120th Avenue Connection

MASTER PLAN DRAINAGE REPORT

Prepared for:

Colorado Department of Transportation
4201 East Arkansas Avenue
Denver, Colorado 80222

Prepared by:

707 17th Street, Suite 2300
Denver, Colorado 80202

July 2008

Ref: 072208.405

Table of Contents

Table of Contents (continued)

Appendices

I. PROJECT DESCRIPTION AND LOCATION

A. Description

The proposed 120th Avenue Connection project is a multi-phase roadway and drainage project which involves the extension of 120th Avenue (SH 128) from Wadsworth Parkway (SH 121) east to U.S. 287, a distance of approximately 1.1 miles. It also includes extensions and/or improvements to several other local roads, including: Commerce Street, which will be extended from its current terminus at Park Street, approximately ½ mile to the south to 118th Avenue; Wadsworth Boulevard, which will be realigned approximately 500 feet to the west of its current location for a distance of approximately 1,500 feet, where it will tie back in with the existing street.; a new section 118th Avenue, which will be from existing Allison Street to realigned Wadsworth Boulevard, a distance of approximately 650 feet; and U.S. 287, where a new connection will be made from just north of 120th Avenue to Upham Street, a distance of approximately 1,300 feet. New bridge structures will be required on 120th Avenue over U.S. 36 and proposed Commerce Street, and there will be an undercrossing of the BNSF Railroad. The project is proposed to be constructed in three phases as follows:

Phase 1 will include the extension of 120th Avenue from Wadsworth Parkway to Wadsworth Boulevard, and also the Wadsworth Boulevard relocation. This includes the bridge crossings of U.S. 36 and Commerce Street.

Phase 2 will include the remaining extension of 120th Avenue, from Wadsworth Boulevard to U.S. 287, where it will tie back in with existing 120th Avenue. This includes the undercrossing of the BNSF Railroad. Also included in Phase 2 is the U.S. 287 connection to Upham Street.

Phase 3 is the remaining improvements to the local streets, including Commerce Street and 118th Avenue.

Other improvements in the general project area which are not a part of this project include:

- RTD Improvements: RTD is proposing to construct a new Park-n-ride facility south of the proposed 120th Avenue Connection bridge which includes a pedestrian bridge over U.S. 36 with bus slip ramps from U.S. 36 to serve this crossing. This project must be completed and functional before the 120th Avenue Connection project can proceed (which requires the removal of the existing Park-n-ride at Wadsworth Parkway).

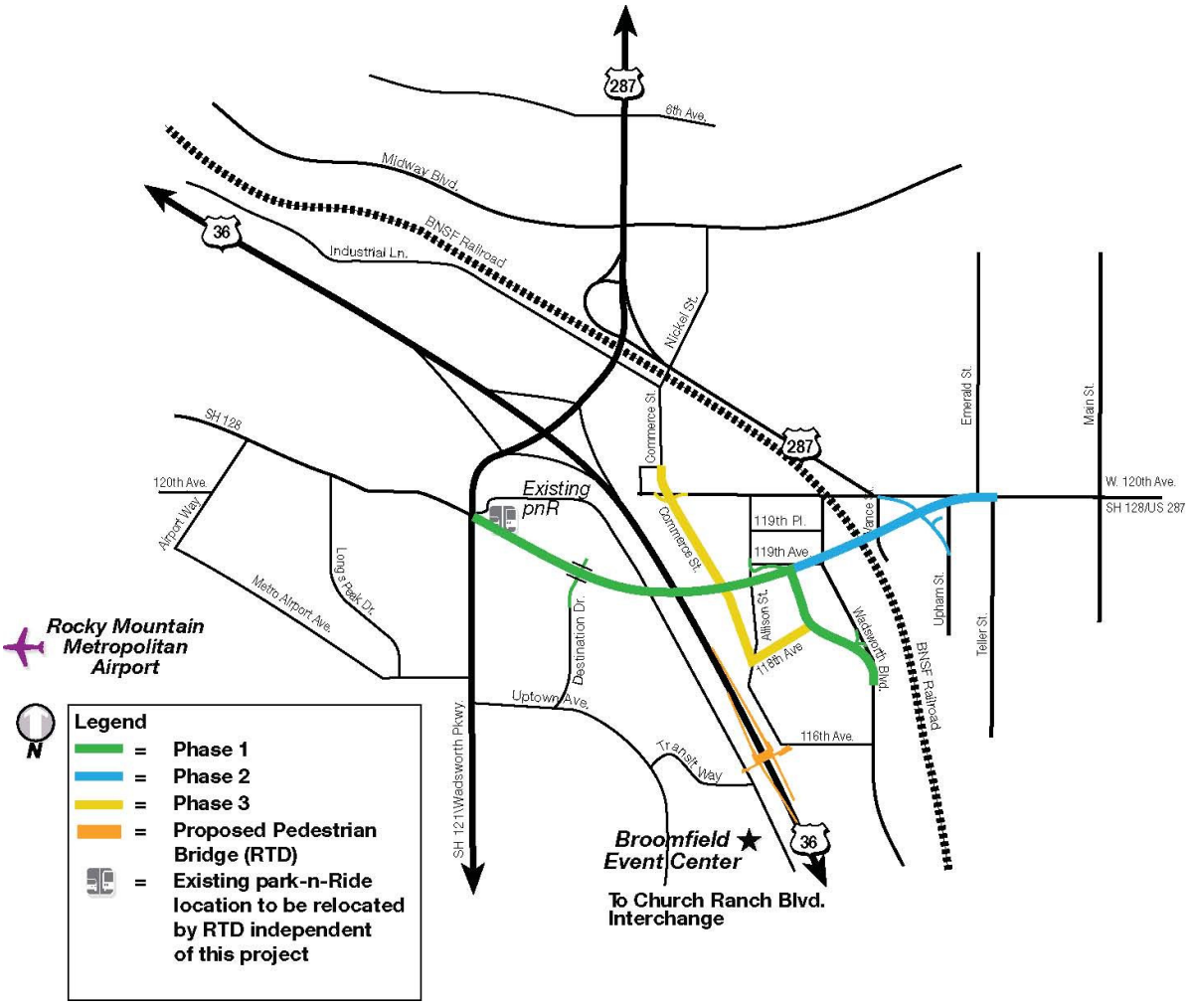
- Future U.S. 36 Improvements: Future ultimate widening of both Wadsworth Parkway and U.S. 36 (Boulder Turnpike), a new diamond interchange at U.S. 36 and 120th Avenue, and a revised interchange configuration at U.S. 36 and Wadsworth Parkway are being studied as a part of the U.S. 36 EIS. While the final preferred configuration is not

known at this time, conceptual geometry and grades of what is considered to be the alternative with the widest footprint is being used by the 120th Avenue project to set grades and plan future drainage impacts.

B. Location

The project is located in the City of Broomfield in the south ½ of Sections 34 and 35, Township 1 South, Range 69 West and the north ½ of Sections 2 and 3, Township 2 South, Range 69 West. See **Figure 1: Project Vicinity Map** for the overall project limits and phasing.

FIGURE 1
Project Vicinity Map – 120th Avenue Connection



N.T.S.

C. Purpose

The proposed 120th Avenue Connection project represents a significant change to the infrastructure system within the project area, including the drainage systems. Some of the drainage improvements constructed with the project will tie into systems within the surrounding area which are also proposed to be improved in the future. These areas will be discussed in further detail later in this report.

The Colorado Department of Transportation (CDOT) will be procuring a design-build contractor in 2008 to do final design and construction of the Phase 1 project. The Phase 3 improvements will also be included in the design-build package as additional requested elements. The bid package will show the preliminary design of the drainage elements required for these phases of the project. CDOT will then complete the design of the Phase 2 improvements, which will be constructed separately in the future.

Because the 120th Avenue Connection project itself will be constructed in multiple phases, and because the drainage infrastructure will be impacted by other projects outside of the scope of this project, this drainage master plan report is intended serve several purposes:

- To document the anticipated changes to drainage patterns, peak flow rates, and runoff volumes, for both the proposed conditions for this project and for ultimate future conditions outside of this project.

- To provide guidance and set criteria for the final drainage design of the Phase 1 and Phase 3 design-build project.

- To provide conceptual level design for the drainage facilities required for future phases of this project and other future improvements. This report can thus serve as a reference and guide as the designs of these projects are finalized.

D. Previous Studies

As part of the analysis and conceptual design of the required drainage systems within the project area, information from previous studies was reviewed. The proposed design implements recommendations of previous studies in this area. Some of the previous analyses were revised to account for the proposed project. These areas are discussed below and later in this report.

The *Conceptual Drainage Report for Wadsworth Interchange / U.S. 36 Corridor Environmental Assessment* (Reference 1) provided a preliminary assessment of the drainage in this area in support of the EA, including conceptual level design of drainage facilities. The sub-basin delineations and associated analyses from

this report have now been updated based on the most current roadway alignments, profiles, and phasing.

Most of the project area falls within the City Park Basin, which is a tributary to Big Dry Creek. The affected sub-basins within the project area are tributary to what has been defined as "Reach 5" of by the *City Park and 3207 Drainageways Outfall Systems Planning Study (OSP)* (Reference 2). This reach outfalls to the east in 120th Avenue.

The southeastern portion of the project falls within the Airport Creek Basin, which is also tributary to Big Dry Creek. Basin characteristics and proposed improvements are described in the *Outfall Systems Planning for Big Dry Creek (ADCO) and Tributaries* (Reference 3).

There have also been several studies for other recent or proposed projects within the project area. The *Final Drainage Report for SH128/SH121 Intersection Realignment* (Reference 4) describes the recent improvements made for the new intersection, which included a slight realignment of SH 128 to the south (west of SH 121), improvements within the RTD park-n-ride, and the addition of a detention pond in the northeast quadrant of the intersection.

The *Broomfield Urban Transit Village – Arista Preliminary Drainage Report* (Reference 5) describes the recent development south of the project area. This affected the boundaries of some of the tributary sub-basins based on the proposed site grading. It also affected the operation of the Dry Creek Valley Irrigation Ditch, as further discussed later in this report.

Finally, the *Final Drainage Report for U.S. 36 at Broomfield Event Center RTD Transit Facility Bus Slip Ramps and Pull Outs* (Reference 6) was reviewed, which will affect the tributary area to the Airport Creek basin under ultimate conditions. The recommended outfall systems within the Airport Creek basin account for the tributary flows from this proposed project.

II. DRAINAGE BASINS

A. Existing Major Basin Description

The project is located within the upper reaches of two different drainage basins; the City Park Basin and the Airport Creek Basin. The existing drainage basins and flow patterns are shown on Figure 2.

City Park Basin

The majority (northerly side) of the project is located in the City Park Basin. Land use within the affected sub-basins is primarily residential. Most of the flows west of U.S. 36 are conveyed overland to an existing inadvertent detention pond against the west side of the frontage road embankment. The Outfall Systems

Planning Study (OSP) (Reference 2) indicates this area as City Park Basin 12 (CP12). There is an existing undersized culvert (24") under U.S. 36, which creates the inadvertent detention. Most of this sub-basin is undeveloped, with the exception of the RTD park-n-ride (southeast corner of Wadsworth Parkway and U.S. 36 frontage road) which will be relocated by RTD independent of this project. Downstream of U.S. 36, Basin CP13 has a flow split at 120th Avenue and Carr Street that sends approximately 15 cfs north via a 12" pipe and the rest is conveyed in an existing channel/street system to the east along 120th Avenue, as shown in the OSP. This area has been a problem in the past, since the existing drainage system is very poorly defined. The OSP recommends improvements in this area that consist of a 5-year pipe and 100-year overflow channel down 120th Avenue.

Airport Creek Basin

The southerly side of the project is located in the North Branch of Airport Creek Tributary 1 (a tributary of Big Dry Creek). The existing project area within this basin is mostly undeveloped at present with few drainage features in place. Most of the flows for the northern part of Airport Creek are carried overland to an existing undersized ditch that runs along the west side of Wadsworth Boulevard. Runoff from a portion of this tributary basin is inadvertently captured by an abandoned irrigation ditch, where it then crosses under Wadsworth Boulevard in a 15" CMP culvert and is conveyed to the northeast to the City Park Basin via a 36" RCP. This ditch and small culvert will intercept approximately 8 cfs before the ditch overflows and the remaining flow continues to the south in the roadside ditch along the west side of Wadsworth Boulevard.

The flows are then conveyed southerly via the roadside ditch and driveway crossings where they outfall to an undeveloped parcel at the northwest corner of 116th Avenue and Wadsworth Boulevard (northern study limit of Airport Creek Tributary 1). No culvert crossing of Wadsworth Boulevard exists to carry flows from the northwest corner to the southeast quadrant at 116th; flows appear to pond in the northwest quadrant currently, and would eventually overtop the intersection. The OSP indicates that "Several inadvertent detention storage areas are formed by undersized road and railroad crossings… this accidental storage, coupled with the relatively large areas of undeveloped land, have prevented major flooding or erosion problems. Future development will worsen problems…" The OSP recommends regional detention storage wherever possible to reduce the risk of potential flooding in the existing drainageway facilities at the downstream end of Airport Creek.

A small sub-basin on the west side of U.S. 36, between the mainline and a future ultimate ramp, drains across U.S. 36 through a 24" RCP culvert. This flow then drains to the east along the south side of 116th Avenue in a roadside ditch, to the southwest corner of 116th Avenue and Wadsworth Boulevard, then crosses to the east side through an 18" CMP culvert. This culvert will potentially be replaced with this project.

B. Proposed Major Basin Description

City Park Basin

The proposed improvements within City Park Basin will create new basin boundaries for two different conditions. The proposed project condition (interim) is based on the roadway improvements for all phases of the 120th Avenue Connection project. This condition assumes a 70 percent impervious value for Basin CP12, which is bounded by the U.S. 36 frontage road on the north, Wadsworth Parkway on the west and 120th Avenue on the south. This sub-basin is adjacent to a proposed detention pond, which will formalize the previously discussed inadvertent detention area west of U.S. 36. This pond will be discussed in more detail later in this report.

Each of the sub-basin boundaries have been slightly modified and impervious values adjusted based on the proposed roadway alignments, profiles, and layout of proposed drainage facilities. The general drainage pattern through the overall basin has remained the same. A portion of Basin CP15 has been added to the proposed condition (designated as Basin CP15A). This consists of a segment of U.S. 287 for approximately 1,500 feet to the northwest of the project area. This section of existing roadway drains to the southeast in existing curb and gutter, and will need to be tied into the storm sewer outfall to the east in 120th Avenue.

The ultimate condition is a modified version of the interim, which includes the future widening of U.S. 36 and Wadsworth Parkway and the new interchanges on U.S. 36 at 120th Avenue and Wadsworth Parkway. The proposed future ramps create further modifications of the sub-basin boundaries within the area. Also, the U.S. 36 frontage road becomes abandoned, so the limits of Basin CP12 (sub-basin tributary to the proposed detention pond) are enlarged to include the area between the frontage road and the U.S. 36 mainline. This area will need to be regraded to drain to the southeast, toward the pond.

The proposed sub-basin delineations for City Park Basin are shown on Figures 3 and 4 for interim conditions and Figures 6 and 7 for ultimate conditions.

Airport Creek Basin

The proposed improvements within Airport Creek Basin will create a defined conveyance route for both on-site and off-site drainage. In addition to fulfilling the OSP requirements, one goal of the improvements was to provide water quality treatment for Phase 1 and 3 roadway improvements and contributing developed drainage, which would outfall to the northern study limit of Airport Creek Tributary 1. Because the roadway improvements within Airport Creek Basin will be completed before the adjacent properties are developed, the basins were delineated based on both the undeveloped (interim) and the developed (ultimate) conditions. The basin boundaries remain the same under both conditions, but the ultimate condition assumes a 70 percent impervious value for the future contributing developed drainage and does not require on-site detention for these developments. The proposed major basin delineations for Airport

Creek Basin are shown on Figure 5 for interim conditions and Figure 8 for ultimate conditions.

III. DRAINAGE DESIGN CRITERIA

A. General Criteria

The project is located in the City and County of Broomfield and the Urban Drainage & Flood Control District (UD&FCD). However, most of the roadways that are being changed are under the jurisdiction of the Colorado Department of Transportation (CDOT). Therefore, it was decided that the CDOT criteria manual (Reference 7) would be used with supplemental information coming from the UD&FCD manuals (Reference 8). The City Park Basin detention pond is designed to meet the UD&FCD criteria so that it is eligible for maintenance by the UD&FCD.

B. Hydrologic Criteria

The hydrologic analysis for the City Park and Airport Creek Basins was conducted for both the 10-year minor storm and the 100-year major storm. Rainfall distribution data was taken from the City Park Drainage OSP. The Stormwater Management Model (SWMM) program (Reference 9) was used to develop hydrographs and peak flows, and Flow Master (Reference 10) was used to size the pipes and ditches for the given flows.

IV. DRAINAGE FACILITY DESIGN

A. General Concept

The 2002 Conceptual Drainage Report (Reference 2) analyzed the City Park drainage basin with the SWMM program. The first step in the design process was to evaluate the major basin modeling that had been done for the Conceptual Drainage Report.

The design for the SH 128/ 120th Avenue Connection project needs to ensure that protection from the 100-year event is provided for adjacent developments within the project area as well as downstream of the project area. The Conceptual Drainage Report analyzed the overall basin for the existing conditions and for future conditions that result from project improvements. This project also considers the “ultimate” condition which includes adjacent developments and future improvements to U.S. 36. Results from the SWMM model were checked against Flow Master (Reference 10) to make sure the pipes and ditches were adequately sized for the given flows. The results were also checked to make sure that the flows did not exceed the OSP’s recommended design.

The same process was used for Airport Creek Basin, but because there was no known SWMM model. A base "existing" model was created based on existing topography. The "interim" and "ultimate" conditions were modeled and the worst case conditions at each design point were the basis for design.

B. Specific Details

City Park Basin

Proposed Regional Detention Pond

In order to minimize flows and required drainage systems downstream of the project area, the City Park OSP recommends formalizing the inadvertent detention pond adjacent to U.S. 36. Since the proposed 120th Avenue Connection project creates new basin boundaries (Figure 3), the detention pond was investigated on a conceptual level to determine if it would still be adequate to function as intended in the OSP. The OSP recommends a 10.7 acre-ft pond with a maximum release rate of 43 cfs. The proposed model indicates that the pond will need only 6.0 acre-ft of storage for the 100-year event. The proposed pond grading provides 7.74 acre-ft of available storage with a maximum release rate of 24 cfs, therefore the goals for the 100-year event are met.

During the interim condition, a berm is proposed northwest of the pond and Dry Creek Valley Irrigation Ditch to direct all flows from CP12 into the detention pond rather than into the active portion of the ditch (see Figure 9). The abandoned portion of the ditch south of the pond should also be filled in to ensure that it no longer intercepts runoff. The ultimate condition assumes that the active portion of the ditch to the west will be piped from the existing Arista pipe outlet (just west of the pond) to the existing 4' box culvert (currently under the frontage road). This will allow for the ditch to be filled in so that the site can be developed and regraded to drain toward the pond.

The 18" detention pond outlet will need to be constructed during the interim condition and piped to the existing 24" culvert which runs east under U.S. 36. The pond will be designed to meet UD&FCD criteria for maintenance eligibility. The grading and outlet works will accommodate the ultimate interchange condition and therefore will not need to be reconstructed in the future (see Figure 6). The existing 24" culvert under U.S. 36 will continue to function adequately under the interim condition. This crossing and drainage paths immediately east of U.S. 36 are anticipated to be reconstructed with the ultimate U.S. 36 project, but overall drainage pattern to the east will remain the same.

Outfall along 120th Avenue (Reach 5 in OSP)

Under the proposed project conditions, the existing flow split at 120th Avenue and Carr Street will be eliminated. The existing 12" culvert will be plugged, the low spot at the culvert entrance will be filled in, and the runoff will be directed to the east, with a new culvert crossing under Commerce Street.

The OSP calls for an ultimate 5-year pipe with 100-year overflow system along 120th Avenue to the east. The proposed model indicates that a 36" pipe is required to the railroad, and the OSP calls for a 54" pipe east of the railroad (the proposed model shows that a 60" pipe may be necessary). These future improvements between the new Commerce Street crossing of 120th on the west and the proposed reconstruction of the U.S.287/120th intersection area on the east are not a part of the proposed 120th Avenue Connection project. It should be noted that when this stretch of 120th Avenue is improved in the future, conveyance of the 100-year flows under the railroad may be required.

Phase 2 of the 120th Avenue Connection project will construct the 60" 5-year pipe within the reconstructed portions of U.S.287 and new 120th Avenue. Future OSP improvements coming from the west under the railroad will tie to this system.

Phase 2 of the project also involves depressing the 120th Avenue Connection profile to pass under the BNSF Railroad. At the crossing, the proposed profile of 120th Avenue will be approximately 25 feet below existing ground. The roadway profile has been designed with a -0.50% minimum grade to the east to not form an actual low point, allowing flows in excess of the capacity of the 5-year storm system to flow in the street section as necessary.

According to the EA, the proposed depressed roadway beneath the BNSF railroad presents a risk of encountering soil and/or groundwater contamination from surrounding properties. The EA recommends soil and groundwater sampling in this area prior to the Phase 2 construction. Groundwater was recently encountered within the project area during construction of the SH128/SH121 intersection realignment, at the west end of the existing RTD Park-n-ride, so a means of handling groundwater through this large cut is likely going to be necessary during the Phase 2 design.

A preliminary storm sewer profile was generated within the Phase 2 project area and east to Main Street to ensure that this system could physically tie into the design as shown in the OSP. The profile shows that a 54" pipe running from the undercrossing location to the east at a 0.50% slope can tie into the OSP profile near Main Street (approximately 2,300 feet east of the railroad tracks), at approximate elevation 5,352 feet. The remainder of the future proposed system would follow the OSP profile from this point. Responsibility for the construction of this intermediate portion of the OSP system from Teller Street to Main Street will need to be determined. East of

Main Street, this future system will eventually outfall to the open channel at Chase Street (approximately 6,800 feet to the east). This will be a separate project by the City and County of Broomfield.

It is important to note that the area along 120th Avenue from the railroad crossing to Main Street has very little available space within the existing right-of-way, and is developed enough that right-of-way concerns and other potential conflicts exist for the 100-year overflow system that is required by the OSP.

Airport Creek Basin

Proposed Detention/Water Quality Pond

Within the new local roadways (Commerce Street, 118th Avenue, and Wadsworth Boulevard), the proposed storm sewer system is sized to handle the 100-year major storm for all roadway improvements for Phases 1 and 3, as well as contributing developed drainage. The proposed condition assumes 70% imperviousness for the future contributing developed lots and does not require on-site detention for these developments. This piped system will drain into a proposed detention pond at the southeast quadrant of Wadsworth Place and Wadsworth Boulevard. The pond is located where the flow inadvertently captured by the abandoned irrigation ditch drains to the northeast to City Park Basin, as discussed previously. The 36" RCP will be plugged so that this diversion will no longer occur. Release from the pond will be into a storm sewer to the south in Wadsworth Boulevard.

