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MASTER DEVELOPMENT DRAINAGE REPORT (M.D.D.P.) AND PRELIMINARY/FINAL DRAINAGE REPORT FOR THE FALCON SCHOOL DISTRICT ANNEXATION COLORADO SPRINGS, COLORADO

APRIL 2004
REVISED OCTOBER 2005
REVISED AUGUST 2007

Prepared For:

FALCON SCHOOL DISTRICT NO. 49
10850 Woodmen Road
Falcon, Colorado
(719) 495-1004

Prepared By:

TERRA NOVA ENGINEERING, INC.
815 S. 25TH Street
Colorado Springs, CO 80904
(719) 635-6422

Job No. 0404.00

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REQUIRED MAPS AND DRAWINGS

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 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.

LDRubey 7/8/7

Name

Seal

COLORADO REGISTERED LUANNE D RUBEY 32339 PROFESSIONAL ENGINEER

Developer's Statement:

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

FALCON SCHOOL DISTRICT NO. 49

Business Name

By: HENRY REITWIESNER

Title: DIR of PLANG & CONSTR.

Address: 10850 Woodmen Road Falcon, CO 80831

10 AUG '07

City of Colorado Springs Approval:

Filed in accordance with Section 7-7-906 of the Code of the City of Colorado Springs, 2001, as amended.

for City Engineer

Date 8/21/07

Conditions

MASTER DEVELOPMENT DRAINAGE REPORT (M.D.D.P.) AND PRELIMINARY/FINAL DRAINAGE REPORT FOR THE FALCON SCHOOL DISTRICT ANNEXATION COLORADO SPRINGS, COLORADO

PURPOSE

The purpose of this drainage report is to identify and analyze the proposed drainage patterns, determine proposed runoff quantities, size drainage structures for conveyance of developed runoff, and present solutions to drainage impacts on-site and off-site resulting from this development.

GENERAL DESCRIPTION

This Master Development Drainage Plan (M.D.D.P.) and Preliminary Drainage Report covers the area shown on the Falcon School District Annexation plan as submitted to the City of Colorado Springs for annexation to the City. The entire site being 55.56 acres and a portion of the North Half of the Southeast Quarter of Section 7, Township 13 South, Range 65 West of the 6th Principal Meridian currently within unincorporated El Paso County, Colorado. The development of this site consists of a high school including parking, a building, play fields, a football stadium and portable classrooms. In addition, the extension of Black Forest Road (a major arterial roadway) along the easterly boundary, and the extension of another public roadway (a major collector) along the northerly boundary are anticipated. The entire site is bounded to the north by the Horseshoe Rancheros residential subdivision, to the west by unplatted county land, to the east by the Horseshoe Rancheros residential subdivision, and to the south by the Horseshoe Rancheros residential subdivision and the Greenhaven Filing No. 1 and No. 2 residential subdivision.

The site is contained within the Sand Creek Basin. Flows from this site are tributary to Sand Creek.

Soils for this project are delineated by the map in the appendix as Blakeland loamy sand (8). Soils in the study area are shown as mapped by S.C.S. in the "Soils Survey of El Paso County Area" and are primarily of Hydrologic Group A. The study area is consists of undeveloped land with existing natural, grassy vegetation. The existing topography is sloping from the northwest to the southeast with an average slope of 7%.

EXISTING DRAINAGE CONDITIONS

This site was most recently studied in the "Master Development Drainage Plan Amendment No. II for the Easterly Portion of Ridgeview Subdivision and Preliminary Drainage Report for the Northeasterly Portion of Ridgeview Subdivision and Phase II Sand Creek Channel Improvements." (MDDP Amend II) by JR Engineering, dated February 2004. Overland flow from on site and offsite is tributary to existing natural swales that currently cross the site from the northwest to the southeast. These swales currently discharge into a man made swale located at the south edge of the site. This man made swale is approximately 6' deep and 1400' long and parallels the south boundary of the proposed site. This swale was constructed as part of the Greenhaven Filing No. 1 residential subdivision to the south. At the time of writing this report, this swale has been constructed and flows from west to east along the south side of the school site. At the east end of the swale, an existing 66" pipe with a headwall captures the flow. This pipe was designed in the report entitled "Final Drainage Report for The Black Forest Road Portion of Greenhaven Filing No. 1, a Portion of Dublin Boulevard and Final Design/ Analysis Report for Black Forest Storm Drain", by JR Engineering, March 10, 2004. This pipe will convey flows from the site to the south in a storm sewer within Black Forest Road and discharge into Sand Creek.

PROPOSED DRAINAGE CONDITIONS

In the MDDP Amend II, the Falcon High School site was part of proposed Basins 145-2, 145-3, 145-4, and 146-1. The Falcon High School site was studied as a developed property and therefore all downstream facilities were sized for developed flows and no on site detention was required. However, in compliance with the City of Colorado Springs requirements, the site will have an onsite sand filter basin. This water quality feature will be located in the south east corner of the site just south of the parking area. This water quality feature will work as an extended basin using rip rap berms. In addition to the water quality basin, shallow overland grass swales will be used to direct runoff to the low points in the areas of the playing fields. These shallow swales will use the methods of sedimentation, filtering, biological uptake, and straining as discussed in the "Urban Storm Drainage Criteria Manual, Volume 3. Developed flows from the subject site will drain to the south east via proposed on site storm sewer and connect to the existing swale on the south side of the site. Once these flows are routed through the water quality features they will be conveyed by the existing swale to the proposed storm sewer in Black Forest Road. Offsite, bypass flows from the west will also be collected in this storm sewer system. Offsite, bypass flows from the north will be intercepted in the proposed storm sewer system in the collector road and conveyed to the proposed storm sewer system in Black Forest Road. These flows will join with runoff from Black Forest Road and be conveyed to the south via storm sewer. These flows will outfall in Sand Creek. All proposed flows will follow the proposed condition flow patterns determined in the MDDP Amend II. Please see the MDDP Amend II Drainage Map in the appendix of this report.

The offsite basins have been calculated using an assumed land use per the MDDP Amend II, if these land uses later change and have an increase in runoff due to a change in impervious area these upstream owners will need to restrict flow to the runoff calculated here in this report and the MDDP Amend II , please see map from this report in the appendix.

The following is a description of the onsite basins, offsite bypass flows and the overall proposed drainage characteristics for the complete build out of the High School Site.

Basin OS-1 (2.83 Ac, Q_5=3.6 cfs and Q_{100}=7.8 cfs), Basin OS-2 (13.97 Ac, Q_5=16.5 cfs and Q_{100}=35.8 cf s), OS-3 (4.07 Ac, Q_5=5 cfs and Q_{100}=11 cf s), Basin OS-4 (18.62 Ac, Q_5=14.8 cfs and Q_{100}=30.7 cfs), Basin OS-11 (4.13 Ac, Q_5=5.2 cfs and Q_{100}=11.5 cf s) and Basin OS-5 (3.71 Ac, Q_5=3.3 cfs and Q_{100}=8.0 cf s) lie to the west of the proposed high school. These basins flow to on-site basin A (25.88 Ac, Q_5=18.2 cfs and Q_{100}=41.6 cf) at Design Points 3, 7, and 9. Basin A lies in the west portion of the site and will contain future soccer and baseball fields. On-site flows outfall to Basin A at DP91 and DP 70a. These combined flows will be outfall through an existing 66" storm sewer and outfall to the existing 66" storm sewer in Black Forest Road at DP71 (Q_5=92 cfs and Q_{100}=182 cf). See the drainage map in the appendix for routing and the subsequent paragraphs for discussion on Design Points that outfall to Basin A.

Proposed Basins A1-A40 (with the exception of A-33) includes the proposed track and surrounding property draining to the track's private 8"-18" field drain system. This system contains 5.6 acres and has a highpoint located between Basin A16 and A15. This field drain system outfalls to a 30" storm sewer at DP 67 (Q_5=11 cfs and Q_{100}=21 cfs). See the Proposed Drainage Map in the Appendix.

Flows from Basin C (0.8Ac, Q_5=1.5 cfs and Q_{100}=3.0 cfs) consists of landscaping and the future fire lane. Flows from this basin collect in 2'X2' Firebaugh Inlet at DP 68. Flows are then directed through a 12" storm sewer to the proposed 30" storm at DP 92. See inlet and storm sewer calculations in the appendix.

Drainage from DP54 (Q_5=0.8 cfs and Q_{100}=1.2 cfs) results from basin A-33 is collected in a 2'X2' Firebaugh Inlet and flow through an 8" storm sewer. This drainage combines with runoff from landscaped Basin OO at a 2'X2' Firebaugh Inlet at DP 78 (Q_5=2 cfs and Q_{100}=4 cfs). Flows from this design point are transported via a 15" storm drain to DP 109. At DP109 combined flow from DP79 (Basins S and T, Q_5=1 cfs and Q_{100}=3 cfs) at DP 78 flow through a 18" storm sewer to DP 106.

Flows from DP 108 consist of roof drainage from Basin R (0.19 Ac, Q_5=2.2 cfs and Q_{100}=4.1 cfs). Flows from DP108 combine with flows from DP 107, Basin Q (0.23 Ac, Q_5=1 cfs and Q_{100}=2 cfs) at DP 80 (Q_5=3 cfs and Q_{100}=7 cfs). Drainage from this design point flows to the junction at DP 106 (Q_5=6 cfs and Q_{100}=11 cfs).

Proposed Basin O (0.13 Ac, Q_5=0.6 cfs and Q_{100}=1.1 cfs) is comprised of paved sidewalk and landscaping. Drainage from this basin is collected at a 2'X2' Firebaugh inlet at DP 81. Runoff from DP81 combines with flows from DP 106 at DP 104 (Q_5=6 cfs and Q_{100}=11 cfs).

Flow from Basins N (0.19 Ac, Q5 = 0.9cfs, Q100 = 1.6 cfs) will collect in a roof drain at DP102. Flows from Basin M (0.15 Ac, Q5= 0.7 cfs, Q100 = 1.3 cfs) and Basin K (0.13 Ac, Q5=0.6 cfs, Q100 = 1.1 cfs) result from roof drainage and collect at DP103. DP103 flows through a pipe to DP101 to combine with flows from DP102. These flows outfall to the storm system at DP99. See the Drainage Map in the Appendix.

Roof drainage from Basin H (0.23 Ac, Q_5=1cfs and Q_{100}= 2 cfs) collects at DP 100 and combines with runoff from landscaped and paved Basin D (0.46 Ac, Q_5=1.7 cfs and Q_{100}=3.1 cfs) at DP 98. Flows from Basin D are collected in a 2'X2' Firebaugh inlet at DP 82. Drainage from DP 98 flows via an 18" storm sewer to DP 97 where it combines with flows from DP 99. Total flows at DP 97 are Q_5=11 cfs and Q_{100}=20 cfs.

Proposed Basin PP (1.74 Ac, Q_5=5.7 cfs and Q_{100}=11 cfs) is comprised of paved bus parking and roadway. Flows from this basin outfall to a 6' D-10-R at DP 83. Flows from this design point travel via an 18" storm sewer and combine with DP 97 at DP 96 (Q_5=16 cfs and Q_{100}=29 cfs).

Roof Drainage from Basin F is collected at DP 95 (Q_5=1 cfs and Q_{100}=2 cfs). Design Point 95 flows via a 6" storm drain to DP 94 where it combines with DP 96 flows. The total flow at DP 94 is Q_5=16 cfs and Q_{100}=31 cfs. This flow is directed to DP 93 via a 30"storm sewer. The total flow at DP93 is Q_5=24 cfs and Q_{100}=45 cfs.

Flows collected at DP 93 combine with flows from Design Points 67 and combine with drainage from DP 68 at DP 92 (Q_5= 26 cfs and Q_{100}= 48 cfs). Design point 92 drainage continues to Design Point 91(Q_5=26 cfs and Q_{100}=48 cfs) through a proposed 30" storm sewer. This flow travels via a grass-lined swale to DP71, where it exits the site through and existing storm drain in Black Forest Road. This system has been designed to accommodate school site flows.

Basin E flows (0.2 Ac, Q5=0.8 cfs, Q100= 1.6 cfs) are also comprised of roof drainage and will discharge through a drain to DP85 where they will combine with flows from DP86. Flows from DP85 will discharge to DP84, the sand filter basin. This basin will be designed per City of Colorado Springs Drainage Criteria Manual II Sand Filter Extended Detention Basin and utilize an overflow outlet to transport flows to Design Point 70A. This sand filter basin was designed using the total drainage basin's impervious ratio of 62% and the area draining to this water quality feature is 11.88 acres. The 11.88 acres is comprised of school parking, buildings, landscaping, grass areas and sports fields. Flows from the sand filter basin will discharge at DP70 and flow to the swale on the south side of the property at DP70A. Drainage will continue to DP 71 where it is picked up by the Black Forest Road system.

Proposed Basin I (1.14 Ac, Q_5=4.7 cfs and Q_{100}=9.0 cfs) is located in the north central portion of the site in the future collector road. Basin I receives sheet flow from half of OS-6 and in the ultimate condition, will be collected in two 10' D-10-R at-grade inlets at DP-11. One sump will be located on the south side of the future collector, the other on the north. The other half of the drainage from OS-6 will be collected in a 36" off site and discharge into the north inlet. In the interim condition, flows from DP 10 will continue through on-site Basin QQ (0.77 Ac, Q_5=2.6 cfs and Q_{100}=5.1 cfs) via a grass-lined swale. In the interim these flows will continue through the afore-mentioned swale to two temporary CMP risers labeled DP17 and DP18. These risers have been sized to accommodate flows from DP10, 11, 12, 13, and 14 (Q_5=46 cfs and Q_{100}=100 cfs). The Riser at DP17 will be 4' in diameter, the riser at DP18 will be 3' in diameter. In the interim condition, these risers will be in a sump condition. In the ultimate condition the sump inlets will connect to a 36" trunk main through the future collector north of the site. From DP13, the trunk main will continue and connect to a proposed 48" storm sewer in Black Forest Road. Future storm sewer in the future collector to the north of the school is shown on the proposed Drainage Map in the appendix.

Basin OS-7 (56.05 Ac, Q5=13.9 cfs, Q100= 32.6 cfs) is currently undeveloped and flows on site from the north. Flows from this basin will be captured in the future sump inlet at DP12 and will outfall to the proposed system in Black Forest Road. See the drainage map in the appendix. In the interim, these flows will be carried in a swale along the north side of the site to the riser at DP17.

Basin SS (0.86, Q5 = 2.4 cfs, Q100= 4.7 cfs) will consist of landscaping and Black Forest Road. In the interim condition, this basin will flow to DP 17 and DP18. In the ultimate condition, this drainage will be collected in a 20' at-grade inlet at DP19a. See the Drainage Map in the Appendix.

Flows from offsite basin OS-8 (2.47 Ac, Q5 = 8.3 cfs Q100 = 15.6cfs) are currently undeveloped flows but in the future will be comprised of flows from the future extension of Black Forest Road. Bypass flows will be collected at DP17 in the interim and will flow to DP 19A in the ultimate condition.

Drainage from Basin Y (0.59 Ac, Q_5=2.4 cfs and Q_{100}=4.6 cfs) and by-pass flows from DP19A (Q_5=1 cfs and Q_{100}=3 cfs) will be collected in a proposed 20' at-grade inlet at DP19. Flows from this inlet will also be directed to the proposed 48" storm sewer in Black Forest Road. Bypass Flows from this inlet will combine with drainage from Basin LL (0.83 Ac, Q_5=3.5 cfs and Q_{100}=6.7 cfs) and be directed to the proposed 48" storm sewer. Design point 23, including flows from Basin II (0.1 Ac, Q5 =0.4 cfs, Q100 =0.7 cfs) will outfall to the existing portion of Black Forest Road with a total flow of(Q_5=2 cfs and Q_{100}=6 cfs). These flows will be picked up by existing inlets on Black Forest Road. These inlets have been sized to accommodate these flows. Please reference the Final Drainage Report for Black Forest Road.

