

T1 Ranch-Fort Apache Storm Drain Project  
 T2 Main Storm Drain - Mannings's N = 0.013  
 T3 By FKR, 4/23/2013 Checked By JSD, 4/28/2013

SO	800.0002588.104	1			2591.440				
R	911.1702590.528	1	.013			.000			
R	1012.1902592.730	1	.013			.000			
TS	1018.9402592.860	12	.013			.000			
JX	1018.9502592.870	12 10	.013	6.000	2593.870	80.0		.000	
TS	1062.1602593.770	3	.013			.000			
JX	1465.0002602.180	3 6	.013	5.000	2603.170	80.0		.000	
R	1850.0002610.200	3	.013			.000			
R	2059.3632613.390	3	.013			.000	.000 0		
R	2216.3622615.790	3	.013			89.954	.000 0		
R	2250.0002616.300	3	.013			.000	.000 0		
R	2612.5732621.190	3	.013			.000	.000 0		
R	2682.1602622.130	3	.013			39.870	.000 0		
R	2751.7502623.070	3	.013			-39.870	.000 0		
R	2770.0002623.360	3	.013			.000	.000 0		
JX	2778.9302623.500	3 4	.013	70.000	2624.000	-45.0		.000	
R	2830.0002624.300	3	.013			.000	.000 0		
JX	2846.9402624.570	3 10	.013	25.000	2625.070	-63.0		.000	
R	3218.4002630.400	3	.013			.000	.000 0		
R	3251.9002631.070	3	.013			-19.193	.000 0		
R	3286.3202631.760	3	.013			19.721	.000 0		
R	3400.0002634.030	3	.013			.000			
JX	3440.0002634.830	3 5	.013	210.000	2634.830	-30.0		.000	
R	3455.4902635.140	3	.013			.000			
R	3499.2802636.020	3	.013			8.364			
R	3544.8302636.400	3	.013			-8.718			
JX	3544.9302636.400	3 9	.013	6.000	2636.900	-80.0		.000	
R	3600.0002636.860	3	.013			.000			
R	4000.0002640.180	3	.013			.000			
R	4400.0002643.500	3	.013			.000			
R	4803.8502646.850	3	.013			.000			
JX	4806.7802646.890	3 7	.013	123.000	2647.390	-64.0		.000	
R	5470.0002655.420	3	.013			.000			
JX	5486.7002655.630	3 6	.013	26.000	2656.130	-45.0			
R	5578.2502656.810	3	.013			.000	.000 0		
R	5994.1802660.970	3	.013			.000	.000 0		
R	6064.3002661.660	3	.013			-25.611	.000 0		
JX	6064.4002661.670	3 11	.013	185.000	2661.670	6.0			
R	6064.5002661.680	8	.013			.000	.000 0		
R	6080.9602661.840	8	.013			-6.140	.000 0		
R	6135.1302663.140	8	.013			-23.997	.000 0		
R	6234.9902665.540	8	.013			.000	.000 0		
SH	6400.0002669.500	8			2673.760				
CD	1 2 0	.000	7.000	14.000	.000	.000	.00		
CD	2 2 0	.000	7.000	12.000	.000	.000	.00		
CD	3 3 0	.000	6.000	12.000	.000	.000	.00		
CD	4 4 1	.000	3.000	.000	.000	.000	.00		
CD	5 3 0	.000	4.000	4.000	.000	.000	.00		
CD	6 4 1	.000	2.500	.000	.000	.000	.00		
CD	7 4 1	.000	4.000	.000	.000	.000	.00		
CD	8 3 0	.000	6.000	7.000	.000	.000	.00		
CD	9 4 1	.000	28	.013			-33.124	.000 0	
R	6400.0002669.500	8.000	.000	.000	.000	.00			
CD	10 4 1	.000	1.500	.000	.000	.000	.00		
CD	11 3 0	.000	5.000	5.000	.000	.000	.00		
CD	12 2 0	.000	6.870	13.730	.000	.000	.00		
Q	815.000	.0							

