CITY OF ALBUQUERQUE

August 13, 2008

Fred C. Arfman, P.E.
Isaacson & Arfman, P.A.
128 Monroe St. NE
Albuquerque, NM 87108

Re: Monterra del Rey Units 1-3 Interim Drainage Improvements Plan
Engineer's Stamp dated 8-6-08 (D18/D054)

Dear Mr. Arfman,

Based upon the information provided in your submittal received 8-7-08, the above referenced plan is approved for Grading Permit and for Work Order.

If you have any questions, you can contact me at 924-3695.

Sincerely,

Curtis A. Cherne, P.E.
Senior Engineer, Planning Dept.
Development and Building Services

C: file

PO Box 1293
Albuquerque
NM 87103
www.cabq.gov

REVISIONS TO
DRAINAGE REPORT

FOR

MONTERRA DEL REY, UNITS 1-3

A 411-DWELLING UNIT MIXED RESIDENTIAL SUBDIVISION

ALBUQUERQUE, NEW MEXICO
JUNE 2008

Prepared by:

ISAACSON & ARFMAN, P.A.
128 Monroe Street NE
Albuquerque, NM 87108
(505) 268-8828

Åsa Nilsson-Weber 6-25-08

Åsa Nilsson-Weber, PE **Date**

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SUMMARY OF REVISIONS

The following is a summary of the revisions that were made since the 3-7-08 submittal. The Study Phase Letter Report for San Pedro Collectors showed that flows of 160 cfs in Derickson Ave. would be contained in the street. Since there is mountable curb on the north side of the street, these flows would overtop the curb and encroach onto private property. Therefore, additional onsite and offsite storm drain improvements were added to reduce the flows in Derickson. Also, there were changes to the grading plans as noted below. The following is a summary of the grading and drainage changes that were made since the previous submittal.

Drainage

- 8 inlets were added (6 onsite and 2 in Derickson Ave).
- Storm drain pipes in Derickson Ave to Montes Dr/Monte Sur Ave were up-sized to 48" dia.
- Tract P basin areas (B7, B12 and B16) were revised to show the entire park area draining west.
- 4" drain pipes were added through curb at the parking areas in Tracts H, L and R.
- 2' curb opening and cobble rundown was added at the parking area in Tract E.

Grading

- Grades were revised due to a 4-foot right-of-way dedication in San Pedro Blvd., which shifted the westerly portion of the site east and reduced the median to 8 feet in Montes Dr.
- The landscaping plan for the private open space tracts was incorporated and those areas were graded.
- The majority of the multiple townhome pads were changed to split-level pads.
- Pad elevations were lowered by 4" to account for 4" aggregate base course underneath building slabs per the Geotechnical Report requirements.
- Retaining walls were added along the back yards of the single detached homes adjacent to the commercial tract to accommodate the future commercial development.

AHYMO

AHYMO Drainage calculations were revised based on the added inlets and modified Basins B7, B12 and B16--see Appendix B. Also included in Appendix B is a summary table of the basins contributing to each discharge location.

SURFACE FLOWS

A re-study of the existing Basin 5 from the San Pedro Collectors report (see Appendix E for excerpts) shows that the area north of, and including, Derickson Ave. discharges 40.5 cfs to Derickson, and a portion of Basin 5 discharges 15.1 cfs to San Pedro Blvd. An existing basin map is included in Appendix A. The following table summarizes the existing peak flows at two key locations—1. Derickson Ave by the existing cattle guard inlet and 2. San Pedro Blvd south of Derickson Ave.

EXISTING FLOW SUMMARY				
BASIN	Q100 (cfs)	DISCHARGE LOCATION	TOTAL FLOWS 1. DERICKSON	TOTAL FLOWS 2. SAN PEDRO
Offsite 5A	40.5	Derickson		
Onsite 5B	104.9	"	145.4 CFS	
Onsite 5C	10.2	San Pedro		
Offsite 5D	4.9	"		
Onsite 340B	104.2	"		
Offsite 340B	139.7	"		259.0 CFS

The proposed added inlets will reduce the on-site peak flows to Derickson Ave. to 26.1 cfs. The Proposed Flows Exhibit in Appendix A shows surface flow discharge from the site, and the remaining offsite flows were added to show street flows at the two key locations in Derickson Ave and San Pedro Blvd. The table below summarizes the peak flows in proposed conditions.

PROPOSED FLOW SUMMARY				
Analysis Point/Basin	Q100 (cfs)	DISCHARGE LOCATION	TOTAL FLOWS 1. DERICKSON	TOTAL FLOWS 2. SAN PEDRO
Offsite 5A	40.5	Derickson		
AP33	1.6*	"		
AP20A	8.3*	"		
AP20B	15.3*	"		
AP31	26.1*	"	66.6 CFS*	
Basins OFF1-3	1.3	San Pedro		
Offsite 5D	4.9			
Offsite 340B	139.7	"		145.9 CFS

*In AHYMO (see Appendix B), the flows from AP33, AP20A and AP20B were routed west in Derickson Ave. to the two proposed inlets. These inlets will capture 20 cfs. After combining the remaining flows from these analysis points (5.0 cfs) with the flows at AP31, AHYMO shows that the peak flow at AP31 is 26.1 cfs—the peak will occur before the routed flows reach this location.

The on-site street flow depth capacities were re-calculated where the flows and/or street slopes changed—see summary table in Appendix C. Calculations for sections A-F (for Derickson Ave, San Pedro Blvd, Montes Dr and Monte Sur Ave) as shown on the proposed flow exhibit and on the drainage plans are also included in Appendix C. The flows will be contained within the right-of-way.

STORM DRAIN FLOWS

The site will discharge a total of 162.3 cfs to the storm drain system.

- 125.6 cfs to the Derickson Ave. storm drain +20+67 =249
- 36.7 cfs to the San Pedro Blvd storm drain

An additional 20 cfs will be captured by the two proposed inlets in Derickson Ave, and the cattle guard inlet will capture the remaining surface flows at this location of 66.6 cfs. The HGL at the existing cattle guard inlet in Derickson Ave is below the grate elevation. The HGL at the south sump inlet (inlet 1B) at the west end of Monte Sur Ave is 0.51 feet above the flowline, which is acceptable since the 100-year flows will still be contained within the street. Appendix D includes Hydraflow storm drain calculations and an exhibit showing inlet and manhole numbers corresponding to the Hydraflow calculation summary.

DRAIN PIPES AND CURB OPENING

Where parking areas are sloped away from the street/private alleys, drain pipes through curb shall be installed to capture minor flows at Tracts H, L & R and a curb opening with a cobble rundown shall be installed at Tract E where the flows enter the private alley. The flow rate at the parking areas in Tracts E, H and L (by multiple townhomes) is 0.3 cfs, and the flow rate at Tract R (south of greencourt units) is 0.6 cfs.

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02d RUN DATE (MON/DAY/YR) =06/19/2008
INPUT FILE = 1614P8.DAT USER NO.= AHYMO-S-9702dIsa-Arfman2

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	NOTATION
*S**********										
*S	MONTERRA DEL REY									
*S	DEVELOPED CONDITIONS									
*S	100-YR, 6-HR STORM									
*S	1614P4.DAT									
*S	MARCH, 2008—REVISED JUNE 2008									
*S	BY ASA NILSSON-WEBER									
*S	ISAACSON & ARFMAN, P.A.									
*S**********										
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 2.450
*S BASIN A1										
*S	* * * AP1 * * *									
COMPUTE NM HYD	101.00	-	1	.00445	11.95	.426	1.79429	1.500	4.195	PER IMP= 65.00
*S BASIN A2										
COMPUTE NM HYD	102.00	-	2	.00405	10.87	.388	1.79429	1.500	4.195	PER IMP= 65.00
*S BASIN A3										
COMPUTE NM HYD	103.00	-	3	.00086	2.32	.082	1.79429	1.500	4.222	PER IMP= 65.00
*S BASIN B1										
COMPUTE NM HYD	204.00	-	4	.00231	5.91	.206	1.67455	1.500	3.996	PER IMP= 55.00
*S BASIN B2										
COMPUTE NM HYD	205.00	-	5	.00159	4.07	.142	1.67455	1.500	4.001	PER IMP= 55.00
*S BASIN B3										
COMPUTE NM HYD	206.00	-	6	.00152	3.89	.136	1.67455	1.500	4.001	PER IMP= 55.00
*S BASIN B4										
COMPUTE NM HYD	207.00	-	7	.00264	6.75	.236	1.67455	1.500	3.994	PER IMP= 55.00
*S BASIN B5										
COMPUTE NM HYD	208.00	-	8	.00244	6.24	.218	1.67455	1.500	3.994	PER IMP= 55.00
*S BASIN B6										
COMPUTE NM HYD	209.00	-	9	.00220	5.83	.207	1.76013	1.500	4.144	PER IMP= 62.00
*S BASIN B7										
COMPUTE NM HYD	210.00	-	10	.00348	8.89	.311	1.67455	1.500	3.991	PER IMP= 55.00
*S BASIN B8										
*S	* * * AP9 * * *									
COMPUTE NM HYD	211.00	-	11	.00413	10.55	.369	1.67455	1.500	3.990	PER IMP= 55.00
*S BASIN B9										
COMPUTE NM HYD	212.00	-	12	.00172	4.40	.154	1.67455	1.500	3.999	PER IMP= 55.00
*S BASIN B10										
COMPUTE NM HYD	213.00	-	13	.00380	9.70	.339	1.67455	1.500	3.990	PER IMP= 55.00
*S BASIN B11										
COMPUTE NM HYD	214.00	-	14	.00061	1.57	.054	1.67455	1.500	4.029	PER IMP= 55.00
*S BASIN B12										
COMPUTE NM HYD	215.00	-	15	.00346	8.84	.309	1.67454	1.500	3.991	PER IMP= 55.00
*S BASIN B13A										
COMPUTE NM HYD	216.00	-	16	.00091	2.34	.081	1.67454	1.500	4.016	PER IMP= 55.00
*S BASIN B14										
COMPUTE NM HYD	217.00	-	17	.00103	2.64	.092	1.67455	1.500	4.011	PER IMP= 55.00
*S BASIN B15										
COMPUTE NM HYD	218.00	-	18	.00131	3.36	.117	1.67455	1.500	4.004	PER IMP= 55.00
*S BASIN B16										

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	NOTATION	
COMPUTE NM HYD	219.00	-	19	.00177	4.53	.158	1.67455	1.500	3.998	PER IMP=	55.00
*S BASIN B17											
COMPUTE NM HYD	220.00	-	20	.00120	3.08	.107	1.67455	1.500	4.007	PER IMP=	55.00
*S BASIN C1											
COMPUTE NM HYD	321.00	-	21	.00383	10.18	.362	1.77034	1.500	4.154	PER IMP=	63.00
*S BASIN C2											
COMPUTE NM HYD	322.00	-	22	.00267	7.71	.281	1.97567	1.500	4.512	PER IMP=	80.00
*S BASIN C3											
COMPUTE NM HYD	323.00	-	23	.00266	7.68	.280	1.97567	1.500	4.512	PER IMP=	80.00
*S BASIN C4											
COMPUTE NM HYD	324.00	-	24	.00205	5.92	.216	1.97567	1.500	4.516	PER IMP=	80.00
*S BASIN C5											
COMPUTE NM HYD	325.00	-	25	.00208	6.01	.219	1.97567	1.500	4.516	PER IMP=	80.00
*S BASIN C6											
COMPUTE NM HYD	326.00	-	26	.00206	5.95	.217	1.97567	1.500	4.516	PER IMP=	80.00
*S BASIN C7											
COMPUTE NM HYD	327.00	-	27	.00083	2.22	.078	1.77034	1.500	4.182	PER IMP=	63.00
*S BASIN C8											
COMPUTE NM HYD	328.00	-	28	.00114	3.04	.108	1.77034	1.500	4.172	PER IMP=	63.00
*S BASIN C9											
COMPUTE NM HYD	329.00	-	29	.00138	3.68	.130	1.77034	1.500	4.168	PER IMP=	63.00
*S BASIN C10											
COMPUTE NM HYD	330.00	-	30	.00138	3.68	.130	1.77034	1.500	4.168	PER IMP=	63.00
*S BASIN C11											
COMPUTE NM HYD	331.00	-	31	.00195	5.19	.184	1.77034	1.500	4.163	PER IMP=	63.00
*S BASIN C12											
COMPUTE NM HYD	332.00	-	32	.00189	5.04	.178	1.77034	1.500	4.163	PER IMP=	63.00
*S BASIN C13											
COMPUTE NM HYD	333.00	-	33	.00147	3.92	.139	1.77034	1.500	4.168	PER IMP=	63.00
*S BASIN C14											
COMPUTE NM HYD	334.00	-	34	.00098	2.62	.093	1.77034	1.500	4.176	PER IMP=	63.00
*S BASIN D1											
COMPUTE NM HYD	435.00	-	35	.00259	6.93	.246	1.78408	1.500	4.183	PER IMP=	64.00
*S BASIN D2											
COMPUTE NM HYD	436.00	-	36	.00658	17.59	.626	1.78408	1.500	4.177	PER IMP=	64.00
*S BASIN D3											
COMPUTE NM HYD	437.00	-	37	.00234	6.27	.223	1.78408	1.500	4.184	PER IMP=	64.00
*S BASIN D4											
COMPUTE NM HYD	438.00	-	38	.00114	3.06	.108	1.78408	1.500	4.197	PER IMP=	64.00
*S BASIN E (COMMERCIAL SITE)											
COMPUTE NM HYD	539.00	-	39	.00367	10.82	.398	2.03378	1.500	4.608	PER IMP=	85.00
*S BASIN OFF1											
COMPUTE NM HYD	640.00	-	40	.00017	.45	.015	1.67455	1.500	4.167	PER IMP=	55.00
*S BASIN OFF2											
COMPUTE NM HYD	641.00	-	41	.00014	.38	.013	1.67454	1.500	4.203	PER IMP=	55.00
*S BASIN OFF3											
COMPUTE NM HYD	642.00	-	42	.00014	.42	.015	1.97567	1.500	4.682	PER IMP=	80.00
*S BASIN B13B											
COMPUTE NM HYD	643.00	-	43	.00106	2.72	.095	1.67455	1.500	4.011	PER IMP=	55.00
*S BASIN OFF4											
COMPUTE NM HYD	644.00	-	44	.00022	.65	.023	1.97567	1.500	4.637	PER IMP=	80.00
*S BASIN OFF5											

