

DOCKETED	
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Description:	N/A
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Submitter Role:	Applicant Consultant
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HCM 6th AWSC
2: Hwy 111 & Main St

2022 Existing Conditions

Intersection												
Intersection Delay, s/veh	17.9											
Intersection LOS	C											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔			↔↔			↔↔			↔↔	
Traffic Vol, veh/h	31	82	40	49	127	34	69	143	214	21	95	41
Future Vol, veh/h	31	82	40	49	127	34	69	143	214	21	95	41
Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	31	126	62	75	195	52	106	220	329	32	146	63
Number of Lanes	0	2	0	0	2	0	0	2	0	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	12.8	14.2	23.3	12.6
HCM LOS	B	B	C	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	49%	0%	43%	0%	44%	0%	31%	0%
Vol Thru, %	51%	25%	57%	51%	56%	65%	69%	54%
Vol Right, %	0%	75%	0%	49%	0%	35%	0%	46%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	141	286	72	81	113	98	69	89
LT Vol	69	0	31	0	49	0	21	0
Through Vol	72	72	41	41	64	64	48	48
RT Vol	0	214	0	40	0	34	0	41
Lane Flow Rate	216	439	94	125	173	150	105	136
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.427	0.772	0.21	0.258	0.374	0.304	0.225	0.272
Departure Headway (Hd)	7.114	6.328	8.018	7.44	7.78	7.306	7.689	7.198
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	506	571	448	482	462	492	467	498
Service Time	4.855	4.069	5.767	5.189	5.527	5.053	5.441	4.95
HCM Lane V/C Ratio	0.427	0.769	0.21	0.259	0.374	0.305	0.225	0.273
HCM Control Delay	15.1	27.4	12.9	12.8	15.1	13.2	12.7	12.6
HCM Lane LOS	C	D	B	B	C	B	B	B
HCM 95th-tile Q	2.1	7.1	0.8	1	1.7	1.3	0.9	1.1

HCM 6th TWSC
1: Hwy 111 & Sinclair Rd

2022 Existing Conditions

Intersection												
Int Delay, s/veh	1.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Vol, veh/h	10	4	4	2	2	12	2	99	2	3	126	11
Future Vol, veh/h	10	4	4	2	2	12	2	99	2	3	126	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	250	-	-	290	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	12	5	5	2	2	14	2	119	2	4	152	13

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	299	292	159	296	297	120	165	0	0	121	0	0
Stage 1	167	167	-	124	124	-	-	-	-	-	-	-
Stage 2	132	125	-	172	173	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	657	622	892	660	618	937	1426	-	-	1479	-	-
Stage 1	840	764	-	885	797	-	-	-	-	-	-	-
Stage 2	876	796	-	835	760	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	643	620	892	651	616	937	1426	-	-	1479	-	-
Mov Cap-2 Maneuver	643	620	-	651	616	-	-	-	-	-	-	-
Stage 1	839	762	-	884	796	-	-	-	-	-	-	-
Stage 2	859	795	-	823	758	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	10.5		9.4		0.1		0.2	
HCM LOS	B		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1426	-	-	680 837	1479	-	-
HCM Lane V/C Ratio	0.002	-	-	0.032 0.023	0.002	-	-
HCM Control Delay (s)	7.5	-	-	10.5 9.4	7.4	-	-
HCM Lane LOS	A	-	-	B A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1 0.1	0	-	-

HCM 6th AWSC
2: Hwy 111 & Main St

2022 Existing Conditions

Intersection	
Intersection Delay, s/veh	12.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇄			⇄			⇄			⇄	
Traffic Vol, veh/h	50	101	60	156	113	25	63	86	56	35	139	63
Future Vol, veh/h	50	101	60	156	113	25	63	86	56	35	139	63
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	61	123	73	190	138	30	77	105	68	43	170	77
Number of Lanes	0	2	0	0	2	0	0	2	0	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	11.7	15	11.9	12.1
HCM LOS	B	B	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	59%	0%	50%	0%	73%	0%	33%	0%
Vol Thru, %	41%	43%	50%	46%	27%	69%	67%	52%
Vol Right, %	0%	57%	0%	54%	0%	31%	0%	48%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	106	99	101	111	213	82	105	133
LT Vol	63	0	50	0	156	0	35	0
Through Vol	43	43	51	51	57	57	70	70
RT Vol	0	56	0	60	0	25	0	63
Lane Flow Rate	129	121	123	135	259	99	127	162
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.263	0.222	0.24	0.244	0.502	0.176	0.252	0.296
Departure Headway (Hd)	7.316	6.608	7.187	6.519	7.095	6.502	7.115	6.604
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	494	546	503	553	511	556	507	546
Service Time	5.025	4.316	4.887	4.245	4.795	4.202	4.824	4.313
HCM Lane V/C Ratio	0.261	0.222	0.245	0.244	0.507	0.178	0.25	0.297
HCM Control Delay	12.6	11.2	12.1	11.3	16.7	10.6	12.2	12.1
HCM Lane LOS	B	B	B	B	C	B	B	B
HCM 95th-tile Q	1	0.8	0.9	1	2.8	0.6	1	1.2

MBGP Attachment DRR 89 Construction LOS Calculations



HCM 6th TWSC
1: Hwy 111 & Sinclair Rd

Existing + Project Construction

Intersection												
Int Delay, s/veh	2.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↵	↵		↵	↵	
Traffic Vol, veh/h	17	5	6	2	5	3	46	107	8	15	99	60
Future Vol, veh/h	17	5	6	2	5	3	46	107	8	15	99	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	250	-	-	290	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	19	5	7	2	5	3	51	118	9	16	109	66
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	403	403	142	405	432	123	175	0	0	127	0	0
Stage 1	174	174	-	225	225	-	-	-	-	-	-	-
Stage 2	229	229	-	180	207	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	562	539	911	560	519	933	1414	-	-	1472	-	-
Stage 1	833	759	-	782	721	-	-	-	-	-	-	-
Stage 2	778	718	-	826	734	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	536	514	911	532	495	933	1414	-	-	1472	-	-
Mov Cap-2 Maneuver	536	514	-	532	495	-	-	-	-	-	-	-
Stage 1	803	751	-	754	695	-	-	-	-	-	-	-
Stage 2	741	692	-	805	726	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	11.5		11.3		2.2		0.6					
HCM LOS	B		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1414	-	-	583	586	1472	-	-				
HCM Lane V/C Ratio	0.036	-	-	0.053	0.019	0.011	-	-				
HCM Control Delay (s)	7.6	-	-	11.5	11.3	7.5	-	-				
HCM Lane LOS	A	-	-	B	B	A	-	-				
HCM 95th %tile Q(veh)	0.1	-	-	0.2	0.1	0	-	-				

HCM 6th AWSC

2: Hwy 111 & Main St

Existing + Project Construction

Intersection	
Intersection Delay, s/veh	21.7
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		←↑↑			←↑↑			←↑↑			←↑↑	
Traffic Vol, veh/h	31	82	40	49	142	34	81	180	214	21	98	41
Future Vol, veh/h	31	82	40	49	142	34	81	180	214	21	98	41
Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	48	126	62	75	218	52	125	277	329	32	151	63
Number of Lanes	0	2	0	0	2	0	0	2	0	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	13.6	15.4	30.1	13.4
HCM LOS	B	C	D	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	47%	0%	43%	0%	41%	0%	30%	0%
Vol Thru, %	53%	30%	57%	51%	59%	68%	70%	54%
Vol Right, %	0%	70%	0%	49%	0%	32%	0%	46%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	171	304	72	81	120	105	70	90
LT Vol	81	0	31	0	49	0	21	0
Through Vol	90	90	41	41	71	71	49	49
RT Vol	0	214	0	40	0	34	0	41
Lane Flow Rate	263	468	111	125	185	162	108	138
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.535	0.855	0.256	0.268	0.413	0.341	0.24	0.29
Departure Headway (Hd)	7.324	6.578	8.318	7.739	8.047	7.604	8.03	7.547
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	492	552	431	464	447	473	447	475
Service Time	5.073	4.326	6.077	5.498	5.801	5.358	5.793	5.309
HCM Lane V/C Ratio	0.535	0.848	0.258	0.269	0.414	0.342	0.242	0.291
HCM Control Delay	18.2	36.8	13.9	13.3	16.4	14.3	13.3	13.4
HCM Lane LOS	C	E	B	B	C	B	B	B
HCM 95th-tile Q	3.1	9.2	1	1.1	2	1.5	0.9	1.2

HCM 6th TWSC
1: Hwy 111 & Sinclair Rd

Existing + Project Construction

Intersection												
Int Delay, s/veh	3.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↵	↵		↵	↵	
Traffic Vol, veh/h	51	4	55	2	2	12	2	99	2	3	126	11
Future Vol, veh/h	51	4	55	2	2	12	2	99	2	3	126	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	250	-	-	290	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	61	5	66	2	2	14	2	119	2	4	152	13
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	299	292	159	326	297	120	165	0	0	121	0	0
Stage 1	167	167	-	124	124	-	-	-	-	-	-	-
Stage 2	132	125	-	202	173	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	657	622	892	631	618	937	1426	-	-	1479	-	-
Stage 1	840	764	-	885	797	-	-	-	-	-	-	-
Stage 2	876	796	-	805	760	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	643	620	892	579	616	937	1426	-	-	1479	-	-
Mov Cap-2 Maneuver	643	620	-	579	616	-	-	-	-	-	-	-
Stage 1	839	762	-	884	796	-	-	-	-	-	-	-
Stage 2	859	795	-	738	758	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	10.9		9.5			0.1			0.2			
HCM LOS	B		A									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1426	-	-	746	820	1479	-	-				
HCM Lane V/C Ratio	0.002	-	-	0.178	0.024	0.002	-	-				
HCM Control Delay (s)	7.5	-	-	10.9	9.5	7.4	-	-				
HCM Lane LOS	A	-	-	B	A	A	-	-				
HCM 95th %tile Q(veh)	0	-	-	0.6	0.1	0	-	-				

HCM 6th AWSC
2: Hwy 111 & Main St

Existing + Project Construction

Intersection	
Intersection Delay, s/veh	13.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇄			⇄			⇄			⇄	
Traffic Vol, veh/h	50	116	73	156	113	25	63	86	56	35	190	63
Future Vol, veh/h	50	116	73	156	113	25	63	86	56	35	190	63
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	61	141	89	190	138	30	77	105	68	43	232	77
Number of Lanes	0	2	0	0	2	0	0	2	0	0	2	0
Approach	EB		WB		NB		SB					
Opposing Approach	WB		EB		SB		NB					
Opposing Lanes	2		2		2		2					
Conflicting Approach Left	SB		NB		EB		WB					
Conflicting Lanes Left	2		2		2		2					
Conflicting Approach Right	NB		SB		WB		EB					
Conflicting Lanes Right	2		2		2		2					
HCM Control Delay	12.6		16.3		12.5		13.5					
HCM LOS	B		C		B		B					

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	59%	0%	46%	0%	73%	0%	27%	0%
Vol Thru, %	41%	43%	54%	44%	27%	69%	73%	60%
Vol Right, %	0%	57%	0%	56%	0%	31%	0%	40%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	106	99	108	131	213	82	130	158
LT Vol	63	0	50	0	156	0	35	0
Through Vol	43	43	58	58	57	57	95	95
RT Vol	0	56	0	73	0	25	0	63
Lane Flow Rate	129	121	132	160	259	99	159	193
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.274	0.232	0.271	0.301	0.532	0.188	0.32	0.366
Departure Headway (Hd)	7.623	6.912	7.417	6.781	7.386	6.792	7.263	6.84
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	472	519	485	530	490	529	495	526
Service Time	5.369	4.658	5.162	4.525	5.127	4.532	5.007	4.583
HCM Lane V/C Ratio	0.273	0.233	0.272	0.302	0.529	0.187	0.321	0.367
HCM Control Delay	13.2	11.7	12.9	12.4	18.3	11.1	13.4	13.5
HCM Lane LOS	B	B	B	B	C	B	B	B
HCM 95th-tile Q	1.1	0.9	1.1	1.3	3.1	0.7	1.4	1.7

MBGP Attachment DRR 107 LOMR Application



Massoud Rezakhani

From: Ibrahim osman <iosmanmrc@outlook.com>
Sent: Friday, May 19, 2023 3:07 AM
To: Massoud Rezakhani
Subject: Fw: Revision Project is Created with Case Number = 23-09-0889P

From: no-reply@fema.dhs.gov <no-reply@fema.dhs.gov>
Sent: Thursday, May 18, 2023 4:02 PM
To: iosmanmrc@outlook.com <iosmanmrc@outlook.com>
Subject: Revision Project is Created with Case Number = 23-09-0889P

We have received your request that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) issue a revision to the flood hazard information on the applicable National Flood Insurance Program (NFIP) map for: IMPERIAL COUNTY *, Imperial County, CA; and IMPERIAL COUNTY *, Imperial County, CA.

The Case Number assigned to your request is 23-09-0889P, and the Project ID is Alamo River.
Your Online LOMC Application ID was R4651623459011.

We are reviewing your submitted data and will contact you if additional information is required to process your request.

If additional information is not required, we will issue a final determination letter within 90 days.

You may obtain project status information from MIP via the Online LOMC homepage. To return to your application, click on the following link or copy and paste the link into the address bar of your browser:

<https://hazards.fema.gov/femaportal/onlinelomc>

Inquiries concerning the status of your request should be made by calling the FEMA Map Information eXchange (FMIX) toll free at (877) 336-2627 (877-FEMA-MAP).

Please be assured we will do our best to respond to all inquiries in a timely manner.

This message has been generated automatically. Please do not reply to this message.

LOMC Application

Application ID: R4651623459011

Revision

All (*) indicate a required field.

Project Submission Details



Case Number 23-09-0889P successfully created.

You will receive a confirmation e-mail shortly regarding your case creation. Please be sure to login to Online LOMC with your registered e-mail address and check periodically for status updates on this case.

OK

Certain documents require a plug-in. To download plug-in for Adobe Acrobat Reader [click here](#) and/or Microsoft Word [click here](#).

[DHS](#) [FEMA.gov](#) [Privacy Policy](#) [Accessibility](#) [Site Help](#) [Contact Us](#)

TECHNICAL STUDY DATA NOTEBOOK IN SUPPORT OF A

LETTER OF MAP REVISION



ALAMO RIVER, IMPERIAL COUNTY



PREPARED FOR

Mr. Jerry Salamy
2485 Natomas Park Drive, Suite 600
Sacramento, CA 95833

PREPARED BY

MRC, LLC
29830 N. 78th Way
Scottsdale, Arizona 85266

TECHNICAL SUPPORT DATA NOTEBOOK

In Support of a Letter of Map Revision

for

The Property Located Along Alamo River, Imperial County, CA

Prepared for:

Mr. Jerry Salamy, Project Manager

Jacobs

2485 Natomas Park Drive, Suite 600

Sacramento, CA 95833

Submitted by MRC, LLC

Dated: March 25, 2023



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Exhibit 2 – Topographic Map

Exhibit 3 – Work Map

Exhibit 4 – Annotated FIRM Panel

Exhibit 5 – Hydraulic Models and Electronic Files

EXECUTIVE SUMMARY

This report summarizes the results of the MRC, LLC (“MRC”) updated detailed floodplain study along the Alamo River within Imperial County, California. This study focuses on the proposed sites located immediately adjacent east to the Salton Sea, on the southwest corner of the intersection of McKendry Road and Boyle Road. These sites are located in flood zone A, as shown on the Digital Flood Insurance Rate Map (DFIRM) Panel No. 06025C0700C and 06025C0725C for Imperial County, CA, and Incorporated Areas, dated September 26, 2008.

The floodplain boundary for the sites, which is subject to flood hazards along the Alamo River, is currently designated as Zone A (according to FEMA, Zone A is “subject to inundation by the 1-percent-annual-chance flood event”) and is depicted on the aforementioned DFIRM panel.

Results of MRC’s analyses are hereby released to Jacobs for their use in evaluating potential hazards associated with the project site and for further detailed evaluation of the project area in the future.

STATEMENT OF LIMITATIONS

This report has been prepared to investigate the potential flood hazard associated along the southwest corner of the intersection of McKendry Road and Boyle Road project site. MRC performed an investigation of the project area to further the understanding of the Zone A floodplain boundaries shown on the effective Flood Insurance Rate Map (FIRM) panel. The scope of services performed during this investigation may not adequately address the needs of other users, and any re-use of this report or the findings, conclusions, or recommendations presented herein are at the sole risk of the user.

Our investigation included aerial map inspection of the project area and an evaluation of the contributing watershed based upon the updated topographic map from Jacobs.

MRC has no direct knowledge of and offers no warranty for information provided by others. Comments outlined in the report are derived from the engineering experience and judgment of MRC staff, in accordance with current standards of professional practice. The investigation outlined in this report may be invalidated, wholly or in part, by changes beyond our control.

We have made every effort to perform our investigation based on conventional professional civil engineering standards of care and the stipulations provided in our contract. If new data becomes available, or there are perceived omissions or misstatements in this report regarding any aspect of our work, we ask that they be brought to our attention as soon as possible so that we have the opportunity to fully address them.

SECTION 1.0 INTRODUCTION

1.1 Purpose of Study

Jacobs has retained MRC to investigate and revise the flood hazard information for the project area located on the southwest corner of the intersection of McKendry Road and Boyle Road in Imperial County, CA. The vicinity map and project location are provided as **Figure 1** below.

This report summarizes the results of MRC's scope of work to revise the flood hazard information for the project area located at the southwest corner of the intersection of McKendry Road and Boyle Road in Imperial County, CA. The results of MRC's analyses are hereby released to Jacobs for its use in evaluating potential hazards associated with the project site and for further detailed evaluation of the project area in the future.

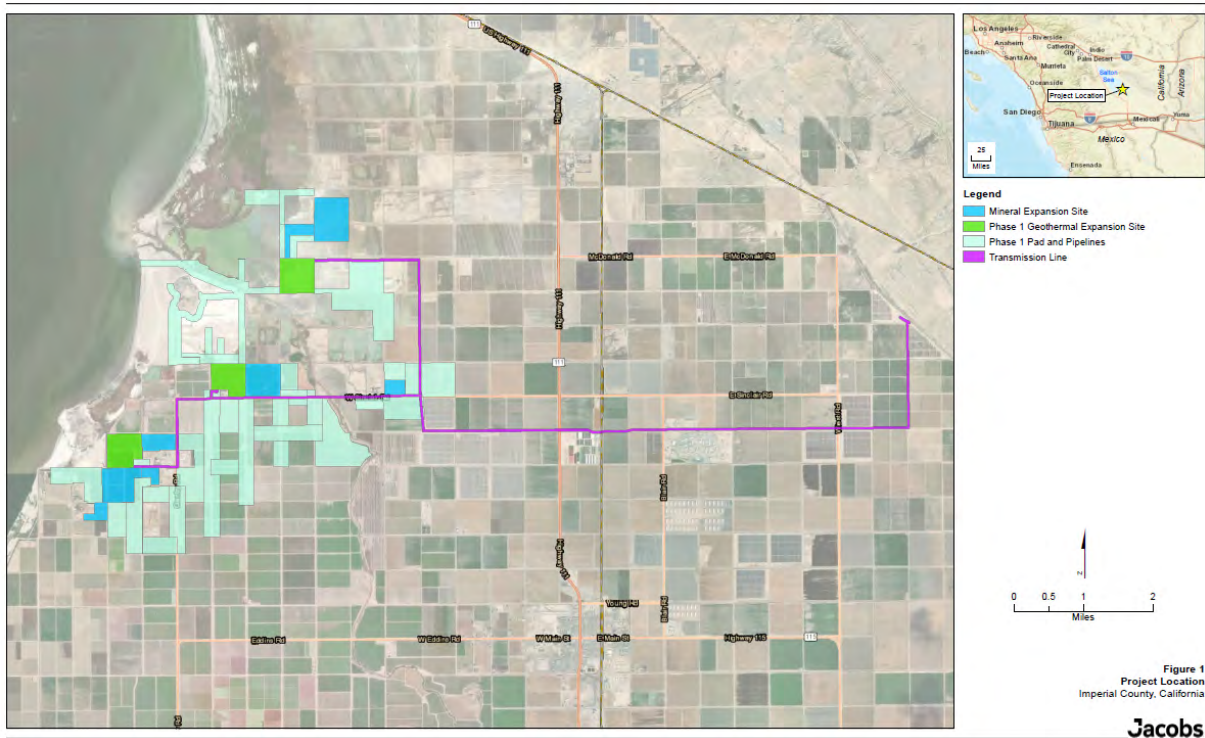


Figure 1 (Vicinity Map)

1.2 Authority and Acknowledgement

MRC was contracted by Jacobs to evaluate and (if appropriate) revise the flood hazard risk in support of a Letter of Map Revision (LOMR).

1.3 Review of Existing Studies

MRC made a request for obtaining back up data from the Federal Emergency Management Agency (FEMA) Engineering Library. No backup engineering data was available.

SECTION 2.0 SURVEY AND MAPPING INFORMATION

2.1 Topographic Map

Updated topographic data and aerial maps prepared by Jacobs were used in our hydraulic modeling. A copy of the topographic map is attached under Exhibit 2. A terrain DEM raster and TIN data set was also developed from the topographic data for use in our hydraulic modeling of floodplain mapping.

2.2 As-Built Conditions

There are no as-built conditions for this LOMR.

SECTION 3.0 HYDRAULICS

The Alamo River has been modeled (HEC-RAS 5.07 1D) to study the hydraulic behavior of the river in existing conditions. The river is intended to be studied against base flow of one percent annual chance of flood discharge of 4500 cfs. The hydraulic analysis of the existing condition is based on updated topographic information. This hydraulic model along with other associated geometric data was used to establish the 100-year water surface elevations along a reach of the Alamo River.

The hydraulic analysis results reveals that the floodplain boundaries are reduced, and the associated 100-year water surface elevations are lower when compared to the effective flood risk information depicted on FIRM panels.

The main channel and overbanks were modeled together for final mapping and combined into a single model at the final stage. (Input/output of models are attached)

Channel and Flow Path Representation

Alamo River stream centerline and flow paths on the left and right overbanks were digitized in ArcGIS and imported into the HEC-RAS model. Overbank flow paths were delineated based on topographic data, aerial imagery and results from preliminary runs.

Cross Sections

Cross sections for the Alamo River main channel were limited to the channel banks. Geometry for the channel portion was obtained from a triangulated irregular network (TIN). Cross sections on the overbanks were oriented based on preliminary modeling results by determining the flow direction and deepest parts of the overbanks.

In addition, 2-foot contours were used along with aerial imagery to appropriately define the effective portion of the cross sections. The overbank cross sections were connected to the main channel cross sections at locations where the main channel overtopped.

Roughness Coefficients

Landcover information from Imperial County has been used and augmented at several locations in the channel to match the existing conditions information from the imagery data. Channel has a roughness value of 0.036 and an overbank roughness value of 0.045.

Starting Condition (Boundary Condition)

The upstream flow boundary feeds the inflow to the hydraulic model. No flow change locations have been modeled other than use of lateral structure to carry the flow out of the 1-D system. Downstream boundary conditions are based on slope area method as the downstream revision is at the confluence with Alamo River. Normal slope has been used to control the left and right areas.

Flow Regime

A supercritical flow regime was used in the hydraulic model to evaluate changes in the water surface elevation that could result as the slope in the channel profile changes.

Floodplain Delineation

Floodplains for the main channel and left and right overbank areas were delineated using RAS-Mapper and a 2-foot ground surface DEM. The generated draft floodplain boundaries from RAS-Mapper are exported to ArcMAP to develop the final floodplain mapping. No floodway analysis was conducted as part of the study. No encroachment will be allowed within the constructed channel. Furthermore, the channel is either dedicated right away or drainage easement. Currently, no floodway is designated for the Alamo River on the effective FIRM Panels.

SECTION 4.0 DISCUSSIONS AND CONCLUSION

The HEC-RAS model analysis results show that by using the updated topography along a reach of the Alamo River results in changes to the FEMA DFIRM Panel No. 06025C0700C and 06025C0725C. A LOMR application has been prepared and submitted to revise the floodplain boundaries and flood elevations for the above-mentioned reach of Alamo River. Also, the revised analysis results show that the revised floodplain will not negatively impact the adjacent properties.

SECTION 5.0: REFERENCES

1. Federal Emergency Management Agency (FEMA), *Flood Insurance Rate Map, Panel Nos. 06025C0700C and 06025C0725C* for Imperial County, CA, and Incorporated Areas, dated September 26, 2008.

APPENDICES

APPENDIX A

(Mapping Support Information)



LiDAR Validation Report

Document no: 01

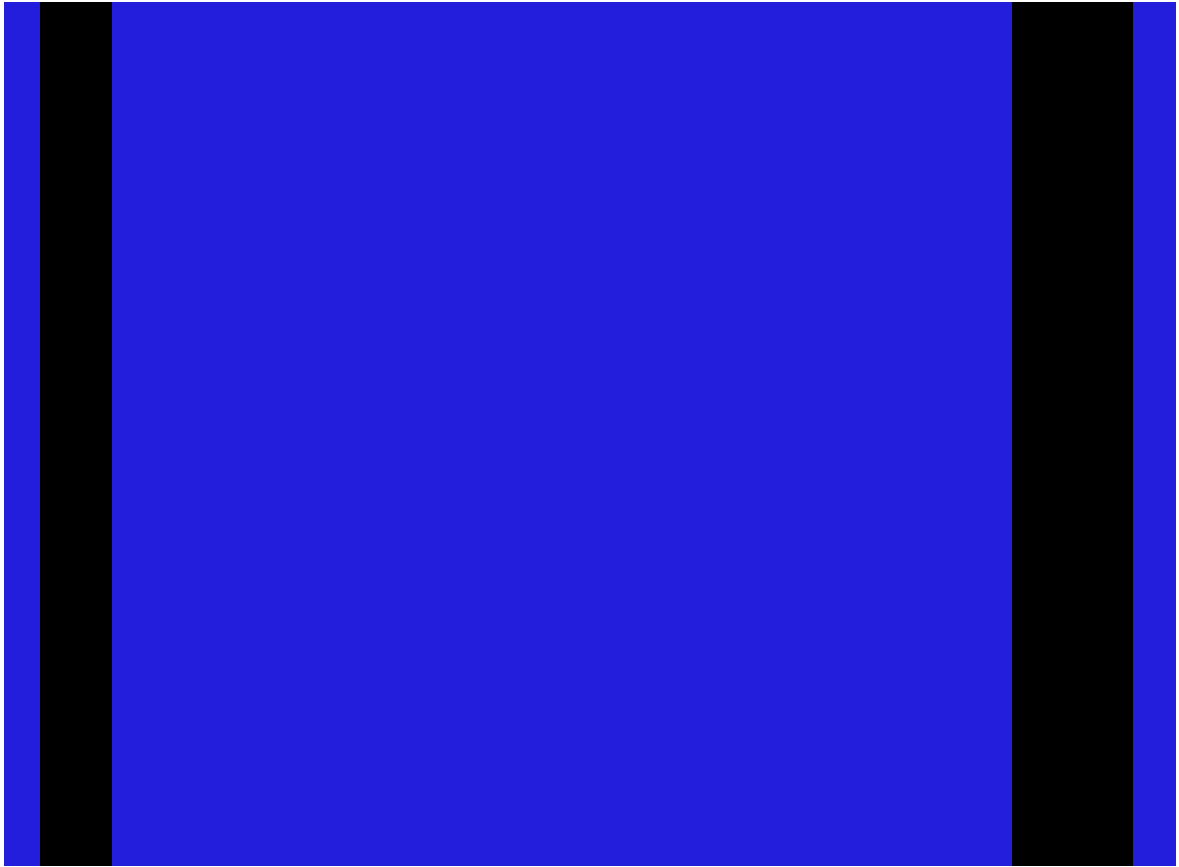
Version: 02

BHE Renewables, LLC

Black Rock, Elmore North, and Morton Bay Geothermal Projects

Letter of Map Revision/Conditional Letter of Map Revision

April 27, 2023





LiDAR Validation Report

Client name: BHE Renewables, LLC

Project name: Letter of Map Revision/Conditional Letter of Map Revision

Client reference: Black Rock, Elmore North, and Morton Bay Geothermal Projects Project no: [Project number]

Document no: 01 Project manager: [Project manager]

Version: 02 Prepared by: Kristopher Andersen

Date: April 27, 2023 File name: BHER_Lidar_Validation_Report_Final.docx

Document status: [Document suitability – Delete row if not applicable]

Document history and status

Version	Date	Description	Author	Checked	Reviewed	Approved
01	4/19/2023	Final	Andersen	Vossman	Engesath	
02	4/27/2023	Edits	Andersen	Vossman		

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Version	Issue approved	Date issued	Issued to	Comments

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1.2	LiDAR Acquisition Summary	2
1.3	LiDAR Field Survey	8
1.4	LiDAR Data Processing.....	17
1.5	Conclusion	20

1. Introduction

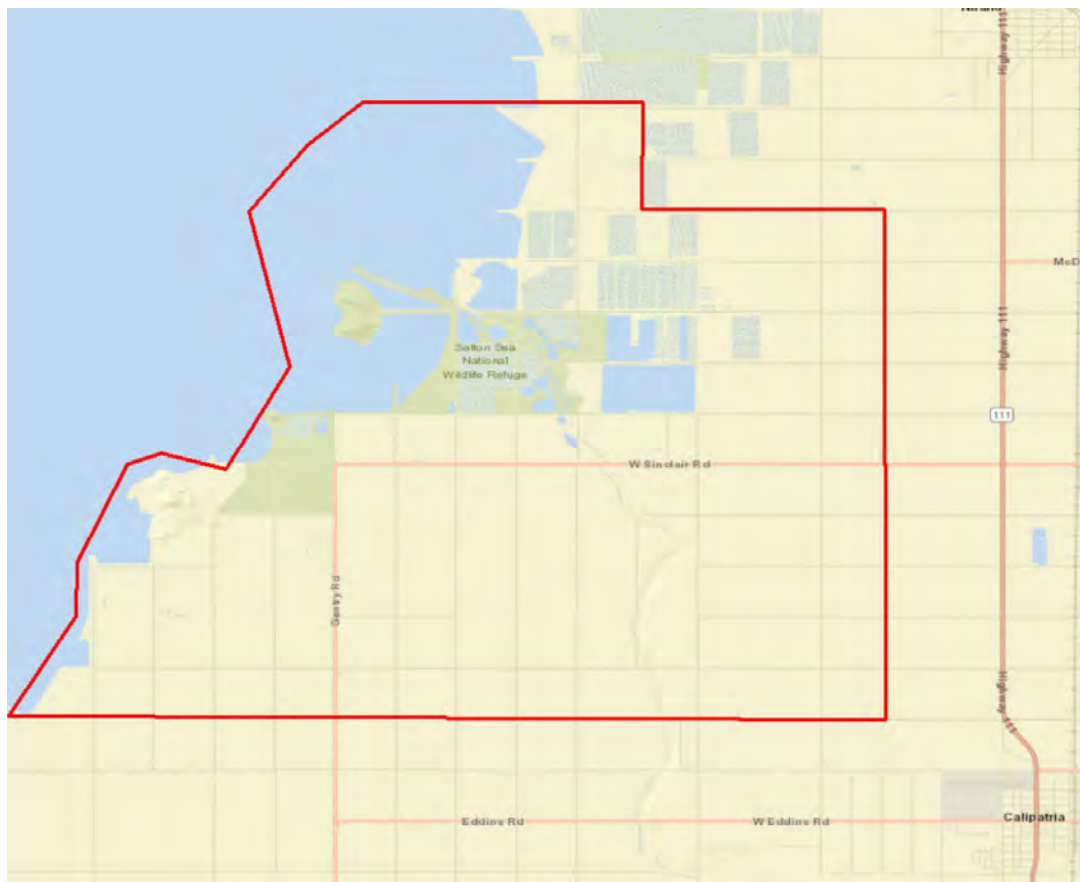
In late spring and early summer of 2022, a LiDAR survey was performed on 21,418 acres. This summary report provides the process used to generate detailed terrain models derived from 10 points per square meter Airborne LiDAR as well as the numerous QC steps within the workflow.

The vertical accuracy was verified following the guidelines in the 2014 ASPRS positional accuracy standards at the 95% confidence interval.

Horizontal Accuracy was calculated following the 2014 ASPRS positional accuracy standards, section 7.5. Derived from estimated GNSS errors, IMU errors, and flying altitude. Visual inspection was also performed. Checking for point cloud misalignment and horizontal location based on ground control points that were visible in the Lidar intensity. Horizontal accuracy is stated as laid out in USGS Lidar Base Specification 2022 rev.

The LiDAR was captured from a sensor in the belly hole of a fixed wing aircraft. This sensor is sending and receiving constant GPS data from a base station rover located at a nearby airfield, which ensures the sensor is constantly adjusting and correcting the millions of positional data points being collected.

The project area shown below is located along the southeast shore of the Salton Sea just to the northwest of Calipatria, California. The ground conditions are mostly low vegetation and hard packed loose surface. The LiDAR was not used to capture any data about the bathymetry of the adjacent water.



LiDAR Validation Report

1.1 Horizontal and Vertical Control Used

(REF FRAME): NAD_83(2011)	
EPOCH:2010.0000	
Mapping System: CA State Plane Zone 6	
Vertical Datum: NAVD88 (GEOID18)	
Units: US Survey Feet	

1.2 LiDAR Acquisition Summary

The LiDAR data was flown on May 13, 2022 using a Cessna 206 Fixed Wing single engine aircraft. Conditions were clear and there was no turbulence.

The LiDAR was collected with an ALTM Galaxy T1000 fixed mount LiDAR system. This system is common for large collection areas due to its consistent point coverage and distribution as well as its reliability in challenging airspaces.



Parameter	Specification
Sensor Performance	
Performance envelope ^{1,2,3,4}	150-4700 m AGL, nominal
Absolute horizontal accuracy ^{2,3}	1/10,000 x altitude; 1 σ
Absolute elevation accuracy ^{2,3}	< 0.03-0.20 m RMSE from 150-4700 m A
Laser Configuration	
Topographic laser	1064-nm near-infrared
Laser classification	Class IV (US FDA 21 CFR 1040.10 and 1040.11; IEC/EN 60825-1)
Pulse repetition frequency (effective)	Programmable, 50-1000 kHz
Beam divergence	0.25 mrad (I/e)
Laser range precision ⁵	< 0.008 m, 1 σ
Minimum target separation distance	< 0.7 m (discrete)
Range capture	Up to 8 range measurements, including last
Intensity capture	Up to 8 intensity measurements, including last (12-bit)
Sensor Configuration	
Position and orientation system	POS AV™ AP60 (OEM); 220-channel dual frequency GNSS receiver; GNSS airborne antenna with Iridium filters; high-accuracy AIMU (Type 57); non-ITAR
Scan angle (FOV)	10-60°
Swath width	10-115% of altitude AGL
Scan frequency	0-120 Hz advertised (0-240 scan lines/sec)
Scan product	2000 maximum
Flight management system	Optech FMS (Airborne Mission Manager and Nav) with operator console
SwathTRAK™	Dynamic FOV for fixed-width data swaths in variable terrain
PulseTRAK™	Multipulse tracking algorithm with no density loss across PIA transition zones
Roll compensation	±5° minimum
Data storage	Internal solid-state drive (SSD)
Power requirements	28 V; 300 W
Dimensions and weight	Sensor: 0.34 x 0.34 x 0.25 m, 27 kg — PDU: 0.42 x 0.33 x 0.10 m, 6.5 kg
Operating temperature	0 to +35°C
Optional Peripherals	
External data storage	Ruggedized, removable 2.5" SSD
Image capture	Compatible with all Optech CS-Series and most 3rd party digital metric cameras
Full waveform capture	12-bit Optech IWR-3 Intelligent Waveform Recorder with removable SSD
Gyro-stabilization	SOMAG GSM 3000/4000 integration kit
Multi-sensor mounts and pods	2 and 4-station machined aluminum sensor mounts (aircraft and/or helicopter) Carbon-fiber sensor mounts supporting nadir and fore/aft oblique cameras Heli-pod mount options for Bell 206/407 (FAA-approved)

1. Target reflectivity >20%; 90% detection probability

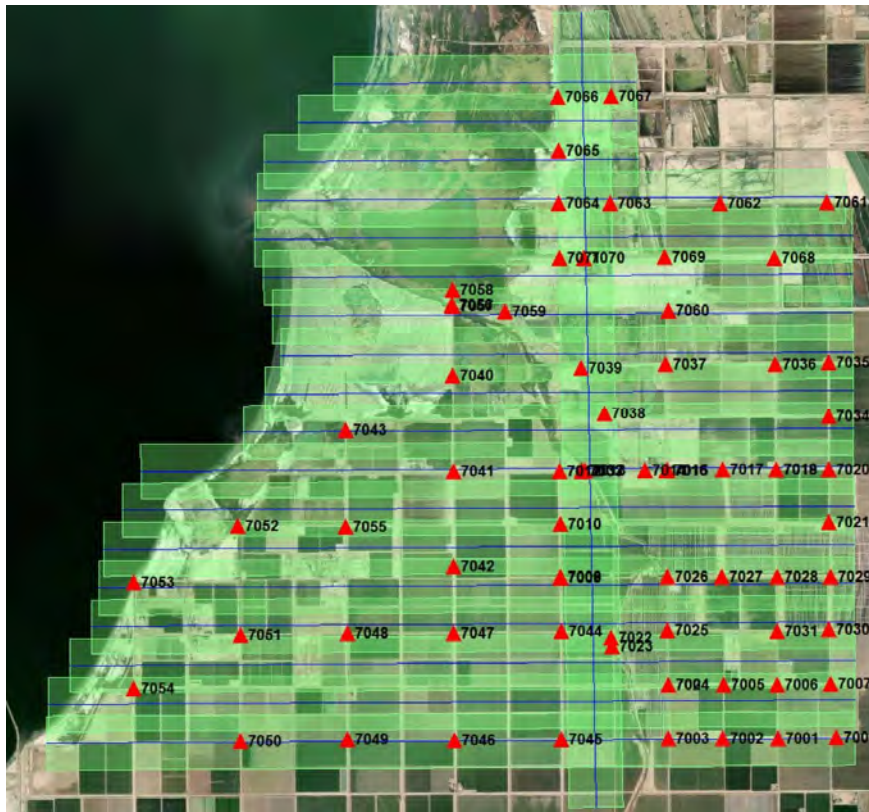
2. Dependent on selected operational parameters: assumes nominal FOV of up to 40° in standard atmospheric conditions (i.e. 23-km visibility) and use of Optech LMS Professional software suite

3. Angle of incidence <20°

4. Target size > laser footprint

5. Under Teledyne Optech test conditions, 1 sigma

LiDAR Validation Report



The table below demonstrates the vertical deviation of the flight lines when the data was registered and calibrated. As shown, this LiDAR data was very accurate and well within acceptable tolerance for the topography and surface model generation specifications.

Average magnitude: 0.12424

Flightline	Points	Magnitude	Dz
111	124673002	0.1119	-0.0101
1911	32175966	0.1789	-0.0629
2011	17507927	0.1444	+0.0343
1711	44893167	0.1532	-0.0269
1811	32806676	0.1942	-0.0261
1511	53602324	0.1140	+0.0147
1611	55595377	0.1295	-0.0029
1211	58922201	0.1143	+0.0042
1311	57381122	0.1010	+0.0167
1411	54823390	0.1004	-0.0033
1011	61692424	0.1014	-0.0014
1111	59096512	0.1166	-0.0163
811	69509505	0.1278	+0.0121
911	66435038	0.1067	+0.0039
511	73284233	0.1297	+0.0132
611	71984174	0.1362	+0.0276
711	70532714	0.1353	-0.0070
311	77404169	0.1286	-0.0328
411	74441623	0.1281	+0.0159
211	41688967	0.1108	+0.0463

1.3 LiDAR Accuracy Validation

The absolute vertical accuracy was verified following the guidelines in the 2014 ASPRS positional accuracy standards. The table below shows the results of z values of the LiDAR compared against the surveyed ground control.

POINT ID	NORTHING	EASTING	SURVEYED ELEV.	LIDAR ELEV.	Dz
7000	1995400.203	6780356.69	-191.466	-191.594	-0.128
7001	1995378.057	6777490.936	-193.682	-193.754	-0.072
7002	1995358.153	6774770.65	-198.627	-198.699	-0.072
7003	1995345.93	6772085.065	-199.614	-199.642	-0.028
7004	1998003.294	6772079.427	-202.251	-202.228	0.023
7005	1998008.09	6774826.208	-201.879	-201.917	-0.038
7006	1998014.248	6777464.947	-197.378	-197.401	-0.023
7007	1998037.72	6780080.617	-194.782	-194.829	-0.047
7008	2003321.693	6766770.981	-212.211	-212.159	0.052
7009	2003277.622	6766760.261	-211.995	-211.963	0.032
7010	2005911.973	6766733.614	-215.553	-215.613	-0.06
7011	2008510.916	6766720.115	-216.343	slope	*
7012	2008532.727	6766707.287	-216.258	-216.263	-0.005
7013	2008562.873	6767955.275	-214.438	-214.541	-0.103
7014	2008575.139	6770912.424	-214.684	-214.712	-0.028
7015	2008570.641	6772014.298	-213.014	-212.999	0.015
7016	2008589.433	6772002.423	-212.783	-212.831	-0.048
7017	2008610.318	6774762.813	-208.956	-208.898	0.058
7018	2008602.731	6777397.864	-204.761	-204.653	0.108
7019	2008624.044	6777417.239	-204.366	-204.246	0.12
7020	2008622.749	6780014.234	-198.664	-198.608	0.056
7021	2006041.029	6780019.891	-196.826	-196.836	-0.01
7022	2000322.909	6769268.298	-205.721	removed	*
7023	1999912.328	6769292.566	-205.918	-205.918	0
7024	1998008.121	6772079.272	-202.212	-202.21	0.002
7025	2000694.001	6772055.286	-206.091	-206.087	0.004
7026	2003350.886	6772025.856	-209.364	-209.321	0.043
7027	2003357.542	6774729.877	-205.075	-205.145	-0.07
7028	2003323.192	6777437.271	-201.254	-201.304	-0.05
7029	2003327.356	6780081.76	-198.881	-198.899	-0.018
7030	2000740.658	6780030.512	-195.075	-195.042	0.033
7031	2000665.85	6777455.173	-199.849	-199.807	0.042
7032	2008578.239	6767801.702	-214.595	slope	*
7033	2008545.435	6767801.825	-214.518	-214.489	0.029
7034	2011254.16	6780022.151	-197.662	-197.528	0.134
7035	2013928.342	6779994.883	-197.973	-197.88	0.093

LiDAR Validation Report

7036	2013880.806	6777359.744	-203.378	-203.401	-0.023
7037	2013843.231	6771949.319	-214.758	-214.786	-0.028
7038	2011412.346	6768946.966	-217.441	-217.38	0.061
7039	2013675.821	6767770.249	-219.997	-220.045	-0.048
7040	2013307.346	6761422.4	-224.373	-224.253	0.12
7041	2008510.723	6761461.448	-225.073	-225.111	-0.038
7042	2003840.914	6761462.537	-218.396	-218.42	-0.024
7043	2010578.278	6756135.792	-222.307	-222.343	-0.036
7044	2000635.814	6766783.382	-208.85	-208.871	-0.021
7045	1995324.998	6766817.694	-203.122	-203.098	0.024
7046	1995292.07	6761525.03	-207.11	-207.063	0.047
7047	2000566.602	6761485.366	-212.631	-212.492	0.139
7048	2000554.537	6756209.756	-216.342	-216.266	0.076
7049	1995316.795	6756244.166	-211.216	-211.206	0.01
7050	1995206.066	6750953.914	-218.439	-218.53	-0.091
7051	2000441.676	6750930.627	-225.434	-225.383	0.051
7052	2005851.8	6750825.617	-221.374	-221.441	-0.067
7053	2003076.979	6745671.395	-220.923	-220.972	-0.049
7054	1997836.012	6745680.381	-220.846	-220.965	-0.119
7055	2005812.034	6756156.241	-223.77	-223.882	-0.112
7056	2016759.314	6761385.155	-224.55	-224.459	0.091
7057	2016750.764	6761417.211	-224.926	slope	*
7058	2017534.6	6761428.196	-227.028	-227.139	-0.111
7059	2016469.475	6764019.964	-222.531	-222.605	-0.074
7060	2016509.733	6772100.516	-216.137	-216.128	0.009
7061	2021817.317	6779898.653	-192.893	-192.798	0.095
7062	2021788.42	6774651.661	-208.666	-208.526	0.14
7063	2021783.705	6769230.355	-221.237	-221.159	0.078
7064	2021769.049	6766662.715	-224.323	-224.285	0.038
7065	2024401.316	6766636.742	-222.432	-222.316	0.116
7066	2027042.71	6766612.824	-221.003	-220.894	0.109
7067	2027055.951	6769272.41	-217.526	-217.569	-0.043
7068	2019109.073	6777308.319	-201.619	-201.712	-0.093
7069	2019119.08	6771906.114	-214.563	-214.587	-0.024
7070	2019102.04	6767916.305	-218.046	-218.167	-0.121
7071	2019104.613	6766700.395	-223.329	-223.474	-0.145

Average Dz	0.000
Minimum DZ	-0.145
Maximum DZ	0.140
Average Magnitude	0.061
STD Deviation	0.073

LiDAR Validation Report

Confidence Level(95.0%)	0.018
Lower CI (95%)	-0.018
Upper CI (95%)	0.017
RMSE	0.073
Units Feet	

The relative vertical accuracy was also compared for each swath (flightline) captured to ensure there were no fatal flaws in the calibration of the swaths prior to classification.

Flightline	Magnitude	Abs(DZ)	Dz
111	0.112	0.010	-0.010
1911	0.179	0.063	-0.063
2011	0.144	0.034	0.034
1711	0.153	0.027	-0.027
1811	0.194	0.026	-0.026
1511	0.114	0.015	0.015
1611	0.130	0.003	-0.003
1211	0.114	0.004	0.004
1311	0.101	0.017	0.017
1411	0.100	0.003	-0.003
1011	0.101	0.001	-0.001
1111	0.117	0.016	-0.016
811	0.128	0.012	0.012
911	0.107	0.004	0.004
511	0.130	0.013	0.013
611	0.136	0.028	0.028
711	0.135	0.007	-0.007
311	0.129	0.033	-0.033
411	0.128	0.016	0.016
211	0.111	0.046	0.046

Average Dz	0.000
Minimum DZ	-0.063
Maximum DZ	0.046
Average Magnitude	0.128
STD Deviation	0.025
Confidence Level(95.0%)	0.012
Lower CI (95%)	-0.012
Upper CI (95%)	0.012
RMSE	0.025
Units Feet	

Additional LiDAR relative accuracy provided by the aerial contractor is provided in Attachment 1.

1.4 LiDAR Field Survey

This project also included the delivery of rectified orthophotography, which requires an even distribution of fixed visible targets. These targets can be existing permanent features visible on the ground. We were able to use these hard surface known points to calibrate and validate the accuracy of the LiDAR as well as rectify the orthoimagery. The exact values of each control point are shown in the table below.

Point ID	Northing	Easting	Elevation	Description
7000	1995400.203	6780356.69	-191.466	GROUND DIRT RD
7001	1995378.057	6777490.936	-193.682	GROUND ASPHALT RD
7002	1995358.153	6774770.65	-198.627	GROUND DIRT RD
7003	1995345.93	6772085.065	-199.614	GROUND ASPHALT RD
7004	1998003.294	6772079.427	-202.251	GROUND ASPHALT RD
7005	1998008.09	6774826.208	-201.879	GROUND DIRT RD
7006	1998014.248	6777464.947	-197.378	ASPHALT RD
7007	1998037.72	6780080.617	-194.782	GROUND DIRT RD
7008	2003321.693	6766770.981	-212.211	CONCRETE SOUTH EAST CORNER
7009	2003277.622	6766760.261	-211.995	ASPHALT
7010	2005911.973	6766733.614	-215.553	ASPHALT
7011	2008510.916	6766720.115	-216.343	STOP BAR NORTH ANGLE POINT
7012	2008532.727	6766707.287	-216.258	ASPHALT
7013	2008562.873	6767955.275	-214.438	END OF YELLOW SKIPPY STRIPE
7014	2008575.139	6770912.424	-214.684	END OF YELLOW SKIPPY STRIPE
7015	2008570.641	6772014.298	-213.014	STOP BAR NORTH ANGLE POINT
7016	2008589.433	6772002.423	-212.783	ASPHALT
7017	2008610.318	6774762.813	-208.956	END OF YELLOW SKIPPY STRIPE
7018	2008602.731	6777397.864	-204.761	END OF YELLOW SOLID STRIPE
7019	2008624.044	6777417.239	-204.366	END OF YELLOW SOLID STRIPE
7020	2008622.749	6780014.234	-198.664	END OF YELLOW SKIPPY STRIPE
7021	2006041.029	6780019.891	-196.826	DIRT ROAD
7022	2000322.909	6769268.298	-205.721	CON N EDGE
7023	1999912.328	6769292.566	-205.918	DIRT ROAD
7024	1998008.121	6772079.272	-202.212	ASPHALT
7025	2000694.001	6772055.286	-206.091	END OF YELLOW SKIPPY STRIPE
7026	2003350.886	6772025.856	-209.364	ASPHALT
7027	2003357.542	6774729.877	-205.075	DIRT ROAD
7028	2003323.192	6777437.271	-201.254	ASPHALT
7029	2003327.356	6780081.76	-198.881	DIRT ROAD

LiDAR Validation Report

Point ID	Northing	Easting	Elevation	Description
7030	2000740.658	6780030.512	-195.075	DIRT ROAD
7031	2000665.85	6777455.173	-199.849	ASPHALT
7032	2008578.239	6767801.702	-214.595	CONCRETE NW CORNER BRIDGE
7033	2008545.435	6767801.825	-214.518	CONCRETE SW CORNER BRIDGE
7034	2011254.16	6780022.151	-197.662	DIRT ROAD
7035	2013928.342	6779994.883	-197.973	DIRT ROAD
7036	2013880.806	6777359.744	-203.378	GRAVEL ROAD
7037	2013843.231	6771949.319	-214.758	DIRT ROAD
7038	2011412.346	6768946.966	-217.441	DIRT ROAD
7039	2013675.821	6767770.249	-219.997	DIRT ROAD
7040	2013307.346	6761422.4	-224.373	DIRT ROAD
7041	2008510.723	6761461.448	-225.073	END OF YELLOW SOLID STRIPE
7042	2003840.914	6761462.537	-218.396	DIRT ROAD
7043	2010578.278	6756135.792	-222.307	DIRT ROAD
7044	2000635.814	6766783.382	-208.85	ASPHALT
7045	1995324.998	6766817.694	-203.122	ASPHALT
7046	1995292.07	6761525.03	-207.11	DIRT ROAD
7047	2000566.602	6761485.366	-212.631	DIRT ROAD
7048	2000554.537	6756209.756	-216.342	END OF YELLOW SKIPPY STRIPE
7049	1995316.795	6756244.166	-211.216	END OF YELLOW SKIPPY STRIPE
7050	1995206.066	6750953.914	-218.439	DIRT ROAD
7051	2000441.676	6750930.627	-225.434	DIRT ROAD
7052	2005851.8	6750825.617	-221.374	DIRT ROAD
7053	2003076.979	6745671.395	-220.923	DIRT ROAD
7054	1997836.012	6745680.381	-220.846	STOP BAR ANGLE POINT WEST
7055	2005812.034	6756156.241	-223.77	CONCRETE NW CORNER
7056	2016759.314	6761385.155	-224.55	CONCRETE NW CORNER
7057	2016750.764	6761417.211	-224.926	CONCRETE NE CORNER
7058	2017534.6	6761428.196	-227.028	DIRT ROAD
7059	2016469.475	6764019.964	-222.531	DIRT ROAD
7060	2016509.733	6772100.516	-216.137	DIRT ROAD
7061	2021817.317	6779898.653	-192.893	DIRT ROAD
7062	2021788.42	6774651.661	-208.666	DIRT ROAD
7063	2021783.705	6769230.355	-221.237	DIRT ROAD
7064	2021769.049	6766662.715	-224.323	DIRT ROAD

LiDAR Validation Report

Point ID	Northing	Easting	Elevation	Description
7065	2024401.316	6766636.742	-222.432	DIRT ROAD
7066	2027042.71	6766612.824	-221.003	DIRT ROAD
7067	2027055.951	6769272.41	-217.526	DIRT ROAD
7068	2019109.073	6777308.319	-201.619	STOP BAR EAST ANGLE POINT
7069	2019119.08	6771906.114	-214.563	AC
7070	2019102.04	6767916.305	-218.046	END OF YELLOW SOLID STRIPE
7071	2019104.613	6766700.395	-223.329	STOP BAR SW CORNER

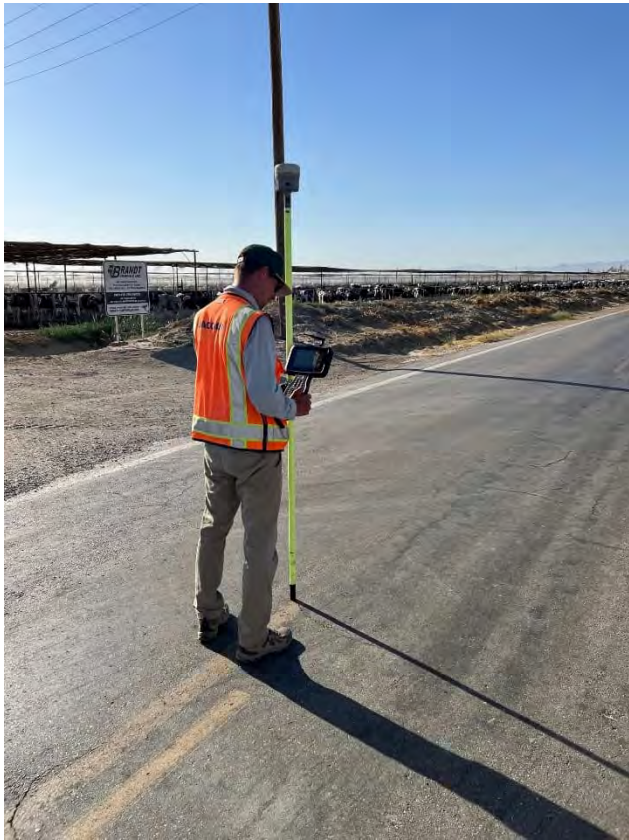
The following pages are examples of the survey control points used for calibration of the LiDAR and validation of the data's accuracy. Visible paint markings, corners of concrete pads and defined structures were used as the control targets. All these points were observed using RTK GPS and tied to a local benchmark.

As shown in many of these photos, the number painted on the ground corresponds directly to the target locations shown in the flight plan on the previous page. This allows each surveyed location to be checked against the LiDAR point cloud and derived surface, to ensure accuracy was within the specifications of this project.

















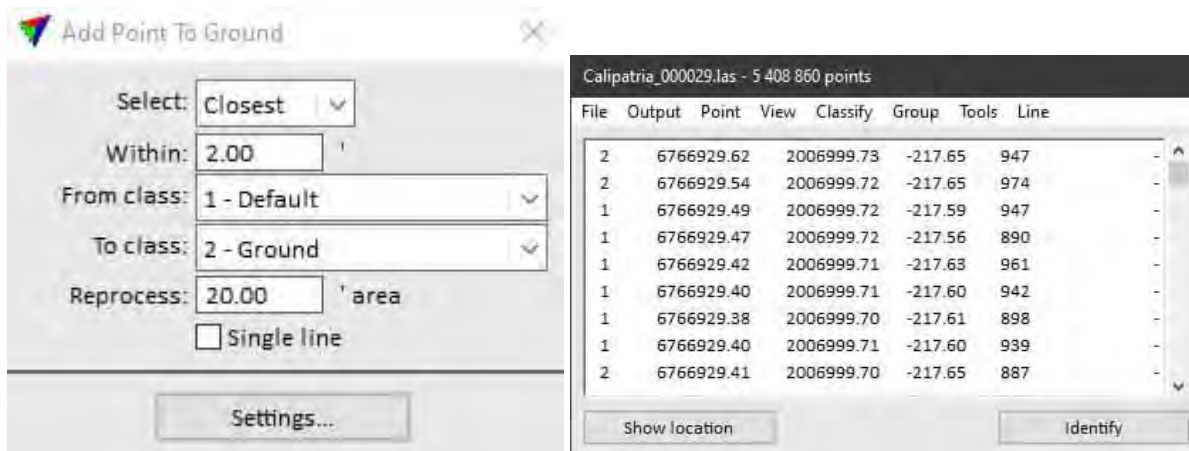
1.5 LiDAR Data Processing

LiDAR Classification Process:

The first step in the process is the calibration of the LiDAR data immediately after it's been flown. This is done in the event of a system malfunction, a reflight can quickly be performed prior to demobilization. The calibration process uses the ground control values and the airborne GPS data to properly align and orient the swaths and create a single point cloud of all swaths combined and tied together.

The calibrated, unclassified point cloud is loaded into a processing program called TerraScan and split into smaller parcels for automatic classification. A macro is run on the dataset to determine ground points using algorithms imbedded in the program to decipher which LiDAR returns from the scan are ground. Once ground points are determined, additional macro processes can be run to classify vegetation, buildings, etc. A team of processors work through each of the smaller parcels for an overall QC on the automatic classifications and adjust where needed.

LiDAR Validation Report



A final macro process can be run on the ground points to pull "key" ground points for surface mapping. The purpose of the key ground point process is to help thin the dataset to a smaller file size allowing the LiDAR deliverable to be a more user friendly file for the end user to work with. The thinning process still maintains an accurate representation of the surface as a final product. All classification and exporting is conducted in the program TerraScan.

Once the data is classified to ground, the accuracy is then checked against the control. This check compares the surveyed values with the LiDAR derived value. Below is the result of the accuracy checks. The "Dz" column shows how much higher or lower the LiDAR point is versus the surveyed control. Units are in feet. The rule of thumb is there should be half as much variation in elevation as the intended contour interval. For example, for 1' contours, Dz values of .5 or less are acceptable.

LiDAR Accuracy Reports

Point ID	Northing	Easting	Surveyed Elev.	LiDAR Elev.	Dz
7000	1995400.203	6780356.69	-191.466	-191.594	-0.128
7001	1995378.057	6777490.936	-193.682	-193.754	-0.072
7002	1995358.153	6774770.65	-198.627	-198.699	-0.072
7003	1995345.93	6772085.065	-199.614	-199.642	-0.028
7004	1998003.294	6772079.427	-202.251	-202.228	0.023
7005	1998008.09	6774826.208	-201.879	-201.917	-0.038
7006	1998014.248	6777464.947	-197.378	-197.401	-0.023
7007	1998037.72	6780080.617	-194.782	-194.829	-0.047
7008	2003321.693	6766770.981	-212.211	-212.159	0.052
7009	2003277.622	6766760.261	-211.995	-211.963	0.032
7010	2005911.973	6766733.614	-215.553	-215.613	-0.06
7011	2008510.916	6766720.115	-216.343	slope	*
7012	2008532.727	6766707.287	-216.258	-216.263	-0.005
7013	2008562.873	6767955.275	-214.438	-214.541	-0.103
7014	2008575.139	6770912.424	-214.684	-214.712	-0.028
7015	2008570.641	6772014.298	-213.014	-212.999	0.015

LiDAR Validation Report

Point ID	Northing	Easting	Surveyed Elev.	LiDAR Elev.	Dz
7016	2008589.433	6772002.423	-212.783	-212.831	-0.048
7017	2008610.318	6774762.813	-208.956	-208.898	0.058
7018	2008602.731	6777397.864	-204.761	-204.653	0.108
7019	2008624.044	6777417.239	-204.366	-204.246	0.12
7020	2008622.749	6780014.234	-198.664	-198.608	0.056
7021	2006041.029	6780019.891	-196.826	-196.836	-0.01
7022	2000322.909	6769268.298	-205.721	removed	*
7023	1999912.328	6769292.566	-205.918	-205.918	0
7024	1998008.121	6772079.272	-202.212	-202.21	0.002
7025	2000694.001	6772055.286	-206.091	-206.087	0.004
7026	2003350.886	6772025.856	-209.364	-209.321	0.043
7027	2003357.542	6774729.877	-205.075	-205.145	-0.07
7028	2003323.192	6777437.271	-201.254	-201.304	-0.05
7029	2003327.356	6780081.76	-198.881	-198.899	-0.018
7030	2000740.658	6780030.512	-195.075	-195.042	0.033
7031	2000665.85	6777455.173	-199.849	-199.807	0.042
7032	2008578.239	6767801.702	-214.595	slope	*
7033	2008545.435	6767801.825	-214.518	-214.489	0.029
7034	2011254.16	6780022.151	-197.662	-197.528	0.134
7035	2013928.342	6779994.883	-197.973	-197.88	0.093
7036	2013880.806	6777359.744	-203.378	-203.401	-0.023
7037	2013843.231	6771949.319	-214.758	-214.786	-0.028
7038	2011412.346	6768946.966	-217.441	-217.38	0.061
7039	2013675.821	6767770.249	-219.997	-220.045	-0.048
7040	2013307.346	6761422.4	-224.373	-224.253	0.12
7041	2008510.723	6761461.448	-225.073	-225.111	-0.038
7042	2003840.914	6761462.537	-218.396	-218.42	-0.024
7043	2010578.278	6756135.792	-222.307	-222.343	-0.036
7044	2000635.814	6766783.382	-208.85	-208.871	-0.021
7045	1995324.998	6766817.694	-203.122	-203.098	0.024
7046	1995292.07	6761525.03	-207.11	-207.063	0.047
7047	2000566.602	6761485.366	-212.631	-212.492	0.139
7048	2000554.537	6756209.756	-216.342	-216.266	0.076
7049	1995316.795	6756244.166	-211.216	-211.206	0.01
7050	1995206.066	6750953.914	-218.439	-218.53	-0.091

LiDAR Validation Report

Point ID	Northing	Easting	Surveyed Elev.	LiDAR Elev.	Dz
7051	2000441.676	6750930.627	-225.434	-225.383	0.051
7052	2005851.8	6750825.617	-221.374	-221.441	-0.067
7053	2003076.979	6745671.395	-220.923	-220.972	-0.049
7054	1997836.012	6745680.381	-220.846	-220.965	-0.119
7055	2005812.034	6756156.241	-223.77	-223.882	-0.112
7056	2016759.314	6761385.155	-224.55	-224.459	0.091
7057	2016750.764	6761417.211	-224.926	slope	*
7058	2017534.6	6761428.196	-227.028	-227.139	-0.111
7059	2016469.475	6764019.964	-222.531	-222.605	-0.074
7060	2016509.733	6772100.516	-216.137	-216.128	0.009
7061	2021817.317	6779898.653	-192.893	-192.798	0.095
7062	2021788.42	6774651.661	-208.666	-208.526	0.14
7063	2021783.705	6769230.355	-221.237	-221.159	0.078
7064	2021769.049	6766662.715	-224.323	-224.285	0.038
7065	2024401.316	6766636.742	-222.432	-222.316	0.116
7066	2027042.71	6766612.824	-221.003	-220.894	0.109
7067	2027055.951	6769272.41	-217.526	-217.569	-0.043
7068	2019109.073	6777308.319	-201.619	-201.712	-0.093
7069	2019119.08	6771906.114	-214.563	-214.587	-0.024
7070	2019102.04	6767916.305	-218.046	-218.167	-0.121
7071	2019104.613	6766700.395	-223.329	-223.474	-0.145
	Average dz	0			
	Minimum dz	-0.145			
	Maximum dz	0.14			
	Average magnitude	0.061			
	Root mean square	0.073			
	Std deviation	0.073			

1.6 Conclusion

The LiDAR data is validated and checked at several gates throughout the process. The first QC check is performed immediately off the plane with the initial calibration of the data. If there is a fatal flaw in the data, it would be caught in this QC check.

The second check is performed during the classification. The classification will reveal if there are any abnormal spikes or dips in the LiDAR returns.

