APPENDICES

Navajo Wash, Oracle Road to Ft. Lowell Road

Drainage Alternatives Analysis

Submitted to

City of Tucson Department of Transportation
Engineering Division

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June 2007

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Appendix 2a. Areal Reduction Calculations

SUBBASIN AREAS FROM TSMS SUBWATERSHED REPORT
INITIAL TSMS(1) MODELING

Facility ID	Actual Surface Area (Acres)	Actual Surface Area (Sq Mi)	Non-Contribuary Area Percent	Non-Contribuary Area Acres	Non-Contribuary Area Sq Miles	
POC_A (DG-N0280)						
To Blacklidge (Becomes Cemetary Wash)						
DG-S0270	67.5	.105	26.%	50.0	.078	
DG-S0280	107.6	.168	21.%	85.0	.133	
	175.1	.274		135.0	.211	.21

100-yr 3_hr Precipitation: 3.60
ARF: 1.000
Reduced Precipitation: 3.600

POC_B (DG-N0230)						
DG-S0230	68.4	.107	22.%	53.4	.083	
	68.4	.107		53.4	.083	.08

100-yr 3_hr Precipitation: 3.60
ARF: 1.000
Reduced Precipitation: 3.600

POC_D (DG-N0200)						
DG-S0010	108.0	.169	15.%	91.8	.143	
DG-S0020	75.6	.118	19.%	61.2	.096	
DG-S0030	124.4	.194	15.%	105.7	.165	
DG-S0040	83.5	.130	19.%	67.6	.106	
DG-S0050	53.1	.083	24.%	40.4	.063	
DG-S0060	66.4	.104	28.%	47.8	.075	
DG-S0070	42.4	.066	14.%	36.5	.057	
DG-S0080	26.7	.042	18.%	21.9	.034	
DG-S0090	97.0	.152	22.%	75.7	.118	
DG-S0100	239.0	.373	23.%	184.0	.288	
DG-S0110	167.6	.262	18.%	137.4	.215	
DG-S0120	101.4	.158	18.%	83.1	.130	
DG-S0130	139.2	.218	28.%	100.2	.157	
DG-S0140	151.9	.237	26.%	112.4	.176	
DG-S0150	99.0	.155	24.%	75.2	.118	
DG-S0160	117.0	.183	27.%	85.4	.133	
DG-S0170	131.0	.205	20.%	104.8	.164	
DG-S0180	36.7	.057	23.%	28.3	.044	
DG-S0190	50.5	.079				
DG-S0200	70.7	.110	15.%	60.1	.094	
	1981.1	3.095		1519.6	2.374	2.38

100-yr 3_hr Precipitation: 3.60
ARF: .933
Reduced Precipitation: 3.359

SUBBASIN AREAS FROM TSMS SUBWATERSHED REPORT
INITIAL TSMS(1) MODELING

Facility ID	Actual Surface Area (Acres)	Actual Surface Area (Sq Mi)	Non-Contribuary Area Percent	Non-Contribuary Area Acres	Non-Contribuary Area Sq Miles	
POC_C (DG-0210)						
POC_D	1981.1	3.095		1519.6	2.374	
DG-S0210	34.6	.054	20.%	27.7	.043	
	2015.7	3.150		1547.3	2.418	2.42

100-yr 3_hr Precipitation: 3.60
ARF: .931
Reduced Precipitation: 3.353

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POC_I (DG-N0220)						
POC_C	2015.7	3.150		1547.3	2.418	
DG-S0220	116.4	.182	7.%	108.3	.169	
	2132.1	3.331		1655.6	2.587	2.59

100-yr 3_hr Precipitation: 3.60
ARF: .926
Reduced Precipitation: 3.335

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POC_J (DG-N0260)						
POC_B	68.4	.107		53.4	.083	
POC_E	122.8	.192		92.1	.144	
POC_I	2132.1	3.331		1655.6	2.587	
DG-S0236	48.7	.076	8.%	44.8	.070	
DG-S0240	97.9	.153	9.%	89.1	.139	
DG-S0250	74.6	.117	6.%	70.1	.110	
DG-S0260	59.0	.092	8.%	54.3	.085	
	2603.5	4.068		2059.3	3.218	3.22

100-yr 3_hr Precipitation: 3.60
ARF: .907
Reduced Precipitation: 3.265

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POC_K (DG-N0350)						
POC_J	2603.5	4.068		2059.3	3.218	
POC_A	175.1	.274		135.0	.211	
DG-S0290	231.0	.361	10.%	207.9	.325	
DG-S0300	160.0	.250	6.%	150.4	.235	
DG-S0310	115.5	.180	5.%	109.7	.171	
DG-S0320	80.0	.125	5.%	76.0	.119	
DG-S0340	88.1	.138	0.%	88.1	.138	
DG-S0340	69.0	.108	2.%	67.6	.106	
DG-S0350	137.0	.214	0.%	137.0	.214	
	3659.2	5.718		3031.0	4.736	4.74

100-yr 3_hr Precipitation: 3.60
ARF: .870
Reduced Precipitation: 3.131

SUBBASIN AREAS FROM TSMS SUBWATERSHED REPORT
INITIAL TSMS(1) MODELING

	Actual Surface Area		Non-Contribuary Area			
Facility ID	(Acres)	(Sq Mi)	Percent	Acres	Sq Miles	
POC_E (DG-N0235)						
DG-S0235	122.8	.192	25.%	92.1	.144	
	122.8	.192		92.1	.144	.14

100-yr 3_hr Precipitation: 3.60
ARF: 1.000
Reduced Precipitation: 3.600

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POC_F (GR-N0010)						
GR-S0010	80.3	.125	23.%	61.8	.097	
	80.3	.125		61.8	.097	.10

100-yr 3_hr Precipitation: 3.60
ARF: 1.000
Reduced Precipitation: 3.600

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POC_G (GR-N0020)						
POC_F	80.3	.125		61.8	.097	
GR-S0020	113.5	.177	23.%	87.4	.137	
	193.8	.303		149.2	.233	.23

100-yr 3_hr Precipitation: 3.60
ARF: 1.000
Reduced Precipitation: 3.600

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POC_H (GR-N0030)						
POC_G	193.8	.303		149.2	.233	
GR-S0030	131.3	.205	16.%	110.3	.172	
	325.1	.508		259.5	.405	.41

100-yr 3_hr Precipitation: 3.60
ARF: 1.000
Reduced Precipitation: 3.600

SUBBASIN AREAS FROM TSMS SUBWATERSHED REPORT
REFINED TSMS(2) MODELING

Facility ID	Actual Surface Area (Acres)	Actual Surface Area (Sq Mi)	Non-Contribuary Area Percent	Non-Contribuary Area Acres	Non-Contribuary Area Sq Miles	
POC_A (DG-N0280)						
To Blacklidge (Becomes Cemetary Wash)						
DG-S0270	67.5	.105	26.%	50.0	.078	
DG-S0280	107.6	.168	21.%	85.0	.133	
	175.1	.274		135.0	.211	.21

100-yr 3_hr Precipitation: 3.60
ARF: 1.000
Reduced Precipitation: 3.600

POC_B (DG-N0230)						
DG-S0230	68.4	.107	22.%	53.4	.083	
	68.4	.107		53.4	.083	.08

100-yr 3_hr Precipitation: 3.60
ARF: 1.000
Reduced Precipitation: 3.600

POC_D (DG-N0200)						
DG-S0010	108.0	.169	15.%	91.8	.143	
DG-S0020	75.6	.118	19.%	61.2	.096	
DG-S0030	124.4	.194	15.%	105.7	.165	
DG-S0040	83.5	.130	19.%	67.6	.106	
DG-S0050	53.1	.083	24.%	40.4	.063	
DG-S0060	66.4	.104	28.%	47.8	.075	
DG-S0070	42.4	.066	14.%	36.5	.057	
DG-S0080	26.7	.042	18.%	21.9	.034	
DG-S0090	97.0	.152	22.%	75.7	.118	
DG-S0100	239.0	.373	23.%	184.0	.288	
DG-S0110	167.6	.262	18.%	137.4	.215	
DG-S0120	101.4	.158	18.%	83.1	.130	
DG-S0130	139.2	.218	28.%	100.2	.157	
DG-S0140	151.9	.237	26.%	112.4	.176	
DG-S0150	99.0	.155	24.%	75.2	.118	
DG-S0160	117.0	.183	27.%	85.4	.133	
DG-S0170	131.0	.205	20.%	104.8	.164	
DG-S0180	36.7	.057	23.%	28.3	.044	
DG-S0190	50.5					
DG-S0200	70.7	.110	15.%	60.1	.094	
	1981.1	3.017		1519.6	2.374	2.38

100-yr 3_hr Precipitation: 3.60
ARF: .935
Reduced Precipitation: 3.367

SUBBASIN AREAS FROM TSMS SUBWATERSHED REPORT
REFINED TSMS(2) MODELING

Facility ID	Actual Surface Area (Acres)	Actual Surface Area (Sq Mi)	Non-Contribuary Area Percent	Non-Contribuary Area Acres	Non-Contribuary Area Sq Miles	
POC_C (DG-0210)						
POC_D	1981.1	3.017		1519.6	2.374	
DG-S0210	34.6	.054	20.%	27.7	.043	
	2015.7	3.071		1547.3	2.418	2.42

100-yr 3_hr Precipitation: 3.60
ARF: .934
Reduced Precipitation: 3.361

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POC_I (DG-N0220)						
POC_C	2015.7	3.071		1547.3	2.418	
DG-S0220	116.4	.182	7.%	108.3	.169	
	2132.1	3.253		1655.6	2.587	2.59

100-yr 3_hr Precipitation: 3.60
ARF: .929
Reduced Precipitation: 3.343

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POC_J (DG-N0260)						
POC_B	68.4	.107		53.4	.083	
POC_E	122.8	.192		92.1	.144	
POC_I	2132.1	3.253		1655.6	2.587	
DG-S0236	48.7	.076	8.%	44.8	.070	
DG-S0240	97.9	.153	9.%	89.1	.139	
DG-S0250	74.6	.117	6.%	70.1	.110	
DG-S0260	59.0	.092	8.%	54.3	.085	
	2603.5	3.989		2059.3	3.218	3.22

100-yr 3_hr Precipitation: 3.60
ARF: .909
Reduced Precipitation: 3.272

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POC_K (DG-N0350)						
POC_J	2603.5	3.989		2059.3	3.218	
POC_A	175.1	.274		135.0	.211	
DG-S0290	231.0	.361	10.%	207.9	.325	
DG-S0300	160.0	.250	6.%	150.4	.235	
DG-S0310	115.5	.180	5.%	109.7	.171	
DG-S0320	80.0	.125	5.%	76.0	.119	
DG-S0340	88.1	.138	0.%	88.1	.138	
DG-S0340	69.0	.108	2.%	67.6	.106	
DG-S0350	137.0	.214	0.%	137.0	.214	
	3659.2	5.639		3031.0	4.736	4.74

100-yr 3_hr Precipitation: 3.60
ARF: .871
Reduced Precipitation: 3.137

SUBBASIN AREAS FROM TSMS SUBWATERSHED REPORT
REFINED TSMS(2) MODELING

	Actual Surface Area		Non-Contribuary Area			
Facility ID	(Acres)	(Sq Mi)	Percent	Acres	Sq Miles	
POC_E (DG-N0235)						
DG-S0235	122.8	.192	25.%	92.1	.144	
	122.8	.192		92.1	.144	.14

100-yr 3_hr Precipitation: 3.60
ARF: 1.000
Reduced Precipitation: 3.600

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POC_F (GR-N0010)						
GR-S0010	80.3	.125	23.%	61.8	.097	
	80.3	.125		61.8	.097	.10

100-yr 3_hr Precipitation: 3.60
ARF: 1.000
Reduced Precipitation: 3.600

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POC_G (GR-N0020)						
POC_F	80.3	.125		61.8	.097	
GR-S0020	113.5	.177	23.%	87.4	.137	
	193.8	.303		149.2	.233	.23

100-yr 3_hr Precipitation: 3.60
ARF: 1.000
Reduced Precipitation: 3.600

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POC_H (GR-N0030)						
POC_G	193.8	.303		149.2	.233	
GR-S0030	131.3	.205	16.%	110.3	.172	
	325.1	.508		259.5	.405	.41

100-yr 3_hr Precipitation: 3.60
ARF: 1.000
Reduced Precipitation: 3.600

SUBBASIN AREAS FROM TSMS SUBWATERSHED REPORT
NAVAJO WASH ALTERNATIVE CONFIGURATION TSMS(4), TSMS(6)

Facility ID	Actual Surface Area (Acres)	Actual Surface Area (Sq Mi)	Non-Contribuary Area Percent	Non-Contribuary Area Acres	Non-Contribuary Area Sq Miles	
POC_A (DG-N0280)						
To Blacklidge (Becomes Cemetary Wash)						
DG-S0270	67.5	.105	26.%	50.0	.078	
DG-S0280	107.6	.168	21.%	85.0	.133	
	175.1	.274		135.0	.211	.21

100-yr 3_hr Precipitation: 3.60
ARF: 1.000
Reduced Precipitation: 3.60

POC_B (DG-N0230)						
DG-S0230	68.4	.107	22.%	53.4	.083	
	68.4	.107		53.4	.083	.08

100-yr 3_hr Precipitation: 3.60
ARF: 1.000
Reduced Precipitation: 3.60

POC_D (DG-N0200)						
DG-S0010	108.0	.169	15.%	91.8	.143	
DG-S0020	75.6	.118	19.%	61.2	.096	
DG-S0030	124.4	.194	15.%	105.7	.165	
DG-S0040	83.5	.130	19.%	67.6	.106	
DG-S0050	53.1	.083	24.%	40.4	.063	
DG-S0060	66.4	.104	28.%	47.8	.075	
DG-S0070	42.4	.066	14.%	36.5	.057	
DG-S0080	26.7	.042	18.%	21.9	.034	
DG-S0090	97.0	.152	22.%	75.7	.118	
DG-S0100	239.0	.373	23.%	184.0	.288	
DG-S0110	167.6	.262	18.%	137.4	.215	
DG-S0120	101.4	.158	18.%	83.1	.130	
DG-S0130	139.2	.218	28.%	100.2	.157	
DG-S0140	151.9	.237	26.%	112.4	.176	
DG-S0150	99.0	.155	24.%	75.2	.118	
DG-S0160	117.0	.183	27.%	85.4	.133	
DG-S0170	131.0	.205	20.%	104.8	.164	
DG-S0180	36.7	.057	23.%	28.3	.044	
DG-S0200	70.7	.110	15.%	60.1	.094	
	1930.6	3.017		1519.6	2.374	2.38

100-yr 3_hr Precipitation: 3.60
ARF: .935
Reduced Precipitation: 3.367

SUBBASIN AREAS FROM TSMS SUBWATERSHED REPORT
NAVAJO WASH ALTERNATIVE CONFIGURATION TSMS(4), TSMS(6)

	Actual Surface Area		Non-Contribuary Area			
Facility ID	(Acres)	(Sq Mi)	Percent	Acres	Sq Miles	
POC_C (DG-0210)						
POC_D	1930.6	3.017		1519.6	2.374	
POC_B	68.4	0.1				
DG-S0210	34.6	.054	20.%	27.7	.043	
	2033.6	3.178		1547.3	2.418	2.42

100-yr 3_hr Precipitation: 3.60
ARF: .931
Reduced Precipitation: 3.350

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POC_I (DG-N0220)						
POC_C	2033.6	3.178		1547.3	2.418	
DG-S0220	116.4	.182	7.%	108.3	.169	
	2150.0	3.359		1655.6	2.587	2.59

100-yr 3_hr Precipitation: 3.60
ARF: .926
Reduced Precipitation: 3.332

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POC_J (DG-N0260)						
POC_B	68.4	.107		53.4	.083	
POC_I	2150.0	3.359		1655.6	2.587	
DG-S0236	48.7	.076	8.%	44.8	.070	
DG-S0240	97.9	.153	9.%	89.1	.139	
DG-S0250	74.6	.117	6.%	70.1	.110	
DG-S0260	59.0	.092	8.%	54.3	.085	
	2498.6	3.904		1967.2	3.074	3.22

100-yr 3_hr Precipitation: 3.60
ARF: .911
Reduced Precipitation: 3.280

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POC_K (DG-N0350)						
POC_J	2498.6	3.904		1967.2	3.074	
POC_A	175.1	.274		135.0	.211	
DG-S0290	231.0	.361	10.%	207.9	.325	
DG-S0300	160.0	.250	6.%	150.4	.235	
DG-S0310	115.5	.180	5.%	109.7	.171	
DG-S0320	80.0	.125	5.%	76.0	.119	
DG-S0340	88.1	.138	0.%	88.1	.138	
DG-S0340	69.0	.108	2.%	67.6	.106	
DG-S0350	137.0	.214	0.%	137.0	.214	
	3554.3	5.554		2938.9	4.592	4.74

100-yr 3_hr Precipitation: 3.60
ARF: .873
Reduced Precipitation: 3.143

SUBBASIN AREAS FROM TSMS SUBWATERSHED REPORT
NAVAJO WASH ALTERNATIVE CONFIGURATION TSMS(4), TSMS(6)

	Actual Surface Area		Non-Contribuary Area			
Facility ID	(Acres)	(Sq Mi)	Percent	Acres	Sq Miles	
POC_E (DG-N0235)						
DG-S0235	122.8	.192	25.%	92.1	.144	
	122.8	.192		92.1	.144	.14

100-yr 3_hr Precipitation: 3.60
ARF: 1.000
Reduced Precipitation: 3.600

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POC_F (GR-N0010)						
GR-S0010	80.3	.125	23.%	61.8	.097	
POC_E	122.8	.192		92.1	.144	
	203.1	.317		61.8	.097	.10

100-yr 3_hr Precipitation: 3.60
ARF: 1.000
Reduced Precipitation: 3.600

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POC_G (GR-N0020)						
POC_F	203.1	.317		61.8	.097	
GR-S0020	113.5	.177	23.%	87.4	.137	
	316.6	.495		149.2	.233	.23

100-yr 3_hr Precipitation: 3.600
ARF: 1.000
Reduced Precipitation: 3.600

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POC_H (GR-N0030)						
POC_G	316.6	.495		149.2	.233	
GR-S0030	131.3	.205	16.%	110.3	.172	
	447.9	.700		259.5	.405	.41

100-yr 3_hr Precipitation: 3.600
ARF: 1.000
Reduced Precipitation: 3.600

SUBBASIN AREAS FROM TSMS SUBWATERSHED REPORT
FIRST AVENUE ALTERNATIVE CONFIGURATION TSMS(5), TSMS(7)

Facility ID	Actual Surface Area (Acres)	Actual Surface Area (Sq Mi)	Non-Contribuary Area for Check: Percent	Non-Contribuary Area for Check: Acres	Non-Contribuary Area for Check: Sq Miles	Non-Contribuary Area for Check: Per TSMS
POC_A (DG-N0280)						
To Blacklidge (Becomes Cemetary Wash)						
DG-S0270	67.5	.105	26.%	50.0	.078	
DG-S0280	107.6	.168	21.%	85.0	.133	
	175.1	.274		135.0	.211	.21
100-yr 3_hr Precipitation:		3.60				
ARF:		1.000				
Reduced Precipitation:		3.600				
POC_B (DG-N0230)						
DG-S0230	68.4	.107	22.%	53.4	.083	
	68.4	.107		53.4	.083	.08
100-yr 3_hr Precipitation:		3.60				
ARF:		1.000				
Reduced Precipitation:		3.600				
POC_D (DG-N0200)						
DG-S0010	108.0	.169	15.%	91.8	.143	
DG-S0020	75.6	.118	19.%	61.2	.096	
DG-S0030	124.4	.194	15.%	105.7	.165	
DG-S0040	83.5	.130	19.%	67.6	.106	
DG-S0050	53.1	.083	24.%	40.4	.063	
DG-S0060	66.4	.104	28.%	47.8	.075	
DG-S0070	42.4	.066	14.%	36.5	.057	
DG-S0080	26.7	.042	18.%	21.9	.034	
DG-S0090	97.0	.152	22.%	75.7	.118	
DG-S0100	239.0	.373	23.%	184.0	.288	
DG-S0110	167.6	.262	18.%	137.4	.215	
DG-S0120	101.4	.158	18.%	83.1	.130	
DG-S0130	139.2	.218	28.%	100.2	.157	
DG-S0140	151.9	.237	26.%	112.4	.176	
DG-S0150	99.0	.155	24.%	75.2	.118	
DG-S0160	117.0	.183	27.%	85.4	.133	
DG-S0170	131.0	.205	20.%	104.8	.164	
DG-S0180	36.7	.057	23.%	28.3	.044	
DG-S0200	70.7	.110	15.%	60.1	.094	
	1930.6	3.017		1519.6	2.374	2.38
100-yr 3_hr Precipitation:		3.60				
ARF:		.935				
Reduced Precipitation:		3.367				

SUBBASIN AREAS FROM TSMS SUBWATERSHED REPORT
FIRST AVENUE ALTERNATIVE CONFIGURATION TSMS(5), TSMS(7)

	Actual Surface Area		Non-Contribuary Area for Check			
Facility ID	(Acres)	(Sq Mi)	Percent	Acres	Sq Miles	Per TSMS
POC_C (DG-0210)						
POC_D	1930.6	3.017		1519.6	2.374	
POC_B	68.4	.107		53.4	.083	
DG-S0210	34.6	.054	20.%	27.7	.043	
	2033.6	3.178		1600.7	2.501	2.42

100-yr 3_hr Precipitation: 3.60
ARF: .931
Reduced Precipitation: 3.350

POC_E (DG-N0235)						
POC_C	2033.6	3.178		1600.7	2.501	
DG-S0235	122.8	.192	25.%	92.1	.144	
	2156.4	3.369		1692.8	2.645	2.59

100-yr 3_hr Precipitation: 3.60
ARF: .925
Reduced Precipitation: 3.331

POC_F (GR-N0010)						
POC_E	2156.4	3.369		1692.8	2.645	
GR-S0010	80.3	.125	23.%	61.8	.097	
	2236.7	3.495		1754.6	2.742	.14

100-yr 3_hr Precipitation: 3.60
ARF: .922
Reduced Precipitation: 3.319

POC_G (GR-N0020)						
POC_F	2236.7	3.495		1754.6	2.742	
GR-S0020	113.5	.177	23.%	87.4	.137	
	2350.2	3.672		1842.0	2.878	

100-yr 3_hr Precipitation: 3.60
ARF: .917
Reduced Precipitation: 3.30

POC_H (GR-N0030)						
POC_G	2350.2	3.672		1842.0	2.878	
GR-S0030	131.3	.205	16.%	110.3	.172	
	2481.5	3.877		1952.3	3.050	

100-yr 3_hr Precipitation: 3.60
ARF: .912
Reduced Precipitation: 3.282

SUBBASIN AREAS FROM TSMS SUBWATERSHED REPORT
FIRST AVENUE ALTERNATIVE CONFIGURATION TSMS(5), TSMS(7)

	Actual Surface Area		Non-Contribuary Area for Check			
Facility ID	(Acres)	(Sq Mi)	Percent	Acres	Sq Miles	Per TSMS
POC_I (DG-N0220)						
DG-S0220	116.4	.182	7.%	108.3	.169	
	116.4	.182		108.3	.169	

100-yr 3_hr Precipitation: 3.60
ARF: 1.000
Reduced Precipitation: 3.600

POC_J (DG-N0260)						
POC_I	116.4	.182		108.3	.169	
DG-S0236	48.7	.076	8.%	44.8	.070	
DG-S0240	97.9	.153	9.%	89.1	.139	
DG-S0250	74.6	.117	6.%	70.1	.110	
DG-S0260	59.0	.092	8.%	54.3	.085	
	396.6	.620		366.5	.573	

100-yr 3_hr Precipitation: 3.60
ARF: 1.000
Reduced Precipitation: 3.60

POC_K (DG-N0350)						
POC_J	396.6	.620		366.5	.573	
DG-S0290	231.0	.361	10.%	207.9	.325	
DG-S0300	160.0	.250	6.%	150.4	.235	
DG-S0310	115.5	.180	5.%	109.7	.171	
DG-S0320	80.0	.125	5.%	76.0	.119	
DG-S0340	88.1	.138	0.%	88.1	.138	
DG-S0340	69.0	.108	2.%	67.6	.106	
DG-S0350	137.0	.214	0.%	137.0	.214	
	1277.2	1.996		1203.3	1.880	

100-yr 3_hr Precipitation: 3.60
ARF: .967
Reduced Precipitation: 3.483

Appendix 2b. TSMS(1) -- Initial TSMS Modeling Provided by City of Tucson

Appendix 2b
TSMS(1) -- INITIAL TSMS MODELING PROVIDED BY CITY OF TUCSON

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
*  RUN DATE  07/30/2006  TIME  13:23:19 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID   Appendix 2a
  2           ID   TSMS(1) -- INITIAL TSMS MODELING PROVIDED BY CITY OF TUCSON
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *DIAGRAM
              * Curve numbers for Basin DG are based on PB = 3.131 corresponding to POC_K
              * and are slightly inaccurate for other precipitation values.  CNs for Basin GR
              * are based on PB = 3.60.
              *
              * The models and the purpose of each that have been created for this project
              * are as follows:
              *
              * -- TSMS(1) --
              * TSMS(1)reflects the original TSMS modeling provided by the City of Tucson
              * consisting of the Navajo Wash portion of the Flowing Wells Wash watershed (DG)
              * through its confluence with Flowing Wells Wash (DG-N0350), and First Avenue
              * Wash watershed (GR) in its entirety.  Precipitation-adjusted curve numbers
              * (CNs) for DG are based on the areally-reduced basin precipitation (PB) of
              * 3.131 which corresponds to DG-N0350.  The total area of GR is under one square
              * mile and its CNs have not been adjusted.  For convenience, the two watersheds
              * have been combined into a single file.
              *
              * Under TSMS, precipitation for watersheds larger than one square mile is
              * adjusted using an areal reduction factor ARF = A ^ -(.027 + .07 Log A )
              * Basin areas available in the TSMS data exclude non-contributing areas and are
              * not used for determining ARF.  Actual areas have been taken from watershed
              * reports also provided by the City (CR2 files).
              *
              * For this project, basin precipitation PB is adjusted depending on the area
              * tributary to the point in question, but CNs are not.  CNs used to determine
              * discharges in DG are based on PB = 3.131, and those in GR on PB = 3.60 as
              * described above.  A study performed as part of this project found that the
              * error associated with this to be less than 1% along the major flow paths.
              *
              * Key points of concentration where discharges are needed for this project
              * are denoted POC_A through POC_K.  The corresponding nodes TSMS nodes,
              * locations, tributary areas, and associated ARFs and PBs are as follows:
              *
              *  Proj     TSMS    Trib
              *  Node     Node    Area    PB          Location
              *  -----  --------  -----  -----  -------------------------------------------
              *  POC_A  DG-N0280  0.274  3.600  First Avenue at Blacklidge (Cemetery Wash)
              *  POC_B  DG-N0230  0.107  3.600  First Avenue at Ft Lowell
              *  POC_D  DG-N0200  3.095  3.359  Navajo Wash at Fort Lowell
              *  POC_C  DG-N0210  3.150  3.353  Navajo Wash at First Avenue
              *  POC_I  DG-N0220  3.331  3.335  Navajo Wash at Stone Avenue
              *  POC_J  DG-N0260  4.068  3.265  Navajo Wash at Oracle Road
              *  POC_K  DG-N0350  5.718  3.131  Navajo Wash at Flowing Wells Wash confluence
              *  POC_E  DG-N0235  0.192  3.600  First Avenue at Prince Road
              *  POC_F  GR-N0010  0.125  3.600  First Avenue at Roger Road
              *  POC_G  GR-N0020  0.303  3.600  First Avenue at Limberlost Road
              *  POC_H  GR-N0030  0.508  3.600  First Avenue at Wetmore Road
              *
              *
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  3           IT       1                     300
  4           IO       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *

  5           KK   S0010
  6           KM        RUNOFF FROM SUBBASIN S0010
  7           IN       1
  8           PB   3.131
  9           PI  .05691  .06348  .07131  .08064  .09195  .10581  .12309  .14493  .17316  .19047
 10           PI  .15810  .13332  .11397  .09852  .08601  .07575  .06723  .06006  .05397  .05127
 11           PI  .04878  .04647  .04431  .04227  .04041  .03864  .03699  .03546  .03402  .03264
 12           PI  .03138  .03018  .02904  .02796  .02694  .02598  .02505  .02421  .02337  .02259
 13           PI  .02187  .02115  .02049  .01983  .01923  .01866  .01809  .01755  .01704  .01656
 14           PI  .01611  .01566  .01521  .01482  .01440  .01404  .01368  .01332  .01299  .01266
 15           PI  .01236  .01203  .01176  .01146  .01119  .01095  .01068  .01044  .01020  .00999
 16           PI  .00978  .00957  .00936  .00915  .00897  .00876  .00858  .00843  .00825  .00807
 17           PI  .00792  .00777  .00762  .00747  .00732  .00720  .00705  .00693  .00681  .00666
 18           PI  .00654  .00645  .00633  .00621  .00609  .00600  .00588  .00579  .00570  .00561
 19           PI  .00552  .00543  .00534  .00525  .00516  .00507  .00501  .00492  .00483  .00477
 20           PI  .00471  .00462  .00456  .00450  .00441  .00435  .00429  .00423  .00417  .00411
 21           PI  .00405  .00399  .00393  .00390  .00384  .00378  .00372  .00369  .00363  .00357
 22           PI  .00354  .00348  .00345  .00339  .00336  .00330  .00327  .00324  .00318  .00315
 23           PI  .00312  .00306  .00303  .00300  .00297  .00291  .00288  .00285  .00282  .00279
 24           PI  .00276  .00273  .00270  .00267  .00264  .00261  .00258  .00255  .00252  .00249
 25           PI  .00246  .00243  .00240  .00237  .00234  .00231  .00231  .00228  .00225  .00222
 26           PI  .00219  .00219  .00216  .00213  .00210  .00210  .00207  .00204  .00204  .00201
 27           BA   0.144
 28           LS       0      99                  89.99
 29           UK     100    .015      .1      66
 30           UK     100    .015      .2      34
 31           RK     400    .015     .02 0.00313    TRAP       0      50
 32           RK    1408   .0114     .02 0.07344    TRAP       0      50
 33           RK    2400   .0017     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 34           KK   R0010
 35           KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0010
 36           RS       1    FLOW      -1
 37           RC      .1    .016      .1    2660    .006
 38           RX       0      10      20      30      60      75      80     100
 39           RY    2418    2417    2416    2414    2414    2416    2416    2417
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 40           KK   S0020
 41           KM        RUNOFF FROM SUBBASIN S0020
 42           BA   0.096
 43           LS       0      99                  88.76
 44           UK     100    .015      .1      39
 45           UK     100    .015    .206      61
 46           RK     465    .015     .02 0.00781    TRAP       0      50
 47           RK     465    .015     .02 0.00781    TRAP       0      50
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  48          RK    2660    .006     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  49          KK   N0020
  50          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0020
  51          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  52          KK   R0020
  53          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0020
  54          RS       1    FLOW      -1
  55          RC      .1    .016      .1    2960   .0062
  56          RX       0       5      10      29      32      50      55      60
  57          RY    2402    2401    2400  2399.5  2399.5    2400    2401    2402
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  58          KK   S0030
  59          KM        RUNOFF FROM SUBBASIN S0030
  60          BA   0.164
  61          LS       0      99                   91.18
  62          UK     100     .01      .1      62
  63          UK     100     .01      .2      38
  64          RK     425    .007     .02 0.00625    TRAP       0      50
  65          RK    1100    .012     .02 0.02344    TRAP       0      50
  66          RK    3250     .01     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  67          KK   R0030
  68          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0030
  69          RS       1    FLOW      -1
  70          RC      .1    .016      .1    1025   .0137
  71          RX       0      20      40      58      69      80      90     100
  72          RY    2400    2399    2398  2397.5  2397.5    2398    2399    2400
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  73          KK   S0040
  74          KM        RUNOFF FROM SUBBASIN S0040
  75          BA   0.105
  76          LS       0      99                   92.28
  77          UK     100     .01      .1      37
  78          UK     100     .01      .2      63
  79          RK     500    .022     .02 0.00313    TRAP       0      50
  80          RK     950   .0084     .02 0.02031    TRAP       0      50
  81          RK    3150    .013     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  82          KK   R0040
  83          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0040
  84          RS       1    FLOW      -1
  85          RC      .1    .016      .1     790   .0076
  86          RX       0      90     180     245     290     365     440     540
  87          RY    2404    2402    2400    2398    2398    2400    2402    2404
              *
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+

  88          KK   N0050
  89          KM       COMBINE CHANNEL HYDROGRAPHS @ N0050
  90          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  91          KK   S0050
  92          KM        RUNOFF FROM SUBBASIN S0050
  93          BA   0.063
  94          LS       0      99                    92.28
  95          UK      75    .015      .1      41
  96          UK      75    .015      .2      59
  97          RK     175    .011     .02 0.00156    TRAP       0      50
  98          RK     575   .0174     .02  0.0125    TRAP       0      50
  99          RK     790   .0063     .02            TRAP       0      50
              *
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+

 100          KK   N0050
 101          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0050
 102          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 103          KK   R0050
 104          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0050
 105          RS       1    FLOW      -1
 106          RC      .1    .016      .1     790   .0063
 107          RX       0     220     221     239     241     260     261     610
 108          RY    2396    2392  2391.4    2391    2391  2391.4    2392    2396
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 109          KK   N0060
 110          KM       COMBINE CHANNEL HYDROGRAPHS @ N0060
 111          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 112          KK   S0060
 113          KM        RUNOFF FROM SUBBASIN S0060
 114          BA   0.074
 115          LS       0      99                    90.19
 116          UK      50    .015      .1      41
 117          UK      50    .015      .2      59
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 118          RK     250    .024     .02 0.00156    TRAP       0      50
 119          RK    1000    .022     .02 0.01719    TRAP       0      50
 120          RK    2960   .0051     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 121          KK   N0060
 122          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0060
 123          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 124          KK   R0060
 125          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0060
 126          RS       1    FLOW      -1
 127          RC      .1    .016      .1    1225   .0057
 128          RX       0     210     220     235     245     260     270     300
 129          RY    2386    2384    2384  2383.5  2383.5    2384    2384    2386
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 130          KK   S0070
 131          KM        RUNOFF FROM SUBBASIN S0070
 132          BA   0.057
 133          LS       0      99                   87.53
 134          UK      50    .004      .1      45
 135          UK      50    .004    .313      55
 136          RK     200     .01     .02 0.00156    TRAP       0      50
 137          RK     650    .012     .02 0.03906    TRAP       0      50
 138          RK    1225   .0057     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 139          KK   N0070
 140          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0070
 141          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 142          KK   R0070
 143          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0070
 144          RS       1    FLOW      -1
 145          RC      .1    .016      .1     765   .0057
 146          RX       0     420     430     449     451     470     480     770
 147          RY    2384    2381    2380  2379.5  2379.5    2380    2381    2384
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 148          KK   S0080
 149          KM        RUNOFF FROM SUBBASIN S0080
 150          BA   0.034
 151          LS       0      99                   87.96
 152          UK      50    .007      .1      49
 153          UK      50    .007     .22      51
 154          RK     200     .01     .02 0.00781    TRAP       0      50
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 155          RK     765   .0078     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 156          KK   N0080
 157          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0080
 158          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 159          KK   R0080
 160          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0080
 161          RS       1    FLOW      -1
 162          RC      .1    .016      .1     765   .0083
 163          RX       0      10      20      39      41      60      70      80
 164          RY    2380    2378  2377.5    2377    2377  2377.5    2378    2380
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 165          KK   S0090
 166          KM        RUNOFF FROM SUBBASIN S0090
 167          BA   0.119
 168          LS       0      99                    86.07
 169          UK     100     .01      .1      55
 170          UK     100     .01      .2      45
 171          RK     900     .01     .02 0.03125    TRAP       0      50
 172          RK    3950   .0066     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 173          KK   N0090
 174          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0090
 175          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 176          KK   R0090
 177          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0090
 178          RS       1    FLOW      -1
 179          RC      .1    .016      .1       5   .0071
 180          RX       0       1     200     218     222     240     260     800
 181          RY    2372    2371    2370  2369.4  2369.4    2370    2371    2372
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 182          KK   S0100
 183          KM        RUNOFF FROM SUBBASIN S0100
 184          BA   0.289
 185          LS       0      99                    89.02
 186          UK     100     .01      .1      53
 187          UK     100     .01      .2      47
 188          RK     800     .01     .02 0.00625    TRAP       0      50
 189          RK    3700   .0073     .02 0.09375    TRAP       0      50
 190          RK    2600   .0127     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 191          KK   R0100
 192          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0100
 193          RS       1    FLOW      -1
 194          RC      .1    .016      .1    3960   .0056
 195          RX       0      10      20      39      41      60      70      80
 196          RY    2435    2434    2434  2433.5  2433.5    2434    2434    2436
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 197          KK   S0110
 198          KM        RUNOFF FROM SUBBASIN S0110
 199          BA   0.214
 200          LS       0      99                    88.03
 201          UK     100    .008      .1      46
 202          UK     100    .008    .197      54
 203          RK     575    .007     .02 0.00469    TRAP       0      50
 204          RK    1300     .01     .02 0.05625    TRAP       0      50
 205          RK    3960   .0056     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 206          KK   N0110
 207          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0110
 208          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 209          KK   R0110
 210          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0110
 211          RS       1    FLOW      -1
 212          RC      .1    .016      .1    4190   .0067
 213          RX       0     500     520     539     541     560     570     940
 214          RY    2398    2396    2395  2394.5  2394.5    2395    2396    2398
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 215          KK   S0120
 216          KM        RUNOFF FROM SUBBASIN S0120
 217          BA    0.13
 218          LS       0      99                    88.52
 219          UK     100     .01      .1      51
 220          UK     100     .01      .2      49
 221          RK     500    .014     .02 0.00781    TRAP       0      50
 222          RK    2940   .0082     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 223          KK   R0120
 224          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0120
 225          RS       1    FLOW      -1
 226          RC      .1    .016      .1    4040   .0035
 227          RX       0      10      20      39      41      60      70      80
 228          RY    2412    2411    2411  2410.5  2410.5    2411    2411    2412
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 229          KK   S0130
 230          KM        RUNOFF FROM SUBBASIN S0130
 231          BA   0.157
 232          LS       0      99                    85.09
 233          UK     100    .004      .1      42
 234          UK     100    .004      .2      58
 235          RK    1200   .0033     .02 0.01719    TRAP       0      50
 236          RK    4040   .0035     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 237          KK   N0130
 238          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0130
 239          HC       2

 240          KK   R0130
 241          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0130
 242          RS       1    FLOW      -1
 243          RC      .1    .016      .1    2000   .0038
 244          RX       0      50      51      70      80      91      92     150
 245          RY    2391    2390    2388    2388    2388    2388    2390    2391
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 246          KK   S0140
 247          KM        RUNOFF FROM SUBBASIN S0140
 248          BA   0.176
 249          LS       0      99                    86.04
 250          UK     100    .003      .1      42
 251          UK     100    .003    .212      58
 252          RK    1300   .0046     .02 0.00938    TRAP       0      50
 253          RK    1500    .004     .02 0.07813    TRAP       0      50
 254          RK    2000   .0038     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 255          KK   N0140
 256          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0140
 257          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 258          KK   R0140
 259          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0140
 260          RS       1    FLOW      -1
 261          RC      .1    .016      .1    1320   .0045
 262          RX       0      50      51      70      80      91      92     150
 263          RY    2391    2390    2388    2388    2388    2388    2390    2391
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 264          KK   N0150
 265          KM       COMBINE CHANNEL HYDROGRAPHS @ N0150
 266          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 267          KK   S0150
 268          KM        RUNOFF FROM SUBBASIN S0150
 269          BA   0.118
 270          LS       0      99                    85.82
 271          UK     100    .005      .1      50
 272          UK     100    .005    .213      50
 273          RK     300     .01     .02 0.00313    TRAP       0      50
 274          RK     500    .004     .02 0.01563    TRAP       0      50
 275          RK    4190   .0067    .017            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 276          KK   N0150
 277          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0150
 278          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 279          KK   R0150
 280          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0150
 281          RS       1    FLOW      -1
 282          RC      .1    .016      .1    1430   .0021
 283          RX       0     180     205     230     250     260     290     660
 284          RY    2386    2385    2384  2383.8  2383.8    2384    2385    2386
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 285          KK   S0160
 286          KM        RUNOFF FROM SUBBASIN S0160
 287          BA   0.133
 288          LS       0      99                    85.82
 289          UK     100    .005      .1      39
 290          UK     100    .005    .206      61
 291          RK    1850   .0054     .02 0.03125    TRAP       0      50
 292          RK    5900   .0085     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 293          KK   S0170
 294          KM        RUNOFF FROM SUBBASIN S0170
 295          BA   0.165
 296          LS       0      99                    89.00
 297          UK     100     .01      .1      60
 298          UK     100     .01    .213      40
 299          RK     600    .013     .02 0.00938    TRAP       0      50
 300          RK    5540   .0072     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 301          KK   N0170
 302          KM       COMBINE SUBBASIN HYDROGRAPHS @ N0170
 303          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 304          KK   N0170
 305          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0170
 306          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 307          KK   R0170
 308          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0170
 309          RS       1    FLOW      -1
 310          RC      .1    .016      .1    2650    .005
 311          RX       0     330     331     350     370     371     899     900
 312          RY    2378    2376    2375    2375    2375    2376    2376    2378
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 313          KK   N0180
 314          KM       COMBINE CHANNEL HYDROGRAPHS @ N0180
 315          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 316          KK   S0180
 317          KM        RUNOFF FROM SUBBASIN S0180
 318          BA   0.044
 319          LS       0      99                    84.14
 320          UK     100    .004      .1      54
 321          UK     100    .004      .2      46
 322          RK     600   .0038     .02 0.00469    TRAP       0      50
 323          RK    2620   .0038     .02            TRAP       0      50

 324          KK   N0180
 325          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0180
 326          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 327          KK   R0180
 328          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0180
 329          RS       1    FLOW      -1
 330          RC      .1    .016      .1    1190    .005
 331          RX       0       1     200     201     240     241     250     650
 332          RY    2368    2366    2364  2363.5  2363.5    2364    2366    2368
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 333          KK   S0190
 334          KM        RUNOFF FROM SUBBASIN S0190
 335          BA   0.068
 336          LS       0      99                    87.00
 337          UK     150    .007      .1      44
 338          UK     150    .007      .2      56
 339          RK    1050    .006     .02 0.01094    TRAP       0      50
 340          RK    1400     .01     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 341          KK   R0190
 342          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0190
 343          RS       1    FLOW      -1
 344          RC      .1    .016      .1     415    .012
 345          RX       0     100     220     244     246     270     350     430
 346          RY    2366  2365.5    2365    2365    2365    2365  2365.5    2366
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 347          KK   N0200
 348          KM       COMBINE CHANNEL HYDROGRAPHS @ N0200
 349          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 350          KK   S0200
 351          KM        RUNOFF FROM SUBBASIN S0200
 352          BA   0.094
 353          LS       0      99                    87.24
 354          UK     100    .005      .1      57
 355          UK     100    .005    .195      43
 356          RK     200    .005     .02 0.00313    TRAP       0      50
 357          RK    3540   .0048     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 358          KK   POC_D *(Was N0200)
 359          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0200
 360          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 361          KK   R0200
 362          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0200
 363          RS       1    FLOW      -1
 364          RC      .1    .016      .1    2460   .0057
 365          RX       0     190     470     489     491     530    1000    1001
 366          RY    2358    2356    2354    2354    2354    2356    2356    2358
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 367          KK   S0210
 368          KM        RUNOFF FROM SUBBASIN S0210
 369          BA   0.043
 370          LS       0      99                    85.37
 371          UK     100    .007      .1      57
 372          UK     100    .007    .192      43
 373          RK     250     .01     .02 0.00313    TRAP       0      50
 374          RK    2400   .0054     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 375          KK   POC_C *(Was N0210)
 376          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0210
 377          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 378          KK   R0210
 379          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0210
 380          RS       1    FLOW      -1
 381          RC      .1    .016      .1    3305   .0054
 382          RX       0       1     250     251     290     310     850     851
 383          RY    2339    2338    2336  2335.5  2335.5    2336    2338    2339
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 384          KK   S0220
 385          KM        RUNOFF FROM SUBBASIN S0220
 386          BA    0.17
 387          LS       0      99                    84.92
 388          UK     100    .004      .1      56
 389          UK     100    .004    .208      44
 390          RK     600    .003     .02 0.00469    TRAP       0      50
 391          RK    3400    .005     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 392          KK   POC_I *(Was N0220)
 393          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0220
 394          HC       2

 395          KK   R0220
 396          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0220
 397          RS       1    FLOW      -1
 398          RC      .1    .016      .1    1870   .0037
 399          RX       0       1     250     274     276     300     750     751
 400          RY  2334.5    2333    2332    2331    2331    2332    2333  2334.5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 401          KK   POC_B  *(Was S0230)
 402          KM        RUNOFF FROM SUBBASIN S0230
 403          BA   0.083
 404          LS       0      99                    85.54
 405          UK     100    .004      .1      49
 406          UK     100    .004      .2      51
 407          RK    1600    .006     .02  0.0125    TRAP       0      50
 408          RK    2600   .0054     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 409          KK   R0230
 410          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0230
 411          RS       1    FLOW      -1
 412          RC      .1    .016      .1    5820   .0046
 413          RX       0     100     101     127     153     180     200     450
 414          RY    2337    2336  2335.5    2335    2335  2335.5    2336    2337
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 415          KK   POC_E *(Was S0235)
 416          KM        RUNOFF FROM SUBBASIN S0235
 417          BA   0.144
 418          LS       0      99                    86.48
 419          UK     300    .004      .1      42
 420          UK     300    .004    .197      58
 421          RK    2367    .006     .02 0.06672    TRAP       0      50
 422          RK    1750    .003     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 423          KK   R0235
 424          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0235
 425          RS       1    FLOW      -1
 426          RC      .1    .016      .1    3340    .003
 427          RX     100     100     120     125     190     200     275     275
 428          RY    2436    2434    2432    2432    2432    2432    2432    2434
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 429          KK   S0236
 430          KM        RUNOFF FROM SUBBASIN S0236
 431          BA    0.07
 432          LS       0      99                    87.20
 433          UK     300    .004      .1      69
 434          UK     300    .004      .2      31
 435          RK    3400    .003     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 436          KK   N0236
 437          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0236
 438          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 439          KK   R0236
 440          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0236
 441          RS       1    FLOW      -1
 442          RC      .1    .015      .1    2670   .0026
 443          RX     100     200     280     285     350     350     400     550
 444          RY    2318    2317    2317  2316.2  2316.2  2316.7    2318    2318
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 445          KK   S0240
 446          KM        RUNOFF FROM SUBBASIN S0240
 447          BA   0.139
 448          LS       0      99                    84.93
 449          UK     100    .003      .1      67
 450          UK     100    .003    .231      33
 451          RK     560    .004     .02 0.00469    TRAP       0      50
 452          RK    4700    .003     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 453          KK   N0240
 454          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0240
 455          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 456          KK   R0240
 457          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0240
 458          RS       1    FLOW      -1
 459          RC      .1    .016      .1    1120    .002
 460          RX       0      25      50      69      71      90     140     141
 461          RY    2331    2330    2330  2328.5  2328.5    2330    2330    2331
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 462          KK   N0260
 463          KM       COMBINE CHANNEL HYDROGRAPHS @ N0260
 464          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 465          KK   S0250
 466          KM        RUNOFF FROM SUBBASIN S0250
 467          BA    0.11
 468          LS       0      99                    87.14
 469          UK     150    .003      .1      74
 470          UK     150    .003      .2      26
 471          RK     500    .006    .013 0.00625    TRAP       0      50
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 472          RK    3360    .004     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 473          KK   S0260
 474          KM        RUNOFF FROM SUBBASIN S0260
 475          BA   0.085
 476          LS       0      99                   88.51
 477          UK     100    .003      .1      68
 478          UK     100    .003    .261      32
 479          RK     720    .006     .02 0.00625    TRAP       0      50
 480          RK    1870   .0037     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 481          KK   N0260
 482          KM       COMBINE SUBBASIN HYDROGRAPHS @ N0260
 483          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 484          KK   POC_J
 485          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0260
 486          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 487          KK   R0260
 488          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0260
 489          RS       1    FLOW      -1
 490          RC      .1     .03      .1    3350   .0099
 491          RX       0     580     600     623     627     650     840     850
 492          RY    2321    2320    2320    2310    2310    2320    2320    2321
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 493          KK   S0270
 494          KM        RUNOFF FROM SUBBASIN S0270
 495          BA   0.078
 496          LS       0      99                   92.07
 497          UK      50    .018      .1      40
 498          UK      50    .018    .206      60
 499          RK     550    .011     .02 0.00313    TRAP       0      50
 500          RK     550    .012     .02 0.02344    TRAP       0      50
 501          RK    3860    .011     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 502          KK   R0270
 503          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0270
 504          RS       1    FLOW      -1
 505          RC      .1    .016      .1    2510    .008
 506          RX       0      95     200     219     221     240     450     620
 507          RY    2362    2361  2360.8    2360    2360  2360.8  2360.8    2362
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 508          KK   S0280
 509          KM        RUNOFF FROM SUBBASIN S0280
 510          BA   0.133
 511          LS       0      99                    88.68
 512          UK      50     .01      .1      53
 513          UK      50     .01      .2      47
 514          RK     950     .01     .02 0.00313    TRAP       0      50
 515          RK    1700     .01     .02 0.03906    TRAP       0      50
 516          RK    2700   .0074     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 517          KK   POC_A *(Was N0280)
 518          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0280
 519          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 520          KK   R0280
 521          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0280
 522          RS       1    FLOW      -1
 523          RC      .1    .016      .1     920   .0054
 524          RX       0     310     350     369     371     390     999    1000
 525          RY    2352    2350  2348.8  2347.5  2347.5  2348.8  2348.8    2352
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 526          KK   S0290
 527          KM        RUNOFF FROM SUBBASIN S0290
 528          BA   0.325
 529          LS       0      99                    90.44
 530          UK     150    .008      .1      55
 531          UK     150    .008    .207      45
 532          RK     300     .01     .02 0.00156    TRAP       0      50
 533          RK     600    .006     .02 0.04688    TRAP       0      50
 534          RK    5300    .009     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 535          KK   N0290
 536          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0290
 537          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 538          KK   R0290
 539          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0290
 540          RS       1    FLOW      -1
 541          RC      .1    .016      .1    2010   .0065
 542          RX       0     300     350     379     381     410    1040    1041
 543          RY    2345    2344  2343.5    2342    2342  2343.4  2343.4    2345
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

544           KK   S0300
545           KM        RUNOFF FROM SUBBASIN S0300
546           BA   0.236
547           LS       0      99                    89.50
548           UK     150    .005      .1      49
549           UK     150    .005      .2      51
550           RK     600    .013     .02 0.00469    TRAP       0      50
551           RK     580     .01     .02 0.02813    TRAP       0      50
552           RK    5960    .009     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

553           KK   N0300
554           KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0300
555           HC       2

556           KK   R0300
557           KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0300
558           RS       1    FLOW      -1
559           RC      .1    .025      .1    2075   .0043
560           RX       0       1     350     375     385     410     690     700
561           RY    2332    2330    2330    2326    2326    2330    2330    2332
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

562           KK   S0310
563           KM        RUNOFF FROM SUBBASIN S0310
564           BA   0.171
565           LS       0      99                    87.03
566           UK     100     .01      .1      62
567           UK     100     .01    .194      38
568           RK     200     .01     .02 0.00156    TRAP       0      50
569           RK    1150    .012     .02 0.03125    TRAP       0      50
570           RK    5500   .0085     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

571           KK   N0310
572           KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0310
573           HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

574           KK   R0310
575           KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0310
576           RS       1    FLOW      -1
577           RC      .1    .025      .1    2480    .006
578           RX       0     800     850     870     880     900     950    1500
579           RY    2329    2324    2324    2318    2318    2324    2324    2325
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 580          KK   S0320
 581          KM        RUNOFF FROM SUBBASIN S0320
 582          BA   0.119
 583          LS       0      99                    90.07
 584          UK     150     .01      .1      53
 585          UK     150     .01    .196      47
 586          RK     550    .009     .02 0.00625    TRAP       0      50
 587          RK    1450    .015     .02 0.04219    TRAP       0      50
 588          RK    1800    .008     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 589          KK   R0320
 590          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0320
 591          RS       1    FLOW      -1
 592          RC      .1    .025      .1    3240   .0105
 593          RX       0      40      50      70      80     100     150     300
 594          RY    2319    2318    2316    2311    2311    2318    2318    2319
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 595          KK   N0340
 596          KM       COMBINE CHANNEL HYDROGRAPHS @ N0340
 597          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 598          KK   S0330
 599          KM        RUNOFF FROM SUBBASIN S0330
 600          BA   0.138
 601          LS       0      99                    87.11
 602          UK     350    .004      .1      15
 603          UK     350    .004    .357      85
 604          RK     800   .0075     .02 0.03125    TRAP       0      50
 605          RK    2500    .006     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 606          KK   S0340
 607          KM        RUNOFF FROM SUBBASIN S0340
 608          BA   0.106
 609          LS       0      99                    91.40
 610          UK     150     .01      .1      47
 611          UK     150     .01    .203      53
 612          RK     700    .022     .02 0.01563    TRAP       0      50
 613          RK    3240   .0105     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 614          KK   N0340
 615          KM       COMBINE SUBBASIN HYDROGRAPHS @ N0340
 616          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 617          KK   N0340
 618          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0340
 619          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 620          KK   R0340
 621          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0340
 622          RS       1    FLOW      -1
 623          RC      .1    .025      .1     400      .02
 624          RX       0      25      50      70       80     100     125     150
 625          RY    2316    2315    2315    2305     2305    2315    2315    2316
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 626          KK   N0350
 627          KM       COMBINE CHANNEL HYDROGRAPHS @ N0350
 628          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 629          KK   S0350
 630          KM        RUNOFF FROM SUBBASIN S0350
 631          BA   0.213
 632          LS       0      99                     86.12
 633          UK     350    .003      .1      18
 634          UK     350    .003    .318      82
 635          RK     800    .005     .02 0.01563    TRAP       0      50
 636          RK    1700    .003     .02 0.07813    TRAP       0      50
 637          RK    3550   .0099     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 638          KK   POC_K *(Was N0350)
 639          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0350
 640          HC       2
              *
              *  End of DG
              *
              *
              *
              *
              *
              *
              *
              *
              *
              *  ==================================================================
              *                                BEGIN GR
```

* *

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 641          KK   POC_F *(Was S0010)
 642          KM        RUNOFF FROM SUBBASIN S0010
 643          PB    3.60
 644          BA   0.096
 645          LS       0      99                     85.25
 646          UK     200     .02      .1      48
 647          UK     200     .02      .2      52
 648          RK    1867    .006     .02 0.04183    TRAP       0      50
 649          RK    2400    .005     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 650          KK   R0010
 651          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0010
 652          RS       1    FLOW      -1
 653          RC     .06    .016     .06    1300    .002
 654          RX     100     100     130     140     210     240     275     275
 655          RY    2330  2328.5    2328    2326    2326    2327    2328    2330
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 656          KK   S0020
 657          KM        RUNOFF FROM SUBBASIN S0020
 658          BA   0.137
 659          LS       0      99                     86.09
 660          UK     200     .02      .1      46
 661          UK     200     .02      .2      54
 662          RK    3800    .007     .02  0.1773    TRAP       0      50
 663          RK    4800   .0075     .05            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 664          KK   POC_G *(was N0020)
 665          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0020
 666          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 667          KK   R0020
 668          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0020
 669          RS       1    FLOW      -1
 670          RC     .06    .016     .06    1157   .0026
 671          RX     100     118     129     135     200     210     222     240
 672          RY    2326    2326    2325    2325    2325    2325    2325    2327
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 673          KK   R0025
 674          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0025
 675          RS       1    FLOW      -1
 676          RC     .06    .015     .06     843    .003
 677          RX     100     100     130     130     146     146     200     200
 678          RY    2319  2317.5  2317.5  2309.5  2309.5  2317.5  2317.5    2319
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 679          KK   S0030
 680          KM        RUNOFF FROM SUBBASIN S0030
 681          BA   0.172
 682          LS       0      99                    86.14
 683          UK     100     .01      .1      45
 684          UK     100     .01    .192      55
 685          RK    2150    .004    .035 0.01542    TRAP       0      50
 686          RK    2150    .003     .05 0.20517    TRAP       0      50
 687          RK    2000    .002     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 688          KK   POC_H *(was N0030)
 689          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0030
 690          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
 691          ZZ
1
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.       (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   5       S0010
               V
               V
  34       R0010
               .
               .
  40           .       S0020
               .           .
               .           .
  49       N0020............
               V
               V
  52       R0020
               .
               .
  58           .       S0030
               .           V
               .           V
  67           .       R0030
               .           .
               .           .
  73           .           .       S0040
               .           .           V
               .           .           V
  82           .           .       R0040
               .           .           .
               .           .           .
  88           .       N0050............
               .           .
               .           .
  91           .           .       S0050
               .           .           .
               .           .           .
 100           .       N0050............
               .           V
               .           V
 103           .       R0050
               .           .
               .           .
 109       N0060............
               .
               .
 112           .       S0060
               .           .
               .           .
 121       N0060............
               V
               V
 124       R0060
               .
               .
 130           .       S0070
               .           .
               .           .
 139       N0070............
```

```
                V
                V
142         R0070
                .
                .
148             .       S0080
                .           .
                .           .
156         N0080............
                V
                V
159         R0080
                .
                .
165             .       S0090
                .           .
                .           .
173         N0090............
                V
                V
176         R0090
                .
                .
182             .       S0100
                .           V
                .           V
191             .       R0100
                .           .
                .           .
197             .           .       S0110
                .           .           .
                .           .           .
206             .       N0110............
                .           V
                .           V
209             .       R0110
                .           .
                .           .
215             .           .       S0120
                .           .           V
                .           .           V
223             .           .       R0120
                .           .           .
                .           .           .
229             .           .           .       S0130
                .           .           .           .
                .           .           .           .
237             .           .       N0130............
                .           .           V
                .           .           V
240             .           .       R0130
                .           .           .
                .           .           .
246             .           .           .       S0140
                .           .           .           .
                .           .           .           .
255             .           .       N0140............
                .           .           V
                .           .           V
258             .           .       R0140
                .           .           .
```

```
                .           .           .
264             .       N0150............
                .           .
                .           .
267             .           .       S0150
                .           .           .
                .           .           .
276             .       N0150............
                .           V
                .           V
279             .       R0150
                .           .
                .           .
285             .           .       S0160
                .           .           .
                .           .           .
293             .           .           .       S0170
                .           .           .           .
                .           .           .           .
301             .           .       N0170............
                .           .           .
                .           .           .
304             .       N0170............
                .           V
                .           V
307             .       R0170
                .           .
                .           .
313         N0180............
                .
                .
316             .       S0180
                .           .
                .           .
324         N0180............
                V
                V
327         R0180
                .
                .
333             .       S0190
                .           V
                .           V
341             .       R0190
                .           .
                .           .
347         N0200............
                .
                .
350             .       S0200
                .           .
                .           .
358         POC_D............
                V
                V
361         R0200
                .
                .
367             .       S0210
                .           .
                .           .
```

```
375     POC_C............
            V
            V
378     R0210
            .
            .
384         .       S0220
            .           .
            .           .
392     POC_I............
            V
            V
395     R0220
            .
            .
401         .       POC_B
            .           V
            .           V
409         .       R0230
            .           .
            .           .
415         .           .       POC_E
            .           .           V
            .           .           V
423         .           .       R0235
            .           .           .
            .           .           .
429         .           .           .       S0236
            .           .           .           .
            .           .           .           .
436         .           .       N0236............
            .           .           V
            .           .           V
439         .           .       R0236
            .           .           .
            .           .           .
445         .           .           .       S0240
            .           .           .           .
            .           .           .           .
453         .           .       N0240............
            .           .           V
            .           .           V
456         .           .       R0240
            .           .           .
            .           .           .
462     N0260........................
            .
            .
465         .       S0250
            .           .
            .           .
473         .           .       S0260
            .           .           .
            .           .           .
481         .       N0260............
            .           .
            .           .
484     POC_J............
            V
            V
487     R0260
```

```
                .
                .
493             .       S0270
                .           V
                .           V
502             .       R0270
                .           .
                .           .
508             .           .       S0280
                .           .           .
                .           .           .
517             .       POC_A............
                .           V
                .           V
520             .       R0280
                .           .
                .           .
526             .           .       S0290
                .           .           .
                .           .           .
535             .       N0290............
                .           V
                .           V
538             .       R0290
                .           .
                .           .
544             .           .       S0300
                .           .           .
                .           .           .
553             .       N0300............
                .           V
                .           V
556             .       R0300
                .           .
                .           .
562             .           .       S0310
                .           .           .
                .           .           .
571             .       N0310............
                .           V
                .           V
574             .       R0310
                .           .
                .           .
580             .           .       S0320
                .           .           V
                .           .           V
589             .           .       R0320
                .           .           .
                .           .           .
595             .       N0340............
                .           .
                .           .
598             .           .       S0330
                .           .           .
                .           .           .
606             .           .           .       S0340
                .           .           .           .
                .           .           .           .
614             .           .       N0340............
                .           .           .
```

```
                .          .          .
 617            .       N0340............
                .           V
                .           V
 620            .       R0340
                .           .
                .           .
 626        N0350............
                .
                .
 629            .       S0350
                .           .
                .           .
 638        POC_K............
                .
                .
 641            .       POC_F
                .           V
                .           V
 650            .       R0010
                .           .
                .           .
 656            .           .       S0020
                .           .           .
                .           .           .
 664            .       POC_G............
                .           V
                .           V
 667            .       R0020
                .           V
                .           V
 673            .       R0025
                .           .
                .           .
 679            .           .       S0030
                .           .           .
                .           .           .
 688            .       POC_H............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
*  RUN DATE  06/09/2006  TIME  07:49:00 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

Appendix B
TSMS(1) -- INITIAL TSMS DATA PROVIDED BY CITY OF TUCSON

```
  4 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN          1  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1    0  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      1    0  ENDING DATE
                     NDTIME       0459  ENDING TIME
                     ICENT         19  CENTURY MARK

                 COMPUTATION INTERVAL     .02 HOURS
                      TOTAL TIME BASE    4.98 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT

       *** FDKRUT - NEWTON RAPHSON FAILEDFIXED POINT ITERATION USED - ITERATION=  1


WARNING --- ROUTED OUTFLOW (   1014.) IS GREATER THAN MAXIMUM OUTFLOW (   1002.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   1037.) IS GREATER THAN MAXIMUM OUTFLOW (   1002.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   1058.) IS GREATER THAN MAXIMUM OUTFLOW (   1002.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   1077.) IS GREATER THAN MAXIMUM OUTFLOW (   1002.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   1094.) IS GREATER THAN MAXIMUM OUTFLOW (   1002.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   1108.) IS GREATER THAN MAXIMUM OUTFLOW (   1002.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   1120.) IS GREATER THAN MAXIMUM OUTFLOW (   1002.) IN STORAGE-OUTFLOW TABLE
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	S0010	388.	.43	50.	50.	50.	.14		
ROUTED TO	R0010	323.	.50	50.	50.	50.	.14	2415.19	.50
HYDROGRAPH AT	S0020	223.	.38	30.	30.	30.	.10		
2 COMBINED AT	N0020	503.	.47	80.	80.	80.	.24		
ROUTED TO	R0020	447.	.57	79.	79.	79.	.24	2401.01	.57
HYDROGRAPH AT	S0030	480.	.37	57.	57.	57.	.16		
ROUTED TO	R0030	464.	.40	57.	57.	57.	.16	2398.71	.40
HYDROGRAPH AT	S0040	273.	.40	35.	35.	35.	.10		
ROUTED TO	R0040	259.	.43	35.	35.	35.	.10	2398.69	.43
2 COMBINED AT	N0050	713.	.42	92.	92.	92.	.27		
HYDROGRAPH AT	S0050	213.	.28	21.	21.	21.	.06		
2 COMBINED AT	N0050	833.	.42	113.	113.	113.	.33		
ROUTED TO	R0050	780.	.45	113.	113.	113.	.33	2392.93	.45
2 COMBINED AT	N0060	1166.	.50	192.	192.	192.	.57		
HYDROGRAPH AT	S0060	186.	.40	24.	24.	24.	.07		
2 COMBINED AT	N0060	1313.	.48	216.	216.	216.	.65		

+	ROUTED TO	R0060	1177.	.58	216.	216.	216.	.65	2385.75	.58
+										
+	HYDROGRAPH AT	S0070	134.	.30	18.	18.	18.	.06		
+	2 COMBINED AT	N0070	1250.	.57	233.	233.	233.	.70		
+	ROUTED TO	R0070	1206.	.63	233.	233.	233.	.70	2381.99	.63
+										
+	HYDROGRAPH AT	S0080	101.	.23	11.	11.	11.	.03		
+	2 COMBINED AT	N0080	1239.	.63	244.	244.	244.	.74		
+	ROUTED TO	R0080	1236.	.65	244.	244.	244.	.74	2379.34	.65
+										
+	HYDROGRAPH AT	S0090	261.	.43	38.	38.	38.	.12		
+	2 COMBINED AT	N0090	1394.	.63	281.	281.	281.	.86		
+	ROUTED TO	R0090	1394.	.63	281.	281.	281.	.86	2371.65	.63
+										
+	HYDROGRAPH AT	S0100	650.	.48	94.	94.	94.	.29		
+	ROUTED TO	R0100	457.	.65	94.	94.	94.	.29	2435.03	.65
+										
+	HYDROGRAPH AT	S0110	443.	.48	67.	67.	67.	.21		
+	2 COMBINED AT	N0110	807.	.57	161.	161.	161.	.50		
+	ROUTED TO	R0110	637.	.78	160.	160.	160.	.50	2396.26	.78
+										
+	HYDROGRAPH AT	S0120	330.	.35	42.	42.	42.	.13		
+	ROUTED TO	R0120	174.	.58	42.	42.	42.	.13	2411.58	.58
+										
+	HYDROGRAPH AT	S0130	240.	.58	45.	45.	45.	.16		

+	2 COMBINED AT	N0130	414.	.58	87.	87.	87.	.29		
+	ROUTED TO	R0130	400.	.65	86.	86.	86.	.29	2389.39	.65
+	HYDROGRAPH AT	S0140	283.	.55	52.	52.	52.	.18		
+	2 COMBINED AT	N0140	661.	.62	138.	138.	138.	.46		
+	ROUTED TO	R0140	656.	.65	138.	138.	138.	.46	2389.78	.65
+	2 COMBINED AT	N0150	1264.	.68	298.	298.	298.	.97		
+	HYDROGRAPH AT	S0150	228.	.45	36.	36.	36.	.12		
+	2 COMBINED AT	N0150	1415.	.67	334.	334.	334.	1.08		
+	ROUTED TO	R0150	1156.	.95	333.	333.	333.	1.08	2386.15	.95
+	HYDROGRAPH AT	S0160	199.	.63	38.	38.	38.	.13		
+	HYDROGRAPH AT	S0170	372.	.47	55.	55.	55.	.17		
+	2 COMBINED AT	N0170	500.	.50	94.	94.	94.	.30		
+	2 COMBINED AT	N0170	1430.	.85	426.	426.	426.	1.38		
+	ROUTED TO	R0170	1166.	1.23	425.	425.	425.	1.38	2376.84	1.23
+	2 COMBINED AT	N0180	1982.	.75	706.	706.	706.	2.24		
+	HYDROGRAPH AT	S0180	82.	.48	13.	13.	13.	.04		
+	2 COMBINED AT	N0180	2032.	.73	720.	720.	720.	2.28		
+	ROUTED TO	R0180	1999.	.85	719.	719.	719.	2.28	2366.43	.85
+	HYDROGRAPH AT	S0190	134.	.37	21.	21.	21.	.07		

+	ROUTED TO	R0190	124.	.42	21.	21.	21.	.07	2365.39	.42
+										
+	2 COMBINED AT	N0200	2062.	.83	739.	739.	739.	2.35		
+	HYDROGRAPH AT	S0200	203.	.43	30.	30.	30.	.09		
+	2 COMBINED AT	POC_D	2152.	.80	770.	770.	770.	2.44		
+	ROUTED TO	R0200	1896.	1.20	765.	765.	765.	2.44	2356.48	1.18
+										
+	HYDROGRAPH AT	S0210	99.	.38	14.	14.	14.	.04		
+	2 COMBINED AT	POC_C	1916.	1.18	779.	779.	779.	2.49		
+	ROUTED TO	R0210	1731.	1.58	775.	775.	775.	2.49	2337.57	1.57
+										
+	HYDROGRAPH AT	S0220	342.	.45	53.	53.	53.	.17		
+	2 COMBINED AT	POC_I	1787.	1.55	828.	828.	828.	2.66		
+	ROUTED TO	R0220	1723.	1.80	825.	825.	825.	2.66	2333.59	1.78
+										
+	HYDROGRAPH AT	POC_B	151.	.48	25.	25.	25.	.08		
+	ROUTED TO	R0230	74.	.88	24.	24.	24.	.08	2335.48	.88
+										
+	HYDROGRAPH AT	POC_E	189.	.55	42.	42.	42.	.14		
+	ROUTED TO	R0235	110.	1.10	41.	41.	41.	.14	2432.42	1.10
+										
+	HYDROGRAPH AT	S0236	122.	.55	24.	24.	24.	.07		
+	2 COMBINED AT	N0236	173.	.85	64.	64.	64.	.21		
+	ROUTED TO	R0236	168.	1.03	63.	63.	63.	.21	2316.86	1.03
+										

+	HYDROGRAPH AT	S0240	253.	.60	46.	46.	46.	.14	
+	2 COMBINED AT	N0240	349.	.63	109.	109.	109.	.35	
+	ROUTED TO	R0240	323.	.80	108.	108.	108.	.35	2330.63 .80
+	3 COMBINED AT	N0260	1936.	1.72	957.	957.	957.	3.09	
+	HYDROGRAPH AT	S0250	249.	.47	38.	38.	38.	.11	
+	HYDROGRAPH AT	S0260	218.	.38	29.	29.	29.	.09	
+	2 COMBINED AT	N0260	435.	.43	67.	67.	67.	.19	
+	2 COMBINED AT	POC_J	1994.	1.70	1025.	1025.	1025.	3.29	
+	ROUTED TO	R0260	1990.	1.75	1020.	1020.	1020.	3.29	2317.60 1.75
+	HYDROGRAPH AT	S0270	213.	.40	26.	26.	26.	.08	
+	ROUTED TO	R0270	112.	.60	26.	26.	26.	.08	2360.88 .60
+	HYDROGRAPH AT	S0280	342.	.42	43.	43.	43.	.13	
+	2 COMBINED AT	POC_A	439.	.43	69.	69.	69.	.21	
+	ROUTED TO	R0280	307.	.63	69.	69.	69.	.21	2349.03 .63
+	HYDROGRAPH AT	S0290	737.	.45	109.	109.	109.	.32	
+	2 COMBINED AT	N0290	976.	.47	178.	178.	178.	.54	
+	ROUTED TO	R0290	647.	.78	178.	178.	178.	.54	2343.77 .78
+	HYDROGRAPH AT	S0300	445.	.53	76.	76.	76.	.24	
	2 COMBINED AT								

+		N0300	982.	.63	254.	254.	254.	.77		
+	ROUTED TO	R0300	916.	.82	254.	254.	254.	.77	2329.90	.82
+	HYDROGRAPH AT	S0310	383.	.48	57.	57.	57.	.17		
+	2 COMBINED AT	N0310	1151.	.58	310.	310.	310.	.94		
+	ROUTED TO	R0310	1118.	.72	310.	310.	310.	.94	2322.71	.72
+	HYDROGRAPH AT	S0320	298.	.37	40.	40.	40.	.12		
+	ROUTED TO	R0320	231.	.50	39.	39.	39.	.12	2312.88	.50
+	2 COMBINED AT	N0340	1294.	.67	349.	349.	349.	1.06		
+	HYDROGRAPH AT	S0330	86.	1.30	34.	34.	34.	.14		
+	HYDROGRAPH AT	S0340	255.	.38	35.	35.	35.	.11		
+	2 COMBINED AT	N0340	288.	.42	70.	70.	70.	.24		
+	2 COMBINED AT	N0340	1510.	.63	419.	419.	419.	1.31		
+	ROUTED TO	R0340	1510.	.65	419.	419.	419.	1.31	2309.60	.65
+	2 COMBINED AT	N0350	2689.	1.42	1439.	1439.	1439.	4.59		
+	HYDROGRAPH AT	S0350	126.	.77	51.	51.	51.	.21		
+	2 COMBINED AT	POC_K	2811.	1.43	1490.	1490.	1490.	4.81		
+	HYDROGRAPH AT	POC_F	227.	.43	34.	34.	34.	.10		
+	ROUTED TO	R0010	189.	.55	34.	34.	34.	.10	2326.73	.55
+	HYDROGRAPH AT	S0020	216.	.83	49.	49.	49.	.14		

	2 COMBINED AT								
+		POC_G	343.	.78	83.	83.	83.	.23	
	ROUTED TO								
+		R0020	340.	.82	82.	82.	82.	.23	2325.90 .82
+									
	ROUTED TO								
+		R0025	340.	.83	82.	82.	82.	.23	2312.03 .83
+									
	HYDROGRAPH AT								
+		S0030	293.	.82	61.	61.	61.	.17	
	2 COMBINED AT								
+		POC_H	632.	.82	143.	143.	143.	.41	

*** NORMAL END OF HEC-1 ***

Appendix 2c. Revised Navajo Wash Routing Sections

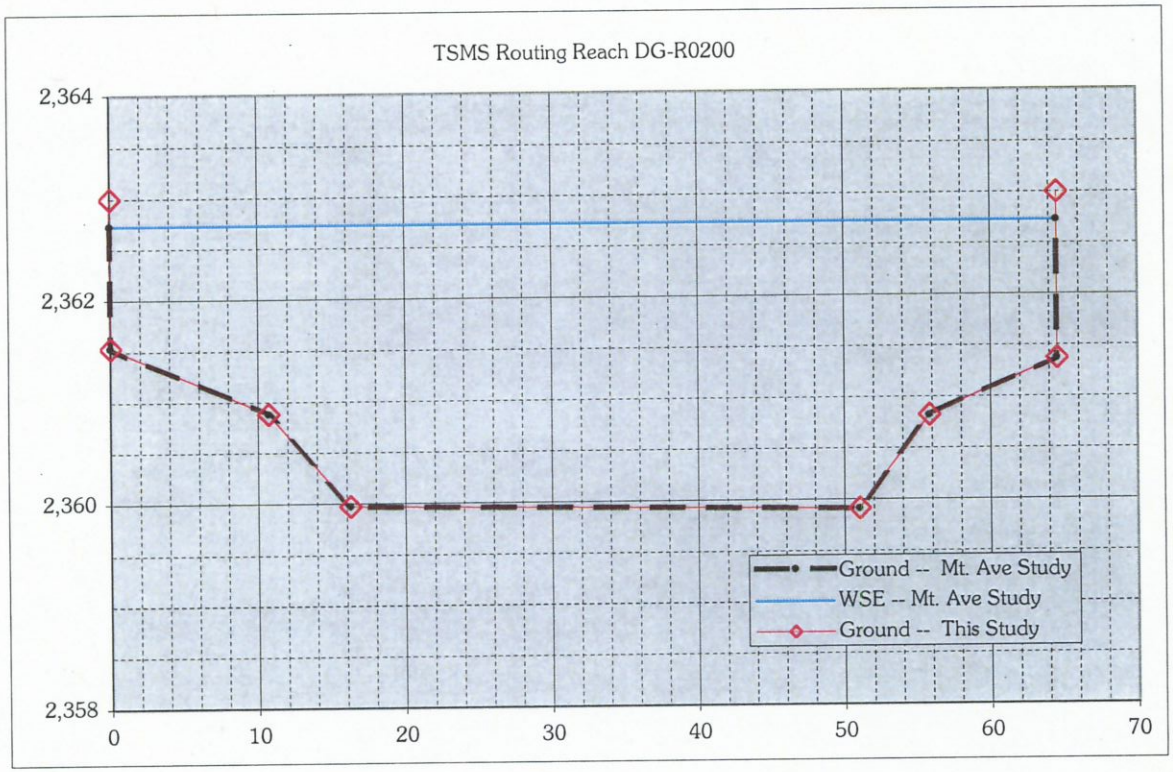
NAVAJO WASH ROUTING ELEMENT REFINEMENT
Navajo Wash, Oracle Road to Ft. Lowell Road -- Initial Study

TSMS Routing Reach DG-R0200
Mountain Avenue Study Section 145+26

Ground -- Mt. Ave Study x	y		Ground -- This Study x	y
0.00	2,362.73	1	0.00	2,363.00
0.00	2,361.53	2	0.00	2,361.53
10.71	2,360.88	3	10.71	2,360.88
16.27	2,359.97	4	16.27	2,359.97
51.01	2,359.91	5	51.01	2,359.91
55.78	2,360.82	6	55.78	2,360.82
64.50	2,361.37	7	64.50	2,361.37
64.50	2,362.73	8	64.50	2,363.00

WSE --
Mt. Ave Study

x	y
0.00	2,362.73
64.50	2,362.73



n_lt_ovrbnk:	.035	
n_chnl	.016	
n_rt_ovrbnk:	.035	
L:	2,600	From TSMS AutoCAD drainage map.
So:	.0050	From Mountain Avenue study base condition printout

```
-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
* Based on section 145+26 from Mountain Avenue study (DG-R0200)
RS      1    FLOW      -1
RC   .035    .016    .035    2600    .0050
RX      0       0      11      16       51      56      65      65
RY2363.0  2361.5  2360.9  2360.0  2359.9  2360.8  2361.4  2363.0
-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

NAVAJO WASH ROUTING ELEMENT REFINEMENT
Navajo Wash, Oracle Road to Ft. Lowell Road -- Initial Study

TSMS Routing Reach DG-R0210
Mountain Avenue Study Section 104+53

Ground --
Mt. Ave Study

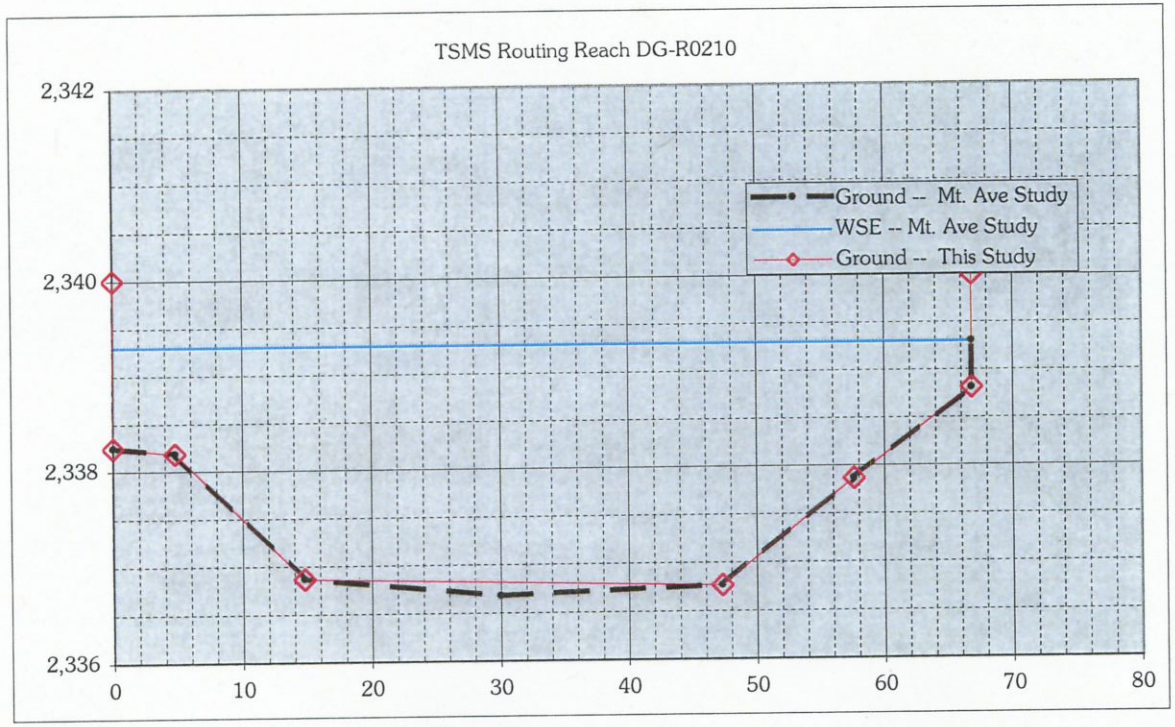
x	y
0.00	2,338.25
4.80	2,338.19
14.80	2,336.87
30.00	2,336.68
47.30	2,336.77
57.60	2,337.87
66.80	2,338.81
66.80	2,339.31

Ground --
This Study

	x	y
1	0.00	2,340.00
2	0.00	2,338.25
3	4.80	2,338.19
4	14.80	2,336.87
5	47.30	2,336.77
6	57.60	2,337.87
7	66.80	2,338.81
8	66.80	2,340.00

WSE --
Mt. Ave Study

x	y
0.00	2,339.31
66.80	2,339.31



n_lt_ovrbnk:	.035	
n_chnl	.016	
n_rt_ovrbnk:	.035	
L:	3,460	From TSMS AutoCAD drainage map.
So:	.0050	From Mountain Avenue study base condition printout

```
-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
* Based on section 104+53 from Mountain Avenue study (DG-R0210)
RS      1    FLOW      -1
RC   .035    .016    .035    3460   .0050
RX      0       0       5      15      47      58      67      67
RY2340.0  2338.3  2338.2  2336.9  2336.8  2337.9  2338.8  2340.0
-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

NAVAJO WASH ROUTING ELEMENT REFINEMENT
Navajo Wash, Oracle Road to Ft. Lowell Road -- Initial Study

TSMS Routing Reach DG-R0220
Mountain Avenue Study Section 89+99

Ground -- Mt. Ave Study

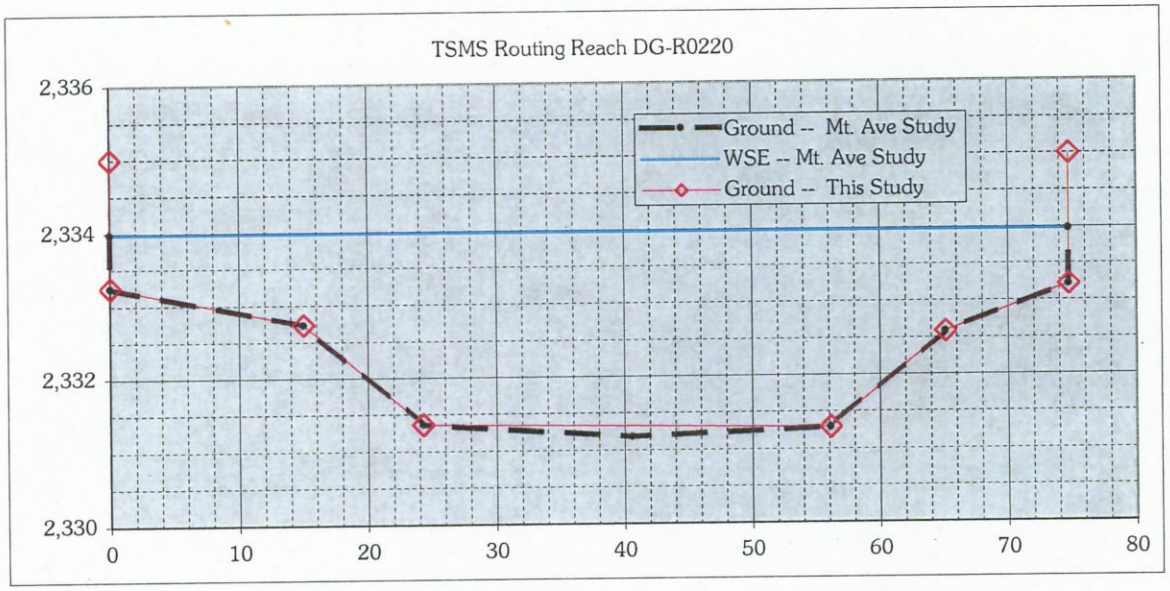
x	y
0.00	2,333.98
0.00	2,333.24
15.00	2,332.73
24.30	2,331.36
40.60	2,331.18
56.10	2,331.29
65.10	2,332.58
74.70	2,333.21
74.70	2,333.98

Ground -- This Study

	x	y
1	0.00	2,335.00
2	0.00	2,333.24
3	15.00	2,332.73
4	24.30	2,331.36
5	56.10	2,331.29
6	65.10	2,332.58
7	74.70	2,333.21
8	74.70	2,335.00

WSE -- Mt. Ave Study

x	y
0.00	2,333.98
74.70	2,333.98



n_lt_ovrbnk:	.035	
n_chnl	.016	
n_rt_ovrbnk:	.035	
L:	1,830	From TSMS AutoCAD drainage map.
So:	.0045	From Mountain Avenue study base condition printout

```
-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
* Based on section 89+99 from Mountain Avenue study (DG-R0220)
RS      1    FLOW      -1
RC   .035    .016    .035    1830   .0045
RX      0       0      15      24      56      65      75      75
RY2335.0  2333.2  2332.7  2331.4  2331.3  2332.6  2333.2  2335.0
-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

NAVAJO WASH ROUTING ELEMENT REFINEMENT
Navajo Wash, Oracle Road to Ft. Lowell Road -- Initial Study

TSMS Routing Reach DG-R0260
Mountain Avenue Study Section 61+24

Ground -- Mt. Ave Study

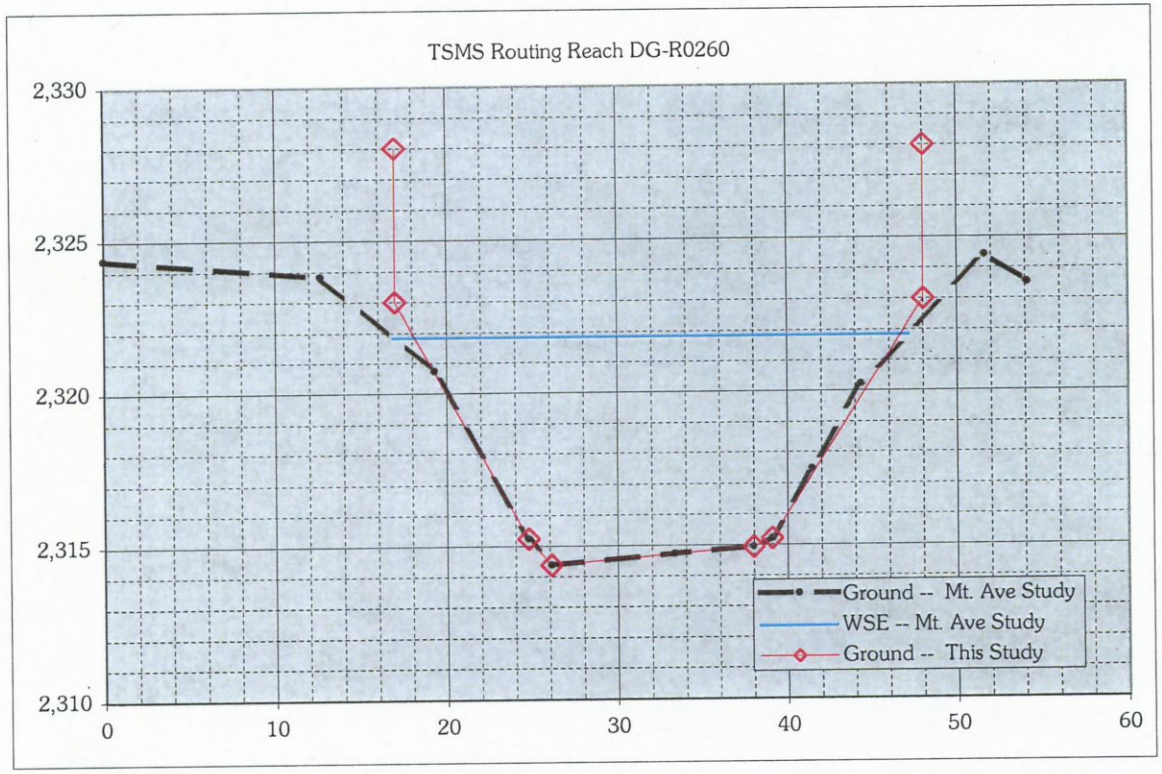
x	y
0.00	2,324.39
12.64	2,323.82
12.68	2,323.82
19.31	2,320.73
19.32	2,320.72
24.78	2,315.23
26.11	2,314.38
33.35	2,314.72
37.98	2,314.93
39.08	2,315.20
41.44	2,317.46
44.33	2,320.22
51.63	2,324.41
54.07	2,323.54
54.11	2,323.52
54.13	2,323.52

Ground -- This Study

	x	y
1	17.00	2,328.00
2	17.00	2,323.00
3	24.78	2,315.23
4	26.11	2,314.38
5	37.98	2,314.93
6	39.08	2,315.20
7	48.00	2,323.00
8	48.00	2,328.00

WSE -- Mt. Ave Study

x	y
16.89	2,321.86
47.18	2,321.86



n_lt_ovrbnk:	.050	
n_chnl	.030	
n_rt_ovrbnk:	.050	
L:	3,270	From TSMS AutoCAD drainage map.
So:	.0022	From Mountain Avenue study base condition printout

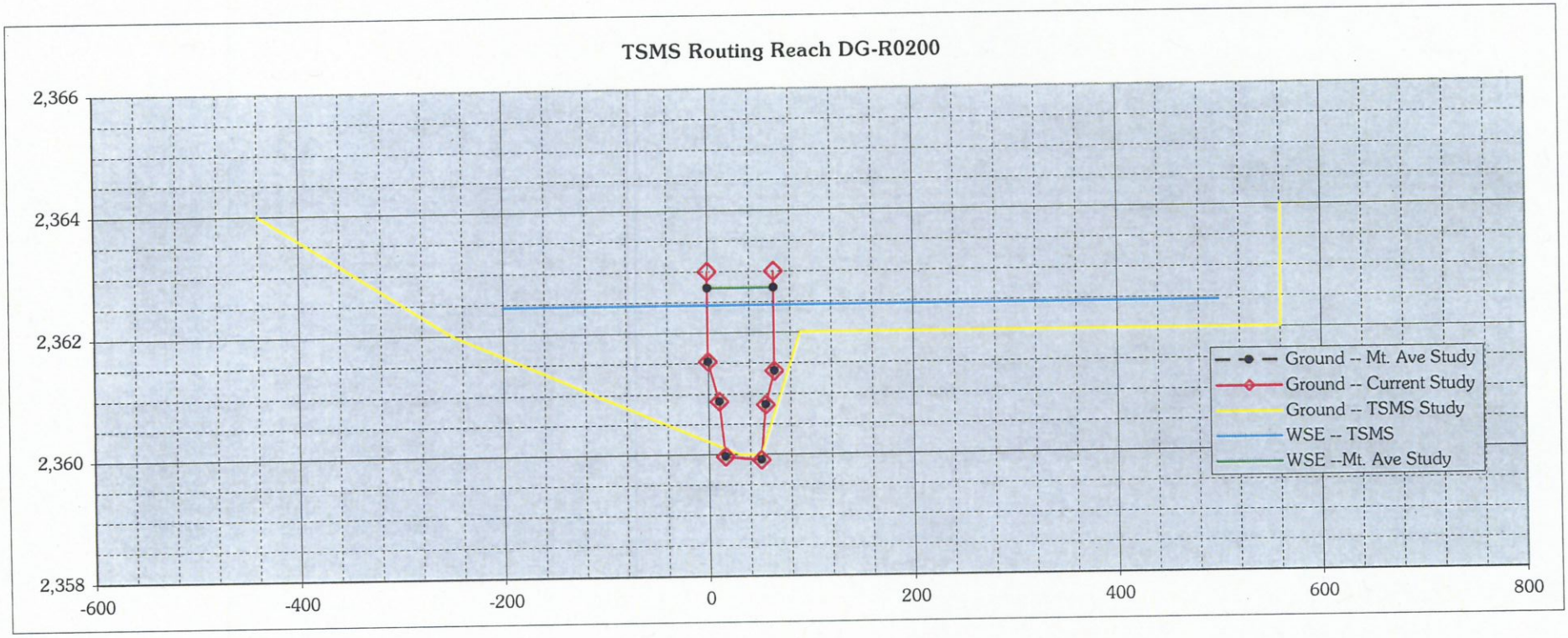
```
-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
* Based on section 61+24 from Mountain Avenue study (DG-R0260)
RS      1     FLOW      -1
RC   .050     .030     .050     3270    .0022
RX     17       17       25       26       38       39       48       48
RY2328.0  2323.0  2315.2  2314.4  2314.9  2315.2  2323.0  2328.0
-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

COMPARISON OF ROUTING SECTIONS

TSMS Routing Reach DG-R0200
Navajo between Ft. Lowell Road and First Avenue
Mountain Avenue Study Section 145+26

Ground -- Mt. Ave Study		Ground -- Current Study		Ground -- TSMS Study			
					Adj		Adj
x	y	x	y	x	-440	y	6.0
0	2,362.7	0	2,363.0	0	-440	2,358.0	2,364.0
0	2,361.5	0	2,361.5	190	-250	2,356.0	2,362.0
11	2,360.9	11	2,360.9	470	30	2,354.0	2,360.0
16	2,360.0	16	2,360.0	489	49	2,354.0	2,360.0
51	2,359.9	51	2,359.9	491	51	2,354.0	2,360.0
56	2,360.8	56	2,360.8	530	90	2,356.0	2,362.0
65	2,361.4	65	2,361.4	1,000	560	2,356.0	2,362.0
65	2,362.7	65	2,363.0	1,001	561	2,358.0	2,364.0

WSE -- TSMS			WSE --Mt. Ave Study	
-200	2,356.5	2,362.5	0.00	2,362.73
500	2,356.5	2,362.5	64.50	2,362.73



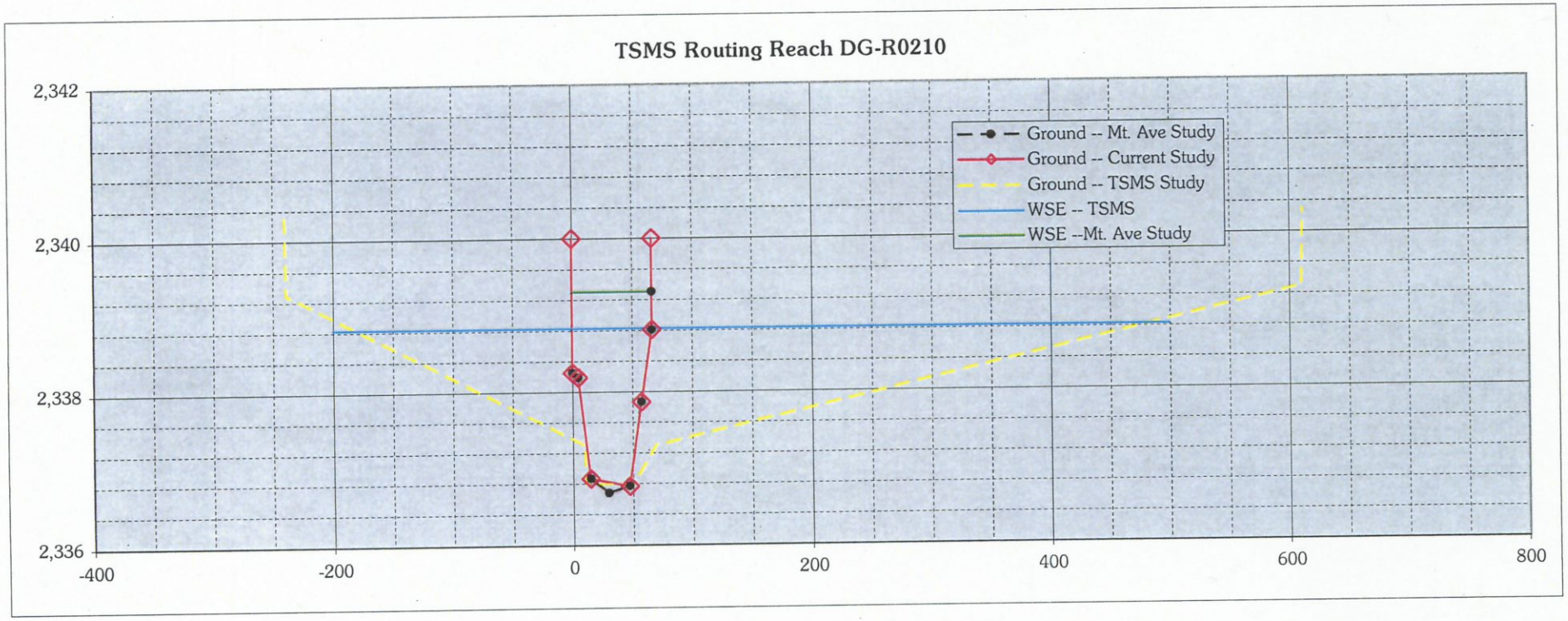
COMPARISON OF ROUTING SECTIONS

TSMS Routing Reach DG-R0210
Navajo between First Avenue and Stone Mountain Avenue Study Section 104+53

Ground -- Mt. Ave Study x	Ground -- Mt. Ave Study y	Ground -- Current Study x	Ground -- Current Study y
0	2,338.3	0	2,340.0
5	2,338.2	0	2,338.3
15	2,336.9	5	2,338.2
30	2,336.7	15	2,336.9
47	2,336.8	47	2,336.8
58	2,337.9	58	2,337.9
67	2,338.8	67	2,338.8
67	2,339.3	67	2,340.0

Ground -- TSMS Study	Adj -240		Adj 1.3
0	-240	2,339.0	2,340.3
1	-239	2,338.0	2,339.3
250	10	2,336.0	2,337.3
251	11	2,335.5	2,336.8
290	50	2,335.5	2,336.8
310	70	2,336.0	2,337.3
850	610	2,338.0	2,339.3
851	611	2,339.0	2,340.3

WSE -- TSMS			WSE --Mt. Ave Study	
-200	2,337.5	2,338.8	0.00	2,339.31
500	2,337.5	2,338.8	66.80	2,339.31

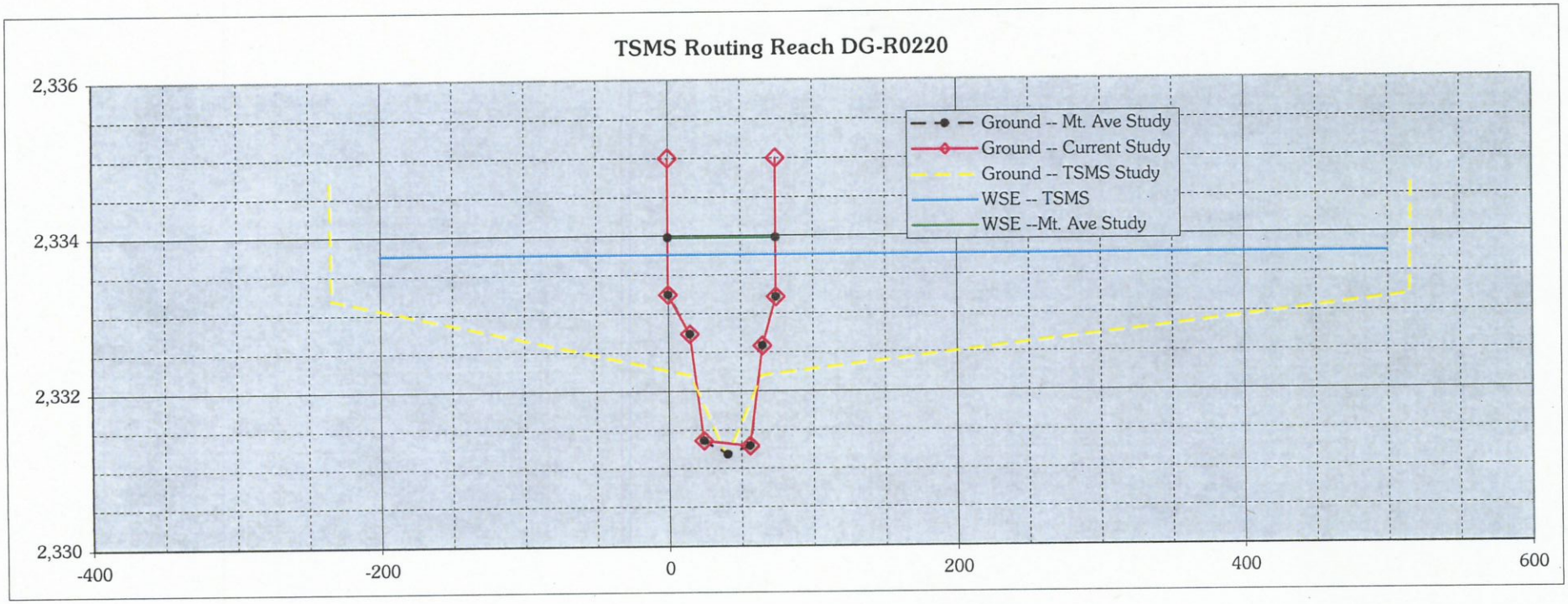


COMPARISON OF ROUTING SECTIONS

TSMS Routing Reach DG-R0220
Mountain Avenue Study Section 89+99

Ground -- Mt. Ave Study		Ground -- Current Study		Ground -- TSMS Study	Adj -235		Adj 0.2
x	y	x	y	x		y	
0	2,334.0	0	2,335.0	0	-235	2,334.5	2,334.7
0	2,333.2	0	2,333.2	1	-234	2,333.0	2,333.2
15	2,332.7	15	2,332.7	250	15	2,332.0	2,332.2
24	2,331.4	24	2,331.4	274	39	2,331.0	2,331.2
41	2,331.2	56	2,331.3	276	41	2,331.0	2,331.2
56	2,331.3	65	2,332.6	300	65	2,332.0	2,332.2
65	2,332.6	75	2,333.2	750	515	2,333.0	2,333.2
75	2,333.2	75	2,335.0	751	516	2,334.5	2,334.7
75	2,334.0						

WSE -- TSMS			WSE --Mt. Ave Study	
-200	2,333.6	2,333.8	0	2,334.0
500	2,333.6	2,333.8	75	2,334.0



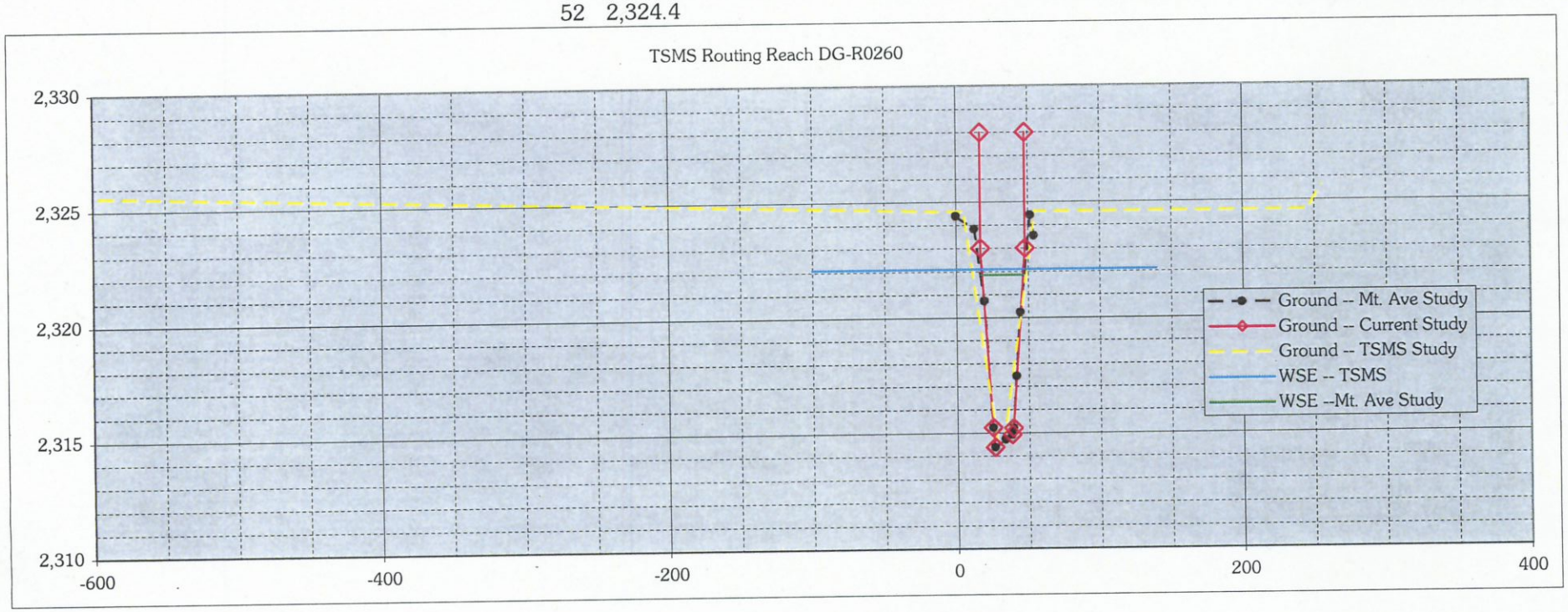
COMPARISON OF ROUTING SECTIONS

TSMS Routing Reach DG-R0260
Mountain Avenue Study Section 61+24

Ground -- Mt. Ave Study		Ground -- Current Study		Ground -- TSMS Study			
					Adj		Adj
x	y	x	y	x	-595	y	4.6
0	2,324.4	17	2,328.0	0	-595	2,321.0	2,325.6
13	2,323.8	17	2,323.0	580	-15	2,320.0	2,324.6
13	2,323.8	25	2,315.2	600	5	2,320.0	2,324.6
19	2,320.7	26	2,314.4	623	28	2,310.0	2,314.6
19	2,320.7	38	2,314.9	627	32	2,310.0	2,314.6
25	2,315.2	39	2,315.2	650	55	2,320.0	2,324.6
26	2,314.4	48	2,323.0	840	245	2,320.0	2,324.6
33	2,314.7	48	2,328.0	850	255	2,321.0	2,325.6
38	2,314.9						
39	2,315.2						
41	2,317.5						
44	2,320.2						
52	2,324.4						

WSE -- TSMS		
-100	2,317.5	2,322.1
140	2,317.5	2,322.1

WSE --Mt. Ave Study	
17	2,321.9
47	2,321.9



Appendix 2d -- Refined TSMS(2)
DG WITH STORM DRAIN DIVERSIONS, MODIFIED NAVAJO WASH ROUTING ELEMENTS AND DG-S0190 ELIMINATION APPLIED.

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*            SEPTEMBER 1990            *
*             VERSION 4.0              *
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*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID       Appendix D
  2           ID       Refined TSMS(2)
  3           ID       DG WITH STORM DRAIN DIVERSIONS, MODIFIED NAVAJO WASH ROUTING ELEMENTS
  4           ID       AND DG-S0190 ELIMINATION APPLIED.
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *DIAGRAM
              * Curve numbers for Basin DG are based on PB = 3.131 corresponding to POC_K
              * and are slightly inaccurate for other precipitation values.  CNs for Basin GR
              * are based on PB = 3.60.
              *
              * -- TSMS(2) --
              * TSMS(2) represents the TSMS(1) modeling refined for this project as follows:
              *
              * 1. The following diversions have been added to reflect storm drains carrying
              * flow out of the project area:
              *      Below DG-N0140, 216 cfs capacity of Tucson Blvd storm drain
              *      Below DG-N0170, 312 cfs capacity of Campbell Ave storm drain
              *      Below DG-N0180, 355 cfs capacity of Mountain Avenue storm drain
              * 2. The following routing elements have been revised based on field survey:
              *      DG-R0200, based on section 145+26
              *      DG-R0210, based on section 104+53
              *      DG-R0220, based on section  89+99
              *      DG-R0260, based on section  61+24
              * 3. Subbasin DG-N0190 will be cut off by Mountain Avenue construction and
              * has been eliminated.
              *
              *  Proj      TSMS     Trib
              *  Node      Node     Area    PB
              *  -----  --------  -----  -----
              *  POC_D  DG-N0200  3.017  3.367
              *  POC_C  DG-N0210  3.071  3.361
              *  POC_I  DG-N0220  3.253  3.343
              *  POC_J  DG-N0260  3.989  3.272
              *  POC_K  DG-N0350  5.639  3.137
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  5           IT       1                    300
  6           IO       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  7           KK   S0010
  8           KM        RUNOFF FROM SUBBASIN S0010
  9           IN       1
 10           PB   3.137
 11           PI  .05691  .06348  .07131  .08064  .09195  .10581  .12309  .14493  .17316  .19047
 12           PI  .15810  .13332  .11397  .09852  .08601  .07575  .06723  .06006  .05397  .05127
 13           PI  .04878  .04647  .04431  .04227  .04041  .03864  .03699  .03546  .03402  .03264
 14           PI  .03138  .03018  .02904  .02796  .02694  .02598  .02505  .02421  .02337  .02259
 15           PI  .02187  .02115  .02049  .01983  .01923  .01866  .01809  .01755  .01704  .01656
 16           PI  .01611  .01566  .01521  .01482  .01440  .01404  .01368  .01332  .01299  .01266
 17           PI  .01236  .01203  .01176  .01146  .01119  .01095  .01068  .01044  .01020  .00999
 18           PI  .00978  .00957  .00936  .00915  .00897  .00876  .00858  .00843  .00825  .00807
 19           PI  .00792  .00777  .00762  .00747  .00732  .00720  .00705  .00693  .00681  .00666
 20           PI  .00654  .00645  .00633  .00621  .00609  .00600  .00588  .00579  .00570  .00561
 21           PI  .00552  .00543  .00534  .00525  .00516  .00507  .00501  .00492  .00483  .00477
 22           PI  .00471  .00462  .00456  .00450  .00441  .00435  .00429  .00423  .00417  .00411
 23           PI  .00405  .00399  .00393  .00390  .00384  .00378  .00372  .00369  .00363  .00357
 24           PI  .00354  .00348  .00345  .00339  .00336  .00330  .00327  .00324  .00318  .00315
 25           PI  .00312  .00306  .00303  .00300  .00297  .00291  .00288  .00285  .00282  .00279
 26           PI  .00276  .00273  .00270  .00267  .00264  .00261  .00258  .00255  .00252  .00249
 27           PI  .00246  .00243  .00240  .00237  .00234  .00231  .00231  .00228  .00225  .00222
 28           PI  .00219  .00219  .00216  .00213  .00210  .00210  .00207  .00204  .00204  .00201
 29           BA   0.144
 30           LS       0      99                  89.99
 31           UK     100    .015      .1      66
 32           UK     100    .015      .2      34
 33           RK     400    .015     .02 0.00313    TRAP       0      50
 34           RK    1408   .0114     .02 0.07344    TRAP       0      50
 35           RK    2400   .0017     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 36           KK   R0010
 37           KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0010
 38           RS       1    FLOW      -1
 39           RC      .1    .016      .1    2660    .006
 40           RX       0      10      20      30      60      75      80     100
 41           RY    2418    2417    2416    2414    2414    2416    2416    2417
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 42           KK   S0020
 43           KM        RUNOFF FROM SUBBASIN S0020
 44           BA   0.096
 45           LS       0      99                  88.76
 46           UK     100    .015      .1      39
 47           UK     100    .015    .206      61
 48           RK     465    .015     .02 0.00781    TRAP       0      50
 49           RK     465    .015     .02 0.00781    TRAP       0      50
 50           RK    2660    .006     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  51          KK   N0020
  52          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0020
  53          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  54          KK   R0020
  55          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0020
  56          RS       1    FLOW      -1
  57          RC      .1    .016      .1    2960   .0062
  58          RX       0       5      10      29      32      50      55      60
  59          RY    2402    2401    2400  2399.5  2399.5    2400    2401    2402
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  60          KK   S0030
  61          KM        RUNOFF FROM SUBBASIN S0030
  62          BA   0.164
  63          LS       0      99                   91.18
  64          UK     100     .01      .1      62
  65          UK     100     .01      .2      38
  66          RK     425    .007     .02 0.00625    TRAP       0      50
  67          RK    1100    .012     .02 0.02344    TRAP       0      50
  68          RK    3250     .01     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  69          KK   R0030
  70          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0030
  71          RS       1    FLOW      -1
  72          RC      .1    .016      .1    1025   .0137
  73          RX       0      20      40      58      69      80      90     100
  74          RY    2400    2399    2398  2397.5  2397.5    2398    2399    2400
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  75          KK   S0040
  76          KM        RUNOFF FROM SUBBASIN S0040
  77          BA   0.105
  78          LS       0      99                   92.28
  79          UK     100     .01      .1      37
  80          UK     100     .01      .2      63
  81          RK     500    .022     .02 0.00313    TRAP       0      50
  82          RK     950   .0084     .02 0.02031    TRAP       0      50
  83          RK    3150    .013     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  84          KK   R0040
  85          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0040
  86          RS       1    FLOW      -1
  87          RC      .1    .016      .1     790   .0076
  88          RX       0      90     180     245     290     365     440     540
  89          RY    2404    2402    2400    2398    2398    2400    2402    2404
              *
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  90          KK   N0050
  91          KM       COMBINE CHANNEL HYDROGRAPHS @ N0050
  92          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  93          KK   S0050
  94          KM        RUNOFF FROM SUBBASIN S0050
  95          BA   0.063
  96          LS       0      99                    92.28
  97          UK      75    .015      .1      41
  98          UK      75    .015      .2      59
  99          RK     175    .011     .02 0.00156    TRAP       0      50
 100          RK     575   .0174     .02  0.0125    TRAP       0      50
 101          RK     790   .0063     .02            TRAP       0      50
              *
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+

 102          KK   N0050
 103          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0050
 104          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 105          KK   R0050
 106          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0050
 107          RS       1    FLOW      -1
 108          RC      .1    .016      .1     790   .0063
 109          RX       0     220     221     239     241     260     261     610
 110          RY    2396    2392  2391.4    2391    2391  2391.4    2392    2396
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 111          KK   N0060
 112          KM       COMBINE CHANNEL HYDROGRAPHS @ N0060
 113          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 114          KK   S0060
 115          KM        RUNOFF FROM SUBBASIN S0060
 116          BA   0.074
 117          LS       0      99                    90.19
 118          UK      50    .015      .1      41
 119          UK      50    .015      .2      59
 120          RK     250    .024     .02 0.00156    TRAP       0      50
 121          RK    1000    .022     .02 0.01719    TRAP       0      50
 122          RK    2960   .0051     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 123          KK   N0060
 124          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0060
 125          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 126          KK   R0060
 127          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0060
 128          RS       1    FLOW      -1
 129          RC      .1    .016      .1    1225   .0057
 130          RX       0     210     220     235     245     260     270     300
 131          RY    2386    2384    2384  2383.5  2383.5    2384    2384    2386
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 132          KK   S0070
 133          KM        RUNOFF FROM SUBBASIN S0070
 134          BA   0.057
 135          LS       0      99                    87.53
 136          UK      50    .004      .1      45
 137          UK      50    .004    .313      55
 138          RK     200     .01     .02 0.00156    TRAP       0      50
 139          RK     650    .012     .02 0.03906    TRAP       0      50
 140          RK    1225   .0057     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 141          KK   N0070
 142          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0070
 143          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 144          KK   R0070
 145          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0070
 146          RS       1    FLOW      -1
 147          RC      .1    .016      .1     765   .0057
 148          RX       0     420     430     449     451     470     480     770
 149          RY    2384    2381    2380  2379.5  2379.5    2380    2381    2384
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 150          KK   S0080
 151          KM        RUNOFF FROM SUBBASIN S0080
 152          BA   0.034
 153          LS       0      99                    87.96
 154          UK      50    .007      .1      49
 155          UK      50    .007     .22      51
 156          RK     200     .01     .02 0.00781    TRAP       0      50
 157          RK     765   .0078     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 158          KK   N0080
 159          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0080
 160          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 161          KK   R0080
 162          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0080
 163          RS       1    FLOW      -1
 164          RC      .1    .016      .1     765   .0083
 165          RX       0      10      20      39      41      60      70      80
 166          RY    2380    2378  2377.5    2377    2377  2377.5    2378    2380
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 167          KK   S0090
 168          KM        RUNOFF FROM SUBBASIN S0090
 169          BA   0.119
 170          LS       0      99                    86.07
 171          UK     100     .01      .1      55
 172          UK     100     .01      .2      45
 173          RK     900     .01     .02 0.03125    TRAP       0      50
 174          RK    3950   .0066     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 175          KK   N0090
 176          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0090
 177          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 178          KK   R0090
 179          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0090
 180          RS       1    FLOW      -1
 181          RC      .1    .016      .1       5   .0071
 182          RX       0       1     200     218     222     240     260     800
 183          RY    2372    2371    2370  2369.4  2369.4    2370    2371    2372
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 184          KK   S0100
 185          KM        RUNOFF FROM SUBBASIN S0100
 186          BA   0.289
 187          LS       0      99                    89.02
 188          UK     100     .01      .1      53
 189          UK     100     .01      .2      47
 190          RK     800     .01     .02 0.00625    TRAP       0      50
 191          RK    3700   .0073     .02 0.09375    TRAP       0      50
 192          RK    2600   .0127     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 193          KK   R0100
 194          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0100
 195          RS       1    FLOW      -1
 196          RC      .1    .016      .1    3960   .0056
 197          RX       0      10      20      39      41      60      70      80
 198          RY    2435    2434    2434  2433.5  2433.5    2434    2434    2436
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 199          KK   S0110
 200          KM        RUNOFF FROM SUBBASIN S0110
 201          BA   0.214
 202          LS       0      99                    88.03
 203          UK     100    .008      .1      46
 204          UK     100    .008    .197      54
 205          RK     575    .007     .02 0.00469    TRAP       0      50
 206          RK    1300     .01     .02 0.05625    TRAP       0      50
 207          RK    3960   .0056     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 208          KK   N0110
 209          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0110
 210          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 211          KK   R0110
 212          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0110
 213          RS       1    FLOW      -1
 214          RC      .1    .016      .1    4190   .0067
 215          RX       0     500     520     539     541     560     570     940
 216          RY    2398    2396    2395  2394.5  2394.5    2395    2396    2398
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 217          KK   S0120
 218          KM        RUNOFF FROM SUBBASIN S0120
 219          BA    0.13
 220          LS       0      99                    88.52
 221          UK     100     .01      .1      51
 222          UK     100     .01      .2      49
 223          RK     500    .014     .02 0.00781    TRAP       0      50
 224          RK    2940   .0082     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 225          KK   R0120
 226          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0120
 227          RS       1    FLOW      -1
 228          RC      .1    .016      .1    4040   .0035
 229          RX       0      10      20      39      41      60      70      80
 230          RY    2412    2411    2411  2410.5  2410.5    2411    2411    2412
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 231          KK   S0130
 232          KM        RUNOFF FROM SUBBASIN S0130
 233          BA   0.157
 234          LS       0      99                    85.09
 235          UK     100    .004      .1      42
 236          UK     100    .004      .2      58
 237          RK    1200   .0033     .02 0.01719    TRAP       0      50
 238          RK    4040   .0035     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 239          KK   N0130
 240          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0130
 241          HC       2

 242          KK   R0130
 243          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0130
 244          RS       1    FLOW      -1
 245          RC      .1    .016      .1    2000   .0038
 246          RX       0      50      51      70      80      91      92     150
 247          RY    2391    2390    2388    2388    2388    2388    2390    2391
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 248          KK   S0140
 249          KM        RUNOFF FROM SUBBASIN S0140
 250          BA   0.176
 251          LS       0      99                    86.04
 252          UK     100    .003      .1      42
 253          UK     100    .003    .212      58
 254          RK    1300   .0046     .02 0.00938    TRAP       0      50
 255          RK    1500    .004     .02 0.07813    TRAP       0      50
 256          RK    2000   .0038     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 257          KK   N0140
 258          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0140
 259          KM   Flow reaching Hedrick and Tucson Boulevard
 260          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 261          KK     sdx
 262          KM     Divert Qcap of 72" Tucson Blvd (n=.014 So-0.0030, Qcap=216)
 263          DT    SD_x
 264          DI       0   216.0    1000
 265          DQ       0   216.0   216.0
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 266          KK   R0140
 267          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0140
 268          RS       1    FLOW      -1
 269          RC      .1    .016      .1    1320   .0045
 270          RX       0      50      51      70      80      91      92     150
 271          RY    2391    2390    2388    2388    2388    2388    2390    2391
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 272          KK   N0150
 273          KM       COMBINE CHANNEL HYDROGRAPHS @ N0150
 274          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 275          KK   S0150
 276          KM        RUNOFF FROM SUBBASIN S0150
 277          BA   0.118
 278          LS       0      99                    85.82
 279          UK     100    .005      .1      50
 280          UK     100    .005    .213      50
 281          RK     300     .01     .02 0.00313    TRAP       0      50
 282          RK     500    .004     .02 0.01563    TRAP       0      50
 283          RK    4190   .0067    .017            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 284          KK   N0150
 285          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0150
 286          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 287          KK   R0150
 288          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0150
 289          RS       1    FLOW      -1
 290          RC      .1    .016      .1    1430   .0021
 291          RX       0     180     205     230     250     260     290     660
 292          RY    2386    2385    2384  2383.8  2383.8    2384    2385    2386
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 293          KK   S0160
 294          KM        RUNOFF FROM SUBBASIN S0160
 295          BA   0.133
 296          LS       0      99                    85.82
 297          UK     100    .005      .1      39
 298          UK     100    .005    .206      61
 299          RK    1850   .0054     .02 0.03125    TRAP       0      50
 300          RK    5900   .0085     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 301          KK   S0170
 302          KM        RUNOFF FROM SUBBASIN S0170
 303          BA   0.165
 304          LS       0      99                    89.00
 305          UK     100     .01      .1      60
 306          UK     100     .01    .213      40
 307          RK     600    .013     .02 0.00938    TRAP       0      50
 308          RK    5540   .0072     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 309          KK   N0170
 310          KM       COMBINE SUBBASIN HYDROGRAPHS @ N0170
 311          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 312          KK   N0170
 313          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0170
 314          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 315          KK     sdy
 316          KM     Divert Qcap of 72" Campbell SD (n=.014, So=.0063, Qcap=312)
 317          DT    SD_y
 318          DI       0   312.1    1000
 319          DQ       0   312.1   312.1
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 320          KK   R0170
 321          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0170
 322          RS       1    FLOW      -1
 323          RC      .1    .016      .1    2650    .005
 324          RX       0     330     331     350     370     371     899     900
 325          RY    2378    2376    2375    2375    2375    2376    2376    2378
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 326          KK   N0180
 327          KM       COMBINE CHANNEL HYDROGRAPHS @ N0180
 328          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 329          KK   S0180
 330          KM        RUNOFF FROM SUBBASIN S0180
 331          BA   0.044
 332          LS       0      99                    84.14
 333          UK     100    .004      .1      54
 334          UK     100    .004      .2      46
 335          RK     600   .0038     .02 0.00469    TRAP       0      50
 336          RK    2620   .0038     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 337          KK   N0180
 338          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0180
 339          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 340          KK     sdz
 341          KM     Divert Qcap of 84" Mountain Ave SD determined in previous study to be 355
 342          DT    SD_z
 343          DI       0     355    4000
 344          DQ       0     355     355
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 345          KK   R0180
 346          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0180
 347          RS       1    FLOW      -1
 348          RC      .1    .016      .1    1190    .005
 349          RX       0       1     200     201     240     241     250     650
 350          RY    2368    2366    2364  2363.5  2363.5    2364    2366    2368
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * S0190, R0190, and first N0200 eliminated since S0190 will be cut off
              * by Mountain Avenue construction
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 351          KK   S0200
 352          KM        RUNOFF FROM SUBBASIN S0200
 353          BA   0.094
 354          LS       0      99                    87.24
 355          UK     100    .005      .1      57
 356          UK     100    .005    .195      43
 357          RK     200    .005     .02 0.00313    TRAP       0      50
 358          RK    3540   .0048     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 359          KK   POC_D
 360          KM   Was N0200
 361          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0200
 362          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * ----- Revised routing section.  See note above. --------

 363          KK   R0200
 364          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0200
              * Based on section 145+26 from Mountain Avenue study (DG-R0200)
 365          RS       1    FLOW      -1
 366          RC    .035    .016    .035    2600   .0050
 367          RX       0       0      11      16      51      56      65      65
 368          RY  2363.0  2361.5  2360.9  2360.0  2359.9  2360.8  2361.4  2363.0
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 369          KK   S0210
 370          KM        RUNOFF FROM SUBBASIN S0210
 371          BA   0.043
 372          LS       0      99                    85.37
 373          UK     100    .007      .1      57
 374          UK     100    .007    .192      43
 375          RK     250     .01     .02 0.00313    TRAP       0      50
 376          RK    2400   .0054     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 377          KK   POC_C
 378          KM   Was N0210
 379          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0210
 380          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * ----- Revised routing section.  See note above. --------

 381          KK   R0210
 382          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0210
              * Based on section 104+53 from Mountain Avenue study (DG-R0210)
 383          RS       1    FLOW      -1
 384          RC    .035    .016    .035    3460   .0050
 385          RX       0       0       5      15      47      58      67      67
 386          RY  2340.0  2338.3  2338.2  2336.9  2336.8  2337.9  2338.8  2340.0
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 387          KK   S0220
 388          KM        RUNOFF FROM SUBBASIN S0220
 389          BA    0.17
 390          LS       0      99                    84.92
 391          UK     100    .004      .1      56
 392          UK     100    .004    .208      44
 393          RK     600    .003     .02 0.00469    TRAP       0      50
 394          RK    3400    .005     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 395          KK   POC_I *(Was N0220)
 396          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0220
 397          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 398          KK   R0220
 399          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0220
              * Based on section 89+99 from Mountain Avenue study (DG-R0220)
 400          RS       1    FLOW      -1
 401          RC    .035    .016    .035    1830   .0045
 402          RX       0       0      15      24      56      65      75      75
 403          RY  2336.0  2333.2  2332.7  2331.4  2331.3  2332.6  2333.2  2336.0
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 404          KK   POC_B  *(Was S0230)
 405          KM        RUNOFF FROM SUBBASIN S0230
 406          BA   0.083
 407          LS       0      99                    85.54
 408          UK     100    .004      .1      49
 409          UK     100    .004      .2      51
 410          RK    1600    .006     .02  0.0125    TRAP       0      50
 411          RK    2600   .0054     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 412          KK   R0230
 413          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0230
 414          RS       1    FLOW      -1
 415          RC      .1    .016      .1    5820   .0046
 416          RX       0     100     101     127     153     180     200     450
 417          RY    2337    2336  2335.5    2335    2335  2335.5    2336    2337
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 418          KK   POC_E
 419          KM   Was S0235
 420          KM        RUNOFF FROM SUBBASIN S0235
 421          BA   0.144
 422          LS       0      99                    86.48
 423          UK     300    .004      .1      42
 424          UK     300    .004    .197      58
 425          RK    2367    .006     .02 0.06672    TRAP       0      50
 426          RK    1750    .003     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 427          KK   R0235
 428          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0235
 429          RS       1    FLOW      -1
 430          RC      .1    .016      .1    3340    .003
 431          RX     100     100     120     125     190     200     275     275
 432          RY    2436    2434    2432    2432    2432    2432    2432    2434
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 433          KK   S0236
 434          KM        RUNOFF FROM SUBBASIN S0236
 435          BA    0.07
 436          LS       0      99                    87.20
 437          UK     300    .004      .1      69
 438          UK     300    .004      .2      31
 439          RK    3400    .003     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 440          KK   N0236
 441          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0236
 442          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 443          KK   R0236
 444          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0236
 445          RS       1    FLOW      -1
 446          RC      .1    .015      .1    2670    .0026
 447          RX     100     200     280     285     350     350     400     550
 448          RY    2318    2317    2317  2316.2  2316.2  2316.7    2318    2318
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 449          KK   S0240
 450          KM        RUNOFF FROM SUBBASIN S0240
 451          BA   0.139
 452          LS       0      99                    84.93
 453          UK     100    .003      .1      67
 454          UK     100    .003    .231      33
 455          RK     560    .004     .02 0.00469    TRAP       0      50
 456          RK    4700    .003     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 457          KK   N0240
 458          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0240
 459          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 460          KK   R0240
 461          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0240
 462          RS       1    FLOW      -1
 463          RC      .1    .016      .1    1120    .002
 464          RX       0      25      50      69      71      90     140     141
 465          RY    2331    2330    2330  2328.5  2328.5    2330    2330    2331
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 466          KK   N0260
 467          KM       COMBINE CHANNEL HYDROGRAPHS @ N0260
 468          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 469          KK   S0250
 470          KM        RUNOFF FROM SUBBASIN S0250
 471          BA    0.11
 472          LS       0      99                    87.14
 473          UK     150    .003      .1      74
 474          UK     150    .003      .2      26
 475          RK     500    .006    .013 0.00625    TRAP       0      50
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 476          RK    3360    .004     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 477          KK   S0260
 478          KM        RUNOFF FROM SUBBASIN S0260
 479          BA   0.085
 480          LS       0      99                   88.51
 481          UK     100    .003      .1      68
 482          UK     100    .003    .261      32
 483          RK     720    .006     .02 0.00625    TRAP       0      50
 484          RK    1870   .0037     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 485          KK   N0260
 486          KM       COMBINE SUBBASIN HYDROGRAPHS @ N0260
 487          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 488          KK   POC_J
 489          KM   Was N0260
 490          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0260
 491          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 492          KK   R0260
 493          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0260
              * Based on section 61+24 from Mountain Avenue study (DG-R0260)
 494          RS       1    FLOW      -1
 495          RC    .050    .030    .050    3270   .0022
 496          RX      17      17      25      26      38      39      48      48
 497          RY  2328.0  2323.0  2315.2  2314.4  2314.9  2315.2  2323.0  2328.0
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 498          KK   S0270
 499          KM        RUNOFF FROM SUBBASIN S0270
 500          BA   0.078
 501          LS       0      99                   92.07
 502          UK      50    .018      .1      40
 503          UK      50    .018    .206      60
 504          RK     550    .011     .02 0.00313    TRAP       0      50
 505          RK     550    .012     .02 0.02344    TRAP       0      50
 506          RK    3860    .011     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 507          KK   R0270
 508          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0270
 509          RS       1    FLOW      -1
 510          RC      .1    .016      .1    2510    .008
 511          RX       0      95     200     219     221     240     450     620
 512          RY    2362    2361  2360.8    2360    2360  2360.8  2360.8    2362
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 513          KK   S0280
 514          KM        RUNOFF FROM SUBBASIN S0280
 515          BA   0.133
 516          LS       0      99                   88.68
 517          UK      50     .01      .1      53
 518          UK      50     .01      .2      47
 519          RK     950     .01     .02 0.00313    TRAP       0      50
 520          RK    1700     .01     .02 0.03906    TRAP       0      50
 521          RK    2700   .0074     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 522          KK   POC_A *(Was N0280)
 523          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0280
 524          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 525          KK   R0280
 526          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0280
 527          RS       1    FLOW      -1
 528          RC      .1    .016      .1     920   .0054
 529          RX       0     310     350     369     371     390     999    1000
 530          RY    2352    2350  2348.8  2347.5  2347.5  2348.8  2348.8    2352
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 531          KK   S0290
 532          KM        RUNOFF FROM SUBBASIN S0290
 533          BA   0.325
 534          LS       0      99                   90.44
 535          UK     150    .008      .1      55
 536          UK     150    .008    .207      45
 537          RK     300     .01     .02 0.00156    TRAP       0      50
 538          RK     600    .006     .02 0.04688    TRAP       0      50
 539          RK    5300    .009     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 540          KK   N0290
 541          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0290
 542          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 543          KK   R0290
 544          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0290
 545          RS       1    FLOW      -1
 546          RC      .1    .016      .1    2010   .0065
 547          RX       0     300     350     379     381     410    1040    1041
 548          RY    2345    2344  2343.5    2342    2342  2343.4  2343.4    2345
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 549          KK   S0300
 550          KM        RUNOFF FROM SUBBASIN S0300
 551          BA   0.236
 552          LS       0      99                    89.50
 553          UK     150    .005      .1      49
 554          UK     150    .005      .2      51
 555          RK     600    .013     .02 0.00469    TRAP       0      50
 556          RK     580     .01     .02 0.02813    TRAP       0      50
 557          RK    5960    .009     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 558          KK   N0300
 559          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0300
 560          HC       2

 561          KK   R0300
 562          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0300
 563          RS       1    FLOW      -1
 564          RC      .1    .025      .1    2075   .0043
 565          RX       0       1     350     375     385     410     690     700
 566          RY    2332    2330    2330    2326    2326    2330    2330    2332
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 567          KK   S0310
 568          KM        RUNOFF FROM SUBBASIN S0310
 569          BA   0.171
 570          LS       0      99                    87.03
 571          UK     100     .01      .1      62
 572          UK     100     .01    .194      38
 573          RK     200     .01     .02 0.00156    TRAP       0      50
 574          RK    1150    .012     .02 0.03125    TRAP       0      50
 575          RK    5500   .0085     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 576          KK   N0310
 577          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0310
 578          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 579          KK   R0310
 580          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0310
 581          RS       1    FLOW      -1
 582          RC      .1    .025      .1    2480    .006
 583          RX       0     800     850     870     880     900     950    1500
 584          RY    2329    2324    2324    2318    2318    2324    2324    2325
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 585          KK   S0320
 586          KM        RUNOFF FROM SUBBASIN S0320
 587          BA   0.119
 588          LS       0      99                    90.07
 589          UK     150     .01      .1      53
 590          UK     150     .01    .196      47
 591          RK     550    .009     .02 0.00625    TRAP       0      50
 592          RK    1450    .015     .02 0.04219    TRAP       0      50
 593          RK    1800    .008     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 594          KK   R0320
 595          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0320
 596          RS       1    FLOW      -1
 597          RC      .1    .025      .1    3240   .0105
 598          RX       0      40      50      70      80     100     150     300
 599          RY    2319    2318    2316    2311    2311    2318    2318    2319
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 600          KK   N0340
 601          KM       COMBINE CHANNEL HYDROGRAPHS @ N0340
 602          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 603          KK   S0330
 604          KM        RUNOFF FROM SUBBASIN S0330
 605          BA   0.138
 606          LS       0      99                    87.11
 607          UK     350    .004      .1      15
 608          UK     350    .004    .357      85
 609          RK     800   .0075     .02 0.03125    TRAP       0      50
 610          RK    2500    .006     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 611          KK   S0340
 612          KM        RUNOFF FROM SUBBASIN S0340
 613          BA   0.106
 614          LS       0      99                    91.40
 615          UK     150     .01      .1      47
 616          UK     150     .01    .203      53
 617          RK     700    .022     .02 0.01563    TRAP       0      50
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 618          RK    3240   .0105     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 619          KK   N0340
 620          KM       COMBINE SUBBASIN HYDROGRAPHS @ N0340
 621          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 622          KK   N0340
 623          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0340
 624          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 625          KK   R0340
 626          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0340
 627          RS       1    FLOW      -1
 628          RC      .1    .025      .1     400     .02
 629          RX       0      25      50      70      80     100     125     150
 630          RY    2316    2315    2315    2305    2305    2315    2315    2316
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 631          KK   N0350
 632          KM       COMBINE CHANNEL HYDROGRAPHS @ N0350
 633          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 634          KK   S0350
 635          KM        RUNOFF FROM SUBBASIN S0350
 636          BA   0.213
 637          LS       0      99                    86.12
 638          UK     350    .003      .1      18
 639          UK     350    .003    .318      82
 640          RK     800    .005     .02 0.01563    TRAP       0      50
 641          RK    1700    .003     .02 0.07813    TRAP       0      50
 642          RK    3550   .0099     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 643          KK   POC_K *(Was N0350)
 644          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0350
 645          HC       2
              *
              *  End of DG
              *
              *
              *
              *
              *
              *
              *
              *
              *
```

