

CITY OF ALBUQUERQUE

Hydrology Section Planning Department
David S. Campbell, Director



Timothy M. Keller, Mayor

February 22, 2019

Savana Garcia
Wilson & Company Inc.
4401 Masthead St NE, Suite 150
Albuquerque, NM, 87109

**RE: 4600 Edith Blvd NE – SWMD Admin. Office and Vehicle Maintenance
Conceptual G&D Plan (Engineer's Stamp 4/29/2019)
Hydrology File: G15D202**

Based upon the information provided in your submittal received 5/15/2019, the Conceptual Grading and Drainage Plan can't be approved for Site Plan, Building Permit or Work Order until the following comments are addressed and the plan agrees with the plat and site plan.

Prior approval of the Conceptual G&D for Site Plan

1. Please correct the Stormwater Quality Volume (SWQV) calculation at the end of the "Proposed Conditions" note on sheet GR-1. The required 80th percentile volume is 0.26" excess precipitation from the impervious area.
2. It appears that right of way dedication is needed along Rankin Rd. to contain the new C&G and Sidewalk. Please show the new Right of Way on the G&D Plan.
3. Add an inlet at the west end of the C&G in Rankin Rd. Identify the basin area draining to the new inlet and size the inlet(s) for total interception of the 100 year flows in Rankin Rd.
4. Please add a BMP, Pond C, for Basin 206 below the retaining wall.

Prior to approval of the final G&D Plan for Building Permit and Work Order

5. Remove the label "Not for Construction" from the G&D Plan. Include an overall sheet like the Conceptual G&D Plan and provide a detailed design at a larger scale on multiple 24' x 36" sheets including many more spot elevations and details of the ponds.
6. Please provide a cover page and table of contents for the calculations/report, and an engineer's stamp and signature. Please number the pages and organize each copy of the report in the same order. One of the submitted reports got scrambled and was difficult to reassemble. Please bind or staple the report.
7. Please add typical section of Rankin Road to the G&D Plan and include dimensions from the face of curb and sidewalk to the new right of way line. Also provide a typical section of the slope/retaining wall at the west end of the Rankin Rd frontage between the sidewalk and parking lot. The Retaining wall must not encroach into the public right of way.

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15. Typical sections should be shown at numerous locations around the perimeter of the site. Each section should show the property line, both the existing and proposed grades, slopes and walls with dimensions, both horizontal and vertical, as necessary to demonstrate compliance with DPM 22.5.B
16. A Phasing Plan should identify which portions of the site work are to be completed with each building.

Prior to Certificate of Occupancy

17. An engineer's Certification will be required for each building with site improvements complete according to the approved phasing plan.

If you have any questions, please contact me at 924-3986 or e-mail jhughes@cabq.gov.

Sincerely,

James D. Hughes, P.E.
Principal Engineer, Planning Dept.
Development and Review Services

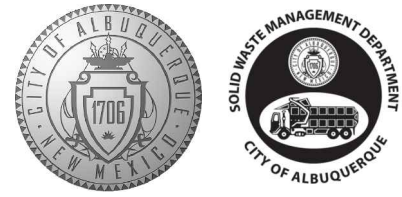
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NM 87103

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SWMD Maintenance & Administration Buildings Project
City of Albuquerque
Department of Municipal Development
Solid Waste Management Department



DRAINAGE ANALYSIS

INTRODUCTION

THE PROJECT SITE IS LOCATED IN NORTHEAST ALBUQUERQUE AT 4600 EDITH BLVD. THE SITE IS BOUNDED BY THE ALAMEDA DRAIN/EDITH BLVD. TO THE WEST, COMANCHE RD TO THE NORTH, RANKIN RD TO THE SOUTH, AND COMMERCIAL BUSINESSES TO THE EAST OF THE SITE. THE SITE IS NOT LOCATED WITHIN A DESIGNATED FEMA FLOOD PLAIN MAP SEE FIRM MAPS 35001C0119G AND 35001C0332G. THE DRAINAGE REPORT HAS BEEN PREPARED IN ACCORDANCE WITH THE LATEST REVISION TO VOLUME 2 SECTION 22.2 OF THE CITY OF ALBUQUERQUE PROCESS MANUAL.

EXISTING CONDITIONS

THE SITE IS 23.8 AC AND MAJORITY OF THE SITE IS IMPERVIOUS. THE EXISTING SITE TOPOGRAPHY GENERALLY SLOPES FROM EAST TO WEST. THE EXISTING DRAINAGE INFRASTRUCTURE DIVERTS ALL THE SITES FLOWS THROUGH A SERIES OF WATER/OIL SEPARATORS AND INLETS INTO TWO PONDS LOCATED ON THE NORTH AND SOUTH OF THE SITE. THE LARGER DETENTION POND TO THE NORTH HAS AN OUTLET STRUCTURE THAT DISCHARGES THROUGH A 30 INCH CORRUGATED METAL PIPE (CMP) INTO A DRAINAGE SYSTEM IN COMANCHE RD. THE CONSTRUCTION PLANS FOR STORM WATER CONTROL IMPROVEMENTS FOR SOLID WASTE MANAGEMENT FACILITY COA PROJECT NUMBER 700691 PREPARED BY APPLIED ENGINEERING AND SURVEYING, INC. DATED 07/22/03 SHEET 2 OF 17 SHOWS AN OUTLET FROM THE POND WITH PEAK FLOW OF 44.3 CFS AND AN ALLOWABLE DISCHARGE OF 47.6 CFS FROM THE SITE. THE NORTHERN THREE QUARTERS OF THE SITE DRAINS INTO THIS POND. THE REMAINDER OF THE SITE DRAINS INTO THE SMALLER RETENTION POND TO THE SOUTHWEST CORNER OF THE SITE.

THE COMMERCIAL BUSINESSES TO THE EAST OF THE SITE ALSO DRAIN FROM THE EAST TO WEST. THE BUILDINGS ON THESE COMMERCIAL SITES ARE APPROXIMATELY 10-15 FT HIGHER THAN THE SITES EXISTING GRADE. THE OFFSITE FLOWS WILL FLOW DIRECTLY TO THE EAST AND THE NORTHERN HALF WILL EVENTUALLY DRAIN INTO THE NORTH POND AND THE SOUTH HALF FLOWS INTO THE SOUTH RETENTION POND. THE POND IS A SHALLOW POND WITH ROCK RIPRAP SPILLWAY DRAINING INTO RANKIN RD. THE AREA TO THE NORTH OF THE SITE IS COMANCHE RD WHICH HAS DRAINAGE INFRASTRUCTURE IN PLACE TO PREVENT FLOWS FROM BEING DISCHARGED TO THE PROJECT SITE. RANKIN RD TO THE SOUTH DRAINS EAST TO WEST AND THE FLOWS DO NOT ENTER THE PROPERTY. THE AREA TO THE WEST DRAINS EAST TO WEST AND THOSE FLOWS WILL ENTER THE ALAMEDA DRAIN.

PROPOSED CONDITIONS

THE PROPOSED SITE WILL MAINTAIN THE GENERAL FLOW DIRECTION OF EAST TO WEST AND SOUTH TO NORTH. ALL THE BASINS EXCEPT BASIN 206 WILL ULTIMATELY DRAIN INTO THE NEW POND LOCATED IN BASIN 220. BASINS 201-204 AND OFFSITE BASINS 1 AND 2 WILL CAPTURE THE DRAINAGE FROM THE MAINTENANCE AREA AND COMMERCIAL VEHICLE PARKING LOT AND BE ROUTED THROUGH A NEW POND IN BASIN 204. THIS POND WILL BE LINED AND WILL HAVE A WATER QUALITY OUTLET TO REMOVE THE TRASH AND OIL CAPTURED FROM THE SITE RUNOFF. THE NEW POND IN BASIN 220 WILL BE CONNECTED TO THE EXISTING POND DRAINAGE INFRASTRUCTURE THAT DISCHARGES TO THE STORM DRAIN SYSTEM IN COMANCHE RD. THIS POND WILL HAVE A WATER QUALITY RISER TO HELP REMOVE TRASH AND SEDIMENT FROM THE RUNOFF. THE POND DISCHARGE WILL BE 44.3 CFS WHICH WILL LESS THAN THE ALLOWABLE SITE DISCHARGE OF 47.6 CFS. THE EXISTING 60 INCH DRAINAGE SYSTEM IN COMANCHE RD IS ABOUT 19 FT DEEP. NO DATA RELATED TO HYDRAULIC GRADE LINE OF THIS SYSTEM WAS FOUND. THE POND OUTFALL WILL TIE TO THE EXISTING 30 INCH PIPE UPSTREAM OF THE EXISTING SYSTEM IN COMANCHE RD. THE EXISTING RETENTION POND IN BASIN 206 LOCATED ON THE SOUTHWEST CORNER WILL BE REMOVED. RUNOFF FROM THIS BASIN SHEET FLOWS TO AN INLET WHICH WILL ULTIMATELY DRAIN INTO THE EXISTING CATTLE GUARD INLET AT THE INTERSECTION OF EDITH BLVD AND RANKIN RD. THE COA STORMWATER QUALITY VOLUME FOR THE 80th PERCENTILE EVENT WAS CALCULATED USING 0.5 INCH OF RAINFALL DEPTH (0.6 INCH LESS 0.1 INCH FOR INITIAL ABSTRACTION). THIS VOLUME WAS CALCULATED TO BE 0.9 AC-FT FOR THE 21.48 AC OF THE SITE IMPERVIOUS AREAS. THIS RETENTION VOLUME WILL BE ACCOMMODATED IN POND A.

CALCULATIONS

THE 100-YR, 24-HR STORM EVENT USING AHYMO S-4 WERE USED TO CALCULATE PEAK FLOWS AND RUNOFF VOLUME FOR THE PROPOSED DEVELOPMENT WHICH ARE SUMMARIZED HERE. BENTLEY FLOWMASTER V8I WERE UTILIZED TO DETERMINE PROPOSED INLET CAPACITIES. BENTLEY CULVERTMASTER V3.3 WAS USED TO DESIGN PONDS OUTFALL PIPES. PEAK FLOWS FROM THE MODEL WERE ENTERED INTO THE STORMCAD V10.1 SOFTWARE TO ANALYZE AND DESIGN THE STORM SYSTEMS. BOTH PONDS INCLUDE ONE FOOT OF FREEBOARD AND SIDE SLOPES OF 3H: 1V.

CONCEPTUAL GRADING & DRAINAGE PLAN



NOT FOR CONSTRUCTION

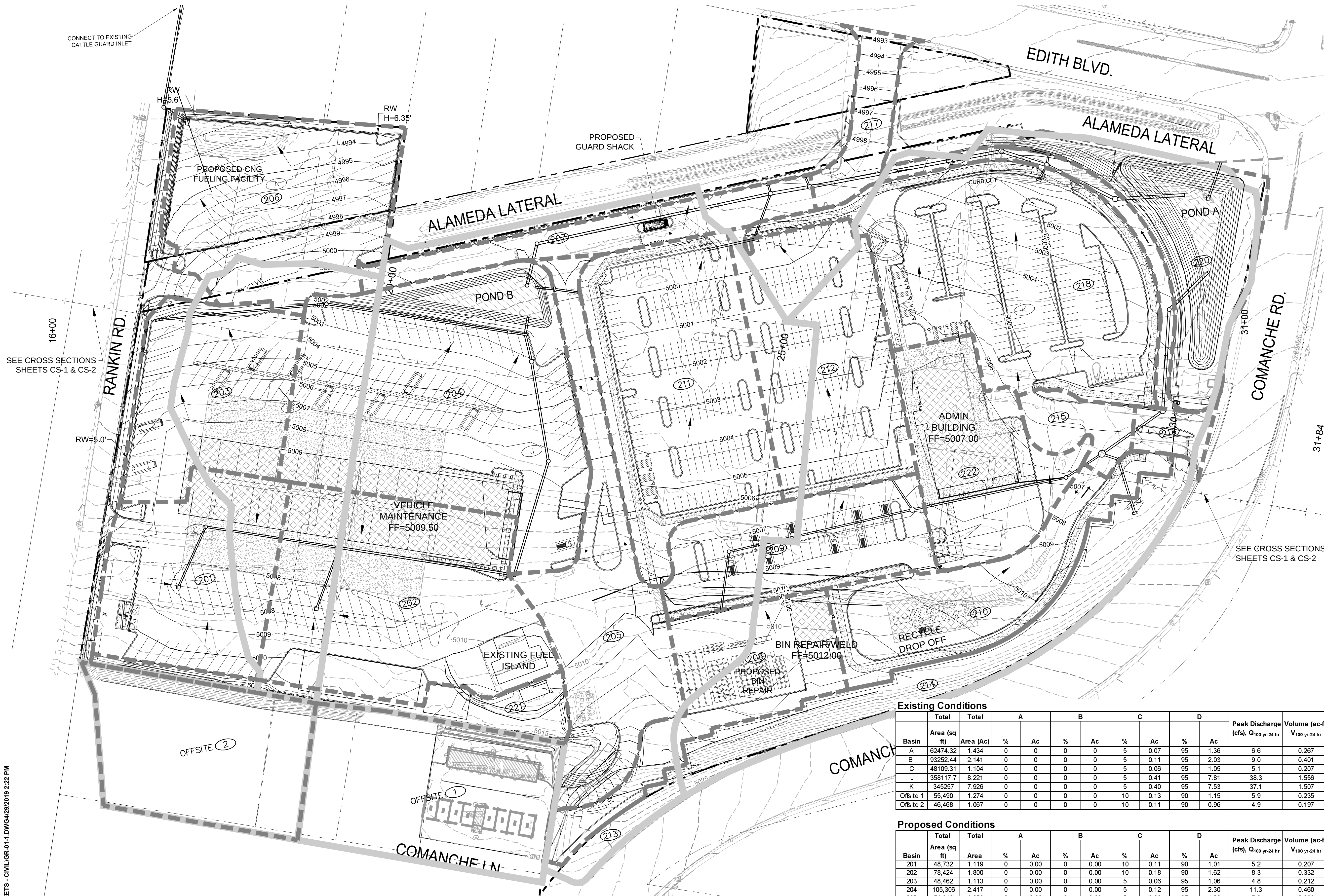
JRMA
ARCHITECTS ENGINEERS
JR MILLER & ASSOCIATES
2700 SATURN STREET
BREA, CA 92821
714-524-1870

WILSON & COMPANY
WILSON & COMPANY, INC.
4401 MASTHEAD ST NE
ALBUQUERQUE, NM 87109
505-348-4000

MAY 01, 2019

SHEET No. GR-1

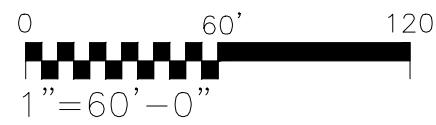
COA PROJECT No. 7006.92 JRMA No. 4907



LEGEND

- XX EXISTING CONTOURS
- XX PROPOSED CONTOURS
- FF FINISHED FLOOR
- X% SLOPE ARROW
- PROPOSED RETAINING WALL
- EXISTING BASIN BOUNDARY
- PROPOSED BASIN BOUNDARY

GRADING & DRAINAGE PLAN



Pond	Peak Flow (cfs)		Volume (ac-ft)		Elevation (ft)		
	In	Out	Prvd	Req'd	Top	Bottom	WSEL
A	97	44.3	1.95	1.20	4997	4989	4995.4
B	48	44.2	0.56	0.39	4999	4994	4998.0

Existing Conditions

Basin	Total	Total	A		B		C		D		Peak Discharge (cfs), Q _{100 yr-24 hr}	Volume (ac-ft) V _{100 yr-24 hr}
	Area (sq ft)	Area (Ac)	%	Ac	%	Ac	%	Ac	%	Ac		
A	82474.32	1.434	0	0	0	0	5	0.07	95	1.36	6.6	0.267
B	93252.44	2.141	0	0	0	0	5	0.11	95	2.03	9.0	0.401
C	48109.31	1.104	0	0	0	0	5	0.06	95	1.05	5.1	0.207
J	358117.7	8.221	0	0	0	0	5	0.41	95	7.81	38.3	1.556
K	345257	7.926	0	0	0	0	5	0.40	95	7.53	37.1	1.507
Offsite 1	55,490	1.274	0	0	0	0	10	0.13	90	1.15	5.9	0.235
Offsite 2	46,468	1.067	0	0	0	0	10	0.11	90	0.96	4.9	0.197