In the interim condition, flows from the east side of the proposed Black Forest Road improvements will discharge to the west side of the road. In the ultimate condition, a 20' at-grade inlet will be placed at DP-15 to pick up flows from Basin OS-9 (4.31 Ac, Q_5=5.0 cfs and Q_{100}=9.0 cfs). Bypass flows from this inlet will combine with drainage from Basin TT (0.6 Ac., Q_5=2.4 cfs and Q_{100}=4.7 cfs) and Basin OS-12 (0.27 Ac, Q_5=0.34 cfs and Q_{100}=0.9 cfs) will be directed to a 10' inlet at DP16. Basin MM drainage (0.48 Ac, Q_5=3.9 cfs and Q_{100}=7.0 cfs) will combine with bypass flows from DP16 (Q_5=2 cfs and Q_{100}=4 cfs) at a 10' at-grade inlet at DP20. Flows collected at the proposed 20' at-grade inlet at DP22 (Q_5=5 cfs and Q_{100}=11 cfs), including flows from Basin KK, will be transported to the proposed 48" storm sewer in Black Forest Road. Bypass flow from this inlet will combine with drainage from Basin JJ for a total discharge of Q_5=2 cfs and Q_{100}=6 cfs at DP 24 to the existing portion of Black Forest Road. The downstream inlets are sized to accommodate these additional flows as existing flows at these design points are Q5 = 149 CFS and Q 100 = 279 CFS per the MDDP Amend II Map in the Appendix (See Basin 146-1).

On-site flows from Basin CC (1.54 Ac, Q_5=6.2 cfs and Q_{100}=12 cfs) consists mainly of paved parking and will be intercepted at a 6' Sump Inlet at DP84A. Flows from proposed Basin BB (2.50 Ac, Q_5=10 cfs and Q_{100}=19.4 cfs) will be collected in a 14' Sump at DP85.

Basin AA (0.62 Ac, Q_5=2.2 cfs and Q_{100}=4.1 cfs) flows are intercepted at 5'X10' D-9 inlet at DP75. From DP75, collected drainage combines with drainage from DP 76 at DP90A (Q_5=9 cfs and Q_{100}=17 cfs). Flows from DP 85A will combine with flows from DP90A at DP 89 (Q_5=16 cfs and Q_{100}=29 cfs). Flows at DP 76 (Q_5=6 cfs and Q_{100}=12. cfs) result from roof drainage of basins X and W as well as landscaping in basins FF and EE.

Drainage at DP89 is conveyed via a 24" storm sewer to DP 88 where drainage will combine with flows from Basin U for a total flow of Q_5=16 cfs and Q_{100}=30 cfs. Flow to DP88A (Q_5=3 cfs and Q_{100}=5 cfs) results from landscaped area Z (1.91 Ac). Flows at DP88A are collected by a 2'X2' Firebaugh inlet and flow via an 18" storm sewer where they combine with flows from DP88 at DP88B (Q_5=17 cfs and Q_{100}=31 cfs).

Basin RR (0.39 Ac, Q_5=1.6 cfs and Q_{100}=3.0 cfs) is comprised of mostly roadway. Drainage from this basin is collected at a proposed 4' D-10-R inlet at DP74. Flows will be conveyed via a 15" storm sewer to DP73 and combine with flows from Basin GG (0.41 Ac, Q_5=1.7 cfs and Q_{100}=3.1 cfs) at a 4' D-10 R inlet. The combined drainage at DP73 (Q_5=4 cfs and Q_{100}=7 cfs) flow via a 24"storm sewer where they combine with flows from DP 88B at DP87 (Q_5=17 cfs and Q_{100}=33 cfs). At DP 86 (Q_5=18 cfs and Q_{100}=34 cfs) flows from DP87 and Basin G combine. This drainage continues through a 36" storm sewer and discharges to a sand filter extended detention basin at DP 84.

Drainage from Basin HH (2.94 Ac, Q_5=8 cfs and Q_{100}=14.6 cfs) and roof drainage from basins P, L and J is collected at DP 72 (Q_5=10 cfs and Q_{100}=17 cfs) in a 6' sump inlet and transported to the above-mentioned sand filter extended detention basin, DP 84, via a 24" storm sewer. Flows from this sand filter basin are discharged via a 36" storm sewer to DP 70A (Q_5=31 cfs and Q_{100}=56 cfs).

At Design Point 71 the entrance to the existing 66" RCP the combined flow from DP 91 and 70A is Q_5=92 cfs and Q_{100}=182 cfs. The runoff is collected in the pipe and directed south as per the MDDP Amend II. This runoff is far less then what was accounted for in the MDDP Amend II at Design Point N-1A (Q_5=136 cfs and Q_{100}=247 cfs), this is due to the fact that the Major Collector on the north side of the site and the Black Forest Road on the east side of the site will route some of the flow in a storm drain system through Black Forest Road. The proposed Major Collector and the continuation of Black Forest Road is planned to be built based on triggers from annexation. All proposed storm facilities in the public roads will also be built with the continuation of Black Forest Road and the Major Collector.

At Design Point 24A the combined flow (Q_5=146 cfs and Q_{100}=292 cfs) from Pipe Run 109A (DP 22a) and Design Point 71 are combined in the existing 78" RCP designed with the "Final Drainage Report for The Black Forest Road Portion of Greenhaven Filing No. 1, a Portion of Dublin Boul evard and Final Design/ Analysis Report for Black Forest Storm Drain." This compares below the flows of Q_5=290 cfs and Q_{100}=537 cfs shown at this point in the MDDP Amend II and the Black Forest Road Final Drainage Report.

DRAINAGE MAINTENANCE

All drainage facilities on school property will be maintained by the school including the south swale and sand filter basin. All facilities within the future Collector and Black Forest Road are public and will be maintained by the City of Colorado Springs.

HYDROLOGIC CALCULATIONS

Hydrologic calculations were performed using the El Paso County and City of Colorado Springs Storm Drainage Design Criteria manual. The Rational Method was used to estimate storm water runoff anticipated from design storms with 5-year and 100-year recurrence intervals.

HYDRAULIC CALCULATIONS

Hydraulic calculations were estimated using the Manning's Formula and the methods described in the El Paso County and City of Colorado Springs Storm Drainage Design Criteria manual the pertinent data sheets are included in the appendix of this report.

FLOODPLAIN STATEMENT

No portion of this site is within a designated F.E.M.A. floodplain, as determined by Flood Insurance Rate Map No. 08041C0537 F dated March 17, 1997 (see appendix).

EROSION CONTROL

It is the policy of the City of Colorado Springs that we submit an erosion control plan with the drainage report. At this time we respectfully request that the erosion control plan be submitted in conjunction with the final grading plan. Proposed straw bale check dams, silt fence, vehicle traffic control, and reseeding are proposed as erosion control measures.

CONSTRUCTION COST OPINION

Public Drainage Facilities Reimbursable

(Within Right of Way of Collector and Black Forest Rd.)

Item	Description	Quantity	Unit Cost	Cost
1.	48" RCP	1185 LF	$ 85/LF	$ 100,725.00
2.	66" RCP	65 LF	$100/LF	$ 6,500.00
3.	STORM BEND	2 EA	$1,225/EA	$ 2500.00
4.	48" X 36" WYE	1 EA	$ 1,800/EA	$ 1800.00
5.	48" X 18" WYE	4 EA	$ 1,500/EA	$ 6,000.00
6.	66"X18" WYE	1 EA	$ 1,600/EA	$ 1,600.00
8.	66"X36" WYE	1 EA	$ 2,750/EA	$ 2,750.00
9.	36"X 36"X 48" WYE	1 EA	$1800/EA	$ 1,800.00
10.	48"X66" REDUCER	1 EA	$2000/EA	$ 2,000.00
11.	6' DIA MH	2 EA	$8,000/EA	$ 16,000.00
			SubTotal:	$ 141,675.00
			15% Engineering Contingency:	$ 21,251.25
			Total:	**$ 162,926.25**

The school should amass a Credit for Reimbursable Public Drainage Facilities of $162,926.25.

Public Drainage Facilities Non-reimbursable

(Within Right of Way of Collector and Black Forest Road)

Item	Description	Quantity	Unit Cost	Cost
1.	36" CMP Pipe	130 LF	$ 45/LF	$ 5,850.00
2.	48" CMP Pipe	65 LF	$ 58/LF	$ 3,770.00
3.	36" CMP Bend	2 EA	$ 1500	$ 3,000.00
4.	48" CMP Bend	1 EA	$ 1,100/EA	$ 1,100.00
5.	10' D-10-R Inlet	8 EA	$ 6,500/EA	$ 52,000.00
6.	18' D-10-R Inlet	1 EA	$ 7,200/EA	$ 7,200.00

7.	20' D-10-R Inlet	5 EA	$ 7,560/EA	$ 37,800.00
8.	36" RCP Pipe	1175 LF	$ 75/LF	$ 88,125.00
9.	18" RCP Pipe	260 LF	$ 45/LF	$ 11,700.00
10.	36" X36" WYE	1 EA	$ 1750/EA	$ 1,750.00
11.	36" X18" WYE	1 EA	$ 1500/EA	$ 1,500.00
11.	STORM BEND	9 EA	$ 1,200/EA	$ 10,800.00
12.	5' DIA MH	1 EA	$ 6,000/EA	$ 6,000.00
			SubTotal:	$ 230,595.00
			15% Engineering Contingency:	$ 34,589.25
			Total:	**$ 265,184.25**

Private Drainage Facilities Non-reimbursable

(On Site School Annexation Area)

Item	**Description**	**Quantity**	**Unit Cost**	**Cost**
1.	18" RCP Pipe	980 LF	$ 45/LF	$ 44,100.00
2.	24" RCP Pipe	1853 LF	$ 58/LF	$ 105,734.00
3.	30" RCP Pipe	645 LF	$ 74/LF	$ 47,730.00
4.	36" RCP Pipe	370 LF	$ 75/LF	$ 27,750.00
5.	15" RCP Pipe	775 LF	$ 40/LF	$ 31,100.00
6.	12" RCP Pipe	535 LF	$ 35/LF	$ 18,725.00
7.	10" RCP Pipe	200 LF	$ 32/LF	$ 6,400.00
8.	6" PVC Pipe	1225	$28/LF	$ 34,300.00
9.	30" F.E.S	1	$1,100/EA	$ 1,100.00
10.	36" F.E.S	1	$1,400/EA	$ 1,400.00
11.	24" F.E.S	2	$1,000/EA	$ 2,000.00
12.	STORM BEND	46	$1,200/EA	$ 55,200.00
13.	W.Y.E.	46	$ 2200/EA	$ 101,200.00
14.	2'x2' Firebaugh Inlet	20	$ 2300/EA	$ 46,000.00
15.	2.5'X5' D-9 Inlet	2	$ 4000/EA	$ 8,000.00
16.	5 X 10 D-9 INLET	2	$ 6200/EA	$ 12,400.00
17.	4' D-10-R Inlet	2	$4,200/EA	$ 8,400.00

13.	6' D10-R inlet	2	$ 4,600/EA	$ 9,200.00
14.	10' D10-R inlet	1	$ 6,500/EA	$ 6,500.00
15.	14' D10-R inlet	1	$ 8,800/EA	$ 8,800.00
16.	Type 1 MH	5	$ 3,800/EA	$ 19,000.00
17.	WQ Basins	1	$ 10,000/EA	$ 10,000.00
			Subtotal:	$ 605,039.00
			15% Engineer's Contigency:	$ 90,755.85
			TOTAL:	**$ 695,794.85**

DRAINAGE FEES

The existing site is in the Sand Creek Basin. 2007 Drainage fees due on the final plat for the Falcon School District Annexation fees are as follows:

DRAINAGE FEES:	55.557 acres	x	$14,979.00	=	$ 832,188.30
BRIDGE FEES:	55.557 acres	x	$ 562.00	=	$ 31,223.03
POND FEES:					
LAND :	55.557 acres	x	$ 1,070.00	=	$ 59,445.99
FACILITIES:	55.557 acres	x	$2,717.00	=	$ 150,948.37
SURCHARGE:	55.557 acres	x	$ 985.00	=	$ 54,723.65
					TOTAL $ 1,128,529.34

SUMMARY

The Sand Creek DBPS did not anticipate the extension of Black Forest Road and had this area called out as "ranchette", however, the DBPS was superseded by "Master Development Drainage Plan Amendmnet No. II For The Easterly Portion Of Ridgeview Subdivision And Preliminary Drainage Report For The Northeasterly Portion Of Ridgeview Subdivision And Phase II Sand Creek Channel Improvements." Prepared by JR Engineering, February 2004. Downstream facilities have been sized to include flows from this site per this report. We request that drainage facilities within Black Forest Road and the School Collector be reimbursable improvements. Development of this site will not adversely affect the surrounding development. Proposed flows, as detailed in this report, will follow the drainage patterns outlined in this report and will be conveyed overland to the east where they will outfall as shown on the approved MDDP Amend II. Although there is an increase in the runoff it was anticipated in the MDDP and will be designed for in the outfall facilities which are to be installed by others. Care will be taken to accommodate overland emergency flow routes on site and temporary drainage conditions caused by the partial extension of Black Forest Road.

PREPARED BY:
TERRA NOVA ENGINEERING, INC.

Maggie R. S. Easton, P.E.
Senior Project Engineer
Jobs/0567.00/word/mddppdr7-rev

BIBLIOGRAPHY

"El Paso County and City of Colorado Springs Drainage Criteria Manual"

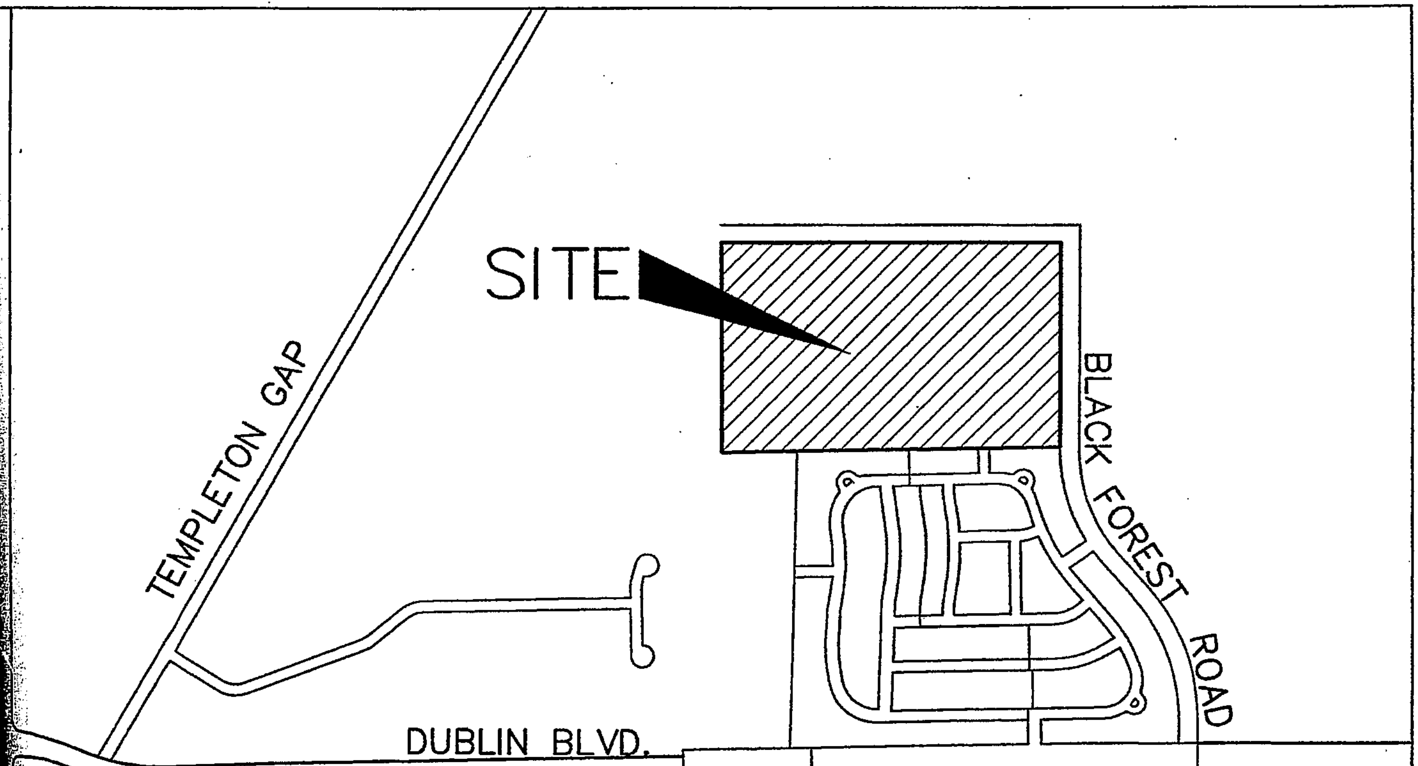
SCS Soils Map for El Paso County

"Master Development Drainage Plan Amendmnet No. II For The Easterly Portion Of Ridgeview Subdivision And Preliminary Drainage Report For The Northeasterly Portion Of Ridgeview Subdivision And Phase II Sand Creek Channel Improvements." Prepared by JR Engineering, February 2004.

