

MASTER DEVELOPMENT DRAINAGE PLAN

CLOUD FAMILY PARTNERSHIP PROPERTY

Prepared for:
Cloud Family Partnership
5225 East Platte Avenue
Colorado Springs, CO 80915
Contact: Randy Cloud

Prepared by:
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Revised May 2012

ADP Job No. 090701



19721-3



3520 Austin Bluffs Parkway, Suite 200
Colorado Springs, CO 80918

ENGINEER'S STATEMENT

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the City/County for drainage reports, and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

Michael A. Bartusek, P.E. #23329



DEVELOPER'S STATEMENT

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

Cloud Family Partnership Property

By:

Randy Cloud

Title: Owner
Address: 5225 East Platte Avenue
Colorado Springs, CO 80915

Filed in accordance with Section 7.7.906 of the Code of the City of Colorado Springs, 2001, as amended.

FOR THE CITY ENGINEER

6/7/12

Conditions:

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APPENDICES

- Appendix A: Exhibit 1 and Maps
- Appendix B: Time Delay Agreement
- Appendix C: Design Calculations
- Appendix D: Ayers Sand Creek Plan
- Appendix E: Design Charts
- Appendix F: Description of Cable Loss in Sand Creek
- Appendix G: Platte Avenue Bridge Stabilization Project –
Memorandum of Understanding



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LOCATION

The Cloud Family Partnership property includes all of the land bounded by Platte Avenue; Wooten Road; and the Main Stem and West Forks of Sand Creek, except for two existing subdivisions at the southeast corner of Wooten and Platte called Coleman Subdivision Filing No. 1 and C S D Subdivision. The Cloud Family Partnership property also extends to the east side of the Main Stem Sand Creek. The ownership is depicted on *Exhibit 1* in *Appendix A* of this MDDP.

The Cloud Family Partnership property is approximately 100 acres. Within this property four acres were platted as *Case Subdivision* and 11 acres were platted as *Cloud Subdivision Filing No 1*, including Babcock Road R.O.W.

The Cloud Family Partnership property lies within the Sand Creek basin and in the Northwest Quarter of Section 13, Township 14 South, Range 66 West of the 6th PM, Colorado Springs, El Paso County, Colorado. The floodplain on the property is shown on FIRM Panel No. 08041C0753F, dated March 17, 1997.

COOPERATION WITH THE CITY

The serious erosion problem in Sand Creek is a community-wide concern. The tributary area extends through one of the most intensely developing areas in the region. Elements of infrastructure are in jeopardy and affect the lives and safety of a significant number of citizens. The Cloud family has been cooperating with the city of Colorado Springs for many years about the drainage and utility issues.

- The sewer line along the West Fork failed prior to 2005, and the Cloud Family cooperated fully with Springs Utilities by granting the easements necessary to complete the repairs which included a new crossing, a drop structure, and an energy dissipation pond.
- Since the Cloud Family Partnership assumed ownership of this property in 1991 they have witnessed dramatic storm damage and degradation in the adjacent channels. The Main Stem channel is home to many utilities, including a 24-inch high pressure natural gas main, a fiber optic line critical to the military, a large telephone and internet line, a city sewer main that lies on an outside corner of the Main Stem and a sewer main that crosses the Main Stem near the West Fork.
- Gabion baskets held things in place at one time. They were just downstream of the telephone line crossing. The gabions also provided stabilization of the creek bed under the Platte Avenue Bridge. But storm flows eventually caused the gabion wall to fail. In a single storm in 2003 the creek bed upstream of the gabion wall dropped over five feet and took out the communication lines behind the wall. Much of the east side of Colorado Springs was without phone service as a result of the failure. US West worked around-the-clock in response to the failure and placed a new phone line using a horizontal boring 25 feet below the existing creek bed and then spent weeks splicing those lines together. A description of the outage given by a now-retired US West manager can be found in Appendix F of this report. The Cloud Family Partnership cooperated fully with the city and US West by granting access to complete the repairs.

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- Once the gabion wall failed and the phone lines were buried, the creek erosion was free to move upstream. The erosion moved quickly during subsequent storms and took out the drop structure that had been stabilizing the grade on the Platte Avenue Bridge.
- In 2005 Springs Utilities became very concerned about the east bank sewer main line and constructed a riprap-lined bank for the entire length of the Fitzgerald (Dynamic Sciences) property. This new riprap wall tied into a new grouted boulder drop structure just downstream of Platte Avenue (Photos 1 and 2).

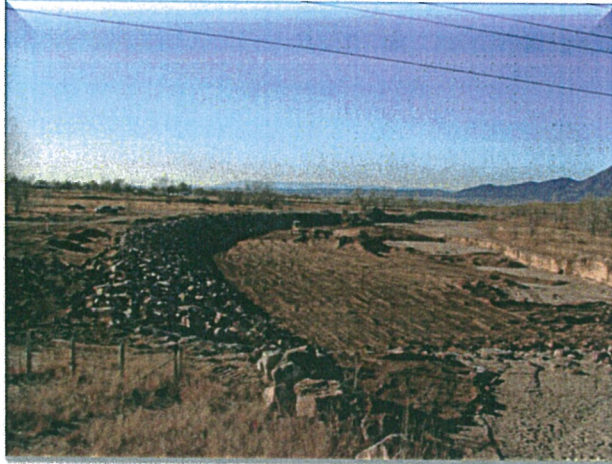


Photo 1-East Bank

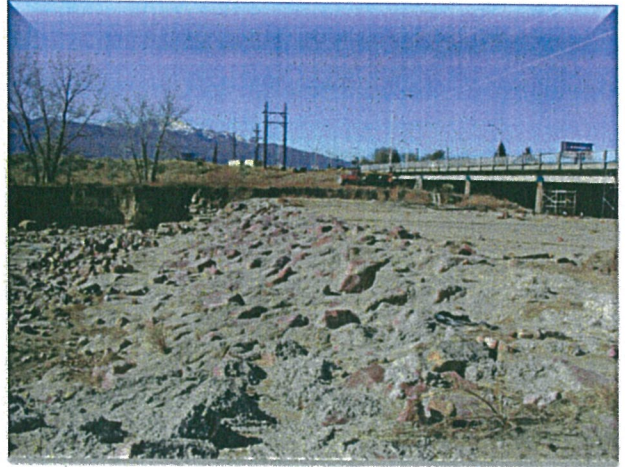


Photo 2-East Bank tied to Platte Drop

- With no downstream grade control structure the creek bed at the newly installed riprap channel bank eroded over two feet the first year after it was installed. The city made repairs the next winter. But the creek bed continued to erode and eventually took out the grouted boulder drop structure at the Platte Avenue Bridge, and the erosion moved upstream to the Platte Avenue Bridge. In August 2008 a storm eroded the creek bed several feet under the bridge. The creek bed eroded past the footing of the foundation of the bridge (see Photo 3). Platte Avenue was shut down, and emergency repairs were undertaken to keep the bridge from what appeared to be imminent collapse. Several utility lines were also exposed during the creek bed degradation.
- The Platte Avenue Bridge foundation was repaired, and a new massive grouted boulder drop structure was built in 2008. However, with no adequate grade control structures in place the creek bed continues to erode. Now, in 2012 the new massive drop structure is beginning to fail. The creek has eroded from the front of the drop, and the lowest center section of the drop has failed (Photo 4).
- With no grade control structures for a long distance downstream of Platte Avenue the creek bed downstream of Platte has seen over a six-foot loss in elevation. In 2011 Springs Utilities became very concerned about the sewer line crossing near the confluence with the West Fork. Springs Utilities replaced the sewer line crossing with a massive concrete encased steel reinforced line buried deep in the main channel. The Cloud Family Partnership again cooperated by granting a new permanent easement for this work.
- The high pressure gas main below the confluence of the West Fork now lies inches below the surface of the creek bed. The degradation of the Main Stem elevation has

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caused the erosion and failure of the private storm sewer outlet pipes. Each outfall has experienced significant erosion, and one has experienced total failure resulting in significant repair cost (Photo 5).

- *The Cloud Family Partnership has always cooperated with the city to ensure the continued safety and well being of the creek and has every intention to continue to do so.*



Photo 3-Damage to Platte Bridge

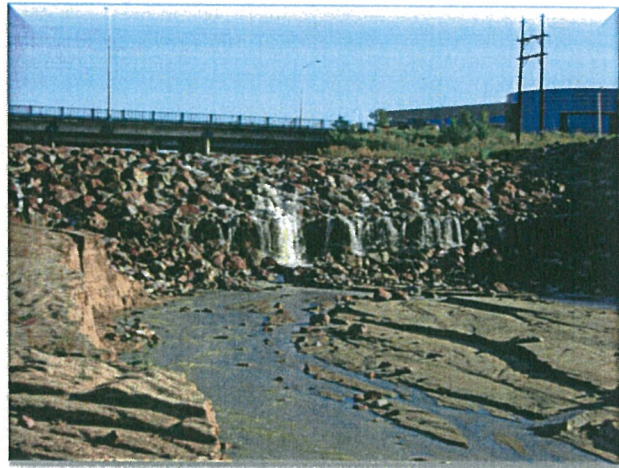


Photo 4-Platte Drop September 2011

SUMMARY OF KEY ISSUES

Main Stem of Sand Creek. The city of Colorado Springs has applied for a Grant to secure funding for constructing the Main Stem of Sand Creek along the Cloud Family Partnership property. Erosion in Sand Creek has jeopardized major public roadway and utility infrastructure in the reach of the Main Stem of Sand Creek along the Cloud Family Partnership property. A memorandum of understanding exists between the property owner and the city documenting the owner's intent to



Photo 5-Pipe Outfall

dedicate all of the easements necessary for the project. The Grant was not approved as of the writing of this MDDP and the MOU will expire at the end of 2012. The Cloud Family Partnership has no plans to construct the Main Stem improvements and if channel construction is delayed, any platting and development that may occur on their property prior to channel construction must be set back from the channel based on a *prudent line* determination.

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West Fork of Sand Creek. The Cloud Family Partnership owns to the center of the West Fork of Sand Creek. The West Fork improvements are the responsibility of the two adjacent sub-dividers and, ideally, the cost should be shared equally by the two. One significant drop structure near the confluence with the Main Stem will achieve a stable gradient up to the sanitary sewer crossing. From the sanitary sewer crossing to Wooten Road may have already achieved a stable gradient. One major drop structure and selective bank stabilization is proposed in this MDDP which must be designed and approved by the city before any development occurs adjacent to the West Fork. A public drainage easement will be dedicated for the West Fork with adjacent platting.

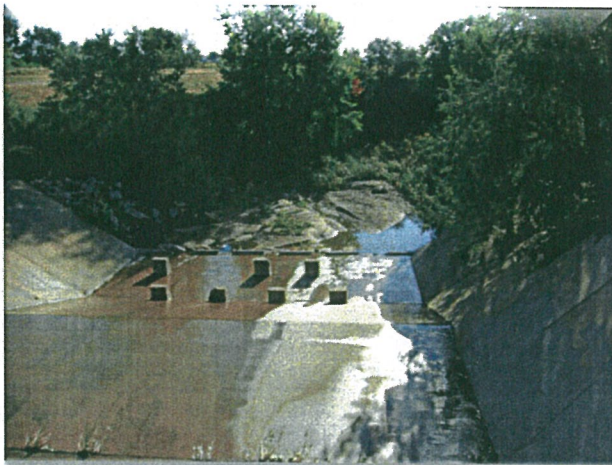


Photo 6-West Fork at Wooten Rd Sept 2011



Photo 7-West Fork below sewer crossing 2011

Drainage Fees and Construction Costs. It is not known when development near the West Fork will occur which will require the public drainage facility construction. Based on the current Sand Creek drainage fee, it appears that the Cloud Family Partnership will owe drainage fees adequate to cover their cost to construct the West Fork improvements. Therefore, at the time of any future platting within this MDDP area the drainage fees should be escrowed in a suitable manner toward construction of the West Fork public drainage facilities. For example, since drainage fees are due when the future plats are recorded, the fees could be held in an escrow account separate from the Sand Creek basin fee account. An Escrow Agreement or Development Agreement could document how and when the fees will be used for



Photo 8-West Fork sewer crossing 2011

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construction. But any platting adjacent to the West Fork will require construction of West Fork facilities to be determined in the Final Drainage report.

PREVIOUS DRAINAGE STUDIES

The previously completed studies for the area include a site drainage study, as well as channel studies.

Site Drainage Study

- *Cloud Subdivision Filing No. 1*, prepared by URS Consultants, September 1991. Channel Improvement Studies
- *Sand Creek DBPS*, prepared by Kiowa Engineering Corp, July 1996.
- *Master Plan for Sand Creek Channel Improvements*, prepared by Ayres Associates, September 2010 & Revised September 2011
- *Springs Utilities CLOMR application and related studies for the sewer crossing in the West Fork dated October, 2005.*

METHOD OF COMPUTATION

The methodology used for this report is in accordance with the *City/County Drainage Criteria Manual*. The Rational Method for computation of runoff was used for local basin design.

$$Q = cia$$

Where	Q	=	Maximum rate of runoff in cubic feet per second
	c	=	Runoff coefficient representing drainage area characteristics
	i	=	Average rainfall intensity, in inches per hour, for the duration required for the runoff to become established
	a	=	Drainage basin size in acres

SOILS

The soils on this site are classified by the Soil Conservation Service in the *Soil Survey of El Paso County Area, Colorado* as follows:

Map Symbol No.	Soil Complex	Hydrologic Soil Group
28	Ellicott Loamy Coarse Sand	A
59	Nunn Clay Loam	C
95	Truckton Loamy Sand	B
96	Truckton Sandy Loam	B

EXISTING DRAINAGE CHARACTERISTICS

Existing Channel Characteristics. The Main Stem of Sand Creek flows along the east side and through the southeastern portion of the property. Currently, the land on the east of the channel is vacant. The land located directly along the west side of the channel is undeveloped. The existing flea market is located about 200 feet away from the channel bank.

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The West Fork of Sand Creek forms the southern property boundary from the confluence with the main channel of Sand Creek to Wooten Road. No development currently exists along the West Fork of Sand Creek.

Figure 1 includes excerpts from the Master Plan for Sand Creek Channel Improvements that describe the conditions of the existing channels. (*The list of Figures can be found at the end of this MDDP just before the Appendices.*)

Existing Site Characteristics. About 20 acres of this 112.9-acre site are currently developed. The developed portion is located in the northeastern section of the site perched about 15 feet above the Sand Creek floodplain; it consists of a large paved area which is used for a flea market.

The developed area drains generally to the south, whose flows are intercepted by a series of D-10R inlets and storm sewers and transported from the upper developed area to the Sand Creek channel. Two 30-inch RCP storm sewers and one 36-inch RCP storm sewer discharge across the overbank area and into Sand Creek. The storm sewer outlet protection ranges from good to poor condition. The city's plans for the Grant Application design would have corrected and improved the storm sewer outfall pipes. If development that is tributary to these pipes precedes channel construction by the city, the Final Drainage reports will address the required upgrades to these outfall facilities by the developer.

The detailed description of the on-site sub-basins and a table of their flow rates are located in *Figure 2* of this MDDP.