Proposed Conditions

Basin	Total	Total	A		B		C		D		Peak Discharge (cfs), Q _{100 yr-24 hr}	Volume (ac-ft) V _{100 yr-24 hr}
	Area (sq ft)	Area	%	Ac	%	Ac	%	Ac	%	Ac		
201	48,732	1.119	0	0.00	0	0.00	10	0.11	90	1.01	5.2	0.207
202	78,424	1.800	0	0.00	0	0.00	10	0.18	90	1.62	8.3	0.332
203	48,462	1.113	0	0.00	0	0.00	5	0.06	95	1.06	4.8	0.212
204	105,306	2.417	0	0.00	0	0.00	5	0.12	95	2.30	11.3	0.460
205	54,819	1.258	0	0.00	0	0.00	5	0.06	95	1.20	5.9	0.239
206	59,717	1.371	0	0.00	0	0.00	5	0.07	95	1.30	6.4	0.260
207	23,213	0.533	0	0.00	0	0.00	5	0.03	95	0.51	2.5	0.101
208	38,436	0.882	0	0.00	0	0.00	5	0.04	95	0.84	4.2	0.168
209	39,485	0.906	0	0.00	0	0.00	2	0.02	98	0.89	4.3	0.176
210	40,798	0.937	0	0.00	0	0.00	2	0.02	98	0.92	4.4	0.181
211	71,721	1.646	0	0.00	0	0.00	5	0.08	95	1.56	7.7	0.312
212	56,736	1.302	0	0.00	0	0.00	5	0.07	95	1.24	6.1	0.248
213	6,289	0.144	0	0.00	0	0.00	75	0.11	25	0.04	0.7	0.025
214	38,158	0.876	0	0.00	0	0.00	75	0.09	25	0.22	3.9	0.147
215	10,070	0.231	1	0.00	1	0.00	10	0.02	90	0.21	1.1	0.042
216	5,758	0.132	0	0.00	0	0.00	5	0.01	95	0.13	0.6	0.026
217	12,735	0.292	0	0.00	0	0.00	20	0.06	80	0.23	1.3	0.051
218	90,301	2.073	0	0.00	0	0.00	10	0.21	90	1.87	9.6	0.382
219	10,416	0.239	0	0.00	0	0.00	5	0.01	95	0.23	1.1	0.045
220	38,671	0.888	0	0.00	0	0.00	15	0.13	85	0.75	4.1	0.159
221	16,629	0.382	0	0.00	0	0.00	10	0.04	90	0.34	1.8	0.071
222	41,098	0.943	0	0.00	0	0.00	2	0.02	98	0.92	4.5	0.182
Offsite 1	55,490	1.274	0	0.00	0	0.00	10	0.13	90	1.15	5.9	0.235
Offsite 2	46,468	1.067	0	0.00	0	0.00	10	0.11	90	0.96	4.9	0.197

HYDROLOGY CALCULATIONS

AHYMO-EXISTING CONDITIONS

PAGE = 1

TIME= 0.00

TIME= 0.00

ALBUQUERQUE

RAINFALL DATA FROM NOAA ATLAS 14

*C 100 YEAR 24HR STORM

RAINFALL TYPE= 2 NOAA 14

RAIN24= 2.600

COMPUTE NM HYD	A	-	1	0.00220	6.60	0.267	2.27931	1.467	4.687	PER IMP=	95.00
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COMPUTE NM HYD	A	-	2	0.00220	9.89	0.1207	2.127932	1.467	4.685	PER IMP=	95.00
COMPUTE NM HYD	B	-	2	0.00330	9.89	0.401	2.27932	1.467	4.685	PER IMP=	95.00

COMPUTE NM HYD	C	-	3	0.00170	5.10	0.207	2.27932	1.467	4.691 PER IMP=	95.00
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COMPUTE NM HYD	1	-	4	0.01280	38.34	1.556	2.27932	1.467	4.680 PER TMP=	95.00
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COMPUTE NM HYD	5	-	5	0.01240	37.14	1.507	2.27932	1.467	4.680 PER TMP=	95.00
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COMPUTE NM HYD	OFF1	-	6	0.00199	5.89	0.235	2.21326	1.467	4.621	PER TMP=	90.00
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COMPUTE NM HYD	OFF1	-	6	0.00155	5.183	0.1255	2.711526	1.467	4.621 PER IMP=	50.00
COMPUTE NM HYD	OFF2	-	7	0.00167	4.94	0.197	2.21326	1.467	4.623 PER TMP=	90.00

FINISH

```

* SWMD Maintenance & Admin Project Proposed Basins
* Drainage Basin Analysis
*S "EXISTING" CONDITION MODEL FOR SWMD Maintenance & Admin Project
*
START          TIME=0.0 PUNCH CODE=0 PRINT CODE=0
LOCATION        ALBUQUERQUE
*
* RAINFALL FROM NOAA COA DEVELOPMENT PROCESS MANUAL
*S          RAINFALL DATA FROM NOAA ATLAS 14
*S*****
*S 100 YEAR 24HR STORM
RAINFALL      TYPE=2
              QUARTER=1.06 IN
              HOUR= 1.77 IN
              SIX HR= 2.29 IN
              DAY= 2.60 IN   DT=0.03333
*
*** Sub-BASIN A ****
*
COMPUTE LT TP      LCODE=1 UPLAND/LAG TIME METHOD
                  NK=2 ISLOPE=1
                  LENGTH=100 FT SLOPE=0.050 K=0.7
                  LENGTH=105 FT SLOPE=0.011 K=2.0
*
COMPUTE NM HYD     ID=1 HYD NO=A DA=0.0022 SQ MI
                  PER A=00 PER B=00 PER C=5 PER D=95
                  TP=-0.1 hr MASSRAIN=-1
*
PRINT HYD          ID=1 CODE=1
*
*
*** Sub-BASIN B ****
*
COMPUTE LT TP      LCODE=1 UPLAND/LAG TIME METHOD
                  NK=2 ISLOPE=1
                  LENGTH=100 FT SLOPE=0.020 K=0.7
                  LENGTH=140 FT SLOPE=0.020 K=2.0
*
COMPUTE NM HYD     ID=2 HYD NO=B DA=0.0033 SQ MI
                  PER A=00 PER B=00 PER C=5 PER D=95
                  TP=-0.1 hr MASSRAIN=-1
*
PRINT HYD          ID=2 CODE=1
*
*
*** Sub-BASIN C ****
*
COMPUTE LT TP      LCODE=1 UPLAND/LAG TIME METHOD
                  NK=2 ISLOPE=1
                  LENGTH=100 FT SLOPE=0.020 K=0.7
                  LENGTH=100 FT SLOPE=0.020 K=2.0
*
COMPUTE NM HYD     ID=3 HYD NO=C DA=0.0017 SQ MI
                  PER A=00 PER B=00 PER C=5 PER D=95
                  TP=-0.1 hr MASSRAIN=-1
*
PRINT HYD          ID=3 CODE=1
*
*
*** Sub-BASIN J ****
*
COMPUTE LT TP      LCODE=1 UPLAND/LAG TIME METHOD
                  NK=2 ISLOPE=1
                  LENGTH=100 FT SLOPE=0.020 K=0.7
                  LENGTH=170 FT SLOPE=0.020 K=2.0
*
COMPUTE NM HYD     ID=4 HYD NO=J DA=0.0128 SQ MI
                  PER A=00 PER B=00 PER C=5 PER D=95
                  TP=-0.1 hr MASSRAIN=-1
*
PRINT HYD          ID=4 CODE=1
*
*

```

*** Sub-BASIN K ***

*

COMPUTE LT TP LCODE=1 UPLAND/LAG TIME METHOD
 NK=2 ISLOPE=1
 LENGTH=100 FT SLOPE=0.020 K=0.7
 LENGTH=600 FT SLOPE=0.020 K=2.0

*

COMPUTE NM HYD ID=5 HYD NO=K DA=0.0124 SQ MI
 PER A=00 PER B=00 PER C=5 PER D=95
 TP=-0.1 hr MASSRAIN=-1

*

PRINT HYD ID=5 CODE=1

*

*

*** Sub-BASIN OFF1 ***

*

COMPUTE LT TP LCODE=1 UPLAND/LAG TIME METHOD
 NK=2 ISLOPE=1
 LENGTH=100 FT SLOPE=0.010 K=0.7
 LENGTH=200 FT SLOPE=0.050 K=2.0

*

COMPUTE NM HYD ID=6 HYD NO=OFF1 DA=0.00199 SQ MI
 PER A=00 PER B=00 PER C=10 PER D=90
 TP=-0.1 hr MASSRAIN=-1

*

PRINT HYD ID=6 CODE=1

*

*

*** Sub-BASIN OFF2 ***

*

COMPUTE LT TP LCODE=1 UPLAND/LAG TIME METHOD
 NK=2 ISLOPE=1
 LENGTH=100 FT SLOPE=0.010 K=0.7
 LENGTH=200 FT SLOPE=0.050 K=2.0

*

COMPUTE NM HYD ID=7 HYD NO=OFF2 DA=0.00167 SQ MI
 PER A=00 PER B=00 PER C=10 PER D=90
 TP=-0.1 hr MASSRAIN=-1

*

PRINT HYD ID=7 CODE=1

*

*

*

FINISH

AHYMO-PROPOSED CONDITIONS

AHYMO.SUM

AHYMO PROGRAM SUMMARY TABLE (AHYMO-S4)

- Ver. S4.01a, Rel: 01a

RUN DATE (MON/DAY/YR) =04/25/2019

INPUT FILE = 14-100-132-01\2_Disciplines\Drainage_or_Sitework\Calculations\AHYMO\SWMD.txt USER NO.= WilsonCoANMSiteA96476897

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 1 NOTATION
*S "PROPOSED" CONDITION MODEL FOR SWMD Maintenance & Admin Project										
START										TIME= 0.00
LOCATION ALBUQUERQUE										
*S RAINFALL DATA FROM NOAA ATLAS 14										
*S*****										
*S 100 YEAR 24HR STORM										
RAINFALL TYPE= 2 NOAA 14										RAIN24= 2.600
COMPUTE NM HYD	OFF2	-	1	0.00167	4.94	0.197	2.21326	1.467	4.623	PER IMP= 90.00
COMPUTE NM HYD	201.00	-	97	0.00175	5.18	0.207	2.21326	1.467	4.623	PER IMP= 90.00
ADD HYD	201SUM	1897	12	0.00342	10.12	0.404	2.21313	1.467	4.623	
COMPUTE NM HYD	203.00	-	2	0.00160	4.80	0.195	2.27932	1.467	4.692	PER IMP= 95.00
ADD HYD	203SUM	128	2 10	0.00502	14.92	0.598	2.23418	1.467	4.645	
COMPUTE NM HYD	OFF1	-	1	0.00199	5.89	0.235	2.21326	1.467	4.621	PER IMP= 90.00
COMPUTE NM HYD	202.00	-	98	0.00281	8.31	0.332	2.21326	1.467	4.618	PER IMP= 90.00
ADD HYD	202SUM	1898	3	0.00480	14.19	0.567	2.21316	1.467	4.620	
COMPUTE NM HYD	204.00	-	2	0.00378	11.33	0.460	2.27932	1.467	4.684	PER IMP= 95.00
ADD HYD	204SUM	38	2 1	0.00858	25.52	1.026	2.24228	1.467	4.648	
COMPUTE NM HYD	221.00	-	2	0.00060	1.78	0.071	2.21326	1.467	4.647	PER IMP= 90.00
COMPUTE NM HYD	205.00	-	5	0.00197	5.91	0.239	2.27931	1.467	4.689	PER IMP= 95.00
ADD HYD	205SUM	28	5 4	0.00257	7.70	0.310	2.26372	1.467	4.679	
ADD HYD	205SUMA	18	4 6	0.01115	33.22	1.336	2.24722	1.467	4.655	
ADD HYD	205SUMB	108	6 1	0.01617	48.14	1.935	2.24317	1.467	4.652	
ROUTE RESERVOIR	PONDA	1	30	0.01617	44.36	1.858	2.15480	1.533	4.286	AC-FT= 0.391
COMPUTE NM HYD	206.00	-	1	0.00223	6.69	0.271	2.27932	1.467	4.687	PER IMP= 95.00
ROUTE MCUNGE	206Rt	1	2	0.00223	6.69	0.271	2.27922	1.467	4.687	CCODE = 0.0
COMPUTE NM HYD	208.00	-	8	0.00138	4.15	0.168	2.27932	1.467	4.694	PER IMP= 95.00
COMPUTE NM HYD	209.00	-	9	0.00142	4.30	0.176	2.31895	1.467	4.734	PER IMP= 98.00
ADD HYD	209SUM	98	8 11	0.00280	8.45	0.343	2.29924	1.467	4.714	
COMPUTE NM HYD	222.00	-	12	0.00147	4.45	0.182	2.31895	1.467	4.734	PER IMP= 98.00
ADD HYD	222SUM	118	12 13	0.00427	12.90	0.525	2.30597	1.467	4.721	
COMPUTE NM HYD	215.00	-	14	0.00036	1.08	0.042	2.21326	1.467	4.672	PER IMP= 90.00
ADD HYD	215SUM	148	13 15	0.00463	13.98	0.568	2.29873	1.467	4.717	
COMPUTE NM HYD	216.00	-	16	0.00021	0.64	0.026	2.27932	1.467	4.746	PER IMP= 95.00
ADD HYD	216SUM	168	15 17	0.00484	14.62	0.593	2.29786	1.467	4.718	
COMPUTE NM HYD	213.00	-	2	0.00023	0.66	0.025	2.01509	1.467	4.504	PER IMP= 75.00
COMPUTE NM HYD	214.00	-	99	0.00137	3.88	0.147	2.01509	1.467	4.425	PER IMP= 75.00
ADD HYD	214SUM	998	2 3	0.00160	4.54	0.172	2.01488	1.467	4.436	
COMPUTE NM HYD	210.00	-	1	0.00146	4.42	0.181	2.31895	1.467	4.734	PER IMP= 98.00

					AHYMO. SUM						
ADD HYD	210SUM	1& 3	31	0.00306	8.97	0.352	2.15989	1.467	4.578		
ADD HYD	210SUMA	17&31	18	0.00790	23.58	0.946	2.24442	1.467	4.664		
COMPUTE NM HYD	207.00	-	1	0.00083	2.50	0.101	2.27932	1.467	4.703	PER IMP=	95.00
COMPUTE NM HYD	211.00	-	11	0.00257	7.71	0.312	2.27932	1.467	4.687	PER IMP=	95.00
ADD HYD	211SUM	1&11	10	0.00340	10.21	0.413	2.27918	1.467	4.691		
COMPUTE NM HYD	212.00	-	3	0.00204	6.12	0.248	2.27932	1.467	4.689	PER IMP=	95.00
ADD HYD	212SUM	10& 3	11	0.00544	16.33	0.661	2.27919	1.467	4.690		
COMPUTE NM HYD	218.00	-	1	0.00324	9.58	0.382	2.21326	1.467	4.618	PER IMP=	90.00
ADD HYD	218SUM	18& 1	10	0.01114	33.16	1.328	2.23533	1.467	4.651		
COMPUTE NM HYD	219.00	-	1	0.00037	1.12	0.045	2.27932	1.467	4.725	PER IMP=	95.00
ADD HYD	219SUM	10& 1	19	0.01151	34.28	1.373	2.23673	1.467	4.653		

