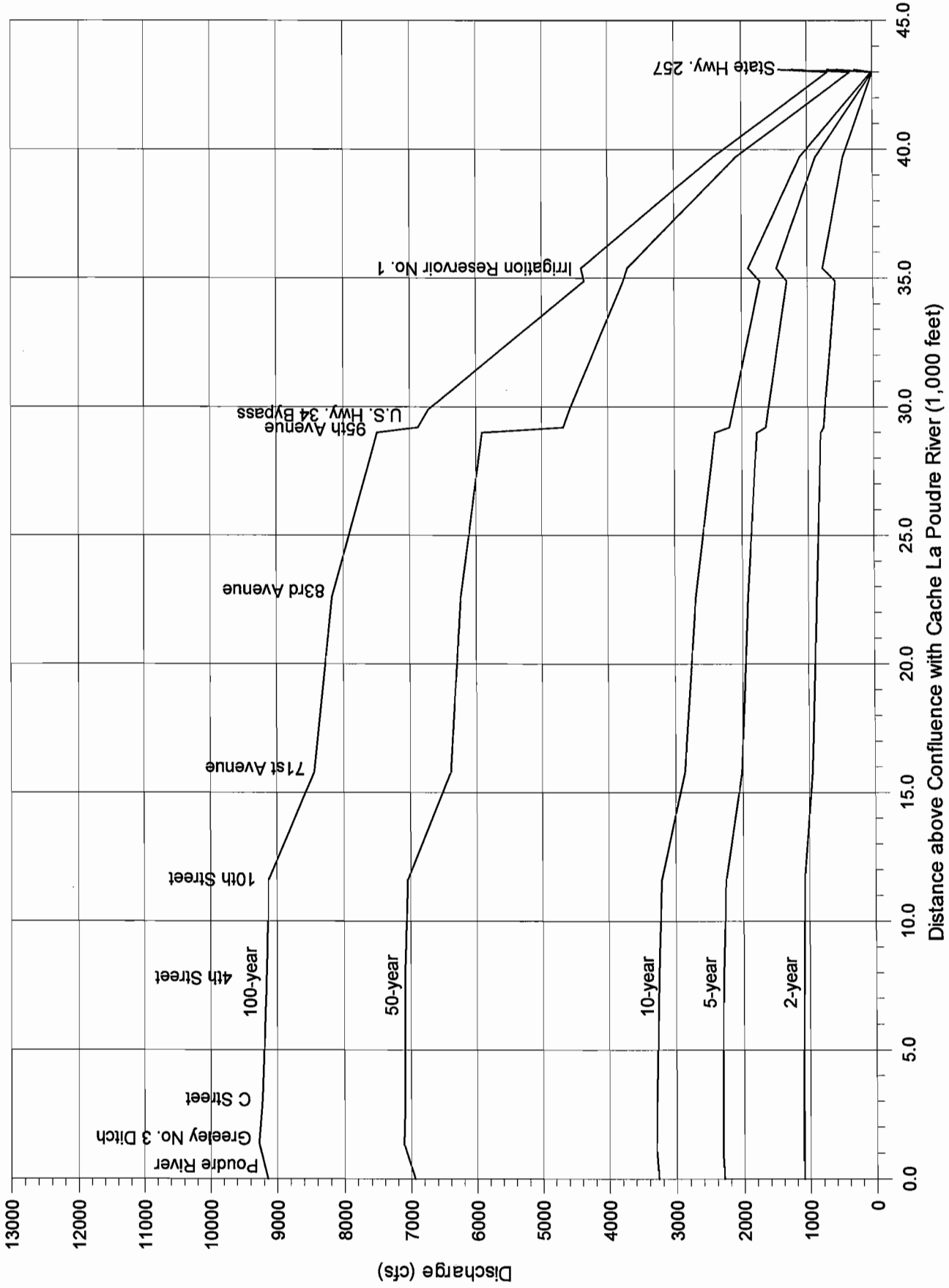

Figure 4.2 Discharge Profiles along Sheep Draw, Future Condition.

crossing. Again, this would be due to both the limited capacity of the Sheep Draw Channel as well as the obstruction presented by the existing crossing/diversion structure. Channel stability within Sheep Draw would likely be adversely impacted by the undetained runoff from the basin. Significant improvements to the channel would be required to stabilize the erosion created by the increased runoff. Without modifications to existing detention facilities, roadway overtopping during the 100-year event would increase to depths of approximately 0.7 feet for the State Highway 257 Detention Pond and 1.6 feet for the 95th Avenue Detention Pond. In addition, the remaining detention pond embankments could incur an increased likelihood of damage and/or failure by the undetained runoff from the contributing subbasins.

V. HYDRAULIC ANALYSIS AND FLOODPLAIN/FLOODWAY MAPPING

5.1 Hydraulic Model

A single hydraulic model for Sheep Draw was prepared in support of the current Comp Plan using the U.S. Army Corps of Engineers' River Analysis System computer model (HEC-RAS Version 3.1.3, dated May 2005) and the ArcView GIS extension HEC-GeoRAS (HEC-GeoRAS Version 3.1.1, dated May 2003). The model extends from the confluence with the Cache La Poudre River to approximately 0.5 mile east of State Highway 257 (a location immediately north of Weld County Road 56), a reach length of 7.5 miles. In order to accommodate the encroachments needed specifically for the floodway analysis, two *plans* were specified in the model: (a) the 1-percent annual chance of occurrence event (100-year event); and (b) the 1-foot rise floodway using the 100-year discharges.

5.2 Cross Section Geometry

Cross section locations along the study reach were selected to represent changes in geometry along the channel, including hydraulic structures, bridges, and culverts, while also providing adequate detail for accurately defining hydraulic conditions. Cross sections were defined using the information obtained from the following nine sources:

(a) a triangulated irregular network (TIN) served as the basis for the majority of the cross sections (provided by the City of Greeley, September 2004, as previously described in Section 1.3 of this report);

(b) existing and proposed 1-foot contours for the Northridge Estates Subdivision, located along the left bank of Sheep Draw between C Street and 4th Street (provided by the City of Greeley, October 2004);

(c) existing and proposed 1-foot contours for the Hunter's Cove Subdivision, located on the right bank of Sheep Draw between C Street and 4th Street (provided by Zoyiopoulos and Associates, Inc., February 2001);

(d) existing and proposed 1-foot contours for the Pumpkin Ridge Subdivision, located along the right bank of Sheep Draw between 4th Street and 10th Street (provided by the City of Greeley, October 2004);

(e) existing 1-foot contours developed by Pickett Engineering, Inc. for the McClosky Farm site, located along both banks of Sheep Draw between 10th Street and 71st Avenue (provided by Drexel, Barrell, and Co., February 2004);

(f) existing and proposed 1-foot contours for the Mountain Shadows Subdivision, located along the right bank of Sheep Draw between 83rd Avenue and 20th Street (provided by the City of Greeley, October 2004);

(g) existing and proposed 1-foot contours for the Pebble Brook Subdivision, located along the right bank of Sheep Draw approximately 0.5 mile east of the 95th Avenue/U.S. Highway 34 Bypass intersection (provided by the City of Greeley, October 2004);

(h) existing and proposed 0.2-meter contours for the 95th Avenue/U.S. Highway 34 Bypass culvert additions (provided by Felsburg, Holt, and Ullevig, October 2004); and

(i) cross section survey information at 10th Street, the pedestrian bridge directly upstream of 10th Street, and 71st Avenue (surveyed by the City of Greeley, November 2004).

It should be noted that proposed 1-foot contour mapping for the Boomerang Ranch Subdivision, located along the left bank of Sheep Draw, immediately east of 77th Avenue, was also provided by the City of Greeley in November 2004; however, this topographic information did not directly affect any cross sections, but was used to map the floodplain between cross sections. The TIN provided by the City of Greeley was based horizontally on NAD27 and vertically on NGVD29. With respect to the horizontal datum, except for the survey information provided by the City, the remaining seven mapping sources were based on arbitrary datums other than NAD83. These data were adjusted to NAD27 in order to align with the TIN and overall base map for the basin. Generally speaking, cross section geometry was obtained from the TIN provided by the City of Greeley using HEC-GeoRAS, and modified as necessary where local 1-foot topographic information was available.

5.3 Road Crossings/Bridges and Culverts

A total of 6 bridges and 8 culverts were defined in the hydraulic model. The geometry of the bridges and culverts was confirmed using several different sources, including: (a) field measurements taken for the 1997 Comp Plan; (b) CDOT and Weld County design plan sets; (c) existing condition 1-foot topographic mapping; and (d) field survey data collected by the City of Greeley.

From a vertical datum standpoint, bridge cross section data provided by the City at the 10th Street Bridge, the pedestrian bridge directly upstream of 10th Street, and 71st Avenue, as well as bridge/culvert design drawings for 83rd Avenue, 95th Avenue, and the U.S. Highway 34 Bypass, were based on NAVD88. Since the TIN and overall base map were prepared based on

NGVD29, the information at these aforementioned locations was adjusted vertically downward from NAVD88 to NGVD29 based on the CORPSCON program develop by the National Geodetic Survey (NGS) and the USACE.

All bridges and culverts were represented in the hydraulic model using standard bridge and culvert modeling techniques, with specific parameters defined based on field observations, measurements, and design plans. The bridges and culverts, respectively, were modeled using the HEC-RAS Version 3.1.3 bridge and culvert routines, using the highest upstream energy solution criteria. It should be noted that partial clogging of bridges and culverts was not accounted for in the hydraulic model; due to a future FEMA submittal and for flood insurance purposes, FEMA does not recognize such potential increases in water surface elevations.

5.4 Roughness Coefficients

Manning's roughness coefficients (*n* values) for the Sheep Draw channel were defined based on field observations and the application of Cowan's method (Chow, 1959). Manning's *n* values for the overbank areas were defined based on generally accepted roughness coefficients for shallow flow areas given observed ground cover and approximate flow depths, with adjustments made to account for other ground conditions influencing relative roughness and effective conveyance. Roughness coefficients defined for the Sheep Draw channel range from 0.030 to 0.045, except for culverts, where n values of 0.020 were used. Roughness coefficients for overbank areas range from 0.040 for pasture, high grass, and mature field crops to 0.060 for light brush and trees. Backup information concerning the specification of Manning's *n* values is provided in Section 3.1 of the Project Notebook.

5.5 Discharge Profiles and Boundary Conditions

Discharges associated with the 100-year event were defined based on the existing condition hydrology prepared for the current study. The 1997 Comp Plan had previously utilized discharges based on the future development with Comp Plan facilities condition; however, it is anticipated that the current floodplain mapping will be submitted to FEMA for adoption into the National Flood Insurance Program (NFIP); consequently, existing condition discharges were utilized for this current hydraulic analysis and floodplain/floodway mapping effort.

As identified in Section 4.6 of this report, the discharge profile arising from the hydrologic model for the Sheep Draw main stem was adjusted at the U.S. Highway 34 Bypass to accommodate commingled flows from the right bank tributary which passes through Irrigation

Reservoir No. 4. Low flows along this tributary are conveyed along the west side of 95th Avenue, south of the bypass, until they are carried under the 95th Avenue/U.S. Highway 34 Bypass intersection via a 66-inch RCP. However, the 100-year discharge for this tributary at the intersection is 591 cfs. This exceeds the 350 cfs capacity of the 66-inch RCP, prior to overtopping of the roadway, by 241 cfs. At overtopping, flows along Sheep Draw commingle with flows along this tributary; consequently, the 241 cfs of excess tributary runoff was added directly to Sheep Draw main stem flows directly south of the U.S. Highway 34 Bypass.

The hydraulic analyses were conducted assuming subcritical, steady state flow conditions. Starting water surface elevations at the downstream end of the Sheep Draw channel were defined based on normal depth using an average channel slope of 0.0104 ft/ft. Water surface elevations due to flooding along the Cache La Poudre River were not taken into account in the hydraulic model boundary conditions, as the original Flood Insurance Study for Sheep Draw (revised September 1991) also did not account for this potential backwater from the Poudre River. This is commensurate with other local floodplain analyses along the Poudre River east of the canyon mouth near Laporte, due to the vastly differing storm events that cause major flooding along the river compared to the local watersheds.

5.6 Floodway Analysis

For the 1-foot rise floodway analysis, floodway encroachments were initially defined assuming equal conveyance reduction in the overbank areas along both sides of the channel. Adjustments were then made to optimize the floodway using fixed encroachments, while attempting to maintain equal conveyance reduction. It is noted that through Irrigation Reservoir No. 1, upstream of the U.S. Highway 34 Bypass, floodway encroachments were set to coincide with the 100-year floodplain limits. This was done to ensure the stormwater detention function of the upper portion of the reservoir would not be physically encroached without compensatory detention storage being provided.

5.7 Hydraulic Modeling Results

As discussed in Section 5.1 of this report, the methodology selected for the hydraulic modeling of Sheep Draw included the use of the U.S. Army Corps of Engineers' River Analysis System computer model (HEC-RAS Version 3.1.3). The two plans defined in the HEC-RAS model were used to evaluate the hydraulic conditions associated with 100-year (1-percent annual chance) flood and the 1-foot rise floodway. HEC-RAS input data and summary output for both

analyses is included in Section 3.2 and 3.3 of the Project Notebook, respectively. The CD enclosed in Section 7 of the Project Notebook includes model input and complete output for both the floodplain and floodway analyses.

Results of the unencroached (i.e., floodplain) analyses are summarized in the form of a tabular water surface profile provided in Table 5.1. Graphical water surface profiles for the 100-year event, prepared in FIS format, are provided in Appendix F of this report. Water surface elevations to the north of the Greeley No. 3 Ditch were not plotted due to the inundation limits of the 100-year Poudre River floodplain. Results of the 1-foot floodway analysis are summarized in Table 5.2, which provides a water surface profile comparison between the unencroached (i.e., floodplain) and encroached (i.e., floodway) conditions associated with the 100-year event.

5.8 Floodplain and Floodway Mapping

Floodplain boundaries for the 100-year (1-percent annual chance) event for Sheep Draw were delineated using the various mapping sources identified previously, as shown on the floodplain/floodway work maps provided in Appendix E of this report. Similar to the graphical water surface profile, water surface elevations to the north of the Greeley No. 3 Ditch were not plotted due to the inundation limits of the 100-year Poudre River floodplain. The boundaries associated with the 1-foot floodway were also delineated as shown on the work maps, as well as a table listing the discharge profile used in the hydraulic model.

An electronic copy of the floodplain work maps (in AutoCad 2004 format) is provided on the CD included with this report. Commensurate with the topographic work map prepared for the 1997 Comp Plan, and also used for the current study, the floodplain and floodway boundaries provided in the electronic mapping file are horizontally located based on the North American Datum of 1927 using the State Plane Colorado North projection.

Due to ongoing grading activities within the limits of the Sheep Draw 1-foot floodway and 100-year floodplain, future floodway and floodplain mapping will be modified to reflect as-built geometric conditions at the following four locations/reaches:

(a) the as-built 83rd Avenue Bridge;

(b) three pedestrian bridge crossings on the trail system (as well as the trail itself) between 71st Avenue and 10th Street;

(c) one pedestrian bridge crossing on the trail system (as well as the trail itself) between 10th Street and 4th Street; and

(d) the 4th Street Bridge (due to the addition of fill in the flood fringe for development north of 4th Street and west of Sheep Draw, the modification of the existing Pumpkin Ridge detention pond south of 4th Street in the flood fringe and the construction/extension of the existing pedestrian trail along with two additional pedestrian bridge crossings both upstream and downstream of 4th Street).

In addition, due to the presence of proposed/design contours as well as the potential for changes in land development, cross sections in the following seven areas may be modified to relect as-built geometric conditions:

(a) the left overbank of Sheep Draw between C Street and 4th Street (Northridge Estates Subdivision);

(b) the right overbank of Sheep Draw between C Street and 4th Street (Hunter's Cove Subdivision);

(c) the right overbank of Sheep Draw between 4th Street and 10th Street (Pumpkin Ridge Subdivision);

(d) the left overbank of Sheep Draw east of 77th Avenue (Boomerang Ranch Subdivision);

(e) the right overbank of Sheep Draw between 83rd Avenue and 20th Street (Mountain Shadows Subdivision);

(f) the right overbank of Sheep Draw approximately 0.5 miles east of the 95th Avenue/U.S. Highway 34 Bypass intersection (Pebble Brook Subdivision); and

(g) at the 95th Avenue/U.S. Highway 34 Bypass intersection.

These changes/modifications to the hydraulic model will ensure the reflection of existing geometric conditions in order to facilitate an updated floodway/floodplain map submittal to FEMA.

Table 5.1 Tabular Water Surface Profiles for Sheep Draw.

Cross Section ID		Water Surface Elevation (ft, NGVD) for the 100-Year Flood	Location
Letter ID	HEC-RAS ID		
A	217	4690.71	Confluence with Cache La Poudre River
B	561	4692.61	
C	975	4693.70	
D	1182	4694.30	
E	1382	4695.25	North Bank of Greeley No. 3 Ditch
F	1447	4696.42	South Bank of Greeley No. 3 Ditch
G	1821	4698.35	
H	2246	4700.10	
I	2713	4702.44	
J	2925	4704.43	
K	2961	4705.38	
L	2998	4707.09	C Street Bridge
M	3015	4707.10	
N	3521	4707.42	
O	4044	4708.99	
P	4538	4712.93	
Q	5113	4714.36	
R	5656	4715.89	
S	6231	4717.44	
T	6800	4719.99	
U	7507	4723.92	
V	7706	4726.10	
W	7766	4727.37	
X	7852	4727.56	4th Street Bridge
Y	7879	4727.19	
Z	8369	4729.34	
AA	8761	4729.66	
AB	9215	4730.03	
AC	9499	4732.60	
AD	9881	4734.56	
AE	10337	4737.59	
AF	10838	4740.01	
AG	11281	4741.37	
AH	11371	4742.28	
AI	11492	4743.43	
AJ	11598	4745.62	10th Street Bridge
AK	11615	4745.84	
AL	11630	4747.15	10th Street Pedestrian Bridge
AM	11949	4747.89	
AN	11973	4747.94	
AO	12448	4748.83	
AP	12847	4749.73	
AQ	13329	4751.70	
AR	13853	4754.55	
AS	14453	4757.61	
AT	14852	4760.65	
AU	15108	4762.23	
AV	15451	4764.28	
AW	15775	4768.56	
AX	15825	4774.09	71st Avenue
AY	15868	4774.11	
AZ	16283	4774.15	
BA	16788	4774.15	
BB	17291	4775.69	
BC	17821	4776.58	
BD	18328	4779.85	
BE	18651	4780.72	
BF	19372	4783.66	
BG	19852	4787.41	
BH	20331	4788.95	

Table 5.1 Tabular Water Surface Profiles for Sheep Draw (Continued).

Cross Section ID		Water Surface Elevation (ft, NGVD) for the 100-Year Flood	Location
Letter ID	HEC-RAS ID		
BI	20846	4790.87	
BJ	21312	4793.18	
BK	21701	4795.64	
BL	22140	4799.11	
BM	22396	4800.94	
BN	22493	4801.18	
BO	22585	4804.09	83rd Avenue
BP	22610	4804.94	
BQ	23028	4805.44	
BR	23389	4805.42	
BS	23830	4807.00	
BT	24289	4809.31	
BU	24695	4811.12	
BV	25178	4813.30	
BW	25693	4816.73	
BX	26102	4821.04	
BY	26108	4822.67	
BZ	26448	4825.61	
CA	26791	4827.46	
CB	27298	4828.74	
CC	27795	4832.25	
CD	28309	4834.42	
CE	28686	4837.71	
CF	28988	4841.78	
CG	29141	4841.85	
CH	29216	4848.42	95th Avenue
CI	29682	4847.88	
CJ	29910	4854.04	U.S. Highway 34 Bypass
CK	30537	4854.00	
CL	30658	4854.06	
CM	30674	4854.07	
CN	31097	4854.20	
CO	31454	4857.18	
CP	31926	4859.18	
CQ	32120	4860.91	
CR	32541	4864.23	
CS	32955	4868.08	
CT	33001	4869.70	
CU	33543	4874.25	
CV	33996	4879.13	
CW	34385	4882.14	
CX	34413	4883.48	
CY	34833	4886.16	
CZ	34920	4896.54	Irrigation Reservoir No. 1
DA	35430	4896.55	
DB	35891	4896.62	
DC	36379	4897.03	
DD	36743	4899.59	
DE	37085	4901.67	
DF	37370	4905.21	
DG	37792	4910.75	
DH	38273	4914.56	
DI	38791	4920.32	
DJ	39293	4926.10	
DK	39744	4930.94	Upstream Limit of Detailed Study Reach

Table 5.2 Floodway Results for Sheep Draw.

Cross Section ID		Water Surface Elevation (ft, NGVD) for the 100-Year Flood		Difference in WSEL (ft)	Location
Letter ID	HEC-RAS ID	Unencroached (Floodplain)	Encroached (Floodway)		
A	217	4690.7	4691.6	0.9	Confluence with Cache La Poudre River
B	561	4692.6	4693.6	1.0	
C	975	4693.7	4694.7	1.0	
D	1182	4694.3	4695.3	1.0	
E	1382	4695.3	4695.8	0.5	North Bank of Greeley No. 3 Ditch
F	1447	4696.4	4696.7	0.3	South Bank of Greeley No. 3 Ditch
G	1821	4698.4	4699.1	0.7	
H	2246	4700.1	4701.0	0.9	
I	2713	4702.4	4703.0	0.6	
J	2925	4704.4	4705.3	0.9	
K	2961	4705.4	4705.9	0.5	
L	2998	4707.1	4708.0	0.9	C Street Bridge
M	3015	4707.1	4708.0	0.9	
N	3521	4707.4	4708.3	0.9	
O	4044	4709.0	4709.8	0.9	
P	4538	4712.9	4713.2	0.2	
Q	5113	4714.4	4715.1	0.7	
R	5656	4715.9	4716.8	0.9	
S	6231	4717.4	4718.4	1.0	
T	6800	4720.0	4720.0	0.0	
U	7507	4723.9	4724.1	0.2	
V	7706	4726.1	4726.1	0.0	
W	7766	4727.4	4727.4	0.1	
X	7852	4727.6	4727.6	0.1	4th Street Bridge
Y	7879	4727.2	4727.3	0.1	
Z	8369	4729.3	4729.5	0.1	
AA	8761	4729.7	4730.0	0.3	
AB	9215	4730.0	4730.6	0.6	
AC	9499	4732.6	4733.6	1.0	
AD	9881	4734.6	4735.6	1.0	
AE	10337	4737.6	4738.0	0.4	
AF	10838	4740.0	4740.9	0.8	
AG	11281	4741.4	4741.8	0.5	
AH	11371	4742.3	4743.3	1.0	
AI	11492	4743.4	4743.4	0.0	
AJ	11598	4745.6	4745.6	0.0	10th Street Bridge
AK	11615	4745.8	4745.8	0.0	
AL	11630	4747.2	4747.3	0.1	10th Street Pedestrian Bridge
AM	11949	4747.9	4748.1	0.2	
AN	11973	4747.9	4748.1	0.2	
AO	12448	4748.8	4749.5	0.7	
AP	12847	4749.7	4750.6	0.9	
AQ	13329	4751.7	4752.7	1.0	
AR	13853	4754.5	4755.0	0.5	
AS	14453	4757.6	4758.1	0.5	
AT	14852	4760.6	4761.1	0.4	
AU	15108	4762.2	4763.2	1.0	
AV	15451	4764.3	4765.0	0.7	
AW	15775	4768.6	4769.6	1.0	
AX	15825	4774.1	4775.0	0.9	71st Avenue
AY	15868	4774.1	4775.1	0.9	
AZ	16283	4774.2	4775.1	1.0	
BA	16788	4774.1	4775.0	0.9	
BB	17291	4775.7	4776.4	0.7	
BC	17821	4776.6	4777.0	0.4	
BD	18328	4779.8	4780.7	0.8	
BE	18651	4780.7	4781.7	1.0	
BF	19372	4783.7	4783.8	0.2	
BG	19852	4787.4	4788.0	0.6	

Table 5.2 Floodway Results for Sheep Draw (Continued).

Cross Section ID		Water Surface Elevation (ft, NGVD) for the 100-Year Flood		Difference in WSEL (ft)	Location
Letter ID	HEC-RAS ID	Unencroached (Floodplain)	Encroached (Floodway)		
BH	20331	4788.9	4789.6	0.6	
BI	20846	4790.9	4791.5	0.6	
BJ	21312	4793.2	4793.4	0.2	
BK	21701	4795.6	4795.7	0.1	
BL	22140	4799.1	4799.9	0.8	
BM	22396	4800.9	4801.6	0.7	
BN	22493	4801.2	4801.8	0.7	
BO	22585	4804.1	4804.4	0.3	83rd Avenue
BP	22610	4804.9	4804.9	0.0	
BQ	23028	4805.4	4805.6	0.1	
BR	23389	4805.4	4805.8	0.4	
BS	23830	4807.0	4807.4	0.4	
BT	24289	4809.3	4809.5	0.2	
BU	24695	4811.1	4811.1	0.0	
BV	25178	4813.3	4813.7	0.4	
BW	25693	4816.7	4817.0	0.2	
BX	26102	4821.0	4821.2	0.2	
BY	26108	4822.7	4823.6	0.9	
BZ	26448	4825.6	4825.7	0.1	
CA	26791	4827.5	4827.8	0.4	
CB	27298	4828.7	4829.4	0.7	
CC	27795	4832.3	4832.6	0.3	
CD	28309	4834.4	4835.3	0.9	
CE	28686	4837.7	4837.7	0.0	
CF	28988	4841.8	4841.9	0.2	
CG	29141	4841.9	4842.5	0.6	
CH	29216	4848.4	4848.4	0.0	95th Avenue
CI	29682	4847.9	4848.7	0.8	
CJ	29910	4854.0	4855.0	1.0	U.S. Highway 34 Bypass
CK	30537	4854.0	4855.0	1.0	
CL	30658	4854.1	4855.0	1.0	
CM	30674	4854.1	4855.1	1.0	
CN	31097	4854.2	4855.2	1.0	
CO	31454	4857.2	4857.4	0.3	
CP	31926	4859.2	4860.0	0.9	
CQ	32120	4860.9	4860.9	0.0	
CR	32541	4864.2	4864.6	0.4	
CS	32955	4868.1	4868.1	0.0	
CT	33001	4869.7	4870.6	0.9	
CU	33543	4874.2	4874.3	0.0	
CV	33996	4879.1	4879.7	0.6	
CW	34385	4882.1	4882.4	0.3	
CX	34413	4883.5	4884.3	0.8	
CY	34833	4886.2	4886.2	0.1	
CZ	34920	4896.5	4896.5	0.0	Irrigation Reservoir No. 1
DA	35430	4896.5	4896.5	0.0	
DB	35891	4896.6	4896.6	0.0	
DC	36379	4897.0	4897.1	0.1	
DD	36743	4899.6	4900.0	0.4	
DE	37085	4901.7	4901.7	0.0	
DF	37370	4905.2	4905.3	0.1	
DG	37792	4910.8	4910.8	0.0	
DH	38273	4914.6	4914.7	0.1	
DI	38791	4920.3	4920.3	0.0	
DJ	39293	4926.1	4926.1	0.0	
DK	39744	4930.9	4931.0	0.1	Upstream Limit of Detailed Study Reach

VI. MISCELLANEOUS HYDROLOGIC AND HYDRAULIC ISSUES

In addition to the basin-wide hydrologic and hydraulic analyses presented in Chapters IV and V, several issue-specific hydrologic and/or hydraulic evaluations were completed as part of the current Comp Plan study. The topics associated with these additional analyses included the following: (a) evaluation of regional versus on-site detention in the Sheep Draw Basin; (b) site grading or the construction of improvements within the 100-year Sheep Draw floodplain; (c) construction of on-site detention ponds within the 100-year Sheep Draw floodplain; and (d) evaluation of the proposed Leisure Center Regional Detention Pond. These four specific issues and the evaluations completed in support of them are presented in the following sections.

6.1 Evaluation of Regional versus On-Site Detention within the Sheep Draw Basin

The 1997 Comp Plan evaluated the option of providing regional versus on-site detention within the Sheep Draw Basin and subsequently recommended on-site detention be required for new development in the basin, as opposed to specifying the use of regional detention ponds. However, interest in this topic was recently renewed by various development groups and City staff. Consequently, the current study included a test case consisting of a detailed evaluation of potential detention requirements, on both a regional and on-site basis, for a selected subbasin within the Sheep Draw Basin.

This detention evaluation was completed for Subbasin 18, as previously defined in the 1997 Comp Plan. Subbasin 18 covers an area of 632 acres located within the south-central portion of the Sheep Draw Basin, largely south of 20th Street and between 71st Avenue and 83rd Avenue. The subbasin is a major right bank tributary to Sheep Draw. This subbasin was chosen for the evaluation due to its being largely undeveloped and of a size that could support several separate developments, thereby allowing for the differentiation between regional and on-site drainage facilities. The 95-acre portion of the subbasin north of 20th Street is currently being developed; therefore, the detention evaluation focused on only the 537-acre portion of the subbasin south of 20th Street. The following three scenarios were evaluated:

(1) Regional detention provided for the entire subbasin using a single dry detention pond, including a single major conveyance channel through the subbasin;

(2) Regional detention provided for the entire subbasin using a single wet detention pond (i.e., a pond with a permanent pool similar to the ponds located in Bittersweet Park or Sanborn Park), including a single major conveyance channel through the subbasin; and

(3) Detention for the entire subbasin provided by a series of smaller on-site, dry detention ponds connected with an on-site storm drainage system.

The evaluation of each of these three scenarios is described in detail in the following sections.

6.1.1 Drainage System Description and Hydrologic Analysis

The 1997 Comp Plan identified basin-specific drainage criteria for the Sheep Draw Basin that includes on-site detention to reduce 100-year developed condition runoff to 100-year existing condition levels. This requirement was used as the basis for the formulation of drainage systems and the conceptual design of facilities for all scenarios.

Scenario No. 1 – Regional Detention, Dry Pond. This scenario assumed that all future development would route undetained runoff to a single, dry regional detention pond. In addition a single, major drainage channel extending from the U.S. Highway 34 Bypass downstream to 20th Street was assumed as part of the regional detention system, while conveyance facilities to direct runoff into the main channel were not included.

As determined by the 1997 Comp Plan, the 100-year, existing condition runoff from Subbasin 18 is 541 cfs, with the prorated portion of that discharge for the area south of 20th Street being 460 cfs. The 100-year, fully developed condition runoff from this same subbasin (assuming no detention) would be 1,487 cfs, with a prorated discharge for the subject area of 1,264 cfs. As a result, a conceptual design was completed for a regional detention pond to be located at the downstream end of the subbasin, directly south of 20th Street, to reduce the fully developed peak discharge of 1,264 cfs to the existing peak runoff of 460 cfs.

An EPA SWMM model was developed for Subbasin 18 to estimate the required storage volume for the regional detention pond. The fully developed 100-year hydrograph for the entire subbasin was prorated based on drainage area and routed through the pond; the pond volume was then iterated until the allowable release rate of 460 cfs was achieved. The required detention volume was determined to be 50.4 acre-feet.

Scenario No. 2 – Regional Detention, Wet Pond. In the context of the regional detention scenario, the wet pond would have the same storage volume requirement as the dry regional detention pond; however, additional volume would be required below the permanent water surface elevation to sustain the permanent pool. Consequently, the required detention volume for this scenario would also be 50.4 acre-feet.

Scenario No. 3 – On-Site Detention, Dry Ponds. For this scenario, the topography associated with Subbasin 18 was evaluated and the subbasin divided into eight subcatchments varying in size and release rate. This scenario assumed that all future development would route undetained runoff to one of eight on-site detention ponds, one associated with each subcatchment. In addition, a single, major drainage channel extending from the U.S. Highway 34 Bypass downstream to 20th Street, was assumed as part of the on-site detention system. This major drainage channel would be smaller than required for the regional detention scenario due to the reduced 100-year flow rates within the subbasin. Finally, an outflow pipe for each on-site detention pond was assumed to carry individual pond releases to the major drainage channel. Commensurate with the regional detention scenario, other on-site drainage facilities were not included in this evaluation.

The on-site detention pond scenario assumed that each pond would meet the 100-year detention requirement on an individual basis prior to releasing flows to the major drainageway. Consequently, the cumulative release rate for the subcatchments was set to the existing 100-year runoff for the subject area of 460 cfs.

Similar to the regional detention scenario, an EPA SWMM model was developed which included all eight subcatchments and was used to determine the required storage volume for each on-site detention pond. The fully developed 100-year hydrograph for the entire subbasin was prorated to represent the runoff from each of the eight subcatchments, and routed through each pond; the pond volumes were then iterated until the release rate from each pond was achieved. The required detention volume for the ponds ranged from 1.2 to 18.5 acre-feet, with the total required storage volume for the subbasin determined to be 50.4 acre-feet; equal to required volume for the regional detention scenario.

6.1.2 Conceptual Cost Estimates

Scenario No. 1 – Regional Detention, Dry Pond. A conceptual-level cost estimate was prepared for the dry regional detention pond scenario. Construction costs included the following eight line items quantified at a conceptual level of detail:

(1) *Earthwork (cut/fill volumes).* Proposed grading was prepared using the City's topographic mapping at a 2-foot contour interval; cut and fill volumes were determined in order to achieve the necessary 50.4 acre-feet for detention storage plus a freeboard allowance of 1 foot.

(2) *Topsoil removal/replacement.* The volume of topsoil that would need to be stockpiled and replaced in conjunction with construction of the pond was estimated.

(3) *Dryland/wetland seeding.* It was assumed that the entire pond area would be re-seeded after construction.

(4) *Reinforced concrete pipe (RCP).* Costs for installing the required RCP's to convey 100-year flows under the U.S. Highway 34 Bypass and 20th Street were estimated, including a pipe jacking cost for the crossing under the U.S. Highway 34 Bypass.

(5) *Headwall/wingwall combinations.* The cost included the inlet and outlet structures associated with the two major culvert crossings, at the U.S. Highway 34 Bypass and 20th Street.

(6) *Grouted riprap drop structures.* It was assumed that the major drainage channel identified above would be regraded to a 0.5 percent slope; the existing channel slope is approximately 2 percent. Consequently, it was also assumed that grouted riprap drop structures would be placed at regular intervals along the channel to accommodate the proposed channel slope.

(7) *Plain Riprap Protection.* The volume of riprap was estimated for otherwise providing erosion control for the major drainage channel from the U.S. Highway 34 Bypass to 20th Street, as well as for the inlets and outlets of the two culvert crossings.

(8) *Land acquisition.* An estimate was included for the acquisition of the land necessary for constructing the regional pond.

The total cost to build the dry regional detention pond system, including 35 percent construction contingency (relatively high due to current conceptual level of design) and 20 percent engineering and project management fees, was estimated at $5,800,000. Supporting documentation of this analysis and cost estimate is included in Section 4 of the Project Notebook.

Scenario No. 2 – Regional Detention, Wet Pond. A conceptual-level cost estimate was prepared for the wet regional detention pond scenario. This estimate considered the same line items as identified for the dry regional pond scenario, but with a significant increase in earthwork costs for the pond in order to accommodate a permanent pool approximately 5 feet deep. Less substantial cost increases were identified for topsoil removal/replacement, dryland/wetland seeding, and land acquisition. All other costs remained the same as the dry pond scenario.

The total cost to build the wet regional detention pond system was estimated at $6,550,000. It is noted that this cost estimate does not include the annual cost of water

augmentation for losses associated with a permanent water impoundment. The annual cost of water augmentation has become a significant cost for projects of this nature. Supporting documentation of this analysis and cost estimate is included in Section 4 of the Project Notebook.

Scenario No. 3 – On-Site Detention, Dry Ponds. A conceptual cost estimate was prepared for the on-site detention scenario. This estimate considered the same line items as identified for the previous two scenarios, but with a modified approach for determining earthwork, topsoil removal/replacement, land acquisition, and dryland/wetland seeding costs. Proposed grading was determined for only one of the eight subcatchment ponds (Subcatchment No. 5). This subcatchment represented one of average size with a typical cut/fill situation associated with the on-site pond. The volume of cut and fill required, in order to obtain the necessary storage for that subcatchment, was applied to the other seven on-site ponds on a storage volume-weighted basis. The same methodology was applied to the topsoil removal/replacement, land acquisition, and seeding costs.

Headwall/wingwall combinations were determined for all eight ponds, as well as RCP sizes and lengths for each outlet structure. A riprap-lined channel similar to the first two scenarios was also sized, only to carry a smaller flow and at a steeper slope. Riprap volumes were also determined for each of the eight inlets and outlets. Due to the steeper slope of the channel, fewer grouted riprap drop structures would be necessary.

The total cost to build the on-site detention pond system, including the same construction contingency and engineering/project management fee percentages as used in the first two scenarios, was determined to be $4,100,000. Supporting documentation of this analysis and cost estimate is included in Section 4 of the Project Notebook.

6.1.3 Detention Alternative Comparisons

After completion of the evaluation of on-site versus regional detention in the Sheep Draw Basin, several observations and/or conclusions were drawn from each alternative. The observations, along with insight provided by City staff, are presented below and are listed by negative and positive aspects.

Scenario No. 1 – Regional Detention, Dry Pond. Potential negative aspects from the regional detention, dry pond scenario are as follows:

(a) Significant disturbance to the natural channel and local wildlife habitat would be an issue for regional detention ponds located on both tributaries to and the main Sheep

Draw Channel, due to the installation of numerous grouted riprap drop structures and substantial re-grading. Disturbance would tend to be greater along the main Sheep Draw Channel due to the magnitude of flows the channel must carry, the presence of more wetlands, and the presence of more local wildlife habitat. Loss of existing wetlands/vegetation would require mitigation, and additional studies would have to be performed so as to ascertain impacts to existing local wildlife.

(b) The cost to construct inflow conveyance channels would likely be high due to the capacity needed to convey and contain the undetained 100-year developed condition runoff, the number of drop structures needed to maintain a stable grade along the channel, channel re-grading between drop structures, and other possible erosion control measures needed to stabilize the channel. Significant excavation would likely be required for the pond, as well as costs to purchase the land and drainage easement. Based on the conceptual level construction cost estimates, the analysis indicates that a single, dry regional detention pond system for Subbasin 18 would cost approximately 40 percent more to implement than an on-site detention pond system. This scenario, according to City staff, would require a large up front investment in order to finance the construction of such facilities, likely requiring a bond issue by the City of Greeley Public Works Department.

(c) If sizing of the inflow conveyance channels becomes cost prohibitive, a lower return period (e.g., 10-year or 50-year) could be chosen to carry flows to the regional facility. However, this could potentially cause 100-year flows to spill out of the conveyance channels and would result in a loss of developable land along the channel corridor if 100-year flood protection is to be maintained.

(d) In order to comply with current City of Greeley stormwater quality standards, developments are required to treat their runoff prior to releasing it off-site, usually through the use of on-site detention ponds. The potential for adversely impacting the main channel with sediment, trash, and additional pollutants generally decreases through the use of such ponds; however, potentially developable land is also lost in the process in addition to land needed for the regional facility.

(e) Maintenance costs could be more of an issue with this scenario. The main channel and pond would have to be maintained in addition to the individual smaller on-site water quality facilities.

A potential positive aspect of the regional detention, dry pond scenario is that the pond could serve as a multi-use facility, such as a park or soccer fields. Such a facility would provide a regional benefit to the local community.

Scenario No. 2 – Regional Detention, Wet Pond. All of the potentially negative aspects of the regional detention, dry pond scenario would apply for this scenario. An additional negative aspect of this scenario would be the added cost of water augmentation due to the presence of a wet pond. According to City staff, water augmentation would require a bond issue

by the City of Greeley in order to finance the cost. The City of Greeley Public Works Department could not justify financing the cost of constructing a permanent pool and water augmentation, as it is not a requirement for stormwater utility services. In addition, it appears that the capital improvement cost associated a wet regional detention pond system for this subbasin would be roughly 60 percent higher than an on-site detention pond system.

An additional positive aspect of this scenario would be an added water feature within the Greeley city limits. The pond could be integrated into a regional park and, similar to the regional detention, dry pond scenario, would benefit the local community.

Scenario No. 3 – On-Site Detention, Dry Pond. Potential negative aspects of the on-site detention, dry ponds scenario are as follows:

(a) Potentially developable land is lost due to the presence of on-site facilities, with construction costs generally passed on to the developer. However, the ponds can become more cost effective to construct if integrated into the overall earthwork balance for site.

(b) The number of on-site ponds needed will depend upon the size of the development. Depending on the situation, the City could choose to leave maintenance up to the individual developments or purchase the ponds and maintain them as city facilities. Maintenance costs would increase as more ponds are purchased.

Potential positive aspects of the on-site detention dry ponds scenario are as follows:

(a) A generally higher level of preservation for the natural channel as well as local wildlife habitat would be achieved through the use of on-site ponds. Modifications to the channel could generally be minimized due to reduced release rates from each pond.

(b) Potential channel modification costs would be reduced due to lower discharges along the main channel. The cost of on-site facilities would largely be the responsibility of the developer.

(c) More developable land along the channel would generally be available due to decreased discharges; however, this would still depend on the extent of the 100-year floodplain.

(d) On-site detention ponds, or sometimes referred to as Extended Detention Basins (EDBs), are generally required by City of Greeley stormwater quality standards. They collect trash, sediment, and other pollutants generated by developments, contain them on-site, and help to preserve downstream channels and wildlife habitat. Further, over-detention (e.g., detaining 10-year developed flows to 5-year existing condition flows) provided by on-site ponds generally reduces the

discharges along the natural channel generated by the lower return periods, keeping flows more in line with historic conditions.

(e) Maintenance costs may be reduced due to confining sediment and other pollutants to distinct locations, depending on the number of facilities owned by the City.

Consequently, it is recommended that on-site detention continue to be required for new development in the Sheep Draw Basin.

6.2 Site Grading and Other Improvements in the 100-Year Sheep Draw Floodplain

Commensurate with FEMA regulations associated with the FEMA floodway along Sheep Draw, the City of Greeley has adopted a 1-foot rise criterion with respect to the Sheep Draw 100-year floodplain defined by the City. This criterion implies that except under specific limited conditions, any construction or grading that is proposed within the Sheep Draw floodway result in zero increase in 100-year flood levels along Sheep Draw. Construction or grading proposed within the Sheep Draw flood fringe (i.e., the area between the floodway boundary and the 100-year floodplain boundary, located on both sides of the channel) is permissible and may result in a maximum rise in 100-year flood levels of 1-foot along Sheep Draw. The regulatory City of Greeley hydraulic model for Sheep Draw must be used to evaluate the proposed condition associated with a project design in order to show no adverse impact (i.e., no rise) in 100-year flood levels if construction will take place within the floodway along Sheep Draw.

If a proposed project would partially obstruct 100-year flood flows within the floodway, in certain situations the obstruction may be mitigated by providing compensatory conveyance within the overbank areas along Sheep Draw. For the situation where compensatory conveyance is being provided, no adverse impact to the stability of the Sheep Draw channel must be demonstrated using a combination of hydraulic, sediment transport and channel bank stability analyses that are appropriate for the specific situation.

In the specific case of footbridge crossings of Sheep Draw, the following options are available that will ensure compliance with the no-rise criteria.

(1) All permanent features associated with a footbridge must be placed at or below grade, and a tethered, break-away bridge installed such that the proposed crossing (including trail approaches to the crossing) results in no obstruction of 100-year flood flows within the floodway.

(2) If the proposed crossing consists of a fixed (stationary) facility, the obstruction caused by the crossing features would be allowable provided that the regulatory City of Greeley hydraulic model for Sheep Draw be used to evaluate the proposed

condition associated with the crossing design to show no adverse impact (i.e., no rise) in 100-year flood levels along Sheep Draw in accordance with City of Greeley and FEMA regulations. In addition, no adverse impact to the stability of the Sheep Draw channel must be demonstrated using a combination of hydraulic, sediment transport and channel bank stability analyses that are appropriate for the specific situation.

The conditions outlined above are intended to be considered in conjunction with all other City standards and criteria as related to construction requirements, and do not replace or supercede any such standards and criteria.

6.3 Construction of On-Site Detention Ponds in the 100-Year Sheep Draw Floodplain

The City of Greeley has, in the past, allowed on-site detention ponds associated with new development to be constructed within the 100-year floodplain along Sheep Draw. The recent construction of several of these ponds, combined with the anticipation of future proposals for more ponds of this nature, prompted an evaluation of this practice. At issue are both the efficacy and potential adverse impacts associated with on-site detention ponds located where Sheep Draw flows would inundate the ponds during flood events. The effectiveness of the ponds to provide the required attenuation of the peak runoff in this situation, as well as potential stability issues with respect to detention pond embankments exposed to Sheep Draw flood flows are both of specific concern. Additional concerns relate to potential impacts to flood levels along Sheep Draw and the stability of the Sheep Draw channel itself.

Based on consideration of hydraulic conditions associated with 100-year flows along Sheep Draw, local versus regional hydrologic response within the basin, and potential erosion issues within the Sheep Draw channel and floodplain, on-site detention ponds may be constructed in the 100-year floodplain along Sheep Draw provided the following six conditions can be satisfied.

(1) Considering no impacts from inundation by Sheep Draw flows, the proposed detention pond must reduce the 10-year developed condition peak runoff from the site to no more than the 5-year existing condition peak runoff rate, while reducing the 100-year developed condition peak runoff from the site to no more than the 100-year existing condition peak runoff rate.

(2) The proposed detention pond must be hydrologically analyzed using the City of Greeley's current CUHP/EPA SWMM model for the Sheep Draw Basin to demonstrate that during the 100-year event, Sheep Draw flows will not enter or

overtop into the on-site detention pond until on-site runoff from the 100-year event (assuming developed conditions) has dropped below the 100-year existing condition peak runoff rate.

(3) Any pond embankments that are exposed to flood flows along Sheep Draw must be protected from riverine erosion by these flows, as evidenced by appropriate analyses to demonstrate stability of the proposed embankment protection measures in the context of 100-year hydraulic conditions along Sheep Draw.

(4) Any pond embankments that would be subject to overtopping by Sheep Draw flood flows must be protected from erosion due to embankment overtopping either by structural or engineered measures, or by demonstrating through rigorous hydrologic and/or hydraulic analyses that embankment erosion potential due to these overtopping flows is minimal.

(5) The grading for the pond and any of its attendant facilities, features or protection measures may not obstruct in any manner 100-year flood flows within the floodway of Sheep Draw.

(6) No adverse impact to the stability of the Sheep Draw channel must be demonstrated using a combination of hydraulic, sediment transport and channel bank stability analyses that are appropriate for the specific situation.

6.4 Evaluation of the Proposed Leisure Center Regional Detention Pond

An evaluation was completed to ascertain both the effectiveness and potential impacts of the proposed regional detention pond along the north side of Sheep Draw, adjacent to the City of Greeley's Leisure Center site. This evaluation was based on a conceptual design drawing prepared by Picket Engineering Incorporated entitled, "McClosky Farm, Sheep Draw Flood Control Pond," dated August 13, 2003. Based on this design drawing it appears that the proposed pond would be located directly adjacent to the north bank of the Sheep Draw channel along a 900-foot reach of the creek. Up to an overtopping elevation of 4755.3, the active storage available in the pond would be 21.2 acre-feet. Grading for the pond appears to show that the north bank of Sheep Draw would be lowered by more than 5 feet in some locations.

In order to assess possible effects of the pond on the 100-year peak flow on Sheep Draw, existing development with existing facilities hydrologic modeling results were reviewed. Based on the current modeling effort, it was determined that the Sheep Draw 100-year peak discharge just upstream of this location at 71st Avenue would be 3,760 cfs, and that the volume of runoff

during the 100-year event would exceed 780 acre-feet. The 100-year Sheep Draw existing development with existing facilities hydrograph at 71st Avenue, directly upstream of the proposed Leisure Center Pond is shown in Figure 6.1.

Due to the lack of complete design information for the pond, a direct analysis of the pond operation was not possible. Consequently, two scenarios were evaluated in order to assess the possible pond operation during the 100-year event along Sheep Draw.

The first scenario considered the maximum possible benefit the pond could provide with respect to reducing the peak flow along Sheep Draw. If the proposed detention pond was configured to precisely remove the peak 21.2 acre-feet of volume from the 100-year Sheep Draw hydrograph, the pond could reduce the 100-year peak flow along Sheep Draw by approximately 560 cfs, to approximately 3,200 cfs; this scenario is depicted in Figure 6.2. From a practical standpoint, it would be extremely difficult to design such a pond to function in this manner, and the current pond configuration would not support this particular operation.

The second scenario was investigated in an attempt to provide a closer approximation of the possible operation of the pond. As currently configured, rather than starting to intercept Sheep Draw flows near the 3,200 cfs level, the pond would begin to fill with runoff from Sheep Draw at less than 500 cfs. Based on this overtopping discharge, as well as the relationship between the total discharge in Sheep Draw and the portion of the flow that would be conveyed in the left overbank, an estimate of the portion of the rising limb of the 100-year Sheep Draw hydrograph that would be captured by the pond is shown in Figure 6.3. Due to the relatively small active storage volume in the pond compared to the volume of 100-year flows along the creek, the figure indicates that the pond would be ineffective with respect to reducing 100-year peak flows along Sheep Draw.

It is likely that the actual operation of the pond would fall somewhere between the behavior indicated by these two scenarios. However, based on this limited evaluation, it can be concluded that in its current configuration the proposed detention pond is not large enough to appreciably attenuate the existing 100-year peak flow along Sheep Draw.

The proposed detention pond configuration was also considered at a qualitative level with respect to stability of the Sheep Draw channel. Due to the apparent reduction in the height of the north bank along roughly 500 feet of the creek, flows along Sheep Draw will start to be intercepted by the pond at a relatively low discharge. During frequently occurring events, this may impact hydraulic conditions along Sheep Draw such that flow levels and channel flow velocities would be locally reduced. This could result in a reduction in the sediment-carrying capacity in the channel over a range of flow events such that the local stability of the Sheep Draw channel is compromised. Over the range of impacted flows, it is possible that local deposition of alluvial sediments could be accelerated to the extent that the channel banks could experience erosion and lateral movement as the channel responds to the change in flow regime. In addition, bed lowering downstream of the subject area could result, as flows in the creek seek

to satisfy the local sediment deficit that could result from the increased sediment deposition in the vicinity of the pond.

Without an extensive sediment transport analysis and channel stability evaluation, it is difficult to quantitatively assess potential impacts that the proposed grading plan may have on the stability of the Sheep Draw channel. However, it appears that construction of the pond as shown may adversely impact the stability of Sheep Draw both in the vicinity of and downstream of the pond.

As a result of this evaluation, considering the apparent ineffectiveness of the proposed pond in reducing 100-year flows along Sheep Draw, in conjunction with potential channel stability issues resulting from implementation of the pond, it would be difficult to recommend that the pond be constructed as currently proposed.

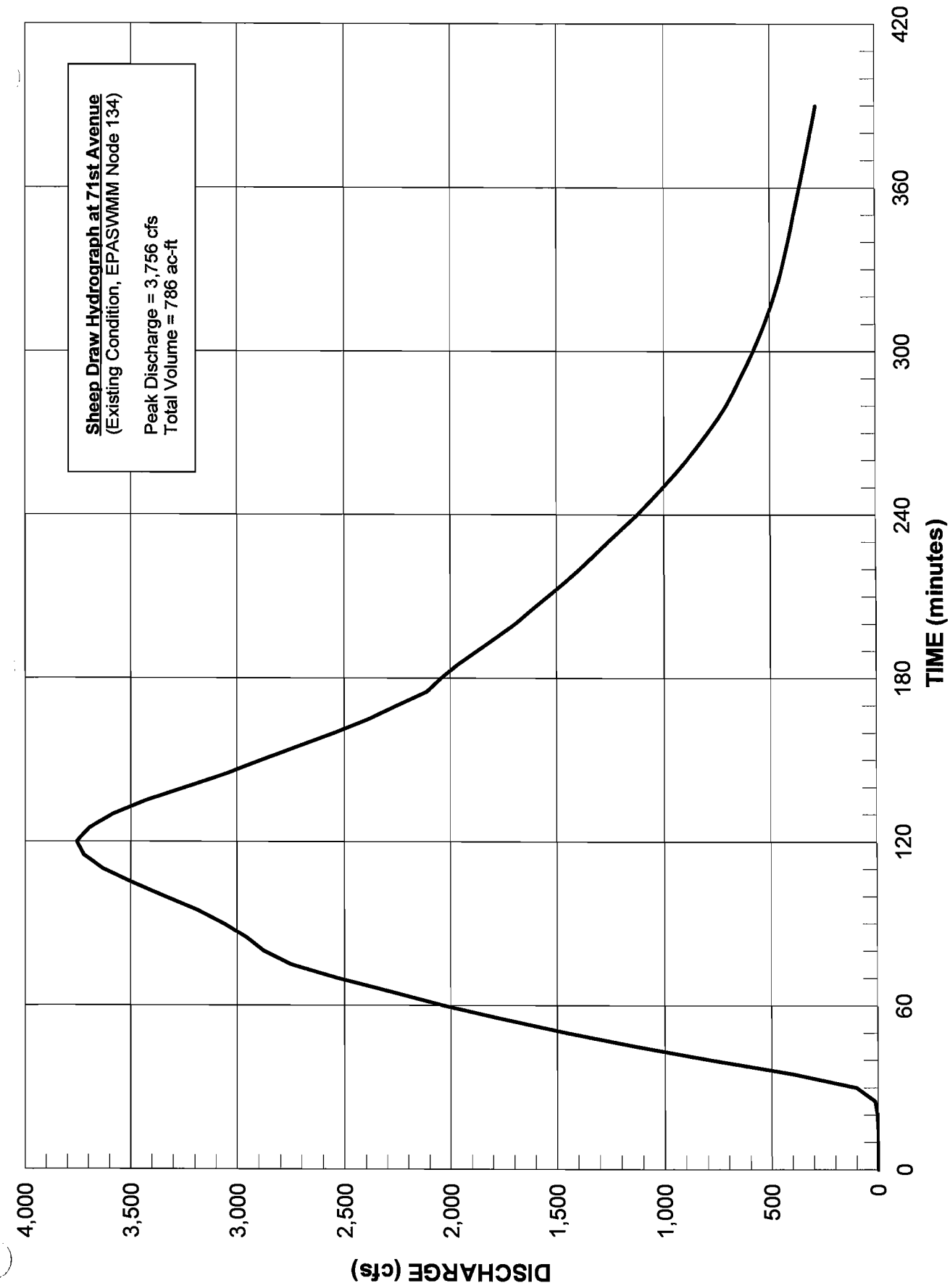

Figure 6.1 Sheep Draw 100-Year Existing Condition Hydrograph at 71st Avenue.

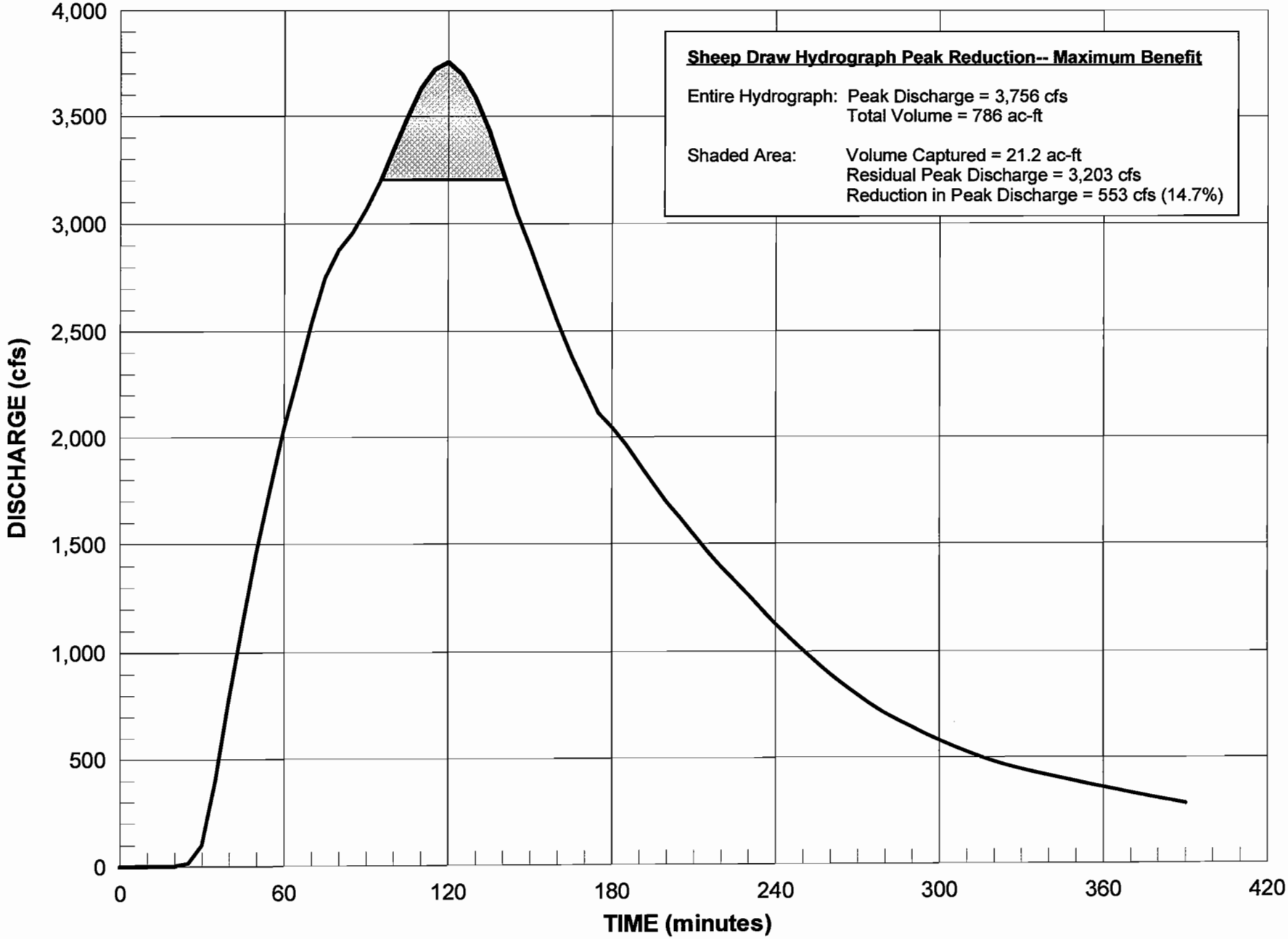

Figure 6.2 Maximum Possible Reduction in the Sheep Draw 100-Year Peak Discharge at 71st Avenue. (Proposed Leisure Center Pond)

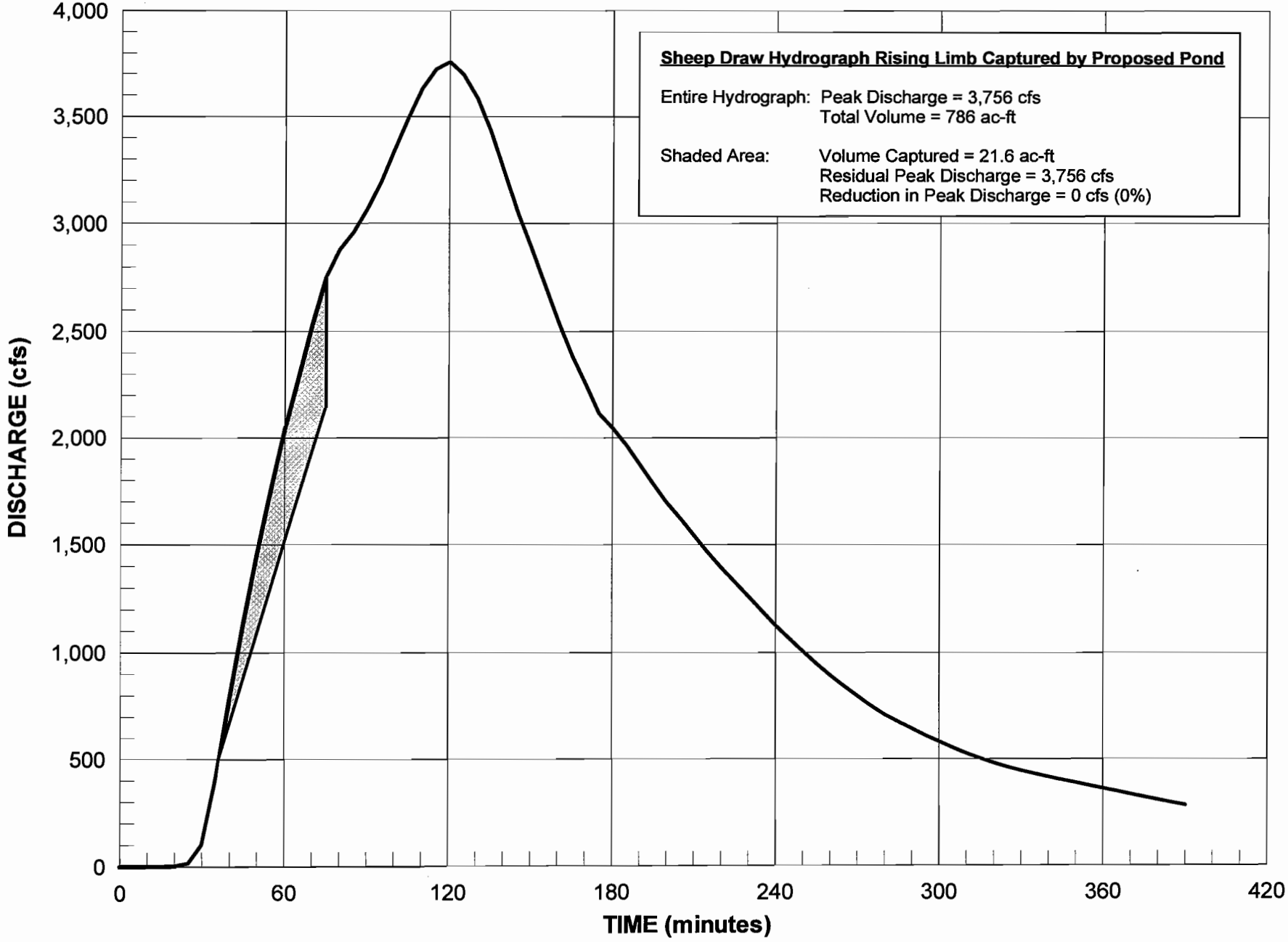

Figure 6.3 Probable Impact to the Sheep Draw 100-Year Hydrograph at 71st Avenue.
(Proposed Leisure Center Pond)

VII. RECOMMENDED PLAN OF DRAINAGE IMPROVEMENTS

The 1997 Comp Plan included an evaluation of alternative drainage plan components intended to reduce flooding and potential flood damages in the Sheep Draw Basin. The alternative components ranged from regional and on-site detention to improvement of bridge/culvert structures and major drainage channels to floodproofing and/or acquisition of structures. Based on the 1997 evaluation, it was concluded that on-site detention would be more appropriate than regional detention for the Sheep Draw Basin. The 1997 plan of improvements also identified the replacement of several crossing structures, modifications to the Greeley No. 3 Ditch, and acquisition and improvement of irrigation reservoirs and inadvertent detention areas.