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	NOTATION
COMPUTE NM HYD	645.00	-	45	.00061	1.57	.054	1.67455	1.500	4.029	PER IMP= 55.00
*S ADD BASINS A3&B1										
ADD HYD	101.20	3& 4	46	.00317	8.23	.289	1.70686	1.500	4.057	
*S DIVIDE FLOWS, 6.9 CFS WEST REMAINDER TO SUMP INLETS 1 & 2										
DIVIDE HYD	101.WEST	46	47	.00308	6.90	.280	1.70686	1.467	3.501	
	101.NORTH	and	48	.00009	1.33	.008	1.70686	1.500	22.991	
*S ROUTE FLOWS NORTH THROUGH 32' F-F STREET										
ROUTE MCUNGE	101.2A	48	49	.00009	1.31	.009	1.80248	1.567	22.661	CCODE = .2
*S ADD BASIN A2										
*S	* * * AP2 * * *									
ADD HYD	101.10	2&49	50	.00414	10.87	.396	1.79428	1.500	4.104	
*S ADD BASIN A1—TOTAL FLOWS AT SUMP INLETS 1 & 2										
*S	* * * AP3 * * *									
ADD HYD	101.30	1&50	51	.00859	22.82	.822	1.79425	1.500	4.151	
*S ROUTE FLOWS WEST IN LOS VASCOS THROUGH 28' F-F STREET										
ROUTE MCUNGE	205.10	47	1	.00308	6.90	.280	1.70553	1.533	3.501	CCODE = .1
*S ADD BASIN B2										
*S	* * * AP4 * * *									
ADD HYD	205.20	5& 1	52	.00467	10.82	.422	1.69482	1.533	3.621	
*S DIVIDE FLOWS, 7.0 CFS WEST REMAINDER NORTH IN TARAPACA										
DIVIDE HYD	205.WEST	52	53	.00414	7.00	.374	1.69482	1.467	2.645	
	205.NORTH	and	54	.00053	3.82	.048	1.69482	1.533	11.169	
*S ROUTE FLOWS WEST IN LOS VASCOS THROUGH 28' F-F STREET										
ROUTE MCUNGE	205.30	53	2	.00414	7.00	.374	1.69385	1.533	2.645	CCODE = .1
*S ADD BASIN B3										
*S	* * * AP5 * * *									
ADD HYD	206.10	6& 2	55	.00566	10.75	.509	1.68853	1.533	2.970	
*S ROUTE FLOWS FROM BASIN B4 THRU 28' F-F STREET										
*S (LOS ROBLES)										
ROUTE MCUNGE	207.10	7	56	.00264	6.74	.236	1.67492	1.533	3.986	CCODE = .2
*S ADD BASIN B5										
*S	* * * AP6 * * *									
ADD HYD	208.10	8&56	57	.00508	12.78	.454	1.67459	1.500	3.932	
*S ROUTE FLOWS THRU 28' F-F STREET (CANEPA)										
ROUTE MCUNGE	208.20	57	58	.00508	12.75	.453	1.67223	1.567	3.921	CCODE = .1
*S ADD BASIN B6										
*S	* * * AP7 * * *									
ADD HYD	209.10	9&58	59	.00728	17.66	.660	1.69869	1.567	3.790	
*S DIVIDE FLOWS, 7 CFS SD REMAINDER IN STREET										
DIVIDE HYD	209.SD	59	60	.00528	7.00	.479	1.69869	1.433	2.070	
	209.ST	and	61	.00200	10.66	.181	1.69869	1.567	8.343	
*S ADD FLOWS AT LOS VASCOS AND CANEPA										
*S	* * * AP5A * * *									
ADD HYD	209.20	55&61	6	.00765	20.96	.690	1.69118	1.567	4.279	
*S DIVIDE FLOWS, 15.8 CFS WEST REMAINDER NORTH IN CANEPA										
DIVIDE HYD	209.WEST	6	62	.00712	15.80	.643	1.69118	1.500	3.465	
	209.NORTH	and	63	.00053	5.16	.047	1.69118	1.567	15.298	
*S ROUTE FLOWS WEST IN LOS VASCOS THROUGH 28' F-F STREET										
ROUTE MCUNGE	209.30	62	7	.00712	15.80	.642	1.68919	1.567	3.465	CCODE = .1
*S ADD BASIN B7										
*S	* * * AP8 * * *									

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	NOTATION
ADD HYD	209.10	10& 7	64	.01060	23.33	.953	1.68432	1.567	3.437	
*S ADD FLOWS AT MONTE SUR AND TARAPACA										
ADD HYD	211.20	11&54	3	.00466	13.97	.417	1.67681	1.533	4.681	
*S DIVIDE FLOWS, 6.7 CFS NORTH TO DERICKSON REMAINDER WEST IN MONTE SUR										
DIVIDE HYD	211.NORTH	3	4	.00372	6.70	.333	1.67681	1.433	2.812	
	212.WEST	and	5	.00094	7.27	.084	1.67681	1.533	12.067	
*S ADD FLOWS AT DERICKSON AND TARAPACA										
*S	* * * AP20A * * *									
ADD HYD	211.20	45& 4	99	.00433	8.27	.387	1.67642	1.500	2.984	
*S ADD BASIN B9 TO FLOWS AT TARAPACA AND MONTE SUR										
*S	* * * AP10 * * *									
ADD HYD	212.10	5&12	67	.00266	11.51	.238	1.67525	1.533	6.758	
*S ROUTE FLOWS AT CANEPA N OF LOS VASCOS THRU 28' F-F STREET										
ROUTE MCUNGE	206.20	63	70	.00053	5.08	.047	1.66426	1.633	15.084	CCODE = .1
*S ADD BASIN B10 TO ROUTED FLOWS										
*S	* * * AP11 * * *									
ADD HYD	213.10	13&70	71	.00433	11.00	.386	1.67312	1.633	3.972	
*S ADD FLOWS AT CANEPA & MONTE SUR										
*S	* * * AP12 * * *									
ADD HYD	213.20	67&71	72	.00699	21.13	.624	1.67393	1.500	4.725	
*S DIVIDE FLOWS 4 CFS TO SD REMAINING IN STREET										
DIVIDE HYD	213.SD	72	73	.00343	4.00	.306	1.67393	1.367	1.823	
	213.ST	and	74	.00356	17.13	.318	1.67393	1.500	7.520	
*S ADD BASIN B11										
*S	* * * AP13 * * *									
ADD HYD	214.10	14&74	1	.00417	18.70	.372	1.67395	1.500	7.010	
*S DIVIDE FLOWS 3.8 CFS TO SD REMAINING IN STREET										
DIVIDE HYD	214.SD	1	2	.00162	3.80	.145	1.67395	1.400	3.665	
	214.ST	and	3	.00255	14.90	.228	1.67395	1.500	9.136	
*S ROUTE FLOWS AT MONTGRAS N OF LOS VASCOS THRU 28' F-F STREET										
*S TO SOUTH INLET										
ROUTE MCUNGE	210.20	64	75	.01060	23.05	.953	1.68468	1.600	3.396	CCODE = .2
*S DIVIDE BASIN B12 77% CONTRIBUTING AREA AT SOUTH INLET										
DIVIDE HYD	215.SOUTH	15	76	.00266	6.80	.238	1.67446	1.500	3.991	
	215.NORTH	and	77	.00080	2.03	.071	1.67446	1.500	3.991	
*S ADD FLOWS AT SOUTH INLET IN MONTGRAS										
*S	* * * AP14 * * *									
ADD HYD	215.10	75&76	78	.01327	28.78	1.191	1.68259	1.567	3.389	
*S DIVIDE FLOWS, 8 CFS SD REMAINDER IN STREET										
DIVIDE HYD	215.SDS	78	79	.00757	8.00	.679	1.68259	1.433	1.652	
	215.STS	and	80	.00570	20.78	.512	1.68259	1.567	5.694	
*S ADD FLOWS AT NORTH INLET IN MONTGRAS										
*S	* * * AP15 * * *									
ADD HYD	215.20	77&80	81	.00650	22.50	.583	1.68156	1.567	5.411	
*S DIVIDE FLOWS, 7.0 CFS SD REMAINDER IN STREET										
DIVIDE HYD	215.SDN	81	82	.00338	7.00	.303	1.68156	1.467	3.234	
	215.STN	and	83	.00312	15.50	.279	1.68156	1.567	7.773	
*S ADD FLOWS AT INLET IN MONTE SUR WEST OF MONTGRAS										
*S	* * * AP16 * * *									
ADD HYD	216.10	3&83	84	.00567	27.49	.507	1.67814	1.533	7.582	
ADD HYD	216.20	16&84	85	.00658	29.74	.588	1.67759	1.533	7.068	
*S DIVIDE FLOWS, 5.6 CFS SD REMAINDER IN STREET										

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	NOTATION
DIVIDE HYD	216.SDE	85	86	.00236	5.60	.212	1.67759	1.433	3.701	
	216.STE	and	87	.00421	24.14	.377	1.67759	1.533	8.957	
*S ADD BASIN B13B--FLOWS AT INLET IN MONTE SUR										
*S EAST OF PATRONALES DR										
*S	* * * AP17 * * *									
ADD HYD	216.30	43&87	88	.00527	26.76	.471	1.67692	1.533	7.933	
*S DIVIDE FLOWS, 3.6 CFS SD REMAINDER IN STREET										
DIVIDE HYD	216.SDW	88	89	.00154	3.60	.138	1.67692	1.467	3.656	
	216.STW	and	90	.00373	23.16	.334	1.67692	1.533	9.696	
*S ROUTE FLOWS FROM BASIN B15 N ON PATRONALES										
*S THRU 28' F-F STREET										
ROUTE MCUNGE	218.10	18	46	.00131	3.37	.117	1.67487	1.533	4.017	CCODE = .2
*S ADD BASIN B16										
ADD HYD	219.10	19&46	47	.00308	7.73	.275	1.67444	1.533	3.921	
*S ROUTE FLOWS N ON PATRONALES THRU 28' F-F STREET										
ROUTE MCUNGE	219.20	47	48	.00308	7.66	.275	1.67194	1.567	3.884	CCODE = .1
*S ADD BASIN B17										
*S	* * * AP18 * * *									
ADD HYD	219.10	20&48	49	.00428	10.26	.382	1.67250	1.567	3.747	
*S ADD FLOWS AT PATRONALES AND MONTE SUR										
ADD HYD	220.10	49&90	50	.00801	33.06	.716	1.67456	1.533	6.446	
*S DIVIDE FLOW 10.4 CFS WEST IN MONTE SUR,										
*S REM. NORTH IN PATRONALES										
*S	* * * AP19 * * *									
DIVIDE HYD	220.WEST	50	1	.00477	10.40	.426	1.67456	1.467	3.406	
	220.NORTH	and	52	.00324	22.66	.290	1.67456	1.533	10.921	
*S ADD FLOWS AT PATRONALES AND DERICKSON										
ADD HYD	220.10	44&52	53	.00346	23.28	.313	1.69364	1.533	10.508	
*S DIVIDE FLOWS 8 CFS TO STORM DRAIN REMAINING NORTH TO DERICKSON										
*S	* * * AP20B * * *									
DIVIDE HYD	221.SD	53	48	.00177	8.00	.160	1.69364	1.500	7.067	
	221.NORTH	and	49	.00169	15.28	.153	1.69364	1.533	14.104	
*S ROUTE FLOWS AT PATRONALES AND MONTE SUR WEST THRU 26' F-F ST										
ROUTE MCUNGE	220.30	1	54	.00477	10.40	.426	1.67253	1.533	3.406	CCODE = .1
*S ADD BASIN C11										
*S	* * * AP21 * * *									
ADD HYD	331.10	31&54	55	.00672	15.39	.610	1.70079	1.533	3.577	
*S ROUTE FLOWS WEST THRU 26' F-F ST										
ROUTE MCUNGE	231.20	55	56	.00672	15.37	.610	1.70057	1.567	3.573	CCODE = .1
*S ADD BASIN C12										
*S	* * * AP22 * * *									
ADD HYD	332.10	32&56	57	.00861	19.61	.788	1.71579	1.567	3.558	
*S ROUTE BASIN B14 IN LAPOSTOLLE THRU 26' F-F STREET										
ROUTE MCUNGE	217.10	17	58	.00103	2.62	.092	1.67539	1.567	3.972	CCODE = .2
*S ADD BASIN C1										
*S	* * * AP23 * * *									
ADD HYD	321.10	21&58	59	.00486	12.43	.454	1.75006	1.500	3.998	
*S DIVIDE FLOWS 3.7 CFS WEST IN LAPOSTOLLE,										
*S REM. NORTH IN CONCHA Y TORO										
DIVIDE HYD	321.WEST	59	62	.00307	3.70	.287	1.75006	1.367	1.881	
	321.NORTH	and	63	.00179	8.73	.167	1.75007	1.500	7.640	
*S ADD BASINS C7 AND D1										
*S	* * * AP24 * * *									

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	NOTATION
ADD HYD	327.10	27&62	64	.00390	5.92	.365	1.75431	1.500	2.370	
ADD HYD	435.10	35&64	65	.00649	12.86	.612	1.76614	1.500	3.093	
*S ADD BASIN D2										
*S	* * * AP25 * * *									
ADD HYD	436.10	36&65	66	.01307	30.44	1.238	1.77514	1.500	3.639	
*S ROUTE FLOWS AT CONCHA Y TORO N. OF LA POSTOLLE										
*S NORTH THRU 28' F-F STREET										
ROUTE MCUNGE	321.20	63	67	.00179	8.71	.166	1.74563	1.567	7.618	CCODE = .1
*S ADD BASINS C4 AND C8 TO ROUTED FLOWS										
*S	* * * AP26 * * *									
ADD HYD	324.10	24&28	68	.00319	8.97	.324	1.90212	1.500	4.393	
ADD HYD	324.20	67&68	69	.00498	16.19	.490	1.84584	1.567	5.083	
*S ROUTE FLOWS NORTH THRU 28' F-F STREET										
ROUTE MCUNGE	206.20	69	70	.00498	16.07	.488	1.84005	1.600	5.044	CCODE = .1
*S ADD BASINS C2, C5 AND C9 TO ROUTED FLOWS										
*S	* * * AP27 * * *									
ADD HYD	325.10	25&70	71	.00706	20.26	.707	1.87992	1.600	4.486	
ADD HYD	325.20	29&71	72	.00844	23.15	.838	1.86196	1.567	4.288	
ADD HYD	325.30	22&72	75	.01111	29.55	1.119	1.88927	1.567	4.158	
*S ROUTE FLOWS NORTH THRU 28' F-F STREET										
ROUTE MCUNGE	206.20	75	76	.01111	29.35	1.118	1.88780	1.600	4.130	CCODE = .1
*S ADD BASINS C3, C6 AND C10 TO ROUTED FLOWS										
*S	* * * AP28 * * *									
ADD HYD	326.10	26&76	77	.01317	33.97	1.335	1.90149	1.567	4.032	
ADD HYD	326.20	30&77	78	.01455	37.07	1.466	1.88903	1.567	3.982	
ADD HYD	326.30	23&78	80	.01721	43.45	1.746	1.90241	1.567	3.946	
*S DIVIDE FLOWS 20.4 CFS TO INLETS,										
*S REM. NORTH IN CONCHA Y TORO TO MONTE SUR										
DIVIDE HYD	330.SD	80	83	.01305	20.40	1.324	1.90241	1.433	2.442	
	330.ST	and	84	.00416	23.05	.422	1.90241	1.567	8.666	
*S ADD FLOWS AT CONCHA Y TORO AND MONTE SUR										
*S	* * * AP29 * * *									
ADD HYD	330.20	57&84	85	.01277	42.66	1.210	1.77654	1.567	5.220	
*S ADD BASINS C14 AND D4										
*S	* * * AP30 * * *									
ADD HYD	314.10	34&38	87	.00212	5.68	.201	1.77747	1.500	4.188	
*S ADD FLOWS AT MONTES DR AND DERICKSON										
ADD HYD	314.20	85&87	88	.01489	47.43	1.411	1.77667	1.567	4.978	
ADD HYD	333.10	33&88	90	.01636	50.73	1.549	1.77608	1.567	4.846	
*S	* * * AP31 * * *									
*S DIVIDE FLOWS 24.6 CFS TO 4 INLETS AT MONTE SUR/MONTES,										
*S REM. NORTH IN STREET TO DERICKSON										
DIVIDE HYD	333.SD	90	96	.01268	24.60	1.201	1.77608	1.467	3.031	
	333.ST	and	97	.00368	26.13	.348	1.77608	1.567	11.110	
*S ADD BASIN D3 TO FLOWS AT AP25										
*S	* * * AP-32 * * *									
ADD HYD	437.10	37&66	91	.01541	36.71	1.460	1.77649	1.500	3.721	
*S ADD STORM DRAIN FLOWS										
*S	* * * AP-SD1 * * *									
ADD HYD	SD.1A	39&51	5	.01226	33.64	1.220	1.86593	1.500	4.288	
*S	* * * AP-SD2 * * *									