"Final Drainage Report for The Black Forest Road Portion of Greenhaven Filing No. 1, a Portion of Dublin Boulevard and Final Design/ Analysis Report for Black Forest Storm Drain", by JR Engineering, March 10, 2004.

"Final Drainage Report Greenhaven Filing No. 1 and 2 Colorado Springs, Colorado" by Terra Nova Engineering, Inc., dated March 2004.

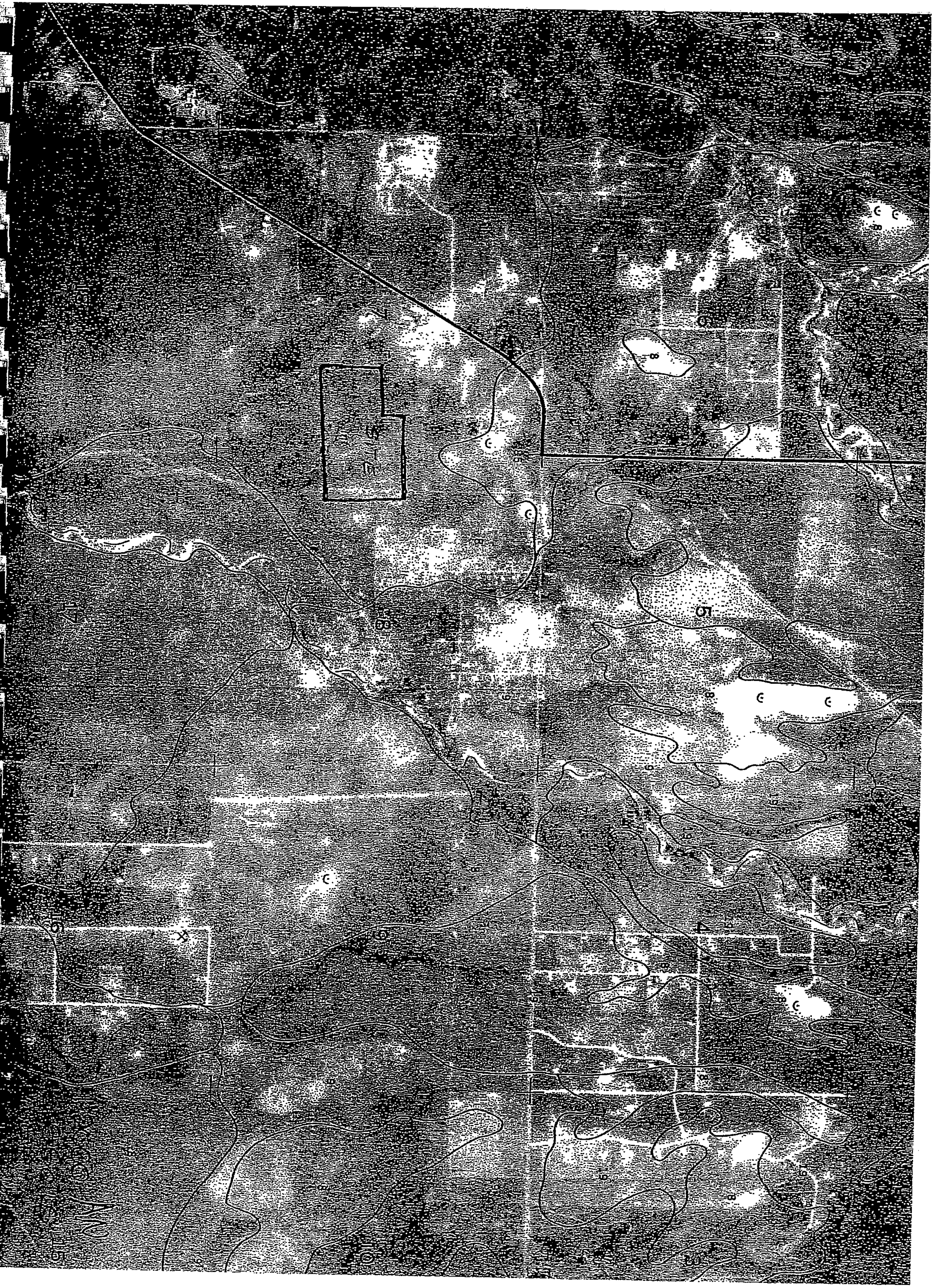
GENERAL LOCATION MAP



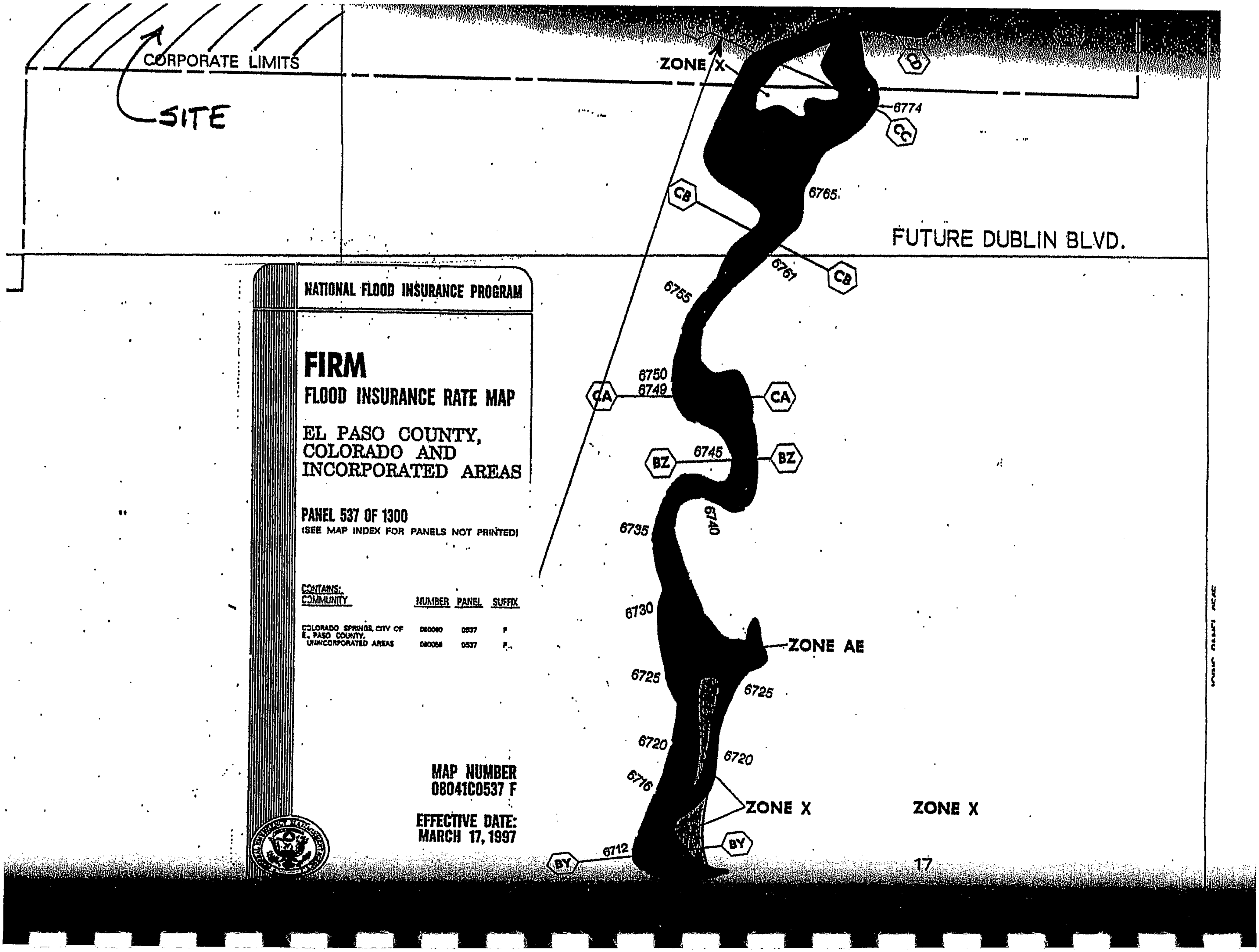
VICINITY MAP

N.T.S.

S.C.S. SOILS MAP



FEMA FIRM MAP



CORPORATE LIMITS
SITE
ZONE X
CD
6774
CC
CB
6765
FUTURE DUBLIN BLVD.
6761
CB
6755
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO AND INCORPORATED AREAS
PANEL 537 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
COLORADO SPRINGS, CITY OF 080060 0537 F
EL PASO COUNTY, UNINCORPORATED AREAS 0537 F
MAP NUMBER 08041C0537 F
EFFECTIVE DATE: MARCH 17, 1997
6750
6749
CA
CA
6745
BZ
BZ
6740
6735
6730
ZONE AE
6725
6725
6720
6720
6716
ZONE X
ZONE X
6712
BY
BY

HYDROLOGIC CALCULATIONS

Design Procedure Form: Sand Filter Basin (SFB)

Designer:	**Luanne Rubey**
Company:	**Terra Nova Engineering**
Date:	**March 5, 2007**
Project:	**Falcon High School # 3**
Location:	**Colorado Springs, CO**

1. Basin Storage Volume	
A) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)	I_a = 62.00 % i = 0.62
B) Contributing Watershed Area (Area)	Area = 11.88 acres
C) Water Quality Capture Volume (WQCV) (WQCV =1.0 * (0.91 * I^3 - 1.19 * I^2 + 0.78 * I))	WQCV = 0.24 watershed inches
D) Design Volume: Vol = (WQCV / 12) * Area	Vol = 0.241 acre-feet
2. Minimum Filter Surface Area: A_s = (Vol / 3) * 43,560	A_s = 3,494 square feet
Filter Surface Elevation	6809.50 feet
Average Side Slope of the Filter Basin (3:1 or flatter)	Z = 3.0
3. Estimate of Basin Depth (D), based on filter area A_s	D = 2.5 feet
4. Outlet Works	
A) Sand (ASTM C-33) Layer Thickness (18" min.)	18 inches
Gravel (AASHTO No. 8; CDOT Section 703) Layer Thickness (9" min.)	9 inches
B) Overflow Elevation At Top of Design Volume (Filter Surface Elev. + Estimate of Basin Depth (D))	6812.00 feet
5. Draining of porous pavement (Check a, **or** b, **or** c, **answer** d) Based on answers to 5a through 5d, check the appropriate method	____ Infiltration to Subgrade with Permeable Membrane: 5(c) checked **and** 5(d) = no
a) Check box if subgrade is heavy or expansive clay [ ]	____ Underdrain with Impermeable Membrane: 5(a) checked **or** 5(d) = yes
b) Check box if subgrade is silty or clayey sands [X]	X Underdrain with Permeable Membrane: 5(b) checked **and** 5(d) = no
c) Check box if subgrade is well-draining soils [ ]	
d) Does tributary catchment contain land uses that may have petroleum products, greases, or other chemicals present, such as gas station, hardware store, restaurant, etc.? yes [ ] no [x]	____ Other: ____
6 Describe Provisions for Maintenance	

Notes:

BMPDesignForms_Blank, SFB

FALCON HIGH SCHOOL ANNEXATION MDDP
(Area Runoff Coefficient Summary)
PROPOSED CONDITIONS

		STREETS / DEVELOPED			*OVERLAND / UNDEVELOPED*			*WEIGHTED*	
BASIN	**TOTAL AREA** *(Acres)*	**AREA** *(Acres)*	C_5	C_{100}	**AREA** *(Acres)*	C_5	C_{100}	C_5	C_{100}
OS-1	2.83	Per MDDP by JR Engineering, See Figure 1.0						***0.35***	***0.45***
OS-2	13.97	Per MDDP by JR Engineering, See Figure 1.0						***0.35***	***0.45***
OS-3	4.07	Per MDDP by JR Engineering, See Figure 1.0						***0.35***	***0.45***
OS-4	18.62	Per MDDP by JR Engineering, See Figure 1.0						***0.35***	***0.45***
OS-5	3.71	Per MDDP by JR Engineering, See Figure 1.0						***0.25***	***0.35***
OS-6	17.72	Per MDDP by JR Engineering, See Figure 1.0						***0.25***	***0.35***
OS-7	56.05	Per MDDP by JR Engineering, See Figure 1.0						***0.25***	***0.35***
OS-8	2.47	2.10	0.90	0.95	0.37	0.25	0.35	***0.80***	***0.86***
OS-9	4.31	2.10	0.90	0.95	2.21	0.25	0.35	***0.57***	***0.64***
OS-10	0.64	0.00	0.90	0.95	0.64	0.25	0.35	***0.25***	***0.35***
OS-11	4.13	0.00	0.90	0.95	4.13	0.25	0.35	***0.25***	***0.35***
OS-12	0.27	0.00	0.00	0.00	0.27	0.25	0.35	***0.25***	***0.35***
A1	0.16	0.03	0.90	0.95	0.13	0.25	0.35	***0.37***	***0.46***
A2	0.16	0.01	0.90	0.95	0.15	0.25	0.35	***0.29***	***0.39***
A3	0.16	0.01	0.90	0.95	0.15	0.25	0.35	***0.29***	***0.39***
A4	0.16	0.03	0.90	0.95	0.13	0.25	0.35	***0.37***	***0.46***
A5	0.16	0.03	0.90	0.95	0.13	0.25	0.35	***0.37***	***0.46***
A6	0.16	0.03	0.90	0.95	0.13	0.25	0.35	***0.37***	***0.46***
A7	0.16	0.03	0.90	0.95	0.13	0.25	0.35	***0.37***	***0.46***
A8	0.16	0.03	0.90	0.95	0.13	0.25	0.35	***0.37***	***0.46***
A9	0.16	0.03	0.90	0.95	0.13	0.25	0.35	***0.37***	***0.46***
A10	0.16	0.03	0.90	0.95	0.13	0.25	0.35	***0.37***	***0.46***
A11	0.16	0.03	0.90	0.95	0.13	0.25	0.35	***0.37***	***0.46***
A12	0.16	0.03	0.90	0.95	0.13	0.25	0.35	***0.37***	***0.46***
A13	0.14	0.14	0.90	0.95	0.00	0.25	0.35	***0.90***	***0.95***
A14	0.09	0.09	0.90	0.95	0.00	0.25	0.35	***0.90***	***0.95***

FALCON HIGH SCHOOL ANNEXATION MDDP
(Area Runoff Coefficient Summary)
PROPOSED CONDITIONS

		STREETS / DEVELOPED			*OVERLAND / UNDEVELOPED*			*WEIGHTED*	
BASIN	**TOTAL AREA** *(Acres)*	**AREA** *(Acres)*	C_5	C_{100}	**AREA** *(Acres)*	C_5	C_{100}	C_5	C_{100}
A15	0.08	0.08	0.90	0.95	0.00	0.25	0.35	***0.90***	***0.95***
A16	0.08	0.08	0.90	0.95	0.00	0.25	0.35	***0.90***	***0.95***
A17	0.10	0.10	0.90	0.95	0.00	0.25	0.35	***0.90***	***0.95***
A18	0.10	0.10	0.90	0.95	0.00	0.25	0.35	***0.90***	***0.95***
A19	0.03	0.03	0.90	0.95	0.00	0.25	0.35	***0.90***	***0.95***
A20	0.02	0.02	0.90	0.95	0.00	0.25	0.35	***0.90***	***0.95***
A21	0.13	0.13	0.90	0.95	0.00	0.25	0.35	***0.90***	***0.95***
A22	0.06	0.06	0.90	0.95	0.00	0.25	0.35	***0.90***	***0.95***
A23	0.11	0.11	0.90	0.95	0.00	0.25	0.35	***0.90***	***0.95***
A24	0.16	0.16	0.90	0.95	0.00	0.25	0.35	***0.90***	***0.95***
A25	0.24	0.20	0.90	0.95	0.04	0.25	0.35	***0.79***	***0.85***
A26	0.20	0.15	0.90	0.95	0.05	0.25	0.35	***0.74***	***0.80***
A27	0.12	0.09	0.90	0.95	0.03	0.25	0.35	***0.74***	***0.80***
A28	0.43	0.22	0.90	0.95	0.21	0.25	0.35	***0.58***	***0.66***
A29	0.16	0.03	0.90	0.95	0.13	0.25	0.35	***0.37***	***0.46***
A30	0.18	0.03	0.90	0.95	0.15	0.25	0.35	***0.36***	***0.45***
A31	0.32	0.03	0.90	0.95	0.29	0.25	0.35	***0.31***	***0.41***
A32	0.17	0.03	0.90	0.95	0.14	0.25	0.35	***0.36***	***0.46***
A33	0.30	0.10	0.90	0.95	0.20	0.25	0.35	***0.47***	***0.55***
A34	0.15	0.03	0.90	0.95	0.12	0.25	0.35	***0.38***	***0.47***
A35	0.16	0.03	0.90	0.95	0.13	0.25	0.35	***0.37***	***0.46***
A36	0.10	0.10	0.90	0.95	0.00	0.25	0.35	***0.90***	***0.95***
A37	0.10	0.10	0.90	0.95	0.00	0.25	0.35	***0.90***	***0.95***
A38	0.08	0.08	0.90	0.95	0.00	0.25	0.35	***0.90***	***0.95***
A39	0.08	0.08	0.90	0.95	0.00	0.25	0.35	***0.90***	***0.95***
A40	0.09	0.09	0.90	0.95	0.00	0.25	0.35	***0.90***	***0.95***
A	25.88	0.26	0.90	0.95	25.62	0.25	0.35	***0.26***	***0.36***
B	0.68	0.60	0.90	0.95	0.08	0.25	0.35	***0.82***	***0.88***