The pond is designed to have a maximum of 1.15 ac-ft of storage (pond elevation 5395). The flow into the pond will be controlled by a diversion structure which will have one 36" pipe outlet to the pond and divert any flows that may back up from the pond into a proposed 24" bypass pipe. This diversion structure is proposed as an additional factor of safety, since the pond does not provide freeboard and any overflow from the pond will potentially flow to the properties to the east. The pond outlet will release the flow in two stages: the first stage will be controlled by a proposed 24" pipe with the equivalent of a 12" inlet control orifice; and the second stage will flow over a weir or double grate inlet at elevation 5394.5 into the 24" pipe. The 12" orifice will allow the pond to be used as detention storage up to the 10-year event (and pond elevation 5394.5) with a release rate of 8 cfs into the outfall storm sewer. The required water quality capture volume (WQCV) is approximately 0.5 ac-ft, so the pond will also serve as water quality treatment for the tributary basin area. Flows in excess of the 10-year event will flow over the weir structure and pass through the pond with little detention benefit and into the 24" outlet pipe. The 24" bypass pipe invert will be set at 5394.5 as relief for the weir in the event that the outlet structure in the pond becomes clogged.

The 36" storm sewer outfall from the pond to 116th Avenue is sized to handle the 10-year minor storm under fully developed future conditions. It will need to be upsized in the future to handle the 100-year major storm under fully developed future conditions, since the storm sewers upstream are sized for this condition. The 36" storm sewer will outfall to the south in Wadsworth Boulevard to the proposed ditch system in the southeast quadrant of 116th Avenue and Wadsworth Boulevard.

Outfall along Tributary 1 of Airport Creek

The proposed improvements will have two systems: the piped system north of 116th Avenue (Figure 10) as discussed above, and a ditch system south of 116th Avenue.

South of 116th Avenue, several alternatives were considered to outfall the proposed storm sewer system in Wadsworth Boulevard, including: continuing the storm sewer to the south to Airport Creek (approximately 1,300 feet south of 116th Avenue); outfalling at the southeast corner of 116th Avenue and Wadsworth Boulevard and then creating a roadside ditch along the east side of Wadsworth Boulevard to Airport Creek; and outfalling at the southeast corner of 116th Avenue and Wadsworth Boulevard and constructing a ditch directly east to the existing informal drainageway formed by the BNSF railroad embankment. The additional length of storm sewer required for the first alternative was deemed to be uneconomical, and the roadside ditch required for the second alternative would not fit within the existing right-of-way and would result in significant utility conflicts, such as relocating overhead and underground power facilities. The proposed ditch system to the east (Figure 11) was determined to be the best interim solution.

The OSP shows improvements to Tributary 1 beginning at 116th Avenue and running southeasterly along its natural drainage path across the undeveloped parcel between Wadsworth Boulevard and the BNSF Railroad. Because the proposed 36" pipe outfall will introduce a more concentrated flow at the intersection, it was determined that it should be conveyed across the undeveloped property in a more controlled fashion. The proposed ditch will direct the flows along the northern edge rather than across the property. In order to get adequate depth within the proposed ditch to contain the 100-year flow, the limits of the required ditch grading will need to extend approximately 40 feet past the east property line into the existing channel within the Railroad property. This proposed ditch outfall location is approximately 190 feet north of the outfall location that was proposed in the OSP. An analysis of the ditch outfall shows that the nuisance flows caused by the minor storms (less than 10-year) will be less than historic, due to the storage and the controlled release of flows at the detention pond. The 10-year flows are reduced from 90 cfs to 69 cfs. The flows that enter the Railroad property will slightly increase from 193 cfs to 197 cfs for the major storm (100-year), since the

pond is not sized to fully detain the major storm. The existing channel is very wide and well-defined, so this slight increase in flow will not affect the normal depth of flow within the existing channel.

The proposed ditch system is sized to handle the 100-year major storm for all interim roadway improvements for Phases 1 and 3, contributing undeveloped drainage, and flows from the proposed RTD Transit Facility. As the tributary basin area develops, the outfall system south of 116th Avenue will require further improvements. The City and County of Broomfield will have several alternatives, including: continued use of the ditch system along the northern edge of the property (with additional depth required); construction of the Tributary 1 improvements as shown in the OSP; and constructing a storm sewer in Wadsworth Boulevard to Airport Creek.

V. CONCLUSIONS

A. Compliance with Standards

The hydraulic design for this project was prepared in accordance with the Colorado Department of Transportation Drainage Design Manual. The design of the City Park Basin detention pond is to be in compliance with the UD&FCD manual so that it will be eligible for maintenance by the UD&FCD, per the memo by CDOT dated January 24, 2008 (see Appendix D).

B. Drainage Concept

The drainage design for City Park Basin 12 allows for the 100-year major storm to be collected by the proposed detention pond and to be released to the City Park Drainageway Reach 5. Reach 5 allows for the 5-year minor storm to be collected in a pipe system; however there are right-of-way concerns for the 100-year major storm to be collected in an overflow roadside ditch. Some of the ultimate improvements for this reach are outside of the scope of this project.

The drainage design for the Airport Creek North Tributary allows for the 100-year major storm to be collected and discharged to Airport Creek for interim conditions. Further improvements will be required in the future to convey flows for 100-year ultimate conditions.

C. Water Quality

The proposed detention ponds will provide water quality treatment for each of the respective basin areas before discharging into the drainageways.

VI. REFERENCES

1. *Conceptual Drainage Report for Wadsworth Interchange/ US 36 Corridor Environmental Assessment*, Carter & Burgess, October 16, 2002.

2. *City Park and 3207 Drainageways Outfall Systems Planning Study*, Kiowa Engineering Corporation, June 2006.

3. *Outfall Systems Planning Big Dry Creek (ADCO) and Tributaries*, Muller Engineering Company, Inc., August 1987, Revised January 1989.

4. *Final Drainage Report for the SH 128/ SH 121 Intersection Realignment*, Colorado Department of Transportation in cooperation with the City and County of Broomfield, March 2006.

5. *Broomfield Urban Transit Village – Arista Preliminary Drainage Report*, Martin/ Martin Inc., February 1, 2005.

6. *Final Drainage Report for US 36 at Broomfield Event Center RTD Transit Facility Bus Slip Ramps and Pull-outs*, EME Solutions, Inc., March 3, 2008.

7. *Drainage Design Manual*, Colorado Department of Transportation, 2004.

8. *Urban Storm Drainage Criteria Manual*, Volume 2, Wright Water Engineers, Inc., June 2001.

9. *UDSWM 2000*; Version 1.4.6; Urban Drainage and Flood Control District (UDFCD); 2000.

10. *Bentley FlowMaster*; Bentley Systems, Inc., November, 2005.

Appendix A

SWMM Hydrologic Computation Summary

EXISTING CONDITIONS (CITY PARK)

```
   2   1   1   2
   3   4
WATERSHED   0
US 36/Wadsworth Interchange - Existing Conditions
City Park Basin, Reach 5 & S Trib - CityPark10Existing.sin
        72       5.0    1                                                          1
   24    5
 0.40 0.75 1.65 3.02 5.04 2.42 1.13 0.87 0.77 0.65
 0.65 0.65 0.65 0.65 0.65 0.50 0.38 0.38 0.38 0.38
 0.38 0.38 0.34 0.26
    1   12  1311150. 47.8 20.7 0.05 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1   13  1321200. 50.4 19.1 0.02 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1   19  1460950. 58.6  70. 0.02 0.02  0.2  0.1  0.4   3.  0.5    0.0018

   3
   12   13   19
    0    5
    0  131  308    3              1.
    0  308  195  8 2     1.5     233   0.005                    0.02     1.5
       0.        0.     0.01       4.0      0.04      12.8       .13     20
      .32       26       .70        31      1.32        34      2.21     37
0230   195  270  4 3              1.
       0.        0.       15.        0.      500.      480.     1000.      980.
    0  230  221    4      1.   2700.    0.02      2.      2.    0.03      3.
                         13.   2700.    0.02     15.     15.    0.02     10.
    0  132  230    3              1.
    0  146  221    3              1.
    0  221  121    1      1.   2000.    0.02     20.     20.    0.02     4.5

    0
    0    5
ENDPROGRAM
```

URBAN DRAINAGE STORM WATER MANAGEMENT MODEL - 32 BIT VERSION 1998
REVISED BY UNIVERSITY OF COLORADO AT DENVER

*** ENTRY MADE TO RUNOFF MODEL ***

US 36/Wadsworth Interchange - Existing Conditions
City Park Basin, Reach 5 & S Trib - CityPark10Existing.sin

0NUMBER OF TIME STEPS 72
0INTEGRATION TIME INTERVAL (MINUTES) 5.00

25.0 PERCENT OF IMPERVIOUS AREA HAS ZERO DETENTION DEPTH
0FOR 24 RAINFALL STEPS, THE TIME INTERVAL IS 5.00 MINUTES
0FOR RAINGAGE NUMBER 1 RAINFALL HISTORY IN INCHES PER HOUR

.40 .75 1.65 3.02 5.04 2.42 1.13 .87 .77 .65
.65 .65 .65 .65 .65 .50 .38 .38 .38 .38
.38 .38 .34 .26
1

US 36/Wadsworth Interchange - Existing Conditions
City Park Basin, Reach 5 & S Trib - CityPark10Existing.sin

SUBAREA NUMBER	GUTTER OR MANHOLE	WIDTH (FT)	AREA (AC)	PERCENT IMPERV.	SLOPE (FT/FT)	RESISTANCE FACTOR IMPERV.	RESISTANCE FACTOR PERV.	SURFACE STORAGE(IN) IMPERV.	SURFACE STORAGE(IN) PERV.	INFILTRATION RATE(IN/HR) MAXIMUM	INFILTRATION RATE(IN/HR) MINIMUM	DECAY RATE	GAGE NO
12	131	1150.	47.8	20.7	.0500	.020	.200	.100	.400	3.00	.50	.00180	1
13	132	1200.	50.4	19.1	.0200	.020	.200	.100	.400	3.00	.50	.00180	1
19	146	950.	58.6	70.0	.0200	.020	.200	.100	.400	3.00	.50	.00180	1

0TOTAL NUMBER OF SUBCATCHMENTS, 3
0TOTAL TRIBUTARY AREA (ACRES), 156.80
0HYDROGRAPHS WILL BE SAVED FOR THE FOLLOWING 3SUBCATCHMENTS FOR SUBSEQUENT USE WITH UDSWM386 MODEL
12 13 19
1

US 36/Wadsworth Interchange - Existing Conditions
City Park Basin, Reach 5 & S Trib - CityPark10Existing.sin

*** CONTINUITY CHECK FOR SUBCATCHMEMT ROUTING IN UDSWM386 MODEL ***

WATERSHED AREA (ACRES)	156.800
TOTAL RAINFALL (INCHES)	1.944
TOTAL INFILTRATION (INCHES)	.705
TOTAL WATERSHED OUTFLOW (INCHES)	.916
TOTAL SURFACE STORAGE AT END OF STORM (INCHES)	.322
ERROR IN CONTINUITY, PERCENTAGE OF RAINFALL	.077

1

US 36/Wadsworth Interchange - Existing Conditions
City Park Basin, Reach 5 & S Trib - CityPark10Existing.sin

					WIDTH		INVERT	SIDE SLOPES		
OVERBANK/SURCHARGE GUTTER	GUTTER	NDP	NP		OR DIAM	LENGTH	SLOPE	HORIZ TO VERT		
MANNING NUMBER	DEPTH CONNECTION (FT)	JK			(FT)	(FT)	(FT/FT)	L	R	N
131	308	0	3		.0	1.	.0010	.0	.0	
.001	10.00	0								
308	195	8	2	PIPE	1.5	233.	.0050	.0	.0	
.020	1.50	0								
		RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW								
		.0	.0	.0	4.0	.0	12.8	.1	20.0	.3
26.0	.7	31.0								
		1.3	34.0	2.2	37.0					
195	270	4	3		.0	1.	.0010	.0	.0	
.001	10.00	230								
		DIVERSION TO GUTTER NUMBER 230 - TOTAL Q VS DIVERTED Q IN CFS								
		.0	.0	15.0	.0	500.0	480.0	1000.0	980.0	
230	221	0	4	CHANNEL	1.0	2700.	.0200	2.0	2.0	
.030	3.00	0								
				OVERFLOW	13.0	2700.	.0200	15.0	15.0	
.020	10.00									
132	230	0	3		.0	1.	.0010	.0	.0	

```
.001       10.00        0
  146         221          0          3                        .0        1.     .0010       .0    .0
.001       10.00        0
  221         121          0          1      CHANNEL          1.0     2000.     .0200     20.0  20.0
.020        4.50        0
0TOTAL NUMBER OF GUTTERS/PIPES,   7
1
```

US 36/Wadsworth Interchange - Existing Conditions
City Park Basin, Reach 5 & S Trib - CityPark10Existing.sin

ARRANGEMENT OF SUBCATCHMENTS AND GUTTERS/PIPES

GUTTER	TRIBUTARY GUTTER/PIPE										TRIBUTARY SUBAREA						
	D.A.(AC)																
131	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0
0	0	0	0	47.8													
132	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0
0	0	0	0	50.4													
146	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0	0
0	0	0	0	58.6													
195	308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	47.8													
221	230	146	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	109.0													
230	132	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	50.4													
308	131	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	47.8													

1

US 36/Wadsworth Interchange - Existing Conditions
City Park Basin, Reach 5 & S Trib - CityPark10Existing.sin

*** PEAK FLOWS, STAGES AND STORAGES OF GUTTERS AND DETENTION DAMS ***

CONVEYANCE ELEMENT	PEAK (CFS)	STAGE (FT)	STORAGE (AC-FT)	TIME (HR/MIN)
131	48.	(DIRECT FLOW)		0 25.
132	43.	(DIRECT FLOW)		0 25.
308	29.	1.5	.2	0 30.
146	96.	(DIRECT FLOW)		0 30.
230	36.	1.5		0 35.
195	29.	(DIRECT FLOW)		0 30.
221	113.	.9		0 35.
270	15.	(DIRECT FLOW)		0 30.
121	113.	(DIRECT FLOW)		0 35.

```
   2   1   1   2
   3   4
WATERSHED   0
US 36/Wadsworth Interchange - Existing Conditions
City Park Basin, Reach 5 & S Trib - CityPark100Existing.sin
        72       5.0    1                                                      1
   24    5
 0.32 0.96 1.48 2.64 4.50 8.16 4.50 2.64 1.99 1.68
 1.29 1.29 1.29 0.64 0.64 0.39 0.39 0.39 0.39 0.39
 0.39 0.39 0.39 0.39
    1   12  1311150. 47.8 20.7 0.05 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1   13  1321200. 50.4 19.1 0.02 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1   19  1460950. 58.6  70. 0.02 0.02  0.2  0.1  0.4   3.  0.5    0.0018

   3
   12   13   19
    0    5
    0  131  308    3              1.
    0  308  195  8 2     1.5     233   0.005                    0.02     1.5
        0.        0.     0.01       4.0      0.04      12.8       .13     20
       .32       26       .70       31      1.32        34      2.21     37
0230   195  270  4 3              1.
        0.        0.       15.        0.      500.      480.     1000.      980.
    0  230  221    4      1.   2700.    0.02      2.      2.    0.03      3.
                         13.   2700.    0.02     15.     15.    0.02     10.
    0  132  230    3              1.
    0  146  221    3              1.
    0  221  121    1      1.   2000.    0.02     20.     20.    0.02     4.5

    0
    0    5
ENDPROGRAM
```

URBAN DRAINAGE STORM WATER MANAGEMENT MODEL - 32 BIT VERSION 1998
REVISED BY UNIVERSITY OF COLORADO AT DENVER

*** ENTRY MADE TO RUNOFF MODEL ***

US 36/Wadsworth Interchange - Existing Conditions
City Park Basin, Reach 5 & S Trib - CityPark100Existing.sin

0NUMBER OF TIME STEPS 72
0INTEGRATION TIME INTERVAL (MINUTES) 5.00

25.0 PERCENT OF IMPERVIOUS AREA HAS ZERO DETENTION DEPTH
0FOR 24 RAINFALL STEPS, THE TIME INTERVAL IS 5.00 MINUTES
0FOR RAINGAGE NUMBER 1 RAINFALL HISTORY IN INCHES PER HOUR

.32	.96	1.48	2.64	4.50	8.16	4.50	2.64	1.99	1.68
1.29	1.29	1.29	.64	.64	.39	.39	.39	.39	.39
.39	.39	.39	.39						

1

US 36/Wadsworth Interchange - Existing Conditions
City Park Basin, Reach 5 & S Trib - CityPark100Existing.sin

SUBAREA NUMBER	GUTTER OR MANHOLE	WIDTH (FT)	AREA (AC)	PERCENT IMPERV.	SLOPE (FT/FT)	RESISTANCE FACTOR IMPERV.	RESISTANCE FACTOR PERV.	SURFACE STORAGE(IN) IMPERV.	SURFACE STORAGE(IN) PERV.	INFILTRATION RATE(IN/HR) MAXIMUM	INFILTRATION RATE(IN/HR) MINIMUM	GAGE DECAY RATE	GAGE NO
12	131	1150.	47.8	20.7	.0500	.020	.200	.100	.400	3.00	.50	.00180	1
13	132	1200.	50.4	19.1	.0200	.020	.200	.100	.400	3.00	.50	.00180	1
19	146	950.	58.6	70.0	.0200	.020	.200	.100	.400	3.00	.50	.00180	1

0TOTAL NUMBER OF SUBCATCHMENTS, 3
0TOTAL TRIBUTARY AREA (ACRES), 156.80
0HYDROGRAPHS WILL BE SAVED FOR THE FOLLOWING 3SUBCATCHMENTS FOR SUBSEQUENT USE WITH UDSWM386 MODEL
12 13 19

1

*** CONTINUITY CHECK FOR SUBCATCHMEMT ROUTING IN UDSWM386 MODEL ***

WATERSHED AREA (ACRES)	156.800
TOTAL RAINFALL (INCHES)	3.128
TOTAL INFILTRATION (INCHES)	.718
TOTAL WATERSHED OUTFLOW (INCHES)	2.039
TOTAL SURFACE STORAGE AT END OF STORM (INCHES)	.368
ERROR IN CONTINUITY, PERCENTAGE OF RAINFALL	.049

1

US 36/Wadsworth Interchange - Existing Conditions
City Park Basin, Reach 5 & S Trib - CityPark100Existing.sin

GUTTER DEPTH	GUTTER JK NUMBER	NDP	NP		WIDTH OR DIAM (FT)	LENGTH (FT)	INVERT SLOPE (FT/FT)	SIDE SLOPES HORIZ TO VERT L	R	MANNING N	OVERBANK/SURCHARGE
131	308	0	3		.0	1.	.0010	.0	.0	.001	
10.00	0										
308	195	8	2	PIPE	1.5	233.	.0050	.0	.0	.020	
1.50	0										
		RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW									
		.0	.0	.0	4.0	.0	12.8	.1	20.0	.3	26.0
.7	31.0										
		1.3	34.0	2.2	37.0						
195	270	4	3		.0	1.	.0010	.0	.0	.001	

```
  10.00      230
                    DIVERSION TO GUTTER NUMBER 230 - TOTAL Q VS DIVERTED Q IN CFS
                          .0      .0      15.0      .0      500.0    480.0    1000.0    980.0
  230          221           0           4      CHANNEL          1.0     2700.     .0200       2.0    2.0         .030
   3.00         0
                                                 OVERFLOW      13.0     2700.     .0200      15.0   15.0         .020
  10.00
  132          230           0           3                       .0        1.     .0010        .0     .0         .001
  10.00         0
  146          221           0           3                       .0        1.     .0010        .0     .0         .001
  10.00         0
  221          121           0           1      CHANNEL          1.0     2000.     .0200      20.0   20.0         .020
   4.50         0
0TOTAL NUMBER OF GUTTERS/PIPES,   7
1


 US 36/Wadsworth Interchange - Existing Conditions
 City Park Basin, Reach 5 & S Trib - CityPark100Existing.sin


 ARRANGEMENT OF SUBCATCHMENTS AND GUTTERS/PIPES

        GUTTER     TRIBUTARY GUTTER/PIPE                                                TRIBUTARY SUBAREA
           D.A.(AC)

        131          0    0    0    0    0    0    0    0    0    0              12    0    0    0    0    0    0
0    0    0    47.8

        132          0    0    0    0    0    0    0    0    0    0              13    0    0    0    0    0    0
0    0    0    50.4

        146          0    0    0    0    0    0    0    0    0    0              19    0    0    0    0    0    0
0    0    0    58.6

        195        308    0    0    0    0    0    0    0    0    0               0    0    0    0    0    0    0
0    0    0    47.8

        221        230  146    0    0    0    0    0    0    0    0               0    0    0    0    0    0    0
0    0    0   109.0

        230        132    0    0    0    0    0    0    0    0    0               0    0    0    0    0    0    0
0    0    0    50.4
```

```
       308       131    0    0    0    0    0    0    0    0    0              0    0    0    0    0    0    0
0    0    0    47.8
1
```

US 36/Wadsworth Interchange - Existing Conditions
City Park Basin, Reach 5 & S Trib - CityPark100Existing.sin

*** PEAK FLOWS, STAGES AND STORAGES OF GUTTERS AND DETENTION DAMS ***

CONVEYANCE ELEMENT	PEAK (CFS)	STAGE (FT)	STORAGE (AC-FT)	TIME (HR/MIN)
131	97.	(DIRECT FLOW)		0 30.
132	85.	(DIRECT FLOW)		0 30.
308	40.	1.5	1.5	1 10.
146	203.	(DIRECT FLOW)		0 35.
230	78.	2.1		0 40.
195	40.	(DIRECT FLOW)		1 10.
221	254.	1.3		0 40.
270	15.	(DIRECT FLOW)		1 10.
121	254.	(DIRECT FLOW)		0 40.