⬆

		FROM	TO		PEAK	RUNOFF		TIME TO	CFS	PAGE =	2
	HYDROGRAPH	ID	ID	AREA	DISCHARGE	VOLUME	RUNOFF	PEAK	PER		
COMMAND	IDENTIFICATION	NO.	NO.	(SQ MI)	(CFS)	(AC-FT)	(INCHES)	(HOURS)	ACRE	NOTATION	
ADD HYD	219SUMA	19&11	18	0.01695	50.60	2.034	2.25036	1.467	4.665		
COMPUTE NM HYD	220.00	-	20	0.00139	4.06	0.159	2.14720	1.467	4.559	PER IMP=	85.00
ADD HYD	220SUM	18&20	21	0.01834	54.66	2.193	2.24253	1.467	4.657		
ADD HYD	POND.IN	21&30	1	0.03451	97.32	4.052	2.20142	1.500	4.406		
ROUTE RESERVOIR	PONDA	1	96	0.03451	44.30	4.051	2.20123	1.667	2.006	AC-FT=	1.209
COMPUTE NM HYD	217.00	-	6	0.00046	1.33	0.051	2.08115	1.467	4.524	PER IMP=	80.00
FINISH											

```

* SWMD Maintenance & Admin Project Proposed Basins
* Drainage Basin Analysis
*S "PROPOSED" CONDITION MODEL FOR SWMD Maintenance & Admin Project
*
START          TIME=0.0 PUNCH CODE=0 PRINT CODE=0
LOCATION         ALBUQUERQUE
*
* RAINFALL FROM NOAA COA DEVELOPMENT PROCESS MANUAL
*S          RAINFALL DATA FROM NOAA ATLAS 14
*S*****
*S 100 YEAR 24HR STORM
RAINFALL      TYPE=2
              QUARTER=1.06 IN
              HOUR= 1.77 IN
              SIX HR= 2.29 IN
              DAY= 2.60 IN   DT=0.03333

*** Sub-BASIN OFF2 ***
*
COMPUTE LT TP      LCODE=1 UPLAND/LAG TIME METHOD
                  NK=2 ISLOPE=1
                  LENGTH=100 FT SLOPE=0.010 K=0.7
                  LENGTH=200 FT SLOPE=0.050 K=2.0
*
COMPUTE NM HYD     ID=1 HYD NO=OFF2 DA=0.00167 SQ MI
                  PER A=00 PER B=00 PER C=10 PER D=90
                  TP=-0.1 hr MASSRAIN=-1
*
PRINT HYD          ID=1 CODE=1
*
*
*** Sub-BASIN 201 ***
*
COMPUTE LT TP      LCODE=1 UPLAND/LAG TIME METHOD
                  NK=2 ISLOPE=1
                  LENGTH=100 FT SLOPE=0.050 K=0.7
                  LENGTH=185 FT SLOPE=0.011 K=2.0
*
COMPUTE NM HYD     ID=97 HYD NO=201 DA=0.00175 SQ MI
                  PER A=00 PER B=00 PER C=10 PER D=90
                  TP=-0.1 hr MASSRAIN=-1
*
PRINT HYD          ID=97 CODE=1
*
*
* Total Flow from Basin (OFF2 + 201)
ADD HYD            ID=12 HYD NO=201SUM ID I=1 ID II=97
PRINT HYD          ID=12 CODE=1
*
*
*** Sub-BASIN 203 ***
*
COMPUTE LT TP      LCODE=1 UPLAND/LAG TIME METHOD
                  NK=2 ISLOPE=1
                  LENGTH=100 FT SLOPE=0.020 K=0.7
                  LENGTH=190 FT SLOPE=0.020 K=2.0
*
COMPUTE NM HYD     ID=2 HYD NO=203 DA=0.0016 SQ MI
                  PER A=00 PER B=00 PER C=5 PER D=95
                  TP=-0.1 hr MASSRAIN=-1
*
PRINT HYD          ID=2 CODE=1
*
*
* Total Flow from Basin (OFF2+201+203)
ADD HYD            ID=10 HYD NO=203SUM ID I=12 ID II=2
PRINT HYD          ID=10 CODE=1
*
*
*****
*** Sub-BASIN OFF1 ***
*
COMPUTE LT TP      LCODE=1 UPLAND/LAG TIME METHOD
                  NK=2 ISLOPE=1

```

```

                                SWMD.txt
                                LENGTH=100 FT    SLOPE=0.010    K=0.7
                                LENGTH=200 FT    SLOPE=0.050    K=2.0
*
COMPUTE NM HYD                ID=1    HYD NO=OFF1    DA=0.00199 SQ MI
                                PER A=00 PER B=00 PER C=10 PER D=90
                                TP=-0.1 hr    MASSRAIN=-1
*
PRINT HYD                     ID=1    CODE=1
*
*
*** Sub-BASIN 202 ****
*
COMPUTE LT TP                 LCODE=1    UPLAND/LAG TIME METHOD
                                NK=2    ISLOPE=1
                                LENGTH=100 FT    SLOPE=0.048    K=0.7
                                LENGTH=240 FT    SLOPE=0.052    K=2.0
*
COMPUTE NM HYD                ID=98    HYD NO=202    DA=0.00281 SQ MI
                                PER A=00 PER B=00 PER C=10 PER D=90
                                TP=-0.1 hr    MASSRAIN=-1
*
PRINT HYD                     ID=98    CODE=1
*
*
* Total Flow from Basin (OFF1+202)
ADD HYD                       ID=3    HYD NO=202SUM ID I=1    ID II=98
PRINT HYD                     ID=3    CODE=1
*
*
*** Sub-BASIN 204 ****
*
COMPUTE LT TP                 LCODE=1    UPLAND/LAG TIME METHOD
                                NK=2    ISLOPE=1
                                LENGTH=90 FT    SLOPE=0.050    K=0.7
*
COMPUTE NM HYD                ID=2    HYD NO=204    DA=0.00378 SQ MI
                                PER A=00 PER B=00 PER C=5 PER D=95
                                TP=-0.1 hr    MASSRAIN=-1
*
PRINT HYD                     ID=2    CODE=1
*
*
* Total Flow from Basin (OFF1 +202 + 204)
ADD HYD                       ID=1    HYD NO=204SUM ID I=3    ID II=2
PRINT HYD                     ID=1    CODE=1
*
*
*** Sub-BASIN 221 ****
*
COMPUTE LT TP                 LCODE=1    UPLAND/LAG TIME METHOD
                                NK=2    ISLOPE=1
                                LENGTH=100 FT    SLOPE=0.045    K=0.7
                                LENGTH=200 FT    SLOPE=0.032    K=2.0
*
COMPUTE NM HYD                ID=2    HYD NO=221    DA=0.0006 SQ MI
                                PER A=00 PER B=00 PER C=10 PER D=90
                                TP=-0.1 hr    MASSRAIN=-1
*
PRINT HYD                     ID=2    CODE=1
*
*
*** Sub-BASIN 205 ****
*
COMPUTE LT TP                 LCODE=1    UPLAND/LAG TIME METHOD
                                NK=2    ISLOPE=1
                                LENGTH=100 FT    SLOPE=0.025    K=0.7
                                LENGTH=239 FT    SLOPE=0.014    K=2.0
*
COMPUTE NM HYD                ID=5    HYD NO=205    DA=0.00197 SQ MI
                                PER A=00 PER B=00 PER C=05 PER D=95
                                TP=-0.1 hr    MASSRAIN=-1
*
PRINT HYD                     ID=5    CODE=1
*

```

```

*
* Total Flow from Basin (205 + 221)
ADD HYD          ID=4  HYD NO=205SUM ID I=2  ID II=5
PRINT HYD        ID=4  CODE=1
*
*
* Total Flow from Basin (OFF1 TO 205)
ADD HYD          ID=6  HYD NO=205SUMA ID I=1  ID II=4
PRINT HYD        ID=6  CODE=1
*
*
* Total Flow TO POND B
ADD HYD          ID=1  HYD NO=205SUMB ID I=10  ID II=6
PRINT HYD        ID=1  CODE=1
*
*
****Route HYD 205sum to Sub-Basin Through a Pipe

****Route Hyd through POND B
*
ROUTE RESERVOIR      ID=30  HYD NO=PONDA  INFLOW ID=1  CODE=1
                     OUTFLOW (CFS)    STORAGE (AC FT)    ELEV
                     0              0.0              4994
                     0.01            0.0626            4995
                     0.02            0.1469            4996
                     0.03            0.2561            4997
                     43.9            0.3932            4998
                     76.5            0.5613            4999

*
*PRINT HYD          ID=30  CODE=1
*
*****
*** Sub-BASIN 206, Sheet Flow Out ***
*
COMPUTE LT TP        LCODE=1  UPLAND/LAG TIME METHOD
                     NK=2  ISLOPE=1
                     LENGTH=100 FT  SLOPE=0.020  K=0.7
                     LENGTH=187 FT  SLOPE=0.033  K=2.0

*
COMPUTE NM HYD        ID=1  HYD NO=206  DA=0.00223 SQ MI
                     PER A=00 PER B=00 PER C=05 PER D=95
                     TP=-0.1 hr  MASSRAIN=-1

*
PRINT HYD            ID=1  CODE=1
*

*
****Route HYD to Sub-Basin Through a Pipe
COMPUTE RATING CURVE  CID=1  VS NO=1 CODE=-1  SLP=0.023
                     DIA=24 IN  N=0.013

*
ROUTE MCUNGE          ID=2  HYD NO=206Rt  INFLOW ID=1
                     DT=0 HR  LENGTH=200 FT
                     NS=0  SLOPE=0.010

*
PRINT HYD            ID=2  CODE=1
*
*
*****
*****
*
**** Sub-BASIN 208 ****
*
COMPUTE LT TP        LCODE=1  UPLAND/LAG TIME METHOD
                     NK=2  ISLOPE=1
                     LENGTH=100 FT  SLOPE=0.025  K=0.7
                     LENGTH=485 FT  SLOPE=0.018  K=2.0

*
COMPUTE NM HYD        ID=8  HYD NO=208  DA=0.00138 SQ MI
                     PER A=00 PER B=00 PER C=05 PER D=95
                     TP=-0.1 hr  MASSRAIN=-1

*
PRINT HYD            ID=8  CODE=1

```

```

*
*
*** Sub-BASIN 209 ****
*
COMPUTE LT TP          LCODE=1  UPLAND/LAG TIME METHOD
                        NK=2  ISLOPE=1
                        LENGTH=100 FT  SLOPE=0.018  K=0.7
                        LENGTH=410 FT  SLOPE=0.004  K=2.0
*
COMPUTE NM HYD          ID=9  HYD NO=209  DA=0.00142 SQ MI
                        PER A=00 PER B=00 PER C=02 PER D=98
                        TP=-0.1 hr  MASSRAIN=-1
*
PRINT HYD              ID=9  CODE=1
*
*
* Total Flow from Basin (208 + 209)
ADD HYD                ID=11  HYD NO=209SUM ID I=9  ID II=8
PRINT HYD              ID=11  CODE=1
*
*** Sub-BASIN 222 ****
*
COMPUTE LT TP          LCODE=1  UPLAND/LAG TIME METHOD
                        NK=2  ISLOPE=1
                        LENGTH=89 FT  SLOPE=0.032  K=0.7
*
COMPUTE NM HYD          ID=12  HYD NO=222  DA=0.00147 SQ MI
                        PER A=00 PER B=00 PER C=2 PER D=98
                        TP=-0.1 hr  MASSRAIN=-1
*
PRINT HYD              ID=12  CODE=1
*
*
* Total Flow from Basin (208 + 209 + 222)
ADD HYD                ID=13  HYD NO=222SUM ID I=11  ID II=12
PRINT HYD              ID=13  CODE=1
*
*** Sub-BASIN 215 ****
*
COMPUTE LT TP          LCODE=1  UPLAND/LAG TIME METHOD
                        NK=2  ISLOPE=1
                        LENGTH=100 FT  SLOPE=0.029  K=0.7
                        LENGTH=206 FT  SLOPE=0.003  K=2.0
*
COMPUTE NM HYD          ID=14  HYD NO=215  DA=0.00036 SQ MI
                        PER A=00 PER B=00 PER C=10 PER D=90
                        TP=-0.1 hr  MASSRAIN=-1
*
PRINT HYD              ID=14  CODE=1
*
*
* Total Flow from Basin (208 TO 215)
ADD HYD                ID=15  HYD NO=215SUM ID I=14  ID II=13
PRINT HYD              ID=15  CODE=1
*
*** Sub-BASIN 216 ****
*
COMPUTE LT TP          LCODE=1  UPLAND/LAG TIME METHOD
                        NK=2  ISLOPE=1
                        LENGTH=100 FT  SLOPE=0.011  K=0.7
                        LENGTH=479 FT  SLOPE=0.023  K=2.0
*
COMPUTE NM HYD          ID=16  HYD NO=216  DA=0.00021 SQ MI
                        PER A=00 PER B=00 PER C=05 PER D=95
                        TP=-0.1 hr  MASSRAIN=-1
*
PRINT HYD              ID=16  CODE=1
*
*
* Total Flow from Basin (208 TO 216)
ADD HYD                ID=17  HYD NO=216SUM ID I=16  ID II=15
PRINT HYD              ID=17  CODE=1
*
*****

```

*** Sub-BASIN 213 ***

*

```

COMPUTE LT TP          LCODE=1  UPLAND/LAG TIME METHOD
                        NK=2  ISLOPE=1
                        LENGTH=100 FT  SLOPE=0.025  K=0.7
                        LENGTH=50 FT  SLOPE=0.060  K=2.0

```

*

```

COMPUTE NM HYD          ID=2  HYD NO=213  DA=0.00023 SQ MI
                        PER A=00 PER B=00 PER C=25 PER D=75
                        TP=-0.1 hr  MASSRAIN=-1

```

*

```

PRINT HYD              ID=2  CODE=1

```

*

*

*** Sub-BASIN 214 ***

*

```

COMPUTE LT TP          LCODE=1  UPLAND/LAG TIME METHOD
                        NK=2  ISLOPE=1
                        LENGTH=100 FT  SLOPE=0.028  K=0.7
                        LENGTH=90 FT  SLOPE=0.061  K=2.0

```

*

```

COMPUTE NM HYD          ID=99  HYD NO=214  DA=0.00137 SQ MI
                        PER A=00 PER B=00 PER C=25 PER D=75
                        TP=-0.1 hr  MASSRAIN=-1

```

*

```

PRINT HYD              ID=99  CODE=1

```

*

* Total Flow from Basin (214 + 213)

```

ADD HYD                ID=3  HYD NO=214SUM ID I=99  ID II=2

```

```

PRINT HYD              ID=3  CODE=1

```

*

*

*

*** Sub-BASIN 210 ***

*

```

COMPUTE LT TP          LCODE=1  UPLAND/LAG TIME METHOD
                        NK=2  ISLOPE=1
                        LENGTH=300 FT  SLOPE=0.005  K=0.7

```

*

```

COMPUTE NM HYD          ID=1  HYD NO=210  DA=0.00146 SQ MI
                        PER A=00 PER B=00 PER C=02 PER D=98
                        TP=-0.1 hr  MASSRAIN=-1

```

*

```

PRINT HYD              ID=1  CODE=1

```

*

* Total Flow from Basin (213 + 214 + 210)

```

ADD HYD                ID=31  HYD NO=210SUM ID I=1  ID II=3

```

```

PRINT HYD              ID=31  CODE=1

```

*

*

* Total Flow from Basin (208 TO 216 TO 210, 213 + 214)

```

ADD HYD                ID=18  HYD NO=210SUMA ID I=17  ID II=31

```

```

PRINT HYD              ID=18  CODE=1

```

*

*** Sub-BASIN 207 ***

*

```

COMPUTE LT TP          LCODE=1  UPLAND/LAG TIME METHOD
                        NK=2  ISLOPE=1
                        LENGTH=100 FT  SLOPE=0.025  K=0.7
                        LENGTH=545 FT  SLOPE=0.015  K=2.0

```

*

```

COMPUTE NM HYD          ID=1  HYD NO=207  DA=0.00083 SQ MI
                        PER A=00 PER B=00 PER C=05 PER D=95
                        TP=-0.1 hr  MASSRAIN=-1

```

*

```

PRINT HYD              ID=1  CODE=1

```

*

*

*** Sub-BASIN 211 ***

*

```

COMPUTE LT TP          LCODE=1  UPLAND/LAG TIME METHOD
                        NK=2  ISLOPE=1
                        LENGTH=100 FT  SLOPE=0.055  K=0.7
                        LENGTH=114 FT  SLOPE=0.037  K=2.0
*
COMPUTE NM HYD          ID=11  HYD NO=211  DA=0.00257 SQ MI
                        PER A=00 PER B=00 PER C=5 PER D=95
                        TP=-0.1 hr  MASSRAIN=-1
*
PRINT HYD              ID=11  CODE=1
*
*
* Total Flow from Basin (211 + 207)
ADD HYD                ID=10  HYD NO=211SUM ID I=1  ID II=11
PRINT HYD              ID=10  CODE=1
*
*** Sub-BASIN 212 ****
*
COMPUTE LT TP          LCODE=1  UPLAND/LAG TIME METHOD
                        NK=2  ISLOPE=1
                        LENGTH=100 FT  SLOPE=0.005  K=0.7
                        LENGTH=50 FT  SLOPE=0.260  K=2.0
*
COMPUTE NM HYD          ID=3  HYD NO=212  DA=0.00204 SQ MI
                        PER A=00 PER B=00 PER C=5 PER D=95
                        TP=-0.1 hr  MASSRAIN=-1
*
PRINT HYD              ID=3  CODE=1
*
*
* Total Flow from Basin (207+211+212)
ADD HYD                ID=11  HYD NO=212SUM ID I=10  ID II=3
PRINT HYD              ID=11  CODE=1
*
*** Sub-BASIN 218 ****
*
COMPUTE LT TP          LCODE=1  UPLAND/LAG TIME METHOD
                        NK=2  ISLOPE=1
                        LENGTH=100 FT  SLOPE=0.040  K=0.7
                        LENGTH=50 FT  SLOPE=0.040  K=2.0
*
COMPUTE NM HYD          ID=1  HYD NO=218  DA=0.00324 SQ MI
                        PER A=00 PER B=00 PER C=10 PER D=90
                        TP=-0.1 hr  MASSRAIN=-1
*
PRINT HYD              ID=1  CODE=1
*
*
* Total Flow from Basins
ADD HYD                ID=10  HYD NO=218SUM ID I=18  ID II=1
PRINT HYD              ID=10  CODE=1
*
*** Sub-BASIN 219 ****
*
COMPUTE LT TP          LCODE=1  UPLAND/LAG TIME METHOD
                        NK=2  ISLOPE=1
                        LENGTH=100 FT  SLOPE=0.025  K=0.7
                        LENGTH=143 FT  SLOPE=0.019  K=2.0
*
COMPUTE NM HYD          ID=1  HYD NO=219  DA=0.00037 SQ MI
                        PER A=00 PER B=00 PER C=05 PER D=95
                        TP=-0.1 hr  MASSRAIN=-1
*
PRINT HYD              ID=1  CODE=1
*
*
* Total Flow from Basins
ADD HYD                ID=19  HYD NO=219SUM ID I=10  ID II=1
PRINT HYD              ID=19  CODE=1
*
*
* Add Flows from West Basins