Pursuant to the additional on-site detention versus regional detention analyses completed as part of the current Comp Plan, on-site detention remains the preferred method for reducing peak runoff rates from developing areas in the Sheep Draw Basin. All development within the Sheep Draw Basin that has occurred since completion of the 1997 Comp Plan, with the exception of one residential subdivision, have provided on-site detention that was intended to meet or, in most cases, exceed criteria. These detention facilities have had the effect of reducing 100-year discharges along Sheep Draw. In the case of the Poudre River Ranch, the development is located adjacent to the Greeley No. 3 Ditch and the Poudre River floodplain; consequently, this development was allowed to direct undetained runoff directly to both the Greeley No. 3 Ditch (low flows only) and the Poudre River corridor.

With respect to other methods for reducing flood hazards and minimizing potential increases in flood damage potential, the City's approach to floodplain management along Sheep Draw and the application of current drainage criteria throughout the basin has been notably successful. Since adoption of the 1997 Comp Plan, although some site grading has occurred along the Sheep Draw channel, floodplain encroachment has been limited and new buildings have not been introduced into the floodplain.

Other drainage-related improvements that have been implemented since 1997 include enlargement of the bridge serving 10th Street, the pending construction of the 83rd Avenue Bridge, and the addition of a second box culvert at both 95th Avenue and the U.S. Highway 34 Bypass. The recently installed F Street Diversion Structure on the Greeley No. 3 Ditch, a short distance east of 59th Avenue, although not located directly in the Sheep Draw Basin serves to spill unwanted storm flows that are intercepted by the ditch within the basin.

7.1 Formulation of the Drainage Improvement Plan

Modifying the drainage improvement plan for the Sheep Draw Basin was not included in the Scope of Work for the current study. However, 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, minor 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.

Since the area along the Greeley No. 3 Ditch within the Sheep Draw Basin is either in or adjacent to the 100-year floodplain for the Poudre River, previously identified drainage improvements in this area would likely provide limited benefit. Therefore, all improvements associated with the Greeley No. 3 Ditch, as well as those associated with the Sheep Draw channel in the vicinity of the ditch, have been eliminated from the current plan of drainage improvements.

Detention within the basin is primarily focused on new development providing on-site detention to release 100-year developed condition flows at no greater than the existing condition 100-year peak runoff rate. However, using the four existing irrigation reservoirs, as well as the two inadvertent detention areas (all located in the upper portion of the basin) to provide additional detention on a limited regional basis remains a component of the current plan of improvements.

Finally, although crossing improvements have already been implemented at several locations along the Sheep Draw channel, five additional crossing improvements are identified as part of this plan of improvements. Details associated with the drainage improvement plan are provided in the following section.

7.2 Major Storm Drainage Improvements

The major storm drainage improvement plan for the Sheep Draw Basin, as adapted from the 1997 Comp Plan, consists of the following eleven components. It is noted that these facilities are identified on the Drainage Improvement Plan sheet provided in Appendix G of this report. The facilities have been sized based on 100-year flows associated with the fully developed with proposed improvements condition, as defined in Section 7.8 of this report.

1. ***C Street Bridge.*** The C Street crossing of Sheep Draw in its current configuration will be overtopped by the 100-year flood by more than 2 feet. Replacement of this structure, along with local channel improvements to accommodate a new bridge, is recommended to: (a) reduce the existing safety hazard at the crossing; (b) improve emergency access during large flood events; and (c) reduce potential damages associated with flooding. The 1997 Comp Plan recommended that a bridge structure 70 feet in length and 50 feet in width, at a minimum, be constructed at this location. The Comp Plan condition (future development with proposed drainage improvements) 100-year discharge at C Street, as defined by the current study, is more than 1,100 cfs less than was estimated for the 1997

Comp Plan. Consequently, a smaller structure may now provide the conveyance capacity necessary for passing the 100-year flow. The required structure size would need to be confirmed by a detailed analysis completed as part of final design of this crossing.

2. ***71st Avenue Bridge.*** This structure was not identified as part of the 1997 Comp Plan. However, the 71st Avenue crossing of Sheep Draw in its current configuration will be overtopped by the 100-year flood by approximately 2 feet. Replacement of this structure, along with local channel improvements to accommodate a new bridge, is recommended to: (a) reduce the existing safety hazard at the crossing; (b) improve emergency access during large flood events; and (c) reduce potential damages associated with flooding. A bridge structure that is roughly equivalent to the 71-foot span bridge that has been designed by Weld County for the 83rd Avenue crossing would likely be required to provide the conveyance capacity necessary for passing the 100-year flow. The required structure size would need to be confirmed by a detailed analysis completed as part of final design of this crossing.

3. ***95th Avenue (County Road 25) Culvert.*** Although a second culvert was added at this location as part of the U.S. Highway 34 Bypass widening project completed by CDOT in 1999, the two culverts do not provide adequate conveyance for passing the 100-year discharge without overtopping 95th Avenue. The 95th Avenue crossing of Sheep Draw in its current configuration will be overtopped by approximately 0.2 feet. An additional culvert, along with local channel improvements to accommodate the third culvert, is recommended to: (a) reduce the existing safety hazard at the crossing; (b) improve emergency access during large flood events; and (c) reduce tailwater on the culverts under the U.S. Highway 34 Bypass, a crossing which is also subject to overtopping during the 100-year flood. Initial calculations indicate that an additional 9'Wx7'H concrete box culvert could pass the 100-year flow without overtopping the roadway while also providing 12 inches of freeboard prior to overtopping. The required culvert size would need to be confirmed by a detailed analysis completed as part of final design of this crossing.

4. ***U.S. Highway 34 Bypass Culvert.*** Although a second culvert was added at this location as part of the U.S. Highway 34 Bypass widening project completed by CDOT in 1999, the two culverts do not provide adequate conveyance for passing the 100-year discharge without overtopping the highway and the 95th Avenue intersection. During the 100-year event, the highway would be overtopped by more than 0.7 feet. An additional culvert, along with local channel improvements to accommodate the third culvert, is recommended to: (a) reduce the existing safety hazard at the crossing; and (b) improve emergency access during large flood events. Initial calculations indicate that an additional 14'Wx6'H concrete box culvert could pass the 100-year flow without overtopping the roadway while also providing 12 inches of freeboard prior to overtopping. The required culvert size would need to be confirmed by a detailed analysis completed as part of final design of this crossing.

5. ***U.S. Highway 34 Bypass/95th Avenue Intersection Culvert.*** The existing 66-inch RCP that serves the tributary carrying releases from Irrigation Reservoir #4 passes under the

U.S. Highway 34 Bypass/95th Avenue intersection. This facility was not improved as part of the U.S. Highway 34 Bypass project and remains under-sized compared to the 100-year discharge at this location. Releases from Irrigation Reservoir #4 during the 100-year event currently commingle with flows along the Sheep Draw mainstem as they overtop the highway and intersection. During the 100-year event, the highway and intersection would be overtopped by more than 0.7 feet. Replacement of this culvert, along with local channel improvements to accommodate a new culvert, is recommended at this location to: (a) reduce the existing safety hazard at the crossing; and (b) improve emergency access during large flood events. The 1997 Comp Plan recommended that an 8'Wx6'H concrete box culvert could pass the 100-year flow without overtopping the roadway. The 100-year discharge at this location as determined by the current study is practically identical to that estimated by the 1997 Comp Plan. Consequently, an 8'Wx6'H culvert should still be adequate at this location. The required culvert size would need to be confirmed by a detailed analysis completed as part of final design of this crossing.

6. ***Irrigation Reservoir #1.*** Irrigation Reservoir #1 is located upstream of the U.S. Highway 34 Bypass on the Sheep Draw mainstem. Based on the current hydrologic modeling effort for the existing condition, during the 100-year event this reservoir provides 27.6 acre-feet of active detention storage. However, due to the magnitude of stormwater inflows combined with the relatively efficient spillway configuration for releasing outflows, the 100-year peak inflow is only attenuated by 41 cfs (or less than 3 percent) through the reservoir. Based on the findings of the 1997 Comp Plan, it is recommended that this reservoir be purchased and improvements to the spillway be completed. As a minimum, the capacity of the existing reservoir should not be reduced to ensure that the 100-year existing condition releases remain unchanged. Assuming encroachment by adjacent housing developments along with the undersized road crossings downstream of the reservoir, it is likely that the existing reservoir will be classified as no less than a Class II structure by the State Engineer's Office (SEO). Consequently, improvements to the spillway may be necessary to meet SEO requirements.

7. ***Irrigation Reservoir #2.*** Irrigation Reservoir #2 is located upstream of Reservoir #1, on a right bank tributary to Sheep Draw. Based on the current hydrologic modeling effort for the existing condition, during the 100-year event this reservoir provides 10.7 acre-feet of active detention storage. The 100-year peak inflow is attenuated by 67 cfs (or 24 percent) through the reservoir. Based on the findings of the 1997 Comp Plan, it is recommended that this reservoir be purchased as development occurs. As a minimum, the capacity of the existing reservoir should not be reduced to ensure that the 100-year existing condition releases remain unchanged. It is likely that spillway or outlet facility improvements will be required to promote the safe and efficient conveyance of stormwater runoff through the reservoir.

8. ***Irrigation Reservoir #3.*** Irrigation Reservoir #3 is located upstream (east) of 95th Avenue, on a right bank tributary to Sheep Draw. Based on the current hydrologic modeling effort for the existing condition, during the 100-year event this reservoir provides 25.3 acre-feet of active detention storage. The 100-year peak inflow is attenuated by 214 cfs (or 31 percent) through the reservoir. Based on the findings of the 1997 Comp Plan, it is

recommended that this reservoir be purchased as development occurs. As a minimum, the capacity of the existing reservoir should not be reduced to ensure that the 100-year existing condition releases remain unchanged. It is likely that spillway or outlet facility improvements will be required to promote the safe and efficient conveyance of stormwater runoff through the reservoir.

9. ***Irrigation Reservoir #4.*** Irrigation Reservoir #4 is located downstream (west) of 95th Avenue and Irrigation Reservoir #3, on a right bank tributary to Sheep Draw. Based on the current hydrologic modeling effort for the existing condition, during the 100-year event this reservoir provides 24.3 acre-feet of active detention storage. However, due to the magnitude and timing of stormwater inflows (having been previously routed through Irrigation Reservoir # 3 and the inadvertent detention area upstream of 95th Avenue) combined with the relatively efficient spillway configuration for releasing outflows, the 100-year peak inflow is only attenuated by 65 cfs (or 10 percent) through the reservoir. Based on the findings of the 1997 Comp Plan, it is recommended that this reservoir be purchased as development occurs. As a minimum, the capacity of the existing reservoir should not be reduced to ensure that the 100-year existing condition releases remain unchanged. It is likely that spillway or outlet facility improvements will be required to promote the safe and efficient conveyance of stormwater runoff through the reservoir.

10. ***Inadvertent Detention Area at 95th Avenue.*** The right bank tributary to Sheep Draw that passes through Irrigation Reservoirs #3 and #4, crosses 95th Avenue from east to west at a location south of the U.S. Highway 34 Bypass. The roadway embankment is elevated relative to existing ground on the upstream side of 95th Avenue, creating an inadvertent detention area that is drained by a 24-inch CMP under the road. Based on the current hydrologic modeling effort for the existing condition, during the 100-year event this area provides 11.7 acre-feet of active detention storage. Due to the magnitude and timing of stormwater inflows (having been previously routed through Irrigation Reservoir #3), no attenuation of the 100-year peak flow is indicated through this facility. Based on the findings of the 1997 Comp Plan, it was recommended that this area be purchased as development occurs. It is likely that outlet facility improvements will be required to promote the safe and efficient conveyance of stormwater runoff through the reservoir.

11. ***Inadvertent Detention Area at State Highway 257.*** This inadvertent detention area is located on the Sheep Draw mainstem, upstream of Irrigation Reservoir #1, along the west side of State Highway 257. The roadway embankment is elevated relative to existing ground on the upstream side of Highway 257, creating an inadvertent detention area that is drained by a 24-inch RCP under the road. Based on the current hydrologic modeling effort for the existing condition, during the 100-year event this area provides 46.2 acre-feet of active detention storage. The 100-year peak inflow is attenuated by 406 cfs (or 71 percent) through the facility. Based on the findings of the 1997 Comp Plan, it is recommended that this reservoir be purchased as development occurs. As a minimum, the capacity of the existing reservoir should not be reduced to ensure that the 100-year existing condition releases remain unchanged. It is likely that outlet facility improvements will be required to promote the safe and efficient conveyance of stormwater runoff through the reservoir.

7.3 Alternative Storm Drainage Considerations

Based on the hydrologic and hydraulic analyses completed for the current study, it was determined that the U.S. Highway 34 Bypass and 95th Avenue improvements recently completed by CDOT are not adequate for safely passing the 100-year flow; overtopping of the roadway during the 100-year event, while reduced, will still occur. This is reflected in the drainage improvement plan defined above by the need for additional conveyance facilities under the Bypass and 95th Avenue. As a result, several alternative storm drainage solutions for the portion of the Sheep Draw Basin upstream of 95th Avenue have been identified; these are discussed below.

Alternative No. 1. Since they provide minimal benefit with respect to flow peak reduction, it may not be necessary to acquire and improve either Irrigation Reservoir #1 or the inadvertent detention area at 95th Avenue. This would likely result in only nominal increases in the sizes of the three culverts required for Bypass and 95th Avenue.

Alternative No. 2. In addition to not acquiring Irrigation Reservoir #1 and the inadvertent detention area at 95th Avenue, if may be possible to improve Irrigation Reservoirs #2 and #4 to over-detain such that flows at the Bypass and 95th Avenue can be safely conveyed by the existing culverts at those locations.

Alternative No. 3. If over-detention at Irrigation Reservoirs #2 and #4 is not sufficient for reducing 100-year flow peaks to acceptable levels, it may be necessary to acquire all identified detention facilities upstream of the Bypass and over-detain as needed in order to avoid adding conveyance facilities at the Bypass and 95th Avenue.

Numerous variations and permutations of the alternatives identified above would also be possible candidates for resolving drainage issues in the upper portion of the Sheep Draw basin. Therefore, it is recommended that a complete alternative evaluation be conducted using hydrologic modeling for various scenarios, including all necessary hydraulic analyses, in order to define the most economical drainage system for the upper portion of the Sheep Draw Basin. It is possible that the selected alternative for the upper portion of the basin may influence peak flows further downstream. However, since the only two proposed improvements downstream of 95th Avenue are the C Street and 71st Avenue Bridges, it is likely that the upper basin improvements would have only a minimal impact (if any) on structure size at these locations.

7.4 Other Storm Drainage Improvements and Considerations

The following discussion concerning tributary drainage and water augmentation was largely provided in the 1997 Comp Plan and remains valid today. The discussion concerning

water quality detention and the pedestrian crossing of Sheep Draw near 10th Street represent issues that have emerged since 1997.

Road crossings of several tributaries to Sheep Draw exist within the basin. Several of these crossings lack the capacity to convey the peak discharge from the 100-year storm event for existing conditions. In addition, several of the crossings were noted to be experiencing potential sediment and debris problems that would tend to reduce conveyance capacity. As land development occurs within the basin, these crossing structures will require improvements to meet the existing drainage criteria. Improvements to these crossings should consider the peak discharges conveyed through or over the roadways during the 100-year storm event. Replacement of these structures should not allow more than the existing 100-year peak discharge to pass downstream (i.e., inadvertent detention should not be compromised), unless adequate improvements are provided for downstream drainage facilities. In addition, discharge limitations associated with the releases from each subbasin must remain intact.

The improvements discussed in Section 7.2 of this report included the acquisition of four irrigation reservoirs. Presently, these reservoirs store water and are considered wet ponds. In general, the modeling effort assumed that the water level in each of these reservoirs prior to the 100-year storm event would be at the crest of their respective emergency spillways. Acquisition of these reservoirs assumes that a wet pond would be maintained; however, it should be noted that water augmentation would be required to offset evaporative losses associated with these structures. Consequently, costs associated with augmentation of these irrigation reservoirs must be considered. Alternatively, if these reservoirs are not maintained as wet ponds, either the active storage volumes can be utilized to reduce the peak discharge and possibly reduce on-site detention requirements, or active storage volumes could be reduced to coincide with the available detention storage identified above the spillway crest. In the case of using the latter approach, costs associated with embankment/spillway improvements would likely be reduced significantly.

Current drainage criteria require new development to provide water quality facilities in accordance with best management practices. With respect to stormwater quality facilities for the Sheep Draw Basin, it is assumed that new development will provide water quality ponds for extended detention on an as-required basis as development progresses.

Finally, it appears that the pedestrian crossing of the Sheep Draw channel directly upstream of the 10th Street Bridge, completed by CDOT in early 2000, has resulted in an increase in the 100-year water surface elevation at that location of approximately 1.5 feet. Since this crossing would be considered fill in the regulatory (FEMA and City) floodway, analyses should have been completed prior to construction that verified no rise in the 100-year water surface. It is suggested that CDOT be approached and encouraged to reconfigure that crossing to meet both FEMA and City of Greeley floodplain criteria. Otherwise, the City could be found to be non-

compliant with respect to meeting FEMA floodplain regulations and the City's participation in the National Flood Insurance Program (NFIP) jeopardized.

7.5 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.

In addition to the drainage criteria, land development in the Sheep Draw Basin will be dictated by the guidelines and recommendations provided in this comprehensive drainage plan document. The following information is presented to guide development specifically within the Sheep Draw Basin.

a. New development or redevelopment within the basin will be required to limit the developed condition 100-year peak runoff from any given site to no greater than the existing condition 100-year peak runoff rate.

b. New development or redevelopment within the basin will be required to limit the developed condition 10-year peak runoff from any given site to no greater than the existing condition 5-year peak runoff rate.

c. The total 100-year runoff from any subbasin must not increase the 100-year discharge at the nearest downstream design point along Sheep Draw, as dictated by the proposed condition hydrologic model documented in Section 7.8 of this report.

d. The peak 100-year release, as well as frequently-occurring storm flows, from each site must be conveyed in a safe and non-erosive manner to the confluence with Sheep Draw in an appropriately-sized and functional outfall facility such as a stabilized storm drainage channel or storm sewer.

e. Until an alternative evaluation is completed to further refine the system of storm drainage improvements upstream of 95th Avenue, all six existing irrigation reservoirs and roadway detention areas identified in Section 7.2 of this report must remain intact or be replaced. Developed condition releases from these reservoirs or inadvertent detention areas must be limited to the existing condition peak discharge associated with the 100-year flood event.

7.6 Conceptual Construction Cost Estimates

As part of the 1997 Comp Plan, estimates of potential construction costs were prepared for all of the currently proposed improvements, with the exception of the 71st Avenue Bridge. 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 each of the eleven proposed projects for the Sheep Draw is provided in Table 7.1.

For the ***C Street Bridge***, the contracted construction cost for 83rd Avenue Bridge which will be constructed by Weld County in early 2005 was prorated upward based on the increase in the 100-year discharge between 83rd Avenue and C Street. The modified cost estimate was then 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 estimate for this project and the remaining ten projects is included in Section 5 of the Project Notebook.

The estimated construction cost for the ***71st Avenue Bridge***, which was not included in the 1997 Comp Plan, was assumed to be approximately equal to the contracted construction cost for 83rd Avenue Bridge which will be constructed by Weld County in early 2005. Estimated construction costs for the ***95th Avenue Culvert*** and the ***U.S. Highway 34 Bypass Culvert*** were based on current unit cost data for the major elements associated with the required culverts at each of these two locations. For the ***U.S. Highway 34 Bypass/95th Avenue Intersection Culvert***, the 1997 cost estimate was converted to 2004 dollars based on the cumulative increase in the CCI computed by the ENR. Likewise, for the ***four irrigation reservoirs*** and the ***two inadvertent detention areas***, the 1997 cost estimate was converted to 2004 dollars based on the cumulative increase in the CCI computed by the ENR.

Table 7.1 Summary of Conceptual Construction Cost Estimates.

Description	Construction Cost [1]	Property Acquisition	Engineering and Project Management	Total Cost
C Street Bridge	$1,460,000	$0	$292,000	$1,752,000
71st Avenue Bridge	$1,100,000	$0	$220,000	$1,320,000
95th Avenue Culvert	$107,000	$0	$21,000	$128,000
U.S. Highway 34 Bypass Culvert	$400,000	$0	$80,000	$480,000
U.S. Highway 34 Bypass/95th Avenue Intersection Culvert	$210,000	$0	$42,000	$252,000
Irrigation Reservoir #1	$260,000	$279,000	$52,000	$591,000
Irrigation Reservoir #2 Irrigation Reservoir #3 Irrigation Reservoir #4 Detention Area at 95th Avenue	$746,000	$816,000	$149,000	$1,711,000
Detention Area at Highway 257	$64,000	$189,000	$13,000	$266,000
Total Project Costs				**$6,500,000**

[1] Includes initial estimate and 35 percent contingency.

7.7 Implementation Plan

Due to the current uncertainty with respect to a final plan of improvements for the upper portion of the basin, particularly with nine of the eleven identified drainage facilities located in the upper area, a basin-wide implementation plan is difficult to quantify at this time. The two projects identified in the lower basin are the C Street Bridge and the 71st Avenue Bridge. Given the current development pressure in the lower portion of the basin, it is recommended that replacement and enlargement of the C Street Bridge be considered the top priority in the Sheep Draw Basin. Also, factored into the identification of the C Street Bridge as the first project that should be implemented in the basin, is the remote location of the project with respect to the upper basin. Regardless of the final plan of improvements selected for the upper portion of the basin, design discharges at C Street would likely not be affected. Once the alternative evaluation for the upper portion of the basin is complete, a final implementation plan for the entire basin should be prepared.

7.8 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 facilities 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 of this report. Consequently, the future condition CUHP analysis documented in Section 2 of the Project Notebook applies to the proposed condition. Similarly, hydraulic conveyance modeling parameters defined for the future condition hydrologic model remain valid for the condition associated with the recommended plan of improvements, and were not modified for this analysis.

With respect to special modeling features, numerous detention storage elements were added to reflect on-site detention associated with future development. On-site detention was assumed and incorporated into the hydrologic model for all undeveloped areas with the following exceptions: (a) several small subbasins comprised entirely of steeply sloping ground adjacent to an existing drainage channel, as these subbasins represent areas that would not likely be developed; and (b) areas that have not been annexed into the City and remain in Weld County where detention requirements are not recognized. The basin map and model schematic associated with the future condition hydrologic model are included in Appendix A.

In the cases where entire subbasins are undeveloped and located in the City, defining detention parameters for the hydrologic model was straightforward. The storage-discharge relationships were manually iterated using EPA SWMM until the required detention volumes were determined to: (1) reduce the 10-year developed condition discharge to the 5-year existing condition level; and (2) reduce the 100-year developed condition discharge to the 100-year existing condition level. For instances where basins are partially developed without on-site detention having been provided or where basins are partially located in the County, release rates at the 10-year and 100-year levels were adjusted to accommodate developed condition runoff for the subject event from the portion of the basin where detention either has not been provided or likely will not be provided in the future.

A summary of peak discharges along Sheep Draw resulting from the proposed condition hydrologic modeling effort is provided in Table 7.2. EPA SWMM input files and summary output are included in Section 8.5 and 8.6, respectively, of the Project Notebook. Figure 7.1 presents flood profiles along Sheep Draw 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.

Table 7.2 Summary of Proposed Condition Peak Discharges along Sheep Draw.

Location	EPA SWMM Element	Drainage Area (acres)	Distance above Confluence with Poudre River (1,000 feet)	Peak Discharge (cfs) for the Given Return Period				
				2-yr	5-yr	10-yr	50-yr	100-yr
State Highway 257 (Inflow)	201	454	43.1	266	541	686	1,239	1,423
State Highway 257 (Outflow)	301	454	43.0	0	0	0	104	165
Upstream Limit of Hydraulic Model along Sheep Draw	501	1,369	39.7	55	105	138	661	992
Irrigation Reservoir No. 1 (Inflow)	542	2,431	35.4	99	186	246	1,190	1,770
Irrigation Reservoir No. 1 (Outflow)	304	2,431	34.9	95	175	241	1,169	1,738
Irrigation Reservoir No. 4 (Outflow)	311	833	29.9	2	4	6	346	591
U.S. Highway 34 Bypass	508	3,629	29.9	150	274	378	1,594	2,324
95th Avenue (Upstream)	509	3,876	29.2	162	297	410	1,644	2,388
95th Avenue (Downstream)	510	4,917	29.0	175	319	439	2,020	2,954
83rd Avenue	123	5,887	22.6	220	404	554	2,291	3,344
71st Avenue	134	7,110	15.8	277	510	690	2,556	3,668
10th Street	525	8,727	11.6	376	720	973	3,056	4,309
4th Street	529	9,236	7.9	411	788	1,065	3,146	4,424
C Street	533	9,810	3.0	437	840	1,136	3,232	4,534
Greeley No. 3 Ditch	537	10,085	1.4	450	864	1,169	3,268	4,600
Outfall to Cache La Poudre River	174	10,085	0.0	446	848	1,162	3,252	4,573
Basins 53 and 54 Outfall to Cache La Poudre River	526	866	*	49	96	129	637	925

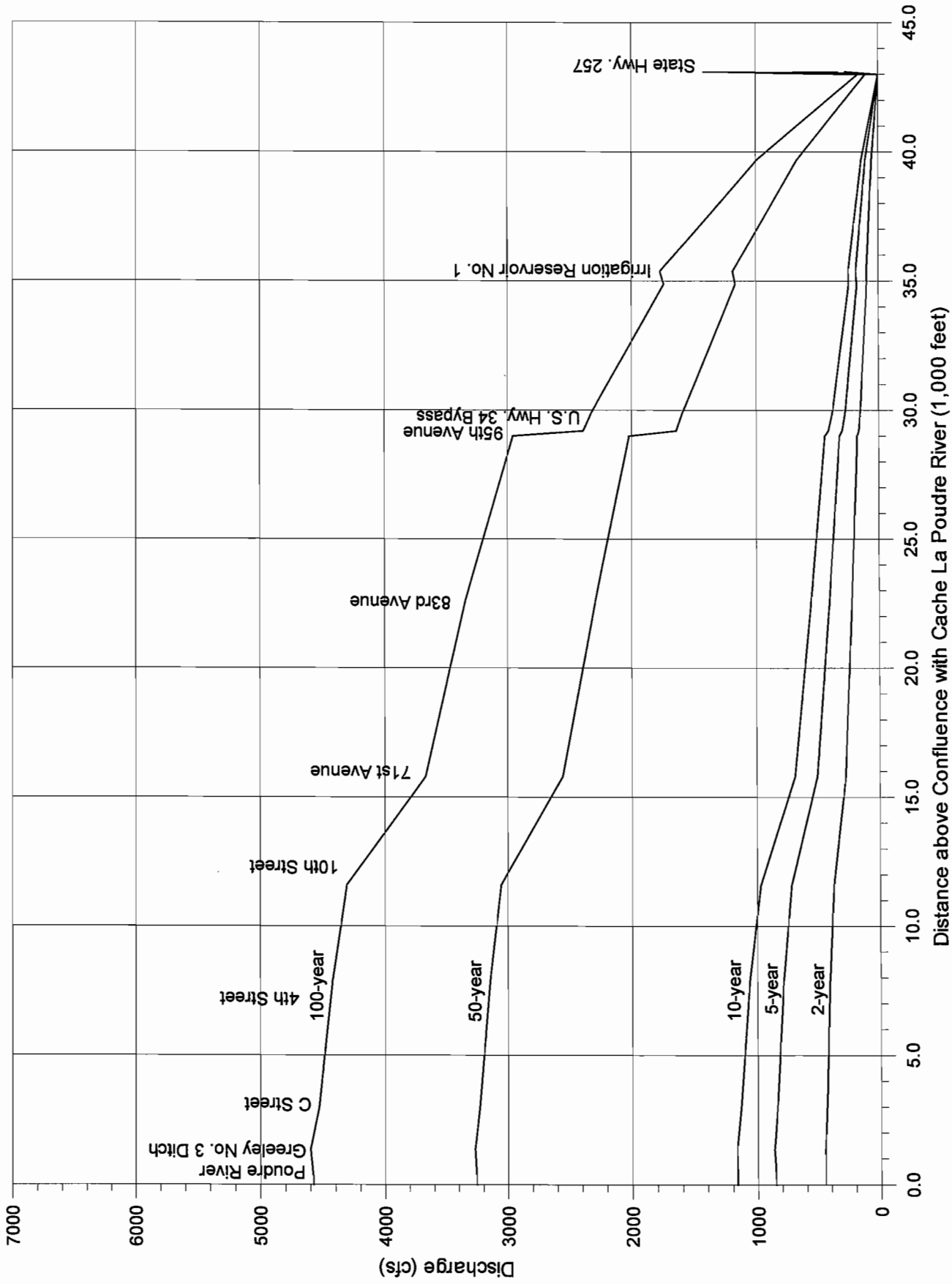

Figure 7.1 Discharge Profiles along Sheep Draw, Proposed Condition.

Compared to the existing condition, results of the proposed condition analysis indicate a dramatic increase in the inflow to the State Highway 257 Ponding Area. However, this is simply a reflection of the developed condition runoff from the contributing subbasin. For the purposes of modeling the proposed condition, the State Highway 257 Ponding Area was the location where it was assumed that on-site detention would be provided for the one tributary subbasin; it is noted that the outflow from this ponding area is shown to be identical to that indicated for the existing condition. Otherwise, only a slight increase in 100-year flows along Sheep Draw is evident upstream of the U.S. Highway 34 Bypass for proposed conditions. This is likely due to better agreement in the timing and alignment of the future development condition but attenuated peak flows, as compared to the non-attenuated existing condition flow peaks. Downstream of the Bypass, 100-year flow peaks for proposed conditions are slightly lower than existing conditions. It appears that the detention that would be provided upstream of the Bypass would slow the upper basin response enough to allow runoff from the lower basin to reach the Sheep Draw channel prior to combining as efficiently with the upper basin runoff.

VIII. REFERENCES

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EXISTING CONDITION
(EXISTING DEVELOPMENT WITH EXISTING FACILITIES)

SHEEP DRAW BASIN
FILENAME: SDB002EC.SUM
EXISTING CONDITIONS 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.
Sheep Draw Basin - Existing Conditions with Existing Facilities - 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.....	0.573	0.381	2.632	0.323	0.000	5.844	6.625	0.505	0.395	0.089
STANDARD DEVIATION OF FLOW.....	0.144	0.095	0.407	0.081	0.000	1.146	1.443	0.108	0.091	0.038
MAXIMUM FLOW.....	4.221	2.514	10.925	2.050	0.000	38.172	52.461	2.638	2.230	1.468
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).....	1.20E+04	8.01E+03	5.53E+04	6.79E+03	0.00E+00	1.23E+05	1.39E+05	1.06E+04	8.30E+03	1.86E+03

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	0.403	0.000	0.746	0.000	0.000	14.066	4.395	7.822	2.918	0.000
STANDARD DEVIATION OF FLOW.....	0.104	0.000	0.175	0.000	0.000	3.175	0.912	1.825	0.601	0.000
MAXIMUM FLOW.....	2.890	0.000	5.079	0.000	0.000	118.731	31.127	71.360	20.324	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).....	8.46E+03	0.00E+00	1.57E+04	0.00E+00	0.00E+00	2.95E+05	9.23E+04	1.64E+05	6.13E+04	0.00E+00

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	0.159	1.515	0.124	4.415	0.000	0.722	0.744	0.000	1.997	0.075
STANDARD DEVIATION OF FLOW.....	0.056	0.394	0.048	1.108	0.000	0.197	0.192	0.000	0.475	0.037
MAXIMUM FLOW.....	1.796	13.800	1.667	44.560	0.000	6.393	5.992	0.000	16.340	1.563
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).....	3.33E+03	3.18E+04	2.60E+03	9.27E+04	0.00E+00	1.52E+04	1.56E+04	0.00E+00	4.19E+04	1.57E+03

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	0.000	3.358	0.483	1.416	0.273	5.004	7.895	0.128	15.735	6.743
STANDARD DEVIATION OF FLOW.....	0.000	0.798	0.119	0.382	0.092	1.122	1.797	0.060	3.091	1.373
MAXIMUM FLOW.....	0.000	30.670	3.326	13.001	3.082	41.420	66.500	2.483	100.491	47.949
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	7.05E+04	1.01E+04	2.97E+04	5.74E+03	1.05E+05	1.66E+05	2.68E+03	3.30E+05	1.42E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	2.052	3.597	5.646	0.695	0.000	4.593	0.192	0.202	3.527	7.072
STANDARD DEVIATION OF FLOW.....	0.423	0.837	1.182	0.202	0.000	1.005	0.078	0.074	0.999	1.349
MAXIMUM FLOW.....	12.139	31.160	41.517	6.630	0.000	36.029	2.930	2.595	38.700	41.108
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).....	4.31E+04	7.55E+04	1.19E+05	1.46E+04	0.00E+00	9.65E+04	4.03E+03	4.24E+03	7.41E+04	1.49E+05

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	16.297	3.473	0.296	1.962	0.686	0.121	5.379	8.214	4.589	3.331
STANDARD DEVIATION OF FLOW.....	3.412	0.769	0.092	0.321	0.201	0.057	1.140	2.091	1.062	0.742
MAXIMUM FLOW.....	117.877	29.160	2.940	8.550	6.849	2.344	38.758	85.850	43.120	27.220
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).....	3.42E+05	7.29E+04	6.21E+03	4.12E+04	1.44E+04	2.53E+03	1.13E+05	1.72E+05	9.64E+04	6.99E+04

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	2.493	2.072	1.497	1.062	1.168	0.187	1.673	0.072	6.527	0.104
STANDARD DEVIATION OF FLOW.....	0.594	0.505	0.374	0.294	0.297	0.072	0.426	0.035	1.564	0.049
MAXIMUM FLOW.....	24.260	16.763	13.850	10.067	10.490	2.677	14.640	1.449	62.580	2.013
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).....	5.24E+04	4.35E+04	3.14E+04	2.23E+04	2.45E+04	3.92E+03	3.51E+04	1.51E+03	1.37E+05	2.18E+03

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	4.669	3.940	12.537	0.000	1.670
STANDARD DEVIATION OF FLOW.....	1.095	1.009	2.843	0.000	0.377
MAXIMUM FLOW.....	42.170	40.010	106.570	0.000	11.399
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	9.81E+04	8.27E+04	2.63E+05	0.00E+00	3.51E+04

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	0.000	0.000	3.014	3.026	4.614	0.552	7.964	8.468	7.263	7.195
STANDARD DEVIATION OF FLOW.....	0.000	0.000	0.493	0.481	0.246	0.023	0.727	0.820	0.439	0.449
MAXIMUM FLOW.....	0.000	0.000	13.310	12.482	7.087	0.670	20.686	23.268	11.531	11.527
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	6.33E+04	6.36E+04	9.69E+04	1.16E+04	1.67E+05	1.78E+05	1.53E+05	1.51E+05

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	0.394	0.000	0.000	11.891	12.443	12.270	2.893	15.162	14.913	7.678
STANDARD DEVIATION OF FLOW.....	0.057	0.000	0.000	0.684	0.693	0.720	0.314	0.982	1.012	0.456
MAXIMUM FLOW.....	1.420	0.000	0.000	19.137	19.669	19.642	7.658	26.984	26.888	12.449
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).....	8.28E+03	0.00E+00	0.00E+00	2.50E+05	2.61E+05	2.58E+05	6.07E+04	3.18E+05	3.13E+05	1.61E+05

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	7.516	0.711	0.000	0.403	0.364	2.896	2.797	22.429	25.226	2.386
STANDARD DEVIATION OF FLOW.....	0.479	0.067	0.000	0.104	0.030	0.110	0.128	1.382	1.489	0.101
MAXIMUM FLOW.....	12.397	1.737	0.000	2.890	0.851	3.597	3.580	37.227	40.684	3.160
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).....	1.58E+05	1.49E+04	0.00E+00	8.46E+03	7.65E+03	6.08E+04	5.87E+04	4.71E+05	5.30E+05	5.01E+04

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

SHEEP DRAW BASIN
FILENAME: SDB005EC.SUM
EXISTING CONDITIONS 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.
Sheep Draw Basin - Existing Conditions with Existing Facilities - 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.....	22.426	19.250	17.289	11.717	2.721	9.865	11.070	16.347	11.585	7.980
STANDARD DEVIATION OF FLOW.....	3.922	2.654	2.511	1.413	0.562	2.040	2.529	1.958	1.322	1.396
MAXIMUM FLOW.....	109.237	69.490	69.456	39.230	17.350	68.300	93.087	54.397	36.800	41.337
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).....	4.78E+05	4.10E+05	3.68E+05	2.50E+05	5.80E+04	2.10E+05	2.36E+05	3.48E+05	2.47E+05	1.70E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	3.694	2.524	13.969	5.015	2.460	23.911	8.384	13.910	5.283	3.397
STANDARD DEVIATION OF FLOW.....	0.623	0.594	2.583	0.862	0.573	5.689	1.861	3.453	1.156	0.821
MAXIMUM FLOW.....	17.540	19.426	77.627	25.159	18.666	216.800	64.519	136.870	39.732	27.465
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).....	7.87E+04	5.38E+04	2.98E+05	1.07E+05	5.24E+04	5.09E+05	1.79E+05	2.96E+05	1.13E+05	7.24E+04

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	5.737	3.453	8.461	9.026	0.890	2.384	5.258	1.527	4.021	2.886
STANDARD DEVIATION OF FLOW.....	1.007	0.883	1.585	2.410	0.264	0.616	1.161	0.497	0.975	0.739
MAXIMUM FLOW.....	29.375	31.370	47.623	99.900	9.292	20.844	36.928	19.198	34.080	25.309
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).....	1.22E+05	7.36E+04	1.80E+05	1.92E+05	1.90E+04	5.08E+04	1.12E+05	3.25E+04	8.56E+04	6.15E+04

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	0.507	6.539	8.818	5.835	3.694	9.168	15.354	2.106	33.406	11.329
STANDARD DEVIATION OF FLOW.....	0.132	1.653	1.482	1.550	0.893	2.203	3.742	0.654	6.982	2.428
MAXIMUM FLOW.....	4.087	64.710	42.986	55.499	29.664	81.890	138.673	24.853	227.013	85.492
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).....	1.08E+04	1.39E+05	1.88E+05	1.24E+05	7.87E+04	1.95E+05	3.27E+05	4.49E+04	7.12E+05	2.41E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	6.666	7.269	10.046	1.689	0.264	7.972	2.198	1.385	9.884	17.468
STANDARD DEVIATION OF FLOW.....	1.365	1.788	2.241	0.436	0.079	1.844	0.658	0.384	2.819	3.501
MAXIMUM FLOW.....	40.879	67.200	79.956	14.590	2.537	67.271	24.368	13.064	111.520	108.764
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).....	1.42E+05	1.55E+05	2.14E+05	3.60E+04	5.63E+03	1.70E+05	4.68E+04	2.95E+04	2.11E+05	3.72E+05

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	34.234	5.323	9.408	17.039	3.374	1.997	11.079	16.635	7.007	5.736
STANDARD DEVIATION OF FLOW.....	7.649	1.209	1.975	2.472	0.928	0.619	2.495	4.513	1.663	1.329
MAXIMUM FLOW.....	267.144	47.210	63.230	69.162	33.160	23.448	86.467	191.220	69.070	49.820
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).....	7.29E+05	1.13E+05	2.00E+05	3.63E+05	7.19E+04	4.25E+04	2.36E+05	3.54E+05	1.49E+05	1.22E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	3.734	5.081	2.621	2.366	2.151	0.765	3.796	0.836	12.224	1.252
STANDARD DEVIATION OF FLOW.....	0.898	1.233	0.645	0.585	0.526	0.214	0.952	0.210	3.139	0.374
MAXIMUM FLOW.....	36.830	42.458	24.670	20.010	19.010	7.440	33.220	6.445	128.650	14.242
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).....	7.95E+04	1.08E+05	5.58E+04	5.04E+04	4.58E+04	1.63E+04	8.09E+04	1.78E+04	2.60E+05	2.67E+04

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	9.009	8.609	22.233	1.073	16.379
STANDARD DEVIATION OF FLOW.....	2.256	2.309	5.366	0.325	3.384
MAXIMUM FLOW.....	88.130	94.480	204.474	11.831	100.510
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.92E+05	1.83E+05	4.74E+05	2.28E+04	3.49E+05

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	0.000	0.000	36.539	36.680	7.900	0.950	56.296	72.643	69.482	69.302
STANDARD DEVIATION OF FLOW.....	0.000	0.000	5.150	5.027	0.437	0.038	6.733	8.655	6.494	6.503
MAXIMUM FLOW.....	0.000	0.000	138.334	129.797	12.817	1.134	178.610	231.683	162.658	162.402
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	7.78E+05	7.81E+05	1.68E+05	2.02E+04	1.20E+06	1.55E+06	1.48E+06	1.48E+06

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	11.258	5.181	5.200	20.460	26.610	26.365	5.245	31.610	31.258	88.540
STANDARD DEVIATION OF FLOW.....	0.924	1.130	1.103	1.242	2.086	2.096	0.608	2.676	2.685	7.772
MAXIMUM FLOW.....	23.623	35.300	34.231	35.276	63.880	63.061	14.873	77.259	76.314	199.298
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).....	2.40E+05	1.10E+05	1.11E+05	4.36E+05	5.67E+05	5.62E+05	1.12E+05	6.73E+05	6.66E+05	1.89E+06

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	88.021	13.165	0.000	3.694	3.262	5.286	5.135	119.279	127.811	4.652
STANDARD DEVIATION OF FLOW.....	7.790	1.058	0.000	0.623	0.217	0.199	0.227	9.897	10.036	0.198
MAXIMUM FLOW.....	197.962	27.023	0.000	17.540	5.745	6.566	6.533	253.755	263.270	6.337
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).....	1.87E+06	2.80E+05	0.00E+00	7.87E+04	6.95E+04	1.13E+05	1.09E+05	2.54E+06	2.72E+06	9.91E+04

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

SHEEP DRAW BASIN
FILENAME: SDB010EC.SUM
EXISTING CONDITIONS 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.
Sheep Draw Basin - Existing Conditions with Existing Facilities - 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.....	39.045	34.907	34.379	26.411	6.606	12.416	13.862	36.368	24.984	19.040
STANDARD DEVIATION OF FLOW.....	6.556	4.680	4.808	3.032	1.237	2.544	3.126	4.154	2.736	3.083
MAXIMUM FLOW.....	174.985	118.810	125.901	79.974	34.200	86.388	115.664	110.295	72.606	83.781
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).....	8.55E+05	7.64E+05	7.53E+05	5.78E+05	1.45E+05	2.72E+05	3.04E+05	7.96E+05	5.47E+05	4.17E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	7.832	6.332	33.652	12.170	5.931	30.211	11.168	17.972	6.881	8.159
STANDARD DEVIATION OF FLOW.....	1.260	1.340	5.770	1.925	1.245	7.091	2.442	4.393	1.488	1.761
MAXIMUM FLOW.....	32.600	39.469	160.289	51.387	36.400	278.100	84.075	181.530	51.041	53.182
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).....	1.72E+05	1.39E+05	7.37E+05	2.67E+05	1.30E+05	6.62E+05	2.45E+05	3.94E+05	1.51E+05	1.79E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	13.327	4.876	20.425	12.372	1.970	3.828	10.837	3.654	5.409	6.733
STANDARD DEVIATION OF FLOW.....	2.182	1.195	3.517	3.214	0.518	0.918	2.227	1.015	1.272	1.537
MAXIMUM FLOW.....	58.452	43.380	97.010	134.460	17.172	29.961	65.261	36.559	45.790	47.630
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).....	2.92E+05	1.07E+05	4.47E+05	2.71E+05	4.31E+04	8.38E+04	2.37E+05	8.00E+04	1.18E+05	1.47E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	1.097	8.783	21.151	9.844	7.623	12.028	20.616	4.716	47.019	14.224
STANDARD DEVIATION OF FLOW.....	0.261	2.169	3.329	2.421	1.681	2.848	4.926	1.281	9.655	3.016
MAXIMUM FLOW.....	7.371	86.870	88.972	82.729	50.743	109.920	189.000	45.737	313.261	107.600
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).....	2.40E+04	1.92E+05	4.63E+05	2.16E+05	1.67E+05	2.63E+05	4.51E+05	1.03E+05	1.03E+06	3.11E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	10.570	9.892	12.984	2.392	0.721	10.175	4.153	2.692	15.692	25.698
STANDARD DEVIATION OF FLOW.....	2.067	2.377	2.862	0.583	0.172	2.322	1.108	0.671	4.218	5.019
MAXIMUM FLOW.....	59.166	91.470	102.249	19.930	4.594	85.780	38.406	21.696	168.550	150.985
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).....	2.31E+05	2.17E+05	2.84E+05	5.24E+04	1.58E+04	2.23E+05	9.09E+04	5.90E+04	3.44E+05	5.63E+05

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	47.451	6.508	22.224	34.220	5.882	4.473	15.229	22.722	8.542	7.588
STANDARD DEVIATION OF FLOW.....	10.379	1.469	4.258	4.753	1.477	1.213	3.358	5.997	2.012	1.790
MAXIMUM FLOW.....	361.155	58.680	123.940	125.285	50.132	43.190	114.822	256.840	86.160	69.490
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).....	1.04E+06	1.43E+05	4.87E+05	7.49E+05	1.29E+05	9.80E+04	3.34E+05	4.98E+05	1.87E+05	1.66E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	4.441	7.413	3.446	3.713	2.919	1.151	5.594	1.604	16.172	2.982
STANDARD DEVIATION OF FLOW.....	1.046	1.722	0.853	0.923	0.704	0.297	1.343	0.376	4.071	0.870
MAXIMUM FLOW.....	44.110	57.860	34.060	32.770	26.540	10.230	47.030	10.847	170.860	32.808
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).....	9.72E+04	1.62E+05	7.55E+04	8.13E+04	6.39E+04	2.52E+04	1.23E+05	3.51E+04	3.54E+05	6.53E+04

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	12.059	12.329	28.828	2.388	27.492
STANDARD DEVIATION OF FLOW.....	2.956	3.194	6.864	0.638	5.401
MAXIMUM FLOW.....	118.580	131.080	269.460	21.708	152.896
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.64E+05	2.70E+05	6.31E+05	5.23E+04	6.02E+05

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	0.000	0.000	69.286	69.545	10.069	1.226	106.025	142.393	138.553	138.275
STANDARD DEVIATION OF FLOW.....	0.000	0.000	9.471	9.267	0.560	0.048	12.683	16.797	14.145	14.134
MAXIMUM FLOW.....	0.000	0.000	242.955	232.630	16.626	1.459	325.038	434.408	390.019	388.840
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).....	0.00E+00	0.00E+00	1.52E+06	1.52E+06	2.21E+05	2.68E+04	2.32E+06	3.12E+06	3.03E+06	3.03E+06

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	24.369	12.537	12.556	26.118	39.900	39.622	6.840	46.462	46.067	181.683
STANDARD DEVIATION OF FLOW.....	1.975	2.472	2.438	1.602	3.646	3.644	0.800	4.422	4.414	17.383
MAXIMUM FLOW.....	51.364	69.820	68.928	46.155	106.219	105.828	19.811	124.192	123.505	484.222
MINIMUM FLOW.....	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	5.34E+05	2.75E+05	2.75E+05	5.72E+05	8.74E+05	8.68E+05	1.50E+05	1.02E+06	1.01E+06	3.98E+06

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	180.813	31.836	20.922	28.754	21.320	6.999	6.819	226.880	241.858	6.324
STANDARD DEVIATION OF FLOW.....	17.327	2.553	2.385	2.227	1.394	0.259	0.293	20.676	21.074	0.267
MAXIMUM FLOW.....	476.164	68.552	61.182	70.639	34.917	8.766	8.751	570.319	589.586	8.718
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).....	3.96E+06	6.97E+05	4.58E+05	6.30E+05	4.67E+05	1.53E+05	1.49E+05	4.97E+06	5.30E+06	1.38E+05

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

SHEEP DRAW BASIN
FILENAME: SDB050EC.SUM
EXISTING CONDITIONS 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.
Sheep Draw Basin - Existing Conditions with Existing Facilities - 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.....	86.877	79.957	85.854	70.562	18.645	19.476	21.562	96.592	65.347	52.304
STANDARD DEVIATION OF FLOW.....	15.445	11.322	12.654	8.548	3.674	4.413	5.419	11.622	7.543	8.935
MAXIMUM FLOW.....	454.119	317.290	359.149	241.744	110.610	157.225	208.567	330.018	213.471	262.479
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).....	1.98E+06	1.82E+06	1.96E+06	1.61E+06	4.25E+05	4.44E+05	4.92E+05	2.20E+06	1.49E+06	1.19E+06

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	21.133	18.645	96.634	34.224	16.766	47.746	19.161	29.411	11.426	22.711
STANDARD DEVIATION OF FLOW.....	3.561	4.180	17.583	5.703	3.718	12.523	4.660	8.065	2.744	5.216
MAXIMUM FLOW.....	101.237	133.500	528.175	164.887	117.680	516.164	168.905	344.903	99.068	169.330
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).....	4.82E+05	4.25E+05	2.20E+06	7.80E+05	3.82E+05	1.09E+06	4.37E+05	6.71E+05	2.61E+05	5.18E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	36.546	9.006	57.379	21.977	5.354	8.068	28.067	10.230	9.332	18.520
STANDARD DEVIATION OF FLOW.....	6.299	2.427	10.456	6.431	1.500	2.088	6.143	3.063	2.409	4.498
MAXIMUM FLOW.....	184.343	90.890	314.094	266.752	52.445	72.356	195.090	113.229	90.114	149.560
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).....	8.33E+05	2.05E+05	1.31E+06	5.01E+05	1.22E+05	1.84E+05	6.40E+05	2.33E+05	2.13E+05	4.22E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	2.997	15.238	61.034	21.881	19.749	20.211	35.653	12.855	85.942	22.226
STANDARD DEVIATION OF FLOW.....	0.725	4.230	10.156	5.808	4.602	5.373	9.545	3.766	19.491	5.229
MAXIMUM FLOW.....	22.088	172.460	296.766	207.399	148.990	216.157	382.181	138.842	673.005	194.584
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).....	6.83E+04	3.47E+05	1.39E+06	4.99E+05	4.50E+05	4.61E+05	8.13E+05	2.93E+05	1.96E+06	5.07E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	21.914	17.466	21.307	4.394	2.058	16.354	10.285	6.573	32.810	49.479
STANDARD DEVIATION OF FLOW.....	4.587	4.701	5.238	1.158	0.483	4.169	2.909	1.749	9.884	10.501
MAXIMUM FLOW.....	141.390	186.029	195.167	41.106	13.769	161.717	104.671	60.080	393.951	341.330
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).....	5.00E+05	3.98E+05	4.86E+05	1.00E+05	4.69E+04	3.73E+05	2.35E+05	1.50E+05	7.48E+05	1.13E+06

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	85.512	10.325	61.357	86.258	13.490	12.193	27.259	40.325	13.443	14.111
STANDARD DEVIATION OF FLOW.....	20.729	2.661	12.482	12.588	3.649	3.564	6.661	12.026	3.610	3.772
MAXIMUM FLOW.....	757.875	109.756	389.833	358.480	129.758	131.201	239.683	510.304	158.101	149.274
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).....	1.95E+06	2.35E+05	1.40E+06	1.97E+06	3.08E+05	2.78E+05	6.21E+05	9.19E+05	3.06E+05	3.22E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	6.251	14.197	6.303	10.646	6.346	5.689	10.780	4.064	27.493	10.791
STANDARD DEVIATION OF FLOW.....	1.610	3.610	1.736	2.910	1.731	1.605	2.872	0.986	7.811	3.121
MAXIMUM FLOW.....	68.888	128.117	70.000	107.263	65.767	60.098	105.667	30.617	331.915	114.507
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).....	1.43E+05	3.24E+05	1.44E+05	2.43E+05	1.45E+05	1.30E+05	2.46E+05	9.26E+04	6.27E+05	2.46E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	20.828	23.513	47.963	6.431	59.174
STANDARD DEVIATION OF FLOW.....	5.740	6.926	12.880	1.831	12.454
MAXIMUM FLOW.....	235.847	281.754	533.783	65.020	392.350
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	4.75E+05	5.36E+05	1.09E+06	1.47E+05	1.35E+06

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	7.377	8.182	173.993	174.504	16.131	2.004	261.197	357.789	352.213	351.676
STANDARD DEVIATION OF FLOW.....	1.415	1.283	23.508	22.861	0.952	0.077	32.021	43.546	40.033	39.881
MAXIMUM FLOW.....	37.635	33.071	675.350	635.734	28.227	2.366	894.719	1222.886	1173.822	1160.820
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).....	1.68E+05	1.87E+05	3.97E+06	3.98E+06	3.68E+05	4.57E+04	5.96E+06	8.16E+06	8.03E+06	8.02E+06

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	64.107	35.411	35.425	41.979	79.408	79.047	11.377	90.424	89.912	468.088
STANDARD DEVIATION OF FLOW.....	5.599	7.365	7.288	2.775	9.261	9.213	1.432	10.589	10.515	50.135
MAXIMUM FLOW.....	153.685	228.290	226.814	80.169	290.798	290.613	37.374	323.672	320.071	1466.862
MINIMUM FLOW.....	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.46E+06	8.07E+05	8.08E+05	9.57E+05	1.81E+06	1.80E+06	2.59E+05	2.06E+06	2.05E+06	1.07E+07

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	466.459	93.716	95.677	116.810	101.789	11.919	11.662	556.371	590.743	11.212
STANDARD DEVIATION OF FLOW.....	49.580	10.448	12.164	14.013	8.477	0.448	0.496	57.152	58.610	0.487
MAXIMUM FLOW.....	1417.762	302.503	353.807	421.713	265.352	15.142	15.126	1633.097	1691.326	15.915
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).....	1.06E+07	2.14E+06	2.18E+06	2.66E+06	2.32E+06	2.72E+05	2.66E+05	1.27E+07	1.35E+07	2.56E+05

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

SHEEP DRAW BASIN
FILENAME: SDB100EC.SUM
EXISTING CONDITIONS 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.
Sheep Draw Basin - Existing Conditions with Existing Facilities - 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.....	112.510	104.122	113.656	95.295	25.387	22.601	24.952	130.354	87.866	71.053
STANDARD DEVIATION OF FLOW.....	19.819	14.722	16.686	11.485	4.871	5.228	6.359	15.605	10.110	11.902
MAXIMUM FLOW.....	571.234	410.076	465.520	323.222	139.586	180.767	242.577	441.123	285.140	338.929
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).....	2.63E+06	2.44E+06	2.66E+06	2.23E+06	5.94E+05	5.29E+05	5.84E+05	3.05E+06	2.06E+06	1.66E+06

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	28.243	25.497	131.363	46.578	22.834	55.543	22.896	34.621	13.512	30.898
STANDARD DEVIATION OF FLOW.....	4.712	5.524	23.429	7.617	4.897	14.694	5.615	9.515	3.288	6.846
MAXIMUM FLOW.....	128.150	166.839	685.357	213.619	147.102	584.932	198.428	397.583	115.960	210.850
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).....	6.61E+05	5.97E+05	3.07E+06	1.09E+06	5.34E+05	1.30E+06	5.36E+05	8.10E+05	3.16E+05	7.23E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	49.487	10.952	78.080	26.558	7.243	10.212	37.343	13.942	11.102	25.098
STANDARD DEVIATION OF FLOW.....	8.376	2.943	13.911	7.667	1.935	2.603	7.999	3.936	2.892	5.870
MAXIMUM FLOW.....	236.020	107.220	402.919	317.502	64.489	86.523	241.460	139.827	104.734	186.210
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).....	1.16E+06	2.56E+05	1.83E+06	6.21E+05	1.69E+05	2.39E+05	8.74E+05	3.26E+05	2.60E+05	5.87E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	4.047	18.268	82.905	28.159	26.412	23.990	42.727	17.347	104.779	25.759
STANDARD DEVIATION OF FLOW.....	0.945	5.050	13.583	7.268	5.962	6.401	11.423	4.828	23.882	6.172
MAXIMUM FLOW.....	27.320	202.579	383.747	249.596	184.110	250.104	443.747	171.076	791.095	224.807
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).....	9.47E+04	4.27E+05	1.94E+06	6.59E+05	6.18E+05	5.61E+05	1.00E+06	4.06E+05	2.45E+06	6.03E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	27.736	21.055	25.095	5.274	2.801	19.129	13.608	8.668	41.444	61.307
STANDARD DEVIATION OF FLOW.....	5.775	5.649	6.246	1.408	0.633	4.931	3.673	2.233	12.136	13.035
MAXIMUM FLOW.....	170.935	218.377	228.564	48.350	17.030	185.505	126.837	73.108	478.631	408.760
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).....	6.49E+05	4.93E+05	5.87E+05	1.23E+05	6.55E+04	4.48E+05	3.18E+05	2.03E+05	9.70E+05	1.43E+06