```
*
*  ==================================================================
*                              BEGIN GR
*  ==================================================================
*
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 646          KK   POC_F *(Was S0010)
 647          KM        RUNOFF FROM SUBBASIN S0010
 648          PB    3.60
 649          BA   0.096
 650          LS       0      99                    85.25
 651          UK     200     .02      .1      48
 652          UK     200     .02      .2      52
 653          RK    1867    .006     .02 0.04183    TRAP       0      50
 654          RK    2400    .005     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 655          KK   R0010
 656          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0010
 657          RS       1    FLOW      -1
 658          RC     .06    .016     .06    1300    .002
 659          RX     100     100     130     140     210     240     275     275
 660          RY    2330  2328.5    2328    2326    2326    2327    2328    2330
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 661          KK   S0020
 662          KM        RUNOFF FROM SUBBASIN S0020
 663          BA   0.137
 664          LS       0      99                    86.09
 665          UK     200     .02      .1      46
 666          UK     200     .02      .2      54
 667          RK    3800    .007     .02  0.1773    TRAP       0      50
 668          RK    4800   .0075     .05            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 669          KK   POC_G *(was N0020)
 670          KM        COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0020
 671          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 672          KK   R0020
 673          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0020
 674          RS       1    FLOW      -1
 675          RC     .06    .016     .06    1157   .0026
 676          RX     100     118     129     135     200     210     222     240
 677          RY    2326    2326    2325    2325    2325    2325    2325    2327
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 678          KK   R0025
 679          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0025
 680          RS       1    FLOW      -1
 681          RC     .06    .015     .06     843    .003
 682          RX     100     100     130     130     146     146     200     200
 683          RY    2319  2317.5  2317.5  2309.5  2309.5  2317.5  2317.5    2319
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  684         KK   S0030
  685         KM        RUNOFF FROM SUBBASIN S0030
  686         BA   0.172
  687         LS       0      99                    86.14
  688         UK     100     .01      .1      45
  689         UK     100     .01    .192      55
  690         RK    2150    .004    .035 0.01542    TRAP       0      50
  691         RK    2150    .003     .05 0.20517    TRAP       0      50
  692         RK    2000    .002     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  693         KK   POC_H *(was N0030)
  694         KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0030
  695         HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
  696         ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.       (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   7       S0010
               V
               V
  36       R0010
               .
               .
  42           .       S0020
               .           .
               .           .
  51       N0020............
               V
               V
  54       R0020
               .
               .
  60           .       S0030
               .           V
               .           V
  69           .       R0030
               .           .
               .           .
  75           .           .       S0040
               .           .           V
               .           .           V
  84           .           .       R0040
               .           .           .
               .           .           .
  90           .       N0050............
               .           .
               .           .
  93           .           .       S0050
               .           .           .
               .           .           .
 102           .       N0050............
               .           V
               .           V
 105           .       R0050
               .           .
               .           .
 111       N0060............
               .
               .
 114           .       S0060
               .           .
               .           .
 123       N0060............
               V
               V
 126       R0060
               .
               .
 132           .       S0070
               .           .
               .           .
 141       N0070............
```

```
                V
                V
144         R0070
                .
                .
150             .       S0080
                .           .
                .           .
158         N0080............
                V
                V
161         R0080
                .
                .
167             .       S0090
                .           .
                .           .
175         N0090............
                V
                V
178         R0090
                .
                .
184             .       S0100
                .           V
                .           V
193             .       R0100
                .           .
                .           .
199             .           .       S0110
                .           .           .
                .           .           .
208             .       N0110............
                .           V
                .           V
211             .       R0110
                .           .
                .           .
217             .           .       S0120
                .           .           V
                .           .           V
225             .           .       R0120
                .           .           .
                .           .           .
231             .           .           .       S0130
                .           .           .           .
                .           .           .           .
239             .           .       N0130............
                .           .           V
                .           .           V
242             .           .       R0130
                .           .           .
                .           .           .
248             .           .           .       S0140
                .           .           .           .
                .           .           .           .
257             .           .       N0140............
                .           .           .
                .           .           .
263             .           .           .------->    SD_x
261             .           .         sdx
```

```
                .           .           V
                .           .           V
266             .           .       R0140
                .           .           .
                .           .           .
272             .       N0150............
                .           .
                .           .
275             .           .       S0150
                .           .           .
                .           .           .
284             .       N0150............
                .           V
                .           V
287             .       R0150
                .           .
                .           .
293             .           .       S0160
                .           .           .
                .           .           .
301             .           .           .       S0170
                .           .           .           .
                .           .           .           .
309             .           .       N0170............
                .           .           .
                .           .           .
312             .       N0170............
                .           .
                .           .
317             .           .------->   SD_y
315             .         sdy
                .           V
                .           V
320             .       R0170
                .           .
                .           .
326         N0180............
                .
                .
329             .       S0180
                .           .
                .           .
337         N0180............
                .
                .
342             .------->   SD_z
340           sdz
                V
                V
345         R0180
                .
                .
351             .       S0200
                .           .
                .           .
359         POC_D............
                V
                V
363         R0200
                .
                .
```

```
369          .       S0210
             .           .
             .           .
377       POC_C............
             V
             V
381       R0210
             .
             .
387          .       S0220
             .           .
             .           .
395       POC_I............
             V
             V
398       R0220
             .
             .
404          .       POC_B
             .           V
             .           V
412          .       R0230
             .           .
             .           .
418          .           .       POC_E
             .           .           V
             .           .           V
427          .           .       R0235
             .           .           .
             .           .           .
433          .           .           .       S0236
             .           .           .           .
             .           .           .           .
440          .           .       N0236............
             .           .           V
             .           .           V
443          .           .       R0236
             .           .           .
             .           .           .
449          .           .           .       S0240
             .           .           .           .
             .           .           .           .
457          .           .       N0240............
             .           .           V
             .           .           V
460          .           .       R0240
             .           .           .
             .           .           .
466       N0260........................
             .
             .
469          .       S0250
             .           .
             .           .
477          .           .       S0260
             .           .           .
             .           .           .
485          .       N0260............
             .           .
             .           .
488       POC_J............
```

```
                V
                V
492         R0260
                .
                .
498             .       S0270
                .           V
                .           V
507             .       R0270
                .           .
                .           .
513             .           .       S0280
                .           .           .
                .           .           .
522             .       POC_A............
                .           V
                .           V
525             .       R0280
                .           .
                .           .
531             .           .       S0290
                .           .           .
                .           .           .
540             .       N0290............
                .           V
                .           V
543             .       R0290
                .           .
                .           .
549             .           .       S0300
                .           .           .
                .           .           .
558             .       N0300............
                .           V
                .           V
561             .       R0300
                .           .
                .           .
567             .           .       S0310
                .           .           .
                .           .           .
576             .       N0310............
                .           V
                .           V
579             .       R0310
                .           .
                .           .
585             .           .       S0320
                .           .           V
                .           .           V
594             .           .       R0320
                .           .           .
                .           .           .
600             .       N0340............
                .           .
                .           .
603             .           .       S0330
                .           .           .
                .           .           .
611             .           .           .       S0340
                .           .           .           .
```

```
                .           .           .           .
619             .           .       N0340............
                .           .           .
                .           .           .
622             .       N0340............
                .           V
                .           V
625             .       R0340
                .           .
                .           .
631         N0350............
                .
                .
634             .       S0350
                .           .
                .           .
643         POC_K............
                .
                .
646             .       POC_F
                .           V
                .           V
655             .       R0010
                .           .
                .           .
661             .           .       S0020
                .           .           .
                .           .           .
669             .       POC_G............
                .           V
                .           V
672             .       R0020
                .           V
                .           V
678             .       R0025
                .           .
                .           .
684             .           .       S0030
                .           .           .
                .           .           .
693             .       POC_H............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
*  RUN DATE  06/09/2006  TIME  08:51:46 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

Appendix D
Refined TSMS(2)
DG WITH STORM DRAIN DIVERSIONS, MODIFIED NAVAJO WASH ROUTING ELEMENTS
AND DG-S0190 ELIMINATION APPLIED.

```
  6 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN          1  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1    0  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      1    0  ENDING DATE
                     NDTIME       0459  ENDING TIME
                      ICENT         19  CENTURY MARK

                 COMPUTATION INTERVAL     .02 HOURS
                      TOTAL TIME BASE    4.98 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	S0010	389.	.43	50.	50.	50.	.14		
ROUTED TO	R0010	324.	.50	50.	50.	50.	.14	2415.20	.50
HYDROGRAPH AT	S0020	224.	.38	30.	30.	30.	.10		
2 COMBINED AT	N0020	504.	.47	80.	80.	80.	.24		
ROUTED TO	R0020	448.	.57	80.	80.	80.	.24	2401.01	.57
HYDROGRAPH AT	S0030	482.	.37	57.	57.	57.	.16		
ROUTED TO	R0030	465.	.40	57.	57.	57.	.16	2398.71	.40
HYDROGRAPH AT	S0040	273.	.40	35.	35.	35.	.10		
ROUTED TO	R0040	260.	.43	35.	35.	35.	.10	2398.70	.43
2 COMBINED AT	N0050	715.	.42	92.	92.	92.	.27		
HYDROGRAPH AT	S0050	213.	.28	21.	21.	21.	.06		
2 COMBINED AT	N0050	835.	.42	113.	113.	113.	.33		
ROUTED TO	R0050	782.	.45	113.	113.	113.	.33	2392.94	.45
2 COMBINED AT	N0060	1169.	.50	193.	193.	193.	.57		
HYDROGRAPH AT	S0060	186.	.40	24.	24.	24.	.07		
2 COMBINED AT	N0060	1317.	.48	216.	216.	216.	.65		

+	ROUTED TO	R0060	1180.	.58	216.	216.	216.	.65	2385.75	.58
+										
+	HYDROGRAPH AT	S0070	134.	.30	18.	18.	18.	.06		
+	2 COMBINED AT	N0070	1254.	.57	234.	234.	234.	.70		
+	ROUTED TO	R0070	1210.	.63	234.	234.	234.	.70	2381.99	.63
+										
+	HYDROGRAPH AT	S0080	101.	.23	11.	11.	11.	.03		
+	2 COMBINED AT	N0080	1242.	.63	245.	245.	245.	.74		
+	ROUTED TO	R0080	1239.	.65	244.	244.	244.	.74	2379.34	.65
+										
+	HYDROGRAPH AT	S0090	262.	.43	38.	38.	38.	.12		
+	2 COMBINED AT	N0090	1398.	.63	282.	282.	282.	.86		
+	ROUTED TO	R0090	1398.	.63	282.	282.	282.	.86	2371.66	.63
+										
+	HYDROGRAPH AT	S0100	651.	.48	95.	95.	95.	.29		
+	ROUTED TO	R0100	458.	.65	94.	94.	94.	.29	2435.03	.65
+										
+	HYDROGRAPH AT	S0110	445.	.48	67.	67.	67.	.21		
+	2 COMBINED AT	N0110	809.	.57	161.	161.	161.	.50		
+	ROUTED TO	R0110	638.	.78	160.	160.	160.	.50	2396.26	.78
+										
+	HYDROGRAPH AT	S0120	331.	.35	42.	42.	42.	.13		
+	ROUTED TO	R0120	175.	.58	42.	42.	42.	.13	2411.58	.58
+										
+	HYDROGRAPH AT	S0130	241.	.58	45.	45.	45.	.16		

+	2 COMBINED AT	N0130	416.	.58	87.	87.	87.	.29	
+	ROUTED TO	R0130	401.	.65	87.	87.	87.	.29	2389.40 .65
+	HYDROGRAPH AT	S0140	284.	.55	52.	52.	52.	.18	
+	2 COMBINED AT	N0140	663.	.62	138.	138.	138.	.46	
+	DIVERSION TO	SD_x	216.	.62	92.	92.	92.	.46	
+	HYDROGRAPH AT	sdx	447.	.62	46.	46.	46.	.46	
+	ROUTED TO	R0140	440.	.65	46.	46.	46.	.46	2389.40 .65
+	2 COMBINED AT	N0150	1052.	.70	206.	206.	206.	.97	
+	HYDROGRAPH AT	S0150	228.	.45	36.	36.	36.	.12	
+	2 COMBINED AT	N0150	1201.	.67	242.	242.	242.	1.08	
+	ROUTED TO	R0150	972.	.92	242.	242.	242.	1.08	2385.97 .92
+	HYDROGRAPH AT	S0160	199.	.63	38.	38.	38.	.13	
+	HYDROGRAPH AT	S0170	373.	.47	56.	56.	56.	.17	
+	2 COMBINED AT	N0170	501.	.50	94.	94.	94.	.30	
+	2 COMBINED AT	N0170	1258.	.82	336.	336.	336.	1.38	
+	DIVERSION TO	SD_y	312.	.82	165.	165.	165.	1.38	
+	HYDROGRAPH AT	sdy	946.	.82	170.	170.	170.	1.38	
+	ROUTED TO	R0170	704.	1.18	170.	170.	170.	1.38	2376.51 1.18
+	2 COMBINED AT	N0180	1754.	.68	452.	452.	452.	2.24	

+	HYDROGRAPH AT	S0180	82.	.48	13.	13.	13.	.04		
+	2 COMBINED AT	N0180	1812.	.67	466.	466.	466.	2.28		
+	DIVERSION TO	SD_z	355.	.67	180.	180.	180.	2.28		
+	HYDROGRAPH AT	sdz	1457.	.67	286.	286.	286.	2.28		
+	ROUTED TO	R0180	1407.	.77	286.	286.	286.	2.28	2365.96	.75
+	HYDROGRAPH AT	S0200	204.	.43	31.	31.	31.	.09		
+	2 COMBINED AT	POC_D	1510.	.73	316.	316.	316.	2.38		
+	ROUTED TO	R0200	1493.	.80	316.	316.	316.	2.38	2362.58	.80
+	HYDROGRAPH AT	S0210	99.	.38	14.	14.	14.	.04		
+	2 COMBINED AT	POC_C	1531.	.80	330.	330.	330.	2.42		
+	ROUTED TO	R0210	1500.	.87	329.	329.	329.	2.42	2339.44	.87
+	HYDROGRAPH AT	S0220	342.	.45	53.	53.	53.	.17		
+	2 COMBINED AT	POC_I	1654.	.85	382.	382.	382.	2.59		
+	ROUTED TO	R0220	1645.	.88	382.	382.	382.	2.59	2334.19	.88
+	HYDROGRAPH AT	POC_B	152.	.48	25.	25.	25.	.08		
+	ROUTED TO	R0230	74.	.88	24.	24.	24.	.08	2335.48	.88
+	HYDROGRAPH AT	POC_E	190.	.55	42.	42.	42.	.14		
+	ROUTED TO	R0235	110.	1.10	41.	41.	41.	.14	2432.42	1.08
+	HYDROGRAPH AT									

+		S0236	122.	.55	24.	24.	24.	.07		
+	2 COMBINED AT	N0236	174.	.85	64.	64.	64.	.21		
+	ROUTED TO	R0236	168.	1.03	63.	63.	63.	.21	2316.87	1.03
+	HYDROGRAPH AT	S0240	254.	.60	46.	46.	46.	.14		
+	2 COMBINED AT	N0240	350.	.63	109.	109.	109.	.35		
+	ROUTED TO	R0240	324.	.80	109.	109.	109.	.35	2330.63	.80
+	3 COMBINED AT	N0260	2038.	.88	515.	515.	515.	3.03		
+	HYDROGRAPH AT	S0250	250.	.47	38.	38.	38.	.11		
+	HYDROGRAPH AT	S0260	219.	.38	29.	29.	29.	.09		
+	2 COMBINED AT	N0260	436.	.43	68.	68.	68.	.19		
+	2 COMBINED AT	POC_J	2221.	.87	583.	583.	583.	3.22		
+	ROUTED TO	R0260	2153.	.97	580.	580.	580.	3.22	2325.73	.97
+	HYDROGRAPH AT	S0270	213.	.40	26.	26.	26.	.08		
+	ROUTED TO	R0270	112.	.60	26.	26.	26.	.08	2360.88	.60
+	HYDROGRAPH AT	S0280	343.	.42	43.	43.	43.	.13		
+	2 COMBINED AT	POC_A	440.	.43	69.	69.	69.	.21		
+	ROUTED TO	R0280	307.	.63	69.	69.	69.	.21	2349.03	.63
+	HYDROGRAPH AT	S0290	739.	.45	109.	109.	109.	.32		
+	2 COMBINED AT	N0290	978.	.47	179.	179.	179.	.54		

+	ROUTED TO	R0290	649.	.78	179.	179.	179.	.54	
+									2343.77 .78
+	HYDROGRAPH AT	S0300	446.	.53	76.	76.	76.	.24	
+	2 COMBINED AT	N0300	984.	.63	255.	255.	255.	.77	
+	ROUTED TO	R0300	918.	.82	254.	254.	254.	.77	
+									2329.91 .82
+	HYDROGRAPH AT	S0310	384.	.48	57.	57.	57.	.17	
+	2 COMBINED AT	N0310	1152.	.58	311.	311.	311.	.94	
+	ROUTED TO	R0310	1120.	.72	310.	310.	310.	.94	
+									2322.71 .72
+	HYDROGRAPH AT	S0320	299.	.37	40.	40.	40.	.12	
+	ROUTED TO	R0320	231.	.50	40.	40.	40.	.12	
+									2312.89 .50
+	2 COMBINED AT	N0340	1296.	.67	350.	350.	350.	1.06	
+	HYDROGRAPH AT	S0330	87.	1.30	34.	34.	34.	.14	
+	HYDROGRAPH AT	S0340	256.	.38	35.	35.	35.	.11	
+	2 COMBINED AT	N0340	290.	.42	70.	70.	70.	.24	
+	2 COMBINED AT	N0340	1513.	.63	420.	420.	420.	1.31	
+	ROUTED TO	R0340	1513.	.65	420.	420.	420.	1.31	
+									2309.60 .65
+	2 COMBINED AT	N0350	3489.	.92	1000.	1000.	1000.	4.53	
+	HYDROGRAPH AT	S0350	126.	.77	52.	52.	52.	.21	
+	2 COMBINED AT	POC_K	3609.	.92	1051.	1051.	1051.	4.74	
+	HYDROGRAPH AT	POC_F	227.	.43	34.	34.	34.	.10	

+	ROUTED TO	R0010	189.	.55	34.	34.	34.	.10	2326.73	.55
+										
+	HYDROGRAPH AT	S0020	216.	.83	49.	49.	49.	.14		
+	2 COMBINED AT	POC_G	343.	.78	83.	83.	83.	.23		
+	ROUTED TO	R0020	340.	.82	82.	82.	82.	.23	2325.90	.82
+										
+	ROUTED TO	R0025	340.	.83	82.	82.	82.	.23	2312.03	.83
+										
+	HYDROGRAPH AT	S0030	293.	.82	61.	61.	61.	.17		
+	2 COMBINED AT	POC_H	632.	.82	143.	143.	143.	.41		
1										

Appendix 2e. TSMS(3) -- Project Base Hydrologic Modeling
Should produce same results as Refined TSMS(2)

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
*  RUN DATE  06/09/2006  TIME  09:14:27 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

    1         ID   Appendix 2e.  TSMS(3) -- Project Base Hydrologic Modeling
    2         ID   RECONFIGURED TSMS(3)
    3         ID   Should produce same results as Refined TSMS(2)
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *DIAGRAM
              * Curve numbers for Basin DG are based on PB = 3.131 corresponding to POC_K
              * and are slightly inaccurate for other precipitation values.  CNs for Basin GR
              * are based on PB = 3.60.
              *
              *
              * -- TSMS(3) --
              * RECONFIGURED TSMS(3) is equivalent to TSMS(2) except that discharges reaching
              * the project nodes are diverted (by means of DT card sequences) and stored for
              * later recall and routing to model the different scenarios being considered.
              * For this particular run, they are recalled and routed in the same manner and
              * using the same routing elements as TSMS(2), and the results are the same.
              * This run has been made to ensure that the approach has been applied correctly.
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  4           IT       1                     300
  5           IO       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  6           KK   S0010
  7           KM        RUNOFF FROM SUBBASIN S0010
  8           IN       1
  9           PB   3.137
 10           PI  .05691  .06348  .07131  .08064  .09195  .10581  .12309  .14493  .17316  .19047
 11           PI  .15810  .13332  .11397  .09852  .08601  .07575  .06723  .06006  .05397  .05127
 12           PI  .04878  .04647  .04431  .04227  .04041  .03864  .03699  .03546  .03402  .03264
 13           PI  .03138  .03018  .02904  .02796  .02694  .02598  .02505  .02421  .02337  .02259
 14           PI  .02187  .02115  .02049  .01983  .01923  .01866  .01809  .01755  .01704  .01656
 15           PI  .01611  .01566  .01521  .01482  .01440  .01404  .01368  .01332  .01299  .01266
 16           PI  .01236  .01203  .01176  .01146  .01119  .01095  .01068  .01044  .01020  .00999
 17           PI  .00978  .00957  .00936  .00915  .00897  .00876  .00858  .00843  .00825  .00807
 18           PI  .00792  .00777  .00762  .00747  .00732  .00720  .00705  .00693  .00681  .00666
 19           PI  .00654  .00645  .00633  .00621  .00609  .00600  .00588  .00579  .00570  .00561
 20           PI  .00552  .00543  .00534  .00525  .00516  .00507  .00501  .00492  .00483  .00477
 21           PI  .00471  .00462  .00456  .00450  .00441  .00435  .00429  .00423  .00417  .00411
 22           PI  .00405  .00399  .00393  .00390  .00384  .00378  .00372  .00369  .00363  .00357
 23           PI  .00354  .00348  .00345  .00339  .00336  .00330  .00327  .00324  .00318  .00315
 24           PI  .00312  .00306  .00303  .00300  .00297  .00291  .00288  .00285  .00282  .00279
 25           PI  .00276  .00273  .00270  .00267  .00264  .00261  .00258  .00255  .00252  .00249
 26           PI  .00246  .00243  .00240  .00237  .00234  .00231  .00231  .00228  .00225  .00222
 27           PI  .00219  .00219  .00216  .00213  .00210  .00210  .00207  .00204  .00204  .00201
 28           BA   0.144
 29           LS       0      99                  89.99
 30           UK     100    .015      .1      66
 31           UK     100    .015      .2      34
 32           RK     400    .015     .02 0.00313    TRAP       0      50
 33           RK    1408   .0114     .02 0.07344    TRAP       0      50
 34           RK    2400   .0017     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 35           KK   R0010
 36           KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0010
 37           RS       1    FLOW      -1
 38           RC      .1    .016      .1    2660    .006
 39           RX       0      10      20      30      60      75      80     100
 40           RY    2418    2417    2416    2414    2414    2416    2416    2417
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 41           KK   S0020
 42           KM        RUNOFF FROM SUBBASIN S0020
 43           BA   0.096
 44           LS       0      99                  88.76
 45           UK     100    .015      .1      39
 46           UK     100    .015    .206      61
 47           RK     465    .015     .02 0.00781    TRAP       0      50
 48           RK     465    .015     .02 0.00781    TRAP       0      50
 49           RK    2660    .006     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 50           KK   N0020
 51           KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0020
 52           HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 53           KK   R0020
 54           KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0020
 55           RS       1    FLOW      -1
 56           RC      .1    .016      .1    2960   .0062
 57           RX       0       5      10      29      32      50      55      60
 58           RY    2402    2401    2400  2399.5  2399.5    2400    2401    2402
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 59           KK   S0030
 60           KM        RUNOFF FROM SUBBASIN S0030
 61           BA   0.164
 62           LS       0      99                    91.18
 63           UK     100     .01      .1      62
 64           UK     100     .01      .2      38
 65           RK     425    .007     .02 0.00625    TRAP       0      50
 66           RK    1100    .012     .02 0.02344    TRAP       0      50
 67           RK    3250     .01     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 68           KK   R0030
 69           KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0030
 70           RS       1    FLOW      -1
 71           RC      .1    .016      .1    1025   .0137
 72           RX       0      20      40      58      69      80      90     100
 73           RY    2400    2399    2398  2397.5  2397.5    2398    2399    2400
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 74           KK   S0040
 75           KM        RUNOFF FROM SUBBASIN S0040
 76           BA   0.105
 77           LS       0      99                    92.28
 78           UK     100     .01      .1      37
 79           UK     100     .01      .2      63
 80           RK     500    .022     .02 0.00313    TRAP       0      50
 81           RK     950   .0084     .02 0.02031    TRAP       0      50
 82           RK    3150    .013     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 83           KK   R0040
 84           KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0040
 85           RS       1    FLOW      -1
 86           RC      .1    .016      .1     790   .0076
 87           RX       0      90     180     245     290     365     440     540
 88           RY    2404    2402    2400    2398    2398    2400    2402    2404
              *
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 89           KK   N0050
 90           KM       COMBINE CHANNEL HYDROGRAPHS @ N0050
 91           HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 92           KK   S0050
 93           KM        RUNOFF FROM SUBBASIN S0050
 94           BA   0.063
 95           LS       0      99                    92.28
 96           UK      75    .015      .1      41
 97           UK      75    .015      .2      59
 98           RK     175    .011     .02 0.00156    TRAP       0      50
 99           RK     575   .0174     .02  0.0125    TRAP       0      50
100           RK     790   .0063     .02            TRAP       0      50
              *
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+

101           KK   N0050
102           KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0050
103           HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

104           KK   R0050
105           KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0050
106           RS       1    FLOW      -1
107           RC      .1    .016      .1     790   .0063
108           RX       0     220     221     239     241     260     261     610
109           RY    2396    2392  2391.4    2391    2391  2391.4    2392    2396
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

110           KK   N0060
111           KM       COMBINE CHANNEL HYDROGRAPHS @ N0060
112           HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

113           KK   S0060
114           KM        RUNOFF FROM SUBBASIN S0060
115           BA   0.074
116           LS       0      99                    90.19
117           UK      50    .015      .1      41
118           UK      50    .015      .2      59
119           RK     250    .024     .02 0.00156    TRAP       0      50
120           RK    1000    .022     .02 0.01719    TRAP       0      50
121           RK    2960   .0051     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 122          KK   N0060
 123          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0060
 124          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 125          KK   R0060
 126          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0060
 127          RS       1    FLOW      -1
 128          RC      .1    .016      .1    1225   .0057
 129          RX       0     210     220     235     245     260     270     300
 130          RY    2386    2384    2384  2383.5  2383.5    2384    2384    2386
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 131          KK   S0070
 132          KM        RUNOFF FROM SUBBASIN S0070
 133          BA   0.057
 134          LS       0      99                    87.53
 135          UK      50    .004      .1      45
 136          UK      50    .004    .313      55
 137          RK     200     .01     .02 0.00156    TRAP       0      50
 138          RK     650    .012     .02 0.03906    TRAP       0      50
 139          RK    1225   .0057     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 140          KK   N0070
 141          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0070
 142          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 143          KK   R0070
 144          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0070
 145          RS       1    FLOW      -1
 146          RC      .1    .016      .1     765   .0057
 147          RX       0     420     430     449     451     470     480     770
 148          RY    2384    2381    2380  2379.5  2379.5    2380    2381    2384
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 149          KK   S0080
 150          KM        RUNOFF FROM SUBBASIN S0080
 151          BA   0.034
 152          LS       0      99                    87.96
 153          UK      50    .007      .1      49
 154          UK      50    .007     .22      51
 155          RK     200     .01     .02 0.00781    TRAP       0      50
 156          RK     765   .0078     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 157          KK   N0080
 158          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0080
 159          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 160          KK   R0080
 161          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0080
 162          RS       1    FLOW      -1
 163          RC      .1    .016      .1     765   .0083
 164          RX       0      10      20      39      41      60      70      80
 165          RY    2380    2378  2377.5    2377    2377  2377.5    2378    2380
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 166          KK   S0090
 167          KM        RUNOFF FROM SUBBASIN S0090
 168          BA   0.119
 169          LS       0      99                    86.07
 170          UK     100     .01      .1      55
 171          UK     100     .01      .2      45
 172          RK     900     .01     .02 0.03125    TRAP       0      50
 173          RK    3950   .0066     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 174          KK   N0090
 175          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0090
 176          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 177          KK   R0090
 178          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0090
 179          RS       1    FLOW      -1
 180          RC      .1    .016      .1       5   .0071
 181          RX       0       1     200     218     222     240     260     800
 182          RY    2372    2371    2370  2369.4  2369.4    2370    2371    2372
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 183          KK   S0100
 184          KM        RUNOFF FROM SUBBASIN S0100
 185          BA   0.289
 186          LS       0      99                    89.02
 187          UK     100     .01      .1      53
 188          UK     100     .01      .2      47
 189          RK     800     .01     .02 0.00625    TRAP       0      50
 190          RK    3700   .0073     .02 0.09375    TRAP       0      50
 191          RK    2600   .0127     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 192          KK   R0100
 193          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0100
 194          RS       1    FLOW      -1
 195          RC      .1    .016      .1    3960   .0056
 196          RX       0      10      20      39      41      60      70      80
 197          RY    2435    2434    2434  2433.5  2433.5    2434    2434    2436
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 198          KK   S0110
 199          KM        RUNOFF FROM SUBBASIN S0110
 200          BA   0.214
 201          LS       0      99                    88.03
 202          UK     100    .008      .1      46
 203          UK     100    .008    .197      54
 204          RK     575    .007     .02 0.00469    TRAP       0      50
 205          RK    1300     .01     .02 0.05625    TRAP       0      50
 206          RK    3960   .0056     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 207          KK   N0110
 208          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0110
 209          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 210          KK   R0110
 211          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0110
 212          RS       1    FLOW      -1
 213          RC      .1    .016      .1    4190   .0067
 214          RX       0     500     520     539     541     560     570     940
 215          RY    2398    2396    2395  2394.5  2394.5    2395    2396    2398
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 216          KK   S0120
 217          KM        RUNOFF FROM SUBBASIN S0120
 218          BA    0.13
 219          LS       0      99                    88.52
 220          UK     100     .01      .1      51
 221          UK     100     .01      .2      49
 222          RK     500    .014     .02 0.00781    TRAP       0      50
 223          RK    2940   .0082     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 224          KK   R0120
 225          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0120
 226          RS       1    FLOW      -1
 227          RC      .1    .016      .1    4040   .0035
 228          RX       0      10      20      39      41      60      70      80
 229          RY    2412    2411    2411  2410.5  2410.5    2411    2411    2412
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 230          KK   S0130
 231          KM        RUNOFF FROM SUBBASIN S0130
 232          BA   0.157
 233          LS       0      99                    85.09
 234          UK     100    .004      .1      42
 235          UK     100    .004      .2      58
 236          RK    1200   .0033     .02 0.01719    TRAP       0      50
 237          RK    4040   .0035     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 238          KK   N0130
 239          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0130
 240          HC       2

 241          KK   R0130
 242          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0130
 243          RS       1    FLOW      -1
 244          RC      .1    .016      .1    2000   .0038
 245          RX       0      50      51      70      80      91      92     150
 246          RY    2391    2390    2388    2388    2388    2388    2390    2391
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 247          KK   S0140
 248          KM        RUNOFF FROM SUBBASIN S0140
 249          BA   0.176
 250          LS       0      99                    86.04
 251          UK     100    .003      .1      42
 252          UK     100    .003    .212      58
 253          RK    1300   .0046     .02 0.00938    TRAP       0      50
 254          RK    1500    .004     .02 0.07813    TRAP       0      50
 255          RK    2000   .0038     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 256          KK   N0140
 257          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0140
 258          KM   Flow reaching Hedrick and Tucson Boulevard
 259          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 260          KK     sdx
 261          KM     Divert Qcap of 72" Tucson Blvd (n=.014 So-0.0030, Qcap=216)
 262          DT    SD_x
 263          DI       0   216.0    1000
 264          DQ       0   216.0   216.0
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 265          KK   R0140
 266          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0140
 267          RS       1    FLOW      -1
 268          RC      .1    .016      .1    1320   .0045
 269          RX       0      50      51      70      80      91      92     150
 270          RY    2391    2390    2388    2388    2388    2388    2390    2391
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 271          KK   N0150
 272          KM       COMBINE CHANNEL HYDROGRAPHS @ N0150
 273          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 274          KK   S0150
 275          KM        RUNOFF FROM SUBBASIN S0150
 276          BA   0.118
 277          LS       0      99                    85.82
 278          UK     100    .005      .1      50
 279          UK     100    .005    .213      50
 280          RK     300     .01     .02 0.00313    TRAP       0      50
 281          RK     500    .004     .02 0.01563    TRAP       0      50
 282          RK    4190   .0067    .017            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 283          KK   N0150
 284          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0150
 285          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 286          KK   R0150
 287          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0150
 288          RS       1    FLOW      -1
 289          RC      .1    .016      .1    1430   .0021
 290          RX       0     180     205     230     250     260     290     660
 291          RY    2386    2385    2384  2383.8  2383.8    2384    2385    2386
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 292          KK   S0160
 293          KM        RUNOFF FROM SUBBASIN S0160
 294          BA   0.133
 295          LS       0      99                    85.82
 296          UK     100    .005      .1      39
 297          UK     100    .005    .206      61
 298          RK    1850   .0054     .02 0.03125    TRAP       0      50
 299          RK    5900   .0085     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 300          KK   S0170
 301          KM        RUNOFF FROM SUBBASIN S0170
 302          BA   0.165
 303          LS       0      99                    89.00
 304          UK     100     .01      .1      60
 305          UK     100     .01    .213      40
 306          RK     600    .013     .02 0.00938    TRAP       0      50
 307          RK    5540   .0072     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 308          KK   N0170
 309          KM       COMBINE SUBBASIN HYDROGRAPHS @ N0170
 310          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 311          KK   N0170
 312          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0170
 313          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 314          KK     sdy
 315          KM     Divert Qcap of 72" Campbell SD (n=.014, So=.0063, Qcap=312)
 316          DT    SD_y
 317          DI       0   312.1    1000
 318          DQ       0   312.1   312.1
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 319          KK   R0170
 320          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0170
 321          RS       1    FLOW      -1
 322          RC      .1    .016      .1    2650    .005
 323          RX       0     330     331     350     370     371     899     900
 324          RY    2378    2376    2375    2375    2375    2376    2376    2378
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 325          KK   N0180
 326          KM       COMBINE CHANNEL HYDROGRAPHS @ N0180
 327          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 328          KK   S0180
 329          KM        RUNOFF FROM SUBBASIN S0180
 330          BA   0.044
 331          LS       0      99                    84.14
 332          UK     100    .004      .1      54
 333          UK     100    .004      .2      46
 334          RK     600   .0038     .02 0.00469    TRAP       0      50
 335          RK    2620   .0038     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 336          KK   N0180
 337          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0180
 338          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 339          KK     sdz
 340          KM     Divert Qcap of 84" Mountain Ave SD determined in previous study to be 355
 341          DT    SD_z
 342          DI       0     355    4000
 343          DQ       0     355     355
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 344          KK   R0180
 345          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0180
 346          RS       1    FLOW      -1
 347          RC      .1    .016      .1    1190    .005
 348          RX       0       1     200     201     240     241     250     650
 349          RY    2368    2366    2364  2363.5  2363.5    2364    2366    2368
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * S0190, R0190, and first N0200 eliminated since S0190 will be cut off
              * by Mountain Avenue construction
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 350          KK   S0200
 351          KM        RUNOFF FROM SUBBASIN S0200
 352          BA   0.094
 353          LS       0      99                    87.24
 354          UK     100    .005      .1      57
 355          UK     100    .005    .195      43
 356          RK     200    .005     .02 0.00313    TRAP       0      50
 357          RK    3540   .0048     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 358          KK   N0200
 359          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0200
 360          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 361          KK    Pt_D
 362          KM     Store hydrograph for POC_D
 363          DT   POC_D
 364          DI       0   10000
 365          DQ       0   10000
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 366          KK   S0210
 367          KM        RUNOFF FROM SUBBASIN S0210
 368          BA   0.043
 369          LS       0      99                    85.37
 370          UK     100    .007      .1      57
 371          UK     100    .007    .192      43
 372          RK     250     .01     .02 0.00313    TRAP       0      50
 373          RK    2400   .0054     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 374          KK       x
 375          KM    Dummy combination with zero flow to shift one position left
 376          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 377          KK    Pt_C
 378          KM     Store hydrograph for POC_C
 379          DT   POC_C
 380          DI       0   10000
 381          DQ       0   10000
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 382          KK   S0220
 383          KM        RUNOFF FROM SUBBASIN S0220
 384          BA    0.17
 385          LS       0      99                    84.92
 386          UK     100    .004      .1      56
 387          UK     100    .004    .208      44
 388          RK     600    .003     .02 0.00469    TRAP       0      50
 389          RK    3400    .005     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 390          KK       x
 391          KM    Dummy combination with zero flow to shift one position left
 392          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 393          KK    Pt_I
 394          KM     Store hydrograph for POC_I
 395          DT   POC_I
 396          DI       0   10000
 397          DQ       0   10000
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 398          KK   S0230
 399          KM        RUNOFF FROM SUBBASIN S0230
 400          BA   0.083
 401          LS       0      99                    85.54
 402          UK     100    .004      .1      49
 403          UK     100    .004      .2      51
 404          RK    1600    .006     .02  0.0125    TRAP       0      50
 405          RK    2600   .0054     .02             TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 406          KK       x
 407          KM    Dummy combination with zero flow to restore position in flow network
 408          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 409          KK    Pt_B
 410          KM     Store hydrograph for POC_B
 411          DT   POC_B
 412          DI       0   10000
 413          DQ       0   10000
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 414          KK   POC_B
 415          KM    Recall B to be routed and combined at J
 416          DR   POC_B
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 417          KK       x
 418          KM    Dummy combination with zero flow to restore position in flow network
 419          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 420          KK   R0230
 421          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0230
 422          RS       1    FLOW      -1
 423          RC      .1    .016      .1    5820   .0046
 424          RX       0     100     101     127     153     180     200     450
 425          RY    2337    2336  2335.5    2335    2335  2335.5    2336    2337
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 426          KK   S0235
 427          KM        RUNOFF FROM SUBBASIN S0235
 428          BA   0.144
 429          LS       0      99                    86.48
 430          UK     300    .004      .1      42
 431          UK     300    .004    .197      58
 432          RK    2367    .006     .02 0.06672    TRAP       0      50
 433          RK    1750    .003     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 434          KK    Pt_E
 435          KM     Store hydrograph for POC_E
 436          DT   POC_E
 437          DI       0   10000
 438          DQ       0   10000
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 439          KK   POC_E
 440          KM    Recall E for routing and eventual combining at J
 441          DR   POC_E
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+

 442          KK       x
 443          KM    Dummy combination with zero flow to restore position in flow network
 444          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 445          KK   R0235
 446          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0235
 447          RS       1    FLOW      -1
 448          RC      .1    .016      .1    3340    .003
 449          RX     100     100     120     125     190     200     275     275
 450          RY    2436    2434    2432    2432    2432    2432    2432    2434
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 451          KK   S0236
 452          KM        RUNOFF FROM SUBBASIN S0236
 453          BA    0.07
 454          LS       0      99                    87.20
 455          UK     300    .004      .1      69
 456          UK     300    .004      .2      31
 457          RK    3400    .003     .02             TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 458          KK   N0236
 459          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0236
 460          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 461          KK   R0236
 462          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0236
 463          RS       1    FLOW      -1
 464          RC      .1    .015      .1    2670    .0026
 465          RX     100     200     280     285     350     350     400     550
 466          RY    2318    2317    2317  2316.2  2316.2  2316.7    2318    2318
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

467           KK   S0240
468           KM        RUNOFF FROM SUBBASIN S0240
469           BA   0.139
470           LS       0      99                    84.93
471           UK     100    .003      .1      67
472           UK     100    .003    .231      33
473           RK     560    .004     .02 0.00469    TRAP       0      50
474           RK    4700    .003     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

475           KK   N0240
476           KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0240
477           HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

478           KK   R0240
479           KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0240
480           RS       1    FLOW      -1
481           RC      .1    .016      .1    1120    .002
482           RX       0      25      50      69      71      90     140     141
483           RY    2331    2330    2330  2328.5  2328.5    2330    2330    2331
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

484           KK   S0250
485           KM        RUNOFF FROM SUBBASIN S0250
486           BA    0.11
487           LS       0      99                    87.14
488           UK     150    .003      .1      74
489           UK     150    .003      .2      26
490           RK     500    .006    .013 0.00625    TRAP       0      50
491           RK    3360    .004     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

492           KK   S0260
493           KM        RUNOFF FROM SUBBASIN S0260
494           BA   0.085
495           LS       0      99                    88.51
496           UK     100    .003      .1      68
497           UK     100    .003    .261      32
498           RK     720    .006     .02 0.00625    TRAP       0      50
499           RK    1870   .0037     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

500           KK   N0260
501           KM       Combine S0250 and S0260
502           HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

503           KK   N0260
504           KM       Combine local basins (S0250 & S0260), flow from north (R0240) and
              *      flow from south (R0230)
505           HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

506           KK    Pt_J
507           KM     Store hydrograph for POC_J
508           DT   POC_J
509           DI       0   10000
510           DQ       0   10000
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

511           KK   S0270
512           KM        RUNOFF FROM SUBBASIN S0270
513           BA   0.078
514           LS       0      99                    92.07
515           UK      50    .018      .1      40
516           UK      50    .018    .206      60
517           RK     550    .011     .02 0.00313    TRAP       0      50
518           RK     550    .012     .02 0.02344    TRAP       0      50
519           RK    3860    .011     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

520           KK       x
521           KM    Dummy combination with zero flow to restore position in flow network
522           HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

523           KK   R0270
524           KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0270
525           RS       1    FLOW      -1
526           RC      .1    .016      .1    2510    .008
527           RX       0      95     200     219     221     240     450     620
528           RY    2362    2361  2360.8    2360    2360  2360.8  2360.8    2362
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

529           KK   S0280
530           KM        RUNOFF FROM SUBBASIN S0280
531           BA   0.133
532           LS       0      99                    88.68
533           UK      50     .01      .1      53
534           UK      50     .01      .2      47
535           RK     950     .01     .02 0.00313    TRAP       0      50
536           RK    1700     .01     .02 0.03906    TRAP       0      50
537           RK    2700   .0074     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 538          KK   N0280
 539          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0280
 540          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 541          KK    Pt_A
 542          KM     Store hydrograph for POC_A
 543          DT   POC_A
 544          DI       0   10000
 545          DQ       0   10000
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 546          KK   POC_A
 547          KM    Recall S0280
 548          DR   POC_A
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 549          KK       x
 550          KM    Dummy combination with zero flow to restore position in flow network
 551          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 552          KK   R0280
 553          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0280
 554          RS       1    FLOW      -1
 555          RC      .1    .016      .1     920   .0054
 556          RX       0     310     350     369     371     390     999    1000
 557          RY    2352    2350  2348.8  2347.5  2347.5  2348.8  2348.8    2352
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 558          KK   S0290
 559          KM        RUNOFF FROM SUBBASIN S0290
 560          BA   0.325
 561          LS       0      99                    90.44
 562          UK     150    .008      .1      55
 563          UK     150    .008    .207      45
 564          RK     300     .01     .02 0.00156    TRAP       0      50
 565          RK     600    .006     .02 0.04688    TRAP       0      50
 566          RK    5300    .009     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 567          KK   N0290
 568          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0290
 569          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 570          KK   R0290
 571          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0290
 572          RS       1    FLOW      -1
 573          RC      .1    .016      .1    2010   .0065
 574          RX       0     300     350     379     381     410    1040    1041
 575          RY    2345    2344  2343.5    2342    2342  2343.4  2343.4    2345
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 576          KK   S0300
 577          KM        RUNOFF FROM SUBBASIN S0300
 578          BA   0.236
 579          LS       0      99                    89.50
 580          UK     150    .005      .1      49
 581          UK     150    .005      .2      51
 582          RK     600    .013     .02 0.00469    TRAP       0      50
 583          RK     580     .01     .02 0.02813    TRAP       0      50
 584          RK    5960    .009     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 585          KK   N0300
 586          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0300
 587          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 588          KK   R0300
 589          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0300
 590          RS       1    FLOW      -1
 591          RC      .1    .025      .1    2075   .0043
 592          RX       0       1     350     375     385     410     690     700
 593          RY    2332    2330    2330    2326    2326    2330    2330    2332
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 594          KK   S0310
 595          KM        RUNOFF FROM SUBBASIN S0310
 596          BA   0.171
 597          LS       0      99                    87.03
 598          UK     100     .01      .1      62
 599          UK     100     .01    .194      38
 600          RK     200     .01     .02 0.00156    TRAP       0      50
 601          RK    1150    .012     .02 0.03125    TRAP       0      50
 602          RK    5500   .0085     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 603          KK   N0310
 604          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0310
 605          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

606           KK   R0310
607           KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0310
608           RS       1    FLOW      -1
609           RC      .1    .025      .1    2480    .006
610           RX       0     800     850     870     880     900     950    1500
611           RY    2329    2324    2324    2318    2318    2324    2324    2325
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

612           KK   S0320
613           KM        RUNOFF FROM SUBBASIN S0320
614           BA   0.119
615           LS       0      99                    90.07
616           UK     150     .01      .1      53
617           UK     150     .01    .196      47
618           RK     550    .009     .02 0.00625    TRAP       0      50
619           RK    1450    .015     .02 0.04219    TRAP       0      50
620           RK    1800    .008     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

621           KK   R0320
622           KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0320
623           RS       1    FLOW      -1
624           RC      .1    .025      .1    3240   .0105
625           RX       0      40      50      70      80     100     150     300
626           RY    2319    2318    2316    2311    2311    2318    2318    2319
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

627           KK   S0330
628           KM        RUNOFF FROM SUBBASIN S0330
629           BA   0.138
630           LS       0      99                    87.11
631           UK     350    .004      .1      15
632           UK     350    .004    .357      85
633           RK     800   .0075     .02 0.03125    TRAP       0      50
634           RK    2500    .006     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

635           KK   S0340
636           KM        RUNOFF FROM SUBBASIN S0340
637           BA   0.106
638           LS       0      99                    91.40
639           UK     150     .01      .1      47
640           UK     150     .01    .203      53
641           RK     700    .022     .02 0.01563    TRAP       0      50
642           RK    3240   .0105     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 643          KK   N0340
 644          KM       COMBINE SUBBASIN HYDROGRAPHS @ N0340
 645          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 646          KK   N0340
 647          KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0340
 648          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 649          KK   R0340
 650          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0340
 651          RS       1    FLOW      -1
 652          RC      .1    .025      .1     400     .02
 653          RX       0      25      50      70      80     100     125     150
 654          RY    2316    2315    2315    2305    2305    2315    2315    2316
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 655          KK   S0350
 656          KM        RUNOFF FROM SUBBASIN S0350
 657          BA   0.213
 658          LS       0      99                    86.12
 659          UK     350    .003      .1      18
 660          UK     350    .003    .318      82
 661          RK     800    .005     .02 0.01563    TRAP       0      50
 662          RK    1700    .003     .02 0.07813    TRAP       0      50
 663          RK    3550   .0099     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 664          KK   N0350
 665          KM       COMBINE CHANNEL HYDROGRAPHS @ N0350
 666          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 667          KK    Pt_K
 668          KM     Store hydrograph for POC_K
 669          DT   POC_K
 670          DI       0   10000
 671          DQ       0   10000
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *
              *  ==================================================================
              *                              BEGIN GR
              *  ==================================================================
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 672          KK   S0010
 673          KM        RUNOFF FROM SUBBASIN S0010
 674          PB    3.60
 675          BA   0.096
 676          LS       0      99                    85.25
 677          UK     200     .02      .1      48
 678          UK     200     .02      .2      52
 679          RK    1867    .006     .02 0.04183    TRAP       0      50
 680          RK    2400    .005     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 681          KK       x
 682          KM    Dummy combination with zero flow to restore position in flow network
 683          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 684          KK    Pt_F
 685          KM     Store hydrograph for POC_F
 686          DT   POC_F
 687          DI       0   10000
 688          DQ       0   10000
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 689          KK   S0020
 690          KM        RUNOFF FROM SUBBASIN S0020
 691          BA   0.137
 692          LS       0      99                    86.09
 693          UK     200     .02      .1      46
 694          UK     200     .02      .2      54
 695          RK    3800    .007     .02  0.1773    TRAP       0      50
 696          RK    4800   .0075     .05            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *

 697          KK       x
 698          KM    Dummy combination with zero flow to restore position in flow network
 699          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 700          KK    Pt_G
 701          KM     Store hydrograph for POC_G
 702          DT   POC_G
 703          DI       0   10000
 704          DQ       0   10000
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 705          KK   S0030
 706          KM        RUNOFF FROM SUBBASIN S0030
 707          BA   0.172
 708          LS       0      99                    86.14
 709          UK     100     .01      .1      45
 710          UK     100     .01    .192      55
 711          RK    2150    .004    .035 0.01542    TRAP       0      50
 712          RK    2150    .003     .05 0.20517    TRAP       0      50
 713          RK    2000    .002     .02            TRAP       0      50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 714          KK       x
 715          KM    Dummy combination with zero flow to restore position in flow network
 716          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 717          KK    Pt_H
 718          KM     Store hydrograph for POC_H
 719          DT   POC_H
 720          DI       0   10000
 721          DQ       0   10000
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * ==========================================================================
              *           Begin recalling and routing diverted hydrographs
              * ==========================================================================
              *

 722          KK       D
 723          KM    Recall N0200
 724          DR   POC_D
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 725          KK       x
 726          KM    Dummy combination with zero flow to restore position in flow network
 727          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 728          KK   R0200
 729          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0200
              * Based on section 145+26 from Mountain Avenue study (DG-R0200)
 730          RS       1    FLOW      -1
 731          RC    .035    .016    .035    2600    .0050
 732          RX       0       0      11      16      51      56      65      65
 733          RY  2363.0  2361.5  2360.9  2360.0  2359.9  2360.8  2361.4  2363.0
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 734          KK        C
 735          KM    Recall N0210
 736          DR   POC_C
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 737          KK       C'
 738          KM   Combine D & C
 739          HC        2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 740          KK   R0210
 741          KM        Route C' through R0210
              * Based on section 104+53 from Mountain Avenue study (DG-R0210)
 742          RS        1    FLOW      -1
 743          RC     .035    .016    .035    3460   .0050
 744          RX        0       0       5      15      47      58      67      67
 745          RY   2340.0  2338.3  2338.2  2336.9  2336.8  2337.9  2338.8  2340.0
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 746          KK        I
 747          KM    Recall N0220
 748          DR   POC_I
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+

 749          KK       I'
 750          KM   Add I to C
 751          HC        2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 752          KK   R0220
 753          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0220
              * Based on section 89+99 from Mountain Avenue study (DG-R0220)
 754          RS        1    FLOW      -1
 755          RC     .035    .016    .035    1830   .0045
 756          RX        0       0      15      24      56      65      75      75
 757          RY   2336.0  2333.2  2332.7  2331.4  2331.3  2332.6  2333.2  2336.0
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 758          KK        J
 759          KM    Recall N0260
 760          DR   POC_J
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 761          KK      J'
 762          KM   Add J to I
 763          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 764          KK   R0260
 765          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0260
              * Based on section 61+24 from Mountain Avenue study (DG-R0260)
 766          RS       1    FLOW      -1
 767          RC    .050    .030    .050    3270   .0022
 768          RX      17      17      25      26      38      39      48      48
 769          RY  2328.0  2323.0  2315.2  2314.4  2314.9  2315.2  2323.0  2328.0
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *

 770          KK   POC_K
 771          KM    Recall N0350
 772          DR   POC_K
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 773          KK      K'
 774          KM   Add K to J
 775          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *
              *
              *

 776          KK      A'
 777          KM    Recall S0280
 778          DR   POC_A
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *

 779          KK      B'
 780          KM    Recall S0230
 781          DR   POC_B
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *

 782          KK      E'
 783          KM    Recall S0235
 784          DR   POC_E
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 785          KK       x
 786          KM    Dummy combination to restore position in flow network.  Ingore result
 787          HC       4
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *
              *

 788          KK      F'
 789          KM    Recall S0010
 790          DR   POC_F
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 791          KK   R0010
 792          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0010
 793          RS       1    FLOW      -1
 794          RC     .06    .016     .06    1300    .002
 795          RX     100     100     130     140     210     240     275     275
 796          RY    2330  2328.5    2328    2326    2326    2327    2328    2330
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 797          KK   POC_G
 798          KM    Recall N0020
 799          DR   POC_G
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 800          KK      G'
 801          KM   Add F to G
 802          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 803          KK   R0020
 804          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0020
 805          RS       1    FLOW      -1
 806          RC     .06    .016     .06    1157   .0026
 807          RX     100     118     129     135     200     210     222     240
 808          RY    2326    2326    2325    2325    2325    2325    2325    2327
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 809          KK   R0025
 810          KM        ROUTING HYDROGRAPH THROUGH CHANNEL R0025
 811          RS       1    FLOW      -1
 812          RC     .06    .015     .06     843    .003
 813          RX     100     100     130     130     146     146     200     200
 814          RY    2319  2317.5  2317.5  2309.5  2309.5  2317.5  2317.5    2319
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  815         KK   POC_H
  816         KM    Recall N0030
  817         DR   POC_H
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  818         KK      H'
  819         KM   Add G to H
  820         HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
  821         ZZ
1
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.       (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   6       S0010
               V
               V
  35       R0010
               .
               .
  41           .       S0020
               .           .
               .           .
  50       N0020............
               V
               V
  53       R0020
               .
               .
  59           .       S0030
               .           V
               .           V
  68           .       R0030
               .           .
               .           .
  74           .           .       S0040
               .           .           V
               .           .           V
  83           .           .       R0040
               .           .           .
               .           .           .
  89           .       N0050............
               .           .
               .           .
  92           .           .       S0050
               .           .           .
               .           .           .
 101           .       N0050............
               .           V
               .           V
 104           .       R0050
               .           .
               .           .
 110       N0060............
               .
               .
 113           .       S0060
               .           .
               .           .
 122       N0060............
               V
               V
 125       R0060
               .
               .
 131           .       S0070
               .           .
               .           .
 140       N0070............
```

```
                V
                V
143         R0070
                .
                .
149             .       S0080
                .           .
                .           .
157         N0080............
                V
                V
160         R0080
                .
                .
166             .       S0090
                .           .
                .           .
174         N0090............
                V
                V
177         R0090
                .
                .
183             .       S0100
                .           V
                .           V
192             .       R0100
                .           .
                .           .
198             .           .       S0110
                .           .           .
                .           .           .
207             .       N0110............
                .           V
                .           V
210             .       R0110
                .           .
                .           .
216             .           .       S0120
                .           .           V
                .           .           V
224             .           .       R0120
                .           .           .
                .           .           .
230             .           .           .       S0130
                .           .           .           .
                .           .           .           .
238             .           .       N0130............
                .           .           V
                .           .           V
241             .           .       R0130
                .           .           .
                .           .           .
247             .           .           .       S0140
                .           .           .           .
                .           .           .           .
256             .           .       N0140............
                .           .           .
                .           .           .
262             .           .           .------->    SD_x
260             .           .         sdx
```

```
                .           .           V
                .           .           V
265             .           .       R0140
                .           .           .
                .           .           .
271             .       N0150............
                .           .
                .           .
274             .           .       S0150
                .           .           .
                .           .           .
283             .       N0150............
                .           V
                .           V
286             .       R0150
                .           .
                .           .
292             .           .       S0160
                .           .           .
                .           .           .
300             .           .           .       S0170
                .           .           .           .
                .           .           .           .
308             .           .       N0170............
                .           .           .
                .           .           .
311             .       N0170............
                .           .
                .           .
316             .           .------->   SD_y
314             .         sdy
                .           V
                .           V
319             .       R0170
                .           .
                .           .
325         N0180............
                .
                .
328             .       S0180
                .           .
                .           .
336         N0180............
                .
                .
341             .------->   SD_z
339           sdz
                V
                V
344         R0180
                .
                .
350             .       S0200
                .           .
                .           .
358         N0200............
                .
                .
363             .------->   POC_D
361           Pt_D
                .
```

```
                .
366             .       S0210
                .           .
                .           .
374             x............
                .
                .
379             .------->   POC_C
377         Pt_C
                .
                .
382             .       S0220
                .           .
                .           .
390             x............
                .
                .
395             .------->   POC_I
393         Pt_I
                .
                .
398             .       S0230
                .           .
                .           .
406             x............
                .
                .
411             .------->   POC_B
409         Pt_B
                .
                .
416             .           .<-------   POC_B
414             .       POC_B
                .           .
                .           .
417             x............
                V
                V
420         R0230
                .
                .
426             .       S0235
                .           .
                .           .
436             .           .------->   POC_E
434             .        Pt_E
                .           .
                .           .
441             .           .           .<-------   POC_E
439             .           .       POC_E
                .           .           .
                .           .           .
442             .           x............
                .           V
                .           V
445             .       R0235
                .           .
                .           .
451             .           .       S0236
                .           .           .
                .           .           .
```

```
458          .       N0236............
             .           V
             .           V
461          .       R0236
             .           .
             .           .
467          .           .       S0240
             .           .           .
             .           .           .
475          .       N0240............
             .           V
             .           V
478          .       R0240
             .           .
             .           .
484          .           .       S0250
             .           .           .
             .           .           .
492          .           .           .       S0260
             .           .           .           .
             .           .           .           .
500          .           .       N0260............
             .           .           .
             .           .           .
503     N0260........................
             .
             .
508          .-------->   POC_J
506      Pt_J
             .
             .
511          .       S0270
             .           .
             .           .
520          x............
             V
             V
523     R0270
             .
             .
529          .       S0280
             .           .
             .           .
538     N0280............
             .
             .
543          .-------->   POC_A
541      Pt_A
             .
             .
548          .           .<-------   POC_A
546          .       POC_A
             .           .
             .           .
549          x............
             V
             V
552     R0280
             .
             .
558          .       S0290
```

```
                .           .
                .           .
567         N0290............
                V
                V
570         R0290
                .
                .
576             .       S0300
                .           .
                .           .
585         N0300............
                V
                V
588         R0300
                .
                .
594             .       S0310
                .           .
                .           .
603         N0310............
                V
                V
606         R0310
                .
                .
612             .       S0320
                .           V
                .           V
621             .       R0320
                .           .
                .           .
627             .           .       S0330
                .           .           .
                .           .           .
635             .           .           .       S0340
                .           .           .           .
                .           .           .           .
643             .           .       N0340............
                .           .           .
                .           .           .
646         N0340........................
                V
                V
649         R0340
                .
                .
655             .       S0350
                .           .
                .           .
664         N0350............
                .
                .
669             .-------->   POC_K
667          Pt_K
                .
                .
672             .       S0010
                .           .
                .           .
681             x............
```

```
                .
                .
686             .-------->   POC_F
684          Pt_F
                .
                .
689             .       S0020
                .           .
                .           .
697             x............
                .
                .
702             .-------->   POC_G
700          Pt_G
                .
                .
705             .       S0030
                .           .
                .           .
714             x............
                .
                .
719             .-------->   POC_H
717          Pt_H
                .
                .
724             .           .<-------   POC_D
722             .           D
                .           .
                .           .
725             x............
                V
                V
728          R0200
                .
                .
736             .           .<-------   POC_C
734             .           C
                .           .
                .           .
737            C'............
                V
                V
740          R0210
                .
                .
748             .           .<-------   POC_I
746             .           I
                .           .
                .           .
749            I'............
                V
                V
752          R0220
                .
                .
760             .           .<-------   POC_J
758             .           J
                .           .
                .           .
761            J'............
```

```
                V
                V
764         R0260
                .
                .
772             .           .<-------   POC_K
770             .       POC_K
                .           .
                .           .
773           K'............
                .
                .
778             .           .<-------   POC_A
776             .          A'
                .           .
                .           .
781             .           .           .<-------   POC_B
779             .           .          B'
                .           .           .
                .           .           .
784             .           .           .           .<-------   POC_E
782             .           .           .          E'
                .           .           .           .
                .           .           .           .
785             x.................................
                .
                .
790             .           .<-------   POC_F
788             .          F'
                .           V
                .           V
791             .       R0010
                .           .
                .           .
799             .           .           .<-------   POC_G
797             .           .       POC_G
                .           .           .
                .           .           .
800             .          G'............
                .           V
                .           V
803             .       R0020
                .           V
                .           V
809             .       R0025
                .           .
                .           .
817             .           .           .<-------   POC_H
815             .           .       POC_H
                .           .           .
                .           .           .
818             .          H'............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
*  RUN DATE  06/09/2006  TIME  09:14:27 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

```
                    Appendix E
                    RECONFIGURED TSMS(3)
                    Should produce same results as Refined TSMS(2)

  5 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN          1  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1    0  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      1    0  ENDING DATE
                     NDTIME       0459  ENDING TIME
                      ICENT         19  CENTURY MARK

                 COMPUTATION INTERVAL     .02 HOURS
                      TOTAL TIME BASE    4.98 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S0010	389.	.43	50.	50.	50.	.14		
+	ROUTED TO	R0010	324.	.50	50.	50.	50.	.14	2415.20	.50
+	HYDROGRAPH AT	S0020	224.	.38	30.	30.	30.	.10		
+	2 COMBINED AT	N0020	504.	.47	80.	80.	80.	.24		
+	ROUTED TO	R0020	448.	.57	80.	80.	80.	.24	2401.01	.57
+	HYDROGRAPH AT	S0030	482.	.37	57.	57.	57.	.16		
+	ROUTED TO	R0030	465.	.40	57.	57.	57.	.16	2398.71	.40
+	HYDROGRAPH AT	S0040	273.	.40	35.	35.	35.	.10		
+	ROUTED TO	R0040	260.	.43	35.	35.	35.	.10	2398.70	.43
+	2 COMBINED AT	N0050	715.	.42	92.	92.	92.	.27		
+	HYDROGRAPH AT	S0050	213.	.28	21.	21.	21.	.06		
+	2 COMBINED AT	N0050	835.	.42	113.	113.	113.	.33		
+	ROUTED TO	R0050	782.	.45	113.	113.	113.	.33	2392.94	.45
+	2 COMBINED AT	N0060	1169.	.50	193.	193.	193.	.57		
+	HYDROGRAPH AT	S0060	186.	.40	24.	24.	24.	.07		
+	2 COMBINED AT	N0060	1317.	.48	216.	216.	216.	.65		

+	ROUTED TO	R0060	1180.	.58	216.	216.	216.	.65	2385.75	.58
+										
+	HYDROGRAPH AT	S0070	134.	.30	18.	18.	18.	.06		
+	2 COMBINED AT	N0070	1254.	.57	234.	234.	234.	.70		
+	ROUTED TO	R0070	1210.	.63	234.	234.	234.	.70	2381.99	.63
+										
+	HYDROGRAPH AT	S0080	101.	.23	11.	11.	11.	.03		
+	2 COMBINED AT	N0080	1242.	.63	245.	245.	245.	.74		
+	ROUTED TO	R0080	1239.	.65	244.	244.	244.	.74	2379.34	.65
+										
+	HYDROGRAPH AT	S0090	262.	.43	38.	38.	38.	.12		
+	2 COMBINED AT	N0090	1398.	.63	282.	282.	282.	.86		
+	ROUTED TO	R0090	1398.	.63	282.	282.	282.	.86	2371.66	.63
+										
+	HYDROGRAPH AT	S0100	651.	.48	95.	95.	95.	.29		
+	ROUTED TO	R0100	458.	.65	94.	94.	94.	.29	2435.03	.65
+										
+	HYDROGRAPH AT	S0110	445.	.48	67.	67.	67.	.21		
+	2 COMBINED AT	N0110	809.	.57	161.	161.	161.	.50		
+	ROUTED TO	R0110	638.	.78	160.	160.	160.	.50	2396.26	.78
+										
+	HYDROGRAPH AT	S0120	331.	.35	42.	42.	42.	.13		
+	ROUTED TO	R0120	175.	.58	42.	42.	42.	.13	2411.58	.58
+										
+	HYDROGRAPH AT	S0130	241.	.58	45.	45.	45.	.16		

+	2 COMBINED AT	N0130	416.	.58	87.	87.	87.	.29	
+	ROUTED TO	R0130	401.	.65	87.	87.	87.	.29	2389.40 .65
+	HYDROGRAPH AT	S0140	284.	.55	52.	52.	52.	.18	
+	2 COMBINED AT	N0140	663.	.62	138.	138.	138.	.46	
+	DIVERSION TO	SD_x	216.	.62	92.	92.	92.	.46	
+	HYDROGRAPH AT	sdx	447.	.62	46.	46.	46.	.46	
+	ROUTED TO	R0140	440.	.65	46.	46.	46.	.46	2389.40 .65
+	2 COMBINED AT	N0150	1052.	.70	206.	206.	206.	.97	
+	HYDROGRAPH AT	S0150	228.	.45	36.	36.	36.	.12	
+	2 COMBINED AT	N0150	1201.	.67	242.	242.	242.	1.08	
+	ROUTED TO	R0150	972.	.92	242.	242.	242.	1.08	2385.97 .92
+	HYDROGRAPH AT	S0160	199.	.63	38.	38.	38.	.13	
+	HYDROGRAPH AT	S0170	373.	.47	56.	56.	56.	.17	
+	2 COMBINED AT	N0170	501.	.50	94.	94.	94.	.30	
+	2 COMBINED AT	N0170	1258.	.82	336.	336.	336.	1.38	
+	DIVERSION TO	SD_y	312.	.82	165.	165.	165.	1.38	
+	HYDROGRAPH AT	sdy	946.	.82	170.	170.	170.	1.38	
+	ROUTED TO	R0170	704.	1.18	170.	170.	170.	1.38	2376.51 1.18
+	2 COMBINED AT	N0180	1754.	.68	452.	452.	452.	2.24	

+	HYDROGRAPH AT	S0180	82.	.48	13.	13.	13.	.04	
+	2 COMBINED AT	N0180	1812.	.67	466.	466.	466.	2.28	
+	DIVERSION TO	SD_z	355.	.67	180.	180.	180.	2.28	
+	HYDROGRAPH AT	sdz	1457.	.67	286.	286.	286.	2.28	
+	ROUTED TO	R0180	1407.	.77	286.	286.	286.	2.28	2365.96 .75
+									
+	HYDROGRAPH AT	S0200	204.	.43	31.	31.	31.	.09	
+	2 COMBINED AT	N0200	1510.	.73	316.	316.	316.	2.38	
+	DIVERSION TO	POC_D	1510.	.02	316.	316.	316.	2.38	
+	HYDROGRAPH AT	Pt_D	0.	.02	0.	0.	0.	2.38	
+	HYDROGRAPH AT	S0210	99.	.38	14.	14.	14.	.04	
+	2 COMBINED AT	x	99.	.38	14.	14.	14.	2.42	
+	DIVERSION TO	POC_C	99.	.02	14.	14.	14.	2.42	
+	HYDROGRAPH AT	Pt_C	0.	.02	0.	0.	0.	2.42	
+	HYDROGRAPH AT	S0220	342.	.45	53.	53.	53.	.17	
+	2 COMBINED AT	x	342.	.45	53.	53.	53.	2.59	
+	DIVERSION TO	POC_I	342.	.02	53.	53.	53.	2.59	
+	HYDROGRAPH AT	Pt_I	0.	.02	0.	0.	0.	2.59	
+	HYDROGRAPH AT	S0230	152.	.48	25.	25.	25.	.08	
+	2 COMBINED AT	x	152.	.48	25.	25.	25.	2.67	
+	DIVERSION TO	POC_B	152.	.02	25.	25.	25.	2.67	

+	HYDROGRAPH AT	Pt_B	0.	.02	0.	0.	0.	2.67	
+	HYDROGRAPH AT	POC_B	152.	.48	25.	25.	25.	.00	
+	2 COMBINED AT	x	152.	.48	25.	25.	25.	2.67	
+	ROUTED TO	R0230	74.	.88	24.	24.	24.	2.67	2335.48 .88
+	HYDROGRAPH AT	S0235	190.	.55	42.	42.	42.	.14	
+	DIVERSION TO	POC_E	190.	.02	42.	42.	42.	.14	
+	HYDROGRAPH AT	Pt_E	0.	.02	0.	0.	0.	.14	
+	HYDROGRAPH AT	POC_E	190.	.55	42.	42.	42.	.00	
+	2 COMBINED AT	x	190.	.55	42.	42.	42.	.14	
+	ROUTED TO	R0235	110.	1.10	41.	41.	41.	.14	2432.42 1.08
+	HYDROGRAPH AT	S0236	122.	.55	24.	24.	24.	.07	
+	2 COMBINED AT	N0236	174.	.85	64.	64.	64.	.21	
+	ROUTED TO	R0236	168.	1.03	63.	63.	63.	.21	2316.87 1.03
+	HYDROGRAPH AT	S0240	254.	.60	46.	46.	46.	.14	
+	2 COMBINED AT	N0240	350.	.63	109.	109.	109.	.35	
+	ROUTED TO	R0240	324.	.80	109.	109.	109.	.35	2330.63 .80
+	HYDROGRAPH AT	S0250	250.	.47	38.	38.	38.	.11	
+	HYDROGRAPH AT	S0260	219.	.38	29.	29.	29.	.09	
+	2 COMBINED AT	N0260	436.	.43	68.	68.	68.	.19	

+	3 COMBINED AT	N0260	632.	.68	201.	201.	201.	3.22	
+	DIVERSION TO	POC_J	632.	.02	201.	201.	201.	3.22	
+	HYDROGRAPH AT	Pt_J	0.	.02	0.	0.	0.	3.22	
+	HYDROGRAPH AT	S0270	213.	.40	26.	26.	26.	.08	
+	2 COMBINED AT	x	213.	.40	26.	26.	26.	3.30	
+	ROUTED TO	R0270	112.	.60	26.	26.	26.	3.30	2360.88 .60
+	HYDROGRAPH AT	S0280	343.	.42	43.	43.	43.	.13	
+	2 COMBINED AT	N0280	440.	.43	69.	69.	69.	3.43	
+	DIVERSION TO	POC_A	440.	.02	69.	69.	69.	3.43	
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+	2 COMBINED AT	x	440.	.43	69.	69.	69.	3.43	
+	ROUTED TO	R0280	307.	.63	69.	69.	69.	3.43	2349.03 .63
+	HYDROGRAPH AT	S0290	739.	.45	109.	109.	109.	.32	
+	2 COMBINED AT	N0290	978.	.47	179.	179.	179.	3.76	
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+	HYDROGRAPH AT	S0300	446.	.53	76.	76.	76.	.24	
+	2 COMBINED AT	N0300	984.	.63	255.	255.	255.	3.99	
+	ROUTED TO	R0300	918.	.82	254.	254.	254.	3.99	2329.91 .82

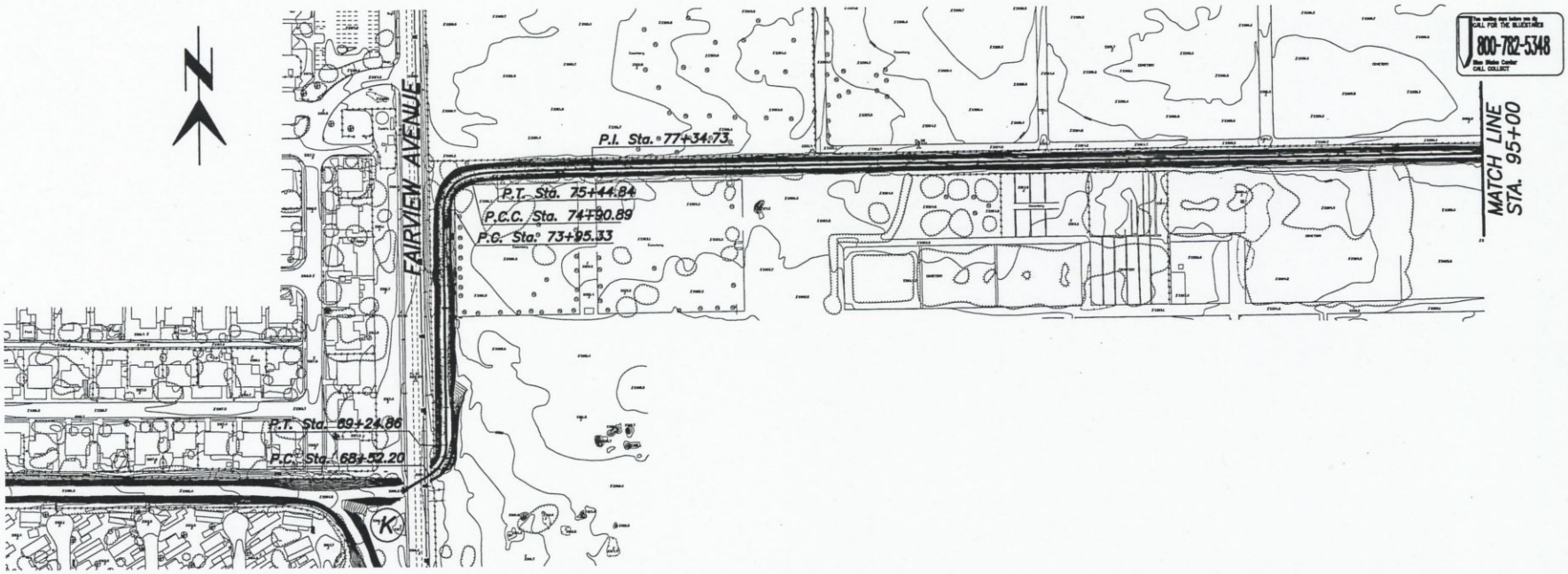
+	HYDROGRAPH AT	S0310	384.	.48	57.	57.	57.	.17	
+	2 COMBINED AT	N0310	1152.	.58	311.	311.	311.	4.16	
+	ROUTED TO	R0310	1120.	.72	310.	310.	310.	4.16	2322.71 .72
+	HYDROGRAPH AT	S0320	299.	.37	40.	40.	40.	.12	
+	ROUTED TO	R0320	231.	.50	40.	40.	40.	.12	2312.89 .50
+	HYDROGRAPH AT	S0330	87.	1.30	34.	34.	34.	.14	
+	HYDROGRAPH AT	S0340	256.	.38	35.	35.	35.	.11	
+	2 COMBINED AT	N0340	290.	.42	70.	70.	70.	.24	
+	3 COMBINED AT	N0340	1513.	.63	420.	420.	420.	4.53	
+	ROUTED TO	R0340	1513.	.65	420.	420.	420.	4.53	2309.60 .65
+	HYDROGRAPH AT	S0350	126.	.77	52.	52.	52.	.21	
+	2 COMBINED AT	N0350	1621.	.67	471.	471.	471.	4.74	
+	DIVERSION TO	POC_K	1621.	.02	471.	471.	471.	4.74	
+	HYDROGRAPH AT	Pt_K	0.	.02	0.	0.	0.	4.74	
+	HYDROGRAPH AT	S0010	227.	.43	34.	34.	34.	.10	
+	2 COMBINED AT	x	227.	.43	34.	34.	34.	4.84	
+	DIVERSION TO	POC_F	227.	.02	34.	34.	34.	4.84	
+	HYDROGRAPH AT	Pt_F	0.	.02	0.	0.	0.	4.84	
+	HYDROGRAPH AT	S0020	216.	.83	49.	49.	49.	.14	
	2 COMBINED AT								

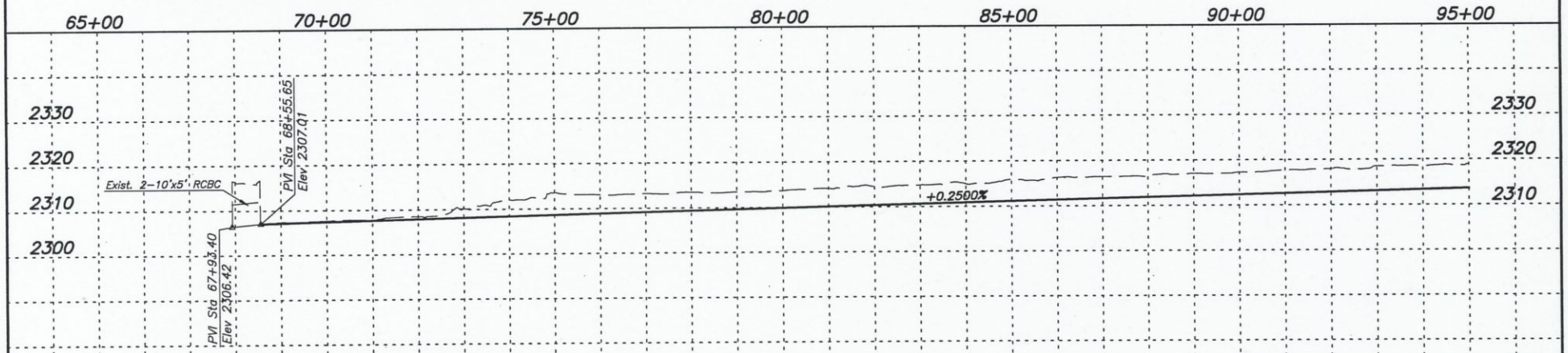
+		x	216.	.83	49.	49.	49.	4.97		
+	DIVERSION TO	POC_G	216.	.02	49.	49.	49.	4.97		
+	HYDROGRAPH AT	Pt_G	0.	.02	0.	0.	0.	4.97		
+	HYDROGRAPH AT	S0030	293.	.82	61.	61.	61.	.17		
+	2 COMBINED AT	x	293.	.82	61.	61.	61.	5.14		
+	DIVERSION TO	POC_H	293.	.02	61.	61.	61.	5.14		
+	HYDROGRAPH AT	Pt_H	0.	.02	0.	0.	0.	5.14		
+	HYDROGRAPH AT	D	1510.	.73	316.	316.	316.	.00		
+	2 COMBINED AT	x	1510.	.73	316.	316.	316.	5.14		
+	ROUTED TO	R0200	1493.	.80	316.	316.	316.	5.14	2362.58	.80
+	HYDROGRAPH AT	C	99.	.38	14.	14.	14.	.00		
+	2 COMBINED AT	C'	1531.	.80	330.	330.	330.	5.14		
+	ROUTED TO	R0210	1500.	.87	329.	329.	329.	5.14	2339.44	.87
+	HYDROGRAPH AT	I	342.	.45	53.	53.	53.	.00		
+	2 COMBINED AT	I'	1654.	.85	382.	382.	382.	5.14		
+	ROUTED TO	R0220	1645.	.88	382.	382.	382.	5.14	2334.19	.88
+	HYDROGRAPH AT	J	632.	.68	201.	201.	201.	.00		
+	2 COMBINED AT	J'	2221.	.87	583.	583.	583.	5.14		
+	ROUTED TO	R0260	2153.	.97	580.	580.	580.	5.14	2325.73	.97
+	HYDROGRAPH AT									

+		POC_K	1621.	.67	471.	471.	471.	.00	
+	2 COMBINED AT	K'	3609.	.92	1051.	1051.	1051.	5.14	
+	HYDROGRAPH AT	A'	440.	.43	69.	69.	69.	.00	
+	HYDROGRAPH AT	B'	152.	.48	25.	25.	25.	.00	
+	HYDROGRAPH AT	E'	190.	.55	42.	42.	42.	.00	
+	4 COMBINED AT	x	4028.	.88	1188.	1188.	1188.	5.14	
+	HYDROGRAPH AT	F'	227.	.43	34.	34.	34.	.00	
+	ROUTED TO	R0010	189.	.55	34.	34.	34.	.00	2326.73 .55
+	HYDROGRAPH AT	POC_G	216.	.83	49.	49.	49.	.00	
+	2 COMBINED AT	G'	343.	.78	83.	83.	83.	.00	
+	ROUTED TO	R0020	340.	.82	82.	82.	82.	.00	2325.90 .82
+	ROUTED TO	R0025	340.	.83	82.	82.	82.	.00	2312.03 .83
+	HYDROGRAPH AT	POC_H	293.	.82	61.	61.	61.	.00	
+	2 COMBINED AT	H'	632.	.82	143.	143.	143.	.00	

*** NORMAL END OF HEC-1 ***

Appendix 3a. Concept Plan -- Future Navajo Wash





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Preliminary
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NO.	DATE	REVISION	BY	CHKD.	APPR.

DEPARTMENT OF TRANSPORTATION/ENGINEERING DIVISION

NAVAJO ROAD / WASH
FAIRVIEW AVENUE TO FORT LOWELL ROAD

1 OF 5

CITY OF TUCSON

DRWN. BY	RMW	2006	REF. F.B.XXXX SCALE:
DSGN. BY	RMW	2006	
CHKD. BY	MTJ	2006	PLAN NO. I-2006-XXX

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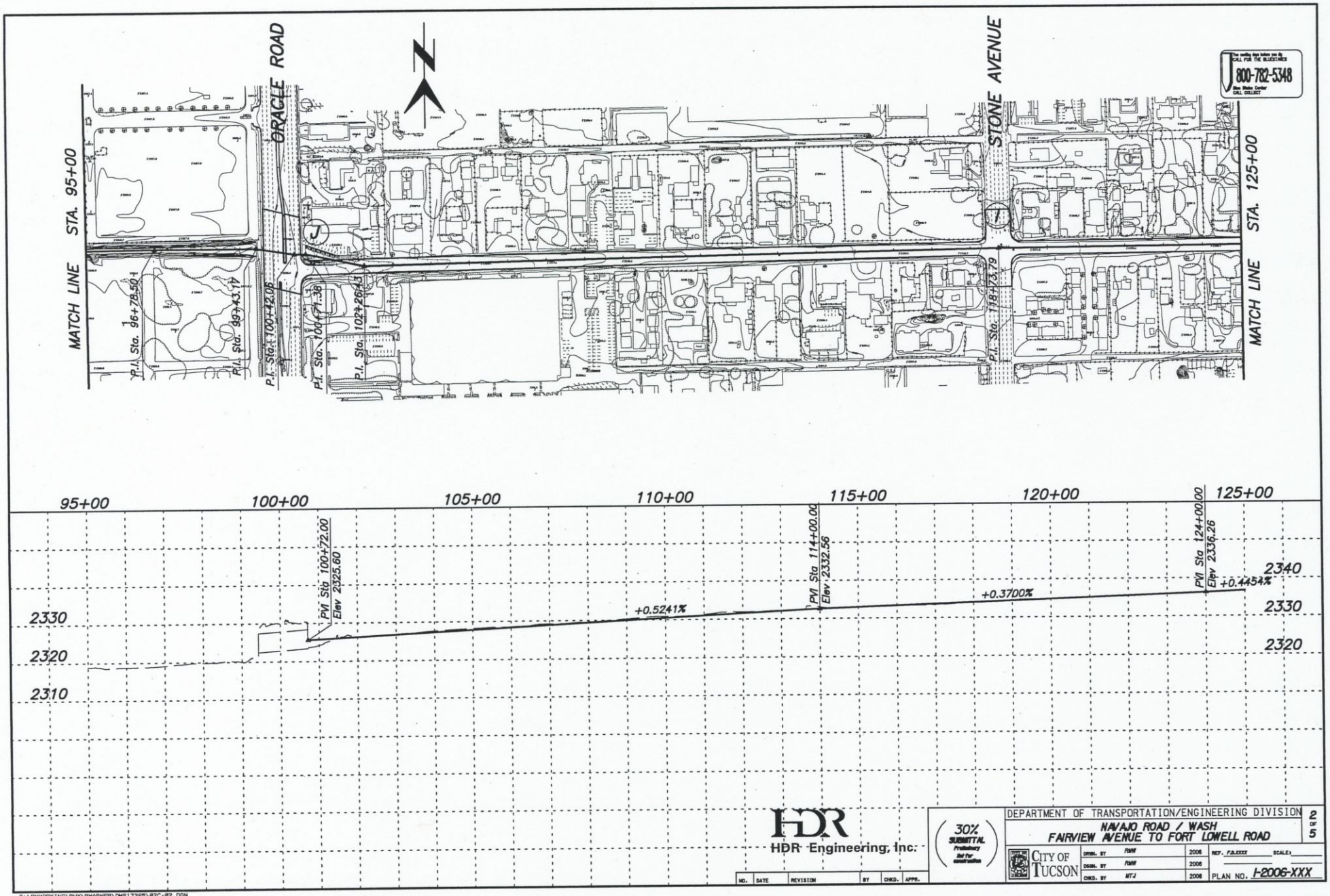

HDR Engineering, Inc.

30% SUBMITTAL Preliminary Not For construction

NO.	DATE	REVISION	BY	CHKD.	APPR.

DEPARTMENT OF TRANSPORTATION/ENGINEERING DIVISION

NAVAJO ROAD / WASH
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CITY OF TUCSON

DRWN. BY	RWW	2006	REF. F.B.XXXX SCALE:
DSGN. BY	RWW	2006	
CHKD. BY	MTJ	2006	PLAN NO. I-2006-XXX

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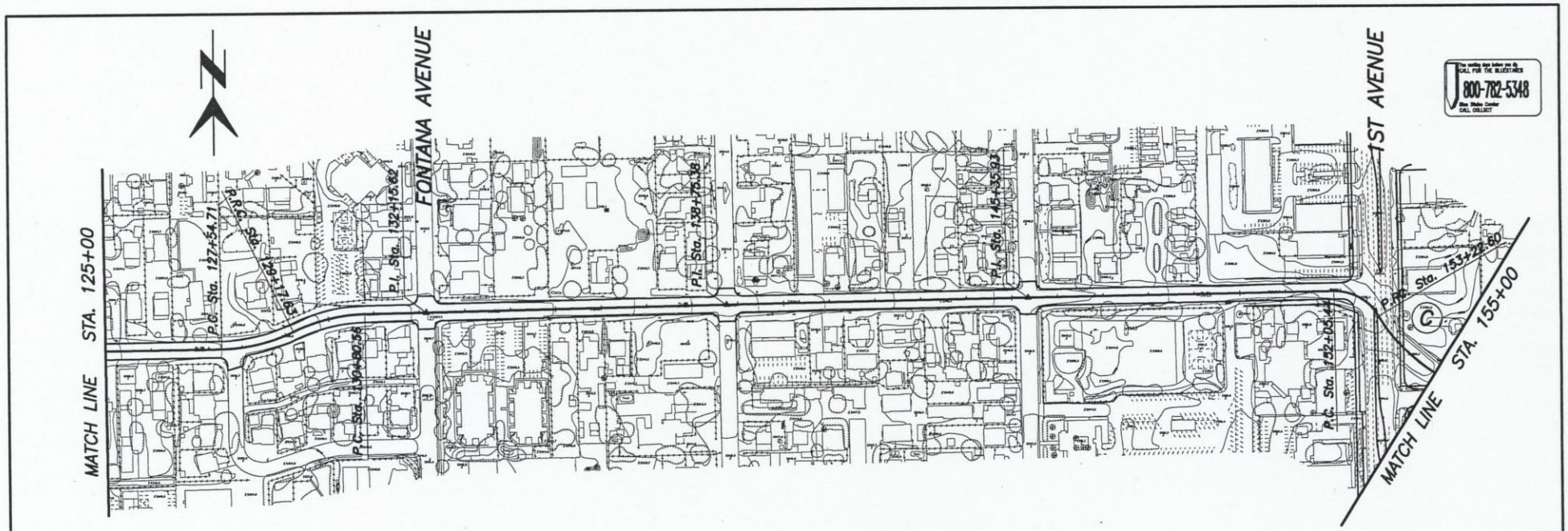

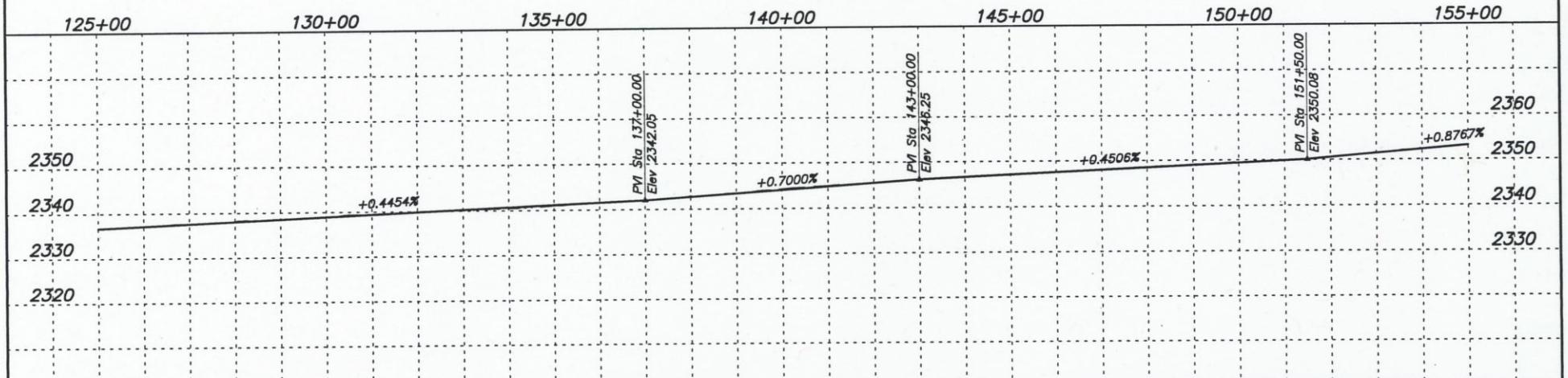

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DEPARTMENT OF TRANSPORTATION/ENGINEERING DIVISION

NAVAJO ROAD / WASH
FAIRVIEW AVENUE TO FORT LOWELL ROAD

3 of 5

CITY OF TUCSON

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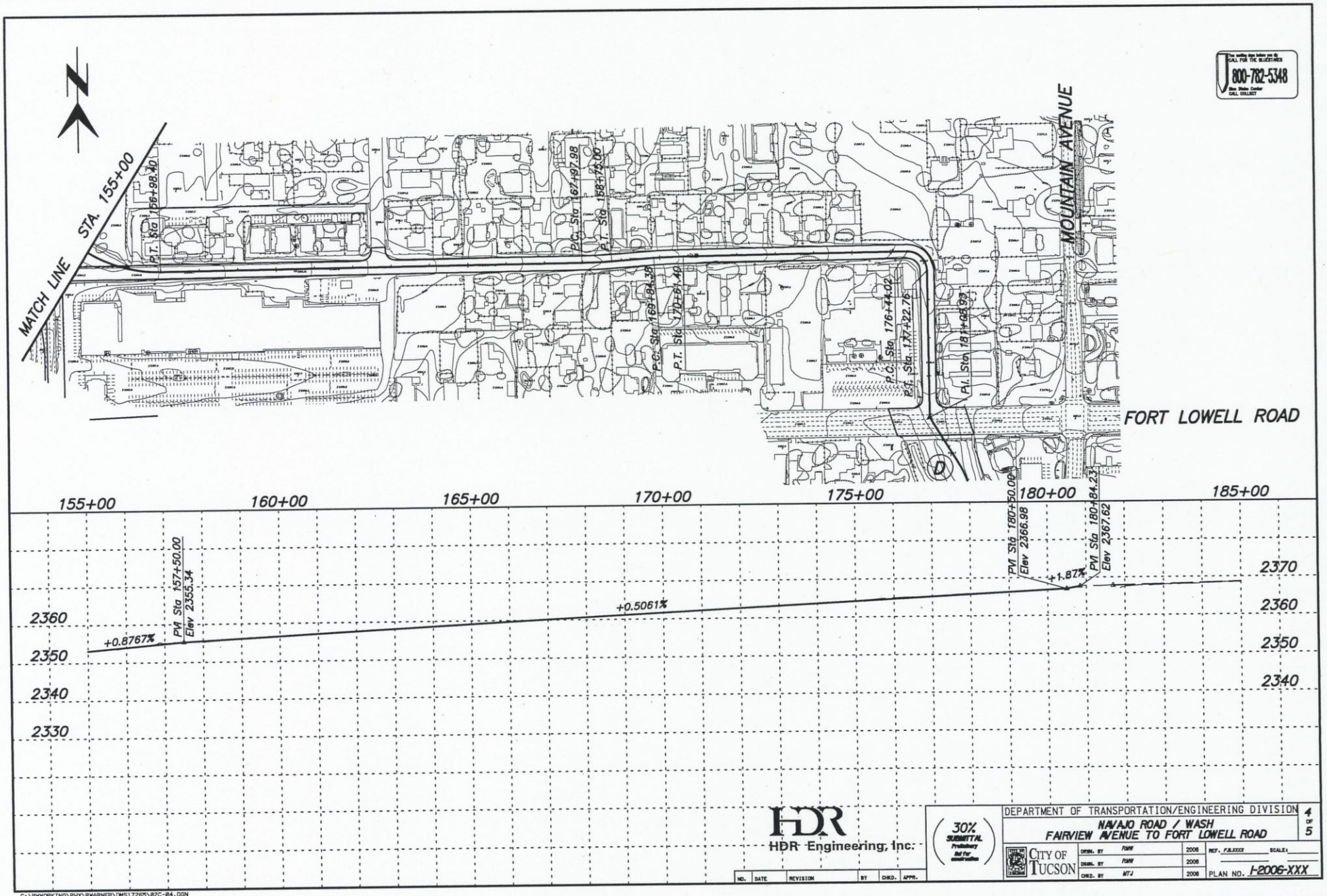

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NAVAJO ROAD / WASH
FAIRVIEW AVENUE TO FORT LOWELL ROAD

4 of 5

CITY OF TUCSON

DRWN. BY	RWW	2006
DSGN. BY	RWW	2006
CHKD. BY	MTJ	2006

REF. F.B.XXXX SCALE:1

PLAN NO. I-2006-XXX

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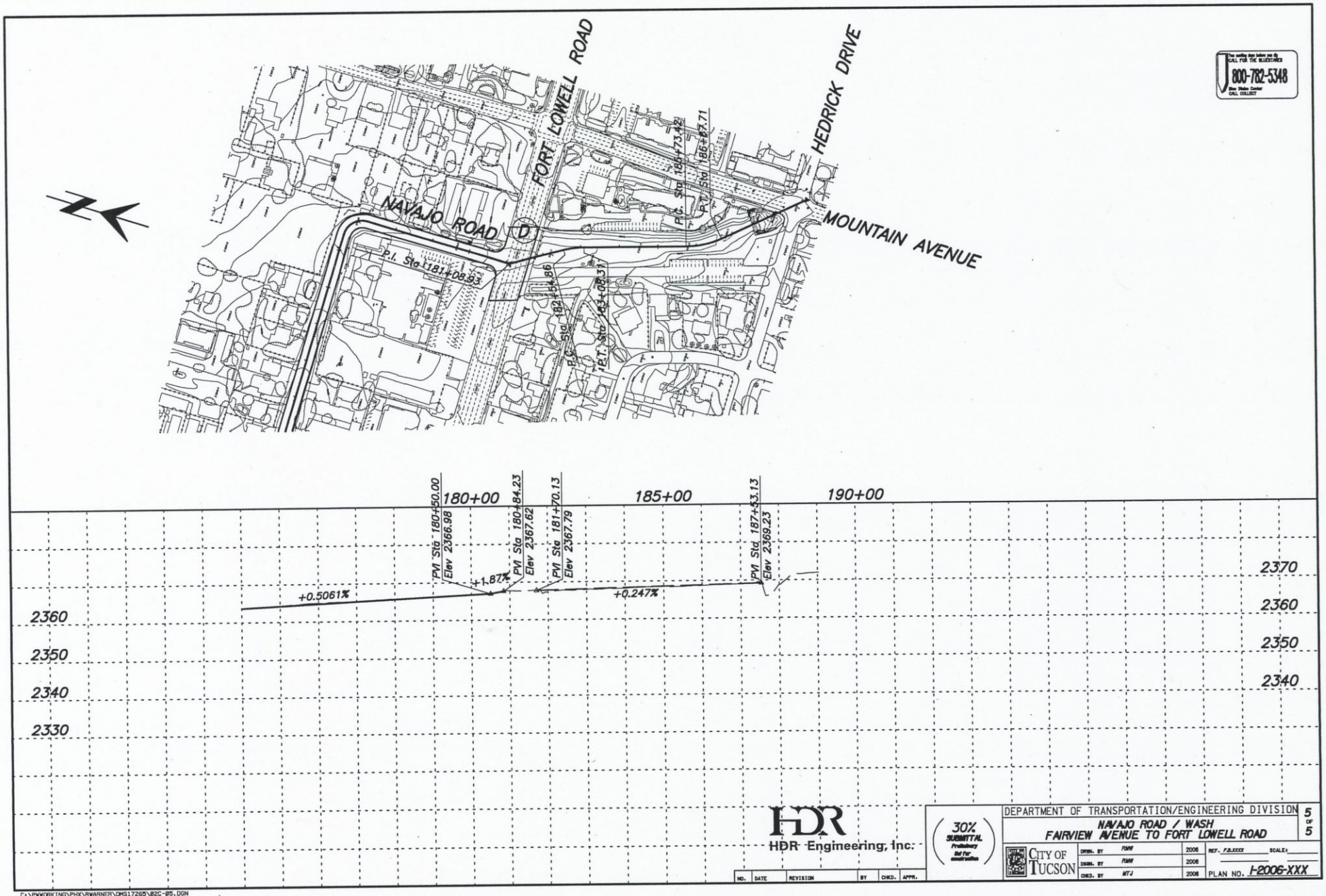
NAVAJO ROAD
FORT LOWELL ROAD
HEDRICK DRIVE
MOUNTAIN AVENUE
P.I. Sta 181+08.93
P.C. Sta 182+64.86
P.T. Sta 183+08.31
P.C. Sta 185+73.42
P.T. Sta 186+87.71
180+00
185+00
190+00
PVI Sta 180+50.00
Elev 2366.98
PVI Sta 180+84.23
Elev 2367.62
PVI Sta 181+70.13
Elev 2367.79
PVI Sta 187+53.13
Elev 2369.23
+0.5061%
+1.87%
+0.247%
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HDR
HDR Engineering, Inc.
30% SUBMITTAL
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NO. DATE REVISION BY CHKD. APPR.
DEPARTMENT OF TRANSPORTATION/ENGINEERING DIVISION
NAVAJO ROAD / WASH
FAIRVIEW AVENUE TO FORT LOWELL ROAD
5 OF 5
CITY OF TUCSON
DRWN. BY RMW 2006
DSGN. BY RMW 2006
CHKD. BY MTJ 2006
REF. F.B.XXXX
SCALE:
PLAN NO. I-2006-XXX
Two working days before you dig CALL FOR THE BLUESTAKES 800-782-5348 Blue Stake Center CALL COLLECT
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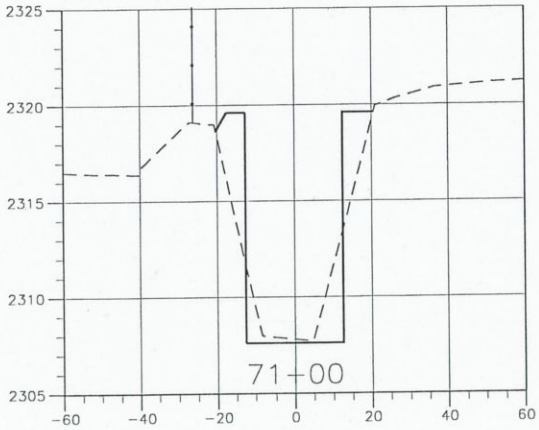
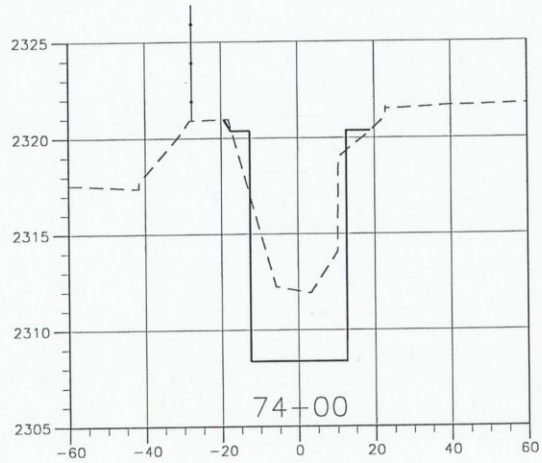
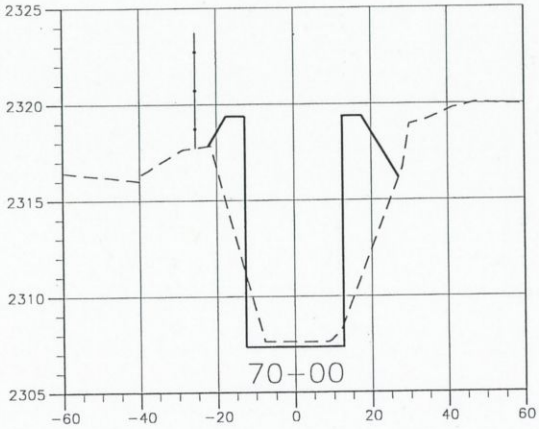
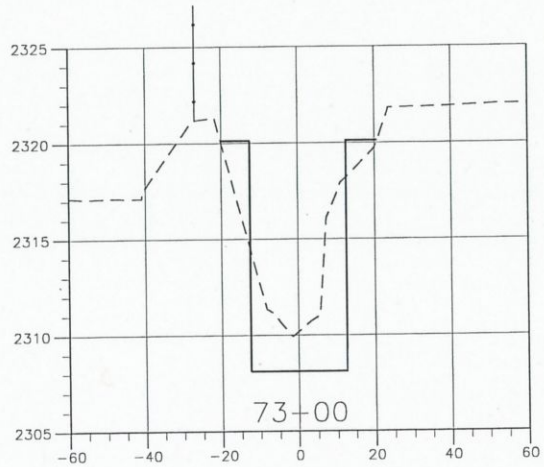
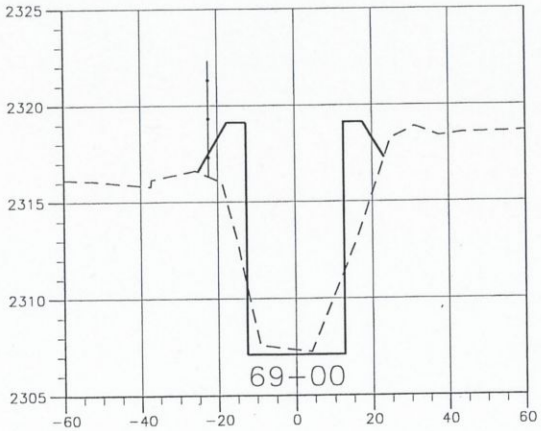
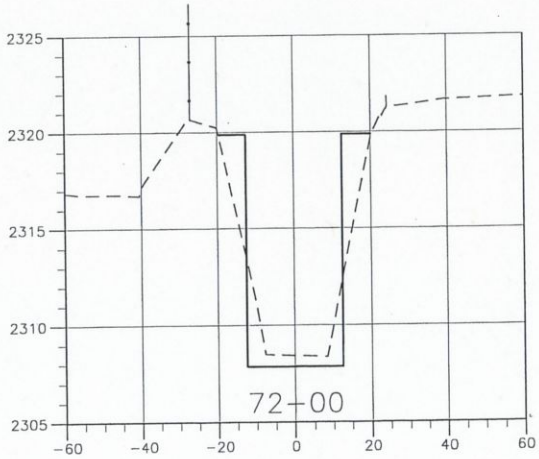