EXISTING CONDITIONS (AIRPORT CREEK)

```
   2   1   1   2
   3   4
WATERSHED   0
Airport Creek Existing- 10Existing.sin
- New Interchange -
        72       5.0    1                                                    1
   24    5
 0.40 0.75 1.65 3.02 5.04 2.42 1.13 0.87 0.77 0.65
 0.65 0.65 0.65 0.65 0.65 0.50 0.38 0.38 0.38 0.38
 0.38 0.38 0.34 0.26
    1 1000 10010640. 10.8  4.2 0.04 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1200 12011150. 49.1  20. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1300 13010475. 26.0  75. .025 0.02  0.2  0.1  0.4   3.  0.5    0.0018

    0
    0    5
    0 1001  360    3            3100    0.04                  0.035
    0 1201  360    3            2500    0.03                  0.035
    0  360  400    3             640    0.03                  0.035
    0 1301  400    3            2600    .025                  0.035

    5
 1001 1201 1301  360  400    0    0    0    0    0    0    0    0    0    0    0
    0    5
ENDPROGRAM
```

```
URBAN DRAINAGE STORM WATER MANAGEMENT MODEL -  32 BIT VERSION 1998
         REVISED BY UNIVERSITY OF COLORADO AT DENVER

 *** ENTRY MADE TO RUNOFF MODEL ***


 Airport Creek Existing- 10Existing.sin
 - New Interchange -

0NUMBER OF TIME STEPS   72
0INTEGRATION TIME INTERVAL (MINUTES)    5.00

 25.0 PERCENT OF IMPERVIOUS AREA HAS ZERO DETENTION DEPTH
0FOR    24 RAINFALL STEPS, THE TIME INTERVAL IS   5.00 MINUTES
0FOR RAINGAGE NUMBER   1   RAINFALL HISTORY IN INCHES PER HOUR

       .40       .75      1.65      3.02      5.04      2.42      1.13       .87       .77       .65
       .65       .65       .65       .65       .65       .50       .38       .38       .38       .38
       .38       .38       .34       .26
1


 Airport Creek Existing
 - New Interchange -


 SUBAREA   GUTTER   WIDTH    AREA   PERCENT    SLOPE   RESISTANCE FACTOR  SURFACE STORAGE(IN)    INFILTRATION
RATE(IN/HR)  GAGE
 NUMBER  OR MANHOLE  (FT)    (AC)   IMPERV.   (FT/FT)    IMPERV.    PERV.    IMPERV.    PERV.   MAXIMUM MINIMUM
DECAY RATE   NO
 1000     1001       640.    10.8      4.2     .0400      .020      .200      .100      .400     3.00      .50
.00180    1
 1200     1201      1150.    49.1     20.0     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
 1300     1301       475.    26.0     75.0     .0250      .020      .200      .100      .400     3.00      .50
.00180    1
0TOTAL NUMBER OF SUBCATCHMENTS,   3
0TOTAL TRIBUTARY AREA (ACRES),     85.90
1
```

Airport Creek Existing
- New Interchange -

*** CONTINUITY CHECK FOR SUBCATCHMEMT ROUTING IN UDSWM386 MODEL ***

WATERSHED AREA (ACRES)	85.900
TOTAL RAINFALL (INCHES)	1.944
TOTAL INFILTRATION (INCHES)	.750
TOTAL WATERSHED OUTFLOW (INCHES)	.865
TOTAL SURFACE STORAGE AT END OF STORM (INCHES)	.328
ERROR IN CONTINUITY, PERCENTAGE OF RAINFALL	.054

1

Airport Creek Existing
- New Interchange -

OVERBANK/SURCHARGE GUTTER DEPTH NUMBER (FT)	GUTTER JK CONNECTION	NDP	NP	WIDTH OR DIAM (FT)	LENGTH (FT)	INVERT SLOPE (FT/FT)	SIDE SLOPES HORIZ TO VERT L	R	MANNING N
1001	360	0	3	.0	3100.	.0400	.0	.0	.035
10.00	0								
1201	360	0	3	.0	2500.	.0300	.0	.0	.035
10.00	0								
360	400	0	3	.0	640.	.0300	.0	.0	.035
10.00	0								
1301	400	0	3	.0	2600.	.0250	.0	.0	.035
10.00	0								

0TOTAL NUMBER OF GUTTERS/PIPES, 4
1

Airport Creek Existing
- New Interchange -

ARRANGEMENT OF SUBCATCHMENTS AND GUTTERS/PIPES

```
       GUTTER     TRIBUTARY GUTTER/PIPE                                          TRIBUTARY SUBAREA
          D.A.(AC)

        360      1001 1201    0    0    0    0    0    0    0    0              0    0    0    0    0    0    0
0    0    0    59.9

       1001         0    0    0    0    0    0    0    0    0    0           1000    0    0    0    0    0    0
0    0    0    10.8

       1201         0    0    0    0    0    0    0    0    0    0           1200    0    0    0    0    0    0
0    0    0    49.1

       1301         0    0    0    0    0    0    0    0    0    0           1300    0    0    0    0    0    0
0    0    0    26.0
0HYDROGRAPHS WILL BE  STORED FOR THE FOLLOWING    5 POINTS
       1001      1201      1301       360       400
1
```

Airport Creek Existing
- New Interchange -

*** PEAK FLOWS, STAGES AND STORAGES OF GUTTERS AND DETENTION DAMS ***

CONVEYANCE ELEMENT	PEAK (CFS)	STAGE (FT)	STORAGE (AC-FT)	TIME (HR/MIN)
1201	45.	(DIRECT FLOW)	0	25.
1001	4.	(DIRECT FLOW)	0	40.
1301	49.	(DIRECT FLOW)	0	30.
360	48.	(DIRECT FLOW)	0	25.
400	90.	(DIRECT FLOW)	0	25.

```
   2   1   1   2
   3   4
WATERSHED   0
Airport Creek Existing- 100Existing.sin
- New Interchange -
        72       5.0    1                                                    1
   24    5
 0.32 0.96 1.48 2.64 4.50 8.16 4.50 2.64 1.99 1.68
 1.29 1.29 1.29 0.64 0.64 0.39 0.39 0.39 0.39 0.39
 0.39 0.39 0.39 0.39
    1 1000 10010640. 10.8  4.2 0.04 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1200 12011150. 49.1  20. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1300 13010475. 26.0  75. .025 0.02  0.2  0.1  0.4   3.  0.5    0.0018

    0
    0    5
    0 1001  360    3            3100    0.04                  0.035
    0 1201  360    3            2500    0.03                  0.035
    0  360  400    3             640    0.03                  0.035
    0 1301  400    3            2600    .025                  0.035

    5
 1001 1201 1301  360  400    0    0    0    0    0    0    0    0    0    0    0
    0    5
ENDPROGRAM
```

```
URBAN DRAINAGE STORM WATER MANAGEMENT MODEL -  32 BIT VERSION 1998
         REVISED BY UNIVERSITY OF COLORADO AT DENVER

 *** ENTRY MADE TO RUNOFF MODEL ***


 Airport Creek Existing- 100Existing.sin
 - New Interchange -

0NUMBER OF TIME STEPS   72
0INTEGRATION TIME INTERVAL (MINUTES)    5.00

 25.0 PERCENT OF IMPERVIOUS AREA HAS ZERO DETENTION DEPTH
0FOR    24 RAINFALL STEPS, THE TIME INTERVAL IS   5.00 MINUTES
0FOR RAINGAGE NUMBER   1   RAINFALL HISTORY IN INCHES PER HOUR

       .32       .96      1.48      2.64      4.50      8.16      4.50      2.64      1.99      1.68
      1.29      1.29      1.29       .64       .64       .39       .39       .39       .39       .39
       .39       .39       .39       .39
1


 Airport Creek Existing
 - New Interchange -


 SUBAREA   GUTTER   WIDTH    AREA   PERCENT    SLOPE   RESISTANCE FACTOR  SURFACE STORAGE(IN)
INFILTRATION RATE(IN/HR)  GAGE
 NUMBER  OR MANHOLE  (FT)    (AC)   IMPERV.   (FT/FT)    IMPERV.    PERV.    IMPERV.    PERV.   MAXIMUM
MINIMUM DECAY RATE   NO
 1000     1001       640.    10.8      4.2     .0400      .020      .200      .100      .400     3.00
.50      .00180    1
 1200     1201      1150.    49.1     20.0     .0300      .020      .200      .100      .400     3.00
.50      .00180    1
 1300     1301       475.    26.0     75.0     .0250      .020      .200      .100      .400     3.00
.50      .00180    1
0TOTAL NUMBER OF SUBCATCHMENTS,   3
0TOTAL TRIBUTARY AREA (ACRES),     85.90
1


 Airport Creek Existing
 - New Interchange -
```

*** CONTINUITY CHECK FOR SUBCATCHMEMT ROUTING IN UDSWM386 MODEL ***

WATERSHED AREA (ACRES)	85.900
TOTAL RAINFALL (INCHES)	3.127
TOTAL INFILTRATION (INCHES)	.765
TOTAL WATERSHED OUTFLOW (INCHES)	1.992
TOTAL SURFACE STORAGE AT END OF STORM (INCHES)	.370
ERROR IN CONTINUITY, PERCENTAGE OF RAINFALL	.034

1

Airport Creek Existing
- New Interchange -

GUTTER NUMBER	GUTTER CONNECTION	NDP	NP	WIDTH OR DIAM (FT)	LENGTH (FT)	INVERT SLOPE (FT/FT)	SIDE SLOPES HORIZ TO VERT L	R	OVERBANK/SURCHARGE DEPTH (FT)	GUTTER MANNING N	JK
1001	360	0	3	.0	3100.	.0400	.0	.0	10.00	.035	0
1201	360	0	3	.0	2500.	.0300	.0	.0	10.00	.035	0
360	400	0	3	.0	640.	.0300	.0	.0	10.00	.035	0
1301	400	0	3	.0	2600.	.0250	.0	.0	10.00	.035	0

0TOTAL NUMBER OF GUTTERS/PIPES, 4
1

Airport Creek Existing
- New Interchange -

ARRANGEMENT OF SUBCATCHMENTS AND GUTTERS/PIPES

```
       GUTTER     TRIBUTARY GUTTER/PIPE                                                    TRIBUTARY SUBAREA
                  D.A.(AC)

        360       1001 1201    0    0    0    0    0    0    0    0              0    0    0    0    0    0
0    0    0    0    59.9

       1001          0    0    0    0    0    0    0    0    0    0           1000    0    0    0    0    0
0    0    0    0    10.8

       1201          0    0    0    0    0    0    0    0    0    0           1200    0    0    0    0    0
0    0    0    0    49.1

       1301          0    0    0    0    0    0    0    0    0    0           1300    0    0    0    0    0
0    0    0    0    26.0
0HYDROGRAPHS WILL BE  STORED FOR THE FOLLOWING    5 POINTS
       1001       1201       1301       360        400
1
```

Airport Creek Existing
- New Interchange -

*** PEAK FLOWS, STAGES AND STORAGES OF GUTTERS AND DETENTION DAMS ***

CONVEYANCE ELEMENT	PEAK (CFS)	STAGE (FT)	STORAGE (AC-FT)	TIME (HR/MIN)
1201	90.	(DIRECT FLOW)		0 30.
1001	17.	(DIRECT FLOW)		0 45.
1301	102.	(DIRECT FLOW)		0 35.
360	101.	(DIRECT FLOW)		0 30.
400	193.	(DIRECT FLOW)		0 30.

PROPOSED CONDITIONS (CITY PARK)

```
   2   1   1   2
   3   4
WATERSHED   0
US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark10int.sin
        72       5.0    1                                                    1
   24    5
 0.40 0.75 1.65 3.02 5.04 2.42 1.13 0.87 0.77 0.65
 0.65 0.65 0.65 0.65 0.65 0.50 0.38 0.38 0.38 0.38
 0.38 0.38 0.34 0.26
    1   12  1311050. 46.4 26.7 .060 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1   13  1321134. 55.8 18.3 .020 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1   15  150 280.  9.3 75.0 .020 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1   19  1462700. 57.2  70. 0.02 0.02  0.2  0.1  0.4   3.  0.5    0.0018

   4
   12   13   15   19
    0    5
    0  131  308    3              1.
    0  308  195  8 2     1.5     445   0.005                    0.02      1.5
        0.        0.      0.58       3.6      1.54         9      2.59      12.5
      3.73        15      4.97        18      6.30        20      7.74        24
    0  195  250    3              1.
    0  250  230    5     3.0   1500.     .05                    0.02      3.0
                        0.01   1500.     .05       8.       8.    0.05     10.
    0  230  221    5     5.0   1100.     .005                   0.02      5.0
                        0.01   1100.     .005      4.       4.    0.05     10.
    0  132  230    3              1.
    0  146  221    3              1.
    0  150  221    3              1.
    0  221  121    5     5.0   2000.     .01                    0.02      5.0
                        0.01   2000.     .01      10.      10.    0.05     10.

    0
    0    5
ENDPROGRAM
```

```
URBAN DRAINAGE STORM WATER MANAGEMENT MODEL -  32 BIT VERSION 1998
         REVISED BY UNIVERSITY OF COLORADO AT DENVER

 *** ENTRY MADE TO RUNOFF MODEL ***


 US 36/Wadsworth Interchange - New Run w/ project basins
 City Park Basin, Reach 5 & S Trib - New Interchange - CityPark10int.sin

0NUMBER OF TIME STEPS   72
0INTEGRATION TIME INTERVAL (MINUTES)    5.00

 25.0 PERCENT OF IMPERVIOUS AREA HAS ZERO DETENTION DEPTH
0FOR    24 RAINFALL STEPS, THE TIME INTERVAL IS   5.00 MINUTES
0FOR RAINGAGE NUMBER   1   RAINFALL HISTORY IN INCHES PER HOUR

       .40       .75      1.65      3.02      5.04      2.42      1.13       .87       .77       .65
       .65       .65       .65       .65       .65       .50       .38       .38       .38       .38
       .38       .38       .34       .26
1


 US 36/Wadsworth Interchange - New Run w/ project basins
 City Park Basin, Reach 5 & S Trib - New Interchange - CityPark10int.sin



 SUBAREA   GUTTER   WIDTH    AREA   PERCENT    SLOPE   RESISTANCE FACTOR  SURFACE STORAGE(IN)
INFILTRATION RATE(IN/HR)  GAGE
 NUMBER  OR MANHOLE  (FT)    (AC)   IMPERV.   (FT/FT)    IMPERV.    PERV.    IMPERV.    PERV.   MAXIMUM
MINIMUM DECAY RATE   NO
   12      131      1050.    46.4     26.7     .0600      .020      .200      .100      .400     3.00
.50      .00180    1
   13      132       1134.    55.8     18.3     .0200      .020      .200      .100      .400     3.00
.50      .00180    1
   15      150        280.     9.3     75.0     .0200      .020      .200      .100      .400     3.00
.50      .00180    1
   19      146       2700.    57.2     70.0     .0200      .020      .200      .100      .400     3.00
.50      .00180    1
0TOTAL NUMBER OF SUBCATCHMENTS,   4
0TOTAL TRIBUTARY AREA (ACRES),    168.70
0HYDROGRAPHS WILL BE SAVED FOR THE FOLLOWING   4SUBCATCHMENTS FOR SUBSEQUENT USE WITH UDSWM386 MODEL
        12        13        15        19
1
```

*** CONTINUITY CHECK FOR SUBCATCHMEMT ROUTING IN UDSWM386 MODEL ***

WATERSHED AREA (ACRES)	168.700
TOTAL RAINFALL (INCHES)	1.944
TOTAL INFILTRATION (INCHES)	.675
TOTAL WATERSHED OUTFLOW (INCHES)	.964
TOTAL SURFACE STORAGE AT END OF STORM (INCHES)	.305
ERROR IN CONTINUITY, PERCENTAGE OF RAINFALL	.025

1

US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark10int.sin

					WIDTH OR DIAM (FT)	LENGTH (FT)	INVERT SLOPE (FT/FT)	SIDE SLOPES HORIZ TO VERT L	R	N	OVERBANK/SURCHARGE GUTTER MANNING NUMBER	GUTTER DEPTH (FT)	NDP JK CONNECTION
131	308	0	3		.0	1.	.0010	.0	.0	.001	10.00	0
308	195	8	2	PIPE	1.5	445.	.0050	.0	.0	.020	1.50	0
RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW												
		.0	.0	.6	3.6	1.5	9.0	2.6	12.5	3.7	15.0	5.0	18.0
		6.3	20.0	7.7	24.0								
195	250	0	3		.0	1.	.0010	.0	.0	.001	10.00	0	
250	230	0	5	PIPE	3.0	1500.	.0500	.0	.0	.020	3.00	0	
				OVERFLOW	.0	1500.	.0500	8.0	8.0	.050	10.00		
230	221	0	5	PIPE	5.0	1100.	.0050	.0	.0				

```
.020        5.00        0
                                          OVERFLOW       .0     1100.     .0050       4.0   4.0
.050       10.00
  132         230          0          3                  .0        1.     .0010        .0    .0
.001       10.00        0
  146         221          0          3                  .0        1.     .0010        .0    .0
.001       10.00        0
  150         221          0          3                  .0        1.     .0010        .0    .0
.001       10.00        0
  221         121          0          5      PIPE        5.0     2000.     .0100        .0    .0
.020        5.00        0
                                          OVERFLOW       .0     2000.     .0100       10.0  10.0
.050       10.00
0TOTAL NUMBER OF GUTTERS/PIPES,   9
1
```

US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark10int.sin

ARRANGEMENT OF SUBCATCHMENTS AND GUTTERS/PIPES

GUTTER	TRIBUTARY GUTTER/PIPE D.A.(AC)										TRIBUTARY SUBAREA					
131	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0
0	0	0	0	46.4												
132	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0
0	0	0	0	55.8												
146	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0
0	0	0	0	57.2												
150	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0
0	0	0	0	9.3												
195	308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	46.4												
221	230	146	150	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	168.7												
230	250	132	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	102.2												
250	195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

```
0    0    0    0    46.4

       308       131    0    0    0    0    0    0    0    0    0              0    0    0    0    0    0
0    0    0    0    46.4
1
```

US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark10int.sin

*** PEAK FLOWS, STAGES AND STORAGES OF GUTTERS AND DETENTION DAMS ***

CONVEYANCE ELEMENT	PEAK (CFS)	STAGE (FT)	STORAGE (AC-FT)	TIME (HR/MIN)
131	57.	(DIRECT FLOW)		0 25.
308	12.	1.5	1.1	1 25.
195	12.	(DIRECT FLOW)		1 25.
132	44.	(DIRECT FLOW)		0 25.
250	12.	.7		1 25.
150	20.	(DIRECT FLOW)		0 30.
146	145.	(DIRECT FLOW)		0 25.
230	47.	2.2		0 30.
221	182.	5.2		0 30.
121	182.	(DIRECT FLOW)		0 30.

```
   2   1   1   2
   3   4
WATERSHED   0
US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark100int.sin
        72       5.0    1                                                    1
   24    5
 0.32 0.96 1.48 2.64 4.50 8.16 4.50 2.64 1.99 1.68
 1.29 1.29 1.29 0.64 0.64 0.39 0.39 0.39 0.39 0.39
 0.39 0.39 0.39 0.39
    1   12  1311050. 46.4 26.7 .060 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1   13  1321134. 55.8 18.3 .020 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1   15  150 280.  9.3 75.0 .020 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1   19  1462700. 57.2  70. 0.02 0.02  0.2  0.1  0.4   3.  0.5    0.0018

   4
   12   13   15   19
    0    5
    0  131  308    3              1.
    0  308  195  8 2     1.5     445   0.005                    0.02      1.5
        0.         0.      0.58       3.6       1.54          9      2.59      12.5
      3.73         15       4.97        18       6.30         20      7.74        24
    0  195  250    3              1.
    0  250  230    5     3.0    1500.     .05                    0.02      3.0
                        0.01    1500.     .05       8.       8.    0.05     10.
    0  230  221    5     5.0    1100.     .005                   0.02      5.0
                        0.01    1100.     .005      4.       4.    0.05     10.
    0  132  230    3              1.
    0  146  221    3              1.
    0  150  221    3              1.
    0  221  121    5     5.0    2000.     .01                    0.02      5.0
                        0.01    2000.     .01      10.      10.    0.05     10.

    0
    0    5
ENDPROGRAM
```

```
URBAN DRAINAGE STORM WATER MANAGEMENT MODEL -  32 BIT VERSION 1998
         REVISED BY UNIVERSITY OF COLORADO AT DENVER

 *** ENTRY MADE TO RUNOFF MODEL ***


 US 36/Wadsworth Interchange - New Run w/ project basins
 City Park Basin, Reach 5 & S Trib - New Interchange - CityPark100int.sin

0NUMBER OF TIME STEPS   72
0INTEGRATION TIME INTERVAL (MINUTES)    5.00

 25.0 PERCENT OF IMPERVIOUS AREA HAS ZERO DETENTION DEPTH
0FOR    24 RAINFALL STEPS, THE TIME INTERVAL IS   5.00 MINUTES
0FOR RAINGAGE NUMBER   1   RAINFALL HISTORY IN INCHES PER HOUR

       .32       .96      1.48      2.64      4.50      8.16      4.50      2.64      1.99      1.68
      1.29      1.29      1.29       .64       .64       .39       .39       .39       .39       .39
       .39       .39       .39       .39
1


 US 36/Wadsworth Interchange - New Run w/ project basins
 City Park Basin, Reach 5 & S Trib - New Interchange - CityPark100int.sin



 SUBAREA   GUTTER   WIDTH    AREA   PERCENT    SLOPE   RESISTANCE FACTOR  SURFACE STORAGE(IN)
INFILTRATION RATE(IN/HR)  GAGE
 NUMBER  OR MANHOLE  (FT)    (AC)   IMPERV.   (FT/FT)    IMPERV.    PERV.    IMPERV.    PERV.   MAXIMUM
MINIMUM DECAY RATE   NO
   12      131      1050.    46.4     26.7     .0600      .020      .200      .100      .400     3.00
.50      .00180    1
   13      132       1134.    55.8     18.3     .0200      .020      .200      .100      .400     3.00
.50      .00180    1
   15      150        280.     9.3     75.0     .0200      .020      .200      .100      .400     3.00
.50      .00180    1
   19      146       2700.    57.2     70.0     .0200      .020      .200      .100      .400     3.00
.50      .00180    1
0TOTAL NUMBER OF SUBCATCHMENTS,   4
0TOTAL TRIBUTARY AREA (ACRES),    168.70
0HYDROGRAPHS WILL BE SAVED FOR THE FOLLOWING   4SUBCATCHMENTS FOR SUBSEQUENT USE WITH UDSWM386 MODEL
        12        13        15        19
1
```

*** CONTINUITY CHECK FOR SUBCATCHMEMT ROUTING IN UDSWM386 MODEL ***

WATERSHED AREA (ACRES)	168.700
TOTAL RAINFALL (INCHES)	3.127
TOTAL INFILTRATION (INCHES)	.687
TOTAL WATERSHED OUTFLOW (INCHES)	2.087
TOTAL SURFACE STORAGE AT END OF STORM (INCHES)	.353
ERROR IN CONTINUITY, PERCENTAGE OF RAINFALL	.015

1

US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark100int.sin

					WIDTH OR DIAM (FT)	LENGTH (FT)	INVERT SLOPE (FT/FT)	SIDE SLOPES HORIZ TO VERT L	R	OVERBANK/SURCHARGE MANNING N
GUTTER NUMBER	GUTTER DEPTH (FT)	NDP	NP	JK						
131	308	0	3		.0	1.	.0010	.0	.0	.001
10.00	0									
308	195	8	2	PIPE	1.5	445.	.0050	.0	.0	.020
1.50	0									
RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW										
		.0	.0	.6	3.6	1.5	9.0	2.6	12.5	3.7
15.0	5.0	18.0								
		6.3	20.0	7.7	24.0					
195	250	0	3		.0	1.	.0010	.0	.0	.001
10.00	0									
250	230	0	5	PIPE	3.0	1500.	.0500	.0	.0	.020
3.00	0									
				OVERFLOW	.0	1500.	.0500	8.0	8.0	.050
10.00										
230	221	0	5	PIPE	5.0	1100.	.0050	.0	.0	

```
.020        5.00        0
                                                OVERFLOW       .0     1100.     .0050       4.0   4.0
.050       10.00
  132         230          0          3                      .0        1.     .0010        .0    .0
.001       10.00        0
  146         221          0          3                      .0        1.     .0010        .0    .0
.001       10.00        0
  150         221          0          3                      .0        1.     .0010        .0    .0
.001       10.00        0
  221         121          0          5      PIPE            5.0     2000.     .0100        .0    .0
.020        5.00        0
                                                OVERFLOW       .0     2000.     .0100       10.0  10.0
.050       10.00
0TOTAL NUMBER OF GUTTERS/PIPES,   9
1
```

US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark100int.sin

ARRANGEMENT OF SUBCATCHMENTS AND GUTTERS/PIPES

GUTTER	TRIBUTARY GUTTER/PIPE										TRIBUTARY SUBAREA					
	D.A.(AC)															
131	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0
0	0	0	0	46.4												
132	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0
0	0	0	0	55.8												
146	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0
0	0	0	0	57.2												
150	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0
0	0	0	0	9.3												
195	308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	46.4												
221	230	146	150	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	168.7												
230	250	132	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	102.2												
250	195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

```
0    0    0    0    46.4

       308       131    0    0    0    0    0    0    0    0    0              0    0    0    0    0    0
0    0    0    0    46.4
1
```

US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark100int.sin

*** PEAK FLOWS, STAGES AND STORAGES OF GUTTERS AND DETENTION DAMS ***

CONVEYANCE ELEMENT	PEAK (CFS)	STAGE (FT)	STORAGE (AC-FT)	TIME (HR/MIN)
131	114.	(DIRECT FLOW)		0 30.
308	20.	1.5	3.8	1 40.
195	20.	(DIRECT FLOW)		1 40.
132	87.	(DIRECT FLOW)		0 30.
250	20.	.9		1 45.
150	40.	(DIRECT FLOW)		0 30.
146	289.	(DIRECT FLOW)		0 30.
230	91.	3.3		0 35.
221	298.	7.0		0 40.
121	298.	(DIRECT FLOW)		0 40.