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	103.782	12.111	83.269	114.568	17.511	16.455	32.976	48.692	15.722	17.165
STANDARD DEVIATION OF FLOW.....	25.209	3.151	16.481	16.615	4.581	4.571	8.089	14.299	4.245	4.599
MAXIMUM FLOW.....	892.690	126.837	495.834	464.300	156.351	161.654	283.072	607.373	184.644	177.211
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).....	2.43E+06	2.83E+05	1.95E+06	2.68E+06	4.10E+05	3.85E+05	7.72E+05	1.14E+06	3.68E+05	4.02E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	6.995	17.460	7.594	14.155	8.037	8.545	13.245	5.379	32.756	15.007
STANDARD DEVIATION OF FLOW.....	1.824	4.431	2.100	3.794	2.186	2.291	3.528	1.271	9.256	4.090
MAXIMUM FLOW.....	78.661	152.288	83.406	133.533	80.460	81.106	126.195	37.830	389.571	143.021
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	4.09E+05	1.78E+05	3.31E+05	1.88E+05	2.00E+05	3.10E+05	1.26E+05	7.66E+05	3.51E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	24.937	28.931	56.674	8.710	75.816
STANDARD DEVIATION OF FLOW.....	6.848	8.372	15.276	2.358	15.770
MAXIMUM FLOW.....	276.105	339.167	612.210	79.996	475.130
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	5.84E+05	6.77E+05	1.33E+06	2.04E+05	1.77E+06

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	35.049	36.258	254.036	254.622	18.939	2.390	368.856	499.210	493.429	492.855
STANDARD DEVIATION OF FLOW.....	6.004	5.678	31.888	31.121	1.144	0.090	43.320	58.731	55.661	55.422
MAXIMUM FLOW.....	164.912	156.096	871.544	844.569	34.790	2.798	1196.788	1637.638	1596.628	1587.495
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).....	8.20E+05	8.48E+05	5.94E+06	5.96E+06	4.43E+05	5.59E+04	8.63E+06	1.17E+07	1.15E+07	1.15E+07

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	86.456	48.221	48.235	49.278	99.903	99.518	13.463	112.981	112.436	650.364
STANDARD DEVIATION OF FLOW.....	7.883	9.735	9.655	3.351	12.117	12.063	1.743	13.748	13.668	70.182
MAXIMUM FLOW.....	218.330	286.688	284.800	99.968	367.992	367.811	46.978	410.300	408.984	2028.403
MINIMUM FLOW.....	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.02E+06	1.13E+06	1.13E+06	1.15E+06	2.34E+06	2.33E+06	3.15E+05	2.64E+06	2.63E+06	1.52E+07

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	648.594	128.350	137.575	165.818	150.625	14.362	14.078	761.030	806.005	13.658
STANDARD DEVIATION OF FLOW.....	69.291	15.986	18.983	22.078	16.794	0.538	0.591	79.146	81.330	0.597
MAXIMUM FLOW.....	1965.064	470.931	556.764	656.343	591.306	18.497	18.474	2256.992	2343.935	19.998
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).....	1.52E+07	3.00E+06	3.22E+06	3.88E+06	3.52E+06	3.36E+05	3.29E+05	1.78E+07	1.89E+07	3.20E+05

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

FUTURE CONDITION
(FUTURE DEVELOPMENT WITH EXISTING FACILITIES)

SHEEP DRAW BASIN
FILENAME: SDB002FC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Existing Facilities - 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.....	35.399	32.881	38.752	31.828	8.410	5.844	6.625	43.250	29.255	23.779
STANDARD DEVIATION OF FLOW.....	7.434	6.160	7.486	5.511	1.843	1.146	1.443	7.447	4.978	4.826
MAXIMUM FLOW.....	265.763	200.847	253.189	171.590	66.971	38.172	52.461	231.420	153.180	167.217
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).....	7.43E+05	6.90E+05	8.14E+05	6.68E+05	1.77E+05	1.23E+05	1.39E+05	9.08E+05	6.14E+05	4.99E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	9.739	8.628	44.892	15.603	7.600	14.066	4.395	7.822	2.918	10.350
STANDARD DEVIATION OF FLOW.....	2.022	1.984	9.417	3.140	1.761	3.175	0.912	1.825	0.601	2.414
MAXIMUM FLOW.....	71.695	76.940	338.141	108.223	68.240	118.731	31.127	71.360	20.324	95.210
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).....	2.05E+05	1.81E+05	9.43E+05	3.28E+05	1.60E+05	2.95E+05	9.23E+04	1.64E+05	6.13E+04	2.17E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	16.747	1.515	26.359	4.415	2.258	2.803	12.511	4.639	1.997	8.203
STANDARD DEVIATION OF FLOW.....	3.437	0.394	5.519	1.108	0.520	0.575	2.913	1.091	0.475	1.969
MAXIMUM FLOW.....	121.090	13.800	198.666	44.560	18.080	19.438	114.170	42.960	16.340	80.070
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).....	3.52E+05	3.18E+04	5.54E+05	9.27E+04	4.74E+04	5.89E+04	2.63E+05	9.74E+04	4.19E+04	1.72E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	0.000	3.358	27.886	3.758	8.571	5.004	7.895	5.701	23.924	6.743
STANDARD DEVIATION OF FLOW.....	0.000	0.798	5.586	0.938	2.025	1.122	1.797	1.242	5.013	1.373
MAXIMUM FLOW.....	0.000	30.670	190.166	35.240	80.990	41.420	66.500	44.532	180.001	47.949
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	7.05E+04	5.86E+05	7.89E+04	1.80E+05	1.05E+05	1.66E+05	1.20E+05	5.02E+05	1.42E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	2.052	3.597	5.646	0.695	0.000	4.593	0.192	2.880	16.608	18.407
STANDARD DEVIATION OF FLOW.....	0.423	0.837	1.182	0.202	0.000	1.005	0.078	0.645	4.444	4.052
MAXIMUM FLOW.....	12.139	31.160	41.517	6.630	0.000	36.029	2.930	23.290	198.767	150.815
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).....	4.31E+04	7.55E+04	1.19E+05	1.46E+04	0.00E+00	9.65E+04	4.03E+03	6.05E+04	3.49E+05	3.87E+05

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	16.297	3.473	27.762	31.227	3.442	5.546	5.379	12.394	4.589	3.331
STANDARD DEVIATION OF FLOW.....	3.412	0.769	6.136	5.615	0.712	1.158	1.140	3.162	1.062	0.742
MAXIMUM FLOW.....	117.877	29.160	229.436	177.406	23.582	40.695	38.758	133.580	43.120	27.220
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).....	3.42E+05	7.29E+04	5.83E+05	6.56E+05	7.23E+04	1.16E+05	1.13E+05	2.60E+05	9.64E+04	6.99E+04

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	2.493	2.072	1.497	3.726	1.174	0.942	4.836	1.590	6.527	3.832
STANDARD DEVIATION OF FLOW.....	0.594	0.505	0.374	0.769	0.299	0.261	1.070	0.397	1.564	0.784
MAXIMUM FLOW.....	24.260	16.763	13.850	26.318	10.590	9.020	38.980	14.320	62.580	26.517
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).....	5.24E+04	4.35E+04	3.14E+04	7.82E+04	2.47E+04	1.98E+04	1.02E+05	3.34E+04	1.37E+05	8.05E+04

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	4.669	5.121	12.537	2.882	24.038
STANDARD DEVIATION OF FLOW.....	1.095	1.312	2.843	0.654	5.596
MAXIMUM FLOW.....	42.170	53.810	106.570	24.270	213.480
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	9.81E+04	1.08E+05	2.63E+05	6.05E+04	5.05E+05

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	0.000	0.000	71.632	72.009	4.614	0.552	108.451	151.701	149.543	149.420
STANDARD DEVIATION OF FLOW.....	0.000	0.000	13.639	13.009	0.246	0.023	18.324	25.625	20.502	20.383
MAXIMUM FLOW.....	0.000	0.000	454.036	392.257	7.087	0.670	551.127	772.049	578.199	573.924
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+06	1.51E+06	9.69E+04	1.16E+04	2.28E+06	3.19E+06	3.14E+06	3.14E+06

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	29.120	16.009	16.043	11.891	28.486	28.331	2.893	31.224	31.020	202.319
STANDARD DEVIATION OF FLOW.....	3.208	3.594	3.513	0.684	3.710	3.633	0.314	3.872	3.763	25.312
MAXIMUM FLOW.....	76.515	132.970	131.528	19.137	140.584	137.269	7.658	142.212	132.162	705.389
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).....	6.12E+05	3.36E+05	3.37E+05	2.50E+05	5.98E+05	5.95E+05	6.07E+04	6.56E+05	6.51E+05	4.25E+06

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	202.051	42.730	33.345	43.084	33.341	2.896	2.797	233.071	246.219	2.386
STANDARD DEVIATION OF FLOW.....	24.960	3.706	3.633	3.633	2.015	0.110	0.128	27.447	27.880	0.101
MAXIMUM FLOW.....	679.792	99.550	93.533	105.243	53.161	3.597	3.580	742.251	758.887	3.160
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).....	4.24E+06	8.97E+05	7.00E+05	9.05E+05	7.00E+05	6.08E+04	5.87E+04	4.89E+06	5.17E+06	5.01E+04

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

SHEEP DRAW BASIN
FILENAME: SDB005FC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Existing Facilities - 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.....	68.104	62.645	68.757	57.302	15.053	10.006	11.228	78.078	52.838	42.650
STANDARD DEVIATION OF FLOW.....	15.232	12.498	14.160	10.615	3.501	2.065	2.561	14.413	9.638	9.230
MAXIMUM FLOW.....	541.416	401.298	477.074	328.180	128.327	68.300	93.087	445.020	294.690	318.146
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).....	1.43E+06	1.32E+06	1.44E+06	1.20E+06	3.16E+05	2.10E+05	2.36E+05	1.64E+06	1.11E+06	8.96E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	17.074	15.323	79.403	27.910	13.602	24.252	8.503	14.109	5.358	18.535
STANDARD DEVIATION OF FLOW.....	3.746	3.730	17.675	5.980	3.340	5.760	1.884	3.497	1.170	4.592
MAXIMUM FLOW.....	132.653	144.080	630.988	205.035	129.300	216.800	64.519	136.870	39.732	181.070
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).....	3.59E+05	3.22E+05	1.67E+06	5.86E+05	2.86E+05	5.09E+05	1.79E+05	2.96E+05	1.13E+05	3.89E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	29.912	3.502	47.106	9.155	4.171	5.116	22.144	8.325	4.078	14.674
STANDARD DEVIATION OF FLOW.....	6.535	0.894	10.499	2.442	0.981	1.113	5.457	2.072	0.987	3.735
MAXIMUM FLOW.....	229.682	31.370	377.348	99.900	34.381	37.682	213.210	82.250	34.080	153.160
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).....	6.28E+05	7.36E+04	9.89E+05	1.92E+05	8.76E+04	1.07E+05	4.65E+05	1.75E+05	8.56E+04	3.08E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	0.515	6.633	49.382	9.167	15.326	9.299	15.573	10.207	44.840	11.490
STANDARD DEVIATION OF FLOW.....	0.134	1.674	10.506	2.405	3.838	2.231	3.789	2.355	10.127	2.457
MAXIMUM FLOW.....	4.087	64.710	356.851	89.890	154.230	81.890	138.673	85.108	365.203	85.492
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).....	1.08E+04	1.39E+05	1.04E+06	1.93E+05	3.22E+05	1.95E+05	3.27E+05	2.14E+05	9.42E+05	2.41E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	6.761	7.372	10.189	1.713	0.268	8.086	2.229	5.138	28.643	32.106
STANDARD DEVIATION OF FLOW.....	1.381	1.811	2.269	0.442	0.081	1.867	0.667	1.212	8.049	7.472
MAXIMUM FLOW.....	40.879	67.200	79.956	14.590	2.537	67.271	24.368	43.850	359.363	279.534
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).....	1.42E+05	1.55E+05	2.14E+05	3.60E+04	5.63E+03	1.70E+05	4.68E+04	1.08E+05	6.02E+05	6.74E+05

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	34.723	5.399	49.611	58.972	7.193	9.878	11.237	22.315	7.107	5.818
STANDARD DEVIATION OF FLOW.....	7.744	1.224	11.668	11.420	1.574	2.186	2.526	6.049	1.684	1.346
MAXIMUM FLOW.....	267.144	47.210	439.841	357.854	52.260	76.966	86.467	263.610	69.070	49.820
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).....	7.29E+05	1.13E+05	1.04E+06	1.24E+06	1.51E+05	2.07E+05	2.36E+05	4.69E+05	1.49E+05	1.22E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	3.787	5.153	2.659	6.151	2.188	2.120	8.008	2.926	12.398	7.079
STANDARD DEVIATION OF FLOW.....	0.909	1.249	0.654	1.304	0.535	0.523	1.840	0.723	3.180	1.526
MAXIMUM FLOW.....	36.830	42.458	24.670	44.290	19.120	18.480	67.120	26.380	128.650	51.690
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).....	7.95E+04	1.08E+05	5.58E+04	1.29E+05	4.59E+04	4.45E+04	1.68E+05	6.14E+04	2.60E+05	1.49E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	9.137	10.475	22.551	5.186	45.401
STANDARD DEVIATION OF FLOW.....	2.285	2.839	5.434	1.242	11.188
MAXIMUM FLOW.....	88.130	119.460	204.474	46.290	425.470
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.92E+05	2.20E+05	4.74E+05	1.09E+05	9.53E+05

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	0.000	0.000	131.402	131.959	7.956	0.948	197.217	275.295	272.725	272.579
STANDARD DEVIATION OF FLOW.....	0.000	0.000	26.637	25.289	0.440	0.039	35.585	49.752	43.668	43.267
MAXIMUM FLOW.....	0.000	0.000	878.373	742.099	12.817	1.134	1044.823	1468.003	1315.225	1275.441
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	2.76E+06	2.77E+06	1.67E+05	1.99E+04	4.14E+06	5.78E+06	5.73E+06	5.72E+06

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	52.648	28.655	28.677	20.636	50.261	50.005	5.317	55.322	55.020	367.877
STANDARD DEVIATION OF FLOW.....	6.489	6.824	6.704	1.247	7.055	6.936	0.612	7.385	7.217	53.735
MAXIMUM FLOW.....	163.278	251.781	253.806	35.276	270.036	261.639	14.873	271.065	260.354	1562.828
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).....	1.11E+06	6.02E+05	6.02E+05	4.33E+05	1.06E+06	1.05E+06	1.12E+05	1.16E+06	1.16E+06	7.73E+06

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	367.578	76.621	73.870	90.944	75.783	5.292	5.138	422.598	446.271	4.667
STANDARD DEVIATION OF FLOW.....	52.622	8.283	9.061	10.000	4.641	0.202	0.230	57.405	58.418	0.201
MAXIMUM FLOW.....	1467.783	218.799	252.536	299.452	122.764	6.566	6.533	1597.715	1638.925	6.337
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).....	7.72E+06	1.61E+06	1.55E+06	1.91E+06	1.59E+06	1.11E+05	1.08E+05	8.87E+06	9.37E+06	9.80E+04

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

SHEEP DRAW BASIN
FILENAME: SDB010FC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Existing Facilities - 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.....	88.828	82.033	90.206	75.682	19.926	12.948	14.456	103.049	69.636	56.480
STANDARD DEVIATION OF FLOW.....	19.433	16.093	18.335	13.886	4.557	2.635	3.243	18.846	12.579	12.053
MAXIMUM FLOW.....	686.378	507.667	607.238	419.140	162.826	86.388	115.664	569.060	375.580	413.763
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).....	1.87E+06	1.72E+06	1.89E+06	1.59E+06	4.18E+05	2.72E+05	3.04E+05	2.16E+06	1.46E+06	1.19E+06

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	22.427	20.270	104.826	36.937	18.004	31.506	11.647	18.742	7.176	24.536
STANDARD DEVIATION OF FLOW.....	4.849	4.850	22.993	7.805	4.341	7.358	2.532	4.561	1.543	5.970
MAXIMUM FLOW.....	169.486	190.860	820.359	265.478	170.970	278.100	84.075	181.530	51.041	240.010
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).....	4.71E+05	4.26E+05	2.20E+06	7.76E+05	3.78E+05	6.62E+05	2.45E+05	3.94E+05	1.51E+05	5.15E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	39.543	5.085	62.324	12.902	5.544	6.832	29.152	11.029	5.641	19.413
STANDARD DEVIATION OF FLOW.....	8.516	1.241	13.682	3.339	1.277	1.463	7.056	2.694	1.320	4.849
MAXIMUM FLOW.....	296.694	43.380	488.206	134.460	44.920	48.314	281.820	107.880	45.790	200.970
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).....	8.30E+05	1.07E+05	1.31E+06	2.71E+05	1.16E+05	1.43E+05	6.12E+05	2.32E+05	1.18E+05	4.08E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	1.144	9.159	65.284	13.745	20.271	12.544	21.500	13.508	60.518	14.833
STANDARD DEVIATION OF FLOW.....	0.271	2.252	13.707	3.455	4.984	2.955	5.113	3.064	13.449	3.126
MAXIMUM FLOW.....	7.371	86.870	459.846	128.160	203.360	109.920	189.000	107.832	478.003	107.600
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).....	2.40E+04	1.92E+05	1.37E+06	2.89E+05	4.26E+05	2.63E+05	4.51E+05	2.84E+05	1.27E+06	3.11E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	11.023	10.316	13.540	2.494	0.752	10.611	4.331	6.750	37.207	41.926
STANDARD DEVIATION OF FLOW.....	2.140	2.467	2.968	0.605	0.179	2.408	1.151	1.561	10.314	9.603
MAXIMUM FLOW.....	59.166	91.470	102.249	19.930	4.594	85.780	38.406	57.090	485.817	352.597
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).....	2.31E+05	2.17E+05	2.84E+05	5.24E+04	1.58E+04	2.23E+05	9.09E+04	1.42E+05	7.81E+05	8.80E+05

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	49.484	6.787	65.616	79.992	10.164	13.040	15.882	29.638	8.908	7.913
STANDARD DEVIATION OF FLOW.....	10.762	1.524	15.181	15.317	2.171	2.842	3.482	7.888	2.088	1.858
MAXIMUM FLOW.....	361.155	58.680	561.291	469.800	69.576	98.026	114.822	339.080	86.160	69.490
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).....	1.04E+06	1.43E+05	1.38E+06	1.68E+06	2.13E+05	2.74E+05	3.34E+05	6.22E+05	1.87E+05	1.66E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	4.631	7.731	3.594	8.334	3.084	2.879	10.189	3.883	16.865	9.598
STANDARD DEVIATION OF FLOW.....	1.086	1.786	0.886	1.798	0.744	0.681	2.301	0.926	4.228	2.081
MAXIMUM FLOW.....	44.110	57.860	34.060	61.572	27.130	23.550	85.190	34.130	170.860	69.798
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).....	9.72E+04	1.62E+05	7.55E+04	1.75E+05	6.48E+04	6.05E+04	2.14E+05	8.15E+04	3.54E+05	2.02E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	12.576	14.789	30.063	6.863	58.982
STANDARD DEVIATION OF FLOW.....	3.069	3.888	7.124	1.613	14.182
MAXIMUM FLOW.....	118.580	160.090	269.460	60.710	549.760
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.64E+05	3.11E+05	6.31E+05	1.44E+05	1.24E+06

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	2.514	3.366	175.605	176.103	10.288	1.219	262.072	365.122	361.757	361.562
STANDARD DEVIATION OF FLOW.....	0.581	0.512	34.169	32.417	0.570	0.050	45.984	64.570	58.538	57.916
MAXIMUM FLOW.....	16.568	13.500	1114.904	957.764	16.626	1.459	1359.080	1897.256	1725.147	1695.501
MINIMUM FLOW.....	0.000	0.000	0.043	0.000	0.000	0.000	0.012	0.027	0.001	0.000
FLOW VOLUME (CUBIC FEET).....	5.28E+04	7.07E+04	3.69E+06	3.70E+06	2.16E+05	2.56E+04	5.50E+06	7.67E+06	7.60E+06	7.59E+06

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	69.399	37.930	37.958	26.799	65.976	65.672	7.121	72.792	72.380	487.442
STANDARD DEVIATION OF FLOW.....	8.853	8.877	8.732	1.621	9.177	9.037	0.817	9.634	9.439	72.556
MAXIMUM FLOW.....	220.702	331.830	331.883	46.155	352.621	337.295	19.811	349.555	336.459	2087.445
MINIMUM FLOW.....	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.027
FLOW VOLUME (CUBIC FEET).....	1.46E+06	7.97E+05	7.97E+05	5.63E+05	1.39E+06	1.38E+06	1.50E+05	1.53E+06	1.52E+06	1.02E+07

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	486.987	101.714	103.876	126.303	109.874	7.025	6.833	559.367	590.736	6.384
STANDARD DEVIATION OF FLOW.....	70.900	12.410	14.067	15.977	9.204	0.270	0.306	77.356	78.883	0.276
MAXIMUM FLOW.....	1953.537	345.969	399.949	473.944	287.170	8.766	8.751	2126.681	2187.899	8.718
MINIMUM FLOW.....	0.000	0.001	0.000	0.016	0.000	0.000	0.000	0.000	0.041	0.000
FLOW VOLUME (CUBIC FEET).....	1.02E+07	2.14E+06	2.18E+06	2.65E+06	2.31E+06	1.48E+05	1.44E+05	1.17E+07	1.24E+07	1.34E+05

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

SHEEP DRAW BASIN
FILENAME: SDB050FC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Existing Facilities - 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.....	145.383	134.941	150.356	127.496	33.833	21.145	23.410	173.535	116.952	95.553
STANDARD DEVIATION OF FLOW.....	35.035	29.038	33.697	25.620	8.637	4.743	5.836	34.726	23.072	22.597
MAXIMUM FLOW.....	1239.018	946.230	1137.820	797.377	310.396	157.225	208.567	1080.025	710.934	780.259
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).....	3.05E+06	2.83E+06	3.16E+06	2.68E+06	7.10E+05	4.44E+05	4.92E+05	3.64E+06	2.46E+06	2.01E+06

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	37.802	34.591	178.296	62.720	30.570	51.838	20.803	31.932	12.405	41.571
STANDARD DEVIATION OF FLOW.....	9.098	9.297	43.654	14.694	8.253	13.497	5.015	8.699	2.953	11.318
MAXIMUM FLOW.....	319.416	367.122	1565.465	504.000	324.903	516.164	168.905	344.903	99.068	454.273
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).....	7.94E+05	7.26E+05	3.74E+06	1.32E+06	6.42E+05	1.09E+06	4.37E+05	6.71E+05	2.61E+05	8.73E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	66.852	9.778	105.756	23.860	9.505	11.755	49.059	18.704	10.131	32.857
STANDARD DEVIATION OF FLOW.....	15.979	2.617	25.845	6.943	2.417	2.784	13.288	5.112	2.595	9.195
MAXIMUM FLOW.....	559.066	90.890	924.035	266.752	85.616	93.292	532.825	201.609	90.114	374.314
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).....	1.40E+06	2.05E+05	2.22E+06	5.01E+05	2.00E+05	2.47E+05	1.03E+06	3.93E+05	2.13E+05	6.90E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	3.254	16.544	111.491	27.411	34.295	21.943	38.709	22.924	105.403	24.131
STANDARD DEVIATION OF FLOW.....	0.781	4.564	26.065	7.655	9.436	5.792	10.291	5.795	26.042	5.624
MAXIMUM FLOW.....	22.088	172.460	884.817	277.889	381.544	216.157	382.181	206.904	925.213	194.584
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).....	6.83E+04	3.47E+05	2.34E+06	5.76E+05	7.20E+05	4.61E+05	8.13E+05	4.81E+05	2.21E+06	5.07E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	23.792	18.963	23.133	4.770	2.234	17.756	11.167	11.285	61.093	69.324
STANDARD DEVIATION OF FLOW.....	4.919	5.069	5.639	1.249	0.519	4.491	3.139	2.888	18.937	17.666
MAXIMUM FLOW.....	141.390	186.029	195.167	41.106	13.769	161.717	104.671	105.570	939.960	642.593
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).....	5.00E+05	3.98E+05	4.86E+05	1.00E+05	4.69E+04	3.73E+05	2.35E+05	2.37E+05	1.28E+06	1.46E+06

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	92.842	11.210	111.018	140.287	18.931	22.037	29.595	50.609	14.595	15.321
STANDARD DEVIATION OF FLOW.....	22.309	2.867	28.671	29.530	4.445	5.335	7.170	15.165	3.892	4.067
MAXIMUM FLOW.....	757.875	109.756	1048.758	939.410	145.233	184.904	239.683	621.190	158.101	149.274
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).....	1.95E+06	2.35E+05	2.33E+06	2.95E+06	3.98E+05	4.63E+05	6.21E+05	1.06E+06	3.06E+05	3.22E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	6.786	15.414	6.843	16.072	6.930	8.352	16.141	6.577	29.849	18.476
STANDARD DEVIATION OF FLOW.....	1.735	3.888	1.873	3.982	1.881	2.270	4.041	1.712	8.429	4.436
MAXIMUM FLOW.....	68.888	128.117	70.000	136.834	66.380	78.943	149.946	62.909	331.915	149.044
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).....	1.43E+05	3.24E+05	1.44E+05	3.38E+05	1.46E+05	1.75E+05	3.39E+05	1.38E+05	6.27E+05	3.88E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	22.613	27.832	52.074	11.602	95.914
STANDARD DEVIATION OF FLOW.....	6.191	8.325	13.887	3.033	25.508
MAXIMUM FLOW.....	235.847	324.078	533.783	113.438	994.854
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	4.75E+05	5.84E+05	1.09E+06	2.44E+05	2.01E+06

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	59.069	61.039	346.336	346.617	16.854	1.984	490.967	664.503	660.534	660.305
STANDARD DEVIATION OF FLOW.....	11.429	10.693	64.305	61.722	0.986	0.083	86.733	120.904	115.478	113.456
MAXIMUM FLOW.....	345.094	309.001	2084.050	1899.324	28.227	2.366	2671.060	3703.206	3764.388	3588.151
MINIMUM FLOW.....	0.000	0.000	0.085	0.000	0.000	0.000	0.025	0.054	0.001	0.000
FLOW VOLUME (CUBIC FEET).....	1.24E+06	1.28E+06	7.27E+06	7.28E+06	3.54E+05	4.17E+04	1.03E+07	1.40E+07	1.39E+07	1.39E+07

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	116.655	64.403	64.434	44.224	110.642	110.203	12.316	122.519	121.900	872.513
STANDARD DEVIATION OF FLOW.....	17.557	16.849	16.619	2.856	17.393	17.181	1.503	18.213	17.921	143.141
MAXIMUM FLOW.....	567.169	635.298	627.334	80.169	667.406	638.803	37.374	663.399	637.939	4539.191
MINIMUM FLOW.....	0.001	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.000	0.054
FLOW VOLUME (CUBIC FEET).....	2.45E+06	1.35E+06	1.35E+06	9.29E+05	2.32E+06	2.31E+06	2.59E+05	2.57E+06	2.56E+06	1.83E+07

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	871.780	174.853	191.303	229.105	211.611	12.020	11.730	993.680	1046.981	11.439
STANDARD DEVIATION OF FLOW.....	138.735	28.041	32.243	37.710	30.638	0.485	0.538	150.799	153.572	0.521
MAXIMUM FLOW.....	4214.142	831.194	951.767	1130.111	1027.002	15.142	15.126	4574.410	4673.397	15.915
MINIMUM FLOW.....	0.000	0.002	0.000	0.033	0.001	0.000	0.000	0.000	0.083	0.000
FLOW VOLUME (CUBIC FEET).....	1.83E+07	3.67E+06	4.02E+06	4.81E+06	4.44E+06	2.52E+05	2.46E+05	2.09E+07	2.20E+07	2.40E+05

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

SHEEP DRAW BASIN
FILENAME: SDB100FC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Existing Facilities - 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.....	173.341	161.102	180.398	153.556	40.813	25.184	27.803	208.983	140.708	115.186
STANDARD DEVIATION OF FLOW.....	42.265	35.301	41.052	31.428	10.490	5.751	7.014	42.599	28.284	27.554
MAXIMUM FLOW.....	1423.267	1095.630	1323.870	936.538	361.986	180.767	242.577	1264.429	833.248	900.236
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).....	3.64E+06	3.38E+06	3.79E+06	3.22E+06	8.57E+05	5.29E+05	5.84E+05	4.39E+06	2.95E+06	2.42E+06

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	45.454	41.759	215.021	75.632	36.876	61.891	25.513	38.578	15.056	50.134
STANDARD DEVIATION OF FLOW.....	11.073	11.247	53.148	17.941	9.973	16.221	6.187	10.512	3.623	13.656
MAXIMUM FLOW.....	371.608	422.298	1807.318	583.033	373.806	584.932	198.428	397.583	115.960	522.336
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).....	9.55E+05	8.77E+05	4.52E+06	1.59E+06	7.74E+05	1.30E+06	5.36E+05	8.10E+05	3.16E+05	1.05E+06

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	80.565	12.204	127.555	29.593	11.434	14.244	59.008	22.561	12.371	39.611
STANDARD DEVIATION OF FLOW.....	19.471	3.249	31.459	8.479	2.944	3.413	16.009	6.169	3.191	11.064
MAXIMUM FLOW.....	647.942	107.220	1071.704	317.502	98.513	109.098	609.857	233.853	104.734	434.430
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+06	2.56E+05	2.68E+06	6.21E+05	2.40E+05	2.99E+05	1.24E+06	4.74E+05	2.60E+05	8.32E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	4.509	20.356	134.595	34.788	41.338	26.732	47.610	27.648	128.358	28.703
STANDARD DEVIATION OF FLOW.....	1.040	5.580	31.860	9.527	11.371	7.067	12.613	7.042	31.876	6.797
MAXIMUM FLOW.....	27.320	202.579	1030.620	330.629	440.494	250.104	443.747	240.001	1080.396	224.807
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).....	9.47E+04	4.27E+05	2.83E+06	7.31E+05	8.68E+05	5.61E+05	1.00E+06	5.81E+05	2.70E+06	6.03E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	30.906	23.461	27.963	5.877	3.121	21.315	15.163	13.520	72.912	82.951
STANDARD DEVIATION OF FLOW.....	6.332	6.237	6.886	1.554	0.696	5.441	4.056	3.493	22.327	21.306
MAXIMUM FLOW.....	170.935	218.377	228.564	48.350	17.030	185.505	126.837	121.023	1044.180	753.077
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).....	6.49E+05	4.93E+05	5.87E+05	1.23E+05	6.55E+04	4.48E+05	3.18E+05	2.84E+05	1.53E+06	1.74E+06

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	115.643	13.495	133.828	171.177	23.499	26.542	36.745	61.168	17.519	19.127
STANDARD DEVIATION OF FLOW.....	27.771	3.477	34.738	36.516	5.538	6.500	8.914	18.139	4.688	5.078
MAXIMUM FLOW.....	892.690	126.837	1231.996	1097.070	171.161	216.053	283.072	732.466	184.644	177.211
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).....	2.43E+06	2.83E+05	2.81E+06	3.59E+06	4.93E+05	5.57E+05	7.72E+05	1.28E+06	3.68E+05	4.02E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	7.794	19.456	8.462	20.270	8.996	11.585	19.035	7.845	36.499	23.020
STANDARD DEVIATION OF FLOW.....	2.013	4.886	2.320	5.025	2.427	3.111	4.824	2.070	10.231	5.554
MAXIMUM FLOW.....	78.661	152.288	83.406	164.759	81.053	101.866	169.417	72.506	389.571	177.069
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	4.09E+05	1.78E+05	4.26E+05	1.89E+05	2.43E+05	4.00E+05	1.65E+05	7.66E+05	4.83E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	27.787	34.616	63.152	13.982	114.074
STANDARD DEVIATION OF FLOW.....	7.565	10.163	16.869	3.673	30.490
MAXIMUM FLOW.....	276.105	388.076	612.210	130.760	1123.476
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	5.84E+05	7.27E+05	1.33E+06	2.94E+05	2.40E+06

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	87.027	89.094	430.594	430.920	20.087	2.359	604.563	813.546	809.279	808.958
STANDARD DEVIATION OF FLOW.....	19.750	18.197	82.829	80.239	1.200	0.100	110.824	152.649	148.328	146.137
MAXIMUM FLOW.....	688.518	599.548	2419.500	2233.200	34.790	2.798	3158.871	4392.532	4347.782	4327.168
MINIMUM FLOW.....	0.000	0.000	0.043	0.000	0.000	0.000	0.012	0.027	0.001	0.000
FLOW VOLUME (CUBIC FEET).....	1.83E+06	1.87E+06	9.04E+06	9.05E+06	4.22E+05	4.95E+04	1.27E+07	1.71E+07	1.70E+07	1.70E+07

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	140.379	77.690	77.716	52.830	132.906	132.397	14.948	147.345	146.651	1064.523
STANDARD DEVIATION OF FLOW.....	23.043	20.415	20.175	3.489	21.136	20.917	1.862	22.195	21.893	185.438
MAXIMUM FLOW.....	736.669	727.940	730.552	99.968	775.397	759.075	46.978	787.267	754.764	5564.789
MINIMUM FLOW.....	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.027
FLOW VOLUME (CUBIC FEET).....	2.95E+06	1.63E+06	1.63E+06	1.11E+06	2.79E+06	2.78E+06	3.14E+05	3.09E+06	3.08E+06	2.24E+07

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	1063.881	211.423	235.026	280.479	262.580	14.533	14.200	1210.532	1274.866	14.035
STANDARD DEVIATION OF FLOW.....	179.967	36.202	42.111	49.492	42.934	0.597	0.658	195.293	199.155	0.651
MAXIMUM FLOW.....	5215.165	1030.702	1200.684	1455.684	1375.529	18.497	18.474	5693.562	5851.835	19.998
MINIMUM FLOW.....	0.000	0.001	0.000	0.016	0.000	0.000	0.000	0.000	0.041	0.000
FLOW VOLUME (CUBIC FEET).....	2.23E+07	4.44E+06	4.94E+06	5.89E+06	5.51E+06	3.05E+05	2.98E+05	2.54E+07	2.68E+07	2.95E+05

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

PROPOSED CONDITION
(FUTURE DEVELOPMENT WITH PROPOSED FACILITIES)

SHEEP DRAW BASIN
FILENAME: SDB002PC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Comp. Plan Facilities - 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.....	35.399	32.881	38.752	31.828	8.410	5.844	6.625	43.250	29.255	23.779
STANDARD DEVIATION OF FLOW.....	7.434	6.160	7.486	5.511	1.843	1.146	1.443	7.447	4.978	4.826
MAXIMUM FLOW.....	265.763	200.847	253.189	171.590	66.971	38.172	52.461	231.420	153.180	167.217
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).....	7.43E+05	6.90E+05	8.14E+05	6.68E+05	1.77E+05	1.23E+05	1.39E+05	9.08E+05	6.14E+05	4.99E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	9.739	8.628	44.892	15.603	7.600	14.066	4.395	7.822	2.918	10.350
STANDARD DEVIATION OF FLOW.....	2.022	1.984	9.417	3.140	1.761	3.175	0.912	1.825	0.601	2.414
MAXIMUM FLOW.....	71.695	76.940	338.141	108.223	68.240	118.731	31.127	71.360	20.324	95.210
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).....	2.05E+05	1.81E+05	9.43E+05	3.28E+05	1.60E+05	2.95E+05	9.23E+04	1.64E+05	6.13E+04	2.17E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	16.747	1.515	26.359	4.415	2.258	2.803	12.511	4.639	1.997	8.203
STANDARD DEVIATION OF FLOW.....	3.437	0.394	5.519	1.108	0.520	0.575	2.913	1.091	0.475	1.969
MAXIMUM FLOW.....	121.090	13.800	198.666	44.560	18.080	19.438	114.170	42.960	16.340	80.070
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).....	3.52E+05	3.18E+04	5.54E+05	9.27E+04	4.74E+04	5.89E+04	2.63E+05	9.74E+04	4.19E+04	1.72E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	0.000	3.358	27.886	3.758	8.571	5.004	7.895	5.701	23.924	6.743
STANDARD DEVIATION OF FLOW.....	0.000	0.798	5.586	0.938	2.025	1.122	1.797	1.242	5.013	1.373
MAXIMUM FLOW.....	0.000	30.670	190.166	35.240	80.990	41.420	66.500	44.532	180.001	47.949
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	7.05E+04	5.86E+05	7.89E+04	1.80E+05	1.05E+05	1.66E+05	1.20E+05	5.02E+05	1.42E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	2.052	3.597	5.646	0.695	0.000	4.593	0.192	2.880	16.608	18.407
STANDARD DEVIATION OF FLOW.....	0.423	0.837	1.182	0.202	0.000	1.005	0.078	0.645	4.444	4.052
MAXIMUM FLOW.....	12.139	31.160	41.517	6.630	0.000	36.029	2.930	23.290	198.767	150.815
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).....	4.31E+04	7.55E+04	1.19E+05	1.46E+04	0.00E+00	9.65E+04	4.03E+03	6.05E+04	3.49E+05	3.87E+05

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	16.297	3.473	27.762	31.227	3.442	5.546	5.379	12.394	4.589	3.331
STANDARD DEVIATION OF FLOW.....	3.412	0.769	6.136	5.615	0.712	1.158	1.140	3.162	1.062	0.742
MAXIMUM FLOW.....	117.877	29.160	229.436	177.406	23.582	40.695	38.758	133.580	43.120	27.220
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).....	3.42E+05	7.29E+04	5.83E+05	6.56E+05	7.23E+04	1.16E+05	1.13E+05	2.60E+05	9.64E+04	6.99E+04

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	2.493	2.072	1.497	3.726	1.174	0.942	4.836	1.590	6.527	3.832
STANDARD DEVIATION OF FLOW.....	0.594	0.505	0.374	0.769	0.299	0.261	1.070	0.397	1.564	0.784
MAXIMUM FLOW.....	24.260	16.763	13.850	26.318	10.590	9.020	38.980	14.320	62.580	26.517
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).....	5.24E+04	4.35E+04	3.14E+04	7.82E+04	2.47E+04	1.98E+04	1.02E+05	3.34E+04	1.37E+05	8.05E+04

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	4.669	5.121	12.537	2.882	24.038
STANDARD DEVIATION OF FLOW.....	1.095	1.312	2.843	0.654	5.596
MAXIMUM FLOW.....	42.170	53.810	106.570	24.270	213.480
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	9.81E+04	1.08E+05	2.63E+05	6.05E+04	5.05E+05

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	402	403	501	404	405	306	307	408	502
AVERAGE FLOW.....	0.000	19.334	21.267	40.601	12.270	5.102	4.614	0.552	16.879	56.138
STANDARD DEVIATION OF FLOW.....	0.000	0.898	0.961	1.858	0.580	0.217	0.246	0.023	0.807	2.830
MAXIMUM FLOW.....	0.000	26.452	28.477	54.927	16.122	6.865	7.087	0.670	22.246	77.384
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	4.06E+05	4.47E+05	8.53E+05	2.58E+05	1.07E+05	9.69E+04	1.16E+04	3.54E+05	1.18E+06

MO/DA/YR HR:MIN:SEC STEP	542	304	309	415	503	316	504	319	505	410
AVERAGE FLOW.....	73.017	63.309	7.709	5.347	10.449	11.891	22.706	2.893	25.271	12.603
STANDARD DEVIATION OF FLOW.....	3.626	4.192	0.373	0.243	0.457	0.684	1.148	0.314	1.428	0.544
MAXIMUM FLOW.....	99.389	94.847	9.999	7.538	14.391	19.137	33.624	7.658	40.376	16.589
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).....	1.53E+06	1.33E+06	1.62E+05	1.12E+05	2.19E+05	2.50E+05	4.77E+05	6.07E+04	5.31E+05	2.65E+05

MO/DA/YR HR:MIN:SEC STEP	506	110	313	312	507	311	414	318	420	508
AVERAGE FLOW.....	82.574	79.531	9.329	0.000	9.739	2.001	7.808	2.896	7.645	104.342
STANDARD DEVIATION OF FLOW.....	5.006	5.288	0.396	0.000	2.022	0.084	0.334	0.110	0.362	5.975
MAXIMUM FLOW.....	119.986	119.869	11.554	0.000	71.695	2.478	10.182	3.597	11.007	149.766
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).....	1.73E+06	1.67E+06	1.96E+05	0.00E+00	2.05E+05	4.20E+04	1.64E+05	6.08E+04	1.61E+05	2.19E+06

MO/DA/YR HR:MIN:SEC STEP	509	317	421	510	511	322	512	423	427	324

SHEEP DRAW BASIN

FILENAME: SDB005PC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Comp. Plan Facilities - 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.....	68.104	62.645	68.757	57.302	15.053	10.006	11.228	78.078	52.838	42.650
STANDARD DEVIATION OF FLOW.....	15.232	12.498	14.160	10.615	3.501	2.065	2.561	14.413	9.638	9.230
MAXIMUM FLOW.....	541.416	401.298	477.074	328.180	128.327	68.300	93.087	445.020	294.690	318.146
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).....	1.43E+06	1.32E+06	1.44E+06	1.20E+06	3.16E+05	2.10E+05	2.36E+05	1.64E+06	1.11E+06	8.96E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	17.074	15.323	79.403	27.910	13.602	24.252	8.503	14.109	5.358	18.535
STANDARD DEVIATION OF FLOW.....	3.746	3.730	17.675	5.980	3.340	5.760	1.884	3.497	1.170	4.592
MAXIMUM FLOW.....	132.653	144.080	630.988	205.035	129.300	216.800	64.519	136.870	39.732	181.070
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).....	3.59E+05	3.22E+05	1.67E+06	5.86E+05	2.86E+05	5.09E+05	1.79E+05	2.96E+05	1.13E+05	3.89E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	29.912	3.502	47.106	9.155	4.171	5.116	22.144	8.325	4.078	14.674
STANDARD DEVIATION OF FLOW.....	6.535	0.894	10.499	2.442	0.981	1.113	5.457	2.072	0.987	3.735
MAXIMUM FLOW.....	229.682	31.370	377.348	99.900	34.381	37.682	213.210	82.250	34.080	153.160
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).....	6.28E+05	7.36E+04	9.89E+05	1.92E+05	8.76E+04	1.07E+05	4.65E+05	1.75E+05	8.56E+04	3.08E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	0.515	6.633	49.382	9.167	15.326	9.299	15.573	10.207	44.840	11.490
STANDARD DEVIATION OF FLOW.....	0.134	1.674	10.506	2.405	3.838	2.231	3.789	2.355	10.127	2.457
MAXIMUM FLOW.....	4.087	64.710	356.851	89.890	154.230	81.890	138.673	85.108	365.203	85.492
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).....	1.08E+04	1.39E+05	1.04E+06	1.93E+05	3.22E+05	1.95E+05	3.27E+05	2.14E+05	9.42E+05	2.41E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	6.761	7.372	10.189	1.713	0.268	8.086	2.229	5.138	28.643	32.106
STANDARD DEVIATION OF FLOW.....	1.381	1.811	2.269	0.442	0.081	1.867	0.667	1.212	8.049	7.472
MAXIMUM FLOW.....	40.879	67.200	79.956	14.590	2.537	67.271	24.368	43.850	359.363	279.534
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).....	1.42E+05	1.55E+05	2.14E+05	3.60E+04	5.63E+03	1.70E+05	4.68E+04	1.08E+05	6.02E+05	6.74E+05

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	34.723	5.399	49.611	58.972	7.193	9.878	11.237	22.315	7.107	5.818
STANDARD DEVIATION OF FLOW.....	7.744	1.224	11.668	11.420	1.574	2.186	2.526	6.049	1.684	1.346
MAXIMUM FLOW.....	267.144	47.210	439.841	357.854	52.260	76.966	86.467	263.610	69.070	49.820
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).....	7.29E+05	1.13E+05	1.04E+06	1.24E+06	1.51E+05	2.07E+05	2.36E+05	4.69E+05	1.49E+05	1.22E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	3.787	5.153	2.659	6.151	2.188	2.120	8.008	2.926	12.398	7.079
STANDARD DEVIATION OF FLOW.....	0.909	1.249	0.654	1.304	0.535	0.523	1.840	0.723	3.180	1.526
MAXIMUM FLOW.....	36.830	42.458	24.670	44.290	19.120	18.480	67.120	26.380	128.650	51.690
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).....	7.95E+04	1.08E+05	5.58E+04	1.29E+05	4.59E+04	4.45E+04	1.68E+05	6.14E+04	2.60E+05	1.49E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	9.137	10.475	22.551	5.186	45.401
STANDARD DEVIATION OF FLOW.....	2.285	2.839	5.434	1.242	11.188
MAXIMUM FLOW.....	88.130	119.460	204.474	46.290	425.470
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.92E+05	2.20E+05	4.74E+05	1.09E+05	9.53E+05

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	402	403	501	404	405	306	307	408	502
AVERAGE FLOW.....	0.000	37.263	38.190	75.453	22.403	9.229	7.956	0.948	30.920	103.382
STANDARD DEVIATION OF FLOW.....	0.000	1.764	1.745	3.508	1.052	0.403	0.440	0.039	1.468	5.261
MAXIMUM FLOW.....	0.000	52.525	52.336	104.853	29.419	12.782	12.817	1.134	40.750	145.838
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	7.83E+05	8.02E+05	1.58E+06	4.70E+05	1.94E+05	1.67E+05	1.99E+04	6.49E+05	2.17E+06

MO/DA/YR HR:MIN:SEC STEP	542	304	309	415	503	316	504	319	505	410
AVERAGE FLOW.....	134.302	118.441	14.142	9.657	18.886	20.636	40.182	5.317	45.009	22.877
STANDARD DEVIATION OF FLOW.....	6.710	7.575	0.675	0.456	0.853	1.247	2.109	0.612	2.652	0.999
MAXIMUM FLOW.....	186.330	175.103	18.173	14.216	26.958	35.276	62.778	14.873	76.320	30.796
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).....	2.82E+06	2.49E+06	2.97E+05	2.03E+05	3.97E+05	4.33E+05	8.44E+05	1.12E+05	9.45E+05	4.80E+05

MO/DA/YR HR:MIN:SEC STEP	506	110	313	312	507	311	414	318	420	508
AVERAGE FLOW.....	153.586	148.140	16.743	0.000	17.074	3.556	14.135	5.292	13.812	192.460
STANDARD DEVIATION OF FLOW.....	9.059	9.602	0.702	0.000	3.746	0.147	0.609	0.202	0.683	10.753
MAXIMUM FLOW.....	220.916	220.693	20.467	0.000	132.653	4.343	18.790	6.566	20.936	274.114
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).....	3.23E+06	3.11E+06	3.52E+05	0.00E+00	3.59E+05	7.47E+04	2.97E+05	1.11E+05	2.90E+05	4.04E+06

MO/DA/YR HR:MIN:SEC STEP	509	317	421	510	511	322	512	423	427	324

SHEEP DRAW BASIN
FILENAME: SDB010PC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Comp. Plan Facilities - 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.....	88.828	82.033	90.206	75.682	19.926	12.948	14.456	103.049	69.636	56.480
STANDARD DEVIATION OF FLOW.....	19.433	16.093	18.335	13.886	4.557	2.635	3.243	18.846	12.579	12.053
MAXIMUM FLOW.....	686.378	507.667	607.238	419.140	162.826	86.388	115.664	569.060	375.580	413.763
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).....	1.87E+06	1.72E+06	1.89E+06	1.59E+06	4.18E+05	2.72E+05	3.04E+05	2.16E+06	1.46E+06	1.19E+06

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	22.427	20.270	104.826	36.937	18.004	31.506	11.647	18.742	7.176	24.536
STANDARD DEVIATION OF FLOW.....	4.849	4.850	22.993	7.805	4.341	7.358	2.532	4.561	1.543	5.970
MAXIMUM FLOW.....	169.486	190.860	820.359	265.478	170.970	278.100	84.075	181.530	51.041	240.010
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).....	4.71E+05	4.26E+05	2.20E+06	7.76E+05	3.78E+05	6.62E+05	2.45E+05	3.94E+05	1.51E+05	5.15E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	39.543	5.085	62.324	12.902	5.544	6.832	29.152	11.029	5.641	19.413
STANDARD DEVIATION OF FLOW.....	8.516	1.241	13.682	3.339	1.277	1.463	7.056	2.694	1.320	4.849
MAXIMUM FLOW.....	296.694	43.380	488.206	134.460	44.920	48.314	281.820	107.880	45.790	200.970
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).....	8.30E+05	1.07E+05	1.31E+06	2.71E+05	1.16E+05	1.43E+05	6.12E+05	2.32E+05	1.18E+05	4.08E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	1.144	9.159	65.284	13.745	20.271	12.544	21.500	13.508	60.518	14.833
STANDARD DEVIATION OF FLOW.....	0.271	2.252	13.707	3.455	4.984	2.955	5.113	3.064	13.449	3.126
MAXIMUM FLOW.....	7.371	86.870	459.846	128.160	203.360	109.920	189.000	107.832	478.003	107.600
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).....	2.40E+04	1.92E+05	1.37E+06	2.89E+05	4.26E+05	2.63E+05	4.51E+05	2.84E+05	1.27E+06	3.11E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	11.023	10.316	13.540	2.494	0.752	10.611	4.331	6.750	37.207	41.926
STANDARD DEVIATION OF FLOW.....	2.140	2.467	2.968	0.605	0.179	2.408	1.151	1.561	10.314	9.603
MAXIMUM FLOW.....	59.166	91.470	102.249	19.930	4.594	85.780	38.406	57.090	485.817	352.597
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).....	2.31E+05	2.17E+05	2.84E+05	5.24E+04	1.58E+04	2.23E+05	9.09E+04	1.42E+05	7.81E+05	8.80E+05

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	49.484	6.787	65.616	79.992	10.164	13.040	15.882	29.638	8.908	7.913
STANDARD DEVIATION OF FLOW.....	10.762	1.524	15.181	15.317	2.171	2.842	3.482	7.888	2.088	1.858
MAXIMUM FLOW.....	361.155	58.680	561.291	469.800	69.576	98.026	114.822	339.080	86.160	69.490
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).....	1.04E+06	1.43E+05	1.38E+06	1.68E+06	2.13E+05	2.74E+05	3.34E+05	6.22E+05	1.87E+05	1.66E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	4.631	7.731	3.594	8.334	3.084	2.879	10.189	3.883	16.865	9.598
STANDARD DEVIATION OF FLOW.....	1.086	1.786	0.886	1.798	0.744	0.681	2.301	0.926	4.228	2.081
MAXIMUM FLOW.....	44.110	57.860	34.060	61.572	27.130	23.550	85.190	34.130	170.860	69.798
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).....	9.72E+04	1.62E+05	7.55E+04	1.75E+05	6.48E+04	6.05E+04	2.14E+05	8.15E+04	3.54E+05	2.02E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	12.576	14.789	30.063	6.863	58.982
STANDARD DEVIATION OF FLOW.....	3.069	3.888	7.124	1.613	14.182
MAXIMUM FLOW.....	118.580	160.090	269.460	60.710	549.760
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.64E+05	3.11E+05	6.31E+05	1.44E+05	1.24E+06

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	402	403	501	404	405	306	307	408	502
AVERAGE FLOW.....	0.000	48.730	50.070	98.800	29.564	12.208	10.288	1.219	40.779	135.464
STANDARD DEVIATION OF FLOW.....	0.000	2.317	2.301	4.616	1.397	0.536	0.570	0.050	1.947	6.927
MAXIMUM FLOW.....	0.000	68.989	68.999	137.988	38.999	16.998	16.626	1.459	53.999	191.977
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	1.02E+06	1.05E+06	2.07E+06	6.21E+05	2.56E+05	2.16E+05	2.56E+04	8.56E+05	2.84E+06

MO/DA/YR HR:MIN:SEC STEP	542	304	309	415	503	316	504	319	505	410
AVERAGE FLOW.....	176.243	156.239	18.618	12.776	24.984	26.799	52.646	7.121	59.163	30.278
STANDARD DEVIATION OF FLOW.....	8.850	10.059	0.894	0.606	1.133	1.621	2.767	0.817	3.491	1.330
MAXIMUM FLOW.....	245.753	240.980	23.965	18.973	35.898	46.155	82.874	19.811	101.016	40.999
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	3.70E+06	3.28E+06	3.91E+05	2.68E+05	5.25E+05	5.63E+05	1.11E+06	1.50E+05	1.24E+06	6.36E+05

MO/DA/YR HR:MIN:SEC STEP	506	110	313	312	507	311	414	318	420	508
AVERAGE FLOW.....	202.707	195.646	22.085	0.000	22.427	4.665	18.693	7.025	18.278	253.964
STANDARD DEVIATION OF FLOW.....	12.068	12.777	0.932	0.000	4.849	0.194	0.811	0.270	0.907	14.353
MAXIMUM FLOW.....	303.551	302.895	26.995	0.000	169.486	5.695	24.999	8.766	27.998	378.480
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).....	4.26E+06	4.11E+06	4.64E+05	0.00E+00	4.71E+05	9.80E+04	3.93E+05	1.48E+05	3.84E+05	5.33E+06

MO/DA/YR HR:MIN:SEC STEP	509	317	421	510	511	322	512	423	427	324

SHEEP DRAW BASIN
FILENAME: SDB050PC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Comp. Plan Facilities - 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.....	145.383	134.941	150.356	127.496	33.833	21.145	23.410	173.535	116.952	95.553
STANDARD DEVIATION OF FLOW.....	35.035	29.038	33.697	25.620	8.637	4.743	5.836	34.726	23.072	22.597
MAXIMUM FLOW.....	1239.018	946.230	1137.820	797.377	310.396	157.225	208.567	1080.025	710.934	780.259
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).....	3.05E+06	2.83E+06	3.16E+06	2.68E+06	7.10E+05	4.44E+05	4.92E+05	3.64E+06	2.46E+06	2.01E+06

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	37.802	34.591	178.296	62.720	30.570	51.838	20.803	31.932	12.405	41.571
STANDARD DEVIATION OF FLOW.....	9.098	9.297	43.654	14.694	8.253	13.497	5.015	8.699	2.953	11.318
MAXIMUM FLOW.....	319.416	367.122	1565.465	504.000	324.903	516.164	168.905	344.903	99.068	454.273
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).....	7.94E+05	7.26E+05	3.74E+06	1.32E+06	6.42E+05	1.09E+06	4.37E+05	6.71E+05	2.61E+05	8.73E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	66.852	9.778	105.756	23.860	9.505	11.755	49.059	18.704	10.131	32.857
STANDARD DEVIATION OF FLOW.....	15.979	2.617	25.845	6.943	2.417	2.784	13.288	5.112	2.595	9.195
MAXIMUM FLOW.....	559.066	90.890	924.035	266.752	85.616	93.292	532.825	201.609	90.114	374.314
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).....	1.40E+06	2.05E+05	2.22E+06	5.01E+05	2.00E+05	2.47E+05	1.03E+06	3.93E+05	2.13E+05	6.90E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	3.254	16.544	111.491	27.411	34.295	21.943	38.709	22.924	105.403	24.131
STANDARD DEVIATION OF FLOW.....	0.781	4.564	26.065	7.655	9.436	5.792	10.291	5.795	26.042	5.624
MAXIMUM FLOW.....	22.088	172.460	884.817	277.889	381.544	216.157	382.181	206.904	925.213	194.584
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).....	6.83E+04	3.47E+05	2.34E+06	5.76E+05	7.20E+05	4.61E+05	8.13E+05	4.81E+05	2.21E+06	5.07E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	23.792	18.963	23.133	4.770	2.234	17.756	11.167	11.285	61.093	69.324
STANDARD DEVIATION OF FLOW.....	4.919	5.069	5.639	1.249	0.519	4.491	3.139	2.888	18.937	17.666
MAXIMUM FLOW.....	141.390	186.029	195.167	41.106	13.769	161.717	104.671	105.570	939.960	642.593
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).....	5.00E+05	3.98E+05	4.86E+05	1.00E+05	4.69E+04	3.73E+05	2.35E+05	2.37E+05	1.28E+06	1.46E+06

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	92.842	11.210	111.018	140.287	18.931	22.037	29.595	50.609	14.595	15.321
STANDARD DEVIATION OF FLOW.....	22.309	2.867	28.671	29.530	4.445	5.335	7.170	15.165	3.892	4.067
MAXIMUM FLOW.....	757.875	109.756	1048.758	939.410	145.233	184.904	239.683	621.190	158.101	149.274
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).....	1.95E+06	2.35E+05	2.33E+06	2.95E+06	3.98E+05	4.63E+05	6.21E+05	1.06E+06	3.06E+05	3.22E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	6.786	15.414	6.843	16.072	6.930	8.352	16.141	6.577	29.849	18.476
STANDARD DEVIATION OF FLOW.....	1.735	3.888	1.873	3.982	1.881	2.270	4.041	1.712	8.429	4.436
MAXIMUM FLOW.....	68.888	128.117	70.000	136.834	66.380	78.943	149.946	62.909	331.915	149.044
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).....	1.43E+05	3.24E+05	1.44E+05	3.38E+05	1.46E+05	1.75E+05	3.39E+05	1.38E+05	6.27E+05	3.88E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	22.613	27.832	52.074	11.602	95.914
STANDARD DEVIATION OF FLOW.....	6.191	8.325	13.887	3.033	25.508
MAXIMUM FLOW.....	235.847	324.078	533.783	113.438	994.854
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	4.75E+05	5.84E+05	1.09E+06	2.44E+05	2.01E+06

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	402	403	501	404	405	306	307	408	502
AVERAGE FLOW.....	50.609	98.403	106.730	254.626	77.920	25.660	16.854	1.984	106.592	344.934
STANDARD DEVIATION OF FLOW.....	4.243	10.096	11.332	23.550	8.387	3.156	0.986	0.083	11.479	32.721
MAXIMUM FLOW.....	103.539	285.798	320.325	661.320	218.829	96.852	28.227	2.366	299.888	889.852
MINIMUM FLOW.....	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.06E+06	2.07E+06	2.24E+06	5.35E+06	1.64E+06	5.39E+05	3.54E+05	4.17E+04	2.24E+06	7.24E+06

MO/DA/YR HR:MIN:SEC STEP	542	304	309	415	503	316	504	319	505	410
AVERAGE FLOW.....	451.526	428.907	60.952	24.987	50.647	44.224	96.488	12.316	108.076	67.722
STANDARD DEVIATION OF FLOW.....	44.141	43.232	6.022	3.207	6.288	2.856	8.752	1.503	10.188	7.915
MAXIMUM FLOW.....	1189.643	1168.753	148.573	104.546	198.700	80.169	277.792	37.374	313.636	229.826
MINIMUM FLOW.....	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.000
FLOW VOLUME (CUBIC FEET).....	9.48E+06	9.01E+06	1.28E+06	5.25E+05	1.06E+06	9.29E+05	2.03E+06	2.59E+05	2.27E+06	1.42E+06