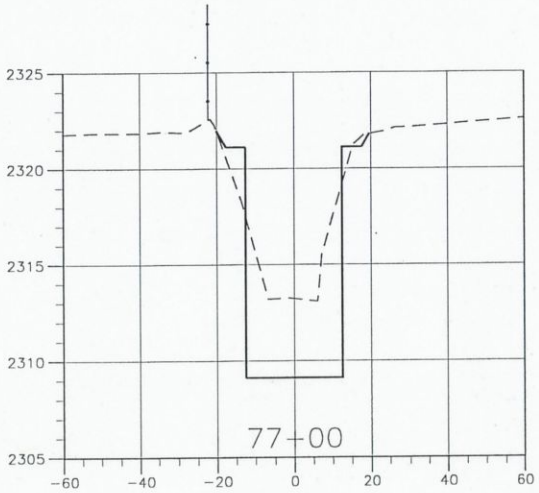


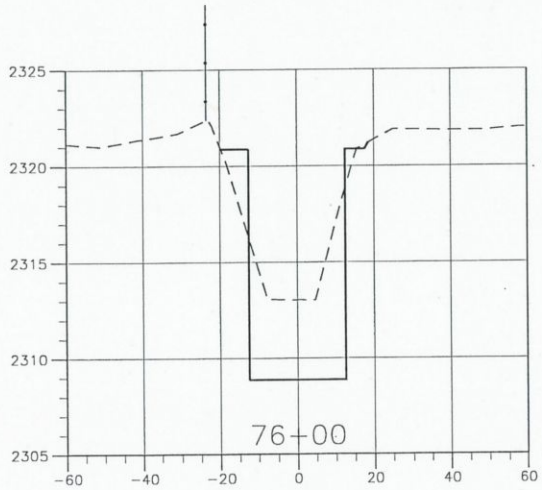


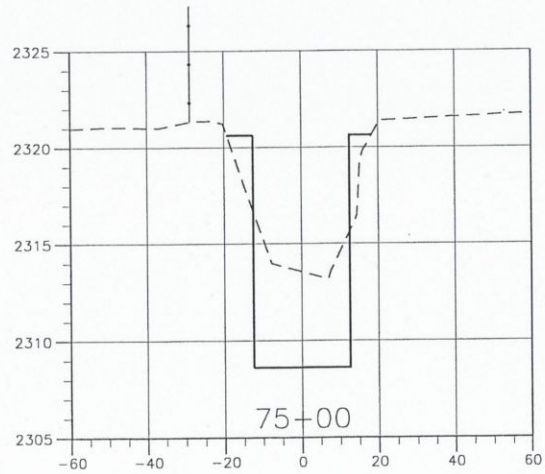


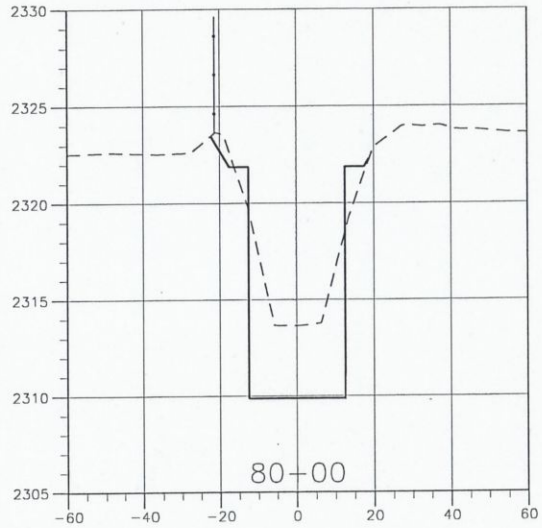


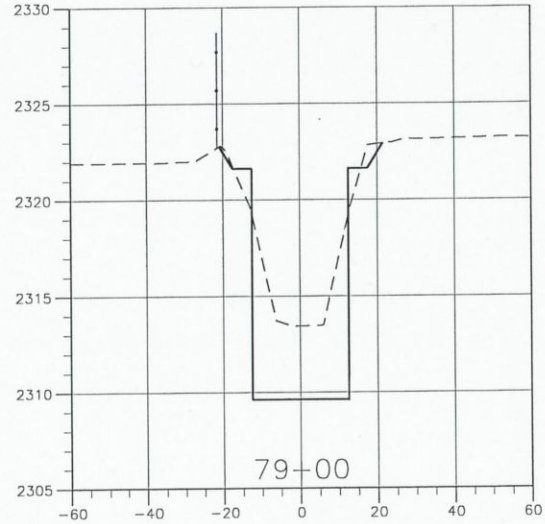
STA. 69+00 TO STA. 74+00 NAVAJO WASH

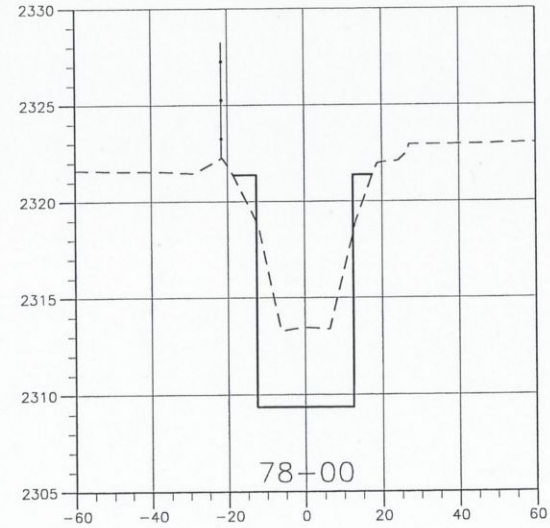




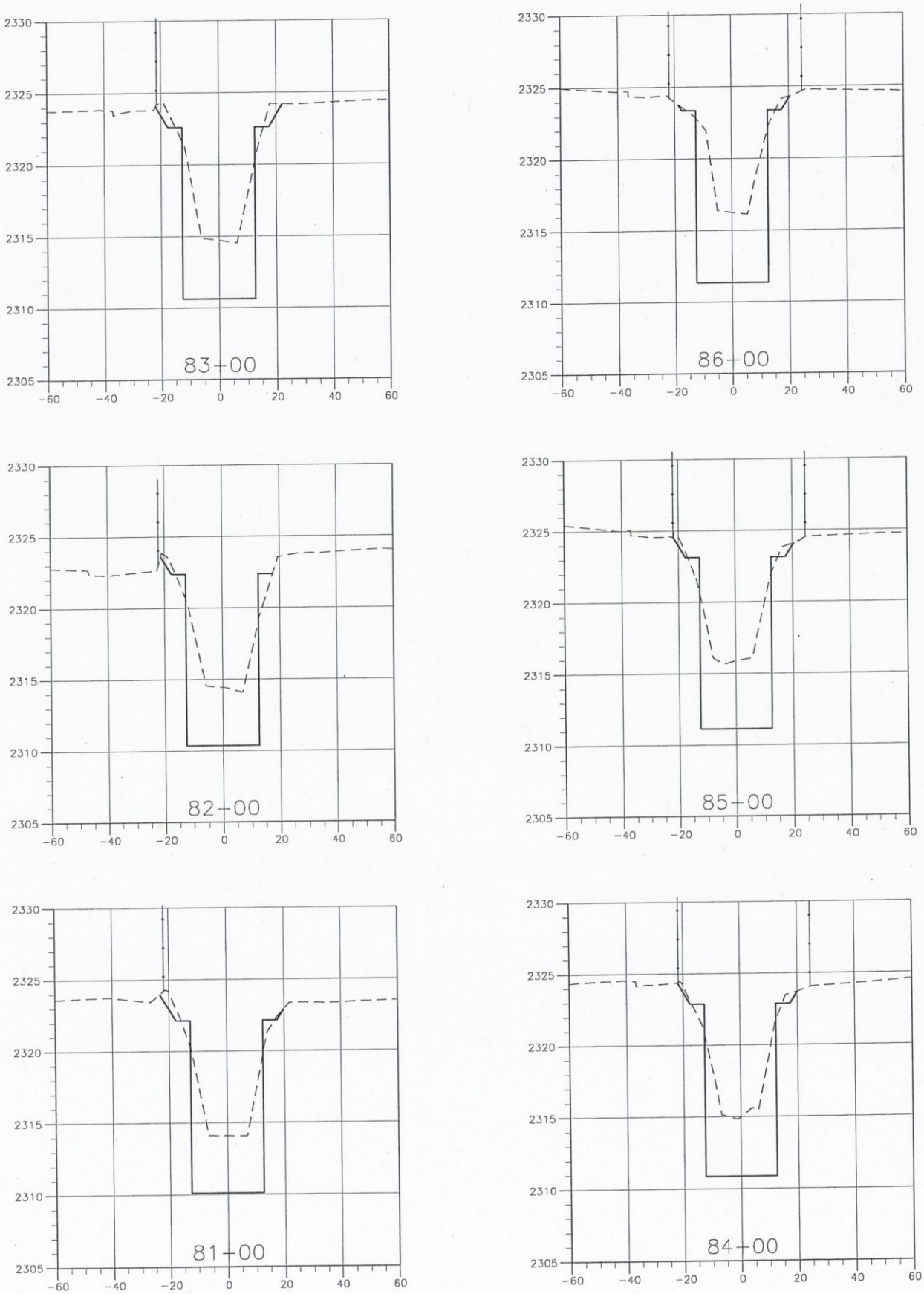




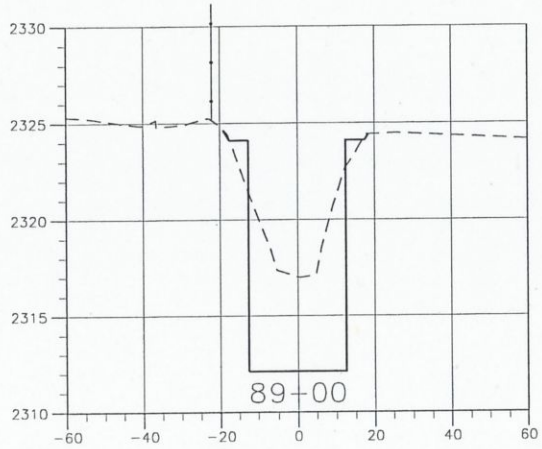


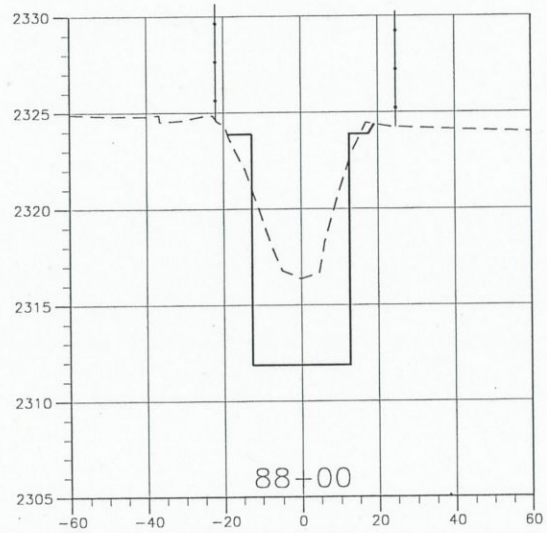


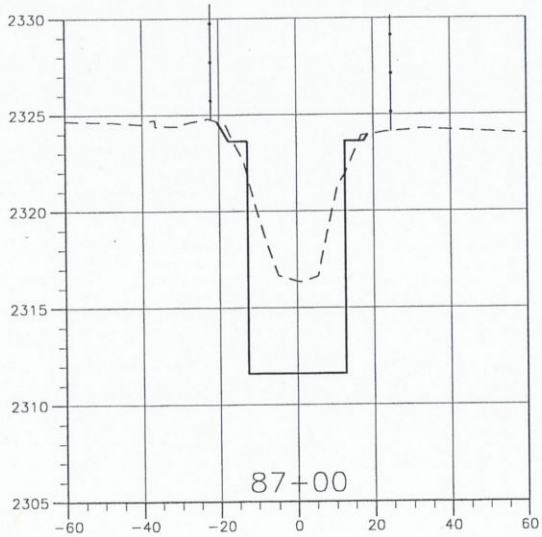
STA. 75+00 TO STA. 80+00 NAVAJO WASH

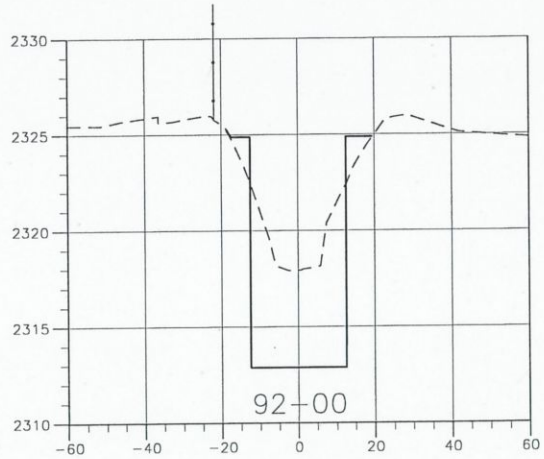


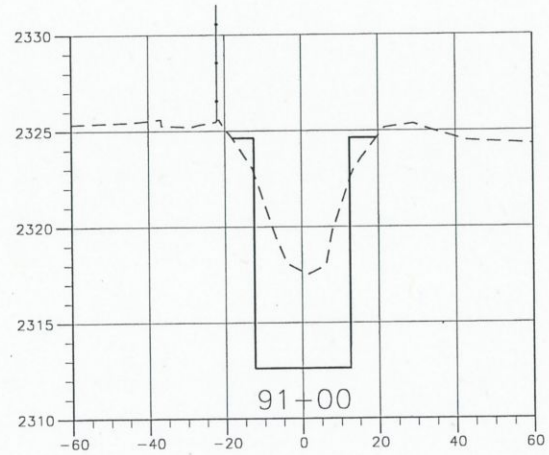
STA. 81+00 TO STA. 86+00 NAVAJO WASH

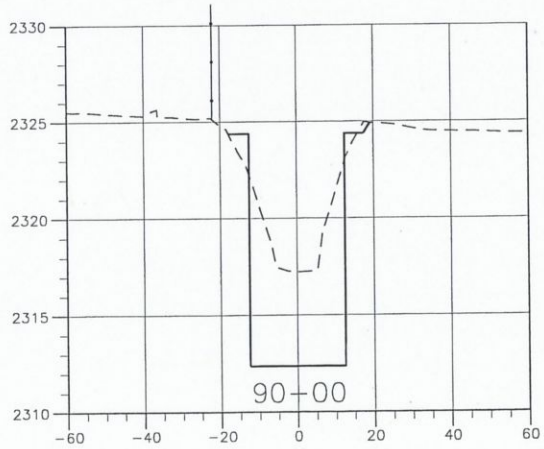




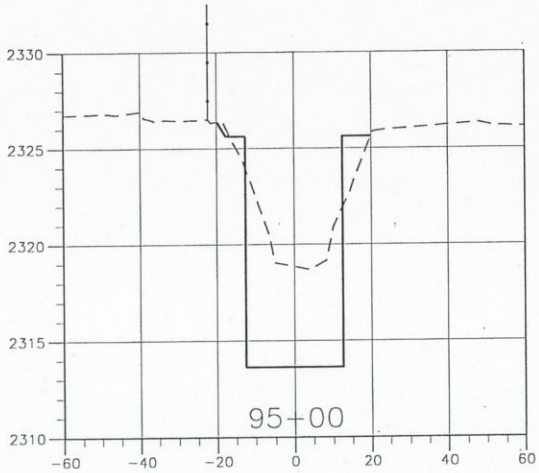


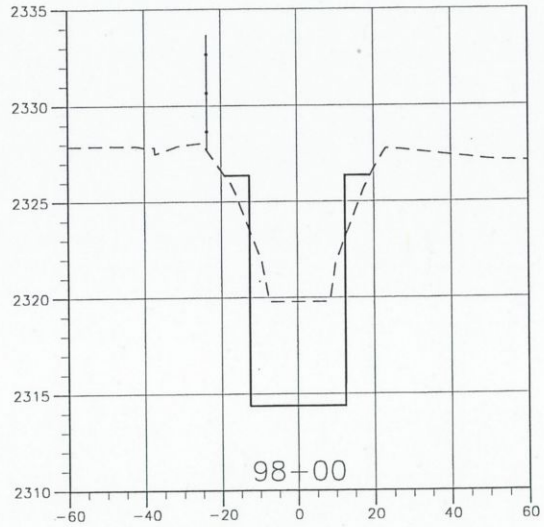


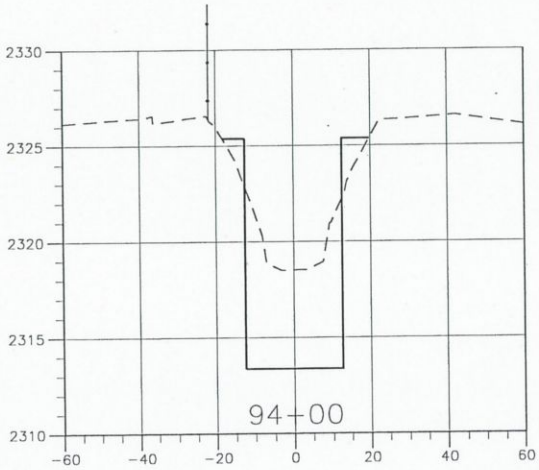


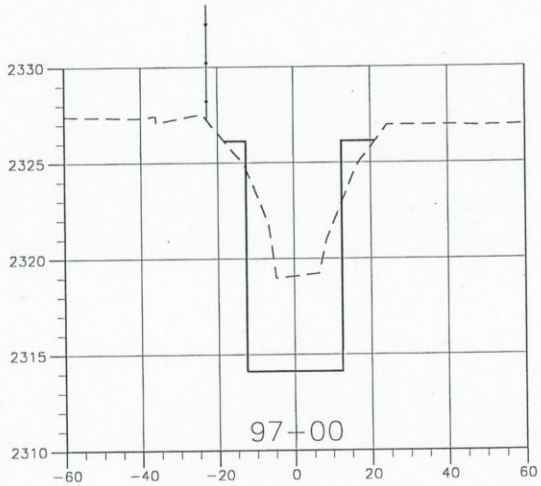


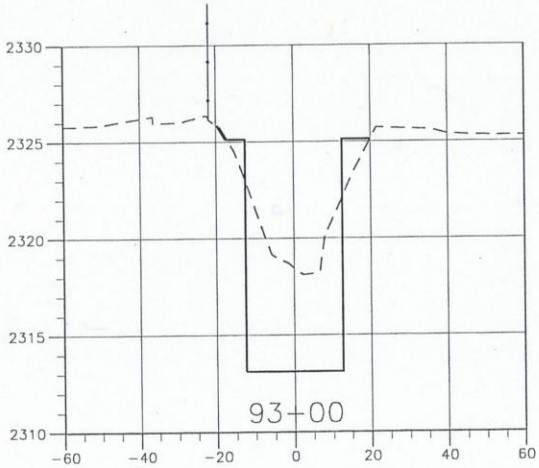
STA. 87+00 TO STA. 92+00 NAVAJO WASH

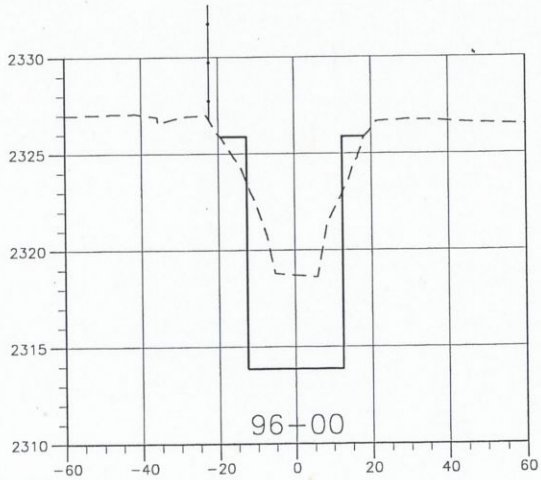




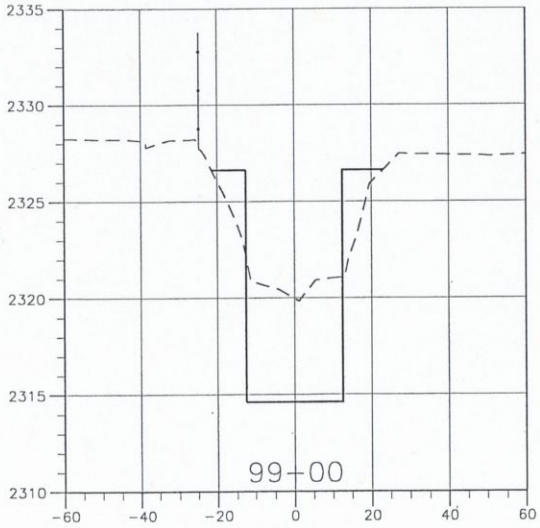




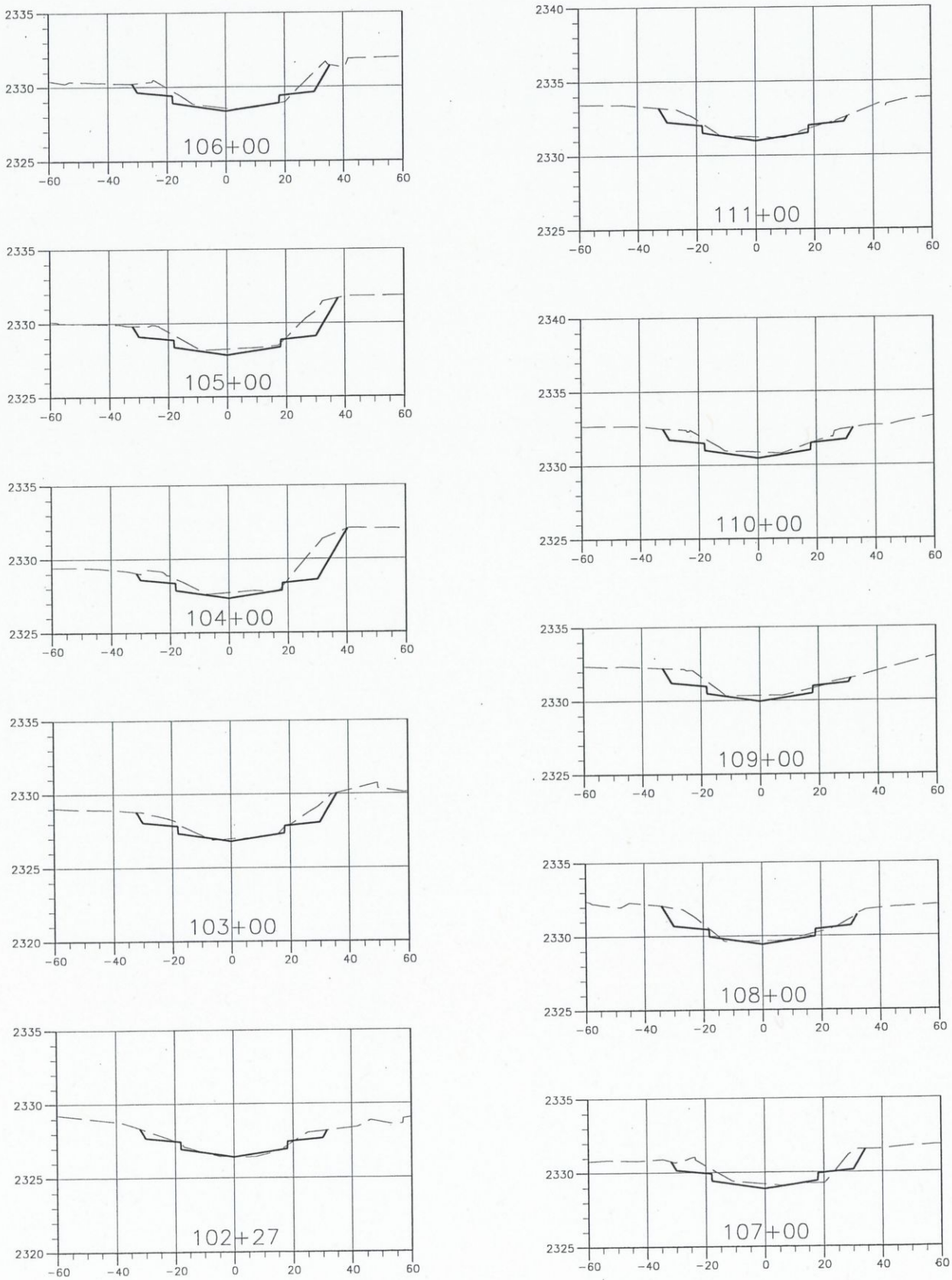




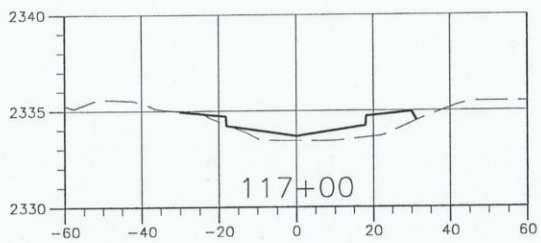
STA. 93+00 TO STA. 98+00 NAVAJO WASH

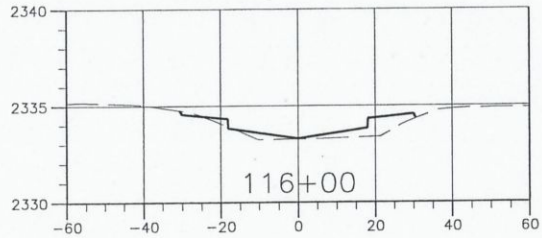


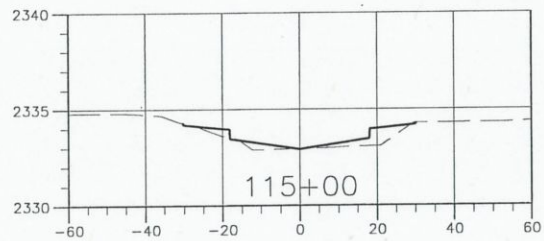
STA. 99+00 TO STA. 99+00 NAVAJO WASH

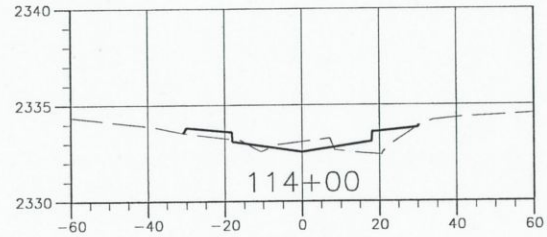


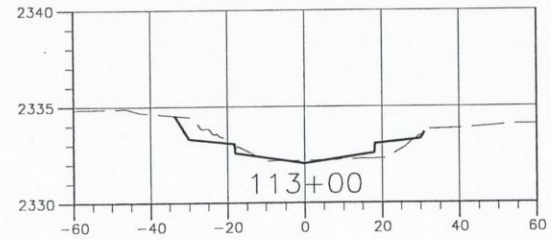
STA. 102+27 TO STA. 111+00 NAVAJO ROAD

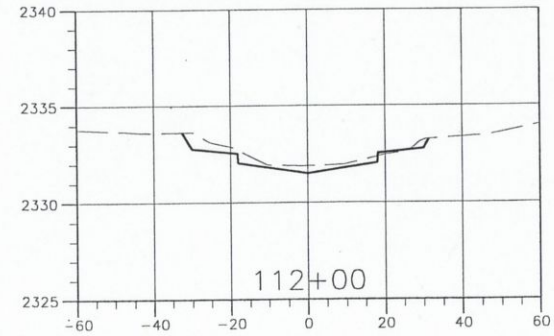


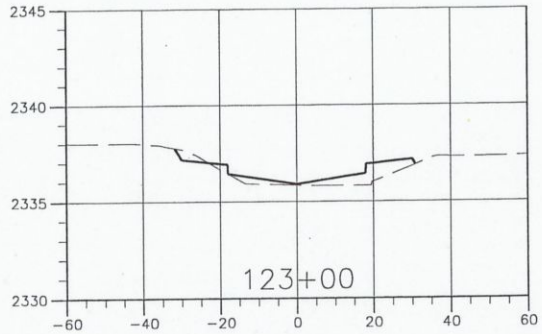


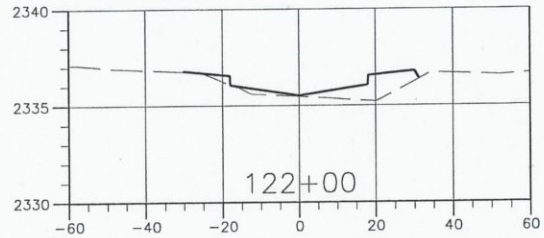


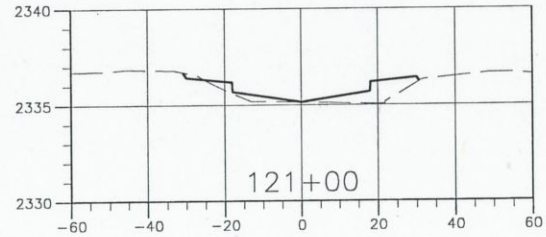


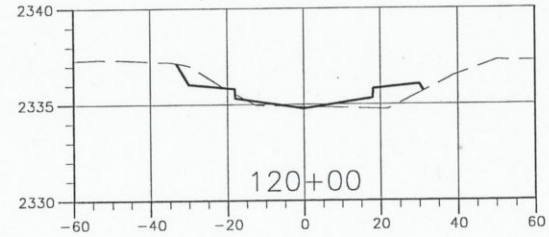


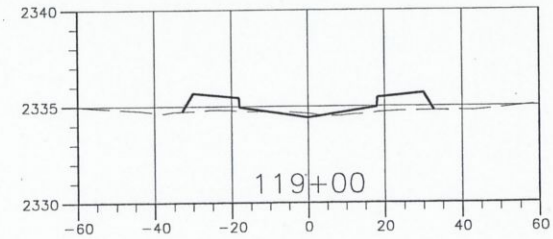


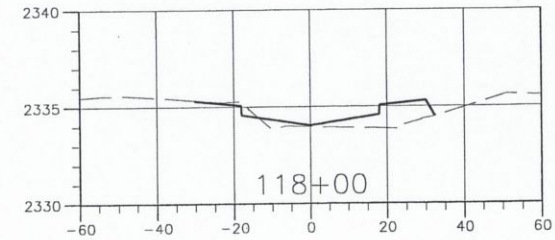




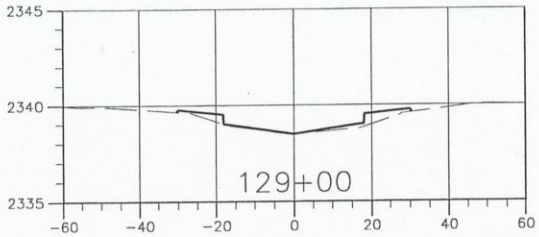


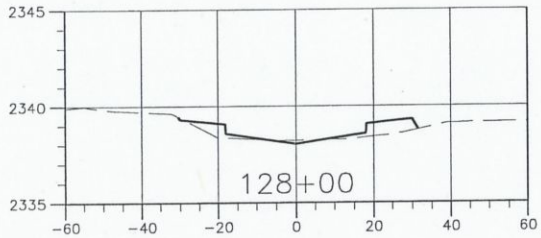


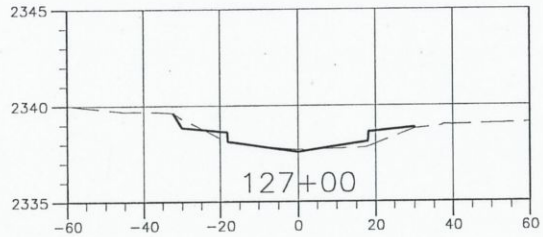


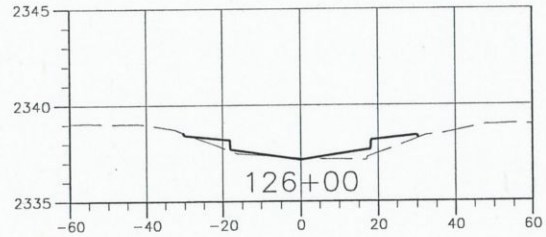


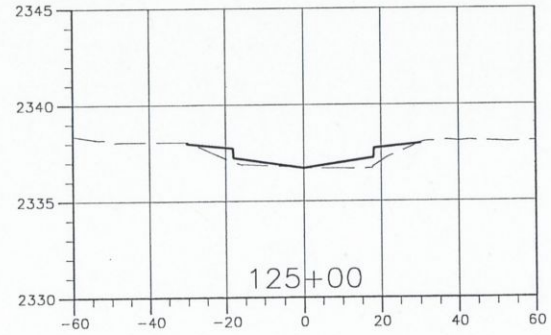
STA. 112+00 TO STA. 123+00 NAVAJO ROAD

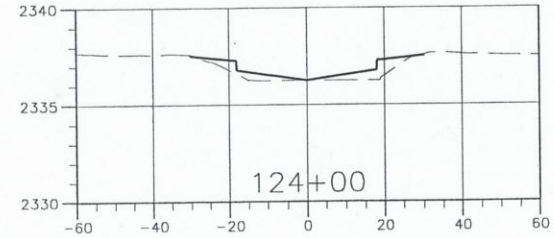


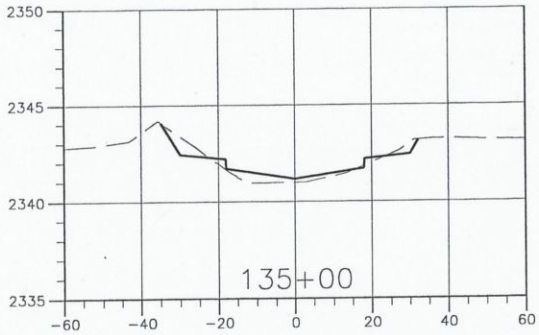


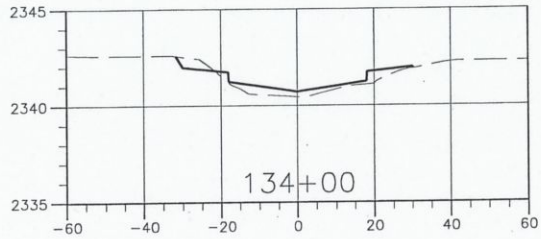


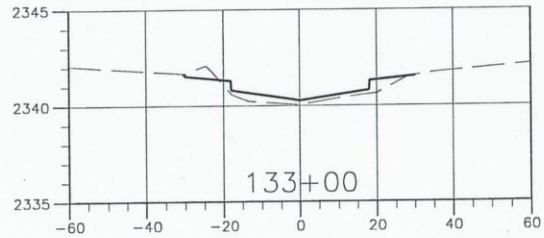


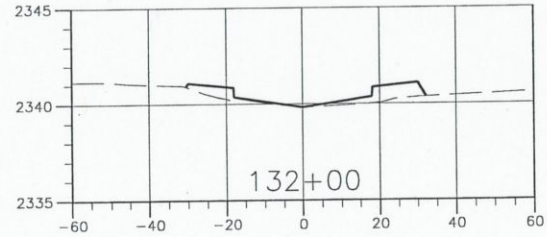


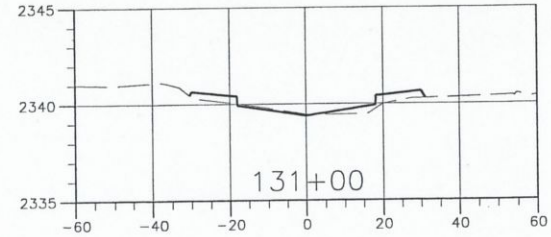


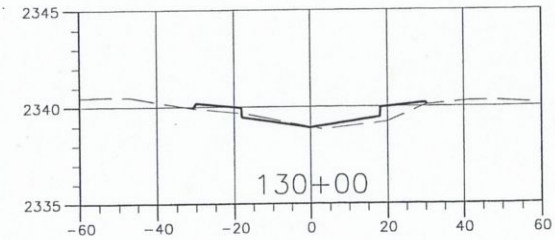




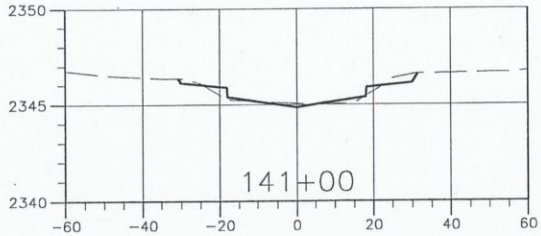


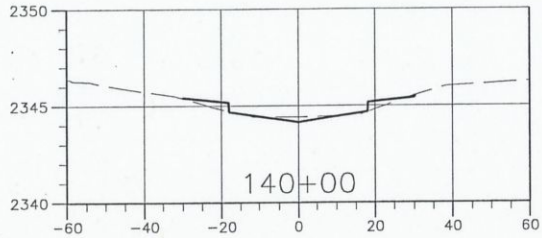


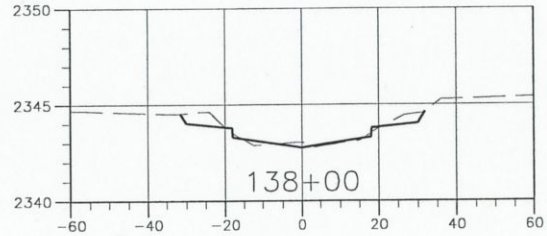


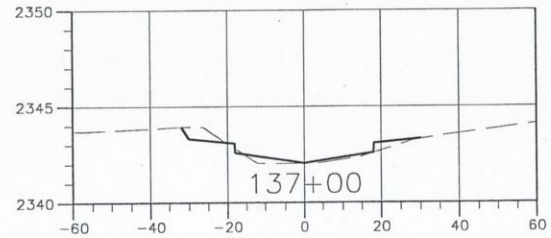


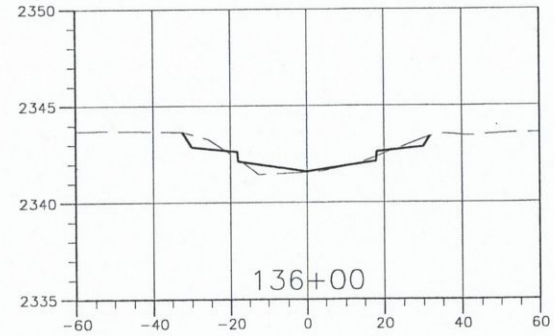
STA. 124+00 TO STA. 135+00 NAVAJO ROAD

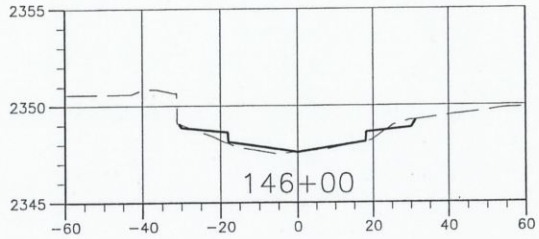


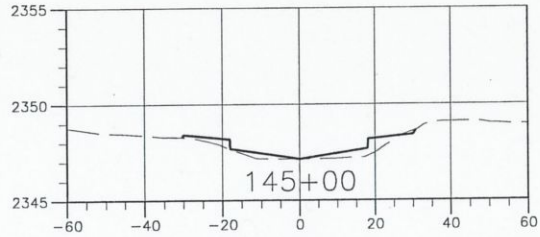


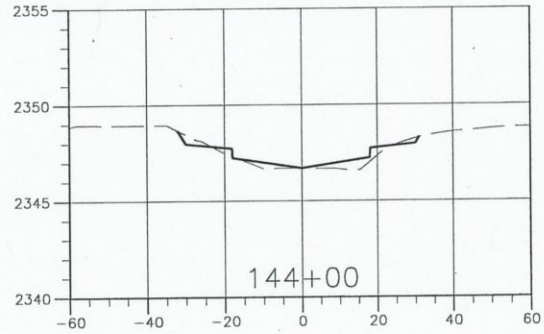


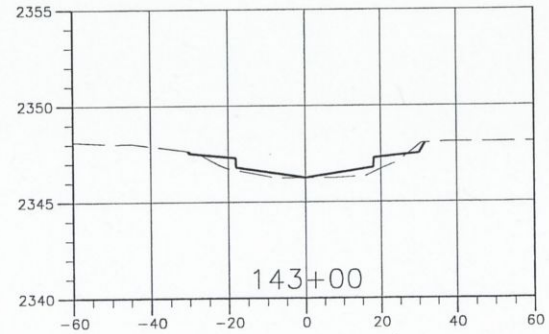


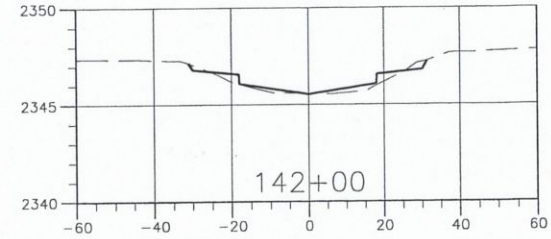




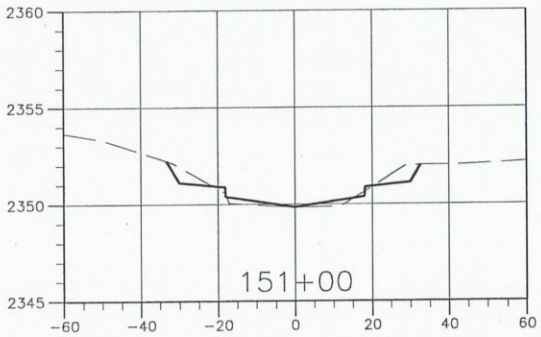


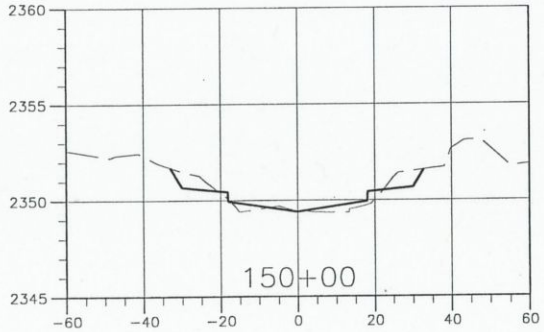


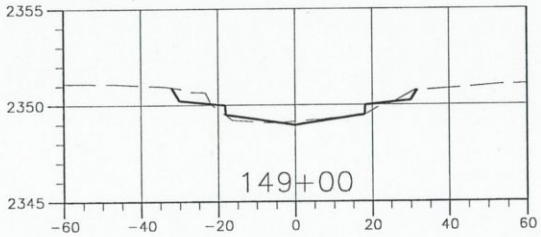


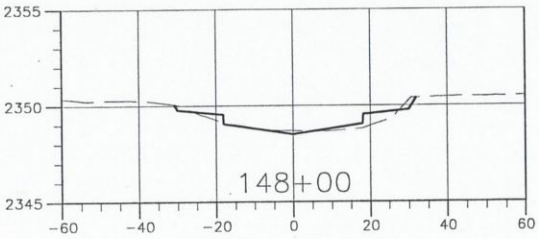


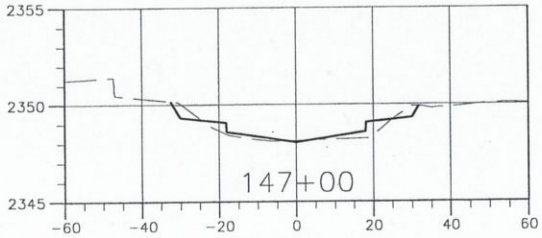
STA. 136+00 TO STA. 146+00 NAVAJO ROAD

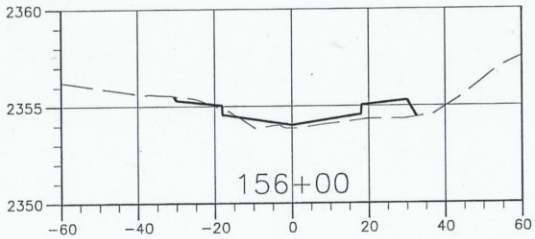


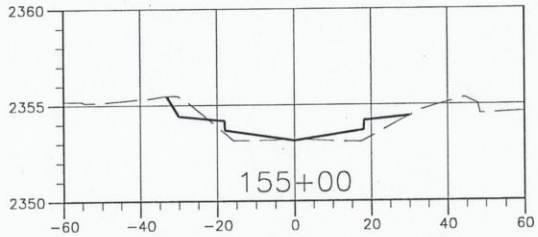


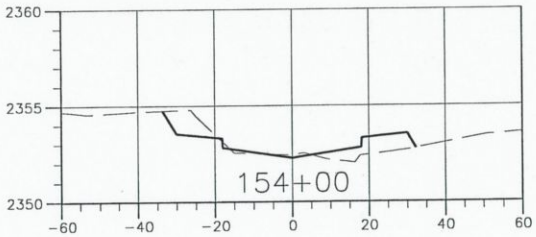


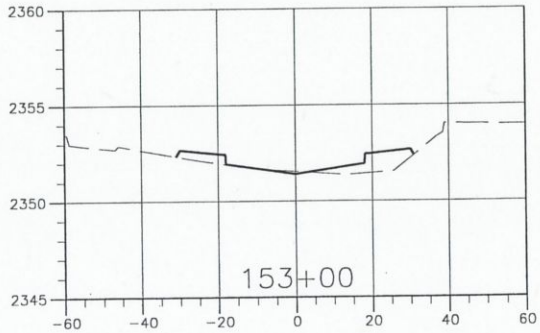


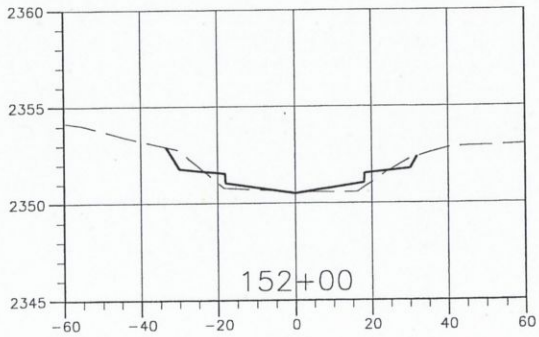




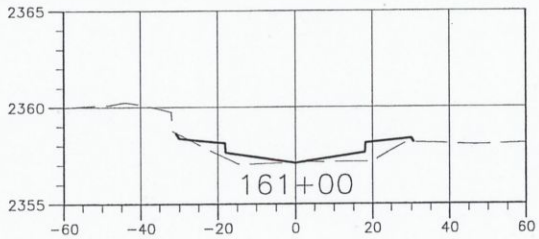


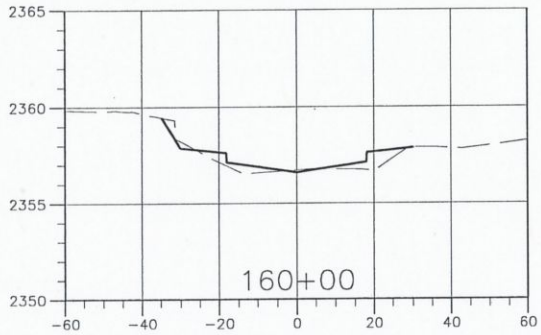


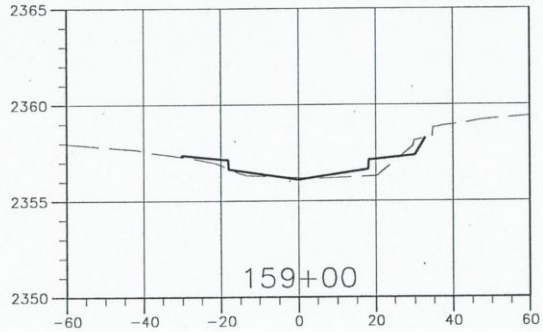


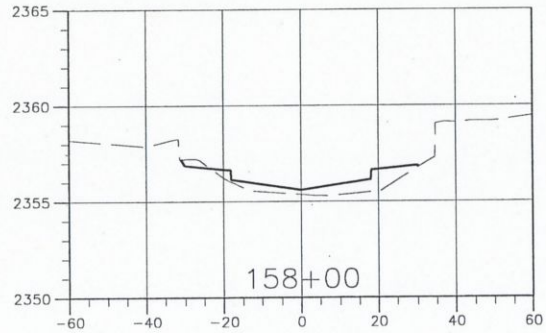


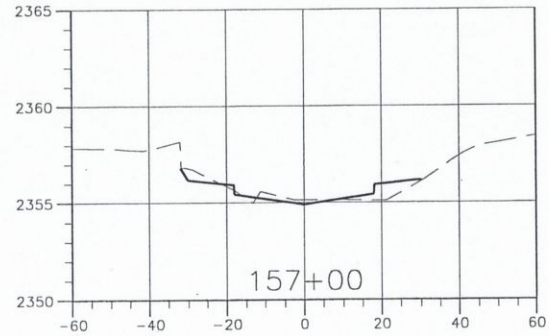
STA. 147+00 TO STA. 156+00 NAVAJO ROAD

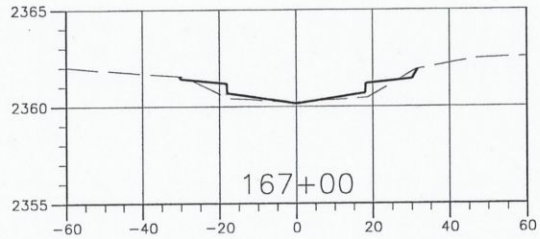


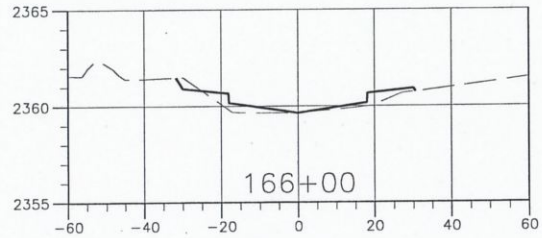


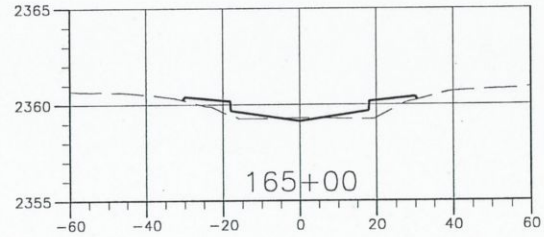


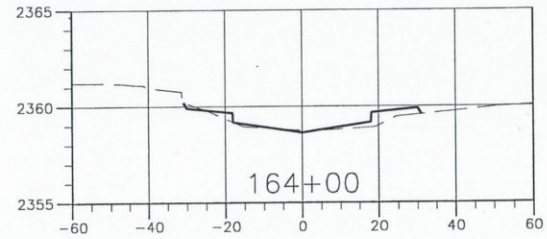


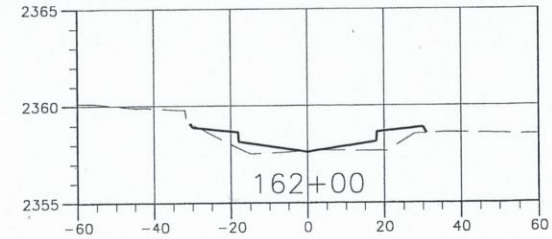




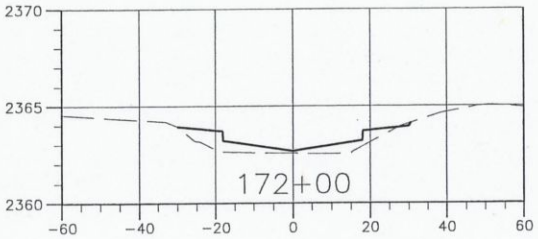


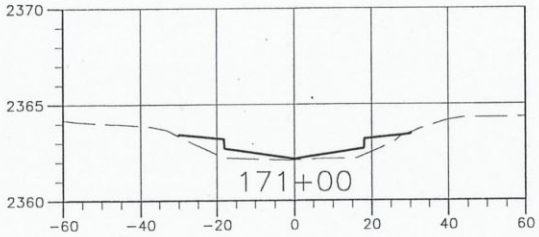


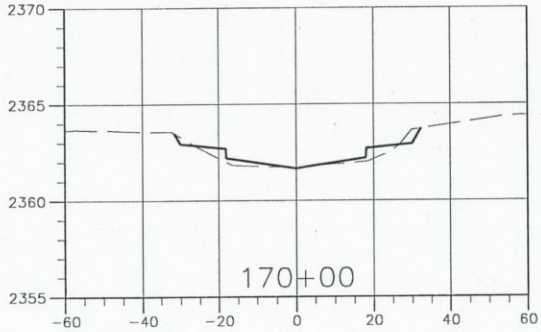


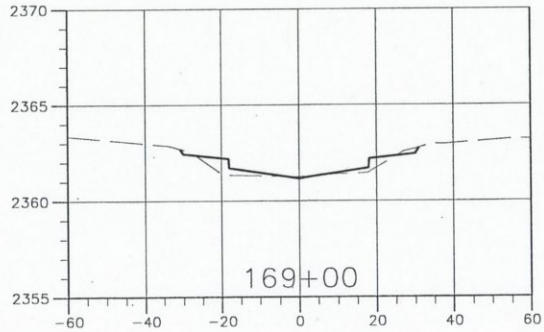


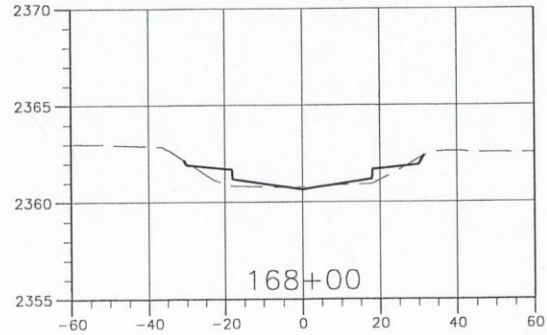
STA. 157+00 TO STA. 167+00 NAVAJO ROAD

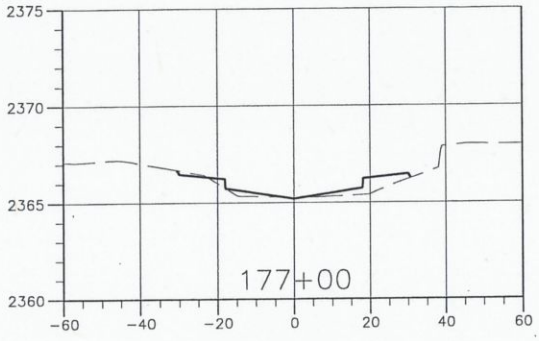


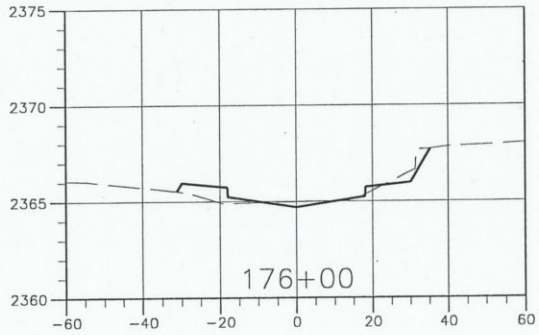


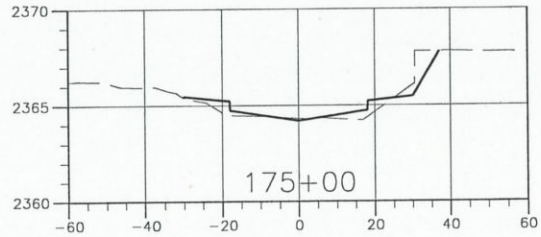


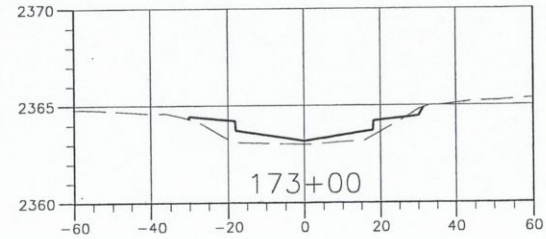




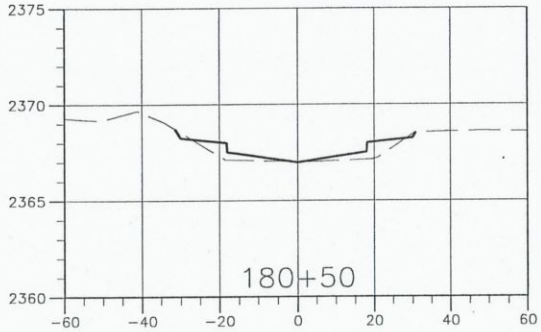


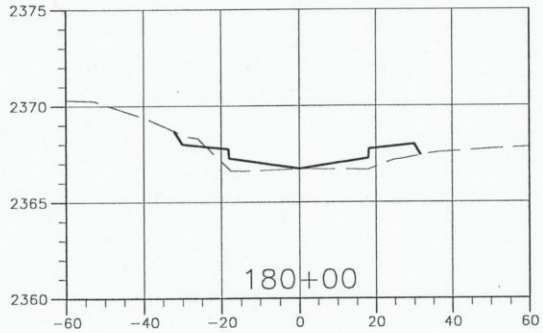


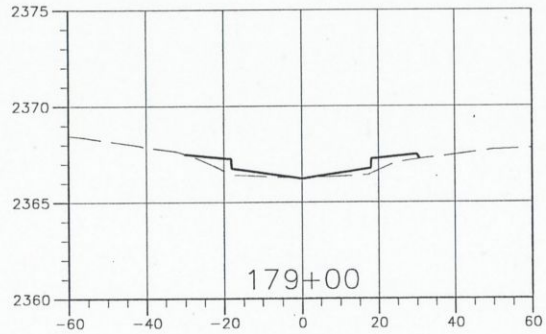


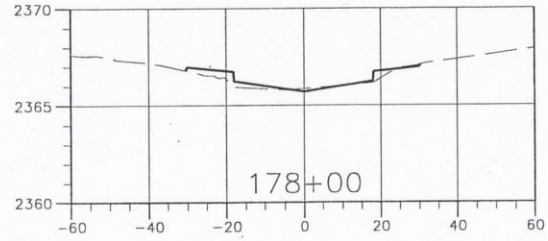


STA. 168+00 TO STA. 177+00 NAVAJO ROAD



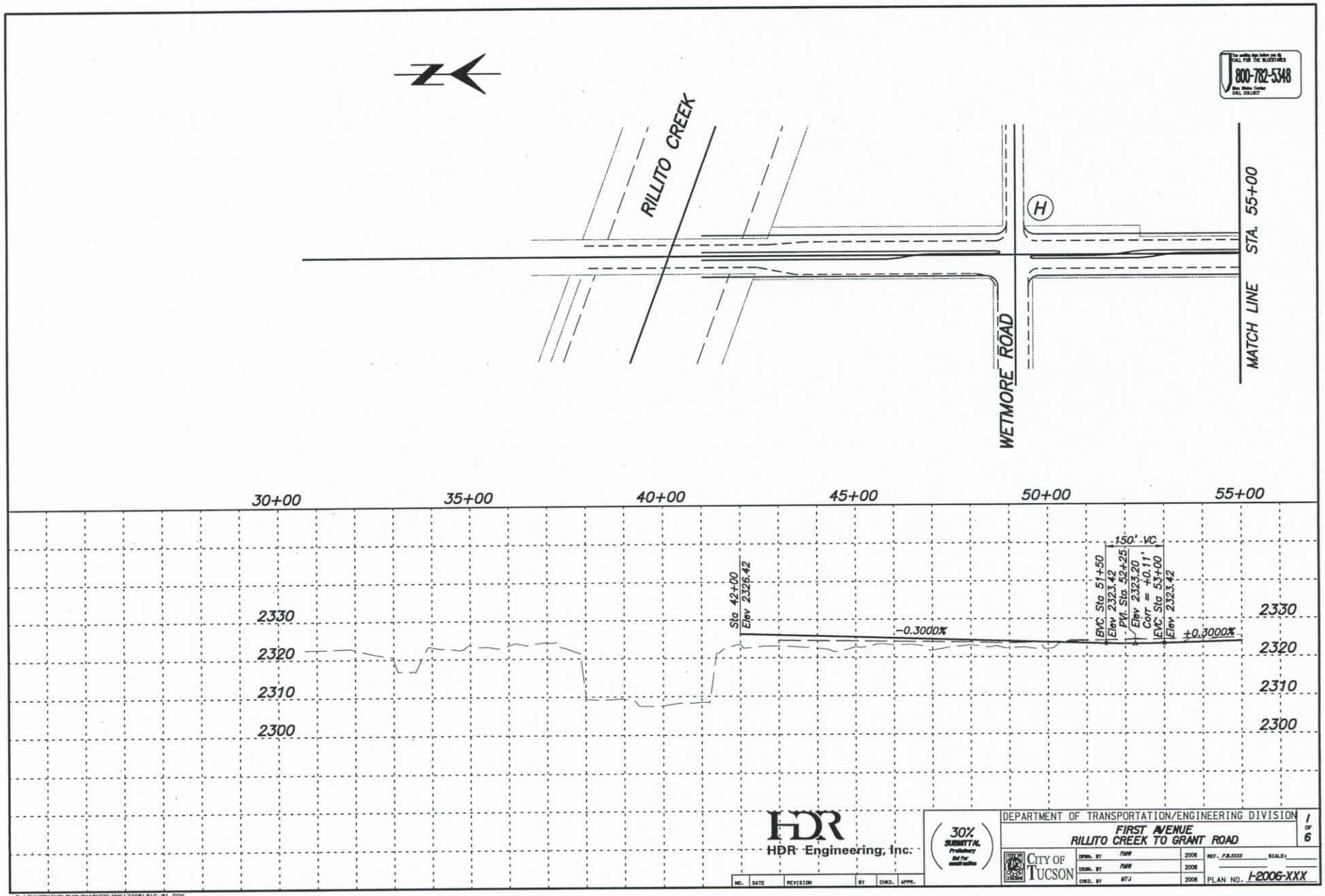






STA. 178+00 TO STA. 180+50 NAVAJO ROAD

Appendix 3b. Concept Plan -- Future First Avenue



HDR
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NO.	DATE	REVISION	BY	CHKD.	APPR.

30% SUBMITTAL Preliminary Not for construction

DEPARTMENT OF TRANSPORTATION/ENGINEERING DIVISION

FIRST AVENUE
RILLITO CREEK TO GRANT ROAD

1 OF 6

CITY OF TUCSON

DRWN. BY	RWW	2006	REF. F.B.XXXX SCALE:
DSGN. BY	RWW	2006	
CHKD. BY	MTJ	2006	PLAN NO. I-2006-XXX

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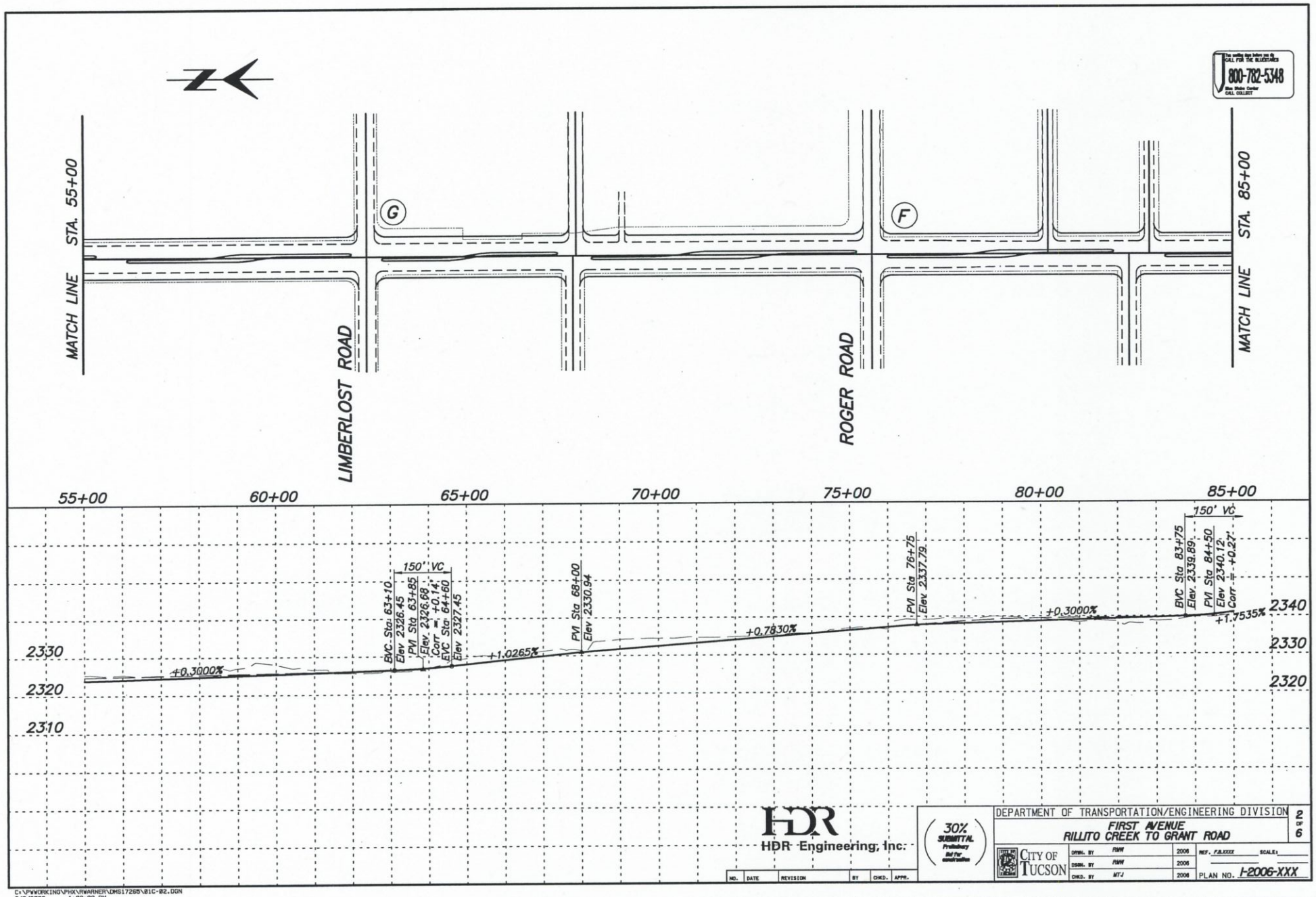
800-782-5348
MATCH LINE STA. 55+00
MATCH LINE STA. 85+00
LIMBERLOST ROAD
ROGER ROAD
G
F
55+00
60+00
65+00
70+00
75+00
80+00
85+00
2330
2320
2310
2340
+0.3000%
BVC Sta 63+10
Elev 2326.45
150' VC
PVI Sta 63+85
Elev 2326.68
Corr = +0.14'
EVC Sta 64+60
Elev 2327.45
+1.0265%
PVI Sta 68+00
Elev 2330.94
+0.7830%
PVI Sta 76+75
Elev 2337.79
+0.3000%
BVC Sta 83+75
Elev 2339.89
150' VC
PVI Sta 84+50
Elev 2340.12
Corr = +0.27'
+1.7535%
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30% SUBMITTAL
Preliminary
Not For construction
NO. DATE REVISION BY CHKD. APPR.
DEPARTMENT OF TRANSPORTATION/ENGINEERING DIVISION
FIRST AVENUE
RILLITO CREEK TO GRANT ROAD
SHEET 26
CITY OF TUCSON
DRWN. BY RWW 2006
DSNR. BY RWW 2006
CHKD. BY MTJ 2006
REF. F.B.XXXX
SCALE:
PLAN NO. I-2006-XXX
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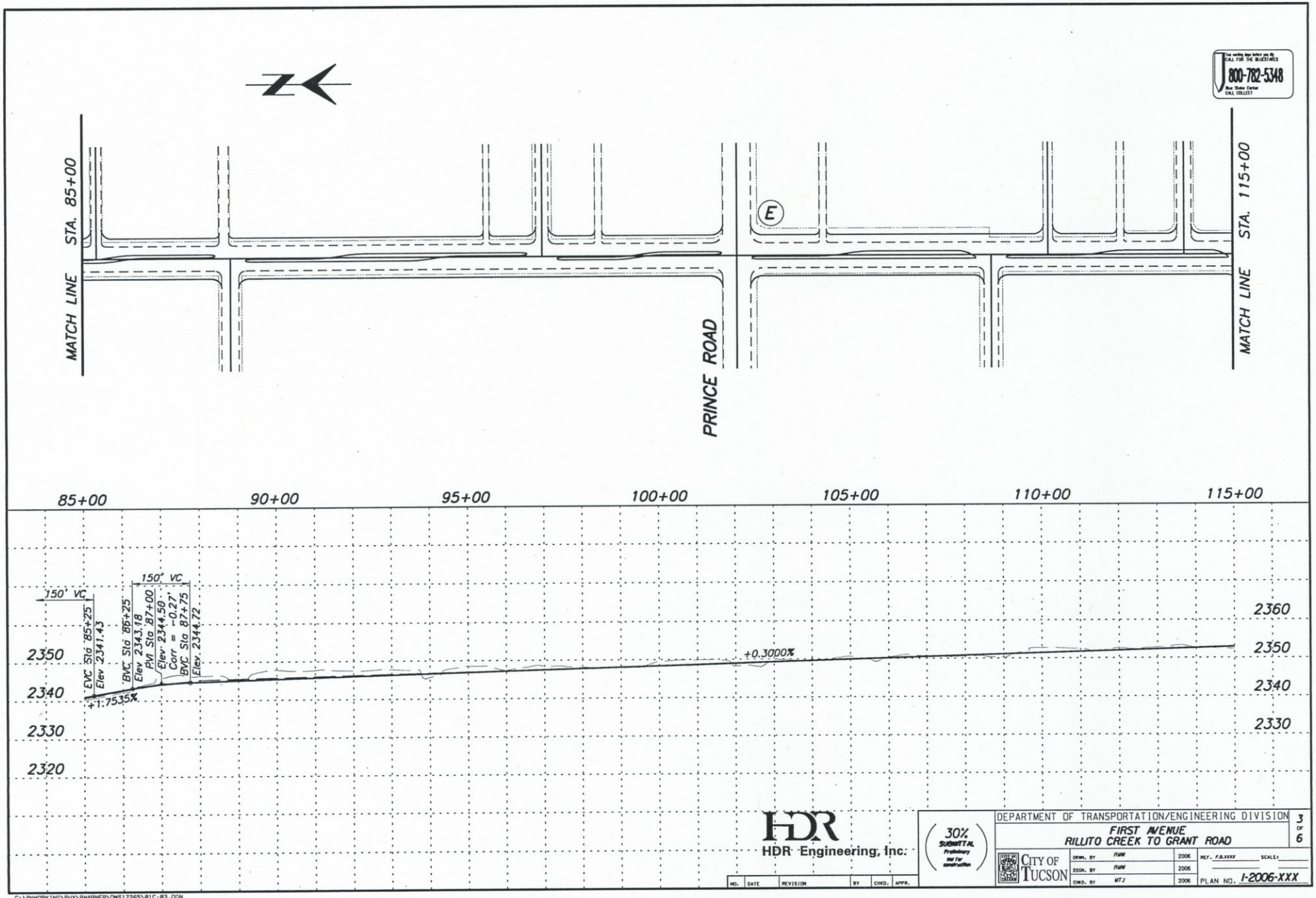
800-782-5348
MATCH LINE STA. 85+00
MATCH LINE STA. 115+00
PRINCE ROAD
E
85+00
90+00
95+00
100+00
105+00
110+00
115+00
2360
2350
2340
2330
2320
150' VC
EVC Sta 85+25
Elev 2341.43
+1.7535%
BVC Sta 86+25
Elev 2343.18
150' VC
PVI Sta 87+00
Elev 2344.50
Corr = -0.27
BVC Sta 87+75
Elev 2344.72
+0.3000%
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30% SUBMITTAL Preliminary Not For construction
DEPARTMENT OF TRANSPORTATION/ENGINEERING DIVISION
FIRST AVENUE
RILLITO CREEK TO GRANT ROAD
3 OF 6
CITY OF TUCSON
DRWN. BY RWW 2006
DSGN. BY RWW 2006
CHKD. BY MTJ 2006
REF. F.B.XXXX
SCALE:
PLAN NO. I-2006-XXX
NO. DATE REVISION BY CHKD. APPR.
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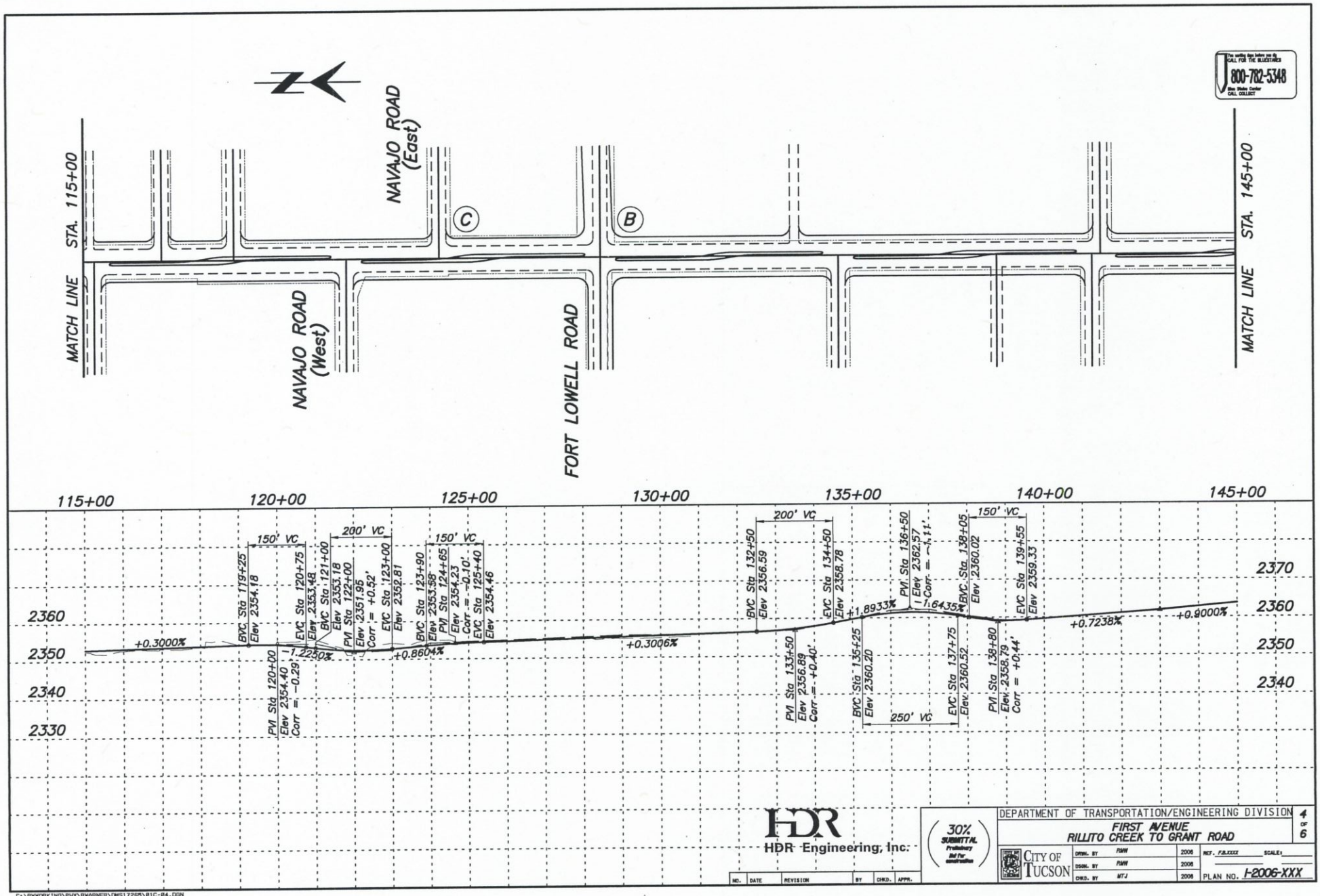
800-782-5348
NAVAJO ROAD (East)
NAVAJO ROAD (West)
FORT LOWELL ROAD
MATCH LINE STA. 115+00
MATCH LINE STA. 145+00
C
B
115+00
120+00
125+00
130+00
135+00
140+00
145+00
2370
2360
2350
2340
2330
+0.3000%
+0.3006%
+0.8604%
+1.2250%
+1.8933%
+1.6435%
+0.7238%
+0.9000%
150' VC
200' VC
250' VC
BVC Sta 119+25 Elev 2354.18
PVI Sta 120+00 Elev 2354.40 Corr = -0.29'
EVC Sta 120+75 Elev 2353.48
BVC Sta 121+00 Elev 2353.18
PVI Sta 122+00 Elev 2351.95 Corr = +0.52'
EVC Sta 123+00 Elev 2352.81
BVC Sta 123+90 Elev 2353.58
PVI Sta 124+65 Elev 2354.23 Corr = -0.10'
EVC Sta 125+40 Elev 2354.46
BVC Sta 132+50 Elev 2356.59
PVI Sta 133+50 Elev 2356.89 Corr = +0.40'
EVC Sta 134+50 Elev 2358.78
BVC Sta 135+25 Elev 2360.20
PVI Sta 136+50 Elev 2362.57 Corr = -1.11'
EVC Sta 137+75 Elev 2360.52
BVC Sta 138+05 Elev 2360.02
PVI Sta 138+80 Elev 2358.79 Corr = +0.44'
EVC Sta 139+55 Elev 2359.33
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NO. DATE REVISION BY CHKD. APPR.
DEPARTMENT OF TRANSPORTATION/ENGINEERING DIVISION
FIRST AVENUE
RILLITO CREEK TO GRANT ROAD
4 OF 6
CITY OF TUCSON
DRWN. BY FWW 2006
DSGN. BY FWW 2006
CHKD. BY MTJ 2006
REF. F.B.XXXX
SCALE:
PLAN NO. I-2006-XXX
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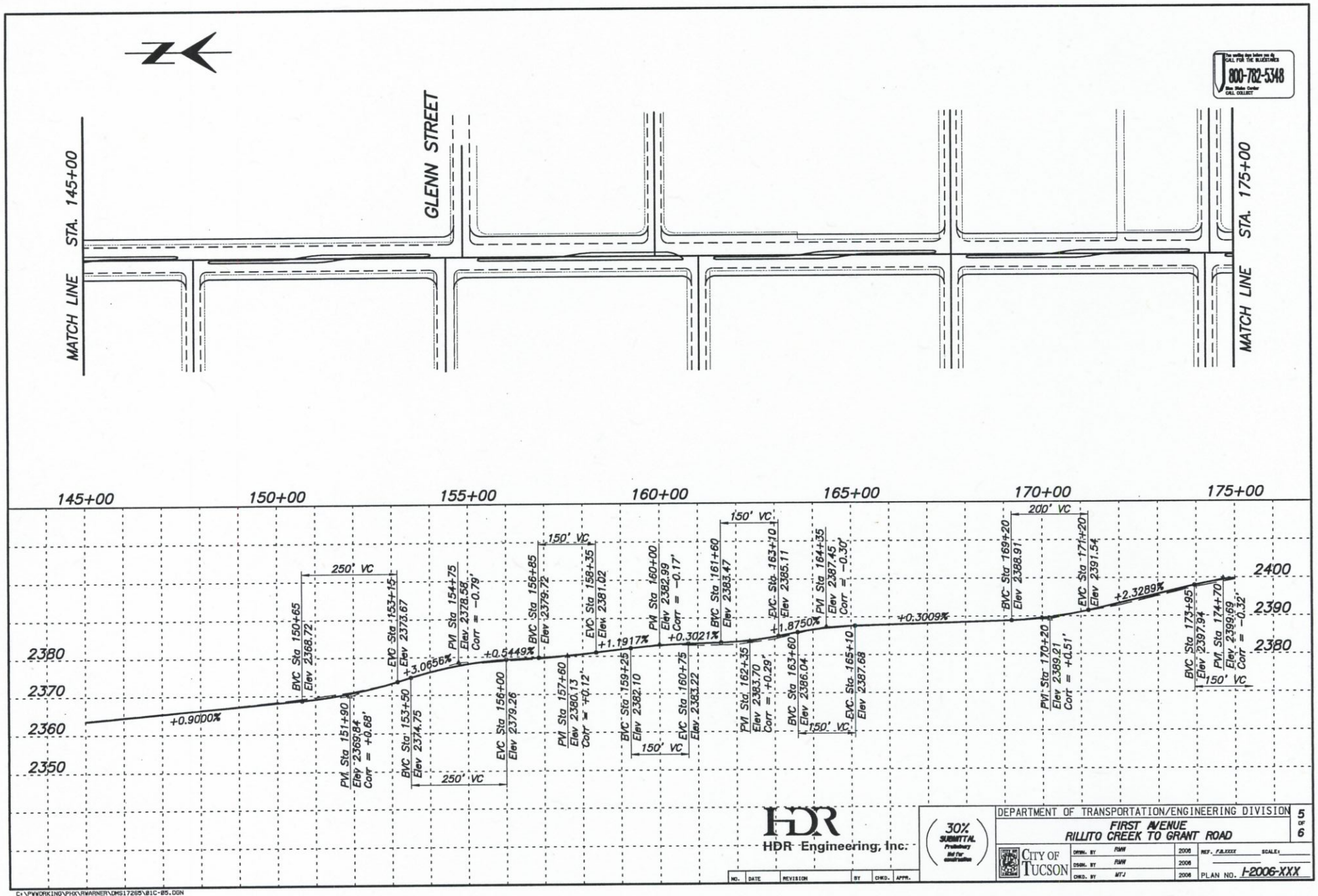

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NO.	DATE	REVISION	BY	CHKD.	APPR.

DEPARTMENT OF TRANSPORTATION/ENGINEERING DIVISION

FIRST AVENUE
RILLITO CREEK TO GRANT ROAD

5 OF 6

CITY OF TUCSON

DRWN. BY	RWW	2006	REF. F.A.XXXX SCALE:
DSGN. BY	RWW	2006	
CHKD. BY	MTJ	2006	PLAN NO. I-2006-XXX

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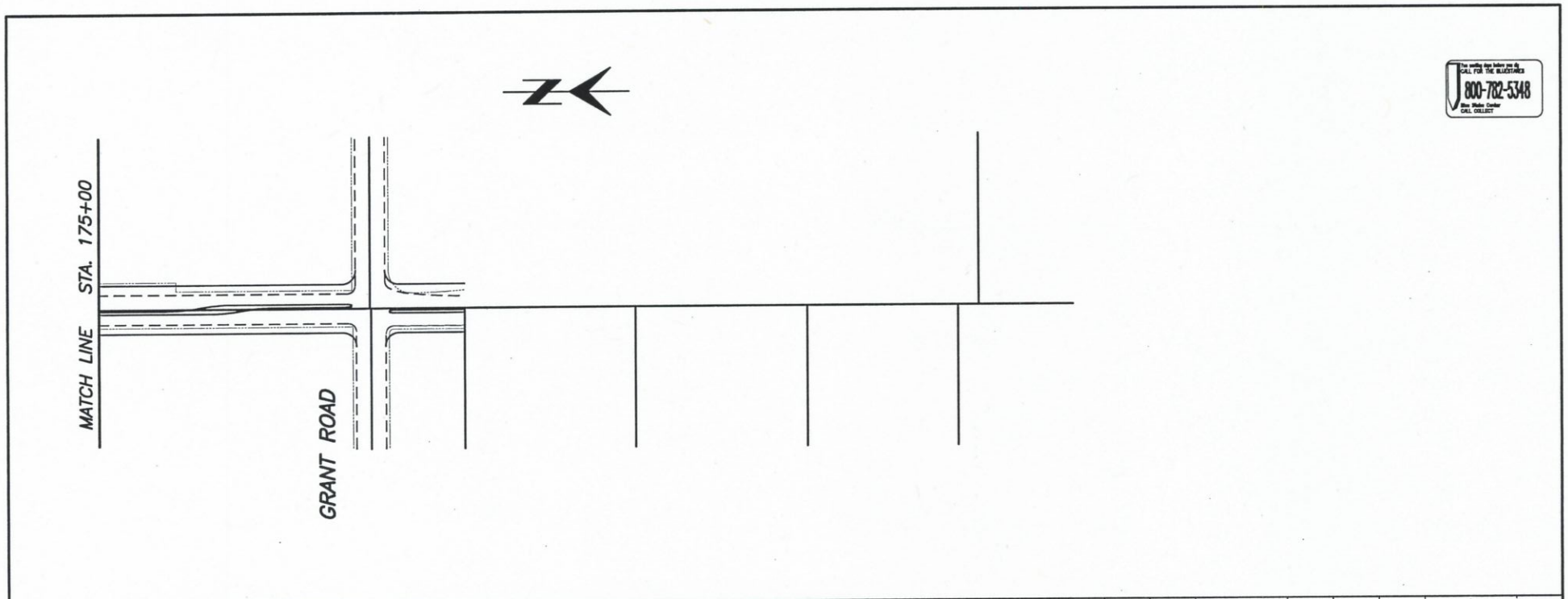

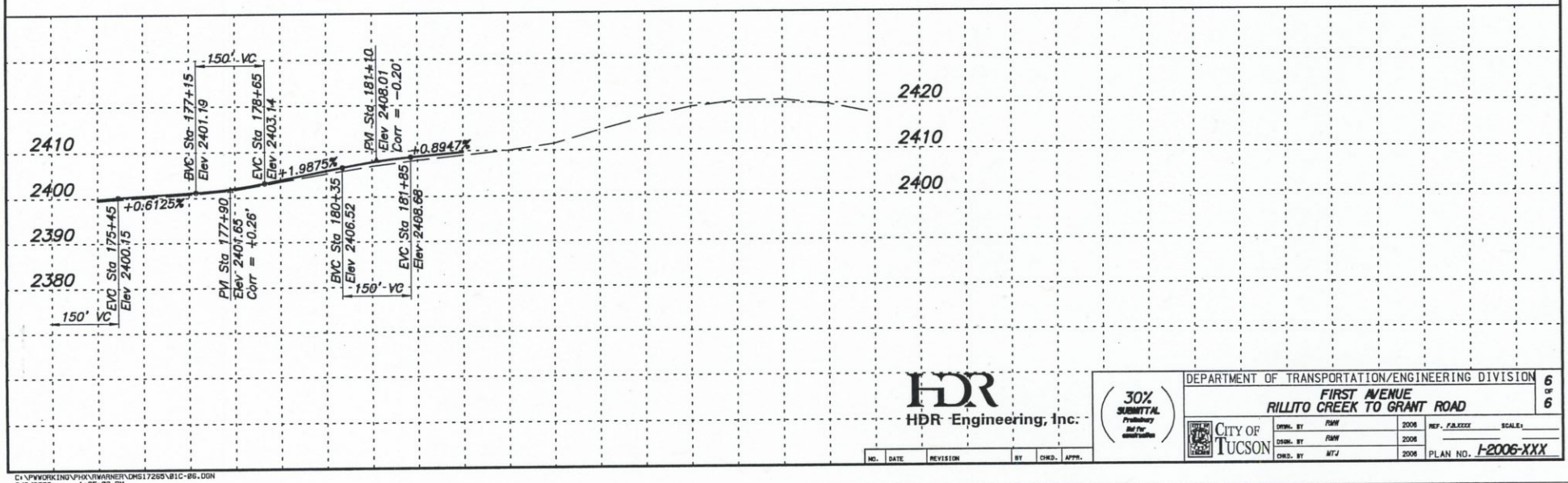

HDR Engineering, Inc.

NO.	DATE	REVISION	BY	CHKD.	APPR.

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DEPARTMENT OF TRANSPORTATION/ENGINEERING DIVISION

FIRST AVENUE
RILLITO CREEK TO GRANT ROAD

6 of 6

CITY OF TUCSON

DRWN. BY	RWW	2006	REF. F.B.XXXX SCALE:
DSGN. BY	RWW	2006	
CHKD. BY	MTJ	2006	PLAN NO. I-2006-XXX

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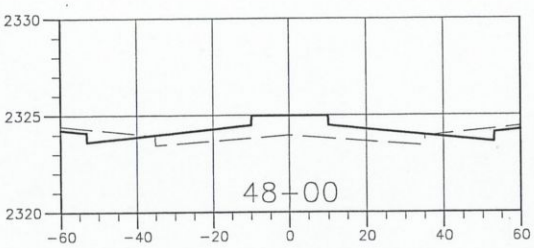
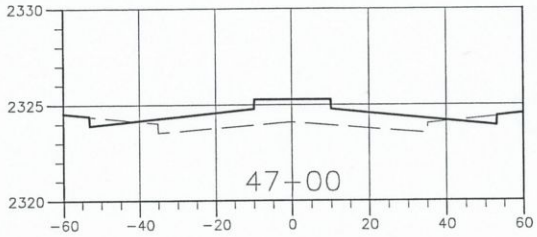
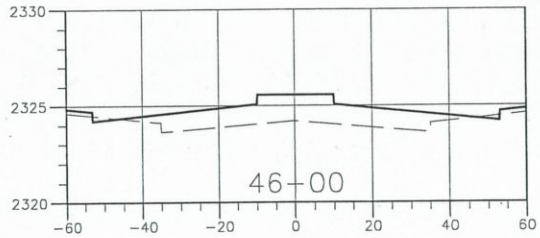
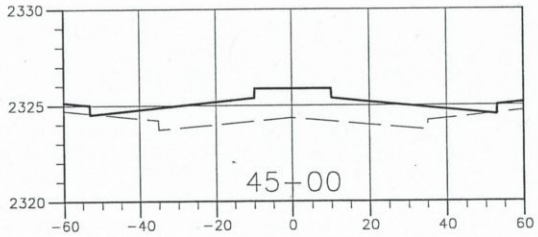
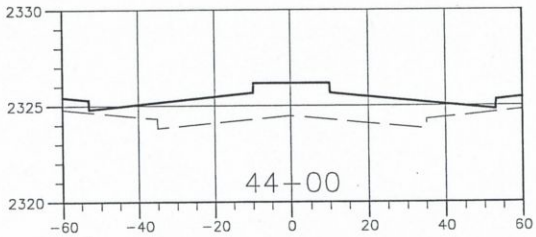
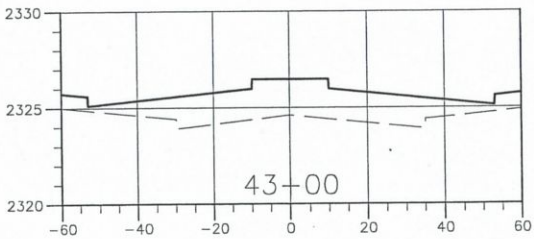


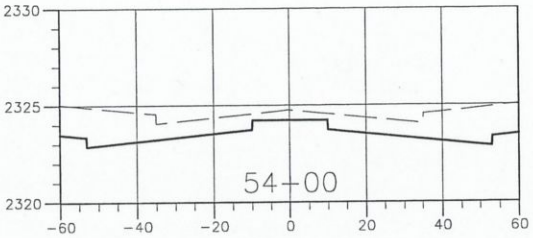


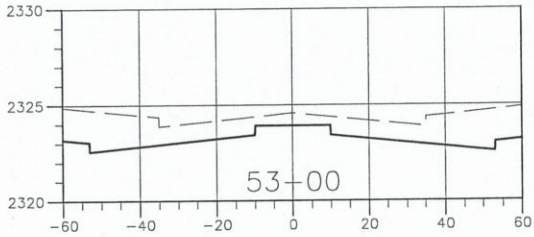


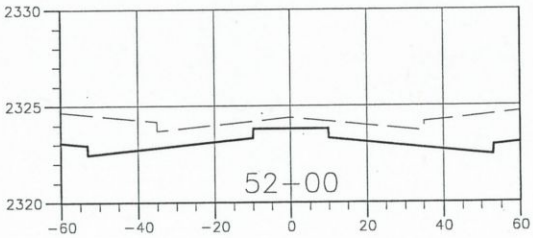


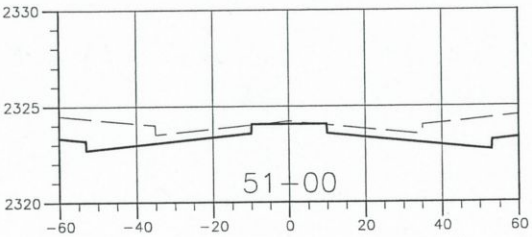


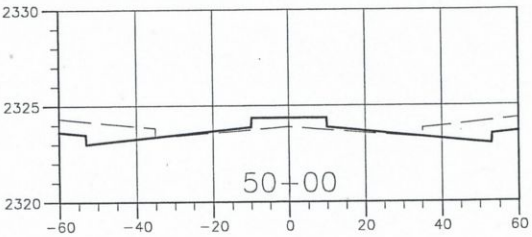


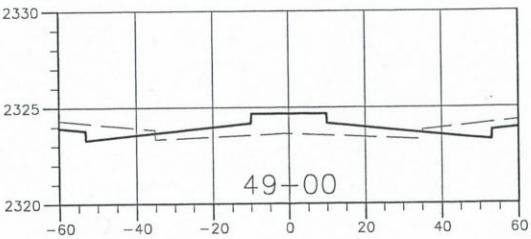




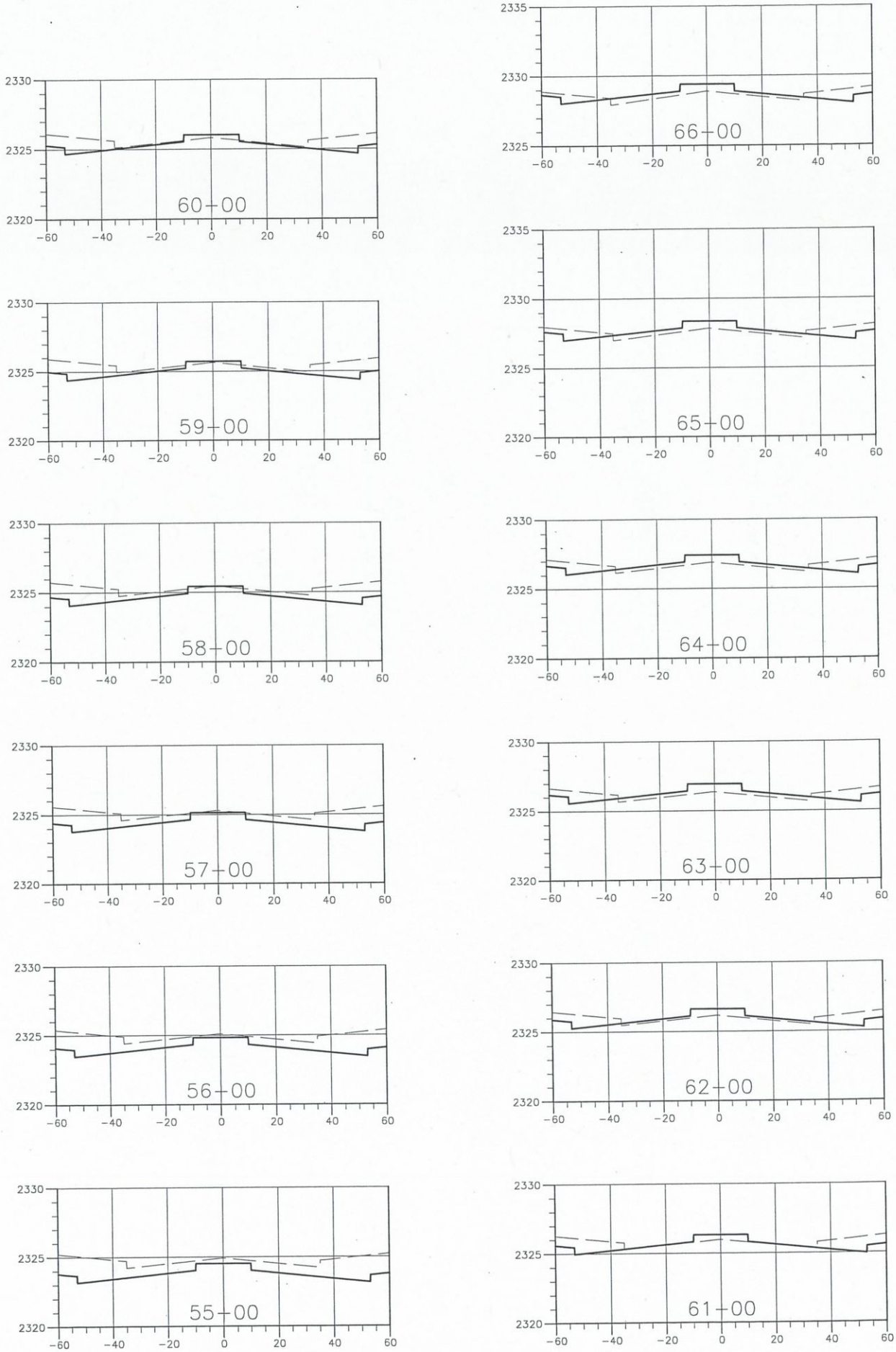




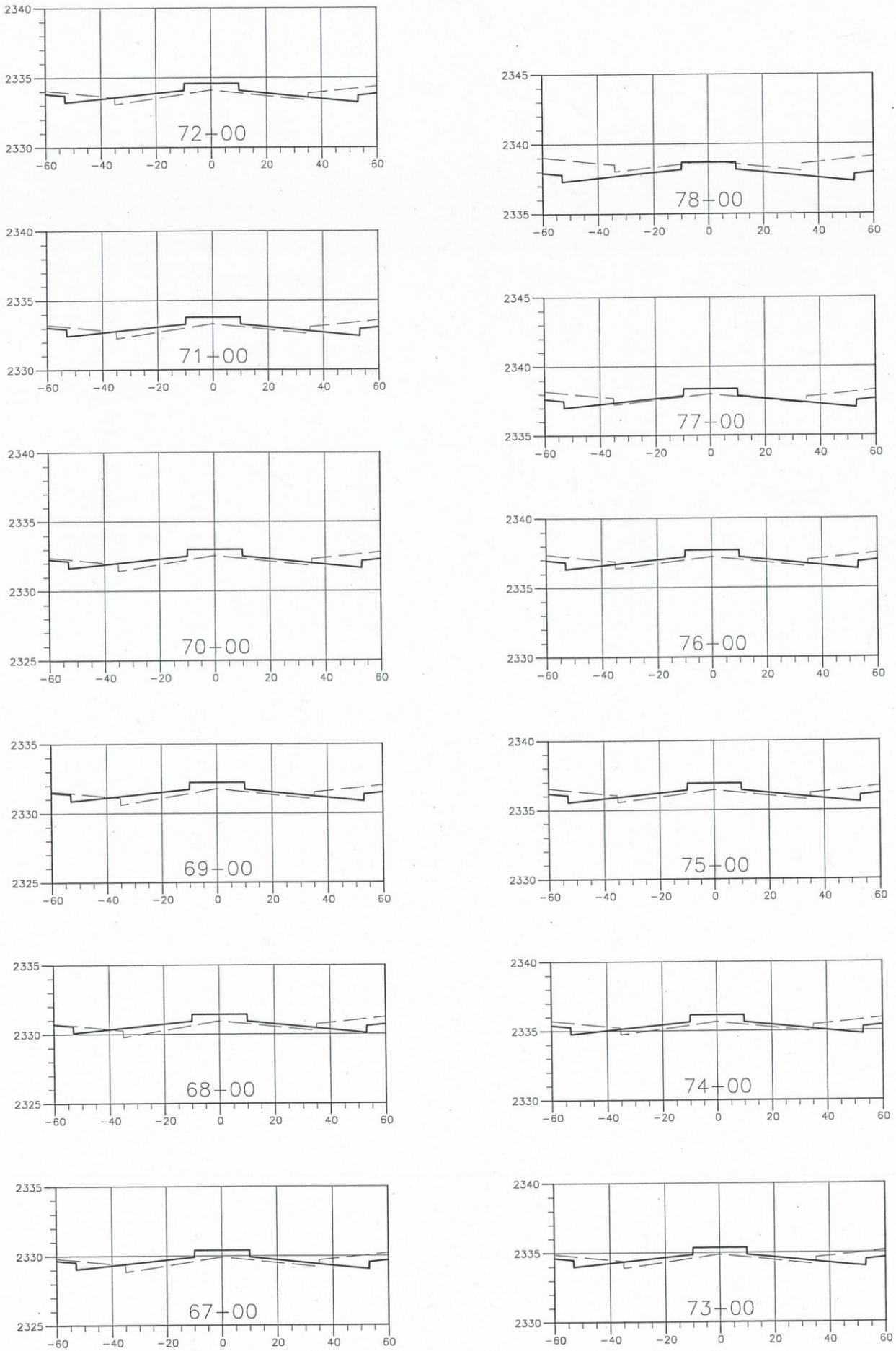




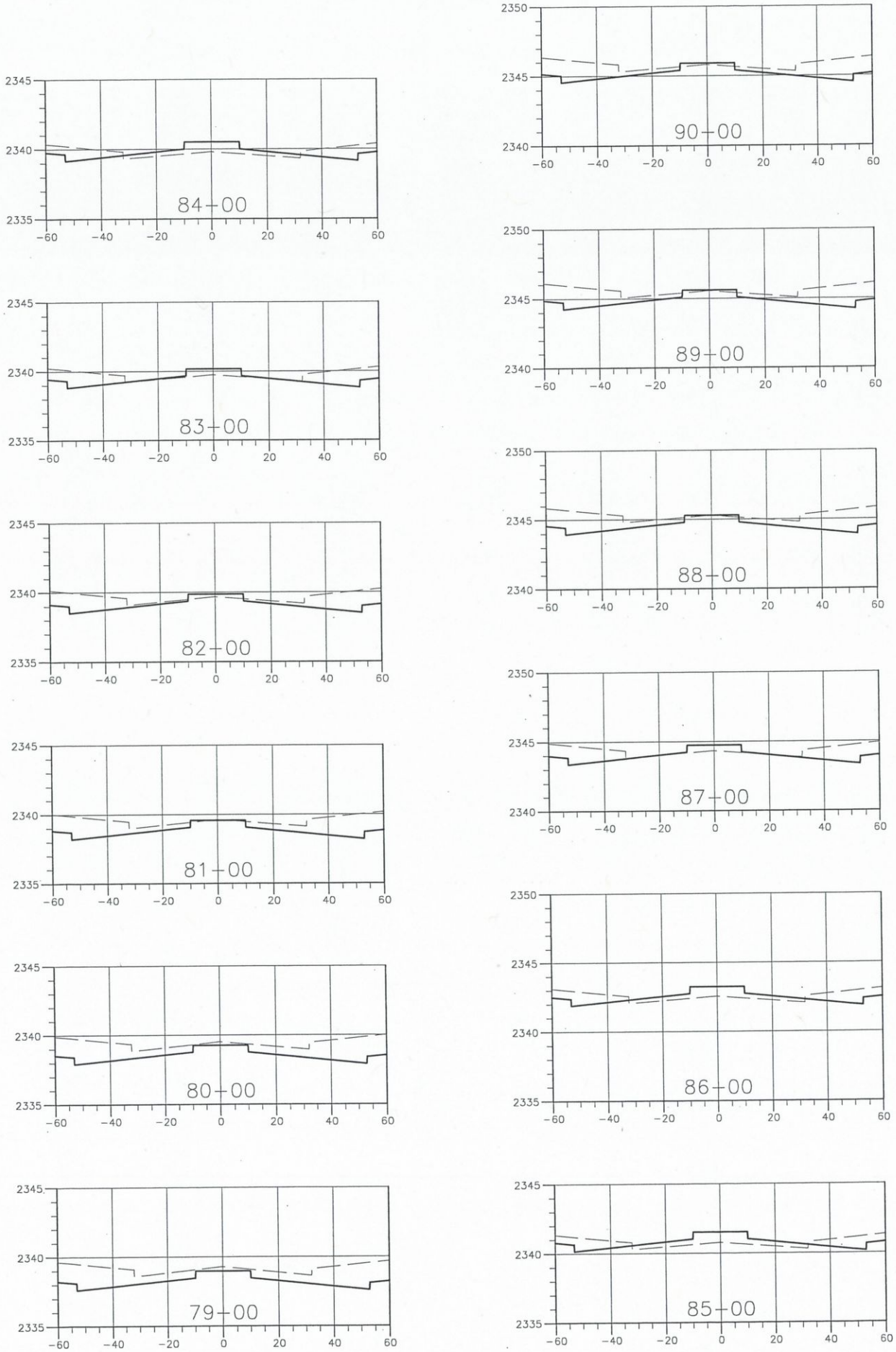
STA. 43+00 TO STA. 54+00 IST AVENUE



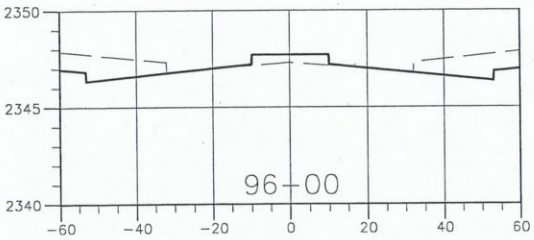
STA. 55+00 TO STA. 66+00 IST AVENUE

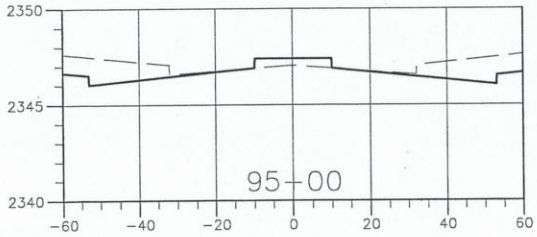


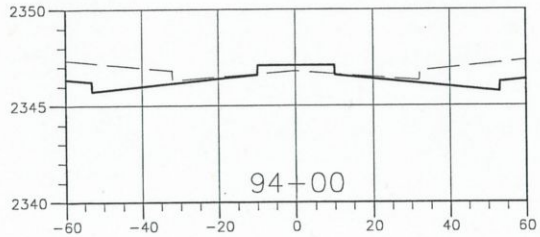
STA. 67+00 TO STA. 78+00 IST AVENUE

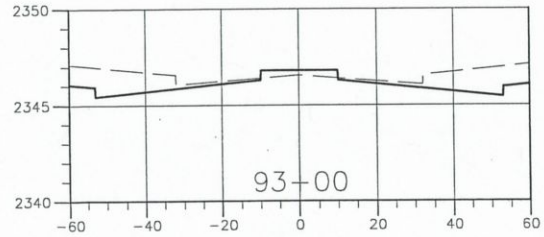


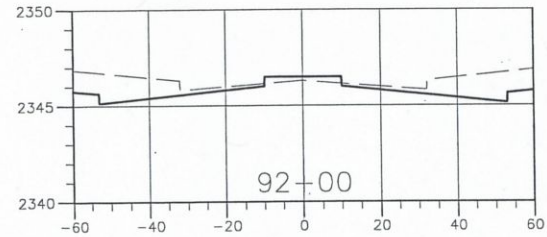
STA. 79+00 TO STA. 90+00 IST AVENUE

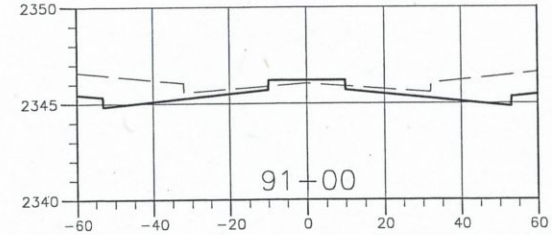


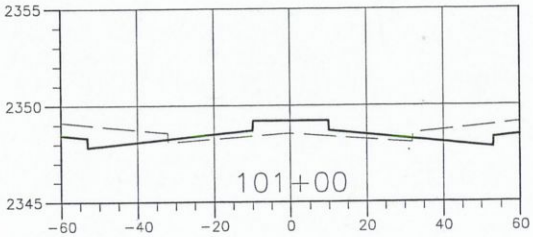


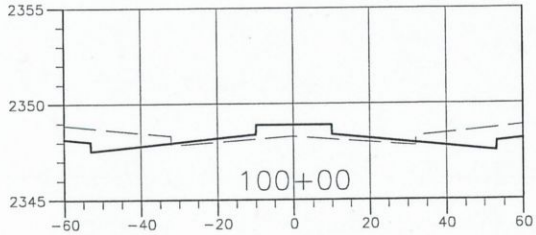


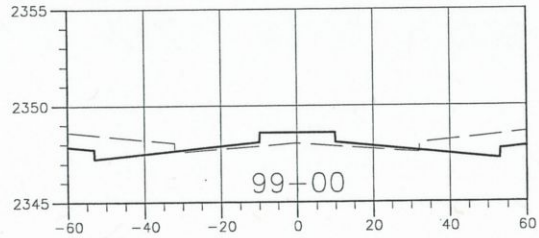


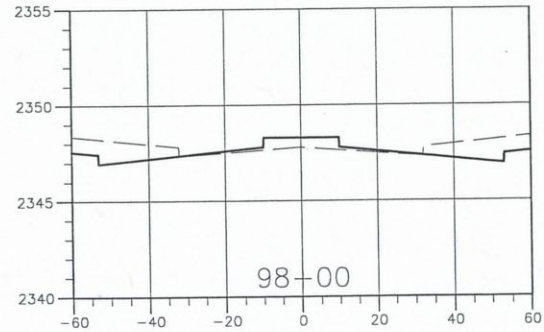


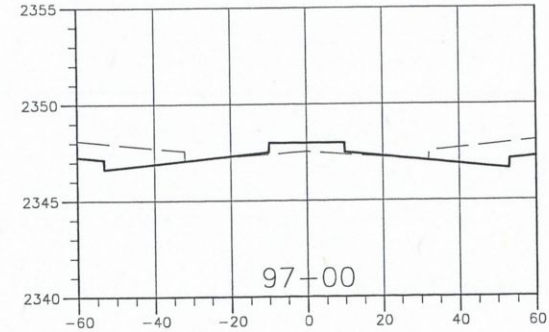




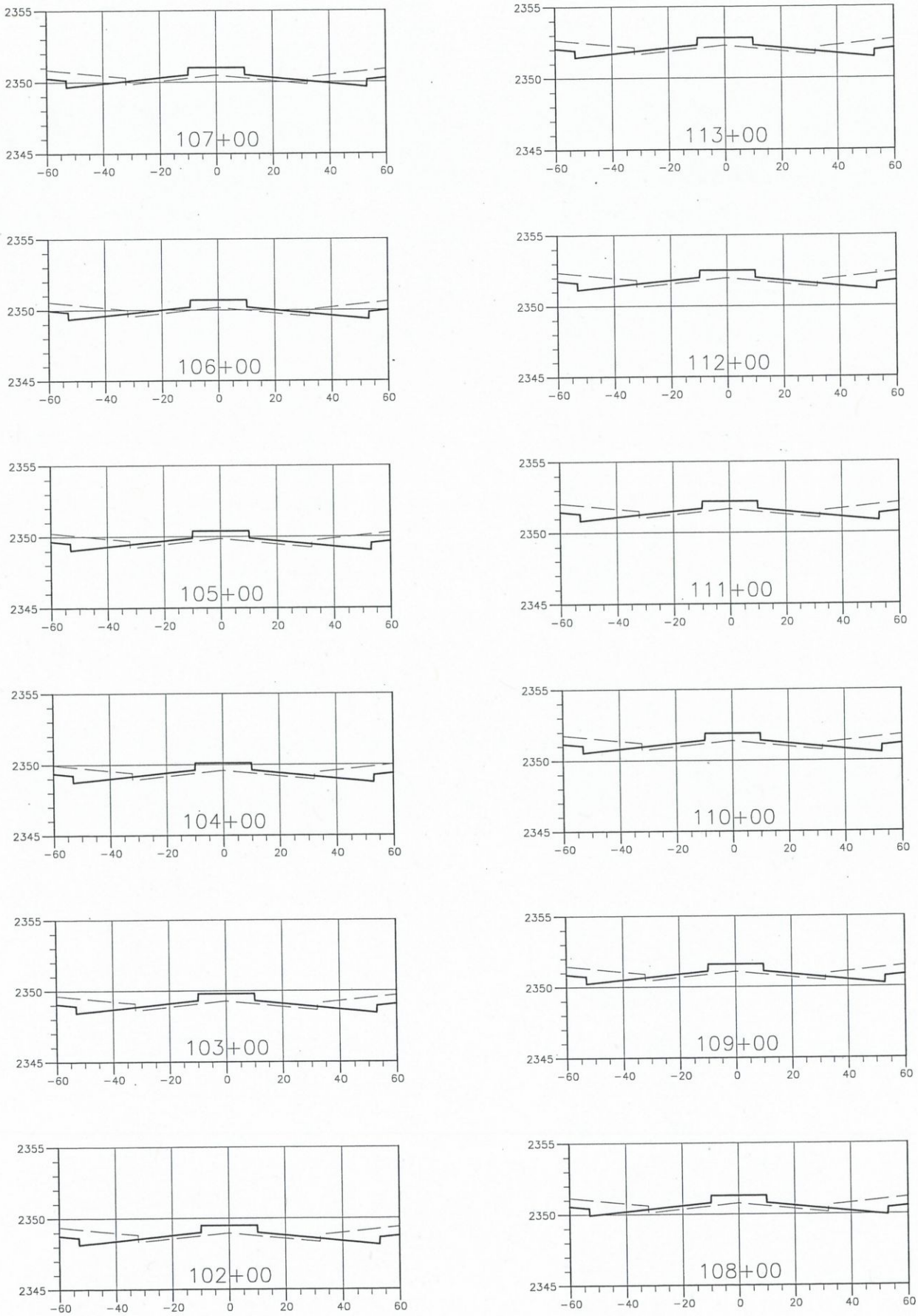




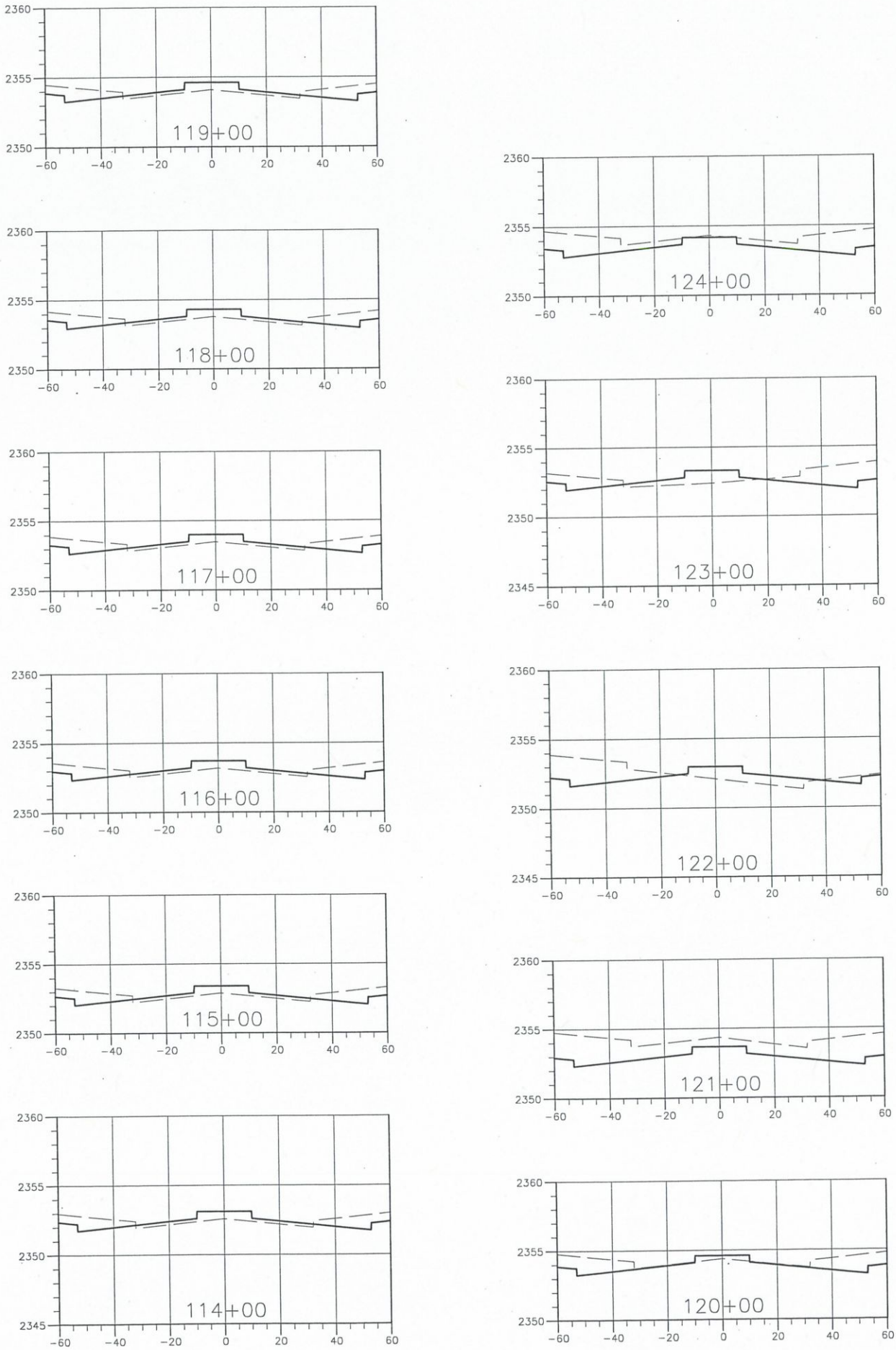




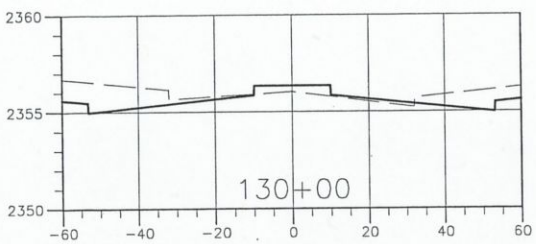
STA. 91+00 TO STA. 101+00 IST AVENUE

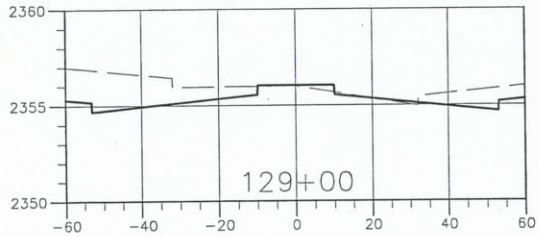


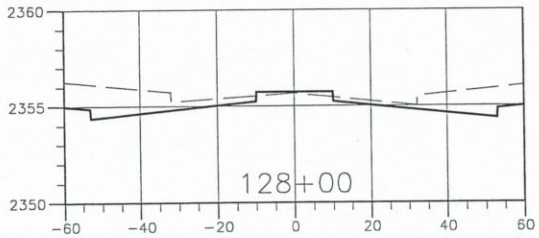
STA. 102+00 TO STA. 113+00 1ST AVENUE

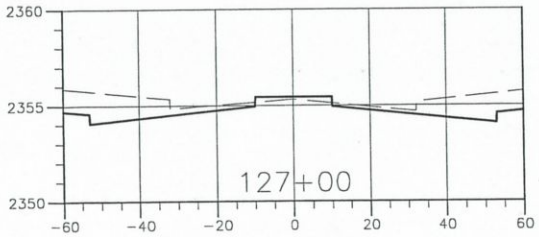


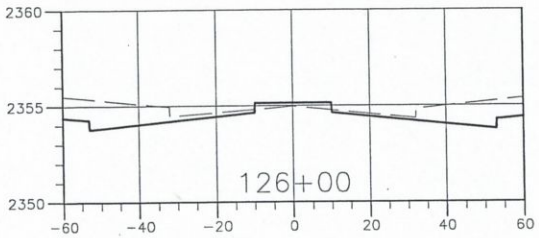
STA. 114+00 TO STA. 124+00 1ST AVENUE

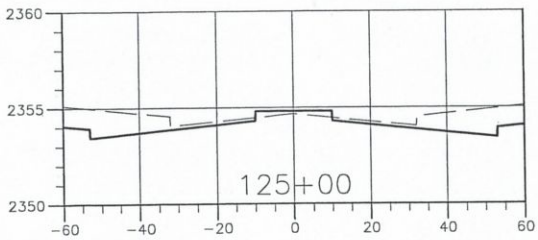


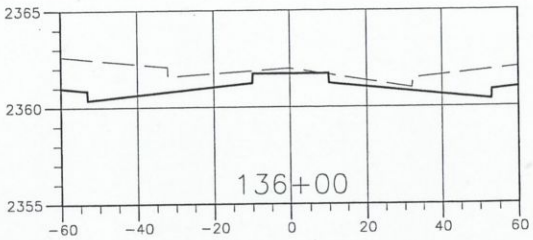


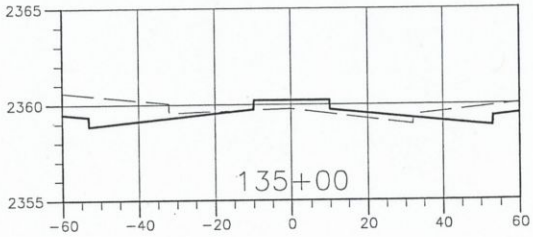


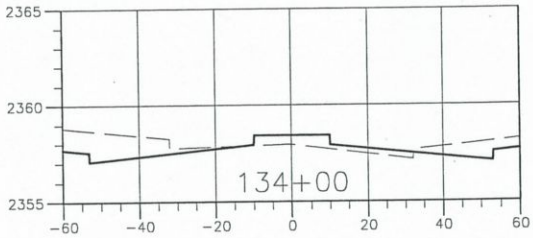


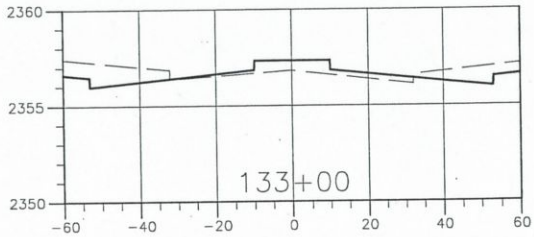


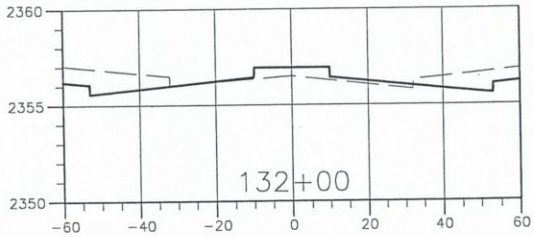


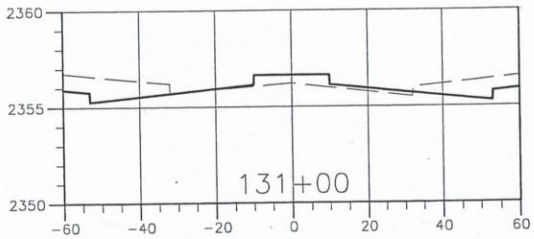




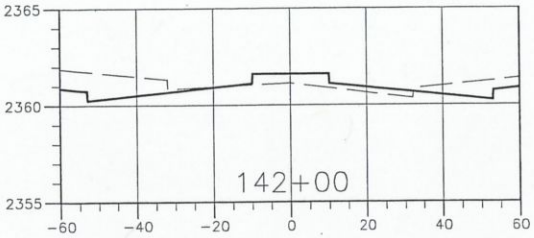


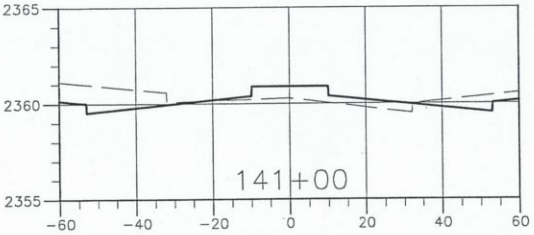


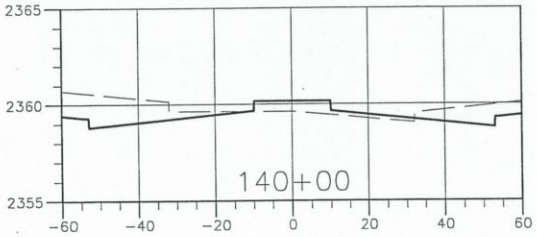


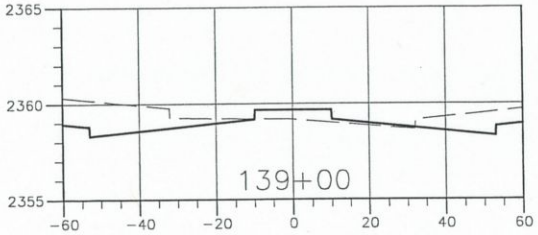


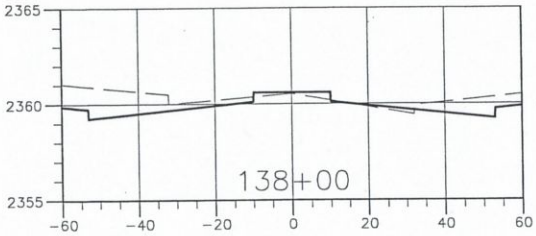
STA. 125+00 TO STA. 136+00 1ST AVENUE

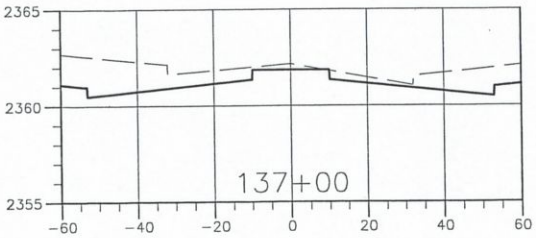


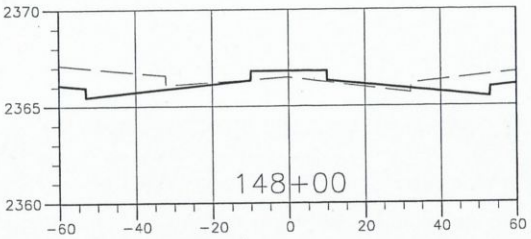


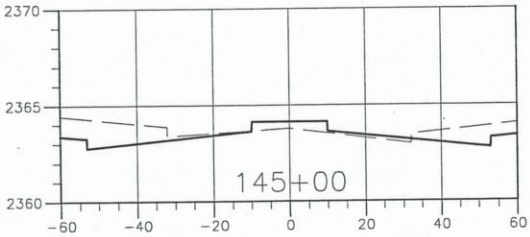


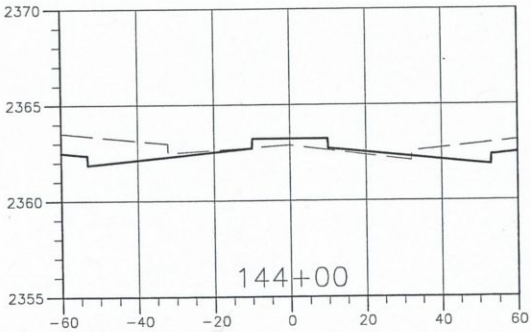


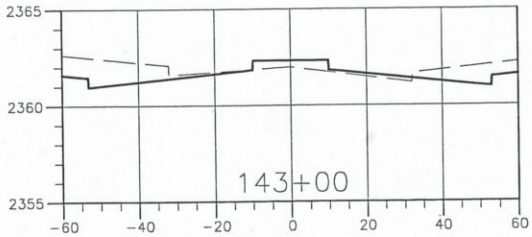




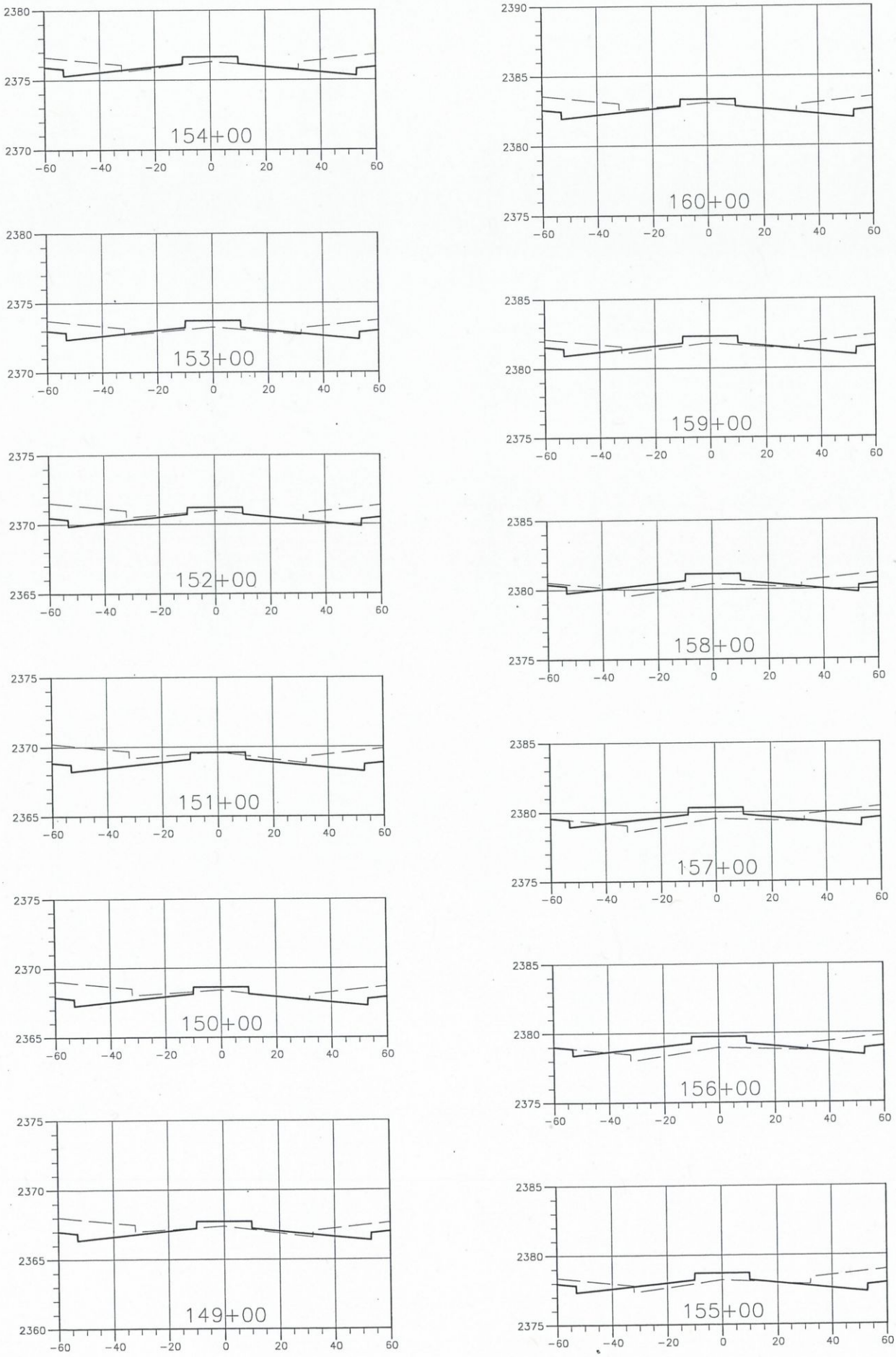




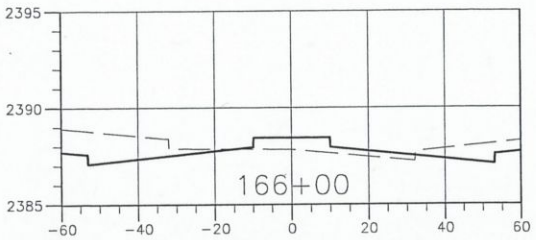


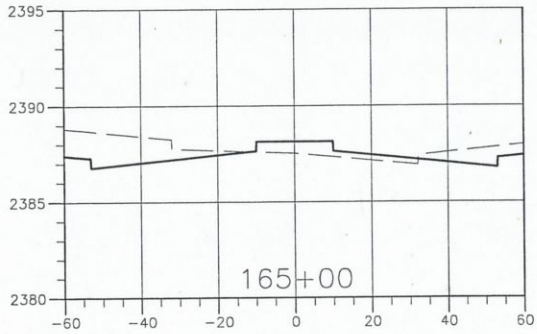


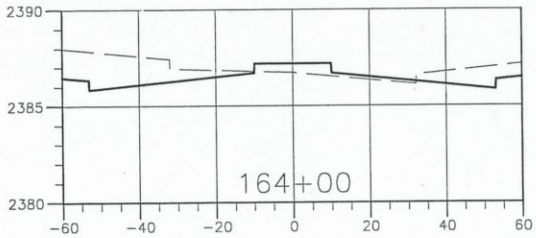
STA. 137+00 TO STA. 148+00 1ST AVENUE

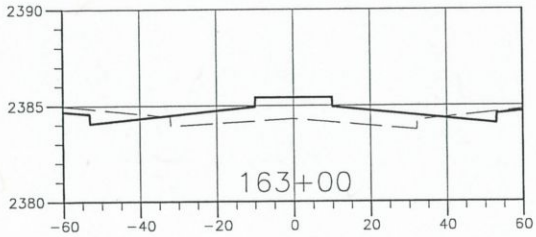


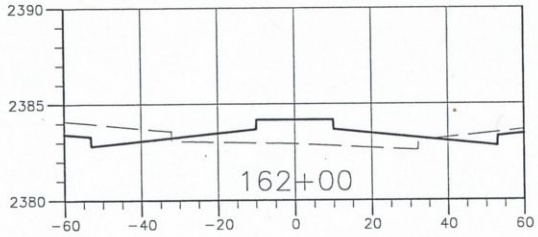
STA. 149+00 TO STA. 160+00 1ST AVENUE

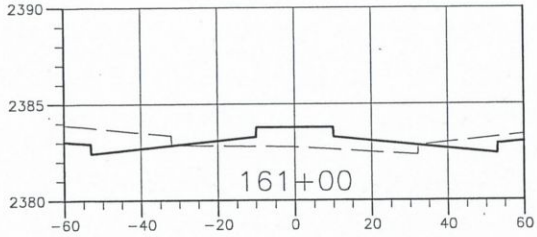


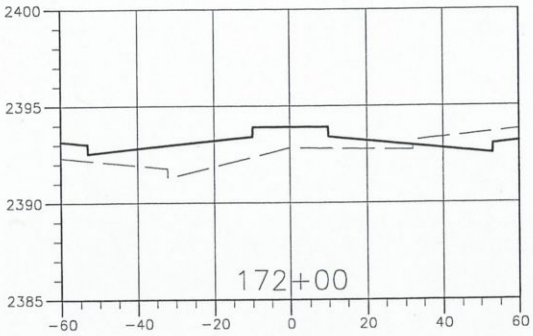


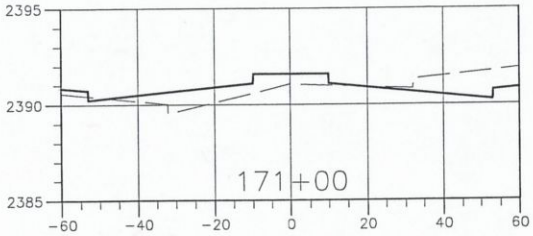


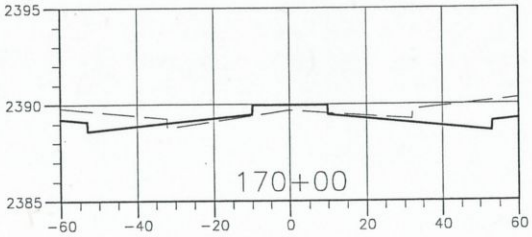


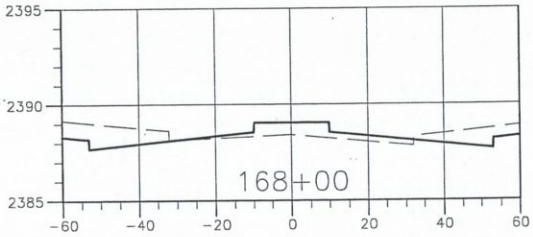


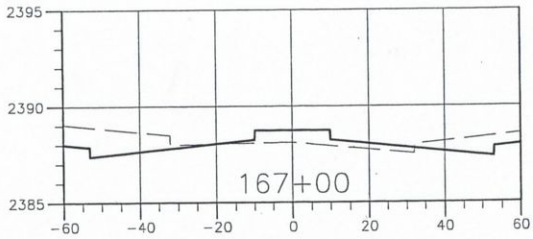




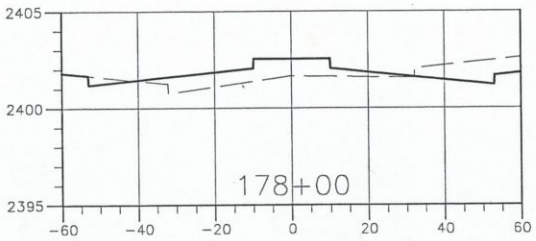


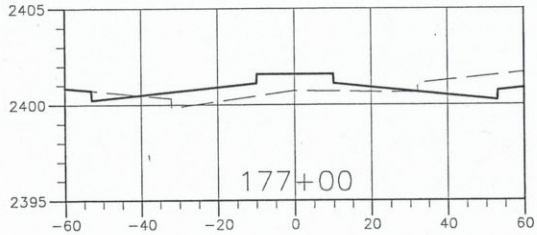


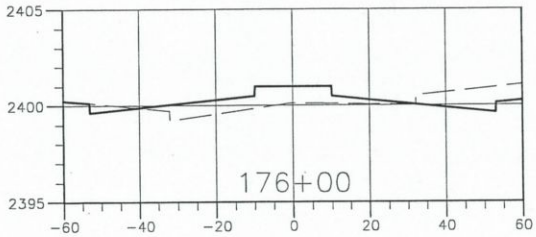


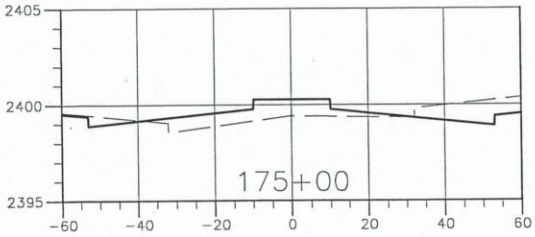


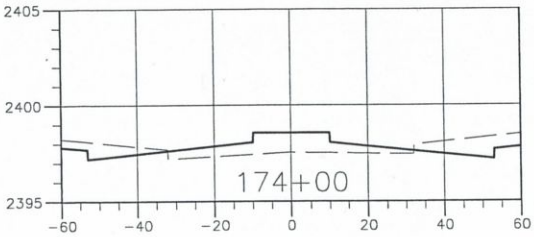
STA. 161+00 TO STA. 172+00 1ST AVENUE

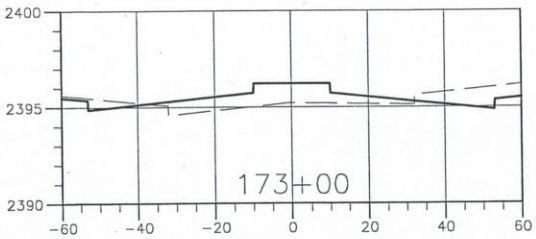


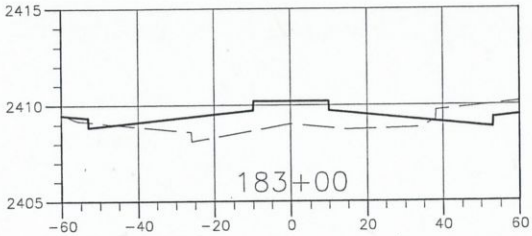


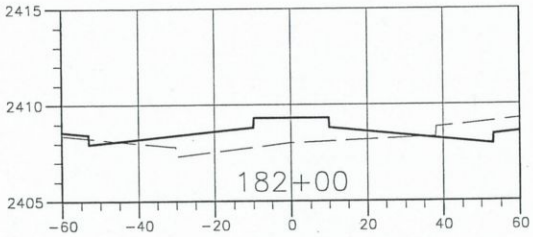


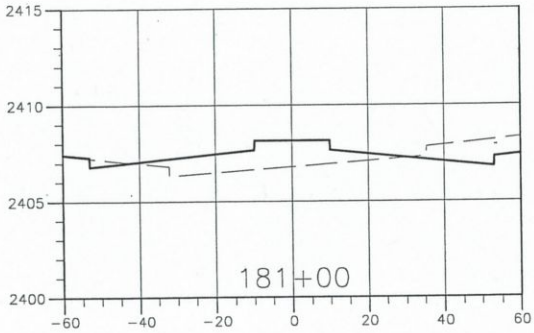


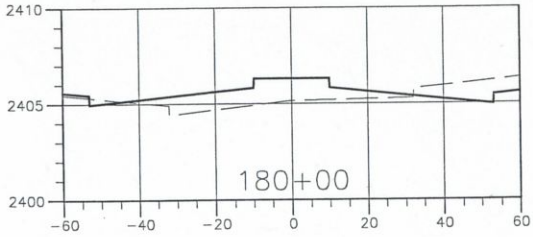


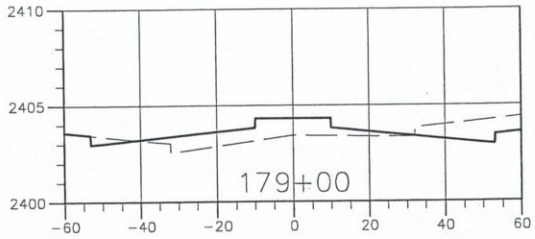












STA. 173+00 TO STA. 183+00 1ST AVENUE

Appendix 3c. Future Channel and Roadway Routing Data

CHANNEL RATING DATA

For Navajo Wash Approach

CF_JK

Ft. Lowell to First Ave

W	H	n	L	So
25.0	8.0	.016	3,176	.0025

d	a	p	r	qn
0.00	0.0	25.0	0.00	0
1.00	25.0	27.0	0.93	111
2.00	50.0	29.0	1.72	335
3.00	75.0	31.0	2.42	629
4.00	100.0	33.0	3.03	975
5.00	125.0	35.0	3.57	1360
6.00	150.0	37.0	4.05	1776
7.00	175.0	39.0	4.49	2217
8.00	200.0	41.0	4.88	2679

HEC1 Data

SE	SQ	SV
0.00	0	0.00
1.00	111	1.82
2.00	335	3.65
3.00	629	5.47
4.00	975	7.29
5.00	1360	9.11
6.00	1776	10.94
7.00	2217	12.76
8.00	2679	14.58

```
*
KK CF_JK
KM      New channel downstream of Oracle -- NAVAJO WASH APPROACH
* Bottom Width B=25.0  Max Depth D=8.0  =.016  L=3176  So=.0025
RS      1     FLOW      -1
SV      0    1.823    3.645    5.468    7.291    9.113   10.936   12.759   14.581
SQ      0      111      335      629      975     1360     1776     2217     2679
SE      0     1.00     2.00     3.00     4.00     5.00     6.00     7.00     8.00
* -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

For First Avenue Approach

CF_JK

Ft. Lowell to First Ave

W	H	n	L	So
20.0	6.0	.016	3,176	.0025

d	a	p	r	qn
0.00	0.0	25.0	0.00	0
0.75	18.8	26.5	0.71	69
1.50	37.5	28.0	1.34	212
2.25	56.3	29.5	1.91	403
3.00	75.0	31.0	2.42	629
3.75	93.8	32.5	2.88	885
4.50	112.5	34.0	3.31	1163
5.25	131.3	35.5	3.70	1461
6.00	150.0	37.0	4.05	1776

HEC1 Data

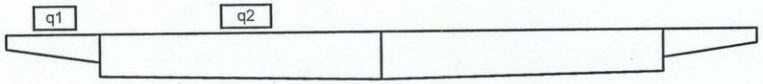
SE	SQ	SV
0.00	0	0.00
0.75	69	1.37
1.50	212	2.73
2.25	403	4.10
3.00	629	5.47
3.75	885	6.83
4.50	1163	8.20
5.25	1461	9.57
6.00	1776	10.94

```
*
KK CF_JK
KM      New channel downstream of Oracle -- FIRST AVENUE APPROACH
* Bottom Width B=20.0  Max Depth D=6.0  =.016  L=3176  So=.0025
RS      1     FLOW      -1
SV      0    1.367    2.734    4.101    5.468    6.835    8.202    9.569   10.936
SQ      0       69      212      403      629      885     1163     1461     1776
SE      0     0.75     1.50     2.25     3.00     3.75     4.50     5.25     6.00
* -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

1 SF_DC
Navajo Wash, Ft. Lowell to First Ave

Half Street		Parkway		Reach	
W:	18.0	W:	12.0	L:	2780
Sx:	.030	Sx:	.020	So:	.0050
n:	.016	n:	.025		
Curb h:	.50				

Inv Elev:	.00
Gut Elev:	.54
Curb Elev:	1.04
Elev @ R/W:	1.28



q2			q1			Total		
d	qn	an	d	qn	an	d	qn	an
0.00	0	0.0	--	--	--	--	--	--
0.54	16	4.9	0.04	0.0	0.04	0.54	32	9.8
0.79	40	9.4	0.29	2.6	2.04	0.79	85	22.8
1.04	77	13.9	0.54	11.9	5.04	1.04	177	37.8
1.28	121	18.2	0.78	25.3	7.92	1.28	292	52.2
2.00	296	31.1	1.50	86.5	16.56	2.00	764	95.4
3.00	632	49.1	2.50	214.6	28.56	3.00	1693	155.4
3.50	837	58.1	3.00	294.8	34.56	3.50	2263	185.4
4.00	1063	67.1	3.50	385.0	40.56	4.00	2897	215.4
1.28	121	18.2	0.78	25.3	7.92	1.28	292	52.2

HEC1 Data		
SE	SQ	SV
0.00	0	0.000
0.54	32	0.421
0.79	85	0.979
1.04	177	1.623
1.28	292	2.241
2.00	764	4.095
3.00	1693	6.671
3.50	2263	7.959
4.00	2897	9.247
1.28	291.6	2.241

L	V	Nsteps
2780	8.01	347

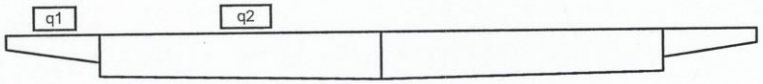
```
*
1  KK SF_DC
   KM Navajo Wash, Ft. Lowell to First Ave
   * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
   * Half Parkway W=12.0  Sx=.020  n=.025
   * L=2780  So=.0050
   RS     1    FLOW      -1
   SV     0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
   SQ     0      32      85     177     292     764    1693    2263    2897
   SE     0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

2 SF_CI

Navajo Wash, First Ave to Stone Ave

Half Street		Parkway		Reach	
W:	18.0	W:	12.0	L:	3450
Sx:	.030	Sx:	.020	So:	.0045
n:	.016	n:	.025		
Curb h:	.50				

Inv Elev:	.00
Gut Elev:	.54
Curb Elev:	1.04
Elev @ R/W:	1.28



q2			q1			Total		
d	qn	an	d	qn	an	d	qn	an
0.00	0	0.0	--	--	--	--	--	--
0.54	15	4.9	0.04	0.0	0.04	0.54	30	9.8
0.79	38	9.4	0.29	2.5	2.04	0.79	81	22.8
1.04	73	13.9	0.54	11.3	5.04	1.04	168	37.8
1.28	114	18.2	0.78	24.0	7.92	1.28	277	52.2
2.00	280	31.1	1.50	82.1	16.56	2.00	725	95.4
3.00	600	49.1	2.50	203.5	28.56	3.00	1606	155.4
3.50	794	58.1	3.00	279.7	34.56	3.50	2147	185.4
4.00	1009	67.1	3.50	365.2	40.56	4.00	2748	215.4
1.28	114	18.2	0.78	24.0	7.92	1.28	277	52.2

HEC1 Data		
SE	SQ	SV
0.00	0	0.000
0.54	30	0.421
0.79	81	0.979
1.04	168	1.623
1.28	277	2.241
2.00	725	4.095
3.00	1606	6.671
3.50	2147	7.959
4.00	2748	9.247
1.28	276.7	2.241

L	V	Nsteps
3450	7.60	454

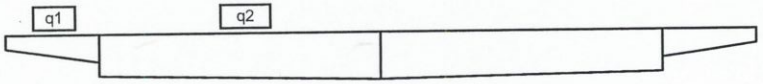
```
*
2  KK SF_CI
   KM Navajo Wash, First Ave to Stone Ave
   * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
   * Half Parkway W=12.0  Sx=.020  n=.025
   * L=3450  So=.0045
   RS     1    FLOW      -1
   SV     0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
   SQ     0      30      81     168     277     725    1606    2147    2748
   SE     0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
   * -----+-------+-------+-------+-------+-------+-------+-------+-------+
```

3 SF_IJ

Navajo Wash, Stone Ave to Oracle Road

Half Street		Parkway		Reach	
W:	18.0	W:	12.0	L:	1870
Sx:	.030	Sx:	.020	So:	.0037
n:	.016	n:	.025		
Curb h:	.50				

Inv Elev:	.00
Gut Elev:	.54
Curb Elev:	1.04
Elev @ R/W:	1.28



q2			q1			Total		
d	qn	an	d	qn	an	d	qn	an
0.00	0	0.0	--	--	--	--	--	--
0.54	14	4.9	0.04	0.0	0.04	0.54	27	9.8
0.79	34	9.4	0.29	2.3	2.04	0.79	73	22.8
1.04	66	13.9	0.54	10.2	5.04	1.04	152	37.8
1.28	104	18.2	0.78	21.8	7.92	1.28	251	52.2
2.00	254	31.1	1.50	74.4	16.56	2.00	657	95.4
3.00	544	49.1	2.50	184.6	28.56	3.00	1457	155.4
3.50	720	58.1	3.00	253.6	34.56	3.50	1947	185.4
4.00	915	67.1	3.50	331.2	40.56	4.00	2492	215.4
1.28	104	18.2	0.78	21.8	7.92	1.28	251	52.2

HEC1 Data		
SE	SQ	SV
0.00	0	0.000
0.54	27	0.421
0.79	73	0.979
1.04	152	1.623
1.28	251	2.241
2.00	657	4.095
3.00	1457	6.671
3.50	1947	7.959
4.00	2492	9.247
1.28	250.9	2.241

L	V	Nsteps
1870	4.81	389

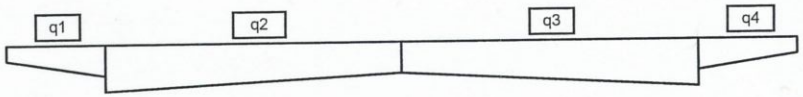
```
*
3  KK SF_IJ
   KM Navajo Wash, Stone Ave to Oracle Road
   * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
   * Half Parkway W=12.0  Sx=.020  n=.025
   * L=1870  So=.0037
   RS     1    FLOW      -1
   SV     0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
   SQ     0      27      73     152     251     657    1457    1947    2492
   SE     0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
   * -----+-------+-------+-------+-------+-------+-------+-------+-------+
```

Jun-09-06 4:40 PM

1 SF_BC
First Avenue, Ft. Lowell to Navajo Road

Street		Parkway		Reach	
W:	43.0	W:	7.0	L:	440
Sx:	.020	Sx:	.020	So:	.0030
n:	.016	n:	.025		
h:	.50				

Gut Elev:	0.00
CL Elev:	0.86
Curb Elev:	.50
Elev @ R/W:	0.64



q2			q1			Total		
d	qn	an	d	qn	an	d	qn	an
0.00	0	0.0	--	--	--	0.00	0	0.0
0.50	15	6.3	--	--	--	0.50	30	12.5
0.64	29	10.2	0.14	0	0.5	0.64	59	21.5
0.86	64	18.5	0.36	3	2.0	0.86	134	41.0
1.00	86	24.5	0.50	6	3.0	1.00	183	55.0
1.50	246	46.0	1.00	20	6.5	1.50	532	105.0
2.00	465	67.5	1.50	41	10.0	2.00	1013	155.0
3.00	1058	110.5	2.50	100	17.0	3.00	2316	255.0
3.50	1422	132.0	3.00	137	20.5	3.50	3119	305.0
0.64	29	10.2	0.14	0	0.5	0.64	59	21.5

HEC1 Data		
SE	SQ	SV
0.00	0	0.000
0.50	30	0.126
0.64	59	0.217
0.86	134	0.415
1.00	183	0.556
1.50	532	1.061
2.00	1013	1.566
3.00	2316	2.576
3.50	3119	3.081
0.64	59	0.217

L	V	Nsteps
440	5.06	87

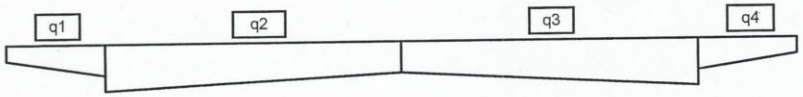
```
*
1  KK SF_BC
   KM First Avenue, Ft. Lowell to Navajo Road
   * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
   * Half Parkway W=7.0  Sx=.020  n=.025
   * L=440  So=.0030
   RS     1    FLOW      -1
   SV     0    .126    .217    .415    .556   1.061   1.566   2.576   3.081
   SQ     0      30      59     134     183     532    1013    2316    3119
   SE     0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

2 SF_CE

First Avenue, Navajo Road to Prince Road

Street		Parkway		Reach	
W:	43.0	W:	7.0	L:	2220
Sx:	.020	Sx:	.020	So:	.0030
n:	.016	n:	.025		
h:	.50				

Gut Elev:	0.00
CL Elev:	0.86
Curb Elev:	.50
Elev @ R/W:	0.64



q2			q1			Total		
d	qn	an	d	qn	an	d	qn	an
0.00	0	0.0	--	--	--	0.00	0	0.0
0.50	15	6.3	--	--	--	0.50	30	12.5
0.64	29	10.2	0.14	0	0.5	0.64	59	21.5
0.86	64	18.5	0.36	3	2.0	0.86	134	41.0
1.00	86	24.5	0.50	6	3.0	1.00	183	55.0
1.50	246	46.0	1.00	20	6.5	1.50	532	105.0
2.00	465	67.5	1.50	41	10.0	2.00	1013	155.0
3.00	1058	110.5	2.50	100	17.0	3.00	2316	255.0
3.50	1422	132.0	3.00	137	20.5	3.50	3119	305.0
0.64	29	10.2	0.14	0	0.5	0.64	59	21.5

HEC1 Data		
SE	SQ	SV
0.00	0	0.000
0.50	30	0.637
0.64	59	1.094
0.86	134	2.091
1.00	183	2.805
1.50	532	5.353
2.00	1013	7.901
3.00	2316	12.997
3.50	3119	15.545
0.64	59	0.217

L	V	Nsteps
2220	5.06	439

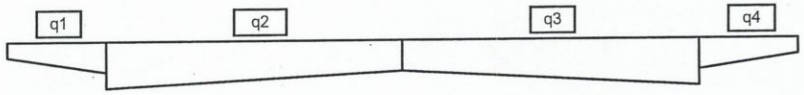
```
*
2  KK SF_CE
   KM First Avenue, Navajo Road to Prince Road
   * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
   * Half Parkway W=7.0  Sx=.020  n=.025
   * L=2220  So=.0030
   RS     1    FLOW      -1
   SV     0    .637   1.094   2.091   2.805   5.353   7.901  12.997  15.545
   SQ     0      30      59     134     183     532    1013    2316    3119
   SE     0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

3 SF_EF

First Avenue, Navajo Road to Prince Road

Street		Parkway		Reach	
W:	43.0	W:	7.0	L:	2650
Sx:	.020	Sx:	.020	So:	.0030
n:	.016	n:	.025		
h:	.50				

Gut Elev:	0.00
CL Elev:	0.86
Curb Elev:	.50
Elev @ R/W:	0.64



q2			q1			Total		
d	qn	an	d	qn	an	d	qn	an
0.00	0	0.0	--	--	--	0.00	0	0.0
0.50	15	6.3	--	--	--	0.50	30	12.5
0.64	29	10.2	0.14	0	0.5	0.64	59	21.5
0.86	64	18.5	0.36	3	2.0	0.86	134	41.0
1.00	86	24.5	0.50	6	3.0	1.00	183	55.0
1.50	246	46.0	1.00	20	6.5	1.50	532	105.0
2.00	465	67.5	1.50	41	10.0	2.00	1013	155.0
3.00	1058	110.5	2.50	100	17.0	3.00	2316	255.0
3.50	1422	132.0	3.00	137	20.5	3.50	3119	305.0
0.64	29	10.2	0.14	0	0.5	0.64	59	21.5

HEC1 Data		
SE	SQ	SV
0.00	0	0.000
0.50	134	0.760
0.64	30	1.306
0.86	59	2.497
1.00	183	3.348
1.50	532	6.390
2.00	1013	9.432
3.00	2316	15.516
3.50	3119	18.557
0.64	59	0.217

L	V	Nsteps
2650	5.06	524

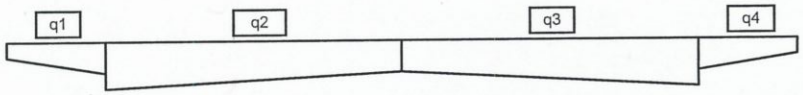
```
*
3  KK SF_EF
   KM First Avenue, Navajo Road to Prince Road
   * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
   * Half Parkway W=7.0  Sx=.020  n=.025
   * L=2650  So=.0030
   RS     1    FLOW      -1
   SV     0    .760   1.306   2.497   3.348   6.390   9.432  15.516  18.557
   SQ     0     134      30      59     183     532    1013    2316    3119
   SE     0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

4 SF_FG

First Avenue, Roger Road to Limberlost

Street		Parkway		Reach	
W:	43.0	W:	7.0	L:	1320
Sx:	.020	Sx:	.020	So:	.0078
n:	.016	n:	.025		
h:	.50				

Gut Elev:	0.00
CL Elev:	0.86
Curb Elev:	.50
Elev @ R/W:	0.64



q2			q1			Total		
d	qn	an	d	qn	an	d	qn	an
0.00	0	0.0	--	--	--	0.00	0	0.0
0.50	24	6.3	--	--	--	0.50	49	12.5
0.64	47	10.2	0.14	1	0.5	0.64	95	21.5
0.86	103	18.5	0.36	5	2.0	0.86	216	41.0
1.00	139	24.5	0.50	9	3.0	1.00	295	55.0
1.50	396	46.0	1.00	33	6.5	1.50	857	105.0
2.00	750	67.5	1.50	67	10.0	2.00	1634	155.0
3.00	1705	110.5	2.50	162	17.0	3.00	3734	255.0
3.50	2293	132.0	3.00	221	20.5	3.50	5029	305.0
0.64	47	10.2	0.14	1	0.5	0.64	95	21.5

HEC1 Data		
SE	SQ	SV
0.00	0	0.000
0.50	49	0.379
0.64	95	0.650
0.86	216	1.244
1.00	295	1.668
1.50	857	3.183
2.00	1634	4.698
3.00	3734	7.728
3.50	5029	9.244
0.64	95	0.217

L	V	Nsteps
1320	8.16	162

```
*
4  KK SF_FG
   KM First Avenue, Roger Road to Limberlost
   * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
   * Half Parkway W=7.0  Sx=.020  n=.025
   * L=1320  So=.0078
   RS     1    FLOW      -1
   SV     0    .379    .650   1.244   1.668   3.183   4.698   7.728   9.244
   SQ     0      49      95     216     295     857    1634    3734    5029
   SE     0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

5 SF_GH

First Avenue, Limberlost to Wetmore

Street		Parkway		Reach	
W:	43.0	W:	7.0	L:	1320
Sx:	.020	Sx:	.020	So:	.0030
n:	.016	n:	.025		
h:	.50				

Gut Elev:	0.00
CL Elev:	0.86
Curb Elev:	.50
Elev @ R/W:	0.64

q2			q1			Total		
d	qn	an	d	qn	an	d	qn	an
0.00	0	0.0	--	--	--	0.00	0	0.0
0.50	15	6.3	--	--	--	0.50	30	12.5
0.64	29	10.2	0.14	0	0.5	0.64	59	21.5
0.86	64	18.5	0.36	3	2.0	0.86	134	41.0
1.00	86	24.5	0.50	6	3.0	1.00	183	55.0
1.50	246	46.0	1.00	20	6.5	1.50	532	105.0
2.00	465	67.5	1.50	41	10.0	2.00	1013	155.0
3.00	1058	110.5	2.50	100	17.0	3.00	2316	255.0
3.50	1422	132.0	3.00	137	20.5	3.50	3119	305.0
0.64	29	10.2	0.14	0	0.5	0.64	59	21.5

HEC1 Data		
SE	SQ	SV
0.00	0	0.000
0.50	30	0.379
0.64	59	0.650
0.86	134	1.244
1.00	183	1.668
1.50	532	3.183
2.00	1013	4.698
3.00	2316	7.728
3.50	3119	9.244
0.64	59	0.217

L	V	Nsteps
1320	5.06	261

```
*
5  KK SF_GH
   KM First Avenue, Limberlost to Wetmore
   * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
   * Half Parkway W=7.0  Sx=.020  n=.025
   * L=1320  So=.0030
   RS     1    FLOW      -1
   SV     0    .379    .650   1.244   1.668   3.183   4.698   7.728   9.244
   SQ     0      30      59     134     183     532    1013    2316    3119
   SE     0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

Appendix 4a. TSMS(4) -- Initial Hydrologic Modeling, Navajo Wash Scenario

Appendix 4a. TSMS(4) -- INITIAL HYDROLOGIC MODELING, NAVAJO WASH SCENARIO
Routing along future streets and channel, no storm drains
Data and results common to TSMS(3) not printed here.