FALCON HIGH SCHOOL ANNEXATION MDDP
(Area Runoff Coefficient Summary)
PROPOSED CONDITIONS

		STREETS / DEVELOPED			*OVERLAND / UNDEVELOPED*			*WEIGHTED*	
BASIN	**TOTAL AREA** *(Acres)*	**AREA** *(Acres)*	**C_5**	**C_{100}**	**AREA** *(Acres)*	**C_5**	**C_{100}**	**C_5**	**C_{100}**
C	0.80	0.30	0.90	0.95	0.50	0.25	0.35	0.49	0.58
D	0.46	0.46	0.90	0.95	0.00	0.25	0.35	0.90	0.95
E	0.18	0.18	0.90	0.95	0.00	0.25	0.35	0.90	0.95
F	0.21	0.21	0.90	0.95	0.00	0.25	0.35	0.90	0.95
G	0.22	0.22	0.90	0.95	0.00	0.25	0.35	0.90	0.95
H	0.23	0.23	0.90	0.95	0.00	0.25	0.35	0.90	0.95
I	1.14	1.00	0.90	0.95	0.14	0.25	0.35	0.82	0.88
J	0.13	0.13	0.90	0.95	0.00	0.25	0.35	0.90	0.95
K	0.13	0.13	0.90	0.95	0.00	0.25	0.35	0.90	0.95
L	0.10	0.10	0.90	0.95	0.00	0.25	0.35	0.90	0.95
M	0.15	0.15	0.90	0.95	0.00	0.25	0.35	0.90	0.95
N	0.19	0.19	0.90	0.95	0.00	0.25	0.35	0.90	0.95
O	0.13	0.13	0.90	0.95	0.00	0.25	0.35	0.90	0.95
P	0.27	0.27	0.90	0.95	0.00	0.25	0.35	0.90	0.95
Q	0.23	0.23	0.90	0.95	0.00	0.25	0.35	0.90	0.95
R	0.19	0.19	0.90	0.95	0.00	0.25	0.35	0.90	0.95
S	0.20	0.20	0.90	0.95	0.00	0.25	0.35	0.90	0.95
T	0.13	0.13	0.90	0.95	0.00	0.25	0.35	0.90	0.95
U	0.09	0.09	0.90	0.95	0.00	0.25	0.35	0.90	0.95
V	0.17	0.17	0.90	0.95	0.00	0.25	0.35	0.90	0.95
W	0.34	0.34	0.90	0.95	0.00	0.25	0.35	0.90	0.95
X	0.18	0.18	0.90	0.95	0.00	0.25	0.35	0.90	0.95
Y	0.59	0.51	0.90	0.95	0.08	0.25	0.35	0.81	0.87
Z	1.52	0.70	0.90	0.95	0.82	0.25	0.35	0.55	0.63
AA	0.62	0.52	0.90	0.95	0.10	0.25	0.35	0.80	0.85
BB	2.50	2.10	0.90	0.95	0.40	0.25	0.35	0.80	0.85
CC	1.54	1.30	0.90	0.95	0.24	0.25	0.35	0.80	0.86
DD	0.50	0.25	0.90	0.95	0.25	0.25	0.35	0.58	0.65

FALCON HIGH SCHOOL ANNEXATION MDDP
(Area Runoff Coefficient Summary)
PROPOSED CONDITIONS

		STREETS / DEVELOPED			*OVERLAND / UNDEVELOPED*			*WEIGHTED*	
BASIN	**TOTAL AREA** *(Acres)*	**AREA** *(Acres)*	C_5	C_{100}	**AREA** *(Acres)*	C_5	C_{100}	C_5	C_{100}
EE	0.11	0.00	0.90	0.95	0.11	0.25	0.35	***0.25***	***0.35***
FF	0.17	0.10	0.90	0.95	0.07	0.25	0.35	***0.63***	***0.70***
GG	0.41	0.40	0.90	0.95	0.01	0.25	0.35	***0.88***	***0.94***
HH	2.94	2.40	0.90	0.95	0.54	0.25	0.35	***0.78***	***0.84***
II	0.09	0.08	0.90	0.95	0.01	0.25	0.35	***0.83***	***0.88***
JJ	0.09	0.08	0.90	0.95	0.01	0.25	0.35	***0.83***	***0.88***
KK	0.69	0.60	0.90	0.95	0.09	0.25	0.35	***0.82***	***0.87***
LL	0.83	0.75	0.90	0.95	0.08	0.25	0.35	***0.84***	***0.89***
MM	0.48	1.00	0.90	0.95	-0.52	0.25	0.35	***1.60***	***1.60***
NN	0.21	0.10	0.90	0.95	0.11	0.25	0.35	***0.56***	***0.64***
OO	0.20	0.20	0.90	0.95	0.00	0.25	0.35	***0.90***	***0.95***
PP	1.74	1.24	0.90	0.95	0.50	0.25	0.35	***0.71***	***0.78***
QQ	0.77	0.50	0.90	0.95	0.27	0.25	0.35	***0.67***	***0.74***
RR	0.39	0.33	0.90	0.95	0.06	0.25	0.35	***0.80***	***0.86***
SS	0.86	0.75	0.90	0.95	0.11	0.25	0.35	***0.82***	***0.87***
TT	0.60	0.52	0.90	0.95	0.08	0.25	0.35	***0.81***	***0.87***
INTEAST	0.83	0.00	0.90	0.95	0.83	0.25	0.35	***0.25***	***0.35***

FALCON HIGH SCHOOL ANNEXATION
ROUTING SUMMARY

Design Point(s)	*Contributing Basins*	*Equivalent CA_5*	*Equivalent CA_{100}*	*Maximum T_C*	*Intensity*		*Flow*	
					I_5	*I_{100}*	*Q_5*	*Q_{100}*
2	NN	0.12	0.13	5.00	5.0	9.1	*1*	*1*
3	OS-1	0.99	1.28	13.86	3.6	6.1	*4*	*8*
4	OS-2	4.89	6.29	16.11	3.4	5.7	*16*	*36*
5	OS-3	1.42	1.83	14.26	3.5	6.0	*5*	*11*
6	OS-4	6.52	8.38	35.39	2.3	3.7	*15*	*31*
7	OS-11+DP 4+DP5+DP6	14.27	18.35	35.39	2.3	3.7	*32*	*67*
8	OS-5	0.93	1.30	13.78	3.6	6.1	*3*	*8*
9	B+DP8	7.57	10.51	13.78	3.6	6.1	*27*	*65*
10	OS-6	4.43	6.20	5.00	5.0	9.1	*22*	*56*
11	10+I	5.36	7.20	18.83	3.1	5.3	*17*	*38*
13 ULT	OS-7+QQ	14.53	20.19	41.56	2.1	3.3	*30*	*67*
13	11+OS-7+QQ	19.89	27.39	41.56	2.1	3.3	*41*	*91*
14	OS-8	1.98	2.12	9.06	4.2	7.4	*8*	*16*
17	1/2 (13+OS-8+SS)	11.29	15.13	41.56	2.1	3.3	*23*	*50*
17A	17,14,15	15.71	20.02	42.47	2.0	3.3	*32*	*65*
18	17	11.29	15.13	41.56	2.1	3.3	*23*	*50*
18A	17A, 18	26.99	35.14	42.47	2.0	3.3	*55*	*115*
19 INT	Y	0.48	0.51	5.00	5.0	9.1	*2*	*5*
19 ULT	Y+BP 19A	0.68	0.82	5.00	5.0	9.1	*3*	*7*
19A	SS	0.65	0.77	5.00	5.0	9.1	*3*	*7*
19B	19,16A	28.21	37.10	42.47	2.0	3.3	*57*	*121*
21	BP19+LL	0.91	1.08	5.00	5.0	9.1	*5*	*10*
23	BP21+II	0.42	0.64	5.00	5.0	9.1	*2*	*6*
15	OS-9	2.44	2.77	42.47	2.0	3.3	*5*	*9*

FALCON HIGH SCHOOL ANNEXATION
ROUTING SUMMARY

Design Point(s)	*Contributing Basins*	*Equivalent* CA_5	*Equivalent* CA_{100}	*Maximum* T_C	*Intensity*		*Flow*	
					I_5	I_{100}	Q_5	Q_{100}
16	TT+BP 15+OS-12	1.48	1.98	42.47	2.0	3.3	*3*	*6*
16A	18A, 19A, 16	27.99	36.76	42.47	2.0	3.3	*57*	*120*
20	BP 16+MM	2.27	3.29	42.47	2.0	3.3	*5*	*11*
20A	19B, 20	29.72	39.61	42.47	2.0	3.3	*61*	*129*

FALCON HIGH SCHOOL ANNEXATION
ROUTING SUMMARY

Design Point(s)	Contributing Basins	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity		Flow	
					I_5	I_{100}	Q_5	Q_{100}
22	BP 20+OS-10+KK	2.23	3.34	42.47	2.0	3.3	5	11
22A	20A, 21, 22	30.84	41.85	42.47	2.0	3.3	63	137
24	BP22+JJ	0.85	1.75	42.47	2.0	3.3	2	6
90	X+EE	0.19	0.21	14.7	3.5	5.9	1	1
84A	CC	1.23	1.32	5.0	5.0	9.1	6	12
77	90+84	1.42	1.53	14.7	3.5	5.9	5	9
76	77+1/2 W+FF+X	1.84	1.98	14.7	3.5	5.9	6	12
75	AA+V+1/2W	0.80	0.85	8.1	4.4	7.7	3	7
90A	75+76	2.64	2.83	15.0	3.5	5.9	9	17
85A	BB	1.99	2.14	5.0	5.0	9.1	10	19
89	85+90A	4.63	4.97	15.0	3.5	5.9	16	29
88	89+U	4.71	5.05	15.0	3.5	5.9	16	30
74	RR	0.31	0.33	5.0	5.0	9.1	2	3
88A	Z	0.84	0.95	19.0	3.1	5.2	3	5
88B	88+88A	5.55	6.01	19.0	3.1	5.2	17	31
73	GG+74	1.20	1.34	19.0	3.1	5.2	4	7
73A	73+74	1.51	1.67	19.0	3.1	5.2	5	9
87	73A+88B	7.06	7.68	19.0	3.1	5.2	22	40
86	G+87	7.25	7.88	20.0	3.0	5.1	22	40
85	86	7.25	7.88	20.0	3.0	5.1	22	40
84	85+E	7.42	8.06	20.0	3.0	5.1	23	41

FALCON HIGH SCHOOL ANNEXATION
ROUTING SUMMARY

Design Point(s)	Contributing Basins	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity I_5	I_{100}	Flow Q_5	Q_{100}
72	HH+P+L+J	2.75	2.94	14.9	3.5	5.9	10	17
70	72	2.75	2.94	14.94	3.47	5.90	10	17
70a	72, 84	10.16	11.00	20.00	3.0	5.1	31	56
52	A31	0.10	0.13	8.0	4.4	7.7	0	1
53	A32+52	0.16	0.21	8.0	4.4	7.7	1	2
38	A15	0.07	0.08	8.0	4.4	7.7	0	1
37	A14+38+53	0.31	0.37	8.0	4.4	7.7	1	3
36	A13+37	0.44	0.50	8.0	4.4	7.7	2	4
35	A11+36	0.50	0.58	14.0	3.6	6.1	2	4
34	A9+35	0.56	0.65	14.0	3.6	6.1	2	4
33	A7+34	0.62	0.72	14.0	3.6	6.1	2	4
32	A5+33	0.68	0.80	14.0	3.6	6.1	2	5
31	A3+32	0.73	0.86	15.0	3.5	5.9	3	5
30	A1+31	0.78	0.93	15.0	3.5	5.9	3	6
29	A34+30	0.84	0.98	15.0	3.5	5.9	3	6
28	A21+29	0.96	1.10	15.0	3.5	5.9	3	7
27	A40+28	1.04	1.19	15.0	3.5	5.9	4	7

FALCON HIGH SCHOOL ANNEXATION
ROUTING SUMMARY

Design Point(s)	Contributing Basins	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity I_5	Intensity I_{100}	Flow Q_5	Flow Q_{100}
51	A16	0.07	0.08	5.0	5.0	9.1	0	1
50	A17+51	0.16	0.17	5.0	5.0	9.1	1	2
49	A18+50	0.25	0.27	5.0	5.0	9.1	1	2
48	A12+49	0.31	0.34	14.0	3.6	6.1	1	2
47	A10+48	0.37	0.41	14.0	3.6	6.1	1	3
46	A8+47	0.43	0.49	14.0	3.6	6.1	2	3
45	A6+46	0.49	0.56	14.0	3.6	6.1	2	3
44	A4+45	0.55	0.64	14.0	3.6	6.1	2	4
43	A2+44	0.60	0.70	15.0	3.5	5.9	2	4
42	A35+43	0.66	0.77	15.0	3.5	5.9	2	5
41	A36+42	0.75	0.87	15.0	3.5	5.9	3	5
40	A37+41	0.84	0.96	15.0	3.5	5.9	3	6
39	A38+40	0.91	1.04	16.0	3.4	5.7	3	6
26	A39+39	0.98	1.11	16.0	3.4	5.7	3	6
66	26+27	2.02	2.30	16.0	3.4	5.7	7	13
55	A30	0.06	0.08	5.0	5.0	9.1	0	1
56	A29+55	0.12	0.16	6.0	4.8	8.6	1	1
57	A28+56	0.37	0.44	6.0	4.8	8.6	2	4
58	A19	0.03	0.03	5.0	5.0	9.1	0	0

FALCON HIGH SCHOOL ANNEXATION
ROUTING SUMMARY

Design Point(s)	Contributing Basins	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity		Flow	
					I_5	I_{100}	Q_5	Q_{100}
59	A27+57+58	0.49	0.56	6.0	4.8	8.6	2	5
60	A26+59	0.64	0.72	6.0	4.8	8.6	3	6
61	A25+60	0.83	0.93	6.0	4.8	8.6	4	8
62	A24+61	0.97	1.08	6.0	4.8	8.6	5	9
63	A23+62	1.07	1.18	6.0	4.8	8.6	5	10
64	A22+63	1.12	1.24	6.0	4.8	8.6	5	11
65	A20	0.06	0.07	5.0	5.0	9.1	0	1
21	64+65	1.18	1.31	6.0	4.8	8.6	6	11
67	66+21	3.20	3.62	16.0	3.4	5.7	11	21
54	A33	0.14	0.17	10.2	4.0	7.0	1	1.2
78	54+OO+X	0.48	0.53	10.2	4.0	7.0	2	4
79	S+T	0.30	0.31	5.0	5.0	9.1	1	3
109	78+79	0.78	0.84	10.2	4.0	7.0	3	6
108	R	0.17	0.18	5.0	5.0	9.1	1	2
107	Q+DD	0.49	0.54	5.0	5.0	9.1	2	5
80	107+108	0.67	0.72	5.0	5.0	9.1	3	7
106	80+109	1.44	1.56	10.2	4.0	7.0	6	11
81	0	0.12	0.12	5.0	5.0	9.1	1	1
102	N	0.17	0.18	5.0	5.0	9.1	1	2
103	M+K	0.25	0.27	5.0	5.0	9.1	1	2