WATER SURFACE PROFILE LISTING

Date: 4-29-2013 Time: 2: 6:36

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Main Storm Drain - Mannings's N = 0.013  
By FKR, 4/23/2013 Checked By JSD, 4/28/2013

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
      | Elev  | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
800.000 | 2588.104 | 3.526 | 2591.630 | 1471.00 | 29.80 | 13.79 | 2605.42 | .00 | 7.00 | 14.00 | 7.000 | 14.000 | .00 | 0 .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
111.170 | .0218 | | | | | .0218 | 2.43 | 3.53 | 2.80 | 3.53 | .013 | .00 | .00 | RECTANG
911.170 | 2590.528 | 3.525 | 2594.053 | 1471.00 | 29.81 | 13.80 | 2607.85 | .00 | 7.00 | 14.00 | 7.000 | 14.000 | .00 | 0 .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
101.020 | .0218 | | | | | .0218 | 2.21 | 3.53 | 2.80 | 3.53 | .013 | .00 | .00 | RECTANG
1012.190 | 2592.730 | 3.524 | 2596.254 | 1471.00 | 29.81 | 13.80 | 2610.06 | .00 | 7.00 | 14.00 | 7.000 | 14.000 | .00 | 0 .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
TRANS STR | .0193 | | | | | .0217 | .15 | 3.52 | 2.80 | | | .013 | .00 | .00 | RECTANG
1018.940 | 2592.860 | 3.601 | 2596.461 | 1471.00 | 29.75 | 13.75 | 2610.21 | .00 | 7.09 | 13.73 | 6.870 | 13.730 | .00 | 0 .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
JUNCT STR | 1.0000 | | | | | .0217 | .00 | 3.60 | 2.76 | | | .013 | .00 | .00 | RECTANG
1018.950 | 2592.870 | 3.570 | 2596.440 | 1465.00 | 29.89 | 13.87 | 2610.31 | .00 | 7.07 | 13.73 | 6.870 | 13.730 | .00 | 0 .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
TRANS STR | .0208 | | | | | .0209 | .90 | 3.57 | 2.79 | | | .013 | .00 | .00 | RECTANG
1062.160 | 2593.770 | 4.166 | 2597.936 | 1465.00 | 29.31 | 13.34 | 2611.27 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
JUNCT STR | .0209 | | | | | .0191 | 7.68 | 4.17 | 2.53 | | | .013 | .00 | .00 | BOX
1465.000 | 2602.180 | 4.274 | 2606.454 | 1460.00 | 28.47 | 12.58 | 2619.04 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
232.543 | .0208 | | | | | .0173 | 4.03 | 4.27 | 2.43 | 4.08 | .013 | .00 | .00 | BOX
1697.543 | 2607.024 | 4.453 | 2611.477 | 1460.00 | 27.32 | 11.59 | 2623.07 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
152.457 | .0208 | | | | | .0153 | 2.34 | 4.45 | 2.28 | 4.08 | .013 | .00 | .00 | BOX
1850.000 | 2610.200 | 4.670 | 2614.870 | 1460.00 | 26.05 | 10.54 | 2625.41 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
209.363 | .0152 | | | | | .0140 | 2.94 | 4.67 | 2.12 | 4.57 | .013 | .00 | .00 | BOX