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
*  RUN DATE  07/24/2006  TIME  16:34:42 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID    Appendix 4a.  TSMS(4) -- INITIAL HYDROLOGIC MODELING, NAVAJO WASH SCENARIO
  3           ID    Routing along future streets and channel, no storm drains
  4           ID    Data and results common to TSMS(3) not printed here.
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *DIAGRAM
              * Curve numbers for Basin DG are based on PB = 3.131 corresponding to POC_K
              * and are slightly inaccurate for other precipitation values.  CNs for Basin GR
              * are based on PB = 3.60.
              *
              * The purpose of TSMS(4) is as follows:
              *
              * The project base model TSMS(3) has been revised to reflect the Navajo Wash
              * Scenario but without future storm drains in place.  All flow is routed
              * assuming street(or channel) flow based on the future profiles and
              * cross-sections.
              * Preliminary plans for Navajo Wash including channel improvements downstream of
              * Oracle to Fairview have been prepared to determine the necessary
              * surface routing data.  This purpose of this run is to determine approximately
              * the discharges occurring along the Navajo Wash flow route, from
              * which preliminary storm drain sizing can be determined.
              *
              * In this scenario (and in the First Avenue Scenario), flow reaching POC_E
              * (DG-N0235, First Avenue at Prince Road) has been directed northward along
              * First Avenue rather than westward on Prince as current TSMS modeling has it.
              * This again changes total tributary area to certain points and required re-
              * calculation of ARFs and PBs as follows:
              *
              *   Proj   Area
              *   Node  (sq mi)  ARF    PB
              *  ------ ------- -----  -----
              *   POC_D  3.017  0.935  3.367
              *   POC_C  3.078  0.931  3.350
              *   POC_I  3.359  0.926  3.332
              *   POC_J  3.904  0.911  3.280
              *   POC_K  5.554  0.873  3.143
              *
  5           IT       1                     300
  6           IO       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  7           KK   S0010
  8           KM        RUNOFF FROM SUBBASIN S0010
  9           IN       1
 10           PB   3.143
```

```
*
* ==========================================================
*      BEGIN RECALLING AND ROUTING DIVERTED FLOWS IN
*       ACCORDANCE WITH THE NAVAJO WASH ALTERNATIVE
* ==========================================================
*

KK       A
KM      Off-Site flow at First Avenue and Blacklidge (Cemetary Wash)
DR   POC_A

KK       x
HC       2
* -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
*

KK       B
KM      Off-Site flow at First Avenue and Ft Lowell
DR   POC_B
* -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
*

KK   SF_BC
KM   First Avenue, Ft. Lowell to Navajo Road
* Half Roadway W=43.0  Sx=.020  n=.016  h=.50
* Half Parkway W=7.0  Sx=.020  n=.025
* L=440  So=.0030
RS       1    FLOW      -1
SV       0    .126    .217    .415    .556   1.061   1.566   2.576   3.081
SQ       0      30      59     134     183     532    1013    2316    3119
SE       0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
* -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
*

KK       D
KM     Off-Site flow at Navajo and Ft. Lowell Road
DR   POC_D
* -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
*
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 740          KK   SF_DC
 741          KM   Navajo Wash, Ft. Lowell to First Ave
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=2780  So=.0050
 742          RS       1    FLOW      -1
 743          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 744          SQ       0      32      85     177     292     764    1693    2263    2897
 745          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 746          KK       C
 747          KM      Off-Site flow at Navajo and First Avenue
 748          DR   POC_C
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 749          KK    HC_C
 750          KM   Combine D & C at Navajo
 751          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 752          KK   SF_CI
 753          KM   Navajo Wash, First Ave to Stone Ave
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=3450  So=.0045
 754          RS       1    FLOW      -1
 755          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 756          SQ       0      30      81     168     277     725    1606    2147    2748
 757          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 758          KK       I
 759          KM    Recall N0220
 760          DR   POC_I
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 761          KK    HC_I
 762          KM   Combine with flow from C
 763          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 764          KK   SF_IJ
 765          KM   Navajo Wash, Stone Ave to Oracle Road
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=1870  So=.0037
 766          RS       1    FLOW      -1
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 767          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 768          SQ       0      27      73     152     251     657    1457    1947    2492
 769          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 770          KK       J
 771          KM    Recall N0260
 772          DR   POC_J
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 773          KK    HC_J
 774          KM   Combine with flow from I
 775          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *

 776          KK   CF_JK
 777          KM       New channel downstream of Oracle -- NAVAJO WASH APPROACH
              * Bottom Width B=25.0  Max Depth D=8.0  =.016  L=3176  So=.0025
 778          RS       1    FLOW      -1
 779          SV       0   1.823   3.645   5.468   7.291   9.113  10.936  12.759  14.581
 780          SQ       0     111     335     629     975    1360    1776    2217    2679
 781          SE       0    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 782          KK       K
 783          DR   POC_K
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 784          KK    HC_K
 785          KM   Add K to J
 786          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *
              *
              *

 787          KK       E
 788          KM      Off-Site flow at First Avenue and Prince
 789          DR   POC_E
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 790          KK   SF_EF
 791          KM   First Avenue, Navajo Road to Prince Road
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=2650  So=.0030
 792          RS       1    FLOW      -1
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 793          SV        0     .760    1.306    2.497    3.348    6.390    9.432   15.516   18.557
 794          SQ        0      134       30       59      183      532     1013     2316     3119
 795          SE        0     0.50     0.64     0.86     1.00     1.50     2.00     3.00     3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 796          KK        F
 797          DR    POC_F
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 798          KK     HC_F
 799          KM    Combine with flow from E
 800          HC        2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 801          KK    SF_FG
 802          KM    First Avenue, Roger Road to Limberlost
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=1320  So=.0078
 803          RS        1    FLOW       -1
 804          SV        0     .379     .650    1.244    1.668    3.183    4.698    7.728    9.244
 805          SQ        0       49       95      216      295      857     1634     3734     5029
 806          SE        0     0.50     0.64     0.86     1.00     1.50     2.00     3.00     3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 807          KK        G
 808          KM     Recall N0020
 809          DR    POC_G
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 810          KK     HC_G
 811          KM    Combine with flow from F
 812          HC        2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 813          KK    SF_GH
 814          KM    First Avenue, Limberlost to Wetmore
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=1320  So=.0030
 815          RS        1    FLOW       -1
 816          SV        0     .379     .650    1.244    1.668    3.183    4.698    7.728    9.244
 817          SQ        0       30       59      134      183      532     1013     2316     3119
 818          SE        0     0.50     0.64     0.86     1.00     1.50     2.00     3.00     3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 819          KK        H
 820          KM    Off-Site flow at Wetmore
 821          DR   POC_H
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 822          KK    HC_H
 823          KM   Combine with flow from G.  This is outflow to Rillito River
 824          HC        2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
 825          ZZ
1
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.       (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

 718         Pt_H
                .
                .
 725            .          .<-------   POC_A
 723            .         A
                .          .
                .          .
 726           x............
                .
                .
 730            .          .<-------   POC_B
 728            .         B
                .         V
                .         V
 731            .      SF_BC
                .          .
                .          .
 739            .          .           .<-------   POC_D
 737            .          .          D
                .          .          V
                .          .          V
 740            .          .       SF_DC
                .          .           .
                .          .           .
 748            .          .           .           .<-------   POC_C
 746            .          .           .          C
                .          .           .           .
                .          .           .           .
 749            .       HC_C........................
                .         V
                .         V
 752            .      SF_CI
                .          .
                .          .
 760            .          .           .<-------   POC_I
 758            .          .          I
                .          .           .
                .          .           .
 761            .       HC_I............
                .         V
                .         V
 764            .      SF_IJ
                .          .
                .          .
 772            .          .           .<-------   POC_J
 770            .          .          J
                .          .           .
                .          .           .
 773            .       HC_J............
                .         V
                .         V
 776            .      CF_JK
                .          .
                .          .
 783            .          .           .<-------   POC_K
```

```
782          .          .          K
             .          .          .
             .          .          .
784          .       HC_K...........
             .          .
             .          .
789          .          .          .<-------   POC_E
787          .          .          E
             .          .          V
             .          .          V
790          .          .       SF_EF
             .          .          .
             .          .          .
797          .          .          .          .<-------   POC_F
796          .          .          .          F
             .          .          .          .
             .          .          .          .
798          .          .       HC_F...........
             .          .          V
             .          .          V
801          .          .       SF_FG
             .          .          .
             .          .          .
809          .          .          .          .<-------   POC_G
807          .          .          .          G
             .          .          .          .
             .          .          .          .
810          .          .       HC_G...........
             .          .          V
             .          .          V
813          .          .       SF_GH
             .          .          .
             .          .          .
821          .          .          .          .<-------   POC_H
819          .          .          .          H
             .          .          .          .
             .          .          .          .
822          .          .       HC_H...........
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	Pt_H	0.	.02	0.	0.	0.	5.14		
+	HYDROGRAPH AT	A	441.	.43	70.	70.	70.	.00		
+	2 COMBINED AT	x	441.	.43	70.	70.	70.	5.14		
+	HYDROGRAPH AT	B	152.	.48	25.	25.	25.	.00		
+	ROUTED TO	SF_BC	147.	.53	25.	25.	25.	.00	.90	.53
+	HYDROGRAPH AT	D	1514.	.75	317.	317.	317.	.00		
+	ROUTED TO	SF_DC	1506.	.78	317.	317.	317.	.00	2.80	.78
+	HYDROGRAPH AT	C	100.	.38	14.	14.	14.	.00		
+	3 COMBINED AT	HC_C	1645.	.77	356.	356.	356.	.00		
+	ROUTED TO	SF_CI	1638.	.80	356.	356.	356.	.00	3.03	.80
+	HYDROGRAPH AT	I	343.	.45	53.	53.	53.	.00		
+	2 COMBINED AT	HC_I	1815.	.77	410.	410.	410.	.00		
+	ROUTED TO	SF_IJ	1806.	.80	409.	409.	409.	.00	3.36	.80
+	HYDROGRAPH AT	J	633.	.68	201.	201.	201.	.00		
+	2 COMBINED AT	HC_J	2414.	.78	610.	610.	610.	.00		
+	ROUTED TO	CF_JK	2388.	.85	609.	609.	609.	.00	7.37	.85

+	HYDROGRAPH AT	K	1625.	.67	472.	472.	472.	.00		
+	2 COMBINED AT	HC_K	3931.	.80	1082.	1082.	1082.	.00		
+	HYDROGRAPH AT	E	190.	.55	42.	42.	42.	.00		
+	ROUTED TO	SF_EF	140.	.90	42.	42.	42.	.00	.95	.90
+	HYDROGRAPH AT	F	227.	.43	34.	34.	34.	.00		
+	2 COMBINED AT	HC_F	332.	.50	76.	76.	76.	.00		
+	ROUTED TO	SF_FG	299.	.53	76.	76.	76.	.00	1.00	.53
+	HYDROGRAPH AT	G	216.	.83	49.	49.	49.	.00		
+	2 COMBINED AT	HC_G	448.	.85	125.	125.	125.	.00		
+	ROUTED TO	SF_GH	441.	.88	125.	125.	125.	.00	1.37	.88
+	HYDROGRAPH AT	H	293.	.82	61.	61.	61.	.00		
+	2 COMBINED AT	HC_H	725.	.85	185.	185.	185.	.00		

*** NORMAL END OF HEC-1 ***

Appendix 4b. TSMS(5) -- Initial Hydrologic Modeling, First Avenue Scenario

Appendix 4b. TSMS(5) -- Initial Hydrologic Modeling, First Avenue Scenario
Routing in future streets without storm drains in place
Data and results common to TSMS(3) not printed here.

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
*  RUN DATE  06/09/2006  TIME  17:04:21 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID   Appendix 4b.  TSMS(5) -- Initial Hydrologic Modeling, First Avenue Scenario
  3           ID   Routing in future streets without storm drains in place
  4           ID   Data and results common to TSMS(3) not printed here.
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *DIAGRAM
              * Curve numbers for Basin DG are based on PB = 3.131 corresponding to POC_K
              * and are slightly inaccurate for other precipitation values.  CNs for Basin GR
              * are based on PB = 3.60.
              *
              * -- TSMS(5) --
              * TSMS(5)is similar to TSMS(4) except the routing reflects the First Avenue
              * Scenario.  Because the flow path is altered, the tributary areas and therefore
              * ARFs and PBs are again altered and are as follows:
              *
              *   Proj   Area
              *   Node  (sq mi)  ARF    PB
              *  ------ ------- -----  -----
              *   POC_D  3.017  0.935  3.367
              *   POC_C  3.178  0.931  3.350
              *   POC_E  3.369  0.925  3.331
              *   POC_F  3.495  0.922  3.319
              *   POC_G  3.672  0.917  3.301
              *   POC_H  3.877  0.912  3.282
              *
              *   POC_I  0.182  1.000  3.600
              *   POC_J  0.620  1.000  3.600
              *   POC_K  1.996  0.967  3.483
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  5           IT       1                    300
  6           IO       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  7           KK   S0010
  8           KM        RUNOFF FROM SUBBASIN S0010
  9           IN       1
 10           PB   3.282
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * ==========================================================
              *      BEGIN RECALLING AND ROUTING DIVERTED FLOWS IN
              *       ACCORDANCE WITH THE FIRST AVENUE ALTERNATIVE
              * ==========================================================
              *

 723           KK       A
 724           KM      Off-Site flow at First Avenue and Blacklidge (Cemetary Wash)
 725           DR   POC_A

 726           KK       x
 727           HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 728           KK       B
 729           KM      Off-Site flow at First Avenue and Ft Lowell
 730           DR   POC_B
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 731           KK   SF_BC
 732           KM   First Avenue, Ft. Lowell to Navajo Road
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=440  So=.0030
 733           RS       1    FLOW      -1
 734           SV       0    .126    .217    .415    .556   1.061   1.566   2.576   3.081
 735           SQ       0      30      59     134     183     532    1013    2316    3119
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 736          SE        0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 737          KK        D
 738          KM      Off-Site flow at Navajo and Ft. Lowell Road
 739          DR    POC_D
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 740          KK    SF_DC
 741          KM    Navajo Wash, Ft. Lowell to First Ave
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=2780  So=.0050
 742          RS        1    FLOW      -1
 743          SV        0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 744          SQ        0      32      85     177     292     764    1693    2263    2897
 745          SE        0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 746          KK        C
 747          KM       Off-Site flow at Navajo and First Avenue
 748          DR    POC_C
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 749          KK     HC_C
 750          KM    Combine D & C at Navajo
 751          HC        3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 752          KK    SF_CE
 753          KM    First Avenue, Navajo Road to Prince Road
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=2220  So=.0030
 754          RS        1    FLOW      -1
 755          SV        0    .637   1.094   2.091   2.805   5.353   7.901  12.997  15.545
 756          SQ        0      30      59     134     183     532    1013    2316    3119
 757          SE        0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 758          KK        E
 759          KM       Off-Site flow at First Avenue and Prince
 760          DR    POC_E
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 761          KK    HC_E
 762          KM      Combined flow at First Avenue and Prince
 763          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 764          KK   SF_EF
 765          KM   First Avenue, Navajo Road to Prince Road
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=2650  So=.0030
 766          RS       1    FLOW      -1
 767          SV       0    .760   1.306   2.497   3.348   6.390   9.432  15.516  18.557
 768          SQ       0     134      30      59     183     532    1013    2316    3119
 769          SE       0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 770          KK       F
 771          DR   POC_F
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 772          KK    HC_F
 773          KM   Combine with flow from E
 774          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 775          KK   SF_FG
 776          KM   First Avenue, Roger Road to Limberlost
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=1320  So=.0078
 777          RS       1    FLOW      -1
 778          SV       0    .379    .650   1.244   1.668   3.183   4.698   7.728   9.244
 779          SQ       0      49      95     216     295     857    1634    3734    5029
 780          SE       0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 781          KK       G
 782          KM    Recall N0020
 783          DR   POC_G
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 784          KK    HC_G
 785          KM   Combine with flow from F
 786          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 787          KK   SF_GH
 788          KM   First Avenue, Limberlost to Wetmore
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=1320  So=.0030
 789          RS       1    FLOW      -1
 790          SV       0    .379    .650   1.244   1.668   3.183   4.698   7.728   9.244
 791          SQ       0      30      59     134     183     532    1013    2316    3119
 792          SE       0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 793          KK       H
 794          KM    Off-Site flow at Wetmore
 795          DR   POC_H
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 796          KK    HC_H
 797          KM   Combine with flow from G.  This is outflow to Rillito River
 798          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *
              *
              *

 799          KK       I
 800          KM    Recall N0220
 801          DR   POC_I
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 802          KK   SF_IJ
 803          KM   Navajo Wash, Stone Ave to Oracle Road
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=1870  So=.0037
 804          RS       1    FLOW      -1
 805          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 806          SQ       0      27      73     152     251     657    1457    1947    2492
 807          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 808          KK       J
 809          KM    Recall N0260
 810          DR   POC_J
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 811          KK    HC_J
 812          KM   Combine with flow from I
 813          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 814          KK   CF_JK
 815          KM       New channel downstream of Oracle -- FIRST AVENUE APPROACH
              * Bottom Width B=20.0  Max Depth D=6.0  =.016  L=3176  So=.0025
 816          RS       1    FLOW      -1
 817          SV       0   1.367   2.734   4.101   5.468   6.835   8.202   9.569  10.936
 818          SQ       0      69     212     403     629     885    1163    1461    1776
 819          SE       0    0.75    1.50    2.25    3.00    3.75    4.50    5.25    6.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 820          KK       K
 821          DR   POC_K
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 822          KK    HC_K
 823          KM   Add K to J
 824          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
 825          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

  718        Pt_H
                .
                .
  725           .           .<-------   POC_A
  723           .           A
                .           .
                .           .
  726           x............
                .
                .
  730           .           .<-------   POC_B
  728           .           B
                .           V
                .           V
  731           .       SF_BC
                .           .
                .           .
  739           .           .           .<-------   POC_D
  737           .           .           D
                .           .           V
                .           .           V
  740           .           .       SF_DC
                .           .           .
                .           .           .
  748           .           .           .           .<-------   POC_C
  746           .           .           .           C
                .           .           .           .
                .           .           .           .
  749           .        HC_C........................
                .           V
                .           V
  752           .       SF_CE
                .           .
                .           .
  760           .           .           .<-------   POC_E
  758           .           .           E
                .           .           .
                .           .           .
  761           .        HC_E............
                .           V
                .           V
  764           .       SF_EF
                .           .
                .           .
  771           .           .           .<-------   POC_F
  770           .           .           F
                .           .           .
                .           .           .
  772           .        HC_F............
                .           V
                .           V
  775           .       SF_FG
                .           .
                .           .
  783           .           .           .<-------   POC_G
```

```
781          .          .          G
             .          .          .
             .          .          .
784          .       HC_G...........
             .          V
             .          V
787          .      SF_GH
             .          .
             .          .
795          .          .          .<-------   POC_H
793          .          .          H
             .          .          .
             .          .          .
796          .       HC_H...........
             .          .
             .          .
801          .          .          .<-------   POC_I
799          .          .          I
             .          .          V
             .          .          V
802          .          .      SF_IJ
             .          .          .
             .          .          .
810          .          .          .           .<-------   POC_J
808          .          .          .           J
             .          .          .           .
             .          .          .           .
811          .          .      HC_J...........
             .          .          V
             .          .          V
814          .          .      CF_JK
             .          .          .
             .          .          .
821          .          .          .           .<-------   POC_K
820          .          .          .           K
             .          .          .           .
             .          .          .           .
822          .          .      HC_K...........
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	Pt_H	0.	.02	0.	0.	0.	5.14		
+	HYDROGRAPH AT	A	466.	.43	73.	73.	73.	.00		
+	2 COMBINED AT	x	466.	.43	73.	73.	73.	5.14		
+	HYDROGRAPH AT	B	162.	.48	27.	27.	27.	.00		
+	ROUTED TO	SF_BC	157.	.52	27.	27.	27.	.00	.93	.52
+	HYDROGRAPH AT	D	1629.	.75	350.	350.	350.	.00		
+	ROUTED TO	SF_DC	1621.	.78	350.	350.	350.	.00	2.92	.78
+	HYDROGRAPH AT	C	106.	.37	14.	14.	14.	.00		
+	3 COMBINED AT	HC_C	1767.	.75	391.	391.	391.	.00		
+	ROUTED TO	SF_CE	1749.	.82	390.	390.	390.	.00	2.56	.82
+	HYDROGRAPH AT	E	204.	.55	45.	45.	45.	.00		
+	2 COMBINED AT	HC_E	1908.	.80	435.	435.	435.	.00		
+	ROUTED TO	SF_EF	1880.	.87	435.	435.	435.	.00	2.67	.87
+	HYDROGRAPH AT	F	227.	.43	34.	34.	34.	.00		
+	2 COMBINED AT	HC_F	1975.	.87	469.	469.	469.	.00		
+	ROUTED TO	SF_FG	1973.	.88	469.	469.	469.	.00	2.16	.88

+	HYDROGRAPH AT	G	216.	.83	49.	49.	49.	.00	
+	2 COMBINED AT	HC_G	2184.	.87	518.	518.	518.	.00	
+	ROUTED TO	SF_GH	2176.	.90	517.	517.	517.	.00	2.89 .90
+	HYDROGRAPH AT	H	293.	.82	61.	61.	61.	.00	
+	2 COMBINED AT	HC_H	2454.	.88	578.	578.	578.	.00	
+	HYDROGRAPH AT	I	365.	.43	56.	56.	56.	.00	
+	ROUTED TO	SF_IJ	319.	.52	56.	56.	56.	.00	1.40 .52
+	HYDROGRAPH AT	J	676.	.67	212.	212.	212.	.00	
+	2 COMBINED AT	HC_J	957.	.57	268.	268.	268.	.00	
+	ROUTED TO	CF_JK	939.	.67	266.	266.	266.	.00	3.90 .67
+	HYDROGRAPH AT	K	1702.	.65	498.	498.	498.	.00	
+	2 COMBINED AT	HC_K	2640.	.67	764.	764.	764.	.00	

*** NORMAL END OF HEC-1 ***

Appendix 4c. TSMS(4) -- Initial Storm Drain Sizing Calculations, Navajo Wash Scenario

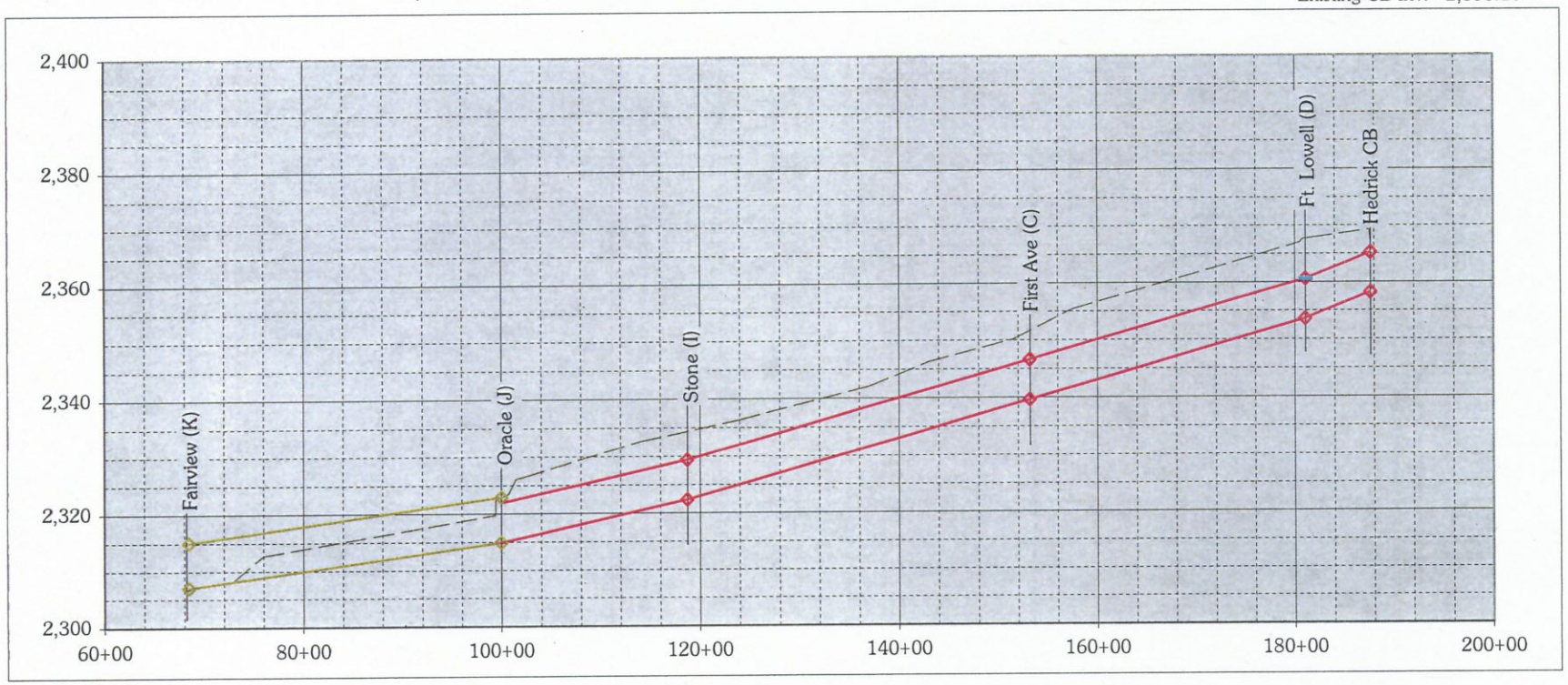
APPENDIX 4c. TSMS(4) -- Initial Storm Drain Sizing Calculations, Navajo Wash Scenario
Navajo Wash Storm Drain and Dw Channel Improvements

n: .016

Starting Invert: 2,307.00

Reach		Proj Sta	Grnd Elev	Q100	Exst Street Cap	Needed in SD or	nCls	B	D	So	A	P	R	Qcap	Excess Cap	L	Crown	Inv	Cover
JK	Fairview	68+49.26	2,306.71	2,583	--	2,583		25.00	8.00	.0025	200.0	41.0	4.88	2,679	+96	3,151	2,315.00	2,307.00	
	Oracle	100+00.00	2,322.85														2,322.88	2,314.88	
IJ	Oracle	100+00.00	2,322.85	1,995	251	1,744	3	10.00	7.00	.0040	210.0	102.0	2.06	2,002	+258	1,874	2,321.88	2,314.88	
	Stone	118+73.79	2,334.31														2,329.37	2,322.37	4.94
CI	Stone	118+73.79	2,334.31	1,828	277	1,551	3	8.00	7.00	.0050	168.0	90.0	1.87	1,677	+126	3,449	2,329.37	2,322.37	
	First Ave	153+22.60	2,351.59														2,346.62	2,339.62	4.98
DC	First Ave	153+22.60	2,351.59	1,701	292	1,409	3	8.00	7.00	.0050	168.0	90.0	1.87	1,677	+268	2,786	2,346.62	2,339.62	
	Ft. Lowell	181+08.93	2,367.67														2,360.55	2,353.55	7.12
		181+08.93	2,367.67	1,701	--	1,701	3	8.00	7.00	.0070	168.0	90.0	1.87	1,984	+283	657	2,360.55	2,353.55	
		187+65.51	2,367.16														2,365.14	2,358.14	2.02

Existing CB Inv: 2,358.16

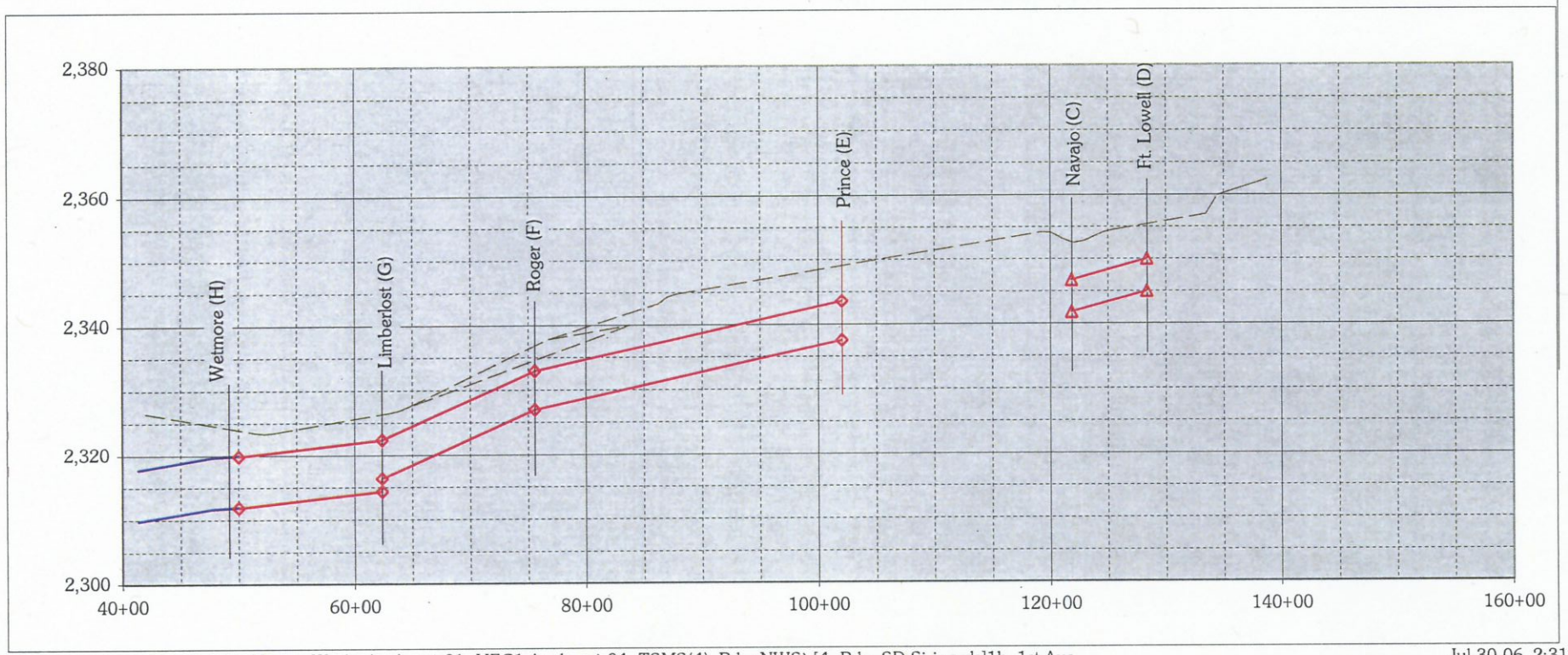


APPENDIX 4c contintued, TSMS(4) -- Initial Storm Drain Sizing Calculations, Navajo Wash Scenario
First Avenue Storm Drain and Dw Channel Improvements

Starting Invert: 2,311.81
Starting Crown: 2319.81

n: .016

SD Reach		Proj Sta	Grnd Elev	Q100	Exst SD/ Street Cap	Needed in SD	nCls	B	D	So	A	P	R	Qcap	Excess Cap	L	Crown	Inv	Cover
Exst	Exst 16'x8' Outlet	41+31.24		789	1,255	-466	1	1.00	0.00	.0030	0.0	2.0	0.00	0	+466	869			
	Inlet	50+00.00	2,323.91														2,319.81	2,311.81	4.10
GH	Inlet	50+00.00	2,323.91	509	59	450	1	10.00	8.00	.0020	80.0	36.0	2.22	567	+117	1,239	2,319.81	2,311.81	
	Limberlost	62+38.50	2,326.24														2,322.29	2,314.29	3.95
FG	Limberlost	62+38.50	2,326.24	347	95	252	1	--	6.00	.0080	28.3	18.8	1.50	309	+57	1,321	2,322.29	2,316.29	
	Roger	75+59.40	2,336.79														2,332.85	2,326.85	3.94
EF	Roger	75+59.40	2,336.79	236	59	177	1	--	6.00	.0040	28.3	18.8	1.50	218	+41	2,647	2,332.85	2,326.85	
	Prince	102+06.40	2,349.02														2,343.44	2,337.44	5.58
BC	Navajo	121+90.00	2,352.49	188	59	129	1	--	5.00	.0050	19.6	15.7	1.25	150	+21	650	2,346.62	2,341.62	
	Ft. Lowell	128+40.00	2,355.36														2,349.87	2,344.87	5.49



Appendix 4d. TSMS(5) -- Initial Storm Drain Sizing Calculations, First Avenue Scenario

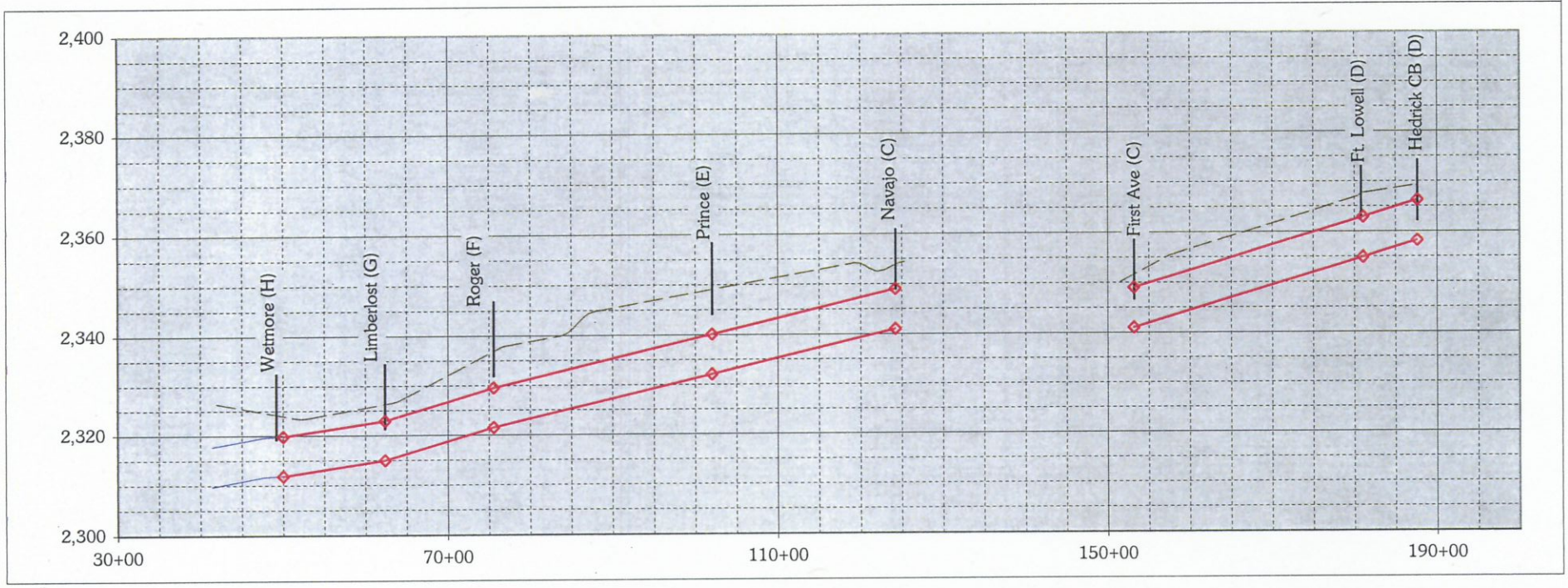
Appendix 4d. TSMS(5) -- Initial Storm Drain Sizing Calculations, First Avenue Scenario
First Avenue Improvements

Starting Invert: 2,311.81

Starting Crown: 2319.81

n: .016

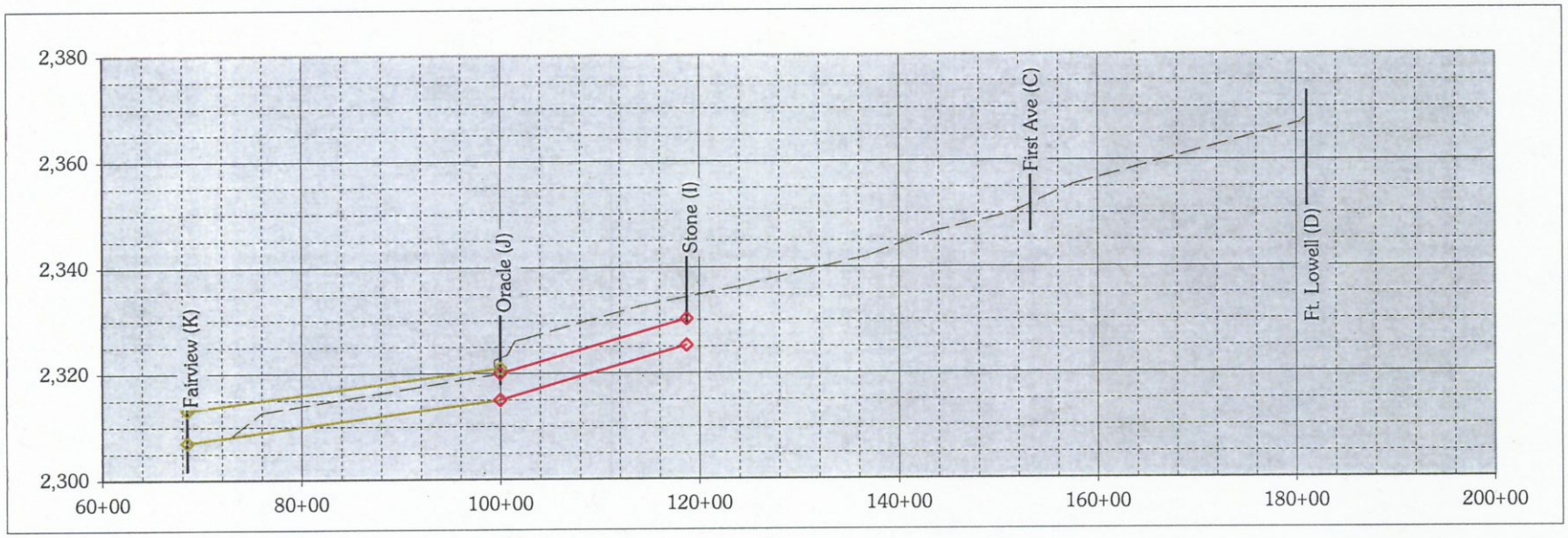
SD Reach		Proj Sta	Grnd Elev	Q100	Exst SD/ Street Cap	Needed in SD	nCls	B	D	So	A	P	R	Qcap	Excess Cap	L	Crown	Inv	Cover
	Exst 16'x8' Outlet	41+31.24		2,454	1,255	1,199	1	16.00	8.00	.0030	128.0	48.0	2.67	1,255	+57	869			
	Inlet	50+00.00	2,323.91														2,319.81	2,311.81	4.10
GH	Inlet	50+00.00	2,323.91	2,203	--	2,203	2	16.00	8.00	.0025	256.0	96.0	2.67	2,292	+89	1,239	2,319.81	2,311.81	
	Limberlost	62+38.50	2,326.24														2,322.91	2,314.91	3.33
FG	Limberlost	62+38.50	2,326.24	2,010	95	1,915	2	12.00	8.00	.0050	192.0	80.0	2.40	2,266	+351	1,321	2,322.91	2,314.91	
	Roger	75+59.40	2,336.79														2,329.51	2,321.51	7.28
EF	Roger	75+59.40	2,336.79	1,956	59	1,897	2	12.00	8.00	.0040	192.0	80.0	2.40	2,027	+130	2,647	2,329.51	2,321.51	
	Prince	102+06.40	2,349.02														2,340.10	2,332.10	8.92
CE	Prince	102+06.40	2,349.02	1,828	59	1,769	2	12.00	8.00	.0040	192.0	80.0	2.40	2,027	+258	2,220	2,340.10	2,332.10	
	Navajo	124+26.25	2,353.87														2,348.98	2,340.98	4.89
DC	First Ave	153+22.60	2,353.87	1,701	292	1,409	2	10.00	8.00	.0050	160.0	72.0	2.22	1,792	+383	2,786	2,348.98	2,340.98	
	Ft. Lowell	181+08.93	2,367.68														2,362.88	2,354.88	4.79
DC	Ft. Lowell	181+08.93	2,367.68	1,701	--	1,701	2	10.00	8.00	.0050	160.0	72.0	2.22	1,792	+91	657	2,362.88	2,354.88	
	Hedrick CB	187+65.51	2,367.16														2,366.16	2,358.16	1.00
																	Existing CB Inv:	2,358.16	



Appendix 4d, continued. TSMS(5) -- Initial Storm Drain Sizing Calculations, First Avenue Scenario
Navajo Wash Storm Drain and Downstream Channel Improvements

n: .016 Starting Invert: 2,307.00

POC		Proj Sta	Grnd Elev	Q100	Exst SD/ Street Cap	Needed in SD or Channel	nCells	B	D	So	A	P	R	Qcap	Excess Cap	L	Crown	Inv	Cover
JK	Fairview	68+49.26	2,306.71	1,101	--	1,101		20.00	6.00	.0025	120.0	32.0	3.75	1,349	+248	3,151	2,313.00	2,307.00	
	Oracle	100+00.00	2,322.85														2,320.88	2,314.88	
IJ	Oracle	100+00.00	2,322.85	423	187	251	1	8.00	5.00	.0055	40.0	26.0	1.54	368	+117	1,874	2,319.88	2,314.88	
	Stone	118+73.79	2,334.31														2,330.18	2,325.18	4.13



4e. TSMS(6) -- Storm Drain Flow Routing Data, Navajo Wash Scenario

APPENDIX 4E. TSMS(6) -- STORM DRAIN FLOW ROUTING DATA, NAVAJO WASH SCENARIO

```
1 SD_BC
1 Navajo Wash Scenario
1
1      B       D      nCls     So       n       L
1     --     5.00     1      .0050    .016    650
1
1    *
1    KK DT_B
1    KM      Navajo Wash Scenario
1    * Divert Capacity of storm drain (150.0 cfs).  Save temporarily as divB
1    * Storm Drain is RCP  D=5.0  nCls=1 So=.0050  n=.016  L=650
1    DT divB
1    DI   0.0   150.0   10000
1    DQ   0.0   150.0   150.0
1    * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
1    *
1    KK SF_BC
1    KM First Avenue, Ft. Lowell to Navajo Road
1    * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
1    * Half Parkway W=7.0  Sx=.020  n=.025
1    * L=440  So=.0030
1    RS     1    FLOW      -1
1    SV     0    .126    .217    .415    .556   1.061   1.566   2.576   3.081
1    SQ     0      30      59     134     183     532    1013    2316    3119
1    SE     0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
1    * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
1    *
1    * Recall  divB
1    KK DR_B
1    KM      Navajo Wash Scenario
1    DR  divB
1    * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
1    *
1    * Route storm drain flow.
1    KK SD_BC
1    KM     Navajo Wash Scenario
1    RS     1    FLOW      -1
1    SV     0     .02     .06     .10     .15     .19     .24     .27     .29
1    SQ     0       2      10      21      35      50      64      73     150
1    SE     0    0.63    1.25    1.88    2.50    3.13    3.75    4.38    5.00
1    * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

Type	A	P	R	Qcap
RCP	19.6	15.7	1.25	150
			Check Vol:	0.29

Hydraulics		
d	an	qn
--	--	--
0.63	1.4	2
1.25	3.8	10
1.88	6.7	21
2.50	9.8	35
3.13	12.9	50
3.75	15.8	64
4.38	18.2	73
5.00	19.6	150

HEC1 Data		
SE	SQ	SV
0.00	0	0
0.63	2	.02
1.25	10	.06
1.88	21	.10
2.50	35	.15
3.13	50	.19
3.75	64	.24
4.38	73	.27
5.00	150	.29

APPENDIX 4E. TSMS(6) -- STORM DRAIN FLOW ROUTING DATA, NAVAJO WASH SCENARIO

```
2 SD_DC
2 Navajo Wash Scenario
2
```

B	D	nCls	So	n	L
8.00	7.00	3	.0050	.016	2786

Type	A	P	R	Qcap
RCBC	168.0	90.0	1.87	1,677
			Check Vol:	10.74

```
2 *
2 KK DT_D
2 KM      Navajo Wash Scenario
2 * Divert Capacity of storm drain (1,677.1 cfs).  Save temporarily as divD
2 * Storm Drain is RCBC B=8.0  D=7.0  nCls=3 So=.0050  n=.016  L=2786
2 DT divD
2 DI   0.0  1677.1   10000
2 DQ   0.0  1677.1  1677.1
2 * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
2 *
2 KK SF_DC
2 KM Navajo Wash, Ft. Lowell to First Ave
2 * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
2 * Half Parkway W=12.0  Sx=.020  n=.025
2 * L=2780  So=.0050
2 RS     1    FLOW      -1
2 SV     0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
2 SQ     0      32      85     177     292     764    1693    2263    2897
2 SE     0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
2 * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
2 *
2 * Recall  divD
2 KK DR_D
2 KM      Navajo Wash Scenario
2 DR  divD
2 * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
2 *
2 * Route storm drain flow.
2 KK SD_DC
2 KM     Navajo Wash Scenario
2 RS     1    FLOW      -1
2 SV     0    1.34    2.69    4.03    5.37    6.72    8.06    9.40   10.74
2 SQ     0     111     315     564     839    1130    1433    1745    1677
2 SE     0    0.88    1.75    2.63    3.50    4.38    5.25    6.13    7.00
2 * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

Hydraulics		
d	an	qn
--	--	--
0.88	21.0	111
1.75	42.0	315
2.63	63.0	564
3.50	84.0	839
4.38	105.0	1130
5.25	126.0	1433
6.13	147.0	1745
7.00	168.0	1677

HEC1 Data		
SE	SQ	SV
0.00	0	0
0.88	111	1.34
1.75	315	2.69
2.63	564	4.03
3.50	839	5.37
4.38	1130	6.72
5.25	1433	8.06
6.13	1745	9.40
7.00	1677	10.74

APPENDIX 4E. TSMS(6) -- STORM DRAIN FLOW ROUTING DATA, NAVAJO WASH SCENARIO

```
3 SD_CI
3 Navajo Wash Scenario
3
```

B	D	nCls	So	n	L
8.00	7.00	3	.0050	.016	3449

Type	A	P	R	Qcap
RCBC	168.0	90.0	1.87	1,677
			Check Vol:	13.30

```
3
3   *
3   KK DT_C
3   KM      Navajo Wash Scenario
3   * Divert Capacity of storm drain (1,677.1 cfs).  Save temporarily as divC
3   * Storm Drain is RCBC B=8.0  D=7.0  nCls=3 So=.0050  n=.016  L=3449
3   DT divC
3   DI   0.0  1677.1   10000
3   DQ   0.0  1677.1  1677.1
3   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
3   *
3   KK SF_CI
3   KM Navajo Wash, First Ave to Stone Ave
3   * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
3   * Half Parkway W=12.0  Sx=.020  n=.025
3   * L=3450  So=.0045
3   RS     1    FLOW      -1
3   SV     0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
3   SQ     0      30      81     168     277     725    1606    2147    2748
3   SE     0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
3   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
3   *
3   * Recall  divC
3   KK DR_C
3   KM      Navajo Wash Scenario
3   DR  divC
3   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
3   *
3   * Route storm drain flow.
3   KK SD_CI
3   KM     Navajo Wash Scenario
3   RS     1    FLOW      -1
3   SV     0    1.66    3.33    4.99    6.65    8.31    9.98   11.64   13.30
3   SQ     0     111     315     564     839    1130    1433    1745    1677
3   SE     0    0.88    1.75    2.63    3.50    4.38    5.25    6.13    7.00
3   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

Hydraulics		
d	an	qn
--	--	--
0.88	21.0	111
1.75	42.0	315
2.63	63.0	564
3.50	84.0	839
4.38	105.0	1130
5.25	126.0	1433
6.13	147.0	1745
7.00	168.0	1677

HEC1 Data		
SE	SQ	SV
0.00	0	0
0.88	111	1.66
1.75	315	3.33
2.63	564	4.99
3.50	839	6.65
4.38	1130	8.31
5.25	1433	9.98
6.13	1745	11.64
7.00	1677	13.30

APPENDIX 4E. TSMS(6) -- STORM DRAIN FLOW ROUTING DATA, NAVAJO WASH SCENARIO

B	D	nCls	So	n	L
10.00	7.00	3	.0040	.016	1873

Type	A	P	R	Qcap
RCBC	210.0	102.0	2.06	2,002
			Check Vol:	9.03

Hydraulics		
d	an	qn
--	--	--
0.88	26.3	127
1.75	52.5	368
2.63	78.8	666
3.50	105.0	1001
4.38	131.3	1360
5.25	157.5	1736
6.13	183.8	2126
7.00	210.0	2002

HEC1 Data		
SE	SQ	SV
0.00	0	0
0.88	127	1.13
1.75	368	2.26
2.63	666	3.39
3.50	1001	4.51
4.38	1360	5.64
5.25	1736	6.77
6.13	2126	7.90
7.00	2002	9.03

```
4 SD_IJ
4 Navajo Wash Scenario
4
4
4
4   *
4   KK DT_I
4   KM      Navajo Wash Scenario
4   * Divert Capacity of storm drain (2,001.7 cfs).  Save temporarily as divI
4   * Storm Drain is RCBC B=10.0  D=7.0  nCls=3 So=.0040  n=.016  L=1873
4   DT divI
4   DI   0.0  2001.7   10000
4   DQ   0.0  2001.7  2001.7
4   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
4   *
4   KK SF_IJ
4   KM Navajo Wash, Stone Ave to Oracle Road
4   * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
4   * Half Parkway W=12.0  Sx=.020  n=.025
4   * L=1870  So=.0037
4   RS     1    FLOW      -1
4   SV     0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
4   SQ     0      27      73     152     251     657    1457    1947    2492
4   SE     0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
4   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
4   *
4   * Recall  divI
4   KK DR_I
4   KM      Navajo Wash Scenario
4   DR  divI
4   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
4   *
4   * Route storm drain flow.
4   KK SD_IJ
4   KM     Navajo Wash Scenario
4   RS     1    FLOW      -1
4   SV     0    1.13    2.26    3.39    4.51    5.64    6.77    7.90    9.03
4   SQ     0     127     368     666    1001    1360    1736    2126    2002
4   SE     0    0.88    1.75    2.63    3.50    4.38    5.25    6.13    7.00
4   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

```
5 SD_EF
5 Navajo Wash Approach
5
5       B         D      nCls      So        n         L
5       --      6.00      1      .0040     .016      2647
5
5   *
5   KK DT_E
5   KM       Navajo Wash Approach
5   * Divert Capacity of storm drain (218.2 cfs).  Save temporarily as divE
5   * Storm Drain is RCP  D=6.0  nCls=1 So=.0040  n=.016  L=2647
5   DT divE
5   DI   0.0   218.2   10000
5   DQ   0.0   218.2   218.2
5   * -----+-------+-------+-------+-------+-------+-------+-------+-------+
5   *
5   KK SF_EF
5   KM First Avenue, Navajo Road to Prince Road
5   * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
5   * Half Parkway W=7.0  Sx=.020  n=.025
5   * L=2650  So=.0030
5   RS     1    FLOW      -1
5   SV     0    .760   1.306   2.497   3.348   6.390   9.432  15.516  18.557
5   SQ     0     134      30      59     183     532    1013    2316    3119
5   SE     0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
5   * -----+-------+-------+-------+-------+-------+-------+-------+-------+
5   *
5   * Recall  divE
5   KK DR_E
5   KM       Navajo Wash Approach
5   DR  divE
5   * -----+-------+-------+-------+-------+-------+-------+-------+-------+
5   *
5   * Route storm drain flow.
5   KK SD_EF
5   KM      Navajo Wash Approach
5   RS     1    FLOW      -1
5   SV     0     .12     .34     .59     .86    1.13    1.38    1.59    1.72
5   SQ     0       3      14      30      51      73      93     107     218
5   SE     0    0.75    1.50    2.25    3.00    3.75    4.50    5.25    6.00
5   * -----+-------+-------+-------+-------+-------+-------+-------+-------+
```

Type	A	P	R	Qcap
RCP	28.3	18.8	1.50	218
			Check Vol:	1.72

Hydraulics		
d	an	qn
--	--	--
0.75	2.0	3
1.50	5.5	14
2.25	9.7	30
3.00	14.1	51
3.75	18.6	73
4.50	22.7	93
5.25	26.2	107
6.00	28.3	218

HEC1 Data		
SE	SQ	SV
0.00	0	0
0.75	3	.12
1.50	14	.34
2.25	30	.59
3.00	51	.86
3.75	73	1.13
4.50	93	1.38
5.25	107	1.59
6.00	218	1.72

APPENDIX 4E. TSMS(6) -- STORM DRAIN FLOW ROUTING DATA, NAVAJO WASH SCENARIO

```
6 SD_FG
6 Navajo Wash Approach
6
6      B       D      nCls     So       n       L
6     --     6.00     1      .0080    .016    1321
6
6    *
6    KK DT_F
6    KM      Navajo Wash Approach
6    * Divert Capacity of storm drain (308.6 cfs).  Save temporarily as divF
6    * Storm Drain is RCP  D=6.0  nCls=1 So=.0080  n=.016  L=1321
6    DT divF
6    DI   0.0   308.6   10000
6    DQ   0.0   308.6   308.6
6    * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
6    *
6    KK SF_FG
6    KM First Avenue, Roger Road to Limberlost
6    * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
6    * Half Parkway W=7.0  Sx=.020  n=.025
6    * L=1320  So=.0078
6    RS     1    FLOW      -1
6    SV     0    .379    .650   1.244   1.668   3.183   4.698   7.728   9.244
6    SQ     0      49      95     216     295     857    1634    3734    5029
6    SE     0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
6    * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
6    *
6    * Recall  divF
6    KK DR_F
6    KM      Navajo Wash Approach
6    DR  divF
6    * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
6    *
6    * Route storm drain flow.
6    KK SD_FG
6    KM     Navajo Wash Approach
6    RS     1    FLOW      -1
6    SV     0     .06     .17     .29     .43     .56     .69     .80     .86
6    SQ     0       5      20      43      72     103     131     151     309
6    SE     0    0.75    1.50    2.25    3.00    3.75    4.50    5.25    6.00
6    * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

Type	A	P	R	Qcap
RCP	28.3	18.8	1.50	309
			Check Vol:	0.86

Hydraulics		
d	an	qn
--	--	--
0.75	2.0	5
1.50	5.5	20
2.25	9.7	43
3.00	14.1	72
3.75	18.6	103
4.50	22.7	131
5.25	26.2	151
6.00	28.3	309

HEC1 Data		
SE	SQ	SV
0.00	0	0
0.75	5	.06
1.50	20	.17
2.25	43	.29
3.00	72	.43
3.75	103	.56
4.50	131	.69
5.25	151	.80
6.00	309	.86

APPENDIX 4E. TSMS(6) -- STORM DRAIN FLOW ROUTING DATA, NAVAJO WASH SCENARIO

B	D	nCls	So	n	L
10.00	8.00	1	.0020	.016	1239

Type	A	P	R	Qcap
RCBC	80.0	36.0	2.22	567
			Check Vol:	2.28

```
7 SD_GH
7 Navajo Wash Approach
7
7
7
7
7   *
7   KK DT_G
7   KM      Navajo Wash Approach
7   * Divert Capacity of storm drain (567.4 cfs).  Save temporarily as divG
7   * Storm Drain is RCBC B=10.0  D=8.0  nCls=1 So=.0020  n=.016  L=1239
7   DT divG
7   DI   0.0   567.4   10000
7   DQ   0.0   567.4   567.4
7   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
7   *
7   KK SF_GH
7   KM First Avenue, Limberlost to Wetmore
7   * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
7   * Half Parkway W=7.0  Sx=.020  n=.025
7   * L=1320  So=.0030
7   RS     1    FLOW      -1
7   SV     0    .379    .650   1.244   1.668   3.183   4.698   7.728   9.244
7   SQ     0      30      59     134     183     532    1013    2316    3119
7   SE     0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
7   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
7   *
7   * Recall  divG
7   KK DR_G
7   KM      Navajo Wash Approach
7   DR  divG
7   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
7   *
7   * Route storm drain flow.
7   KK SD_GH
7   KM     Navajo Wash Approach
7   RS     1    FLOW      -1
7   SV     0     .28     .57     .85    1.14    1.42    1.71    1.99    2.28
7   SQ     0      37     106     190     284     384     488     595     567
7   SE     0    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00
7   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

Hydraulics		
d	an	qn
--	--	--
1.00	10.0	37
2.00	20.0	106
3.00	30.0	190
4.00	40.0	284
5.00	50.0	384
6.00	60.0	488
7.00	70.0	595
8.00	80.0	567

HEC1 Data		
SE	SQ	SV
0.00	0	0
1.00	37	.28
2.00	106	.57
3.00	190	.85
4.00	284	1.14
5.00	384	1.42
6.00	488	1.71
7.00	595	1.99
8.00	567	2.28

4f. TSMS(7) -- Storm Drain Flow Routing Data, First Avenue Scenario

Appendix 4f. TSMS(7) -- Storm Drain Flow Routing Data, First Avenue Scenario

```
1  SD_DC
1  Navajo Wash, Ft. Lowell Road to First Avenue
1
```

B	D	nCls	So	n	L
10.00	8.00	2	.0050	.016	2786

Type	A	P	R	Qcap
RCBC	160.0	72.0	2.22	1,794
			Check Vol:	10.23

```
1      *
1      * Divert Capacity of storm drain.  Save temporarily as divD
1      * Storm Drain is RCBC
1      * B=10.0  D=8.0  nCls=2
1      * So=.0050  n=.016  L=2786
1      KK  DT_D
1      KM      Navajo Wash, Ft. Lowell Road to First Avenue
1      DT  divD
1      DI   0.0  1794.2   10000
1      DQ   0.0  1794.2  1794.2
1      * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
1      *
1      KK SF_DC
1      KM Navajo Wash, Ft. Lowell to First Ave
1      * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
1      * Half Parkway W=12.0  Sx=.020  n=.025
1      * L=2780  So=.0050
1      RS     1    FLOW      -1
1      SV     0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
1      SQ     0      32      85     177     292     764    1693    2263    2897
1      SE     0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
1      * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
1      *
1      * Recall divD
1      KK  DR_D
1      KM      Navajo Wash, Ft. Lowell Road to First Avenue
1      DR  divD
1      * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
1      *
1      * Route storm drain flow.
1      KK SD_DC
1      KM     Navajo Wash, Ft. Lowell Road to First Avenue
1      SV     0    1.28    2.56    3.84    5.12    6.40    7.67    8.95   10.23
1      SQ     0     117     334     601     897    1213    1542    1882    1794
1      SE     0    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00
1      * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

Hydraulics		
d	an	qn
--	--	--
1.00	20.0	117
2.00	40.0	334
3.00	60.0	601
4.00	80.0	897
5.00	100.0	1213
6.00	120.0	1542
7.00	140.0	1882
8.00	160.0	1794

HEC1 Data		
SE	SQ	SV
0.00	0	.00
1.00	117	1.28
2.00	334	2.56
3.00	601	3.84
4.00	897	5.12
5.00	1213	6.40
6.00	1542	7.67
7.00	1882	8.95
8.00	1794	10.23

```
2  SD_BC
2  Navajo Wash, Ft. Lowell Road to First Avenue
2
```

B	D	nCls	So	n	L
--	5.00	1	.0050	.016	650

Type	A	P	R	Qcap
RCP	19.6	15.7	1.25	150
			Check Vol:	0.29

Hydraulics		
d	an	qn
--	--	--
0.63	1.4	2
1.25	3.8	10
1.88	6.7	21
2.50	9.8	35
3.13	12.9	50
3.75	15.8	64
4.38	18.2	73
5.00	19.6	150

HEC1 Data		
SE	SQ	SV
0.00	0	.00
0.63	2	.02
1.25	10	.06
1.88	21	.10
2.50	35	.15
3.13	50	.19
3.75	64	.24
4.38	73	.27
5.00	150	.29

```
2     *
2     * Divert Capacity of storm drain.  Save temporarily as divB
2     * Storm Drain is RCP
2     * B=.0  D=5.0  nCls=1
2     * So=.0050  n=.016  L=650
2     KK  DT_B
2     KM      Navajo Wash, Ft. Lowell Road to First Avenue
2     DT  divB
2     DI   0.0   150.0   10000
2     DQ   0.0   150.0   150.0
2     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
2     *
2     KK SF_BC
2     KM First Avenue, Ft. Lowell to Navajo Road
2     * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
2     * Half Parkway W=7.0  Sx=.020  n=.025
2     * L=440  So=.0030
2     RS     1    FLOW      -1
2     SV     0    .126    .217    .415    .556   1.061   1.566   2.576   3.081
2     SQ     0      30      59     134     183     532    1013    2316    3119
2     SE     0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
2     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
2     *
2     * Recall divB
2     KK  DR_B
2     KM      Navajo Wash, Ft. Lowell Road to First Avenue
2     DR  divB
2     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
2     *
2     * Route storm drain flow.
2     KK SD_BC
2     KM     Navajo Wash, Ft. Lowell Road to First Avenue
2     SV     0     .02     .06     .10     .15     .19     .24     .27     .29
2     SQ     0       2      10      21      35      50      64      73     150
2     SE     0    0.63    1.25    1.88    2.50    3.13    3.75    4.38    5.00
2     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

```
3  SD_CE
3  Navajo Wash, Ft. Lowell Road to First Avenue
3
```

B	D	nCls	So	n	L
12.00	8.00	2	.0040	.016	2220

Type	A	P	R	Qcap
RCBC	192.0	80.0	2.40	2,027
			Check Vol:	9.79

```
3
3     *
3     * Divert Capacity of storm drain.  Save temporarily as divC
3     * Storm Drain is RCBC
3     * B=12.0  D=8.0  nCls=2
3     * So=.0040  n=.016  L=2220
3     KK  DT_C
3     KM      Navajo Wash, Ft. Lowell Road to First Avenue
3     DT  divC
3     DI   0.0  2027.1   10000
3     DQ   0.0  2027.1  2027.1
3     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
3     *
3     KK SF_CE
3     KM First Avenue, Navajo Road to Prince Road
3     * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
3     * Half Parkway W=7.0  Sx=.020  n=.025
3     * L=2220  So=.0030
3     RS     1    FLOW      -1
3     SV     0    .637   1.094   2.091   2.805   5.353   7.901  12.997  15.545
3     SQ     0      30      59     134     183     532    1013    2316    3119
3     SE     0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
3     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
3     *
3     * Recall divC
3     KK  DR_C
3     KM      Navajo Wash, Ft. Lowell Road to First Avenue
3     DR  divC
3     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
3     *
3     * Route storm drain flow.
3     KK SD_CE
3     KM     Navajo Wash, Ft. Lowell Road to First Avenue
3     SV     0    1.22    2.45    3.67    4.89    6.12    7.34    8.56    9.79
3     SQ     0     128     370     673    1014    1380    1764    2162    2027
3     SE     0    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00
3     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

Hydraulics		
d	an	qn
--	--	--
1.00	24.0	128
2.00	48.0	370
3.00	72.0	673
4.00	96.0	1014
5.00	120.0	1380
6.00	144.0	1764
7.00	168.0	2162
8.00	192.0	2027

HEC1 Data		
SE	SQ	SV
0.00	0	.00
1.00	128	1.22
2.00	370	2.45
3.00	673	3.67
4.00	1014	4.89
5.00	1380	6.12
6.00	1764	7.34
7.00	2162	8.56
8.00	2027	9.79

```
4   SD_EF
4   Navajo Wash, Ft. Lowell Road to First Avenue
4
```

B	D	nCls	So	n	L
12.00	8.00	2	.0040	.016	2647

Type	A	P	R	Qcap
RCBC	192.0	80.0	2.40	2,027
			Check Vol:	11.67

Hydraulics		
d	an	qn
--	--	--
1.00	24.0	128
2.00	48.0	370
3.00	72.0	673
4.00	96.0	1014
5.00	120.0	1380
6.00	144.0	1764
7.00	168.0	2162
8.00	192.0	2027

```
4     *
4     * Divert Capacity of storm drain.  Save temporarily as divE
4     * Storm Drain is RCBC
4     * B=12.0  D=8.0  nCls=2
4     * So=.0040  n=.016  L=2647
4     KK  DT_E
4     KM      Navajo Wash, Ft. Lowell Road to First Avenue
4     DT  divE
4     DI   0.0  2027.1   10000
4     DQ   0.0  2027.1  2027.1
4     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
4     *
4     KK SF_EF
4     KM First Avenue, Navajo Road to Prince Road
4     * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
4     * Half Parkway W=7.0  Sx=.020  n=.025
4     * L=2650  So=.0030
4     RS     1    FLOW      -1
4     SV     0    .760   1.306   2.497   3.348   6.390   9.432  15.516  18.557
4     SQ     0     134      30      59     183     532    1013    2316    3119
4     SE     0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
4     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
4     *
4     * Recall divE
4     KK  DR_E
4     KM      Navajo Wash, Ft. Lowell Road to First Avenue
4     DR  divE
4     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
4     *
4     * Route storm drain flow.
4     KK SD_EF
4     KM     Navajo Wash, Ft. Lowell Road to First Avenue
4     SV     0    1.46    2.92    4.38    5.83    7.29    8.75   10.21   11.67
4     SQ     0     128     370     673    1014    1380    1764    2162    2027
4     SE     0    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00
4     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

HEC1 Data		
SE	SQ	SV
0.00	0	.00
1.00	128	1.46
2.00	370	2.92
3.00	673	4.38
4.00	1014	5.83
5.00	1380	7.29
6.00	1764	8.75
7.00	2162	10.21
8.00	2027	11.67

```
5  SD_FG
5  Navajo Wash, Ft. Lowell Road to First Avenue
5
```

B	D	nCls	So	n	L
12.00	8.00	2	.0050	.016	1321

Type	A	P	R	Qcap
RCBC	192.0	80.0	2.40	2,266
			Check Vol:	5.82

```
5
5     *
5     * Divert Capacity of storm drain.  Save temporarily as divF
5     * Storm Drain is RCBC
5     * B=12.0  D=8.0  nCls=2
5     * So=.0050  n=.016  L=1321
5     KK  DT_F
5     KM      Navajo Wash, Ft. Lowell Road to First Avenue
5     DT  divF
5     DI   0.0  2266.3   10000
5     DQ   0.0  2266.3  2266.3
5     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
5     *
5     KK SF_FG
5     KM First Avenue, Roger Road to Limberlost
5     * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
5     * Half Parkway W=7.0  Sx=.020  n=.025
5     * L=1320  So=.0078
5     RS     1    FLOW      -1
5     SV     0    .379    .650   1.244   1.668   3.183   4.698   7.728   9.244
5     SQ     0      49      95     216     295     857    1634    3734    5029
5     SE     0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
5     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
5     *
5     * Recall divF
5     KK  DR_F
5     KM      Navajo Wash, Ft. Lowell Road to First Avenue
5     DR  divF
5     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
5     *
5     * Route storm drain flow.
5     KK SD_FG
5     KM     Navajo Wash, Ft. Lowell Road to First Avenue
5     SV     0     .73    1.46    2.18    2.91    3.64    4.37    5.09    5.82
5     SQ     0     143     414     753    1133    1542    1972    2418    2266
5     SE     0    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00
5     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

Hydraulics		
d	an	qn
--	--	--
1.00	24.0	143
2.00	48.0	414
3.00	72.0	753
4.00	96.0	1133
5.00	120.0	1542
6.00	144.0	1972
7.00	168.0	2418
8.00	192.0	2266

HEC1 Data		
SE	SQ	SV
0.00	0	.00
1.00	143	.73
2.00	414	1.46
3.00	753	2.18
4.00	1133	2.91
5.00	1542	3.64
6.00	1972	4.37
7.00	2418	5.09
8.00	2266	5.82

```
6  SD_GH
6  Navajo Wash, Ft. Lowell Road to First Avenue
6
```

B	D	nCls	So	n	L
16.00	8.00	2	.0025	.016	1239

Type	A	P	R	Qcap
RCBC	256.0	96.0	2.67	2,292
			Check Vol:	7.28

Hydraulics		
d	an	qn
--	--	--
1.00	32.0	138
2.00	64.0	408
3.00	96.0	752
4.00	128.0	1146
5.00	160.0	1576
6.00	192.0	2033
7.00	224.0	2510
8.00	256.0	2292

```
6      *
6      * Divert Capacity of storm drain.  Save temporarily as divG
6      * Storm Drain is RCBC
6      * B=16.0  D=8.0  nCls=2
6      * So=.0025  n=.016  L=1239
6      KK  DT_G
6      KM      Navajo Wash, Ft. Lowell Road to First Avenue
6      DT  divG
6      DI   0.0  2292.2   10000
6      DQ   0.0  2292.2  2292.2
6      * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
6      *
6      KK SF_GH
6      KM First Avenue, Limberlost to Wetmore
6      * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
6      * Half Parkway W=7.0  Sx=.020  n=.025
6      * L=1320  So=.0030
6      RS     1    FLOW      -1
6      SV     0    .379    .650   1.244   1.668   3.183   4.698   7.728   9.244
6      SQ     0      30      59     134     183     532    1013    2316    3119
6      SE     0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
6      * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
6      *
6      * Recall divG
6      KK  DR_G
6      KM      Navajo Wash, Ft. Lowell Road to First Avenue
6      DR  divG
6      * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
6      *
6      * Route storm drain flow.
6      KK SD_GH
6      KM     Navajo Wash, Ft. Lowell Road to First Avenue
6      SV     0     .91    1.82    2.73    3.64    4.55    5.46    6.37    7.28
6      SQ     0     138     408     752    1146    1576    2033    2510    2292
6      SE     0    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00
6      * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

HEC1 Data		
SE	SQ	SV
0.00	0	.00
1.00	138	.91
2.00	408	1.82
3.00	752	2.73
4.00	1146	3.64
5.00	1576	4.55
6.00	2033	5.46
7.00	2510	6.37
8.00	2292	7.28

```
7  SD_IJ
7  Navajo Wash, Ft. Lowell Road to First Avenue
7
```

B	D	nCls	So	n	L
8.00	5.00	1	.0055	.016	2320

Type	A	P	R	Qcap
RCBC	40.0	26.0	1.54	368
			Check Vol:	2.13

```
7
7     *
7     * Divert Capacity of storm drain.  Save temporarily as divI
7     * Storm Drain is RCBC
7     * B=8.0  D=5.0  nCls=1
7     * So=.0055  n=.016  L=2320
7     KK  DT_I
7     KM      Navajo Wash, Ft. Lowell Road to First Avenue
7     DT  divI
7     DI   0.0   368.2   10000
7     DQ   0.0   368.2   368.2
7     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
7     *
7     KK SF_IJ
7     KM Navajo Wash, Stone Ave to Oracle Road
7     * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
7     * Half Parkway W=12.0  Sx=.020  n=.025
7     * L=1870  So=.0037
7     RS     1    FLOW      -1
7     SV     0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
7     SQ     0      27      73     152     251     657    1457    1947    2492
7     SE     0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
7     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
7     *
7     * Recall divI
7     KK  DR_I
7     KM      Navajo Wash, Ft. Lowell Road to First Avenue
7     DR  divI
7     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
7     *
7     * Route storm drain flow.
7     KK SD_IJ
7     KM     Navajo Wash, Ft. Lowell Road to First Avenue
7     SV     0     .27     .53     .80    1.07    1.33    1.60    1.86    2.13
7     SQ     0      23      67     122     184     251     322     395     368
7     SE     0    0.63    1.25    1.88    2.50    3.13    3.75    4.38    5.00
7     * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

Hydraulics		
d	an	qn
--	--	--
0.63	5.0	23
1.25	10.0	67
1.88	15.0	122
2.50	20.0	184
3.13	25.0	251
3.75	30.0	322
4.38	35.0	395
5.00	40.0	368

HEC1 Data		
SE	SQ	SV
0.00	0	.00
0.63	23	.27
1.25	67	.53
1.88	122	.80
2.50	184	1.07
3.13	251	1.33
3.75	322	1.60
4.38	395	1.86
5.00	368	2.13

Appendix 4g. TSMS(6) DETAILED HYDROLOGIC MODELING, Navajo Wash Scenario
Future Street Flow and 100-year Storm Drain Routing in Place
Data and results common to TSMS(3) not printed here.

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
*  RUN DATE  07/24/2006  TIME  16:57:50 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID    Appendix 4g.  TSMS(6) DETAILED HYDROLOGIC MODELING, Navajo Wash Scenario
  3           ID    Future Street Flow and Storm Drain Routing in Place
  4           ID    Data and results common to TSMS(3) not printed here.
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *DIAGRAM
              *
              * Curve numbers for Basin DG are based on PB = 3.131 corresponding to POC_K
              * and are slightly inaccurate for other precipitation values.  CNs for Basin GR
              * are based on PB = 3.60.
              *
              * The models and the purpose of each that have been created for this project
              * are as follows:
              *
              * -- TSMS(6) --
              * TSMS(6)is equivalent to TSMS(4) except that routing elements have been added
              * to reflect the preliminary storm drain sizing based on the TSMS(4) results.
              * This is considered to be sufficiently accurate for preliminary and final
              * design purposes under the Navajo Wash Scenario.
              *
              * The general approach for the TSMS(6) and TSMS(7) modeling is as follows:
              * Offsite discharge reaching project nodes are determined and stored via
              * diversion elements as described for TSMS(3).  Once that process is
              * complete, nodes are connected along the route in question with proposed (SD)
              * and street flow (SF) routing elements as describe for TSMS(6) and TSMS(7).
              * The offsite flow reaching are particular node is combined with the incoming
              * storm drain and street flow from the previous (upstream)node(s) to obtain the
              * total flow at that point.
              *
              * Of that total flow, the amount exceeding the capacity of the next storm drain
              * downstream is diverted from the principal flow path temporarily and the
              * remaining routed to the next node as street flow using a street flow
              * (SF) element.
              * The storm drain capacity just diverted is then recalled and routed to the next
              * node in a storm drain (SD) element.  The routed SF and SDx flows are then
              * combined with the previously determined offsite flow reaching that location,
              * and the process repeated.
              *
              * The stage/storage/discharge data for the street flow elements is based on a
              * starting stage elevation of zero.  Doing so results in the stage elevation
              * determined by HEC-1, which is easily found in the HEC-1 printout, being the
              * maximum depth of street flow.
              * being zero so that the stage printed out by HEC-1 reflects the maximum depth
              * of flow and can be easily seen in the printout.
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  5           IT       1                    300
  6           IO       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  7           KK   S0010
  8           KM        RUNOFF FROM SUBBASIN S0010
  9           IN       1
 10           PB   3.143

              *
              *
              *
              * ==========================================================
              *      BEGIN RECALLING AND ROUTING DIVERTED FLOWS IN
              *       ACCORDANCE WITH THE NAVAJO WASH ALTERNATIVE
              * ==========================================================
              *

 723           KK       A
 724           KM      Off-Site flow at First Avenue and Blacklidge (Cemetary Wash)
 725           DR   POC_A

 726           KK       x
 727           HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 728           KK       B
 729           KM      Off-Site flow at First Avenue and Ft Lowell
 730           DR   POC_B
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 731          KK    DT_B
 732          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (150.0 cfs).  Save temporarily as divB
              * Storm Drain is RCP  D=5.0  nCls=1 So=.0050  n=.016  L=650
 733          DT    divB
 734          DI     0.0   150.0   10000
 735          DQ     0.0   150.0   150.0
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 736          KK   SF_BC
 737          KM   First Avenue, Ft. Lowell to Navajo Road
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=440  So=.0030
 738          RS       1    FLOW      -1
 739          SV       0    .126    .217    .415    .556   1.061   1.566   2.576   3.081
 740          SQ       0      30      59     134     183     532    1013    2316    3119
 741          SE       0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divB

 742          KK    DR_B
 743          KM        Navajo Wash Scenario
 744          DR    divB
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 745          KK   SD_BC
 746          KM       Navajo Wash Scenario
 747          RS       1    FLOW      -1
 748          SV       0     .02     .06     .10     .15     .19     .24     .27     .29
 749          SQ       0       2      10      21      35      50      64      73     150
 750          SE       0    0.63    1.25    1.88    2.50    3.13    3.75    4.38    5.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 751          KK       D
 752          KM     Off-Site flow at Navajo and Ft. Lowell Road
 753          DR   POC_D
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Begin Routing from D to C (2)
              *

 754          KK    DT_D
 755          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (1,677.1 cfs).  Save temporarily as divD
              * Storm Drain is RCBC B=8.0  D=7.0  nCls=3 So=.0050  n=.016  L=2786
 756          DT    divD
 757          DI     0.0  1677.1   10000
 758          DQ     0.0  1677.1  1677.1
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 759          KK   SF_DC
 760          KM   Navajo Wash, Ft. Lowell to First Ave
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=2780  So=.0050
 761          RS       1    FLOW      -1
 762          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 763          SQ       0      32      85     177     292     764    1693    2263    2897
 764          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divD

 765          KK    DR_D
 766          KM        Navajo Wash Scenario
 767          DR    divD
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 768          KK   SD_DC
 769          KM       Navajo Wash Scenario
 770          RS       1    FLOW      -1
 771          SV       0    1.34    2.69    4.03    5.37    6.72    8.06    9.40   10.74
 772          SQ       0     111     315     564     839    1130    1433    1745    1677
 773          SE       0    0.88    1.75    2.63    3.50    4.38    5.25    6.13    7.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 774          KK       C
 775          KM      Off-Site flow at Navajo and First Avenue
 776          DR   POC_C
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 777          KK    HC_C
 778          KM   Combine D & C at Navajo
 779          HC       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Begin Routing from C to I (3)
              *

 780          KK    DT_C
 781          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (1,677.1 cfs).  Save temporarily as divC
              * Storm Drain is RCBC B=8.0  D=7.0  nCls=3 So=.0050  n=.016  L=3449
 782          DT    divC
 783          DI     0.0  1677.1   10000
 784          DQ     0.0  1677.1  1677.1
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 785          KK   SF_CI
 786          KM   Navajo Wash, First Ave to Stone Ave
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=3450  So=.0045
 787          RS       1    FLOW      -1
 788          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 789          SQ       0      30      81     168     277     725    1606    2147    2748
 790          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divC

 791          KK    DR_C
 792          KM        Navajo Wash Scenario
 793          DR    divC
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 794          KK   SD_CI
 795          KM       Navajo Wash Scenario
 796          RS       1    FLOW      -1
 797          SV       0    1.66    3.33    4.99    6.65    8.31    9.98   11.64   13.30
 798          SQ       0     111     315     564     839    1130    1433    1745    1677
 799          SE       0    0.88    1.75    2.63    3.50    4.38    5.25    6.13    7.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 800          KK    HC_I
 801          KM   Combine with flow from C
 802          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 803          KK    DT_I
 804          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (2,001.7 cfs).  Save temporarily as divI
              * Storm Drain is RCBC B=10.0  D=7.0  nCls=3 So=.0040  n=.016  L=1873
 805          DT    divI
 806          DI     0.0  2001.7   10000
 807          DQ     0.0  2001.7  2001.7
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 808          KK   SF_IJ
 809          KM   Navajo Wash, Stone Ave to Oracle Road
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=1870  So=.0037
 810          RS       1    FLOW      -1
 811          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 812          SQ       0      27      73     152     251     657    1457    1947    2492
 813          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divI
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 814          KK    DR_I
 815          KM        Navajo Wash Scenario
 816          DR    divI
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 817          KK   SD_IJ
 818          KM       Navajo Wash Scenario
 819          RS       1    FLOW      -1
 820          SV       0    1.13    2.26    3.39    4.51    5.64    6.77    7.90    9.03
 821          SQ       0     127     368     666    1001    1360    1736    2126    2002
 822          SE       0    0.88    1.75    2.63    3.50    4.38    5.25    6.13    7.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 823          KK       J
 824          KM    Recall N0260
 825          DR   POC_J
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 826          KK    HC_J
 827          KM   Combine with flow from I
 828          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 829          KK   CF_JK
 830          KM       New channel downstream of Oracle
              * Bottom Width B=30.0  Max Depth D=8.0  =.016  L=3062  So=.0030
 831          RS       1    FLOW      -1
 832          SV       0   2.109   4.218   6.326   8.435  10.544  12.653  14.762  16.871
 833          SQ       0     147     447     846    1317    1847    2422    3036    3682
 834          SE       0    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 835          KK       K
 836          DR   POC_K
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 837          KK    HC_K
 838          KM   Add K to J
 839          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 840          KK       E
 841          KM      Off-Site flow at First Avenue and Prince
 842          DR   POC_E
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Begin Routing from E to F (5)
              *

 843          KK    DT_E
 844          KM        Navajo Wash Approach
              * Divert Capacity of storm drain (218.2 cfs).  Save temporarily as divE
              * Storm Drain is RCP  D=6.0  nCls=1 So=.0040  n=.016  L=2647
 845          DT    divE
 846          DI     0.0   218.2   10000
 847          DQ     0.0   218.2   218.2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 848          KK   SF_EF
 849          KM   First Avenue, Navajo Road to Prince Road
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=2650  So=.0030
 850          RS       1    FLOW      -1
 851          SV       0    .760   1.306   2.497   3.348   6.390   9.432  15.516  18.557
 852          SQ       0     134      30      59     183     532    1013    2316    3119
 853          SE       0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divE

 854          KK    DR_E
 855          KM        Navajo Wash Approach
 856          DR    divE
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 857          KK   SD_EF
 858          KM       Navajo Wash Approach
 859          RS       1    FLOW      -1
 860          SV       0     .12     .34     .59     .86    1.13    1.38    1.59    1.72
 861          SQ       0       3      14      30      51      73      93     107     218
 862          SE       0    0.75    1.50    2.25    3.00    3.75    4.50    5.25    6.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 863          KK       F
 864          DR   POC_F
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 865          KK    HC_F
 866          KM   Combine with flow from E
 867          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Begin Routing from F to G (6)
              *

 868          KK    DT_F
 869          KM        Navajo Wash Approach
              * Divert Capacity of storm drain (308.6 cfs).  Save temporarily as divF
              * Storm Drain is RCP  D=6.0  nCls=1 So=.0080  n=.016  L=1321
 870          DT    divF
 871          DI     0.0   308.6   10000
 872          DQ     0.0   308.6   308.6
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 873          KK   SF_FG
 874          KM   First Avenue, Roger Road to Limberlost
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=1320  So=.0078
 875          RS       1    FLOW      -1
 876          SV       0    .379    .650   1.244   1.668   3.183   4.698   7.728   9.244
 877          SQ       0      49      95     216     295     857    1634    3734    5029
 878          SE       0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divF

 879          KK    DR_F
 880          KM        Navajo Wash Approach
 881          DR    divF
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 882          KK   SD_FG
 883          KM       Navajo Wash Approach
 884          RS       1    FLOW      -1
 885          SV       0     .06     .17     .29     .43     .56     .69     .80     .86
 886          SQ       0       5      20      43      72     103     131     151     309
 887          SE       0    0.75    1.50    2.25    3.00    3.75    4.50    5.25    6.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 888          KK       G
 889          KM    Recall N0020
 890          DR   POC_G
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 891          KK    HC_G
 892          KM   Combine with flow from F
 893          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Begin Routing from G to H (7)
              *

 894          KK    DT_G
 895          KM        Navajo Wash Approach
              * Divert Capacity of storm drain (567.4 cfs).  Save temporarily as divG
              * Storm Drain is RCBC B=10.0  D=8.0  nCls=1 So=.0020  n=.016  L=1239
 896          DT    divG
 897          DI     0.0   567.4   10000
 898          DQ     0.0   567.4   567.4
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 899          KK   SF_GH
 900          KM   First Avenue, Limberlost to Wetmore
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=1320  So=.0030
 901          RS       1    FLOW      -1
 902          SV       0    .379    .650   1.244   1.668   3.183   4.698   7.728   9.244
 903          SQ       0      30      59     134     183     532    1013    2316    3119
 904          SE       0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divG

 905          KK    DR_G
 906          KM        Navajo Wash Approach
 907          DR    divG
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 908          KK   SD_GH
 909          KM       Navajo Wash Approach
 910          RS       1    FLOW      -1
 911          SV       0     .28     .57     .85    1.14    1.42    1.71    1.99    2.28
 912          SQ       0      37     106     190     284     384     488     595     567
 913          SE       0    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 914          KK       H
 915          KM    Off-Site flow at Wetmore
 916          DR   POC_H
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 917          KK    HC_H
 918          KM   Combine with flow from G.  This is outflow to Rillito River
 919          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
 920          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.       (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

 718         Pt_H
               .
               .
 725           .          .<-------   POC_A
 723           .          A
               .          .
               .          .
 726           x............
               .
               .
 730           .          .<-------   POC_B
 728           .          B
               .          .
               .          .
 733           .          .------->   divB
 731           .       DT_B
               .          V
               .          V
 736           .      SF_BC
               .          .
               .          .
 744           .          .          .<-------   divB
 742           .          .       DR_B
               .          .          V
               .          .          V
 745           .          .      SD_BC
               .          .          .
               .          .          .
 753           .          .          .          .<-------   POC_D
 751           .          .          .          D
               .          .          .          .
               .          .          .          .
 756           .          .          .          .------->   divD
 754           .          .          .       DT_D
               .          .          .          V
               .          .          .          V
 759           .          .          .      SF_DC
               .          .          .          .
               .          .          .          .
 767           .          .          .          .          .<-------   divD
 765           .          .          .          .       DR_D
               .          .          .          .          V
               .          .          .          .          V
 768           .          .          .          .      SD_DC
               .          .          .          .          .
               .          .          .          .          .
 776           .          .          .          .          .          .<-------   POC_C
 774           .          .          .          .          .          C
               .          .          .          .          .          .
               .          .          .          .          .          .
 777           .       HC_C..........................................
               .          .
               .          .
 782           .          .------->   divC
 780           .       DT_C
```

```
                .          V
                .          V
785             .       SF_CI
                .          .
                .          .
793             .          .          .<-------    divC
791             .          .       DR_C
                .          .          V
                .          .          V
794             .          .      SD_CI
                .          .          .
                .          .          .
800          HC_I.......................
                .
                .
805             .------->    divI
803          DT_I
                V
                V
808         SF_IJ
                .
                .
816             .          .<-------    divI
814             .       DR_I
                .          V
                .          V
817             .       SD_IJ
                .          .
                .          .
825             .          .          .<-------   POC_J
823             .          .          J
                .          .          .
                .          .          .
826          HC_J.......................
                V
                V
829         CF_JK
                .
                .
836             .          .<-------   POC_K
835             .          K
                .          .
                .          .
837          HC_K............
                .
                .
842             .          .<-------   POC_E
840             .          E
                .          .
                .          .
845             .          .------->    divE
843             .       DT_E
                .          V
                .          V
848             .       SF_EF
                .          .
                .          .
856             .          .          .<-------    divE
854             .          .       DR_E
                .          .          V
                .          .          V
```

```
857          .          .       SD_EF
             .          .          .
             .          .          .
864          .          .          .          .<-------   POC_F
863          .          .          .          F
             .          .          .          .
             .          .          .          .
865          .       HC_F.......................
             .          .
             .          .
870          .          .------->    divF
868          .       DT_F
             .          V
             .          V
873          .      SF_FG
             .          .
             .          .
881          .          .          .<-------    divF
879          .          .       DR_F
             .          .          V
             .          .          V
882          .          .      SD_FG
             .          .          .
             .          .          .
890          .          .          .          .<-------   POC_G
888          .          .          .          G
             .          .          .          .
             .          .          .          .
891          .       HC_G.......................
             .          .
             .          .
896          .          .------->    divG
894          .       DT_G
             .          V
             .          V
899          .      SF_GH
             .          .
             .          .
907          .          .          .<-------    divG
905          .          .       DR_G
             .          .          V
             .          .          V
908          .          .      SD_GH
             .          .          .
             .          .          .
916          .          .          .          .<-------   POC_H
914          .          .          .          H
             .          .          .          .
             .          .          .          .
917          .       HC_H.......................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	Pt_H	0.	.02	0.	0.	0.	5.14		
+	HYDROGRAPH AT	A	441.	.43	70.	70.	70.	.00		
+	2 COMBINED AT	x	441.	.43	70.	70.	70.	5.14		
+	HYDROGRAPH AT	B	152.	.48	25.	25.	25.	.00		
+	DIVERSION TO	divB	150.	.48	25.	25.	25.	.00		
+	HYDROGRAPH AT	DT_B	2.	.48	0.	0.	0.	.00		
+	ROUTED TO	SF_BC	1.	.50	0.	0.	0.	.00	.01	.50
+	HYDROGRAPH AT	DR_B	150.	.47	25.	25.	25.	.00		
+	ROUTED TO	SD_BC	150.	.48	25.	25.	25.	.00	5.00	.48
+	HYDROGRAPH AT	D	1514.	.75	317.	317.	317.	.00		
+	DIVERSION TO	divD	1514.	.02	317.	317.	317.	.00		
+	HYDROGRAPH AT	DT_D	0.	.02	0.	0.	0.	.00		
+	ROUTED TO	SF_DC	0.	.02	0.	0.	0.	.00	.00	1.42
+	HYDROGRAPH AT	DR_D	1514.	.75	317.	317.	317.	.00		
+	ROUTED TO	SD_DC	1493.	.80	317.	317.	317.	.00	5.42	.80
+	HYDROGRAPH AT	C	100.	.38	14.	14.	14.	.00		

+	5 COMBINED AT	HC_C	1620.	.78	356.	356.	356.	.00	
+	DIVERSION TO	divC	1620.	.02	356.	356.	356.	.00	
+	HYDROGRAPH AT	DT_C	0.	.02	0.	0.	0.	.00	
+	ROUTED TO	SF_CI	0.	.02	0.	0.	0.	.00	.00 .43
+	HYDROGRAPH AT	DR_C	1620.	.78	356.	356.	356.	.00	
+	ROUTED TO	SD_CI	1587.	.87	356.	356.	356.	.00	5.69 .87
+	3 COMBINED AT	HC_I	1808.	.83	426.	426.	426.	5.14	
+	DIVERSION TO	divI	1808.	.02	426.	426.	426.	5.14	
+	HYDROGRAPH AT	DT_I	0.	.02	0.	0.	0.	5.14	
+	ROUTED TO	SF_IJ	0.	.02	0.	0.	0.	5.14	.00 1.50
+	HYDROGRAPH AT	DR_I	1808.	.83	426.	426.	426.	.00	
+	ROUTED TO	SD_IJ	1799.	.88	426.	426.	426.	.00	5.39 .88
+	HYDROGRAPH AT	J	633.	.68	201.	201.	201.	.00	
+	3 COMBINED AT	HC_J	2381.	.85	627.	627.	627.	5.14	
+	ROUTED TO	CF_JK	2364.	.90	626.	626.	626.	5.14	5.90 .90
+	HYDROGRAPH AT	K	1625.	.67	472.	472.	472.	.00	
+	2 COMBINED AT	HC_K	3870.	.85	1098.	1098.	1098.	5.14	
+	HYDROGRAPH AT	E	190.	.55	42.	42.	42.	.00	
+	DIVERSION TO	divE	190.	.02	42.	42.	42.	.00	

+	HYDROGRAPH AT	DT_E	0.	.02	0.	0.	0.	.00	
+	ROUTED TO	SF_EF	0.	.02	0.	0.	0.	.00	.00 1.03
+	HYDROGRAPH AT	DR_E	190.	.55	42.	42.	42.	.00	
+	ROUTED TO	SD_EF	185.	.60	42.	42.	42.	.00	5.77 .60
+	HYDROGRAPH AT	F	227.	.43	34.	34.	34.	.00	
+	3 COMBINED AT	HC_F	352.	.58	76.	76.	76.	.00	
+	DIVERSION TO	divF	309.	.58	76.	76.	76.	.00	
+	HYDROGRAPH AT	DT_F	43.	.58	1.	1.	1.	.00	
+	ROUTED TO	SF_FG	20.	.65	1.	1.	1.	.00	.20 .65
+	HYDROGRAPH AT	DR_F	309.	.57	76.	76.	76.	.00	
+	ROUTED TO	SD_FG	310.	.58	75.	75.	75.	.00	6.01 .58
+	HYDROGRAPH AT	G	216.	.83	49.	49.	49.	.00	
+	3 COMBINED AT	HC_G	502.	.68	125.	125.	125.	.00	
+	DIVERSION TO	divG	502.	.02	125.	125.	125.	.00	
+	HYDROGRAPH AT	DT_G	0.	.02	0.	0.	0.	.00	
+	ROUTED TO	SF_GH	0.	.02	0.	0.	0.	.00	.00 .92
+	HYDROGRAPH AT	DR_G	502.	.68	125.	125.	125.	.00	
+	ROUTED TO	SD_GH	496.	.72	124.	124.	124.	.00	6.07 .72

```
          HYDROGRAPH AT
+                                H       293.     .82          61.          61.          61.          .00

          3 COMBINED AT
+                              HC_H       777.     .78         185.         185.         185.          .00
1