FALCON HIGH SCHOOL ANNEXATION
ROUTING SUMMARY

Design Point(s)	Contributing Basins	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity		Flow	
					I_5	I_{100}	Q_5	Q_{100}
101	102+103	0.42	0.45	5.0	5.0	9.1	2	4
104	81+106	1.56	1.69	11.0	3.9	6.8	6	11
99	104+101	1.98	2.13	11.0	3.9	6.8	8	14
82	D	0.41	0.44	9.7	4.1	7.2	2	3
100	H	0.21	0.22	5.0	5.0	9.1	1	2
98	100+82	0.62	0.66	10.0	4.1	7.1	3	5
97	99+98	2.61	2.79	10.0	4.1	7.1	11	20
83	PP	1.24	1.35	7.1	4.5	8.1	6	11
96	83+97	3.85	4.14	10.0	4.1	7.1	16	29
95	F	0.19	0.20	5.0	5.0	9.1	1	2
94	96+95	4.04	4.34	10.0	4.1	7.1	16	31
93	94+67	7.24	7.96	16.0	3.4	5.7	24	45
68	C	0.40	0.46	11.9	3.8	6.6	2	3
92	93+68	7.63	8.42	16.0	3.4	5.7	26	48
91	92	7.63	8.42	16.0	3.4	5.7	26	48
71	DP:9, 7, 3, 91, 70a	40.63	49.56	35.4	2.3	3.7	92	182
24A	71, 22A	71.47	89.17	42.5	2.0	3.3	146	292
22 INT	EAST HALF OF BLK FST+ OS-9	2.65	3.06	42.5	2.0	3.3	5	10

Calculated by: MSE
Date: 3/26/2007
Checked by: ______

HYDRAULIC CALCULATIONS

Pipe Routing

RUN	Contributing Basins	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	I_5	I_{100}	Q_5	Q_{100}
100	11	5.36	7.20	18.83	3.1	5.3	17	38
101	Run 100+13	19.89	27.39	41.56	2.1	3.3	41	91
101A	103A+101	24.31	32.27	42.47	2.0	3.3	50	105
102	14	1.98	2.12	9.06	4.2	7.4	8	16
103	15	2.44	2.77	42.47	2.0	3.3	5	9
103A	102+103	4.42	4.89	42.47	2.0	3.3	9	16
104	19A	0.65	0.77	5.00	5.0	9.1	3	7
105	19	0.68	0.82	5.00	5.0	9.1	3	7
106	21	0.91	1.08	5.00	5.0	9.1	5	10
107	16	1.48	1.98	42.47	2.0	3.3	3	6
107A	107+104+101A	26.44	35.03	42.47	2.0	3.3	54	115
108	20	2.27	3.29	42.47	2.0	3.3	5	11
108A	107A+105+108	29.39	39.14	42.47	2.0	3.3	60	128
109	22+ INT 22	4.88	6.39	42.47	2.0	3.3	10	21
109A	109+106+108A	35.19	46.61	42.47	2.0	3.3	72	152
110	55	0.06	0.08	5.00	5.0	9.1	0	1
111	PR110+56	0.12	0.16	6.00	4.8	8.6	1	1
112	PR111+57	0.37	0.44	6.00	4.8	8.6	2	4
113	PR112+59	0.49	0.56	6.00	4.8	8.6	2	5
114	PR113+60	0.64	0.72	6.00	4.8	8.6	3	6
115	PR114+61	0.83	0.93	6.00	4.8	8.6	4	8
116	PR115+62	0.97	1.08	6.00	4.8	8.6	5	9
117	PR116+63	1.07	1.18	6.00	4.8	8.6	5	10
118	PR117+64	1.12	1.24	6.00	4.8	8.6	5	11
119	65	0.06	0.07	5.00	5.0	9.1	0	1
120	PR119+118	1.18	1.31	6.00	4.8	8.6	6	11
121	67	3.20	3.62	16.00	3.4	5.7	11	21
122	68	0.40	0.46	11.86	3.8	6.6	2	3
123	90	0.19	0.21	14.70	3.5	5.9	1	1
124	84A	1.23	1.32	5.00	5.0	9.1	6	12
125	77	1.42	1.53	19.70	3.1	5.1	4	8
126	76	1.84	1.98	14.70	3.5	5.9	6	12
127	75	0.80	0.85	8.10	4.4	7.7	3	7
128	90A	2.64	2.83	15.00	3.5	5.9	9	17
129	85A	1.99	2.14	5.00	5.0	9.1	10	19
130	129+128	4.63	4.97	15.00	3.5	5.9	16	29
131	88A	0.84	0.95	19.00	3.1	5.2	3	5
132	130+131	5.47	5.92	19.00	3.1	5.2	17	31

Pipe Routing

133	74	0.31	0.33	5.00	5.0	9.1	***2***	***3***
134	73A	1.51	1.67	19.00	3.1	5.2	***5***	***9***
135	87	7.06	7.68	19.00	3.1	5.2	***22***	***40***
136	72	2.75	2.94	14.94	3.5	5.9	***10***	***17***
137	135+136	9.80	10.62	19.00	3.1	5.2	***31***	***56***
138	71	40.63	49.56	35.39	2.3	3.7	***92***	***182***
139	24A	2.65	3.06	42.47	2.0	3.3	***5***	***10***
140	54	0.14	0.17	10.17	4.0	7.0	***1***	***1***
141	78	0.48	0.53	10.20	4.0	7.0	***2***	***4***
142	79	0.30	0.31	5.00	5.0	9.1	***1***	***3***
143	dp107	0.49	0.54	5.00	5.0	9.1	***2***	***5***
144	dp 104	1.56	1.69	11.00	3.9	6.8	***6***	***11***
145	81	0.12	0.12	5.00	5.0	9.1	***1***	***1***
146	82	0.41	0.44	9.70	4.1	7.2	***2***	***3***
147	99	1.98	2.13	11.00	3.9	6.8	***8***	***14***
148	97	2.61	2.79	10.00	4.1	7.1	***11***	***20***
149	83	1.24	1.35	7.10	4.5	8.1	***6***	***11***
150	96	3.85	4.14	10.00	4.1	7.1	***16***	***29***
151	94	4.04	4.34	10.00	4.1	7.1	***16***	***31***
152	92	7.63	8.42	16.00	3.4	5.7	***26***	***48***

DESIGN POINT 14

5-YR FLOW					
Q(5)	8	I(5)	4.2		
DEPTH	0.34	Fr	3.22	Inlet size ? L(i) =	**20**
SPREAD	15.3	L(1)	38.0	If Li < L(2) then Qi =	4
CROSS SLOPE	2.0%	L(2)	22.8	If Li > L(2) then Qi =	5
STREET SLOPE	6.0%	L(3)	81.5	FB =	4
				CA(eqv.)=	0.94

100-YR FLOW					
Q(100)	16	I(100)	7.4		
DEPTH	0.42	Fr	3.36	Inlet size ? L(i) =	**20**
SPREAD	19.3	L(1)	49.9	If Li < L(2) then Qi =	6
CROSS SLOPE	2.0%	L(2)	30.0	If Li > L(2) then Qi =	8
STREET SLOPE	6.0%	L(3)	107.0	FB =	9.4
				CA(eqv.)=	1.27

DESIGN POINT 15

5-YR FLOW

Q(5)	5	I(5)	2.0		
DEPTH	0.29	Fr	3.11	Inlet size ? L(i) =	**20**
SPREAD	12.8	L(1)	30.7	If Li < L(2) then Qi =	3
CROSS SLOPE	2.0%	L(2)	18.5	If Li > L(2) then Qi =	3
STREET SLOPE	6.0%	L(3)	65.9	FB =	2
				CA(eqv.)=	0.93

100-YR FLOW

Q(100)	9	I(100)	3.3		
DEPTH	0.35	Fr	3.24	Inlet size ? L(i) =	**20**
SPREAD	15.8	L(1)	39.5	If Li < L(2) then Qi =	5
CROSS SLOPE	2.0%	L(2)	23.7	If Li > L(2) then Qi =	5
STREET SLOPE	6.0%	L(3)	84.7	FB =	4.5
				CA(eqv.)=	1.37

DESIGN POINT 16

5-YR FLOW

Q(5)	3	I(5)	2.0		
DEPTH	0.25	Fr	2.57	Inlet size ? L(i) =	**10**
SPREAD	10.8	L(1)	21.5	If Li < L(2) then Qi =	1
CROSS SLOPE	2.0%	L(2)	12.9	If Li > L(2) then Qi =	2
STREET SLOPE	4.4%	L(3)	46.0	FB =	2
				CA(eqv.)=	0.79

100-YR FLOW

Q(100)	6	I(100)	3.3		
DEPTH	0.32	Fr	2.71	Inlet size ? L(i) =	**10**
SPREAD	14.1	L(1)	29.4	If Li < L(2) then Qi =	2
CROSS SLOPE	2.0%	L(2)	17.7	If Li > L(2) then Qi =	3
STREET SLOPE	4.4%	L(3)	63.0	FB =	4
				CA(eqv.)=	1.31

DESIGN POINT 20

5-YR FLOW

Q(5)	5	I(5)	2.0		
DEPTH	0.29	Fr	3.07	Inlet size ? L(i) =	**10**
SPREAD	12.6	L(1)	29.8	If Li < L(2) then Qi =	2
CROSS SLOPE	2.0%	L(2)	17.9	If Li > L(2) then Qi =	2
STREET SLOPE	5.9%	L(3)	63.8	FB =	3
				CA(eqv.)=	1.51

100-YR FLOW

Q(100)	11	I(100)	3.3		
DEPTH	0.37	Fr	3.25	Inlet size ? L(i) =	**10**
SPREAD	16.9	L(1)	42.3	If Li < L(2) then Qi =	3
CROSS SLOPE	2.0%	L(2)	25.4	If Li > L(2) then Qi =	4
STREET SLOPE	5.9%	L(3)	90.6	FB =	8.2
				CA(eqv.)=	2.51

DESIGN POINT 22

5-YR FLOW

Q(5)	5	I(5)	2.0		
DEPTH	0.28	Fr	2.87	Inlet size ? L(i) =	**20**
SPREAD	12.3	L(1)	27.3	If Li < L(2) then Qi =	3
CROSS SLOPE	2.0%	L(2)	16.4	If Li > L(2) then Qi =	3
STREET SLOPE	5.2%	L(3)	58.5	FB =	2
				CA(eqv.)=	0.78

100-YR FLOW

Q(100)	11	I(100)	3.3		
DEPTH	0.37	Fr	3.06	Inlet size ? L(i) =	**20**
SPREAD	17.0	L(1)	40.1	If Li < L(2) then Qi =	5
CROSS SLOPE	2.0%	L(2)	24.1	If Li > L(2) then Qi =	6
STREET SLOPE	5.2%	L(3)	86.0	FB =	5.5
				CA(eqv.)=	1.67

DESIGN POINT 19A

5-YR FLOW

Q(5)	3	I(5)	5.0		
DEPTH	0.26	Fr	2.81	Inlet size ? L(i) =	**20**
SPREAD	11.1	L(1)	24.0	If Li < L(2) then Qi =	3
CROSS SLOPE	2.0%	L(2)	14.4	If Li > L(2) then Qi =	2
STREET SLOPE	5.2%	L(3)	51.4	FB =	1
				CA(eqv.)=	0.20

100-YR FLOW

Q(100)	7	I(100)	9.1		
DEPTH	0.33	Fr	2.97	Inlet size ? L(i) =	**20**
SPREAD	14.6	L(1)	33.3	If Li < L(2) then Qi =	4
CROSS SLOPE	2.0%	L(2)	20.0	If Li > L(2) then Qi =	4
STREET SLOPE	5.2%	L(3)	71.5	FB =	3
				CA(eqv.)=	0.31

DESIGN POINT 19

5-YR FLOW

Q(5)	3	I(5)	5.0		
DEPTH	0.26	Fr	2.82	Inlet size ? L(i) =	**20**
SPREAD	11.3	L(1)	24.7	If Li < L(2) then Qi =	3
CROSS SLOPE	2.0%	L(2)	14.8	If Li > L(2) then Qi =	2
STREET SLOPE	5.2%	L(3)	52.8	FB =	1
				CA(eqv.)=	0.22

100-YR FLOW

Q(100)	7	I(100)	9.1		
DEPTH	0.33	Fr	2.98	Inlet size ? L(i) =	**20**
SPREAD	14.8	L(1)	34.0	If Li < L(2) then Qi =	4
CROSS SLOPE	2.0%	L(2)	20.4	If Li > L(2) then Qi =	4
STREET SLOPE	5.2%	L(3)	72.9	FB =	3
				CA(eqv.)=	0.34

DESIGN POINT 21

5-YR FLOW

Q(5)	5	I(5)	5.0		
DEPTH	0.29	Fr	2.83	Inlet size ? L(i) =	**18**
SPREAD	12.6	L(1)	27.4	If Li < L(2) then Qi =	3
CROSS SLOPE	2.0%	L(2)	16.5	If Li > L(2) then Qi =	3
STREET SLOPE	5.0%	L(3)	58.7	FB =	2
				CA(eqv.)=	0.34

100-YR FLOW

Q(100)	10	I(100)	9.1		
DEPTH	0.36	Fr	2.97	Inlet size ? L(i) =	**18**
SPREAD	16.3	L(1)	37.4	If Li < L(2) then Qi =	5
CROSS SLOPE	2.0%	L(2)	22.5	If Li > L(2) then Qi =	5
STREET SLOPE	5.0%	L(3)	80.2	FB =	5
				CA(eqv.)=	0.56

Design Point 17

INTERIM

Equation 7-2

$$Q = \frac{3 \times P \times d^{1.5}}{F}$$

Maxium Ponding Depth (d) =	0.5	ft
Discharge (Q) =	50	cfs
Clogging Factor (F) =	2	
Grate perimeter (P) =	**94.55**	ft

Circular Grate Inlet

Diameter (D) **D =** **15.04** ft

Rectangle Grate Inlet

Length of Each Side (L) **L =** **23.64** ft

DESIGN POINT 11

5-YR FLOW

Q(5)	4	I(5)	5.0		
DEPTH	0.28	Fr	2.86	Inlet size ? L(i) =	**10**
SPREAD	12.1	L(1)	26.6	If Li < L(2) then Qi =	2
CROSS SLOPE	2.0%	L(2)	16.0	If Li > L(2) then Qi =	2
STREET SLOPE	5.2%	L(3)	57.1	FB =	3
				CA(eqv.)=	0.52

100-YR FLOW

Q(100)	9	I(100)	9.1		
DEPTH	0.36	Fr	3.02	Inlet size ? L(i) =	**10**
SPREAD	16.1	L(1)	37.5	If Li < L(2) then Qi =	3
CROSS SLOPE	2.0%	L(2)	22.5	If Li > L(2) then Qi =	4
STREET SLOPE	5.2%	L(3)	80.3	FB =	7
				CA(eqv.)=	0.76

DESIGN POINT 13

Total Flow:

Q_5 = **10** cfs

Q_{100} = **24** cfs

Maximum allowable ponding depth at sump:

D_5 = 0.45

D_{100} = 0.70 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **6** foot inlet required

100-Year Event: **10** foot inlet required

developed flows
at this design point.)

Calculated by: MSE

Date: 3/27/2007

Checked by:

DESIGN POINT 84A

Total Flow: Q_5 = **6** cfs

Q_{100} = **12** cfs

Maximum allowable ponding depth at sump:

D_5 = 0.45

D_{100} = 0.70 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **4** foot inlet required

100-Year Event: **4** foot inlet required

(Install a 4' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: MSE

Date: 3/27/2007

Checked by: ________

DESIGN POINT 85A

Total Flow:

Q_5	=	**10** cfs
Q_{100}	=	**19** cfs

Maximum allowable ponding depth at sump:

D_5	=	0.45
D_{100}	=	0.70 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25
Li (1.25) = Length of inlet opening

5-Year Event:	**6**	foot inlet required
100-Year Event:	**8**	foot inlet required

(Install an 8' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: MSE
Date: 3/27/2007
Checked by: ________

DESIGN POINT 83

Total Flow:	Q_5	=	6 cfs
	Q_{100}	=	11 cfs

Maximum allowable ponding depth at sump:

D_5	=	0.45
D_{100}	=	0.70 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25
Li (1.25) = Length of inlet opening

5-Year Event:	4	foot inlet required
100-Year Event:	4	foot inlet required

(Install an 4' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: MSE
Date: 3/27/2007
Checked by: ____________

DESIGN POINT 72

Total Flow:

Q_5 = **10** cfs

Q_{100} = **17** cfs

Maximum allowable ponding depth at sump:

D_5 = 0.45

D_{100} = 0.70 (dmax)

Qi = = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: **6** foot inlet required

100-Year Event: **6** foot inlet required

(Install an 6' D-10-R inlet to accept both 5 yr. & 100 yr. developed flows at this design point.)