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Main Storm Drain - Mannings's N = 0.013  
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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
      | Elev  | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
2059.363 | 2613.390 | 4.744 | 2618.134 | 1460.00 | 25.65 | 10.21 | 2628.35 | 6.00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | | | | | | | | | | | | | | | | |
156.999 | .0153 | | | | | .0134 | 2.10 | 6.00 | 2.08 | 4.56 | .013 | .00 | .00 | BOX
2216.362 | 2615.790 | 4.838 | 2620.628 | 1460.00 | 25.15 | 9.82 | 2630.45 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | | | | | | | | | | | | | | | | |
33.638 | .0152 | | | | | .0129 | .43 | 4.84 | 2.01 | 4.58 | .013 | .00 | .00 | BOX
2250.000 | 2616.300 | 4.863 | 2621.163 | 1460.00 | 25.02 | 9.72 | 2630.88 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | | | | | | | | | | | | | | | | |
362.573 | .0135 | | | | | .0123 | 4.47 | 4.86 | 2.00 | 4.78 | .013 | .00 | .00 | BOX
2612.573 | 2621.190 | 5.011 | 2626.201 | 1460.00 | 24.28 | 9.15 | 2635.35 | 6.00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | | | | | | | | | | | | | | | | |
69.587 | .0135 | | | | | .0117 | .81 | 6.00 | 1.91 | 4.77 | .013 | .00 | .00 | BOX
2682.160 | 2622.130 | 5.060 | 2627.190 | 1460.00 | 24.04 | 8.98 | 2636.17 | 6.00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | | | | | | | | | | | | | | | | |
69.590 | .0135 | | | | | .0113 | .79 | 6.00 | 1.88 | 4.77 | .013 | .00 | .00 | BOX
2751.750 | 2623.070 | 5.122 | 2628.192 | 1460.00 | 23.76 | 8.76 | 2636.95 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | | | | | | | | | | | | | | | | |
18.250 | .0159 | | | | | .0110 | .20 | 5.12 | 1.85 | 4.50 | .013 | .00 | .00 | BOX
2770.000 | 2623.360 | 5.159 | 2628.519 | 1460.00 | 23.59 | 8.64 | 2637.16 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | | | | | | | | | | | | | | | | |
JUNCT STR | .0157 | | | | | .0122 | .11 | 5.16 | 1.83 | | .013 | .00 | .00 | BOX
2778.930 | 2623.500 | 4.611 | 2628.111 | 1390.00 | 25.12 | 9.80 | 2637.91 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | | | | | | | | | | | | | | | | |
51.070 | .0157 | | | | | .0133 | .68 | 4.61 | 2.06 | 4.36 | .013 | .00 | .00 | BOX
2830.000 | 2624.300 | 4.648 | 2628.948 | 1390.00 | 24.92 | 9.64 | 2638.59 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | | | | | | | | | | | | | | | | |
JUNCT STR | .0159 | | | | | .0136 | .23 | 4.65 | 2.04 | | .013 | .00 | .00 | BOX

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      | Elev  | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev  | Depth  | Width  | Dia.-FT | or I.D. | ZL | Prs/Pip
L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
2846.940 | 2624.570 | 4.472 | 2629.042 | 1365.00 | 25.43 | 10.04 | 2639.09 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | | | | | | | | | | | | | | | | |
171.832 | .0157 | | | | | .0137 | 2.35 | 4.47 | 2.12 | 4.30 | .013 | .00 | .00 | BOX
3018.772 | 2627.267 | 4.576 | 2631.843 | 1365.00 | 24.86 | 9.60 | 2641.44 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | | | | | | | | | | | | | | | | |
199.628 | .0157 | | | | | .0124 | 2.48 | 4.58 | 2.05 | 4.30 | .013 | .00 | .00 | BOX
3218.400 | 2630.400 | 4.799 | 2635.199 | 1365.00 | 23.70 | 8.72 | 2643.92 | 6.00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | | | | | | | | | | | | | | | | |
33.500 | .0200 | | | | | .0113 | .38 | 6.00 | 1.91 | 3.95 | .013 | .00 | .00 | BOX
3251.900 | 2631.070 | 4.915 | 2635.985 | 1365.00 | 23.14 | 8.32 | 2644.30 | 6.00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | | | | | | | | | | | | | | | | |
34.420 | .0200 | | | | | .0105 | .36 | 6.00 | 1.84 | 3.94 | .013 | .00 | .00 | BOX
3286.320 | 2631.760 | 5.063 | 2636.822 | 1365.00 | 22.47 | 7.84 | 2644.66 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | | | | | | | | | | | | | | | | |
26.403 | .0200 | | | | | .0097 | .26 | 5.06 | 1.76 | 3.95 | .013 | .00 | .00 | BOX
3312.723 | 2632.287 | 5.200 | 2637.487 | 1365.00 | 21.88 | 7.43 | 2644.92 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | | | | | | | | | | | | | | | | |
37.689 | .0200 | | | | | .0088 | .33 | 5.20 | 1.69 | 3.95 | .013 | .00 | .00 | BOX
3350.412 | 2633.040 | 5.454 | 2638.493 | 1365.00 | 20.86 | 6.76 | 2645.25 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | | | | | | | | | | | | | | | | |
28.404 | .0200 | | | | | .0077 | .22 | 5.45 | 1.57 | 3.95 | .013 | .00 | .00 | BOX
      | | | | | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----
3378.816 | 2633.607 | 5.720 | 2639.327 | 1365.00 | 19.89 | 6.14 | 2645.47 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | | | | | | | | | | | | | | | | |
21.184 | .0200 | | | | | .0091 | .19 | 5.72 | 1.47 | 3.95 | .013 | .00 | .00 | BOX
----- WARNING - Flow depth near top of box conduit -----