PROPOSED CONDITIONS (AIRPORT CREEK)

```
   2   1   1   2
   3   4
WATERSHED   0
Wadsworth Place Pond - New Run w/ Project Basins
Airport Creek Basin, North Tributary 1- New Interchange - 10interim.sin
        72       5.0    1                                                    1
   24    5
 0.40 0.75 1.65 3.02 5.04 2.42 1.13 0.87 0.77 0.65
 0.65 0.65 0.65 0.65 0.65 0.50 0.38 0.38 0.38 0.38
 0.38 0.38 0.34 0.26
    1  101  151 137. 1.59 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  105  156 160. 1.78 38.5 0.05 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  102  152 137. 0.60 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  103  153 137. 0.43 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  110  160 112. 1.59 25.1 0.05 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  111  169 118. 1.46 53.0 0.05 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  112  171  75. 0.57 95.5 0.02 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  113  154 131. 1.40 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  114  175  33. 1.10 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  120  179 700. 7.76  0.0 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  121  129 100. 1.78 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  122  190  94. 1.01 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  130  196 440. 8.01  8.0 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  131  182  88. 0.98 92.9 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1000 10010640. 10.8  4.2 0.04 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1200 12011150. 27.3  10. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1300 13010420. 22.4  75. .025 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1350 13510100. 2.94  0.5 .025 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  300  301 100. 0.62  0.5 0.29 0.02  0.2  0.1  0.4   3.  0.5    0.0018

    0
    0    5
    0  151  150    2     1.5      90   0.23                      0.013    1.5

    0  150  156    3            143
    0  152  156    2     1.5     100   0.19                      0.013    1.5
    0  156  155    2     2.0     170   0.026                     0.013    2.0

    0  153  155    2     1.5      90   0.169                     0.013    1.5
    0  155  160    1   0.001     490   0.026       4       4     0.013     10
    0  154  165    2     2.0      60   0.020                     0.013    2.0
    0  160  154    2     2.0      36   0.020                     0.013    2.0
    0  165  129    2     2.0     600   0.033                     0.013    2.0
    0  169  171    2     1.5     350   0.023                     0.013    1.5
    0  171  175    2     1.5     650   0.015                     0.013    1.5
```

```
    0  175  176    2     2.0      60   0.010                    0.013    2.0
    0  179  129    2     2.0      35   0.010                    0.013    2.0
    0  129  176    2     2.5      90   0.028                    0.013    2.5
    0  176  190    2     3.0     414   0.024                    0.013    3.0
    0  196  190    2     2.5      60   0.019                    0.013    2.5
    0  190  194    2     3.0     100   0.040                    0.013    3.0
    0  194  301    2     3.0      20   0.250                    0.013    3.0
    0  182  301    2     1.0      95   0.037                    0.013    1.5
    0  301  350  6 2    1.00     170   0.005                    0.013   1.00
         0          0      0.09       3.5       0.28       5.5      0.52       7.0
      0.81       8.0      1.15      79.7
    0  350  351    1   0.001      50   0.012       4        4    0.013     10
    0  351  360    3     3.0     845   0.016                    0.013    3.0
    0 1001  360    1   0.001    1050   0.035       4        4    0.035    3.0
    0 1201  360    1   0.001     630   0.035       4        4    0.035    1.5
    0  360  400    1   0.001     640    0.03       3        3    0.035    3.0
    0 1301  400    3            1900    .025                    0.035
    0 1351  400    3             670    .025                    0.035

   31
  151  150  156  152  153  154  155  160  165  129  179  175  171  169  170
  182  196  190  300  350  176  301  194  351 1001 1201 1301 1350 1351  400
    0    5
ENDPROGRAM
```

URBAN DRAINAGE STORM WATER MANAGEMENT MODEL - 32 BIT VERSION 1998
REVISED BY UNIVERSITY OF COLORADO AT DENVER

*** ENTRY MADE TO RUNOFF MODEL ***

Wadsworth Place Pond - New Run w/ Project Basins
Airport Creek Basin, North Tributary 1- New Interchange - 10interim.sin

0NUMBER OF TIME STEPS 72
0INTEGRATION TIME INTERVAL (MINUTES) 5.00

25.0 PERCENT OF IMPERVIOUS AREA HAS ZERO DETENTION DEPTH
0FOR 24 RAINFALL STEPS, THE TIME INTERVAL IS 5.00 MINUTES
0FOR RAINGAGE NUMBER 1 RAINFALL HISTORY IN INCHES PER HOUR

.40	.75	1.65	3.02	5.04	2.42	1.13	.87	.77	.65
.65	.65	.65	.65	.65	.50	.38	.38	.38	.38
.38	.38	.34	.26						

1

Wadsworth Place Pond - New Run w/ Project Basins
Airport Creek Basin, North Tributary 1- New Interchange - 10interim.sin

SUBAREA NUMBER	GUTTER OR MANHOLE	WIDTH (FT)	AREA (AC)	PERCENT IMPERV.	SLOPE (FT/FT)	RESISTANCE FACTOR IMPERV.	RESISTANCE FACTOR PERV.	SURFACE STORAGE(IN) IMPERV.	SURFACE STORAGE(IN) PERV.	INFILTRATION RATE(IN/HR) MAXIMUM	INFILTRATION RATE(IN/HR) MINIMUM	DECAY RATE	GAGE NO
101	151	137.	1.6	99.9	.0300	.020	.200	.100	.400	3.00	.50	.00180	1
105	156	160.	1.8	38.5	.0500	.020	.200	.100	.400	3.00	.50	.00180	1
102	152	137.	.6	99.9	.0300	.020	.200	.100	.400	3.00	.50	.00180	1
103	153	137.	.4	99.9	.0300	.020	.200	.100	.400	3.00	.50	.00180	1
110	160	112.	1.6	25.1	.0500	.020	.200	.100	.400	3.00	.50	.00180	1
111	169	118.	1.5	53.0	.0500	.020	.200	.100	.400	3.00	.50		

```
.00180    1
  112      171        75.      .6     95.5     .0200      .020      .200      .100      .400     3.00      .50
.00180    1
  113      154       131.     1.4     99.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  114      175        33.     1.1     99.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  120      179       700.     7.8       .0     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  121      129       100.     1.8     99.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  122      190        94.     1.0     99.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  130      196       440.     8.0      8.0     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  131      182        88.     1.0     92.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
 1000     1001       640.    10.8      4.2     .0400      .020      .200      .100      .400     3.00      .50
.00180    1
 1200     1201      1150.    27.3     10.0     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
 1300     1301       420.    22.4     75.0     .0250      .020      .200      .100      .400     3.00      .50
.00180    1
 1350     1351       100.     2.9       .5     .0250      .020      .200      .100      .400     3.00      .50
.00180    1
  300      301       100.      .6       .5     .2900      .020      .200      .100      .400     3.00      .50
.00180    1
0TOTAL NUMBER OF SUBCATCHMENTS,  19
0TOTAL TRIBUTARY AREA (ACRES),     94.12
1
```

Wadsworth Place Pond - New Run w/ Project Basins
Airport Creek Basin, North Tributary 1- New Interchange - 10interim.sin

*** CONTINUITY CHECK FOR SUBCATCHMEMT ROUTING IN UDSWM386 MODEL ***

WATERSHED AREA (ACRES)	94.120
TOTAL RAINFALL (INCHES)	1.944
TOTAL INFILTRATION (INCHES)	.760

TOTAL WATERSHED OUTFLOW (INCHES) .881

TOTAL SURFACE STORAGE AT END OF STORM (INCHES) .303

ERROR IN CONTINUITY, PERCENTAGE OF RAINFALL .044

1

Wadsworth Place Pond - New Run w/ Project Basins
Airport Creek Basin, North Tributary 1- New Interchange - 10interim.sin

OVERBANK/SURCHARGE GUTTER DEPTH (FT)	GUTTER JK NUMBER CONNECTION	NDP	NP		WIDTH OR DIAM (FT)	LENGTH (FT)	INVERT SLOPE (FT/FT)	SIDE SLOPES HORIZ TO VERT L	R	MANNING N
151	150	0	2	PIPE	1.5	90.	.2300	.0	.0	.010
31.50	0									
150	156	0	3		.0	143.	.0010	.0	.0	.001
10.00	0									
152	156	0	2	PIPE	1.5	100.	.1900	.0	.0	.010
31.50	0									
156	155	0	2	PIPE	2.0	170.	.0260	.0	.0	.010
32.00	0									
153	155	0	2	PIPE	1.5	90.	.1690	.0	.0	.010
31.50	0									
155	160	0	1	CHANNEL	.0	490.	.0260	4.0	4.0	.010
310.00	0									
154	165	0	2	PIPE	2.0	60.	.0200	.0	.0	.010
32.00	0									
160	154	0	2	PIPE	2.0	36.	.0200	.0	.0	.010
32.00	0									
165	129	0	2	PIPE	2.0	600.	.0330	.0	.0	.010
32.00	0									
169	171	0	2	PIPE	1.5	350.	.0230	.0	.0	.010
31.50	0									
171	175	0	2	PIPE	1.5	650.	.0150	.0	.0	.010
31.50	0									
175	176	0	2	PIPE	2.0	60.	.0100	.0	.0	.010
32.00	0									

```
 179          129          0          2      PIPE             2.0       35.     .0100        .0    .0        .010
 32.00         0
 129          176          0          2      PIPE             2.5       90.     .0280        .0    .0        .010
 32.50         0
 176          190          0          2      PIPE             3.0      414.     .0240        .0    .0        .010
 33.00         0
 196          190          0          2      PIPE             2.5       60.     .0190        .0    .0        .010
 32.50         0
 190          194          0          2      PIPE             3.0      100.     .0400        .0    .0        .010
 33.00         0
 194          301          0          2      PIPE             3.0       20.     .2500        .0    .0        .010
 33.00         0
 182          301          0          2      PIPE             1.0       95.     .0370        .0    .0        .010
 31.50         0
 301          350          6          2      PIPE             1.0      170.     .0050        .0    .0        .010
 31.00         0
                    RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW
                          .0      .0        .1     3.5         .3     5.5         .5     7.0         .8     8.0
 1.1    79.7
 350          351          0          1      CHANNEL           .0       50.     .0120       4.0   4.0        .010
310.00         0
 351          360          0          3                        3.0      845.     .0160        .0    .0        .010
 33.00         0
1001          360          0          1      CHANNEL           .0     1050.     .0350       4.0   4.0        .030
 53.00         0
1201          360          0          1      CHANNEL           .0      630.     .0350       4.0   4.0        .030
 51.50         0
 360          400          0          1      CHANNEL           .0      640.     .0300       3.0   3.0        .030
 53.00         0
1301          400          0          3                        .0     1900.     .0250        .0    .0        .030
   5.00        0
1351          400          0          3                        .0      670.     .0250        .0    .0        .030
   5.00        0
0TOTAL NUMBER OF GUTTERS/PIPES,  27
1


 Wadsworth Place Pond - New Run w/ Project Basins
 Airport Creek Basin, North Tributary 1- New Interchange - 10interim.sin


 ARRANGEMENT OF SUBCATCHMENTS AND GUTTERS/PIPES

       GUTTER     TRIBUTARY GUTTER/PIPE                                          TRIBUTARY SUBAREA
```

D.A.(AC)

129	165	179	0	0	0	0	0	0	0	0	121	0	0	0	0	0	0	0	0
0	16.9																		
150	151	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	1.6																		
151	0	0	0	0	0	0	0	0	0	0	101	0	0	0	0	0	0	0	0
0	1.6																		
152	0	0	0	0	0	0	0	0	0	0	102	0	0	0	0	0	0	0	0
0	.6																		
153	0	0	0	0	0	0	0	0	0	0	103	0	0	0	0	0	0	0	0
0	.4																		
154	160	0	0	0	0	0	0	0	0	0	113	0	0	0	0	0	0	0	0
0	7.4																		
155	156	153	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	4.4																		
156	150	152	0	0	0	0	0	0	0	0	105	0	0	0	0	0	0	0	0
0	4.0																		
160	155	0	0	0	0	0	0	0	0	0	110	0	0	0	0	0	0	0	0
0	6.0																		
165	154	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	7.4																		
169	0	0	0	0	0	0	0	0	0	0	111	0	0	0	0	0	0	0	0
0	1.5																		
171	169	0	0	0	0	0	0	0	0	0	112	0	0	0	0	0	0	0	0
0	2.0																		
175	171	0	0	0	0	0	0	0	0	0	114	0	0	0	0	0	0	0	0
0	3.1																		
176	175	129	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	20.1																		
179	0	0	0	0	0	0	0	0	0	0	120	0	0	0	0	0	0	0	0

```
0    0    0     7.8

       182         0    0    0    0    0    0    0    0    0    0          131    0    0    0    0    0    0
0    0    0     1.0

       190       176  196    0    0    0    0    0    0    0    0          122    0    0    0    0    0    0
0    0    0    29.1

       194       190    0    0    0    0    0    0    0    0    0            0    0    0    0    0    0    0
0    0    0    29.1

       196         0    0    0    0    0    0    0    0    0    0          130    0    0    0    0    0    0
0    0    0     8.0

       301       194  182    0    0    0    0    0    0    0    0          300    0    0    0    0    0    0
0    0    0    30.7

       350       301    0    0    0    0    0    0    0    0    0            0    0    0    0    0    0    0
0    0    0    30.7

       351       350    0    0    0    0    0    0    0    0    0            0    0    0    0    0    0    0
0    0    0    30.7

       360       351 1001 1201    0    0    0    0    0    0    0            0    0    0    0    0    0    0
0    0    0    68.8

      1001         0    0    0    0    0    0    0    0    0    0         1000    0    0    0    0    0    0
0    0    0    10.8

      1201         0    0    0    0    0    0    0    0    0    0         1200    0    0    0    0    0    0
0    0    0    27.3

      1301         0    0    0    0    0    0    0    0    0    0         1300    0    0    0    0    0    0
0    0    0    22.4

      1351         0    0    0    0    0    0    0    0    0    0         1350    0    0    0    0    0    0
0    0    0     2.9
0HYDROGRAPHS WILL BE  STORED FOR THE FOLLOWING   31 POINTS
       151       150       156       152       153       154       155       160       165       129
       179       175       171       169       170         0       182       196       190       300
       350       176       301       194       351      1001      1201      1301      1350      1351
       400
1
```

Wadsworth Place Pond - New Run w/ Project Basins
Airport Creek Basin, North Tributary 1- New Interchange - 10interim.sin

*** PEAK FLOWS, STAGES AND STORAGES OF GUTTERS AND DETENTION DAMS ***

CONVEYANCE ELEMENT	PEAK (CFS)	STAGE (FT)	STORAGE (AC-FT)	TIME (HR/MIN)
151	7.	.3		0 25.
152	3.	.2		0 25.
150	7.	(DIRECT FLOW)		0 25.
153	2.	.2		0 25.
156	13.	.7		0 25.
155	15.	.6		0 25.
160	17.	.9		0 25.
154	23.	1.1		0 25.
169	4.	.4		0 25.
179	3.	.4		0 40.
165	22.	.9		0 25.
171	6.	.6		0 25.
129	28.	1.0		0 25.
175	9.	.7		0 25.
196	3.	.4		0 25.
176	36.	1.1		0 30.
190	43.	1.0		0 25.
182	4.	.5		0 25.
194	43.	.6		0 25.
301	14.	1.0	.8	0 55.
350	14.	.7		0 55.
1201	13.	.8		0 25.
1001	3.	.5		0 40.
351	14.	(DIRECT FLOW)		0 55.
1351	0.	(DIRECT FLOW)		1 10.
1301	43.	(DIRECT FLOW)		0 30.
360	25.	1.2		0 30.
400	69.	(DIRECT FLOW)		0 30.

```
   2   1   1   2
   3   4
WATERSHED   0
Wadsworth Place Pond - New Run w/ Project Basins
Airport Creek Basin, North Tributary 1- New Interchange - 100interim.sin
        72       5.0    1                                                    1
   24    5
 0.32 0.96 1.48 2.64 4.50 8.16 4.50 2.64 1.99 1.68
 1.29 1.29 1.29 0.64 0.64 0.39 0.39 0.39 0.39 0.39
 0.39 0.39 0.39 0.39
    1  101  151 137. 1.59 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  105  156 160. 1.78 38.5 0.05 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  102  152 137. 0.60 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  103  153 137. 0.43 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  110  160 112. 1.59 25.1 0.05 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  111  169 118. 1.46 53.0 0.05 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  112  171  75. 0.57 95.5 0.02 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  113  154 131. 1.40 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  114  175  33. 1.10 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  120  179 700. 7.76  0.0 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  121  129 100. 1.78 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  122  190  94. 1.01 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  130  196 440. 8.01  8.0 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  131  182  88. 0.98 92.9 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1000 10010640. 10.8  4.2 0.04 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1200 12011150. 27.3  10. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1300 13010420. 22.4  75. .025 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1350 13510100. 2.94  0.5 .025 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  300  301 100. 0.62  0.5 0.29 0.02  0.2  0.1  0.4   3.  0.5    0.0018

    0
    0    5
    0  151  150    2     1.5      90   0.23                      0.013    1.5

    0  150  156    3             143
    0  152  156    2     1.5     100   0.19                      0.013    1.5
    0  156  155    2     2.0     170   0.026                     0.013    2.0

    0  153  155    2     1.5      90   0.169                     0.013    1.5
    0  155  160    1   0.001     490   0.026       4       4     0.013     10
    0  154  165    2     2.0      60   0.020                     0.013    2.0
    0  160  154    2     2.0      36   0.020                     0.013    2.0
    0  165  129    2     2.0     600   0.033                     0.013    2.0
    0  169  171    2     1.5     350   0.023                     0.013    1.5
    0  171  175    2     1.5     650   0.015                     0.013    1.5
    0  175  176    2     2.0      60   0.010                     0.013    2.0
    0  179  129    2     2.0      35   0.010                     0.013    2.0
    0  129  176    2     2.5      90   0.028                     0.013    2.5
    0  176  190    2     3.0     414   0.024                     0.013    3.0
```

```
    0  196  190    2     2.5      60   0.019                    0.013    2.5
    0  190  194    2     3.0     100   0.040                    0.013    3.0
    0  194  301    2     3.0      20   0.250                    0.013    3.0
    0  182  301    2     1.0      95   0.037                    0.013    1.5
    0  301  350  6 2    1.00     170   0.005                    0.013   1.00
         0          0      0.09       3.5      0.28       5.5      0.52       7.0
      0.81         8.0      1.15      79.7
    0  350  351    1   0.001      50   0.012       4        4    0.013     10
    0  351  360    3     3.0     845   0.016                    0.013    3.0
    0 1001  360    1   0.001    1050   0.035       4        4    0.035    3.0
    0 1201  360    1   0.001     630   0.035       4        4    0.035    1.5
    0  360  400    1   0.001     640    0.03       3        3    0.035    3.0
    0 1301  400    3            1900    .025                    0.035
    0 1351  400    3             670    .025                    0.035

   31
  151  150  156  152  153  154  155  160  165  129  179  175  171  169  170
  182  196  190  300  350  176  301  194  351 1001 1201 1301 1350 1351  400
    0    5
ENDPROGRAM
```

URBAN DRAINAGE STORM WATER MANAGEMENT MODEL - 32 BIT VERSION 1998
REVISED BY UNIVERSITY OF COLORADO AT DENVER

*** ENTRY MADE TO RUNOFF MODEL ***

Wadsworth Place Pond - New Run w/ Project Basins
Airport Creek Basin, North Tributary 1- New Interchange - 100interim.sin

0NUMBER OF TIME STEPS 72
0INTEGRATION TIME INTERVAL (MINUTES) 5.00

25.0 PERCENT OF IMPERVIOUS AREA HAS ZERO DETENTION DEPTH
0FOR 24 RAINFALL STEPS, THE TIME INTERVAL IS 5.00 MINUTES
0FOR RAINGAGE NUMBER 1 RAINFALL HISTORY IN INCHES PER HOUR

.32 .96 1.48 2.64 4.50 8.16 4.50 2.64 1.99 1.68
1.29 1.29 1.29 .64 .64 .39 .39 .39 .39 .39
.39 .39 .39 .39
1

Wadsworth Place Pond - New Run w/ Project Basins
Airport Creek Basin, North Tributary 1- New Interchange - 100interim.sin

SUBAREA NUMBER	GUTTER OR MANHOLE	WIDTH (FT)	AREA (AC)	PERCENT IMPERV.	SLOPE (FT/FT)	RESISTANCE FACTOR IMPERV.	RESISTANCE FACTOR PERV.	SURFACE STORAGE(IN) IMPERV.	SURFACE STORAGE(IN) PERV.	INFILTRATION RATE(IN/HR) MAXIMUM	INFILTRATION RATE(IN/HR) MINIMUM	DECAY RATE	GAGE NO
101	151	137.	1.6	99.9	.0300	.020	.200	.100	.400	3.00	.50	.00180	1
105	156	160.	1.8	38.5	.0500	.020	.200	.100	.400	3.00	.50	.00180	1
102	152	137.	.6	99.9	.0300	.020	.200	.100	.400	3.00	.50	.00180	1
103	153	137.	.4	99.9	.0300	.020	.200	.100	.400	3.00	.50	.00180	1
110	160	112.	1.6	25.1	.0500	.020	.200	.100	.400	3.00	.50	.00180	1
111	169	118.	1.5	53.0	.0500	.020	.200	.100	.400	3.00	.50		

```
.00180    1
  112      171        75.      .6     95.5     .0200      .020      .200      .100      .400     3.00      .50
.00180    1
  113      154       131.     1.4     99.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  114      175        33.     1.1     99.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  120      179       700.     7.8       .0     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  121      129       100.     1.8     99.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  122      190        94.     1.0     99.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  130      196       440.     8.0      8.0     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  131      182        88.     1.0     92.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
 1000     1001       640.    10.8      4.2     .0400      .020      .200      .100      .400     3.00      .50
.00180    1
 1200     1201      1150.    27.3     10.0     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
 1300     1301       420.    22.4     75.0     .0250      .020      .200      .100      .400     3.00      .50
.00180    1
 1350     1351       100.     2.9       .5     .0250      .020      .200      .100      .400     3.00      .50
.00180    1
  300      301       100.      .6       .5     .2900      .020      .200      .100      .400     3.00      .50
.00180    1
0TOTAL NUMBER OF SUBCATCHMENTS,  19
0TOTAL TRIBUTARY AREA (ACRES),     94.12
1
```