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	NOTATION
ADD HYD	SD.2	60& 5	6	.01754	40.64	1.699	1.81556	1.500	3.620	
*S	* * * AP-SD3 * * *									
ADD HYD	SD.3	79&82	7	.01095	15.00	.982	1.68228	1.467	2.141	
ADD HYD	SD.3A	6& 7	8	.02849	55.64	2.681	1.76434	1.500	3.051	
*S	* * * AP-SD4 * * *									
ADD HYD	SD.4	2&73	9	.00505	7.80	.451	1.67394	1.400	2.414	
ADD HYD	SD.4A	8& 9	10	.03354	63.44	3.132	1.75073	1.500	2.955	
ADD HYD	SD.5	86&89	11	.00390	9.20	.349	1.67733	1.467	3.683	
ADD HYD	SD.5A	10&11	12	.03744	72.64	3.481	1.74308	1.500	3.031	
*S	* * * AP-SD5 * * *									
ADD HYD	SD.5B	12&48	5	.03921	80.64	3.641	1.74085	1.500	3.213	
ADD HYD	SD.6A	5&83	6	.05226	101.04	4.965	1.78119	1.500	3.021	
*S	* * * AP-SD6 * * *									
ADD HYD	SD.6B	6&96	14	.06495	125.64	6.166	1.78020	1.500	3.023	
*S										
*S BASIN A2A										
*S DRAINS TO SW CULVERT IN DERICKSON (EMERGENCY										
*S OVERFLOW OUTFALL)										
*S	* * * AP33 * * *									
COMPUTE NM HYD	102.A	-	15	.00059	1.60	.056	1.79429	1.500	4.236	PER IMP= 65.00
*S ADD FLOWS FROM AP33 AND AP20A AND ROUTE IN										
*S DERICKSON TO AP20B										
ADD HYD	ST.1	99&15	16	.00492	9.87	.444	1.69050	1.500	3.134	
*S ROUTE FLOWS WEST THRU 40' F-F STREET TO AP20B										
ROUTE MCUNGE	ST.2	16	17	.00492	9.84	.444	1.69118	1.533	3.123	CCODE = .2
*S ADD FLOWS AT AP20B										
ADD HYD	ST.3	17&49	18	.00662	25.12	.597	1.69174	1.533	5.933	
*S ROUTE FLOWS WEST THRU 40' F-F STREET TO INLETS IN DERICKSON										
ROUTE MCUNGE	ST.4	18	19	.00662	24.95	.596	1.68807	1.633	5.892	CCODE = .1
*S DIVIDE FLOW-20 CFS TO 2 INLETS IN DERICKSON REMAINDER WEST										
DIVIDE HYD	334.SD	19	20	.00635	20.00	.572	1.68800	1.600	4.919	
	334.ST	and	21	.00026	4.95	.024	1.68800	1.633	29.389	
*S ADD FLOWS AT AP31-TOTAL PEAK SURFACE DISCHARGE TO DERICKSON										
ADD HYD	ST.5	21&97	22	.00394	26.13	.372	1.77020	1.567	10.368	
FINISH										

MONTERRA DEL REY, UNITS 1-3

DISCHARGE LOCATION/CONTRIBUTING BASIN TABLE

DISCHARGE LOCATION	CONTRIBUTING BASINS	Q100 (CFS)
SANTA MONICA SURFACE	OFF1-OFF3	1.3
AP33--LOT 25 NW CORNER OF GREENCOURT UNITS -- *DERICKSON SURFACE*	A-2A	1.6 *
AP20A--TARAPACA-- *DERICKSON SURFACE*	B1, B2, B8 (portion), OFF5	8.3 *
AP20B--PATRONALES-- *DERICKSON SURFACE*	B3-B7, B8 (portion) B9-B13, B15-B17, OFF4	15.3 *
AP31--MONTES DR-- *DERICKSON SURFACE*	C1 (portion), C2-C6, C8-C14, D4	26.1
AP31--MONTES DR-- *DERICKSON SD*	A1-A3, E, remaining routed flows from basins draining to Derickson	125.6
AP32--MONTE SUR-- *SAN PEDRO STORM DRAIN*	C1 (portion), C7, D1-D3	36.7
	TOTAL	**214.9**

* FLOWS FROM AP33, AP20A AND AP20B WERE ROUTED IN AHYMO TO THE INLETS IN DERICKSON WHERE 20 CFS IS CAPTURED BY 2 INLETS THE 100-YEAR PEAK FLOW AT AP31 (MONTES DR/DERICKSON) IS 26.1 CFS (PEAK WILL OCCUR BEFORE SAID ROUTED FLOWS REACH AP31).

MONTERRA DEL REY

STREET FLOW DEPTH SUMMARY

STREET	LOCATION	STREET WIDTH	CURB TYPE	SLOPE (ft/ft)	Q_{100} (cfs)	DEPTH (ft)	EGL DEPTH (ft)
VENTISQUERO	AP2-- W. OF LOW PT	28' F-F	MTBL	0.0200	10.9	0.26	0.42
VENTISQUERO	AP1--E. OF LOW PT	28' F-F	MTBL	0.0200	12	0.27	0.44
VENTISQUERO	AP 3--@ LOW PT	28' F-F	STD	0.0050	22.8	0.44	0.55
VENTISQUERO	LOS VASCOS	28' F-F	MTBL	0.0210	8.2	0.18	0.30
VENTISQUERO	LOS VASCOS 1/2 STREET @ 2% CROSS SLOPE	28' F-F	MTBL	0.0210	6	0.27	0.44
LOS VASCOS	AP4--TARAPACA	28' F-F	MTBL	0.0211	10.8	0.26	0.42
LOS VASCOS	AP5--CANEPA	28' F-F	MTBL	0.0295	10.8	0.25	0.45
LOS VASCOS	CANEPA HALF STREET @ 1% CROSS SLOPE	28' F-F	MTBL	0.0295	2.5	0.27	0.51
LOS ROBLES	AP6--CANEPA	28' F-F	MTBL	0.0285	12.8	0.26	0.48
CANEPA	AP 7--S. OF LOS VASCOS	28' F-F	STD	0.0350	17.7	0.28	0.59
MONTGRAS	AP8--LOS VASCOS	28' F-F	STD	0.0146	23.3	0.36	0.58
TARAPACA	AP9--MONTE SUR	28' F-F	MTBL	0.0180	14	0.29	0.46
MONTE SUR	AP10--CANEPA E. SIDE	28' F-F	MTBL	0.0284	11.5	0.25	0.46
CANEPA	AP11--MONTE SUR	28' F-F	MTBL	0.0311	11	0.24	0.46
MONTE SUR	AP12--W. OF CANEPA	26' F-F	STD	0.0284	21.1	0.31	0.63
MONTE SUR	AP13--E. OF MONTGRAS	26' F-F	STD	0.0284	18.7	0.30	0.59
MONTE SUR	AP16--W. OF MONTGRAS	26' F-F	STD	0.0284	29.7	0.35	0.77
MONTGRAS	AP 14--S. INLET S. OF MONTE SUR	28' F-F	STD	0.0146	28.8	0.39	0.65
MONTGRAS	AP 15--N. INLET S. OF MONTE SUR	28' F-F	STD	0.0146	22.5	0.36	0.57
LA POSTOLLE	AP23	26' F-F	MTBL	0.0067	12.4	0.33	0.42
LA POSTOLLE	AP 23--1/2 ST CAPACITY	26' F-F	MTBL	0.0067	3	0.26	0.31
LAPOSTOLLE	AP24--BRAMLETT	28' F-F	STD	0.0050	12.9	0.35	0.43
BRAMLETT	AP25--MONTE SUR	26' F-F	STD	0.0150	31	0.40	0.70
CONCHA Y TORO	AP26--CONO SUR	28' F-F	MTBL	0.0102	16.2	0.34	0.47
CONCHA Y TORO	AP27--ESTAMPA	28' F-F	STD	0.0102	29.6	0.42	0.64
CONCHA Y TORO	AP28--MONTE SUR S. INLET (6.6 CFS)	28' F-F	STD	0.0102	43.4	0.50	0.79
CONCHA Y TORO	AP28--MONTE SUR N. INLETS	28' F-F	STD	0.0102	36.8	0.46	0.72
MONTE SUR	CONCHA Y TORO--WEST OF AP29 E. INLET	28' F-F	STD	0.0136	43.9	0.47	0.82
MONTE SUR	CONCHA Y TORO--WEST OF AP29 W. INLET	28' F-F	STD	0.0136	39.7	0.45	0.77
MONTE SUR	AP32--SUMP INLETS BY SAN PEDRO	32' F-F	STD	0.0300	36.7	0.30	0.74

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Wednesday, Jun 25 2008

DERICKSON AVE--SECTION A (1% CROSS SLOPE)

User-defined

Invert Elev (ft)	= 0.10
Slope (%)	= 2.55
N-Value	= 0.017

Calculations

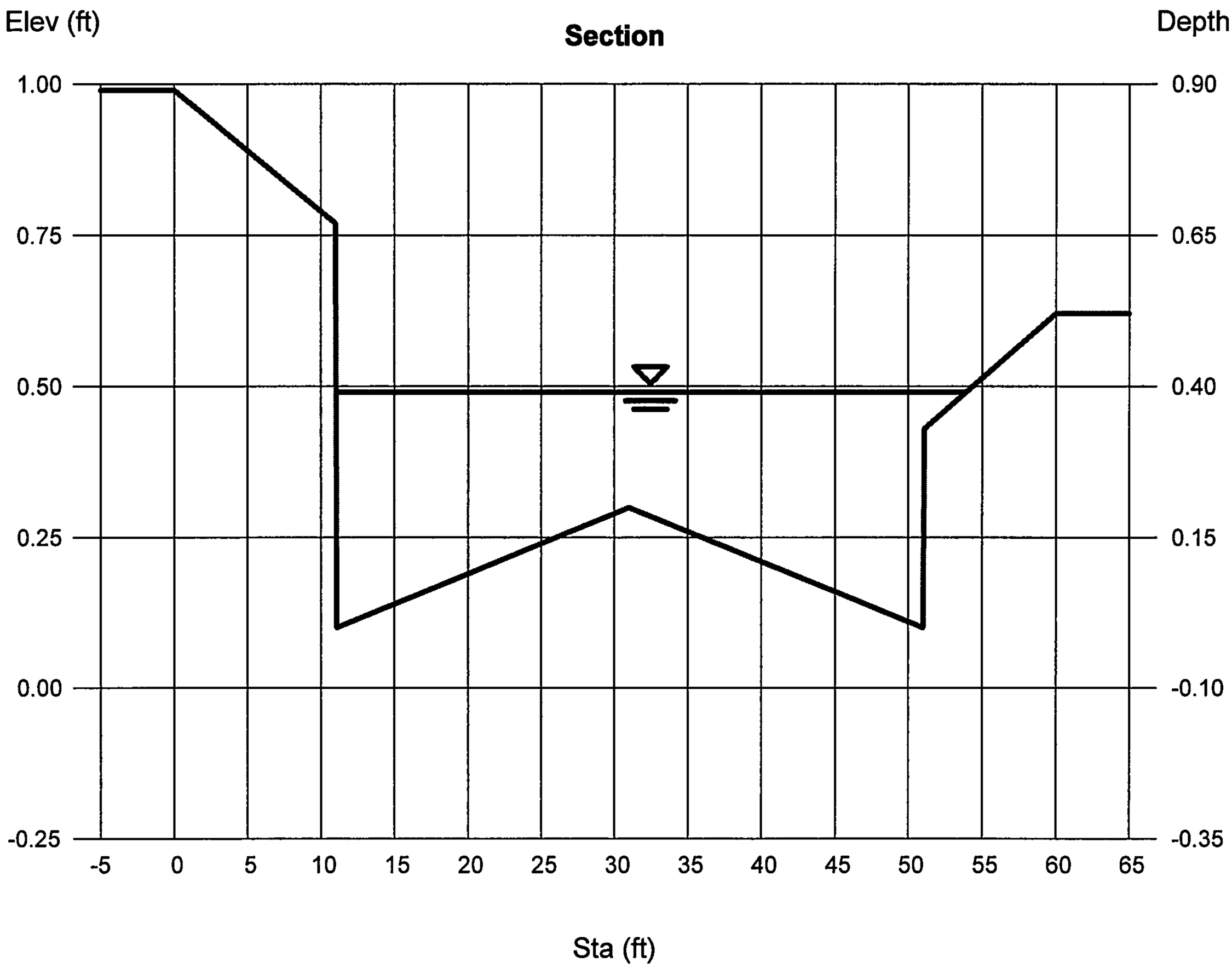
Compute by:	Known Q
Known Q (cfs)	= 66.60

Highlighted

Depth (ft)	= 0.39
Q (cfs)	= 66.60
Area (sqft)	= 11.69
Velocity (ft/s)	= 5.70
Wetted Perim (ft)	= 43.45
Crit Depth, Yc (ft)	= 0.55
Top Width (ft)	= 42.87
EGL (ft)	= 0.89

(Sta, El, n)-(Sta, El, n)...

(0.00, 0.99)-(11.00, 0.77, 0.017)-(11.10, 0.10, 0.017)-(31.00, 0.30, 0.017)-(51.00, 0.10, 0.017)-(51.10, 0.43, 0.017)-(60.00, 0.62, 0.017)



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Wednesday, Jun 25 2008

DERICKSON AVE--SECTION B

User-defined

Invert Elev (ft)	= 0.10
Slope (%)	= 2.55
N-Value	= 0.017

Calculations

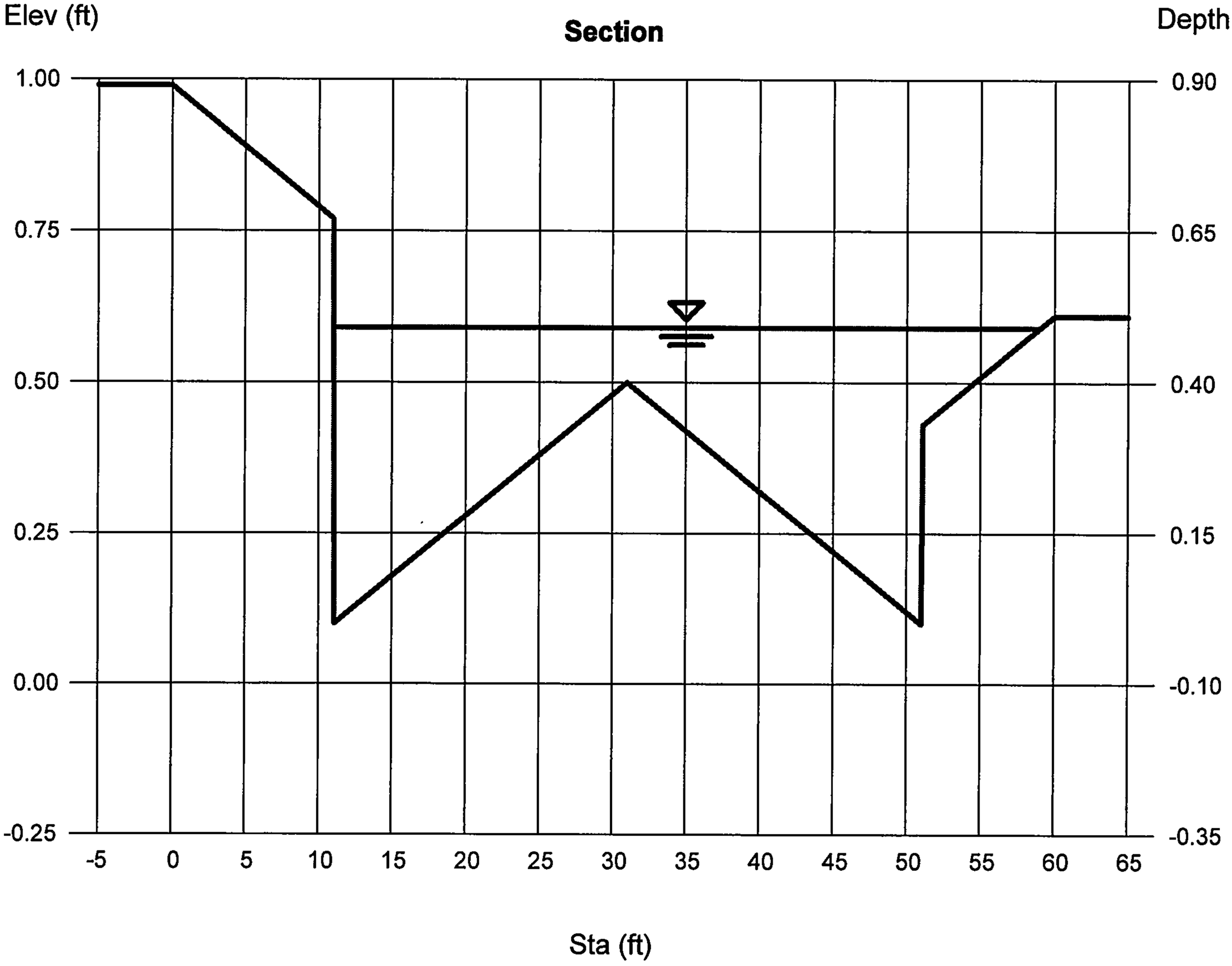
Compute by:	Known Q
Known Q (cfs)	= 64.80

Highlighted

Depth (ft)	= 0.49
Q (cfs)	= 64.80
Area (sqft)	= 12.25
Velocity (ft/s)	= 5.29
Wetted Perim (ft)	= 48.66
Crit Depth, Yc (ft)	= 0.62
Top Width (ft)	= 47.98
EGL (ft)	= 0.92

(Sta, El, n)-(Sta, El, n)...