DEVELOPED DRAINAGE CONDITIONS

Proposed development of the overall parcel is a mixed-use area that will include community commercial, industrial/research and development, and office uses. The existing flea market area will remain.

On-Site Development. Storm runoff patterns for the developed area of the site will not change from existing conditions. *Sub-Basins A1A through A4B* will remain unchanged, except for some increase in runoff in the northeastern area of the site.

The detailed description of the anticipated on-site sub-basins and a table of their flow rates can be found in *Figure 3*.

Main Stem of Sand Creek. Numerous stabilization projects have been undertaken along the main channel reach by the city and Springs Utilities, such as:

- Drop structure at Karr Road, about 1,900 feet downstream of the Cloud Family Partnership property
- Drop structure located just downstream of Platte Avenue and 700 feet upstream of the Cloud Family Partnership property
- Sanitary trunk sewer realignment and encasement located just upstream of the confluence with the West Fork
- At the time of this writing major channel repairs are underway just downstream of the Platte Avenue Bridge by the city.

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The primary incentive for stabilization of the channel bed is the great risk associated with the existing sanitary sewer trunk line running along the channel and the bridge over Platte Avenue. Failure or damage to these critical items of public infrastructure would be catastrophic. The main channel of Sand Creek along the Cloud Family Partnership property has been degrading severely for many years. As recently as September 2011 drop structures and bank lining, which was constructed in recent history, experienced serious damage from storm flows. Riprap was added to the east stream bank that is adjacent to the sanitary sewer and at the outlet side of the bridge, but the stream bottom continues to degrade and is undermining the riprap protection.

The city applied for a Grant to fund construction of Sand Creek channel improvements as described previously in the Summary of Key Issues. City and Springs Utilities funds would be matched by federal funds. (It is assumed that the city would be eligible for basin reimbursement for their contributions for any costs expended that are eligible for reimbursement in the DBPS.) The Cloud Family Partnership agreed to dedicate to the city all easements needed for construction of the channel improvements in accordance with the MOU. In this scenario future platting and development would extend up to the easements. The Grant was not approved as of the writing of this MDDP and the MOU will expire at the end of 2012. The Cloud Family Partnership property does not need the channel improvements in order to develop as long as any development stays far enough away from the channel based on a detailed computation of a *prudent line* at the time of platting and Final Drainage Reports.

The Cloud Family Partnership property is divided by the Main Stem Sand Creek channel - about 87.7 acres are located on the west side of the channel, and 21.1 acres are located on the east side. Approximately 6.3 acres of the property fall within the 100-year floodplain. The existing developed flea market to the west of the main stem with its parking lots and drive aisles has about 200 feet of overbank area located between the channel bank and the site improvements.

The proposed channel design for the Main Stem of Sand Creek is based on the report prepared by Ayres Associates, *Master Plan - Sand Creek Improvements*. This report supersedes the recommendations that were presented in the *Sand Creek DBPS* prepared by Kiowa Engineering Corporation in March 1996. The 100-year storm runoff amounts used in the Ayres report are:

- Confluence of the West Fork Upstream 4300 cfs
- Confluence of the West Fork Downstream 7700 cfs

The Ayres study calls for sloping grouted boulder drop structures that will stabilize the channel bed and restore it to previous levels in specific locations. These drop structures will provide a stable channel bed slope of 0.4 percent. The current channel bed has about a 1.2 percent slope. These structures are summarized as follows:

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Station	Drop Height (ft)	Drop Length (ft)
245+50	6.7	200
252+00	6.7	200
255+73	9.2	200
261+80	10.2	240

West Fork of Sand Creek

The West Fork of Sand Creek has also degraded during the past years. Degradation of the Main Stem channel bottom moved up the West Fork until it exposed the sanitary sewer which crosses this tributary. Emergency repairs were undertaken in 2005 to build a sloping grouted riprap drop structure. This structure appears to have halted upstream degradation. The storm in September 2011 that caused serious scour in the Main Stem Sand Creek channel did not adversely affect the West Fork. The 100-year storm runoff amount per the Ayres report is 6800 cfs.

The Ayres study recommends that two drop structures be added to the West Fork channel:

Station	Drop Height (ft)	Drop Length (ft)
1+31	7.8	90
9+19	6.6	100

These proposed structures would raise the channel bottom up to six feet above the existing grouted drop structure over the sanitary sewer.

This MDDP recommends an alternative plan for the West Fork.

- The initial drop structure at the confluence with Sand Creek should be moved about 170 feet upstream. At its present location the proposed runoff at the drop structure would overtop the southern bank of the West Fork channel. If the structure were moved upstream by this recommended amount, all runoff would then be contained within the channel banks.
- The second drop structure is not needed. At the assumed stable channel slope of 0.4 percent, the new channel bottom would match the top of the existing sanitary sewer drop structure. The elimination of this drop structure would require additional earthwork to remove the vertical slide slopes; however, the cost of earthwork compared to the cost of building a second drop structure would be significantly less. Based on the revised HEC-RAS calculations, no significant changes in the channel flows would take place if this structure were eliminated.
- For the purpose of this MDDP, the preliminary design anticipates 3:1 channel back-slopes subject to final design at the time of Final Drainage Reports for platting.

The West Fork improvements are the responsibility of the two adjacent developments and ideally the cost should be shared equally by the two. Assuming that the Cloud Family Partnership develops near the West Fork before the land to the south, the major drop structure might be the first priority for construction. In the meantime, as the Cloud Family Partnership property subdivides land that is not near the West Fork channel funds in the

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amount of the drainage fees for such platting could be escrowed towards the West Fork construction as described previously in the *Summary of Key Issues*.

This MDDP recommends one major drop structure, selective channel lining and suitable public drainage easement widths to be determined at the time of Final Drainage Reports for platting.

CONCEPTUAL OPINION OF CONSTRUCTION COSTS

Costs have been provided for the conceptual MDDP facilities; however, these costs are for planning purposes only and will be re-examined at the time of final development plans and final platting. The drop structure costs are those used in the master plan study by Ayres Associates.

Main Stem Sand Creek Channel. Cost estimates that were part of the Federal Grant Application are appropriate for planning purposes and are, therefore, not included in this report.

As part of the platting of Filing No. 1 a time-delay agreement was executed in October 1991 with a corresponding letter of credit in the amount of \$67,000.00. A copy of this agreement is in the *Appendix B*. The city agreed (in the MOU) to release the letter of credit when the Cloud Family Partnership dedicates the easements needed for construction of the Sand Creek channel improvements. In the meantime this LOC will remain on file with the city to cover the drainage fees for Filing 1.

West Fork Sand Creek: Drop Structure Improvements

Station	Drop Height (ft)	Cost
3+00	7.8	\$500,000.00

West Fork Sand Creek: Channel Improvements

Description	Quantity	Unit Cost	Amount
Type "M" riprap	850	\$45 CY	\$38,250.00
Earthwork	20,000	\$5 Cy	\$100,000.00
Turf reinforcement	15,000	\$18 SY	<u>\$270,000.00</u>
		Sub-Total	\$408,250.00
		15% Engineering & Contingencies	<u>\$61,237.50</u>
		TOTAL	\$469,487.50

DRAINAGE AND BRIDGE FEES

This project lies within the Sand Creek drainage basin. The total unplatted area is 105.15 acres; in addition, 6.30 acres are within the floodplain (per the Sand Creek DBPS) and are not subject to fees. The total area subject to fees is 98.85 acres. The year 2011 drainage and bridge fees are as follows: (NOTE: a six percent fee increase has been recommended by the Drainage Board for 2012 but no City Council action has occurred as of this writing.)

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Drainage Fee:

\$9,632 x 98.85 acres = \$952,123.00

Bridge Fee:

\$596 x 98.85 acres = \$58,915.00

Pond Land Fee:

\$1,070 x 98.85 acres = \$105,770.00

Pond Facility Fee:

\$2,881 x 98.85 acres = \$284,787.00

Private Storm Sewer Improvements (not reimbursable)

Description	Quantity	Unit Cost		Amount
24" RCP Storm Sewer	250	\$45	LF	\$11,250.00
30" RCP Storm Sewer	1775	\$60	LF	\$106,500.00
36" RCP Storm Sewer	1100	\$75	LF	\$82,500.00
42" RCP Storm Sewer	750	\$100	LF	\$75,000.00
Concrete Headwalls	7	\$1,500	EA	\$10,500.00
Inlets	15	\$5,000	EA	<u>\$75,000.00</u>
			Sub-Total	\$360,750.00
			15% Engineering & Contingencies	<u>\$54,112.50</u>
			TOTAL	\$414,862.50

SUMMARY

The Cloud Family Partnership Property MDDP has been prepared in accordance with the approved Sand Creek DBPS as updated by the recently prepared Ayres master plan for Sand Creek channel improvements. There will be no detention requirements for this development. Water quality requirements will be met at the time of development.

The Cloud Family Partnership anticipates that the main channel of Sand Creek will be constructed by the city; and in the event that development precedes the channel construction, it will require a *prudent line*.

Selective riprap protection and/or other bio-diverse stabilization techniques are proposed in the West Fork in addition to the proposed drop structure to be constructed near the confluence with the Main Stem of Sand Creek. These West Fork improvements will be designed in the Final Drainage Reports at the time of development to be within public drainage easements and to be maintained by the city. In the meantime development will be kept back away from the West Fork.

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FIGURES

- FIGURE 1: DESCRIPTION OF EXISTING CHANNELS**
- FIGURE 2: EXISTING ON-SITE DRAINAGE BASINS**
- FIGURE 3: ANTICIPATED FUTURE ON-SITE SUB-BASINS**

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FIGURE 1

DESCRIPTION OF EXISTING CHANNELS

Main Channel of Sand Creek (West Fork to East Bijou Street alignment).

A 24-inch sanitary sewer line is exposed in the bed of the channel beginning at 925 feet upstream of the Karr Road alignment and extends along the bed parallel to the channel to a point 950 feet further upstream where it converges with the left bank. A large manhole access pipe is exposed in the channel at the upstream end. Recent re-grading of the channel bed has been conducted unsuccessfully, apparently in an effort to re-cover the pipeline. The widest part of the channel occurs in this segment and the width may be partly related to the presence of the exposed sewer pipeline.

The confluence of a major right bank tributary is present at 1,950 feet upstream from the Karr Road alignment. The tributary is deeply entrenched into the right bank terrace, colluvial slope, and hill slope. Bedrock is present in both banks of the tributary and along the right bank of the main channel in this area. For about 200 feet upstream of the confluence, the channel of Sand Creek narrows rapidly. The channel begins to widen again in the upstream direction beginning at about 750 feet upstream of the right bank tributary confluence. Both banks are eroding for the remainder of the reach upstream of the right bank tributary confluence.

At about 400 feet upstream of the confluence of the right bank tributary, there are numerous terraces present on both bank for the remainder of this reach. At least 1 and as many as 3 recent terrace levels are present intermittently along both banks indicative of at least 3 episodes of incision.

A bed material sample was collected about 800 feet upstream of the Karr Road alignment and consists primarily of fine to coarse sand with a minor amount of fine gravel.

Main Channel of Sand Creek (East Bijou Street alignment to East Platte Avenue)

This reach is about 1,450 feet long with a wide, actively adjusting channel that forms a large high radius bend in the upper part of the reach. The upstream end of the reach is marked by the East Platte Avenue bridges and the downstream end is defined by the Karr Road alignment.

Shale bedrock crops out in the bed on the right side of the channel and in the lower toe position in both banks for more than 400 feet upstream of the downstream end of the reach. The channel in this reach appears to have recently incised to this elevation and is currently trying to adjust laterally by eroding its unconsolidated and non-cohesive sandy-gravelly banks.

The left bank is fully revetted with rock riprap beginning at 1,050 feet downstream of East Platte Avenue and extending all the way upstream to the GCS just below the bridges. The rock riprap fully covers the bank and is wrapped back to the east at the downstream end. The toe of the riprap near the downstream end is beginning to be undermined and rock is launching off the toe and exposing the remaining upper bank to further undermining. The revetment has no apparent underlying filter fabric or geotextile. The toe along the upstream half of the revetment contains numerous evenly spaced, small, low stone dikes.

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West Fork Sand Creek

The reach of the West Fork of Sand Creek to be examined extends from its confluence to Wooten Road, a distance of about 2,600 feet. The creek is defined by a deeply entrenched meandering channel inset between low hills. Only the lower 800 feet of the West Fork of Sand Creek was examined during the Sand Creek field reconnaissance.

The downstream 800 feet of the channel is deeply incised and is slowly widening as evidenced by the raw, near vertical banks. Shale bedrock crops out in the bed and banks and much of the reach is surrounded by colluvium covered hill slopes underlain by the shale bedrock. At about 800 feet upstream, at least one high terrace is visible. Given the degree of incision, it is likely that more than one terrace level exists in the upper reaches.

The remainder of the reach was examined using 2006 Google Earth Pro images. From about 1,490 to 1,660 feet upstream, there appears to be a steep, bedrock knick zone that is riffled. At 1,700 feet upstream there is a low flow haul road crossing of the creek for what appears to be a small sand and gravel mining operation or some sort of construction site on the left bank.

Beginning about 430 feet downstream of Wooten Road and continuing upstream, the creek appears to be steeply riffled, possibly as a result of incision and exposure of bedrock in the channel bed.

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FIGURE 2

EXISTING ON-SITE DRAINAGE BASINS

Sub-Basin A1A drains the northeastern part of the site. This area contains the access roadway and mostly pervious areas. It produces runoff amounts of 14.2 cfs for the five-year storm event and 29.9 cfs for the 100-year storm event. The runoff drains through an 18-inch RCP into Sub-Basin A1B.

Sub-Basin A1B produces runoff amounts of 1.0 cfs for the five-year storm event and 2.4 cfs for the 100-year storm event. Combined runoff at **DP1** is 14.7 cfs and 31.2 cfs for the five- and 100-year storm events, respectively. This runoff is then transported overland into Sand Creek.

Sub-Basin A2A drains the eastern part of the developed site. This area produces runoff amounts of 25.5 cfs for the five-year storm event and 46.9 cfs for the 100-year storm event. The runoff is intercepted by a 20-foot D10R inlet which is connected to a 30-inch RCP. This storm sewer turns into the undeveloped area, Sub-Basin A2B, located adjacent to Sand Creek.

Sub-Basin A2B produces runoff amounts of 2.7 cfs for the five-year storm event and 6.3 cfs for the 100-year storm event. The combined runoff at **DP2** is 20.8 cfs and 39.4 cfs for the five- and 100-year storm events, respectively.

Sub-Basin A3A drains the central part of the flea market site. It produces runoff amounts of 22.4 cfs for the five-year storm event and 41.4 cfs for the 100-year storm event. The runoff is intercepted by a 20-foot D10R inlet which is connected to a 30-inch RCP. This storm sewer runs into the undeveloped area, Sub-Basin A3B, located adjacent to Sand Creek.

Sub-Basin A3B produces runoff amounts of 3.5 cfs for the five-year storm event and 8.3 cfs for the 100-year storm event. The combined runoff at **DP4** is 25.8 cfs and 49.3 cfs for the five- and 100-year storm events, respectively. The runoff at **DP5**, where Sub-Basins A1, A2, and A3 combine is 52.8 cfs for the five-year storm event and 103.4 cfs for the 100-year storm event.