*** NORMAL END OF HEC-1 ***
```

Appendix 4h. TSMS(7) -- Detailed Hydrologic Modeling, First Avenue Scenario
Future Street Flow and 100-year Storm Drain Routing in Place
Data and results common to TSMS(3) not printed here.

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
*  RUN DATE  07/21/2006  TIME  11:56:54 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   1          ID   Appendix 4h. TSMS(7) -- Detailed Hydrologic Modeling, First Avenue Scenario
   2          ID   Routing in future streets with storm drains in place
   3          ID   PB=3.151 for determining discharge at POC_K
   4          ID   Data and results common to TSMS(3) not printed here.
              *
              *DIAGRAM
              *
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * CNs are based on PB=3.131 for DG and PB = 3.60 for GR
              * and are slightly inaccurate for other precipitation values.
              *
              * The models and the purpose of each that have been created for this project
              * are as follows:
              *
              * -- TSMS(7) --
              * As with TMS(6), TSMS(7)is equivalent to TSMS(5) except that routing elements
              * have been added to reflect the preliminary storm drain sizing.  These results
              *  will be used for preliminary and final design purposes under the First Avenue
              * Scenario. The general modeling procedure described for TSMS(6) applies here
              * as well.
              *
   5          IT       1                    300
   6          IO       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

   7          KK   S0010
   8          KM        RUNOFF FROM SUBBASIN S0010
   9          IN       1
  10          PB   3.282


              *
              * ==========================================================
              *      BEGIN RECALLING AND ROUTING DIVERTED FLOWS IN
              *       ACCORDANCE WITH THE FIRST AVENUE ALTERNATIVE
              * ==========================================================
              *

 723          KK       A
 724          KM      Off-Site flow at First Avenue and Blacklidge (Cemetary Wash)
 725          DR   POC_A

 726          KK       x
 727          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 728          KK       B
 729          KM      Off-Site flow at First Avenue and Ft Lowell
 730          DR   POC_B
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Divert Capacity of storm drain.  Save temporarily as divB
              * Storm Drain is RCP
              * B=.0  D=5.0  nCls=1
```

```
* So=.0050  n=.016  L=650

KK    DT_B
KM        Navajo Wash, Ft. Lowell Road to First Avenue
DT    divB
DI     0.0   150.0   10000
DQ     0.0   150.0   150.0
* -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
*

KK   SF_BC
KM   First Avenue, Ft. Lowell to Navajo Road
* Half Roadway W=43.0  Sx=.020  n=.016  h=.50
* Half Parkway W=7.0  Sx=.020  n=.025
* L=440  So=.0030
RS       1    FLOW      -1
SV       0    .126    .217    .415    .556   1.061   1.566   2.576   3.081
SQ       0      30      59     134     183     532    1013    2316    3119
SE       0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
* -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
*
* Recall divB
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 742          KK    DR_B
 743          KM        Navajo Wash, Ft. Lowell Road to First Avenue
 744          DR    divB
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 745          KK   SD_BC
 746          KM       Navajo Wash, Ft. Lowell Road to First Avenue
 747          SV       0     .02     .06     .10     .15     .19     .24     .27     .29
 748          SQ       0       2      10      21      35      50      64      73     150
 749          SE       0    0.63    1.25    1.88    2.50    3.13    3.75    4.38    5.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 750          KK       D
 751          KM     Off-Site flow at Navajo and Ft. Lowell Road
 752          DR   POC_D
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Divert Capacity of storm drain.  Save temporarily as divD
              * Storm Drain is RCBC
              * B=10.0  D=8.0  nCls=2
              * So=.0050  n=.016  L=2786

 753          KK    DT_D
 754          KM        Navajo Wash, Ft. Lowell Road to First Avenue
 755          DT    divD
 756          DI     0.0  1794.2   10000
 757          DQ     0.0  1794.2  1794.2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 758          KK   SF_DC
 759          KM   Navajo Wash, Ft. Lowell to First Ave
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=2780  So=.0050
 760          RS       1    FLOW      -1
 761          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 762          SQ       0      32      85     177     292     764    1693    2263    2897
 763          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall divD

 764          KK    DR_D
 765          KM        Navajo Wash, Ft. Lowell Road to First Avenue
 766          DR    divD
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 767          KK   SD_DC
 768          KM       Navajo Wash, Ft. Lowell Road to First Avenue
 769          SV       0    1.28    2.56    3.84    5.12    6.40    7.67    8.95   10.23
 770          SQ       0     117     334     601     897    1213    1542    1882    1794
 771          SE       0    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 772          KK       C
 773          KM      Off-Site flow at Navajo and First Avenue
 774          DR   POC_C
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 775          KK    HC_C
 776          KM   Combine D & C at Navajo
 777          HC       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Divert Capacity of storm drain.  Save temporarily as divC
              * Storm Drain is RCBC
              * B=12.0  D=8.0  nCls=2
              * So=.0040  n=.016  L=2220

 778          KK    DT_C
 779          KM        Navajo Wash, Ft. Lowell Road to First Avenue
 780          DT    divC
 781          DI     0.0  2027.1   10000
 782          DQ     0.0  2027.1  2027.1
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 783          KK   SF_CE
 784          KM   First Avenue, Navajo Road to Prince Road
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=2220  So=.0030
 785          RS       1    FLOW      -1
 786          SV       0    .637   1.094   2.091   2.805   5.353   7.901  12.997  15.545
 787          SQ       0      30      59     134     183     532    1013    2316    3119
 788          SE       0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall divC

 789          KK    DR_C
 790          KM        Navajo Wash, Ft. Lowell Road to First Avenue
 791          DR    divC
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 792          KK   SD_CE
 793          KM       Navajo Wash, Ft. Lowell Road to First Avenue
 794          SV       0    1.22    2.45    3.67    4.89    6.12    7.34    8.56    9.79
 795          SQ       0     128     370     673    1014    1380    1764    2162    2027
 796          SE       0    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 797          KK       E
 798          KM      Off-Site flow at First Avenue and Prince
 799          DR   POC_E
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 800          KK    HC_E
 801          KM      Combined flow at First Avenue and Prince
 802          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Divert Capacity of storm drain.  Save temporarily as divE
              * Storm Drain is RCBC
              * B=12.0  D=8.0  nCls=2
              * So=.0040  n=.016  L=2647

 803          KK    DT_E
 804          KM        Navajo Wash, Ft. Lowell Road to First Avenue
 805          DT    divE
 806          DI     0.0  2027.1   10000
 807          DQ     0.0  2027.1  2027.1
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 808          KK   SF_EF
 809          KM   First Avenue, Navajo Road to Prince Road
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=2650  So=.0030
 810          RS       1    FLOW      -1
 811          SV       0    .760   1.306   2.497   3.348   6.390   9.432  15.516  18.557
 812          SQ       0     134      30      59     183     532    1013    2316    3119
 813          SE       0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall divE

 814          KK    DR_E
 815          KM        Navajo Wash, Ft. Lowell Road to First Avenue
 816          DR    divE
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 817          KK   SD_EF
 818          KM       Navajo Wash, Ft. Lowell Road to First Avenue
 819          SV       0    1.46    2.92    4.38    5.83    7.29    8.75   10.21   11.67
 820          SQ       0     128     370     673    1014    1380    1764    2162    2027
 821          SE       0    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+--------+
              *

 822          KK       F
 823          DR   POC_F
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+--------+
              *

 824          KK    HC_F
 825          KM   Combine with flow from E
 826          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+--------+
              *
              * Divert Capacity of storm drain.  Save temporarily as divF
              * Storm Drain is RCBC
              * B=12.0  D=8.0  nCls=2
              * So=.0050  n=.016  L=1321

 827          KK    DT_F
 828          KM        Navajo Wash, Ft. Lowell Road to First Avenue
 829          DT    divF
 830          DI     0.0  2266.3   10000
 831          DQ     0.0  2266.3  2266.3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+--------+
              *

 832          KK   SF_FG
 833          KM   First Avenue, Roger Road to Limberlost
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=1320  So=.0078
 834          RS       1    FLOW      -1
 835          SV       0    .379    .650   1.244   1.668   3.183   4.698   7.728   9.244
 836          SQ       0      49      95     216     295     857    1634    3734    5029
 837          SE       0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+--------+
              *
              * Recall divF

 838          KK    DR_F
 839          KM        Navajo Wash, Ft. Lowell Road to First Avenue
 840          DR    divF
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+--------+
              *
              * Route storm drain flow.
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 841          KK   SD_FG
 842          KM       Navajo Wash, Ft. Lowell Road to First Avenue
 843          SV       0     .73    1.46    2.18    2.91    3.64    4.37    5.09    5.82
 844          SQ       0     143     414     753    1133    1542    1972    2418    2266
 845          SE       0    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 846          KK       G
 847          KM    Recall N0020
 848          DR   POC_G
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 849          KK    HC_G
 850          KM   Combine with flow from F
 851          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Divert Capacity of storm drain.  Save temporarily as divG
              * Storm Drain is RCBC
              * B=16.0  D=8.0  nCls=2
              * So=.0025  n=.016  L=1239

 852          KK    DT_G
 853          KM        Navajo Wash, Ft. Lowell Road to First Avenue
 854          DT    divG
 855          DI     0.0  2292.2   10000
 856          DQ     0.0  2292.2  2292.2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 857          KK   SF_GH
 858          KM   First Avenue, Limberlost to Wetmore
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=1320  So=.0030
 859          RS       1    FLOW      -1
 860          SV       0    .379    .650   1.244   1.668   3.183   4.698   7.728   9.244
 861          SQ       0      30      59     134     183     532    1013    2316    3119
 862          SE       0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall divG

 863          KK    DR_G
 864          KM        Navajo Wash, Ft. Lowell Road to First Avenue
 865          DR    divG
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 866          KK   SD_GH
 867          KM       Navajo Wash, Ft. Lowell Road to First Avenue
 868          SV       0     .91    1.82    2.73    3.64    4.55    5.46    6.37    7.28
 869          SQ       0     138     408     752    1146    1576    2033    2510    2292
 870          SE       0    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 871          KK       H
 872          KM    Off-Site flow at Wetmore
 873          DR   POC_H
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 874          KK    HC_H
 875          KM   Combine with flow from G.  This is outflow to Rillito River
 876          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *
              *
              *

 877          KK       I
 878          KM    Recall N0220
 879          DR   POC_I
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Divert Capacity of storm drain.  Save temporarily as divI
              * Storm Drain is RCBC
              * B=8.0  D=5.0  nCls=1
              * So=.0055  n=.016  L=2320

 880          KK    DT_I
 881          KM        Navajo Wash, Ft. Lowell Road to First Avenue
 882          DT    divI
 883          DI     0.0   368.2   10000
 884          DQ     0.0   368.2   368.2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 885          KK   SF_IJ
 886          KM   Navajo Wash, Stone Ave to Oracle Road
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=1870  So=.0037
 887          RS       1    FLOW      -1
 888          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 889          SQ       0      27      73     152     251     657    1457    1947    2492
 890          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall divI
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 891          KK    DR_I
 892          KM        Navajo Wash, Ft. Lowell Road to First Avenue
 893          DR    divI
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 894          KK   SD_IJ
 895          KM       Navajo Wash, Ft. Lowell Road to First Avenue
 896          SV       0     .27     .53     .80    1.07    1.33    1.60    1.86    2.13
 897          SQ       0      23      67     122     184     251     322     395     368
 898          SE       0    0.63    1.25    1.88    2.50    3.13    3.75    4.38    5.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 899          KK       J
 900          KM    Recall N0260
 901          DR   POC_J
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 902          KK    HC_J
 903          KM   Combine with flow from I
 904          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 905          KK   CF_JK
 906          KM       New channel downstream of Oracle -- FIRST AVENUE APPROACH
              * Bottom Width B=20.0  Max Depth D=6.0  =.016  L=3176  So=.0025
 907          RS       1    FLOW      -1
 908          SV       0   1.367   2.734   4.101   5.468   6.835   8.202   9.569  10.936
 909          SQ       0      69     212     403     629     885    1163    1461    1776
 910          SE       0    0.75    1.50    2.25    3.00    3.75    4.50    5.25    6.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 911          KK       K
 912          DR   POC_K
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 913          KK    HC_K
 914          KM   Add K to J
 915          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
 916          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.       (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

 718         Pt_H
                .
                .
 725            .          .<-------   POC_A
 723            .         A
                .          .
                .          .
 726            x............
                .
                .
 730            .          .<-------   POC_B
 728            .         B
                .          .
                .          .
 733            .          .------->    divB
 731            .       DT_B
                .          V
                .          V
 736            .      SF_BC
                .          .
                .          .
 744            .          .           .<-------    divB
 742            .          .       DR_B
                .          .           .
                .          .           .
 752            .          .           .           .<-------   POC_D
 750            .          .           .          D
                .          .           .           .
                .          .           .           .
 755            .          .           .           .------->    divD
 753            .          .           .       DT_D
                .          .           .          V
                .          .           .          V
 758            .          .           .      SF_DC
                .          .           .           .
                .          .           .           .
 766            .          .           .           .           .<-------    divD
 764            .          .           .           .       DR_D
                .          .           .           .           .
                .          .           .           .           .
 774            .          .           .           .           .           .<-------   POC_C
 772            .          .           .           .           .          C
                .          .           .           .           .           .
                .          .           .           .           .           .
 775            .       HC_C.............................................
                .          .
                .          .
 780            .          .------->    divC
 778            .       DT_C
                .          V
                .          V
 783            .      SF_CE
                .          .
                .          .
 791            .          .           .<-------    divC
```

```
789          .          .        DR_C
             .          .           .
             .          .           .
799          .          .           .           .<-------   POC_E
797          .          .           .           E
             .          .           .           .
             .          .           .           .
800          .       HC_E.......................
             .          .
             .          .
805          .          .------->    divE
803          .       DT_E
             .          V
             .          V
808          .      SF_EF
             .          .
             .          .
816          .          .           .<-------    divE
814          .          .        DR_E
             .          .           .
             .          .           .
823          .          .           .           .<-------   POC_F
822          .          .           .           F
             .          .           .           .
             .          .           .           .
824          .       HC_F.......................
             .          .
             .          .
829          .          .------->    divF
827          .       DT_F
             .          V
             .          V
832          .      SF_FG
             .          .
             .          .
840          .          .           .<-------    divF
838          .          .        DR_F
             .          .           .
             .          .           .
848          .          .           .           .<-------   POC_G
846          .          .           .           G
             .          .           .           .
             .          .           .           .
849          .       HC_G.......................
             .          .
             .          .
854          .          .------->    divG
852          .       DT_G
             .          V
             .          V
857          .      SF_GH
             .          .
             .          .
865          .          .           .<-------    divG
863          .          .        DR_G
             .          .           .
             .          .           .
873          .          .           .           .<-------   POC_H
871          .          .           .           H
             .          .           .           .
             .          .           .           .
```

```
874          .        HC_H.......................
             .           .
             .           .
879          .           .           .<-------   POC_I
877          .           .           I
             .           .           .
             .           .           .
882          .           .           .------->    divI
880          .           .        DT_I
             .           .           V
             .           .           V
885          .           .       SF_IJ
             .           .           .
             .           .           .
893          .           .           .           .<-------    divI
891          .           .           .        DR_I
             .           .           .           .
             .           .           .           .
901          .           .           .           .           .<-------   POC_J
899          .           .           .           .           J
             .           .           .           .           .
             .           .           .           .           .
902          .           .        HC_J.......................
             .           .           V
             .           .           V
905          .           .       CF_JK
             .           .           .
             .           .           .
912          .           .           .           .<-------   POC_K
911          .           .           .           K
             .           .           .           .
             .           .           .           .
913          .           .        HC_K............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	Pt_H	0.	.02	0.	0.	0.	5.14		
+	HYDROGRAPH AT	A	466.	.43	73.	73.	73.	.00		
+	2 COMBINED AT	x	466.	.43	73.	73.	73.	5.14		
+	HYDROGRAPH AT	B	162.	.48	27.	27.	27.	.00		
+	DIVERSION TO	divB	150.	.48	26.	26.	26.	.00		
+	HYDROGRAPH AT	DT_B	12.	.48	0.	0.	0.	.00		
+	ROUTED TO	SF_BC	8.	.52	0.	0.	0.	.00	.13	.52
+	HYDROGRAPH AT	DR_B	150.	.43	26.	26.	26.	.00		
+	ROUTED TO	SD_BC	151.	.43	26.	26.	26.	.00	5.01	.43
+	HYDROGRAPH AT	D	1629.	.75	350.	350.	350.	.00		
+	DIVERSION TO	divD	1629.	.02	350.	350.	350.	.00		
+	HYDROGRAPH AT	DT_D	0.	.02	0.	0.	0.	.00		
+	ROUTED TO	SF_DC	0.	.02	0.	0.	0.	.00	.00	1.35
+	HYDROGRAPH AT	DR_D	1629.	.75	350.	350.	350.	.00		
+	ROUTED TO	SD_DC	1613.	.80	350.	350.	350.	.00	6.21	.80
+	HYDROGRAPH AT	C	106.	.37	14.	14.	14.	.00		
	5 COMBINED AT									

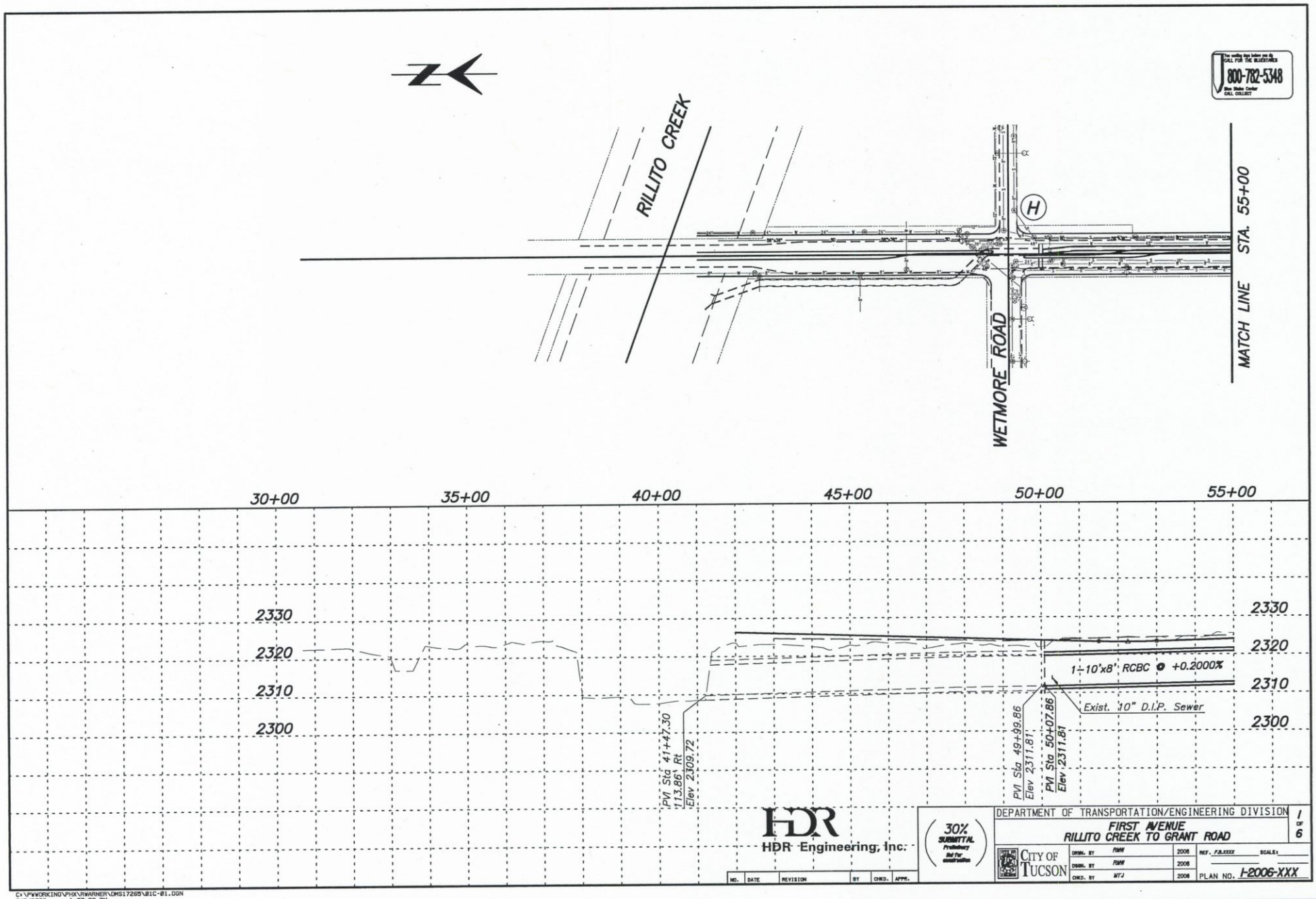
+		HC_C	1748.	.78	391.	391.	391.	.00	
+	DIVERSION TO	divC	1748.	.02	391.	391.	391.	.00	
+	HYDROGRAPH AT	DT_C	0.	.02	0.	0.	0.	.00	
+	ROUTED TO	SF_CE	0.	.02	0.	0.	0.	.00	
+	HYDROGRAPH AT	DR_C	1748.	.78	391.	391.	391.	.00	
+	ROUTED TO	SD_CE	1737.	.82	390.	390.	390.	.00	
+									5.93 .82
+	HYDROGRAPH AT	E	204.	.55	45.	45.	45.	.00	
+	3 COMBINED AT	HC_E	1896.	.82	435.	435.	435.	.00	
+	DIVERSION TO	divE	1896.	.02	435.	435.	435.	.00	
+	HYDROGRAPH AT	DT_E	0.	.02	0.	0.	0.	.00	
+	ROUTED TO	SF_EF	0.	.02	0.	0.	0.	.00	
+	HYDROGRAPH AT	DR_E	1896.	.82	435.	435.	435.	.00	
+	ROUTED TO	SD_EF	1880.	.87	435.	435.	435.	.00	
+									6.29 .87
+	HYDROGRAPH AT	F	227.	.43	34.	34.	34.	.00	
+	3 COMBINED AT	HC_F	1978.	.85	469.	469.	469.	.00	
+	DIVERSION TO	divF	1978.	.02	469.	469.	469.	.00	
+	HYDROGRAPH AT	DT_F	0.	.02	0.	0.	0.	.00	
+	ROUTED TO	SF_FG	0.	.02	0.	0.	0.	.00	
+									.00 1.33
+	HYDROGRAPH AT	DR_F	1978.	.85	469.	469.	469.	.00	
+	ROUTED TO	SD_FG	1975.	.87	469.	469.	469.	.00	

+								6.01	.87
+	HYDROGRAPH AT	G	216.	.83	49.	49.	49.	.00	
+	3 COMBINED AT	HC_G	2188.	.87	518.	518.	518.	.00	
+	DIVERSION TO	divG	2188.	.02	518.	518.	518.	.00	
+	HYDROGRAPH AT	DT_G	0.	.02	0.	0.	0.	.00	
+	ROUTED TO	SF_GH	0.	.02	0.	0.	0.	.00	
+								.00	1.33
+	HYDROGRAPH AT	DR_G	2188.	.87	518.	518.	518.	.00	
+	ROUTED TO	SD_GH	2183.	.88	518.	518.	518.	.00	
+								6.31	.88
+	HYDROGRAPH AT	H	293.	.82	61.	61.	61.	.00	
+	3 COMBINED AT	HC_H	2465.	.87	578.	578.	578.	.00	
+	HYDROGRAPH AT	I	365.	.43	56.	56.	56.	.00	
+	DIVERSION TO	divI	365.	.02	56.	56.	56.	.00	
+	HYDROGRAPH AT	DT_I	0.	.02	0.	0.	0.	.00	
+	ROUTED TO	SF_IJ	0.	.02	0.	0.	0.	.00	
+								.00	.78
+	HYDROGRAPH AT	DR_I	365.	.43	56.	56.	56.	.00	
+	ROUTED TO	SD_IJ	340.	.50	56.	56.	56.	.00	
+								3.90	.50
+	HYDROGRAPH AT	J	676.	.67	212.	212.	212.	.00	
+	3 COMBINED AT	HC_J	969.	.50	268.	268.	268.	.00	
+	ROUTED TO	CF_JK	943.	.65	266.	266.	266.	.00	
+								3.91	.65

+	HYDROGRAPH AT	K	1702.	.65	498.	498.	498.	.00
+	2 COMBINED AT	HC_K	2645.	.65	764.	764.	764.	.00

*** NORMAL END OF HEC-1 ***

Appendix 5a. TSMS(6) -- Concept Drainage Plan, First Avenue Scenario


RILLITO CREEK
WETMORE ROAD
MATCH LINE STA. 55+00
H
30+00
35+00
40+00
45+00
50+00
55+00
2330
2320
2310
2300
1-10'x8' RCBC @ +0.2000%
Exist. 10" D.I.P. Sewer
PVI Sta 41+47.30
113.86' Rt
Elev 2309.72
PVI Sta 49+99.86
Elev 2311.81'
PVI Sta 50+07.86
Elev 2311.81'
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30% SUBMITTAL Preliminary Not For construction
DEPARTMENT OF TRANSPORTATION/ENGINEERING DIVISION
FIRST AVENUE
RILLITO CREEK TO GRANT ROAD
1 OF 6
CITY OF TUCSON
DRWN. BY RWW 2006
DSGN. BY RWW 2006
CHKD. BY MTJ 2006
REF. F.B.XXXX
SCALE:
PLAN NO. I-2006-XXX
NO. DATE REVISION BY CHKD. APPR.
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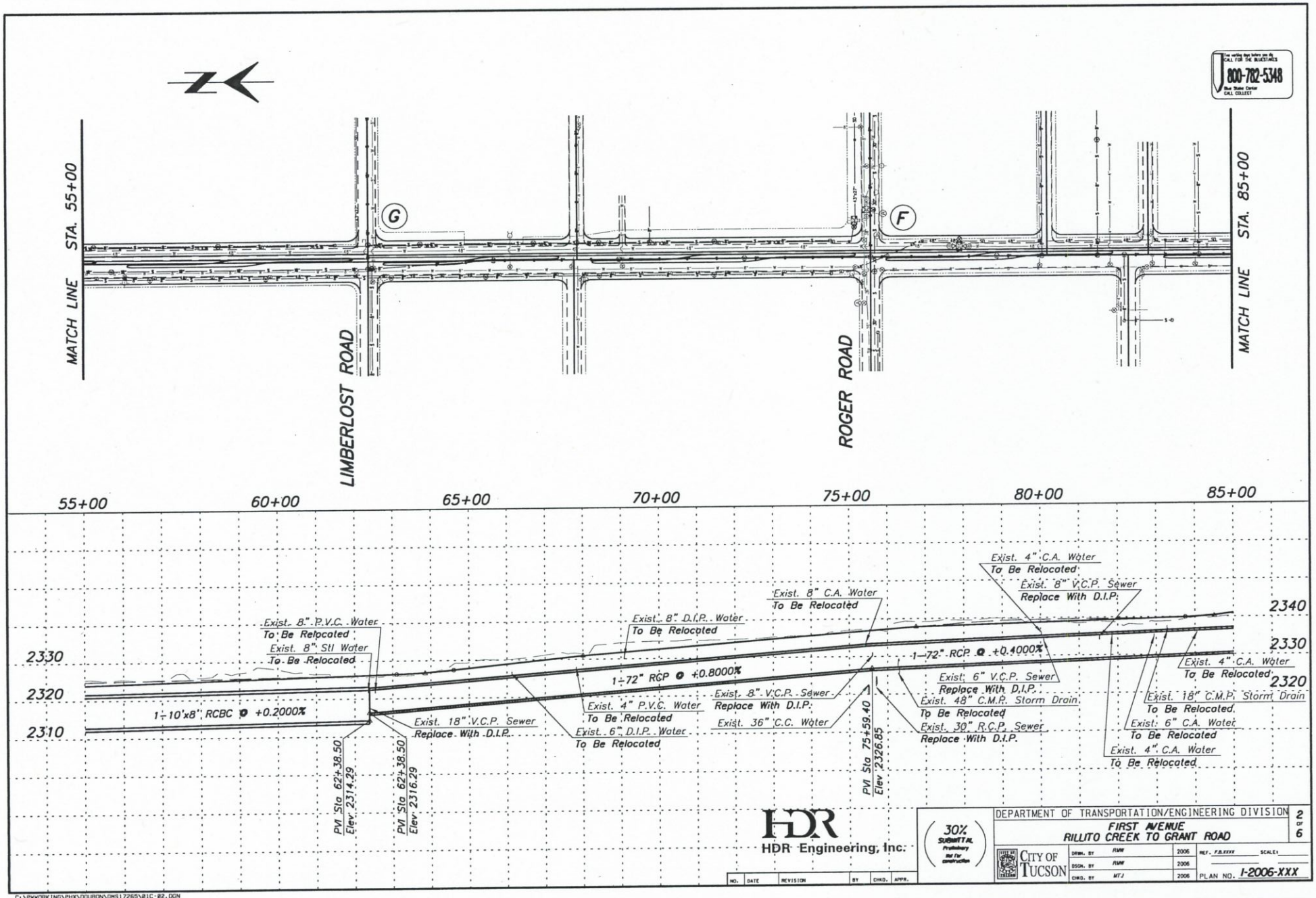
800-782-5348
MATCH LINE STA. 55+00
MATCH LINE STA. 85+00
LIMBERLOST ROAD
ROGER ROAD
G
F
55+00
60+00
65+00
70+00
75+00
80+00
85+00
2340
2330
2320
2310
Exist. 8" P.V.C. Water
To Be Relocated
Exist. 8" Stl Water
To Be Relocated
1-10'x8' RCBC @ +0.2000%
Exist. 18" V.C.P. Sewer
Replace With D.I.P.
PVI Sta 62+38.50
Elev 2314.29
PVI Sta 62+38.50
Elev 2316.29
Exist. 8" D.I.P. Water
To Be Relocated
Exist. 4" P.V.C. Water
To Be Relocated
Exist. 6" D.I.P. Water
To Be Relocated
1-72" RCP @ +0.8000%
Exist. 8" V.C.P. Sewer
Replace With D.I.P.
Exist. 36" C.C. Water
Exist. 8" C.A. Water
To Be Relocated
PVI Sta 75+59.40
Elev 2326.85
1-72" RCP @ +0.4000%
Exist. 6" V.C.P. Sewer
Replace With D.I.P.
Exist. 48" C.M.P. Storm Drain
To Be Relocated
Exist. 30" R.C.P. Sewer
Replace With D.I.P.
Exist. 4" C.A. Water
To Be Relocated
Exist. 8" V.C.P. Sewer
Replace With D.I.P.
Exist. 4" C.A. Water
To Be Relocated
Exist. 18" C.M.P. Storm Drain
To Be Relocated
Exist. 6" C.A. Water
To Be Relocated
Exist. 4" C.A. Water
To Be Relocated
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2 OF 6
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DSGN. BY RMW 2006
CHKD. BY MTJ 2006
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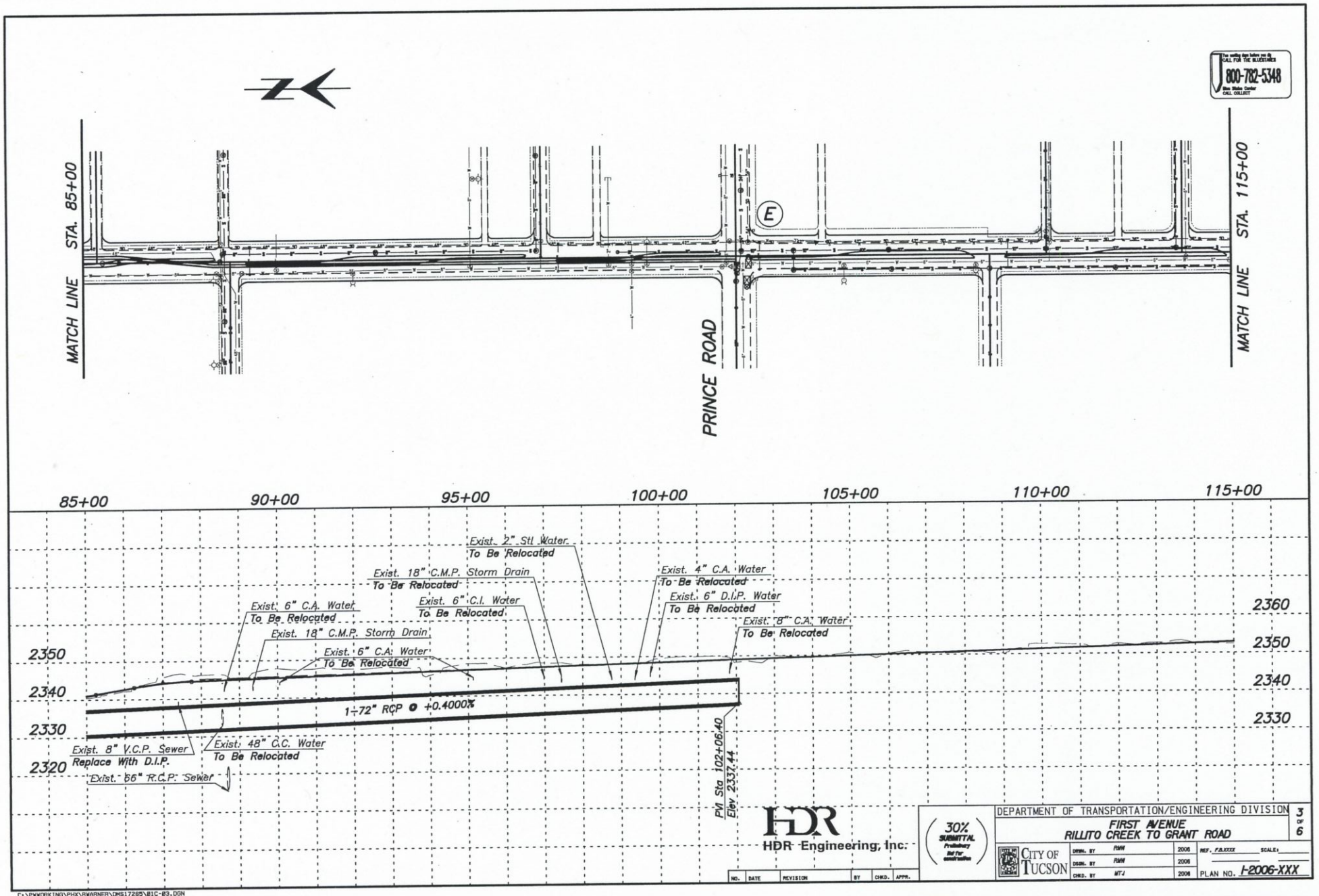
800-782-5348
MATCH LINE STA. 85+00
MATCH LINE STA. 115+00
PRINCE ROAD
E
85+00
90+00
95+00
100+00
105+00
110+00
115+00
2360
2350
2340
2330
2320
Exist. 2" Stl Water
To Be Relocated
Exist. 18" C.M.P. Storm Drain
To Be Relocated
Exist. 6" C.I. Water
To Be Relocated
Exist. 4" C.A. Water
To Be Relocated
Exist. 6" D.I.P. Water
To Be Relocated
Exist. 8" C.A. Water
To Be Relocated
Exist. 6" C.A. Water
To Be Relocated
Exist. 18" C.M.P. Storm Drain
Exist. 6" C.A. Water
To Be Relocated
1-72" RCP @ +0.4000%
Exist. 8" V.C.P. Sewer
Replace With D.I.P.
Exist. 48" C.C. Water
To Be Relocated
Exist. 66" R.C.P. Sewer
PVI Sta 102+06.40
Elev 2337.44
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CHKD. BY MTJ 2006
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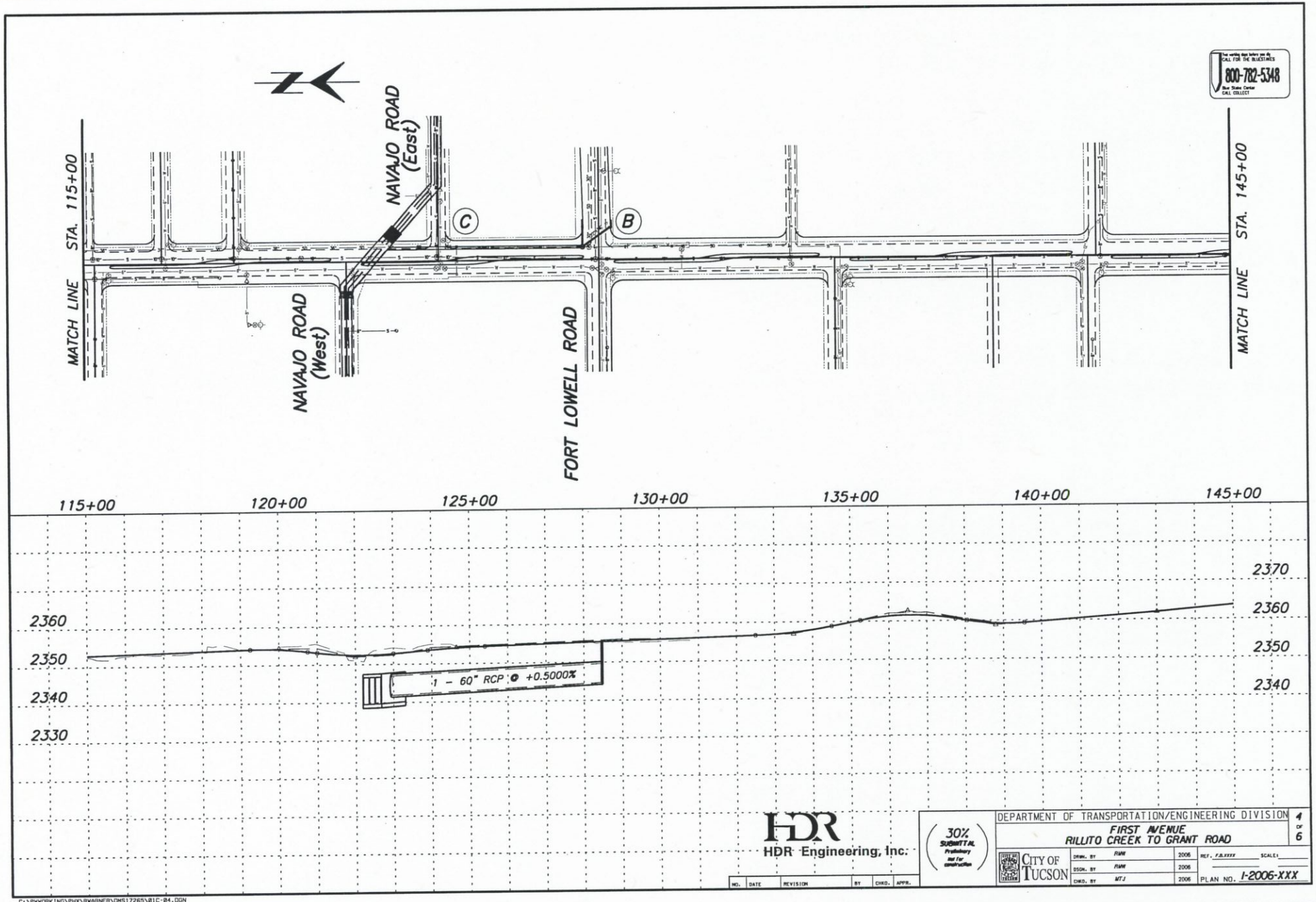

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FIRST AVENUE
RILLITO CREEK TO GRANT ROAD

4 OF 6

CITY OF TUCSON

DRWN. BY	RWW	2006
DSGN. BY	RWW	2006
CHKD. BY	MTJ	2006

REF. F.B.XXXX SCALE:

PLAN NO. I-2006-XXX

NO.	DATE	REVISION	BY	CHKD.	APPR.

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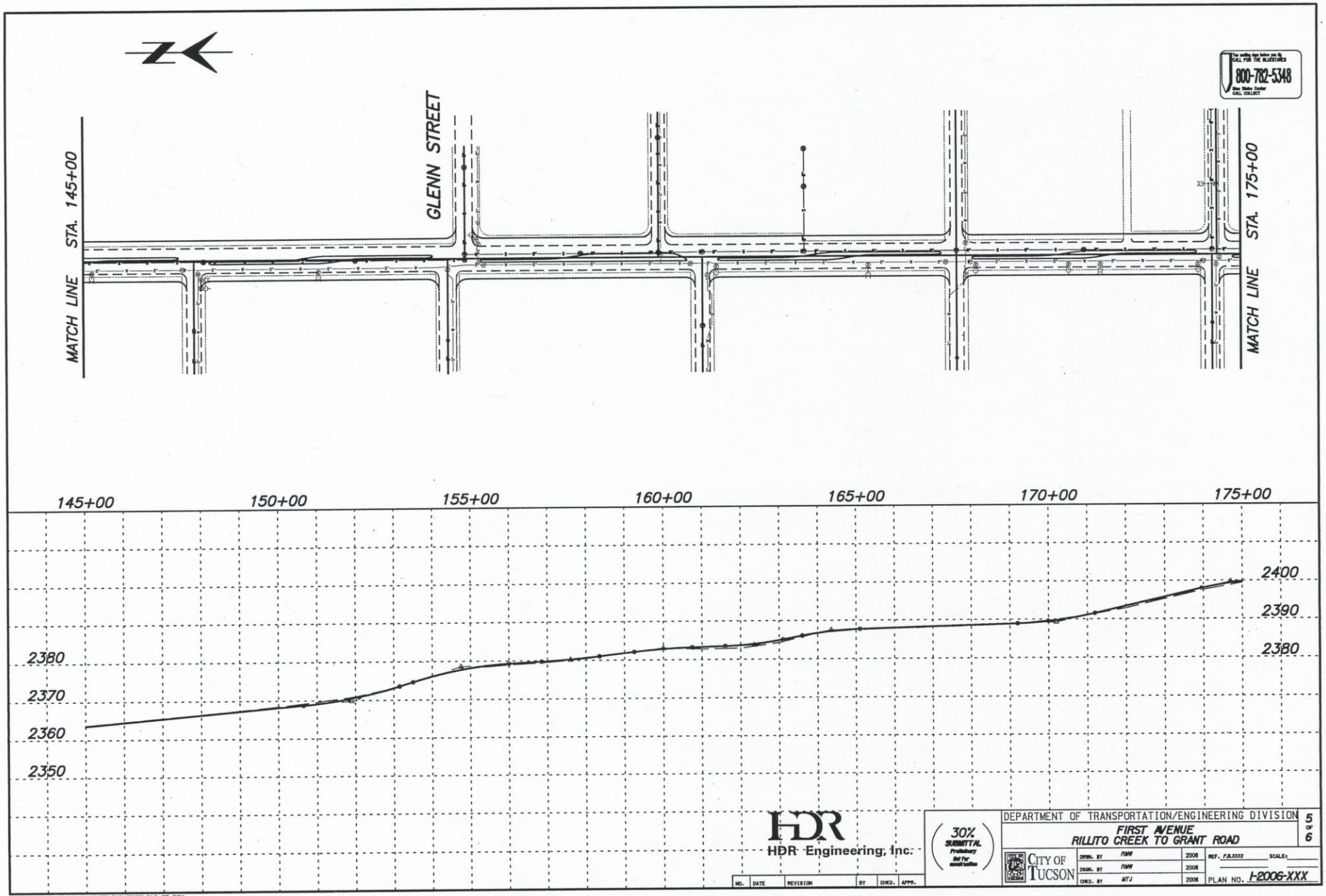

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DEPARTMENT OF TRANSPORTATION/ENGINEERING DIVISION

FIRST AVENUE
RILLITO CREEK TO GRANT ROAD

5 OF 6

CITY OF TUCSON

DRWN. BY	RWW	2006	REF. F.B.XXXX SCALE:
DSGN. BY	RWW	2006	
CHKD. BY	MTJ	2006	PLAN NO. I-2006-XXX

NO.	DATE	REVISION	BY	CHKD.	APPR.

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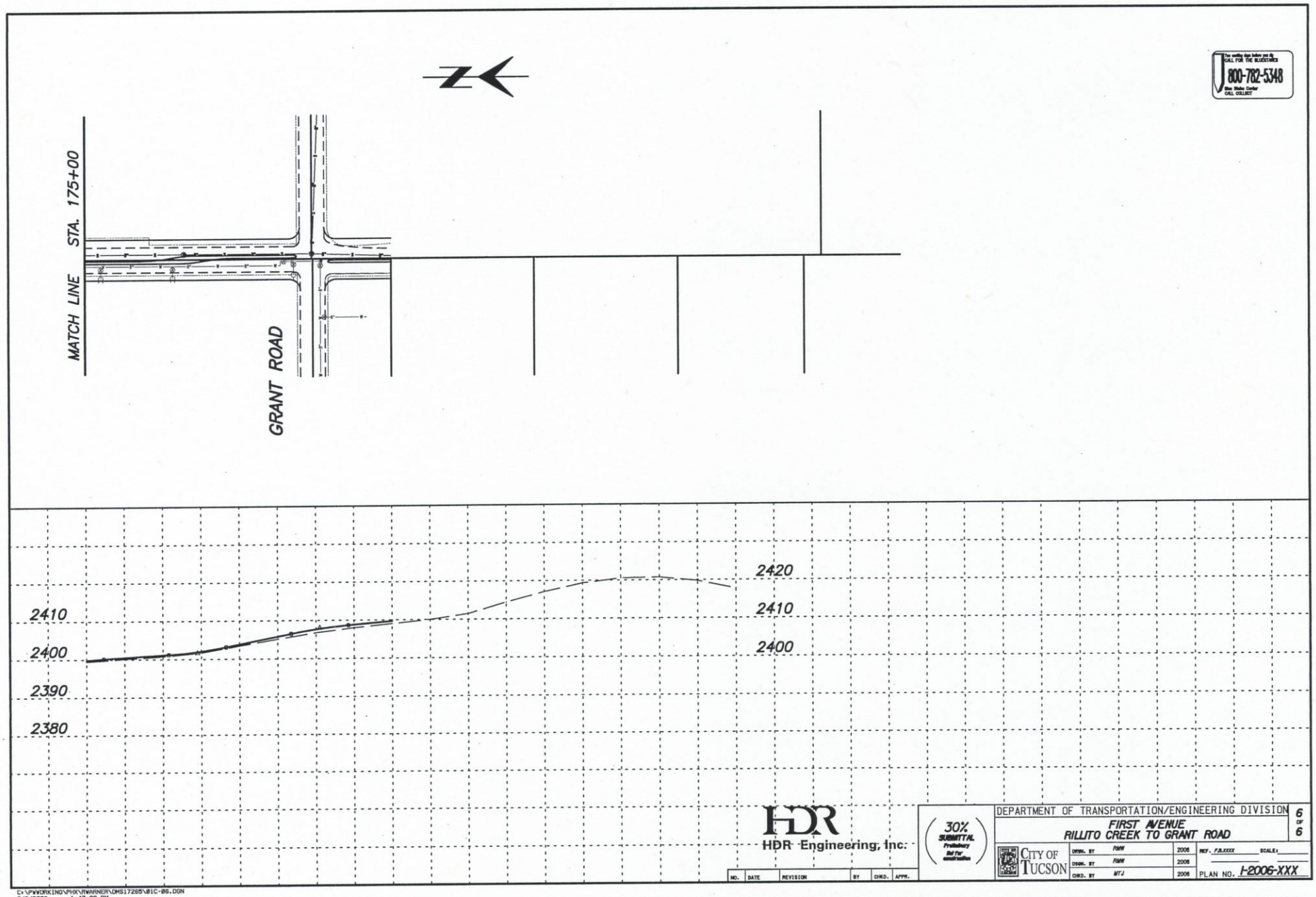
MATCH LINE STA. 175+00
GRANT ROAD
2420
2410
2400
2410
2400
2390
2380
HDR
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DEPARTMENT OF TRANSPORTATION/ENGINEERING DIVISION
FIRST AVENUE
RILLITO CREEK TO GRANT ROAD
6 of 6
CITY OF TUCSON
DRWN. BY FWW 2006
DSGN. BY FWW 2006
CHKD. BY MTJ 2006
REF. F.B.XXXX
SCALE:
PLAN NO. I-2006-XXX
NO. DATE REVISION BY CHKD. APPR.
CALL FOR THE BLUESTAKES
800-782-5348
Blue Stake Center
CALL COLLECT
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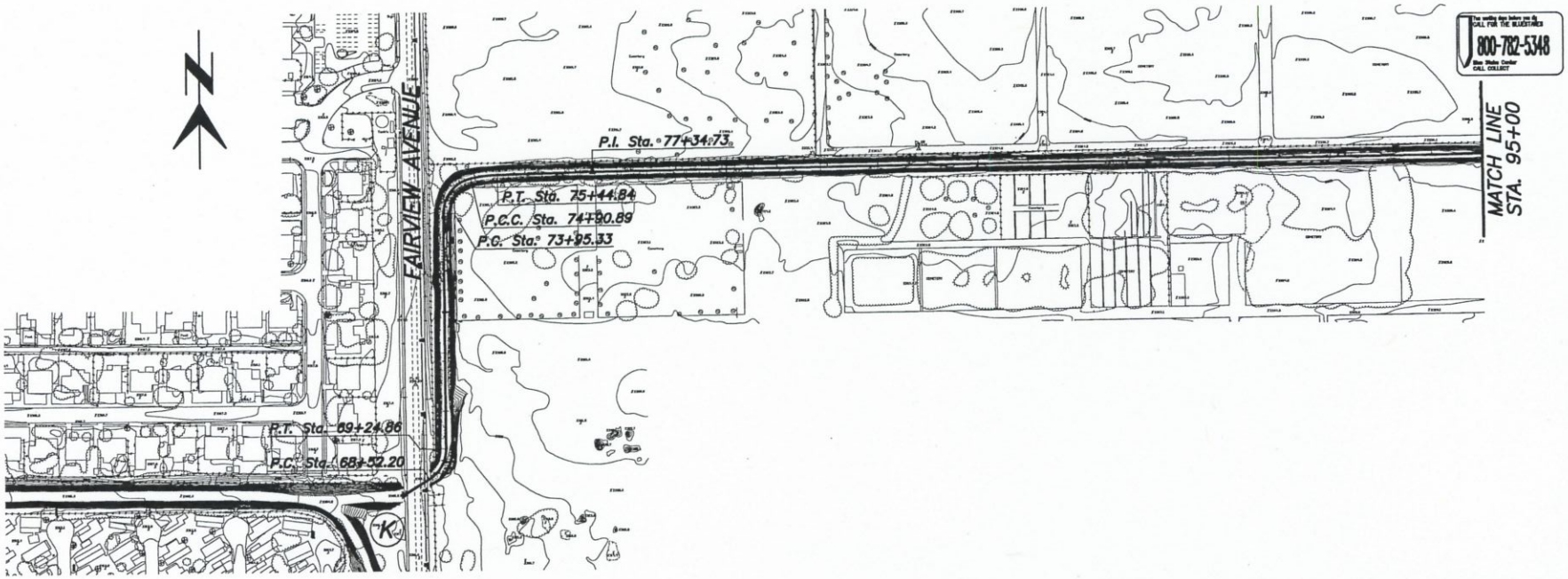

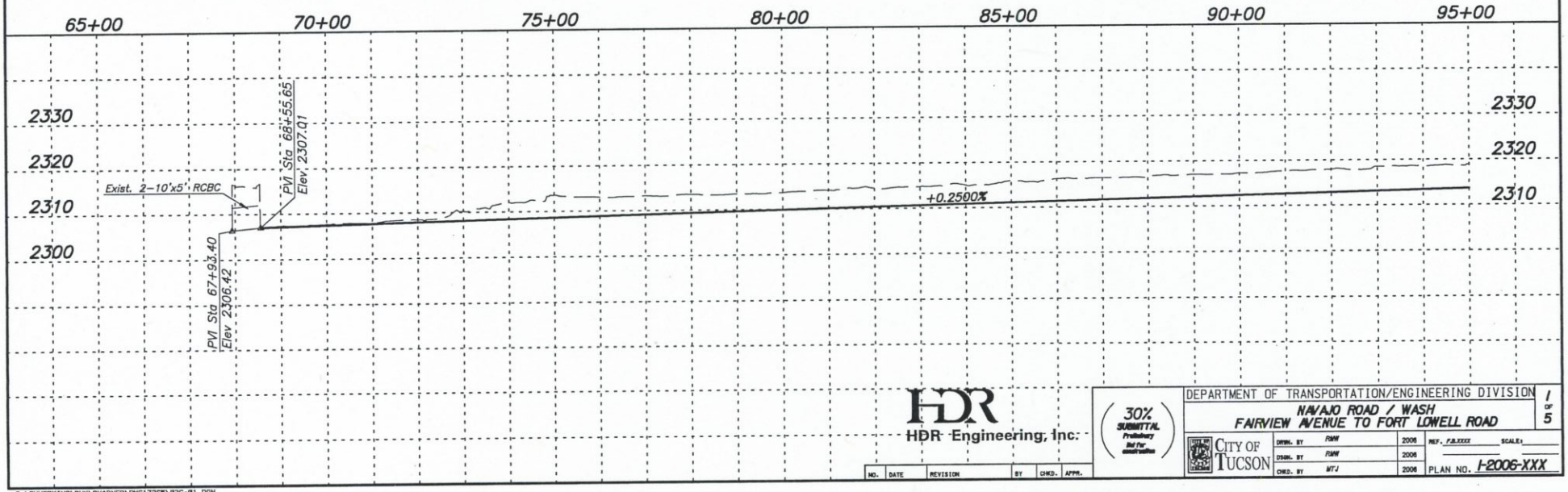

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DEPARTMENT OF TRANSPORTATION/ENGINEERING DIVISION

NAVAJO ROAD / WASH
FAIRVIEW AVENUE TO FORT LOWELL ROAD

1 of 5

CITY OF TUCSON

DRWN. BY	RWW	2006	REF. F.B.XXXX SCALE:
DSGN. BY	RWW	2006	
CHKD. BY	WTJ	2006	PLAN NO. I-2006-XXX

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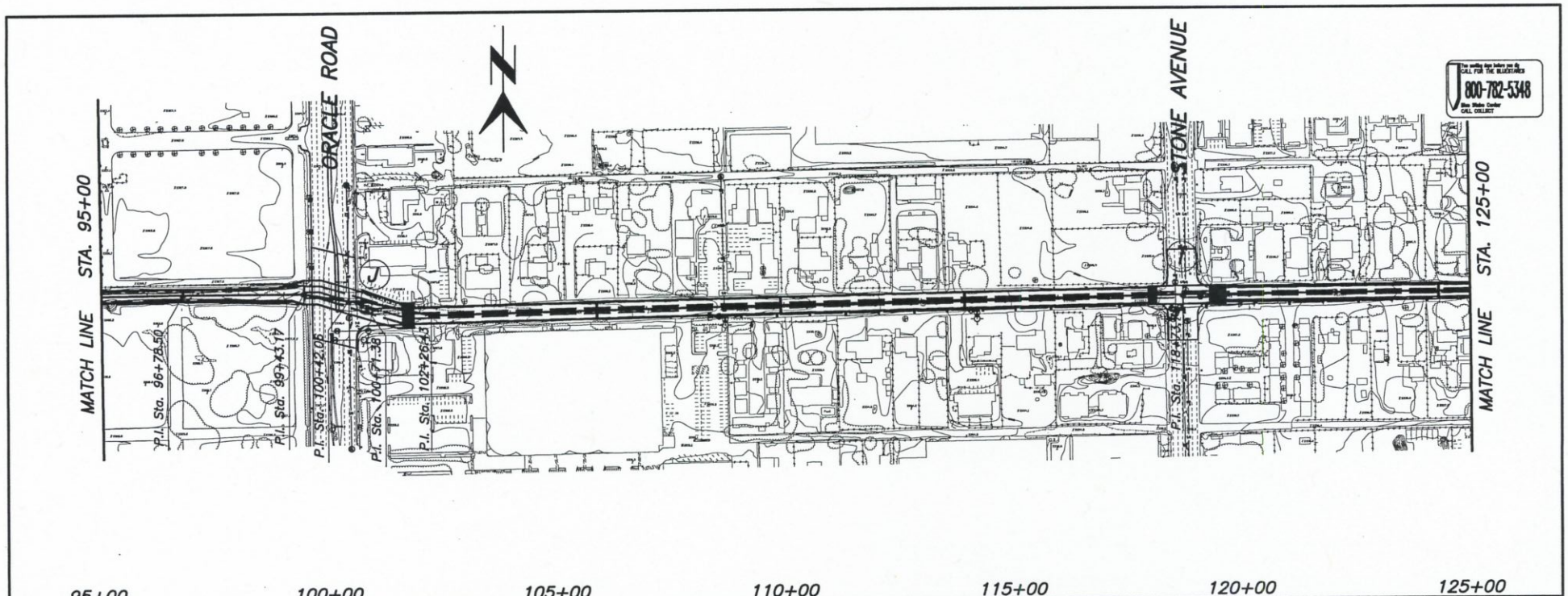

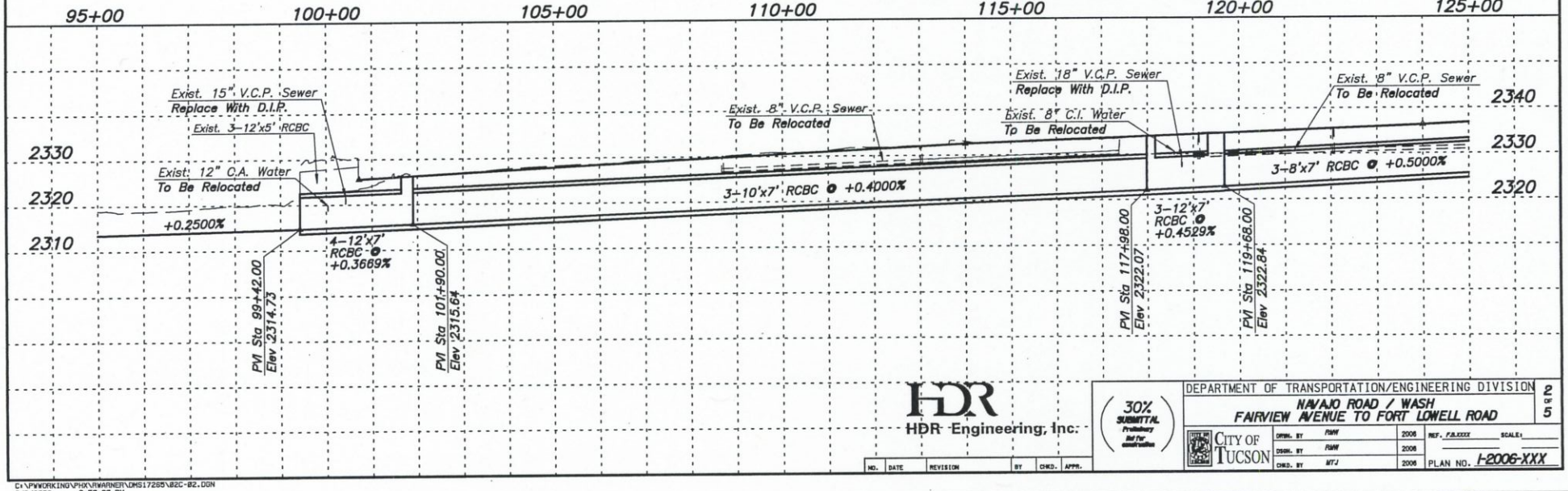

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NAVAJO ROAD / WASH
FAIRVIEW AVENUE TO FORT LOWELL ROAD

2 of 5

CITY OF TUCSON

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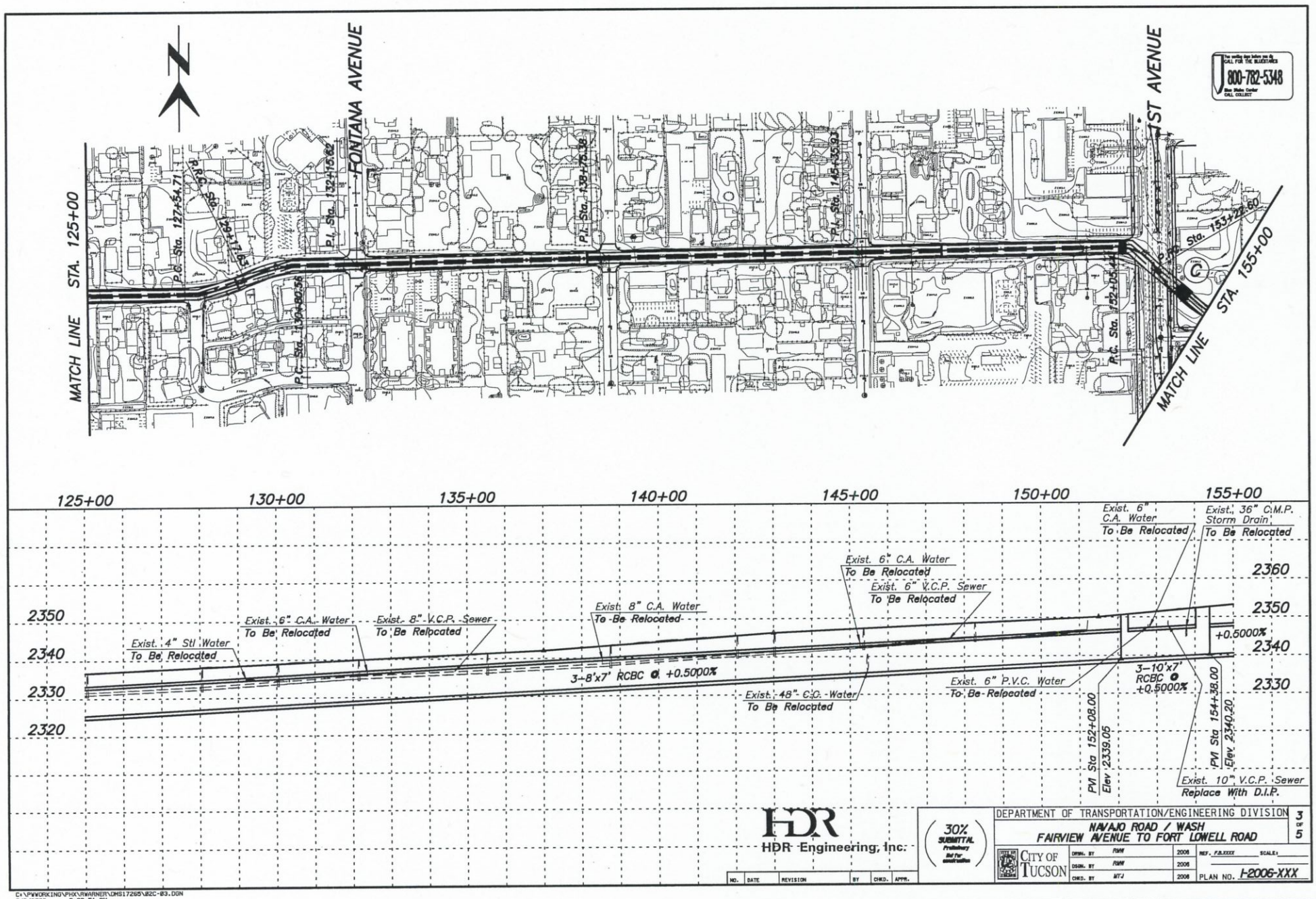

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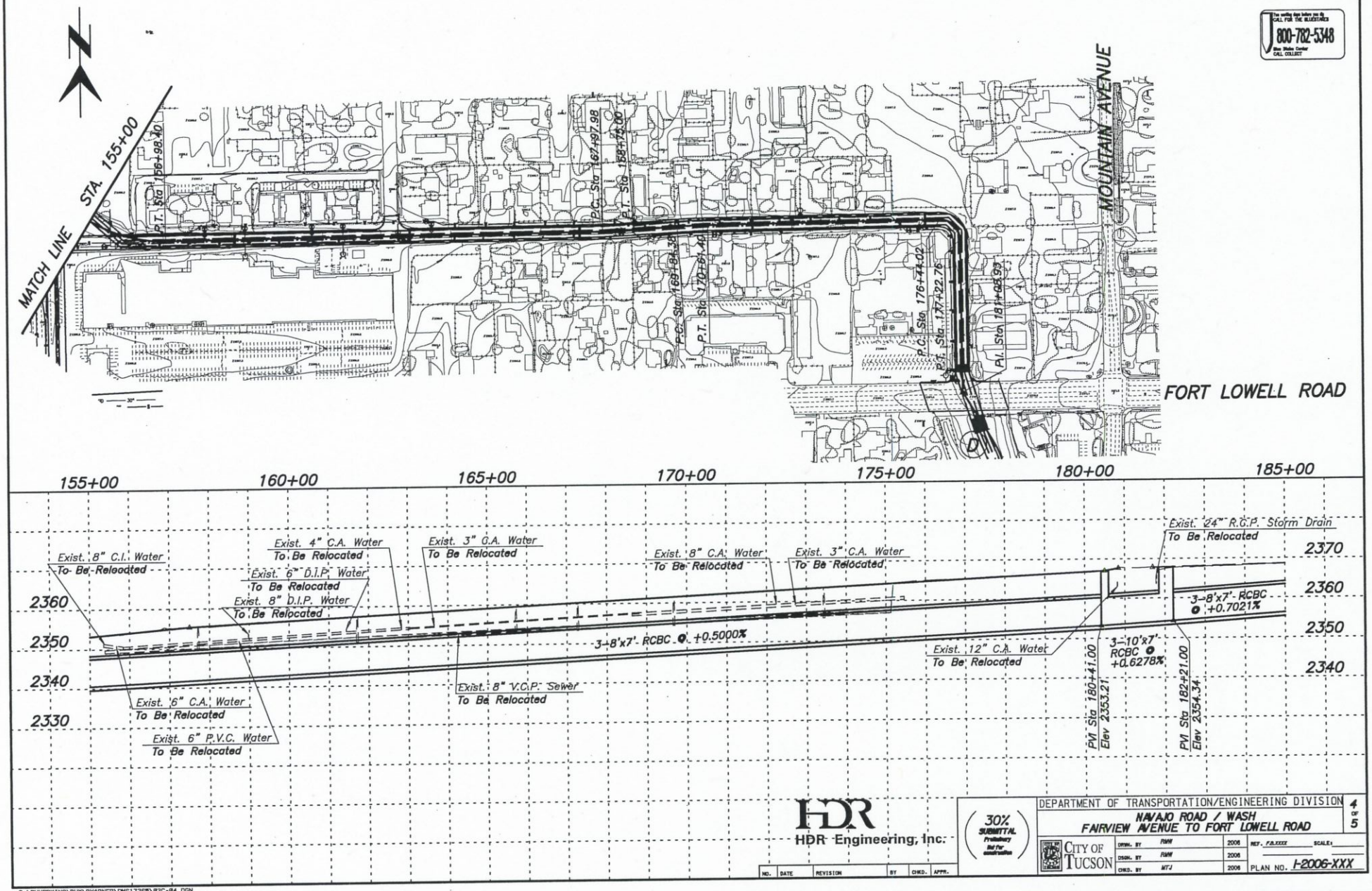

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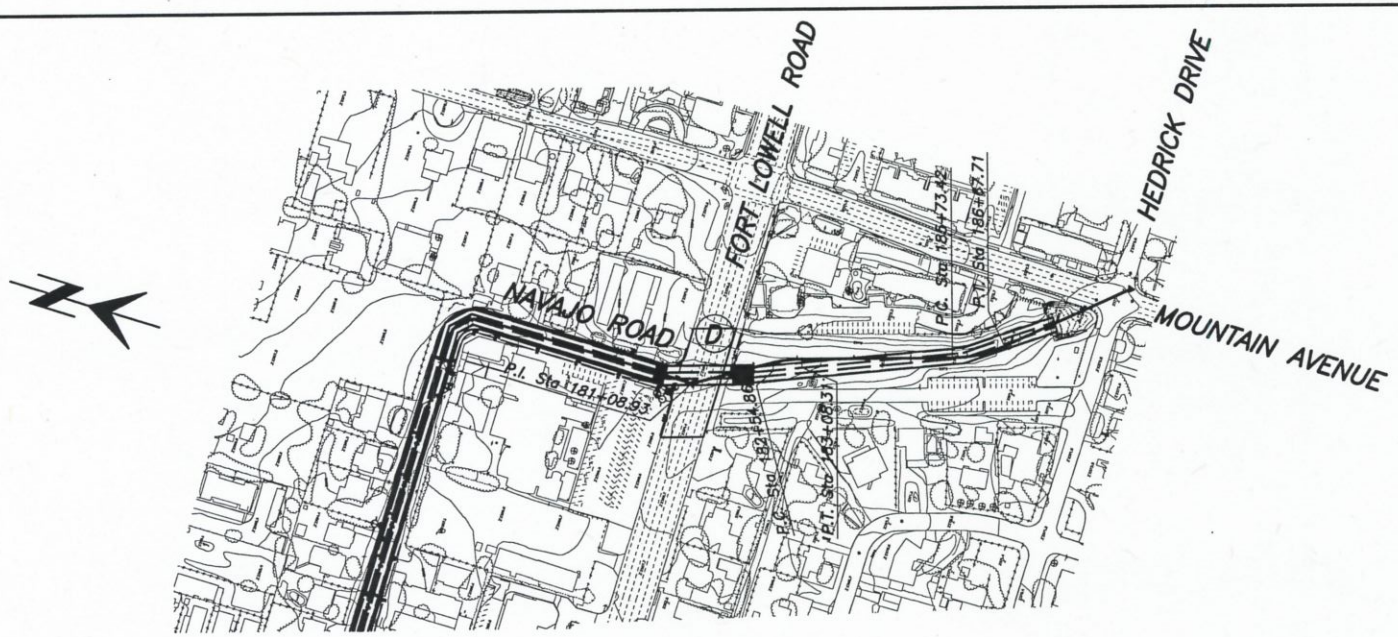

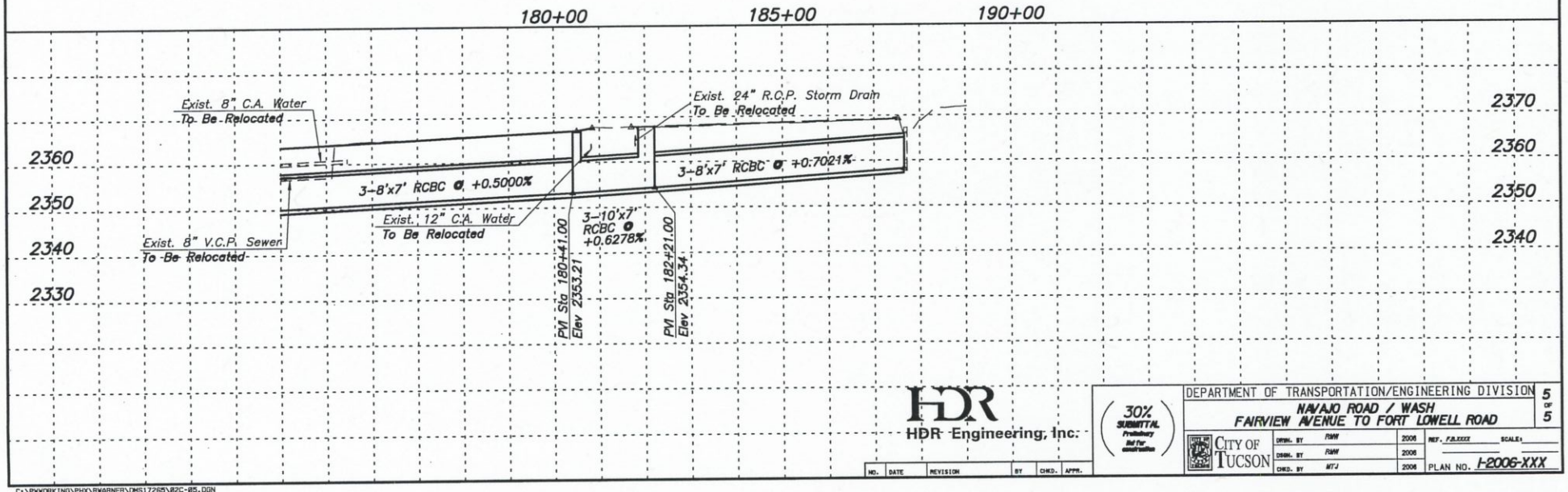

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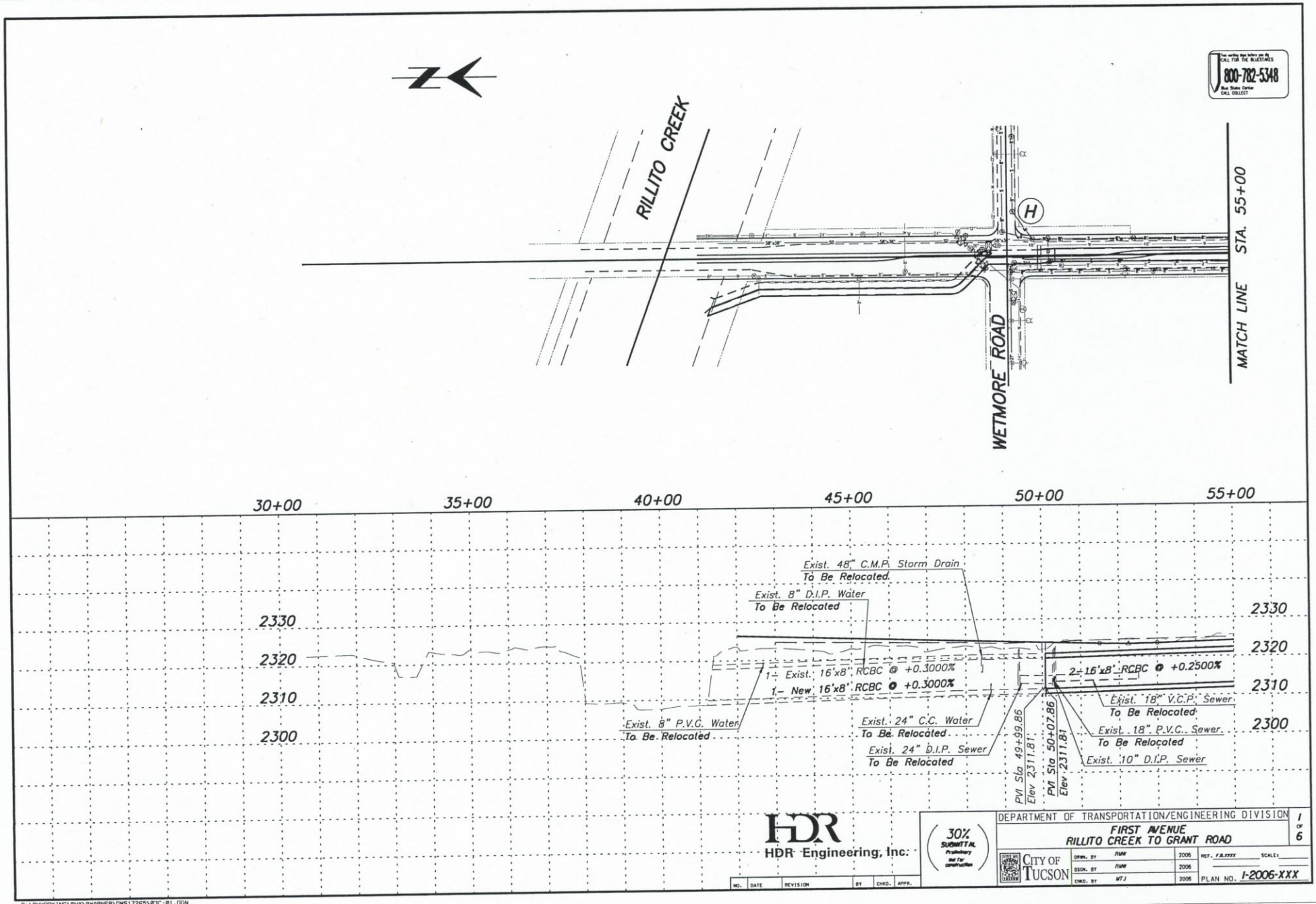
Appendix 5b. TSMS(7) -- Concept Drainage Plan, First Avenue Scenario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WETMORE ROAD
MATCH LINE STA. 55+00
30+00
35+00
40+00
45+00
50+00
55+00
2330
2320
2310
2300
Exist. 48" C.M.P. Storm Drain
To Be Relocated
Exist. 8" D.I.P. Water
To Be Relocated
1- Exist. 16'x8' RCBC @ +0.3000%
1- New 16'x8' RCBC @ +0.3000%
2- 16'x8' RCBC @ +0.2500%
Exist. 8" P.V.C. Water
To Be Relocated
Exist. 24" C.C. Water
To Be Relocated
Exist. 24" D.I.P. Sewer
To Be Relocated
Exist. 18" V.C.P. Sewer
To Be Relocated
Exist. 18" P.V.C. Sewer
To Be Relocated
Exist. 10" D.I.P. Sewer
PVI Sta 49+99.86
Elev 2311.81
PVI Sta 50+07.86
Elev 2311.81
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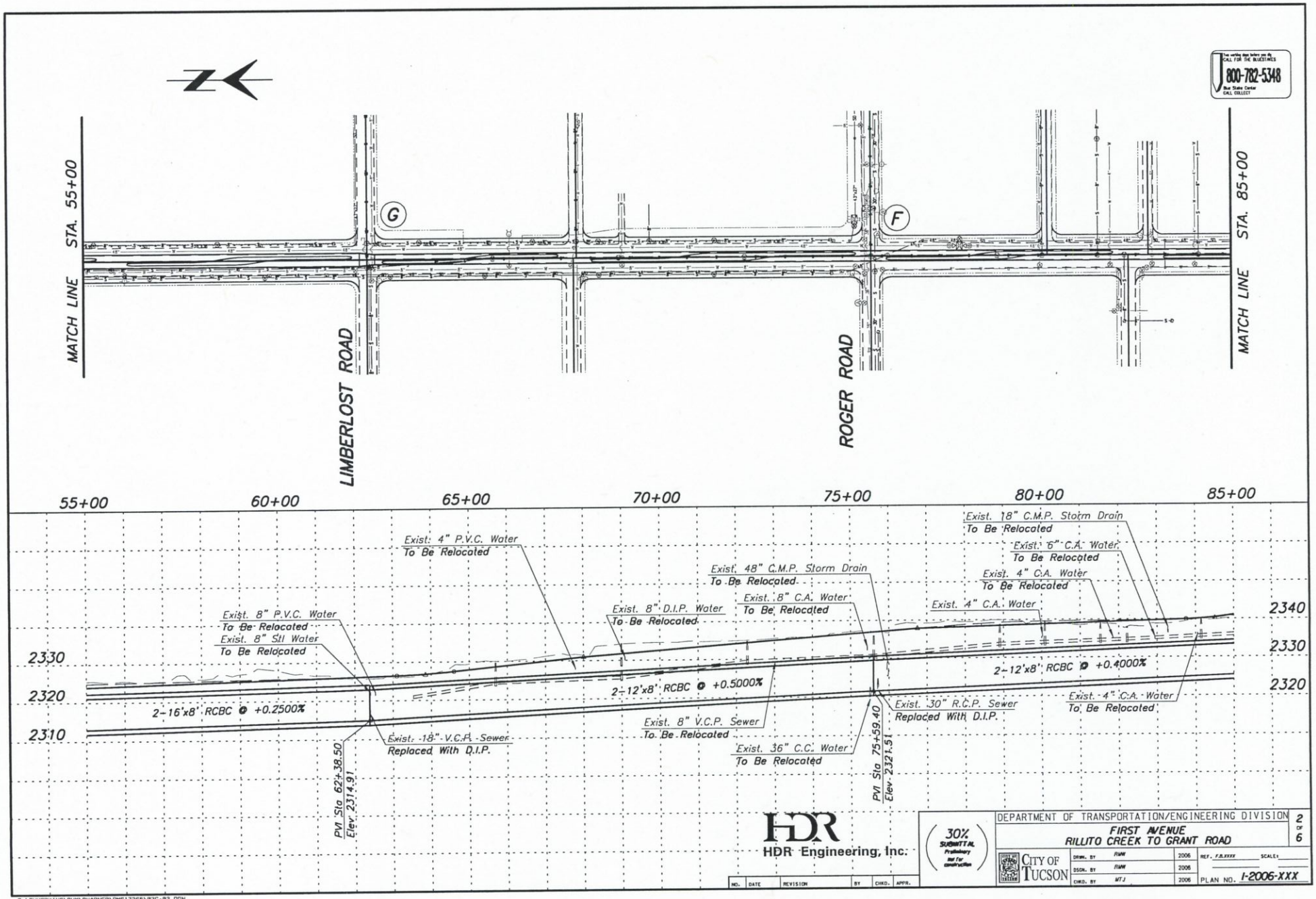
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MATCH LINE STA. 85+00
LIMBERLOST ROAD
ROGER ROAD
G
F
55+00
60+00
65+00
70+00
75+00
80+00
85+00
2340
2330
2320
2310
Exist. 4" P.V.C. Water
To Be Relocated
Exist. 8" P.V.C. Water
To Be Relocated
Exist. 8" STI Water
To Be Relocated
Exist. 8" D.I.P. Water
To Be Relocated
Exist. 48" C.M.P. Storm Drain
To Be Relocated
Exist. 8" C.A. Water
To Be Relocated
Exist. 4" C.A. Water
Exist. 18" C.M.P. Storm Drain
To Be Relocated
Exist. 6" C.A. Water
To Be Relocated
Exist. 4" C.A. Water
To Be Relocated
2-16'x8' RCBC @ +0.2500%
2-12'x8' RCBC @ +0.5000%
2-12'x8' RCBC @ +0.4000%
Exist. 18" V.C.P. Sewer
Replaced With D.I.P.
Exist. 8" V.C.P. Sewer
To Be Relocated
Exist. 36" C.C. Water
To Be Relocated
Exist. 30" R.C.P. Sewer
Replaced With D.I.P.
Exist. 4" C.A. Water
To Be Relocated
PVI Sta 62+38.50
Elev 2314.91
PVI Sta 75+59.40
Elev 2321.51
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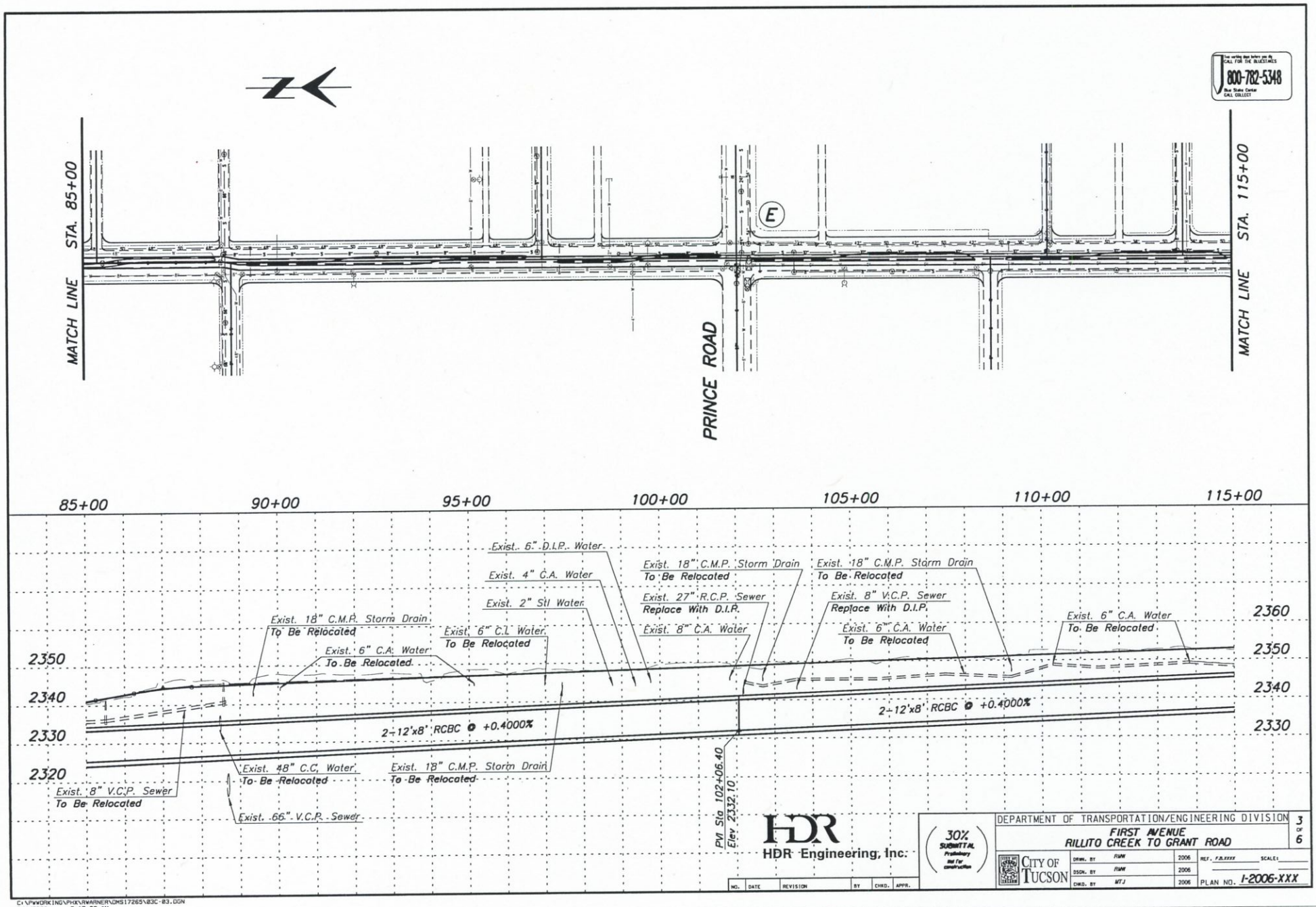
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MATCH LINE STA. 85+00
MATCH LINE STA. 115+00
PRINCE ROAD
E
85+00
90+00
95+00
100+00
105+00
110+00
115+00
2360
2350
2340
2330
2320
Exist. 6" D.I.P. Water
Exist. 4" C.A. Water
Exist. 2" Stl Water
Exist. 18" C.M.P. Storm Drain To Be Relocated
Exist. 27" R.C.P. Sewer Replace With D.I.P.
Exist. 8" C.A. Water
Exist. 18" C.M.P. Storm Drain To Be Relocated
Exist. 8" V.C.P. Sewer Replace With D.I.P.
Exist. 6" C.A. Water To Be Relocated
Exist. 6" C.A. Water To Be Relocated
Exist. 18" C.M.P. Storm Drain To Be Relocated
Exist. 6" C.L. Water To Be Relocated
Exist. 6" C.A. Water To Be Relocated
2-12'x8' RCBC @ +0.4000%
2-12'x8' RCBC @ +0.4000%
Exist. 48" C.C. Water To Be Relocated
Exist. 18" C.M.P. Storm Drain To Be Relocated
Exist. 8" V.C.P. Sewer To Be Relocated
Exist. 66" V.C.P. Sewer
PVI Sta 102+06.40
Elev 2332.10
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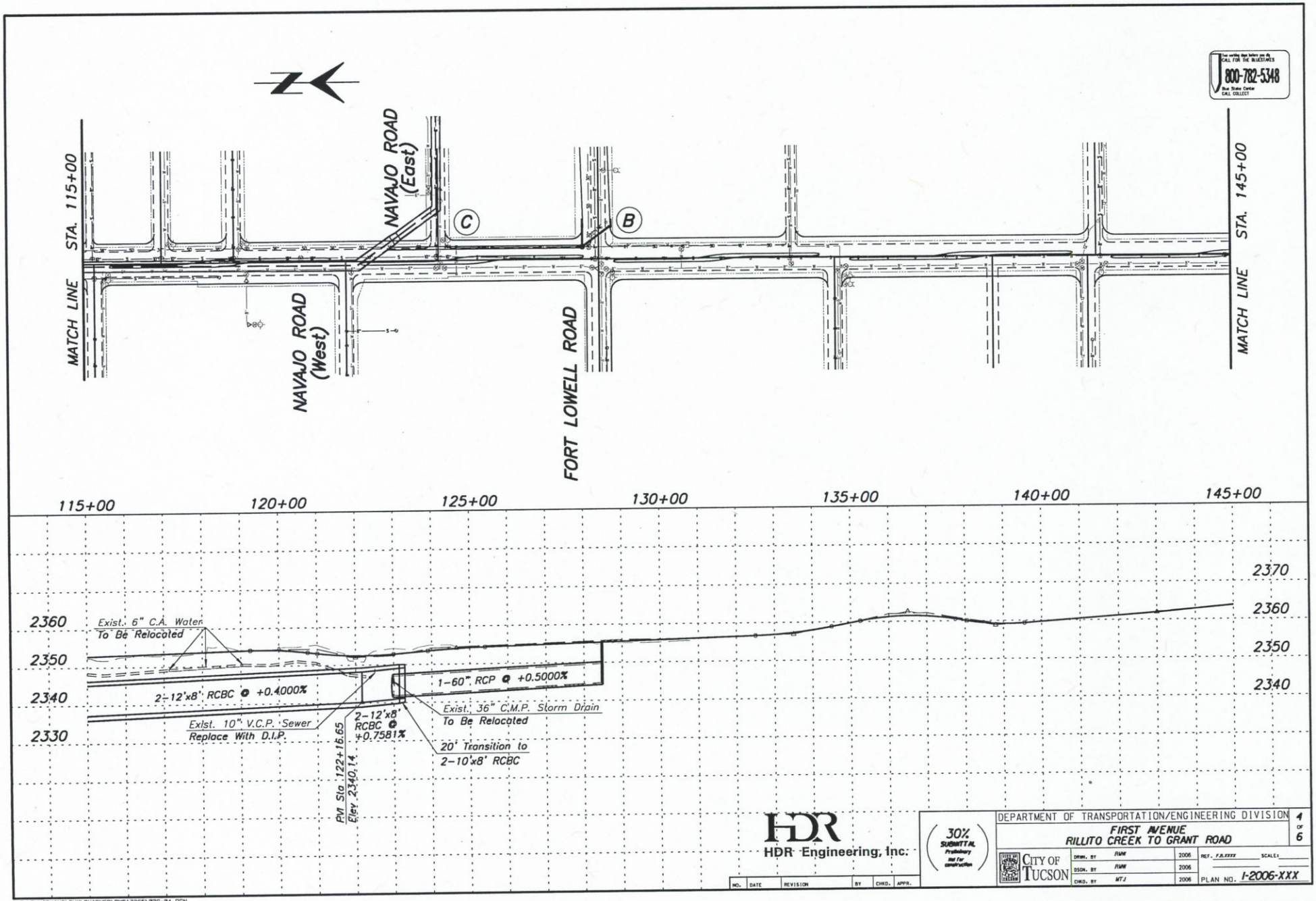

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MATCH LINE STA. 115+00
NAVAJO ROAD (East)
NAVAJO ROAD (West)
FORT LOWELL ROAD
C
B
MATCH LINE STA. 145+00
115+00
120+00
125+00
130+00
135+00
140+00
145+00
2370
2360
2350
2340
2330
Exist. 6" C.A. Water To Be Relocated
2-12'x8' RCBC @ +0.4000%
1-60" RCP @ +0.5000%
Exist. 36" C.M.P. Storm Drain To Be Relocated
Exist. 10" V.C.P. Sewer Replace With D.I.P.
2-12'x8' RCBC @ +0.7581%
20' Transition to 2-10'x8' RCBC
PVI Sta 122+16.65
Elev 2340.14
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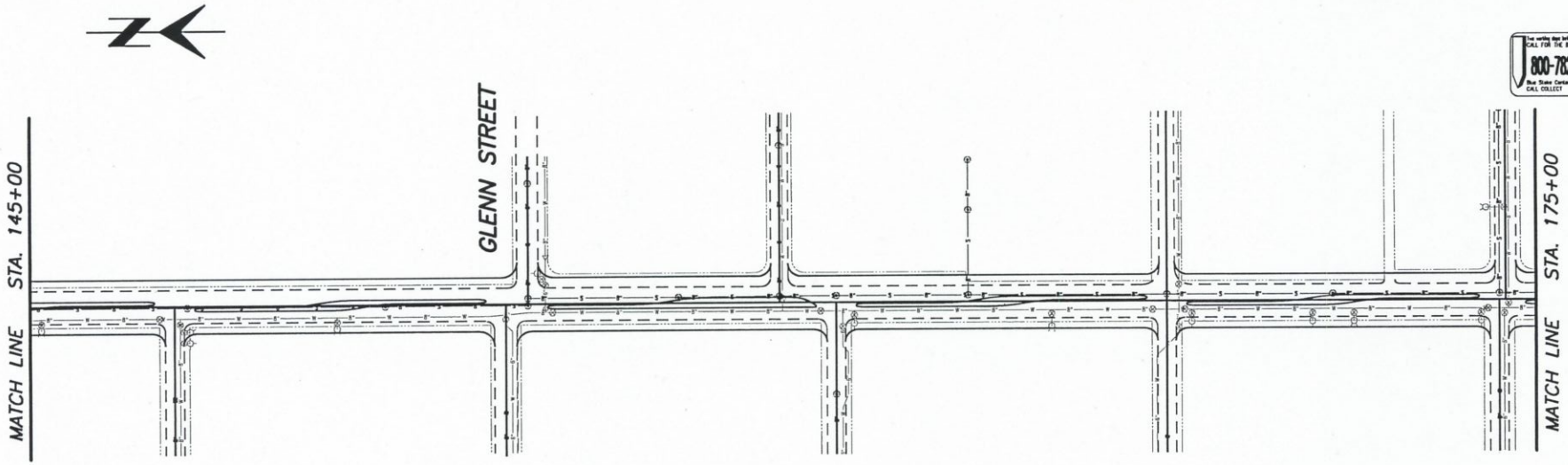

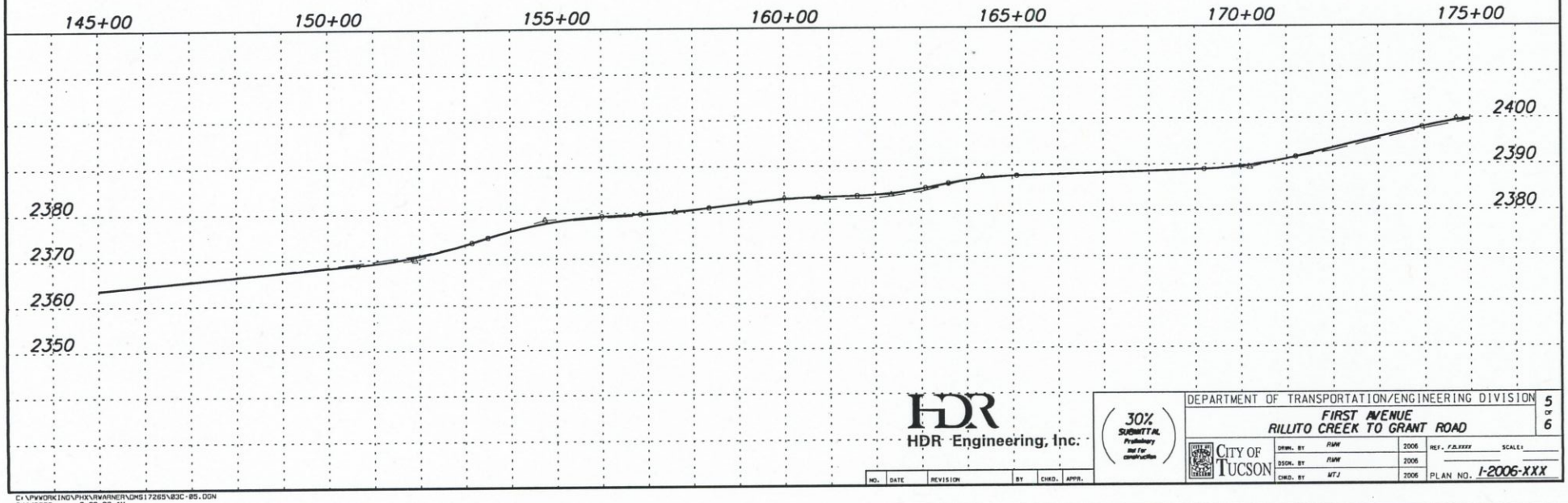

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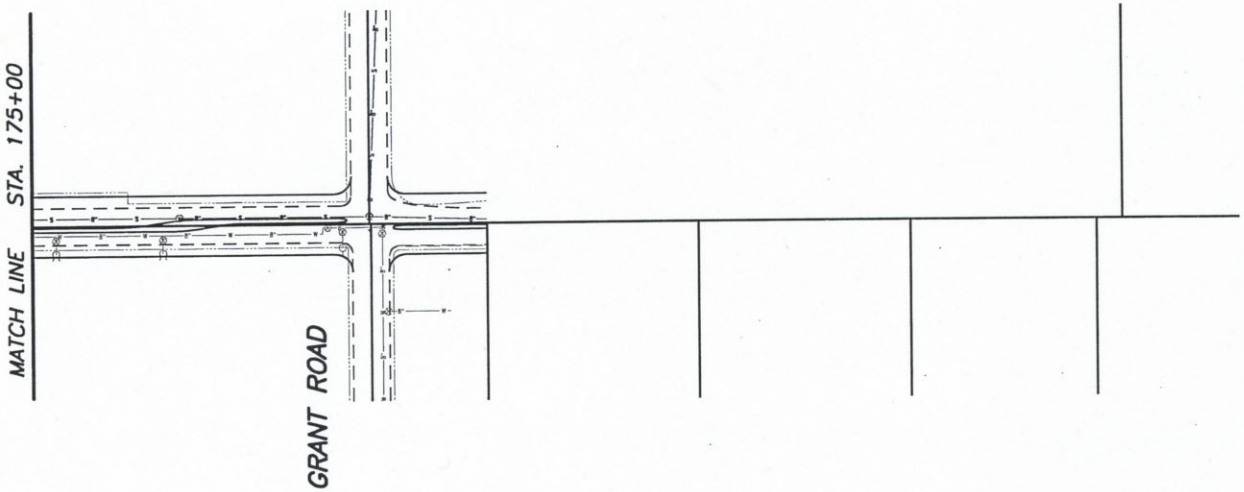

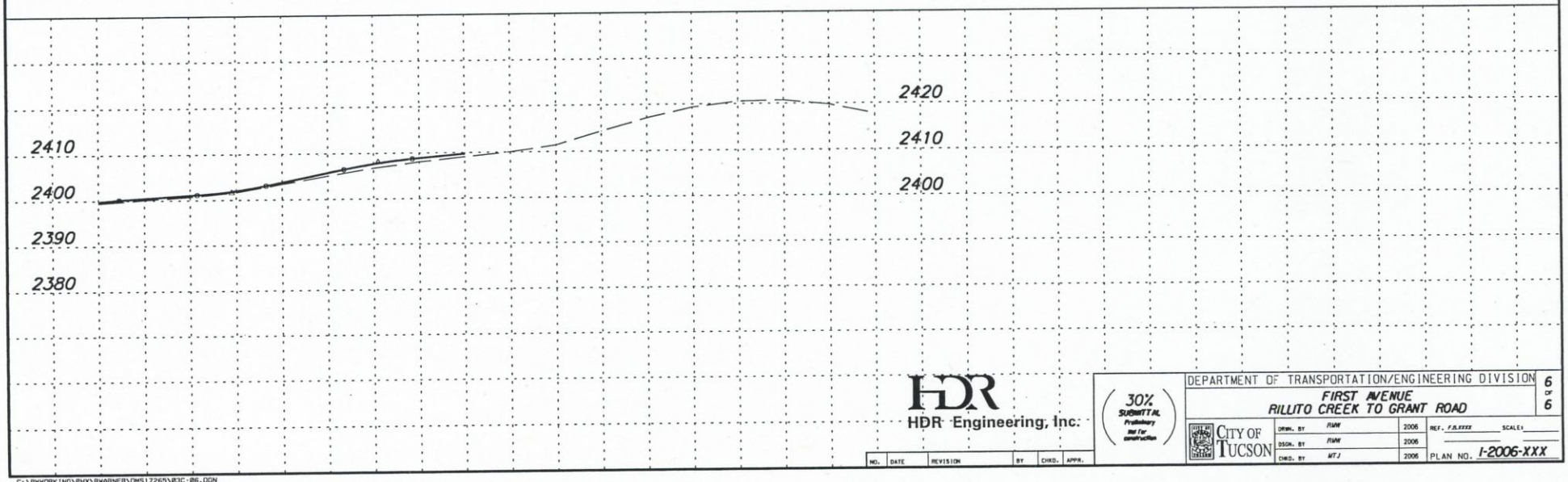

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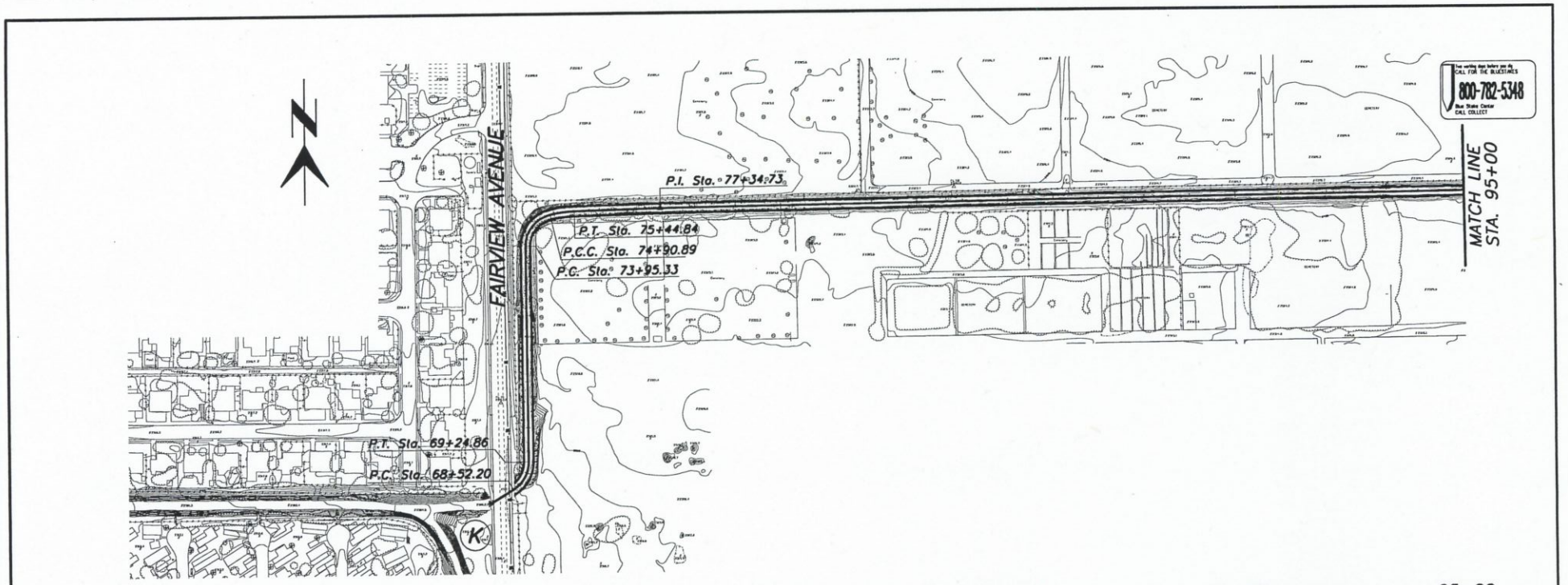

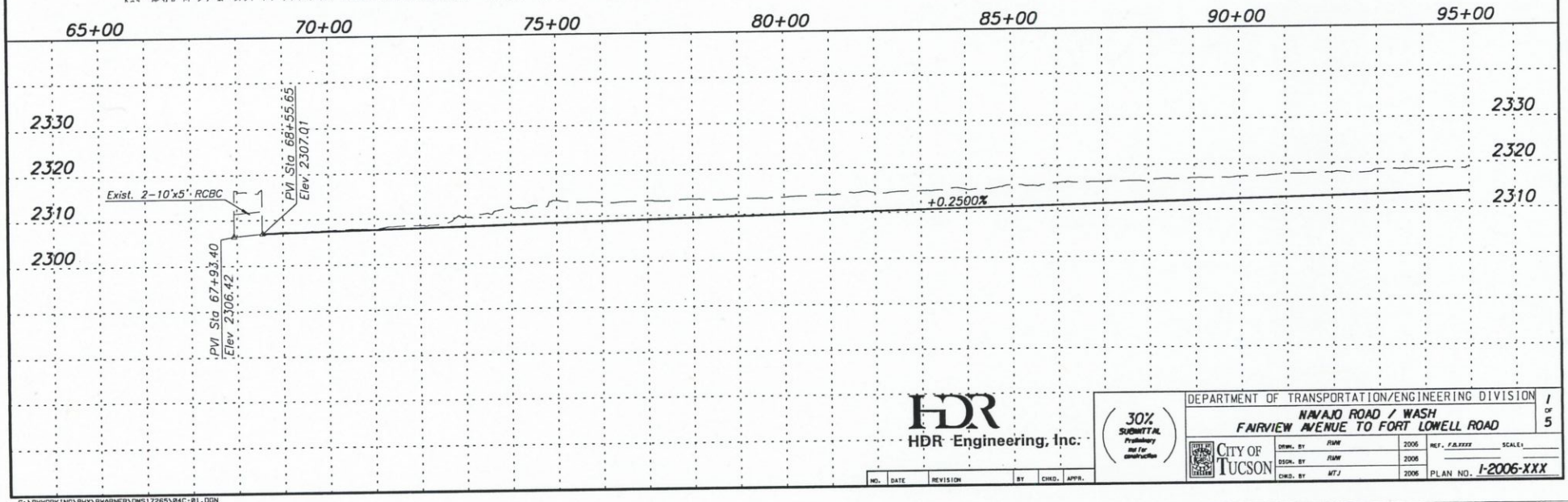

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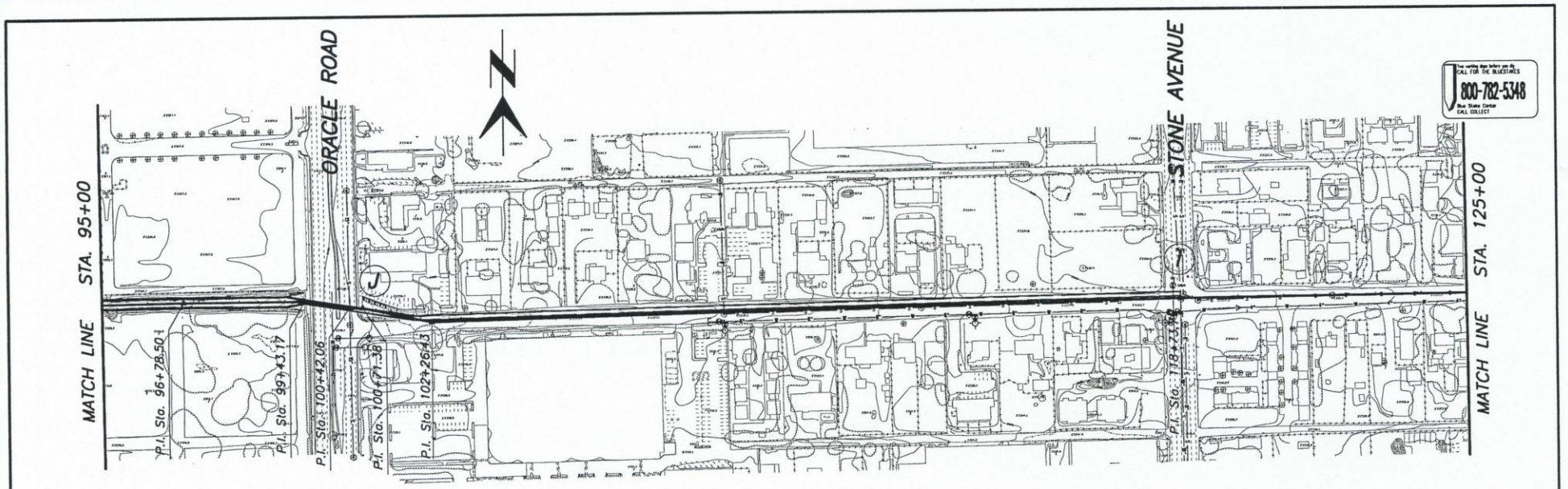

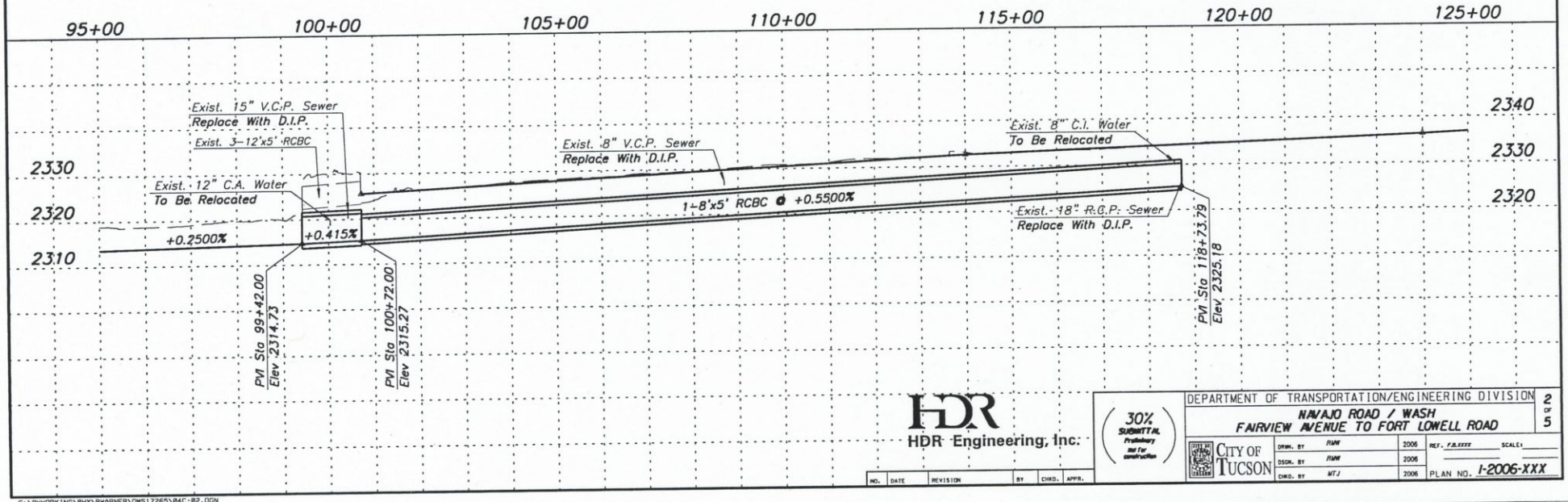

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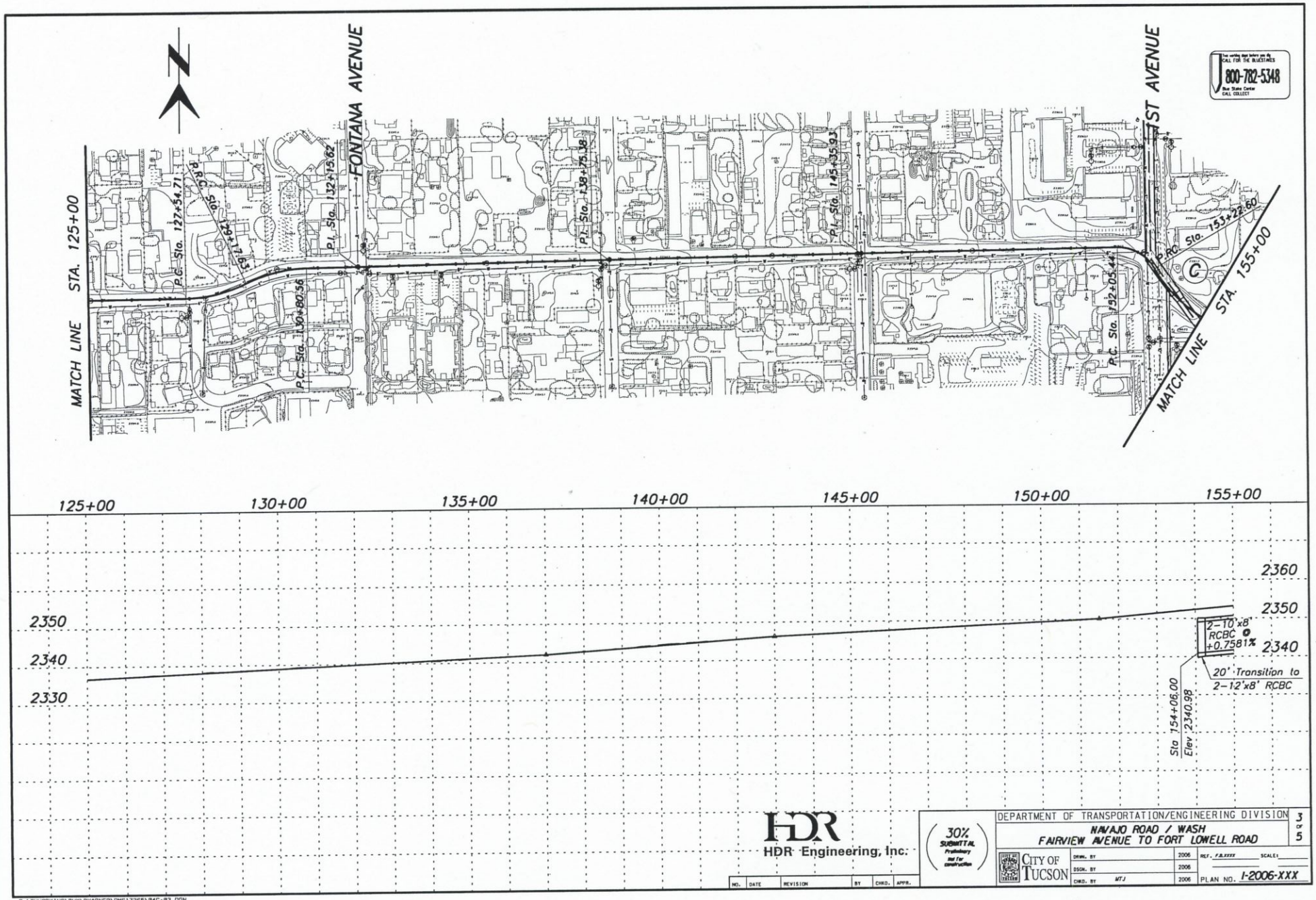
FONTANA AVENUE
ST AVENUE
MATCH LINE STA. 125+00
MATCH LINE STA. 155+00
P.C. Sta. 127+54.71
P.R.C. Sta. 129+17.63
P.C. Sta. 130+80.56
P.I. Sta. 132+15.62
P.I. Sta. 138+75.38
P.I. Sta. 145+35.93
P.C. Sta. 152+05.44
P.R.C. Sta. 153+22.60
125+00
130+00
135+00
140+00
145+00
150+00
155+00
2360
2350
2340
2330
2-10'x8' RCBC @ +0.7581%
20' Transition to 2-12'x8' RCBC
Sta 154+06.00
Elev 2340.98
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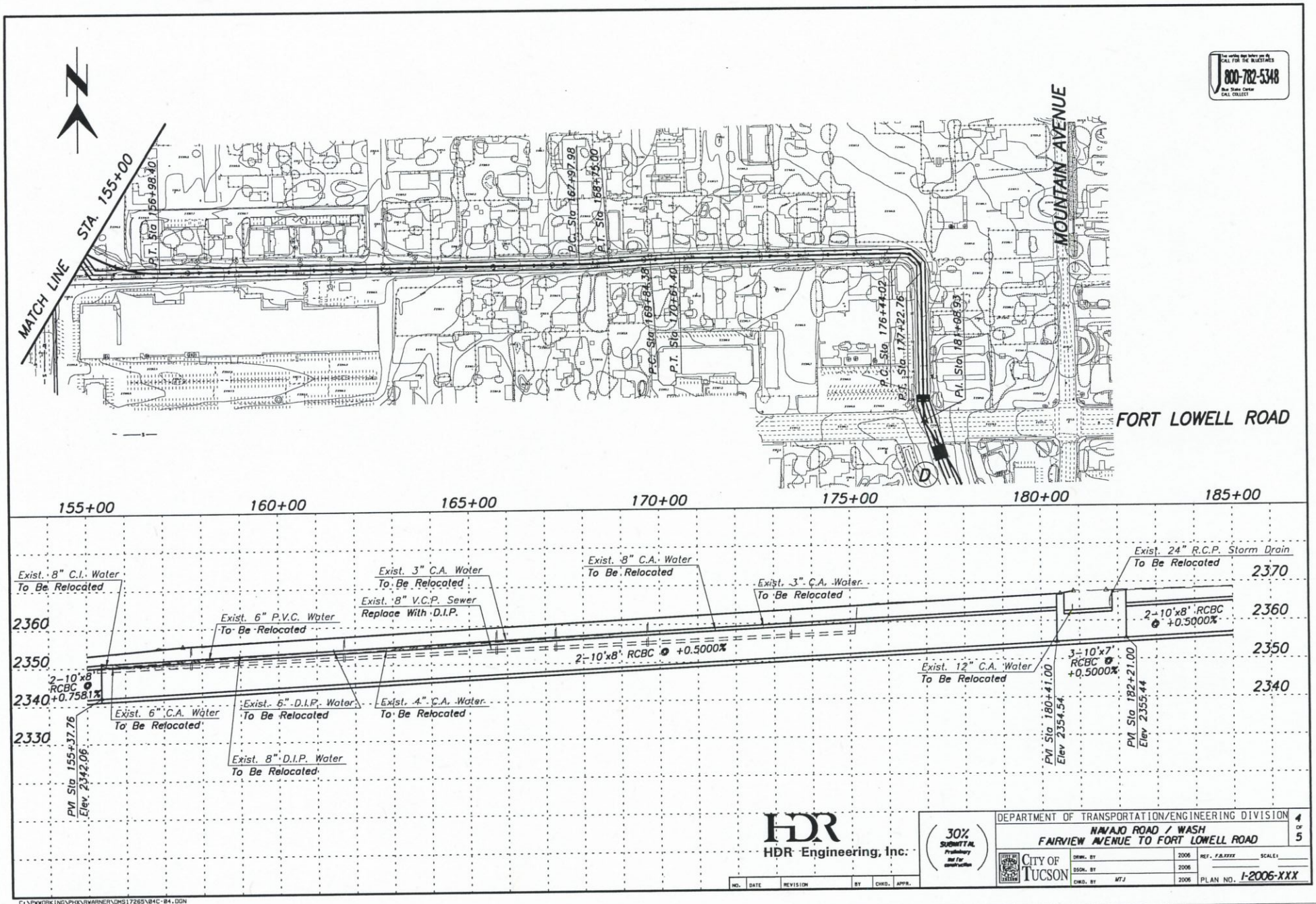

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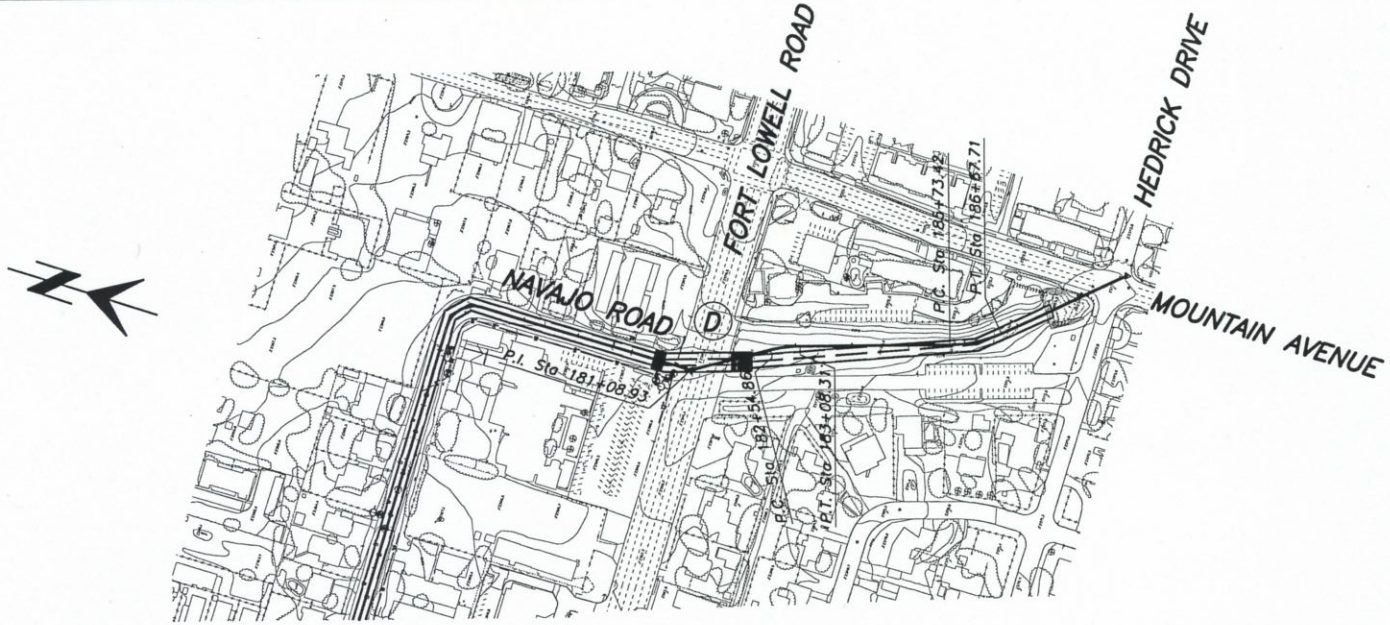

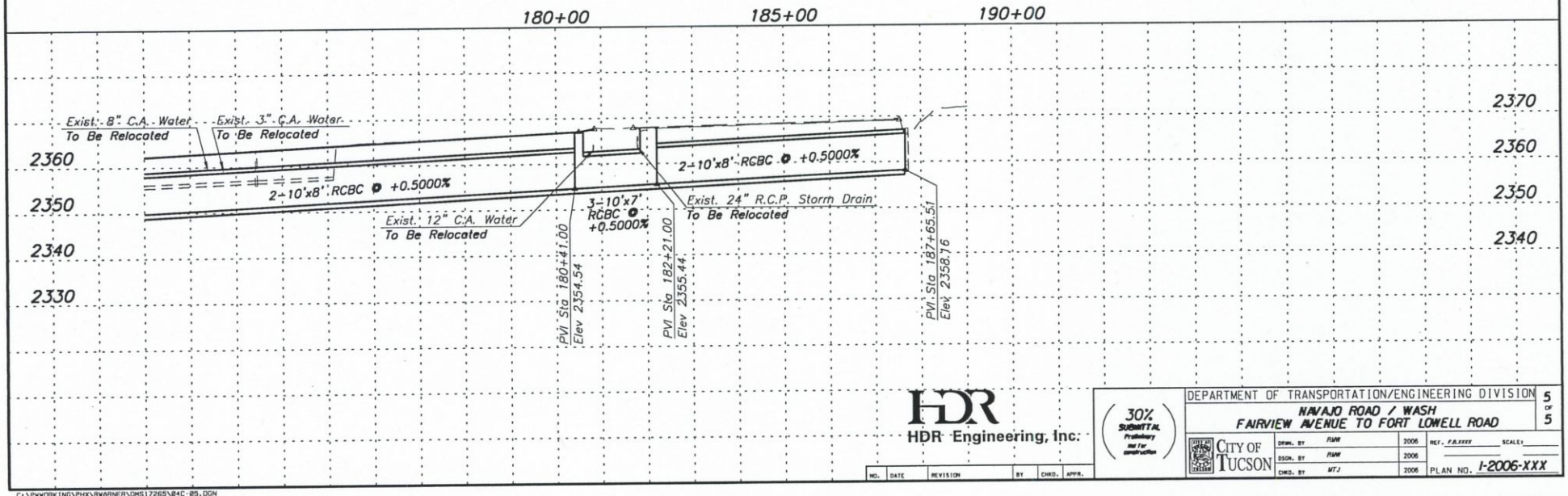

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Appendix 5c. Cost Calculations for Navajo Wash and First Avenue Scenarios

Appendix 5c. Cost Calculations for Navajo Wash and First Avenue Scenarios

Section 5. Cost Determination for Navajo Wash and First Avenue Scenarios
Summary

	Navajo Wash Scenario	First Avenue Scenario
1. Navajo Wash Downstream Channel Improvements	4.86	4.33
2. Navajo Wash Primary Storm Drain	17.73	3.56
3. Navajo Road Reconstruction	1.52	1.52
4. Arterial Crossing Reconstruction	0.44	0.44
5. Navajo Road Water & Sewer Relocation	1.40	0.61
6. First Avenue Primary Storm Drain	3.14	25.96
7. First Avenue Water & Sewer Relocation	0.36	1.09
	29.44	37.50
Costs are shown in $millions	Difference	8.06

Section 5. Cost Determination for Navajo Wash and First Avenue Scenarios
TSMS(6) -- 100 YEAR NAVAJO WASH SCENARIO COST ESTIMATE

Quantity	Units	Description	Unit Price	Total Amount	Total in $Millions
1. Navajo Wash Downstream Channel Improvements					
3150	LF	25' x 12' Concrete Channel	$1,285	$4,047,750	
		Contingency & Miscellaneous:	20%	809,550	
				$4,857,300	4.86
2. Navajo Wash Primary Storm Drain					
1875	LF	3 - 10' x 7' RCBC (3.394 CY/LF @ $600)	2,036	3,818,250	
6890	LF	3 - 8' x 7' RCBC (2.579 CY/LF @ $600)	1,547	10,661,586	
15	LF	24" RCP	125	1,875	
70	LF	36" RCP	150	10,500	
14	EA	Large Catch Basins	20,000	280,000	
				14,772,211	
		Contingency & Miscellaneous:	20%	2,954,442	
				$17,726,653	17.73
3. Navajo Road Reconstruction					
8,400	LF	36' Roadway w/curb & sidewalk	145	1,218,000	
		Contingency & Miscellaneous:	25%	304,500	
				$1,522,500	1.52
4. Arterial Crossing Reconstruction					
200	LF	Six-Lane Arterial Reconstuction	415	83,000	
600	LF	Five-Lane Arterial Reconstuction	350	210,000	
				293,000	
		Contingency & Miscellaneous:	50%	146,500	
				$439,500	0.44
5. Navajo Road Water & Sewer Relocation					
1090	LF	4" PVC Water Line	60	65,400	
3040	LF	6" PVC Water Line	75	228,000	
80	LF	6" DIP Water Line	80	6,400	
1125	LF	8" PVC Water Line	100	112,500	
80	LF	8" DIP Water Line	125	10,000	
245	LF	12" PVC Water Line	160	39,200	
120	LF	48" CCP Water Line	600	72,000	
3	EA	4" Water Valves	1,000	3,000	
8	EA	6" Water Valves	1,400	11,200	
7	EA	8" Water Valves	2,000	14,000	
1250	LF	6" PVC Sewer Line	60	75,000	
4830	LF	8" PVC Sewer Line	75	362,250	
70	LF	10" DIP Sewer Line	150	10,500	
55	LF	15" DIP Sewer Line	250	13,750	
50	LF	18" DIP Sewer Line	300	15,000	
25	EA	Sewer Manholes	5,000	125,000	
				1,163,200	
		Contingency & Miscellaneous:	20%	232,640	
				$1,395,840	1.40

Section 5. Cost Determination for Navajo Wash and First Avenue Scenarios
TSMS(6) -- 100 YEAR NAVAJO WASH SCENARIO COST ESTIMATE

Quantity	Units	Description	Unit Price	Total Amount	Total in $Millions
6. First Avenue Primary Storm Drain					
1240	LF	1 - 10' x 7' RCBC (1.343CY/LF @ $600)	$806	$999,192	
3970	LF	72" RCP	400	1,588,000	
130	LF	18" RCP	100	13,000	
75	LF	48" RCP	200	15,000	
				$2,615,192	
		Contingency & Miscellaneous:	20%	523,038	
				$3,138,230	3.14
7. First Avenue Water & Sewer Relocation					
550	LF	4" PVC Water Line	60	33,000	
410	LF	6" PVC Water Line	75	30,750	
140	LF	6" DIP Water Line	75	10,500	
470	LF	8" PVC Water Line	100	47,000	
100	LF	48" CCP Water Line	600	60,000	
7	EA	4" Water Valves	1,000	7,000	
6	EA	6" Water Valves	1,400	8,400	
6	EA	8" Water Valves	2,000	12,000	
30	LF	6" DIP Sewer Line	100	3,000	
55	LF	18" DIP Sewer Line	600	33,000	
330	LF	8" DIP Sewer Line	125	41,250	
30	LF	30" DIP Sewer Line	600	18,000	
				$303,900	
		Contingency & Miscellaneous:	20%	60,780	
				$364,680	0.36
				Total for Scenario:	29.44

Section 5. Cost Determination for Navajo Wash and First Avenue Scenarios
TSMS(7) -- 100 YEAR FIRST AVENUE SCENARIO COST ESTIMATE

Quantity	Units	Description	Unit Price	Total Amount	Total in $Millions
1. Navajo Wash Downstream Channel Improvements					
3,150	LF	20' x 12' Concrete Channel	$1,145	$3,606,750	
		Contingency & Miscellaneous:	20%	721,350	
				$4,328,100	4.33
2. Navajo Wash Primary Storm Drain					
1,875	LF	1 - 8' x 5' RCBC (.976 CY/LF @ $600)	586	1,098,000	
3,970	LF	72" RCP	400	1,588,000	
15	LF	24" RCP	125	1,875	
14	EA	Large Catch Basins	20,000	280,000	
				2,967,875	
		Contingency & Miscellaneous:	20%	593,575	
				$3,561,450	3.56
3. Navajo Road Reconstruction					
8,400	LF	36' Roadway w/curb & sidewalk	145	1,218,000	
		Contingency & Miscellaneous:	25%	304,500	
				$1,522,500	1.52
4. Arterial Crossing Reconstruction					
200	LF	Six-Lane Arterial Reconstuction	415	83,000	
600	LF	Five-Lane Arterial Reconstuction	350	210,000	
				293,000	
		Contingency & Miscellaneous:	50%	146,500	
				$439,500	0.44
5. Navajo Road Water & Sewer Relocation					
780	LF	4" PVC Water Line	60	46,800	
800	LF	6" PVC Water Line	75	60,000	
80	LF	6" DIP Water Line	80	6,400	
900	LF	8" PVC Water Line	100	90,000	
80	LF	8" DIP Water Line	125	10,000	
220	LF	12" PVC Water Line	160	35,200	
3	EA	4" Water Valves	1,000	3,000	
2	EA	6" Water Valves	1,400	2,800	
5	EA	8" Water Valves	2,000	10,000	
1	EA	12" Water Valves	3,000	3,000	
1,995	LF	8" PVC Sewer Line	75	149,625	
30	LF	8" DIP Sewer Line	125	3,750	
30	LF	15" DIP Sewer Line	250	7,500	
30	LF	18" PVC Sewer Line	250	7,500	
14	EA	Sewer Manholes	5,000	70,000	
				505,575	
		Contingency & Miscellaneous:	20%	101,115	
				$606,690	0.61

Section 5. Cost Determination for Navajo Wash and First Avenue Scenarios
TSMS(7) -- 100 YEAR FIRST AVENUE SCENARIO COST ESTIMATE

Quantity	Units	Description	Unit Price	Total Amount	Total in $Millions
6. First Avenue Primary Storm Drain					
870	LF	1 - 16' x 8' RCBC	$1,356	$1,179,333	
1,240	LF	2 - 16' x 8' RCBC	2,478	3,072,444	
6,190	LF	2 - 12' x 8' RCBC (3.282 CY/LF @ $600)	1,969	12,189,348	
3,445	LF	2 - 10' x 8' RCBC (2.474 @ $600)	1,484	5,113,758	
330	LF	18" RCP	100	33,000	
70	LF	36" RCP	150	10,500	
160	LF	48" RCP	200	32,000	
				$21,630,384	
		Contingency & Miscellaneous:	20%	4,326,077	
				$25,956,461	25.96
7. First Avenue Water & Sewer Relocation					
280	LF	4" PVC Water Line	60	16,800	
2,715	LF	6" PVC Water Line	75	203,625	
615	LF	8" PVC Water Line	100	61,500	
70	LF	24" CCP Water Line	400	28,000	
120	LF	36" CCP Water Line	500	60,000	
125	LF	48" CCP Water Line	600	75,000	
3	EA	4" Water Valves	1,000	3,000	
11	EA	6" Water Valves	1,400	15,400	
5	EA	8" Water Valves	2,000	10,000	
2,510	LF	8" PVC Sewer Line	75	188,250	
45	LF	8" DIP Sewer Line	125	5,625	
70	LF	10" DIP Sewer Line	150	10,500	
230	LF	18" PVC Sewer Line	200	46,000	
55	LF	18" DIP Sewer Line	300	16,500	
95	LF	24" DIP Sewer Line	400	38,000	
45	LF	27" DIP Sewer Line	500	22,500	
60	LF	30" DIP Sewer Line	600	36,000	
14	EA	Sewer Manholes	5,000	70,000	
				$906,700	
		Contingency & Miscellaneous:	20%	181,340	
				$1,088,040	1.09
				Total for Scenario:	37.50

Section 5. Cost Determination for Navajo Wash and First Avenue Scenarios
Develop of Unit Costs for Roadway Reconstruction

Assumed Pavement Structure--

	Navajo	Arterials
AC:	3	6
AB:	4	12

Unit Costs--

Weigth of AC:	145 lb/cu ft	=	1.9575	ton/cy
Cost of AC per Harrison Road Estimate:	$80 per ton	=	156.60	per cy
		=	$0.48	per sf in
Cost of AB per Harrison Road Estimate:	$40 per cy	=	$0.12	per sf in

Cost of Pavement per SF--

	Navajo	Arterials
AC:	1.45	2.90
AB:	0.49	1.48
	1.94	4.38

Grading:	$1.00	per sy
6" Type 2 Curb per Harrison Road Estimate:	$12.00	per lf
Sidewalk per Harrison Road Estimate:	$4.00	per sf

Unit Cost of Navajo Road Reconstruction

Width/Cost per lf of Paving:	36	69.98
Width/Cost per lf of Grading:	60	6.67
Type 2 Curb both sides:	2	24.00
5' sidewalks both sides:	10	40.00
Total Cost of Navajo per lf:		140.64

Arterial Roadway Reconstruction

Oracle Road

Pavement Width/Cost:	80	350.52
Grading Width/Cost:	120	13.33
Number of Curbs/Cost:	4	48.00
sf of sidewalk/Cost:	10	40.00
	Total cost/lf:	411.85

Stone, First, and Fort Lowell

Pavement Width/Cost:	72	315.47
Grading Width/Cost:	90	10.00
Number of Curbs/Cost:	2	24.00
sf of sidewalk/Cost:	10	40.00
	Total cost/lf:	349.47

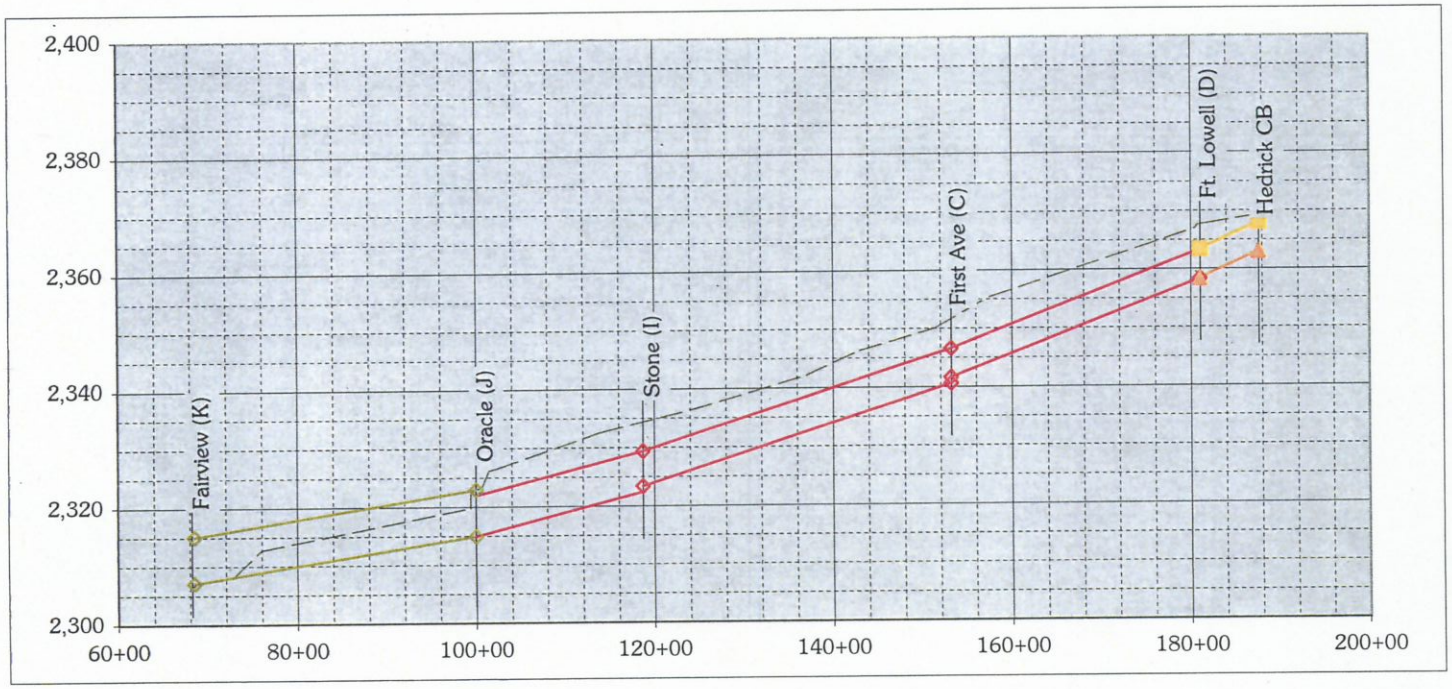
Appendix 6a. TSMS(8) -- 10-year Storm Drain Sizing Calculations

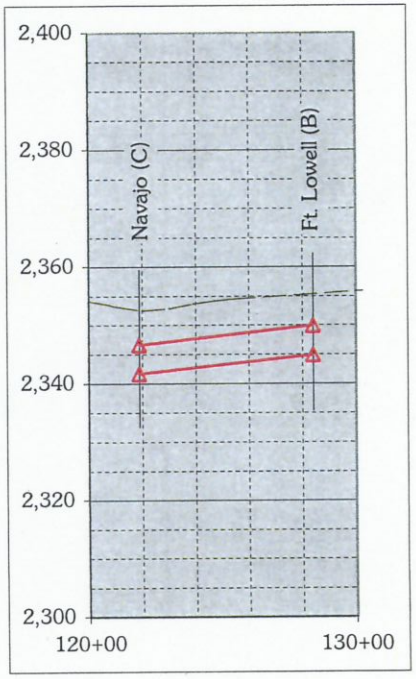
APPENDIX 6a.
TSMS(8) -- 10-YEAR STORM DRAIN SIZING

n: .016

Starting Invert: 2,307.00

Reach		Proj Sta	Grnd Elev	Q100	Exst Street Cap	Needed in SD or	nCls	B	D	So	A	P	R	Qcap	Excess Cap	L	Crown	Inv	Cover
JK	Fairview	68+49.26	2,306.71	1,144		1,144	Chnl	15.00	8.00	.0025	120.0	31.0	3.87	1,378	+234	3,151	2,315.00	2,307.00	
	Oracle	100+00.00	2,322.85														2,322.88	2,314.88	
IJ	Oracle	100+00.00	2,322.85	869		869	2	8.00	7.00	.0040	112.0	60.0	1.87	1,000	+131	1,874	2,321.88	2,314.88	
	Stone	118+73.79	2,334.31														2,329.37	2,322.37	4.94
CI	Stone	118+73.79	2,334.31	772		772	2	8.00	6.00	.0050	96.0	56.0	1.71	905	+133	3,449	2,329.37	2,323.37	
	First Ave	153+22.60	2,351.59														2,346.62	2,340.62	4.98
DC	First Ave	153+22.60	2,351.59	720		720	2	8.00	5.00	.0060	80.0	52.0	1.54	769	+49	2,786	2,346.62	2,341.62	
	Ft. Lowell	181+08.93	2,367.67														2,363.33	2,358.33	4.33
	Ft. Lowell	181+08.93	2,367.67	720		720	2	8.00	5.00	.0070	80.0	52.0	1.54	831	+111	657	2,363.33	2,358.33	
	Hedrick	187+65.51	2,367.16														2,367.93	2,362.93	-0.77
																Existing CB Inv:		2,358.16	
BC	Navajo	121+90.00	2,352.49	91		91	1	--	5.00	.0050	19.6	15.7	1.25	150	+59	650	2,346.62	2,341.62	
	Ft. Lowell	128+40.00	2,355.36														2,349.87	2,344.87	5.49





APPENDIX 6b. TSMS(8) 10-Year Street Flow/Storm Drain Routing Data

B	D	nCls	So	n	L
--	5.00	1	.0050	.016	650

Type	A	P	R	Qcap
RCP	19.6	15.7	1.25	150
			Check Vol:	0.29

```
1 SD_BC
1 Navajo Wash Scenario
1
1
1   *
1   KK DT_B
1   KM      Navajo Wash Scenario
1   * Divert Capacity of storm drain (150.0 cfs).  Save temporarily as divB
1   * Storm Drain is RCP  D=5.0  nCls=1 So=.0050  n=.016  L=650
1   DT divB
1   DI   0.0   150.0   10000
1   DQ   0.0   150.0   150.0
1   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
1   *
1   KK SF_BC
1   KM First Avenue, Ft. Lowell to Navajo Road
1   * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
1   * Half Parkway W=7.0  Sx=.020  n=.025
1   * L=440  So=.0030
1   RS     1    FLOW      -1
1   SV     0    .126    .217    .415    .556   1.061   1.566   2.576   3.081
1   SQ     0      30      59     134     183     532    1013    2316    3119
1   SE     0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
1   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
1   *
1   * Recall  divB
1   KK DR_B
1   KM      Navajo Wash Scenario
1   DR  divB
1   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
1   *
1   * Route storm drain flow.
1   KK SD_BC
1   KM     Navajo Wash Scenario
1   RS     1    FLOW      -1
1   SV     0     .02     .06     .10     .15     .19     .24     .27     .29
1   SQ     0       2      10      21      35      50      64      73     150
1   SE     0    0.63    1.25    1.88    2.50    3.13    3.75    4.38    5.00
1   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

Hydraulics		
d	an	qn
--	--	--
0.63	1.4	2
1.25	3.8	10
1.88	6.7	21
2.50	9.8	35
3.13	12.9	50
3.75	15.8	64
4.38	18.2	73
5.00	19.6	150

HEC1 Data		
SE	SQ	SV
0.00	0	0
0.63	2	.02
1.25	10	.06
1.88	21	.10
2.50	35	.15
3.13	50	.19
3.75	64	.24
4.38	73	.27
5.00	150	.29

APPENDIX 6b. TSMS(8) 10-Year Street Flow/Storm Drain Routing Data

```
2 SD_DC
2 Navajo Wash Scenario
2
2       B       D      nCls     So       n       L
2     8.00    5.00     2      .0060    .016    2786
2
2   *
2   KK DT_D
2   KM        Navajo Wash Scenario
2   * Divert Capacity of storm drain (769.1 cfs).  Save temporarily as divD
2   * Storm Drain is RCBC B=8.0  D=5.0  nCls=2 So=.0060  n=.016  L=2786
2   DT divD
2   DI    0.0    769.1    10000
2   DQ    0.0    769.1    769.1
2   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
2   *
2   KK SF_DC
2   KM Navajo Wash, Ft. Lowell to First Ave
2   * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
2   * Half Parkway W=12.0  Sx=.020  n=.025
2   * L=2780  So=.0050
2   RS     1    FLOW      -1
2   SV     0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
2   SQ     0      32      85     177     292     764    1693    2263    2897
2   SE     0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
2   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
2   *
2   * Recall  divD
2   KK DR_D
2   KM        Navajo Wash Scenario
2   DR  divD
2   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
2   *
2   * Route storm drain flow.
2   KK SD_DC
2   KM       Navajo Wash Scenario
2   RS     1    FLOW      -1
2   SV     0     .64    1.28    1.92    2.56    3.20    3.84    4.48    5.12
2   SQ     0      48     140     255     385     525     672     825     769
2   SE     0    0.63    1.25    1.88    2.50    3.13    3.75    4.38    5.00
2   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

Type	A	P	R	Qcap
RCBC	80.0	52.0	1.54	769
			Check Vol:	5.12

Hydraulics		
d	an	qn
--	--	--
0.63	10.0	48
1.25	20.0	140
1.88	30.0	255
2.50	40.0	385
3.13	50.0	525
3.75	60.0	672
4.38	70.0	825
5.00	80.0	769

HEC1 Data		
SE	SQ	SV
0.00	0	0
0.63	48	.64
1.25	140	1.28
1.88	255	1.92
2.50	385	2.56
3.13	525	3.20
3.75	672	3.84
4.38	825	4.48
5.00	769	5.12

APPENDIX 6b. TSMS(8) 10-Year Street Flow/Storm Drain Routing Data

```
3 SD_CI
3 Navajo Wash Scenario
3
3      B       D      nCls     So       n       L
3    8.00    6.00      2     .0050    .016    3449
3
3    *
3    KK DT_C
3    KM       Navajo Wash Scenario
3    * Divert Capacity of storm drain (905.5 cfs).  Save temporarily as divC
3    * Storm Drain is RCBC B=8.0  D=6.0  nCls=2 So=.0050  n=.016  L=3449
3    DT divC
3    DI   0.0   905.5   10000
3    DQ   0.0   905.5   905.5
3    * -----+-------+-------+-------+-------+-------+-------+-------+-------+
3    *
3    KK SF_CI
3    KM Navajo Wash, First Ave to Stone Ave
3    * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
3    * Half Parkway W=12.0  Sx=.020  n=.025
3    * L=3450  So=.0045
3    RS     1    FLOW      -1
3    SV     0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
3    SQ     0      30      81     168     277     725    1606    2147    2748
3    SE     0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
3    * -----+-------+-------+-------+-------+-------+-------+-------+-------+
3    *
3    * Recall  divC
3    KK DR_C
3    KM       Navajo Wash Scenario
3    DR  divC
3    * -----+-------+-------+-------+-------+-------+-------+-------+-------+
3    *
3    * Route storm drain flow.
3    KK SD_CI
3    KM      Navajo Wash Scenario
3    RS     1    FLOW      -1
3    SV     0     .95    1.90    2.85    3.80    4.75    5.70    6.65    7.60
3    SQ     0      58     167     302     453     614     782     955     905
3    SE     0    0.75    1.50    2.25    3.00    3.75    4.50    5.25    6.00
3    * -----+-------+-------+-------+-------+-------+-------+-------+-------+
```

Type	A	P	R	Qcap
RCBC	96.0	56.0	1.71	905
			Check Vol:	7.60

Hydraulics		
d	an	qn
--	--	--
0.75	12.0	58
1.50	24.0	167
2.25	36.0	302
3.00	48.0	453
3.75	60.0	614
4.50	72.0	782
5.25	84.0	955
6.00	96.0	905

HEC1 Data		
SE	SQ	SV
0.00	0	0
0.75	58	.95
1.50	167	1.90
2.25	302	2.85
3.00	453	3.80
3.75	614	4.75
4.50	782	5.70
5.25	955	6.65
6.00	905	7.60

APPENDIX 6b. TSMS(8) 10-Year Street Flow/Storm Drain Routing Data

B	D	nCls	So	n	L
8.00	7.00	2	.0040	.016	1873

Type	A	P	R	Qcap
RCBC	112.0	60.0	1.87	1,000
			Check Vol:	4.82

```
4 SD_IJ
4 Navajo Wash Scenario
4
4
4
4   *
4   KK DT_I
4   KM      Navajo Wash Scenario
4   * Divert Capacity of storm drain (1,000.1 cfs).  Save temporarily as divI
4   * Storm Drain is RCBC B=8.0  D=7.0  nCls=2 So=.0040  n=.016  L=1873
4   DT divI
4   DI   0.0  1000.1   10000
4   DQ   0.0  1000.1  1000.1
4   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
4   *
4   KK SF_IJ
4   KM Navajo Wash, Stone Ave to Oracle Road
4   * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
4   * Half Parkway W=12.0  Sx=.020  n=.025
4   * L=1870  So=.0037
4   RS     1    FLOW      -1
4   SV     0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
4   SQ     0      27      73     152     251     657    1457    1947    2492
4   SE     0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
4   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
4   *
4   * Recall  divI
4   KK DR_I
4   KM      Navajo Wash Scenario
4   DR  divI
4   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
4   *
4   * Route storm drain flow.
4   KK SD_IJ
4   KM     Navajo Wash Scenario
4   RS     1    FLOW      -1
4   SV     0     .60    1.20    1.81    2.41    3.01    3.61    4.21    4.82
4   SQ     0      66     188     336     500     674     855    1040    1000
4   SE     0    0.88    1.75    2.63    3.50    4.38    5.25    6.13    7.00
4   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

Hydraulics		
d	an	qn
--	--	--
0.88	14.0	66
1.75	28.0	188
2.63	42.0	336
3.50	56.0	500
4.38	70.0	674
5.25	84.0	855
6.13	98.0	1040
7.00	112.0	1000

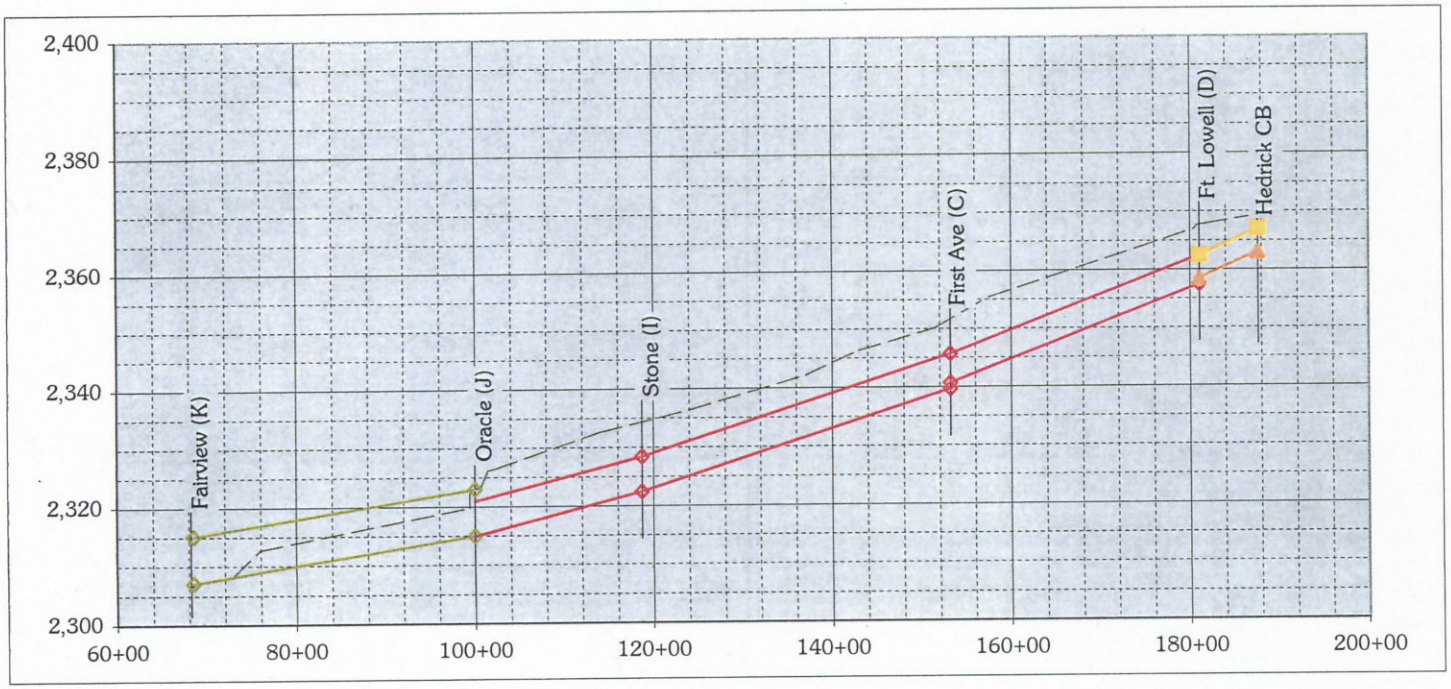
HEC1 Data		
SE	SQ	SV
0.00	0	0
0.88	66	.60
1.75	188	1.20
2.63	336	1.81
3.50	500	2.41
4.38	674	3.01
5.25	855	3.61
6.13	1040	4.21
7.00	1000	4.82

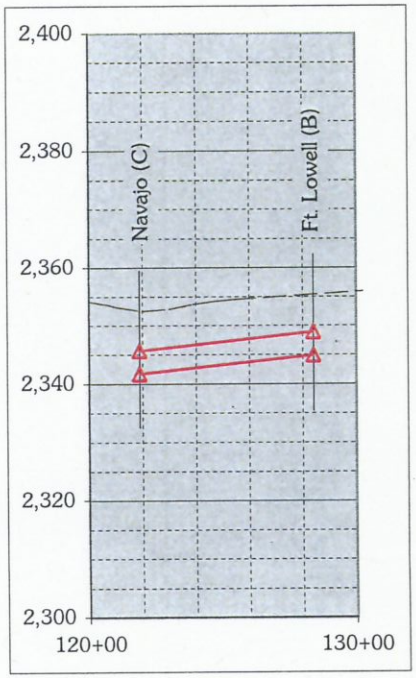
APPENDIX 6c.
TSMS(9) -- 2-YEAR STORM DRAIN SIZING
Navajo Wash Storm Drain and Downstream Channel Improvements

n: .016

Starting Invert: 2,307.00

Reach		Proj Sta	Grnd Elev	Q100	Exst Street Cap	Needed in SD or	nCls	B	D	So	A	P	R	Qcap	Excess Cap	L	Crown	Inv	Cover
JK	Fairview	68+49.26	2,306.71	713		713	Chnl	25.00	8.00	.0025	200.0	41.0	4.88	2,679	+1,966	3,151	2,315.00	2,307.00	
	Oracle	100+00.00	2,322.85														2,322.88	2,314.88	
IJ	Oracle	100+00.00	2,322.85	313		313	2	--	6.00	.0040	56.5	37.7	1.50	436	+123	1,874	2,320.88	2,314.88	
	Stone	118+73.79	2,334.31														2,328.37	2,322.37	5.94
CI	Stone	118+73.79	2,334.31	163		163	1	--	6.00	.0050	28.3	18.8	1.50	244	+81	3,449	2,328.37	2,322.37	
	First Ave	153+22.60	2,351.59														2,345.62	2,339.62	5.98
DC	First Ave	153+22.60	2,351.59	88		88	1	--	5.00	.0060	19.6	15.7	1.25	164	+76	2,786	2,345.62	2,340.62	
	Ft. Lowell	181+08.93	2,367.67														2,362.33	2,357.33	5.33
	Ft. Lowell	181+08.93	2,367.67	49		49	1	--	4.00	.0070	12.6	12.6	1.00	98	+49	657	2,362.33	2,358.33	
	Hedrick	187+65.51	2,367.16														2,366.93	2,362.93	0.23
																Existing CB Inv:		2,358.16	
BC	Navajo	121+90.00	2,352.49	39		39	1	--	4.00	.0050	12.6	12.6	1.00	83	+44	650	2,345.62	2,341.62	
	Ft. Lowell	128+40.00	2,355.36														2,348.87	2,344.87	6.49





Appendix 6c
TSMS(8) 10-YEAR MODELING -- Navajo Wash Scenario
Future Street Flow and 10-year Storm Drain Routing in Place
Data and results common to TSMS(3) not printed here.

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
*  RUN DATE  07/25/2006  TIME  15:12:59 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
1                                    HEC-1 INPUT                                                PAGE  1

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           1          ID   Appendix U
           2          ID   TSMS(8)used to resize Navajo Wash Scenario storm drains for 10-year storm
                      * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
                      *
                      *DIAGRAM
                      * Curve numbers for Basin DG are based on PB = 3.131 corresponding to POC_K
                      * and are slightly inaccurate for other precipitation values.  CNs for Basin GR
                      * are based on PB = 3.60.
                      *
                      * -- TSMS(8) --
                      * This model was used to determine existing discharges along Navajo wash for a
                      * range of return frequencies.  As with other TSMS runs, only PB has
                      * been changed.  CNs remain constant leading to slightly erroneous results The
                      * PBs used for various runs follows:
                      *
                      *            Trib          100     50     25     10      5      2
```

```
* POC Reach  Area   ARF    Year   Year   Year   Year   Year   Year
*  A   --    .274  1.000  3.600  3.240  2.760  2.280  1.800  1.320
*  B   BC    .107  1.000  3.600  3.240  2.760  2.280  1.800  1.320
*  D   DC   3.017   .935  3.367  3.030  2.581  2.133  1.684  1.235
*  C   CI   3.178   .931  3.350  3.015  2.569  2.122  1.675  1.228
*  I   IJ   3.359   .926  3.332  2.999  2.555  2.110  1.666  1.222
*  J   JK   3.904   .911  3.280  2.952  2.514  2.077  1.640  1.203
*  K   --   5.554   .873  3.143  2.829  2.410  1.991  1.572  1.153
*  E   EF    .192  1.000  3.600  3.240  2.760  2.280  1.800  1.320
*  F   FG    .125  1.000  3.600  3.240  2.760  2.280  1.800  1.320
*  G   GH    .317  1.000  3.600  3.240  2.760  2.280  1.800  1.320
*  H   --    .495  1.000  3.600  3.240  2.760  2.280  1.800  1.320
IT       1                    300
IO       5
* -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
*

KK   S0010
KM        RUNOFF FROM SUBBASIN S0010
IN       1
PB   1.991

*
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

721           KK       A
722           KM      Off-Site flow at First Avenue and Blacklidge (Cemetary Wash)
723           DR   POC_A

724           KK       x
725           HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

726           KK       B
727           KM      Off-Site flow at First Avenue and Ft Lowell
728           DR   POC_B
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

729           KK    DT_B
730           KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (150.0 cfs).  Save temporarily as divB
              * Storm Drain is RCP  D=5.0  nCls=1 So=.0050  n=.016  L=650
731           DT    divB
732           DI     0.0   150.0   10000
733           DQ     0.0   150.0   150.0
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

734           KK   SF_BC
735           KM   First Avenue, Ft. Lowell to Navajo Road
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=440  So=.0030
736           RS       1    FLOW      -1
737           SV       0    .126    .217    .415    .556   1.061   1.566   2.576   3.081
738           SQ       0      30      59     134     183     532    1013    2316    3119
739           SE       0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divB

740           KK    DR_B
741           KM        Navajo Wash Scenario
742           DR    divB
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

743           KK   SD_BC
744           KM       Navajo Wash Scenario
745           RS       1    FLOW      -1
746           SV       0     .02     .06     .10     .15     .19     .24     .27     .29
747           SQ       0       2      10      21      35      50      64      73     150
748           SE       0    0.63    1.25    1.88    2.50    3.13    3.75    4.38    5.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 749          KK       D
 750          KM     Off-Site flow at Navajo and Ft. Lowell Road
 751          DR   POC_D
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 752          KK    DT_D
 753          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (769.1 cfs).  Save temporarily as divD
              * Storm Drain is RCBC B=8.0  D=5.0  nCls=2 So=.0060  n=.016  L=2786
 754          DT    divD
 755          DI     0.0   769.1   10000
 756          DQ     0.0   769.1   769.1
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 757          KK   SF_DC
 758          KM   Navajo Wash, Ft. Lowell to First Ave
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=2780  So=.0050
 759          RS       1    FLOW      -1
 760          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 761          SQ       0      32      85     177     292     764    1693    2263    2897
 762          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divD

 763          KK    DR_D
 764          KM        Navajo Wash Scenario
 765          DR    divD
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 766          KK   SD_DC
 767          KM       Navajo Wash Scenario
 768          RS       1    FLOW      -1
 769          SV       0     .64    1.28    1.92    2.56    3.20    3.84    4.48    5.12
 770          SQ       0      48     140     255     385     525     672     825     769
 771          SE       0    0.63    1.25    1.88    2.50    3.13    3.75    4.38    5.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 772          KK       C
 773          KM      Off-Site flow at Navajo and First Avenue
 774          DR   POC_C
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 775          KK    HC_C
 776          KM   Combine D & C at Navajo
 777          HC       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 778          KK    DT_C
 779          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (905.5 cfs).  Save temporarily as divC
              * Storm Drain is RCBC B=8.0  D=6.0  nCls=2 So=.0050  n=.016  L=3449
 780          DT    divC
 781          DI     0.0   905.5   10000
 782          DQ     0.0   905.5   905.5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 783          KK   SF_CI
 784          KM   Navajo Wash, First Ave to Stone Ave
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=3450  So=.0045
 785          RS       1    FLOW      -1
 786          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 787          SQ       0      30      81     168     277     725    1606    2147    2748
 788          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divC

 789          KK    DR_C
 790          KM        Navajo Wash Scenario
 791          DR    divC
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 792          KK   SD_CI
 793          KM       Navajo Wash Scenario
 794          RS       1    FLOW      -1
 795          SV       0     .95    1.90    2.85    3.80    4.75    5.70    6.65    7.60
 796          SQ       0      58     167     302     453     614     782     955     905
 797          SE       0    0.75    1.50    2.25    3.00    3.75    4.50    5.25    6.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 798          KK    HC_I
 799          KM   Combine with flow from C
 800          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 801          KK    DT_I
 802          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (1,000.1 cfs).  Save temporarily as divI
              * Storm Drain is RCBC B=8.0  D=7.0  nCls=2 So=.0040  n=.016  L=1873
 803          DT    divI
 804          DI     0.0  1000.1   10000
 805          DQ     0.0  1000.1  1000.1
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 806          KK   SF_IJ
 807          KM   Navajo Wash, Stone Ave to Oracle Road
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=1870  So=.0037
 808          RS       1    FLOW      -1
 809          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 810          SQ       0      27      73     152     251     657    1457    1947    2492
 811          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divI

 812          KK    DR_I
 813          KM        Navajo Wash Scenario
 814          DR    divI
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 815          KK   SD_IJ
 816          KM       Navajo Wash Scenario
 817          RS       1    FLOW      -1
 818          SV       0     .60    1.20    1.81    2.41    3.01    3.61    4.21    4.82
 819          SQ       0      66     188     336     500     674     855    1040    1000
 820          SE       0    0.88    1.75    2.63    3.50    4.38    5.25    6.13    7.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 821          KK       J
 822          KM    Recall N0260
 823          DR   POC_J
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 824          KK    HC_J
 825          KM   Combine with flow from I
 826          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 827          KK   CF_JK
 828          KM       New channel downstream of Oracle -- NAVAJO WASH APPROACH
              * Bottom Width B=25.0  Max Depth D=8.0  =.016  L=3176  So=.0025
 829          RS       1    FLOW      -1
 830          SV       0   1.823   3.645   5.468   7.291   9.113  10.936  12.759  14.581
 831          SQ       0     111     335     629     975    1360    1776    2217    2679
 832          SE       0    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 833          KK       K
 834          DR   POC_K
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 835          KK    HC_K
 836          KM   Add K to J
 837          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *
 838          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.       (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

 716         Pt_H
               .
               .
 723           .           .<-------   POC_A
 721           .          A
               .           .
               .           .
 724           x............
               .
               .
 728           .           .<-------   POC_B
 726           .          B
               .           .
               .           .
 731           .           .------->    divB
 729           .       DT_B
               .          V
               .          V
 734           .      SF_BC
               .           .
               .           .
 742           .           .          .<-------    divB
 740           .           .       DR_B
               .           .          V
               .           .          V
 743           .           .      SD_BC
               .           .           .
               .           .           .
 751           .           .           .           .<-------   POC_D
 749           .           .           .          D
               .           .           .           .
               .           .           .           .
 754           .           .           .           .------->    divD
 752           .           .           .       DT_D
               .           .           .          V
               .           .           .          V
 757           .           .           .      SF_DC
               .           .           .           .
               .           .           .           .
 765           .           .           .           .           .<-------    divD
 763           .           .           .           .       DR_D
               .           .           .           .          V
               .           .           .           .          V
 766           .           .           .           .      SD_DC
               .           .           .           .           .
               .           .           .           .           .
 774           .           .           .           .           .           .<-------   POC_C
 772           .           .           .           .           .          C
               .           .           .           .           .           .
               .           .           .           .           .           .
 775           .       HC_C.............................................
               .           .
               .           .
 780           .           .------->    divC
 778           .       DT_C
```

```
                .          V
                .          V
783             .      SF_CI
                .          .
                .          .
791             .          .          .<-------    divC
789             .          .       DR_C
                .          .          V
                .          .          V
792             .          .      SD_CI
                .          .          .
                .          .          .
798          HC_I.......................
                .
                .
803             .------->    divI
801          DT_I
                V
                V
806         SF_IJ
                .
                .
814             .          .<-------    divI
812             .       DR_I
                .          V
                .          V
815             .      SD_IJ
                .          .
                .          .
823             .          .          .<-------   POC_J
821             .          .          J
                .          .          .
                .          .          .
824          HC_J.......................
                V
                V
827         CF_JK
                .
                .
834             .          .<-------   POC_K
833             .          K
                .          .
                .          .
835          HC_K............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	Pt_H	0.	.02	0.	0.	0.	5.14		
+	HYDROGRAPH AT	A	236.	.48	40.	40.	40.	.00		
+	2 COMBINED AT	x	236.	.48	40.	40.	40.	5.14		
+	HYDROGRAPH AT	B	74.	.55	14.	14.	14.	.00		
+	DIVERSION TO	divB	74.	.02	14.	14.	14.	.00		
+	HYDROGRAPH AT	DT_B	0.	.02	0.	0.	0.	.00		
+	ROUTED TO	SF_BC	0.	.02	0.	0.	0.	.00	.00	.92
+	HYDROGRAPH AT	DR_B	74.	.55	14.	14.	14.	.00		
+	ROUTED TO	SD_BC	71.	.60	14.	14.	14.	.00	4.23	.60
+	HYDROGRAPH AT	D	598.	.85	87.	87.	87.	.00		
+	DIVERSION TO	divD	598.	.02	87.	87.	87.	.00		
+	HYDROGRAPH AT	DT_D	0.	.02	0.	0.	0.	.00		
+	ROUTED TO	SF_DC	0.	.02	0.	0.	0.	.00	.00	1.08
+	HYDROGRAPH AT	DR_D	598.	.85	87.	87.	87.	.00		
+	ROUTED TO	SD_DC	584.	.90	87.	87.	87.	.00	3.38	.90
+	HYDROGRAPH AT	C	50.	.42	8.	8.	8.	.00		

	5 COMBINED AT								
+		HC_C	652.	.88	109.	109.	109.	.00	
	DIVERSION TO								
+		divC	652.	.02	109.	109.	109.	.00	
	HYDROGRAPH AT								
+		DT_C	0.	.02	0.	0.	0.	.00	
	ROUTED TO								
+		SF_CI	0.	.02	0.	0.	0.	.00	
+									.00 1.18
	HYDROGRAPH AT								
+		DR_C	652.	.88	109.	109.	109.	.00	
	ROUTED TO								
+		SD_CI	631.	.95	109.	109.	109.	.00	
+									3.83 .95
	3 COMBINED AT								
+		HC_I	746.	.93	149.	149.	149.	5.14	
	DIVERSION TO								
+		divI	746.	.02	149.	149.	149.	5.14	
	HYDROGRAPH AT								
+		DT_I	0.	.02	0.	0.	0.	5.14	
	ROUTED TO								
+		SF_IJ	0.	.02	0.	0.	0.	5.14	
+									.00 2.22
	HYDROGRAPH AT								
+		DR_I	746.	.93	149.	149.	149.	.00	
	ROUTED TO								
+		SD_IJ	740.	.97	149.	149.	149.	.00	
+									4.70 .97
	HYDROGRAPH AT								
+		J	321.	.58	115.	115.	115.	.00	
	3 COMBINED AT								
+		HC_J	1036.	.95	263.	263.	263.	5.14	
	ROUTED TO								
+		CF_JK	1023.	1.00	262.	262.	262.	5.14	
+									4.12 1.00
	HYDROGRAPH AT								
+		K	894.	.78	264.	264.	264.	.00	
	2 COMBINED AT								
+		HC_K	1851.	.93	527.	527.	527.	5.14	

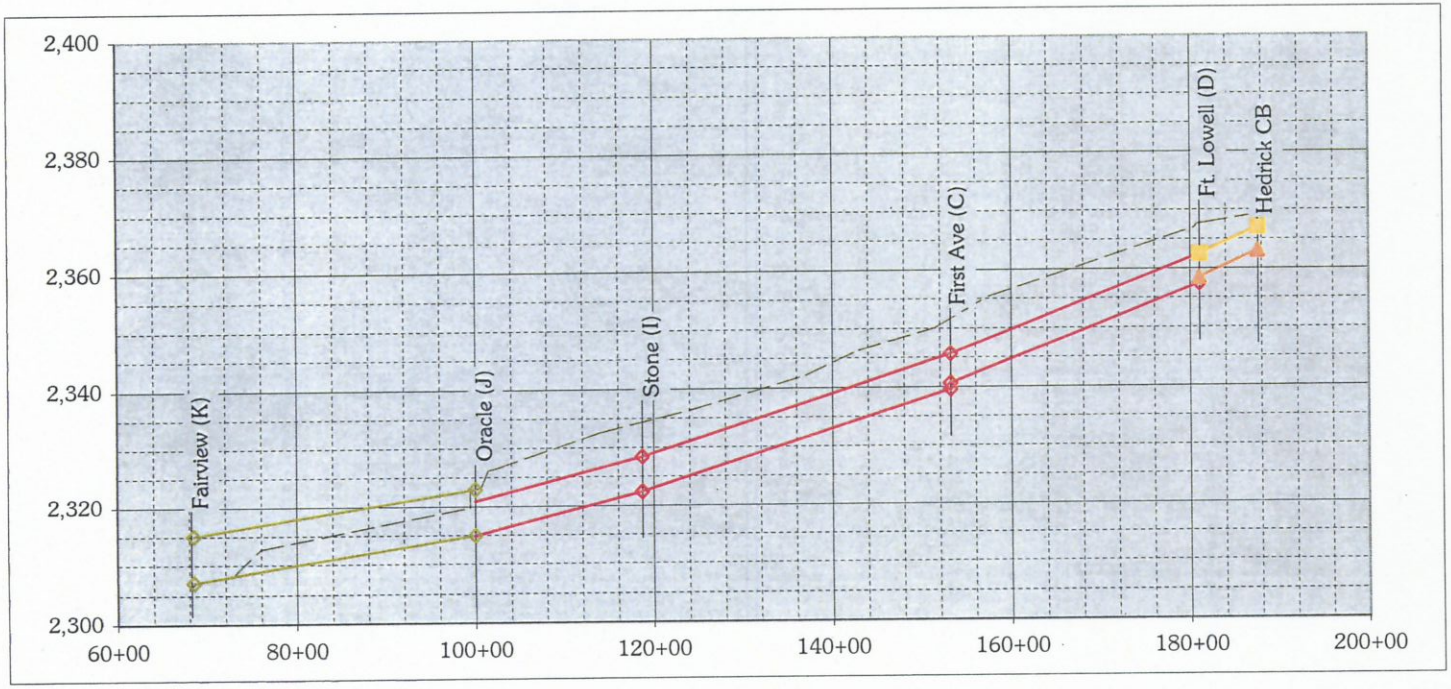
*** NORMAL END OF HEC-1 ***

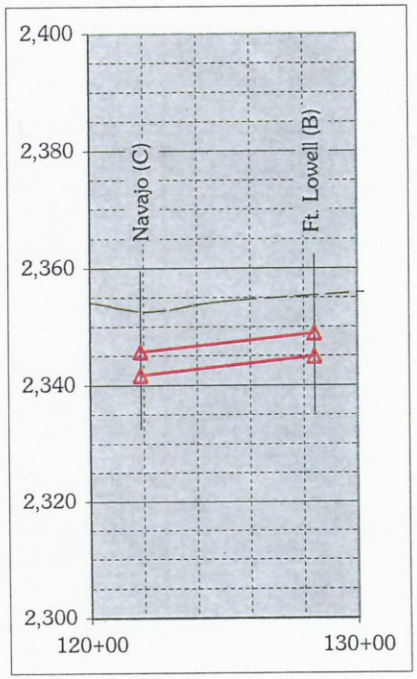
APPENDIX 6d.
TSMS(9) -- 2-YEAR STORM DRAIN SIZING
Navajo Wash Storm Drain and Downstream Channel Improvements

n: .016

Starting Invert: 2,307.00

Reach		Proj Sta	Grnd Elev	Q100	Exst Street Cap	Needed in SD or	nCls	B	D	So	A	P	R	Qcap	Excess Cap	L	Crown	Inv	Cover
JK	Fairview	68+49.26	2,306.71	713		713	Chnl	25.00	8.00	.0025	200.0	41.0	4.88	2,679	+1,966	3,151	2,315.00	2,307.00	
	Oracle	100+00.00	2,322.85														2,322.88	2,314.88	
IJ	Oracle	100+00.00	2,322.85	313		313	2	--	6.00	.0040	56.5	37.7	1.50	436	+123	1,874	2,320.88	2,314.88	
	Stone	118+73.79	2,334.31														2,328.37	2,322.37	5.94
CI	Stone	118+73.79	2,334.31	163		163	1	--	6.00	.0050	28.3	18.8	1.50	244	+81	3,449	2,328.37	2,322.37	
	First Ave	153+22.60	2,351.59														2,345.62	2,339.62	5.98
DC	First Ave	153+22.60	2,351.59	88		88	1	--	5.00	.0060	19.6	15.7	1.25	164	+76	2,786	2,345.62	2,340.62	
	Ft. Lowell	181+08.93	2,367.67														2,362.33	2,357.33	5.33
	Ft. Lowell	181+08.93	2,367.67	49		49	1	--	4.00	.0070	12.6	12.6	1.00	98	+49	657	2,362.33	2,358.33	
	Hedrick	187+65.51	2,367.16														2,366.93	2,362.93	0.23
																Existing CB Inv:		2,358.16	
BC	Navajo	121+90.00	2,352.49	39		39	1	--	4.00	.0050	12.6	12.6	1.00	83	+44	650	2,345.62	2,341.62	
	Ft. Lowell	128+40.00	2,355.36														2,348.87	2,344.87	6.49





Appendix 6e. TSMS(9) -- 2-year Storm Drain Routing Data

APPENDIX 6e. TSMS(9) 2-Year Street Flow/Storm Drain Routing Data -- Navajo Wash Scenario
Mountain Avenue Storm Drain Operational

```
1 SD_BC
1 Navajo Wash Scenario
1
```

B	D	nCls	So	n	L
--	4.00	1	.0050	.016	650

Type	A	P	R	Qcap
RCP	12.6	12.6	1.00	83
			Check Vol:	0.19

```
1    *
1    KK DT_B
1    KM      Navajo Wash Scenario
1    * Divert Capacity of storm drain (82.7 cfs).  Save temporarily as divB
1    * Storm Drain is RCP  D=4.0  nCls=1 So=.0050  n=.016  L=650
1    DT divB
1    DI   0.0    82.7   10000
1    DQ   0.0    82.7    82.7
1    * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
1    *
1    KK SF_BC
1    KM First Avenue, Ft. Lowell to Navajo Road
1    * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
1    * Half Parkway W=7.0  Sx=.020  n=.025
1    * L=440  So=.0030
1    RS     1    FLOW      -1
1    SV     0    .126    .217    .415    .556   1.061   1.566   2.576   3.081
1    SQ     0      30      59     134     183     532    1013    2316    3119
1    SE     0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
1    * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
1    *
1    * Recall  divB
1    KK DR_B
1    KM      Navajo Wash Scenario
1    DR  divB
1    * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
1    *
1    * Route storm drain flow.
1    KK SD_BC
1    KM     Navajo Wash Scenario
1    RS     1    FLOW      -1
1    SV     0     .01     .04     .06     .09     .12     .15     .17     .19
1    SQ     0       1       5      12      19      28      35      41      83
1    SE     0    0.50    1.00    1.50    2.00    2.50    3.00    3.50    4.00
1    * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

Hydraulics		
d	an	qn
--	--	--
0.50	0.9	1
1.00	2.5	5
1.50	4.3	12
2.00	6.3	19
2.50	8.3	28
3.00	10.1	35
3.50	11.7	41
4.00	12.6	83

HEC1 Data		
SE	SQ	SV
0.00	0	0
0.50	1	.01
1.00	5	.04
1.50	12	.06
2.00	19	.09
2.50	28	.12
3.00	35	.15
3.50	41	.17
4.00	83	.19

APPENDIX 6e. TSMS(9) 2-Year Street Flow/Storm Drain Routing Data -- Navajo Wash Scenario
Mountain Avenue Storm Drain Operational

B	D	nCls	So	n	L
--	5.00	1	.0060	.016	2786

Type	A	P	R	Qcap
RCP	19.6	15.7	1.25	164
			Check Vol:	1.26

```
2 SD_DC
2 Navajo Wash Scenario
2
2
2
2
2  *
2  KK DT_D
2  KM       Navajo Wash Scenario
2  * Divert Capacity of storm drain (164.4 cfs).  Save temporarily as divD
2  * Storm Drain is RCP  D=5.0  nCls=1 So=.0060  n=.016  L=2786
2  DT divD
2  DI   0.0   164.4   10000
2  DQ   0.0   164.4   164.4
2  * -----+-------+-------+-------+-------+-------+-------+-------+-------+
2  *
2  KK SF_DC
2  KM Navajo Wash, Ft. Lowell to First Ave
2  * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
2  * Half Parkway W=12.0  Sx=.020  n=.025
2  * L=2780  So=.0050
2  RS     1    FLOW      -1
2  SV     0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
2  SQ     0      32      85     177     292     764    1693    2263    2897
2  SE     0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
2  * -----+-------+-------+-------+-------+-------+-------+-------+-------+
2  *
2  * Recall  divD
2  KK DR_D
2  KM       Navajo Wash Scenario
2  DR  divD
2  * -----+-------+-------+-------+-------+-------+-------+-------+-------+
2  *
2  * Route storm drain flow.
2  KK SD_DC
2  KM      Navajo Wash Scenario
2  RS     1     FLOW      -1
2  SV     0     .09     .25     .43     .63     .83    1.01    1.17    1.26
2  SQ     0       3      10      23      38      55      70      81     164
2  SE     0    0.63    1.25    1.88    2.50    3.13    3.75    4.38    5.00
2  * -----+-------+-------+-------+-------+-------+-------+-------+-------+
```

Hydraulics		
d	an	qn
--	--	--
0.63	1.4	3
1.25	3.8	10
1.88	6.7	23
2.50	9.8	38
3.13	12.9	55
3.75	15.8	70
4.38	18.2	81
5.00	19.6	164

HEC1 Data		
SE	SQ	SV
0.00	0	0
0.63	3	.09
1.25	10	.25
1.88	23	.43
2.50	38	.63
3.13	55	.83
3.75	70	1.01
4.38	81	1.17
5.00	164	1.26

APPENDIX 6e. TSMS(9) 2-Year Street Flow/Storm Drain Routing Data -- Navajo Wash Scenario
Mountain Avenue Storm Drain Operational

```
3 SD_CI
3 Navajo Wash Scenario
3
```

B	D	nCls	So	n	L
--	6.00	1	.0050	.016	3449

Type	A	P	R	Qcap
RCP	28.3	18.8	1.50	244
			Check Vol:	2.24

```
3
3   *
3   KK DT_C
3   KM      Navajo Wash Scenario
3   * Divert Capacity of storm drain (244.0 cfs).  Save temporarily as divC
3   * Storm Drain is RCP  D=6.0  nCls=1 So=.0050  n=.016  L=3449
3   DT divC
3   DI   0.0   244.0   10000
3   DQ   0.0   244.0   244.0
3   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
3   *
3   KK SF_CI
3   KM Navajo Wash, First Ave to Stone Ave
3   * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
3   * Half Parkway W=12.0  Sx=.020  n=.025
3   * L=3450  So=.0045
3   RS     1    FLOW      -1
3   SV     0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
3   SQ     0      30      81     168     277     725    1606    2147    2748
3   SE     0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
3   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
3   *
3   * Recall  divC
3   KK DR_C
3   KM      Navajo Wash Scenario
3   DR  divC
3   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
3   *
3   * Route storm drain flow.
3   KK SD_CI
3   KM     Navajo Wash Scenario
3   RS     1    FLOW      -1
3   SV     0     .16     .44     .77    1.12    1.47    1.80    2.08    2.24
3   SQ     0       4      16      34      57      81     104     120     244
3   SE     0    0.75    1.50    2.25    3.00    3.75    4.50    5.25    6.00
3   * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

Hydraulics		
d	an	qn
--	--	--
0.75	2.0	4
1.50	5.5	16
2.25	9.7	34
3.00	14.1	57
3.75	18.6	81
4.50	22.7	104
5.25	26.2	120
6.00	28.3	244

HEC1 Data		
SE	SQ	SV
0.00	0	0
0.75	4	.16
1.50	16	.44
2.25	34	.77
3.00	57	1.12
3.75	81	1.47
4.50	104	1.80
5.25	120	2.08
6.00	244	2.24

APPENDIX 6e. TSMS(9) 2-Year Street Flow/Storm Drain Routing Data -- Navajo Wash Scenario
Mountain Avenue Storm Drain Operational

```
4 SD_IJ
4 Navajo Wash Scenario
4
4      B        D       nCls     So       n        L
4      --      6.00      2      .0040    .016     1873
4
4   *
4   KK DT_I
4   KM       Navajo Wash Scenario
4   * Divert Capacity of storm drain (436.4 cfs).  Save temporarily as divI
4   * Storm Drain is RCP  D=6.0  nCls=2 So=.0040  n=.016  L=1873
4   DT divI
4   DI   0.0   436.4   10000
4   DQ   0.0   436.4   436.4
4   * -----+-------+-------+-------+-------+-------+-------+-------+-------+
4   *
4   KK SF_IJ
4   KM Navajo Wash, Stone Ave to Oracle Road
4   * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
4   * Half Parkway W=12.0  Sx=.020  n=.025
4   * L=1870  So=.0037
4   RS     1     FLOW      -1
4   SV     0     .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
4   SQ     0       27      73     152     251     657    1457    1947    2492
4   SE     0     0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
4   * -----+-------+-------+-------+-------+-------+-------+-------+-------+
4   *
4   * Recall  divI
4   KK DR_I
4   KM       Navajo Wash Scenario
4   DR  divI
4   * -----+-------+-------+-------+-------+-------+-------+-------+-------+
4   *
4   * Route storm drain flow.
4   KK SD_IJ
4   KM      Navajo Wash Scenario
4   RS     1     FLOW      -1
4   SV     0      .18     .48     .83    1.22    1.60    1.96    2.26    2.43
4   SQ     0        7      28      61     102     145     186     214     436
4   SE     0     0.75    1.50    2.25    3.00    3.75    4.50    5.25    6.00
4   * -----+-------+-------+-------+-------+-------+-------+-------+-------+
```

Type	A	P	R	Qcap
RCP	56.5	37.7	1.50	436
		Check Vol:		2.43

Hydraulics		
d	an	qn
--	--	--
0.75	4.1	7
1.50	11.1	28
2.25	19.4	61
3.00	28.3	102
3.75	37.2	145
4.50	45.5	186
5.25	52.5	214
6.00	56.5	436

HEC1 Data		
SE	SQ	SV
0.00	0	0
0.75	7	.18
1.50	28	.48
2.25	61	.83
3.00	102	1.22
3.75	145	1.60
4.50	186	1.96
5.25	214	2.26
6.00	436	2.43

```
*
KK CF_JK
KM     New channel downstream of Oracle -- NAVAJO WASH APPROACH
* Bottom Width B=25.0  Max Depth D=8.0  =.016  L=3176  So=.0025
RS      1    FLOW      -1
SV      0   1.823   3.645   5.468   7.291   9.113  10.936  12.759  14.581
SQ      0     111     335     629     975    1360    1776    2217    2679
SE      0    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00
* -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
```

Appendix 6f.
TSMS(9) 2-YEAR MODELING -- Navajo Wash Scenario
Future Street Flow and 2-year Storm Drain Routing in Place
Data and results common to TSMS(3) not printed here.