Wadsworth Place Pond - New Run w/ Project Basins
Airport Creek Basin, North Tributary 1- New Interchange - 100interim.sin

*** CONTINUITY CHECK FOR SUBCATCHMEMT ROUTING IN UDSWM386 MODEL ***

WATERSHED AREA (ACRES)	94.120
TOTAL RAINFALL (INCHES)	3.127
TOTAL INFILTRATION (INCHES)	.774

TOTAL WATERSHED OUTFLOW (INCHES) 2.029

TOTAL SURFACE STORAGE AT END OF STORM (INCHES) .323

ERROR IN CONTINUITY, PERCENTAGE OF RAINFALL .028

1

Wadsworth Place Pond - New Run w/ Project Basins
Airport Creek Basin, North Tributary 1- New Interchange - 100interim.sin

OVERBANK/SURCHARGE GUTTER DEPTH (FT)	GUTTER JK NUMBER	CONNECTION	NDP	NP		WIDTH OR DIAM (FT)	LENGTH (FT)	INVERT SLOPE (FT/FT)	SIDE SLOPES HORIZ TO VERT L	R	MANNING N
151	150		0	2	PIPE	1.5	90.	.2300	.0	.0	.010
31.50	0										
150	156		0	3		.0	143.	.0010	.0	.0	.001
10.00	0										
152	156		0	2	PIPE	1.5	100.	.1900	.0	.0	.010
31.50	0										
156	155		0	2	PIPE	2.0	170.	.0260	.0	.0	.010
32.00	0										
153	155		0	2	PIPE	1.5	90.	.1690	.0	.0	.010
31.50	0										
155	160		0	1	CHANNEL	.0	490.	.0260	4.0	4.0	.010
310.00	0										
154	165		0	2	PIPE	2.0	60.	.0200	.0	.0	.010
32.00	0										
160	154		0	2	PIPE	2.0	36.	.0200	.0	.0	.010
32.00	0										
165	129		0	2	PIPE	2.0	600.	.0330	.0	.0	.010
32.00	0										
169	171		0	2	PIPE	1.5	350.	.0230	.0	.0	.010
31.50	0										
171	175		0	2	PIPE	1.5	650.	.0150	.0	.0	.010
31.50	0										
175	176		0	2	PIPE	2.0	60.	.0100	.0	.0	.010
32.00	0										

```
 179         129          0          2      PIPE            2.0       35.     .0100       .0    .0       .010
 32.00        0
 129         176          0          2      PIPE            2.5       90.     .0280       .0    .0       .010
 32.50        0
 176         190          0          2      PIPE            3.0      414.     .0240       .0    .0       .010
 33.00        0
 196         190          0          2      PIPE            2.5       60.     .0190       .0    .0       .010
 32.50        0
 190         194          0          2      PIPE            3.0      100.     .0400       .0    .0       .010
 33.00        0
 194         301          0          2      PIPE            3.0       20.     .2500       .0    .0       .010
 33.00        0
 182         301          0          2      PIPE            1.0       95.     .0370       .0    .0       .010
 31.50        0
 301         350          6          2      PIPE            1.0      170.     .0050       .0    .0       .010
 31.00        0
                    RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW
                          .0      .0        .1     3.5        .3     5.5        .5     7.0        .8     8.0
 1.1    79.7
 350         351          0          1      CHANNEL          .0       50.     .0120      4.0   4.0       .010
310.00        0
 351         360          0          3                       3.0      845.     .0160       .0    .0       .010
 33.00        0
1001         360          0          1      CHANNEL          .0     1050.     .0350      4.0   4.0       .030
 53.00        0
1201         360          0          1      CHANNEL          .0      630.     .0350      4.0   4.0       .030
 51.50        0
 360         400          0          1      CHANNEL          .0      640.     .0300      3.0   3.0       .030
 53.00        0
1301         400          0          3                       .0     1900.     .0250       .0    .0       .030
  5.00        0
1351         400          0          3                       .0      670.     .0250       .0    .0       .030
  5.00        0
0TOTAL NUMBER OF GUTTERS/PIPES,  27
1


 Wadsworth Place Pond - New Run w/ Project Basins
 Airport Creek Basin, North Tributary 1- New Interchange - 100interim.sin


 ARRANGEMENT OF SUBCATCHMENTS AND GUTTERS/PIPES

       GUTTER     TRIBUTARY GUTTER/PIPE                                          TRIBUTARY SUBAREA
```

D.A.(AC)

129	165	179	0	0	0	0	0	0	0	0	121	0	0	0	0	0	0	0	0
0	16.9																		
150	151	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	1.6																		
151	0	0	0	0	0	0	0	0	0	0	101	0	0	0	0	0	0	0	0
0	1.6																		
152	0	0	0	0	0	0	0	0	0	0	102	0	0	0	0	0	0	0	0
0	.6																		
153	0	0	0	0	0	0	0	0	0	0	103	0	0	0	0	0	0	0	0
0	.4																		
154	160	0	0	0	0	0	0	0	0	0	113	0	0	0	0	0	0	0	0
0	7.4																		
155	156	153	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	4.4																		
156	150	152	0	0	0	0	0	0	0	0	105	0	0	0	0	0	0	0	0
0	4.0																		
160	155	0	0	0	0	0	0	0	0	0	110	0	0	0	0	0	0	0	0
0	6.0																		
165	154	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	7.4																		
169	0	0	0	0	0	0	0	0	0	0	111	0	0	0	0	0	0	0	0
0	1.5																		
171	169	0	0	0	0	0	0	0	0	0	112	0	0	0	0	0	0	0	0
0	2.0																		
175	171	0	0	0	0	0	0	0	0	0	114	0	0	0	0	0	0	0	0
0	3.1																		
176	175	129	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	20.1																		
179	0	0	0	0	0	0	0	0	0	0	120	0	0	0	0	0	0	0	0

```
0    0    0     7.8

       182         0    0    0    0    0    0    0    0    0    0          131    0    0    0    0    0    0
0    0    0     1.0

       190       176  196    0    0    0    0    0    0    0    0          122    0    0    0    0    0    0
0    0    0    29.1

       194       190    0    0    0    0    0    0    0    0    0            0    0    0    0    0    0    0
0    0    0    29.1

       196         0    0    0    0    0    0    0    0    0    0          130    0    0    0    0    0    0
0    0    0     8.0

       301       194  182    0    0    0    0    0    0    0    0          300    0    0    0    0    0    0
0    0    0    30.7

       350       301    0    0    0    0    0    0    0    0    0            0    0    0    0    0    0    0
0    0    0    30.7

       351       350    0    0    0    0    0    0    0    0    0            0    0    0    0    0    0    0
0    0    0    30.7

       360       351 1001 1201    0    0    0    0    0    0    0            0    0    0    0    0    0    0
0    0    0    68.8

      1001         0    0    0    0    0    0    0    0    0    0         1000    0    0    0    0    0    0
0    0    0    10.8

      1201         0    0    0    0    0    0    0    0    0    0         1200    0    0    0    0    0    0
0    0    0    27.3

      1301         0    0    0    0    0    0    0    0    0    0         1300    0    0    0    0    0    0
0    0    0    22.4

      1351         0    0    0    0    0    0    0    0    0    0         1350    0    0    0    0    0    0
0    0    0     2.9
0HYDROGRAPHS WILL BE  STORED FOR THE FOLLOWING   31 POINTS
       151       150       156       152       153       154       155       160       165       129
       179       175       171       169       170         0       182       196       190       300
       350       176       301       194       351      1001      1201      1301      1350      1351
       400
1
```

Wadsworth Place Pond - New Run w/ Project Basins
Airport Creek Basin, North Tributary 1- New Interchange - 100interim.sin

*** PEAK FLOWS, STAGES AND STORAGES OF GUTTERS AND DETENTION DAMS ***

CONVEYANCE ELEMENT	PEAK (CFS)	STAGE (FT)	STORAGE (AC-FT)	TIME (HR/MIN)
151	12.	.4		0 30.
152	5.	.3		0 30.
150	12.	(DIRECT FLOW)		0 30.
153	4.	.3		0 30.
156	25.	1.0		0 30.
155	27.	.7		0 30.
160	31.	1.3		0 30.
154	42.	1.7		0 30.
169	7.	.6		0 30.
179	14.	1.0		0 45.
165	39.	1.3		0 30.
171	11.	.9		0 30.
129	60.	1.5		0 35.
175	16.	1.1		0 30.
196	11.	.7		0 45.
176	78.	1.6		0 35.
190	94.	1.6		0 35.
182	7.	.7		0 30.
194	94.	1.0		0 35.
301	79.	1.0	1.1	0 40.
350	80.	1.3		0 40.
1201	36.	1.2		0 35.
1001	16.	.9		0 45.
351	80.	(DIRECT FLOW)		0 40.
1351	3.	(DIRECT FLOW)		0 55.
1301	88.	(DIRECT FLOW)		0 35.
360	129.	2.2		0 40.
400	197.	(DIRECT FLOW)		0 40.

ULTIMATE CONDITIONS (CITY PARK)

```
   2   1   1   2
   3   4
WATERSHED   0
US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark5_ult.sin
        72       5.0    1                                                    1
   24    5
 0.34 0.62 1.46 2.57 4.20 2.18 0.97 0.74  0.6  0.6
 0.50 0.50 0.50 0.50 0.42 0.37 0.37 0.37 0.37 0.25
 0.25 0.25 0.25 0.22
    1   12  1311050. 46.4 60.0 .060 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1   13  1321134. 55.8 28.4 .020 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1   15  150 280.  9.3 75.0 .020 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1   19  1462700. 57.2  70. 0.02 0.02  0.2  0.1  0.4   3.  0.5    0.0018

   4
   12   13   15   19
    0    5
    0  131  308    3              1.
    0  308  195  8 2     1.5     445   0.005                  0.02      1.5
        0.        0.      0.58        3.6      1.54         9      2.59      12.5
      3.73         15      4.97         18      6.30        20      7.74        24
    0  195  250    3              1.
    0  250  230    5     3.0   1500.     .05                  0.02      3.0
                        0.01   1500.     .05       8.       8.    0.05      10.
    0  230  221    5     5.0   1100.     .005                 0.02      5.0
                        0.01   1100.     .005      4.       4.    0.05      10.
    0  132  230    3              1.
    0  146  221    3              1.
    0  150  221    3              1.
    0  221  121    5     5.0   2000.     .01                  0.02      5.0
                        0.01   2000.     .01      10.     10.    0.05      10.

    0
    0    5
ENDPROGRAM
```

URBAN DRAINAGE STORM WATER MANAGEMENT MODEL - 32 BIT VERSION 1998
REVISED BY UNIVERSITY OF COLORADO AT DENVER

*** ENTRY MADE TO RUNOFF MODEL ***

US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark5_ult.sin

0NUMBER OF TIME STEPS 72
0INTEGRATION TIME INTERVAL (MINUTES) 5.00

25.0 PERCENT OF IMPERVIOUS AREA HAS ZERO DETENTION DEPTH
0FOR 24 RAINFALL STEPS, THE TIME INTERVAL IS 5.00 MINUTES
0FOR RAINGAGE NUMBER 1 RAINFALL HISTORY IN INCHES PER HOUR

.34	.62	1.46	2.57	4.20	2.18	.97	.74	.60	.60
.50	.50	.50	.50	.42	.37	.37	.37	.37	.25
.25	.25	.25	.22						

1

US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark5_ult.sin

SUBAREA NUMBER	GUTTER OR MANHOLE	WIDTH (FT)	AREA (AC)	PERCENT IMPERV.	SLOPE (FT/FT)	RESISTANCE FACTOR IMPERV.	RESISTANCE FACTOR PERV.	SURFACE STORAGE(IN) IMPERV.	SURFACE STORAGE(IN) PERV.	INFILTRATION RATE(IN/HR) MAXIMUM	INFILTRATION RATE(IN/HR) MINIMUM	DECAY RATE	GAGE NO
12	131	1050.	46.4	60.0	.0600	.020	.200	.100	.400	3.00	.50	.00180	1
13	132	1134.	55.8	28.4	.0200	.020	.200	.100	.400	3.00	.50	.00180	1
15	150	280.	9.3	75.0	.0200	.020	.200	.100	.400	3.00	.50	.00180	1
19	146	2700.	57.2	70.0	.0200	.020	.200	.100	.400	3.00	.50	.00180	1

0TOTAL NUMBER OF SUBCATCHMENTS, 4
0TOTAL TRIBUTARY AREA (ACRES), 168.70
0HYDROGRAPHS WILL BE SAVED FOR THE FOLLOWING 4SUBCATCHMENTS FOR SUBSEQUENT USE WITH UDSWM386 MODEL

*** CONTINUITY CHECK FOR SUBCATCHMEMT ROUTING IN UDSWM386 MODEL ***

WATERSHED AREA (ACRES)	168.700
TOTAL RAINFALL (INCHES)	1.617
TOTAL INFILTRATION (INCHES)	.494
TOTAL WATERSHED OUTFLOW (INCHES)	.892
TOTAL SURFACE STORAGE AT END OF STORM (INCHES)	.230
ERROR IN CONTINUITY, PERCENTAGE OF RAINFALL	.045

1

US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark5_ult.sin

GUTTER DEPTH NUMBER	GUTTER JK CONNECTION	NDP	NP		WIDTH OR DIAM (FT)	LENGTH (FT)	INVERT SLOPE (FT/FT)	SIDE SLOPES HORIZ TO VERT L	R	MANNING N	OVERBANK/SURCHARGE (FT)
131	308	0	3		.0	1.	.0010	.0	.0	.001	10.00
					0						
308	195	8	2	PIPE	1.5	445.	.0050	.0	.0	.020	1.50
					0						

RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW

.0	.0	.6	3.6	1.5	9.0	2.6	12.5	3.7	15.0	5.0	18.0

```
                          6.3    20.0       7.7    24.0
  195          250          0          3                      .0        1.     .0010        .0    .0        .001
  10.00         0
  250          230          0          5      PIPE            3.0     1500.     .0500        .0    .0        .020
   3.00         0
                                             OVERFLOW        .0      1500.     .0500       8.0   8.0        .050
  10.00
  230          221          0          5      PIPE            5.0     1100.     .0050        .0    .0        .020
   5.00         0
                                             OVERFLOW        .0      1100.     .0050       4.0   4.0        .050
  10.00
  132          230          0          3                      .0        1.     .0010        .0    .0        .001
  10.00         0
  146          221          0          3                      .0        1.     .0010        .0    .0        .001
  10.00         0
  150          221          0          3                      .0        1.     .0010        .0    .0        .001
  10.00         0
  221          121          0          5      PIPE            5.0     2000.     .0100        .0    .0        .020
   5.00         0
                                             OVERFLOW        .0      2000.     .0100      10.0  10.0        .050
  10.00
0TOTAL NUMBER OF GUTTERS/PIPES,   9
1


 US 36/Wadsworth Interchange - New Run w/ project basins
 City Park Basin, Reach 5 & S Trib - New Interchange - CityPark5_ult.sin


 ARRANGEMENT OF SUBCATCHMENTS AND GUTTERS/PIPES

       GUTTER     TRIBUTARY GUTTER/PIPE                                                TRIBUTARY SUBAREA
          D.A.(AC)

       131          0    0    0    0    0    0    0    0    0    0          12    0    0    0    0    0    0
0    0    0    46.4

       132          0    0    0    0    0    0    0    0    0    0          13    0    0    0    0    0    0
0    0    0    55.8

       146          0    0    0    0    0    0    0    0    0    0          19    0    0    0    0    0    0
0    0    0    57.2

       150          0    0    0    0    0    0    0    0    0    0          15    0    0    0    0    0    0
```

```
0    0    0     9.3

        195       308    0    0    0    0    0    0    0    0    0              0    0    0    0    0    0    0
0    0    0    46.4

        221       230  146  150    0    0    0    0    0    0    0              0    0    0    0    0    0    0
0    0    0   168.7

        230       250  132    0    0    0    0    0    0    0    0              0    0    0    0    0    0    0
0    0    0   102.2

        250       195    0    0    0    0    0    0    0    0    0              0    0    0    0    0    0    0
0    0    0    46.4

        308       131    0    0    0    0    0    0    0    0    0              0    0    0    0    0    0    0
0    0    0    46.4
1
```

US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark5_ult.sin

*** PEAK FLOWS, STAGES AND STORAGES OF GUTTERS AND DETENTION DAMS ***

CONVEYANCE ELEMENT	PEAK (CFS)	STAGE (FT)	STORAGE (AC-FT)	TIME (HR/MIN)
131	78.	(DIRECT FLOW)		0 25.
308	15.	1.5	1.8	1 15.
195	15.	(DIRECT FLOW)		1 15.
132	46.	(DIRECT FLOW)		0 25.
250	15.	.8		1 20.
150	17.	(DIRECT FLOW)		0 30.
146	114.	(DIRECT FLOW)		0 25.
230	53.	2.3		0 30.
221	167.	4.0		0 30.
121	167.	(DIRECT FLOW)		0 30.

```
   2   1   1   2
   3   4
WATERSHED   0
US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark10_ult.sin
        72       5.0    1                                                    1
   24    5
 0.40 0.75 1.65 3.02 5.04 2.42 1.13 0.87 0.77 0.65
 0.65 0.65 0.65 0.65 0.65 0.50 0.38 0.38 0.38 0.38
 0.38 0.38 0.34 0.26
    1   12  1311050. 46.4 60.0 .060 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1   13  1321134. 55.8 28.4 .020 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1   15  150 280.  9.3 75.0 .020 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1   19  1462700. 57.2  70. 0.02 0.02  0.2  0.1  0.4   3.  0.5    0.0018

   4
   12   13   15   19
    0    5
    0  131  308    3             1.
    0  308  195  8 2     1.5     445   0.005                  0.02      1.5
        0.        0.      0.58       3.6      1.54         9      2.59      12.5
      3.73        15      4.97        18      6.30        20      7.74        24
    0  195  250    3             1.
    0  250  230    5     3.0   1500.     .05                  0.02      3.0
                        0.01   1500.     .05       8.       8.    0.05     10.
    0  230  221    5     5.0   1100.     .005                 0.02      5.0
                        0.01   1100.     .005      4.       4.    0.05     10.
    0  132  230    3             1.
    0  146  221    3             1.
    0  150  221    3             1.
    0  221  121    5     5.0   2000.     .01                  0.02      5.0
                        0.01   2000.     .01      10.      10.    0.05     10.

    0
    0    5
ENDPROGRAM
```

```
URBAN DRAINAGE STORM WATER MANAGEMENT MODEL -  32 BIT VERSION 1998
         REVISED BY UNIVERSITY OF COLORADO AT DENVER

 *** ENTRY MADE TO RUNOFF MODEL ***


 US 36/Wadsworth Interchange - New Run w/ project basins
 City Park Basin, Reach 5 & S Trib - New Interchange - CityPark10_ult.sin

0NUMBER OF TIME STEPS   72
0INTEGRATION TIME INTERVAL (MINUTES)    5.00

 25.0 PERCENT OF IMPERVIOUS AREA HAS ZERO DETENTION DEPTH
0FOR    24 RAINFALL STEPS, THE TIME INTERVAL IS   5.00 MINUTES
0FOR RAINGAGE NUMBER   1   RAINFALL HISTORY IN INCHES PER HOUR

       .40       .75      1.65      3.02      5.04      2.42      1.13       .87       .77       .65
       .65       .65       .65       .65       .65       .50       .38       .38       .38       .38
       .38       .38       .34       .26
1


 US 36/Wadsworth Interchange - New Run w/ project basins
 City Park Basin, Reach 5 & S Trib - New Interchange - CityPark10_ult.sin



 SUBAREA   GUTTER   WIDTH    AREA   PERCENT    SLOPE   RESISTANCE FACTOR  SURFACE STORAGE(IN)
INFILTRATION RATE(IN/HR)  GAGE
 NUMBER  OR MANHOLE  (FT)    (AC)   IMPERV.   (FT/FT)    IMPERV.    PERV.    IMPERV.    PERV.   MAXIMUM
MINIMUM DECAY RATE   NO
   12      131      1050.    46.4     60.0     .0600      .020      .200      .100      .400     3.00
.50      .00180    1
   13      132      1134.    55.8     28.4     .0200      .020      .200      .100      .400     3.00
.50      .00180    1
   15      150       280.     9.3     75.0     .0200      .020      .200      .100      .400     3.00
.50      .00180    1
   19      146      2700.    57.2     70.0     .0200      .020      .200      .100      .400     3.00
.50      .00180    1
0TOTAL NUMBER OF SUBCATCHMENTS,   4
0TOTAL TRIBUTARY AREA (ACRES),    168.70
0HYDROGRAPHS WILL BE SAVED FOR THE FOLLOWING   4SUBCATCHMENTS FOR SUBSEQUENT USE WITH UDSWM386 MODEL
        12        13        15        19
1
```

*** CONTINUITY CHECK FOR SUBCATCHMEMT ROUTING IN UDSWM386 MODEL ***

WATERSHED AREA (ACRES)	168.700
TOTAL RAINFALL (INCHES)	1.944
TOTAL INFILTRATION (INCHES)	.531
TOTAL WATERSHED OUTFLOW (INCHES)	1.164
TOTAL SURFACE STORAGE AT END OF STORM (INCHES)	.249
ERROR IN CONTINUITY, PERCENTAGE OF RAINFALL	.038

1

US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark10_ult.sin

					WIDTH OR DIAM (FT)	LENGTH (FT)	INVERT SLOPE (FT/FT)	SIDE SLOPES HORIZ TO VERT L	R	OVERBANK/SURCHARGE GUTTER MANNING NUMBER	GUTTER DEPTH (FT)	NDP CONNECTION	JK
131	308	0	3		.0	1.	.0010	.0	.0	.001	10.00	0	
308	195	8	2	PIPE	1.5	445.	.0050	.0	.0	.020	1.50	0	
RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW													
		.0	.0	.6	3.6	1.5	9.0	2.6	12.5	3.7	15.0	5.0	18.0
		6.3	20.0	7.7	24.0								
195	250	0	3		.0	1.	.0010	.0	.0	.001	10.00	0	
250	230	0	5	PIPE	3.0	1500.	.0500	.0	.0	.020	3.00	0	
				OVERFLOW	.0	1500.	.0500	8.0	8.0	.050	10.00		
230	221	0	5	PIPE	5.0	1100.	.0050	.0	.0				

```
.020        5.00        0
                                                OVERFLOW       .0     1100.     .0050       4.0   4.0
.050       10.00
  132         230          0          3                      .0        1.     .0010        .0    .0
.001       10.00        0
  146         221          0          3                      .0        1.     .0010        .0    .0
.001       10.00        0
  150         221          0          3                      .0        1.     .0010        .0    .0
.001       10.00        0
  221         121          0          5      PIPE            5.0     2000.     .0100        .0    .0
.020        5.00        0
                                                OVERFLOW       .0     2000.     .0100       10.0  10.0
.050       10.00
0TOTAL NUMBER OF GUTTERS/PIPES,   9
1
```