```

SWMD.txt

```

ADD HYD          ID=18  HYD NO=219SUMA ID I=19  ID II=11
PRINT HYD        ID=18  CODE=1
*
*
*** Sub-BASIN 220 ****
*
COMPUTE LT TP      LCODE=1  UPLAND/LAG TIME METHOD
                   NK=2  ISLOPE=1
                   LENGTH=100 FT  SLOPE=0.016  K=0.7
                   LENGTH=127 FT  SLOPE=0.032  K=2.0
*
COMPUTE NM HYD     ID=20  HYD NO=220  DA=0.00139 SQ MI
                   PER A=00 PER B=00 PER C=15 PER D=85
                   TP=-0.1 hr  MASSRAIN=-1
*
PRINT HYD          ID=20  CODE=1
*
*
* Total Flows from All Basins
ADD HYD            ID=21  HYD NO=220SUM ID I=18  ID II=20
PRINT HYD          ID=21  CODE=1
*
*
* Add Outflow From Pond B
ADD HYD            ID=1  HYD NO=POND.IN ID I=21  ID II=30
PRINT HYD          ID=1  CODE=1
*
****Route Hyd  through POND A- 27 inch orifice
*
ROUTE RESERVOIR    ID=96  HYD NO=PONDA  INFLOW ID=1  CODE=1
                   OUTFLOW (CFS)  STORAGE (AC FT)  ELEV
                   0.0             0.00           4989
                   3.7             0.1097         4990
                   12.8            0.2491         4991
                   24.2            0.4241         4992
                   32.1            0.6403         4993
                   37.8            0.8999         4994
                   42.7            1.0112         4995
                   47.1            1.5550         4996
                   51.2            1.9531         4997
*
*PRINT HYD         ID=96  CODE=1
*
*
*** Sub-BASIN 217, Sheet flow Out ****
*
COMPUTE LT TP      LCODE=1  UPLAND/LAG TIME METHOD
                   NK=2  ISLOPE=1
                   LENGTH=100 FT  SLOPE=0.005  K=0.7
                   LENGTH=230 FT  SLOPE=0.004  K=2.0
*
COMPUTE NM HYD     ID=6  HYD NO=217  DA=0.00046 SQ MI
                   PER A=00 PER B=00 PER C=20 PER D=80
                   TP=-0.1 hr  MASSRAIN=-1
*
PRINT HYD          ID=6  CODE=1
*
*
*
FINISH

```

HYDRAULIC CALCULATIONS

FLOWMASTER CALCULATIONS

Worksheet for Basin 201-Dbl D_Sag

Project Description

Solve For Spread

Input Data

Discharge		10.12	ft ³ /s
Gutter Width		2.50	ft
Gutter Cross Slope		0.06	ft/ft
Road Cross Slope		0.03	ft/ft
Grate Width		2.08	ft
Grate Length		6.66	ft
Local Depression		1.00	in
Local Depression Width		2.37	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		50.00	%

Results

Spread	18.18	ft
Depth	0.62	ft
Gutter Depression	0.08	ft
Total Depression	0.16	ft
Open Grate Area	6.23	ft ²
Active Grate Weir Length	8.74	ft

Worksheet for Basin 202-Dbl D_Sag

Project Description

Solve For Spread

Input Data

Discharge		14.20	ft ³ /s
Gutter Width		2.50	ft
Gutter Cross Slope		0.06	ft/ft
Road Cross Slope		0.03	ft/ft
Grate Width		2.08	ft
Grate Length		6.66	ft
Local Depression		1.00	in
Local Depression Width		2.37	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		50.00	%

Results

Spread	22.66	ft
Depth	0.75	ft
Gutter Depression	0.08	ft
Total Depression	0.16	ft
Open Grate Area	6.23	ft ²
Active Grate Weir Length	8.74	ft

Worksheet for Basin 203-Sgl C_Sag

Project Description

Solve For Spread

Input Data

Discharge	5.20	ft ³ /s
Gutter Width	2.50	ft
Gutter Cross Slope	0.06	ft/ft
Road Cross Slope	0.04	ft/ft
Local Depression	2.25	in
Local Depression Width	3.95	ft
Grate Width	2.08	ft
Grate Length	3.33	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	3.95	ft
Opening Height	0.50	ft
Curb Throat Type	Horizontal	
Throat Incline Angle	90.00	degrees

Options

Calculation Option Use Both

Results

Spread	7.08	ft
Depth	0.31	ft
Gutter Depression	0.06	ft
Total Depression	0.25	ft
Open Grate Area	3.12	ft ²
Active Grate Weir Length	5.41	ft

Worksheet for Basin 204-1 Sgl C

Project Description

Solve For Efficiency

Input Data

Discharge	16.50	ft ³ /s
Slope	0.04000	ft/ft
Gutter Width	2.50	ft
Gutter Cross Slope	0.06	ft/ft
Road Cross Slope	0.01	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.25	in
Local Depression Width	3.95	ft
Grate Width	2.08	ft
Grate Length	3.33	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	3.95	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	34.55	%
Intercepted Flow	5.70	ft ³ /s
Bypass Flow	10.80	ft ³ /s
Spread	26.83	ft
Depth	0.32	ft
Flow Area	2.68	ft ²
Gutter Depression	0.13	ft
Total Depression	0.32	ft
Velocity	6.15	ft/s
Splash Over Velocity	7.39	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.01	
Grate Flow Ratio	0.30	
Equivalent Cross Slope	0.03444	ft/ft
Active Grate Length	1.67	ft
Length Factor	0.03	
Total Interception Length	75.77	ft

Messages

Messages Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m).

Notes

Each Side

Worksheet for Basin 204.2-Dbl C_Sag

Project Description

Solve For Spread

Input Data

Discharge		10.80	ft ³ /s
Gutter Width		2.50	ft
Gutter Cross Slope		0.06	ft/ft
Road Cross Slope		0.05	ft/ft
Local Depression		2.25	in
Local Depression Width		7.40	ft
Grate Width		2.08	ft
Grate Length		6.66	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		50.00	%
Curb Opening Length		7.40	ft
Opening Height		0.50	ft
Curb Throat Type	Horizontal		
Throat Incline Angle		90.00	degrees

Options

Calculation Option Use Both

Results

Spread	6.48	ft
Depth	0.37	ft
Gutter Depression	0.03	ft
Total Depression	0.21	ft
Open Grate Area	6.23	ft ²
Active Grate Weir Length	8.74	ft

Worksheet for Basin 206-Sgl C_Sag

Project Description

Solve For Spread

Input Data

Discharge	6.40	ft ³ /s
Gutter Width	2.50	ft
Gutter Cross Slope	0.06	ft/ft
Road Cross Slope	0.05	ft/ft
Local Depression	2.25	in
Local Depression Width	3.95	ft
Grate Width	2.08	ft
Grate Length	3.33	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	3.95	ft
Opening Height	0.50	ft
Curb Throat Type	Horizontal	
Throat Incline Angle	90.00	degrees

Options

Calculation Option Use Both

Results

Spread	6.94	ft
Depth	0.36	ft
Gutter Depression	0.04	ft
Total Depression	0.23	ft
Open Grate Area	3.12	ft ²
Active Grate Weir Length	5.41	ft

Worksheet for Basin 207-1-Dbl C

Project Description

Solve For Efficiency

Input Data

Discharge	5.52	ft ³ /s
Slope	0.00300	ft/ft
Gutter Width	2.50	ft
Gutter Cross Slope	0.06	ft/ft
Road Cross Slope	0.01	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.25	in
Local Depression Width	7.40	ft
Grate Width	2.08	ft
Grate Length	6.66	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	7.40	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	65.13	%
Intercepted Flow	3.60	ft ³ /s
Bypass Flow	1.92	ft ³ /s
Spread	23.26	ft
Depth	0.36	ft
Flow Area	2.87	ft ²
Gutter Depression	0.13	ft
Total Depression	0.32	ft
Velocity	1.92	ft/s
Splash Over Velocity	10.50	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.25	
Grate Flow Ratio	0.31	
Equivalent Cross Slope	0.02536	ft/ft
Active Grate Length	3.33	ft
Length Factor	0.15	
Total Interception Length	26.43	ft

Messages

Messages Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m).

Worksheet for Basin 207-2-Sgl C

Project Description

Solve For Efficiency

Input Data

Discharge	4.42	ft ³ /s
Slope	0.00300	ft/ft
Gutter Width	2.50	ft
Gutter Cross Slope	0.06	ft/ft
Road Cross Slope	0.01	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.25	in
Local Depression Width	3.95	ft
Grate Width	2.08	ft
Grate Length	3.33	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	3.95	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	55.45	%
Intercepted Flow	2.45	ft ³ /s
Bypass Flow	1.97	ft ³ /s
Spread	21.19	ft
Depth	0.34	ft
Flow Area	2.41	ft ²
Gutter Depression	0.13	ft
Total Depression	0.32	ft
Velocity	1.84	ft/s
Splash Over Velocity	7.39	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.07	
Grate Flow Ratio	0.34	
Equivalent Cross Slope	0.04176	ft/ft
Active Grate Length	1.67	ft
Length Factor	0.13	
Total Interception Length	17.85	ft

Messages

Notes

Bypass to Basin 2017

Worksheet for Basin 208-Sgl C

Project Description

Solve For Efficiency

Input Data

Discharge	4.20	ft ³ /s
Slope	0.02800	ft/ft
Gutter Width	2.50	ft
Gutter Cross Slope	0.06	ft/ft
Road Cross Slope	0.01	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.25	in
Local Depression Width	3.95	ft
Grate Width	2.08	ft
Grate Length	3.33	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	3.95	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	68.52	%
Intercepted Flow	2.88	ft ³ /s
Bypass Flow	1.32	ft ³ /s
Spread	12.29	ft
Depth	0.25	ft
Flow Area	0.92	ft ²
Gutter Depression	0.13	ft
Total Depression	0.32	ft
Velocity	4.57	ft/s
Splash Over Velocity	7.39	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.01	
Grate Flow Ratio	0.58	
Equivalent Cross Slope	0.06264	ft/ft
Active Grate Length	1.67	ft
Length Factor	0.09	
Total Interception Length	26.77	ft

Messages

Notes

Each Side

Worksheet for Basin 209-Sgl C_Sag

Project Description

Solve For Spread

Input Data

Discharge		5.77	ft ³ /s
Gutter Width		2.50	ft
Gutter Cross Slope		0.06	ft/ft
Road Cross Slope		0.05	ft/ft
Local Depression		2.25	in
Local Depression Width		3.95	ft
Grate Width		2.08	ft
Grate Length		3.33	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		50.00	%
Curb Opening Length		3.95	ft
Opening Height		0.50	ft
Curb Throat Type	Horizontal		
Throat Incline Angle		90.00	degrees

Options

Calculation Option Use Both

Results

Spread	6.43	ft
Depth	0.33	ft
Gutter Depression	0.04	ft
Total Depression	0.23	ft
Open Grate Area	3.12	ft ²
Active Grate Weir Length	5.41	ft

Worksheet for Basin 210-Sgl C

Project Description

Solve For Efficiency

Input Data

Discharge	1.48	ft ³ /s
Slope	0.02100	ft/ft
Gutter Width	2.50	ft
Gutter Cross Slope	0.06	ft/ft
Road Cross Slope	0.01	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.25	in
Local Depression Width	3.95	ft
Grate Width	2.08	ft
Grate Length	3.33	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	3.95	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	93.83	%
Intercepted Flow	1.39	ft ³ /s
Bypass Flow	0.09	ft ³ /s
Spread	6.87	ft
Depth	0.20	ft
Flow Area	0.40	ft ²
Gutter Depression	0.13	ft
Total Depression	0.32	ft
Velocity	3.70	ft/s
Splash Over Velocity	7.39	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.02	
Grate Flow Ratio	0.83	
Equivalent Cross Slope	0.08270	ft/ft
Active Grate Length	1.67	ft
Length Factor	0.17	
Total Interception Length	13.41	ft

Messages

Notes

Each Side

Worksheet for Basin 211-Dbl C_Sag

Project Description

Solve For Spread

Input Data

Discharge	7.70	ft ³ /s
Gutter Width	2.50	ft
Gutter Cross Slope	0.06	ft/ft
Road Cross Slope	0.02	ft/ft
Local Depression	2.25	in
Local Depression Width	7.40	ft
Grate Width	2.08	ft
Grate Length	6.66	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	7.40	ft
Opening Height	0.50	ft
Curb Throat Type	Horizontal	
Throat Incline Angle	90.00	degrees

Options

Calculation Option Use Both

Results

Spread	5.65	ft
Depth	0.29	ft
Gutter Depression	0.10	ft
Total Depression	0.29	ft
Open Grate Area	6.23	ft ²
Active Grate Weir Length	8.74	ft

Worksheet for Basin 212-Dbl C_Sag

Project Description

Solve For Spread

Input Data

Discharge	6.10	ft ³ /s
Gutter Width	2.50	ft
Gutter Cross Slope	0.06	ft/ft
Road Cross Slope	0.02	ft/ft
Local Depression	2.25	in
Local Depression Width	7.40	ft
Grate Width	2.08	ft
Grate Length	6.66	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	7.40	ft
Opening Height	0.50	ft
Curb Throat Type	Horizontal	
Throat Incline Angle	90.00	degrees

Options

Calculation Option Use Both

Results

Spread	5.12	ft
Depth	0.25	ft
Gutter Depression	0.10	ft
Total Depression	0.29	ft
Open Grate Area	6.23	ft ²
Active Grate Weir Length	8.74	ft

Worksheet for Basin 214-Sgl D_Sag

Project Description

Solve For Spread

Input Data

Discharge	4.54	ft ³ /s
Gutter Width	2.50	ft
Gutter Cross Slope	0.06	ft/ft
Road Cross Slope	0.04	ft/ft
Grate Width	2.08	ft
Grate Length	3.33	ft
Local Depression	1.00	in
Local Depression Width	2.37	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%

Results

Spread	11.32	ft
Depth	0.50	ft
Gutter Depression	0.05	ft
Total Depression	0.13	ft
Open Grate Area	3.12	ft ²
Active Grate Weir Length	5.41	ft

Worksheet for Basins 215-Sgl C

Project Description

Solve For Efficiency

Input Data

Discharge	1.24	ft ³ /s
Slope	0.01500	ft/ft
Gutter Width	2.50	ft
Gutter Cross Slope	0.06	ft/ft
Road Cross Slope	0.01	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.25	in
Local Depression Width	3.95	ft
Grate Width	2.08	ft
Grate Length	3.33	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	3.95	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	95.33	%
Intercepted Flow	1.18	ft ³ /s
Bypass Flow	0.06	ft ³ /s
Spread	6.82	ft
Depth	0.20	ft
Flow Area	0.40	ft ²
Gutter Depression	0.13	ft
Total Depression	0.32	ft
Velocity	3.13	ft/s
Splash Over Velocity	7.39	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.03	
Grate Flow Ratio	0.83	
Equivalent Cross Slope	0.08287	ft/ft
Active Grate Length	1.67	ft
Length Factor	0.20	
Total Interception Length	11.24	ft

Messages

Messages Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m).

Worksheet for Basin 218-Dbl C

Project Description

Solve For Efficiency

Input Data

Discharge	14.05	ft ³ /s
Slope	0.03000	ft/ft
Gutter Width	2.50	ft
Gutter Cross Slope	0.06	ft/ft
Road Cross Slope	0.01	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.25	in
Local Depression Width	7.40	ft
Grate Width	2.08	ft
Grate Length	6.66	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	7.40	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	44.56	%
Intercepted Flow	6.26	ft ³ /s
Bypass Flow	7.79	ft ³ /s
Spread	21.23	ft
Depth	0.34	ft
Flow Area	2.42	ft ²
Gutter Depression	0.13	ft
Total Depression	0.32	ft
Velocity	5.81	ft/s
Splash Over Velocity	10.50	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.04	
Grate Flow Ratio	0.34	
Equivalent Cross Slope	0.02691	ft/ft
Active Grate Length	3.33	ft
Length Factor	0.05	
Total Interception Length	75.33	ft

Messages

Messages Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m).