(0.00, 0.99)-(11.00, 0.77, 0.017)-(11.10, 0.10, 0.017)-(31.00, 0.50, 0.017)-(51.00, 0.10, 0.017)-(51.10, 0.43, 0.017)-(60.00, 0.61, 0.017)



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Wednesday, Jun 25 2008

SAN PEDRO--SECTION C

User-defined

Invert Elev (ft)	= 0.10
Slope (%)	= 2.00
N-Value	= 0.017

Calculations

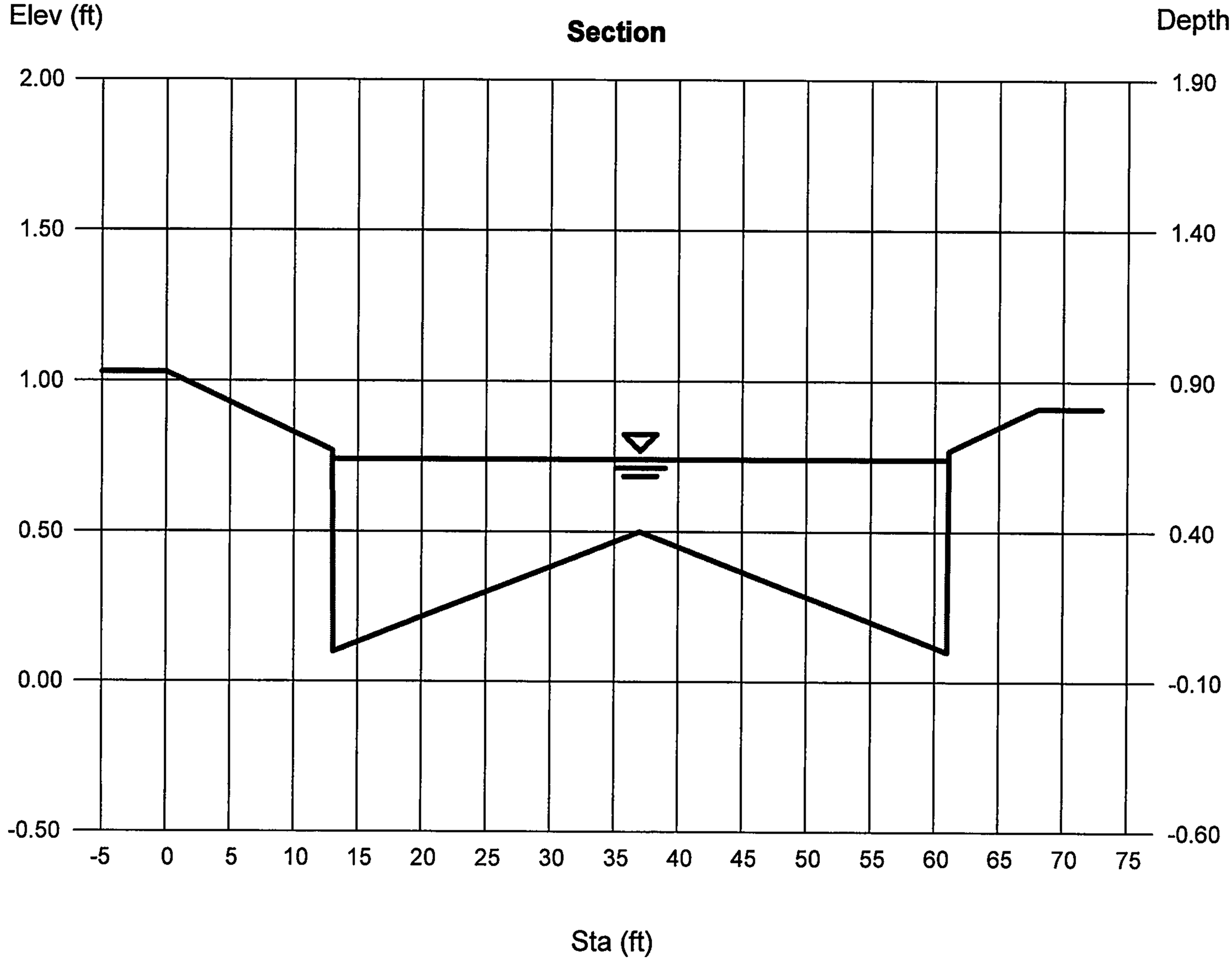
Compute by:	Known Q
Known Q (cfs)	= 145.90

Highlighted

Depth (ft)	= 0.64
Q (cfs)	= 145.90
Area (sqft)	= 21.14
Velocity (ft/s)	= 6.90
Wetted Perim (ft)	= 49.20
Crit Depth, Yc (ft)	= 0.89
Top Width (ft)	= 48.09
EGL (ft)	= 1.38

(Sta, El, n)-(Sta, El, n)...

(0.00, 1.03)-(13.00, 0.77, 0.017)-(13.10, 0.10, 0.017)-(37.00, 0.50, 0.017)-(61.00, 0.10, 0.017)-(61.10, 0.77, 0.017)-(68.00, 0.91, 0.017)



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Wednesday, Jun 25 2008

MONTES DRIVE S. INLET--SECTION D (1/2 OF STREET FLOWS ASSUMED)

User-defined

Invert Elev (ft)	= 60.42
Slope (%)	= 1.10
N-Value	= 0.017

Calculations

Compute by:	Known Q
Known Q (cfs)	= 19.30

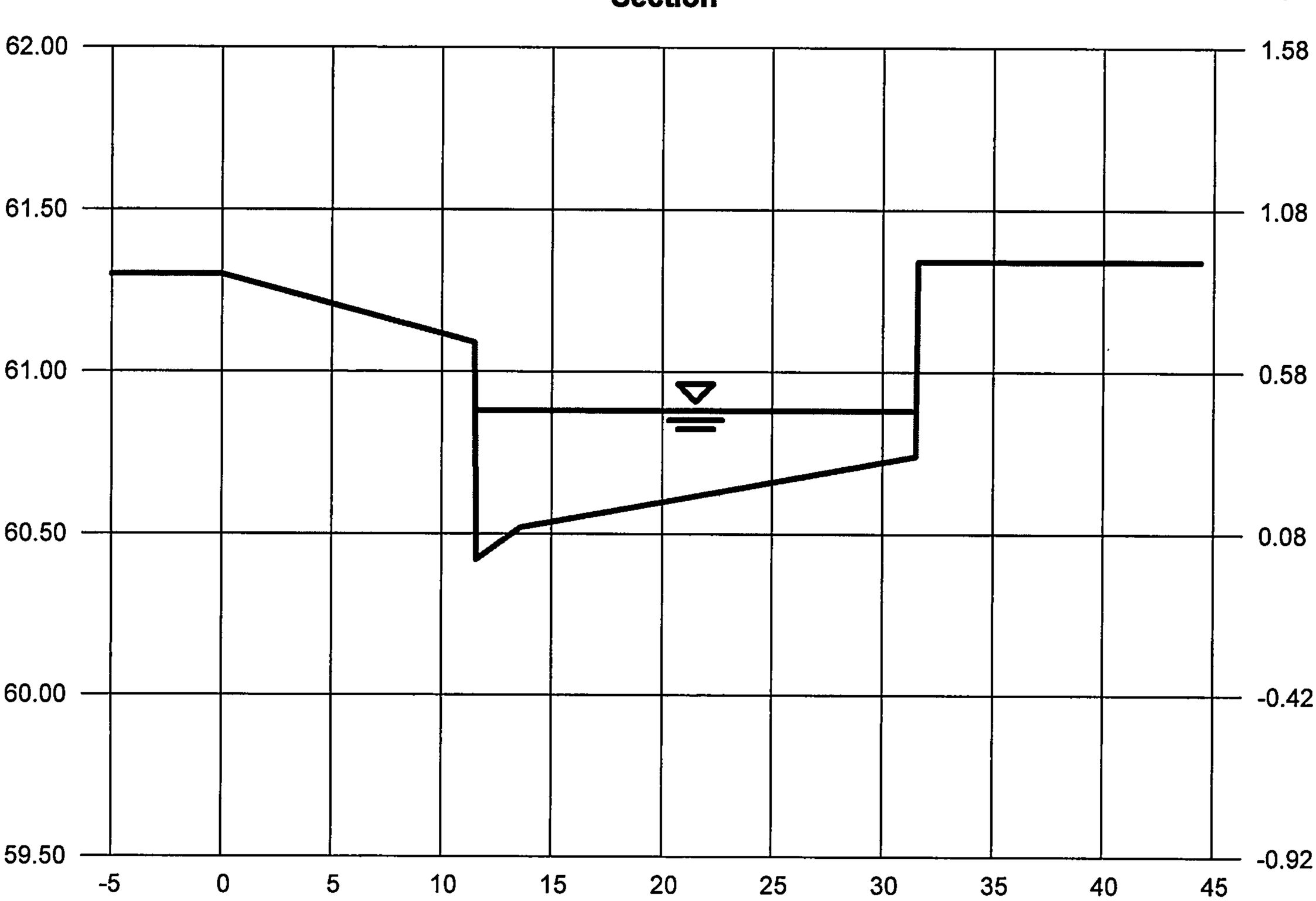
Highlighted

Depth (ft)	= 0.46
Q (cfs)	= 19.30
Area (sqft)	= 5.31
Velocity (ft/s)	= 3.63
Wetted Perim (ft)	= 20.51
Crit Depth, Yc (ft)	= 0.51
Top Width (ft)	= 19.99
EGL (ft)	= 0.67

(Sta, El, n)-(Sta, El, n)...

(0.00, 61.30)-(11.50, 61.09, 0.017)-(11.60, 60.42, 0.017)-(13.60, 60.52, 0.017)-(31.50, 60.74, 0.017)-(31.60, 61.34, 0.017)-(39.40, 61.34, 0.017)

Section



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Wednesday, Jun 25 2008

MONTES DRIVE N. INLET--SECTION E (1/2 OF STREET FLOW ASSUMED)

User-defined

Invert Elev (ft)	= 58.93
Slope (%)	= 2.50
N-Value	= 0.017

Calculations

Compute by:	Known Q
Known Q (cfs)	= 16.00

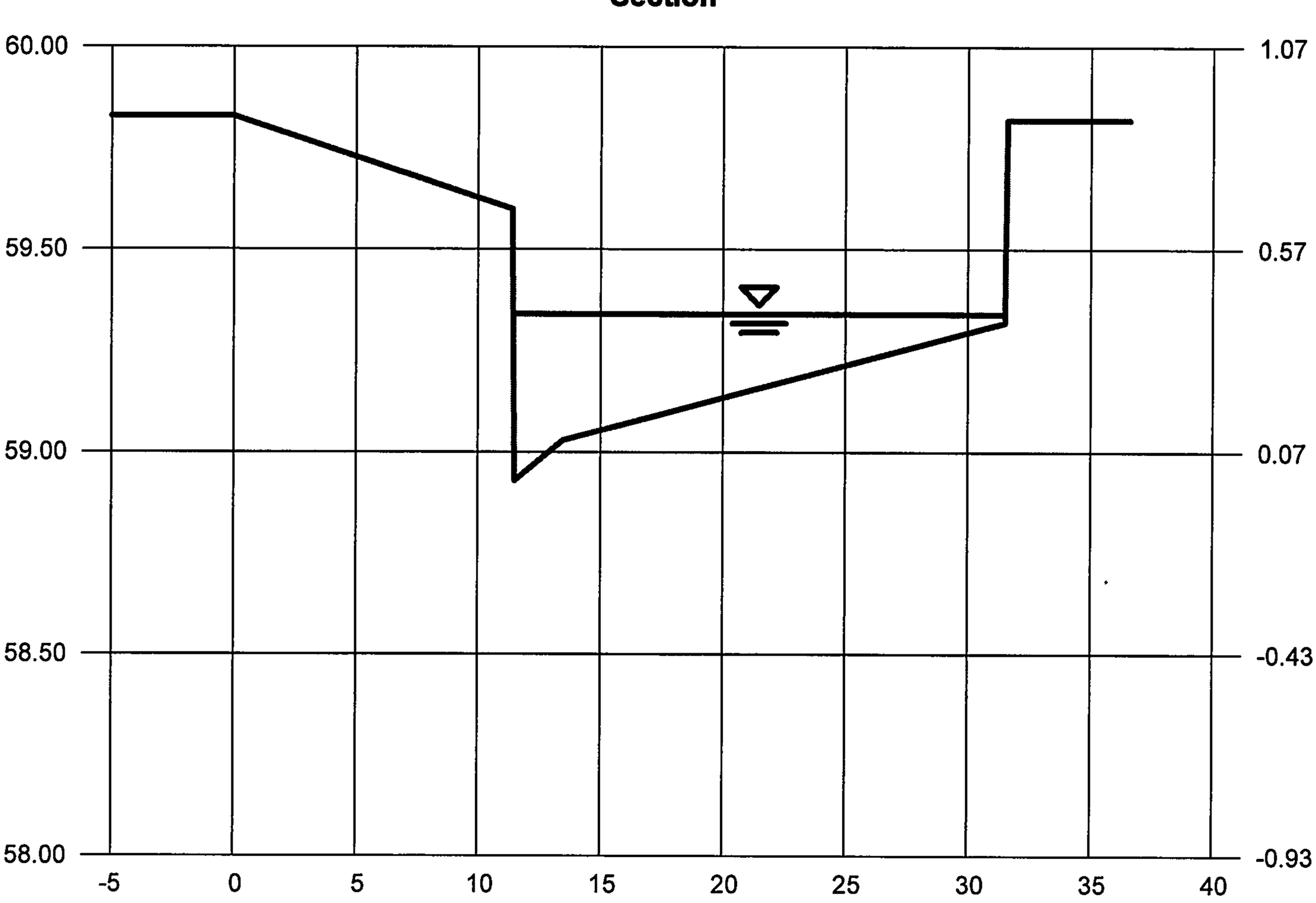
Highlighted

Depth (ft)	= 0.41
Q (cfs)	= 16.00
Area (sqft)	= 3.70
Velocity (ft/s)	= 4.32
Wetted Perim (ft)	= 20.44
Crit Depth, Yc (ft)	= 0.50
Top Width (ft)	= 20.07
EGL (ft)	= 0.70

(Sta, El, n)-(Sta, El, n)...