Calculated by: MSE

Date: 3/27/2007

Checked by: ____________

Design Point 54

Equation 7-2 $$Q = \frac{3 \times P \times d^{1.5}}{F}$$

Maxium Ponding Depth (d) =	0.5	ft
Discharge (Q) =	1	cfs
Clogging Factor (F) =	2	
Grate perimeter (P) =	**2.19**	ft

Circular Grate Inlet

Diameter (D) **D =** **0.35** ft

Rectangle Grate Inlet

Length of Each Side (L) **L =** **0.55** ft

Use 12"X12' Firebaugh

Design Point 57

Equation 7-2

$$Q = \frac{3 \times P \times d^{1.5}}{F}$$

Maxium Ponding Depth (d) =	0.5	ft
Discharge (Q) =	2	cfs
Clogging Factor (F) =	2	
Grate perimeter (P) =	**4.70**	ft

Circular Grate Inlet

Diameter (D) **D =** **0.75** ft

Rectangle Grate Inlet

Length of Each Side (L) **L =** **1.17** ft

Use 24"X24' Firebaugh

Design Point 59

Equation 7-2

$$Q = \frac{3 \times P \times d^{1.5}}{F}$$

Maxium Ponding Depth (d) =	0.5	ft
Discharge (Q) =	1	cfs
Clogging Factor (F) =	2	
Grate perimeter (P) =	**1.64**	ft

Circular Grate Inlet

Diameter (D) **D =** **0.26** ft

Rectangle Grate Inlet

Length of Each Side (L) **L =** **0.41** ft

Use12"X12' Firebaugh

Design Point 60

Equation 7-2

$$Q = \frac{3 \times P \times d^{1.5}}{F}$$

Maxium Ponding Depth (d) =	0.5	ft
Discharge (Q) =	1	cfs
Clogging Factor (F) =	2	
Grate perimeter (P) =	**1.64**	ft

Circular Grate Inlet

Diameter (D) **D =** **0.26** ft

Rectangle Grate Inlet

Length of Each Side (L) **L =** **0.41** ft

Use12"X12' Firebaugh

Design Point 68

Equation 7-2

$$Q = \frac{3 \times P \times d^{1.5}}{F}$$

Maxium Ponding Depth (d) =	1	ft
Discharge (Q) =	3	cfs
Clogging Factor (F) =	2	
Grate perimeter (P) =	**2.02**	ft

		Circular Grate Inlet	
Diameter (D)	**D =**	**0.32**	ft
		Rectangle Grate Inlet	
Length of Each Side (L)	**L =**	**0.50**	ft

Use 12"X12' Firebaugh

Design Point 75

Equation 7-2

$$Q = \frac{3 \times P \times d^{1.5}}{F}$$

Maxium Ponding Depth (d) =	0.5	ft
Discharge (Q) =	7	cfs
Clogging Factor (F) =	2	
Grate perimeter (P) =	**12.36**	ft

Circular Grate Inlet

Diameter (D) **D =** **1.97** ft

Rectangle Grate Inlet

Length of Each Side (L) **L =** **3.09** ft

Install D-9 inlet
with ped friendly grate

Design Point 78

Equation 7-2

$$Q = \frac{3 \times P \times d^{1.5}}{F}$$

Maxium Ponding Depth (d) =	1	ft
Discharge (Q) =	4	cfs
Clogging Factor (F) =	2	
Grate perimeter (P) =	**2.46**	ft

Circular Grate Inlet

Diameter (D) **D =** **0.39** ft

Rectangle Grate Inlet

Length of Each Side (L) **L =** **0.62** ft

Use 12"X12' Firebaugh

Design Point81

Equation 7-2

$$Q = \frac{3 \times P \times d^{1.5}}{F}$$

Maxium Ponding Depth (d) =	0.5	ft
Discharge (Q) =	1	cfs
Clogging Factor (F) =	2	
Grate perimeter (P) =	**2.11**	ft

Circular Grate Inlet

Diameter (D) **D =** **0.34** ft

Rectangle Grate Inlet

Length of Each Side (L) **L =** **0.53** ft

Use 12"X12' Firebaugh

Design Point 82

Equation 7-2

$$Q = \frac{3 \times P \times d^{1.5}}{F}$$

Maxium Ponding Depth (d) =	0.5	ft
Discharge (Q) =	3	cfs
Clogging Factor (F) =	2	
Grate perimeter (P) =	**5.89**	ft

Circular Grate Inlet

Diameter (D) **D =** **0.94** ft

Rectangle Grate Inlet

Length of Each Side (L) **L =** **1.47** ft

Use 24"X24' Firebaugh

Design Point 88A

Equation 7-2

$$Q = \frac{3 \times P \times d^{1.5}}{F}$$

Maxium Ponding Depth (d) =	1	ft
Discharge (Q) =	5	cfs
Clogging Factor (F) =	2	
Grate perimeter (P) =	**3.34**	ft

Circular Grate Inlet

Diameter (D) **D =** **0.53** ft

Rectangle Grate Inlet

Length of Each Side (L) **L =** **0.83** ft

Use 12"X12' Firebaugh

Terra Nova Engineering, Inc.

Falcon HS 3
Job No. 0404.00
3/28/2007

				Head =	0.5		Head = 0.5
				Head = 0.5	Head = 0.5		
				No Clooging Factor Applied		Head = 0.5	Head =.5
			Ped Safe	capacity	ped safe	Clogging factor of 2	
Firebaugh		area (sq fi	area (sq ft)	cfs	capacity (cfs)	applied	
12x12	Deeter 2812	0.35		**1.19**		**0.60**	**0.00**
Type 13	Deeter 2501	2.68		**9.12**		**4.56**	**0.00**
24x24	Deeter 3224	1.66	0.00	**5.65**	**0.00**	**2.83**	**0.00**
2.5'x5'	d9	6.25	0.00	**21.28**	**0.00**	**10.64**	**0.00**
2.5'x7.5'	d9	9.38	0.00	**31.92**	**0.00**	**15.96**	**0.00**
2.5'x10'	d9	12.50		**42.56**	**0.00**	**21.28**	**0.00**
5x10	d9	50.00	35.00	**170.24**	**119.16**	**85.12**	**59.58**

Pipe Run 100 -30"
Worksheet for Circular Channel

Project Description	
Worksheet	100
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	020000	ft/ft
Discharge	38.00	cfs

Results		
Depth	2.13	ft
Diameter	26	in
Flow Area	3.6	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	2.02	ft
Percent Full	100.0	%
Critical Slope	017304	ft/ft
Velocity	10.63	ft/s
Velocity Head	1.76	ft
Specific Energ:	3.89	ft
Froude Numbe	0.00	
Maximum Disc	40.88	cfs
Discharge Full	38.00	cfs
Slope Full	020000	ft/ft
Flow Type	N/A	

Pipe Run 101-36"
Worksheet for Circular Channel

Project Description	
Worksheet	101
Flow Element	Circular Channe
Method	Manning's Forn
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	020000	ft/ft
Discharge	91.00	cfs

Results		
Depth	2.96	ft
Diameter	36	in
Flow Area	6.9	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	2.83	ft
Percent Full	100.0	%
Critical Slope	017379	ft/ft
Velocity	13.22	ft/s
Velocity Head	2.72	ft
Specific Energ:	5.68	ft
Froude Numbe	0.00	
Maximum Disc	97.89	cfs
Discharge Full	91.00	cfs
Slope Full	020000	ft/ft
Flow Type	N/A	

Pipe Run 102 -24"
Worksheet for Circular Channel

Project Description	
Worksheet	102
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	020000	ft/ft
Discharge	16.00	cfs

Results		
Depth	1.54	ft
Diameter	19	in
Flow Area	1.9	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.44	ft
Percent Full	100.0	%
Critical Slope	017285	ft/ft
Velocity	8.56	ft/s
Velocity Head	1.14	ft
Specific Energ:	2.68	ft
Froude Numbe	0.00	
Maximum Disc	17.21	cfs
Discharge Full	16.00	cfs
Slope Full	020000	ft/ft
Flow Type	N/A	

Pipe Run 103 - 18"
Worksheet for Circular Channel

Project Description	
Worksheet	103
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	020000	ft/ft
Discharge	9.00	cfs

Results		
Depth	1.24	ft
Diameter	15	in
Flow Area	1.2	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.15	ft
Percent Full	100.0	%
Critical Slope	017310	ft/ft
Velocity	7.42	ft/s
Velocity Head	0.85	ft
Specific Energ	2.10	ft
Froude Numbe	0.00	
Maximum Disc	9.68	cfs
Discharge Full	9.00	cfs
Slope Full	020000	ft/ft
Flow Type	N/A	

Pipe Run 103 A - 24"
Worksheet for Circular Channel

Project Description	
Worksheet	103A
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	020000	ft/ft
Discharge	17.00	cfs

Results		
Depth	1.58	ft
Diameter	19	in
Flow Area	2.0	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.48	ft
Percent Full	100.0	%
Critical Slope	017284	ft/ft
Velocity	8.69	ft/s
Velocity Head	1.17	ft
Specific Energ;	2.75	ft
Froude Numbe	0.00	
Maximum Disc	18.29	cfs
Discharge Full	17.00	cfs
Slope Full	020000	ft/ft
Flow Type	N/A	

Pipe Run 104-18"
Worksheet for Circular Channel

Project Description	
Worksheet	104
Flow Element	Circular Chann
Method	Manning's Forr
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.013	
Slope	200000	ft/ft
Diameter	18	in
Discharge	7.00	cfs

Results		
Depth	0.39	ft
Flow Area	0.4	ft²
Wetted Perime	1.61	ft
Top Width	1.32	ft
Critical Depth	1.02	ft
Percent Full	26.1	%
Critical Slope	0.006766	ft/ft
Velocity	19.08	ft/s
Velocity Head	5.66	ft
Specific Energ;	6.05	ft
Froude Numbe	6.38	
Maximum Disc	50.53	cfs
Discharge Full	46.97	cfs
Slope Full	0.004441	ft/ft
Flow Type	;upercritical	

Pipe Run 105-18"
Worksheet for Circular Channel

Project Description	
Worksheet	105
Flow Element	Circular Chann
Method	Manning's Forr
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.013	
Slope	152000	ft/ft
Diameter	18	in
Discharge	7.00	cfs

Results		
Depth	0.42	ft
Flow Area	0.4	ft²
Wetted Perime	1.67	ft
Top Width	1.35	ft
Critical Depth	1.02	ft
Percent Full	28.0	%
Critical Slope	0.006766	ft/ft
Velocity	17.30	ft/s
Velocity Head	4.65	ft
Specific Energ;	5.07	ft
Froude Numbe	5.57	
Maximum Disc	44.05	cfs
Discharge Full	40.95	cfs
Slope Full	0.004441	ft/ft
Flow Type	3upercritical	

Pipe Run 106 - 18"
Worksheet for Circular Channel

Project Description	
Worksheet	106
Flow Element	Circular Chann
Method	Manning's Forr
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.013	
Slope	056000	ft/ft
Diameter	18	in
Discharge	10.00	cfs

Results		
Depth	0.66	ft
Flow Area	0.8	ft²
Wetted Perime	2.18	ft
Top Width	1.49	ft
Critical Depth	1.22	ft
Percent Full	44.1	%
Critical Slope	0.009206	ft/ft
Velocity	13.30	ft/s
Velocity Head	2.75	ft
Specific Energ;	3.41	ft
Froude Numbe	3.30	
Maximum Disc	26.74	cfs
Discharge Full	24.86	cfs
Slope Full	0.009064	ft/ft
Flow Type	;upercritical	

Pipe Run 107-18"
Worksheet for Circular Channel

Project Description	
Worksheet	107
Flow Element	Circular Chann
Method	Manning's Forr
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.013	
Slope	105000	ft/ft
Diameter	18	in
Discharge	6.00	cfs

Results		
Depth	0.43	ft
Flow Area	0.4	ft²
Wetted Perime	1.69	ft
Top Width	1.35	ft
Critical Depth	0.95	ft
Percent Full	28.4	%
Critical Slope	0.006218	ft/ft
Velocity	14.51	ft/s
Velocity Head	3.27	ft
Specific Energ:	3.70	ft
Froude Numbe	4.63	
Maximum Disc	36.61	cfs
Discharge Full	34.04	cfs
Slope Full	0.003263	ft/ft
Flow Type	;upercritical	

Pipe Run 108-18"
Worksheet for Circular Channel

Project Description	
Worksheet	108
Flow Element	Circular Chann
Method	Manning's Forr
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.013	
Slope	·075800	ft/ft
Diameter	18	in
Discharge	11.00	cfs

Results		
Depth	0.64	ft
Flow Area	0.7	ft²
Wetted Perime	2.14	ft
Top Width	1.48	ft
Critical Depth	1.27	ft
Percent Full	42.8	%
Critical Slope	0.010387	ft/ft
Velocity	15.25	ft/s
Velocity Head	3.61	ft
Specific Energ;	4.26	ft
Froude Numbe	3.86	
Maximum Disc	31.11	cfs
Discharge Full	28.92	cfs
Slope Full	0.010967	ft/ft
Flow Type	;upercritical	

Pipe Run 109-18"
Worksheet for Circular Channel

Project Description	
Worksheet	109
Flow Element	Circular Chann
Method	Manning's Forr
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.013	
Slope	087000	ft/ft
Diameter	36	in
Discharge	21.00	cfs

Results		
Depth	0.66	ft
Flow Area	1.2	ft²
Wetted Perime	2.93	ft
Top Width	2.49	ft
Critical Depth	1.47	ft
Percent Full	22.1	%
Critical Slope	0.004225	ft/ft
Velocity	18.14	ft/s
Velocity Head	5.11	ft
Specific Energ;	5.77	ft
Froude Numbe	4.69	
Maximum Disc	211.61	cfs
Discharge Full	196.72	cfs
Slope Full	0.000991	ft/ft
Flow Type	Supercritical	

Pipe Run 101A - 42"
Worksheet for Circular Channel

Project Description	
Worksheet	101A
Flow Element	Circular Chann
Method	Manning's Forr
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.013	
Slope	045800	ft/ft
Diameter	48	in
Discharge	105.00	cfs

Results		
Depth	1.61	ft
Flow Area	4.7	ft²
Wetted Perime	5.50	ft
Top Width	3.92	ft
Critical Depth	3.10	ft
Percent Full	40.3	%
Critical Slope	0.005962	ft/ft
Velocity	22.15	ft/s
Velocity Head	7.62	ft
Specific Energ;	9.24	ft
Froude Numbe	3.55	
Maximum Disc	330.66	cfs
Discharge Full	307.39	cfs
Slope Full	0.005344	ft/ft
Flow Type	;upercritical	

Pipe Run 107A - 42"
Worksheet for Circular Channel

Project Description	
Worksheet	107A
Flow Element	Circular Chann
Method	Manning's Forr
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.013	
Slope	045800	ft/ft
Diameter	48	in
Discharge	115.00	cfs

Results		
Depth	1.69	ft
Flow Area	5.1	ft²
Wetted Perime	5.67	ft
Top Width	3.95	ft
Critical Depth	3.24	ft
Percent Full	42.4	%
Critical Slope	0.006564	ft/ft
Velocity	22.69	ft/s
Velocity Head	8.00	ft
Specific Energ;	9.70	ft
Froude Numbe	3.53	
Maximum Disc	330.66	cfs
Discharge Full	307.39	cfs
Slope Full	0.006410	ft/ft
Flow Type	Supercritical	

Pipe Run 108-A 48"
Worksheet for Circular Channel

Project Description	
Worksheet	108A
Flow Element	Circular Chann
Method	Manning's Forr
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.013	
Slope	015000	ft/ft
Diameter	48	in
Discharge	128.00	cfs

Results		
Depth	2.53	ft
Flow Area	8.4	ft²
Wetted Perime	7.36	ft
Top Width	3.86	ft
Critical Depth	3.39	ft
Percent Full	63.3	%
Critical Slope	0.007511	ft/ft
Velocity	15.27	ft/s
Velocity Head	3.62	ft
Specific Energ:	6.15	ft
Froude Numbe	1.83	
Maximum Disc	189.23	cfs
Discharge Full	175.92	cfs
Slope Full	0.007941	ft/ft
Flow Type	;upercritical	

Pipe Run 109A-48"
Worksheet for Circular Channel

Project Description	
Worksheet	109A
Flow Element	Circular Chann
Method	Manning's Forr
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.013	
Slope	045800	ft/ft
Diameter	48	in
Discharge	152.00	cfs

Results		
Depth	1.99	ft
Flow Area	6.2	ft²
Wetted Perime	6.26	ft
Top Width	4.00	ft
Critical Depth	3.61	ft
Percent Full	49.7	%
Critical Slope	0.009834	ft/ft
Velocity	24.39	ft/s
Velocity Head	9.25	ft
Specific Energ;	11.23	ft
Froude Numbe	3.45	
Maximum Disc	330.66	cfs
Discharge Full	307.39	cfs
Slope Full	0.011199	ft/ft
Flow Type	;upercritical	