MO/DA/YR HR:MIN:SEC STEP	506	110	313	312	507	311	414	318	420	508
AVERAGE FLOW.....	554.620	546.142	92.210	84.452	122.254	101.416	43.332	12.020	34.868	653.193
STANDARD DEVIATION OF FLOW.....	52.421	52.700	11.519	12.479	14.352	13.090	5.042	0.485	4.567	57.548
MAXIMUM FLOW.....	1453.257	1413.017	297.885	344.655	421.617	345.947	144.640	15.142	151.126	1593.688
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.033	0.000	0.000	0.000	0.001	0.000
FLOW VOLUME (CUBIC FEET).....	1.16E+07	1.15E+07	1.94E+06	1.77E+06	2.57E+06	2.13E+06	9.10E+05	2.52E+05	7.32E+05	1.37E+07

MO/DA/YR HR:MIN:SEC STEP	509	317	421	510	511	322	512	423	427	324

SHEEP DRAW BASIN
FILENAME: SDB100PC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Comp. Plan Facilities - 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.....	173.341	161.102	180.398	153.556	40.813	25.184	27.803	208.983	140.708	115.186
STANDARD DEVIATION OF FLOW.....	42.265	35.301	41.052	31.428	10.490	5.751	7.014	42.599	28.284	27.554
MAXIMUM FLOW.....	1423.267	1095.630	1323.870	936.538	361.986	180.767	242.577	1264.429	833.248	900.236
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).....	3.64E+06	3.38E+06	3.79E+06	3.22E+06	8.57E+05	5.29E+05	5.84E+05	4.39E+06	2.95E+06	2.42E+06

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	45.454	41.759	215.021	75.632	36.876	61.891	25.513	38.578	15.056	50.134
STANDARD DEVIATION OF FLOW.....	11.073	11.247	53.148	17.941	9.973	16.221	6.187	10.512	3.623	13.656
MAXIMUM FLOW.....	371.608	422.298	1807.318	583.033	373.806	584.932	198.428	397.583	115.960	522.336
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).....	9.55E+05	8.77E+05	4.52E+06	1.59E+06	7.74E+05	1.30E+06	5.36E+05	8.10E+05	3.16E+05	1.05E+06

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	80.565	12.204	127.555	29.593	11.434	14.244	59.008	22.561	12.371	39.611
STANDARD DEVIATION OF FLOW.....	19.471	3.249	31.459	8.479	2.944	3.413	16.009	6.169	3.191	11.064
MAXIMUM FLOW.....	647.942	107.220	1071.704	317.502	98.513	109.098	609.857	233.853	104.734	434.430
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+06	2.56E+05	2.68E+06	6.21E+05	2.40E+05	2.99E+05	1.24E+06	4.74E+05	2.60E+05	8.32E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	4.509	20.356	134.595	34.788	41.338	26.732	47.610	27.648	128.358	28.703
STANDARD DEVIATION OF FLOW.....	1.040	5.580	31.860	9.527	11.371	7.067	12.613	7.042	31.876	6.797
MAXIMUM FLOW.....	27.320	202.579	1030.620	330.629	440.494	250.104	443.747	240.001	1080.396	224.807
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).....	9.47E+04	4.27E+05	2.83E+06	7.31E+05	8.68E+05	5.61E+05	1.00E+06	5.81E+05	2.70E+06	6.03E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	30.906	23.461	27.963	5.877	3.121	21.315	15.163	13.520	72.912	82.951
STANDARD DEVIATION OF FLOW.....	6.332	6.237	6.886	1.554	0.696	5.441	4.056	3.493	22.327	21.306
MAXIMUM FLOW.....	170.935	218.377	228.564	48.350	17.030	185.505	126.837	121.023	1044.180	753.077
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).....	6.49E+05	4.93E+05	5.87E+05	1.23E+05	6.55E+04	4.48E+05	3.18E+05	2.84E+05	1.53E+06	1.74E+06

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	115.643	13.495	133.828	171.177	23.499	26.542	36.745	61.168	17.519	19.127
STANDARD DEVIATION OF FLOW.....	27.771	3.477	34.738	36.516	5.538	6.500	8.914	18.139	4.688	5.078
MAXIMUM FLOW.....	892.690	126.837	1231.996	1097.070	171.161	216.053	283.072	732.466	184.644	177.211
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).....	2.43E+06	2.83E+05	2.81E+06	3.59E+06	4.93E+05	5.57E+05	7.72E+05	1.28E+06	3.68E+05	4.02E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	7.794	19.456	8.462	20.270	8.996	11.585	19.035	7.845	36.499	23.020
STANDARD DEVIATION OF FLOW.....	2.013	4.886	2.320	5.025	2.427	3.111	4.824	2.070	10.231	5.554
MAXIMUM FLOW.....	78.661	152.288	83.406	164.759	81.053	101.866	169.417	72.506	389.571	177.069
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	4.09E+05	1.78E+05	4.26E+05	1.89E+05	2.43E+05	4.00E+05	1.65E+05	7.66E+05	4.83E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	27.787	34.616	63.152	13.982	114.074
STANDARD DEVIATION OF FLOW.....	7.565	10.163	16.869	3.673	30.490
MAXIMUM FLOW.....	276.105	388.076	612.210	130.760	1123.476
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	5.84E+05	7.27E+05	1.33E+06	2.94E+05	2.40E+06

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	402	403	501	404	405	306	307	408	502
AVERAGE FLOW.....	76.240	123.666	135.759	334.369	103.090	32.499	20.087	2.359	140.831	452.708
STANDARD DEVIATION OF FLOW.....	6.464	14.667	16.642	35.198	12.358	4.699	1.200	0.100	16.897	48.138
MAXIMUM FLOW.....	164.952	409.958	465.942	991.718	322.940	139.892	34.790	2.798	441.952	1328.545
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).....	1.60E+06	2.60E+06	2.85E+06	7.02E+06	2.16E+06	6.82E+05	4.22E+05	4.95E+04	2.96E+06	9.51E+06

MO/DA/YR HR:MIN:SEC STEP	542	304	309	415	503	316	504	319	505	410
AVERAGE FLOW.....	593.539	570.356	83.632	31.219	63.718	52.830	118.535	14.948	132.693	86.848
STANDARD DEVIATION OF FLOW.....	64.946	63.591	8.788	4.778	9.387	3.489	12.269	1.862	14.039	11.842
MAXIMUM FLOW.....	1769.609	1737.889	217.971	146.835	283.468	99.968	381.529	46.978	426.542	338.991
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.25E+07	1.20E+07	1.76E+06	6.56E+05	1.34E+06	1.11E+06	2.49E+06	3.14E+05	2.79E+06	1.82E+06

MO/DA/YR HR:MIN:SEC STEP	506	110	313	312	507	311	414	318	420	508
AVERAGE FLOW.....	737.661	728.632	128.162	127.572	173.025	152.181	55.897	14.533	43.364	860.214
STANDARD DEVIATION OF FLOW.....	77.525	77.189	17.721	19.775	22.806	21.535	7.553	0.597	6.751	84.208
MAXIMUM FLOW.....	2158.866	2075.804	470.979	556.677	726.758	590.880	213.946	18.497	210.843	2324.188
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.016	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.55E+07	1.53E+07	2.69E+06	2.68E+06	3.63E+06	3.20E+06	1.17E+06	3.05E+05	9.11E+05	1.81E+07

MO/DA/YR HR:MIN:SEC STEP	509	317	421	510	511	322	512	423	427	324

FLOOD HYDROGRAPHS

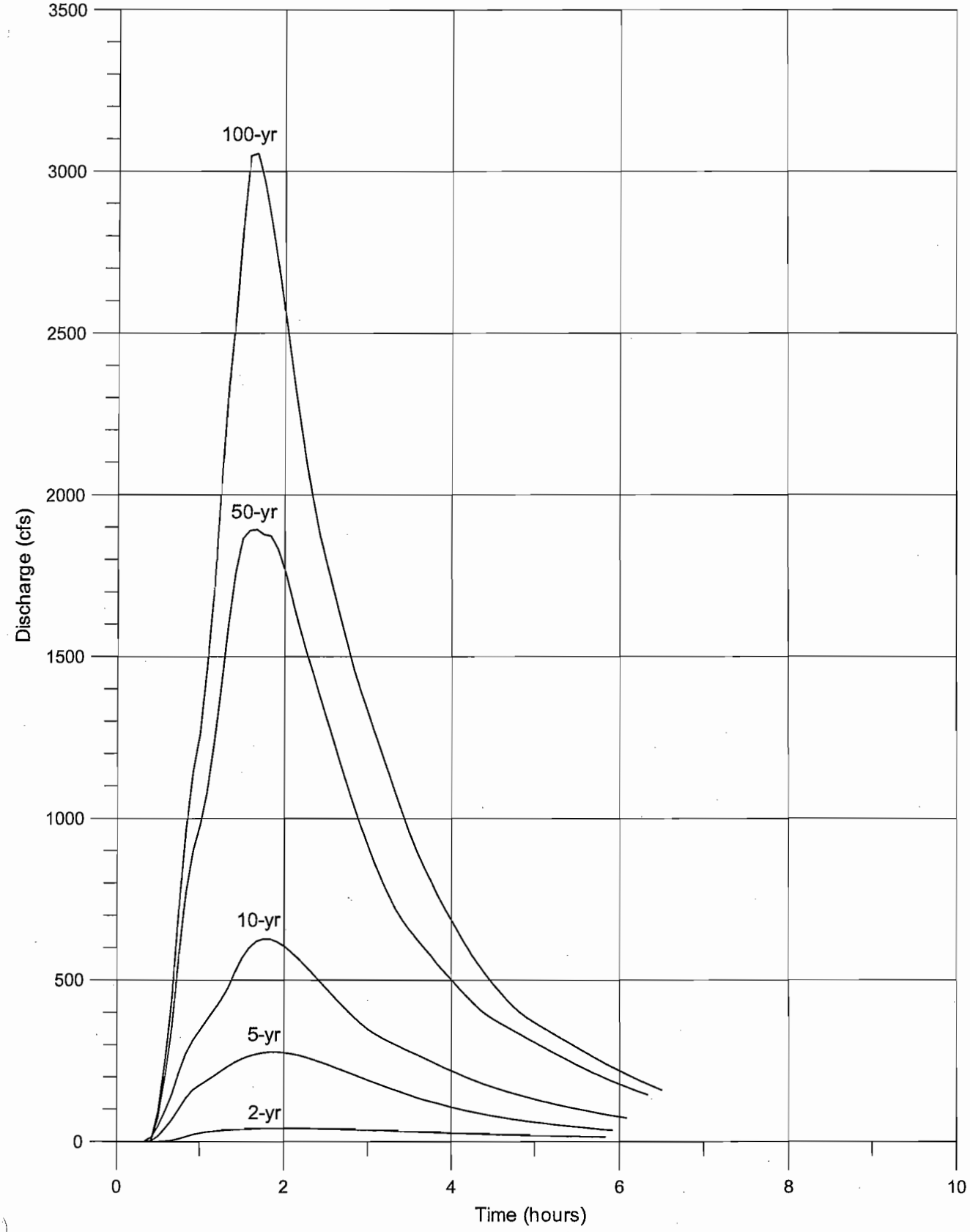


Figure D-1 Flood Hydrographs Downstream of 95th Avenue
Existing Condition (EPA SWMM Node 510)

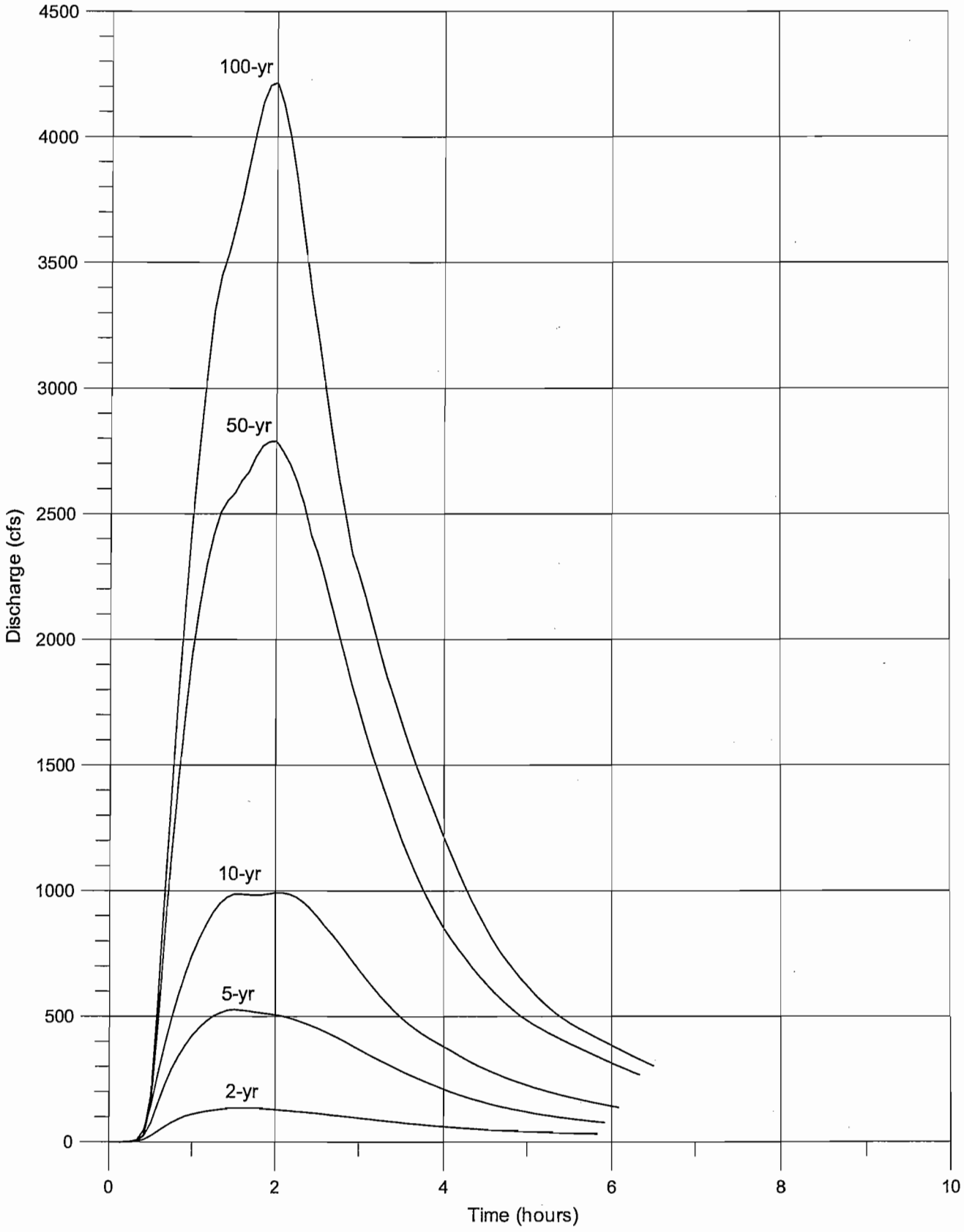


Figure D-2 Flood Hydrographs Downstream of 71st Avenue
Existing Condition (EPA SWMM Node 523)

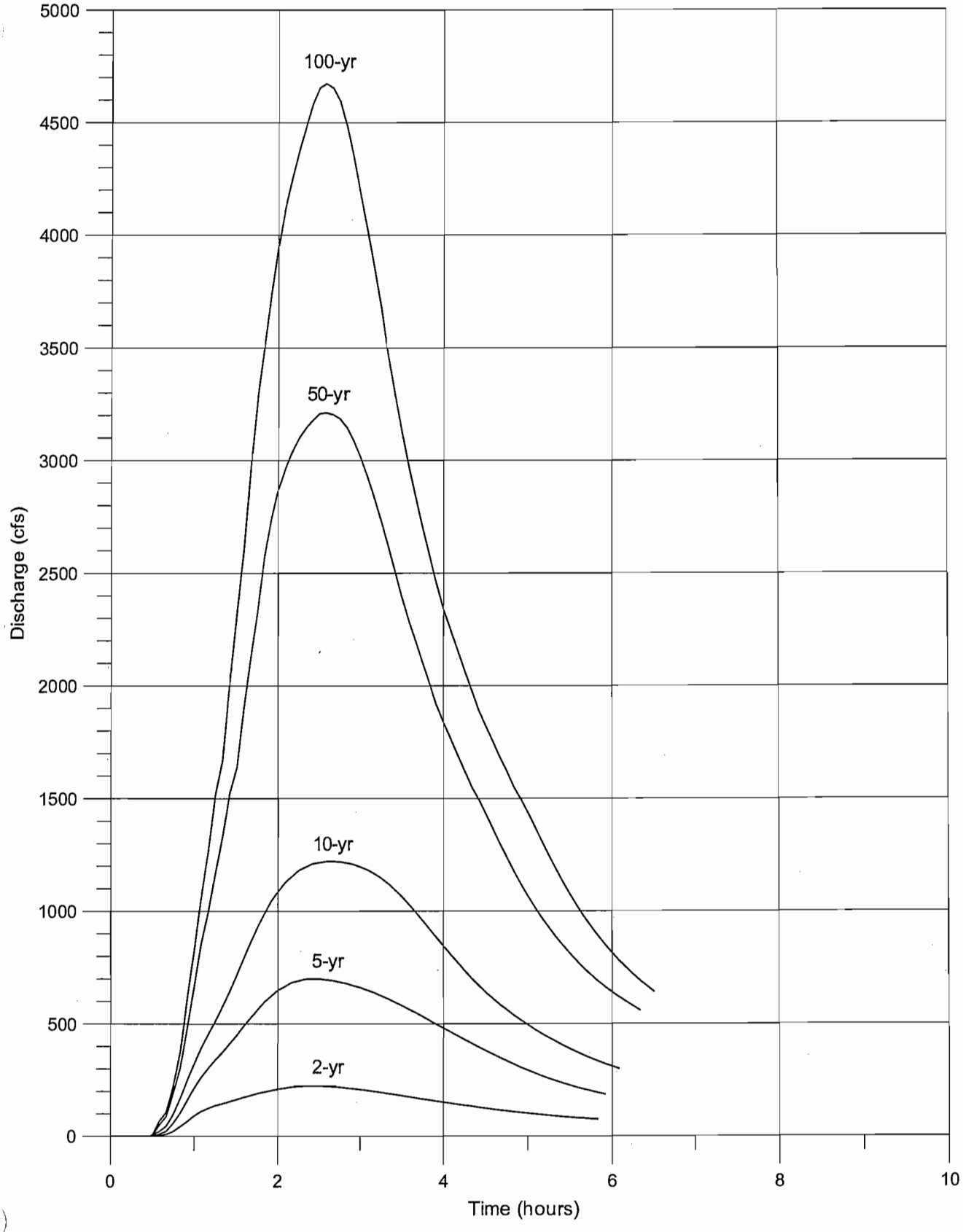


Figure D-3 Flood Hydrographs at Greeley No. 3 Ditch
Existing Condition (EPA SWMM Node 537)

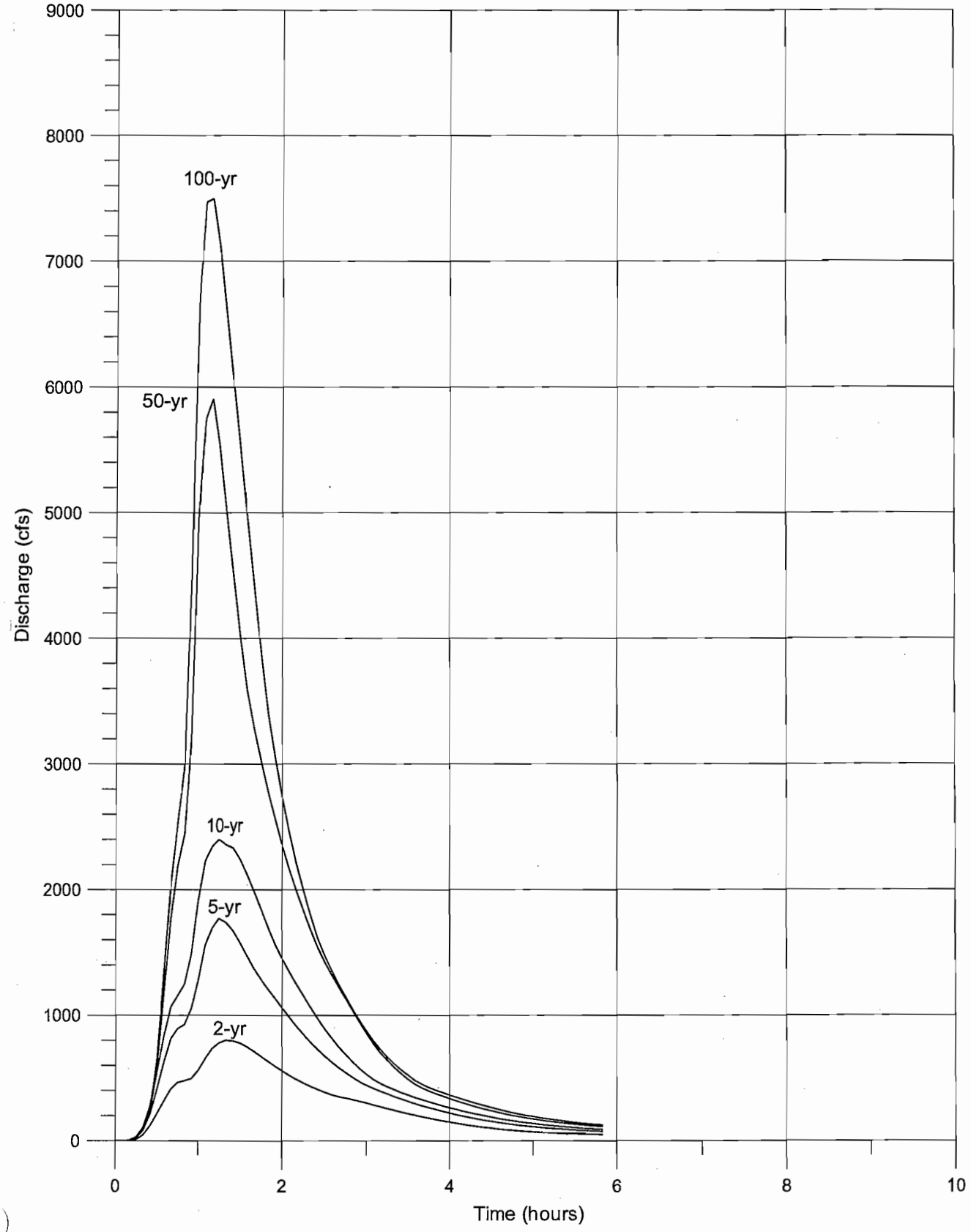


Figure D-4 Flood Hydrographs Downstream of 95th Avenue
Future Condition (EPA SWMM Node 510)

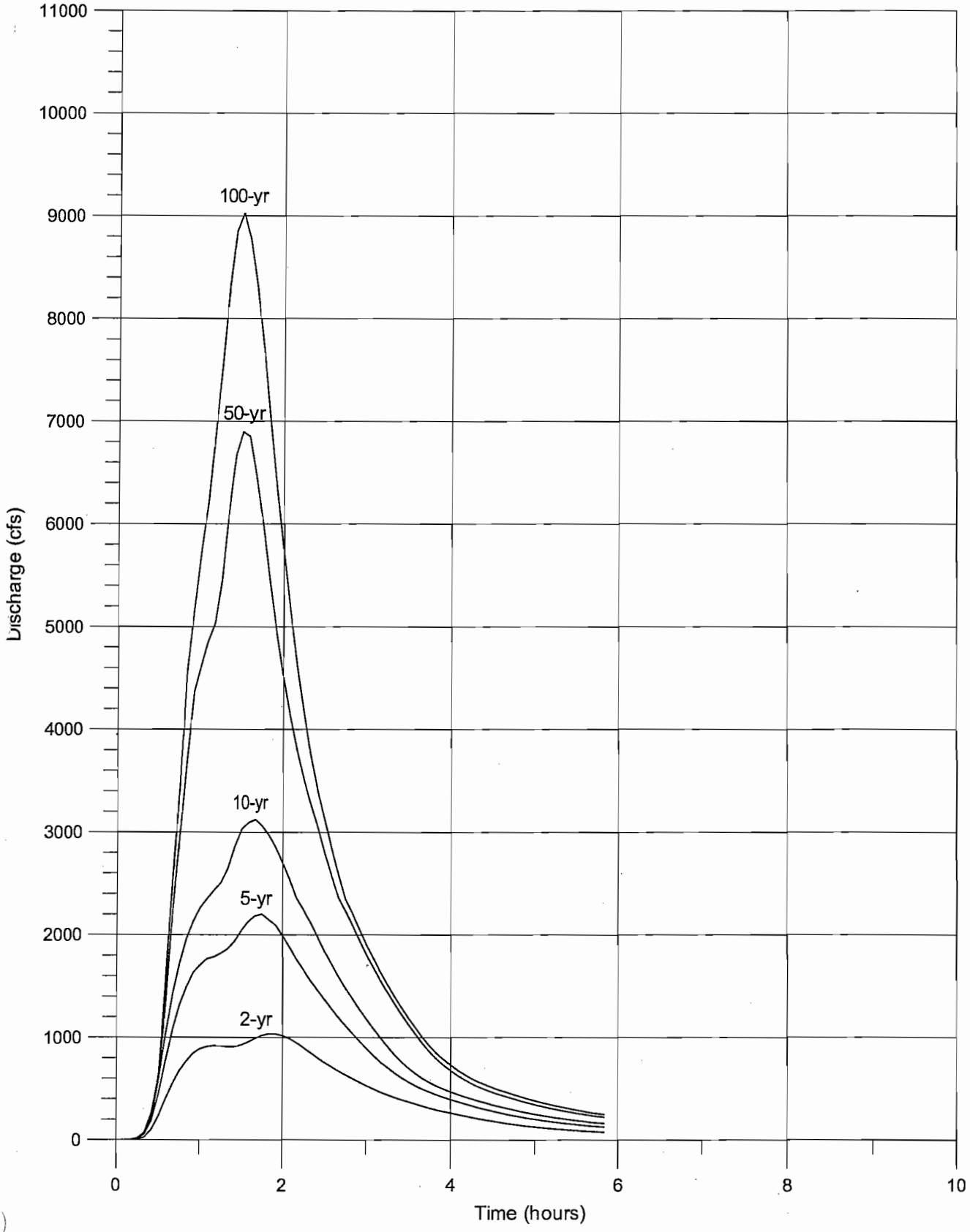


Figure D-5 Flood Hydrographs Downstream of 71st Avenue
Future Condition (EPA SWMM Node 523)

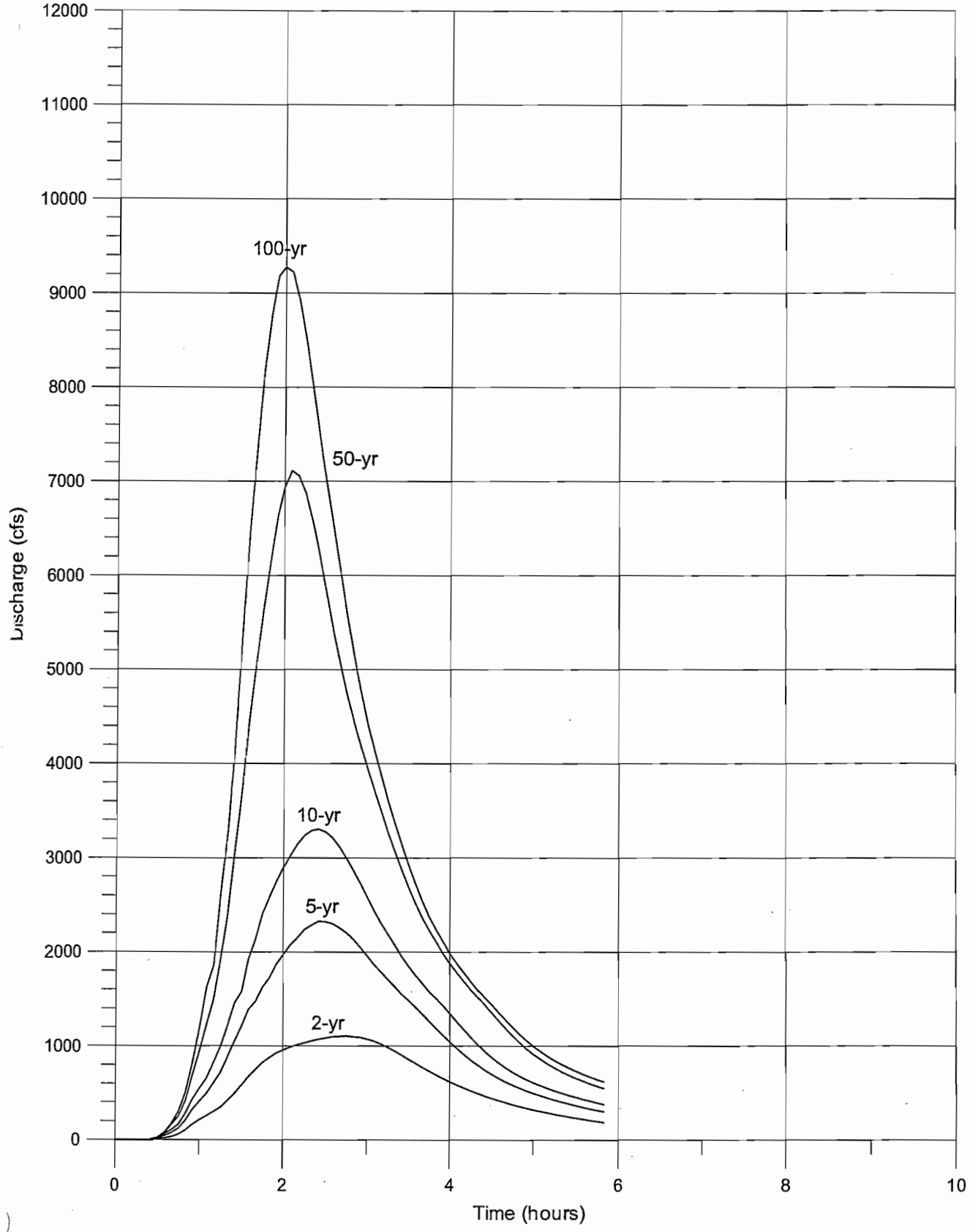


Figure D-6 Flood Hydrographs at Greeley No. 3 Ditch
Future Condition (EPA SWMM Node 537)

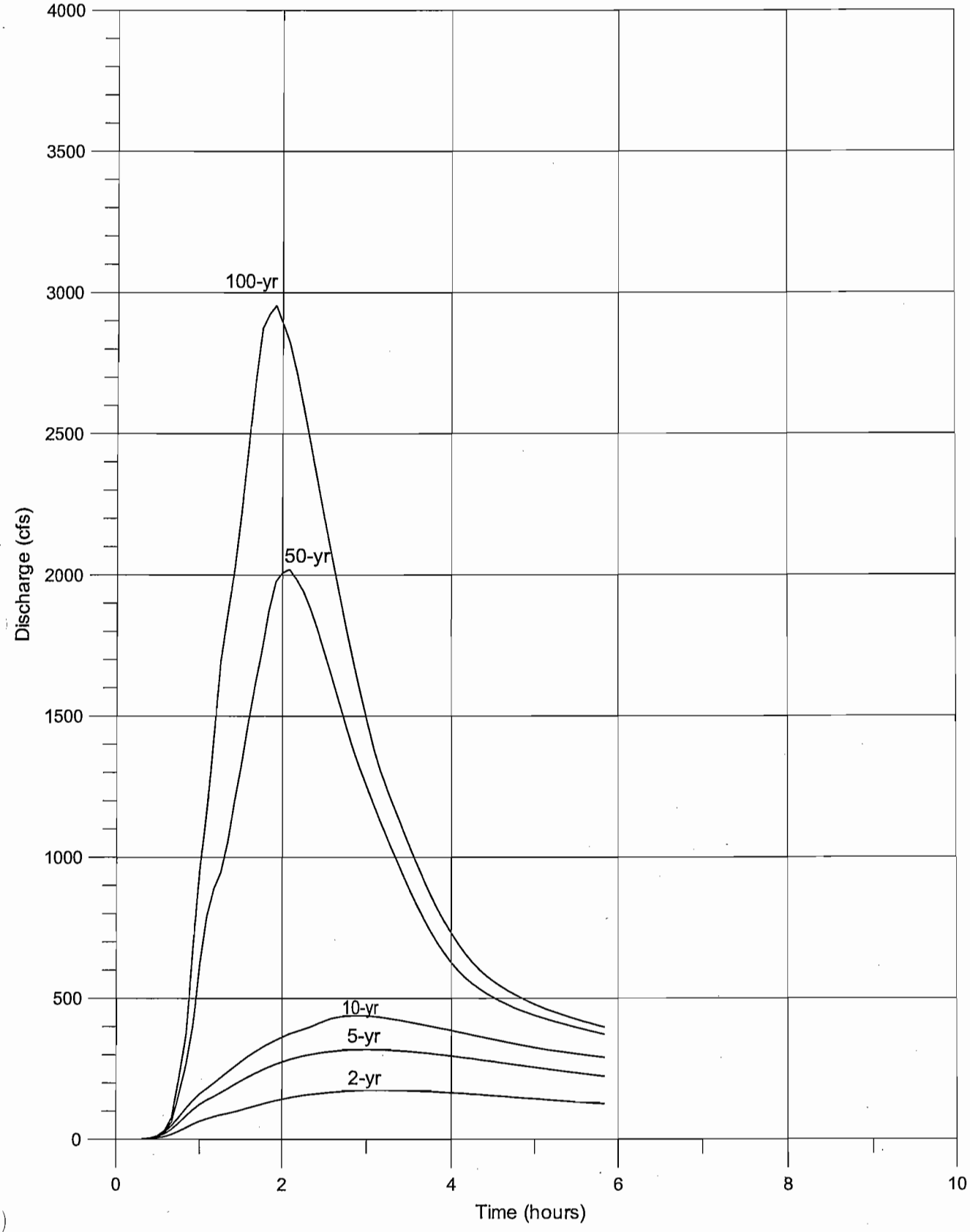


Figure D-7 Flood Hydrographs Downstream of 95th Avenue
Proposed Condition (EPA SWMM Node 510)

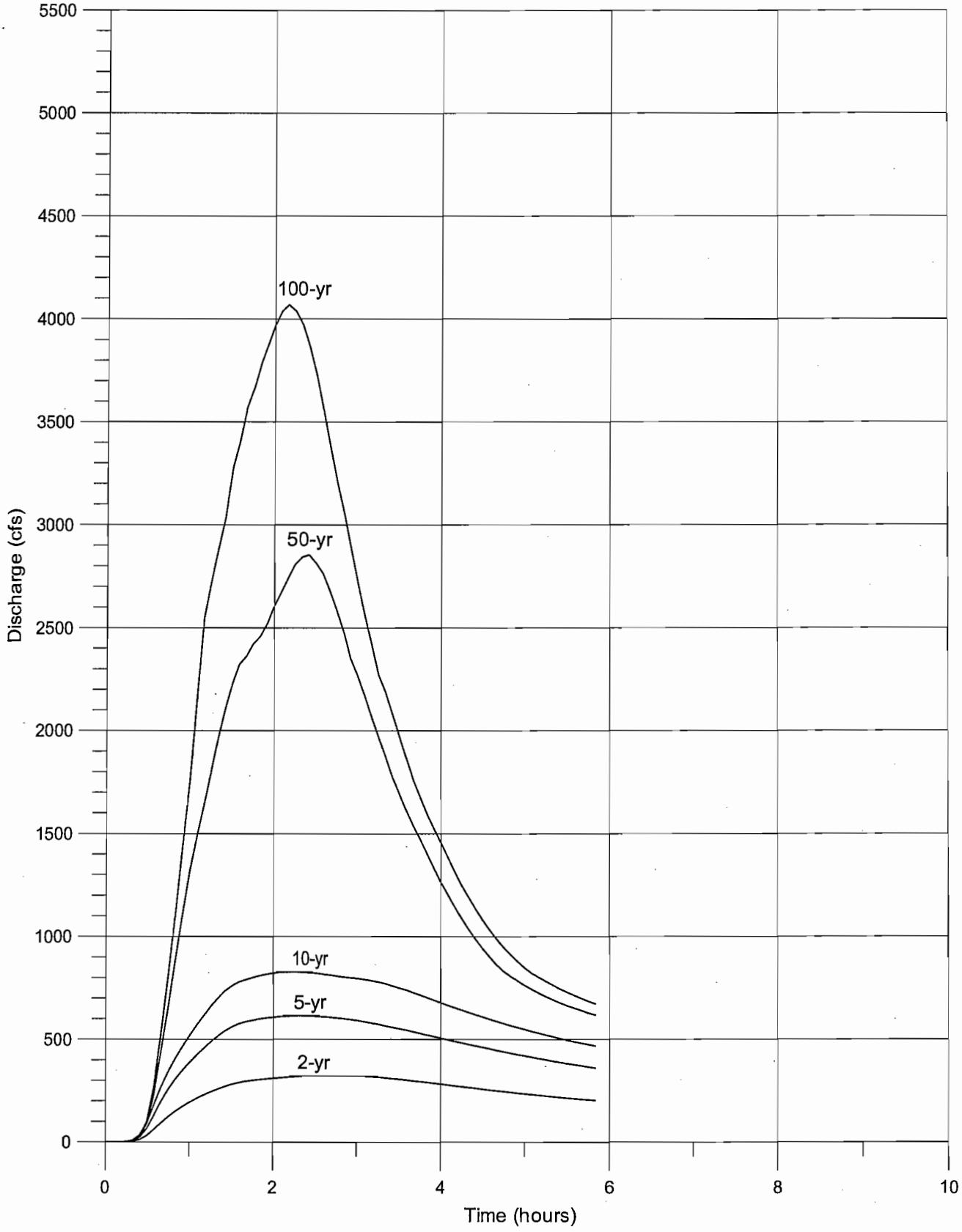


Figure D-8 Flood Hydrographs Downstream of 71st Avenue
Proposed Condition (EPA SWMM Node 523)

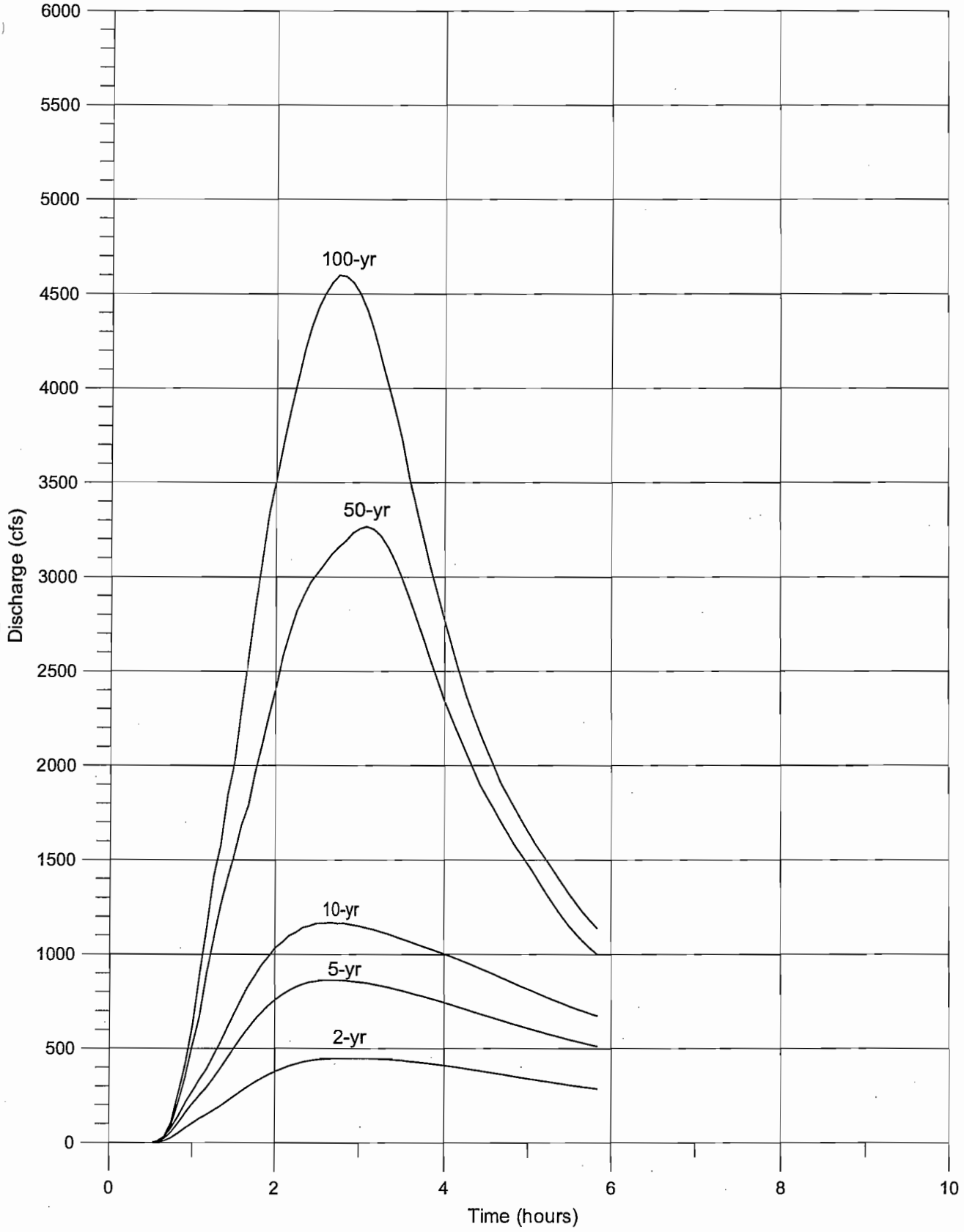
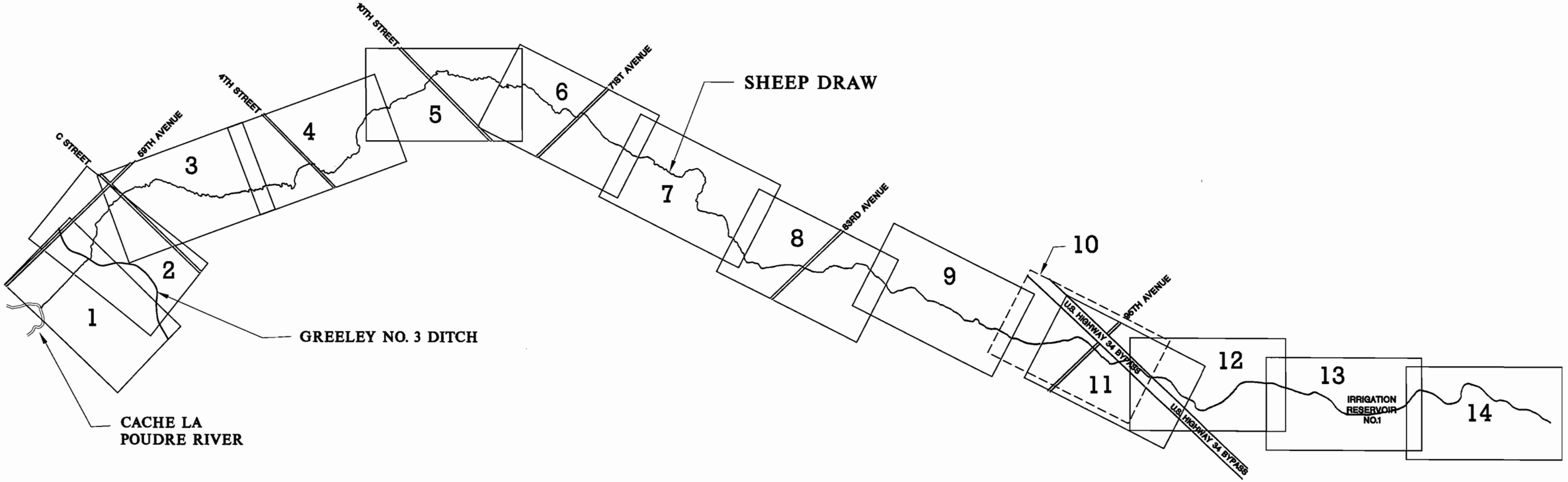


Figure D-9 Flood Hydrographs at Greeley No. 3 Ditch
Proposed Condition (EPA SWMM Node 537)



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REVISIONS:
REV1
REV2
REV3
REV4
REV5
REV6

CONTOUR INTERVAL
2 FEET
1"=2000'
0 1000 2000 4000

PROJECT NUMBER: COCOG05	DRAWN BY: BLV/TAW
ACAD FILE: INDEX SHEET	DESIGNED BY: BLV
DATE: 11/12/2004	CHECKED BY: GJK

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CITY OF GREELEY
COMPREHENSIVE DRAINAGE PLAN
SHEEP DRAW BASIN

100-YEAR FLOODPLAIN AND 1-FOOT FLOODWAY
INDEX MAP

SHEET
INDEX

LEGEND

- 91095 — HEC-RAS CROSS SECTION
- 4950 — BASE FLOOD ELEVATION
- 1-FOOT FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- 4558 — EXISTING/PROPOSED CONTOUR
- STREAM CENTERLINE

SHEEP DRAW 100-YEAR EXISTING CONDITION WITH EXISTING FACILITIES DISCHARGE PROFILE

GENERAL LOCATION/DESCRIPTION	HEC-RAS CROSS SECTION	DISCHARGE (CFS)
GREELEY NO.3 DITCH	1382	4,673
C STREET	3015	4,596
HUNTER'S COVE POND B	4538	4,556
DOWNSTREAM OF 4TH STREET	6800	4,558
4TH STREET	7879	4,502
PUMPKIN RIDGE POND A1	9215	4,436
10TH STREET	11630	4,425
DOWNSTREAM OF 71ST AVENUE	15451	4,216
75TH AVENUE (EXTENDED)	17291	3,756
76TH AVENUE (EXTENDED)	18328	3,743
BOOMERANG RANCH POND	19372	3,506
DOWNSTREAM OF 83RD AVENUE	22396	3,494
UPSTREAM OF 83RD AVENUE	23389	3,491
MOUNTAIN SHADOWS POND	23830	3,304
PEBBLE BROOK POND G	25693	3,185
PEBBLE BROOK SUBDIVISION	26791	3,176
DOWNSTREAM OF 95TH AVENUE	28988	3,055
95TH AVENUE	29216	2,585
U.S. HIGHWAY 34 BYPASS	29910	2,498
IRRIGATION RESERVOIR NO. 2 CONFLUENCE	33543	2,028
IRRIGATION RESERVOIR NO. 1 OUTFLOW	34920	1,597
IRRIGATION RESERVOIR NO. 1 INFLOW	35430	1,638
UPSTREAM LIMIT OF STUDY	39744	872

POUDRE RIVER 100-YEAR FLOODPLAIN (BASED ON JULY 2003 DRAFT FIS REVISION BY THE U.S. ARMY CORPS OF ENGINEERS)

CACHE LA POUDRE RIVER

4690 4686 4690 4690 4692 4694 4694 4696 4697 4698 4698

5+00 10+00 15+00

SHEEP DRAW

59TH AVENUE

DOWNSTREAM LIMIT OF STUDY

GREELEY NO.3 DITCH

1382 1447 1821

REVISIONS:
REV1
REV2
REV3
REV4
REV5
REV6

CONTOUR INTERVAL 2 FEET

N

1"=200'

0 50 100 200

PROJECT NUMBER: COCOG05	DRAWN BY: BLV/TAW
ACAD FILE: FP-FW WORKMAPS	DESIGNED BY: BLV
DATE: 11/22/2004	CHECKED BY: GJK

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CITY OF GREELEY
COMPREHENSIVE DRAINAGE PLAN
SHEEP DRAW BASIN

100-YEAR FLOODPLAIN AND 1-FOOT FLOODWAY WORK MAP

SHEET 1

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POUDRE RIVER 100-YEAR FLOODPLAIN (BASED ON JULY 2003 DRAFT FIS REVISION BY THE U.S. ARMY CORPS OF ENGINEERS)

LEGEND

- 91095 — HEC-RAS CROSS SECTION
- 4950 — BASE FLOOD ELEVATION
- 1-FOOT FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- 4658 — EXISTING/PROPOSED CONTOUR
- STREAM CENTERLINE

SHEEP DRAW 100-YEAR EXISTING CONDITION WITH EXISTING FACILITIES DISCHARGE PROFILE

GENERAL LOCATION/DESCRIPTION	HEC-RAS CROSS SECTION	DISCHARGE (CFS)
GREELEY NO.3 DITCH	1382	4,673
C STREET	3015	4,596
HUNTER'S COVE POND B	4538	4,556
DOWNSTREAM OF 4TH STREET	6800	4,558
4TH STREET	7879	4,502
PUMPKIN RIDGE POND A1	9215	4,436
10TH STREET	11630	4,425
DOWNSTREAM OF 71ST AVENUE	15451	4,216
75TH AVENUE (EXTENDED)	17291	3,756
76TH AVENUE (EXTENDED)	18328	3,743
BOOMERANG RANCH POND	19372	3,506
DOWNSTREAM OF 83RD AVENUE	22396	3,494
UPSTREAM OF 83RD AVENUE	23389	3,491
MOUNTAIN SHADOWS POND	23830	3,304
PEBBLE BROOK POND G	25693	3,185
PEBBLE BROOK SUBDIVISION	26791	3,176
DOWNSTREAM OF 95TH AVENUE	28988	3,055
95TH AVENUE	29216	2,585
U.S. HIGHWAY 34 BYPASS	29910	2,498
IRRIGATION RESERVOIR NO. 2 CONFLUENCE	33543	2,028
IRRIGATION RESERVOIR NO. 1 OUTFLOW	34920	1,597
IRRIGATION RESERVOIR NO. 1 INFLOW	35430	1,638
UPSTREAM LIMIT OF STUDY	39744	872

TOPOGRAPHY IN THIS AREA BASED ON EXISTING AND DESIGN CONTOURS (1-FOOT INTERVAL) FROM NORTHRIDGE ESTATES, OBTAINED FROM THE CITY OF GREELEY IN OCTOBER 2004.

TOPOGRAPHY IN THIS AREA BASED ON DESIGN AND AS-BUILT CONTOURS (1-FOOT INTERVAL) FROM THE HUNTER'S COVE SUBDIVISION, BASED ON A FEMA SUBMITTAL BY ANDERSON CONSULTING ENGINEERS, INC. IN FEBRUARY 2001.

ROAD OVERTOPPING DURING THE 100-YEAR EVENT

DOWNSTREAM LIMIT OF STUDY

GREELEY NO.3 DITCH

SHEEP DRAW

69TH AVENUE

C STREET

15-00 | 20-00 | 25-00 | 30-00

4694 | 4696 | 4697 | 4698 | 4699 | 4700 | 4701 | 4702 | 4703 | 4704 | 4705 | 4729

1382 | 1447 | 1821 | 2246 | 2713 | 2925 | 2961 | 2998 | 3015

REVISIONS:	CONTOUR INTERVAL 2 FEET	PROJECT NUMBER: COCOG05	DRAWN BY: BLV/TAW
REV1	N	ACAD FILE: FP-FW WORKMAPS	DESIGNED BY: BLV
REV2	1"=200'	DATE: 11/22/2004	CHECKED BY: GJK
REV3	0 50 100 200		
REV4			
REV5			
REV6			

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Phone (970) 226-0120 / Fax (970) 226-0121

CITY OF GREELEY
COMPREHENSIVE DRAINAGE PLAN
SHEEP DRAW BASIN

100-YEAR FLOODPLAIN AND 1-FOOT FLOODWAY WORK MAP

SHEET 2

P:\COCOG05\ACAD\SHEEPDRAW\SHEEP DRAW FP-FW WORKMAPS.DWG 03/26/2008 MRC

TOPOGRAPHY IN THIS AREA BASED ON DESIGN AND AS-BUILT CONTOURS (1-FOOT INTERVAL) FROM THE HUNTER'S COVE SUBDIVISION, BASED ON A FEMA SUBMITTAL BY ANDERSON CONSULTING ENGINEERS, INC. IN FEBRUARY 2001.

TOPOGRAPHY IN THIS AREA BASED ON EXISTING AND DESIGN CONTOURS (1-FOOT INTERVAL) FROM NORTHRIDGE ESTATES, OBTAINED FROM THE CITY OF GREELEY IN OCTOBER 2004.

ROAD OVERTOPPING DURING THE 100-YEAR EVENT

59TH AVENUE

C STREET

SHEEP DRAW

SHEEP DRAW 100-YEAR EXISTING CONDITION WITH EXISTING FACILITIES DISCHARGE PROFILE

GENERAL LOCATION/DESCRIPTION	HEC-RAS CROSS SECTION	DISCHARGE (CFS)
GREELEY NO.3 DITCH	1382	4,673
C STREET	3015	4,596
HUNTER'S COVE POND B	4538	4,556
DOWNSTREAM OF 4TH STREET	6800	4,558
4TH STREET	7879	4,502
PUMPKIN RIDGE POND A1	9215	4,436
10TH STREET	11630	4,425
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UPSTREAM OF 83RD AVENUE	23389	3,491
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PEBBLE BROOK SUBDIVISION	26791	3,176
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IRRIGATION RESERVOIR NO. 1 OUTFLOW	34920	1,597
IRRIGATION RESERVOIR NO. 1 INFLOW	35430	1,638
UPSTREAM LIMIT OF STUDY	39744	872

LEGEND

- 91095 — HEC-RAS CROSS SECTION
- 4950 — BASE FLOOD ELEVATION
- 1-FOOT FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- 4658 — EXISTING/PROPOSED CONTOUR
- STREAM CENTERLINE

REVISIONS:
REV1
REV2
REV3
REV4
REV5
REV6

N

CONTOUR INTERVAL 2 FEET

1"=200'

0 50 100 200

PROJECT NUMBER:	COCOG05
ACAD FILE:	FP-FW WORKMAPS
DATE:	11/19/2004
DRAWN BY:	BLV/TAW
DESIGNED BY:	BLV
CHECKED BY:	GJK

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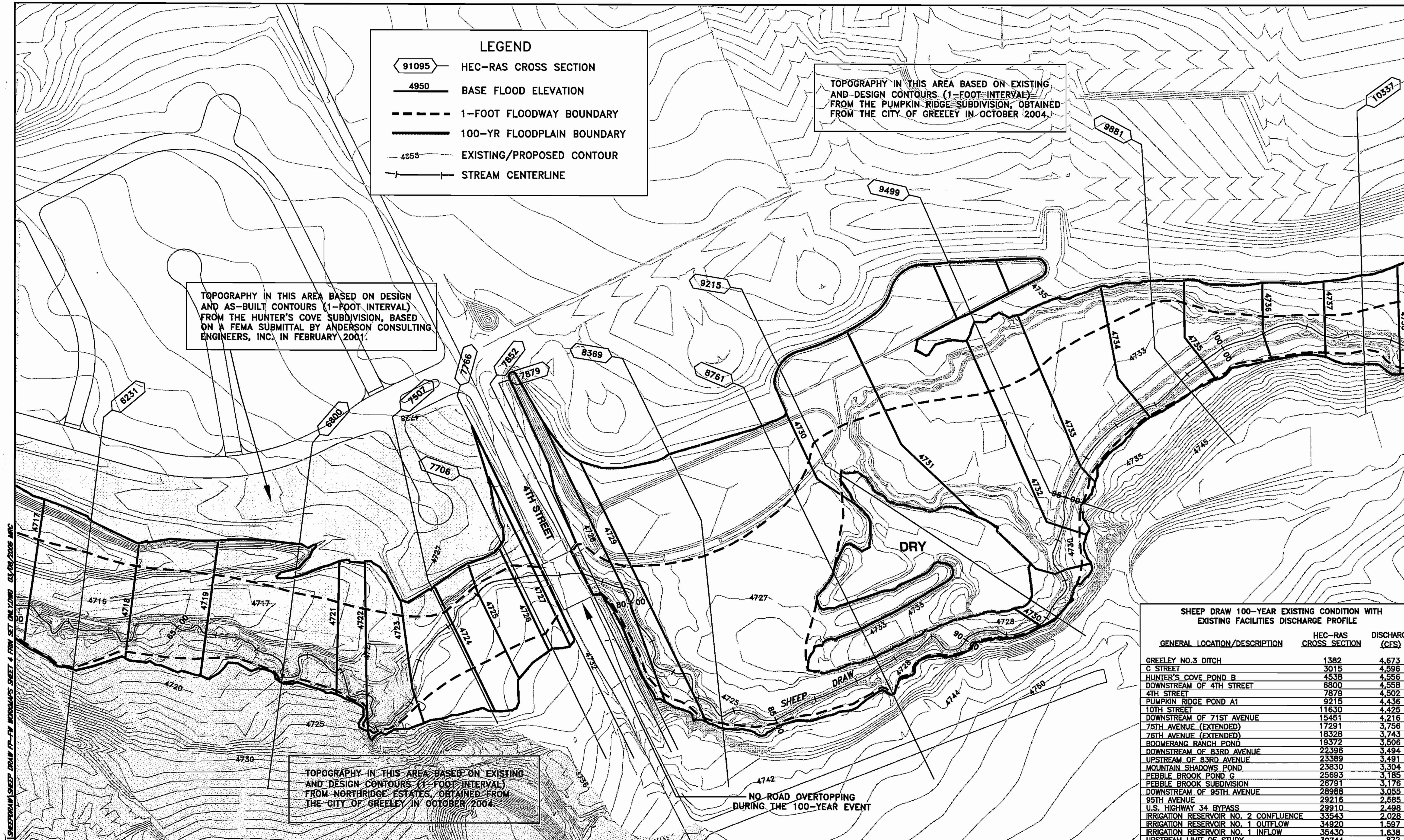
CITY OF GREELEY
COMPREHENSIVE DRAINAGE PLAN
SHEEP DRAW BASIN

100-YEAR FLOODPLAIN AND 1-FOOT FLOODWAY WORK MAP

SHEET 3



SHEEP DRAW 100-YEAR EXISTING CONDITION WITH EXISTING FACILITIES DISCHARGE PROFILE

GENERAL LOCATION/DESCRIPTION	HEC-RAS CROSS SECTION	DISCHARGE (CFS)
GREELEY NO.3 DITCH	1382	4,673
C STREET	3015	4,596
HUNTER'S COVE POND B	4538	4,556
DOWNSTREAM OF 4TH STREET	6800	4,558
4TH STREET	7879	4,502
PUMPKIN RIDGE POND A1	9215	4,436
10TH STREET	11630	4,425
DOWNSTREAM OF 71ST AVENUE	15451	4,216
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76TH AVENUE (EXTENDED)	18328	3,743
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UPSTREAM OF 83RD AVENUE	23389	3,491
MOUNTAIN SHADOWS POND	23830	3,304
PEBBLE BROOK POND G	25693	3,185
PEBBLE BROOK SUBDIVISION	26791	3,176
DOWNSTREAM OF 95TH AVENUE	28988	3,055
95TH AVENUE	29216	2,585
U.S. HIGHWAY 34 BYPASS	29910	2,498
IRRIGATION RESERVOIR NO. 2 CONFLUENCE	33543	2,028
IRRIGATION RESERVOIR NO. 1 OUTFLOW	34920	1,597
IRRIGATION RESERVOIR NO. 1 INFLOW	35430	1,638
UPSTREAM LIMIT OF STUDY	39744	872

REVISIONS: REV1 REV2 REV3 REV4 REV5 REV6

CONTOUR INTERVAL 2 FEET
1"=200'
0 50 100 200

PROJECT NUMBER: COCOGO5
ACAD FILE: FP-FW WORKMAPS
DATE: 11/19/2004
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CITY OF GREELEY
COMPREHENSIVE DRAINAGE PLAN
SHEEP DRAW BASIN

100-YEAR FLOODPLAIN AND 1-FOOT FLOODWAY WORK MAP

SHEET 4

P:\COCOGO5\ACAD\SHEEPDRAW\SHEEP DRAW FP-FW WORKMAPS SHEET 4 FRM SET ONLY.DWG 03/08/2005 MRC

TOPOGRAPHY IN THIS AREA BASED ON EXISTING AND DESIGN CONTOURS (1-FOOT INTERVAL) FROM THE PUMPKIN RIDGE SUBDIVISION, OBTAINED FROM THE CITY OF GREELEY IN OCTOBER 2004.