Sub-Basin OS1 drains an off-site developed commercial site located adjacent to Frontage Road. This sub-basin produces runoff amounts of 10.4 cfs for the five-year storm event and 20.6 cfs for the 100-year storm event. This runoff sheet flows into Sub-Basin A4A which is located on the western side of the developed area.

Sub-Basin A4A produces runoff amounts of 37.3 cfs for the five-year storm event and 73.3 cfs for the 100-year storm event. The combined runoff at **DP6** is 35.1 cfs and 69.2 cfs for the five- and 100-year storm events, respectively. This runoff is intercepted by a 30-foot D10R

**MASTER DEVELOPMENT DRAINAGE PLAN
CLOUD FAMILY PARTNERSHIP PROPERTY**

inlet which is connected to a 36-inch RCP. The storm sewer flows into the undeveloped area, Sub-Basin A4B, adjacent to Sand Creek.

Sub-Basin A4B produces runoff amounts of 3.8 cfs for the five-year storm event and 8.8 cfs for the 100-year storm event. The combined runoff at **DP7** is 36.2 cfs and 72.3 cfs for the five- and 100-year storm events, respectively. The total runoff from the developed portion of the site at **DP8** is 82.5 cfs and 162.9 cfs for the five- and 100-year storm events, respectively.

Sub-Basin A5 drains an undeveloped area located just west of the developed flea market area. It produces runoff amounts of 4.6 cfs for the five-year storm event and 10.7 cfs for the 100-year storm event. The combined runoff at **DP9** is 86.9 cfs and 173.2 cfs for the five- and 100-year storm events, respectively. This runoff then drains into the main channel of Sand Creek.

The northwestern corner of the area was previously subdivided into the Coleman and the CSD Subdivisions. These off-site commercial areas, known as **Sub-Basin OS2**, produce runoff amounts of 21.8 cfs for the five-year storm event and 43.3 cfs for the 100-year storm event. The runoff drains south into Sub-Basin A6.

Sub-Basin A6 is located adjacent to Wooten Road and produces runoff amounts of 4.9 cfs for the five-year storm event and 11.3 cfs for the 100-year storm event. Total runoff at **DP10** is 20.0 cfs and 41.3 cfs for the five- and 100-year storm events, respectively. The runoff drains into the West Fork of Sand Creek near Wooten Road.

Sub-Basin A7A is located in the north central part of the site. This is an undeveloped area and produces runoff amounts of 9.0 cfs and 20.9 cfs for the five- and 100-year storm events respectively. The runoff drains to the southwest into Sub-Basin A7B.

Sub-Basin A7B is also an undeveloped area and produces runoff amounts of 4.3 cfs and 10.0 cfs for the five- and 100-year storm events, respectively. The runoff drains to the southwest into the West Fork of Sand Creek. The combined runoff at **DP11** is 10.3 cfs for the five-year storm event and 23.9 cfs for the 100-year storm event. This runoff combines at **DP12** with the runoff from DP10 to produce total runoff into the West Fork of Sand Creek of 24.8 cfs for the five-year storm event and 53.8 cfs for the 100-year storm event.

Sub-Basin A8 drains the southwestern part of the undeveloped site. This small sub-basin produces runoff amounts of 2.8 cfs and 6.4 cfs for the five- and 100-year storm events, respectively. The combined runoff at **DP13** is 26.3 cfs and 57.5 cfs for the five- and 100-year storm events, respectively.

Sub-Basin A9 drains the central part of the site and produces runoff amounts of 12.4 cfs for the five-year storm event and 28.8 cfs for the 100-year storm event. This runoff drain southerly into an existing swale, then empties directly into the West Fork. This runoff

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combines with runoff from DP13 and produces a total runoff amount at **DP14** of 40.2 for the five-year storm event and 89.5 cfs for the 100-year storm event.

Sub-Basin A10 drains the southern part of the undeveloped area. It produces runoff amounts of 4.2 cfs and 9.8 cfs for the five- and 100-year storm events, respectively. Total runoff into the West Fork of Sand Creek at **DP15** is 40.9 cfs for the five-year storm event and 91.5 cfs for the 100-year storm event. DP15 runoff then combines with runoff from DP9 at **DP16** to produce total runoff amounts of 100.5 cfs and 210.2 cfs for the five- and 100-year storm events, respectively. These runoff amounts include only site runoff and do not include the existing upstream channel flows within the West Fork or main channel of Sand Creek.

The area of the property located east of Sand Creek drains in a southwesterly direction through several existing swales into Sand Creek. **Sub-Basin B1** drains the area adjacent to Sand Creek. This northern area of the eastern property produces runoff amounts of 5.4 cfs and 12.5 cfs for the five- and 100-year storm events, respectively. Part of the adjacent sub-basin also drains a small off-site area.

Sub-Basin OS3 drains the area just south of East Bijou Street and produces runoff amounts of 0.4 cfs for the five-year storm event and 0.8 cfs for the 100-year storm event. It drains to the southwest into Sub-Basin B2.

Sub-Basin B2 is a narrow sub-basin and produces runoff amounts of 4.3 cfs and 10.1 cfs for the five- and 100-year storm events, respectively. The combined runoff at **DP17** is 4.6 cfs for the five-year storm event and 10.7 cfs for the 100-year storm event. At **DP18** the runoff from DP17 combines with runoff from Sub-Basin B1 to produce total runoff amounts of 5.4 cfs for the five-year storm event and 12.5 cfs for the 100-year storm event.

The sub-basin to the south also drains an off-site area, **Sub-Basin OS4**. This sub-basin produces runoff amounts of 3.7 cfs and 8.3 cfs for the five- and 100-year storm events, respectively. This area then flows into **Sub-Basin B3** which produces flows of 4.7 cfs and 11.0 cfs for the five- and 100-year storm events, respectively. The total combined runoff for these sub-basins at **DP19** produce amounts of 7.1 cfs for the five-year storm event and 16.5 cfs for the 100-year storm event. At **DP20** (DP18 and DP19 combined) the runoff amounts are 11.7 for the five-year storm event and 27.1 cfs for the 100-year storm event.

Sub-Basin B5 drains a large off-site area which is currently used for material storage. It produces runoff amounts of 8.8 cfs and 20.1 cfs for the five- and 100-year storm events, respectively. This runoff flows in a southwesterly direction into Sub-Basin B4.

Sub-Basin B4 produces runoff amounts of 5.6 cfs and 12.9 cfs for the five- and 100-year storm events, respectively. The combined runoff at **DP21** is 12.4 cfs for the five-year storm event and 28.6 cfs for the 100-year storm event. DP20 and DP21 combine at **DP22** to produce combined runoff amounts of 24.8 cfs for the five-year storm event and 54.9 cfs for the 100-year storm events.

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CLOUD FAMILY PARTNERSHIP PROPERTY**

Sub-Basin B5 drains the southeastern corner of the site. Runoff from *Sub-Basin OS6* is tributary to this sub-basin. The off-site area produces runoff amounts of 9.9 cfs and 22.5 cfs for the five- and 100-year storm events, respectively. Sub-Basin B5 produces runoff amounts of 1.1 cfs and 2.6 cfs for the five- and 100-year storm events, respectively. The combination of these flows at **DP23** produce total runoff amounts of 10.3 cfs for the five-year storm event and 23.7 cfs for the 100-year storm event. Runoff from DP22 and DP23 combine at **DP24** to produce amounts of 33.3 cfs for the five-year storm event and 76.8 cfs for the 100-year storm event.

All runoff that is tributary to and produced by the project site combine at DP25. Total runoff amounts at **DP25**, excluding existing channel flows, are 126.9 cfs for the five-year storm event and 271.0 cfs for the 100-year storm event.

The runoff produced under existing conditions is listed in the following table.

EXISTING CONDITIONS		
Sub-Basin	5-Year Runoff (cfs)	100-Year Runoff (cfs)
A1A	14.2	29.9
A1B	1.0	2.4
A2A	25.5	46.9
A2B	2.7	6.3
A3A	22.4	41.4
A3B	3.5	8.3
A4A	37.3	73.3
A4B	3.8	8.8
A5	4.6	10.7
A6	4.9	11.3
A7A	9.0	20.9
A7B	4.3	10.0
A8	2.8	6.4
A9	12.4	28.8
A10	4.2	9.8
B1	5.4	12.5
B2	4.3	10.1
B4	5.6	12.9
B5	1.1	2.6
OS1	10.4	20.6
OS2	21.8	43.3
OS3	0.4	0.8
OS4	3.7	8.3
OS5	8.8	20.1
OS6	9.9	22.5
DP1(A1A+A1B)	14.7	31.2
DP2(A2A+A2B)	20.8	39.4

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Sub-Basin	5-Year Runoff (cfs)	100-Year Runoff (cfs)
DP3(DP1+DP2)	35.0	69.4
DP4(A3A+A3B)	25.8	49.3
DP5(DP3+DP4)	52.8	103.4
DP6(OS1+A4A)	35.1	69.2
DP7(DP6+A4B)	36.2	72.3
DP8(DP5+DP7)	82.5	162.9
DP9(DP8+A5)	86.9	178.2
DP10(OS2+A6)	20.0	4.13
DP11(A7A+A7B)	10.3	23.9
DP12(DP10+DP11)	24.8	53.8
DP13(DP12+A8)	26.3	57.5
DP14(DP13+A9)	40.2	89.5
DP15(DP14+A10)	40.9	91.5
DP16(DP9+DP15)	100.5	210.2
DP17(OS3+B2)	4.6	10.7
DP18(DP17+B1)	5.4	12.5
DP19(OS4+B3)	7.1	16.5
DP20(DP18+DP19)	11.7	27.1
DP21(OS5+B4)	12.4	28.6
DP22(DP20+DP21)	24.8	54.9
DP23(OS6+B5)	10.3	23.7
DP24(DP22+DP23)	33.3	76.8
DP25(DP16+DP24)	126.9	271.0

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CLOUD FAMILY PARTNERSHIP PROPERTY**

FIGURE 3

ANTICIPATED FUTURE ON-SITE SUB-BASINS

Sub-Basin A5 will be partially developed as the lower portion of this sub-basin falls within the Sand Creek channel area. It will produce runoff amounts of 10.5 cfs for the five-year storm event and 21.8 cfs for the 100-year storm event. This sub-basin is directly tributary to Sand Creek. The combined developed site runoff at **DP10** of this sub-basin will be 100.2 cfs and 193.5 cfs for the five- and 100-year storm events, respectively.

Assuming the off-site area will fully develop, *Sub-Basin OS2* located in the northwestern part of the site will then produce increased runoff amounts of 24.9 cfs for the five-year storm event and 49.8 cfs for the 100-year storm event. This runoff will be intercepted by a 30-inch RCP and be transported along Wooten Road to the West Fork of Sand Creek.

Sub-Basin A6 will also be connected into the same 30-inch RCP and will produce runoff amounts of 11.3 cfs and 21.0 cfs for the five- and 100-year storm events, respectively. The combined runoff at **DP11** will produce amounts of 34.1 cfs for the five-year storm event and 66.7 cfs for the 100-year storm event.

Sub-Basin A7A will develop as a community commercial area, producing runoff of 27.8 cfs and 51.8 cfs for the five- and 100-year storm events, respectively. This runoff will be intercepted by a 30-inch storm sewer and be transported to the southeast corner of Sub-Basin A7B.

Sub-Basin A7B will develop as a combination office and industrial/research and development site. It will produce runoff amounts of 39.8 cfs and 74.2 cfs for the five- and 100-year storm events, respectively. A proposed 36-inch RCP will intercept this runoff along the southern part of the site. This storm sewer will connect to the storm sewer from Sub-Basin A7A at **DP12**. The combined runoff at this point will be 63.2 cfs for the five-year storm event and 117.8 cfs for the 100-year storm event. The runoff will be transported into the West Fork of Sand Creek through a 36-inch storm sewer. The combined site runoff into the West Fork at **DP13** will be 96.6 cfs for the five-year storm event and 183.2 cfs for the 100-year storm event.

Sub-Basin A8 drains the southeastern area of the site and will develop as an industrial/research and development area. It will produce runoff amounts of 32.6 cfs and 65.1 cfs for the five- and 100-year storm events, respectively. The runoff will flow into the channel through a 30-inch storm sewer. At **DP14** total runoff amounts will be 124.2 cfs for the five-year storm event and 238.4 cfs for the 100-year storm event.

Sub-Basin A9 will drain the central portion of the industrial/research and development area. It will produce runoff amounts of 32.2 cfs and 64.2 cfs for the five- and 100-year storm events, respectively. The runoff will flow into the channel through a 30-inch storm sewer,

**MASTER DEVELOPMENT DRAINAGE PLAN
CLOUD FAMILY PARTNERSHIP PROPERTY**

making the total runoff at **DP15** 150.2 cfs and 290.7 cfs for the five- and 100-year storm events, respectively.

Sub-Basin A10, located on the southeast corner of the site, will produce runoff amounts of 12.0 cfs and 23.9 cfs for the five- and 100-year storm events, respectively. Total projected runoff into the West Fork of Sand Creek at **DP16** will be 147.5 cfs for the five-year storm event and 286.1 cfs for the 100-year storm event. When combined with the runoff from the flea market area at **DP17** the total amounts will be 226.1 cfs for the five-year storm event and 437.6 cfs for the 100-year storm event.

The proposed development for the area east of Sand Creek is industrial/research and development. It is assumed that the off-site area east of the property will be fully developed. Since the overall master plan for the site shows a proposed north/south roadway along the property line, it is assumed that future runoff will be captured in roadway ditches and transported to the southern end of the site. Using this assumption the off-site basins will drain to the south, beginning with *Sub-Basin OS3*. This sub-basin will then produce runoff amounts of 1.3 cfs and 2.6 cfs for the five- and 100-year storm events, respectively, and will then flow into Sub-Basin OS4.

Sub-Basin OS4 will produce storm runoff amounts of 7.9 cfs for the five-year storm event and 15.7 for the 100-year storm event. The combined ditch runoff at **DP18** will be 8.9 cfs and 17.8 cfs for the two storms, respectively. Continuing south this runoff will combine with the runoff from *Sub-Basin OS5* amounting to 19.5 cfs and 38.9 cfs for the two storms. The combined runoff of these two sub-basins at **DP19** will be 45.6 cfs for the five-year storm event and 91.0 for the 100-year storm event.

Sub-Basin OS6 is the southern-most off-site basin affecting the Cloud Family Partnership property. It will produce runoff amounts of 22.0 cfs and 43.9 cfs for the two storms. The combined off-site runoff at **DP20** will be 47.5 cfs for the five-year storm event and 94.7 cfs for the 100-year storm event. This combined runoff will be directed into a 42-inch storm sewer and transported westerly toward Sand Creek.

The Cloud Family Partnership property located east of Sand Creek is divided into three sub-basins: Sub-basins B1, B2, and B3.

Sub-Basin B1 will produce runoff amounts of 6.8 cfs and 14.4 cfs for the two storms. Its runoff will be directed into Sand Creek through a 24-inch storm sewer.