Notes

Each Side

Worksheet for Basins 219-1-DbI C

Project Description

Solve For Efficiency

Input Data

Discharge	8.91	ft ³ /s
Slope	0.01500	ft/ft
Gutter Width	2.50	ft
Gutter Cross Slope	0.06	ft/ft
Road Cross Slope	0.01	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.25	in
Local Depression Width	7.40	ft
Grate Width	2.08	ft
Grate Length	6.66	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	7.40	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	51.85	%
Intercepted Flow	4.62	ft ³ /s
Bypass Flow	4.29	ft ³ /s
Spread	20.27	ft
Depth	0.33	ft
Flow Area	2.22	ft ²
Gutter Depression	0.13	ft
Total Depression	0.32	ft
Velocity	4.02	ft/s
Splash Over Velocity	10.50	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.08	
Grate Flow Ratio	0.36	
Equivalent Cross Slope	0.02775	ft/ft
Active Grate Length	3.33	ft
Length Factor	0.08	
Total Interception Length	49.62	ft

Messages

Messages Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m).

Worksheet for Basin 219-2-Sgl C

Project Description

Solve For Efficiency

Input Data

Discharge	4.29	ft ³ /s
Slope	0.01500	ft/ft
Gutter Width	2.50	ft
Gutter Cross Slope	0.06	ft/ft
Road Cross Slope	0.01	ft/ft
Roughness Coefficient	0.013	
Local Depression	2.25	in
Local Depression Width	3.95	ft
Grate Width	2.08	ft
Grate Length	3.33	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.00	%
Curb Opening Length	3.95	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	62.88	%
Intercepted Flow	2.70	ft ³ /s
Bypass Flow	1.59	ft ³ /s
Spread	14.55	ft
Depth	0.28	ft
Flow Area	1.22	ft ²
Gutter Depression	0.13	ft
Total Depression	0.32	ft
Velocity	3.51	ft/s
Splash Over Velocity	7.39	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.02	
Grate Flow Ratio	0.50	
Equivalent Cross Slope	0.05576	ft/ft
Active Grate Length	1.67	ft
Length Factor	0.10	
Total Interception Length	24.01	ft

Messages

Notes

Each Side

Inlet Calculations

Basin ID	Flows (cfs)			Inlet Type	Notes
	Total	Intercepted	Bypass		
Offsite 1	4.94	0	4.94	-	Sheet flow to basin 201
Offsite 2	5.9	0	5.90	-	Sheet flow to basin 202
201	10.12	10.12	0.00	Double D	Sump inlet
202	14.20	14.20	0.00	Double D	Sump inlet
203	5.20	5.20	0.00	Single C	Sump inlet
204-1	16.50	5.70	10.80	Single C	Inlet at grade
204-2	10.80	10.80	0.00	Double C	Sump inlet
205	9.02	6.00	3.02	Single C	Inlets at grade, each side, 205 and 221
206	6.40	6.40	0.00	Single C	Sump inlet
207-1	5.52	3.60	1.92	Double C	bypass to second inlet
207-2	4.42	2.45	1.97	Single C	to Edith
208	4.20	2.88	1.32	Single C	bypass to basin 205
209	5.77	5.77	0.00	Single C	Sump inlet, 209 and third of 210 runoff
210	1.47	1.39	0.08	Single C	third of runoff , rest to basin 215
211	7.70	7.70	0.00	Double C	Sump inlet
212	6.10	6.10	0.00	Double C	Sump inlet
213	0.66	0.00	0.66	-	to Basin 214
214	4.54	4.54	0.00	Single C	Sump inlet
215	1.24	1.18	0.06	Single C	bypass of 210 and Basins 215, 216
216	0.60	0.00	0.60	-	to Basin 215 and Edith
217	1.33	0.00	1.33		to Edith
218	14.05	6.26	7.79	-	Basins 222 and 218
219-1	8.91	4.62	4.29	Double C	bypass of 218 and Basin 219
219-2	4.29	2.70	1.59	Single C	bypass to Edith
220	4.10	4.10	0.00	-	Pond
221	1.78	0.00	1.78	-	to Basin 205
222	4.45	0.00	4.45	-	sheet flow to Basin 218

CULVERTMASTER CALCULATIONS

Culvert Calculator Report

Pond A Orifice

Comments: Maximum Allowable Discharge = 47.6 cfs

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	4,997.00 ft	Headwater Depth/Height	3.56
Computed Headwater Elevation	4,997.00 ft	Discharge	51.18 cfs
Inlet Control HW Elev.	4,997.00 ft	Tailwater Elevation	4,986.92 ft
Outlet Control HW Elev.	4,995.11 ft	Control Type	Inlet Control

Grades			
Upstream Invert	4,989.00 ft	Downstream Invert	4,984.42 ft
Length	50.00 ft	Constructed Slope	0.091600 ft/ft

Hydraulic Profile			
Profile	CompositePressureProfileS1S2	Depth, Downstream	1.40 ft
Slope Type	N/A	Normal Depth	1.19 ft
Flow Regime	N/A	Critical Depth	2.18 ft
Velocity Downstream	19.66 ft/s	Critical Slope	0.024086 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	2.25 ft
Section Size	27 inch	Rise	2.25 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	4,995.11 ft	Upstream Velocity Head	2.62 ft
Ke	0.50	Entrance Loss	1.31 ft

Inlet Control Properties			
Inlet Control HW Elev.	4,997.00 ft	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	4.0 ft ²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Calculator Report

Pond A Outlet

Comments: Maximum Allowable Discharge = 47.6 cfs

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	4,997.00 ft	Headwater Depth/Height	3.20
Computed Headwater Elevation	4,997.00 ft	Discharge	62.44 cfs
Inlet Control HW Elev.	4,997.00 ft	Tailwater Elevation	4,986.92 ft
Outlet Control HW Elev.	4,995.27 ft	Control Type	Inlet Control

Grades			
Upstream Invert	4,989.00 ft	Downstream Invert	4,984.42 ft
Length	50.00 ft	Constructed Slope	0.091600 ft/ft

Hydraulic Profile			
Profile	CompositeS1S2	Depth, Downstream	1.51 ft
Slope Type	Steep	Normal Depth	1.25 ft
Flow Regime	N/A	Critical Depth	2.41 ft
Velocity Downstream	20.08 ft/s	Critical Slope	0.020246 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	2.50 ft
Section Size	30 inch	Rise	2.50 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	4,995.27 ft	Upstream Velocity Head	2.58 ft
Ke	0.50	Entrance Loss	1.29 ft

Inlet Control Properties			
Inlet Control HW Elev.	4,997.00 ft	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	4.9 ft ²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

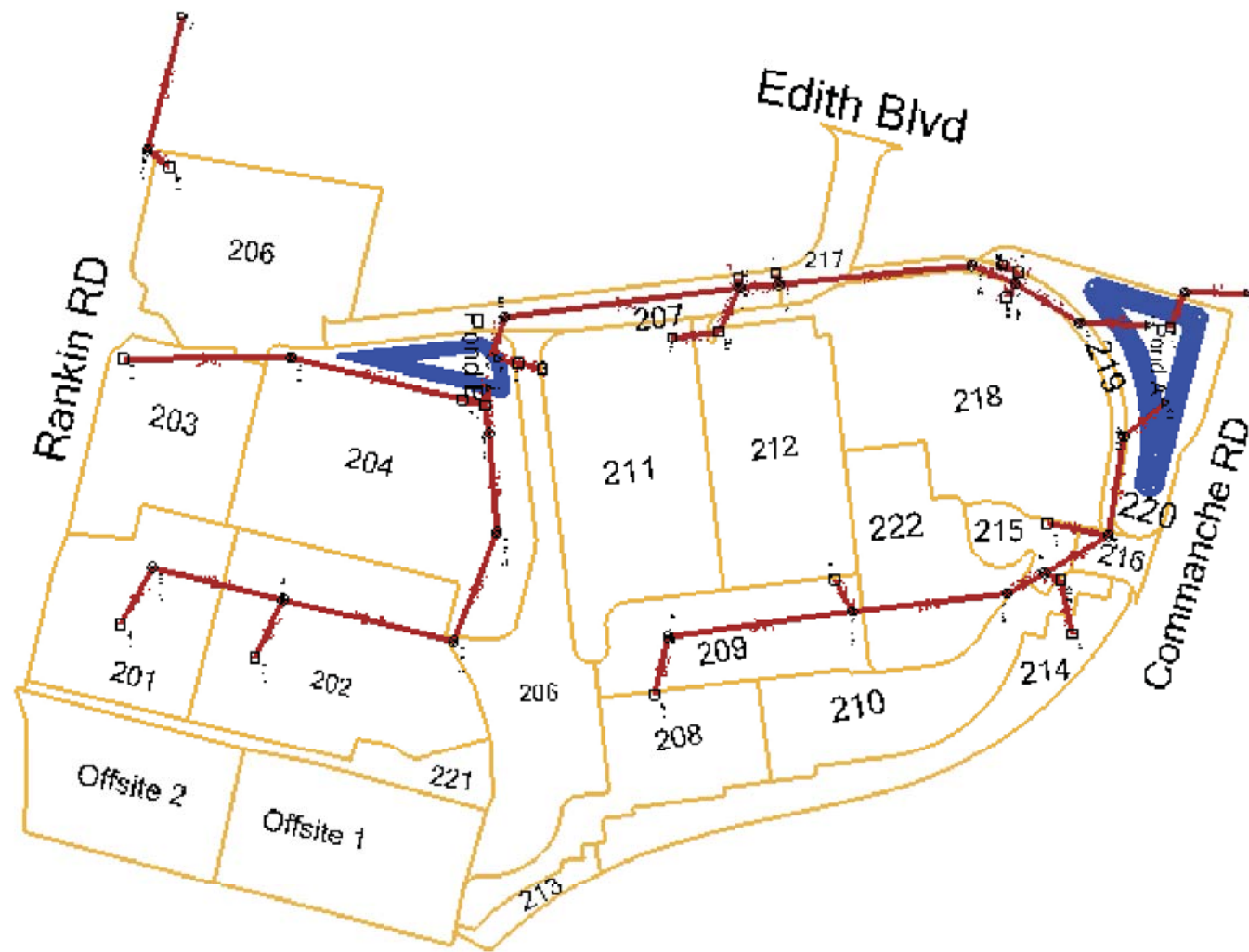
Culvert Calculator Report

POND B Outlet

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	4,999.00 ft	Headwater Depth/Height	1.57
Computed Headwater Elevation	4,999.00 ft	Discharge	76.51 cfs
Inlet Control HW Elev.	4,997.93 ft	Tailwater Elevation	4,997.51 ft
Outlet Control HW Elev.	4,999.00 ft	Control Type	Outlet Control
Grades			
Upstream Invert	4,993.50 ft	Downstream Invert	4,993.29 ft
Length	53.70 ft	Constructed Slope	0.003911 ft/ft
Hydraulic Profile			
Profile	PressureProfile	Depth, Downstream	4.22 ft
Slope Type	N/A	Normal Depth	N/A ft
Flow Regime	N/A	Critical Depth	2.74 ft
Velocity Downstream	7.95 ft/s	Critical Slope	0.006341 ft/ft
Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	3.50 ft
Section Size	42 inch	Rise	3.50 ft
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev.	4,999.00 ft	Upstream Velocity Head	0.98 ft
Ke	0.20	Entrance Loss	0.20 ft
Inlet Control Properties			
Inlet Control HW Elev.	4,997.93 ft	Flow Control	Submerged
Inlet Type	Beveled ring, 33.7° bevels	Area Full	9.6 ft²
K	0.00180	HDS 5 Chart	3
M	2.50000	HDS 5 Scale	B
C	0.02430	Equation Form	1
Y	0.83000		

STORMCAD CALCULATIONS



StormCAD Plan View

StormCAD Results
Conduit Table

Label	Start Node	Stop Node	Diameter (in)	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Flow (cfs)	Capacity (Full Flow) (cfs)	Invert (Start) (ft)	Invert (Stop) (ft)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Velocity (ft/s)	Headloss (ft)	Cover (Start) (ft)	Cover (Stop) (ft)
CO-2	CB-20	CB-10	12	21.7	0.018	2.7	4.84	4996.96	4996.56	4999.93	5000.56	4998.60	4998.48	3.44	0.12	1.97	3.00
CO-4	CB-21	MH-2	30	48.6	0.094	44.3	125.91	4989.00	4984.42	4997.00	4998.85	4991.21	4989.24	23.41	2.15	5.50	11.93
CO-6	MH-2	O-6	30	80.9	0.05	44.3	91.88	4984.42	4980.36	4998.85	4998.90	4987.86	4986.92	9.02	0.94	11.93	16.04
Pipe - (01)	CB-18	MH - (02)	24	35.4	0.141	6.4	85.05	4985.00	4980.00	4992.21	4984.72	4985.90	4981.41	15.93	4.72	5.21	2.72
Pipe - (02)	MH - (02)	O-5	24	175.8	0.04	6.4	45.13	4980.00	4973.00	4984.72	4977.69	4980.90	4975.00	10.17	6.17	2.72	2.69
Pipe - (03)	CB-16	MH - (05)	24	83.3	0.005	10.1	16.07	5004.50	5004.08	5007.78	5008.78	5006.96	5006.79	3.22	0.17	1.28	2.70
Pipe - (04)	MH - (05)	MH - (65)	24	170.3	0.007	10.1	18.91	5004.08	5002.89	5008.78	5008.77	5006.61	5006.27	3.22	0.34	2.70	3.88
Pipe - (05)	MH - (65)	MH- (06)	30	222.8	0.005	24.3	28.95	5002.89	5001.78	5008.77	5008.77	5005.78	5005.00	4.95	0.78	3.38	4.49
Pipe - (06)	MH- (06)	MH - (63)	30	149.4	0.01	24.3	40.96	5001.78	5000.29	5008.77	5007.39	5003.46	5003.00	8.70	0.82	4.49	4.60
Pipe - (07)	CB-1	MH - (11)	24	212.9	0.006	5.2	17.47	4997.02	4995.75	5002.10	5001.89	4999.38	4999.27	1.66	0.11	3.08	4.14
Pipe - (08)(1)	MH - (11)	CB-19	24	233.1	0.006	5.2	17.53	4995.75	4994.35	5001.89	5001.49	4999.23	4999.11	1.66	0.12	4.14	5.14
Pipe - (08)(2)	CB-19	CB-2	24	20	0.006	10.9	17.52	4994.35	4994.23	5001.49	5001.42	4998.89	4998.84	3.47	0.05	5.14	5.19
Pipe - (15)	MH - (30)	MH - (20)	42	300.7	0.004	44.3	63.81	4993.29	4992.08	4999.92	4999.15	4997.32	4996.74	4.60	0.58	3.13	3.57
Pipe - (17)	MH - (20)	MH - (91)	42	49.7	0.004	61.7	63.82	4992.08	4991.88	4999.15	4999.04	4996.08	4995.89	6.41	0.19	3.57	3.66
Pipe - (18)	MH - (91)	MH - (22)	48	245.4	0.004	64.2	90.77	4991.88	4990.90	4999.04	5000.25	4995.77	4995.29	7.83	0.48	3.16	5.35
Pipe - (19)	MH - (22)	MH - (49)	48	59.8	0.004	64.2	91.00	4990.90	4990.66	5000.25	5000.71	4994.97	4994.85	5.10	0.12	5.35	6.05
Pipe - (20)	CB-4	O-2	24	24.8	0.02	6.0	32.13	4995.50	4995.00	5000.77	4999.00	4997.89	4997.87	1.91	0.02	3.27	2.00
Pipe - (21)	CB-3	CB-4	24	30.6	0.02	3.0	31.67	4996.10	4995.50	5000.93	5000.77	4997.96	4997.96	6.34	0.00	2.83	3.27
Pipe - (23)	H-1	MH - (30)	42	53.7	0.004	44.3	62.89	4993.50	4993.29	4999.00	4999.92	4997.78	4997.67	4.60	0.10	2.00	3.13
Pipe - (26)	MH - (58)	MH - (33)	18	197.4	0.01	8.7	10.49	5002.01	5000.04	5007.81	5006.88	5003.38	5002.09	6.63	1.32	4.30	5.34
Pipe - (27)	CB-6	MH - (20)	24	61.4	0.02	13.8	32.03	4994.03	4992.80	4999.24	4999.15	4996.99	4996.76	4.39	0.23	3.21	4.35
Pipe - (28)	CB-7	MH - (20)	18	12.1	0.05	3.6	23.48	4993.33	4992.73	4999.03	4999.15	4996.91	4996.90	2.04	0.01	4.20	4.93
Pipe - (29)	MH - (33)	MH - (36)	24	54.1	0.01	8.7	22.61	5000.04	4999.50	5006.88	5006.34	5002.15	5002.07	2.75	0.08	4.84	4.84
Pipe - (30)	MH - (36)	MH- (42)	24	93.7	0.02	14.6	31.96	4999.50	4997.63	5006.34	5005.23	5000.88	5000.24	9.94	0.92	4.84	5.60
Pipe - (31)	MH- (42)	MH - (38)	24	128	0.02	15.8	31.74	4997.63	4995.11	5005.23	5003.28	4999.06	4997.59	10.08	1.75	5.60	6.17
Pipe - (32)	MH - (38)	O-4	24	68.4	0.02	15.8	32.03	4995.11	4993.74	5003.28	4997.00	4996.54	4994.77	10.15	0.97	6.17	1.26
Pipe - (33)	CB-12	CB-13	18	70.9	0.02	4.5	14.82	5001.35	4999.94	5006.67	5005.43	5002.58	5002.48	7.37	0.13	3.82	3.99
Pipe - (34)	CB-13	MH - (36)	18	21.8	0.02	5.9	14.92	4999.94	4999.50	5005.43	5006.34	5002.11	5002.04	3.36	0.07	3.99	5.34
Pipe - (36)	CB-11	MH- (42)	18	60.7	0.03	1.2	18.19	5001.19	4999.37	5005.46	5005.23	5001.60	5000.44	5.80	1.29	2.77	4.36
Pipe - (38)	MH - (44)	O-3	54	87.7	0.009	77.7	185.49	4990.28	4989.50	5001.25	4999.00	4993.33	4993.46	11.15	0.16	6.47	5.00
Pipe - (42)	MH - (49)	MH - (44)	48	95.9	0.004	77.7	90.43	4990.66	4990.28	5000.71	5001.25	4994.26	4994.05	8.09	0.27	6.05	6.97
Pipe - (43)	CB-9	MH - (49)	18	20.8	0.02	6.3	14.94	4996.55	4996.13	5000.55	5000.71	4997.52	4996.87	8.08	0.25	2.50	3.08
Pipe - (44)	CB-10	MH - (49)	18	14.1	0.02	7.3	14.82	4996.56	4996.28	5000.56	5000.71	4997.61	4997.12	8.37	0.16	2.50	2.93
Pipe - (47)	MH - (86)	CB-2	30	35.1	0.02	24.3	57.91	4994.93	4994.23	5002.14	5001.42	4998.85	4998.73	4.95	0.12	4.71	4.69
Pipe - (48)	MH - (63)	MH - (86)	30	126.8	0.042	24.3	84.31	5000.29	4994.93	5007.39	5002.14	5001.97	4999.09	14.85	3.25	4.60	4.71
Pipe - (49)	CB-2	O-1	36	22.6	0.01	46.0	67.21	4994.23	4994.00	5001.42	4999.00	4997.98	4997.87	6.51	0.11	4.19	2.00
Pipe - (55)	CB-17	MH - (65)	24	82.1	0.005	14.2	15.98	5004.00	5003.59	5007.51	5008.77	5006.50	5006.18	4.52	0.32	1.51	3.18
Pipe - (75)	CB-8	MH - (91)	18	14.4	0.02	2.5	14.92	4992.17	4991.88	4998.91	4999.04	4996.26	4996.25	1.39	0.01	5.24	5.66
Pipe - (78)	CB-14	MH - (58)	18	46.9	0.01	5.8	10.52	5002.48	5002.01	5006.00	5007.81	5004.16	5004.02	3.27	0.14	2.02	4.30
Pipe - (80)	MH - (100)	MH - (58)	18	236.7	0.01	2.9	10.51	5004.38	5002.01	5007.72	5007.81	5005.02	5004.09	5.07	1.13	1.84	4.30
Pipe - (81)	CB-15	MH - (100)	18	74.5	0.03	2.9	18.19	5006.62	5004.38	5010.18	5007.72	5007.26	5005.40	7.52	2.03	2.07	1.84
Pipe - (82)	CB-5	CB-6	24	60.4	0.02	7.7	32.01	4995.24	4994.03	4999.24	4999.24	4997.45	4997.38	2.45	0.07	2.00	3.21