US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark10_ult.sin

ARRANGEMENT OF SUBCATCHMENTS AND GUTTERS/PIPES

GUTTER	TRIBUTARY GUTTER/PIPE										TRIBUTARY SUBAREA					
	D.A.(AC)															
131	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0
0	0	0	0	46.4												
132	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0
0	0	0	0	55.8												
146	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0
0	0	0	0	57.2												
150	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0
0	0	0	0	9.3												
195	308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	46.4												
221	230	146	150	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	168.7												
230	250	132	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	102.2												
250	195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

```
0    0    0    0    46.4

       308       131    0    0    0    0    0    0    0    0    0              0    0    0    0    0    0
0    0    0    0    46.4
1
```

US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark10_ult.sin

*** PEAK FLOWS, STAGES AND STORAGES OF GUTTERS AND DETENTION DAMS ***

CONVEYANCE ELEMENT	PEAK (CFS)	STAGE (FT)	STORAGE (AC-FT)	TIME (HR/MIN)
131	99.	(DIRECT FLOW)		0 25.
308	17.	1.5	2.4	1 25.
195	17.	(DIRECT FLOW)		1 25.
132	59.	(DIRECT FLOW)		0 25.
250	17.	.9		1 30.
150	20.	(DIRECT FLOW)		0 30.
146	145.	(DIRECT FLOW)		0 25.
230	65.	2.6		0 30.
221	185.	5.5		0 30.
121	185.	(DIRECT FLOW)		0 30.

```
   2   1   1   2
   3   4
WATERSHED   0
US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark100_ult.sin
        72       5.0    1                                                    1
   24    5
 0.32 0.96 1.48 2.64 4.50 8.16 4.50 2.64 1.99 1.68
 1.29 1.29 1.29 0.64 0.64 0.39 0.39 0.39 0.39 0.39
 0.39 0.39 0.39 0.39
    1   12  1311050. 46.4 60.0 .060 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1   13  1321134. 55.8 28.4 .020 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1   15  150 280.  9.3 75.0 .020 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1   19  1462700. 57.2  70. 0.02 0.02  0.2  0.1  0.4   3.  0.5    0.0018

   4
   12   13   15   19
    0    5
    0  131  308    3              1.
    0  308  195  8 2     1.5     445   0.005                    0.02      1.5
        0.         0.      0.58       3.6       1.54          9      2.59      12.5
      3.73         15       4.97        18       6.30         20      7.74        24
    0  195  250    3              1.
    0  250  230    5     3.0   1500.     .05                    0.02      3.0
                        0.01   1500.     .05       8.       8.    0.05     10.
    0  230  221    5     5.0   1100.     .005                   0.02      5.0
                        0.01   1100.     .005      4.       4.    0.05     10.
    0  132  230    3              1.
    0  146  221    3              1.
    0  150  221    3              1.
    0  221  121    5     5.0   2000.     .01                    0.02      5.0
                        0.01   2000.     .01      10.      10.    0.05     10.

    0
    0    5
ENDPROGRAM
```

```
URBAN DRAINAGE STORM WATER MANAGEMENT MODEL -  32 BIT VERSION 1998
         REVISED BY UNIVERSITY OF COLORADO AT DENVER

 *** ENTRY MADE TO RUNOFF MODEL ***


 US 36/Wadsworth Interchange - New Run w/ project basins
 City Park Basin, Reach 5 & S Trib - New Interchange - CityPark100_ult.sin

0NUMBER OF TIME STEPS   72
0INTEGRATION TIME INTERVAL (MINUTES)    5.00

 25.0 PERCENT OF IMPERVIOUS AREA HAS ZERO DETENTION DEPTH
0FOR    24 RAINFALL STEPS, THE TIME INTERVAL IS   5.00 MINUTES
0FOR RAINGAGE NUMBER   1   RAINFALL HISTORY IN INCHES PER HOUR

       .32       .96      1.48      2.64      4.50      8.16      4.50      2.64      1.99      1.68
      1.29      1.29      1.29       .64       .64       .39       .39       .39       .39       .39
       .39       .39       .39       .39
1


 US 36/Wadsworth Interchange - New Run w/ project basins
 City Park Basin, Reach 5 & S Trib - New Interchange - CityPark100_ult.sin



 SUBAREA   GUTTER   WIDTH    AREA   PERCENT    SLOPE   RESISTANCE FACTOR  SURFACE STORAGE(IN)
INFILTRATION RATE(IN/HR)  GAGE
 NUMBER  OR MANHOLE  (FT)    (AC)   IMPERV.   (FT/FT)    IMPERV.    PERV.    IMPERV.    PERV.   MAXIMUM
MINIMUM DECAY RATE   NO
   12      131      1050.    46.4     60.0     .0600      .020      .200      .100      .400     3.00
.50      .00180    1
   13      132      1134.    55.8     28.4     .0200      .020      .200      .100      .400     3.00
.50      .00180    1
   15      150       280.     9.3     75.0     .0200      .020      .200      .100      .400     3.00
.50      .00180    1
   19      146      2700.    57.2     70.0     .0200      .020      .200      .100      .400     3.00
.50      .00180    1
0TOTAL NUMBER OF SUBCATCHMENTS,   4
0TOTAL TRIBUTARY AREA (ACRES),    168.70
0HYDROGRAPHS WILL BE SAVED FOR THE FOLLOWING   4SUBCATCHMENTS FOR SUBSEQUENT USE WITH UDSWM386 MODEL
        12        13        15        19
1
```

*** CONTINUITY CHECK FOR SUBCATCHMEMT ROUTING IN UDSWM386 MODEL ***

WATERSHED AREA (ACRES)	168.700
TOTAL RAINFALL (INCHES)	3.127
TOTAL INFILTRATION (INCHES)	.541
TOTAL WATERSHED OUTFLOW (INCHES)	2.306
TOTAL SURFACE STORAGE AT END OF STORM (INCHES)	.279
ERROR IN CONTINUITY, PERCENTAGE OF RAINFALL	.024

1

US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark100_ult.sin

					WIDTH		INVERT	SIDE SLOPES		
OVERBANK/SURCHARGE GUTTER NUMBER	GUTTER DEPTH CONNECTION (FT)	NDP JK	NP		OR DIAM (FT)	LENGTH (FT)	SLOPE (FT/FT)	HORIZ TO VERT L	R	MANNING N
131	308	0	3		.0	1.	.0010	.0	.0	.001
10.00	0									
308	195	8	2	PIPE	1.5	445.	.0050	.0	.0	.020
1.50	0									
RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW										
		.0	.0	.6	3.6	1.5	9.0	2.6	12.5	3.7
15.0	5.0	18.0								
		6.3	20.0	7.7	24.0					
195	250	0	3		.0	1.	.0010	.0	.0	.001
10.00	0									
250	230	0	5	PIPE	3.0	1500.	.0500	.0	.0	.020
3.00	0									
				OVERFLOW	.0	1500.	.0500	8.0	8.0	.050
10.00										
230	221	0	5	PIPE	5.0	1100.	.0050	.0	.0	

```
.020        5.00        0
                                                OVERFLOW       .0     1100.     .0050       4.0   4.0
.050       10.00
  132         230          0          3                      .0        1.     .0010        .0    .0
.001       10.00        0
  146         221          0          3                      .0        1.     .0010        .0    .0
.001       10.00        0
  150         221          0          3                      .0        1.     .0010        .0    .0
.001       10.00        0
  221         121          0          5      PIPE            5.0     2000.     .0100        .0    .0
.020        5.00        0
                                                OVERFLOW       .0     2000.     .0100       10.0  10.0
.050       10.00
0TOTAL NUMBER OF GUTTERS/PIPES,   9
1
```

US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark100_ult.sin

ARRANGEMENT OF SUBCATCHMENTS AND GUTTERS/PIPES

GUTTER	TRIBUTARY GUTTER/PIPE										TRIBUTARY SUBAREA					
	D.A.(AC)															
131	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0
0	0	0	0	46.4												
132	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0
0	0	0	0	55.8												
146	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0
0	0	0	0	57.2												
150	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0
0	0	0	0	9.3												
195	308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	46.4												
221	230	146	150	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	168.7												
230	250	132	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	102.2												
250	195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

```
0    0    0    0    46.4

       308       131    0    0    0    0    0    0    0    0    0              0    0    0    0    0    0
0    0    0    0    46.4
1
```

US 36/Wadsworth Interchange - New Run w/ project basins
City Park Basin, Reach 5 & S Trib - New Interchange - CityPark100_ult.sin

*** PEAK FLOWS, STAGES AND STORAGES OF GUTTERS AND DETENTION DAMS ***

CONVEYANCE ELEMENT	PEAK (CFS)	STAGE (FT)	STORAGE (AC-FT)	TIME (HR/MIN)
131	199.	(DIRECT FLOW)		0 30.
308	25.	1.5	6.0	1 30.
195	25.	(DIRECT FLOW)		1 30.
132	117.	(DIRECT FLOW)		0 30.
250	25.	1.0		1 30.
150	40.	(DIRECT FLOW)		0 30.
146	289.	(DIRECT FLOW)		0 30.
230	125.	4.3		0 35.
221	324.	7.1		0 40.
121	324.	(DIRECT FLOW)		0 40.

ULTIMATE CONDITIONS (AIRPORT CREEK)

```
   2   1   1   2
   3   4
WATERSHED   0
Wadsworth Place Pond - New Run w/ Project Basins- Ultimate
Airport Creek Basin, North Tributary 1- New Interchange - 10Ultimate.sin
        72       5.0    1                                                    1
   24    5
 0.40 0.75 1.65 3.02 5.04 2.42 1.13 0.87 0.77 0.65
 0.65 0.65 0.65 0.65 0.65 0.50 0.38 0.38 0.38 0.38
 0.38 0.38 0.34 0.26
    1  101  151 137. 1.59 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  105  156 160. 1.78 38.5 0.05 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  102  152 137. 0.60 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  103  153 137. 0.43 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  110  160 112. 1.59 25.1 0.05 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  111  169 118. 1.46 53.0 0.05 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  112  171  75. 0.57 95.5 0.02 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  113  154 131. 1.40 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  114  175  33. 1.10 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  120  179 700. 7.76 60.0 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  121  129 100. 1.78 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  122  190  94. 1.01 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  130  196 440. 8.01 70.0 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  131  182  88. 0.98 92.9 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1000 10010640. 10.8 75.0 0.04 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1100 11010450. 16.2 30.0 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1200 12011150. 27.3 70.0 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1300 13010420. 22.4  75. .025 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1350 13510100. 2.94  0.5 .025 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  300  301 100. 0.62  0.5 0.29 0.02  0.2  0.1  0.4   3.  0.5    0.0018

    0
    0    5
    0  151  150    2     1.5      90   0.23                      0.013    1.5

    0  150  156    3             143
    0  152  156    2     1.5     100   0.19                      0.013    1.5
    0  156  155    2     2.0     170   0.026                     0.013    2.0

    0  153  155    2     1.5      90   0.169                     0.013    1.5
    0  155  160    1   0.001     490   0.026       4       4     0.013     10
    0  154  165    2     2.0      60   0.020                     0.013    2.0
    0  160  154    2     2.0      36   0.020                     0.013    2.0
    0  165  129    2     2.0     600   0.033                     0.013    2.0
    0  169  171    2     1.5     350   0.023                     0.013    1.5
    0  171  175    2     1.5     650   0.015                     0.013    1.5
    0  175  176    2     2.0      60   0.010                     0.013    2.0
    0  179  129    2     2.0      35   0.010                     0.013    2.0
    0  129  176    2     2.5      90   0.028                     0.013    2.5
```

```
    0  176  190    2     3.0     414   0.024                    0.013    3.0
    0  196  190    2     2.5      60   0.019                    0.013    2.5
    0  190  194    2     3.0     100   0.040                    0.013    3.0
    0  194  301    2     3.0      20   0.250                    0.013    3.0
    0  182  301    2     1.0      95   0.037                    0.013    1.5
    0  301  350  6 2    1.00     170   0.005                    0.013   1.00
         0          0     0.09       3.5       0.28       5.5      0.52       7.0
      0.81        8.0     1.15      79.7
    0  350  351    1   0.001      50   0.012        4        4    0.013     10
    0  351  360    3     3.0     845   0.016                      0.013    3.0
    0 1001  360    1   0.001    1050   0.035        4        4    0.035    3.0
    0 1101  360    1   0.001    1560   0.035        4        4    0.035    3.0
    0 1201  360    1   0.001     630   0.035        4        4    0.035    1.5
    0  360  400    1   0.001     640    0.03        3        3    0.035    3.0
    0 1301  400    3            1900    .025                     0.035
    0 1351  400    3             670    .025                     0.035

   31
  151  150  156  152  153  154  155  160  165  129  179  175  171  169  170
  182  196  190  300  350  176  301  194  351 1001 1201 1301 1350 1351  400
    0    5
ENDPROGRAM
```

URBAN DRAINAGE STORM WATER MANAGEMENT MODEL - 32 BIT VERSION 1998
REVISED BY UNIVERSITY OF COLORADO AT DENVER

*** ENTRY MADE TO RUNOFF MODEL ***

Wadsworth Place Pond - New Run w/ Project Basins- Ultimate
Airport Creek Basin, North Tributary 1- New Interchange - 10Ultimate.sin

0NUMBER OF TIME STEPS 72
0INTEGRATION TIME INTERVAL (MINUTES) 5.00

25.0 PERCENT OF IMPERVIOUS AREA HAS ZERO DETENTION DEPTH
0FOR 24 RAINFALL STEPS, THE TIME INTERVAL IS 5.00 MINUTES
0FOR RAINGAGE NUMBER 1 RAINFALL HISTORY IN INCHES PER HOUR

.40	.75	1.65	3.02	5.04	2.42	1.13	.87	.77	.65
.65	.65	.65	.65	.65	.50	.38	.38	.38	.38
.38	.38	.34	.26						

1

Wadsworth Place Pond - New Run w/ Project Basins- Ultimate
Airport Creek Basin, North Tributary 1- New Interchange - 10Ultimate.sin

SUBAREA NUMBER	GUTTER OR MANHOLE	WIDTH (FT)	AREA (AC)	PERCENT IMPERV.	SLOPE (FT/FT)	RESISTANCE FACTOR IMPERV.	RESISTANCE FACTOR PERV.	SURFACE STORAGE(IN) IMPERV.	SURFACE STORAGE(IN) PERV.	INFILTRATION RATE(IN/HR) MAXIMUM	INFILTRATION RATE(IN/HR) MINIMUM	GAGE DECAY RATE	GAGE NO
101	151	137.	1.6	99.9	.0300	.020	.200	.100	.400	3.00	.50	.00180	1
105	156	160.	1.8	38.5	.0500	.020	.200	.100	.400	3.00	.50	.00180	1
102	152	137.	.6	99.9	.0300	.020	.200	.100	.400	3.00	.50	.00180	1
103	153	137.	.4	99.9	.0300	.020	.200	.100	.400	3.00	.50	.00180	1
110	160	112.	1.6	25.1	.0500	.020	.200	.100	.400	3.00	.50	.00180	1
111	169	118.	1.5	53.0	.0500	.020	.200	.100	.400	3.00	.50		

```
.00180    1
  112      171        75.      .6     95.5     .0200      .020      .200      .100      .400     3.00      .50
.00180    1
  113      154       131.     1.4     99.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  114      175        33.     1.1     99.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  120      179       700.     7.8     60.0     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  121      129       100.     1.8     99.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  122      190        94.     1.0     99.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  130      196       440.     8.0     70.0     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  131      182        88.     1.0     92.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
 1000     1001       640.    10.8     75.0     .0400      .020      .200      .100      .400     3.00      .50
.00180    1
 1100     1101       450.    16.2     30.0     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
 1200     1201      1150.    27.3     70.0     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
 1300     1301       420.    22.4     75.0     .0250      .020      .200      .100      .400     3.00      .50
.00180    1
 1350     1351       100.     2.9       .5     .0250      .020      .200      .100      .400     3.00      .50
.00180    1
  300      301       100.      .6       .5     .2900      .020      .200      .100      .400     3.00      .50
.00180    1
0TOTAL NUMBER OF SUBCATCHMENTS,  20
0TOTAL TRIBUTARY AREA (ACRES),    110.32
1
```

Wadsworth Place Pond - New Run w/ Project Basins- Ultimate
Airport Creek Basin, North Tributary 1- New Interchange - 10Ultimate.sin

*** CONTINUITY CHECK FOR SUBCATCHMEMT ROUTING IN UDSWM386 MODEL ***

WATERSHED AREA (ACRES)	110.320
TOTAL RAINFALL (INCHES)	1.944

TOTAL INFILTRATION (INCHES) .416

TOTAL WATERSHED OUTFLOW (INCHES) 1.332

TOTAL SURFACE STORAGE AT END OF STORM (INCHES) .195

ERROR IN CONTINUITY, PERCENTAGE OF RAINFALL .054

1

Wadsworth Place Pond - New Run w/ Project Basins- Ultimate
Airport Creek Basin, North Tributary 1- New Interchange - 10Ultimate.sin

OVERBANK/SURCHARGE GUTTER DEPTH NUMBER (FT)	GUTTER JK CONNECTION	NDP	NP		WIDTH OR DIAM (FT)	LENGTH (FT)	INVERT SLOPE (FT/FT)	SIDE SLOPES HORIZ TO VERT L	R	MANNING N
151	150	0	2	PIPE	1.5	90.	.2300	.0	.0	.010
31.50	0									
150	156	0	3		.0	143.	.0010	.0	.0	.001
10.00	0									
152	156	0	2	PIPE	1.5	100.	.1900	.0	.0	.010
31.50	0									
156	155	0	2	PIPE	2.0	170.	.0260	.0	.0	.010
32.00	0									
153	155	0	2	PIPE	1.5	90.	.1690	.0	.0	.010
31.50	0									
155	160	0	1	CHANNEL	.0	490.	.0260	4.0	4.0	.010
310.00	0									
154	165	0	2	PIPE	2.0	60.	.0200	.0	.0	.010
32.00	0									
160	154	0	2	PIPE	2.0	36.	.0200	.0	.0	.010
32.00	0									
165	129	0	2	PIPE	2.0	600.	.0330	.0	.0	.010
32.00	0									
169	171	0	2	PIPE	1.5	350.	.0230	.0	.0	.010
31.50	0									
171	175	0	2	PIPE	1.5	650.	.0150	.0	.0	.010
31.50	0									

```
 175          176          0          2      PIPE             2.0       60.     .0100        .0    .0        .010
 32.00         0
 179          129          0          2      PIPE             2.0       35.     .0100        .0    .0        .010
 32.00         0
 129          176          0          2      PIPE             2.5       90.     .0280        .0    .0        .010
 32.50         0
 176          190          0          2      PIPE             3.0      414.     .0240        .0    .0        .010
 33.00         0
 196          190          0          2      PIPE             2.5       60.     .0190        .0    .0        .010
 32.50         0
 190          194          0          2      PIPE             3.0      100.     .0400        .0    .0        .010
 33.00         0
 194          301          0          2      PIPE             3.0       20.     .2500        .0    .0        .010
 33.00         0
 182          301          0          2      PIPE             1.0       95.     .0370        .0    .0        .010
 31.50         0
 301          350          6          2      PIPE             1.0      170.     .0050        .0    .0        .010
 31.00         0
                    RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW
                          .0      .0        .1     3.5         .3     5.5         .5     7.0         .8     8.0
 1.1    79.7
 350          351          0          1      CHANNEL           .0       50.     .0120       4.0    4.0        .010
310.00         0
 351          360          0          3                        3.0      845.     .0160        .0    .0        .010
 33.00         0
1001          360          0          1      CHANNEL           .0      1050.     .0350       4.0    4.0        .030
 53.00         0
1101          360          0          1      CHANNEL           .0      1560.     .0350       4.0    4.0        .030
 53.00         0
1201          360          0          1      CHANNEL           .0       630.     .0350       4.0    4.0        .030
 51.50         0
 360          400          0          1      CHANNEL           .0       640.     .0300       3.0    3.0        .030
 53.00         0
1301          400          0          3                        .0      1900.     .0250        .0    .0        .030
   5.00        0
1351          400          0          3                        .0       670.     .0250        .0    .0        .030
   5.00        0
0TOTAL NUMBER OF GUTTERS/PIPES,  28
1


 Wadsworth Place Pond - New Run w/ Project Basins- Ultimate
 Airport Creek Basin, North Tributary 1- New Interchange - 10Ultimate.sin
```

ARRANGEMENT OF SUBCATCHMENTS AND GUTTERS/PIPES

GUTTER	TRIBUTARY GUTTER/PIPE									TRIBUTARY SUBAREA							
D.A.(AC)																	
129	165	179	0	0	0	0	0	0	0	121	0	0	0	0	0	0	0
16.9																	
150	151	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.6																	
151	0	0	0	0	0	0	0	0	0	101	0	0	0	0	0	0	0
1.6																	
152	0	0	0	0	0	0	0	0	0	102	0	0	0	0	0	0	0
.6																	
153	0	0	0	0	0	0	0	0	0	103	0	0	0	0	0	0	0
.4																	
154	160	0	0	0	0	0	0	0	0	113	0	0	0	0	0	0	0
7.4																	
155	156	153	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.4																	
156	150	152	0	0	0	0	0	0	0	105	0	0	0	0	0	0	0
4.0																	
160	155	0	0	0	0	0	0	0	0	110	0	0	0	0	0	0	0
6.0																	
165	154	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.4																	
169	0	0	0	0	0	0	0	0	0	111	0	0	0	0	0	0	0
1.5																	
171	169	0	0	0	0	0	0	0	0	112	0	0	0	0	0	0	0
2.0																	
175	171	0	0	0	0	0	0	0	0	114	0	0	0	0	0	0	0
3.1																	

```
       176       175  129    0    0    0    0    0    0    0    0              0    0    0    0    0    0    0
0    0    0    20.1

       179         0    0    0    0    0    0    0    0    0    0            120    0    0    0    0    0    0
0    0    0     7.8

       182         0    0    0    0    0    0    0    0    0    0            131    0    0    0    0    0    0
0    0    0     1.0

       190       176  196    0    0    0    0    0    0    0    0            122    0    0    0    0    0    0
0    0    0    29.1

       194       190    0    0    0    0    0    0    0    0    0              0    0    0    0    0    0    0
0    0    0    29.1

       196         0    0    0    0    0    0    0    0    0    0            130    0    0    0    0    0    0
0    0    0     8.0

       301       194  182    0    0    0    0    0    0    0    0            300    0    0    0    0    0    0
0    0    0    30.7

       350       301    0    0    0    0    0    0    0    0    0              0    0    0    0    0    0    0
0    0    0    30.7

       351       350    0    0    0    0    0    0    0    0    0              0    0    0    0    0    0    0
0    0    0    30.7

       360       351 1001 1101 1201    0    0    0    0    0    0              0    0    0    0    0    0    0
0    0    0    85.0

      1001         0    0    0    0    0    0    0    0    0    0           1000    0    0    0    0    0    0
0    0    0    10.8

      1101         0    0    0    0    0    0    0    0    0    0           1100    0    0    0    0    0    0
0    0    0    16.2

      1201         0    0    0    0    0    0    0    0    0    0           1200    0    0    0    0    0    0
0    0    0    27.3

      1301         0    0    0    0    0    0    0    0    0    0           1300    0    0    0    0    0    0
0    0    0    22.4

      1351         0    0    0    0    0    0    0    0    0    0           1350    0    0    0    0    0    0
0    0    0     2.9
0HYDROGRAPHS WILL BE  STORED FOR THE FOLLOWING   31 POINTS
```

151	150	156	152	153	154	155	160	165	129
179	175	171	169	170	0	182	196	190	300
350	176	301	194	351	1001	1201	1301	1350	1351
400									

1

Wadsworth Place Pond - New Run w/ Project Basins- Ultimate
Airport Creek Basin, North Tributary 1- New Interchange - 10Ultimate.sin

*** PEAK FLOWS, STAGES AND STORAGES OF GUTTERS AND DETENTION DAMS ***

CONVEYANCE ELEMENT	PEAK (CFS)	STAGE (FT)	STORAGE (AC-FT)	TIME (HR/MIN)
151	7.	.3		0 25.
152	3.	.2		0 25.
150	7.	(DIRECT FLOW)		0 25.
153	2.	.2		0 25.
156	13.	.7		0 25.
155	15.	.6		0 25.
160	17.	.9		0 25.
154	23.	1.1		0 25.
169	4.	.4		0 25.
179	22.	1.3		0 25.
165	22.	.9		0 25.
171	6.	.6		0 25.
129	51.	1.4		0 25.
175	9.	.7		0 25.
196	23.	1.0		0 25.
176	58.	1.4		0 25.
190	85.	1.5		0 25.
182	4.	.5		0 25.
194	85.	.9		0 25.
301	54.	1.0	1.0	0 35.
350	54.	1.1		0 35.
1201	69.	1.5		0 30.
1101	17.	.9		0 30.
1001	31.	1.1		0 30.
351	54.	(DIRECT FLOW)		0 35.
1351	0.	(DIRECT FLOW)		1 10.
1301	43.	(DIRECT FLOW)		0 30.
360	151.	2.3		0 30.