Sub-Basin B2 lies in the central area and will produce runoff amounts of 19.2 cfs and 38.7 cfs for the two storms. This runoff will be intercepted by a 30-inch storm sewer, then flowing into Sand Creek. The total runoff amount flowing into Sand Creek from Sub-Basins B1 and B2 at **DP21** will be 23.7 cfs for the five-year storm event and 48.3 cfs for the 100-year storm event.

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Sub-Basin B3 will produce runoff of 33.6 cfs and 67.7 cfs for the two storms. The total runoff amount flowing from Sub-Basins B1 through B3 at **DP22** will be 50.3 cfs for the five-year storm event and 101.8 cfs for the 100-year storm event. Off-site runoff will combine with this runoff at **DP23** and will produce 96.5 cfs and 194.1 cfs for the two storms.

At **DP24** the total combined runoff from the Cloud Family Partnership property will be 312.6 cfs for the five-year storm event and 611.7 cfs for the 100-year storm event.

The total estimated runoff produced under proposed conditions is listed in the following table.

ANTICIPATED FUTURE DEVELOPMENT

Sub-Basin	5-Year Runoff (cfs)	100-Year Runoff (cfs)
A1A	25.0	46.6
A1B	0.5	1.2
A2A	25.5	46.9
A2B	2.7	6.3
A3A	22.4	41.4
A3B	3.5	8.3
A4A	37.3	73.3
A4B	3.8	8.8
A5	10.5	21.8
A6	11.3	21.0
A7A	27.8	51.8
A7B	29.8	74.2
A8	32.6	65.1
A9	32.2	64.2
A10	12.0	23.9
B1	6.8	14.4
B2	19.2	38.7
B3	33.6	67.7
OS1A	8.5	15.7
OS1B	7.1	12.3
OS2	24.9	49.8
OS3	1.3	2.6
OS4	7.9	15.7
OS5	19.5	38.9
OS6	22.0	43.9
DP1(A1A+A1B)	24.6	46.1
DP2(A2A+A2B)	24.9	47.2
DP3(DP1+DP2)	47.8	90.1
DP4(A3A+A3B)	25.8	49.3
DP5(DP3+DP4)	67.6	128.0
DP6(OS1A+OS1B)	13.2	23.9

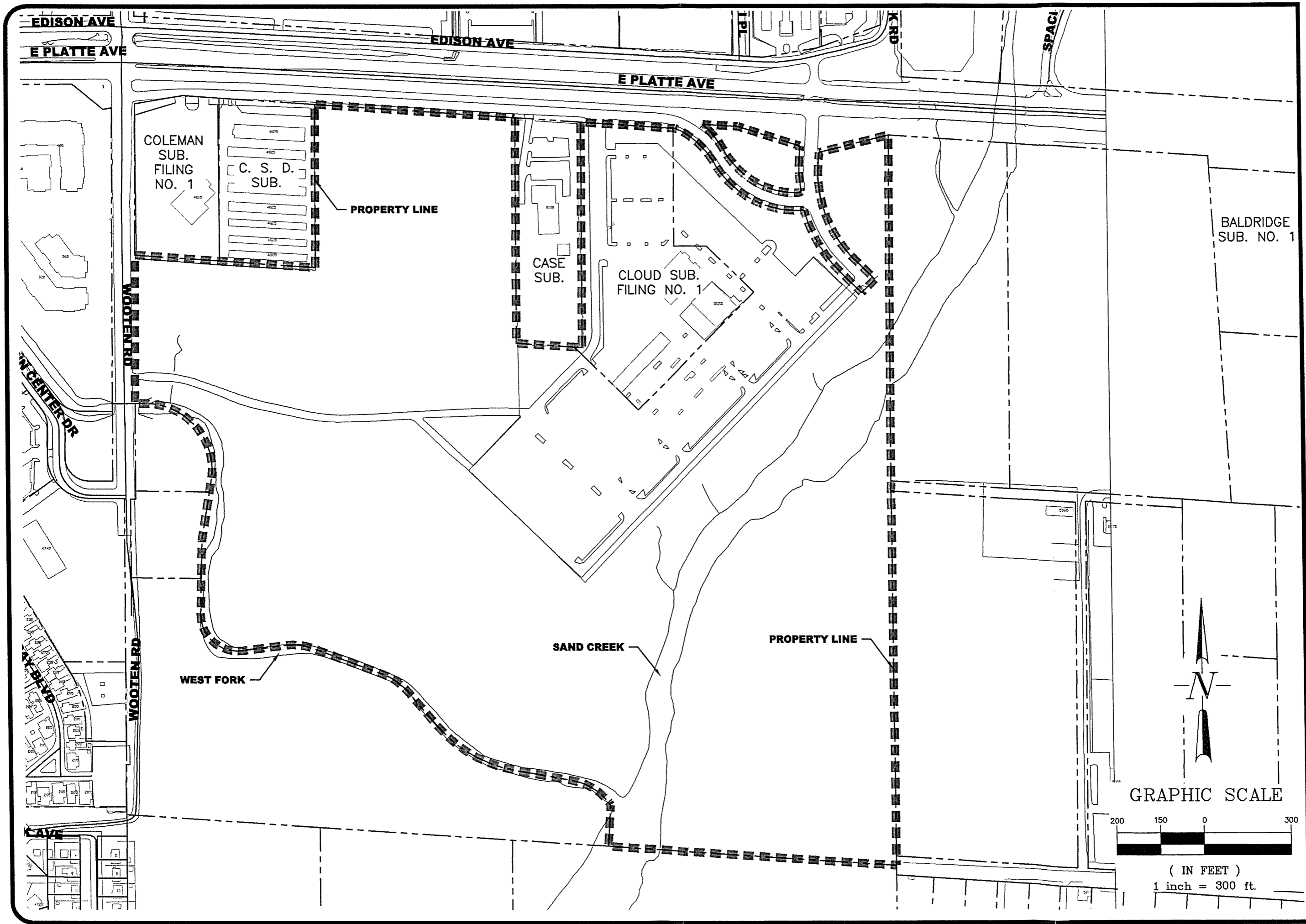
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Sub-Basin	5-Year Runoff (cfs)	100-Year Runoff (cfs)
DP7(DP6+A4A)	38.3	73.7
DP8(DP7+A4B)	39.2	76.7
DP9(DP5+DP8)	92.0	176.4
DP10(DP9+A5)	100.2	193.5
DP11(OS2+A6)	34.1	66.7
DP12(A7A+A7B)	63.2	117.8
DP13(DP11+DP12)	96.6	183.2
DP14(DP13+A8)	124.2	238.4
DP15(DP14+A9)	150.2	290.7
DP16(DP15+A10)	147.5	286.1
DP17(DP10+DP16)	226.1	437.6
DP18(OS3+OS4)	8.9	17.8
DP19(DP18+OS5)	45.6	91.0
DP20(DP19+OS6)	47.5	94.7
DP21(B1+B2)	23.7	48.3
DP22(DP21+B3)	50.3	101.8
DP23(DP20+DP22)	96.5	194.1
DP24(DP17+DP23)	312.6	611.7

**MASTER DEVELOPMENT DRAINAGE PLAN
CLOUD FAMILY PARTNERSHIP PROPERTY**

APPENDIX A

EXHIBIT 1 – OWNERSHIP MAP



DESIGNED BY: JPH
 PROJECT ENGINEER: MAB
 PROJECT MANAGER: MAB

DATE: 5/15/12
 JOB NO.: 080701
 CAD FILE NO.:

PREPARE:

ANP
 5500 Austin St
 Suite
 Colorado Springs
 CO 80901
 Tel: (719)

NO.	DATE	REVISION	BY

MASTER DEVELOPMENT DRAINAGE PLAN
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APPENDIX B

TIME DELAY AGREEMENT

CITY OF COLORADO SPRINGS
The "America the Beautiful" City
DEPARTMENT OF PLANNING & DEVELOPMENT CITY ENGINEERING DIVISION (719) 578-6606
30 S. NEVADA SUITE 403 P.O. BOX 1575
COLORADO SPRINGS, COLORADO 80901

October 8, 1991

Mr. Scott W. Johnson
Johnson & Johnson
Attorneys at Law
Tejon Law Building
1528 North Tejon St.
Colorado Springs, CO 80907-7439

Re: FLEA MARKET INC.

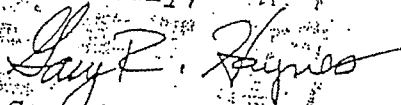
Dear Mr. Johnson:

I have received the signed time delay for this referenced plat and have signed it and sent it out for recording. After recording the document, we will submit to you a copy thereof.

Another purpose for writing this letter to you is to inform you that this particular solution for the drainage improvements adjacent and nearby this plat is unique and is considered a one time solution for this property only. Due to the uniqueness of the plat and use of the property coupled with the uncertainty concerning the scheduling of improvements for the main drainageway, it was felt that this document was in order. It is my intention to not use this procedure as a precedent for other plats adjacent to drainageways in Colorado Springs. I believe that the City's ordinances are clear in their requirements and we have held to those requirements uniformly with a variety of developments.

Thank you for your willingness to work with your client and my office in establishing this special agreement.

Sincerely,



Gary R. Haynes
City Engineer

c: Robert Adamczyk, Senior Civil Engineer
Peter Kernkamp, Planning
John Maynard, NES Inc.
Nolan Shriner, NES, Inc.
Chris Smith, Subdivision Administrator

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BOOK 5892 PAGE 125

ARDIS W. SCHMITT
EL PASO COUNTY CLERK & RECORDER

1190

**TIME DELAY FOR INSTALLATION
OF PUBLIC IMPROVEMENTS AGREEMENT**

WHEREAS, the undersigned own those premises in the City of Colorado Springs, El Paso County, Colorado, described on Exhibit "A", attached hereto and by reference made a part hereof (the "property"), a portion of which is to be platted (the "platted property"), and

3^d

WHEREAS, said premises are in close proximity to Sand Creek, located within the City of Colorado Springs, and

WHEREAS, the said City of Colorado Springs has the right to insist upon installation of public improvements upon the property by the undersigned, consisting of drainage facilities and improvements, more fully set forth upon the drainage report approved by the City, as the same shall be subsequently modified upon completion of studies currently in progress, and

WHEREAS, the undersigned and the City recognize that a multi-use trail is planned within the Sand Creek drainage corridor through the property at an uncertain date in the future, the location of which is dependent in part upon the completion of and content of the aforesaid drainage basin study, and

WHEREAS, the undersigned and the City recognize that the said drainage facilities and improvements are to be constructed by the undersigned at an uncertain date in the future and dependent upon the completion of and content of the aforesaid drainage basin study, and

WHEREAS, the undersigned and the City wish to more fully specify the assurances by the undersigned that such drainage improvements will be constructed and installed as indicated, or as subsequently modified by the aforesaid drainage basin study.

NOW, THEREFORE, in consideration of the premises and covenants set forth herein, it is agreed by the undersigned as follows:

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GRA
INITIAL

1. The undersigned shall deposit with the City a Letter of Credit in form and content acceptable to the City, and issued by the United Bank of Colorado Springs, in the amount of sixty seven thousand and no/100 dollars (\$67,000.00), to secure, in part, the obligation of the undersigned to make drainage improvements as required by the terms of this Agreement. It is further agreed that the depositing of such Letter of Credit shall not diminish or alter the responsibility of the undersigned for the construction of such drainage facilities, but rather, the same shall serve to provide assurance that such facilities will be constructed as agreed.

2. The undersigned agree that they will, when improvements are required by the City to be installed, dedicate the necessary right-of-way upon the property for the drainage improvements, immediately make such installation, and pay the costs thereof. Further, the undersigned covenant and agree that they shall install such improvements prior to any sale or transfer [other than lease or transfer by operation of law] of all or any portion of the property (including the platted property) or any interest therein, or in the alternative, shall provide to the City such further and additional assurances as the City shall deem adequate and appropriate that such drainage improvements and facilities shall be constructed and installed when required by the City. In the alternative, the City may, in its sole discretion, include the said improvement in a special improvement district, and all costs thereof shall be a charge upon the premises herein described. Such special assessments shall be in proportion to the special benefits derived to such property and on a front foot, area, zone or other equitable basis, as may be determined by the City Council. The undersigned and all persons claiming through them hereby waive notice and all objections to

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D.F.V.
A.R.H.
INITIALS

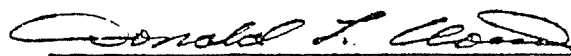
the inclusion of the herein described land in such a special improvement district and all assessments and costs levied thereunder.

3. The undersigned covenant and agree that prior to the installation of such improvements, they will indemnify and hold harmless the City from and against any claims, liabilities, demands, or suits by third parties for damage to property, including Babcock Road within Cloud Subdivision No. 1, violation of occupancy agreements or conditions, or injury or death of any person in any way arising out of or resulting from damages or injury suffered from flooding of the premises prior to time such improvements are installed. Such indemnification shall include the obligation of the undersigned to defend any and all actions, claims, or other legal proceedings and to reimburse the City for all expenses, including attorneys fees, incurred in connection therewith.

4. The undersigned agree to dedicate to the City a 20' wide multi-use trail easement along Sand Creek within existing 100-yard flood plain at a specific location determined by the City when requested by the City.

5. This Agreement shall be binding upon the undersigned, their successors, assigns, and or personal representatives. This Agreement shall be recorded in the office of the Clerk and Recorder of El Paso County and shall run with the land hereinabove described.

DATED at Colorado Springs, Colorado this 2nd day of October,
1991.


DONALD L. CLOUD


PATRICIA L. CLOUD

APPROVED:

for The Director of Public Works

By: Gary R. Haynes
City Engineer

PLANNING ACTION: DS 591-118PF
TIME DELAY REQUIRED: Public Drainage Facilities
INSPECTOR: N/A DATE: _____

STATE OF Colorado }
COUNTY OF El Paso } ss.

SUBSCRIBED and sworn to before me this 8 day of October,
1991, by Gary R. Haynes, as City Engineer of
City of Colorado Springs, Colorado.

My commission expires: 12/9/93.

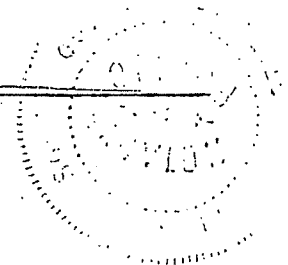
Joseph A. Duest
Notary Public

STATE OF Colorado }
COUNTY OF El Paso } ss.

SUBSCRIBED and sworn to before me this 2nd day of October,
1991, by Donald L. Cloud and Patricia L. Cloud

My commission expires: 8-8-95.