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L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
3400.000 | 2634.030 | 6.000 | 2640.030 | 1365.00 | 18.96 | 5.58 | 2645.61 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
        | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
JUNCT STR | .0200 | | | | | .0078 | .31 | 6.00 | 1.36 | | .013 | .00 | .00 | BOX
3440.000 | 2634.830 | 7.715 | 2642.545 | 1155.00 | 16.04 | 4.00 | 2646.54 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
        | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
        | 15.490 | .0200 | | | | | .0078 | .12 | 7.72 | 1.15 | 3.51 | .013 | .00 | .00 | BOX
3455.490 | 2635.140 | 7.527 | 2642.667 | 1155.00 | 16.04 | 4.00 | 2646.66 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
        | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
        | 43.790 | .0201 | | | | | .0078 | .34 | .00 | 1.15 | 3.50 | .013 | .00 | .00 | BOX
3499.280 | 2636.020 | 7.232 | 2643.252 | 1155.00 | 16.04 | 4.00 | 2647.25 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
        | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
        | 45.550 | .0083 | | | | | .0078 | .36 | .00 | 1.15 | 4.80 | .013 | .00 | .00 | BOX
3544.830 | 2636.400 | 7.457 | 2643.857 | 1155.00 | 16.04 | 4.00 | 2647.85 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
        | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
JUNCT STR | .0000 | | | | | .0077 | .00 | 7.46 | 1.15 | | .013 | .00 | .00 | BOX
3544.930 | 2636.400 | 7.540 | 2643.940 | 1149.00 | 15.96 | 3.95 | 2647.89 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
        | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
        | 55.070 | .0084 | | | | | .0077 | .43 | 7.54 | 1.15 | 4.77 | .013 | .00 | .00 | BOX
3600.000 | 2636.860 | 7.506 | 2644.366 | 1149.00 | 15.96 | 3.95 | 2648.32 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
        | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
        | 400.000 | .0083 | | | | | .0077 | 3.09 | 7.51 | 1.15 | 4.79 | .013 | .00 | .00 | BOX
4000.000 | 2640.180 | 7.280 | 2647.460 | 1149.00 | 15.96 | 3.95 | 2651.41 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
        | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
        | 400.000 | .0083 | | | | | .0077 | 3.09 | 7.28 | 1.15 | 4.79 | .013 | .00 | .00 | BOX