400 194. (DIRECT FLOW) 0 30.

```
   2   1   1   2
   3   4
WATERSHED   0
Wadsworth Place Pond - New Run w/ Project Basins- Ultimate
Airport Creek Basin, North Tributary 1- New Interchange - 100Ultimate.sin
        72       5.0    1                                                    1
   24    5
 0.32 0.96 1.48 2.64 4.50 8.16 4.50 2.64 1.99 1.68
 1.29 1.29 1.29 0.64 0.64 0.39 0.39 0.39 0.39 0.39
 0.39 0.39 0.39 0.39
    1  101  151 137. 1.59 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  105  156 160. 1.78 38.5 0.05 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  102  152 137. 0.60 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  103  153 137. 0.43 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  110  160 112. 1.59 25.1 0.05 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  111  169 118. 1.46 53.0 0.05 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  112  171  75. 0.57 95.5 0.02 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  113  154 131. 1.40 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  114  175  33. 1.10 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  120  179 700. 7.76 60.0 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  121  129 100. 1.78 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  122  190  94. 1.01 100. 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  130  196 440. 8.01 70.0 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  131  182  88. 0.98 92.9 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1000 10010640. 10.8 75.0 0.04 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1100 11010450. 16.2 30.0 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1200 12011150. 27.3 70.0 0.03 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1300 13010420. 22.4  75. .025 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1 1350 13510100. 2.94  0.5 .025 0.02  0.2  0.1  0.4   3.  0.5    0.0018
    1  300  301 100. 0.62  0.5 0.29 0.02  0.2  0.1  0.4   3.  0.5    0.0018

    0
    0    5
    0  151  150    2     1.5      90   0.23                      0.013    1.5

    0  150  156    3             143
    0  152  156    2     1.5     100   0.19                      0.013    1.5
    0  156  155    2     2.0     170   0.026                     0.013    2.0

    0  153  155    2     1.5      90   0.169                     0.013    1.5
    0  155  160    1   0.001     490   0.026       4       4     0.013     10
    0  154  165    2     2.0      60   0.020                     0.013    2.0
    0  160  154    2     2.0      36   0.020                     0.013    2.0
    0  165  129    2     2.0     600   0.033                     0.013    2.0
    0  169  171    2     1.5     350   0.023                     0.013    1.5
    0  171  175    2     1.5     650   0.015                     0.013    1.5
    0  175  176    2     2.0      60   0.010                     0.013    2.0
    0  179  129    2     2.0      35   0.010                     0.013    2.0
    0  129  176    2     2.5      90   0.028                     0.013    2.5
```

```
    0  176  190    2     3.0     414   0.024                    0.013    3.0
    0  196  190    2     2.5      60   0.019                    0.013    2.5
    0  190  194    2     3.0     100   0.040                    0.013    3.0
    0  194  301    2     3.0      20   0.250                    0.013    3.0
    0  182  301    2     1.0      95   0.037                    0.013    1.5
    0  301  350  6 2    1.00     170   0.005                    0.013   1.00
         0          0     0.09       3.5       0.28       5.5      0.52       7.0
      0.81        8.0     1.15      79.7
    0  350  351    1   0.001      50   0.012        4        4    0.013     10
    0  351  360    3     3.0     845   0.016                      0.013    3.0
    0 1001  360    1   0.001    1050   0.035        4        4    0.035    3.0
    0 1101  360    1   0.001    1560   0.035        4        4    0.035    3.0
    0 1201  360    1   0.001     630   0.035        4        4    0.035    1.5
    0  360  400    1   0.001     640    0.03        3        3    0.035    3.0
    0 1301  400    3            1900    .025                     0.035
    0 1351  400    3             670    .025                     0.035

   31
  151  150  156  152  153  154  155  160  165  129  179  175  171  169  170
  182  196  190  300  350  176  301  194  351 1001 1201 1301 1350 1351  400
    0    5
ENDPROGRAM
```

URBAN DRAINAGE STORM WATER MANAGEMENT MODEL - 32 BIT VERSION 1998
REVISED BY UNIVERSITY OF COLORADO AT DENVER

*** ENTRY MADE TO RUNOFF MODEL ***

Wadsworth Place Pond - New Run w/ Project Basins- Ultimate
Airport Creek Basin, North Tributary 1- New Interchange - 100Ultimate.sin

0NUMBER OF TIME STEPS 72
0INTEGRATION TIME INTERVAL (MINUTES) 5.00

25.0 PERCENT OF IMPERVIOUS AREA HAS ZERO DETENTION DEPTH
0FOR 24 RAINFALL STEPS, THE TIME INTERVAL IS 5.00 MINUTES
0FOR RAINGAGE NUMBER 1 RAINFALL HISTORY IN INCHES PER HOUR

.32 .96 1.48 2.64 4.50 8.16 4.50 2.64 1.99 1.68
1.29 1.29 1.29 .64 .64 .39 .39 .39 .39 .39
.39 .39 .39 .39
1

Wadsworth Place Pond - New Run w/ Project Basins- Ultimate
Airport Creek Basin, North Tributary 1- New Interchange - 100Ultimate.sin

SUBAREA NUMBER	GUTTER OR MANHOLE	WIDTH (FT)	AREA (AC)	PERCENT IMPERV.	SLOPE (FT/FT)	RESISTANCE FACTOR IMPERV.	RESISTANCE FACTOR PERV.	SURFACE STORAGE(IN) IMPERV.	SURFACE STORAGE(IN) PERV.	INFILTRATION RATE(IN/HR) MAXIMUM	INFILTRATION RATE(IN/HR) MINIMUM	GAGE DECAY RATE	GAGE NO
101	151	137.	1.6	99.9	.0300	.020	.200	.100	.400	3.00	.50	.00180	1
105	156	160.	1.8	38.5	.0500	.020	.200	.100	.400	3.00	.50	.00180	1
102	152	137.	.6	99.9	.0300	.020	.200	.100	.400	3.00	.50	.00180	1
103	153	137.	.4	99.9	.0300	.020	.200	.100	.400	3.00	.50	.00180	1
110	160	112.	1.6	25.1	.0500	.020	.200	.100	.400	3.00	.50	.00180	1
111	169	118.	1.5	53.0	.0500	.020	.200	.100	.400	3.00	.50		

```
.00180    1
  112      171        75.      .6     95.5     .0200      .020      .200      .100      .400     3.00      .50
.00180    1
  113      154       131.     1.4     99.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  114      175        33.     1.1     99.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  120      179       700.     7.8     60.0     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  121      129       100.     1.8     99.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  122      190        94.     1.0     99.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  130      196       440.     8.0     70.0     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
  131      182        88.     1.0     92.9     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
 1000     1001       640.    10.8     75.0     .0400      .020      .200      .100      .400     3.00      .50
.00180    1
 1100     1101       450.    16.2     30.0     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
 1200     1201      1150.    27.3     70.0     .0300      .020      .200      .100      .400     3.00      .50
.00180    1
 1300     1301       420.    22.4     75.0     .0250      .020      .200      .100      .400     3.00      .50
.00180    1
 1350     1351       100.     2.9       .5     .0250      .020      .200      .100      .400     3.00      .50
.00180    1
  300      301       100.      .6       .5     .2900      .020      .200      .100      .400     3.00      .50
.00180    1
0TOTAL NUMBER OF SUBCATCHMENTS,  20
0TOTAL TRIBUTARY AREA (ACRES),    110.32
1
```

Wadsworth Place Pond - New Run w/ Project Basins- Ultimate
Airport Creek Basin, North Tributary 1- New Interchange - 100Ultimate.sin

*** CONTINUITY CHECK FOR SUBCATCHMEMT ROUTING IN UDSWM386 MODEL ***

WATERSHED AREA (ACRES)	110.320
TOTAL RAINFALL (INCHES)	3.128

TOTAL INFILTRATION (INCHES) .424

TOTAL WATERSHED OUTFLOW (INCHES) 2.498

TOTAL SURFACE STORAGE AT END OF STORM (INCHES) .205

ERROR IN CONTINUITY, PERCENTAGE OF RAINFALL .034

1

Wadsworth Place Pond - New Run w/ Project Basins- Ultimate
Airport Creek Basin, North Tributary 1- New Interchange - 100Ultimate.sin

OVERBANK/SURCHARGE GUTTER DEPTH NUMBER	GUTTER JK CONNECTION (FT)	NDP	NP		WIDTH OR DIAM (FT)	LENGTH (FT)	INVERT SLOPE (FT/FT)	SIDE SLOPES HORIZ TO VERT L	R	MANNING N
151	150	0	2	PIPE	1.5	90.	.2300	.0	.0	.010
31.50	0									
150	156	0	3		.0	143.	.0010	.0	.0	.001
10.00	0									
152	156	0	2	PIPE	1.5	100.	.1900	.0	.0	.010
31.50	0									
156	155	0	2	PIPE	2.0	170.	.0260	.0	.0	.010
32.00	0									
153	155	0	2	PIPE	1.5	90.	.1690	.0	.0	.010
31.50	0									
155	160	0	1	CHANNEL	.0	490.	.0260	4.0	4.0	.010
310.00	0									
154	165	0	2	PIPE	2.0	60.	.0200	.0	.0	.010
32.00	0									
160	154	0	2	PIPE	2.0	36.	.0200	.0	.0	.010
32.00	0									
165	129	0	2	PIPE	2.0	600.	.0330	.0	.0	.010
32.00	0									
169	171	0	2	PIPE	1.5	350.	.0230	.0	.0	.010
31.50	0									
171	175	0	2	PIPE	1.5	650.	.0150	.0	.0	.010
31.50	0									

```
 175          176          0          2      PIPE             2.0       60.     .0100        .0    .0        .010
 32.00         0
 179          129          0          2      PIPE             2.0       35.     .0100        .0    .0        .010
 32.00         0
 129          176          0          2      PIPE             2.5       90.     .0280        .0    .0        .010
 32.50         0
 176          190          0          2      PIPE             3.0      414.     .0240        .0    .0        .010
 33.00         0
 196          190          0          2      PIPE             2.5       60.     .0190        .0    .0        .010
 32.50         0
 190          194          0          2      PIPE             3.0      100.     .0400        .0    .0        .010
 33.00         0
 194          301          0          2      PIPE             3.0       20.     .2500        .0    .0        .010
 33.00         0
 182          301          0          2      PIPE             1.0       95.     .0370        .0    .0        .010
 31.50         0
 301          350          6          2      PIPE             1.0      170.     .0050        .0    .0        .010
 31.00         0
                    RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW
                          .0      .0        .1     3.5         .3     5.5         .5     7.0         .8     8.0
 1.1    79.7
 350          351          0          1      CHANNEL           .0       50.     .0120       4.0    4.0        .010
310.00         0
 351          360          0          3                        3.0      845.     .0160        .0    .0        .010
 33.00         0
1001          360          0          1      CHANNEL           .0      1050.     .0350       4.0    4.0        .030
 53.00         0
1101          360          0          1      CHANNEL           .0      1560.     .0350       4.0    4.0        .030
 53.00         0
1201          360          0          1      CHANNEL           .0       630.     .0350       4.0    4.0        .030
 51.50         0
 360          400          0          1      CHANNEL           .0       640.     .0300       3.0    3.0        .030
 53.00         0
1301          400          0          3                        .0      1900.     .0250        .0    .0        .030
   5.00        0
1351          400          0          3                        .0       670.     .0250        .0    .0        .030
   5.00        0
0TOTAL NUMBER OF GUTTERS/PIPES,  28
1


 Wadsworth Place Pond - New Run w/ Project Basins- Ultimate
 Airport Creek Basin, North Tributary 1- New Interchange - 100Ultimate.sin
```

ARRANGEMENT OF SUBCATCHMENTS AND GUTTERS/PIPES

GUTTER	TRIBUTARY GUTTER/PIPE									TRIBUTARY SUBAREA							
D.A.(AC)																	
129	165	179	0	0	0	0	0	0	0	121	0	0	0	0	0	0	0
16.9																	
150	151	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.6																	
151	0	0	0	0	0	0	0	0	0	101	0	0	0	0	0	0	0
1.6																	
152	0	0	0	0	0	0	0	0	0	102	0	0	0	0	0	0	0
.6																	
153	0	0	0	0	0	0	0	0	0	103	0	0	0	0	0	0	0
.4																	
154	160	0	0	0	0	0	0	0	0	113	0	0	0	0	0	0	0
7.4																	
155	156	153	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.4																	
156	150	152	0	0	0	0	0	0	0	105	0	0	0	0	0	0	0
4.0																	
160	155	0	0	0	0	0	0	0	0	110	0	0	0	0	0	0	0
6.0																	
165	154	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.4																	
169	0	0	0	0	0	0	0	0	0	111	0	0	0	0	0	0	0
1.5																	
171	169	0	0	0	0	0	0	0	0	112	0	0	0	0	0	0	0
2.0																	
175	171	0	0	0	0	0	0	0	0	114	0	0	0	0	0	0	0
3.1																	

```
       176       175  129    0    0    0    0    0    0    0    0              0    0    0    0    0    0    0
0    0    0    20.1

       179         0    0    0    0    0    0    0    0    0    0            120    0    0    0    0    0    0
0    0    0     7.8

       182         0    0    0    0    0    0    0    0    0    0            131    0    0    0    0    0    0
0    0    0     1.0

       190       176  196    0    0    0    0    0    0    0    0            122    0    0    0    0    0    0
0    0    0    29.1

       194       190    0    0    0    0    0    0    0    0    0              0    0    0    0    0    0    0
0    0    0    29.1

       196         0    0    0    0    0    0    0    0    0    0            130    0    0    0    0    0    0
0    0    0     8.0

       301       194  182    0    0    0    0    0    0    0    0            300    0    0    0    0    0    0
0    0    0    30.7

       350       301    0    0    0    0    0    0    0    0    0              0    0    0    0    0    0    0
0    0    0    30.7

       351       350    0    0    0    0    0    0    0    0    0              0    0    0    0    0    0    0
0    0    0    30.7

       360       351 1001 1101 1201    0    0    0    0    0    0              0    0    0    0    0    0    0
0    0    0    85.0

      1001         0    0    0    0    0    0    0    0    0    0           1000    0    0    0    0    0    0
0    0    0    10.8

      1101         0    0    0    0    0    0    0    0    0    0           1100    0    0    0    0    0    0
0    0    0    16.2

      1201         0    0    0    0    0    0    0    0    0    0           1200    0    0    0    0    0    0
0    0    0    27.3

      1301         0    0    0    0    0    0    0    0    0    0           1300    0    0    0    0    0    0
0    0    0    22.4

      1351         0    0    0    0    0    0    0    0    0    0           1350    0    0    0    0    0    0
0    0    0     2.9
0HYDROGRAPHS WILL BE  STORED FOR THE FOLLOWING   31 POINTS
```

151	150	156	152	153	154	155	160	165	129
179	175	171	169	170	0	182	196	190	300
350	176	301	194	351	1001	1201	1301	1350	1351
400									

1

Wadsworth Place Pond - New Run w/ Project Basins- Ultimate
Airport Creek Basin, North Tributary 1- New Interchange - 100Ultimate.sin

*** PEAK FLOWS, STAGES AND STORAGES OF GUTTERS AND DETENTION DAMS ***

CONVEYANCE ELEMENT	PEAK (CFS)	STAGE (FT)	STORAGE (AC-FT)	TIME (HR/MIN)
151	12.	.4		0 30.
152	5.	.3		0 30.
150	12.	(DIRECT FLOW)		0 30.
153	4.	.3		0 30.
156	25.	1.0		0 30.
155	27.	.7		0 30.
160	31.	1.3		0 30.
154	42.	1.7		0 30.
169	7.	.6		0 30.
179	32.	2.0	.1	0 35.
165	39.	1.3		0 30.
171	11.	.9		0 30.
129	94.	2.2		0 30.
175	16.	1.1		0 30.
196	45.	1.4		0 30.
176	105.	2.0		0 30.
190	157.	2.2		0 30.
182	7.	.7		0 30.
194	157.	1.2		0 30.
301	139.	1.0	1.4	0 35.
350	138.	1.6		0 35.
1201	135.	1.9		0 35.
1101	36.	1.2		0 35.
1001	60.	1.4		0 35.
351	138.	(DIRECT FLOW)		0 35.
1351	3.	(DIRECT FLOW)		0 55.
1301	88.	(DIRECT FLOW)		0 35.
360	365.	3.3		0 35.

400 455. (DIRECT FLOW) 0 35.

Appendix B

Calculations

US 36/Wadsworth (Broomfield) Interchange

City Park Basin Detention Pond Routing - Pond @ Point 308 - Volume versus Release Rate

Existing Conditions (Inadvertent Detention)

							24" Eq. RCP in Inlet Control	
Elevation	Area (ft^2)	Area (AC)	A1+A2	Diff in Elev	Vol (AC-FT)	Cum. Vol	HW/D	Release (cfs)
5458	21.54	0.00				0.00	0	0
			0.02	1	0.01			
5459	877.06	0.02				0.01	0.5	4
			0.07	1	0.04			
5460	2314.82	0.05				0.04	1.0	12.8
			0.18	1	0.09			
5461	5332.00	0.12				0.13	1.5	20
			0.39	1	0.19			
5462	11851.08	0.27				0.32	2.0	26
			0.77	1	0.38			
5463	21684.12	0.50				0.70	2.5	31
			1.25	1	0.62			
5464	32727.10	0.75				1.32	3.0	34
			1.78	1	0.88			
5465	44652.53	1.03				2.21	3.5	37

US 36/Wadsworth (Broomfield) Interchange

City Park Basin Detention Pond Routing - Pond @ Point 308 - Volume versus Release Rate

Interim and Ultimate Conditions

							18" Eq. RCP in Inlet Control	
Elevation	Area (ft^2)	Area (AC)	A1+A2	Diff in Elev	Vol (AC-FT)	Cum. Vol	HW/D	Release (cfs)
5461	13822.09	0.32				0.00	0	0
			1.22	1	0.58			
5462	39218.83	0.90				0.58	0.7	3.6
			1.91	1	0.95			
5463	43900.00	1.01				1.54	1.3	9
			2.11	1	1.05			
5464	47802.24	1.10				2.59	2.0	12.5
			2.29	1	1.14			
5465	51829.39	1.19				3.73	2.7	15
			2.48	1	1.24			
5466	55982.34	1.29				4.97	3.3	18
			2.67	1	1.33			
5467	60255.39	1.38				6.30	4.0	20
			2.87	1	1.43			
5468	64653.26	1.48				7.74	4.7	24

US 36/Wadsworth (Broomfield) Interchange

Airport Creek Basin Detention Pond Routing - Pond @ Point 300 - Volume versus Release Rate

Interim and Ultimate Conditions

	Elevation	Area (ft^2)	Area (AC)	A1+A2	Diff in Elev	Vol (AC-FT)	Cum. Vol	12" Eq. RCP in Inlet Control	
								HW/D	Release (cfs)
	5389.5	0.00	0.00				0.00	0	0
				0.18	1.5	0.09			
	5390	1632.50	0.04				0.00	0	0
				0.25	2	0.23			
	5391	7633.65	0.18				0.09	1.5	3.5
				0.39	1	0.19			
	5392	9296.47	0.21				0.28	2.5	5.5
				0.48	1	0.24			
	5393	11593.12	0.27				0.52	3.5	7
				0.58	1	0.29			
	5394	13792.30	0.32				0.81	4.5	8
				0.69	1	0.34			
*	5395	16070.58	0.37				1.15	5.5	79.7

Release based on flow through an orifice.