[Signature]
Notary Public



FMIAgmt.000/1417-001

The Westerly three-eighths (3/8) of the East half of the Northwest quarter of Section 13 Township 14 South, Range 66 West of the 6th P.M., El Paso County, Colorado, except that portion conveyed for highway purposes by Deeds recorded in Book 910 at Page 259, Book 441 at Page 11, Book 1669 at Page 21, Parcel No. 17 and right of way recorded in Book 1682 at Page 599 and in Book 1742 at Page 198 of the records of the Clerk and Recorder of El Paso County, Colorado, excepting therefrom the following described tract:

That portion of the East half of the northwest quarter of Section 13, Township 14 South Range 66 West of the 6th P.M., El Paso County, Colorado, more particularly described as follows: Commencing at the Northwest corner of the East half of the Northwest quarter of said Section 13; thence S 00°03'06" W, 154.33 feet along the West line of the East half of the Northwest quarter to a point on the Southerly right of way line of land Deeded to The Department of Highways, State of Colorado, as recorded in Book 1742 at Page 198 of the records of said County; thence S 86°13'00" E, 30.06 feet along said Southerly right of way line to a point on the Easterly right of way line of the 30.00 foot wide road right of way described in Book 1682 at Page 599 of the said records and the point of beginning of the tract of and herein described; thence S 86°13'00" E, 225.00 feet along said Southerly right of way line described in Book 1742 at Page 198; thence S 00°03'06" W, 775.00 feet; thence N 86°13'00" W, 225.00 feet to a point on said Easterly right of way line described in Book 1682 at Page 599; thence N 00°03'06" E, 775.00 feet along said Easterly right of way line to the point of beginning.

THE E 5/8 OF THE E 1/2 OF THE NW 1/4 OF SECTION 13 IN TOWNSHIP 14 SOUTH, RANGE 66 WEST OF THE 6TH P.M. EL PASO COUNTY, COLORADO; EXCEPTING THAT PORTION CONVEYED IN BOOK 1766 AT PAGE 268 TO THE DEPARTMENT OF HIGHWAYS, STATE OF COLORADO; AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS: COMMENCING AT THE NORTH ONE-QUARTER CORNER OF SAID SECTION 13; THENCE S 00 DEGREES 12 MINUTES 14 SECONDS W, ON THE EAST LINE OF SAID NW 1/4, 129.7 FEET TO THE SOUTHERLY LINE OF THAT TRACT DESCRIBED IN BOOK 1766 AT PAGE 268 AND THE POINT OF BEGINNING OF THE TRACT TO BE DESCRIBED HEREBY; THENCE CONTINUE ON SAID EAST LINE, S 00 DEGREES 12 MINUTES 14 SECONDS W, 2509.31 FEET TO THE SOUTHEAST CORNER OF SAID NW 1/4; THENCE N 86 DEGREES 12 MINUTES 02 SECONDS W, ON THE SOUTH LINE OF SAID NW 1/4, 825.74 FEET; THENCE N 00 DEGREES 10 MINUTES 51 SECONDS E, 2484.29 FEET TO THE SOUTHERLY LINE OF SAID HIGHWAY TRACT IN BOOK 1766 AT PAGE 268; THENCE ON SAID SOUTHERLY LINE FOR THE NEXT 3 COURSES: 1) S 86 DEGREES 13 MINUTES 00 SECONDS E, 309.75 FEET; 2) THENCE S 72 DEGREES 43 MINUTES 00 SECONDS E, 257.10 FEET; 3) THENCE N 76 DEGREES 03 MINUTES 00 SECONDS, 279.00 FEET, MORE OR LESS, TO THE POINT OF BEGINNING.

© 1988 U.S.A.

P.L.C.

**MASTER DEVELOPMENT DRAINAGE PLAN
CLOUD FAMILY PARTNERSHIP PROPERTY**

APPENDIX C

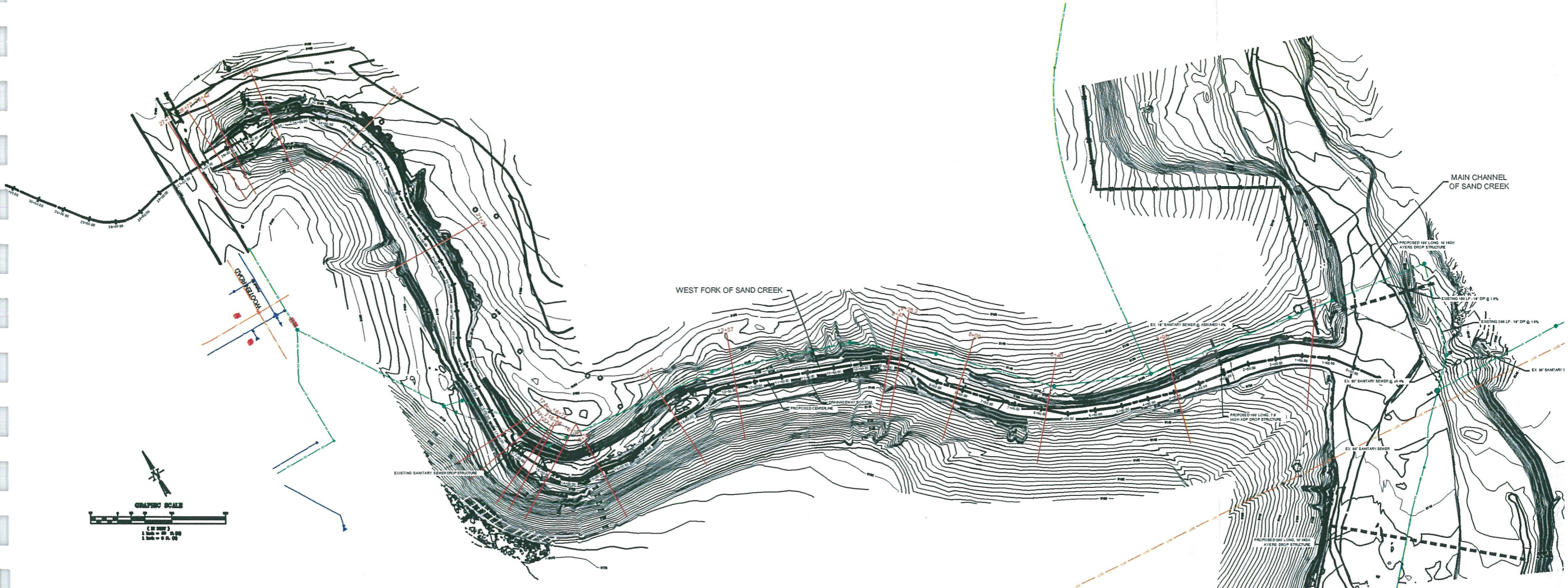
DESIGN CALCULATIONS

TABLE 6-1

Allowable Use of Roads and Streets

Street Classification	Use of Streets for Initial and Major Storms		Cross Flow In Streets For Initial and Major Storms	
	Initial Storm	Major Storm	Initial Storm	Major Storm
Hillside Residential (Less Than 32' F/C to F/C)	No curb overtopping, maximum street flow = 25 cfs, whichever is most limiting.	Same as Type A (Local/Residential) below.	Same as Type A (Local/Residential) below.	Same as Type A (Local/Residential) below.
Type A (Local/Residential)	No curb overtopping, flow may spread to crown of street or top of curb, whichever is the most limiting.	Residential dwellings, public, commercial and industrial buildings shall not be inundated at the ground line. The depth of water at the gutter flow line shall not exceed 12 inches.	6 inches of depth in cross pan or gutter flow line	12 inches of depth at gutter flow line
Type A (Local with Roadside Ditch)	Flow must not encroach upon street shoulder area.	Residential dwellings, public, commercial and industrial buildings shall not be inundated at the ground line. The depth of flow shall not exceed 6 inches at the shoulder.	Requires culvert. Flow shall not encroach upon street shoulder.	Requires culvert, depth of flow shall not exceed 6 inches at the street shoulder.
Type B (Collector or Minor Arterial)	No curb overtopping. Flow spread must be limited to a maximum 20 foot spread from each curb face.	Same as Type A (Local/Residential) above.	Where cross pans are allowed, depth of flow shall not exceed 6 inches at flow line	12 inches of depth at gutter flow line
Type B (Collector or Minor Arterial with Roadside Ditch)	Flow must not encroach upon street shoulder area.	Same as Type A (Local with Roadside Ditch) above.	Requires culvert. Flow shall not encroach upon street shoulder.	Requires culvert. Depth of flow shall not exceed 6 inches at the street shoulder.
Type C (Arterial)	No curb overtopping. Flow may encroach only onto one outside lane in each direction and must leave at least one 12 foot lane free of water in each direction.	Residential dwellings, public, commercial and industrial buildings shall not be inundated at the ground line. The depth of water shall not exceed 8 inches at the gutter flow line with no curb overtopping.	No allowable cross flow	No allowable cross flow
Type C (Arterial with Roadside Ditch)	Flow must not encroach upon street shoulder.	Residential dwellings, public, commercial and industrial buildings shall not be inundated at the ground line. Depth of flow shall not encroach upon street shoulder.	Requires culvert. Flow shall not encroach upon street shoulder.	Requires Culvert. Depth of flow shall not encroach upon street shoulder
Type D (Highway/Freeway)	No encroachment is allowed on any traffic lanes.	No encroachment on any traffic lanes.	No allowable cross flow	No allowable cross flow

6-4



ADP 3520 Austin Bluffs Pkwy, Suite 200
 Colorado Springs, CO 80918
 (719) 266-5212
 fax: (719) 266-5341
 Associated Design Professionals, Inc.

HEC-RAS SECTION EXHIBIT
 FOR
 WEST FORK OF SAND CREEK

HEC-RAS Plan: WFSC FC River: West_Sand_Cr Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	133	50 YR	5400.00	6120.00	6126.19	6126.19	6128.63	0.005547	12.54	430.74	89.20	1.01
1	133	100 YR	6840.00	6120.00	6127.13	6127.13	6129.84	0.005528	13.23	517.01	95.13	1.00
1	133	FIS 100 YR	5162.00	6120.00	6126.03	6126.03	6128.41	0.005531	12.39	416.62	88.19	1.00

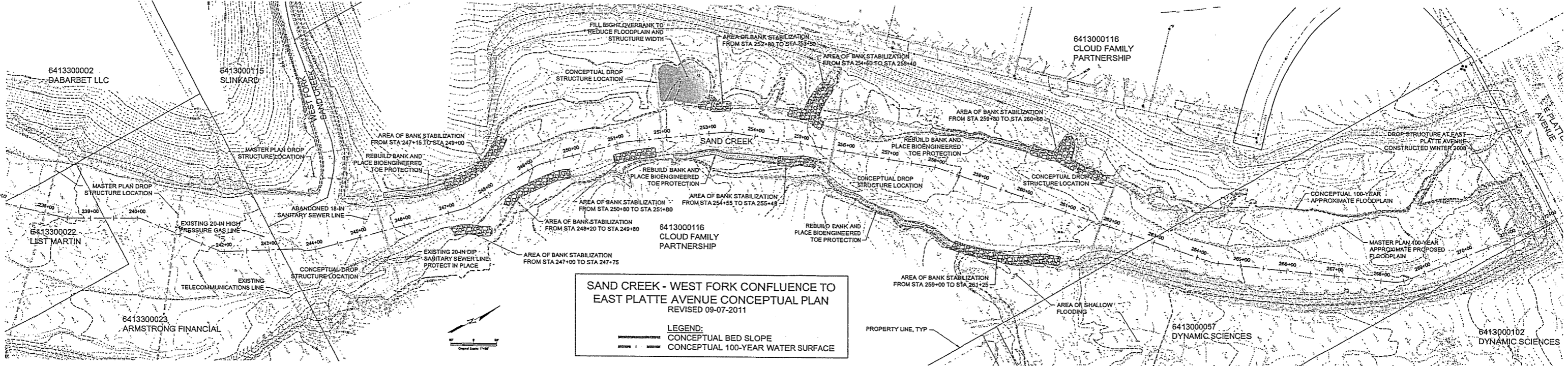
HEC-RAS Plan: SC_Design River: Sand Creek Reach: Main Stem (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev. (ft)	Crit W.S. (ft)	E.G. Elev. (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main Stem	24259	FIS 500 YR	9080.00	6119.08	6122.39	6122.39	6123.90	0.003730	10.00	1027.78	344.04	0.98
Main Stem	24259	FIS OWS	0.01	6119.08	6119.10	6119.10	6119.10	0.000000	0.00	5.76	245.92	0.00
Main Stem	24089	DBPS 1.5 YR	2400.00	6118.40	6119.48	6119.48	6120.01	0.004158	5.87	409.04	384.69	1.00
Main Stem	24089	DBPS 2 YR	2600.00	6118.40	6119.54	6119.54	6120.10	0.004076	6.02	431.97	385.23	1.00
Main Stem	24089	DBPS 5 YR	3500.00	6118.40	6119.78	6119.78	6120.47	0.003869	6.66	525.73	387.46	1.01
Main Stem	24089	DBPS 10 YR	4200.00	6118.40	6119.96	6119.96	6120.73	0.003699	7.05	595.50	389.11	1.00
Main Stem	24089	DBPS 25 YR	5400.00	6118.40	6120.24	6120.24	6121.15	0.003586	7.67	703.81	390.40	1.01
Main Stem	24089	DBPS 50 YR	6400.00	6118.40	6120.46	6120.46	6121.48	0.003483	8.09	791.02	391.26	1.00
Main Stem	24089	DBPS 100 YR	7700.00	6118.40	6120.72	6120.72	6121.88	0.003446	8.62	892.98	392.27	1.01
Main Stem	24089	DBPS 500 YR	9900.00	6118.40	6121.14	6121.14	6122.50	0.003368	9.37	1057.08	393.88	1.01
Main Stem	24089	FIS 10 YR	1890.00	6118.40	6119.31	6119.31	6119.78	0.004454	5.45	346.61	383.19	1.01
Main Stem	24089	FIS 50 YR	4230.00	6118.40	6119.97	6119.97	6120.74	0.003697	7.07	598.16	389.17	1.01
Main Stem	24089	FIS 100 YR	5660.00	6118.40	6120.30	6120.30	6121.24	0.003557	7.79	726.88	390.63	1.01
Main Stem	24089	FIS 500 YR	9080.00	6118.40	6120.99	6120.99	6122.27	0.003374	9.09	999.23	393.31	1.00
Main Stem	24089	FIS OWS	0.01	6118.40	6118.42	6118.42	6118.42	0.000000	0.00	8.60	375.01	0.00

**MASTER DEVELOPMENT DRAINAGE PLAN
CLOUD FAMILY PARTNERSHIP PROPERTY**

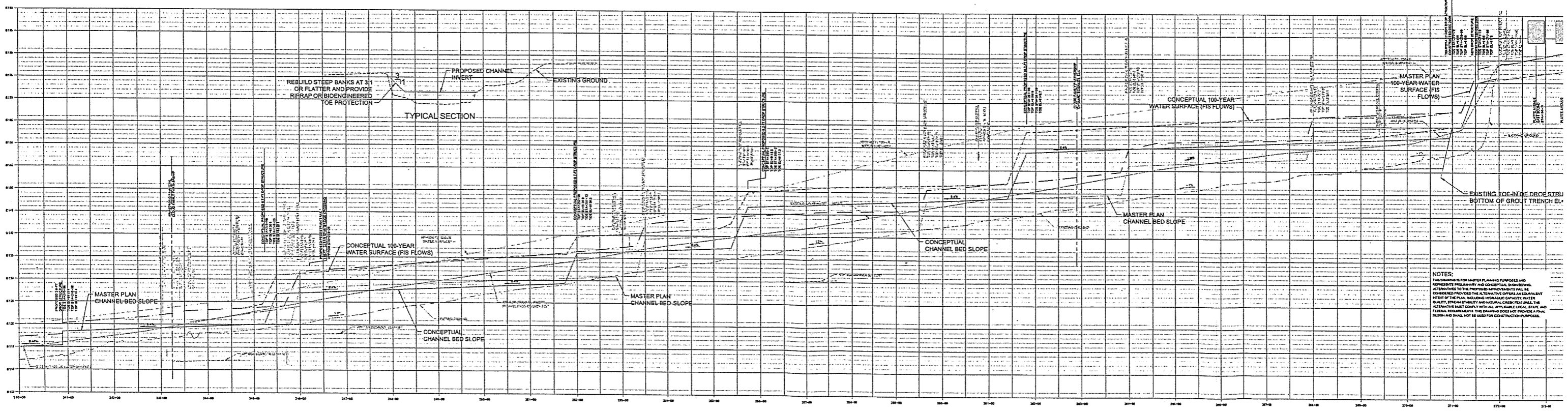
APPENDIX D

AYERS SAND CREEK PLAN



SAND CREEK - WEST FORK CONFLUENCE TO EAST PLATTE AVENUE CONCEPTUAL PLAN
 REVISED 09-07-2011

LEGEND:
 CONCEPTUAL BED SLOPE
 CONCEPTUAL 100-YEAR WATER SURFACE



NOTES:
 THIS DRAWING IS FOR MASTER PLANNING PURPOSES AND IS NOT TO BE USED FOR CONSTRUCTION PURPOSES. ALTERNATIVES TO THE PROPOSED APPROVED DESIGN SHALL BE CONSIDERED PROVIDED THE ALTERNATIVE OFFERS AN EQUIVALENT INTENT OF THE PLAN, INCLUDING HYDRAULIC CAPACITY, WATER QUALITY, EROSION STABILITY AND NATURAL CHANNEL FEATURES. THE ALTERNATIVE MUST COMPLY WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL REQUIREMENTS. THE DRAWING DOES NOT PROVIDE A FINISH AND SHALL NOT BE USED FOR CONSTRUCTION PURPOSES.