LiDAR Validation Report

The final check is performed after the data has been classified and thinned. This is where the accuracy is thoroughly vetted using the provided control values and measured against the values of that same point in the LiDAR surface.

The data collected, processed and delivered for this project passed every QC check through the process and the resulting data is well within specification for detailed design and construction planning.

1.7 Certification

I, Aaron D. Willis, a Licensed Land Surveyor with license number 8881, hereby certify that I have reviewed and verified this LiDAR Validation Report.

I affirm that the LiDAR data was collected, processed, and analyzed as presented in this report, and that this work took place under my oversight.

Aaron D. Willis, PLS
License No. 8881
Date: 05/03/2023



Attachment 1 LiDAR Accuracy Validation by Keystone Aerial Surveys, Incorporated

General Information

Mission Information

Project name	22CA-1041
Processing date	2022-05-19 18:15:22
Mission date	2022-05-13 14:49:43
Mission duration	02:51:20.391
Processing mode	IN-Fusion SmartBase
GPS Station	ASB

Rover Hardware Information

Product	POS AV 610 VER6 HW2.5-12
Serial number	S/N9297
IMU type	57
Receiver type	BD982
Antenna type	AT1675-80

Project File List

Rover Data Files

File name	File type
20220513_1_25Y.659	POS Data
20220513_1_25Y.660	POS Data
20220513_1_25Y.661	POS Data
20220513_1_25Y.662	POS Data
20220513_1_25Y.663	POS Data
20220513_1_25Y.664	POS Data
20220513_1_25Y.665	POS Data
20220513_1_25Y.666	POS Data
20220513_1_25Y.667	POS Data
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20220513_1_25Y.678	POS Data
20220513_1_25Y.679	POS Data
20220513_1_25Y.680	POS Data
20220513_1_25Y.681	POS Data
20220513_1_25Y.682	POS Data
20220513_1_25Y.683	POS Data
20220513_1_25Y.684	POS Data

Input Files

File Name	File Type
Ephm1330.22g	GLONASS Broadcast Ephemeris
Ephm1330.22n	GPS Broadcast Ephemeris
bomg1330.22o	GNSS SingleBase
crrs1330.22o	GPS SingleBase
errg1330.22o	GNSS SingleBase
glrs1330.22o	GNSS SingleBase
p4951330.22o	GPS SingleBase
p4991330.22o	GNSS SingleBase
p5021330.22o	GPS SingleBase
p5031330.22o	GPS SingleBase
p5061330.22o	GNSS SingleBase
p5071330.22o	GPS SingleBase
p5081330.22o	GNSS SingleBase
p5101330.22o	GNSS SingleBase

Output Files

Filename	File type
sbt_Mission 1.out	SBET Trajectory File
NAD83(2011)_Ep2010_Sbet.out	Custom Smoothed BET Export Output

Rover Data Summary

First raw data file	20220513_1_25Y.659		
Last raw data file	20220513_1_25Y.684		
Start GPS week	2209		
Start time	485382.542 (5/13/2022 2:49:42 PM)		
End time	501947.422 (5/13/2022 7:25:47 PM)		
Start of fine alignment	490287.980 (5/13/2022 4:11:27 PM)		
Available subsystems	Primary GNSS, IMU		
POS Event Input	None		
Correction data	None		
IMU Installation Lever Arms & Mounting Angles			
Reference to IMU lever arm (m)	0.000	0.000	0.000
Reference to IMU mounting angles (deg)	0.000	0.000	180.000
Reference to Primary GNSS lever arm (m)	-0.485	-0.379	-1.141
Reference to Primary GNSS lever arm std dev (m)	-1.000		
Aircraft to Reference mounting angles (deg)	0.000	0.000	0.000

Rover Data QC

Raw IMU Import QC Summary

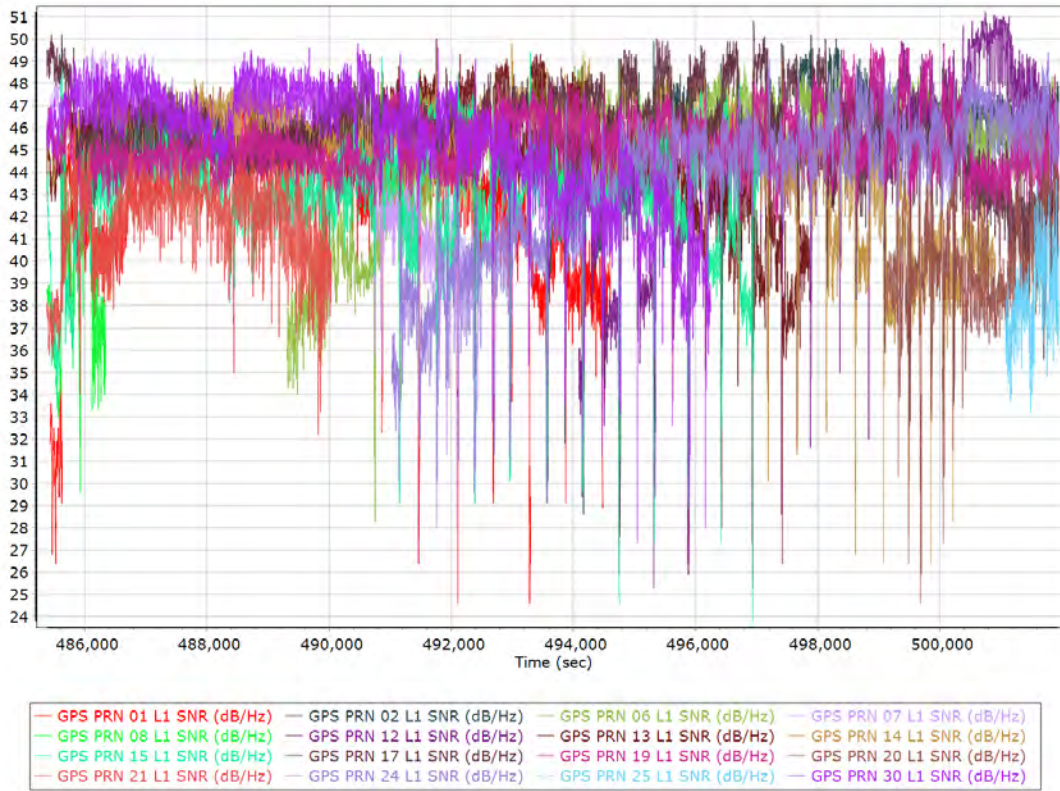
IMU data input file	imu_Mission 1.dat
IMU data check log file	imudt_Mission 1.log
IMU Records Processed	3312377
Termination Status	Normal
IMU Anomalies	0

Primary Observables & Satellite Data

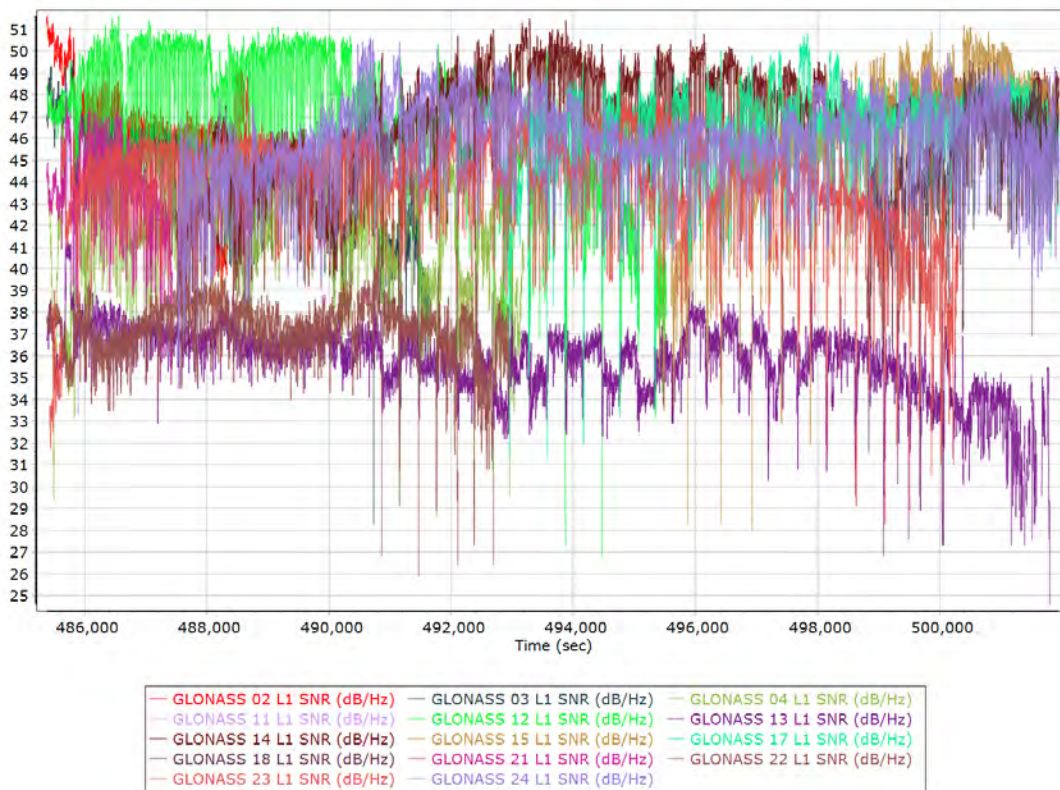
GPS/GLONASS L1 Satellite Lock/Elevation



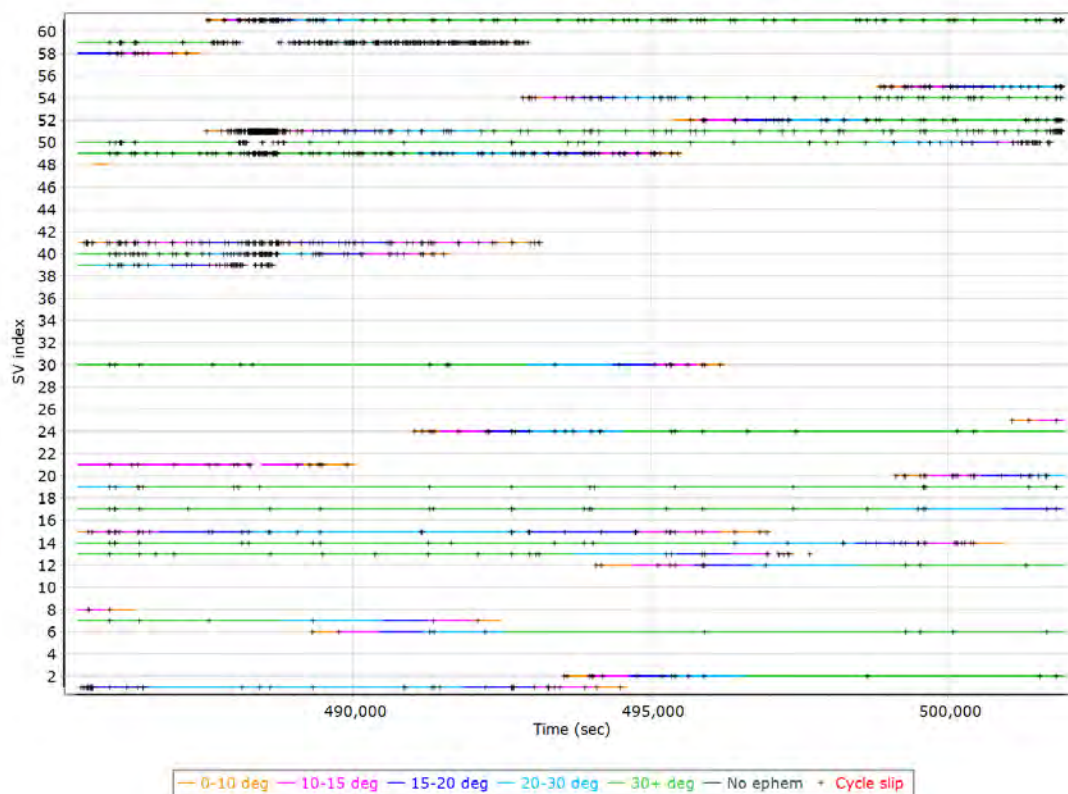
GPS L1 SNR



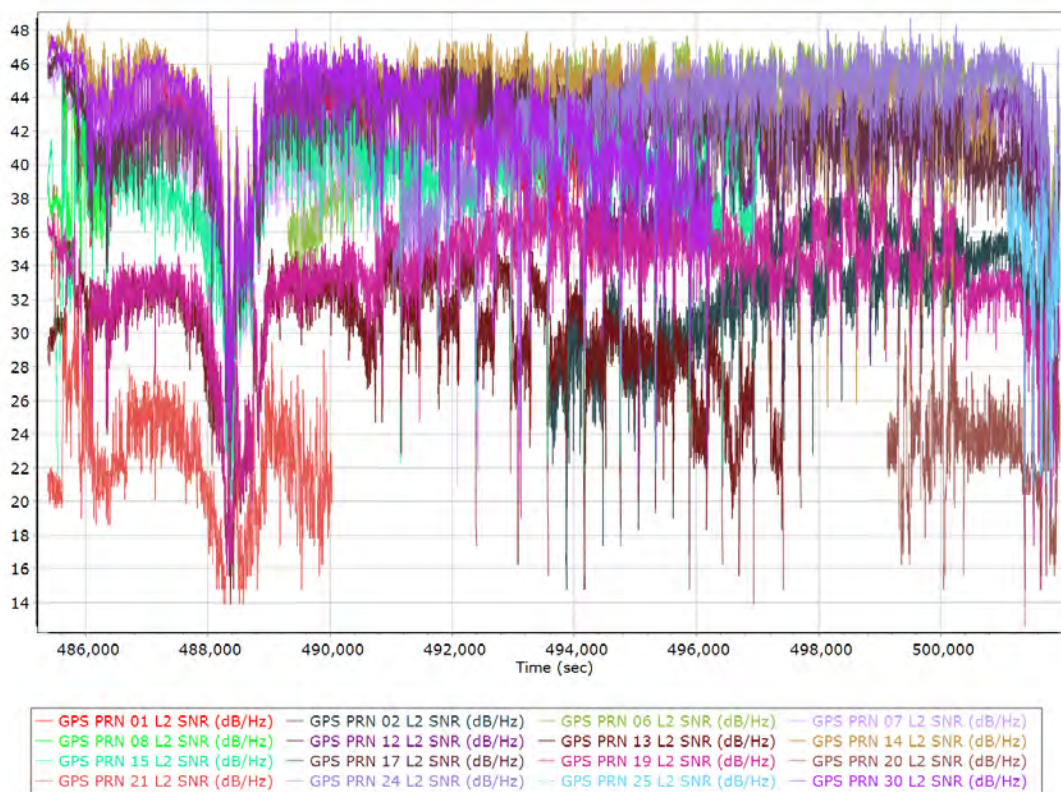
GLONASS L1 SNR



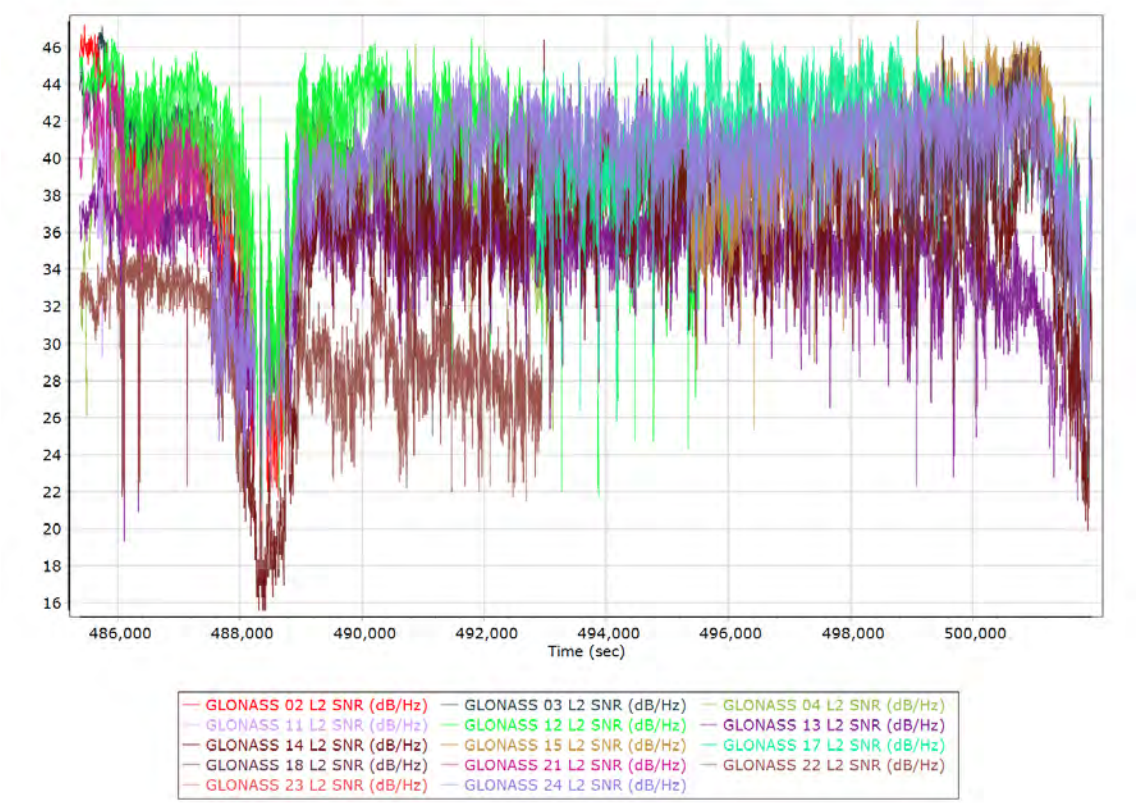
GPS/GLONASS L2 Satellite Lock/Elevation



GPS L2 SNR



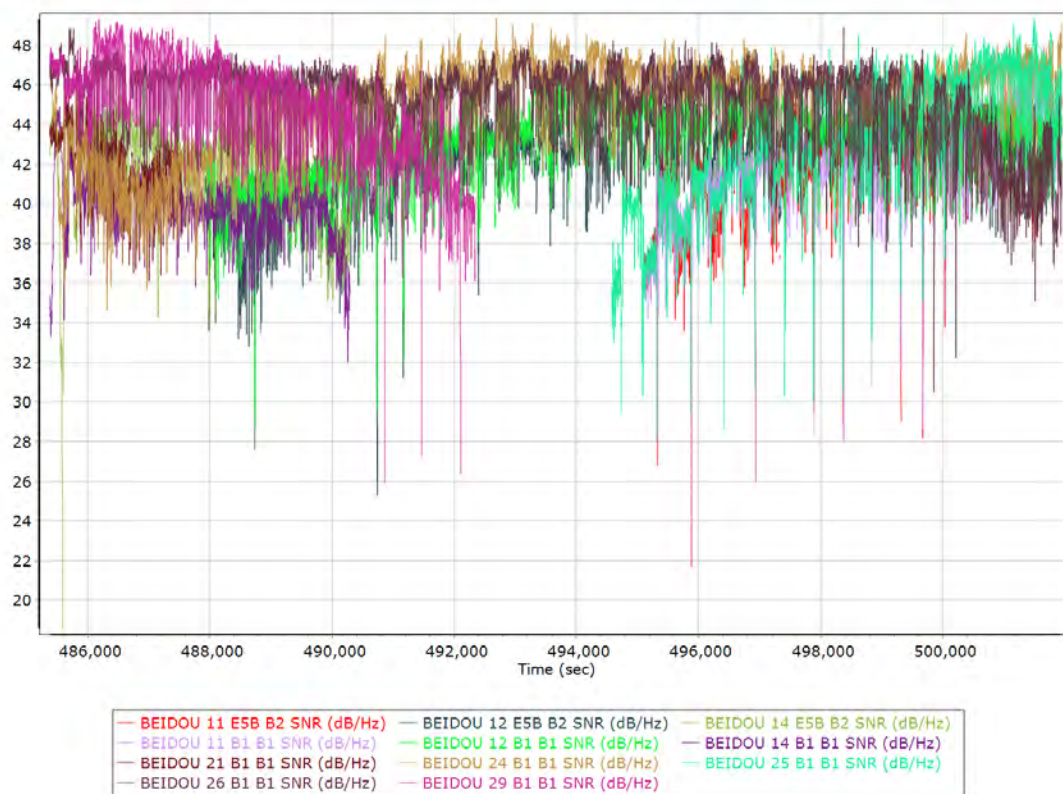
GLONASS L2 SNR



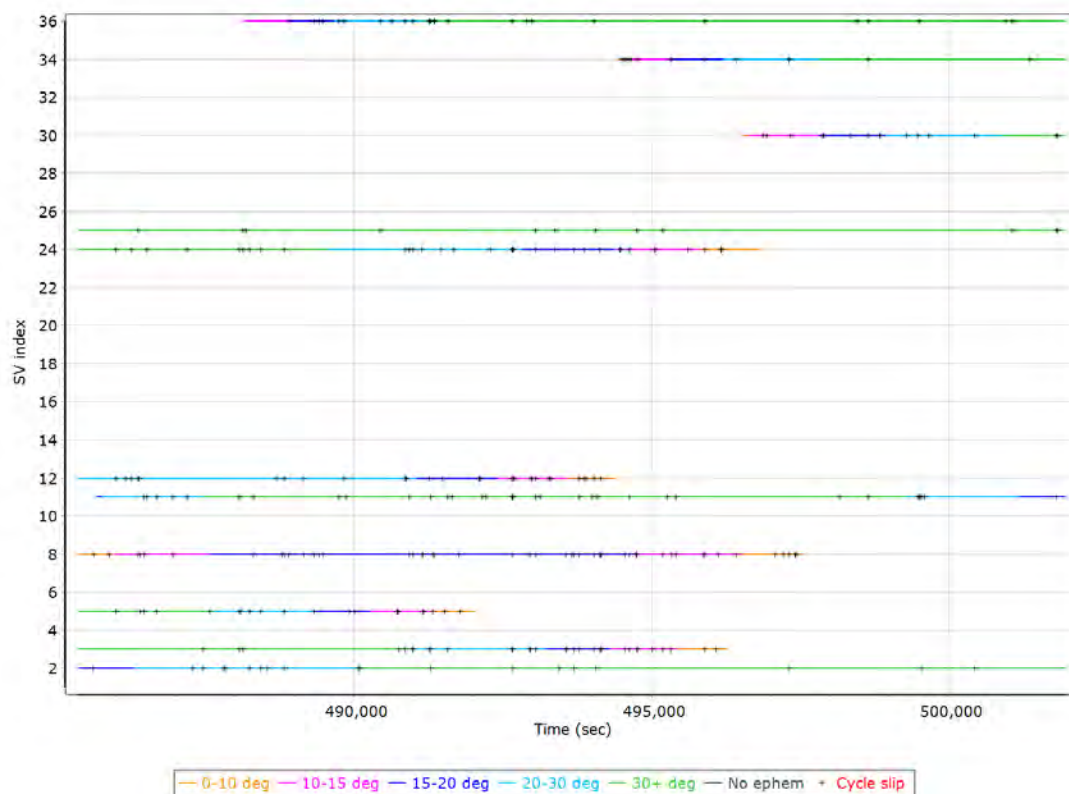
BEIDOU Satellite Lock/Elevation



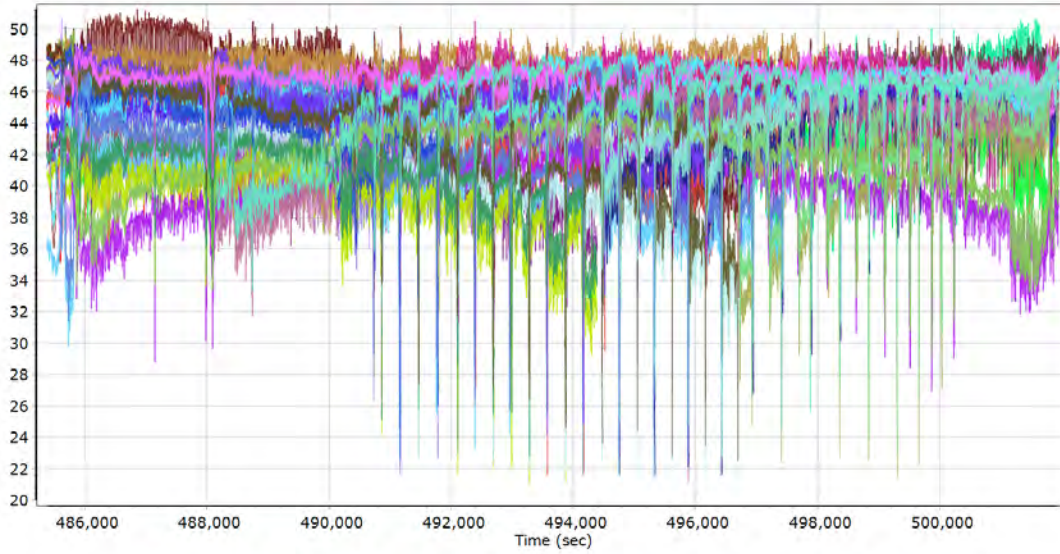
BEIDOU SNR



GALILEO Satellite Lock/Elevation



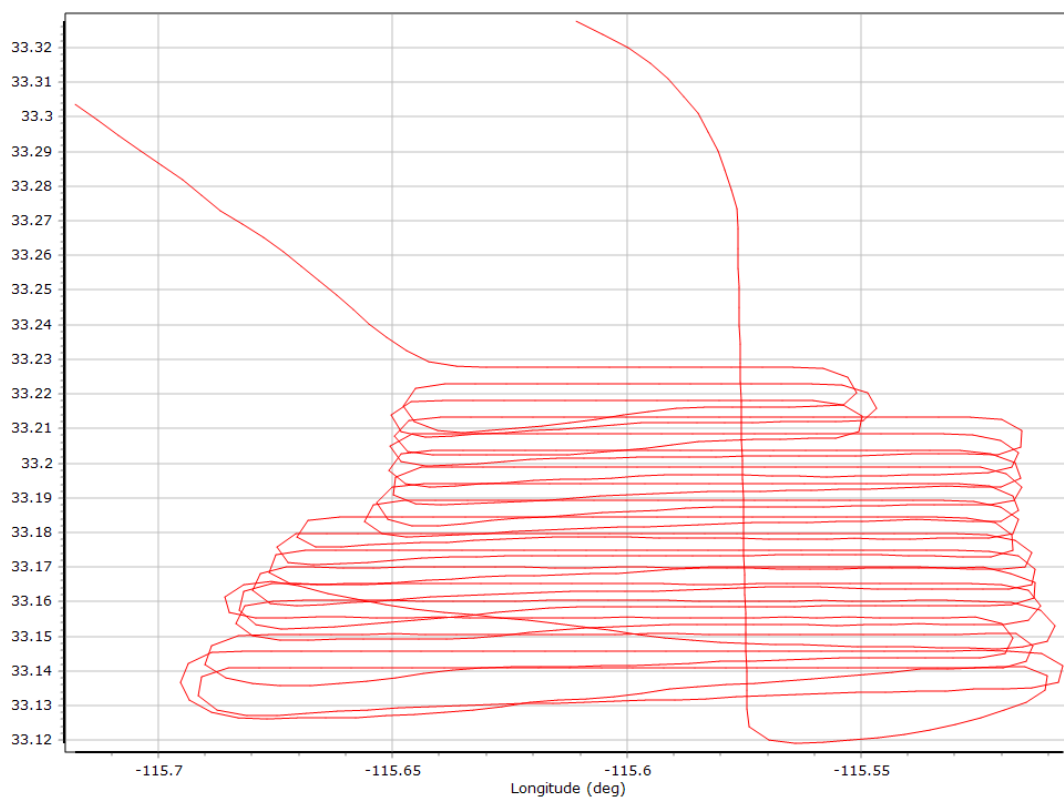
GALILEO SNR



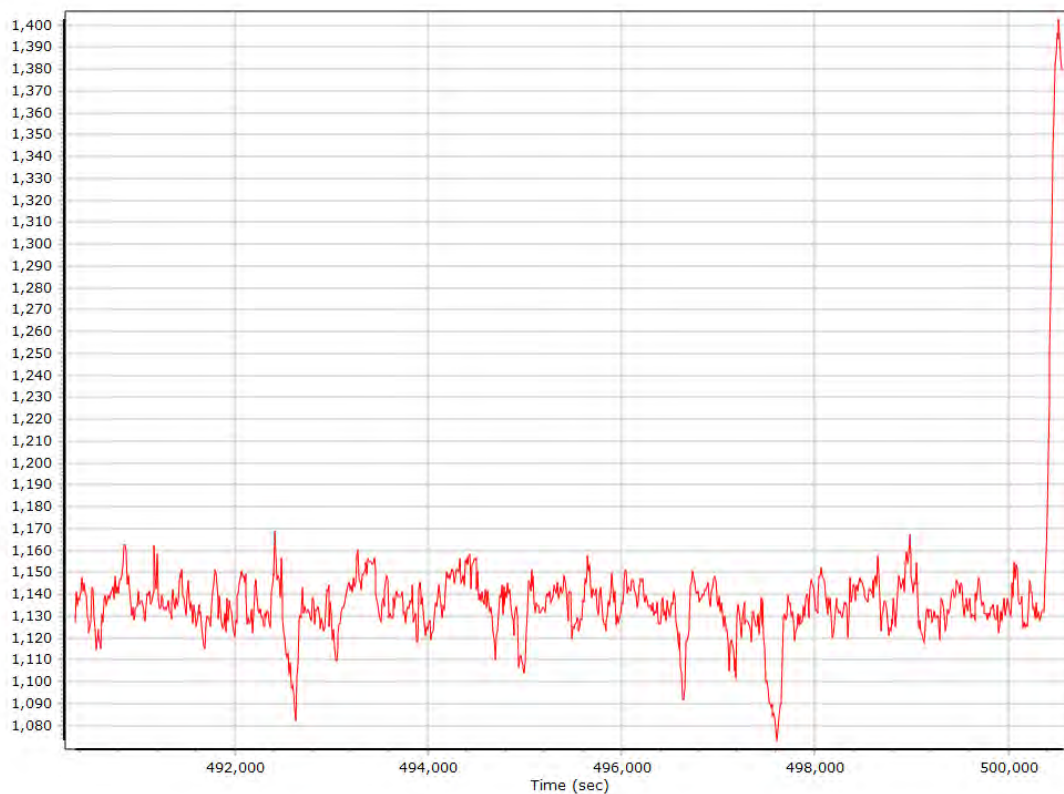
— GALILEO 02 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 03 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
— GALILEO 05 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 08 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
— GALILEO 11 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 12 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
— GALILEO 24 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 25 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
— GALILEO 30 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 34 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
— GALILEO 36 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 02 E5B BPSK10_PD SNR (dB/Hz)
— GALILEO 03 E5B BPSK10_PD SNR (dB/Hz)	— GALILEO 05 E5B BPSK10_PD SNR (dB/Hz)
— GALILEO 08 E5B BPSK10_PD SNR (dB/Hz)	— GALILEO 11 E5B BPSK10_PD SNR (dB/Hz)
— GALILEO 12 E5B BPSK10_PD SNR (dB/Hz)	— GALILEO 34 E5B BPSK10_PD SNR (dB/Hz)
— GALILEO 25 E5B BPSK10_PD SNR (dB/Hz)	— GALILEO 30 E5B BPSK10_PD SNR (dB/Hz)