FARM ROAD CROSSING

10TH STREET

SHEEP DRAW

10TH STREET PEDESTRIAN FOOT-BRIDGE

NO ROAD OVERTOPPING DURING THE 100-YEAR EVENT

TOPOGRAPHY IN THIS AREA BASED ON EXISTING CONTOURS (1-FOOT INTERVAL) FROM PICKETT ENGINEERING FOR THE McCLOSKY FARM SITE, OBTAINED FROM DREXELL BARRELL IN FEBRUARY 2004.

LEGEND

- 91095 — HEC-RAS CROSS SECTION
- 4950 — BASE FLOOD ELEVATION
- 1-FOOT FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- 4658 — EXISTING/PROPOSED CONTOUR
- STREAM CENTERLINE

SHEEP DRAW 100-YEAR EXISTING CONDITION WITH EXISTING FACILITIES DISCHARGE PROFILE

GENERAL LOCATION/DESCRIPTION	HEC-RAS CROSS SECTION	DISCHARGE (CFS)
GREELEY NO.3 DITCH	1382	4,673
C STREET	3015	4,596
HUNTER'S COVE POND B	4538	4,556
DOWNSTREAM OF 4TH STREET	6800	4,558
4TH STREET	7879	4,502
PUMPKIN RIDGE POND A1	9215	4,436
10TH STREET	11630	4,425
DOWNSTREAM OF 71ST AVENUE	15451	4,216
75TH AVENUE (EXTENDED)	17291	3,756
76TH AVENUE (EXTENDED)	18328	3,743
BOOMERANG RANCH POND	19372	3,506
DOWNSTREAM OF 83RD AVENUE	22396	3,494
UPSTREAM OF 83RD AVENUE	23389	3,491
MOUNTAIN SHADOWS POND	23830	3,304
PEBBLE BROOK POND G	25693	3,185
PEBBLE BROOK SUBDIVISION	26791	3,176
DOWNSTREAM OF 95TH AVENUE	28988	3,055
95TH AVENUE	29216	2,585
U.S. HIGHWAY 34 BYPASS	29910	2,498
IRRIGATION RESERVOIR NO. 2 CONFLUENCE	33543	2,028
IRRIGATION RESERVOIR NO. 1 OUTFLOW	34920	1,597
IRRIGATION RESERVOIR NO. 1 INFLOW	35430	1,838
UPSTREAM LIMIT OF STUDY	39744	872

P:\COCOG05\ACAD\SHEEPDRAW\SHEEP DRAW FP-FW WORKMAPS.DWG 03/08/2005 MRC

REVISIONS:
REV1
REV2
REV3
REV4
REV5
REV6

N

CONTOUR INTERVAL 2 FEET

1"=200'

0 50 100 200

PROJECT NUMBER: COCOG05
ACAD FILE: FP-FW WORKMAPS
DATE: 11/19/2004
DRAWN BY: BLV/TAW
DESIGNED BY: BLV
CHECKED BY: GJK

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CITY OF GREELEY
COMPREHENSIVE DRAINAGE PLAN
SHEEP DRAW BASIN

100-YEAR FLOODPLAIN AND 1-FOOT FLOODWAY WORK MAP

SHEET 5

13853
14453
14852
15108
15451
15775
15825
15868
16283
16788
4754
4753
4755
4756
4757
4758
4759
4760
4761
4762
4763
4764
4765
4766
4768
4770
4772
4775
1400.00
1357.00
1600.00
1850.00
SHEEP DRAW

ROAD OVERTOPPING DURING THE 100-YEAR EVENT

71ST AVENUE

TOPOGRAPHY IN THIS AREA BASED ON EXISTING CONTOURS (1-FOOT INTERVAL) FROM PICKETT ENGINEERING FOR THE McCLOSKY FARM SITE, OBTAINED FROM DREXELL BARRELL IN FEBRUARY 2004.

SHEEP DRAW 100-YEAR EXISTING CONDITION WITH EXISTING FACILITIES DISCHARGE PROFILE

GENERAL LOCATION/DESCRIPTION	HEC-RAS CROSS SECTION	DISCHARGE (CFS)
GREELEY NO.3 DITCH	1382	4,673
C STREET	3015	4,596
HUNTER'S COVE POND B	4538	4,556
DOWNSTREAM OF 4TH STREET	6800	4,558
4TH STREET	7879	4,502
PUMPKIN RIDGE POND A1	9215	4,436
10TH STREET	11630	4,425
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75TH AVENUE (EXTENDED)	17291	3,756
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BOOMERANG RANCH POND	19372	3,506
DOWNSTREAM OF 83RD AVENUE	22396	3,494
UPSTREAM OF 83RD AVENUE	23389	3,491
MOUNTAIN SHADOWS POND	23830	3,304
PEBBLE BROOK POND G	25693	3,185
PEBBLE BROOK SUBDIVISION	26791	3,176
DOWNSTREAM OF 95TH AVENUE	28988	3,055
95TH AVENUE	29216	2,585
U.S. HIGHWAY 34 BYPASS	29910	2,498
IRRIGATION RESERVOIR NO. 2 CONFLUENCE	33543	2,028
IRRIGATION RESERVOIR NO. 1 OUTFLOW	34920	1,597
IRRIGATION RESERVOIR NO. 1 INFLOW	35430	1,638
UPSTREAM LIMIT OF STUDY	39744	872

LEGEND

- 91095 — HEC-RAS CROSS SECTION
- 4950 — BASE FLOOD ELEVATION
- 1-FOOT FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- 4658 — EXISTING/PROPOSED CONTOUR
- STREAM CENTERLINE

P:\COCOG05\ACAD\SHEEPDRAW\SHEEP DRAW FP-FW WORKMAPS.DWG 05/08/2006 MRC

REVISIONS:
REV1
REV2
REV3
REV4
REV5
REV6

CONTOUR INTERVAL 2 FEET
1"=200'
0 50 100 200

PROJECT NUMBER: COCOG05
ACAD FILE: FP-FW WORKMAPS
DATE: 11/19/2004
DRAWN BY: BLV/TAW
DESIGNED BY: BLV
CHECKED BY: GJK

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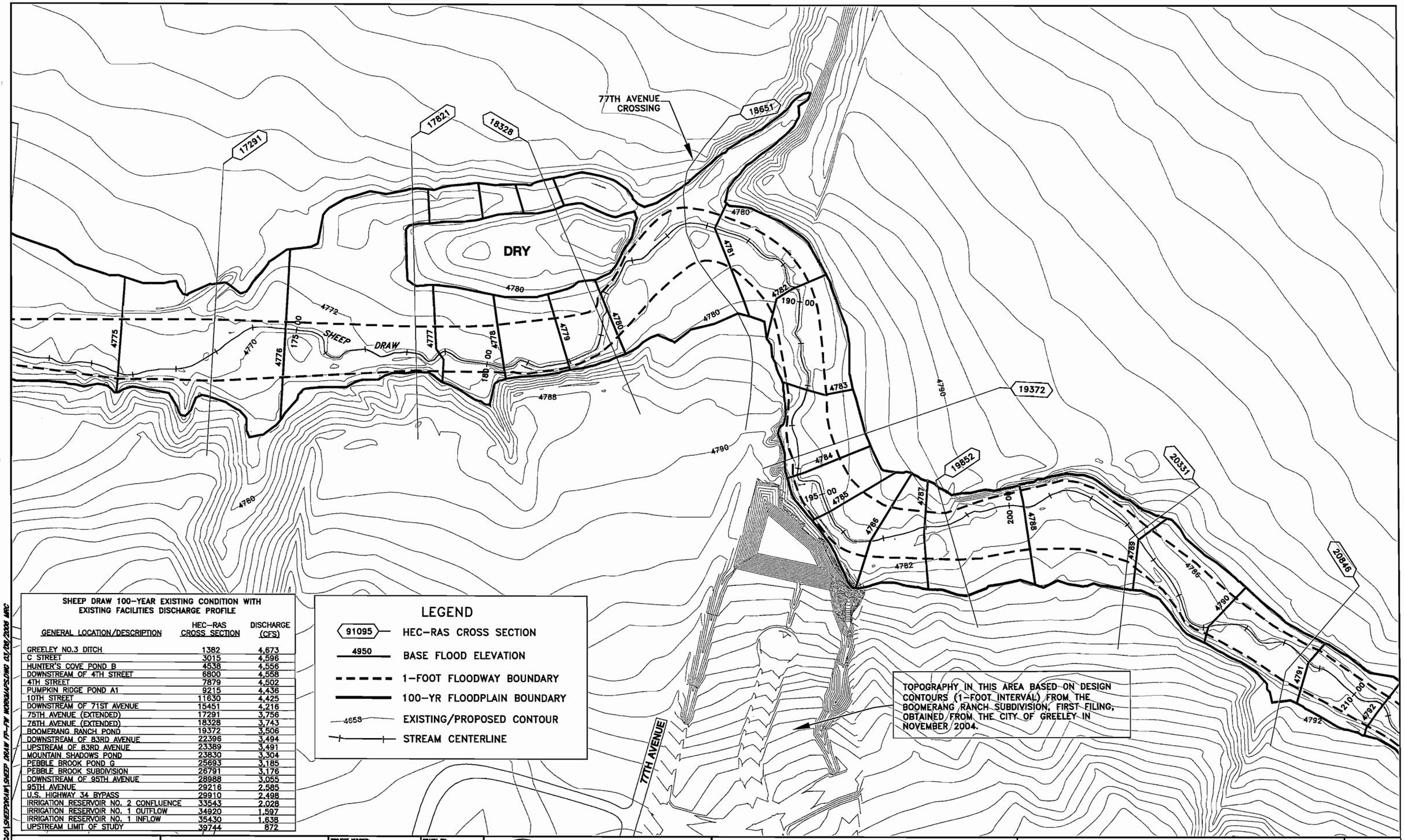
CITY OF GREELEY
COMPREHENSIVE DRAINAGE PLAN
SHEEP DRAW BASIN

100-YEAR FLOODPLAIN AND 1-FOOT FLOODWAY WORK MAP

SHEET 6



SHEEP DRAW 100-YEAR EXISTING CONDITION WITH EXISTING FACILITIES DISCHARGE PROFILE		
GENERAL LOCATION/DESCRIPTION	HEC-RAS CROSS SECTION	DISCHARGE (CFS)
GREELEY NO.3 DITCH	1382	4,673
C STREET	3015	4,596
HUNTER'S COVE POND B	4538	4,556
DOWNSTREAM OF 4TH STREET	6800	4,558
4TH STREET	7879	4,502
PUMPKIN RIDGE POND A1	9215	4,436
10TH STREET	11630	4,425
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75TH AVENUE (EXTENDED)	17291	3,756
76TH AVENUE (EXTENDED)	18328	3,743
BOOMERANG RANCH POND	19372	3,506
DOWNSTREAM OF 83RD AVENUE	22396	3,494
UPSTREAM OF 83RD AVENUE	23389	3,491
MOUNTAIN SHADOWS POND	23830	3,304
PEBBLE BROOK POND G	25693	3,185
PEBBLE BROOK SUBDIVISION	26791	3,176
DOWNSTREAM OF 95TH AVENUE	28988	3,055
95TH AVENUE	29216	2,585
U.S. HIGHWAY 34 BYPASS	29910	2,498
IRRIGATION RESERVOIR NO. 2 CONFLUENCE	33543	2,028
IRRIGATION RESERVOIR NO. 1 OUTFLOW	34920	1,597
IRRIGATION RESERVOIR NO. 1 INFLOW	35430	1,638
UPSTREAM LIMIT OF STUDY	39744	872

LEGEND

- 91095 — HEC-RAS CROSS SECTION
- 4950 — BASE FLOOD ELEVATION
- 1-FOOT FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- 4658 — EXISTING/PROPOSED CONTOUR
- STREAM CENTERLINE

TOPOGRAPHY IN THIS AREA BASED ON DESIGN CONTOURS (1-FOOT INTERVAL) FROM THE BOOMERANG RANCH SUBDIVISION, FIRST FILING, OBTAINED FROM THE CITY OF GREELEY IN NOVEMBER 2004.

P:\20000\GIS\SHEEP\MAPS\SHEEP DRW FP-FW WORKMAPS 02/06/2006 JNC

REVISIONS:
REV1
REV2
REV3
REV4
REV5
REV6

CONTOUR INTERVAL 2 FEET

1"=200'

0 50 100 200

PROJECT NUMBER: COCOG05	DRAWN BY: BLV/TAW
ACAD FILE: FP-FW WORKMAPS	DESIGNED BY: BLV
DATE: 11/19/2004	CHECKED BY: GJK

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CITY OF GREELEY
COMPREHENSIVE DRAINAGE PLAN
SHEEP DRAW BASIN

100-YEAR FLOODPLAIN AND 1-FOOT FLOODWAY WORK MAP

SHEET 7

TOPOGRAPHY IN THIS AREA BASED ON EXISTING AND DESIGN CONTOURS (1-FOOT INTERVAL) FOR THE MOUNTAIN SHADOWS SUBDIVISION, OBTAINED FROM THE CITY OF GREELEY IN OCTOBER 2004.

NO ROAD OVERTOPPING DURING THE 100-YEAR EVENT

83RD AVENUE

SHEEP DRAW

SHEEP DRAW 100-YEAR EXISTING CONDITION WITH EXISTING FACILITIES DISCHARGE PROFILE

GENERAL LOCATION/DESCRIPTION	HEC-RAS CROSS SECTION	DISCHARGE (CFS)
GREELEY NO.3 DITCH	1382	4,673
C STREET	3015	4,596
HUNTER'S COVE POND B	4538	4,556
DOWNSTREAM OF 4TH STREET	6800	4,558
4TH STREET	7879	4,502
PUMPKIN RIDGE POND A1	9215	4,436
10TH STREET	11630	4,425
DOWNSTREAM OF 71ST AVENUE	15451	4,216
75TH AVENUE (EXTENDED)	17291	3,756
76TH AVENUE (EXTENDED)	18328	3,743
BOOMERANG RANCH POND	19372	3,506
DOWNSTREAM OF 83RD AVENUE	22396	3,494
UPSTREAM OF 83RD AVENUE	23389	3,491
MOUNTAIN SHADOWS POND	23830	3,304
PEBBLE BROOK POND G	25693	3,185
PEBBLE BROOK SUBDIVISION	26791	3,176
DOWNSTREAM OF 95TH AVENUE	28988	3,055
95TH AVENUE	29216	2,585
U.S. HIGHWAY 34 BYPASS	29910	2,498
IRRIGATION RESERVOIR NO. 2 CONFLUENCE	33543	2,028
IRRIGATION RESERVOIR NO. 1 OUTFLOW	34920	1,597
IRRIGATION RESERVOIR NO. 1 INFLOW	35430	1,638
UPSTREAM LIMIT OF STUDY	39744	872

LEGEND

- 91095 — HEC-RAS CROSS SECTION
- 4950 — BASE FLOOD ELEVATION
- 1-FOOT FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- 4658 — EXISTING/PROPOSED CONTOUR
- STREAM CENTERLINE

REVISIONS:
REV1
REV2
REV3
REV4
REV5
REV6

CONTOUR INTERVAL 2 FEET
1"=200'
0 50 100 200

PROJECT NUMBER: COCOG05
ACAD FILE: FP-FW WORKMAPS
DATE: 11/19/2004
DRAWN BY: BLV/TAW
DESIGNED BY: BLV
CHECKED BY: GJK

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Phone (970) 226-0120 / Fax (970) 226-0121

CITY OF GREELEY
COMPREHENSIVE DRAINAGE PLAN
SHEEP DRAW BASIN

100-YEAR FLOODPLAIN AND 1-FOOT FLOODWAY WORK MAP

SHEET 8

SHEEP DRAW 100-YEAR EXISTING CONDITION WITH EXISTING FACILITIES DISCHARGE PROFILE

GENERAL LOCATION/DESCRIPTION	HEC-RAS CROSS SECTION	DISCHARGE (CFS)
GREELEY NO.3 DITCH	1382	4,673
C STREET	3015	4,596
HUNTER'S COVE POND B	4538	4,556
DOWNSTREAM OF 4TH STREET	6800	4,558
4TH STREET	7879	4,502
PUMPKIN RIDGE POND A1	9215	4,436
10TH STREET	11630	4,425
DOWNSTREAM OF 71ST AVENUE	15451	4,216
75TH AVENUE (EXTENDED)	17291	3,756
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BOOMERANG RANCH POND	19372	3,506
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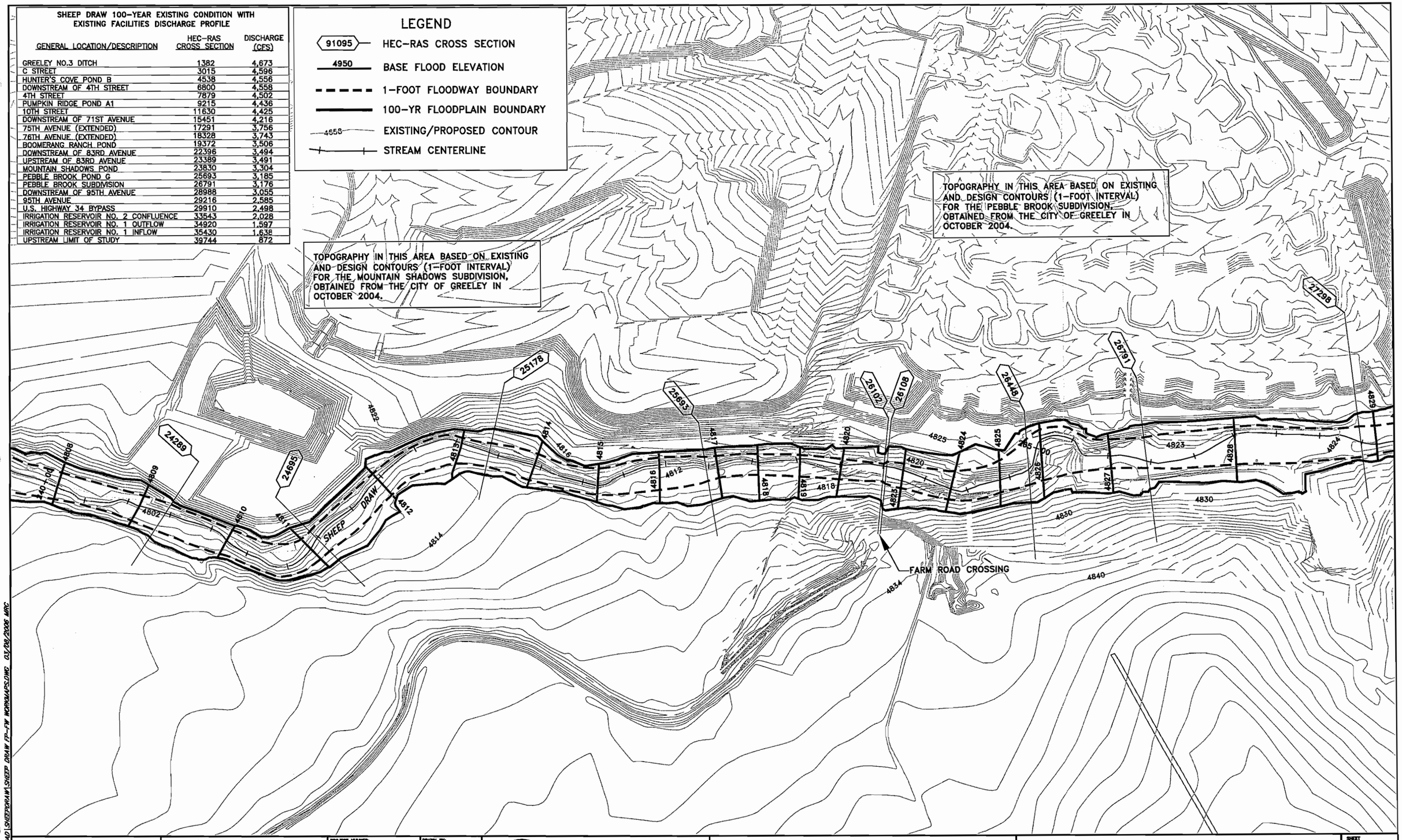
PEBBLE BROOK SUBDIVISION	26791	3,176
DOWNSTREAM OF 95TH AVENUE	28988	3,055
95TH AVENUE	29216	2,585
U.S. HIGHWAY 34 BYPASS	29910	2,498
IRRIGATION RESERVOIR NO. 2 CONFLUENCE	33543	2,028
IRRIGATION RESERVOIR NO. 1 OUTFLOW	34920	1,597
IRRIGATION RESERVOIR NO. 1 INFLOW	35430	1,638
UPSTREAM LIMIT OF STUDY	39744	872

LEGEND

- 91095 — HEC-RAS CROSS SECTION
- 4950 — BASE FLOOD ELEVATION
- 1-FOOT FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- 4658 — EXISTING/PROPOSED CONTOUR
- STREAM CENTERLINE

TOPOGRAPHY IN THIS AREA BASED ON EXISTING AND DESIGN CONTOURS (1-FOOT INTERVAL) FOR THE MOUNTAIN SHADOWS SUBDIVISION, OBTAINED FROM THE CITY OF GREELEY IN OCTOBER 2004.

TOPOGRAPHY IN THIS AREA BASED ON EXISTING AND DESIGN CONTOURS (1-FOOT INTERVAL) FOR THE PEBBLE BROOK SUBDIVISION, OBTAINED FROM THE CITY OF GREELEY IN OCTOBER 2004.



P:\COCO005\ACAD\SHEEPDRAW\SHEEP DRAW FP-FW WORKMAPS.DWG 03/08/2006 MRC

REVISIONS:
REV1
REV2
REV3
REV4
REV5
REV6

CONTOUR INTERVAL 2 FEET

1"=200'

0 50 100 200

PROJECT NUMBER: COCO005	DRAWN BY: BLV/TAW
ACAD FILE: FP-FW WORKMAPS	DESIGNED BY: BLV
DATE: 11/19/2004	CHECKED BY: GJK

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CITY OF GREELEY
COMPREHENSIVE DRAINAGE PLAN
SHEEP DRAW BASIN

100-YEAR FLOODPLAIN AND 1-FOOT FLOODWAY WORK MAP

SHEET 9

TOPOGRAPHY IN THIS AREA BASED ON EXISTING AND DESIGN CONTOURS (1-FOOT INTERVAL) FOR THE PEBBLE BROOK SUBDIVISION, OBTAINED FROM THE CITY OF GREELEY IN OCTOBER 2004.

TOPOGRAPHY IN THIS AREA BASED ON EXISTING AND DESIGN CONTOURS (0.2-METER INTERVAL) FOR 95TH AVENUE AND THE U.S. HIGHWAY 34 BYPASS, OBTAINED FROM FHU, INC. IN SEPTEMBER 2004.

U.S. HIGHWAY 34 BYPASS

95TH AVENUE

ROAD OVERTOPPING DURING THE 100-YEAR EVENT

SHALLOW FLOODING (≤2 FT.)

ROAD OVERTOPPING DURING THE 100-YEAR EVENT

SHEEP DRAW

28686 28309 27795 27298 28988 29147 29216 30537

4862 4851.5 4848 4846 4844 4842 4840 4839 4838 4837 4836 4835 4834 4833 4832 4831 4830 4829 4826 4824 4850

300.00 305.00 290.00 280.00 275.00

86TH AVENUE

LEGEND

- 91095 — HEC-RAS CROSS SECTION
- 4950 — BASE FLOOD ELEVATION
- 1-FOOT FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- 4658 — EXISTING/PROPOSED CONTOUR
- STREAM CENTERLINE

SHEEP DRAW 100-YEAR EXISTING CONDITION WITH EXISTING FACILITIES DISCHARGE PROFILE

GENERAL LOCATION/DESCRIPTION	HEC-RAS CROSS SECTION	DISCHARGE (CFS)
GREELEY NO.3 DITCH	1382	4,673
C STREET	3015	4,596
HUNTER'S COVE POND B	4538	4,556
DOWNSTREAM OF 4TH STREET	6800	4,558
4TH STREET	7879	4,502
PUMPKIN RIDGE POND A1	9215	4,436
10TH STREET	11630	4,425
DOWNSTREAM OF 71ST AVENUE	15451	4,216
75TH AVENUE (EXTENDED)	17291	3,756
76TH AVENUE (EXTENDED)	18328	3,743
BOOMERANG RANCH POND	19372	3,506
DOWNSTREAM OF 83RD AVENUE	22396	3,494
UPSTREAM OF 83RD AVENUE	23389	3,491
MOUNTAIN SHADOWS POND	23830	3,304
PEBBLE BROOK POND G	25693	3,185
PEBBLE BROOK SUBDIVISION	26791	3,176
DOWNSTREAM OF 95TH AVENUE	28988	3,055
95TH AVENUE	29216	2,585
U.S. HIGHWAY 34 BYPASS	29910	2,498
IRRIGATION RESERVOIR NO. 2 CONFLUENCE	33543	2,028
IRRIGATION RESERVOIR NO. 1 OUTFLOW	34920	1,597
IRRIGATION RESERVOIR NO. 1 INFLOW	35430	1,638
UPSTREAM LIMIT OF STUDY	39744	872

P:\COCO605\ACAD\SHEEP DRAW\SHEEP DRAW FP-FW WORKMAPS.DWG 03/09/2006 MRC

REVISIONS:
REV1
REV2
REV3
REV4
REV5
REV6

CONTOUR INTERVAL 2 FEET

1"=200'

0 50 100 200

PROJECT NUMBER: COCOG05	DRAWN BY: BLV/TAW
ACAD FILE: FP-FW WORKMAPS	DESIGNED BY: BLV
DATE: 11/19/2004	CHECKED BY: GJK

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CITY OF GREELEY
COMPREHENSIVE DRAINAGE PLAN
SHEEP DRAW BASIN

100-YEAR FLOODPLAIN AND 1-FOOT FLOODWAY WORK MAP

SHEET 10

TOPOGRAPHY IN THIS AREA BASED ON EXISTING AND DESIGN CONTOURS (0.2-METER INTERVAL) FOR 95TH AVENUE AND THE U.S. HIGHWAY 34 BYPASS, OBTAINED FROM FHU, INC. IN SEPTEMBER 2004.

U.S. HIGHWAY 34 BYPASS

95TH AVENUE

ROAD OVERTOPPING DURING THE 100-YEAR EVENT

SHALLOW FLOODING (≤2 FT.)

FARM ROAD CROSSING

ROAD OVERTOPPING DURING THE 100-YEAR EVENT

SHEEP DRAW

28686 28309 28988 29141 29216 30537 30658 30674 31097 29910 29682

4840 4842 4844 4846 4848 4850 4851.3 4852 4854 4855 4856 4856.5 4857 4859.8 4860 4862 4862.4 4864.4 4865

300-YR 290-YR 280-YR

LEGEND

- 91095 — HEC-RAS CROSS SECTION
- 4950 — BASE FLOOD ELEVATION
- 1-FOOT FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- 4558 — EXISTING/PROPOSED CONTOUR
- STREAM CENTERLINE

SHEEP DRAW 100-YEAR EXISTING CONDITION WITH EXISTING FACILITIES DISCHARGE PROFILE

GENERAL LOCATION/DESCRIPTION	HEC-RAS CROSS SECTION	DISCHARGE (CFS)
GREELEY NO.3 DITCH	1382	4,673
C STREET	3015	4,596
HUNTER'S COVE POND B	4538	4,556
DOWNSTREAM OF 4TH STREET	6800	4,558
4TH STREET	7879	4,502
PUMPKIN RIDGE POND A1	9215	4,436
10TH STREET	11630	4,425
DOWNSTREAM OF 71ST AVENUE	15451	4,216
75TH AVENUE (EXTENDED)	17291	3,756
76TH AVENUE (EXTENDED)	18328	3,743
BOOMERANG RANCH POND	19372	3,506
DOWNSTREAM OF 83RD AVENUE	22396	3,494
UPSTREAM OF 83RD AVENUE	23389	3,491
MOUNTAIN SHADOWS POND	23830	3,304
PEBBLE BROOK POND G	25693	3,185
PEBBLE BROOK SUBDIVISION	26791	3,176
DOWNSTREAM OF 95TH AVENUE	28988	3,055
95TH AVENUE	29216	2,585
U.S. HIGHWAY 34 BYPASS	29910	2,498
IRRIGATION RESERVOIR NO. 2 CONFLUENCE	33543	2,028
IRRIGATION RESERVOIR NO. 1 OUTFLOW	34920	1,597
IRRIGATION RESERVOIR NO. 1 INFLOW	35430	1,638
UPSTREAM LIMIT OF STUDY	39744	872

REVISIONS:
REV1
REV2
REV3
REV4
REV5
REV6

CONTOUR INTERVAL 2 FEET
1"=200'
0 50 100 200

PROJECT NUMBER: COCOG05
ACAD FILE: FP-FW WORKMAPS
DATE: 11/19/2004
DRAWN BY: BLV/TAW
DESIGNED BY: BLV
CHECKED BY: GJK

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Phone (970) 226-0120 / Fax (970) 226-0121

CITY OF GREELEY
COMPREHENSIVE DRAINAGE PLAN
SHEEP DRAW BASIN

100-YEAR FLOODPLAIN AND 1-FOOT FLOODWAY WORK MAP

SHEET 11

P:\COCOG05\ACAD\SHEEPDRAW\SHEEP DRAW FP-FW WORKMAPS.DWG 03/08/2006 MRG

SHEEP DRAW 100-YEAR EXISTING CONDITION WITH EXISTING FACILITIES DISCHARGE PROFILE

GENERAL LOCATION/DESCRIPTION	HEC-RAS CROSS SECTION	DISCHARGE (CFS)
GREELEY NO.3 DITCH	1382	4,673
C STREET	3015	4,596
HUNTER'S COVE POND B	4538	4,556
DOWNSTREAM OF 4TH STREET	6800	4,558
4TH STREET	7879	4,502
PUMPKIN RIDGE POND A1	9215	4,436
10TH STREET	11630	4,425
DOWNSTREAM OF 71ST AVENUE	15451	4,216
75TH AVENUE (EXTENDED)	17291	3,756
76TH AVENUE (EXTENDED)	18328	3,743
BOOMERANG RANCH POND	19372	3,506
DOWNSTREAM OF 83RD AVENUE	22396	3,494
UPSTREAM OF 83RD AVENUE	23389	3,491
MOUNTAIN SHADOWS POND	23830	3,304
PEBBLE BROOK POND G	25693	3,185
PEBBLE BROOK SUBDIVISION	26791	3,176
DOWNSTREAM OF 95TH AVENUE	28988	3,055
95TH AVENUE	29216	2,585
U.S. HIGHWAY 34 BYPASS	29910	2,498
IRRIGATION RESERVOIR NO. 2 CONFLUENCE	33543	2,028
IRRIGATION RESERVOIR NO. 1 OUTFLOW	34920	1,597
IRRIGATION RESERVOIR NO. 1 INFLOW	35430	1,638
UPSTREAM LIMIT OF STUDY	39744	872

LEGEND

- 91095 — HEC-RAS CROSS SECTION
- 4950 — BASE FLOOD ELEVATION
- 1-FOOT FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- 4853 — EXISTING/PROPOSED CONTOUR
- STREAM CENTERLINE

FARM ROAD CROSSING

FARM ROAD CROSSING

FARM ROAD CROSSING

SHEEP DRAW

US HIGHWAY 34 BYPASS

TOPOGRAPHY IN THIS AREA BASED ON EXISTING AND DESIGN CONTOURS (0.2-METER INTERVAL) FOR 95TH AVENUE AND THE U.S. HIGHWAY 34 BYPASS, OBTAINED FROM FHU, INC. IN SEPTEMBER 2004.

P:\COCOG05\ACAD\SHEEPDRAW\SHEEP DRAW FP-FW WORKMAPS.DWG 03/08/2006 MRC

REVISIONS:
REV1
REV2
REV3
REV4
REV5
REV6

CONTOUR INTERVAL 2 FEET

1"=200'

0 50 100 200

PROJECT NUMBER: COCOG05
ACAD FILE: FP-FW WORKMAPS
DATE: 11/19/2004
DRAWN BY: BLV/TAW
DESIGNED BY: BLV
CHECKED BY: GJK

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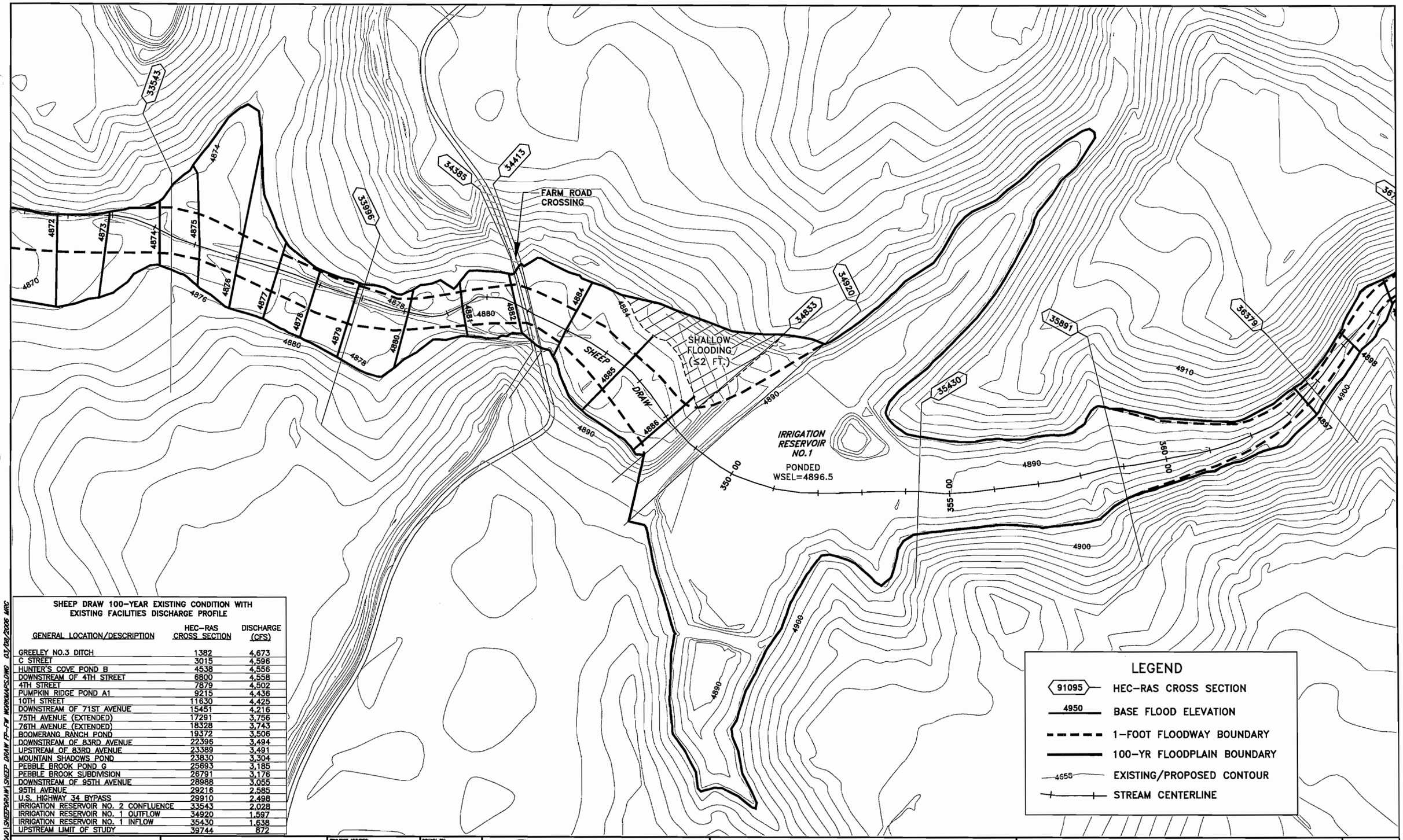
CITY OF GREELEY
COMPREHENSIVE DRAINAGE PLAN
SHEEP DRAW BASIN

100-YEAR FLOODPLAIN AND 1-FOOT FLOODWAY WORK MAP

SHEET 12



SHEEP DRAW 100-YEAR EXISTING CONDITION WITH EXISTING FACILITIES DISCHARGE PROFILE

GENERAL LOCATION/DESCRIPTION	HEC-RAS CROSS SECTION	DISCHARGE (CFS)
GREELEY NO.3 DITCH	1382	4,673
C STREET	3015	4,596
HUNTER'S COVE POND B	4538	4,556
DOWNSTREAM OF 4TH STREET	6800	4,558
4TH STREET	7879	4,502
PUMPKIN RIDGE POND A1	9215	4,436
10TH STREET	11630	4,425
DOWNSTREAM OF 71ST AVENUE	15451	4,216
75TH AVENUE (EXTENDED)	17291	3,756
76TH AVENUE (EXTENDED)	18328	3,743
BOOMERANG RANCH POND	19372	3,506
DOWNSTREAM OF 83RD AVENUE	22396	3,494
UPSTREAM OF 83RD AVENUE	23389	3,491
MOUNTAIN SHADOWS POND	23830	3,304
PEBBLE BROOK POND G	25693	3,185
PEBBLE BROOK SUBDIVISION	26791	3,176
DOWNSTREAM OF 95TH AVENUE	28988	3,055
95TH AVENUE	29216	2,585
U.S. HIGHWAY 34 BYPASS	29910	2,498
IRRIGATION RESERVOIR NO. 2 CONFLUENCE	33543	2,028
IRRIGATION RESERVOIR NO. 1 OUTFLOW	34920	1,597
IRRIGATION RESERVOIR NO. 1 INFLOW	35430	1,638
UPSTREAM LIMIT OF STUDY	39744	872

P:\COCO605\ACAD\SHEEPDRAW\SHEEP DRAW FP-FW WORKMAPS.DWG 03/08/2006 MRC

REVISIONS:
REV1
REV2
REV3
REV4
REV5
REV6

CONTOUR INTERVAL 2 FEET
1"=200'
0 50 100 200

PROJECT NUMBER: COCO605
ACAD FILE: FP-FW WORKMAPS
DATE: 11/19/2004
DRAWN BY: BLV/TAW
DESIGNED BY: BLV
CHECKED BY: GJK

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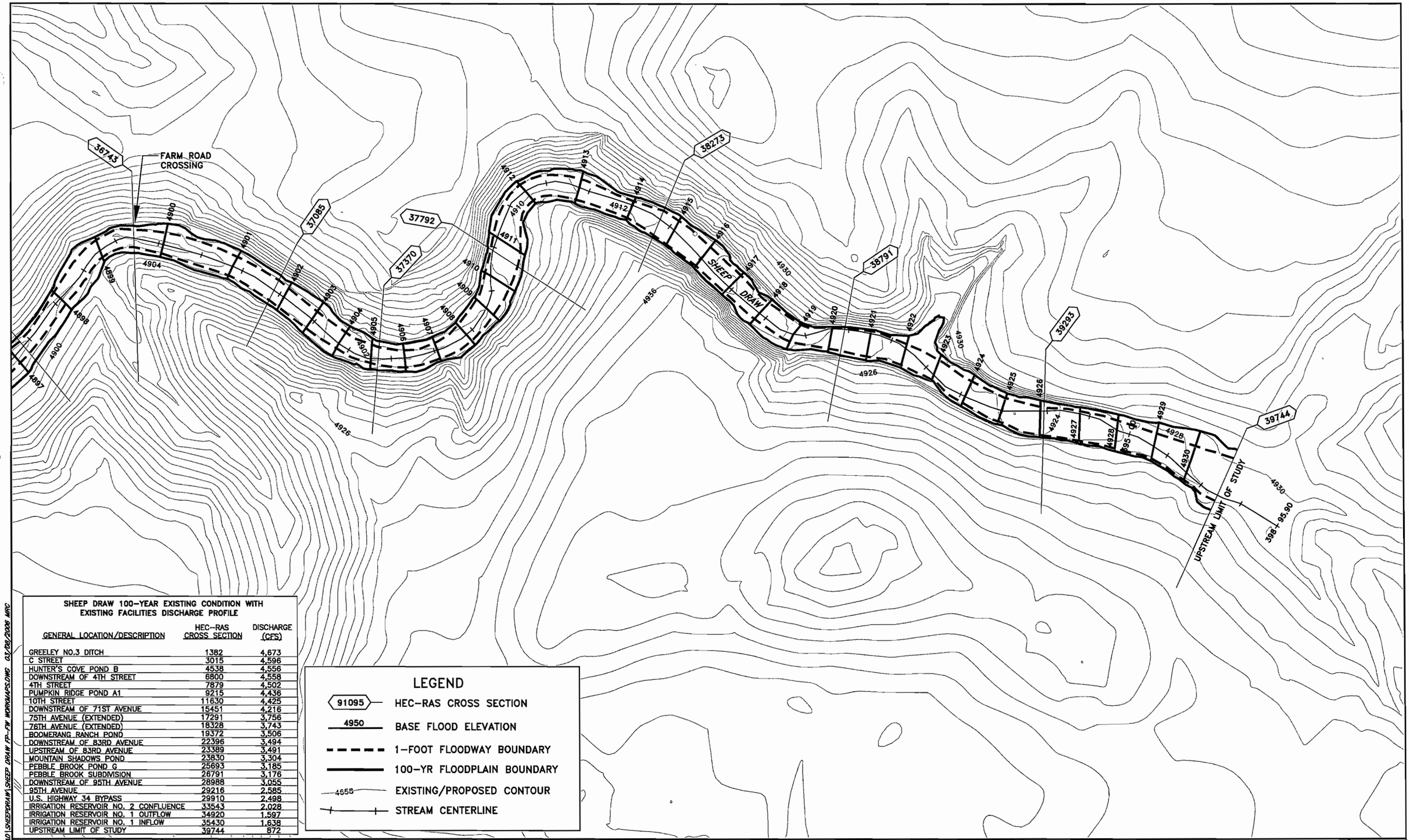
CITY OF GREELEY
COMPREHENSIVE DRAINAGE PLAN
SHEEP DRAW BASIN

100-YEAR FLOODPLAIN AND 1-FOOT FLOODWAY WORK MAP

SHEET 13



SHEEP DRAW 100-YEAR EXISTING CONDITION WITH EXISTING FACILITIES DISCHARGE PROFILE

GENERAL LOCATION/DESCRIPTION	HEC-RAS CROSS SECTION	DISCHARGE (CFS)
GREELEY NO.3 DITCH	1382	4,673
C STREET	3015	4,596
HUNTER'S COVE POND B	4538	4,556
DOWNSTREAM OF 4TH STREET	6800	4,558
4TH STREET	7879	4,502
PUMPKIN RIDGE POND A1	9215	4,436
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IRRIGATION RESERVOIR NO. 1 OUTFLOW	34920	1,597
IRRIGATION RESERVOIR NO. 1 INFLOW	35430	1,638
UPSTREAM LIMIT OF STUDY	39744	872

LEGEND

- 91095 — HEC-RAS CROSS SECTION
- 4950 — BASE FLOOD ELEVATION
- 1-FOOT FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- 4658 — EXISTING/PROPOSED CONTOUR
- STREAM CENTERLINE

P:\COCOG05\ACAD\SHEEPDRAW\SHEEP DRAW FP-FW WORKMAPS.DWG 03/08/2006 MRC

REVISIONS:
REV1
REV2
REV3
REV4
REV5
REV6

CONTOUR INTERVAL 2 FEET

1"=200'

0 50 100 200

PROJECT NUMBER: COCOG05	DRAWN BY: BLV/TAW
ACAD FILE: FP-FW WORKMAPS	DESIGNED BY: BLV
DATE: 11/19/2004	CHECKED BY: GJK

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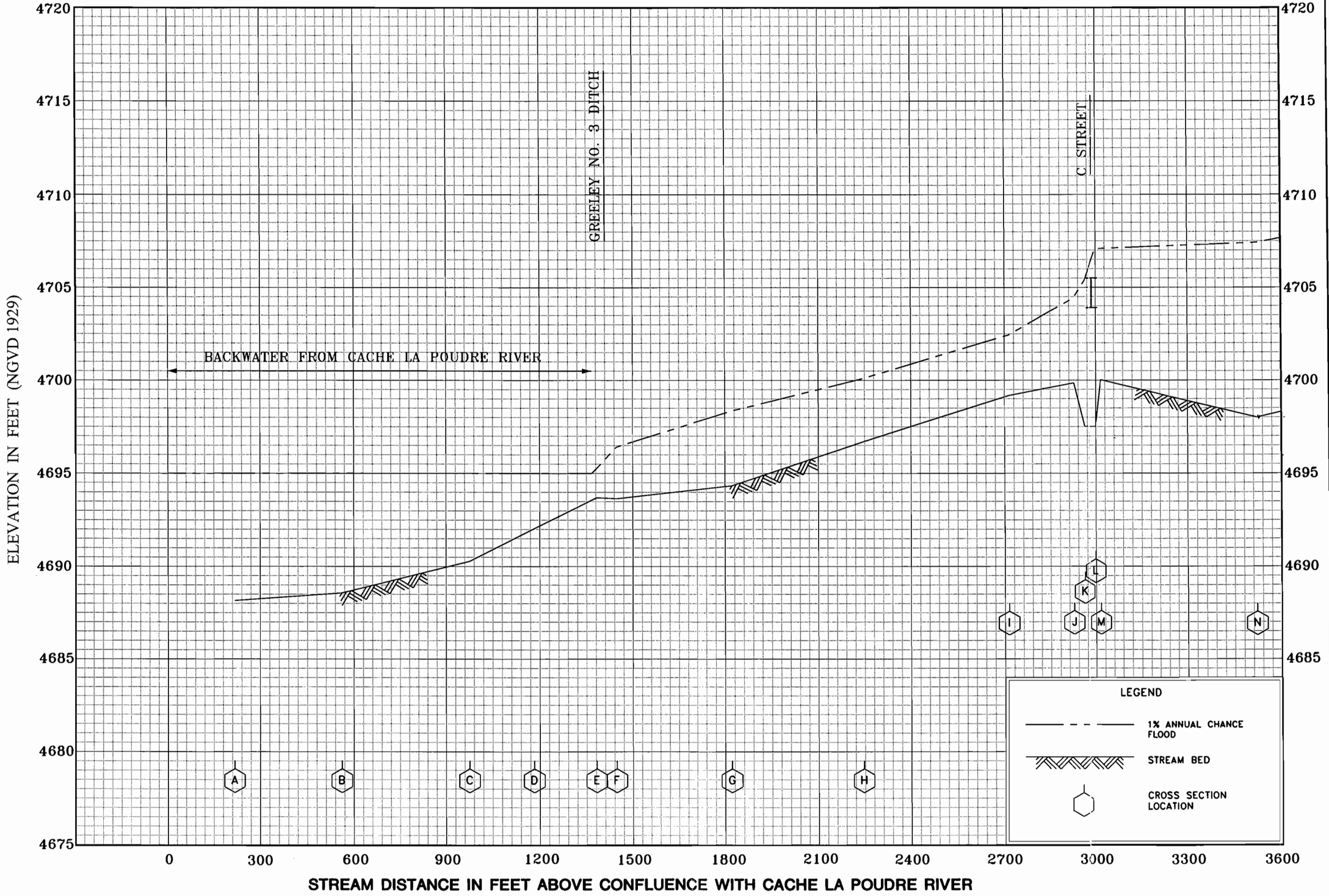
Phone (970) 226-0120 / Fax (970) 226-0121

CITY OF GREELEY
COMPREHENSIVE DRAINAGE PLAN
SHEEP DRAW BASIN

100-YEAR FLOODPLAIN AND 1-FOOT FLOODWAY WORK MAP

SHEET 14



FLOOD PROFILES

SHEEP DRAW

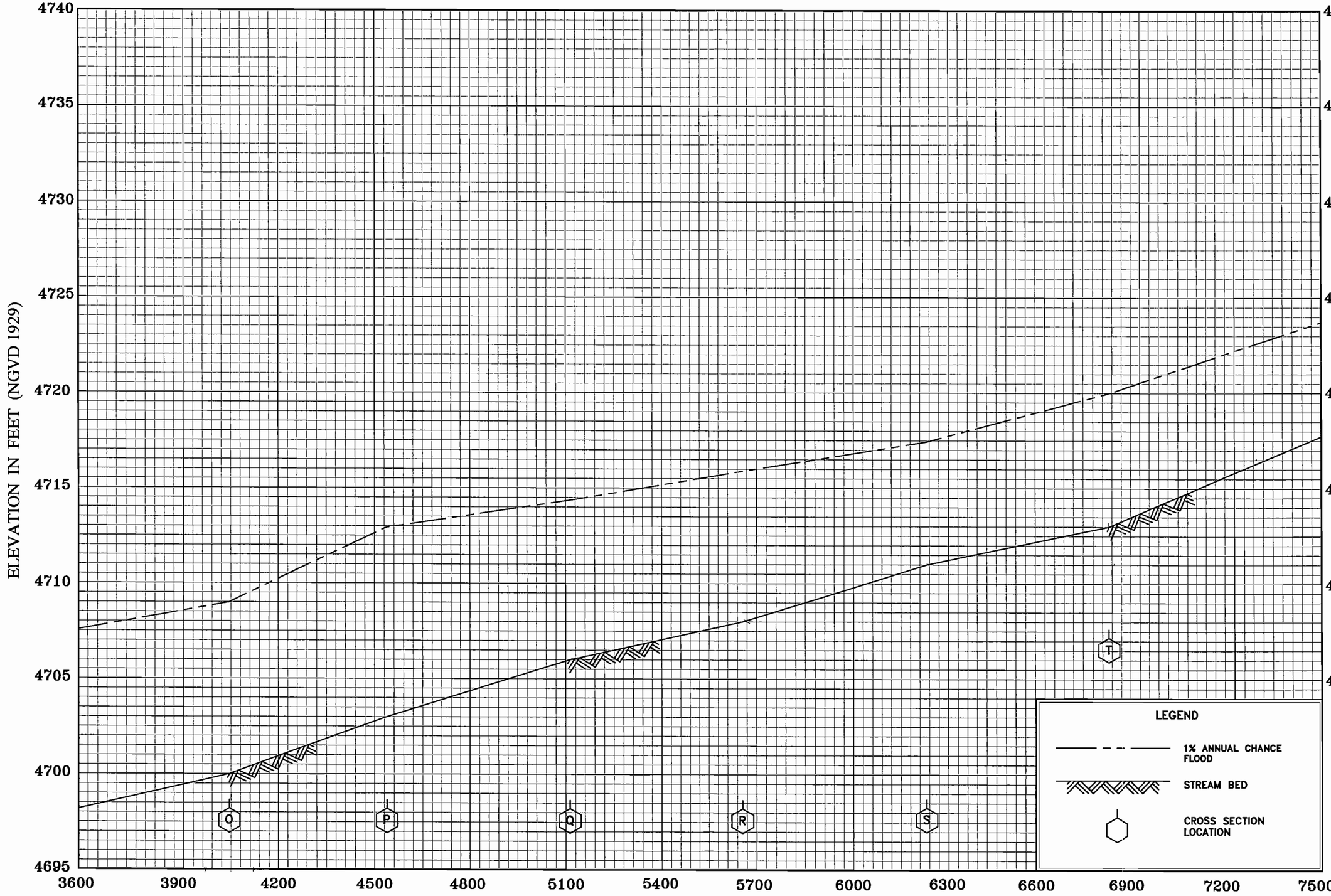
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREELEY, CO

(WELD COUNTY)

F-1

P:\020305\FIS PLOTS\SHEEP DRAW FIS PLOTS.DWG 12/16/2004



FLOOD PROFILES

SHEEP DRAW

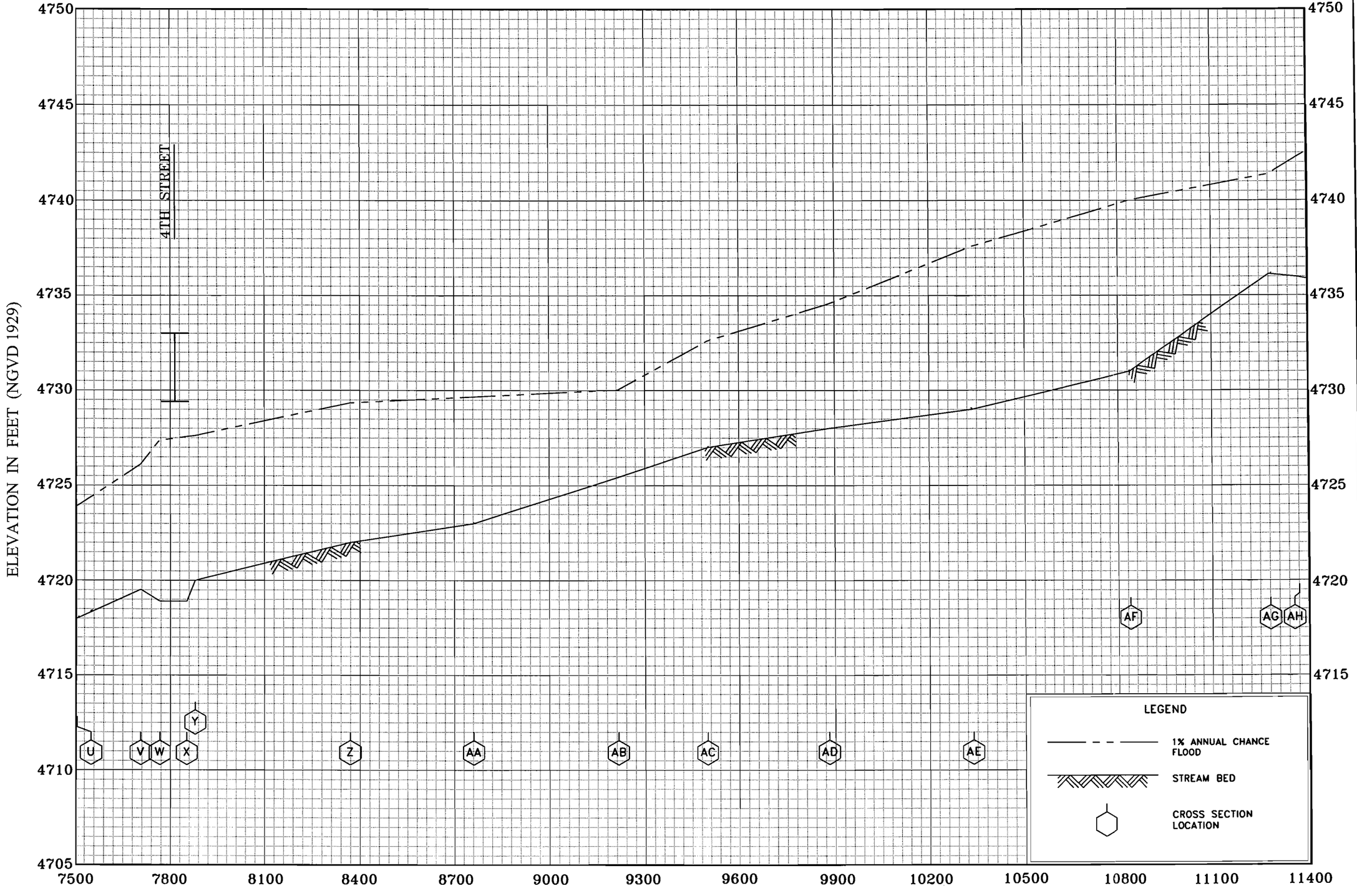
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREELEY, CO

(WELD COUNTY)

F-2

P:\COCOGOS\FIS PLOTS\SHEEP DRAW FIS PLOTS.DWG 12/16/2004



FLOOD PROFILES

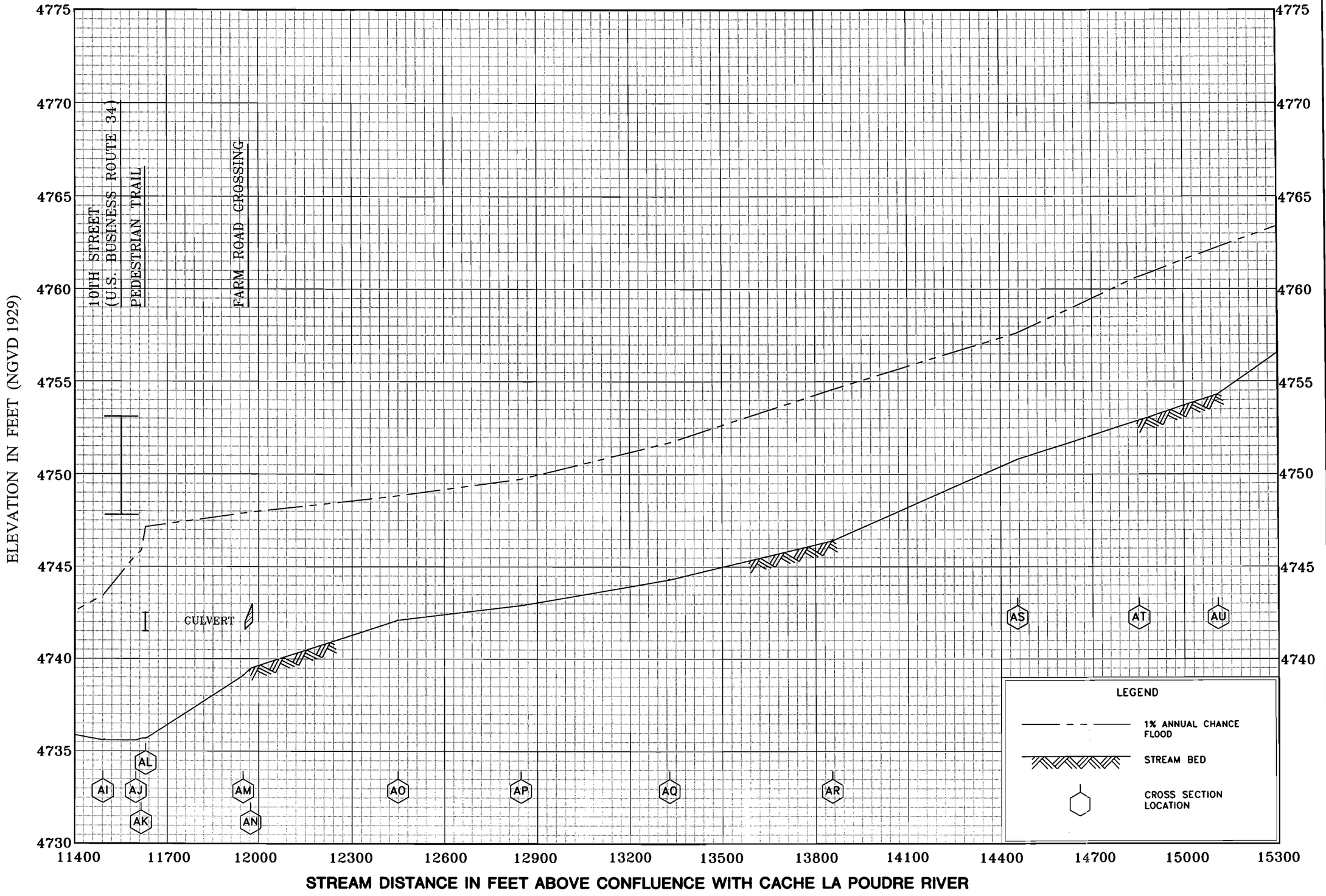
SHEEP DRAW

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREELEY, CO

(WELD COUNTY)