**MASTER DEVELOPMENT DRAINAGE PLAN
CLOUD FAMILY PARTNERSHIP PROPERTY**

APPENDIX E

DESIGN CHARTS

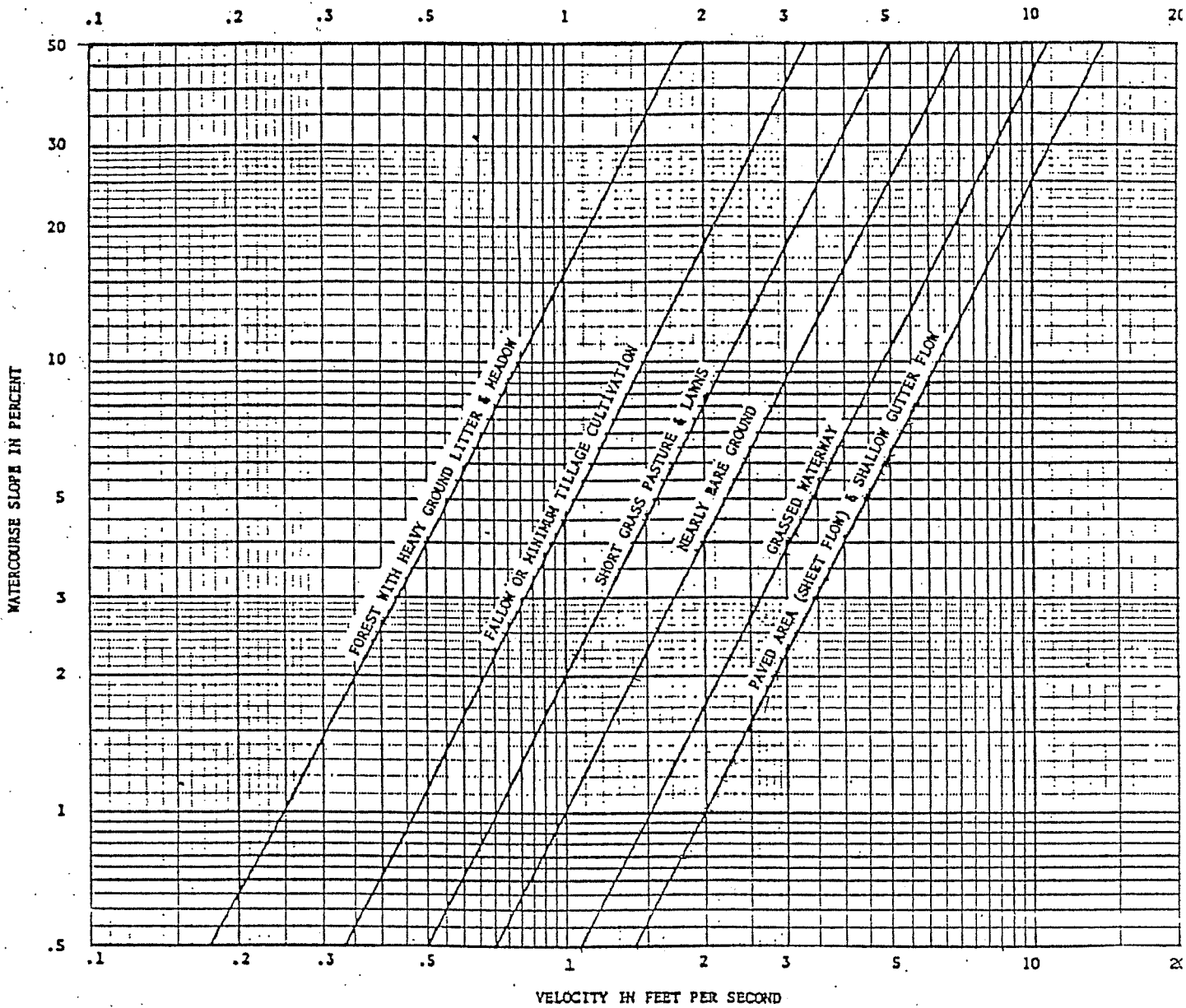
TABLE 5-1

RECOMMENDED AVERAGE RUNOFF COEFFICIENTS AND PERCENT IMPERVIOUS

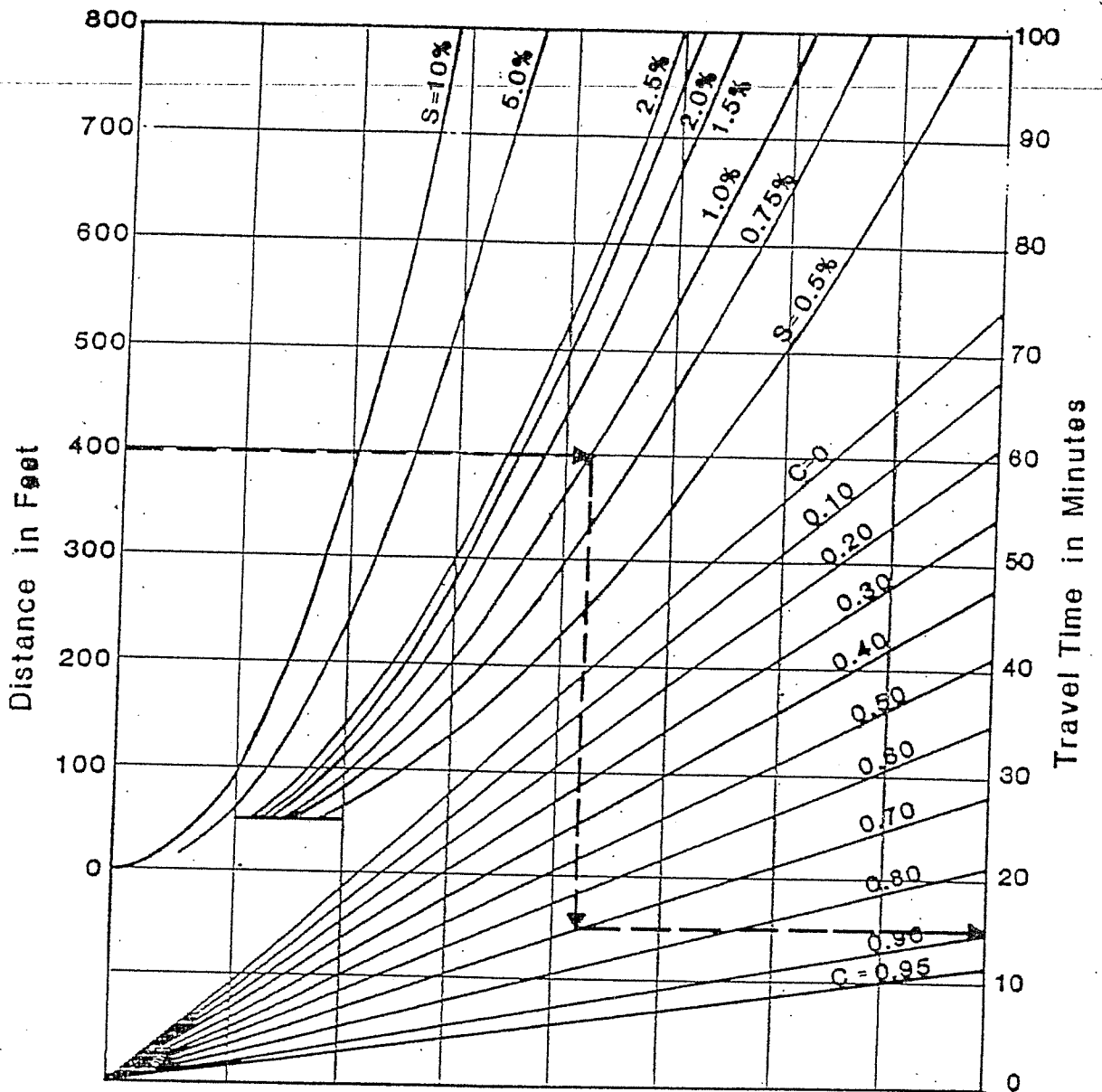
LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	"C" FREQUENCY			
		10		100	
		A&B*	C&D*	A&B*	C&D*
Business					
Commercial Areas	95	0.90	0.90	0.90	0.9
Neighborhood Areas	70	0.75	0.75	0.80	0.8
Residential					
1/8 Acre or less	65	0.60	0.70	0.70	0.8
1/4 Acre	40	0.50	0.60	0.60	0.7
1/3 Acre	30	0.40	0.50	0.55	0.6
1/2 Acre	25	0.35	0.45	0.45	0.5
1 Acre	20	0.30	0.40	0.40	0.5
Industrial					
Light Areas	80	0.70	0.70	0.80	0.8
Heavy Areas	90	0.80	0.80	0.90	0.9
Parks and Cemeteries	7	0.30	0.35	0.55	0.6
Playgrounds	13	0.30	0.35	0.60	0.6
Railroad Yard Areas	40	0.50	0.55	0.60	0.6
Undeveloped Areas					
Historic Flow Analysis- Greenbelts, Agricultural	2	0.15	0.25	0.20	0.3
Pasture/Meadow	0	0.25	0.30	0.35	0.4
Forest	0	0.10	0.15	0.15	0.2
Exposed Rock	100	0.90	0.90	0.95	0.9
Offsite Flow Analysis (when land use not defined)	45	0.55	0.60	0.65	0.7
Streets					
Paved	100	0.90	0.90	0.95	0.9
Gravel	80	0.80	0.80	0.85	0.8
Drive and Walks	100	0.90	0.90	0.95	0.9
Roofs	90	0.90	0.90	0.95	0.9
Lawns	0	0.25	0.30	0.35	0.4

* Hydrologic Soil Group

9/30/90



--Average velocities for estimating travel time for overland flow.



REFERENCE : Wright - McLaughlin Engineers, Urban Storm Drainage Criteria Manual, Vol. 1,
 Denver Regional Council of Governments, Denver, Co. 1977



HDR Infrastructure, Inc.
 A Centerra Company

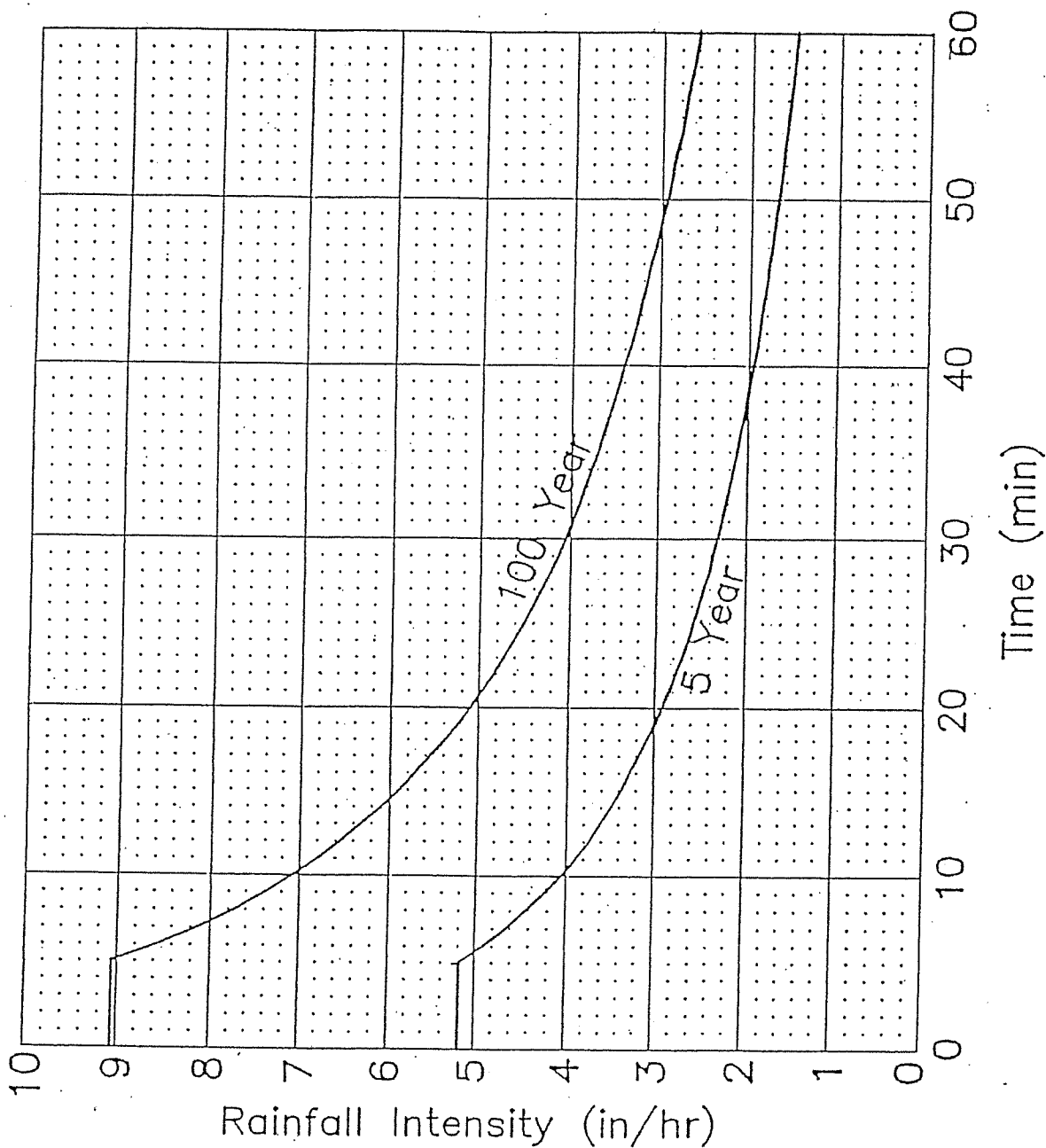
The City of Colorado Springs / El Paso County
 Drainage Criteria Manual

Overland Flow Curves

5-10

Date
 OCT. 1987

Figure
 5-2



$$i_t = \frac{36.4 * i_{60}}{t^{0.53} + 6.72}$$

5 Year: $i_{60} = 1.50$
 100 Year: $i_{60} = 2.62$

RE: Based upon Pikes Peak Area Council of Governments
 Areawide Urban Runoff Control Manual.