Pipe Run 110-10"
Worksheet for Circular Channel

Project Description	
Worksheet	110
Flow Element	Circular Channe
Method	Manning's Forn
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	006600	ft/ft
Discharge	1.00	cfs

Results		
Depth	0.67	ft
Diameter	8	in
Flow Area	0.4	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	0.47	ft
Percent Full	100.0	%
Critical Slope	009226	ft/ft
Velocity	2.83	ft/s
Velocity Head	0.12	ft
Specific Energ;	0.80	ft
Froude Numbe	0.00	
Maximum Disc	1.08	cfs
Discharge Full	1.00	cfs
Slope Full	006600	ft/ft
Flow Type	N/A	

Pipe Run 111-10"
Worksheet for Circular Channel

Project Description	
Worksheet	111
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	006600	ft/ft
Discharge	1.00	cfs

Results		
Depth	0.67	ft
Diameter	8	in
Flow Area	0.4	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	0.47	ft
Percent Full	100.0	%
Critical Slope	009226	ft/ft
Velocity	2.83	ft/s
Velocity Head	0.12	ft
Specific Energ;	0.80	ft
Froude Numbe	0.00	
Maximum Disc	1.08	cfs
Discharge Full	1.00	cfs
Slope Full	006600	ft/ft
Flow Type	N/A	

Pipe Run 112-15"
Worksheet for Circular Channel

Project Description	
Worksheet	112
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	004000	ft/ft
Discharge	4.00	cfs

Results		
Depth	1.24	ft
Diameter	15	in
Flow Area	1.2	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	0.81	ft
Percent Full	100.0	%
Critical Slope	006863	ft/ft
Velocity	3.31	ft/s
Velocity Head	0.17	ft
Specific Energ	1.41	ft
Froude Numbe	0.00	
Maximum Disc	4.30	cfs
Discharge Full	4.00	cfs
Slope Full	004000	ft/ft
Flow Type	N/A	

Pipe Run 113-15"
Worksheet for Circular Channel

Project Description	
Worksheet	113
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	005500	ft/ft
Discharge	5.00	cfs

Results		
Depth	1.27	ft
Diameter	15	in
Flow Area	1.3	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	0.90	ft
Percent Full	100.0	%
Critical Slope	007537	ft/ft
Velocity	3.95	ft/s
Velocity Head	0.24	ft
Specific Energ	1.51	ft
Froude Numbe	0.00	
Maximum Disc	5.38	cfs
Discharge Full	5.00	cfs
Slope Full	005500	ft/ft
Flow Type	N/A	

Pipe Run 114-18"
Worksheet for Circular Channel

Project Description	
Worksheet	114
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	004000	ft/ft
Discharge	6.00	cfs

Results		
Depth	1.44	ft
Diameter	17	in
Flow Area	1.6	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	0.96	ft
Percent Full	100.0	%
Critical Slope	006623	ft/ft
Velocity	3.66	ft/s
Velocity Head	0.21	ft
Specific Energ:	1.65	ft
Froude Numbe	0.00	
Maximum Disc	6.45	cfs
Discharge Full	6.00	cfs
Slope Full	004000	ft/ft
Flow Type	N/A	

Pipe Run 115-18"
Worksheet for Circular Channel

Project Description	
Worksheet	115
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	005200	ft/ft
Discharge	8.00	cfs

Results		
Depth	1.53	ft
Diameter	18	in
Flow Area	1.8	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.09	ft
Percent Full	100.0	%
Critical Slope	007098	ft/ft
Velocity	4.35	ft/s
Velocity Head	0.29	ft
Specific Energ	1.82	ft
Froude Numbe	0.00	
Maximum Disc	8.61	cfs
Discharge Full	8.00	cfs
Slope Full	005200	ft/ft
Flow Type	N/A	

Pipe Run 116-18"
Worksheet for Circular Channel

Project Description	
Worksheet	116
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	006500	ft/ft
Discharge	9.00	cfs

Results		
Depth	1.53	ft
Diameter	18	in
Flow Area	1.8	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.16	ft
Percent Full	100.0	%
Critical Slope	007750	ft/ft
Velocity	4.87	ft/s
Velocity Head	0.37	ft
Specific Energ;	1.90	ft
Froude Numbe	0.00	
Maximum Disc	9.68	cfs
Discharge Full	9.00	cfs
Slope Full	006500	ft/ft
Flow Type	N/A	

Pipe Run 117-24"
Worksheet for Circular Channel

Project Description	
Worksheet	117
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	004000	ft/ft
Discharge	10.00	cfs

Results		
Depth	1.75	ft
Diameter	21	in
Flow Area	2.4	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.18	ft
Percent Full	100.0	%
Critical Slope	006322	ft/ft
Velocity	4.16	ft/s
Velocity Head	0.27	ft
Specific Energ	2.02	ft
Froude Numbe	0.00	
Maximum Disc	10.76	cfs
Discharge Full	10.00	cfs
Slope Full	004000	ft/ft
Flow Type	N/A	

Pipe Run 118-24"
Worksheet for Circular Channel

Project Description	
Worksheet	118
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	004000	ft/ft
Discharge	11.00	cfs

Results		
Depth	1.81	ft
Diameter	22	in
Flow Area	2.6	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.22	ft
Percent Full	100.0	%
Critical Slope	006272	ft/ft
Velocity	4.26	ft/s
Velocity Head	0.28	ft
Specific Energ	2.09	ft
Froude Numbe	0.00	
Maximum Disc	11.83	cfs
Discharge Full	11.00	cfs
Slope Full	004000	ft/ft
Flow Type	N/A	

Pipe Run 121-24"
Worksheet for Circular Channel

Project Description	
Worksheet	121
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	038800	ft/ft
Discharge	21.00	cfs

Results		
Depth	1.51	ft
Diameter	18	in
Flow Area	1.8	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.48	ft
Percent Full	100.0	%
Critical Slope	034836	ft/ft
Velocity	11.75	ft/s
Velocity Head	2.15	ft
Specific Energ	3.65	ft
Froude Numbe	0.00	
Maximum Disc	22.59	cfs
Discharge Full	21.00	cfs
Slope Full	038800	ft/ft
Flow Type	N/A	

Pipe Run 122- 12"
Worksheet for Circular Channel

Project Description	
Worksheet	122
Flow Element	Circular Channe
Method	Manning's Form
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	166100	ft/ft
Discharge	3.00	cfs

Results		
Depth	0.55	ft
Diameter	7	in
Flow Area	0.2	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	0.55	ft
Percent Full	100.0	%
Critical Slope	159859	ft/ft
Velocity	12.46	ft/s
Velocity Head	2.41	ft
Specific Energ;	2.97	ft
Froude Numbe	0.00	
Maximum Disc	3.23	cfs
Discharge Full	3.00	cfs
Slope Full	166100	ft/ft
Flow Type	N/A	

Pipe Run 123-8"
Worksheet for Circular Channel

Project Description	
Worksheet	123
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	006400	ft/ft
Discharge	1.00	cfs

Results		
Depth	0.68	ft
Diameter	8	in
Flow Area	0.4	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	0.47	ft
Percent Full	100.0	%
Critical Slope	009117	ft/ft
Velocity	2.79	ft/s
Velocity Head	0.12	ft
Specific Energ	0.80	ft
Froude Numbe	0.00	
Maximum Disc	1.08	cfs
Discharge Full	1.00	cfs
Slope Full	006400	ft/ft
Flow Type	N/A	

Pipe Run 124-15"
Worksheet for Circular Channel

Project Description	
Worksheet	124
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	129800	ft/ft
Discharge	12.00	cfs

Results		
Depth	0.98	ft
Diameter	12	in
Flow Area	0.7	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	0.97	ft
Percent Full	100.0	%
Critical Slope	124642	ft/ft
Velocity	16.07	ft/s
Velocity Head	4.01	ft
Specific Energ;	4.99	ft
Froude Numbe	0.00	
Maximum Disc	12.91	cfs
Discharge Full	12.00	cfs
Slope Full	129800	ft/ft
Flow Type	N/A	

Pipe Run 125-15"
Worksheet for Circular Channel

Project Description	
Worksheet	125
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	046200	ft/ft
Discharge	8.00	cfs

Results		
Depth	1.02	ft
Diameter	12	in
Flow Area	0.8	ft^2
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.00	ft
Percent Full	100.0	%
Critical Slope	041611	ft/ft
Velocity	9.86	ft/s
Velocity Head	1.51	ft
Specific Energ	2.53	ft
Froude Numbe	0.00	
Maximum Disc	8.61	cfs
Discharge Full	8.00	cfs
Slope Full	046200	ft/ft
Flow Type	N/A	

Pipe Run 126-15"
Worksheet for Circular Channel

Project Description	
Worksheet	126
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	046200	ft/ft
Discharge	12.00	cfs

Results		
Depth	1.18	ft
Diameter	14	in
Flow Area	1.1	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.16	ft
Percent Full	100.0	%
Critical Slope	041783	ft/ft
Velocity	10.91	ft/s
Velocity Head	1.85	ft
Specific Energ	3.03	ft
Froude Numbe	0.00	
Maximum Disc	12.91	cfs
Discharge Full	12.00	cfs
Slope Full	046200	ft/ft
Flow Type	N/A	

Pipe Run 127-24"
Worksheet for Circular Channel

Project Description	
Worksheet	127
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	017000	ft/ft
Discharge	7.00	cfs

Results		
Depth	1.17	ft
Diameter	14	in
Flow Area	1.1	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.05	ft
Percent Full	100.0	%
Critical Slope	014917	ft/ft
Velocity	6.55	ft/s
Velocity Head	0.67	ft
Specific Energ:	1.83	ft
Froude Numbe	0.00	
Maximum Disc	7.53	cfs
Discharge Full	7.00	cfs
Slope Full	017000	ft/ft
Flow Type	N/A	

Pipe Run 128-24"
Worksheet for Circular Channel

Project Description	
Worksheet	128
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	017000	ft/ft
Discharge	17.00	cfs

Results		
Depth	1.63	ft
Diameter	20	in
Flow Area	2.1	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.49	ft
Percent Full	100.0	%
Critical Slope	014766	ft/ft
Velocity	8.18	ft/s
Velocity Head	1.04	ft
Specific Energ	2.67	ft
Froude Numbe	0.00	
Maximum Disc	18.29	cfs
Discharge Full	17.00	cfs
Slope Full	017000	ft/ft
Flow Type	N/A	

Pipe Run 129-24"
Worksheet for Circular Channel

Project Description	
Worksheet	129
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	006400	ft/ft
Discharge	19.00	cfs

Results		
Depth	2.04	ft
Diameter	24	in
Flow Area	3.3	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.56	ft
Percent Full	100.0	%
Critical Slope	007306	ft/ft
Velocity	5.83	ft/s
Velocity Head	0.53	ft
Specific Energ;	2.57	ft
Froude Numbe	0.00	
Maximum Disc	20.44	cfs
Discharge Full	19.00	cfs
Slope Full	006400	ft/ft
Flow Type	N/A	

Pipe Run 130-24"
Worksheet for Circular Channel

Project Description	
Worksheet	130
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	033700	ft/ft
Discharge	29.00	cfs

Results		
Depth	1.75	ft
Diameter	21	in
Flow Area	2.4	ft^2
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.71	ft
Percent Full	100.0	%
Critical Slope	030017	ft/ft
Velocity	12.08	ft/s
Velocity Head	2.27	ft
Specific Energ	4.02	ft
Froude Numbe	0.00	
Maximum Disc	31.20	cfs
Discharge Full	29.00	cfs
Slope Full	033700	ft/ft
Flow Type	N/A	

Pipe Run 131-18"
Worksheet for Circular Channel

Project Description	
Worksheet	131
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	004000	ft/ft
Discharge	5.00	cfs

Results		
Depth	1.35	ft
Diameter	16	in
Flow Area	1.4	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	0.89	ft
Percent Full	100.0	%
Critical Slope	006729	ft/ft
Velocity	3.50	ft/s
Velocity Head	0.19	ft
Specific Energ	1.54	ft
Froude Numbe	0.00	
Maximum Disc	5.38	cfs
Discharge Full	5.00	cfs
Slope Full	004000	ft/ft
Flow Type	N/A	

Pipe Run 132-24"
Worksheet for Circular Channel

Project Description	
Worksheet	132
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	004000	ft/ft
Discharge	31.00	cfs

Results		
Depth	2.67	ft
Diameter	32	in
Flow Area	5.6	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.87	ft
Percent Full	100.0	%
Critical Slope	005742	ft/ft
Velocity	5.53	ft/s
Velocity Head	0.47	ft
Specific Energ	3.15	ft
Froude Numbe	0.00	
Maximum Disc	33.35	cfs
Discharge Full	31.00	cfs
Slope Full	004000	ft/ft
Flow Type	N/A	

Pipe Run 133-15"
Worksheet for Circular Channel

Project Description	
Worksheet	133
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	009500	ft/ft
Discharge	3.00	cfs

Results		
Depth	0.95	ft
Diameter	11	in
Flow Area	0.7	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	0.75	ft
Percent Full	100.0	%
Critical Slope	010110	ft/ft
Velocity	4.26	ft/s
Velocity Head	0.28	ft
Specific Energ;	1.23	ft
Froude Numbe	0.00	
Maximum Disc	3.23	cfs
Discharge Full	3.00	cfs
Slope Full	009500	ft/ft
Flow Type	N/A	

Pipe Run 134-24"
Worksheet for Circular Channel

Project Description	
Worksheet	134
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	010000	ft/ft
Discharge	9.00	cfs

Results		
Depth	1.42	ft
Diameter	17	in
Flow Area	1.6	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.17	ft
Percent Full	100.0	%
Critical Slope	009847	ft/ft
Velocity	5.72	ft/s
Velocity Head	0.51	ft
Specific Energ:	1.92	ft
Froude Numbe	0.00	
Maximum Disc	9.68	cfs
Discharge Full	9.00	cfs
Slope Full	010000	ft/ft
Flow Type	N/A	

Pipe Run 135-36"
Worksheet for Circular Channel

Project Description	
Worksheet	135
Flow Element	Circular Channe
Method	Manning's Forn
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	005000	ft/ft
Discharge	40.00	cfs

Results		
Depth	2.82	ft
Diameter	34	in
Flow Area	6.2	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	2.09	ft
Percent Full	100.0	%
Critical Slope	006169	ft/ft
Velocity	6.40	ft/s
Velocity Head	0.64	ft
Specific Energ:	3.46	ft
Froude Numbe	0.00	
Maximum Disc	43.03	cfs
Discharge Full	40.00	cfs
Slope Full	005000	ft/ft
Flow Type	N/A	

Pipe Run 136-24"
Worksheet for Circular Channel

Project Description	
Worksheet	136
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	005000	ft/ft
Discharge	17.00	cfs

Results		
Depth	2.05	ft
Diameter	25	in
Flow Area	3.3	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.48	ft
Percent Full	100.0	%
Critical Slope	006579	ft/ft
Velocity	5.17	ft/s
Velocity Head	0.42	ft
Specific Energ;	2.46	ft
Froude Numbe	0.00	
Maximum Disc	18.29	cfs
Discharge Full	17.00	cfs
Slope Full	005000	ft/ft
Flow Type	N/A	

Pipe Run 137-24"
Worksheet for Circular Channel

Project Description	
Worksheet	137
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	108700	ft/ft
Discharge	56.00	cfs

Results		
Depth	1.80	ft
Diameter	22	in
Flow Area	2.5	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.79	ft
Percent Full	100.0	%
Critical Slope	104423	ft/ft
Velocity	22.10	ft/s
Velocity Head	7.59	ft
Specific Energ	9.39	ft
Froude Numbe	0.00	
Maximum Disc	60.24	cfs
Discharge Full	56.00	cfs
Slope Full	108700	ft/ft
Flow Type	N/A	

Pipe Run 140 -8"
Worksheet for Circular Channel

Project Description	
Worksheet	140
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	095000	ft/ft
Discharge	1.00	cfs

Results		
Depth	0.41	ft
Diameter	5	in
Flow Area	0.1	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	0.40	ft
Percent Full	100.0	%
Critical Slope	088317	ft/ft
Velocity	7.68	ft/s
Velocity Head	0.92	ft
Specific Energ	1.32	ft
Froude Numbe	0.00	
Maximum Disc	1.08	cfs
Discharge Full	1.00	cfs
Slope Full	095000	ft/ft
Flow Type	N/A	

Pipe Run 141-15"
Worksheet for Circular Channel

Project Description	
Worksheet	141
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	004000	ft/ft
Discharge	4.00	cfs