F-3



FLOOD PROFILES

SHEEP DRAW

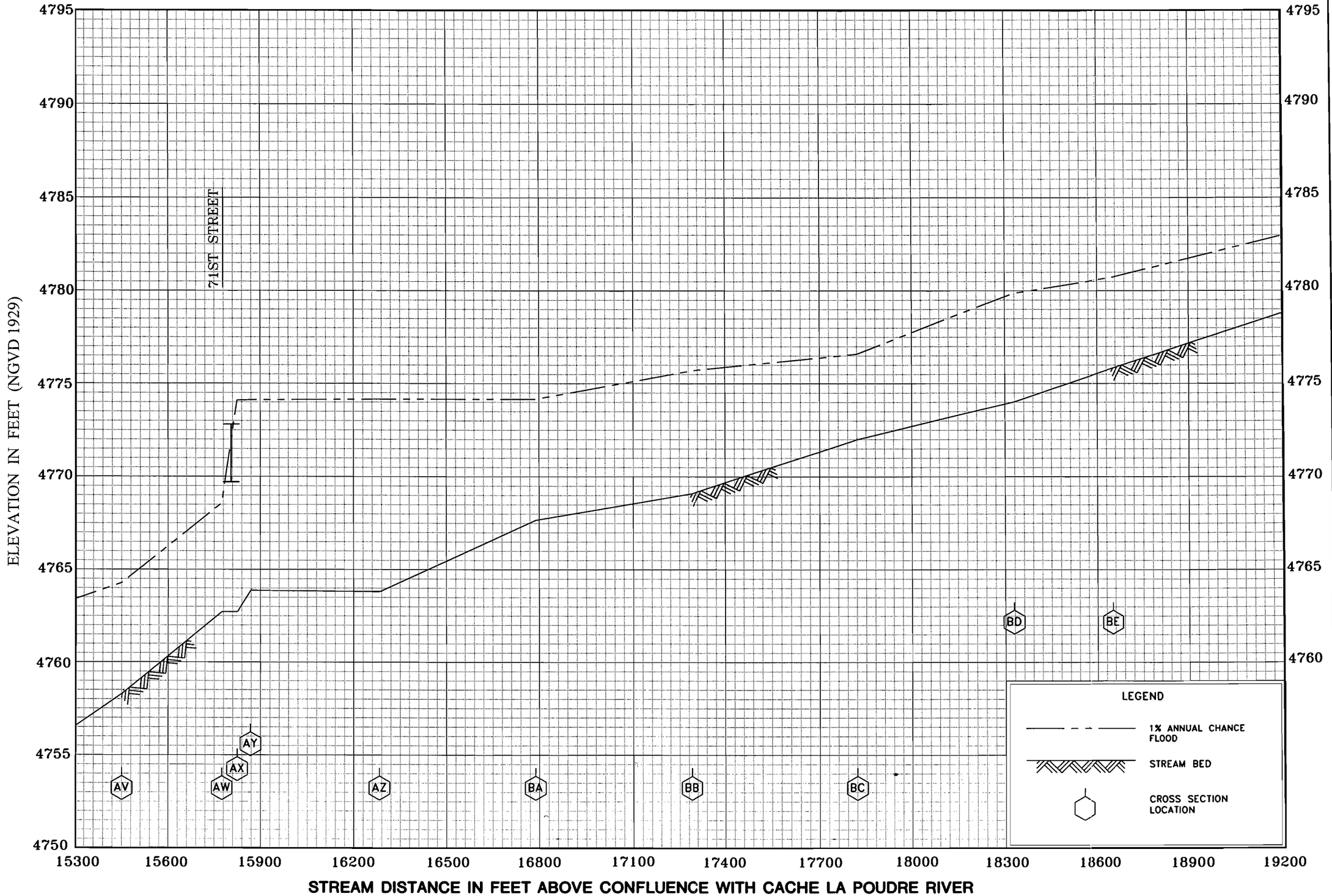
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREELEY, CO

(WELD COUNTY)

F-4

S:\PROJECTS\FIS PLOTS\SHEEP DRAW FIS PLOTS.DWG 12/16/2004



FLOOD PROFILES

SHEEP DRAW

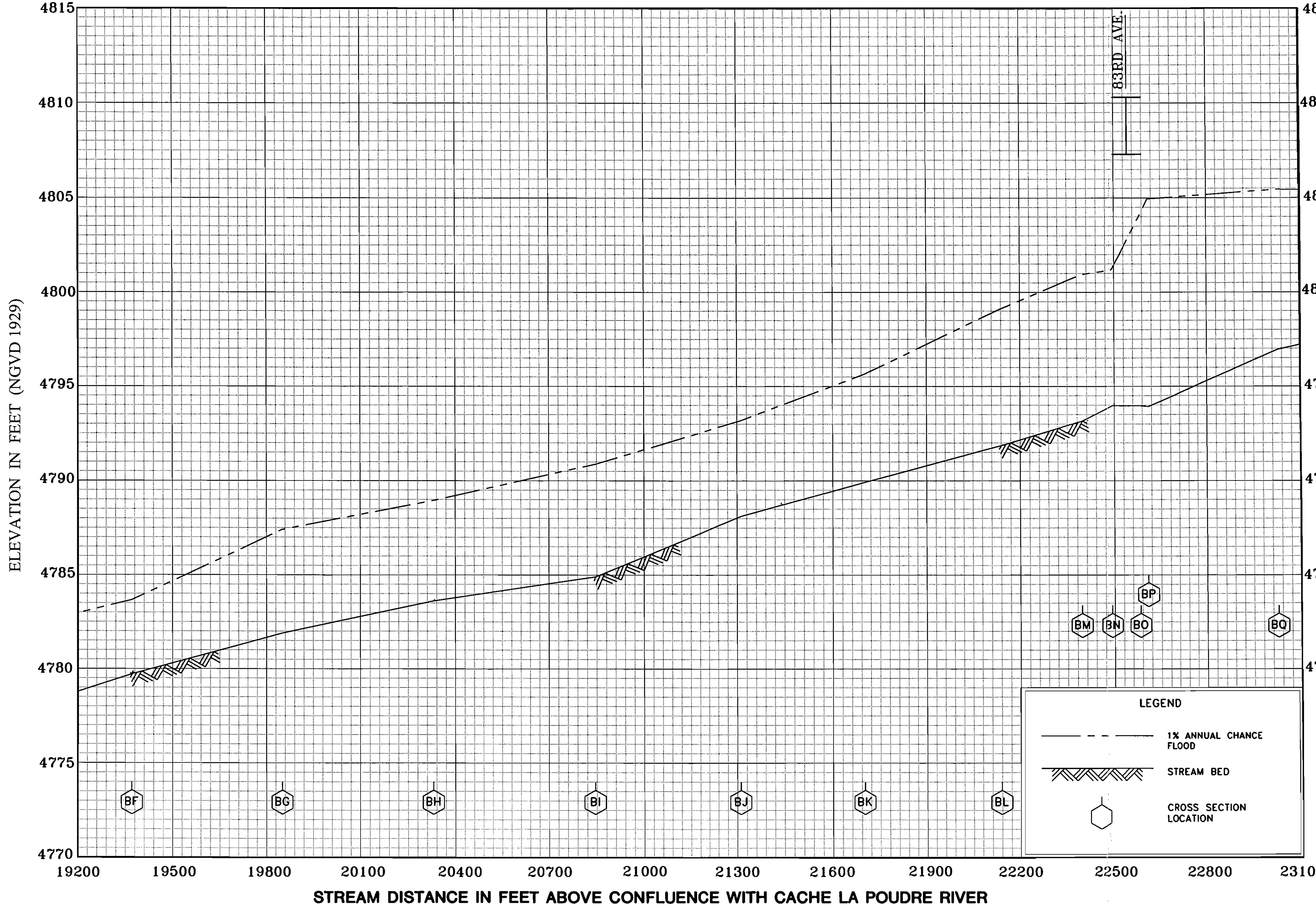
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREELEY, CO

(WELD COUNTY)

F-5

12/16/2004 G:\GIS\GIS\PLOTS\SHEEP DRAW\SHEEP DRAW.MXD



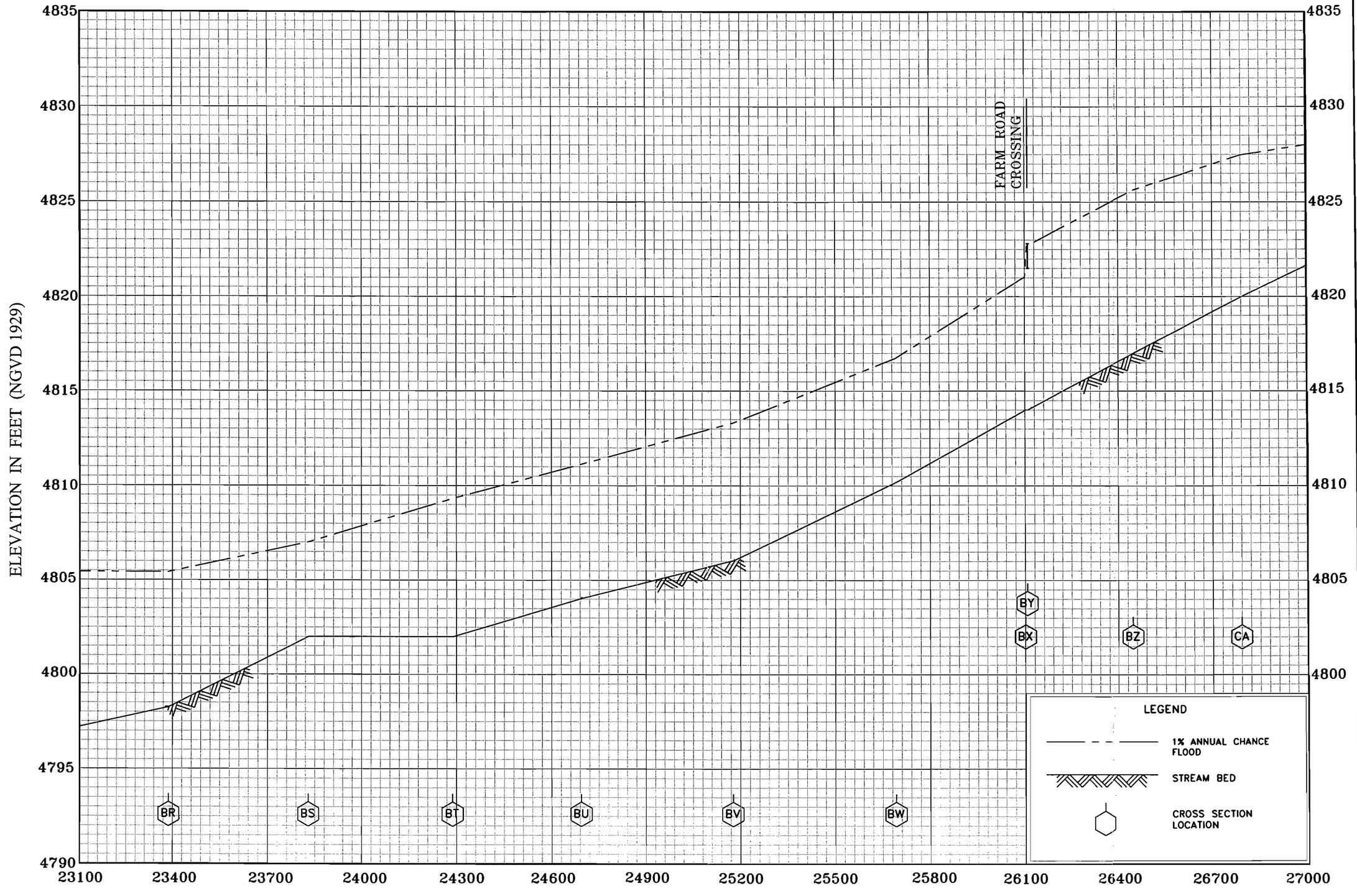
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREELEY, CO

(WELD COUNTY)

FLOOD PROFILES

SHEEP DRAW



FLOOD PROFILES

SHEEP DRAW

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREELEY, CO
(WELD COUNTY)

F-7

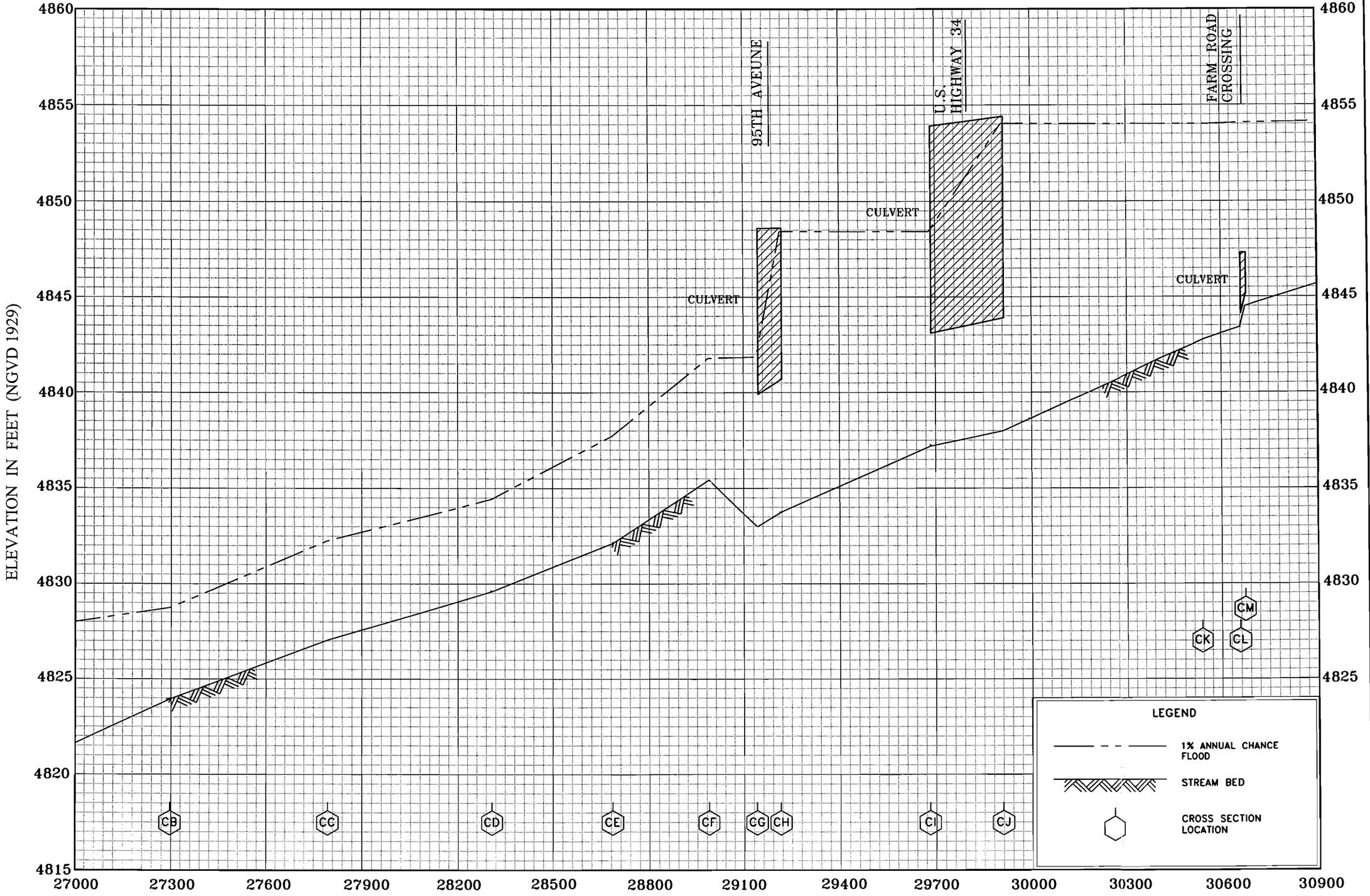
SHEEP DRAW

FLOOD PROFILES

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREELEY, CO

(WELD COUNTY)



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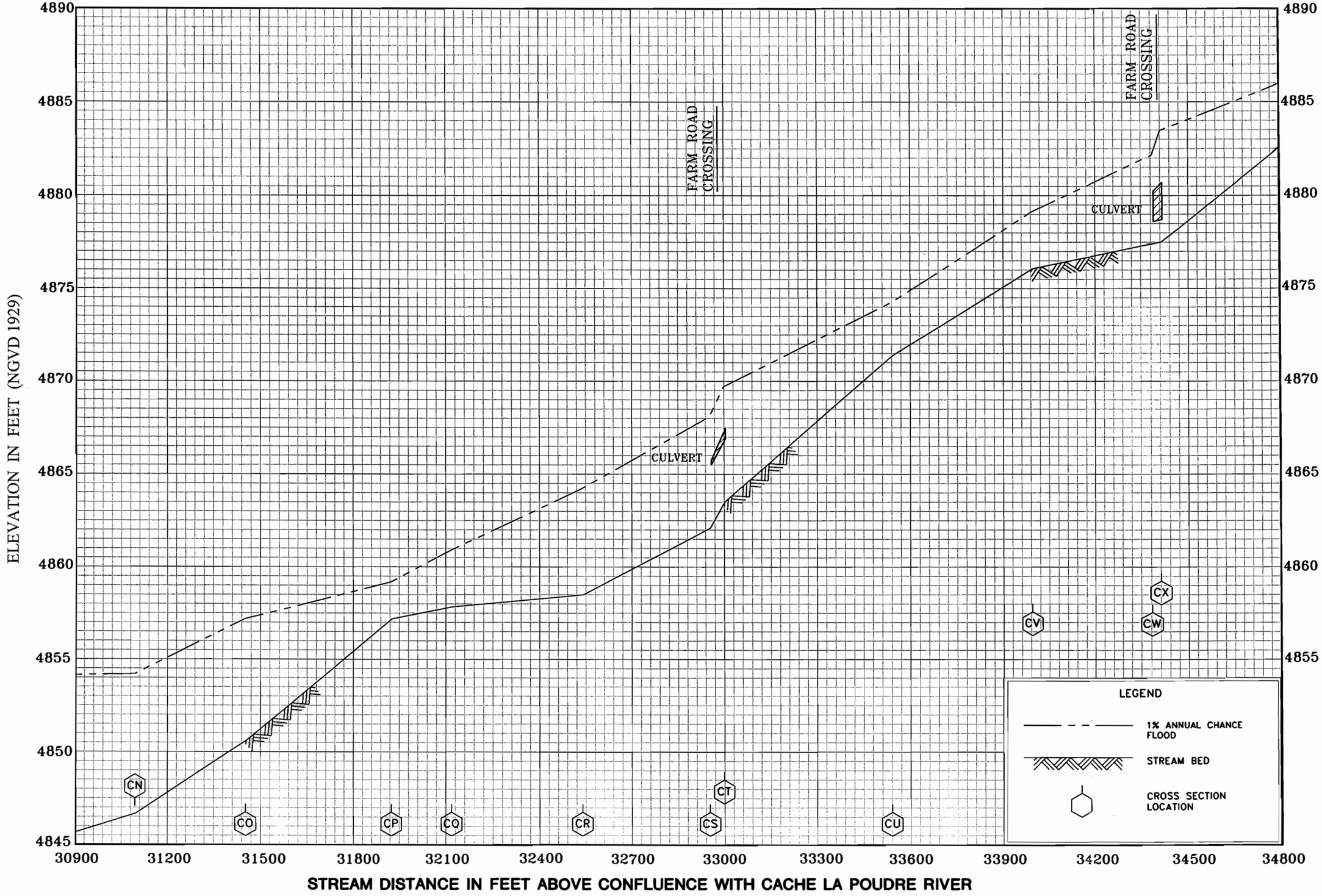


FLOOD PROFILES

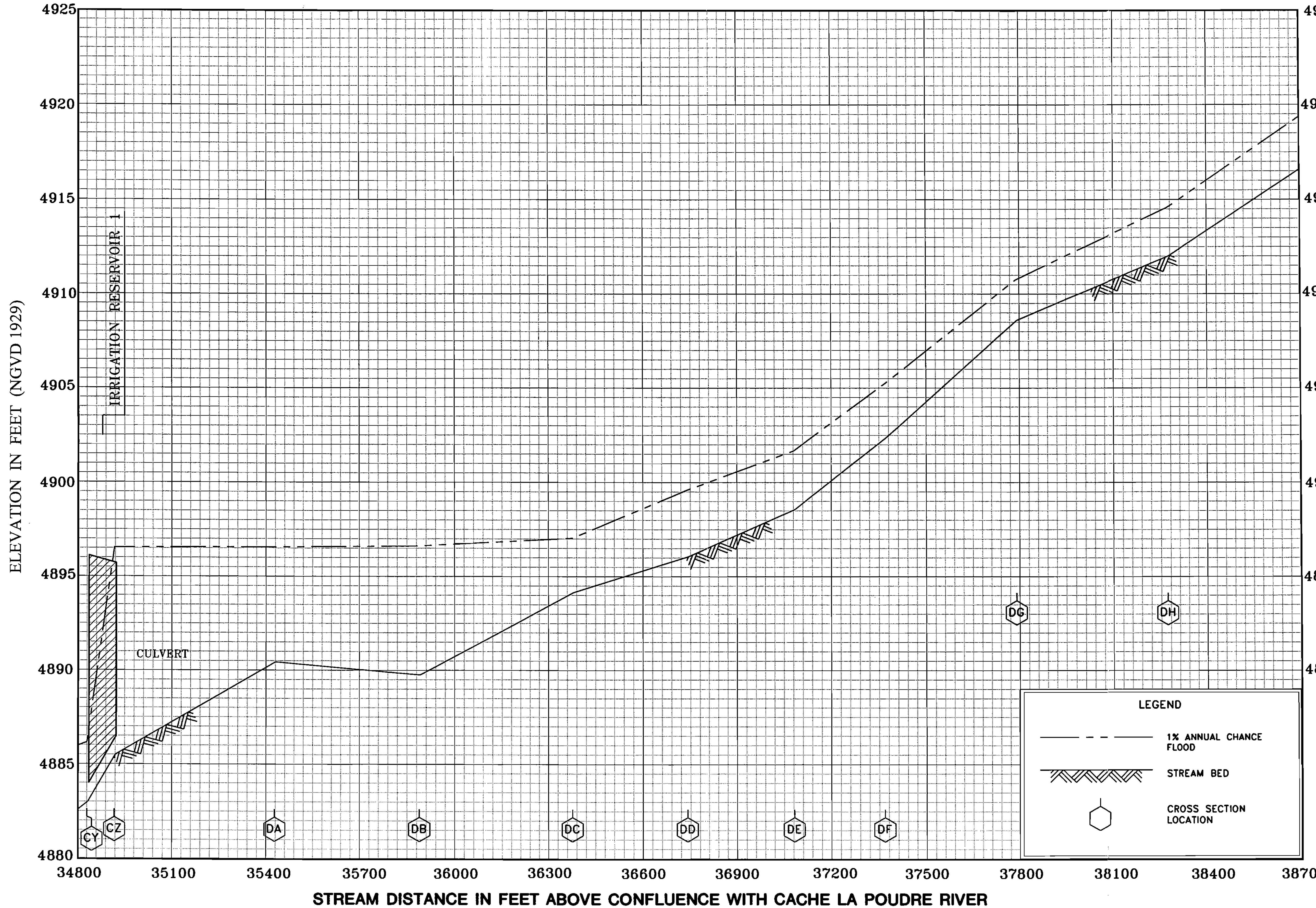
SHEEP DRAW

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREELEY, CO

(WELD COUNTY)

F-9



FLOOD PROFILES

SHEEP DRAW

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREELEY, CO

(WELD COUNTY)

F-10

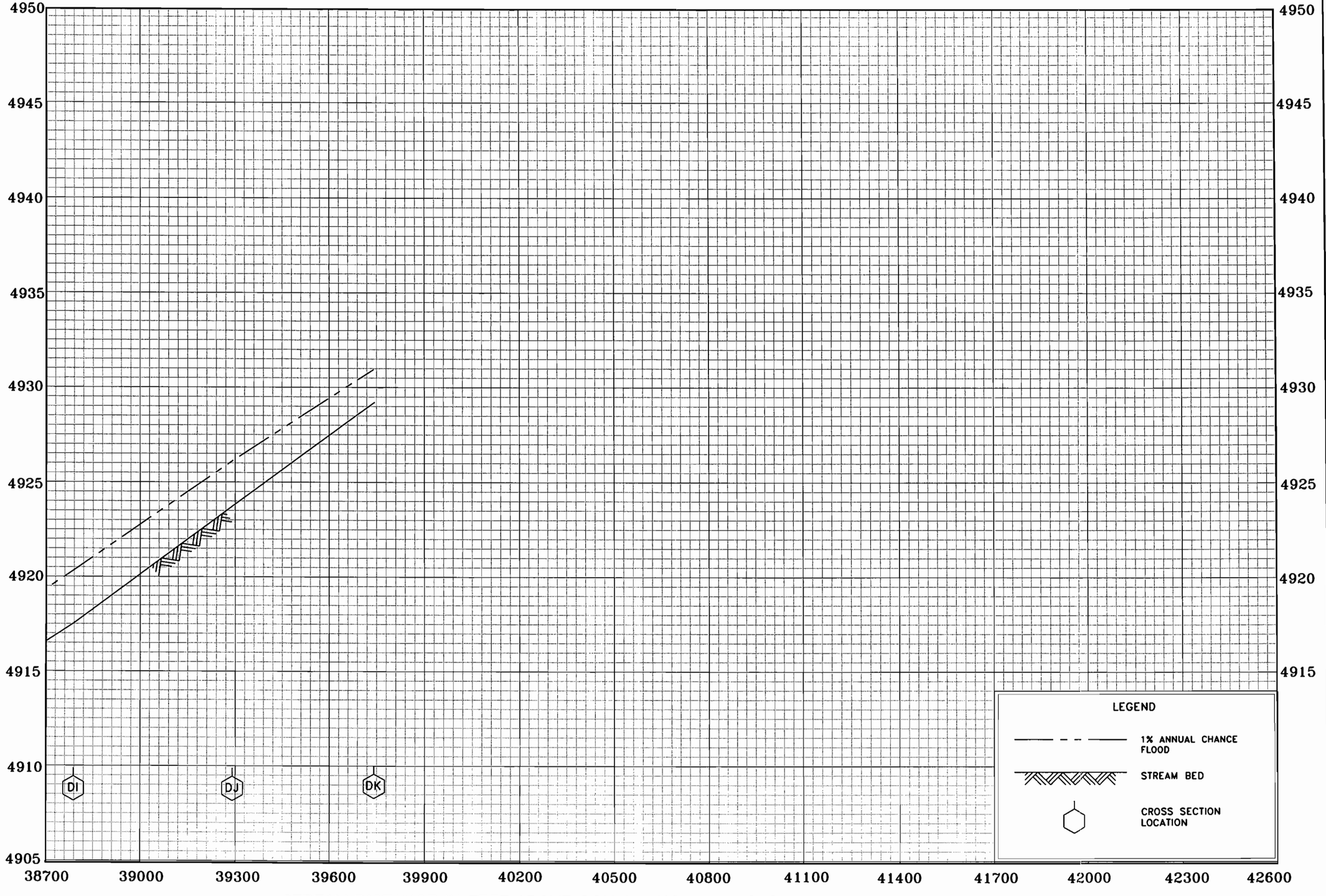
SHEEP DRAW

FLOOD PROFILES

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GREELEY, CO

(WELD COUNTY)



F-11

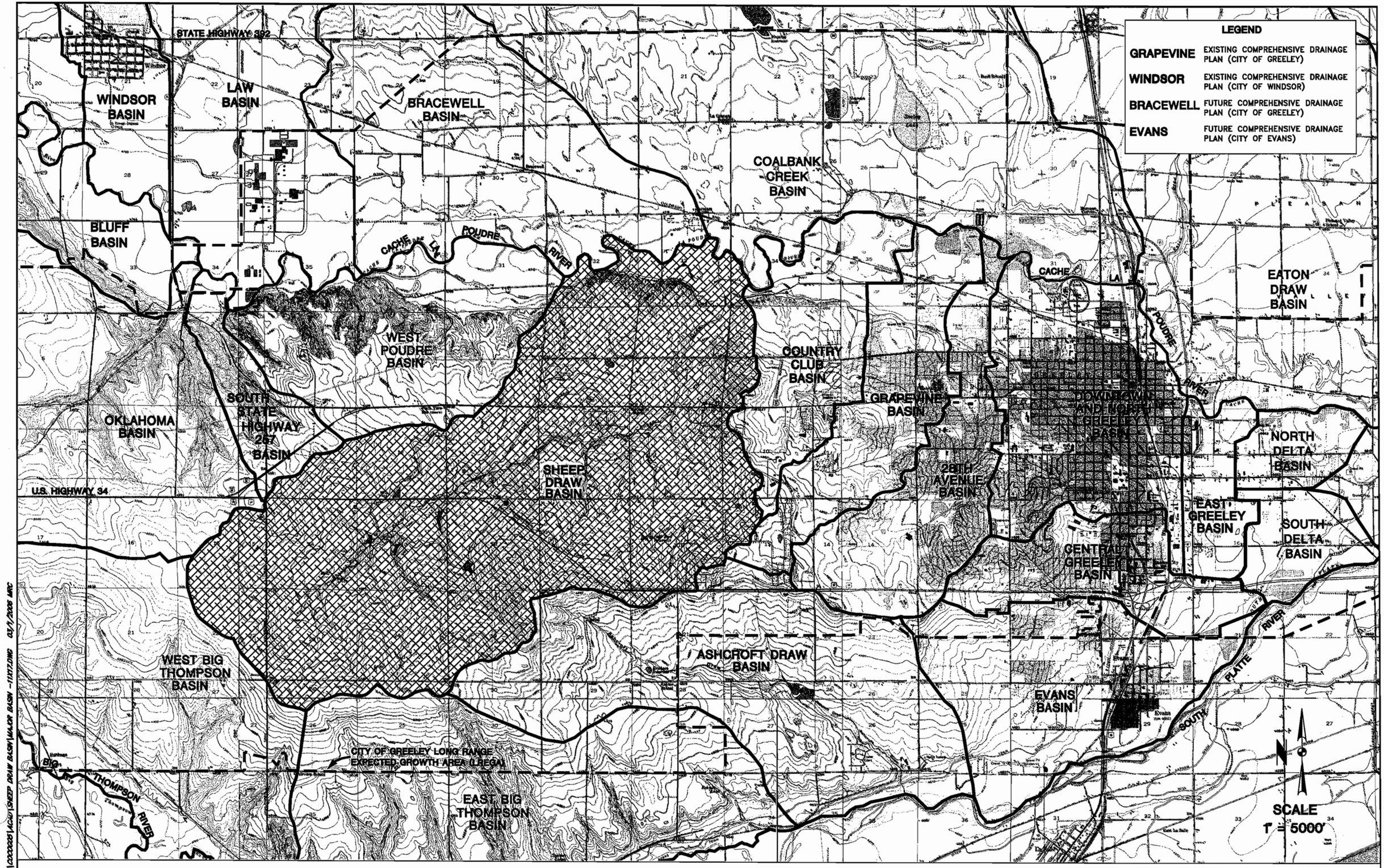
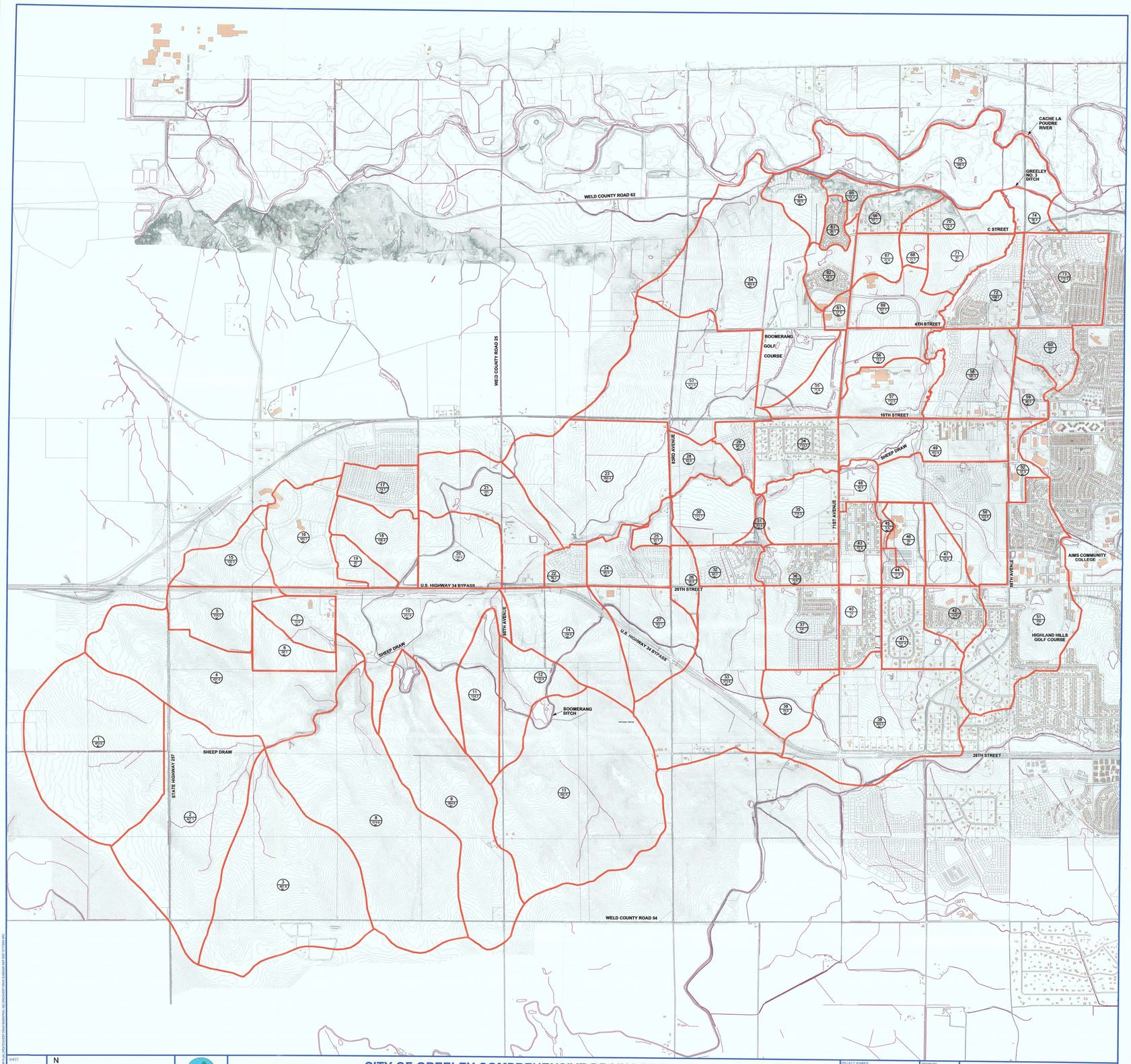


Figure 2.1. Basin Vicinity Map



SHEET
A-1

N

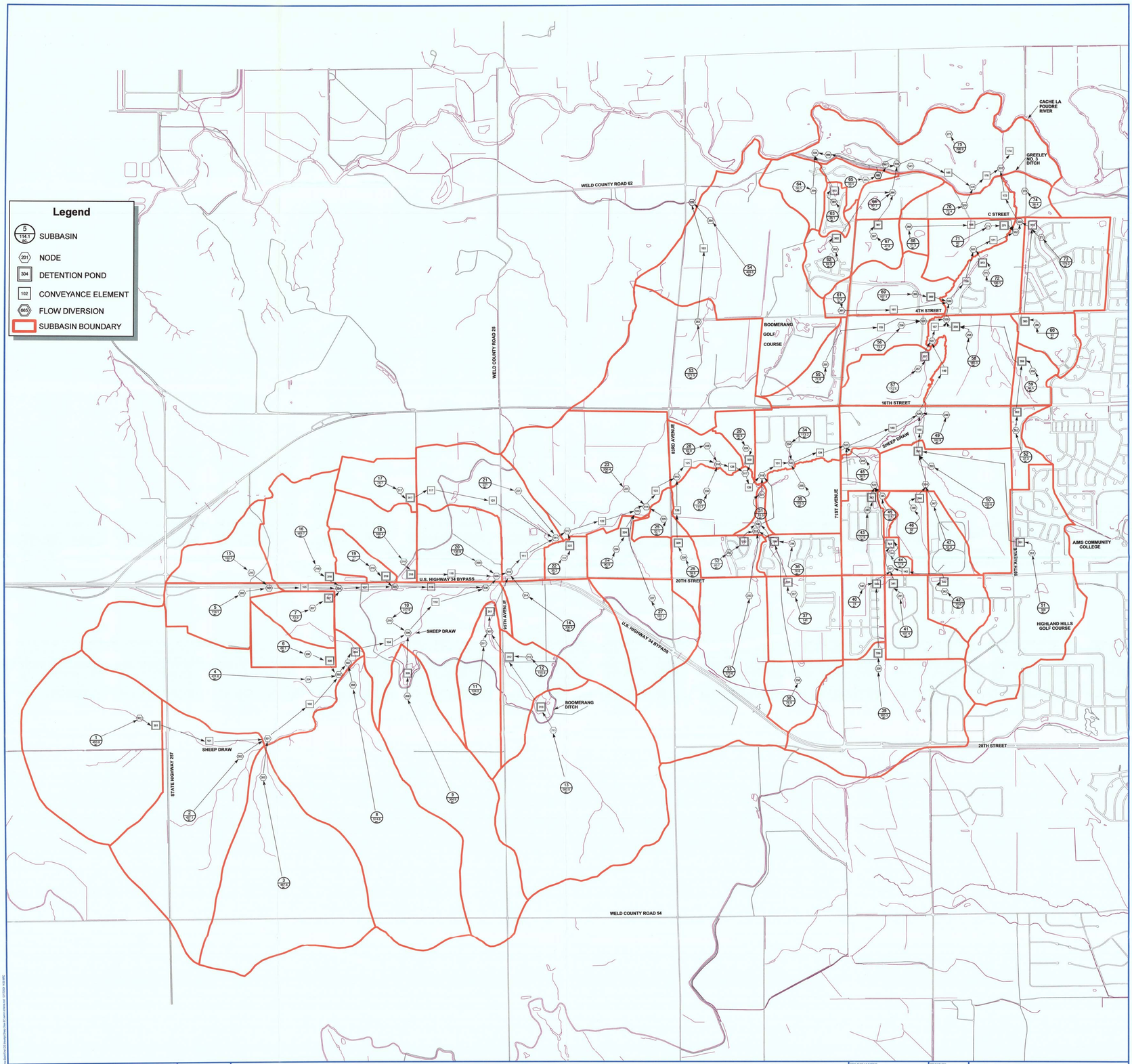
ORIGINAL SCALE: 1" = 1000'
0 1,000 2,000 3,000

City of Greeley

CITY OF GREELEY COMPREHENSIVE DRAINAGE PLAN
SHEEP DRAW BASIN
SUBBASIN MAP

PROJECT NUMBER	COCOG05
FILE	SUBBASIN MAP
DATE	12/20/2004
DRAWN BY	MRC
DESIGNED BY	BLV
CHECKED BY	GJK

Anderson Consulting Engineers, Inc
Civil • Water Resources • Environmental
771 Vrain Way, Suite 200, Fort Collins, CO 80521
Phone (970) 224-5828 Fax (970) 224-6121



SHEET A-2

N

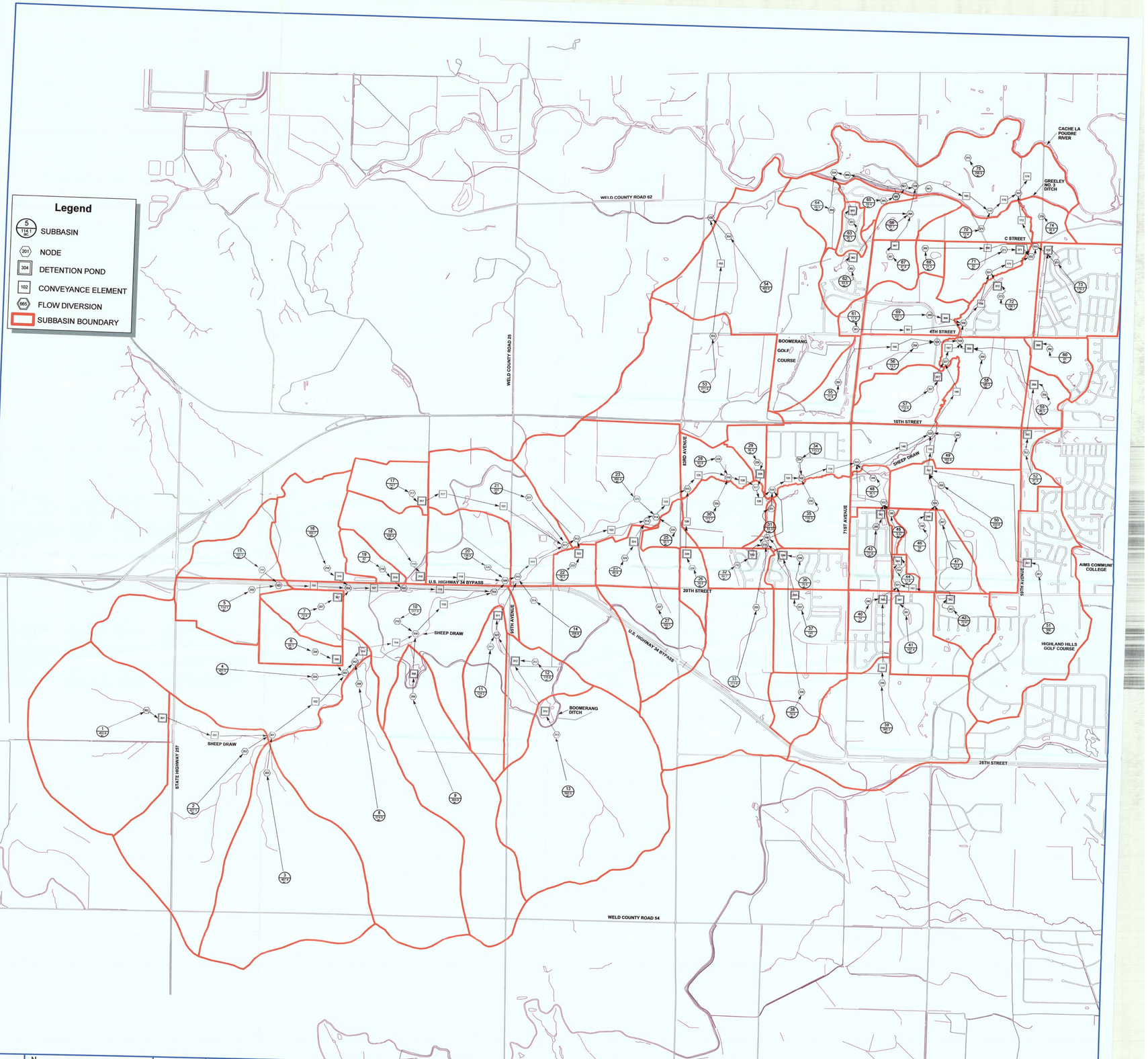
ORIGINAL SCALE: 1" = 1000'

0 1,000 2,000 3,000

CITY OF GREELEY COMPREHENSIVE DRAINAGE PLAN
SHEEP DRAW BASIN
EXISTING CONDITION SWMM SCHEMATIC

PROJECT NUMBER:	COCOG05
FILE:	EC SWMM SCHEME
DATE:	12/20/2004
DRAWN BY:	MRC
DESIGNED BY:	BLV
CHECKED BY:	GJK

Anderson Consulting Engineers, Inc
Civil • Water Resources • Environmental



SHEET A-3

N

ORIGINAL SCALE: 1" = 1000'

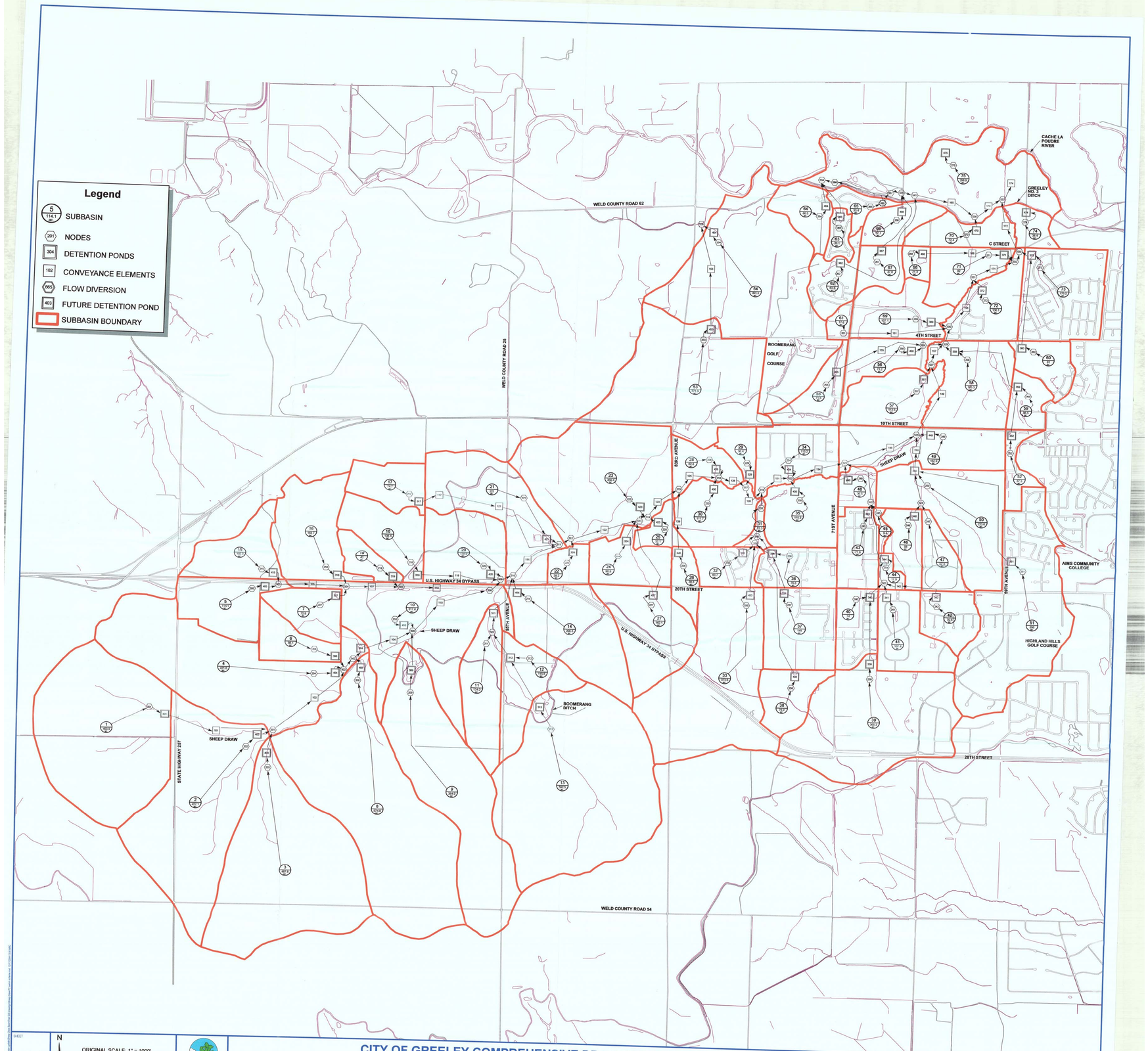
0 1,000 2,000 3,000

City of Greeley

CITY OF GREELEY COMPREHENSIVE DRAINAGE PLAN
SHEEP DRAW BASIN
FUTURE CONDITION SWMM SCHEMATIC

PROJECT NUMBER: COCOG05
FILE: FC SWMM SCHEME
DATE: 12/20/2004
DRAWN BY: MRC
DESIGNED BY: BLV
CHECKED BY: GJK

Anderson Consulting Engineers, Inc
Civil • Water Resources • Environmental
771 Wadsworth Blvd., Suite 200, Fort Collins, CO 80525
Phone (970) 224-5828 / Fax (970) 224-5821



SHEET: A-4

N

ORIGINAL SCALE: 1" = 1000'

0 1,000 2,000 3,000

City of Greeley

CITY OF GREELEY COMPREHENSIVE DRAINAGE PLAN
SHEEP DRAW BASIN
PROPOSED CONDITION SWMM SCHEMATIC

PROJECT NUMBER: COCOG05
FILE: PC SWMM SCHEME
DATE: 12/20/2004
DRAWN BY: MRC
DESIGNED BY: BLV
CHECKED BY: GJK

Anderson Consulting Engineers, Inc
Civil • Water Resources • Environmental
772 Whalers Way, Suite 200, Fort Collins, CO 80525
Phone (970) 226-0126 • Fax (970) 226-0123

EXISTING CONDITION
(EXISTING DEVELOPMENT WITH EXISTING FACILITIES)

SHEEP DRAW BASIN
FILENAME: SDB002EC.SUM
EXISTING CONDITIONS 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.
Sheep Draw Basin - Existing Conditions with Existing Facilities - 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.....	0.573	0.381	2.632	0.323	0.000	5.844	6.625	0.505	0.395	0.089
STANDARD DEVIATION OF FLOW.....	0.144	0.095	0.407	0.081	0.000	1.146	1.443	0.108	0.091	0.038
MAXIMUM FLOW.....	4.221	2.514	10.925	2.050	0.000	38.172	52.461	2.638	2.230	1.468
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).....	1.20E+04	8.01E+03	5.53E+04	6.79E+03	0.00E+00	1.23E+05	1.39E+05	1.06E+04	8.30E+03	1.86E+03

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	0.403	0.000	0.746	0.000	0.000	14.066	4.395	7.822	2.918	0.000
STANDARD DEVIATION OF FLOW.....	0.104	0.000	0.175	0.000	0.000	3.175	0.912	1.825	0.601	0.000
MAXIMUM FLOW.....	2.890	0.000	5.079	0.000	0.000	118.731	31.127	71.360	20.324	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).....	8.46E+03	0.00E+00	1.57E+04	0.00E+00	0.00E+00	2.95E+05	9.23E+04	1.64E+05	6.13E+04	0.00E+00

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	0.159	1.515	0.124	4.415	0.000	0.722	0.744	0.000	1.997	0.075
STANDARD DEVIATION OF FLOW.....	0.056	0.394	0.048	1.108	0.000	0.197	0.192	0.000	0.475	0.037
MAXIMUM FLOW.....	1.796	13.800	1.667	44.560	0.000	6.393	5.992	0.000	16.340	1.563
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).....	3.33E+03	3.18E+04	2.60E+03	9.27E+04	0.00E+00	1.52E+04	1.56E+04	0.00E+00	4.19E+04	1.57E+03

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	0.000	3.358	0.483	1.416	0.273	5.004	7.895	0.128	15.735	6.743
STANDARD DEVIATION OF FLOW.....	0.000	0.798	0.119	0.382	0.092	1.122	1.797	0.060	3.091	1.373
MAXIMUM FLOW.....	0.000	30.670	3.326	13.001	3.082	41.420	66.500	2.483	100.491	47.949
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	7.05E+04	1.01E+04	2.97E+04	5.74E+03	1.05E+05	1.66E+05	2.68E+03	3.30E+05	1.42E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	2.052	3.597	5.646	0.695	0.000	4.593	0.192	0.202	3.527	7.072
STANDARD DEVIATION OF FLOW.....	0.423	0.837	1.182	0.202	0.000	1.005	0.078	0.074	0.999	1.349
MAXIMUM FLOW.....	12.139	31.160	41.517	6.630	0.000	36.029	2.930	2.595	38.700	41.108
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).....	4.31E+04	7.55E+04	1.19E+05	1.46E+04	0.00E+00	9.65E+04	4.03E+03	4.24E+03	7.41E+04	1.49E+05

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	16.297	3.473	0.296	1.962	0.686	0.121	5.379	8.214	4.589	3.331
STANDARD DEVIATION OF FLOW.....	3.412	0.769	0.092	0.321	0.201	0.057	1.140	2.091	1.062	0.742
MAXIMUM FLOW.....	117.877	29.160	2.940	8.550	6.849	2.344	38.758	85.850	43.120	27.220
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).....	3.42E+05	7.29E+04	6.21E+03	4.12E+04	1.44E+04	2.53E+03	1.13E+05	1.72E+05	9.64E+04	6.99E+04

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	2.493	2.072	1.497	1.062	1.168	0.187	1.673	0.072	6.527	0.104
STANDARD DEVIATION OF FLOW.....	0.594	0.505	0.374	0.294	0.297	0.072	0.426	0.035	1.564	0.049
MAXIMUM FLOW.....	24.260	16.763	13.850	10.067	10.490	2.677	14.640	1.449	62.580	2.013
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).....	5.24E+04	4.35E+04	3.14E+04	2.23E+04	2.45E+04	3.92E+03	3.51E+04	1.51E+03	1.37E+05	2.18E+03

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	4.669	3.940	12.537	0.000	1.670
STANDARD DEVIATION OF FLOW.....	1.095	1.009	2.843	0.000	0.377
MAXIMUM FLOW.....	42.170	40.010	106.570	0.000	11.399
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	9.81E+04	8.27E+04	2.63E+05	0.00E+00	3.51E+04

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	0.000	0.000	3.014	3.026	4.614	0.552	7.964	8.468	7.263	7.195
STANDARD DEVIATION OF FLOW.....	0.000	0.000	0.493	0.481	0.246	0.023	0.727	0.820	0.439	0.449
MAXIMUM FLOW.....	0.000	0.000	13.310	12.482	7.087	0.670	20.686	23.268	11.531	11.527
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	6.33E+04	6.36E+04	9.69E+04	1.16E+04	1.67E+05	1.78E+05	1.53E+05	1.51E+05

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	0.394	0.000	0.000	11.891	12.443	12.270	2.893	15.162	14.913	7.678
STANDARD DEVIATION OF FLOW.....	0.057	0.000	0.000	0.684	0.693	0.720	0.314	0.982	1.012	0.456
MAXIMUM FLOW.....	1.420	0.000	0.000	19.137	19.669	19.642	7.658	26.984	26.888	12.449
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).....	8.28E+03	0.00E+00	0.00E+00	2.50E+05	2.61E+05	2.58E+05	6.07E+04	3.18E+05	3.13E+05	1.61E+05

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	7.516	0.711	0.000	0.403	0.364	2.896	2.797	22.429	25.226	2.386
STANDARD DEVIATION OF FLOW.....	0.479	0.067	0.000	0.104	0.030	0.110	0.128	1.382	1.489	0.101
MAXIMUM FLOW.....	12.397	1.737	0.000	2.890	0.851	3.597	3.580	37.227	40.684	3.160
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).....	1.58E+05	1.49E+04	0.00E+00	8.46E+03	7.65E+03	6.08E+04	5.87E+04	4.71E+05	5.30E+05	5.01E+04

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

SHEEP DRAW BASIN
FILENAME: SDB005EC.SUM
EXISTING CONDITIONS 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.
Sheep Draw Basin - Existing Conditions with Existing Facilities - 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.....	22.426	19.250	17.289	11.717	2.721	9.865	11.070	16.347	11.585	7.980
STANDARD DEVIATION OF FLOW.....	3.922	2.654	2.511	1.413	0.562	2.040	2.529	1.958	1.322	1.396
MAXIMUM FLOW.....	109.237	69.490	69.456	39.230	17.350	68.300	93.087	54.397	36.800	41.337
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).....	4.78E+05	4.10E+05	3.68E+05	2.50E+05	5.80E+04	2.10E+05	2.36E+05	3.48E+05	2.47E+05	1.70E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	3.694	2.524	13.969	5.015	2.460	23.911	8.384	13.910	5.283	3.397
STANDARD DEVIATION OF FLOW.....	0.623	0.594	2.583	0.862	0.573	5.689	1.861	3.453	1.156	0.821
MAXIMUM FLOW.....	17.540	19.426	77.627	25.159	18.666	216.800	64.519	136.870	39.732	27.465
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).....	7.87E+04	5.38E+04	2.98E+05	1.07E+05	5.24E+04	5.09E+05	1.79E+05	2.96E+05	1.13E+05	7.24E+04

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	5.737	3.453	8.461	9.026	0.890	2.384	5.258	1.527	4.021	2.886
STANDARD DEVIATION OF FLOW.....	1.007	0.883	1.585	2.410	0.264	0.616	1.161	0.497	0.975	0.739
MAXIMUM FLOW.....	29.375	31.370	47.623	99.900	9.292	20.844	36.928	19.198	34.080	25.309
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).....	1.22E+05	7.36E+04	1.80E+05	1.92E+05	1.90E+04	5.08E+04	1.12E+05	3.25E+04	8.56E+04	6.15E+04

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	0.507	6.539	8.818	5.835	3.694	9.168	15.354	2.106	33.406	11.329
STANDARD DEVIATION OF FLOW.....	0.132	1.653	1.482	1.550	0.893	2.203	3.742	0.654	6.982	2.428
MAXIMUM FLOW.....	4.087	64.710	42.986	55.499	29.664	81.890	138.673	24.853	227.013	85.492
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).....	1.08E+04	1.39E+05	1.88E+05	1.24E+05	7.87E+04	1.95E+05	3.27E+05	4.49E+04	7.12E+05	2.41E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	6.666	7.269	10.046	1.689	0.264	7.972	2.198	1.385	9.884	17.468
STANDARD DEVIATION OF FLOW.....	1.365	1.788	2.241	0.436	0.079	1.844	0.658	0.384	2.819	3.501
MAXIMUM FLOW.....	40.879	67.200	79.956	14.590	2.537	67.271	24.368	13.064	111.520	108.764
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).....	1.42E+05	1.55E+05	2.14E+05	3.60E+04	5.63E+03	1.70E+05	4.68E+04	2.95E+04	2.11E+05	3.72E+05

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	34.234	5.323	9.408	17.039	3.374	1.997	11.079	16.635	7.007	5.736
STANDARD DEVIATION OF FLOW.....	7.649	1.209	1.975	2.472	0.928	0.619	2.495	4.513	1.663	1.329
MAXIMUM FLOW.....	267.144	47.210	63.230	69.162	33.160	23.448	86.467	191.220	69.070	49.820
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).....	7.29E+05	1.13E+05	2.00E+05	3.63E+05	7.19E+04	4.25E+04	2.36E+05	3.54E+05	1.49E+05	1.22E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	3.734	5.081	2.621	2.366	2.151	0.765	3.796	0.836	12.224	1.252
STANDARD DEVIATION OF FLOW.....	0.898	1.233	0.645	0.585	0.526	0.214	0.952	0.210	3.139	0.374
MAXIMUM FLOW.....	36.830	42.458	24.670	20.010	19.010	7.440	33.220	6.445	128.650	14.242
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).....	7.95E+04	1.08E+05	5.58E+04	5.04E+04	4.58E+04	1.63E+04	8.09E+04	1.78E+04	2.60E+05	2.67E+04

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	9.009	8.609	22.233	1.073	16.379
STANDARD DEVIATION OF FLOW.....	2.256	2.309	5.366	0.325	3.384
MAXIMUM FLOW.....	88.130	94.480	204.474	11.831	100.510
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.92E+05	1.83E+05	4.74E+05	2.28E+04	3.49E+05