Smoothed Trajectory Information

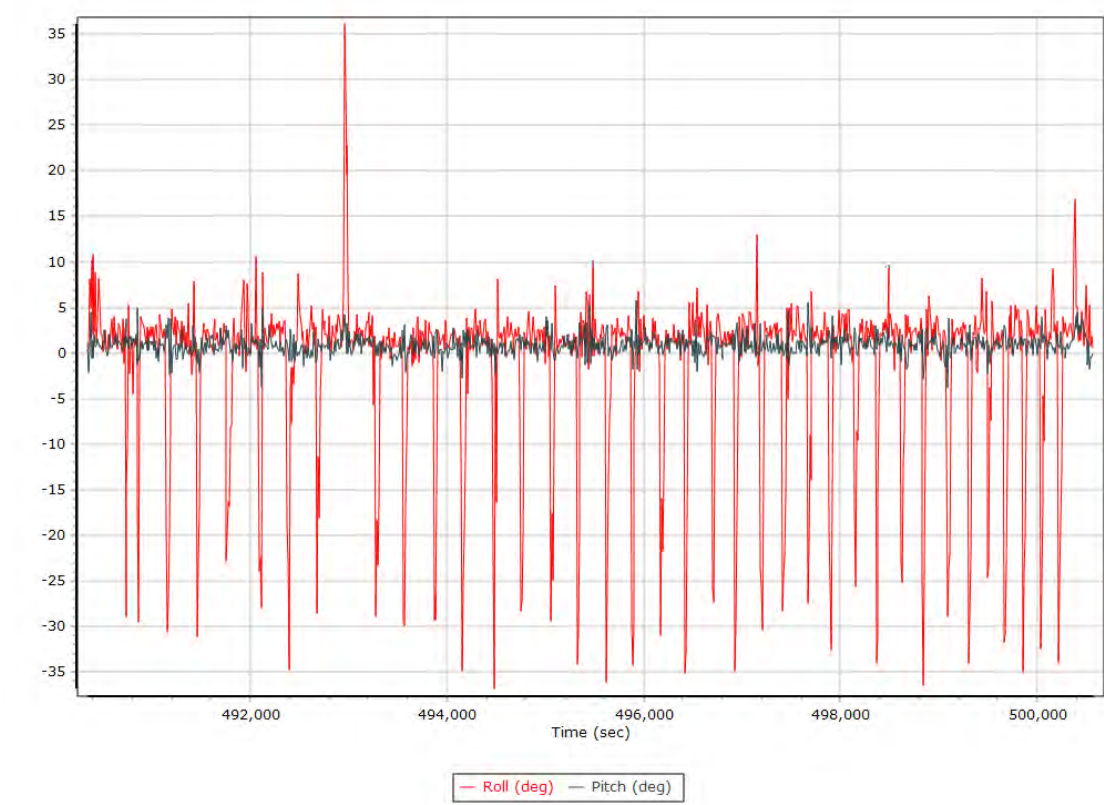
Top View



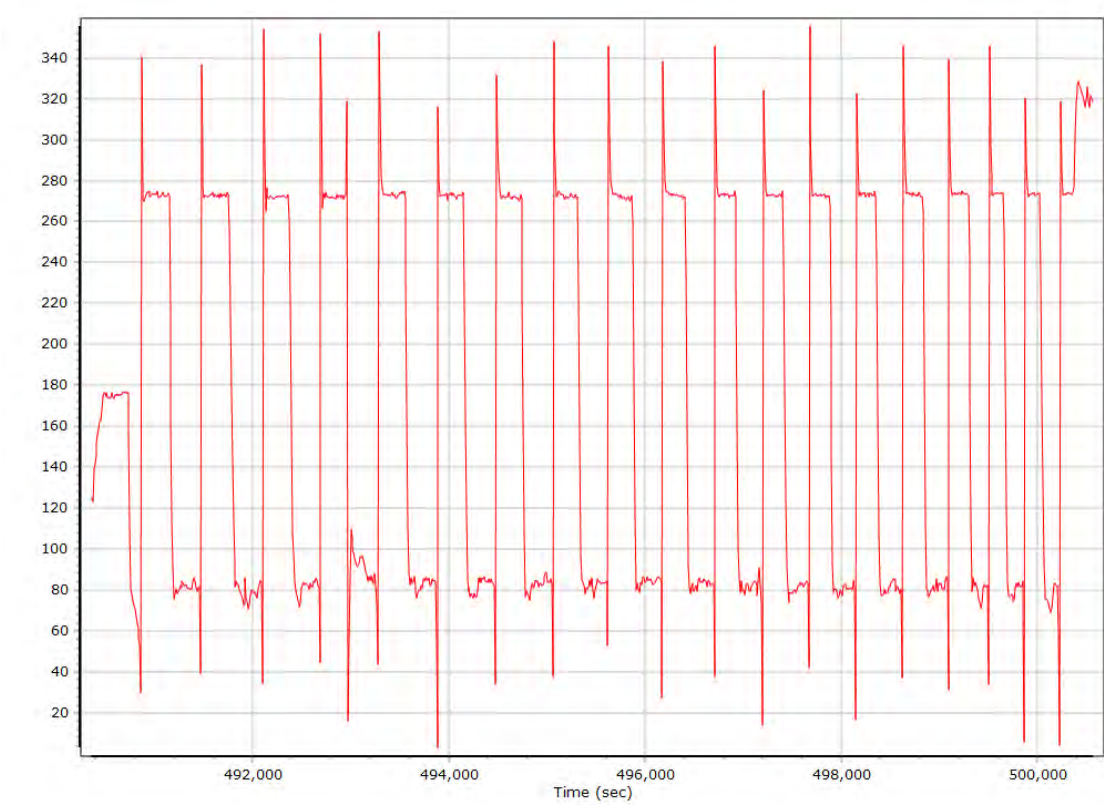
Altitude



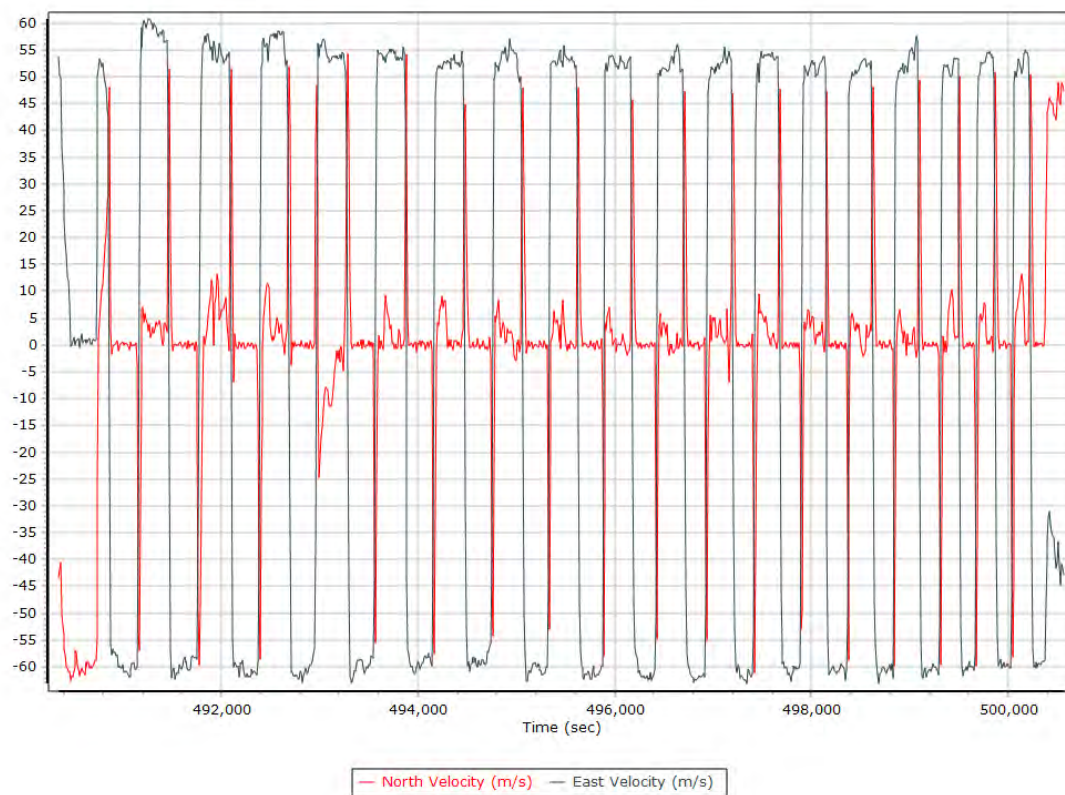
Roll/Pitch



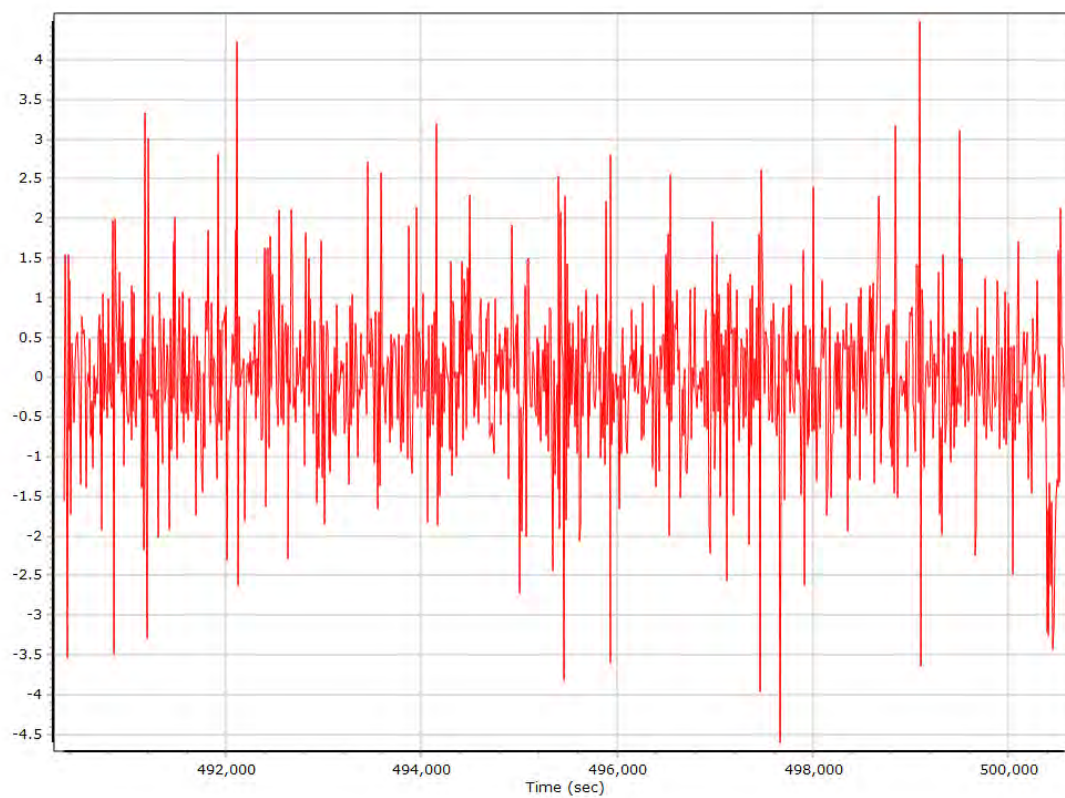
Heading



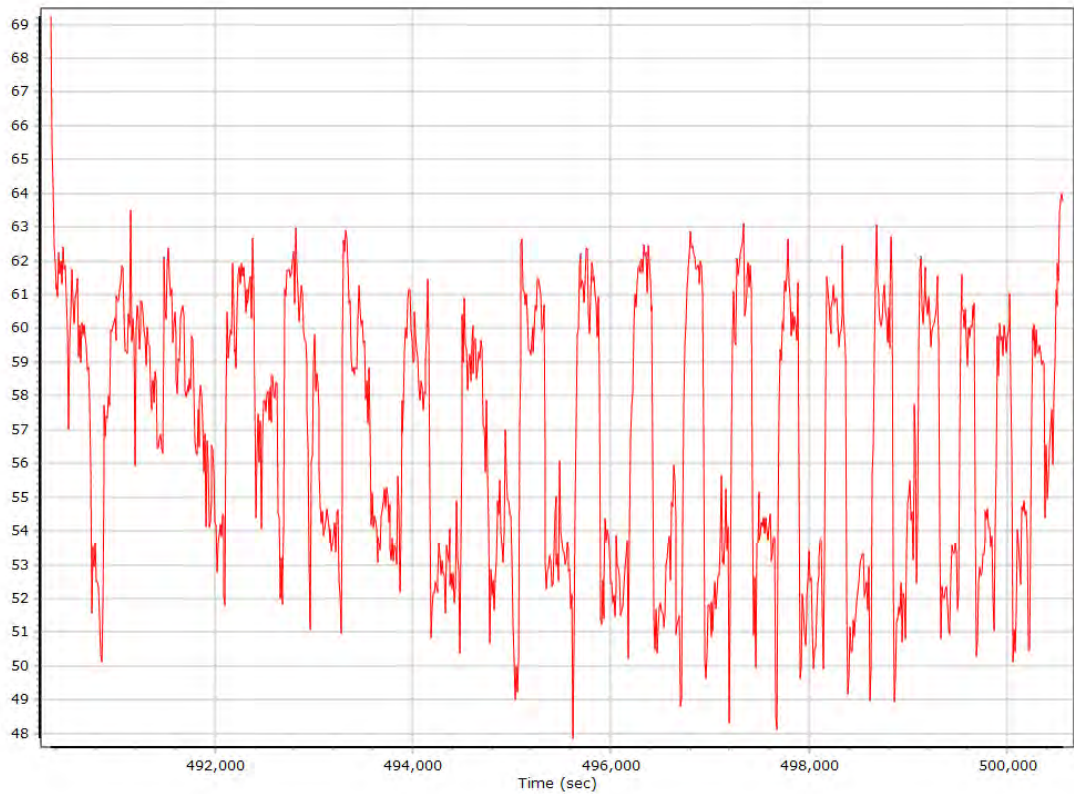
North/East Velocity



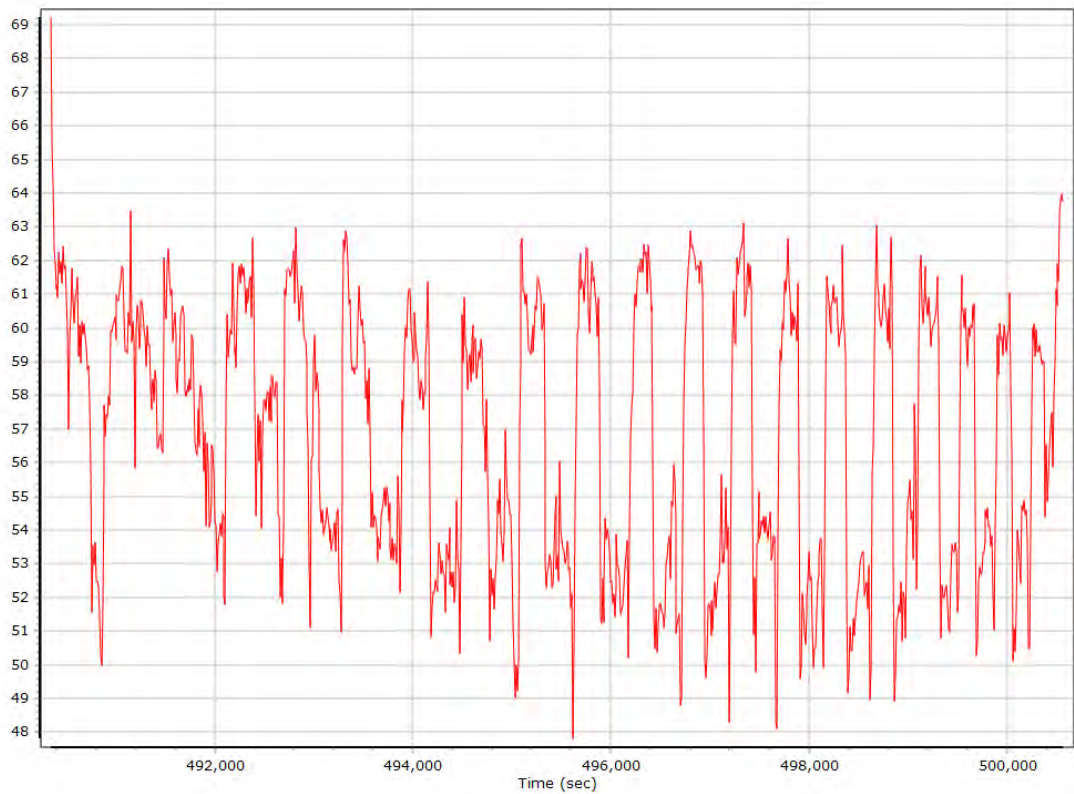
Down Velocity



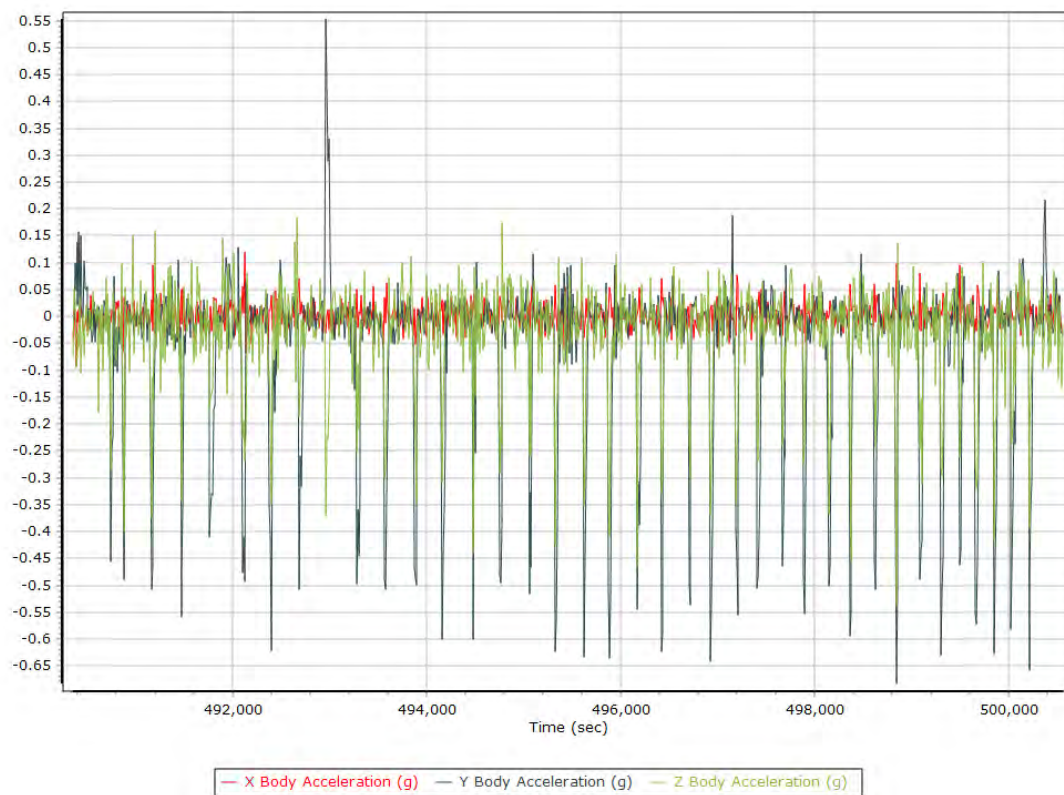
Total Speed



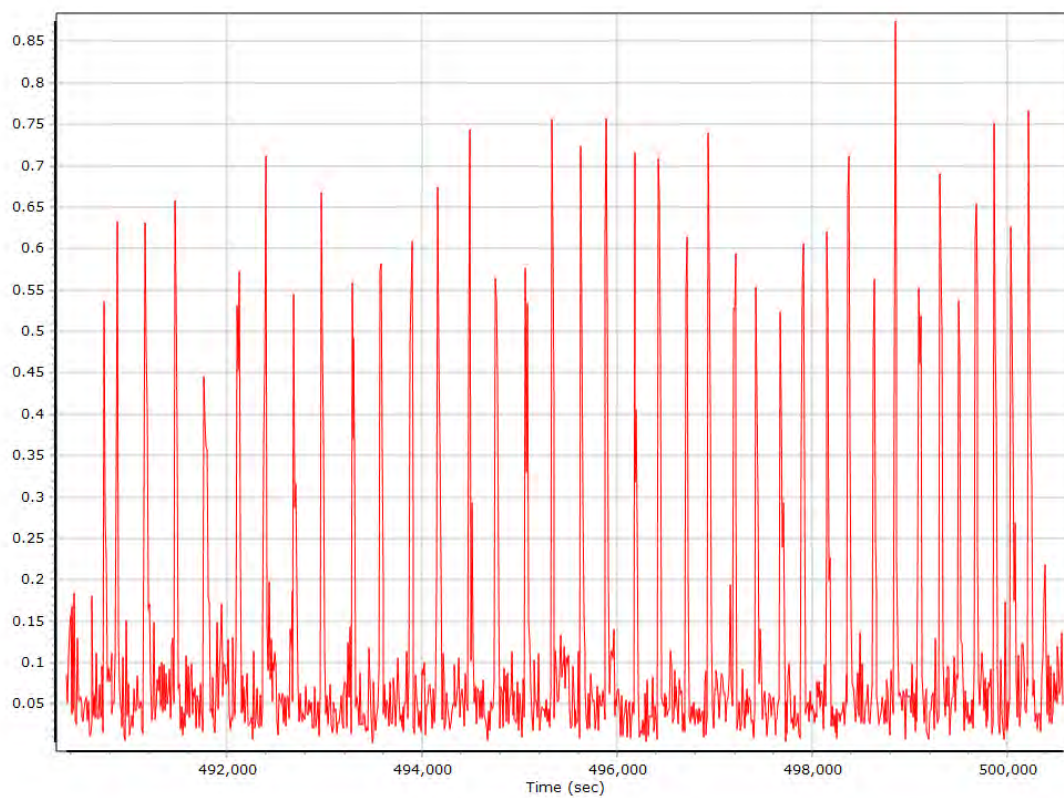
Ground Speed



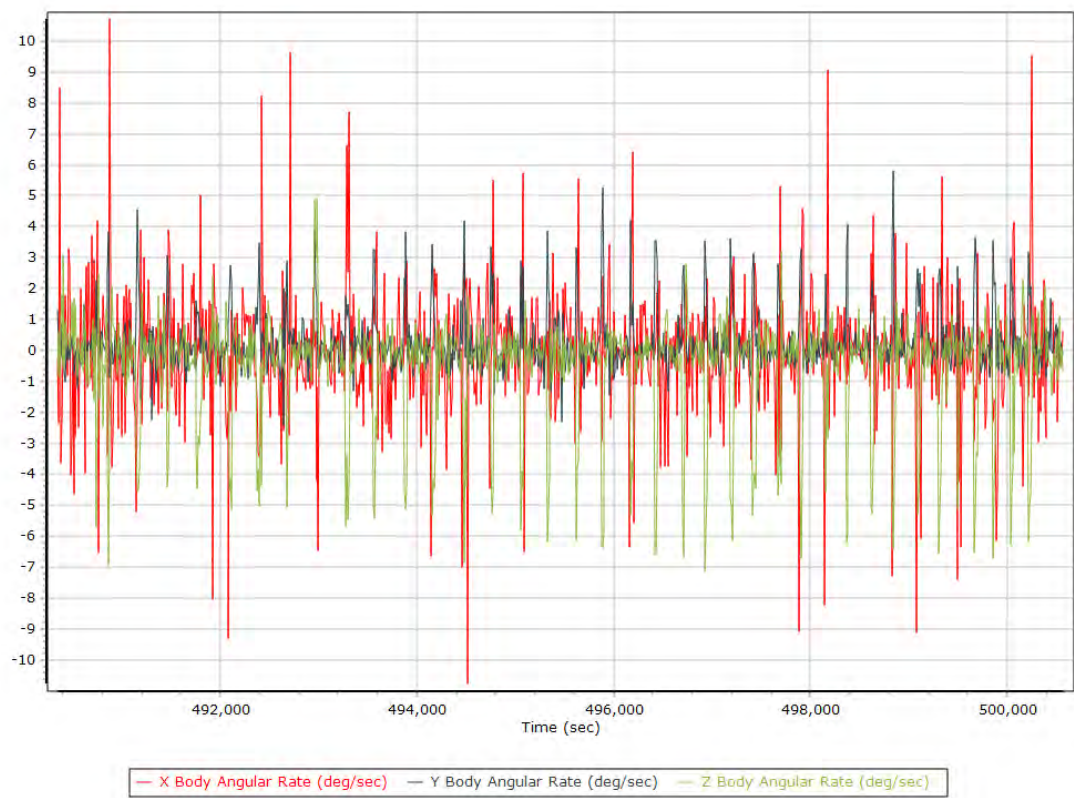
Body Acceleration



Total Body Acceleration

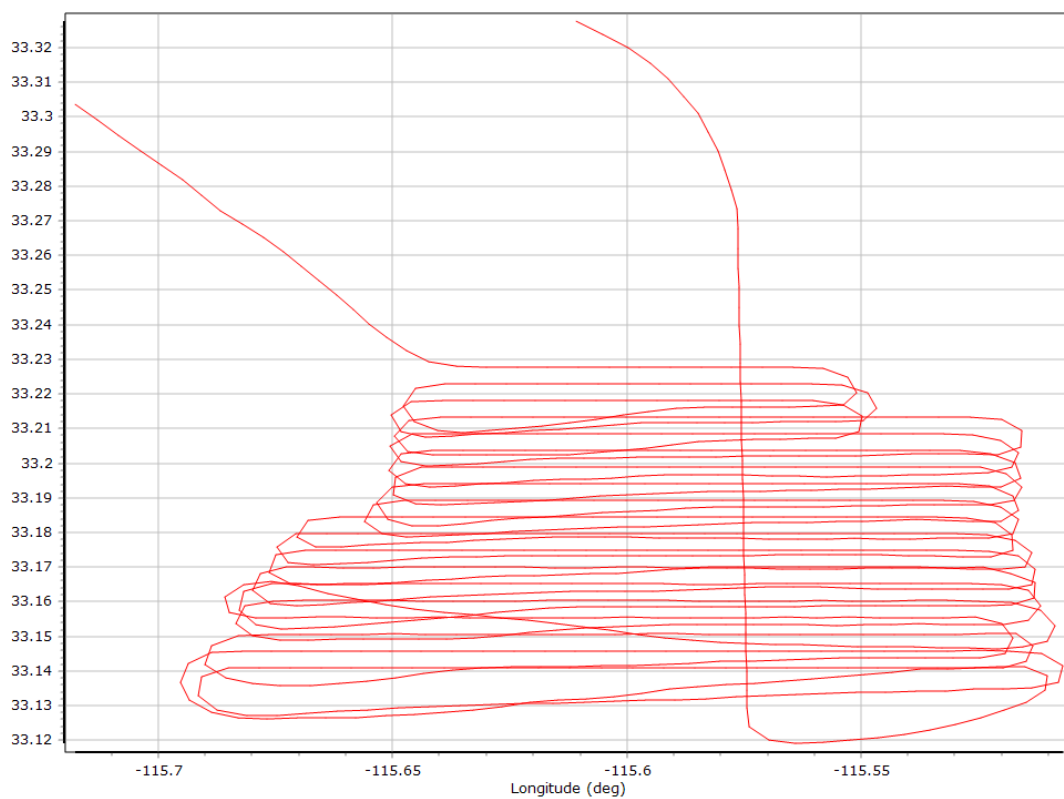


Body Angular Rate

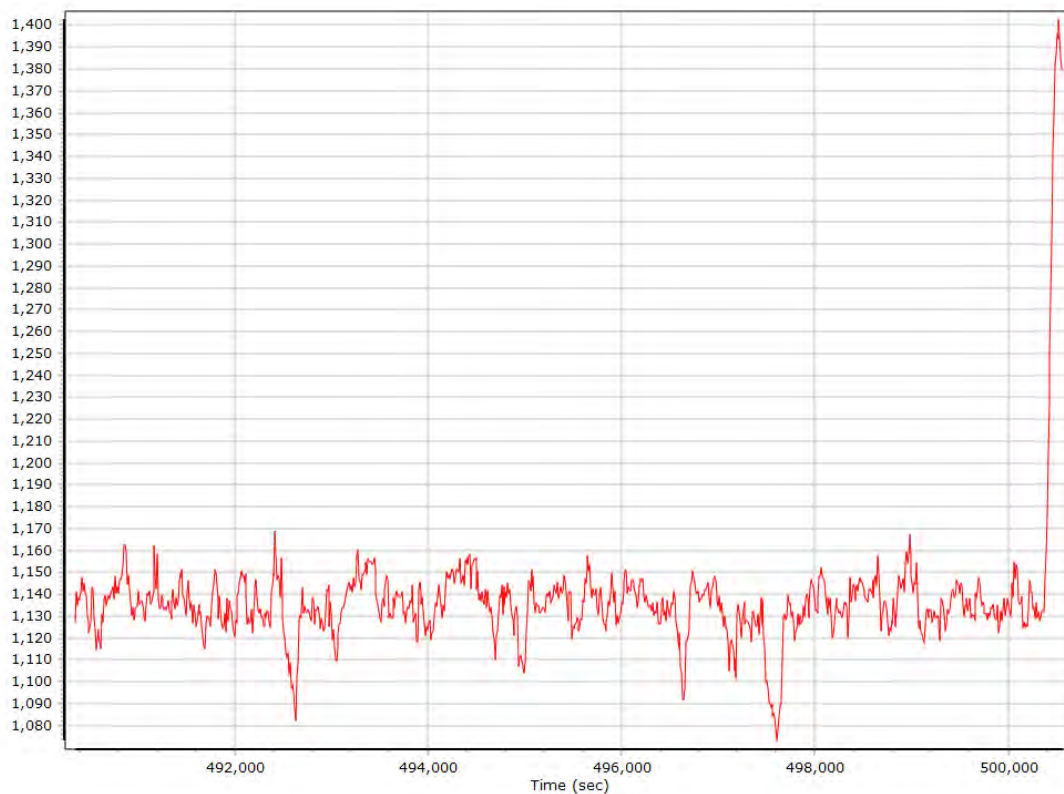


Forward Processed Trajectory Information

Top View



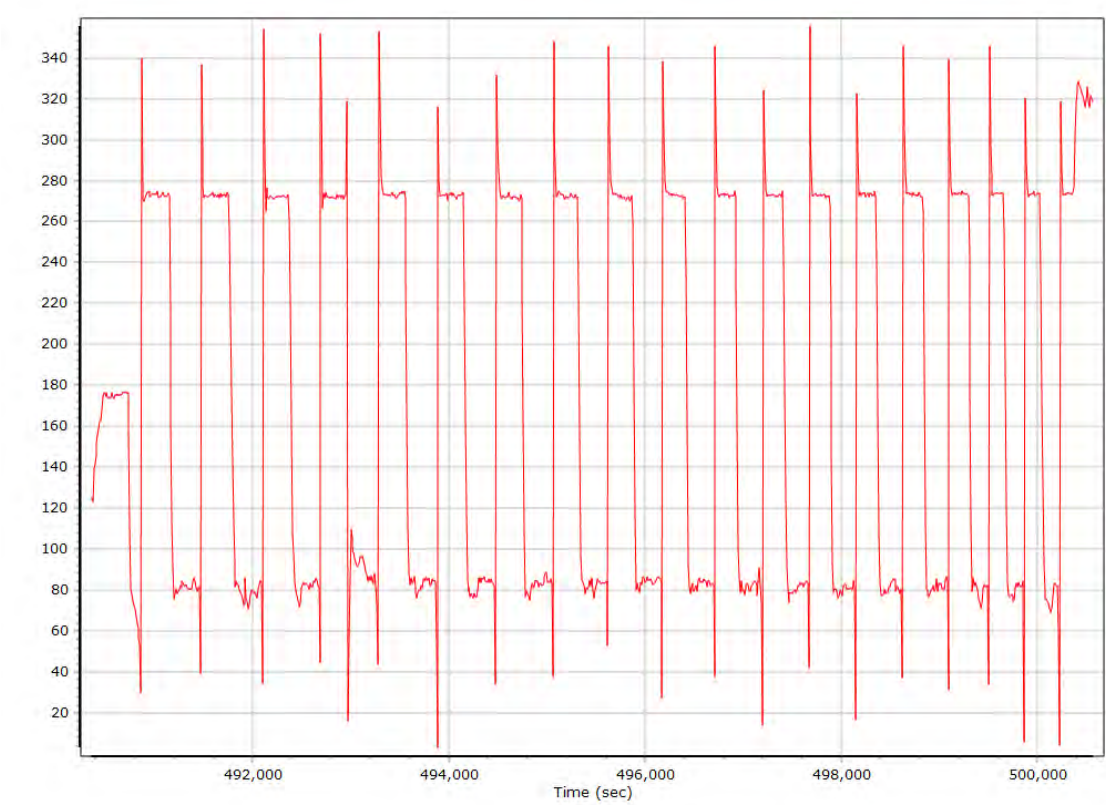
Altitude



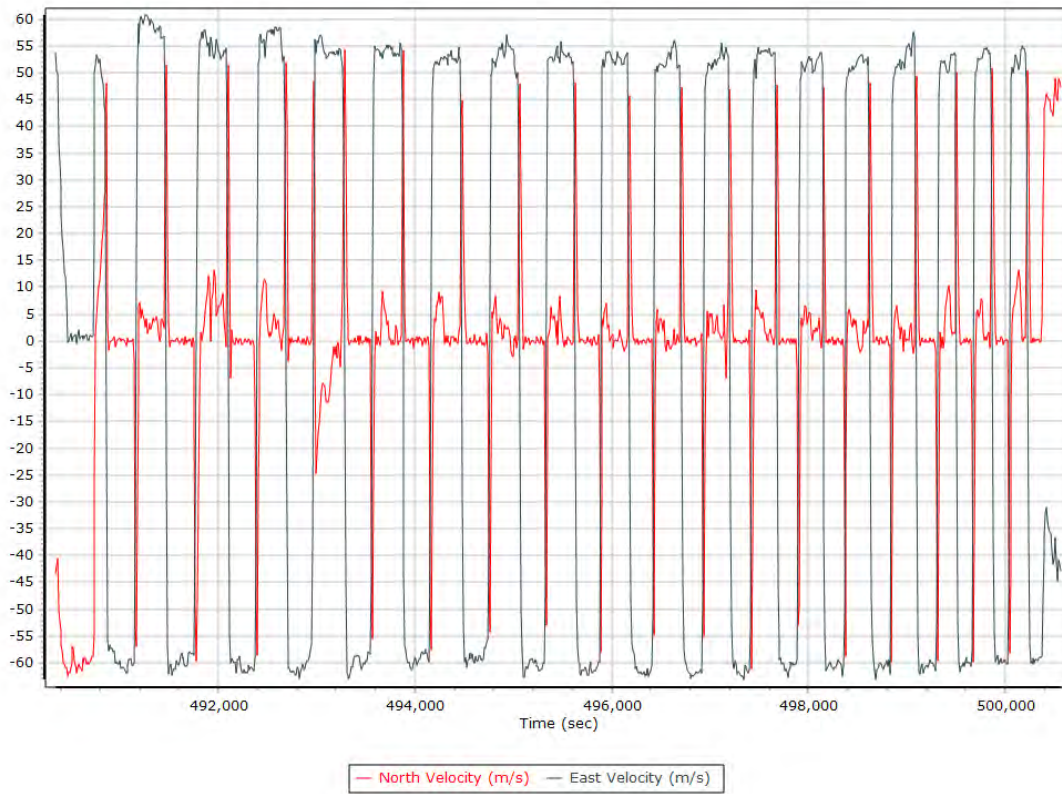
Roll/Pitch



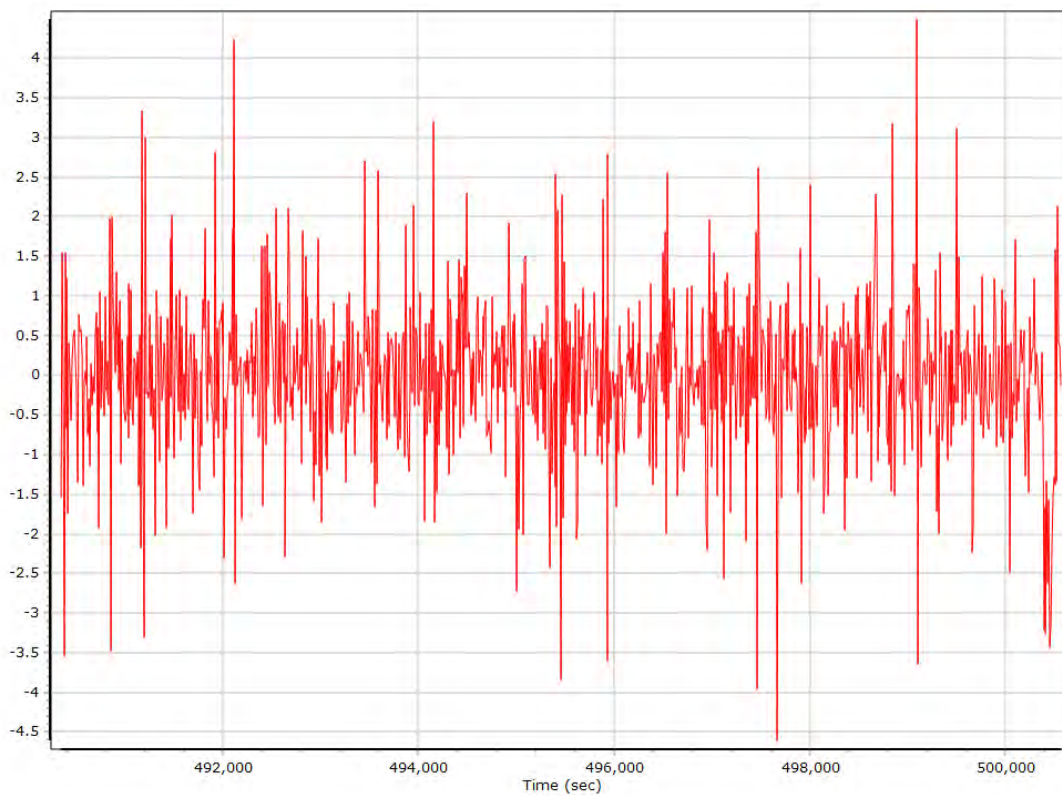
Heading



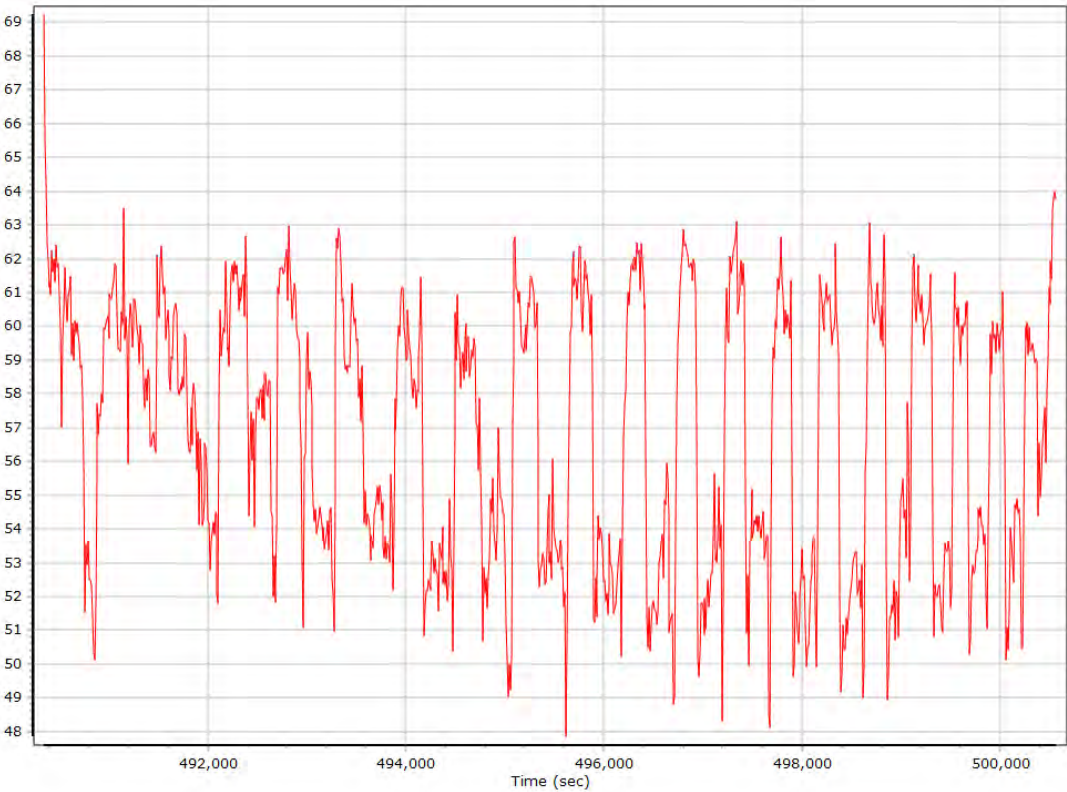
North/East Velocity



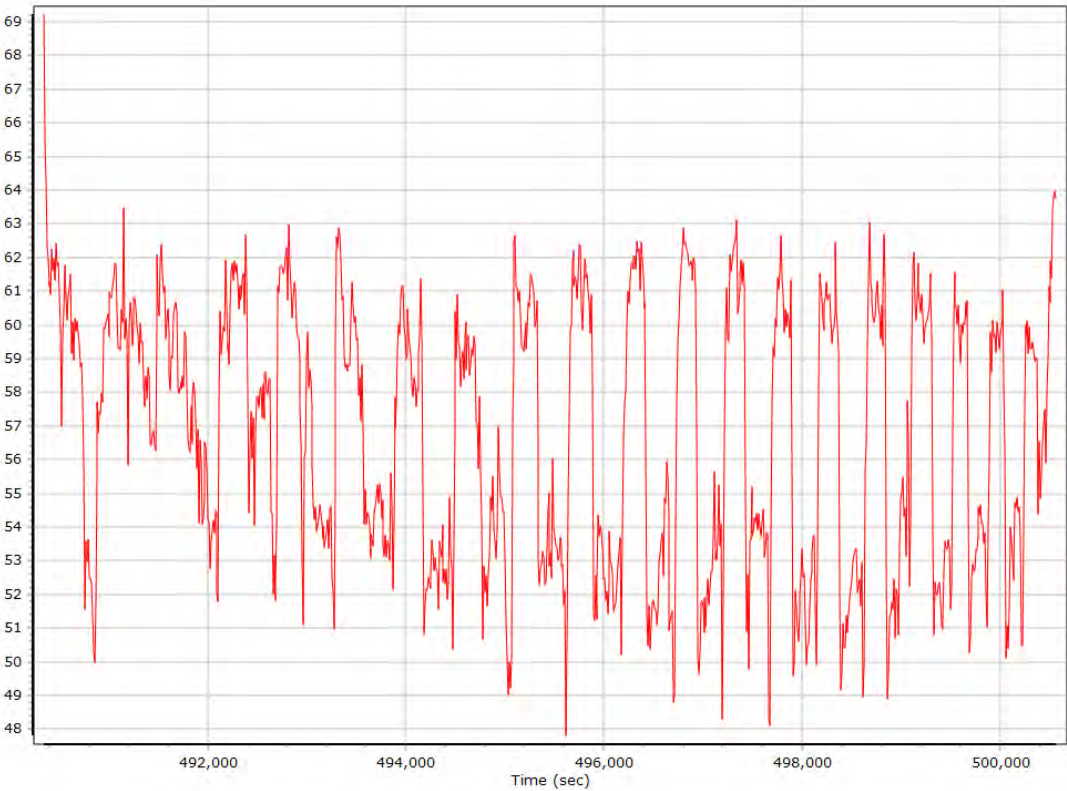
Down Velocity



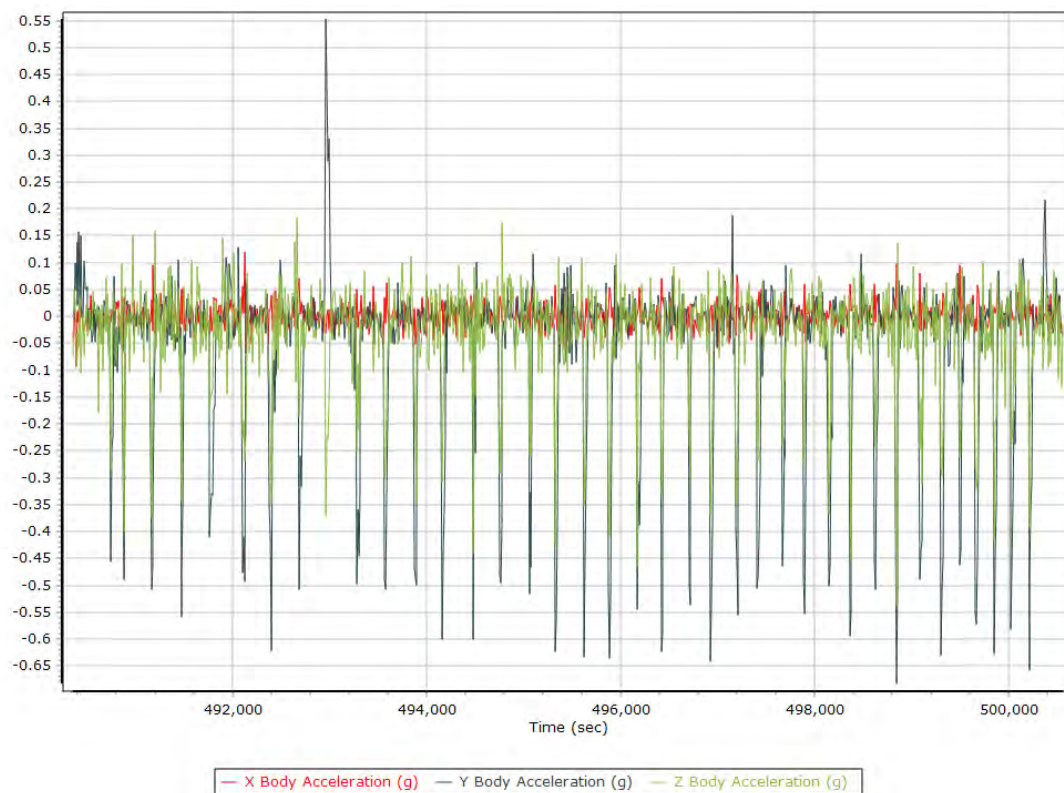
Total Speed



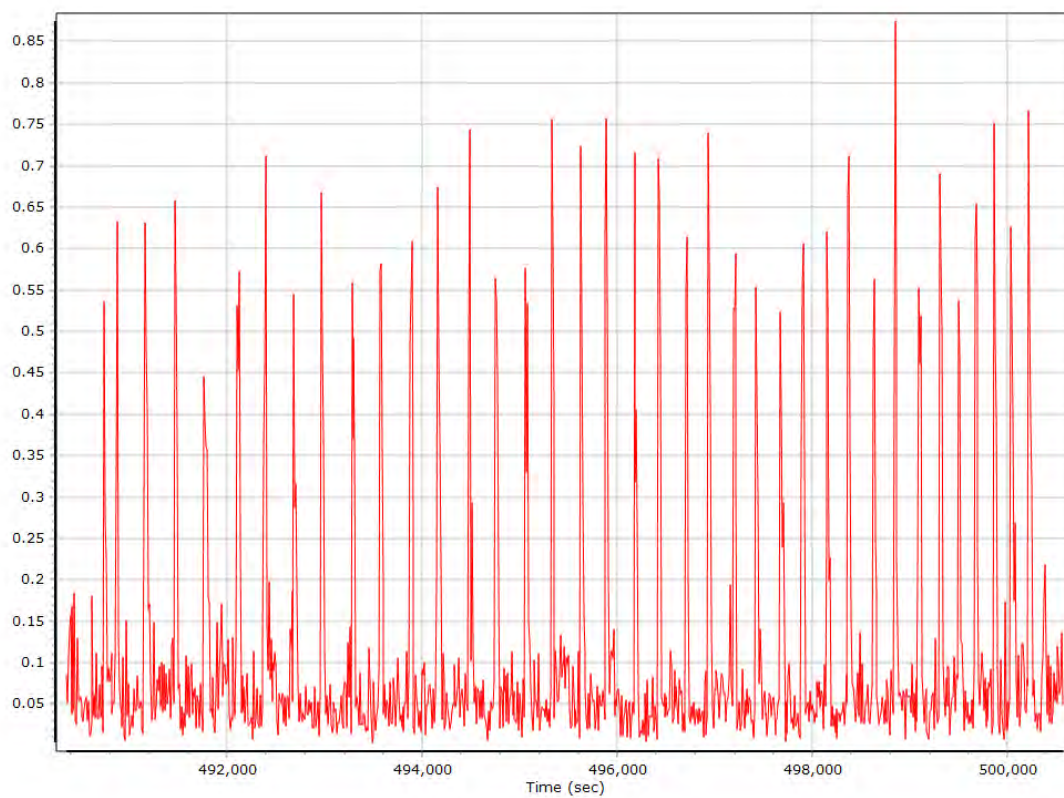
Ground Speed



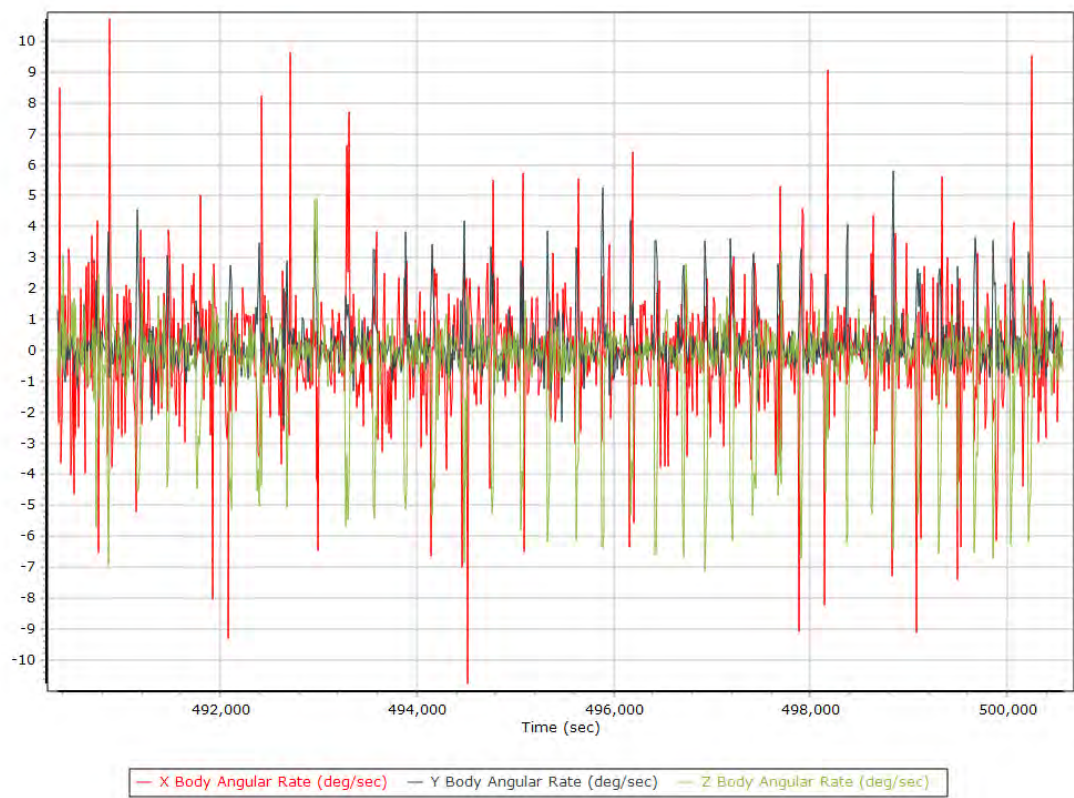
Body Acceleration



Total Body Acceleration



Body Angular Rate



SmartBase Processing Summary

Smart Select Options

Archive enabled	False
User database enabled	False
Include high-rate data sites	False
Include RINEX 3 data sites	False
Target GNSS Selection	GNSS

Basestation Selection

Date	ID	Dist	System	Rate	Service	Database	Status
05/13/2022	P507	3.11	GPS	15	UNAVCO (daily)	Smart Base	Imported
05/13/2022	GLRS	12.69	GNSS	30	CORS (daily)	Smart Base	Imported
05/13/2022	P506	13.43	GNSS	30	CORS (daily)	Smart Base	Imported
05/13/2022	P495	15.24	GPS	15	UNAVCO (daily)	Smart Base	Imported
05/13/2022	P508	17.29	GNSS	15	UNAVCO (daily)	Smart Base	Imported
05/13/2022	CRRS	17.88	GPS	15	UNAVCO (daily)	Smart Base	Imported
05/13/2022	ERRG	22.42	GNSS	15	UNAVCO (daily)	Smart Base	Imported
05/13/2022	P510	23.79	GNSS	15	UNAVCO (daily)	Smart Base	Imported
05/13/2022	BOMG	24.17	GNSS	15	UNAVCO (daily)	Smart Base	Imported
05/13/2022	P499	24.28	GNSS	15	UNAVCO (daily)	Smart Base	Imported
05/13/2022	P502	27.14	GPS	15	UNAVCO (daily)	Smart Base	Imported
05/13/2022	P503	28.10	GPS	15	UNAVCO (daily)	Smart Base	Imported

SmartBase Results

SmartBase status	PROC_STATUS_OK
Primary station Id	GLRS
Primary station data rate (sec)	30.0
VRS/ASB generation rate (sec)	1.0
VRS/ASB timespan	16564 s (2209 485383 - 2209 501947)
Number of reference stations	9
Primary station GPS measurement usage (%)	98.8
Primary station GLONASS measurement usage (%)	69.6
Average number of satellites per epoch	13.0
Max number of GPS stations used	6
Min number of GPS stations used	3
Max number of GLONASS stations used	5
Min number of GLONASS stations used	3
Total full data gap (sec)	0
Total GPS full data gaps	0
Total GLONASS full data gaps	0
Total individual satellite data gap (sec)	34802
GPS precise vs. broadcast ephemeris used	0.0 % / 100.0 %
GLONASS precise vs. broadcast ephemeris used	0.0 % / 100.0 %
Termination Status	Normal

SmartBase Quality Check

Base Station - BOMG

Status	OK	SBQI	9	
Duration (Hours)	22.67	Output Coordinates	Original	
Solution Epochs	2720	Mean Epoch SVs	8.8	
Base Station Coordinates		Latitude	Longitude	Height (m)
Original		N33°21'52.66064"	W115°43'46.94756"	84.258
Adjusted		N33°21'52.66077"	W115°43'46.94765"	84.242
Coordinate Adjustments		Horizontal (m)	Vertical (m)	Total (m)
Adjustments		0.005	0.016	0.017

Base Station Information

Station ID	BOMG		
Filename	bomg1330.22o		
Start date	5/13/2022 12:00:00 AM		
End date	5/13/2022 11:59:45 PM		
Duration	23:59:45.000		
Data type	GNSS		
Receiver manufacturer, model, serial no.	Trimble	NetR9	5301K55926
Antenna manufacturer, model	Trimble	Zephyr Geodetic 2 RoHS	
Antenna height [m]	0.035		
Antenna measurement method	Bottom of antenna mount		
Offset from measured point to APC (m)	0.08546		
Latitude	N33°21'52.66064"		
Longitude	W115°43'46.94756"		
Ellipsoidal height (m)	-84.25789		
Frame	ITRF00		
Epoch	2022.3616		
Ellipsoid	WGS84		
Velocity North (mm/y)	-5.55559013037266		
Velocity East (mm/y)	-19.6092420728597		
Velocity Up (mm/y)	-1.01167654566297		

Base Station - P510

Status	OK	SBQI	9
Duration (Hours)	22.67	Output Coordinates	Original
Solution Epochs	2720	Mean Epoch SVs	7.6
Base Station Coordinates	Latitude	Longitude	Height (m)
Original	N33°08'36.86350"	W115°20'36.00324"	1.511
Adjusted	N33°08'36.86299"	W115°20'36.00314"	1.501
Coordinate Adjustments	Horizontal (m)	Vertical (m)	Total (m)
Adjustments	0.016	0.010	0.019

Base Station Information

Station ID	P510
Filename	p5101330.22o
Start date	5/13/2022 12:00:00 AM
End date	5/13/2022 11:59:45 PM
Duration	23:59:45.000
Data type	GNSS
Receiver manufacturer, model, serial no.	Septentrio PolaRx5 3075033
Antenna manufacturer, model	UNAVCO TRM 59800.99 w/SCIT
Antenna height [m]	0.008
Antenna measurement method	Bottom of antenna mount
Offset from measured point to APC (m)	0.08569
Latitude	N33°08'36.86350"
Longitude	W115°20'36.00324"
Ellipsoidal height (m)	1.51071
Frame	ITRF00
Epoch	2022.3616
Ellipsoid	WGS84
Velocity North (mm/y)	-4.99201912005521
Velocity East (mm/y)	-12.5953844555759
Velocity Up (mm/y)	0.64242134555524

Base Station - ERRG

Status	OK	SBQI	7	
Duration (Hours)	22.14	Output Coordinates	Original	
Solution Epochs	2657	Mean Epoch SVs	8.4	
Base Station Coordinates		Latitude	Longitude	Height (m)
Original		N33°06'59.20370"	W115°49'21.84761"	92.415
Adjusted		N33°06'59.20400"	W115°49'21.84774"	92.389
Coordinate Adjustments		Horizontal (m)	Vertical (m)	Total (m)
Adjustments		0.010	0.027	0.028

Base Station Information

Station ID	ERRG		
Filename	errg1330.22o		
Start date	5/13/2022 12:00:00 AM		
End date	5/13/2022 11:59:45 PM		
Duration	23:59:45.000		
Data type	GNSS		
Receiver manufacturer, model, serial no.	Topcon	NET-G3A	618-01043
Antenna manufacturer, model	Topcon	TPS CR.G3 w/SCIT	
Antenna height [m]	0.008		
Antenna measurement method	Bottom of antenna mount		
Offset from measured point to APC (m)	0.1051		
Latitude	N33°06'59.20370"		
Longitude	W115°49'21.84761"		
Ellipsoidal height (m)	-92.41514		
Frame	ITRF00		
Epoch	2022.3616		
Ellipsoid	WGS84		
Velocity North (mm/y)	3.66763783722735		
Velocity East (mm/y)	-28.2142966146359		
Velocity Up (mm/y)	-1.28262669274541		

Base Station - CRRS

Status	OK	SBQI	9	
Duration (Hours)	22.67	Output Coordinates	Original	
Solution Epochs	2720	Mean Epoch SVs	8.6	
Base Station Coordinates		Latitude	Longitude	Height (m)
Original		N33°04'11.30859"	W115°44'06.16250"	81.905
Adjusted		N33°04'11.30875"	W115°44'06.16226"	81.891
Coordinate Adjustments		Horizontal (m)	Vertical (m)	Total (m)
Adjustments		0.008	0.014	0.016

Base Station Information

Station ID	CRRS		
Filename	crrs1330.22o		
Start date	5/13/2022 12:00:00 AM		
End date	5/13/2022 11:59:45 PM		
Duration	23:59:45.000		
Data type	GPS		
Receiver manufacturer, model, serial no.	Trimble	NetRS	4427235662
Antenna manufacturer, model	Trimble	TRM59800-80 w/SCIT Dome	
Antenna height [m]	0.008		
Antenna measurement method	Bottom of antenna mount		
Offset from measured point to APC (m)	0.11		
Latitude	N33°04'11.30859"		
Longitude	W115°44'06.16250"		
Ellipsoidal height (m)	-81.90516		
Frame	ITRF00		
Epoch	2022.3616		
Ellipsoid	WGS84		
Velocity North (mm/y)	5.8325629808463		
Velocity East (mm/y)	-25.5660240595239		
Velocity Up (mm/y)	1.04648697700421		

Base Station - P508

Status	OK	SBQI	9	
Duration (Hours)	22.67	Output Coordinates	Original	
Solution Epochs	2720	Mean Epoch SVs	6.7	
Base Station Coordinates		Latitude	Longitude	Height (m)
Original		N33°14'52.00508"	W115°25'43.34564"	10.685
Adjusted		N33°14'52.00449"	W115°25'43.34597"	10.685
Coordinate Adjustments		Horizontal (m)	Vertical (m)	Total (m)
Adjustments		0.020	0.000	0.020

Base Station Information

Station ID	P508		
Filename	p5081330.22o		
Start date	5/13/2022 12:00:00 AM		
End date	5/13/2022 11:59:45 PM		
Duration	23:59:45.000		
Data type	GNSS		
Receiver manufacturer, model, serial no.	Septentrio	PolarRx5	3012393
Antenna manufacturer, model	Trimble	GNSS Choke w/SCIT Dome	
Antenna height [m]	0.008		
Antenna measurement method	Bottom of antenna mount		
Offset from measured point to APC (m)	0.11		
Latitude	N33°14'52.00508"		
Longitude	W115°25'43.34564"		
Ellipsoidal height (m)	10.68466		
Frame	ITRF00		
Epoch	2022.3616		
Ellipsoid	WGS84		
Velocity North (mm/y)	-5.00219586573782		
Velocity East (mm/y)	-12.5913783711368		
Velocity Up (mm/y)	0.649036271159588		

Base Station - P495

Status	OK	SBQI	9	
Duration (Hours)	22.67	Output Coordinates	Original	
Solution Epochs	2720	Mean Epoch SVs	8.5	
Base Station Coordinates		Latitude	Longitude	Height (m)
Original		N33°02'41.85729"	W115°37'42.22588"	84.079
Adjusted		N33°02'41.85782"	W115°37'42.22590"	84.052
Coordinate Adjustments		Horizontal (m)	Vertical (m)	Total (m)
Adjustments		0.016	0.027	0.031

Base Station Information

Station ID	P495		
Filename	p4951330.22o		
Start date	5/13/2022 12:00:00 AM		
End date	5/13/2022 11:59:45 PM		
Duration	23:59:45.000		
Data type	GPS		
Receiver manufacturer, model, serial no.	Trimble	NetRS	4522251529
Antenna manufacturer, model	Trimble	Choke Ring w/SCIT Dome	
Antenna height [m]	0.008		
Antenna measurement method	Bottom of antenna mount		
Offset from measured point to APC (m)	0.11		
Latitude	N33°02'41.85729"		
Longitude	W115°37'42.22588"		
Ellipsoidal height (m)	-84.07864		
Frame	ITRF00		
Epoch	2022.3616		
Ellipsoid	WGS84		
Velocity North (mm/y)	4.66481805281871		
Velocity East (mm/y)	-22.1107184742231		
Velocity Up (mm/y)	-6.23487857957138		

Base Station - P506

Status	OK	SBQI	9
Duration (Hours)	22.67	Output Coordinates	Original
Solution Epochs	2720	Mean Epoch SVs	8.0
Base Station Coordinates	Latitude	Longitude	Height (m)
Original	N33°04'53.14484"	W115°30'36.72012"	83.465
Adjusted	N33°04'53.14495"	W115°30'36.71968"	83.457
Coordinate Adjustments	Horizontal (m)	Vertical (m)	Total (m)
Adjustments	0.012	0.008	0.014

Base Station Information

Station ID	P506
Filename	p5061330.22o
Start date	5/13/2022 12:00:00 AM
End date	5/13/2022 11:59:30 PM
Duration	23:59:30.000
Data type	GNSS
Receiver manufacturer, model, serial no.	Trimble NetR9 5303K57612
Antenna manufacturer, model	Trimble TRM59800-80 w/SCIT Dome
Antenna height [m]	0.008
Antenna measurement method	Bottom of antenna mount
Offset from measured point to APC (m)	0.11
Latitude	N33°04'53.14484"
Longitude	W115°30'36.72012"
Ellipsoidal height (m)	-83.46520
Frame	ITRF00
Epoch	2022.3616
Ellipsoid	WGS84
Velocity North (mm/y)	-9.81504405388771
Velocity East (mm/y)	-16.0580103205209
Velocity Up (mm/y)	-5.67072439392276

Base Station - P507

Status	OK	SBQI	9
Duration (Hours)	22.67	Output Coordinates	Adjusted
Solution Epochs	2720	Mean Epoch SVs	8.7
Base Station Coordinates	Latitude	Longitude	Height (m)
Original	N33°11'59.90938"	W115°36'44.66647"	78.539
Adjusted	N33°11'59.90752"	W115°36'44.66739"	78.600
Coordinate Adjustments	Horizontal (m)	Vertical (m)	Total (m)
Adjustments	0.000	0.000	0.000

Base Station Information

Station ID	P507
Filename	p5071330.22o
Start date	5/13/2022 12:00:00 AM
End date	5/13/2022 11:59:45 PM
Duration	23:59:45.000
Data type	GPS
Receiver manufacturer, model, serial no.	Trimble NetRS 4537257368
Antenna manufacturer, model	Trimble Choke Ring w/SCIT Dome
Antenna height [m]	0.008
Antenna measurement method	Bottom of antenna mount
Offset from measured point to APC (m)	0.11
Latitude	N33°11'59.90938"
Longitude	W115°36'44.66647"
Ellipsoidal height (m)	-78.53851
Frame	ITRF00
Epoch	2022.3616
Ellipsoid	WGS84
Velocity North (mm/y)	-5.02433337898832
Velocity East (mm/y)	-12.5826635389121
Velocity Up (mm/y)	0.686968671025071

Base Station - GLRS

Status	CONTROL	SBQI	9
Duration (Hours)	22.67	Output Coordinates	Control
Solution Epochs	2720	Mean Epoch SVs	7.8
Base Station Coordinates	Latitude	Longitude	Height (m)
Original	N33°16'29.31835"	W115°31'16.94681"	48.658
Adjusted	N33°16'29.31835"	W115°31'16.94681"	48.658
Coordinate Adjustments	Horizontal (m)	Vertical (m)	Total (m)
Adjustments	0.000	0.000	0.000

Base Station Information

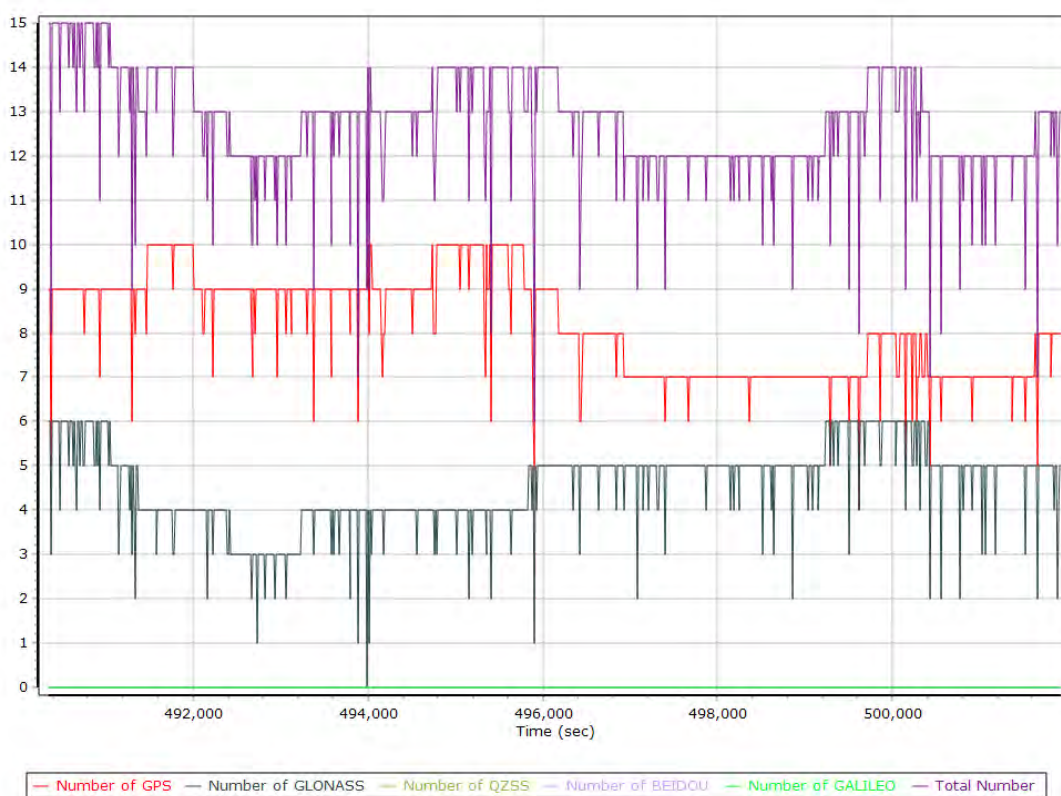
Station ID	GLRS		
Filename	glrs1330.22o		
Start date	5/13/2022 12:00:00 AM		
End date	5/13/2022 11:59:30 PM		
Duration	23:59:30.000		
Data type	GNSS		
Receiver manufacturer, model, serial no.	Trimble	NetR9	5303K57560
Antenna manufacturer, model	Trimble	TRM59800-80 w/SCIT Dome	
Antenna height [m]	0.008		
Antenna measurement method	Bottom of antenna mount		
Offset from measured point to APC (m)	0.11		
Latitude	N33°16'29.31835"		
Longitude	W115°31'16.94681"		
Ellipsoidal height (m)	-48.65782		
Frame	ITRF00		
Epoch	2022.3616		
Ellipsoid	WGS84		
Velocity North (mm/y)	-10.5091987226116		
Velocity East (mm/y)	-16.4922887886943		
Velocity Up (mm/y)	-1.15019153195771		

GNSS QC

GNSS QC Statistics

Statistics	Min	Max	Mean
Baseline length (km)	0.05	288.00	
Number of GPS SV	3	10	8
Number of GLONASS SV	0	6	4
Number of QZSS SV	0	0	0
Number of BEIDOU SV	0	0	0
Number of GALILEO SV	0	0	0
Total number of SV	5	15	13
PDOP	1.26	6.23	1.62
QC Solution Gaps	1.00	2.00	
Solution Type	Fixed	Float	No solution
Epoch (sec)	15811.00	734.00	8.00
Percentage	95.52	4.43	0.05

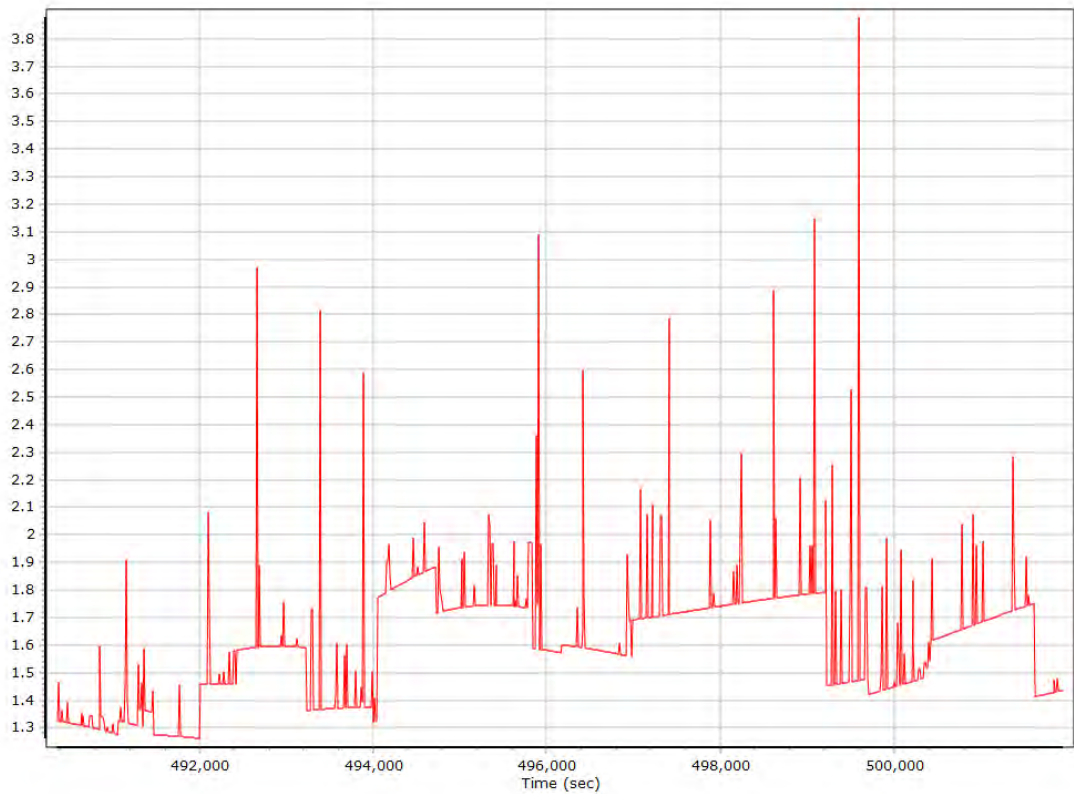
Num SVs in solution



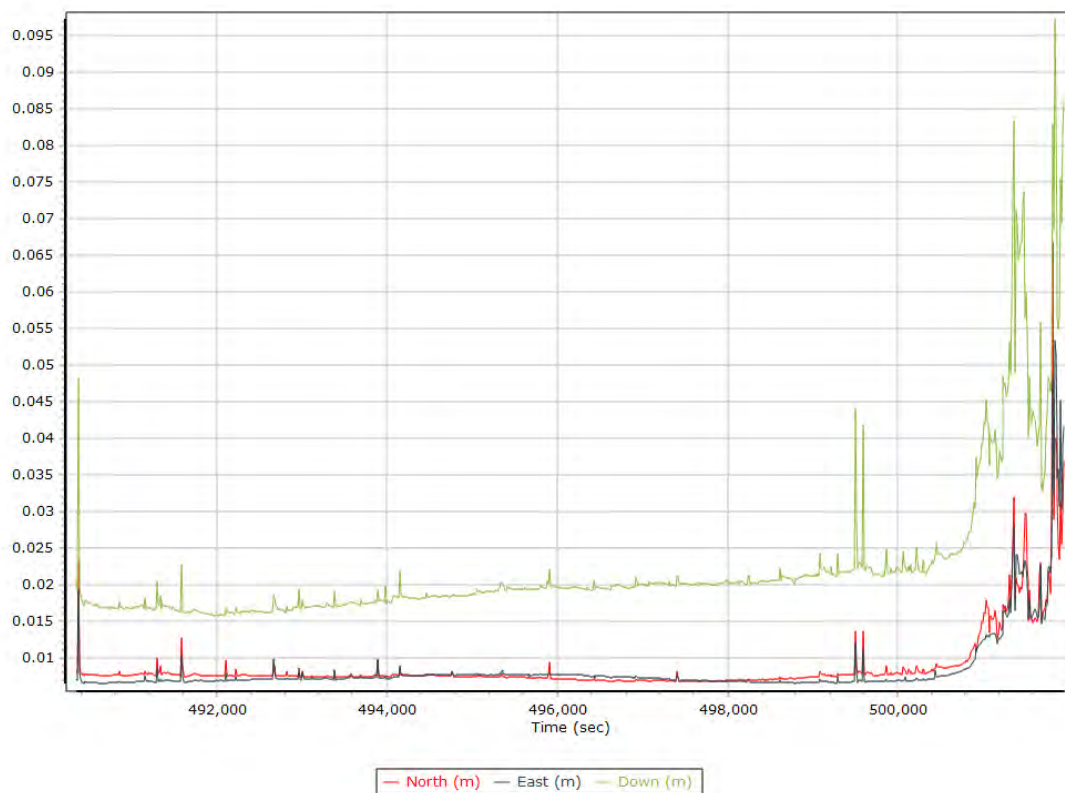
Forward/Reverse Separation



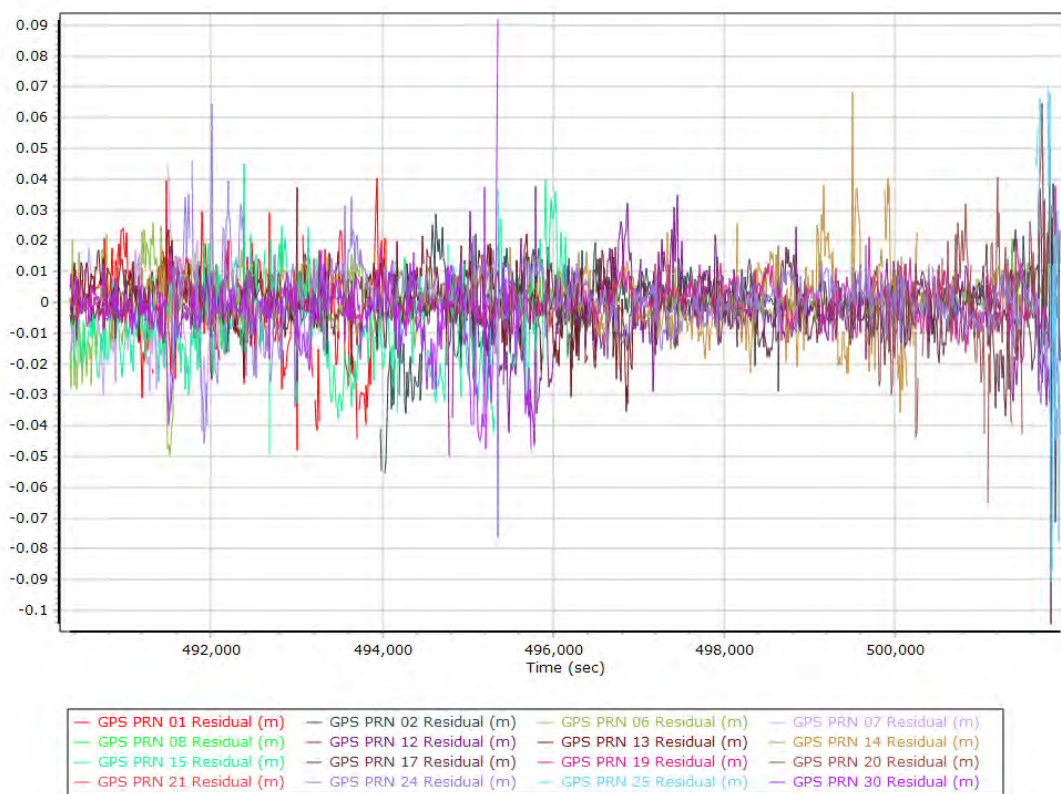
PDOP



Estimated Position Accuracy



GPS Residuals



GLONASS Residuals



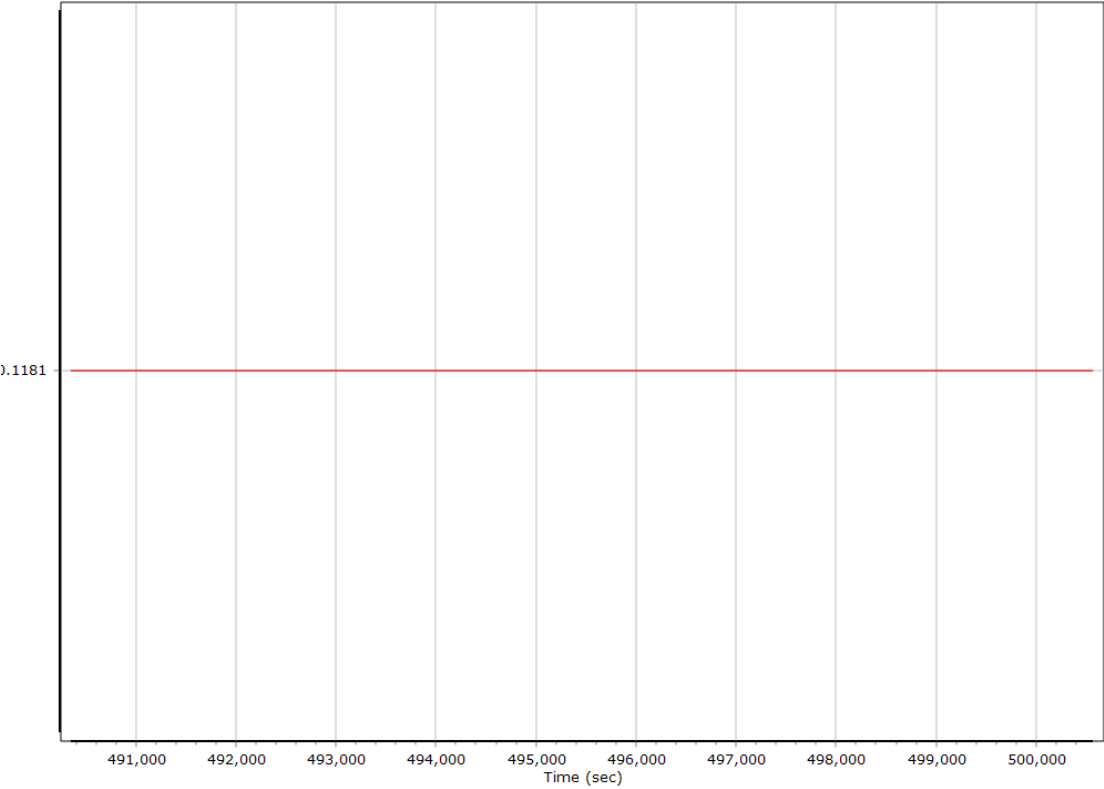
GNSS-Inertial Processor Configuration

Processing mode	IN-Fusion SmartBase		
Stabilized mount	False		
Base station	ASB		
Processing start time	490287.709 (5/13/2022 4:11:27 PM)		
Processing end time	500568.100 (5/13/2022 7:02:48 PM)		
Initial attitude source	Real-Time VNAV/RNAV Attitude		
IMU Sensor Context	Processing with Onboard IMU		
Reference to IMU lever arm (m)	0.000	0.000	0.000
Reference to IMU mounting angles (deg)	0.000	0.000	180.000
Reference to Primary GNSS lever arm (m)	0.118	-0.185	-0.949
Reference to Primary GNSS lever arm std dev (m)	0.030	0.030	0.030
Aircraft to Reference mounting angles (deg)	0.000	0.000	0.000

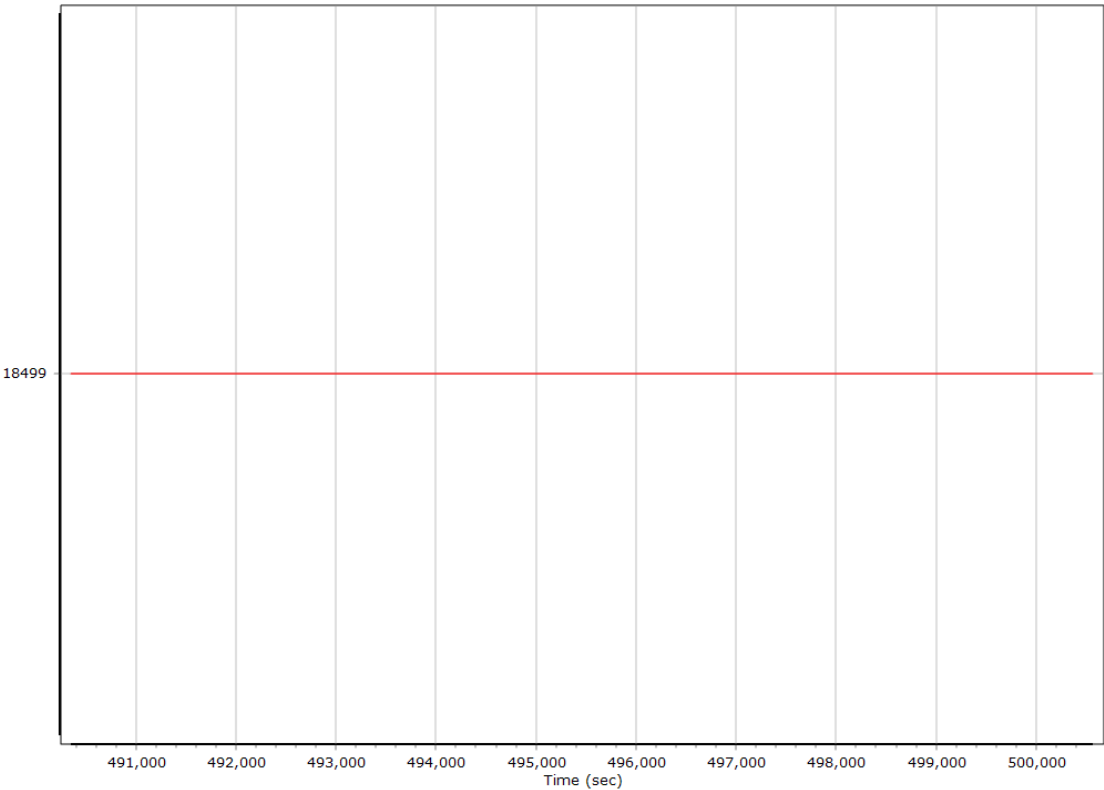
Calibrated Installation Parameters

Reference-Primary GNSS Lever Arm (m)

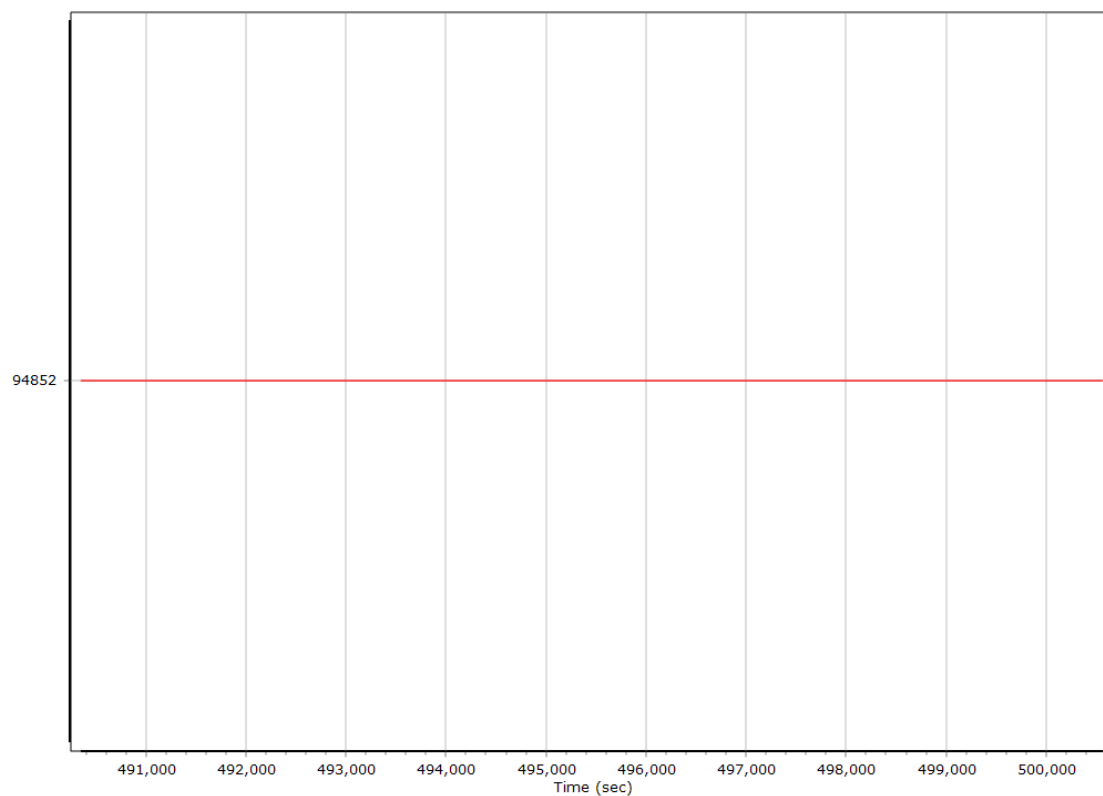
X Reference-Primary GNSS Lever Arm (m)



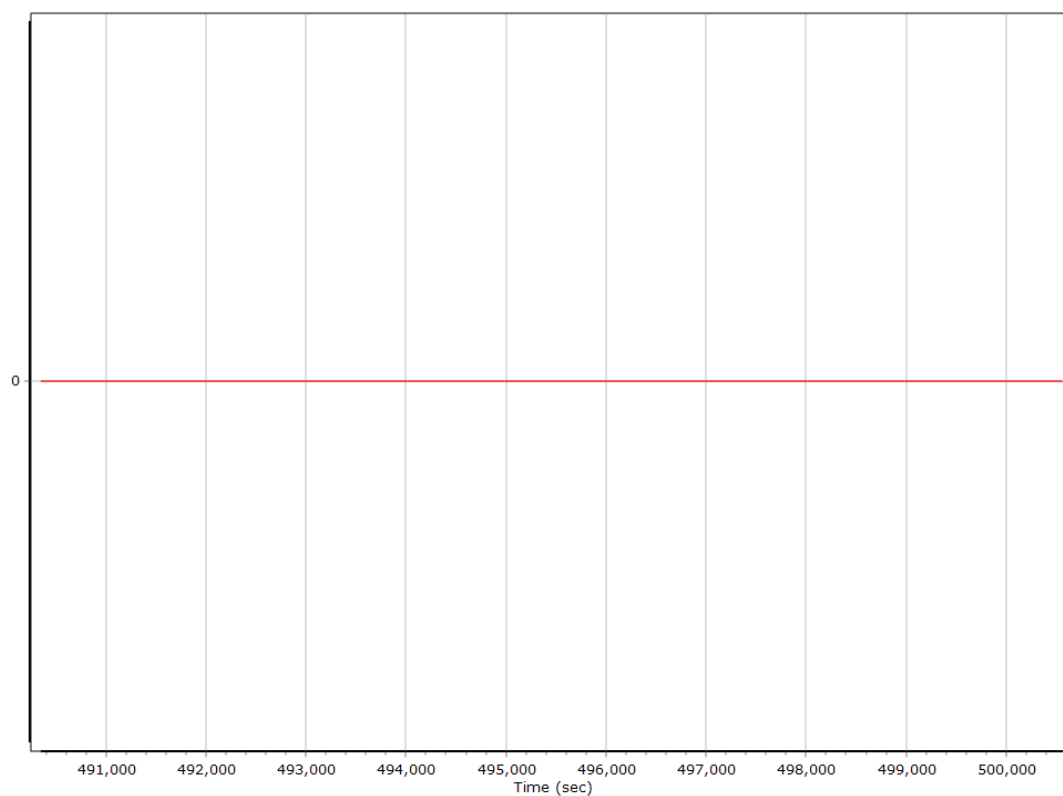
Y Reference-Primary GNSS Lever Arm (m)



Z Reference-Primary GNSS Lever Arm (m)



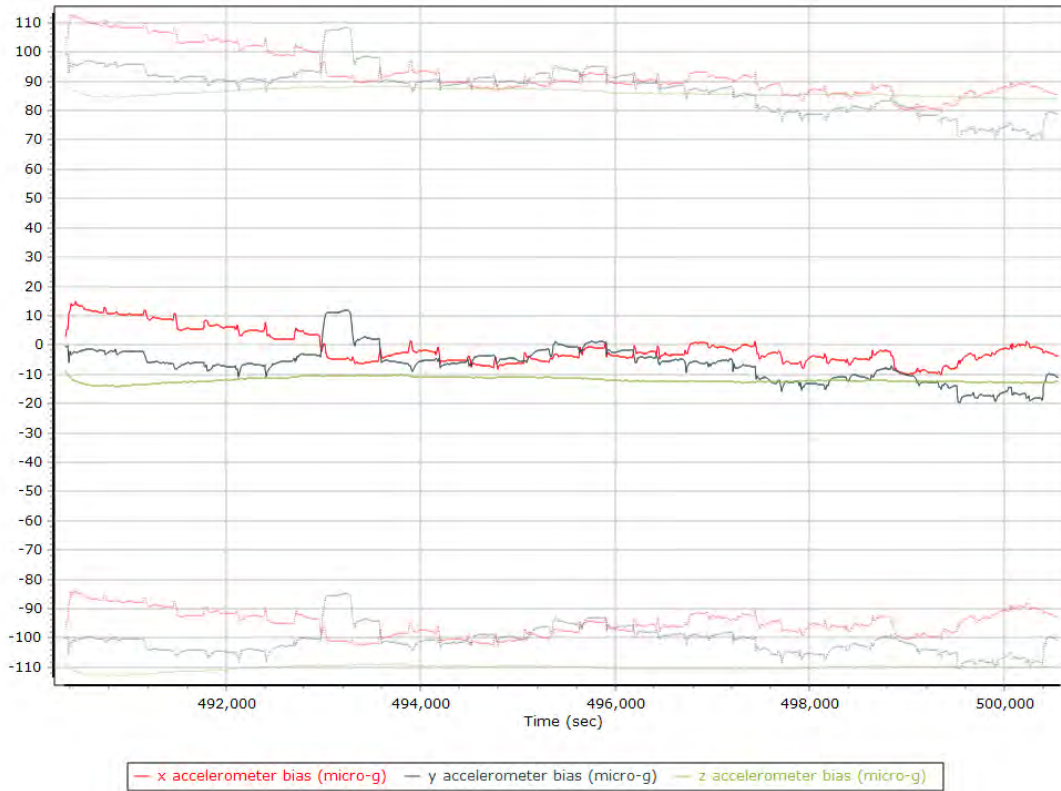
Reference-Primary GNSS Lever Arm Figure of Merit



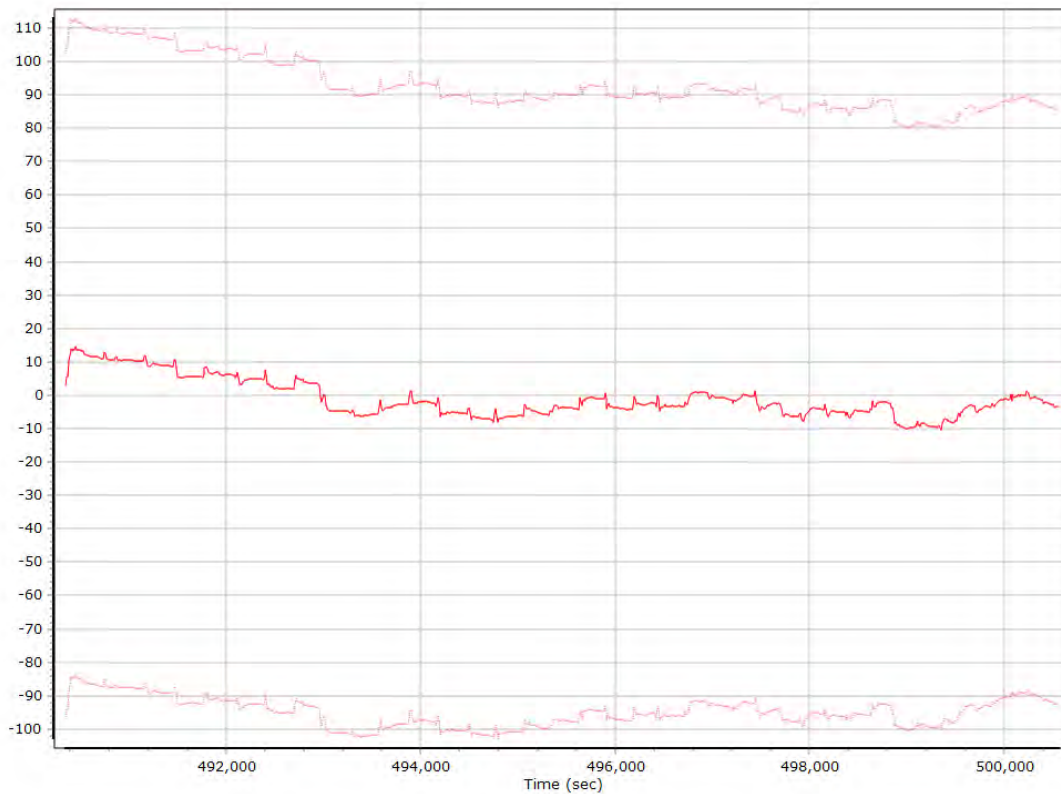
IN-Fusion QC

Forward Processed Estimated Errors, Reference Frame

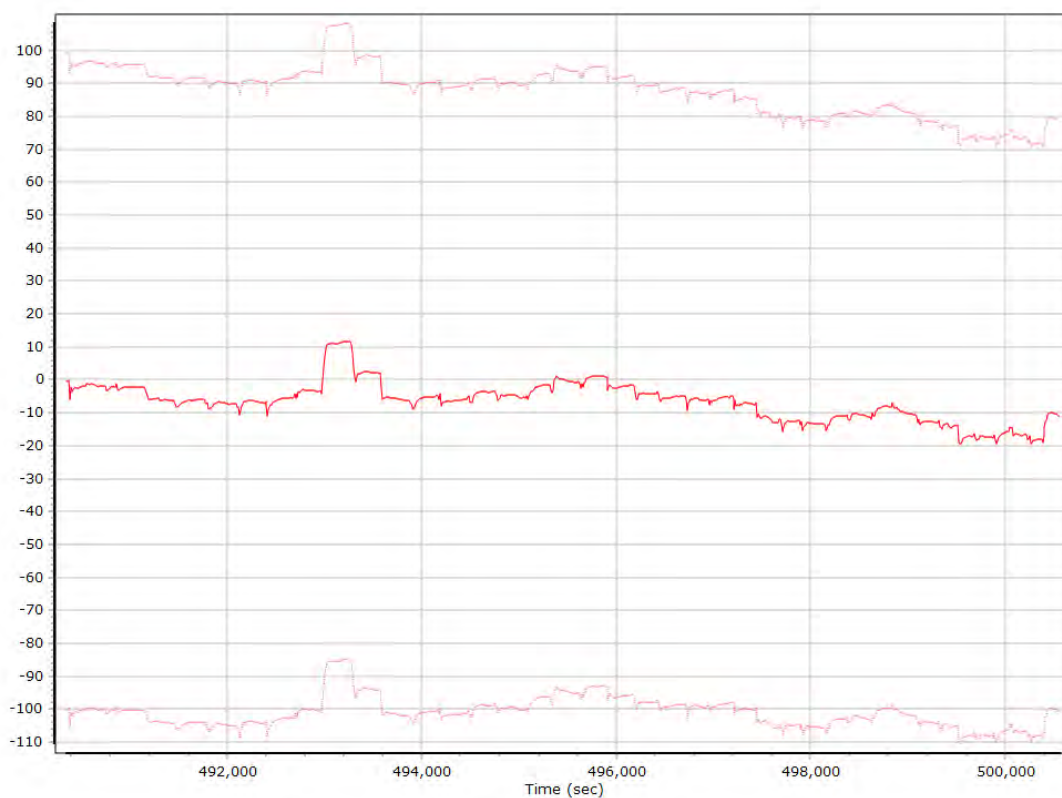
Accelerometer Bias (micro-g)