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L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
4400.000 | 2643.500 | 7.054 | 2650.554 | 1149.00 | 15.96 | 3.95 | 2654.51 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
403.850 | .0083 | | | | | .0077 | 3.12 | 7.05 | 1.15 | 4.79 | .013 | .00 | .00 | BOX
4803.850 | 2646.850 | 6.828 | 2653.678 | 1149.00 | 15.96 | 3.95 | 2657.63 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
JUNCT STR | .0136 | | | | | .0062 | .02 | 6.83 | 1.15 | | .013 | .00 | .00 | BOX
4806.780 | 2646.890 | 8.183 | 2655.073 | 1026.00 | 14.25 | 3.15 | 2658.23 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
61.431 | .0129 | | | | | .0062 | .38 | 8.18 | 1.03 | 3.77 | .013 | .00 | .00 | BOX
4868.210 | 2647.680 | 7.771 | 2655.451 | 1026.00 | 14.25 | 3.15 | 2658.60 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
HYDRAULIC JUMP
4868.210 | 2647.680 | 3.842 | 2651.522 | 1026.00 | 22.25 | 7.69 | 2659.21 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
262.553 | .0129 | | | | | .0118 | 3.10 | 3.84 | 2.00 | 3.77 | .013 | .00 | .00 | BOX
5130.763 | 2651.057 | 3.930 | 2654.987 | 1026.00 | 21.76 | 7.35 | 2662.34 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
222.400 | .0129 | | | | | .0107 | 2.38 | 3.93 | 1.93 | 3.77 | .013 | .00 | .00 | BOX
5353.163 | 2653.917 | 4.122 | 2658.039 | 1026.00 | 20.74 | 6.68 | 2664.72 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
116.837 | .0129 | | | | | .0094 | 1.10 | 4.12 | 1.80 | 3.77 | .013 | .00 | .00 | BOX
5470.000 | 2655.420 | 4.323 | 2659.743 | 1026.00 | 19.78 | 6.07 | 2665.82 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
JUNCT STR | .0126 | | | | | .0093 | .16 | 4.32 | 1.68 | | .013 | .00 | .00 | BOX
5486.700 | 2655.630 | 4.058 | 2659.688 | 1000.00 | 20.54 | 6.55 | 2666.24 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
91.550 | .0129 | | | | | .0094 | .86 | 4.06 | 1.80 | 3.70 | .013 | .00 | .00 | BOX

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WATER SURFACE PROFILE LISTING

Date: 4-29-2013 Time: 2: 6:36

Ranch-Fort Apache Storm Drain Project  
Main Storm Drain - Mannings's N = 0.013  
By FKR, 4/23/2013 Checked By JSD, 4/28/2013

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
        | Elev   | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev | Depth | Width | Dia.-FT | or I.D. | ZL | Prs/Pip
L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
5578.250 2656.810 | 4.212 2661.022 | 1000.00 19.79 | 6.08 2667.10 | .00 6.00 | 12.00 | 6.000 | 12.000 | .00 0 .0
        -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
122.605 .0100 | | | | | .0087 1.07 | 4.21 1.70 | 4.05 .013 | .00 .00 | BOX
5700.855 2658.036 | 4.300 2662.336 | 1000.00 19.38 | 5.83 2668.17 | .00 6.00 | 12.00 | 6.000 | 12.000 | .00 0 .0
        -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
154.424 .0100 | | | | | .0079 1.22 | 4.30 1.65 | 4.05 .013 | .00 .00 | BOX
5855.279 2659.581 | 4.510 2664.091 | 1000.00 18.48 | 5.30 2669.39 | .00 6.00 | 12.00 | 6.000 | 12.000 | .00 0 .0
        -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
85.806 .0100 | | | | | .0069 .60 | 4.51 1.53 | 4.05 .013 | .00 .00 | BOX
5941.085 2660.439 | 4.730 2665.169 | 1000.00 17.62 | 4.82 2669.99 | .00 6.00 | 12.00 | 6.000 | 12.000 | .00 0 .0
        -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
53.095 .0100 | | | | | .0061 .32 | 4.73 1.43 | 4.05 .013 | .00 .00 | BOX
5994.181 2660.970 | 4.961 2665.931 | 1000.00 16.80 | 4.38 2670.31 | .67 6.00 | 12.00 | 6.000 | 12.000 | .00 0 .0
        -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
34.265 .0098 | | | | | .0054 .18 | 5.63 1.33 | 4.07 .013 | .00 .00 | BOX
6028.446 2661.307 | 5.198 2666.505 | 1000.00 16.03 | 3.99 2670.50 | .61 6.00 | 12.00 | 6.000 | 12.000 | .00 0 .0
        -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
21.298 .0098 | | | | | .0047 .10 | 5.81 1.24 | 4.07 .013 | .00 .00 | BOX
6049.744 2661.517 | 5.452 2666.969 | 1000.00 15.29 | 3.63 2670.60 | 6.00 6.00 | 12.00 | 6.000 | 12.000 | .00 0 .0
        -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
11.199 .0098 | | | | | .0041 .05 | 6.00 1.15 | 4.07 .013 | .00 .00 | BOX
        ----- WARNING - Flow depth near top of box conduit -----
6060.943 2661.627 | 5.718 2667.345 | 1000.00 14.57 | 3.30 2670.64 | 6.00 6.00 | 12.00 | 6.000 | 12.000 | .00 0 .0
        -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
3.356 .0098 | | | | | .0036 .01 | 6.00 1.07 | 4.07 .013 | .00 .00 | BOX
        ----- WARNING - Flow depth near top of box conduit -----