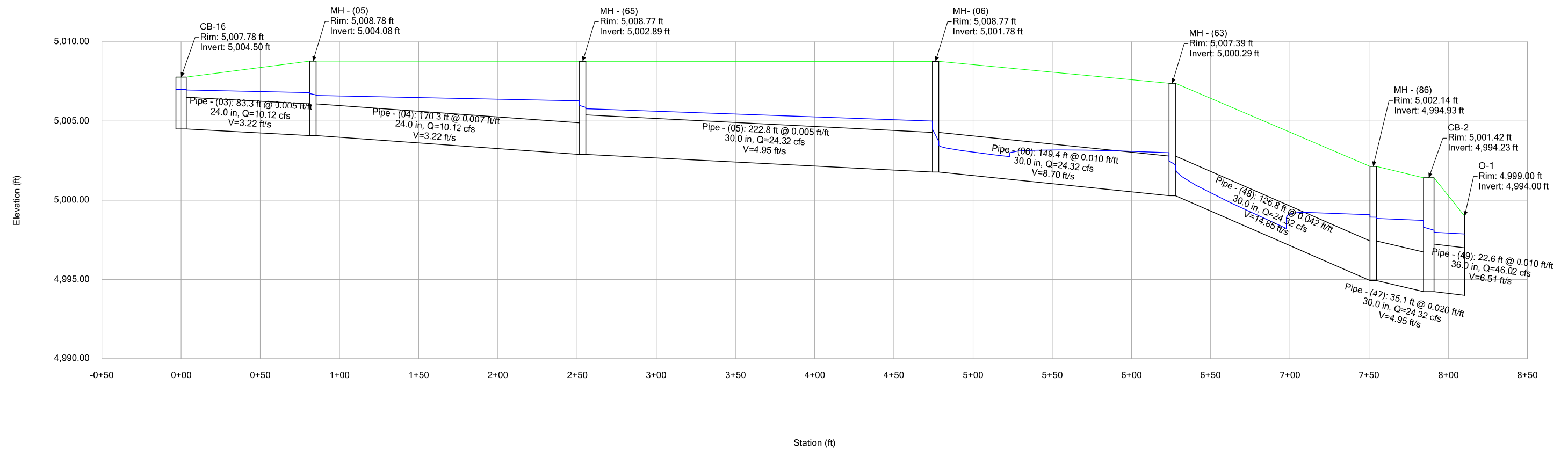
StormCAD Results
Manhole Table

Label	Diameter (in)	Elevation (Rim) (ft)	Elevation (Invert in 1) (ft)	Elevation (Invert in 2) (ft)	Elevation (Invert Out) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss (ft)
MH - (02)	48	4,984.72	4,980.00	(N/A)	4,980.00	4,981.13	4,980.96	0.24
MH - (05)	48	5,008.78	5,004.08	(N/A)	5,004.08	5,006.73	5,006.64	0.12
MH - (11)	48	5,001.89	4,995.75	(N/A)	4,995.75	4,999.25	4,999.24	0.01
MH - (20)	60	4,999.15	4,992.08	4,992.80	4,992.08	4,996.30	4,996.20	0.22
MH - (22)	72	5,000.25	4,990.90	(N/A)	4,990.90	4,995.13	4,995.05	0.16
MH - (30)	72	4,999.92	4,993.29	(N/A)	4,993.29	4,997.54	4,997.39	0.22
MH - (33)	48	5,006.88	5,000.04	(N/A)	5,000.04	5,002.19	5,002.18	0.04
MH - (36)	96	5,006.34	4,999.50	4,999.50	4,999.50	5,001.52	5,001.10	0.65
MH - (38)	48	5,003.28	4,995.11	(N/A)	4,995.11	4,997.16	4,996.78	0.61
MH - (44)	72	5,001.25	4,990.28	(N/A)	4,990.28	4,993.70	4,993.50	0.37
MH - (49)	72	5,000.71	4,990.66	4,996.13	4,990.66	4,994.43	4,994.39	0.17
MH - (58)	72	5,007.81	5,002.01	5,002.01	5,002.01	5,003.71	5,003.50	0.33
MH - (63)	48	5,007.39	5,000.29	(N/A)	5,000.29	5,002.48	5,002.23	0.51
MH - (65)	48	5,008.77	5,002.89	5,003.59	5,002.89	5,005.99	5,005.86	0.21
MH - (86)	48	5,002.14	4,994.93	(N/A)	4,994.93	4,998.93	4,998.93	0.08
MH - (91)	60	4,999.04	4,991.88	4,991.88	4,991.88	4,995.86	4,995.85	0.09
MH - (100)	48	5,007.72	5,004.38	(N/A)	5,004.38	5,005.20	5,005.07	0.17
MH- (06)	48	5,008.77	5,001.78	(N/A)	5,001.78	5,004.48	5,003.72	1.02
MH- (42)	72	5,005.23	4,997.63	4,999.37	4,997.63	4,999.78	4,999.30	0.72
MH-2	48	4,998.85	4,984.42	(N/A)	4,984.42	4,988.74	4,988.12	0.87

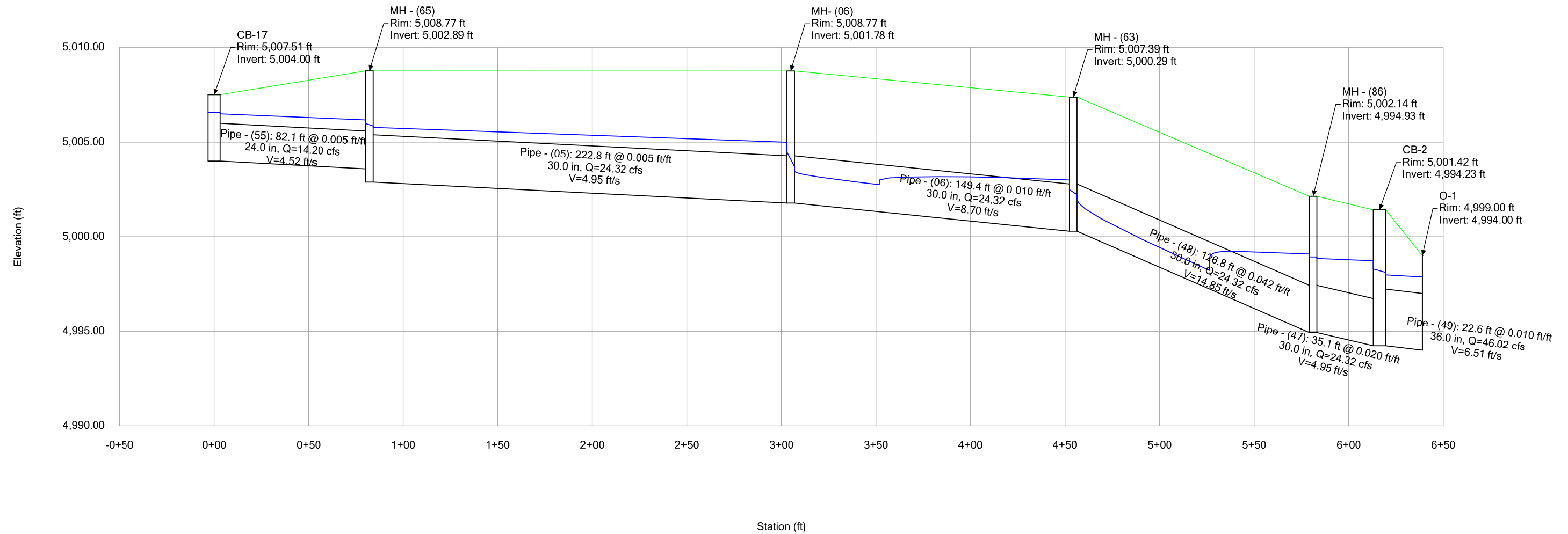
StormCAD Results
Inlet Table

ID	Label	Length (ft)	Flow (Total Out) (cfs)	Elevation (Rim) (ft)	Elevation (Invert Out) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
143	CB-1	6.5	5.2	5,002.10	4,997.02	4,999.40	4,999.39
144	CB-2	6.6	46.02	5,001.42	4,994.23	4,998.30	4,998.11
145	CB-3	3.25	3	5,000.93	4,996.10	4,997.97	4,997.96
146	CB-4	3.25	6	5,000.77	4,995.50	4,997.91	4,997.90
147	CB-5	6.5	7.7	4,999.24	4,995.24	4,997.49	4,997.47
148	CB-6	6.5	13.8	4,999.24	4,994.03	4,997.14	4,997.05
149	CB-7	3.25	3.6	4,999.03	4,993.33	4,996.94	4,996.93
150	CB-8	3.25	2.45	4,998.91	4,992.17	4,996.28	4,996.27
151	CB-9	3.25	6.26	5,000.55	4,996.55	4,997.89	4,997.66
152	CB-10	6.5	7.32	5,000.56	4,996.56	4,998.11	4,997.78
153	CB-11	6.5	1.18	5,005.46	5,001.19	5,001.69	5,001.63
154	CB-12	2.37	4.54	5,006.67	5,001.35	5,002.68	5,002.61
155	CB-13	3.25	5.93	5,005.43	4,999.94	5,002.41	5,002.11
156	CB-14	3.25	5.77	5,006.00	5,002.48	5,004.23	5,004.19
157	CB-15	3.25	2.88	5,010.18	5,006.62	5,007.39	5,007.31
158	CB-16	6.5	10.12	5,007.78	5,004.50	5,007.00	5,006.99
159	CB-17	6.4	14.2	5,007.51	5,004.00	5,006.58	5,006.56
160	CB-18	6.5	6.4	4,992.21	4,985.00	4,985.90	4,985.90
181	CB-19	3.25	10.9	5,001.49	4,994.35	4,998.95	4,998.93
184	CB-20	3.25	2.7	4,999.93	4,996.96	4,998.68	4,998.64
186	CB-21	3	44.3	4,997.00	4,989.00	4,992.13	4,991.57

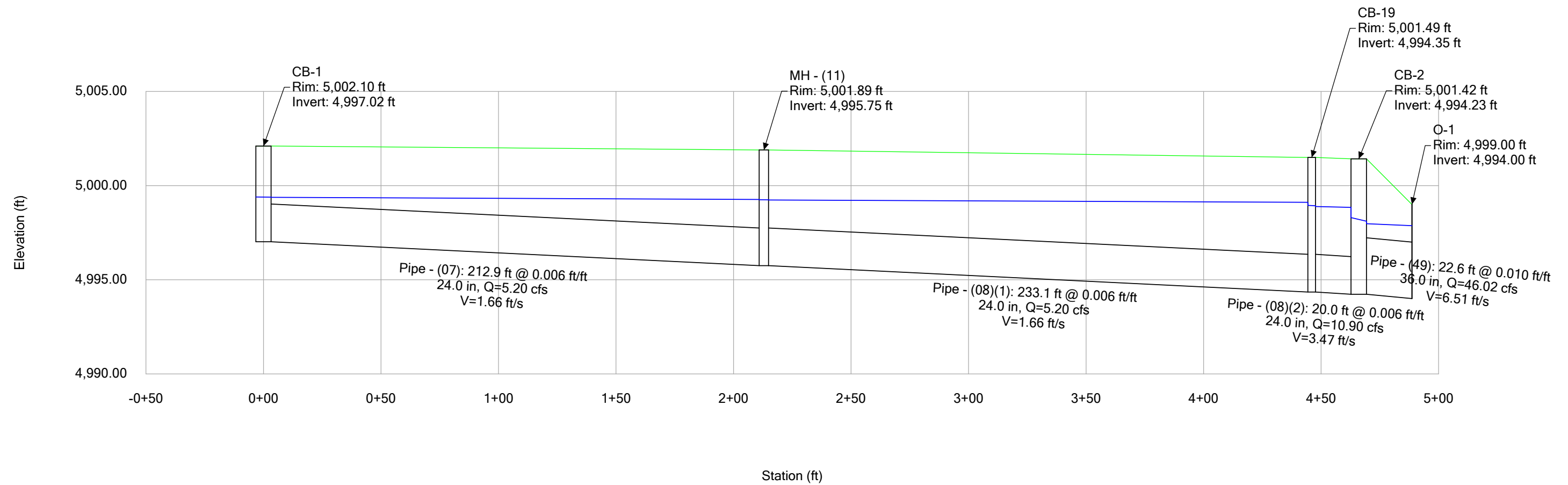
Profile Report
Engineering Profile - Profile - Basin 201 to Pond B (SWMD SD.stsw)