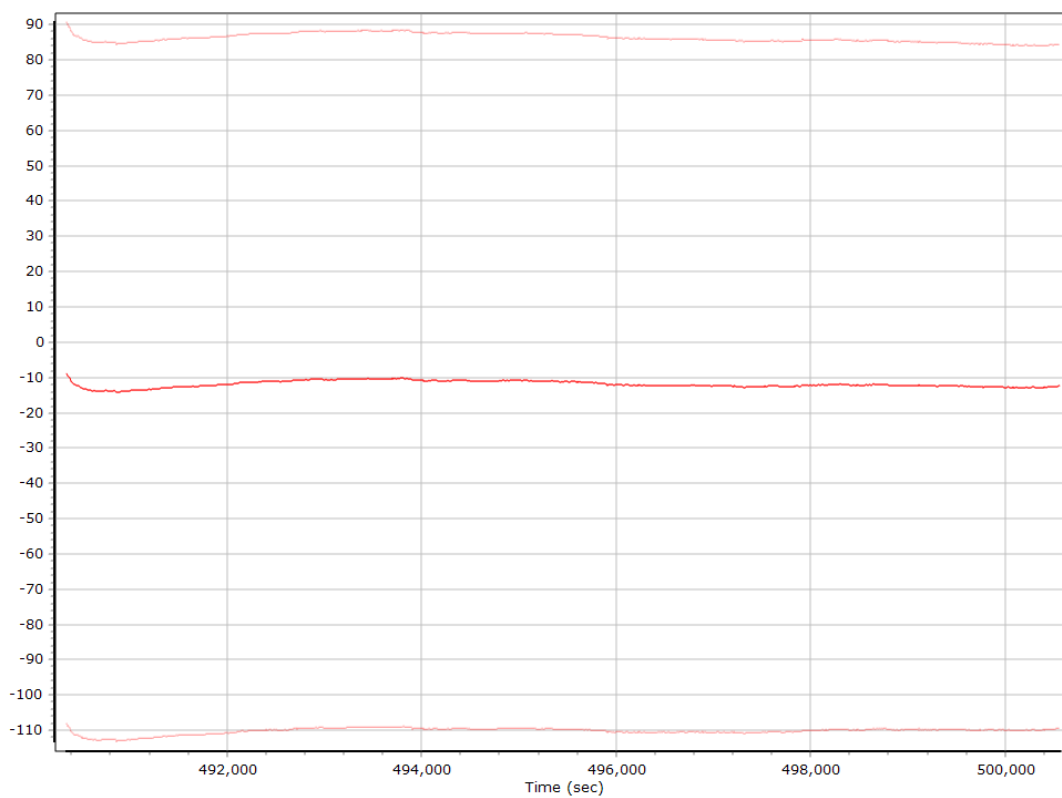
X Accelerometer Bias (micro-g)



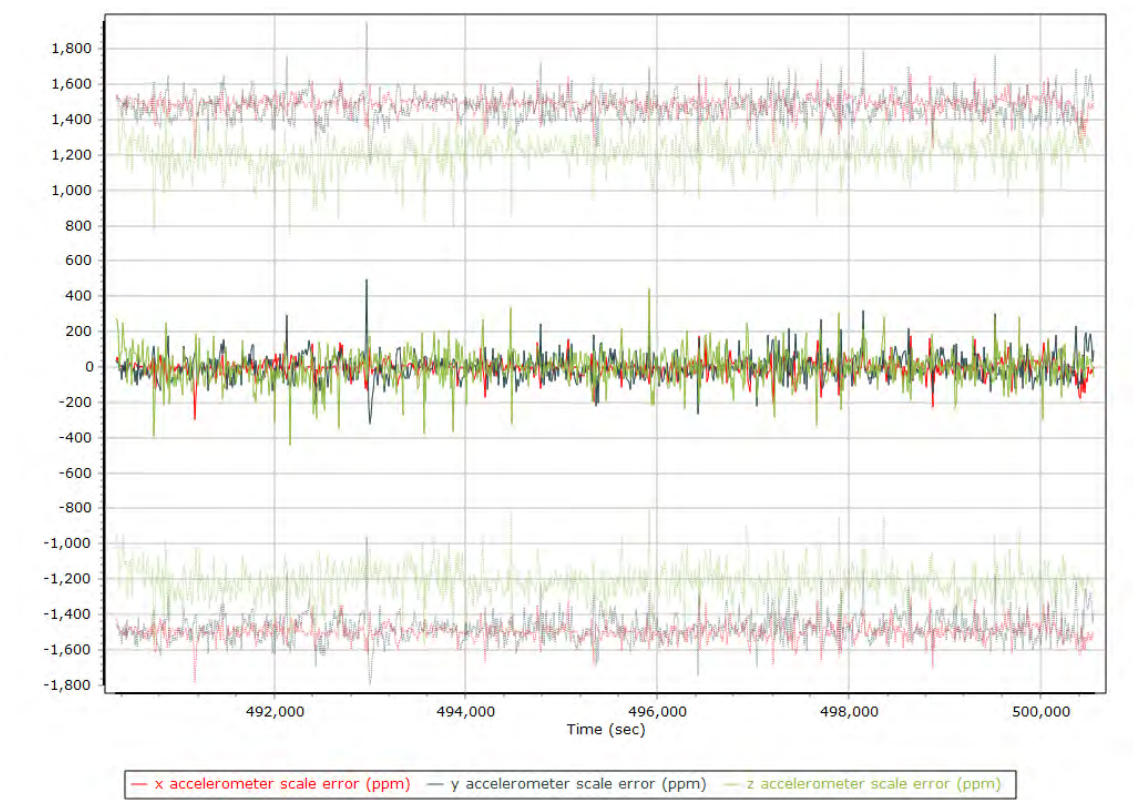
Y Accelerometer Bias (micro-g)



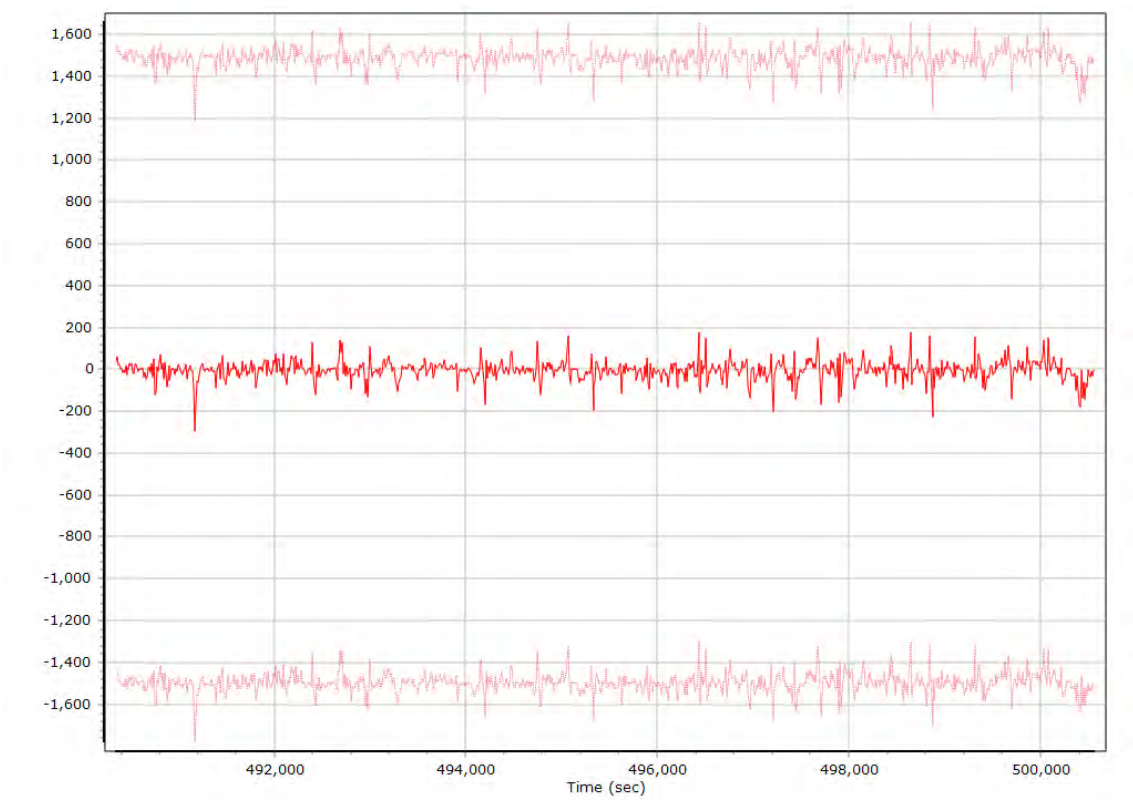
Z Accelerometer Bias (micro-g)



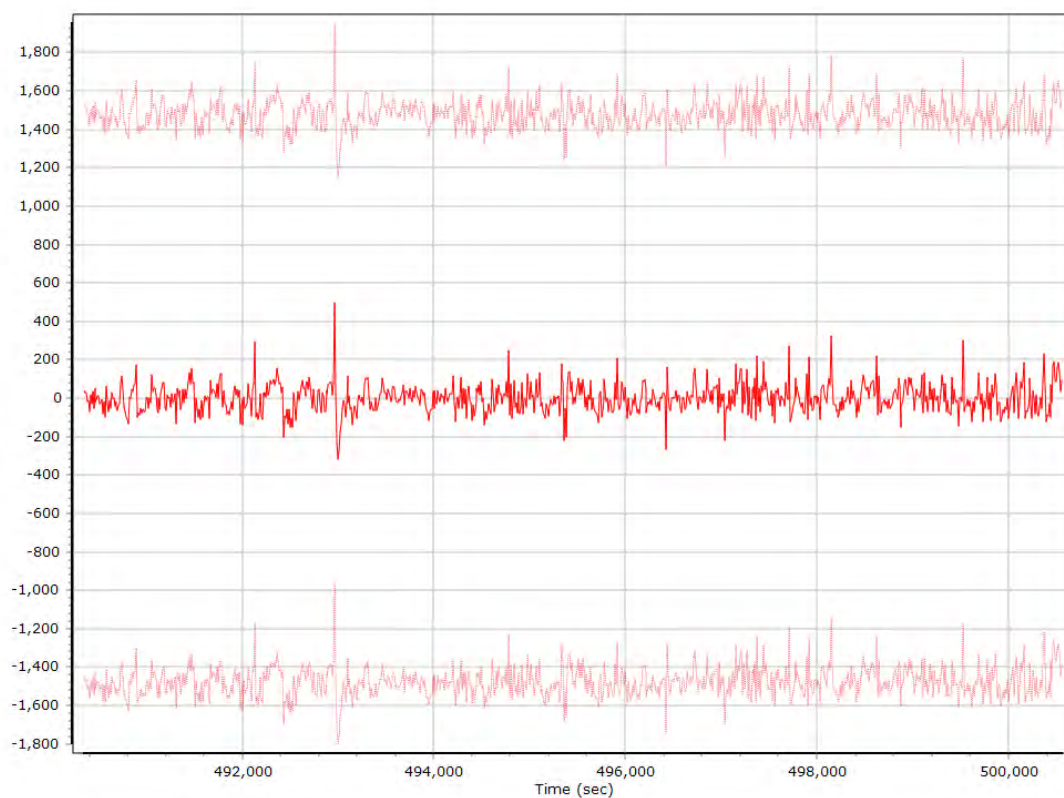
Accelerometer Scale Error (ppm)



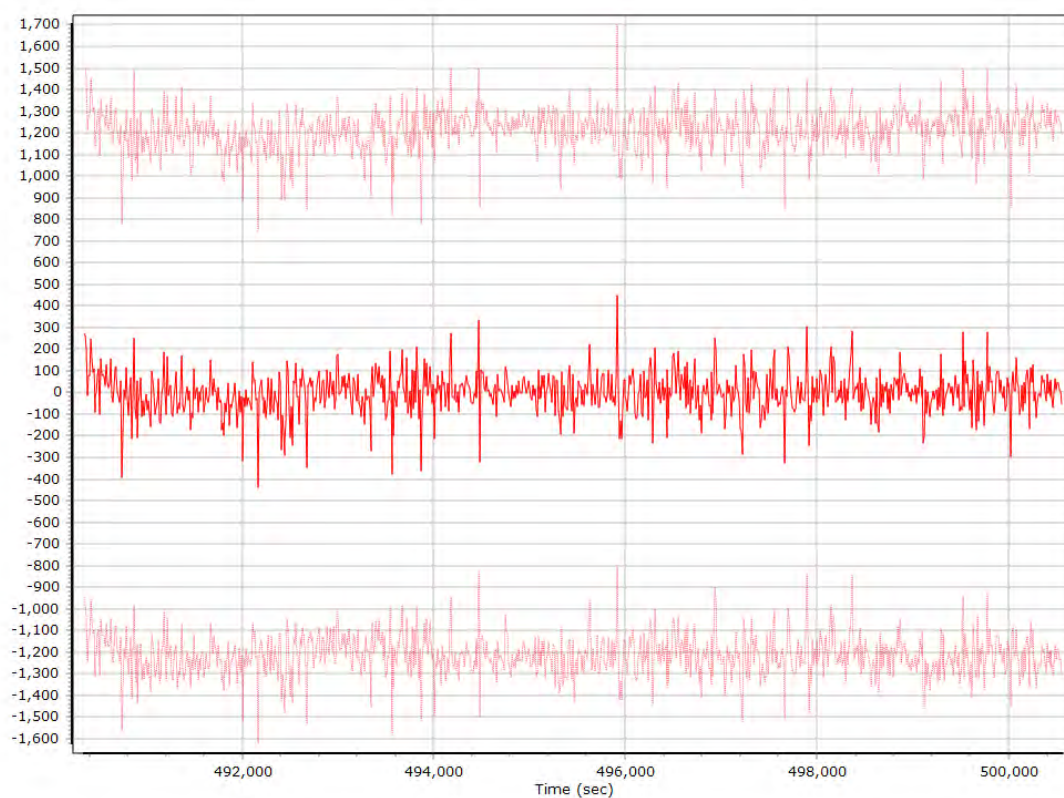
X Accelerometer Scale Error (ppm)



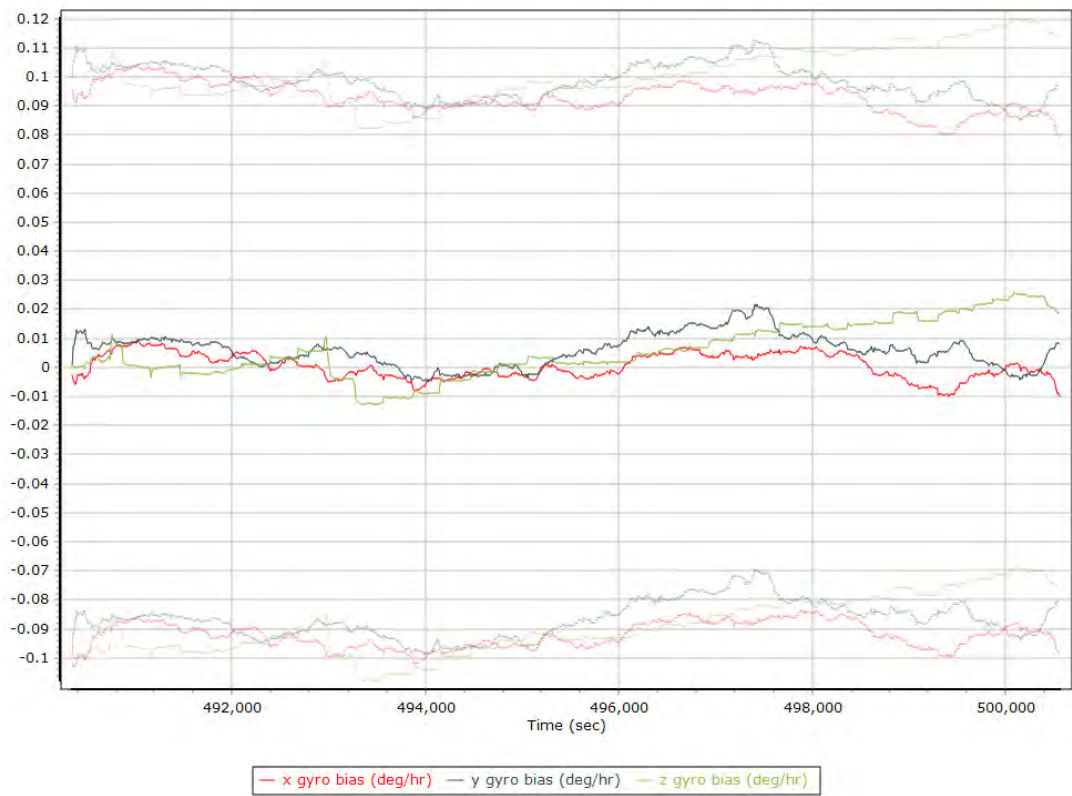
Y Accelerometer Scale Error (ppm)



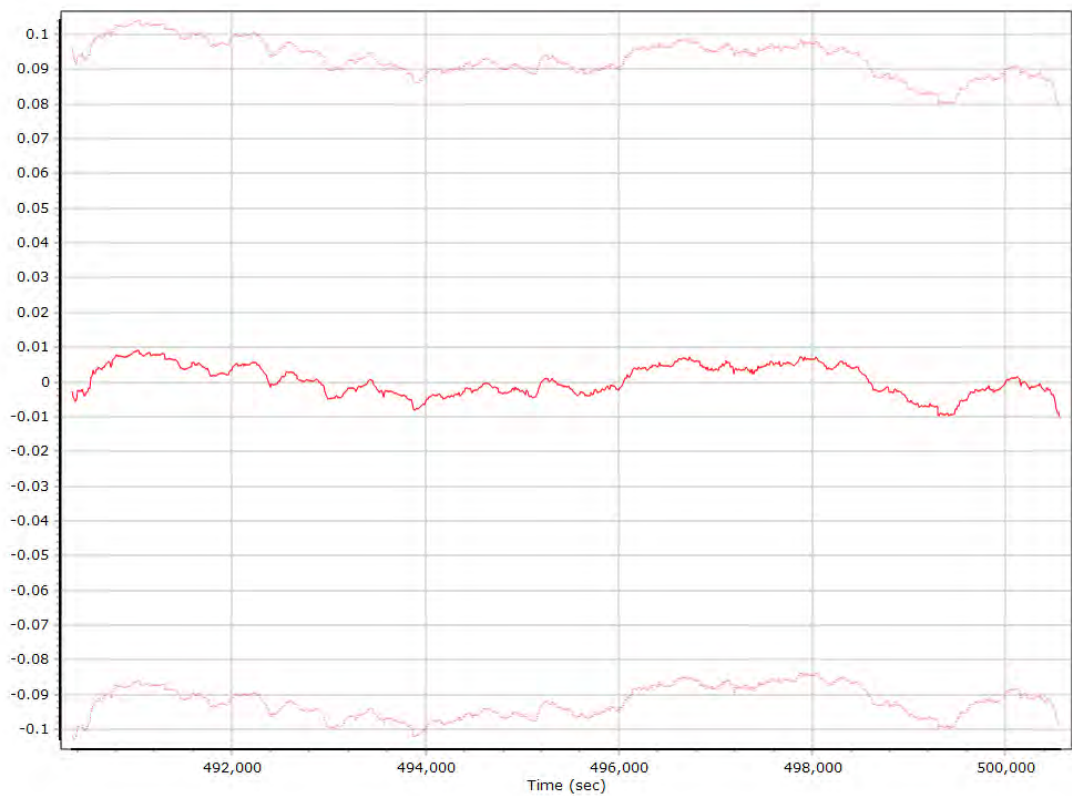
Z Accelerometer Scale Error (ppm)



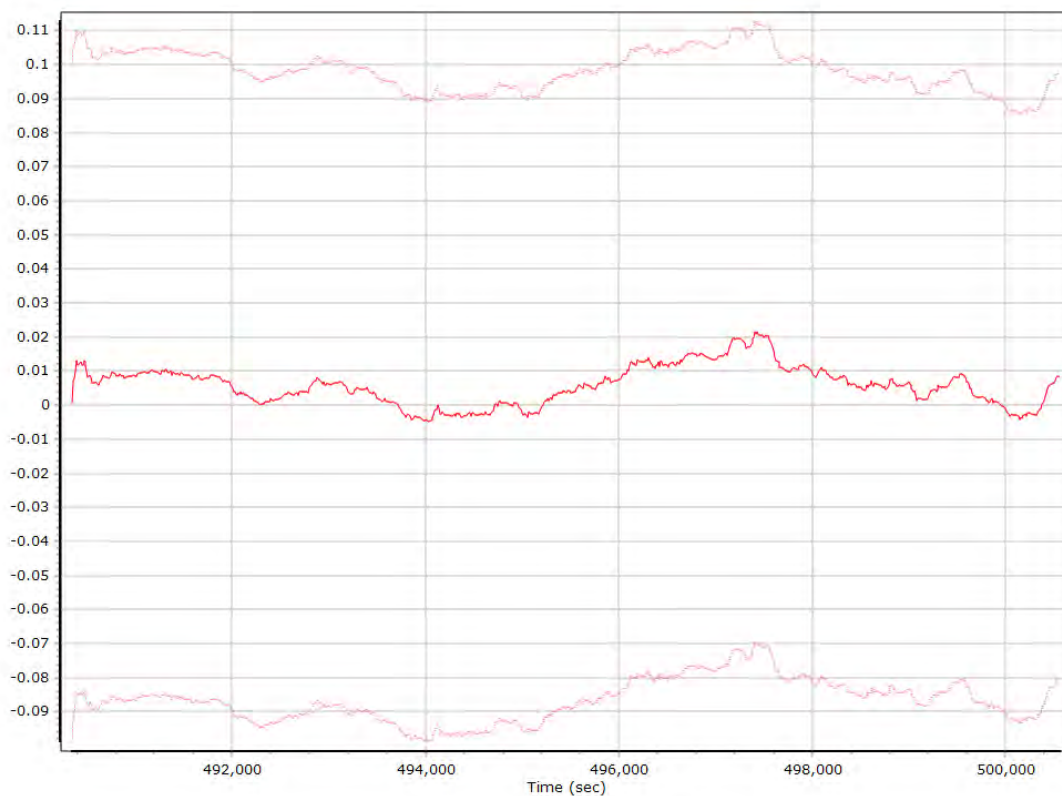
Gyro Bias (deg/h)



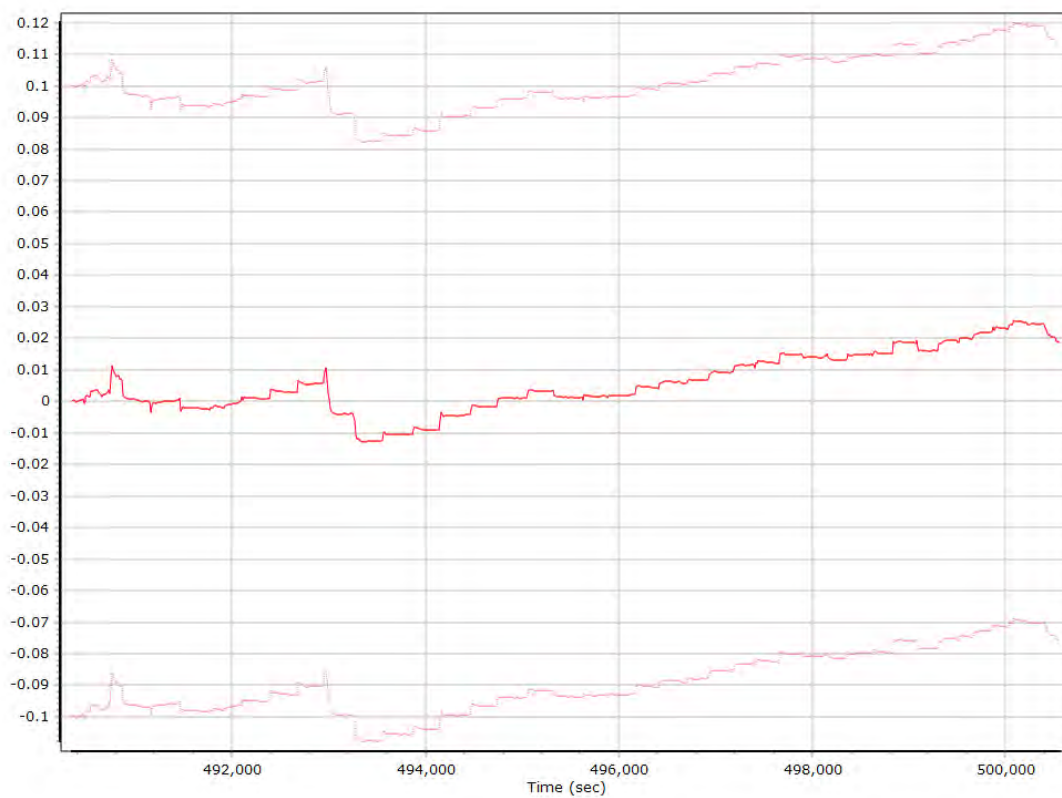
X Gyro Bias (deg/h)



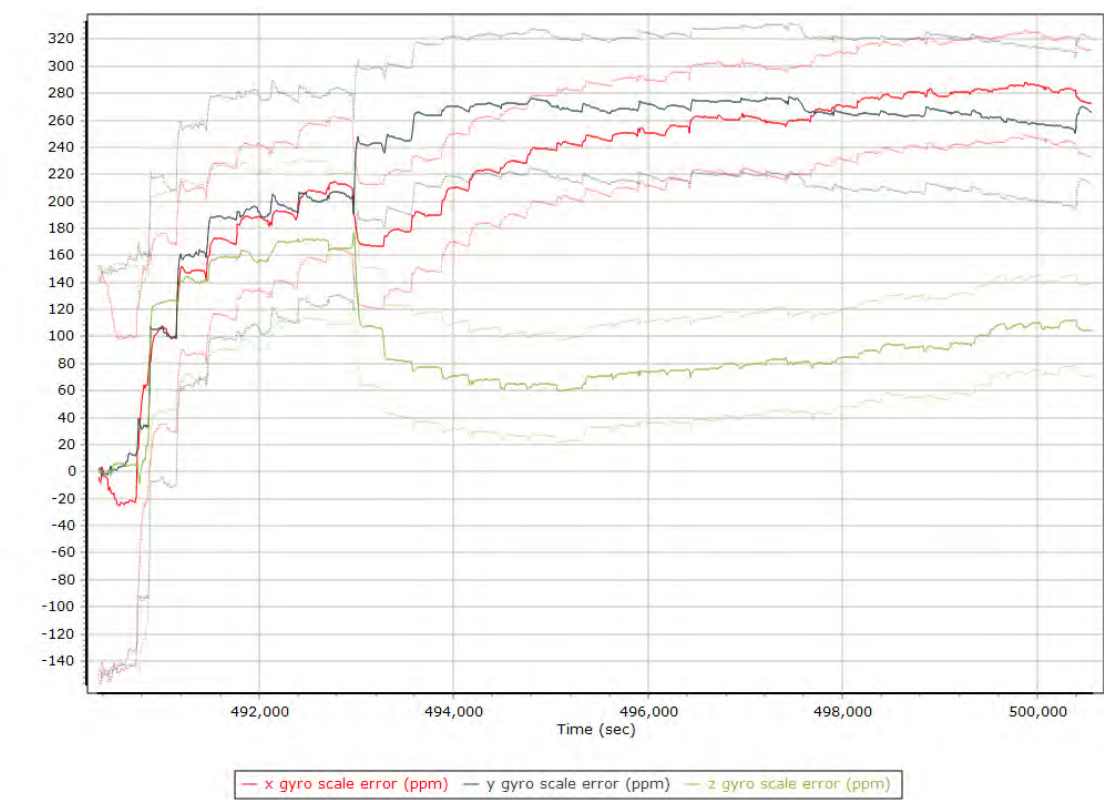
Y Gyro Bias (deg/h)



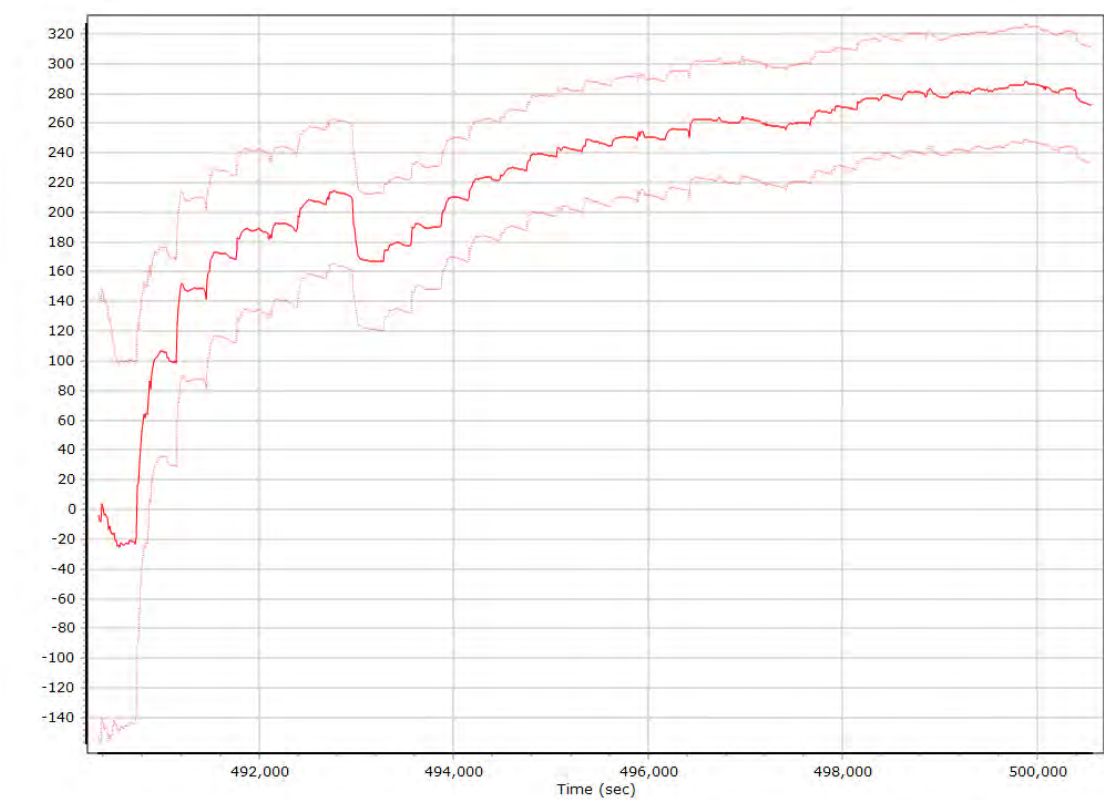
Z Gyro Bias (deg/h)



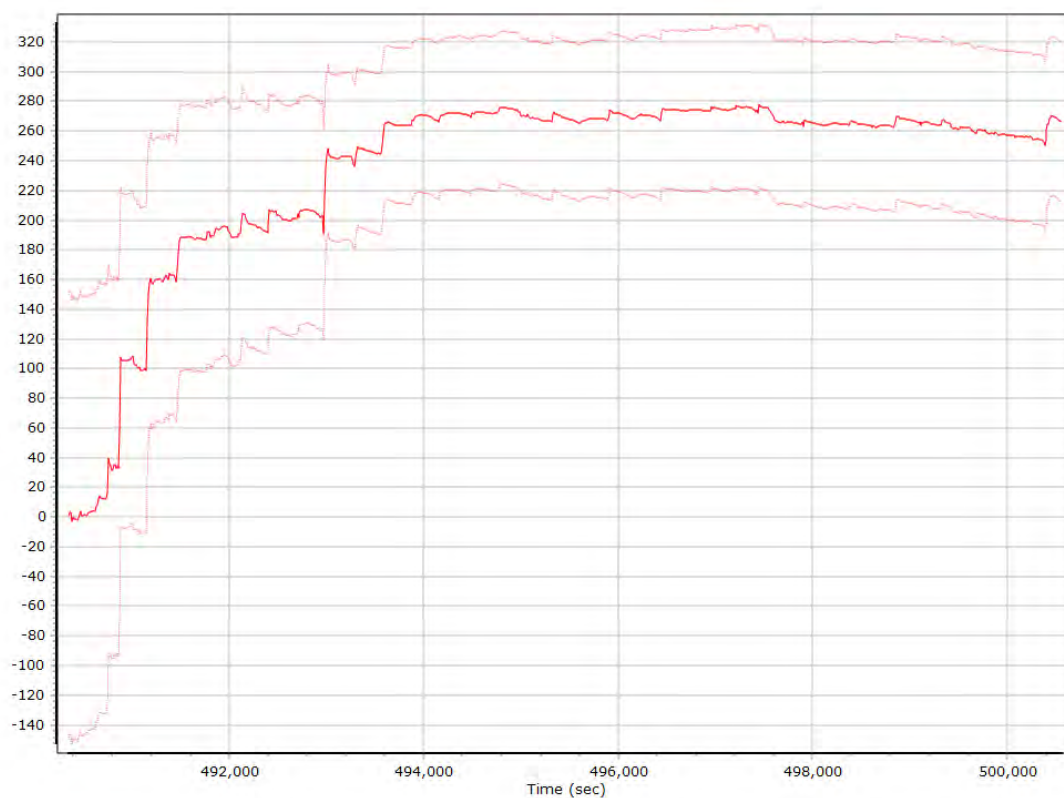
Gyro Scale Error (ppm)



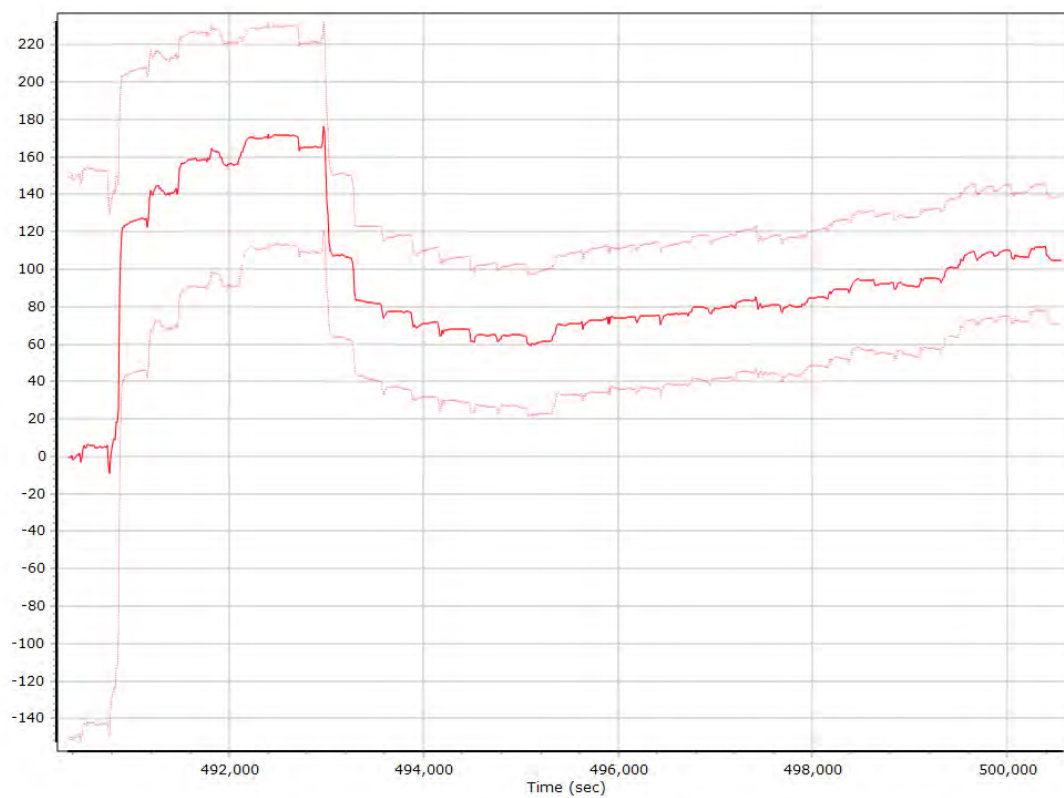
X Gyro Scale Error (ppm)



Y Gyro Scale Error (ppm)

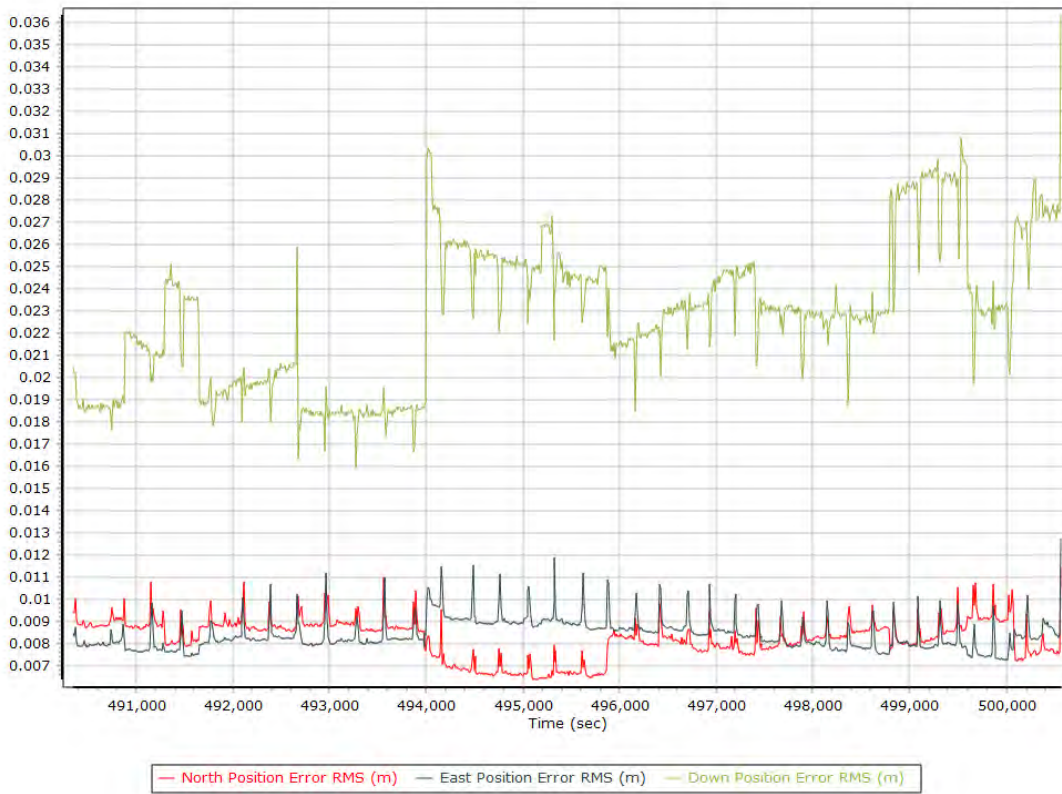


Z Gyro Scale Error (ppm)

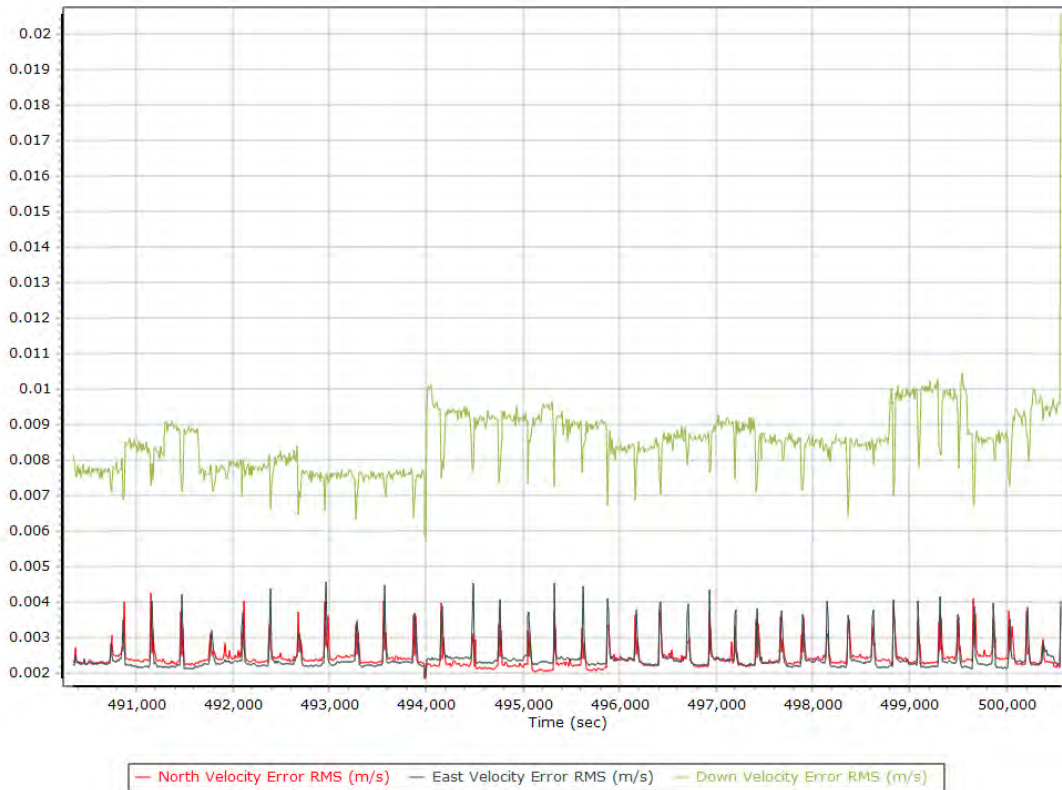


Smoothed Performance Metrics

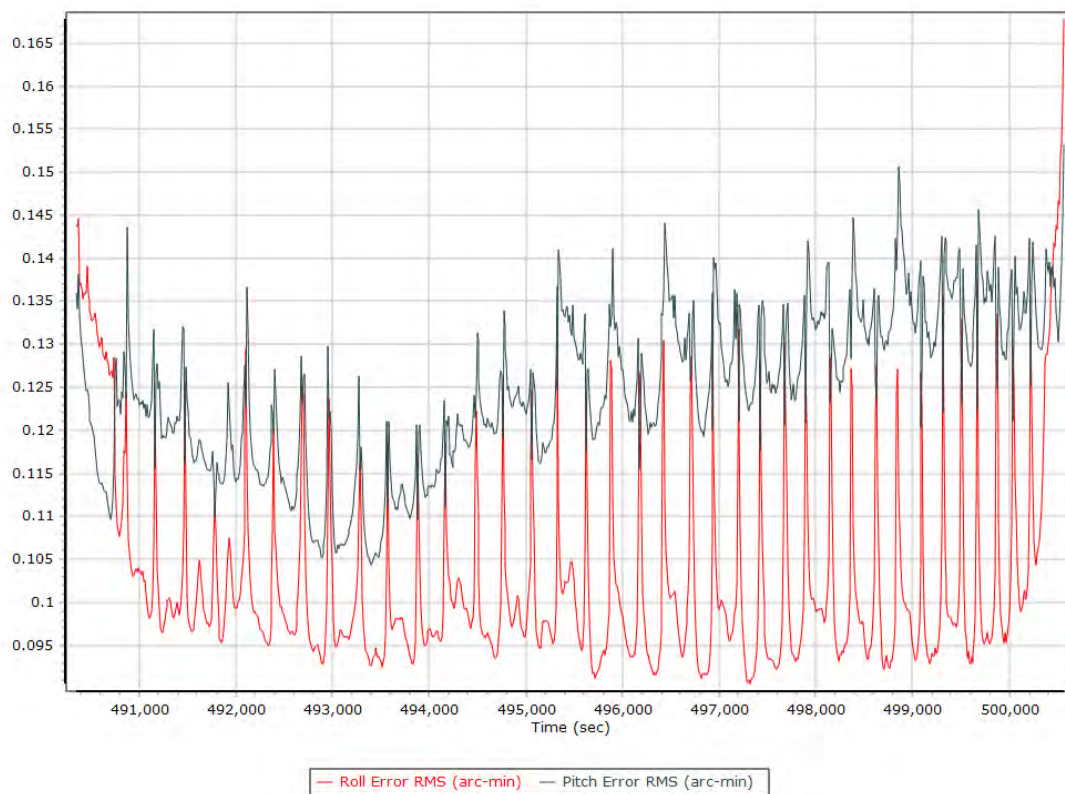
Position Error RMS (m)



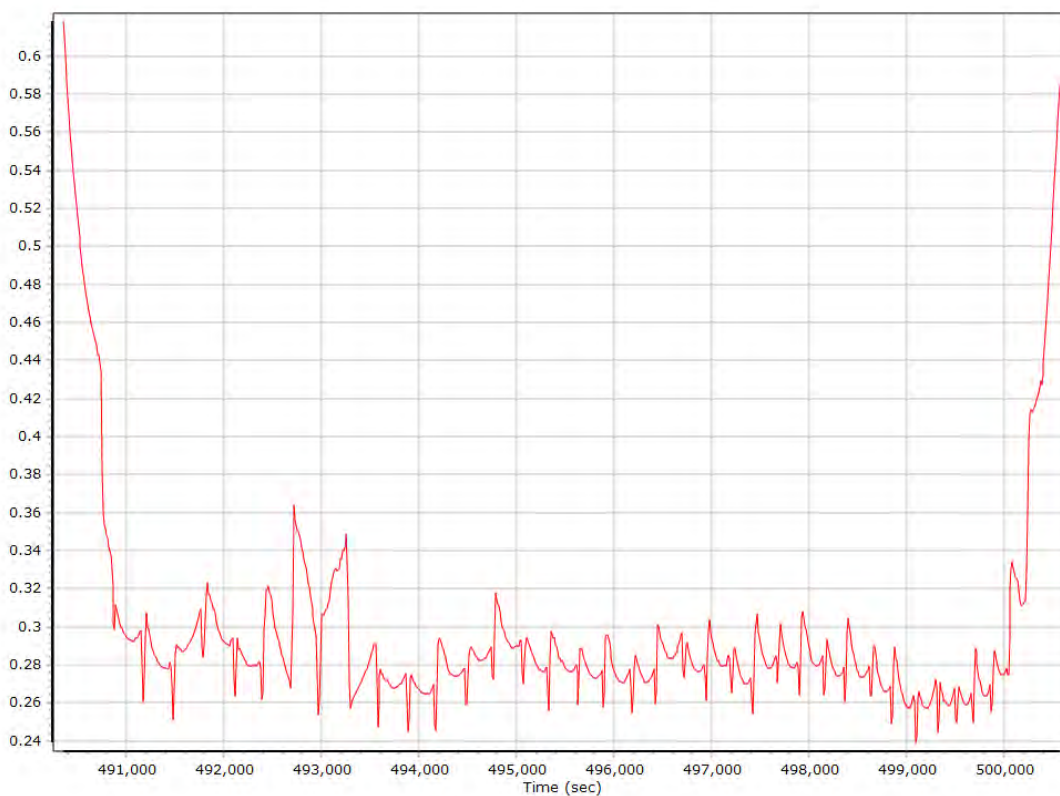
Velocity Error RMS (m/s)



Roll/Pitch Error RMS (arc-min)

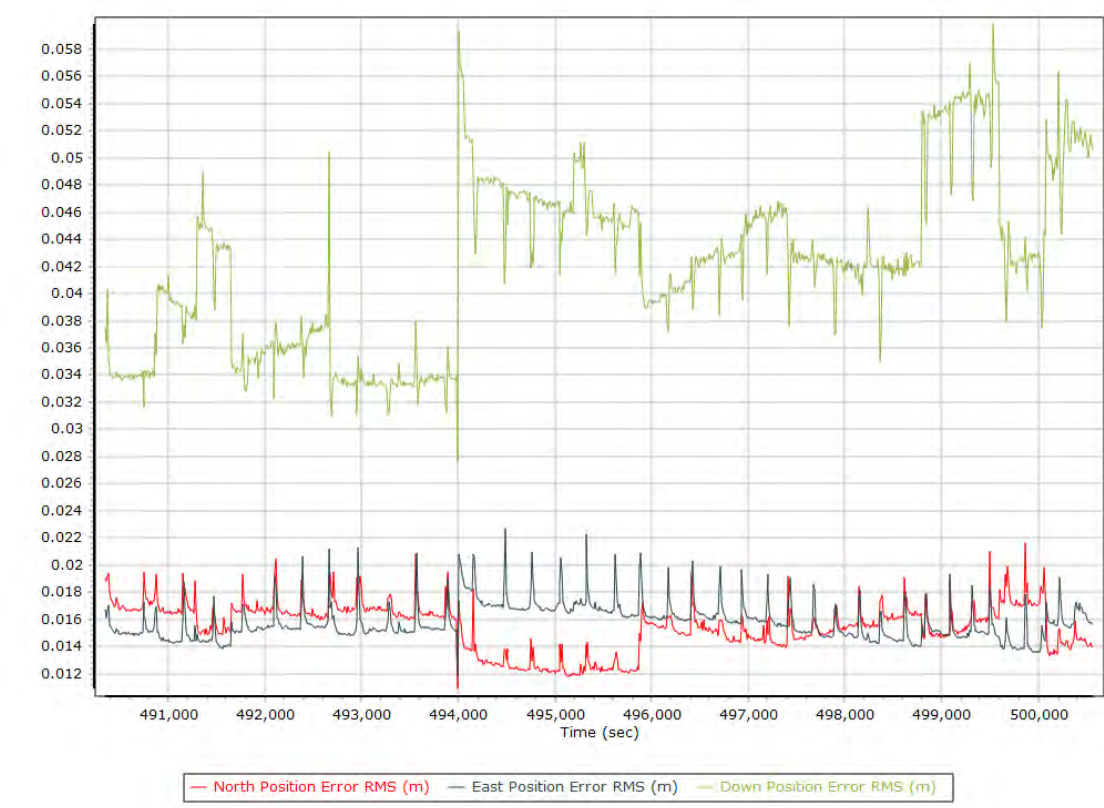


Heading Error RMS (arc-min)

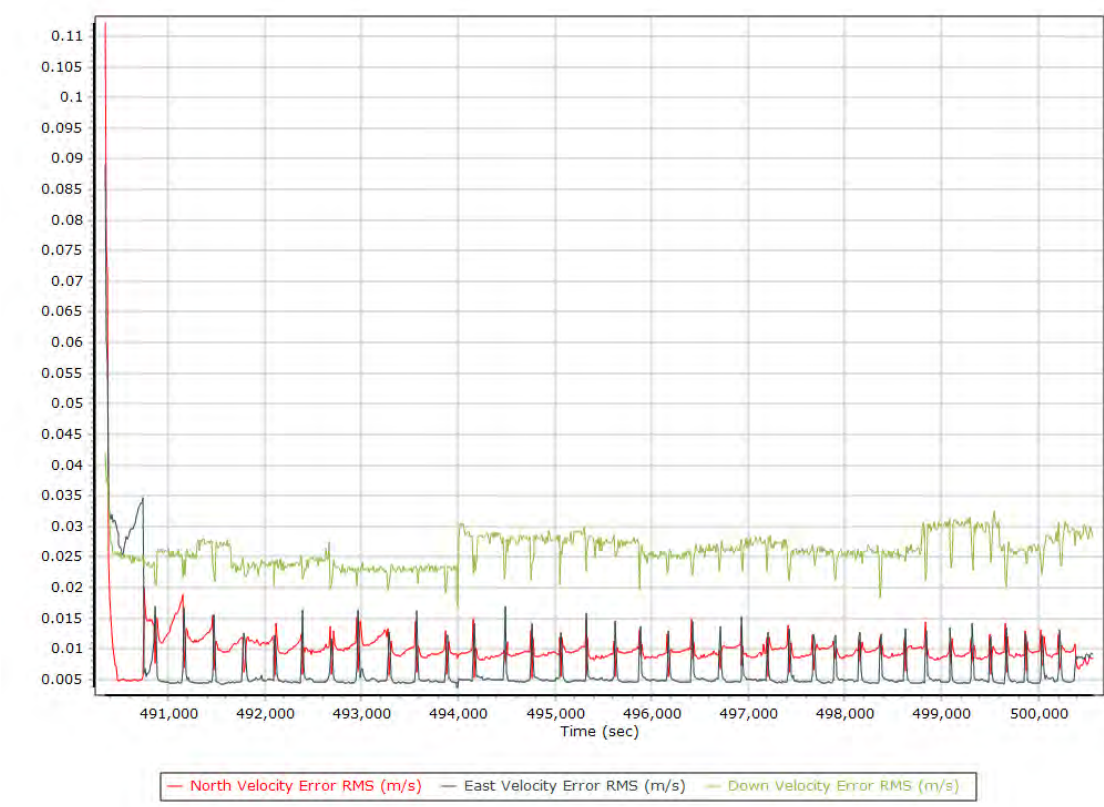


Forward Processed Performance Metrics

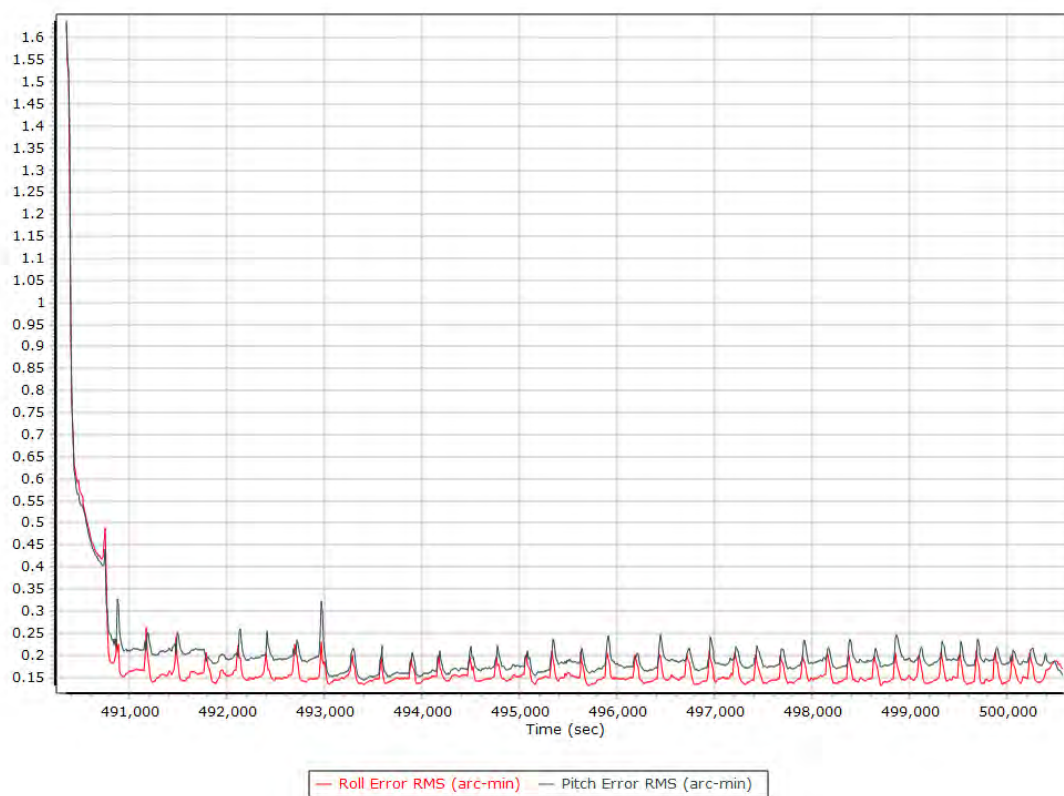
Position Error RMS (m)



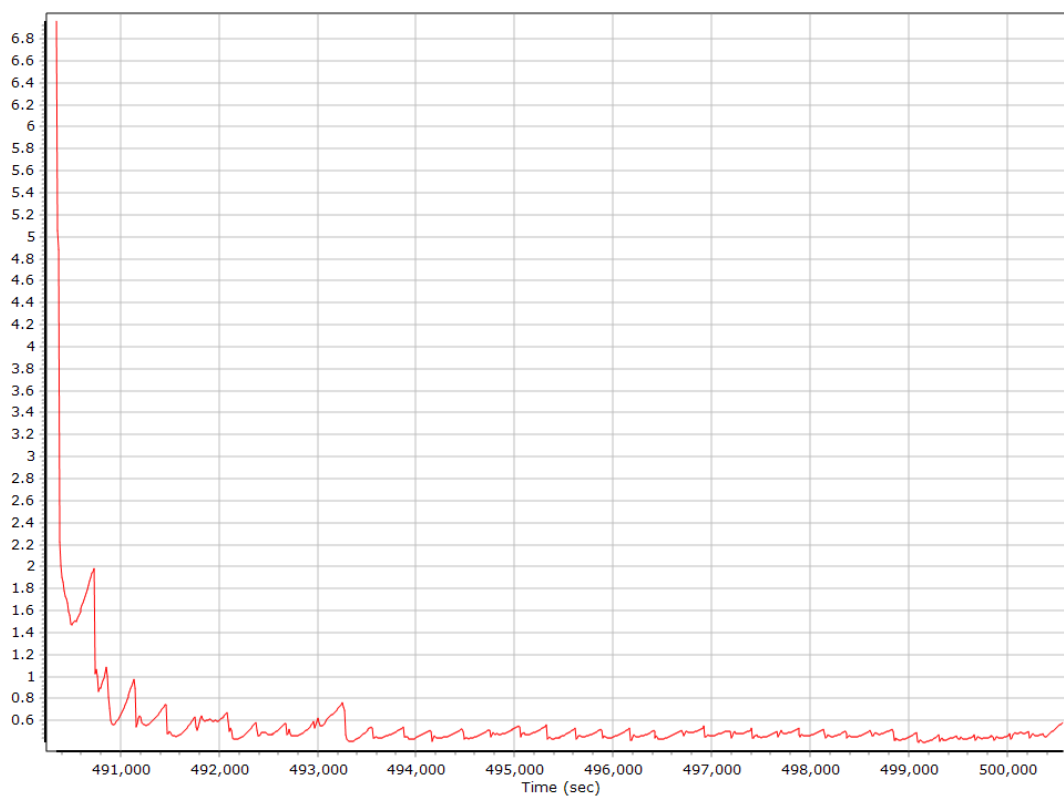
Velocity Error RMS (m/s)



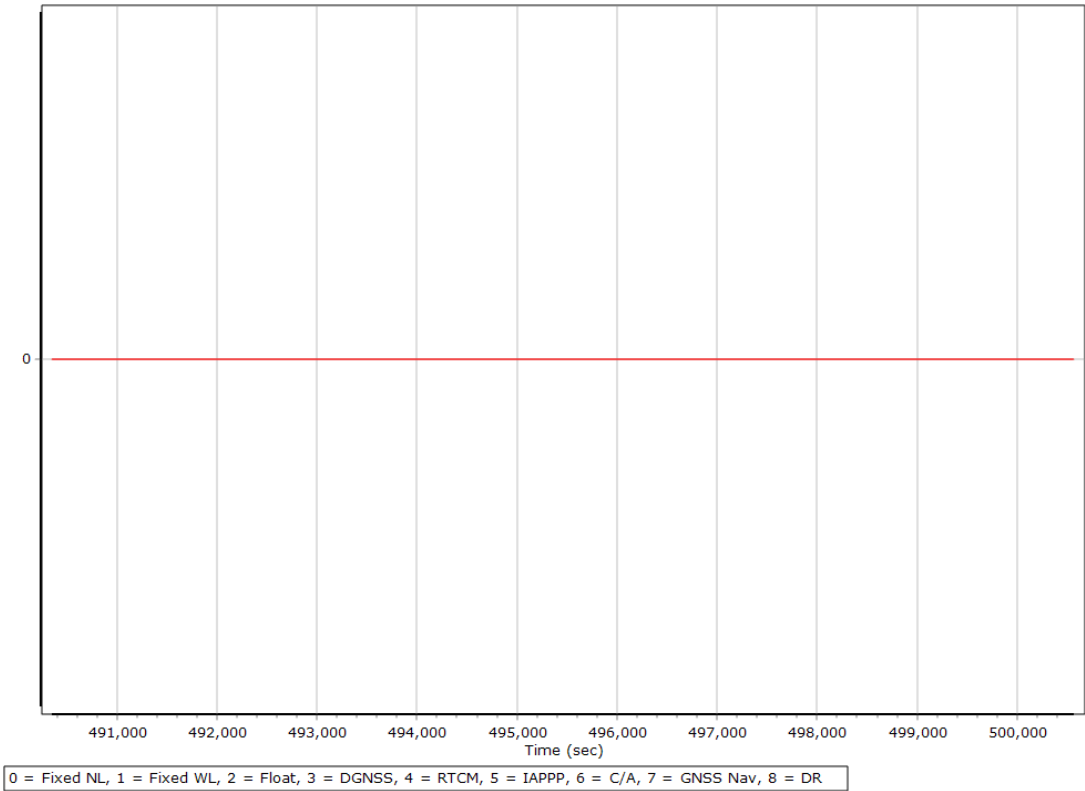
Roll/Pitch Error RMS (arc-min)



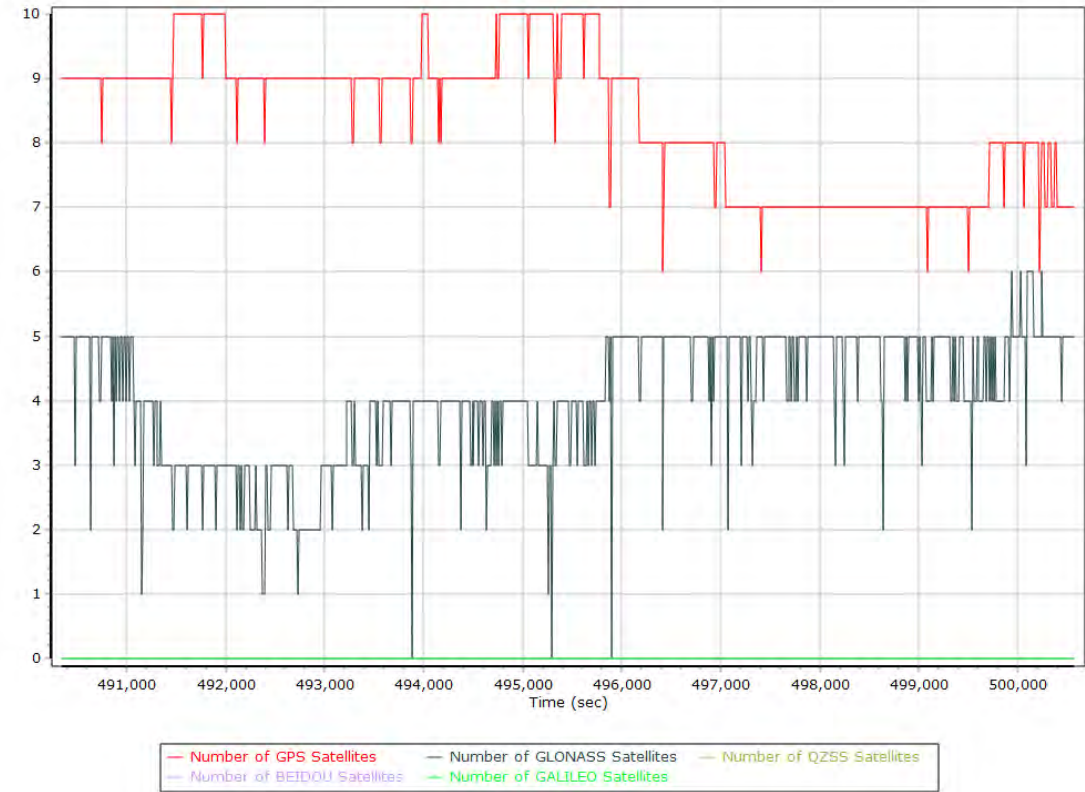
Heading Error RMS (arc-min)