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	0.000	0.000	36.539	36.680	7.900	0.950	56.296	72.643	69.482	69.302
STANDARD DEVIATION OF FLOW.....	0.000	0.000	5.150	5.027	0.437	0.038	6.733	8.655	6.494	6.503
MAXIMUM FLOW.....	0.000	0.000	138.334	129.797	12.817	1.134	178.610	231.683	162.658	162.402
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	7.78E+05	7.81E+05	1.68E+05	2.02E+04	1.20E+06	1.55E+06	1.48E+06	1.48E+06

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	11.258	5.181	5.200	20.460	26.610	26.365	5.245	31.610	31.258	88.540
STANDARD DEVIATION OF FLOW.....	0.924	1.130	1.103	1.242	2.086	2.096	0.608	2.676	2.685	7.772
MAXIMUM FLOW.....	23.623	35.300	34.231	35.276	63.880	63.061	14.873	77.259	76.314	199.298
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).....	2.40E+05	1.10E+05	1.11E+05	4.36E+05	5.67E+05	5.62E+05	1.12E+05	6.73E+05	6.66E+05	1.89E+06

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	88.021	13.165	0.000	3.694	3.262	5.286	5.135	119.279	127.811	4.652
STANDARD DEVIATION OF FLOW.....	7.790	1.058	0.000	0.623	0.217	0.199	0.227	9.897	10.036	0.198
MAXIMUM FLOW.....	197.962	27.023	0.000	17.540	5.745	6.566	6.533	253.755	263.270	6.337
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).....	1.87E+06	2.80E+05	0.00E+00	7.87E+04	6.95E+04	1.13E+05	1.09E+05	2.54E+06	2.72E+06	9.91E+04

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

SHEEP DRAW BASIN
FILENAME: SDB010EC.SUM
EXISTING CONDITIONS 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.
Sheep Draw Basin - Existing Conditions with Existing Facilities - 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.....	39.045	34.907	34.379	26.411	6.606	12.416	13.862	36.368	24.984	19.040
STANDARD DEVIATION OF FLOW.....	6.556	4.680	4.808	3.032	1.237	2.544	3.126	4.154	2.736	3.083
MAXIMUM FLOW.....	174.985	118.810	125.901	79.974	34.200	86.388	115.664	110.295	72.606	83.781
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).....	8.55E+05	7.64E+05	7.53E+05	5.78E+05	1.45E+05	2.72E+05	3.04E+05	7.96E+05	5.47E+05	4.17E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	7.832	6.332	33.652	12.170	5.931	30.211	11.168	17.972	6.881	8.159
STANDARD DEVIATION OF FLOW.....	1.260	1.340	5.770	1.925	1.245	7.091	2.442	4.393	1.488	1.761
MAXIMUM FLOW.....	32.600	39.469	160.289	51.387	36.400	278.100	84.075	181.530	51.041	53.182
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).....	1.72E+05	1.39E+05	7.37E+05	2.67E+05	1.30E+05	6.62E+05	2.45E+05	3.94E+05	1.51E+05	1.79E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	13.327	4.876	20.425	12.372	1.970	3.828	10.837	3.654	5.409	6.733
STANDARD DEVIATION OF FLOW.....	2.182	1.195	3.517	3.214	0.518	0.918	2.227	1.015	1.272	1.537
MAXIMUM FLOW.....	58.452	43.380	97.010	134.460	17.172	29.961	65.261	36.559	45.790	47.630
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).....	2.92E+05	1.07E+05	4.47E+05	2.71E+05	4.31E+04	8.38E+04	2.37E+05	8.00E+04	1.18E+05	1.47E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	1.097	8.783	21.151	9.844	7.623	12.028	20.616	4.716	47.019	14.224
STANDARD DEVIATION OF FLOW.....	0.261	2.169	3.329	2.421	1.681	2.848	4.926	1.281	9.655	3.016
MAXIMUM FLOW.....	7.371	86.870	88.972	82.729	50.743	109.920	189.000	45.737	313.261	107.600
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).....	2.40E+04	1.92E+05	4.63E+05	2.16E+05	1.67E+05	2.63E+05	4.51E+05	1.03E+05	1.03E+06	3.11E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	10.570	9.892	12.984	2.392	0.721	10.175	4.153	2.692	15.692	25.698
STANDARD DEVIATION OF FLOW.....	2.067	2.377	2.862	0.583	0.172	2.322	1.108	0.671	4.218	5.019
MAXIMUM FLOW.....	59.166	91.470	102.249	19.930	4.594	85.780	38.406	21.696	168.550	150.985
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).....	2.31E+05	2.17E+05	2.84E+05	5.24E+04	1.58E+04	2.23E+05	9.09E+04	5.90E+04	3.44E+05	5.63E+05

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	47.451	6.508	22.224	34.220	5.882	4.473	15.229	22.722	8.542	7.588
STANDARD DEVIATION OF FLOW.....	10.379	1.469	4.258	4.753	1.477	1.213	3.358	5.997	2.012	1.790
MAXIMUM FLOW.....	361.155	58.680	123.940	125.285	50.132	43.190	114.822	256.840	86.160	69.490
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).....	1.04E+06	1.43E+05	4.87E+05	7.49E+05	1.29E+05	9.80E+04	3.34E+05	4.98E+05	1.87E+05	1.66E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	4.441	7.413	3.446	3.713	2.919	1.151	5.594	1.604	16.172	2.982
STANDARD DEVIATION OF FLOW.....	1.046	1.722	0.853	0.923	0.704	0.297	1.343	0.376	4.071	0.870
MAXIMUM FLOW.....	44.110	57.860	34.060	32.770	26.540	10.230	47.030	10.847	170.860	32.808
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).....	9.72E+04	1.62E+05	7.55E+04	8.13E+04	6.39E+04	2.52E+04	1.23E+05	3.51E+04	3.54E+05	6.53E+04

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	12.059	12.329	28.828	2.388	27.492
STANDARD DEVIATION OF FLOW.....	2.956	3.194	6.864	0.638	5.401
MAXIMUM FLOW.....	118.580	131.080	269.460	21.708	152.896
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.64E+05	2.70E+05	6.31E+05	5.23E+04	6.02E+05

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	0.000	0.000	69.286	69.545	10.069	1.226	106.025	142.393	138.553	138.275
STANDARD DEVIATION OF FLOW.....	0.000	0.000	9.471	9.267	0.560	0.048	12.683	16.797	14.145	14.134
MAXIMUM FLOW.....	0.000	0.000	242.955	232.630	16.626	1.459	325.038	434.408	390.019	388.840
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).....	0.00E+00	0.00E+00	1.52E+06	1.52E+06	2.21E+05	2.68E+04	2.32E+06	3.12E+06	3.03E+06	3.03E+06

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	24.369	12.537	12.556	26.118	39.900	39.622	6.840	46.462	46.067	181.683
STANDARD DEVIATION OF FLOW.....	1.975	2.472	2.438	1.602	3.646	3.644	0.800	4.422	4.414	17.383
MAXIMUM FLOW.....	51.364	69.820	68.928	46.155	106.219	105.828	19.811	124.192	123.505	484.222
MINIMUM FLOW.....	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	5.34E+05	2.75E+05	2.75E+05	5.72E+05	8.74E+05	8.68E+05	1.50E+05	1.02E+06	1.01E+06	3.98E+06

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	180.813	31.836	20.922	28.754	21.320	6.999	6.819	226.880	241.858	6.324
STANDARD DEVIATION OF FLOW.....	17.327	2.553	2.385	2.227	1.394	0.259	0.293	20.676	21.074	0.267
MAXIMUM FLOW.....	476.164	68.552	61.182	70.639	34.917	8.766	8.751	570.319	589.586	8.718
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).....	3.96E+06	6.97E+05	4.58E+05	6.30E+05	4.67E+05	1.53E+05	1.49E+05	4.97E+06	5.30E+06	1.38E+05

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

SHEEP DRAW BASIN
FILENAME: SDB050EC.SUM
EXISTING CONDITIONS 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.
Sheep Draw Basin - Existing Conditions with Existing Facilities - 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.....	86.877	79.957	85.854	70.562	18.645	19.476	21.562	96.592	65.347	52.304
STANDARD DEVIATION OF FLOW.....	15.445	11.322	12.654	8.548	3.674	4.413	5.419	11.622	7.543	8.935
MAXIMUM FLOW.....	454.119	317.290	359.149	241.744	110.610	157.225	208.567	330.018	213.471	262.479
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).....	1.98E+06	1.82E+06	1.96E+06	1.61E+06	4.25E+05	4.44E+05	4.92E+05	2.20E+06	1.49E+06	1.19E+06

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	21.133	18.645	96.634	34.224	16.766	47.746	19.161	29.411	11.426	22.711
STANDARD DEVIATION OF FLOW.....	3.561	4.180	17.583	5.703	3.718	12.523	4.660	8.065	2.744	5.216
MAXIMUM FLOW.....	101.237	133.500	528.175	164.887	117.680	516.164	168.905	344.903	99.068	169.330
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).....	4.82E+05	4.25E+05	2.20E+06	7.80E+05	3.82E+05	1.09E+06	4.37E+05	6.71E+05	2.61E+05	5.18E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	36.546	9.006	57.379	21.977	5.354	8.068	28.067	10.230	9.332	18.520
STANDARD DEVIATION OF FLOW.....	6.299	2.427	10.456	6.431	1.500	2.088	6.143	3.063	2.409	4.498
MAXIMUM FLOW.....	184.343	90.890	314.094	266.752	52.445	72.356	195.090	113.229	90.114	149.560
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).....	8.33E+05	2.05E+05	1.31E+06	5.01E+05	1.22E+05	1.84E+05	6.40E+05	2.33E+05	2.13E+05	4.22E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	2.997	15.238	61.034	21.881	19.749	20.211	35.653	12.855	85.942	22.226
STANDARD DEVIATION OF FLOW.....	0.725	4.230	10.156	5.808	4.602	5.373	9.545	3.766	19.491	5.229
MAXIMUM FLOW.....	22.088	172.460	296.766	207.399	148.990	216.157	382.181	138.842	673.005	194.584
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).....	6.83E+04	3.47E+05	1.39E+06	4.99E+05	4.50E+05	4.61E+05	8.13E+05	2.93E+05	1.96E+06	5.07E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	21.914	17.466	21.307	4.394	2.058	16.354	10.285	6.573	32.810	49.479
STANDARD DEVIATION OF FLOW.....	4.587	4.701	5.238	1.158	0.483	4.169	2.909	1.749	9.884	10.501
MAXIMUM FLOW.....	141.390	186.029	195.167	41.106	13.769	161.717	104.671	60.080	393.951	341.330
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).....	5.00E+05	3.98E+05	4.86E+05	1.00E+05	4.69E+04	3.73E+05	2.35E+05	1.50E+05	7.48E+05	1.13E+06

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	85.512	10.325	61.357	86.258	13.490	12.193	27.259	40.325	13.443	14.111
STANDARD DEVIATION OF FLOW.....	20.729	2.661	12.482	12.588	3.649	3.564	6.661	12.026	3.610	3.772
MAXIMUM FLOW.....	757.875	109.756	389.833	358.480	129.758	131.201	239.683	510.304	158.101	149.274
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).....	1.95E+06	2.35E+05	1.40E+06	1.97E+06	3.08E+05	2.78E+05	6.21E+05	9.19E+05	3.06E+05	3.22E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	6.251	14.197	6.303	10.646	6.346	5.689	10.780	4.064	27.493	10.791
STANDARD DEVIATION OF FLOW.....	1.610	3.610	1.736	2.910	1.731	1.605	2.872	0.986	7.811	3.121
MAXIMUM FLOW.....	68.888	128.117	70.000	107.263	65.767	60.098	105.667	30.617	331.915	114.507
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).....	1.43E+05	3.24E+05	1.44E+05	2.43E+05	1.45E+05	1.30E+05	2.46E+05	9.26E+04	6.27E+05	2.46E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	20.828	23.513	47.963	6.431	59.174
STANDARD DEVIATION OF FLOW.....	5.740	6.926	12.880	1.831	12.454
MAXIMUM FLOW.....	235.847	281.754	533.783	65.020	392.350
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	4.75E+05	5.36E+05	1.09E+06	1.47E+05	1.35E+06

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	7.377	8.182	173.993	174.504	16.131	2.004	261.197	357.789	352.213	351.676
STANDARD DEVIATION OF FLOW.....	1.415	1.283	23.508	22.861	0.952	0.077	32.021	43.546	40.033	39.881
MAXIMUM FLOW.....	37.635	33.071	675.350	635.734	28.227	2.366	894.719	1222.886	1173.822	1160.820
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).....	1.68E+05	1.87E+05	3.97E+06	3.98E+06	3.68E+05	4.57E+04	5.96E+06	8.16E+06	8.03E+06	8.02E+06

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	64.107	35.411	35.425	41.979	79.408	79.047	11.377	90.424	89.912	468.088
STANDARD DEVIATION OF FLOW.....	5.599	7.365	7.288	2.775	9.261	9.213	1.432	10.589	10.515	50.135
MAXIMUM FLOW.....	153.685	228.290	226.814	80.169	290.798	290.613	37.374	323.672	320.071	1466.862
MINIMUM FLOW.....	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.46E+06	8.07E+05	8.08E+05	9.57E+05	1.81E+06	1.80E+06	2.59E+05	2.06E+06	2.05E+06	1.07E+07

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	466.459	93.716	95.677	116.810	101.789	11.919	11.662	556.371	590.743	11.212
STANDARD DEVIATION OF FLOW.....	49.580	10.448	12.164	14.013	8.477	0.448	0.496	57.152	58.610	0.487
MAXIMUM FLOW.....	1417.762	302.503	353.807	421.713	265.352	15.142	15.126	1633.097	1691.326	15.915
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).....	1.06E+07	2.14E+06	2.18E+06	2.66E+06	2.32E+06	2.72E+05	2.66E+05	1.27E+07	1.35E+07	2.56E+05

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

SHEEP DRAW BASIN
FILENAME: SDB100EC.SUM
EXISTING CONDITIONS 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.
Sheep Draw Basin - Existing Conditions with Existing Facilities - 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.....	112.510	104.122	113.656	95.295	25.387	22.601	24.952	130.354	87.866	71.053
STANDARD DEVIATION OF FLOW.....	19.819	14.722	16.686	11.485	4.871	5.228	6.359	15.605	10.110	11.902
MAXIMUM FLOW.....	571.234	410.076	465.520	323.222	139.586	180.767	242.577	441.123	285.140	338.929
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).....	2.63E+06	2.44E+06	2.66E+06	2.23E+06	5.94E+05	5.29E+05	5.84E+05	3.05E+06	2.06E+06	1.66E+06

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	28.243	25.497	131.363	46.578	22.834	55.543	22.896	34.621	13.512	30.898
STANDARD DEVIATION OF FLOW.....	4.712	5.524	23.429	7.617	4.897	14.694	5.615	9.515	3.288	6.846
MAXIMUM FLOW.....	128.150	166.839	685.357	213.619	147.102	584.932	198.428	397.583	115.960	210.850
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).....	6.61E+05	5.97E+05	3.07E+06	1.09E+06	5.34E+05	1.30E+06	5.36E+05	8.10E+05	3.16E+05	7.23E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	49.487	10.952	78.080	26.558	7.243	10.212	37.343	13.942	11.102	25.098
STANDARD DEVIATION OF FLOW.....	8.376	2.943	13.911	7.667	1.935	2.603	7.999	3.936	2.892	5.870
MAXIMUM FLOW.....	236.020	107.220	402.919	317.502	64.489	86.523	241.460	139.827	104.734	186.210
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).....	1.16E+06	2.56E+05	1.83E+06	6.21E+05	1.69E+05	2.39E+05	8.74E+05	3.26E+05	2.60E+05	5.87E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	4.047	18.268	82.905	28.159	26.412	23.990	42.727	17.347	104.779	25.759
STANDARD DEVIATION OF FLOW.....	0.945	5.050	13.583	7.268	5.962	6.401	11.423	4.828	23.882	6.172
MAXIMUM FLOW.....	27.320	202.579	383.747	249.596	184.110	250.104	443.747	171.076	791.095	224.807
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).....	9.47E+04	4.27E+05	1.94E+06	6.59E+05	6.18E+05	5.61E+05	1.00E+06	4.06E+05	2.45E+06	6.03E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	27.736	21.055	25.095	5.274	2.801	19.129	13.608	8.668	41.444	61.307
STANDARD DEVIATION OF FLOW.....	5.775	5.649	6.246	1.408	0.633	4.931	3.673	2.233	12.136	13.035
MAXIMUM FLOW.....	170.935	218.377	228.564	48.350	17.030	185.505	126.837	73.108	478.631	408.760
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).....	6.49E+05	4.93E+05	5.87E+05	1.23E+05	6.55E+04	4.48E+05	3.18E+05	2.03E+05	9.70E+05	1.43E+06

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	103.782	12.111	83.269	114.568	17.511	16.455	32.976	48.692	15.722	17.165
STANDARD DEVIATION OF FLOW.....	25.209	3.151	16.481	16.615	4.581	4.571	8.089	14.299	4.245	4.599
MAXIMUM FLOW.....	892.690	126.837	495.834	464.300	156.351	161.654	283.072	607.373	184.644	177.211
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).....	2.43E+06	2.83E+05	1.95E+06	2.68E+06	4.10E+05	3.85E+05	7.72E+05	1.14E+06	3.68E+05	4.02E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	6.995	17.460	7.594	14.155	8.037	8.545	13.245	5.379	32.756	15.007
STANDARD DEVIATION OF FLOW.....	1.824	4.431	2.100	3.794	2.186	2.291	3.528	1.271	9.256	4.090
MAXIMUM FLOW.....	78.661	152.288	83.406	133.533	80.460	81.106	126.195	37.830	389.571	143.021
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	4.09E+05	1.78E+05	3.31E+05	1.88E+05	2.00E+05	3.10E+05	1.26E+05	7.66E+05	3.51E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	24.937	28.931	56.674	8.710	75.816
STANDARD DEVIATION OF FLOW.....	6.848	8.372	15.276	2.358	15.770
MAXIMUM FLOW.....	276.105	339.167	612.210	79.996	475.130
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	5.84E+05	6.77E+05	1.33E+06	2.04E+05	1.77E+06

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	35.049	36.258	254.036	254.622	18.939	2.390	368.856	499.210	493.429	492.855
STANDARD DEVIATION OF FLOW.....	6.004	5.678	31.888	31.121	1.144	0.090	43.320	58.731	55.661	55.422
MAXIMUM FLOW.....	164.912	156.096	871.544	844.569	34.790	2.798	1196.788	1637.638	1596.628	1587.495
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).....	8.20E+05	8.48E+05	5.94E+06	5.96E+06	4.43E+05	5.59E+04	8.63E+06	1.17E+07	1.15E+07	1.15E+07

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	86.456	48.221	48.235	49.278	99.903	99.518	13.463	112.981	112.436	650.364
STANDARD DEVIATION OF FLOW.....	7.883	9.735	9.655	3.351	12.117	12.063	1.743	13.748	13.668	70.182
MAXIMUM FLOW.....	218.330	286.688	284.800	99.968	367.992	367.811	46.978	410.300	408.984	2028.403
MINIMUM FLOW.....	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.02E+06	1.13E+06	1.13E+06	1.15E+06	2.34E+06	2.33E+06	3.15E+05	2.64E+06	2.63E+06	1.52E+07

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	648.594	128.350	137.575	165.818	150.625	14.362	14.078	761.030	806.005	13.658
STANDARD DEVIATION OF FLOW.....	69.291	15.986	18.983	22.078	16.794	0.538	0.591	79.146	81.330	0.597
MAXIMUM FLOW.....	1965.064	470.931	556.764	656.343	591.306	18.497	18.474	2256.992	2343.935	19.998
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).....	1.52E+07	3.00E+06	3.22E+06	3.88E+06	3.52E+06	3.36E+05	3.29E+05	1.78E+07	1.89E+07	3.20E+05

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

FUTURE CONDITION
(FUTURE DEVELOPMENT WITH EXISTING FACILITIES)

SHEEP DRAW BASIN
FILENAME: SDB002FC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Existing Facilities - 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.....	35.399	32.881	38.752	31.828	8.410	5.844	6.625	43.250	29.255	23.779
STANDARD DEVIATION OF FLOW.....	7.434	6.160	7.486	5.511	1.843	1.146	1.443	7.447	4.978	4.826
MAXIMUM FLOW.....	265.763	200.847	253.189	171.590	66.971	38.172	52.461	231.420	153.180	167.217
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).....	7.43E+05	6.90E+05	8.14E+05	6.68E+05	1.77E+05	1.23E+05	1.39E+05	9.08E+05	6.14E+05	4.99E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	9.739	8.628	44.892	15.603	7.600	14.066	4.395	7.822	2.918	10.350
STANDARD DEVIATION OF FLOW.....	2.022	1.984	9.417	3.140	1.761	3.175	0.912	1.825	0.601	2.414
MAXIMUM FLOW.....	71.695	76.940	338.141	108.223	68.240	118.731	31.127	71.360	20.324	95.210
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).....	2.05E+05	1.81E+05	9.43E+05	3.28E+05	1.60E+05	2.95E+05	9.23E+04	1.64E+05	6.13E+04	2.17E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	16.747	1.515	26.359	4.415	2.258	2.803	12.511	4.639	1.997	8.203
STANDARD DEVIATION OF FLOW.....	3.437	0.394	5.519	1.108	0.520	0.575	2.913	1.091	0.475	1.969
MAXIMUM FLOW.....	121.090	13.800	198.666	44.560	18.080	19.438	114.170	42.960	16.340	80.070
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).....	3.52E+05	3.18E+04	5.54E+05	9.27E+04	4.74E+04	5.89E+04	2.63E+05	9.74E+04	4.19E+04	1.72E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	0.000	3.358	27.886	3.758	8.571	5.004	7.895	5.701	23.924	6.743
STANDARD DEVIATION OF FLOW.....	0.000	0.798	5.586	0.938	2.025	1.122	1.797	1.242	5.013	1.373
MAXIMUM FLOW.....	0.000	30.670	190.166	35.240	80.990	41.420	66.500	44.532	180.001	47.949
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	7.05E+04	5.86E+05	7.89E+04	1.80E+05	1.05E+05	1.66E+05	1.20E+05	5.02E+05	1.42E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	2.052	3.597	5.646	0.695	0.000	4.593	0.192	2.880	16.608	18.407
STANDARD DEVIATION OF FLOW.....	0.423	0.837	1.182	0.202	0.000	1.005	0.078	0.645	4.444	4.052
MAXIMUM FLOW.....	12.139	31.160	41.517	6.630	0.000	36.029	2.930	23.290	198.767	150.815
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).....	4.31E+04	7.55E+04	1.19E+05	1.46E+04	0.00E+00	9.65E+04	4.03E+03	6.05E+04	3.49E+05	3.87E+05

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	16.297	3.473	27.762	31.227	3.442	5.546	5.379	12.394	4.589	3.331
STANDARD DEVIATION OF FLOW.....	3.412	0.769	6.136	5.615	0.712	1.158	1.140	3.162	1.062	0.742
MAXIMUM FLOW.....	117.877	29.160	229.436	177.406	23.582	40.695	38.758	133.580	43.120	27.220
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).....	3.42E+05	7.29E+04	5.83E+05	6.56E+05	7.23E+04	1.16E+05	1.13E+05	2.60E+05	9.64E+04	6.99E+04

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	2.493	2.072	1.497	3.726	1.174	0.942	4.836	1.590	6.527	3.832
STANDARD DEVIATION OF FLOW.....	0.594	0.505	0.374	0.769	0.299	0.261	1.070	0.397	1.564	0.784
MAXIMUM FLOW.....	24.260	16.763	13.850	26.318	10.590	9.020	38.980	14.320	62.580	26.517
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).....	5.24E+04	4.35E+04	3.14E+04	7.82E+04	2.47E+04	1.98E+04	1.02E+05	3.34E+04	1.37E+05	8.05E+04

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	4.669	5.121	12.537	2.882	24.038
STANDARD DEVIATION OF FLOW.....	1.095	1.312	2.843	0.654	5.596
MAXIMUM FLOW.....	42.170	53.810	106.570	24.270	213.480
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	9.81E+04	1.08E+05	2.63E+05	6.05E+04	5.05E+05

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	0.000	0.000	71.632	72.009	4.614	0.552	108.451	151.701	149.543	149.420
STANDARD DEVIATION OF FLOW.....	0.000	0.000	13.639	13.009	0.246	0.023	18.324	25.625	20.502	20.383
MAXIMUM FLOW.....	0.000	0.000	454.036	392.257	7.087	0.670	551.127	772.049	578.199	573.924
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+06	1.51E+06	9.69E+04	1.16E+04	2.28E+06	3.19E+06	3.14E+06	3.14E+06

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	29.120	16.009	16.043	11.891	28.486	28.331	2.893	31.224	31.020	202.319
STANDARD DEVIATION OF FLOW.....	3.208	3.594	3.513	0.684	3.710	3.633	0.314	3.872	3.763	25.312
MAXIMUM FLOW.....	76.515	132.970	131.528	19.137	140.584	137.269	7.658	142.212	132.162	705.389
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).....	6.12E+05	3.36E+05	3.37E+05	2.50E+05	5.98E+05	5.95E+05	6.07E+04	6.56E+05	6.51E+05	4.25E+06

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	202.051	42.730	33.345	43.084	33.341	2.896	2.797	233.071	246.219	2.386
STANDARD DEVIATION OF FLOW.....	24.960	3.706	3.633	3.633	2.015	0.110	0.128	27.447	27.880	0.101
MAXIMUM FLOW.....	679.792	99.550	93.533	105.243	53.161	3.597	3.580	742.251	758.887	3.160
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).....	4.24E+06	8.97E+05	7.00E+05	9.05E+05	7.00E+05	6.08E+04	5.87E+04	4.89E+06	5.17E+06	5.01E+04

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

SHEEP DRAW BASIN
FILENAME: SDB005FC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Existing Facilities - 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.....	68.104	62.645	68.757	57.302	15.053	10.006	11.228	78.078	52.838	42.650
STANDARD DEVIATION OF FLOW.....	15.232	12.498	14.160	10.615	3.501	2.065	2.561	14.413	9.638	9.230
MAXIMUM FLOW.....	541.416	401.298	477.074	328.180	128.327	68.300	93.087	445.020	294.690	318.146
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).....	1.43E+06	1.32E+06	1.44E+06	1.20E+06	3.16E+05	2.10E+05	2.36E+05	1.64E+06	1.11E+06	8.96E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	17.074	15.323	79.403	27.910	13.602	24.252	8.503	14.109	5.358	18.535
STANDARD DEVIATION OF FLOW.....	3.746	3.730	17.675	5.980	3.340	5.760	1.884	3.497	1.170	4.592
MAXIMUM FLOW.....	132.653	144.080	630.988	205.035	129.300	216.800	64.519	136.870	39.732	181.070
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).....	3.59E+05	3.22E+05	1.67E+06	5.86E+05	2.86E+05	5.09E+05	1.79E+05	2.96E+05	1.13E+05	3.89E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	29.912	3.502	47.106	9.155	4.171	5.116	22.144	8.325	4.078	14.674
STANDARD DEVIATION OF FLOW.....	6.535	0.894	10.499	2.442	0.981	1.113	5.457	2.072	0.987	3.735
MAXIMUM FLOW.....	229.682	31.370	377.348	99.900	34.381	37.682	213.210	82.250	34.080	153.160
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).....	6.28E+05	7.36E+04	9.89E+05	1.92E+05	8.76E+04	1.07E+05	4.65E+05	1.75E+05	8.56E+04	3.08E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	0.515	6.633	49.382	9.167	15.326	9.299	15.573	10.207	44.840	11.490
STANDARD DEVIATION OF FLOW.....	0.134	1.674	10.506	2.405	3.838	2.231	3.789	2.355	10.127	2.457
MAXIMUM FLOW.....	4.087	64.710	356.851	89.890	154.230	81.890	138.673	85.108	365.203	85.492
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).....	1.08E+04	1.39E+05	1.04E+06	1.93E+05	3.22E+05	1.95E+05	3.27E+05	2.14E+05	9.42E+05	2.41E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	6.761	7.372	10.189	1.713	0.268	8.086	2.229	5.138	28.643	32.106
STANDARD DEVIATION OF FLOW.....	1.381	1.811	2.269	0.442	0.081	1.867	0.667	1.212	8.049	7.472
MAXIMUM FLOW.....	40.879	67.200	79.956	14.590	2.537	67.271	24.368	43.850	359.363	279.534
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).....	1.42E+05	1.55E+05	2.14E+05	3.60E+04	5.63E+03	1.70E+05	4.68E+04	1.08E+05	6.02E+05	6.74E+05

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	34.723	5.399	49.611	58.972	7.193	9.878	11.237	22.315	7.107	5.818
STANDARD DEVIATION OF FLOW.....	7.744	1.224	11.668	11.420	1.574	2.186	2.526	6.049	1.684	1.346
MAXIMUM FLOW.....	267.144	47.210	439.841	357.854	52.260	76.966	86.467	263.610	69.070	49.820
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).....	7.29E+05	1.13E+05	1.04E+06	1.24E+06	1.51E+05	2.07E+05	2.36E+05	4.69E+05	1.49E+05	1.22E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	3.787	5.153	2.659	6.151	2.188	2.120	8.008	2.926	12.398	7.079
STANDARD DEVIATION OF FLOW.....	0.909	1.249	0.654	1.304	0.535	0.523	1.840	0.723	3.180	1.526
MAXIMUM FLOW.....	36.830	42.458	24.670	44.290	19.120	18.480	67.120	26.380	128.650	51.690
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).....	7.95E+04	1.08E+05	5.58E+04	1.29E+05	4.59E+04	4.45E+04	1.68E+05	6.14E+04	2.60E+05	1.49E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	9.137	10.475	22.551	5.186	45.401
STANDARD DEVIATION OF FLOW.....	2.285	2.839	5.434	1.242	11.188
MAXIMUM FLOW.....	88.130	119.460	204.474	46.290	425.470
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.92E+05	2.20E+05	4.74E+05	1.09E+05	9.53E+05

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	0.000	0.000	131.402	131.959	7.956	0.948	197.217	275.295	272.725	272.579
STANDARD DEVIATION OF FLOW.....	0.000	0.000	26.637	25.289	0.440	0.039	35.585	49.752	43.668	43.267
MAXIMUM FLOW.....	0.000	0.000	878.373	742.099	12.817	1.134	1044.823	1468.003	1315.225	1275.441
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	2.76E+06	2.77E+06	1.67E+05	1.99E+04	4.14E+06	5.78E+06	5.73E+06	5.72E+06

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	52.648	28.655	28.677	20.636	50.261	50.005	5.317	55.322	55.020	367.877
STANDARD DEVIATION OF FLOW.....	6.489	6.824	6.704	1.247	7.055	6.936	0.612	7.385	7.217	53.735
MAXIMUM FLOW.....	163.278	251.781	253.806	35.276	270.036	261.639	14.873	271.065	260.354	1562.828
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).....	1.11E+06	6.02E+05	6.02E+05	4.33E+05	1.06E+06	1.05E+06	1.12E+05	1.16E+06	1.16E+06	7.73E+06

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	367.578	76.621	73.870	90.944	75.783	5.292	5.138	422.598	446.271	4.667
STANDARD DEVIATION OF FLOW.....	52.622	8.283	9.061	10.000	4.641	0.202	0.230	57.405	58.418	0.201
MAXIMUM FLOW.....	1467.783	218.799	252.536	299.452	122.764	6.566	6.533	1597.715	1638.925	6.337
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).....	7.72E+06	1.61E+06	1.55E+06	1.91E+06	1.59E+06	1.11E+05	1.08E+05	8.87E+06	9.37E+06	9.80E+04

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

SHEEP DRAW BASIN
FILENAME: SDB010FC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Existing Facilities - 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.....	88.828	82.033	90.206	75.682	19.926	12.948	14.456	103.049	69.636	56.480
STANDARD DEVIATION OF FLOW.....	19.433	16.093	18.335	13.886	4.557	2.635	3.243	18.846	12.579	12.053
MAXIMUM FLOW.....	686.378	507.667	607.238	419.140	162.826	86.388	115.664	569.060	375.580	413.763
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).....	1.87E+06	1.72E+06	1.89E+06	1.59E+06	4.18E+05	2.72E+05	3.04E+05	2.16E+06	1.46E+06	1.19E+06

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	22.427	20.270	104.826	36.937	18.004	31.506	11.647	18.742	7.176	24.536
STANDARD DEVIATION OF FLOW.....	4.849	4.850	22.993	7.805	4.341	7.358	2.532	4.561	1.543	5.970
MAXIMUM FLOW.....	169.486	190.860	820.359	265.478	170.970	278.100	84.075	181.530	51.041	240.010
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).....	4.71E+05	4.26E+05	2.20E+06	7.76E+05	3.78E+05	6.62E+05	2.45E+05	3.94E+05	1.51E+05	5.15E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	39.543	5.085	62.324	12.902	5.544	6.832	29.152	11.029	5.641	19.413
STANDARD DEVIATION OF FLOW.....	8.516	1.241	13.682	3.339	1.277	1.463	7.056	2.694	1.320	4.849
MAXIMUM FLOW.....	296.694	43.380	488.206	134.460	44.920	48.314	281.820	107.880	45.790	200.970
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).....	8.30E+05	1.07E+05	1.31E+06	2.71E+05	1.16E+05	1.43E+05	6.12E+05	2.32E+05	1.18E+05	4.08E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	1.144	9.159	65.284	13.745	20.271	12.544	21.500	13.508	60.518	14.833
STANDARD DEVIATION OF FLOW.....	0.271	2.252	13.707	3.455	4.984	2.955	5.113	3.064	13.449	3.126
MAXIMUM FLOW.....	7.371	86.870	459.846	128.160	203.360	109.920	189.000	107.832	478.003	107.600
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).....	2.40E+04	1.92E+05	1.37E+06	2.89E+05	4.26E+05	2.63E+05	4.51E+05	2.84E+05	1.27E+06	3.11E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	11.023	10.316	13.540	2.494	0.752	10.611	4.331	6.750	37.207	41.926
STANDARD DEVIATION OF FLOW.....	2.140	2.467	2.968	0.605	0.179	2.408	1.151	1.561	10.314	9.603
MAXIMUM FLOW.....	59.166	91.470	102.249	19.930	4.594	85.780	38.406	57.090	485.817	352.597
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).....	2.31E+05	2.17E+05	2.84E+05	5.24E+04	1.58E+04	2.23E+05	9.09E+04	1.42E+05	7.81E+05	8.80E+05

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	49.484	6.787	65.616	79.992	10.164	13.040	15.882	29.638	8.908	7.913
STANDARD DEVIATION OF FLOW.....	10.762	1.524	15.181	15.317	2.171	2.842	3.482	7.888	2.088	1.858
MAXIMUM FLOW.....	361.155	58.680	561.291	469.800	69.576	98.026	114.822	339.080	86.160	69.490
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).....	1.04E+06	1.43E+05	1.38E+06	1.68E+06	2.13E+05	2.74E+05	3.34E+05	6.22E+05	1.87E+05	1.66E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	4.631	7.731	3.594	8.334	3.084	2.879	10.189	3.883	16.865	9.598
STANDARD DEVIATION OF FLOW.....	1.086	1.786	0.886	1.798	0.744	0.681	2.301	0.926	4.228	2.081
MAXIMUM FLOW.....	44.110	57.860	34.060	61.572	27.130	23.550	85.190	34.130	170.860	69.798
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).....	9.72E+04	1.62E+05	7.55E+04	1.75E+05	6.48E+04	6.05E+04	2.14E+05	8.15E+04	3.54E+05	2.02E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	12.576	14.789	30.063	6.863	58.982
STANDARD DEVIATION OF FLOW.....	3.069	3.888	7.124	1.613	14.182
MAXIMUM FLOW.....	118.580	160.090	269.460	60.710	549.760
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.64E+05	3.11E+05	6.31E+05	1.44E+05	1.24E+06

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	2.514	3.366	175.605	176.103	10.288	1.219	262.072	365.122	361.757	361.562
STANDARD DEVIATION OF FLOW.....	0.581	0.512	34.169	32.417	0.570	0.050	45.984	64.570	58.538	57.916
MAXIMUM FLOW.....	16.568	13.500	1114.904	957.764	16.626	1.459	1359.080	1897.256	1725.147	1695.501
MINIMUM FLOW.....	0.000	0.000	0.043	0.000	0.000	0.000	0.012	0.027	0.001	0.000
FLOW VOLUME (CUBIC FEET).....	5.28E+04	7.07E+04	3.69E+06	3.70E+06	2.16E+05	2.56E+04	5.50E+06	7.67E+06	7.60E+06	7.59E+06

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	69.399	37.930	37.958	26.799	65.976	65.672	7.121	72.792	72.380	487.442
STANDARD DEVIATION OF FLOW.....	8.853	8.877	8.732	1.621	9.177	9.037	0.817	9.634	9.439	72.556
MAXIMUM FLOW.....	220.702	331.830	331.883	46.155	352.621	337.295	19.811	349.555	336.459	2087.445
MINIMUM FLOW.....	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.027
FLOW VOLUME (CUBIC FEET).....	1.46E+06	7.97E+05	7.97E+05	5.63E+05	1.39E+06	1.38E+06	1.50E+05	1.53E+06	1.52E+06	1.02E+07

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	486.987	101.714	103.876	126.303	109.874	7.025	6.833	559.367	590.736	6.384
STANDARD DEVIATION OF FLOW.....	70.900	12.410	14.067	15.977	9.204	0.270	0.306	77.356	78.883	0.276
MAXIMUM FLOW.....	1953.537	345.969	399.949	473.944	287.170	8.766	8.751	2126.681	2187.899	8.718
MINIMUM FLOW.....	0.000	0.001	0.000	0.016	0.000	0.000	0.000	0.000	0.041	0.000
FLOW VOLUME (CUBIC FEET).....	1.02E+07	2.14E+06	2.18E+06	2.65E+06	2.31E+06	1.48E+05	1.44E+05	1.17E+07	1.24E+07	1.34E+05

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

SHEEP DRAW BASIN
FILENAME: SDB050FC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Existing Facilities - 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.....	145.383	134.941	150.356	127.496	33.833	21.145	23.410	173.535	116.952	95.553
STANDARD DEVIATION OF FLOW.....	35.035	29.038	33.697	25.620	8.637	4.743	5.836	34.726	23.072	22.597
MAXIMUM FLOW.....	1239.018	946.230	1137.820	797.377	310.396	157.225	208.567	1080.025	710.934	780.259
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).....	3.05E+06	2.83E+06	3.16E+06	2.68E+06	7.10E+05	4.44E+05	4.92E+05	3.64E+06	2.46E+06	2.01E+06

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	37.802	34.591	178.296	62.720	30.570	51.838	20.803	31.932	12.405	41.571
STANDARD DEVIATION OF FLOW.....	9.098	9.297	43.654	14.694	8.253	13.497	5.015	8.699	2.953	11.318
MAXIMUM FLOW.....	319.416	367.122	1565.465	504.000	324.903	516.164	168.905	344.903	99.068	454.273
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).....	7.94E+05	7.26E+05	3.74E+06	1.32E+06	6.42E+05	1.09E+06	4.37E+05	6.71E+05	2.61E+05	8.73E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	66.852	9.778	105.756	23.860	9.505	11.755	49.059	18.704	10.131	32.857
STANDARD DEVIATION OF FLOW.....	15.979	2.617	25.845	6.943	2.417	2.784	13.288	5.112	2.595	9.195
MAXIMUM FLOW.....	559.066	90.890	924.035	266.752	85.616	93.292	532.825	201.609	90.114	374.314
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).....	1.40E+06	2.05E+05	2.22E+06	5.01E+05	2.00E+05	2.47E+05	1.03E+06	3.93E+05	2.13E+05	6.90E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	3.254	16.544	111.491	27.411	34.295	21.943	38.709	22.924	105.403	24.131
STANDARD DEVIATION OF FLOW.....	0.781	4.564	26.065	7.655	9.436	5.792	10.291	5.795	26.042	5.624
MAXIMUM FLOW.....	22.088	172.460	884.817	277.889	381.544	216.157	382.181	206.904	925.213	194.584
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).....	6.83E+04	3.47E+05	2.34E+06	5.76E+05	7.20E+05	4.61E+05	8.13E+05	4.81E+05	2.21E+06	5.07E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	23.792	18.963	23.133	4.770	2.234	17.756	11.167	11.285	61.093	69.324
STANDARD DEVIATION OF FLOW.....	4.919	5.069	5.639	1.249	0.519	4.491	3.139	2.888	18.937	17.666
MAXIMUM FLOW.....	141.390	186.029	195.167	41.106	13.769	161.717	104.671	105.570	939.960	642.593
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).....	5.00E+05	3.98E+05	4.86E+05	1.00E+05	4.69E+04	3.73E+05	2.35E+05	2.37E+05	1.28E+06	1.46E+06

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	92.842	11.210	111.018	140.287	18.931	22.037	29.595	50.609	14.595	15.321
STANDARD DEVIATION OF FLOW.....	22.309	2.867	28.671	29.530	4.445	5.335	7.170	15.165	3.892	4.067
MAXIMUM FLOW.....	757.875	109.756	1048.758	939.410	145.233	184.904	239.683	621.190	158.101	149.274
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).....	1.95E+06	2.35E+05	2.33E+06	2.95E+06	3.98E+05	4.63E+05	6.21E+05	1.06E+06	3.06E+05	3.22E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	6.786	15.414	6.843	16.072	6.930	8.352	16.141	6.577	29.849	18.476
STANDARD DEVIATION OF FLOW.....	1.735	3.888	1.873	3.982	1.881	2.270	4.041	1.712	8.429	4.436
MAXIMUM FLOW.....	68.888	128.117	70.000	136.834	66.380	78.943	149.946	62.909	331.915	149.044
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).....	1.43E+05	3.24E+05	1.44E+05	3.38E+05	1.46E+05	1.75E+05	3.39E+05	1.38E+05	6.27E+05	3.88E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	22.613	27.832	52.074	11.602	95.914
STANDARD DEVIATION OF FLOW.....	6.191	8.325	13.887	3.033	25.508
MAXIMUM FLOW.....	235.847	324.078	533.783	113.438	994.854
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	4.75E+05	5.84E+05	1.09E+06	2.44E+05	2.01E+06

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	59.069	61.039	346.336	346.617	16.854	1.984	490.967	664.503	660.534	660.305
STANDARD DEVIATION OF FLOW.....	11.429	10.693	64.305	61.722	0.986	0.083	86.733	120.904	115.478	113.456
MAXIMUM FLOW.....	345.094	309.001	2084.050	1899.324	28.227	2.366	2671.060	3703.206	3764.388	3588.151
MINIMUM FLOW.....	0.000	0.000	0.085	0.000	0.000	0.000	0.025	0.054	0.001	0.000
FLOW VOLUME (CUBIC FEET).....	1.24E+06	1.28E+06	7.27E+06	7.28E+06	3.54E+05	4.17E+04	1.03E+07	1.40E+07	1.39E+07	1.39E+07

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	116.655	64.403	64.434	44.224	110.642	110.203	12.316	122.519	121.900	872.513
STANDARD DEVIATION OF FLOW.....	17.557	16.849	16.619	2.856	17.393	17.181	1.503	18.213	17.921	143.141
MAXIMUM FLOW.....	567.169	635.298	627.334	80.169	667.406	638.803	37.374	663.399	637.939	4539.191
MINIMUM FLOW.....	0.001	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.000	0.054
FLOW VOLUME (CUBIC FEET).....	2.45E+06	1.35E+06	1.35E+06	9.29E+05	2.32E+06	2.31E+06	2.59E+05	2.57E+06	2.56E+06	1.83E+07

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	871.780	174.853	191.303	229.105	211.611	12.020	11.730	993.680	1046.981	11.439
STANDARD DEVIATION OF FLOW.....	138.735	28.041	32.243	37.710	30.638	0.485	0.538	150.799	153.572	0.521
MAXIMUM FLOW.....	4214.142	831.194	951.767	1130.111	1027.002	15.142	15.126	4574.410	4673.397	15.915
MINIMUM FLOW.....	0.000	0.002	0.000	0.033	0.001	0.000	0.000	0.000	0.083	0.000
FLOW VOLUME (CUBIC FEET).....	1.83E+07	3.67E+06	4.02E+06	4.81E+06	4.44E+06	2.52E+05	2.46E+05	2.09E+07	2.20E+07	2.40E+05

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

SHEEP DRAW BASIN
FILENAME: SDB100FC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Existing Facilities - 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.....	173.341	161.102	180.398	153.556	40.813	25.184	27.803	208.983	140.708	115.186
STANDARD DEVIATION OF FLOW.....	42.265	35.301	41.052	31.428	10.490	5.751	7.014	42.599	28.284	27.554
MAXIMUM FLOW.....	1423.267	1095.630	1323.870	936.538	361.986	180.767	242.577	1264.429	833.248	900.236
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).....	3.64E+06	3.38E+06	3.79E+06	3.22E+06	8.57E+05	5.29E+05	5.84E+05	4.39E+06	2.95E+06	2.42E+06

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	45.454	41.759	215.021	75.632	36.876	61.891	25.513	38.578	15.056	50.134
STANDARD DEVIATION OF FLOW.....	11.073	11.247	53.148	17.941	9.973	16.221	6.187	10.512	3.623	13.656
MAXIMUM FLOW.....	371.608	422.298	1807.318	583.033	373.806	584.932	198.428	397.583	115.960	522.336
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).....	9.55E+05	8.77E+05	4.52E+06	1.59E+06	7.74E+05	1.30E+06	5.36E+05	8.10E+05	3.16E+05	1.05E+06

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	80.565	12.204	127.555	29.593	11.434	14.244	59.008	22.561	12.371	39.611
STANDARD DEVIATION OF FLOW.....	19.471	3.249	31.459	8.479	2.944	3.413	16.009	6.169	3.191	11.064
MAXIMUM FLOW.....	647.942	107.220	1071.704	317.502	98.513	109.098	609.857	233.853	104.734	434.430
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+06	2.56E+05	2.68E+06	6.21E+05	2.40E+05	2.99E+05	1.24E+06	4.74E+05	2.60E+05	8.32E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	4.509	20.356	134.595	34.788	41.338	26.732	47.610	27.648	128.358	28.703
STANDARD DEVIATION OF FLOW.....	1.040	5.580	31.860	9.527	11.371	7.067	12.613	7.042	31.876	6.797
MAXIMUM FLOW.....	27.320	202.579	1030.620	330.629	440.494	250.104	443.747	240.001	1080.396	224.807
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).....	9.47E+04	4.27E+05	2.83E+06	7.31E+05	8.68E+05	5.61E+05	1.00E+06	5.81E+05	2.70E+06	6.03E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	30.906	23.461	27.963	5.877	3.121	21.315	15.163	13.520	72.912	82.951
STANDARD DEVIATION OF FLOW.....	6.332	6.237	6.886	1.554	0.696	5.441	4.056	3.493	22.327	21.306
MAXIMUM FLOW.....	170.935	218.377	228.564	48.350	17.030	185.505	126.837	121.023	1044.180	753.077
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).....	6.49E+05	4.93E+05	5.87E+05	1.23E+05	6.55E+04	4.48E+05	3.18E+05	2.84E+05	1.53E+06	1.74E+06

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	115.643	13.495	133.828	171.177	23.499	26.542	36.745	61.168	17.519	19.127
STANDARD DEVIATION OF FLOW.....	27.771	3.477	34.738	36.516	5.538	6.500	8.914	18.139	4.688	5.078
MAXIMUM FLOW.....	892.690	126.837	1231.996	1097.070	171.161	216.053	283.072	732.466	184.644	177.211
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).....	2.43E+06	2.83E+05	2.81E+06	3.59E+06	4.93E+05	5.57E+05	7.72E+05	1.28E+06	3.68E+05	4.02E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	7.794	19.456	8.462	20.270	8.996	11.585	19.035	7.845	36.499	23.020
STANDARD DEVIATION OF FLOW.....	2.013	4.886	2.320	5.025	2.427	3.111	4.824	2.070	10.231	5.554
MAXIMUM FLOW.....	78.661	152.288	83.406	164.759	81.053	101.866	169.417	72.506	389.571	177.069
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	4.09E+05	1.78E+05	4.26E+05	1.89E+05	2.43E+05	4.00E+05	1.65E+05	7.66E+05	4.83E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	27.787	34.616	63.152	13.982	114.074
STANDARD DEVIATION OF FLOW.....	7.565	10.163	16.869	3.673	30.490
MAXIMUM FLOW.....	276.105	388.076	612.210	130.760	1123.476
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	5.84E+05	7.27E+05	1.33E+06	2.94E+05	2.40E+06

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	101	501	102	306	307	502	542	304	104
AVERAGE FLOW.....	87.027	89.094	430.594	430.920	20.087	2.359	604.563	813.546	809.279	808.958
STANDARD DEVIATION OF FLOW.....	19.750	18.197	82.829	80.239	1.200	0.100	110.824	152.649	148.328	146.137
MAXIMUM FLOW.....	688.518	599.548	2419.500	2233.200	34.790	2.798	3158.871	4392.532	4347.782	4327.168
MINIMUM FLOW.....	0.000	0.000	0.043	0.000	0.000	0.000	0.012	0.027	0.001	0.000
FLOW VOLUME (CUBIC FEET).....	1.83E+06	1.87E+06	9.04E+06	9.05E+06	4.22E+05	4.95E+04	1.27E+07	1.71E+07	1.70E+07	1.70E+07

MO/DA/YR HR:MIN:SEC STEP	309	503	105	316	504	107	319	505	119	506
AVERAGE FLOW.....	140.379	77.690	77.716	52.830	132.906	132.397	14.948	147.345	146.651	1064.523
STANDARD DEVIATION OF FLOW.....	23.043	20.415	20.175	3.489	21.136	20.917	1.862	22.195	21.893	185.438
MAXIMUM FLOW.....	736.669	727.940	730.552	99.968	775.397	759.075	46.978	787.267	754.764	5564.789
MINIMUM FLOW.....	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.027
FLOW VOLUME (CUBIC FEET).....	2.95E+06	1.63E+06	1.63E+06	1.11E+06	2.79E+06	2.78E+06	3.14E+05	3.09E+06	3.08E+06	2.24E+07

MO/DA/YR HR:MIN:SEC STEP	110	313	312	507	311	318	118	508	509	317
AVERAGE FLOW.....	1063.881	211.423	235.026	280.479	262.580	14.533	14.200	1210.532	1274.866	14.035
STANDARD DEVIATION OF FLOW.....	179.967	36.202	42.111	49.492	42.934	0.597	0.658	195.293	199.155	0.651
MAXIMUM FLOW.....	5215.165	1030.702	1200.684	1455.684	1375.529	18.497	18.474	5693.562	5851.835	19.998
MINIMUM FLOW.....	0.000	0.001	0.000	0.016	0.000	0.000	0.000	0.000	0.041	0.000
FLOW VOLUME (CUBIC FEET).....	2.23E+07	4.44E+06	4.94E+06	5.89E+06	5.51E+06	3.05E+05	2.98E+05	2.54E+07	2.68E+07	2.95E+05

MO/DA/YR HR:MIN:SEC STEP	117	121	510	111	511	322	512	122	324	513

PROPOSED CONDITION
(FUTURE DEVELOPMENT WITH PROPOSED FACILITIES)

SHEEP DRAW BASIN
FILENAME: SDB002PC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Comp. Plan Facilities - 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.....	35.399	32.881	38.752	31.828	8.410	5.844	6.625	43.250	29.255	23.779
STANDARD DEVIATION OF FLOW.....	7.434	6.160	7.486	5.511	1.843	1.146	1.443	7.447	4.978	4.826
MAXIMUM FLOW.....	265.763	200.847	253.189	171.590	66.971	38.172	52.461	231.420	153.180	167.217
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).....	7.43E+05	6.90E+05	8.14E+05	6.68E+05	1.77E+05	1.23E+05	1.39E+05	9.08E+05	6.14E+05	4.99E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	9.739	8.628	44.892	15.603	7.600	14.066	4.395	7.822	2.918	10.350
STANDARD DEVIATION OF FLOW.....	2.022	1.984	9.417	3.140	1.761	3.175	0.912	1.825	0.601	2.414
MAXIMUM FLOW.....	71.695	76.940	338.141	108.223	68.240	118.731	31.127	71.360	20.324	95.210
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).....	2.05E+05	1.81E+05	9.43E+05	3.28E+05	1.60E+05	2.95E+05	9.23E+04	1.64E+05	6.13E+04	2.17E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	16.747	1.515	26.359	4.415	2.258	2.803	12.511	4.639	1.997	8.203
STANDARD DEVIATION OF FLOW.....	3.437	0.394	5.519	1.108	0.520	0.575	2.913	1.091	0.475	1.969
MAXIMUM FLOW.....	121.090	13.800	198.666	44.560	18.080	19.438	114.170	42.960	16.340	80.070
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).....	3.52E+05	3.18E+04	5.54E+05	9.27E+04	4.74E+04	5.89E+04	2.63E+05	9.74E+04	4.19E+04	1.72E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	0.000	3.358	27.886	3.758	8.571	5.004	7.895	5.701	23.924	6.743
STANDARD DEVIATION OF FLOW.....	0.000	0.798	5.586	0.938	2.025	1.122	1.797	1.242	5.013	1.373
MAXIMUM FLOW.....	0.000	30.670	190.166	35.240	80.990	41.420	66.500	44.532	180.001	47.949
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	7.05E+04	5.86E+05	7.89E+04	1.80E+05	1.05E+05	1.66E+05	1.20E+05	5.02E+05	1.42E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	2.052	3.597	5.646	0.695	0.000	4.593	0.192	2.880	16.608	18.407
STANDARD DEVIATION OF FLOW.....	0.423	0.837	1.182	0.202	0.000	1.005	0.078	0.645	4.444	4.052
MAXIMUM FLOW.....	12.139	31.160	41.517	6.630	0.000	36.029	2.930	23.290	198.767	150.815
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).....	4.31E+04	7.55E+04	1.19E+05	1.46E+04	0.00E+00	9.65E+04	4.03E+03	6.05E+04	3.49E+05	3.87E+05

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	16.297	3.473	27.762	31.227	3.442	5.546	5.379	12.394	4.589	3.331
STANDARD DEVIATION OF FLOW.....	3.412	0.769	6.136	5.615	0.712	1.158	1.140	3.162	1.062	0.742
MAXIMUM FLOW.....	117.877	29.160	229.436	177.406	23.582	40.695	38.758	133.580	43.120	27.220
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).....	3.42E+05	7.29E+04	5.83E+05	6.56E+05	7.23E+04	1.16E+05	1.13E+05	2.60E+05	9.64E+04	6.99E+04

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	2.493	2.072	1.497	3.726	1.174	0.942	4.836	1.590	6.527	3.832
STANDARD DEVIATION OF FLOW.....	0.594	0.505	0.374	0.769	0.299	0.261	1.070	0.397	1.564	0.784
MAXIMUM FLOW.....	24.260	16.763	13.850	26.318	10.590	9.020	38.980	14.320	62.580	26.517
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).....	5.24E+04	4.35E+04	3.14E+04	7.82E+04	2.47E+04	1.98E+04	1.02E+05	3.34E+04	1.37E+05	8.05E+04

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	4.669	5.121	12.537	2.882	24.038
STANDARD DEVIATION OF FLOW.....	1.095	1.312	2.843	0.654	5.596
MAXIMUM FLOW.....	42.170	53.810	106.570	24.270	213.480
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	9.81E+04	1.08E+05	2.63E+05	6.05E+04	5.05E+05

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	402	403	501	404	405	306	307	408	502
AVERAGE FLOW.....	0.000	19.334	21.267	40.601	12.270	5.102	4.614	0.552	16.879	56.138
STANDARD DEVIATION OF FLOW.....	0.000	0.898	0.961	1.858	0.580	0.217	0.246	0.023	0.807	2.830
MAXIMUM FLOW.....	0.000	26.452	28.477	54.927	16.122	6.865	7.087	0.670	22.246	77.384
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	4.06E+05	4.47E+05	8.53E+05	2.58E+05	1.07E+05	9.69E+04	1.16E+04	3.54E+05	1.18E+06

MO/DA/YR HR:MIN:SEC STEP	542	304	309	415	503	316	504	319	505	410
AVERAGE FLOW.....	73.017	63.309	7.709	5.347	10.449	11.891	22.706	2.893	25.271	12.603
STANDARD DEVIATION OF FLOW.....	3.626	4.192	0.373	0.243	0.457	0.684	1.148	0.314	1.428	0.544
MAXIMUM FLOW.....	99.389	94.847	9.999	7.538	14.391	19.137	33.624	7.658	40.376	16.589
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).....	1.53E+06	1.33E+06	1.62E+05	1.12E+05	2.19E+05	2.50E+05	4.77E+05	6.07E+04	5.31E+05	2.65E+05

MO/DA/YR HR:MIN:SEC STEP	506	110	313	312	507	311	414	318	420	508
AVERAGE FLOW.....	82.574	79.531	9.329	0.000	9.739	2.001	7.808	2.896	7.645	104.342
STANDARD DEVIATION OF FLOW.....	5.006	5.288	0.396	0.000	2.022	0.084	0.334	0.110	0.362	5.975
MAXIMUM FLOW.....	119.986	119.869	11.554	0.000	71.695	2.478	10.182	3.597	11.007	149.766
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).....	1.73E+06	1.67E+06	1.96E+05	0.00E+00	2.05E+05	4.20E+04	1.64E+05	6.08E+04	1.61E+05	2.19E+06

MO/DA/YR HR:MIN:SEC STEP	509	317	421	510	511	322	512	423	427	324

SHEEP DRAW BASIN

FILENAME: SDB005PC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Comp. Plan Facilities - 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.....	68.104	62.645	68.757	57.302	15.053	10.006	11.228	78.078	52.838	42.650
STANDARD DEVIATION OF FLOW.....	15.232	12.498	14.160	10.615	3.501	2.065	2.561	14.413	9.638	9.230
MAXIMUM FLOW.....	541.416	401.298	477.074	328.180	128.327	68.300	93.087	445.020	294.690	318.146
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).....	1.43E+06	1.32E+06	1.44E+06	1.20E+06	3.16E+05	2.10E+05	2.36E+05	1.64E+06	1.11E+06	8.96E+05

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	17.074	15.323	79.403	27.910	13.602	24.252	8.503	14.109	5.358	18.535
STANDARD DEVIATION OF FLOW.....	3.746	3.730	17.675	5.980	3.340	5.760	1.884	3.497	1.170	4.592
MAXIMUM FLOW.....	132.653	144.080	630.988	205.035	129.300	216.800	64.519	136.870	39.732	181.070
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).....	3.59E+05	3.22E+05	1.67E+06	5.86E+05	2.86E+05	5.09E+05	1.79E+05	2.96E+05	1.13E+05	3.89E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	29.912	3.502	47.106	9.155	4.171	5.116	22.144	8.325	4.078	14.674
STANDARD DEVIATION OF FLOW.....	6.535	0.894	10.499	2.442	0.981	1.113	5.457	2.072	0.987	3.735
MAXIMUM FLOW.....	229.682	31.370	377.348	99.900	34.381	37.682	213.210	82.250	34.080	153.160
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).....	6.28E+05	7.36E+04	9.89E+05	1.92E+05	8.76E+04	1.07E+05	4.65E+05	1.75E+05	8.56E+04	3.08E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	0.515	6.633	49.382	9.167	15.326	9.299	15.573	10.207	44.840	11.490
STANDARD DEVIATION OF FLOW.....	0.134	1.674	10.506	2.405	3.838	2.231	3.789	2.355	10.127	2.457
MAXIMUM FLOW.....	4.087	64.710	356.851	89.890	154.230	81.890	138.673	85.108	365.203	85.492
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).....	1.08E+04	1.39E+05	1.04E+06	1.93E+05	3.22E+05	1.95E+05	3.27E+05	2.14E+05	9.42E+05	2.41E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	6.761	7.372	10.189	1.713	0.268	8.086	2.229	5.138	28.643	32.106
STANDARD DEVIATION OF FLOW.....	1.381	1.811	2.269	0.442	0.081	1.867	0.667	1.212	8.049	7.472
MAXIMUM FLOW.....	40.879	67.200	79.956	14.590	2.537	67.271	24.368	43.850	359.363	279.534
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).....	1.42E+05	1.55E+05	2.14E+05	3.60E+04	5.63E+03	1.70E+05	4.68E+04	1.08E+05	6.02E+05	6.74E+05