(0.00, 59.83)-(11.40, 59.60, 0.017)-(11.50, 58.93, 0.017)-(13.50, 59.03, 0.017)-(31.50, 59.32, 0.017)-(31.60, 59.82, 0.017)

Section



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Wednesday, Jun 25 2008

MONTE SUR AVE--SECTION F (1% CROSS SLOPE)

User-defined

Invert Elev (ft)	= 0.10
Slope (%)	= 3.00
N-Value	= 0.017

Highlighted

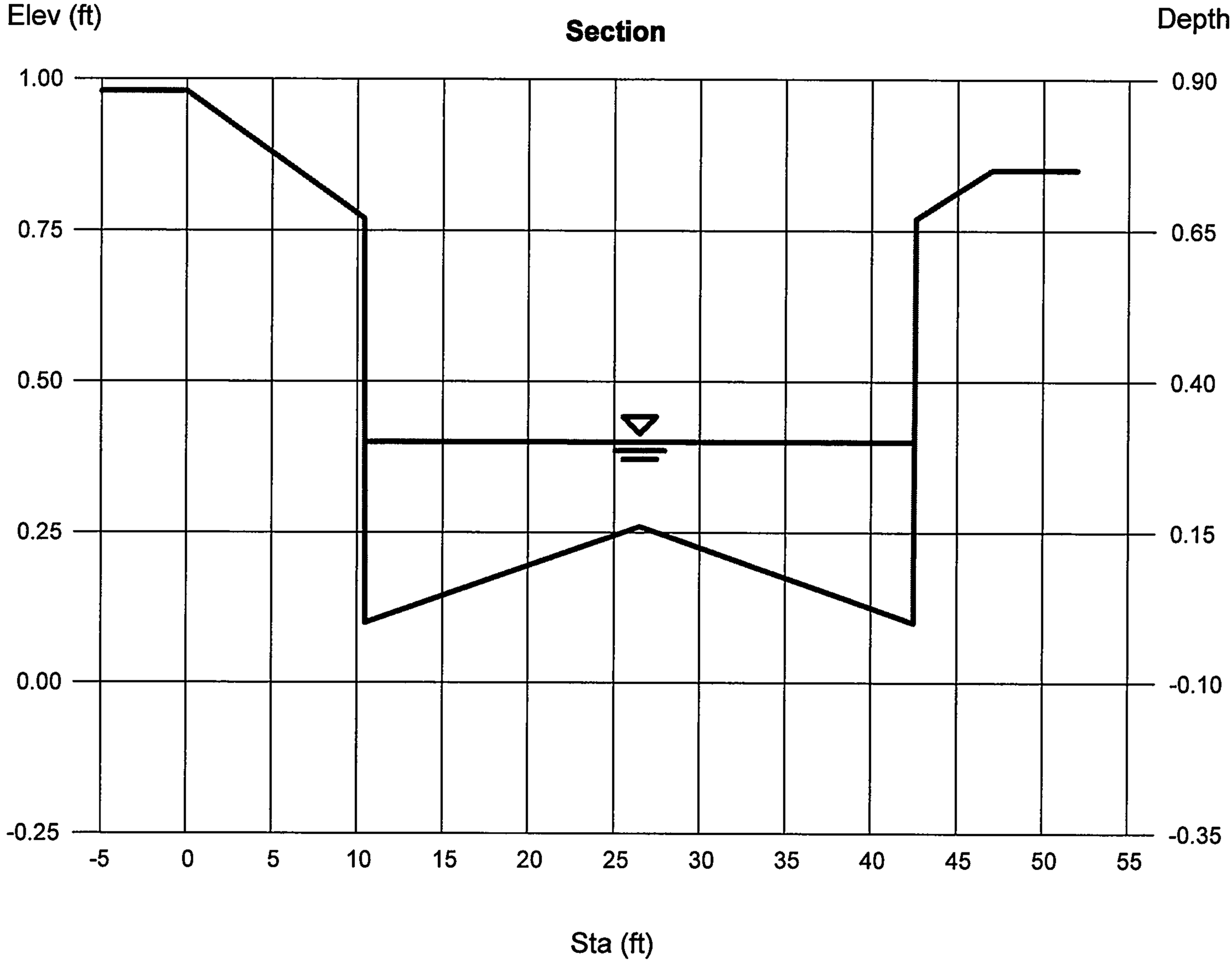
Depth (ft)	= 0.30
Q (cfs)	= 36.70
Area (sqft)	= 7.05
Velocity (ft/s)	= 5.20
Wetted Perim (ft)	= 32.61
Crit Depth, Yc (ft)	= 0.43
Top Width (ft)	= 32.09
EGL (ft)	= 0.72

Calculations

Compute by:	Known Q
Known Q (cfs)	= 36.70

(Sta, El, n)-(Sta, El, n)...

(0.00, 0.98)-(10.40, 0.77, 0.017)-(10.50, 0.10, 0.017)-(26.50, 0.26, 0.017)-(42.50, 0.10, 0.017)-(42.60, 0.77, 0.017)-(47.00, 0.85, 0.017)



LEGEND

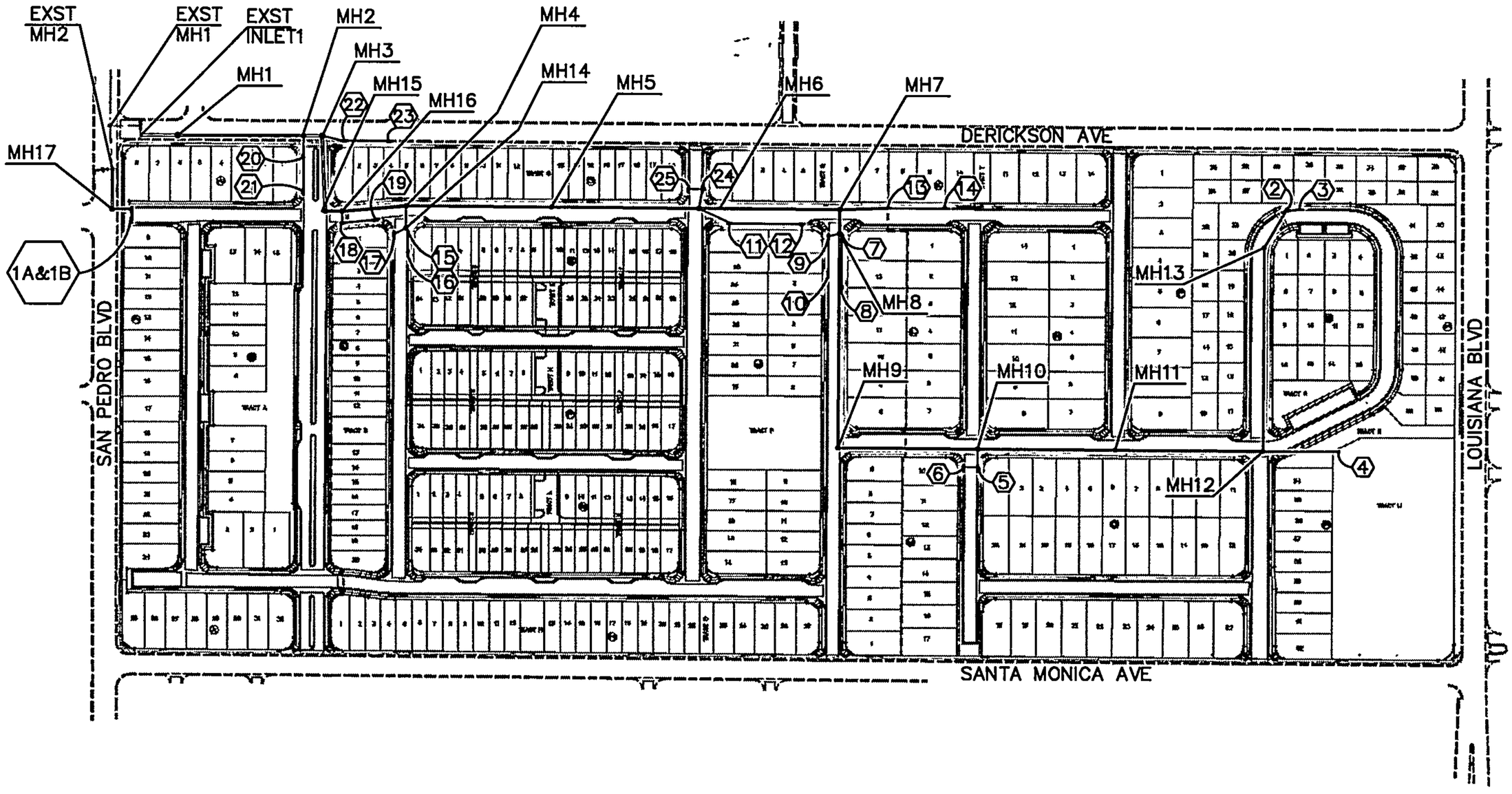
CORRESPONDING TO HYDRAFLOW STORM SEWER CALCULATION OUTPUT

MH8 MANHOLE NUMBER

⟨19⟩ INLET NUMBER

1"=300'

MONTERRA DEL REY
DRB #1003916
HYDRAFLOW STORM DRAIN CALCULATIONS
STORM DRAIN MANHOLE/INLET INDEX
6/19/08



Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	EXMH1-EXINLET	212.2	48	Cir	66.600	5241.67	5242.74	1.607	5248.00*	5249.46*	0.66	5250.12	End	Manhole
2	EXINLET1-MH1	145.6	48	Cir	70.000	5245.00	5245.40	0.571	5250.12*	5250.84*	0.31	5251.15	1	Manhole
3	MH1-MH2	145.6	48	Cir	244.400	5245.50	5249.80	1.759	5251.15	5253.37	2.36	5253.37	2	Manhole
4	MH2-MH3	133.6	48	Cir	36.100	5249.90	5252.20	6.372	5253.37	5255.66	2.08	5255.66	3	Manhole
5	MH3-MH15	113.6	48	Cir	147.500	5252.30	5253.30	0.678	5255.66	5256.45	n/a	5256.45	4	Manhole
6	MH15-MH16	113.6	42	Cir	33.100	5253.40	5254.00	1.813	5256.45	5257.21	2.35	5257.21	5	Manhole
7	MH16-MH4	101.0	42	Cir	124.400	5254.10	5256.65	2.050	5257.21	5259.74	1.97	5259.74	6	Manhole
8	MH4-MH5	80.60	36	Cir	281.000	5256.75	5266.04	3.306	5259.74	5268.82	n/a	5268.82	7	Manhole
9	MH5-MH6	80.60	36	Cir	295.300	5266.14	5273.00	2.323	5268.82	5275.78	n/a	5275.78	8	Manhole
10	MH6-MH7	63.40	36	Cir	270.000	5273.10	5279.48	2.363	5275.78	5282.02	1.54	5282.02	9	Manhole
11	MH7-MH8	55.60	36	Cir	46.700	5279.58	5279.94	0.771	5282.02	5282.32	1.30	5283.62	10	Manhole
12	MH8-MH9	40.60	36	Cir	418.900	5280.04	5286.20	1.471	5283.62	5288.23	n/a	5288.23 j	11	Manhole
13	MH9-MH10	40.60	36	Cir	269.480	5286.30	5294.00	2.857	5288.23	5296.03	n/a	5296.03	12	Manhole
14	MH10-MH11	33.60	36	Cir	265.000	5294.10	5299.80	2.151	5296.03	5301.65	n/a	5301.65 j	13	Manhole
15	MH11-MH12	33.60	36	Cir	283.000	5299.90	5301.40	0.530	5301.74	5303.26	0.83	5304.09	14	Manhole
16	MH12-MH13	22.80	30	Cir	399.200	5301.25	5303.25	0.501	5304.09	5305.23	0.26	5305.49	15	Manhole
17	MH13-INLET2	22.80	24	Cir	79.800	5303.35	5303.60	0.313	5305.49*	5306.30*	1.01	5307.31	16	Generic
18	INLET2-INLET3	7.60	24	Cir	14.500	5303.70	5303.80	0.687	5307.31*	5307.33*	0.09	5307.42	17	Generic
19	MH12-INLET4	10.80	24	Cir	148.000	5301.10	5312.80	7.905	5304.09	5313.96	n/a	5313.96 j	15	Generic
20	MH10-INLET5	7.00	18	Cir	34.300	5294.10	5295.90	5.247	5296.03	5296.91	n/a	5296.91 j	13	Generic
21	INLET5-INLET6	3.50	18	Cir	24.000	5295.60	5295.80	0.832	5296.91	5296.91	0.10	5297.01	20	Generic
22	MH8-INLET7	7.50	18	Cir	5.700	5280.04	5281.70	29.126	5283.62*	5283.65*	0.38	5284.03	11	Generic
23	INLET7-INLET8	4.00	18	Cir	96.000	5281.40	5283.15	1.823	5284.03	5284.13	0.17	5284.30	22	Generic

Project File: 1614p1-REV6.stm | Number of lines: 41 | Run Date: 06-25-2008

NOTES: Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
24	MH8-INLET9	7.50	18	Cir	20.500	5280.04	5281.70	8.098	5283.62*	5283.73*	0.41	5284.14	11	Generic
25	INLET9-INLET10	4.00	18	Cir	68.000	5281.40	5282.77	2.015	5284.14	5284.23	0.08	5284.31	24	Generic
26	MH7-INLET13	7.80	18	Cir	91.600	5279.58	5284.00	4.825	5282.02	5285.07	n/a	5285.07 j	10	Generic
27	INLET13-INLET14	4.00	18	Cir	105.200	5283.70	5286.72	2.871	5285.07	5287.48	n/a	5287.48 j	26	Generic
28	MH6-INLET11	9.20	18	Cir	51.600	5273.96	5276.58	5.078	5275.78	5277.74	n/a	5277.74 j	9	Generic
29	INLET11-INLET12	5.60	18	Cir	134.700	5276.78	5279.13	1.745	5277.74	5280.03	n/a	5280.03 j	28	Generic
30	MH4-MH14	20.40	24	Cir	42.900	5257.25	5258.83	3.683	5259.74	5260.43	n/a	5260.43 j	7	Manhole
31	MH14-INLET15	14.50	24	Cir	8.100	5258.93	5259.50	7.035	5260.43	5260.85	n/a	5260.85 j	30	Generic
32	INLET15-INLET16	6.60	18	Cir	29.200	5259.20	5259.90	2.396	5260.85	5260.88	n/a	5260.88 j	31	Generic
33	MH14-INLET17	5.90	18	Cir	50.000	5258.43	5259.40	1.939	5260.43	5260.50	0.28	5260.78	30	Generic
34	MH16-INLET 18	12.60	24	Cir	21.000	5255.00	5257.10	10.000	5257.21	5258.36	n/a	5258.36 j	6	Generic
35	INLET 18-INLET19	6.60	18	Cir	59.800	5257.30	5258.90	2.676	5258.36	5259.88	n/a	5259.88 j	34	Generic
36	MH3-INLET22	20.00	18	Cir	40.900	5252.30	5255.90	8.802	5255.66	5257.37	n/a	5257.37	4	Generic
37	INLET22-INLET23	9.50	18	Cir	80.100	5256.00	5258.27	2.834	5257.37	5259.45	n/a	5259.45 j	36	Generic
38	MH6-INLET24	8.00	18	Cir	30.000	5273.10	5274.50	4.666	5275.78	5275.93	0.49	5276.43	9	Generic
39	INLET24-INLET25	4.00	18	Cir	26.000	5274.70	5275.00	1.153	5276.43	5276.46	0.08	5276.54	38	Generic
40	MH2-INLET20	12.00	18	Cir	38.100	5250.80	5254.80	10.499	5253.37	5256.12	n/a	5256.12 j	3	Generic
41	INLET 20-INLET21	6.00	18	Cir	65.700	5255.00	5256.70	2.588	5256.12	5257.64	n/a	5257.64 j	40	Generic