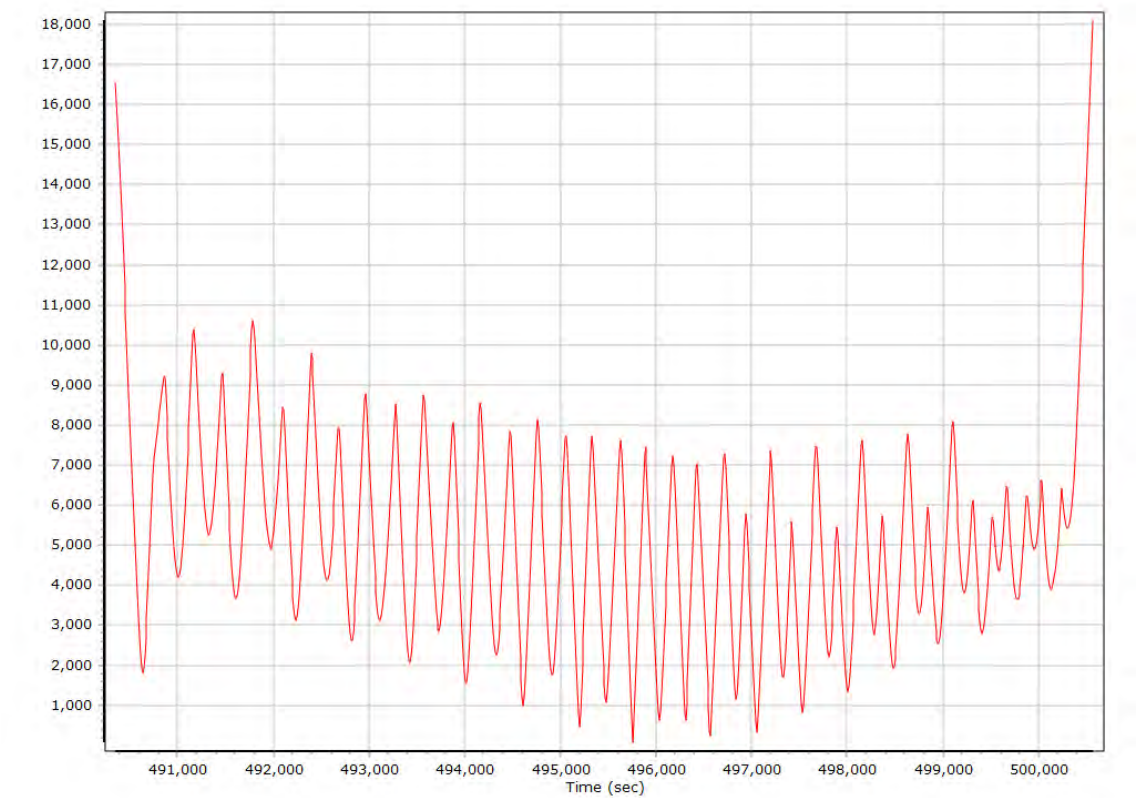
Smoothed Solution Status
Processing Mode



Number of Satellites

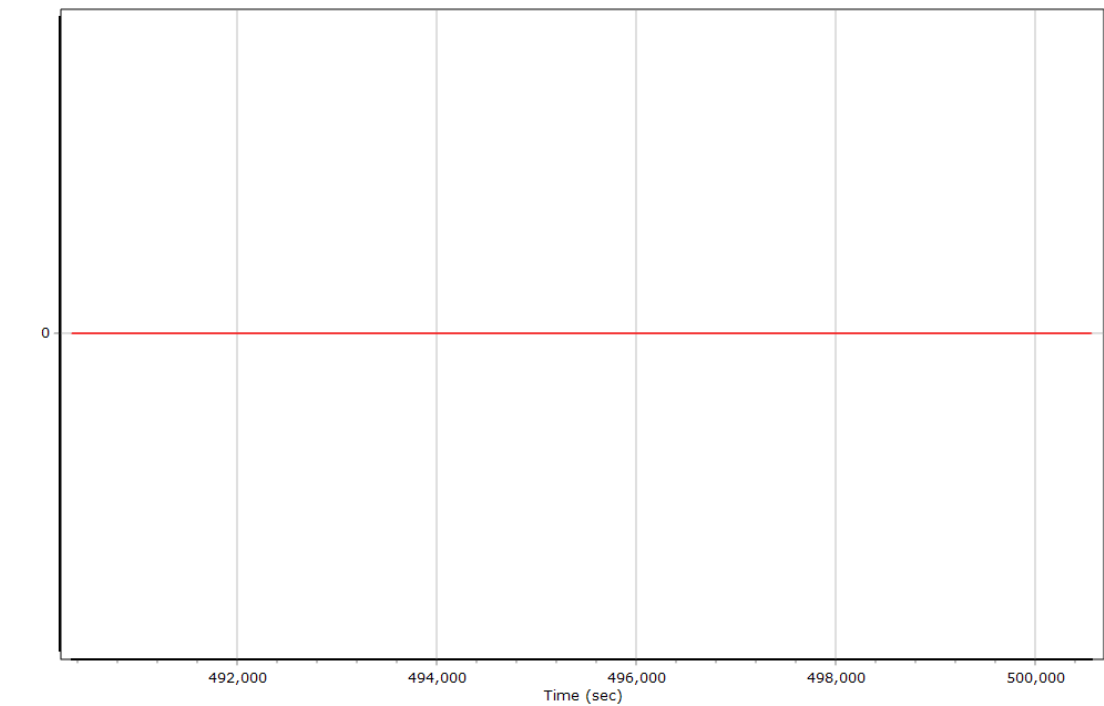


Baseline Length



Forward Processed Solution Status

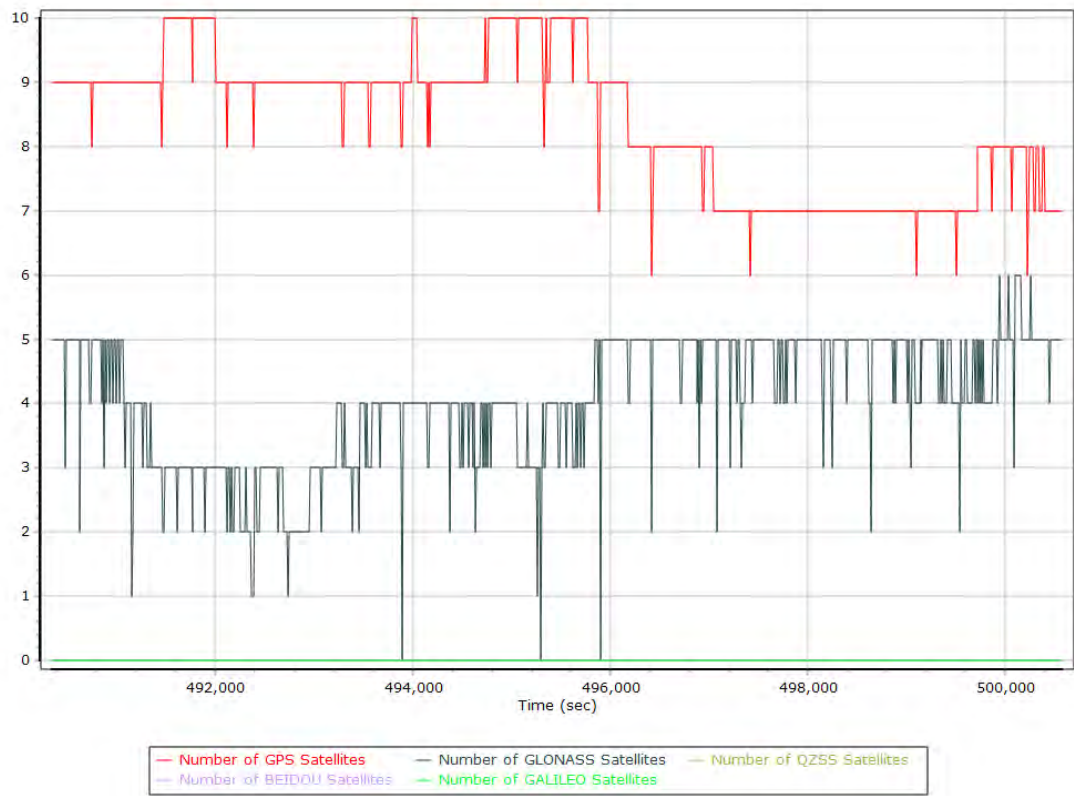
Processing Mode



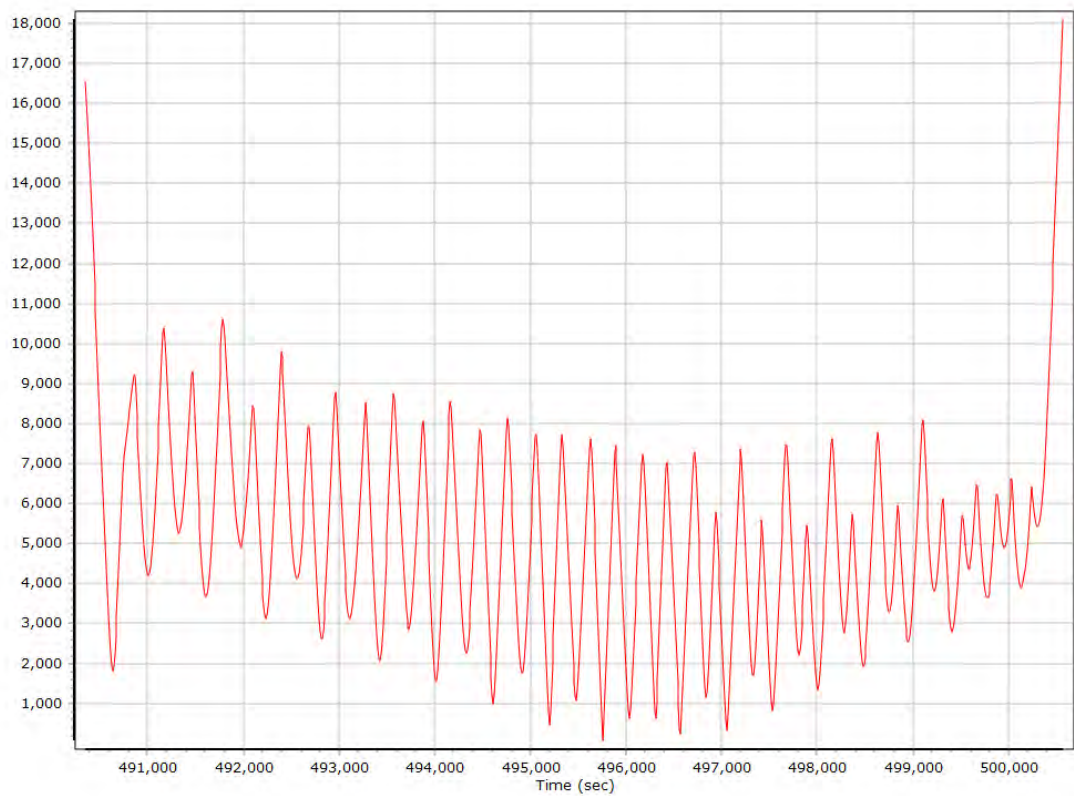
☒ Forward ☒ Reverse

0 = Fixed NL, 1 = Fixed WL, 2 = Float, 3 = DGNSS, 4 = RTCM, 5 = IAPPP, 6 = C/A, 7 = GNSS Nav, 8 = DR

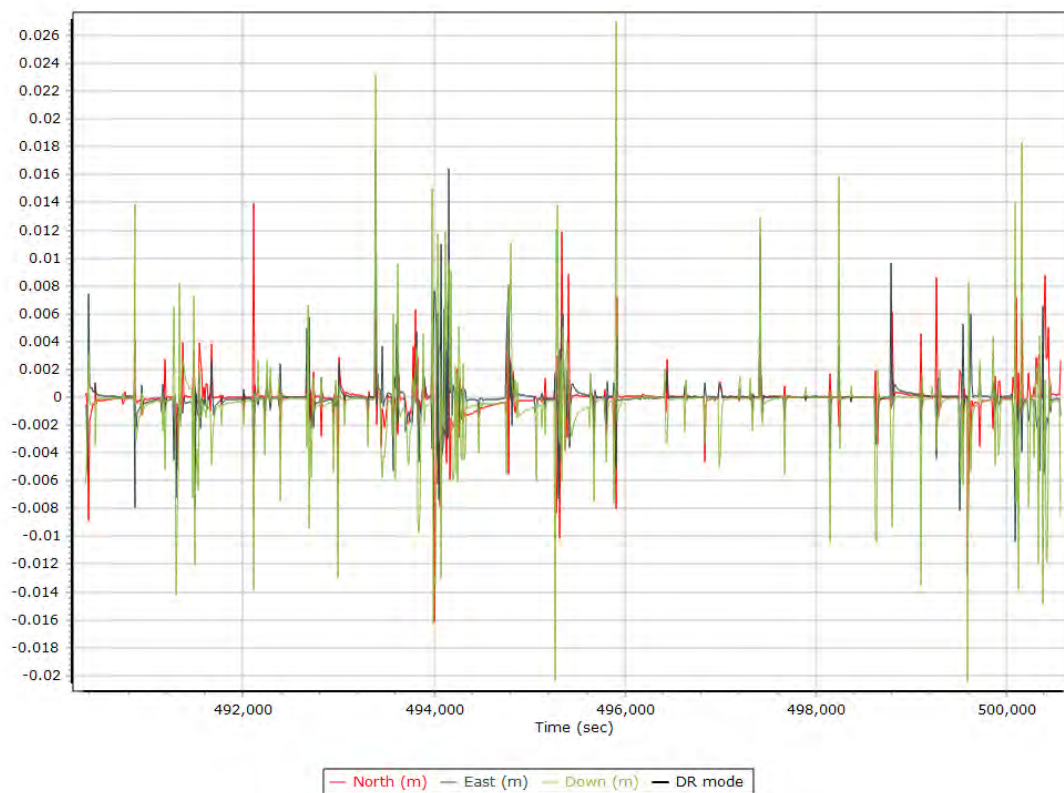
Number of Satellites



Baseline Length



SBET IAKAR Separation



Export Summary

Export file	NAD83(2011)_Ep2010_Sbet.out		
Export format	Custom Smoothed BET		
Solution in use	Post-processed		
Output rate	All Records		
Reference to Output lever arm (m)	0.000	0.000	0.000
Reference mounting angles (deg)	0.000	0.000	0.000
Output units (Coordinate / Lat & Lon)	Meter		Deg Decimal
Export start time	490289.005 (5/13/2022 4:11:29 PM)		
Export end time	500568.105 (5/13/2022 7:02:48 PM)		
Height option	Ellipsoid Height		
WGS84 height flag	False		
Grid	Universal Transverse Mercator		
Zone	UTM North 11 (120W to 114W)		
Datum	NAD83 (2011)		
Ellipsoid	GRS 1980		
Local Transformation	NONE		
Target Epoch	2010		

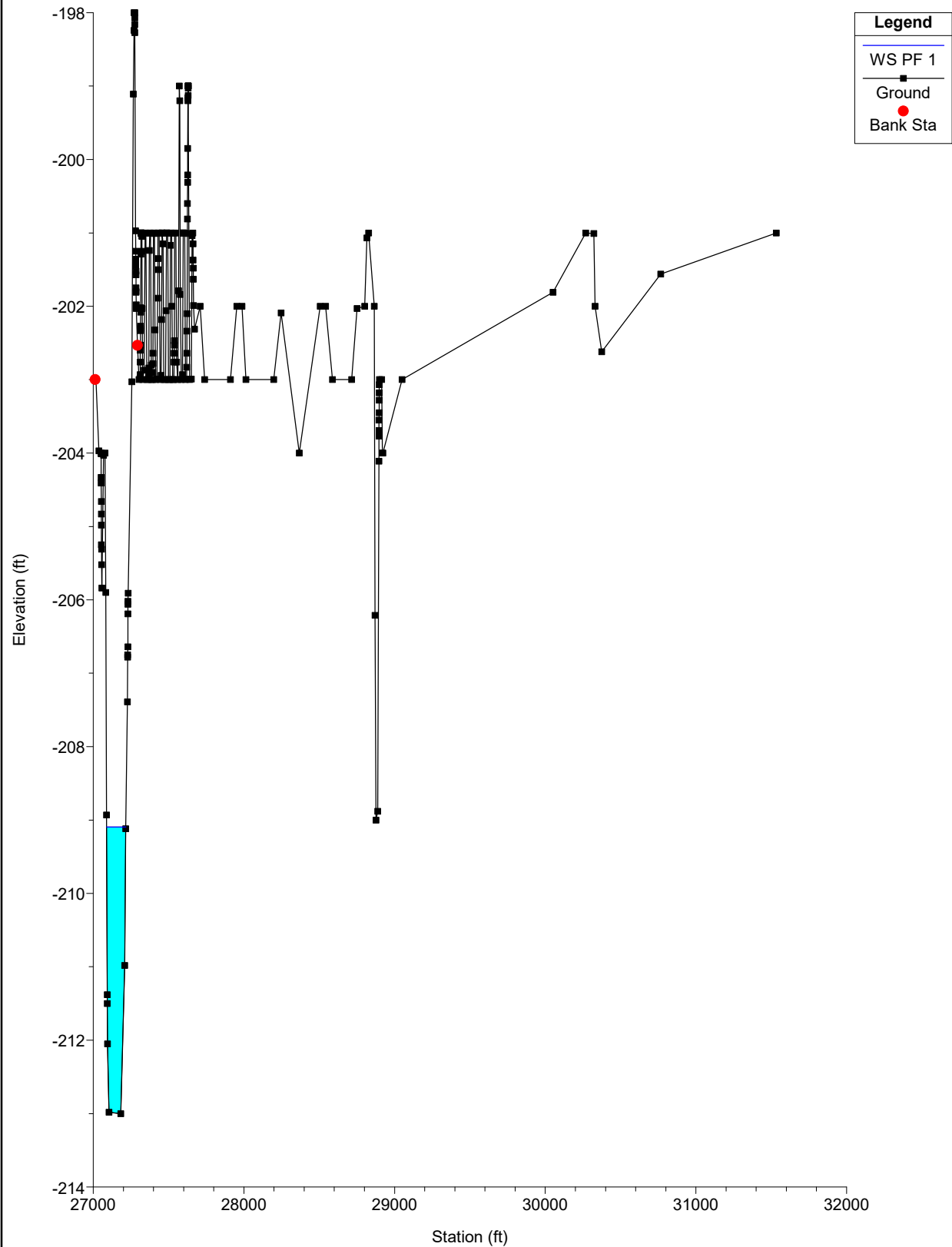
APPENDIX B

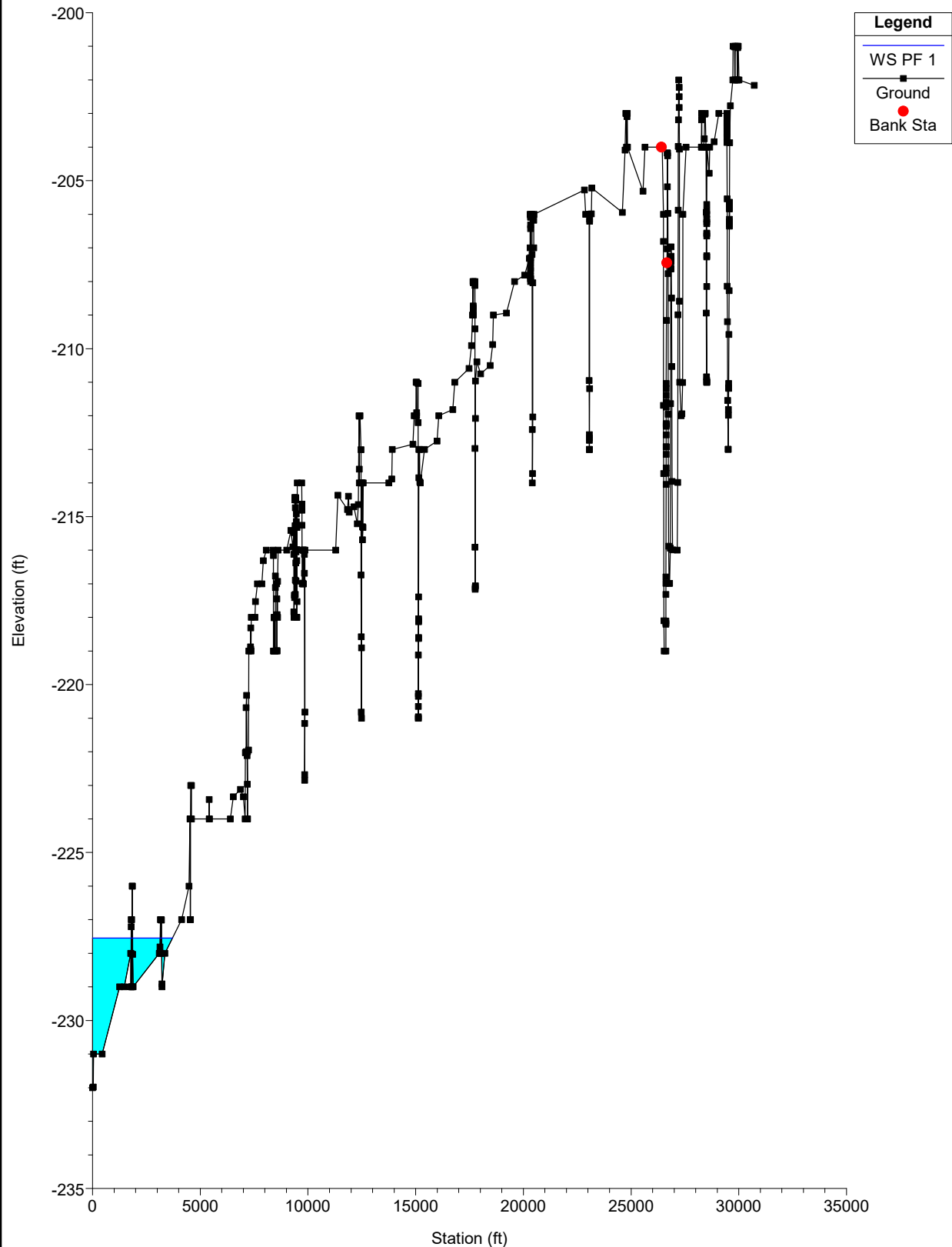
(HEC-RAS Output Files for Existing Condition [LOMR])

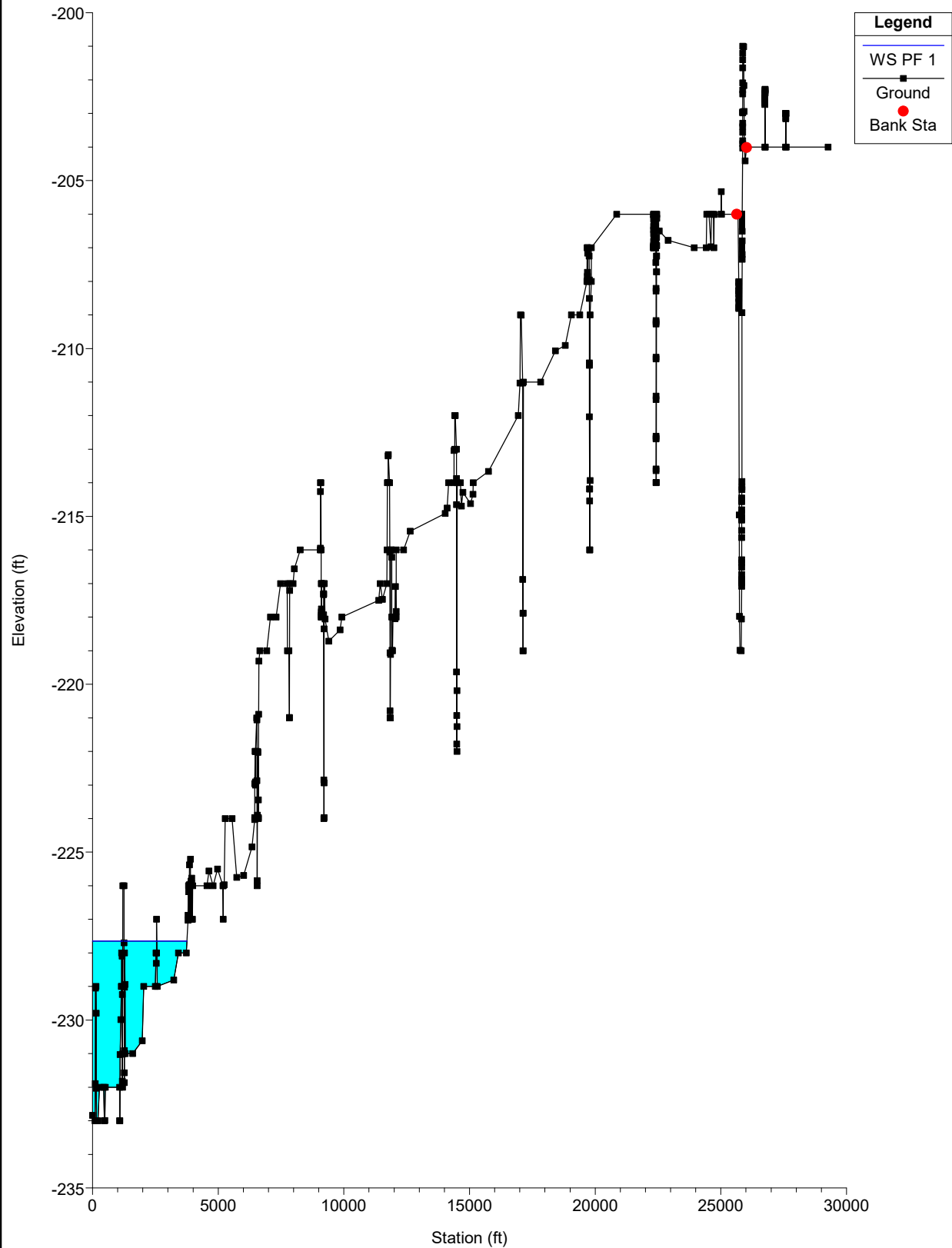
HEC-RAS Plan: 01 River: Alamo River Reach: Alamo River Profile: PF 1

Reach	River Sta	Profile	Hydr Depth	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(ft)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Alamo River	37000	PF 1	3.37	4500.00	-213.00	-209.09	-209.09	-207.40	0.012807	10.44	430.90	127.91	1.00
Alamo River	36071	PF 1	1.56	4500.00	-219.00	-227.54		-227.54	0.000247		5639.52	3612.20	0.00
Alamo River	34926	PF 1	2.52	4500.00	-219.00	-227.65		-227.64	0.000047		9304.69	3692.09	0.00
Alamo River	33520	PF 1	2.35	4500.00	-219.00	-227.70		-227.70	0.000046		10255.89	4373.10	0.00
Alamo River	32581	PF 1	3.20	4500.00	-219.00	-227.72		-227.72	0.000011		15943.71	4989.96	0.00
Alamo River	31366	PF 1	3.60	4500.00	-219.00	-227.73		-227.73	0.000007		18752.25	5211.75	0.00
Alamo River	30072	PF 1	3.30	4500.00	-219.00	-227.75		-227.75	0.000014		14413.13	4372.41	0.00
Alamo River	28816	PF 1	1.30	4500.00	-221.00	-227.82		-227.81	0.000476		4999.53	3850.64	0.00
Alamo River	25128	PF 1	1.61	4500.00	-222.00	-228.56		-228.55	0.000292		5448.83	3383.47	0.00
Alamo River	22693	PF 1	2.07	4500.00	-223.00	-229.01		-229.00	0.000152		6078.26	2940.98	0.00
Alamo River	19983	PF 1	1.97	4500.00	-224.00	-229.48		-229.47	0.000230		5439.90	2763.89	0.00
Alamo River	16662	PF 1	2.18	4500.00	-226.00	-229.61		-229.61	0.000021		16059.27	7367.41	0.00
Alamo River	13897	PF 1	2.02	4500.00	-228.00	-229.67		-229.67	0.000025		15007.94	7421.09	0.00
Alamo River	10023	PF 1	1.78	4500.00	-231.00	-229.83		-229.82	0.000136	0.51	6054.11	3391.89	0.09
Alamo River	4195	PF 1	2.32	4500.00	-234.00	-230.83		-230.82	0.000227	1.05	4578.00	1969.34	0.12
Alamo River	1623	PF 1	0.94	4500.00	-234.00	-231.67	-232.67	-231.66	0.000500	1.36	5289.16	5640.39	0.18