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WATER SURFACE PROFILE LISTING

Date: 4-29-2013 Time: 2: 6:36

Ranch-Fort Apache Storm Drain Project  
Main Storm Drain - Mannings's N = 0.013  
By FKR, 4/23/2013 Checked By JSD, 4/28/2013

```

*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
      | Elev  | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev  | Depth  | Width  | Dia.-FT | or I.D. | ZL | Prs/Pip
L/Elem | Ch Slope | | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch
*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****|*****
6064.300 | 2661.660 | 5.998 | 2667.658 | 1000.00 | 13.89 | 3.00 | 2670.66 | .00 | 6.00 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
JUNCT STR | .1000 | | | | | .0039 | .00 | 6.00 | 1.00 | | .013 | .00 | .00 | BOX
      | | | | | | | | | | | | | | | |
----- WARNING - Flow depth near top of box conduit -----
6064.400 | 2661.670 | 7.415 | 2669.085 | 815.00 | 11.32 | 1.99 | 2671.07 | .00 | 5.23 | 12.00 | 6.000 | 12.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
6064.400 | 2661.670 | 4.308 | 2665.978 | 815.00 | 27.03 | 11.34 | 2677.32 | .00 | 6.00 | 7.00 | 6.000 | 7.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
      | .100 | .1000 | | | | | .0232 | .00 | 4.31 | 2.29 | 2.50 | .013 | .00 | .00 | BOX
6064.500 | 2661.680 | 4.310 | 2665.990 | 815.00 | 27.02 | 11.33 | 2677.32 | .52 | 6.00 | 7.00 | 6.000 | 7.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
      | 16.460 | .0097 | | | | | .0236 | .39 | 4.83 | 2.29 | 6.00 | .013 | .00 | .00 | BOX
6080.960 | 2661.840 | 4.257 | 2666.097 | 815.00 | 27.35 | 11.61 | 2677.71 | 1.26 | 6.00 | 7.00 | 6.000 | 7.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
      | 54.170 | .0240 | | | | | .0240 | 1.30 | 5.51 | 2.34 | 4.26 | .013 | .00 | .00 | BOX
6135.130 | 2663.140 | 4.257 | 2667.397 | 815.00 | 27.35 | 11.61 | 2679.01 | .94 | 6.00 | 7.00 | 6.000 | 7.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
      | 99.860 | .0240 | | | | | .0240 | 2.39 | 5.20 | 2.34 | 4.25 | .013 | .00 | .00 | BOX
6234.990 | 2665.540 | 4.258 | 2669.798 | 815.00 | 27.34 | 11.61 | 2681.41 | .00 | 6.00 | 7.00 | 6.000 | 7.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
      | 165.010 | .0240 | | | | | .0239 | 3.95 | 4.26 | 2.34 | 4.26 | .013 | .00 | .00 | BOX
6400.000 | 2669.500 | 4.260 | 2673.760 | 815.00 | 27.33 | 11.60 | 2685.36 | .00 | 6.00 | 7.00 | 6.000 | 7.000 | .00 | 0 | .0
      | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -

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