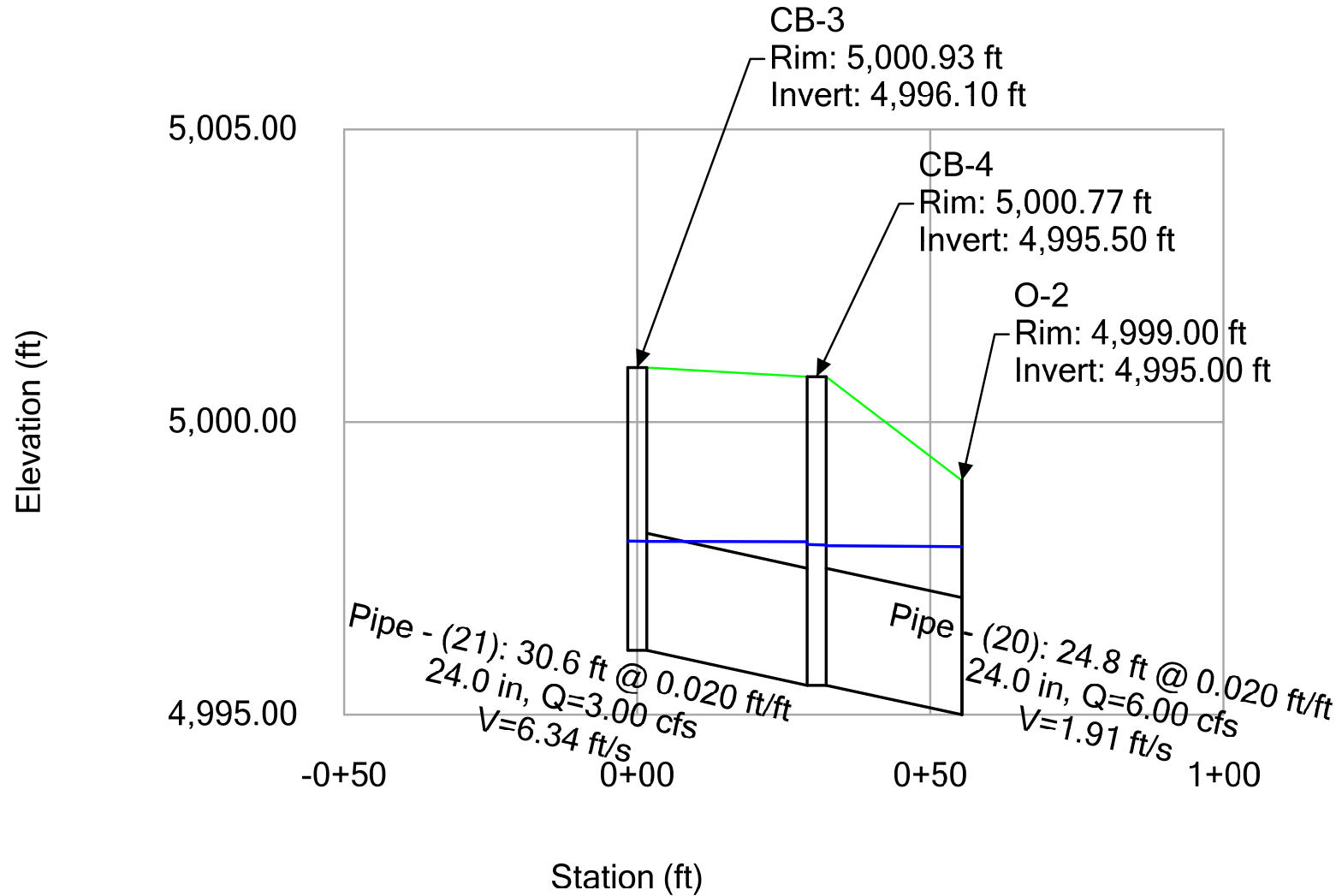
Profile Report
Engineering Profile - Profile - Basin 202 to Pond B (SWMD SD.stsw)



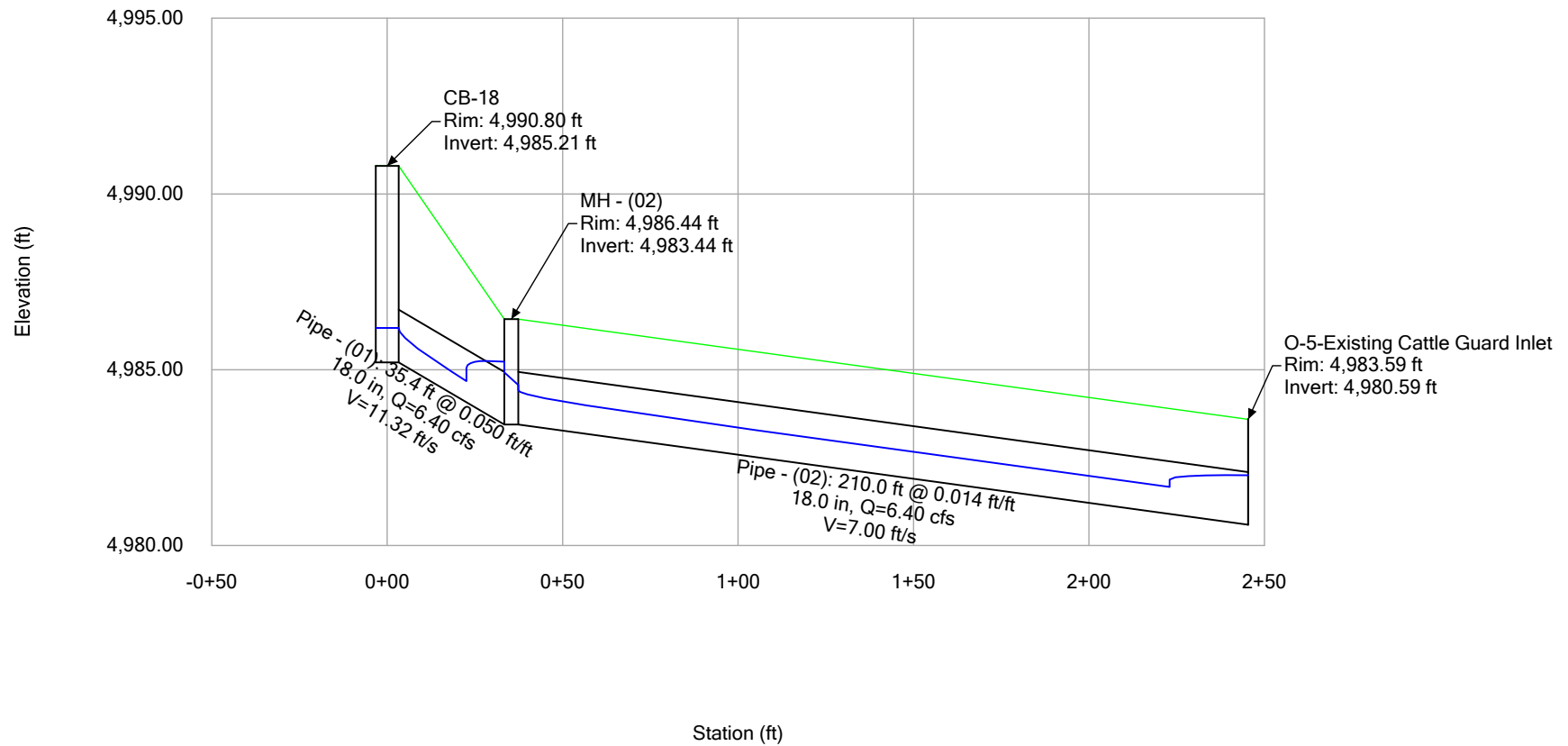
Profile Report
Engineering Profile - Profile - Basin 203 to Pond B (SWMD SD.stsw)



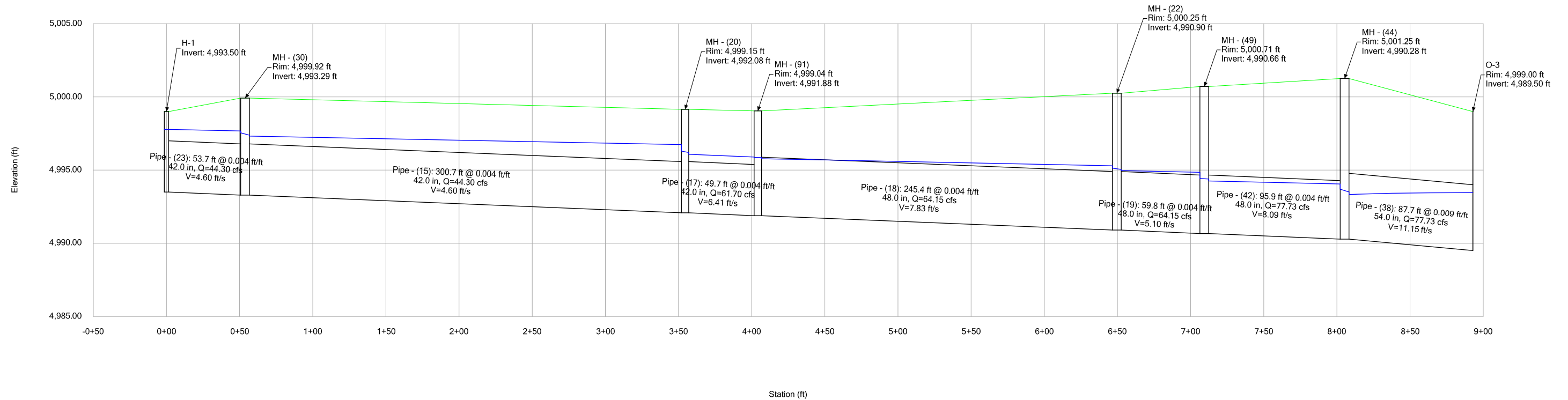
Profile Report **Engineering Profile - Profile - Basin 205 to Pond B (SWMD SD.stsw)**



Profile Report **Engineering Profile - Profile - Basin 206 (SWMD SD.stsw)**

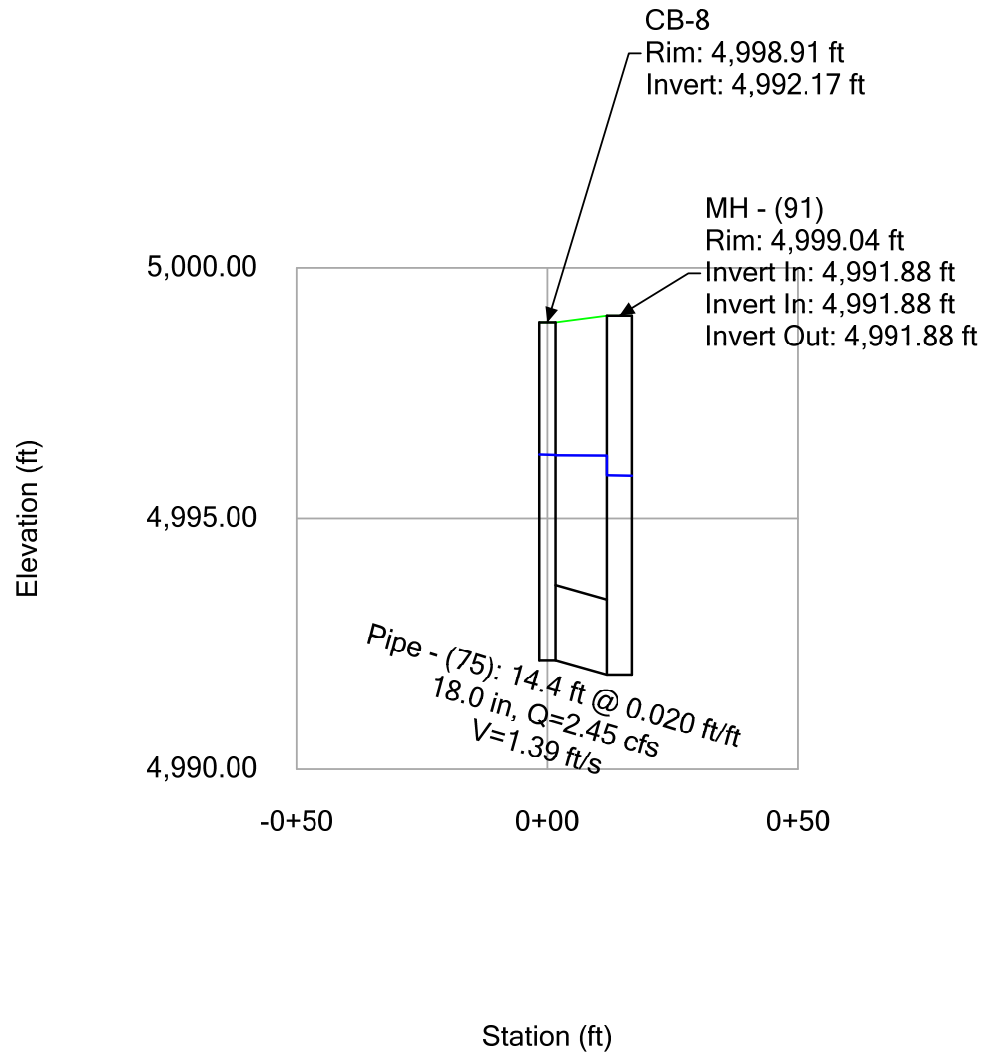


Profile Report
Engineering Profile - Profile - Pond B to Pond A (SWMD SD.stsw)

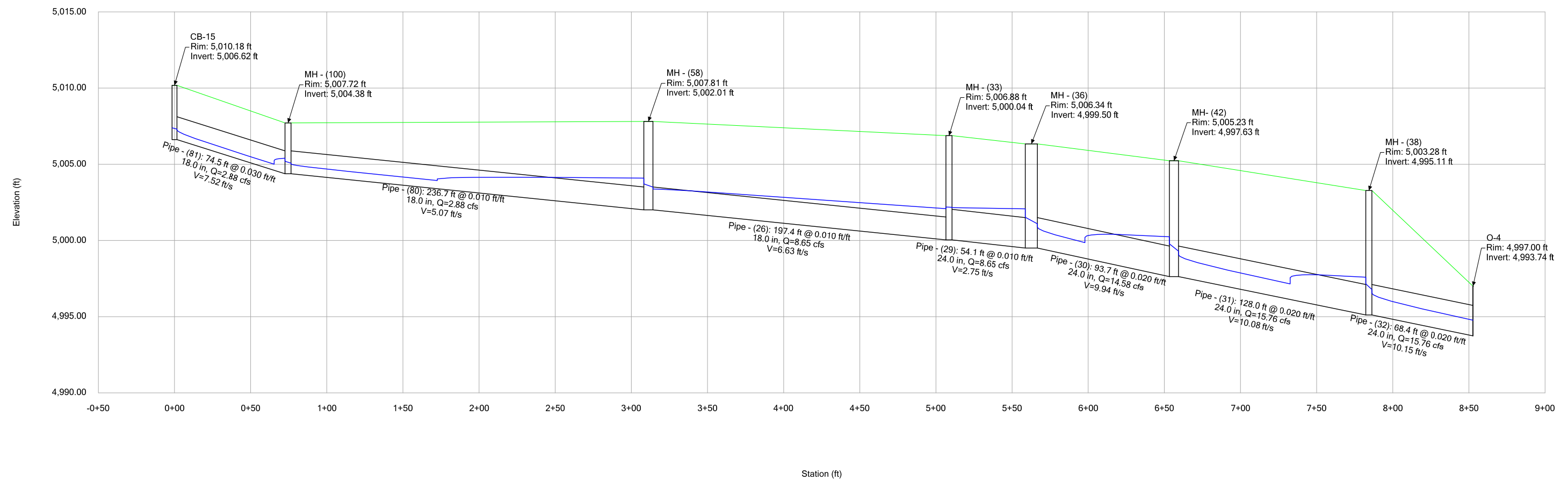


Profile Report

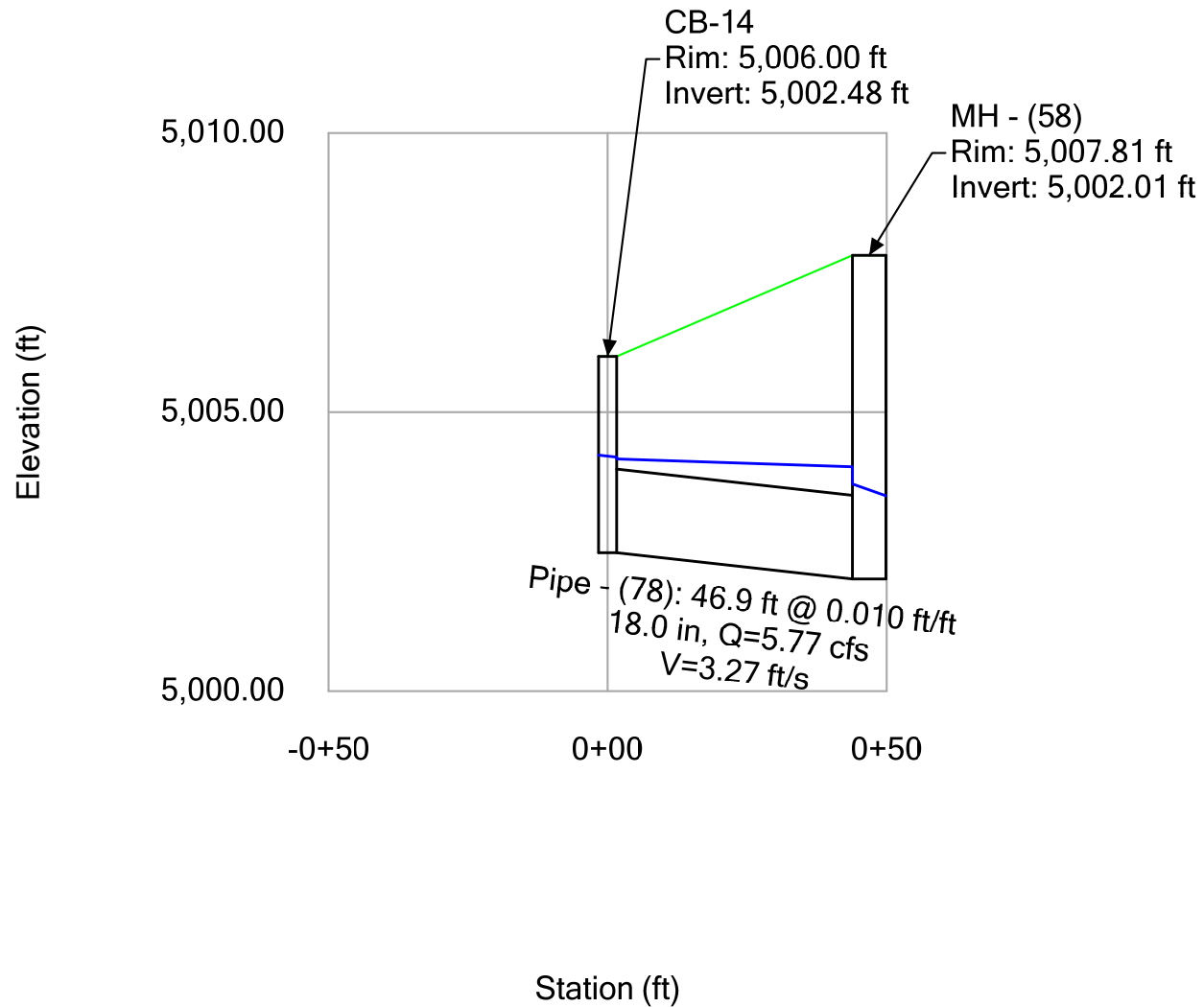
Engineering Profile - Profile - Basin 207 (SWMD SD.stsw)