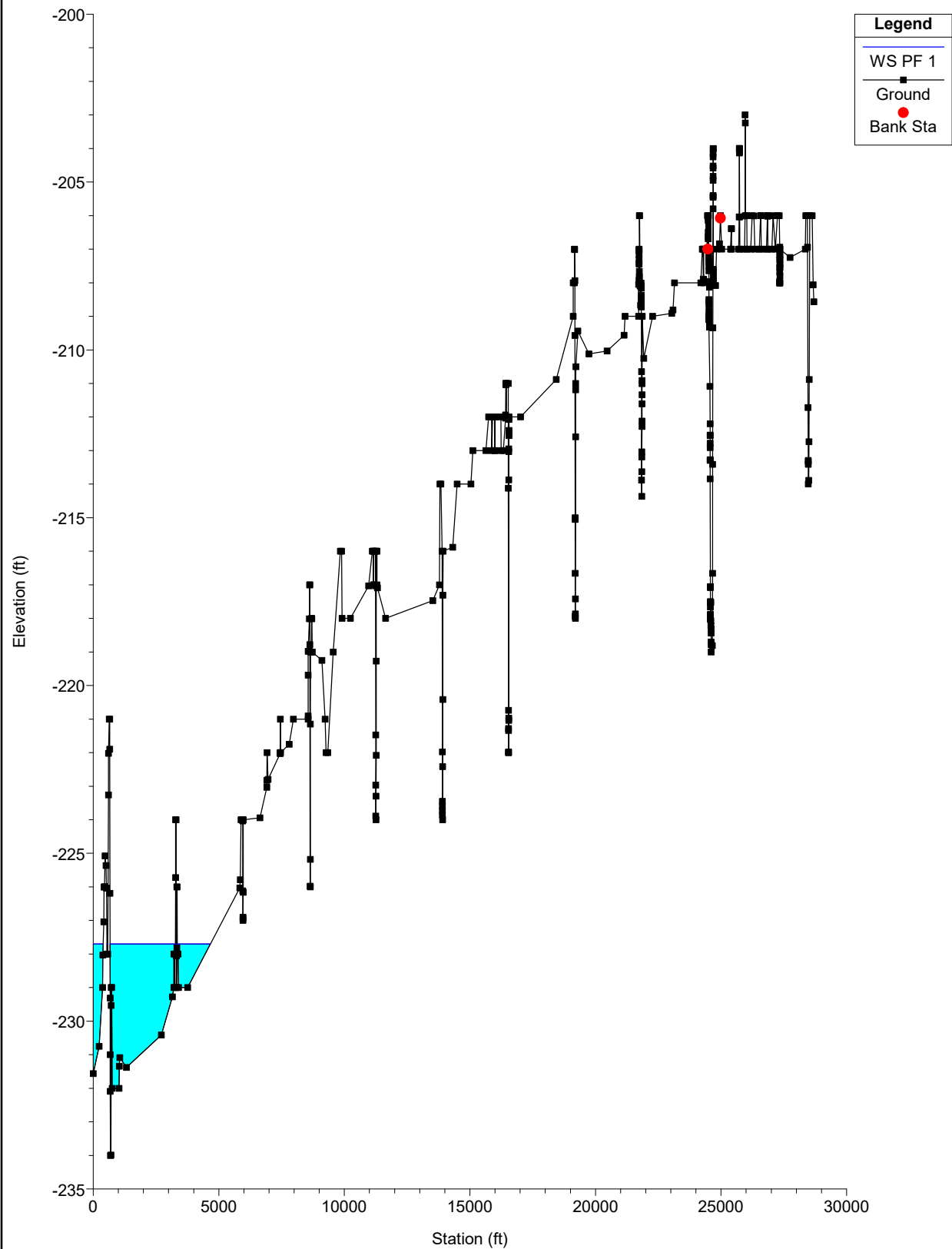
Alamo Creek Plan: AlamoRiver 9/5/2022

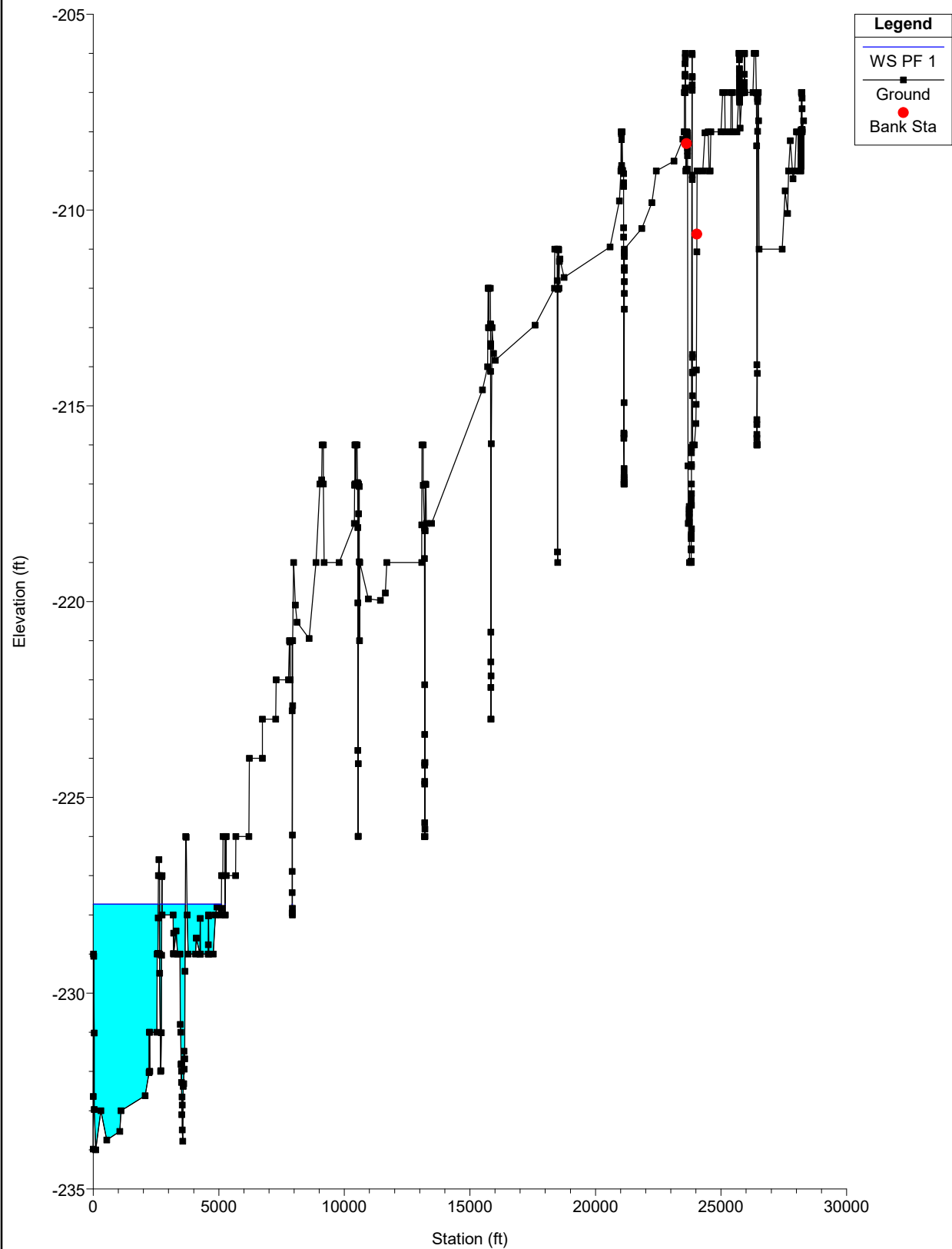


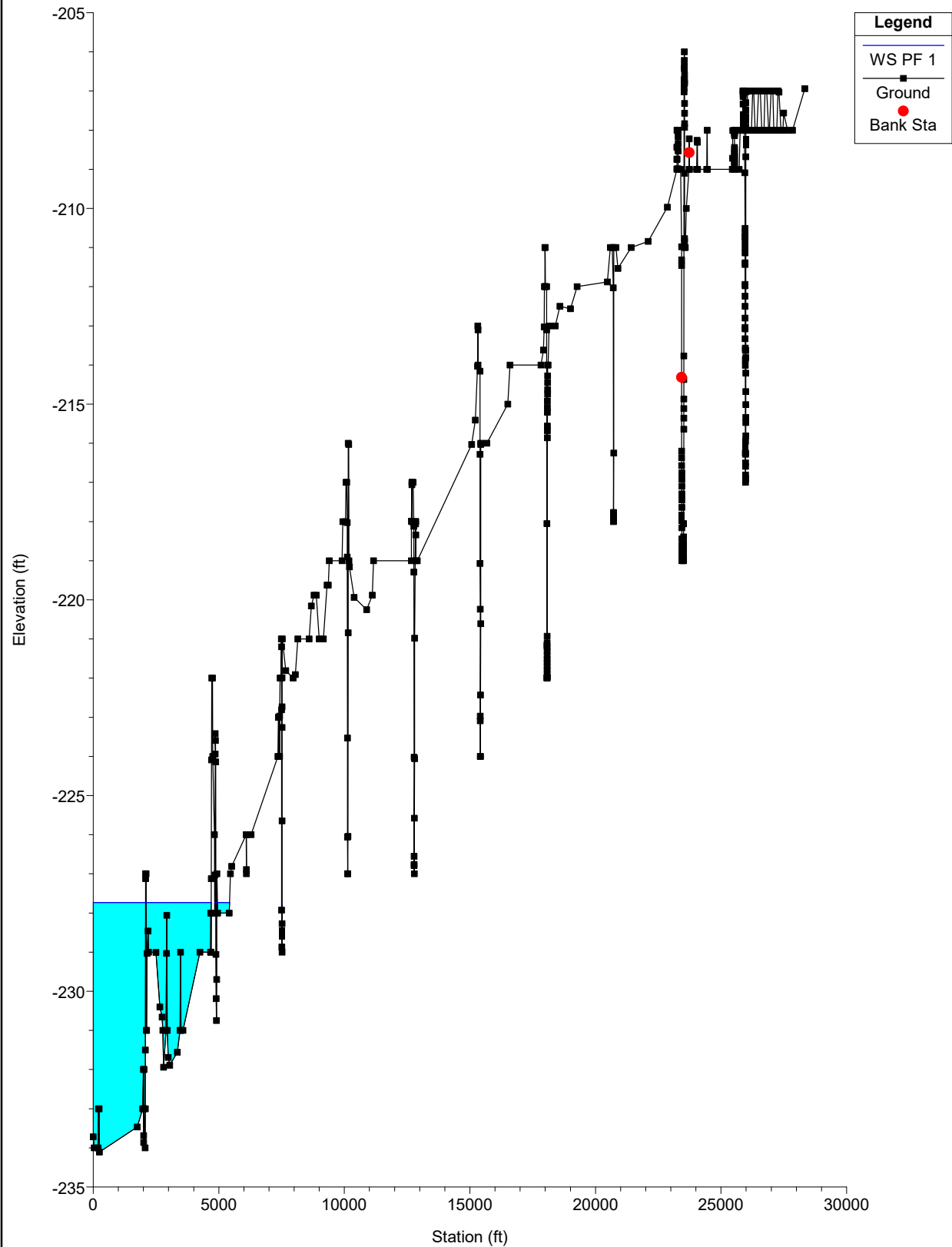


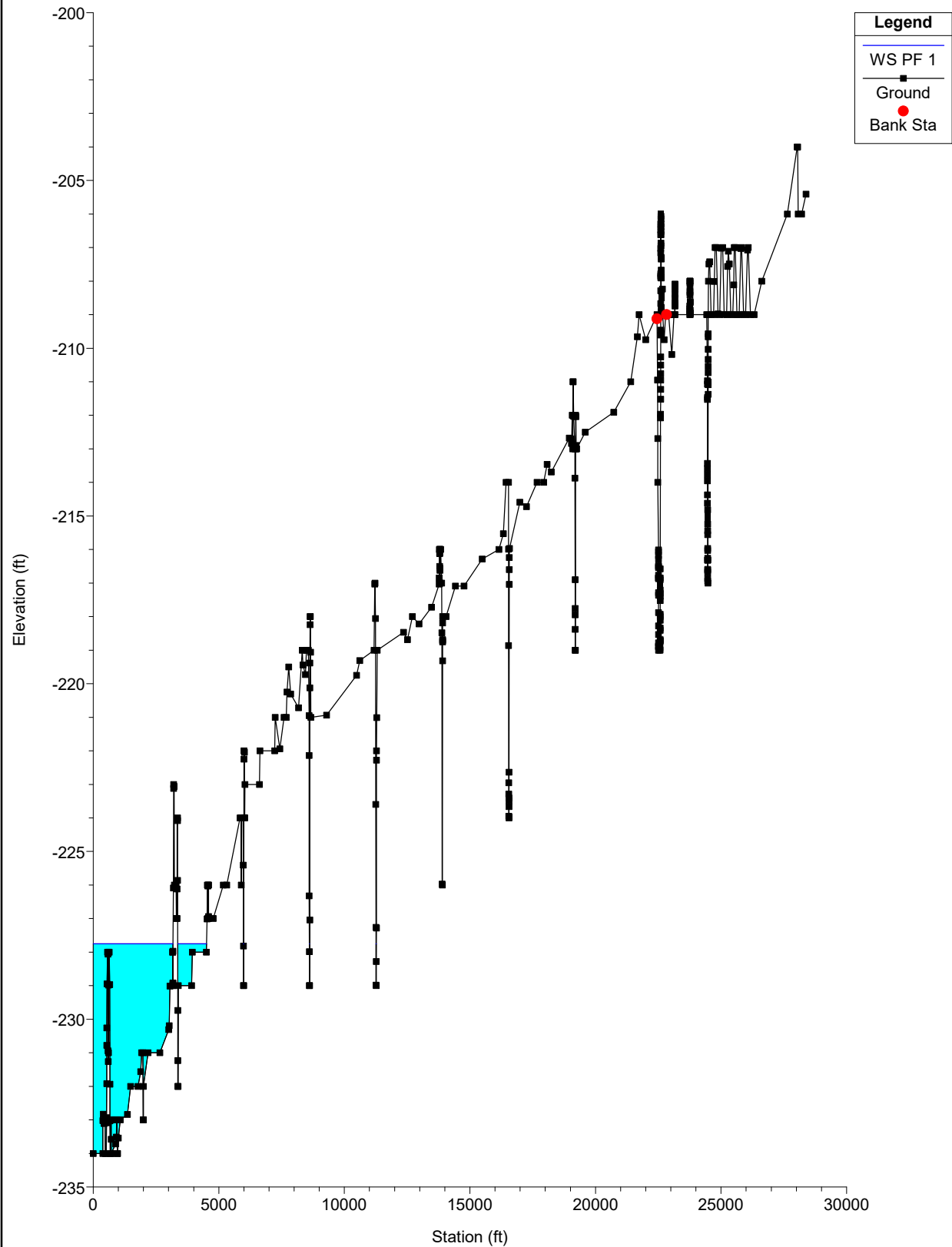


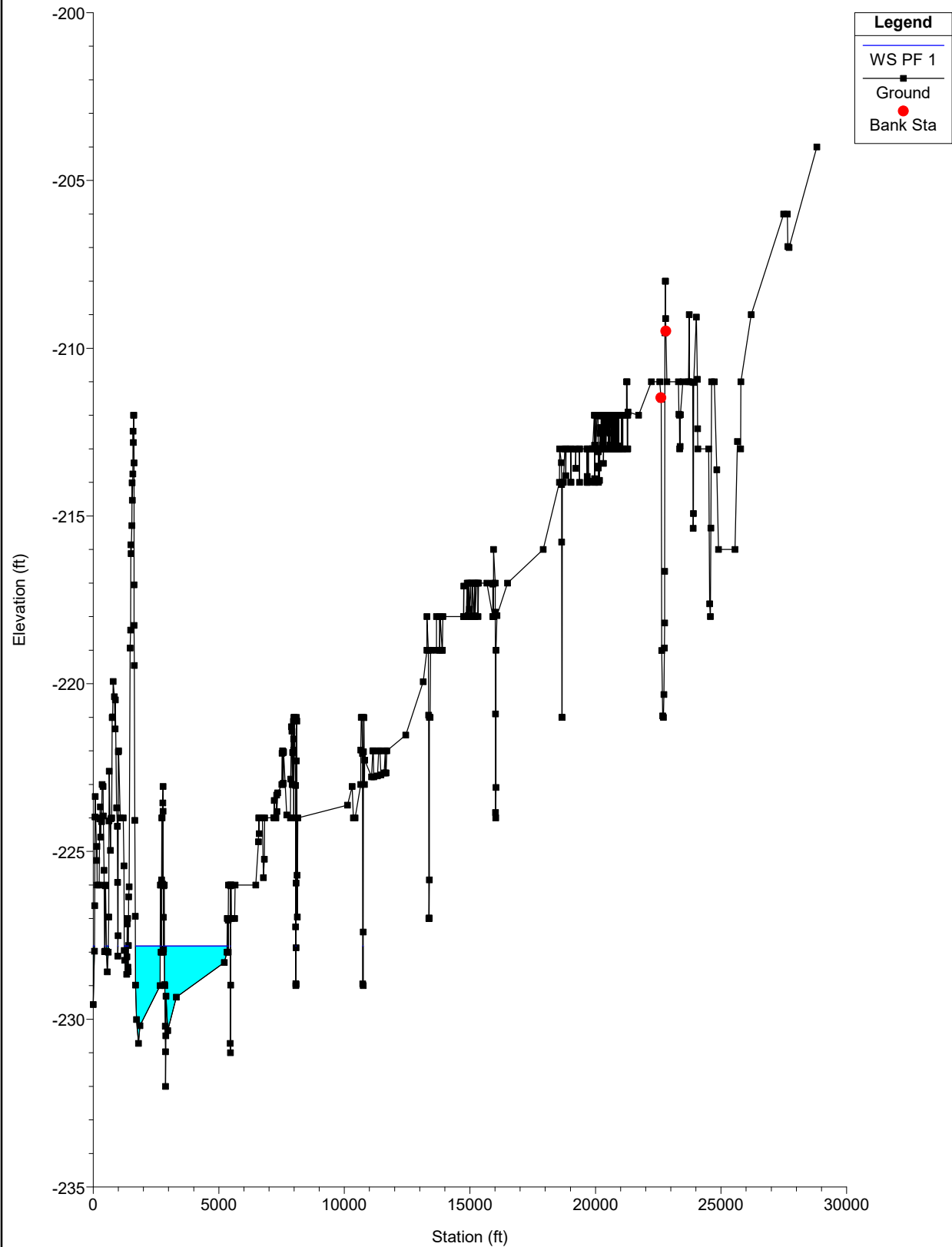
Alamo Creek Plan: AlamoRiver 9/5/2022

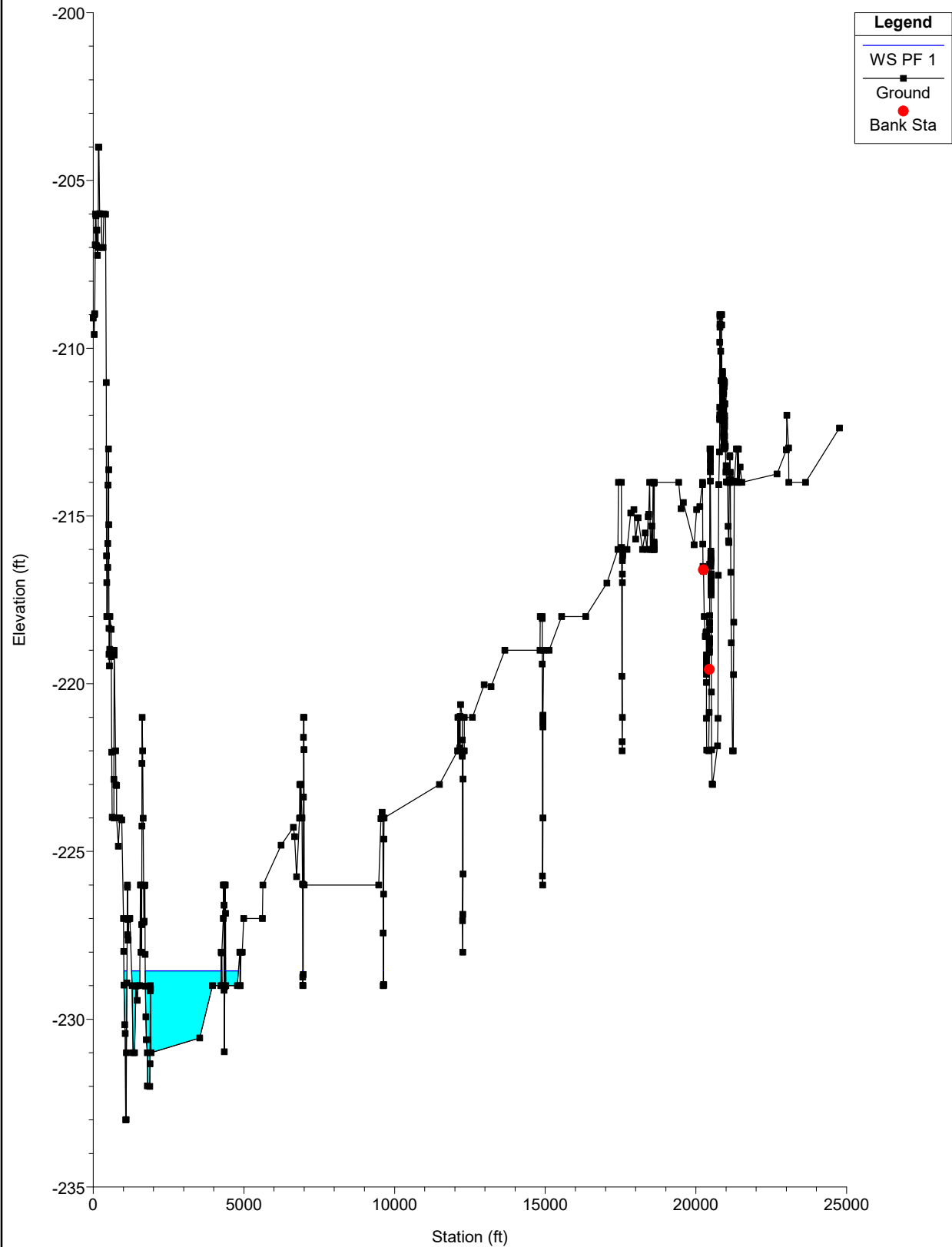


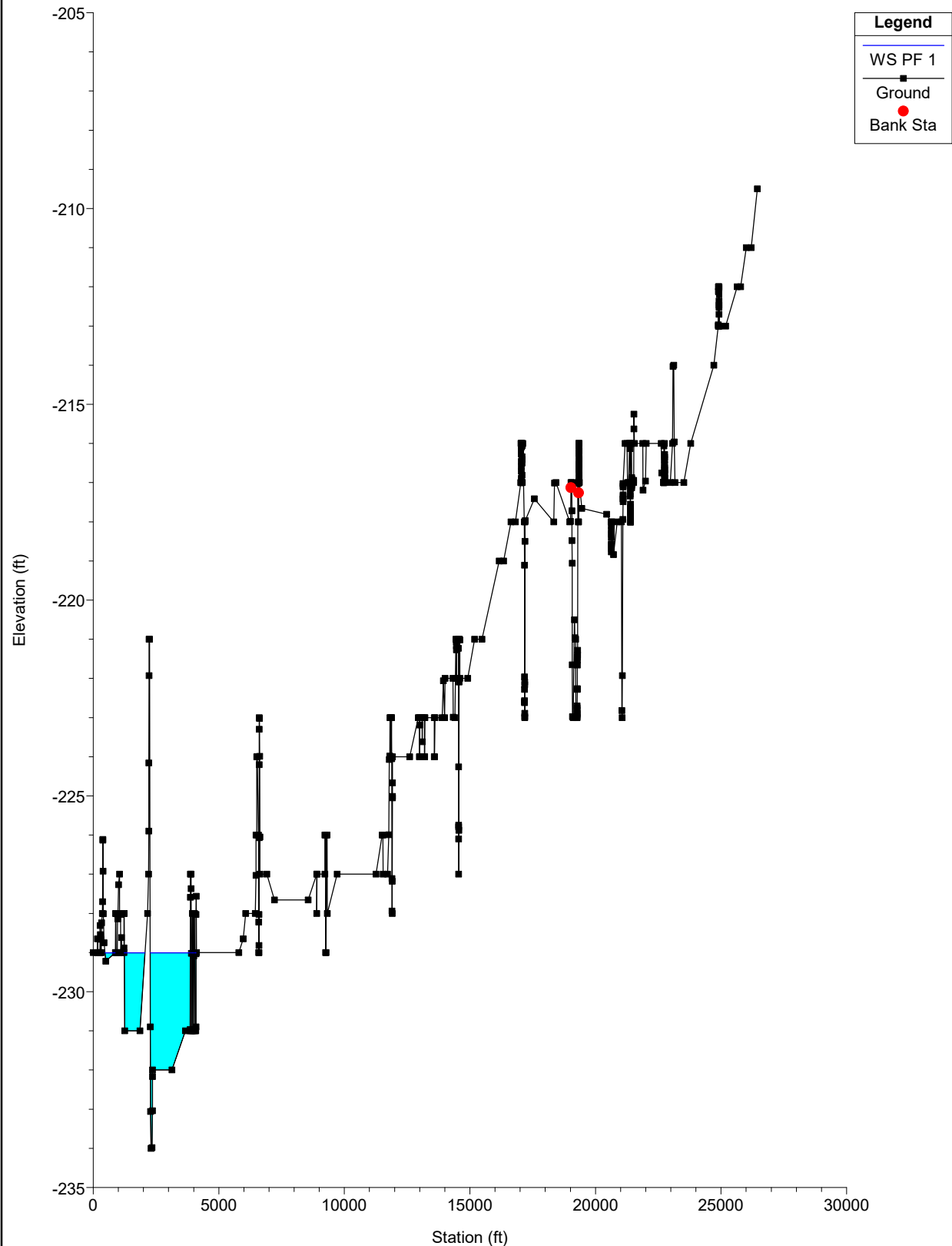


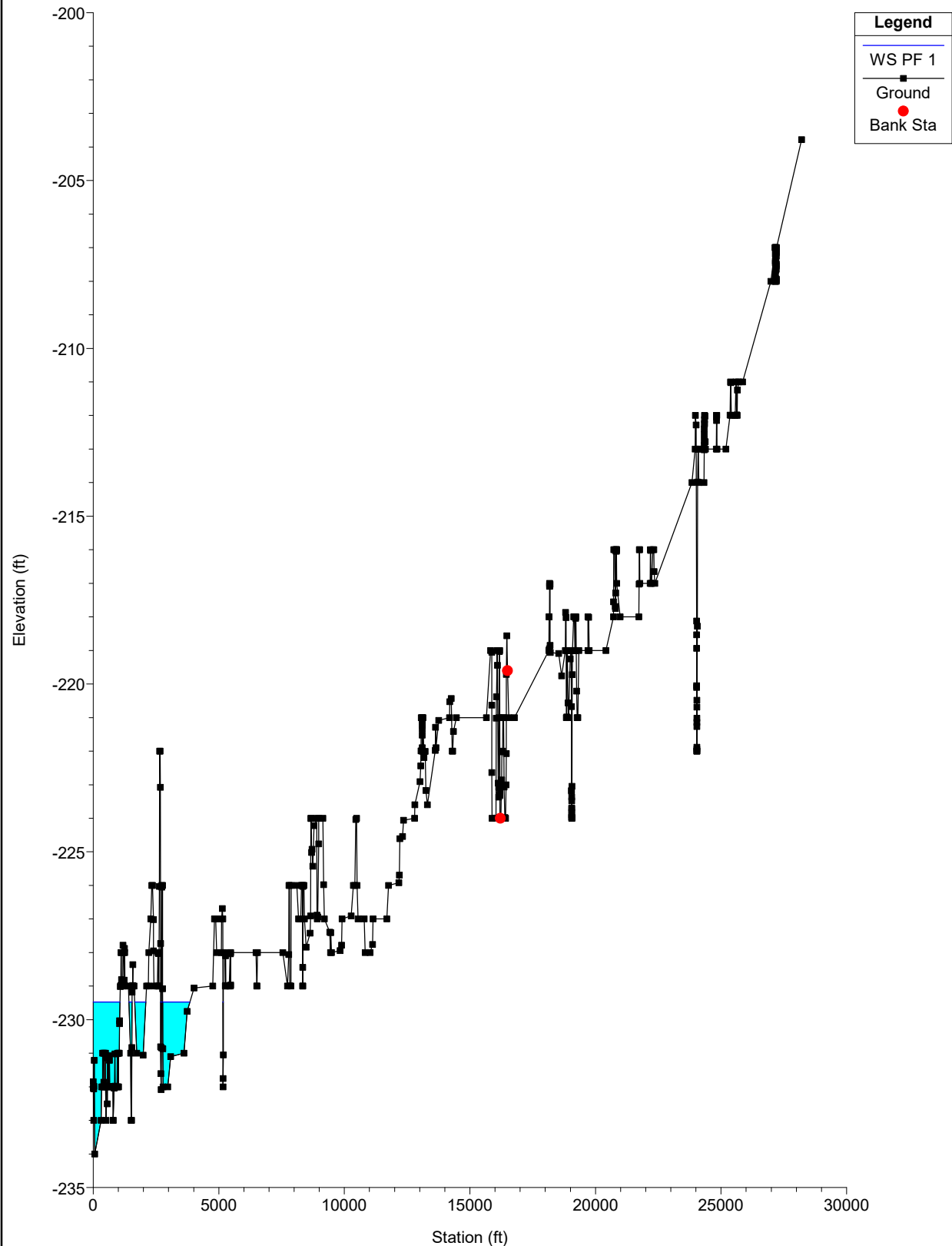


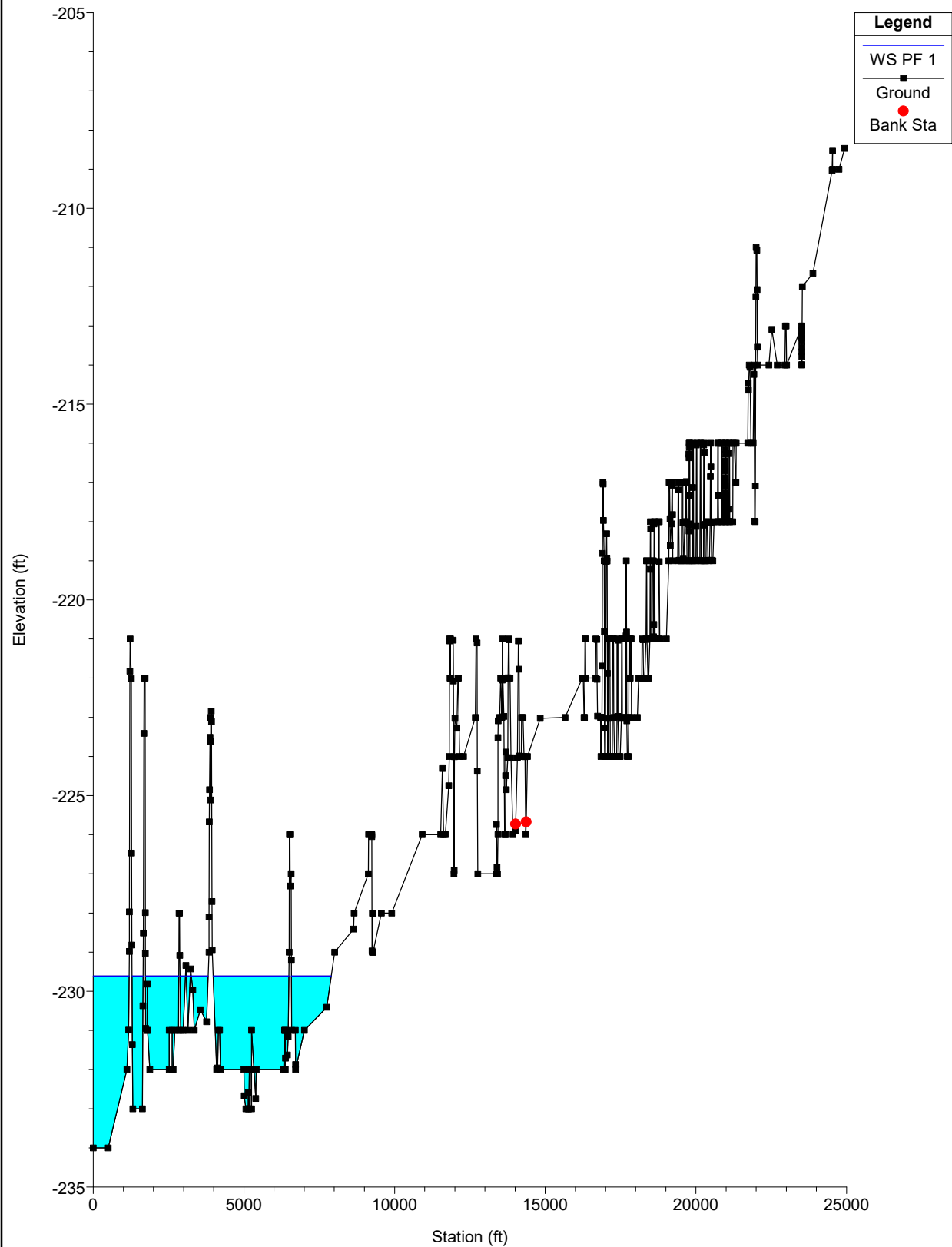


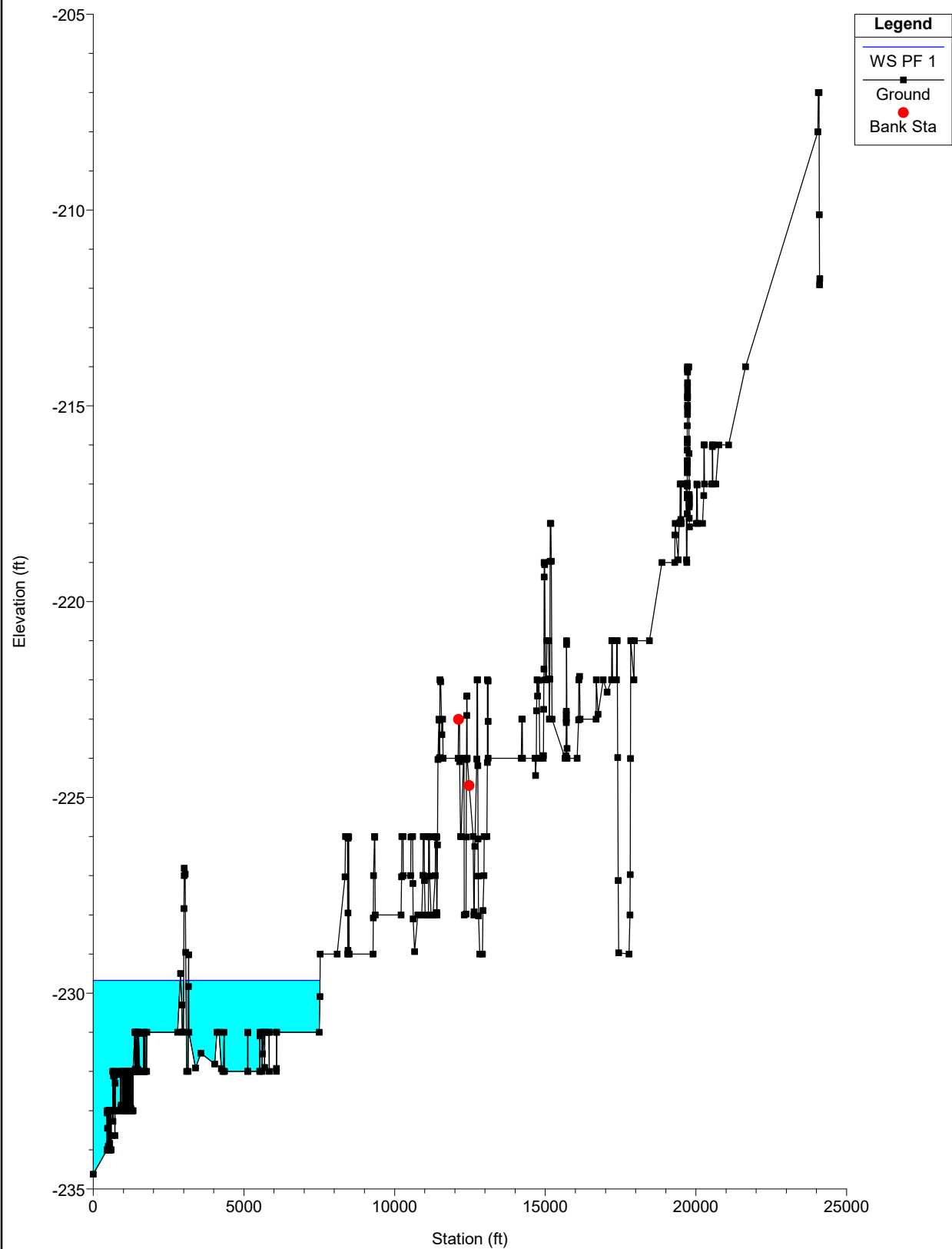


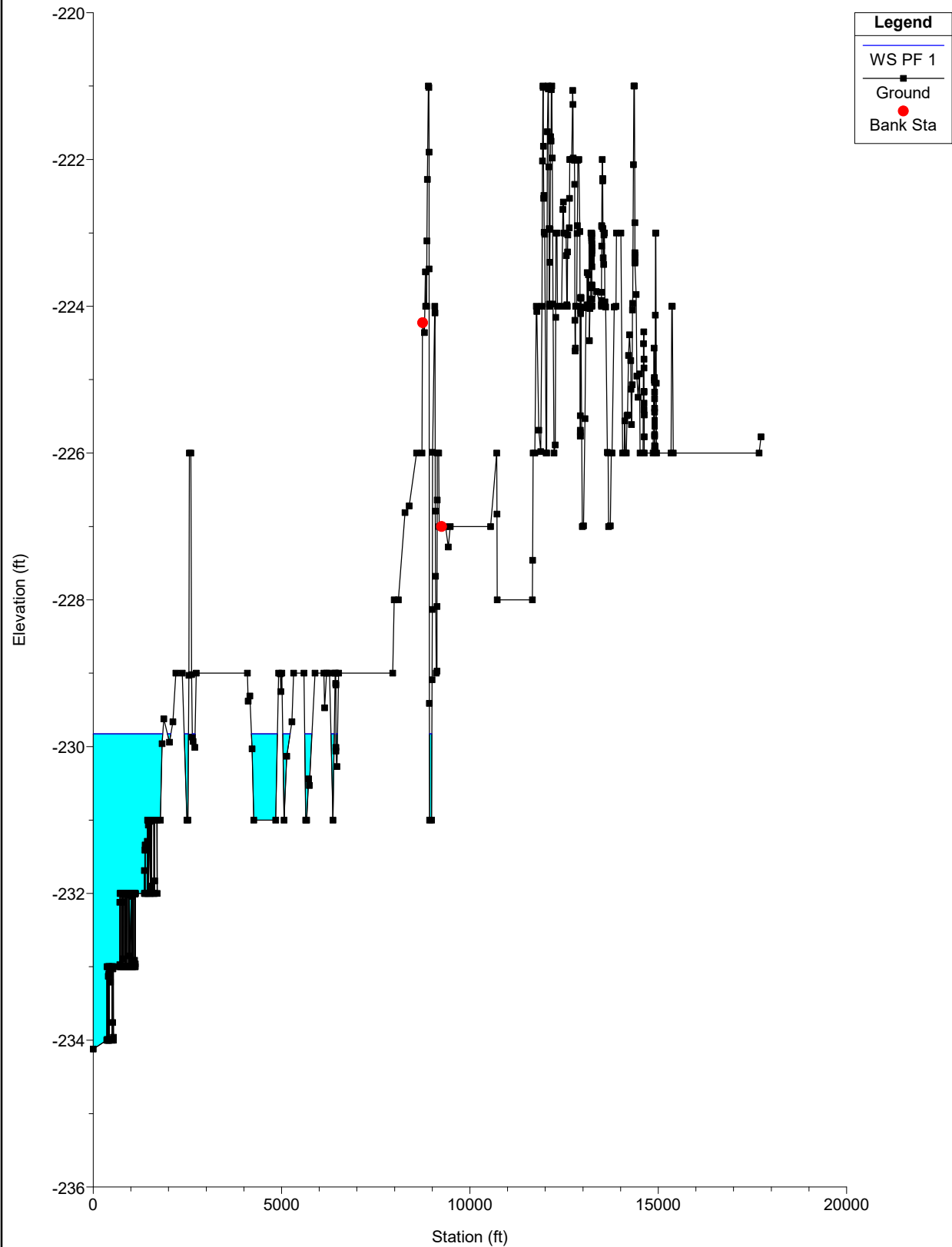




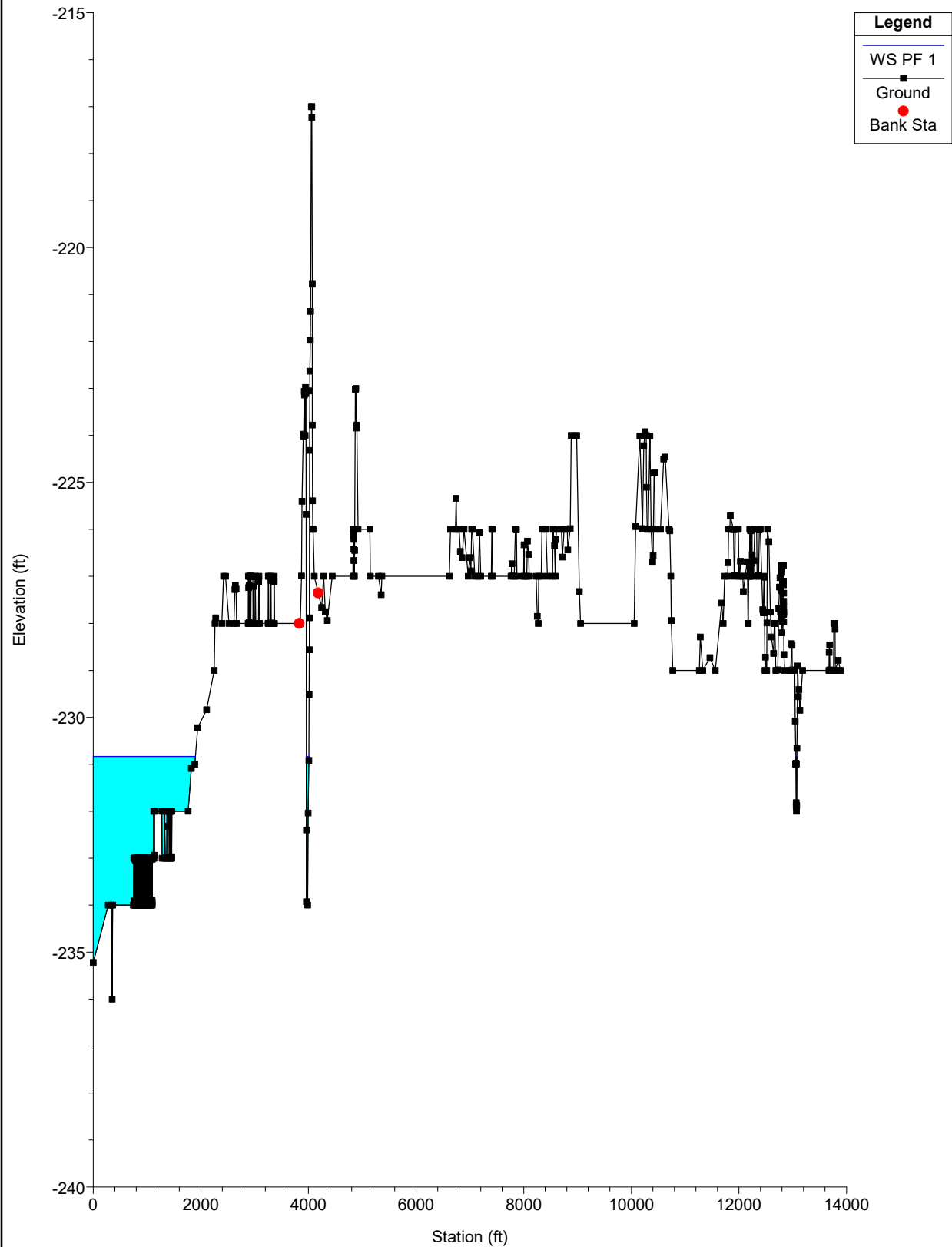


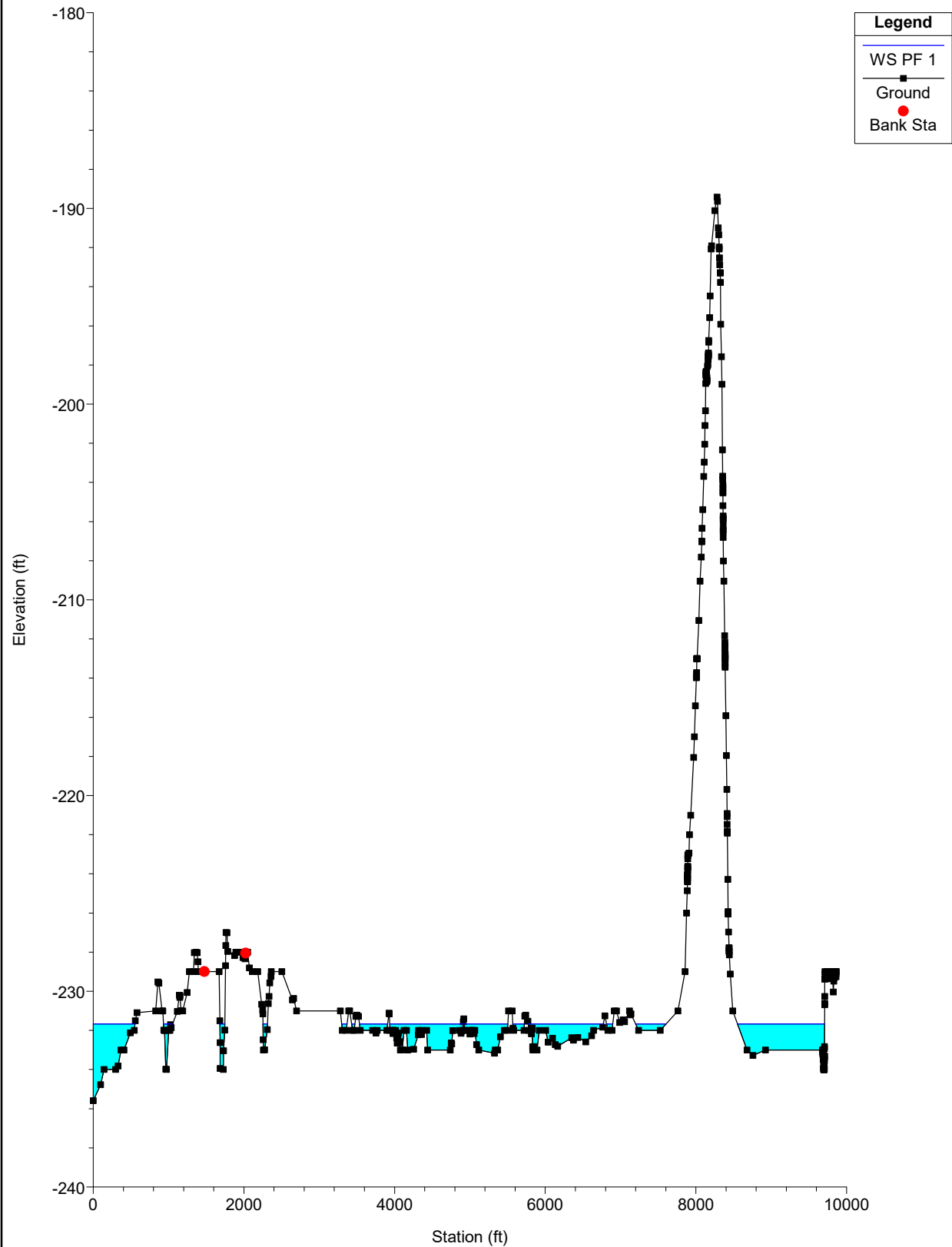






Alamo Creek Plan: AlamoRiver 9/5/2022





HEC-RAS HEC-RAS 5.0.7 March 2019
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```