* Release based on 1' of head over a weir (L=23.5')

$Q = CLH^{3/2}$

C = 3.4

H = 1

Carter:Burgess

PROJECT 120th Avenue Connection

CLIENT

SUBJECT Airport Creek Ditch Flows - 100 yr Interim

JOB NO.		NO.
DESIGNED BY	DATE	
CHECKED BY	DATE 05/29/08	OF

FROM SWMM MODEL, FLOWS FOR 100-yr INTERIM CONDITION AT DESIGN POINT 360 = 129 cfs

FROM REFERENCE 6 DRAINAGE BASIN MAP,

DP1 = 11.7 cfs
DP2 = 17.3 cfs
DP12 = 3.1 cfs

} THESE BASINS WERE NOT INCLUDED IN SWMM MODEL

TOTAL FLOW TO BE ADDED TO DESIGN POINT 360 = 32.1 cfs

TOTAL FLOW AT DESIGN POINT 360 = **161.1 cfs**

REFERENCE 6: FINAL DRAINAGE REPORT FOR U.S. 36 AT BROOMFIELD EVENT CENTER RTD TRANSIT FACILITY BUS SLIP RAMPS AND PULL OUTS

Worksheet for Airport Creek Ditch - 10ft

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.02760	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	161.00	ft³/s

Results

Normal Depth	1.48	ft
Flow Area	21.37	ft²
Wetted Perimeter	19.36	ft
Top Width	18.88	ft
Critical Depth	1.68	ft
Critical Slope	0.01713	ft/ft
Velocity	7.53	ft/s
Velocity Head	0.88	ft
Specific Energy	2.36	ft
Froude Number	1.25	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.48	ft
Critical Depth	1.68	ft
Channel Slope	0.02760	ft/ft
Critical Slope	0.01713	ft/ft

Worksheet for Airport Creek Ditch - 14ft_1+00

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.00720	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	14.00	ft
Discharge	161.00	ft³/s

Results

Normal Depth	1.83	ft
Flow Area	35.76	ft²
Wetted Perimeter	25.60	ft
Top Width	25.00	ft
Critical Depth	1.44	ft
Critical Slope	0.01744	ft/ft
Velocity	4.50	ft/s
Velocity Head	0.31	ft
Specific Energy	2.15	ft
Froude Number	0.66	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.83	ft
Critical Depth	1.44	ft
Channel Slope	0.00720	ft/ft
Critical Slope	0.01744	ft/ft

Worksheet for Airport Creek Ditch - 14ft_3+00

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.01050	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	14.00	ft
Discharge	161.00	ft³/s

Results

Normal Depth	1.65	ft
Flow Area	31.35	ft²
Wetted Perimeter	24.46	ft
Top Width	23.92	ft
Critical Depth	1.44	ft
Critical Slope	0.01744	ft/ft
Velocity	5.14	ft/s
Velocity Head	0.41	ft
Specific Energy	2.06	ft
Froude Number	0.79	
Flow Type	Subcritical	

GVF Input Data

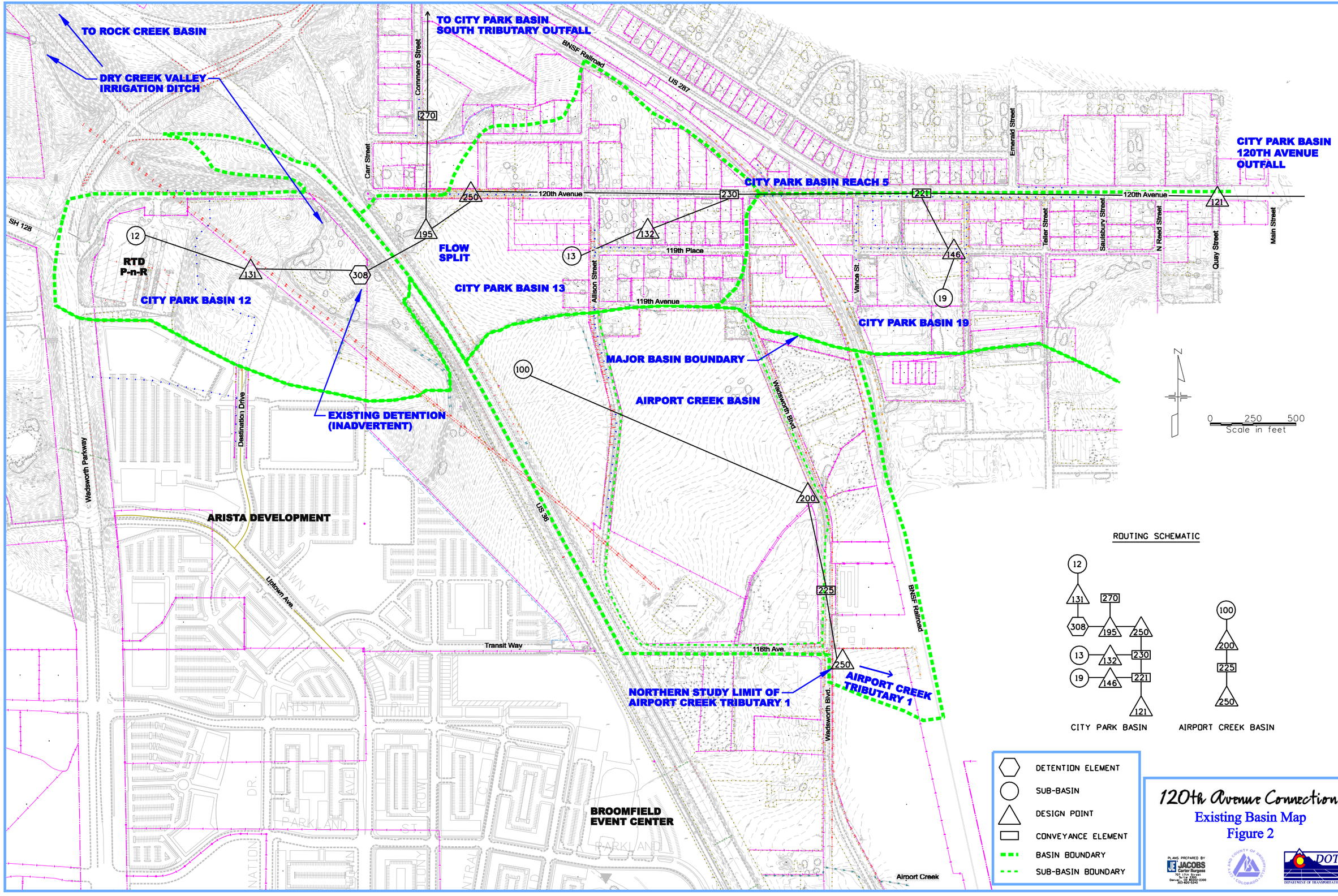
Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.65	ft
Critical Depth	1.44	ft
Channel Slope	0.01050	ft/ft
Critical Slope	0.01744	ft/ft

Appendix C

Basin Maps



120th Avenue Connection

Existing Basin Map

Figure 2

PLANS PREPARED BY
JACOBS Carter Burgess
707 17th Street
Suite 2300
Denver, CO 80202-2300
303-820-5240

DEPARTMENT OF TRANSPORTATION

DRY CREEK VALLEY IRRIGATION DITCH

PROPOSED BERM

CITY PARK BASIN 12

CITY PARK BASIN 13

CITY PARK BASIN REACH 5

5-YR PIPE / 100-YR OVERFLOW

36" (FUTURE)

60" (FUTURE)

PROPOSED PROJECT PHASE 2

MAJOR BASIN BOUNDARY

PROPOSED 100- YEAR REGIONAL DETENTION AND WATER QUALITY POND

ARISTA DEVELOPMENT

Commerce Street

Carr Street

Allison Street

Wadsworth Parkway

Wadsworth Blvd

Destination Drive

BNSF Railroad

US 287

US 36

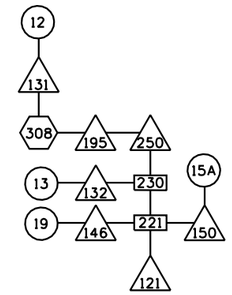
120th Avenue

119th Place

119th Avenue

120th Ave. Connection

ROUTING SCHEMATIC



LEGEND

PHASE 1

PHASE 2

PHASE 3

DETENTION ELEMENT

SUB-BASIN

DESIGN POINT

CONVEYANCE ELEMENT

BASIN BOUNDARY

SUB-BASIN BOUNDARY

MAJOR BASIN BOUNDARY

N

0 150 300

Scale in feet

120th Avenue Connection

Proposed Project

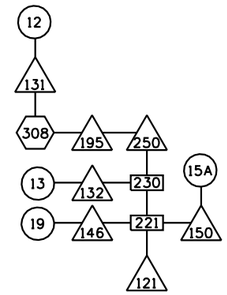
City Park Basin Map West

Figure 3

PLANS PREPARED BY JACOBS Carter Burgess 707 17th Street Suite 2300 Denver, CO 80202-2300 303-820-5240

DOT DEPARTMENT OF TRANSPORTATION

ROUTING SCHEMATIC



FUTURE CONNECTION TO PHASE 2 PROJECT SYSTEM

5-YR PIPE / 100-YR OVERFLOW

36"(FUTURE)

CITY PARK BASIN 13

CITY PARK BASIN REACH 5

60" (FUTURE)

5-YR PIPE / 100-YR OVERFLOW

60" (FUTURE)

CITY PARK BASIN 120TH AVENUE OUTFALL

PROPOSED PROJECT PHASE 2

CITY PARK BASIN 19

MAJOR BASIN BOUNDARY

AIRPORT CREEK BASIN

BNSF Railroad

US 287

120th Avenue

119th Place

119th Avenue

118th Ave.

Allison Street

Vance St.

Emerald Street

Teller Street

Saulsbury Street

N Reed Street

Quay Street

Main Street

Wadsworth Blvd.

Commerce Street

LEGEND

PHASE 1

PHASE 2

PHASE 3

DETENTION ELEMENT

SUB-BASIN

DESIGN POINT

CONVEYANCE ELEMENT

BASIN BOUNDARY

SUB-BASIN BOUNDARY

MAJOR BASIN BOUNDARY

N

0 150 300

Scale in feet

120th Avenue Connection

Proposed Project

City Park Basin Map East

Figure 4

PLANS PREPARED BY JACOBS Carter Burgess 707 17th Street Suite 2300 Denver, CO 80202-2300 303-820-5240

CITY AND COUNTY OF BROOMFIELD COLORADO

DOT DEPARTMENT OF TRANSPORTATION

CITY PARK BASIN

PROPOSED PROJECT PHASE 2

MAJOR BASIN BOUNDARY

DETENTION/ WATER QUALITY POND

DRAINAGE BASIN BOUNDARY (TYP.)

ARISTA DEVELOPMENT

PROPOSED RTD PEDESTRIAN BRIDGE AND BUS SLIP RAMPS (BY RTD)

PROPOSED DITCH

120th Ave. Connection

119th Pl.

Allison St.

119th Ave.

Commerce Street

Wadsworth Blvd.

118th Ave.

Transit Way

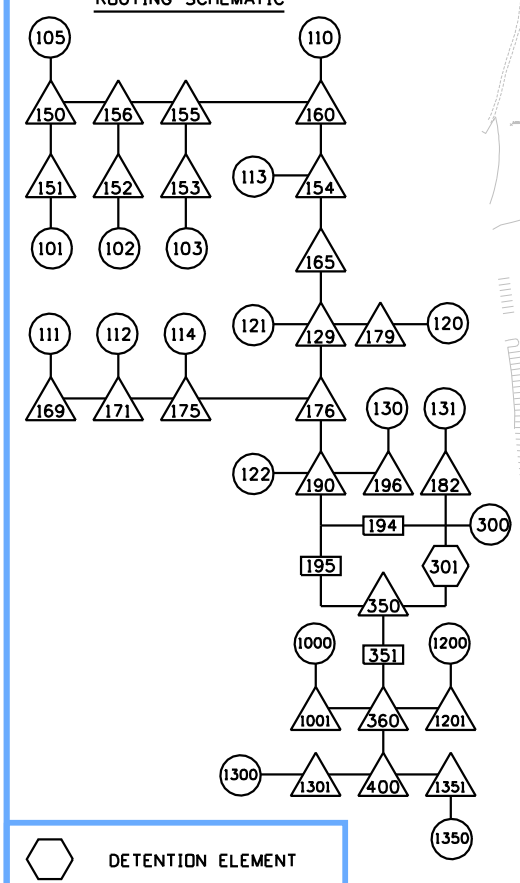
116th Ave.

US 36

BNSF Railroad

Airport Creek

ROUTING SCHEMATIC



DETENTION ELEMENT
SUB-BASIN
DESIGN POINT
CONVEYANCE ELEMENT
BASIN BOUNDARY
SUB-BASIN BOUNDARY
MAJOR BASIN BOUNDARY

0 150 300
Scale in feet

LEGEND

PHASE 1
PHASE 2
PHASE 3

120th Avenue Connection

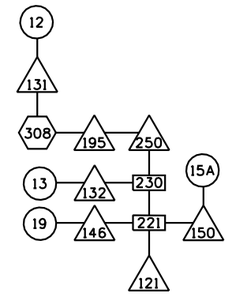
Proposed Project
Airport Creek Basin Map
Figure 5

PLANS PREPARED BY
JACOBS Carter Burgess
707 17th Street
Suite 2300
Denver, CO 80202-2300
303-820-5240

CITY AND COUNTY OF BROOMFIELD, COLORADO

DOT DEPARTMENT OF TRANSPORTATION

ROUTING SCHEMATIC



RE-GRADE AREA TO DRAIN TO POND

DRY CREEK VALLEY DITCH IN 48" PIPE (FUTURE)

CITY PARK BASIN 12

CITY PARK BASIN 13

CITY PARK BASIN REACH 5

5-YR PIPE / 100-YR OVERFLOW

36"

60"

PROPOSED PROJECT PHASE 2

MAJOR BASIN BOUNDARY

FUTURE

FUTURE US36 RAMP

PROPOSED 100- YEAR REGIONAL DETENTION AND WATER QUALITY POND

ARISTA DEVELOPMENT

BNSF Railroad

US 287

US 36

Commerce Street

Carr Street

Allison Street

Wadsworth Parkway

Wadsworth Blvd

Destination Drive

120th Avenue

119th Avenue

119th Place

120th Ave. Connection

LEGEND

PHASE 1
PHASE 2
PHASE 3
ULTIMATE

DETENTION ELEMENT
SUB-BASIN
DESIGN POINT
CONVEYANCE ELEMENT
BASIN BOUNDARY
SUB-BASIN BOUNDARY
MAJOR BASIN BOUNDARY

0 150 300
Scale in feet

120th Avenue Connection

Proposed Ultimate City Park Basin Map West

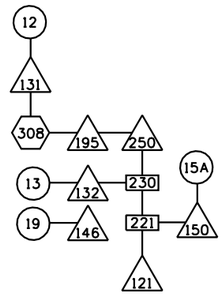
Figure 6

PLANS PREPARED BY
JACOBS Carter Burgess
707 17th Street
Suite 2300
Denver, CO 80202-2300
303-820-5240

CITY AND COUNTY OF BROOMFIELD COLORADO

DOT DEPARTMENT OF TRANSPORTATION

ROUTING SCHEMATIC



BNSF Railroad

US 287

15A

146

CITY PARK BASIN REACH 5

5-YR PIPE / 100-YR OVERFLOW

120th Avenue

230

36"

60"

221

5-YR PIPE / 100-YR OVERFLOW

120th Avenue

121

CITY PARK BASIN 120TH AVENUE OUTFALL

CITY PARK BASIN 13

132

13

119th Place

Allison Street

119th Avenue

Emerald Street

Teller Street

Saulsbury Street

N Reed Street

Quay Street

Main Street

PROPOSED PROJECT PHASE 2

146

19

Vance St.

CITY PARK BASIN 19

MAJOR BASIN BOUNDARY

AIRPORT CREEK BASIN

Wadsworth Blvd.

Commerce Street

118th Ave.

BNSF Railroad

LEGEND

PHASE 1

PHASE 2

PHASE 3

ULTIMATE

DETENTION ELEMENT

SUB-BASIN

DESIGN POINT

CONVEYANCE ELEMENT

BASIN BOUNDARY

SUB-BASIN BOUNDARY

MAJOR BASIN BOUNDARY

N

0 150 300

Scale in feet

120th Avenue Connection

Proposed Ultimate City Park Basin Map East

Figure 7

PLANS PREPARED BY
JACOBS
Carter Burgess
707 17th Street
Suite 2300
Denver, CO 80202-2300
303-820-5240

CITY AND COUNTY OF DENVER COLORADO

DOT
DEPARTMENT OF TRANSPORTATION

CITY PARK BASIN

PROPOSED PROJECT PHASE 2

MAJOR BASIN BOUNDARY

PROPOSED DETENTION/ WATER QUALITY POND

DRAINAGE BASIN BOUNDARY (TYP.)

PROPOSED DITCH

PROPOSED RTD PARK-N-RIDE

AIRPORT CREEK TRIBUTARY 1

ARISTA DEVELOPMENT

FUTURE

Allison St.

119th Pl.

119th Ave.

Commerce Street

Wadsworth Blvd.

118th Ave.

116th Ave.

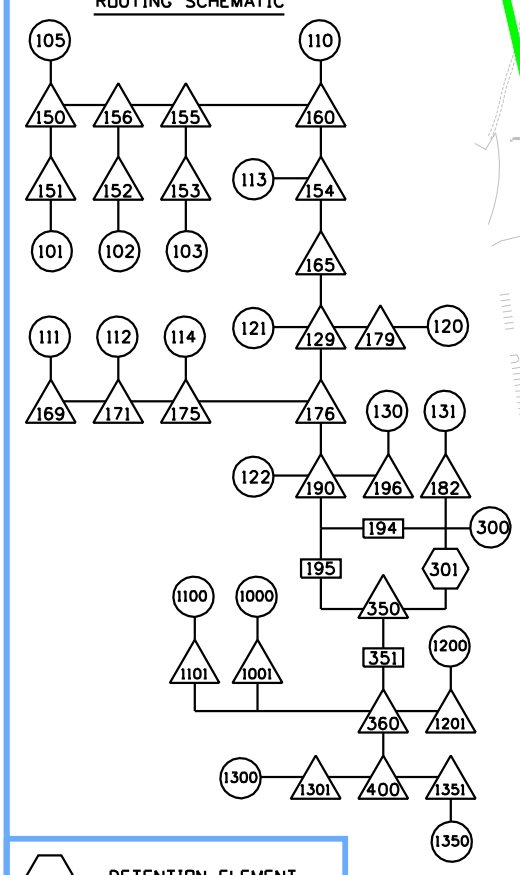
Transit Way

US-36

BNSF Railroad

Airport Creek

ROUTING SCHEMATIC



DETENTION ELEMENT

SUB-BASIN

DESIGN POINT

CONVEYANCE ELEMENT

BASIN BOUNDARY

SUB-BASIN BOUNDARY

MAJOR BASIN BOUNDARY

0 150 300

Scale in feet

LEGEND

PHASE 1

PHASE 2

PHASE 3

ULTIMATE

120th Avenue Connection

Proposed Ultimate Airport Creek Basin Map Figure 8

PLANS PREPARED BY
JACOBS Carter Burgess
707 17th Street
Suite 2300
Denver, CO 80202-3300
303-820-5240

CITY AND COUNTY OF BROOMFIELD, COLORADO

DOT DEPARTMENT OF TRANSPORTATION

Proposed Flows at Pond Outlet		
	Interim	Ultimate
10-Year	12 cfs	20 cfs
100-Year	17 cfs	25 cfs

US 36

ULTIMATE FUTURE
U.S. 36 IMPROVEMENTS

EXISTING CULVERT
(MAY NEED TO BE REPLACED
WITH ULTIMATE FUTURE
U.S. 36 IMPROVEMENTS)

PROPOSED BERM
(TO BE CONSTRUCTED
WITH PHASE 1 PROJECT)

DRY CREEK VALLEY DITCH

18"
ORIFICE

PROPOSED 100- YEAR
REGIONAL DETENTION AND
WATER QUALITY POND

POND ACCESS ROAD

4:1

EXISTING 48" CULVERT

TRICKLE CHANNEL

120th Ave. Connection

0 50 100
Scale in feet

120th Avenue Connection

Proposed City Park Pond
Figure 9

PLANS PREPARED BY
JACOBS Carter Burgess
707 17th Street
Suite 2300
Denver, CO 80202-2300
303-820-5240

CITY AND COUNTY OF BROOMFIELD COLORADO

DOT
DEPARTMENT OF TRANSPORTATION

WEIR STRUCTURE

12" CONTROL ORIFICE

PROPOSED DETENTION/
WATER QUALITY POND

DIVISION STRUCTURE

PROPOSED INTERIM 100-YEAR DITCH
HAS CAPACITY FOR 10-YEAR FLOWS.
(WILL REQUIRE FURTHER IMPROVEMENTS
FOR ULTIMATE 100-YEAR CONDITION).

PROPOSED INTERIM 100-YEAR
STORM SEWER HAS CAPACITY
FOR ULTIMATE 10-YEAR FLOWS.
(WILL NEED TO BE UPSIZED TO 48"
FOR ULTIMATE 100–YEAR CONDITION).

Wadsworth Blvd.

Wadsworth Place

116th Ave.

Wadsworth Blvd.

N

0 50 100
Scale in feet

Proposed Flows at Pond Outlet

	Interim	Ultimate
10-Year	14 cfs	54 cfs
100-Year	79 cfs	139 cfs

120th Avenue Connection

Proposed Airport Creek Pond
Figure 10

PLANS PREPARED BY
JACOBS
Carter Burgess
707 17th Street
Suite 2300
Denver, CO 80202-2300
303-820-5240

CITY AND COUNTY OF BROOMFIELD, COLORADO

DOT
DEPARTMENT OF TRANSPORTATION

Flows in Proposed Channel Tributary to BNSF Railroad Property

	Historic	Proposed
10-Year	90 cfs	69 cfs
100-Year	193 cfs	197 cfs

36" OUTFALL FROM POND

10' DITCH BOTTOM

116th Ave.

POTENTIAL NEW CULVERT

PROPOSED PERMANENT EASEMENT

PROPOSED TEMPORARY EASEMENT

14' DITCH BOTTOM

TOP OF BERM

PROPOSED OUTFALL TO RAILROAD PROPERTY

EXISTING DRAINAGE CHANNEL

AIRPORT CREEK TRIBUTARY 1 (NATURAL CHANNEL)

Wadsworth Blvd.

BNSF Railroad

5370

5380

PROPOSED OUTFALL LOCATION IN OSP

0 25 50
Scale in feet

N

120th Avenue Connection

Proposed Airport Creek Outfall
100 yr Ditch
Figure 11

PLANS PREPARED BY
JACOBS
Carter Burgess
707 17th Street
Suite 2300
Denver, CO 80202-2300
303-820-5240

CITY AND COUNTY OF BROOMFIELD, COLORADO

DOT
DEPARTMENT OF TRANSPORTATION

Appendix D

Correspondence

MEMORANDUM

DEPARTMENT OF TRANSPORTATION

Region 6 Engineering
2000 S Holly Street
Denver, Colorado 80222
FAX (303) 757-9053

TO: Project File

FROM: Justin Werdel

DATE: January 24, 2008

SUBJECT: 15782 - UDFCD maintenance of Regional Detention Facility southwest of US 36

A meeting was held on December 5, 2007 to discuss detention alternatives for the 120th Avenue Connection project. Representatives from CDOT, Jacobs Carter Burgess, and Broomfield were in attendance along with Bill Degroot from UDFCD.

The majority of the project area is within the City Park basin. Currently there is inadvertent detention on the southwest side of the U.S. 36 frontage road embankment along this drainageway. The Outfall Systems Planning Study (OSP) for the City Park watershed shows formalization of this detention. Jacobs Carter Burgess (JCB) has developed several different SWMM models for the basin for different design scenarios, as well as preliminary grading plans for the proposed pond for different conditions. They have also done a more thorough analysis of existing conditions for the basin and for the inadvertent detention area.

Proposed scenarios include an "interim" condition, which will exist after the construction of the Phase 1 project. This condition accounts only for the additional roadway pavement resulting from this first phase. There are also different models for the "ultimate" condition, which includes the future U.S. 36 improvements and potential development within the basin. This ultimate condition was analyzed assuming approximately 60 percent imperviousness for the tributary basin (worst case), and also for approximately 30 percent imperviousness. This lower value may be more likely, since the tributary basin has only one planned access point from 120th Avenue or SH-121, and therefore development type may be limited.

There was discussion among the design team regarding the extents of the pond construction and formalization that should occur with the Phase 1 project. For the ultimate condition, the northern limit of the pond, and therefore the location of the outlet works, will be controlled by the future U.S. 36 ramp. The interim condition model has been designed as if the majority of the pond excavation would occur, but the release would be controlled at the existing culvert under the frontage road, rather than at the ultimate location. Construction of the pond to its ultimate configuration would require construction of a berm at the downstream edge, which would eventually become part of the U.S. 36 ramp embankment. After some discussion, it was determined that the project should go ahead and formalize the ultimate condition pond with the Phase 1 project. The pond would be eligible for maintenance by the UDFCD as long as all of their design criteria is met (outlet works, side slopes, trickle channels, maintenance access, etc.). David Mallory at UDFCD will do the design review for the pond, so coordination with him will need to occur during the design process.