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
*  RUN DATE  07/25/2006  TIME  14:50:06 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID   Appendix W
  2           ID   TSMS(9)used to resize Navajo Wash Scenario storm drains for 10-year storm
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *DIAGRAM
              * Curve numbers for Basin DG are based on PB = 3.131 corresponding to POC_K
              * and are slightly inaccurate for other precipitation values.  CNs for Basin GR
              * are based on PB = 3.60.
              *
              * -- TSMS(9) --
              * This model was used to determine 2-year discharges along Navajo.
              * As with other TSMS runs, only PB has  been changed.
              * CNs remain constant leading to slightly erroneous results The
              * PBs used for various runs follows:
              *
              *          Trib          100     50     25     10      5      2
              * POC Reach Area   ARF   Year   Year   Year   Year   Year   Year
              *  A   --    .274  1.000  3.600  3.240  2.760  2.280  1.800  1.320
              *  B   BC    .107  1.000  3.600  3.240  2.760  2.280  1.800  1.320
              *  D   DC   3.017   .935  3.367  3.030  2.581  2.133  1.684  1.235
              *  C   CI   3.178   .931  3.350  3.015  2.569  2.122  1.675  1.228
              *  I   IJ   3.359   .926  3.332  2.999  2.555  2.110  1.666  1.222
              *  J   JK   3.904   .911  3.280  2.952  2.514  2.077  1.640  1.203
              *  K   --   5.554   .873  3.143  2.829  2.410  1.991  1.572  1.153
              *  E   EF    .192  1.000  3.600  3.240  2.760  2.280  1.800  1.320
              *  F   FG    .125  1.000  3.600  3.240  2.760  2.280  1.800  1.320
              *  G   GH    .317  1.000  3.600  3.240  2.760  2.280  1.800  1.320
              *  H   --    .495  1.000  3.600  3.240  2.760  2.280  1.800  1.320
  3           IT       1                    300
  4           IO       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  5           KK   S0010
  6           KM        RUNOFF FROM SUBBASIN S0010
  7           IN       1
  8           PB   1.153
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 721          KK       A
 722          KM      Off-Site flow at First Avenue and Blacklidge (Cemetary Wash)
 723          DR   POC_A

 724          KK       x
 725          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 726          KK       B
 727          KM      Off-Site flow at First Avenue and Ft Lowell
 728          DR   POC_B
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 729          KK    DT_B
 730          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (82.7 cfs).  Save temporarily as divB
              * Storm Drain is RCP  D=4.0  nCls=1 So=.0050  n=.016  L=650
 731          DT    divB
 732          DI     0.0    82.7   10000
 733          DQ     0.0    82.7    82.7
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 734          KK   SF_BC
 735          KM   First Avenue, Ft. Lowell to Navajo Road
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=440  So=.0030
 736          RS       1    FLOW      -1
 737          SV       0    .126    .217    .415    .556   1.061   1.566   2.576   3.081
 738          SQ       0      30      59     134     183     532    1013    2316    3119
 739          SE       0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divB

 740          KK    DR_B
 741          KM        Navajo Wash Scenario
 742          DR    divB
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 743          KK   SD_BC
 744          KM       Navajo Wash Scenario
 745          RS       1    FLOW      -1
 746          SV       0     .01     .04     .06     .09     .12     .15     .17     .19
 747          SQ       0       1       5      12      19      28      35      41      83
 748          SE       0    0.50    1.00    1.50    2.00    2.50    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 749          KK        D
 750          KM      Off-Site flow at Navajo and Ft. Lowell Road
 751          DR    POC_D
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 752          KK     DT_D
 753          KM         Navajo Wash Scenario
              * Divert Capacity of storm drain (164.4 cfs).  Save temporarily as divD
              * Storm Drain is RCP  D=5.0  nCls=1 So=.0060  n=.016  L=2786
 754          DT     divD
 755          DI      0.0    164.4    10000
 756          DQ      0.0    164.4    164.4
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 757          KK    SF_DC
 758          KM    Navajo Wash, Ft. Lowell to First Ave
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=2780  So=.0050
 759          RS        1     FLOW       -1
 760          SV        0     .421     .979    1.623    2.241    4.095    6.671    7.959    9.247
 761          SQ        0       32       85      177      292      764     1693     2263     2897
 762          SE        0     0.54     0.79     1.04     1.28     2.00     3.00     3.50     4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divD

 763          KK     DR_D
 764          KM         Navajo Wash Scenario
 765          DR     divD
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 766          KK    SD_DC
 767          KM        Navajo Wash Scenario
 768          RS        1     FLOW       -1
 769          SV        0      .09      .25      .43      .63      .83     1.01     1.17     1.26
 770          SQ        0        3       10       23       38       55       70       81      164
 771          SE        0     0.63     1.25     1.88     2.50     3.13     3.75     4.38     5.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 772          KK        C
 773          KM       Off-Site flow at Navajo and First Avenue
 774          DR    POC_C
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 775          KK    HC_C
 776          KM   Combine D & C at Navajo
 777          HC       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 778          KK    DT_C
 779          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (244.0 cfs).  Save temporarily as divC
              * Storm Drain is RCP  D=6.0  nCls=1 So=.0050  n=.016  L=3449
 780          DT    divC
 781          DI     0.0   244.0   10000
 782          DQ     0.0   244.0   244.0
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 783          KK   SF_CI
 784          KM   Navajo Wash, First Ave to Stone Ave
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=3450  So=.0045
 785          RS       1    FLOW      -1
 786          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 787          SQ       0      30      81     168     277     725    1606    2147    2748
 788          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divC

 789          KK    DR_C
 790          KM        Navajo Wash Scenario
 791          DR    divC
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 792          KK   SD_CI
 793          KM       Navajo Wash Scenario
 794          RS       1    FLOW      -1
 795          SV       0     .16     .44     .77    1.12    1.47    1.80    2.08    2.24
 796          SQ       0       4      16      34      57      81     104     120     244
 797          SE       0    0.75    1.50    2.25    3.00    3.75    4.50    5.25    6.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 798          KK    HC_I
 799          KM   Combine with flow from C
 800          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 801          KK    DT_I
 802          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (436.4 cfs).  Save temporarily as divI
              * Storm Drain is RCP  D=6.0  nCls=2 So=.0040  n=.016  L=1873
 803          DT    divI
 804          DI     0.0   436.4   10000
 805          DQ     0.0   436.4   436.4
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 806          KK   SF_IJ
 807          KM   Navajo Wash, Stone Ave to Oracle Road
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=1870  So=.0037
 808          RS       1    FLOW      -1
 809          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 810          SQ       0      27      73     152     251     657    1457    1947    2492
 811          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divI

 812          KK    DR_I
 813          KM        Navajo Wash Scenario
 814          DR    divI
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 815          KK   SD_IJ
 816          KM       Navajo Wash Scenario
 817          RS       1    FLOW      -1
 818          SV       0     .18     .48     .83    1.22    1.60    1.96    2.26    2.43
 819          SQ       0       7      28      61     102     145     186     214     436
 820          SE       0    0.75    1.50    2.25    3.00    3.75    4.50    5.25    6.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 821          KK       J
 822          KM    Recall N0260
 823          DR   POC_J
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 824          KK    HC_J
 825          KM   Combine with flow from I
 826          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 827          KK   CF_JK
 828          KM       New channel downstream of Oracle -- NAVAJO WASH APPROACH
              * Bottom Width B=25.0  Max Depth D=8.0  =.016  L=3176  So=.0025
 829          RS       1    FLOW      -1
 830          SV       0   1.823   3.645   5.468   7.291   9.113  10.936  12.759  14.581
 831          SQ       0     111     335     629     975    1360    1776    2217    2679
 832          SE       0    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 833          KK       K
 834          DR   POC_K
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 835          KK    HC_K
 836          KM   Add K to J
 837          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *
 838          ZZ
1
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.       (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

 716         Pt_H
                .
                .
 723            .           .<-------   POC_A
 721            .          A
                .           .
                .           .
 724            x............
                .
                .
 728            .           .<-------   POC_B
 726            .          B
                .           .
                .           .
 731            .           .------->    divB
 729            .       DT_B
                .          V
                .          V
 734            .      SF_BC
                .           .
                .           .
 742            .           .          .<-------    divB
 740            .           .       DR_B
                .           .          V
                .           .          V
 743            .           .      SD_BC
                .           .           .
                .           .           .
 751            .           .           .          .<-------   POC_D
 749            .           .           .          D
                .           .           .           .
                .           .           .           .
 754            .           .           .           .------->    divD
 752            .           .           .       DT_D
                .           .           .          V
                .           .           .          V
 757            .           .           .      SF_DC
                .           .           .           .
                .           .           .           .
 765            .           .           .           .          .<-------    divD
 763            .           .           .           .       DR_D
                .           .           .           .          V
                .           .           .           .          V
 766            .           .           .           .      SD_DC
                .           .           .           .           .
                .           .           .           .           .
 774            .           .           .           .           .          .<-------   POC_C
 772            .           .           .           .           .          C
                .           .           .           .           .           .
                .           .           .           .           .           .
 775            .       HC_C.......................................................
                .           .
                .           .
 780            .           .------->    divC
 778            .       DT_C
```

```
                .           V
                .           V
783             .       SF_CI
                .           .
                .           .
791             .           .           .<-------    divC
789             .           .        DR_C
                .           .           V
                .           .           V
792             .           .       SD_CI
                .           .           .
                .           .           .
798          HC_I.......................
                .
                .
803             .------->    divI
801          DT_I
                V
                V
806         SF_IJ
                .
                .
814             .           .<-------    divI
812             .        DR_I
                .           V
                .           V
815             .       SD_IJ
                .           .
                .           .
823             .           .           .<-------   POC_J
821             .           .           J
                .           .           .
                .           .           .
824          HC_J.......................
                V
                V
827         CF_JK
                .
                .
834             .           .<-------   POC_K
833             .           K
                .           .
                .           .
835          HC_K............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	Pt_H	0.	.02	0.	0.	0.	5.14		
+	HYDROGRAPH AT	A	97.	.60	20.	20.	20.	.00		
+	2 COMBINED AT	x	97.	.60	20.	20.	20.	5.14		
+	HYDROGRAPH AT	B	32.	.65	7.	7.	7.	.00		
+	DIVERSION TO	divB	32.	.02	7.	7.	7.	.00		
+	HYDROGRAPH AT	DT_B	0.	.02	0.	0.	0.	.00		
+	ROUTED TO	SF_BC	0.	.02	0.	0.	0.	.00	.00	.68
+	HYDROGRAPH AT	DR_B	32.	.65	7.	7.	7.	.00		
+	ROUTED TO	SD_BC	31.	.70	7.	7.	7.	.00	2.70	.70
+	HYDROGRAPH AT	D	44.	.60	9.	9.	9.	.00		
+	DIVERSION TO	divD	44.	.02	9.	9.	9.	.00		
+	HYDROGRAPH AT	DT_D	0.	.02	0.	0.	0.	.00		
+	ROUTED TO	SF_DC	0.	.02	0.	0.	0.	.00	.00	1.03
+	HYDROGRAPH AT	DR_D	44.	.60	9.	9.	9.	.00		
+	ROUTED TO	SD_DC	34.	.73	9.	9.	9.	.00	2.33	.73
+	HYDROGRAPH AT	C	23.	.50	4.	4.	4.	.00		
	5 COMBINED AT									

+	HC_C	79.	.68	19.	19.	19.	.00		
DIVERSION TO									
+	divC	79.	.02	19.	19.	19.	.00		
HYDROGRAPH AT									
+	DT_C	0.	.02	0.	0.	0.	.00		
ROUTED TO									
+	SF_CI	0.	.02	0.	0.	0.	.00		
+								.00	2.28
HYDROGRAPH AT									
+	DR_C	79.	.68	19.	19.	19.	.00		
ROUTED TO									
+	SD_CI	64.	.90	19.	19.	19.	.00		
+								3.23	.90
3 COMBINED AT									
+	HC_I	141.	.75	39.	39.	39.	5.14		
DIVERSION TO									
+	divI	141.	.02	39.	39.	39.	5.14		
HYDROGRAPH AT									
+	DT_I	0.	.02	0.	0.	0.	5.14		
ROUTED TO									
+	SF_IJ	0.	.02	0.	0.	0.	5.14		
+								.00	1.72
HYDROGRAPH AT									
+	DR_I	141.	.75	39.	39.	39.	.00		
ROUTED TO									
+	SD_IJ	133.	.88	38.	38.	38.	.00		
+								3.55	.88
HYDROGRAPH AT									
+	J	147.	.83	56.	56.	56.	.00		
3 COMBINED AT									
+	HC_J	280.	.87	95.	95.	95.	5.14		
ROUTED TO									
+	CF_JK	270.	.98	94.	94.	94.	5.14		
+								1.71	.98
HYDROGRAPH AT									
+	K	429.	.92	124.	124.	124.	.00		
2 COMBINED AT									
+	HC_K	697.	.93	219.	219.	219.	5.14		

*** NORMAL END OF HEC-1 ***

Appendix 7a. June 2006 Cost Estimate for Mountain Avenue Storm Drain

MOUNTAIN AVENUE - Roger Road to Fort Lowell Road - Storm Drain Breakout

COST ESTIMATE 7/27/2006

BID ITEM NUMBER	QUANTITY	UNITS	ITEM DESCRIPTION	USE	TOTAL AMOUNT	
1040001	1	F.A.	PARTNERING	5,000.00	5,000.00	
1055001	1	HR.	RESTAKING FEES	150.00	150.00	
1070001	1	L.S.	AZPDES SWPPP	20,000.00	20,000.00	
1070002	1	F.A.	AZPDES SWPPP MODIFICATIONS	5,000.00	5,000.00	
2010001	1	L.SUM	CLEARING AND GRUBBING	15,000.00	15,000.00	
2020001	1	L.SUM	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	7,500.00	7,500.00	7,500.00
2020014	1	F.A.	REMOVAL OF UNKNOWN STRUCTURES AND OBSTRUCTIONS	10,000.00	10,000.00	
2020020	1,658	L.FT.	REMOVAL OF CONCRETE CURB	4.00	6,632.00	
2020021	282	L.FT.	REMOVAL OF CONCRETE CURB AND GUTTER	6.00	1,692.00	
2020025	4,294	SQ.FT.	REMOVAL OF CONCRETE SIDEWALKS, DRIVEWAYS AND SLABS	2.00	8,588.00	
2020030	1,165	SQ.YD.	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	2.00	2,330.00	2,300.00
2020056	1	L.SUM	REMOVE AND SALVAGE (RIPRAP)	1,500.00	1,500.00	1,500.00
2020058	88	L.FT.	REMOVE AND SALVAGE (CABLE BARRIER)	4.00	352.00	
2020061	58	EACH	REMOVE AND RELOCATE MAIL BOXES	250.00	14,500.00	
2020072	3,634	L.FT.	REMOVE AND SALVAGE GUARD RAIL	5.00	18,170.00	
2020101	181	L.FT.	REMOVE FENCE (BLOCK WALL)	3.00	543.00	
2020102	100	L.FT.	REMOVE AND SALVAGE FENCE	4.00	400.00	400.00
2030301	250	CU.YD.	ROADWAY EXCAVATION	12.00	3,000.00	
2030401	347	CU.YD.	DRAINAGE EXCAVATION	30.00	10,410.00	10,410.00
3030102	227	CU.YD.	AGGREGATE BASE	30.00	6,810.00	6,810.00
4040111	1	TON	BITUMINOUS TACK COAT	700.00	700.00	700.00
4060017	124	TON	ASPHALTIC CONCRETE (MIX NO. 1)	75.00	9,300.00	9,300.00
4060018	114	TON	ASPHALTIC CONCRETE (MIX NO.2)	80.00	9,120.00	
4061004	2,635	SQ.YD.	PAVEMENT CUT & REPLACEMENT (COT/PC DTL. 216)	75.00	197,625.00	197,625.00
4130040	124	TON	ASPHALTIC CONCRETE (ASPHALT-RUBBER)	90.00	11,160.00	11,160.00
5011009	3	L.FT.	PIPE, REINFORCED CONCRETE, CLASS IV, 15"	100.00	300.00	
5011012	128	L.FT.	PIPE, REINFORCED CONCRETE, CLASS II, 18"	105.00	13,440.00	
5011013	189	L.FT.	PIPE, REINFORCED CONCRETE, CLASS III, 18"	110.00	20,790.00	
5011014	779	L.FT.	PIPE, REINFORCED CONCRETE, CLASS IV, 18"	120.00	93,480.00	
5011023	121	L.FT.	PIPE, REINFORCED CONCRETE, CLASS III, 24"	125.00	15,125.00	
5011024	61	L.FT.	PIPE, REINFORCED CONCRETE, CLASS IV, 24"	135.00	8,235.00	
5011033	238	L.FT.	PIPE, REINFORCED CONCRETE, CLASS III, 30"	140.00	33,320.00	
5011034	47	L.FT.	PIPE, REINFORCED CONCRETE, CLASS IV, 30"	145.00	6,815.00	
5011042	49	L.FT.	PIPE, REINFORCED CONCRETE, CLASS II, 36"	145.00	7,105.00	
5011058	223	L.FT.	PIPE, REINFORCED CONCRETE, CLASS III, 54"	250.00	55,750.00	55,750.00
5011063	298	L.FT.	PIPE, REINFORCED CONCRETE, CLASS III, 60"	350.00	104,300.00	104,300.00
5011064	1,004	L.FT.	PIPE, REINFORCED CONCRETE, CLASS IV, 60"	400.00	401,600.00	401,600.00
5011068	402	L.FT.	PIPE, REINFORCED CONCRETE, CLASS III, 66"	475.00	190,950.00	190,950.00
5011072	2,930	L.FT.	PIPE, REINFORCED CONCRETE, CLASS II, 72"	600.00	1,758,000.00	1,758,000.00
5011073	1,234	L.FT.	PIPE, REINFORCED CONCRETE, CLASS III, 72"	650.00	802,100.00	802,100.00
5011077	633	L.FT.	PIPE, REINFORCED CONCRETE, CLASS II, 78"	800.00	506,400.00	506,400.00
5030402	1	EACH	CONCRETE APRON FOR CATCH BASIN (DETAIL DE)	1,500.00	1,500.00	
5030602	2	EACH	CONCRETE CATCH BASIN (STD.309)	4,500.00	9,000.00	
5030603	2	EACH	CONCRETE CATCH BASIN (STD.308)4'WING,SINGLE, H=8'OR LESS	5,000.00	10,000.00	
5030604	4	EACH	CONCRETE CATCH BASIN (STD.308)8'WING,SINGLE, H=8'OR LESS	6,500.00	26,000.00	
5030605	1	EACH	CONCRETE CATCH BASIN (STD.308)8'WING,SINGLE, H=OVER 8'	7,000.00	7,000.00	
5030606	1	EACH	CONCRETE CATCH BASIN (STD.308)8'WING,DOUBLE, H=OVER 8'	8,000.00	8,000.00	
5030607	3	EACH	CONCRETE CATCH BASIN (STD.308)12'WING,SINGLE, H=8' OR LESS	5,000.00	15,000.00	
5030608	1	EACH	CONCRETE CATCH BASIN (STD.308)12'WING,SINGLE, H=OVER 8'	6,000.00	6,000.00	
5030609	10	EACH	CONCRETE CATCH BASIN (STD.308)16'WING,SINGLE, H=8' OR LESS	9,500.00	95,000.00	
5030610	7	EACH	CONCRETE CATCH BASIN (DETAIL DA)	15,000.00	105,000.00	
5030611	2	EACH	CONCRETE CATCH BASIN (DETAIL DB)	5,000.00	10,000.00	
5030612	1	EACH	CONCRETE CATCH BASIN (DETAIL DC)	15,000.00	15,000.00	
5030613	1	EACH	CONCRETE CATCH BASIN (DETAIL DD)	9,000.00	9,000.00	
5030614	1	EACH	CONCRETE CATCH BASIN (DETAIL DG)	6,500.00	6,500.00	
5030615	1	EACH	CONCRETE CATCH BASIN (DETAIL DH)	20,000.00	20,000.00	
5030616	1	EACH	CONCRETE CATCH BASIN (DETAIL DI)(SUMP ONLY)	4,500.00	4,500.00	
5030617	3	EACH	CONCRETE CATCH BASIN (DETAIL DI)4'WING,SINGLE, H=8' OR LESS	5,000.00	15,000.00	
5030618	1	EACH	CONCRETE CATCH BASIN (DETAIL DI)4'WING,DOUBLE, H=8' OR LESS	6,000.00	6,000.00	
5030619	2	EACH	CONCRETE CATCH BASIN (DETAIL DI)8'WING,DOUBLE, H= 8' OR LESS	8,000.00	16,000.00	
5030620	1	EACH	CONCRETE CATCH BASIN (DETAIL DK)	10,000.00	10,000.00	
5030702	1	EACH	JUNCTION STRUCTURE (DETAIL DJ)	5,000.00	5,000.00	5,000.00
5030703	2	EACH	JUNCTION STRUCTURE (DETAIL DF)	10,000.00	20,000.00	20,000.00
5030756	1	EACH	STORM DRAIN STRUCTURE (CONCRETE) (TRANSITION DETAIL DN)	1,500.00	1,500.00	1,500.00
5030758	15	L.FT.	STORM DRAIN STRUCTURE (TRANSITION DETAIL DL)	1,000.00	15,000.00	15,000.00
5050089	14	EACH	MANHOLE (COT/PC DTL. 301)	10,000.00	140,000.00	140,000.00
5050202	21	EACH	RESET FRAME AND COVER FOR MANHOLE (SEWER)	675.00	14,175.00	
5050206	6	EACH	RESET FRAME AND COVER FOR MANHOLE (STORM DRAIN)	750.00	4,500.00	
5050211	2	EACH	RESET FRAME AND COVER FOR CLEAN OUT	400.00	800.00	
5090611	1	F.A.	SEWAGE BYPASS (6" & 8")	20,000.00	20,000.00	
5090613	1	F.A.	SEWAGE BYPASS (18" & 24")	200,000.00	200,000.00	200,000.00
6017105	391	L.FT.	PRECAST REINFORCED CONCRETE BOX CULVERT	850.00	332,350.00	332,350.00
6080200	2	EACH	PROJECT SIGN	1,250.00	2,500.00	
7010001	1	L.SUM	MAINTENANCE AND PROTECTION OF TRAFFIC	100,000.00	100,000.00	
7010006	1	L.SUM	FURNISH AND INSTALL TEMPORARY TRAFFIC CONTROL DEVICES	300,000.00	300,000.00	
7010008	50,000	F.A.	FLAGGING SERVICES (FORCE ACCOUNT)	1.00	50,000.00	
7015010	200	L.FT.	TEMPORARY CONCRETE BARRIER (NEW INSTALLATION)	10.00	2,000.00	
7016020	50,000	L.FT/DAY	TEMPORARY CONCRETE BARRIER (IN USE)	0.05	2,500.00	
7040003	19,249	L.FT.	PAVEMENT MARKING (WHITE SPRAYED THERMOPLASTIC) (0.060")	0.50	9,624.50	
7040004	9,274	L.FT.	PAVEMENT MARKING (YELLOW SPRAYED THERMOPLASTIC) (0.060")	0.50	4,637.00	
7040024	46	EACH	PAVEMENT SYMBOL (WHITE SPRAYED THERMOPLASTIC) (BIKE OR ARROW)	100.00	4,600.00	
7040072	2,967	L.FT.	PAVEMENT MARKING (TRANSVERSE)(THERMOPLASTIC)(ALKYD)(0.090")	0.60	1,780.20	

MOUNTAIN AVENUE - Roger Road to Fort Lowell Road - Storm Drain Breakout

COST ESTIMATE 7/27/2006

BID ITEM NUMBER	QUANTITY	UNITS	ITEM DESCRIPTION	USE	TOTAL AMOUNT
7060001	23	EACH	PAVEMENT MARKER, RAISED (BLUE)	5.00	115.00
7060015	242	EACH	PAVEMENT MARKER, RAISED, TYPE D	5.00	1,210.00
7060018	461	EACH	PAVEMENT MARKER, RAISED, TYPE G	5.00	2,305.00
7310010	2	EACH	POLE (TYPE A)	850.00	1,700.00
7310060	1	EACH	POLE (TYPE F)	1,250.00	1,250.00
7310130	3	EACH	POLE (TYPE Q)	3,450.00	10,350.00
7310190	9	EACH	POLE (20 FT, TYPE I, T444)	2,500.00	22,500.00
7310200	2	EACH	POLE FOUNDATION (TYPE A)	500.00	1,000.00
7310250	1	EACH	POLE FOUNDATION (TYPE F)	500.00	500.00
7310310	3	EACH	POLE FOUNDATION (TYPE Q)	2,100.00	6,300.00
7310371	9	EACH	POLE FOUNDATION (T444)	500.00	4,500.00
7310551	15	EACH	MAST ARM (20 FT.)(TAPERED)	900.00	13,500.00
7310561	1	EACH	MAST ARM (25 FT.) (TAPERED)	1,250.00	1,250.00
7310580	1	EACH	MAST ARM (35-FT.) (TAPERED)	2,250.00	2,250.00
7310590	2	EACH	MAST ARM (40-FT.) (TAPERED)	2,400.00	4,800.00
7320015	600	L.FT.	ELECTRICAL CONDUIT (1 1/2")(PVC)	6.00	3,600.00
7320050	5,500	L.FT.	ELECTRICAL CONDUIT (2") (PVC)	8.00	44,000.00
7320070	100	L.FT.	ELECTRICAL CONDUIT (3") (PVC)	9.50	950.00
7320090	500	L.FT.	ELECTRICAL CONDUIT (4") (PVC)	14.00	7,000.00
7320091	1,000	L.FT.	ELECTRICAL CONDUIT(4")(PVC)(SECOND IN TRENCH)	10.00	10,000.00
7320140	100	L.FT.	ELECTRICAL CONDUIT(2-1/2")(RIGID METAL)	12.00	1,200.00
7320170	65	L.FT.	ELECTRICAL CONDUIT(4")(RIGID METAL)	15.00	975.00
7320175	115	L.FT.	ELECTRICAL CONDUIT(6")(RIGID METAL)	18.00	2,070.00
7320291	390	L.FT.	ELECTRICAL CONDUIT(2-1/2")(WAVE-RIB)(TEP)	4.00	1,560.00
7320292	7,130	L.FT.	ELECTRICAL CONDUIT(4")(SMOOTH-COR)(TEP)	7.00	49,910.00
7320293	11,575	L.FT.	ELECTRICAL CONDUIT(6")(SMOOTH-COR)(TEP)	11.00	127,325.00
7320400	4	EACH	PULL BOX (NO. 3 1/2)	300.00	1,200.00
7320420	3	EACH	PULL BOX (NO. 7)	750.00	2,250.00
7320421	4	EACH	PULL BOX (NO. 7) (WITH EXTENSION)	900.00	3,600.00
7320463	7	EACH	PULL BOX (TEP SR-225) (TYPE B)	7,500.00	52,500.00
7320580	15,000	L.FT.	CONDUCTORS (BARE BOND)(NO. 8)	0.85	12,750.00
7320600	1	L.SUM	CONDUCTORS (TRAFFIC SYSTEM @ PRINCE/MOUNTAIN)	12,500.00	12,500.00
7320654	24,000	L.FT.	CONDUCTORS (NO. 6)(STREET LIGHT SYSTEM)	1.20	28,800.00
7320711	1	L.SUM	TRENCHING AND BACKFILL (UTILITY CONDUITS)	88,000.00	88,000.00
7330060	12	EACH	TRAFFIC SIGNAL FACE (TYPE F)	850.00	10,200.00
7330210	8	EACH	TRAFFIC SIGNAL FACE (PEDESTRIAN) (MAN/HAND)	500.00	4,000.00
7330220	8	EACH	PEDESTRIAN PUSH BUTTON	300.00	2,400.00
7330310	8	EACH	TRAFFIC SIGNAL MOUNTING ASSEMBLY (TYPE II)	150.00	1,200.00
7330340	4	EACH	TRAFFIC SIGNAL MOUNTING ASSEMBLY (TYPE V)	350.00	1,400.00
7330350	2	EACH	TRAFFIC SIGNAL MOUNTING ASSEMBLY (TYPE VI)	250.00	500.00
7330400	8	EACH	TRAFFIC SIGNAL MOUNTING ASSEMBLY (TYPE XI)	260.00	2,080.00
7330560	1	EACH	REMOVE AND SALVAGE TRAFFIC SIGNALS	5,000.00	5,000.00
7340402	8	EACH	BOX PAD (TEP SR-240)	500.00	4,000.00
7350120	4	EACH	LOOP DETECTOR FOR TRAFFIC SIGNALS (6'X 6')	500.00	2,000.00
7350165	1,050	L.FT.	LOOP DETECTOR LEAD-IN-CABLE	0.75	787.50
7350455	1	L.SUM	TESTING LOOP DETECTOR	5,000.00	5,000.00
7350551	1	EACH	OPTICOM PRE-EMPTION SYSTEM	30,000.00	30,000.00
7350811	1	L.SUM	SPARE BEACONS,PRE-EMPT SENSORS,PROCESSOR CARD,CAGE & HARNESS	7,500.00	7,500.00
7360030	7	EACH	LUMINAIRE (HORIZONTAL MOUNT) (HPS 250 WATT)	400.00	2,800.00
7360050	6	EACH	LUMINAIRE (HORIZONTAL MOUNT) (HPS 400 WATT120V, 1PH)	450.00	2,700.00
7360200	4	EACH	INTERNALLY ILLUMINATED STREET NAME SIGN	1,500.00	6,000.00
7360211	2	EACH	LOAD CENTER CABINET (TYPE I)(240/480 VOLT SERVICE POLE MOUNT)	10,000.00	20,000.00
7360240	2	EACH	LOAD CENTER CABINET FOUNDATION	1,000.00	2,000.00
7370101	1	L.SUM	TEMPORARY TRAFFIC SIGNALS	25,000.00	25,000.00
7370399	2	EACH	ELECTRICAL SERVICE	5,500.00	11,000.00
7370703	1	L.SUM	VIDEO DETECTION SYSTEM	40,000.00	40,000.00
7378916	8	EACH	GROUND ROD	150.00	1,200.00
8020021	1	L.SUM	GRADING FOR WATER HARVESTING BASINS	5,500.00	5,500.00
8030120	66,671	SQ.FT.	DECOMPOSED GRANITE SURFACING	0.40	26,668.40
8030139	1	L.SUM	BOULDERS (PLACEMENT)	12,000.00	12,000.00
8051005	221	EACH	TREE-15 GALLON	90.00	19,890.00
8060016	1	EACH	TRANSPLANT NATIVE SHRUB	500.00	500.00
8060017	3	EACH	TRANSPLANT CACTI/ACCENT PLANT	300.00	900.00
8061068	120	EACH	TREE (RABBIT PROOF FENCE)	20.00	2,400.00
8061296	753	EACH	SHRUB (ONE GALLON)	30.00	22,590.00
8061298	127	EACH	SHRUB (FIVE GALLON)	40.00	5,080.00
8061800	100	EACH	TREE STAKES-INSTALLED	28.00	2,800.00
8062001	160	L.FT.	HEADER (CONCRETE)	13.00	2,080.00
8063001	1	L.SUM	TREE NURSERY	8,000.00	8,000.00
8070001	1	L.SUM	LANDSCAPE ESTABLISHMENT	20,400.00	20,400.00
8080035	2	EACH	BACKFLOW PREVENTION UNIT (2")	1,500.00	3,000.00
8080036	2	EACH	BACKFLOW UNIT SECURITY ENCLOSURE	550.00	1,100.00
8080057	598	EACH	EMITTER(ASSEMBLY)(SIX OUTLET)	25.00	14,950.00
8080112	81	EACH	LATERAL FLUSH ASSEMBLY	12.00	972.00
8080150	2	EACH	CONTROLLER-12 STATION	17,000.00	34,000.00
8080155	2	EACH	CONTROLLER SECURITY CABINET	2,200.00	4,400.00
8080161	2	EACH	MASTER VALVE ASSEMBLY	385.00	770.00
8080168	16	EACH	REMOTE CONTROL VALVE ASSEMBLY (1")	110.00	1,760.00
8080213	4	EACH	GATE/BALL VALVE ASSEMBLY(1")	55.00	220.00
8080214	2	EACH	FLOW SENSOR ASSEMBLY	550.00	1,100.00
8080286	30	L.FT.	PIPE (PVC) (6") (STORM DRAIN)	25.00	750.00
8080306	7,154	L.FT.	PIPE, PVC, SCHEDULE 40 (1/2")	1.20	8,584.80

MOUNTAIN AVENUE - Roger Road to Fort Lowell Road - Storm Drain Breakout

COST ESTIMATE 7/27/2006

BID ITEM NUMBER	QUANTITY	UNITS	ITEM DESCRIPTION	USE	TOTAL AMOUNT	
8080314	7,154	L.FT.	PIPE, PVC, SCHEDULE 40 (3/4")	1.25	8,942.50	
8080325	7,154	L.FT.	PIPE, PVC, SCHEDULE 40 (1")	1.50	10,731.00	
8080344	3,324	L.FT.	PIPE, PVC, SCHEDULE 40 (1 1/2")	2.25	7,479.00	
8080394	5,699	L.FT.	PIPE (SLEEVE)PVC, SCHEDULE 40(4")	6.00	34,194.00	
8080606	2	EACH	ELECTRICAL SERVICE TO CONTROLLER	1,100.00	2,200.00	
8080618	2	EACH	PROVIDE WATER SERVICE (IRRIG.METER)	8,000.00	16,000.00	
8080791	1	L.SUM	LOW VOLTAGE ELECTRICAL WIRE	2,200.00	2,200.00	
8090061	10	L.FT.	SEWER PIPE (6")(DUCTILE IRON)	175.00	1,750.00	1,750.00
8090081	53	L.FT.	SEWER PIPE (8")(DUCTILE IRON)	235.00	12,455.00	12,455.00
8090181	20	L.FT.	SEWER PIPE (18")(DUCTILE IRON)	525.00	10,500.00	10,500.00
8090241	140	L.FT.	SEWER PIPE (24")(DUCTILE IRON)	700.00	98,000.00	98,000.00
8090461	37	EACH	REROUTE HOUSE CONNECTION SEWER (PC/COT WWM-404)	1,000.00	37,000.00	
8090462	15	EACH	REPLACE HCS WITH DUCTILE IRON PIPE (PC/COT WWM-108)	1,500.00	22,500.00	
8101104	137	L.FT.	PIPE, POLYVINYL CHLORIDE (PVC), 4" (CLASS 200)	60.00	8,220.00	
8101106	611	L.FT.	PIPE, POLYVINYL CHLORIDE (PVC), 6" (CLASS 200)	75.00	45,825.00	45,825.00
8101108	380	L.FT.	PIPE, POLYVINYL CHLORIDE (PVC), 8" (CLASS 200)	90.00	34,200.00	34,200.00
8101112	5,220	L.FT.	PIPE, POLYVINYL CHLORIDE (PVC), 12" (CLASS 200)	120.00	626,400.00	
8101306	172	L.FT.	PIPE, DUCTILE IRON, 6" (CLASS 350)	80.00	13,760.00	13,760.00
8101308	198	L.FT.	PIPE, DUCTILE IRON, 8" (CLASS 350)	120.00	23,760.00	23,760.00
8101312	71	L.FT.	PIPE, DUCTILE IRON, 12" (CLASS 350)	150.00	10,650.00	10,650.00
8101503	745	L.FT.	PIPE, COPPER, 3/4", W/FITTINGS	15.00	11,175.00	
8101504	45	L.FT.	PIPE, COPPER, 1", W/FITTINGS	20.00	900.00	
8101506	10	L.FT.	PIPE, COPPER, 1 1/2" W/ FITTINGS	30.00	300.00	
8101508	35	L.FT.	PIPE, COPPER, 2", W/FITTINGS	35.00	1,225.00	
8102104	2	EACH	VALVE, 4", BOX & COVER	1,000.00	2,000.00	
8102106	5	EACH	VALVE, 6", BOX & COVER	1,350.00	6,750.00	6,750.00
8102108	2	EACH	VALVE, 8", BOX & COVER	1,800.00	3,600.00	3,600.00
8102112	11	EACH	GATE VALVE (12")	2,200.00	24,200.00	
8102312	1	EACH	TAPPING SLEEVE & VALVE, BOX & COVER, 12" x 8"	3,000.00	3,000.00	
8102505	4	EACH	RESET FRAME AND COVER FOR VALVE BOX	400.00	1,600.00	
8103205	13	EACH	FIRE HYDRANT	3,300.00	42,900.00	
8104010	516	L.FT.	WATER PIPE REMOVAL & DISPOSAL,OTHER THAN CEMENT-ASBESTOS(CA)	20.00	10,320.00	10,320.00
8104210	803	L.FT.	CEMENT-ASBESTOS WATER PIPE REMOVAL & DISPOSAL, 10" & SMALLER	15.00	12,045.00	12,045.00
8104212	5,369	L.FT.	CEMENT-ASBESTOS WATER PIPE REMOVAL & DISPOSAL, 12" & LARGER	23.00	123,487.00	
8108103	63	EACH	TIE OVER, 3/4" (T)	200.00	12,600.00	
8108104	2	EACH	TIE OVER, 1" (T)	250.00	500.00	
8108106	1	EACH	TIE OVER, 1 1/2"(T)	300.00	300.00	
8108108	2	EACH	TIE OVER, 2" (T)	350.00	700.00	
8108113	10	EACH	METER RELOCATION, SERVICE LINE RENEWAL, 3/4" (M/R)	750.00	7,500.00	
8108114	1	EACH	METER RELOCATION, SERVICE LINE RENEWAL, 1" (M/R)	1,000.00	1,000.00	
9010001	1	L.SUM	MOBILIZATION	600,000.00	600,000.00	
9020171	109	L.FT.	RECONSTRUCT CHAIN LINK FENCE	25.00	2,725.00	2,725.00
9080041	12,357	L.FT.	CONCRETE CURB (COT/PC STD. 209)(VERTICAL)(TYPE 2)	16.50	203,890.50	
9080042	145	L.FT.	CONCRETE CURB (COT/PC STD. 209) (24" WEDGE)	22.00	3,190.00	
9080084	261	L.FT.	CONCRETE CURB AND GUTTER (COT/PC STD. 209, H=7")	25.00	6,525.00	
9080112	6	EACH	CONCRETE TRANSITION CURB (COT/PC STD. 210)	450.00	2,700.00	
9080113	4	EACH	CONCRETE TRANSITION CURB (DETAIL H)	500.00	2,000.00	
9080203	46,511	SQ.FT.	CONCRETE SIDEWALK (COT/PC STD. NO. 200)	5.50	255,810.50	
9080298	39	EACH	CONCRETE SIDEWALK RAMP	1,500.00	58,500.00	
9080304	28,194	SQ.FT.	CONCRETE DRIVEWAYS (PC/COT 206)	7.00	197,358.00	
9080401	48	L.FT.	CONCRETE HEADER	20.00	960.00	
9090003	1	EACH	SURVEY MONUMENT (PC/COT 103)	550.00	550.00	550.00
9130099	1	L.SUM	RECONSTRUCT RIPRAP	2,500.00	2,500.00	2,500.00
9140105	14,648	SQ.FT.	DECORATIVE PAVEMENT (STAMPED ASPHALT)	8.00	117,184.00	
9140116	13	L.FT.	WALL (BLOCK) (RECONSTRUCT)	50.00	650.00	
9140142	213	L.FT.	RECONSTRUCT FENCE (CABLE BARRIER AND WOOD)	15.00	3,195.00	
9140153	488	SQ.FT.	RETAINING WALL (DETAIL DP)	90.00	43,920.00	43,920.00
9201006	1,161	SQ.YD.	CONCRETE CHANNEL LINING (6")	200.00	232,200.00	232,200.00
9210100	252	SQ.YD.	CONCRETE UNIT PAVERS	60.00	15,120.00	
9240015	1	L.SUM	FORCE ACCOUNT WORK (RECONSTRUCT HOUSE CONNECTION SEWER)	10,000.00	10,000.00	
9260004	1	L.SUM	ENGINEERS FIELD OFFICE	40,000.00	40,000.00	
9240002	500	HR.	PROVIDE ON-THE-JOB TRAINING	0.80	400.00	
9240170	1	L.SUM	CONTRACTOR QUALITY CONTROL	50,000.00	50,000.00	
				TOTAL:	$9,981,257.90	$5,346,165.00

Appendix 7.b
TSMS(10) -- 100-year Metering Proposal
Data and results common to TSMS(6) not printed here.

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
*  RUN DATE  07/25/2006  TIME  17:49:33 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
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```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X   -    X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID    Appendix 7a
  2           ID    TSMS(10) -- 100-Year with Metering Proposal (175 cfs)
  3           ID    Future Street Flow and Storm Drain Routing in Place
  4           ID    Data and results common to TSMS(3) not printed here.
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *DIAGRAM
              *
              * Curve numbers for Basin DG are based on PB = 3.131 corresponding to POC_K
              * and are slightly inaccurate for other precipitation values.  CNs for Basin GR
              * are based on PB = 3.60.
              *
              * -- TSMS(10) --
              * The diversion in TSMS(6) at sdz (Mountain Avenue) has been reduced from 355
              * cfs to 175 cfs.
              *
              *
  5           IT       1                    300
  6           IO       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  7           KK   S0010
  8           KM        RUNOFF FROM SUBBASIN S0010
  9           IN       1
 10           PB   3.143

              *

340           KK     sdz
341           KM     Divert Qcap of 84" Mountain Ave SD determined in previous study to be 355
342           DT    SD_z
343           DI       0     175    4000
344           DQ       0     175     175
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *     .



723           KK       A
724           KM      Off-Site flow at First Avenue and Blacklidge (Cemetery Wash)
725           DR   POC_A

726           KK       x
727           HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 728          KK       B
 729          KM      Off-Site flow at First Avenue and Ft Lowell
 730          DR   POC_B
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 731          KK    DT_B
 732          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (244.0 cfs).  Save temporarily as divB
              * Storm Drain is RCP  D=6.0  nCls=1 So=.0050  n=.016  L=650
 733          DT    divB
 734          DI     0.0   244.0   10000
 735          DQ     0.0   244.0   244.0
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 736          KK   SF_BC
 737          KM   First Avenue, Ft. Lowell to Navajo Road
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=440  So=.0030
 738          RS       1    FLOW      -1
 739          SV       0    .126    .217    .415    .556   1.061   1.566   2.576   3.081
 740          SQ       0      30      59     134     183     532    1013    2316    3119
 741          SE       0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divB

 742          KK    DR_B
 743          KM        Navajo Wash Scenario
 744          DR    divB
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 745          KK   SD_BC
 746          KM       Navajo Wash Scenario
 747          RS       1    FLOW      -1
 748          SV       0     .03     .08     .14     .21     .28     .34     .39     .42
 749          SQ       0       4      16      34      57      81     104     120     244
 750          SE       0    0.75    1.50    2.25    3.00    3.75    4.50    5.25    6.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 751          KK       D
 752          KM     Off-Site flow at Navajo and Ft. Lowell Road
 753          DR   POC_D
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 754          KK    DT_D
 755          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (1,837.2 cfs).  Save temporarily as divD
              * Storm Drain is RCBC B=8.0  D=7.0  nCls=3 So=.0060  n=.016  L=2786
 756          DT    divD
 757          DI     0.0  1837.2   10000
 758          DQ     0.0  1837.2  1837.2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 759          KK   SF_DC
 760          KM   Navajo Wash, Ft. Lowell to First Ave
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=2780  So=.0050
 761          RS       1    FLOW      -1
 762          SV       0    .421     .979   1.623   2.241   4.095   6.671   7.959   9.247
 763          SQ       0      32      85     177     292     764    1693    2263    2897
 764          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divD

 765          KK    DR_D
 766          KM        Navajo Wash Scenario
 767          DR    divD
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 768          KK   SD_DC
 769          KM       Navajo Wash Scenario
 770          RS       1    FLOW      -1
 771          SV       0    1.34    2.69    4.03    5.37    6.72    8.06    9.40   10.74
 772          SQ       0     121     345     618     919    1238    1570    1911    1837
 773          SE       0    0.88    1.75    2.63    3.50    4.38    5.25    6.13    7.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 774          KK       C
 775          KM      Off-Site flow at Navajo and First Avenue
 776          DR   POC_C
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 777          KK    HC_C
 778          KM   Combine D & C at Navajo
 779          HC       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Begin Routing from C to I (3)
              *
```

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 780          KK    DT_C
 781          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (2,236.2 cfs).  Save temporarily as divC
              * Storm Drain is RCBC B=8.0  D=7.0  nCls=4 So=.0050  n=.016  L=3449
 782          DT    divC
 783          DI     0.0  2236.2   10000
 784          DQ     0.0  2236.2  2236.2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 785          KK   SF_CI
 786          KM   Navajo Wash, First Ave to Stone Ave
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=3450  So=.0045
 787          RS       1    FLOW      -1
 788          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 789          SQ       0      30      81     168     277     725    1606    2147    2748
 790          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divC

 791          KK    DR_C
 792          KM        Navajo Wash Scenario
 793          DR    divC
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 794          KK   SD_CI
 795          KM       Navajo Wash Scenario
 796          RS       1    FLOW      -1
 797          SV       0    2.22    4.43    6.65    8.87   11.08   13.30   15.52   17.74
 798          SQ       0     148     420     752    1118    1507    1911    2326    2236
 799          SE       0    0.88    1.75    2.63    3.50    4.38    5.25    6.13    7.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 800          KK    HC_I
 801          KM   Combine with flow from C
 802          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 803          KK    DT_I
 804          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (2,668.9 cfs).  Save temporarily as divI
              * Storm Drain is RCBC B=10.0  D=7.0  nCls=4 So=.0040  n=.016  L=1873
 805          DT    divI
 806          DI     0.0  2668.9   10000
 807          DQ     0.0  2668.9  2668.9
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 808          KK   SF_IJ
 809          KM   Navajo Wash, Stone Ave to Oracle Road
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=1870  So=.0037
 810          RS       1    FLOW      -1
 811          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 812          SQ       0      27      73     152     251     657    1457    1947    2492
 813          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divI

 814          KK    DR_I
 815          KM        Navajo Wash Scenario
 816          DR    divI
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 817          KK   SD_IJ
 818          KM       Navajo Wash Scenario
 819          RS       1    FLOW      -1
 820          SV       0    1.50    3.01    4.51    6.02    7.52    9.03   10.53   12.04
 821          SQ       0     169     490     888    1334    1813    2315    2834    2669
 822          SE       0    0.88    1.75    2.63    3.50    4.38    5.25    6.13    7.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 823          KK       J
 824          KM    Recall N0260
 825          DR   POC_J
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 826          KK    HC_J
 827          KM   Combine with flow from I
 828          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 829          KK   CF_JK
 830          KM       New channel downstream of Oracle -- NAVAJO WASH APPROACH
              * Bottom Width B=25.0  Max Depth D=12.0  =.016  L=3176  So=.0025
 831          RS       1    FLOW      -1
 832          SV       0   2.734   5.468   8.202  10.936  13.670  16.404  19.138  21.872
 833          SQ       0     212     629    1163    1776    2445    3158    3903    4675
 834          SE       0    1.50    3.00    4.50    6.00    7.50    9.00   10.50   12.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 835          KK       K
 836          DR   POC_K
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 837          KK    HC_K
 838          KM   Add K to J
 839          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
 840          ZZ
1
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.       (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW


 718        Pt_H
               .
               .
 725           .           .<-------   POC_A
 723           .          A
               .           .
               .           .
 726           x............
               .
               .
 730           .           .<-------   POC_B
 728           .          B
               .           .
               .           .
 733           .           .------->    divB
 731           .        DT_B
               .           V
               .           V
 736           .       SF_BC
               .           .
               .           .
 744           .           .           .<-------    divB
 742           .           .        DR_B
               .           .           V
               .           .           V
 745           .           .       SD_BC
               .           .           .
               .           .           .
 753           .           .           .           .<-------   POC_D
 751           .           .           .          D
               .           .           .           .
               .           .           .           .
 756           .           .           .           .------->    divD
 754           .           .           .       DT_D
               .           .           .          V
               .           .           .          V
 759           .           .           .      SF_DC
               .           .           .           .
               .           .           .           .
 767           .           .           .           .           .<-------    divD
 765           .           .           .           .        DR_D
               .           .           .           .           V
               .           .           .           .           V
 768           .           .           .           .       SD_DC
               .           .           .           .           .
               .           .           .           .           .
 776           .           .           .           .           .           .<-------   POC_C
 774           .           .           .           .           .          C
               .           .           .           .           .           .
               .           .           .           .           .           .
 777           .        HC_C.............................................
               .           .
               .           .
 782           .           .------->    divC
```

```
[illegible]          .        DT_C
                     .           V
                     .           V
785                  .       SF_CI
                     .           .
                     .           .
793                  .           .           .<-------    divC
791                  .           .        DR_C
                     .           .           V
                     .           .           V
794                  .           .       SD_CI
                     .           .           .
                     .           .           .
800             HC_I.......................
                     .
                     .
805                  .------->    divI
803             DT_I
                     V
                     V
808            SF_IJ
                     .
                     .
816                  .           .<-------    divI
814                  .        DR_I
                     .           V
                     .           V
817                  .       SD_IJ
                     .           .
                     .           .
825                  .           .           .<-------    POC_J
823                  .           .           J
                     .           .           .
                     .           .           .
826             HC_J.......................
                     V
                     V
829            CF_JK
                     .
                     .
836                  .           .<-------    POC_K
835                  .           K
                     .           .
                     .           .
837             HC_K...........
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	DIVERSION TO	SD_z	175.	.67	109.	109.	109.	2.28		
+	HYDROGRAPH AT	sdz	1642.	.67	358.	358.	358.	2.28		
+	HYDROGRAPH AT	Pt_H	0.	.02	0.	0.	0.	5.14		
+	HYDROGRAPH AT	A	441.	.43	70.	70.	70.	.00		
+	2 COMBINED AT	x	441.	.43	70.	70.	70.	5.14		
+	HYDROGRAPH AT	B	152.	.48	25.	25.	25.	.00		
+	DIVERSION TO	divB	152.	.02	25.	25.	25.	.00		
+	HYDROGRAPH AT	DT_B	0.	.02	0.	0.	0.	.00		
+	ROUTED TO	SF_BC	0.	.02	0.	0.	0.	.00		
+									.00	1.52
+	HYDROGRAPH AT	DR_B	152.	.48	25.	25.	25.	.00		
+	ROUTED TO	SD_BC	155.	.47	25.	25.	25.	.00		
+									5.46	.47
+	HYDROGRAPH AT	D	1694.	.75	388.	388.	388.	.00		
+	DIVERSION TO	divD	1694.	.02	388.	388.	388.	.00		
+	HYDROGRAPH AT	DT_D	0.	.02	0.	0.	0.	.00		
	ROUTED TO									

+	SF_DC	0.	.02	0.	0.	0.	.00	.00	1.45
+									
+	HYDROGRAPH AT DR_D	1694.	.75	388.	388.	388.	.00		
+	ROUTED TO SD_DC	1676.	.80	388.	388.	388.	.00	5.52	.80
+									
+	HYDROGRAPH AT C	100.	.38	14.	14.	14.	.00		
+	5 COMBINED AT HC_C	1811.	.78	427.	427.	427.	.00		
+	DIVERSION TO divC	1811.	.02	427.	427.	427.	.00		
+	HYDROGRAPH AT DT_C	0.	.02	0.	0.	0.	.00		
+	ROUTED TO SF_CI	0.	.02	0.	0.	0.	.00	.00	.72
+									
+	HYDROGRAPH AT DR_C	1811.	.78	427.	427.	427.	.00		
+	ROUTED TO SD_CI	1774.	.87	427.	427.	427.	.00	4.96	.87
+									
+	3 COMBINED AT HC_I	1996.	.83	497.	497.	497.	5.14		
+	DIVERSION TO divI	1996.	.02	497.	497.	497.	5.14		
+	HYDROGRAPH AT DT_I	0.	.02	0.	0.	0.	5.14		
+	ROUTED TO SF_IJ	0.	.02	0.	0.	0.	5.14	.00	1.27
+									
+	HYDROGRAPH AT DR_I	1996.	.83	497.	497.	497.	.00		
+	ROUTED TO SD_IJ	1986.	.88	497.	497.	497.	.00	4.68	.88
+									
+	HYDROGRAPH AT J	633.	.68	201.	201.	201.	.00		
+	3 COMBINED AT HC_J	2569.	.85	698.	698.	698.	5.14		
+	ROUTED TO CF_JK	2548.	.90	697.	697.	697.	5.14		

+								7.72	.90
	HYDROGRAPH AT								
+		K	1625.	.67	472.	472.	472.	.00	
	2 COMBINED AT								
+		HC_K	4050.	.87	1169.	1169.	1169.	5.14	

*** NORMAL END OF HEC-1 ***

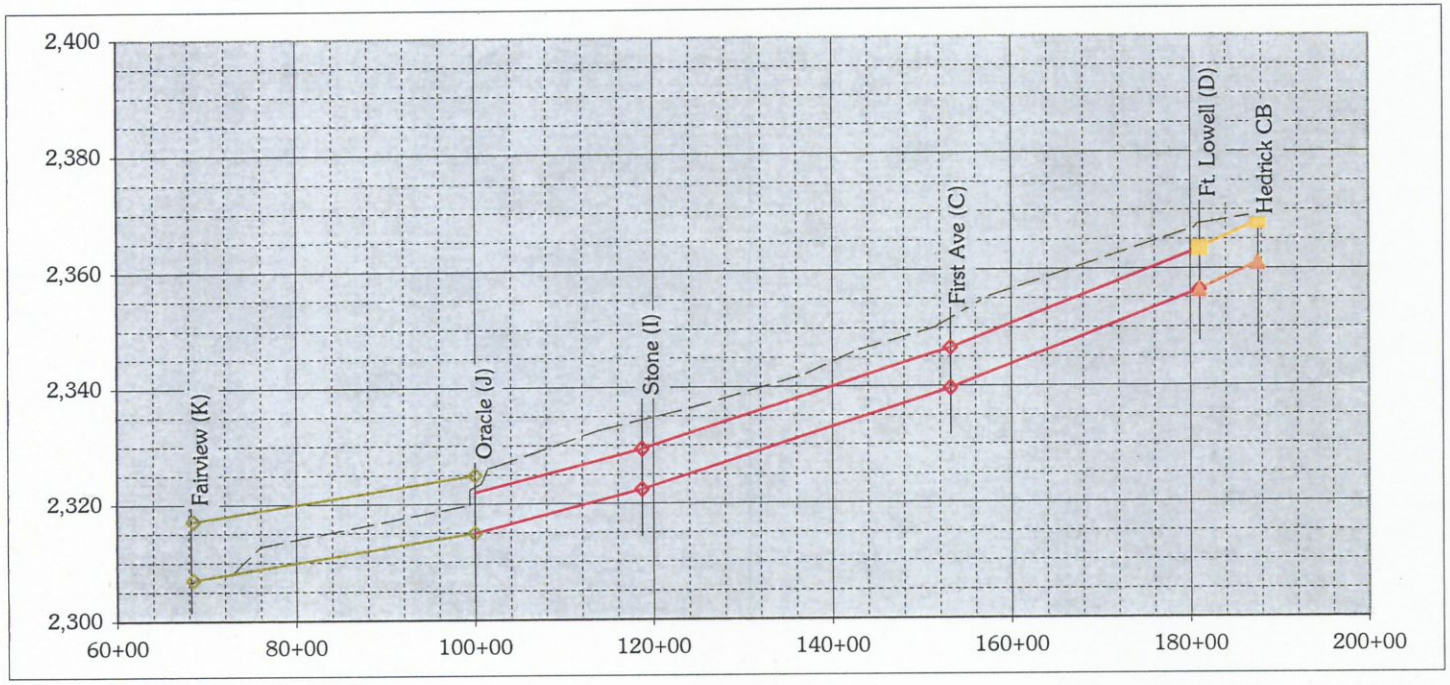
Appendix 7c. TSMS(10) -- 100-Year Metered Conditions Storm Drain Sizing Calculations

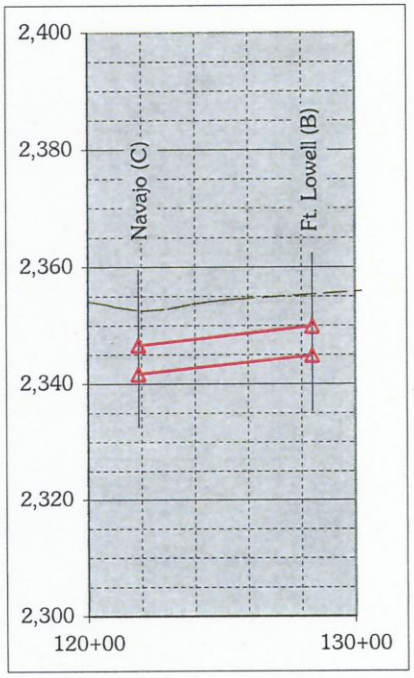
APPENDIX 7c. Storm Drain Sizing for 100-year Metered Conditions
TSMS(10) -- 100-YEAR METERING PROPOSAL

n: .016

Starting Invert: 2,307.00

Reach		Proj Sta	Grnd Elev	Q100	Exst Street Cap	Needed in SD or	nCls	B	D	So	A	P	R	Qcap	Excess Cap	L	Crown	Inv	Cover
JK	Fairview	68+49.26	2,306.71	2,731		2,731	Chnl	25.00	10.00	.0025	250.0	45.0	5.56	3,651		3,151	2,317.00	2,307.00	
	Oracle	100+00.00	2,322.85														2,324.88	2,314.88	
IJ	Oracle	100+00.00	2,322.85	2,172	251	1,921	3	10.00	7.00	.0040	210.0	102.0	2.06	2,002	+81	1,874	2,321.88	2,314.88	
	Stone	118+73.79	2,334.31														2,329.37	2,322.37	4.94
CI	Stone	118+73.79	2,334.31	1,982	277	1,705	3	10.00	7.00	.0050	210.0	102.0	2.06	2,238	+533	3,449	2,329.37	2,322.37	
	First Ave	153+22.60	2,351.59														2,346.62	2,339.62	4.98
DC	First Ave	153+22.60	2,351.59	1,879	292	1,587	3	8.00	7.00	.0060	168.0	90.0	1.87	1,837	+250	2,786	2,346.62	2,339.62	
	Ft. Lowell	181+08.93	2,367.67														2,363.33	2,356.33	4.33
	Ft. Lowell	181+08.93	2,367.67	1,879		1,879	3	8.00	7.00	.0070	168.0	90.0	1.87	1,984	+105	657	2,363.33	2,356.33	
	Hedrick	187+65.51	2,367.16														2,367.93	2,360.93	-0.77
																Existing CB Inv:		2,358.16	
BC	Navajo	121+90.00	2,352.49	188	59	129	1	--	5.00	.0050	19.6	15.7	1.25	150	+21	650	2,346.62	2,341.62	
	Ft. Lowell	128+40.00	2,355.36														2,349.87	2,344.87	5.49





Appendix 7d.
TSMS(11) -- 10-YEAR WITH METERING
Some data and results common to TSMS(8) not printed here.

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
*  RUN DATE  07/26/2006  TIME  16:30:44 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID   Appendix __
  2           ID   TSMS(11) -- 10-year meterd conditions
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *DIAGRAM
              * Curve numbers for Basin DG are based on PB = 3.131 corresponding to POC_K
              * and are slightly inaccurate for other precipitation values.  CNs for Basin GR
              * are based on PB = 3.60.
              *
              * -- TSMS(11) --
              * This model was used to determine 10-year discharges along Navajo Wash with
              * flow diverted into existing 84" Mountain Avenue storm drain metered to not
              * exceed 175 cfs.
              *
  3           IT       1                     300
  4           IO       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  5           KK   S0010
  6           KM        RUNOFF FROM SUBBASIN S0010
  7           IN       1
  8           PB   1.991


              *

335           KK   N0180
336           KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0180
337           HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

338           KK     sdz
339           KM     Divert Qcap of 84" Mountain Ave SD determined in previous study to be 355
340           DT    SD_z
341           DI       0     175    4000
342           DQ       0     175     175
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *


              *
              * ==========================================================
              *      BEGIN RECALLING AND ROUTING DIVERTED FLOWS IN
              *       ACCORDANCE WITH THE NAVAJO WASH ALTERNATIVE
              * ==========================================================
              *

721           KK       A
722           KM      Off-Site flow at First Avenue and Blacklidge (Cemetary Wash)
723           DR   POC_A

724           KK       x
725           HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 726          KK       B
 727          KM      Off-Site flow at First Avenue and Ft Lowell
 728          DR   POC_B
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 729          KK    DT_B
 730          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (150.0 cfs).  Save temporarily as divB
              * Storm Drain is RCP  D=5.0  nCls=1 So=.0050  n=.016  L=650
 731          DT    divB
 732          DI     0.0   150.0   10000
 733          DQ     0.0   150.0   150.0
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 734          KK   SF_BC
 735          KM   First Avenue, Ft. Lowell to Navajo Road
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=440  So=.0030
 736          RS       1    FLOW      -1
 737          SV       0    .126    .217    .415    .556   1.061   1.566   2.576   3.081
 738          SQ       0      30      59     134     183     532    1013    2316    3119
 739          SE       0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divB

 740          KK    DR_B
 741          KM        Navajo Wash Scenario
 742          DR    divB
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 743          KK   SD_BC
 744          KM       Navajo Wash Scenario
 745          RS       1    FLOW      -1
 746          SV       0     .02     .06     .10     .15     .19     .24     .27     .29
 747          SQ       0       2      10      21      35      50      64      73     150
 748          SE       0    0.63    1.25    1.88    2.50    3.13    3.75    4.38    5.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 749          KK       D
 750          KM     Off-Site flow at Navajo and Ft. Lowell Road
 751          DR   POC_D
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 752          KK    DT_D
 753          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (991.9 cfs).  Save temporarily as divD
              * Storm Drain is RCBC B=8.0  D=6.0  nCls=2 So=.0060  n=.016  L=2786
 754          DT    divD
 755          DI     0.0   991.9   10000
 756          DQ     0.0   991.9   991.9
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 757          KK   SF_DC
 758          KM   Navajo Wash, Ft. Lowell to First Ave
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=2780  So=.0050
 759          RS       1    FLOW      -1
 760          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 761          SQ       0      32      85     177     292     764    1693    2263    2897
 762          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divD

 763          KK    DR_D
 764          KM        Navajo Wash Scenario
 765          DR    divD
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 766          KK   SD_DC
 767          KM       Navajo Wash Scenario
 768          RS       1    FLOW      -1
 769          SV       0     .77    1.53    2.30    3.07    3.84    4.60    5.37    6.14
 770          SQ       0      64     183     331     496     672     856    1047     992
 771          SE       0    0.75    1.50    2.25    3.00    3.75    4.50    5.25    6.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 772          KK       C
 773          KM      Off-Site flow at Navajo and First Avenue
 774          DR   POC_C
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 775          KK    HC_C
 776          KM   Combine D & C at Navajo
 777          HC       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 778          KK    DT_C
 779          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (1,118.1 cfs).  Save temporarily as divC
              * Storm Drain is RCBC B=8.0  D=7.0  nCls=2 So=.0050  n=.016  L=3449
 780          DT    divC
 781          DI     0.0  1118.1   10000
 782          DQ     0.0  1118.1  1118.1
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 783          KK   SF_CI
 784          KM   Navajo Wash, First Ave to Stone Ave
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=3450  So=.0045
 785          RS       1    FLOW      -1
 786          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 787          SQ       0      30      81     168     277     725    1606    2147    2748
 788          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divC

 789          KK    DR_C
 790          KM        Navajo Wash Scenario
 791          DR    divC
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 792          KK   SD_CI
 793          KM       Navajo Wash Scenario
 794          RS       1    FLOW      -1
 795          SV       0    1.11    2.22    3.33    4.43    5.54    6.65    7.76    8.87
 796          SQ       0      74     210     376     559     753     955    1163    1118
 797          SE       0    0.88    1.75    2.63    3.50    4.38    5.25    6.13    7.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 798          KK    HC_I
 799          KM   Combine with flow from C
 800          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 801          KK    DT_I
 802          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (1,334.5 cfs).  Save temporarily as divI
              * Storm Drain is RCBC B=10.0  D=7.0  nCls=2 So=.0040  n=.016  L=1873
 803          DT    divI
 804          DI     0.0  1334.5   10000
 805          DQ     0.0  1334.5  1334.5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

806           KK   SF_IJ
807           KM   Navajo Wash, Stone Ave to Oracle Road
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=1870  So=.0037
808           RS       1    FLOW      -1
809           SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
810           SQ       0      27      73     152     251     657    1457    1947    2492
811           SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divI

812           KK    DR_I
813           KM        Navajo Wash Scenario
814           DR    divI
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

815           KK   SD_IJ
816           KM       Navajo Wash Scenario
817           RS       1    FLOW      -1
818           SV       0     .75    1.50    2.26    3.01    3.76    4.51    5.27    6.02
819           SQ       0      85     245     444     667     907    1158    1417    1334
820           SE       0    0.88    1.75    2.63    3.50    4.38    5.25    6.13    7.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+

821           KK       J
822           KM    Recall N0260
823           DR   POC_J
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

824           KK    HC_J
825           KM   Combine with flow from I
826           HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *

827           KK   CF_JK
828           KM       New channel downstream of Oracle -- NAVAJO WASH APPROACH
              * Bottom Width B=25.0  Max Depth D=8.0  =.016  L=3176  So=.0025
829           RS       1    FLOW      -1
830           SV       0   1.823   3.645   5.468   7.291   9.113  10.936  12.759  14.581
831           SQ       0     111     335     629     975    1360    1776    2217    2679
832           SE       0    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 833          KK        K
 834          DR    POC_K
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 835          KK     HC_K
 836          KM    Add K to J
 837          HC        2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *
 838          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.       (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW


 335       N0180............
                .
                .
 340            .------->    SD_z
 338          sdz
                V
                V
 343       R0180
                .


 716        Pt_H
                .
                .
 723            .           .<-------   POC_A
 721            .           A
                .           .
                .           .
 724            x............
                .
                .
 728            .           .<-------   POC_B
 726            .           B
                .           .
                .           .
 731            .           .------->    divB
 729            .        DT_B
                .           V
                .           V
 734            .       SF_BC
                .           .
                .           .
 742            .           .           .<-------    divB
 740            .           .        DR_B
                .           .           V
                .           .           V
 743            .           .       SD_BC
                .           .           .
                .           .           .
 751            .           .           .           .<-------   POC_D
 749            .           .           .           D
                .           .           .           .
                .           .           .           .
 754            .           .           .           .------->    divD
 752            .           .           .        DT_D
                .           .           .           V
                .           .           .           V
 757            .           .           .       SF_DC
                .           .           .           .
                .           .           .           .
 765            .           .           .           .           .<-------    divD
 763            .           .           .           .        DR_D
                .           .           .           .           V
                .           .           .           .           V
```

```
766          .           .           .           .       SD_DC
             .           .           .           .           .
             .           .           .           .           .
             .           .           .           .           .<-------   POC_C
774          .           .           .           .           .
772          .           .           .           .           .           C
             .           .           .           .           .           .
             .           .           .           .           .           .
             .           .           .           .           .           .
775          .       HC_C.......................................................
             .           .
             .           .
780          .           .------->    divC
778          .       DT_C
             .           V
             .           V
783          .      SF_CI
             .           .
             .           .
791          .           .           .<-------    divC
789          .           .       DR_C
             .           .           V
             .           .           V
792          .           .      SD_CI
             .           .           .
             .           .           .
798       HC_I.........................
             .
             .
803          .------->    divI
801       DT_I
             V
             V
806      SF_IJ
             .
             .
814          .           .<-------    divI
812          .       DR_I
             .           V
             .           V
815          .      SD_IJ
             .           .
             .           .
823          .           .           .<-------   POC_J
821          .           .           J
             .           .           .
             .           .           .
824       HC_J.........................
             V
             V
827      CF_JK
             .
             .
834          .           .<-------   POC_K
833          .           K
             .           .
             .           .
835       HC_K............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	2 COMBINED AT	N0180	924.	.80	206.	206.	206.	2.28		
+	DIVERSION TO	SD_z	175.	.80	92.	92.	92.	2.28		
+	HYDROGRAPH AT	sdz	749.	.80	114.	114.	114.	2.28		
+	ROUTED TO	R0180	722.	.85	114.	114.	114.	2.28		
+	HYDROGRAPH AT	Pt_H	0.	.02	0.	0.	0.	5.14		
+	HYDROGRAPH AT	A	236.	.48	40.	40.	40.	.00		
+	2 COMBINED AT	x	236.	.48	40.	40.	40.	5.14		
+	HYDROGRAPH AT	B	74.	.55	14.	14.	14.	.00		
+	DIVERSION TO	divB	74.	.02	14.	14.	14.	.00		
+	HYDROGRAPH AT	DT_B	0.	.02	0.	0.	0.	.00		
+	ROUTED TO	SF_BC	0.	.02	0.	0.	0.	.00	.00	.92
+	HYDROGRAPH AT	DR_B	74.	.55	14.	14.	14.	.00		
+	ROUTED TO	SD_BC	71.	.60	14.	14.	14.	.00	4.23	.60
+	HYDROGRAPH AT	D	776.	.85	132.	132.	132.	.00		
+	DIVERSION TO	divD	776.	.02	132.	132.	132.	.00		
+	HYDROGRAPH AT	DT_D	0.	.02	0.	0.	0.	.00		
+	ROUTED TO	SF_DC	0.	.02	0.	0.	0.	.00		

+								.00	2.60
+	HYDROGRAPH AT	DR_D	776.	.85	132.	132.	132.	.00	
+	ROUTED TO	SD_DC	763.	.90	132.	132.	132.	.00	4.12 .90
+	HYDROGRAPH AT	C	50.	.42	8.	8.	8.	.00	
+	5 COMBINED AT	HC_C	832.	.88	154.	154.	154.	.00	
+	DIVERSION TO	divC	832.	.02	154.	154.	154.	.00	
+	HYDROGRAPH AT	DT_C	0.	.02	0.	0.	0.	.00	
+	ROUTED TO	SF_CI	0.	.02	0.	0.	0.	.00	.00 .77
+	HYDROGRAPH AT	DR_C	832.	.88	154.	154.	154.	.00	
+	ROUTED TO	SD_CI	812.	.95	153.	153.	153.	.00	4.64 .95
+	3 COMBINED AT	HC_I	927.	.93	193.	193.	193.	5.14	
+	DIVERSION TO	divI	927.	.02	193.	193.	193.	5.14	
+	HYDROGRAPH AT	DT_I	0.	.02	0.	0.	0.	5.14	
+	ROUTED TO	SF_IJ	0.	.02	0.	0.	0.	5.14	.00 1.28
+	HYDROGRAPH AT	DR_I	927.	.93	193.	193.	193.	.00	
+	ROUTED TO	SD_IJ	922.	.97	193.	193.	193.	.00	4.43 .97
+	HYDROGRAPH AT	J	321.	.58	115.	115.	115.	.00	
+	3 COMBINED AT	HC_J	1219.	.95	308.	308.	308.	5.14	
+	ROUTED TO	CF_JK	1206.	1.00	307.	307.	307.	5.14	4.60 1.00

```
          HYDROGRAPH AT
+                                K       894.     .78        264.       264.       264.        .00