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	34.723	5.399	49.611	58.972	7.193	9.878	11.237	22.315	7.107	5.818
STANDARD DEVIATION OF FLOW.....	7.744	1.224	11.668	11.420	1.574	2.186	2.526	6.049	1.684	1.346
MAXIMUM FLOW.....	267.144	47.210	439.841	357.854	52.260	76.966	86.467	263.610	69.070	49.820
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).....	7.29E+05	1.13E+05	1.04E+06	1.24E+06	1.51E+05	2.07E+05	2.36E+05	4.69E+05	1.49E+05	1.22E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	3.787	5.153	2.659	6.151	2.188	2.120	8.008	2.926	12.398	7.079
STANDARD DEVIATION OF FLOW.....	0.909	1.249	0.654	1.304	0.535	0.523	1.840	0.723	3.180	1.526
MAXIMUM FLOW.....	36.830	42.458	24.670	44.290	19.120	18.480	67.120	26.380	128.650	51.690
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).....	7.95E+04	1.08E+05	5.58E+04	1.29E+05	4.59E+04	4.45E+04	1.68E+05	6.14E+04	2.60E+05	1.49E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	9.137	10.475	22.551	5.186	45.401
STANDARD DEVIATION OF FLOW.....	2.285	2.839	5.434	1.242	11.188
MAXIMUM FLOW.....	88.130	119.460	204.474	46.290	425.470
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.92E+05	2.20E+05	4.74E+05	1.09E+05	9.53E+05

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	402	403	501	404	405	306	307	408	502
AVERAGE FLOW.....	0.000	37.263	38.190	75.453	22.403	9.229	7.956	0.948	30.920	103.382
STANDARD DEVIATION OF FLOW.....	0.000	1.764	1.745	3.508	1.052	0.403	0.440	0.039	1.468	5.261
MAXIMUM FLOW.....	0.000	52.525	52.336	104.853	29.419	12.782	12.817	1.134	40.750	145.838
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	7.83E+05	8.02E+05	1.58E+06	4.70E+05	1.94E+05	1.67E+05	1.99E+04	6.49E+05	2.17E+06

MO/DA/YR HR:MIN:SEC STEP	542	304	309	415	503	316	504	319	505	410
AVERAGE FLOW.....	134.302	118.441	14.142	9.657	18.886	20.636	40.182	5.317	45.009	22.877
STANDARD DEVIATION OF FLOW.....	6.710	7.575	0.675	0.456	0.853	1.247	2.109	0.612	2.652	0.999
MAXIMUM FLOW.....	186.330	175.103	18.173	14.216	26.958	35.276	62.778	14.873	76.320	30.796
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).....	2.82E+06	2.49E+06	2.97E+05	2.03E+05	3.97E+05	4.33E+05	8.44E+05	1.12E+05	9.45E+05	4.80E+05

MO/DA/YR HR:MIN:SEC STEP	506	110	313	312	507	311	414	318	420	508
AVERAGE FLOW.....	153.586	148.140	16.743	0.000	17.074	3.556	14.135	5.292	13.812	192.460
STANDARD DEVIATION OF FLOW.....	9.059	9.602	0.702	0.000	3.746	0.147	0.609	0.202	0.683	10.753
MAXIMUM FLOW.....	220.916	220.693	20.467	0.000	132.653	4.343	18.790	6.566	20.936	274.114
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).....	3.23E+06	3.11E+06	3.52E+05	0.00E+00	3.59E+05	7.47E+04	2.97E+05	1.11E+05	2.90E+05	4.04E+06

MO/DA/YR HR:MIN:SEC STEP	509	317	421	510	511	322	512	423	427	324

SHEEP DRAW BASIN
FILENAME: SDB010PC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Comp. Plan Facilities - 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.....	88.828	82.033	90.206	75.682	19.926	12.948	14.456	103.049	69.636	56.480
STANDARD DEVIATION OF FLOW.....	19.433	16.093	18.335	13.886	4.557	2.635	3.243	18.846	12.579	12.053
MAXIMUM FLOW.....	686.378	507.667	607.238	419.140	162.826	86.388	115.664	569.060	375.580	413.763
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).....	1.87E+06	1.72E+06	1.89E+06	1.59E+06	4.18E+05	2.72E+05	3.04E+05	2.16E+06	1.46E+06	1.19E+06

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	22.427	20.270	104.826	36.937	18.004	31.506	11.647	18.742	7.176	24.536
STANDARD DEVIATION OF FLOW.....	4.849	4.850	22.993	7.805	4.341	7.358	2.532	4.561	1.543	5.970
MAXIMUM FLOW.....	169.486	190.860	820.359	265.478	170.970	278.100	84.075	181.530	51.041	240.010
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).....	4.71E+05	4.26E+05	2.20E+06	7.76E+05	3.78E+05	6.62E+05	2.45E+05	3.94E+05	1.51E+05	5.15E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	39.543	5.085	62.324	12.902	5.544	6.832	29.152	11.029	5.641	19.413
STANDARD DEVIATION OF FLOW.....	8.516	1.241	13.682	3.339	1.277	1.463	7.056	2.694	1.320	4.849
MAXIMUM FLOW.....	296.694	43.380	488.206	134.460	44.920	48.314	281.820	107.880	45.790	200.970
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).....	8.30E+05	1.07E+05	1.31E+06	2.71E+05	1.16E+05	1.43E+05	6.12E+05	2.32E+05	1.18E+05	4.08E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	1.144	9.159	65.284	13.745	20.271	12.544	21.500	13.508	60.518	14.833
STANDARD DEVIATION OF FLOW.....	0.271	2.252	13.707	3.455	4.984	2.955	5.113	3.064	13.449	3.126
MAXIMUM FLOW.....	7.371	86.870	459.846	128.160	203.360	109.920	189.000	107.832	478.003	107.600
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).....	2.40E+04	1.92E+05	1.37E+06	2.89E+05	4.26E+05	2.63E+05	4.51E+05	2.84E+05	1.27E+06	3.11E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	11.023	10.316	13.540	2.494	0.752	10.611	4.331	6.750	37.207	41.926
STANDARD DEVIATION OF FLOW.....	2.140	2.467	2.968	0.605	0.179	2.408	1.151	1.561	10.314	9.603
MAXIMUM FLOW.....	59.166	91.470	102.249	19.930	4.594	85.780	38.406	57.090	485.817	352.597
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).....	2.31E+05	2.17E+05	2.84E+05	5.24E+04	1.58E+04	2.23E+05	9.09E+04	1.42E+05	7.81E+05	8.80E+05

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	49.484	6.787	65.616	79.992	10.164	13.040	15.882	29.638	8.908	7.913
STANDARD DEVIATION OF FLOW.....	10.762	1.524	15.181	15.317	2.171	2.842	3.482	7.888	2.088	1.858
MAXIMUM FLOW.....	361.155	58.680	561.291	469.800	69.576	98.026	114.822	339.080	86.160	69.490
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).....	1.04E+06	1.43E+05	1.38E+06	1.68E+06	2.13E+05	2.74E+05	3.34E+05	6.22E+05	1.87E+05	1.66E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	4.631	7.731	3.594	8.334	3.084	2.879	10.189	3.883	16.865	9.598
STANDARD DEVIATION OF FLOW.....	1.086	1.786	0.886	1.798	0.744	0.681	2.301	0.926	4.228	2.081
MAXIMUM FLOW.....	44.110	57.860	34.060	61.572	27.130	23.550	85.190	34.130	170.860	69.798
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).....	9.72E+04	1.62E+05	7.55E+04	1.75E+05	6.48E+04	6.05E+04	2.14E+05	8.15E+04	3.54E+05	2.02E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	12.576	14.789	30.063	6.863	58.982
STANDARD DEVIATION OF FLOW.....	3.069	3.888	7.124	1.613	14.182
MAXIMUM FLOW.....	118.580	160.090	269.460	60.710	549.760
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	2.64E+05	3.11E+05	6.31E+05	1.44E+05	1.24E+06

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	402	403	501	404	405	306	307	408	502
AVERAGE FLOW.....	0.000	48.730	50.070	98.800	29.564	12.208	10.288	1.219	40.779	135.464
STANDARD DEVIATION OF FLOW.....	0.000	2.317	2.301	4.616	1.397	0.536	0.570	0.050	1.947	6.927
MAXIMUM FLOW.....	0.000	68.989	68.999	137.988	38.999	16.998	16.626	1.459	53.999	191.977
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	1.02E+06	1.05E+06	2.07E+06	6.21E+05	2.56E+05	2.16E+05	2.56E+04	8.56E+05	2.84E+06

MO/DA/YR HR:MIN:SEC STEP	542	304	309	415	503	316	504	319	505	410
AVERAGE FLOW.....	176.243	156.239	18.618	12.776	24.984	26.799	52.646	7.121	59.163	30.278
STANDARD DEVIATION OF FLOW.....	8.850	10.059	0.894	0.606	1.133	1.621	2.767	0.817	3.491	1.330
MAXIMUM FLOW.....	245.753	240.980	23.965	18.973	35.898	46.155	82.874	19.811	101.016	40.999
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	3.70E+06	3.28E+06	3.91E+05	2.68E+05	5.25E+05	5.63E+05	1.11E+06	1.50E+05	1.24E+06	6.36E+05

MO/DA/YR HR:MIN:SEC STEP	506	110	313	312	507	311	414	318	420	508
AVERAGE FLOW.....	202.707	195.646	22.085	0.000	22.427	4.665	18.693	7.025	18.278	253.964
STANDARD DEVIATION OF FLOW.....	12.068	12.777	0.932	0.000	4.849	0.194	0.811	0.270	0.907	14.353
MAXIMUM FLOW.....	303.551	302.895	26.995	0.000	169.486	5.695	24.999	8.766	27.998	378.480
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).....	4.26E+06	4.11E+06	4.64E+05	0.00E+00	4.71E+05	9.80E+04	3.93E+05	1.48E+05	3.84E+05	5.33E+06

MO/DA/YR HR:MIN:SEC STEP	509	317	421	510	511	322	512	423	427	324

SHEEP DRAW BASIN
FILENAME: SDB050PC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Comp. Plan Facilities - 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.....	145.383	134.941	150.356	127.496	33.833	21.145	23.410	173.535	116.952	95.553
STANDARD DEVIATION OF FLOW.....	35.035	29.038	33.697	25.620	8.637	4.743	5.836	34.726	23.072	22.597
MAXIMUM FLOW.....	1239.018	946.230	1137.820	797.377	310.396	157.225	208.567	1080.025	710.934	780.259
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).....	3.05E+06	2.83E+06	3.16E+06	2.68E+06	7.10E+05	4.44E+05	4.92E+05	3.64E+06	2.46E+06	2.01E+06

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	37.802	34.591	178.296	62.720	30.570	51.838	20.803	31.932	12.405	41.571
STANDARD DEVIATION OF FLOW.....	9.098	9.297	43.654	14.694	8.253	13.497	5.015	8.699	2.953	11.318
MAXIMUM FLOW.....	319.416	367.122	1565.465	504.000	324.903	516.164	168.905	344.903	99.068	454.273
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).....	7.94E+05	7.26E+05	3.74E+06	1.32E+06	6.42E+05	1.09E+06	4.37E+05	6.71E+05	2.61E+05	8.73E+05

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	66.852	9.778	105.756	23.860	9.505	11.755	49.059	18.704	10.131	32.857
STANDARD DEVIATION OF FLOW.....	15.979	2.617	25.845	6.943	2.417	2.784	13.288	5.112	2.595	9.195
MAXIMUM FLOW.....	559.066	90.890	924.035	266.752	85.616	93.292	532.825	201.609	90.114	374.314
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).....	1.40E+06	2.05E+05	2.22E+06	5.01E+05	2.00E+05	2.47E+05	1.03E+06	3.93E+05	2.13E+05	6.90E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	3.254	16.544	111.491	27.411	34.295	21.943	38.709	22.924	105.403	24.131
STANDARD DEVIATION OF FLOW.....	0.781	4.564	26.065	7.655	9.436	5.792	10.291	5.795	26.042	5.624
MAXIMUM FLOW.....	22.088	172.460	884.817	277.889	381.544	216.157	382.181	206.904	925.213	194.584
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).....	6.83E+04	3.47E+05	2.34E+06	5.76E+05	7.20E+05	4.61E+05	8.13E+05	4.81E+05	2.21E+06	5.07E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	23.792	18.963	23.133	4.770	2.234	17.756	11.167	11.285	61.093	69.324
STANDARD DEVIATION OF FLOW.....	4.919	5.069	5.639	1.249	0.519	4.491	3.139	2.888	18.937	17.666
MAXIMUM FLOW.....	141.390	186.029	195.167	41.106	13.769	161.717	104.671	105.570	939.960	642.593
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).....	5.00E+05	3.98E+05	4.86E+05	1.00E+05	4.69E+04	3.73E+05	2.35E+05	2.37E+05	1.28E+06	1.46E+06

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	92.842	11.210	111.018	140.287	18.931	22.037	29.595	50.609	14.595	15.321
STANDARD DEVIATION OF FLOW.....	22.309	2.867	28.671	29.530	4.445	5.335	7.170	15.165	3.892	4.067
MAXIMUM FLOW.....	757.875	109.756	1048.758	939.410	145.233	184.904	239.683	621.190	158.101	149.274
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).....	1.95E+06	2.35E+05	2.33E+06	2.95E+06	3.98E+05	4.63E+05	6.21E+05	1.06E+06	3.06E+05	3.22E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	6.786	15.414	6.843	16.072	6.930	8.352	16.141	6.577	29.849	18.476
STANDARD DEVIATION OF FLOW.....	1.735	3.888	1.873	3.982	1.881	2.270	4.041	1.712	8.429	4.436
MAXIMUM FLOW.....	68.888	128.117	70.000	136.834	66.380	78.943	149.946	62.909	331.915	149.044
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).....	1.43E+05	3.24E+05	1.44E+05	3.38E+05	1.46E+05	1.75E+05	3.39E+05	1.38E+05	6.27E+05	3.88E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	22.613	27.832	52.074	11.602	95.914
STANDARD DEVIATION OF FLOW.....	6.191	8.325	13.887	3.033	25.508
MAXIMUM FLOW.....	235.847	324.078	533.783	113.438	994.854
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	4.75E+05	5.84E+05	1.09E+06	2.44E+05	2.01E+06

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	402	403	501	404	405	306	307	408	502
AVERAGE FLOW.....	50.609	98.403	106.730	254.626	77.920	25.660	16.854	1.984	106.592	344.934
STANDARD DEVIATION OF FLOW.....	4.243	10.096	11.332	23.550	8.387	3.156	0.986	0.083	11.479	32.721
MAXIMUM FLOW.....	103.539	285.798	320.325	661.320	218.829	96.852	28.227	2.366	299.888	889.852
MINIMUM FLOW.....	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.06E+06	2.07E+06	2.24E+06	5.35E+06	1.64E+06	5.39E+05	3.54E+05	4.17E+04	2.24E+06	7.24E+06

MO/DA/YR HR:MIN:SEC STEP	542	304	309	415	503	316	504	319	505	410
AVERAGE FLOW.....	451.526	428.907	60.952	24.987	50.647	44.224	96.488	12.316	108.076	67.722
STANDARD DEVIATION OF FLOW.....	44.141	43.232	6.022	3.207	6.288	2.856	8.752	1.503	10.188	7.915
MAXIMUM FLOW.....	1189.643	1168.753	148.573	104.546	198.700	80.169	277.792	37.374	313.636	229.826
MINIMUM FLOW.....	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.000
FLOW VOLUME (CUBIC FEET).....	9.48E+06	9.01E+06	1.28E+06	5.25E+05	1.06E+06	9.29E+05	2.03E+06	2.59E+05	2.27E+06	1.42E+06

MO/DA/YR HR:MIN:SEC STEP	506	110	313	312	507	311	414	318	420	508
AVERAGE FLOW.....	554.620	546.142	92.210	84.452	122.254	101.416	43.332	12.020	34.868	653.193
STANDARD DEVIATION OF FLOW.....	52.421	52.700	11.519	12.479	14.352	13.090	5.042	0.485	4.567	57.548
MAXIMUM FLOW.....	1453.257	1413.017	297.885	344.655	421.617	345.947	144.640	15.142	151.126	1593.688
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.033	0.000	0.000	0.000	0.001	0.000
FLOW VOLUME (CUBIC FEET).....	1.16E+07	1.15E+07	1.94E+06	1.77E+06	2.57E+06	2.13E+06	9.10E+05	2.52E+05	7.32E+05	1.37E+07

MO/DA/YR HR:MIN:SEC STEP	509	317	421	510	511	322	512	423	427	324

SHEEP DRAW BASIN
FILENAME: SDB100PC.SUM
FUTURE CONDITIONS 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.
Sheep Draw Basin - Future Conditions with Comp. Plan Facilities - 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.....	173.341	161.102	180.398	153.556	40.813	25.184	27.803	208.983	140.708	115.186
STANDARD DEVIATION OF FLOW.....	42.265	35.301	41.052	31.428	10.490	5.751	7.014	42.599	28.284	27.554
MAXIMUM FLOW.....	1423.267	1095.630	1323.870	936.538	361.986	180.767	242.577	1264.429	833.248	900.236
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).....	3.64E+06	3.38E+06	3.79E+06	3.22E+06	8.57E+05	5.29E+05	5.84E+05	4.39E+06	2.95E+06	2.42E+06

MO/DA/YR HR:MIN:SEC STEP	11	12	13	14	15	16	17	18	19	20
AVERAGE FLOW.....	45.454	41.759	215.021	75.632	36.876	61.891	25.513	38.578	15.056	50.134
STANDARD DEVIATION OF FLOW.....	11.073	11.247	53.148	17.941	9.973	16.221	6.187	10.512	3.623	13.656
MAXIMUM FLOW.....	371.608	422.298	1807.318	583.033	373.806	584.932	198.428	397.583	115.960	522.336
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).....	9.55E+05	8.77E+05	4.52E+06	1.59E+06	7.74E+05	1.30E+06	5.36E+05	8.10E+05	3.16E+05	1.05E+06

MO/DA/YR HR:MIN:SEC STEP	21	22	23	24	25	26	27	28	29	30
AVERAGE FLOW.....	80.565	12.204	127.555	29.593	11.434	14.244	59.008	22.561	12.371	39.611
STANDARD DEVIATION OF FLOW.....	19.471	3.249	31.459	8.479	2.944	3.413	16.009	6.169	3.191	11.064
MAXIMUM FLOW.....	647.942	107.220	1071.704	317.502	98.513	109.098	609.857	233.853	104.734	434.430
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+06	2.56E+05	2.68E+06	6.21E+05	2.40E+05	2.99E+05	1.24E+06	4.74E+05	2.60E+05	8.32E+05

MO/DA/YR HR:MIN:SEC STEP	31	32	33	34	35	36	37	38	39	40
AVERAGE FLOW.....	4.509	20.356	134.595	34.788	41.338	26.732	47.610	27.648	128.358	28.703
STANDARD DEVIATION OF FLOW.....	1.040	5.580	31.860	9.527	11.371	7.067	12.613	7.042	31.876	6.797
MAXIMUM FLOW.....	27.320	202.579	1030.620	330.629	440.494	250.104	443.747	240.001	1080.396	224.807
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).....	9.47E+04	4.27E+05	2.83E+06	7.31E+05	8.68E+05	5.61E+05	1.00E+06	5.81E+05	2.70E+06	6.03E+05

MO/DA/YR HR:MIN:SEC STEP	41	42	43	44	45	46	47	48	49	50
AVERAGE FLOW.....	30.906	23.461	27.963	5.877	3.121	21.315	15.163	13.520	72.912	82.951
STANDARD DEVIATION OF FLOW.....	6.332	6.237	6.886	1.554	0.696	5.441	4.056	3.493	22.327	21.306
MAXIMUM FLOW.....	170.935	218.377	228.564	48.350	17.030	185.505	126.837	121.023	1044.180	753.077
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).....	6.49E+05	4.93E+05	5.87E+05	1.23E+05	6.55E+04	4.48E+05	3.18E+05	2.84E+05	1.53E+06	1.74E+06

MO/DA/YR HR:MIN:SEC STEP	51	52	53	54	55	56	57	58	59	60
AVERAGE FLOW.....	115.643	13.495	133.828	171.177	23.499	26.542	36.745	61.168	17.519	19.127
STANDARD DEVIATION OF FLOW.....	27.771	3.477	34.738	36.516	5.538	6.500	8.914	18.139	4.688	5.078
MAXIMUM FLOW.....	892.690	126.837	1231.996	1097.070	171.161	216.053	283.072	732.466	184.644	177.211
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).....	2.43E+06	2.83E+05	2.81E+06	3.59E+06	4.93E+05	5.57E+05	7.72E+05	1.28E+06	3.68E+05	4.02E+05

MO/DA/YR HR:MIN:SEC STEP	61	62	63	64	65	66	67	68	69	70
AVERAGE FLOW.....	7.794	19.456	8.462	20.270	8.996	11.585	19.035	7.845	36.499	23.020
STANDARD DEVIATION OF FLOW.....	2.013	4.886	2.320	5.025	2.427	3.111	4.824	2.070	10.231	5.554
MAXIMUM FLOW.....	78.661	152.288	83.406	164.759	81.053	101.866	169.417	72.506	389.571	177.069
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	4.09E+05	1.78E+05	4.26E+05	1.89E+05	2.43E+05	4.00E+05	1.65E+05	7.66E+05	4.83E+05

MO/DA/YR HR:MIN:SEC STEP	71	72	73	74	75
AVERAGE FLOW.....	27.787	34.616	63.152	13.982	114.074
STANDARD DEVIATION OF FLOW.....	7.565	10.163	16.869	3.673	30.490
MAXIMUM FLOW.....	276.105	388.076	612.210	130.760	1123.476
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	5.84E+05	7.27E+05	1.33E+06	2.94E+05	2.40E+06

CONVEYANCE ELEMENT OUTFLOWS

MO/DA/YR HR:MIN:SEC STEP	301	402	403	501	404	405	306	307	408	502
AVERAGE FLOW.....	76.240	123.666	135.759	334.369	103.090	32.499	20.087	2.359	140.831	452.708
STANDARD DEVIATION OF FLOW.....	6.464	14.667	16.642	35.198	12.358	4.699	1.200	0.100	16.897	48.138
MAXIMUM FLOW.....	164.952	409.958	465.942	991.718	322.940	139.892	34.790	2.798	441.952	1328.545
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).....	1.60E+06	2.60E+06	2.85E+06	7.02E+06	2.16E+06	6.82E+05	4.22E+05	4.95E+04	2.96E+06	9.51E+06

MO/DA/YR HR:MIN:SEC STEP	542	304	309	415	503	316	504	319	505	410
AVERAGE FLOW.....	593.539	570.356	83.632	31.219	63.718	52.830	118.535	14.948	132.693	86.848
STANDARD DEVIATION OF FLOW.....	64.946	63.591	8.788	4.778	9.387	3.489	12.269	1.862	14.039	11.842
MAXIMUM FLOW.....	1769.609	1737.889	217.971	146.835	283.468	99.968	381.529	46.978	426.542	338.991
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.25E+07	1.20E+07	1.76E+06	6.56E+05	1.34E+06	1.11E+06	2.49E+06	3.14E+05	2.79E+06	1.82E+06

MO/DA/YR HR:MIN:SEC STEP	506	110	313	312	507	311	414	318	420	508
AVERAGE FLOW.....	737.661	728.632	128.162	127.572	173.025	152.181	55.897	14.533	43.364	860.214
STANDARD DEVIATION OF FLOW.....	77.525	77.189	17.721	19.775	22.806	21.535	7.553	0.597	6.751	84.208
MAXIMUM FLOW.....	2158.866	2075.804	470.979	556.677	726.758	590.880	213.946	18.497	210.843	2324.188
MINIMUM FLOW.....	0.000	0.000	0.000	0.000	0.016	0.000	0.000	0.000	0.000	0.000
FLOW VOLUME (CUBIC FEET).....	1.55E+07	1.53E+07	2.69E+06	2.68E+06	3.63E+06	3.20E+06	1.17E+06	3.05E+05	9.11E+05	1.81E+07

MO/DA/YR HR:MIN:SEC STEP	509	317	421	510	511	322	512	423	427	324

FLOOD HYDROGRAPHS

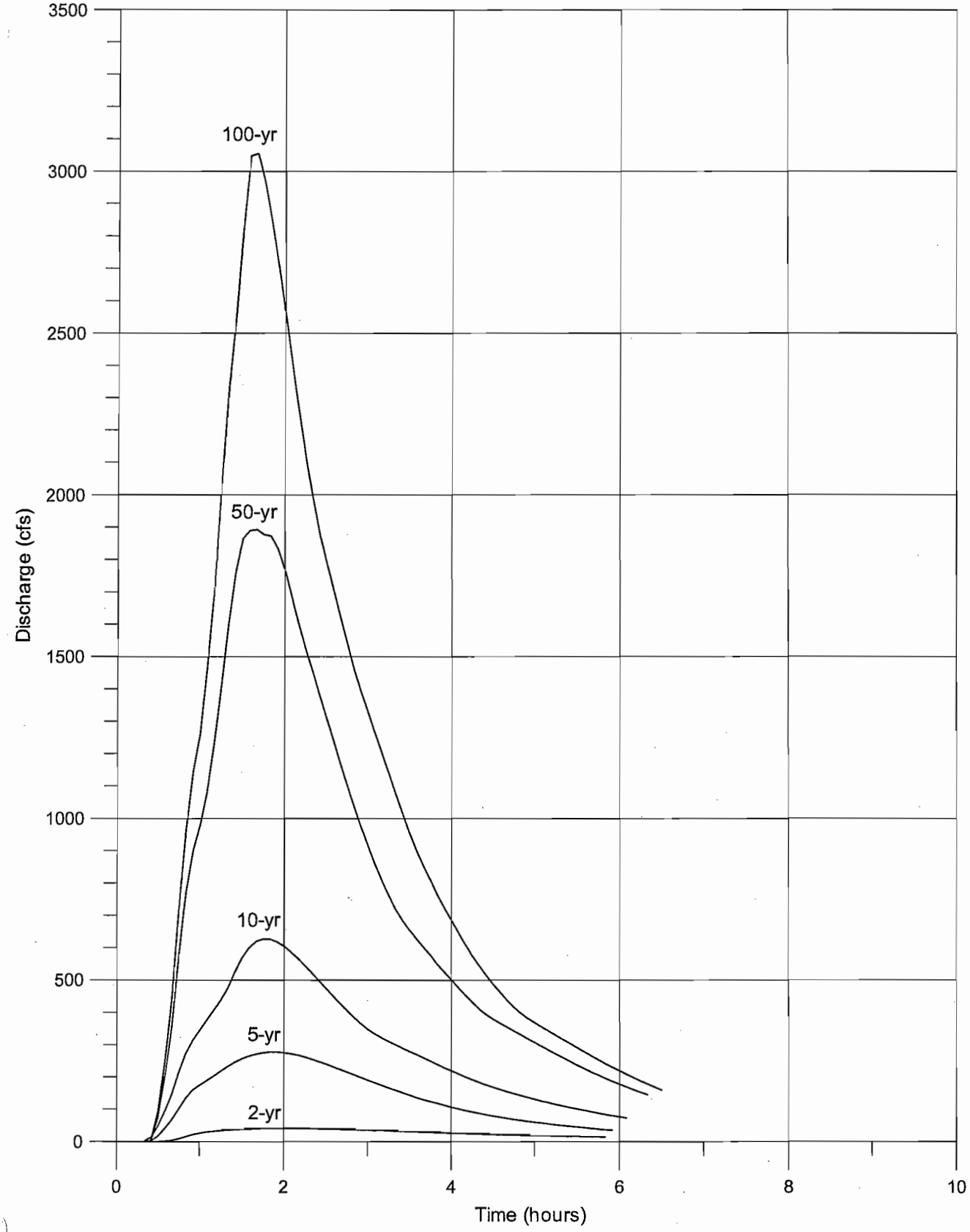


Figure D-1 Flood Hydrographs Downstream of 95th Avenue
Existing Condition (EPA SWMM Node 510)

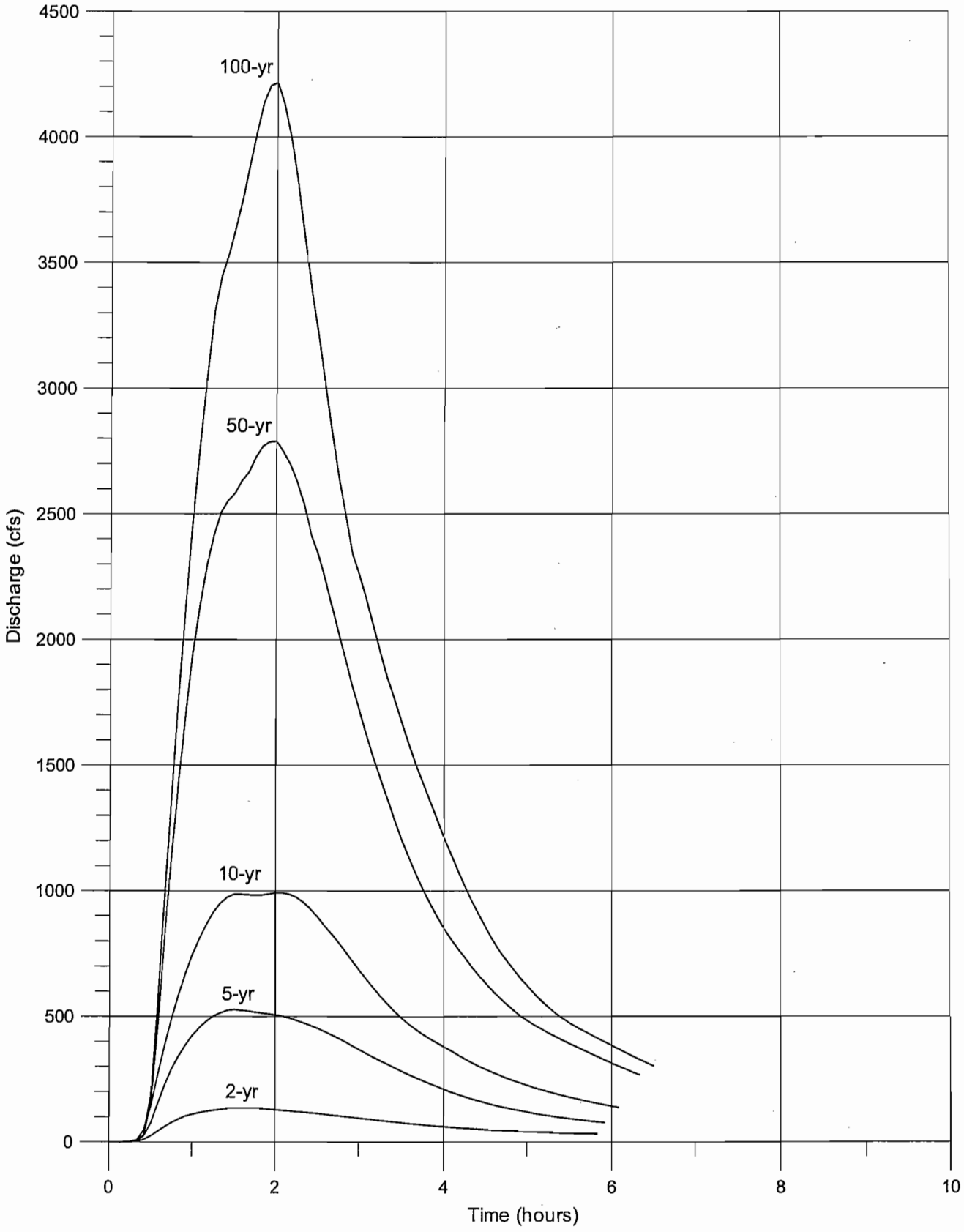


Figure D-2 Flood Hydrographs Downstream of 71st Avenue
Existing Condition (EPA SWMM Node 523)

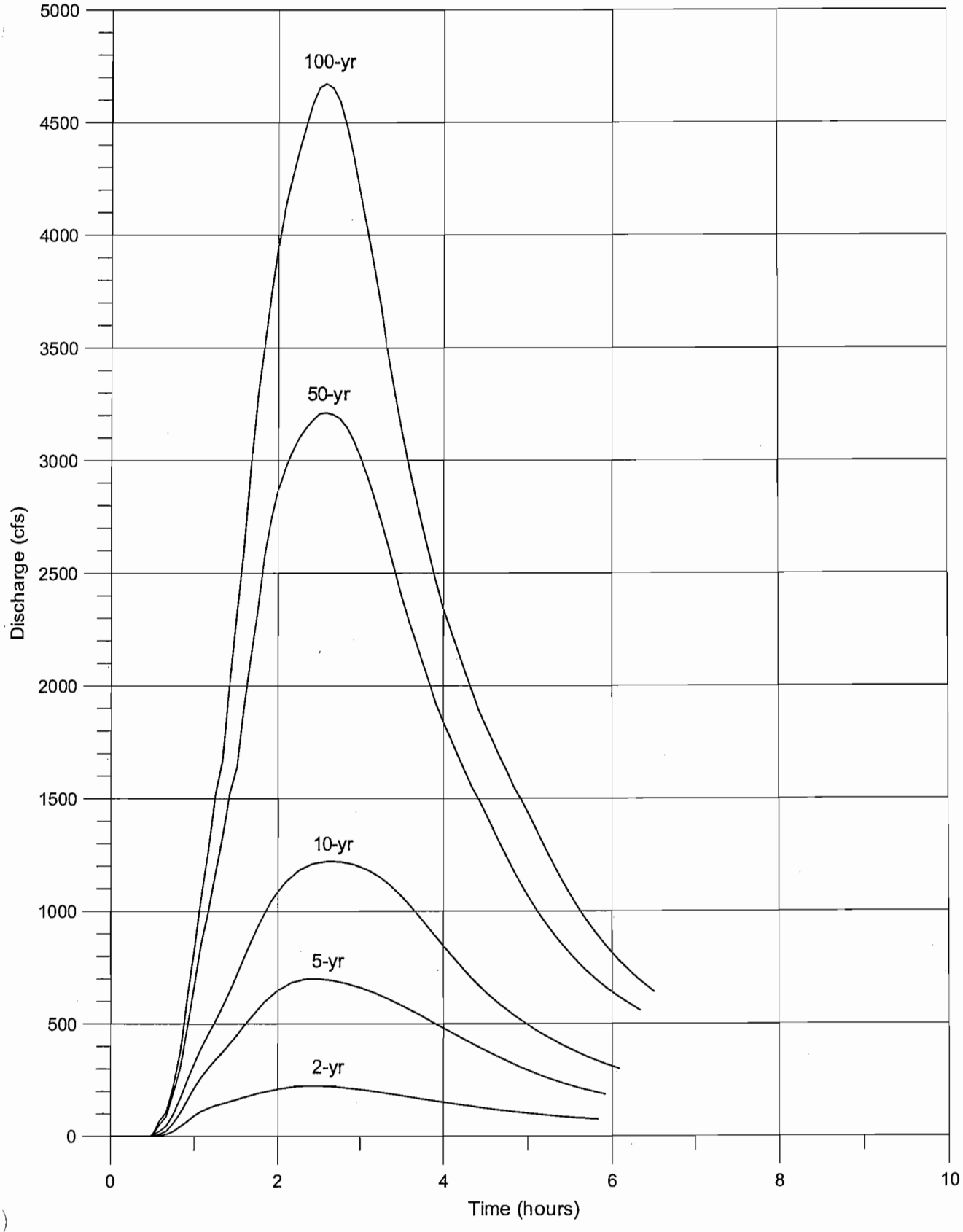


Figure D-3 Flood Hydrographs at Greeley No. 3 Ditch
Existing Condition (EPA SWMM Node 537)

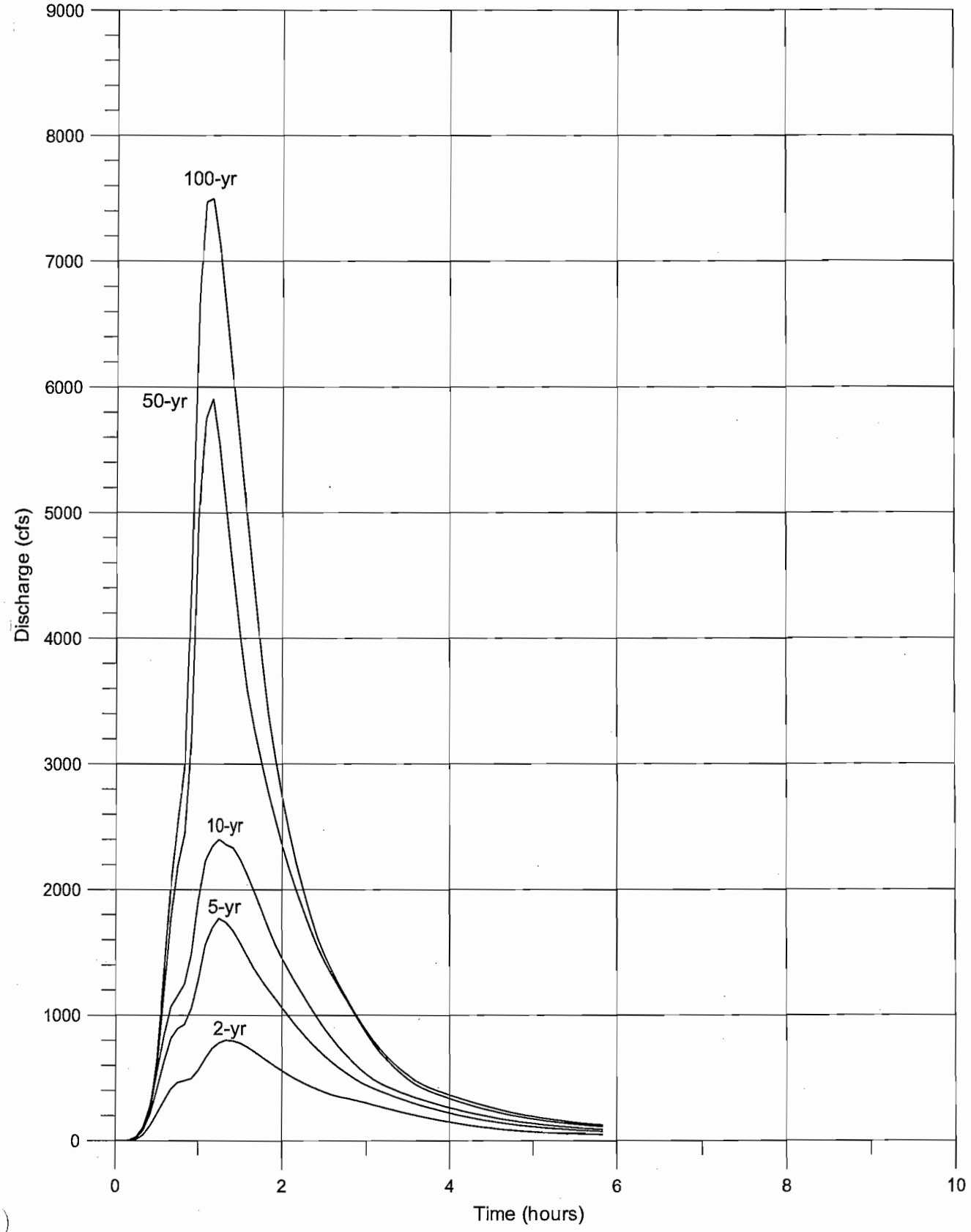


Figure D-4 Flood Hydrographs Downstream of 95th Avenue
Future Condition (EPA SWMM Node 510)

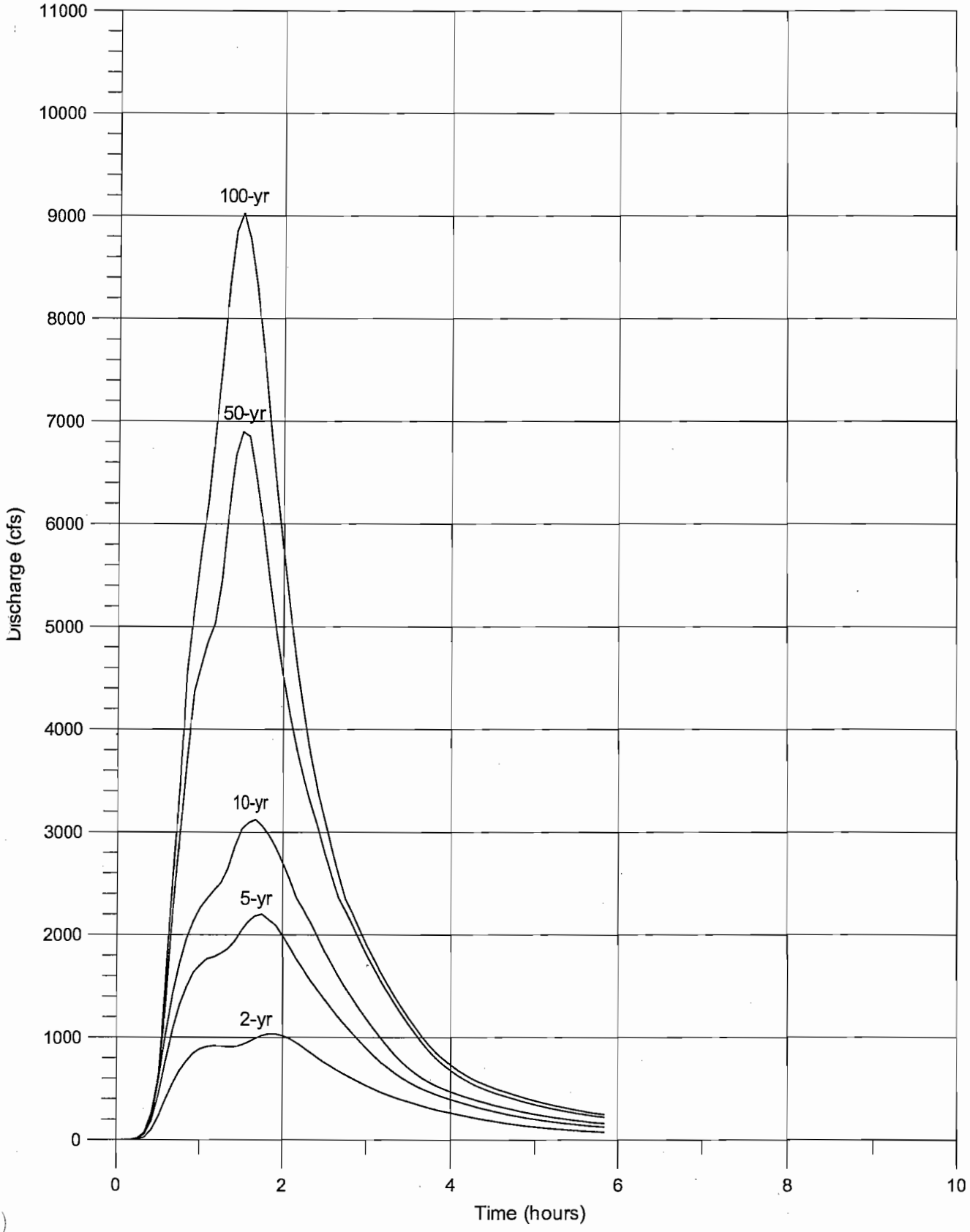


Figure D-5 Flood Hydrographs Downstream of 71st Avenue
Future Condition (EPA SWMM Node 523)

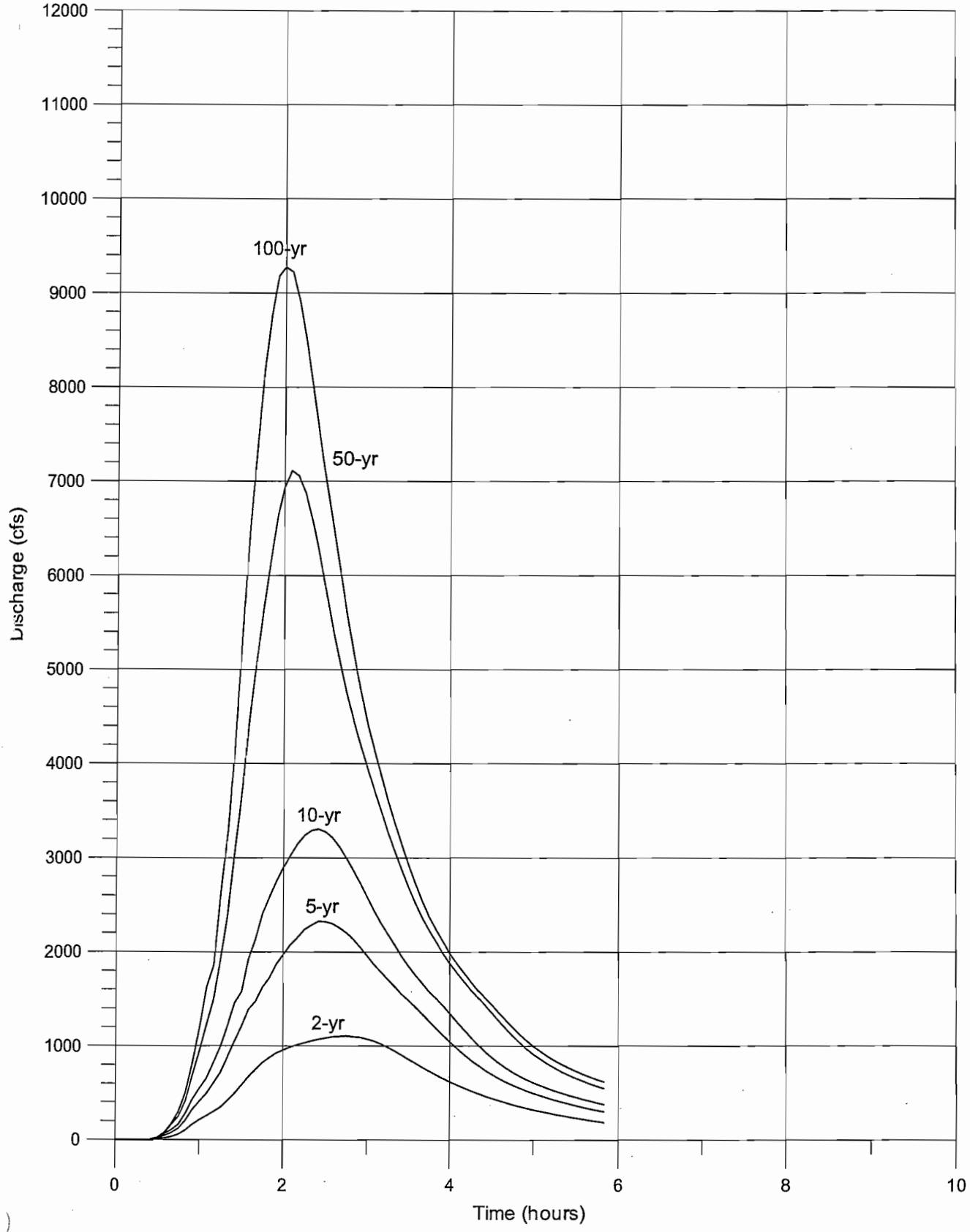


Figure D-6 Flood Hydrographs at Greeley No. 3 Ditch
Future Condition (EPA SWMM Node 537)

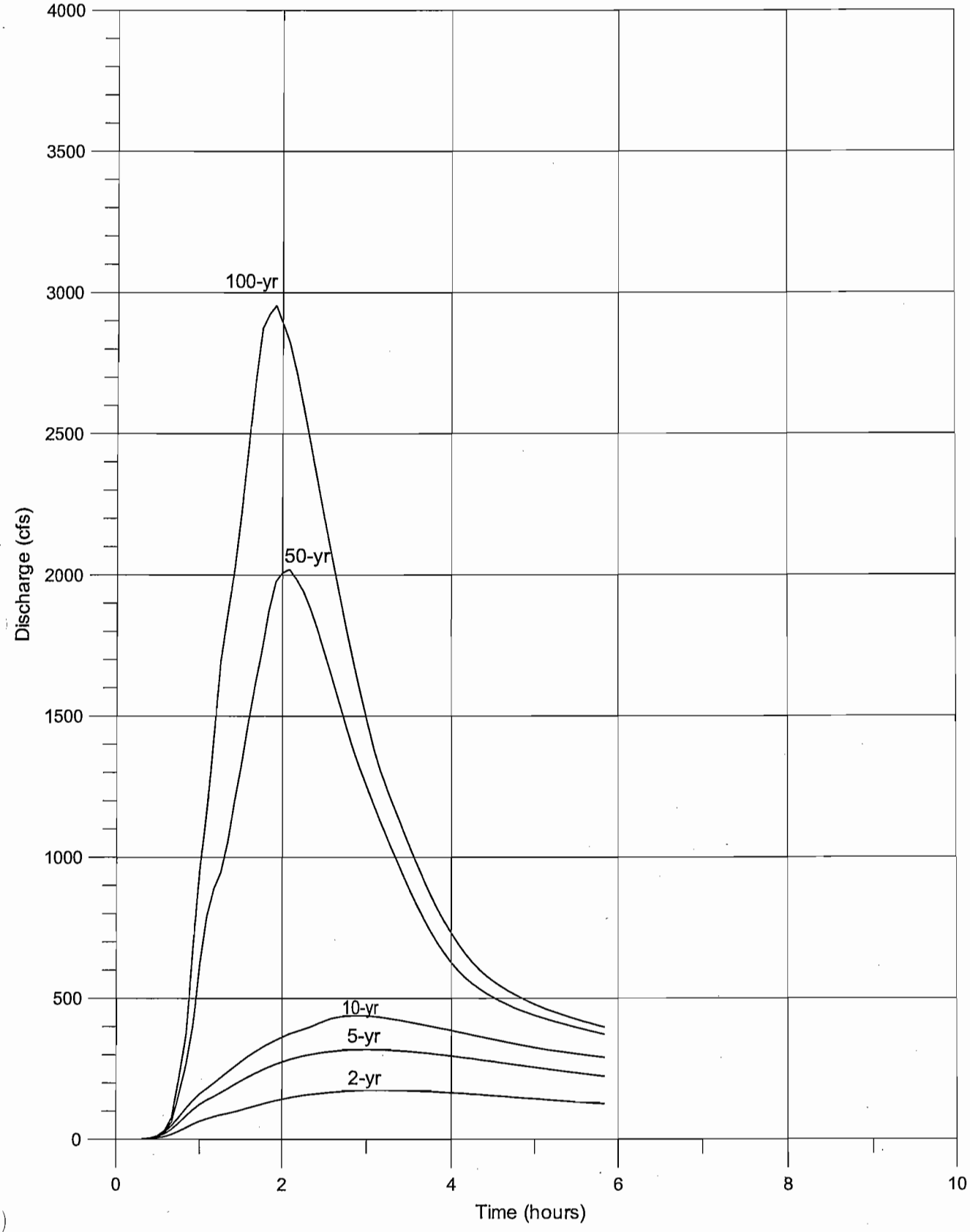


Figure D-7 Flood Hydrographs Downstream of 95th Avenue
Proposed Condition (EPA SWMM Node 510)

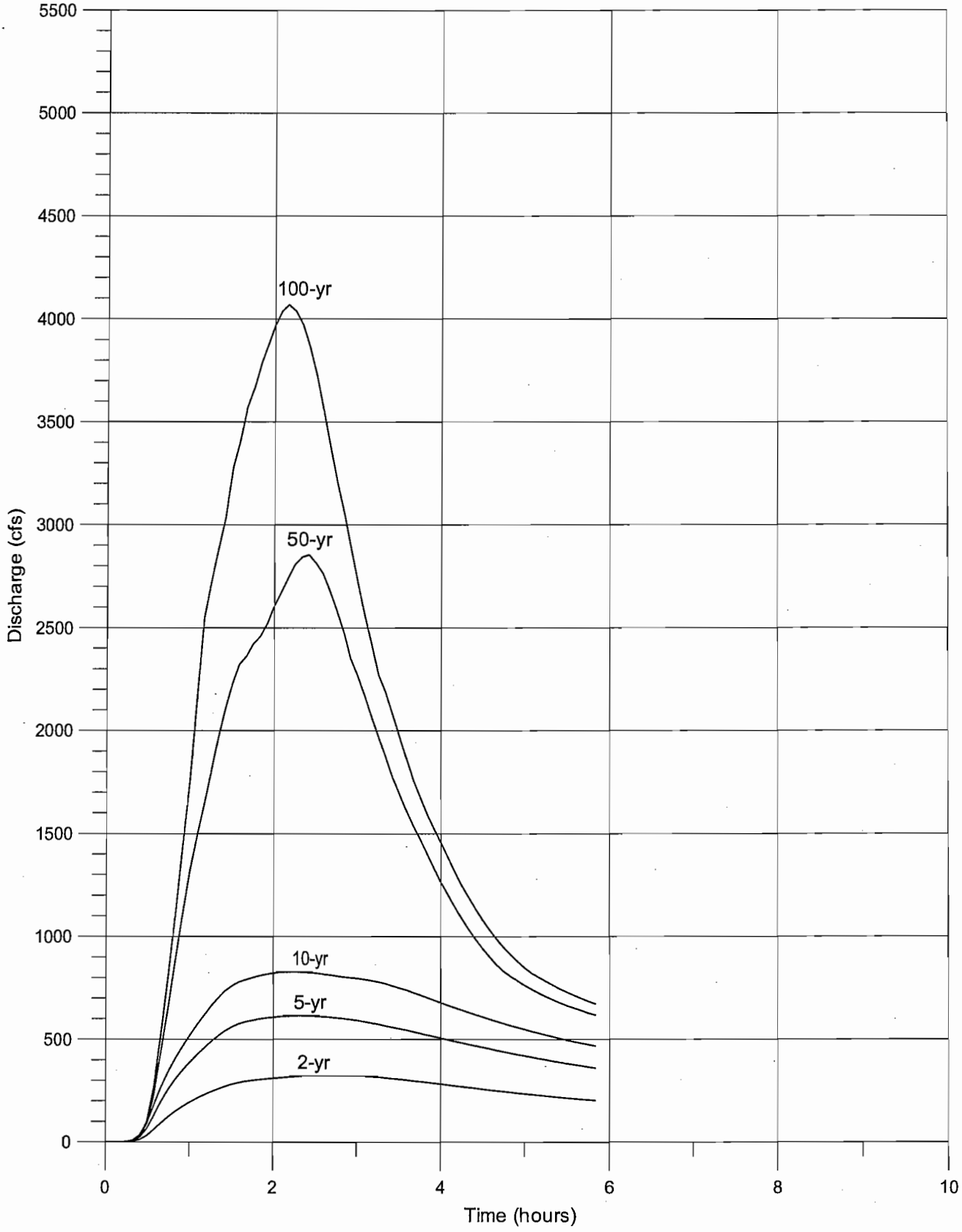


Figure D-8 Flood Hydrographs Downstream of 71st Avenue
Proposed Condition (EPA SWMM Node 523)

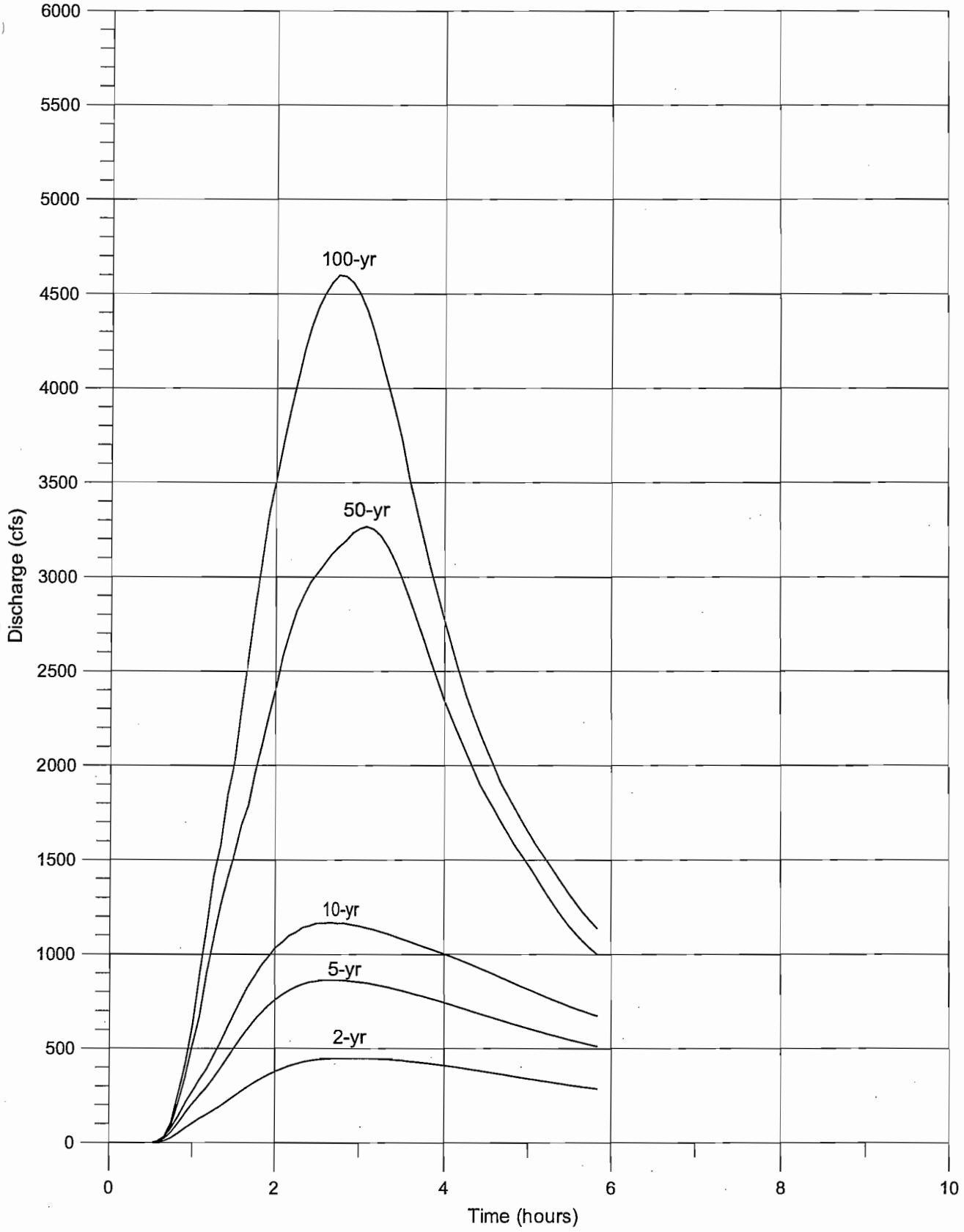


Figure D-9 Flood Hydrographs at Greeley No. 3 Ditch
Proposed Condition (EPA SWMM Node 537)