Project File: 1614p1-REV6.stm | Number of lines: 41 | Run Date: 06-25-2008

NOTES: Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	66.600	0.00	0.00	0.00	0.00	0.00	0.0	8.1	0.0	212.2	182.1	16.89	48	1.61	5241.67	5242.74	5248.00	5249.46	5249.57	5250.29	EXMH1-EXINLET
2	1	70.000	0.00	0.00	0.00	0.00	0.00	0.0	8.0	0.0	145.6	108.6	11.59	48	0.57	5245.00	5245.40	5250.12	5250.84	5250.29	5258.30	EXINLET1-MH1
3	2	244.400	0.00	0.00	0.00	0.00	0.00	0.0	7.7	0.0	145.6	190.5	11.95	48	1.76	5245.50	5249.80	5251.15	5253.37	5258.30	5259.40	MH1-MH2
4	3	36.100	0.00	0.00	0.00	0.00	0.00	0.0	7.6	0.0	133.6	362.6	11.56	48	6.37	5249.90	5252.20	5253.37	5255.66	5259.40	5259.20	MH2-MH3
5	4	147.500	0.00	0.00	0.00	0.00	0.00	0.0	7.3	0.0	113.6	118.3	10.39	48	0.68	5252.30	5253.30	5255.66	5256.45	5259.20	5260.80	MH3-MH15
6	5	33.100	0.00	0.00	0.00	0.00	0.00	0.0	7.3	0.0	113.6	135.5	12.53	42	1.81	5253.40	5254.00	5256.45	5257.21	5260.80	5261.15	MH15-MH16
7	6	124.400	0.00	0.00	0.00	0.00	0.00	0.0	7.1	0.0	101.0	144.0	11.22	42	2.05	5254.10	5256.65	5257.21	5259.74	5261.15	5263.15	MH16-MH4
8	7	281.000	0.00	0.00	0.00	0.00	0.00	0.0	6.7	0.0	80.60	121.3	11.60	36	3.31	5256.75	5266.04	5259.74	5268.82	5263.15	5271.54	MH4-MH5
9	8	295.300	0.00	0.00	0.00	0.00	0.00	0.0	6.2	0.0	80.60	101.7	11.94	36	2.32	5266.14	5273.00	5268.82	5275.78	5271.54	5279.00	MH5-MH6
10	9	270.000	0.00	0.00	0.00	0.00	0.00	0.0	5.7	0.0	63.40	102.5	9.73	36	2.36	5273.10	5279.48	5275.78	5282.02	5279.00	5284.98	MH6-MH7
11	10	46.700	0.00	0.00	0.00	0.00	0.00	0.0	5.6	0.0	55.60	58.55	9.14	36	0.77	5279.58	5279.94	5282.02	5282.32	5284.98	5285.44	MH7-MH8
12	11	418.900	0.00	0.00	0.00	0.00	0.00	0.0	4.4	0.0	40.60	80.88	6.86	36	1.47	5280.04	5286.20	5283.62	5288.23	5285.44	5291.70	MH8-MH9
13	12	269.480	0.00	0.00	0.00	0.00	0.00	0.0	3.6	0.0	40.60	112.7	8.21	36	2.86	5286.30	5294.00	5288.23	5296.03	5291.70	5299.50	MH9-MH10
14	13	265.000	0.00	0.00	0.00	0.00	0.00	0.0	2.7	0.0	33.60	97.81	7.17	36	2.15	5294.10	5299.80	5296.03	5301.65	5299.50	5306.58	MH10-MH11
15	14	283.000	0.00	0.00	0.00	0.00	0.00	0.0	1.7	0.0	33.60	48.56	7.37	36	0.53	5299.90	5301.40	5301.74	5303.26	5306.58	5312.55	MH11-MH12
16	15	399.200	0.00	0.00	0.00	0.00	0.00	0.0	0.3	0.0	22.80	29.03	5.05	30	0.50	5301.25	5303.25	5304.09	5305.23	5312.55	5307.80	MH12-MH13
17	16	79.800	0.00	0.00	0.00	0.00	0.00	0.0	0.1	0.0	22.80	12.66	7.26	24	0.31	5303.35	5303.60	5305.49	5306.30	5307.80	5307.26	MH13-INLET2
18	17	14.500	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	7.60	18.75	2.42	24	0.69	5303.70	5303.80	5307.31	5307.33	5307.26	5307.39	INLET2-INLET3
19	15	148.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	10.80	63.59	4.57	24	7.91	5301.10	5312.80	5304.09	5313.96	5312.55	5320.00	MH12-INLET4
20	13	34.300	0.00	0.00	0.00	0.00	0.00	0.0	0.2	0.0	7.00	24.05	4.75	18	5.25	5294.10	5295.90	5296.03	5296.91	5299.50	5299.40	MH10-INLET5
21	20	24.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	3.50	9.58	2.31	18	0.83	5295.60	5295.80	5296.91	5296.91	5299.40	5299.39	INLET5-INLET6
22	11	5.700	0.00	0.00	0.00	0.00	0.00	0.0	0.7	0.0	7.50	56.67	4.24	18	29.13	5280.04	5281.70	5283.62	5283.65	5285.44	5285.41	MH8-INLET7

Project File: 1614p1-REV6.stm | Number of lines: 41 | Run Date: 06-25-2008

NOTES: Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82; Return period = 100 Yrs. ; c = cir e = ellip b = box

Storm Sewer Tabulation

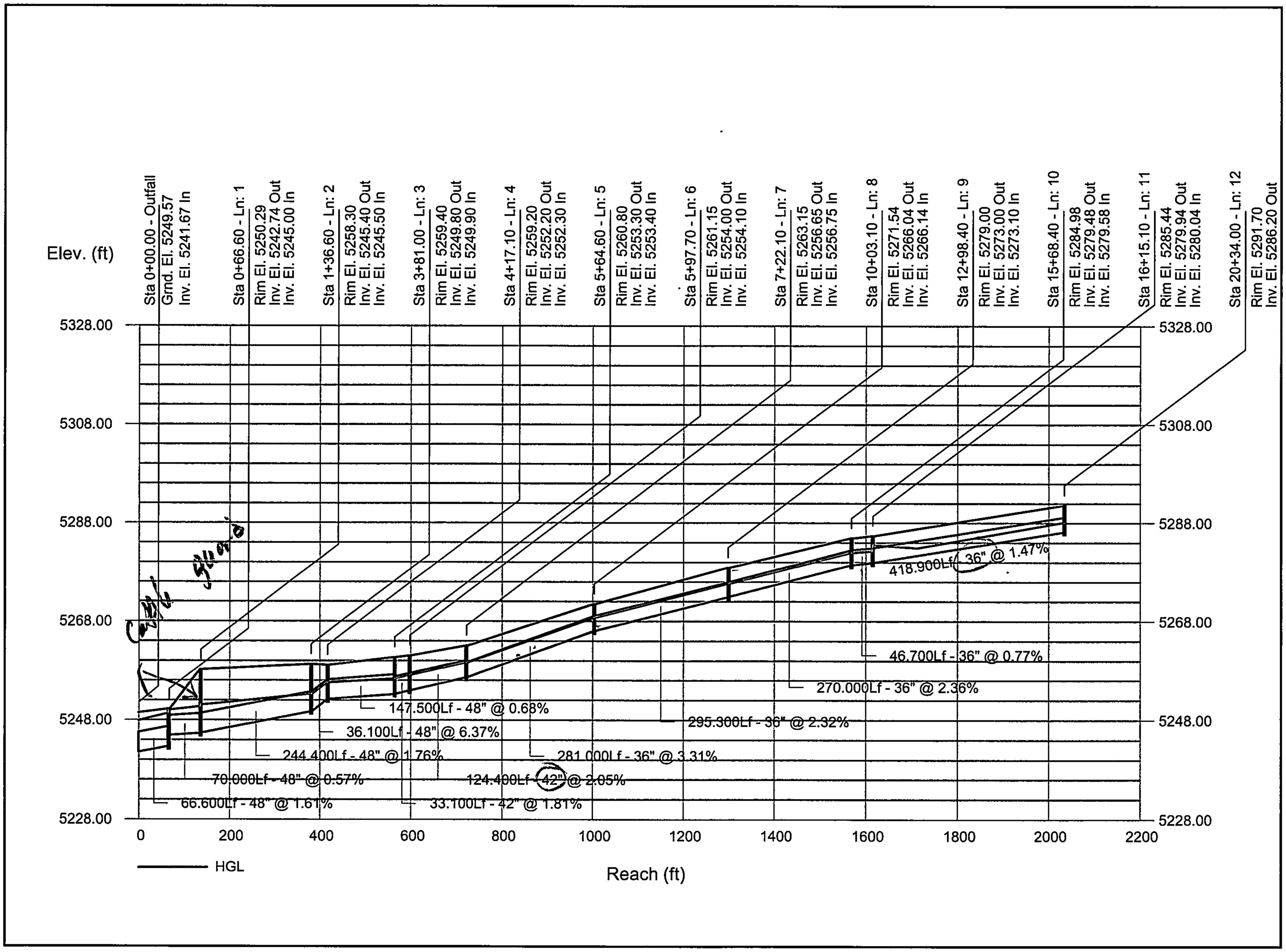
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
23	22	96.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	4.00	14.18	2.77	18	1.82	5281.40	5283.15	5284.03	5284.13	5285.41	5286.85	INLET7-INLET8
24	11	20.500	0.00	0.00	0.00	0.00	0.00	0.0	0.5	0.0	7.50	29.88	4.24	18	8.10	5280.04	5281.70	5283.62	5283.73	5285.44	5284.89	MH8-INLET9
25	24	68.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	4.00	14.91	2.27	18	2.01	5281.40	5282.77	5284.14	5284.23	5284.89	5286.47	INLET9-INLET10
26	10	91.600	0.00	0.00	0.00	0.00	0.00	0.0	0.8	0.0	7.80	23.07	5.11	18	4.83	5279.58	5284.00	5282.02	5285.07	5284.98	5287.30	MH7-INLET13
27	26	105.200	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	4.00	17.79	3.40	18	2.87	5283.70	5286.72	5285.07	5287.48	5287.30	5290.42	INLET13-INLET1
28	9	51.600	0.00	0.00	0.00	0.00	0.00	0.0	0.7	0.0	9.20	23.66	5.75	18	5.08	5273.96	5276.58	5275.78	5277.74	5279.00	5279.78	MH6-INLET11
29	28	134.700	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	5.60	13.87	4.87	18	1.74	5276.78	5279.13	5277.74	5280.03	5279.78	5282.33	INLET11-INLET1
30	7	42.900	0.00	0.00	0.00	0.00	0.00	0.0	0.2	0.0	20.40	43.41	7.03	24	3.68	5257.25	5258.83	5259.74	5260.43	5263.15	5263.33	MH4-MH14
31	30	8.100	0.00	0.00	0.00	0.00	0.00	0.0	0.1	0.0	14.50	59.99	6.09	24	7.03	5258.93	5259.50	5260.43	5260.85	5263.33	5263.21	MH14-INLET15
32	31	29.200	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	6.60	16.26	4.56	18	2.40	5259.20	5259.90	5260.85	5260.88	5263.21	5263.58	INLET15-INLET1
33	30	50.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	5.90	14.62	3.79	18	1.94	5258.43	5259.40	5260.43	5260.50	5263.33	5263.13	MH14-INLET17
34	6	21.000	0.00	0.00	0.00	0.00	0.00	0.0	0.3	0.0	12.60	71.53	5.04	24	10.00	5255.00	5257.10	5257.21	5258.36	5261.15	5261.17	MH16-INLET 18
35	34	59.800	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	6.60	17.18	5.17	18	2.68	5257.30	5258.90	5258.36	5259.88	5261.17	5261.98	INLET 18-INLET1
36	4	40.900	0.00	0.00	0.00	0.00	0.00	0.0	0.2	0.0	20.00	31.16	11.35	18	8.80	5252.30	5255.90	5255.66	5257.37	5259.20	5259.90	MH3-INLET22
37	36	80.100	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	9.50	17.68	6.00	18	2.83	5256.00	5258.27	5257.37	5259.45	5259.90	5261.77	INLET22-INLET2
38	9	30.000	0.00	0.00	0.00	0.00	0.00	0.0	0.2	0.0	8.00	22.68	4.56	18	4.67	5273.10	5274.50	5275.78	5275.93	5279.00	5278.50	MH6-INLET24
39	38	26.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	4.00	11.28	2.27	18	1.15	5274.70	5275.00	5276.43	5276.46	5278.50	5278.50	INLET24-INLET2
40	3	38.100	0.00	0.00	0.00	0.00	0.00	0.0	0.3	0.0	12.00	34.03	7.04	18	10.50	5250.80	5254.80	5253.37	5256.12	5259.40	5258.85	MH2-INLET20
41	40	65.700	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	6.00	16.89	4.71	18	2.59	5255.00	5256.70	5256.12	5257.64	5258.85	5260.33	INLET 20-INLET2

Project File: 1614p1-REV6.stm | Number of lines: 41 | Run Date: 06-25-2008

NOTES: Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82; Return period = 100 Yrs. ; c = cir e = ellip b = box

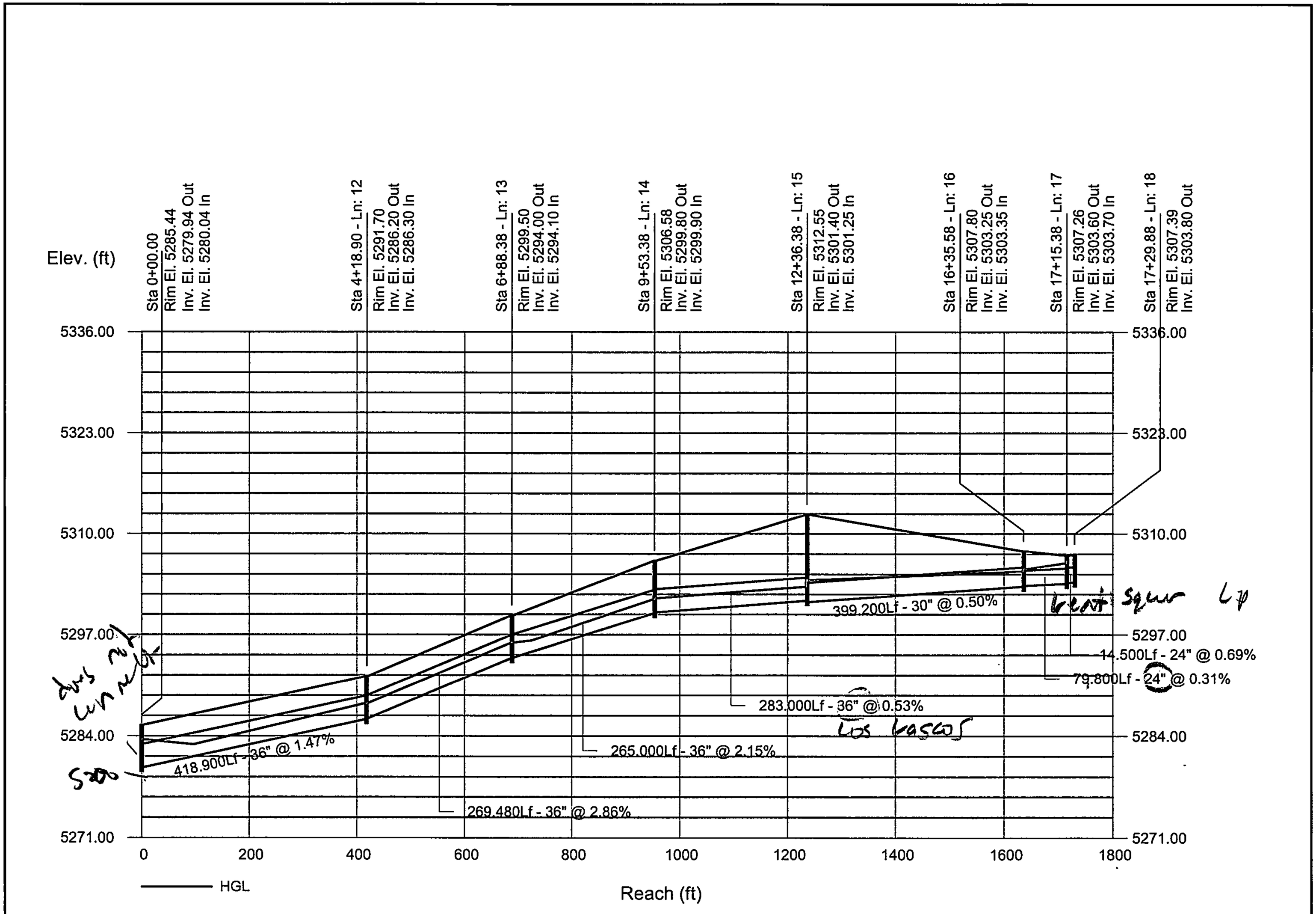
Storm Sewer Profile

Proj. file: 1614p1-REV6.stm



Storm Sewer Profile

Proj. file: 1614p1-REV6.stm



Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	EX MH1-EXMH2	96.70	36	Cir	83.700	5241.67	5244.10	2.903	5248.00*	5249.76*	0.44	5250.20	End	Manhole
2	EXMH2-MH17	96.70	42	Cir	79.000	5244.60	5244.70	0.127	5250.20*	5250.93*	1.57	5252.50	1	Manhole
3	MH17-INLET1A	36.70	30	Cir	38.000	5244.80	5249.00	11.053	5252.50*	5252.80*	1.30	5254.11	2	Generic
4	INLET1A-INLET1B	18.30	24	Cir	12.000	5249.20	5249.40	1.664	5254.11*	5254.19*	0.53	5254.71	3	Generic

Project File: 1614p2-REV.stm | Number of lines: 4 | Run Date: 06-25-2008

NOTES: Return period = 100 Yrs. ; *Surcharged (HGL above crown).