Results		
Depth	1.24	ft
Diameter	15	in
Flow Area	1.2	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	0.81	ft
Percent Full	100.0	%
Critical Slope	006863	ft/ft
Velocity	3.31	ft/s
Velocity Head	0.17	ft
Specific Energ	1.41	ft
Froude Numbe	0.00	
Maximum Disc	4.30	cfs
Discharge Full	4.00	cfs
Slope Full	004000	ft/ft
Flow Type	N/A	

Pipe Run 142 -18"
Worksheet for Circular Channel

Project Description	
Worksheet	142
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	004000	ft/ft
Discharge	3.00	cfs

Results		
Depth	1.11	ft
Diameter	13	in
Flow Area	1.0	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	0.72	ft
Percent Full	100.0	%
Critical Slope	007047	ft/ft
Velocity	3.08	ft/s
Velocity Head	0.15	ft
Specific Energ;	1.26	ft
Froude Numbe	0.00	
Maximum Disc	3.23	cfs
Discharge Full	3.00	cfs
Slope Full	004000	ft/ft
Flow Type	N/A	

Pipe Run 143-18"
Worksheet for Circular Channel

Project Description	
Worksheet	143
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	014500	ft/ft
Discharge	5.00	cfs

Results		
Depth	1.06	ft
Diameter	13	in
Flow Area	0.9	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	0.93	ft
Percent Full	100.0	%
Critical Slope	013143	ft/ft
Velocity	5.68	ft/s
Velocity Head	0.50	ft
Specific Energ	1.56	ft
Froude Numbe	0.00	
Maximum Disc	5.38	cfs
Discharge Full	5.00	cfs
Slope Full	014500	ft/ft
Flow Type	N/A	

Pipe Run 144 -30"
Worksheet for Circular Channel

Project Description	
Worksheet	144
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	004000	ft/ft
Discharge	11.00	cfs

Results		
Depth	1.81	ft
Diameter	22	in
Flow Area	2.6	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.22	ft
Percent Full	100.0	%
Critical Slope	006272	ft/ft
Velocity	4.26	ft/s
Velocity Head	0.28	ft
Specific Energ	2.09	ft
Froude Numbe	0.00	
Maximum Disc	11.83	cfs
Discharge Full	11.00	cfs
Slope Full	004000	ft/ft
Flow Type	N/A	

Pipe Run 145-8"
Worksheet for Circular Channel

Project Description	
Worksheet	145
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	102200	ft/ft
Discharge	1.00	cfs

Results		
Depth	0.40	ft
Diameter	5	in
Flow Area	0.1	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	0.40	ft
Percent Full	100.0	%
Critical Slope	095440	ft/ft
Velocity	7.89	ft/s
Velocity Head	0.97	ft
Specific Energ;	1.37	ft
Froude Numbe	0.00	
Maximum Disc	1.08	cfs
Discharge Full	1.00	cfs
Slope Full	102200	ft/ft
Flow Type	N/A	

Pipe Run 146-15"
Worksheet for Circular Channel

Project Description	
Worksheet	146
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	042000	ft/ft
Discharge	3.00	cfs

Results		
Depth	0.72	ft
Diameter	9	in
Flow Area	0.4	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	0.70	ft
Percent Full	100.0	%
Critical Slope	037199	ft/ft
Velocity	7.44	ft/s
Velocity Head	0.86	ft
Specific Energ	1.58	ft
Froude Numbe	0.00	
Maximum Disc	3.23	cfs
Discharge Full	3.00	cfs
Slope Full	042000	ft/ft
Flow Type	N/A	

Pipe Run 147-30"
Worksheet for Circular Channel

Project Description	
Worksheet	147
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	004000	ft/ft
Discharge	14.00	cfs

Results		
Depth	1.98	ft
Diameter	24	in
Flow Area	3.1	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.35	ft
Percent Full	100.0	%
Critical Slope	006141	ft/ft
Velocity	4.53	ft/s
Velocity Head	0.32	ft
Specific Energ;	2.30	ft
Froude Numbe	0.00	
Maximum Disc	15.06	cfs
Discharge Full	14.00	cfs
Slope Full	004000	ft/ft
Flow Type	N/A	

Pipe Run 148-30"
Worksheet for Circular Channel

Project Description	
Worksheet	148
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	004000	ft/ft
Discharge	20.00	cfs

Results		
Depth	2.27	ft
Diameter	27	in
Flow Area	4.0	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.56	ft
Percent Full	100.0	%
Critical Slope	005956	ft/ft
Velocity	4.95	ft/s
Velocity Head	0.38	ft
Specific Energ	2.65	ft
Froude Numbe	0.00	
Maximum Disc	21.51	cfs
Discharge Full	20.00	cfs
Slope Full	004000	ft/ft
Flow Type	N/A	

Pipe Run 149-18"
Worksheet for Circular Channel

Project Description	
Worksheet	149
Flow Element	Circular Channe
Method	Manning's Forn
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	099200	ft/ft
Discharge	11.00	cfs

Results		
Depth	0.99	ft
Diameter	12	in
Flow Area	0.8	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	0.99	ft
Percent Full	100.0	%
Critical Slope	094143	ft/ft
Velocity	14.22	ft/s
Velocity Head	3.14	ft
Specific Energ	4.13	ft
Froude Numbe	0.00	
Maximum Disc	11.83	cfs
Discharge Full	11.00	cfs
Slope Full	099200	ft/ft
Flow Type	N/A	

Pipe Run 150-30"
Worksheet for Circular Channel

Project Description	
Worksheet	150
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	082400	ft/ft
Discharge	29.00	cfs

Results		
Depth	1.48	ft
Diameter	18	in
Flow Area	1.7	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.47	ft
Percent Full	100.0	%
Critical Slope	077967	ft/ft
Velocity	16.90	ft/s
Velocity Head	4.44	ft
Specific Energ:	5.92	ft
Froude Numbe	0.00	
Maximum Disc	31.20	cfs
Discharge Full	29.00	cfs
Slope Full	082400	ft/ft
Flow Type	N/A	

Pipe Run 151-30"
Worksheet for Circular Channel

Project Description	
Worksheet	151
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	030200	ft/ft
Discharge	31.00	cfs

Results		
Depth	1.83	ft
Diameter	22	in
Flow Area	2.6	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.78	ft
Percent Full	100.0	%
Critical Slope	026693	ft/ft
Velocity	11.79	ft/s
Velocity Head	2.16	ft
Specific Energ	3.99	ft
Froude Numbe	0.00	
Maximum Disc	33.35	cfs
Discharge Full	31.00	cfs
Slope Full	030200	ft/ft
Flow Type	N/A	

Pipe Run 152-30"
Worksheet for Circular Channel

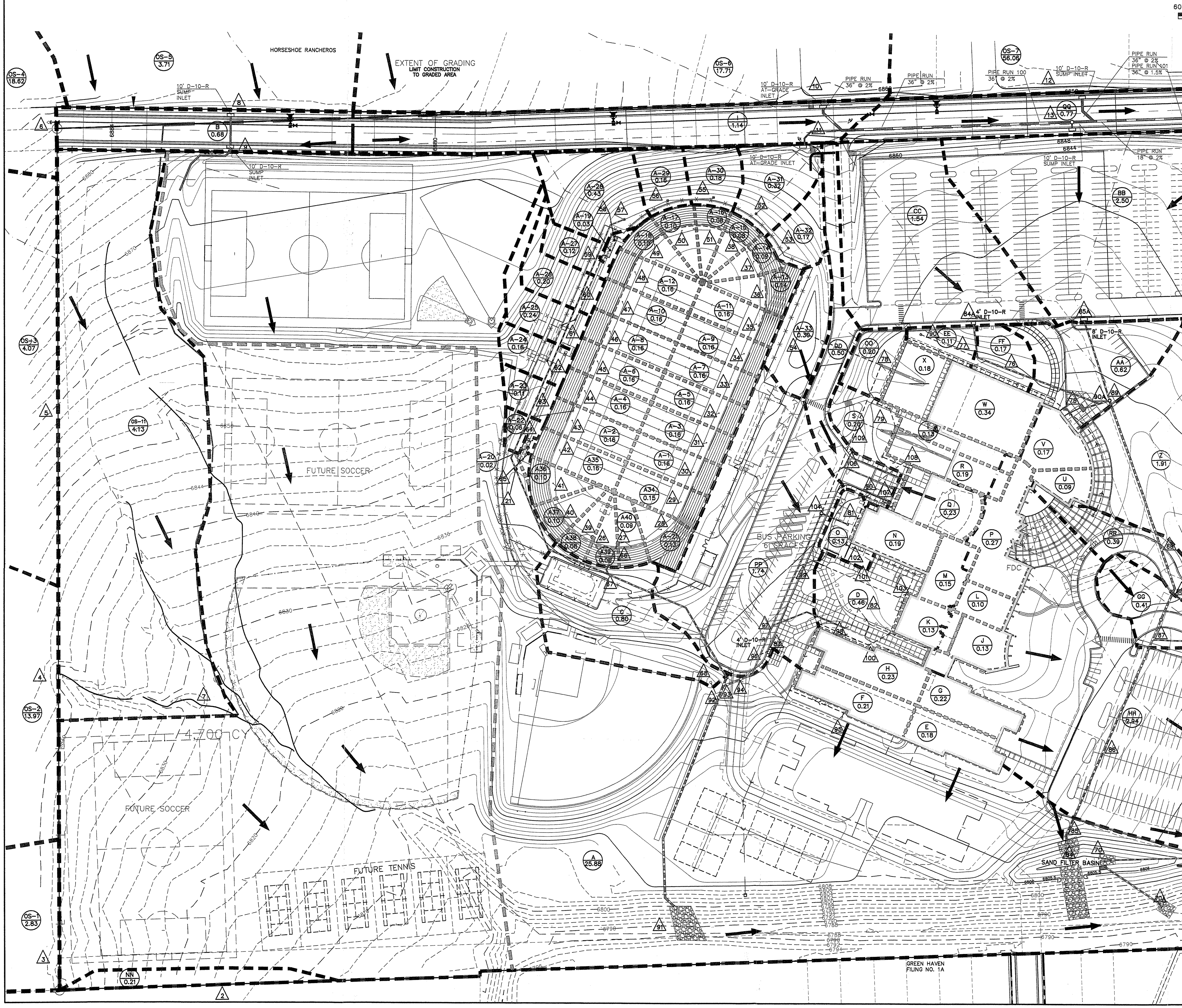
Project Description	
Worksheet	152
Flow Element	Circular Channe
Method	Manning's Forr
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	078000	ft/ft
Discharge	48.00	cfs

Results		
Depth	1.80	ft
Diameter	22	in
Flow Area	2.6	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	1.80	ft
Percent Full	100.0	%
Critical Slope	073847	ft/ft
Velocity	18.78	ft/s
Velocity Head	5.48	ft
Specific Energ;	7.28	ft
Froude Numbe	0.00	
Maximum Disc	51.63	cfs
Discharge Full	48.00	cfs
Slope Full	078000	ft/ft
Flow Type	N/A	

DRAINAGE MAPS

D-49 HIGH SCHOOL NO. 3
COLORADO SPRINGS, COLORADO
DRAINAGE MAP-FINAL BUILD-OUT
JUNE 2007



LEGEND
- BASIN DESIGNATION / AREA IN BASIN (AC)
- DESIGN POINT
- BASIN BOUNDARY
- PROPOSED BASIN LINE MINOR
- EXISTING 2' CONTOUR
- EXISTING 10' CONTOUR
- DIRECTION OF FLOW

NO.	REVISIONS DESCRIPTION	DATE

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, TERRA NOVA ENGINEERING AND SURVEYING, INC. APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

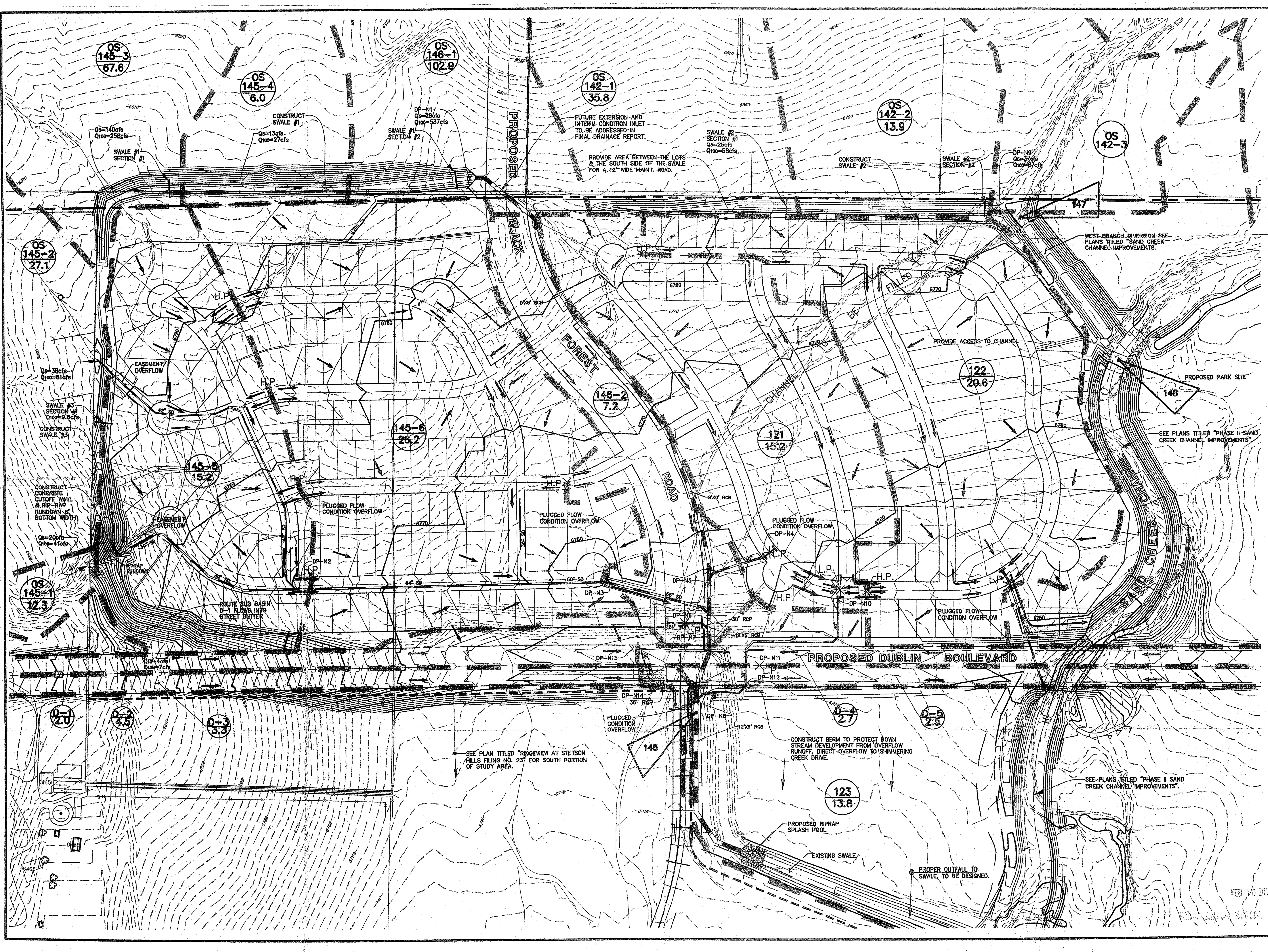
PREPARED FOR:
FALCON SCHOOL DISTRICT 49
ATTN: HENRY REITWESNER
10850 E. WOODMEN ROAD
FALCON, CO. 80831
719-495-1004

Terra Nova Engineering, Inc.

D-49 HIGH SCHOOL NO. 3

DRAINAGE MAP - FINAL BUILD-OUT

DESIGNED BY	DLM
DRAWN BY	DLM
CHECKED BY	LDR
H-SCALE	1"=60'
V-SCALE	N/A
JOB NO.	0567.00
DATE ISSUED	5/1/07
SHEET NO.	1 OF 1



UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, JR ENGINEERING APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

PREPARED FOR

J·R ENGINEERING
A Subsidiary of Westrian
4310 ArrowsWest Drive • Colorado Springs, CO 80907
719-593-2593 • Fax: 719-528-6613
www.jrengineering.com

No.	REVISION	BY	DATE

H-SCALE	120
V-SCALE	N/A
DATE	12/23/02
DESIGNED BY	JRB
DRAWN BY	DWS
CHECKED BY	

RIDGEVIEW
NORTHEAST PORTION

PRELIMINARY
DRAINAGE PLAN

SHEET 2 OF 2

JOB NO. 29104.90