X      X  XXXXXX   XXXX       XXXX       XX       XXXX
X      X  X        X   X       X  X       X  X       X
X      X  X        X         X  X       X   X       X
XXXXXXXX XXXX      X         XXX XXXX      XXXXXX      XXXX
X      X  X        X         X  X       X   X         X
X      X  X        X   X       X  X       X   X       X
X      X  XXXXXX   XXXX       X   X       X   X       XXXXX

```

PROJECT DATA

Project Title: Alamo Creek
Project File : AlamoCreek.prj
Run Date and Time: 9/5/2022 2:46:32 PM

Project in English units

PLAN DATA

Plan Title: AlamoRiver

Geometry Title: Alamo Creek

Flow Title : Alamo River

Plan Summary Information:

Number of: Cross Sections =	16	Multiple Openings =	0
Culverts =	0	Inline Structures =	0
Bridges =	0	Lateral Structures =	0

Computational Information

Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01

Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options

Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Alamo River

Flow Data (cfs)

River	Reach	RS	PF 1
Alamo River	Alamo River	37000	4500

Boundary Conditions

River	Reach	Profile	Upstream
Downstream			
Alamo River	Alamo River	PF 1	

Normal S = 0.0005

GEOMETRY DATA

Geometry Title: Alamo Creek

CROSS SECTION

RIVER: Alamo River
REACH: Alamo River RS: 37000

INPUT

Description:

Station Elevation Data

num= 232

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
27012.3	-203	27017.2	-203	27037	-203.97	27051.5	-204	27051.5	-204.01
27052.4	-204.33	27052.6	-204.41	27053.2	-204.66	27053.6	-204.83	27054	-204.98
27054.6	-205.25	27054.8	-205.31	27055.3	-205.52	27056.7	-205.84	27068.1	-204.03
27078.5	-204	27083.2	-205.9	27088	-208.93	27093.1	-211.38	27093.4	-211.5
27095.3	-212.05	27104.2	-212.98	27183.5	-213	27208.8	-210.98	27216.1	-209.12
27226.5	-207.39	27229.1	-206.78	27229.2	-206.75	27229.4	-206.64	27230.2	-206.19
27230.7	-206.06	27230.8	-206.02	27231.3	-205.91	27256.2	-203.03	27266.6	-199.11
27271.3	-198.24	27272.8	-198	27272.9	-198	27274.2	-198	27274.5	-198
27274.9	-198	27275.3	-198.07	27275.7	-198.16	27276.1	-198.27	27281.4	-200.97
27282.2	-201.25	27282.6	-201.36	27282.9	-201.44	27283.2	-201.52	27283.4	-201.57
27284	-201.75	27284.2	-201.8	27284.2	-201.81	27285	-201.98	27285.3	-202.03
27294.4	-202.534	27302.8	-203	27310.4	-202.98	27310.9	-202.93	27311.7	-202.76
27312.3	-202.6	27312.6	-202.53	27313.3	-202.33	27313.3	-202.31	27313.4	-202.3
27313.5	-202.27	27314.2	-202.08	27314.4	-202.02	27315.8	-201.29	27316.4	-201
27316.6	-201	27317.2	-201	27317.4	-201	27317.5	-201	27317.6	-201
27318.2	-201	27318.5	-201	27319	-201	27319.6	-201	27322.3	-201.04
27322.7	-201.05	27323.1	-201.25	27324.8	-202.03	27327.9	-203	27338.5	-202.87
27345	-201	27349.7	-201	27355.9	-203	27367.3	-203	27367.7	-202.95
27368.2	-202.87	27368.4	-202.84	27371.7	-201.24	27375	-201	27379.8	-201
27385.6	-202.8	27387.1	-203	27395.2	-203	27395.7	-202.9	27396	-202.78
27396.4	-202.64	27399.6	-201	27401.7	-201	27406.6	-201.01	27409.9	-202.32
27414.5	-203	27422.4	-202.99	27427.8	-201.89	27428.6	-201.5	27429	-201.35
27429.7	-201	27430.1	-201	27436.6	-201	27444.2	-203	27450.5	-202.94
27453.6	-202.18	27456.7	-201	27456.8	-201	27457.3	-201	27457.6	-201
27457.7	-201	27463.7	-201.15	27468.1	-203	27479.5	-203	27483.7	-202.06
27485.8	-201	27486.8	-201	27487.6	-201	27487.9	-201	27488.3	-201
27494.1	-201	27499.3	-203	27508.5	-203	27512.7	-201.17	27514.3	-201
27520	-201	27522.1	-202	27527.3	-203	27535.5	-203	27537.1	-202.76
27537.4	-202.64	27537.7	-202.53	27537.9	-202.47	27540.8	-201	27548.4	-201
27553.3	-202.76	27561.6	-203	27566.4	-201.79	27571	-199	27574.1	-199.2
27578.4	-201.84	27583.4	-203	27592.4	-202.93	27597	-201	27597.5	-201
27597.9	-201	27598.7	-201	27599	-201	27599.5	-201	27599.6	-201
27606.3	-201	27611.5	-203	27619.9	-202.99	27620.8	-202.83	27621.4	-202.64
27622.2	-202.34	27622.8	-202.1	27624.6	-201.01	27625	-200.81	27625.4	-200.6
27626	-200.31	27626.2	-200.21	27627.1	-199.85	27628.6	-199.2	27628.7	-199.16
27629.2	-199	27629.5	-199	27630	-199	27630.2	-199	27630.3	-199.03
27630.7	-199.13	27639.5	-203	27650.3	-202.99	27656	-201.04	27660.2	-201
27662.7	-201.15	27663.3	-201.37	27663.5	-201.48	27663.9	-201.63	27665.2	-201.99
27671.6	-202.31	27709.2	-202	27739.3	-203	27911	-203	27953.3	-202
27987.6	-202	28012.9	-203	28197.4	-203	28246.3	-202.09	28367.8	-204
28507	-202	28542.2	-202	28588.1	-203	28715.7	-203	28751.3	-202.03
28802.1	-202	28817	-201.07	28827	-201	28864.4	-202	28870.7	-206.21
28876.9	-209	28887.5	-208.88	28895.6	-204.11	28896.4	-203.77	28896.6	-203.69
28897	-203.55	28897.2	-203.45	28897.7	-203.28	28898.1	-203.18	28898.4	-203.07
28898.7	-203	28914.3	-203	28918.7	-204	28922.4	-204	29049.4	-203

30050.9	-201.81	30267.9	-201	30322	-201.01	30330.3	-202	30374.9	-202.62
30765.6	-201.56	31533.1	-201						

Manning's n Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val
27012.3	.045	27012.3	.036	27294.4	.045

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	27012.3	27294.4		952	929.5	971.1		.1	.3

CROSS SECTION

RIVER: Alamo River

REACH: Alamo River RS: 36071

INPUT

Description:

Station Elevation Data		num=		452	
Sta	Elev	Sta	Elev	Sta	Elev
0	-232	30.6	-231.98	47.6	-231
1478.8	-229	1771.5	-228	1782.6	-228
1792.5	-227	1810.6	-227	1817.6	-229
1852.6	-226	1865.6	-228.03	1888.6	-229
3156.6	-227	3165.6	-227	3168.6	-228
3196.9	-227.01	3216.6	-228.91	3223.6	-229
4481.6	-226	4525.6	-224	4529.6	-224
4550.6	-224	4554.6	-223	4587.6	-223
5419.8	-223.42	5425.6	-224	6399.7	-224
7006.7	-223.34	7087.7	-224	7097.7	-222.03
7152.3	-220.32	7176.7	-222.12	7181.7	-222.97
7197.7	-222	7240.7	-221.95	7255.7	-219
7349.5	-218.95	7356.7	-219	7368	-218
7656.7	-217	7857.7	-217	7931.7	-216.31
8390.7	-216.16	8395.7	-219	8428.7	-219
8437.7	-219	8441.7	-219	8443.7	-218
8488.5	-217.11	8489.7	-216.77	8548.7	-217
8565.7	-219	8571.7	-217.92	8585.7	-218
9009.7	-216	9212	-215.41	9296.7	-215.9
9349.7	-217.84	9349.8	-217.85	9350.6	-217.99
9379.7	-217.41	9389.6	-214.5	9391.7	-214.43
9413.7	-217.32	9415.8	-216.89	9417.7	-216
9432.7	-214.5	9438.7	-216.38	9442.4	-216.05
9463.7	-214.92	9477.7	-215.98	9479.7	-216.31
9488.7	-217.53	9493.2	-215.32	9498.7	-214
9718.7	-214.63	9723.7	-215.26	9726.7	-217
9777.4	-216	9780.7	-217	9785.7	-217
9837.7	-216.12	9838.7	-216.69	9843.7	-221.16
9854.7	-220.82	9860.7	-216	11289.7	-216
11875.7	-214.39	11914.7	-214.87	12127.8	-214.71

12372.8	-212	12378.7	-212.01	12383.7	-213.59	12387.7	-214	12395.7	-212
12417.9	-212	12458.7	-213.01	12462.7	-214	12466.7	-216.74	12470.3	-218.58
12476.3	-220.82	12479.7	-221	12487.7	-218.91	12495.7	-214	12519.7	-214
12526.7	-215.3	12532.7	-215.69	12551.7	-215.32	12562.7	-214	13750.7	-214
13885.7	-213.88	13916.7	-213	14872.5	-212.85	14929.7	-212	15009.7	-212
15026.7	-211	15036.2	-211	15039.7	-212	15044.3	-211.91	15048.3	-211
15111.7	-211.04	15114.6	-212.2	15123.6	-219.12	15126.6	-220.27	15126.9	-220.35
15127.7	-220.65	15128.6	-220.96	15129.6	-221	15129.7	-221	15137.7	-218.63
15137.7	-218.6	15138.7	-218.13	15138.7	-218.09	15138.8	-218.04	15139.7	-217.39
15143.7	-213.84	15145.7	-213	15179.8	-213	15195.9	-213.97	15214.5	-214
15407.6	-213	15993.7	-212.75	16071.7	-212	16725.9	-211.81	16814.8	-211
17476.8	-210.59	17593.8	-209.91	17641.8	-209	17663.6	-208	17667.9	-208.04
17669.6	-208.73	17669.8	-208.78	17669.9	-208.81	17670.7	-208.98	17670.8	-209
17676.7	-209	17682.8	-208	17745.8	-208	17746	-208.03	17746.5	-208.12
17748.8	-209.41	17752.5	-212.97	17756.8	-215.91	17759.8	-217.11	17762.8	-217.16
17768.8	-217.06	17776.1	-212.08	17778.8	-210.96	17846.8	-210.39	18017.8	-210.75
18455.5	-210.5	18574.6	-209.88	18612.7	-209	19212.2	-208.94	19591.6	-208
20057.8	-207.81	20274.8	-207.31	20307.5	-207	20314.8	-206	20330.4	-206.06
20330.8	-206.09	20331.2	-206.32	20331.4	-206.43	20333.2	-207.29	20335.8	-208
20336.2	-207.93	20336.4	-207.91	20336.8	-207.84	20337.2	-207.67	20337.3	-207.61
20337.8	-207.44	20340.8	-206	20402.8	-206	20406.1	-207.2	20412.5	-212.41
20415.8	-214	20429.8	-213.72	20432.8	-212.03	20436.9	-208.04	20480.7	-207
20485.7	-206.18	20487.9	-206	22838.8	-205.28	22893.8	-206	23050.8	-206
23055.8	-210.95	23058.6	-212.56	23058.8	-212.66	23059	-212.73	23059.8	-213
23060	-213	23066.8	-213	23069.8	-211.19	23074.8	-206.21	23075.1	-206.15
23075.8	-206	23156.4	-205.99	23181.1	-205.22	24594.1	-205.94	24722	-204.09
24759.2	-203	24780.2	-203	24788	-204	24798.8	-204	24808.2	-203.09
24820.7	-203	24832	-204	25557.6	-205.31	25642.7	-204	26414.9	-204
26440	-204	26496.2	-206	26498.3	-206.81	26505.8	-211.69	26510.7	-213.72
26529.7	-218.1	26536.7	-219	26615.7	-219	26618.8	-218.2	26618.8	-218.17
26618.9	-218.11	26620.4	-217.32	26620.9	-216.99	26621.2	-216.8	26625.2	-214.04
26625.9	-213.71	26626.2	-213.55	26627.1	-213.15	26627.6	-212.93	26627.7	-212.92
26628.5	-212.57	26629.1	-212.31	26629.2	-212.26	26629.3	-212.23	26630.3	-211.74
26630.5	-211.59	26630.9	-211.39	26631.3	-211.19	26631.7	-211.04	26639.8	-209.16
26664.7	-207.449	26670.8	-207.03	26678.4	-205.18	26687.4	-204.18	26687.6	-204.18
26688.2	-204.18	26691.6	-204.26	26708.2	-205.97	26713.4	-207.77	26721.7	-211.95
26737	-215.88	26759.1	-216.99	26785.1	-216.99	26820.5	-215.94	26837.1	-211.64
26849.5	-207.63	26849.6	-207.62	26849.6	-207.6	26850.4	-207.4	26850.6	-207.35
26851	-207.28	26851.2	-207.25	26853.7	-206.97	26878.7	-208.49	26889.1	-210.53
26899.4	-213.95	26920.8	-215.99	27137.5	-216	27162.4	-213.98	27175.2	-208.99
27181.6	-205.88	27187.3	-203.98	27200.9	-203.19	27211.3	-202	27233.1	-202.22
27234.1	-202.5	27235.3	-202.82	27238.3	-204.06	27246.4	-208.59	27254.9	-211
27327.4	-212	27356.8	-211.94	27389.8	-211.01	27405.6	-206	27548	-204
28261	-204	28266.2	-203.19	28270.1	-203	28277.6	-203	28281.8	-204
28367.3	-204	28401.3	-203.75	28416.7	-203.02	28447.1	-203	28479.3	-204
28484.5	-205.94	28489.8	-208.94	28501.1	-210.84	28506.6	-211	28507.2	-211
28507.3	-211	28507.4	-210.95	28511.5	-208.15	28513	-207.27	28513.1	-207.23
28514.4	-206.65	28514.6	-206.59	28514.7	-206.56	28515.5	-206.28	28515.7	-206.23
28515.9	-206.15	28516.3	-206	28516.7	-205.89	28517.3	-205.71	28525	-204
28629	-204.78	28649.2	-204	28858.6	-203.84	29076.9	-203	29446.8	-203

29446.9	-203.02	29447	-203.03	29448	-203.19	29448.4	-203.27	29448.5	-203.28
29449	-203.37	29449.3	-203.44	29449.9	-203.57	29450	-203.61	29450.5	-203.71
29451	-203.86	29457.1	-205.54	29464.6	-208.14	29469.8	-209.2	29485	-211.54
29499.9	-213	29505.2	-212.99	29511.4	-211.81	29518	-211.98	29525.3	-211.18
29525.5	-211.16	29530.1	-211.04	29537.6	-209.58	29549.9	-208.27	29557.2	-205.7
29557.9	-205.68	29558.1	-205.66	29558.6	-205.65	29558.7	-205.65	29559.2	-205.64
29559.5	-205.7	29560.1	-205.82	29560.2	-205.84	29561.9	-206.15	29562.3	-206.22
29562.7	-206.3	29565.1	-206.35	29579.7	-203.87	29610.1	-202.77	29725.4	-202
29732.9	-201	29804.9	-201.02	29817.3	-202	29824.3	-202	29839.8	-201
29919.8	-201	29928	-202	29941.5	-202	29951.5	-201.04	29971.7	-201
30013.4	-202	30720	-202.16						

Manning's n Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.045	26414.9	.036	26664.7	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
26414.9	26664.7	1189.4	1144.6	1141.6		.1	.3

CROSS SECTION

RIVER: Alamo River

REACH: Alamo River

RS: 34926

INPUT

Description:

Station Elevation Data		num=		444					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	-232.84	97.3	-233	109.3	-231.89	119.3	-229.05	137.3	-229
142.3	-229.8	147.3	-232.03	161.3	-233	213.3	-233	276.3	-232
436.3	-232	468.3	-233	490.3	-232.99	513.3	-232	1073.3	-232
1081.3	-233	1089.3	-233	1096.6	-231.03	1128.1	-229.99	1143.3	-229
1154.3	-229	1157.3	-228	1179.3	-228.1	1181.3	-229.24	1184.3	-231.82
1193.3	-232	1195.4	-231.01	1202.3	-226	1251.3	-226	1254.4	-227.7
1258.3	-231	1259.3	-231.57	1261.3	-231.86	1267.3	-230.91	1270.4	-229.02
1274.3	-228	1294.3	-228.94	1300.3	-231	1597.5	-231	1982.6	-230.62
2041.2	-229	2498.4	-229	2521.3	-228	2531.3	-228	2533.3	-228.31
2544.3	-228	2547.3	-227	2574.2	-229	3232.8	-228.81	3414.3	-228
3732.3	-228	3800.5	-227.03	3802.3	-226.88	3805.3	-226	3807.2	-226.18
3809.3	-227	3814.3	-226.88	3816.4	-226	3839.3	-226	3842.2	-226.98
3847.3	-227	3850.3	-225.97	3861.3	-225.38	3892.3	-225.21	3896.3	-225.96
3898.3	-227	3911.3	-227	3915.3	-225.86	3944.3	-225.77	3950.3	-225.94
3954.3	-227	3975.3	-227	3986.6	-226	4555.3	-226	4627.3	-225.56
4793.2	-226	4969.3	-225.5	5193.3	-226	5197.3	-227	5201.3	-226
5240.2	-225.97	5273.3	-224	5552.1	-224	5736.3	-225.75	6012.3	-225.69
6342.3	-224.84	6451.5	-224.03	6453.3	-223.97	6456.3	-222.96	6468.3	-222
6473.3	-222	6477.3	-222.91	6483.2	-223	6486.3	-222	6529.3	-221
6539.3	-221.06	6544.4	-222.87	6549.3	-225.85	6554.3	-226	6560.2	-223.9
6569.3	-222	6583.3	-222.03	6595.3	-223.97	6599.3	-224	6602.5	-223.44

6608.3	-220.89	6622.3	-219.31	6657	-219	6928.4	-219	7079.3	-218
7300.3	-218	7476.2	-217	7747.3	-217	7754.3	-219	7817.4	-219
7831.3	-220.99	7835.3	-221	7841.3	-217.21	7842.3	-217	7978	-217
8029.3	-216.56	8264.2	-216	9061.3	-216	9062.3	-215.95	9065.6	-214.26
9067.3	-214	9081.3	-214	9091.3	-216	9094.3	-218	9099.1	-217.95
9103.5	-217	9107.3	-217	9109.2	-217.76	9109.3	-217.84	9109.5	-217.87
9110.3	-218	9113.3	-218	9116.3	-217	9193.3	-217	9194.3	-217.3
9194.3	-217.31	9194.4	-217.33	9195.4	-217.93	9200.3	-222.85	9202.3	-224
9209.4	-223.97	9211.4	-222.94	9216.2	-218.35	9219.3	-217	9248.2	-218.06
9398.3	-218.72	9852.3	-218.38	9917.3	-218	11385.3	-217.5	11443.3	-217
11534.3	-217.47	11714.3	-217	11723.1	-216	11733.3	-214	11754.5	-213.99
11763.2	-213.2	11772.2	-213.16	11813.4	-214	11829.3	-216.06	11833.3	-219.06
11837.3	-220.79	11838.3	-221	11847.3	-221	11855.3	-219.11	11860.3	-216
11900.3	-216	11901.5	-216.22	11905.3	-218	11919.1	-218.99	11931.3	-219
11951.6	-218	12037.3	-218.05	12051.3	-217.09	12061.8	-217.99	12081.3	-218
12082.3	-217.83	12086.3	-216	12374.1	-216	12636.3	-215.44	14026.4	-214.91
14105.2	-214.75	14168.3	-214	14383.3	-214	14386.3	-213.04	14410.3	-213
14414.3	-212	14430.3	-212	14476.3	-213	14478.3	-213.87	14479.3	-214.65
14485.3	-219.63	14487.3	-220.93	14489.3	-221.78	14499.3	-222	14501.3	-221.26
14503.3	-220.19	14511.3	-214	14639.3	-214	14677.3	-214.69	14738.8	-214.28
15040.3	-214.62	15136.8	-214.34	15150.3	-214	15756.2	-213.66	16943.3	-212
17008.3	-211.03	17023.3	-209	17054.5	-209.01	17111.3	-211.03	17118.3	-216.88
17120.3	-217.89	17125.3	-219	17130.3	-219	17133.3	-217.88	17142.3	-211
17825.3	-211	18412.5	-210.07	18806.3	-209.91	19057.3	-209	19386.3	-209
19671.3	-208	19677.3	-207	19691.1	-207	19693.1	-207.73	19693.3	-207.84
19693.6	-207.88	19694.1	-207.97	19694.3	-208	19699.3	-208	19701.3	-207.16
19702.3	-207	19760.3	-207.25	19766.4	-207.96	19767.4	-208.51	19769.3	-210.43
19769.3	-210.47	19769.4	-210.5	19771.3	-212.03	19775.3	-214.18	19775.3	-214.19
19776.4	-214.54	19780.3	-216	19789.4	-216	19793.4	-213.93	19800.3	-209
19843.2	-208	19849.3	-207	20853.8	-206	22323.4	-206	22323.6	-206.01
22324.4	-206.03	22324.6	-206.14	22325.1	-206.36	22325.4	-206.47	22325.6	-206.58
22326.1	-206.81	22326.4	-206.93	22326.6	-206.95	22327.1	-206.98	22327.4	-207
22328.1	-207	22328.4	-207	22328.6	-207	22329.1	-207	22329.4	-207
22329.6	-207	22330.1	-207	22330.4	-207	22330.6	-206.95	22331.1	-206.84
22331.6	-206.67	22332.1	-206.43	22332.6	-206.24	22333.1	-206.07	22333.4	-206
22361.2	-206	22394.3	-207	22394.4	-207	22394.5	-207	22395.5	-207
22396.3	-207	22396.4	-207	22397.3	-207	22397.4	-207	22397.4	-206.98
22398.3	-206.77	22399.3	-206.44	22399.4	-206.41	22399.4	-206.38	22400.3	-206.1
22400.4	-206.07	22400.4	-206.06	22401.3	-206.01	22401.4	-206	22412.4	-206
22412.4	-206.02	22413.3	-206.27	22415.4	-206.84	22415.4	-206.87	22416.4	-207.44
22417.3	-208.21	22417.4	-208.29	22418.3	-209.17	22418.4	-209.22	22418.4	-209.27
22419.3	-210.26	22419.4	-210.31	22420.3	-211.42	22420.4	-211.52	22421.3	-212.61
22421.4	-212.66	22421.4	-212.69	22422.3	-213.59	22422.4	-213.64	22423.3	-213.99
22424.3	-214	22433.4	-213.99	22441.3	-207.72	22441.4	-207.72	22442.3	-207.25
22442.4	-207.25	22443.3	-206.94	22443.4	-206.94	22443.4	-206.93	22444.3	-206.69
22447.4	-206.12	22448.4	-206	22545.4	-206.5	22902.3	-206.78	23943.6	-207
24415.1	-207	24442.8	-206	24524.8	-206	24602.2	-206.97	24623.5	-206
24703.5	-206	24718.3	-207	24730.5	-206.01	25004.7	-206	25015.9	-205.33
25029.5	-206	25637.5	-206	25682.4	-206	25712.4	-208.01	25712.5	-208.04
25712.9	-208.14	25713.3	-208.27	25713.4	-208.3	25713.6	-208.36	25714.1	-208.51

25714.5	-208.62	25715	-208.78	25715.1	-208.81	25729.1	-214.96	25739.3	-217.98
25757.5	-218.99	25808.6	-219	25818.8	-218.06	25825.2	-217.08	25825.9	-216.97
25826.1	-216.92	25826.2	-216.91	25826.3	-216.88	25827	-216.73	25827.8	-216.51
25828.3	-216.38	25828.6	-216.29	25830.6	-215.63	25831.1	-215.42	25831.9	-215.11
25832	-215.07	25832.4	-214.9	25832.7	-214.8	25833.4	-214.56	25833.5	-214.53
25833.5	-214.51	25833.7	-214.45	25834.3	-214.2	25834.5	-214.13	25834.8	-213.96
25841.8	-208.93	25844.6	-207.34	25844.9	-207.2	25845.4	-207.01	25845.8	-206.84
25845.9	-206.79	25846.6	-206.51	25846.9	-206.38	25847.4	-206.21	25847.5	-206.18
25847.9	-206	25865.8	-204.03	25866.2	-203.9	25866.6	-203.81	25867.2	-203.56
25867.6	-203.39	25867.8	-203.29	25868.6	-202.98	25868.6	-202.97	25868.7	-202.95
25869.5	-202.42	25869.7	-202.3	25870	-202.09	25870.7	-201.64	25871.1	-201.4
25871.4	-201.2	25871.7	-201	25909	-201.01	25916.1	-202.17	25929.7	-202.94
25935.7	-203.97	25966.8	-204.41	26026.4	-204.016	26028.9	-204	26745.9	-204
26752.2	-202.73	26752.5	-202.68	26753.2	-202.57	26753.3	-202.56	26753.3	-202.55
26753.4	-202.53	26754.1	-202.42	26754.3	-202.4	26754.6	-202.38	26755.3	-202.33
26755.7	-202.31	26756	-202.29	26756.6	-202.28	26771.9	-204	27575.8	-204
27579.9	-203.16	27580.1	-203.14	27581	-203	27581.5	-203	27582	-203
27582.9	-203	27587.1	-203	27600.6	-204	29263.8	-204		

Manning's n Values	num=	3
Sta n Val Sta n Val Sta n Val		
0 .045 25637.5 .036 26026.4 .045		

Bank Sta: Left Right	Lengths: Left Channel Right	Coeff Contr.	Expan.
25637.5 26026.4	1203 1406.4 1411.4	.1	.3

CROSS SECTION

RIVER: Alamo River

REACH: Alamo River

RS: 33520

INPUT

Description:

Station Elevation Data	num=	438
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev		
0 -231.56 237 -230.75 375 -229 386 -228.03 419.5 -227.04		
432 -226.01 451.7 -225.99 471 -225.08 509.9 -225.36 527.2 -226.04		
548 -228 579.1 -228 606.1 -223.26 610 -222.02 634 -221		
657 -221 659 -221.9 665 -226.19 671 -229.31 675 -231		
680.3 -232.09 686 -234 705 -233.99 712 -229.53 714 -229		
731 -229 756 -232 1025.1 -232 1036.1 -231.34 1053.1 -231.09		
1320.1 -231.38 2712.1 -230.41 3156.1 -229.28 3210.1 -229 3214.1 -228		
3251.1 -229 3254.1 -228 3273.1 -228 3278 -225.72 3283.1 -224		
3300.1 -224 3306 -228.06 3309 -229 3321.1 -229 3324.1 -227.81		
3327.1 -226 3342.1 -226 3348.1 -228 3382.1 -228 3394.1 -229		
3754.9 -229 5834.1 -226.03 5854.1 -225.79 5882.1 -224 5952.1 -224		
5953.1 -224.04 5956.9 -226.12 5959.2 -226.9 5966.1 -227 5967.1 -226.94		
5969.1 -226.16 5973.1 -224 6637.1 -223.94 6911.1 -223.03 6915.8 -222.83		
6919.1 -222 6961.1 -222.8 7439.1 -222.03 7445.1 -222 7450.1 -221		

7460.1	-222	7808.1	-221.75	7971.1	-221	8554.1	-221	8555.1	-220.91
8557.1	-219.69	8559.1	-218.98	8602.7	-218.01	8613.1	-217	8625.1	-217
8629.1	-218.78	8638.1	-225.98	8645.1	-226	8646.3	-225.18	8650.1	-221.15
8655.1	-219	8685.1	-219	8691.1	-218	8704.2	-218.01	8722	-219
9110.1	-219.25	9233.1	-221	9268.1	-222	9338.1	-222	9560.9	-219
9841.9	-216	9885.1	-216	9909.1	-218	10238.1	-218	10969.1	-217.03
11109.1	-216	11156.1	-216	11159.1	-217	11163.1	-217	11166.1	-216
11232.1	-216	11241.1	-217.03	11245.6	-221.47	11248.1	-222.97	11253.1	-223.89
11260.1	-224	11263.1	-223.3	11265.6	-222.08	11269.6	-219.27	11273.1	-216
11299.1	-216	11302.1	-217	11315.1	-217.09	11641.6	-218	13521.1	-217.47
13788.1	-217	13806.1	-214	13842.1	-214	13893.1	-216	13901.4	-221.98
13904.1	-223.45	13904.4	-223.59	13904.8	-223.73	13905.1	-223.86	13913.1	-224
13917.5	-222.42	13920.5	-220.42	13924.1	-217.31	13928.1	-216	14312.1	-215.88
14494.1	-214	15041.1	-214	15113.1	-213	15641.1	-213	15745	-212
15860.1	-212	15875.7	-213	15902.1	-212	15985.1	-212	15989.8	-213
15996.1	-213	16000.1	-212	16238.1	-212	16248.1	-213	16327.1	-213
16421.3	-212.03	16421.9	-212.01	16423.1	-211.94	16426.1	-211.04	16426.3	-211.03
16427.1	-211	16441	-211	16444.1	-212	16449.1	-212	16452.1	-211
16524.1	-211	16528	-214.12	16534.1	-220.74	16535	-221.28	16535.1	-221.34
16537	-221.98	16537.1	-222	16541.1	-222	16543	-221.04	16543.1	-220.97
16550.1	-213.87	16551.1	-213.03	16551.2	-212.95	16552	-212.55	16552.1	-212.47
16552.3	-212.4	16553	-212.07	16553.1	-212	17014.1	-212	18434.1	-210.88
19109.1	-209	19112.1	-208	19157	-208	19162.1	-207	19167.2	-207.01
19177.1	-207.94	19180.1	-209.57	19186	-215	19186.1	-215.05	19188.1	-216.66
19190.1	-217.94	19200.1	-218	19202.1	-217.87	19203.1	-217.42	19209.1	-212.59
19211.1	-211.19	19212.1	-211	19224.1	-210.5	19300.9	-209.44	19738.5	-210.12
20466.4	-210.03	21141.1	-209.56	21182	-209	21712.1	-209	21716.6	-208.05
21729.1	-207.03	21734.1	-207	21734.6	-207.02	21735.1	-207.05	21735.6	-207.17
21736.1	-207.3	21736.6	-207.43	21736.6	-207.44	21738.6	-207.93	21743.1	-208
21743.6	-207.84	21743.6	-207.82	21744.1	-207.66	21748.1	-206	21758.1	-206
21775.7	-208.1	21797.5	-208.67	21810.1	-208.63	21817.8	-208.01	21826.1	-208.09
21826.4	-208.16	21827.1	-208.37	21827.4	-208.44	21827.9	-208.58	21828.1	-208.65
21828.4	-208.72	21832.4	-210.65	21836.1	-213.88	21845.1	-214.36	21847.3	-213.63
21847.9	-213.19	21848.1	-213.04	21849.1	-212.28	21849.3	-212.12	21849.9	-211.61
21850.3	-211.34	21850.9	-211.01	21851.1	-210.91	21861.1	-209	21927.1	-210.25
22273.1	-209	23040.6	-208.91	23088.1	-208.81	23150.2	-208	24192.2	-208
24255.9	-207	24284.5	-207	24291.1	-207.89	24303.9	-208	24304.3	-207.99
24304.4	-207.99	24304.6	-207.99	24305	-207.98	24305.8	-207.96	24307.1	-207.96
24307.4	-207.9	24313.5	-207	24442	-207	24456.3	-206	24477.1	-206.06
24479.2	-207	24481.9	-207	24485.5	-207	24486.4	-206.69	24486.5	-206.63
24486.9	-206.49	24487.2	-206.41	24487.6	-206.24	24487.9	-206.15	24488.7	-206
24493.9	-206	24510.5	-207	24510.9	-207.04	24511.3	-207.16	24511.7	-207.27
24511.8	-207.31	24512.1	-207.39	24512.5	-207.51	24512.9	-207.64	24513.6	-207.95
24514.1	-208.13	24514.9	-208.5	24515	-208.56	24515.2	-208.65	24515.7	-208.84
24516	-208.98	24516.4	-209.03	24516.8	-209.06	24517.1	-209.09	24517.2	-209.1
24517.7	-209.15	24519.6	-209.33	24558.2	-211.09	24563.2	-212.2	24563.9	-212.54
24564	-212.55	24564.5	-212.78	24564.7	-212.91	24565.5	-213.27	24565.5	-213.28
24565.6	-213.29	24566.6	-213.84	24571.8	-217.05	24571.9	-217.06	24571.9	-217.08
24573.4	-217.5	24573.5	-217.53	24574	-217.66	24574.9	-217.88	24575	-217.9
24575.1	-217.91	24575.8	-217.98	24576.1	-217.99	24576.5	-218	24576.6	-218

24577.4	-218.01	24578.1	-218.02	24578.2	-218.02	24590.7	-217.52	24599.6	-218.07
24600.1	-218.22	24600.4	-218.31	24600.7	-218.44	24601.2	-218.7	24601.3	-218.78
24602.4	-219	24650.8	-218.81	24659.8	-216.66	24668.5	-213.41	24674.8	-209.34
24679.5	-205.8	24680.2	-205.45	24680.3	-205.42	24680.3	-205.4	24681.1	-204.95
24681.4	-204.83	24681.8	-204.58	24681.9	-204.52	24682.4	-204.25	24682.7	-204.15
24683.5	-204	24689.7	-204	24697	-207.6	24697.2	-207.69	24697.5	-207.8
24697.8	-207.88	24698.2	-208	24777.2	-208.08	24823.5	-207	24936.4	-206.84
24977.3	-206	24980.8	-206.073	25024.7	-207	25382.5	-207	25403.2	-206.38
25413.5	-206.39	25421.7	-207	25699.3	-207	25718.3	-206.04	25729.1	-204
25730.1	-204	25730.2	-204	25731.2	-204	25731.7	-204	25731.8	-204
25732.3	-204	25732.6	-204.03	25733.3	-204.12	25733.4	-204.13	25739.7	-206.04
25748.1	-207	25939.7	-207	25951.8	-206.01	25960.8	-203	25967	-203.24
25975.6	-206	26020.8	-206	26034.5	-207	26180.9	-207	26236.7	-206
26308.5	-206.01	26349.4	-207	26525.4	-207	26572.7	-206	26582.3	-206
26601.1	-207	26807.5	-207	26850.3	-206	26850.6	-206	26855.9	-206.01
26856.1	-206.02	26865.4	-207	27025.4	-207	27072.4	-206	27157.3	-207
27246.6	-206	27316.9	-206	27335.1	-206.94	27335.4	-206.96	27336.1	-207
27336.4	-207.17	27336.7	-207.31	27337.1	-207.53	27337.5	-207.69	27338.2	-208
27339.2	-208	27339.9	-208	27340.7	-208	27341.3	-208	27341.5	-207.95
27341.8	-207.79	27342.2	-207.55	27342.4	-207.46	27342.7	-207.32	27343	-207.18
27343.5	-207	27746.6	-207.25	28356.5	-207	28370.2	-206	28429.9	-206
28439.5	-206.94	28460.2	-211.72	28468.9	-213.29	28469.2	-213.33	28469.7	-213.41
28474.6	-214	28490.3	-213.89	28500.8	-212.74	28510.9	-210.88	28532	-206
28627.8	-206	28670.8	-208.06	28698.4	-208.57				

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
0	.045	24481.9	.036
		24980.8	.045

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	24481.9	24980.8		1084.3	938.9		.1	.3

CROSS SECTION

RIVER: Alamo River

REACH: Alamo River

RS: 32581

INPUT

Description:

Station Elevation Data		num= 452	
Sta	Elev	Sta	Elev
0	-233.98	2.9	-232.64
42.9	-232.97	93.9	-234
1104	-233	2066.1	-232.62
2252.1	-232	2255.1	-231
2587.1	-228.08	2592.1	-227
2646.1	-229.49	2683.1	-232
2731	-227.02	2740.1	-227
3198.1	-228.47	3206.1	-229

3464.3	-230.8	3486.1	-231	3491.1	-231.82	3507.1	-231.8	3512.1	-232.28
3517.1	-231.99	3527.1	-233.1	3535.1	-232.65	3542.8	-232.86	3548.1	-233.49
3565.2	-233.78	3588.1	-232.38	3602.1	-232.31	3612.1	-231.48	3625.6	-231.94
3645.4	-231.68	3655.1	-229.44	3685.1	-226	3702.1	-226.02	3737.1	-228
3782.9	-229	4069.2	-229	4101.6	-228.59	4245.2	-229	4256.2	-228.09
4270.2	-229	4577.2	-229	4586.2	-228.76	4592.4	-228	4596.2	-228.03
4602.3	-229	4780	-229	4865.9	-228	4925.2	-227.8	5083.2	-228
5098.4	-227.83	5110.5	-227	5160.2	-227	5166.1	-226	5244.2	-226
5250.2	-228	5259.2	-228	5265.2	-226	5294.2	-226	5300.2	-227
5672.3	-227	5683.3	-226	6193.3	-226	6216.2	-224	6736.3	-224
6740.3	-223	7264.5	-223	7281.3	-222	7778.4	-222	7814.4	-221
7834.4	-221.03	7836.4	-222	7839.7	-222	7843.4	-221	7916.4	-221
7919.3	-222.79	7923.2	-226.89	7924.2	-227.43	7925.4	-227.95	7931.4	-228
7931.6	-227.95	7932.4	-227.83	7935.4	-225.96	7938.7	-222.66	7942.4	-221
7981.4	-219	8049.4	-220.09	8116.2	-220.53	8597.4	-220.94	8872.4	-219
9029.3	-217	9094.5	-216.89	9115.3	-216	9163.5	-216	9168.5	-217
9192.5	-219	9791.5	-219	10399.5	-218	10404.5	-217.03	10415.5	-217
10418.5	-216	10447.5	-216	10451.5	-217	10457.5	-217	10460.5	-216
10502.5	-216	10523.3	-216.96	10531.5	-218.11	10534.7	-220.03	10538.5	-223.8
10546.5	-226	10551.6	-225.99	10556.6	-224.14	10564.5	-217.76	10566.5	-217
10590.5	-217.06	10594.5	-218.98	10603.5	-221	10617.5	-219	10958.6	-219.93
11435.2	-219.97	11628.6	-219.78	11694.8	-219	13080.7	-219	13085.7	-218.04
13090.7	-216	13136.7	-216	13141.7	-217.03	13188.7	-218.12	13190.7	-218.9
13194.8	-222.12	13196.6	-223.39	13197.7	-224.12	13197.8	-224.18	13198.7	-224.59
13198.8	-224.66	13200.8	-225.65	13201.7	-226	13201.8	-226	13202.7	-226
13202.9	-226	13203.9	-226	13205.9	-225.81	13210.7	-224.11	13218	-218.19
13220.7	-217	13245.1	-217.01	13263.7	-218	13468.7	-218	15504.2	-214.59
15707.8	-214	15723.8	-212	15735.8	-212	15739.7	-213	15741.7	-213
15744.8	-212	15815.8	-212	15818.8	-212.91	15818.9	-212.95	15819.8	-213.41
15819.8	-213.44	15819.9	-213.48	15820.8	-214.12	15827.8	-220.78	15828.8	-221.54
15829.8	-222.19	15831.9	-223	15838.7	-223	15841	-221.9	15848.8	-215.97
15881.8	-213	15935.8	-213.66	16003.9	-213.84	17594.7	-212.94	18372.9	-212
18377	-211	18473	-211	18475.1	-211.8	18484	-218.73	18497	-219
18507	-212.02	18523	-211	18534.7	-211.02	18539.8	-212	18562	-211.31
18583.7	-211.25	18753.9	-211.72	20580.1	-210.94	20955.1	-209.77	21011.1	-209
21024.1	-208	21029.3	-208.05	21032.4	-208.95	21038.1	-209	21038.4	-208.86
21039.8	-208.21	21040.1	-208.06	21057.6	-208	21084.9	-208.99	21119.3	-209.07
21120	-209.3	21120.3	-209.4	21123.3	-210.45	21123.9	-210.69	21132.1	-215.7
21132.4	-215.83	21134.5	-216.6	21135.1	-216.83	21135.5	-216.89	21135.8	-216.94
21136.1	-217	21136.5	-217	21136.8	-217	21137.1	-217	21137.8	-216.76
21140.1	-215.73	21141.1	-214.92	21144.1	-212.53	21144.7	-212.13	21145.1	-211.83
21145.6	-211.54	21145.7	-211.47	21146.1	-211.19	21146.6	-211.1	21146.7	-211.08
21147.1	-211	21848.1	-210.47	22250.2	-209.81	22422.5	-209	23129.6	-208.75
23478.9	-208.19	23533.1	-208	23533.4	-208	23537.5	-207	23568.7	-207
23568.8	-207	23569	-206.99	23569.8	-206.88	23570.7	-206.58	23570.9	-206.53
23571.6	-206.26	23572.2	-206.1	23576	-206	23587.7	-206.93	23596.1	-209
23612.6	-208.96	23627.5	-208.306	23634.5	-208	23662.8	-208.03	23663.2	-208.08
23663.6	-208.16	23663.9	-208.19	23664	-208.23	23664.9	-208.42	23665.3	-208.5
23665.8	-208.61	23667.6	-208.96	23682.6	-216.53	23691.2	-218	23732.7	-218
23733.5	-217.97	23733.6	-217.97	23734.6	-217.85	23734.8	-217.82	23735.4	-217.76

23735.6	-217.72	23736	-217.67	23736.2	-217.63	23736.6	-217.57	23744.7	-219
23813.5	-219	23814.3	-218.97	23814.5	-218.97	23815.4	-218.68	23815.5	-218.66
23815.5	-218.65	23816.4	-218.39	23816.5	-218.34	23816.7	-218.29	23817.2	-218.14
23819	-217.54	23819.1	-217.52	23819.5	-217.37	23819.9	-217.24	23820.5	-217
23821.4	-216.55	23821.6	-216.5	23822.2	-216.2	23822.6	-216.06	23836.9	-206.86
23839.8	-206	23847.8	-206.03	23849.9	-206.59	23849.9	-206.61	23850.7	-206.8
23851.1	-206.94	23854.9	-209.11	23855.1	-209.22	23862	-213.69	23862.2	-213.76
23863	-214.14	23863	-214.16	23864.8	-214.74	23870	-216	23942.5	-216
24002.1	-215.45	24012.7	-214.96	24021.5	-214.08	24032.8	-211.07	24036.1	-210.617
24047.9	-209	24270.4	-209	24361.3	-208.03	24486.7	-208	24529.9	-209
24562.6	-209	24593.8	-208	25000.3	-208	25060.9	-207	25144.1	-207
25166	-208	25390.5	-208	25399.6	-207	25452	-207	25460.3	-208
25630.1	-208	25712.9	-207	25723.8	-206	25724.1	-206	25724.4	-206
25724.9	-206	25727.1	-206	25728.5	-206.1	25728.8	-206.16	25729.6	-206.39
25729.7	-206.4	25730.2	-206.53	25730.5	-206.64	25730.9	-206.76	25731.2	-206.86
25732.1	-207.01	25733.2	-207.06	25734.2	-207.12	25734.9	-207.15	25735.2	-207.16
25735.8	-207.17	25736.2	-207.19	25736.8	-207.22	25737.2	-207.25	25762.2	-207.91
25827	-207.01	25924.3	-207	25924.3	-206.99	25925.1	-206.84	25925.5	-206.74
25926.3	-206.53	25928.3	-206.01	25929.3	-206	25934.4	-206	25944.5	-207
26269	-207	26322.6	-206	26375.3	-206	26410.5	-207.01	26414.6	-208.36
26422.6	-213.95	26426.3	-215.35	26426.7	-215.48	26427.5	-215.73	26427.9	-215.82
26428.7	-215.99	26428.9	-216	26437.8	-216	26438.2	-216	26439.3	-215.99
26439.8	-215.99	26443.9	-214.17	26452.4	-207.99	26457.2	-207.23	26457.8	-207.17
26458.3	-207.12	26461.1	-207	26484.2	-207	26496.4	-207.72	26514.6	-211
27432.5	-211	27553.9	-209.51	27649.8	-210.09	27688.3	-209	27756	-208.23
27866.5	-209.2	27936	-209	27999.7	-208	28057.6	-208.01	28139.2	-209
28183.7	-209	28184.4	-208.88	28184.7	-208.84	28185	-208.79	28185.3	-208.76
28185.7	-208.7	28186.2	-208.64	28186.2	-208.63	28186.7	-208.56	28187.4	-208.45
28187.7	-208.41	28187.9	-208.37	28188.6	-208.27	28188.7	-208.25	28188.8	-208.24
28189.4	-208.14	28189.7	-208.1	28189.7	-208.09	28189.8	-208.09	28190.7	-207.97
28191	-207.95	28201.9	-207	28221.8	-207	28222.1	-207	28222.3	-207.03
28223	-207.14	28224.1	-207.41	28226.6	-207.94	28226.7	-207.95	28227.1	-208
28227.5	-208	28285	-207.72						

Manning's n Values				num=	3
Sta	n Val	Sta	n Val	Sta	n Val
0	.045	23627.5	.036	24036.1	.045

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	23627.5	24036.1		1364.6	1215	938.9		.1	.3

CROSS SECTION

RIVER:	Alamo River	
REACH:	Alamo River	RS: 31366

INPUT

Description:	
Station Elevation Data	num= 448

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	-233.72	37.7	-234	194.7	-234	208.7	-233	235.7	-233
243.7	-234.11	1750.9	-233.47	1963.7	-233	1998.7	-232	2003.7	-233.69
2005.7	-233.86	2011.4	-233	2014.7	-232	2017.7	-232	2021.7	-233
2067.7	-234	2074.7	-233	2077.7	-231.5	2083.7	-227.12	2084.7	-227
2104.7	-227	2112.7	-231	2127.7	-231	2146.4	-229.03	2186.4	-228.46
2206.7	-229	2494.7	-229.01	2652.7	-230.4	2736.9	-230.66	2768.7	-231
2796.7	-231.94	2893.7	-231	2921.7	-229.03	2925.7	-228.06	2942.7	-231
2982.7	-231.69	3044.7	-231.89	3352.8	-231.56	3451.7	-231	3473.7	-229
3496.7	-231	3576.3	-231	4253.7	-229	4671.7	-229	4681.7	-228
4688.7	-228	4690.7	-229	4693.7	-229	4696.8	-227.12	4711.7	-224.09
4718.7	-222	4745.7	-222	4753.7	-224	4829.7	-226	4836.7	-228
4842.5	-228	4850.7	-227.03	4855.7	-223.94	4858.7	-223.42	4870	-223.59
4876.5	-224.14	4889.7	-229.06	4897.7	-230.19	4907.7	-230.75	4912.4	-229.7
4915.7	-228	4921.7	-227	4950.7	-228	5418.7	-228	5461.7	-227
5513.7	-226.81	6091.7	-226	6096.5	-226.89	6100.7	-227	6104.7	-226
6289.6	-226	7353.7	-224	7371.7	-223	7378.7	-223	7381.7	-224
7387.7	-224	7392.3	-223	7409.7	-223	7416.7	-224	7421.7	-224
7424.7	-222.97	7441.7	-222	7472.7	-222	7489.7	-221	7497.7	-221.2
7500.4	-222.81	7504.7	-227.93	7505.7	-228.44	7506.1	-228.59	7506.7	-228.87
7514.7	-229	7516.1	-228.27	7518.4	-225.65	7521	-223.26	7521.7	-222.73
7522.7	-221.99	7524.7	-221	7662.7	-221.81	7963.7	-222	8048.7	-221.91
8141.7	-221	8596.8	-221	8683.7	-220.16	8792.4	-219.88	8878.7	-219.88
8995.7	-221	9166.7	-221	9314.7	-219.62	9358.7	-219.62	9394.7	-219
9905.7	-219	9939.7	-218	10048.7	-218	10062.7	-217	10090.8	-217
10114.7	-218.03	10116.7	-218.91	10122.7	-223.53	10126.7	-226.06	10132.8	-227
10137.7	-227	10144.7	-226.04	10150.8	-220.84	10154.7	-216	10174.9	-216.03
10179.7	-219	10203.7	-219.16	10391.7	-219.94	10885.3	-220.25	11117.7	-219.88
11162.7	-219	12666.7	-219	12672.7	-217.99	12684.7	-217	12691	-217.06
12693.7	-218	12696.7	-218	12700.7	-217	12735.7	-217	12765.7	-218.12
12768.3	-219.29	12774.7	-224.02	12778.7	-226.55	12779.2	-226.76	12779.3	-226.79
12785.7	-227	12790.7	-225.58	12794.7	-224.06	12799.7	-220.98	12834.7	-218
12839.3	-218	12839.7	-218	12840.1	-218.06	12841.3	-218.34	12843.7	-219
12902.7	-219	15071.7	-216.03	15215.7	-215.41	15301.7	-214.03	15316.7	-213
15319.1	-213.1	15322.7	-214	15398.6	-214.16	15402.9	-216.28	15405.9	-219.07
15406.9	-220.24	15408.7	-222.97	15408.9	-223.09	15409.7	-224	15422.7	-224
15425.7	-222.43	15427.7	-220.61	15431.7	-216.03	15432.7	-216	15675.7	-216
16509.7	-215	16592.7	-214	17825.9	-214	17931.7	-213.62	17957.7	-213.03
17962.7	-212	17983.6	-212	17988.7	-211	17997.6	-211	18007.7	-212
18052.7	-212	18055.1	-213.1	18061.4	-218.05	18066.4	-221.16	18068.7	-222
18073.7	-222	18074.1	-221.99	18074.4	-221.98	18074.7	-221.97	18075.1	-221.88
18075.4	-221.79	18075.7	-221.7	18076.1	-221.6	18076.4	-221.52	18076.7	-221.42
18077.1	-221.31	18077.4	-221.22	18077.7	-221.1	18078.1	-220.93	18086.7	-215.86
18087.1	-215.68	18087.4	-215.56	18088.1	-215.21	18088.4	-215.09	18088.7	-214.92
18089.1	-214.74	18089.4	-214.63	18089.7	-214.45	18090.1	-214.28	18090.7	-214
18116.7	-214	18152.7	-213	18396.8	-213	18586.1	-212.5	19001	-212.56
19265	-212	20473.8	-211.88	20594.8	-211	20664.4	-211	20706.8	-212.03
20714.5	-217.77	20715	-217.95	20720.8	-218	20721	-217.97	20721.5	-217.9
20721.8	-217.88	20722	-217.77	20724.8	-216.25	20731.8	-211	20818.8	-211
20898.9	-211.53	21426.8	-211	22094.2	-210.84	22858.6	-209.97	23244.8	-209

23244.8	-208.99	23245.8	-208.75	23245.8	-208.74	23246.8	-208.44	23246.8	-208.43
23248.7	-208	23291.8	-208	23291.8	-208.01	23292.7	-208.15	23292.8	-208.17
23293.8	-208.34	23294.7	-208.52	23294.8	-208.53	23297.7	-208.99	23388.8	-209
23425.4	-210.98	23426.4	-211.31	23426.8	-211.46	23431.2	-214.316	23434.1	-216.2
23434.4	-216.37	23434.8	-216.57	23435.1	-216.76	23435.4	-216.92	23435.8	-217.1
23436.1	-217.29	23436.4	-217.45	23436.8	-217.64	23437.1	-217.82	23437.4	-217.97
23437.8	-218.16	23438.4	-218.44	23438.8	-218.61	23439.1	-218.75	23439.4	-218.86
23439.8	-219	23506.8	-219	23507.3	-218.95	23507.8	-218.89	23508.3	-218.73
23508.3	-218.72	23508.8	-218.56	23509.3	-218.39	23510.2	-218.06	23510.3	-218.05
23516.8	-215.64	23517.3	-215.36	23517.8	-215.11	23518.2	-214.87	23519.2	-214.37
23520.2	-213.77	23529.8	-207.02	23530.2	-206.93	23530.8	-206.81	23531.3	-206.71
23535.8	-206	23541.8	-206.22	23542.2	-206.38	23542.3	-206.43	23542.8	-206.58
23543.2	-206.75	23543.3	-206.8	23544.3	-207.32	23544.8	-207.57	23545.2	-207.83
23545.3	-207.93	23547.3	-209.1	23551.2	-210.77	23551.4	-210.84	23552.2	-211
23577.4	-211	23611.8	-210	23721.8	-209	23729.8	-208.22	23737.6	-208.577
23746.8	-209	24025.8	-209	24045.2	-208.26	24053.4	-208.31	24069.8	-209
24424.8	-209	24447.2	-208	24461.8	-209	25443.3	-209	25460.8	-208.72
25469.3	-208.01	25531.8	-208	25532.1	-208.03	25532.4	-208.06	25532.8	-208.09
25533.1	-208.14	25535.4	-208.44	25535.8	-208.49	25536.4	-208.57	25536.8	-208.61
25537.1	-208.66	25537.4	-208.71	25537.8	-208.76	25538.1	-208.81	25538.4	-208.85
25539.1	-208.93	25539.8	-209	25716.7	-209	25759.6	-208	25858.4	-208
25874.8	-207	25880.1	-207	25880.4	-207	25880.8	-207	25881.1	-207.08
25881.4	-207.14	25882.1	-207.33	25883.1	-207.6	25883.4	-207.66	25883.8	-207.76
25889.8	-208	25890.2	-207.88	25890.4	-207.82	25890.8	-207.71	25891.8	-207.33
25892.8	-207	25905.8	-207	25930.8	-208	25947.8	-209.09	25954.3	-210.51
25954.8	-210.61	25955.2	-210.72	25955.3	-210.73	25955.8	-210.84	25956.3	-211
25956.8	-211.14	25957.2	-211.39	25957.3	-211.43	25958.2	-211.94	25958.3	-211.98
25958.8	-212.24	25959.2	-212.5	25959.8	-212.8	25960.2	-213.04	25960.3	-213.08
25960.8	-213.33	25961.2	-213.57	25961.3	-213.62	25961.8	-213.86	25962.2	-214.01
25970.8	-216.25	25975.8	-217	25976.2	-216.92	25976.3	-216.89	25976.8	-216.81
25977.8	-216.59	25978.2	-216.5	25979.2	-216.28	25979.3	-216.25	25979.8	-216.16
25980.2	-216.01	25980.3	-215.95	25980.8	-215.81	25981.2	-215.47	25981.3	-215.34
25981.8	-215.01	25982.2	-214.68	25982.8	-214.21	25983.2	-213.81	25983.4	-213.63
25987.8	-208.68	25988.2	-208.37	25988.4	-208.22	25988.8	-207.91	25989.2	-207.74
25989.4	-207.66	25989.8	-207.49	25990.2	-207.3	25990.8	-207.02	25991.2	-207.01
25991.8	-207	26039.5	-207	26082.8	-208	26212.7	-208	26257.8	-207
26302.8	-207	26356.8	-208	26427.8	-208	26491.8	-207	26558.8	-207
26622.7	-208	26705.8	-208	26749.8	-207	26818.8	-207	26895.8	-208
26923.2	-208	26996.8	-207	27063.6	-207	27104.8	-208	27220.9	-208
27265.8	-207	27305.5	-207.03	27383.8	-208	27460.4	-208	27493.8	-207.56
27647.8	-208	27843.8	-208	28331.6	-206.94				

Manning's n	Values		num=	3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.045	23431.2	.036	23737.6	.045

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	23431.2	23737.6		1527.4	1294		.1	.3

CROSS SECTION

RIVER: Alamo River

REACH: Alamo River

RS: 30072

INPUT

Description:

Station Elevation Data num= 450

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	-234	378	-234	386.3	-233.02	398.2	-232.83	426.2	-233.11
471.2	-233	478.2	-234	522.2	-234	527.8	-233.09	533.2	-232.93
536.2	-231.92	538.2	-230.78	540.6	-230.26	551.7	-228.95	570.2	-228
584.2	-228.06	591	-230.94	594.3	-231.26	609.2	-231	611.2	-228.98
613.2	-228	633.2	-228	660.2	-228.97	666.2	-231.94	669.2	-233.03
675.2	-234	702.2	-234	705.2	-233	713.2	-233	715	-233.58
719.1	-234	894.2	-233.72	921.2	-233.51	929.8	-233	949.2	-233
955.2	-234	973.2	-234	994	-233.54	1072.2	-233	1357.2	-232.84
1490.4	-232	1783.2	-232	1894.2	-231.56	1933.2	-231	1979.2	-231
1985.2	-233	1993.2	-233	1998.2	-232	2188.2	-231	2657.2	-231
3009.2	-230.31	3027.2	-230.19	3059.2	-229.01	3159.2	-229	3163.2	-228
3166.2	-228	3168.2	-228.93	3172.3	-229	3173.3	-228.92	3175.2	-227.97
3187.3	-226.09	3197	-223.12	3198.3	-223	3221.3	-223.06	3232.3	-226
3303.2	-226.01	3308.1	-227	3335.3	-227	3337.3	-226.12	3340.3	-224.04
3354.3	-224	3355.3	-224.08	3360.3	-225.86	3366.6	-229.74	3369.6	-231.23
3372.3	-232	3376.3	-232	3385.3	-229	3919.4	-229	3942.3	-228
4505.3	-228	4538.1	-227.01	4546.3	-226	4558.3	-226.03	4564.3	-227
4576.3	-227	4586.3	-226	4591.3	-226	4594.3	-226.94	4595.3	-227
4773.4	-227	5181.3	-226	5316.3	-226	5848.3	-224	5881.3	-224
5898.3	-226	5911.3	-224	5974.4	-224	5977.4	-225.41	5980.3	-227.82
5982.3	-229	5993.3	-229	6004.3	-222.25	6005.3	-222	6021.3	-222.04
6024.3	-223.99	6031.3	-224	6036.3	-223	6614.6	-223	6641.4	-222
7223.4	-222	7242.4	-221	7431.5	-221.94	7599.1	-221	7685.4	-221
7711.4	-220.25	7779.6	-219.5	7866.4	-220.31	8171.4	-220.72	8318.4	-219
8354.4	-219.44	8453.7	-219.73	8487.4	-219	8567.4	-219	8592.4	-220.95
8595	-222.14	8600.9	-226.32	8604.4	-227.99	8608.4	-229	8612.4	-229
8621.4	-227.04	8629.4	-220.12	8630.4	-219.38	8632.7	-218.24	8633.4	-218
8650.4	-218	8653.4	-219.06	8669.4	-221	9287.3	-220.94	10485.5	-219.75
10609.5	-219.31	11178.5	-219	11210.5	-217.03	11224.5	-217	11241.5	-218.06
11249.7	-223.6	11256.2	-227.26	11260.5	-228.98	11268.5	-229	11272.1	-228.28
11275	-227.28	11283.5	-222.28	11284	-222	11286.5	-221.01	11310.5	-219
12358.6	-218.47	12512.1	-218.69	12711.4	-218	12975.2	-218.22	13472.6	-217.72
13772.6	-217.03	13778.6	-216.85	13786.6	-216	13798.5	-216	13798.6	-216
13798.7	-216.01	13799.5	-216.11	13799.6	-216.12	13800.5	-216.5	13800.6	-216.56
13800.7	-216.62	13801.6	-217	13806.4	-217	13810.6	-216	13830.6	-216
13878.6	-217	13881.6	-218.48	13890.6	-225.97	13901.6	-226	13911.7	-219.32
13912.6	-218.75	13912.6	-218.72	13912.7	-218.69	13913.6	-218.19	13914.6	-218
14048.5	-218	14423.9	-217.09	14769.7	-217.09	15491.7	-216.28	16151.7	-216
16326.9	-215.53	16441.7	-214	16532.7	-214	16537.3	-215.99	16540.7	-218.86
16546.7	-222.95	16548	-223.29	16550.7	-223.95	16552.7	-224	16553	-223.97
16554.7	-223.66	16555.4	-223.48	16555.7	-223.41	16558	-222.64	16566.7	-217.04

16567.7	-216.6	16568.5	-216.24	16571.7	-215.97	16984.7	-214.59	17248.7	-214.72
17675.6	-214	17932.7	-214	18072.9	-213.46	18244.2	-213.69	18951.8	-212.68
19045.9	-212.84	19058	-212.7	19072.8	-212	19088.8	-212	19094.8	-213
19101.8	-211	19114.8	-211	19136.7	-212.03	19181.8	-213	19183.5	-213.87
19187.5	-216.9	19188.8	-217.76	19189.1	-217.95	19189.8	-218.38	19190.8	-219
19198.8	-219	19208.2	-213.01	19214.8	-212	19220.2	-212.04	19233.8	-212.9
19252.8	-213	19589.2	-212.5	20729.9	-211.91	21401.8	-211	21668.7	-209.66
21737.2	-209	22003.9	-209.75	22450.6	-209	22451.8	-209.122	22469.8	-210.95
22476.7	-212.69	22485.1	-214	22505.1	-216.01	22505.4	-216.06	22505.8	-216.18
22506.3	-216.28	22507	-216.48	22507.1	-216.51	22507.2	-216.54	22507.8	-216.77
22508.1	-216.84	22508.1	-216.85	22508.1	-216.87	22509	-217.29	22509.1	-217.36
22509.9	-217.88	22510.4	-218.28	22510.8	-218.53	22511.1	-218.78	22511.6	-218.88
22511.6	-218.9	22512.1	-219	22572.6	-219	22572.6	-218.99	22572.9	-218.92
22573.5	-218.74	22573.6	-218.72	22573.7	-218.69	22574.6	-218.41	22574.8	-218.34
22575.6	-218.11	22576	-218	22576.2	-217.93	22577.6	-217.52	22578	-217.4
22578.3	-217.31	22578.6	-217.21	22578.9	-217.13	22579.4	-216.96	22579.6	-216.9
22579.8	-216.85	22580.6	-216.58	22592.1	-212.08	22592.3	-211.97	22593.2	-211.52
22593.7	-211.23	22594.1	-210.95	22594.4	-210.76	22594.7	-210.5	22595	-210.26
22595.8	-209.61	22595.9	-209.46	22596.8	-208.67	22597.3	-208.29	22597.7	-207.89
22597.8	-207.84	22597.8	-207.78	22598.6	-207.16	22598.8	-207.03	22599.5	-206.62
22599.8	-206.47	22600.1	-206.3	22600.4	-206.18	22600.8	-206	22609.4	-206.07
22609.9	-206.14	22610.3	-206.29	22610.5	-206.38	22610.9	-206.52	22611.2	-206.62
22611.9	-206.87	22612.1	-206.95	22612.8	-207.3	22612.9	-207.34	22613.5	-207.67
22613.8	-207.86	22613.9	-207.88	22613.9	-207.91	22614.7	-208.33	22615.1	-208.51
22615.6	-208.79	22615.9	-208.92	22616.2	-208.95	22616.5	-208.98	22616.9	-209
22660.2	-209	22665.7	-208.24	22676.4	-209	22737	-209.75	22792.2	-209
22829.4	-209	22914.2	-209	23042.1	-210.19	23124.7	-209	23155	-209
23161	-208.09	23161.5	-208.1	23161.6	-208.1	23162.1	-208.11	23162.5	-208.17
23162.6	-208.18	23163.1	-208.24	23163.8	-208.39	23164.3	-208.51	23164.9	-208.66
23165.1	-208.7	23165.2	-208.74	23166.1	-209	23756.6	-209	23756.9	-208.91
23757.3	-208.82	23757.6	-208.74	23758.7	-208.41	23759.6	-208.16	23760.7	-208
23761.4	-208	23761.9	-208	23766.8	-208.05	23767.7	-208.31	23767.7	-208.34
23768.6	-208.61	23768.7	-208.64	23769.5	-208.87	23769.7	-208.94	23769.9	-208.96
23770.4	-208.97	23770.7	-209	24433.6	-209	24456.9	-210.97	24457.1	-211.07
24457.9	-211.47	24458	-211.53	24460.7	-213.43	24460.9	-213.59	24461.2	-213.77
24461.6	-213.95	24462.4	-214.37	24462.9	-214.62	24463.4	-214.82	24463.5	-214.91
24463.9	-215.09	24464.3	-215.24	24464.7	-215.44	24465	-215.56	24465.8	-215.97
24466	-216.03	24466.8	-216.26	24466.9	-216.31	24467	-216.31	24467	-216.32
24467.8	-216.59	24468	-216.62	24468.1	-216.68	24468.7	-216.86	24469	-216.94
24479.1	-217	24487.1	-211.37	24487.6	-211.09	24487.7	-211.01	24488.1	-210.73
24488.5	-210.54	24488.8	-210.33	24489.4	-210.03	24490	-209.66	24490.1	-209.57
24491.2	-209	24498.3	-208	24517.4	-207.49	24545.6	-207.42	24600.4	-208.99
24698.2	-209	24736.8	-208.01	24759.2	-207	24808.6	-207	24876.5	-208.98
24945.7	-209	25009.3	-207.02	25064.5	-207	25119.9	-208.99	25220.9	-209
25263.4	-207.56	25292.6	-207.11	25333.1	-207.49	25386.8	-208.99	25463.1	-209
25502.2	-208.11	25529	-207	25564.1	-207	25636	-209	25725.7	-209
25788	-207.03	25816.1	-207	25900.9	-208.99	25972.2	-209	26058.9	-207.07
26081.9	-207	26171.9	-209	26316	-209	26619.3	-208	27638.8	-206
28032.1	-204	28049.2	-204	28073.4	-206	28203.6	-206	28386.1	-205.41

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	22451.8	.036	22829.4	.045

Bank	Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
	22451.8	22829.4	1393.8	1255.7	1008.8		.1	.3

CROSS SECTION

RIVER: Alamo River

REACH: Alamo River

RS: 28816

INPUT

Description:

Station Elevation Data		num= 452							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	-229.56	44.6	-227.97	55.6	-226.62	69.6	-223.97	82.8	-223.36
136.6	-225.27	143.6	-224.85	158.6	-226	236.7	-226	256.1	-224.03
282.7	-223.67	297.8	-224.57	301.7	-224	337.7	-224.11	348.7	-223
392.6	-223.06	397.8	-223.94	430.8	-225.56	452.5	-227.99	468.6	-227.97
481.8	-226.02	493.9	-226	528.8	-227.98	555.8	-228.59	599.9	-228
614.9	-226.95	626	-224.09	639.9	-222.61	684.9	-224.97	701.9	-224.02
731.9	-224	757.7	-221.01	771.6	-220.99	788.9	-219.93	839.2	-220.39
867	-221.35	884.8	-220.48	928	-223.7	956.5	-224.25	970.2	-225.92
981	-228.12	988	-227.51	1001.9	-222.03	1010.2	-222	1079.1	-224
1190.4	-224	1219.2	-225.43	1238.2	-227.95	1250.2	-228.24	1329.3	-228.66
1345.8	-228.14	1350.2	-227.16	1369.9	-227	1377.8	-228.45	1386.2	-228.58
1400.9	-227.8	1412.6	-226.35	1427.3	-226.05	1468.3	-218.94	1491.3	-218.4
1500.3	-215.86	1510.3	-216.12	1535.3	-215.29	1548.2	-214.01	1555.3	-214.53
1572.3	-213.75	1583.3	-212.47	1600.3	-212.81	1605.3	-212	1619.4	-212
1622.4	-213.42	1626.7	-217.05	1629.8	-218.26	1638.4	-219.46	1653.4	-224.07
1676.4	-226.93	1685.2	-228.98	1724.9	-230.01	1806.4	-230.72	1855.5	-230.19
2662.6	-229	2671.8	-226	2696.9	-226	2702.9	-228	2715.9	-228
2721.9	-225.85	2730.9	-224	2744.9	-224	2761.9	-225.97	2769.9	-226
2775.6	-223.55	2778.9	-223.06	2784.5	-223.8	2789.9	-226.96	2792.9	-228
2799.9	-227.91	2809.6	-226.02	2827.9	-226	2837.9	-228.97	2848	-229
2865.9	-230.21	2876	-230.97	2880.5	-232	2886.7	-230.49	2897	-229.31
2967	-230.34	3312.2	-229.34	5216.1	-228.31	5330.2	-228	5340.2	-227
5367.2	-227	5370.2	-228	5376.2	-228	5378.2	-227.05	5388.2	-226
5450.2	-226	5458.2	-230.72	5464.2	-231	5471.2	-228.98	5475.2	-226.02
5476.6	-226	5497	-226	5501.2	-227	5625.3	-227	5645.3	-226
6468.7	-226	6582.6	-224.71	6587.8	-224	6608.8	-224.47	6612.8	-224
6739.9	-224	6774	-225.78	6812.9	-225.23	6820.9	-224	7191.3	-223.99
7205.4	-223.48	7219.1	-224	7277.1	-224	7301.1	-223.32	7315.2	-223.81
7343.1	-223.25	7510.2	-223	7518.2	-222.07	7535.2	-222	7547.2	-223
7567.3	-222.97	7573.1	-222.05	7578.3	-222.03	7705.3	-223.91	7852.4	-224
7857.4	-222.84	7888.4	-221.28	7906.9	-221.41	7920.5	-223	7927.3	-223
7938.4	-222.05	7965.4	-221.12	7978.7	-221.65	7981.3	-221.98	7984.5	-224
7988.5	-224	7993.5	-221	8009.2	-221	8054.5	-223.03	8061.1	-227.25

8067	-228.94	8070.8	-229	8076.7	-228.96	8079.6	-227.87	8082.5	-225.94
8085.6	-222.3	8087.5	-221	8109.5	-221.11	8120.3	-225.71	8129.5	-226.95
8146.5	-224	10125.3	-223.62	10305.6	-223.06	10355.6	-224	10425.4	-224
10648.8	-223	10653.1	-221.98	10669	-221	10700.8	-221	10722.8	-222.08
10733.6	-228.95	10748.8	-229	10752.4	-227.4	10760.5	-222.03	10764.8	-221
10779.1	-221.01	10794.8	-223	10808	-222.28	11079.3	-222.78	11129.8	-222
11152.1	-222	11171	-222.78	11317.1	-222.75	11366.5	-222	11415.1	-222
11453.2	-222.72	11583.8	-222.66	11630.1	-222	11642.5	-222.66	11665.3	-222.66
11692.3	-222	12447.3	-221.53	13139	-219.94	13283	-219	13286	-218
13343.1	-219	13353.1	-220.94	13365.1	-227	13376.1	-227	13376.5	-226.99
13377.1	-226.98	13379.6	-225.85	13387.1	-221	13416.1	-221	13435.9	-219
13664.2	-219	13672.2	-218	13786.3	-218	13798.7	-219	13819.5	-218
13895.7	-219	13906.3	-219	13918.7	-218	14744.8	-218	14750.5	-217.09
14757.8	-218	14854.8	-218	14891.1	-217	14922.2	-218	14934.8	-217.97
14943.9	-217	14980.9	-217.78	15031.8	-217	15062.9	-218	15093.1	-217.99
15100.9	-217	15163.2	-218	15173	-217.98	15185.9	-217	15195.2	-217.01
15208	-218	15263.3	-217	15312.9	-217	15324	-218	15345	-217
15675.2	-217	15906.7	-218	15914	-217.03	15931.3	-217	15934.3	-218
15936.3	-218	15942.3	-216	16008.4	-217	16010.4	-217.87	16013.4	-220.9
16017.4	-223.84	16031.4	-224	16034.4	-223.09	16041.4	-219	16078.4	-217.97
16497.6	-217	17920.3	-216	18568.6	-214	18572.6	-213	18640.7	-213.41
18647.7	-214.06	18652.7	-215.78	18661.7	-221	18667.7	-221	18677.7	-214
18720.7	-214	18781.5	-213	18809.8	-213	18815.7	-213.8	18826.7	-213
19008.1	-213	19014.3	-214	19021.2	-214	19025.8	-213	19207.9	-213
19213.6	-213.58	19221	-213.01	19359	-213	19362.7	-214	19368	-213
19662.2	-213	19668.3	-214	19669.1	-214	19669.2	-214	19669.2	-213.99
19670.1	-213.82	19673.2	-213	19710	-213	19712.9	-213.96	19715.8	-214
19722.8	-213.01	19890.3	-212.99	19956.3	-212	19963.2	-212.89	19966.5	-213.89
19969.6	-214	19970	-214	19974.3	-213.01	19974.8	-212.99	19995.3	-212
20014	-212.99	20064.4	-212.02	20102.8	-212	20114.2	-212.99	20114.4	-213.02
20114.5	-213.09	20115.4	-213.51	20115.5	-213.57	20116.3	-213.95	20123.4	-214
20131	-213.01	20158.6	-213.01	20164.4	-213.94	20179.4	-212.54	20199.4	-212.36
20221.2	-213	20239.2	-212	20260.1	-212.02	20264	-212.88	20266.8	-213
20284.6	-212	20305.7	-212.02	20319.2	-213.43	20339.4	-212.17	20357.9	-212.2
20366.2	-213	20372.5	-213	20393.5	-212	20412.4	-212.03	20412.5	-212.03
20412.7	-212.09	20413.3	-212.34	20413.5	-212.41	20413.7	-212.48	20415.5	-213
20435.4	-212	20512.1	-212	20516.7	-213	20523.4	-212.99	20528.5	-212
20557.9	-212	20566.2	-213	20570.6	-212.88	20572.4	-212.53	20576.5	-212
20615.2	-212	20618.5	-213	20630.4	-212.98	20641	-212	20658.1	-212.02
20666.5	-213	20675.8	-212.99	20686.8	-212	20714.5	-212	20717.9	-213
20728.9	-212.99	20733	-212	20766.7	-212	20770.8	-213	20779.7	-213
20784.1	-212	20816.9	-212	20820	-213	20835.9	-213	20840.4	-212
20869	-212	20873.1	-213	20881.2	-213	20887.4	-212	20920.2	-212
20925.3	-213	20930.4	-213	20932	-212.91	20936.5	-212	21027.5	-212
21033.7	-213	21040.8	-212	21078.7	-212	21081.8	-213	21086.8	-213
21089.9	-212	21235.1	-212	21239.2	-211	21255.6	-211	21265.4	-213
21285.3	-213	21288.3	-212	21298.6	-211.9	21721	-212	22225.1	-211
22559.5	-211	22610.3	-211.477	22614.8	-211.52	22637.3	-219.01	22680.2	-220.96
22705.6	-221	22727.5	-220.32	22747.6	-218.94	22751.1	-218.19	22754.9	-216.65
22767.9	-209.54	22780.4	-208	22787.6	-208	22794.9	-209.12	22805.1	-209.493

22846.2	-211	23301	-211	23322.1	-211.97	23345	-212	23350.1	-213
23371.2	-212.93	23379	-211.98	23481.3	-211	23701.9	-211	23732.6	-209
23747.9	-211	23873.7	-211.01	23893.2	-215.37	23897.2	-214.93	23909.5	-211.02
24012.8	-209.07	24059.8	-210.93	24070	-212.4	24079.2	-213	24508.8	-213
24548.4	-217.62	24574.3	-218	24600	-215.36	24628	-211	24736.9	-211
24833.3	-213.62	24895.4	-216	25554	-216	25655.9	-212.78	25781.1	-213
25788.2	-211	26201.4	-209	27495.3	-206	27642.4	-206	27659.8	-206.97
27704.8	-207	28817.3	-204						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	22610.3	.036	22805.1	.045

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	22610.3	22805.1		2027.8	3687.7		.1	.3

CROSS SECTION

RIVER: Alamo River

REACH: Alamo River

RS: 25128

INPUT

Description:

Station Elevation Data				num=		449			
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	-209.1	31.2	-209.59	37.2	-209	46.2	-208.97	62.3	-206.92
76.3	-206	92.1	-206.05	105.1	-206.94	123.3	-206.48	141.3	-207.23
163.3	-207	174.3	-204	185.3	-204.01	208.3	-205.99	268.4	-206
284.4	-207	326.4	-207	353.4	-206	410	-206.01	435	-211.02
443.4	-216.19	445.4	-216.99	451.4	-218	473.5	-218	479.5	-216.53
485.4	-215.82	491.5	-214.08	505.5	-213	510.5	-213.62	514.5	-215.26
519.5	-218.35	523.5	-219.12	534.5	-219.47	550.5	-218.97	554.5	-218
592.5	-218.38	598.1	-219.19	610.5	-222.04	629.5	-223.98	681.6	-224
686.6	-222.85	694.6	-219.15	697.6	-219	743.6	-222	753.6	-223.02
773.6	-223.03	775.6	-224	831.3	-224.84	883.6	-224	946.7	-224.06
1006.7	-227	1012.7	-227.98	1023.7	-228.98	1042.5	-230.16	1062.7	-230.43
1076.7	-233	1094.9	-232.99	1098.8	-231	1120.8	-228.92	1130.7	-226
1133.8	-226.07	1143.8	-227.48	1150.8	-227.03	1161.7	-227.64	1172.8	-227
1215.8	-227	1287.8	-229	1319.9	-231	1366.9	-231	1416.7	-229.01
1458.9	-229.44	1484.8	-229	1543	-229	1566	-226	1578	-226
1582	-228	1607	-228	1610	-227.18	1614.1	-224.24	1618	-222.37
1623	-221	1643	-222	1653	-224.01	1678.9	-227.11	1691.7	-227.08
1698	-226.02	1717	-226	1723	-228.07	1727.4	-229.01	1742.1	-229.93
1762.1	-230.61	1795.1	-231	1799.1	-231.99	1880	-232	1886.1	-231.33
1893.1	-229.15	1895.1	-229	1901.4	-229.09	1915.1	-231	3529.9	-230.56
3959.1	-229	4234.3	-229	4242.3	-228	4260.5	-228.02	4265.3	-229
4268.3	-228	4312.3	-227	4316.3	-226	4339.3	-226	4340.6	-226.6
4343.3	-229.14	4347.3	-230.97	4361.3	-229.03	4368.3	-226	4379.3	-226
4387	-226.84	4394.3	-229	4778.3	-229	4862.6	-228	4871.6	-228

4874.6	-229	4876.7	-229	4903.9	-228	4940.8	-228	4995.6	-227
5615.9	-227	5625.9	-226	6235.3	-224.81	6644.4	-224.28	6686.4	-224.56
6747.7	-225.75	6845.3	-224.01	6850.5	-223	6866.5	-223	6869.5	-224
6876.5	-224	6880.4	-223	6898.5	-223	6927.5	-224	6945.6	-225.97
6949.5	-228.74	6950.5	-228.99	6963.6	-229	6965.1	-228.67	6969.6	-225.99
6972.3	-223.38	6973.6	-221.6	6974.6	-221	6990.6	-221	6993.6	-221.96
7000.6	-226	9476.6	-226	9550.3	-224.02	9590.5	-223.83	9611.8	-224.01
9617.4	-227.43	9620.8	-229	9634.9	-229	9635.7	-228.97	9635.8	-228.97
9639.8	-226.27	9643.8	-224.63	9650.8	-224	11488.7	-223	12089	-222
12102.5	-221	12112.3	-222	12136	-222	12148	-221	12163	-221
12165.4	-221.91	12171.1	-222	12174.1	-220.97	12186.1	-220.62	12244.1	-221
12246.2	-221.68	12247	-222.12	12247.1	-222.16	12254.1	-227.06	12260.1	-228
12266.6	-226.87	12268.7	-225.67	12272.1	-222.84	12274.1	-222	12310.1	-222
12315.1	-221	12585.3	-221	12969.4	-220.03	13204	-220.09	13660.8	-219
14828.3	-219	14835.3	-218	14898.4	-218	14899.4	-218.06	14901.4	-219.41
14908.4	-225.73	14913.4	-226	14920.4	-224	14925.2	-221.29	14925.4	-221.17
14925.6	-221.12	14926.2	-220.98	14926.4	-220.94	14948.4	-219	15124.5	-219
15544.6	-218	16346.3	-218	17047.9	-217	17410.6	-216	17431.6	-214
17524.6	-214	17535.6	-215.94	17541.6	-219.78	17546.6	-222	17553.8	-221.73
17555.6	-221	17561.6	-216.99	17562	-216.73	17562.6	-216.33	17563.1	-216.19
17563.2	-216.14	17563.6	-216	17710.7	-216	17838.7	-214.91	17942.6	-214.81
17999.9	-215.69	18077.5	-215.05	18225.9	-216	18317.8	-215.51	18377	-216
18411.7	-215.02	18434.1	-214.95	18463.4	-214	18490.2	-216	18540.8	-215.3
18553.1	-216	18579.1	-214	18601.1	-214.03	18608.1	-215.78	18608.4	-215.83
18608.9	-215.95	18609.1	-216	18609.3	-216	18612.2	-216	18622.3	-214
19431.1	-214	19510.5	-214.78	19579.9	-214.6	19939.2	-215.86	20023.1	-214.81
20132	-214.72	20215.4	-214	20215.9	-214.06	20222.8	-215.84	20232.2	-216.5
20247.8	-216.604	20254.7	-216.65	20275.2	-218	20311.5	-218.59	20340.3	-218.45
20340.7	-218.47	20340.9	-218.49	20341.4	-218.52	20341.7	-218.55	20342.4	-218.59
20342.5	-218.59	20346.7	-219.14	20347.1	-219.28	20347.6	-219.46	20347.8	-219.54
20347.9	-219.59	20348.2	-219.72	20348.7	-219.96	20351	-221.03	20361.1	-221.98
20423.6	-222	20439.6	-220.86	20447.3	-219.571	20450.3	-219.07	20450.4	-219.04
20450.7	-218.96	20451.2	-218.81	20451.4	-218.76	20451.8	-218.65	20452.8	-218.39
20453.5	-218.19	20453.6	-218.18	20454.3	-217.97	20457.8	-216.44	20464.2	-213
20476	-213	20476.1	-213.03	20476.3	-213.14	20476.8	-213.32	20477	-213.4
20477.4	-213.59	20477.6	-213.68	20478.4	-213.96	20498.4	-216.05	20498.6	-216.11
20499.1	-216.24	20499.4	-216.29	20499.4	-216.32	20499.6	-216.37	20500.1	-216.5
20500.9	-216.72	20501.4	-216.84	20501.6	-216.91	20501.7	-216.94	20502	-217.02
20502.5	-217.17	20502.7	-217.23	20503.1	-217.35	20511	-220.25	20517.6	-221.97
20533.5	-222.99	20550.7	-223	20718.4	-221.85	20729.1	-221.03	20744.1	-216.77
20760	-214.06	20778.2	-213.09	20787.5	-212.13	20787.8	-212.09	20788.3	-211.98
20789.1	-211.76	20793	-209.82	20795.3	-209.06	20796.4	-209	20797.4	-209
20798.2	-209.28	20798.4	-209.37	20804.9	-212	20817.8	-211.99	20824	-210.09
20831.6	-210.97	20835.9	-212	20844.4	-212	20845	-211.94	20845.5	-211.89
20852	-209.31	20856.2	-209	20862.6	-212	20875.3	-211.97	20875.4	-211.97
20876.1	-211.66	20876.5	-211.48	20876.9	-211.29	20877.3	-211.08	20877.5	-210.96
20877.6	-210.93	20877.9	-210.86	20878.4	-210.72	20878.6	-210.69	20886.9	-211
20887.1	-211	20887.5	-211.05	20890.1	-211.95	20890.8	-212.1	20891	-212.12
20891.4	-212.16	20891.6	-212.15	20904	-212	20904.2	-212	20904.6	-211.83
20905.3	-211.57	20907.4	-210.98	20915.7	-210.96	20916	-210.96	20916.6	-211.16

20917	-211.29	20917.2	-211.37	20918	-211.71	20918.1	-211.75	20918.3	-211.81
20918.8	-211.97	20919.6	-212.19	20920	-212.29	20920.3	-212.36	20921.1	-212.5
20921.3	-212.54	20921.7	-212.62	20921.9	-212.66	20922.4	-212.75	20923.4	-212.93
20923.4	-212.94	20923.5	-212.94	20930.9	-213	20932.8	-212.79	20938.8	-211.15
20946.9	-211	20947.5	-211.02	20948	-211.05	20949.1	-211.65	20949.1	-211.66
20949.1	-211.67	20949.9	-212.01	20950.1	-212.15	20950.6	-212.33	20950.8	-212.38
20951.2	-212.55	20951.4	-212.62	20952	-212.84	20952.2	-212.94	20952.3	-212.97
20952.5	-212.98	20973.6	-212.92	20991.8	-213.69	21002.7	-213.5	21013.2	-213.98
21053.7	-214	21064.4	-215.31	21079.6	-215.74	21090.5	-215.79	21105	-214
21113.1	-213.96	21124.2	-213.2	21124.6	-213.24	21128.5	-213.94	21135.3	-214
21135.5	-214	21136	-214	21136.3	-213.98	21137.1	-213.9	21138.6	-213.7
21142.8	-213.96	21157	-216.68	21171.2	-218.78	21216.8	-222	21239.6	-222
21248.1	-219.73	21256.7	-218.17	21270.9	-213.96	21347.4	-213	21373.5	-213
21379.2	-214	21387.7	-214	21394.9	-213	21413.6	-213.01	21430.4	-214
21467.9	-213.54	21521.5	-214	22693.1	-213.75	23005	-213.03	23019.6	-212
23073.1	-212.97	23078.7	-214	23636.2	-214	24764.4	-212.38		

Manning's n Values			num= 3		
Sta	n Val	Sta	n Val	Sta	n Val
0	.045	20247.8	.036	20447.3	.045

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	20247.8	20447.3		2183	2435.1	2561.2		.1	.3

CROSS SECTION

RIVER: Alamo River
 REACH: Alamo River RS: 22693

INPUT

Description:

Station Elevation Data				num= 440					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	-229	153.2	-229	170.2	-228.65	185.2	-229	268.3	-229
276.3	-228.31	286.3	-228.54	290.3	-229	301.3	-228.66	316.4	-229
333.3	-228.24	361.4	-228	367.3	-227.7	378.3	-226.11	383.3	-226.13
389.3	-226.92	404.3	-228.01	428.3	-228.75	503.4	-229.22	884.5	-229
889.5	-228	904.8	-228.01	910.4	-229	962.5	-229	967.5	-228.02
982.7	-228.14	1003.9	-227.27	1044.5	-227	1051.6	-228	1086.2	-228.03
1099.6	-229	1123.6	-228.62	1128.8	-229	1222.9	-229	1224.6	-228.88
1227.6	-228	1230.6	-228	1249.6	-231	1855.8	-231	2165	-228
2202	-227	2209	-225.9	2215	-224.16	2220.8	-221.93	2225.7	-221
2247	-221	2272	-230.9	2284	-233.06	2297.8	-234	2339	-233.98
2355	-233.04	2358	-232.17	2360	-232	3130.3	-232	3672.5	-231
3857.6	-231	3858.6	-230.97	3867.6	-227.59	3870.6	-227	3898.6	-227
3900	-227.37	3902.6	-229.02	3909.6	-231	3931.6	-231	3947.6	-228
3970.6	-228	3981.6	-231	3986.3	-230.96	4005.6	-229.09	4008.6	-228
4036.6	-228	4049.6	-231	4087.7	-231	4088.7	-230.9	4092.1	-229.03
4095.3	-228.03	4103.7	-227.56	4109.7	-229	5796.3	-229	5976.1	-228.65

6068.4	-228	6455.5	-228	6482.5	-227.03	6485.5	-226	6508.5	-226
6515.5	-224	6530.5	-224	6580.6	-226	6584.6	-228.22	6586.6	-229
6600.6	-229	6601.6	-228.82	6602.6	-228.03	6604.4	-226.07	6606.6	-224.2
6609.2	-223.3	6612	-223	6620	-223.02	6631.5	-223.99	6636.6	-226.05
6641.6	-227	6910.2	-227	7219	-227.66	8561.2	-227.66	8896.4	-227
8901.4	-228	8906.4	-227	9218.5	-227	9225.5	-226	9249.5	-226
9255.5	-229	9273.5	-229	9278.5	-226	9311.5	-226	9317.5	-228
9709.7	-227	11259.3	-227	11503.2	-226	11535.3	-226	11542.5	-227
11724.5	-227	11770.4	-225.99	11787.4	-224.07	11811.5	-223.98	11816.5	-223
11827.5	-223	11834.4	-224	11863.5	-224	11874.6	-223	11878.5	-223
11887.5	-224.05	11892.5	-227.11	11896.2	-227.94	11904.5	-228	11907.7	-227.18
11911.5	-225.05	11911.6	-225.01	11912.6	-224.67	11915.5	-224	12604	-224
12943.8	-223	12984.7	-223	12990.9	-224	12997.5	-224	13002.9	-224
13007.5	-223.19	13009.9	-223	13093.9	-223	13100	-223.62	13108.9	-223
13185	-223	13192	-224	13198	-224	13204	-223	13576.1	-223
13583.1	-224	13592.1	-224	13607.1	-223	13895.2	-223	13940.5	-222.06
13992.4	-223	14010.3	-222	14327.4	-222	14337.9	-222.99	14398.4	-223
14438.4	-221	14457.4	-221.06	14457.7	-221.17	14458.1	-221.27	14460.4	-222
14460.7	-222	14461.4	-222	14462.4	-222	14466.3	-221.01	14540.4	-221
14541.4	-221.23	14545.5	-224.26	14548.4	-225.75	14548.6	-225.79	14549.3	-226.1
14553.7	-227	14560.5	-225.88	14569.1	-222.09	14579.4	-221	14593.8	-221.02
14601.5	-222	14907.3	-222	15185.7	-221	15477.9	-221	16166	-219
16337.4	-219	16637.2	-218	16807.3	-218	17025.3	-217	17032.3	-216
17036.3	-216	17040.3	-217	17041.1	-217	17041.3	-217	17041.6	-217
17042.1	-217	17042.6	-216.89	17043.1	-216.71	17043.3	-216.59	17043.6	-216.46
17044	-216.27	17044.4	-216.12	17044.7	-216.09	17045	-216.04	17045.4	-216
17045.7	-216	17075.4	-216	17075.5	-216.06	17076.2	-216.34	17076.4	-216.41
17076.5	-216.5	17077.2	-216.81	17078.4	-217	17083.4	-217	17085.4	-216.04
17085.8	-216.02	17105.4	-216	17168.4	-218	17171.4	-219.11	17176.5	-221.96
17177.4	-222.28	17178.3	-222.57	17178.4	-222.6	17178.5	-222.62	17179.3	-222.89
17180.4	-223	17184.5	-222.98	17187.4	-222.16	17187.6	-222.09	17193.7	-218.5