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	83.700	0.00	0.00	0.00	0.00	0.00	0.0	0.9	0.0	96.70	113.6	13.68	36	2.90	5241.67	5244.10	5248.00	5249.76	5249.57	5251.00	EX MH1-EXMH2
2	1	79.000	0.00	0.00	0.00	0.00	0.00	0.0	0.3	0.0	96.70	35.81	10.05	42	0.13	5244.60	5244.70	5250.20	5250.93	5251.00	5252.23	EXMH2-MH17
3	2	38.000	0.00	0.00	0.00	0.00	0.00	0.0	0.1	0.0	36.70	136.3	7.48	30	11.05	5244.80	5249.00	5252.50	5252.80	5252.23	5253.68	MH17-INLET1A
4	3	12.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	18.30	29.18	5.83	24	1.66	5249.20	5249.40	5254.11	5254.19	5253.68	5253.68	INLET1A-INLET1

Project File: 1614p2-REV.stm | Number of lines: 4 | Run Date: 06-25-2008

NOTES: Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82; Return period = 100 Yrs. ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: 1614p2-REV.stm

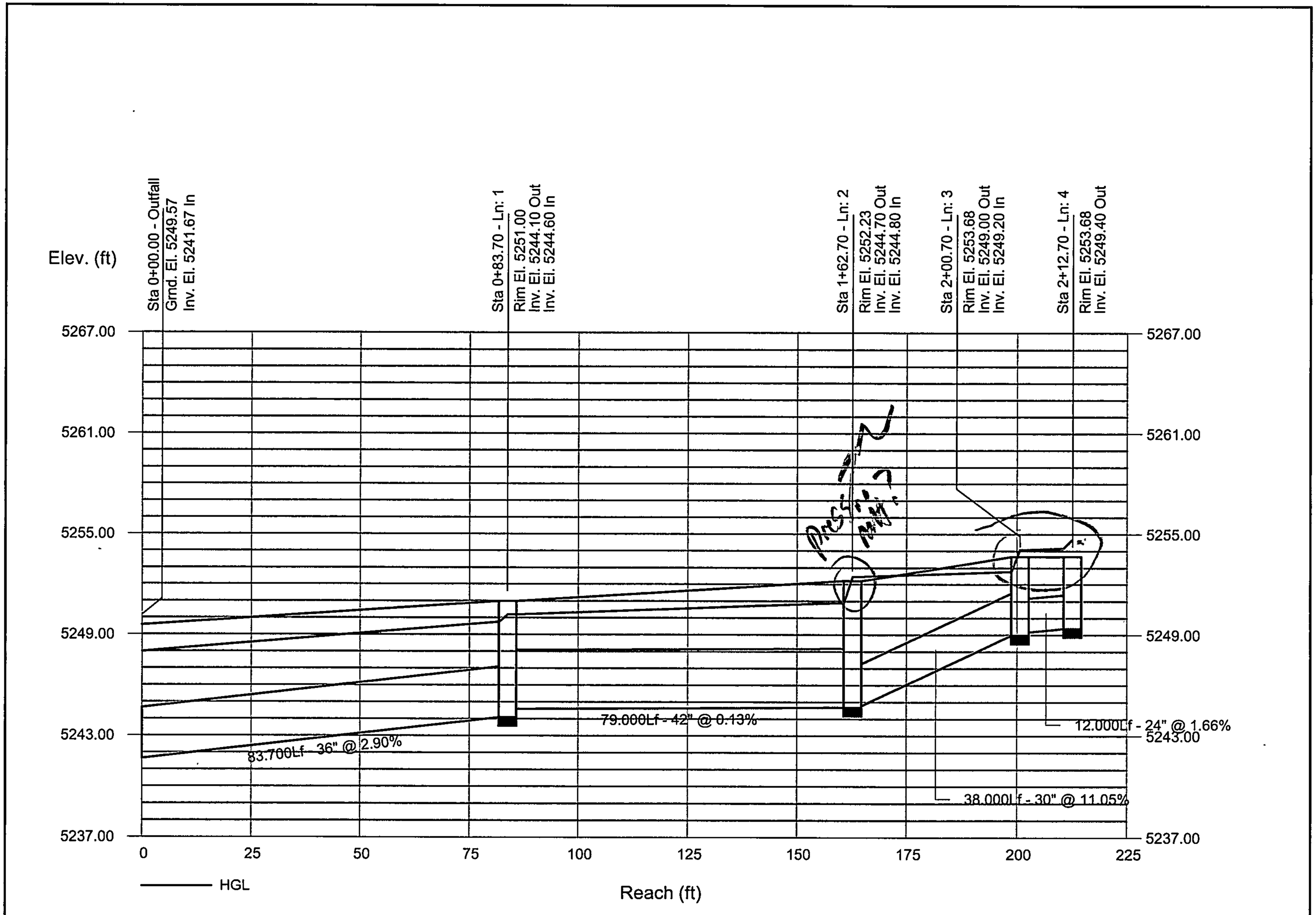


TABLE OF CONTENTS

LIST OF PLATES

INTRODUCTION AND SITE LOCATION

The San Pedro Collectors to the North Pino Arroyo project involves the installation of underground storm drains in San Pedro Boulevard north and south of the North Pino Arroyo connecting to existing storm drain stub-outs from the channel. The storm drain stub-outs, 60" diameter RCP on the south side and 54" RCP on the north side, were constructed with the North Pino Arroyo. To the south of the arroyo, the storm drain extends in San Pedro to just south of Fleetwood Avenue. From the intersection of San Pedro and Derickson, a storm drain is extended east to collect flows in Derickson. To the north of the arroyo, the storm drain extends to San Francisco Road and turns east to collect flows in San Francisco. One of the goals of the study is to determine if an existing floodplain in San Francisco Road can be removed. The amount of flow that can be collected in the storm drain systems north and south of the arroyo is limited by the capacity of the storm drain extensions connecting into the storm drain stub-outs at the arroyo. Therefore, the peak flow in San Pedro, Derickson, and San Francisco may not all be collected in the storm drain extensions.

NARRATIVE OF PROJECT REQUIREMENTS

The purpose of this project is to transport flows from the drainage basins north and south of the North Pino Arroyo in accordance with the "Far Northeast Heights Master Drainage Plan," October 1989, by Weston. The primary goal is to provide for interception of flows at San Pedro, San Francisco, and Derickson Roads. The MDP lists flows for the contributing basins using curve numbers. We understand that the hydrology will be updated using the AHYMO program, however we will model the hydrology using the basin characteristics as listed in the report and only for the basins that contribute to the project area as listed in the report. This project includes the preparation of preliminary and final design plans, specifications, and bid documents for the proposed storm drain system. A key to the success of the project will be providing design solutions to the utility conflicts, specifically sanitary sewer and water line conflicts.

The following issues will be addressed during the design of the project.

- North of the North Pino Arroyo: A storm drain will be constructed from San Francisco Street to the North Pino Arroyo through a public roadway with minimal roadway disturbance. These improvements will divert flows from San Francisco to the arroyo.

- South of the North Pino Arroyo: A storm drain from Fleetwood Avenue to the North Pino Arroyo through a public roadway with minimal roadway disturbance. These improvements will divert flows from San Pedro Boulevard and Derickson Street to the arroyo.

- Storm drain connections to the existing RCP storm drain stub-outs from the channel on the north and south sides of the North Pino Arroyo. A determination of whether drainage and construction easements will be required for the properties adjacent to the channel at the stub-out locations.

- Raising or lowering existing waterlines to accommodate the new storm drain alignment and sleeving existing small diameter sanitary sewer lines through the proposed storm drain lines using concrete collars.

- Design of traffic control to minimize the impact on local traffic. San Pedro is sufficiently wide to allow for two-way traffic and still provide adequate room for construction of the proposed storm drain.

- Possible completion of a CLOMR/LOMR for the reduction of the flood plain in San Francisco Street.

METHODOLOGY

The hydrologic and hydraulic criteria in Section 22 of the City of Albuquerque Development Process Manual (DPM), entitled "Drainage, Flood Control, and Erosion Control," was followed to perform the analyses given in this report. The design storm used for the project is the 100-year, 6-hour storm event for peak flow computations. The project is located in Zone 3, which has a 100-year, 6-hour design storm of 2.60 inches. An AHYMO model was developed for all basins draining to the intersections of San Pedro and San Francisco and San Pedro and Derickson.

Storm drain and street capacities were modeled using Flowmaster program from Haested to determine normal depths. Storm drains were sized assuming gravity flow conditions.

SUMMARY OF STUDY CONCLUSIONS

HYDROLOGY

The "Far Northeast Heights Master Drainage Plan," (FNHMDP) October 1989, by Weston, was used as a basis to define drainage basins that drain to San Pedro from San Francisco and Derickson. The scope of work identified analyzing the basins between San Pedro and Louisiana. But early in the analysis it was obvious that the area draining to San Francisco extended east of Louisiana. Aerial mapping of the project area with 2' contours was obtained from AMAFCA to determine drainage basin delineation. The aerial mapping shows that the basin that drains to San Francisco and San Pedro, begins east of Wyoming Boulevard at Union Street. The aerial mapping was also used to delineate the basin that drains to the intersection of Derickson and San Pedro. This basin does begin at Louisiana Boulevard.

Plate 1 shows the drainage basins that were delineated using the aerial mapping. Basins 1, 2, 3, & 4 all drain to San Francisco. Basins 3 and 4 together are similar to basin 338 in the FNHMDP. Basin 5 drains to the intersection of Derickson and San Pedro. Basin 6 drains to the sidewalk culvert that discharges to San Pedro from Frank Place. Basins 5 and 6 are less than half of basin 340 in the FNHMDP.

Basin characteristics were computed for input to AHYMO. To obtain the percent of Land Treatment D, first all of the residential lots in each basin were counted and divided by the basin area to get a DU/ACRE value, next the DU/ACRE value was input to the calculation for single family residential land use in Table A-5 of the DPM Section 22.2. The remaining percentage for land treatment types was divided equally into Type B and Type C. Input to AHYMO to calculate the Time to Peak for each basin followed the SCS Upland Method as described in Part B of the DPM Section 22.2. All of the basins had a watercourse length of less than 4000 feet, therefore the method described in section B.2.1 was followed. See Appendix B for basin characteristics calculations.

Once the basin characteristics were calculated, an AHYMO model was developed to determine the peak flows. A portion of the flows from Basin 1 were assumed to be collected by the existing 30" Storm Drain in Wyoming Boulevard that drains north to the South Domingo Baca Arroyo. According to the FNHMDP the capacity of the 30" storm drain is 22.8 CFS, therefore the peak flow from the basin that continues to drain west in San Francisco was reduced by 22.8 CFS. A Divide Hydrgraph command was used in AHYMO to split the flow. The remainder of flow from Basin 1 and Basins 2 and 3 were routed in San Francisco by the Muskingham Cunge Method. The results of the AHYMO model indicates that the peak flow at San Francisco and San Pedro is 308.6 CFS and the peak flow at Derickson and San Pedro is 160.5 CFS.

The peak flow in San Pedro from south of Derickson were calculated by multiplying the CFS/ACRE computed by AHYMO for Basin 5 (Derickson) by the remaining area of basin 340 in the FNHMDP (subtracting the areas of basins 5 & 6). The peak flow in San Pedro south of Derickson is 243.2 CFS. See Appendix B for hydrologic calculations.

Table 1 Existing Drainage Conditions

BASINS	Area (acres)	DU's/Acre	100yr-6hr Peak Flow (CFS)	CFS/Acre	Land Treatment
1	21.60	4.90	86.21	3.99	26%B, 25%C, 49%D
2	59.33	2.88	183.53	3.09	34%B, 33%C, 33%D
3	22.47	3.43	84.83	3.78	31%B, 31%C, 38%D
4	37.33	3.54	121.79	3.26	31%B, 30%C, 39%D
5	42.60	5.56	160.46	3.77	23%B, 23%C, 54%D
6	5.20	3.85	20.42	3.93	25%B, 24%C, 41%D
340B	64.7	5.56*	243.20	3.77*	

* Assumed to be the same as basin 5

of 2 feet of cover at the intersection. This ensures that the remainder of the storm drain has at least 2 feet of cover. The slope of the 54" storm drain in San Pedro from the stub-out to San Francisco is .0121 ft/ft. At the tie in to the stub-out, a manhole is required where the slope changes. The storm drain in San Francisco is at a 0.02 ft/ft slope, which is less than the street slope thereby ensuring that the storm drain has a minimum cover of 2 feet.

STORM DRAIN ALIGNMENT SOUTH OF THE NORTH PINO ARROYO

The proposed storm drain on the south side of the North Pino Arroyo will connect into the 60" stub-out on the south side of the channel and run south in San Pedro Boulevard to Fleetwood Street. At Derickson, a storm drain will connect into the 60" storm drain in San Pedro and extend east to collect street flows. The stub-out is located at a 45-degree angle from the channel. At the end of the stub-out an 8-foot diameter manhole will be built to allow the new 60" RCP to be placed at a 45-degree angle to parallel the channel. According to the approximate right-of-way boundary for the channel, the new 60" RCP parallel to the channel slightly impacts the property to the north. This will be discussed in further detail later. Please refer to Plate 2 and Plate 3.

San Pedro Boulevard has a 60-foot right-of-way with a crowned street with a width of 48.5 feet face to face. Existing utilities in San Pedro south of the arroyo include a 16" waterline located 8 feet west of the street centerline. South of Coronado the 16" waterline is reduced to a 12" waterline. An 8" sanitary sewer line is located at the centerline of the street. PNM has indicated that there is a 6" gas line that is located 6 feet from the east right-of-way line, which puts it under the east curb and gutter. Finally Qwest has underground facilities along the east and west right-of-way line behind the curb. The proposed north-south horizontal alignment of the 60" RCP, 48" RCP, and 42" RCP in San Pedro will be in the north bound lane about 12 feet from the face of the east curb to the centerline of the storm drain. This alignment was selected because of the minimal conflicts with other utilities in San Pedro and it can be constructed by closing only one lane allowing for two-way traffic. The north-south storm drain alignment will tie into the 60" storm drain extension of the channel stub-out at a 54-degree pre-cast bend. Please refer to Plate 2.

Derickson has a 60-foot right-of-way with a 40-foot wide crowned street face to face. There is an 8" sanitary sewer line along the centerline of the street, a 6" water line located 10 feet north of the street centerline, and a 4" gas line located 4 feet north of the south right-of-way, which is behind the north curb. The proposed east-west horizontal alignment of the storm drain in Derickson will be in the east bound lane about 7 feet from the face of the south curb to the centerline of the pipe. Again, this alignment was chosen because of the minimal conflicts with existing utilities. The connection to the San Pedro storm drain will be accomplished with a 60" x 48" Wye and a 48" 45-degree bend .

The vertical alignment of the storm drains in San Pedro and Derickson were based on keeping a minimum cover of 2 feet from the pavement surface. The minimum cover of 2

feet allows for the installation of T-Man Holes on the larger diameter pipes and the top of the pipe will be below the pavement structure. The storm drain in San Pedro will connect into the 60" RCP stub-out on the south side of the channel. According to the location survey, the 60" stub-out on the south side of the North Pino Arroyo is 21.71 feet long with a slope of 0.0294 ft/ft. The stub-out discharges into the channel at a 45 degree angle. The slope of San Pedro south of the arroyo is at 0.011 ft/ft to past Fleetwood. The vertical elevation of the 60" storm drain is set so that there is a minimum of 2 feet of cover at the intersection of San Pedro and Derickson. This ensures that the remainder of the storm drain has at least 2 feet of cover. The slope of the 60" storm drain in San Pedro from the stub-out to San Francisco is .0109 ft/ft. The storm drain in Derickson is at a 0,02 ft/ft slope, which is less than the street slope thereby ensuring that the storm drain has a minimum cover of 2 feet.