          2 COMBINED AT
+                              HC_K     2036.     .93        571.       571.       571.       5.14

 *** NORMAL END OF HEC-1 ***
```

Appendix 7.a
TSMS(10) -- 100-year Metering Proposal
Data and results common to TSMS(6) not printed here.

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
*  RUN DATE  07/25/2006  TIME  17:49:33 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID    Appendix 7a
  2           ID    TSMS(10) -- 100-Year with Metering Proposal (175 cfs)
  3           ID    Future Street Flow and Storm Drain Routing in Place
  4           ID    Data and results common to TSMS(3) not printed here.
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *DIAGRAM
              *
              * Curve numbers for Basin DG are based on PB = 3.131 corresponding to POC_K
              * and are slightly inaccurate for other precipitation values.  CNs for Basin GR
              * are based on PB = 3.60.
              *
              * -- TSMS(10) --
              * The diversion in TSMS(6) at sdz (Mountain Avenue) has been reduced from 355
              * cfs to 175 cfs.
              *
              *
  5           IT       1                     300
  6           IO       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  7           KK   S0010
  8           KM        RUNOFF FROM SUBBASIN S0010
  9           IN       1
 10           PB   3.143

              *

340           KK     sdz
341           KM     Divert Qcap of 84" Mountain Ave SD determined in previous study to be 355
342           DT    SD_z
343           DI       0     175    4000
344           DQ       0     175     175
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *



723           KK       A
724           KM      Off-Site flow at First Avenue and Blacklidge (Cemetery Wash)
725           DR   POC_A

726           KK       x
727           HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 728          KK       B
 729          KM      Off-Site flow at First Avenue and Ft Lowell
 730          DR   POC_B
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 731          KK    DT_B
 732          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (244.0 cfs).  Save temporarily as divB
              * Storm Drain is RCP  D=6.0  nCls=1 So=.0050  n=.016  L=650
 733          DT    divB
 734          DI     0.0   244.0   10000
 735          DQ     0.0   244.0   244.0
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 736          KK   SF_BC
 737          KM   First Avenue, Ft. Lowell to Navajo Road
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=440  So=.0030
 738          RS       1    FLOW      -1
 739          SV       0    .126    .217    .415    .556   1.061   1.566   2.576   3.081
 740          SQ       0      30      59     134     183     532    1013    2316    3119
 741          SE       0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divB

 742          KK    DR_B
 743          KM        Navajo Wash Scenario
 744          DR    divB
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 745          KK   SD_BC
 746          KM       Navajo Wash Scenario
 747          RS       1    FLOW      -1
 748          SV       0     .03     .08     .14     .21     .28     .34     .39     .42
 749          SQ       0       4      16      34      57      81     104     120     244
 750          SE       0    0.75    1.50    2.25    3.00    3.75    4.50    5.25    6.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 751          KK       D
 752          KM     Off-Site flow at Navajo and Ft. Lowell Road
 753          DR   POC_D
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 754          KK    DT_D
 755          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (1,837.2 cfs).  Save temporarily as divD
              * Storm Drain is RCBC B=8.0  D=7.0  nCls=3 So=.0060  n=.016  L=2786
 756          DT    divD
 757          DI     0.0  1837.2   10000
 758          DQ     0.0  1837.2  1837.2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 759          KK   SF_DC
 760          KM   Navajo Wash, Ft. Lowell to First Ave
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=2780  So=.0050
 761          RS       1    FLOW      -1
 762          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 763          SQ       0      32      85     177     292     764    1693    2263    2897
 764          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divD

 765          KK    DR_D
 766          KM        Navajo Wash Scenario
 767          DR    divD
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 768          KK   SD_DC
 769          KM       Navajo Wash Scenario
 770          RS       1    FLOW      -1
 771          SV       0    1.34    2.69    4.03    5.37    6.72    8.06    9.40   10.74
 772          SQ       0     121     345     618     919    1238    1570    1911    1837
 773          SE       0    0.88    1.75    2.63    3.50    4.38    5.25    6.13    7.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 774          KK       C
 775          KM      Off-Site flow at Navajo and First Avenue
 776          DR   POC_C
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 777          KK    HC_C
 778          KM   Combine D & C at Navajo
 779          HC       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Begin Routing from C to I (3)
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 780          KK    DT_C
 781          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (2,236.2 cfs).  Save temporarily as divC
              * Storm Drain is RCBC B=8.0  D=7.0  nCls=4 So=.0050  n=.016  L=3449
 782          DT    divC
 783          DI     0.0  2236.2   10000
 784          DQ     0.0  2236.2  2236.2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 785          KK   SF_CI
 786          KM   Navajo Wash, First Ave to Stone Ave
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=3450  So=.0045
 787          RS       1    FLOW      -1
 788          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 789          SQ       0      30      81     168     277     725    1606    2147    2748
 790          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divC

 791          KK    DR_C
 792          KM        Navajo Wash Scenario
 793          DR    divC
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 794          KK   SD_CI
 795          KM       Navajo Wash Scenario
 796          RS       1    FLOW      -1
 797          SV       0    2.22    4.43    6.65    8.87   11.08   13.30   15.52   17.74
 798          SQ       0     148     420     752    1118    1507    1911    2326    2236
 799          SE       0    0.88    1.75    2.63    3.50    4.38    5.25    6.13    7.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 800          KK    HC_I
 801          KM   Combine with flow from C
 802          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 803          KK    DT_I
 804          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (2,668.9 cfs).  Save temporarily as divI
              * Storm Drain is RCBC B=10.0  D=7.0  nCls=4 So=.0040  n=.016  L=1873
 805          DT    divI
 806          DI     0.0  2668.9   10000
 807          DQ     0.0  2668.9  2668.9
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 808          KK   SF_IJ
 809          KM   Navajo Wash, Stone Ave to Oracle Road
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=1870  So=.0037
 810          RS       1    FLOW      -1
 811          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 812          SQ       0      27      73     152     251     657    1457    1947    2492
 813          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divI

 814          KK    DR_I
 815          KM        Navajo Wash Scenario
 816          DR    divI
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 817          KK   SD_IJ
 818          KM       Navajo Wash Scenario
 819          RS       1    FLOW      -1
 820          SV       0    1.50    3.01    4.51    6.02    7.52    9.03   10.53   12.04
 821          SQ       0     169     490     888    1334    1813    2315    2834    2669
 822          SE       0    0.88    1.75    2.63    3.50    4.38    5.25    6.13    7.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 823          KK       J
 824          KM    Recall N0260
 825          DR   POC_J
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 826          KK    HC_J
 827          KM   Combine with flow from I
 828          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 829          KK   CF_JK
 830          KM       New channel downstream of Oracle -- NAVAJO WASH APPROACH
              * Bottom Width B=25.0  Max Depth D=12.0  =.016  L=3176  So=.0025
 831          RS       1    FLOW      -1
 832          SV       0   2.734   5.468   8.202  10.936  13.670  16.404  19.138  21.872
 833          SQ       0     212     629    1163    1776    2445    3158    3903    4675
 834          SE       0    1.50    3.00    4.50    6.00    7.50    9.00   10.50   12.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 835          KK       K
 836          DR   POC_K
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 837          KK    HC_K
 838          KM   Add K to J
 839          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
 840          ZZ
1
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.       (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW


 718        Pt_H
              .
              .
 725          .           .<-------   POC_A
 723          .           A
              .           .
              .           .
 726          x............
              .
              .
 730          .           .<-------   POC_B
 728          .           B
              .           .
              .           .
 733          .           .------->    divB
 731          .        DT_B
              .           V
              .           V
 736          .       SF_BC
              .           .
              .           .
 744          .           .           .<-------    divB
 742          .           .        DR_B
              .           .           V
              .           .           V
 745          .           .       SD_BC
              .           .           .
              .           .           .
 753          .           .           .           .<-------   POC_D
 751          .           .           .           D
              .           .           .           .
              .           .           .           .
 756          .           .           .           .------->    divD
 754          .           .           .        DT_D
              .           .           .           V
              .           .           .           V
 759          .           .           .       SF_DC
              .           .           .           .
              .           .           .           .
 767          .           .           .           .           .<-------    divD
 765          .           .           .           .        DR_D
              .           .           .           .           V
              .           .           .           .           V
 768          .           .           .           .       SD_DC
              .           .           .           .           .
              .           .           .           .           .
 776          .           .           .           .           .           .<-------   POC_C
 774          .           .           .           .           .           C
              .           .           .           .           .           .
              .           .           .           .           .           .
 777          .        HC_C.............................................
              .           .
              .           .
 782          .           .------->    divC
```

```
780          .        DT_C
             .          V
             .          V
785          .       SF_CI
             .          .
             .          .
793          .          .          .<-------    divC
791          .          .       DR_C
             .          .          V
             .          .          V
794          .          .      SD_CI
             .          .          .
             .          .          .
800       HC_I.......................
             .
             .
805          .------->    divI
803       DT_I
             V
             V
808      SF_IJ
             .
             .
816          .          .<-------    divI
814          .        DR_I
             .          V
             .          V
817          .       SD_IJ
             .          .
             .          .
825          .          .          .<-------   POC_J
823          .          .          J
             .          .          .
             .          .          .
826       HC_J.......................
             V
             V
829      CF_JK
             .
             .
836          .          .<-------   POC_K
835          .          K
             .          .
             .          .
837       HC_K............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	DIVERSION TO	SD_z	175.	.67	109.	109.	109.	2.28		
+	HYDROGRAPH AT	sdz	1642.	.67	358.	358.	358.	2.28		
+	HYDROGRAPH AT	Pt_H	0.	.02	0.	0.	0.	5.14		
+	HYDROGRAPH AT	A	441.	.43	70.	70.	70.	.00		
+	2 COMBINED AT	x	441.	.43	70.	70.	70.	5.14		
+	HYDROGRAPH AT	B	152.	.48	25.	25.	25.	.00		
+	DIVERSION TO	divB	152.	.02	25.	25.	25.	.00		
+	HYDROGRAPH AT	DT_B	0.	.02	0.	0.	0.	.00		
+	ROUTED TO	SF_BC	0.	.02	0.	0.	0.	.00	.00	1.52
+	HYDROGRAPH AT	DR_B	152.	.48	25.	25.	25.	.00		
+	ROUTED TO	SD_BC	155.	.47	25.	25.	25.	.00	5.46	.47
+	HYDROGRAPH AT	D	1694.	.75	388.	388.	388.	.00		
+	DIVERSION TO	divD	1694.	.02	388.	388.	388.	.00		
+	HYDROGRAPH AT	DT_D	0.	.02	0.	0.	0.	.00		
	ROUTED TO									

+	SF_DC	0.	.02	0.	0.	0.	.00		
+								.00	1.45
	HYDROGRAPH AT								
+	DR_D	1694.	.75	388.	388.	388.	.00		
	ROUTED TO								
+	SD_DC	1676.	.80	388.	388.	388.	.00		
+								5.52	.80
	HYDROGRAPH AT								
+	C	100.	.38	14.	14.	14.	.00		
	5 COMBINED AT								
+	HC_C	1811.	.78	427.	427.	427.	.00		
	DIVERSION TO								
+	divC	1811.	.02	427.	427.	427.	.00		
	HYDROGRAPH AT								
+	DT_C	0.	.02	0.	0.	0.	.00		
	ROUTED TO								
+	SF_CI	0.	.02	0.	0.	0.	.00		
+								.00	.72
	HYDROGRAPH AT								
+	DR_C	1811.	.78	427.	427.	427.	.00		
	ROUTED TO								
+	SD_CI	1774.	.87	427.	427.	427.	.00		
+								4.96	.87
	3 COMBINED AT								
+	HC_I	1996.	.83	497.	497.	497.	5.14		
	DIVERSION TO								
+	divI	1996.	.02	497.	497.	497.	5.14		
	HYDROGRAPH AT								
+	DT_I	0.	.02	0.	0.	0.	5.14		
	ROUTED TO								
+	SF_IJ	0.	.02	0.	0.	0.	5.14		
+								.00	1.27
	HYDROGRAPH AT								
+	DR_I	1996.	.83	497.	497.	497.	.00		
	ROUTED TO								
+	SD_IJ	1986.	.88	497.	497.	497.	.00		
+								4.68	.88
	HYDROGRAPH AT								
+	J	633.	.68	201.	201.	201.	.00		
	3 COMBINED AT								
+	HC_J	2569.	.85	698.	698.	698.	5.14		
	ROUTED TO								
+	CF_JK	2548.	.90	697.	697.	697.	5.14		

+							7.72	.90
+	HYDROGRAPH AT	K	1625.	.67	472.	472.	472.	.00
+	2 COMBINED AT	HC_K	4050.	.87	1169.	1169.	1169.	5.14

*** NORMAL END OF HEC-1 ***

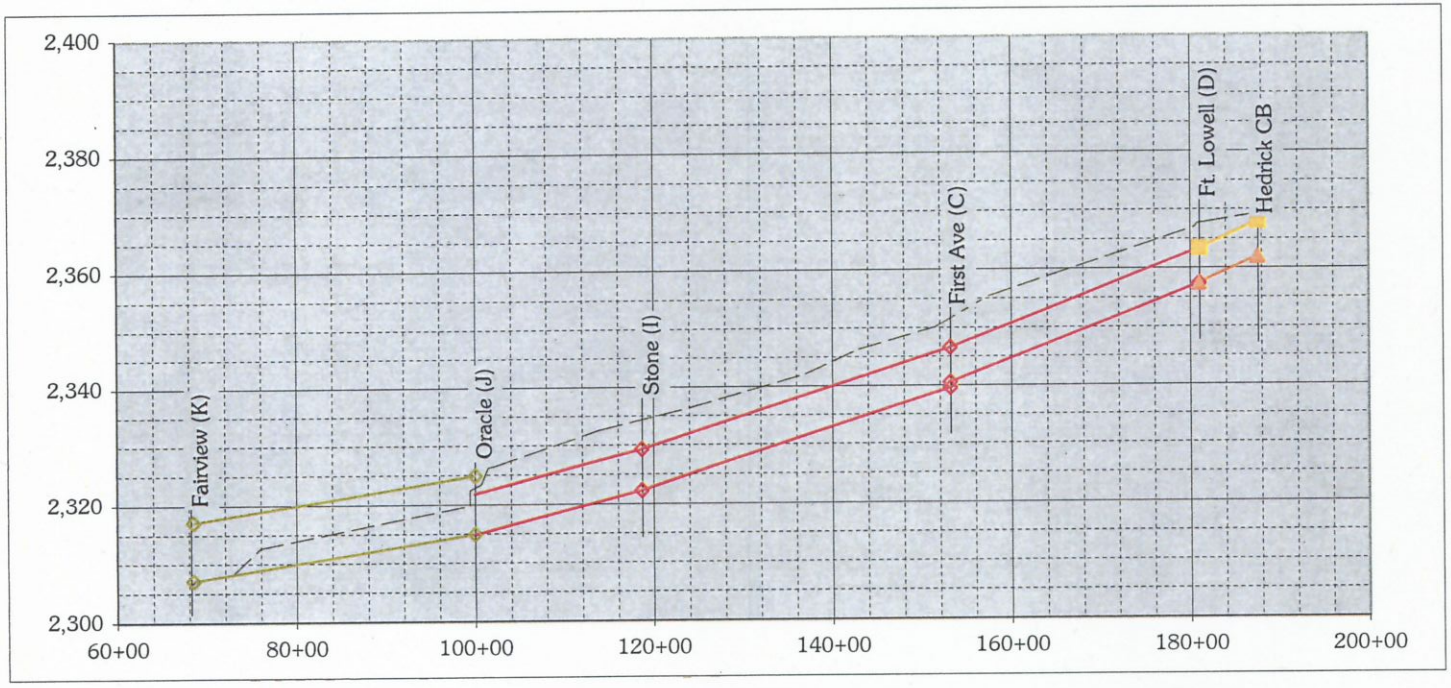
Appendix 7e. TSMS(11) -- 10-Year Metered Conditions Storm Drain Sizing Calculations

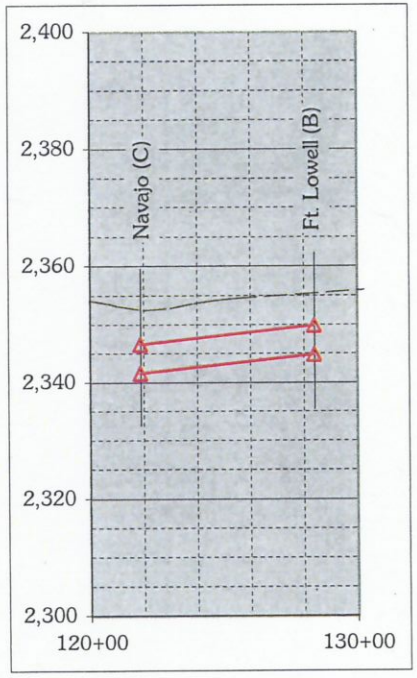
APPENDIX 7e.
TSMS(11) -- 10-YEAR METERING PROPOSAL

n: .016

Starting Invert: 2,307.00

Reach		Proj Sta	Grnd Elev	Q100	Exst Street Cap	Needed in SD or	nCls	B	D	So	A	P	R	Qcap	Excess Cap	L	Crown	Inv	Cover
JK	Fairview	68+49.26	2,306.71	1,328		1,328	Chnl	25.00	10.00	.0025	250.0	45.0	5.56	3,651		3,151	2,317.00	2,307.00	
	Oracle	100+00.00	2,322.85														2,324.88	2,314.88	
IJ	Oracle	100+00.00	2,322.85	1,090		1,090	2	10.00	7.00	.0040	140.0	68.0	2.06	1,334	+244	1,874	2,321.88	2,314.88	
	Stone	118+73.79	2,334.31														2,329.37	2,322.37	4.94
CI	Stone	118+73.79	2,334.31	952		952	2	8.00	7.00	.0050	112.0	60.0	1.87	1,118	+166	3,449	2,329.37	2,322.37	
	First Ave	153+22.60	2,351.59														2,346.62	2,339.62	4.98
DC	First Ave	153+22.60	2,351.59	893		893	2	8.00	6.00	.0060	96.0	56.0	1.71	992	+99	2,786	2,346.62	2,340.62	
	Ft. Lowell	181+08.93	2,367.67														2,363.33	2,357.33	4.33
	Ft. Lowell	181+08.93	2,367.67	893		893	2	8.00	6.00	.0070	96.0	56.0	1.71	1,071	+178	657	2,363.33	2,357.33	
	Hedrick	187+65.51	2,367.16														2,367.93	2,361.93	-0.77
																Existing CB Inv:		2,358.16	
BC	Navajo	121+90.00	2,352.49	91		91	1	--	5.00	.0050	19.6	15.7	1.25	150	+59	650	2,346.62	2,341.62	
	Ft. Lowell	128+40.00	2,355.36														2,349.87	2,344.87	5.49





Appendix 7f.
TSMS(12) -- 2-YEAR WITH METERING
Some data and results common to TSMS(8) not printed here.

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
*  RUN DATE  07/27/2006  TIME  08:24:42 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID   Appendix __
  2           ID   TSMS(12) -- 2-year metered conditions
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *DIAGRAM
              * Curve numbers for Basin DG are based on PB = 3.131 corresponding to POC_K
              * and are slightly inaccurate for other precipitation values.  CNs for Basin GR
              * are based on PB = 3.60.
              *
              * -- TSMS(12) --
              * This model was used to determine 2-year discharges along Navajo Wash with
              * flow diverted into existing 84" Mountain Avenue storm drain metered to not
              * exceed 175 cfs.
              *
  3           IT       1                     300
  4           IO       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

  5           KK   S0010
  6           KM        RUNOFF FROM SUBBASIN S0010
  7           IN       1
  8           PB   1.153


335           KK   N0180
336           KM       COMBINE SUBBASIN & CHANNEL HYDROGRAPHS @ N0180
337           HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

338           KK     sdz
339           KM     Divert Qcap of 84" Mountain Ave SD determined in previous study to be 355
340           DT    SD_z
341           DI       0     175    4000
342           DQ       0     175     175
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *




721           KK       A
722           KM      Off-Site flow at First Avenue and Blacklidge (Cemetary Wash)
723           DR   POC_A

724           KK       x
725           HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 726          KK       B
 727          KM      Off-Site flow at First Avenue and Ft Lowell
 728          DR   POC_B
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 729          KK    DT_B
 730          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (82.7 cfs).  Save temporarily as divB
              * Storm Drain is RCP  D=4.0  nCls=1 So=.0050  n=.016  L=650
 731          DT    divB
 732          DI     0.0    82.7   10000
 733          DQ     0.0    82.7    82.7
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 734          KK   SF_BC
 735          KM   First Avenue, Ft. Lowell to Navajo Road
              * Half Roadway W=43.0  Sx=.020  n=.016  h=.50
              * Half Parkway W=7.0  Sx=.020  n=.025
              * L=440  So=.0030
 736          RS       1    FLOW      -1
 737          SV       0    .126    .217    .415    .556   1.061   1.566   2.576   3.081
 738          SQ       0      30      59     134     183     532    1013    2316    3119
 739          SE       0    0.50    0.64    0.86    1.00    1.50    2.00    3.00    3.50
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divB

 740          KK    DR_B
 741          KM        Navajo Wash Scenario
 742          DR    divB
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 743          KK   SD_BC
 744          KM       Navajo Wash Scenario
 745          RS       1    FLOW      -1
 746          SV       0     .01     .04     .06     .09     .12     .15     .17     .19
 747          SQ       0       1       5      12      19      28      35      41      83
 748          SE       0    0.50    1.00    1.50    2.00    2.50    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 749          KK       D
 750          KM     Off-Site flow at Navajo and Ft. Lowell Road
 751          DR   POC_D
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 752          KK    DT_D
 753          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (267.3 cfs).  Save temporarily as divD
              * Storm Drain is RCP  D=6.0  nCls=1 So=.0060  n=.016  L=2786
 754          DT    divD
 755          DI     0.0   267.3   10000
 756          DQ     0.0   267.3   267.3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 757          KK   SF_DC
 758          KM   Navajo Wash, Ft. Lowell to First Ave
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=2780  So=.0050
 759          RS       1    FLOW      -1
 760          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 761          SQ       0      32      85     177     292     764    1693    2263    2897
 762          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divD

 763          KK    DR_D
 764          KM        Navajo Wash Scenario
 765          DR    divD
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 766          KK   SD_DC
 767          KM       Navajo Wash Scenario
 768          RS       1    FLOW      -1
 769          SV       0     .13     .35     .62     .90    1.19    1.45    1.68    1.81
 770          SQ       0       4      17      37      62      89     114     131     267
 771          SE       0    0.75    1.50    2.25    3.00    3.75    4.50    5.25    6.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 772          KK       C
 773          KM      Off-Site flow at Navajo and First Avenue
 774          DR   POC_C
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 775          KK    HC_C
 776          KM   Combine D & C at Navajo
 777          HC       5
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 778          KK    DT_C
 779          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (244.0 cfs).  Save temporarily as divC
              * Storm Drain is RCP  D=6.0  nCls=1 So=.0050  n=.016  L=3449
 780          DT    divC
 781          DI     0.0   244.0   10000
 782          DQ     0.0   244.0   244.0
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 783          KK   SF_CI
 784          KM   Navajo Wash, First Ave to Stone Ave
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=3450  So=.0045
 785          RS       1    FLOW      -1
 786          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 787          SQ       0      30      81     168     277     725    1606    2147    2748
 788          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divC

 789          KK    DR_C
 790          KM        Navajo Wash Scenario
 791          DR    divC
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 792          KK   SD_CI
 793          KM       Navajo Wash Scenario
 794          RS       1    FLOW      -1
 795          SV       0     .16     .44     .77    1.12    1.47    1.80    2.08    2.24
 796          SQ       0       4      16      34      57      81     104     120     244
 797          SE       0    0.75    1.50    2.25    3.00    3.75    4.50    5.25    6.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 798          KK    HC_I
 799          KM   Combine with flow from C
 800          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 801          KK    DT_I
 802          KM        Navajo Wash Scenario
              * Divert Capacity of storm drain (436.4 cfs).  Save temporarily as divI
              * Storm Drain is RCP  D=6.0  nCls=2 So=.0040  n=.016  L=1873
 803          DT    divI
 804          DI     0.0   436.4   10000
 805          DQ     0.0   436.4   436.4
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 806          KK   SF_IJ
 807          KM   Navajo Wash, Stone Ave to Oracle Road
              * Half Roadway W=18.0  Sx=.030  n=.016  h=.50
              * Half Parkway W=12.0  Sx=.020  n=.025
              * L=1870  So=.0037
 808          RS       1    FLOW      -1
 809          SV       0    .421    .979   1.623   2.241   4.095   6.671   7.959   9.247
 810          SQ       0      27      73     152     251     657    1457    1947    2492
 811          SE       0    0.54    0.79    1.04    1.28    2.00    3.00    3.50    4.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Recall  divI

 812          KK    DR_I
 813          KM        Navajo Wash Scenario
 814          DR    divI
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              * Route storm drain flow.

 815          KK   SD_IJ
 816          KM       Navajo Wash Scenario
 817          RS       1    FLOW      -1
 818          SV       0     .18     .48     .83    1.22    1.60    1.96    2.26    2.43
 819          SQ       0       7      28      61     102     145     186     214     436
 820          SE       0    0.75    1.50    2.25    3.00    3.75    4.50    5.25    6.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 821          KK       J
 822          KM    Recall N0260
 823          DR   POC_J
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 824          KK    HC_J
 825          KM   Combine with flow from I
 826          HC       3
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *

 827          KK   CF_JK
 828          KM       New channel downstream of Oracle -- NAVAJO WASH APPROACH
              * Bottom Width B=25.0  Max Depth D=8.0  =.016  L=3176  So=.0025
 829          RS       1    FLOW      -1
 830          SV       0   1.823   3.645   5.468   7.291   9.113  10.936  12.759  14.581
 831          SQ       0     111     335     629     975    1360    1776    2217    2679
 832          SE       0    1.00    2.00    3.00    4.00    5.00    6.00    7.00    8.00
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 833          KK       K
 834          DR   POC_K
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *

 835          KK    HC_K
 836          KM   Add K to J
 837          HC       2
              * -----+-------+-------+-------+-------+-------+-------+-------+-------+-------+
              *
              *
 838          ZZ
1
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.       (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW


                .
                .
 327            .       S0180
                .           .
                .           .
 335        N0180............
                .
                .
 340            .------->    SD_z
 338          sdz
                V
                V
 343        R0180
                .
                .


 716         Pt_H
                .
                .
 723            .           .<-------   POC_A
 721            .           A
                .           .
                .           .
 724            x............
                .
                .
 728            .           .<-------   POC_B
 726            .           B
                .           .
                .           .
 731            .           .------->    divB
 729            .        DT_B
                .           V
                .           V
 734            .       SF_BC
                .           .
                .           .
 742            .           .           .<-------    divB
 740            .           .        DR_B
                .           .           V
                .           .           V
 743            .           .       SD_BC
                .           .           .
                .           .           .
 751            .           .           .           .<-------   POC_D
 749            .           .           .           D
                .           .           .           .
                .           .           .           .
 754            .           .           .           .------->    divD
```

```
752          .           .           .        DT_D
             .           .           .          V
             .           .           .          V
757          .           .           .       SF_DC
             .           .           .          .
             .           .           .          .
765          .           .           .          .          .<-------    divD
763          .           .           .          .       DR_D
             .           .           .          .          V
             .           .           .          .          V
766          .           .           .          .      SD_DC
             .           .           .          .          .
             .           .           .          .          .
774          .           .           .          .          .           .<-------   POC_C
772          .           .           .          .          .           C
             .           .           .          .          .           .
             .           .           .          .          .           .
775          .       HC_C.............................................
             .           .
             .           .
780          .           .------->    divC
778          .       DT_C
             .          V
             .          V
783          .      SF_CI
             .           .
             .           .
791          .           .           .<-------    divC
789          .           .       DR_C
             .           .          V
             .           .          V
792          .           .      SD_CI
             .           .           .
             .           .           .
798       HC_I......................
             .
             .
803          .------->    divI
801       DT_I
             V
             V
806      SF_IJ
             .
             .
814          .           .<-------    divI
812          .       DR_I
             .          V
             .          V
815          .      SD_IJ
             .           .
             .           .
823          .           .           .<-------   POC_J
821          .           .           J
             .           .           .
             .           .           .
824       HC_J......................
             V
             V
827      CF_JK
             .
             .
```

```
834          .          .<-------   POC_K
833          .          K
             .          .
             .          .
835       HC_K...........
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	Pt_H	0.	.02	0.	0.	0.	5.14		
+	HYDROGRAPH AT	A	97.	.60	20.	20.	20.	.00		
+	2 COMBINED AT	x	97.	.60	20.	20.	20.	5.14		
+	HYDROGRAPH AT	B	32.	.65	7.	7.	7.	.00		
+	DIVERSION TO	divB	32.	.02	7.	7.	7.	.00		
+	HYDROGRAPH AT	DT_B	0.	.02	0.	0.	0.	.00		
+	ROUTED TO	SF_BC	0.	.02	0.	0.	0.	.00	.00	.68
+	HYDROGRAPH AT	DR_B	32.	.65	7.	7.	7.	.00		
+	ROUTED TO	SD_BC	31.	.70	7.	7.	7.	.00	2.70	.70
+	HYDROGRAPH AT	D	158.	.82	23.	23.	23.	.00		
+	DIVERSION TO	divD	158.	.02	23.	23.	23.	.00		
+	HYDROGRAPH AT	DT_D	0.	.02	0.	0.	0.	.00		
+	ROUTED TO	SF_DC	0.	.02	0.	0.	0.	.00	.00	.40
+	HYDROGRAPH AT	DR_D	158.	.82	23.	23.	23.	.00		
+	ROUTED TO	SD_DC	151.	.92	23.	23.	23.	.00	5.36	.92
+	HYDROGRAPH AT	C	23.	.50	4.	4.	4.	.00		
	5 COMBINED AT									

+		HC_C	184.	.90	33.	33.	33.	.00	
+	DIVERSION TO	divC	184.	.02	33.	33.	33.	.00	
+	HYDROGRAPH AT	DT_C	0.	.02	0.	0.	0.	.00	
+	ROUTED TO	SF_CI	0.	.02	0.	0.	0.	.00	
+									.00 1.48
+	HYDROGRAPH AT	DR_C	184.	.90	33.	33.	33.	.00	
+	ROUTED TO	SD_CI	179.	.95	33.	33.	33.	.00	
+									5.61 .95
+	3 COMBINED AT	HC_I	243.	.93	53.	53.	53.	5.14	
+	DIVERSION TO	divI	243.	.02	53.	53.	53.	5.14	
+	HYDROGRAPH AT	DT_I	0.	.02	0.	0.	0.	5.14	
+	ROUTED TO	SF_IJ	0.	.02	0.	0.	0.	5.14	
+									.00 1.03
+	HYDROGRAPH AT	DR_I	243.	.93	53.	53.	53.	.00	
+	ROUTED TO	SD_IJ	210.	1.07	52.	52.	52.	.00	
+									5.15 1.07
+	HYDROGRAPH AT	J	147.	.83	56.	56.	56.	.00	
+	3 COMBINED AT	HC_J	345.	1.02	109.	109.	109.	5.14	
+	ROUTED TO	CF_JK	334.	1.13	108.	108.	108.	5.14	
+									2.00 1.13
+	HYDROGRAPH AT	K	429.	.92	124.	124.	124.	.00	
+	2 COMBINED AT	HC_K	735.	1.00	233.	233.	233.	5.14	

*** NORMAL END OF HEC-1 ***

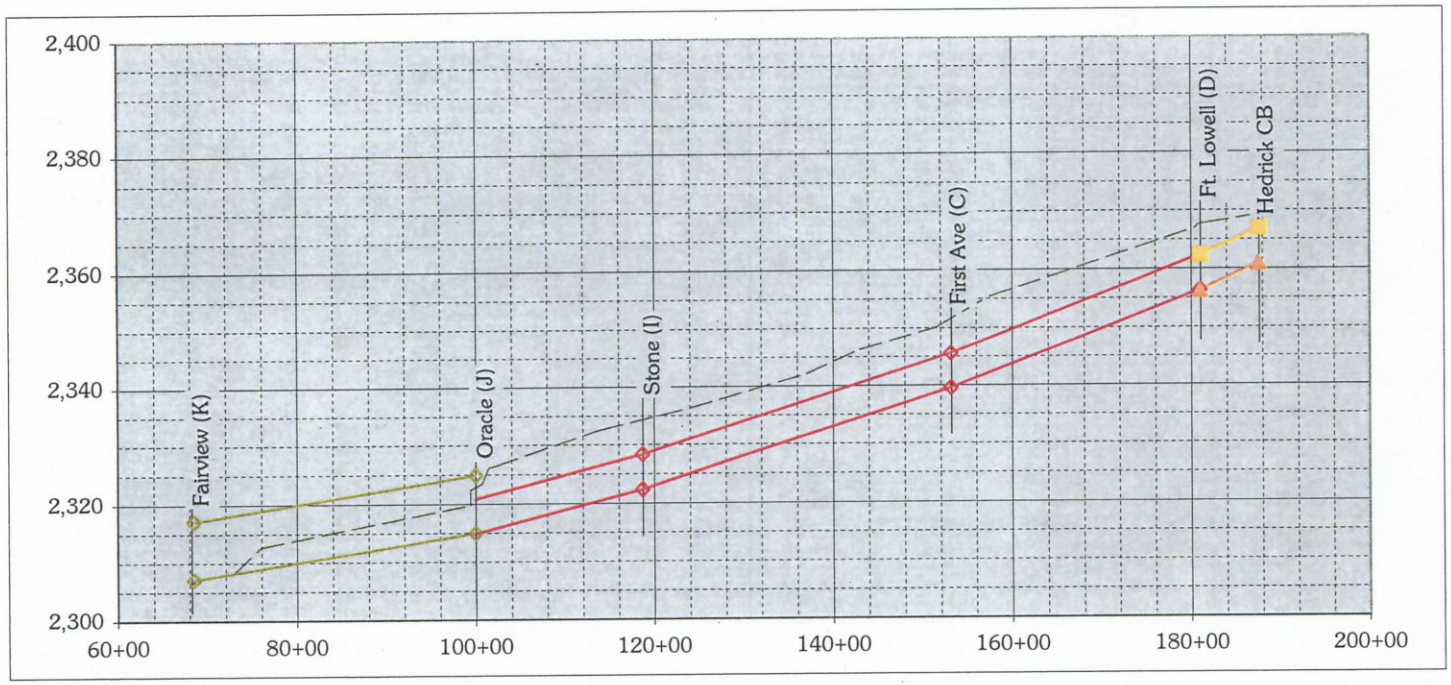
Appendix 7g. TSMS(12) -- 2-Year Metered Conditions Storm Drain Sizing Calculations

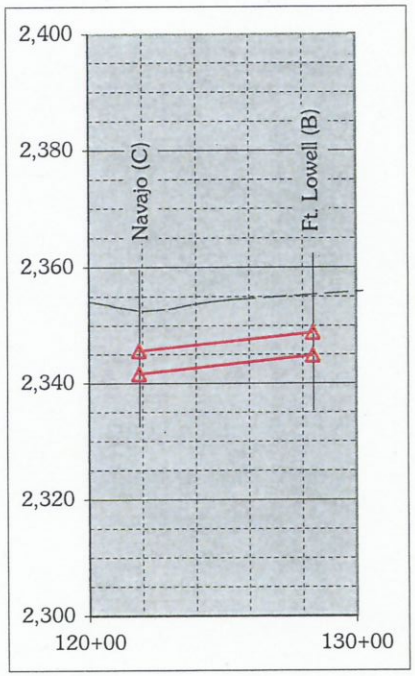
APPENDIX 7g
TSMS(12) -- 2-YEAR METERING PROPOSAL

n: .016

Starting Invert: 2,307.00

Reach		Proj Sta	Grnd Elev	Q100	Exst Street Cap	Needed in SD or	nCls	B	D	So	A	P	R	Qcap	Excess Cap	L	Crown	Inv	Cover
JK	Fairview	68+49.26	2,306.71	435		435	Chnl	25.00	10.00	.0025	250.0	45.0	5.56	3,651		3,151	2,317.00	2,307.00	
	Oracle	100+00.00	2,322.85														2,324.88	2,314.88	
IJ	Oracle	100+00.00	2,322.85	305		305	2	--	6.00	.0040	56.5	37.7	1.50	436	+131	1,874	2,320.88	2,314.88	
	Stone	118+73.79	2,334.31														2,328.37	2,322.37	5.94
CI	Stone	118+73.79	2,334.31	236		236	1	--	6.00	.0050	28.3	18.8	1.50	244	+8	3,449	2,328.37	2,322.37	
	First Ave	153+22.60	2,351.59														2,345.62	2,339.62	5.98
DC	First Ave	153+22.60	2,351.59	199		199	1	--	6.00	.0060	28.3	18.8	1.50	267	+68	2,786	2,345.62	2,339.62	
	Ft. Lowell	181+08.93	2,367.67														2,362.33	2,356.33	5.33
	Ft. Lowell	181+08.93	2,367.67	199		199	1	--	6.00	.0070	28.3	18.8	1.50	289	+90	657	2,362.33	2,356.33	
	Hedrick	187+65.51	2,367.16														2,366.93	2,360.93	0.23
																Existing CB Inv:		2,358.16	
BC	Navajo	121+90.00	2,352.49	39		39	1	--	4.00	.0050	12.6	12.6	1.00	83	+44	650	2,345.62	2,341.62	
	Ft. Lowell	128+40.00	2,355.36														2,348.87	2,344.87	6.49

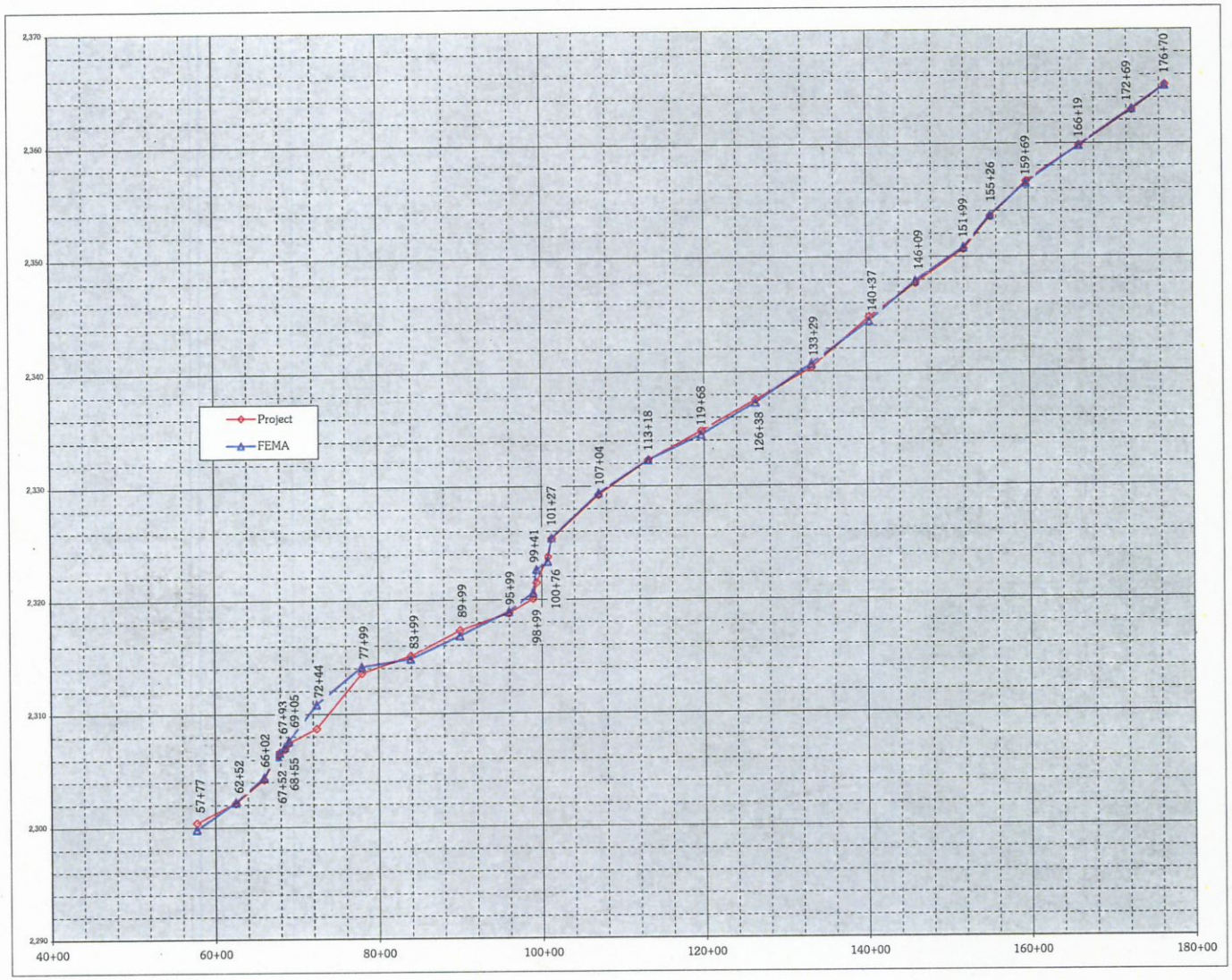




8a. Refined FEMA Cross Sections

PROJECT VS. FEMA FLOWLINE PROFILE
Navajo Wash, Oracle Road to Ft. Lowell Road

	Section	Sta	Project	FEMA	Δ
12	57+77 (12)	57+77	2300.3	2299.8	0.55
13	62+52 (13)	62+52	2302.1	2302.2	-0.10
14	66+02 (14)	66+02	2304.2	2304.4	-0.25
15	67+52 (15)	67+52	2306.4	2306.3	0.07
16	67+93 (16)	67+93	2306.6	2306.6	-0.03
17	68+55 (17)	68+55	2306.9	2307.1	-0.25
18	69+05 (18)	69+05	2307.4	2307.6	-0.20
19	72+44 (19)	72+44	2308.6	2310.8	-2.19
20	77+99 (20)	77+99	2313.5	2314.1	-0.63
21	83+99 (21)	83+99	2315.0	2314.8	0.23
22	89+99 (22)	89+99	2317.2	2316.8	0.45
23	95+99 (23)	95+99	2318.7	2318.9	-0.18
24	98+99 (24)	98+99	2320.0	2320.6	-0.60
25	99+41 (25)	99+41	2321.4	2322.6	-1.20
26	100+76 (26)	100+76	2323.7	2323.3	0.38
27	101+27 (27)	101+27	2325.3	2325.4	-0.08
28	107+04 (28)	107+04	2329.2	2329.4	-0.18
29	113+18 (29)	113+18	2332.3	2332.3	-0.03
30	119+68 (30)	119+68	2334.8	2334.5	0.31
31	126+38 (31)	126+38	2337.5	2337.3	0.20
32	133+29 (32)	133+29	2340.3	2340.7	-0.43
33	140+37 (33)	140+37	2344.7	2344.4	0.31
34	146+09 (34)	146+09	2347.6	2347.9	-0.26
35	151+99 (35)	151+99	2350.6	2350.8	-0.22
36	155+26 (36)	155+26	2353.5	2353.6	-0.11
37	159+69 (37)	159+69	2356.6	2356.5	0.09
38	166+19 (38)	166+19	2359.8	2359.8	-0.02
39	172+69 (39)	172+69	2362.9	2363.0	-0.12
40	176+70 (40)	176+70	2365.1	2365.1	0.00



Project Section 12
57+77 (12)

Polyline from .dwg--

					From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point	X=83513.7238	Y=68339.0061	Z= 368.85	83513.72	68339.01	468	2311.8
2	at point	X=83509.9566	Y=68337.2156	Z= 368.85	83509.96	68337.22	472	2311.4
3	at point	X=83503.9411	Y=68332.4264	Z= 368.85	83503.94	68332.43	478	2310.5
4	at point	X=83492.0514	Y=68282.2289	Z= 368.85	83492.05	68282.23	490	2300.4
5	at point	X=83481.7072	Y=68281.8359	Z= 368.85	83481.71	68281.84	500	2300.3
6	at point	X=83470.6336	Y=68281.4152	Z= 368.85	83470.63	68281.42	511	2300.3
7	at point	X=83460.7933	Y=68332.8044	Z= 368.85	83460.79	68332.80	521	2310.5
8	at point	X=83456.2091	Y=68357.2834	Z= 368.85	83456.21	68357.28	525	2315.4
9	at point	X=83444.9132	Y=68362.0785	Z= 368.85	83444.91	68362.08	537	2316.4
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

Center Vertical Grid Line--

from point,	X=83481.7072	Y=68255.0936	Z=	83481.71	68255.09	500	2295.00
to point,	X=83481.7072	Y=68380.0936	Z=	83481.71	68380.09	500	2320.00

CL X	83481.71
New CL Station:	5+00
Top Elev:	2320
Bottom Elev:	2295

Proj STCHL

478	2309.47
478	2311.47

Line from STCHL to STCHR

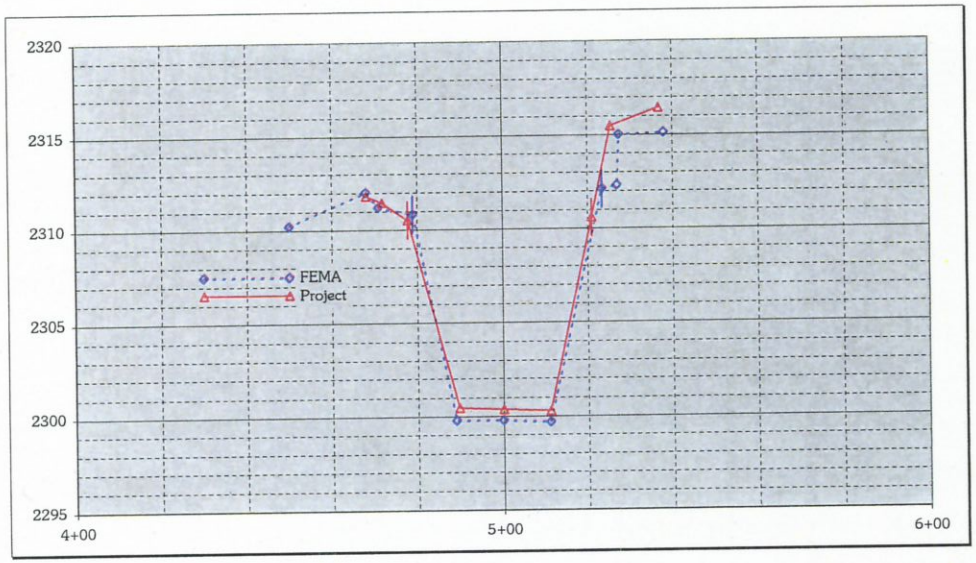
from point,	X=83503.9411	Y=68332.4264	Z=	83503.94	68332.43		
to point,	X=83460.7933	Y=68332.8044	Z=	83460.79	68332.80		

Proj STCHR

521	2309.54
521	2311.54

-------1-------2-------3-------4-------5-------6-------7-------8-------9------10

	X1 12	9	478	521						
1	GR2311.8	468	2311.4	472	2310.5	478	2300.4	490	2300.3	500
2	GR2300.3	511	2310.5	521	2315.4	525	2316.4	537	0.0	0
3	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
4	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
6	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
7	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
8	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0



FEMA SECTION 12

X1	12	11	29	73.5	475	475	475	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2308	0	2309.8	18	2309	21	2308.6	29	2297.6	39
GR	2297.6	50	2297.5	61	2309.9	73.5	2310.1	77	2312.8	77.5
GR	2312.9	88								

	Raw Elev	Sta	Adj Elev
1	2308.0	450.0	2310.2
2	2309.8	468.0	2312.0
3	2309.0	471.0	2311.2
4	2308.6	479.0	2310.8
5	2297.6	489.0	2299.8
6	2297.6	500.0	2299.8
7	2297.5	511.0	2299.7
8	2309.9	523.5	2312.1
9	2310.1	527.0	2312.3
10	2312.8	527.5	2315.0
11	2312.9	538.0	2315.1
12	0.0	450.0	2.2
13	0.0	450.0	2.2
14	0.0	450.0	2.2
15	0.0	450.0	2.2
16	0.0	450.0	2.2
17	0.0	450.0	2.2
18	0.0	450.0	2.2
19	0.0	450.0	2.2
20	0.0	450.0	2.2

Sta Adj Factor: 450.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev		
		Up:	1.0
		Down:	1.0
479.0	2310.8	479.0	2311.8
		479.0	2309.8

Chart Legend--

FEMA		Project	
430.0	2307.5	430.0	2306.5
450.0	2307.5	450.0	2306.5

FEMA STCHR

Sta	Adj Elev		
523.5	2312.1	523.5	2313.1
		523.5	2311.1

Project Section 13
62+52 (13)

Polyline from .dwg--

				From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point	X=83520.8843	Y=68502.0334	83520.88	68502.03	468	2313.4
2	at point	X=83511.7369	Y=68495.9868	83511.74	68495.99	477	2312.2
3	at point	X=83497.4224	Y=68444.7140	83497.42	68444.71	491	2301.9
4	at point	X=83488.7969	Y=68445.6181	83488.80	68445.62	500	2302.1
5	at point	X=83478.6584	Y=68446.7655	83478.66	68446.77	510	2302.3
6	at point	X=83465.0753	Y=68495.7545	83465.08	68495.75	524	2312.1
7	at point	X=83458.6583	Y=68513.0860	83458.66	68513.09	530	2315.6
8	at point	X=83445.5275	Y=68523.5552	83445.53	68523.56	543	2317.7

Center Vertical Grid Line--

from point,	X=83488.7969	Y=68410.0936	Z=	83488.80	68410.09
to point,	X=83488.7969	Y=68535.0936	Z=	83488.80	68535.09

CL X 83488.80
New CL Station: 5+00
Top Elev: 2320
Bottom Elev: 2295

Proj STCHL
500 2295.00
500 2320.00

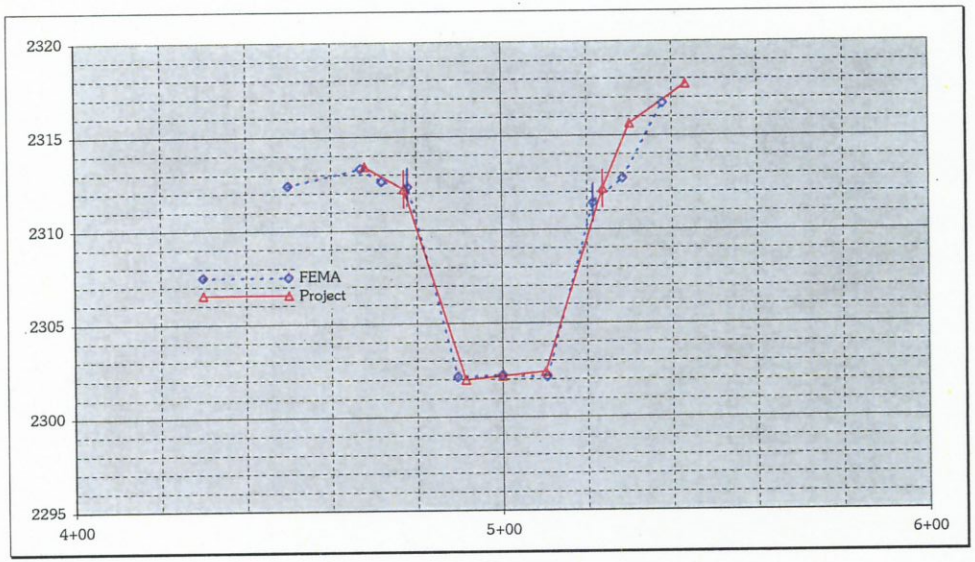
Line from STCHL to STCHR

from point,	X=83511.7369	Y=68495.9868	Z=	83511.74	68495.99
to point,	X=83465.0753	Y=68495.7545	Z=	83465.08	68495.75

Proj STCHR
477 2311.18
477 2313.18
524 2311.13
524 2313.13

-------1-------2-------3-------4-------5-------6-------7-------8-------9------10

	X1	13	8	477	524					
1	GR	2313.4	468	2312.2	477	2301.9	491	2302.1	500	2302.3	510
2	GR	2312.1	524	2315.6	530	2317.7	543	0.0	0	0.0	0
3	GR	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
4	GR	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5	GR	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
6	GR	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
7	GR	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
8	GR	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0



FEMA SECTION 13

X1	13	10	28	71.5	475	475	475	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2310.2	0	2311.1	17	2310.4	22	2310.1	28	2299.9	39.5
GR	2300	50	2299.9	60.5	2309.2	71.5	2310.5	78.5	2314.5	88

	Raw Elev	Sta	Adj Elev
1	2310.2	450.0	2312.4
2	2311.1	467.0	2313.3
3	2310.4	472.0	2312.6
4	2310.1	478.0	2312.3
5	2299.9	489.5	2302.1
6	2300.0	500.0	2302.2
7	2299.9	510.5	2302.1
8	2309.2	521.5	2311.4
9	2310.5	528.5	2312.7
10	2314.5	538.0	2316.7
11	0.0	450.0	2.2
12	0.0	450.0	2.2
13	0.0	450.0	2.2
14	0.0	450.0	2.2
15	0.0	450.0	2.2
16	0.0	450.0	2.2
17	0.0	450.0	2.2
18	0.0	450.0	2.2
19	0.0	450.0	2.2
20	0.0	450.0	2.2

Sta Adj Factor: 450.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev	Up:	1.0
		Down:	1.0
478.0	2312.3	478.0	2313.3
		478.0	2311.3

Chart Legend--

FEMA		Project	
430.0	2307.5	430.0	2306.5
450.0	2307.5	450.0	2306.5

FEMA STCHR

Sta	Adj Elev		
521.5	2311.4	521.5	2312.4
		521.5	2310.4

Project Section 14
66+02 (14)

Polyline from .dwg--

		From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point X=83508.3967 Y=68638.4292 Z= 368.85	83508.40	68638.43	470	2314.7
2	at point X=83498.8298 Y=68632.8438 Z= 368.85	83498.83	68632.84	479	2313.6
3	at point X=83489.1023 Y=68586.4291 Z= 368.85	83489.10	68586.43	489	2304.3
4	at point X=83478.2358 Y=68585.8625 Z= 368.85	83478.24	68585.86	500	2304.2
5	at point X=83470.9714 Y=68586.2877 Z= 368.85	83470.97	68586.29	507	2304.2
6	at point X=83459.1252 Y=68608.3354 Z= 368.85	83459.13	68608.34	519	2308.6
7	at point X=83447.9649 Y=68630.4935 Z= 368.85	83447.96	68630.49	530	2313.1
8	at point X=83443.6554 Y=68634.6805 Z= 368.85	83443.66	68634.68	535	2313.9

Center Vertical Grid Line--

from point, X=83478.2358 Y=68565.0936 Z=	83478.24	68565.09	500	2300.00
to point, X=83478.2358 Y=68665.0936 Z=	83478.24	68665.09	500	2320.00

CL X	83478.24
New CL Station:	5+00
Top Elev:	2320
Bottom Elev:	2300

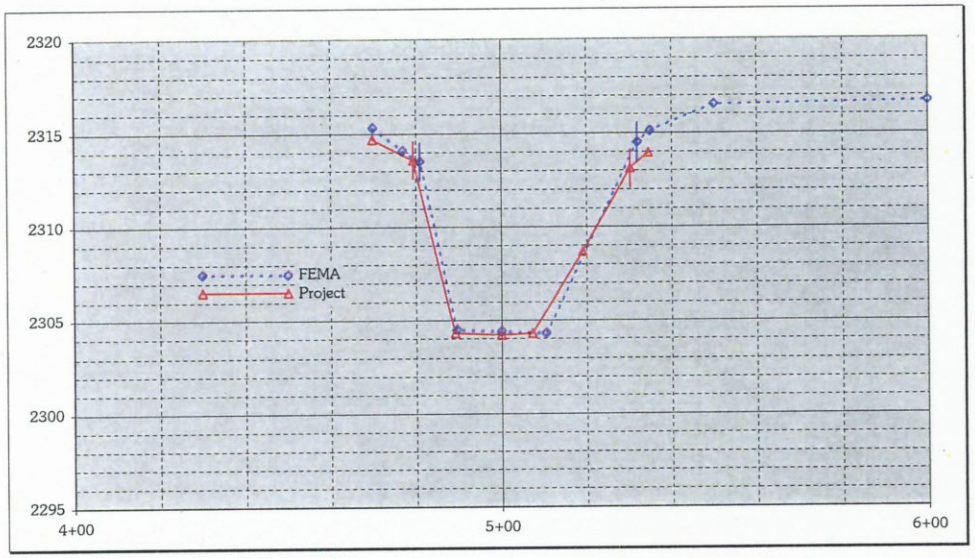
Line from STCHL to STCHR

from point, X=83498.8298 Y=68632.8438 Z=	83498.83	68632.84
to point, X=83447.9649 Y=68630.4935 Z=	83447.96	68630.49

Proj STCHL
479 2312.55
479 2314.55

Proj STCHR
530 2312.08
530 2314.08

	1	2	3	4	5	6	7	8	9	10
	X1 14	8	479	530						
1	GR2314.7	470	2313.6	479	2304.3	489	2304.2	500	2304.2	507
2	GR2308.6	519	2313.1	530	2313.9	535	0.0	0	0.0	0
3	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
4	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
6	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
7	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
8	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0



FEMA SECTION 14

X1	14	10	11	62	350	350	350	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2313.1	0	2311.9	7	2311.3	11	2302.3	19.5	2302.2	30
GR	2302.1	40.5	2312.3	62	2312.9	65	2314.3	80	2314.5	130

	Raw Elev	Sta	Adj Elev
1	2313.1	470.0	2315.3
2	2311.9	477.0	2314.1
3	2311.3	481.0	2313.5
4	2302.3	489.5	2304.5
5	2302.2	500.0	2304.4
6	2302.1	510.5	2304.3
7	2312.3	532.0	2314.5
8	2312.9	535.0	2315.1
9	2314.3	550.0	2316.5
10	2314.5	600.0	2316.7
11	0.0	470.0	2.2
12	0.0	470.0	2.2
13	0.0	470.0	2.2
14	0.0	470.0	2.2
15	0.0	470.0	2.2
16	0.0	470.0	2.2
17	0.0	470.0	2.2
18	0.0	470.0	2.2
19	0.0	470.0	2.2
20	0.0	470.0	2.2

Sta Adj Factor: 470.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev		
		Up:	1.0
		Down:	1.0
481.0	2313.5	481.0	2314.5
		481.0	2312.5

Chart Legend--

FEMA		Project	
430.0	2307.5	430.0	2306.5
450.0	2307.5	450.0	2306.5

FEMA STCHR

Sta	Adj Elev		
532.0	2314.5	532.0	2315.5
		532.0	2313.5

Project Section 15
67+52 (15)

Polyline from .dwg--

		From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point X=83711.5800 Y=68780.7306 Z= 368.8	83711.58	68780.73	366	2317.1
2	at point X=83644.3638 Y=68779.7578 Z= 368.8	83644.36	68779.76	433	2316.9
3	at point X=83626.4047 Y=68778.4574 Z= 368.8	83626.40	68778.46	451	2316.7
4	at point X=83604.8467 Y=68775.5547 Z= 368.8	83604.85	68775.55	473	2316.1
5	at point X=83588.2969 Y=68728.1910 Z= 368.8	83588.30	68728.19	489	2306.6
6	at point X=83577.6239 Y=68726.9604 Z= 368.8	83577.62	68726.96	500	2306.4
7	at point X=83567.1300 Y=68725.7655 Z= 368.8	83567.13	68725.77	510	2306.1
8	at point X=83551.7549 Y=68775.4303 Z= 368.8	83551.75	68775.43	526	2316.1
9	at point X=83538.6253 Y=68776.4019 Z= 368.8	83538.63	68776.40	539	2316.3
10	at point X=83532.2844 Y=68777.4724 Z= 368.8	83532.28	68777.47	545	2316.5
11	at point X=83523.0502 Y=68777.5336 Z= 368.8	83523.05	68777.53	555	2316.5
12					
13					
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Center Vertical Grid Line--

from point, X=83577.6239 Y=68695.0936 Z=	83577.62	68695.09	500 2300.00
to point, X=83577.6239 Y=68795.0936 Z=	83577.62	68795.09	500 2320.00

CL X 83577.62
New CL Station: 5+00
Top Elev: 2320
Bottom Elev: 2300

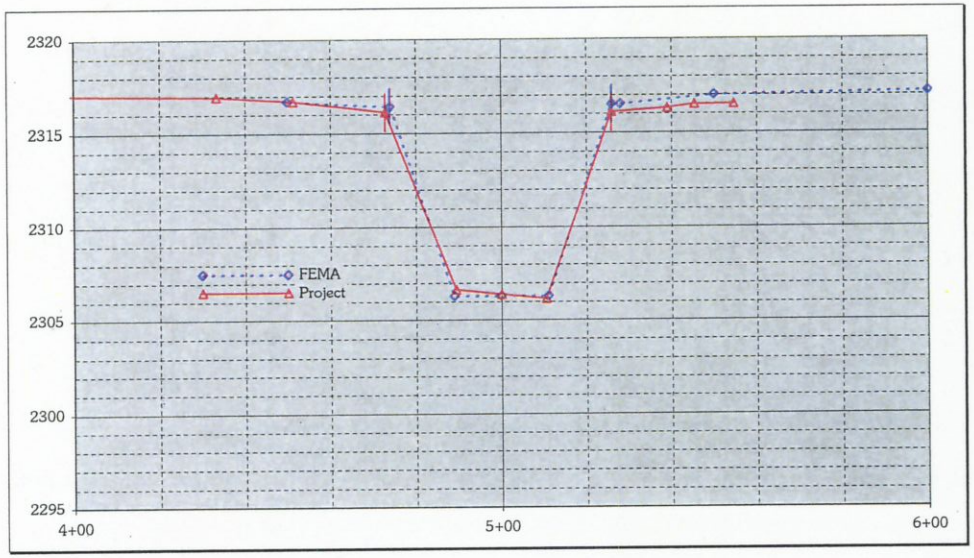
Proj STCHL
473 2315.09
473 2317.09

Line from STCHL to STCHR

from point, X=83604.8467 Y=68775.5547 Z=	83604.85	68775.55	
to point, X=83551.7549 Y=68775.4303 Z=	83551.75	68775.43	

Proj STCHR
526 2315.07
526 2317.07

	-------1-------	-------2-------	-------3-------	-------4-------	-------5-------	-------6-------	-------7-------	-------8-------	-------9-------	-------10
	X1 15	11	473	526						
1	GR2317.1	366	2316.9	433	2316.7	451	2316.1	473	2306.6	489
2	GR2306.4	500	2306.1	510	2316.1	526	2316.3	539	2316.5	545
3	GR2316.5	555	0.0	0	0.0	0	0.0	0	0.0	0
4	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
6	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
7	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
8	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0



FEMA SECTION 15

X1	15	10	24	76	150	150	150	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2314.5	0	2314.2	24	2304.1	39	2304.1	50	2304.1	61
GR	2314.3	76	2314.3	78	2314.8	100	2315	150	2315.1	200

	Raw Elev	Sta	Adj Elev
1	2314.5	450.0	2316.7
2	2314.2	474.0	2316.4
3	2304.1	489.0	2306.3
4	2304.1	500.0	2306.3
5	2304.1	511.0	2306.3
6	2314.3	526.0	2316.5
7	2314.3	528.0	2316.5
8	2314.8	550.0	2317.0
9	2315.0	600.0	2317.2
10	2315.1	650.0	2317.3
11	0.0	450.0	2.2
12	0.0	450.0	2.2
13	0.0	450.0	2.2
14	0.0	450.0	2.2
15	0.0	450.0	2.2
16	0.0	450.0	2.2
17	0.0	450.0	2.2
18	0.0	450.0	2.2
19	0.0	450.0	2.2
20	0.0	450.0	2.2

Sta Adj Factor: 450.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev		
		Up:	1.0
		Down:	1.0
474.0	2316.4	474.0	2317.4
		474.0	2315.4

Chart Legend--

FEMA		Project	
430.0	2307.5	430.0	2306.5
450.0	2307.5	450.0	2306.5

FEMA STCHR

Sta	Adj Elev		
526.0	2316.5	526.0	2317.5
		526.0	2315.5

Project Section 16
67+93 (16)

Polyline from .dwg--

					From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point	X=83626.1567	Y=68910.6897	Z= 368.89	83626.16	68910.69	449	2317.1
2	at point	X=83615.5860	Y=68909.0049	Z= 368.89	83615.59	68909.00	460	2316.8
3	at point	X=83594.1271	Y=68909.0364	Z= 368.89	83594.13	68909.04	481	2316.8
4	at point	X=83589.4587	Y=68908.6168	Z= 368.89	83589.46	68908.62	486	2316.7
5	at point	X=83587.4005	Y=68858.1066	Z= 368.89	83587.40	68858.11	488	2306.6
6	at point	X=83585.8585	Y=68856.7782	Z= 368.89	83585.86	68856.78	489	2306.3
7	at point	X=83575.2518	Y=68857.9438	Z= 368.89	83575.25	68857.94	500	2306.6
8	at point	X=83570.7693	Y=68858.4364	Z= 368.89	83570.77	68858.44	504	2306.7
9	at point	X=83563.5018	Y=68858.8858	Z= 368.89	83563.50	68858.89	512	2306.8
10	at point	X=83562.8644	Y=68907.4280	Z= 368.89	83562.86	68907.43	512	2316.5
11	at point	X=83552.9541	Y=68908.3686	Z= 368.89	83552.95	68908.37	522	2316.7
12	at point	X=83536.2140	Y=68907.9077	Z= 368.8999				
13	at point	X=83493.8710	Y=68908.4044	Z= 368.8999				
14	at point	X=83446.8160	Y=68907.9540	Z= 368.8999				
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Center Vertical Grid Line--

from point,	X=83575.2518	Y=68825.0936	Z=	83575.25	68825.09
to point,	X=83575.2518	Y=68925.0936	Z=	83575.25	68925.09

500	2300.00		
500	2320.00		

CL X 83575.25
New CL Station: 5+00
Top Elev: 2320
Bottom Elev: 2300

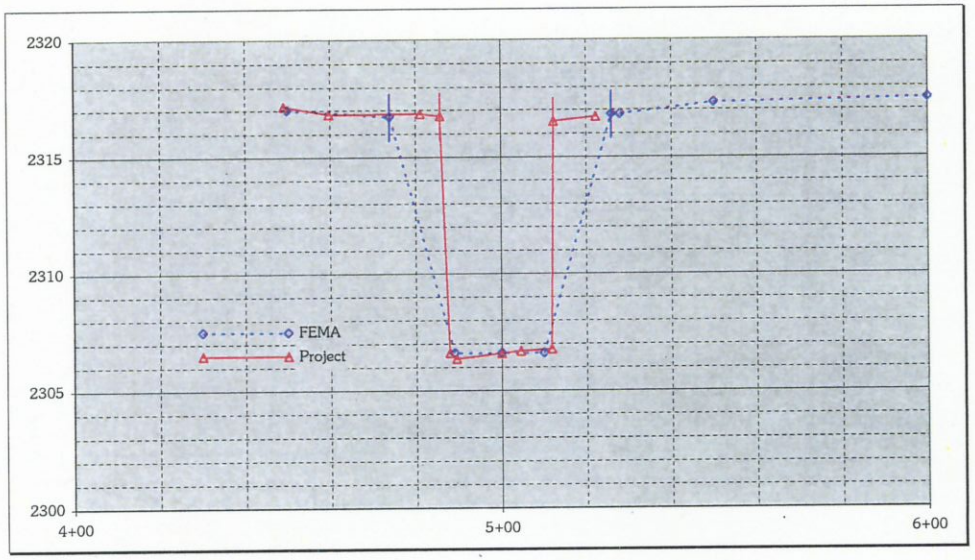
Proj STCHL
486 2315.70
486 2317.70

Line from STCHL to STCHR

from point,	X=83589.4587	Y=68908.6168	Z=	83589.46	68908.62
to point,	X=83562.8644	Y=68907.4280	Z=	83562.86	68907.43

Proj STCHR
512 2315.47
512 2317.47

	-------1-------2-------3-------4-------5-------6-------7-------8-------9------10									
	X1 16	11	486	512						
1	GR2317.1	449	2316.8	460	2316.8	481	2316.7	486	2306.6	488
2	GR2306.3	489	2306.6	500	2306.7	504	2306.8	512	2316.5	512
3	GR2316.7	522	0.0	0	0.0	0	0.0	0	0.0	0
4	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
6	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
7	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
8	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0



FEMA SECTION 16

X1	16	10	24	76	40	40	40	0	0	
X3	0	0	0	39	2311	61	2311	0	0	
GR	2314.8	0	2314.5	24	2304.4	39	2304.4	50	2304.4	60
GR	2314.6	76	2314.6	78	2315.1	100	2315.3	150	2315.4	200

	Raw Elev	Sta	Adj Elev
1	2314.8	450.0	2317.0
2	2314.5	474.0	2316.7
3	2304.4	489.0	2306.6
4	2304.4	500.0	2306.6
5	2304.4	510.0	2306.6
6	2314.6	526.0	2316.8
7	2314.6	528.0	2316.8
8	2315.1	550.0	2317.3
9	2315.3	600.0	2317.5
10	2315.4	650.0	2317.6
11	0.0	450.0	2.2
12	0.0	450.0	2.2
13	0.0	450.0	2.2
14	0.0	450.0	2.2
15	0.0	450.0	2.2
16	0.0	450.0	2.2
17	0.0	450.0	2.2
18	0.0	450.0	2.2
19	0.0	450.0	2.2
20	0.0	450.0	2.2

Sta Adj Factor: 450.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev		
		Up:	1.0
		Down:	1.0
474.0	2316.7	474.0	2317.7
		474.0	2315.7

Chart Legend--

FEMA		Project	
430.0	2307.5	430.0	2306.5
450.0	2307.5	450.0	2306.5

FEMA STCHR

Sta	Adj Elev		
526.0	2316.8	526.0	2317.8
		526.0	2315.8

Project Section 17
68+55 (17)

Polyline from .dwg--

					From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point	X=84079.6391	Y=68336.7013	Z= 368.89	84079.64	68336.70	411	2316.3
2	at point	X=84047.5055	Y=68336.0727	Z= 368.89	84047.51	68336.07	443	2316.2
3	at point	X=84045.2429	Y=68335.1354	Z= 368.89	84045.24	68335.14	446	2316.0
4	at point	X=84023.3498	Y=68335.9793	Z= 368.89	84023.35	68335.98	467	2316.2
5	at point	X=84017.4851	Y=68337.0681	Z= 368.89	84017.49	68337.07	473	2316.4
6	at point	X=84006.7623	Y=68337.6266	Z= 368.89	84006.76	68337.63	484	2316.5
7	at point	X=84002.9416	Y=68301.6950	Z= 368.89	84002.94	68301.70	488	2309.3
8	at point	X=84002.8641	Y=68290.0122	Z= 368.89	84002.86	68290.01	488	2307.0
9	at point	X=83990.7551	Y=68289.3592	Z= 368.89	83990.76	68289.36	500	2306.9
10	at point	X=83979.1963	Y=68290.8482	Z= 368.89	83979.20	68290.85	512	2307.2
11	at point	X=83969.1784	Y=68320.2318	Z= 368.89	83969.18	68320.23	522	2313.0
12	at point	X=83962.7147	Y=68337.0333	Z= 368.89	83962.71	68337.03	528	2316.4
13	at point	X=83932.5599	Y=68337.5134	Z= 368.89	83932.56	68337.51	558	2316.5
14	at point	X=83893.8467	Y=68339.7158	Z= 368.89	83893.85	68339.72	597	2316.9
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Center Vertical Grid Line--

from point,	X=83990.7551	Y=68255.0936	Z=	83990.76	68255.09	500 2300.00
to point,	X=83990.7551	Y=68355.0936	Z=	83990.76	68355.09	500 2320.00

CL X	83990.76
New CL Station:	5+00
Top Elev:	2320
Bottom Elev:	2300

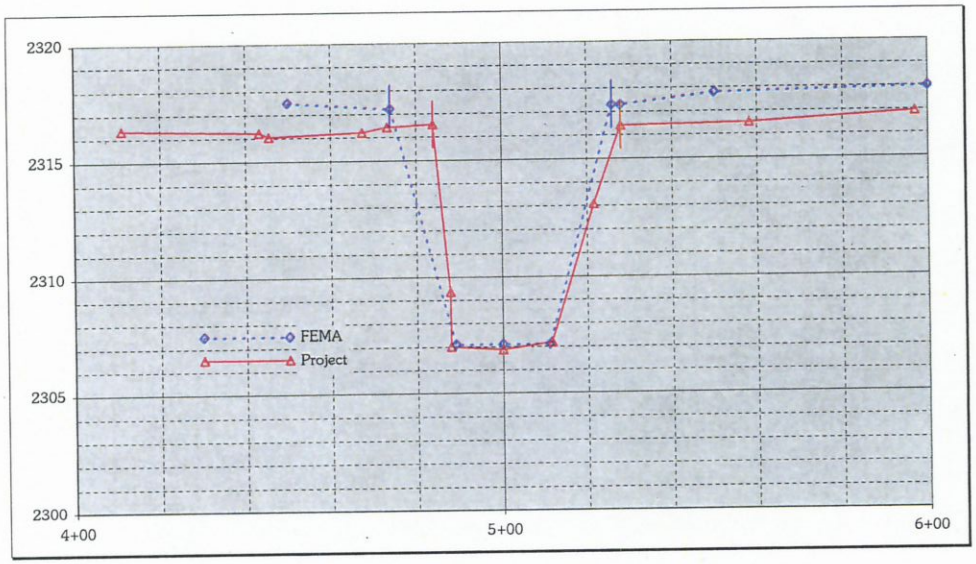
Proj STCHL
528 2315.39
528 2317.39

Line from STCHL to STCHR

from point,	X=83962.7147	Y=68337.0333	Z=	83962.71	68337.03
to point,	X=84006.7623	Y=68337.6266	Z=	84006.76	68337.63

Proj STCHR
484 2315.51
484 2317.51

	-------1-------	-------2-------	-------3-------	-------4-------	-------5-------	-------6-------	-------7-------	-------8-------	-------9-------	-------10
	X1 17	14	528	484						
1	GR2316.3	411	2316.2	443	2316.0	446	2316.2	467	2316.4	473
2	GR2316.5	484	2309.3	488	2307.0	488	2306.9	500	2307.2	512
3	GR2313.0	522	2316.4	528	2316.5	558	2316.9	597	0.0	0
4	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
6	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
7	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
8	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0



FEMA SECTION 17

X1	17	10	24	76	62	62	62	0	0	
X3	0	0	0	39	2314	61	2314	0	0	
GR	2315.3	0	2315	24	2304.9	39	2304.9	50	2304.9	61
GR	2315.1	76	2315.1	78	2315.6	100	2315.8	150	2315.9	200

	Raw Elev	Sta	Adj Elev
1	2315.3	450.0	2317.5
2	2315.0	474.0	2317.2
3	2304.9	489.0	2307.1
4	2304.9	500.0	2307.1
5	2304.9	511.0	2307.1
6	2315.1	526.0	2317.3
7	2315.1	528.0	2317.3
8	2315.6	550.0	2317.8
9	2315.8	600.0	2318.0
10	2315.9	650.0	2318.1
11	0.0	450.0	2.2
12	0.0	450.0	2.2
13	0.0	450.0	2.2
14	0.0	450.0	2.2
15	0.0	450.0	2.2
16	0.0	450.0	2.2
17	0.0	450.0	2.2
18	0.0	450.0	2.2
19	0.0	450.0	2.2
20	0.0	450.0	2.2

Sta Adj Factor: 450.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev		
		Up:	1.0
		Down:	1.0
474.0	2317.2	474.0	2318.2
		474.0	2316.2

Chart Legend--

FEMA		Project	
430.0	2307.5	430.0	2306.5
450.0	2307.5	450.0	2306.5

FEMA STCHR

Sta	Adj Elev		
526.0	2317.3	526.0	2318.3
		526.0	2316.3

Project Section 18
69+05 (18)

Polyline from .dwg--

		From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point X=84046.8017 Y=68452.9909 Z= 368.89	84046.80	68452.99	373	2318.6
2	at point X=84025.0749 Y=68452.3404 Z= 368.89	84025.07	68452.34	395	2318.4
3	at point X=84008.4086 Y=68453.2746 Z= 368.89	84008.41	68453.27	412	2318.6
4	at point X=83982.0798 Y=68451.9283 Z= 368.89	83982.08	68451.93	438	2318.4
5	at point X=83961.0689 Y=68451.1707 Z= 368.89	83961.07	68451.17	459	2318.2
6	at point X=83952.3945 Y=68453.4605 Z= 368.89	83952.39	68453.46	468	2318.7
7	at point X=83946.6238 Y=68450.5974 Z= 368.89	83946.62	68450.60	474	2318.1
8	at point X=83937.0152 Y=68425.4556 Z= 368.89	83937.02	68425.46	483	2313.1
9	at point X=83924.2522 Y=68396.5188 Z= 368.89	83924.25	68396.52	496	2307.3
10	at point X=83920.1362 Y=68397.0780 Z= 368.89	83920.14	68397.08	500	2307.4
11	at point X=83910.0799 Y=68398.1699 Z= 368.89	83910.08	68398.17	510	2307.6
12	at point X=83905.8702 Y=68411.9627 Z= 368.89	83905.87	68411.96	514	2310.4
13	at point X=83895.9042 Y=68441.1540 Z= 368.89	83895.90	68441.15	524	2316.2
14	at point X=83891.1676 Y=68444.5619 Z= 368.89	83891.17	68444.56	529	2316.9

Center Vertical Grid Line--

from point, X=83920.1362 Y=68385.0936 Z=	83920.14	68385.09	500	2305.00
to point, X=83920.1362 Y=68485.0936 Z=	83920.14	68485.09	500	2325.00

CL X	83920.14
New CL Station:	5+00
Top Elev:	2325
Bottom Elev:	2305

Line from STCHL to STCHR

from point, X=83946.6238 Y=68450.5974 Z=	83946.62	68450.60
to point, X=83895.9042 Y=68441.1540 Z=	83895.90	68441.15

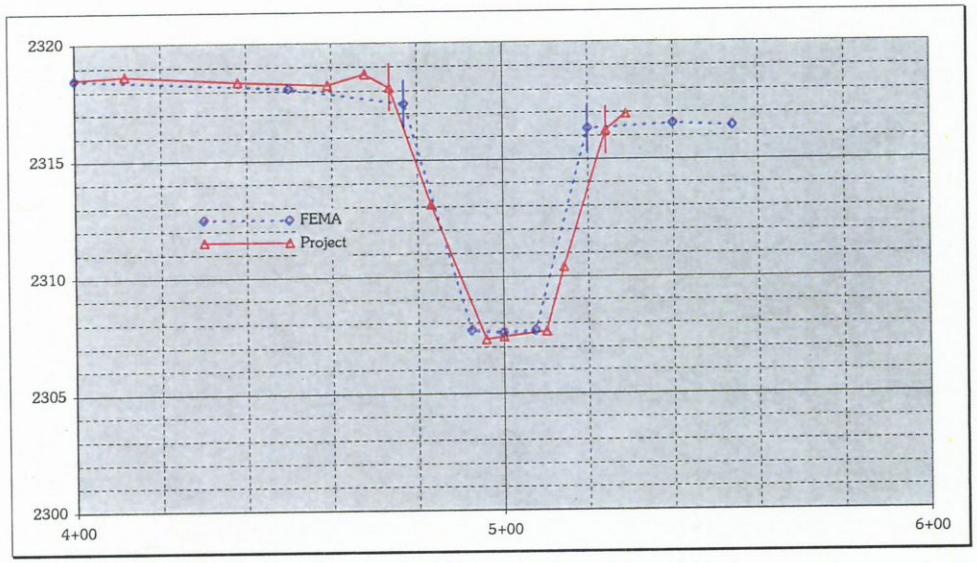
Proj STCHL

474	2317.10
474	2319.10

Proj STCHR

524	2315.21
524	2317.21

	1	2	3	4	5	6	7	8	9	10
	X1 18	14	474	524						
1	GR2318.6	373	2318.4	395	2318.6	412	2318.4	438	2318.2	459
2	GR2318.7	468	2318.1	474	2313.1	483	2307.3	496	2307.4	500
3	GR2307.6	510	2310.4	514	2316.2	524	2316.9	529	0.0	0
4	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
6	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
7	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
8	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0



FEMA SECTION 18

X1	18	9	77	120	100	10	50	0	0	
X3	0	0	0	0	0	140	0	0	0	
GR	2316.3	0	2315.9	50	2315.2	77	2305.5	92.5	2305.4	100
GR	2305.5	107.5	2314.1	120	2314.3	140	2314.2	154		

	Raw Elev	Sta	Adj Elev
1	2316.3	400.0	2318.5
2	2315.9	450.0	2318.1
3	2315.2	477.0	2317.4
4	2305.5	492.5	2307.7
5	2305.4	500.0	2307.6
6	2305.5	507.5	2307.7
7	2314.1	520.0	2316.3
8	2314.3	540.0	2316.5
9	2314.2	554.0	2316.4
10	0.0	400.0	2.2
11	0.0	400.0	2.2
12	0.0	400.0	2.2
13	0.0	400.0	2.2
14	0.0	400.0	2.2
15	0.0	400.0	2.2
16	0.0	400.0	2.2
17	0.0	400.0	2.2
18	0.0	400.0	2.2
19	0.0	400.0	2.2
20	0.0	400.0	2.2

Sta Adj Factor: 400.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev		Up: 1.0 Down: 1.0
477.0	2317.4	477.0	2318.4
		477.0	2316.4

Chart Legend--

FEMA		Project	
430.0	2312.5	430.0	2311.5
450.0	2312.5	450.0	2311.5

FEMA STCHR

Sta	Adj Elev		
520.0	2316.3	520.0	2317.3
		520.0	2315.3

Project Section 19
72+44 (19)

Polyline from .dwg--

		From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point X=83997.6065 Y=68599.4902 Z= 368.89	83997.61	68599.49	431	2321.9
2	at point X=83952.1426 Y=68598.0968 Z= 368.89	83952.14	68598.10	476	2321.6
3	at point X=83950.0990 Y=68595.3804 Z= 368.89	83950.10	68595.38	478	2321.1
4	at point X=83946.3161 Y=68587.0487 Z= 368.89	83946.32	68587.05	482	2319.4
5	at point X=83935.6015 Y=68532.9841 Z= 368.89	83935.60	68532.98	493	2308.6
6	at point X=83928.2702 Y=68533.1539 Z= 368.89	83928.27	68533.15	500	2308.6
7	at point X=83921.2208 Y=68532.2045 Z= 368.89	83921.22	68532.20	507	2308.4
8	at point X=83917.0686 Y=68546.8343 Z= 368.89	83917.07	68546.83	511	2311.3
9	at point X=83915.7742 Y=68556.0555 Z= 368.89	83915.77	68556.06	512	2313.2
10	at point X=83910.8259 Y=68580.6523 Z= 368.89	83910.83	68580.65	517	2318.1
11	at point X=83909.1272 Y=68592.2838 Z= 368.89	83909.13	68592.28	519	2320.4
12	at point X=83902.6364 Y=68596.4086 Z= 368.89	83902.64	68596.41	526	2321.3

Center Vertical Grid Line--

from point, X=83928.2702 Y=68515.0936 Z=	83928.27	68515.09	500	2305.00
to point, X=83928.2702 Y=68615.0936 Z=	83928.27	68615.09	500	2325.00

CL X 83928.27
New CL Station: 5+00
Top Elev: 2325
Bottom Elev: 2305

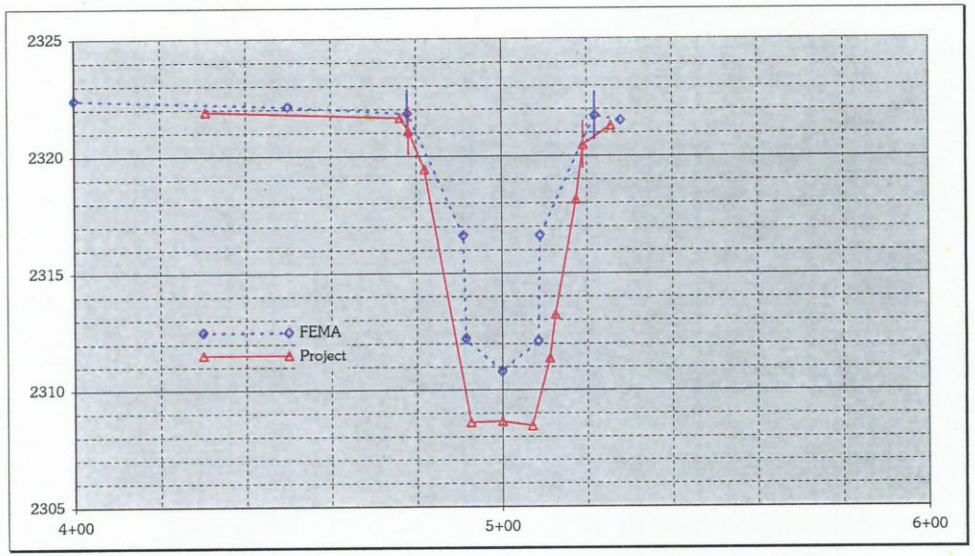
Proj STCHL
478 2320.06
478 2322.06

Line from STCHL to STCHR

from point, X=83950.0990 Y=68595.3804 Z=	83950.10	68595.38
to point, X=83909.1272 Y=68592.2838 Z=	83909.13	68592.28

Proj STCHR
519 2319.44
519 2321.44

	-------1-------	-------2-------	-------3-------	-------4-------	-------5-------	-------6-------	-------7-------	-------8-------	-------9-------	-------10
	X1	19	12	478	519					
1	GR	2321.9	431	2321.6	476	2321.1	478	2319.4	482	2308.6	493
2	GR	2308.6	500	2308.4	507	2311.3	511	2313.2	512	2318.1	517
3	GR	2320.4	519	2321.3	526	0.0	0	0.0	0	0.0	0
4	GR	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5	GR	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
6	GR	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
7	GR	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
8	GR	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0



FEMA SECTION 19

X1	19	11	128	172	350	550	450	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2320.5	0	2320.2	50	2319.9	100	2319.6	128	2314.4	141
GR	2310	141.5	2308.6	150	2309.9	158.5	2314.4	159	2319.5	172
GR	2319.3	178								

	Raw Elev	Sta	Adj Elev
1	2320.5	350.0	2322.7
2	2320.2	400.0	2322.4
3	2319.9	450.0	2322.1
4	2319.6	478.0	2321.8
5	2314.4	491.0	2316.6
6	2310.0	491.5	2312.2
7	2308.6	500.0	2310.8
8	2309.9	508.5	2312.1
9	2314.4	509.0	2316.6
10	2319.5	522.0	2321.7
11	2319.3	528.0	2321.5
12	0.0	350.0	2.2
13	0.0	350.0	2.2
14	0.0	350.0	2.2
15	0.0	350.0	2.2
16	0.0	350.0	2.2
17	0.0	350.0	2.2
18	0.0	350.0	2.2
19	0.0	350.0	2.2
20	0.0	350.0	2.2

Sta Adj Factor: 350.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev	Up:	1.0
		Down:	1.0
478.0	2321.8	478.0	2322.8
		478.0	2320.8

Chart Legend--

FEMA		Project	
430.0	2312.5	430.0	2311.5
450.0	2312.5	450.0	2311.5

FEMA STCHR

Sta	Adj Elev		
522.0	2321.7	522.0	2322.7
		522.0	2320.7

Project Section 20
77+99 (20)

Polyline from .dwg--

		From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point X=84051.5815 Y=68710.8634 Z= 368.85	84051.58	68710.86	359	2323.2
2	at point X=83991.5768 Y=68709.9848 Z= 368.85	83991.58	68709.98	419	2323.0
3	at point X=83937.5351 Y=68709.7735 Z= 368.85	83937.54	68709.77	473	2322.9
4	at point X=83937.4351 Y=68708.0235 Z= 368.85	83937.44	68708.02	473	2322.6
5	at point X=83934.5447 Y=68705.4893 Z= 368.85	83934.54	68705.49	476	2322.1
6	at point X=83929.4828 Y=68704.7526 Z= 368.85	83929.48	68704.75	481	2321.9
7	at point X=83923.8778 Y=68690.2961 Z= 368.85	83923.88	68690.30	487	2319.0
8	at point X=83917.0283 Y=68662.0461 Z= 368.85	83917.03	68662.05	494	2313.4
9	at point X=83910.6030 Y=68662.4335 Z= 368.85	83910.60	68662.43	500	2313.5
10	at point X=83904.3884 Y=68661.5385 Z= 368.85	83904.39	68661.54	506	2313.3
11	at point X=83898.3943 Y=68689.0765 Z= 368.85	83898.39	68689.08	512	2318.8
12	at point X=83891.7955 Y=68702.3492 Z= 368.85	83891.80	68702.35	519	2321.5
13	at point X=83889.1550 Y=68705.9755 Z= 368.85	83889.16	68705.98	521	2322.2
14					
15					
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Center Vertical Grid Line--

from point, X=83910.6030 Y=68645.0936 Z=	83910.60	68645.09	500 2310.00
to point, X=83910.6030 Y=68745.0936 Z=	83910.60	68745.09	500 2330.00

CL X 83910.60
New CL Station: 5+00
Top Elev: 2330
Bottom Elev: 2310

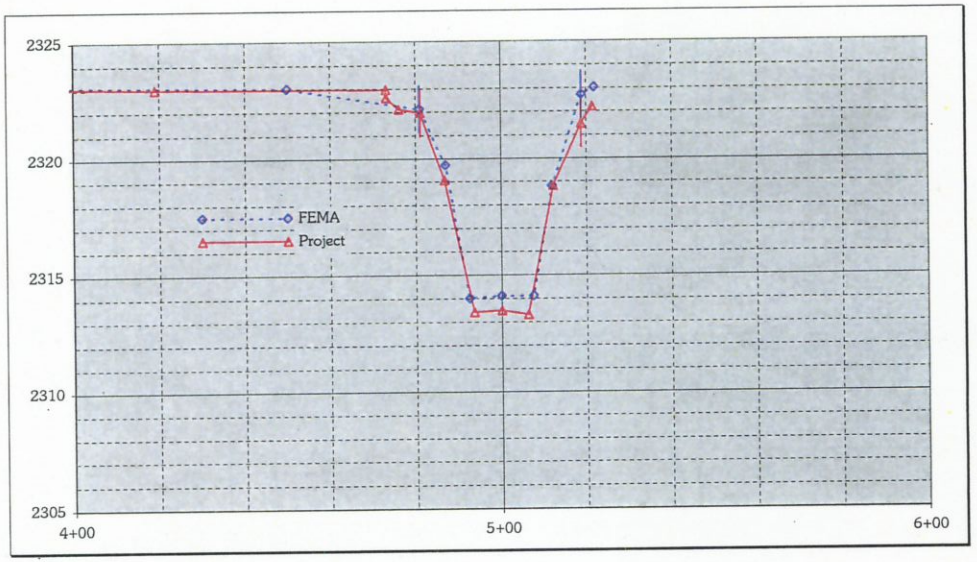
Proj STCHL
481 2320.93
481 2322.93

Line from STCHL to STCHR

from point, X=83929.4828 Y=68704.7526 Z=	83929.48	68704.75	
to point, X=83891.7955 Y=68702.3492 Z=	83891.80	68702.35	

Proj STCHR
519 2320.45
519 2322.45

	-------1-------2-------3-------4-------5-------6-------7-------8-------9------10									
	X1 20	13	481	519						
1	GR2323.2	359	2323.0	419	2322.9	473	2322.6	473	2322.1	476
2	GR2321.9	481	2319.0	487	2313.4	494	2313.5	500	2313.3	506
3	GR2318.8	512	2321.5	519	2322.2	521	0.0	0	0.0	0
4	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
6	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
7	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
8	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0



FEMA SECTION 20

X1	20	10	131	169	550	450	500	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2321	0	2320.8	100	2319.9	131	2317.5	137	2311.8	142.5
GR	2311.9	150	2311.9	157.5	2316.6	162	2320.5	169	2320.8	172

	Raw Elev	Sta	Adj Elev
1	2321.0	350.0	2323.2
2	2320.8	450.0	2323.0
3	2319.9	481.0	2322.1
4	2317.5	487.0	2319.7
5	2311.8	492.5	2314.0
6	2311.9	500.0	2314.1
7	2311.9	507.5	2314.1
8	2316.6	512.0	2318.8
9	2320.5	519.0	2322.7
10	2320.8	522.0	2323.0
11	0.0	350.0	2.2
12	0.0	350.0	2.2
13	0.0	350.0	2.2
14	0.0	350.0	2.2
15	0.0	350.0	2.2
16	0.0	350.0	2.2
17	0.0	350.0	2.2
18	0.0	350.0	2.2
19	0.0	350.0	2.2
20	0.0	350.0	2.2

Sta Adj Factor: 350.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev		
		Up:	1.0
		Down:	1.0
481.0	2322.1	481.0	2323.1
		481.0	2321.1

Chart Legend--

FEMA		Project	
430.0	2317.5	430.0	2316.5
450.0	2317.5	450.0	2316.5

FEMA STCHR

Sta	Adj Elev		
519.0	2322.7	519.0	2323.7
		519.0	2321.7

Project Section 21
83+99 (21)

Polyline from .dwg--

					From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point	X=84182.6807	Y=68848.0196	Z= 368.89	84182.68	68848.02	393	2324.6
2	at point	X=84158.7459	Y=68848.1391	Z= 368.89	84158.75	68848.14	417	2324.6
3	at point	X=84134.0673	Y=68847.8086	Z= 368.89	84134.07	68847.81	442	2324.5
4	at point	X=84119.7418	Y=68846.6176	Z= 368.89	84119.74	68846.62	456	2324.3
5	at point	X=84102.1665	Y=68845.4741	Z= 368.89	84102.17	68845.47	473	2324.1
6	at point	X=84091.4784	Y=68842.3640	Z= 368.89	84091.48	68842.36	484	2323.5
7	at point	X=84087.7725	Y=68832.9141	Z= 368.89	84087.77	68832.91	488	2321.6
8	at point	X=84081.6155	Y=68802.1265	Z= 368.89	84081.62	68802.13	494	2315.4
9	at point	X=84075.6634	Y=68800.2290	Z= 368.89	84075.66	68800.23	500	2315.0
10	at point	X=84074.4611	Y=68799.2034	Z= 368.89	84074.46	68799.20	501	2314.8
11	at point	X=84068.7985	Y=68800.7717	Z= 368.89	84068.80	68800.77	507	2315.1
12	at point	X=84062.4257	Y=68831.6510	Z= 368.89	84062.43	68831.65	513	2321.3
13	at point	X=84057.5584	Y=68841.6579	Z= 368.89	84057.56	68841.66	518	2323.3
14	at point	X=84055.1754	Y=68846.8357	Z= 368.89	84055.18	68846.84	520	2324.3
15	at point	X=84054.3323	Y=68847.4832	Z= 368.89	84054.33	68847.48	521	2324.5
16	at point	X=84053.3113	Y=68846.8821	Z= 368.89	84053.31	68846.88	522	2324.4
17	at point	X=84038.9024	Y=68845.7247	Z= 368.89	84038.90	68845.72	537	2324.1
18	at point	X=84038.8024	Y=68847.4747	Z= 368.89	84038.80	68847.47	537	2324.5
19	at point	X=84028.7364	Y=68847.5921	Z= 368.89	84028.74	68847.59	547	2324.5
20	at point	X=84006.9537	Y=68846.0531	Z= 368.89	84006.95	68846.05	569	2324.2
21	at point	X=83984.0556	Y=68847.3620	Z= 368.89	83984.06	68847.36	592	2324.5
22	at point	X=83954.0532	Y=68849.1645	Z= 368.89	83954.05	68849.16	622	2324.8
23	at point	X=83924.0509	Y=68849.6495	Z= 368.89	83924.05	68849.65	652	2324.9
24	at point	X=83907.0610	Y=68850.0058	Z= 368.89	83907.06	68850.01	669	2325.0
25	at point	X=83894.0485	Y=68852.1474	Z= 368.89	83894.05	68852.15	682	2325.4
26	at point	X=83888.9890	Y=68852.1017	Z= 368.89	83888.99	68852.10	687	2325.4
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

Center Vertical Grid Line--

from point,	X=84075.6634	Y=68775.0936	Z=	84075.66	68775.09	500 2310.00
to point,	X=84075.6634	Y=68875.0936	Z=	84075.66	68875.09	500 2330.00

CL X 84075.66
New CL Station: 5+00
Top Elev: 2330
Bottom Elev: 2310

Proj STCHL
484 2322.45
484 2324.45

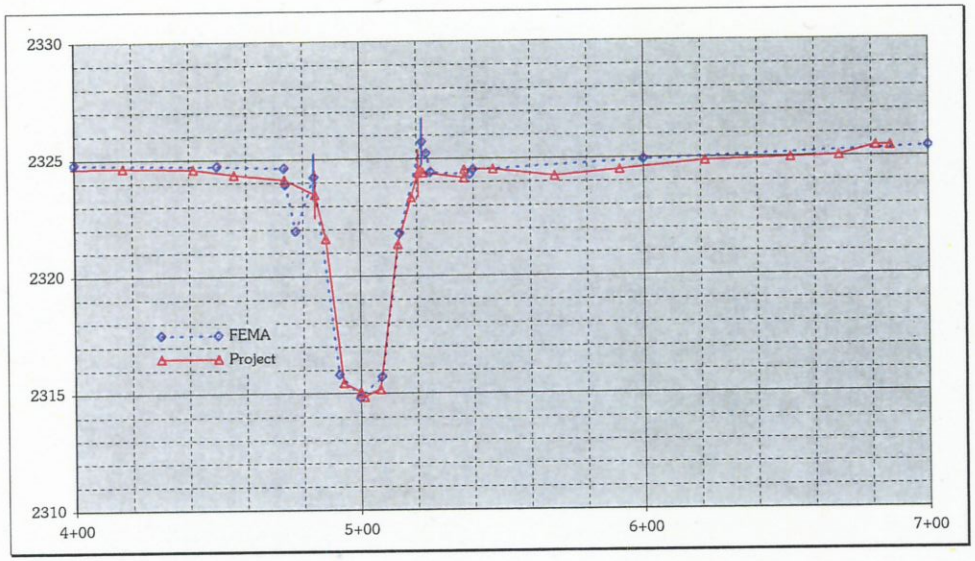
Line from STCHL to STCHR

from point,	X=84091.4784	Y=68842.3640	Z=	84091.48	68842.36	
to point,	X=84055.1754	Y=68846.8357	Z=	84055.18	68846.84	

Proj STCHR
520 2323.35
520 2325.35

-------1-------2-------3-------4-------5-------6-------7-------8-------9------10

	X1	21	26	484	520					
1	GR	2324.6	393	2324.6	417	2324.5	442	2324.3	456	2324.1	473
2	GR	2323.5	484	2321.6	488	2315.4	494	2315.0	500	2314.8	501
3	GR	2315.1	507	2321.3	513	2323.3	518	2324.3	520	2324.5	521
4	GR	2324.4	522	2324.1	537	2324.5	537	2324.5	547	2324.2	569
5	GR	2324.5	592	2324.8	622	2324.9	652	2325.0	669	2325.4	682
6	GR	2325.4	687	0.0	0	0.0	0	0.0	0	0.0	0
7	GR	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
8	GR	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0



FEMA SECTION 21

X1	21	17	84	122	600	600	600	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2322.6	0	2322.5	50	2322.4	73.5	2321.7	74	2319.7	77.5
GR	2322	84	2313.6	92.5	2312.6	100	2313.5	107.5	2319.6	114
GR	2323.5	122	2323	123.5	2322.2	125	2322.1	139	2322.3	140
GR	2322.7	200	2323.2	300						

	Raw Elev	Sta	Adj Elev
1	2322.6	400.0	2324.8
2	2322.5	450.0	2324.7
3	2322.4	473.5	2324.6
4	2321.7	474.0	2323.9
5	2319.7	477.5	2321.9
6	2322.0	484.0	2324.2
7	2313.6	492.5	2315.8
8	2312.6	500.0	2314.8
9	2313.5	507.5	2315.7
10	2319.6	514.0	2321.8
11	2323.5	522.0	2325.7
12	2323.0	523.5	2325.2
13	2322.2	525.0	2324.4
14	2322.1	539.0	2324.3
15	2322.3	540.0	2324.5
16	2322.7	600.0	2324.9
17	2323.2	700.0	2325.4
18	0.0	400.0	2.2
19	0.0	400.0	2.2
20	0.0	400.0	2.2

Sta Adj Factor: 400.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev	Up:	1.0
		Down:	1.0
484.0	2324.2	484.0	2325.2
		484.0	2323.2

Chart Legend--

FEMA		Project	
430.0	2317.5	430.0	2316.5
450.0	2317.5	450.0	2316.5

FEMA STCHR

Sta	Adj Elev		
522.0	2325.7	522.0	2326.7
		522.0	2324.7

Project Section 22
89+99 (22)

Polyline from .dwg--

					From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point	X=84613.2236	Y=68301.5560	Z= 368.8	84613.22	68301.56	404	2324.3
2	at point	X=84550.2533	Y=68302.7304	Z= 368.8	84550.25	68302.73	467	2324.5
3	at point	X=84534.9011	Y=68304.8267	Z= 368.8	84534.90	68304.83	482	2324.9
4	at point	X=84529.8747	Y=68295.6486	Z= 368.8	84529.87	68295.65	487	2323.1
5	at point	X=84524.1733	Y=68277.4624	Z= 368.8	84524.17	68277.46	493	2319.5
6	at point	X=84522.3993	Y=68266.5494	Z= 368.8	84522.40	68266.55	495	2317.3
7	at point	X=84517.2650	Y=68266.3313	Z= 368.8	84517.27	68266.33	500	2317.2
8	at point	X=84511.7496	Y=68267.4706	Z= 368.8	84511.75	68267.47	506	2317.5
9	at point	X=84510.3898	Y=68273.7682	Z= 368.8	84510.39	68273.77	507	2318.7
10	at point	X=84503.6636	Y=68294.1991	Z= 368.8	84503.66	68294.20	514	2322.8
11	at point	X=84498.8960	Y=68303.0602	Z= 368.8	84498.90	68303.06	518	2324.6
12	at point	X=84494.7357	Y=68306.0351	Z= 368.8	84494.74	68306.04	523	2325.2
13	at point	X=84477.1071	Y=68306.5800	Z= 368.8	84477.11	68306.58	540	2325.3
14	at point	X=84412.7448	Y=68310.0527	Z= 368.8	84412.74	68310.05	605	2326.0
15	at point	X=84330.0181	Y=68311.8444	Z= 368.8	84330.02	68311.84	687	2326.4

Center Vertical Grid Line--

from point,	X=84517.2650	Y=68255.0936	Z=	84517.27	68255.09	500 2315.00
to point,	X=84517.2650	Y=68330.0936	Z=	84517.27	68330.09	500 2330.00

CL X	84517.27
New CL Station:	5+00
Top Elev:	2330
Bottom Elev:	2315

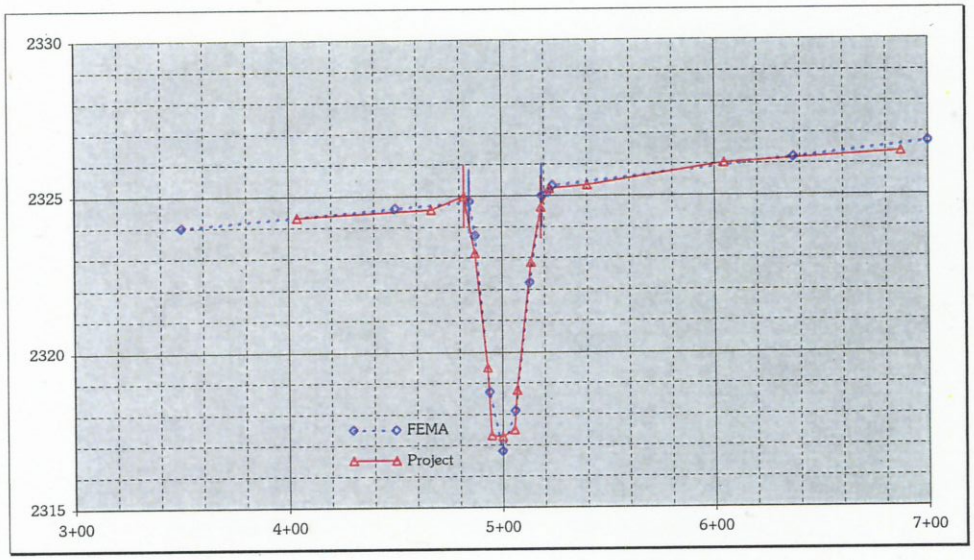
Proj STCHL
482 2323.95
482 2325.95

Line from STCHL to STCHR

from point,	X=84534.9011	Y=68304.8267	Z=	84534.90	68304.83	
to point,	X=84498.8960	Y=68303.0602	Z=	84498.90	68303.06	

Proj STCHR
518 2323.59
518 2325.59

	-------1-------	-------2-------	-------3-------	-------4-------	-------5-------	-------6-------	-------7-------	-------8-------	-------9-------	-------10
	X1 22	15	482	518						
1	GR2324.3	404	2324.5	467	2324.9	482	2323.1	487	2319.5	493
2	GR2317.3	495	2317.2	500	2317.5	506	2318.7	507	2322.8	514
3	GR2324.6	518	2325.2	523	2325.3	540	2326.0	605	2326.4	687
4	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
5	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
6	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
7	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
8	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0



FEMA SECTION 22

X1	22	13	135	169	600	600	600	0	0	
X3	0	0	0	100	0	0	0	0	0	
GR	2321.8	0	2322.4	100	2322.6	135	2321.5	137.5	2316.5	144
GR	2314.6	150	2315.9	156	2320	163	2322.8	169	2322.9	172
GR	2323.1	174	2324	287	2324.5	350				

	Raw Elev	Sta	Adj Elev
1	2321.8	350.0	2324.0
2	2322.4	450.0	2324.6
3	2322.6	485.0	2324.8
4	2321.5	487.5	2323.7
5	2316.5	494.0	2318.7
6	2314.6	500.0	2316.8
7	2315.9	506.0	2318.1
8	2320.0	513.0	2322.2
9	2322.8	519.0	2325.0
10	2322.9	522.0	2325.1
11	2323.1	524.0	2325.3
12	2324.0	637.0	2326.2
13	2324.5	700.0	2326.7
14	0.0	350.0	2.2
15	0.0	350.0	2.2
16	0.0	350.0	2.2
17	0.0	350.0	2.2
18	0.0	350.0	2.2
19	0.0	350.0	2.2
20	0.0	350.0	2.2

Sta Adj Factor: 350.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev		
		Up:	1.0
		Down:	1.0
485.0	2324.8	485.0	2325.8
		485.0	2323.8

Chart Legend--

FEMA		Project	
430.0	2317.5	430.0	2316.5
450.0	2317.5	450.0	2316.5

FEMA STCHR

Sta	Adj Elev		
519.0	2325.0	519.0	2326.0
		519.0	2324.0

Project Section 23
95+99 (23)

Polyline from .dwg--

					From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point	X=85027.4247	Y=68413.0712	Z= 368.89	85027.42	68413.07	337	2325.6
2	at point	X=85003.3582	Y=68413.9754	Z= 368.89	85003.36	68413.98	361	2325.8
3	at point	X=84973.7259	Y=68415.1400	Z= 368.89	84973.73	68415.14	390	2326.0
4	at point	X=84914.4612	Y=68417.7682	Z= 368.89	84914.46	68417.77	450	2326.5
5	at point	X=84894.1039	Y=68418.7861	Z= 368.89	84894.10	68418.79	470	2326.7
6	at point	X=84885.4256	Y=68418.3955	Z= 368.89	84885.43	68418.40	479	2326.7
7	at point	X=84881.9045	Y=68413.9280	Z= 368.89	84881.90	68413.93	482	2325.8
8	at point	X=84878.3472	Y=68403.9167	Z= 368.89	84878.35	68403.92	486	2323.8
9	at point	X=84872.3736	Y=68392.0281	Z= 368.89	84872.37	68392.03	492	2321.4
10	at point	X=84869.8249	Y=68378.2236	Z= 368.89	84869.82	68378.22	494	2318.6
11	at point	X=84864.0291	Y=68378.6869	Z= 368.89	84864.03	68378.69	500	2318.7
12	at point	X=84858.7918	Y=68379.1036	Z= 368.89	84858.79	68379.10	505	2318.8
13	at point	X=84856.7439	Y=68388.2825	Z= 368.89	84856.74	68388.28	507	2320.6
14	at point	X=84849.4951	Y=68407.1953	Z= 368.89	84849.50	68407.20	515	2324.4
15	at point	X=84843.3495	Y=68415.5975	Z= 368.89	84843.35	68415.60	521	2326.1
16	at point	X=84840.9078	Y=68420.0551	Z= 368.89	84840.91	68420.06	523	2327.0
17	at point	X=84834.5965	Y=68419.6316	Z= 368.89	84834.60	68419.63	529	2326.9
18	at point	X=84828.1869	Y=68417.8282	Z= 368.89	84828.19	68417.83	536	2326.5
19	at point	X=84826.9460	Y=68419.7236	Z= 368.89	84826.95	68419.72	537	2326.9
20	at point	X=84819.7240	Y=68420.3983	Z= 368.89	84819.72	68420.40	544	2327.1
21	at point	X=84802.4229	Y=68419.9149	Z= 368.89	84802.42	68419.91	562	2327.0
22	at point	X=84787.4060	Y=68419.3360	Z= 368.89	84787.41	68419.34	577	2326.8
23	at point	X=84772.1400	Y=68420.4831	Z= 368.89	84772.14	68420.48	592	2327.1
24	at point	X=84757.4036	Y=68418.3660	Z= 368.89	84757.40	68418.37	607	2326.7
25	at point	X=84736.6674	Y=68419.4302	Z= 368.89	84736.67	68419.43	627	2326.9
26	at point	X=84720.7862	Y=68419.2675	Z= 368.89	84720.79	68419.27	643	2326.8
27	at point	X=84712.8723	Y=68418.9287	Z= 368.89	84712.87	68418.93	651	2326.8
28	at point	X=84669.2176	Y=68420.4840	Z= 368.89	84669.22	68420.48	695	2327.1
29	at point	X=84637.3943	Y=68420.2971	Z= 368.89	84637.39	68420.30	727	2327.0
30	at point	X=84541.8622	Y=68421.8815	Z= 368.89	84541.86	68421.88	822	2327.4
31	at point	X=84541.7622	Y=68420.1315	Z= 368.89	84541.76	68420.13	822	2327.0
32	at point	X=84520.7345	Y=68422.1283	Z= 368.89	84520.73	68422.13	843	2327.4
33	at point	X=84501.5133	Y=68419.5261	Z= 368.89	84501.51	68419.53	863	2326.9
34	at point	X=84501.4133	Y=68421.2761	Z= 368.89	84501.41	68421.28	863	2327.2
35	at point	X=84494.0567	Y=68422.6179	Z= 368.89	84494.06	68422.62	870	2327.5
36	at point	X=84457.3802	Y=68421.6998	Z= 368.89	84457.38	68421.70	907	2327.3
37	at point	X=84450.6357	Y=68422.4483	Z= 368.89	84450.64	68422.45	913	2327.5
38								
39								
40								

Center Vertical Grid Line--

from point,	X=84864.0291	Y=68360.0936	Z=	84864.03	68360.09	500 2315.00
to point,	X=84864.0291	Y=68435.0936	Z=	84864.03	68435.09	500 2330.00

CL X 84864.03
New CL Station: 5+00
Top Elev: 2330
Bottom Elev: 2315

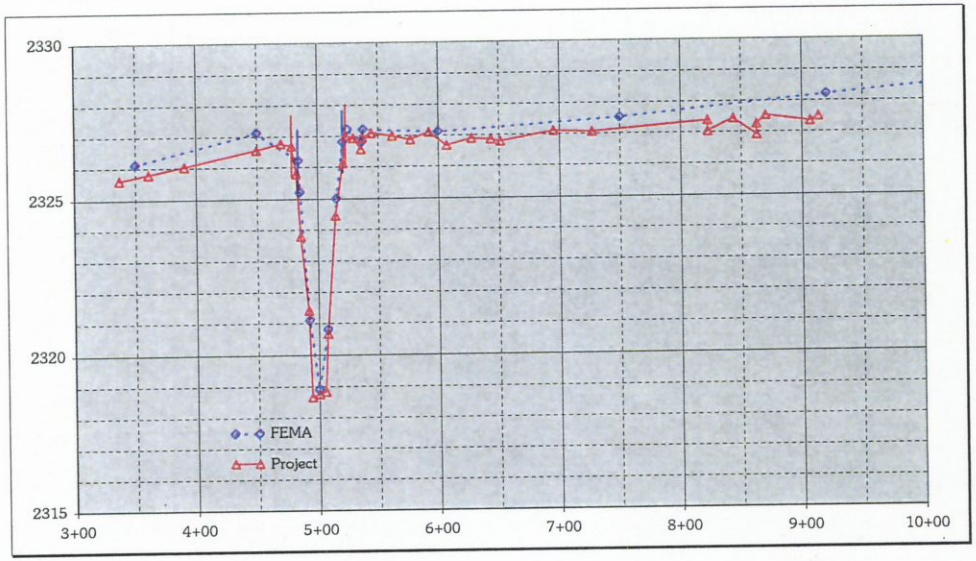
Proj STCHL
479 2325.66
479 2327.66

Line from STCHL to STCHR

from point,	X=84885.4256	Y=68418.3955	Z=	84885.43	68418.40	
to point,	X=84840.9078	Y=68420.0551	Z=	84840.91	68420.06	

Proj STCHR
523 2325.99
523 2327.99

	-------1-------	-------2-------	-------3-------	-------4-------	-------5-------	-------6-------	-------7-------	-------8-------	-------9-------	-------10
	X1 23	37	479	523						
1	GR2325.6	337	2325.8	361	2326.0	390	2326.5	450	2326.7	470
2	GR2326.7	479	2325.8	482	2323.8	486	2321.4	492	2318.6	494
3	GR2318.7	500	2318.8	505	2320.6	507	2324.4	515	2326.1	521
4	GR2327.0	523	2326.9	529	2326.5	536	2326.9	537	2327.1	544
5	GR2327.0	562	2326.8	577	2327.1	592	2326.7	607	2326.9	627
6	GR2326.8	643	2326.8	651	2327.1	695	2327.0	727	2327.4	822
7	GR2327.0	822	2327.4	843	2326.9	863	2327.2	863	2327.5	870
8	GR2327.3	907	2327.5	913	0.0	0	0.0	0	0.0	0



FEMA SECTION 23

X1	23	16	134	171	600	600	600	0	0	
X3	0	0	0	100	0	500	0	0	0	
GR	2323.9	0	2324.9	100	2324	134	2323	135.5	2318.9	142.5
GR	2316.7	150	2318.6	157.5	2322.8	165.5	2324.6	171	2325	175
GR	2324.6	187	2325	188	2324.9	250	2325.3	400	2326	570
GR	2326.5	700								

	Raw Elev	Sta	Adj Elev
1	2323.9	350.0	2326.1
2	2324.9	450.0	2327.1
3	2324.0	484.0	2326.2
4	2323.0	485.5	2325.2
5	2318.9	492.5	2321.1
6	2316.7	500.0	2318.9
7	2318.6	507.5	2320.8
8	2322.8	515.5	2325.0
9	2324.6	521.0	2326.8
10	2325.0	525.0	2327.2
11	2324.6	537.0	2326.8
12	2325.0	538.0	2327.2
13	2324.9	600.0	2327.1
14	2325.3	750.0	2327.5
15	2326.0	920.0	2328.2
16	2326.5	1050.0	2328.7
17	0.0	350.0	2.2
18	0.0	350.0	2.2
19	0.0	350.0	2.2
20	0.0	350.0	2.2

Sta Adj Factor: 350.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev		
		Up:	1.0
		Down:	1.0
484.0	2326.2	484.0	2327.2
		484.0	2325.2

Chart Legend--

FEMA		Project	
430.0	2317.5	430.0	2316.5
450.0	2317.5	450.0	2316.5

FEMA STCHR

Sta	Adj Elev		
521.0	2326.8	521.0	2327.8
		521.0	2325.8

Project Section 24
98+99 (24)

Polyline from .dwg--

					From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point	X=85024.8440	Y=68526.7361	Z= 368.89	85024.84	68526.74	246	2327.3
2	at point	X=84952.8590	Y=68527.0099	Z= 368.89	84952.86	68527.01	318	2327.4
3	at point	X=84912.7427	Y=68527.9862	Z= 368.89	84912.74	68527.99	358	2327.6
4	at point	X=84908.0702	Y=68526.7869	Z= 368.89	84908.07	68526.79	362	2327.3
5	at point	X=84847.2000	Y=68526.6406	Z= 368.89	84847.20	68526.64	423	2327.3
6	at point	X=84818.7546	Y=68526.9048	Z= 368.89	84818.75	68526.90	452	2327.4
7	at point	X=84797.7085	Y=68527.3934	Z= 368.89	84797.71	68527.39	473	2327.5
8	at point	X=84790.1186	Y=68519.5533	Z= 368.89	84790.12	68519.55	480	2325.9
9	at point	X=84784.0098	Y=68495.7065	Z= 368.89	84784.01	68495.71	487	2321.1
10	at point	X=84782.5216	Y=68495.2720	Z= 368.89	84782.52	68495.27	488	2321.0
11	at point	X=84776.2250	Y=68494.7382	Z= 368.89	84776.23	68494.74	494	2320.9
12	at point	X=84771.9368	Y=68489.3036	Z= 368.89	84771.94	68489.30	499	2319.8
13	at point	X=84770.5615	Y=68490.1153	Z= 368.89	84770.56	68490.12	500	2320.0
14	at point	X=84766.4845	Y=68492.4812	Z= 368.89	84766.48	68492.48	504	2320.5
15	at point	X=84759.4274	Y=68494.3179	Z= 368.89	84759.43	68494.32	511	2320.8
16	at point	X=84757.2418	Y=68505.5038	Z= 368.89	84757.24	68505.50	513	2323.1
17	at point	X=84752.5999	Y=68516.3326	Z= 368.89	84752.60	68516.33	518	2325.2
18	at point	X=84744.8548	Y=68531.1730	Z= 368.89	84744.85	68531.17	526	2328.2
19	at point	X=84738.0719	Y=68530.8626	Z= 368.89	84738.07	68530.86	532	2328.2
20	at point	X=84732.0360	Y=68528.9517	Z= 368.89	84732.04	68528.95	539	2327.8
21	at point	X=84731.9360	Y=68530.7017	Z= 368.89	84731.94	68530.70	539	2328.1
22	at point	X=84694.8137	Y=68531.6673	Z= 368.89	84694.81	68531.67	576	2328.3
23	at point	X=84668.7912	Y=68534.7268	Z= 368.89	84668.79	68534.73	602	2328.9
24	at point	X=84647.7344	Y=68533.8040	Z= 368.89	84647.73	68533.80	623	2328.7
25	at point	X=84634.8082	Y=68532.1046	Z= 368.89	84634.81	68532.10	636	2328.4
26	at point	X=84581.8658	Y=68531.7728	Z= 368.89	84581.87	68531.77	689	2328.3
27	at point	X=84568.2974	Y=68531.5961	Z= 368.89	84568.30	68531.60	702	2328.3
28	at point	X=84544.8000	Y=68530.4323	Z= 368.89	84544.80	68530.43	726	2328.1
29	at point	X=84473.8854	Y=68532.0579	Z= 368.89	84473.89	68532.06	797	2328.4
30	at point	X=84456.4555	Y=68532.1071	Z= 368.89	84456.46	68532.11	814	2328.4
31	at point	X=84448.4096	Y=68530.2769	Z= 368.89	84448.41	68530.28	822	2328.0
32	at point	X=84445.6869	Y=68530.1536	Z= 368.89	84445.69	68530.15	825	2328.0
33	at point	X=84445.6033	Y=68528.6915	Z= 368.89	84445.60	68528.69	825	2327.7
34	at point	X=84424.8884	Y=68532.0546	Z= 368.89	84424.89	68532.05	846	2328.4
35	at point	X=84405.0382	Y=68528.8862	Z= 368.89	84405.04	68528.89	866	2327.8
36	at point	X=84404.9577	Y=68530.2964	Z= 368.89	84404.96	68530.30	866	2328.0
37	at point	X=84395.0495	Y=68531.8228	Z= 368.89	84395.05	68531.82	876	2328.3
38	at point	X=84364.7835	Y=68530.3276	Z= 368.89	84364.78	68530.33	906	2328.0
39	at point	X=84355.1146	Y=68531.9370	Z= 368.89	84355.11	68531.94	915	2328.4
40	at point	X=84355.1146	Y=68531.9370	Z= 368.89	84355.11	68531.94	915	2328.4

Center Vertical Grid Line--

from point,	X=84770.5615	Y=68465.0936	Z=	84770.56	68465.09	500 2315.00
to point,	X=84770.5615	Y=68565.0936	Z=	84770.56	68565.09	500 2335.00

CL X	84770.56
New CL Station:	5+00
Top Elev:	2330
Bottom Elev:	2315

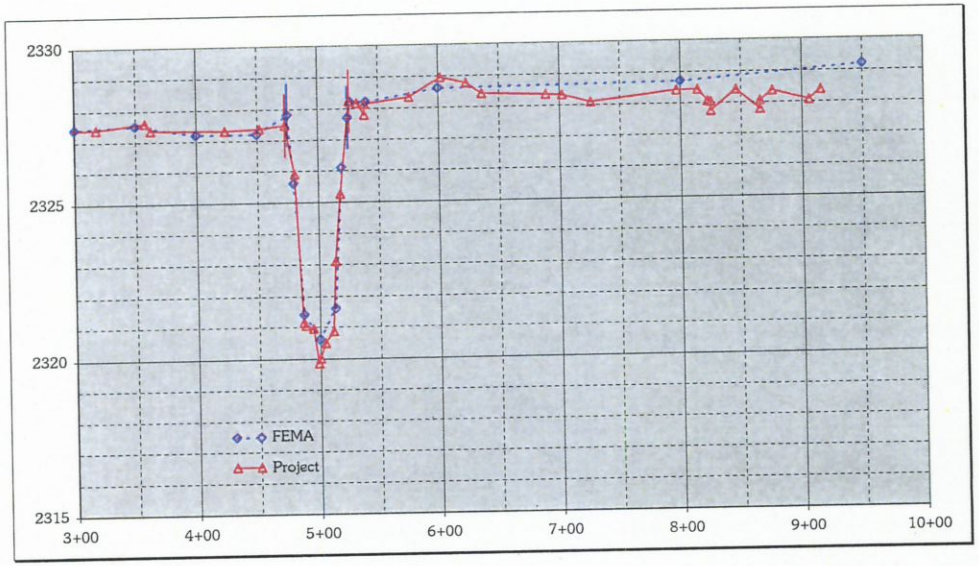
Proj STCHL
473 2326.46
473 2328.46

Line from STCHL to STCHR

from point,	X=84797.7085	Y=68527.3934	Z=	84797.71	68527.39	
to point,	X=84744.8548	Y=68531.1730	Z=	84744.85	68531.17	

Proj STCHR
526 2327.22
526 2329.22

	-------1	-------2	-------3	-------4	-------5	-------6	-------7	-------8	-------9	------10
	X1 24	40	473	526						
1	GR2327.3	246	2327.4	318	2327.6	358	2327.3	362	2327.3	423
2	GR2327.4	452	2327.5	473	2325.9	480	2321.1	487	2321.0	488
3	GR2320.9	494	2319.8	499	2320.0	500	2320.5	504	2320.8	511
4	GR2323.1	513	2325.2	518	2328.2	526	2328.2	532	2327.8	539
5	GR2328.1	539	2328.3	576	2328.9	602	2328.7	623	2328.4	636
6	GR2328.3	689	2328.3	702	2328.1	726	2328.4	797	2328.4	814
7	GR2328.0	822	2328.0	825	2327.7	825	2328.4	846	2327.8	866
8	GR2328.0	866	2328.3	876	2328.0	906	2328.4	915	2328.4	915



FEMA SECTION 24

X1	24	17	225	275	300	300	300	0	0	
X3	0	0	0	100	0	0	0	0	0	
GR	2325.1	0	2325.2	50	2325.3	100	2325	150	2325	200
GR	2325.6	225	2323.4	230	2319.2	237	2318.4	250	2319.4	263
GR	2323.9	269.5	2325.5	275	2326	277	2326	290	2326.4	350
GR	2326.5	550	2327	700						

	Raw Elev	Sta	Adj Elev
1	2325.1	250.0	2327.3
2	2325.2	300.0	2327.4
3	2325.3	350.0	2327.5
4	2325.0	400.0	2327.2
5	2325.0	450.0	2327.2
6	2325.6	475.0	2327.8
7	2323.4	480.0	2325.6
8	2319.2	487.0	2321.4
9	2318.4	500.0	2320.6
10	2319.4	513.0	2321.6
11	2323.9	519.5	2326.1
12	2325.5	525.0	2327.7
13	2326.0	527.0	2328.2
14	2326.0	540.0	2328.2
15	2326.4	600.0	2328.6
16	2326.5	800.0	2328.7
17	2327.0	950.0	2329.2
18	0.0	250.0	2.2
19	0.0	250.0	2.2
20	0.0	250.0	2.2

Sta Adj Factor: 250.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev	Up:	1.0
		Down:	1.0
475.0	2327.8	475.0	2328.8
		475.0	2326.8

Chart Legend--

FEMA		Project	
430.0	2317.5	430.0	2316.5
450.0	2317.5	450.0	2316.5

FEMA STCHR

Sta	Adj Elev		
525.0	2327.7	525.0	2328.7
		525.0	2326.7

Project Section 25
99+41 (25)

Polyline from .dwg--

				From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point	X=85020.8577	Y=68656.6185	85020.86	68656.62	360	2327.3
2	at point	X=84947.4418	Y=68659.0277	84947.44	68659.03	433	2327.8
3	at point	X=84917.8467	Y=68659.7456	84917.85	68659.75	463	2327.9
4	at point	X=84913.1814	Y=68658.1351	84913.18	68658.14	468	2327.6
5	at point	X=84899.6408	Y=68661.1401	84899.64	68661.14	481	2328.2
6	at point	X=84897.5300	Y=68667.1748	84897.53	68667.17	483	2329.4
7	at point	X=84896.5398	Y=68662.2225	84896.54	68662.22	484	2328.4
8	at point	X=84896.3903	Y=68631.0176	84896.39	68631.02	484	2322.2
9	at point	X=84894.0631	Y=68627.0000	84894.06	68627.00	487	2321.4
10	at point	X=84889.6982	Y=68629.1371	84889.70	68629.14	491	2321.8
11	at point	X=84882.7113	Y=68627.1433	84882.71	68627.14	498	2321.4
12	at point	X=84880.8257	Y=68627.0841	84880.83	68627.08	500	2321.4
13	at point	X=84874.6440	Y=68626.7041	84874.64	68626.70	506	2321.3
14	at point	X=84872.9266	Y=68625.0317	84872.93	68625.03	508	2321.0
15	at point	X=84864.2821	Y=68625.1714	84864.28	68625.17	517	2321.0
16	at point	X=84858.7386	Y=68628.9736	84858.74	68628.97	522	2321.8
17	at point	X=84856.9479	Y=68631.8151	84856.95	68631.82	524	2322.3
18	at point	X=84856.9060	Y=68662.5203	84856.91	68662.52	524	2328.5
19	at point	X=84851.9619	Y=68665.3244	84851.96	68665.32	529	2329.0
20	at point	X=84851.9006	Y=68662.7792	84851.90	68662.78	529	2328.5
21	at point	X=84788.8307	Y=68663.6227	84788.83	68663.62	592	2328.7
22	at point	X=84683.5076	Y=68663.8379	84683.51	68663.84	697	2328.7
23	at point	X=84563.4013	Y=68663.0586	84563.40	68663.06	817	2328.6
24	at point	X=84563.2856	Y=68670.9399	84563.29	68670.94	818	2330.2
25	at point	X=84551.7115	Y=68667.1211	84551.71	68667.12	829	2329.4
26	at point	X=84551.3427	Y=68665.3006	84551.34	68665.30	829	2329.0
27	at point	X=84547.5097	Y=68664.1408	84547.51	68664.14	833	2328.8
28	at point	X=84546.5117	Y=68662.6667	84546.51	68662.67	834	2328.5
29	at point	X=84518.5838	Y=68662.8878	84518.58	68662.89	862	2328.6
30	at point	X=84515.4613	Y=68662.4504	84515.46	68662.45	865	2328.5
31	at point	X=84513.9829	Y=68664.2372	84513.98	68664.24	867	2328.8
32	at point	X=84510.6537	Y=68664.9876	84510.65	68664.99	870	2329.0
33	at point	X=84509.8548	Y=68666.8215	84509.85	68666.82	871	2329.3
34	at point	X=84498.5876	Y=68668.9490	84498.59	68668.95	882	2329.8
35	at point	X=84498.4652	Y=68663.3430	84498.47	68663.34	882	2328.6
36	at point	X=84465.8669	Y=68662.5272	84465.87	68662.53	915	2328.5
37							
38							
39							
40							

Center Vertical Grid Line--

from point,	X=84880.8257	Y=68595.0936	Z=	84880.83	68595.09	500 2315.00
to point,	X=84880.8257	Y=68695.0936	Z=	84880.83	68695.09	500 2335.00

CL X 84880.83
New CL Station: 5+00
Top Elev: 2335
Bottom Elev: 2315

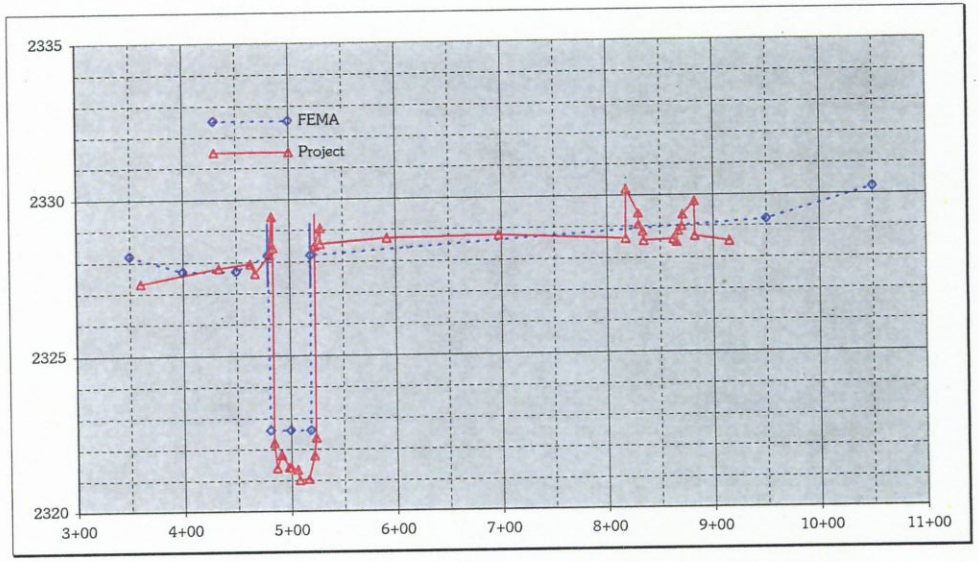
Proj STCHL
484 2327.43
484 2329.43

Line from STCHL to STCHR

from point,	X=84896.5398	Y=68662.2225	Z=	84896.54	68662.22	
to point,	X=84856.9060	Y=68662.5203	Z=	84856.91	68662.52	

Proj STCHR
524 2327.49
524 2329.49

	-------1	-------2	-------3	-------4	-------5	-------6	-------7	-------8	-------9	-------10
	X1 25	36	484	524						
1	GR2327.3	360	2327.8	433	2327.9	463	2327.6	468	2328.2	481
2	GR2329.4	483	2328.4	484	2322.2	484	2321.4	487	2321.8	491
3	GR2321.4	498	2321.4	500	2321.3	506	2321.0	508	2321.0	517
4	GR2321.8	522	2322.3	524	2328.5	524	2329.0	529	2328.5	529
5	GR2328.7	592	2328.7	697	2328.6	817	2330.2	818	2329.4	829
6	GR2329.0	829	2328.8	833	2328.5	834	2328.6	862	2328.5	865
7	GR2328.8	867	2329.0	870	2329.3	871	2329.8	882	2328.6	882
8	GR2328.5	915	0.0	0	0.0	0	0.0	0	0.0	0



FEMA SECTION 25

X1	25	10	130	170	50	50	50	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2326	0	2325.5	50	2325.5	100	2326	130	2320.4	131
GR	2320.4	150	2320.4	169	2326	170	2327	600	2328	700

	Raw Elev	Sta	Adj Elev
1	2326.0	350.0	2328.2
2	2325.5	400.0	2327.7
3	2325.5	450.0	2327.7
4	2326.0	480.0	2328.2
5	2320.4	481.0	2322.6
6	2320.4	500.0	2322.6
7	2320.4	519.0	2322.6
8	2326.0	520.0	2328.2
9	2327.0	950.0	2329.2
10	2328.0	1050.0	2330.2
11	0.0	350.0	2.2
12	0.0	350.0	2.2
13	0.0	350.0	2.2
14	0.0	350.0	2.2
15	0.0	350.0	2.2
16	0.0	350.0	2.2
17	0.0	350.0	2.2
18	0.0	350.0	2.2
19	0.0	350.0	2.2
20	0.0	350.0	2.2

Sta Adj Factor: 350.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev		
		Up:	1.0
		Down:	1.0
480.0	2328.2	480.0	2329.2
		480.0	2327.2

Chart Legend--

FEMA		Project	
430.0	2332.5	430.0	2331.5
500.0	2332.5	500.0	2331.5

FEMA STCHR

Sta	Adj Elev		
520.0	2328.2	520.0	2329.2
		520.0	2327.2

Project Section 26
100+76 (26)

Polyline from .dwg--

					From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point	X=84895.4989	Y=68775.2127	Z= 368.85	84895.50	68775.21	424	2330.0
2	at point	X=84885.6847	Y=68771.7642	Z= 368.85	84885.68	68771.76	434	2329.3
3	at point	X=84878.0721	Y=68769.4085	Z= 368.85	84878.07	68769.41	441	2328.9
4	at point	X=84845.6550	Y=68772.7224	Z= 368.85	84845.66	68772.72	474	2329.5
5	at point	X=84842.6850	Y=68775.5411	Z= 368.85	84842.69	68775.54	477	2330.1
6	at point	X=84841.1038	Y=68765.7176	Z= 368.85	84841.10	68765.72	478	2328.1
7	at point	X=84836.8218	Y=68751.7285	Z= 368.85	84836.82	68751.73	482	2325.3
8	at point	X=84836.4515	Y=68743.6012	Z= 368.85	84836.45	68743.60	483	2323.7
9	at point	X=84819.2712	Y=68743.4706	Z= 368.85	84819.27	68743.47	500	2323.7
10	at point	X=84801.2423	Y=68743.8772	Z= 368.85	84801.24	68743.88	518	2323.8
11	at point	X=84792.4590	Y=68777.0350	Z= 368.85	84792.46	68777.04	527	2330.4
12	at point	X=84785.4089	Y=68776.0578	Z= 368.85	84785.41	68776.06	534	2330.2
13	at point	X=84756.7325	Y=68776.3125	Z= 368.85	84756.73	68776.31	563	2330.2
14	at point	X=84742.0615	Y=68779.1817	Z= 368.85	84742.06	68779.18	577	2330.8
15	at point	X=84741.3589	Y=68777.5644	Z= 368.85	84741.36	68777.56	578	2330.5
16	at point	X=84739.4314	Y=68776.9716	Z= 368.85	84739.43	68776.97	580	2330.4
17	at point	X=84706.4704	Y=68779.1329	Z= 368.85	84706.47	68779.13	613	2330.8
18	at point	X=84695.6300	Y=68776.3417	Z= 368.85	84695.63	68776.34	624	2330.2
19	at point	X=84667.3519	Y=68775.9998	Z= 368.85	84667.35	68776.00	652	2330.2
20	at point	X=84665.1385	Y=68773.0764	Z= 368.85	84665.14	68773.08	654	2329.6
21	at point	X=84634.8942	Y=68773.2039	Z= 368.85	84634.89	68773.20	684	2329.6
22	at point	X=84634.1357	Y=68774.9091	Z= 368.85	84634.14	68774.91	685	2330.0
23	at point	X=84621.8479	Y=68773.1227	Z= 368.85	84621.85	68773.12	697	2329.6
24	at point	X=84577.4858	Y=68773.0267	Z= 368.85	84577.49	68773.03	742	2329.6
25	at point	X=84575.3280	Y=68770.9317	Z= 368.85	84575.33	68770.93	744	2329.2
26	at point	X=84571.1576	Y=68770.2246	Z= 368.85	84571.16	68770.22	748	2329.0
27	at point	X=84564.4313	Y=68766.9268	Z= 368.85	84564.43	68766.93	755	2328.4
28	at point	X=84557.9320	Y=68766.2354	Z= 368.85	84557.93	68766.24	761	2328.2
29	at point	X=84550.9698	Y=68773.0892	Z= 368.85	84550.97	68773.09	768	2329.6
30	at point	X=84542.4876	Y=68778.1598	Z= 368.85	84542.49	68778.16	777	2330.6
31	at point	X=84532.7447	Y=68780.3463	Z= 368.85	84532.74	68780.35	787	2331.1
32	at point	X=84532.6443	Y=68778.5972	Z= 368.85	84532.64	68778.60	787	2330.7
33	at point	X=84514.5093	Y=68778.3099	Z= 368.85	84514.51	68778.31	805	2330.6
34	at point	X=84514.3398	Y=68779.8415	Z= 368.85	84514.34	68779.84	805	2330.9
35	at point	X=84508.5752	Y=68777.4586	Z= 368.85	84508.58	68777.46	811	2330.5
36	at point	X=84443.6478	Y=68777.4906	Z= 368.85	84443.65	68777.49	876	2330.5
37	at point	X=84406.2674	Y=68776.5664	Z= 368.85	84406.27	68776.57	913	2330.3
38								
39								
40								

Center Vertical Grid Line--

from point,	X=84819.2712	Y=68725.0936	Z=	84819.27	68725.09	500 2320.00
to point,	X=84819.2712	Y=68800.0936	Z=	84819.27	68800.09	500 2335.00

CL X	84819.27
New CL Station:	5+00
Top Elev:	2335
Bottom Elev:	2320

Proj STCHL
477 2329.09
477 2331.09

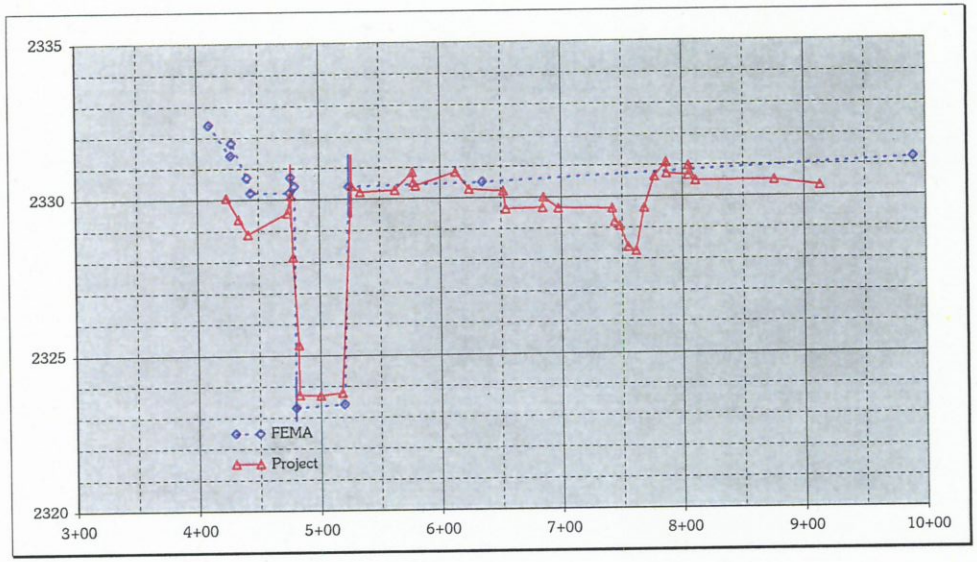
Line from STCHL to STCHR

from point,	X=84842.6850	Y=68775.5411	Z=	84842.69	68775.54	
to point,	X=84792.4590	Y=68777.0350	Z=	84792.46	68777.04	

Proj STCHR
527 2329.39
527 2331.39

-------1-------2-------3-------4-------5-------6-------7-------8-------9------10

	X1 26	37	477	527						
1	GR2330.0	424	2329.3	434	2328.9	441	2329.5	474	2330.1	477
2	GR2328.1	478	2325.3	482	2323.7	483	2323.7	500	2323.8	518
3	GR2330.4	527	2330.2	534	2330.2	563	2330.8	577	2330.5	578
4	GR2330.4	580	2330.8	613	2330.2	624	2330.2	652	2329.6	654
5	GR2329.6	684	2330.0	685	2329.6	697	2329.6	742	2329.2	744
6	GR2329.0	748	2328.4	755	2328.2	761	2329.6	768	2330.6	777
7	GR2331.1	787	2330.7	787	2330.6	805	2330.9	805	2330.5	811
8	GR2330.5	876	2330.3	913	0.0	0	0.0	0	0.0	0



FEMA SECTION 26

X1	26	13	70	115	127	127	127	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2330.2	0	2329.2	18	2329.6	18.5	2328.5	31	2328	34
GR	2328	66	2328.5	67	2328.2	70	2321.1	70	2321.2	110
GR	2328.2	115	2328.3	225	2329	580				

	Raw Elev	Sta	Adj Elev
1	2330.2	410.0	2332.4
2	2329.2	428.0	2331.4
3	2329.6	428.5	2331.8
4	2328.5	441.0	2330.7
5	2328.0	444.0	2330.2
6	2328.0	476.0	2330.2
7	2328.5	477.0	2330.7
8	2328.2	480.0	2330.4
9	2321.1	480.0	2323.3
10	2321.2	520.0	2323.4
11	2328.2	525.0	2330.4
12	2328.3	635.0	2330.5
13	2329.0	990.0	2331.2
14	0.0	410.0	2.2
15	0.0	410.0	2.2
16	0.0	410.0	2.2
17	0.0	410.0	2.2
18	0.0	410.0	2.2
19	0.0	410.0	2.2
20	0.0	410.0	2.2

Sta Adj Factor: 410.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev		
		Up:	1.0
		Down:	1.0
480.0	2323.3	480.0	2324.3
		480.0	2322.3

Chart Legend--

FEMA		Project	
430.0	2322.5	430.0	2321.5
450.0	2322.5	450.0	2321.5

FEMA STCHR

Sta	Adj Elev		
525.0	2330.4	525.0	2331.4
		525.0	2329.4

Project Section 27
101+27 (27)

Polyline from .dwg--

					From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point	X=86282.2775	Y=68312.0994	Z= 368.85	86282.28	68312.10	430	2331.4
2	at point	X=86276.5535	Y=68310.9944	Z= 368.85	86276.55	68310.99	436	2331.2
3	at point	X=86260.1755	Y=68295.7546	Z= 368.85	86260.18	68295.75	452	2328.1
4	at point	X=86229.6409	Y=68294.4414	Z= 368.85	86229.64	68294.44	483	2327.9
5	at point	X=86227.3134	Y=68295.4179	Z= 368.85	86227.31	68295.42	485	2328.1
6	at point	X=86225.3163	Y=68294.2851	Z= 368.85	86225.32	68294.29	487	2327.8
7	at point	X=86220.5889	Y=68281.6197	Z= 368.85	86220.59	68281.62	492	2325.3
8	at point	X=86212.5924	Y=68281.6896	Z= 368.85	86212.59	68281.69	500	2325.3
9	at point	X=86205.2987	Y=68282.1803	Z= 368.85	86205.30	68282.18	507	2325.4
10	at point	X=86193.9395	Y=68308.3059	Z= 368.85	86193.94	68308.31	519	2330.6
11	at point	X=86169.8662	Y=68306.2988	Z= 368.85	86169.87	68306.30	543	2330.2
12	at point	X=86145.3822	Y=68308.0399	Z= 368.85	86145.38	68308.04	567	2330.6
13	at point	X=86139.8635	Y=68306.5664	Z= 368.85	86139.86	68306.57	573	2330.3
14	at point	X=86123.6634	Y=68306.7486	Z= 368.85	86123.66	68306.75	589	2330.3
15	at point	X=86082.0458	Y=68304.3206	Z= 368.85	86082.05	68304.32	631	2329.8
16	at point	X=86075.9476	Y=68308.7593	Z= 368.85	86075.95	68308.76	637	2330.7
17	at point	X=86075.8476	Y=68307.0092	Z= 368.85	86075.85	68307.01	637	2330.4
18	at point	X=86070.2669	Y=68305.2841	Z= 368.85	86070.27	68305.28	642	2330.0
19	at point	X=86048.4765	Y=68304.7406	Z= 368.85	86048.48	68304.74	664	2329.9
20	at point	X=86028.6742	Y=68312.8841	Z= 368.85	86028.67	68312.88	684	2331.6
21	at point	X=86000.5579	Y=68313.5951	Z= 368.85	86000.56	68313.60	712	2331.7
22	at point	X=85970.9061	Y=68312.1465	Z= 368.85	85970.91	68312.15	742	2331.4
23	at point	X=85959.6201	Y=68310.2315	Z= 368.85	85959.62	68310.23	753	2331.0
24	at point	X=85959.3314	Y=68312.3948	Z= 368.85	85959.33	68312.39	753	2331.5
25	at point	X=85956.6498	Y=68307.4003	Z= 368.85	85956.65	68307.40	756	2330.5
26	at point	X=85954.1846	Y=68301.1909	Z= 368.85	85954.18	68301.19	758	2329.2
27	at point	X=85947.6705	Y=68295.3186	Z= 368.85	85947.67	68295.32	765	2328.0
28	at point	X=85944.4918	Y=68295.4648	Z= 368.85	85944.49	68295.46	768	2328.1
29	at point	X=85932.2157	Y=68299.4592	Z= 368.85	85932.22	68299.46	780	2328.9
30	at point	X=85920.7585	Y=68305.5360	Z= 368.85	85920.76	68305.54	792	2330.1
31	at point	X=85905.1133	Y=68308.6499	Z= 368.85	85905.11	68308.65	807	2330.7
32	at point	X=85857.6004	Y=68310.0796	Z= 368.85	85857.60	68310.08	855	2331.0
33	at point	X=85857.2711	Y=68309.0137	Z= 368.85	85857.27	68309.01	855	2330.8
34	at point	X=85838.6787	Y=68307.1833	Z= 368.85	85838.68	68307.18	874	2330.4
35	at point	X=85813.4525	Y=68306.6851	Z= 368.85	85813.45	68306.69	899	2330.3
36								
37								
38								
39								
40								

Center Vertical Grid Line--

from point,	X=86212.5924	Y=68255.0936	Z=	86212.59	68255.09	500 2320.00
to point,	X=86212.5924	Y=68330.0936	Z=	86212.59	68330.09	500 2335.00

CL X 86212.59
New CL Station: 5+00
Top Elev: 2335
Bottom Elev: 2320

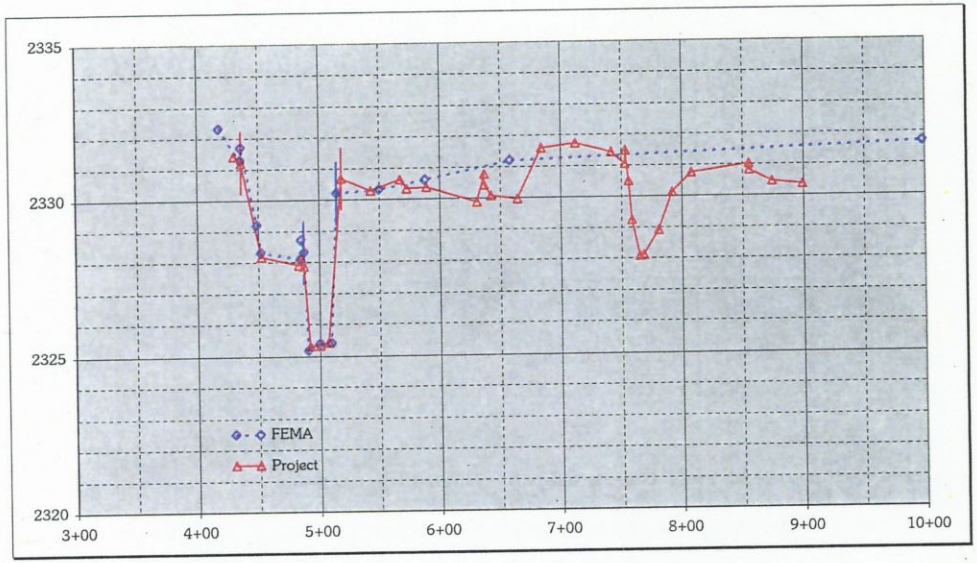
Proj STCHL
436 2330.18
436 2332.18

Line from STCHL to STCHR

from point,	X=86276.5535	Y=68310.9944	Z=	86276.55	68310.99	
to point,	X=86193.9395	Y=68308.3059	Z=	86193.94	68308.31	

Proj STCHR
519 2329.64
519 2331.64

	-------1-------2-------3-------4-------5-------6-------7-------8-------9------10									
	X1 27	35	436	519						
1	GR2331.4	430	2331.2	436	2328.1	452	2327.9	483	2328.1	485
2	GR2327.8	487	2325.3	492	2325.3	500	2325.4	507	2330.6	519
3	GR2330.2	543	2330.6	567	2330.3	573	2330.3	589	2329.8	631
4	GR2330.7	637	2330.4	637	2330.0	642	2329.9	664	2331.6	684
5	GR2331.7	712	2331.4	742	2331.0	753	2331.5	753	2330.5	756
6	GR2329.2	758	2328.0	765	2328.1	768	2328.9	780	2330.1	792
7	GR2330.7	807	2331.0	855	2330.8	855	2330.4	874	2330.3	899
8	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0



FEMA SECTION 27

X1	27	16	69.5	97	50	50	50	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2330.1	0	2329.1	17.5	2329.5	18	2327	31	2326.1	34
GR	2325.9	66.5	2326.5	67	2326.1	69.5	2323	72.5	2323.2	82
GR	2323.2	91.5	2328	97	2328.1	132	2328.4	170	2329	240
GR	2329.5	580								

	Raw Elev	Sta	Adj Elev
1	2330.1	418.0	2332.3
2	2329.1	435.5	2331.3
3	2329.5	436.0	2331.7
4	2327.0	449.0	2329.2
5	2326.1	452.0	2328.3
6	2325.9	484.5	2328.1
7	2326.5	485.0	2328.7
8	2326.1	487.5	2328.3
9	2323.0	490.5	2325.2
10	2323.2	500.0	2325.4
11	2323.2	509.5	2325.4
12	2328.0	515.0	2330.2
13	2328.1	550.0	2330.3
14	2328.4	588.0	2330.6
15	2329.0	658.0	2331.2
16	2329.5	998.0	2331.7
17	0.0	418.0	2.2
18	0.0	418.0	2.2
19	0.0	418.0	2.2
20	0.0	418.0	2.2

Sta Adj Factor: 418.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev	Up:	1.0
		Down:	1.0
487.5	2328.3	487.5	2329.3
		487.5	2327.3

Chart Legend--

FEMA		Project	
430.0	2322.5	430.0	2321.5
450.0	2322.5	450.0	2321.5

FEMA STCHR

Sta	Adj Elev		
515.0	2330.2	515.0	2331.2
		515.0	2329.2

Project Section 28
107+04 (28)

Polyline from .dwg--

				From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point	X=86384.0200	Y=68397.5936	86384.02	68397.59	240	2332.5
2	at point	X=86318.3329	Y=68396.3196	86318.33	68396.32	306	2332.2
3	at point	X=86208.3644	Y=68395.6910	86208.36	68395.69	416	2332.1
4	at point	X=86173.8135	Y=68395.2104	86173.81	68395.21	450	2332.0
5	at point	X=86165.4925	Y=68393.2249	86165.49	68393.22	459	2331.6
6	at point	X=86155.2953	Y=68392.6066	86155.30	68392.61	469	2331.5
7	at point	X=86143.5490	Y=68382.5184	86143.55	68382.52	480	2329.5
8	at point	X=86130.0440	Y=68380.6500	86130.04	68380.65	494	2329.1
9	at point	X=86124.0200	Y=68381.2059	86124.02	68381.21	500	2329.2
10	at point	X=86112.8628	Y=68382.2356	86112.86	68382.24	511	2329.4
11	at point	X=86099.2136	Y=68390.2933	86099.21	68390.29	525	2331.0
12	at point	X=86094.5595	Y=68388.7483	86094.56	68388.75	529	2330.7
13	at point	X=86089.3411	Y=68389.3286	86089.34	68389.33	535	2330.8
14	at point	X=86070.8843	Y=68389.6536	86070.88	68389.65	553	2330.9
15	at point	X=86041.8069	Y=68388.4170	86041.81	68388.42	582	2330.7
16	at point	X=86008.6660	Y=68390.0899	86008.67	68390.09	615	2331.0
17	at point	X=86008.0443	Y=68392.3440	86008.04	68392.34	616	2331.5
18	at point	X=85961.2887	Y=68390.6735	85961.29	68390.67	663	2331.1
19	at point	X=85950.8733	Y=68390.6190	85950.87	68390.62	673	2331.1
20	at point	X=85935.7126	Y=68392.3197	85935.71	68392.32	688	2331.4
21	at point	X=85908.6736	Y=68391.5721	85908.67	68391.57	715	2331.3
22	at point	X=85875.7295	Y=68392.8266	85875.73	68392.83	748	2331.5
23	at point	X=85856.3418	Y=68392.0342	85856.34	68392.03	768	2331.4
24	at point	X=85853.1779	Y=68390.5138	85853.18	68390.51	771	2331.1
25	at point	X=85851.7650	Y=68392.4892	85851.77	68392.49	772	2331.5
26	at point	X=85845.5350	Y=68392.6000	85845.54	68392.60	778	2331.5
27	at point	X=85844.5475	Y=68389.9816	85844.55	68389.98	779	2331.0
28	at point	X=85834.2020	Y=68386.5233	85834.20	68386.52	790	2330.3
29	at point	X=85827.4682	Y=68390.6490	85827.47	68390.65	797	2331.1
30	at point	X=85808.3124	Y=68393.1615	85808.31	68393.16	816	2331.6
31	at point	X=85800.8595	Y=68392.4171	85800.86	68392.42	823	2331.5
32	at point	X=85770.8568	Y=68394.7446	85770.86	68394.74	853	2331.9
33	at point	X=85766.0129	Y=68395.9949	85766.01	68395.99	858	2332.2
34	at point	X=85732.2610	Y=68396.6733	85732.26	68396.67	892	2332.3
35	at point	X=85724.3550	Y=68392.7450	85724.36	68392.75	900	2331.5
36	at point	X=85624.0200	Y=68397.5936	85624.02	68397.59	1000	2332.5
37							
38							
39							
40							

Center Vertical Grid Line--

from point,	X=86124.0200	Y=68360.0936	Z=	86124.02	68360.09	500	2325.00
to point,	X=86124.0200	Y=68410.0936	Z=	86124.02	68410.09	500	2335.00

CL X 86124.02
New CL Station: 5+00
Top Elev: 2335
Bottom Elev: 2325

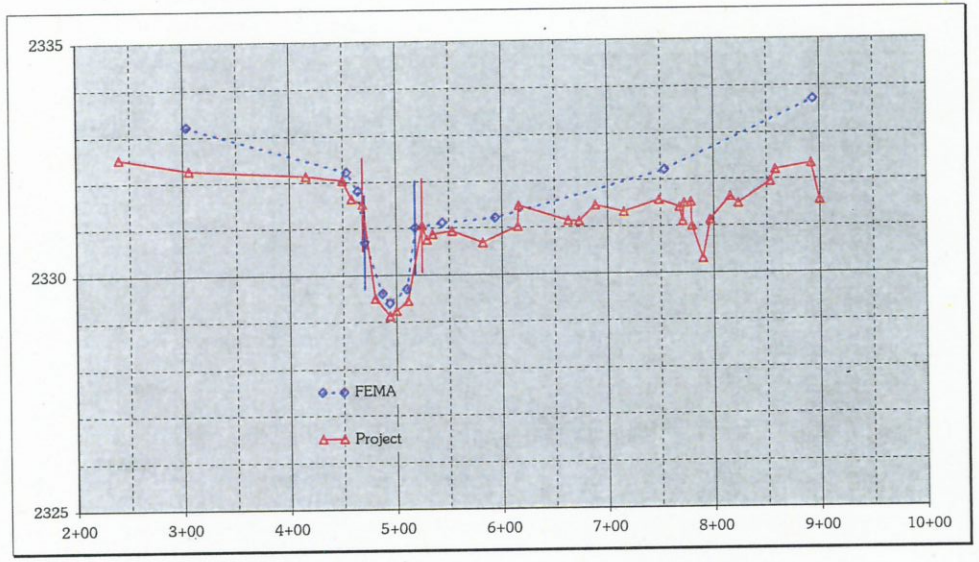
Proj STCHL
469 2330.50
469 2332.50

Line from STCHL to STCHR

from point,	X=86155.2953	Y=68392.6066	Z=	86155.30	68392.61
to point,	X=86099.2136	Y=68390.2933	Z=	86099.21	68390.29

Proj STCHR
525 2330.04
525 2332.04

	-------1	-------2	-------3	-------4	-------5	-------6	-------7	-------8	-------9	------10
	X1 28	36	469	525						
1	GR2332.5	240	2332.2	306	2332.1	416	2332.0	450	2331.6	459
2	GR2331.5	469	2329.5	480	2329.1	494	2329.2	500	2329.4	511
3	GR2331.0	525	2330.7	529	2330.8	535	2330.9	553	2330.7	582
4	GR2331.0	615	2331.5	616	2331.1	663	2331.1	673	2331.4	688
5	GR2331.3	715	2331.5	748	2331.4	768	2331.1	771	2331.5	772
6	GR2331.5	778	2331.0	779	2330.3	790	2331.1	797	2331.6	816
7	GR2331.5	823	2331.9	853	2332.2	858	2332.3	892	2331.5	900
8	GR2332.5	1000	0.0	0	0.0	0	0.0	0	0.0	0



FEMA SECTION 28

X1	28	12	167	214.5	600	600	600	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2331	0	2330	150	2329.6	161	2328.5	167	2327.4	183.5
GR	2327.2	190	2327.5	206.5	2328.8	214.5	2328.9	240	2329	290
GR	2330	450	2331.5	590						

	Raw Elev	Sta	Adj Elev
1	2331.0	304.0	2333.2
2	2330.0	454.0	2332.2
3	2329.6	465.0	2331.8
4	2328.5	471.0	2330.7
5	2327.4	487.5	2329.6
6	2327.2	494.0	2329.4
7	2327.5	510.5	2329.7
8	2328.8	518.5	2331.0
9	2328.9	544.0	2331.1
10	2329.0	594.0	2331.2
11	2330.0	754.0	2332.2
12	2331.5	894.0	2333.7
13	0.0	304.0	2.2
14	0.0	304.0	2.2
15	0.0	304.0	2.2
16	0.0	304.0	2.2
17	0.0	304.0	2.2
18	0.0	304.0	2.2
19	0.0	304.0	2.2
20	0.0	304.0	2.2

Sta Adj Factor: 304.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev		
		Up:	1.0
		Down:	1.0
471.0	2330.7	471.0	2331.7
		471.0	2329.7

Chart Legend--

FEMA		Project	
430.0	2327.5	430.0	2326.5
450.0	2327.5	450.0	2326.5

FEMA STCHR

Sta	Adj Elev		
518.5	2331.0	518.5	2332.0
		518.5	2330.0

Project Section 29
113+18 (29)

Polyline from .dwg--

				From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point	X=86486.9917	Y=68470.6378	86486.99	68470.64	125	2336.1
2	at point	X=86430.3660	Y=68465.7036	86430.37	68465.70	182	2335.1
3	at point	X=86417.8776	Y=68459.9064	86417.88	68459.91	194	2334.0
4	at point	X=86376.8069	Y=68461.9787	86376.81	68461.98	236	2334.4
5	at point	X=86320.4690	Y=68461.5558	86320.47	68461.56	292	2334.3
6	at point	X=86291.2864	Y=68464.1449	86291.29	68464.14	321	2334.8
7	at point	X=86278.3542	Y=68462.0298	86278.35	68462.03	334	2334.4
8	at point	X=86218.6127	Y=68461.0959	86218.61	68461.10	394	2334.2
9	at point	X=86176.4845	Y=68462.2481	86176.48	68462.25	436	2334.4
10	at point	X=86144.6400	Y=68459.8141	86144.64	68459.81	468	2333.9
11	at point	X=86132.8920	Y=68451.8793	86132.89	68451.88	479	2332.4
12	at point	X=86112.3375	Y=68451.4274	86112.34	68451.43	500	2332.3
13	at point	X=86102.0932	Y=68451.5008	86102.09	68451.50	510	2332.3
14	at point	X=86086.2344	Y=68461.3073	86086.23	68461.31	526	2334.2
15	at point	X=86067.6048	Y=68464.0543	86067.60	68464.05	545	2334.8
16	at point	X=86060.9015	Y=68462.5500	86060.90	68462.55	551	2334.5
17	at point	X=86007.3148	Y=68463.5584	86007.31	68463.56	605	2334.7
18	at point	X=85918.6715	Y=68461.7014	85918.67	68461.70	694	2334.3
19	at point	X=85859.3496	Y=68461.6186	85859.35	68461.62	753	2334.3
20	at point	X=85837.6100	Y=68463.5122	85837.61	68463.51	775	2334.7
21	at point	X=85832.9651	Y=68460.5292	85832.97	68460.53	779	2334.1
22	at point	X=85832.7513	Y=68458.1112	85832.75	68458.11	780	2333.6
23	at point	X=85824.5829	Y=68457.1936	85824.58	68457.19	788	2333.4
24	at point	X=85817.7037	Y=68458.7241	85817.70	68458.72	795	2333.7
25	at point	X=85817.6037	Y=68461.2241	85817.60	68461.22	795	2334.2
26	at point	X=85814.9972	Y=68460.8193	85815.00	68460.82	797	2334.1
27	at point	X=85812.4534	Y=68455.0921	85812.45	68455.09	800	2333.0
28	at point	X=85806.8439	Y=68454.8286	85806.84	68454.83	805	2332.9
29	at point	X=85803.1420	Y=68459.4114	85803.14	68459.41	809	2333.9
30	at point	X=85788.5647	Y=68460.2274	85788.56	68460.23	824	2334.0
31	at point	X=85755.3828	Y=68464.9425	85755.38	68464.94	857	2335.0
32	at point	X=85542.3375	Y=68467.5936	85542.34	68467.59	1070	2335.5
33							
34							
35							
36							
37							
38							
39							
40							

Center Vertical Grid Line--

from point,	X=86112.3375	Y=68440.0936	Z=	86112.34	68440.09	500	2330.00
to point,	X=86112.3375	Y=68490.0936	Z=	86112.34	68490.09	500	2340.00

CL X	86112.34
New CL Station:	5+00
Top Elev:	2340
Bottom Elev:	2330

Line from STCHL to STCHR

from point,	X=86144.6400	Y=68459.8141	Z=	86144.64	68459.81	
to point,	X=86086.2344	Y=68461.3073	Z=	86086.23	68461.31	

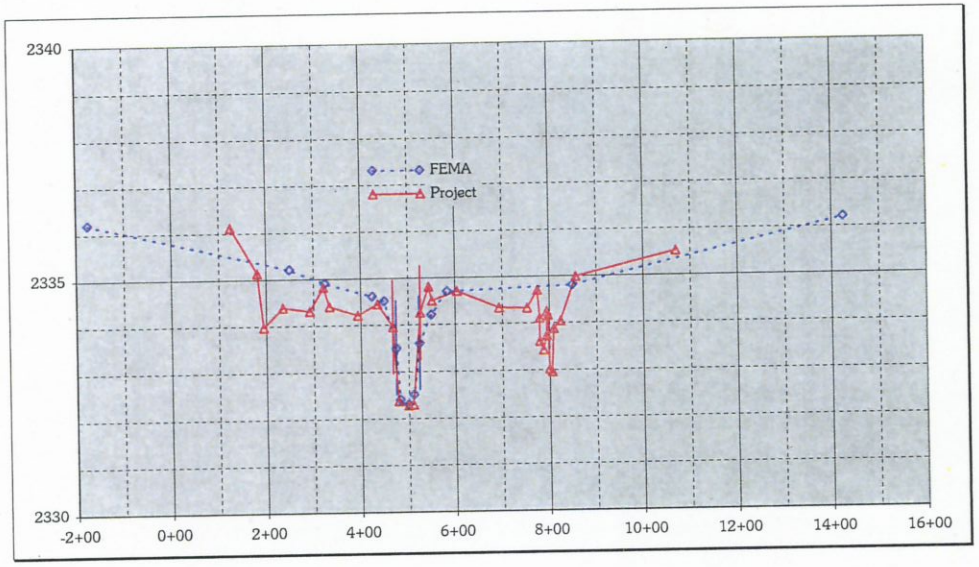
Proj STCHL

468	2332.94
468	2334.94

Proj STCHR

526	2333.24
526	2335.24

	-------1-------2-------3-------4-------5-------6-------7-------8-------9------10									
	X1 29	32	468	526						
1	GR2336.1	125	2335.1	182	2334.0	194	2334.4	236	2334.3	292
2	GR2334.8	321	2334.4	334	2334.2	394	2334.4	436	2333.9	468
3	GR2332.4	479	2332.3	500	2332.3	510	2334.2	526	2334.8	545
4	GR2334.5	551	2334.7	605	2334.3	694	2334.3	753	2334.7	775
5	GR2334.1	779	2333.6	780	2333.4	788	2333.7	795	2334.2	795
6	GR2334.1	797	2333.0	800	2332.9	805	2333.9	809	2334.0	824
7	GR2335.0	857	2335.5	1070	0.0	0	0.0	0	0.0	0
8	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0



FEMA SECTION 29

X1	29	14	650	700	600	600	600	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2334	0	2333	425	2332.7	500	2332.4	600	2332.3	625
GR	2331.3	650	2330.2	658	2330.1	675	2330.3	687	2331.4	700
GR	2332	725	2332.5	759	2332.6	1025	2334	1600		

	Raw Elev	Sta	Adj Elev
1	2334.0	-175.0	2336.2
2	2333.0	250.0	2335.2
3	2332.7	325.0	2334.9
4	2332.4	425.0	2334.6
5	2332.3	450.0	2334.5
6	2331.3	475.0	2333.5
7	2330.2	483.0	2332.4
8	2330.1	500.0	2332.3
9	2330.3	512.0	2332.5
10	2331.4	525.0	2333.6
11	2332.0	550.0	2334.2
12	2332.5	584.0	2334.7
13	2332.6	850.0	2334.8
14	2334.0	1425.0	2336.2
15	0.0	-175.0	2.2
16	0.0	-175.0	2.2
17	0.0	-175.0	2.2
18	0.0	-175.0	2.2
19	0.0	-175.0	2.2
20	0.0	-175.0	2.2

Sta Adj Factor: -175.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev		
		Up:	1.0
		Down:	1.0
475.0	2333.5	475.0	2334.5
		475.0	2332.5

Chart Legend--

FEMA		Project	
430.0	2337.3	430.0	2336.8
530.0	2337.3	530.0	2336.8

FEMA STCHR

Sta	Adj Elev		
525.0	2333.6	525.0	2334.6
		525.0	2332.6

Project Section 30
119+68 (30)

Polyline from .dwg--

					From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point	X=86642.3375	Y=68560.0936	Z= 368.8	86642.34	68560.09	-30	2338.0
2	at point	X=86460.4775	Y=68552.5202	Z= 368.8	86460.48	68552.52	152	2336.5
3	at point	X=86433.3143	Y=68551.6636	Z= 368.8	86433.31	68551.66	179	2336.3
4	at point	X=86419.7880	Y=68549.0941	Z= 368.8	86419.79	68549.09	193	2335.8
5	at point	X=86397.6508	Y=68549.3899	Z= 368.8	86397.65	68549.39	215	2335.9
6	at point	X=86390.1929	Y=68547.2355	Z= 368.8	86390.19	68547.24	222	2335.4
7	at point	X=86380.2478	Y=68548.5343	Z= 368.8	86380.25	68548.53	232	2335.7
8	at point	X=86359.9830	Y=68546.6569	Z= 368.8	86359.98	68546.66	252	2335.3
9	at point	X=86353.1304	Y=68551.2673	Z= 368.8	86353.13	68551.27	259	2336.2
10	at point	X=86318.1415	Y=68551.5789	Z= 368.8	86318.14	68551.58	294	2336.3
11	at point	X=86250.1820	Y=68554.5365	Z= 368.8	86250.18	68554.54	362	2336.9
12	at point	X=86241.0580	Y=68553.9736	Z= 368.8	86241.06	68553.97	371	2336.8
13	at point	X=86237.0018	Y=68556.2706	Z= 368.8	86237.00	68556.27	375	2337.2
14	at point	X=86173.6032	Y=68555.6142	Z= 368.8	86173.60	68555.61	439	2337.1
15	at point	X=86162.0691	Y=68554.6492	Z= 368.8	86162.07	68554.65	450	2336.9
16	at point	X=86151.5907	Y=68551.8864	Z= 368.8	86151.59	68551.89	461	2336.4
17	at point	X=86134.3869	Y=68542.9827	Z= 368.8	86134.39	68542.98	478	2334.6
18	at point	X=86112.3375	Y=68544.1551	Z= 368.8	86112.34	68544.16	500	2334.8
19	at point	X=86099.8735	Y=68544.3927	Z= 368.8	86099.87	68544.39	512	2334.9
20	at point	X=86088.1468	Y=68552.1876	Z= 368.8	86088.15	68552.19	524	2336.4
21	at point	X=86074.3639	Y=68556.6592	Z= 368.8	86074.36	68556.66	538	2337.3
22	at point	X=86057.1648	Y=68558.0521	Z= 368.8	86057.16	68558.05	555	2337.6
23	at point	X=86031.1436	Y=68558.0847	Z= 368.8	86031.14	68558.08	581	2337.6
24	at point	X=85968.7400	Y=68555.6318	Z= 368.8	85968.74	68555.63	644	2337.1
25	at point	X=85959.7308	Y=68551.6636	Z= 368.8	85959.73	68551.66	653	2336.3
26	at point	X=85882.7242	Y=68553.7462	Z= 368.8	85882.72	68553.75	730	2336.7
27	at point	X=85819.7549	Y=68553.5937	Z= 368.8	85819.75	68553.59	793	2336.7
28	at point	X=85815.6487	Y=68554.9449	Z= 368.8	85815.65	68554.94	797	2337.0
29	at point	X=85815.4394	Y=68552.4620	Z= 368.8	85815.44	68552.46	797	2336.5
30	at point	X=85798.0505	Y=68556.3512	Z= 368.8	85798.05	68556.35	814	2337.3
31	at point	X=85788.8252	Y=68557.3417	Z= 368.8	85788.83	68557.34	824	2337.4
32	at point	X=85776.8991	Y=68557.0571	Z= 368.8	85776.90	68557.06	835	2337.4
33	at point	X=85773.2120	Y=68557.5213	Z= 368.8	85773.21	68557.52	839	2337.5
34	at point	X=85773.1120	Y=68560.0189	Z= 368.8	85773.11	68560.02	839	2338.0
35	at point	X=85768.7788	Y=68557.5087	Z= 368.8	85768.78	68557.51	844	2337.5
36	at point	X=85735.5597	Y=68557.8748	Z= 368.8	85735.56	68557.87	877	2337.6
37								
38								
39								
40								

Center Vertical Grid Line--

from point,	X=86112.3375	Y=68520.0936	Z=	86112.34	68520.09	500 2330.00
to point,	X=86112.3375	Y=68570.0936	Z=	86112.34	68570.09	500 2340.00

CL X 86112.34
New CL Station: 5+00
Top Elev: 2340
Bottom Elev: 2330

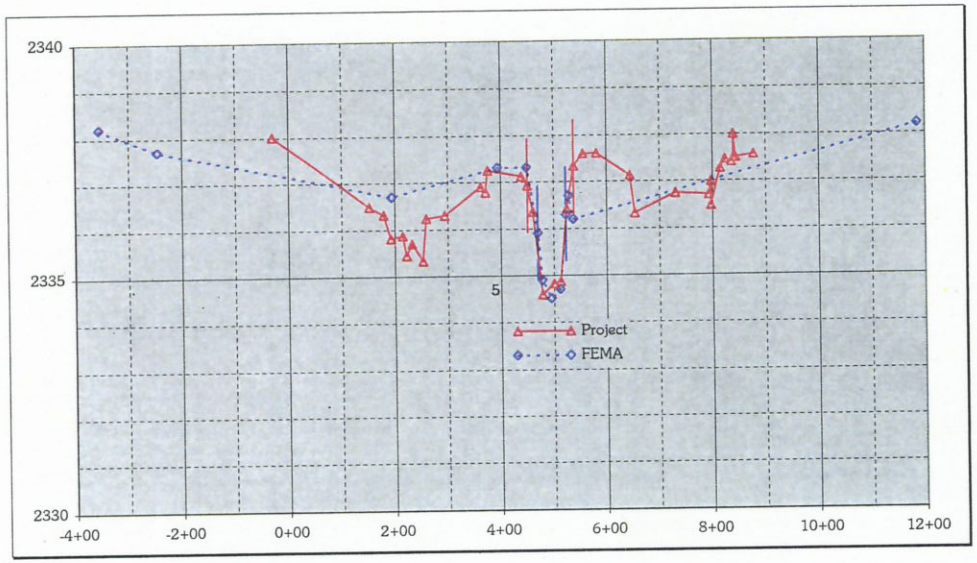
Proj STCHL
450 2335.91
450 2337.91

Line from STCHL to STCHR

from point,	X=86162.0691	Y=68554.6492	Z=	86162.07	68554.65	
to point,	X=86074.3639	Y=68556.6592	Z=	86074.36	68556.66	

Proj STCHR
538 2336.31
538 2338.31

```
-------1-------2-------3-------4-------5-------6-------7-------8-------9------10
 X1    30      36      450     538
1 GR2338.0-     30  2336.5     152  2336.3     179  2335.8     193  2335.9     215
2 GR2335.4     222  2335.7     232  2335.3     252  2336.2     259  2336.3     294
3 GR2336.9     362  2336.8     371  2337.2     375  2337.1     439  2336.9     450
4 GR2336.4     461  2334.6     478  2334.8     500  2334.9     512  2336.4     524
5 GR2337.3     538  2337.6     555  2337.6     581  2337.1     644  2336.3     653
6 GR2336.7     730  2336.7     793  2337.0     797  2336.5     797  2337.3     814
7 GR2337.4     824  2337.4     835  2337.5     839  2338.0     839  2337.5     844
8 GR2337.6     877     0.0       0     0.0       0     0.0       0     0.0       0
```



FEMA SECTION 30

X1	30	13	825	878	650	650	650	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2336	0	2335.5	110	2334.5	550	2335.1	750	2335.1	805
GR	2333.7	825	2332.7	833	2332.3	850	2332.5	867	2334.1	878
GR	2334.5	883	2334	892	2336	1540				

	Raw Elev	Sta	Adj Elev
1	2336.0	-355.0	2338.2
2	2335.5	-245.0	2337.7
3	2334.5	195.0	2336.7
4	2335.1	395.0	2337.3
5	2335.1	450.0	2337.3
6	2333.7	470.0	2335.9
7	2332.7	478.0	2334.9
8	2332.3	495.0	2334.5
9	2332.5	512.0	2334.7
10	2334.1	523.0	2336.3
11	2334.5	528.0	2336.7
12	2334.0	537.0	2336.2
13	2336.0	1185.0	2338.2
14	0.0	-355.0	2.2
15	0.0	-355.0	2.2
16	0.0	-355.0	2.2
17	0.0	-355.0	2.2
18	0.0	-355.0	2.2
19	0.0	-355.0	2.2
20	0.0	-355.0	2.2

Sta Adj Factor: -355.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev		
		Up:	1.0
		Down:	1.0
470.0	2335.9	470.0	2336.9
		470.0	2334.9

Chart Legend--

FEMA		Project	
430.0	2333.3	430.0	2333.8
530.0	2333.3	530.0	2333.8

FEMA STCHR

Sta	Adj Elev		
523.0	2336.3	523.0	2337.3
		523.0	2335.3

Project Section 31
126+38 (31)

Polyline from .dwg--

					From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point	X=86462.8442	Y=68631.9483	Z= 368.85	86462.84	68631.95	149	2341.4
2	at point	X=86421.4471	Y=68633.0188	Z= 368.85	86421.45	68633.02	191	2341.6
3	at point	X=86421.3090	Y=68627.9630	Z= 368.85	86421.31	68627.96	191	2340.6
4	at point	X=86410.9946	Y=68618.7742	Z= 368.85	86410.99	68618.77	201	2338.7
5	at point	X=86396.4755	Y=68618.7567	Z= 368.85	86396.48	68618.76	216	2338.7
6	at point	X=86384.9466	Y=68621.0329	Z= 368.85	86384.95	68621.03	227	2339.2
7	at point	X=86361.0033	Y=68619.5476	Z= 368.85	86361.00	68619.55	251	2338.9
8	at point	X=86340.3689	Y=68620.6108	Z= 368.85	86340.37	68620.61	272	2339.1
9	at point	X=86330.2101	Y=68620.0304	Z= 368.85	86330.21	68620.03	282	2339.0
10	at point	X=86320.6050	Y=68621.0781	Z= 368.85	86320.61	68621.08	292	2339.2
11	at point	X=86270.2121	Y=68619.4145	Z= 368.85	86270.21	68619.41	342	2338.9
12	at point	X=86260.2315	Y=68620.7221	Z= 368.85	86260.23	68620.72	352	2339.1
13	at point	X=86257.4257	Y=68619.7266	Z= 368.85	86257.43	68619.73	355	2338.9
14	at point	X=86238.7214	Y=68619.0604	Z= 368.85	86238.72	68619.06	374	2338.8
15	at point	X=86222.7239	Y=68619.7563	Z= 368.85	86222.72	68619.76	390	2338.9
16	at point	X=86182.3213	Y=68619.1371	Z= 368.85	86182.32	68619.14	430	2338.8
17	at point	X=86162.2734	Y=68620.7677	Z= 368.85	86162.27	68620.77	450	2339.1
18	at point	X=86148.8633	Y=68618.2595	Z= 368.85	86148.86	68618.26	463	2338.6
19	at point	X=86147.1179	Y=68618.1000	Z= 368.85	86147.12	68618.10	465	2338.6
20	at point	X=86134.3742	Y=68614.4024	Z= 368.85	86134.37	68614.40	478	2337.9
21	at point	X=86129.1621	Y=68611.7418	Z= 368.85	86129.16	68611.74	483	2337.3
22	at point	X=86112.3375	Y=68612.5883	Z= 368.85	86112.34	68612.59	500	2337.5
23	at point	X=86096.2048	Y=68613.4001	Z= 368.85	86096.20	68613.40	516	2337.7
24	at point	X=86080.7368	Y=68619.8889	Z= 368.85	86080.74	68619.89	532	2339.0
25	at point	X=86060.1854	Y=68619.8546	Z= 368.85	86060.19	68619.85	552	2339.0
26	at point	X=86042.5291	Y=68621.8833	Z= 368.85	86042.53	68621.88	570	2339.4
27	at point	X=86001.8067	Y=68622.2362	Z= 368.85	86001.81	68622.24	611	2339.4
28	at point	X=85997.9541	Y=68621.5474	Z= 368.85	85997.95	68621.55	614	2339.3
29	at point	X=85995.4266	Y=68622.6672	Z= 368.85	85995.43	68622.67	617	2339.5
30	at point	X=85966.6022	Y=68622.0495	Z= 368.85	85966.60	68622.05	646	2339.4
31	at point	X=85950.0491	Y=68623.0144	Z= 368.85	85950.05	68623.01	662	2339.6
32	at point	X=85856.3370	Y=68623.0176	Z= 368.85	85856.34	68623.02	756	2339.6
33	at point	X=85852.4420	Y=68623.8297	Z= 368.85	85852.44	68623.83	760	2339.7
34	at point	X=85841.6611	Y=68624.7285	Z= 368.85	85841.66	68624.73	771	2339.9
35	at point	X=85828.5619	Y=68624.8213	Z= 368.85	85828.56	68624.82	784	2339.9
36	at point	X=85816.4168	Y=68624.4914	Z= 368.85	85816.42	68624.49	796	2339.9
37	at point	X=85812.4808	Y=68623.6518	Z= 368.85	85812.48	68623.65	800	2339.7
38	at point	X=85792.4615	Y=68624.9054	Z= 368.85	85792.46	68624.91	820	2340.0
39	at point	X=85727.7322	Y=68625.1781	Z= 368.85	85727.73	68625.18	885	2340.0
40	at point	X=85202.3375	Y=68630.0936	Z= 368.85	85202.34	68630.09	1410	2341.0

Center Vertical Grid Line--

from point,	X=86112.3375	Y=68600.0936	Z=	86112.34	68600.09	500 2335.00
to point,	X=86112.3375	Y=68650.0936	Z=	86112.34	68650.09	500 2345.00

CL X	86112.34
New CL Station:	5+00
Top Elev:	2345
Bottom Elev:	2335

Proj STCHL
450 2338.13
450 2340.13

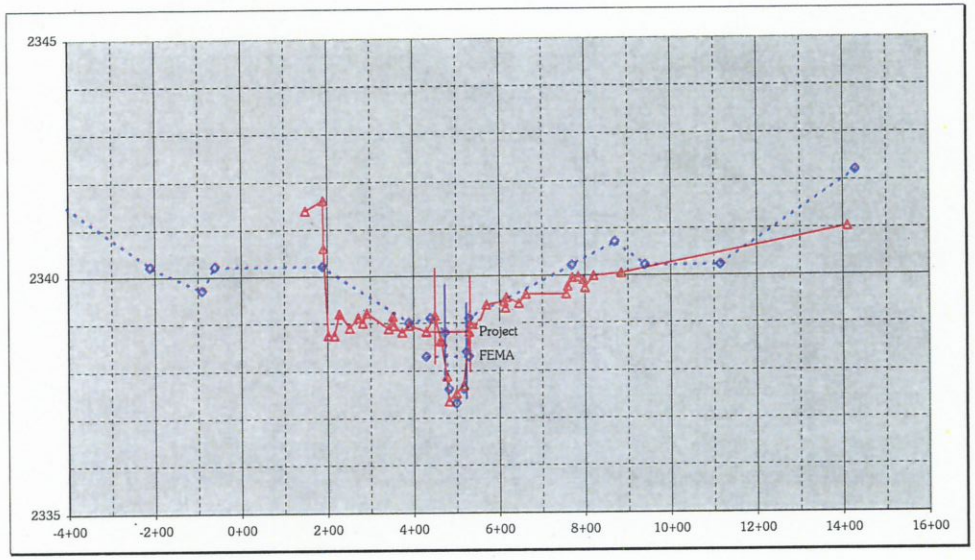
Line from STCHL to STCHR

from point,	X=86162.2734	Y=68620.7677	Z=	86162.27	68620.77
to point,	X=86080.7368	Y=68619.8889	Z=	86080.74	68619.89

Proj STCHR
532 2337.96
532 2339.96

-------1-------2-------3-------4-------5-------6-------7-------8-------9------10

	X1 31	40	450	532						
1	GR2341.4	149	2341.6	191	2340.6	191	2338.7	201	2338.7	216
2	GR2339.2	227	2338.9	251	2339.1	272	2339.0	282	2339.2	292
3	GR2338.9	342	2339.1	352	2338.9	355	2338.8	374	2338.9	390
4	GR2338.8	430	2339.1	450	2338.6	463	2338.6	465	2337.9	478
5	GR2337.3	483	2337.5	500	2337.7	516	2339.0	532	2339.0	552
6	GR2339.4	570	2339.4	611	2339.3	614	2339.5	617	2339.4	646
7	GR2339.6	662	2339.6	756	2339.7	760	2339.9	771	2339.9	784
8	GR2339.9	796	2339.7	800	2340.0	820	2340.0	885	2341.0	1410



FEMA SECTION 31

X1	31	18	984	1034	675	675	675	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2340	0	2338	300	2337.5	420	2338	450	2338	700
GR	2336.8	900	2336.9	950	2336.6	984	2335.4	993	2335.1	1010
GR	2335.4	1027	2336.2	1034	2336.9	1040	2338	1280	2338.5	1380
GR	2338	1450	2338	1625	2340	1940				

	Raw Elev	Sta	Adj Elev
1	2340.0	-510.0	2342.2
2	2338.0	-210.0	2340.2
3	2337.5	-90.0	2339.7
4	2338.0	-60.0	2340.2
5	2338.0	190.0	2340.2
6	2336.8	390.0	2339.0
7	2336.9	440.0	2339.1
8	2336.6	474.0	2338.8
9	2335.4	483.0	2337.6
10	2335.1	500.0	2337.3
11	2335.4	517.0	2337.6
12	2336.2	524.0	2338.4
13	2336.9	530.0	2339.1
14	2338.0	770.0	2340.2
15	2338.5	870.0	2340.7
16	2338.0	940.0	2340.2
17	2338.0	1115.0	2340.2
18	2340.0	1430.0	2342.2
19	0.0	-510.0	2.2
20	0.0	-510.0	2.2

Sta Adj Factor: -510.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev	Up:	1.0
		Down:	1.0
474.0	2338.8	474.0	2339.8
		474.0	2337.8

Chart Legend--

FEMA		Project	
430.0	2338.3	430.0	2338.8
530.0	2338.3	530.0	2338.8

FEMA STCHR

Sta	Adj Elev		
524.0	2338.4	524.0	2339.4
		524.0	2337.4

Project Section 32
133+29 (32)

Polyline from .dwg--

		From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point X=89032.3614 Y=68300.0936 Z= 368.85	89032.36	68300.09	-520	2344.0
2	at point X=88372.5955 Y=68292.7610 Z= 368.85	88372.60	68292.76	140	2342.5
3	at point X=88340.8772 Y=68293.8005 Z= 368.85	88340.88	68293.80	171	2342.7
4	at point X=88340.5461 Y=68305.4798 Z= 368.85	88340.55	68305.48	172	2345.1
5	at point X=88313.1623 Y=68304.4933 Z= 368.85	88313.16	68304.49	199	2344.9
6	at point X=88310.0149 Y=68304.9416 Z= 368.85	88310.01	68304.94	202	2345.0
7	at point X=88305.2638 Y=68303.6586 Z= 368.85	88305.26	68303.66	207	2344.7
8	at point X=88169.3174 Y=68301.2199 Z= 368.85	88169.32	68301.22	343	2344.2
9	at point X=88153.7935 Y=68300.0175 Z= 368.85	88153.79	68300.02	359	2344.0
10	at point X=88145.8216 Y=68298.2928 Z= 368.85	88145.82	68298.29	367	2343.6
11	at point X=88141.7099 Y=68296.0269 Z= 368.85	88141.71	68296.03	371	2343.2
12	at point X=88114.7533 Y=68294.5975 Z= 368.85	88114.75	68294.60	398	2342.9
13	at point X=88050.3509 Y=68290.0610 Z= 368.85	88050.35	68290.06	462	2342.0
14	at point X=88043.5930 Y=68290.0036 Z= 368.85	88043.59	68290.00	469	2342.0
15	at point X=88033.1736 Y=68285.0265 Z= 368.85	88033.17	68285.03	479	2341.0
16	at point X=88032.5824 Y=68283.7762 Z= 368.85	88032.58	68283.78	480	2340.7
17	at point X=88025.6985 Y=68283.6167 Z= 368.85	88025.70	68283.62	487	2340.7
18	at point X=88013.1176 Y=68281.5444 Z= 368.85	88013.12	68281.54	499	2340.3
19	at point X=88012.3614 Y=68281.4672 Z= 368.85	88012.36	68281.47	500	2340.3
20	at point X=87999.3850 Y=68281.4313 Z= 368.85	87999.39	68281.43	513	2340.3
21	at point X=87994.2549 Y=68283.8115 Z= 368.85	87994.25	68283.81	518	2340.7
22	at point X=87987.7738 Y=68290.9876 Z= 368.85	87987.77	68290.99	525	2342.2
23	at point X=87982.6410 Y=68288.6775 Z= 368.85	87982.64	68288.68	530	2341.7
24	at point X=87967.5417 Y=68291.9137 Z= 368.85	87967.54	68291.91	545	2342.4
25	at point X=87944.5889 Y=68292.6564 Z= 368.85	87944.59	68292.66	568	2342.5
26	at point X=87927.2697 Y=68291.2425 Z= 368.85	87927.27	68291.24	585	2342.2
27	at point X=87865.5730 Y=68290.8480 Z= 368.85	87865.57	68290.85	647	2342.2
28	at point X=87861.0362 Y=68290.3286 Z= 368.85	87861.04	68290.33	651	2342.0
29	at point X=87779.4262 Y=68292.2486 Z= 368.85	87779.43	68292.25	733	2342.4
30	at point X=87688.2391 Y=68293.0311 Z= 368.85	87688.24	68293.03	824	2342.6
31	at point X=87685.9213 Y=68292.1536 Z= 368.85	87685.92	68292.15	826	2342.4
32	at point X=87651.8581 Y=68292.2350 Z= 368.85	87651.86	68292.24	861	2342.4
33	at point X=87648.3446 Y=68291.7835 Z= 368.85	87648.34	68291.78	864	2342.3
34	at point X=87637.3383 Y=68292.3827 Z= 368.85	87637.34	68292.38	875	2342.5
35	at point X=87172.3614 Y=68300.0936 Z= 368.85	87172.36	68300.09	1340	2344.0
36					
37					
38					
39					
40					

Center Vertical Grid Line--

from point, X=88012.3614 Y=68255.0936 Z=	88012.36	68255.09	500	2335.00
to point, X=88012.3614 Y=68330.0936 Z=	88012.36	68330.09	500	2350.00

CL X	88012.36
New CL Station:	5+00
Top Elev:	2350
Bottom Elev:	2335

Proj STCHL

469	2340.98
469	2342.98

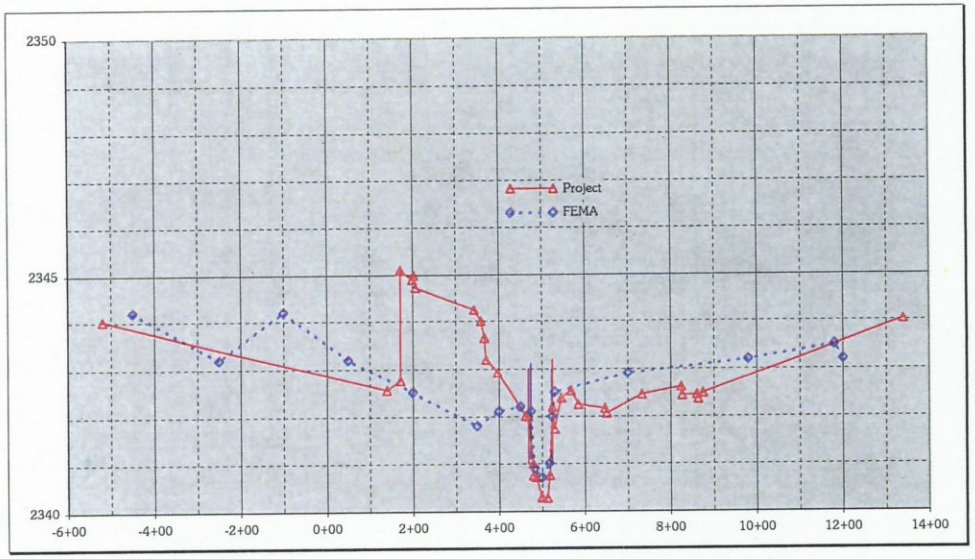
Line from STCHL to STCHR

from point, X=88043.5930 Y=68290.0036 Z=	88043.59	68290.00	
to point, X=87987.7738 Y=68290.9876 Z=	87987.77	68290.99	

Proj STCHR

525	2341.18
525	2343.18