17195.4	-218	17200.4	-217.97	17567.1	-217.41	18339.2	-218	18366	-217.01
18427.2	-217	18977.5	-218	19009.4	-217.99	19026.4	-217.131	19029	-217
19056.3	-217	19062.6	-217.72	19066.6	-218.48	19068.8	-219.06	19075	-221.65
19080.6	-222.98	19110	-223	19160.1	-220.5	19181.4	-220.96	19210.4	-221
19221.8	-223	19268.6	-223	19269	-222.98	19269.6	-222.93	19269.8	-222.9
19269.8	-222.89	19270.5	-222.8	19270.9	-222.75	19271.2	-222.7	19274	-222.28
19274.2	-222.26	19282.3	-221.66	19283	-221.53	19283.4	-221.46	19283.8	-221.4
19284.4	-221.28	19297	-217	19308.5	-217.02	19317.6	-218	19326.8	-218
19330.1	-217.261	19335.6	-216.03	19335.9	-216	19337.1	-216	19337.5	-216.07
19338.2	-216.24	19338.2	-216.25	19339	-216.53	19339.4	-216.67	19340.3	-216.96
19340.4	-216.99	19340.5	-217	19340.7	-217	19341.2	-217	19341.6	-217
19341.9	-217	19342.4	-217	19342.8	-217	19343.2	-217	19343.9	-217
19344.5	-216.89	19344.9	-216.8	19345.1	-216.75	19345.6	-216.59	19345.8	-216.54
19346.2	-216.42	19346.3	-216.39	19348.5	-216	19351.9	-216.19	19356.6	-216.99
19452.3	-217.66	20445.2	-217.81	20623.7	-218	20630.2	-218.77	20631	-218.68
20631.5	-218.61	20631.7	-218.59	20631.8	-218.57	20632.4	-218.4	20632.8	-218.31
20633.2	-218.23	20633.8	-218.09	20650.8	-218	20713.4	-218.84	20861.1	-218
21029.8	-218	21051.3	-222.82	21064.6	-223	21074.6	-221.93	21094	-217.94
21098.6	-217.49	21099.1	-217.42	21099.2	-217.41	21099.7	-217.34	21099.9	-217.31

21101.4	-217.11	21101.6	-217.08	21102	-217.03	21102.1	-217.02	21174.9	-216
21252.3	-216	21275.1	-217	21323.5	-217	21355.2	-216	21378	-216
21378.6	-216.13	21382.2	-217.05	21382.6	-217.12	21382.9	-217.16	21383.7	-217.29
21384.1	-217.34	21388.6	-218	21388.8	-218	21389.2	-218	21389.7	-218
21390	-218	21390.5	-218	21391.3	-217.97	21391.4	-217.96	21392	-217.93
21392.2	-217.92	21392.5	-217.91	21392.9	-217.86	21393.7	-217.76	21393.8	-217.73
21394.3	-217.67	21394.4	-217.66	21394.6	-217.63	21395.4	-217.55	21405	-216
21434	-216	21441.1	-216.87	21441.5	-216.91	21442.3	-217	21443	-217.02
21443.7	-217.04	21444.4	-217.07	21446.7	-217.13	21522.1	-217	21523.2	-216.94
21529.1	-215.63	21533.5	-215.25	21549.5	-216	21886.9	-216	21897.7	-217.19
21990.2	-216.96	22022.2	-216	22613.5	-216	22637.8	-216.75	22713.6	-217
22714.4	-217	22715.1	-217	22715.2	-217	22716.3	-217	22716.6	-217
22717.2	-217	22717.3	-216.99	22725.4	-216.06	22747.5	-216	22750.3	-216.28
22750.8	-216.35	22751.2	-216.42	22751.9	-216.54	22752.4	-216.62	22752.7	-216.67
22752.8	-216.69	22753.3	-216.77	22753.4	-216.78	22753.9	-216.87	22754.1	-216.89
22754.5	-216.93	22754.9	-216.98	22755.1	-217	22976.6	-217	23065.4	-216
23085	-214.03	23112.4	-214	23134.7	-215.96	23162.6	-217	23514.3	-217
23795.1	-216	24715.2	-214	24891.1	-213	24891.3	-212.97	24896.8	-212.13
24897.2	-212.11	24897.9	-212	24900.2	-212	24903.8	-213	24913.2	-213
24915.6	-212.7	24916.3	-212.52	24916.5	-212.47	24917	-212.36	24917.8	-212.2
24918.6	-212.05	24919.2	-212.03	24919.6	-212	24942.4	-213	25186.7	-213
25641.4	-212	25778.9	-212	26006.6	-211	26203.9	-211	26449.6	-209.5

Manning's n Values			num=	3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.045	19026.4	.036	19330.1	.045

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	19026.4	19330.1		2512.2	2709.9	2712.4		.1	.3

CROSS SECTION

RIVER: Alamo River

REACH: Alamo River

RS: 19983

INPUT

Description:

Station Elevation Data			num=	452					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	-232.04	4.1	-231.85	16.1	-233	24.1	-232.06	33.1	-231.99
41.1	-231.21	63.1	-234	317.1	-233	329.1	-232	368.1	-232
372.3	-231	416.1	-231	419.1	-231.86	424.9	-232	440.1	-232
443.1	-231	486.4	-231	491.3	-231.97	505.1	-233	545.1	-232
555.1	-232.51	582.2	-231.14	587.2	-232	613.2	-232	630.1	-231.07
644.2	-231.21	651.2	-231.99	781.2	-232	788.2	-233	797.5	-233
828.6	-232.04	847.2	-231.98	860	-231.02	873.1	-232	952.2	-232
959.2	-231.01	974.2	-231	977.2	-232	1006.2	-232	1013.2	-231
1039.2	-231	1043.2	-230.03	1050.2	-230.12	1072.6	-229.01	1095.9	-228.98
1104.2	-228	1112.2	-228	1124.1	-228.81	1171.2	-229	1182.2	-227.78

1215.2	-228	1230.2	-228.82	1239.1	-227.88	1257.2	-228	1262.3	-229
1398.2	-229	1486.2	-231	1503.2	-233	1530.2	-233	1536.5	-230.83
1550.6	-229.18	1569.2	-228.98	1576.2	-228.36	1581.2	-229	1628.2	-229
1732.1	-231	1985.2	-231.06	2123.2	-229	2195.2	-229	2208.2	-228
2287.2	-227	2328.2	-226	2363.2	-226	2394.2	-227.02	2397.6	-227.95
2418.2	-229	2559.2	-229	2579.1	-228	2591.2	-228.03	2604.3	-229
2618.2	-229	2636.9	-226.03	2645.2	-222	2666.2	-222	2669.2	-223.08
2678.2	-227.73	2687.2	-230.81	2692.2	-231.61	2700.4	-232.08	2715.3	-230.84
2728.1	-226.05	2729.2	-226	2759.2	-226	2765.2	-229.08	2770.6	-230.87
2781.2	-232	2963.2	-232	3082.2	-231.1	3610.3	-231	3743.3	-229.75
4014.3	-229.06	4756.3	-229	4823.3	-227	4877.3	-227	4918.2	-228
5103.3	-228	5112.3	-227	5140.3	-226.69	5160.3	-227	5168.3	-231.75
5172.3	-232	5175.3	-231.05	5181.3	-228	5236.3	-228.01	5255.3	-229
5264.1	-228.98	5271.3	-228.1	5282.2	-229	5415.3	-229	5456.3	-228
5462.9	-228.04	5468.3	-229	5470.9	-228.97	5476.3	-228	6482.6	-228
6507.3	-229	6523.4	-229	6541.3	-228	7550.4	-228	7730.5	-229
7788.4	-228.06	7796.4	-226	7817.4	-226	7826.4	-228.99	7873.4	-229
7886.4	-226	8110.4	-226	8173.4	-227	8235.4	-227	8263.4	-227
8294.4	-226	8334.4	-226	8335.3	-226.01	8338.4	-229	8344.4	-229
8345.4	-228.44	8347.4	-226.03	8348.4	-226	8395.4	-226	8415.4	-227
8475.4	-227.84	8638.4	-227.42	8655	-226.91	8665.4	-224	8679.1	-224.01
8690.4	-225.02	8717.4	-224.92	8743.4	-225.43	8795.4	-224.22	8898.4	-224
8914.4	-226.89	8921.1	-227	8934.7	-226.94	8974.4	-224.76	8979.4	-224
9149.4	-224	9172.4	-225.98	9203.4	-227	9416.8	-227.39	9446.4	-228
9454.4	-227.41	9486.4	-228	9830.4	-227.94	9893.9	-227.78	9913.5	-227
10270.5	-226.91	10355.5	-226	10418.6	-226	10457.3	-224.04	10483.5	-224
10510.5	-226	10547.4	-227	10793.6	-227	10832.5	-228	11024.5	-228
11122.1	-227.76	11139.5	-227	11691.8	-227	11755.8	-226	12169.7	-225.92
12191.5	-225.69	12212.5	-224.61	12317.5	-224.54	12359.5	-224.06	12796.3	-224
12809.9	-223.6	13011.5	-222.91	13038.3	-222.44	13048.6	-221.99	13057.6	-221
13099.6	-221	13100.6	-221.04	13100.8	-221.11	13101.3	-221.17	13101.6	-221.23
13101.8	-221.33	13102.3	-221.52	13103.3	-221.9	13105.6	-222	13109.4	-222
13112.7	-221	13133.6	-221	13173.6	-222.19	13214.9	-222.01	13245.6	-223.17
13306.2	-223.6	13618.6	-221.98	13632.6	-221.29	13653.6	-221.9	13758.5	-221.08
14183.6	-221	14194.3	-220.53	14253.7	-220.43	14290.5	-222	14310.9	-222
14344	-221.41	14462.4	-221	15655.1	-221	15824	-219	15866.7	-219.05
15871.1	-220.63	15874.6	-222.64	15878.3	-224	16035	-223.99	16048	-221.02
16052.7	-220.38	16087.1	-219	16096.5	-219.44	16128.3	-222.95	16144.3	-223.37
16147.8	-223.08	16152.7	-221	16172.3	-219.03	16182.3	-219	16191.8	-223.22
16192.1	-223.32	16194.5	-224	16213.9	-224	16231.5	-224	16249.4	-223.04
16263.7	-222.86	16274.5	-222.02	16300.7	-222	16310.4	-221	16344.9	-221
16364.6	-223.07	16387.8	-223.98	16415.3	-224	16440.4	-223	16444.8	-222.07
16452.3	-219.71	16465.4	-218.56	16498.4	-219.6	16542.8	-221	16770	-221
18147.3	-219	18151.1	-218	18156.7	-218	18159.6	-218.95	18165.8	-219
18171.1	-217.09	18171.2	-217.08	18171.3	-217.06	18171.9	-217.01	18172.3	-217
18188.5	-217.03	18193.6	-218.85	18200.1	-219.06	18531.8	-219.09	18655.4	-219.76
18797.7	-219	18808.5	-217.87	18828.9	-218.02	18840.8	-221	18855.1	-220.98
18861.1	-219	18881.4	-219	18907.5	-220.56	18923.5	-221	18997.2	-219.25
19033.9	-219	19041.3	-220.67	19048.5	-223.17	19048.5	-223.19	19049.2	-223.37
19049.7	-223.48	19050.7	-223.69	19050.8	-223.72	19051.4	-223.82	19051.7	-223.9

19052	-223.96	19052.1	-223.98	19052.2	-224	19059.5	-224	19065.8	-223.05
19077.1	-219.72	19081.7	-219	19129.1	-218	19158.4	-218	19176.2	-219
19194.5	-219	19210.8	-218.04	19220.3	-218	19249.4	-220.21	19272	-221
19296.4	-221	19334.7	-219	19696.9	-219	19702.6	-218	19725.6	-218.01
19745.5	-219	20410.7	-219	20715.2	-218	20720.7	-217.55	20727.9	-216
20762.5	-216	20788.6	-217.69	20798.8	-217.75	20808.2	-217.29	20820.4	-216.04
20837.4	-216	20837.7	-216	20837.9	-216	20838.9	-216	20840	-216.04
20843.6	-217	20984.4	-218	21729.4	-218	21740.8	-217.02	21746.1	-216
21755.4	-216	21765.2	-217	22180.3	-217	22185.5	-216	22196.4	-216.02
22210.4	-217	22231.9	-217	22283.1	-216	22322.8	-216	22334.2	-216.65
22366.8	-217	23839.7	-214	23964	-213	23982.5	-212	24011.8	-212.28
24028.3	-218.12	24029	-218.53	24029.7	-218.94	24031.8	-220.05	24031.9	-220.1
24032.6	-220.48	24033.1	-220.69	24033.8	-221.02	24034.3	-221.14	24034.8	-221.27
24037.4	-221.88	24038.4	-221.94	24039.1	-221.99	24039.3	-222	24041.1	-222
24057.9	-218.28	24070.4	-213.98	24081.4	-213	24094.1	-213	24114.3	-214
24323.1	-214	24332.5	-213.02	24332.7	-212.99	24333.3	-212.88	24334	-212.75
24334.7	-212.57	24335.4	-212.4	24336	-212.26	24336.1	-212.23	24336.8	-212.12
24337.8	-212	24360	-212.02	24365.8	-212.78	24376.3	-213	24814.9	-213
24820.3	-212.15	24821	-212.05	24821.3	-212.04	24821.8	-212.02	24822.1	-212
24823.2	-212	24834	-212	24843.6	-213	25197.1	-213	25360.4	-211.99
25374.6	-211	25387.9	-211.02	25403.7	-212	25569.3	-212	25595.6	-211
25628.2	-211.98	25644.5	-212	25655.2	-211.24	25704.1	-211	25862	-211
26984.9	-208	27150.8	-207	27159.6	-207	27160.1	-207	27160.4	-207
27161	-207.19	27161.6	-207.4	27161.7	-207.46	27162.4	-207.83	27163.2	-208
27163.7	-208	27163.9	-208	27164.5	-207.93	27164.6	-207.91	27165.2	-207.84
27165.3	-207.78	27165.6	-207.68	27166.1	-207.46	27166.4	-207.31	27166.8	-207.21
27167.4	-207.05	27167.5	-207.02	27167.6	-207	27192.1	-207	27192.6	-207
27192.8	-207.02	27193.5	-207.12	27193.8	-207.16	27194.2	-207.28	27194.9	-207.48
27195	-207.51	27196.2	-207.94	27196.4	-207.95	27201	-208	27202.2	-207.97
27203.4	-207.64	27203.6	-207.55	27204.6	-207.25	27205.1	-207.14	27205.6	-207.03
27205.8	-207	28211.1	-203.78						

Manning's n Values	num=	3
Sta n Val Sta n Val		
0 .045 16213.9 .036 16498.4 .045		

Bank Sta: Left Right	Lengths: Left Channel Right	Coeff Contr.	Expan.
16213.9 16498.4	2806.8 3320.8 3045.6	.1	.3

CROSS SECTION

RIVER: Alamo River	
REACH: Alamo River	RS: 16662

INPUT

Description:

Station Elevation Data	num=	450
Sta Elev Sta Elev Sta Elev Sta Elev		
0 -234 498.5 -234 1118.2 -232 1176.2 -230.99 1196.3 -228.98		

1202.3	-227.97	1215.3	-221.82	1221.3	-221	1264.3	-222.01	1273.7	-226.47
1280.3	-228.82	1297.3	-231.36	1314.3	-233	1632.7	-233	1646.6	-230.37
1661.9	-228.51	1680.7	-223.41	1690.7	-222	1717.7	-222	1727.6	-227.99
1730.8	-229.03	1741.7	-230.95	1785.8	-231	1792.8	-229.82	1801.7	-231
1876.8	-232	2517.4	-232	2521.4	-231	2615.3	-231	2621.4	-232
2652.5	-232	2709.5	-231	2832.6	-231	2846.6	-228	2867.7	-228
2873	-229.08	2904.6	-231	2983.9	-231	3077.8	-229.34	3144.9	-231
3233.6	-229.43	3301.1	-229.97	3351.1	-231	3561.2	-230.47	3760.4	-230.78
3839.5	-229	3843.7	-228.1	3849.9	-225.67	3856.5	-224.85	3875.5	-223.51
3881.5	-223.61	3892.5	-225.11	3901.9	-223	3914.5	-222.84	3927.2	-223.11
3937.5	-227.71	3950.6	-228.96	4096.7	-232	4125.7	-231.96	4156.7	-231
4190.8	-231	4225.6	-232	5002.4	-232	5010.2	-232.67	5069.3	-233
5141.4	-233	5147.5	-232.59	5165.7	-233	5178.6	-232	5246.6	-232
5250.6	-233	5254.6	-231	5395.8	-232.74	5412.8	-232	6326.5	-232
6346.9	-231	6359.6	-231	6362.6	-232	6370.6	-232	6374.6	-231
6384.6	-231.71	6442.6	-231.63	6469.6	-231.16	6500.7	-229	6508.7	-226
6527.7	-226	6534.7	-227.31	6570.7	-227	6574.7	-229.21	6583.7	-231
6708.9	-231	6712.1	-231.87	6715.5	-232	7004.9	-231	7750.3	-230.41
8015.9	-229	8639.5	-228.41	8656.5	-228	9130.9	-227	9136.9	-226
9244	-226	9244.4	-226.02	9245	-226.05	9251.7	-228.97	9259	-229
9265.3	-228	9270.4	-228.01	9276.2	-229	9285.8	-229	9566.2	-228
9902.5	-228	10920.4	-226	11529.3	-226	11582.5	-224.31	11625.2	-226
11685.7	-226	11796	-224.75	11815.3	-224	11824.5	-221	11834.8	-221.05
11837.5	-222	11851.8	-222	11858.7	-221	11947.8	-221.03	11952.9	-222.07
11968	-227	11976.3	-226.91	11988.2	-224.01	11998.8	-223.03	12069.5	-223.28
12096.5	-222.01	12116.5	-222	12156.1	-224	12290	-224	12680.8	-223
12703.3	-221	12736.3	-221.1	12746	-224.38	12759.1	-227	13365.1	-227
13384.1	-225.74	13395.5	-226.83	13411.4	-227	13428.1	-226	13433.9	-223.52
13436.3	-223.09	13489.6	-223	13519.2	-222	13557.3	-223	13567.1	-222.05
13576.9	-222	13584.3	-221	13589.9	-222.02	13626.1	-222.98	13649.8	-226
13682.9	-226	13686.6	-224.49	13690.1	-223.89	13704.4	-224.85	13753	-224.03
13765.5	-221.99	13781.5	-221	13796	-221.02	13805.2	-222	13828	-222
13861.4	-224.03	13929.9	-226	14008.4	-225.9	14014.2	-225.726	14070.9	-224.03
14106.6	-221.05	14131.4	-221.77	14144.9	-223.99	14207.3	-224	14212.4	-223
14261.8	-223	14293.8	-224	14323.9	-224.01	14356.1	-226	14365	-225.67
14410.1	-224	14830.1	-223.03	15655.4	-223	16232.2	-222	16263.9	-222
16282.1	-223	16304.2	-223	16317.6	-221	16334.9	-221	16344.2	-222
16673.4	-222	16680.8	-221	16710.6	-221.01	16718	-222.03	16736.6	-222.97
16829.6	-223	16846.3	-224	16866.5	-223	16879.8	-223	16889.7	-221.69
16900.2	-218.81	16915.1	-217	16921	-217.04	16926.7	-217.97	16952.3	-219
16961.3	-220.81	16966	-223.27	16969.1	-224	16995.1	-224	17017	-219.03
17036	-218.31	17043.4	-218.93	17056.3	-219.01	17063.9	-221.88	17073.2	-224
17076.9	-224	17082.4	-223.03	17088.1	-221	17140.2	-221	17155.8	-224
17227	-224	17236.5	-221	17264.9	-221	17272	-223	17294.5	-224
17371.7	-224	17376.3	-222.99	17380	-221	17409.6	-221.03	17414.4	-222.98
17444	-224	17482.8	-224	17524.7	-223.03	17531.8	-221	17553.1	-221
17561.4	-223	17672.9	-223	17677.6	-220.92	17689.5	-219	17700.1	-220.82
17708.5	-223.09	17725.4	-224	17755.9	-224	17770.3	-223	17777.3	-221
17795.7	-221	17800.4	-222	17818.9	-222	17822.4	-221	17850.8	-221
17859.1	-223	18058.6	-223	18098.7	-222	18205.5	-222	18215	-221

18248.2	-221.02	18263.8	-222	18301.5	-222	18343	-221	18357.7	-219
18366.8	-219	18376.5	-221.01	18409.5	-222	18428.4	-222	18472.3	-220.99
18479.2	-219.22	18487.7	-218	18493.7	-218.19	18506.9	-221	18548	-221
18557.3	-219	18583.3	-219	18594.5	-220.94	18601.9	-220.98	18606.1	-220.63
18614.8	-218.06	18618.6	-218	18627.7	-218	18644.3	-221	18748.7	-221
18764.8	-218	18780.7	-218	18783.5	-219.02	18794.9	-221	19015.5	-221
19100.9	-219	19105.7	-217	19129.4	-217.01	19137.6	-217.93	19153.1	-218.61
19189.8	-218.06	19205.7	-217.08	19217.3	-217	19225.3	-217.82	19231.1	-219
19396	-219	19412.9	-217.19	19422.1	-217	19439.6	-218.99	19498.2	-219
19517.9	-219	19526.7	-217	19564.7	-217	19569.4	-218.03	19584.8	-218.94
19600.3	-219	19628.5	-218	19663.1	-218	19669.1	-217	19683.7	-216.98
19705.8	-219	19764.8	-219	19769.1	-218.24	19769.8	-218.07	19769.9	-218.07
19769.9	-218.06	19771.3	-217.33	19773.2	-216.37	19773.4	-216.28	19773.5	-216.27
19774.2	-216.09	19774.6	-216	19774.9	-216	19791.2	-216	19800.7	-219
19889.7	-219	19896.3	-217.13	19903.7	-216.01	19913.2	-216	19924.1	-219
20000	-219	20009.5	-218.12	20017.5	-216.04	20030.8	-216	20041.4	-218.99
20132.7	-219	20143.5	-216	20159.6	-216	20171.9	-219	20248	-219
20254.5	-218.09	20263	-216.04	20276.1	-216	20278.2	-216.24	20283.4	-218.07
20292.9	-219	20329.6	-219	20351.4	-218	20371.2	-218	20399.2	-218.99
20448.3	-219	20474.4	-218.03	20479.6	-216.85	20487	-216	20495.5	-216.6
20502.9	-218.03	20519.4	-218.99	20558.5	-219	20601.2	-218	20712.8	-218
20722.3	-216	20738.8	-216	20743.6	-217.33	20748.4	-218	20839.2	-218
20848	-216	20862.2	-216	20869.3	-218	20966.6	-218	20967	-217.98
20967.5	-217.93	20967.7	-217.91	20967.8	-217.9	20968.3	-217.77	20968.4	-217.76
20969	-217.63	20969.1	-217.6	20969.4	-217.55	20969.8	-217.43	20970.2	-217.36
20970.6	-217.27	20971.3	-217.1	20971.4	-217.09	20971.6	-217.01	20972	-216.88
20972.5	-216.7	20972.7	-216.61	20973.1	-216.46	20973.5	-216.28	20973.7	-216.17
20980	-216	20991.5	-216	21001.1	-218	21090	-218	21090.1	-217.99
21092.3	-217.69	21097.7	-216.26	21103	-216	21116.1	-216	21123.2	-218
21222.6	-218	21233.5	-216	21268.8	-216	21318.9	-217	21331.8	-217
21337.8	-216	21717	-216	21736	-214.46	21744.9	-214.64	21765	-214
21793.2	-214.06	21823.7	-216	21901.1	-216	21920	-214.24	21929	-214
21947.5	-217.99	21967.6	-218	21973.5	-217.09	21988.8	-212.25	21995.9	-211
22025.7	-211.07	22032.9	-212.07	22039.5	-213.54	22044.3	-214	22419.5	-214
22521.8	-213.09	22702.9	-214	22948.4	-214	22966.5	-213	22996	-213
23007	-214	23511.8	-213	23511.9	-213	23512.4	-213.11	23512.5	-213.14
23513.1	-213.26	23513.2	-213.31	23513.5	-213.39	23514	-213.55	23514.3	-213.66
23514.7	-213.78	23515.4	-213.99	23518.9	-214	23528.5	-212	23880.8	-211.66
24519.9	-209.03	24533.1	-208.52	24536.6	-209	24743.6	-209	24935.9	-208.47

Manning's n Values		num=	3
Sta	n Val	Sta	n Val
0	.045	14014.2	.036
		14365	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
14014.2	14365	2588.9	2765.6	2982.9	.1	.3	

CROSS SECTION

RIVER: Alamo River

REACH: Alamo River

RS: 13897

INPUT

Description:

Station	Elevation	Data	num=	452					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	-234.62	453	-234	456	-233	459	-233.06	462	-234
468.1	-234	471.7	-233.45	484.1	-234	488.1	-233	494.1	-234
500.1	-233.91	503.1	-233	507.2	-233	510.2	-233.99	515.2	-234
518.2	-233	523.2	-233	527.2	-234	529.2	-233.94	532.2	-233
540.2	-233	543.3	-234	547.3	-233.84	549.3	-233	556.3	-233
559.3	-234	562.3	-234	565.3	-233	571.3	-233	576.3	-234
579.4	-233	588.4	-233	592.4	-234	596.4	-233	643.5	-233
648.5	-232	654.6	-233.27	658.6	-233	661.6	-232	665.6	-232.11
668.6	-233	689.6	-233	693.7	-232	696.7	-232.12	700.7	-233
705.7	-233	711.7	-232	718.7	-233.64	727.7	-232.3	732.8	-233
897.2	-233	901.2	-232	906.1	-232.08	909.2	-233	914.2	-232.91
917.1	-232	923.3	-232.04	925.3	-232.95	928	-233	930.3	-232.86
932.3	-232	972.4	-232	977.4	-232.95	980.4	-232.03	1004.5	-232
1008.5	-233	1013.4	-232.01	1053.6	-232	1057.8	-233	1059.6	-233
1063.6	-232	1069.7	-232	1074	-233	1076.7	-232.83	1079.4	-232
1085.7	-232	1088.7	-233	1092.7	-232.96	1095.6	-232	1133.8	-232
1137.8	-233	1141.9	-233	1147.6	-232	1150	-232.02	1153.9	-233
1157.9	-233	1160.9	-232.11	1163.1	-232	1166.9	-232.12	1169.9	-233
1174.9	-233	1177.9	-232	1216	-232	1219.1	-233	1224.1	-232.9
1226.1	-232.01	1232.1	-232.02	1234.1	-232.91	1239.1	-233	1242.1	-232
1248.2	-232.01	1251.1	-232.94	1252.8	-233	1255.2	-233	1258.2	-232
1296.3	-232	1301.3	-233	1306.3	-232	1314.3	-232.01	1317.3	-233
1319.3	-233	1322.3	-232	1375.5	-231	1377.5	-231	1381.5	-232
1385.5	-232	1389.5	-231	1393.5	-231	1397.5	-231.94	1401.3	-232
1406.6	-231	1417.2	-232	1453.6	-231	1460.7	-231.03	1463.7	-232
1466.7	-232	1470.7	-231	1476.7	-231	1479.7	-231.95	1481.9	-232
1483.8	-232	1486.8	-231	1492.7	-231.01	1497	-232	1499.8	-232
1502.8	-231	1544.6	-232	1661.2	-232	1667.3	-231.03	1675.5	-232
1678.3	-232	1682.3	-231	1687.2	-231.03	1690.3	-232	1709.4	-232
1714.5	-231	1720.4	-232	1767.5	-232	1782.5	-231	2797.2	-231
2893.7	-229.5	2939.6	-230.3	2954.1	-230.99	2992.8	-231	3010.8	-227.84
3016.9	-227	3021.9	-226.81	3048.4	-226.96	3066	-228.96	3104.1	-232
3152.2	-232	3157.2	-229.83	3162.2	-229.02	3175.3	-231	3392.9	-231.91
3575.5	-231.53	4031.7	-231.81	4105.8	-231	4175.9	-231	4251	-231.93
4298.3	-232	4323.3	-232	4343.3	-231	4360.4	-232	5124.4	-232
5127.5	-231	5130.5	-231.01	5133.5	-232	5525.4	-232	5528.5	-231.09
5531.6	-231	5534.6	-232	5602.7	-232	5605.8	-231	5611.8	-231.55
5681	-231	5686.9	-231.9	5693	-231	5836.5	-231	5840.4	-232
5843.4	-231	6077	-231	6080.3	-232	6082.2	-231.92	6085	-231
7496.8	-231	7522.9	-230.09	7527.9	-229	8091.4	-229	8354.1	-227.03
8373.1	-226	8434.3	-226	8445.3	-229	8450.7	-228.91	8453.5	-227.95
8456.3	-226.04	8458.6	-226	8481.5	-226.01	8496.5	-229	9283.6	-229
9295.3	-228.08	9302.6	-227	9337.7	-226	9342.7	-226.02	9358.8	-228

10217.5	-228	10235.2	-227.03	10241.3	-226	10276.9	-226	10289.4	-227
10532	-227	10545.6	-226.01	10600.6	-226	10608	-227.2	10618.2	-228.1
10665.7	-228.94	10769.8	-228	10902.8	-228	10938.5	-226.99	10945.9	-226
10979.2	-226	10991.3	-227.12	11018.6	-228	11117.9	-228	11129.9	-226
11156.1	-226.01	11164.7	-227.01	11208.4	-228	11276	-228	11347.4	-227
11354.8	-226	11393	-226	11393.3	-226.01	11393.6	-226.01	11394	-226.02
11398.3	-227.94	11410.3	-228	11419.8	-226.21	11442.7	-224.03	11472.8	-223
11477.8	-223.03	11486.1	-223.99	11495.7	-223.99	11505.1	-222	11530.1	-222.05
11571.7	-223.4	11592.5	-223	11608.6	-224	12106.2	-224	12126.6	-223.01
12128.6	-223.009	12155.6	-223	12160.4	-224.09	12186.3	-226	12203.6	-226
12288.5	-224	12306.5	-224	12313.2	-228	12371.1	-227.98	12374.2	-226.01
12389.5	-224.03	12393.5	-222.91	12396.9	-222.42	12400.6	-222.41	12407.1	-224
12477.1	-224.697	12607.9	-226	12631.3	-228	12639.6	-227.92	12659.3	-226.25
12728.3	-224.02	12734.5	-222	12755.2	-222	12760.3	-224.19	12769	-226.06
12774	-227.01	12786	-228.03	12824.1	-229	12914.5	-229	12933.3	-227.89
12966	-227	12973.4	-226	13065.2	-226	13076.3	-224.11	13082.3	-222
13099.9	-222.03	13102.4	-223.06	13106.4	-224	14208.3	-224	14217.6	-223
14239.8	-223	14244.6	-224	14658.5	-224	14675.7	-224.44	14706.5	-224
14713.9	-222.79	14731.1	-222	14744.2	-222.41	14795.8	-222.01	14815.5	-224
14929.5	-224	14938.4	-223.93	14949.2	-222.75	14954.1	-221.72	14960.6	-219.37
14962.7	-219.01	14962.8	-219	14979.9	-219.06	15003.9	-222	15041.4	-222
15050.2	-221	15110.1	-221	15125.5	-221.97	15132.4	-223	15146.1	-223
15151.2	-221.98	15159.8	-218.97	15164.9	-218	15187	-218	15200.9	-218.97
15221.4	-223	15659.9	-224	15685.7	-223.94	15696.4	-223.09	15696.8	-223.04
15697.1	-222.98	15697.6	-222.87	15697.9	-222.8	15703	-221	15710.4	-221.09
15719	-223.75	15722.2	-224	16055.4	-224	16105.2	-223.02	16118.1	-222
16139.9	-221.91	16157.8	-223	16683.5	-223	16694.6	-222	16754.3	-222.88
16920.4	-222	17048.8	-222.31	17203.3	-222	17208.2	-221	17226.7	-221
17231.6	-222	17365.8	-222	17374.3	-221	17389.7	-221	17406.6	-223.98
17421	-227.12	17435.9	-228.97	17779.9	-229	17810.6	-228	17816.7	-226.97
17825.1	-224.01	17837.7	-221	17939.9	-222	17959.8	-221	18457	-221
18872.4	-219	19296.1	-219	19304.4	-218.3	19314.2	-218	19407.8	-218.93
19441.4	-218	19465.8	-217.98	19474	-217	19495.9	-217	19501.8	-217.9
19502.8	-217.98	19503	-217.99	19503.1	-218	19504.3	-218	19508.2	-218
19513.8	-217	19669.3	-217	19685	-218.93	19700.1	-219	19709	-217.76
19710.8	-217.35	19711.2	-217.26	19712.1	-217.05	19712.3	-216.98	19713	-216.71
19713.4	-216.55	19713.7	-216.45	19713.7	-216.43	19713.8	-216.4	19714.4	-216.13
19714.9	-215.95	19715.1	-215.85	19716.1	-215.51	19717.3	-215.22	19717.8	-215.06
19718	-214.99	19718.6	-214.8	19718.7	-214.76	19718.9	-214.69	19719.4	-214.52
19719.8	-214.41	19720.6	-214.14	19720.9	-214.09	19721.1	-214.07	19721.6	-214.02
19722.2	-214	19760	-214.01	19768.9	-216.22	19774.8	-217.27	19775.3	-217.33
19775.4	-217.35	19776	-217.43	19776.5	-217.49	19776.8	-217.53	19777.1	-217.58
19779.6	-217.87	19788.8	-218.09	20011.8	-218	20029	-217	20039.7	-217.02
20052.4	-218	20222.4	-218	20263.2	-217.29	20270.4	-216	20277.8	-216
20282.7	-217	20520.6	-217	20541.4	-217	20546.1	-216.04	20546.3	-216
20554.8	-216	20558.7	-217	20660.9	-217	20755.7	-216	21084.3	-216
21645.1	-214	24046.8	-208	24060.5	-207	24087.9	-207	24096.4	-210.12
24102.8	-211.91	24113.1	-211.75						

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	12128.6	.036	12477.1	.045

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.	
	12128.6	12477.1		3025.4	3873.6		4625.3	.1	.3

CROSS SECTION

RIVER: Alamo River

REACH: Alamo River

RS: 10023

INPUT

Description:

Station Elevation Data num= 451

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	-234.12	361.1	-234	366.2	-233	370.2	-233.99	375.3	-234
381.3	-233	387.3	-234	392.4	-234	396.4	-233	399.5	-233.13
403.5	-234	406.5	-233.99	408.5	-233.1	409.5	-233	416.6	-233
419.6	-234	421.6	-234	424.6	-233	454.9	-233.21	456.9	-233
497.2	-233	501.2	-234	505.2	-233	513.3	-233	517.3	-233.76
520.4	-233.03	529.4	-233	532.4	-233.96	533.5	-234	536.5	-233
704.8	-233	705.8	-232.97	707.8	-232.12	709.8	-232	714.8	-232
718.9	-232.98	720.4	-233	721.9	-233	726.9	-232	766.2	-232
771.3	-232.99	775.3	-232	782.3	-232	786.7	-233	788.4	-232.89
791.4	-232	798.5	-232	802.8	-233	805.5	-233	807.5	-232.12
808.5	-232	847.8	-232	850.9	-233	855	-232.99	857.9	-232.01
858.9	-232	864	-232	868	-233	870	-233	874	-232
881.1	-232	884.1	-233	888.1	-233	891.2	-232	930.5	-232
933.7	-233	937.5	-233	940.5	-232	947.6	-232.02	949.6	-232.85
951.6	-233	953.6	-233	956.7	-232	962.7	-232	965.7	-233
1009.1	-232	1013.1	-232.04	1015.1	-232.98	1016.1	-233	1020.2	-232.94
1023.2	-232	1029.2	-232	1032.2	-233	1033.3	-233	1036.3	-233
1040.3	-232	1044.3	-232.03	1048.4	-232.95	1050.3	-233	1054.4	-232.97
1057.4	-232	1095.7	-232	1098.8	-232.91	1101.8	-233	1104.8	-232
1111.8	-232	1112.9	-232.01	1115.9	-232.96	1117.9	-233	1122.9	-232
1354.7	-232	1360.7	-231.69	1362.8	-232	1367.8	-232	1371.8	-231.41
1374.6	-231.34	1379.9	-232	1432.3	-232	1436.3	-231.29	1442.1	-231
1447.8	-232	1452.4	-231	1459.5	-231.07	1462.7	-232	1503.7	-231
1509.9	-231.02	1512.8	-231.95	1515.2	-232	1519.9	-231	1525	-231
1528	-232	1530.2	-232	1532	-231.94	1535.1	-231	1541.1	-231
1544.1	-231.92	1545.3	-232	1549.2	-231.9	1552.2	-231	1607.6	-231
1610.7	-232	1613.7	-232	1616.7	-231	1624.7	-231	1628.8	-232
1630.8	-231.83	1633.7	-231	1690.4	-231	1695.3	-232	1699.3	-231
1778.9	-231	1824.6	-229.96	1870.5	-229.62	2024.9	-229.94	2113.5	-229.66
2191	-229	2361.3	-229	2485.3	-231	2512.5	-231	2536.7	-229.03
2553.7	-226	2593.1	-226	2612.5	-229.02	2632.4	-229.87	2647.9	-229.93
2695.4	-230.01	2735.2	-229	4094.5	-229	4113.7	-229.38	4155	-229.31
4214.4	-230.03	4262.8	-231	4840.2	-231	4921.8	-229	4969.1	-229.01
4983.2	-229.25	5009.3	-229	5064	-231	5139.3	-230.13	5276.5	-229.66

5316.8	-229	5595.9	-229	5640.4	-231	5666.4	-231	5716.8	-230.44
5739.1	-230.53	5885	-229	6123.9	-229	6141.5	-229.47	6194.4	-229
6276.1	-229	6363.7	-231	6424.9	-229	6438.3	-229	6439.2	-229.14
6439.3	-229.16	6441.3	-230.01	6442.3	-230.06	6467	-230.27	6514.9	-229
7950.1	-229	7991.6	-228	8101.6	-228	8279.7	-226.81	8387.4	-226.72
8581.7	-226	8725.2	-226	8741.5	-224.21	8746.4	-224.224	8793.6	-224.36
8817.3	-223.53	8822.5	-224	8853.8	-224	8858.7	-223.11	8867.6	-222.27
8893.9	-221	8909.5	-221.02	8913.9	-221.9	8916.9	-223.49	8924.1	-229.41
8926.7	-231	8984.5	-231	8994.9	-229.09	9004.2	-228.13	9010	-225.99
9067.8	-224	9071.3	-224.09	9080.7	-226.79	9086.3	-227.68	9104	-229
9122.2	-228.97	9125.7	-228.09	9129.6	-226.64	9132.6	-226	9173.1	-226
9181.2	-227	9248.9	-227	9351.3	-227	9425.8	-227.28	9476.2	-227
10550.2	-227	10708.4	-226	10718	-226.83	10724.3	-228	11658.7	-228
11665.7	-227.46	11676.1	-226	11720.1	-226	11761.8	-224	11777.1	-224.07
11825.4	-225.69	11882.9	-225.98	11915.6	-224	11926	-222.02	11936.4	-221
11947.5	-221.02	11952.6	-221.82	11959.6	-222.53	11967.7	-222.49	11970.9	-222.99
11981.1	-223.02	12022.1	-226	12034.8	-226	12055	-221.62	12075.4	-221
12080.4	-221.04	12096.2	-222.1	12103.5	-222.94	12107.6	-223.97	12109.8	-224
12115.7	-224	12120	-223.4	12129.6	-222.95	12144.1	-221.69	12157.3	-221.75
12163.5	-221.05	12171.2	-221	12189.5	-221.98	12208.4	-223.97	12235.6	-226
12264.9	-225.89	12279	-224.15	12283.6	-223	12308	-223	12324.1	-224
12433.8	-224	12469.6	-222.68	12480.6	-222.58	12496.5	-223	12550.9	-223.01
12560.5	-223.31	12570.7	-223.98	12582.2	-224	12591	-223.26	12598.3	-223.03
12634.9	-222.93	12645.9	-222.53	12651.7	-222	12699.7	-222	12725.7	-221.06
12732.6	-221.25	12740.2	-221.98	12773.2	-222.01	12777.7	-222.34	12787	-224.19
12792.9	-224.61	12798	-224.57	12806.8	-224	12835.6	-224	12844.7	-223.01
12851.4	-222.9	12863.8	-222.01	12894.4	-222	12915.4	-222.98	12930.5	-225.77
12930.9	-225.77	12931.8	-225.72	12932.2	-225.69	12933.3	-225.49	12939.9	-224.1
12940.1	-224.06	12940.6	-224.01	12942	-223.89	12942	-223.88	12942.1	-223.88
12942.8	-223.89	12982.3	-227	13018.9	-226.99	13054.3	-225.53	13082.5	-224.02
13108.1	-223.98	13116.8	-223.54	13123.4	-223.99	13144.5	-223.57	13150.5	-224
13170	-224	13174.6	-224.47	13185.6	-224.03	13204.7	-224	13211.7	-223
13232.3	-223	13232.4	-223.01	13232.5	-223.02	13232.8	-223.04	13233.1	-223.07
13234.2	-223.11	13234.8	-223.15	13235.3	-223.2	13235.6	-223.24	13236	-223.28
13236.2	-223.33	13236.8	-223.41	13237.1	-223.46	13238.2	-223.71	13238.3	-223.72
13238.3	-223.73	13238.4	-223.75	13239	-223.9	13239.7	-223.99	13240.2	-224
13353.8	-223.8	13494	-224	13494.2	-223.98	13494.6	-223.92	13495.2	-223.81
13497.1	-223.18	13498.6	-222.91	13498.6	-222.9	13512.6	-222	13522.7	-222.26
13522.9	-222.26	13523.5	-222.27	13523.7	-222.29	13530.4	-222.94	13539.6	-223.34
13548.4	-223.43	13560.2	-223.03	13570.3	-223	13582	-223.94	13602.5	-224.01
13650	-225.99	13666.4	-226	13682.9	-227	13723.9	-226.99	13753.2	-226
13774.1	-226	13831.2	-224.01	13874.5	-224	13890.6	-223	14009.1	-223
14050.6	-226	14093.4	-226	14111.9	-225.56	14126.8	-226	14154.6	-226
14169.2	-225.49	14182.2	-225.48	14212	-224.67	14236.9	-224.39	14267	-224.74
14272.8	-225.13	14287.8	-225.61	14307.5	-225.07	14317	-224.05	14323.6	-223.96
14339.9	-222.07	14353.5	-221	14368.6	-221	14377.7	-222.86	14380.6	-223.27
14380.9	-223.3	14381.3	-223.33	14382.1	-223.39	14382.5	-223.41	14410.6	-223.84
14429	-224.95	14465.4	-225.24	14506.4	-224.92	14518.1	-226	14593.3	-226
14607.5	-224.51	14616.5	-224.35	14621.4	-224.72	14621.9	-224.84	14623.4	-225.16
14623.5	-225.17	14624.1	-225.32	14624.6	-225.41	14624.9	-225.48	14626.2	-225.78

14627.8	-226	14859.9	-226	14886	-224.57	14898.4	-224.97	14898.8	-225.01
14899.1	-225.04	14900	-225.17	14900.5	-225.26	14901.3	-225.39	14901.6	-225.44
14902.3	-225.55	14902.8	-225.63	14903.5	-225.75	14903.6	-225.77	14904.2	-225.9
14904.6	-225.97	14915.9	-226	14916.2	-226	14916.7	-225.98	14917.3	-225.91
14923.1	-224.12	14927.6	-223	14934.7	-223	14947.3	-225.05	14956.7	-226
15338.8	-226	15356.7	-224	15374.5	-224	15396.4	-226	17673.1	-226
17729.6	-225.78								

Manning's n Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.04	8746.4	.036	9248.9	.045

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	8746.4	9248.9		5778.2	5828.6	5753.7		.1	.3

CROSS SECTION

RIVER: Alamo River

REACH: Alamo River

RS: 4195

INPUT

Description:

Station Elevation Data		num=		452					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	-235.22	277.4	-234	338.4	-234	352.2	-236	359	-234
746.8	-234	752.6	-233	757.2	-233	760.6	-233.91	765.2	-234
767.5	-233.97	773.2	-233	775.5	-233.03	781.3	-234	787	-234
790.4	-233.06	793.9	-233	799.6	-234	805.4	-234	808.8	-233
815.7	-233	821.4	-234	827.2	-234	830.6	-233.02	831.7	-233
836.3	-233	839.8	-234	845.5	-233.89	849	-233	854.7	-233
858.1	-234	863.9	-234	868.5	-233	873	-233	876.5	-234
881.1	-234	885.7	-233	897.1	-234	901.7	-233.98	904	-233.01
904.9	-233	909.8	-233	913.2	-234	917.8	-234	922.4	-233
931.6	-233	935	-234	940.7	-234	946.5	-233	951.1	-233
953.4	-233.97	959.1	-234	963.7	-233	968.4	-233.01	973.1	-233.95
978.6	-234	983.1	-233	987.8	-233.04	994.1	-234	998.1	-233.95
1001.6	-233	1010.7	-233.05	1014.2	-234	1017.6	-233.97	1019.9	-233.01
1029.1	-233	1032.5	-234	1036	-234	1039.4	-233	1049.7	-233
1053.2	-234	1056.6	-234	1060.1	-233	1069.2	-233	1072.7	-234
1075	-233.97	1078.4	-233.03	1088.8	-233	1092.2	-233.89	1094.5	-234
1095.6	-233.94	1097.9	-233.02	1115.1	-233	1122	-232	1130.1	-233
1135.8	-232.94	1138.1	-232	1273.5	-232	1279.2	-233	1317.1	-233
1321.7	-232	1337.7	-233	1364.1	-233	1371	-232	1395.1	-232.32
1405.3	-232	1407.5	-232	1411.1	-232.99	1414.6	-233	1418	-232
1421.6	-232	1437.6	-233	1439.8	-233	1444.4	-232	1453.6	-232
1457	-232.97	1458.9	-233	1462.8	-232	1762.2	-232	1821.9	-231.09
1888.5	-231	1941.2	-230.22	2108.2	-229.84	2246.9	-229	2262	-228
2277	-227.88	2389.2	-228	2423.9	-227	2456.2	-227	2522.1	-228
2612.3	-228	2629.6	-227.28	2641.3	-227.19	2656.7	-227.27	2663.4	-228

2880.5	-228	2885.2	-227	2888.5	-227.24	2892.4	-228	2895.9	-227.98
2899.1	-227.19	2902.6	-227	2904.9	-227	2910.4	-228	2912.4	-228
2916.3	-227.01	2917.6	-227	2920.3	-227	2924.5	-228	2928.3	-228
2932.5	-227	2964.2	-227	2967.6	-227.01	2972.1	-228	2982.3	-227.21
2989.6	-228	3006	-228	3012.2	-227	3019.4	-228	3071.7	-228
3075.7	-227.11	3077.7	-227	3087.6	-228	3249	-228	3254.1	-227
3256.9	-227	3260.9	-228	3295.4	-227.99	3301.2	-227	3303.4	-227.09
3306.7	-228	3356.5	-228	3360.5	-227.1	3363.1	-227	3364.9	-227.11
3368.5	-228	3827.2	-228	3846.5	-228	3869.7	-226.99	3880.6	-225.4
3903.3	-224.03	3912.1	-223.97	3920.1	-223.06	3926	-223.14	3938.1	-224
3943.6	-222.98	3953.8	-223.11	3956.1	-225.68	3959.4	-232.4	3960.6	-233.93
3984.9	-234	3995.3	-232.04	4005.7	-230.92	4010.1	-229.52	4015.3	-228.56
4016.7	-227.88	4021.1	-224.32	4023.3	-223.05	4025.3	-222.63	4035.7	-221.97
4039.4	-221.36	4051.8	-217	4061.2	-217	4062.3	-217.23	4069.3	-220.78
4073	-223.78	4076.7	-225.39	4079.7	-226	4086.9	-226	4109.4	-227
4180.5	-227.352	4242.7	-227.66	4281	-227	4312.3	-227.75	4350.3	-227.94
4440.3	-227	4826.6	-227	4833.6	-226	4841.7	-226	4842.4	-226.08
4842.7	-226.15	4842.8	-226.21	4843.4	-226.42	4844	-226.66	4846.3	-227
4854.4	-227	4858.8	-226.45	4872.9	-223.02	4879.8	-223	4890.2	-223.84
4897.2	-223.78	4922.6	-226	5141.1	-226	5150.4	-227	5302.5	-227
5348.9	-227.39	5362.3	-227	6614.3	-227	6637.3	-226	6732.2	-226
6746.1	-225.34	6755.3	-226	6800.5	-226	6821.2	-226.47	6852.9	-226.6
6889.5	-226	6969.2	-227	6997	-226.6	7019.9	-226.88	7031.7	-226
7046.9	-226	7090.7	-227	7155.4	-227	7178.5	-226.07	7200.2	-227
7399.4	-227	7405.2	-226	7414.4	-226	7419.8	-227	7762.4	-227
7780.3	-226.73	7786.3	-226.99	7820.3	-227	7845.7	-226	7864.2	-226.01
7874.4	-227	7996	-227	8003.1	-226.33	8011.1	-227	8057.3	-227
8071.3	-226.25	8090.2	-226.53	8100.1	-227	8228.5	-227	8251.9	-227.85
8270.3	-228	8280.4	-227	8326.1	-227	8340.4	-226	8412.1	-226
8438.9	-227	8535	-227	8546.4	-226	8570.8	-226.35	8583.4	-227
8595	-226.22	8613.5	-226	8700.2	-226	8718.5	-226.59	8750.3	-226
8807.9	-226	8818.9	-226.44	8862.7	-225.98	8881.7	-224	8983.5	-224
9032.1	-227.32	9057.3	-228	10054.2	-228	10078.5	-225.94	10157.9	-224.01
10209.2	-225.98	10228.6	-224.22	10259.3	-223.92	10276.2	-224	10281.3	-225.1
10292.4	-226	10312.1	-225.99	10345.8	-224.01	10368.7	-226	10393	-226.7
10403.5	-226.56	10423.5	-224.8	10437	-224.8	10442.7	-226	10543.2	-226
10598.8	-224.5	10625.9	-224.46	10700.6	-226	10713.3	-226.03	10734.1	-227
10744.4	-227.94	10769.9	-229	11262.5	-229	11282.2	-228.29	11325.3	-229
11460.6	-228.73	11558.6	-229	11678.6	-227.57	11704.3	-228	11731.9	-227
11787.5	-227	11799.1	-226.71	11808.3	-226	11830.3	-225.99	11838.1	-225.71
11900.3	-226.01	11912.7	-227	11922.2	-226.97	11932	-226	11988.7	-226
11998	-227	12025.7	-226.68	12034.8	-227	12073.1	-227	12081	-227.32
12150.6	-226.69	12157.1	-226.99	12165.6	-228	12174.6	-228	12180.6	-227
12194.2	-227	12201.5	-226	12211.9	-226.03	12216.3	-226.8	12216.5	-226.83
12217.1	-226.92	12217.6	-227	12220	-227	12233.9	-226.72	12240.8	-226.02
12246.3	-226.54	12276.6	-226.67	12292.4	-226	12327.3	-226	12335.6	-227
12355.2	-227	12364.9	-226.97	12379.4	-226.01	12397.8	-226	12440.3	-227.71
12449	-227.77	12464.3	-227	12472.4	-227.02	12475.3	-227.75	12475.5	-227.78
12485	-229	12489.9	-228.72	12514.9	-229	12521.8	-227.99	12528.8	-226
12556.5	-226.26	12581.9	-227.76	12599.7	-228.29	12643.2	-228.64	12658.2	-228

12666.2	-228	12682.9	-229	12722.6	-228.99	12739.4	-227.68	12750.4	-227.23
12761.1	-227.03	12776	-227.76	12776.1	-227.76	12776.6	-227.76	12779.6	-227.7
12779.8	-227.7	12780.4	-227.71	12780.8	-227.7	12784.1	-227.3	12786.5	-226.97
12787.7	-226.85	12787.7	-226.84	12788.4	-226.81	12788.9	-226.79	12789.7	-226.77
12790	-226.76	12790.4	-226.77	12791.2	-226.78	12791.4	-226.79	12791.7	-226.81
12792.1	-226.84	12792.3	-226.86	12792.8	-226.92	12797.2	-227.89	12800.4	-228.2
12807.4	-227.96	12823.5	-226.76	12827.2	-227.1	12827.6	-227.18	12828.2	-227.36
12828.7	-227.53	12829	-227.64	12829.3	-227.75	12829.4	-227.78	12829.6	-227.81
12830.1	-227.97	12834.5	-228.66	12847.8	-229	12961.3	-229	12978.7	-228.43
12986.1	-228.47	12992.4	-228.99	13035	-229	13044.5	-230.08	13057.1	-230.98
13057.7	-230.98	13057.8	-230.99	13058.3	-231	13058.4	-231	13059.1	-231
13060.5	-231	13064.6	-231.82	13065	-231.9	13066.4	-232	13073.3	-231.88
13077.9	-230.66	13089.5	-228.91	13104.4	-229.56	13112.5	-229.41	13133	-229.85
13181.8	-229	13670	-229	13673.7	-228.62	13682.7	-228.46	13689	-228.99
13757.8	-229	13762.5	-228	13781.9	-228	13784.9	-228.13	13787.9	-229
13845.6	-228.79	13886	-229						

Manning's n Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.04	3827.2	.036	4180.5	.045

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	3827.2	4180.5		2600	2571.8	2600		.1	.3

CROSS SECTION

RIVER: Alamo River

REACH: Alamo River RS: 1623

INPUT

Description:

Station Elevation Data		num=		452					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	-235.59	97.5	-234.78	142.9	-234	298.1	-234	330.3	-233.82
367.4	-233	409.1	-233	492	-232.12	545.2	-232	557.9	-231.51
582.2	-231.09	829.1	-231	859.5	-229.52	870.3	-229.59	915.3	-231
922.5	-231	935.4	-231.99	945.5	-232.01	963	-233.98	973.8	-234
1003.3	-232	1019.2	-232	1023.9	-231.71	1035.1	-231.86	1116	-231.03
1142.8	-230.2	1150	-230.32	1153.6	-230.22	1164.8	-230.99	1188.7	-231
1246.2	-230.06	1277	-229	1332.3	-229	1341.4	-228.03	1363	-228
1379.9	-228.03	1389	-228.49	1395.2	-229	1474.5	-229	1669.8	-229
1679.7	-231.51	1683	-232.62	1685.4	-233.94	1725.9	-234	1731.3	-233.04
1746	-231.99	1755.1	-228.69	1759.1	-227.66	1762.9	-227	1774.9	-227.01
1786.6	-227.97	1876.2	-228.18	1891.9	-228	1962.3	-228	1986.2	-228.28
2015.1	-228.34	2024.9	-228.047	2026.5	-228	2050.4	-228	2071.3	-228.81
2110.3	-229	2181.9	-229	2235.7	-230.66	2249.4	-230.95	2251.2	-231.16
2256	-232.48	2258.6	-233	2275.8	-232.99	2310.9	-231.96	2324.1	-230.63
2334.8	-230.26	2344.5	-229.57	2359.9	-229.24	2363.5	-229	2503.1	-229
2644	-230.44	2660.2	-230.37	2700	-231	3279.5	-231	3307.7	-232

3358	-232	3391.5	-231	3403.3	-231	3442.7	-232	3463.1	-232
3486.9	-231.28	3499.7	-231.22	3522.7	-231.28	3544	-232	3706.6	-232
3752.3	-232.14	3770.6	-232	3896.9	-232	3926.2	-231.12	3929.8	-231.16
3938.2	-232	3970.4	-232	3979	-232.16	3986.6	-232	4015.8	-232
4028.8	-232.39	4032.5	-232.65	4040.4	-232.27	4044.7	-232.35	4050.4	-232.13
4059.9	-232.62	4068.6	-232.57	4076.7	-233	4101.3	-232.99	4125.8	-232
4158.9	-232	4175.8	-233	4252.2	-232.97	4314.2	-232.22	4319	-232
4356.2	-232.21	4360.8	-232	4424.2	-232	4439.6	-233	4738.4	-233
4752.2	-232.64	4759.6	-232.69	4771	-232.01	4858.7	-232	4883.9	-232.15
4890.7	-232.01	4907.5	-232	4911.2	-231.56	4918.2	-231.41	4929.1	-232
4984.9	-232	5000.7	-232.19	5016.2	-232	5041.1	-232	5055.6	-232.16
5065.2	-232	5086.7	-232.72	5117.7	-233	5324.8	-233.16	5337.5	-233
5368.4	-233	5403.2	-232.32	5458.2	-232	5499.8	-232	5513.4	-231
5561.8	-231	5570.2	-231.88	5579.6	-232	5717	-232	5729	-231.27
5742.1	-231.22	5769.7	-231.53	5780.3	-232	5805	-232	5814.9	-232.17
5825.2	-231.88	5825.7	-231.89	5826	-231.9	5826.4	-231.92	5826.7	-231.94
5833.2	-232.84	5835.2	-232.97	5840	-233	5840.4	-232.99	5841	-233
5841.1	-233	5843.6	-232.98	5847.2	-232.83	5892.3	-233	5918.8	-232
6006.3	-232	6036.3	-232.6	6097.7	-232.4	6131.3	-232.72	6165.1	-232.81
6350.6	-232.37	6374.9	-232.5	6431.5	-232.36	6537	-232.59	6615.8	-232.28
6642.9	-232	6761.7	-231.84	6792.1	-231.26	6830.9	-232	6885.8	-232
6917.4	-231	6946.7	-231	6987	-231.59	7033.4	-231.46	7053	-231.56
7118.4	-231	7128.1	-231.21	7138.9	-231.16	7239.2	-232	7527	-232
7759.8	-231	7854.3	-228.99	7875.3	-226	7885.1	-224.86	7887.6	-224.41
7887.7	-224.39	7888.3	-224.3	7888.7	-224.22	7889	-224.17	7889.5	-224.09
7889.7	-224.06	7889.9	-224.02	7890.6	-223.82	7891.1	-223.69	7891.2	-223.66
7891.3	-223.62	7892.6	-223.23	7893.2	-223.06	7893.4	-223.01	7907.1	-222.94
7915	-222	7931.7	-221	7968.7	-218.05	7979.9	-217	7991.4	-215.41
8006.7	-213.98	8006.8	-213.96	8006.9	-213.95	8007.3	-213.9	8007.5	-213.88
8008.1	-213.81	8008.2	-213.77	8008.5	-213.72	8011.7	-213.02	8011.9	-213.01
8012.1	-213	8012.6	-213	8013.3	-213	8014	-213	8014.1	-213
8039.1	-211.06	8054.2	-209.05	8072.6	-207.81	8078.3	-207.03	8078.5	-207
8082.1	-206.35	8090.9	-205.39	8103.6	-203.69	8110.9	-202.97	8116.5	-202.05
8120.2	-201.09	8125.1	-200.34	8130.9	-198.95	8133.4	-198.55	8134	-198.5
8134.3	-198.46	8134.6	-198.42	8134.7	-198.42	8134.8	-198.42	8135.4	-198.39
8135.8	-198.36	8136.1	-198.34	8136.6	-198.33	8143.4	-198.85	8143.9	-198.83
8144.1	-198.83	8144.2	-198.82	8144.6	-198.78	8144.8	-198.77	8146.3	-198.64
8151.3	-198.06	8159.3	-197.98	8162.9	-197.7	8163.3	-197.66	8163.6	-197.63
8164.1	-197.57	8164.3	-197.55	8164.5	-197.54	8165.1	-197.47	8165.2	-197.44
8165.7	-197.39	8168.7	-196.84	8169.3	-196.74	8180.6	-195.58	8188.2	-194.47
8202.6	-192.07	8209.1	-191.91	8250.4	-190.11	8280.3	-189.42	8286.3	-189.64
8297	-190.99	8303.1	-191.34	8309.4	-191.97	8310.3	-192.07	8312.8	-192.52
8316.1	-192.88	8321.1	-193.29	8321.5	-193.29	8321.9	-193.29	8324.5	-193.78
8330.4	-195.92	8338.8	-197.57	8344.8	-198.98	8352.6	-202.34	8356.3	-203.68
8356.7	-203.86	8357.3	-204.15	8357.4	-204.25	8357.9	-204.48	8358	-204.53
8359.1	-205.19	8360	-205.72	8360.2	-205.84	8360.3	-205.91	8360.9	-206.19
8361.5	-206.44	8361.6	-206.49	8362.3	-206.81	8365.9	-208.02	8371.2	-209.04
8381.8	-211.84	8383.3	-212.17	8384	-212.32	8384.2	-212.36	8384.9	-212.51
8386.2	-212.75	8386.5	-212.82	8386.9	-212.88	8387.4	-212.97	8387.6	-213.02
8387.7	-213.05	8388.3	-213.23	8388.9	-213.39	8389.1	-213.44	8396.1	-215.92

8403.9	-217.95	8409.4	-219.69	8413	-220.92	8413.6	-221.08	8415.1	-221.47
8416.4	-221.82	8416.5	-221.86	8416.7	-221.92	8422.3	-224.28	8427.1	-225.93
8427.4	-225.99	8427.7	-226.06	8433.1	-226.97	8438.9	-227.78	8439.1	-227.79
8439.6	-227.87	8440.3	-227.96	8440.4	-227.97	8442.3	-228.14	8455.5	-229.12
8488	-231	8678.1	-233	8755.4	-233.28	8923.8	-233	9681.1	-233
9682.5	-233.01	9683.1	-233.01	9683.2	-233.02	9684	-233.06	9684.3	-233.08
9684.7	-233.09	9685.3	-233.12	9685.4	-233.12	9685.5	-233.12	9686.1	-233.16
9686.7	-233.2	9687.1	-233.22	9687.6	-233.25	9689	-233.31	9689.2	-233.32
9689.8	-233.35	9690.3	-233.38	9690.8	-233.42	9691.2	-233.46	9691.4	-233.48
9691.9	-233.52	9695	-233.81	9695.5	-233.86	9696.1	-233.92	9696.2	-233.94
9696.3	-233.94	9697	-233.98	9697.4	-234	9697.7	-234	9698.4	-234
9699.5	-234	9699.9	-234	9700	-234	9700.6	-234	9701	-234
9701.3	-234	9701.8	-234	9702.8	-233.99	9703.4	-233.97	9703.5	-233.95
9703.6	-233.91	9704.2	-233.74	9704.9	-233.54	9705.5	-233.39	9705.6	-233.33
9705.8	-233.3	9707	-232.93	9707.1	-232.83	9709.3	-230.69	9709.4	-230.61
9709.8	-230.26	9710.9	-229.38	9711.4	-229.11	9711.7	-229	9741.6	-229.12
9741.8	-229.1	9742.1	-229.07	9742.5	-229.03	9742.8	-229.02	9743.2	-229.01
9744	-229	9780.5	-229	9780.8	-229.02	9781	-229.04	9781.5	-229.09
9781.9	-229.12	9782.2	-229.15	9782.3	-229.16	9783	-229.22	9783.4	-229.26
9783.7	-229.28	9784.2	-229.33	9784.6	-229.36	9785.1	-229.36	9785.3	-229.33
9785.9	-229.28	9786	-229.26	9786.6	-229.18	9787	-229.12	9787.3	-229.08
9788.2	-229	9812	-229	9824	-230.04	9830.7	-229.49	9832.1	-229.31
9832.3	-229.28	9832.8	-229.23	9833.4	-229.18	9833.5	-229.16	9833.6	-229.15
9835	-229.01	9858.1	-229	9859.2	-229	9859.6	-229	9859.8	-229
9860.3	-229.12	9860.8	-229.26						

Manning's n Values		num=	3		
Sta	n Val	Sta	n Val	Sta	n Val
0	.04	1474.5	.036	2024.9	.045

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
	1474.5	2024.9		.1	.3

SUMMARY OF MANNING'S N VALUES

River:Alamo River

Reach	River Sta.	n1	n2	n3
Alamo River	37000	.045	.036	.045
Alamo River	36071	.045	.036	.045
Alamo River	34926	.045	.036	.045
Alamo River	33520	.045	.036	.045
Alamo River	32581	.045	.036	.045
Alamo River	31366	.045	.036	.045
Alamo River	30072	.045	.036	.045
Alamo River	28816	.045	.036	.045
Alamo River	25128	.045	.036	.045

Alamo River	22693	.045	.036	.045
Alamo River	19983	.045	.036	.045
Alamo River	16662	.045	.036	.045
Alamo River	13897	.04	.036	.045
Alamo River	10023	.04	.036	.045
Alamo River	4195	.04	.036	.045
Alamo River	1623	.04	.036	.045

SUMMARY OF REACH LENGTHS

River: Alamo River

Reach	River Sta.	Left	Channel	Right
Alamo River	37000	952	929.5	971.1
Alamo River	36071	1189.4	1144.6	1141.6
Alamo River	34926	1203	1406.4	1411.4
Alamo River	33520	1084.3	938.9	614.4
Alamo River	32581	1364.6	1215	938.9
Alamo River	31366	1527.4	1294	992.5
Alamo River	30072	1393.8	1255.7	1008.8
Alamo River	28816	2027.8	3687.7	3404.1
Alamo River	25128	2183	2435.1	2561.2
Alamo River	22693	2512.2	2709.9	2712.4
Alamo River	19983	2806.8	3320.8	3045.6
Alamo River	16662	2588.9	2765.6	2982.9
Alamo River	13897	3025.4	3873.6	4625.3
Alamo River	10023	5778.2	5828.6	5753.7
Alamo River	4195	2600	2571.8	2600
Alamo River	1623			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: Alamo River

Reach	River Sta.	Contr.	Expan.
Alamo River	37000	.1	.3
Alamo River	36071	.1	.3
Alamo River	34926	.1	.3
Alamo River	33520	.1	.3
Alamo River	32581	.1	.3
Alamo River	31366	.1	.3
Alamo River	30072	.1	.3

Alamo River	28816	.1	.3
Alamo River	25128	.1	.3
Alamo River	22693	.1	.3
Alamo River	19983	.1	.3
Alamo River	16662	.1	.3
Alamo River	13897	.1	.3
Alamo River	10023	.1	.3
Alamo River	4195	.1	.3
Alamo River	1623	.1	.3

APPENDIX C (MT-2 Forms)

DEPARTMENT OF HOMELAND SECURITY
Federal Emergency Management Agency
OVERVIEW & CONCURRENCE FORM

OMB Control Number: 1660-0016
Expiration: 1/31/2024

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless it displays a valid OMB control number. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington, DC 20472 , Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

A. REQUESTED RESPONSE FROM DHS-FEMA

This request is for a (check one):

☐ CLOMR: A letter from DHS-FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60, 65 & 72). All CLOMRs require documentation of compliance with the Endangered Species Act. Refer to the Instructions for details.

☒ LOMR: A letter from DHS-FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See 44 CFR Ch. 1, Parts 60, 65 & 72).

B. OVERVIEW

1. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
060065	Imperial County	CA	06025C	0700C	09-26-2008
060065	Imperial County	CA	06025C	0725C	09-26-2008

2. a. Flooding Source:

b. Types of Flooding: ☐ Riverine ☐ Coastal ☐ Shallow Flooding (e.g., Zones AO and AH)
☐ Alluvial Fan ☐ Lakes ☐ Other (Attach Description)

3. Project Name/Identifier:

4. FEMA zone designations (choices: A, AH, AO, A1-A30, A99, AE, AR, V, V1-V30, VE, B, C, D, X)

a. Effective:

b. Revised:

5. Basis for Request and Type of Revision:

a. The basis for this revision request is (check all that apply)

- | | | | |
|--|--|---|---|
| ☐ Physical Change | ☐ Improved Methodology/Data | ☐ Regulatory Floodway Revision | ☐ Base Map Changes |
| ☐ Coastal Analysis | ☒ Hydraulic Analysis | ☐ Hydrologic Analysis | ☐ Corrections |
| ☐ Weir-Dam Changes | ☐ Levee Certification | ☐ Alluvial Fan Analysis | ☐ Natural Changes |
| ☒ New Topographic Data | ☐ Other (Attach Description) | | |

Note: A photograph and narrative description of the area of concern is not required, but is very helpful during review.

b. The area of revision encompasses the following structures (check all that apply)

- Structures:
- | | | |
|---|--|---|
| ☐ Channelization | ☐ Levee/Floodwall | ☐ Bridge/Culvert |
| ☐ Dam | ☐ Fill | ☐ Other (Attach Description) |

6. ☐ Documentation of ESA compliance is submitted (required to initiate CLOMR review). Please refer to the instructions for more information.

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☐ Yes Fee amount: \$ _____
☒ No, Attach Explanation

- Please see the DHS-FEMA Web site at <http://www.fema.gov/forms-documents-and-software/flood-map-related-fees> for Fee Amounts and Exemptions.

D. SIGNATURES

1. REQUESTOR'S SIGNATURE

All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Massoud Rezakhani	Company: MRC LCC	
Mailing Address: 29830 N. 78th Way Scottsdale, AZ 85266	Daytime Telephone: 602-317-4303	Fax No.: 480-656-2304
	E-mail Address: mrezakhani@mrcllc.net	
	Date: 3/17/2023	

Signature of Requestor (required): *massoud rezakhani*

2. COMMUNITY CONCURRENCE

As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision (LOMR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirements for when fill is placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. For Conditional LOMR requests, the applicant has documented Endangered Species Act (ESA) compliance to FEMA prior to FEMA's review of the Conditional LOMR application. For LOMR requests, I acknowledge that compliance with Sections 9 and 10 of the ESA has been achieved independently of FEMA's process. For actions authorized, funded, or being carried out by Federal or State agencies, documentation from the agency showing its compliance with Section 7(a)(2) of the ESA will be submitted. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title: Jim Minnick - Planning & Development Services Director

Mailing Address: 801 Main St El Centro, CA 92243	Community Name: Imperial County Planning and Development	
	Daytime Telephone: 442-265-1736	Fax No.:
	E-mail Address: jimminnick@co.imperial.ca.us	

Community Official's Signature (required): _____ Date: _____

3. CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is to be signed and sealed by a licensed land surveyor, registered professional engineer, or architect authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.2(b) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: Ibrahim Osman	License No.: C69825	Expiration Date: 6/30/2024	
Company Name: MRC, LLC	Mailing Address: 29830 N. 78th Way Scottsdale, AZ 85266		
Telephone No.: 480-513-7263			Fax No.:
E-mail Address: ibrahimosman@mrcllc.com			
Signature: <i>Ibrahim M. Osman</i>		Date: 3/25/2023	

Ensure the forms that are appropriate to your revision request are included in your submittal.

Form Name and (Number)**Required if ...**

- | | |
|--|---|
| ☐ Riverine Hydrology and Hydraulics Form (Form 2) | New or revised discharges or water-surface elevations |
| ☐ Riverine Structures Form (Form 3) | Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam |
| ☐ Coastal Analysis Form (Form 4) | New or revised coastal elevations |
| ☐ Coastal Structures Form (Form 5) | Addition/revision of coastal structure |
| ☐ Alluvial Fan Flooding Form (Form 6) | Flood control measures on alluvial fans |



DEPARTMENT OF HOMELAND SECURITY
Federal Emergency Management Agency
RIVERINE HYDROLOGY & HYDRAULICS FORM (FORM 2)

OMB Control Number: 1660-0016
Expiration: 1/31/2024

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 3.5 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless it displays a valid OMB control number. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington, DC 20472 , Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

Flooding Source: Alamo River

Note: Fill out one form for each flooding source studied

A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply):

- | | | |
|---|--|--|
| ☒ Not revised (skip to section B) | ☐ No existing analysis | ☐ Improved data |
| ☐ Alternative methodology | ☐ Proposed Conditions (CLOMR) | ☐ Changed physical condition of watershed |

2. Comparison of Representative 1%-Annual-Chance Discharges

Location	Drainage Area (Sq. Mi.)	Effective/FIS (cfs)	Revised (cfs)
----------	-------------------------	---------------------	---------------

3. Methodology for New Hydrologic Analysis (check all that apply)

- ☐ Precipitation/Runoff Model → Specify Model: _____ Duration: _____ Rainfall Amount: _____
- ☐ Statistical Analysis of Gage Records
- ☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters), and documentation to support the new analysis.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Is the hydrology for the revised flooding source(s) affected by sediment transport? ☐ Yes ☒ No

If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation.

B. HYDRAULICS1. Reach to be Revised

	Description	Cross Section	Water-Surface Elevation (ft.)	
			Effective	Proposed/Revised
Downstream Limit*	Salton Sea Mouth	37000.00	A (No Elevation)	A (-209.09 ft)
Upstream Limit*	Approx 2000 ft upstream of the mouth	1623	A (No Elevation)	A (-231.67 ft)

*Proposed/Revised elevations must tie-into the Effective elevations within 0.5 foot at the downstream and upstream limits of revision.

2. Hydraulic Method/Model Used: HEC-RAS

☐ Steady State ☒ Unsteady State ☒ One-Dimensional ☐ Two-Dimensional

3. Pre-Submittal Review of Hydraulic Models*

DHS-FEMA has developed two review programs, CHECK-2 and CHECK-RAS, to aid in the review of HEC-2 and HEC-RAS hydraulic models, respectively. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS.

4. HEC-RAS File Description**:

Models Submitted	Natural Run		Floodway Run		Datum
Duplicate Effective Model*	File Name:	Plan Name:	File Name:	Plan Name:	
Corrected Effective Model*	File Name:	Plan Name:	File Name:	Plan Name:	
	AlamoCreek.prj	AlamoRiver			
Existing or Pre-Project Conditions Model	File Name:	Plan Name:	File Name:	Plan Name:	
Revised or Post-Project Conditions Model	File Name:	Plan Name:	File Name:	Plan Name:	
Other - (attach description)	File Name:	Plan Name:	File Name:	Plan Name:	

* For details, refer to the corresponding section of the instructions.

**See instructions for information about modeling other than HEC-RAS. ☐ Digital Models Submitted? (Required)

C. MAPPING REQUIREMENTS

A **certified topographic work map** must be submitted showing the following information (where applicable): the boundaries of the effective, existing, and proposed conditions 1%-annual-chance floodplain (for approximate Zone A revisions) or the boundaries of the 1%- and 0.2%-annual-chance floodplains and regulatory floodway (for detailed Zone AE, AO, and AH revisions); location and alignment of all cross sections with stationing control indicated; stream, road, and other alignments (e.g., dams, levees, etc.); current community easements and boundaries; boundaries of the requester's property; certification of a registered professional engineer registered in the subject State; location and description of reference marks; and the referenced vertical datum (NGVD, NAVD, etc.).

Topographic Information:

☒ Digital Mapping (GIS/CADD) Data Submitted (preferred)

Source: Keystone Aerial Surveys

Date: May 13, 2022

Vertical Datum: NAD 1983 and NAVD(88)

Spatial Projection: State Plane Coordinate System - Zone

Accuracy: 1 ft

Note that the boundaries of the existing or proposed conditions floodplains and regulatory floodway to be shown on the revised FIRM and/or FBFM must tie-in with the effective floodplain and regulatory floodway boundaries. Please attach a **copy of the effective FIRM and/or FBFM**, at the same scale as the original, annotated to show the boundaries of the revised 1%-and 0.2%-annual-chance floodplains and regulatory floodway that tie-in with the boundaries of the effective 1%-and 0.2%-annual-chance floodplain and regulatory floodway at the upstream and downstream limits of the area on revision.

☒ Annotated FIRM and/or FBFM (Required)

D. COMMON REGULATORY REQUIREMENTS*

1. For LOMR/CLOMR requests, do Base Flood Elevations (BFEs) or Special Flood Hazard Areas (SFHAs) increase compared to the effective BFEs? ☐ Yes ☒ No

If Yes, please attach **proof of property owner notification**. Examples of property owner notifications can be found in the MT-2 Form 2 Instructions.

2. For CLOMR requests, if either of the following is true, please submit **evidence of compliance with Section 65.12 of the NFIP regulations**:

- The proposed project encroaches upon a regulatory floodway and would result in increases above 0.00 foot compared to pre-project conditions.
- The proposed project encroaches upon a SFHA with or without BFEs established and would result in increases above 1.00 foot compared to pre-project conditions.

3. Does the request involve the placement or proposed placement of fill? ☐ Yes ☒ No

If Yes, the community must be able to certify that the area to be removed from the special flood hazard area, to include any structures or proposed structures, meets all of the standards of the local floodplain ordinances, and is reasonably safe from flooding in accordance with the NFIP regulations set forth at 44 CFR 60.3(A)(3), 65.5(a)(4), and 65.6(a)(14). Please see the MT-2 instructions for more information.

4. Does the request involve the placement or proposed placement of fill? ☐ Yes ☒ No

If Yes, attach **evidence of regulatory floodway revision notification**. As per Paragraph 65.7(b)(1) of the NFIP Regulations, notification is required for requests involving revisions to the regulatory floodway Elements and examples of regulatory floodway revision notification can be found in the MT-2 Form 2 Instructions.

5. For CLOMR requests, please submit documentation to FEMA and the community to show that you have complied with Sections 9 and 10 of the Endangered Species Act (ESA). For actions authorized, funded, or being carried out by Federal or State agencies, please submit documentation from the agency showing its compliance with Section 7(a)(2) of the ESA. Please see the MT-2 instructions for more detail.

EXHIBITS

EXHIBIT 1 (Existing FEMA FIRM Panel)

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' NAVD 88. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations shown in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11. The **horizontal datum** was NAD 83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. Base flood elevations shown on this FIRM may be converted to the Imperial County datum, in NAVD88, by adding 1000 feet. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NNGS12
National Geodetic Survey
SSAC-3 #202
1315 East-West Highway
Silver Springs, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1992 or later. Additional information was provided by the USDA from photography dated 2004.

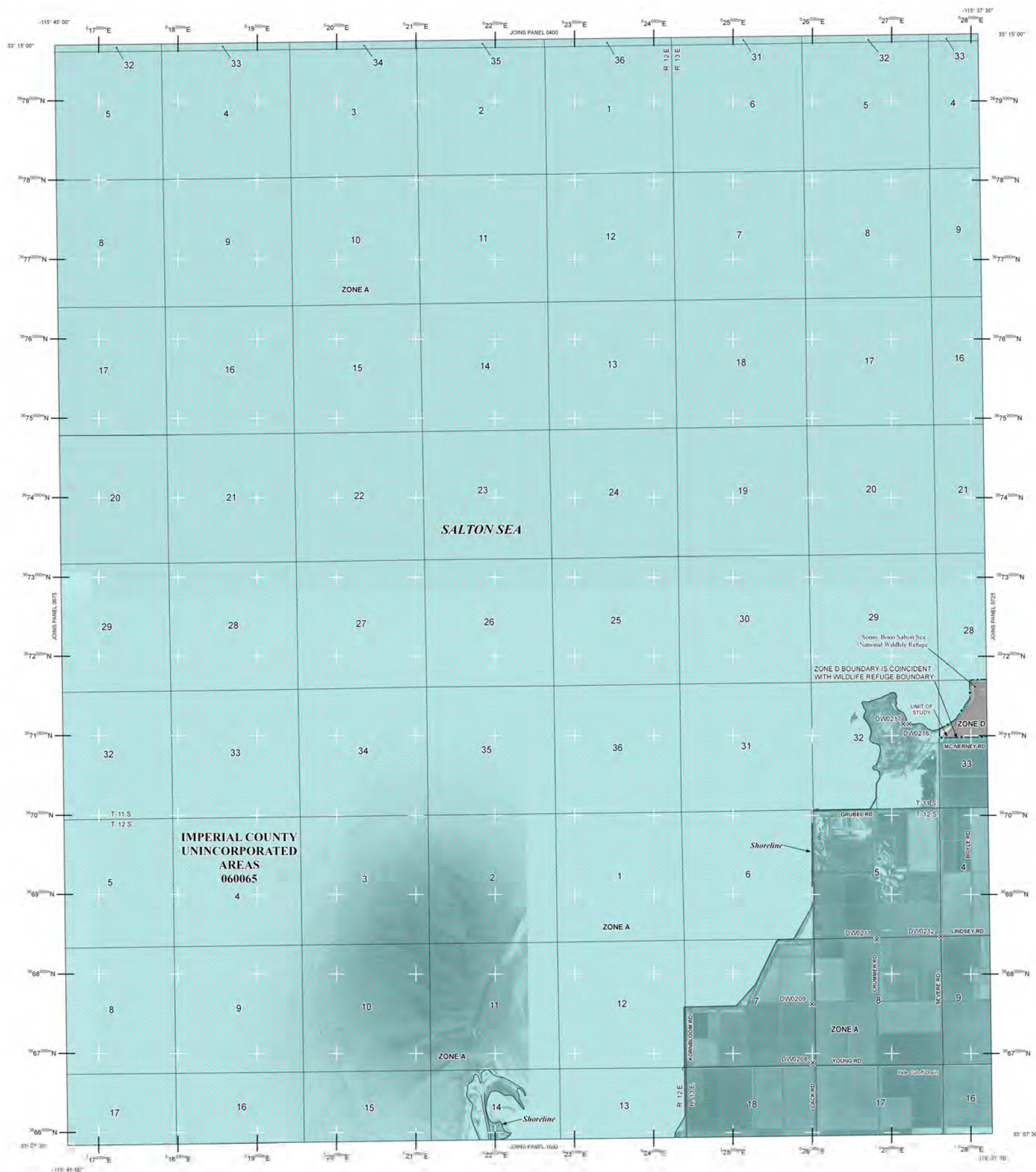
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, an accompanying Flood Insurance Study Report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://www.msc.fema.gov>.

If you have questions about this map or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov>.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No base flood elevations determined.
- ZONE AE** Base flood elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
- ZONE AO** Flood depths of 3 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of sheet flow flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no base flood elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D** Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

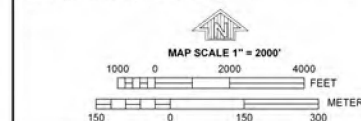
- Cross section line
- Transect line
- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 1000-meter Universal Transverse Mercator grid values, zone 11
- 5000-foot grid (feet): California State Plane coordinate system, VI zone (FIPSZONE 0406), Lambert Conformal Conic
- Bench mark (see explanation in Notes to Users section of this FIRM panel)
- River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0700C

FIRM

FLOOD INSURANCE RATE MAP

IMPERIAL COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 700 OF 2300
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:
 COMMUNITY: IMPERIAL COUNTY
 UNINCORPORATED AREAS 060065

NUMBER PANEL SUFFIX
 0700 C

Notice to User: The **Map Number** shown below should be used when placing map orders. The **Community Number** shown above should be used on insurance applications for the subject.

MAP NUMBER
06025C0700C

EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

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Coastal Base Flood Elevations shown on this map apply only landward of 0.0' NAVD 88. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations shown in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11. The **horizontal datum** was NAD 83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. Base flood elevations shown on this FIRM may be converted to the Imperial County datum, in NAVD88, by adding 1000 feet. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NUNGS12
National Geodetic Survey
SSMC-3 #9202
1315 East-West Highway
Silver Springs, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1992 or later.

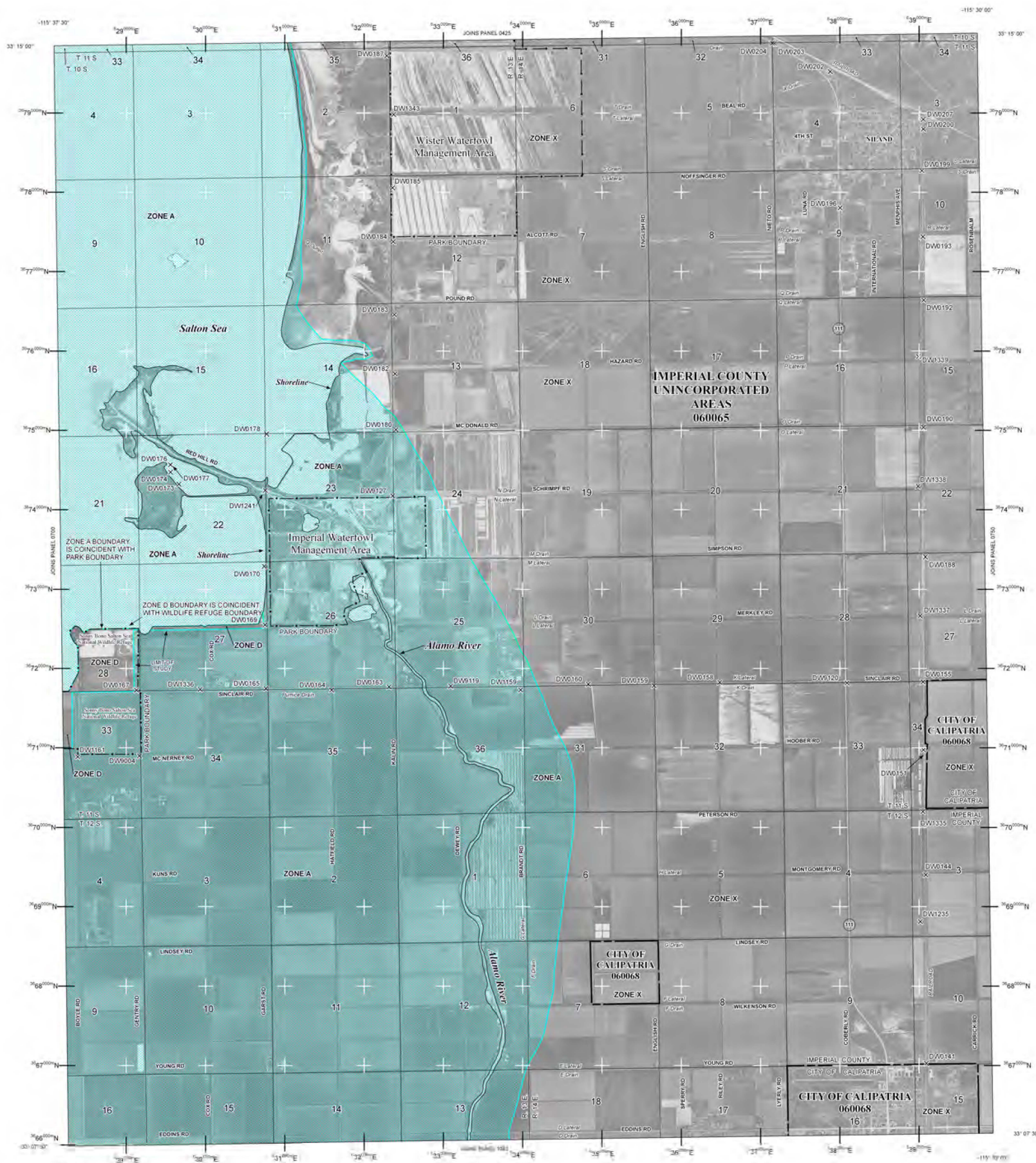
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, an accompanying Flood Insurance Study Report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://www.msc.fema.gov>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov>.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No base flood elevations determined.
- ZONE AE** Base flood elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of unusual fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently deteriorated. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no base flood elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D** Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- Cross section line
- Transect line
- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 1000-meter Universal Transverse Mercator grid values, zone 11
- 5000-foot grid (NAD 83)
- 5000-foot grid (NAD 83)
- VI zone (FIPSZONE 0406), Lambert Conformal Conic
- Bench mark (see explanation in Notes to Users section of this FIRM panel)
- DX5510 x
- M1.5

- MAP REPOSITORY
- Refer to listing of Map Repositories on Map Index
- EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
- September 26, 2008
- EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction. To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



NFIP

PANEL 0725C

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
IMPERIAL COUNTY,
CALIFORNIA
AND INCORPORATED AREAS

PANEL 725 OF 2300
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
IMPERIAL COUNTY	060065	0725	C
UNINCORPORATED AREAS	060068	0725	C
CALIPATRIA, CITY OF	060068	0725	C

Notice to User: The Map Number shown below should be used when placing map orders. The Community Number shown above should be used on insurance applications for the insured.



MAP NUMBER
06025C0725C

EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency

EXHIBIT 2

(Topographic Map)

(digital file only)

EXHIBIT 3 (Work Map)