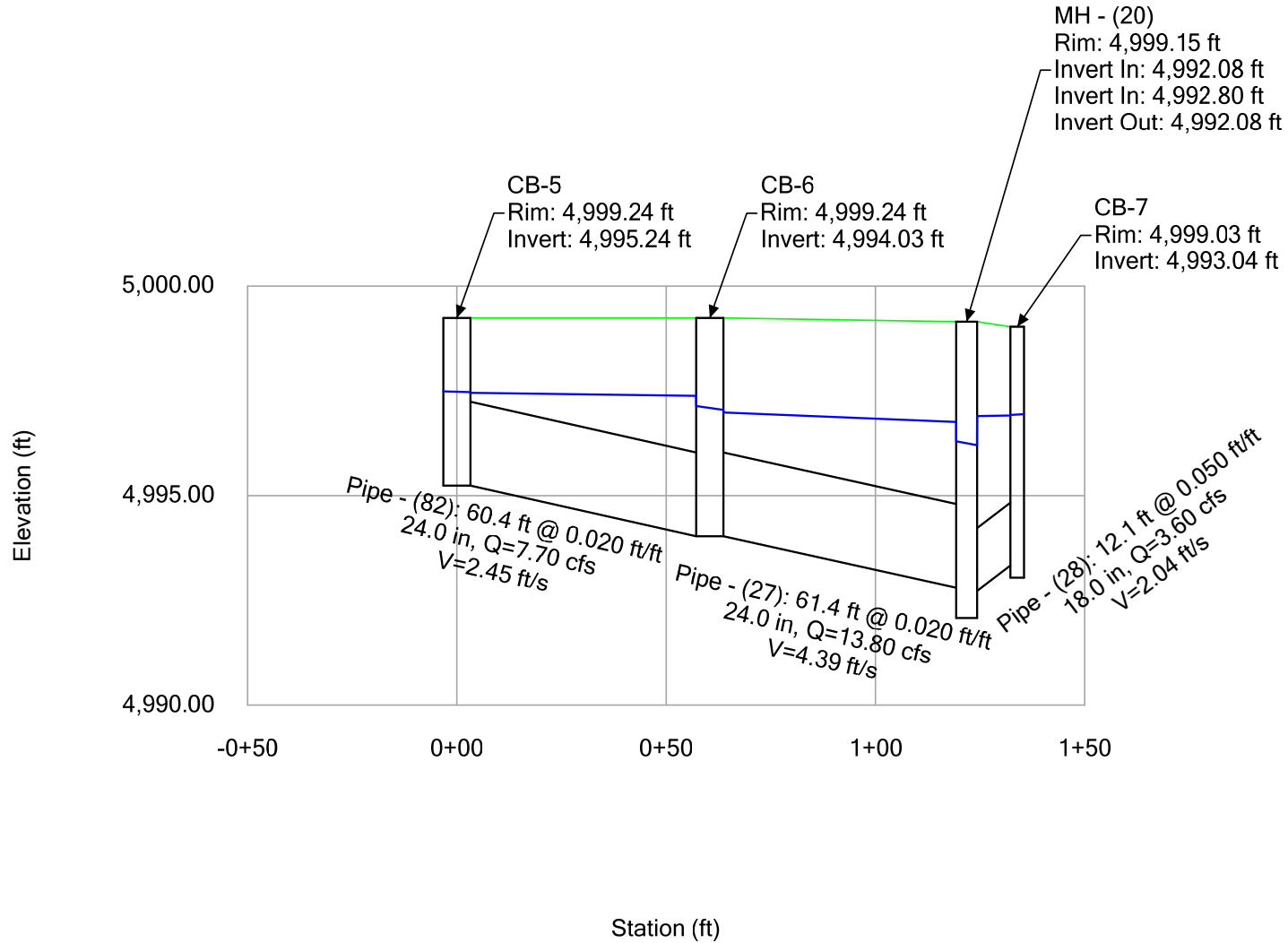
Profile Report
Engineering Profile - Profile - Basin 208 to Pond A (SWMD SD.stsw)



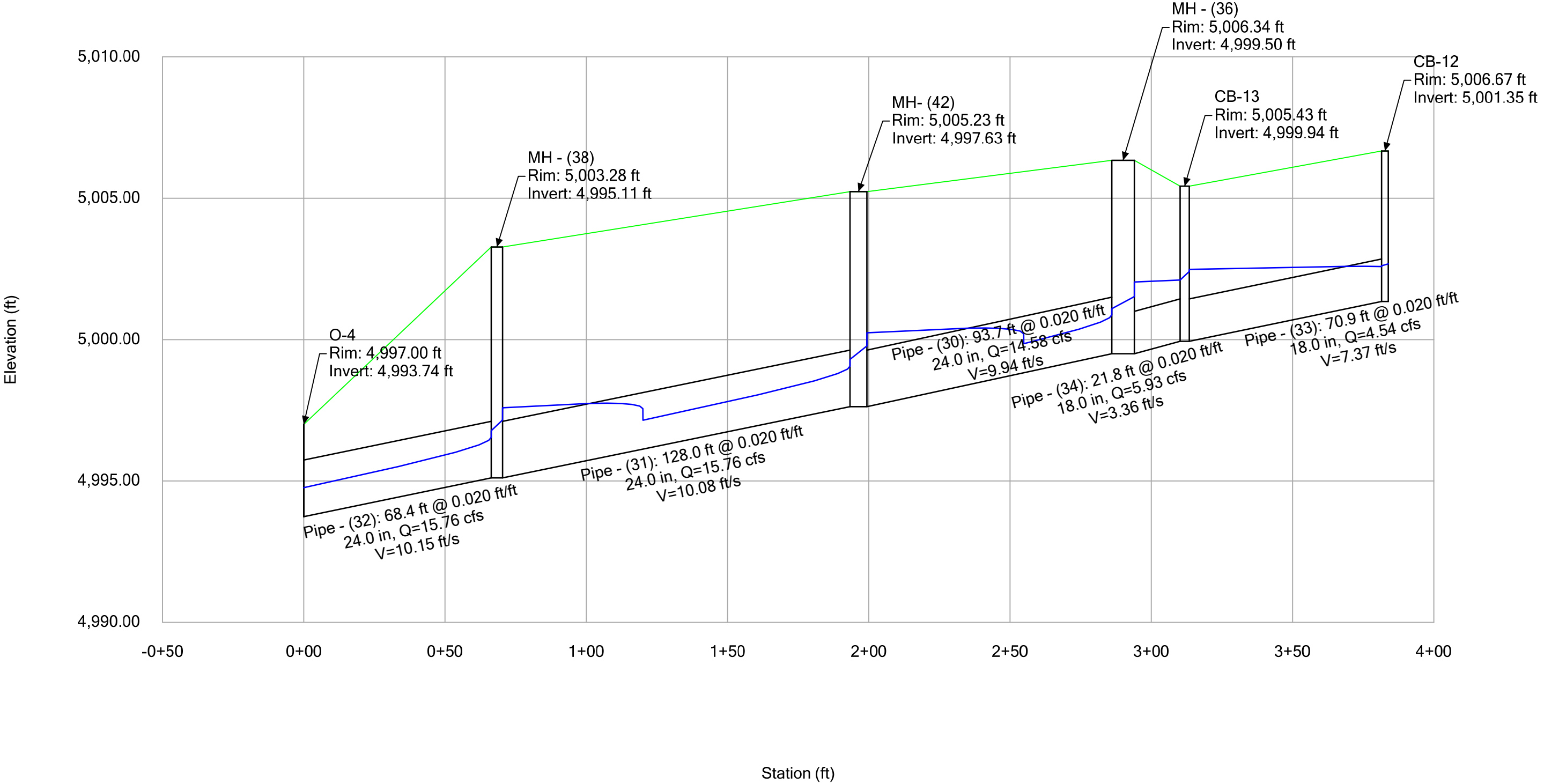
Profile Report **Engineering Profile - Basin 209 (SWMD SD.stsw)**



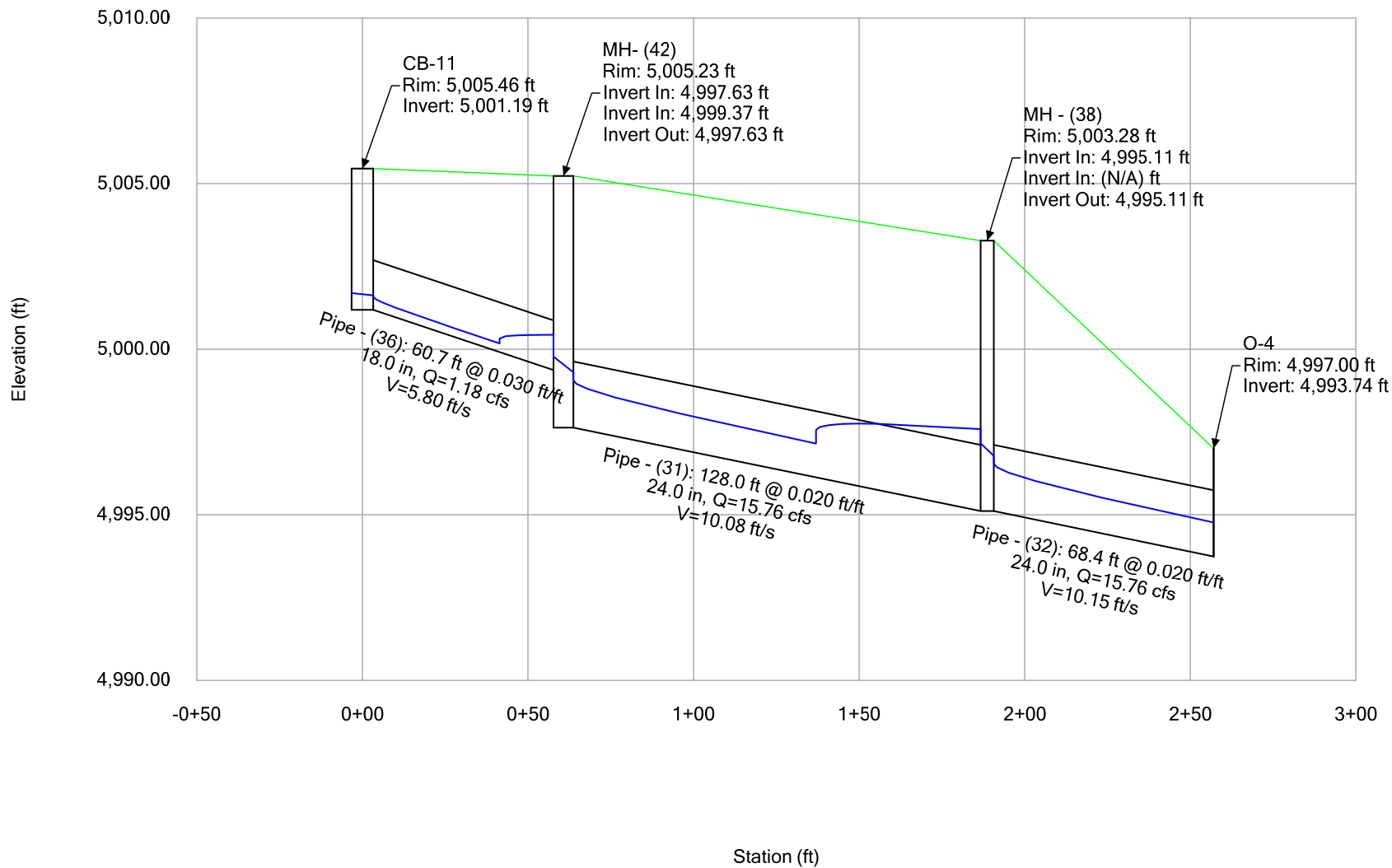
Profile Report **Engineering Profile - Profile - Basins 211 to 212 (SWMD SD.stsw)**



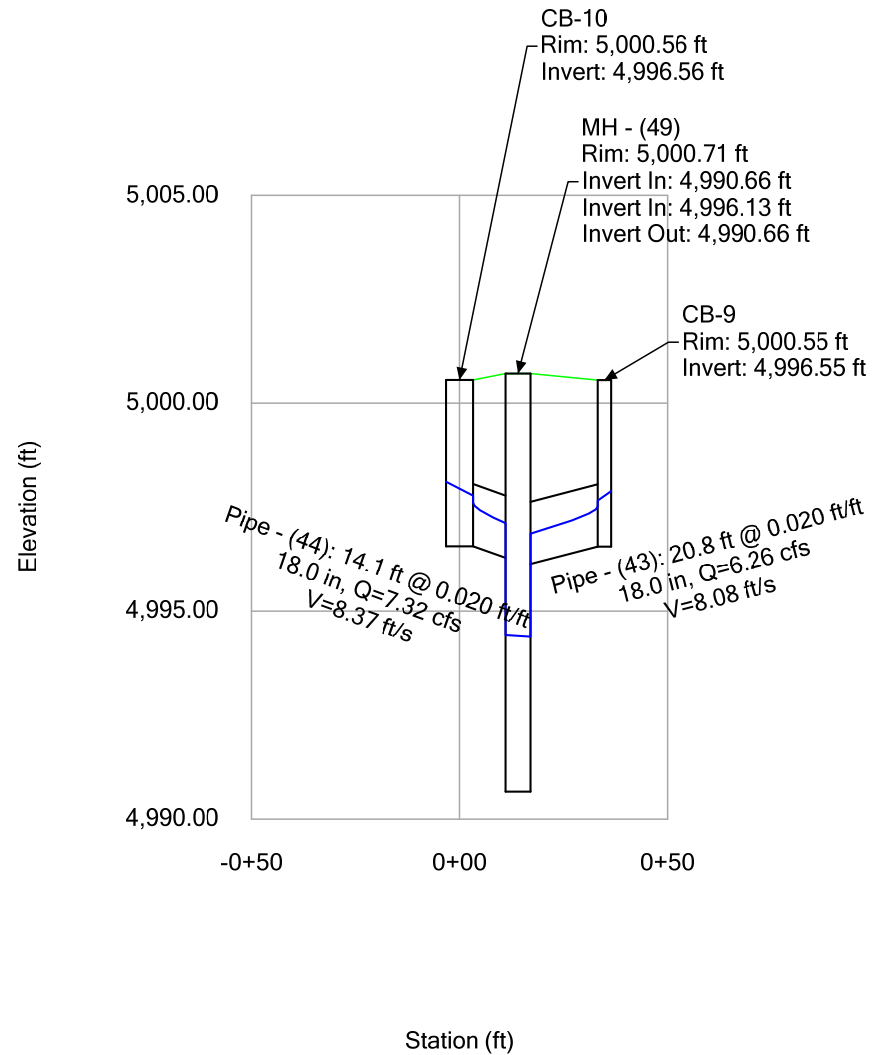
Profile Report
Engineering Profile - Profile - Basin 214 to Pond A (SWMD SD.stsw)



Profile Report **Engineering Profile - Profile - Basin 215 to Pond A (SWMD SD.stsw)**



Profile Report **Engineering Profile - Profile - Basin 219 (SWMD SD.stsw)**



Profile Report **Engineering Profile - Profile - Pond A Outfall (SWMD SD.stsw)**