STORM DRAIN AND STREET HYDRAULICS

STORM DRAIN AND STREETS NORTH OF THE NORTH PINO

According to the FNHMDP, the North Pino Arroyo at San Pedro has a peak flow of 2388 CFS. Using the Flowmaster program, the channel has a normal depth of 4.37 feet. For these analyses, it is assumed that the peak discharge form the 54" RCP into the channel will come before the peek flow in the channel is achieved. The 54" RCP in San Pedro Boulevard has a slope of 0.0121 ft/ft. The capacity of the 54" storm drain under gravity flow conditions is 232 CFS. In San Francisco, a total of three cattle-guard type inlets will be constructed to collect a minimum of 232 CFS to be conveyed in the 54" RCP. The peak flow in San Francisco at San Pedro is 308.6 CFS. Therefore, 76.6 CFS will not be collected by the storm drain system. See Appendix C for hydraulic calculations.

The normal depth in San Francisco at a peak flow of 308.6 CFS is 0.98 feet. In order to determine the amount of flow that a cattle-guard inlet can collect, the weir equation was used because San Francisco has a constant slope. At a depth of 0.83 feet, which is the depth at the right-of-way, a cattle-guard inlet in San Francisco can collect 99.8 CFS. The number of cattle-guard inlets required to collect the 232 CFS is three. Therefore, three cattle-guard inlets are shown in San Francisco on Plate 2 with a 36" RCP between the upper two inlets and a 48" RCP between the lower two inlets.

At the intersection of San Pedro and San Francisco, the 76.6 CFS that is not collected by the inlets will have a normal depth of 0.59 feet. Since the crown continues in San Francisco through the intersection, at the elevation of the crown 25 CFS will drain north in San Pedro, 25 CFS will drain south in San Pedro to the arroyo, and 26.6 CFS will continue west in San Francisco. In San Pedro at the bridge over the arroyo, there is a 27.8-foot curb opening on the east side and a 34.3-foot curb opening on the west side. Using the weir equation, the capacity of the east curb opening at curb height is 45.7 CFS and the capacity of the west curb opening at curb height is 56.4 CFS. The 25 CFS.

overflow from San Francisco will be discharged to the channel through the east curb opening.

STORM DRAIN AND STREETS SOUTH OF THE NORTH PINO

The 60" RCP in San Pedro Boulevard has a slope of 0.0109 ft/ft. The capacity of the 60" storm drain under gravity flow conditions is 292 CFS. The peak flow in Derickson at San Pedro is 160.5 CFS. The normal depth in Derickson with a peak flow of 160.5 CFS is 0.78 feet. In Derickson, a total of two cattle-guard type inlets and two Type A inlets will be constructed to collect the 160.5 CFS peak flow. According to Plate 22.3 D-5 in the DPM, a Type A inlet will collect 15 CFS at a depth of 0.78 feet. The two cattle-guard inlets can collect a total of 137.1 CFS. All of the street flow in Derickson will be collected by the series of storm inlets. The remaining capacity in the 60"RCP in San Pedro after the flows from Derickson are collected is 131.5 CFS.

To get as much flow in the San Pedro storm drain as possible the storm drain is extended south to past Fleetwood to collect street flows. The normal depth in San Pedro near Fleetwood at a peak flow of 243 CFS is 0.92 feet. Since San Pedro is a Minor Arterial, cattle-guard type inlets are not allowed. To collect the 131.5 CFS in San Pedro, a series of double C and single A type inlets will be constructed. At a depth of 0.92 feet, a double C inlet can collect 20 CFS and a single A inlet can collect 15 CFS. A pair of double C inlets, one in each curb and gutter is located just north of Fleetwood. Just south of Fleetwood a series of one single A inlet and two double C inlets in the east and west curb line. A 42". RCP conveys the flows from the series of inlets and a 48" RCP Ties into the 60" RCP at Derickson. The remaining 111.5 CFS in San Pedro will discharge into the North Pino at the bridge.

POTENTIAL CONFLICTS

STORM DRAIN NORTH OF THE NORTH PINO ARROYO

In San Pedro, at the location where the 54" RCP crosses the 16" water line, the waterline will be lowered. Also at the location where the 54" RCP crosses the 6" gas line, the gas line will need to be lowered. And in San Francisco, the 6" waterline will need to be lowered to allow for construction of cattle-guard inlets. See Appendix F for conceptual plan and profile sheets.

STORM DRAIN SOUTH OF THE NORTH PINO ARROYO

At the intersection of Derickson and San Pedro the existing 8" sanitary sewer line is at the same approximate invert of the 60" RCP. In order to minimize or eliminate the vertical conflict at this location, the 60" X 48" Wye fitting was moved to the north to allow for a 60" X 48" reducer to be connected to the south side of the wye so that the soffit of the 48" RCP lines up with the Soffit of the 60" RCP. At the wye, the soffit of the 48" leg is

also lined up with the soffit of the 60" run. This allows for additional clearance over the existing 8" sanitary sewer line. The 8" sanitary sewer line will either be replaced with ductile iron or a concrete cap will be placed over the pipe. See Appendix D for storm drain details. In San Pedro, at the location where the 60" RCP crosses the 16" water line, the waterline will be lowered. Also at the location where the 60" RCP crosses the 6" gas line, the gas line will need to be lowered. And in Derickson, the 6" waterline will need to be lowered to allow for construction of cattle-guard inlets.

NEED FOR SPECIALTY SERVICES

At the North Pino Arroyo where the new storm drains are extended from the storm drain stub-outs, the construction and maintenance of the extensions will impact the adjacent properties to the north and south (see Plate 3). The impact is caused by the stub-outs orientation into the channel and the lack of channel right-of-way. The stub-outs are placed at a 45-degree angle to the channel centerline. According to the approximate property boundaries performed by the surveyor, there is only 8 feet between the top of the channel and the south right-of-way and only 8 feet between the top of the channel and concrete block wall and the north right-of-way.

On the north side of the channel if the property line is correct, a small drainage and construction easement is required to construct the 54" RCP extension. The construction of the 54" RCP will require the removal and replacement of the existing chain link fence and the installation of a temporary chain link fence along the easement line.

On the south side of the channel if the property line is correct, a larger drainage and construction easement is required to construct the 60" RCP extension. The construction of the 60 " RCP will require the following existing items to be removed and replaced.

1. The 6' high block wall with stucco adjacent to the channel and along San Pedro to the driveway.
2. The 6' high chain link fence adjacent to the channel.
3. The concrete header curb and asphalt paving in the channel right-of-way at the top of the channel.

A temporary chain link fence will need to be installed along the easement line during construction of the 60" storm drain.

Obtaining easements or property from private owners can cause significant delays to projects. To attempt to expedite the property acquisition for this project the following Specialty Services need to be negotiated and started immediately.

1. Perform a boundary survey of the adjacent properties on the north and south side of the channel.
2. Write a legal description of the easements required.
3. Perform appraisals of the properties.

MONTERRA DEL REY
DRB #1003916 (C20/D3E)
DERICKSON/SAN PEDRO
PROPOSED FLOWS EXHIBIT

4-10-08

OFFSITE BASIN 5
55.1 CFS

48" SD
224 CFS

STREET
100.1 CFS

STREET
97.0 CFS

42" SD
124.0 CFS

STREET
69.7 CFS

STREET FLOW
DEPTH=.47'

STREET FLOW
DEPTH=.57'

AP31
45.0 CFS

3-INLETS
60 CFS

ONSITE FLOWS TO DERICKSON
45.0 CFS

12.4 CFS
1-TYPE DBL
C-INLET
D=.57'
S=3.94%

AP-SD6
124.0 CFS

C-T3
0.94 Ac.
3.9 CFS

AP32
36.7 CFS

D-3
1.50 Ac.
66.3 CFS

30" SD
36.7 CFS

8 CFS
1-TYPE A
INLET
D=.55'
S=1.07%

46.7
CFS

STREET FLOW
DEPTH=.47'

STREET
129.7 CFS

AP25
31.0 CFS

AP30
5.7 CFS

12.6 CFS
1-TYPE A
1-TYPE C
INLET
D=.47'
S=1.55%

AP28
43.4 CFS

REMAINING PORTION
OF BASIN 340B
128.4 CFS

FLOWS TO SAN PEDRO VIA SANTA MONICA
BASINS OFF1-3
1.3 CFS

1614 CX-CG.dwg Apr 10,2008

SUPPLEMENTAL CALCULATIONS
FOR UNIT 1 INTERIM DRAINAGE IMPROVEMENTS

FOR

MONTERRA DEL REY, UNITS 1-3

A 411-DWELLING UNIT MIXED RESIDENTIAL SUBDIVISION

ALBUQUERQUE, NEW MEXICO

AUGUST 2008

Prepared by:

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(505) 268-8828

Åsa Nilsson-Weber 8-6-08

Åsa Nilsson-Weber, PE **Date**

INTERIM DRAINAGE IMPROVEMENTS

This submittal addresses the interim drainage improvements to be constructed with the Unit 1 development. The interim basin exhibit on the attached Interim Grading Plan shows the drainage basins for the future Unit 2 and Unit 3 areas. Two temporary detention ponds shall be constructed to mitigate the flows entering the development of Unit 1. Appendix A contains AHYMO output and summary files, and the following table summarizes the flows.

Basin	Q100 (cfs)	Discharge Location
EX5 & EX7	1.3	Montes Drive, Unit 1
EX2 & EX3	65.9	Derickson Ave.
EX4	5.9	Santa Monica
EX6	22.9	Interim Pond 2
EX1	98.4	Interim Pond 1

Since future Units 2 & 3 will remain developed (there are 43 mobile home units that will be re-located to Unit 1), except for the pond areas and a contractor staging/borrow/ stockpile area, the flows to Derickson Ave. and Santa Monica Ave. will discharge per historical patterns. Flows from the remaining basins EX1 and EX6 drain toward the proposed perimeter wall at Montes Drive, and those flows will be routed through two proposed temporary detention ponds. Basin EX1 drains to Pond 1 where the flows will be routed via an 18" standpipe (Standpipe #1) to Pond 2. These flows, combined with flows from Basin EX6 will collect in Pond 2 and be routed through an 18" standpipe (Standpipe #2) and discharge to the 18" RCP storm drain connector pipe stub. Calculations for the pond volumes and connector pipe outflow are included in Appendix B.

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02d RUN DATE (MON/DAY/YR) =08/06/2008
INPUT FILE = 1614EX6.DAT USER NO.= AHYMO-S-9702dIsa-Arfman2

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	NOTATION	
*S**********											
*S	MONTERRA DEL REY, UNIT 1 INTERIM DRAINAGE										
*S	UNITS 2 & 3 UNDEVELOPED CONDITIONS										
*S	TWO TEMPORARY DETENTION PONDS WITH STANDPIPES										
*S	100-YR, 6-HR STORM										
*S	1614EX6.DAT										
*S	AUGUST 2008										
*S	BY ASA NILSSON-WEBER										
*S	ISAACSON & ARFMAN, P.A.										
*S**********											
START										TIME=	.00
RAINFALL TYPE= 1										RAIN6=	2.450
*S CALCULATIONS FOR UNDEVELOPED FLOWRATES OF FUTURE											
*S UNITS 2 & 3 (49 ACRES)											
*S											
*S EXISTING LAND TREATMENTS PER STUDY REPORT FOR SAN PEDRO											
*S COLLECTORS TO THE NORTH PINO ARROYO (CPN 7168)											
*S											
*S											
*S BASIN EX1											
COMPUTE NM HYD	101.00	-	1	.03877	98.43	3.441	1.66434	1.500	3.967	PER IMP=	54.00
*S BASIN EX2											
COMPUTE NM HYD	102.00	-	2	.00158	4.03	.140	1.66434	1.500	3.985	PER IMP=	54.00
*S BASIN EX3											
COMPUTE NM HYD	103.00	-	3	.02438	61.90	2.164	1.66434	1.500	3.967	PER IMP=	54.00
*S BASIN EX4											
COMPUTE NM HYD	104.00	-	4	.00231	5.88	.205	1.66434	1.500	3.979	PER IMP=	54.00
*S BASIN EX5											
COMPUTE NM HYD	105.00	-	5	.00033	.86	.029	1.66434	1.500	4.055	PER IMP=	54.00
*S BASIN EX6											
COMPUTE NM HYD	106.00	-	6	.00903	22.94	.802	1.66434	1.500	3.970	PER IMP=	54.00
*S BASIN EX7											
COMPUTE NM HYD	107.00	-	7	.00014	.38	.012	1.66434	1.500	4.187	PER IMP=	54.00
*S ROUTE BASIN EX1 THROUGH POND 1											
ROUTE RESERVOIR	101.10	1	8	.03877	6.54	3.269	1.58094	2.233	.264	AC-FT=	2.871
*S ADD BASIN EX6 TO OUTFLOW FROM POND 1											
ADD HYD	106.10	6& 8	9	.04780	24.83	4.070	1.59669	1.500	.812		
*S ROUTE FLOWS THROUGH POND 2											
ROUTE RESERVOIR	101.10	9	10	.04780	11.13	4.024	1.57862	1.833	.364	AC-FT=	.493
FINISH											

MONTERRA DEL REY UNIT 1--1614
INTERIM POND VOLUME CALCULATIONS

TEMPORARY POND 2

		VOLUME	CUM. VOLUME	
ELEV	AREA	CF	CF	AC-FT
5262	2515.88			
5263	8054.18	5285.03	5285.03	0.121
5264	14885.60	11469.89	16754.92	0.385
5264.5	16187.78	7768.35	24523.27	0.563
5265	17528.67	8103.57	32626.83	0.749

TEMPORARY POND 1

		VOLUME	CUM. VOLUME	
ELEV	AREA	CF	CF	AC-FT
5268	5590.41			
5269	44521.2	25055.81	25055.81	0.575
5270	47901.56	46211.38	71267.19	1.636
5271	51375.96	49638.76	120905.95	2.776
5271.5	53170.87	26136.71	147042.65	3.376
5272	54995.23	27041.53	174084.18	3.996

1614 MONTERRA DEL REY, UNIT 1--TEMPORARY STAND PIPES
OUTFLOW CALCULATIONS FOR AHYMO POND ROUTING

18" TEMPORARY STAND PIPE #1

TOP OF STAND PIPE @ ELEV 5271.0

PERIMETER (L)= ΠD = 4.71 FT

WEIR EQUATION Q =CLH^(3/2)

WEIR COEFFICIENT = C = 3.33

WSEL	H	Q (CFS)
5271.5	0.5	**21.98 cfs**

PERFORATIONS

4" DIA. HOLES AREA (A) = ΠD^2/4 = 0.09 SF

CENTER @ 5268.5 & 5269.5

ORIFICE EQ'UATION Q = CA(2gH)^.5

ORIFICE COEFFICIENT C = 0.6

WSEL	H	# OF HOLES	Q (CFS)	TOTAL Q	TOTAL Q 50% CLOGGING
5269	0.5	8	2.38	2.4	**1.2**
5270	1.5	8	4.12		
	0.5	8	2.38	6.5	**3.2**
5271	2.5	8	5.31		
	1.5	8	4.12	9.4	**4.7**
5271.5	3	8	5.82		
	2	8	4.75		
WEIR (TOP STAND PIPE)			21.98	32.6	**16.3**

18" TEMPORARY STAND PIPE #2

TOP OF STAND PIPE @ ELEV=5264.0

PERIMETER (L)= ΠD = 4.71 FT

WEIR EQUATION

Q =CLH^(3/2)
WEIR COEFFICIENT C = 3.33

WSEL	H	Q (CFS)
5264.5	0.5	**21.98 cfs**

PERFORATIONS

4" DIA. HOLES
CENTER @ 5262.5 & 5263.5
ORIFICE EQ'UATION

AREA (A) = ΠD^2/4 = 0.09 SF

Q = CA(2gH)^.5
ORIFICE COEFFICIENT C = 0.6

WSEL	H	# OF HOLES	Q (CFS)	TOTAL Q	**TOTAL Q 50% CLOGGING**
5263	0.5	8	2.38	2.4	**1.2**
5264	1.5	8	4.12		
	0.5	8	2.38	6.5	**3.2**
5264.5	2	8	4.75		
	1	8	3.36		
WEIR (TOP STAND PIPE)			21.98	30.1	**15.0**