The City of Colorado Springs / El Paso County
 Drainage Criteria Manual

Storm Rainfall
 Time Intensity - Frequency Curves

Date:
 MAR. 1995

Figure:
 5 - 1

**MASTER DEVELOPMENT DRAINAGE PLAN
CLOUD FAMILY PARTNERSHIP PROPERTY**

APPENDIX F

DESCRIPTION OF CABLE LOSS IN SAND CREEK

**MASTER DEVELOPMENT DRAINAGE PLAN
CLOUD FAMILY PARTNERSHIP PROPERTY**

This is a summary of the damage sustained by US West telephone cables as a result of the 2003 storm and its cost to repair the damaged cables. This information was provided by Bob Zipfel, a US West Construction and Line Maintenance Manager, now-retired.

...the conduit system was totally wiped out, concrete cave-ins - 'H' fixtures had to be placed until a new inner duct system could be built. The cables had to be spliced twice. Building the new systems had to be close to \$700,000 due to the contract work involved - I'm basing this cost on some of the major breaks I supervised while in the company. I'm sure, with inflation, the cost is somewhat higher.

Lost service was basically the southern end of town, ranging from Galley Road to Hancock Boulevard, and the break point west was Circle Drive. Fiber optic cable was placed in inner duct and bored 18 feet under Sand Creek to eliminate any possibilities of service loss in the future. {bets are still on }.(sic)

This was not the first time Sand Creek had caused the phone company outages; it was the third time at this location. Further down at Jet Wing, the creek was a problem again.

Service loss was anywhere from five days to two weeks for some, depending upon which cables were spliced first. Residential service loss was high; business service loss was moderate.

**MASTER DEVELOPMENT DRAINAGE PLAN
CLOUD FAMILY PARTNERSHIP PROPERTY**

APPENDIX G

**PLATTE AVENUE BRIDGE STABILIZATION PROJECT
MEMORANDUM OF UNDERSTANDING**

PLATTE AVENUE BRIDGE STABILIZATION PROJECT

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding (MOU) is between and **Cloud Family Partnership**, a Colorado limited liability limited partnership ("Cloud") and the **City of Colorado Springs, Colorado, a home rule city and Colorado municipal corporation** ("City"), and is dated for reference as of the 1st day of December, 2011, and is intended to satisfy the requirements of a FEMA Pre-Disaster Mitigation ("PDM") Grant for the Platte Avenue Bridge Stabilization Project (the "Project"). Cloud and the City may be collectively referred to as the ("Parties") or singularly the ("Party").

RECITALS:

- A. Sand Creek is a major drainageway that traverses the City from north to south.
- B. Cloud is the owner of certain real Property located in the County of El Paso, State of Colorado, known as El Paso County Tax Schedule No. 64130-00-116. An east and southern portion of Cloud's property lies in the Platte Avenue Bridge Stabilization Project improvement area.
- C. The banks of Sand Creek on the Cloud property steeply slope down to the creek and in some instances are collapsing due to erosion. The portion in the streambed and channel of Sand Creek has continued to eroded and degrade.
- D. Developed and storm water flows have increased exacerbating erosion in the Sand Creek channel.
- E. Erosion has occurred to the extent that channel improvements are required to protect the channel, Platte Avenue Bridge, utilities and adjacent property.
- F. The parties to this MOU wish to cooperate, plan for and implement measures that will provide relief from the channel instability and mitigate future erosion and damages to all parties.
- G. To that end, the City intends to apply for a FEMA PDM Grant. That Grant and this MOU will establish a more comprehensive, integrated response to the streambed and channel instability within the reach of Sand Creek.
- H. Cloud agrees that property conveyed to the City to comply with the terms of this MOU, are being conveyed to satisfy the requirements of the FEMA PDM Grant.

TERMS:

- A. The FEMA Pre-Disaster Mitigation Grant application is for the reach of Sand Creek from the Platte Avenue Bridge to the confluence with the west fork of Sand Creek. The goals and objectives of the Project are to:
 - Protect property including adjoining properties.
 - Protect the Platte Avenue Bridge and critical utilities including 911/FAA and United States Air Force communication lines.
 - Provide Sand Creek stream bank and channel bottom stability within this reach that provides continuity to the recent emergency repairs at just south of the Platte Avenue Bridge.
 - Provide a maintenance trail along this creek segment that can dually serve as a regional trail connection.

The proposed design and construction activities will include the construction of drop structures, grade control structures, channel bank riprap lining, extension of existing storm sewer outfalls to

the creek and side slope stabilization. The reach length of this project is approximately 2,800 linear feet.

- B. The proposed project total is an estimated \$4,000,000.00. The FEMA PDM Grant maximum contribution is \$3,000,000.00. This property donation will constitute an estimated \$601,037.67 of the required local share matching funds of \$1,000,000.00 and will be adjusted based on the appraisal of the Donation Property, defined below. The City of Colorado Springs will be responsible for the remaining Project costs of \$464,023.33.
- C. Cloud agrees to convey the property to the City as defined in this MOU in consideration for the City releasing Cloud from their responsibility for drainage improvements required in the Sand Creek basin planning study and to satisfy the requirements of the FEMA PDM Grant, and other good and valuable consideration with no monetary exchange. Cloud agrees that property conveyed to the City to comply with the terms of this MOU, are being conveyed to satisfy the requirements of the FEMA PDM Grant and will not receive monetary compensation from the City for the property conveyance.
- D. Cloud desires and agrees to dedicate the portion of land as conceptually shown in **Exhibit 1** (the "Donation Property") – **Proposed Acquisition Area**. This dedication removes Cloud land from the Sand Creek improvement project area. The Donation Property and the new property line created by the MOU will be determined with the final design for the Project and as acceptable to Cloud.
- E. The City will bear the costs for reconfiguring a new property line boundary, appraisal and recording costs and constructing the Project drainage improvements. The City will provide a copy of the appraisal to Cloud promptly following its completion.
- F. The City will manage and direct the design of the improvements to Sand Creek. The City shall include Cloud during the design process and input shall be solicited during all phases of design.
- G. Cloud agrees to provide clean suitable fill for the areas where the channel will narrow. No specific gradation of fill material shall be required. However, the fill material shall be free of any construction debris, rubble or large boulders. The City shall provide the geotechnical sampling of the material to determine the compaction requirements for the Contractor.
- H. Cloud agrees to provide temporary construction easements for the Project at no cost to the City. The City agrees to provide the easement documents and restore any construction disturbances in the temporary easements. The temporary construction easements will be determined with the final design for the Project.
- I. The City agrees that the Time Delay for Installation of Public Improvements Agreement Recorded in Book 5892 Page 125 dated October 2, 1991, and all associated letters of credit will be released should the City receive the FEMA PDM Grant.
- J. This MOU shall become null and void should the City not receive the FEMA PDM Grant on or before December 31, 2012.
- K. This MOU shall become effective after final execution by all parties.
- L. Notwithstanding any other provision contained in this MOU, the donation of the Donation Property will only occur at such time as the City has been awarded the FEMA PDM Grant. Cloud will convey the Donation Property to the City by a Special Warranty Deed in its "AS IS" condition. The City will obtain title insurance and a title commitment at the City's sole cost and expense and will provide a copy of the commitment to Cloud when available.

GENERAL CONDITIONS:

- A. Amendments: This MOU may be amended to include other agencies or businesses having interest and responsibilities in this project or activities relating to or responding to this project. Any amendments must be in writing and signed by all parties to the MOU.
- B. Assignment: No party may assign or otherwise transfer this MOU or any right or obligation hereunder without the prior written consent of the other parties.
- C. LAW: This MOU is subject to and shall be interpreted under the law of the State of Colorado, and the Charter, City Code, ordinances, rules and regulations of the City of Colorado Springs, Colorado, a home rule City and Colorado municipal corporation. Court Jurisdiction shall exclusively be in the District Court for El Paso County and the United States District Court, District of Colorado. The parties shall insure that they and their employees, agents, and officers are familiar with, and comply with, applicable federal, state, and local laws and regulations as now written or later amended.
- D. APPROPRIATION OF FUNDS: In accord with the City Charter, performance of the City's obligations and the PPRTA under this MOU is expressly subject to appropriation of funds by the City Council and PPRTA. Further, in the event that funds are not appropriated in whole or in part sufficient for performance of the City's obligations under this MOU, or appropriated funds may not be expended due to City Charter spending limitations, then the City may terminate this MOU.

CLOUD FAMILY PARTNERSHIP, LLLP

A Colorado limited liability limited partnership

By: *Randall L. Cloud*
Randall L. Cloud

Date: 12-1-11

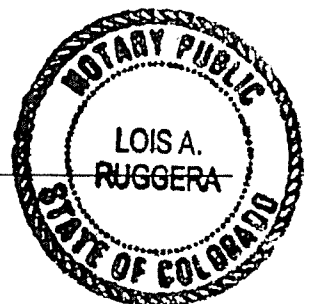
Title: General Partner

State of Colorado)
County of El Paso) ss.

The foregoing instrument was acknowledged before me this 1st day of December, 2011, by Randall L. Cloud as General Partner for the Cloud Family Partnership, a Colorado limited liability limited partnership.

Witness my hand and official seal

My commission Expires: Aug. 29, 2014 *Lois A. Ruggera*
Notary Public



CITY OF COLORADO SPRINGS, COLORADO, A HOME RULE CITY AND COLORADO MUNICIPAL CORPORATION

By: Mike Chaves
Mike Chaves, Acting City Engineer

Date: 12/1/2011

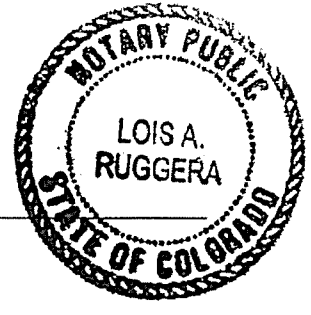
State of Colorado)
County of El Paso) ss.

The foregoing instrument was acknowledged before me this 1st day of December, 2011, by Mike Chaves as Acting City Engineer for the City of Colorado Springs, Colorado, a home rule city and Colorado municipal corporation.

Witness my hand and official seal

My commission Expires: Aug. 29, 2014

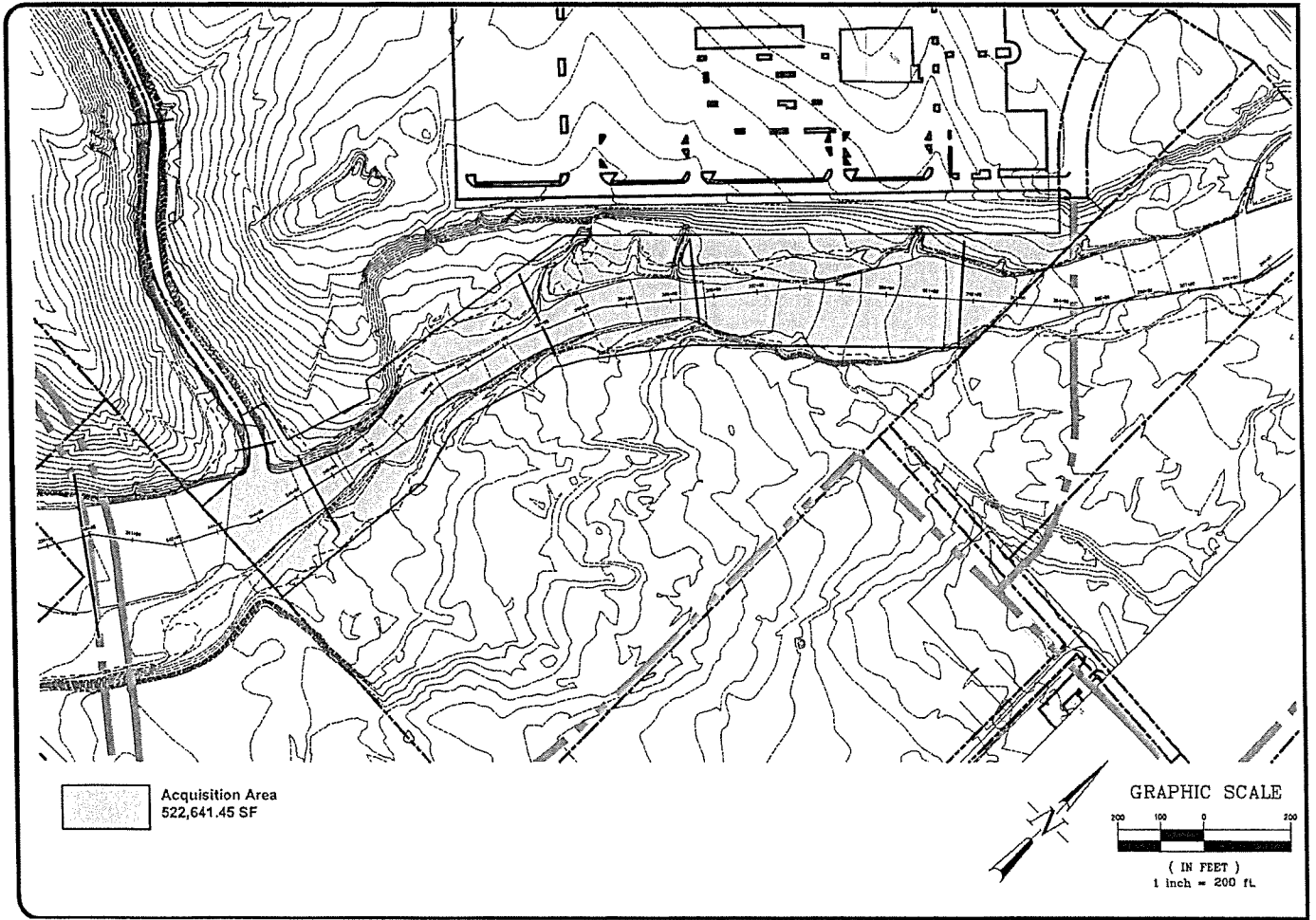
Lois A. Ruggera
Notary Public



Approved as to form:

By: Wynetta Massey
Wynetta Massey, Deputy City Attorney-Municipal

Date: 12-1-2011



PREPARED BY
ADP
 TOWNE EAST MDDP
 CLOUD SUB. FIL. NO. 1
 COLORADO SPRINGS, CO

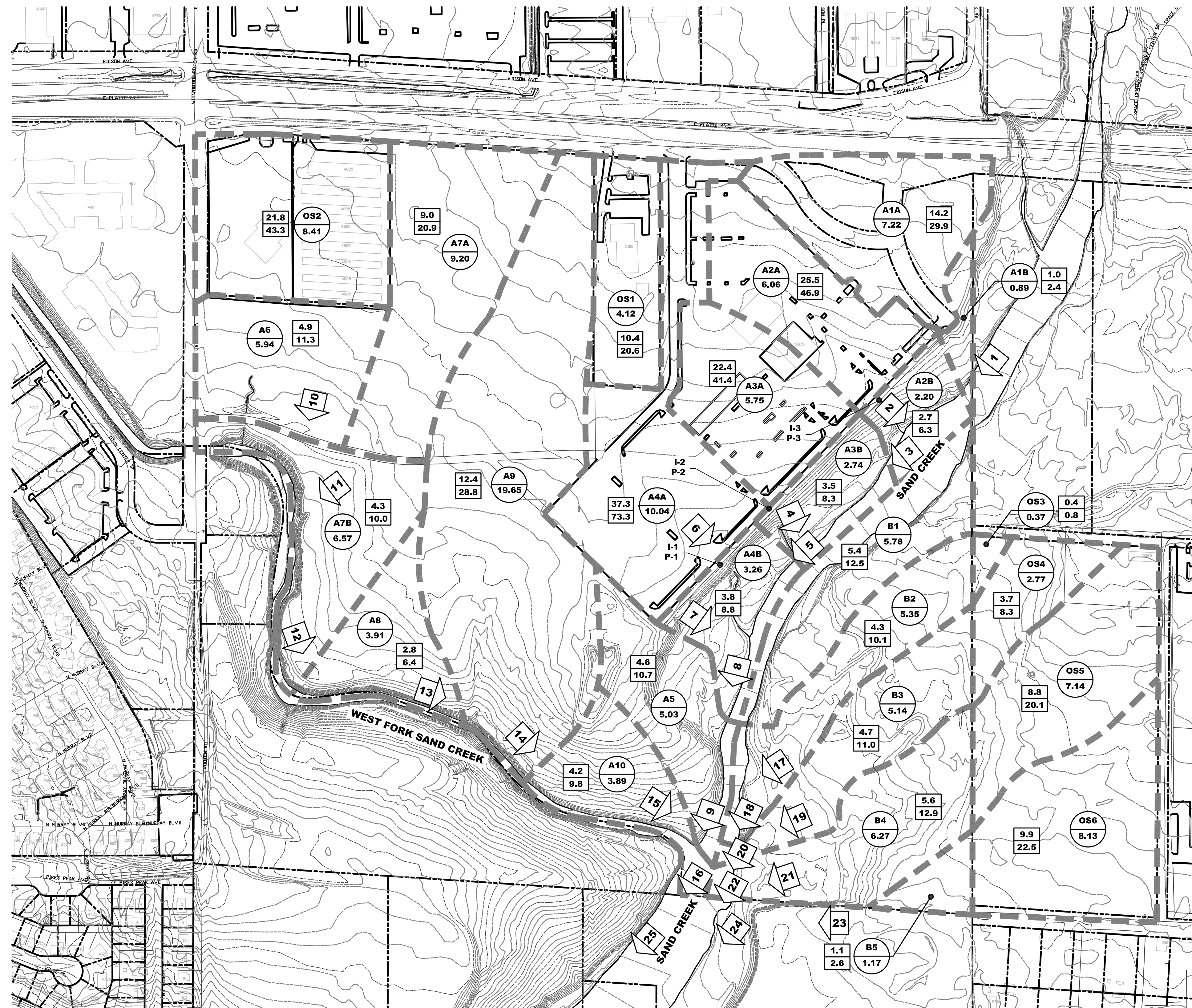
CHECKED BY
 DATE
 DRAWN BY
 DATE
 PROJECT MANAGER
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 PROJECT MANAGER
 DATE
 PROJECT MANAGER
 DATE

SHEET
 1

DRAINAGE DATA		
DESIGN POINT	Q5 (CFS)	Q100 (CFS)
DP1	14.7	31.2
DP2	20.8	39.4
DP3	35.0	69.4
DP4	25.8	49.3
DP5	52.8	103.4
DP6	35.1	69.2
DP7	36.2	72.3
DP8	82.5	162.9
DP9	86.9	173.2
DP10	20.0	41.3
DP11	10.3	23.9
DP12	24.8	53.8
DP13	26.3	57.5
DP14	40.2	89.5
DP15	40.9	91.5
DP16	100.5	210.2
DP17	4.6	10.7
DP18	4.6	10.8
DP19	7.1	16.5
DP20	11.7	27.1
DP21	12.4	28.6
DP22	23.8	54.9
DP23	10.3	23.7
DP24	33.3	76.8
DP25	126.9	271.0

INLET TABLE	
I-1	30" D10R
I-2	20" D10R
I-3	20" D10R

RCP PIPE TABLE	
DESIGNATION	SIZE
P-1	36"
P-2	30"
P-3	30"



LEGEND

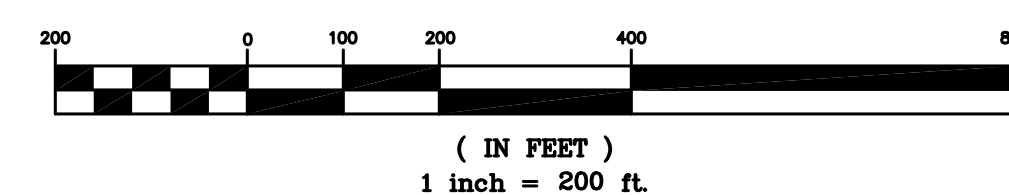
- BASIN DESIGNATION
- BASIN AREA, ACRES
- 5 YEAR STORM, CFS
- 100 YEAR STORM, CFS

DESIGN POINT

BASIN BOUNDARY



GRAPHIC SCALE



DESIGNED BY: MAB
 PROJECT ENGINEER: MAB
 PROJECT MANAGER: MAB
 DATE: 3/12/12
 JOB NO.: 080701
 CAD FILE NO.: DRAINAGE.dwg
 DRAWN BY: SMH
 SCALE: 1"=200'
 HORIZ.: 1/2"=100'
 VERT.: 1/4"=10'

PREPARED BY:



3620 Austin Bluffs Parkway
 Suite 200
 Colorado Springs, CO 80918
 (719) 586-5312
 fax: (719) 586-5341

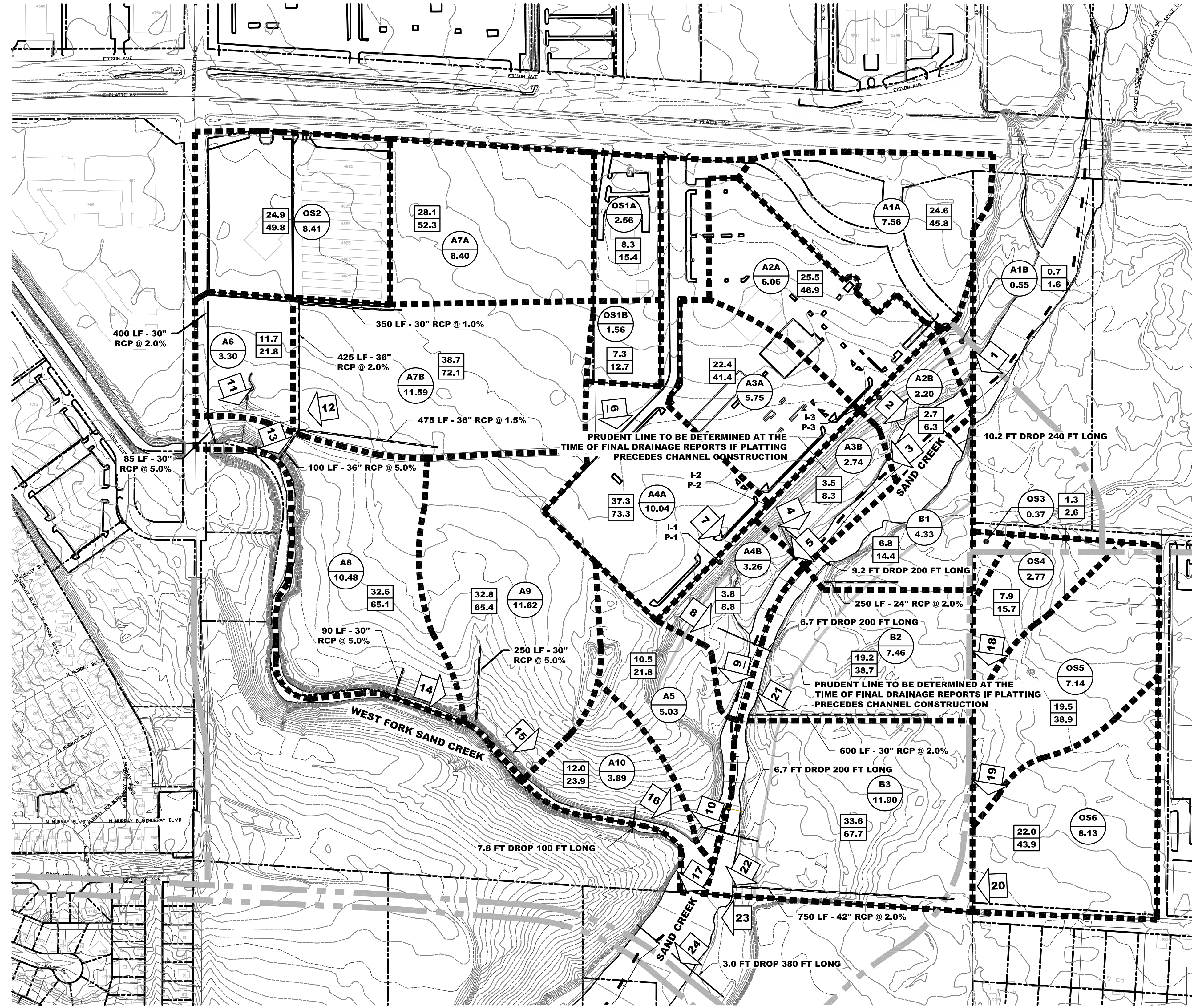
NO.	DATE	REVISION	BY

MASTER DEVELOPMENT DRAINAGE PLAN
CLOUD FAMILY PARTNERSHIP PROPERTY
CITY OF COLORADO SPRINGS, COLORADO
EXISTING DRAINAGE CONDITIONS

DRAINAGE DATA		
DESIGN POINT	Q5 (CFS)	Q100 (CFS)
DP1	24.4	45.8
DP2	24.8	47.2
DP3	47.6	89.7
DP4	25.8	49.3
DP5	67.4	127.6
DP6	13.2	24.0
DP7	38.4	73.7
DP8	39.3	76.7
DP9	91.8	176.2
DP10	100.1	193.2
DP11	34.4	67.4
DP12	62.4	116.2
DP13	96.1	182.3
DP14	123.7	237.6
DP15	150.3	291.1
DP16	147.6	286.4
DP17	226.1	437.7
DP18	8.9	17.8
DP19	45.6	91.0
DP20	48.0	95.8
DP21	23.7	48.3
DP22	50.3	101.8
DP23	96.5	194.1
DP24	312.6	611.7

INLET TABLE		
I-1	30" D10R	EXISTING
I-2	20" D10R	EXISTING
I-3	20" D10R	EXISTING

HDPE PIPE TABLE		
DESIGNATION	SIZE	STATUS
P-1	36"	EXISTING
P-2	30"	EXISTING
P-3	30"	EXISTING

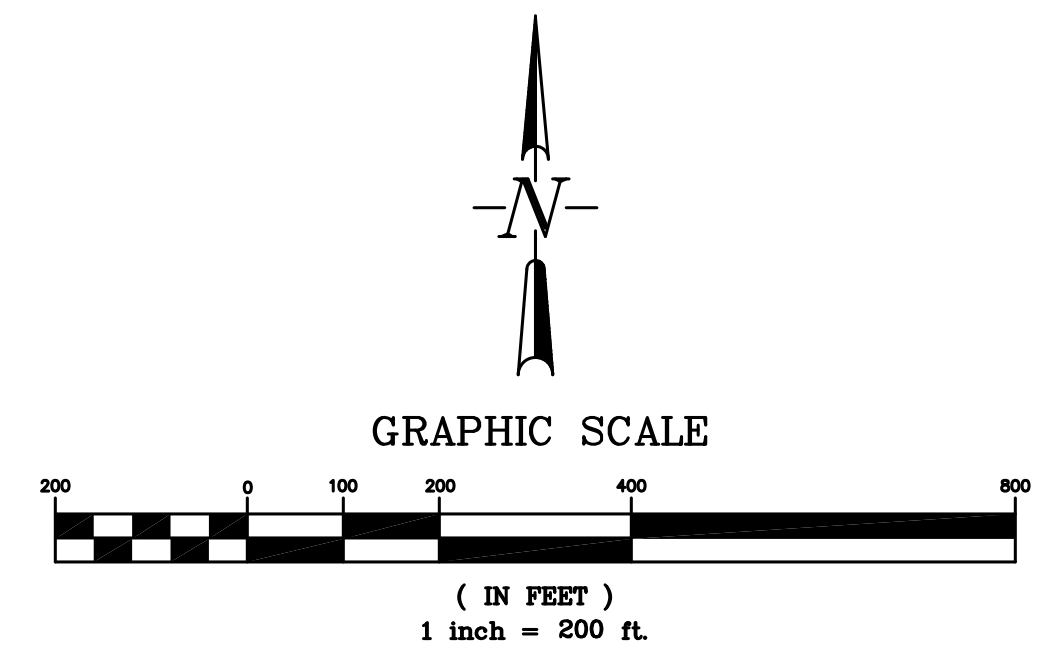


LEGEND

- BASIN DESIGNATION
- BASIN AREA, ACRES
- 5 YEAR STORM, CFS
- 100 YEAR STORM, CFS

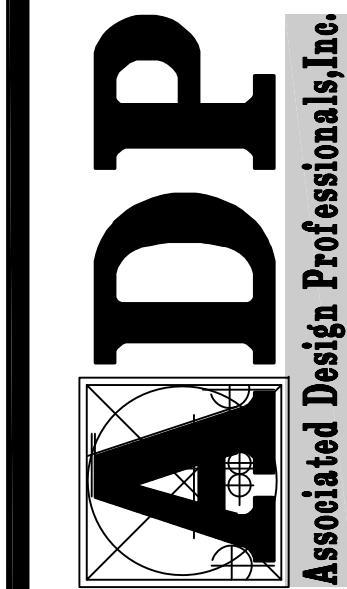
DESIGN POINT

- BASIN BOUNDARY
- FUTURE ROAD



DESIGNED BY: MAB
PROJECT ENGINEER: MAB
JOB NO.: 080701
DATE: 3/12/12
PROJECT MANAGER: MAB
CAD FILE NO.: DRAINAGE.dwg
DRAWN BY: SMH
SCALE: 1"=200'
HORIZ.: 1/2"
VERT.: 1/4"

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MASTER DEVELOPMENT DRAINAGE PLAN
CLOUD FAMILY PARTNERSHIP PROPERTY
CITY OF COLORADO SPRINGS, COLORADO
DEVELOPED DRAINAGE CONDITIONS

SHEET

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