```
       -------1-------2-------3-------4-------5-------6-------7-------8-------9------10
       X1     32      35     469     525
 1 GR2344.0-     520  2342.5     140  2342.7     171  2345.1     172  2344.9     199
 2 GR2345.0     202  2344.7     207  2344.2     343  2344.0     359  2343.6     367
 3 GR2343.2     371  2342.9     398  2342.0     462  2342.0     469  2341.0     479
 4 GR2340.7     480  2340.7     487  2340.3     499  2340.3     500  2340.3     513
 5 GR2340.7     518  2342.2     525  2341.7     530  2342.4     545  2342.5     568
 6 GR2342.2     585  2342.2     647  2342.0     651  2342.4     733  2342.6     824
 7 GR2342.4     826  2342.4     861  2342.3     864  2342.5     875  2344.0    1340
 8 GR    0.0      0     0.0       0     0.0       0     0.0       0     0.0       0
```



FEMA SECTION 32

X1	32	20	925	974	680	680	680	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2342	0	2341	200	2342	350	2341	500	2340.3	650
GR	2339.6	800	2339.9	850	2340	900	2339.9	925	2338.7	933
GR	2338.5	950	2338.8	967	2339.8	974	2340.3	980	2340.7	1150
GR	2341	1430	2341.3	1630	2341	1650	2341.5	1670	2342	1680

	Raw Elev	Sta	Adj Elev
1	2342.0	-450.0	2344.2
2	2341.0	-250.0	2343.2
3	2342.0	-100.0	2344.2
4	2341.0	50.0	2343.2
5	2340.3	200.0	2342.5
6	2339.6	350.0	2341.8
7	2339.9	400.0	2342.1
8	2340.0	450.0	2342.2
9	2339.9	475.0	2342.1
10	2338.7	483.0	2340.9
11	2338.5	500.0	2340.7
12	2338.8	517.0	2341.0
13	2339.8	524.0	2342.0
14	2340.3	530.0	2342.5
15	2340.7	700.0	2342.9
16	2341.0	980.0	2343.2
17	2341.3	1180.0	2343.5
18	2341.0	1200.0	2343.2
19	2341.5	1220.0	2343.7
20	2342.0	1230.0	2344.2

Sta Adj Factor: -450.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev		
		Up:	1.0
		Down:	1.0
475.0	2342.1	475.0	2343.1
		475.0	2341.1

Chart Legend--

FEMA		Project	
430.0	2346.3	430.0	2346.8
530.0	2346.3	530.0	2346.8

FEMA STCHR

Sta	Adj Elev		
524.0	2342.0	524.0	2343.0
		524.0	2341.0

Project Section 33
140+37 (33)

Polyline from .dwg--

					From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point	X=88812.3614	Y=68400.0936	Z= 368.85	88812.36	68400.09	-300	2348.0
2	at point	X=88364.4933	Y=68393.2542	Z= 368.85	88364.49	68393.25	148	2346.6
3	at point	X=88349.1804	Y=68392.3526	Z= 368.85	88349.18	68392.35	163	2346.5
4	at point	X=88298.6070	Y=68394.2212	Z= 368.85	88298.61	68394.22	214	2346.8
5	at point	X=88272.2133	Y=68393.3935	Z= 368.85	88272.21	68393.39	240	2346.7
6	at point	X=88251.4925	Y=68391.2776	Z= 368.85	88251.49	68391.28	261	2346.2
7	at point	X=88228.4463	Y=68392.0803	Z= 368.85	88228.45	68392.08	284	2346.4
8	at point	X=88221.1058	Y=68394.1407	Z= 368.85	88221.11	68394.14	291	2346.8
9	at point	X=88200.1501	Y=68393.2791	Z= 368.85	88200.15	68393.28	312	2346.6
10	at point	X=88193.1913	Y=68390.4336	Z= 368.85	88193.19	68390.43	319	2346.1
11	at point	X=88168.4755	Y=68393.3737	Z= 368.85	88168.48	68393.37	344	2346.7
12	at point	X=88148.4102	Y=68392.0746	Z= 368.85	88148.41	68392.07	364	2346.4
13	at point	X=88106.7788	Y=68393.9538	Z= 368.85	88106.78	68393.95	406	2346.8
14	at point	X=88055.7127	Y=68393.1886	Z= 368.85	88055.71	68393.19	457	2346.6
15	at point	X=88033.0472	Y=68386.3621	Z= 368.85	88033.05	68386.36	479	2345.3
16	at point	X=88027.5501	Y=68383.9443	Z= 368.85	88027.55	68383.94	485	2344.8
17	at point	X=88012.3614	Y=68383.6517	Z= 368.85	88012.36	68383.65	500	2344.7
18	at point	X=88001.5483	Y=68383.4447	Z= 368.85	88001.55	68383.44	511	2344.7
19	at point	X=87993.1711	Y=68384.4737	Z= 368.85	87993.17	68384.47	519	2344.9
20	at point	X=87986.7138	Y=68388.4593	Z= 368.85	87986.71	68388.46	526	2345.7
21	at point	X=87956.8030	Y=68391.4776	Z= 368.85	87956.80	68391.48	556	2346.3
22	at point	X=87956.2471	Y=68390.6436	Z= 368.85	87956.25	68390.64	556	2346.1
23	at point	X=87952.0646	Y=68392.0568	Z= 368.85	87952.06	68392.06	560	2346.4
24	at point	X=87923.1368	Y=68392.6123	Z= 368.85	87923.14	68392.61	589	2346.5
25	at point	X=87898.5096	Y=68391.8040	Z= 368.85	87898.51	68391.80	614	2346.3
26	at point	X=87734.7597	Y=68391.3289	Z= 368.85	87734.76	68391.33	778	2346.2
27	at point	X=87725.0847	Y=68390.9996	Z= 368.85	87725.08	68391.00	787	2346.2
28	at point	X=87691.6732	Y=68391.3294	Z= 368.85	87691.67	68391.33	821	2346.2
29	at point	X=87681.7130	Y=68390.3016	Z= 368.85	87681.71	68390.30	831	2346.0
30	at point	X=87680.4667	Y=68389.6963	Z= 368.85	87680.47	68389.70	832	2345.9
31	at point	X=87664.7842	Y=68388.5675	Z= 368.85	87664.78	68388.57	848	2345.7
32	at point	X=87643.6109	Y=68390.9374	Z= 368.85	87643.61	68390.94	869	2346.2
33	at point	X=86992.3614	Y=68397.5936	Z= 368.85	86992.36	68397.59	1520	2347.5
34								
35								
36								
37								
38								
39								
40								

Center Vertical Grid Line--

from point,	X=88012.3614	Y=68360.0936	Z=	88012.36	68360.09	500 2340.00
to point,	X=88012.3614	Y=68410.0936	Z=	88012.36	68410.09	500 2350.00

CL X	88012.36
New CL Station:	5+00
Top Elev:	2350
Bottom Elev:	2340

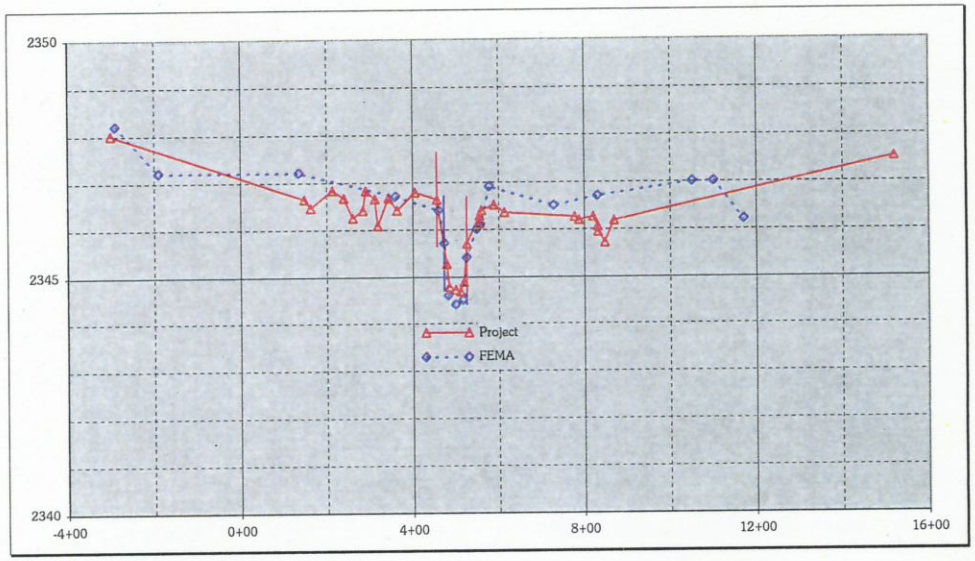
Proj STCHL
457 2345.62
457 2347.62

Line from STCHL to STCHR

from point,	X=88055.7127	Y=68393.1886	Z=	88055.71	68393.19	
to point,	X=87986.7138	Y=68388.4593	Z=	87986.71	68388.46	

Proj STCHR
526 2344.67
526 2346.67

	-------1-------	-------2-------	-------3-------	-------4-------	-------5-------	-------6-------	-------7-------	-------8-------	-------9-------	-------10
	X1 33	33	457	526						
1	GR2348.0-	300	2346.6	148	2346.5	163	2346.8	214	2346.7	240
2	GR2346.2	261	2346.4	284	2346.8	291	2346.6	312	2346.1	319
3	GR2346.7	344	2346.4	364	2346.8	406	2346.6	457	2345.3	479
4	GR2344.8	485	2344.7	500	2344.7	511	2344.9	519	2345.7	526
5	GR2346.3	556	2346.1	556	2346.4	560	2346.5	589	2346.3	614
6	GR2346.2	778	2346.2	787	2346.2	821	2346.0	831	2345.9	832
7	GR2345.7	848	2346.2	869	2347.5	1520	0.0	0	0.0	0
8	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0



FEMA SECTION 33

X1	33	20	763	815	680	680	680	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2346	0	2345	100	2345	425	2344.5	650	2344.2	750
GR	2343.5	763	2342.4	772	2342.2	789	2342.3	806	2343.2	815
GR	2343.8	839	2343.9	848	2344.7	868	2344.3	1018	2344.5	1120
GR	2344.8	1340	2344.8	1390	2344	1460	2345.5	1600	2346	1770

	Raw Elev	Sta	Adj Elev
1	2346.0	-289.0	2348.2
2	2345.0	-189.0	2347.2
3	2345.0	136.0	2347.2
4	2344.5	361.0	2346.7
5	2344.2	461.0	2346.4
6	2343.5	474.0	2345.7
7	2342.4	483.0	2344.6
8	2342.2	500.0	2344.4
9	2342.3	517.0	2344.5
10	2343.2	526.0	2345.4
11	2343.8	550.0	2346.0
12	2343.9	559.0	2346.1
13	2344.7	579.0	2346.9
14	2344.3	729.0	2346.5
15	2344.5	831.0	2346.7
16	2344.8	1051.0	2347.0
17	2344.8	1101.0	2347.0
18	2344.0	1171.0	2346.2
19	2345.5	1311.0	2347.7
20	2346.0	1481.0	2348.2

Sta Adj Factor: -289.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev		
		Up:	1.0
		Down:	1.0
474.0	2345.7	474.0	2346.7
		474.0	2344.7

Chart Legend--

FEMA		Project	
430.0	2343.3	430.0	2343.8
530.0	2343.3	530.0	2343.8

FEMA STCHR

Sta	Adj Elev		
526.0	2345.4	526.0	2346.4
		526.0	2344.4

Project Section 34
146+09 (34)

Polyline from .dwg--

		From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point X=88712.3614 Y=68470.0936 Z= 368.85	88712.36	68470.09	-200	2351.0
2	at point X=88364.7781 Y=68467.1552 Z= 368.85	88364.78	68467.16	148	2350.4
3	at point X=88331.6731 Y=68466.8507 Z= 368.85	88331.67	68466.85	181	2350.4
4	at point X=88315.0664 Y=68464.4655 Z= 368.85	88315.07	68464.47	197	2349.9
5	at point X=88277.2713 Y=68464.5361 Z= 368.85	88277.27	68464.54	235	2349.9
6	at point X=88270.6384 Y=68461.8417 Z= 368.85	88270.64	68461.84	242	2349.3
7	at point X=88245.7185 Y=68465.6463 Z= 368.85	88245.72	68465.65	267	2350.1
8	at point X=88230.5970 Y=68465.9864 Z= 368.85	88230.60	68465.99	282	2350.2
9	at point X=88187.7746 Y=68465.1763 Z= 368.85	88187.77	68465.18	325	2350.0
10	at point X=88175.8116 Y=68466.9660 Z= 368.85	88175.81	68466.97	337	2350.4
11	at point X=88137.6881 Y=68466.9302 Z= 368.85	88137.69	68466.93	375	2350.4
12	at point X=88121.1763 Y=68464.7957 Z= 368.85	88121.18	68464.80	391	2349.9
13	at point X=88086.9352 Y=68464.9012 Z= 368.85	88086.94	68464.90	425	2350.0
14	at point X=88057.8400 Y=68463.9159 Z= 368.85	88057.84	68463.92	455	2349.8
15	at point X=88042.0690 Y=68461.7924 Z= 368.85	88042.07	68461.79	470	2349.3
16	at point X=88031.5936 Y=68456.0717 Z= 368.85	88031.59	68456.07	481	2348.2
17	at point X=88012.3614 Y=68453.3043 Z= 368.85	88012.36	68453.30	500	2347.6
18	at point X=88006.6705 Y=68452.9109 Z= 368.85	88006.67	68452.91	506	2347.6
19	at point X=87981.4566 Y=68460.9310 Z= 368.85	87981.46	68460.93	531	2349.2
20	at point X=87981.1766 Y=68468.8156 Z= 368.85	87981.18	68468.82	531	2350.7
21	at point X=87969.8413 Y=68468.0936 Z= 368.85	87969.84	68468.09	543	2350.6
22	at point X=87934.6937 Y=68468.3937 Z= 368.85	87934.69	68468.39	578	2350.7
23	at point X=87924.4445 Y=68466.0215 Z= 368.85	87924.44	68466.02	588	2350.2
24	at point X=87914.8012 Y=68467.6352 Z= 368.85	87914.80	68467.64	598	2350.5
25	at point X=87876.7175 Y=68467.4706 Z= 368.85	87876.72	68467.47	636	2350.5
26	at point X=87867.3945 Y=68470.3586 Z= 368.85	87867.39	68470.36	645	2351.1
27	at point X=87854.2112 Y=68467.3659 Z= 368.85	87854.21	68467.37	658	2350.5
28	at point X=87817.5306 Y=68467.3098 Z= 368.85	87817.53	68467.31	695	2350.4
29	at point X=87807.8664 Y=68463.6334 Z= 368.85	87807.87	68463.63	704	2349.7
30	at point X=87770.1168 Y=68463.2156 Z= 368.85	87770.12	68463.22	742	2349.6
31	at point X=87758.4846 Y=68464.2192 Z= 368.85	87758.48	68464.22	754	2349.8
32	at point X=87741.3510 Y=68461.9468 Z= 368.85	87741.35	68461.95	771	2349.4
33	at point X=87732.7720 Y=68463.6500 Z= 368.85	87732.77	68463.65	780	2349.7
34	at point X=87704.0859 Y=68462.9202 Z= 368.85	87704.09	68462.92	808	2349.6
35	at point X=87693.1377 Y=68464.0236 Z= 368.85	87693.14	68464.02	819	2349.8
36	at point X=87669.6727 Y=68463.7672 Z= 368.85	87669.67	68463.77	843	2349.7
37	at point X=87669.5702 Y=68466.2670 Z= 368.85	87669.57	68466.27	843	2350.2
38	at point X=87665.6161 Y=68467.0959 Z= 368.85	87665.62	68467.10	847	2350.4
39	at point X=87648.4755 Y=68465.5484 Z= 368.85	87648.48	68465.55	864	2350.1
40	at point X=87312.3614 Y=68470.0936 Z= 368.85	87312.36	68470.09	1200	2351.0

Center Vertical Grid Line--

from point, X=88012.3614 Y=68440.0936 Z=	88012.36	68440.09	500	2345.00
to point, X=88012.3614 Y=68490.0936 Z=	88012.36	68490.09	500	2355.00

CL X	88012.36
New CL Station:	5+00
Top Elev:	2355
Bottom Elev:	2345

Proj STCHL
470 2348.34
470 2350.34

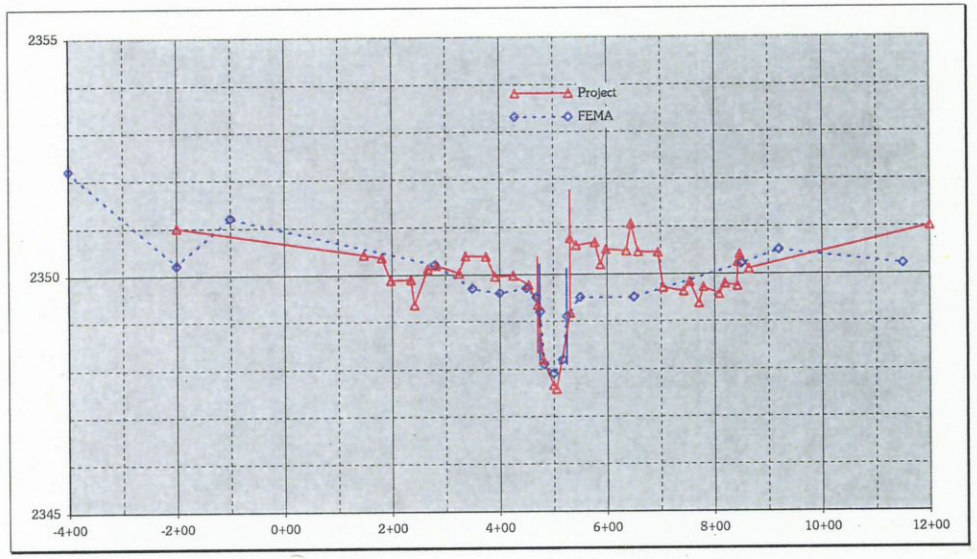
Line from STCHL to STCHR

from point, X=88042.0690 Y=68461.7924 Z=	88042.07	68461.79		
to point, X=87981.1766 Y=68468.8156 Z=	87981.18	68468.82		

Proj STCHR
531 2349.74
531 2351.74

-------1-------2-------3-------4-------5-------6-------7-------8-------9------10

	X1	34	40	470	531									
1	GR2351.0-	200	2350.4	148	2350.4	181	2349.9	197	2349.9	235				
2	GR2349.3	242	2350.1	267	2350.2	282	2350.0	325	2350.4	337				
3	GR2350.4	375	2349.9	391	2350.0	425	2349.8	455	2349.3	470				
4	GR2348.2	481	2347.6	500	2347.6	506	2349.2	531	2350.7	531				
5	GR2350.6	543	2350.7	578	2350.2	588	2350.5	598	2350.5	636				
6	GR2351.1	645	2350.5	658	2350.4	695	2349.7	704	2349.6	742				
7	GR2349.8	754	2349.4	771	2349.7	780	2349.6	808	2349.8	819				
8	GR2349.7	843	2350.2	843	2350.4	847	2350.1	864	2351.0	1200				



FEMA SECTION 34

X1	34	20	875	925	600	600	600	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2350	0	2348	200	2349	300	2348	680	2347.5	750
GR	2347.4	800	2347.5	850	2347.3	869	2347	875	2345.9	883
GR	2345.7	900	2346	917	2346.9	925	2347.3	950	2347.3	1050
GR	2348	1250	2348.3	1320	2348	1550	2348	1600	2349	1650

	Raw Elev	Sta	Adj Elev
1	2350.0	-400.0	2352.2
2	2348.0	-200.0	2350.2
3	2349.0	-100.0	2351.2
4	2348.0	280.0	2350.2
5	2347.5	350.0	2349.7
6	2347.4	400.0	2349.6
7	2347.5	450.0	2349.7
8	2347.3	469.0	2349.5
9	2347.0	475.0	2349.2
10	2345.9	483.0	2348.1
11	2345.7	500.0	2347.9
12	2346.0	517.0	2348.2
13	2346.9	525.0	2349.1
14	2347.3	550.0	2349.5
15	2347.3	650.0	2349.5
16	2348.0	850.0	2350.2
17	2348.3	920.0	2350.5
18	2348.0	1150.0	2350.2
19	2348.0	1200.0	2350.2
20	2349.0	1250.0	2351.2

Sta Adj Factor: -400.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev		
		Up:	1.0
		Down:	1.0
475.0	2349.2	475.0	2350.2
		475.0	2348.2

Chart Legend--

FEMA		Project	
430.0	2353.3	430.0	2353.8
530.0	2353.3	530.0	2353.8

FEMA STCHR

Sta	Adj Elev		
525.0	2349.1	525.0	2350.1
		525.0	2348.1

Project Section 35
151+99 (35)

Polyline from .dwg--

					From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point	X=88397.2203	Y=68568.0090	Z= 368.85	88397.22	68568.01	115	2354.6
2	at point	X=88381.5831	Y=68563.1137	Z= 368.85	88381.58	68563.11	131	2353.6
3	at point	X=88349.9752	Y=68564.7689	Z= 368.85	88349.98	68564.77	162	2353.9
4	at point	X=88337.5401	Y=68566.9119	Z= 368.85	88337.54	68566.91	175	2354.4
5	at point	X=88305.9313	Y=68567.1151	Z= 368.85	88305.93	68567.12	206	2354.4
6	at point	X=88296.6874	Y=68564.9064	Z= 368.85	88296.69	68564.91	216	2354.0
7	at point	X=88286.0352	Y=68564.4442	Z= 368.85	88286.04	68564.44	226	2353.9
8	at point	X=88278.0534	Y=68567.4490	Z= 368.85	88278.05	68567.45	234	2354.5
9	at point	X=88241.2034	Y=68568.2107	Z= 368.85	88241.20	68568.21	271	2354.6
10	at point	X=88185.8786	Y=68568.1150	Z= 368.85	88185.88	68568.12	326	2354.6
11	at point	X=88173.9471	Y=68563.1566	Z= 368.85	88173.95	68563.16	338	2353.6
12	at point	X=88050.6558	Y=68559.1037	Z= 368.85	88050.66	68559.10	462	2352.8
13	at point	X=88043.0511	Y=68556.8431	Z= 368.85	88043.05	68556.84	469	2352.3
14	at point	X=88028.3400	Y=68547.9406	Z= 368.85	88028.34	68547.94	484	2350.6
15	at point	X=88012.3614	Y=68548.0129	Z= 368.85	88012.36	68548.01	500	2350.6
16	at point	X=87994.2215	Y=68550.0089	Z= 368.85	87994.22	68550.01	518	2351.0
17	at point	X=87982.5366	Y=68558.8442	Z= 368.85	87982.54	68558.84	530	2352.8
18	at point	X=87958.0740	Y=68565.0441	Z= 368.85	87958.07	68565.04	554	2354.0
19	at point	X=87932.8310	Y=68568.7909	Z= 368.85	87932.83	68568.79	580	2354.7
20	at point	X=87879.7824	Y=68568.7271	Z= 368.85	87879.78	68568.73	633	2354.7
21	at point	X=87866.5892	Y=68570.8814	Z= 368.85	87866.59	68570.88	646	2355.2
22	at point	X=87839.7387	Y=68570.2373	Z= 368.85	87839.74	68570.24	673	2355.0
23	at point	X=87800.2383	Y=68566.6846	Z= 368.85	87800.24	68566.68	712	2354.3
24	at point	X=87797.8676	Y=68564.2646	Z= 368.85	87797.87	68564.26	714	2353.8
25	at point	X=87792.9609	Y=68565.0639	Z= 368.85	87792.96	68565.06	719	2354.0
26	at point	X=87750.8554	Y=68565.7659	Z= 368.85	87750.86	68565.77	762	2354.1
27	at point	X=87714.3944	Y=68565.2141	Z= 368.85	87714.39	68565.21	798	2354.0
28								
29								
30								
31								
32								
33								
34								
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36								
37								
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Center Vertical Grid Line--

from point,	X=88012.3614	Y=68520.0936	Z=	88012.36	68520.09	500 2345.00
to point,	X=88012.3614	Y=68595.0936	Z=	88012.36	68595.09	500 2360.00

CL X 88012.36
New CL Station: 5+00
Top Elev: 2360
Bottom Elev: 2345

Proj STCHL
462 2351.80
462 2353.80

Line from STCHL to STCHR

from point,	X=88050.6558	Y=68559.1037	Z=	88050.66	68559.10	
to point,	X=87982.5366	Y=68558.8442	Z=	87982.54	68558.84	

Proj STCHR
530 2351.75
530 2353.75

	-------1	-------2	-------3	-------4	-------5	-------6	-------7	-------8	-------9	------10
	X1 35	27	462	530						
1	GR2354.6	115	2353.6	131	2353.9	162	2354.4	175	2354.4	206
2	GR2354.0	216	2353.9	226	2354.5	234	2354.6	271	2354.6	326
3	GR2353.6	338	2352.8	462	2352.3	469	2350.6	484	2350.6	500
4	GR2351.0	518	2352.8	530	2354.0	554	2354.7	580	2354.7	633
5	GR2355.2	646	2355.0	673	2354.3	712	2353.8	714	2354.0	719
6	GR2354.1	762	2354.0	798	0.0	0	0.0	0	0.0	0
7	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
8	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0

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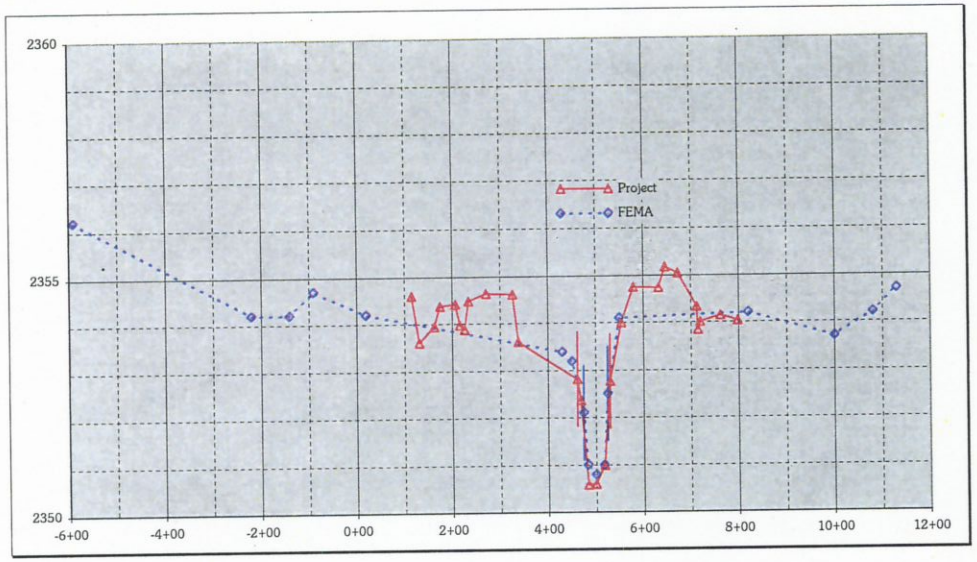

FEMA SECTION 35

X1	35	17	1065	1115	570	570	570	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2354	0	2352	370	2352	450	2352.5	500	2352	610
GR	2351.2	1020	2351	1040	2349.9	1065	2348.8	1073	2348.6	1090
GR	2348.8	1107	2350.3	1115	2351.9	1140	2352	1410	2351.5	1590
GR	2352	1670	2352.5	1720						

	Raw Elev	Sta	Adj Elev
1	2354.0	-590.0	2356.2
2	2352.0	-220.0	2354.2
3	2352.0	-140.0	2354.2
4	2352.5	-90.0	2354.7
5	2352.0	20.0	2354.2
6	2351.2	430.0	2353.4
7	2351.0	450.0	2353.2
8	2349.9	475.0	2352.1
9	2348.8	483.0	2351.0
10	2348.6	500.0	2350.8
11	2348.8	517.0	2351.0
12	2350.3	525.0	2352.5
13	2351.9	550.0	2354.1
14	2352.0	820.0	2354.2
15	2351.5	1000.0	2353.7
16	2352.0	1080.0	2354.2
17	2352.5	1130.0	2354.7
18	0.0	-590.0	2.2
19	0.0	-590.0	2.2
20	0.0	-590.0	2.2

Sta Adj Factor: -590.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev	Up:	1.0
		Down:	1.0
475.0	2352.1	475.0	2353.1
		475.0	2351.1

Chart Legend--

FEMA		Project	
430.0	2356.3	430.0	2356.8
530.0	2356.3	530.0	2356.8

FEMA STCHR

Sta	Adj Elev		
525.0	2352.5	525.0	2353.5
		525.0	2351.5

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Project Section 36
155+26 (36)

Polyline from .dwg--

					From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point	X=88357.9481	Y=68660.3193	Z= 368.85	88357.95	68660.32	154	2357.0
2	at point	X=88345.2852	Y=68658.5933	Z= 368.85	88345.29	68658.59	167	2356.7
3	at point	X=88326.3502	Y=68659.0087	Z= 368.85	88326.35	68659.01	186	2356.8
4	at point	X=88325.9071	Y=68656.8065	Z= 368.85	88325.91	68656.81	186	2356.3
5	at point	X=88299.5024	Y=68653.6200	Z= 368.85	88299.50	68653.62	213	2355.7
6	at point	X=88270.1034	Y=68656.4354	Z= 368.85	88270.10	68656.44	242	2356.3
7	at point	X=88245.0246	Y=68655.2244	Z= 368.85	88245.02	68655.22	267	2356.0
8	at point	X=88244.5404	Y=68657.7122	Z= 368.85	88244.54	68657.71	268	2356.5
9	at point	X=88170.2923	Y=68657.8641	Z= 368.85	88170.29	68657.86	342	2356.6
10	at point	X=88162.9128	Y=68660.9868	Z= 368.85	88162.91	68660.99	349	2357.2
11	at point	X=88131.6367	Y=68661.1805	Z= 368.85	88131.64	68661.18	381	2357.2
12	at point	X=88131.1183	Y=68658.6949	Z= 368.85	88131.12	68658.69	381	2356.7
13	at point	X=88078.7538	Y=68653.1126	Z= 368.85	88078.75	68653.11	434	2355.6
14	at point	X=88078.2322	Y=68650.6163	Z= 368.85	88078.23	68650.62	434	2355.1
15	at point	X=88041.1025	Y=68648.4237	Z= 368.85	88041.10	68648.42	471	2354.7
16	at point	X=88031.9272	Y=68642.0820	Z= 368.85	88031.93	68642.08	480	2353.4
17	at point	X=88014.5042	Y=68642.8206	Z= 368.85	88014.50	68642.82	498	2353.5
18	at point	X=88012.3614	Y=68642.5254	Z= 368.85	88012.36	68642.53	500	2353.5
19	at point	X=87998.3939	Y=68640.7501	Z= 368.85	87998.39	68640.75	514	2353.1
20	at point	X=87981.6905	Y=68652.9689	Z= 368.85	87981.69	68652.97	531	2355.6
21	at point	X=87961.2881	Y=68651.3467	Z= 368.85	87961.29	68651.35	551	2355.3
22	at point	X=87944.1228	Y=68652.1131	Z= 368.85	87944.12	68652.11	568	2355.4
23	at point	X=87887.7253	Y=68650.4781	Z= 368.85	87887.73	68650.48	625	2355.1
24	at point	X=87874.1995	Y=68651.5336	Z= 368.85	87874.20	68651.53	638	2355.3
25	at point	X=87853.1356	Y=68649.8446	Z= 368.85	87853.14	68649.84	659	2355.0
26	at point	X=87800.9008	Y=68651.0577	Z= 368.85	87800.90	68651.06	711	2355.2
27	at point	X=87746.4138	Y=68650.0002	Z= 368.85	87746.41	68650.00	766	2355.0
28	at point	X=87693.2057	Y=68652.1184	Z= 368.85	87693.21	68652.12	819	2355.4
29	at point	X=87669.6924	Y=68651.4506	Z= 368.85	87669.69	68651.45	843	2355.3
30	at point	X=87658.5393	Y=68653.1902	Z= 368.85	87658.54	68653.19	854	2355.6
31	at point	X=87639.6234	Y=68653.2685	Z= 368.85	87639.62	68653.27	873	2355.6
32	at point	X=87372.3614	Y=68655.0936	Z= 368.85	87372.36	68655.09	1140	2356.0
33	at point	X=87232.3614	Y=68660.0936	Z= 368.85	87232.36	68660.09	1280	2357.0
34								
35								
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37								
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39								
40								

Center Vertical Grid Line--

from point,	X=88012.3614	Y=68625.0936	Z=	88012.36	68625.09	500 2350.00
to point,	X=88012.3614	Y=68675.0936	Z=	88012.36	68675.09	500 2360.00

CL X	88012.36
New CL Station:	5+00
Top Elev:	2360
Bottom Elev:	2350

Proj STCHL

471	2353.67
471	2355.67

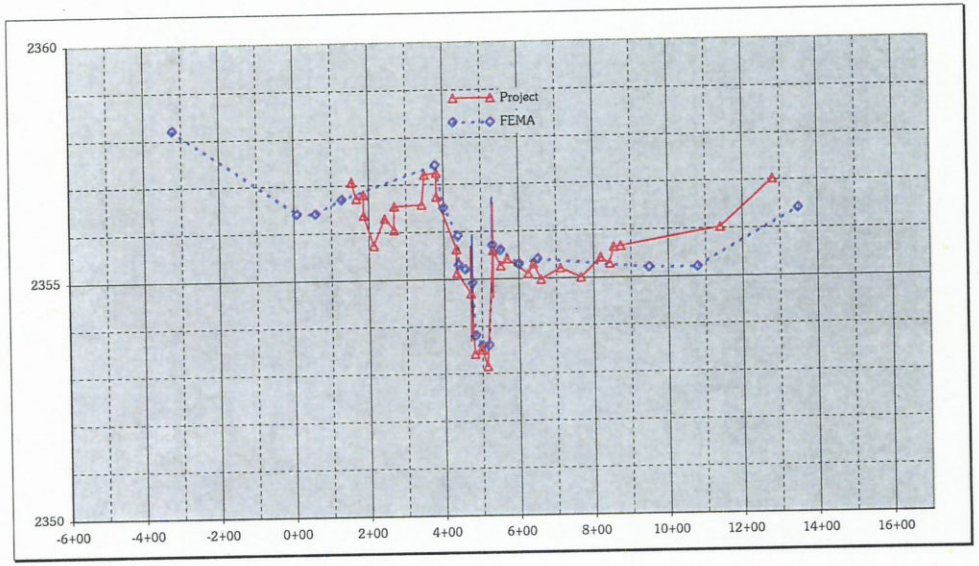
Line from STCHL to STCHR

from point,	X=88041.1025	Y=68648.4237	Z=	88041.10	68648.42	
to point,	X=87981.6905	Y=68652.9689	Z=	87981.69	68652.97	

Proj STCHR

531	2354.58
531	2356.58

	-------1-------	-------2-------	-------3-------	-------4-------	-------5-------	-------6-------	-------7-------	-------8-------	-------9-------	-------10
	X1 36	33	471	531						
1	GR2357.0	154	2356.7	167	2356.8	186	2356.3	186	2355.7	213
2	GR2356.3	242	2356.0	267	2356.5	268	2356.6	342	2357.2	349
3	GR2357.2	381	2356.7	381	2355.6	434	2355.1	434	2354.7	471
4	GR2353.4	480	2353.5	498	2353.5	500	2353.1	514	2355.6	531
5	GR2355.3	551	2355.4	568	2355.1	625	2355.3	638	2355.0	659
6	GR2355.2	711	2355.0	766	2355.4	819	2355.3	843	2355.6	854
7	GR2355.6	873	2356.0	1140	2357.0	1280	0.0	0	0.0	0
8	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0



FEMA SECTION 36

X1	36	20	797	851	220	400	350	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2356	0	2354.2	330	2354.2	380	2354.5	450	2355.2	700
GR	2354.3	722	2353.7	759	2353.1	760	2353	778	2352.7	797
GR	2351.6	805	2351.4	822	2351.4	840	2353.5	851	2353.4	872
GR	2353.1	922	2353.2	972	2353	1270	2353	1400	2354.2	1670

	Raw Elev	Sta	Adj Elev
1	2356.0	-321.0	2358.2
2	2354.2	9.0	2356.4
3	2354.2	59.0	2356.4
4	2354.5	129.0	2356.7
5	2355.2	379.0	2357.4
6	2354.3	401.0	2356.5
7	2353.7	438.0	2355.9
8	2353.1	439.0	2355.3
9	2353.0	457.0	2355.2
10	2352.7	476.0	2354.9
11	2351.6	484.0	2353.8
12	2351.4	501.0	2353.6
13	2351.4	519.0	2353.6
14	2353.5	530.0	2355.7
15	2353.4	551.0	2355.6
16	2353.1	601.0	2355.3
17	2353.2	651.0	2355.4
18	2353.0	949.0	2355.2
19	2353.0	1079.0	2355.2
20	2354.2	1349.0	2356.4

Sta Adj Factor: -321.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev		
		Up:	1.0
		Down:	1.0
476.0	2354.9	476.0	2355.9
		476.0	2353.9

Chart Legend--

FEMA		Project	
430.0	2358.3	430.0	2358.8
530.0	2358.3	530.0	2358.8

FEMA STCHR

Sta	Adj Elev		
530.0	2355.7	530.0	2356.7
		530.0	2354.7

Project Section 37
159+69 (37)

Polyline from .dwg--

					From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point	X=90511.5099	Y=68310.0936	Z= 368.85	90511.51	68310.09	-150	2361.0
2	at point	X=90204.0774	Y=68298.8884	Z= 368.85	90204.08	68298.89	157	2358.8
3	at point	X=90179.0751	Y=68293.1428	Z= 368.85	90179.08	68293.14	182	2357.6
4	at point	X=90108.4357	Y=68294.6963	Z= 368.85	90108.44	68294.70	253	2357.9
5	at point	X=90075.9604	Y=68298.1246	Z= 368.85	90075.96	68298.12	286	2358.6
6	at point	X=90075.4604	Y=68300.6361	Z= 368.85	90075.46	68300.64	286	2359.1
7	at point	X=89955.2905	Y=68302.8188	Z= 368.85	89955.29	68302.82	406	2359.5
8	at point	X=89938.8745	Y=68301.7226	Z= 368.85	89938.87	68301.72	423	2359.3
9	at point	X=89904.1912	Y=68295.0795	Z= 368.85	89904.19	68295.08	457	2358.0
10	at point	X=89890.4049	Y=68294.3763	Z= 368.85	89890.40	68294.38	471	2357.9
11	at point	X=89881.9607	Y=68288.0996	Z= 368.85	89881.96	68288.10	480	2356.6
12	at point	X=89866.0836	Y=68288.2358	Z= 368.85	89866.08	68288.24	495	2356.6
13	at point	X=89861.5099	Y=68288.0421	Z= 368.85	89861.51	68288.04	500	2356.6
14	at point	X=89847.9039	Y=68287.3598	Z= 368.85	89847.90	68287.36	514	2356.5
15	at point	X=89830.3208	Y=68296.0945	Z= 368.85	89830.32	68296.09	531	2358.2
16	at point	X=89830.1175	Y=68301.1895	Z= 368.85	89830.12	68301.19	531	2359.2
17	at point	X=89818.5179	Y=68304.1249	Z= 368.85	89818.52	68304.12	543	2359.8
18	at point	X=89754.5695	Y=68304.1540	Z= 368.85	89754.57	68304.15	607	2359.8
19	at point	X=89740.5519	Y=68301.4620	Z= 368.85	89740.55	68301.46	621	2359.3
20	at point	X=89740.0519	Y=68298.9932	Z= 368.85	89740.05	68298.99	621	2358.8
21	at point	X=89720.2608	Y=68297.4988	Z= 368.85	89720.26	68297.50	641	2358.5
22	at point	X=89707.2952	Y=68298.9747	Z= 368.85	89707.30	68298.97	654	2358.8
23	at point	X=89696.7473	Y=68298.3508	Z= 368.85	89696.75	68298.35	665	2358.7
24	at point	X=89696.2473	Y=68300.8507	Z= 368.85	89696.25	68300.85	665	2359.2
25	at point	X=89693.8137	Y=68300.2339	Z= 368.85	89693.81	68300.23	668	2359.0
26	at point	X=89693.4713	Y=68293.1706	Z= 368.85	89693.47	68293.17	668	2357.6
27	at point	X=89655.1706	Y=68290.7051	Z= 368.85	89655.17	68290.71	706	2357.1
28	at point	X=89593.4876	Y=68290.4809	Z= 368.85	89593.49	68290.48	768	2357.1
29	at point	X=89564.8761	Y=68292.3965	Z= 368.85	89564.88	68292.40	797	2357.5
30	at point	X=89531.3599	Y=68290.2902	Z= 368.85	89531.36	68290.29	830	2357.0
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

Center Vertical Grid Line--

from point,	X=89861.5099	Y=68255.0936	Z=	89861.51	68255.09	500 2350.00
to point,	X=89861.5099	Y=68330.0936	Z=	89861.51	68330.09	500 2365.00

CL X 89861.51
New CL Station: 5+00
Top Elev: 2365
Bottom Elev: 2350

Proj STCHL
471 2356.86
471 2358.86

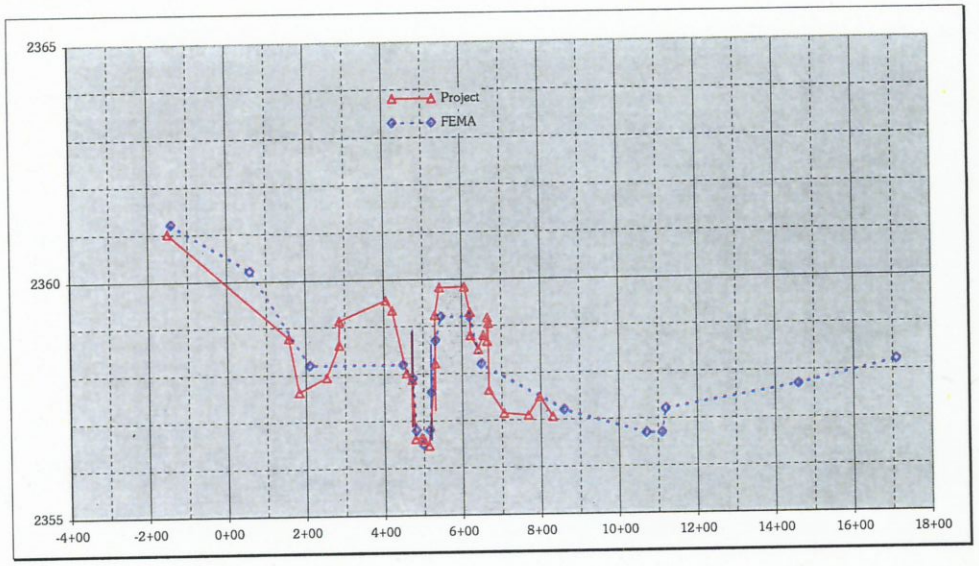
Line from STCHL to STCHR

from point,	X=89890.4049	Y=68294.3763	Z=	89890.40	68294.38	
to point,	X=89830.3208	Y=68296.0945	Z=	89830.32	68296.09	

Proj STCHR
531 2357.20
531 2359.20

-------1-------2-------3-------4-------5-------6-------7-------8-------9------10

	X1	37	30	471	531									
1	GR	2361.0	-150	2358.8	157	2357.6	182	2357.9	253	2358.6	286			
2	GR	2359.1	286	2359.5	406	2359.3	423	2358.0	457	2357.9	471			
3	GR	2356.6	480	2356.6	495	2356.6	500	2356.5	514	2358.2	531			
4	GR	2359.2	531	2359.8	543	2359.8	607	2359.3	621	2358.8	621			
5	GR	2358.5	641	2358.8	654	2358.7	665	2359.2	665	2359.0	668			
6	GR	2357.6	668	2357.1	706	2357.1	768	2357.5	797	2357.0	830			
7	GR	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0			
8	GR	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0			



FEMA SECTION 37

X1	37	19	614	661	480	380	430	0	0	
X3	0	0	0	0	0	1550	0	0	0	
GR	2359	0	2358	200	2356	350	2356	589	2355.7	614
GR	2354.6	622	2354.3	639	2354.6	656	2355.4	661	2356.5	673
GR	2357	687	2357	760	2356	790	2355	1000	2354.5	1210
GR	2354.5	1250	2355	1260	2355.5	1600	2356	1850		

	Raw Elev	Sta	Adj Elev
1	2359.0	-140.0	2361.2
2	2358.0	60.0	2360.2
3	2356.0	210.0	2358.2
4	2356.0	449.0	2358.2
5	2355.7	474.0	2357.9
6	2354.6	482.0	2356.8
7	2354.3	499.0	2356.5
8	2354.6	516.0	2356.8
9	2355.4	521.0	2357.6
10	2356.5	533.0	2358.7
11	2357.0	547.0	2359.2
12	2357.0	620.0	2359.2
13	2356.0	650.0	2358.2
14	2355.0	860.0	2357.2
15	2354.5	1070.0	2356.7
16	2354.5	1110.0	2356.7
17	2355.0	1120.0	2357.2
18	2355.5	1460.0	2357.7
19	2356.0	1710.0	2358.2
20	0.0	-140.0	2.2

Sta Adj Factor: -140.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev		
		Up:	1.0
		Down:	1.0
474.0	2357.9	474.0	2358.9
		474.0	2356.9

Chart Legend--

FEMA		Project	
430.0	2363.3	430.0	2363.8
530.0	2363.3	530.0	2363.8

FEMA STCHR

Sta	Adj Elev		
521.0	2357.6	521.0	2358.6
		521.0	2356.6

Project Section 38
166+19 (38)

Polyline from .dwg--

		From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point X=90208.0505 Y=68406.7950 Z= 368.89	90208.05	68406.80	153	2364.3
2	at point X=90157.3389 Y=68404.6649 Z= 368.89	90157.34	68404.66	204	2363.9
3	at point X=90133.2710 Y=68402.7546 Z= 368.89	90133.27	68402.75	228	2363.5
4	at point X=90126.0624 Y=68404.7829 Z= 368.89	90126.06	68404.78	235	2363.9
5	at point X=90061.6832 Y=68399.4109 Z= 368.89	90061.68	68399.41	300	2362.9
6	at point X=90039.3072 Y=68397.8941 Z= 368.89	90039.31	68397.89	322	2362.6
7	at point X=90031.7009 Y=68394.4552 Z= 368.89	90031.70	68394.46	330	2361.9
8	at point X=89982.3426 Y=68396.8851 Z= 368.89	89982.34	68396.89	379	2362.4
9	at point X=89937.6422 Y=68394.2764 Z= 368.89	89937.64	68394.28	424	2361.8
10	at point X=89905.1435 Y=68391.6781 Z= 368.89	89905.14	68391.68	456	2361.3
11	at point X=89889.3556 Y=68388.8586 Z= 368.89	89889.36	68388.86	472	2360.8
12	at point X=89880.3500 Y=68385.4628 Z= 368.89	89880.35	68385.46	481	2360.1
13	at point X=89872.3836 Y=68384.9306 Z= 368.89	89872.38	68384.93	489	2360.0
14	at point X=89861.5099 Y=68383.9708 Z= 368.89	89861.51	68383.97	500	2359.8
15	at point X=89844.4528 Y=68383.9785 Z= 368.89	89844.45	68383.98	517	2359.8
16	at point X=89831.6136 Y=68392.5309 Z= 368.89	89831.61	68392.53	530	2361.5
17	at point X=89819.6232 Y=68392.4630 Z= 368.89	89819.62	68392.46	542	2361.5
18	at point X=89814.1784 Y=68390.9225 Z= 368.89	89814.18	68390.92	547	2361.2
19	at point X=89807.7100 Y=68392.5361 Z= 368.89	89807.71	68392.54	554	2361.5
20	at point X=89781.2601 Y=68392.5343 Z= 368.89	89781.26	68392.53	580	2361.5
21	at point X=89768.8677 Y=68391.2778 Z= 368.89	89768.87	68391.28	593	2361.2
22	at point X=89755.3796 Y=68392.0391 Z= 368.89	89755.38	68392.04	606	2361.4
23	at point X=89694.3695 Y=68391.9353 Z= 368.89	89694.37	68391.94	667	2361.4
24	at point X=89672.8970 Y=68390.3657 Z= 368.89	89672.90	68390.37	689	2361.1
25	at point X=89650.1557 Y=68391.6873 Z= 368.89	89650.16	68391.69	711	2361.3
26	at point X=89637.0341 Y=68390.8766 Z= 368.89	89637.03	68390.88	724	2361.2
27	at point X=89568.4793 Y=68396.0205 Z= 368.89	89568.48	68396.02	793	2362.2
28	at point X=89551.4497 Y=68401.5773 Z= 368.89	89551.45	68401.58	810	2363.3
29	at point X=89492.1530 Y=68397.1764 Z= 368.89	89492.15	68397.18	869	2362.4
30	at point X=89454.3840 Y=68397.1293 Z= 368.89	89454.38	68397.13	907	2362.4
31	at point X=89450.2426 Y=68393.7577 Z= 368.89	89450.24	68393.76	911	2361.7
32	at point X=89447.3974 Y=68393.6060 Z= 368.89	89447.40	68393.61	914	2361.7
33					
34					
35					
36					
37					
38					
39					
40					

Center Vertical Grid Line--

from point, X=89861.5099 Y=68360.0936 Z=	89861.51	68360.09	500	2355.00
to point, X=89861.5099 Y=68435.0936 Z=	89861.51	68435.09	500	2370.00

CL X	89861.51
New CL Station:	5+00
Top Elev:	2370
Bottom Elev:	2355

Proj STCHL

472	2359.75
472	2361.75

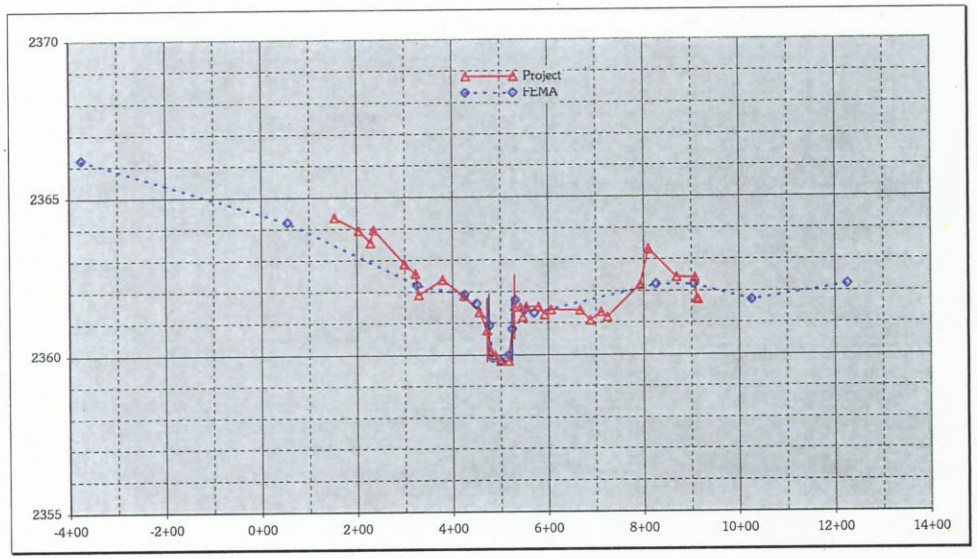
Line from STCHL to STCHR

from point, X=89889.3556 Y=68388.8586 Z=	89889.36	68388.86		
to point, X=89831.6136 Y=68392.5309 Z=	89831.61	68392.53		

Proj STCHR

530	2360.49
530	2362.49

```
-------1-------2-------3-------4-------5-------6-------7-------8-------9------10
  X1    38      32     472     530
1 GR2364.3    153  2363.9    204  2363.5    228  2363.9    235  2362.9    300
2 GR2362.6    322  2361.9    330  2362.4    379  2361.8    424  2361.3    456
3 GR2360.8    472  2360.1    481  2360.0    489  2359.8    500  2359.8    517
4 GR2361.5    530  2361.5    542  2361.2    547  2361.5    554  2361.5    580
5 GR2361.2    593  2361.4    606  2361.4    667  2361.1    689  2361.3    711
6 GR2361.2    724  2362.2    793  2363.3    810  2362.4    869  2362.4    907
7 GR2361.7    911  2361.7    914     0.0      0     0.0      0     0.0      0
8 GR    0.0     0     0.0      0     0.0      0     0.0      0     0.0      0
```



FEMA SECTION 38

X1	38	17	851	899	650	650	650	0	0	
X3	0	0	0	0	0	1600	0	0	0	
GR	2364	0	2362	430	2360	700	2359.7	800	2359.4	825
GR	2358.7	851	2357.7	858	2357.6	875	2357.8	892	2358.6	899
GR	2359.5	906	2359.2	925	2359.1	945	2360	1200	2360	1280
GR	2359.5	1400	2360	1600						

	Raw Elev	Sta	Adj Elev
1	2364.0	-374.0	2366.2
2	2362.0	56.0	2364.2
3	2360.0	326.0	2362.2
4	2359.7	426.0	2361.9
5	2359.4	451.0	2361.6
6	2358.7	477.0	2360.9
7	2357.7	484.0	2359.9
8	2357.6	501.0	2359.8
9	2357.8	518.0	2360.0
10	2358.6	525.0	2360.8
11	2359.5	532.0	2361.7
12	2359.2	551.0	2361.4
13	2359.1	571.0	2361.3
14	2360.0	826.0	2362.2
15	2360.0	906.0	2362.2
16	2359.5	1026.0	2361.7
17	2360.0	1226.0	2362.2
18	0.0	-374.0	2.2
19	0.0	-374.0	2.2
20	0.0	-374.0	2.2

Sta Adj Factor: -374.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

	Adj		
		Up:	1.0
Sta	Elev	Down:	1.0
477.0	2360.9	477.0	2361.9
		477.0	2359.9

Chart Legend--

FEMA		Project	
430.0	2368.3	430.0	2368.8
530.0	2368.3	530.0	2368.8

FEMA STCHR

	Adj		
Sta	Elev		
525.0	2360.8	525.0	2361.8
		525.0	2359.8

Project Section 39
172+69 (39)

Polyline from .dwg--

		From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point X=90244.1981 Y=68500.9036 Z= 368.89	90244.20	68500.90	117	2367.2
2	at point X=90175.4250 Y=68506.5206 Z= 368.89	90175.43	68506.52	186	2368.3
3	at point X=90138.6902 Y=68507.1701 Z= 368.89	90138.69	68507.17	222	2368.4
4	at point X=90136.5852 Y=68509.7236 Z= 368.89	90136.59	68509.72	225	2368.9
5	at point X=90118.4603 Y=68509.0535 Z= 368.89	90118.46	68509.05	243	2368.8
6	at point X=90048.6647 Y=68511.8078 Z= 368.89	90048.66	68511.81	312	2369.3
7	at point X=90046.6813 Y=68501.7732 Z= 368.89	90046.68	68501.77	314	2367.3
8	at point X=90019.7408 Y=68493.1074 Z= 368.89	90019.74	68493.11	341	2365.6
9	at point X=89911.4348 Y=68491.3518 Z= 368.89	89911.43	68491.35	450	2365.3
10	at point X=89896.3440 Y=68490.0523 Z= 368.89	89896.34	68490.05	465	2365.0
11	at point X=89877.0858 Y=68479.9227 Z= 368.89	89877.09	68479.92	484	2363.0
12	at point X=89861.1148 Y=68479.5055 Z= 368.89	89861.11	68479.51	500	2362.9
13	at point X=89842.0374 Y=68480.4276 Z= 368.89	89842.04	68480.43	519	2363.1
14	at point X=89831.3744 Y=68487.3886 Z= 368.89	89831.37	68487.39	530	2364.5
15	at point X=89814.5599 Y=68488.9202 Z= 368.89	89814.56	68488.92	547	2364.8
16	at point X=89746.7173 Y=68488.6094 Z= 368.89	89746.72	68488.61	614	2364.7
17	at point X=89739.2643 Y=68489.3614 Z= 368.89	89739.26	68489.36	622	2364.9
18	at point X=89689.4216 Y=68489.5069 Z= 368.89	89689.42	68489.51	672	2364.9
19	at point X=89623.1412 Y=68492.3313 Z= 368.89	89623.14	68492.33	738	2365.4
20	at point X=89562.6500 Y=68498.3163 Z= 368.89	89562.65	68498.32	798	2366.6
21	at point X=89497.8819 Y=68502.0941 Z= 368.89	89497.88	68502.09	863	2367.4
22	at point X=89468.4326 Y=68502.1036 Z= 368.89	89468.43	68502.10	893	2367.4
23					
24					
25					
26					
27					
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33					
34					
35					
36					
37					
38					
39					
40					

Center Vertical Grid Line--

from point, X=89861.1148 Y=68465.0936 Z=	89861.11	68465.09	500	2360.00
to point, X=89861.1148 Y=68540.0936 Z=	89861.11	68540.09	500	2375.00

CL X 89861.11
New CL Station: 5+00
Top Elev: 2375
Bottom Elev: 2360

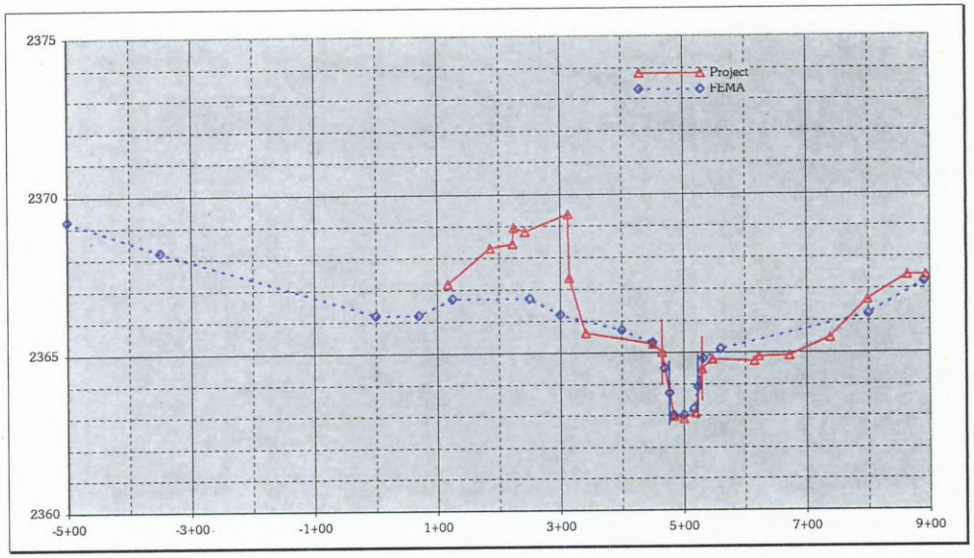
Proj STCHL
465 2363.99
465 2365.99

Line from STCHL to STCHR

from point, X=89896.3440 Y=68490.0523 Z=	89896.34	68490.05	
to point, X=89831.3744 Y=68487.3886 Z=	89831.37	68487.39	

Proj STCHR
530 2363.46
530 2365.46

	-------1	-------2	-------3	-------4	-------5	-------6	-------7	-------8	-------9	------10
	X1 39	22	465	530						
1	GR2367.2	117	2368.3	186	2368.4	222	2368.9	225	2368.8	243
2	GR2369.3	312	2367.3	314	2365.6	341	2365.3	450	2365.0	465
3	GR2363.0	484	2362.9	500	2363.1	519	2364.5	530	2364.8	547
4	GR2364.7	614	2364.9	622	2364.9	672	2365.4	738	2366.6	798
5	GR2367.4	863	2367.4	893	0.0	0	0.0	0	0.0	0
6	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
7	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
8	GR 0.0	0	0.0	0	0.0	0	0.0	0	0.0	0



FEMA SECTION 39

X1	39	19	977	1023	550	550	650	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2367	0	2366	150	2364	500	2364	570	2364.5	625
GR	2364.5	750	2364	800	2363.5	900	2363.1	950	2362.3	969
GR	2361.5	977	2360.8	983	2360.8	1000	2361	1017	2361.7	1023
GR	2362.6	1032	2362.9	1060	2364	1300	2365	1390		

	Raw Elev	Sta	Adj Elev
1	2367.0	-500.0	2369.2
2	2366.0	-350.0	2368.2
3	2364.0	0.0	2366.2
4	2364.0	70.0	2366.2
5	2364.5	125.0	2366.7
6	2364.5	250.0	2366.7
7	2364.0	300.0	2366.2
8	2363.5	400.0	2365.7
9	2363.1	450.0	2365.3
10	2362.3	469.0	2364.5
11	2361.5	477.0	2363.7
12	2360.8	483.0	2363.0
13	2360.8	500.0	2363.0
14	2361.0	517.0	2363.2
15	2361.7	523.0	2363.9
16	2362.6	532.0	2364.8
17	2362.9	560.0	2365.1
18	2364.0	800.0	2366.2
19	2365.0	890.0	2367.2
20	0.0	-500.0	2.2

Sta Adj Factor: -500.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev	Up: Down:	1.0 1.0
477.0	2363.7	477.0	2364.7
		477.0	2362.7

Chart Legend--

FEMA		Project	
430.0	2373.3	430.0	2373.8
530.0	2373.3	530.0	2373.8

FEMA STCHR

Sta	Adj Elev		
523.0	2363.9	523.0	2364.9
		523.0	2362.9

Project Section 40
176+70 (40)

	Polyline from .dwg--	From dwg X	From dwg Y	Adjusted Sta	Adjusted Elev
1	at point X=90515.0789 Y=68611.3801 Z= 368.8	90515.08	68611.38	346	2368.3
2	at point X=90438.4374 Y=68609.3707 Z= 368.8	90438.44	68609.37	423	2367.9
3	at point X=90411.7679 Y=68612.2660 Z= 368.8	90411.77	68612.27	450	2368.4
4	at point X=90403.0094 Y=68611.4195 Z= 368.8	90403.01	68611.42	459	2368.3
5	at point X=90402.4967 Y=68608.9303 Z= 368.8	90402.50	68608.93	459	2367.8
6	at point X=90362.4648 Y=68611.5267 Z= 368.8	90362.46	68611.53	499	2368.3
7	at point X=90325.1488 Y=68608.7618 Z= 368.8	90325.15	68608.76	536	2367.7
8	at point X=90324.6777 Y=68610.8012 Z= 368.8	90324.68	68610.80	537	2368.1
9	at point X=90279.8070 Y=68612.6849 Z= 368.8	90279.81	68612.68	582	2368.5
10	at point X=90211.7299 Y=68610.5278 Z= 368.8	90211.73	68610.53	650	2368.1
11	at point X=90110.5796 Y=68613.2748 Z= 368.8	90110.58	68613.27	751	2368.6
12	at point X=90032.0603 Y=68610.4110 Z= 368.8	90032.06	68610.41	829	2368.1
13	at point X=89907.9363 Y=68610.0431 Z= 368.8	89907.94	68610.04	954	2368.0
14	at point X=89901.2656 Y=68608.8950 Z= 368.8	89901.27	68608.90	960	2367.8
15	at point X=89900.3189 Y=68603.9308 Z= 368.8	89900.32	68603.93	961	2366.8
16	at point X=89897.7939 Y=68601.4703 Z= 368.8	89897.79	68601.47	964	2366.3
17	at point X=89881.0381 Y=68596.6984 Z= 368.8	89881.04	68596.70	980	2365.3
18	at point X=89861.5099 Y=68595.6063 Z= 368.8	89861.51	68595.61	1000	2365.1
19	at point X=89845.3183 Y=68595.8512 Z= 368.8	89845.32	68595.85	1016	2365.2
20	at point X=89837.5025 Y=68601.2956 Z= 368.8	89837.50	68601.30	1024	2366.2
21	at point X=89820.0856 Y=68603.5251 Z= 368.8	89820.09	68603.53	1041	2366.7
22	at point X=89724.7567 Y=68607.2002 Z= 368.8	89724.76	68607.20	1137	2367.4
23	at point X=89679.1793 Y=68611.1053 Z= 368.8	89679.18	68611.11	1182	2368.2
24	at point X=89666.8394 Y=68612.9502 Z= 368.8	89666.84	68612.95	1195	2368.6
25	at point X=89593.8740 Y=68615.3869 Z= 368.8	89593.87	68615.39	1268	2369.1
26	at point X=89507.8111 Y=68620.9336 Z= 368.8	89507.81	68620.93	1354	2370.2
27	at point X=89484.2719 Y=68623.5475 Z= 368.8	89484.27	68623.55	1377	2370.7
28	at point X=89456.9031 Y=68624.5623 Z= 368.8	89456.90	68624.56	1405	2370.9
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					

Center Vertical Grid Line--				
from point, X=89861.5099 Y=68570.0936 Z=	89861.51	68570.09	1000	2360.00
to point, X=89861.5099 Y=68645.0936 Z=	89861.51	68645.09	1000	2375.00

CL X 89861.51
New CL Station: 10+00
Top Elev: 2375
Bottom Elev: 2360

Proj STCHL
961 2365.77
961 2367.77

Line from STCHL to STCHR				
from point, X=89900.3189 Y=68603.9308 Z=	89900.32	68603.93		
to point, X=89837.5025 Y=68601.2956 Z=	89837.50	68601.30		

Proj STCHR
1024 2365.24
1024 2367.24

-------1-------2-------3-------4-------5-------6-------7-------8-------9------10

	X1	40	28	961	1024					
1	GR	2368.3	346	2367.9	423	2368.4	450	2368.3	459	2367.8	459
2	GR	2368.3	499	2367.7	536	2368.1	537	2368.5	582	2368.1	650
3	GR	2368.6	751	2368.1	829	2368.0	954	2367.8	960	2366.8	961
4	GR	2366.3	964	2365.3	980	2365.1	1000	2365.2	1016	2366.2	1024
5	GR	2366.7	1041	2367.4	1137	2368.2	1182	2368.6	1195	2369.1	1268
6	GR	2370.2	1354	2370.7	1377	2370.9	1405	0.0	0	0.0	0
7	GR	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
8	GR	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0

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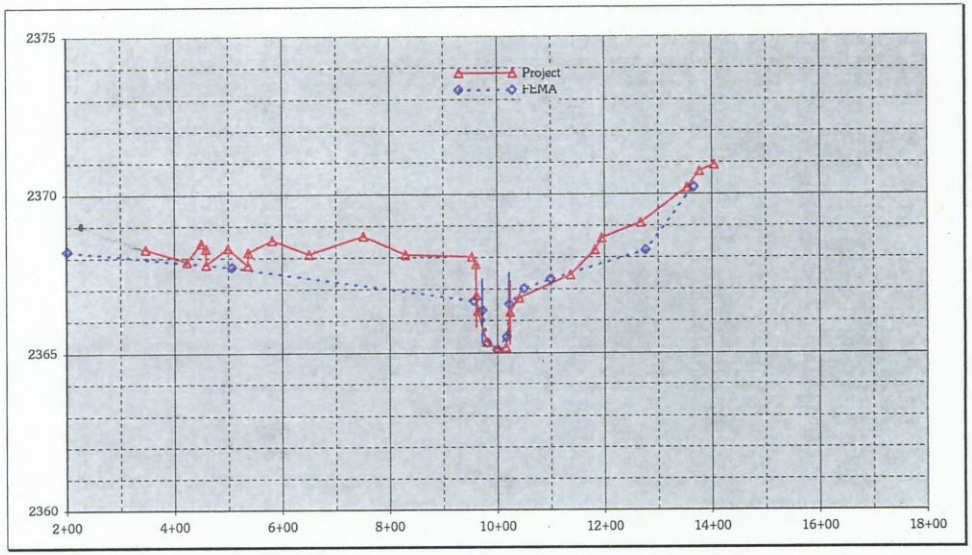
214 2369.0



FEMA SECTION 40

X1	40	15	1096	1146	150	550	400	0	0	
X3	0	0	0	0	0	0	0	0	0	
GR	2368	0	2366	170	2366.2	250	2366	325	2365.5	630
GR	2364.4	1080	2364.1	1096	2363.1	1105	2362.9	1123	2363.3	1141
GR	2364.3	1146	2364.8	1173	2365.1	1223	2366	1400	2368	1490

	Raw Elev	Raw Sta	Adj Elev
1	2368.0	-123.0	2370.2
2	2366.0	47.0	2368.2
3	2366.2	127.0	2368.4
4	2366.0	202.0	2368.2
5	2365.5	507.0	2367.7
6	2364.4	957.0	2366.6
7	2364.1	973.0	2366.3
8	2363.1	982.0	2365.3
9	2362.9	1000.0	2365.1
10	2363.3	1018.0	2365.5
11	2364.3	1023.0	2366.5
12	2364.8	1050.0	2367.0
13	2365.1	1100.0	2367.3
14	2366.0	1277.0	2368.2
15	2368.0	1367.0	2370.2
16	0.0	-123.0	2.2
17	0.0	-123.0	2.2
18	0.0	-123.0	2.2
19	0.0	-123.0	2.2
20	0.0	-123.0	2.2

Sta Adj Factor: -123.00
Elev Adj Factor: 2.20
(Raises FEMA datum to Navajo datum)

FEMA STCHL

Sta	Adj Elev	Up:	1.0
973.0	2366.3	973.0	2367.3
		973.0	2365.3

Chart Legend--

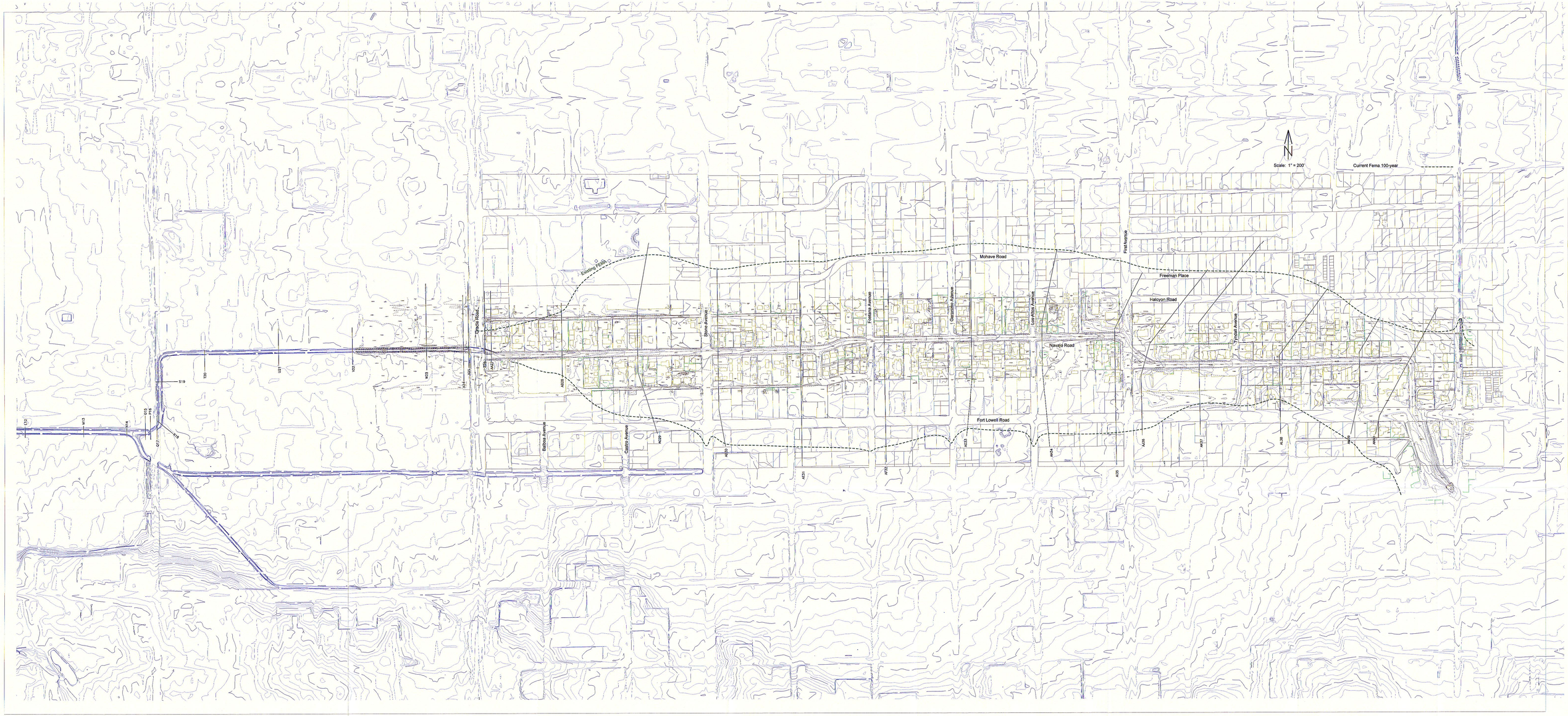
FEMA		Project	
930.0	2373.3	930.0	2373.8
1030.0	2373.3	1030.0	2373.8

FEMA STCHR

Sta	Adj Elev		
1023.0	2366.5	1023.0	2367.5
		1023.0	2365.5

Jul-18-06 10:31 AM

8b. Map of FEMA Cross Section Locations



Appendix 8b. Map of FEMA Cross Section Locations

8c. HEC-2 Evaluation of Navajo Wash Flow for Various Design Conditions

APPENDIX 8C. HEC-2 EVALUATION OF NAVAJO WASH FLOW FOR VARIOUS DESIGN CONDITIONS

1. 100-year Storm Minus 2-year Storm (Corresponds to a 2-year storm drain design)

2. 100-year Storm Minus 10-year Storm (Corresponds to a 10-year storm drain design)

3. 100-year Storm (Corresponds to a 100-year storm drain design)

```
*******************************************
*  HEC-2 WATER SURFACE PROFILES           *
*                                         *
*  Version   4.6.2;  May 1991             *
*                                         *
*  RUN DATE    06SEP06    TIME   14:50:39 *
*******************************************
```

```
****************************************
*  U.S. ARMY CORPS OF ENGINEERS        *
*  HYDROLOGIC ENGINEERING CENTER       *
*  609 SECOND STREET, SUITE D          *
*  DAVIS, CALIFORNIA 95616-4687        *
*          (916) 756-1104              *
****************************************
```

```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
```

THIS RUN EXECUTED 06SEP06 14:50:39

```
************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
************************************
```

T1 Project (100-yr) - (10-yr) Discharges
T3 FEMA(5) Working project file

Current FEMA Data with following changes
Sections 1-11 deleted.
Assumes critical depth for starting point at Section 12
GR cards updated using project survey and mapping, 2005 PAG mapping
Speedway Boulevard cards replaced with SC
Discharges replaced with those of Table 8.1

```
  ICHECK     INQ    NINV    IDIR    STRT

J1  ICHECK     INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

       0         4         0         0        -1

   NPROF   IPLOT   PRFVS                          ALLDC

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      1         0        -1                                       -1

  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

     38        66        43         1         2         8        26         4        53        54
     13        14        15                  101

J5  LPRNT    NUMSEC                    ********REQUESTED SECTION NUMBERS********

    -10       -10

J6  IHLEQ     ICOPY     SUBDIV    STRTDS    RMILE

      1         0       0.0
```

Discharges are taken from Table 8.1 and are as follows:

	INQ =	2	3	4	5
		100-yr	100-yr	100-yr	100-yr
Reach	Sections	FEMA	TSMS(10)	-10-yr	-2-yr
--	12-14	3,000	4,050	2,014	3,315
JK	15-24	2,021	2,731	1,403	2,296
CI	25-29	2,100	1,982	1,030	1,746

```
IJ    30-35    2,100    2,173     1,083    1,868
DC    36-40    2,100    1,879       986    1,680

 --   Discharges downstream of Fairview (Sections 12-14)

QT        4       3000       4050       2014       3315
 -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

NC     0.02       0.02      0.013        0.1        0.3
 -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1       12          9        478        521
GR   2311.8       -468     2311.4        472     2310.5        478     2300.4        490     2300.3        500
GR   2300.3        511     2310.5        521     2315.4        525     2316.4        537
  Section 12    Q100 = 3,609    WSE = 2308.68
 -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1       13          8        477        524        475        475        475
GR   2313.4        468     2312.2        477     2301.9        491     2302.1        500     2302.3        510
GR   2312.1        524     2315.6        530     2317.7        543
    Section 13    Q100 = 3,609    WSE = 2310.47
 -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1       14          8        479        530        350        350        350
GR   2314.7        470     2313.6        479     2304.3        489     2304.2        500     2304.2        507
GR   2308.6        519     2313.1        530     2313.9        535
  Section 14    Q100 = 3,609    WSE = 2312.32
 -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

  JK  |   Fairview to Oracle (channel)  |   15-24

QT        4       2021       2731       1403       2296
 -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1       15         11        473        526        150        150        150
GR   2317.1        366     2316.9        433     2316.7        451     2316.1        473     2306.6        489
GR   2306.4        500     2306.1        510     2316.1        526     2316.3        539     2316.5        545
GR   2316.5        555
  Section 15    Q100 = 2,382    WSE = 2314.17
  Section 1 of special culvert sequence
 -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

NC      0.0        0.0        0.0        0.6        0.8
 -----1-------2-------3-------4-------5-------6-------7-------8-------9------10
```

```
X1       16        11       486       512        40        40        40
X3        0         0         0       486    2316.0       512    2316.0
GR   2317.1       449    2316.8       460    2316.8       481    2316.7       486    2306.6       488
GR   2306.3       489    2306.6       500    2306.7       504    2306.8       512    2316.5       512
GR   2316.7       522
   Section 16    Q100 = 2,382    WSE = 2313.94
   Section 2 of special culvert sequence
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

NC      0.0       0.0       0.0       0.6       0.8
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

SC    2.012       0.2       2.8       200       5.0      10.0        62       8.1    2307.0    2306.4
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1       17        14       484       528        62        62        62
X2        0         0         2    2312.0    2316.0
X3        0         0         0       488    2316.2       512    2316.2
GR   2316.3       411    2316.2       443    2316.0       446    2316.2       467    2316.4       473
GR   2316.5       484    2309.3       488    2307.0       488    2306.9       500    2307.2       512
GR   2313.0       522    2316.4       528    2316.5       558    2316.9       597
   Section 17    Q100 = 2,382    WSE = 2315.40
   Section 3 of special culvert sequence
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

NC    0.035     0.025     0.013       0.1       0.3
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1       18        14       474       524       100        10        50
GR   2318.6       373    2318.4       395    2318.6       412    2318.4       438    2318.2       459
GR   2318.7       468    2318.1       474    2313.1       483    2307.3       496    2307.4       500
GR   2307.6       510    2310.4       514    2316.2       524    2316.9       529
   Section 18    Q100 = 2,382    WSE = 2316.65
   Section 4 of special culvert sequence
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

  ----- End Fairview Avenue Culvert ------

NC      0.0       0.0       0.0       0.1       0.3
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1       19        12       478       519       350       550       450
GR   2321.9       431    2321.6       476    2321.1       478    2319.4       482    2308.6       493
GR   2308.6       500    2308.4       507    2311.3       511    2313.2       512    2318.1       517
GR   2320.4       519    2321.3       526
      Section 19    Q100 = 2,382    WSE = 2316.29
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10
```

```
NC    0.035      0.035      0.025       0.0        0.0
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1       20         13        481        519        550        450        500
GR   2323.2        359     2323.0        419     2322.9        473     2322.6        473     2322.1        476
GR   2321.9        481     2319.0        487     2313.4        494     2313.5        500     2313.3        506
GR   2318.8        512     2321.5        519     2322.2        521
      Section 20    Q100 = 2,382    WSE = 2321.57
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1       21         26        484        520        600        600        600
GR   2324.6        393     2324.6        417     2324.5        442     2324.3        456     2324.1        473
GR   2323.5        484     2321.6        488     2315.4        494     2315.0        500     2314.8        501
GR   2315.1        507     2321.3        513     2323.3        518     2324.3        520     2324.5        521
GR   2324.4        522     2324.1        537     2324.5        537     2324.5        547     2324.2        569
GR   2324.5        592     2324.8        622     2324.9        652     2325.0        669     2325.4        682
GR   2325.4        687
      Section 21    Q100  = 2,382    WSE = 2325.16
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1       22         15        482        518        600        600        600
GR   2324.3        404     2324.5        467     2324.9        482     2323.1        487     2319.5        493
GR   2317.3        495     2317.2        500     2317.5        506     2318.7        507     2322.8        514
GR   2324.6        518     2325.2        523     2325.3        540     2326.0        605     2326.4        687
      Section 22    Q100 = 2,382    WSE = 2326.75
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1       23         37        479        523        600        600        600
GR   2325.6        337     2325.8        361     2326.0        390     2326.5        450     2326.7        470
GR   2326.7        479     2325.8        482     2323.8        486     2321.4        492     2318.6        494
GR   2318.7        500     2318.8        505     2320.6        507     2324.4        515     2326.1        521
GR   2327.0        523     2326.9        529     2326.5        536     2326.9        537     2327.1        544
GR   2327.0        562     2326.8        577     2327.1        592     2326.7        607     2326.9        627
GR   2326.8        643     2326.8        651     2327.1        695     2327.0        727     2327.4        822
GR   2327.0        822     2327.4        843     2326.9        863     2327.2        863     2327.5        870
GR   2327.3        907     2327.5        913
      Section 23    Q100 = 2,382    WSE = 2327.75
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

  ----- Begin Oracle Road Culvert -----

X1       24         40        473        526        300        300        300
GR   2327.3        246     2327.4        318     2327.6        358     2327.3        362     2327.3        423
GR   2327.4        452     2327.5        473     2325.9        480     2321.1        487     2321.0        488
GR   2320.9        494     2319.8        499     2320.0        500     2320.5        504     2320.8        511
GR   2323.1        513     2325.2        518     2328.2        526     2328.2        532     2327.8        539
GR   2328.1        539     2328.3        576     2328.9        602     2328.7        623     2328.4        636
GR   2328.3        689     2328.3        702     2328.1        726     2328.4        797     2328.4        814
GR   2328.0        822     2328.0        825     2327.7        825     2328.4        846     2327.8        866
```

```
GR   2328.0        866     2328.3        876      2328.0        906      2328.4        915      2328.4        915
      Section 24    Q100 = 2,382    WSE = 2327.97
   Section 4 of special culvert sequence
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10


NC      0.0        0.0        0.0        0.6        0.8
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

   CI  |   Oracle to Stone  |   25-29
QT        8          2100       1982       1030       1746
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1       25         36        484        524         50         50         50
X3        0          0          0        484     2330.4        524     2330.4
GR   2327.3        360     2327.8        433     2327.9        463     2327.6        468      2328.2        481
GR   2329.4        483     2328.4        484     2322.2        484     2321.4        487      2321.8        491
GR   2321.4        498     2321.4        500     2321.3        506     2321.0        508      2321.0        517
GR   2321.8        522     2322.3        524     2328.5        524     2329.0        529      2328.5        529
GR   2328.7        592     2328.7        697     2328.6        817     2330.2        818      2329.4        829
GR   2329.0        829     2328.8        833     2328.5        834     2328.6        862      2328.5        865
GR   2328.8        867     2329.0        870     2329.3        871     2329.8        882      2328.6        882
GR   2328.5        915   0
   Section 25    Q100 = 1,843    WSE = 2328.64
   Section 2 of special culvert sequence
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10


NC    0.025       0.06      0.013        0.6        0.8
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

SC    3.012        0.2        2.8         50        5.0       12.0        128        8.1      2323.4      2322.4
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1       26         37        477        527        128        128        128
X2        0          0          2     2328.4     2330.4
GR   2330.0        424     2329.3        434     2328.9        441     2329.5        474      2330.1        477
GR   2328.1        478     2325.3        482     2323.7        483     2323.7        500      2323.8        518
GR   2330.4        527     2330.2        534     2330.2        563     2330.8        577      2330.5        578
GR   2330.4        580     2330.8        613     2330.2        624     2330.2        652      2329.6        654
GR   2329.6        684     2330.0        685     2329.6        697     2329.6        742      2329.2        744
GR   2329.0        748     2328.4        755     2328.2        761     2329.6        768      2330.6        777
GR   2331.1        787     2330.7        787     2330.6        805     2330.9        805      2330.5        811
GR   2330.5        876     2330.3        913
   Section 26    Q100 = 1,843    WSE = 2330.61
   Section 3 of special culvert sequence
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10
```

```
NC     0.025       0.06       0.013       0.1        0.3
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1        27         35         436        519         50         50         50
GR    2331.4        430      2331.2        436     2328.1        452     2327.9        483     2328.1        485
GR    2327.8        487      2325.3        492     2325.3        500     2325.4        507     2330.6        519
GR    2330.2        543      2330.6        567     2330.3        573     2330.3        589     2329.8        631
GR    2330.7        637      2330.4        637     2330.0        642     2329.9        664     2331.6        684
GR    2331.7        712      2331.4        742     2331.0        753     2331.5        753     2330.5        756
GR    2329.2        758      2328.0        765     2328.1        768     2328.9        780     2330.1        792
GR    2330.7        807      2331.0        855     2330.8        855     2330.4        874     2330.3        899
      Section 27    Q100 = 1,843    WSE = 2330.21
   Section 4 of special culvert sequence
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

  ----- End of Oracle Road Culvert -----

NC       0.1       0.05       0.02        0.0        0.0
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1        28         36         469        525        577        577        577
GR    2332.5        240      2332.2        306     2332.1        416     2332.0        450     2331.6        459
GR    2331.5        469      2329.5        480     2329.1        494     2329.2        500     2329.4        511
GR    2331.0        525      2330.7        529     2330.8        535     2330.9        553     2330.7        582
GR    2331.0        615      2331.5        616     2331.1        663     2331.1        673     2331.4        688
GR    2331.3        715      2331.5        748     2331.4        768     2331.1        771     2331.5        772
GR    2331.5        778      2331.0        779     2330.3        790     2331.1        797     2331.6        816
GR    2331.5        823      2331.9        853     2332.2        858     2332.3        892     2331.5        900
GR    2332.5       1000
   Section 28    Q100 = 1,843    WSE = 2332.33
   Added points left and right based on PAG mapping
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

NC      0.05       0.08       0.02        0.0        0.0
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1        29         32         468        526        614        614        614
GR    2336.1        125      2335.1        182     2334.0        194     2334.4        236     2334.3        292
GR    2334.8        321      2334.4        334     2334.2        394     2334.4        436     2333.9        468
GR    2332.4        479      2332.3        500     2332.3        510     2334.2        526     2334.8        545
GR    2334.5        551      2334.7        605     2334.3        694     2334.3        753     2334.7        775
GR    2334.1        779      2333.6        780     2333.4        788     2333.7        795     2334.2        795
GR    2334.1        797      2333.0        800     2332.9        805     2333.9        809     2334.0        824
GR    2335.0        857      2335.5       1070
   Section 29    Q100 = 1,843    WSE = 2335.34
   One point added left from PAG mapping.
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

    IJ  |   Stone to First Avenue  |   30-35
```

```
QT        4         2100      2173      1083      1868
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

NC     0.06      0.06      0.016      0.0       0.0
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1       30        36       450       538       650       650       650
X3                                                          839
GR   2338.0       -30    2336.5       152    2336.3       179    2335.8       193    2335.9       215
GR   2335.4       222    2335.7       232    2335.3       252    2336.2       259    2336.3       294
GR   2336.9       362    2336.8       371    2337.2       375    2337.1       439    2336.9       450
GR   2336.4       461    2334.6       478    2334.8       500    2334.9       512    2336.4       524
GR   2337.3       538    2337.6       555    2337.6       581    2337.1       644    2336.3       653
GR   2336.7       730    2336.7       793    2337.0       797    2336.5       797    2337.3       814
GR   2337.4       824    2337.4       835    2337.5       839    2338.0       839    2337.5       844
GR   2337.6       877
   Section 30    Q100 = 1,722    WSE = 2337.38
   One point added left from PAG mapping.
   Deleted two RH pts beyond point of containment using X3 card
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1       31        40       450       532       670       670       670
X3                                    191
GR   2341.4       149    2341.6       191    2340.6       191    2338.7       201    2338.7       216
GR   2339.2       227    2338.9       251    2339.1       272    2339.0       282    2339.2       292
GR   2338.9       342    2339.1       352    2338.9       355    2338.8       374    2338.9       390
GR   2338.8       430    2339.1       450    2338.6       463    2338.6       465    2337.9       478
GR   2337.3       483    2337.5       500    2337.7       516    2339.0       532    2339.0       552
GR   2339.4       570    2339.4       611    2339.3       614    2339.5       617    2339.4       646
GR   2339.6       662    2339.6       756    2339.7       760    2339.9       771    2339.9       784
GR   2339.9       796    2339.7       800    2340.0       820    2340.0       885    2341.0      1410
   Section 31    Q100 = 1,722    WSE = 2340.12
   Deleted one LH pt beyond point of containment using X3 card
   One point added right from PAG mapping.
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

NC     0.06      0.06      0.02       0.0       0.0
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1       32        35       469       525       691       691       691
GR   2344.0       -20    2342.5       140    2342.7       171    2345.1       172    2344.9       199
GR   2345.0       202    2344.7       207    2344.2       343    2344.0       359    2343.6       367
GR   2343.2       371    2342.9       398    2342.0       462    2342.0       469    2341.0       479
GR   2340.7       480    2340.7       487    2340.3       499    2340.3       500    2340.3       513
GR   2340.7       518    2342.2       525    2341.7       530    2342.4       545    2342.5       568
GR   2342.2       585    2342.2       647    2342.0       651    2342.4       733    2342.6       824
GR   2342.4       826    2342.4       861    2342.3       864    2342.5       875    2344.0      1520
   Section 32    Q100 = 1,722    WSE = 2343.36*
   One point added left from PAG mapping.
   One point added right from PAG mapping.
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10
```

```
X1        33         33        457        526        708        708        708
GR    2348.0       -300     2346.6        148     2346.5        163     2346.8        214     2346.7        240
GR    2346.2        261     2346.4        284     2346.8        291     2346.6        312     2346.1        319
GR    2346.7        344     2346.4        364     2346.8        406     2346.6        457     2345.3        479
GR    2344.8        485     2344.7        500     2344.7        511     2344.9        519     2345.7        526
GR    2346.3        556     2346.1        556     2346.4        560     2346.5        589     2346.3        614
GR    2346.2        778     2346.2        787     2346.2        821     2346.0        831     2345.9        832
GR    2345.7        848     2346.2        869     2347.5       1520
   Section 33    Q100 = 1,722    WSE = 2347.18
   One point added left from PAG mapping.
   One point added right from PAG mapping.
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

NC      0.06       0.06       0.02        0.0        0.0
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1        34         40        470        531        572        572        572
GR    2351.0       -200     2350.4        148     2350.4        181     2349.9        197     2349.9        235
GR    2349.3        242     2350.1        267     2350.2        282     2350.0        325     2350.4        337
GR    2350.4        375     2349.9        391     2350.0        425     2349.8        455     2349.3        470
GR    2348.2        481     2347.6        500     2347.6        506     2349.2        531     2350.7        531
GR    2350.6        543     2350.7        578     2350.2        588     2350.5        598     2350.5        636
GR    2351.1        645     2350.5        658     2350.4        695     2349.7        704     2349.6        742
GR    2349.8        754     2349.4        771     2349.7        780     2349.6        808     2349.8        819
GR    2349.7        843     2350.2        843     2350.4        847     2350.1        864     2351.0       1200
   Section 34    Q100 = 1,722    WSE = 2350.85
   One point added left from PAG mapping.
   One point added right from PAG mapping.
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1        35         27        462        530        590        590        590
X3                                        326                   646
GR    2354.6        115     2353.6        131     2353.9        162     2354.4        175     2354.4        206
GR    2354.0        216     2353.9        226     2354.5        234     2354.6        271     2354.6        326
GR    2353.6        338     2352.8        462     2352.3        469     2350.6        484     2350.6        500
GR    2351.0        518     2352.8        530     2354.0        554     2354.7        580     2354.7        633
GR    2355.2        646     2355.0        673     2354.3        712     2353.8        714     2354.0        719
GR    2354.1        762     2354.0        798
   Section 35    Q100 = 1,722    WSE = 2354.17*
   Deleted 9 LH pts beyond point of containment using X3 card
   Deleted 6 RH pts beyond point of containment using X3 card
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

   DC  |   First Avenue to Fort Lowell  |   36-40
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QT        4          2100       1879         986        1680
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

NC     0.07       0.06       0.02        0.0        0.0
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1       36         33        471        531        220        400        334
X3                                       386
GR   2357.0        154     2356.7        167     2356.8        186     2356.3        186     2355.7        213
GR   2356.3        242     2356.0        267     2356.5        268     2356.6        342     2357.2        349
GR   2357.2        381     2356.7        381     2355.6        434     2355.1        434     2354.7        471
GR   2353.4        480     2353.5        498     2353.5        500     2353.1        514     2355.6        531
GR   2355.3        551     2355.4        568     2355.1        625     2355.3        638     2355.0        659
GR   2355.2        711     2355.0        766     2355.4        819     2355.3        843     2355.6        854
GR   2355.6        873     2356.0       1140     2357.0       1280
   Section 36    Q100 = 1,701    WSE = 2356.32*
   Delete 10 LH points via X3
   Add two PAG points to right end to contain flow.
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1       37         30        471        531        480        380        441
X3                                                              543
GR   2361.0       -150     2358.8        157     2357.6        182     2357.9        253     2358.6        286
GR   2359.1        286     2359.5        406     2359.3        423     2358.0        457     2357.9        471
GR   2356.6        480     2356.6        495     2356.6        500     2356.5        514     2358.2        531
GR   2359.2        531     2359.8        543     2359.8        607     2359.3        621     2358.8        621
GR   2358.5        641     2358.8        654     2358.7        665     2359.2        665     2359.0        668
GR   2357.6        668     2357.1        706     2357.1        768     2357.5        797     2357.0        830
   Section 37    Q100 = 1,701    WSE = 2359.54*
   Added LH pt to contain flow
   Deleted 13 RH pts beyond high point using X3 card.
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

NC     0.06       0.06       0.02        0.0        0.0
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10

X1       38         32        472        530        650        650        650
X3                                       379                   810
GR   2364.3        153     2363.9        204     2363.5        228     2363.9        235     2362.9        300
GR   2362.6        322     2361.9        330     2362.4        379     2361.8        424     2361.3        456
GR   2360.8        472     2360.1        481     2360.0        489     2359.8        500     2359.8        517
GR   2361.5        530     2361.5        542     2361.2        547     2361.5        554     2361.5        580
GR   2361.2        593     2361.4        606     2361.4        667     2361.1        689     2361.3        711
GR   2361.2        724     2362.2        793     2363.3        810     2362.4        869     2362.4        907
GR   2361.7        911     2361.7        914
   Section 38    Q100 = 1,701    WSE = 2362.58*
   Deleted 7 LH pts beyond point of containment using X3 card
   Deleted 4 RH pts beyond point of containment using X3 card
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10
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X1        39        22       465       530       550       550       650
GR    2367.2       117    2368.3       186    2368.4       222    2368.9       225    2368.8       243
GR    2369.3       312    2367.3       314    2365.6       341    2365.3       450    2365.0       465
GR    2363.0       484    2362.9       500    2363.1       519    2364.5       530    2364.8       547
GR    2364.7       614    2364.9       622    2364.9       672    2365.4       738    2366.6       798
GR    2367.4       863    2367.4       893
   Section 39    Q100 = 1,701    WSE = 2366.04*
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10


X1        40        28       961      1024       150       550       403
GR    2369.0       210    2367.9       423    2368.4       450    2368.3       459    2367.8       459
GR    2368.3       499    2367.7       536    2368.1       537    2368.5       582    2368.1       650
GR    2368.6       751    2368.1       829    2368.0       954    2367.8       960    2366.8       961
GR    2366.3       964    2365.3       980    2365.1      1000    2365.2      1016    2366.2      1024
GR    2366.7      1041    2367.4      1137    2368.2      1182    2368.6      1195    2369.1      1268
GR    2370.2      1354    2370.7      1377    2370.9      1405
   Section 40    Q100 = 1,701    WSE = 2368.47*
  -----1-------2-------3-------4-------5-------6-------7-------8-------9------10
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IHLEQ = 1. THEREFORE FRICTION LOSS (HL) IS CALCULATED AS A FUNCTION OF PROFILE TYPE, WHICH CAN VARY FROM REACH TO REACH. SEE DOCUMENTATION FOR DETAILS.

T1 Project (100-yr) - (2-yr) Discharges
T3 FEMA(5) Working project file

	ICHECK	INQ	NINV	IDIR	STRT					
J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	5	0	0	-1					

	NPROF	IPLOT	PRFVS			ALLDC				
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	2	0	-1				-1			

IHLEQ = 1. THEREFORE FRICTION LOSS (HL) IS CALCULATED AS A FUNCTION OF PROFILE TYPE, WHICH CAN VARY FROM REACH TO REACH. SEE DOCUMENTATION FOR DETAILS.

T1 Project (100-yr) Discharges
T3 FEMA(5) Working project file

	ICHECK	INQ	NINV	IDIR	STRT					
J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	3	0	0	-1					

	NPROF	IPLOT	PRFVS				ALLDC			
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	3	0	-1				-1			

IHLEQ = 1. THEREFORE FRICTION LOSS (HL) IS CALCULATED AS A FUNCTION OF PROFILE TYPE, WHICH CAN VARY FROM REACH TO REACH. SEE DOCUMENTATION FOR DETAILS.

THIS RUN EXECUTED 06SEP06 14:50:39

****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

FEMA(5) Working project

SUMMARY PRINTOUT

	SECNO	CUMDS	Q	CWSEL	CRIWS	DEPTH	VCH	TOPWID	SSTA	ENDST	QLOB	QCH	QROB
*	12.000	.00	2014.00	2306.22	2306.22	5.92	12.49	33.73	483.08	516.81	.00	2014.00	.00
*	12.000	.00	3315.00	2308.26	2308.26	7.96	14.13	38.15	480.66	518.81	.00	3315.00	.00
*	12.000	.00	4050.00	2309.23	2309.23	8.93	14.86	40.25	479.51	519.76	.00	4050.00	.00
*	13.000	475.00	2014.00	2308.11	2308.11	6.21	12.26	35.73	482.56	518.29	.00	2014.00	.00
*	13.000	475.00	3315.00	2310.08	2310.08	8.18	13.80	41.23	479.88	521.11	.00	3315.00	.00
*	13.000	475.00	4050.00	2311.02	2311.02	9.12	14.45	43.85	478.60	522.46	.00	4050.00	.00
*	14.000	825.00	2014.00	2310.11	2310.11	5.91	11.75	39.95	482.75	522.70	.00	2014.00	.00
*	14.000	825.00	3315.00	2311.93	2311.93	7.73	13.28	46.33	480.80	527.13	.00	3315.00	.00
*	14.000	825.00	4050.00	2312.81	2312.81	8.61	13.87	49.44	479.85	529.29	.00	4050.00	.00
*	15.000	975.00	1403.00	2310.91	2310.91	4.81	10.85	35.96	481.74	517.70	.00	1403.00	.00
	15.000	975.00	2296.00	2313.40	2312.43	7.30	10.03	44.13	477.55	521.68	.00	2296.00	.00
	15.000	975.00	2731.00	2314.75	2313.06	8.65	9.36	48.58	475.27	523.85	.00	2731.00	.00
*	16.000	1015.00	1403.00	2311.27	2311.27	4.97	12.24	24.92	487.08	512.00	.00	1403.00	.00
*	16.000	1015.00	2296.00	2313.15	2313.07	6.85	14.18	25.30	486.70	512.00	.00	2296.00	.00
*	16.000	1015.00	2731.00	2314.46	2313.87	8.16	13.99	25.56	486.44	512.00	.00	2731.00	.00
*	17.000	1077.00	1403.00	2315.83	.00	8.93	6.62	24.00	488.00	512.00	.00	1403.00	.00
	17.000	1077.00	2296.00	2315.51	.00	8.61	11.24	24.00	488.00	512.00	.00	2296.00	.00
*	17.000	1077.00	2731.00	2314.43	2314.35	7.53	15.32	24.00	488.00	512.00	.00	2731.00	.00
	18.000	1127.00	1403.00	2316.10	2312.76	8.80	5.35	46.25	477.59	523.84	.00	1403.00	.00
*	18.000	1127.00	2296.00	2316.60	2314.33	9.30	8.03	50.19	476.69	526.89	.00	2295.73	.27
*	18.000	1127.00	2731.00	2317.20	2314.98	9.90	8.68	53.38	475.62	529.00	.00	2727.77	3.23
*	19.000	1577.00	1403.00	2315.80	2314.24	7.40	8.83	29.00	485.66	514.66	.00	1403.00	.00
*	19.000	1577.00	2296.00	2316.14	2316.14	7.74	13.62	29.67	485.32	515.00	.00	2296.00	.00
*	19.000	1577.00	2731.00	2316.95	2316.95	8.55	14.13	31.32	484.50	515.82	.00	2731.00	.00

	SECNO	CUMDS	Q	CWSEL	CRIWS	DEPTH	VCH	TOPWID	SSTA	ENDST	QLOB	QCH	QROB
*	20.000	2077.00	1403.00	2319.58	2319.58	6.28	11.71	28.22	485.80	514.02	.00	1403.00	.00
*	20.000	2077.00	2296.00	2321.45	2321.45	8.15	12.71	36.93	481.94	518.86	.00	2296.00	.00
*	20.000	2077.00	2731.00	2322.12	2322.12	8.82	13.26	44.87	475.90	520.76	.47	2729.73	.80
*	21.000	2677.00	1403.00	2323.10	2321.22	8.30	8.35	32.67	484.84	517.51	.00	1403.00	.00
*	21.000	2677.00	2296.00	2324.99	2323.29	10.19	9.03	276.02	393.00	669.02	91.43	2118.72	85.85
*	21.000	2677.00	2731.00	2325.78	2325.41	10.98	8.00	294.00	393.00	687.00	271.37	2101.52	358.11
	22.000	3277.00	1403.00	2324.90	2323.75	7.70	8.29	116.52	404.00	520.52	48.78	1353.97	.25
	22.000	3277.00	2296.00	2326.71	2325.98	9.51	7.01	283.00	404.00	687.00	467.06	1602.15	226.79
	22.000	3277.00	2731.00	2326.87	2326.36	9.67	7.85	283.00	404.00	687.00	573.75	1836.52	320.73
	23.000	3877.00	1403.00	2326.75	2325.10	8.15	6.58	198.38	337.00	612.67	125.98	1276.72	.30
	23.000	3877.00	2296.00	2327.67	2327.50	9.07	6.58	576.00	337.00	913.00	469.67	1542.52	283.80
	23.000	3877.00	2731.00	2328.06	2327.72	9.46	6.21	576.00	337.00	913.00	608.54	1560.14	562.31
	24.000	4177.00	1403.00	2327.28	2325.07	7.48	6.28	49.55	473.98	523.53	.00	1403.00	.00
	24.000	4177.00	2296.00	2327.92	2326.67	8.12	8.25	292.17	246.00	866.00	179.90	2115.62	.48
*	24.000	4177.00	2731.00	2328.47	2328.47	8.67	7.62	619.42	246.00	915.00	490.85	2174.73	65.42
	25.000	4227.00	1030.00	2327.91	2324.14	6.91	3.95	40.00	484.00	524.00	.00	1030.00	.00
	25.000	4227.00	1746.00	2328.66	2325.29	7.66	6.02	40.00	484.00	524.00	.00	1746.00	.00
	25.000	4227.00	1982.00	2328.55	2325.63	7.55	6.93	40.00	484.00	524.00	.00	1982.00	.00
	26.000	4355.00	1030.00	2328.12	.00	4.42	5.86	45.90	477.99	523.89	.00	1030.00	.00
*	26.000	4355.00	1746.00	2330.42	.00	6.72	5.68	327.24	424.00	913.00	64.56	1628.09	53.34
*	26.000	4355.00	1982.00	2331.03	.00	7.33	5.43	487.84	424.00	913.00	117.03	1725.12	139.85
*	27.000	4405.00	1030.00	2329.16	2329.16	3.86	7.78	93.56	446.52	782.62	.00	1016.12	13.88
*	27.000	4405.00	1746.00	2329.98	2329.98	4.68	8.94	143.21	442.31	790.77	.00	1694.83	51.17
*	27.000	4405.00	1982.00	2330.82	2330.31	5.52	7.17	353.93	437.91	899.00	.00	1837.27	144.73
*	28.000	4982.00	1030.00	2331.84	2331.84	2.74	6.36	433.24	453.50	934.45	1.14	748.08	280.78
*	28.000	4982.00	1746.00	2332.28	2332.28	3.18	7.51	685.07	287.58	978.37	12.63	1067.88	665.49
*	28.000	4982.00	1982.00	2332.41	2332.41	3.31	7.73	731.49	259.60	991.09	24.82	1154.32	802.85
*	29.000	5596.00	1030.00	2334.91	2334.91	2.61	5.83	670.17	184.02	854.19	169.22	735.14	125.63
*	29.000	5596.00	1746.00	2335.31	2335.31	3.01	6.91	819.41	169.99	989.40	415.05	1030.12	300.82
*	29.000	5596.00	1982.00	2335.38	2335.38	3.08	7.40	853.84	165.93	1019.77	490.32	1133.82	357.86
*	30.000	6246.00	1083.00	2337.02	2337.02	2.42	6.31	538.49	88.49	808.12	233.51	800.06	49.43
*	30.000	6246.00	1868.00	2337.45	2337.45	2.85	7.40	747.09	36.65	837.03	492.29	1210.97	164.74
*	30.000	6246.00	2173.00	2337.61	2337.61	3.01	7.59	821.67	17.33	839.00	602.23	1349.19	221.58
*	31.000	6916.00	1083.00	2339.71	2339.71	2.41	6.21	566.38	195.66	800.96	189.61	856.79	36.59
*	31.000	6916.00	1868.00	2340.20	2340.20	2.90	7.15	794.28	193.13	987.41	415.55	1269.06	183.39
*	31.000	6916.00	2173.00	2340.33	2340.33	3.03	7.48	868.46	192.40	1060.85	498.26	1414.05	260.69
*	32.000	7607.00	1083.00	2343.04	2343.04	2.74	5.97	810.11	82.47	1106.90	56.22	756.43	270.35
*	32.000	7607.00	1868.00	2343.42	2343.42	3.12	7.16	1028.79	42.34	1268.68	158.92	1057.95	651.14
*	32.000	7607.00	2173.00	2343.52	2343.52	3.22	7.57	1088.22	30.76	1315.39	202.84	1163.15	807.01

	SECNO	CUMDS	Q	CWSEL	CRIWS	DEPTH	VCH	TOPWID	SSTA	ENDST	QLOB	QCH	QROB
*	33.000	8315.00	1083.00	2346.94	2346.94	2.24	5.42	1202.11	38.54	1240.65	82.35	646.36	354.29
*	33.000	8315.00	1868.00	2347.23	2347.23	2.53	6.50	1435.36	-52.40	1382.95	244.96	903.66	719.38
*	33.000	8315.00	2173.00	2347.32	2347.32	2.62	6.82	1509.10	-81.16	1427.94	316.62	990.38	866.00
*	34.000	8887.00	1083.00	2350.50	2350.50	2.90	5.98	810.01	90.94	1012.67	116.01	828.27	138.72
*	34.000	8887.00	1868.00	2350.96	2350.96	3.36	6.56	1360.32	-178.90	1186.42	372.09	1094.43	401.48
*	34.000	8887.00	2173.00	2351.07	2351.07	3.47	6.90	1398.74	-200.00	1200.00	473.23	1193.24	506.52
*	35.000	9477.00	1083.00	2353.34	2353.34	2.74	7.60	161.78	378.94	540.72	14.47	1066.66	1.87
*	35.000	9477.00	1868.00	2354.20	2354.20	3.60	8.40	230.72	330.78	561.50	171.68	1673.36	22.96
*	35.000	9477.00	2173.00	2354.44	2354.44	3.84	8.79	242.31	327.95	570.26	244.07	1892.45	36.49
*	36.000	9811.00	986.00	2355.83	2355.83	2.73	6.11	604.33	422.87	1027.20	35.44	758.75	191.82
*	36.000	9811.00	1680.00	2356.30	2356.30	3.20	6.82	780.86	400.49	1181.36	73.27	1037.00	569.73
*	36.000	9811.00	1879.00	2356.35	2356.35	3.25	7.31	790.33	398.07	1188.40	83.16	1133.83	662.01
*	37.000	10252.00	986.00	2358.83	2358.83	2.33	7.14	228.25	153.35	531.00	160.64	825.36	.00
*	37.000	10252.00	1680.00	2359.52	2359.52	3.02	7.91	481.62	55.88	537.49	432.73	1246.82	.44
*	37.000	10252.00	1879.00	2359.68	2359.68	3.18	8.08	506.51	34.11	540.61	529.37	1348.40	1.23
*	38.000	10902.00	986.00	2362.12	2362.12	2.32	6.53	387.12	400.19	787.31	43.47	746.65	195.87
*	38.000	10902.00	1680.00	2362.57	2362.57	2.77	7.80	419.77	379.00	798.77	112.97	1098.26	468.77
*	38.000	10902.00	1879.00	2362.67	2362.67	2.87	8.14	421.34	379.00	800.34	135.60	1194.34	549.05
*	39.000	11552.00	986.00	2365.47	2365.47	2.57	6.51	352.22	389.16	741.38	4.30	868.59	113.11
*	39.000	11552.00	1680.00	2366.03	2366.03	3.13	7.43	435.46	334.14	769.60	74.38	1263.84	341.78
*	39.000	11552.00	1879.00	2366.15	2366.15	3.25	7.72	443.18	332.28	775.46	100.18	1370.93	407.89
*	40.000	11955.00	986.00	2367.51	2367.51	2.41	7.14	182.92	960.29	1143.21	.15	919.03	66.82
*	40.000	11955.00	1680.00	2368.45	2368.45	3.35	7.00	806.36	316.36	1190.15	87.80	1316.28	275.92
*	40.000	11955.00	1879.00	2368.61	2368.61	3.51	7.01	911.55	285.16	1196.71	166.78	1389.30	322.92

FEMA(5) Working project

SUMMARY PRINTOUT TABLE 101

	SECNO	EGOC	ELLC	EGIC	ELTRD	QCULV	QWEIR	CLASS	H4	DEPTH	CWSEL	VCH	EG
*	17.000	2315.67	2312.00	2318.60	2316.00	1193.43	203.53	16.00	2.91	8.93	2315.83	6.62	2316.51
	17.000	2324.05	2312.00	2331.32	2316.00	1294.25	1003.02	16.00	1.20	8.61	2315.51	11.24	2317.47
*	17.000	2329.88	2312.00	2339.74	2316.00	1330.03	1393.63	16.00	.34	7.53	2314.43	15.32	2318.07
	26.000	2328.65	2328.40	2328.12	2330.40	1030.00	.00	7.00	.50	4.42	2328.12	5.86	2328.65
*	26.000	2330.78	2328.40	2331.05	2330.40	1706.37	48.05	16.00	1.67	6.72	2330.42	5.68	2330.89
*	26.000	2331.28	2328.40	2332.10	2330.40	1835.71	147.34	16.00	2.14	7.33	2331.03	5.43	2331.43

SUMMARY OF ERRORS AND SPECIAL NOTES

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WARNING SECNO=     16.000  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

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CAUTION SECNO=     17.000  PROFILE=  3  WSEL ASSUMED BASED ON MIN DIFF
CAUTION SECNO=     17.000  PROFILE=  3  20 TRIALS ATTEMPTED TO BALANCE WSEL

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WARNING SECNO=     18.000  PROFILE=  3  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

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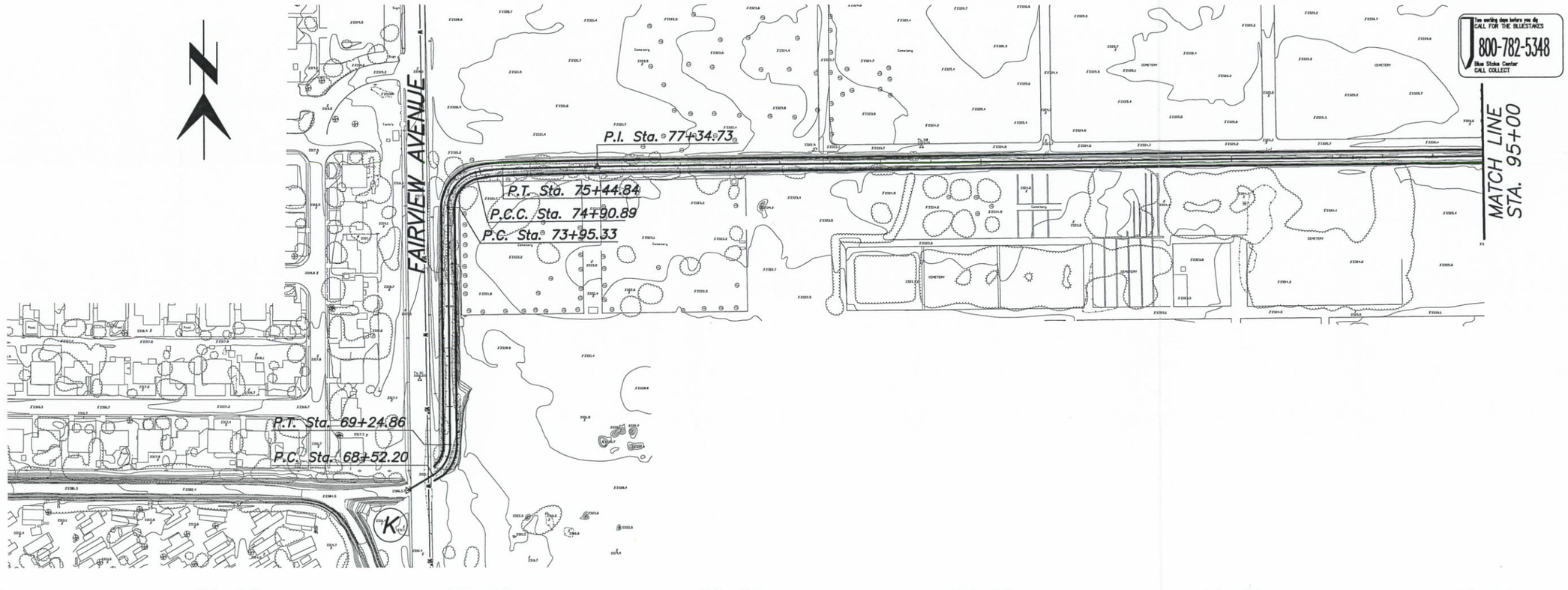

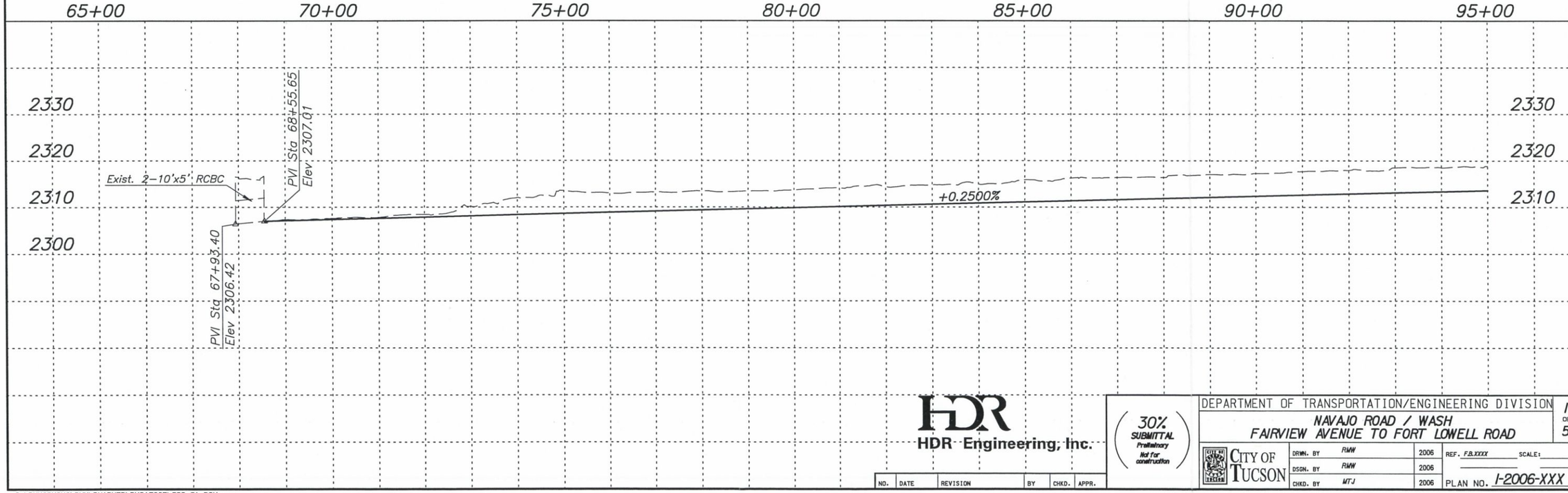

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Preliminary
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NO.	DATE	REVISION	BY	CHKD.	APPR.

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NAVAJO ROAD / WASH
FAIRVIEW AVENUE TO FORT LOWELL ROAD

1 OF 5

CITY OF TUCSON

DRWN. BY	RWW	2006
DSGN. BY	RWW	2006
CHKD. BY	WTJ	2006

REF. F.B.XXXX SCALE:

PLAN NO. I-2006-XXX

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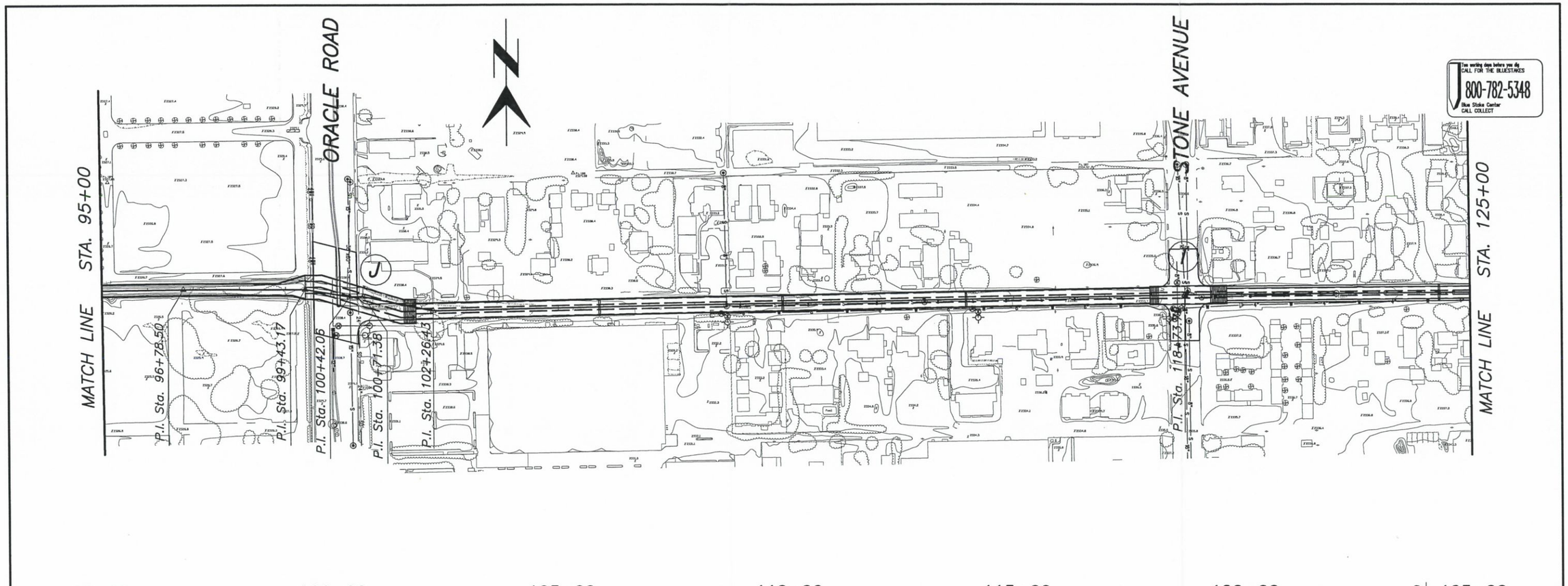

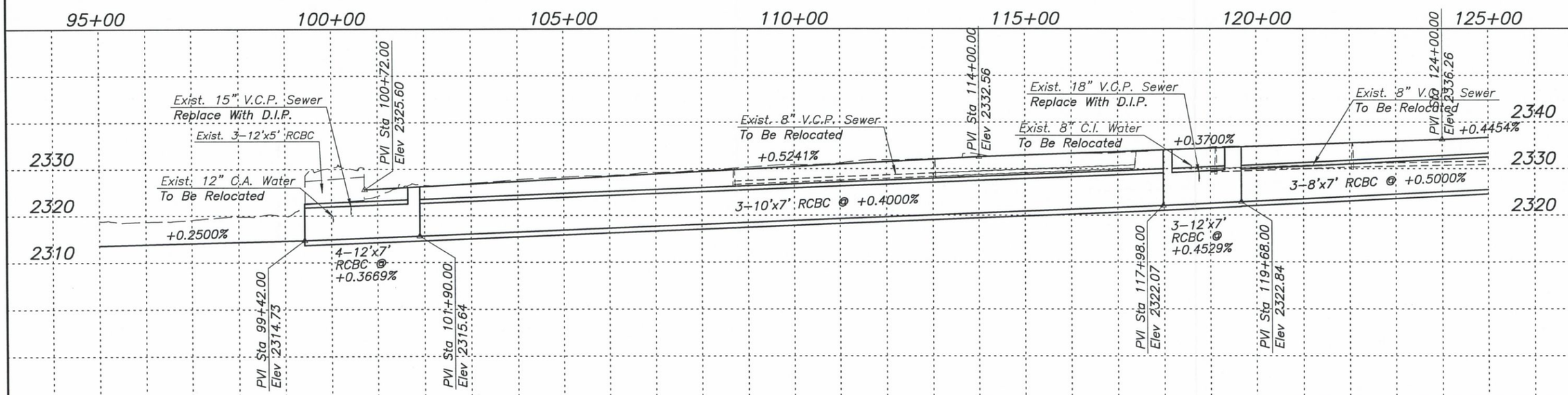

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DSGN. BY	RMW	2006	
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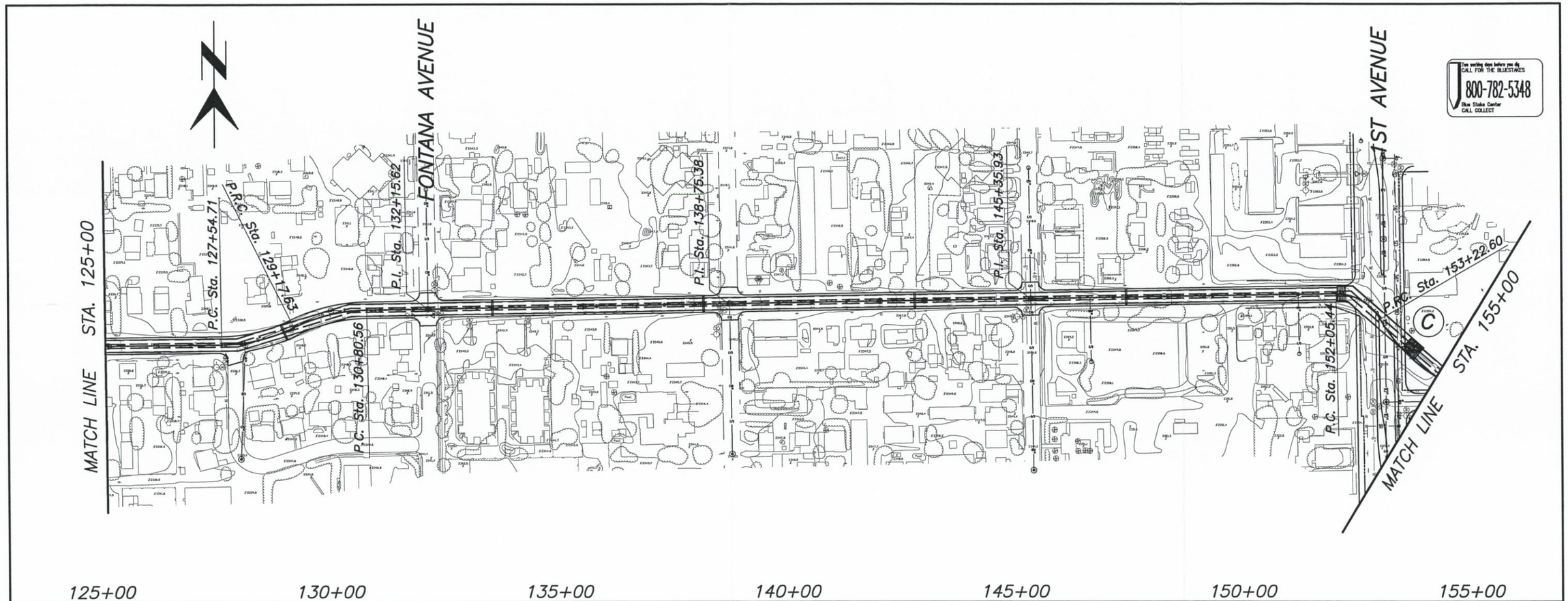

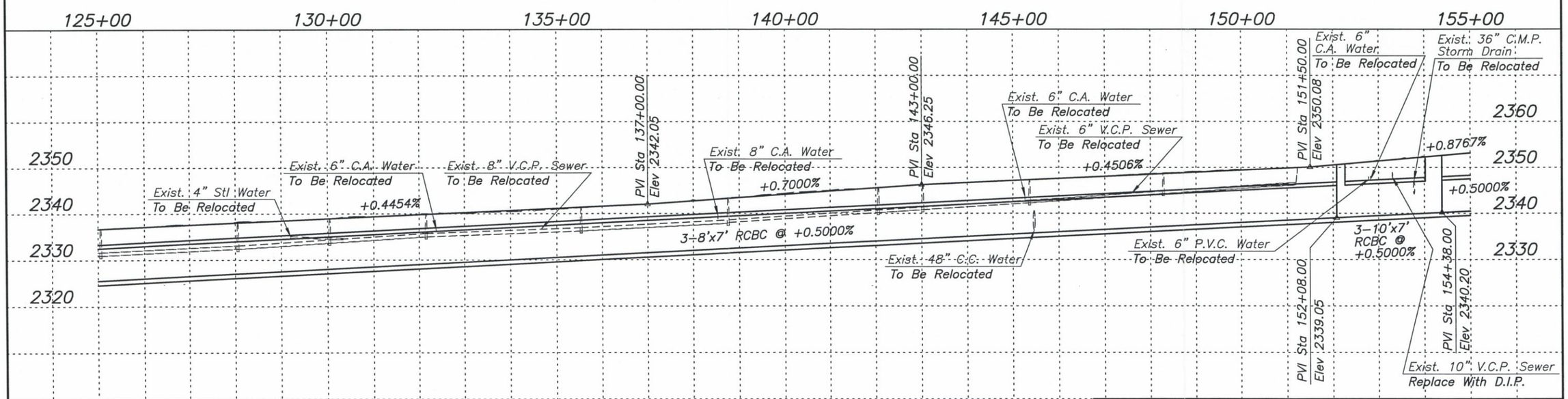

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3 OF 5

CITY OF TUCSON

DRWN. BY	RWW	2006	REF. F.B.XXXX SCALE:
DSGN. BY	RWW	2006	
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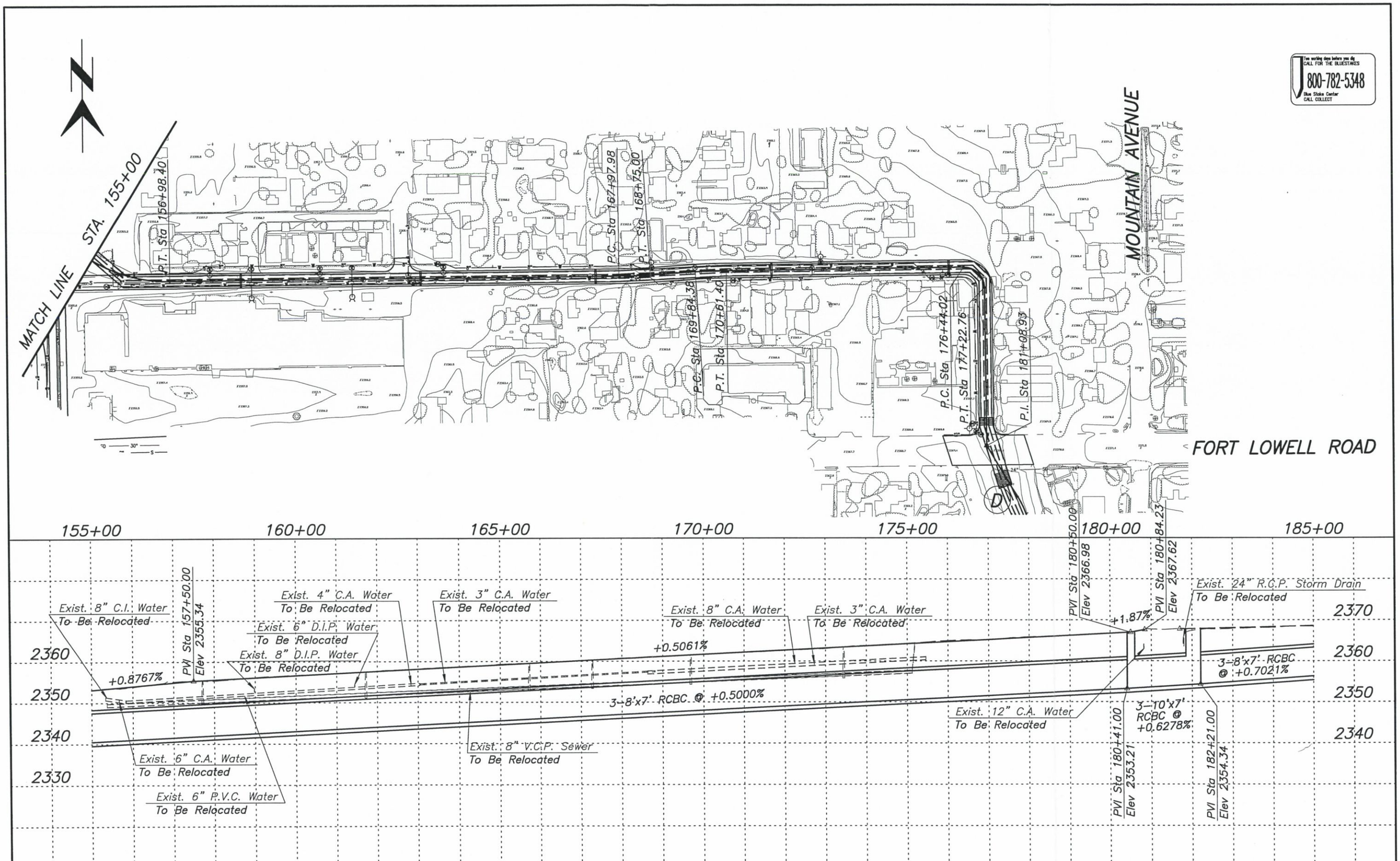

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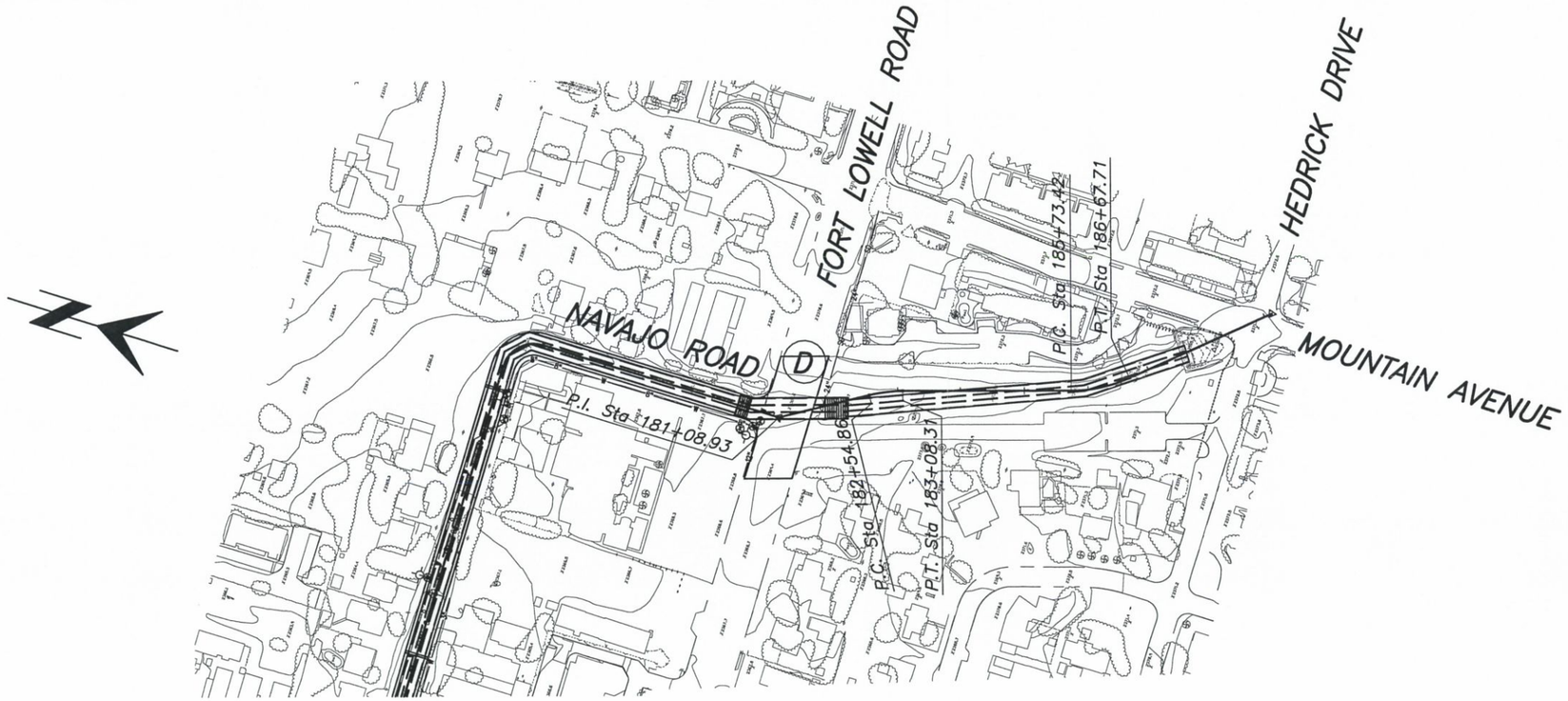

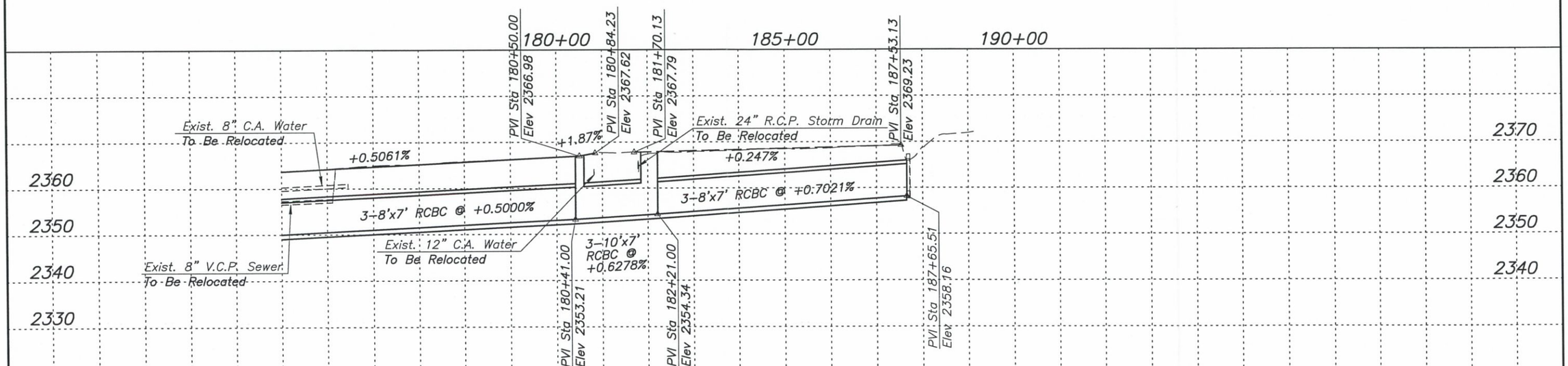

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CHKD. BY	MTJ	2006	PLAN NO. I-2006-XXX

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